

Appendix 1. Survey instrument

<Insert survey number ID>

PART I: QUESTIONS ABOUT YOUR LAND USE PLAN, IF ONE EXISTS

1. Has your county or municipality developed a land use plan?
 No → Please skip to PART II, in the middle of next page
 Yes → What is the title of the plan? _____

2. In what year was the plan developed? _____

3. Has the plan been officially adopted? No Yes If Yes, in what year was the plan adopted? _____

4. Who developed the plan? (Check all that apply)
 Municipal or county planning department Council of Government/ Regional Planning Agency Multiple planning agencies Consultant Other (Please specify below)
 Other: _____

5. Has the plan been updated? Yes No
 a. If Yes, in what year was the last update prepared? _____

6. What time horizon is used in the future land use plan? (Check one)
 20 years 10 years 5 years Other _____

7. What land use categories or types are designated by the future land use plan? (Check all that apply)
 Residential Commercial Industrial Public Open space Mixed-use
 Farmland preservation/agricultural Residential & commercial Other (Please specify below)
 Other: _____

8. Does the future land use plan include specific transportation improvements? No Yes
 a. If Yes, what improvements are included?

Collector streets <input type="checkbox"/>	Transit routes <input type="checkbox"/>
Sidewalks <input type="checkbox"/>	Safety <input type="checkbox"/>
Bicycle paths <input type="checkbox"/>	Pedestrian ways <input type="checkbox"/>
Highways <input type="checkbox"/>	Connectivity improvement plan <input type="checkbox"/>
Greenways <input type="checkbox"/>	Driveway consolidation/ Access management <input type="checkbox"/>

9. Does the future land use plan account for the land development impacts created by transportation improvements? (Check one)


Does not account <input type="checkbox"/>	Only for certain transportation improvements <input type="checkbox"/>	For most transportation improvements <input type="checkbox"/>	For all transportation improvements <input type="checkbox"/>
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10. Does the future land use plan account for the transportation impacts of land development? (Check one)

Does not account <input type="checkbox"/>	Only for certain development projects <input type="checkbox"/>	For most development projects <input type="checkbox"/>	For all development projects <input type="checkbox"/>
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11. What other infrastructure improvements are included in the future land use plan? (Check all that apply)

Major sanitary sewer lines <input type="checkbox"/>	Major storm water drainage facilities <input type="checkbox"/>	School facilities <input type="checkbox"/>	Water and wastewater treatment plants <input type="checkbox"/>	No improvements included <input type="checkbox"/>
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12. When making decisions on development proposals and infrastructure funding, how important is the land use plan for elected officials?

Not important Of little importance Somewhat important Very important

13. Which of the following are used to implement your community's land use plan? (Check all that apply)

- | | | | |
|---|--------------------------|----------------------------|--------------------------|
| a. Zoning ordinance/subdivision regulations | <input type="checkbox"/> | g. Impact fees | <input type="checkbox"/> |
| b. Transfer/purchase of development rights | <input type="checkbox"/> | i. Support of land trusts | <input type="checkbox"/> |
| c. Capital improvement program | <input type="checkbox"/> | j. Site design guidelines | <input type="checkbox"/> |
| d. Designated growth areas | <input type="checkbox"/> | k. Local impact assessment | <input type="checkbox"/> |
| e. Concurrency requirements | <input type="checkbox"/> | l. Other: _____ | <input type="checkbox"/> |
| f. Planned unit developments | <input type="checkbox"/> | _____ | |

PART II: QUESTIONS ABOUT YOU AND YOUR PLANNING TEAM

14. Please tell us how familiar you and your staff are with:

a. The State Transportation Improvements Program (STIP) as it affects your jurisdiction? (Check one)
 Unfamiliar Somewhat unfamiliar Somewhat familiar Familiar

b. Where and when such transportation improvements will happen? (Check one)
 Unfamiliar Somewhat unfamiliar Somewhat familiar Familiar

c. What effect do you anticipate these improvements will have on future land development? (Check one)
 No effect Support new growth Redirect growth from other places Initiate major new growth

15. About how much interaction do you and your staff have with the local RPO or MPO that prepares/coordinates transportation planning for your area? (Check one)
 None Limited Periodic Frequent

16. About how much interaction did you and your staff have with the NC Department of Transportation staff, including division staff, when your land use plan was developed or last updated? (Check one)
 None Limited Periodic Frequent

17. What is the official title of your current position? _____

18. How long have you been in your current position? _____ (years)

PART III: OPINIONS ABOUT TRANSPORTATION AND LAND USE

In the following set of questions, please check the box that best fills-in the blank space in the sentence.

19. Land use plans _____ should consider planned transportation infrastructure improvements
 Never Rarely Sometimes Usually Always

20. Transportation plans _____ should take future land use changes into account
 Never Rarely Sometimes Usually Always



21. Receiving funding for, or learning about a major highway project unanticipated by you or your staff _____ requires a revision or update of the land use plan
 Never Rarely Sometimes Usually Always

PART IV: QUESTIONS ABOUT TRANSPORTATION PLANS IN YOUR COMMUNITY

22. Which of the following are present in your area's transportation/thoroughfare plan and have been implemented (or are being implemented)? (Check all that apply)"

	<u>Present</u>	<u>Implemented</u>		<u>Present</u>	<u>Implemented</u>
a. Road improvements	<input type="checkbox"/>	<input type="checkbox"/>	d. Greenway plan	<input type="checkbox"/>	<input type="checkbox"/>
b. Transit routes	<input type="checkbox"/>	<input type="checkbox"/>	e. Bicycle plan	<input type="checkbox"/>	<input type="checkbox"/>
c. Pedestrian/sidewalk plan	<input type="checkbox"/>	<input type="checkbox"/>	f. Other (Please specify below)	<input type="checkbox"/>	<input type="checkbox"/>
			Other: _____		

23. Which of the following pedestrian- or bicycle-oriented projects are currently funded in your community? (Check all that apply)

a. Sidewalk improvements	<input type="checkbox"/>	g. Pedestrian signal enhancements	<input type="checkbox"/>
b. Rails-to-trails project	<input type="checkbox"/>	h. Pedestrian crossing pavement markings	<input type="checkbox"/>
c. Bicycle lanes	<input type="checkbox"/>	i. Safe routes to schools	<input type="checkbox"/>
d. Bicycle route signage	<input type="checkbox"/>	j. Traffic calming	<input type="checkbox"/>
e. Multi-use pathway	<input type="checkbox"/>	k. No projects funded	<input type="checkbox"/>
f. Greenway	<input type="checkbox"/>	l. Other: _____	<input type="checkbox"/>

24. If you have any additional comments regarding the questions asked in this survey, please check the box below and write these comments on the back of this sheet.

Yes, I have additional comments

THANK YOU VERY MUCH FOR YOUR COOPERATION!

If you have any concerns about this survey or the information that it contains you may contact Professor Daniel Rodríguez at 919-962-4763 (email: danrod@unc.edu) or Dr. Barbara Goldman, Chair of the Academic Affairs Institutional Review Board at the University of North Carolina at Chapel Hill. Dr. Goldman can be reached at (919)-962-7761 or via mail at the Academic Affairs IRB, Campus Box 3378, 6th Floor Bank of American Ctr., University of North Carolina, Chapel Hill, NC 27599-3378.



Appendix 2. Protocol for plan content analysis

Evaluator name & date

	Variable Description	Variable Key	Value	Notes
1	General Information			
1.1	Place name			
1.2	Place type	1 = county; 2 = municipality		
1.3	Name of Plan			
1.4	Date of development	Year; 0 = No date found		
1.5	Date adopted	Year; or n/a = not formally adopted		
1.6	Date of latest update	Year; 0 = No date found		
1.7	Time Horizon	Years; 0 = No time horizon found		
1.8	Approximate page length (incl. appendices)			
1.9	Consultant(s) used			
2	Plan components/presentation			
2.1	Table of contents provided?	1 = Yes; 0 = No		
2.2	Glossary of terms provided?	1 = Yes; 0 = No		
2.3	Executive summary provided?	1 = Yes; 0 = No		
2.4	Sources in text and tables provided?	2 = Always, 1 = Sometimes, 0 = Never		
2.5	Overall quality of land use maps	3 = extensive, clear and usable; 2 = readable with text; 1 = limited or difficult to read; 0 = nonexistent		
2.6	Do the following exist in land classification maps?			
2.6.1	Landmarks/ Key activity points/nodes	1 = Yes; 0 = No		
2.6.2	Transit routes	1 = Yes; 0 = No		
2.6.3	Non-motorized infrastructure routes (right-of-ways, greenways, bikeways)	1 = Yes; 0 = No		
2.7	Overall quality of (non-map) displays	3 = extensive, clear and usable; 2 = readable with text; 1 = limited or difficult to read; 0 = nonexistent		
2.8	Overall quality of transportation maps	3 = extensive, clear and usable; 2 = readable with text; 1 = limited or difficult to read; 0 = nonexistent		
2.9	Is there a specific transportation component in the plan?	1 = Yes; 0 = No		
3	Supporting Data			
3.1	Is a summary of land use-related data collection and analysis provided?	1 = Yes; 0 = No		
3.2	Is a summary of the demographic and economic data collection and its analysis provided?	1 = Yes; 0 = No		

3.3	Are the sources of the economic and demographic data provided?	1 = Yes; 0 = No		
3.4	Is a summary of the transportation-related data presented and analysis provided?	1= Yes; 0 = No		
3.5	Are the sources of the transportation data provided?	1 = Yes; 0 = No		
3.6	Are any data not collected directly double-checked, or just assumed correct?	2 = All double-checked; 1= Most double-checked; 0 = Not double-checked/No mention		
3.7	Primary economic base(s) noted?	1 = Yes; 0 = No		
3.8	Population trends (numbers)	3 = increasing; 2= stable; 1= decreasing; 0 = not provided		
3.9	Economic trends (numbers)	3 = increasing; 2= stable; 1= decreasing; 0 = not provided		
3.10	Development trends discussed?	2 = extensively, 1 = mentioned but not discussed, 0 = no mention		
3.11	Environmental trends/problems discussed?	2 = extensively, 1 = mentioned but not discussed, 0 = no mention		
3.12	Existing undeveloped land and water bodies discussed?	2 = extensively, 1 = mentioned but not discussed, 0 = no mention		
3.13	Physical limitations for development mentioned?			
3.13.1	Stream Buffers	1 = Yes; 0 = No		
3.13.2	Other water body buffers	1 = Yes; 0 = No		
3.13.3	Open space requirements	1 = Yes; 0 = No		
3.13.4	Existing transportation corridors	1 = Yes; 0 = No		
3.13.5	Soils	1 = Yes; 0 = No		
3.13.6	Slopes	1 = Yes; 0 = No		
3.14	Is road supply discussed?	2 = extensively, 1 = mentioned but not discussed, 0 = no mention		
3.15	Is road demand discussed?	2 = extensively, 1 = mentioned but not discussed, 0 = no mention		
3.16	Is transit service supply discussed?	2 = extensively, 1 = mentioned but not discussed, 0 = no mention		
3.17	Is transit demand discussed?	2 = extensively, 1 = mentioned but not discussed, 0 = no mention		
3.18	Is other infrastructure capacity discussed (police, schools, water & sewer, etc)?	2 = extensively, 1 = mentioned but not discussed, 0 = no mention		
3.19	Is induced development from previous expansions to transportation capacity discussed?	2 = extensively, 1 = mentioned but not discussed, 0 = no mention		
3.20	Is induced development from previous expansions to other infrastructure capacities discussed?	2 = extensively, 1 = mentioned but not discussed, 0 = no mention		
4	Planning Process			
4.1	Explanation of planning process provided?	2 = Present & detailed; 1 = Present but not detailed; 0 = Not present		
4.2	Description of public participation process provided?	2 = Present & detailed; 1 = Present but not detailed; 0 = Not		

		present		
4.3	Stakeholder involvement discussed?	1 = Yes; 0 = No		
4.4	Planning or steering committee discussed?	1 = Yes; 0 = No		
4.5	Was there a publicly circulated preliminary draft?	2 = No mention, 1 = Yes; 0 = No		
4.6	Was there a survey of public opinion?	2 = No mention, 1 = Yes; 0 = No		
4.7	Other public participation mechanisms discussed?	1 = Yes; 0 = No		
5	Plan Goals & Policies (background)			
5.1	Is a clear statement of goals and objectives provided?	1 = Yes; 0 = No		
5.2	Do goals, policies and objectives follow ULUP's definition?	1 = Yes; 0 = No (ULUP = Urban Land Use Planning Book)		
5.3	Presentation of goals, objectives & policies (together)	1 = Presented in one place; 0 = Scattered throughout plan		
5.3.1	If scattered, are broader goals discernable from policy statements?	1 = Yes; 0 = No		
5.4	Can a clear emphasis in the goals/objectives be identified?	1 = Yes; 0 = No		
5.4.1	If so, what are they?	Text		
5.5	Are there any transportation/mobility goals stated?	1 = Yes; 0 = No		
5.6	Do transportation goals have land use-related objectives and/or policies?	1 = Yes; 0 = No		
5.7	Do land use goals have transportation-related objectives and/or policies?	1 = Yes; 0 = No		
6	Plan Goals & Policies (detailed)			
6.1	Do the following goals exist in the plan:			
6.1.1	Efficient use of land and infrastructure	1 = Yes; 0 = No		
6.1.2	New growth directed to existing developed areas	1 = Yes; 0 = No		
6.1.3	Mix of land uses	1 = Yes; 0 = No		
6.1.4	Higher density development concentrated in areas with urban services and infrastructure (incl. infill development)	1 = Yes; 0 = No		
6.1.5	Walkable communities	1 = Yes; 0 = No		
6.1.6	Variety in housing options	1 = Yes; 0 = No		
6.1.7	High quality of life for residents	1 = Yes; 0 = No		
6.1.8	Investment in already developed areas	1 = Yes; 0 = No		
6.1.9	Coordinated interagency infrastructure planning (local, state, regional)	1 = Yes; 0 = No		
6.1.10	Transportation/Roads	1 = Yes; 0 = No		
6.1.11	A variety of transportation options	1 = Yes; 0 = No		
6.1.12	Existing infrastructure upgraded and maintained first	1 = Yes; 0 = No		
6.1.13	Sustainable use of natural resources	1 = Yes; 0 = No		
6.1.14	Preservation of natural resources	1 = Yes; 0 = No		
6.2	Do the following policies exist in the plan:			
6.2.1	Infrastructure (water, sewer and roads) investments to manage growth	1 = Yes; 0 = No		
6.2.2	Recreational opportunities within walking or biking distance	1 = Yes; 0 = No		
6.2.3	Office, research, industrial and commercial areas with direct	1 = Yes; 0 = No		

	non-motorized links to surrounding areas			
6.2.4	Locally and regionally appropriate facades, landscaping and site designs	1 = Yes; 0 = No		
6.2.5	Commercial centers provide pedestrian amenities (transit stops, awnings, landscaping, minimal setbacks, etc)	1 = Yes; 0 = No		
6.2.6	Auto-oriented retail development that <u>deliberately</u> promotes or avoids certain areas	1 = Yes; 0 = No		
6.2.7	Quality affordable child care and related transportation opportunities	1 = Yes; 0 = No		
6.2.8	Investments in new infrastructure that <u>deliberately</u> promotes certain growth patterns	1 = Yes; 0 = No		
6.2.9	Public transportation and concomitant infrastructure (bus centers, park & ride, etc)	1 = Yes; 0 = No		
6.2.10	Pedestrian & bike access, connections (greenways, sidewalks) and infrastructure (bike racks, showers, etc)	1 = Yes; 0 = No		
6.2.11	Employer and/or government-sponsored commute reduction programs	1 = Yes; 0 = No		
6.2.12	Traffic management plans to reduce peak period congestion	1 = Yes; 0 = No		
6.2.13	Traffic calming devices	1 = Yes; 0 = No		
6.2.14	Parking demand/supply management	1 = Yes; 0 = No		
6.2.15	Transit-oriented developments	1 = Yes; 0 = No		
6.2.16	Regular performance monitoring of transportation modes	1 = Yes; 0 = No		
6.2.17	Local relationship to regional transportation network	1 = Yes; 0 = No		
6.2.18	Use of renewable energy resources	1 = Yes; 0 = No		
6.2.19	Transfer of development rights	1 = Yes; 0 = No		
7	Content			
7.1	Does the plan articulate a standard goal-objective-policy hierarchy?	1 = Yes; 0 = No		
7.2	Are relationships between goals objectives and policies discernable?	1 = Yes; 0 = No		
7.3	Are relationships between goals objectives and policies reasonable?	1 = Yes; 0 = No		
7.4	What type of language is used in policy statements?	3 = exhortative (shall); 2 = prescriptive (should); 1 = mixed		
7.5	Is there spatial specificity in relevant policies?	1 = Yes; 0 = No/Generic		
7.6	Are goals clearly prioritized?	1 = Yes; 0 = No		
7.7	Is the reciprocal relationship between transportation and land use explicitly mentioned or referenced as part of the plan?	1= Yes; 0 = No		
7.8	Which of the following transportation indicators are used:			
7.8.1	Level of service	1= Yes; 0 = No		
7.8.2	Volume – to – capacity ratio	1= Yes; 0 = No		
7.8.3	Delay	1= Yes; 0 = No		
7.8.4	Vehicles (e.g. buses, cars, bicycles) per hour	1= Yes; 0 = No		
7.8.5	Average commute to work time	1= Yes; 0 = No		
7.8.6	Percent using non-auto modes	1= Yes; 0 = No		

7.8.7	Annual Average Daily Traffic	1= Yes; 0 = No		
7.8.8	Percent of streets with sidewalks	1= Yes; 0 = No		
7.8.9	Percent of population within transit route	1= Yes; 0 = No		
7.8.10	Percent of population within bikeway/trail	1= Yes; 0 = No		
7.8.11	Percent destinations accessible within time ranges	1= Yes; 0 = No		
7.9	Are the following transportation modes mentioned and discussed in the land use plan?			
7.9.1	Auto	2 = extended discussion, 1 = mentioned but not discussed, 0 = no mention		
7.9.2	Public transit	2 = extended discussion, 1 = mentioned but not discussed, 0 = no mention		
7.9.3	Pedestrian	2 = extended discussion, 1 = mentioned but not discussed, 0 = no mention		
7.9.4	Bicycle	2 = extended discussion, 1 = mentioned but not discussed, 0 = no mention		
7.9.5	Carpool	2 = extended discussion, 1 = mentioned but not discussed, 0 = no mention		
7.9.6	Vanpool	2 = extended discussion, 1 = mentioned but not discussed, 0 = no mention		
7.9.7	Other			
7.10	Which of the following strategies for prescribing physical design for particular modes exist?			
7.10.1	Sidewalk plan	1 = Yes; 0 = No		
7.10.2	Greenway plan	1 = Yes; 0 = No		
7.10.3	Bike path / pedestrian plan	1 = Yes; 0 = No		
7.10.4	Road improvements/ thoroughfare plan	1 = Yes; 0 = No		
7.10.5	Transit plan	1 = Yes; 0 = No		
7.10.6	Transit oriented development plan	1 = Yes; 0 = No		
7.11	Is a transportation-related capital improvements program included in the plan?	1 = Yes; 0 = No		
7.12	Does the land suitability analysis take into account transportation facilities?	1 = Yes; 0 = No		
7.13	Are land suitability and infrastructure service capacity constraints considered for prescribing relevant land development policies (e.g. land classification scheme, TIP priorities)?	2 = strong relationship between constraints and policies; 1 = moderate relationships; 0 = no apparent relationship		
7.14	Are there objectives or policies that address environmental impacts of transportation projects	1 = Yes; 0 = No		
7.15	Are there objectives or policies that address long term land	1 = Yes; 0 = No		

	development and related environmental impacts of transportation projects?			
8	Implementation			
8.1	Are land use goals quantified based on measurable objectives?	1 = Yes; 0 = No		
8.1.2	If so, are the indicators of those objectives included?	1 = Yes; 0 = No		
8.2	Are any transportation-related indicators used to quantify land use goals?	1 = Yes; 0 = No		
8.3	Is the timing of implementation of the land use plan provided?	1 = Yes; 0 = No		
8.4	Is a clearly identified person accountable for transportation-related objectives and policies?	1 = Yes; 0 = No		
9	Consistency			
9.1	Vertical Consistency			
9.1.1	Does the plan mention authorizing legislation or state requirements?	1 = Yes; 0 = No		
9.1.2	External agencies mentioned and accounted for			
9.1.2.1	NCDOT	1 = Yes; 0 = No		
9.1.2.2	RPO	1 = Yes; 0 = No		
9.1.2.3	MPO	1 = Yes; 0 = No		
9.1.2.4	COGs	1 = Yes; 0 = No		
9.1.2.5	DENR	1 = Yes; 0 = No		
9.1.2.6	Transit agencies	1 = Yes; 0 = No		
9.1.2.7	Other city/county/state agencies	Text; 0 = Otherwise		
9.2	Horizontal Consistency			
9.2.1	Is any of the following Intergovernmental coordination mentioned?			
9.2.1.1	County-County coordination	1 = Yes; 0 = No; 2 = if a town		
9.2.1.2	Town-Town coordination	1 = Yes; 0 = No; 2 = if a county		
9.2.1.3	Town-County coordination	1 = Yes; 0 = No		
9.3	Internal Consistency			
9.3.1	Are the goals and objectives compatible throughout the plan?	1 = Yes; 0 = No		
9.3.2	Are the policies compatible throughout the plan?			
9.3.3	Are incompatible goals or policies reconciled or ranked in order of importance	1 = Yes; 0 = No		
9.3.4	Is there consistency with current TIPs?	1 = Yes; 0 = No; 2 = Don't know		
9.3.5	Is there consistency with a long-range transportation plan for the area or region?	1 = Yes; 0 = No; 2 = Don't know		
9.3.6	Are land use elements connected to other infrastructure elements (water & sewer, schools, etc)?	1 = Yes; 0 = No		
9.4	Implementation Consistency			
9.4.1	Do the land use plans policies specifically call for certain action(s) to implement those policies? If so, please comment	1 = Yes; 0 = No		
9.4.2	Do the actions related to specific land use policies in the plan appear efficacious?	1 = Yes; 0 = No		

9.4.3	Are specific transportation and land use investments tied to specific funding sources?	1 = Yes; 0 = No		
9.4.4	Do the plan's transportation policies specifically call for new action(s) to implement those policies? If so, please comment	1 = Yes; 0 = No		
9.4.5	Do the actions related to specific transportation policies in the plan appear efficacious?	1 = Yes; 0 = No		

Appendix 3. Concept measurements for six planning outcomes in North Carolina plans

All plans included in the content evaluation sample (N=30) were scored in terms of process-oriented planning outcomes (i.e., overall plan quality, specific quality with respect to the transportation-land use connection, and general and specific consistency in the plan) and in terms of substantive planning outcomes (i.e., goals and policies emphasized through the plans and plan implementation efforts). The concepts below are incorporated into the substantive and/or procedural components of the plans' overall score.

Substantive Outcomes (Transportation-Land Use Connection Emphasis, Maximum Score=24)

As substantive outcomes, we focus on the connection between transportation goals and land use objectives/policies to support such goals. We developed a scale by adding the raw scores of the relevant goals and policies from the content evaluation (Section 6 of the Content Evaluation Instrument).

Goals include (scale from 0-8, one point per goal present in plan):

- Efficient use of land and infrastructure
- Higher density development concentrated in areas with urban services and infrastructure (including infill development)
- Walkable communities
- Investment in already developed areas
- Coordinated interagency infrastructure planning (local, state, regional),
- Transportation/road improvements
- A variety of transportation options
- Existing infrastructure upgraded and maintained first

Policies include (scale from 0-16, one point per goal present in plan):

- Infrastructure (water, sewer and roads) investments to manage growth
- Recreational opportunities within walking or biking distance
- Office, research, industrial and commercial areas with direct non-motorized links to surrounding areas
- Commercial centers provide pedestrian amenities (transit stops, awnings, landscaping, minimal setbacks, etc)
- Auto-oriented retail development that deliberately promotes or avoids certain areas
- Quality affordable child care and related transportation opportunities
- Investment in new infrastructure that deliberately promotes certain growth patterns
- Public transportation and concomitant infrastructure (bus centers, park & ride, etc),
- Pedestrian & bike access, connections (greenways, sidewalks) and infrastructure (bike racks, showers, etc),

- Employer and/or government-sponsored commute reduction programs
- Traffic management plans to reduce peak period congestion
- Traffic calming devices
- Parking demand/supply management
- Transit-oriented developments
- Regular performance monitoring of transportation modes
- Local relationship to regional transportation network.

Procedural Outcomes (Maximum Score=52)

As procedural outcomes, we focus on a) plan consistency and coordination, and b) plan quality (including generic quality as indicated by Kaiser and Godschalk (1995) and quality specific to transportation and land use).

a) Plan Consistency and Coordination

We constructed a scale by adding the scores from the plan content analysis on vertical, horizontal, internal, and implementation consistency (Section 9 of the Content Evaluation Instrument). Each type of consistency was scored as follows: Horizontal consistency (0,1; no,yes); vertical consistency (0-2; low to high); internal consistency (0-2; low to high); and implementation consistency (0-2; low to high).¹ Overall consistency scores range from 0 to 7.

¹ Vertical consistency questions in the plan content analysis include: Does the plan mention authorizing legislation or state requirements? Are any of the following external agencies mentioned and accounted for in the plan? NC Department of Transportation, Rural planning organizations, Metropolitan planning organizations, Councils of Governments, NC Department of Environment and Natural Resources, Transit agencies)

Horizontal consistency questions in the plan content analysis include: Is any of the following Intergovernmental coordination mentioned (yes/no)? County-county coordination, town-town coordination, and town-county coordination.

Internal consistency questions in the plan content analysis include: Are the goals and objectives compatible throughout the plan? Are the policies compatible throughout the plan? Are incompatible goals or policies reconciled or ranked in order of importance? Is there consistency with current TIPs? Is there consistency with a long-range transportation plan for the area or region? Are land use elements connected to other infrastructure elements (water & sewer, schools, etc)?

Implementation consistency questions in the plan content analysis include: Do the land use plans policies specifically call for certain action(s) to implement those policies? Do the actions related to specific land use policies in the plan appear efficacious? Are specific transportation and land use investments tied to specific funding sources? Do the plan's transportation policies specifically call for new action(s) to implement those policies? Do the actions related to specific transportation policies in the plan appear efficacious?

b) Generic and Specific Plan Quality

We constructed a scale by adding the scores from the plan content analysis on generic plan quality and transportation-specific plan quality. Transportation-specific plan quality scores include explicit reference to the reciprocal connection between transportation and land use, utilization of transportation indicators, discussion of multiple transportation modes, discussion of additional plans for specific transportation modes, inclusion of transportation criteria in suitability analysis, among others (scores range from 0-16). Generic plan quality scores include the plan's overall organization, the presence of high quality maps, degree of spatial specificity, quality of supporting data (demographic, economic, environmental), analysis of development options, discussion of infrastructure and capacity, general clarity of goals, objectives, and priorities, etc. (scores range from 0-36).

Appendix 4. Counties and municipalities selected for second stage

Location	City/County?	2000 Population	Region	Growth	Population	Urbanized Region?
Boone	City	13,447	Mountain	low	small	no
Carrboro	City	16,704	Piedmont	high	small	yes
Gastonia	City	66,298	Piedmont	low	large	yes
Goldsboro	City	38,731	Coastal	low	small	yes
Greenville	City	60,385	Coastal	high	large	yes
Hickory	City	37,511	Mountain	high	small	yes
High Point	City	85,949	Piedmont	low	large	yes
Kannapolis	City	36,699	Piedmont	low	small	yes
Kings Mountain	City	9,457	Piedmont	low	small	yes
Mint Hill	City	14,704	Piedmont	high	small	yes
Monroe	City	17,091	Piedmont	low	small	yes
Sanford	City	23,628	Piedmont	high	small	no
Winston-Salem	City	185,480	Piedmont	high	large	yes
Alexander	County	33,603	Mountain	low	small	yes
Ashe	County	24,384	Mountain	low	small	no
Beaufort	County	44,958	Coastal	low	small	no
Brunswick	County	73,143	Coastal	high	large	yes
Carteret	County	59,383	Coastal	low	large	no
Chatham	County	49,329	Piedmont	high	small	yes
Chowan	County	14,526	Coastal	low	small	no
Cleveland	County	96,287	Piedmont	low	large	no
Cumberland	County	302,963	Coastal	low	large	yes
Durham	County	223,314	Piedmont	low	large	yes
Halifax	County	57,370	Coastal	low	large	no
Lenoir	County	59,648	Coastal	low	large	no
Lincoln	County	63,780	Piedmont	high	large	yes
Nash	County	87,420	Coastal	low	large	yes
Orange	County	118,227	Piedmont	high	large	yes
Polk	County	18,324	Mountain	high	small	no
Surry	County	71,219	Piedmont	low	large	no

Note: scores for the factors derived from the survey are not shown to protect respondents' confidentiality

Appendix 5. Selected municipalities and counties compared to all respondents

The tables below reflect the application of the criteria for the selection of municipalities and counties outlined in the body of the document. All numbers in the tables are percentages. The columns of each table add to 100%. For example, for the decennial growth rate table, of the cities selected 53.9% are low growth and 46.2% are high growth. By contrast, of all cities that responded to our questionnaire *and* have a plan, 43.2% are low growth and 56.8% are high growth. These comparisons provide an idea about how representative the selected plans are of all respondents with a plan.

Decennial growth rate

	Selected		All respondents with plans	
	City	County	City	County
High	46.2	29.4	56.8	28.3
Low (< 25%)	53.9	70.6	43.2	71.7
Total	100.0	100.0	100.0	100.0

2000 Population

	Selected		All respondents with plans	
	City	County	City	County
Large	30.8	64.7	29.6	50.0
Small (< 50,000)	69.2	35.3	70.5	50.0
Total	100.0	100.0	100.0	100.0

NC Region

	Selected		All respondents with plans	
	City	County	City	County
Coastal	15.4	47.1	18.2	46.7
Piedmont	69.2	35.3	65.9	36.7
Mountain	15.4	17.7	15.9	16.7
Total	100.0	100.0	100.0	100.0

Belongs to urbanized area

	Selected		All respondents with plans	
	City	County	City	County
No	15.4	52.9	15.9	51.7
Yes	84.6	47.1	84.1	48.3
Total	100.0	100.0	100.0	100.0

Coverage of transportation elements

	Selected		All respondents with plans	
	City	County	City	County
0 (focused)	15.4	41.2	25.0	28.8
1	7.7	17.7	13.6	15.3
2	30.8	29.4	25.0	42.4
3 (comprehensive)	46.2	11.8	36.4	13.6
Total	100.0	100.0	100.0	100.0

Importance of L/U plan in guiding development and growth

	Selected		All respondents	
	City	County	City	County
0 (Low)	30.8	58.8	54.6	62.7
1 (High)	69.2	41.2	45.5	37.3
Total	100.0	100.0	100.0	100.0

Interactions with state and regional transportation agencies

	Selected		All respondents with plans	
	City	County	City	County
0 (infrequent)	11.8	2.3	11.9	11.8
1	41.2	52.3	44.1	41.2
2 (consistent)	47.1	45.5	44.1	47.1
Total	100.0	100.0	100.0	100.0

DOT division

	Selected		All respondents with plans	
	City	County	City	County
1	7.7	11.8	4.6	13.3
2	15.4	11.8	6.8	8.3
3	0.0	0.0	4.6	5.0
4	7.7	5.9	9.1	3.3
5	23.1	0.0	11.4	8.3
6	0.0	5.9	6.8	3.3
7	7.7	11.8	9.1	10.0
8	0.0	5.9	6.8	6.7
9	0.0	5.9	0.0	6.7
10	15.4	0.0	15.9	6.7
11	7.7	11.8	9.1	8.3
12	7.7	17.7	4.6	16.7
13	0.0	11.8	4.6	3.3
14	7.7	0.0	6.8	0.0
Total	100.0	100.0	100.0	100.0

Appendix 6. 2004-2010 Planned Transportation Improvement Expenditures

	Auto/Road Median Expenditures[1]	Auto/Road Mean	Non- Motorized Median Expenditures	Non- Motorized Mean	Transit Operating Assistance Median	Transit Operating Assistance Mean	Transit Capital Median	Transit Capital Mean	Safety Median	Safety Mean
All Jurisdictions (n=164)	56723.5	131412.5	94.50	422.90	135.00	1405.80	0	3034.00	101.20	495.40
Respondents[2] (n=126)	59992	120510.4	93.00	438.70	141.50	1732.30*	0	3283.10	101.20	512.30
Non-Respondents (n=38)	52836.5	167561.4	127.00	370.60	122.50	323.10*	0	2214.70	104.50	439.20
Content Evaluation Sample[3] (N=30)	70193	121243.3	173.00	450.70	181.00	1480.70	0	1080.70	92.50	387.80
Coastal (n=44)	75486	122496.7	0.00	314.50	157.00	922.70	0	1453.40	76.50	538.90
Mountain (n=25)	45420	86776.7	168.00	276.00	136.00	1277.50	0	266.90	300.60	855.50
Piedmont (n=57)	57244	133772.7	94.00	605.80	139.00	2556.70	0	5965.50	90.00	341.30
Jurisdiction Type[4]										
Counties (n=79)	87300	120304.0***	0.00	257.50***	167.00	283.30***	0	2241.80***	0.00	672.50***
Cities (n=47)	39280	120857.4***	192.00	743.20***	0.00	4167.80***	0	5011.20***	0.00	243.20***
Content Evaluation Counties[5] (n=17)	116322	121828.4*	120.00	508.50*	185.00	194.30*	0	10343.60	150.00	534.60*
Content Evaluation Cities (n=13)	53456	120478.3*	195.00	375.00*	0.00	3162.90*	312	1141.10	0.00	65.10*

High Growth (n=44)	75124.5	118348.3	169.50	781.00	58.00	2511.80	0	4465.90	97.50	550.00
Low Growth (n=82)	55648.5	121670.6	71.00	254.90	146.00	1314.00	0	2640.60	102.60	492.10
Urbanized Area[6] (n=73)	66226	144606.7*	169.00	635.10*	153.00	2785.30*	0	5520.30*	102.50	512.60
Non-Urbanized Area (n=53)	51205	87321.2*	0.00	168.00*	131.00	281.90*	0	142.50*	82.50	511.90
Large Population[7] (n=50)	171316	221643.8*	216.50	712.00	230.00	3916.80*	0	7144.80*	257.50	755.00*
Small Population (n=76)	36633	53975.3*	63.50	258.80	111.00	295.10*	0	708.70*	38.10	352.70*

[1] Expenditures are listed in thousands of dollars.

[2] * Significant difference in mean Transit Operating expenditures between responders and non-responders ($p < 0.05$).

[3] No Significant differences for any expenditures between the Plan Content Evaluation sample and survey respondents

[4] *** Significant differences for all expenditures between cities and counties ($p < 0.003$).

[5] *Significant differences for all expenditures except transit capital costs between cities and counties in the Content Evaluation sample ($p < 0.05$).

[6] * Significant differences for all expenditures except Safety between urbanized and non-urbanized regions ($p < 0.05$).

[7] * Significant differences for all expenditures except Non_Motorized between large (>50, 000) and small population sizes ($p < 0.05$).

Appendix 7. Characteristics of Survey Respondents

General Characteristics²

- County respondents were distributed throughout the state roughly proportionate to the number of counties in each region (44% of county respondents came from Coastal counties, 33% from Piedmont counties and 23% from Mountain counties).
- Municipalities surveyed tended to be from the Piedmont area, and a proportionate number of responses came from that area (66%). Nineteen percent of the remaining municipal responses came from Coastal areas³, and 15% came from Mountain areas. See Table 7_1 for a breakdown of respondent characteristics.
- High growth areas comprised 35% of the survey respondents, whereas 65% of respondents were from low growth areas. A greater percentage of respondents in high growth areas came from the Piedmont region (61%), compared to respondents from the Coastal (27%) and Mountain (11%) regions. Respondents from low growth areas reflected a more equitable regional distribution, with 37% Piedmont, 24% Mountain, and 39% Coastal areas.
- Forty percent of respondents came from large population areas (>50,000), while the remaining 60% came from smaller population areas.
- Urbanized regions, as defined by the 2000 U.S. Population Census, comprised 58% of respondents; 42% of respondents were from non-urbanized regions. There was a statistically significant difference in the response rate from urbanized versus non-urbanized regions (73 out of 86 responded from urbanized regions (85%), compared to 53 out of 78 (68%) from non-urbanized regions). No other significant differences between responders and non-responders were found.
- Among high growth areas, 43% had large populations (>50,000) and the remaining 57% had smaller populations. Among low-growth areas, 38% had large populations, and 62% had smaller populations.
- More than three-quarters of high growth areas were from urbanized regions (77%), while 23% were from non-urbanized regions. Low-growth areas were more equitably split between urbanized regions (48%) and non-urbanized regions (52%)⁴.

² Denominator: Respondents who reported having a land use plan, excluding missing responses (N=107)

³ Approximately half of all coastal cities surveyed gave responses, while all Mountain cities surveyed responded.

⁴ There was a statistically significant difference in the proportion of high growth vs. low growth areas from urbanized vs. non-urbanized regions ($p=0.001$).

Table 7_1. Characteristics of Survey Respondents

	Respondents (N = 126)		Non-Respondents (N= 38)	
	Number	Percent ⁵	Number	Percent
Jurisdiction				
County	79	63	21	55
City	47	37	17	45
Region				
Coastal	44	35	13	34
Mountain	25	20	8	21
Piedmont	57	45	17	45
Growth^a				
High	44	35	14	37
<i>Coastal</i>	12	27	4	29
<i>Mountain</i>	5	11	1	7
<i>Piedmont</i>	27	61	9	64
Low	82	65	24	63
<i>Coastal</i>	32	39	9	37
<i>Mountain</i>	20	24	7	29
<i>Piedmont</i>	30	37	8	33
Population^b				
Large	50	40	11	29
Small	76	60	27	71
Urbanized Region⁶				
No	53	42	25	66
Yes	73	58	13	34

General Characteristics of Land Use Plans⁷

- Overall, 85% of respondents reported having a land use plan (107 out of 126). However, this differed by jurisdiction; 98% of municipal respondents had a plan compared to only 77% of county respondents. Regional differences were also observed, with 89% of respondents from Piedmont and Coastal areas having land use plans, compared to 68% of those from mountain areas. These regional differences may be driven by the urbanized, high population composition of the Piedmont area, as well as by CAMA in Coastal areas.

⁵ Percentages are rounded to the nearest integer.

^a High growth is defined as >25% increase in population from 1990 to 2000. There was a statistically significant difference in the proportion of respondents from high growth areas versus respondents from low growth across regions (p=0.02).

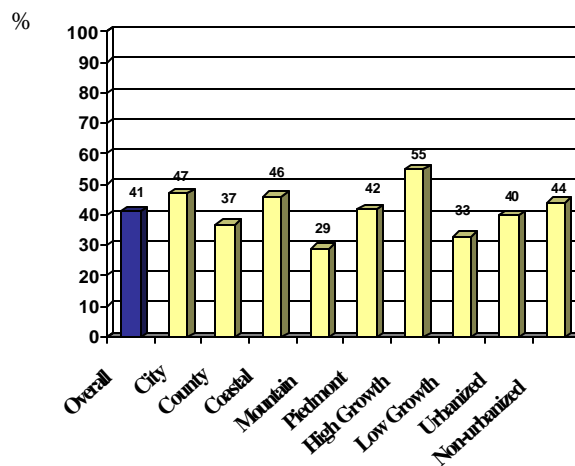
^b Large population is defined as >50,000.

⁶ There was a statistically significant difference in the response rate from urbanized versus non-urbanized regions (p=0.01). No other significant differences between responders and non-responders were found.

⁷ Denominator: Respondents who reported having a land use plan, excluding missing responses (N=107)

- Of the 107 respondents that reported having land use plans, 31% of the plans were developed since 2000. The remaining plans were developed between 1990 and 1999 (50%) and between 1974 and 1989 (19%).
- Ninety-three percent of respondents with a land use plan have adopted it.
- Forty-one percent of respondents had updated their land use plans (44 out of a possible 107). The majority of these updates (85%) occurred since 1998. Several respondents reported that they were currently in the process of updating their plans. Figure 7_1 shows the percentage of respondents with updated plans, by subgroup.

Figure 7_1. Percentage of Respondents with Updated Land Use Plans

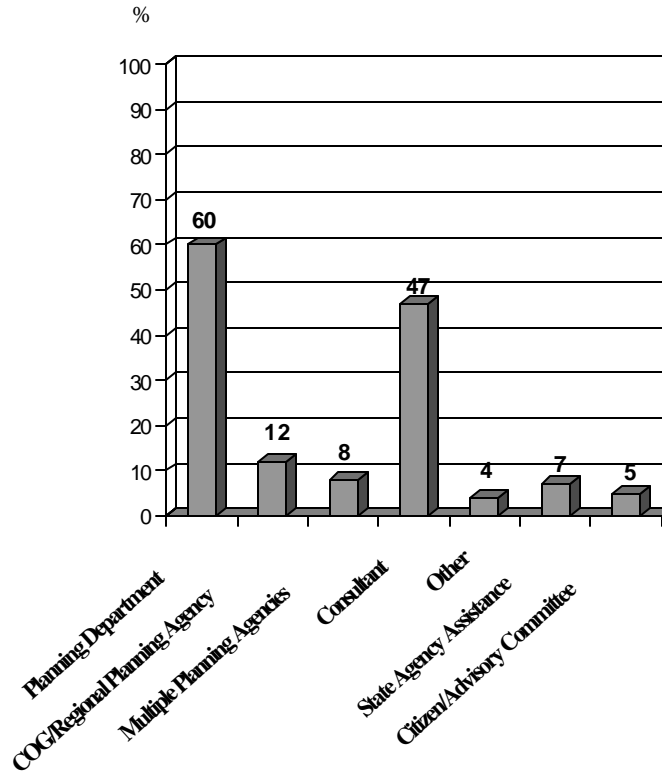


- Fifty-two percent of plans specifically used the term “Land Use” in the plan’s title, while 21% were “Comprehensive” plans, 13% identified as “Development” plans, and another 5% used the terms “Growth” or “Smart Growth”. “Community” or “Strategic” plans each comprised 1% of the sample. Twenty-nine percent of plan titles mentioned a specific calendar year or target date. Respondents with “Comprehensive” plans reported more transportation improvements and implementation tools than did respondents with other types of plans⁸. Respondents with “Growth” plans reported more pedestrian and bicycle-oriented projects compared to respondents with other types of plans.
- As shown in Figure 7_2, many parties were involved in the development of the land use plans. The most frequently involved parties were municipal or county

⁸ There was a statistically significant difference in the average number of transportation improvements reported by respondents with Comprehensive plans (3.8) compared to those with other types of plans (1.9 for those with Land Use plans, 2.8 for those with Growth plans, and 2.2 for those with Development plans, $p < 0.05$). There was also a statistically significant difference in the average number of implementation tools and policies reported by respondents with Comprehensive plans (3.9) compared to those with other types of plans (2.8 for those with Land Use plans, 2.5 for those with Growth plans, and 2.6 for those with Development plans, $p < 0.02$).

planning departments (60%), followed by consultants (47%), Council of Government/Regional Planning Agencies (12%), multiple planning agencies (8%), state agency assistance (7%), citizen/advisory committees (5%), and Other (4%)⁹.

Figure 7_2. Who was Involved in Developing the Land Use Plan?



- Forty-seven percent of respondents used a time horizon of 20 years or more for their land use plans. The remainder used time horizons of 10-15 years (34%), or 2-5 years (18%).
- Approximately half (51%) of the individuals responding to the survey on behalf of their city or county had been in their current positions for five years or less. Thirty-one percent had been in their current position for 6-15 years, and the remaining 18% for 16-34 years.

Land Classes Designated in Land Use Plans

- Residential, Office/Commercial, and Industrial uses were the most common land designations cited in plans. More than half of the respondents reported Open Space designations, and slightly less than half cited Public, Mixed-Use, and Agriculture/Farmland Preservation categories; Residential/Commercial designations

⁹ Categories will not sum to 100% because they are not mutually exclusive.

were cited by approximately 25% of respondents. Conservation was specifically mentioned by 10% of respondents; there was considerable variation by subgroup which appeared to be driven by areas with large population sizes. Transition and Rural designations were mentioned by fewer than 10% of respondents.

Approximately 8% reported “Other” designations, such as rural activity nodes, landfill, city and town centers, corridors, and special areas. Percentages for all subgroups are shown in Table 7_2.

- Public, open-space, and mixed-use designations were reported more frequently by city respondents compared to county respondents, while agricultural/farmland preservation designations were reported more frequently by county respondents than those from cities (Fig. 7_3).

Figure 7_3. Percentage of Designated Land Classes in Land Use Plans, by Jurisdiction

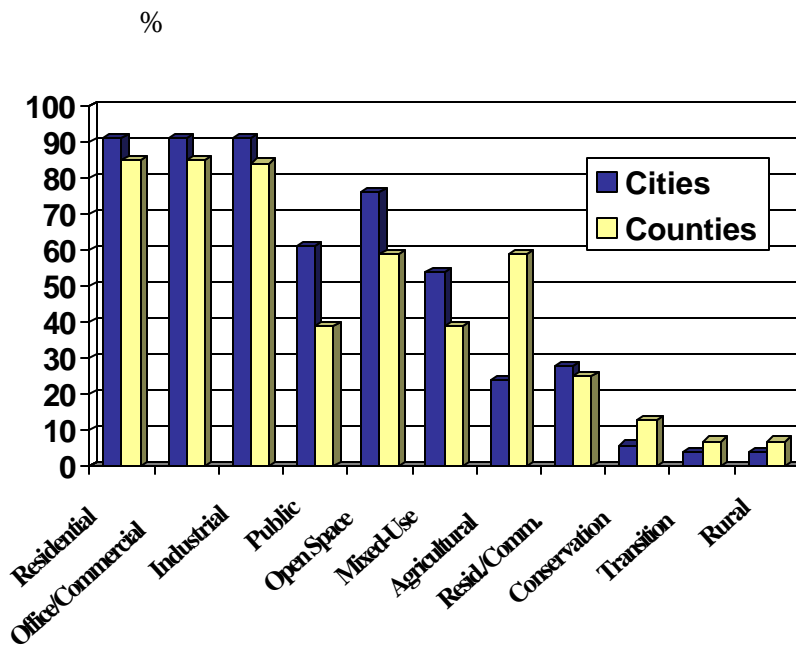


Table 7_2. Percentage of Land Classes Designated in Land Use Plans^{10,11}, by Subgroup

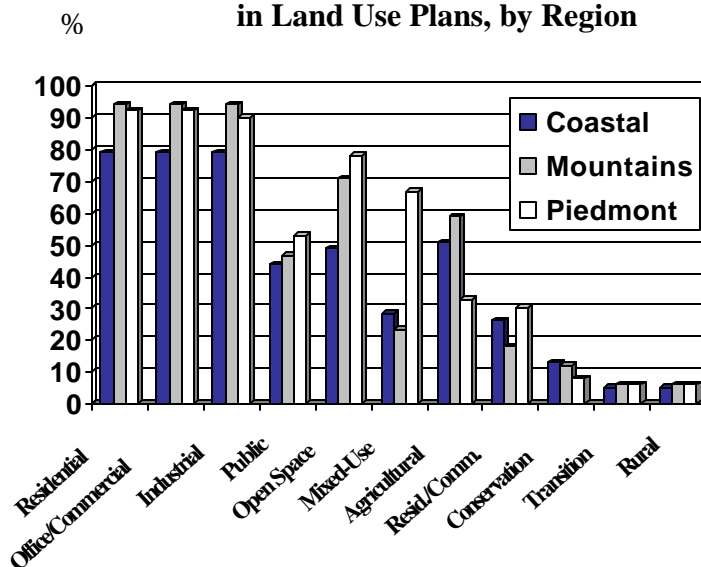
	<i>Sample Size</i>	Residential	Office/ Commercial	Industrial	Public	Open Space	Mixed-Use	Agricultural	Residential/ Commercial	Rural	Transition	Conservation
Overall	107	88	88	87	49	66	46	44	26	6	6	10
Jurisdiction												
City	46	91	91	91	61	76	54	24	28	4	4	6
County	61	85	85	84	39	59	39	59	25	7	7	13
Region												
Coastal	39	79	79	79	44	49	28	51	26	5	5	13
Mountain	17	94	94	94	47	71	23	59	18	6	6	12
Piedmont	51	92	92	90	53	78	67	33	30	6	6	8
Growth												
High	42	86	83	86	52	74	52	45	32	7	7	17
Low	65	89	91	88	46	61	41	43	23	5	5	6
Urbanized Region												
No	41	85	85	88	54	66	44	54	32	2	2	7
Yes	66	89	89	86	45	67	47	38	23	8	8	12
Population												
Large	43	81	79	77	39	65	44	51	24	12	12	21
Small	64	92	94	94	55	67	47	39	28	2	2	3

¹⁰ Denominator: Respondents who reported having a land use plan, excluding missing responses (N=107)

¹¹ Categories will not sum to 100% because they are not mutually exclusive

- Regional variations were observed with respect to land use classes designated by the plans. Almost all classes were more frequently designated by Mountain and Piedmont plans compared to Coastal plans. The greatest regional variations were observed in the mixed-use, open-space, and agricultural/farmland preservation categories (Fig. 7_4).

Figure 7_4. Percentage of Designated Land Classes in Land Use Plans, by Region



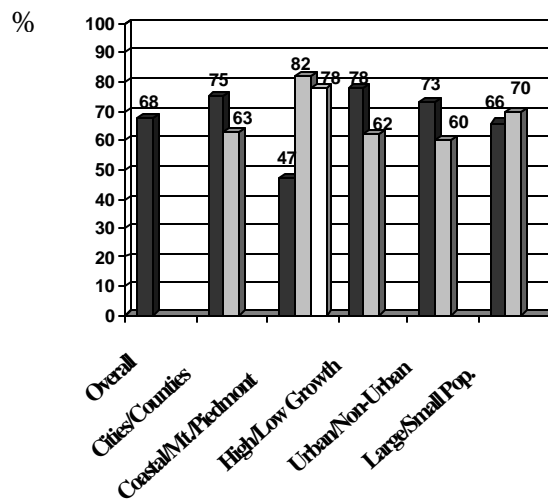
Transportation Improvements in Land Use Plans

- Sixty-eight percent of respondents reported that their land use plans included specific transportation improvements. Highways, greenways, and collector streets were the most frequently reported transportation improvements, followed by sidewalks, bike paths, transit routes, and connectivity improvement plans. Safety, pedestrian ways, and driveway consolidation/access management were less frequently cited. Jurisdictional differences were greatest with respect to non-motorized transportation improvements, followed by roads and transit improvements. Respondents from the Mountain and Piedmont regions were more likely to report transportation improvements compared to those from Coastal regions, and respondents from cities reported more improvements than those from counties.
- Although road improvements were the most frequently reported elements in transportation/thoroughfare plans, we observed discrepancies between the presence and implementation of elements across jurisdictions and regions. Aside

from transportation, the most frequently cited infrastructure improvements were sewer (50%) and water/wastewater treatment (41%), followed by schools and storm drainage. Approximately 16% of respondents included neither transportation nor other infrastructure improvements in their plans.

- As shown in Figure 7_5, sixty-eight percent of respondents reported that their land use plan included specific transportation improvements (71 out of 104)¹². Thirty-two percent reported no transportation improvements. Respondents from the Mountain (82%) and Piedmont (78%) regions were more likely to report transportation improvements compared to those from Coastal regions (47%).

Figure 7_5. Percentage of Respondents with Specific Transportation Improvements in Land Use Plans



- Table 7_3 gives the percentages of specific transportation improvements overall, as well as by subgroup. Highways (50%), greenways (37%), and collector streets (34%) were the most frequently reported transportation improvements, followed by sidewalks, bike paths, transit routes, and connectivity improvement plans (23% each). Safety, pedestrian ways, and driveway consolidation/access management were less frequently reported, at 19%, 16%, and 15%, respectively.
- Jurisdictional differences were observed across all transportation improvement categories, with respondents from cities reporting more improvements than those from counties (Fig. 7_6).

¹² Three out of 107 respondents did not answer this question.

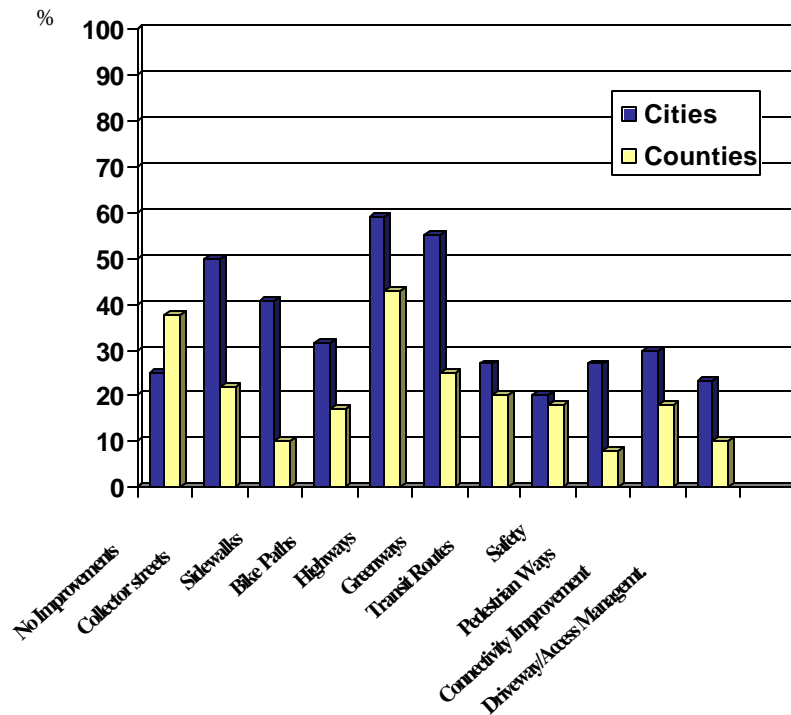
Table 7_3. Percentage of Transportation Improvements Included in Land Use Plans, by Subgroup^{13,14}

	<i>Sample Size</i>	No Transport. Improvements	Collector Streets	Sidewalks	Bike Paths	Highways	Greenways	Transit Routes	Safety	Pedestrian Ways	Connectivity Improvement	Driveway Access Management
Overall	104	32	34	23	23	50	37	23	19	16	23	15
Jurisdiction												
City	44	25	50	41	32	59	55	27	20	27	30	23
County	60	37	22	10	17	43	25	20	18	8	18	10
Region												
Coastal	36	53	25	11	11	36	25	14	14	11	17	8
Mountain	17	18	47	18	29	65	41	29	23	12	12	12
Piedmont	51	22	35	33	29	55	45	27	22	22	31	22
Growth												
High	41	22	44	34	29	61	49	22	22	19	24	22
Low	63	38	27	16	19	43	30	24	17	14	22	11
Urbanized Region												
No	40	40	25	15	12	47	27	17	17	7	15	12
Yes	64	27	39	28	30	52	44	27	20	22	28	17
Population												
Large	41	34	34	24	34	41	41	32	19	24	27	19
Small	63	30	33	22	16	56	35	17	19	11	21	13

¹³ Denominator: Respondents who reported having a land use plan, excluding missing responses (N=107)

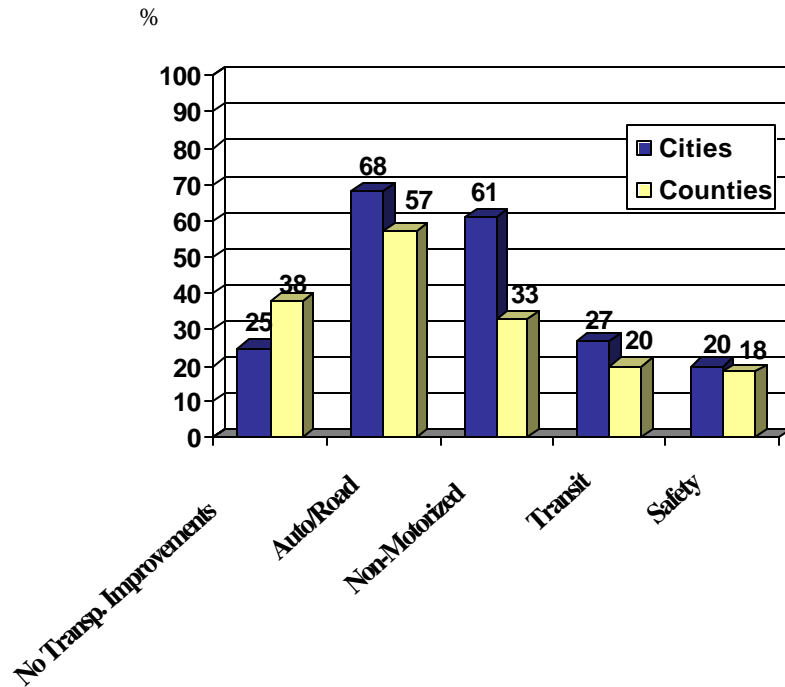
¹⁴ Categories will not sum to 100% because they are not mutually exclusive

Figure 7_6. Transportation Improvements, by Jurisdiction



- To further examine these differences, transportation improvements were grouped into five domains: 1) No Transportation Improvements, 2) Auto/Road Improvements (including Collectors Streets, Highways, Connectivity Improvement, and Driveway/Access Management), 3) Non-Motorized Improvements (Sidewalks, Bike Paths, Greenways, Pedestrian Ways), 4) Transit, and 5) Safety. This analysis showed that jurisdictional differences were greatest with respect to non-motorized transportation improvements, followed by roads and transit (Fig. 7_7). Safety improvements showed little variation across jurisdictions.

Figure 7_7. Transportation Improvement Domains, by Jurisdiction



- Regional variations were also observed, with respondents from the Mountain and Piedmont regions reporting more transportation improvements compared to respondents from Coastal areas (Fig. 7_8). Respondents from the Mountain region cited more transportation improvements across each domain (Auto/Road (76%), Non-Motorized (59%), Transit (29%), and Safety (27%), compared to respondents from other regions (Fig. 7_9). Respondents from Coastal regions cited all types of transportation improvements less frequently.

Figure 7_8. Transportation Improvements, by Region

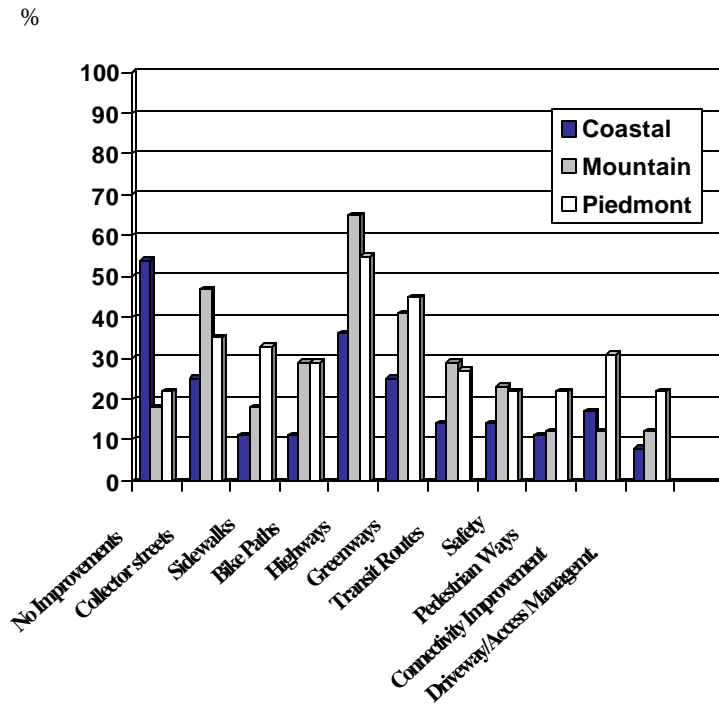
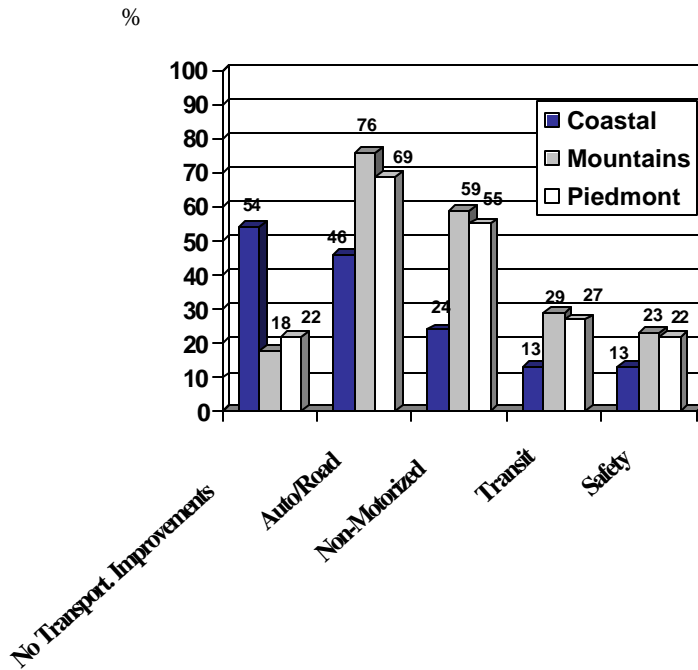


Figure 7_9. Transportation Improvement Domains, by Region



- Respondents from high growth areas were more likely to report non-motorized and road-related transportation improvements compared to respondents from low-growth regions (Fig. 7_10). However, respondents from high growth and low growth regions reported transit and safety improvements approximately equally. A similar pattern was observed when urbanized and non-urbanized areas were compared (Fig. 7_11); Auto/Road, Non-Motorized, and Transit improvements were all reported more frequently by respondents from urbanized regions.

Figure 7_10. Transportation Improvement Domains , by Growth

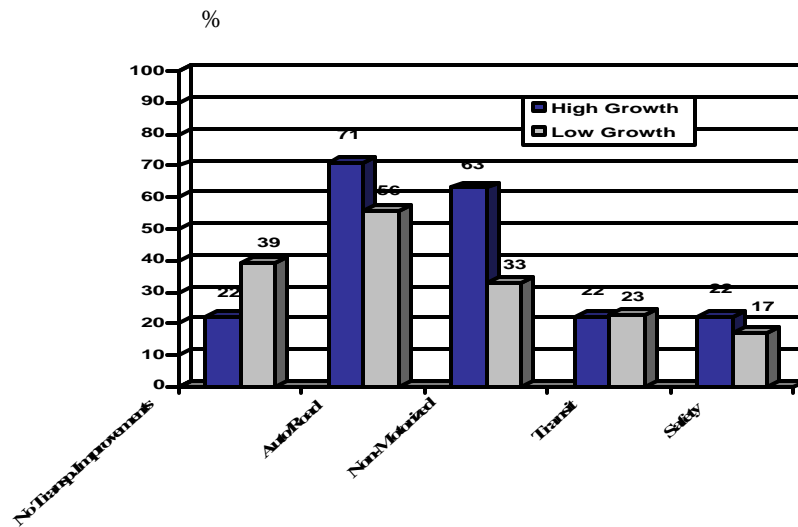
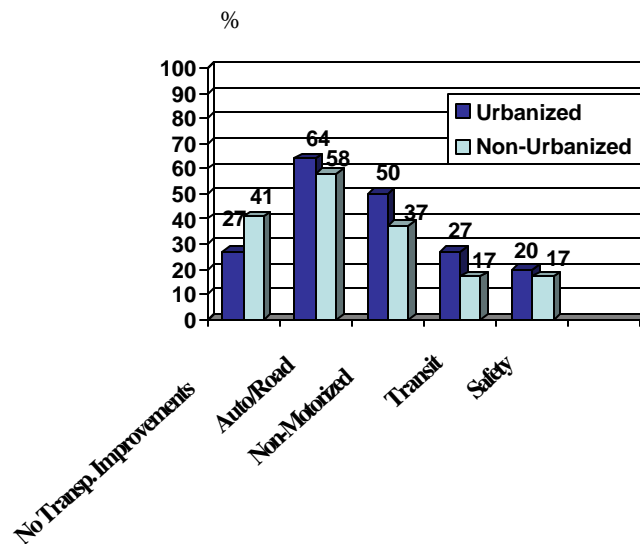


Figure 7_11. Transportation Improvement Domains, by Urbanization

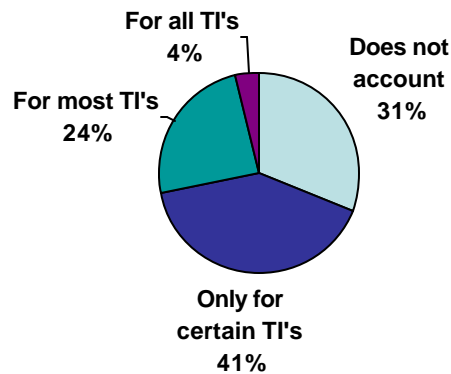


We also examined the transportation domains by counties and municipalities that belong to metropolitan planning organizations (MPOs) versus those that do not belong to MPOs. Survey respondents from MPOs were more likely to report having any non-motorized transportation improvements (56%) compared to non-MPOs (34%) (p=.022) , even though 46% of respondents were from MPOs.

The Connection Between Transportation and Land Use¹⁵

- Forty-one percent of respondents reported that their land use plans accounted for the land development impacts created by “certain transportation improvements”. Thirty-one percent reported that their plans did not account for the impact of transportation improvements, while 24% reported that their plans accounted for the impacts of “most transportation improvements”, and 4% said their plans accounted for the impact of “all transportation improvements” (Fig.7_12).

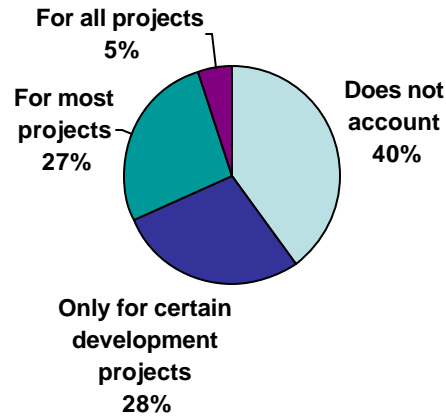
Figure 7_12. Does the Land Use Plan Account for the Land Development Impacts Created by Transportation Improvements?



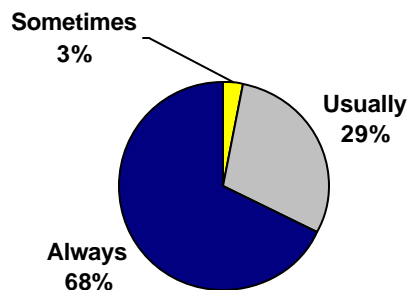
¹⁵ Denominator: Respondents who reported having a land use plan, excluding missing responses (N=107)

- When asked whether land use plans account for the transportation impacts of land development, 40% of respondents reported that their plans did not account for such impacts. Twenty-eight percent said their plans accounted for transportation impacts of “certain development projects”, while 27% said “for most projects” and only 5% said “for all projects” (Fig. 7_13).

Figure 2_13. Does the Land Use Plan Account for the Transportation Impacts of Land Development?



- Sixty-eight percent of respondents felt that land use plans should always consider planned transportation infrastructure improvements, while another 29% felt that plans should usually consider such issues, and 3% felt that plans should sometimes do so. No respondents felt that plans should never take transportation issues into account (Fig. 7_14).

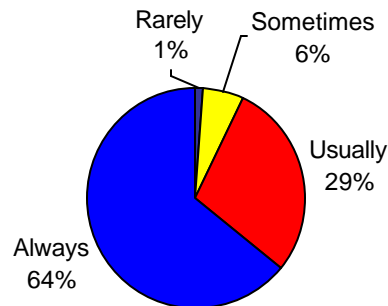


- Respondents’ opinions in Fig. 7_14 were then compared with respect to each plan’s inclusion of the land development impacts of transportation improvements.

Of those who said that land use plans should “Always” consider transportation issues, 34% said their plans accounted for “most or all” transportation improvements, 40% said “only for certain transportation improvements” and 26% said their plans “do not account” for any transportation improvements. In contrast, of those who said that land use plans should “Sometimes” or “Usually” consider transportation issues, 15% said their plans accounted for “most or all” transportation improvements, 44% said “only for certain transportation improvements” and 41% said their plans “do not account” for any transportation improvements.

- Respondents were asked how often transportation plans should take future land use changes into account. Sixty-four percent of respondents felt that transportation plans should always take future land use changes into account, while another 29% answered “usually”, 6% “sometimes”, and 1% “rarely”.

**Figure 7_15. Planners’ Opinions:
How Often Should Transportation Plans Consider Land Use Issues?**

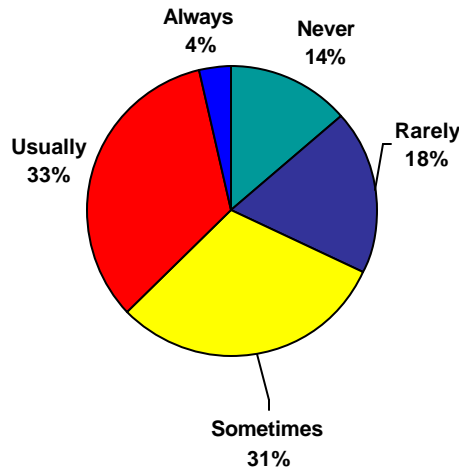


- Respondents’ opinions in Fig. 7_15 were compared with whether their plans accounted for the transportation impacts of land development projects. No major differences were observed; of those who said that transportation plans should “Always” consider land use issues, 31% said their plans accounted for “most or all” development projects, 23% said “only for certain development projects” and 46% said their plans “do not account” for any development projects. A similar distribution was observed for respondents who said that transportation plans should “Rarely”, “Sometimes”, or “Usually” considers land use issues.¹⁶

¹⁶ Among respondents who said that transportation plans should rarely or sometimes consider land use issues, 33% said their plans account for “most or all” development projects, 33% said “only for certain development projects” and 23% said their plans “do not account” for any development projects.

- Respondents were then asked how often a major unanticipated highway project required a revision or update of the land use plan. Most respondents reported that a revision was “Usually” (33%), or “Sometimes” (31%) required. Approximately one third of respondents reported that such revisions were rarely or never required, and only 4% said that they were always required.

Figure 7_16. How Often Does a Major Unanticipated Highway Project Require a Revision or Update of the Land Use Plan?



- Responses given in Fig. 7_16 were also compared with whether respondents’ plans accounted for land development impacts of transportation improvements. Of those who said their plans account for “most or all” transportation improvements, 38% said that a major unanticipated highway project “Usually” or “Always” requires a revision or update of the land use plan, 35% said that a revision is “sometimes” required, and 27% said that a revision is “never” or “rarely” required. Of those who said their plans account for “certain” transportation improvements, 23% said that a major unanticipated highway project “Usually” or “Always” requires a revision or update of the land use plan, 36% said that a revision is “sometimes” required, and 41% said that a revision is “never” or “rarely” required. Finally, of those who said their land use plans do not account for transportation improvements, 30% said that a major unanticipated highway project “Usually” or “Always” requires a revision or update of the land use plan, 33% said that a revision is “sometimes” required, and 37% said that a revision is “never” or “rarely” required.

Other Infrastructure Improvements Included in Land Use Plans ^{17, 18}

- As shown in Table 7_5, the most frequently reported infrastructure improvements aside from transportation were sewer (50%) and water/wastewater treatment (43%), followed by schools (31%) and storm drainage (24%). Approximately one third of respondents reported no infrastructure improvements (other than transportation) in their plans. Seventeen percent of respondents reported neither transportation nor other infrastructure improvements.

Table 7_5. Percentage of Other Infrastructure Improvements, by Subgroup

	<i>Sample Size</i>	<i>No Improvements¹⁹</i>	<i>No Infrastructure Improvements</i>	<i>Sewer</i>	<i>Storm Drainage</i>	<i>Schools</i>	<i>Water/Wastewater Treatment</i>
Overall	106	16	32	50	24	31	41
Jurisdiction							
City	45	14	31	58	36	29	38
County	61	18	33	44	16	33	43
Region							
Coastal	38	28	34	45	29	37	50
Mountain	17	12	35	47	23	18	47
Piedmont	51	10	29	55	22	32	32
Growth							
High	41	17	39	46	27	35	29
Low	65	16	28	52	23	29	48
Urbanized Region							
No	41	20	29	51	22	32	49
Yes	65	14	34	49	26	31	35
Population							
Large	42	17	33	57	21	32	45
Small	64	16	31	48	27	31	37

¹⁷ Denominator: Respondents who reported having a land use plan, excluding missing responses (N=107).

¹⁸ Categories will not sum to 100% because they are not mutually exclusive.

¹⁹ No Transportation or Other Infrastructure Improvements

- Figures 7_17 and 7_18 illustrate percentages of specific infrastructure improvements by jurisdiction and by region. Regionally, respondents from the Piedmont area reported more sewer improvements, while respondents from Coastal areas reported more improvements related to storm drainage, schools, and water/wastewater treatment.

Figure 7_17. Infrastructure Improvements by Jurisdiction

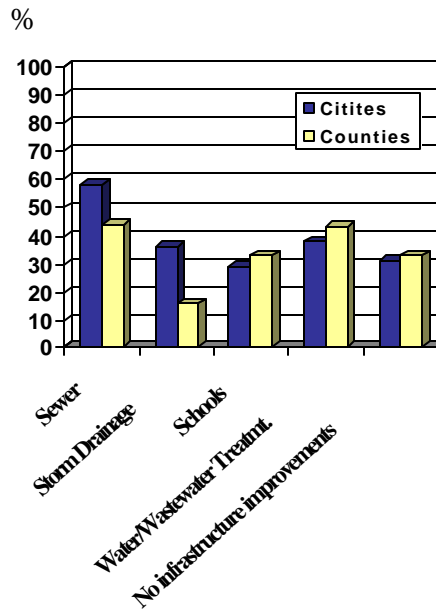
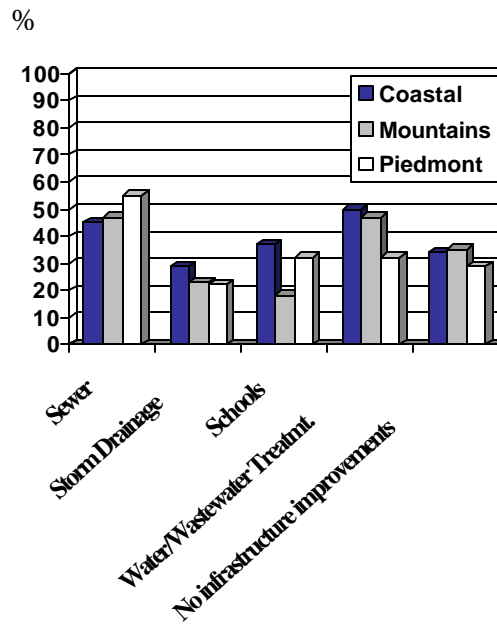
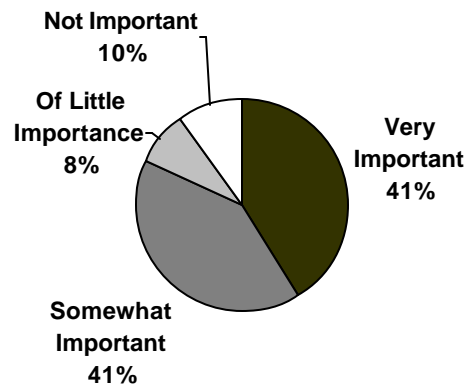


Figure 7_18. Infrastructure Improvements by Region



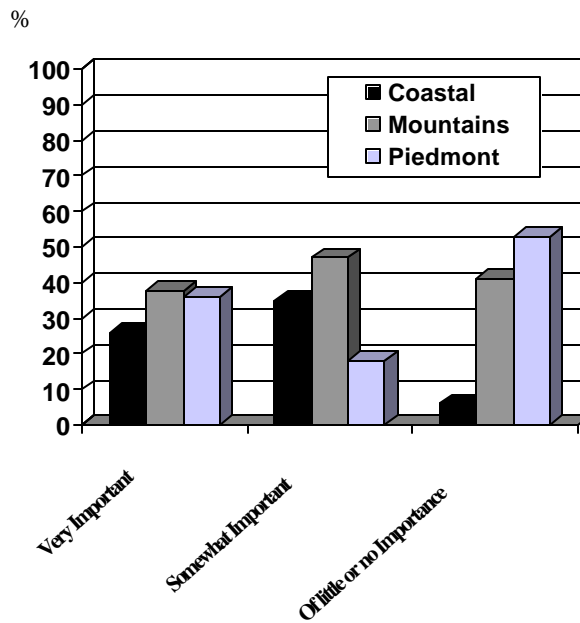
- Figure 7_19 illustrates responses to the question, “When making decisions on development projects and infrastructure funding, how important is the land use plan for elected officials?” The majority of respondents reported that the plan was “Very Important” or “Somewhat Important” (41% each); only 18% said the plan was “Of Little Importance” or “Not Important”.

Figure 7_19. Importance of Land Use Plan for Decision Making by Elected Officials



- Responses in Figure 7_19 were then examined with respect to the number of transportation improvement domains included in the plan (Auto/Road, Non-Motorized, Transit, and Safety). Those who reported that the plan was “Very Important” to elected officials were more likely to include 3 or more transportation domains (33%), compared to 21% of those who considered the plan “Somewhat Important” and 28% of those who considered the plan “Of Little Importance” or “Not Important”.
- Regional differences were also observed. Respondents from the Piedmont region were more likely to report that the plan was “Very Important” to elected officials (53%), compared to 18% of respondents from the Mountain region, and 36% from the Coastal region (Fig. 7_20).

Figure 7_20. Importance of Land Use Plan for Decision Making by Elected Officials, by Region



- The perceived importance of the plan to elected officials was related to the degree to which plans accounted for the reciprocal impacts of land development projects and transportation improvements. Those who reported that the plan was “Very Important” for decision-making were more likely to report that the plan accounted for “Most” or “All” transportation improvements (42%), compared to 24% of those who considered the plan “Somewhat Important” and 0% of those who considered the plan “Of Little Importance” or “Not Important”. Those who considered the plan “Of Little Importance” or “Not Important” were more likely to report that the plan did not account for transportation improvements (44%), compared to 33% of those who considered the plan “Somewhat Important” and 23% of those who considered the plan “Very Important”.

- The importance of the plan to elected officials was also analyzed with respect to each plan’s inclusion of the transportation impact of land development projects. Those who reported that the land use plan was “Very Important” for decision-making were more likely to report that transportation plans accounted for “Most” or “All” development projects (46%), compared to 30% of those who considered the land use plan “Somewhat Important” and 0% of those who considered the plan of little or no importance. Those who felt the land use plan was of little or no importance to elected officials were more likely to report that transportation plans did not account for development projects (67%), compared to 40% of those who considered the land use plan “Somewhat Important” and 28% of those who considered the land use plan “Very Important”.

Implementation Tools and Policies in Land Use Plans^{20,21}

- Table 7_6 shows the percentage of implementation tools and policies related to land use plans. Zoning was the most frequently cited implementation tool (92%), followed by Site Design Guidelines (52%), Capital Improvement Programs (44%), Planned Unit Development (44%), and Designated Growth Areas (41%). Less frequently reported tools included support of Land Trusts (13%), Impact Fees (12%), Local Impact Assessment (8%), Concurrency Requirements (6%), and Transfer/Purchase of Development Rights (2%). Several respondents also cited “other” tools such as AFPOs, utility service areas, overlay districts, school capacity concurrency requirements, and annexation agreements.

²⁰ Denominator: N=107 respondents with land use plans

²¹ Categories will not sum to 100% because they are not mutually exclusive

Table 7_6. Percentage of Implementation Tools and Policies^{1,1}, by Subgroup

	<i>Sample Size</i>	<i>Zoning</i>	<i>Transfer/ Purchase Development Rights</i>	<i>Capital Improvement Program</i>	<i>Designated Growth Areas</i>	<i>Concurrency Requirements</i>	<i>Planned Unit Development</i>	<i>Impact Fees</i>	<i>Support of Land Trusts</i>	<i>Site Designation Guidelines</i>	<i>Local Impact Assessment</i>
Overall	107	92	2	44	41	6	44	12	13	52	8
Jurisdiction											
City	46	93	0	54	46	4	52	15	6	67	11
County	61	92	3	36	37	7	38	10	18	41	5
Region											
Coastal	39	85	3	31	28	13	28	13	10	36	3
Mountain	17	94	0	41	35	0	53	0	12	35	6
Piedmont	51	98	2	55	52	2	53	16	16	71	12
Growth											
High	42	93	5	55	38	5	50	21	12	64	15
Low	65	92	0	37	42	6	40	6	14	45	3
Urbanized Region											
No	41	88	0	34	27	5	32	10	7	41	0
Yes	66	95	3	50	49	6	51	14	17	59	12
Population											
Large	43	95	5	42	52	2	44	9	19	53	9
Small	64	91	0	45	33	8	44	14	9	52	6

- Figures 7_21 and 7_22 show the distribution of specific implementation tools and policies, by jurisdiction and by region. Respondents from cities reported using implementation tools more frequently than those from counties, with the exception of Land Trusts and Transfer/Purchase of Development Rights. Regionally, respondents from the Piedmont area reported more implementation tools compared to respondents from the Mountain or Coastal areas.

Figure 7_21. Implementation Tools, by Jurisdiction

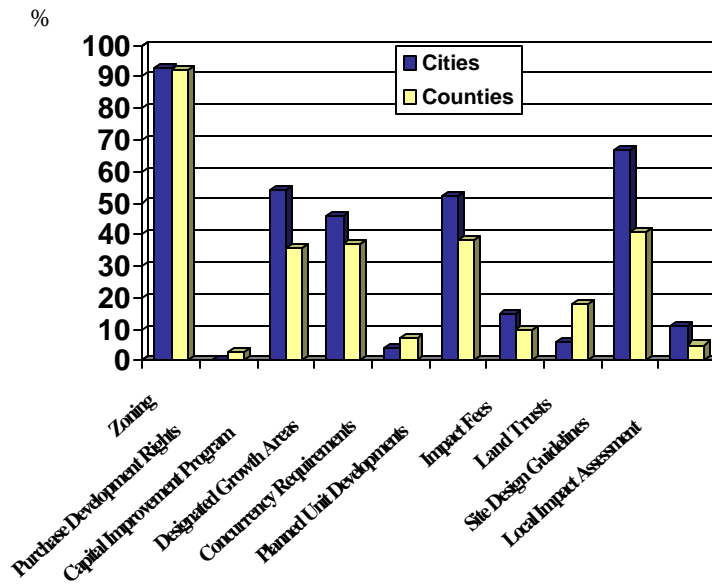
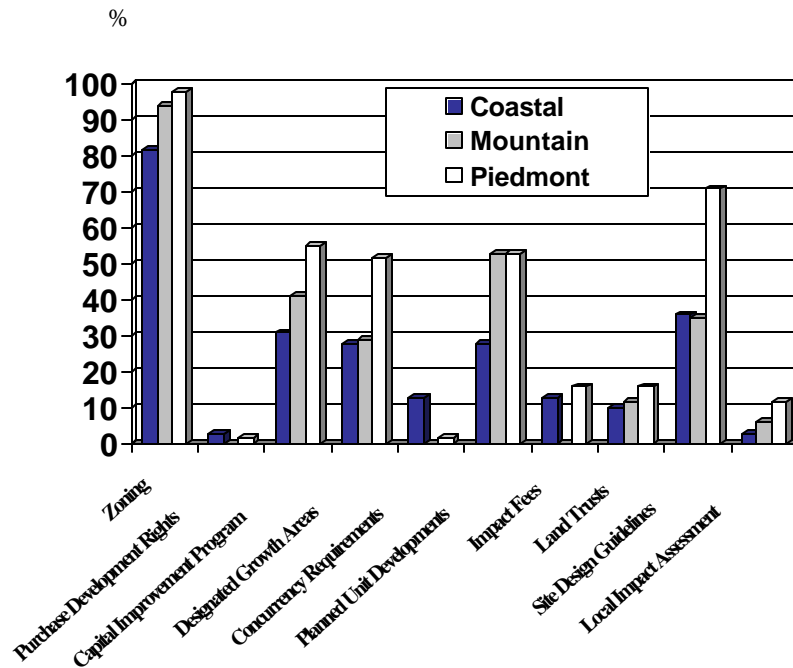


Figure 7_22. Implementation Tools, by Region



- Of the 10 implementation tools and policies listed, 63% of respondents reported 3 or more, while 32% reported 1-2, and only 5% did not report any (Table 7_4). Respondents from cities were more likely to cite 3 or more tools compared to respondents from counties (76% and 54%, respectively). Respondents from the Piedmont region reported 3 or more tools more frequently than did those from Mountain or Coastal areas (76% versus 53% and 51%). Respondents from high growth areas were more likely to report 3 or more tools (71%) compared to those from low growth areas (59%). A similar pattern was observed with respect to urbanization; respondents from urbanized regions were more likely to report 3 or more tools compared to those from non-urbanized regions (75% and 46%, respectively). No differences were observed between respondents from large versus small population areas. Subgroup patterns are illustrated in Figures 7_23 through 7_25.

**Table 7_7. Percentage of Respondents Reporting
0, 1-2, or 3+ Implementation Tools²²**

	<i>Sample Size</i>	0 Tools	1-2 Tools	3+ Tools
Overall	<i>104</i>	5	32	63
Jurisdiction				
City	<i>45</i>	4	20	76
County	<i>59</i>	5	41	54
Region				
Coastal	<i>37</i>	8	40	51
Mountain	<i>17</i>	6	41	53
Piedmont	<i>50</i>	2	22	76
Growth				
High	<i>41</i>	5	24	71
Low	<i>63</i>	5	36	59
Urbanized Region				
No	<i>41</i>	10	44	46
Yes	<i>63</i>	2	24	75
Population				
Large	<i>42</i>	5	31	64
Small	<i>62</i>	5	32	63

²² Denominator: Respondents who reported having a land use plan, excluding missing responses (N=107)

Figure 7_23. Number of Implementation Tools by Jurisdiction

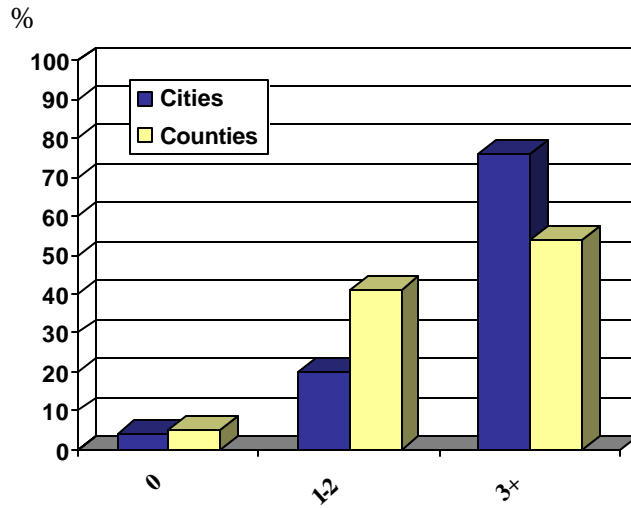


Figure 7_24. Number of Implementation Tools by Region

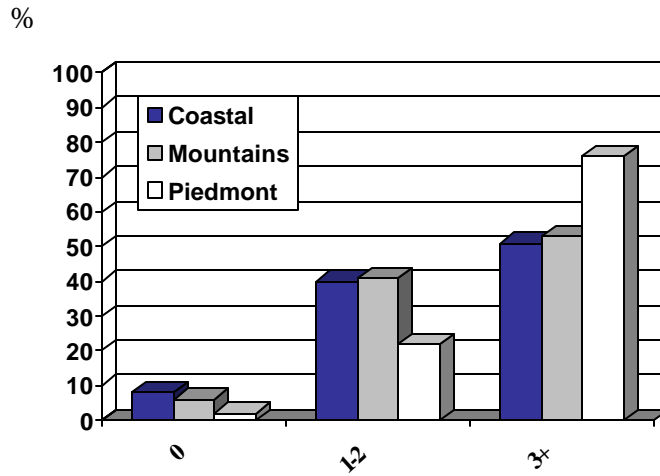
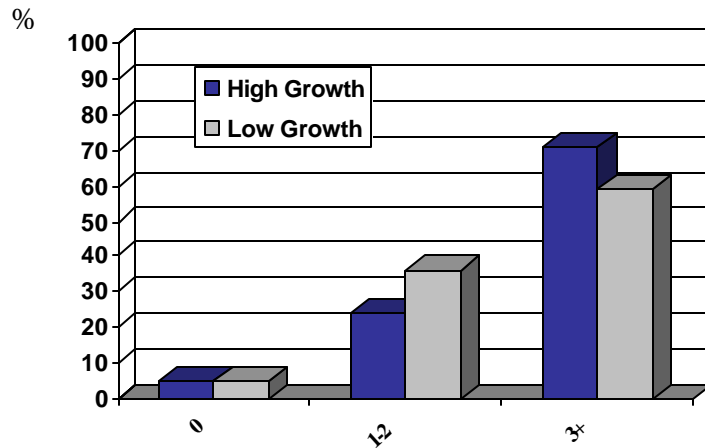


Figure 7_25. Number of Implementation Tools by Growth Rate



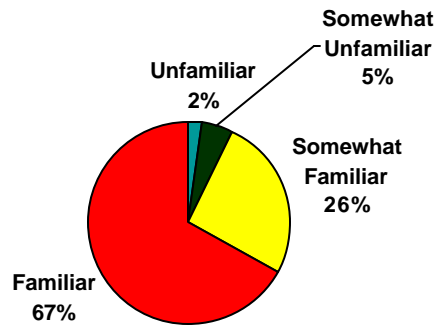
- The number of implementation tools was analyzed with respect to whether land use plans accounted for the land development impacts of transportation improvements. Respondents who said their plans accounted for “Most” or “All” transportation improvements were more likely to report 3 or more implementation tools (82%) compared to those whose plans accounted for “Certain” transportation improvements (66%) and those whose plans did not account for transportation improvements (47%).
- Similarly, respondents who said their land use plans accounted for “Most” or “All” transportation impacts of land development were more likely to report 3 or more implementation tools (84%), compared to those whose plans accounted for “Certain” development projects (70%), and those whose plans did not account for development projects (44%).
- Finally, the number of implementation tools was analyzed with respect to the number of transportation improvement domains (Auto/Road, Non-Motorized, Transit, and Safety) included in land use plans. Respondents who cited 3 or more implementation tools were also more likely to include at least 3 transportation improvement domains (36%), compared to those who cited 1-2 implementation tools (16%). Those who cited no implementation tools also reported no transportation improvements in any domain.

Planners’ Knowledge of State Transportation Improvement Programs²³

- Respondents were asked a series of questions about their familiarity with the impact and timing of transportation improvements. Figure 7_26 shows that the majority of respondents were “familiar” (67%) or “somewhat familiar” (26%) with the State Transportation Improvement Program (STIP) as it affected their jurisdictions.

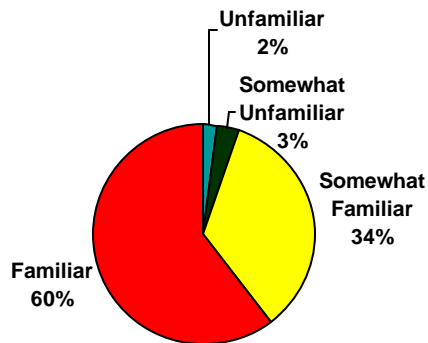
²³ Denominator: All respondents (N=126), excluding missing responses

Figure 7_26. Familiarity with State Transportation Improvement Program (STIP)



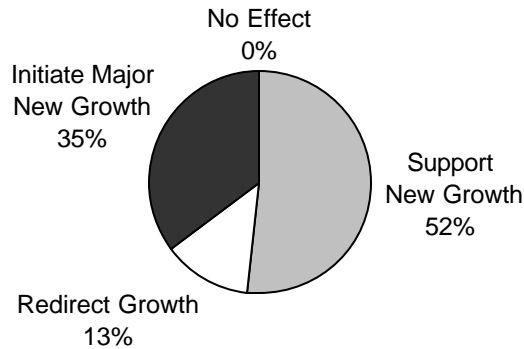
- Similarly, most respondents were “familiar” (60%) or “somewhat familiar” (34%) with where and when such improvements would take place (Figure 7_27).

Figure 7_27. Familiarity with Timing of STIP



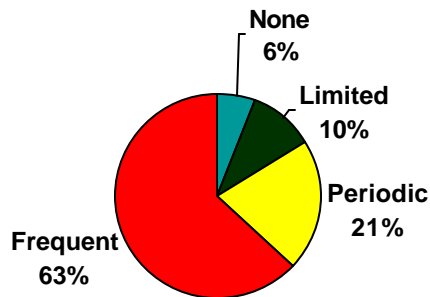
- As shown in Figure 7_28, all respondents felt that state transportation improvements would affect future land development in some way. Fifty-two percent felt that such improvements would support new growth, 13% felt that growth would be redirected from other places, and 35% felt that major new growth would be initiated.

Figure 7_28. Effect of State Transportation Improvements on Future Land Development



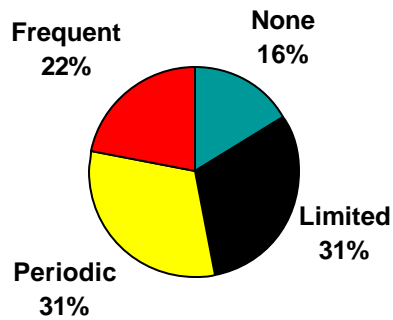
- Respondents were asked to describe the extent of interaction they had with the local RPO or MPO that prepares and coordinates transportation planning in their area. As shown in Figure 7_29, most respondents described such interaction as “Frequent” (63%), or “Periodic” (21%). Few respondents felt such interaction was “Limited” (10%) or nonexistent (6%).

Figure 7_29. Extent of Interaction with local RPO or MPO



- In contrast, when asked to describe the extent of interaction with NC DOT when their land use plans were developed or updated, most respondents described such interaction as “Limited” or “Periodic” (31% each). Less than one quarter of respondents described such interactions as “Frequent” (Figure 7_30).

Figure 7_30. Extent of Interaction with NC DOT



Elements of Transportation Plans in Communities²⁴

- Road improvements were the most frequently reported elements in transportation/thoroughfare plans (77%), compared to transit routes (32%), pedestrian/sidewalk plans (31%), greenway plans (30%), and bicycle plans (31%). However, all categories showed a discrepancy between the presence of an element and its implementation. Percentages for all subgroups are listed in Table 7_8.
- Figure 7_31 shows transportation plan elements broken down by jurisdiction. Although respondents from cities reported more elements compared to respondents from counties, the implementation discrepancy existed across jurisdictions. Categories were also grouped to represent Road, Transit, and Non-Motorized elements (Fig. 7_32). This analysis showed that the largest implementation discrepancy existed for counties in the “Road Improvement” domain.

²⁴ Denominator: All respondents, excluding missing responses (N=126)

Figure 7_31. Transportation Plan Elements Present vs. Implemented, by Jurisdiction

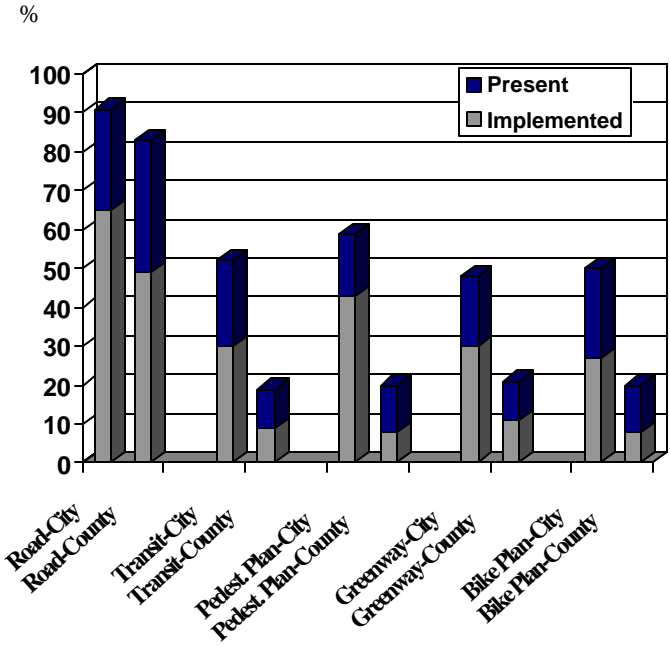


Figure 7_32. Transportation Plan Elements (Grouped), by Jurisdiction

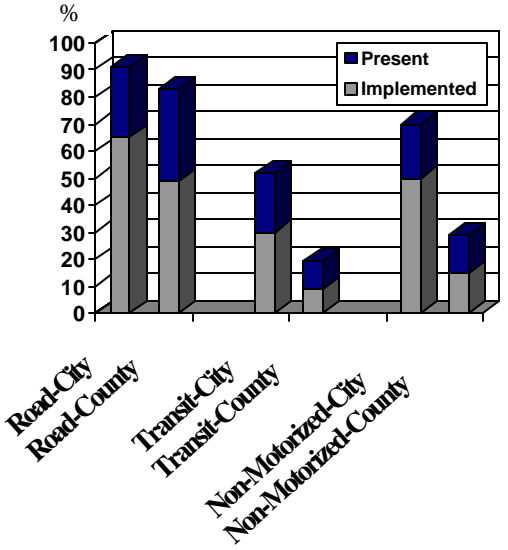


Table 7_8. Elements of Transportation Plans Present vs. Implemented^{25,26} by Subgroup

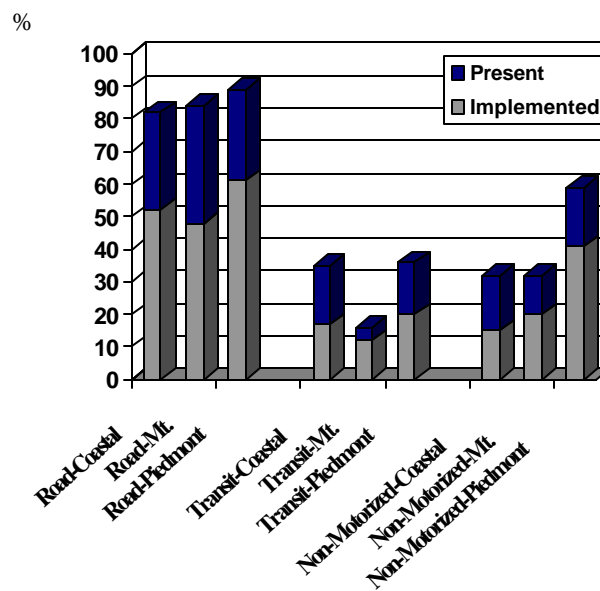
	<i>Sample Size</i>	Road Improvements	Transit Routes	Pedestrian/ Sidewalk Plan	Greenway Plan	Bicycle Plan
Overall						
Present	121	86	31	35	31	31
Implemented		55	17	21	18	15
Jurisdiction						
City-Present	46	91	52	59	48	50
City-Implemented		65	30	43	30	27
County-Present	75	83	19	20	21	20
County-Implemented		49	9	8	11	8
Region						
Coastal-Present	40	82	35	22	22	30
Coastal-Implemented		52	17	15	10	12
Mountains-Present	25	84	16	24	24	24
Mountains-Implemented		48	12	12	12	17
Piedmont-Present	56	89	36	48	41	36
Piedmont-Implemented		61	20	30	27	16
Growth						
High-Present	43	86	39	39	44	35
High-Implemented		63	26	35	30	19
Low-Present	78	86	27	32	24	29
Low-Implemented		51	13	14	11	13
Urbanized Region						
No-Present	50	82	28	24	30	22
No-Implemented		52	12	10	16	4
Yes-Present	71	89	34	42	32	38
Yes-Implemented		58	21	30	20	23
Population						
Large-Present	47	85	36	28	23	25
Large-Implemented		47	19	17	13	13
Small-Present	74	86	28	39	36	35
Small-Implemented		61	16	24	22	16

²⁵ Denominator: All respondents, excluding missing responses (N=126)

²⁶ Categories will not sum to 100% because they are not mutually exclusive

- Figure 7_33 shows the regional distribution of transportation plan elements. Road improvements were the largest category represented across all regions; road improvements also showed the largest implementation discrepancies. Respondents from the Piedmont region were more likely to report elements across most categories compared to respondents from other regions. Transit improvements were cited less frequently across all regions.

Figure 7_33. Transportation Plan Elements (Grouped), by Region



Pedestrian or Bicycle-Oriented Projects Funded in Communities^{27,28}

- Fifty-nine percent of respondents reported funding some type of non-motorized transportation project in their communities. Sidewalks (41%), greenways (32%), and pedestrian crossings (31%) were the most frequently cited pedestrian/bicycle projects overall. Respondents from municipalities reported pedestrian/bicycle projects more frequently than respondents from counties, with the exception of Rails-to-Trails projects (Fig. 7_34). However, thirty percent of municipal respondents and 48% of county respondents reported that there were no pedestrian/bicycle projects funded in their communities. Table 7_9 lists the percentages for all subgroups.

²⁷ Denominator: All respondents, excluding missing responses (N=126)

²⁸ Categories will not sum to 100% because they are not mutually exclusive

Figure 7_34. Pedestrian and Bicycle Oriented Projects Funded, by Jurisdiction

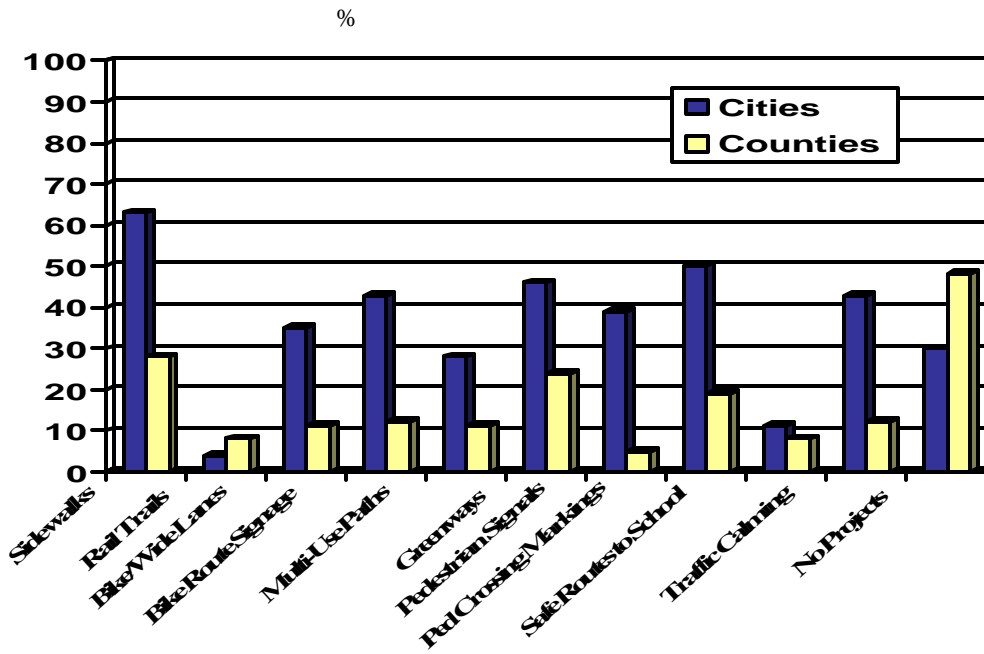


Table 7_9. Percentage of Pedestrian or Bicycle Projects Funded^{29,30} by Subgroup

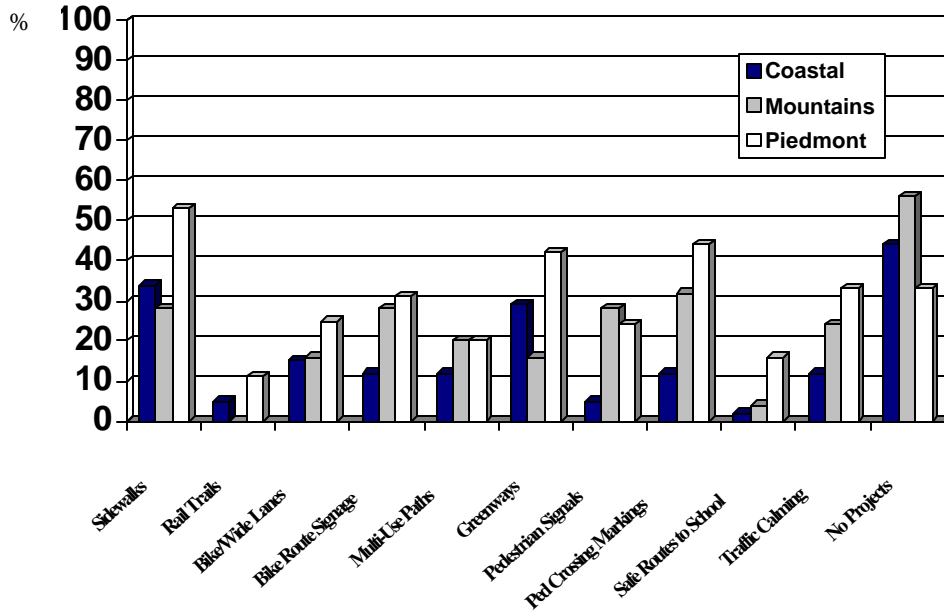
	<i>Sample Size</i>	Sidewalks	Rail-Trails	Bike/Wide Lane	Bike Route Signage	Multi-Use Paths	Greenways	Pedestrian Signals	Pedestrian Crossing Markings	Safe Routes to School Program	Traffic Calming	No Ped-Bike Projects
Overall	121	41	7	20	24	17	32	18	31	9	24	41
Jurisdiction												
City	46	63	4	35	43	28	46	39	50	11	43	30
County	75	28	8	11	12	11	24	5	19	8	12	48
Region												
Coastal	41	34	5	15	12	12	29	5	12	2	12	44
Mountain	25	28	0	16	28	20	16	28	32	4	24	56
Piedmont	55	53	11	25	31	20	42	24	44	16	33	33
Growth												
High	51	51	9	23	21	28	44	23	35	9	28	37
Low	78	36	5	18	26	11	26	15	28	9	22	44
Urbanized Region												
No	51	37	8	16	20	10	27	6	22	0	14	45
Yes	70	44	6	23	27	23	36	27	37	16	31	39
Population												
Large	46	35	11	17	13	20	30	13	24	9	20	48
Small	75	45	4	21	31	16	33	21	35	9	27	37

²⁹ Denominator: All respondents, excluding missing responses (N=126)

³⁰ Categories will not sum to 100% because they are not mutually exclusive

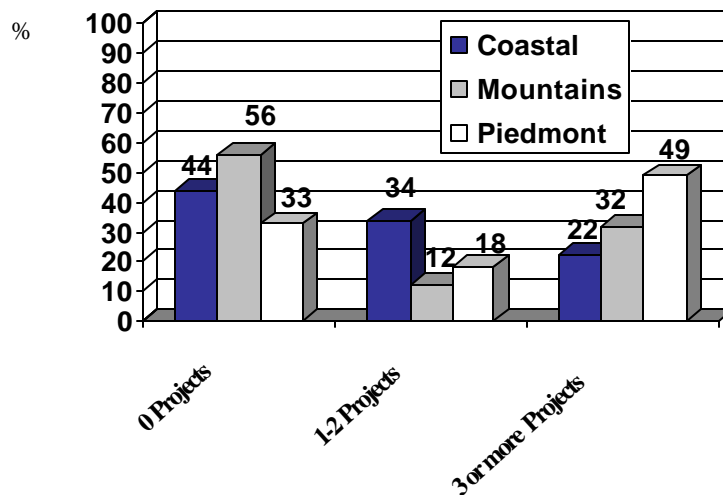
- Respondents from the Piedmont region cited more pedestrian/bicycle oriented projects compared to respondents from other regions (Fig. 7_35).

Figure 7_35. Pedestrian and Bicycle Oriented Projects Funded, by Region



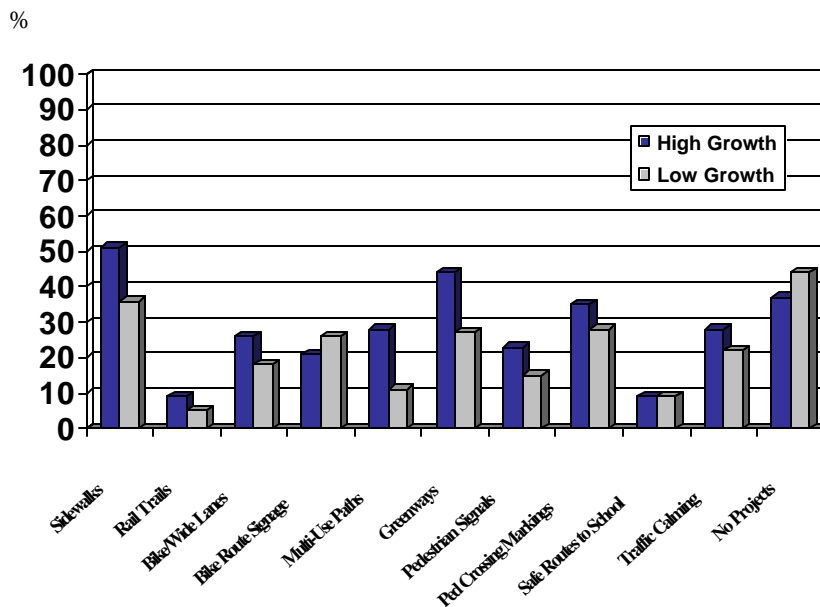
- As shown in Figure 7_36, almost half of Piedmont respondents reported funding three or more pedestrian or bicycle projects, compared to 32% of Mountain and 22% of Coastal respondents. Over 50% of Mountain respondents reported no pedestrian or bicycle projects funded, compared to 44% of Coastal and 33% of Piedmont respondents.

Figure 7_36. Number of Pedestrian and Bicycle Oriented Projects Funded, by Region



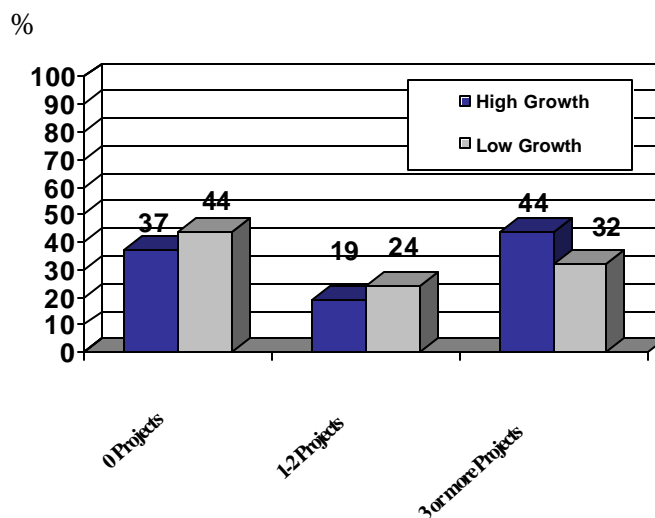
- Funding related to pedestrian and bicycle projects was also analyzed with respect to growth. As shown in Figure 7_37, respondents from high growth areas were more likely to have funded pedestrian and bicycle projects, with the exception of bike route signage and Safe Routes to School Programs. Thirty-seven percent of respondents from high growth areas and 44% of respondents from low growth areas did not report any pedestrian or bicycle oriented projects in their communities.

Figure 7_37. Pedestrian and Bicycle Oriented Projects Funded, by Growth



- Respondents from high growth areas were also more likely to report funding three or more pedestrian or bicycle projects (44%) compared to those from low growth areas (32%) (Fig. 7_38).

Figure 7_38. Number of Pedestrian and Bicycle Oriented Projects Funded, by Growth



Respondent Comments and Concerns

Several respondents wrote comments expressing their views about issues raised by the survey. Selected comments are listed below:

- North Carolina law and administrative practices limit the effectiveness of coordination/implementation between school facilities (in most cases a county function) and transportation plans (mostly municipal and state). Another structural concern is the limitations on counties being able to implement transportation plans. A third is the limited authority of local governments to protect transit r.o.w's through the development regulation process.
- N.C. is falling behind our neighboring states in land use planning.
- NCDOT plays a passive role in the review and planning of future development proposals and future land use. I do see some progress, but they need to be a dominant force to coordinate transportation and land use plans between counties and municipal government.
- (Our area) is in the process of updating its comprehensive plan (planned adoption - summer 2003). This plan focuses on the strong linkage between land use and transportation, with a clear smart growth perspective. The answers to the survey would be made different if this plan was in plan.

Appendix 8. Disaggregate Results of Content Analysis

Planning outcomes examined in protocol	Mean	Std. Dev.	Min	Max
<i>Total Substantive Score (Goals and Policies)</i>	6.80	3.92	0	17
Presence of Transportation and Land Use-Related Goals	1.87	1.43	0	5
Presence of Transportation and Land Use-Related Policies/Objectives	4.93	3.03	0	12
Non-Motorized Policies	2.27	2.20	0	7
Motorized Policies	2.67	1.54	0	6
<i>Total Procedural Score</i>	22.90	4.71	13	33
Land Classification Maps and Transportation	0.27	0.58	0	2
Transportation Maps	0.27	0.45	0	1
Land Use to Achieve Broad Transportation Goals	0.33	0.48	0	1
Transportation to Achieve Broad Land Use Goals	0.57	0.50	0	1
Transportation-Land Use Connection Explicitly Reinforced	0.13	0.35	0	1
Use of Mobility Indicators	0.47	0.51	0	1
Use of Accessibility Indicators	0.00	0.00	0	0
Inclusion of Motorized Modes	0.70	0.47	0	1
Inclusion of Non-Motorized Modes	0.77	0.43	0	1
Motorized Planning Integration	0.40	0.50	0	1
Non-Motorized Planning Integration	0.17	0.38	0	1
Transit Capital Improvements Accounted For	0.30	0.47	0	1
Land Suitability Analysis and Transportation Infrastructure	0.90	0.31	0	1
Environmental Impacts of Transportation Projects	0.13	0.35	0	1
Plan Organization	0.33	0.48	0	1
Sources of Text	0.83	0.38	0	1
Map/Display Quality	0.47	0.51	0	1
Transportation Component	0.67	0.48	0	1
Data Summary and Sources	0.23	0.43	0	1
Data Correctness	0.03	0.18	0	1
Data Discussion	1.67	0.66	0	2
Analysis of Development Options	0.47	0.51	0	1
Current Transportation Conditions	1.37	0.85	0	2
Infrastructure Capacity	0.90	0.31	0	1
Induced Development from Transportation	0.43	0.50	0	1
Induced Development from Other Infrastructure	0.20	0.41	0	1
Clear Objectives	0.73	0.45	0	1
Objectives and Goals Presented Together	0.37	0.49	0	1
Emphasis Clear	0.40	0.50	0	1
Goal-Objective-Policy Hierarchy	0.93	0.74	0	2
Language	0.20	0.41	0	1
Spatial Specificity	0.63	0.49	0	1
Priorities	0.03	0.18	0	1
Vertical Consistency	1.20	0.55	0	2
Horizontal Consistency	0.90	0.31	0	1
Internal Consistency	0.83	0.70	0	2
Implementation Consistency	1.37	0.67	0	2
Plan Implementation	0.07	0.25	0	1
Public Participation	2.23	1.10	0	3

Appendix 9. Reliability assessment of content analysis protocol

To assess the reliability of using the protocol, we followed two approaches. First, we compared the percentage of agreement between the two raters for each item on the instrument applied to each of the 30 plans. The percentage of agreement determines the proportion of occasions that raters agree on scoring, although this method is limited because it does not take into account the level of agreement that could have occurred by chance. A high-level of agreement indicates high reliability.

Second, for each item in the instrument, we calculated a reliability statistic known as Cohen's Kappa, as shown in the table in the Appendix 9. Cohen's Kappa statistic overcomes limitations of the percent agreement measure by providing a chance-corrected measure of agreement between raters (Stokes, Davis, & Koch, 2000). A Kappa coefficient of 1.0 represents perfect agreement; Kappa coefficients equal to zero represent agreement corresponding to that expected by chance, and Kappa coefficients less than zero represent agreement less than that expected by chance. For items with more than two response categories, a weighted kappa statistic (indicated by "w" in the Table) was calculated using the method of Cicchetti et al. (Stokes et al., 2000).³¹ Guidelines for interpreting Kappa coefficients are published in the statistical literature; we used the criteria defined by Landis (Landis & Koch, 1977): Kappa values <0.20 indicate poor agreement between raters, values between 0.21 and 0.40 indicate fair agreement, values between 0.41 and 0.60 indicate good agreement, values between 0.61 and 0.80 indicate very good agreement, and values above 0.80 indicate excellent agreement (in the Table, we combined the "very good" and "excellent" categories).

The results suggest that the highest average kappa values (>0.60) were observed for Sections 1 (General Information) and 2 (Plan Components/Presentation). Kappa coefficients classified as "good" (>0.40) were found for Sections 6 (Detailed Goals and Policies) and 8 (Implementation). The remaining sections (3 (Supporting Data), 4 (Planning Process), 5 (Background Goals and Policies), 7 (Content), and 9 (Consistency)) achieved Kappa coefficients in the "Fair" range (0.21-0.40).³² However, despite having lower Kappa coefficients, the aggregate percentage of agreement for Sections 4 (Planning Process), 7 (Content), and 9 (Consistency) was approximately 75% or higher, so these sections may be regarded as reasonably reliable overall despite a limited number of disagreements on certain items. Sections 3 (Supporting Data) and Section 5 (Background

³¹ Our weighting scheme weights disagreements between responses that are just one category away (e.g. 1 vs. 2) more favorably than disagreements between responses that are several categories away (e.g. 1 vs. 4).

³² Although the Kappa statistic is widely used as an indicator of agreement between raters, Kappa coefficients should be interpreted with caution when data are highly skewed (e.g. when there are limited numbers of observations and a limited number of response categories) because skewed distributions often produce high levels of agreement expected by chance³². Disagreements over a small number of items can produce substantial differences in the Kappa statistic depending on the distribution of the pairwise agreements, since the statistic calculates the expected level of agreement given the observed data. For example, an item that is coded as present 95% of the time and absent only 5% of the time would produce a very high level of agreement expected by chance. This can lead to low kappa scores despite high percentages of agreement between raters.

Goals and Policies) showed lower percentages of agreement (67% and 66%, respectively), indicating that these sections may be less reliable overall and should be interpreted more cautiously. See Appendix 9 for detailed results on both agreement measures.

Question	Variable Description	Kappa ³³	% Percent Observed Agreement	Number Agree	Total Observations	Very Good-Excellent (Kappa >0.60) ³⁴	Good (Kappa 0.41-0.60)	Fair (Kappa 0.21-0.40)	Poor (Kappa <0-0.20)	Average Section Kappa (SE)	Section Percent Agreement
1	General Information					4	0	0	0	1.0 ³⁵ (0)	75
1.1	Place name	1	100	30	30						
1.2	Place type	1	100	30	30						
1.3	Name of Plan	1	100	30	30						
1.4	Date of development	Text	37	11	30						
1.5	Date adopted	Text	63	19	30						
1.6	Date of latest update	Text	73	22	30						
1.7	Time Horizon	Text	53	16	30						
1.8	Approximate page length (incl. appendices)	Text	50	15	30						
1.9	Consultant(s) used	1	100	30	30						
2	Plan components/ presentation					7	2	2	0	0.63 (0.15)	78
2.1	Table of contents provided?	0.84	97	29	30						
2.2	Glossary of terms provided?	0.76	93	28	30						
2.3	Executive summary provided?	0.77	90	27	30						

³³ Cohen's Kappa coefficient represents the amount of agreement between raters, beyond that expected by chance. When Kappa=1 represents perfect agreement; Kappa=0 represents agreement equal to that of chance, and Kappa<0=agreement less than that expected by chance. Kappa values between 0.1 and 0.39 indicate slight agreement; kappa values between 0.4-0.75 indicate moderate agreement, and kappa values>0.75 indicate excellent agreement (Stokes, Davis, and Koch 2000). For items with more than two response categories, a weighted kappa statistic (w) was calculated using the method of Cicchetti and Allison, 1969. This weighting scheme weights disagreements between responses that are just one category away (e.g. 1 vs. 2) more favorably than disagreements between responses that are several categories away (e.g. 1 vs. 4).

³⁴ Asymmetric distributions result when one rater gave all plans the same score for a given question (e.g. 100% "yes", 0% "no") and the other rater scored some plans "yes" and some plans "no". This situation produces very small (0) kappa coefficients. Zero kappa coefficients due to asymmetry were excluded from section averages, but are included for individual items (indicated with an ^a).

³⁵ Based on the four numerical questions in this section.

2.4	Sources in text and tables provided?	0.22 ^w	43	13	30						
2.5	Overall quality of land use maps	0.66	90	26	29						
2.6	Do the following exist in land classification maps?	-									
2.6.1	Landmarks/ Key activity points/nodes	0.55 ^w	48	14	29						
2.6.2	Transit routes	0.71 ^w	77	23	30						
2.6.3	Non-motorized infrastructure routes (right-of-ways, greenways, bikeways)	0.74 ^w	87	26	30						
2.7	Overall quality of (non-map) displays	0.4	70	21	30						
2.8	Overall quality of transportation maps	0.6	81	22	27						
2.9	Is there a specific transportation component in the plan?	0.65	83	25	30						
3	Supporting Data					4	3	7	11	0.32 (0.16)	67
3.1	Is a summary of land use-related data collection and analysis provided?	0.12	43	12	28						
3.2	Is a summary of the demographic and economic data collection and its analysis provided?	0.14	43	13	30						
3.3	Are the sources of the economic and demographic data provided?	0.36	73	22	30						
3.4	Is a summary of the transportation-related data presented and analysis provided?	-0.067	47	14	30						
3.5	Are the sources of the transportation data provided?	0.36	73	22	30						

3.6	Are any data not collected directly double-checked, or just assumed correct?	0.24	83	25	30						
3.7	Primary economic base(s) noted?	1	100	30	30						
3.8	Population trends (numbers)	0.64 ^w	83	25	30						
3.9	Economic trends (numbers)	0.54 ^w	70	21	30						
3.10	Development trends discussed?	0.12	69	20	29						
3.11	Environmental trends/problems discussed?	0.58	79	23	29						
3.12	Existing undeveloped land and water bodies discussed?	0.17 ^w	53	16	30						
3.13	Physical limitations for development mentioned?	-									
3.13.1	Stream Buffers	0.19	60	18	30						
3.13.2	Other water body buffers	0.04	53	16	30						
3.13.3	Open space requirements	0	43	13	30						
3.13.4	Existing transportation corridors	0	43	13	30						
3.13.5	Soils	0.65	83	25	30						
3.13.6	Slopes	0.8	90	27	30						
3.14	Is road supply discussed?	0.32	73	22	30						
3.15	Is road demand discussed?	0.11	43	13	30						
3.16	Is transit service supply discussed?	0.32	67	20	30						
3.17	Is transit demand discussed?	0.36	83	25	30						
3.18	Is other infrastructure capacity discussed (police, schools, water & sewer, etc)?	0.5	77	23	30						
3.19	Is induced development from previous expansions to transportation capacity discussed?	0.19	62	18	29						
3.2	Is induced development from previous expansions to other infrastructure capacities discussed?	0.22	77	23	30						
4	Planning Process					1	2	3	1	0.34 (0.15)	74
4.1	Explanation of planning process provided?	0.22	77	23	30						

4.2	Description of public participation process provided?	0.44	80	24	30						
4.3	Stakeholder involvement discussed?	-0.06	77	23	30						
4.4	Planning or steering committee discussed?	0.35	73	22	30						
4.5	Was there a publicly circulated preliminary draft?	0.22 ^w	47	14	30						
4.6	Was there a survey of public opinion?	0.48 ^w	73	22	30						
4.7	Other public participation mechanisms discussed?	0.74	90	27	30						
5	Plan Goals & Policies (background)					2	0	1	4	0.32 (0.16)	66
5.1	Is a clear statement of goals and objectives provided?	0.62	83	25	30						
5.2	Do goals, policies and objectives follow ULUP's definition?	0.17	63	19	30						
5.3	Presentation of goals, objectives & policies (together)	0.2	57	17	30						
5.3.1	If scattered, are broader goals discernable from policy statements?	(conditional)									
5.4	Can a clear emphasis in the goals/objectives be identified?	0.14	60	18	30						
5.4.1	If so, what are they?	text									
5.5	Are there any transportation/mobility goals stated?	0.63	83	25	30						
5.6	Do transportation goals have land use-related objectives and/or policies?	0.38	57	17	30						
5.7	Do land use goals have transportation-related objectives and/or policies?	0.1	57	17	30						
6	Plan Goals & Policies					8	8	10	6	0.42 (0.18)	80

	(detailed)										
6.1	Do the following goals exist in the plan:	-									
6.1.1	Efficient use of land and infrastructure	0.29	66	19	29						
6.1.2	New growth directed to existing developed areas	0.1	73	22	30						
6.1.3	Mix of land uses	0.59	83	25	30						
6.1.4	Higher density development concentrated in areas with urban services and infrastructure (incl. infill development)	0.15	72	21	29						
6.1.5	Walkable communities	0.26	87	26	30						
6.1.6	Variety in housing options	0.59	83	25	30						
6.1.7	High quality of life for residents	0.67	83	25	30						
6.1.8	Investment in already developed areas	0.23	76	22	29						
6.1.9	Coordinated interagency infrastructure planning (local, state, regional)	0.52	80	24	30						
6.1.10	Transportation/Roads	0.4	70	21	30						
6.1.11	A variety of transportation options	0.79	93	28	30						
6.1.12	Existing infrastructure upgraded and maintained first	-0.06	80	24	30						
6.1.13	Sustainable use of natural resources	0.14	60	18	30						
6.1.14	Preservation of natural resources	0.71	93	28	30						
6.2	Do the following policies exist in the plan:	-									
6.2.1	Infrastructure (water, sewer and roads) investments to manage growth	0.38	77	23	30						
6.2.2	Recreational opportunities within walking or biking distance	0.59	87	26	30						

6.2.3	Office, research, industrial and commercial areas with direct non-motorized links to surrounding areas	0.45	83	25	30						
6.2.4	Locally and regionally appropriate facades, landscaping and site designs	0.31	70	21	30						
6.2.5	Commercial centers provide pedestrian amenities (transit stops, awnings, landscaping, minimal setbacks, etc)	0.31	70	21	30						
6.2.6	Auto-oriented retail development that <u>deliberately</u> promotes or avoids in certain areas	-0.05	43	13	30						
6.2.7	Quality affordable child care and related transportation opportunities	0 ^a	97	29	30						
6.2.8	Investments in new infrastructure that <u>deliberately</u> promotes certain growth patterns	0.49	73	22	30						
6.2.9	Public transportation and concomitant infrastructure (bus centers, park & ride, etc)	0.64	83	25	30						
6.2.10	Pedestrian & bike access, connections (greenways, sidewalks) and infrastructure (bike racks, showers, etc)	0.65	83	25	30						
6.2.11	Employer and/or government-sponsored commute reduction programs	0.63	93	28	30						
6.2.12	Traffic management plans to reduce peak period congestion	0.35	90	27	30						
6.2.13	Traffic calming devices	0.36	83	25	30						
6.2.14	Parking demand/supply management	0.44	87	26	30						
6.2.15	Transit-oriented developments	0.56	83	25	30						
6.2.16	Regular performance monitoring of transportation modes	0.35	90	27	30						
6.2.17	Local relationship to regional transportation network	0.72	87	26	30						

6.2.18	Use of renewable energy resources	0.65	97	29	30						
6.2.19	Transfer of development rights	0.17	63	19	30						
7	Content					10	5	3	14	0.40 (0.09)	80
7.1	Does the plan articulate a standard goal-objective-policy hierarchy?	0.45	73	22	30						
7.2	Are relationships between goals objectives and policies discernable?	0.26	70	21	30						
7.3	Are relationships between goals objectives and policies reasonable?	0.29	73	22	30						
7.4	What type of language is used in policy statements?	0.02 ^w	57	16	28						
7.5	Is there spatial specificity in relevant policies?	0.18	57	17	30						
7.6	Are goals clearly prioritized?	0 ^a	97	29	30						
7.7	Is the reciprocal relationship between transportation and land use explicitly mentioned or referenced as part of the plan?	0.14	47	14	30						
7.8	Which of the following transportation indicators are used:	-									
7.8.1	Level of service	-0.06	80	24	30						
7.8.2	Volume – to – capacity ratio	0 ^a	93	28	30						
7.8.3	Delay	1	100	30	30						
7.8.4	Vehicles (e.g. buses, cars, bicycles) per hour	1	100	30	30						
7.8.5	Average commute to work time	-0.03	93	28	30						
7.8.6	Percent using non-auto modes	0 ^a	97	29	30						
7.8.7	Annual Average Daily Traffic	0.59	87	26	30						
7.8.8	Percent of streets with sidewalks	1	100	30	30						
7.8.9	Percent of population within transit route	1	100	30	30						

7.8.10	Percent of population within bikeway/trail	1	100	39	30						
7.8.11	Percent destinations accessible within time ranges	1	100	30	30						
7.9	Are the following transportation modes mentioned and discussed in the land use plan?	-									
7.9.1	Auto	0.20 ^w	57	17	30						
7.9.2	Public transit	0.55 ^w	63	19	30						
7.9.3	Pedestrian	0.76 ^w	83	25	30						
7.9.4	Bicycle	0.70 ^w	80	24	30						
7.9.5	Carpool	0.87	97	29	30						
7.9.6	Vanpool	0.71	90	27	30						
7.9.7	Other	text									
7.10	Which of the following strategies for prescribing physical design for particular modes exist?										
7.10.1	Sidewalk plan	0.13	69	20	29						
7.10.2	Greenway plan	0.34	72	21	29						
7.10.3	Bike path / pedestrian plan	0.02	55	16	29						
7.10.4	Road improvements/ thoroughfare plan	0.13	52	15	29						
7.10.5	Transit plan	0	83	24	29						
7.10.6	Transit oriented development plan	0	90	26	29						
7.11	Is a transportation-related capital improvements program included in the plan?	0.01	66	19	29						
7.12	Does the land suitability analysis take into account transportation facilities?	0.44	82	23	28						
7.13	Are land suitability and infrastructure service capacity constraints considered for prescribing relevant land development policies (e.g. land classification scheme, TIP priorities)?	0.16 ^w	54	15	28						

7.14	Are there objectives or policies that address environmental impacts of transportation projects	0.42	87	26	30						
7.15	Are there objectives or policies that address long term land development and related environmental impacts of transportation projects?	-0.05	87	26	30						
8	Implementation					0	2	1	0	0.41 (0.19)	83
8.1	Are land use goals quantified based on measurable objectives?	0.5	85	22	26						
8.1.2	If so, are the indicators of those objectives included?	(Conditional)									
8.2	Are any transportation-related indicators used to quantify land use goals?	0.23	79	19	24						
8.3	Is the timing of implementation of the land use plan provided?	0.5	80	24	30						
8.4	Is a clearly identified person accountable for transportation-related objectives and policies?	0 ^a	87	26	30						
9	Consistency					4	2	7	6	0.36 (0.15)	75
9.1	Vertical Consistency										

9.1.1	Does the plan mention authorizing legislation or state requirements?	0.16	50	15	30						
9.1.2	External agencies mentioned and accounted for	-		-							
9.1.2.1	NCDOT	0.37	90	27	30						
9.1.2.2	RPO	1	100	30	30						
9.1.2.3	MPO	1	100	30	30						
9.1.2.4	COGs	0.61	90	27	30						
9.1.2.5	DENR	0.29	73	22	30						
9.1.2.6	Transit agencies	0.74	90	27	30						
9.1.2.7	Other city/county/state agencies	text									
9.2	Horizontal Consistency	-		-							
9.2.1	Is any of the following Intergovernmental coordination mentioned?	-		-							
9.2.1.1	County-County coordination	0.35	77	23	30						
9.2.1.2	Town-Town coordination	0.67	87	26	30						
9.2.1.3	Town-County coordination	0.26	87	26	30						
9.3	Internal Consistency	-		-							
9.3.1	Are the goals and objectives compatible throughout the plan?	-0.04	50	15	30						
9.3.2	Are the policies compatible throughout the plan?	-0.24	56	15	27						
9.3.3	Are <i>incompatible</i> goals or policies reconciled or ranked in order of importance	(Conditional)									
9.3.4	Is there consistency with current TIPs?	.34	66	19	29						
9.3.5	Is there consistency with a long-range transportation plan for the area or region?	.21	70	21	30						
9.3.6	Are land use elements connected to other infrastructure elements (water & sewer, schools, etc)?	0 ^{al}	93	28	30						
9.4	Implementation Consistency	-		-							

9.4.1	Do the land use plans policies specifically call for certain action(s) to implement those policies? If so, please comment	.28	80	24	30						
9.4.2	Do the actions related to specific land use policies in the plan appear efficacious?	0.09	67	20	30						
9.4.3	Are specific transportation and land use investments tied to specific funding sources?	-0.14	57	16	28						
9.4.4	Do the plan's transportation policies specifically call for new action(s) to implement those policies? If so, please comment	0.42 ^w	53	16	30						
9.4.5	Do the actions related to specific transportation policies in the plan appear efficacious?	0.49 ^w	67	20	30						

Appendix 10. Survey validity assessment

To assess the validity or the accuracy of planners’ self-reported responses to the survey, we compared their responses to corresponding items on the content evaluation instrument for the 30 plans that we evaluated in detail. This entailed developing a “gold standard” to reflect the most accurate assessment of the plans’ true content and quality based on the content analysis. The first step in developing the gold standard involved deciding which of the two independent raters (Rater A or Rater B) achieved a greater degree of accuracy in scoring the plans. To provide an expert assessment, three plans were examined in detail by the principal investigator. Each item on the coding instrument was then assigned a score by the principal investigator as well as by a doctoral student trained intensively by the principal investigator. These scores were then regarded as the most accurate “true” scores.

Next, we developed a series of regression models using the “true” scores as the dependent variable, and the independent rater’s scores for the three plans as the independent variable. This analysis showed that Rater A’s scores consistently explained a higher proportion of variance in the “true” scores ($R^2=70\%$); thus Rater A’s scores were regarded as the “gold standard” for the remaining 27 plans in our sample.

Building upon this information, we calculated two measures of validity (sensitivity and specificity) by comparing the gold standard to the planners’ survey responses. Sensitivity assesses the ability of the survey to correctly identify an element as present in the land use plan when the gold standard identified that element as present. Sensitivity is expressed between 0 and 1, with 1 meaning that the planners correctly identified an element as present 100% of the time.³⁶ On the other hand, specificity assesses the ability of the survey to correctly identify an element as *absent* when the gold standard identified that element as absent. Specificity is expressed as (number absent_{survey}/ number absent_{gold standard}). Ideally, both sensitivity and specificity should be higher than 70%.

Gold Standard: Coding Protocol Element	Variable Description	Gold Standard: Number of Plans with Element Present (absent) ³⁷	Planning Survey Question (Self-Report)	Survey: Number Plans with Element Present (absent)	Sensitivity ³⁸	Specificity ³⁹
2.9	Is there a specific transportation component in the plan?	18 (10)	Does the future land use plan include specific transportation improvements (Q8)?	17 (4)	0.94	0.40
7.7	Is the reciprocal relationship between transportation and land use specifically	4 (25)	Does the future land use plan account for the transportation impacts of	4 (10)	1.0	0.40

³⁶ Sensitivity is expressed as a ratio (number present_{survey}/ number present_{gold standard}).

	mentioned or referenced as part of the plan?		land development (Q9)?			
7.7	Is the reciprocal relationship between transportation and land use specifically mentioned or referenced as part of the plan?	4 (25)	Does the future land use plan account for the transportation impacts of land development (Q10)?	4 (11)	1.0	0.44
7.9.1	Are the following transportation modes mentioned in the land use plan: Auto	28 (0)	If the future land use plan includes specific transportation improvements, are auto improvements included? (Collector streets, highways, connectivity improvement plan, driveway access management) (Q8_Auto)?	22 (n/a)	0.79	n/a
7.9.2	Public Transit	19 (9)	Are transit routes included in the future land use plan? (Q8_transit)?	8 (8)	0.42	.88
7.9.3 + 7.9.4	Pedestrian and Bicycle Modes	22 (6)	Are non-motorized modes included in the future land use plan? (Sidewalks, pedestrian ways, bicycle paths, greenways) (Q8_NM)?	16 (5)	0.73	0.83
9.3.5	Is there consistency with a long-range transportation plan for the area or region?	9 (20)	Does the future land use plan account for land development impacts created by transportation improvements? (Q9, accounts for most or all transportation improvements vs. accounts for only certain improvements or does not account for any transportation	5 (14)	0.56	0.70

³⁷ Missing responses are excluded

³⁸ Sensitivity is a measure of validity (accuracy) that assesses the ability of the survey to correctly identify an element as present when the gold standard identified that element as present. Sensitivity is expressed as a ratio (number present_{survey}/ number present_{gold standard}); 1.0 would mean that the planners' survey self-report correctly identified an element as present 100% of the time.

³⁹ Specificity assesses the ability of the survey to correctly identify an element as *absent* when the gold standard identified that element as absent. Specificity is expressed as (number absent_{survey}/ number absent_{gold standard}). Specificity can not be calculated when the denominator (gold standard) is zero; these items are labeled as not applicable (n/a).

			improvements)			
9.3.5	Is there consistency with a long-range transportation plan for the area or region?	8 (21)	Does the future land use plan account for the transportation impacts of land development? (Q10, accounts for most or all development projects vs. accounts for only certain development projects or does not account for any projects)	6 (12)	0.75	0.57
9.1.2.2 and 9.1.2.3	External agencies mentioned and accounted for: MPO	7 (23)	How much interaction do you have with the local RPO or MPO that prepares/coordinates transportation planning in your area? (Q15)	7 (2)	1.0	0.09
9.1.2.1	External agencies mentioned and accounted for: DOT	28 (1)	How much interaction do you have with NC DOT when your land use plan was developed or updated? (Q16)	22 (0)	0.79	0
9.3.6	Are land use elements connected to other infrastructure elements (Water & sewer, schools, etc)?	28 (2)	What other infrastructure improvements are included in the future land use plan: (Major sanitary sewer lines, storm water drainage facilities, school facilities, water and wastewater treatment plants, no improvements included)? (Q11_sum (a-e), any vs. none)	28 (0)	1.0	0
9.4.1	Do the land use plan's policies specifically call for certain action(s) to implement those policies?	24 (5)	Which of the following (tools/policies) are used to implement your community's land use plan? (Q13_sum, any policies vs. no policies)	24 (0)	1.0	0

Appendix 11. Legal Primer: Consistency in Plan Making and Implementation⁴⁰

Local land use planning, when conducted for the purpose of making public policy decisions about transportation investments, environmental protection, and land use control generally, is a rational process—at least in concept. Ideally a local government uses planning to identify and prioritize local and regional land development goals, conduct thorough analyses of current problems and likely future trends, craft policies to advance goals given those current issues and trends, and identify appropriate and effective mechanisms to implement those policies (see generally Kaiser, Godschalk, and Chapin 1995). Implementation is especially important. Although in most states a land use plan carries little if any legal force by itself, it nonetheless provides informed guidance for managing development of the community over time. In theory, local officials adopt capital improvement programs, local outreach and education programs, land use regulations, and so on to give the plan feet and make it enforceable. The implementation policies and ordinances they adopt in doing so are presumably consistent with and advance the policies of the plan itself.

In reality, this has not always been the case. Foreshadowing much of the coming century, the U.S. Department of Commerce in the 1920s published its Standard Zoning Enabling Act (SZEA) some four years before publishing its Standard City Planning Enabling Act (SCPEA). Local development management since then can be characterized in many locations across the country as “regulate now, plan later” (see Juergensmeyer and Roberts 2003). This seemingly backward approach to development management has been driven in part by expediency and in part by enforceability. A thorough and comprehensive land use planning effort can require substantial financial and administrative capacity, a great deal of time and effort on the part of local officials and citizens, and—ideally—a considerable amount of spirited debate as the community hammers out both its vision for future development and mechanisms for advancing that vision. And then having invested so much, the planning process yields in the end a policy document, not a set of land use regulations that can be immediately enforced. For

⁴⁰ This primer was prepared by Richard K. Norton, Ph.D., J.D., Assistant Professor, Urban & Regional Planning Program, University of Michigan, Ann Arbor.

many local officials contemplating pressing land use concerns, undertaking an extended planning process rather than drafting relatively straightforward and readily implemented land use regulations makes little sense (see generally Mandelker 1997; Juergensmeyer and Roberts 2003).

Given the realities of planning in practice over the last century, commenters on the planning process—both from planning and legal perspectives—have long struggled to make sense of that process. They have debated what the purpose of planning should be, how planning outcomes should be measured, and to what extent plans should be used to justify local development regulation as a matter of law (see, e.g., Talen 1996; Baer 1997; Babcock and Siemon 1985, respectively). Indeed, a refrain now commonly heard—even by planners—is that planning is all about process, not about plans themselves (Neuman 1998). Nonetheless, responding largely to widespread and seemingly remorseless sprawling land development around the country, citizens, professionals, and academics alike are paying increasing attention to the role that planning does and might play in managing that development. This attention has reinvigorated work on questions of planning consistency.

Various concepts of “consistency” in planning can be grouped into two general categories: consistency in the plan making process (or analytical consistency) and consistency in the plan implementation process (or application or legal consistency). Analytical consistency addresses in a sense the question of how well the plan engenders coherence from chaos. Implementation consistency addresses the question of how well the various activities a locality undertakes to implement its plan actually comply with and advance the goals and policies of that plan. This paper first summarizes the principal conceptual difficulties with the idea of consistency, and then concludes with a short discussion of the issue of consistency and legal doctrine in North Carolina.

Consistency in Planning

How much policy-setting force and legal weight state planning mandates and enabling statutes, as well local plans themselves, do or should have has been addressed in the planning and the legal literatures through the concept of “consistency.” Planners and lawyers have traditionally applied this concept primarily when evaluating the relationship

between the local plan and local land use regulations. The concept originated from the verbiage of the Standard Zoning Enabling Act (SZA), which provided in § 3 that zoning must be “in accordance with a comprehensive plan” (Meck 1996; Mandelker 1997). From a planning-as-policymaking perspective, this requirement makes great sense; a plan serves little purpose if the zoning code used to implement plan policies is not consistent with those policies. The requirement has proven difficult for courts to interpret, however, given that the SZA and widely practiced zoning came before the standard planning act and widely practiced planning. It has been especially problematic in jurisdictions where a locality has adopted a zoning code but not a plan (not an uncommon occurrence), or where the plan itself has become so dated that it fails to adequately address changed conditions.

Planning scholars have approached this doctrine more from a policymaking and implementation perspective, focusing on the ways in which plans and codes do (or should) fit together. Legal scholars have approached the doctrine more from a pragmatic legal perspective, thinking carefully about what words like “consistency” and “accordance” mean in terms of creating legally enforceable duties. Neither group of scholars takes one perspective exclusive of the other, and some have attempted to integrate both perspectives analytically (see, e.g., DiMento 1980). Nonetheless, confusion persists both with consistency as a planning concept and as a legal doctrine.

In the planning literature, the concept of consistency has taken on more importance, and required more distinction and refinement, with the rise of local planning-oriented state growth management programs over the last several decades. Yet there still exists some disagreement on how exactly the concept should be defined. Burby and May (1997:8-9), for example, describe three kinds of consistency:

Vertical consistency requires that local plans be consistent with state goals and policy. This reflects the primary justification for many of the initial state planning programs and is found in most state mandates for local planning. *Horizontal consistency* requires that local plans be coordinated with those of neighboring local governments. It is also present in most state mandates, particularly in the more recently enacted programs. *Local internal consistency* requires that development management activities of local governments be consistent with their comprehensive plans. This entails requirements that local development regulations (e.g., the zoning ordinance) be consistent with the plan or that capital infrastructure be

adequate to support whatever private development is permitted by local regulations [emphasis in original].

Weitz (1999:198-206), in contrast, while agreeing with Burby and May on the concepts of vertical and horizontal consistency, follows the convention established by Florida, Georgia, and Washington (and other researchers) of defining *internal consistency* as a consistency internal to the plan itself; that is, between the plan's various elements (e.g., land use, housing, transportation) and between its articulation of facts, goals, and policies. Accordingly, what Burby and May define as internal consistency—consistency between local plan and local regulation—Weitz defines as *implementation consistency*. Moreover, recognizing Oregon's express and Georgia's implicit requirement that state agency actions be consistent (or compatible) with duly adopted local plans, Weitz also articulates the concept of "inverse vertical compatibility" (205-206).⁴¹ This concept is generally not addressed explicitly as such, or is lumped together with the notion of vertical consistency by others (i.e., "vertical consistency" means consistency between state and local running both ways). In sum, taken altogether there has been some confusion in the planning literature over the distinction to be made between analytical consistency or consistency within the plan-making process, on the one hand, and consistency between the plan and implementing laws and policies, on the other.

In the legal literature and published appellate court opinions, attention devoted to the consistency doctrine has focused primarily on establishing a precise definition of what "consistency" means in terms of creating a standard of review, usually in the context of implementation consistency or consistency between the plan and the zoning code (DiMento 1980; Lincoln 1996). The various approaches adopted have ranged roughly from the idea that consistency means nothing more than "not inconsistent with" or "compatible with" at one end of the continuum to "implements" or "advances the purpose of" at the other. This debate is significant because these different approaches can yield very different results when it comes time to adjudicate a contested land use

⁴¹ This concept on inverse compatibility is also made explicit in at least some Coastal Zone Management Act programs, such as North Carolina's Coastal Area Management Act (CAMA) program, which requires expressly that state agency actions be "consistent" with duly adopted local CAMA plans. This type of consistency was required in an effort to make the state-mandated planning more acceptable to local officials. See, for example, Heath (1974) regarding North Carolina's adoption of an inverse consistency requirement for its coastal program. This concept is discussed in more detail below.

regulation that purportedly implements a plan. A contested local regulation that is compatible with a plan policy but does nothing to effectuate it, for example, might pass muster under a “not inconsistent with” reading of the consistency doctrine while failing under an “implements” approach. Further complicating this analysis is the issue of plan policy intent (Lincoln 1996:94-100). For example, evaluation of the same regulation in terms of its “consistency”—even using a minimalist “not inconsistent with” standard—could yield a different outcome when set against an exhortative plan policy (e.g., “environmental quality should be maintained”) as compared to a more prescriptive policy (e.g., “development shall not be allowed to increase stormwater runoff”).

In general, the courts have resolved the question of how to interpret consistency as between plan and regulation through the application of two closely related doctrines. First, they give a presumption of validity to local land use regulatory decisions that are “legislative” in character (e.g., adoption or amendment of a zoning ordinance), meaning that they will not second-guess the locality’s decision unless it is clearly oppressive, arbitrary and capricious, or abusive of discretion (Owens 1999; Juergensmeyer and Roberts 2003).⁴² Second, especially in jurisdictions that have adopted land use regulations like a zoning code but have not adopted a plan, courts do *not* interpret literally the standard SZEA phrase “in accordance with a comprehensive plan” still found in many state zoning enabling statutes. Rather, they require that the zoning “be based on a reasoned consideration of the entire jurisdiction and the full range of land use issues facing that jurisdiction” (Owens 1999:233). In other words, the courts essentially “find” a comprehensive plan in a comprehensive zoning code or set of regulations that cover most or all of the jurisdiction and that appear to be well reasoned in their requirements. Combined with the presumption of validity, this means that a local regulation will be found to be “consistent with” the local plan (even if no single comprehensive plan exists) if the regulation appears to be comprehensive, rational (even minimally so), and applied in a general fashion across the community.

⁴² Many states give less deference to “quasi-judicial” actions like conditional use permits or actions that appear to be legislative but that apply to vary narrow locations geographically (so-called “spot zoning”) or that involve extensive negotiation between the locality and the developer (so-called “contract zoning”) (see Mandelker 1997; Juergensmeyer and Roberts 2003).

In fact, the majority rule on this issue is that the consistency requirement does not mandate that a locality must adopt a plan before it can zone. Only one state—Oregon—has adopted a more stringent consistency requirement through judicial decree,⁴³ and that state now mandates planning and requires consistency through legislation (see generally Callies, Freilich, and Roberts 1994; Mandelker 1997). Moreover, consistency between plan and regulation is viewed in an equally deferential way even when a plan has in fact been adopted but conditions on the ground have changed substantially and the locality has not adopted a comprehensive update of its outdated plan. While a locality becomes increasingly at risk of having a rezoning or similar regulatory decision overturned in these situations, a court may nonetheless rely on other planning-like activities (e.g., a project-specific planning study)—short of a fully updated plan—to conclude that the local decision was consistent with a general planning regime (see, e.g., Owens 1999:235 for discussion of a North Carolina case illustrating this approach).

In the context of intergovernmental growth management, these same kinds of issues play out when attempting to evaluate the consistency of a local plan with the state's local planning mandate. By the late 1990s, fewer than 20 states were mandating local comprehensive land use planning either state wide or for a substantial substate region (e.g., coastal areas) (Burby and May 1997; Johnson et al. 2002). Of these, the Florida and Oregon programs are perhaps best known for requiring that localities plan, that those plans be consistent with articulated state growth management goals, and that local ordinances and other implementation measures be consistent with the local plan (see also Weitz 1999). A trend toward greater state involvement in local planning is gaining some momentum, with about one-fifth of the states currently pursuing amendments to strengthen existing local planning requirements and an additional one-third contemplating their first major state-wide reform of local planning mandates (Johnson et al. 2002). Despite these trends, however, relatively little systematic empirical analysis has as yet been conducted to determine how these states are addressing the problem of planning consistency in practice or how legal doctrine has evolved, if at all.

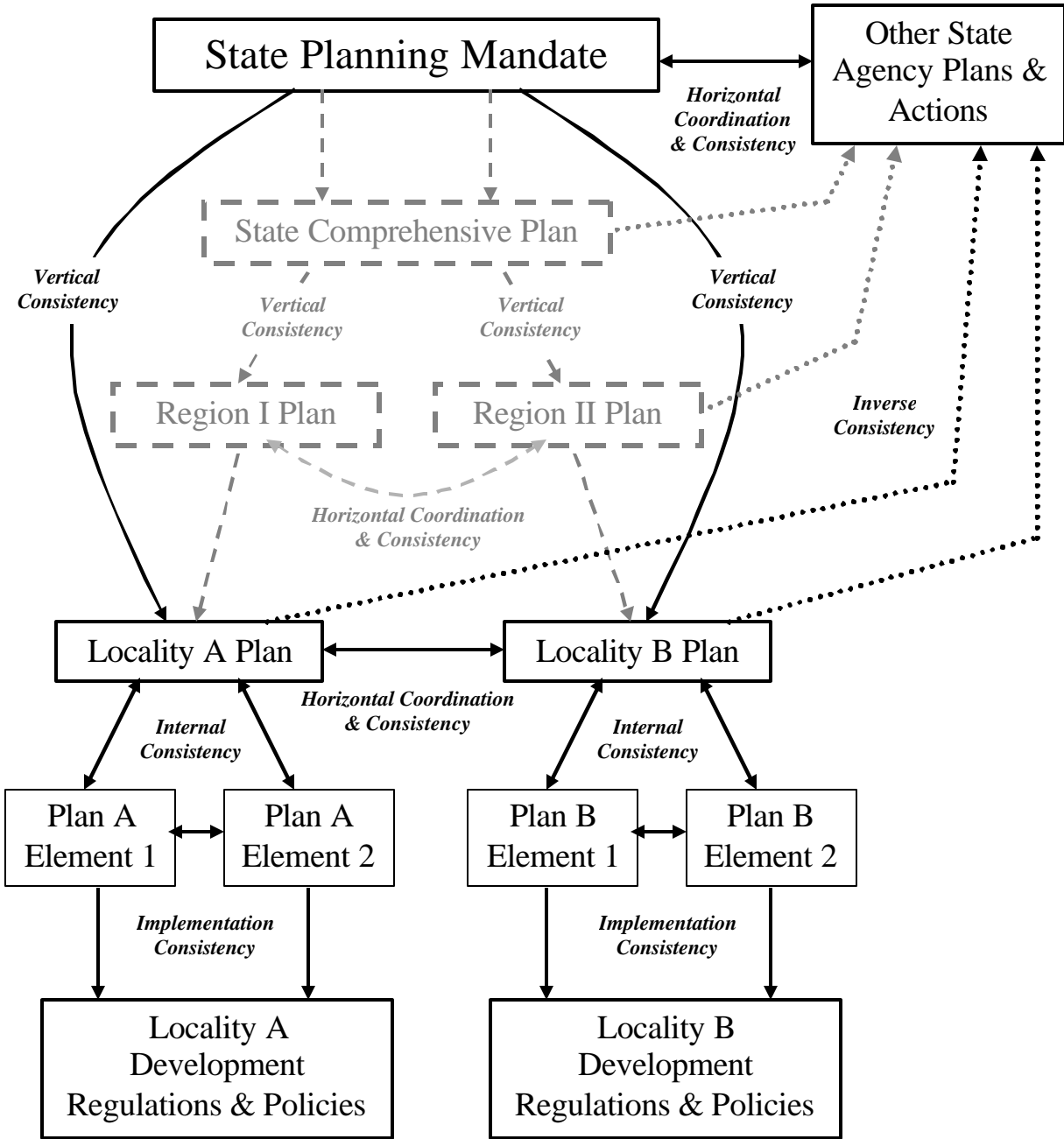
⁴³ See *Fasano v. Board of County Comm'rs*, 507 P.2d 23 (Or. 1973) and *Baker v. City of Milwaukie*, 533 P.2d 772 (Or. 1975).

Nonetheless, given this background it is possible to outline a coherent framework for thinking about consistency that integrates both analytical consistency and implementation consistency from both a planning-as-policymaking and a legal perspective. Figure 1 presents one approach for doing so. This approach builds off of the planning scholarship of Weitz and others, and addresses some of the legal issues raised by Lincoln, by specifying five distinct types of consistency: vertical, inverse, horizontal, internal, and implementation. Vertical, inverse, horizontal, and internal consistency are all different aspects of analytical consistency and speak to the coherence of the local plan making process and the plan it produces; implementation consistency addresses legal considerations more directly and speaks to the application of local plan policy through local actions (e.g., capital improvements) and laws (e.g., zoning ordinances). For the sake of illustration, Figure 1 contemplates two adjacent localities (A and B) that are located within two neighboring regions (I and II).

Vertical consistency generally remains as commonly defined, but for interpretation purposes runs only one way—from state to local. From a planning-as-policymaking perspective, it is important to recognize that policymaking processes do not in fact operate in such a linear way.⁴⁴ It is also important to recognize that state and regional planning requirements and efforts should contemplate the unique conditions and concerns of localities that will be affected. In that sense, vertical consistency implicates both state and locality concerns. For the sake of legal interpretation, however, it is useful to think about vertical consistency as being linear. That is, once substantive requirements for local planning efforts are established (i.e., either minimal requirements through enabling legislation or more substantive requirements through a mandate), it makes sense to think about vertical consistency only in terms of whether the local plan is consistent with the state requirements, not whether the state requirements are somehow consistent

⁴⁴ Public policymaking processes, particularly those involving different levels of government, are in truth messy and iterative, and local concerns are typically infused throughout state program mandates through the politics of the program design and implementation process (see Sabatier and Jenkins-Smith 1993).

Figure 1. Consistency Framework



Adapted from Weitz (1999).

Note: Regional elements and links in grayscale may not be mandated.

with the local plan. Moreover, to the extent that planning should provide meaningful guidance for the rational management of land development given state or regional development management goals, it is reasonable to ask whether the local plan is not just “compatible” with the state planning enabling statutes or mandate, but whether it “complies with” or “advances” or “furthers” in some meaningful way articulated state goals and policies.⁴⁵

Because vertical consistency does not run both ways under this framework, and recognizing that at least some states imply if not require that there should be a two-way relationship between state and local policymaking (such as under North Carolina’s CAMA program), this conceptual framework also includes explicitly the concept of “inverse consistency.” That is, from a policymaking perspective if not in a legally enforceable sense, state plans and actions that implicate local development management policy in some way—such as transportation development plans or grants—should be consistent with the duly adopted local plans in the jurisdictions that will be affected, assuming that the local plan is consistent with state development management goals. It is important to note that inverse consistency addresses consistency between local planning and state actions made by agencies *other* than the agency administering the local planning program, not between state or regional planning requirements and local plans. With regard to both vertical and inverse consistency, it should also be noted that state or regional coordination plans may or may not be required and that inverse consistency may or may not be mandated, depending on the program design model employed by a given state. When they are, however, both would operate in the same ways as described here.

The need to distinguish between vertical and inverse consistency, and to contemplate the implications of that distinction, is especially important from a regional

⁴⁵ The North Carolina Coastal Area Management Act (CAMA) program presents a quirky application of this concept. The program established a state-level coastal management program requiring that coastal localities adopt local CAMA plans consistent with the state-level coastal management plan. The state-level coastal management plan, however, effectively consists of the combined local CAMA plans. As originally formulated, vertical consistency thus required, in a sense, that the local plans be consistent with themselves (NC Gen. Stat. 113A-110 et seq. (2001). See Heath 1974; US DOC 1978). However, recent amendments to the administrative rules that effectively define the state’s planning mandate established, among other things, more clearly articulated regional growth management goals and requirements that localities better demonstrate how their local plans are consistent with those goals, making in effect vertical consistency more linear from state to local (see 15 NC Admin. Code 7H.201 et seq. (2003)).

growth management perspective and warrants further discussion. Vertical consistency asks whether state efforts to implement federal requirements, local efforts to implement state requirements like a mandate to plan, or local efforts to address regional or metropolitan planning policies, are in fact consistent with those requirements and policies. There is an element of intergovernmental cooperation and coordination here, but the main thrust of the concept speaks to the question of whether the more “local” level of government (local or state) is addressing in a meaningful way the concerns or purposes animating the more “regional” requirements (state or federal). One of the difficulties, particularly in the context of local infrastructure decision-making, is how a locality should address actions and policies made at the state level by an agency operating outside of the state-local growth management program. Without strong coordination efforts, for example, it is conceivable that a locality might adopt a land use plan or capital improvement policy unaware of state department of transportation plans for a programmed “upgrade” of a local road from two lanes to six. If the state DOT is not coordinating its goals and policies with the state growth management agency, this development could put a locality in a bind as it attempts to be vertically consistent with the state’s local planning requirements while maintaining some kind of policy consistency as between its own plan and the state DOT’s actions. A potential resolution to this problem comes in part from the use of horizontal consistency, discussed in more detail below, and through the use of inverse consistency.

Inverse consistency is especially important for two closely related reasons. First, it proved to be a significant feature of the original federal Coastal Zone Management legislation in the 1970s. Under this program, the federal government promised states and localities with approved state-level CZM programs that federal-level actions would be made consistent with duly-adopted state and local-level CZMA plans and policies (Godschalk and Cousins 1985; Lowry 1985). This component of the CZMA program was important in particular with regard to the adoption and implementation of North Carolina’s Coastal Area Management Act (CAMA) program, which established inverse consistency not only from the federal to the state and local levels, but has also required that state agency actions be consistent with the policies of duly-adopted local CAMA plans (Heath 1974; Owens 1985; Heath and Owens 1994). Because local governments

want to have at least some control over state and federal actions affecting them, the promise of inverse consistency represents a very important incentive for local planning.

Second, because an inverse consistency requirement forces state (and federal) agencies to pay closer attention to how their policies and actions relate to local plans and policies, it also offers at least the potential for improved state agency coordination. For example, it is conceivable that a locality expressly trying to preserve its small town character, promote walkable communities, and preserve higher-density downtown development—all consistent with a state smart growth program requiring local planning—could reasonably argue that a state DOT’s proposed thoroughfare widening project through its downtown was inconsistent with the locality’s duly adopted growth management plan. An inverse consistency requirement would compel the state DOT to address local concerns in light of the locality’s plan, and in the process to better coordinate its own activities with state-level growth management goals.

It is vitally important that inverse consistency not be used as an incentive for local planning outside of an established state-level growth management program that clearly articulates regional growth management goals and requires that local planning efforts address those goals. The purpose of intergovernmental growth management is, ultimately, to ensure that local government planning and policymaking advances regional as well as local goals. It would not be appropriate under our federalist system for states to bind their hands through required deference to local policy making without ensuring that that local policymaking was in fact being done consistently with state-level growth management goals. From a more pragmatic perspective, offering localities the incentive to plan through an inverse consistency requirement without requiring vertical consistency with state growth management goals could result in perverse policy outcomes like compelled state deference to local plans that are actually sprawl-inducing rather than growth managing.

While inverse consistency addresses to some extent consistency in plans and actions as between co-equal units of government, the concept of horizontal consistency speaks to this issue directly. As with vertical consistency, the concept of horizontal consistency as shown on Figure 1 is much the same as commonly employed in the planning literature. From a policymaking perspective, local land use planning in one

jurisdiction must be consistent with the planning of neighboring jurisdictions if those neighboring jurisdictions are to advance regional or state growth management goals in a coherent way. In this use, however, “consistency” implies at least the notion of compatibility (i.e., one jurisdiction’s local plan policies should not be incompatible with its neighbor’s policies), and ideally a more expansive notion of coordination (i.e., the two plans should work well together to advance mutual local goals and state goals). Horizontal consistency similarly applies to the relationship between multiple state agencies that affect local land development patterns through their policies and activities. Theoretically, the land protection policies of a state environmental protection department should not conflict with the land development policies of a state department of transportation, for example, and ideally the programs of the two agencies should be mutually supporting. This aspect of both horizontal and inverse consistency as described above is one that is generally given little attention in practice yet deserves more.

Both internal consistency and implementation consistency as presented in Figure 1 generally follow the use of these terms as articulated by Weitz (1999). Internal consistency refers to consistency as between different plan elements or multiple plan documents in a jurisdiction with multiple plans, and as between the plan’s articulated facts, goals, and policies. It addresses directly the questions of whether the various plan elements (e.g., housing, land use, resource protection) are compatible with each other or even mutually supporting in a way that advances larger plan goals (e.g., sustainable development). It also addresses the question of whether the plan policies are appropriate given the fact base established by the plan and whether those policies advance the plan’s various goals in a meaningful way.

This concept of internal consistency from the policymaking perspective establishes the coherence, rationality, and overall quality of a given local the plan. Especially within an intergovernmental growth management context, it becomes the linchpin of analytical consistency when combined with vertical, inverse, and horizontal consistency, both for a given locality’s own planning efforts and the regional growth management program, because it demands an assessment of how well, ultimately, the plan coherently and rationally advances both local and regional growth management goals. Although its application in a legal sense is somewhat indirect, it is critically

important to the extent that a given plan policy bearing no apparent relationship to the plan's fact base and stated goals runs the risk of engendering little respect by a court should a local regulation premised on that policy be challenged (see Mandelker 1997; Juergensmeyer and Roberts 2003).

Finally, implementation consistency addresses the question of whether a locality's development regulations (e.g., zoning codes, subdivision codes) and other policies and actions affecting land use (e.g., capital improvement programs) are consistent with and meaningfully advance the policies established by the plan. It is important in a direct sense for both policymaking and legal purposes. As applied here, this concept again should be read in terms of a legal standard of review not in the minimalist "not inconsistent" sense, but in the sense that consistent local development policies and regulations are those that somehow advance or further the expressly stated goals and policies of the duly adopted plan. The devil is in the details, of course; while relatively straightforward conceptually, implementation consistency in particular can be quite difficult to assess when, for example, a plan's various elements establish goals that are not mutually compatible or its policies are exhortative rather than prescriptive (i.e., analytical consistency is poor).

In sum, the concepts of vertical, inverse, horizontal and internal consistency as shown on Figure 1 are all different aspects of analytical consistency in the plan making process. They engender a comprehensive and coherent approach to land use and development that strikes a reasonable balance between local and regional development management goals *and* that establishes an efficacious approach for advancing those goals. The concept of implementation consistency as shown on Figure 1 ensures that the various activities a locality undertakes to implement its plan actually comply with and advance the goals and policies of that plan.

Planning Consistency in North Carolina

For most of the state, North Carolina authorizes but does not mandate comprehensive land use planning by counties and municipalities (see generally Owens

1996).⁴⁶ From a planning-as-policymaking perspective, there is no evidence in the literature to suggest that consistency in plan making—or analytical consistency—is approached differently than as described above for the non-coastal areas of the state, except that the state does not require that state agency actions be inversely consistent with local plans for non-coastal communities. However, North Carolina does mandate local planning by the 20 coastal counties and delegated municipalities within those counties under the Coastal Area Management Act of 1974 (NC Gen. Stat. 113A-100 et seq.). Through that program, the state requires inverse consistency and has engaged over time in a number of efforts to improve vertical, horizontal and internal consistency, albeit with mixed success (see Heath and Owens 1994).

Questions about consistency between state mandate, local planning, and local plan implementation activities under the CAMA program in particular have received some attention by the state itself and by commenters (see, e.g., NC DCM 1985, 1986; NC Coastal Futures Committee 1994; Godschalk 2000, 2000a; Norton 2000). Indeed, controversy surrounding the local planning program prompted the state’s Coastal Resources Commission (CRC), which administers CAMA, to place a moratorium on local planning activities in 1998 and convene a stakeholder group to revisit its planning rules. This group released a report in 2000 recommending a comprehensive set of revisions to those rules (NC DCM 2000). Many of these revisions represented an attempt to increase the analytical consistency of local CAMA plan making, including a revised classification scheme to require more extensive planning from faster-growing localities and those encompassing areas of environmental concern, more clear articulation of state growth management objectives and corresponding requirements that plans address those objectives, stronger land suitability analysis requirements, and stronger intergovernmental coordination requirements. A number of these recommendations have

⁴⁶ The General Assembly recently created an incentive for local planning by adding provisions in 2001 for coordinated transportation planning to state law on roads and highways (see NC Gen. Stat. § 136-66.2). Under this new provision, municipalities seeking technical assistance from the NC Department of Transportation, or that want NC DOT to adopt their Comprehensive Transportation Plan, either independently or through a Metropolitan Planning Organization (if located within an MPO), must have developed within the last 5 years—or must be in the process of developing—a land use plan. While creating a strong new incentive for prompting localities to engage in land use planning (or to update their outdated plans), this provision would not substantially alter by itself the analysis presented here regarding the consistency doctrine, and there has been no published appellate case law speaking to the provision.

since been adopted through amendments to the CRC's local planning rules (see 15A NC Admin. Code 7B). Even so, it is as yet too soon to evaluate fully the effects these rule changes have had on consistency issues with regard to local CAMA planning in practice.⁴⁷

With regard to questions about consistency in implementation, and specifically the consistency doctrine employed by the state courts, North Carolina follows the majority rule. That is, the state courts do not require that a locality adopt a plan in order to zone, only that the local regulations are rational and comprehensive in their coverage (see generally Owens 1999). Accordingly, consistency as between local plan and local regulation is given fairly deferential treatment, so long as the local regulation appears to be reasonable. There are two exceptions to this generally deferential treatment (Owens 2003). The first relates to instances of spot zoning, which the courts have explicitly ruled does not enjoy a presumption of validity, such that plan quality and consistency is especially important for establishing the reasonableness of the zoning action.⁴⁸ The second relates to the increasing use of conditional zoning, where again the courts have stressed the role of planning in establishing a reasonable foundation for these site-specific decisions.⁴⁹ Altogether, to the extent that local regulations and other implementation activities are based transparently on a well-supported comprehensive land use plan, in general and especially in instances of geographically small rezoning and conditional zoning decisions, they are also more defensible against legal attack. Even so, the courts have not required strict adherence between adopted plan and local regulation if conditions have changed on the ground and a locality has engaged in some kind of planning analysis to justify its action, even short of a formal plan update (see Owens 1999:235).

While true as a general matter for the state as a whole, it is not clear whether if at all this approach to consistency applies differently to state-mandated local planning in the coastal region under CAMA. The act in general and its local planning requirements in particular were upheld by the North Carolina Supreme Court not long after CAMA's

⁴⁷ The state's recently revised administrative rules and discussion regarding the history behind those revisions can be accessed at: <http://dcm2.enr.state.nc.us/Rules/current.htm> (July 2003).

⁴⁸ *Blades v. City of Raleigh*, 280 N.C. 531, 187 S.E.2d 35 (1972); *Chrismon v. Guilford County*, 322 N.C. 611, 370 S.E.2d 579 (1988).

⁴⁹ *Massey v. City of Charlotte*, 145 N.C. App. 345, 550 S.E.2d 838, *review denied*, 354 N.C. 219, 554 S.E.2d 342 (2001); *Summers v. City of Charlotte*, 149 N.C. App. 509, 562 S.E.2d 18, *review denied*, 355 N.C. 758, 566 S.E.2d 482 (2002).

enactment,⁵⁰ but there has been no litigation speaking directly to the questions of either how much the state can require of localities through the planning mandate or to what extent the state can require that local land use regulations and other plan implementation actions be consistent with the local CAMA plan. It is reasonable to speculate that the courts might be more demanding in terms of implementation consistency for coastal localities given that local planning is mandated under CAMA rather than merely enabled, but such a presumption would be just that—speculation—if and until a case reaches the courts on that specific question. In short, while planning consistency issues and doctrines could evolve in the coastal region of North Carolina in the foreseeable future as the local planning mandate under CAMA evolves, the ways in which those issues and doctrines are addressed across the entire state currently, including the coastal region, are largely as described with regard to consistency in planning more generally above.

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⁵⁰ Adams v. North Carolina Department of Natural and Economic Resources, 295 N.C. 683, 249 S.E.2d 402 (1978).

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