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Public Transportation and the Carless in Small Cities and Rural Areas: An Annotated Bibliography

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I. INTRODUCTION

Most critical in planning public transportation services for small cities and rural areas is not how to develop the physical and operating systems but whether or not the needs warrant direct governmental or public involvement. The small system is usually simple compared to urban transit in metropolitan areas. However, the "demand" for transit service in small cities and rural areas is very low and is expensive to provide. Although the total cost is not beyond the means of the low density communities to provide needed services to those whose mobility is restricted, high level transit services for everyone is unrealistic.

The primary purpose of supplying publicly supported transportation services in nonmetropolitan areas should be for meeting basic needs of people who do not have any convenient means of transportation. These are the poor, handicapped, elderly, and youth, as well as, people to whom an automobile is not conveniently available. This group is classified collectively as the "carless," or "special mobility groups," or the "transportation handicapped."

This annotated bibliography is prepared for those who are interested in the problem, concerned citizens and planners in small cities and rural areas, and policy analysts in various levels of government. Public transportation planning in nonmetropolitan areas has been disjointed. There are few well developed goals, objectives, and policies. Standards and values are varied among different communities. Consequently, decisions on public transportation services

can best be made locally with active citizen participation. This bibliography, together with a review paper (ITS Report D-SR-77-2), provides adequate information for gaining insights into the various facets of the problem. Additional information and assistance can be obtained from the library of the Institute of Transportation Studies (Berkeley and Irvine), the Division of Mass Transportation - California Department of Transportation, the Urban Mass Transportation Administration - U.S. Department of Transportation, and other agencies or institutes.

The bibliography is divided into three sections. The first section is a list of references arranged alphabetically by author. Each article is classified by a system of coded keywords. The keyword codes are shown in parentheses after each reference. The second section contains the abstracts of the articles. The third section is an index of articles by subject. The cross-reference is shown by the article number.

II. SYSTEM OF KEYWORDS

A. PROBLEM RESEARCH

1. GENERAL
   a. public transportation
   b. community development
   c. carlessness
2. TRAVEL CHARACTERISTICS
   a. trip generation
   b. origin-destination
   c. modal split
   d. trip satisfaction
3. TRANSPORTATION NEEDS
   a. sectoral needs
   b. facility needs
   c. mobility needs
   d. level of service
4. MOBILITY NEEDS OF SPECIAL GROUPS
   a. elderly
   b. poor
   c. handicapped
   d. youth
   e. carless

B. RESEARCH METHODOLOGIES

1. MODELING
2. MARKETING STUDIES
3. ATTITUDE SURVEYS
4. DEMOGRAPHIC AND SOCIO-ECONOMIC ANALYSES
5. COST-EFFICIENCY ANALYSES

C. PLANNING PROCESS

1. INSTITUTIONAL SET-UP
   a. provider and operator
   b. local
   c. regional
   d. state
   e. federal
2. PUBLIC PARTICIPATION
   a. public hearings
   b. interest groups
   c. opinion survey
   d. information dissemination
3. GOALS, OBJECTIVES, AND POLICIES
4. ALTERNATIVES
   a. physical alternatives
   b. policy alternatives
   c. social-service alternatives
5. DEMAND ANALYSIS
6. FINANCIAL PLANNING
   a. funding alternatives
   b. subsidy alternatives
   c. pricing alternatives
   d. service costs
7. EVALUATION
   a. formal evaluations
   b. informal evaluations
8. DECISION MAKING
9. IMPLEMENTATION PLANNING

D. CASE REPORTS

1. SYSTEM DESCRIPTION
   a. dial-a-ride
   b. fixed route
   c. shared taxi
   d. exclusive service
2. FINANCIAL INFORMATION
   a. UMTA funding
   b. state funding
   c. local funding
   d. user funding
   e. special agency funding
   f. private funding
   g. federal funding
3. COSTS, REVENUES, AND FARES
   a. free service
   b. differential fares
   c. limited eligibility
   d. capital and/or operating costs
4. PRE-IMPLEMENTATION PLANNING
5. POST-IMPLEMENTATION PLANNING
   a. user monitoring
   b. general public monitoring
6. ON-BOARD SURVEY

III. REFERENCES

1. Appalachian Regional Commission, "Transportation Needs of the Rural Poor," Appalachia, Vol. 4, No. 2 (October 1970), pp. 6-9.
(A.; B.; C.4; D.1b,2g,3a,5)

2. Bell, Theodore and Sparbel, John, "Nevada Transit Study for Small Urban and Rural Areas," Public Works, Vol. 106, No. 10 (October 1975), pp. 95-96.
(A.2a,2b,3b,3d; B.; C.4a,5; D.)

3. Blue, Stephen M., "Implementing the Continuing Transportation Planning Processes in Small Urban Areas," 43rd Annual Meeting: Compendium of Technical Papers, Institute of Traffic Engineers, 16 July 1973.
(A.1a; B.; C.1a,1b,4b,6; D.)

4. Briggs, Ronald, Designing Transit Systems for Low-Density Rural Regions, University of Texas, Austin, Council for Advanced Transportation Studies, Working Paper 3A, 1975, 54 pp.
(A.3c; B.; C.4a,5,6a,6d; D.)

5. Brown, Neal A., Rural Mass Transportation Feasibility Study, Bluegrass Area Development District, Inc., Lexington, Kentucky, June 1973, 127 pp. (NTIS, PB-241 186).
(A.1a,1c,4a,4b,4c; B.5; C.1; D.1d)

6. Burkhardt, Jon E. and Lago, Armando M., "The Demand for Rural Public Transportation Routes," Proceedings--Transportation Research Forum, Vol. 17, No. 1 (1976), pp. 498-503.
(A.1a; B.1; C.1b,1c,5; D.)

7. Burkhardt, Jon E. and Millar, William W., "Estimating Cost of Providing Rural Public Transportation Service," Transportation Research Record 578, Transportation Research Board, Washington, D.C., 1976, pp. 8-15.
(A.1a; B.; C.5,6d; D.)

8. Burkhardt, Jon E., Eby, Charles L., Abert, James G., Lago, Armando, and Hedrick, James L., The Transportation Needs of the Rural Poor, Resource Management Corporation, Bethesda, Maryland, July 1969, 262 pp. (NTIS, PB-185 253).
(A.1a,3c,4b; B.5; C.1b,2c,4a,4c,6d; D.3a)

9. Buttke, C., "Estimating Ridership on Small Systems," Passenger Transport, Vol. 34, No. 1 (2 January 1976), pp. 6-7.
(A.; B.4; C.5; D.)

10. California, Business and Transportation Agency, Department of Transportation, Division of Mass Transportation, Transportation Development Act, Statutes and Administrative Code for 1977, Sacramento, California, February 1977.

11. California, Department of Transportation, Division of Mass Transportation, Division of Transportation Planning, Public Transit Atlas; Rural California, September 1975, 3 Vols., Sacramento, California, 1975 (Report No. DMT-015).

12. Canadian Transport Commission, Systems Analysis and Research Data Base Branch, Midwestern Ontario-Bruce Transport Study, 3 Vols., Ottawa, Ontario, Canada, Reports 75-77, 1974.
(A.1a,2b; B.3; C.2c,4c; D.1b,2f,3,5a,5b)

13. Chadda, Himmat Singh, "Development of a Methodology for Predicting Public Transportation Needs for Small Cities," Ph.D. Dissertation, University of Maryland, 1976, 264 pp. (Order No. 76-27,369).
(A.1a,3c; B.1,3,4; C.1b,4,5,8; D.6)

14. Chatterjee, Arun, Wegman, Frederick J., and Grecco, William L., "Simplified Procedures for Long-Range Transportation Planning in Small Urban Areas," Proceedings--Transportation Research Forum, Vol. 17, No. 1 (1976), pp. 136-142.
(A.1a,2a,2b,2c; B.1; C.5; D.)

15. Chen, David, Saltzman, Arthur, and Johnson, Joyce H., A Cost Analysis of Rural Public Transportation Systems, North Carolina A&T State University, Transportation Institute, April 1975, 30 pp. (A&T-TI-16-RR-75).
(A.4; B.1,5; C.6d; D.1,3d)

16. Coates, Vary T., Revitalization of Small Communities; Transportation Options, George Washington University, Technology Assessment Group, Washington, D.C., May 1974, 134 pp. (NTIS, PB-234 161).
(A.1a; B.; C.4a; D.)

17. Coates, Vary and Weiss, Ernest, Revitalization of Small Communities: Transportation Options, 2 Vols., George Washington University, Technology Assessment Group, Washington, D.C., December 1975, 194 pp. (NTIS, PB-255 977 and PB-261 324).
(A.1b,3b,4e; B.; C.3; D.)

18. Dean, Donald, Drosdat, Herb, Millikin, Norris H., and Rae, James W., Transit Needs in Small California Communities, An Interim Report, California Department of Transportation, Division of Mass Transportation, Division of Transportation Planning, Sacramento, California, September 1976, 39 pp. and appendices (Report No. DMT-016).
(A.1a,3c,3d,4e; B.; C.3,5,7a,7b; D.)

19. Enders, Wayne et al., Access to Essential Services in Rural/Urban Environment: A Selected Interdisciplinary Bibliography, Council of Planning Librarians, Monticello, Illinois, 1974 (Exchange Bibliography No. 593).

20. Flusberg, Martin, An Innovative Public Transit System for a Small City: The Merrill, Wisconsin Case Study, Prepared for the 55th Annual Meeting of the Transportation Research Board, January 1976.
(A.1a,3d; B.2; C.; D.1a,3b)

21. Gakkenheimer, Ralph A., "Planning, Transportation, and the Small City," Traffic Quarterly, Vol. 18 (April 1964), pp. 282-295.
(A.1b; B.; C.; D.)

22. Gilbert, Gorman, "Taxi Usage in Small and Medium-Sized Cities," Proceedings--Transportation Research Forum, Vol. 17, No. 1 (1976), pp. 115-121.
(A.1a,3c,4; B.3; C.4a; D.1c,1d,6)

23. Gilbert, Gorman, Bach, Robert O., Dilorio, Frank C., and Fravel, Frederick D., Taxicab User Characteristics in Small and Medium-Size Cities, University of North Carolina, Chapel Hill, Center for Urban and Regional Studies, January 1976, 71 pp. (NTIS, PB-251 984).
(A.1a,2,3a; B.; C.; D.6)

24. Grecco, William L., Wegmann, Frederick J., Spencer, J. A., and Chatterjee, Arun, Transportation Planning for Small Urban Areas, National Cooperative Highway Research Program Report 167, Transportation Research Board, Washington, D.C., 1976, 85 pp.
(A.1a; B.; C.4a,5,9; D.)

25. Hart, Kathy, How to Set Up a Local Public Transportation Service in Your Community, Fresno County Council of Governments, Fresno, California, September 1975, 63 pp. (NTIS, PB-247 283).
(A.4a,4c; B.2; C.1,2c,2d,4a,6a,6b,6d; D.)

26. Hartgen, David T. and Keck, Carol A., "Forecasting Dial-a-Bus Ridership in Small Urban Areas," Transportation Research Record 563, Transportation Research Board, Washington, D.C., 1976, pp. 53-62.
(A.1a,1c; B.; C.5,6b,6d; D.)

27. Hauser, Edwin W., Rooks, Elizabeth H., Johnston, Steven A., and MacGillivray, Lois, The Use of Existing Facilities for Transporting Disadvantaged Residents of Rural Areas, 2 Vols., Research Triangle Institute, Research Triangle Park, North Carolina, January 1975, 472 pp. (NTIS, PB-248 746 and PB-248 747).
(A.3b,3c,4a,4b,4c; B.1,5; C.1,3,4a,4c,5,6a,6b,6c,8; D.)

28. Heathington, Kenneth W., Satterly, Gilbert T., and Grecco, William L., "Public Transportation for Small Urban Areas," Highway Research Record 419, Highway Research Board, Washington, D.C., 1972, pp. 1-15.
(A.1a; B.3; C.1b,2c,6a; D.1b)

29. Hensen, Ronald J. and Grecco, William L., "Evaluation of the Effectiveness of Transportation Planning in Smaller Urban Areas," Traffic Quarterly, Vol. 24 (July 1970), pp. 393-406.
(A.; B.; C.1b,7b; D.)

30. Herman, Michael S., Satterly, Gilbert T., Jr., Grecco, William L., and Heathington, Kenneth W., A Study of Bus Transit Planning in Small Urban Areas, Purdue University, Joint Highway Research Project, Lafayette, Indiana, Report 6, March 1973, 247 pp. (NTIS, PB-221 495).
(A.2a,2b,2c; B.3; C.1,2,3,4a,6a,7,9; D.2a)

31. Hibbs, John, "Maintaining Transport Services in Rural Areas," Journal of Transport Economics and Policy, Vol. 6 (January 1972), pp. 10-21.
(A.1a,1b,3c; B.; C.2d; D.)

32. Indiana University, Institute for Urban Transportation, Mass Transit Management: A Handbook for Small Cities, Bloomington, Indiana, February 1971, 328 pp. (NTIS, PB-222 386).
(A.1a; B.2; C.1,2,3,4,6,9; D.)

33. Institute of Public Administration, Planning Handbook: Transportation Services for the Elderly, Reprinted and distributed by the U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., June 1976 (NTIS, PB-247 958).
(A.4a; B.; C.1a,7b,9; D.)

34. Iowa State University, Engineering Research Institute, Integrated Analysis of Small Cities Intercity Transportation to Facilitate the Achievement of Regional Urban Goals, Ames, Iowa, June 1974, 653 pp. (NTIS, PB-236 612).
(A.1b,2b,3a; B.; C.; D.)

35. Iowa State University, Engineering Research Institute, Integrated Analysis of Small Cities Intercity Transportation to Facilitate the Achievement of Regional Urban Goals. Intercity Transportation in Rural Regions: Volume 1. Inventory and Analyses, Ames, Iowa, December 1975, 176 pp. (NTIS, PB-254 930).
(A.1a,1b,3a; B.4; C.; D.)

36. Iowa State University, Engineering Research Institute, Integrated Analysis of Small Cities Intercity Transportation to Facilitate the Achievement of Regional Urban Goals. Intercity Transportation in Rural Regions: Volume 2. Regional Factors and Analyses, Ames, Iowa, May 1976, 379 pp. (NTIS, PB-254 931).
(A.1a,1b,3a; B.3; C.; D.)

37. Kendall, Donald, Misner, Joseph, and Waksman, Robert, "Cost and Service Characteristics of Small Community Transit Operations," Proceedings--Transportation Research Forum, Vol. 17, No. 1 (1976), pp. 123-129.
(A.1a,3d,4; B.1,4; C.1a,1b,1c,1d,1e; D.1a,1b,1c,1d,2,3)

38. Kidder, Alice E., "Economics of Rural Public Transportation Programs," Transportation Research Record 578, Transportation Research Board, Washington, D.C., 1976, pp. 1-7.
(A.1a,1c; B.; C.5,6b,6d; D.)

39. Kidder, Alice E., "Transportation Policy and the Delivery of Social Services in a Small City," Transportation Research Record 516, Transportation Research Board, Washington, D.C., 1974, pp. 21-27.
(A.1b; B.; C.4b; D.)

40. Kidder, Alice E. and Saltzman, Arthur, Mode Choice Among Autoless Workers in Auto-Oriented Cities, Greensboro, North Carolina, North Carolina A&T State University, Transportation Institute, 1973.
(A.1c,2,3c; B.; C.; D.)

41. Kidder, Alice E. and Saltzman, Arthur, Transportation Problems of the Autoless Worker in a Small City, Greensboro, North Carolina, North Carolina A&T State University, Transportation Institute, 1972 (NTIS, PB-213 131).
(A.1a,1b,2a,2b,3c,4e; B.; C.; D.)

42. Kidder, Alice E., Sen, Lalita, Amedee, George, and McKelvey, Douglas J., "Cost of Alternative Systems to Serve Elderly and Handicapped in Small Urban Areas," Proceedings--Transportation Research Forum, Vol. 17, No. 1 (1976), pp. 498-503.
(A.1a,4a,4c; B.; C.6d; D.1d,3d)

43. Koutsopoulos, K. C. and Schmidt, C. G., "Mobility Constraints of the Carless," Traffic Quarterly, Vol. 30, No. 1 (January 1976), pp. 67-83.
(A.1a,3c,4e; B.; C.; D.)

44. Kurban, G. John, Characteristics of Transit Supply in Small and Medium Sized Cities, Pennsylvania Transportation Institute, University Park, Pennsylvania, April 1974, 70 pp. (NTIS, PB-233 532).
(A.; B.1; C.; D.6)

45. Larson, Thomas and Lima, P. M., "Rural Public Transportation," Traffic Quarterly, Vol. 29, No. 3 (July 1975), pp. 369-384.
(A.1a,1c,3c,4a,4c,4e; B.1; C.1c,1d,3,4a,5,6a,9; D.2b,2e)

46. Larwin, Thomas, Transportation Management Strategies: Prospects for Small Cities, Prepared for the 55th Annual Meeting of the Transportation Research Board, January 1976.
(A.1a,2a,2b; B.4; C.2c,3,4a; D.)

47. Liou, Peter, A Technical Review of a Ridership Forecasting Method: Dial-a-Bus in Small Urban Areas, New York State Department of Transportation, Planning and Research Bureau, Preliminary Research Report 73, 1975, 45 pp.
(A.; B.; C.5; D.6)

48. McKelvey, Douglas J., Considerations in Planning and Operating Transportation Systems for Older Americans and Public Transportation Systems in Rural Areas, Iowa University, Institute of Urban and Regional Research, Iowa City, Iowa, Working Paper 15, 1975.
(A.1a,3c,4a,4c; B.; C.1,3,6a; D.)

49. McKelvey, Douglas and Deuker, Kenneth, Transportation Planning: The Urban and Rural Interface and Transit Needs of the Rural Elderly, Iowa University, Institute of Urban and Regional Research, Iowa City, Iowa, April 1974, 28 pp. (NTIS, PB-249 084).
(A.3a,4a; B.; C.; D.)

50. Meyburg, Arnim H., Stopher, Peter R., Ryan, James M., and Coulter, John W., Mass Transit Development for Small Urban Areas: A Case Study, Thompkins County, New York, Report on First Year, Cornell University, College of Engineering, Ithaca, New York, October 1974, 251 pp. (NTIS, PB-242 989).
(A.2a,2b,3c; B.2; C.3,5; D.)

51. Middendorf, David P., Heathington, Kenneth W., and Davis, Frank W., Jr., An Analysis of the Demand for Bus and Shared-Ride Taxi Service in Two Smaller Urban Areas, University of Tennessee, Transportation Center, Knoxville, Tennessee, 1975 (NTIS, PB-245 105).
(A.1a,4; B.3; C.1a,4a; D.1b,1c,5a,6)

52. Miller, James H. and Millar, William, "The Development of Transit Planning Guidelines for Small Urban Areas: The Pennsylvania Experience," Paper presented at the 57th Annual Meeting of the Transportation Research Board, Washington, D.C., January 1977.
(A.1a; B.; C.1a,1b,2b; D.)

53. Miller, N. Craig and Goodknight, John C., "Policies and Procedures for Planning Transit Systems in Small Urban Areas," Highway Research Record 449, Highway Research Board, Washington, D.C., 1973.
(A.1a; B.; C.1b,3; D.)

54. Millikin, Norris, Drosdat, Herb, Dean, Donald, and Rae, James W., Transit Needs in Small California Communities, An Interim Report, California Department of Transportation, Division of Mass Transportation, Division of Transportation Planning, Sacramento, California, April 1976 (DMT-013).
(A.1a,3c,4; B.; C.5; D.)

55. Mix, Charles V.S. and Dickey, John W., "Rural Public Transportation in Virginia," Transportation Research Record 519, Transportation Research Board, Washington, D.C., 1974, pp. 56-65.
(A.1a,3c,4a,4b,4c,4d,4e; B.; C.1,3,4a,4c,6a; D.)

56. Mix, Charles V. S. and Dickey, John W., Analysis of Need for a Rural Transportation System, Virginia Interuniversity Transportation Study Group, Blacksburg, Virginia, May 1974, 58 pp. (NTIS, PB-239 852).
(A.1a,3c; B.3; C.5,7; D.)

57. National Cooperative Highway Research Program, Transportation Requirements for the Handicapped, Elderly, and Economically Disadvantaged, Synthesis of Highway Practice 39, Transportation Research Board, Washington, D.C., 1976, 54 pp.
(A.4a,4b,4c,4e; B.; C.; D.)

58. Noble, Brian, "How to Improve Rural Transportation Systems," Appalachia, Vol. 5, No. 5 (April 1972), pp. 18-25.
(A.1c,3c,3d,4a,4d; B.; C.2b,2d,4a,6c; D.)

59. Nobel, Brian, "Rural and Regional Transportation: A New Discipline," Proceedings of the Third Annual Transportation Conference, Florida Department of Transportation, Tallahassee, Florida, 1973, pp. 41-60.
(A.1a,2a,2b,3c,4a,4b,4c; B.; C.2b,2c,5; D.3b)

60. North Carolina Agricultural and Technical State University, Transportation Institute, Proceedings of the National Conference on Rural Public Transportation (1st), Greensboro, North Carolina, 7-9 June 1976, 251 pp. (NTIS, PB-262 808).
(A.1a; B.; C.1a,5,6; D.)

61. North Carolina Agricultural and Technical State University, Transportation Institute, Rural Public Transportation Bibliography, Greensboro, North Carolina, May 1976, 16 pp.

62. Paaswell, R. E., "Problems of the Carless in the United Kingdom and the United States," Transportation, Vol. 2, No. 4 (1973), pp. 351-372.
(A.1c,4e; B.; C.; D.)

63. Paaswell, Robert E. and Berechman, Joseph, "The Urban Disadvantaged and the Search for Locational Opportunity," Traffic Quarterly, Vol. 30, No. 1 (January 1976), pp. 85-100.
(A.1a,3c,4e; B.; C.; D.)

64. Paaswell, Robert E. and Edelstein, Peter, "A Study of Travel Behavior of the Elderly," Transportation Planning and Technology, Vol. 3 (1976), pp. 143-154.
(A.4a; B.; C.; D.)

65. Paaswell, Robert E. and Milione, V., "Profile of a Carless Population," Transportation Research Record 578, Transportation Research Board, Washington, D.C., 1976, pp. 16-28.
(A.1c,4a,4b,4e; B.4; C.; D.)

66. Patton, Carl, "Busing the Rural Elderly, Public Transit in Montgomery County, Illinois," Traffic Quarterly, Vol. 29, No. 1 (January 1975), pp. 81-99.
(A.2b,2d,3c,4a; B.; C.1c,2c,4a,7a; D.1a,1d,2e,3a,3d,5a,5b)

67. Popper, Robert Jay and Bent, Matthew D., "An Analysis of Planned Demand Rural Public Transportation," Paper presented at the 56th Annual Meeting of the Transportation Research Board, Washington, D.C., January 1977.
(A.1a,3d; B.1; C.1a,1b,3,4a,6c; D.)

68. Rhys, D. G. and Buxton, M. J., "Car Ownership and the Rural Transport Problem," Institute of Transport Journal, Vol. 36, No. 5 (July 1974), pp. 109-112.
(A.1c; B.; C.4a,4c; D.)

69. Sacramento Regional Area Planning Commission, Small Urban and Rural Transit Systems Awareness, Technical Supplement to the Regional Transportation Plan, Sacramento, California, June 1976.
(A.1a,1b,3c,3d,4a,4b,4c,4d,4e; B.; C.4; D.)

70. Saltzman, Arthur, "Role of Paratransit in Rural Transportation," Transportation Research Board Special Report 164, Transportation Research Board, Washington, D.C., 1976, pp. 137-142.
(A.1a; B.; C.1a,1b,4a,4b; D.)

71. Saltzman, Arthur, "Rural Transit Needs and Feasibility Techniques," Proceedings--Transportation Research Forum, Vol. 17, No. 1 (1976), pp. 491-497.
(A.1a,3,4; B.3; C.1b,1c,5; D.)

72. Saltzman, Arthur and Amedee, George, "Serving the Transportation Disadvantaged with Demand-Responsive Transportation," Transportation Research Record 559, Washington, D.C., Transportation Research Board, 1976, pp. 1-10.
(A.1a,1c,4a,4b,4c,4d,4e; B.; C.; D.1a,2,3)

73. Saltzman, Arthur and Kidder, A. E., "Patterns of Mobility of Working Poor," Transportation Engineering Journal, Vol. 100, TE3 (August 1974), pp. 769-780.
(A.1c,3c,4c; B.4; C.; D.)

74. Sharma, Prakash, A Selected Bibliography on Small Town Research, Council of Planning Librarians, Monticello, Illinois (Exchange Bibliography No. 713).

75. Skorpa, Lidvard, Dodge, Richard, Walton, C. Michael, and Huddleston, John, Transportation Impact Studies: A Review with Emphasis on Rural Areas, University of Texas, Austin, Council for Advanced Transportation Studies, Research Report 2, October 1974, 83 pp. (NTIS, PB-239 483).
(A.1a,1b; B.; C.; D.5)

76. Southeastern Federal Regional Council, Rural Transportation in the Southeast, Atlanta, Georgia, November 1974, 113 pp. (NTIS, PB-238 880).
(A.2b,4a,4b,4c; B.; C.1,6,8; D.1b)

77. Tardiff, Timothy J., Lam, Tenny N., and Dana, James P., Small City and Rural Transportation Planning: A Review, Department of Civil Engineering, University of California, Davis, California and Institute of Transportation Studies, University of California, Irvine, California, January 1977, 38 pp.
(A.1a,1c; B.; C.3; D.)

78. U.S. Congress, Senate, Committee on Agriculture and Forestry, Prelude to Legislation to Solve the Growing Crisis in Rural Transportation, 93rd Congress, Washington, D.C., 1975.
(A.1a,2a,3c,4b; B.; C.4a,4c; D.)

79. U.S. Congress, Senate, Committee on Agriculture and Forestry, Subcommittee on Rural Development, The Transportation of People in Rural Areas, Rural Transit Needs, Operations, and Management, 93rd Congress, Washington, D.C., 1974, 61 pp.
(A.1a,1c,4a,4b; B.; C.1b,4a,6d; D.1,2,3)

80. U.S. Department of Transportation, Office of the Secretary, Office of Policy and Plans Development, Rural Transit Operations and Management, Washington, D.C., 1973, 100 pp.
(A.1a,4a,4d; B.; C.1b,4a,6d; D.1,2,3)

81. U.S. Department of Transportation, Office of the Secretary, Office of University Research, Transportation and the Rural Community, Report on the First Workshop on National Transportation Problems, 30-31 May 1974, Washington, D.C.
(A.1a,1b; B.; C.; D.)

82. U.S. Department of Transportation, Transportation Systems Center, Improving the Transportation Planning Process in Small Cities, 3 Vols., Cambridge, Massachusetts, November 1973, 302 pp. (NTIS, PB-225 575).
(A.; B.; C.1b,3; D.)

83. U.S. Department of Transportation, Transportation Systems Center, Technology Sharing Program, Demand Responsive Transportation, State-of-the-Art Overview, Cambridge, Massachusetts, August 1974, 118 pp. (NTIS, PB-250 108).
(A.1a; B.; C.1a,1b; D.)

84. U.S. Department of Transportation, Transportation Systems Center, Technology Sharing Program, Rural Passenger Transportation, Cambridge, Massachusetts, October 1976, 46 pp., 72 pp. appendix.
(A.1c,4e; B.; C.1a,1b,9; D.1)

85. U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Planning Methodology and Technical Support, Analyzing Transit Options for Small Urban Communities, Vol. 1-2, 1976.
(A.1a; B.1; C.1b,1c,3,5,6,7; D.)

86. U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Service and Methods Demonstrations, Small City Transit, 13 Vols., Washington, D.C., March 1976 (Report No. UMTA-MA-06-0049-76-2 through UMTA-MA-06-0049-76-14). (A.1a,4; B.; C.1,3,6; D.1a,1b,1c,1d,2,3)

87. U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Service and Methods Demonstrations, Small City Transit Characteristics: An Overview, Washington, D.C., March 1976, 37 pp. (Report No. UMTA-MA-06-0049-76-1). (A.1a; B.1a,1b; C.; D.1)

88. U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Service and Methods Demonstrations, Small City Transit, Summary of State Aid Programs, Washington, D.C., March 1976, 98 pp. (Report No. UMTA-MA-06-0049-76-15). (A.1a; B.1a,1b; C.; D.1)

89. Yukubousky, Richard and Fichter, Donn, Mobility Club: A Grass Roots Rural and Small Town Transportation Concept, New York State Department of Transportation, Planning and Research Bureau, Preliminary Research Report 69, 1974, 47 pp. (A.1c,3c; B.; C.1a,2,4a,5,6b; D.1,2e,3)

90. Yukubousky, Richard and Politano, Arthur, Latent Travel Demand of the Elderly, Youth, and Low-Income Population, New York State Department of Transportation, Planning and Research Bureau, Preliminary Research Report 63, 1974. (A.1c,4a,4b,4d; B.; C.5; D.)

IV. ABSTRACTS

1. Appalachian Regional Commission, "Transportation Needs of the Rural Poor," Appalachia, Vol. 4, No. 2 (October 1970), pp. 6-9.

   This article reports on a recent study of a project which offered rural residents of Raleigh County, West Virginia, free bus transportation to Beckley, the nearest city, for 19 months. This was one of the first attempts to systematically evaluate the effect transportation deficiencies have on rural poverty. A free minibus service was implemented, which allowed rural residents to avail themselves of the more varied, cheaper shopping, and the medical and other social services in the city. It did not offer a journey-to-work service. The study estimated that in the last year of operation the economic benefits of the service still exceeded the cost by a ratio of two to one. The average rider not only saved nearly $9.00 a month in transportation but also raised his income an average of a little over $8.00 through increased participation in such public programs as food stamps, welfare, and social security. Intangible benefits such as increased ability to participate in community activities were also considered.

2. Bell, Theodore and Sparbel, John, "Nevada Transit Study for Small Urban and Rural Areas," Public Works, Vol. 106, No. 10 (October 1975), pp. 95-96.

   This study was conducted in 1974 to explore the demand for and general feasibility of an alternative means of transit for persons living in rural and small urban areas of the state of Nevada. After deciding to conduct a study of transportation needs, it was necessary to develop a method to evaluate this problem. An estimation of potential demand was needed to predict cost and general feasibility. The demand projection was based on social and economic indicators and related to the location of services and population. Several initial assumptions were made including one that public transportation to Nevada service centers should be available to all possible persons. It was assumed that public transportation would be provided only for essential needs, which were defined as commercial, personal, or government related trips. Trips made for employment, social, or recreational reasons were excluded in the study.

3. Blue, Stephen M., "Implementing the Continuing Transportation Planning Processes in Small Urban Areas," 43rd Annual Meeting: Compendium of Technical Papers, Institute of Traffic Engineers, 16 July 1973.

   The principal aim of this paper is to stimulate thinking, especially by local officials, about how transportation planning can perform a useful service to small communities (50,000 to

250,000 population). The statutory requirements for continuing transportation planning are discussed with emphasis on the administrative and organizational problems associated with establishing and maintaining an effective planning activity. Several factors, in addition to the legal requirements, are also introduced. These factors should be considered by local officials as they develop their continuing planning program, and used as criteria to evaluate various proposals for carrying out the planning process. Three general options for organization are reviewed, and their advantages and disadvantages are noted. A transportation study is cited to illustrate the problems faced by a small urban area in implementing a continuing transportation planning process, the approach taken to address these problems, and the resulting organizational structure which was adopted.

4. Briggs, Ronald, Designing Transit Systems for Low-Density Rural Regions, University of Texas, Austin, Council for Advanced Transportation Studies, Working Paper 3A, 1975, 54 pp.

   The design of transportation systems for rural areas is a new art. This paper describes experiences in the design of transportation systems for low-density rural areas in Texas. The systems discussed represent attempts to blend the court-mandated transportation with the demonstration program of the federal government. Topics include strategies of demand analysis, types of service, and related costs.

5. Brown, Neal A., Rural Mass Transportation Feasibility Study, Bluegrass Area Development District, Inc., Lexington, Kentucky, June 1973, 127 pp. (NTIS, PB-241 186).

   This report is an examination of transit related problems of the six Appalachian counties within the Bluegrass Area Development District (Clark, Estill, Garrard, Lincoln, Madison, and Powell). It outlines steps for the implementation of a rural mass transit system including cost analysis and forecasted benefits during a four year, phased period.

6. Burkhardt, Jon E. and Lago, Armando M., "The Demand for Rural Public Transportation Routes," Proceedings--Transportation Research Forum, Vol. 17, No. 1 (1976), pp. 498-503.

   A set of models developed to forecast demand for small-scale, rural public transportation systems are described. These methods were designed to be useful for small area planning, specific enough to influence operational decisions, and simple enough to be applied by local planning staff personnel.

One model is designed to predict the demand for a specific route in a fixed route system. The second model is designed to predict the demand for a rural, out-of-county, or intercity, fixed route or demand responsive system. This second model has a correction term based on the initial prediction, the fare, and whether the system is fixed route or demand responsive. So this second model is sensitive to fare policies, but the first model is not. The data requirements and a brief statement of the process for determining the applicability of the models are also given.

This paper also briefly describes the differences between fixed route systems and demand responsive systems, the basic assumptions of the methods of projecting demand, and the research methodology used in developing the demand models.

7. Burkhardt, Jon E. and Millar, William W., "Estimating Cost of Providing Rural Public Transportation Service," Transportation Research Record 578, Transportation Research Board, Washington, D.C., 1976, pp. 8-15.

The issue of rural transportation has attracted the attention of public policymakers. Now that the general need has been recognized, decision makers want to move to the important questions of demand and cost. Despite the existence of hundreds of small-scale transportation systems, many of which are rural, very little research on demand is available to guide the would-be designer of a rural transportation system. This paper reports work done by the Governor's Rural Transportation Task Force in Pennsylvania. Among the task force objectives was estimating demand for and cost of transportation in all rural areas of Pennsylvania. Based on what little documentation of demand for public transportation systems in rural areas is available, a range of demand estimates is produced. Alternative service options are introduced to show their influence on final costs. These two factors--level of demand and level of service--appear to be the most significant determinants of the cost of rural transportation systems.

8. Burkhardt, Jon E., Eby, Charles L., Abert, James G., Lago, Armando, and Hedrick, James L., The Transportation Needs of the Rural Poor, Resource Management Corporation, Bethesda, Maryland, July 1969, 262 pp. (NTIS, PB-185 253).

Inadequate transportation can have a particularly serious impact on the lives and welfare of the rural poor. Although transportation may be a severe problem for the urban poor, they can still walk or use mass transit to reach a wide range of activities. This is not true of the rural poor. The distances are great and the terrain and weather may be forbidding,

consequently available modes of transportation are expensive. Moreover, the very isolation of the rural poor can deprive them of awareness of the society around them and hence of their own situation and its potential remedies.

In this context it becomes important to develop reliable information and to identify testable hypothesis that can guide solutions to the transportation problem faced by the rural poor. This report examines the transportation problem facing the rural poor of Raleigh County, West Virginia, and compares the service offered by a system of free minibuses operated by the local community action agency with alternative means of providing equivalent transportation. A methodological cost-benefit framework, for the study of rural transportation in general, is developed. Finally, the study explores the differences between Raleigh County and other rural counties to determine the degree of universality that can be attributed to the methodological and programatic findings reported.

9. Buttke, C., "Estimating Ridership on Small Systems," Passenger Transport, Vol. 34, No. 1 (2 January 1976), pp. 6-7.

This article suggests a technique to estimate ridership on alternative bus operations so that a community can decide on an appropriate course of action in developing or improving a bus system. By use of the technique, one can very quickly estimate the ridership on a line with a reasonable degree of accuracy. One is not required to utilize sophisticated mathematical models which only are understood by the user and only vaguely described to the decision maker. However, one is required to know the characteristics of small bus systems, the number and characteristics of dwelling units to be served and to use judgement.

10. California, Business and Transportation Agency, Department of Transportation, Division of Mass Transportation, Transportation Development Act, Statutes and Administrative Code for 1977, Sacramento, California, February 1977.

This document consolidates the Act, Statutues, and Codes related to the Transportation Development Act of California. Under the provision of this Act, financial supports are provided for public transportation operations and transportation improvements.

11. California, Department of Transportation, Division of Mass Transportation, Division of Transportation Planning, Public Transit Atlas; Rural California, September 1975, 3 Vols., Sacramento, California, 1975 (Report No. DMT-015).

This document lists all the public transportation providers in California and contains maps showing the routes and areas served by these providers.

12. Canadian Transport Commission, Systems Analysis and Research Data Base Branch, Midwestern Ontario-Bruce Transport Study, 3 Vols., Ottawa, Ontario, Canada, Reports 75-77, 1974.

    The need for a better understanding of the attitudes and preferences of transport consumers is being increasingly recognized among transport planners. There is now a general agreement that if a transport system is to be successful it must satisfy the desires of transport consumers, since it is the transport consumer who ultimately assesses the adequacy of any transport system. Moreover, it is now becoming apparent that a better understanding of the behavior of transport consumers--that is, how they respond to various transport service attributes--can be achieved by the application of a number of analytical techniques borrowed from the fields of market and consumer research. Until recently, most of these "behavioral" applications have been in the context of air transport, and to some extent, in urban transport. In this report, the results of an extensive transport consumer survey are presented. The transport system under study is a low density, semi-rural system in midwestern Ontario. The survey is currently one of the first applications of the consumer behavior approach in the context of a low density Canadian transport system. During the survey interviewers went to 1,236 households within the study area and administered a questionnaire to a total 1,965 people. These people were asked about their travel habits within their region, their attitudes and preferences for various transport modes, and their perceptions of the relative worth of various transport system attributes.

13. Chadda, Himmat Singh, "Development of a Methodology for Predicting Public Transportation Needs for Small Cities," Ph.D. Dissertation, University of Maryland, 1976, 264 pp. (Order No. 76-27,369).

    The primary objective of this research is to develop a simple and easy-to-apply methodology for predicting public transportation needs for small cities (less than 50,000 population). The research also synthesizes the characteristics of small cities as compared to larger urban areas, and evaluates the need and justification for public transit in small cities.

    The use of secondary data, readily available from sources such as the Bureau of the Census, is considered a more practical and economical approach for small city managements. A "Case Study Approach" for the collection of data and the study of characteristics of existing transit systems in selected cities is

utilized. The data obtained from the secondary sources are supplemented through on board surveys.

The predictor variables used in the development of the demand prediction model are selected using statistical procedures including: correlation, principal component, and factor analysis; and considerable subjective reasoning for the logic of the proposed relationships between the variables. A transit demand prediction model is derived using the multiple linear regression analysis techniques.

Using the systems design approach, a methodology for planning transit system needs in small cities is developed. Guidelines for formulating transit system elements (for example, ridership estimates, route configurations, scheduling, fleet size, fare structure, and fare plans) are also developed as part of the transit planning methodology.

As a part of the practical application of the methodology, procedural steps are outlined to determine transit system elements in a small city, where the need for transit is being considered. It is hoped that the methodology for transit planning developed in this dissertation will help the administrations of small cities to quickly and inexpensively explore transit system options and needs.

14. Chatterjee, Arun, Wegmann, Frederick J., and Grecco, William L., "Simplified Procedures for Long-Range Transportation Planning in Small Urban Areas," Proceedings--Transportation Research Forum, Vol. 17, No. 1 (1976), pp. 136-142.

Although methodologies for long-range transportation planning have been developed for large urban areas, little attention has been given to the particular planning problems faced by smaller areas. Reliance on the conventional procedures useful in larger areas has proven to be inappropriate or too costly in time and money resources for smaller areas. Therefore, there is a need for simplified procedures for small city transportation planning.

This paper considered several alternative procedures; transferring trip generation and distribution rates from other areas, reducing the sample size used for origin-destination surveys, using disaggregate models, and using conceptual systems planning. Empirical tests indicated that transferring models from other areas should be done with extreme caution because of possible errors. On the other hand, sample size reduction yielded promising results. The use of conceptual systems planning seems to have great appeal for small urban areas. Rather than justifying every segment of a proposed system in terms of travel demand, the conceptual approach develops an idealized system of transportation based on broad principles of functional design.

15. Chen, David, Saltzman, Arthur, and Johnson, Joyce H., A Cost Analysis of Rural Public Transportation Systems, North Carolina A&T State University, Transportation Institute, April 1975, 30 pp. (A&T-TI-16-RR-75).

This paper reports on some initial efforts to provide tools for estimating costs. Data were gathered during 1973 and 1974 on the operations of a selected group of existing systems as part of a research effort done by the Transportation Institute of North Carolina A&T State University under a grant sponsored by the U.S. Department of Transportation.

Over 40 rural transportation operations were contacted by telephone and on-site visitations were made to 12 systems for direct observation of their operations. The sites were chosen to include a wide range of geographical locations and operational characteristics. The 12 sites, which were visited by the project team, are spread over a wide geographic area from North Carolina to Louisiana and from New Jersey to Florida. All systems are located in areas with a high proportion of its population located in rural areas; income levels varied among the areas; all the systems were relatively young; and all had to rely on local, state, or federal support for their operation.

16. Coates, Vary T., Revitalization of Small Communities; Transportation Options, George Washington University, Technology Assessment Group, Washington, D.C., May 1974, 134 pp. (NTIS, PB-234 161).

The report summarizes the first year of an analytical study designed to assist in the formulation of rural transportation policy. The hypotheses were: 1) the U.S. should have undertaken to preserve and revitalize rural towns as a means of future population redistribution, and 2) transportation may provide the key to revitalization of rural towns. The study concluded that no policy aimed at reversing present population distribution trends is likely to succeed. Rural development will be a process of rural urbanization. National policy should aim at selectively encouraging small town growth while maximizing societal benefits and minimizing societal costs of rural urbanization. Rural towns can and do serve several necessary functions including future expansion of agriculture, but many will inevitably disappear. Transportation strategies should support existing growth patterns, prevent their disruption by fuel shortages and rising costs, provide access to necessary social and medical services, and assure a degree of personal mobility for those who can not drive, including those left behind in declining communities.

17. Coates, Vary and Weiss, Ernest, Revitalization of Small Communities: Transportation Options, 2 Vols., George Washington University, Technology Assessment Group, Washington, D.C., December 1975, 194 pp. (NTIS, PB-255 977 and PB-261 324).

Volume 1 is the second year final report and Volume 2 is the final report of a two-year policy-oriented, interdisciplinary study of the long-range trends affecting small towns in non-metropolitan areas, the effects of transportation availability and systems on their viability and vitality, and their needs and problems related to transportation. The majority of small towns were found to be viable as a human habitat offering a quality of life desirable to many Americans, but vulnerable over the long-term to structural changes in society and the economy which may result from rising energy costs or energy shortages. Lack of mobility (local transportation alternatives) for those who lack access to an automobile was identified as the most severe transportation problem for small towns at present. The study also concluded that rural areas need special consideration in formulating national energy policy, transportation policy, and welfare policy.

18. Dean, Donald, Drosdat, Herb, Millikin, Norris H., and Rae, James W., Transit Needs in Small California Communities, An Interim Report, California Department of Transportation, Division of Mass Transportation, Division of Transportation Planning, Sacramento, California, September 1976, 39 pp. and appendices (Report No. DMT-016).

This report is the second of two interim reports describing methodology and progress of a transit needs study of California's rural areas. Using the procedure outlined in the previous report (Millikan et al.), transit needs are estimated for a given community. This estimate of transit needs is added to the existing private automobile travel rate to produce a "standard travel rate." In this way the decision makers of each community can compare current travel rate to the "standard travel rate" to get an idea of the current travel demand. Also, comparable areas may be compared on the basis of how well each community satisfies the "standard travel rate" so that decision makers will be aware of how well similar communities are doing in reducing unmet travel demands.

Using data on existing transit systems, a chart was developed to help local planners to determine whether fixed route or demand responsive transit systems and the number of vehicles needed, on the basis of population and trip rate per capita.

Using the methodology described here, transit proposals were proposed for 33 sites. Evaluation of data trend projections, conclusions, and recommendations will be included in the final

report.

19. Enders, Wayne et al., Access to Essential Services in Rural/Urban Environment: A Selected Interdisciplinary Bibliography, Council of Planning Librarians, Monticello, Illinois, 1974 (Exchange Bibliography No. 593).

The purpose of the literature search was to create a basis from which sound recommendations could be offered for improving the accessibility of essential services to residents of rural areas. The search focused on improving access to the more immediate human needs, physical, social, and psychological health rather than to capital improvement projects such as sewage disposal, refuse disposal, or public recreation facilities. One result of the search for published material related to essential services for rural areas was identification of several weaknesses in the existing body of literature. Some of the more important weaknesses are cited here. A conspicuous inconsistency in the direction and quality of the research can be easily recognized. There exists a major void in research directed toward a coordinated or multi-agency approach to improving service accessibility. Some essential needs of rural residents, such as accessibility to food sources and health services, have received relatively little attention. The complex concepts of the need versus demand for essential services and methods to access each of these require additional clarification and empirical analysis. Finally, there is a general lack of sound, theoretical work in the area of essential services utilization.

20. Flusberg, Martin, An Innovative Public Transit System for a Small City: The Merrill, Wisconsin Case Study, Prepared for the 55th Annual Meeting of the Transportation Research Board, January 1976.

This paper describes a recently implemented innovative transportation system which can serve as a prototype for similar systems in other areas. The system was implemented in Merrill, Wisconsin, a city of 9500 persons which has had a long history of public transportation, but has been unable to maintain high quality transit service in recent years. A point deviation bus system, a form of demand-responsive transportation that had seen little experimentation, has been introduced in Merrill, with the help of a State demonstration grant. The system utilizes two vehicles which make scheduled stops at checkpoints located around the city, but are free to respond to requests for doorstep pickups or dropoffs between checkpoints. A higher fare is charged for the premium doorstep service.

With operating data available from the first 7 months of service, it appears that the point deviation concept is operationally valid.

The service has been of high enough quality to attract a significantly greater number of passengers than had been using the transportation services that previously existed in Merrill. The higher cost, doorstep service option has been chosen by almost 40% of the adult ridership. Cost per hour has been below the cost of many other demand-responsive transportation systems. The system has demonstrated how high quality transportation service can be provided in a small city.

21. Gakkenheimer, Ralph A., "Planning, Transportation, and the Small City," Traffic Quarterly, Vol. 18 (April 1964), pp. 282-295.

    This article discusses the relationship between urban planning and transportation engineering relative to small cities. The similarities between small and large cities and the characteristics unique to the small city are discussed. The author suggests that the problems of the small city, for the greater part, differ merely in scale from those of the larger city. The importance of comprehensive planning is stressed.

22. Gilbert, Gorman, "Taxi Usage in Small and Medium-Sized Cities," Proceedings--Transportation Research Forum, Vol. 17, No. 1 (1976), pp. 115-121.

    Although taxi operations have been extensively studied in large urban areas, very little is known about the role of taxis in smaller areas. It is possible that conclusions from larger areas are not transferable because of the different situation facing smaller areas. One important difference is the fact that a taxi service is often the only form of transit available in smaller cities.

    To test several hypotheses concerning taxi users in small and medium-size cities, on board surveys were conducted in eight North Carolina cities. The data revealed that taxi users in these cities tend to be of lower income than counterparts in larger cities. In addition, it was found that taxi users during the first week of a month are older and poorer than users in the last week of the month. This fact is related to the payment of benefit checks. Taxi users, in general, tend to be poorer and have less access to an automobile than the general population in these cities. Finally, taxi users in sampled cities with public transit service tend to have higher incomes and different trip purposes than users in cities without public transit. However, public transit and taxis appear to serve distinct markets in the sampled cities with both services.

23. Gilbert, Gorman, Bach, Robert O., Dilorio, Frank C., and Fravel, Frederick, D., Taxicab User Characteristics in Small and Medium-Size Cities, University of North Carolina, Chapel Hill, Center for Urban and Regional Studies, January 1976, 71 pp. (NTIS, PB-251 984).

In-taxi interviews were conducted with 6176 taxi users in eight small and medium-size cities in North Carolina to determine taxi usage characteristics in these cities. The interviews were conducted in each city both early and late in the month in order to test the effects of early month ridership peaking. One half of the sample cities have transit service. The data were used to test twelve hypotheses regarding the variation of taxi usage with user characteristics, time of the month, and transit. The results show the taxi users: to have substantially lower incomes and car availability rates than do larger city taxi users; to be more nearly homogeneous than are large city taxi users; and to seldom use transit. The results point clearly to the need to distinguish between large and small city taxi operations.

24. Grecco, William L., Wegmann, Frederick J., Spencer, J. A., and Chatterjee, Arun, Transportation Planning for Small Urban Areas, National Cooperative Highway Research Program Report 167, Transportation Research Board, Washington, D.C., 1976, 85 pp.

This report is of principal interest to those concerned with the estimation of travel demand in urban areas with populations of 50,000 or less. Transportation planners concerned with growth of small urban areas and/or improving mobility of residents in small urban areas will find this report to be helpful in developing plans for highways, streets, and public transportation.

The report stresses the importance of organizing transportation planning procedures to generate solutions for the specific problems of concern to a small urban area. Examples of several typical problems are given, together with the recommended procedures to follow. The nature of small urban area transportation problems is described in terms of scale, purpose, time frame, and level of detail. These elements are considered within the context of institutional arrangements, personnel, and finances.

Four types of transportation planning techniques were recommended for application in small urban areas: (a) network simulation based on synthetic models and a small-scale household survey, (b) consumer-oriented transit planning, (c) simple techniques for corridor analysis, and (d) hand-computation-oriented procedures for estimating localized impacts of major traffic generators. Under each type, existing techniques were reviewed and tested.

This report contains a review of existing planning analysis techniques appropriate for small city problems and an extensive research bibliography.

25. Hart, Kathy, How to Set Up a Local Public Transportation Service in Your Community, Fresno County Council of Governments, Fresno, California, September 1975, 63 pp. (NTIS, PB-247 283).

This document, intended for small urban and rural areas, describes the steps necessary to set up public transportation services. Subjects such as estimating costs, obtaining funding, marketing the service, subsidizing a taxi operator, setting up a non-profit corporation to run the service, and developing the required forms for transit record-keeping are covered. The objective of the study was to provide a simple, straightforward guidebook for local officials and private groups to use in establishing public transit services.

26. Hartgen, David T. and Keck, Carol A., "Forecasting Dial-a-Bus Ridership in Small Urban Areas," Transportation Research Record 563, Transportation Research Board, Washington, D.C., 1976, pp. 53-62.

A method is developed for estimating potential demand for innovative transit services, for example, in small urban areas and suburban communities presently without such services. The method operates by assuming that the rate of usage of a particular type of service is similar for particular population groupings, independent of their geographical location. The rate of usage is presumed to depend upon factors such as age, sex, and service attitudes rather than characteristics of the community under consideration.

The procedure is applied in the analysis of demand for dial-a-bus service in Oneonta, New York, using the existing system in Batavia, New York, as the base for determining actual rates of response to such a service. Results indicate that the method gives reasonable estimates of demand and demand sensitivity to policy variables such as fares or gasoline prices.

27. Hauser, Edwin W., Rooks, Elizabeth H., Johnston, Steven A., and MacFillivray, Lois, The Use of Existing Facilities for Transporting Disadvantaged Residents of Rural Areas, 2 Vols., Research Triangle Institute, Research Triangle Park, North Carolina, January 1975, 472 pp. (NTIS, PB-248 746 and PB-248 747).

This study surveys a variety of programs for improving the mobility of the transportation disadvantaged using only locally

available resources and vehicles. The vehicles available included small buses, seven to fourteen passenger vans, and private cars. The programs included volunteer drivers using their own cars, leased, personal vehicles, subscription service, transportation service by social service agencies, regular fixed-routes/fixed-scheduled service, and others. The report is a manual for laymen based on the author's suggested planning methodology as demonstrated in a southeastern rural area. Using both experts and local citizens in group planning sessions, ten alternative transportation programs were examined for their potential utility. The Delphi technique translated non-quantifiable goals into quantified data by consensus, and when combined with cost effectiveness data, enabled the local group to select those programs best suited to achieve their goals and objectives, including economic efficiency. The findings include summary experience on typical programs costs. For example, given the particular assumptions used in the report, typical direct running costs, driver wages, plus administrative and other costs resulted in total estimated per passenger mile costs ranging from 1 cent per passenger mile for 44 passenger buses to a little over 3 cents for 14 passenger vans to slightly more than 8 cents for taxi service (five passengers).

28. Heathington, Kenneth W., Satterly, Gilbert T., and Grecco, William L., "Public Transportation for Small Urban Areas," Highway Research Record 419, Highway Research Board, Washington, D.C., 1972, pp. 1-15.

    Public transportation systems in small urban areas have been experiencing economic difficulties for quite some time. The requirements for transit planning for small urban areas may be somewhat different from those of large urban areas. The priorities for public transportation in small urban areas will normally be different from those established for the larger metropolitan areas. This study of an urban area with a population of more than 100,000 was performed to establish the priorities for public transportation. As a result of the priority analysis, 14 alternative systems were evaluated. A very close cooperation was maintained with the political structure through the entire study. This led to an effective utilization of the transit planning proposals.

29. Hensen, Ronald J. and Grecco, William L., "Evaluation of the Effectiveness of Transportation Planning in Smaller Urban Areas," Traffic Quarterly, Vol. 24 (July 1970), pp. 393-406.

    The larger urban areas have been reasonably successful in establishing programs aimed at providing proper direction to transportation system improvements. However, the smaller

urbanized areas, for the most part, have not achieved this success. A lack of adequately trained personnel and insufficient funds, to support planning efforts, are two of the problems. This article discusses a recent survey of several small urban transportation studies that was conducted as part of a research study aimed at the development of an information manual on transportation planning. The manual was prepared as an aid to persons who serve as members of technical coordinating committees for transportation studies in the smaller urban areas.

30. Herman, Michael S., Satterly, Gilbert T., Jr., Grecco, William L., and Heathington, Kenneth W., A Study of Bus Transit Planning in Small Urban Areas, Purdue University, Joint Highway Research Project, Lafayette, Indiana, Report 6, March 1973, 247 pp. (NTIS, PB-221 495).

    This study presents a bus transit planning process and provides alternatives to the city for conducting various phases of the planning process. The information for the guidelines was obtained from current literature, bus transit studies, and discussions with persons active in the bus transit field. The study can be helpful to provide an understanding of the management of transit studies or the evaluation of studies provided by consultants. In general, the information in the report should prove useful to anyone interested in studying the transit planning process for small urban areas.

31. Hibbs, John, "Maintaining Transport Services in Rural Areas," Journal of Transport Economics and Policy, Vol. 6 (January 1972), pp. 10-21.

    The author discusses the matter of transport services in rural areas in Great Britain. He states that the specific aim for rural transport policy ought to be; "to achieve the provision of an adequate and viable service that forms an integral part of a self-regulating community." He advocates use of the automobile, and the encouragement and supplementation of automobile use with public transit facilities. The primary need is to come to terms with the private car as a means of transport and to cease to regard it as a candidate for restriction and constraint. The author orders the priorities for maintaining rural transport as follows: 1) derive maximum utilization out of the car; and 2) adjust the framework of public transport to let the bus and coach take full advantage of their great flexibility to fill the gaps.

32. Indiana University, Institute for Urban Transportation, Mass Transit Management: A Handbook for Small Cities, Bloomington, Indiana, February 1971, 328 pp. (NTIS, PB-222 386).

The purpose of the study is to provide information for the management of mass transit particularly for smaller cities in the U.S.; that is, cities with a population of 150,000 or less. The two major constraints discussed are the amount of money which is available and the degree of specialization possible with the limited manpower of a small enterprise. Practices of smaller transit systems in the United States were investigated in order to discover some of the methods and problems of such properties. The best methods utilized by these undertakings have been included. Ways in which it might be possible to improve on existing management and conventional practices of the transit industry are included. A consumer-oriented approach is strongly emphasized. Public and private ownership is discussed in relation to consumer service quality. Much attention is also paid to the gaining of public support, and to financing mass transit in small cities.

33. Institute of Public Administration, Planning Handbook: Transportation Services for the Elderly, Reprinted and distributed by the U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., June 1976 (NTIS, PB-247 958).

A Handbook on planning and implementing transportation projects for serving the elderly is presented. The Handbook contains sections on getting organized, developing a data base, designing the service, selecting the right equipment, running the project, putting a budget together, monitoring and evaluation, paying for the project and problems related to franchise conflicts, insurance costs and labor problems. The Handbook also contains a separate flow chart showing all the steps described in the Handbook and permits easy planning of all stages. The Handbook also contains four Annexes which include sample survey forms, a route information and development chart, a list of vehicle and other equipment suppliers, and sample layouts for developing an operation expense analysis.

34. Iowa State University, Engineering Research Institute, Integrated Analysis of Small Cities Intercity Transportation to Facilitate the Achievement of Regional Urban Goals, Ames, Iowa, June 1974, 653 pp. (NTIS, PB-236 612).

This research focuses upon intercity transportation and its relationship to socioeconomic characteristics in essentially rural regions. The study area consists of the nine administrative planning regions in Iowa, that do not include a community of 50,000 population or more. The research objective was to relate the intercity transportation system of small urban communities to their ability to attract and absorb growth. This relationship, as established, suggested a structured set of conditions regarding transportation planning, regulation, policies, and

programs that would be supportive of growth in the study regions and in similar rural regions in other states. Using a form of rank-size analysis, regions were classified as semiurban (centralized or localized) and rural country (transitional or stranded). This classifying utilized data for population, patterns of employment and economic activity, and the supply of selected (health and education) social services. The basis for this classification of rural regions suggests that transportation policy strategies should differ significantly with the type of region. The transportation system in each city region was then classified by utilizing adjusted transportation indices and a rank-sized analysis. A positive relationship was evident between the regional socioeconomic classification and that based on transportation variables.

35. Iowa State University, Engineering Research Institute, Integrated Analysis of Small Cities Intercity Transportation to Facilitate the Achievement of Regional Urban Goals. Intercity Transportation in Rural Regions: Volume 1. Inventory and Analyses, Ames, Iowa, December 1975, 197 pp. (NTIS, PB-254 930).

Published in two volumes the research is a continuation of that presented in a report, June 1974, with the same title. The research focuses upon intercity transportation and its relationship to socioeconomic characteristics in rural regions. The study area consists of nine administrative planning regions in Iowa that do not include a community of 50,000 or more population. The objective was to relate the intercity transportation system of small urban comminities to their ability to attract and absorb growth. This volume reports on an inventory of the transportation system in the study regions, including an update of data presented previously on bus and rail passenger movements and air transportation. The inventory includes water transportation and additional forms of public passenger transportation, motor truck and rail freight transport, and an investigation into expansion in the transportation role of agricultural cooperatives.

36. Iowa State University, Engineering Research Institute, Integrated Analysis of Small Cities Intercity Transportation to Facilitate the Achievement of Regional Urban Goals. Intercity Transportation in Rural Regions: Volume 2. Regional Factors and Analyses, Ames, Iowa, May 1976, 379 pp. (NTIS, PB-254 931).

The volume includes analyses of the structure and development of economic planning regions as typified by the nine rural regions which constitute the study area for this research. Other research topics include studies of the feasibility of a demand-responsive air taxi system and air ambulance service. Mailed survey instruments were utilized to define patterns and characteristics

of travel in rural regions and to afford information concerning behavior in response to shortages of transportation energy and attitudes toward such shortages. Recommendations are formulated to address typical transportation problems in rural regions and to enhance their potential for growth.

37. Kendall, Donald, Misner, Joseph, and Waksman, Robert, "Cost and Service Characteristics of Small Community Transit Operations," Proceedings--Transportation Research Forum, Vol. 17, No. 1 (1976), pp. 123-124.

This report examines the service, ridership, and cost characteristics of thirteen selected transit systems considered to be representative of small city transit operations. The case study sites were chosen to illustrate not only a range of service options and results, but also a variety of community settings, service objectives, financing mechanisms, and political environments. Populations range from 9,500 to 170,000; most of the cities are under 60,000. The cities are Amherst, Massachusetts; Chapel Hill, North Carolina; East Chicago, Indiana; Eugene, Oregon; Evansville, Indiana; Sudbury, Massachusetts; Westport, Connecticut; Xenia, Ohio; Bremerton, Washington; Merrill, Wisconsin; Ann Arbor, Michigan; El Cajon, California; and Merced, California.

38. Kidder, Alice E., "Economics of Rural Public Transportation Programs," Transportation Research Record 578, Transportation Research Board, Washington, D.C., 1976, pp. 1-7.

Rural transit systems cannot be expected to be self-supporting. Revenue rarely comes close to the 7 cents per mile (4.4 cents per km) that is typical of the costs of the system. Costs are high because low population density and the great number of destinations in most rural areas cause high per-passenger cost for driver salaries and management. Ridership on subsidized systems that have been set up under the Office of Economic Opportunity and similar auspices tends to be a small fraction of the general population and even the disadvantaged population. Competition from automobile alternatives (car pooling and ride-sharing) diminishes the effective demand for transit solutions. Getting programmatic consensus on destinations is difficult because of conflicting alternatives; therefore, ridership is low. A subsidy large enough to provide minimum service levels to all the disadvantaged in a region is beyond what appears to be the fiscal capacity of local governments in rural areas. Few of the original Office of Economic Opportunity experiments have been picked up for sustained local funding. In light of these findings, restricting new expenditures of money for rural transportation demonstration programs to low-cost innovations such as: (a) systematized car pooling, (b) transportation vouchers for specific target

populations, or (c) consolidating social-service transportation and service delivery programs may be useful.

39. Kidder, Alice E., "Transportation Policy and the Delivery of Social Services in a Small City," Transportation Research Record 516, Transportation Research Board, Washington, D.C., 1974, pp. 21-27.

The study examines the ways in which social service agencies in a small city cope with the transportation problems of immobile clients. The study documents unmet needs as well as under-utilized capacity. Inefficiency stems from the tendency of many agencies to have one or two vehicles which operate only a brief time during the day. Low vehicle utilization combines with high driver cost to produce per client trip costs as high as $7.60. Overall, there appears to be poor coordination of demand for services with the available supply of vehicles. Consolidation of transportation services would eliminate the inefficiency described above; however, economic, institutional, and legal barriers stand in the way of an effective merger of transportation programs. Interim solutions include exchanges of data on volunteers and vehicle availability among agencies, and increased reliance on public transit mode. Long range solutions involve application for federal funds through local governmental channels for service development and capital improvement programs.

40. Kidder, Alice E. and Saltzman, Arthur, Mode Choice Among Autoless Workers in Auto-Oriented Cities, Greensboro, North Carolina, North Carolina A&T State University: Transportation Institute, 1973.

Autoless workers in low-income areas of small cities where bus service is an incomplete link between new job opportunities and residences have come to depend, to a remarkable degree, upon informal modes of transportation (ride-sharing and carpools) and occasional programs where the employer furnishes the vehicle, rather than on conventional public transit. The auto-orientation of the majority of the blue collar workers in the sample suggests that a flexibly routed public transit system which charges passengers will face stiff competition from "free" ride-sharing which is currently widely practiced.

41. Kidder, Alice E. and Saltzman, Arthur, Transportation Problems of the Autoless Worker in a Small City, Greensboro, North Carolina, North Carolina A&T State University: Transportation Institute, 1972.

The research examined the transportation problems of low-income residents in Greensboro, North Carolina, with special emphasis on the autoless worker. Relevant sources in the literature are reviewed and background data on the Greensboro area are provided. Survey data reveal a strong auto-orientation among lower-income families. An important segment of the working poor included captive riders of the transit system who were typically older, more likely to be female than male, and more likely to be black than white. Little significant difference appeared between the average hourly wages of auto-owning and autoless workers. Consequently, any alternative transportation system for the city would have to charge low fares in line with current fare structure.

42. Kidder, Alice E., Sen, Lalita, Amedee, George, and McKelvey, Douglas J., "Cost of Alternative Systems to Serve Elderly and Handicapped in Small Urban Areas," Proceedings--Transportation Research Forum, Vol. 17, No. 1 (1976), pp. 498-503.

This paper examines one aspect of cost analysis, that is whether a larger scale of operation leads to significant unit cost reduction. The economic theory of the firm suggests that unit costs should decrease with increasing scale up to a point, and then increase. The result is a u-shaped cost curve. To test this concept with respect to transit services for the elderly and handicapped, data from 16 transportation services for the elderly and handicapped located in various parts of the United States were collected. Using cost per passenger mile as the output or unit cost indicator and total passenger miles as the measure of the scale of operations, the analysis indicated that there were decreasing unit costs over the scales of operation represented in the data. This finding suggests that considerable economics in unit costs can be realized by operating transportation services for the elderly and handicapped at scales of operation considerably larger than most of those existing under contemporary assistance programs.

43. Koutsopoulos, K. C. and Schmidt, C. G., "Mobility Constraints of the Carless," Traffic Quarterly, Vol. 30, No. 1 (January 1976), pp. 67-83.

This article examines the urban mobility needs of carless households as a distinct population subgroup. While there is disagreement as to whether the carless represent a distinct minority group, it is clear that despite their diversity, the majority of carless households do possess common mobility attributes and mobility problems. This study provides some insight into the nature of the vehicular-environmental interaction of the carless population, that is, the relationship between carless urban residents and the various mobility constraints

presented by the metropolitan environment.

44. Kurban, G. John, Characteristics of Transit Supply in Small and Medium Sized Cities, Pennsylvania Transportation Institute, University Park, Pennsylvania, April 1974, 70 pp. (NTIS, PB-233 532).

This study proposes to demonstrate that with small or medium-sized communities, under-utilization of service and hence economic loss for the operator need not always be the case. Instead, by assessing the present ridership rates and route characteristics, analyses can be performed which will suggest a system that is both acceptable to passengers and economically viable to the bus operator. Frequency of service was used as the indicator of the relative quality or level of service. An attempt was made, therefore, to demonstrate the use of a methodological technique to aid transit operators in adjusting bus service using the financial resources available. The objectives were: 1) to test the service specification concept as a means for determining the economic conditions of bus transit operators, and 2) to establish a correlation between economically viable route characteristics and ridership rates. A bibliography is furnished. Appendices include an example of the questionnaire used to obtain data and summary statistics for linear regressions performed in the development of the study analysis.

45. Larson, Thomas and Lima, P. M., "Rural Public Transportation," Traffic Quarterly, Vol. 29, No. 3 (July 1975), pp. 369-384.

In the 1960's transportation planners focused their attention on urban problems. However, economic and social conditions of rural areas, only recently identified in detail, have stimulated interest in rural transportation. This article reviews federal and state efforts to develop rural transportation with particular attention to the experience of the Commonwealth of Pennsylvania.

46. Larwin, Thomas, Transportation Management Strategies: Prospects for Small Cities, Prepared for the 55th Annual Meeting of the Transportation Research Board, January 1976.

A case study transportation systems management (TSM) program for the Santa Barbara, California, CBD is reviewed. The purpose is to indicate the breadth and scope which similar programs might take in other smaller urban areas recognizing the potential for implementation. Three alternative scenarios for transportation management are outlined: (1) maximizing non-auto access, (2) minimizing auto access, and (3) maximizing internal circulation opportunities. The evaluation of more specific options within these categories, according to both potential levels of goal-

achievement and local community preferences, is described. Components of a recommended transportation management program are then outlined. Conclusions are drawn regarding the applicability of case study concepts and methods to other areas.

47. Liou, Peter, A Technical Review of a Ridership Forecasting Method: Dial-a-Bus in Small Urban Areas, New York, State Department of Transportation, Planning and Research Bureau, Preliminary Research Report 73, 1975, 45 pp.

    This report is a technical review of the method used by the New York State Department of Transportation to predict the potential ridership of the dial-a-bus service in small urban areas. The method was applied to the city of Oneonta (population 16,000), New York, in early 1974. The follow up survey was undertaken in that city in the Fall of 1974, three months after the dial-a-bus transit service started operation. Based on the information obtained from this survey both the analytical basis and the predicted accuracy of the forecasting methodology are examined in the study by comparing the observed transit usage and the after-service community sensitivity to fare policies with those predicted prior to the existence of the service. In addition, other aspects of the methodology and its applications such as the adequacy of sample representation and the demand computation procedures are also examined from a critical viewpoint.

48. McKelvey, Douglas J., Considerations in Planning and Operating Transportation Systems for Older Americans and Public Transportation Systems in Rural Areas, Iowa University, Institute of Urban and Regional Research, Iowa City, Iowa, Working Paper 15, 1975.

    This paper identifies considerations in the planning and operating of transportation systems for older Americans and public systems in rural areas. It identifies an approach to transportation planning and a number of elements related to the planning, implementation, and evaluation of that system. The paper draws upon dial-a-ride literature and experiences, the elderly and handicapped transportation literature, and experiences with special rural transportation systems in the mid-western states. The paper is intended to provide a basic set of considerations, questions, knowledge and expectations about elderly and rural transportation systems.

49. McKelvey, Douglas and Deuker, Kenneth, Transportation Planning: The Urban and Rural Interface and Transit Needs of the Rural Elderly, Iowa University, Institute of Urban and Regional Research, Iowa City, Iowa, April 1974, 28 pp. (NTIS, PB-249 084).

The three objectives of this report are: 1) to identify and assess rural transportation problems, especially those affecting the elderly; 2) to identify specific problems and actions taken during the planning and implementation phases of a seven county rural transportation system in southeastern Iowa; and 3) to suggest research questions that could be addressed to evolve more comprehensive and effective transportation planning programs.

A feasibility study was conducted to identify the major problems of the existing systems and make general recommendations regarding the subsequent planning, promotion, and implementation. This report documents recommendations made during the study. The following are observations emphasized by the authors: 1) planning needs should be as coordinated and comprehensive as possible at the regional (rural-urban) scale; 2) planning may not require extensive surveys to initiate a satisfactory system; 3) door-to-door service is required for most elderly; 4) the process should involve users, transportation operators, political leaders, and social agencies; 5) promotion of the system is critical and should emphasize identity and use of the system through memberships, reasonable fares, and availability of all trip types for both elderly and non-elderly; 6) some level of continued funds from state, county, or federal sources should be assured prior to implementation; and 7) extensive monitoring and evaluation of demonstration systems need to be undertaken to facilitate planning of future systems.

50. Meyburg, Arnim H., Stopher, Peter R., Ryan, James H., and Coulter, John W., Mass Transit Development for Small Urban Areas: A Case Study, Thompkins County, New York, Report on First Year, Cornell University, College of Engineering, Ithaca, New York, October 1974, 251 pp. (NTIS, PB-242 989).

This report presents the results of the first year effort within a multiple year research project to develop a transportation planning methodology for small urban areas. In the case study context this report concentrates on establishing a complete inventory of data on travel patterns and preferences on transportation services and facilities and on land use, employment, and socioeconomic characteristics of the population of Thompkins County, New York. Conduct and the results of an extensive household travel and origin destination survey are reported. Mass transit developments for small urban and rural areas, such as Thompkins County, are outlined in terms of the specifications of objectives for a county wide system. An example of service are expansion for public transportation is presented.

51. Middendorf, David P., Heathington, Kenneth W., and Davis, Frank W., Jr., An Analysis of the Demand for Bus and Shared-Ride Taxi Service in Two Smaller Urban Areas, University of Tennessee, Transportation Center, Knoxville, Tennessee, May 1975, 312 pp. (NTIS, PB-245 105).

This report is a study of the demand for the publicly owned, fixed-route, fixed-schedule bus service and the privately owned, demand-responsive transportation service in two smaller urban areas--Davenport, Iowa, and Hicksville, New York. The objectives of the report were to compare the travel patterns and markets of the bus and shared-ride taxi systems, to compare the travel patterns and markets of the shared-ride taxi systems in each study area, to analyze factors and circumstances underlying the choice of either the bus or the shared-ride taxi, and to measure the public sentiment toward each form of public transportation. Information was gathered through on-board surveys, mail surveys, home interviews, and dispatching records and drivers' logs maintained by the taxicab companies. Users as well as non-users of public transportation were interviewed. A bibliography is furnished. Appendices contain Customer Data Record, Vehicle Data Record, and the bus passenger, taxi passenger, and household survey questionnaires.

52. Miller, James H. and Millar, William, "The Development of Transit Planning Guidelines for Small Urban Areas: The Pennsylvania Experience," Paper presented at the 56th Annual Meeting of the Transportation Research Board, Washington, D.C., January 1977.

The purpose of this research was to develop workable guidelines for short-range transit planning in small urban areas in Pennsylvania. Such guidelines must face the unique problems of small areas. In particular, a proper balance between technical sophistication and political considerations is necessary.

Such methodologies were developed and tested using four small urban areas as case studies. The short-range transit planning process was developed in the form of guidelines for decision-making and appeared to represent a sound approach to transit planning. The hypothesis that the short-range transit planning process used in larger urban areas is not appropriate was supported by the findings of the case studies. A less technical, more politically sensitive, approach is required. The proposed methodology represents a reasonable balance of technical detail and more subjective community and political impact.

A further conclusion of this research is that the short-range transit planning studies in small urban areas need not be expensive or time-consuming. Major emphasis should be placed on the interaction of the planning team with local transit officials,

planners, elected officials, and community groups. The technical aspects of the study play only a supportive role in the dialogue among the above mentioned groups and individuals.

53. Miller, N. Craig and Goodknight, John C., "Policies and Procedures for Planning Transit Systems in Small Urban Areas," Highway Research Record 449, Highway Research Board, Washington, D.C., 1973.

This paper suggests an approach to transit planning for small urban areas. It represents the transit planning process as a series of key decisions and identifies the major issues associated with each decision, the major inputs required, and the role of each organization or participant in the planning process. For cities of the size discussed here (smaller than the standard metropolitan statistical area) a detailed inventory of travel information usually will not have been developed and a transit system may not exist. Several specific procedures are suggested that can effectively accomplish the goals of a conventional transit technical study and at the same time minimize costs by maximizing the use of readily available data resources and by replacing sophisticated quantitative techniques with rational qualitative techniques wherever possible.

54. Millikin, Norris, Drosdat, Herb, Dean, Donald, and Rae, James W., Transit Needs in Small California Communities, Sacramento, California, California Department of Transportation, Division of Mass Transportation, Division of Transportation Planning, April 1976.

This interim report reviews research designed to develop a methodology for assessing transit needs in small communities. The analysis consists of several parts. First, a literature review is presented. Second, a state-wide inventory of existing small city transit systems is presented. Third, several alternative approaches to assessing transit needs are tested. The preferred approach is one which uses a five step process to assess transit needs. Transit needs are determined by: a) average and community income, b) percentage of youth and elderly, and c) percentage of trips that are satisfied by existing systems. Finally, the procedure for determining transit needs in a given community is outlined. The relationship involving transit needs and the three independent variables is developed separately for ten basic test sites. The candidate site is matched with one of the test sites and the appropriate relationship is then used to determine transit need.

55. Mix, Charles V. S. and Dickey, John W., "Rural Public Transportation in Virginia," Transportation Research Record 519, Transportation Research Board, Washington, D.C., 1974, pp. 56-65.

Travel in most rural areas is now confined to one mode, the private automobile. Those who cannot own or operate cars; either do not travel or must arrange, sometimes paying high prices, for others to take them where they need to go. Public transportation should be made available to those in rural areas. This paper analyzes the rural transportation problem in Virginia and suggests how public transit systems can be developed and operated in rural areas of the state. A number of projects that are in operation or are proposed for rural areas in other states are reviewed. The study concludes that although scattered, sufficient resources are available in Virginia for the planning and development of rural transportation systems.

56. Mix, Charles V. S. and Dickey, John W., Analysis of Need for a Rural Transportation System, Virginia Interuniversity Transportation Study Group, Blacksburg, Virginia, May 1974, 58 pp. (NTIS, PB-239 852).

Travel in rural localities has received little attention to date. Recent legislation has pointed to the possibility of financial aid to public transit systems set up in such areas. The study defines and develops tools for analyzing the "need" for rural public transportation. Using Madison County, Virginia, as an example case, the study first defines travel demand, latent demand, travel "wants," and diverted travel. Five techniques then are analyzed for making demand and need forecasts (accessibility, gap analysis, attitude surveying, committee estimates, demonstration projects). It is concluded that full-scale origin-destination surveys and analyses are too expensive and that a combination of committee estimates and demonstration projects may be the best forecasting method.

57. National Cooperative Highway Research Program, Transportation Requirements for the Handicapped, Elderly, and Economically Disadvantaged, Synthesis of Highway Practice 39, Transportation Research Board, Washington, D.C., 1976, 54 pp.

This synthesis is a state-of-the-art review and focuses on the handicapped, the elderly, and the poor (economically disadvantaged). It covers the problems of both the rural and urban populations that fall into the category of the transportation disadvantaged and draws heavily from the existing literature, especially from recent studies by the Administration on Aging, UMTA, and the Federal Highway Administration.

The synthesis covers six areas: (a) identification and definition of the nature of the problem, (b) indication of the size and scope of the market of the transportation disadvantaged, (c) description of the travel demand characteristics of that group, (d) review of the present systems serving the transportation disadvantaged, (e) evaluation of the way in which present systems are working, and (f) some recommendations on future research, funding and program needs.

58. Noble, Brian, "How to Improve Rural Transportation Systems," Appalachia, Vol. 5, No. 5 (April 1972), pp. 18-25.

The author, a regional planner for transportation and community development with the Appalachian Regional Commission, discusses the need to improve transportation in rural Appalachia. The nature and magnitude of the transportation problem, transportation demand by trip purpose, future demand, and possible techniques for mitigating the problem are presented.

59. Noble, Brian, "Rural and Regional Transportation: A New Discipline," Proceedings of the Third Annual Transportation Conference, Florida Department of Transportation, Tallahassee, Florida, 1973, pp. 41-60.

The paper exposes a number of problems common to rural (and many urban areas as well) transit services for the transportation disadvantaged. These include: the lack of transportation expertise among those who plan and operate such transportation services; the narrow focus typically taken which provides services for a very exclusively defined clientele; the resulting denial of access to other groups of clients who have unmet service needs; and the general inefficiency of incomplete, uncoordinated, often overlapping services that result in any given locality. An improved technique for planning is presented which calls for coordinated service programs wherein the relevant locations of clients and services are documented together with frequency of travel and time requirements. It is suggested that public transportation systems considered must demonstrate efficiency of operation and economic stability.

60. North Carolina Agricultural and Technical State University, Transportation Institute, Proceedings of the National Conference on Rural Public Transportation (1st), Held at Greensboro, North Carolina, on June 7-9, 1976, 251 pp. (NTIS, PB-262 808).

The proceedings comprise the addresses, presentations, and resource papers given at the conference, with summaries of problems and recommendations developed in the workshop sessions.

Subjects include planning, feasibility, and demand estimation; securing funding and support; use and coordination of public and private systems and resources; federal, state, and local programs; regulatory and legal considerations; vehicle and equipment specifications, purchase, maintenance, and depreciation; marketing and promotion; administration and management; cost control; performance monitoring and evaluation; research and education. (Portions of this document are not fully legible.)

61. North Carolina Agricultural and Technical State University, Transportation Institute, Rural Public Transportation Bibliography, Greensboro, North Carolina, May 1976, 16 pp.

This bibliography, containing approximately 160 references on rural public transportation, was prepared as part of the Rural Public Transportation Feasibility Study.

62. Paaswell, R. E., "Problems of the Carless in the United Kingdom and the United States," Transportation, Vol. 2, No. 4 (1973), pp. 351-372.

An examination of current population statistics shows that in the U.S. more than half of the population is without immediate access to a car, and in the U.K. more than three-fifths of the population is without access to a car. This phenomenon has been accentuated by national investment in both countries in major highway programs. The term carless refers to more than just households that own no cars. It extends, in households with cars to those without licenses (old and young), the handicapped, and even the licensed drivers who have no access to the family car when it is in use elsewhere (e.g. at work). The most severely effected are those in urban areas and especially the urban poor. Transportation expenses are limited for the poor when other family expenditures (food, shelter) take a high priority. Once the work trip has been satisfied, money for other trips, for the poor, is not always available. One solution to cost-free travel is pedestrianism (walking), but this too is difficult in urban areas where the pedestrian has been overlooked in favor of the car. Solutions to problems of the carless include dial-a-ride, better public transit, and better design of urban form.

63. Paaswell, Robert E. and Berechman, Joseph, "The Urban Disadvantaged and the Search for Locational Opportunity," Traffic Quarterly, Vol. 30, No. 1 (January 1976), pp. 85-100.

This study examined the effects of two measures of disadvantage (employed versus not employed and car available versus carless) on transportation behavior. Using survey data collected in Buffalo,

New York, the following conclusions were reached. The important difference in the travel behavior of the advantaged and disadvantaged lies mainly in the spatial distribution of non-work activities and not in the frequency of travel for those activities. The disadvantaged tend to have locations of activities which are less dispersed and more confined to the neighborhood. However, since walking is often the dominant mode, the length of time spent traveling to these nearer locations is actually longer than the time spent in travel by the more advantaged.

Another finding is that high-priority trips (for example, clothes and grocery shopping, medical, and banking) are made by the more disadvantaged even if they are carless and not employed. But with increased access to a car, more trips are given high priority, as manifested by their relative frequency.

Finally, the identification of the urban disadvantaged, as related to transportation, seems to depend more on the attributes of freedom of choice of transportation mode and the equity in the choice of opportunities than the actual deprivation of essential trip-making.

64. Paaswell, Robert E. and Edelstein, Peter, "A Study of Travel Behavior of the Elderly," Transportation Planning and Technology, Vol. 3 (1976), pp. 143-154.

A study has been made of comparative travel behavior of a group of elderly and non-elderly persons in Buffalo, New York. The study supports the hypothesis that there are no severe changes in travel behavior as one gets older, but that the quality of travel, as opposed to the quantity of travel, deteriorates.

The paper analyzes all aspects of travel for 14 non-work activities. Total daily trip frequency is not discriminatory between the elderly and non-elderly. The mode for these trips include car, bus, taxi and walk, the last being an important means of getting around for the elderly. The elderly, in several instances (e.g., grocery shopping) travel more frequently than the non-elderly. Through discriminant analysis, it was found that it is possible to sort the elderly and non-elderly into two groups when trip frequencies for a few specified trips only are considered (shopping, certain social trips). As the age delineation between elderly and non-elderly increases (i.e., from 55 to 65 years) the distinctions get sharper.

Attitudes towards travel show, as expected, the car is always the preferred mode for travel, regardless of age. However, the elderly display a greater tolerance for bus and walking. Thus they would be more receptive to implementation of new modes of

transit to solve the problems of checking quality of service they face.

65. Paaswell, R. E. and Milione, V., "Profile of a Carless Population," Transportation Research Record 578, Washington, D.C., Transportation Research Board, 1976, pp. 16-28.

A survey was carried out in which 401 respondents in Buffalo, New York,were queried on car accessibility, activity choice, travel mode choice, and attitude toward travel modes and activities. The purpose of the survey was to examine the differences in travel behavior between those who had access to and use of a car and those who did not. Of the households without cars, only 21 percent never had access to a car. The carless sample showed a profile that was predominately low income, female, elderly, and unemployed. The largest segment of those identified as carless lived in the most densely populated portions of the city. Discriminating among modal-use patterns and activities of the various respondent groups was possible. The carless shopped for groceries more often (by walking) and participated in other neighborhood-centered activities more often than did those with cars. Paid social activities were engaged in much less frequently by the carless group. Walking was an important mode for the carless, but the bus was used by most of them, at least occasionally, for all but grocery trips.

66. Patton, Carl, "Busing the Rural Elderly, Public Transit in Montgomery County, Illinois," Traffic Quarterly, Vol. 29, No. 1 (January 1975), pp. 81-99.

The article describes a successful minibus program which, for less than $34.00 per operating day, serves over 200 rural elderly people, who were previously without public transportation. Program cost, operating procedure, and the impact of the service upon the travel activities of the elderly people in the rural area are described.

67. Popper, Robert Jay and Bent, Matthew D., "An Analysis of Planned Demand Rural Public Transportation," Paper presented at the 56th Annual Meeting of the Transportation Research Board, Washington, D.C., January 1977.

A partially demand responsive system for providing public transportation to the needy in rural areas is proposed and evaluated. This system, known as the planned demand method, utilizes manual dispatching techniques, that are capable of tailoring the cost and quality-of-service to match local desires and goals. Dispatching rules are outlined which provide for the

clustering of travel demands in time and space so that more economically efficient rural routes are generated.

The planned demand system is tested through multiple computer simulation analyses on a rural, Virginia county. The tests measure the quality-of-services provided to the users and the efficiency of resource utilization for alternative operating strategies. Results are presented in the form of operating cost functions for various fleet sizes, service areas, and demand levels. The results provide useful design information on quality-of-service and operating costs, and may be utilized by rural planners when designing future rural public transportation systems.

68. Rhys, D. G. and Buxton, M. J., "Car Ownership and the Rural Transport Problem," Institute of Transport Journal, Vol. 36, No. 5 (July 1974), pp. 109-112.

During the past few years, the various threats to cut rural bus services have highlighted the problems of the provision of transport facilities in sparsely populated areas. This paper examines the determinants of the geographical incidents of car ownership and attempts to use this analysis as a basis for policies to alleviate the "rural transport problem." In particular, the authors examine whether a rural transport network based upon traditional public transport services is the best way of providing a passenger transport-infrastructure or whether a system based on the private motor vehicle could be superior.

69. Sacramento Regional Area Planning Commission, Small Urban and Rural Transit Systems Awareness, Technical Supplement to the Regional Transportation Plan, Sacramento, California, June 1976.

The purpose of this report is to provide an inventory of existing small urban and rural transit services, to define the transit dependent persons in the region, to determine potential service area population estimates, to describe some alternative methods of providing transit services, and to provide some ground work analysis of the existing transit services and potential service needs which can lead to a more comprehensive planning and implementation program at some future date.

70. Saltzman, Arthur, "Role of Paratransit in Rural Transportation," Transportation Research Board Special Report 164, Transportation Research Board, Washington, D.C., 1976, pp. 137-142.

Rural travel characteristics are briefly discussed and comments are made on the growth of public transportation in such areas. The economic efficiency and consolidation of resources related to

rural transportation are described. The need for effective managers with entepreneurial skills is indicated, and the question of whether to focus on special services for subgroups of the population or to provide a variety of services for the general public is considered. Small, personalized systems providing door-to-door service were first developed in rural areas by community action agencies. Although the cost per passenger trip is high (very long trips are being serviced and the average load factors are more than 65 percent) for rural transit, two important factors indicate that these systems are being operated at reasonable cost and are quite efficient. The greatest impact on transportation in rural areas will come from finding ways to more efficiently use equipment and labor that various agencies currently use to provide paratransit services. Regulations that do not allow flexibility in the use of currently available transportation funds must be changed. The need is indicated for an academic option at universities that would train students in planning and managing specialized transportation services.

71. Saltzman, Arthur, "Rural Transit Needs and Feasibility Techniques," Proceedings--Transportation Research Forum, Vol. 17, No. 1 (1976), pp. 491-497.

This paper resulted from the analysis, of 12 rural transit operations, by a research team from the Transportation Institute at North Carolina A&T State University. The research team attempted to synthesize various steps that were taken in the planning and implementation of these systems and concluded that two important steps were the assessment of transit needs and the determination of whether a feasible system can be created.

The factors which must be considered to determine the transit system potential are the extent of the geographic area and target population; health and social service agency needs, journey to work needs, and shopping and recreation needs; existing systems and activity centers; data from similar systems; and local support. Each of these steps are briefly discussed in this paper. Some of them involve fairly simple and straight-forward decisions requiring relatively little data, while others, such as transit needs, require a good deal more thought and analysis. But nothing should be beyond the ability of a local manager or planner.

Two complementary methods for determining demand are discussed, a survey technique and a technique based on systems similarity. A brief discussion of demand estimation techniques to be avoided is also included.

72. Saltzman, Arthur and Amedee, George, "Serving the Transportation Disadvantaged with Demand-Responsive Transportation," Transportation Research Record 559, Washington, D.C., Transportation Research Board, 1976, pp. 1-10.

An assessment of the nature of transportation problems of the poor, elderly, and handicapped comprises the first section of this paper. It is shown that demand-responsive transportation systems such as Dial-A-Ride are demonstrably superior to conventional transit in providing for the transportation needs of the transportation disadvantaged. The impact of various demonstration projects of demand-responsive transportation are reviewed. The emphasis is on the effect these projects had on serving the poor, elderly and handicapped.

The final section of the paper reports on the Federal role in providing demand-responsive transportation to facilitate more mobility among the poor, elderly and handicapped.

73. Saltzman, Arthur and Kidder, Alice E., "Patterns of Mobility of Working Poor," Transportation Engineering Journal, Vol. 100, TE3 (August 1974), pp. 769-780.

This study examines the transportation problems faced by low-income residents in Greensboro, North Carolina, with special emphasis on the autoless worker. A survey revealed strong auto-orientation among lower income families. Of the autoless respondents, more than half used someone else's automobile as a principle mode for the journey to work. An important segment of the working poor were "captive riders" to the transit system. These workers were typically older, more likely female than male, and more likely black than white. There appeared to be an insignificant difference between the average hourly wages of auto-owning and carless workers. Consequently, any alternative transportation system for the city would have to charge low fares in line with the current fare structures.

74. Sharma, Prakash, A Selected Bibliography on Small Town Research, Council of Planning Librarians, Monticello, Illinois (Exchange Bibliography No. 713).

The bibliography contains nearly 150 selected references on small town research published chiefly during 1920 to 1971. The references listed represent many old and current publications which may be used as guides for further research. The bibliography is divided into two parts: Part One is a listing of books and monographs, and Part Two is a listing of articles and periodicals. The references are arranged by author, in alphabetical order, when possible.

75. Skorpa, Lidvard, Dodge, Richard, Walton, C. Michael, and Huddleston, John, Transportation Impact Studies: A Review with Emphasis on Rural Areas, University of Texas at Austin, Council for Advanced Transportation, Research Report 2, October 1974, 83 pp. (NTIS, PB-239 483).

The studies reviewed were classified into four categories (these are not mutually exclusive) according to the following criteria: the nature of the transportation facility (i.e., highway, rail, etc.); the kind of area examined in the study (e.g., by-pass area, rural area, interchange area); the type of effect measured (changes in land use, land value, economic activity, etc.); and the methodology employed in the analysis of impact.

76. Southeastern Federal Regional Council, Rural Transportation in the Southeast, Altanta, Georgia, November 1974, 113 pp. (NTIS, PB-238 880).

The report was prepared by the Expanded Metromobility Task Force, an interagency group of the Southeastern Federal Regional Council in Atlanta. Part One of the report examines rural transportation systems in Boone, North Carolina, and Sumter, South Carolina, and makes specific and general recommendations which are applicable to the establishment and operation of any rural system. Appendices provide helpful information in the form of sample operating rules and regulations, routing and scheduling techniques, typical costs, state roles and statutes, and a bibliography.

Part Two is a companion document to the basic report and comprises Appendix D, transportation services inventory forms of that report. Part Two documents the statutory and regulatory authorities in the programs of the U.S. Departments of Health, Education and Welfare; Labor and Transportation; and the Office of Economic Opportunity which may be used to provide support (dollars and/or services) for rural transportation. The inventory is specifically geared toward southeastern region states and omits information on those programs of supporting staffing, training, peer research activities, student financial aid, planning and administration, and specific cash benefits programs such as social security.

77. Tardiff, Timothy J., Lam, Tenny N., and Dana, James P., Small City and Rural Transportation Planning: A Review, Department of Civil Engineering, University of California, Davis, California and Institute of Transportation Studies, University of California, Irvine, California, January 1977.

The goals and objectives of providing public transportation services in small cities and rural areas are different from those

of metropolitan regions. For the small cities and rural areas, the primary purpose is supplying transportation services to meet basic needs of people who do not have any convenient means of transportation. This group can be classified collectively as the carless. Carless simply implies that automobile transportation is not available. This group includes the poor, handicapped, elderly, and youth, as well as members of households that do not own an automobile or do not have access to an automobile.

The mobility needs of the carless are examined in this review. The characteristics of the special mobility groups are studied. The emphasis of the review is on the planning process and operation of public transportation services in the small cities and rural areas. A summary of the characteristics of existing non-metropolitan transportation services is also presented.

The state of the art in nonmetropolitan transportation planning is one of considerable disjointed effort. Although there has been careful planning related to the implementation of public transportation operations in the rural areas and small cities, little systematic development of goals, objectives, policies, and criteria could be found. The high per capita costs of providing transportation services to a small disadvantaged group require careful analyses with respect to the equity and efficiency of costs and benefits. In view of increasing competition of various public and social services for very limited funds, there will be greater demand for careful accounting and justification of public transportation services in small cities and rural areas.

78. U.S. Congress, Senate, Committee on Agriculture and Forestry, Prelude to Legislation to Solve the Growing Crisis in Rural Transportation, 93rd Congress, Washington, D.C., 1975.

Chapter 7 of Part I concludes that the present heavy reliance by rural people on automobiles and light trucks is expected to continue. The advantages of this mode for lightly traveled local rural quarters appear great. However, the rural elderly, handicapped, and poor, face special transportation problems when they can not get access to a private vehicle. Also with increasing gasoline prices and higher operating costs of automobiles, more rural people can be expected to encounter transportation difficulties.

Despite the needs of the disadvantaged rural people, public transportation systems designed to serve them are unlikely to operate without public subsidy. Innovative transportation systems are proposed to mitigate the problem, such systems include small vans or jitneys, and demand responsive operations. These systems are believed to offer the greatest chance of success. It is also suggested that on the local level there may be some possibilities

for adapting existing rural transport systems such as school buses.

Chapter 5 of Part II discusses rural mass transit. Attempts to assess the state of rural mass transit are complicated both by a lack of supportive data and by the difficulty of separating "need" from "demand" for transport services. Available data, although limited, show an important paradox. A need for rural mass transit is obvious and significant, particularly among the elderly and poor. But demand has traditionally been too low to pay for rural bus services. Thus, a recent rural transit study found it necessary to include the following warning: "A planner should begin by recognizing one fundamental reality; the demand for rural transit service is very low. Regardless of how much hardship may be created by the lack of such service there are few people, especially the potential riders, who are willing to pay for it."

79. U.S. Congress, Senate, Committee on Agriculture and Forestry, Subcommittee on Rural Development, The Transportation of People in Rural Areas, Rural Transit Needs, Operations, and Management, 93rd Congress, Washington, D.C., 1974, 61 pp.

The statement under the first title is an introduction to the subject matter discussed under the second title. The study, "rural transit needs, operations, and management," gives a glimpse of the efforts of several rural communities, aided by the Office of Economic Opportunity, to fill the need for public transportation in rural areas. More than a case study, it sets up a comprehensive planning check list and guide for communities' use in initiating similar programs. Almost at its outset, it warns the planners that the demand for rural transit services is very low. Regardless of how much hardship may be created by the lack of such services, there are few people, especially the potential riders, who are willing and able to pay for it. It then explains the difference between demand and need; and concludes, "if the lack of transit prevents persons from reaching a central shopping, medical attention, etc., then there is a need for such service. There is a demand for transit service, however, only when someone is willing to pay for it."

80. U.S. Department of Transportation, Office of the Secretary, Office of Policy and Plans Development, Rural Transit Operations and Management, Washington, D.C., 1973, 100 pp.

This report details the results of a brief investigation of selected rural transit projects begun over the last several years by various community action agencies around the country. The investigation, which was carried out entirely by the U.S. Department of Transportation staff, is based on telephone calls to

55 projects identified by the Office of Economic Opportunity and visits to 21 projects selected out of the 55. The basic information, upon which this report is based, was collected during the period from September 1972, to March 1973. The report evaluates existing rural transit projects and compiles data concerning their experiences which might be useful to persons or groups interested in starting or improving their own rural transit services. The report is intended to assist in the planning, design, and operation of rural transit service assuming that some need has been identified and some source of initial funding has been obtained.

81. U.S. Department of Transportation, Office of the Secretary, Office of University Research, Transportation and the Rural Community, Report on the First Workshop on National Transportation Problems, 30-31 May 1974, Washington, D.C.

This report summarizes a conference on Rural Transportation held in Washington, D.C., under the sponsorship of the Department of Transportation, Office of University Research. Bringing together DOT Staff and University Researchers involved in the rural transportation field, the participants addressed themselves to topics covering: (1) the present state of rural transit; (2) the relationship between transportation and rural development; (3) the issue of abandonment; (4) the level of transportation services required for a viable rural community; (5) transportation mechanisms for small communities; and (6) the potential of new technology for solution of rural transportation problems. Consensus developed around the following needs: (1) a flexible policy approach to rural transit; (2) local involvement to provide for continuation of transportation systems and programs after the completion of Federal planning and financial support; (3) revision of transportation regulation to provide for more responsive rural transit; (4) increased coordination between various Federal agencies and programs; (5) development of improved information systems geared to rural areas; and (6) various forms of aggregation in the provision of transportation services.

It was noted upgrading transportation systems within a community will increase the demand for local goods and services; however, improving transportation to larger cities will tend to draw demand away from the former.

82. U.S. Department of Transportation, Transportation Systems Center, Improving the Transportation Planning Process in Small Cities, 3 Vols., Cambridge, Massachusetts, November 1973, 302 pp. (NTIS, PB-225 575).

A planning process that fully considers community value and land use plans was designed by and for the city of Cambridge with the expectation that such a process could also be used in similar cities. The report consists of three volumes bound together: Vol. I - The Organizational Framework; Vol. II - The Planning Program; Vol. III - Recommendations for Small Cities.

83. U.S. Department of Transportation, Transportation Systems Center, Technology Sharing Program, Demand Responsive Transportation, State-of-the-Art Overview, Cambridge, Massachusetts, August 1974, 118 pp. (NTIS, PB-250 108).

This document presents a state-of-the-art overview of demand responsive transportation. Part One discusses the market context, the concept, the role, and the economics of demand responsive transportation. Part Two summarizes demand responsive transportation in North America. Part Three is a general dicussion of implementation considerations of demand responsive transportation; including specific areas of decision making, planning considerations, and operational considerations. Part Four discusses the future of demand responsive transportation relative to technology, use, and research. Supplemental material includes a very comprehensive summary of selected characteristics of 80 demand responsive services.

84. U.S. Department of Transportation, Transportation Systems Center, Technology Sharing Program, Rural Passenger Transportation, Cambridge, Massachusetts, October 1976, 46 pp., 72 pp. appendix.

This document identifies the critical issue in rural transportation to be the impaired mobility of people in rural areas who have limited or no access to an automobile. So much of its content focuses on the issues and considerations associated with increasing the mobility of rural residents who lack adequate accessibility to transportation. After identifying the rural transportation disadvantaged and specifying some of their problems, this overview describes how many rural areas are increasing the mobility of the transportation disadvantaged by modifying the existing transportation system and/or implementing new rural transportation systems.

A very brief, general discussion of the planning and implementation of a rural transportation system is included, covering a few techniques which may be helpful in decision making, institutional factors which may affect the system, and some factors in the cost and financing of the system.

An appendix includes a summary of selected characteristics of the 75 rural transportation projects studied and an outline of

suggested steps for implementing a rural transportation system.

85. U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Planning Methodology and Technical Support, Analyzing Transit Options for Small Urban Communities, Vol. 1-2, 1976.

This manual provides an analytical framework and supporting analytical techniques to assist in the analysis of transit options for small urban communities. It is intended for use principally by planners and decision-makers in communities with less than 200,000 residents, but many portions would be useful in larger urban areas as well.

The procedures and techniques presented in the manual are oriented to state and local planners and decision-makers who are called upon to analyze transit options, but who have limited data and time to perform these analyses. Sufficient information is provided in the manual to permit the small urban community to conduct its own analysis without resorting to outside assistance. At the same time, modifications, embellishments, and improvements to the procedures and techniques set forth in this manual are encouraged should local data or past analyses suggest more appropriate methods.

Volume One, Transit Service Objectives and Options, contains four chapters which set forth the structure, content, and applicability of the manual; describe a general approach to analyzing transit options in small urban communities; discuss the specifications of local transit service objectives; and present information to assist in the formulation of transit service opportunities.

Volume Two, Analysis Methods, describes and details techniques of an evaluation approach with which one can estimate the patronage, cost, and revenue implications of a transit service operation; these are three key elements in the evaluation of transit service alternatives.

86. U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Service and Methods Demonstrations, Small City Transit, 13 Vols., Washington, D.C., March 1976 (Report No. UMTA-MA-06-0049-76-2 through UMTA-MA-06-0049-76-14).

Each of the thirteen volumes describes a particular transit service in a particular city. A description of the setting, the evolution of the service, and the results are usually given; in most cases conclusions are drawn concerning why the particular type of transit service was successful and the suitability of the system for other areas. A summary of the characteristics of the

transit systems is included at the end of each volume.

The thirteen cities and transit system types are: Amherst, Massachusetts, a free fare, student operated transit system; Ann Arbor, Michigan, a pilot dial-a-ride project; Bremerton, Washington, a privately operated subscription bus service; Chapel Hill, North Carolina, public transit serving the university and town; East Chicago, Indiana, free fare transit; El Cajon, California, a shared-ride taxi service; Eugene/Springfield, Oregon, an extensive county-wide transit; Evansville, Indiana, a low subsidy transit service; Merced, California, a dial-a-ride transit system; Merrill, Wisconsin, a point deviation service; Sudbury, Massachusetts, a short-lived suburban transit system; Westport, Connecticut, a comprehensive transit service; Xenia, Ohio, transit service for a rebuilding community.

87. U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Service and Methods Demonstrations, Small City Transit Characteristics: An Overview, Washington, D.C., March 1976, 37 pp. (Report No. UMTA-MA-06-0049-76-1).

This report is based on information and operating data from thirteen small community transit systems which were studied as part of a larger project on small community transit and its potential. It summarizes organizational, institutional, and operational aspects of the case studies and contains an analysis of some of the relationships among service, cost and community response. Hypotheses are offered regarding the types of trips which are served, the cost and service trade-offs which are relevant when choosing between fixed-route and demand-responsive modes of operation, the critical variables such as labor agreements and maintenance arrangements which affect operating costs, the level of subsidy which may be anticipated, and the trade-offs between single-ride fares and transit passes as a means of fare collection. A number of conclusions are offered which bear on these topics, but the uniqueness of each community situation is stressed as an often-dominant factor.

88. U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Service and Methods Demonstrations, Small City Transit, Summary of State Aid Programs, Washington, D.C., March 1976, 98 pp. (Report No. UMTA-MA-06-0049-76-15).

A review of the financial and technical assistance that each state provides to communities of less than 200,000 population reveals a number of different forms. Programs range from small scale, fledgling endeavors to large, well established efforts. Some are in the process of expansion. State Departments of Transportation usually administer the programs.

Most states which provide capital and operating assistance do so for small as well as large cities. In the majority of cases, funding for public transit is allocated from general revenues, although some states use the highway fund.

Most all states provide technical assistance to small cities although in some instances it consists mainly of assisting in the preparation of UMTA grant applications. About half of the states also give planning funds to the localities.

Data sheets and summary tables showing aid programs by state are located in the Appendix.

89. Yukubousky, Richard and Fichter, Donn, Mobility Club: A Grass Roots Rural and Small Town Transportation Concept, New York State Department of Transportation, Planning and Research Bureau, Preliminary Research Report 69, 1974, 47 pp.

The dispersion of relatively small numbers of people in rural environments is a substantial barrier to collective means of travel such as conventional bus service or demand responsive transit. Accordingly, this paper proposes and analyzes an approach based on ride-sharing in private automobiles that might provide significant relief for the problems of rural immobility. This solution, termed "Mobility Club," can be implemented within the manpower and financial resource constraints of most small towns and rural communities.

Trip desires of autoless individuals are matched to the trip-making intentions of persons with autos by the Mobility Club telephone dispatcher or ride broker. A companion feature is the method proposed for increasing the number of "travel friends," the number of persons who are well enough acquainted to trust traveling together. This report discusses the operational, administrative, and institutional aspects of the mobility concept. A case example is presented to illustrate the magnitude of the potential driver-member supply and trip-making desires of autoless residents in a sample rural and small town environment. Operating expenses, fare structures, and subsidy considerations are outlined. Finally, the report lists some simple steps to assist individuals who may wish to start a mobility club.

90. Yukubousky, Richard and Politano, Arthur, Latent Travel Demand of the Elderly, Youth, and Low-Income Population, New York State Department of Transportation, Planning and Research Bureau, Preliminary Research Report 63, 1974.

A method is presented for estimating the latent demand for travel by the elderly, the young, and the low-income in urban and rural

areas. A form of "gap analysis" is used to compare daily trip rates of individuals in autoless families. These comparisons are made for work, shop, social-recreation, personal business, and ate-meal trips for individuals with similar age and income characteristics.

Results based on the Rochester home interview survey (1963) suggests that autoless elderly, young, and low-income urban residents differ markedly in the purpose and frequency of their trips, latent demand, and transit dependence. Furthermore, in some instances the latent travel demand cannot be satisfied solely by improved or increased transportation service. Therefore, interpretation of latent demand analysis results considers a number of possible influencing factors.

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