4. QUICK RESPONSE METHODS

Expert panels and mathematical models require more cost and time than are justified for some smaller projects. Smaller projects may require only a cursory evaluation to establish that negative land-use impacts would be minimal. Three different evaluation techniques are presented here: average development factors for service employment; a detailed checklist; and a short checklist.

These techniques do not call for the same level of testing as either the Lowry Model or the structured expert panel, because the quality of results depends as much on the skill of the person performing the assessment as it does on the method itself. Instead, examples are provided on how the techniques may be applied in actual practice. These examples illustrate the time and data requirements and the extent of reliable information that may be generated. Service development factors were calculated for each of the four case study cities, and the detailed checklist was applied to Eau Claire -- the only case study that had minimal negative impacts.

Service Development Factors

Previous studies (e.g., Chui, et al, 1983; Khasnabis and Babcock, 1978) have attempted to produce statistical models of land-use impacts in the immediate vicinity of a highway project. A review of these studies was performed, and it was determined that the models were not transferable to other localities. The overall fits to data were not particularly strong, there was no underlying theory, and location-specific variables were included. Nonetheless, the results of these studies did suggest that very simple statistical techniques, such as taking averages, could help forecast the amount of development that might occur because of a highway project.

Toward that end, "service development factors" have been calculated for each of the four case study cities. These service development factors are shown in Tables 4.1 to 4.4. The service development factors do not constitute a complete technique. Rather, they are helpful in determining if the results from the more elaborate techniques are reasonable, in refining the results of a Lowry Model, and in doing rough estimates of impact to see if further analysis is warranted.

Separate factors are listed for six standard industrial categories of services. The four tables show the number of service employees as a ratio of population, land area, total

Table 4.1

EMPLOYEE PER POPULATION
FOR SELECTED SERVICE CATEGORIES

	Eau Claire	Sheboygan	Wausau	Wisconsin Rapids
Transportation, Communications, Electric, Gas and Sanitary Service	Ø.Ø39Ø	Ø.Ø186	Ø.Ø487	Ø.Ø38Ø
Wholesale Trade	Ø.Ø3Ø7	Ø.Ø135	Ø.Ø423	Ø.Ø3ØØ
Retail Trade	Ø.149Ø	Ø.1Ø85	Ø.1Ø73	Ø.1411
Finance, Insurance and Real Estate	Ø.Ø21Ø	Ø.Ø272	Ø.Ø288	Ø.Ø2Ø8
Services	Ø.165Ø	Ø.1353	Ø.1871	Ø.1152
Public Administration	Ø.Ø263	Ø.Ø372	Ø.Ø424	Ø.Ø622

Table 4.2

EMPLOYEE PER TOTAL EMPLOYMENT
FOR SELECTED SERVICE CATEGORIES

	Eau Claire	Sheboygan	Wausau	Wisconsin Rapids
Transportation, Communications, Electric, Gas and Sanitary Service	Ø.Ø7Ø3	Ø.Ø339	Ø.Ø623	Ø.Ø569
Wholesale Trade	Ø.Ø554	Ø.Ø245	Ø.Ø542	Ø.Ø45Ø
Retail Trade	Ø.2687	Ø.1975	Ø.1373	Ø.2117
Finance, Insurance and Real Estate	Ø.Ø378	Ø.Ø495	Ø.Ø368	Ø.Ø313
Services	Ø.2975	Ø.2463	Ø.2394	Ø.1729
Public Administration	Ø.Ø475	Ø.Ø676	Ø.Ø542	Ø.Ø933

Table 4.3

EMPLOYEES PER SQUARE MILE
FOR SELECTED SERVICE CATEGORIES

	Eau Claire	Sheboygan	Wausau	Wisconsin Rapids
Transportation, Communications, Electric, Gas and Sanitary Service	91	88	125	60
Wholesale Trade	72	63	109	47
Retail Trade	347	512	276	223
Finance, Insurance and Real Estate	49	128	74	33
Services	385	638	482	182
Public Administration	61	175	109	98

Table 4.4

EMPLOYEE PER VEHICLE MILES TRAVELED
FOR SELECTED SERVICE CATEGORIES

	Eau Claire	Sheboygan	Wausau	Wisconsin Rapids
Transportation, Communications, Electric, Gas and Sanitary Service	0.0026	0.0023	0.0044	0.0026
Wholesale Trade	0.0021	0.0017	0.0038	0.0020
Retail Trade	0.0101	0.0136	0.0097	0.0095
Finance, Insurance and Real Estate	0.0014	0.0034	0.0026	0.0014
Services	0.0111	0.0169	0.0169	0.0078
Public Administration	0.0018	0.0047	0.0038	0.0042

employment, and vehicle-miles-traveled (VMT). Only data from the principal city in each study area were used to develop these service development factors. Vehicle-miles-traveled was limited to major arterials, excluding freeways.

Simple economic base theory states that employment in most service categories is proportional to population, so the factors from Table 4.1 are preferred. If a population forecast for a given area is not available, then total employment (Table 4.2) or land area (Table 4.3) could be used instead, with the understanding that these two variables are proxies for population. Use of these first three sets of service development factors ignores the possibility of agglomeration and does not explicitly incorporate accessibility effects.

Many transportation professionals have an intriguing but unconfirmed belief that service development is related to the amount of traffic on a road. A major study of development along Texas highways (Chui, et al, 1983) tried and failed to confirm such a relationship. Clearly, services would prefer to be readily accessible, to be near other services, to be near concentrations of population, to be central to their market areas. Zoning boards prefer services to be in places that are less desirable for residential use, such as along busy arterials. These preferences would tend to place services along arterial streets with high traffic volumes. Even though the relationship between traffic volumes and development is fuzzy at best, arterial VMT does appear to be a good indicator of the the amount of development that would occur in fully developed corridor within an urbanized area. Table 4.4 lists the appropriate service development factors. One use of these particular factors is to approximate an intrazonal distribution of nonbasic service employment as forecasted by a Lowry Model.

Checklists

In evaluating secondary land-use impacts of highway projects, the most fundamental approach is to use a checklist. The advantage of a checklist is to assure that an analysis of impacts will be complete, even though the analysis may not have great depth. Checklists can be as simple as a list of potential impacts. More elaborate checklists could require ratings of impacts, verbal descriptions of the environmental setting, or verbal descriptions of the potential impacts. The principal use of a checklist in assessing land-use impacts of highway projects is to uncover, at a modest cost, signifcant negative impacts. If a checklist evaluation indicates that significant negative impacts are possible, then one of the more sophisticated evaluation techniques also should be applied.

The list of 31 community features (Table 2.1), which was part of the expert panel questionnaire, is one form of checklist.

It could be used to ensure that nothing important has been overlooked, or it can be used to rate the importances and magnitudes of impacts.

The two other checklists presented in this section are the "detailed checklist" and the "short checklist". The detailed checklist requires short descriptions of all aspects of the project and urban area that could possibly lead to a negative impact. The short checklist is intended for minor projects, which are not expected to have significant impacts.

The detailed checklist consists of an overall summary and seven broad categories of possible land-use impacts, including impacts on the location or amount of industrial, commercial, and residential developments. The checklist items are reproduced in Figures 4.1 and 4.2. The categories and questions included in the checklist provide a framework that is based on traditional urban location theory and on experience gained from applying the structured expert panel and the Lowry Model. A suggested procedure for utilizing the detailed checklist is found in Appendix E. For a comprehensive example of how the checklist should be completed, see the Eau Claire case study presented in Appendix F.

Figures 4.3 and 4.4 are excerpted from the Eau Claire evaluation (Appendix F) and illustrate the extent of discussion that is considered appropriate. This excerpt is from the section of the checklist dealing with potential commercial development. It is seen that some calculations are required, but the analyst is encouraged to draw upon any existing socioeconomic projections. Occasionally, maps and charts are necessary to further explain the impact.

The expectation is that very little original data collection would be required to complete the checklist. The procedures have been designed so that existing sources (Census data, land-use planning reports, state-wide economic data, transit development plans, etc.) could be tapped. It would take between one and three person-weeks to complete the checklist, depending on the nature of the project and the availability of data.

The short checklist is shown in Figures 4.5 and 4.6. Like the detailed checklist, the short checklist requires verbal descriptions of possible impacts. It is intended for initial screening for a negative impact or for documenting the sometimes obvious conclusion that negative impacts will not occur. The short checklist provides a level of analysis that is comparable to the Environmental Screening Worksheets presently used by WisDOT.

1. Summary description of the major secondary land use impacts identified in this analysis

2. Description of existing constraints on development

3.1. Spatial distribution of existing industrial activity

- 3.1.a. Industrial employment data
- 3.1.b. Projections of manufacturing employment
- 3.1.c. Identification of existing areas zoned for industrial activity
- 3.1.d. Identification of major employers

3.2. Evaluate Project impact on the spatial distribution of industrial activity

- 3.2.a. Travel time accessibility
- 3.2.b. Project impact on accessibility from industrial zones to freeway, transfer depots, CBD
- 3.2.c. Project impact on accessibility to major highway interchanges
- 3.2.d. Project impact on industrial location decisions
- 3.2.e. Likelihood of industrial rezoning because of Project

4.1. Spatial distribution of existing commercial activity

- 4.1.a. Commercial employment data
- 4.1.b. Projections of commercial employment
- 4.1.c. Identification of areas zoned for commercial activity

4.2. How the Project will affect spatial distribution of commercial activities

- 4.2.a. Project impact on travel time accessibility to commercial zones

Figure 4.1. Outline of Detailed Checklist: Part I

4.2.b. Project impact on consumer visibility of commercial business activity

4.2.c. Project impact on the commercial trade area

4.2.d. Existing regional shopping centers

4.2.e. Project impact on consumer accessibility to an interstate highway interchange

4.2.f. Project impact on commercial activities in the CBD

5.1. Spatial distribution of existing residential locations

5.1.a. Population data and projections

5.1.b. Identification of existing areas zoned for residential location

5.1.c. Identification of residential densities

5.2. How the Project will affect the spatial distribution of residential location and densities

5.2.a. Project impact on travel time accessibility for residential activity

5.2.b. Likelihood of Project to result in residential rezoning

5.2.c. Likelihood of Project to contribute to a deterioration in community/neighborhood qualities or a decline in community residential values

6. Project impact on agricultural activity within 10 miles of the Project

7. Project impact on land values

8. Project impact on commuting patterns and mass transportation

9. Project impact on public land-use or public services

Figure 4.2. Outline of Detailed Checklist: Part II

4.2.a. Project impact on travel time accessibility to commercial zones

As shown in 3.2.a., the project will reduce driving times along Clairemont Avenue from Highway 53 to the Chippewa River from 7.8 to 5.3 minutes -- a reduction of 32 percent.

The reductions in travel time along Clairemont Avenue also contribute to increases in accessibility between commercial zones at either end of the project and the central business district.

Accessibility to the I-94 interchange is relatively unaffected by the project. However, some reduction in congestion will likely result because of the project.

The project is not likely to lead to any significant increases in the population that will be within a 30 minutes driving time of the commercial zones. Figure F.5 shows the accessibility contours from the project. These contours are essentially unchanged by the project.

Figure 4.3. Excerpt from the Eau Claire Evaluation

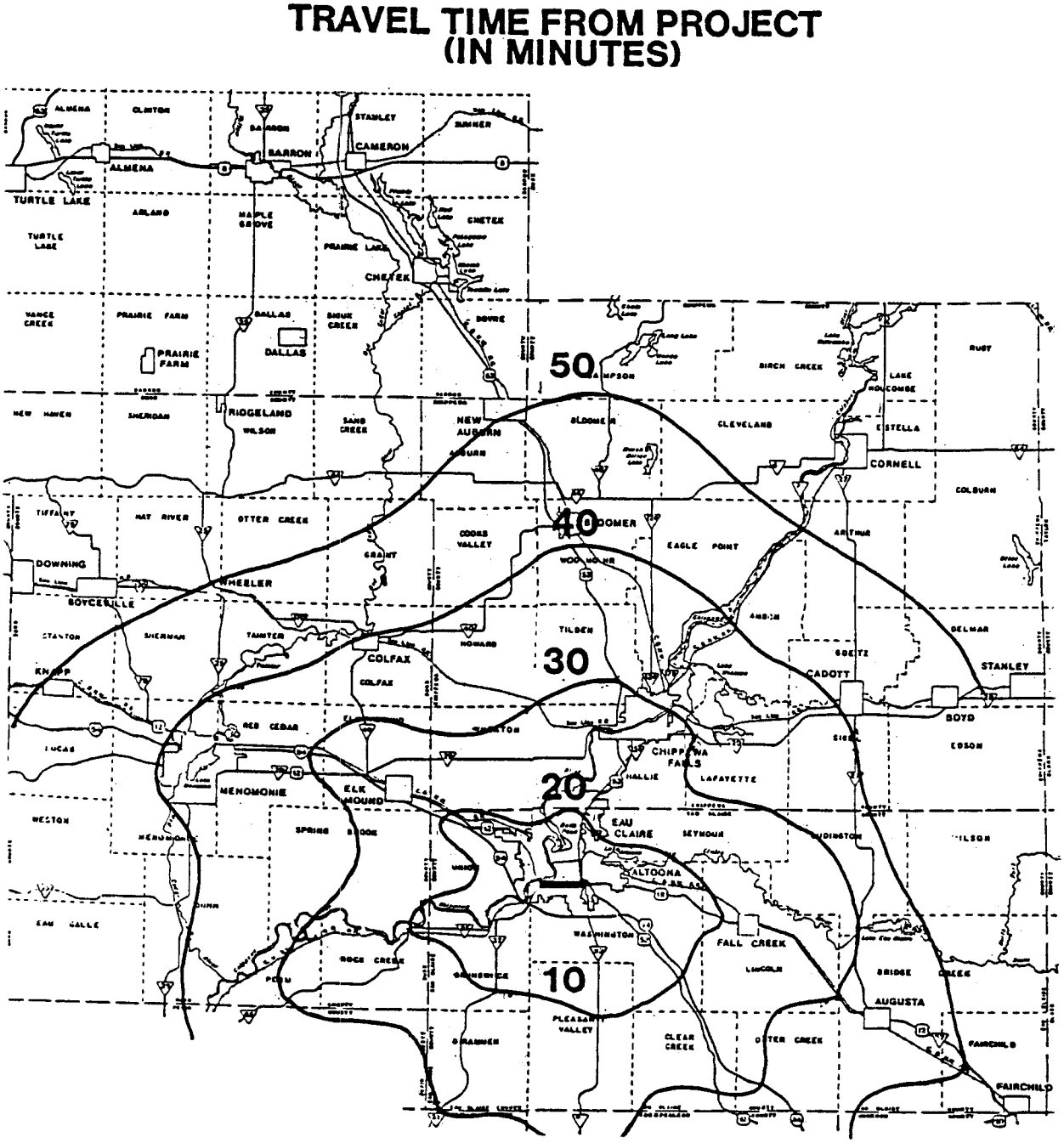

Figure 4.4. Travel Time Contours from Project Center

1. Summary description of existing land use for project and surrounding areas: (summarize answers to 2(a), 3(a), 4(a); include land use maps if available.)

2. Describe briefly existing constraints on development within 10 miles of the project.

3. a) Describe briefly the spatial distribution of existing industrial employment in any urbanized areas within 10 miles of the project.

   b) Estimate how the proposed action (project) will affect (or change) the conditions described in 2(a).

4. a) Describe briefly the spatial distribution of existing commercial activity in any urbanized areas within 10 miles of the project.

   b) Estimate how the proposed action (project) will affect (or change) the conditions described in 3(a).

Figure 4.5. Short Checklist: Part I

5. a) Describe briefly the spatial distribution of existing residential location in any urbanized areas within 10 miles of the project.

   b) Estimate how the proposed action (project) will affect (or change) the conditions described in 4(a).

6. Is a land use change or secondary development expected to occur that will affect agricultural activity within 10 miles of the project?

7. Describe changes in land values that will occur because of or in anticipation of this project.

8. Describe any expected changes to commuting patterns and mass transit in any urbanized areas within 10 miles of the project.

9. Estimate how the proposed action (project) will affect (or change) any public land use or public services.

Figure 4.6. Short Checklist: Part II

Discussion

Forecasting with a statistical model implies that the project and the impacted area are average in all respects, except in terms of the few independent variables within the model. Because of the lack of underlying theory, a model that was developed at a distant location (e.g., Texas or North Carolina) probably would perform poorly. Developing a new statistical model from scratch requires considerable time and effort; no guarantees can be given that the resulting model would dependably forecast anything. On the other hand, simple averages that are well grounded in theory can be easily determined and applied. Simple averages can also be used to further refine the results of more sophisticated forecasting techniques, such as the Lowry Model.

Three versions of checklists have been presented in this report. Checklists inherently constrain the depth and range of the assessment, so they are ideal as screening devices for possible negative impacts. There is still the possibility that a project would have an unusual impact that is not included in the checklist, or that an impact would go undetected because the checklist did not suggest that more extensive analysis is needed. The quality of the results from a checklist depends on the expertise and judgment of the analyst.