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16. Abstract This report discusses the application of the paratransit microsimulation patron accessibility analysis tool developed by the University of Texas researchers. The analysis tool is applied to four rural transit agencies in Texas. Workshops were held at these four agencies plus two other agencies. The workshops were undertaken to achieve the following three objectives: (1) Provide an overview of the demand response transit (DRT) accessibility tool developed by the research team and to demonstrate how it can be used as a proactive planning tool by the transit agencies, (2) Obtain feedback from the transit agencies on the results predicted by the DRT Tool, and (3) Identify recommendations for improving the DRT Tool.					
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Measuring Access to Transit Service in Rural Transit Systems: Feedback from the Workshops and Recommendations for Improving the DRT Accessibility Tool

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Products

An additional CD is provided with the Ready-to-Apply version of the Demand Response Transit (DRT) Tool and GIS files used in the analysis for Colorado Valley Transit, Community Council of Southwest Texas, East Texas Council of Governments, and South Plains Community Action Association.

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Chapter 1. Introduction

One of the major objectives of this research effort is to inform the planning process of regional transit agencies. Demand response transit is a critical mode of transportation for many population segments in the United States, and ensuring that these populations have affordable and reliable transit services is an important objective to these transit providers. Toward this end, the research team developed and offered a series of workshops in May 2011. The workshops were undertaken to achieve the following three objectives: (1) Provide an overview of the demand response transit (DRT) accessibility tool developed by the research team and to demonstrate how it can be used as a proactive planning tool by the transit agencies, (2) Obtain feedback from the transit agencies on the results predicted by the DRT Tool, and (3) Identify recommendations for improving the DRT Tool. The workshops were held at six different transit agencies (see Figure 2.1 for the geographic locations of the transit agencies):

- East Texas Council of Governments (ETCOG) (workshop date: May 9, 2011)
- Colorado Valley Transit (CVT) (workshop date: May 11, 2011)
- Community Council of South West Texas (CCSWT) (workshop date: May 13, 2011)
- South Plains Community Action Association (SPARTAN) (workshop date: May 17, 2011)
- Lower Rio Grande Valley Development Council (LRGVDC) (workshop date: May 20, 2011)
- Texoma Area Paratransit System (TAPS) (workshop date: May 25, 2011)

In this report, we summarize the feedback from the series of workshops, and present the research team's recommendations for improving the DRT tool. Specifically, feedback from each transit agency is presented in Section 2. Recommendations for improving the current DRT Tool are discussed in Section 3. Then, Section 4 concludes the report.¹

¹ The initial intent was also to provide agencies with recommendations for their DRT operations. While we did so at the workshops, agencies made clear that the use of the Census 2000 data as the basis for the tool would make recommendations for system changes not particularly appropriate (given the changes in land-use and demographics since 2000). Thus, while transit agencies consistently voiced strong support for the tool and its potential to address important planning initiatives, it was decided that making DRT service improvement recommendations should not be a focus of the effort.

Chapter 2. Feedback from the Workshops with the Transit Agencies

In addition to the representatives from the TxDOT and UT research team, a number of representatives from the transit agency and other interest groups such as MPOs and fixed route public transport service providers were also invited and present at the workshops. A list of the participants for each of the workshops at ETCOG, CVT, CCSWT, SPARTAN, LRGVDC, and TAPS are provided in Appendix A1, B1, C1, D1, E1, and F1, respectively. The workshops conducted at 6 different transit agencies may be divided into two groups:

- Group A workshops were offered at the transit agencies for which area-specific customized DRT Tools were developed. ETCOG, CVT, CCSWT, and SPARTAN belong to this group.
- Group B workshops were offered at the transit agencies for which no area-specific customized DRT Tools were developed. LRGVDC and TAPS belong to this group.

Summaries of the findings and feedback from the Group A and Group B workshops are presented in Section 2.1 and Section 2.2, respectively.

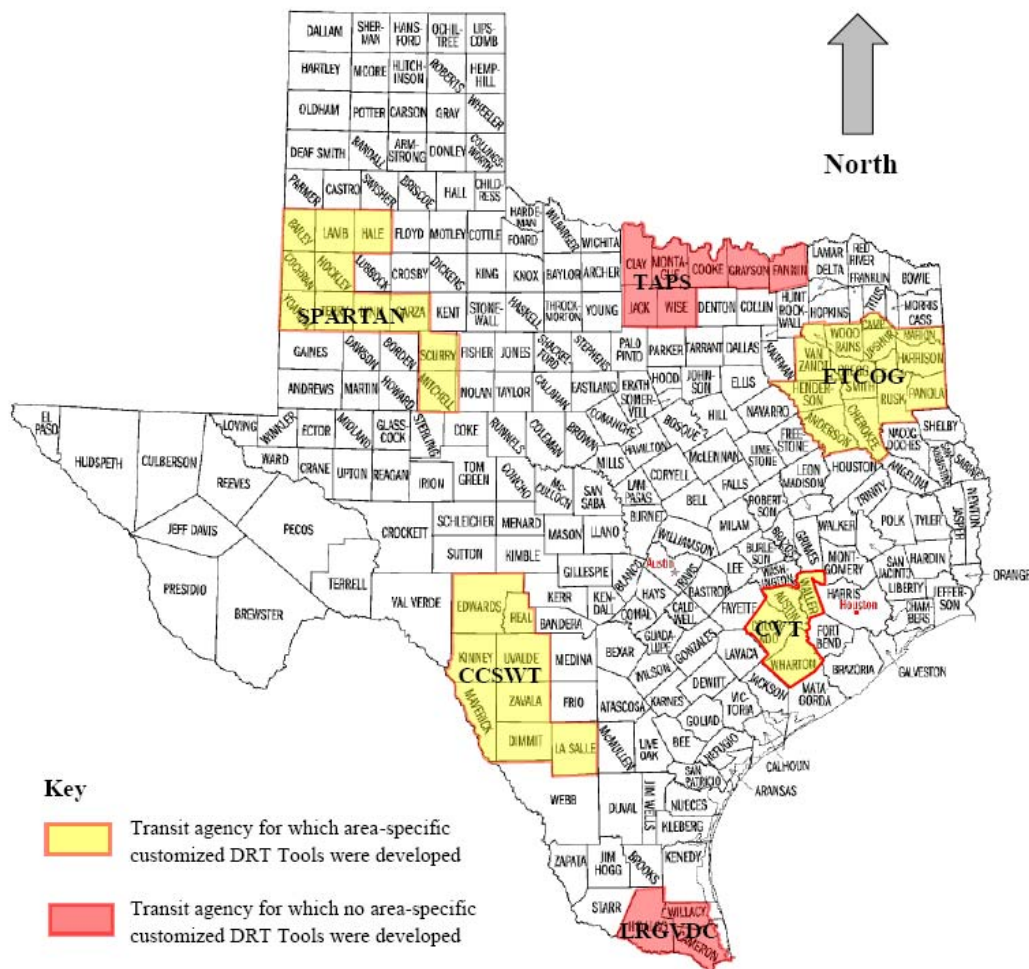


Figure 2.1: Transit Agencies Visited in May 2011

2.1 Feedback from Group A Workshops

Feedback from ETCOG, CVT, CCSWT, and SPARTAN transit agency is presented below in turn in Tables 2.1 through 2.4.

Table 2.1: East Texas Council of Governments (ETCOG)

	<u>Feedback/Findings</u>
Regarding input data:	Concern regarding the use of Census 2000 data instead of Census 2010.
Spatial distribution of demand:	In general, the spatial concentration and distribution of demand in the study area as predicted by the DRT Tool seems to reflect ground conditions (see Appendix A2). However, there is some concern regarding the locations of “no demand” zones. Specifically, the model does not generate any patrons from Woods county, which is at variance with local knowledge. A discussion with the ETCOG team suggests that the demographic profile of Woods county has undergone substantial changes since 2000. In particular, the county has experienced an increase in the share of senior population (age ≥ 65 years) between 2000 and 2010. Since Census 2000 data is used to generate demand, the demand from Woods county is not captured by the DRT Tool.
Total model predicted demand (D_{model}) vis-à-vis total “observed demand” ($D_{observed}$):	The model appears to over-predict demand for the DRT service from the planning area ($D_{model} = 940$ trips/day, $D_{observed} \cong 750$ trips/day). ² The agency also expressed some concern regarding the magnitude of the percentage of unmet demand, which was predicted to be 0% by the model.
Accessibility index:	The general distribution of accessibility indices across the zones (<i>i.e.</i> , Census tracts) seems to be reasonable (see Appendix A3).
Recent activity/work in progress:	<ul style="list-style-type: none"> • Re-launched the DRT service under the new name “GoBus”. • Incorporated a route optimization software program in the current dispatch system.
Specific purpose(s) for which the agency would like to use the DRT Tool/ suggestions for future improvement of the Tool/ additional comments:	<ul style="list-style-type: none"> • Vehicle fleet information provided to the research team was not up-to-date. • The service area of ETCOG is predominantly a rural area, with the exception of the cities of Tyler and Longview. ETCOG serves these cities only if one end of the trip (<i>i.e.</i>, either origin or destination) is located outside the cities.

²For this (and other) transit agency, $D_{observed}$ does not represent actual demand, but an estimate that is based on transit service provider’s experience.

	These special types of trips were not considered in the current analysis undertaken by the research team.
Changes to be made in the analysis immediately	No change.

Table 2.2: Colorado Valley Transit (CVT)

	<u>Feedback/Findings</u>
Regarding input data:	Concern regarding the use of Census 2000 data instead of Census 2010.
Spatial distribution of demand:	In general, the spatial concentration and distribution of demand as predicted by the DRT Tool seems to reflect ground conditions (see Appendix B2).
Total model predicted demand (D_{model}) vis-à-vis total “observed demand” ($D_{observed}$):	The CVT representatives indicated that the model predicted demand was reasonable for this region ($D_{model} = 173$ trips/day, $D_{observed}$ was not available).
Accessibility index:	The general distribution of accessibility indices across the zones (<i>i.e.</i> , Census tracts) seems to be reasonable (see Appendix B3).
Recent activity/work in progress:	At present, no specific action is being pursued.
Specific purpose(s) for which the agency would like to use the DRT Tool/ suggestions for future improvement of the Tool/ additional comments:	<ul style="list-style-type: none"> • The vehicle fleet is being used to provide a combination of deviated route (a modified form of fixed route) and demand response service. Specifically, the CVT is interested in predicting the number of commuter trips generated from their service area (for example, predicting the number of work trips from the CVT service area to Houston). • Consider explicitly incorporating boarding/alight time for wheelchair users. • Model seasonal effects such as surge in grocery and other shopping trips at the beginning of each month. • The vehicle fleet is being used to provide a combination of fixed route (also referred to as deviated route) and demand response service. However, in the model, it is assumed that all the vehicles are available for the DRT service.
Changes to be made in the analysis immediately	No change.

Table 2.3: Community Council of Southwest Texas (CCSWT)

	<u>Feedback/Findings</u>
Regarding input data:	Concern regarding the use of Census 2000 data instead of Census 2010.
Spatial distribution of demand:	In general, the spatial concentration and distribution of demand as predicted by the Tool seems to reflect ground conditions (see Appendix C2).
Total model predicted demand (D_{model}) vis-à-vis total “observed demand” ($D_{observed}$):	The demand model appears to be performing reasonably well ($D_{model} = 208$ trips/day, $D_{observed} = 300-325$ trips/day).
Accessibility index:	The general distribution of accessibility indices across the zones (<i>i.e.</i> , Census tracts) seems to be reasonable (see Appendix C3).
Recent activity/work in progress:	At present, no specific action is being pursued.
Specific purpose(s) for which the agency would like to use the DRT Tool/ suggestions for future improvement of the Tool/ additional comments:	Explicitly incorporate household income in the demand model.
Changes to be made in the analysis immediately	No change.

Table 2.4: South Plains Community Action Association (SPARTAN)

	<u>Feedback/Findings</u>
Regarding input data:	Concern regarding the use of Census 2000 data instead of Census 2010.
Spatial distribution of demand:	In general, the spatial concentration and distribution of demand as predicted by the DRT Tool seems to reflect ground conditions (see Appendix D2).
Total model predicted demand (D_{model}) vis-à-vis total “observed demand” ($D_{observed}$):	The model appears to be under-predicting demand for this area ($D_{model} = 161$ trips/day, $D_{observed} \cong 300$ trips/day). However, $D_{observed}$ includes trips to/from Lubbock area, while D_{model} estimate does not include such trips. It is expected that the revised model estimate will provide a closer match to $D_{observed}$ (see below for the changes that are to be incorporated in the analysis for this area).
Accessibility index:	The general distribution of accessibility indices across the zones (<i>i.e.</i> , Census tracts) seems to be reasonable (see Appendix D3). However, pick up uncertainty appears to be a big concern among the DRT riders in this area, indicating that this variable may need to be assigned a higher weight

	(though, in the absence of any area-specific data, this remains an issue for future consideration).
Recent activity/work in progress:	Recently, the transit service area has expanded to include six additional counties (Hale, Crosby, Dickens, Floyd, King, and Motley County). As a result, the fleet size of the agency has increased substantially (though, a number of aged vehicles will be disposed of in future).
Specific purpose(s) for which the agency would like to use the DRT Tool/ suggestions for future improvement of the Tool/ additional comments:	<ul style="list-style-type: none"> • The agency would like to use the Tool in public forums to increase awareness in the population of the DRT services provided in the area. • Model seasonal effects such as spike in shopping trips during Christmas Holiday season, and drop in service demand during summer (when school is out). • Fleet information provided to the research team was not up-to-date.
Changes to be made in the analysis immediately	<ul style="list-style-type: none"> • Add Hale County, which generates a large number of riders in the analysis area.

2.2 Feedback from Group B Workshops

Comments from the workshops at LRGVDC and TAPS transit agency are presented below in Table 2.5 and Table 2.6, respectively.

Table 2.5: Lower Rio Grande Valley Development Council (LRGVDC)

	<u>Feedback/Comments</u>
Specific purpose(s) for which the agency would like to use the DRT Tool/ additional comments:	<ul style="list-style-type: none"> • The agency would like to use the Tool as a proactive planning tool. • It would be good to be able to define multiple service regions (each of which is served by a different service provider) within the same “what-if” scenario. • Incorporate different operating hours for different days of the week.

Table 2.6: Texoma Area Paratransit System (TAPS)

	<u>Feedback/Comments</u>
Specific purpose(s) for which the agency would like to use the DRT Tool/ additional comments:	<ul style="list-style-type: none"> • The agency would like to use the Tool to investigate the cause(s) of unmet demand. • It would be good to define multiple service regions (each of which is served by a different service provider) within the same “what-if” scenario. • The tool can be used for environmental justice purposes.

Chapter 3. Recommendations for Improving Current DRT Tool

Depending on the data availability, the following recommendations should be implemented to improve the performance and predictive capability of the existing DRT Tool:

- Use Census 2010 data as input so that changes in the socio-demographic profile of the study area after the year 2000 can be incorporated in the prediction of demand and other variables generated within the DRT Tool.
- Explicitly incorporate additional household-level socio-economic variables (such as income and number of employed individuals) in the demand model.
- Accommodate trips with one end (i.e., either origin or destination) within the service area and the other end outside the DRT service area.
- Explicitly incorporate boarding/alighting time for wheelchair and other mobility-impaired DRT users.
- Develop study-area-specific weights for each component of the accessibility index such as average patron arrival time delay, average patron pick-up time uncertainty, average patron difference between in-vehicle and drive alone equivalent travel time, and percent of unmet demand.
- Modify the tool to allow the presence of multiple service providers within the same DRT service area.
- Modify the tool to allow variations in operating hours across different days of the week.
- Customize the Tool to accommodate local seasonal effects, such as a surge in shopping trips during the Christmas Holiday or on the first week of each month.

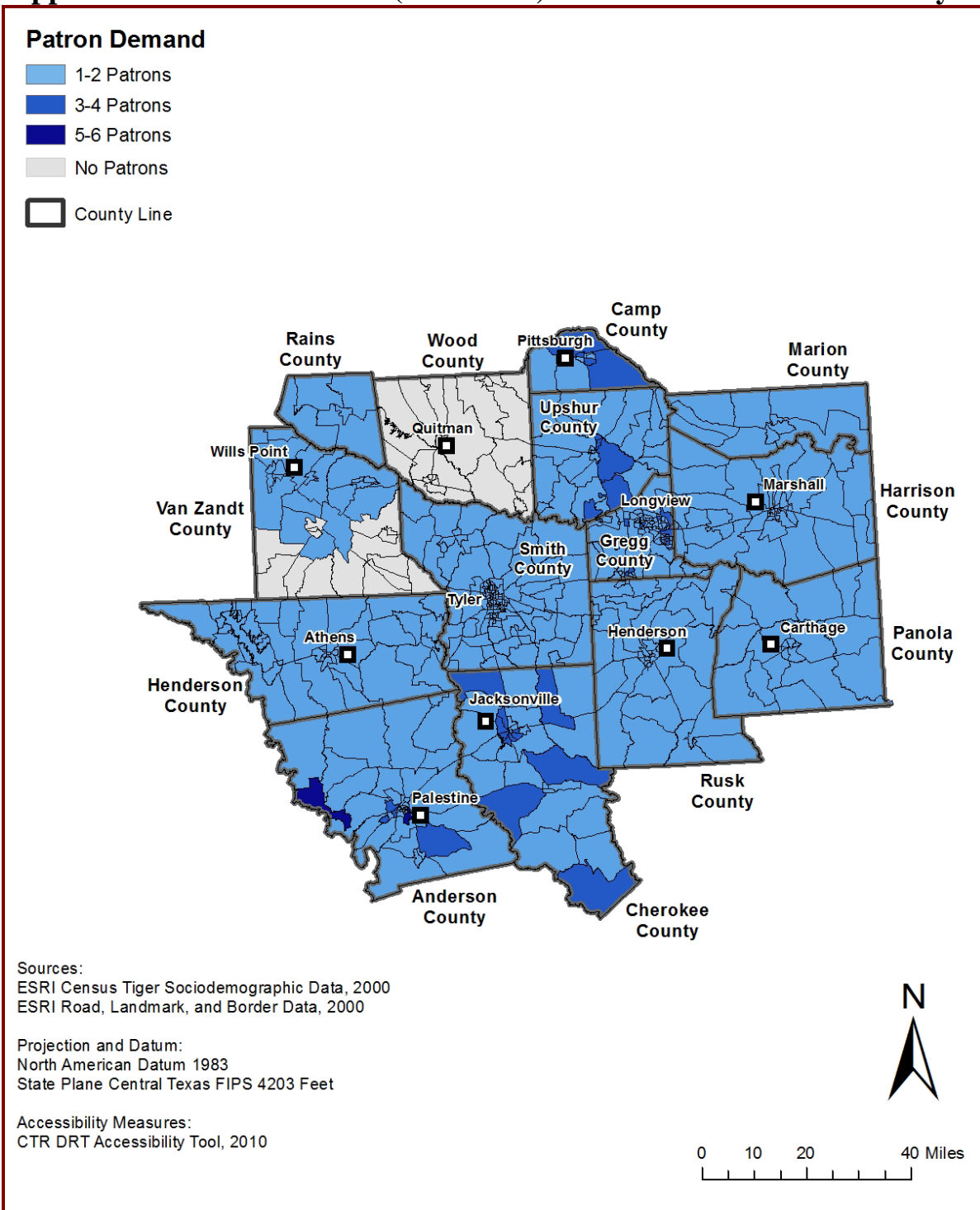
Chapter 4. Conclusions

The workshops provided a forum for the transit and other relevant agencies to express their opinions/concern regarding the DRT tool. In addition, information on “observed” demands was used to undertake an informal model validation exercise. Given that the behaviors of the DRT riders in Brownsville area were transferred to the study areas considered here, the performance of the demand model and accessibility index seem, in general, surprisingly reasonable. However, based on the feedback from the workshops and prior experience, a number of recommendations were identified that should improve the performance of the DRT Tool and make it more appropriate for use in proactive planning exercises.

Appendix A1 Workshop at ETCOG - List of Participants
(arranged alphabetically)

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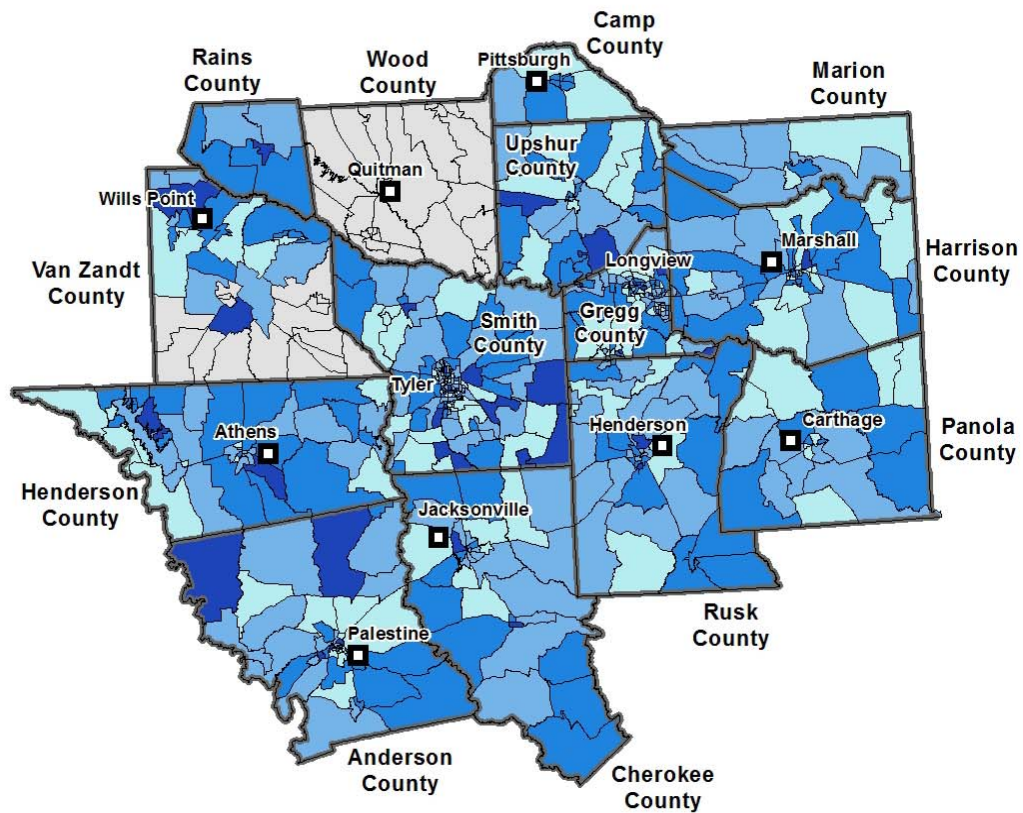
Appendix A2 Distribution of (Estimated) Demand in the ETCOG Study Area



Appendix A3 Distribution of Accessibility Index in the ETCOG Study Area

Accessibility

- Very Low Accessibility (4.86-5.73)
- Low Accessibility (4.35-4.86)
- Moderate Accessibility (3.73-4.35)
- High Accessibility (0-3.73)
- No Patrons
- County Line



Sources:
 ESRI Census Tiger Sociodemographic Data, 2000
 ESRI Road, Landmark, and Border Data, 2000

Projection and Datum:
 North American Datum 1983
 State Plane Central Texas FIPS 4203 Feet

Accessibility Measures:
 CTR DRT Accessibility Tool, 2010



0 10 20 40 Miles

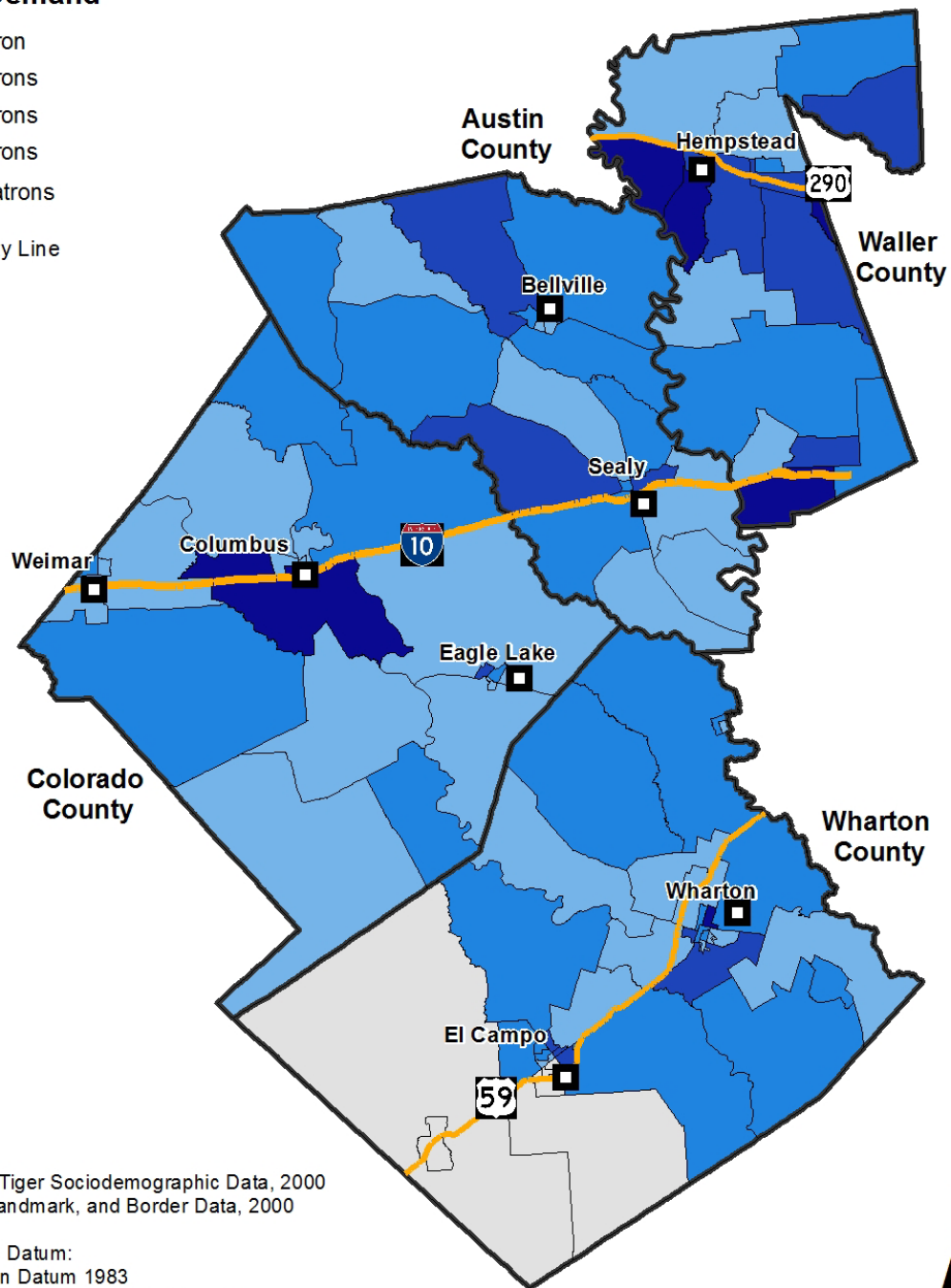
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Appendix B2 Distribution of (Estimated) Demand in the CVT Study Area

Patron Demand

- 1 Patron
- 2 Patrons
- 3 Patrons
- 4 Patrons
- No Patrons
- County Line

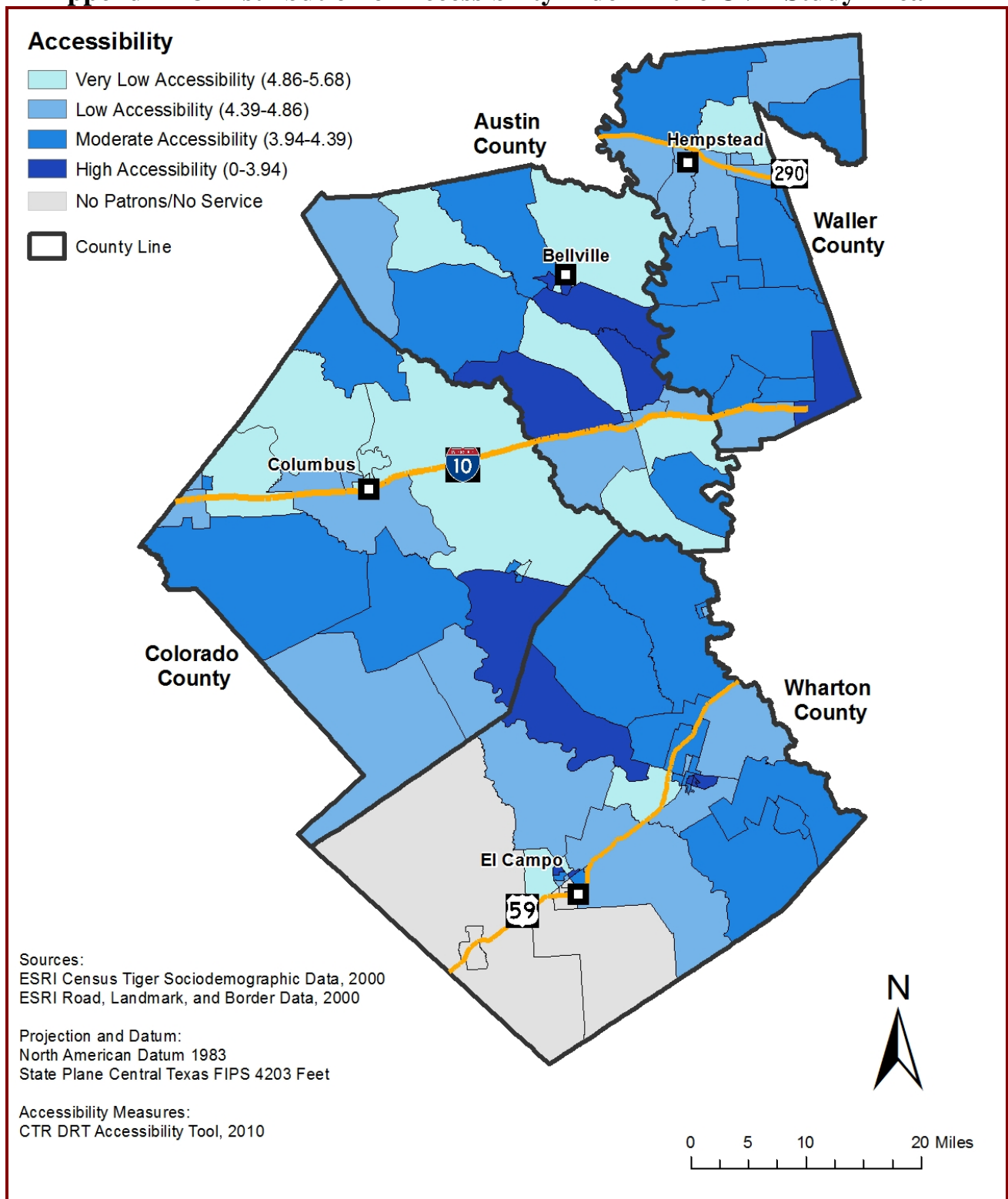


Sources:
ESRI Census Tiger Sociodemographic Data, 2000
ESRI Road, Landmark, and Border Data, 2000

Projection and Datum:
North American Datum 1983
State Plane Central Texas FIPS 4203 Feet

Accessibility Measures:
CTR DRT Accessibility Tool, 2010

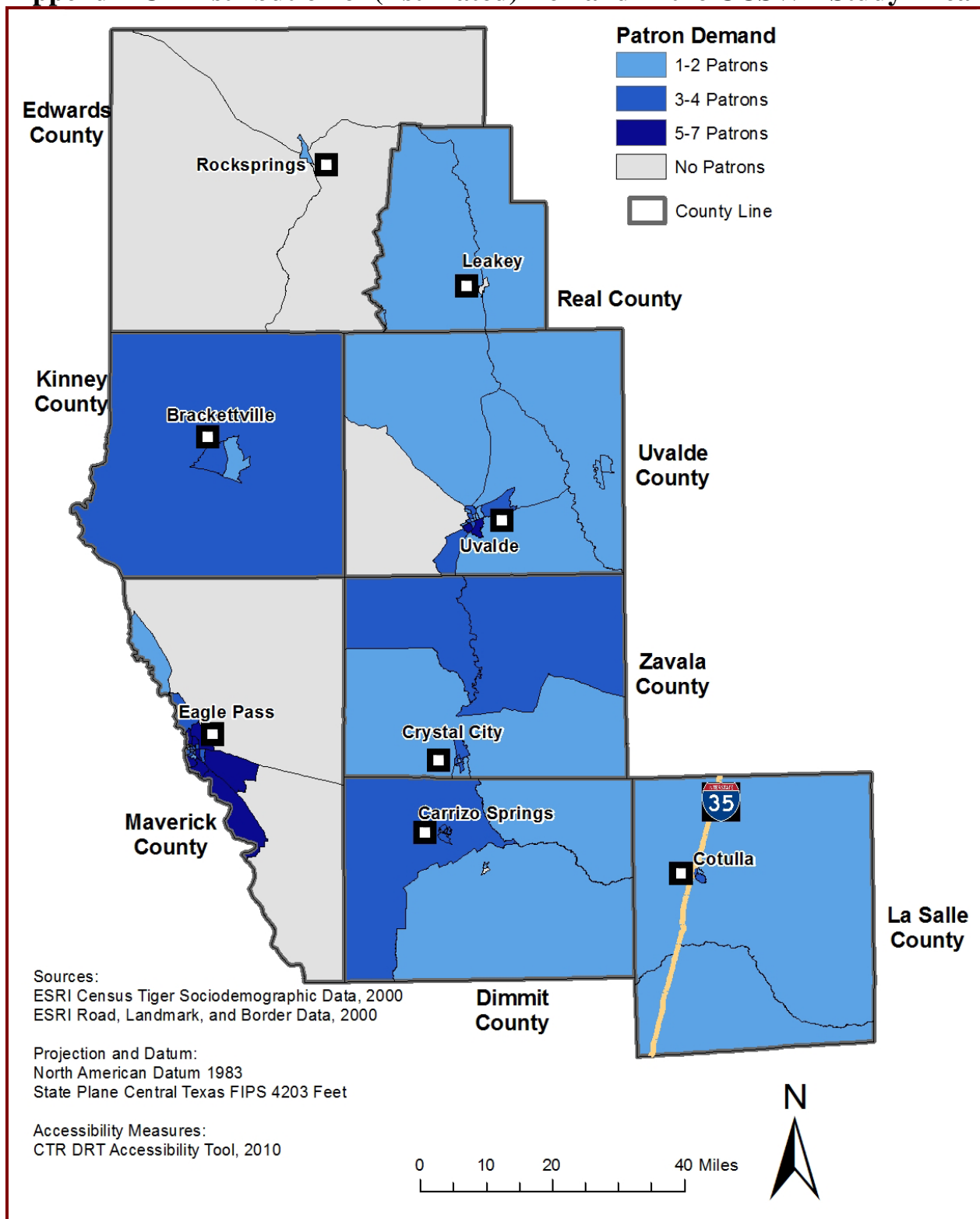
Appendix B3 Distribution of Accessibility Index in the CVT Study Area



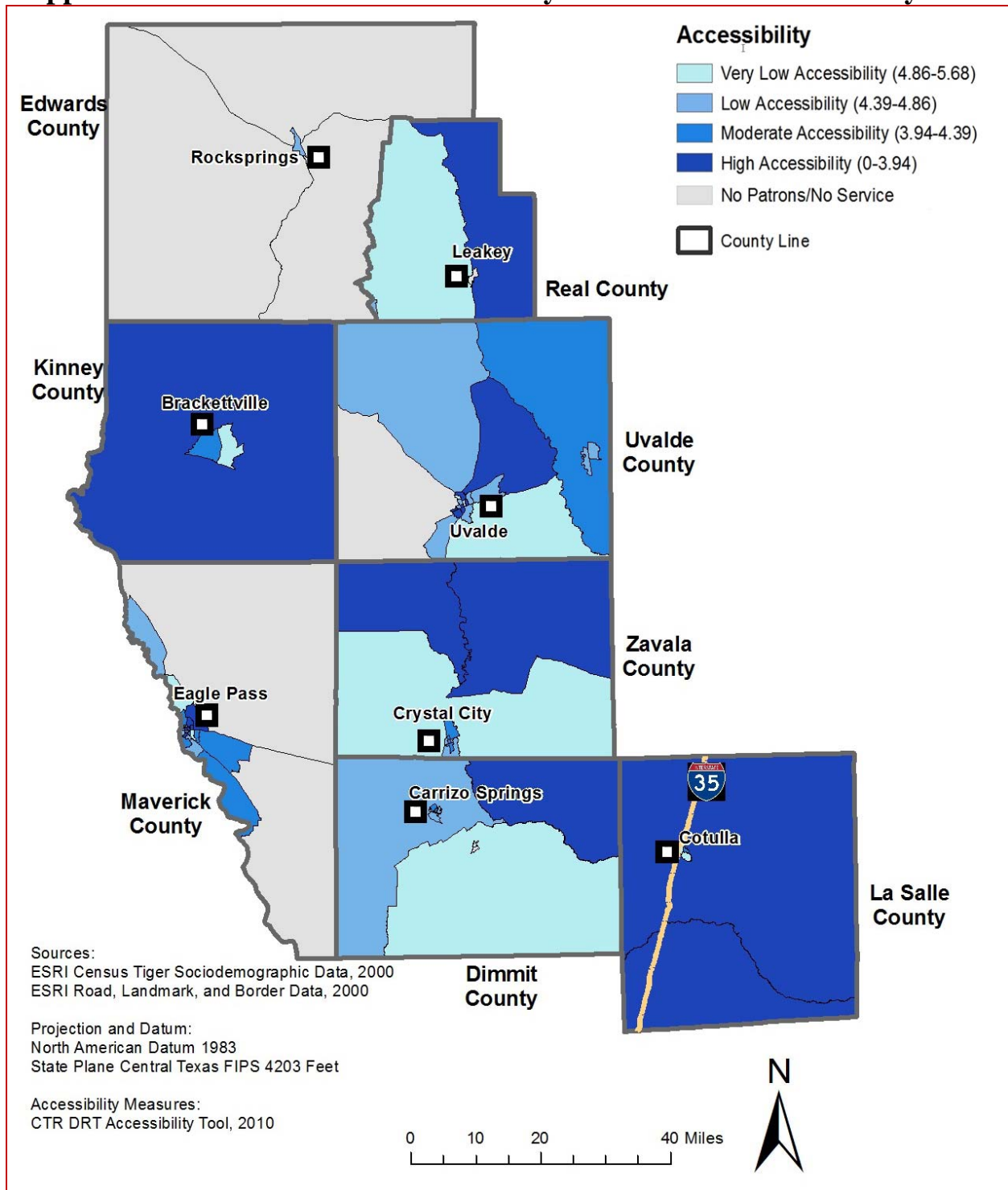
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Appendix C2 Distribution of (Estimated) Demand in the CCSWT Study Area



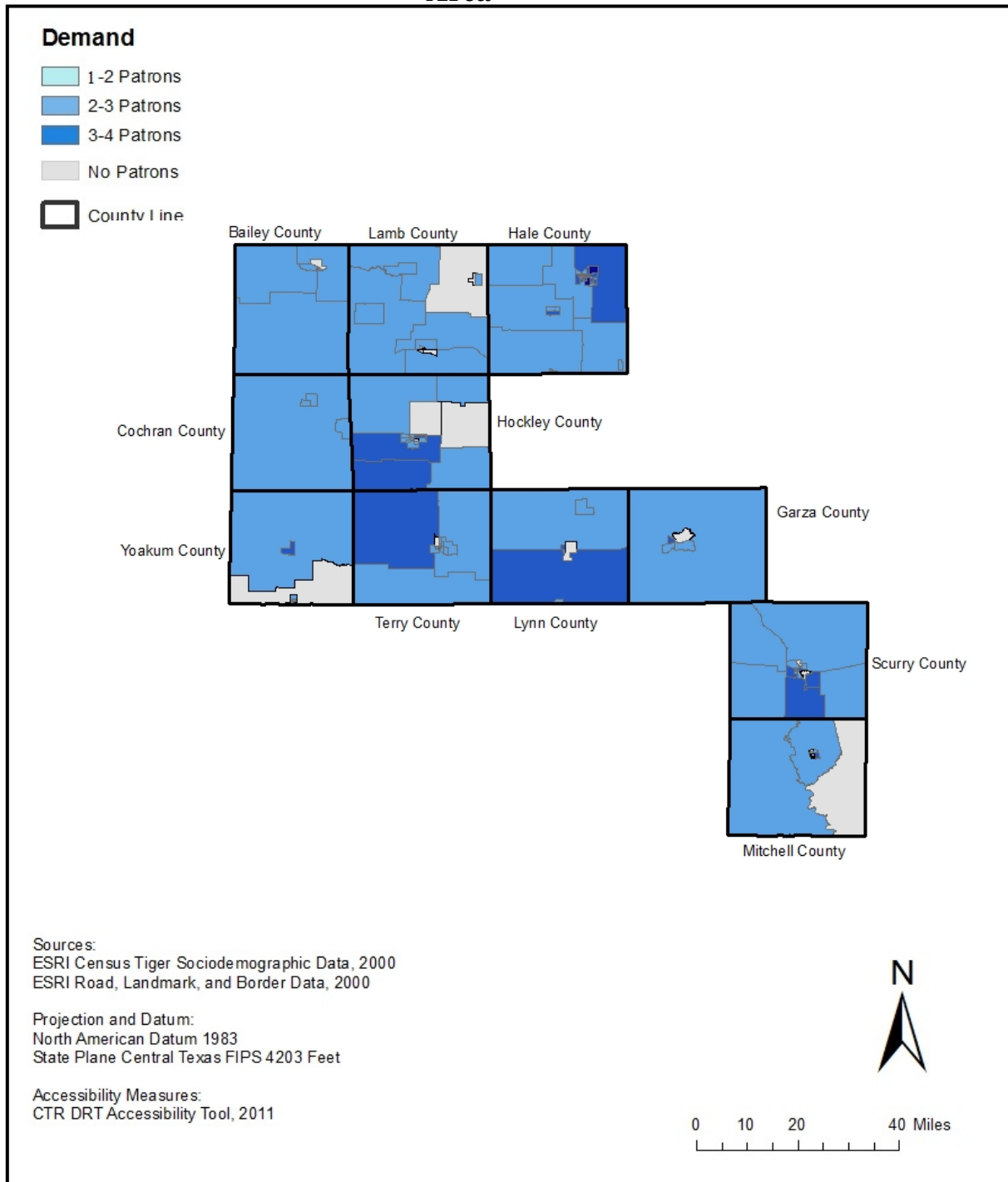
Appendix C3 Distribution of Accessibility Index in the CCSWT Study Area



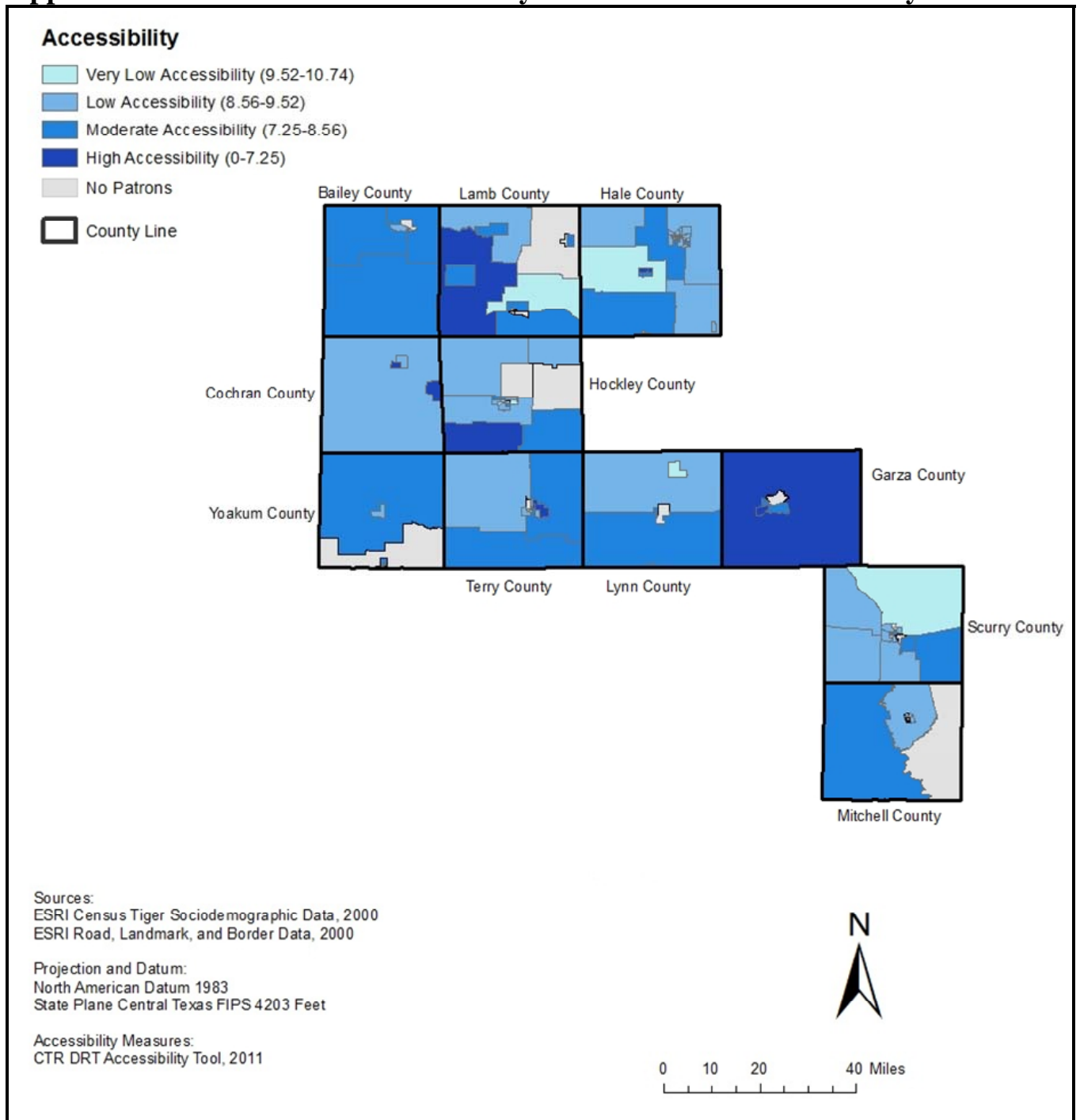
Appendix D1 Workshop at SPARTAN - List of Participants
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Appendix D2 Distribution of (Estimated) Demand in the SPARTAN Study Area



Appendix D3 Distribution of Accessibility Index in the SPARTAN Study Area



Appendix E1 Workshop at LRGVDC- List of Participants
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Appendix F1 Workshop at TAPS - List of Participants
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