



Appendix C: Comprehensive Access Need Areas and Comprehensive Resiliency Network



RMS 2052
EL PASO METROPOLITAN TRANSPORTATION PLAN

Comprehensive Access Need Areas
and Comprehensive Resiliency Network
Technical Memo





TABLE OF CONTENTS

Introduction.....	2
Framework	2
Comprehensive Access Need Areas	4
Data Overview	4
Analysis	4
MPO Averages	4
Scoring and Summation	5
Comprehensive Access Need Areas.....	6
Comprehensive Resiliency Network	11
Scoring.....	11
Methodology	11
Ranking.....	12
Network Development	12
Overlap Between Comprehensive Need Areas and Comprehensive Resiliency Network.....	12
Conclusion.....	19

LIST OF FIGURES

Figure 1. Comprehensive Access Need Areas, Total.....	7
Figure 2. Comprehensive Access Need Areas, People.....	8
Figure 3. Comprehensive Access Need Areas, Place.....	9
Figure 4. Connectivity Score Map	13
Figure 5. Criticality Scores Map.....	14
Figure 6. Vulnerability Scores Map.....	15
Figure 7. Cumulative Scores Map.....	16
Figure 8. Comprehensive Need Areas and the Comprehensive Resiliency Network.....	17

LIST OF TABLES

Table 1. Policy Framework.....	2
Table 2. Data Sources.....	4
Table 3. MPO Averages	5
Table 4. Ranking Calculations	5
Table 5. Indicator Summation	6
Table 6. Summation Ranking Distribution.....	6



INTRODUCTION

The comprehensive access need area and resiliency analysis explores environmental and social aspects of the region that lead to higher vulnerability while offering the potential to increase local resiliency through decision-making. The comprehensive access need area analysis utilizes American Community Survey data from the US Census to explore several indicators that increase personal and household vulnerability. The resiliency analysis studies regional connectivity, criticality, and vulnerability to create a comprehensive resiliency network, which can help identify roadways that should be prioritized. The final portion of the analysis overlays the Equity Priority Areas with the Resiliency Priority Network to find areas within the region where projects can support both environmental and social goals.

FRAMEWORK

This section provides an overview of policies, laws, and other governing documents that frame equity and resiliency research, as can be seen in **Table 1**.

Table 1. Policy Framework

Governing Document	Protections For	Summary
Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	Low-Income and Minority Individuals	This Executive Order focuses federal attention on the environmental and human health effects of federal actions on minority and low-income populations with the goal of achieving environmental protection for all communities.
Americans with Disabilities Act (ADA) of 1990	Disabled Individuals	This Act protects people with disabilities from discrimination in many areas of public life and ensures that people with disabilities have the same opportunities as everyone else.
Executive Order 13166: Improving Access to Services for Persons with Limited English Proficiency	Individuals with Limited English Proficiency	This Executive Order requires Federal agencies to examine the services they provide, identify any need for services to those with limited English proficiency (LEP), and develop and implement a system to provide those services so LEP persons can have meaningful access to them.
Executive Order 13985: Advancing Racial Equity and Support for Underserved Communities Through the Federal Government	Individuals Historically Underserved, Marginalized, and Adversely Affected by Persistent Poverty and Inequality	This Executive Order looks to advance equity for all, including communities that have long been underserved, and addressing systemic racism in our Nation's policies and programs.



Governing Document	Protections For	Summary
Executive Order 14008: Tackling the Climate Crisis at Home and Abroad	Individuals Living in Disadvantaged Communities	This Executive Order (EO) makes achieving environmental justice by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts. This EO includes the Justice40 Initiative, which has the goal of delivering 40 percent of the overall benefits of relevant federal investments to disadvantaged communities. The Justice40 Initiative also includes the development of a tool to help identify disadvantaged communities – The Climate and Economic Justice Screening Tool (CEJST).
Executive Order 14112: Reforming Federal Funding and Support for Tribal Nations To Better Embrace Our Trust Responsibilities and Promote the Next Era of Tribal Self-Determination	Individuals from Tribal Nations	This Executive Order protects and supports Tribal sovereignty and self-determination, and to honors our trust and treaty obligations to Tribal Nations.
FHWA Order 6640.23A	Low-Income and Minority Individuals	This Order establishes policies and procedures for the Federal Highway Administration (FHWA) to use in complying with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.
Section 504 of the Rehabilitation Act of 1973	Disabled Individuals	This Act prohibits discrimination against people with disabilities from programs and activities that receive federal financial assistance.
Title VI of the Civil Rights Act of 1964	Individuals Based on Race, Color, and National Origin	This Act prohibits discrimination based on race, color, or national origin in programs and activities that receive federal financial assistance.
U.S. DOT Order 1000.12 (c)	Individuals Based on Race, Color, or National Origin (including Limited English Proficiency)	This Order ensures that all DOT assisted programs are implemented in compliance with Title VI so that all members of the public enjoy equality of opportunity, regardless of race, color, or national origin (including limited English proficiency).
U.S. DOT Order 5610.2(a)	Low-Income and Minority Individuals	This Order looks to promote the principles of environmental justice in all Departmental programs, policies, and activities.



COMPREHENSIVE ACCESS NEED AREAS

As part of the equity and resiliency analysis, Comprehensive Access Need Areas were identified by exploring several indicators. The analysis to identify the equity priority areas included 21 indicators that were selected based on their inclusion in policies, laws, and other governing documents that were outlined in the previous policy framework section. Areas with high concentrations of these indicators can be considered to have increased vulnerabilities and needs, and by identifying them, decision-making and project prioritization processes can be made comprehensively.

DATA OVERVIEW

Data was collected from the American Community Survey (2018-2022, 5-Year Estimates) from the US Census, including 21 indicators that were selected based upon their inclusion in the policy framework or representation of local characteristics and issues.

Table 2 provides a list of all indicators collected and their source.

Table 2. Data Sources

Indicator	ACS Table	Census Universe
Households with at least one person with a disability	B22010	Households
Adults with less than a high school education	B15003	Population 25 Years and Over
Households with at least one person 65 years or older (elderly)	B11007	Households
Unemployed civilian population	B23025	Population 16 Years and Over
Households with at least one person under 18 years old (child)	B11012	Households
Female-headed households with at least one person under 18 years old (child)	B11012	Households
Male-headed households with at least one person under 18 years old (child)	B11012	Households
Households without internet access	B28002	Households
Housing units without complete kitchen facilities	B25051	Housing Units
Population over 5 years old with limited English proficiency	B16004	Population 5 Years and Over
Owner-occupied housing units that are housing cost burdened	B25091	Owner-occupied housing units
Occupied housing units without complete plumbing	B25049	Occupied housing units
Population in poverty	B17021	Population for which poverty status is determined
Minority population	B02001	Total population
Renter-occupied housing units that are housing cost burdened	B25070	Renter-occupied housing units
Households receiving SNAP benefits	B19058	Households
Occupied housing units that have no access to a vehicle	B25044	Occupied housing units
Occupied housing units without heating fuel	B25040	Occupied housing units
Individuals in group living quarters	B09019	Households
Housing unit build before 1980	B25034	Housing Units
Household Type: Non-site build structures (boats, RV, van, mobile homes)	B25032	Occupied housing units

ANALYSIS

MPO AVERAGES

The first step in the identifying the comprehensive access need areas was to develop regional averages for each indicator for the MPO, as can be seen in **Table 3**. The regional averages are used to develop a baseline for comparison of each block group to the regional average. This allows for block groups with higher than average local need to be identified.



Table 3. MPO Averages

Indicator	MPO Average
Households with at least one person with a disability	32.1%
Adults with less than a high school education	22.9%
Households with at least one person 65 years or older (elderly)	30.8%
Unemployed civilian population	6.9%
Households with at least one person under 18 years old (child)	31.1%
Female-headed households with at least one person under 18 years old (child)	7.9%
Male-headed households with at least one person under 18 years old (child)	1.6%
Households without internet access	12.8%
Housing units without complete kitchen facilities	2.5%
Population over 5 years old with limited English proficiency	15.2%
Owner-occupied housing units that are housing cost burdened	15.6%
Occupied housing units without complete plumbing	0.7%
Population in poverty	21.8%
Minority population	49.9%
Renter-occupied housing units that are housing cost burdened	34.6%
Households receiving SNAP benefits	23.5%
Occupied housing units that have no access to a vehicle	7.2%
Occupied housing units without heating fuel	0.4%
Individuals in group living quarters	1.6%
Housing unit build before 1980	46.5%
Household Type: Non-site build structures (boats, RV, van, mobile homes)	8.1%

SCORING AND SUMMATION

Scoring allows for comparison of each block group to the MPO average. This highlights block groups that have higher concentrations of different indicators. Each block group was scored by dividing the block group average by the MPO average. A score of 1 means that the block group and MPO are equal. A score over 1 means that the block group has a higher concentration, and a score under 1 means the block group has a lower concentration than the MPO as a whole.

Scores were then converted into ranks of 1 through 5 to allow for a summation of scores with equal weight. Scores were ranked based on how many standard deviations (SD) away from the MPO average the score was as can be seen in **Table 4**.

Table 4. Ranking Calculations

Rank	1	2	3	4	5
Calculation	Less than the MPO Average	MPO Average to +1 SD	+1 SD to +1.5 SD	+1.5 SD to +2 SD	Greater than +2 SD

Next, variables were summarized via three calculations. The first was a summation of person and household characteristics (People). The second was a summation of built housing stock characteristics (Place). The last was a total summation across all 21 variables.

Table 5 includes which indicators were included in which summations.



Table 5. Indicator Summation

Indicator	People	Place	Total
Households with at least one person with a disability	✓		✓
Adults with less than a high school education	✓		✓
Households with at least one person 65 years or older (elderly)	✓		✓
Unemployed civilian population	✓		✓
Households with at least one person under 18 years old (child)	✓		✓
Female-headed households with at least one person under 18 years old (child)	✓		✓
Male-headed households with at least one person under 18 years old (child)	✓		✓
Households without internet access		✓	✓
Housing units without complete kitchen facilities		✓	✓
Population over 5 years old with limited English proficiency	✓		✓
Owner-occupied housing units that are housing cost burdened	✓		✓
Occupied housing units without complete plumbing		✓	✓
Population in poverty	✓		✓
Minority population	✓		✓
Renter-occupied housing units that are housing cost burdened	✓		✓
Households receiving SNAP benefits	✓		✓
Occupied housing units that have no access to a vehicle		✓	✓
Occupied housing units without heating fuel		✓	✓
Individuals in group living quarters		✓	✓
Housing unit build before 1980		✓	✓
Household Type: Non-site build structures (boats, RV, van, mobile homes)		✓	✓

The final step was to normalize summation scores. This was done in the same way as individual variables were ranked, utilizing the MPO average and standard deviations. The same ranks were used as in **Table 6**. The following table includes summary information on how many block groups fell into each rank for each of the three summations.

Table 6. Summation Ranking Distribution

	People	Place	Total
1	58%	61%	55%
2	25%	25%	29%
3	9%	8%	8%
4	4%	3%	6%
5	5%	4%	3%

COMPREHENSIVE ACCESS NEED AREAS

A final set of maps were produced that show the three summation ranks. These maps identify block groups from below to average need (1) to highest need (5). In alignment with **Table 2**, **Figure 1** shows the defined total comprehensive access need areas for the MPO area which includes both people and place indicators; **Figure 2** shows the defined areas for the people indicators for comprehensive access need areas; and **Figure 3** shows the defined areas for the place indicators for the comprehensive access need areas. All three maps show concentrations of higher priority in downtown El Paso, Dona Ana and Otero Counties, and areas in eastern El Paso County.

Figure 1. Comprehensive Access Need Areas, Total

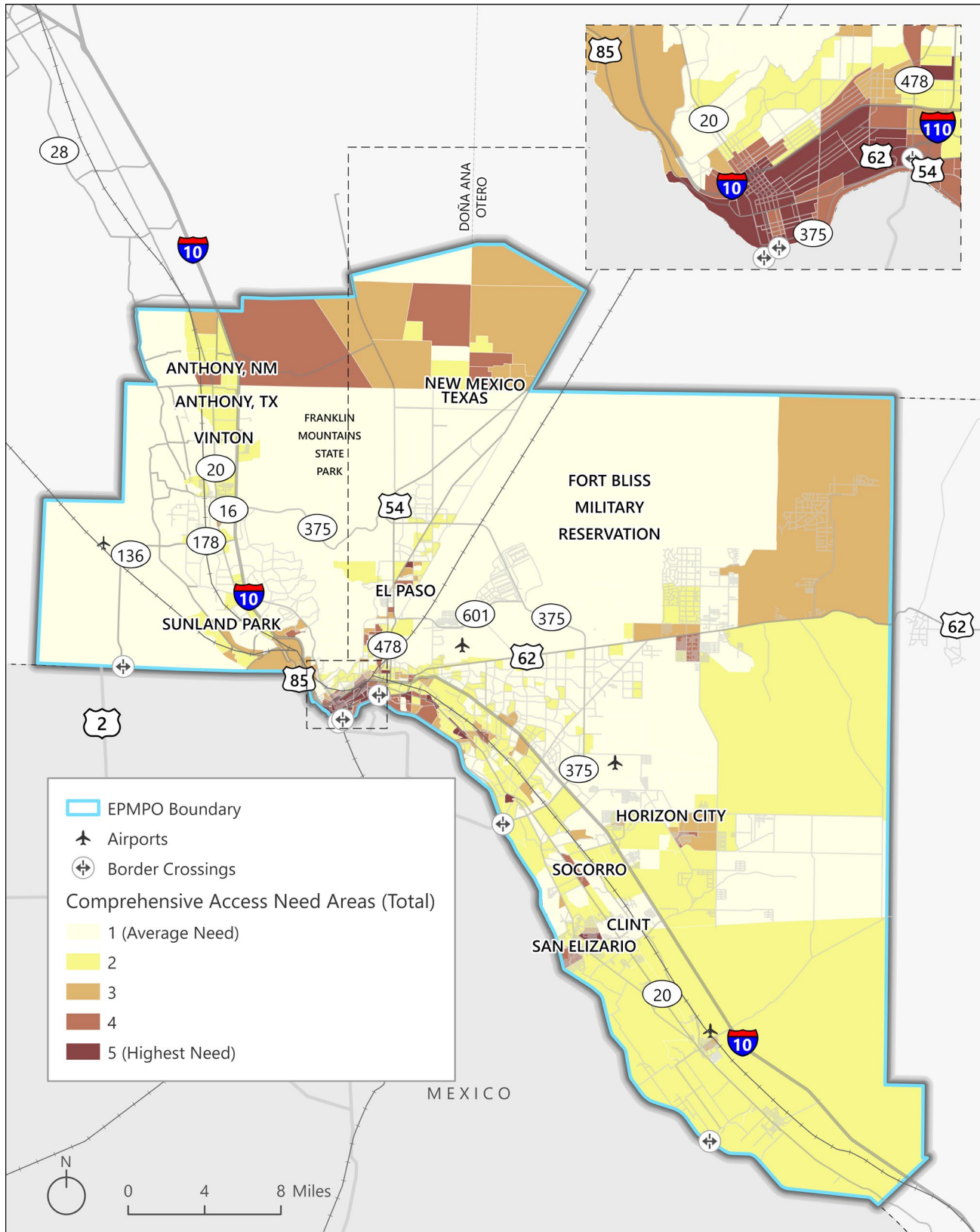


Figure 2. Comprehensive Access Need Areas, People

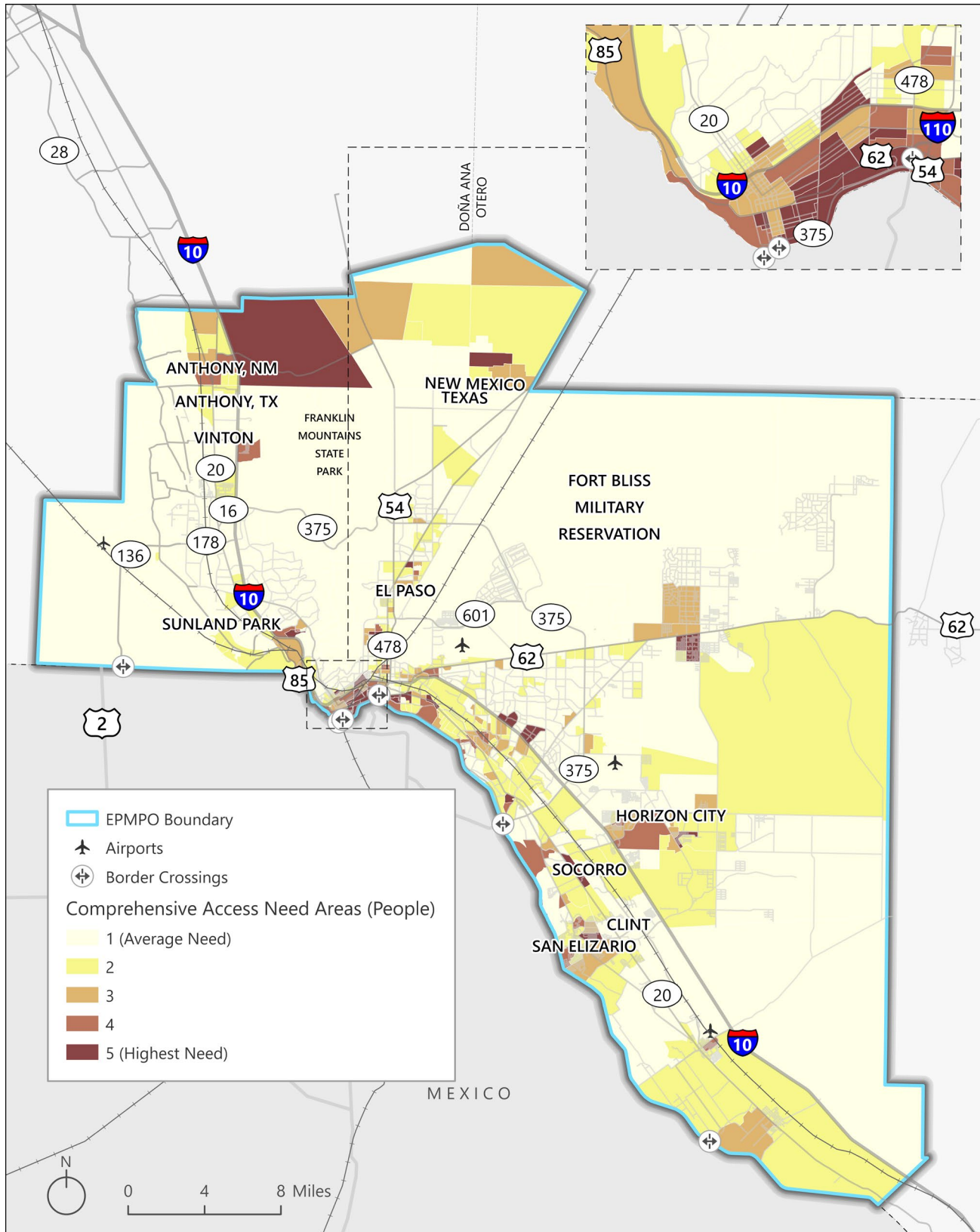
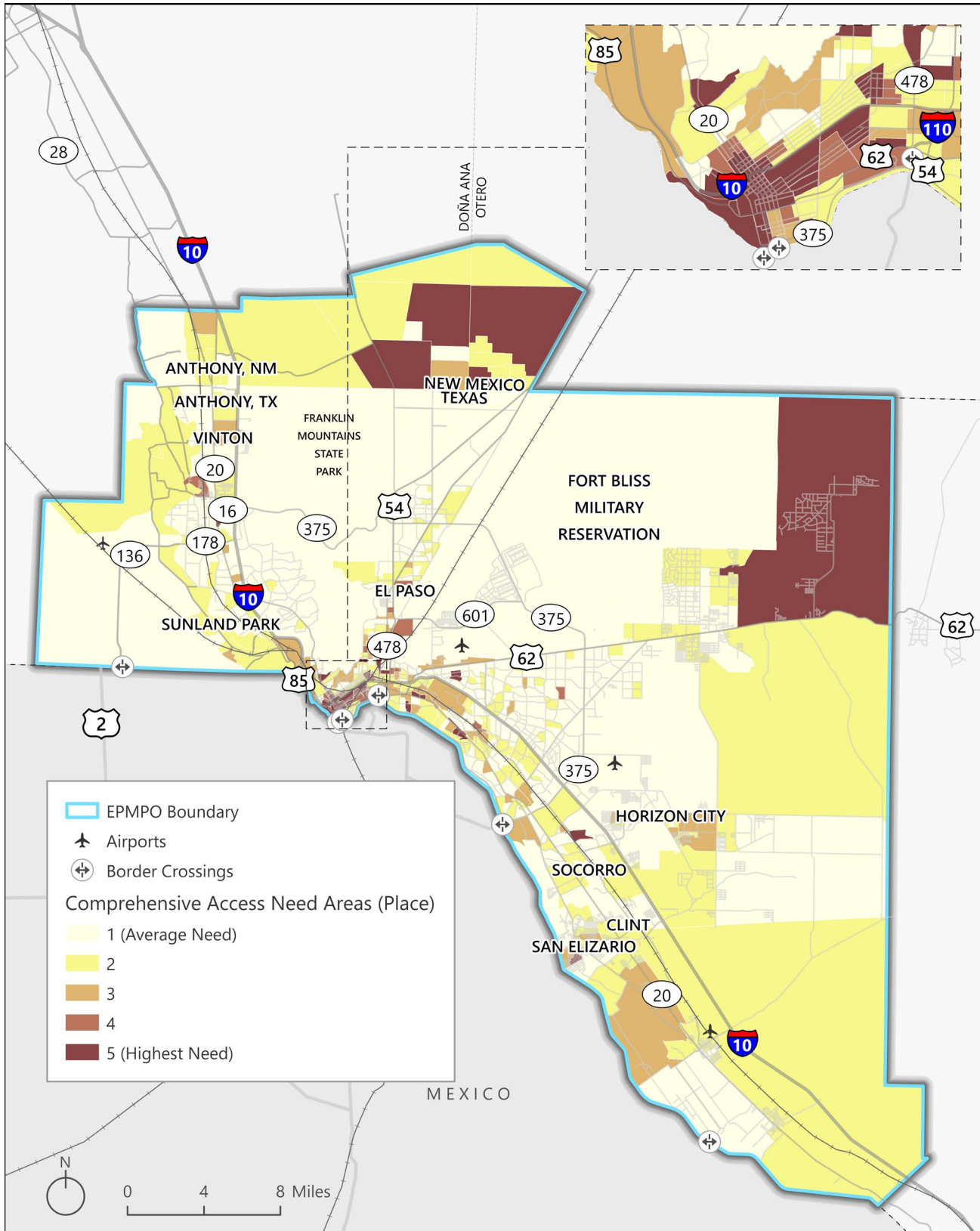




Figure 3. Comprehensive Access Need Areas, Place





COMPREHENSIVE RESILIENCY NETWORK

To effectively map out the resilience of the El Paso MPO region, three themes were examined and mapped: Connectivity, Criticality, and Vulnerability.

The Connectivity Theme examined how a roadway serves the region and identifies sections that serve increased locations that are particularly important during emergency response and recovery. The data includes the following:

- Colleges and Universities (Resilience Analysis and Planning Tool (RAPT))
- Colonias (RAPT)
- Fire Stations (RAPT)
- Hospitals (RAPT)
- Law Enforcement Offices (RAPT)
- Local Emergency Operations Center (RAPT)
- Mobile Home Parks (RAPT)
- Power Plants (RAPT)
- Private and Public Schools (RAPT)
- SNAP-Authorized Retailers (RAPT)
- Solid Waste Landfill Facilities (RAPT)
- Ports of Entry (Bureau of Transportation Statistics)

The Criticality Theme examined which routes have the highest regional importance based on who they serve, such as active transportation and transit routes, inclusion in the national freight network, and/or a high-level functional classification roadway. The data includes the following:

- Active Transportation Routes (trails, bikeways, etc.) (City of El Paso)
- National Freight Routes (USDOT)
- Transit Routes (Sun Metro)
- Functional Classification 1 or 2 (NMDOT, TxDOT)
- STRAHNET (Strategic Highway Network) (STRAHNET) (USDOT)

Vulnerability examined at regional environmental factors that increase risk for essential infrastructure as well as users. The data includes the following:

- Extreme Heat and Cold (FEMA)
- High Growth Areas (TTI Validated Transportation Demand Model for EPMPO)
- Riverine Flooding (FEMA)
- Wildfire Risk (FEMA)
- Drought (FEMA)

SCORING

Roadway segments were scored across the three themes to identify high-scoring segments. Roadway segments were scored as follows:

- **Connectivity:** A roadway gained points based on the overlap or adjacency with a block group that contains a regional asset. 1 point was given per asset in the block group.
- **Criticality:** A roadway gained points based on inclusion in previously identified networks, 1 point for each network.
- **Vulnerability:** A roadway gained points based on overlap with increased environmental risk, 1 point for each risk level.

METHODOLOGY

The process for scoring each theme followed a similar but slightly different process. The process for each theme is described below.

- ➔ **Connectivity:** A block groups layer for the region was developed that contained the total number of assets within each block group. A definition query was then used to select block groups that contained a certain number of each asset. Then all roadway segments within the block group were selected. Roadway segments adjacent to the block group but clearly connected the assets to the region, were also selected. All selected roadway segments received one point.
- ➔ **Criticality:** A definition query was used to select only the centerlines of the roadway segments. This was done using the Road ID of “KG.” Then all roadway segments that were on the previously identified networks were given a point.
- ➔ **Vulnerability:** Each risk was split into several groups based on their standard deviation. A definition query was then used to select areas with a certain risk level. All roadway segments in that area would receive points based on the risk level of the area. For example, the standard of deviation for Heat waves is split into four categories: Level 1 (< -2.5 Std. Dev.), Level 2 (-2.5 - -1.5 Std. Dev.), Level 3 (-1.5 - -0.50 Std. Dev.), and Level 4 (-0.50 - 0.30 Std. Dev.). Level 1 Heat Wave Risk would get one point, Level 2 would get two points, level 3 would get three points, and level 4 would get four points.

RANKING

After initial scoring, scores are converted into normalized ranks to allow for equal weight of each of the three main categories. Scores were converted to be out of 5, for a maximum of 15.

NETWORK DEVELOPMENT

A map was produced for each category to highlight the following:

➔ Highly Connected

Figure 4 shows the connectivity scores in the region. Connectivity includes roadways that are connected to locations deemed particularly important during emergency response and recovery. The higher the score, the more essential locations a roadway serves. The most connected areas are along IH-10, Alameda Ave, and U.S. 62.

➔ Highly Critical

Figure 5 shows the criticality scores in the region. Criticality includes roadways that serve important transportation functions such as transit, active transportation, freight, highways, and more. The higher the score, the more essential transportation passes through the road. The most critical areas are along IH-10 and U.S. 54.

➔ Highly Vulnerable

Figure 6 shows the vulnerability scores in the region. Vulnerability includes roadways in areas with increased risk of certain climate risks like wildfires, extreme heat, drought, flooding, and more. The higher the score, the more vulnerable the roadway is to climate risks. The most vulnerable roadways are along IH-10, U.S. 54, U.S. 62, Alameda Ave, SH 20, and SH 375.

➔ Comprehensive Resiliency Network

Figure 7 shows the cumulative scores in the region. This includes all three factors: Connectivity, Criticality, and Vulnerability. The higher the score, the more essential the roadway is to emergency response and recovery. The roadways with the highest cumulative scores are along IH-10, U.S. 54, U.S. 62, Alameda Ave, SH 20, and SH 375.

OVERLAP BETWEEN COMPREHENSIVE NEED AREAS AND COMPREHENSIVE RESILIENCY NETWORK

This section highlights the overlap between the Comprehensive Need Areas and the Comprehensive Resiliency Network, which can be seen in **Figure 8**. While the roadways with the highest scores do not overlap entirely with the highest comprehensive need areas, they do connect to those areas, providing vital access to communities that may have higher needs than others. Refer to Figure 8 for a map showing the overlap between the Comprehensive Need Areas and the Comprehensive Resiliency Network. .

Figure 4. Connectivity Score Map

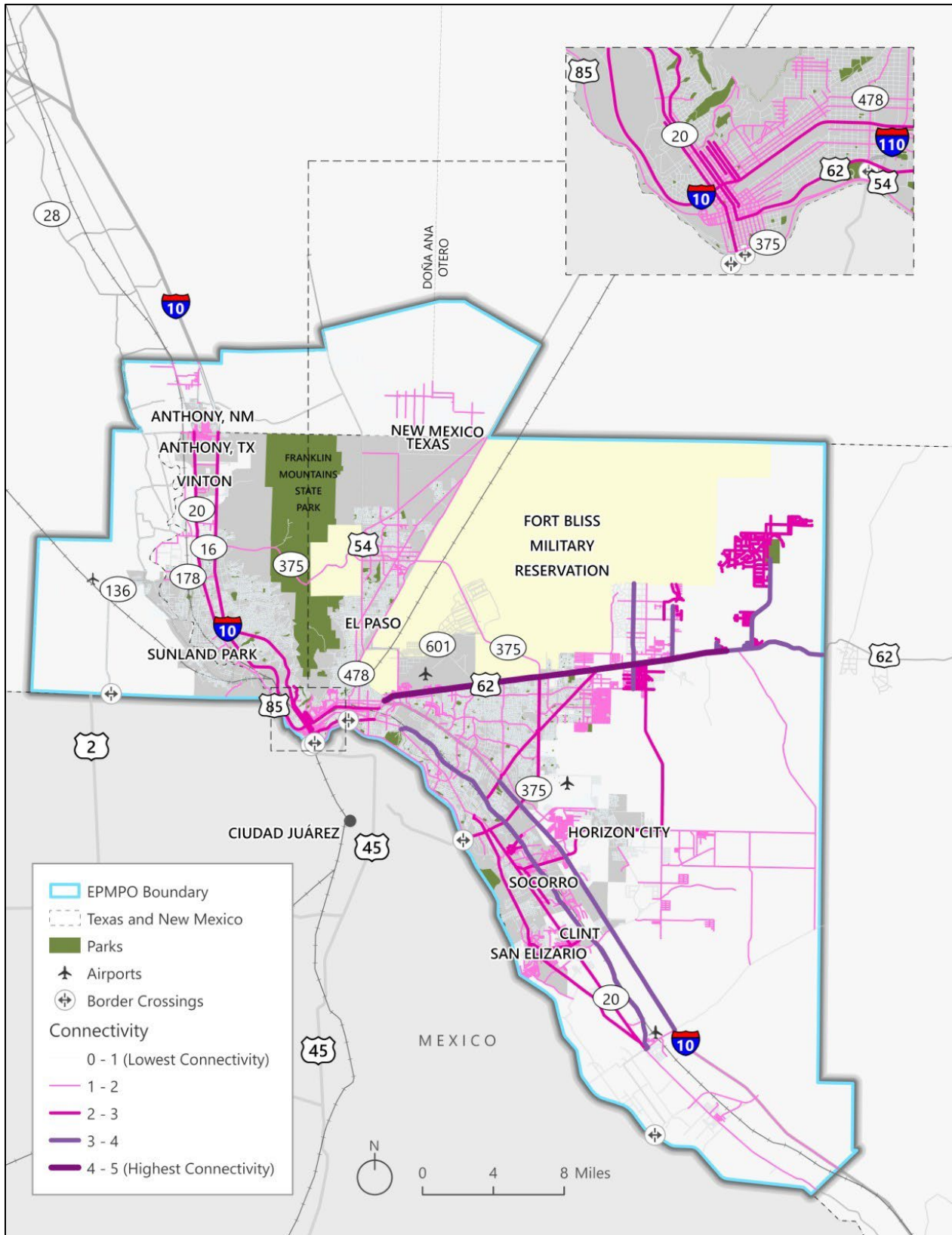


Figure 5. Criticality Scores Map

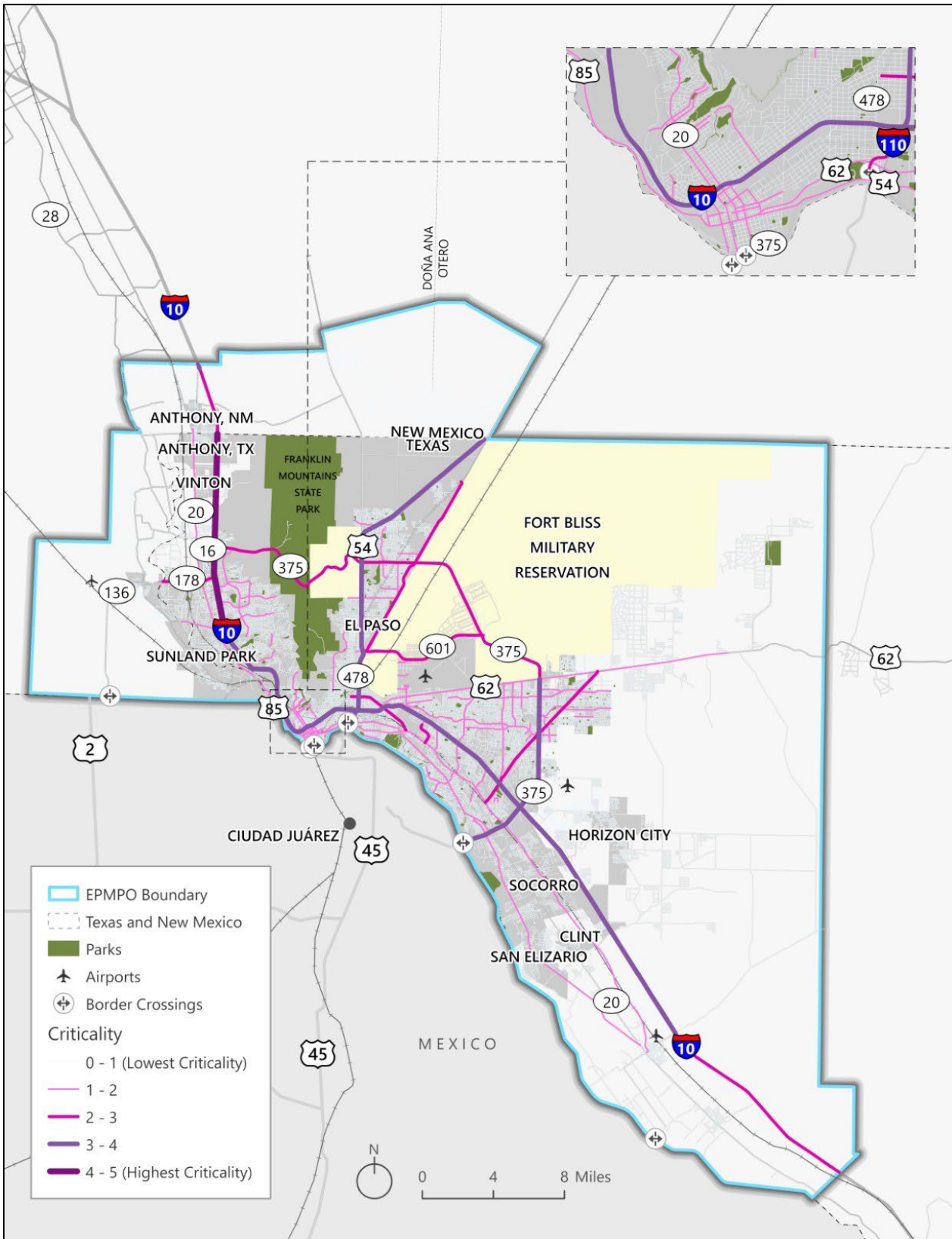


Figure 6. Vulnerability Scores Map

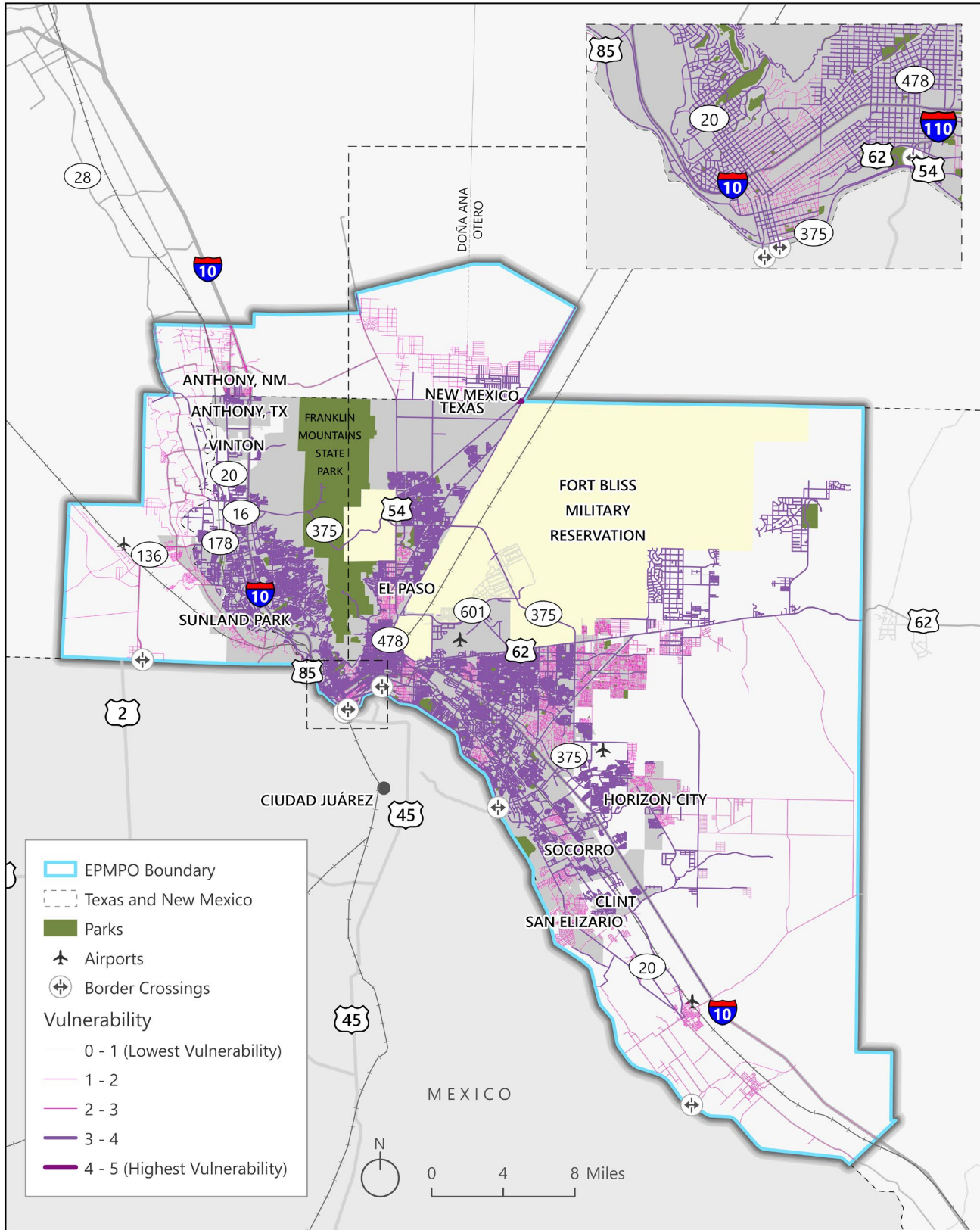


Figure 7. Cumulative Scores Map

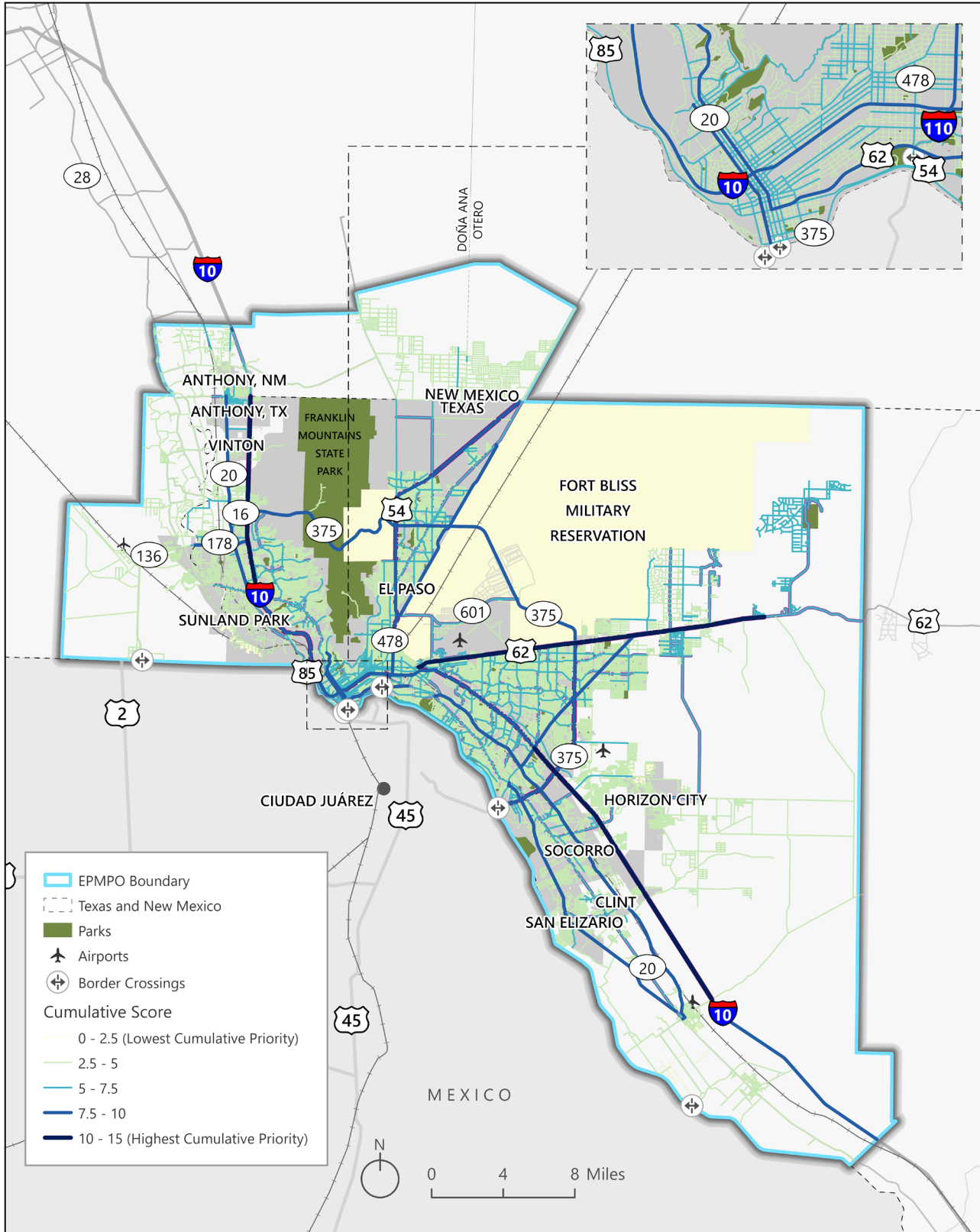
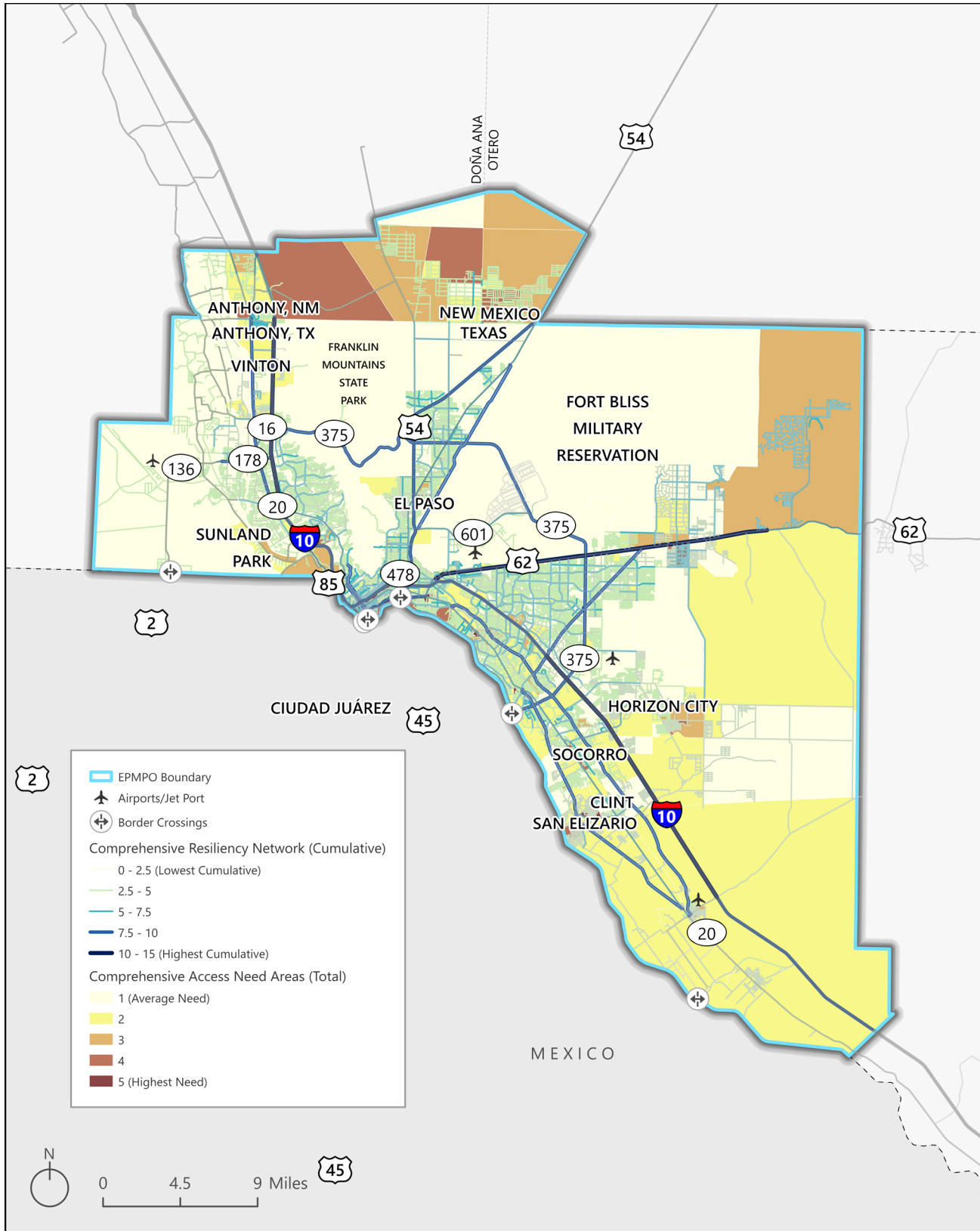




Figure 8. Comprehensive Need Areas and the Comprehensive Resiliency Network





CONCLUSION

This memo examined the need and resilience of the El Paso MPO region to determine high-priority roadways and areas. Several Comprehensive Need Areas were identified using 21 indicators that looked at household, demographic, economic, and education data. The highest comprehensive need areas were the downtown urbanized areas and the north of the MPO area. The resiliency section looked at the MPO region using a scoring system that looked at a roadway's connectivity to essential infrastructure, whether it is on a critical transportation route and the vulnerability of the roadway to climate risks. Using these three parts, this memo created a resiliency network to identify the highest-priority roadways based on their score. Roadways with a higher score were considered a higher priority. Finally, Comprehensive Need Areas and the Comprehensive Resiliency Network were overlaid to show critical areas. While the roadways with the highest scores do not overlap entirely with the highest comprehensive need areas, they do connect to those areas, providing vital access to communities that may have higher needs than others. The Comprehensive Need Areas and Comprehensive Resiliency Network areas with the highest scores are IH-10 in Anthony, New Mexico, IH-10 in Downtown El Paso, U.S. 62 south of the Hueco Tanks State Park, and SH 20 near Anthony, NM and San Elizario, TX. This memo seeks to provide valuable information to policymakers and stakeholders on where to direct future investment in the El Paso MPO's transportation system.