Technical Memorandum
WACO DOWNTOWN TRANSPORTATION STUDY

February 2014

Prepared for:
City of Waco

CDM Smith

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

Greater Downtown Waco provides city and regional residents with diverse businesses, a variety of housing choices, restaurants, shopping, entertainment and parks. Many community leaders and organizations are committed to growing and enhancing the city center and riverfront areas, encouraging investment of mixed use development and urban design which promotes a walkable vibrant community in the core of the downtown. The vision for the heart of the city encourages compact development, complete streets, and multimodal transportation options that will attract the growing population to the area. Several recent developments such as the Heritage Quarters, the Austin Avenue Flats, and Tinsley Place are great examples of the initial residential options for enhancing urban lifestyle.

The ability of residents and visitors to access the multitude of future opportunities depends on an efficient and intuitive downtown transportation network. Without clear and easy ways into and around the city, Waco will have difficulty attracting businesses, institutions, residents, shoppers, and tourists to its downtown. By undertaking this Waco Downtown Transportation Study, which has incorporated the *2010 Imagine Waco Plan*, the city will have a high level overview of strategies to strengthen pedestrian connections, improve wayfinding, improve roadways and intersections, and enhance access/egress to and from the area. The study will address access and circulation demands, one-way versus two-way circulation, Baylor University potential growth, integration of multimodal options, pedestrian connectivity, and complete streets development. This plan will support desired economic and livability visions for Greater Downtown Waco.

This study is an important step in better connecting people to the places they want to go in the City of Waco. By reinforcing and enhancing connections to and around downtown across various modes of transportation, the City will be able to support economic growth in the central business district and improve the quality of life for everyone spending time in downtown.

1.1 Study Area – Project Limits

The City of Waco, shown in **Figure 1-1**, is located in the heart of the Texas manufacturing and technology corridor on Interstate Highway 35, just 90 miles south of Dallas and 100 miles north of Austin. Waco covers 95 square miles and is the county seat of McLennan County in Texas. Downtown Waco is bisected by the Brazos River, creating East and West Waco.

Figure 1-1: Waco Regional Map

The Greater Downtown Waco study area is generally bound by South Loop Drive to the east, Herring Avenue to the north, 17th Street to the west, and US 77 to the south, as shown in **Figure 1-2**. Within these general project limits of Greater Downtown Waco, this study qualitatively addresses at a high level pedestrian and vehicle circulation, pedestrian and vehicle wayfinding, and regional access/egress patterns to/from downtown.

1.2 Vision/Study Focus/Goals

The Downtown Transportation Study will serve as Waco's transportation vision for the future of its greater downtown area. The study will describe downtown Waco's existing transportation system, identify some of the critical transportation problems and opportunities in the downtown, evaluate alternatives that address these issues, and recommend a program of transportation improvements that can help to realize Waco's transportation vision.

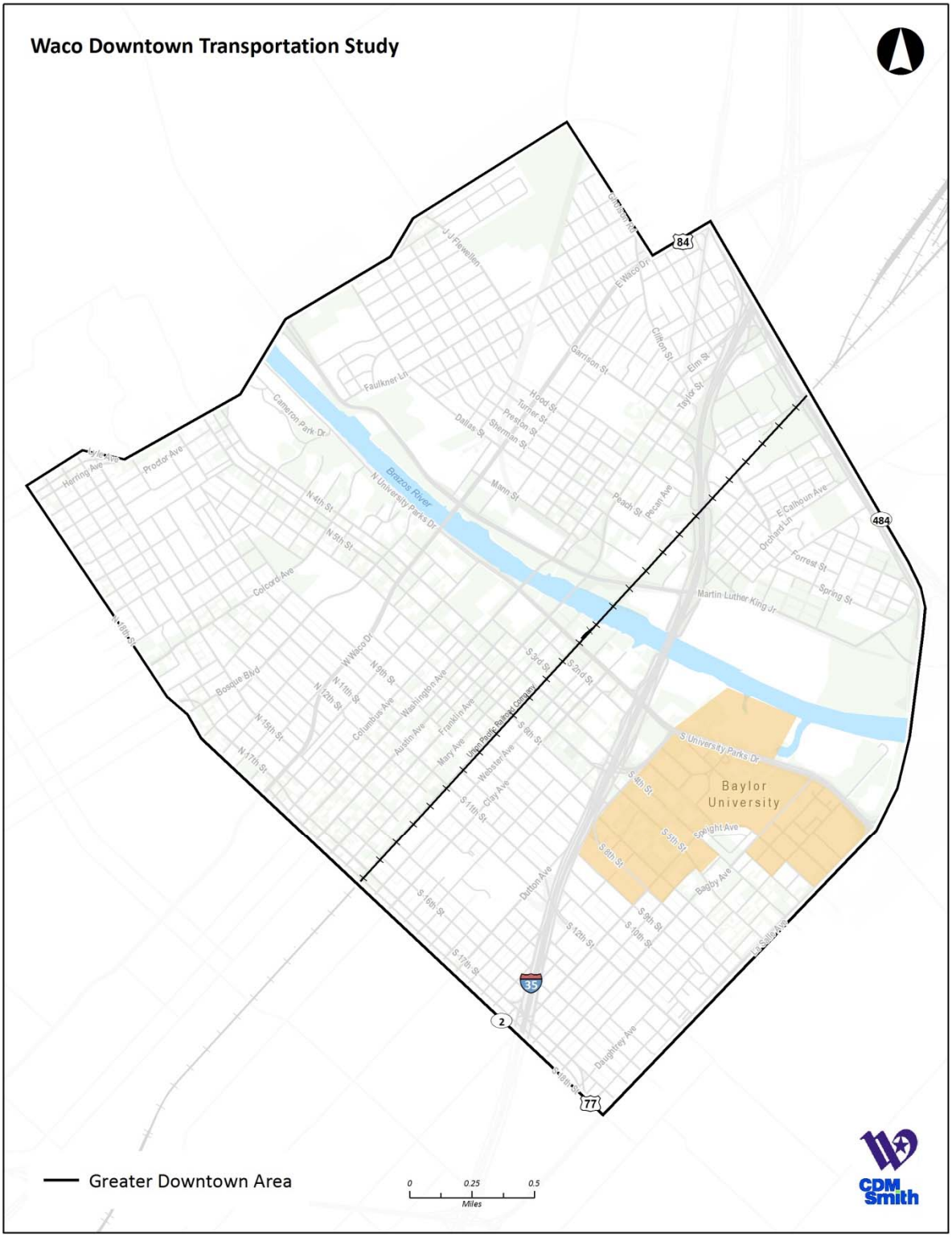
The study has the following goals:

- Ensure the safe and efficient function of all transportation modes in Greater Downtown Waco.
- Identify areas ripe for future economic development supporting of public transportation
- Identify high-level improvements that increase livability and urban character in Greater Downtown Waco which also support public transportation
- Enhance the quality of life for Waco's residents, workers, and visitors.

In order to achieve these goals, the study will evaluate conditions and issues in a variety of dimensions, including different modes of transportation, and in the relationship between the transportation system and Waco's land use and future development.

CDM Smith will explore the likely impacts associated with converting downtown travel corridors from one-way to two-way traffic. Through a collaborative effort with the public, local government agencies, and surrounding neighborhood groups, the study will identify the advantages and disadvantages of projected traffic impacts on the surrounding areas. Traffic impacts are just one of many factors that must be taken into consideration when it comes to determining feasibility for converting one-way streets to two-way traffic. Downtown streets serve as more than just traffic movers - they provide access to businesses, residential areas, and local attractions. It has been argued that one-way streets in some cases hinder opportunities for economic development as certain businesses have a formal policy against locating on one-way streets. Thus, city leaders and the community must look at the big picture when faced with transportation decisions.

Figure 1-2: Greater Downtown Waco Study Area



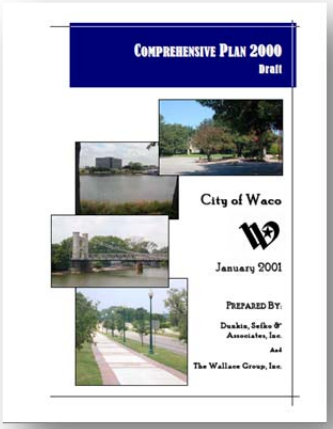
Multiple partners within Waco and the surrounding communities recognize downtown will continue to be a primary activity center in the region, and support this planning effort to increase livability, connectivity, and growth. The *2010 Imagine Waco* plan introduced a vision for the community, including a vibrant urban center for businesses, education, culture, and urban living. New developments over the past 5-10 years have continued to keep downtown an attractive and exciting environment with a lively mix of uses, including housing, offices, retail, hotels, public spaces, learning centers, etc. A functional multimodal transportation system is also envisioned for efficient movement of people within Greater Downtown Waco, and also for connections to/from surrounding areas. The multimodal transportation system offers a choice of transportation mode for residents of Waco. Waco desires a system that will be safe, convenient, attractive, and accessible for all system users.

In addition to this Downtown Transportation Study, two other pertinent studies are underway – the update of the Comprehensive Plan for the City and the W.E. Upjohn Institute for Employment Research (Upjohn) Study, which is an economic development review of the City. Development of this Downtown Transportation Study will be closely coordinated with these other study efforts. This Downtown Transportation Plan will be an input to the City's Comprehensive Plan, and these study efforts are being undertaken in concert to ensure the integration of land use and transportation plans.

2. Review of Previous Studies

The CDM Smith team reviewed various city planning and transportation planning documents for the Waco Region to determine if the goals, objectives, and recommendations contained in these plans were consistent and supported the same goals and principles of multimodalism and Context Sensitive Solutions. The review found a strong concurrence among the plans. This unanimity demonstrates there is institutional and political support for the policies supporting livable communities, transit supportive development, and economic growth, and further shows the relevance of referencing each of these plans as this study progresses.

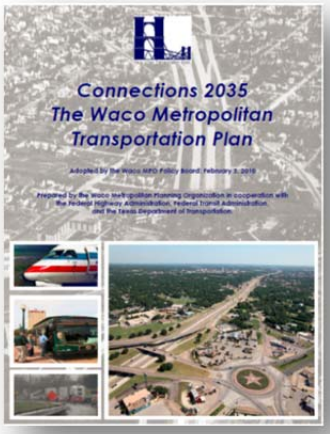
2.1 Waco Comprehensive Plan 2000



The Waco Comprehensive Plan 2000 establishes an emphasis on New Urbanism and Traditional Neighborhood Design. It validates the region's preference for urban features such as a pedestrian-oriented environment, narrower streets, the use of the regional vernacular in architecture and landscaping, and the importance of a center or focal point in neighborhood design.

The plan recognizes that cities with homogeneous style and development trends tend to look anonymous, particularly as viewed from Interstate corridors. It highlighted the desire for Waco to convey its own unique "signature" and positive image.

2.2 Connections 2035 Metropolitan Transportation Plan



The Waco MPO has adopted objectives in five categories to meet the guiding principles set by its Policy Board, with the goal of developing a better functioning multimodal transportation system. Objectives that are most relevant to the Downtown Transportation Study include:

- Objective 2-5: Provide safe, well-lit shelters along Waco Transit's fixed route system.
- Objective 5-2: Waco Transit's fixed route system should provide walking access to 80% of employers with more than 100 employees.
- Objective 5-3: Employers with more than 100 employees should have pedestrian infrastructure connecting their location with the Waco Transit fixed route system.

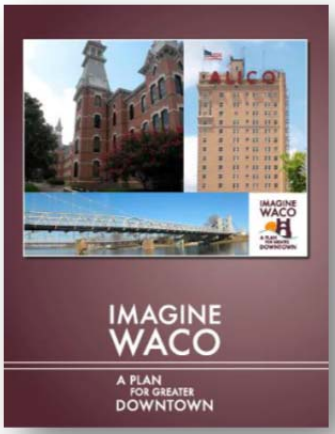
- Objective 5-4: Waco's transportation system should be developed in such a way to encourage most future development to occur within existing nodes of development, and provide walking access between new residential development and most basic municipal and commercial services.

The Needs & Gap Analysis section of the MTP has defined a transit need index, which identified the downtown study area and east Waco as two areas with the highest needs.

The top priority short-term transit project identified in the MTP is to install bus pullouts, bus shelters, and rider information centers at various locations along the existing fixed routes. This strategy coincides with other defined strategies for increasing transit performance, convenience, and safety, and ultimately for increasing transit ridership.

2.3 Imagine Waco: A Plan for Greater Downtown Waco

The 2010 Imagine Waco downtown plan presents a detailed vision for the streets and blocks of Downtown Waco, including cross-sections for proposed multi-modal street types such as Urban Boulevards and Gateways.



The development process for the Imagine Waco downtown plan included several workshops for the public to voice their concerns and ideas for the future of the downtown. Strong ideas coming out of the workshops which are related to the Downtown Transit Study include:

- Improve public transit options
- Create riverfront development such as paths, parks, and an amphitheater
- Improve sidewalks and pedestrian safety
- Create bike lanes and bike friendly streets
- Focus on Elm Avenue redevelopment
- Create a farmer's market in Waco
- Create youth attractions and activities
- Make Waco attractive to young professionals
- Develop arts and cultural attractions
- Beautify the downtown area
- Integrate parks and plazas into the fabric of downtown
- Create a high quality environment that is livable, walkable, and sustainable
- Integrate Waco's many educational facilities into Greater Downtown activities

In designing an urban transportation system, the Imagine Waco plan specified four strategies: gateways, critical intersections, urban design and streetscaping, and increased transit infrastructure and pedestrian connections.

Gateways to Greater Downtown Waco were defined on I-35 at 5th St., 4th St., University Parks Dr., Martin Luther King Jr. Boulevard, US 77 Business, and at Waco Dr. Approaching from the west side, at 18th street gateways are defined at Franklin Ave and at Waco Dr. Within Greater Downtown Waco, gateways are defined on Waco Dr. at University Parks Dr. and at Martin Luther King Jr. Blvd. (**Figure 2-1**)

The function of gateways is to welcome travelers to a section of the city and to help orient them. They typically occur at intersections or neighborhood boundaries. While not mentioned in the plan, wayfinding signage would be an important element of a gateway.

Critical intersections lie on important or high volume traffic routes. Significant bicycle or pedestrian paths can also form critical intersections. These spots form important junctures in the multimodal network; they must function well if the network as a whole is to function well.

Transit infrastructure and pedestrian connections are a way to increase the pleasantness of the system as well as its efficiency. They also have the potential to spur development of adjacent land uses.

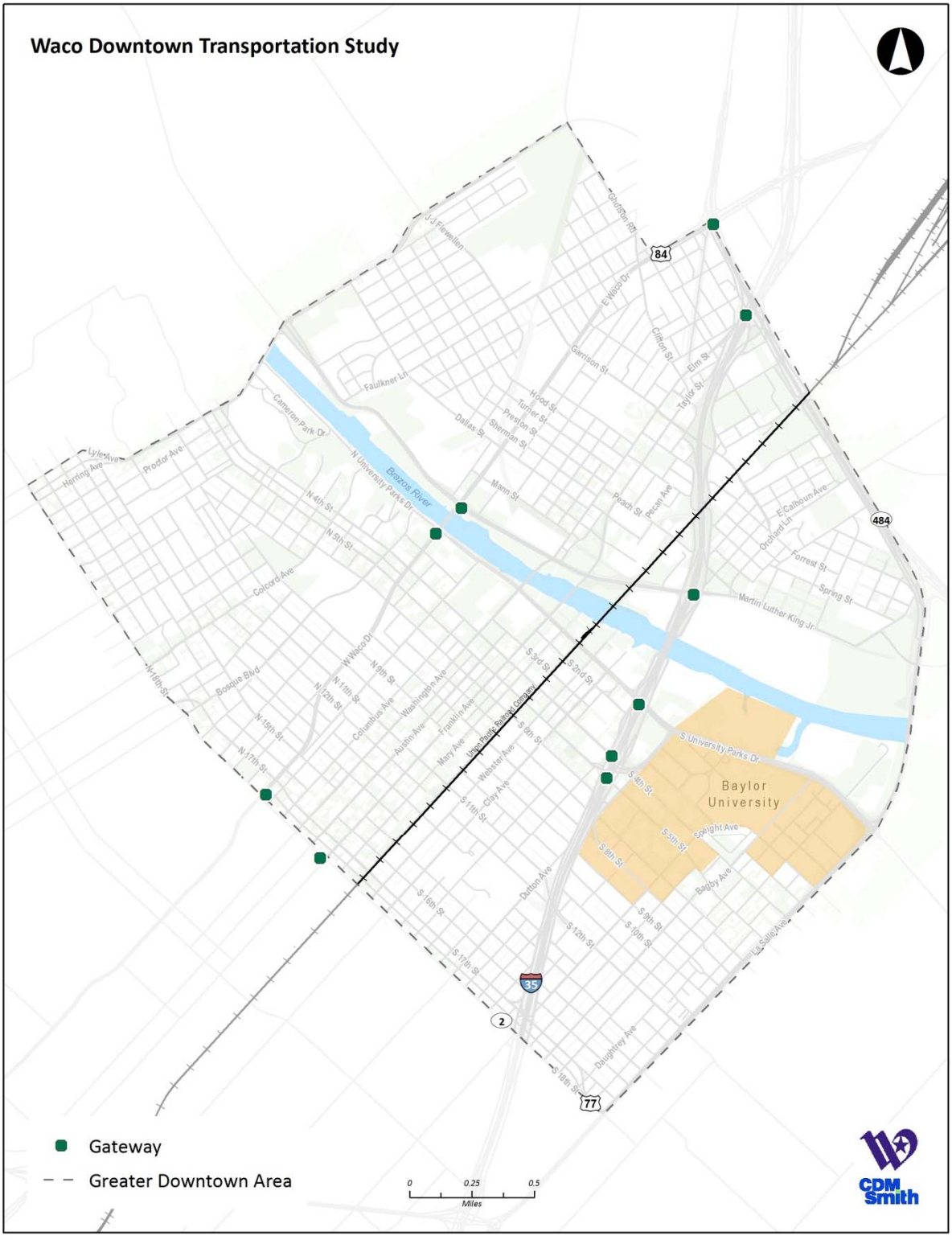
2.4 Master Thoroughfare Plan

The Master Thoroughfare Plan of July 2012 cites context-sensitive design as one of its guiding principles. Specific goals include expansion of multimodal options, increased connectivity, and the promotion of urban vitality. The updated plan was augmented to consider community character and a new awareness of the need to coordinate between multimodal transportation investments and land use decisions. Particular emphasis was placed on the Context Sensitive Solutions approach to transportation investments.

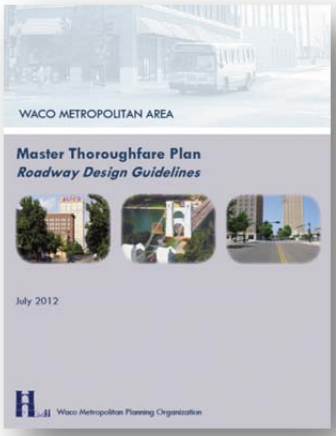
Implementation elements in the Thoroughfare Plan specifically identify several areas in Greater Downtown Waco as potential project locations for Context Sensitive Solutions. These include:

- 4th St / 5th St at I-35…to improve the connectivity between Baylor University and downtown.
- Business US 77….explore converting the facility to an at-grade, medium speed boulevard connecting Lake Brazos Parkway with the Marlin Highway.
- University Parks Dr. and Baylor Ave…concentrate on pedestrian needs with crossings and sidewalks.
- University Parks Dr. from I-35 to SL 491…concentrate on pedestrian needs with crossings and sidewalks.

Figure 2-1: Gateways to Greater Downtown Waco



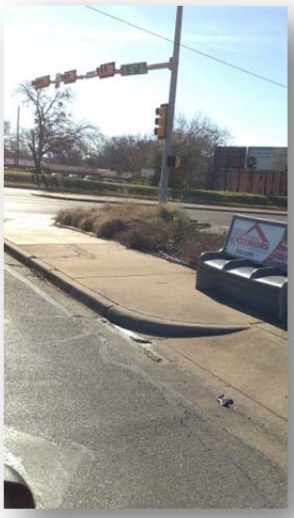
2.5 Roadway Design Guidelines



The Roadway Design Guidelines were developed as a companion to the Master Thoroughfare Plan, supplementing it with detailed guidelines and strategies. It was developed with reference to the ITE publication *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach,* as well as the local *Imagine Waco: A Plan for Greater Downtown Waco*. This plan in particular confirms that the application of Context Sensitive Solutions for development of transit connections in Greater Downtown Waco have wholehearted local support. Many elements for their implementation have already been specified in the plan, including the definition of context zones and the specification of different travel way and streetscape elements for different types of thoroughfares in each context zone. The Greater Downtown Waco study area features the City Center Context Zone as its core, but also extends out to the defined urban area type. Within the urban area type, potential context zones may include the Village Center, Neighborhood Center, and Mixed Use Neighborhood Center. Baylor University, of course, is the Institutional Campus Context Zone.

The criteria for the City Center Context Zone support a viable pedestrian and people-scaled environment. Criteria include:

- Low to moderate vehicle speeds.
- On-street parking.
- Sidewalks with a minimum width of fifteen feet with at least an eight foot walk zone.
- Bicycle lanes.
- Street lighting.



The Village Center Context Zone features many of the same criteria as the city center, with a continuing emphasis on multimodal access and pedestrian needs.

Neighborhood Centers include civic activity facilities which are gathering points for people. They include libraries, schools, parks, and churches. Multimodal access is critical to supporting these activities. Since these locations are destinations, parking and pedestrian activity are particularly important.

The near northside and northwest downtown were mentioned as examples of the Mixed Use Neighborhood Context Zone. This area is essentially follows the traditional urban development pattern, with smaller blocks of detached houses with a moderate density. These areas are somewhat constrained by being built out, with smaller sidewalks and bike shoulders instead of designated lanes. Traffic calming techniques such as curb extensions would be appropriate in this area.

The guidelines rate several design elements by area type. Within the Greater Downtown Waco city center and urban area types, the plan specifies elements which support multimodal access and pedestrian issues. Elements which are rated as desirable or appropriate include:

- Wide sidewalks on both sides of the street.
- Sidewalks set back from the pavement.
- Median refuge areas.
- Reduced corner turning radii.
- Bicycle lanes.
- Signed bicycle routes.
- Specific bicycle parking.

The conversion of one-way street pairs to two-way was seen as appropriate as a design element to help reduce traffic speeds. Traffic calming elements such as chicanes, roundabouts, speed tables, and chokepoints had mixed ratings, and were generally rated as appropriate or may be appropriate. Other desirable or appropriate strategies include on-street parking, compact intersections, and reductions in the number of lanes. Reductions in travel lanes, termed “road diets”, are discussed further in the plan. With traffic volumes less than the capacity of the road, the impacts of road diets on vehicular Level of Service are often minor. Road diets can often improve safety and operations, and can enhance multimodal access. Additionally, road diets may be used to make space available in the streetscape rather than the travel way, allowing for enhanced street furniture, landscaping, and pedestrian amenities.

Interestingly, almost all of the design elements typically seen as supporting traditional downtowns are rated as desirable or appropriate for the City Center and Urban area types. These include wayfinding, landscaping, street furniture, alternative paving materials, and security amenities. Sections of the plan extensively discuss the sidewalk zone to provide guidelines for supporting a safe and pleasant pedestrian-friendly area.

Bus stops are specifically discussed in the Design Guidelines. Even though Waco Transit System currently operates as a flag-stop system, guidelines for the future development of stops and stations are included to support the compatibility and cohesiveness of the system and the overall multimodal environment.

Bus stop spacing is recommended at 300 to 1,000 feet for the city center and at 500 to 1,000 feet for the urban area type. For comparison, the typical city block in Greater Downtown Waco is about 350 to 450 feet long. Urban blocks in the residential areas surrounding the city core vary somewhat, but are generally 350 to 400 feet.

Far-side bus stops are generally recommended as offering superior operations and safety compared to a near-side stop. Mid-block stops

are generally to be avoided, but the guidelines recognize that they may be preferable under certain circumstances.

Certain standard amenities for bus stops are rated by the guidelines. Rather than being based on a type or context zone, they are based on the number of daily boardings at the stop. Special categories for amenities include transfer points, areas with high ridership by transit-dependent people, and stops serving healthcare facilities. All of the amenities are specified for stops, and so include those which can be safely left unattended. The types of enhanced amenities which are possible at a manned transit station are not treated in the guidelines.

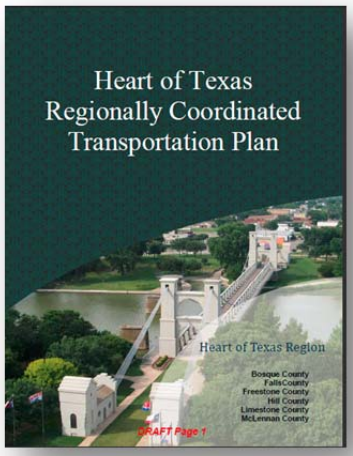
The use of bus bays and bus bulbs with on-street parking are also discussed in the guidelines. The traffic volume of the street and the ability of the bus to pull back into traffic from the bay is an issue.

2.6 Regionally Coordinated Transportation Plan

Two of the defined projects from this plan are of particular interest:

Project 21 is this Downtown Waco Transit Service Expansion Study. It identifies the need to connect the greater downtown area to its surrounding neighborhoods. The goals of the study are to expand the pedestrian catchment area and to provide a more attractive development environment downtown.

Project 19 is a supporting project to provide the infrastructure to make the fixed route system more efficient, more effective, and more compliant with ADA requirements.



3. EXISTING CONDITIONS

3.1 Population and Employment

Demographics for Greater Downtown Waco have been investigated in order to understand the potential transit market for existing and future services. Population and employment data for 2010 are contained in the Waco travel demand model, which divides the region into small units called Traffic Analysis Zones (TAZ). The model has defined 36 TAZs for Greater Downtown Waco, as shown in **Figure 3-1**.

Table 3-1 lists the 2010 demographic data for the TAZs.

Overall, the data shows a downtown population of approximately 25,800 people. Estimates from the Near Northside Master Plan place the daytime population at over 35,000 persons within the downtown area.

Total 2010 population is shown in **Figure 3-2**. As expected, the Baylor campus and surrounding housing areas are predominant. Other high-population areas include the east bank of the river between Herring and Waco Dr. and the residential area between Herring and Waco Dr. bounded by 6th St. and 15th St. Housing in the core downtown area is not as high as in the traditional neighborhoods, but is definitely a presence. Taken together, TAZs 1, 2, 4, and 5 have a population of approximately 1,600.

Population density presents a slightly different picture, as seen in **Figure 3-3**. Population density is highest in the TAZs on the Baylor campus and the apartment areas immediately to the east and south. Densities are also high in TAZs 40, 42, 43, and 44 in northwest Waco around Colcord Ave. These denser areas may have higher potential for transit service.

The data show an overall household size of 2.59, which is reasonable and slightly above the national household average of 2.58. Planning documents recognize that population in the downtown area is generally younger and with smaller households than the region as a whole. Additionally, the presence of Baylor University housing drives household size down. Note that average household size data is not reported for TAZ 12, which is Baylor, because of the presence of group quarters.

The average of the TAZ median household income for Greater Downtown Waco is $15,439. (**Figure 3-4**) Interestingly, four of the nine highest-income zones are on the East side of the river. It is also seen that the TAZs with higher student populations have lower median household incomes.

Figure 3-1: TAZs for Greater Downtown Waco

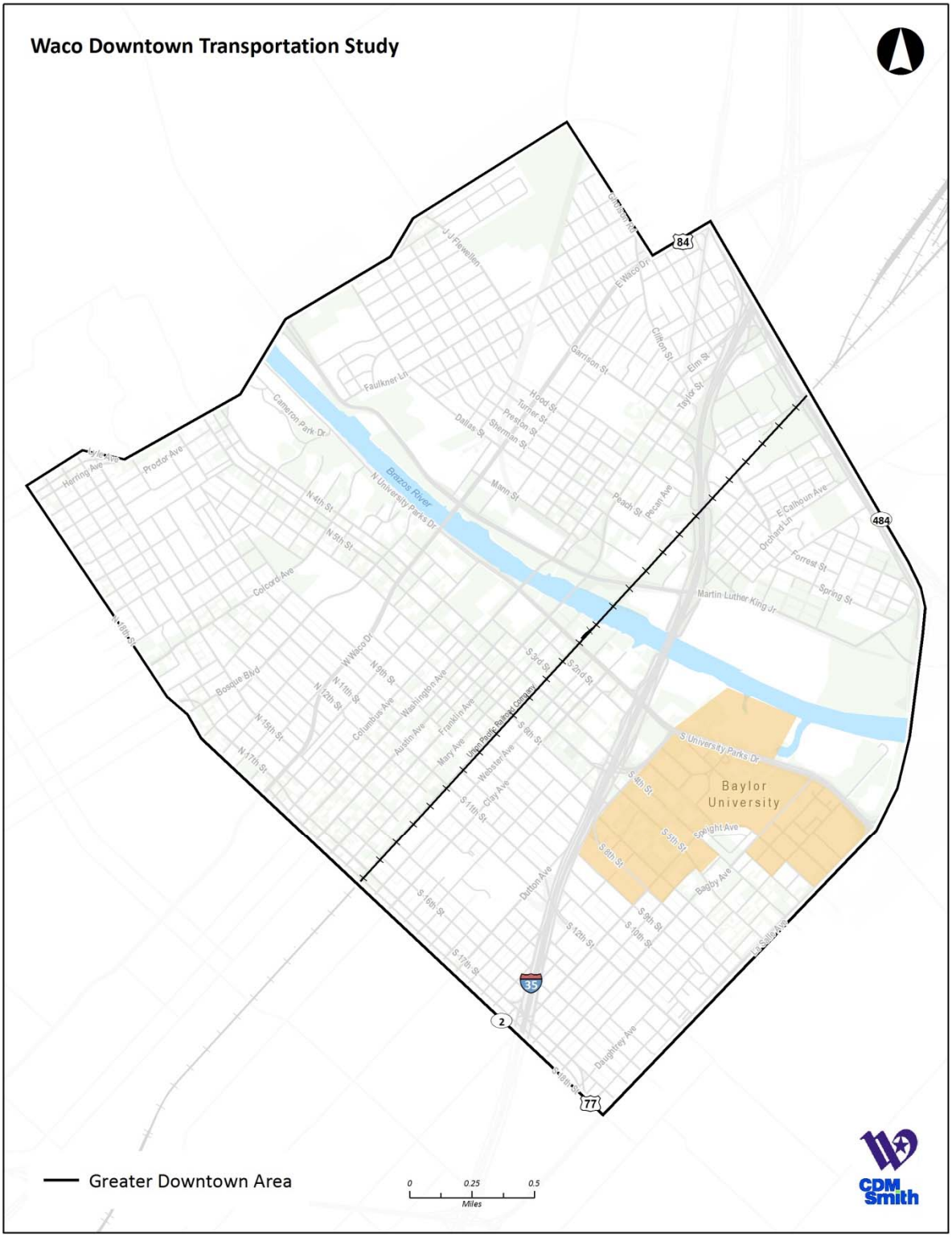


Table 3-1: Greater Downtown Waco 2010 Demographics

Zone ID	Description	Population	Population Density	Households	HH Size	Median HH Income	Retail	Basic	Service	Education	Special Generator	Total Emp	Total Emp Density
1	West riverbank, Franklin to Waco Dr.	328	3.15	163	2.01	7,897	40	0	657	0	87	784	7.54
2	Franklin to Waco Dr., 4th St to 11th St	720	4.21	196	3.67	18,868	145	166	2,180	799		3,290	19.24
3	Franklin to Waco Dr., 11th St to 17th St	251	2.15	143	1.76	17,121	65	70	493	15		643	5.50
4	West riverbank, Franklin to I-35	442	3.23	192	2.30	7,635	386	27	117	0		530	3.87
5	Franklin to Clay, 4th St to 11th St	104	0.94	76	1.37	31,679	104	333	1,209	62		1,708	15.39
6	Franklin to Clay, 11th St to 17th St	92	0.96	32	2.88	20,989	63	216	222	0		501	5.22
7	South Campus, University Parks to 4th St	1,320	13.07	664	1.99	13,326	35	7	164	0		206	2.04
10	West riverbank at Baylor	0	0.00	0		0	12	0	125	0	170	307	1.57
11	Baylor entrance triangle	0	0.00	0		0	81	0	18	0		99	3.00
12	Baylor main campus	4,214	21.07	35	120.40	12,100	79	0	0	0	2,480	2,559	12.80
13	Clay to I-35, 4th St to 11th St	526	4.38	207	2.54	8,287	493	0	30	107		630	5.25
14	Clay to I-35, 11th St to 17th St	335	1.95	114	2.94	20,573	13	0	42	0		55	0.32
15	West Baylor, 4th St to 12th St	1,832	11.97	1,157	1.58	5,369	192	0	93	0		285	1.86
16	I-35 to Wood Ave, 12th St to 17th St	1,043	11.46	552	1.89	12,707	142	13	109	0		264	2.90
26	Bosque to Waco Dr., 15th St to 19th St	337	3.87	140	2.41	28,651	16	0	42	0		58	0.67
34	Maple Ave to Bosque, 15th St to 18th St	455	4.89	193	2.36	14,176	12	0	341	0		353	3.80
40	Herring to Maple, 15th St to 18th St	719	8.46	242	2.97	31,878	17	5	3	6		31	0.36
42	Herring to Colcord, 6th St to 15th St	1,797	9.08	643	2.79	20,845	9	0	5	50		64	0.32
43	Colcord to Waco Dr., 6th St to 15th St	1,262	9.14	506	2.49	17,663	17	0	154	50		221	1.60
44	Bosque to Waco Dr., 11th St to 15th St	525	8.90	175	3.00	17,947	0	0	9	58		67	1.14
49	West riverbank, Herring to Colcord	101	0.53	37	2.73	34,442	24	8	68	0		100	0.53
50	West riverbank, Colcord to Waco Dr.	122	1.27	49	2.49	36,561	6	92	366	0		464	4.83
56	Gholson to Garrison, north of Waco Dr.	185	1.71	76	2.43	21,049	0	0	0	0		0	0.00
57	Gholson to Flewellen, Herring to Faulkner	1,015	7.10	388	2.62	7,216	0	159	6	61		226	1.58
58	Flewellen to Dallas, Herring to Faulkner	880	6.33	430	2.05	25,241	9	0	14	37		60	0.43
59	Garrison to Dallas, Faulkner to Waco Dr.	439	3.43	255	1.72	25,114	17	0	58	0		75	0.59
60	East riverbank, Herring to Waco Dr.	1,221	5.48	614	1.99	12,572	44	0	33	0		77	0.35
61	North Loop to Garrison, Waco Dr. to I-35	647	3.01	323	2.00	15,799	32	0	27	50		109	0.51
62	Garrison to MLK, Waco Dr. to Elm	484	2.06	226	2.14	30,758	30	0	35	26		91	0.39
63	South Loop to Forrest, I-35 to Orchard Ln	69	0.41	38	1.82	16,773	2	6	3	0		11	0.07
64	East riverbank, Elm to I-35	271	1.21	122	2.22	28,320	9	35	37	0		81	0.36
65	Forrest to MLK, I-35 to Orchard Ln	97	1.35	45	2.16	15,255	1	42	0	0		43	0.60
66	South Loop to MLK, Orchard Ln to South Loop	957	4.58	392	2.44	18,356	0	26	8	0		34	0.16
67	East riverbank, I-35 to South Loop	97	0.51	76	1.28	15,208	0	0	11	0		11	0.06
95	Wood to La Salle, 4th St to 12th St	2,540	30.98	1,333	1.91	11,206	50	21	92	0		163	1.99
96	Wood to La Salle, 12th St to 17th St	386	6.43	147	2.63	19,867	5	77	16	0		98	1.63
Totals		**25,813**	**5.22**	**9,981**	**2.59**	**15,439**	**2,150**	**1,303**	**6,787**	**1,321**	**2,737**	**14,298**	**2.89**

Figure 3-2: Population for Greater Downtown Waco

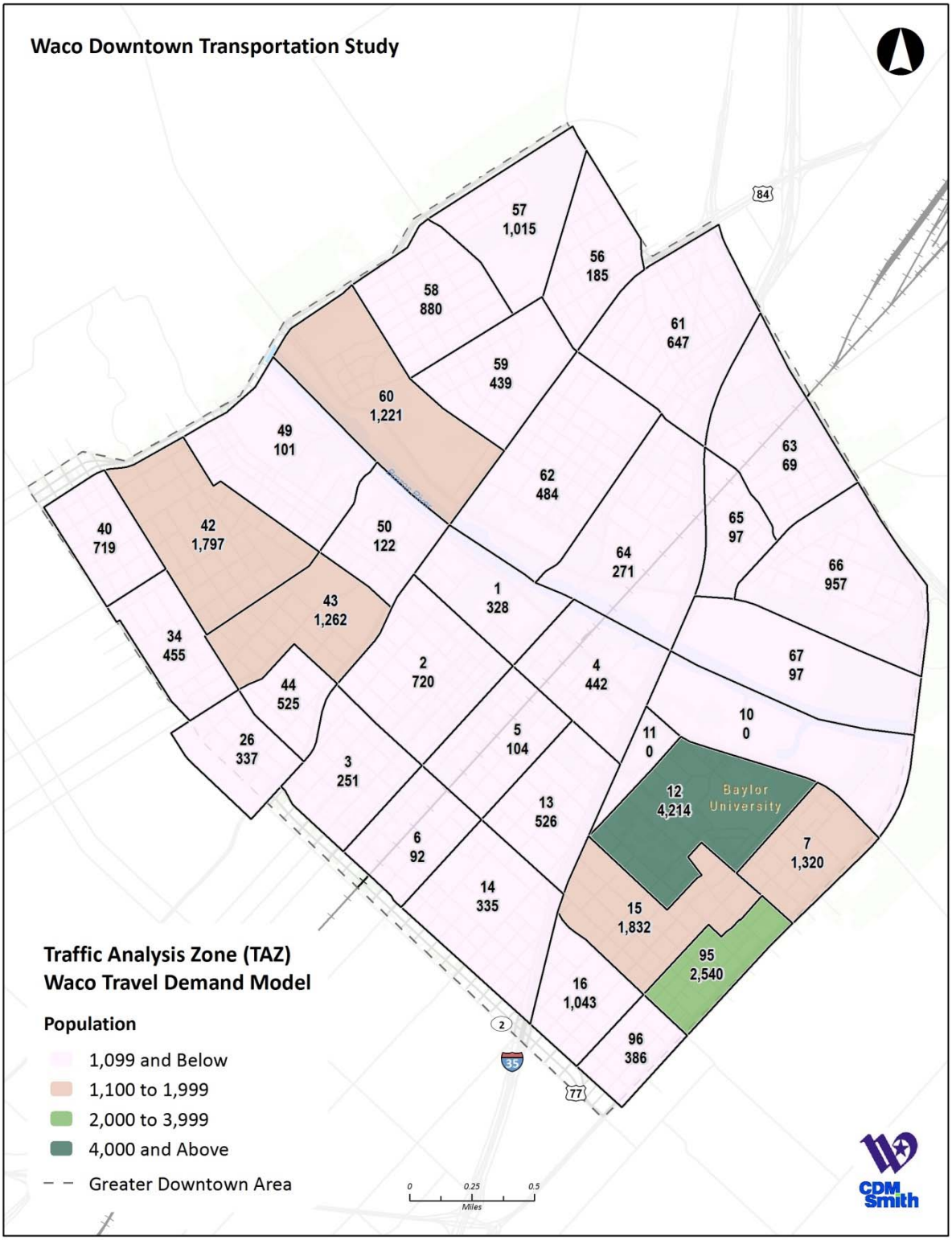


Figure 3-3: 2010 Population Density

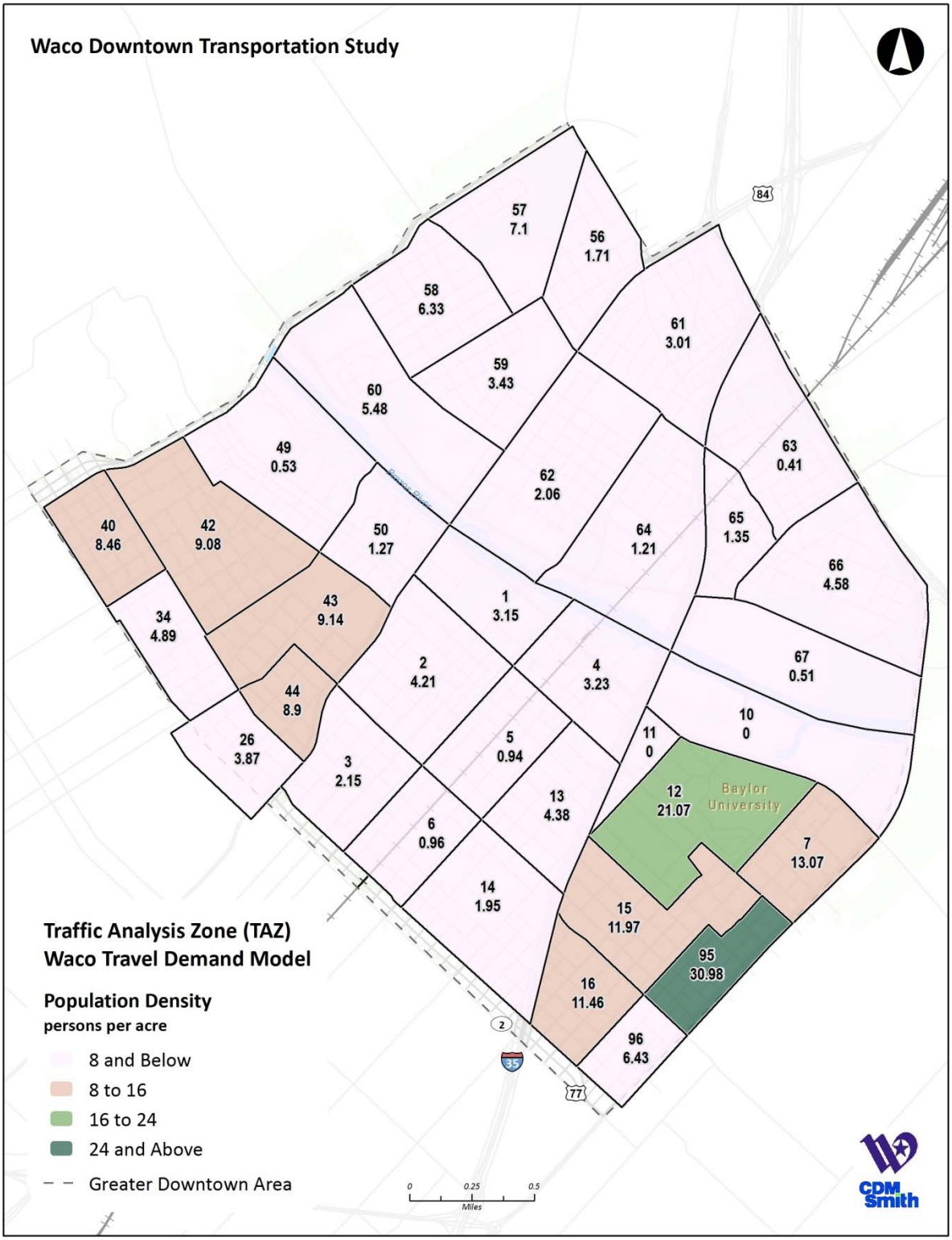
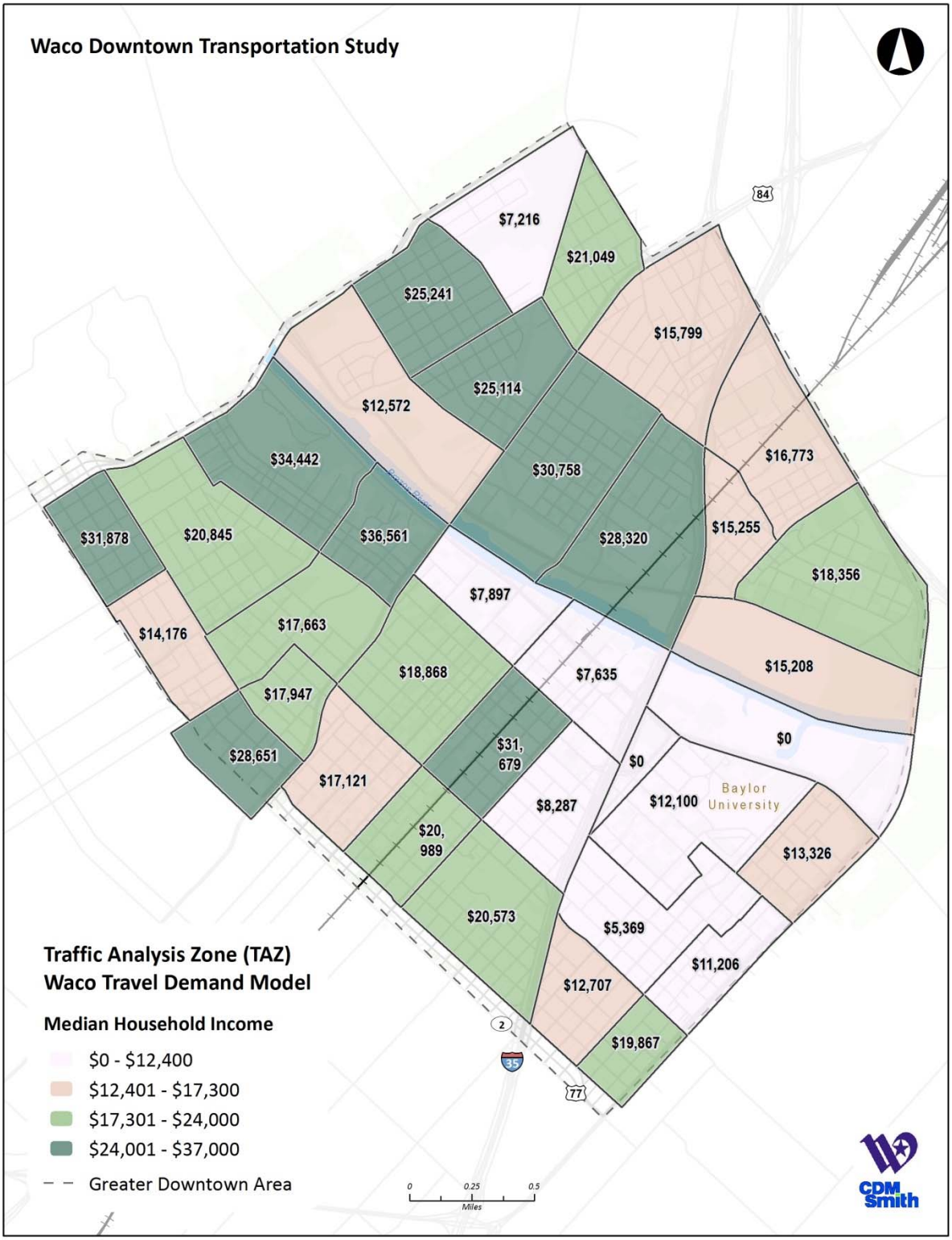


Figure 3-4: 2010 Median Household Income



Total employment in the Greater Downtown Waco area is approximately 14,300 jobs. These categories include:

- 15% retail
- 9% basic
- 48 % service
- 28% educational

Total employment for 2010 is shown in **Figure 3-5**. The core downtown area and the Baylor campus show the highest employment.

The density of total employment is shown in **Figure 3-6**. The majority of downtown employment is located in the TAZs bounded by Waco Dr. and Clay Ave, from 4th St. to 11th St.

Employment in the categories of retail, basic, service, and education is also important in determining potential transit markets. Employment by category is shown in **Figure 3-7**, **Figure 3-8**, **Figure 3-9**, and **Figure 3-10**.

Figure 3-7 illustrates the retail employment concentrated along the west side of I-35. This area includes convenience stores and restaurants clustered around 4th and 5th streets.

Figure 3-8 shows 2010 basic employment. TAZs 5 and 6, lying along the railroad tracks, show the highest concentrations of basic employment. The Oak Farms plant in east Waco contributes to the basic employment in TAZ 57.

Figure 3-9 shows the 2010 service employment, with a high concentration of employment in the core business area. This category of employment also extends further east and west, and geographically is the most well distributed of the employment categories.

Figure 3-10 shows the 2010 educational employment. The Baylor campus is prominent on the map. The Baylor office building at University Parks and I-35, which is in TAZ 4, shows no educational employment. It is likely the employees are probably counted in the service category. This is reasonable, as classes are most likely not held in that building, its workers function more like office workers.

The Waco Independent School District offices are the source of the educational employment in TAZ 2. There is also an old school at 9th and Columbus which appears to have been converted to lofts, but which may have had some educational employment in 2010.

In summary, the demographics for Greater Downtown Waco present an opportunity for building a livable community. The area, which covers about 5 square miles, has approximately 26,000 residents and 14,000 workers, with a daytime population of about 35,000. With these characteristics, it has the potential to become a transit supportive area.

Figure 3-5: 2010 Total Employment

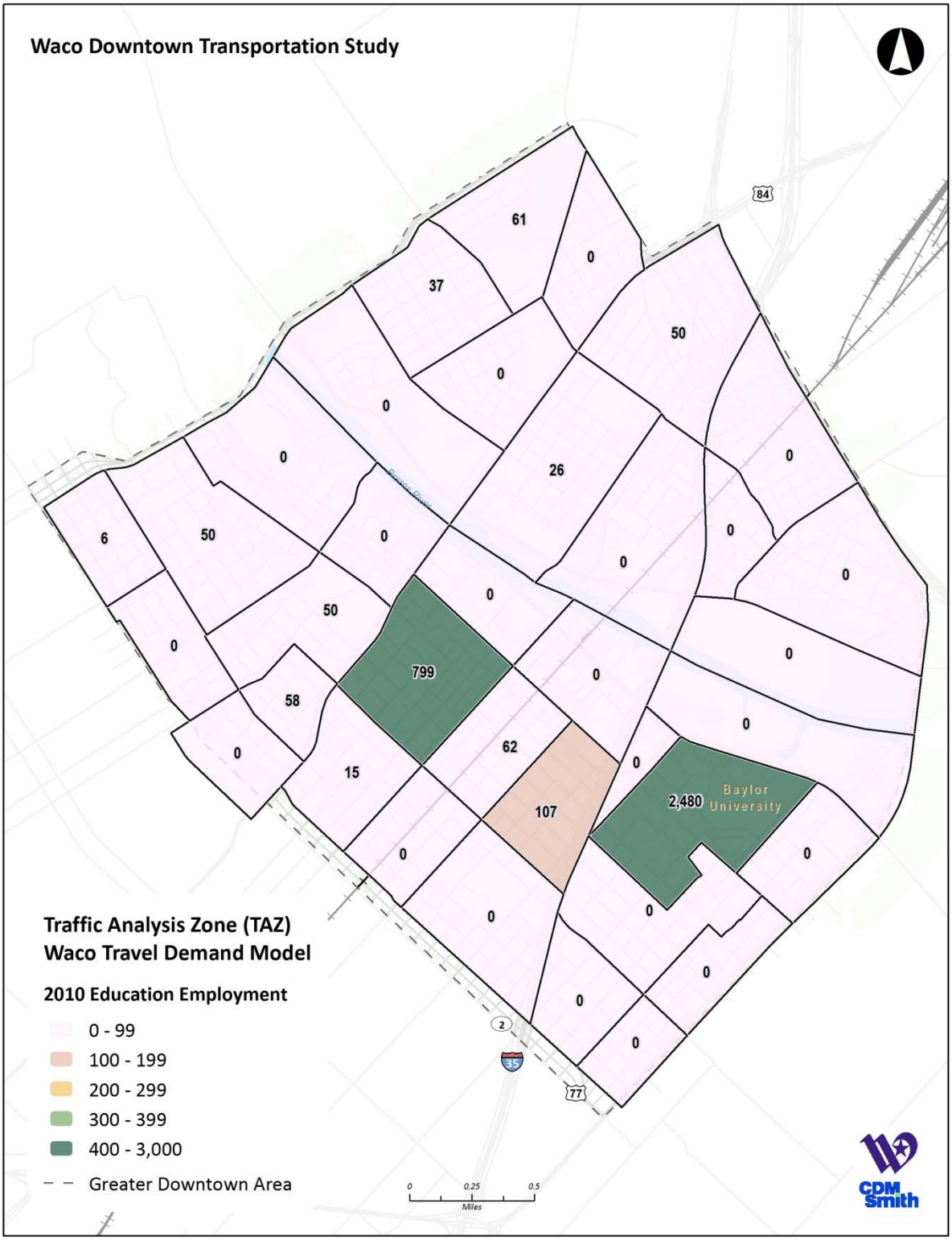


Figure 3-6: 2010 Total Employment Density

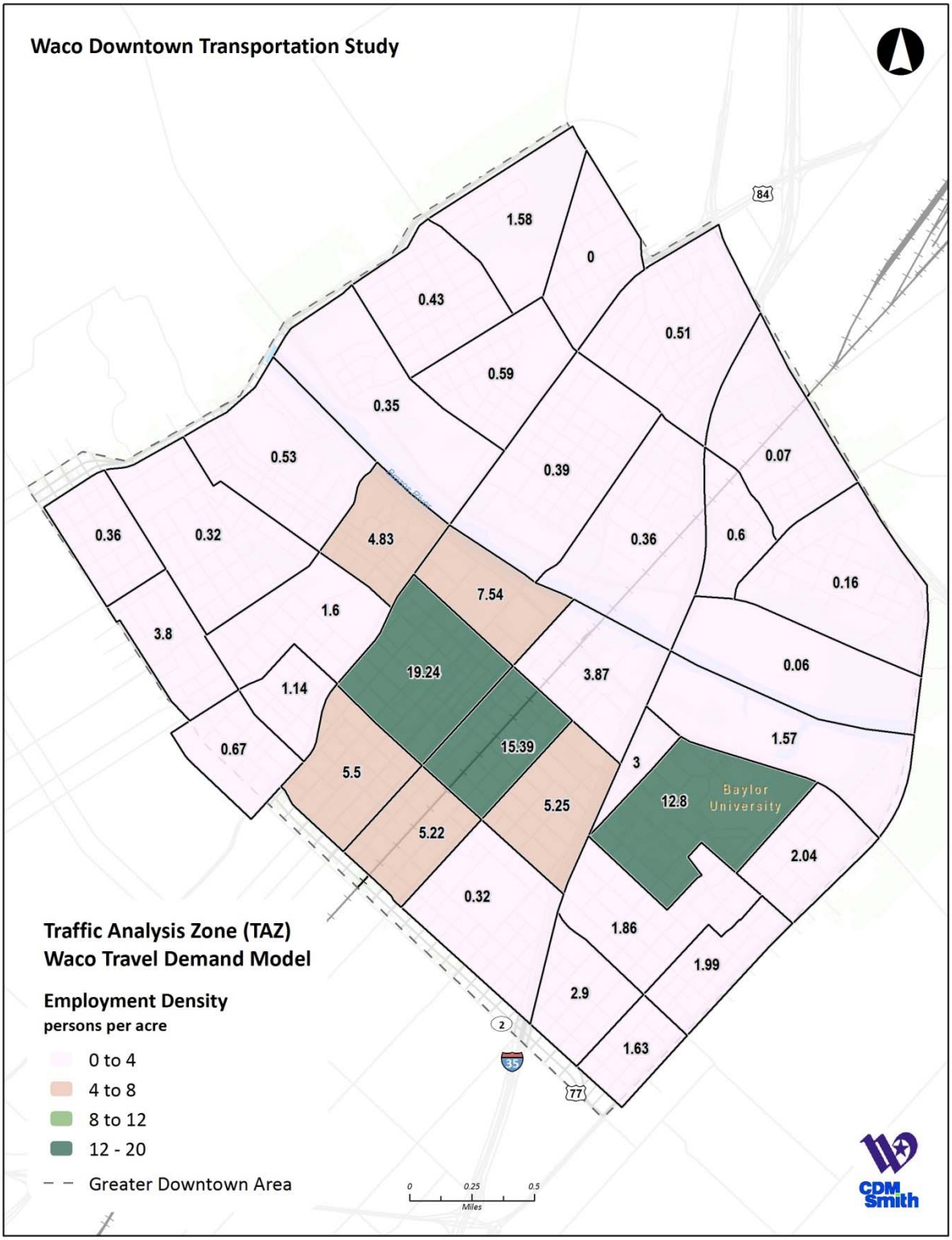


Figure 3-7: 2010 Retail Employment

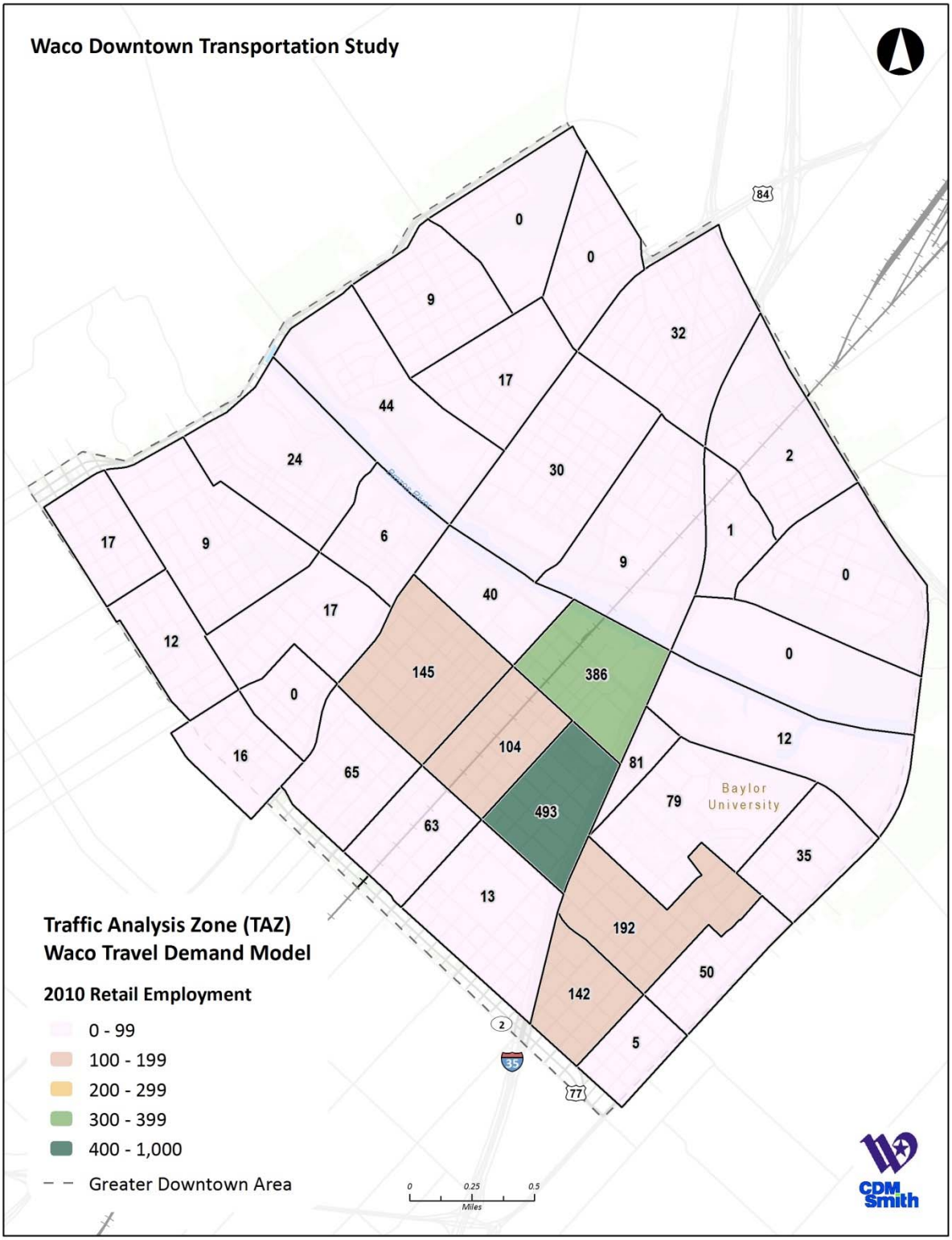


Figure 3-8: 2010 Basic Employment

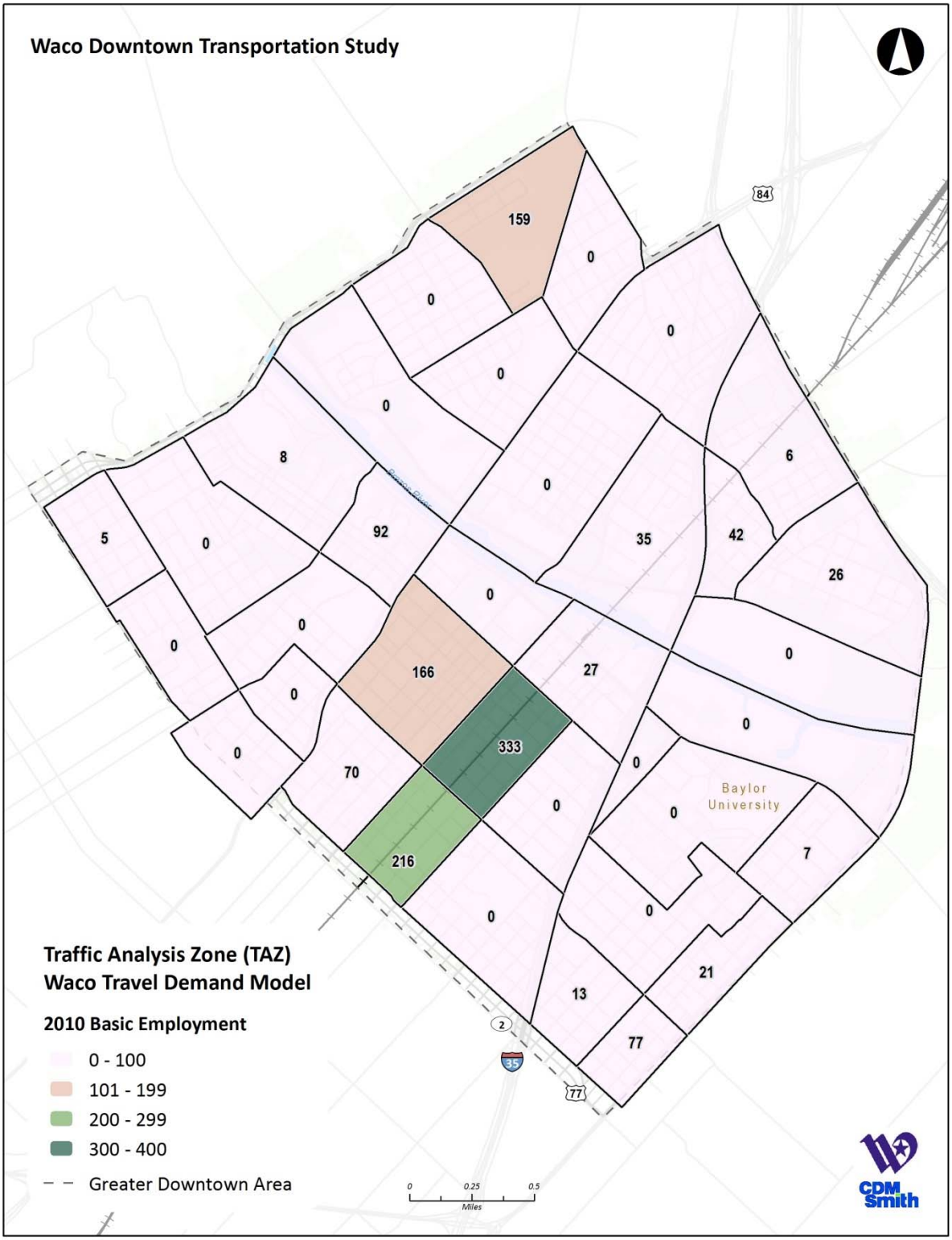


Figure 3-9: 2010 Service Employment

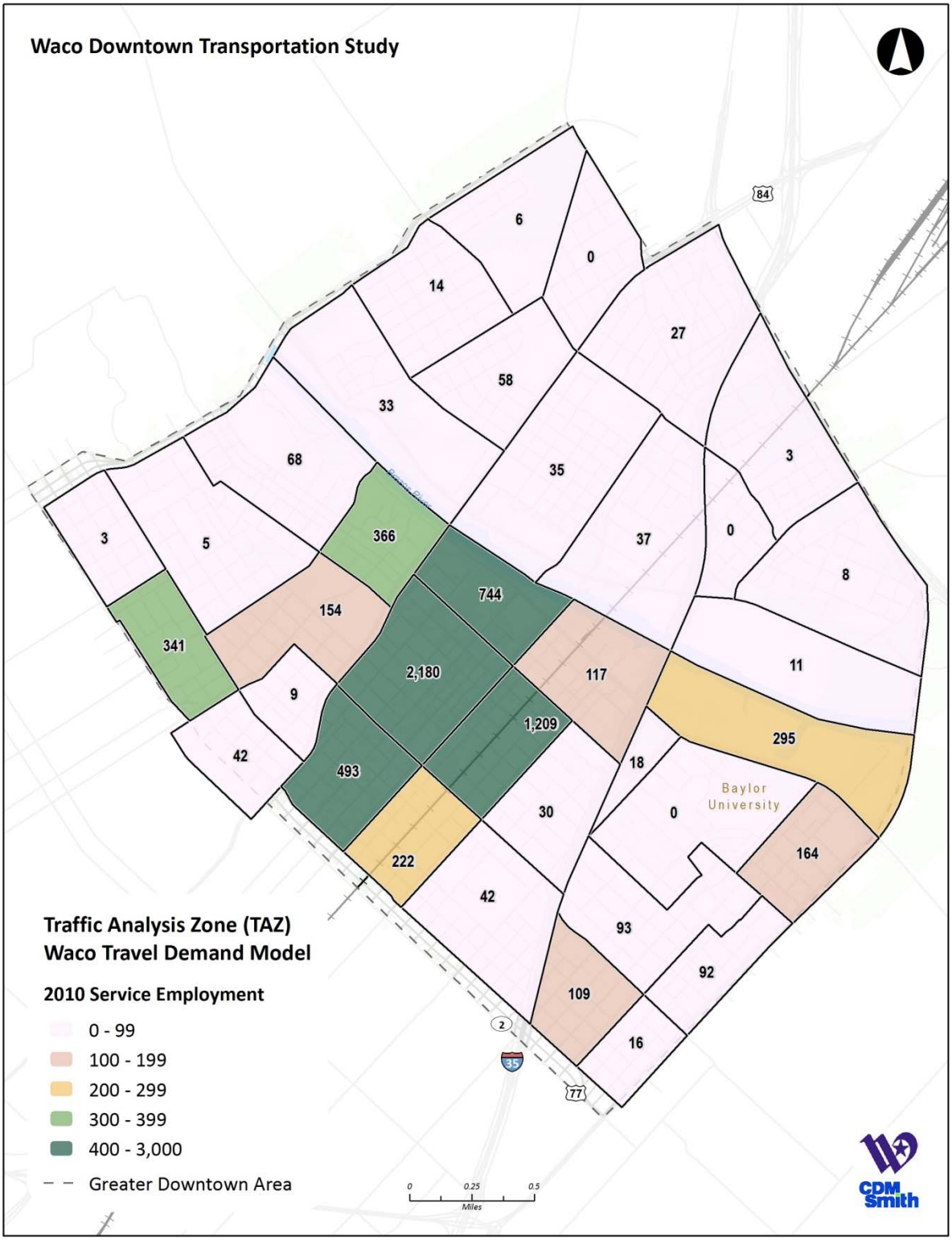
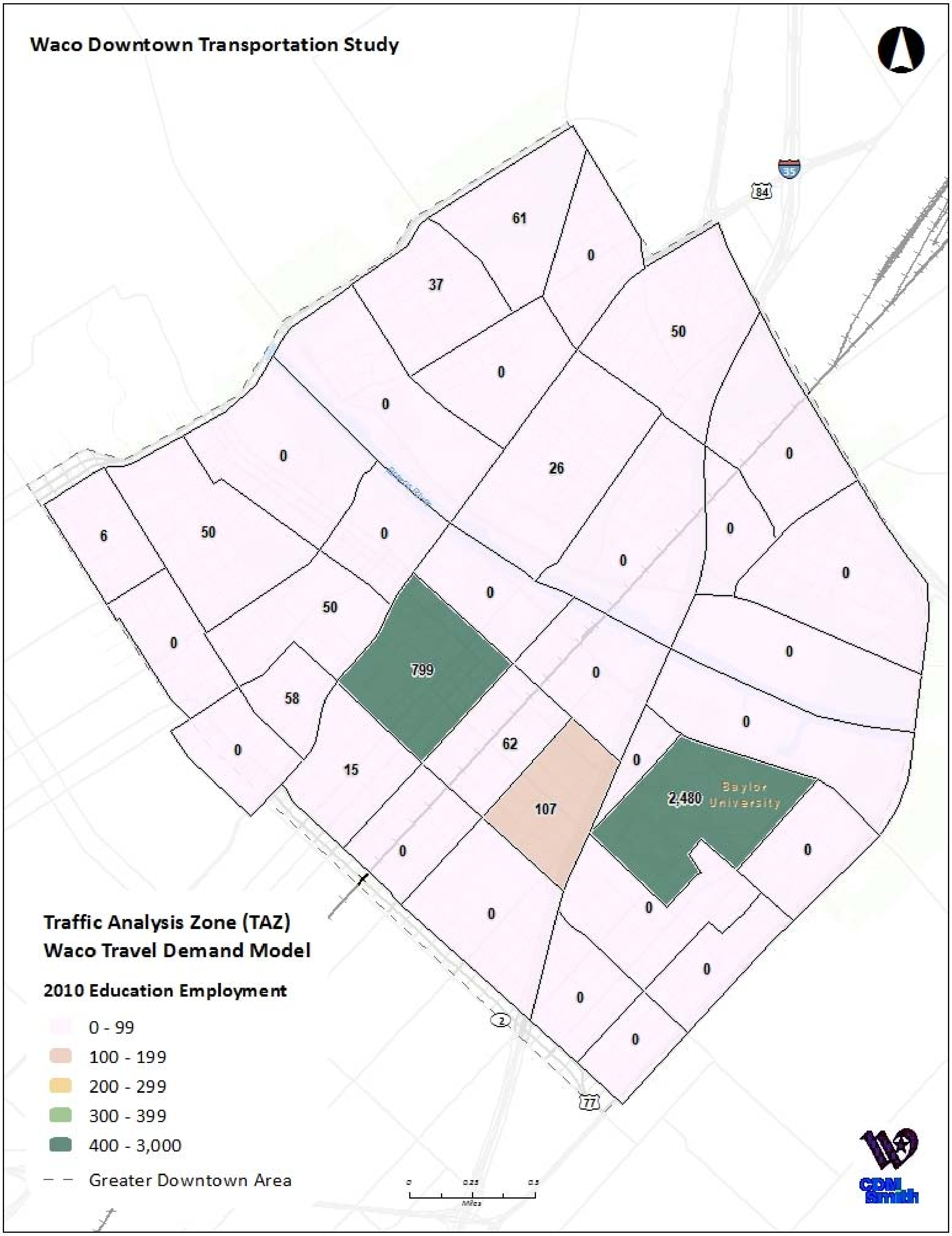


Figure 3-10: 2010 Educational Employment



3.2 Land Use

Land use by category is shown in an overall view in **The northeast** quadrant is shown in Figure 3-12. Corridors of interest are highlighted to show their proximity to land uses by category. Industrial sites along the river extend up to the Oak Farms plant and east of I-35 around Cottonbelt. Commercial areas are seen lining Elm and Waco Dr. and the old Paul Quinn campus is evident as an educational land use. Residential use is well distributed throughout the area. An interesting feature is the single family residential cluster between Waco Dr. and Elm St., with close proximity to commercial and industrial sites.

Figure 3-13 shows land use in the southeast quadrant. The area above the new Baylor stadium is predominantly single family residential, but includes a considerable amount of vacant land. Access to I-35 and to the two Bus 77 and Martin Luther King Jr. Blvd. corridors of interest is obvious.

The southwest quadrant is dominated by Baylor University and its associated student housing, as seen in Figure 3-14. Commercial use stretches along I-35 and also along LaSalle, with a commercial node at the intersection of Speight and 12th Street. Industrial uses are concentrated along LaSalle.

The northwest quadrant, shown in Figure 3-15, contains the core of the downtown area. Land uses present an interesting pattern, with a stripe of commercial and office use along the Washington and Franklin corridors of interest and a stripe of industrial use along the railroad tracks and the Mary St. corridor of interest.

In this quadrant both the predominance of single family residential uses, and the unusually high amount of interspersed vacant land is evident. The former site of the Parkside Village apartments is still shown as multifamily residential, but the buildings have been razed and the land is currently vacant.

Figure 3-11, and zoomed in to four sectors in **Figure 3-12**, **Figure 3-13**. **Figure 3-14**, and **Figure 3-15**.

Land use categories include:

- Single family residential
- Multifamily residential
- Commercial or office
- Industrial
- Government
- Park and open space
- Church
- Education
- Vacant or undeveloped
- Cemetery

The northeast quadrant is shown in Figure 3-12. Corridors of interest are highlighted to show their proximity to land uses by category. Industrial sites along the river extend up to the Oak Farms plant and east of I-35 around Cottonbelt. Commercial areas are seen lining Elm and Waco Dr. and the old Paul Quinn campus is evident as an educational land use. Residential use is well distributed throughout the area. An interesting feature is the single family residential cluster between Waco Dr. and Elm St., with close proximity to commercial and industrial sites.

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Figure 3-11: Land Use by Category

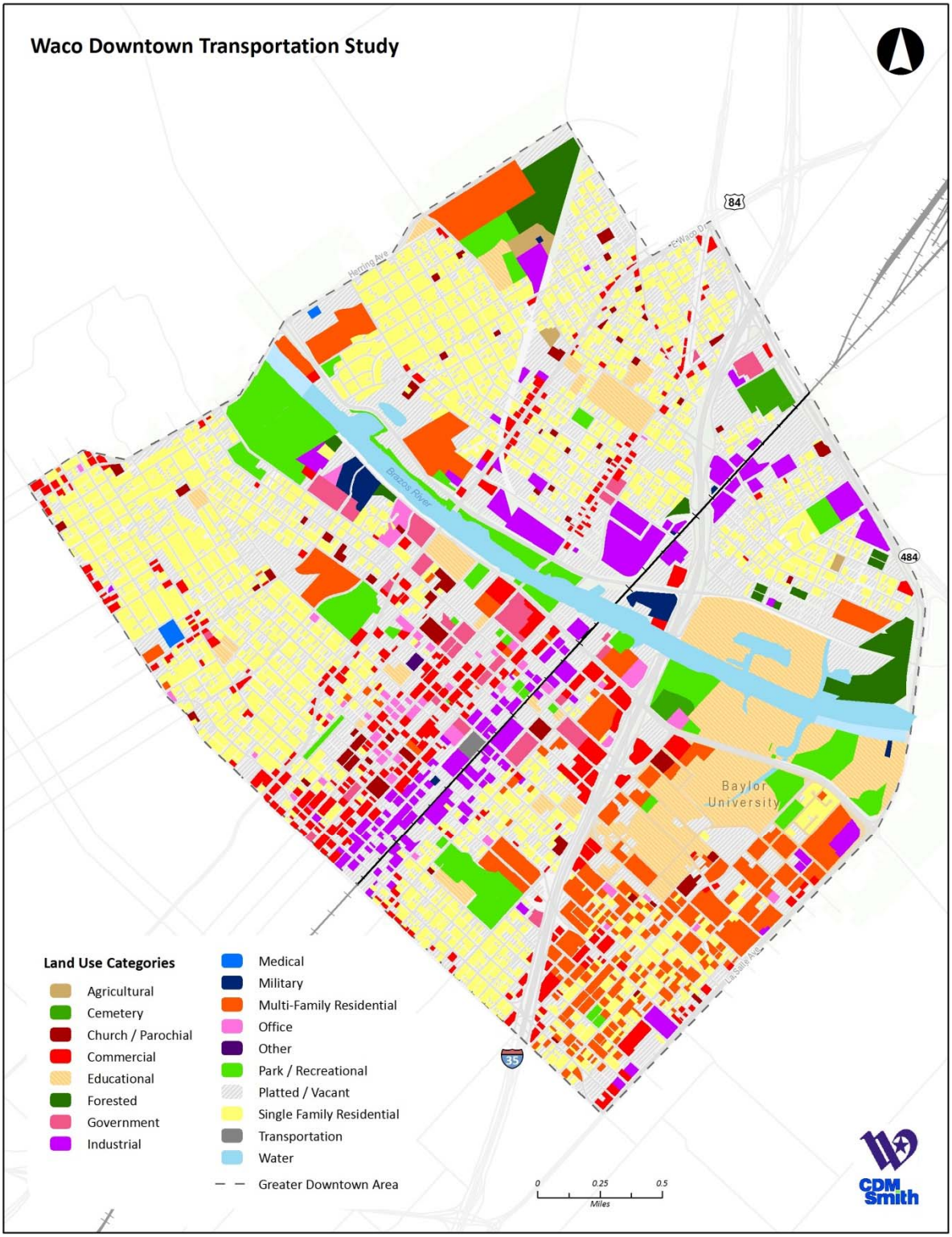


Figure 3-12: Land Use by Category in the North East Quadrant

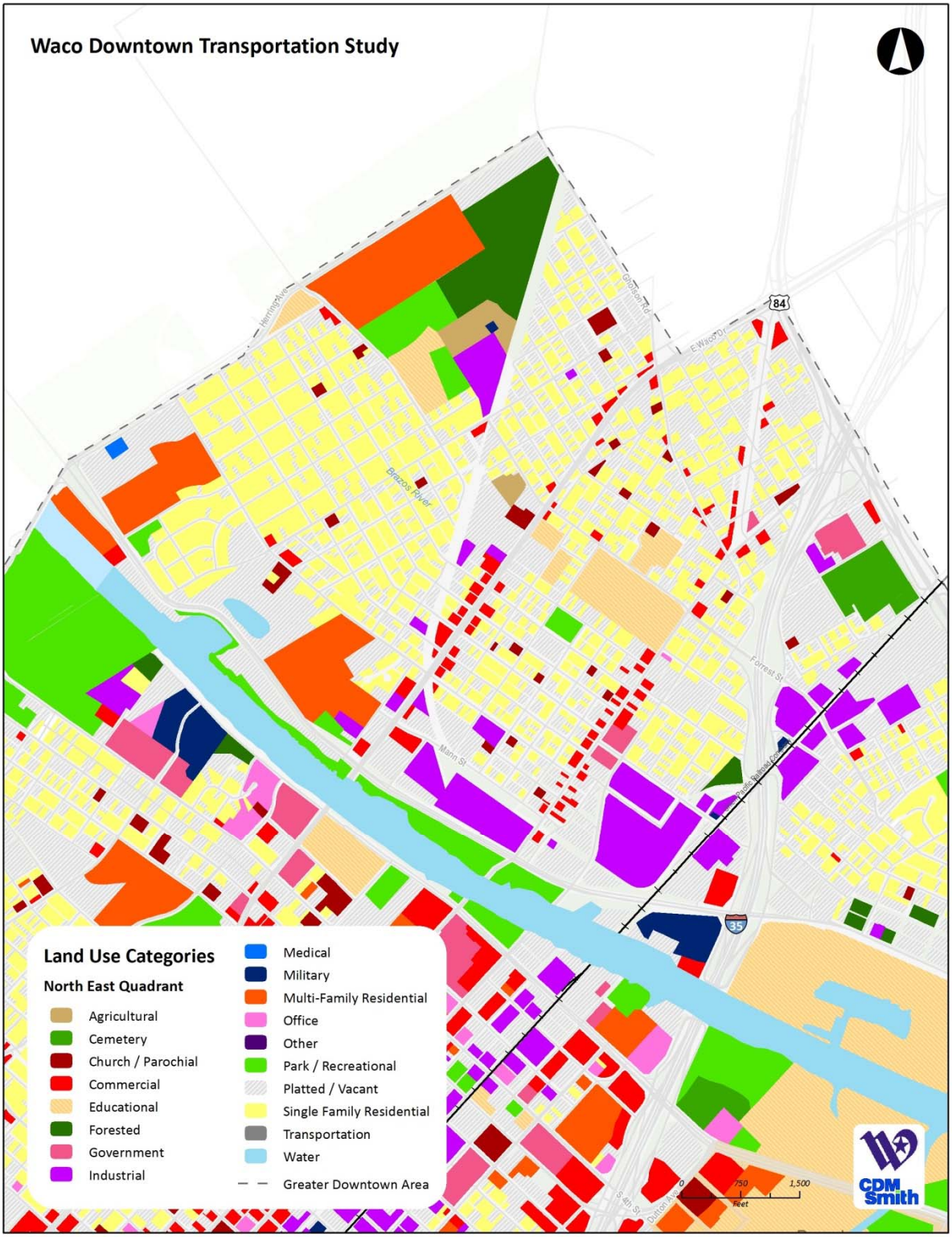


Figure 3-13: Land Use by Category in the South East Quadrant

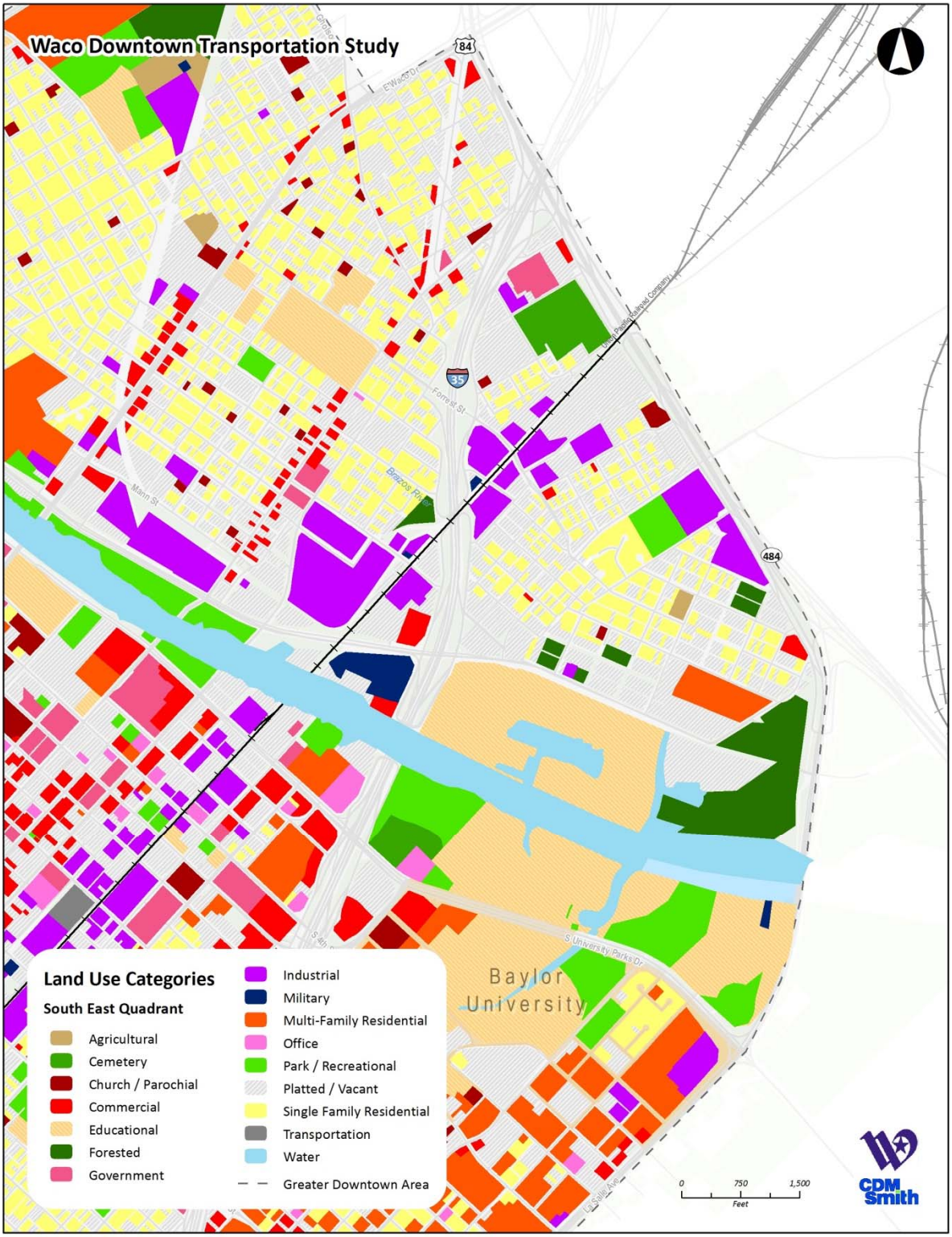


Figure 3-14: Land Use by Category in the South West Quadrant

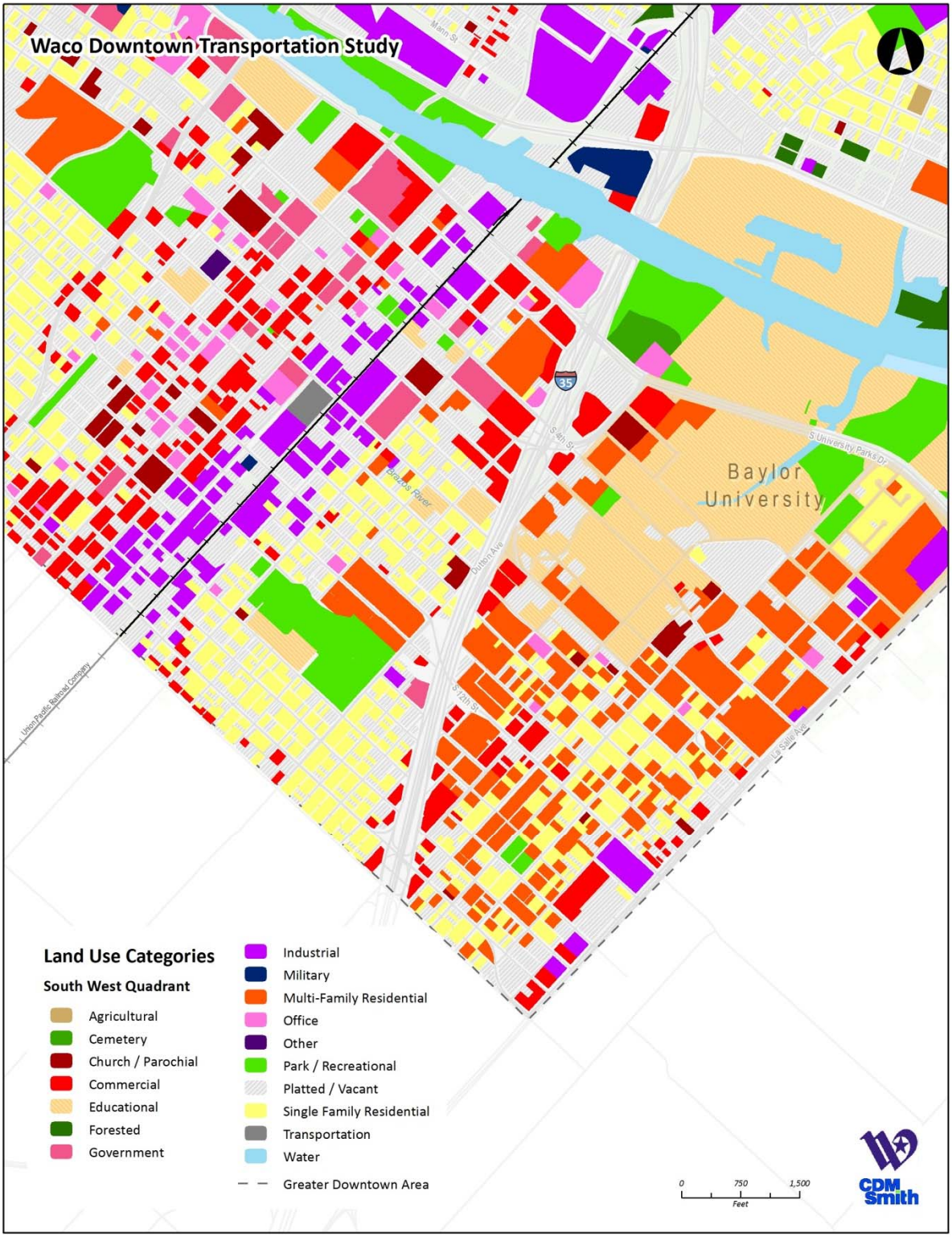
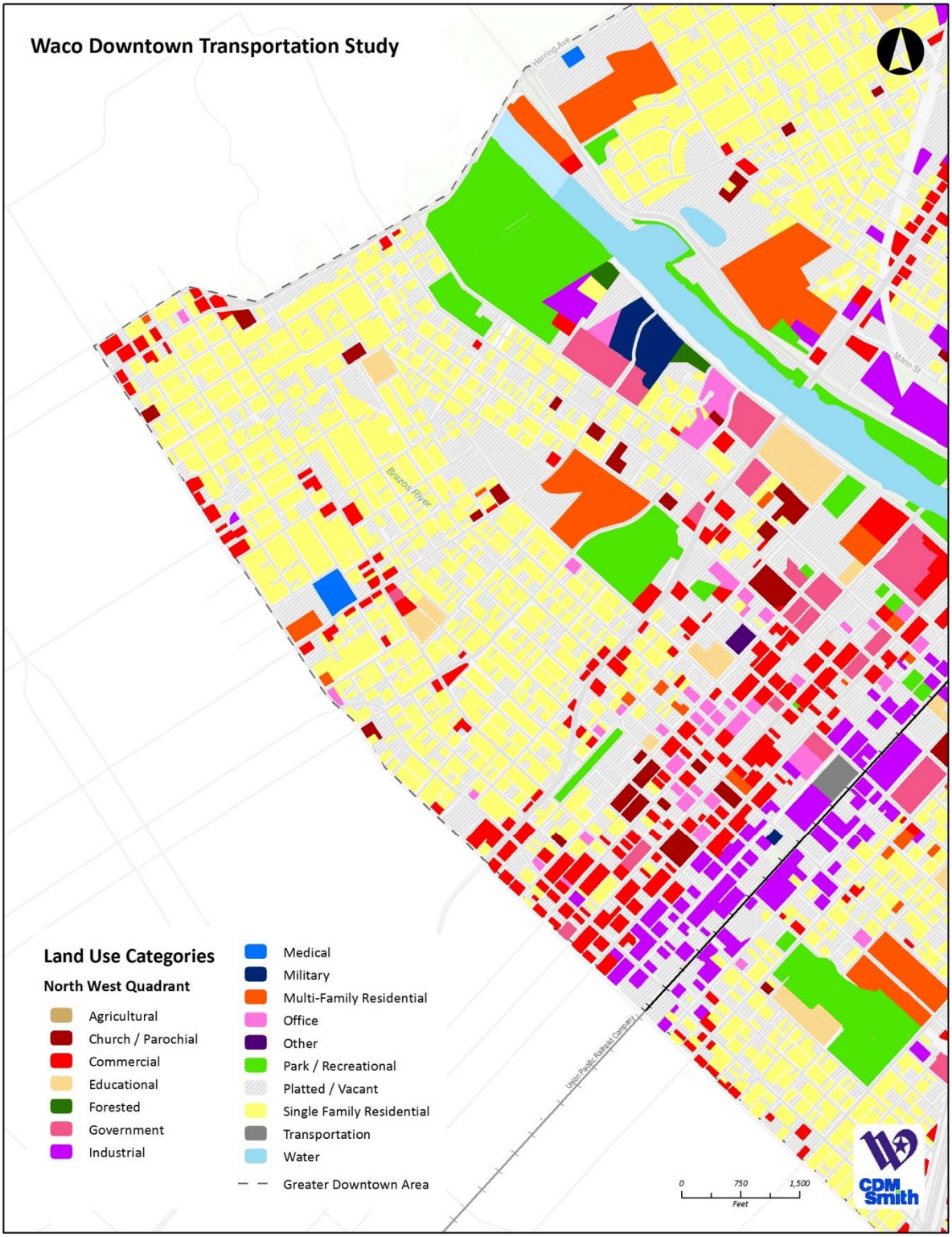


Figure 3-15: Land Use by Category in the North West Quadrant



On the whole, land uses in Greater Downtown Waco present an opportunity for transit connectivity and economic development. While the effects of Euclidean zoning are clearly evident and there are strong divisions between commercial areas and residential areas, there is still a distinct intermingling of land uses. Additionally, there is a considerable amount of vacant or undeveloped land (even when not counting parking lots, wide sidewalks, and wide medians) which is interspersed throughout the area. There appear to be many opportunities for siting new infrastructure, such as future WTS transit hubs and or bus shelters, without interfering with ongoing commercial uses on adjacent land.

3.3 Development

The previous sections of this report provide a wealth of information summarizing the demographics and current lay of the land for Greater Downtown Waco. After the massive tornado ripped through the heart of the city in 1953, the downtown area declined significantly from the vibrant life that was in place prior to the tornado. Many retail uses and business moved to the suburbs of the city. Since that time, the community has evolved and has slowly experienced revitalization in the downtown area over the past two decades.

The *2010 Imagine Waco* adopted plan set the stage that community leaders and residents want to see in the future. The *Imagine Waco* vision describes how Greater Downtown Waco will develop, function, and feel over the next 20 to 40 years. This vision is the guiding document for creating and prioritizing the strategies that will shape the future as a sustainable and important center of community and commerce.

Waco's public and private sector partners have initiated and supported the *Imagine Waco* vision, with renewed focus on Greater Downtown. These partners recognizes Greater Downtown's many assets – the river, proximity to the region's leading university, the diverse neighborhoods, committed advocates and a community enthusiastic to have a strong downtown core. These assets are a springboard for revitalization.

Developments within Greater Downtown Waco are briefly summarized in **Table 3-2**.

Table 3-2: Completed and Current Projects

Central Business District	
• Roosevelt building: Renovated as office space in 2008 this historic hotel is one of three original Hilton Hotels built by Conrad Hilton in the 1920s	• 800 Block of Washington: home to Baylor University School of Social Work
• Chamber building: Built in 2007 this is the First Green Chamber Building in America	• 220 S Fourth : Law Offices of Beard, Kultgen, Brophy, Bostwick and Dickson
• Austin Avenue Flats: Part of Waco Town Square Project this is one of Downtown Waco's first true mixed use developments	• 700 Austin: Clearview Data Center, next level of business continuity and disaster recovery services
• Wells Fargo: Wells Fargo demonstrated confidence in downtown Waco market by investing in new facility in 2009	• 518 Austin Ave: renovated offices of Sorrells and Gunn, builders and downtown developers
• Café Cappuccino: A favorite breakfast and lunch spot for Wacoans opened its second location downtown in 2008	• Historic Lofts At Waco High, affordable living in a beautifully done historic renovation
• 705 Austin: Home to Suit City and some of Austin Avenue's first downtown residential units	• 400 S Fourth: Waco Outreach Foundation
• 721 Austin: Home of Klassy Glass and Legacy Art Gallery and Café	• 808 Austin: On the Run, Waco's premier spot for running shoes and accessories
• 708 Austin: Former Gossip Bench renovated into luxurious Pura Vida Day Spa, Melange Boutique, and rooftop reception area.	• 211 Clay: Hotel Indigo, upscale boutique hotel
• 712 Austin: The Croft Gallery is a great local art gallery and gift shop, stop by on the first Friday of each month for new gallery openings.	• 8th & Franklin: Night Court, renovated bar
• 605 Austin: Former Woolworths Building renovated for Crossfit Gym and office suites on second floor.	• *615 Austin: Kress Building, currently under construction new restaurant space and residential
• 719 Austin: Metro Grill and Bar, great food, casual bar scene.	• *600 Franklin: Franklin Place, currently under construction (new retail, office and residential space)
• 420 Franklin: Barnett's Pub, Downtown Waco's only Irish Pub	• *711 Austin: Coming soon, city lofts and retail
• 601 Franklin: Praetorian Building (residential, retail and studio space)	• *714 Austin: Coming soon, Hippodrome Annex residential
River Square	**Baylor**
• Hilton Waco (renovation)	• Highers-Simpson Athletic Complex
• Waco Convention Center (renovation)	• Texas Sports Hall of Fame (SWC addition)
• Heritage Quarters (new residential)	• Texas Ranger Museum (Knox Hall done, other expansions announced)
• Outdoor Waco (new business)	
• River Square Center (shops, dining, office) – Roots Boutique 201 Collective (201 Second St.) – Oso's Yogurt – Olive Branch – Trojan Cork and Keg	
North Waco	**East Waco**
• Jubilee Theater	• 111 Peach Street (Central Fire Station)
• Intersection improvements at 15th and Colcord	• Rapoport Academy
• Family Health Center expansion	• *Lula Jane's Bakery (406 Elm)

Source: http://greaterdowntownwaco.com/invest-in-gdw/current-projects/

3.4 Traffic

3.4.1 Roadway Network

The roadway network is the one, most important aspect of the Greater Downtown Waco area's transportation system as it is relied upon to bear the burden of transporting the majority of people and goods throughout the area. The economic vitality in downtown is dependent on this roadway network making the area accessible for commuter, industrial, commercial, and other day-to-day uses. The transportation system should be viewed as an indispensable regional economic asset that requires constant reinvestment to protect the economic stability of the region. Maintenance of the roadway network is a critical factor in ensuring the safe and efficient travel of both residents and visitors alike.

This section briefly introduces the major roadways in the study area and addresses the general roadway characteristics such as number of lanes, functional classification, and direction of travel, posted speed and traffic control.

Interstate

- **I-35** – Traversing the study area in the north-south direction, I-35 is a limited access facility with eight travel lanes, four in each direction. This interstate is also known as the Jack Kultgen Freeway in Waco. I-35 also provides access to the Baylor University that is located adjacent to this freeway. It has a posted speed limit of 65 mph.

US Highways

- **US 84** – This is an east-west facility passing through the heart of downtown and then northeast into the suburb of Bellmead. This facility is also known as Waco Drive in the Greater Downtown Waco area. Within the study area, the number of lanes ranges from 4 to 6 lanes. It has a posted speed limit 40 mph.

- **US 77 Business** – The highway is the old alignment of US 77 through Waco and was formerly signed as Loop 491. The section of the highway from Loop 484 to US 84 is a freeway, making it the only business route in Texas that is a freeway.

Other Major Roadways

- **Lake Brazos Parkway** – This arterial runs east-west connecting Business 77, I-35, US 84, and Lake Shore drive. It is a six lane divided roadway with grassy median with three lanes each direction. It has a posted speed limit of 40 mph. Part of this roadway is also knows as Martin Luther King Jr. Blvd.

- **Herring Avenue** – This arterial runs north-south from 18th Street to Gholson Road within the study area. It is a two-way four-lane road for majority of the portion. It has a posted speed limit of 40 mph.**Washington Avenue** – This one-way four-lane arterial runs southwards from South Lake Brazos Pkwy to 18th Street where it terminates within the study area. It has a posted speed limit of 40 mph. It extends north of the river as Elm St, a two-way two-lane arterial. **University Parks Drive** – This is the only arterial in our study area that connects Baylor University to the downtown. It is a six-lane divided roadway with a large median.

- **Franklin Avenue** – This one-way four-lane arterial runs northwards from 18th Street to South Lake Brazos Parkway where it terminates within the study area. It has a posted speed limit of 40 mph. It extends north of the river as Taylor St, a two-way two-lane arterial.**4th Street** – It is a one-way arterial which runs westwards from I-35 to Waco Dr with three lanes, and from Waco Dr to Herring Ave with 2 lanes. It has a bicycle lane from I-35 to Jefferson Ave. It has a posted speed limit of 40 mph.

- **5th Street** – It is a one-way two-lane arterial which runs eastwards from Herring Avenue to I-35. Its bicycle lane runs from Barron Ave almost to I-35. It has a posted speed limit of 40 mph.

- **17th Street** - This is a one-way arterial generally with four lanes, but with 3-lane sections west of Waco Dr, east of Baylor Ave, and in a short section between Washington Ave and Austin Ave. Within the study area, it runs westwards from US 77 Business to West Ave where it merges into 18th St. It has a posted speed limit of 40 mph.

- **18th Street** - This is a one-way arterial which is generally four lanes, but with 3-lane sections west of Waco Dr and east of I-35. Within the study area, it runs eastwards from Lyle Avenue to I-35 where it terminates. It has a posted speed limit of 40 mph.

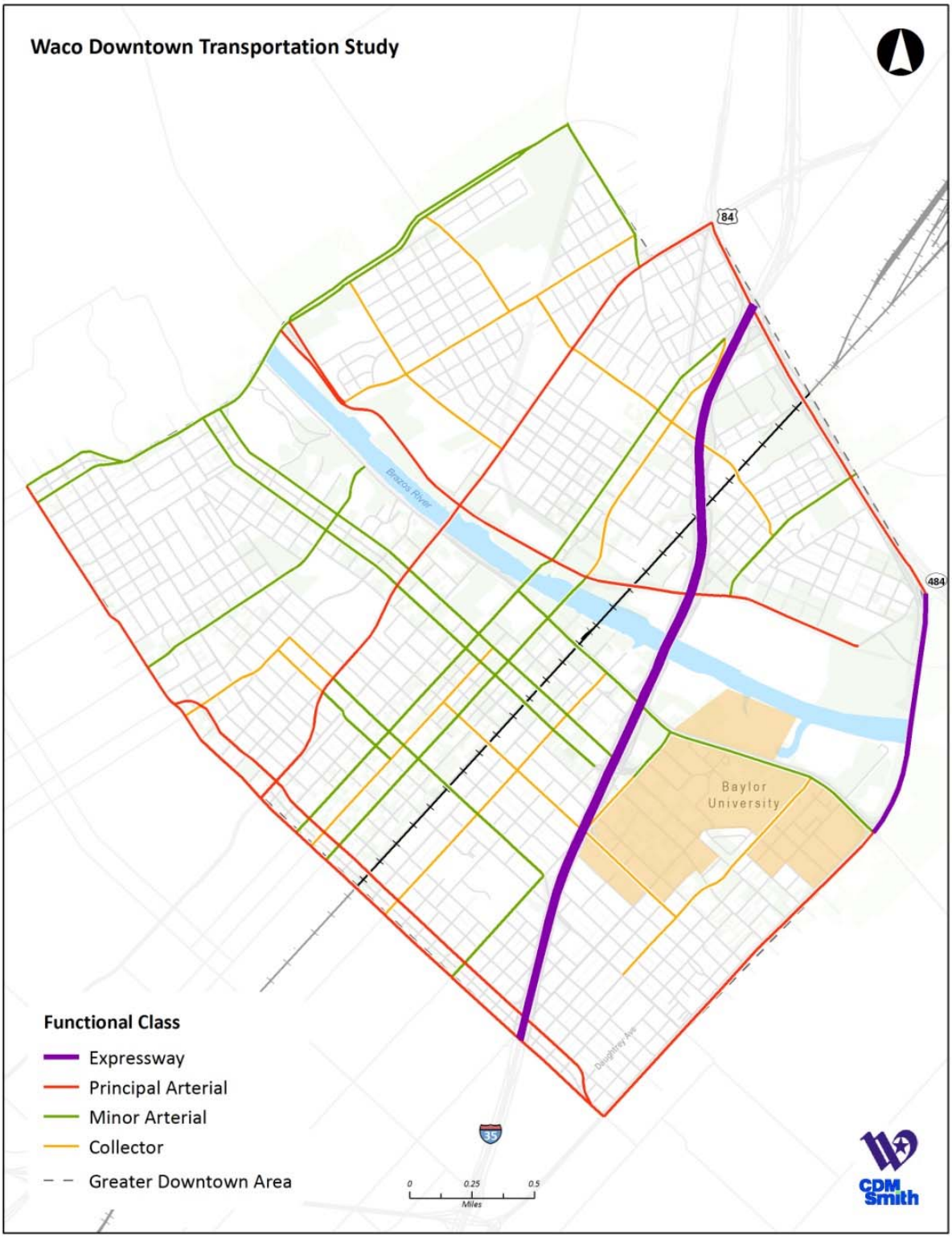
Functional Classification

Functional classification is the process by which roadways are grouped into categories according to the character of service they are intended to provide. Individual roads do not serve travel independently; most travel involves movement through a network of roads. Functional classification examines the channelization of traffic throughout a roadway network and defines the role that each roadway plays in serving traffic flow.

Two important variables define roadway function: mobility and access. At one end of the spectrum, freeways provide the highest level of mobility and the lowest level of access, serving long distance trips with minimal access to abutting land uses. Local streets, on the other hand, have numerous driveways and connections to provide local access to businesses and residences and are not intended for use over long distances. These classifications may change over time, as the function of the roadways change to serve different land uses or transportation facilities. The functional classification of the study area roadways are shown in **Figure 3-16.** The classification was based on the 2012 Waco Thoroughfare Plan. There are five classes within the study area:

- Expressways
- Principal Arterials
- Minor Arterials
- Collectors
- Local Streets

Figure 3-16: Functional Classification



Expressways are high speed (greater than 45 mph), controlled access thoroughfares with no pedestrian access and grade separated interchanges. This thoroughfare classification includes a range of roadway types such as interstates, freeways, toll ways, and parkways, with varying transportation characteristics. These facilities usually do not require context-sensitive solutions and are maintained by the Texas Department of Transportation (TxDOT). I-35 is the only expressway in the study area.

Principal and minor arterials function to facilitate higher speeds and regional mobility. The minor arterials provide greater local accessibility than principal arterials. Some principal arterials in the study area include 17th Street, Waco Drive (US 84), Martin Luther King Jr. Drive (Lake Brazos Pkwy) and Loop 484. Washington Avenue, Franklin Avenue and South University Parks Drive are some of the minor arterials in the study area.

The system of **collectors** provides accessibility to, from, and within local communities, activity centers, and to other roadway classifications. Local streets serve the main purpose of providing accessibility and the majority of the trips start and end in a local street. As shown in Figure 3-16, local streets are the predominant classification present in the Greater Downtown Waco area.

Number of Lanes

The number lanes in the study area range between a total of six lanes to two. The majority of the Greater Downtown Waco roadways have two-lanes with one lane in each direction. The distribution of lanes on each roadway is illustrated in the Figure 3-17.

Direction of Travel

The majority of roadways in the study area are two-way as seen in the **Figure 3-18**. The paired roadways of 17th and 18th, 4th and 5th, and Franklin Avenue and Washington Avenue act as one-way couplets in Greater Downtown Waco . One-way street systems maximize traffic capacity and also minimize the number of potential traffic stops. Increased capacity is achieved by eliminating left turn conflicts. The number of stops is reduced through the ability to more efficiently time traffic lights to provide progression in the one direction traffic is traveling.

Posted Speed

The Posted speed limits range between a high of 65 mph, which is only present on the I-35 expressway and 10 mph, which is experienced only within the Baylor University campus area. As most roadways in Greater Downtown Waco are local streets, the predominant speed limit is 30 mph, as shown in **Figure 3-19**.

Traffic Control

Traffic control describes the types of traffic control utilized to control competing flows of traffic at at-grade intersections. Greater Downtown Waco has 483 at-grade intersections. There are 86 intersections that are controlled by traffic signals, with the remainder controlled by stop signs and yield signs. Out of the 397 stop and yield signs, 5 are yield signs. Out of the 392 stop signs, there are 181 one-way, 189 two-way, 4 three-way, and 18 four-way stop signs. **Figure 3-20** and **Figure 3-21** illustrate the distribution of these traffic control devices in Greater Downtown Waco .

Figure 3-17: Number of Lanes

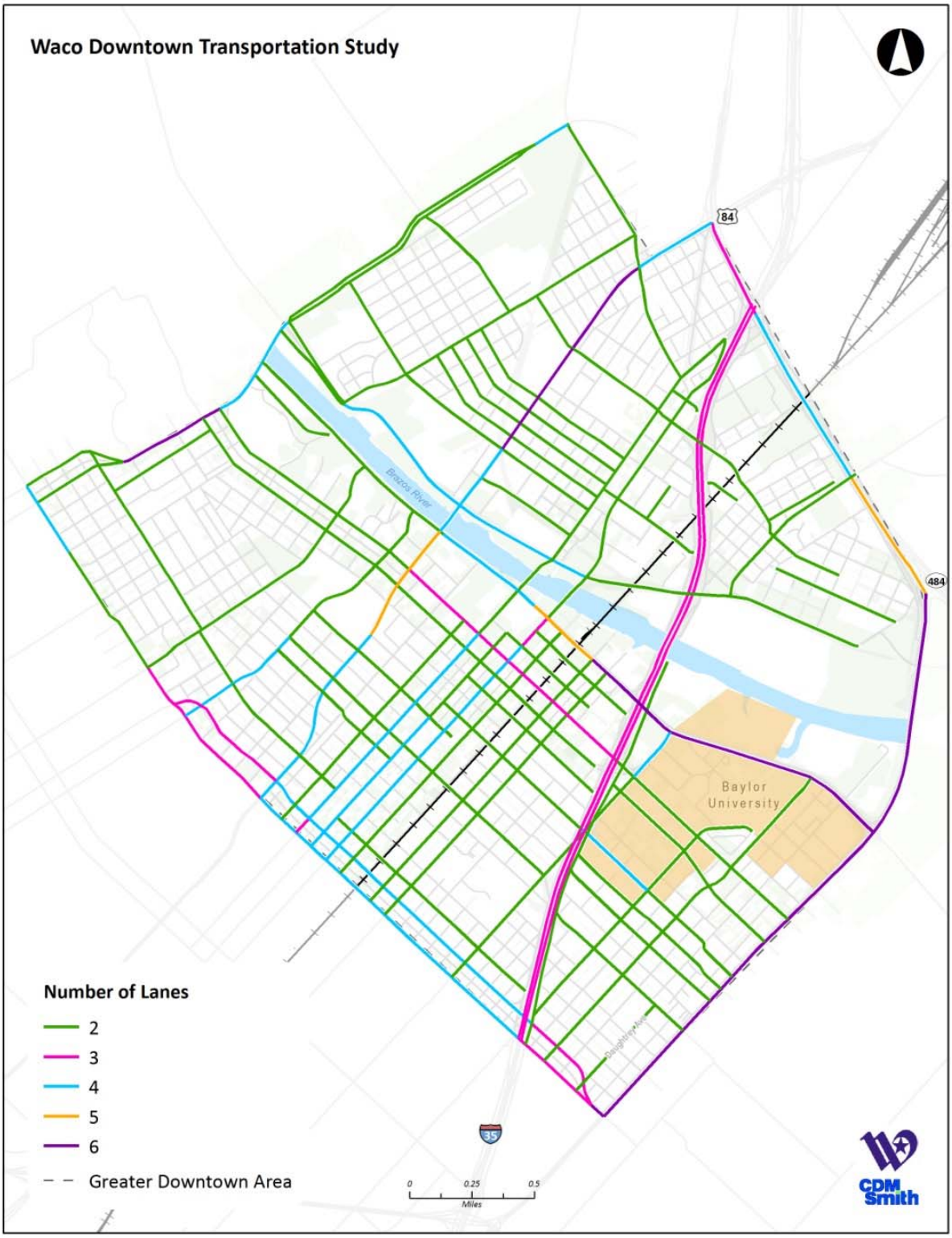


Figure 3-18: Direction of Travel

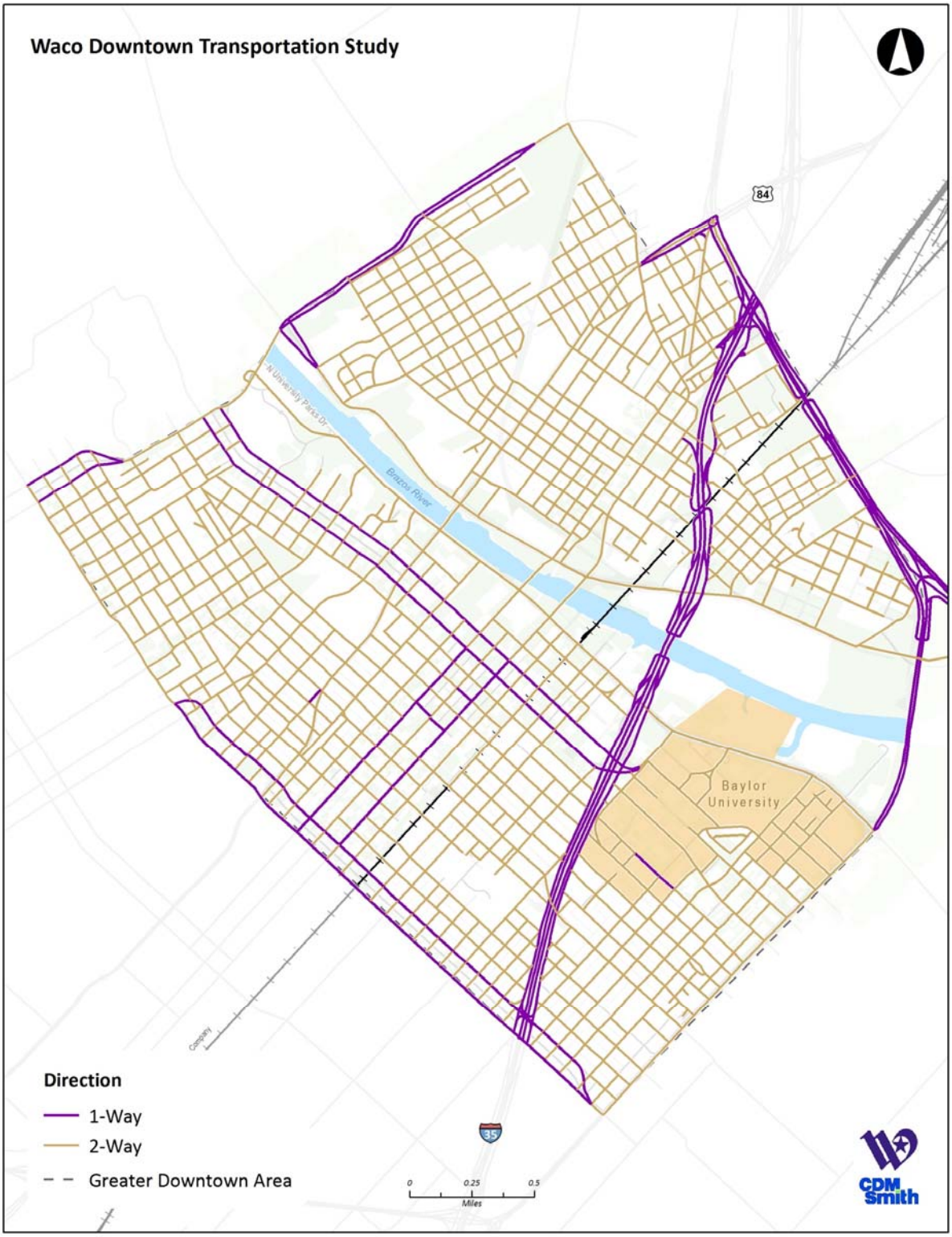


Figure 3-19: Speed Limit

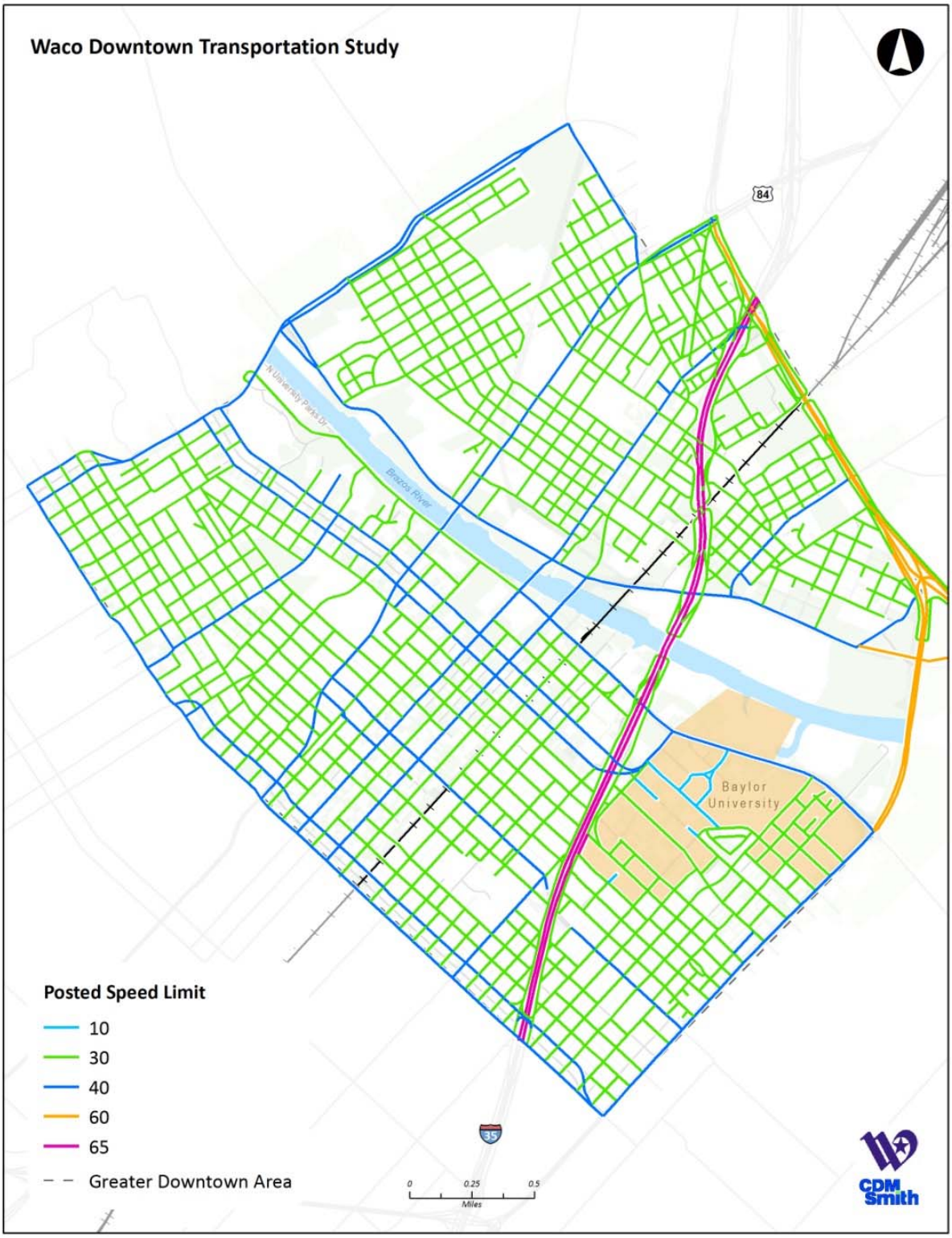


Figure 3-20: Traffic Control

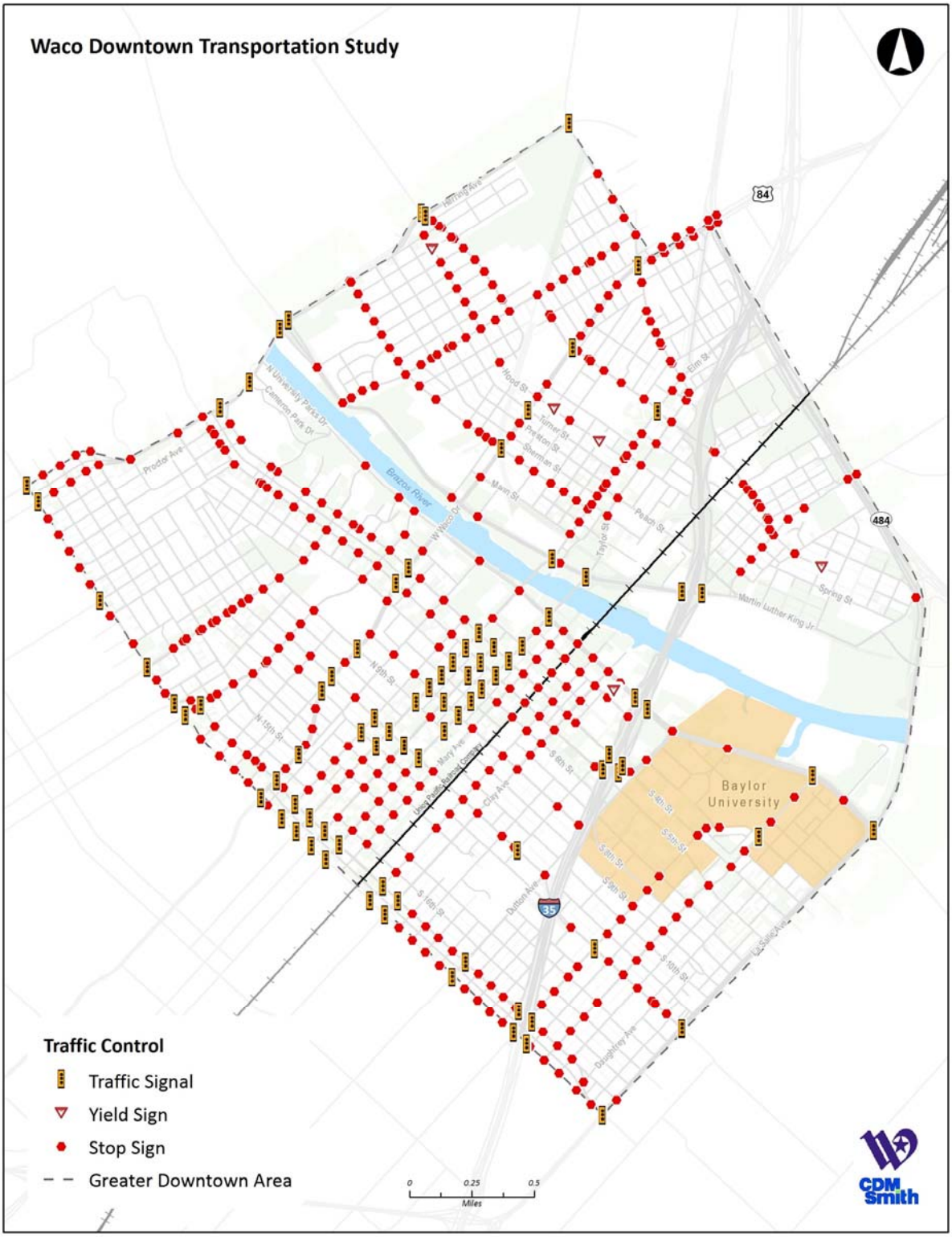


Figure 3-21: Traffic Control – Stop Sign

3.4.2 Traffic Conditions

Daily Traffic Volumes

The 2010 and 2012 annual average daily traffic (AADT) volumes for Greater Downtown Waco were obtained from Waco MPO and supplemented by data from Google Earth Pro. The location with the highest daily traffic volume is on I-35 between Lake Brazos Pkwy. and South University Parks Drive which recorded an annual daily traffic of about 93,000 vehicles. Waco Drive (US 84), recorded the next highest traffic volume with about 22,000 vehicles per day. On South University Parks Drive, between Bagby Avenue and Dutton Avenue, about 20,000 vehicles were recorded in 2010 while 18th and 17th Streets followed suit.

The **Figure 3-22** gives an overall picture of how vehicular traffic is distributed in the study area. Traffic is also high on parts of 17th Street, South University Parks Blvd., and Loop 484 with each recording between 10,000 and 20,000 vehicles per day. Apart from these two categories, most of the roadways in Greater Downtown Waco fall within a daily traffic range of 2,500 to 10,000.

Level of Service

Congestion on a roadway can be indicated by its level-of-service. Level-of-service (LOS) is a qualitative measure of traffic operations, ranging in values from LOS A to LOS F, and is based upon the ratio of a roadway's traffic volume to the roadway's capacity. Transportation planners derive LOS for a roadway by examining its traffic volumes, operating capacity (the number of vehicles per hour the roadway can handle without creating congestion), and vehicle speeds. When the roadway traffic volume exceeds the capacity of the roadway, the facility loses its ability to efficiently move traffic and becomes congested. **Figure 3-23** describes the conditions a driver would experience on a roadway given a particular level of service rating. These levels of congestion range from uncongested traffic traveling at high speeds (LOS A) to severely congested traffic traveling at low speeds (LOS F).

The capacity for each roadway in Greater Downtown Waco was calculated based on the regional travel demand model developed by the MPO in 1997. The AADT recorded in the recent years was divided by the capacity to calculate a ratio to estimate the perceived LOS for the study area roadways. **Figure 3-24** illustrates how the different level of service definitions apply to the study area. In general, most of the roadways have a level of service not greater than C except I-35, Waco Drive (US 84), Martin Luther King Jr. Drive (Lake Brazos Pkwy), and 4th and 12th Streets. 4th and 12th Streets have the worst level of service being with LOS F, and I-35 and Waco Drive have LOS of D and E respectively.

Figure 3-22: Daily Traffic Volume

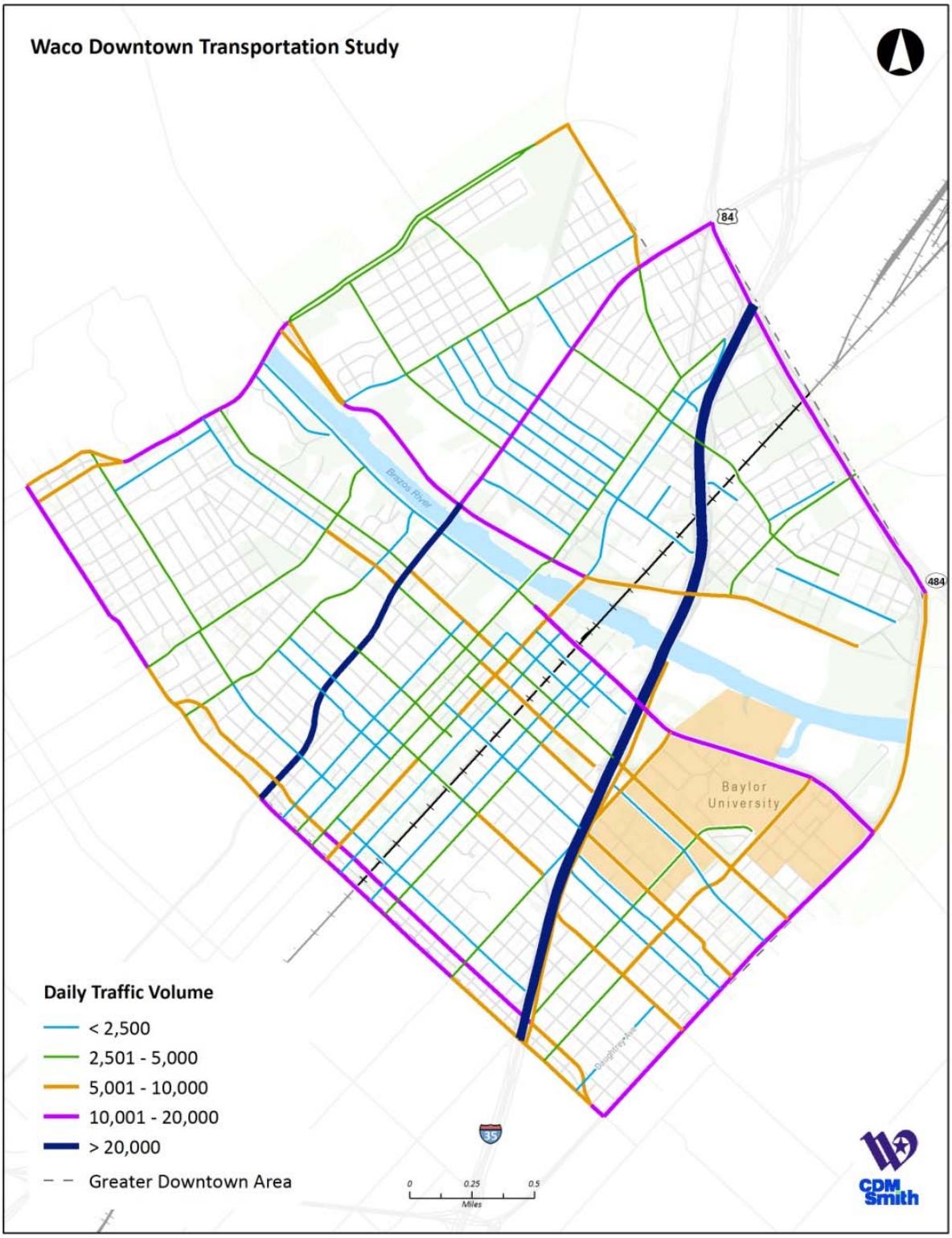
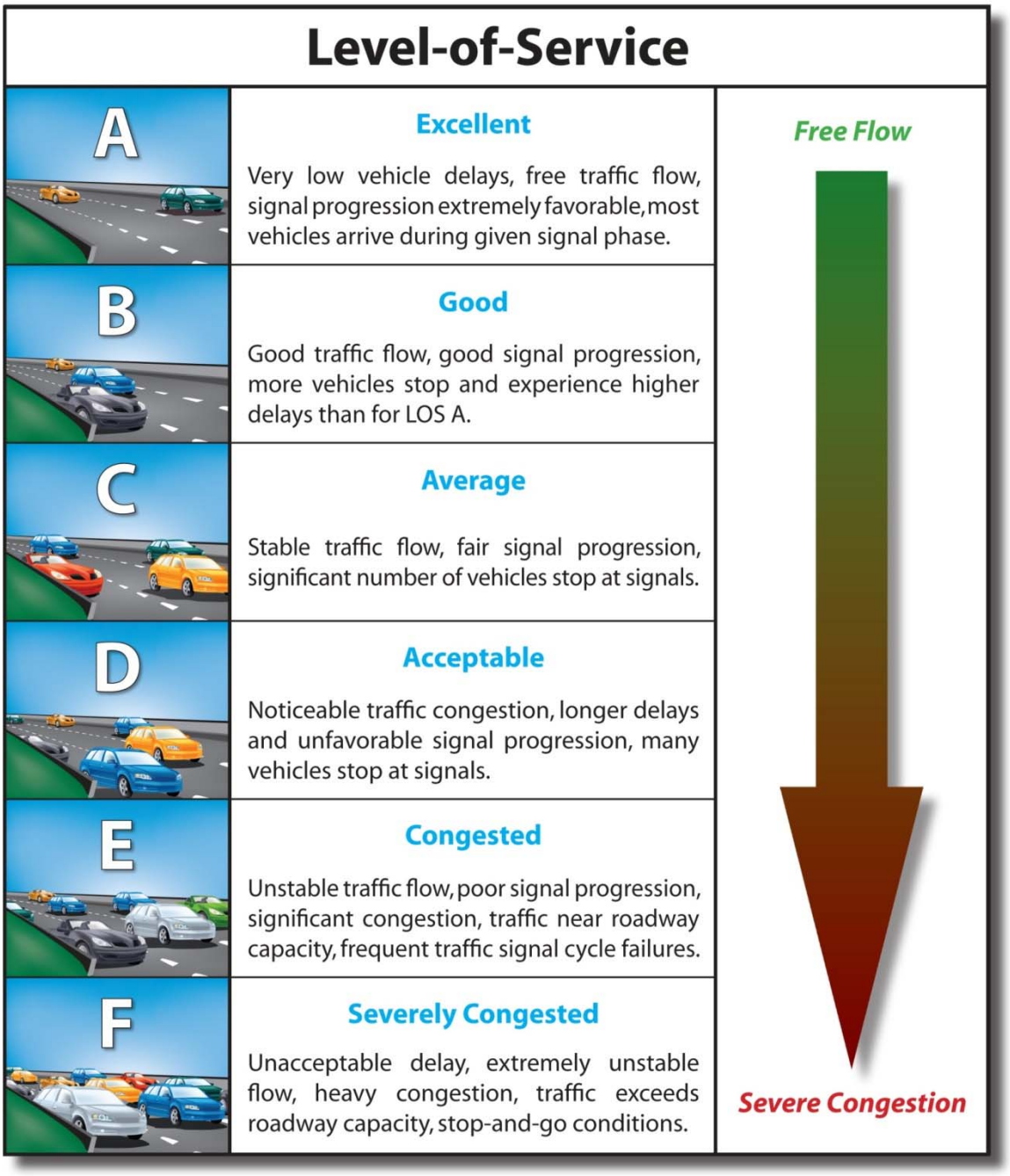
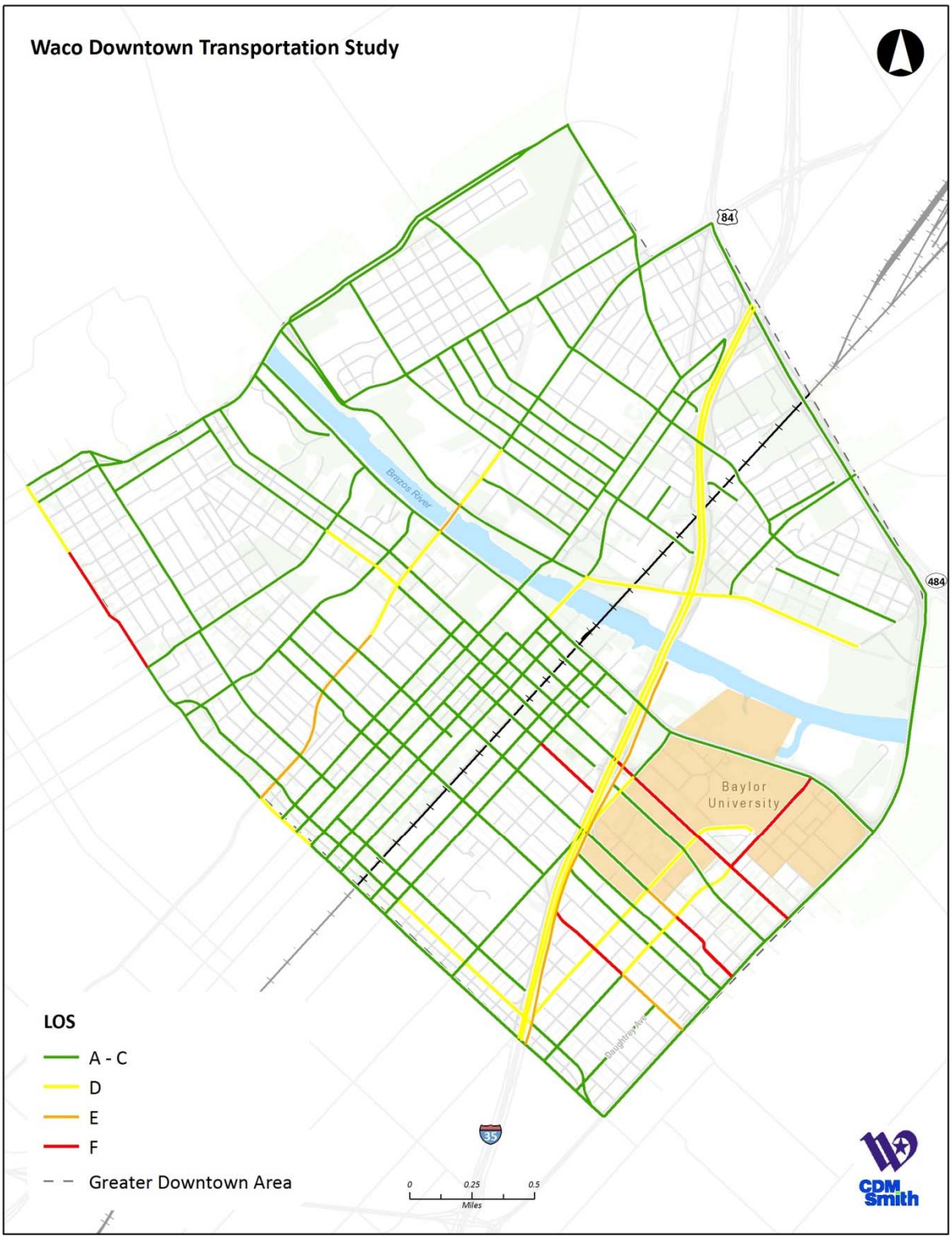


Figure 3-23: Level of Service Definition



Source: Wilbur Smith Associates, 2007

Figure 3-24: Level-of-Service



Capacity Utilization

Volume to capacity ratios (V/C) of roadways also give an indication of how the capacity of a roadway is being utilized. Volume to capacity ratio is the measure of total volume of vehicles passing a section on a roadway in an hour relative to the maximum volume the roadway section can accommodate in that hour. The annual average daily traffic (AADT) was used to calculate the utilization of each roadway in Greater Downtown Waco. As illustrated in **Figure 3-25**, the majority of the roadways in the study area are utilized less than 50 percent of its capacity. In the core downtown area, only the 4th and 5th Street has been utilized to 75% of its capacity. The utilization shows that majority of the downtown roads are underutilized and have the potential to accommodate more traffic.

3.4.3 Safety

Crash analysis was conducted on all corridors within the study area to determine high crash locations and locations with fatalities. Crash data was provided by TxDOT from their Crash Records Information System (CRIS). Data for three consecutive years (2010-2012) were analyzed.

A total of 2,787 crash incidents were recorded for the three-year period in Greater Downtown Waco . Among these, 11 were fatal and 1,026 were injury-related crashes. The **Table 3-3** and **Figure 3-26** identify the top 20 locations where crashes occurred in Greater Downtown Waco. The highest number of crashes is at the intersection of 17th Street and I-35. The intersection of 18th Street and Franklin Avenue had the next highest number of crashes. A high number of crashes were also witnessed on I-35 and 18th Street.

Table 3-3: High Frequency Crash Location

Rank	No. of Crashes	Location
1	111	I-10 and 18th St
2	71	Franklin Ave and 18th St
3	68	Franklin Ave and 17th St
4	63	I-35 N Frontage Rd and 5th St
5	37	US 84 (Waco Dr) and 5th St
6	36	I-35 N Frontage Rd and S University Parks Dr
7	35	US 77 Bus. (La Salle Ave) and S University Parks Dr
8	34	US 84 (Waco Dr) and 18th St
9	31	Burnett Ave and 18th St
10	29	I-35 N Frontage Rd and S MLK Jr Blvd (Lake Brazos Pkwy)
11	27	Herring Ave and 4th St
12	26	US 84 (Waco Dr) and 9th St
13	25	Wood Ave and 18th St
14	24	US 84 (Waco Dr) and Garrison St
15	23	Gurley Ave and 18th St
16	22	Herring Ave and 18th St
17	21	US 84 (Waco Dr) and 15th St
18	20	Bosque Blvd and 4th St
19	19	Colcord St and 4th St
20	17	US 84 (Waco Dr) and 6th St

Figure 3-25: Capacity Utilization

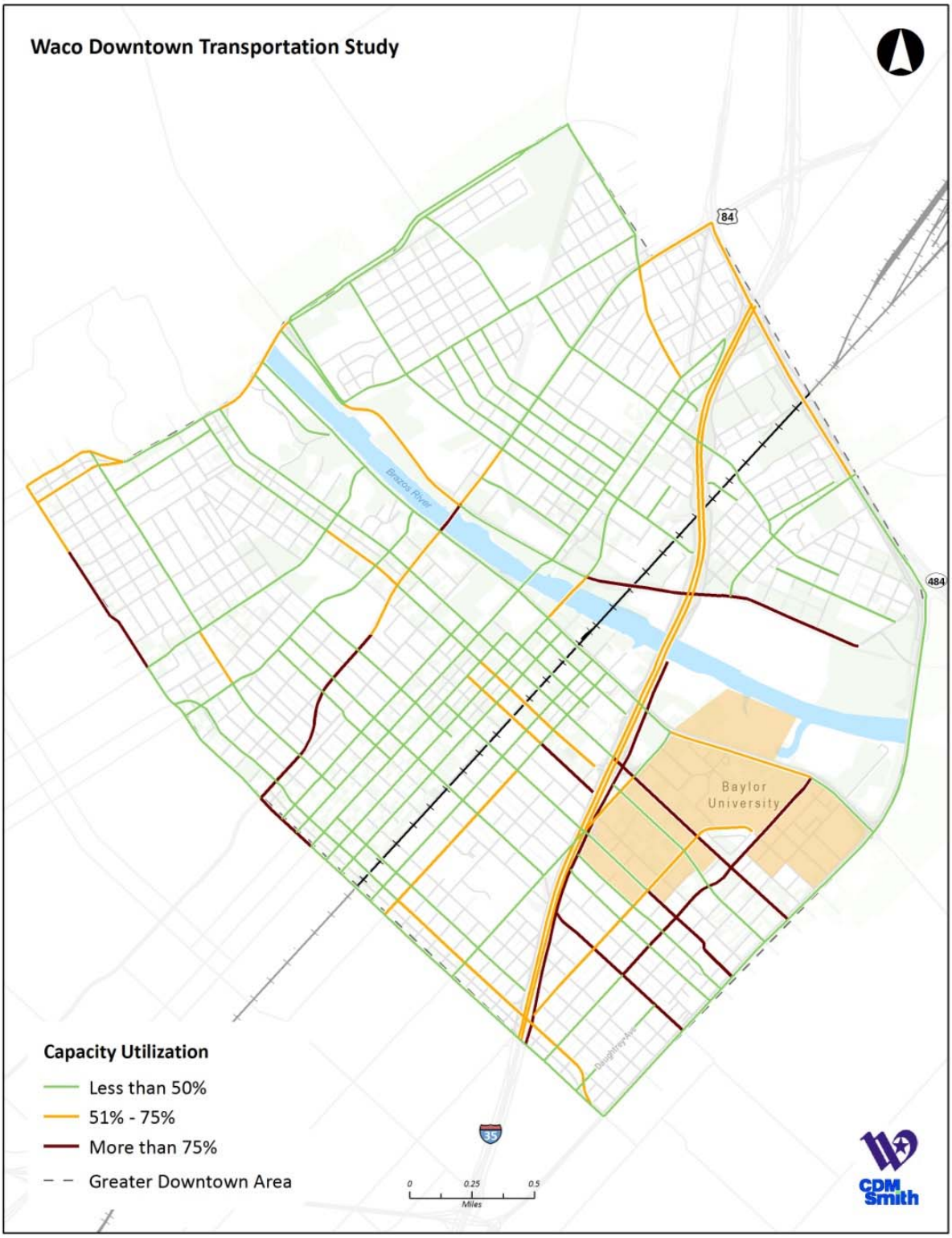
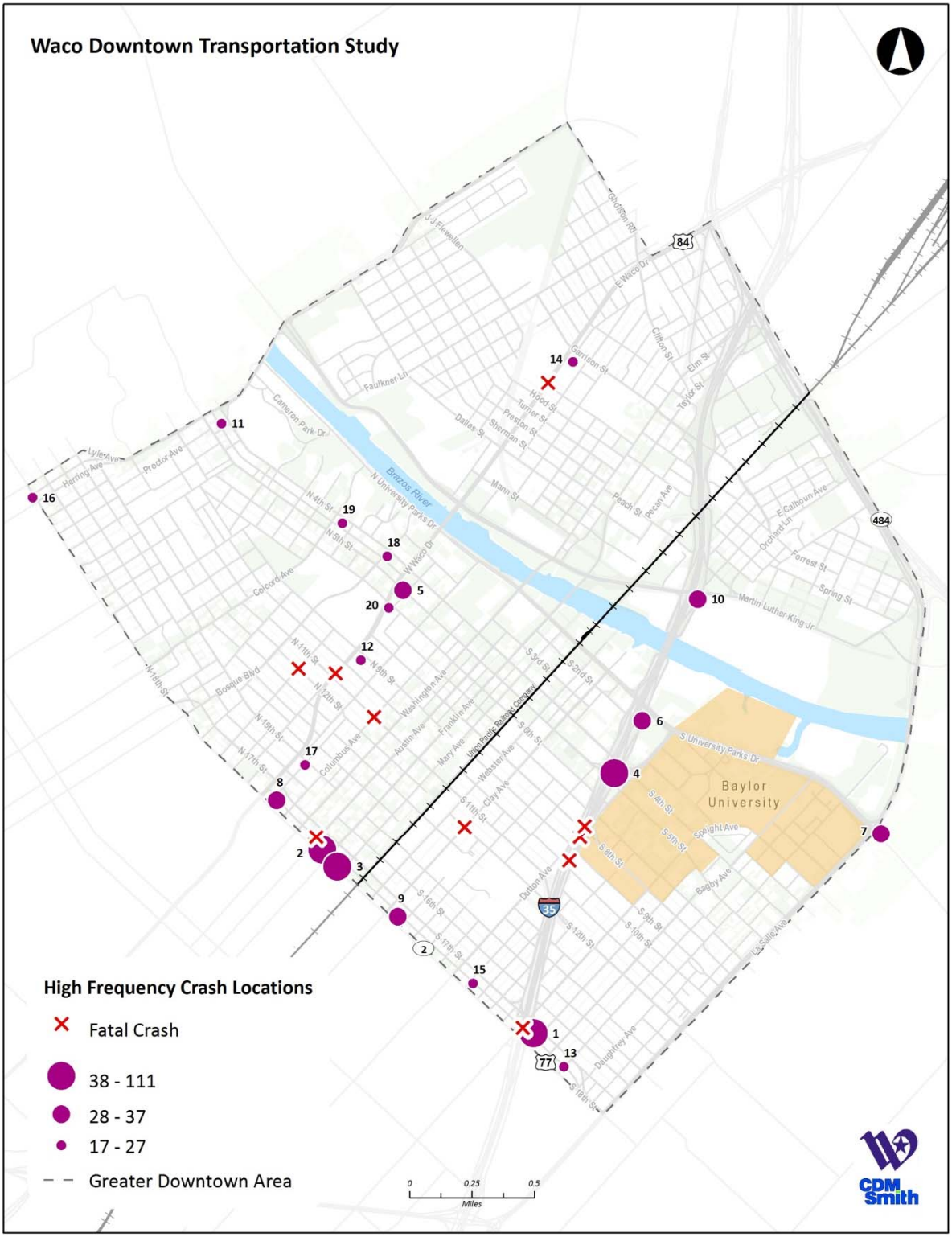


Figure 3-26: High Frequency Crash Locations



In the three year period, there were 49 crashes in Greater Downtown Waco that involved bicyclists and pedestrians. There were a total of three fatalities with two occurring along the I-35 frontage roads and one on intersection of US 84 and 11th Street. There were 37 injury related crashes. (**Figure 3-27)**

3.4.4 Railroad

Greater Downtown Waco is served by a Class I railroad owned by Union Pacific (UPRR). As illustrated in **Figure 3-28**, the only active railroad runs almost in the center of the downtown area north-south. This railroad is operated by Union Pacific Railroad. Pulled railroads exist in the northwestern part of the study area while inactive railroads run almost parallel to the active railroads. With the exception of 17th, 18th, and the Martin Luther King Jr. Blvd over-crossings, all other streets in Greater Downtown Waco are at-grade when crossing the UPRR. A total of 14 at-grade rail road crossings are located in the study area.

3.4.5 Network Deficiencies

Convenient traffic access and circulation is critically important to the livability and the economic success of the downtown. In addition to accommodating private vehicle traffic, the street system also functions as the support framework for bus services, goods movement, and bicycle and pedestrian travel in the downtown area. The existing traffic network accommodates the needs of Greater Downtown Waco very effectively, but still suffers from a number of network deficiencies, which are discussed below.

Freeway Barrier

- I-35, which traverses the downtown, creates an unnatural break in the downtown city scape and traffic circulation. 17th, 18th, 11th, 4th, 5th, Martin Luther King Jr. Blvd., Forest Street, and US 77 act as the connectors between the east and western side of Greater Downtown Waco . This would require motorists to have prior roadway knowledge and to make a few extra turns to make the connection.

Natural Barrier

- The Brazos River, which flows through downtown Waco, acts as a natural barrier for downtown traffic circulation. The northern and southern portion of Greater Downtown Waco is connected by five bridges, includes I-35. The old suspension bridge is open for pedestrian traffic only, and one active and one inactive railroad bridge are also present. The river limits the number of street crossings and creates disruption in the traffic circulation.

Railroad Crossings

- Rail lines through the Downtown, and elsewhere in the city, create a number of problems. The rail traffic results in traffic safety and traffic delay problems at street crossings, as well as noise impacts. The traffic delays impact the transit service schedule reliability, as well as traffic. While there are rail freight customers along these lines in the city, few if any are located in the downtown area. The UPRR railroad corridor limits the number of street crossings, and train movements create delays for buses and cars. With the exception of 17th, 18th, and the Martin Luther King Jr. Blvd. over-crossings, all other streets in Greater Downtown Waco that cross the UPRR are at-grade.

Figure 3-27: Bicycle and Pedestrian Crashes

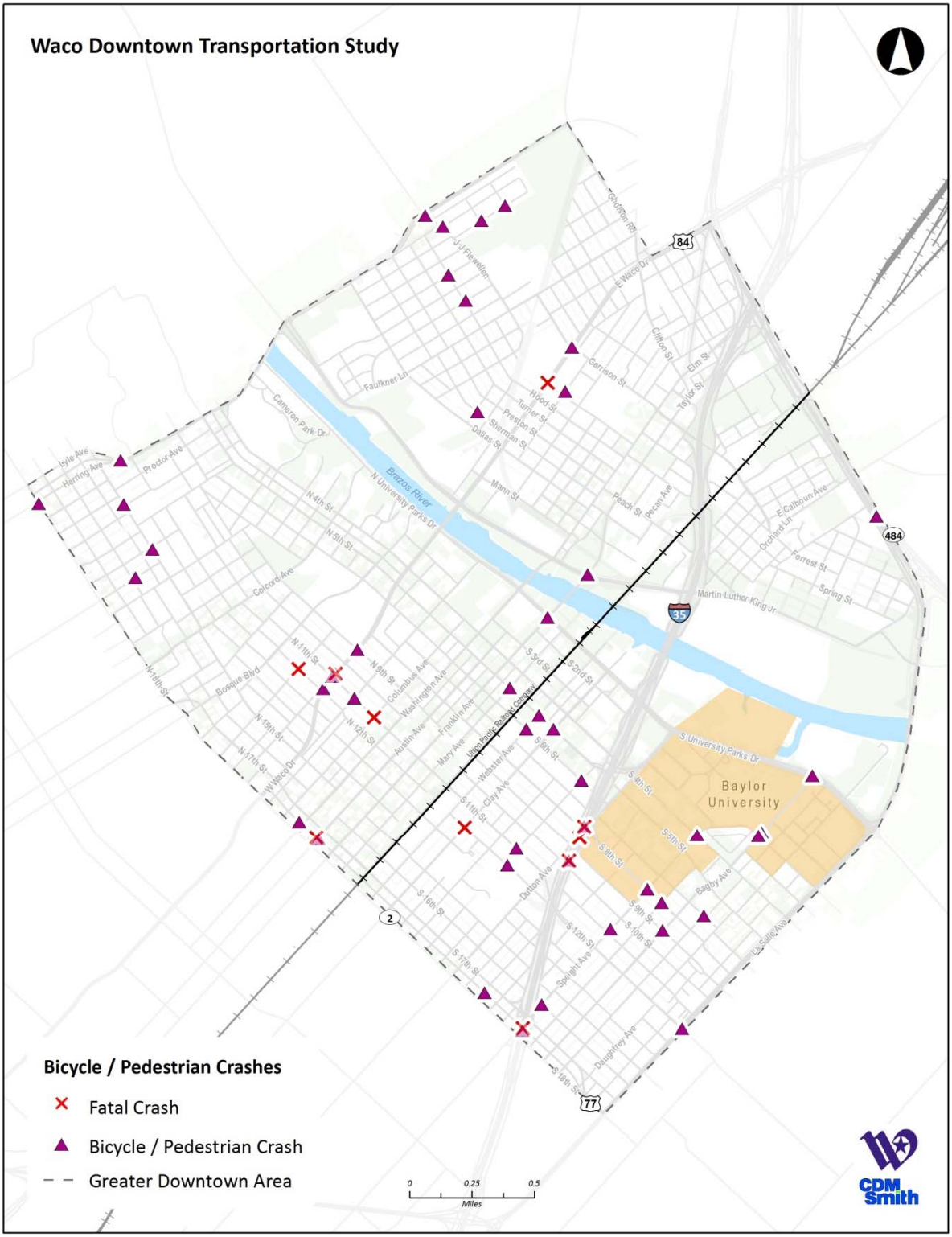
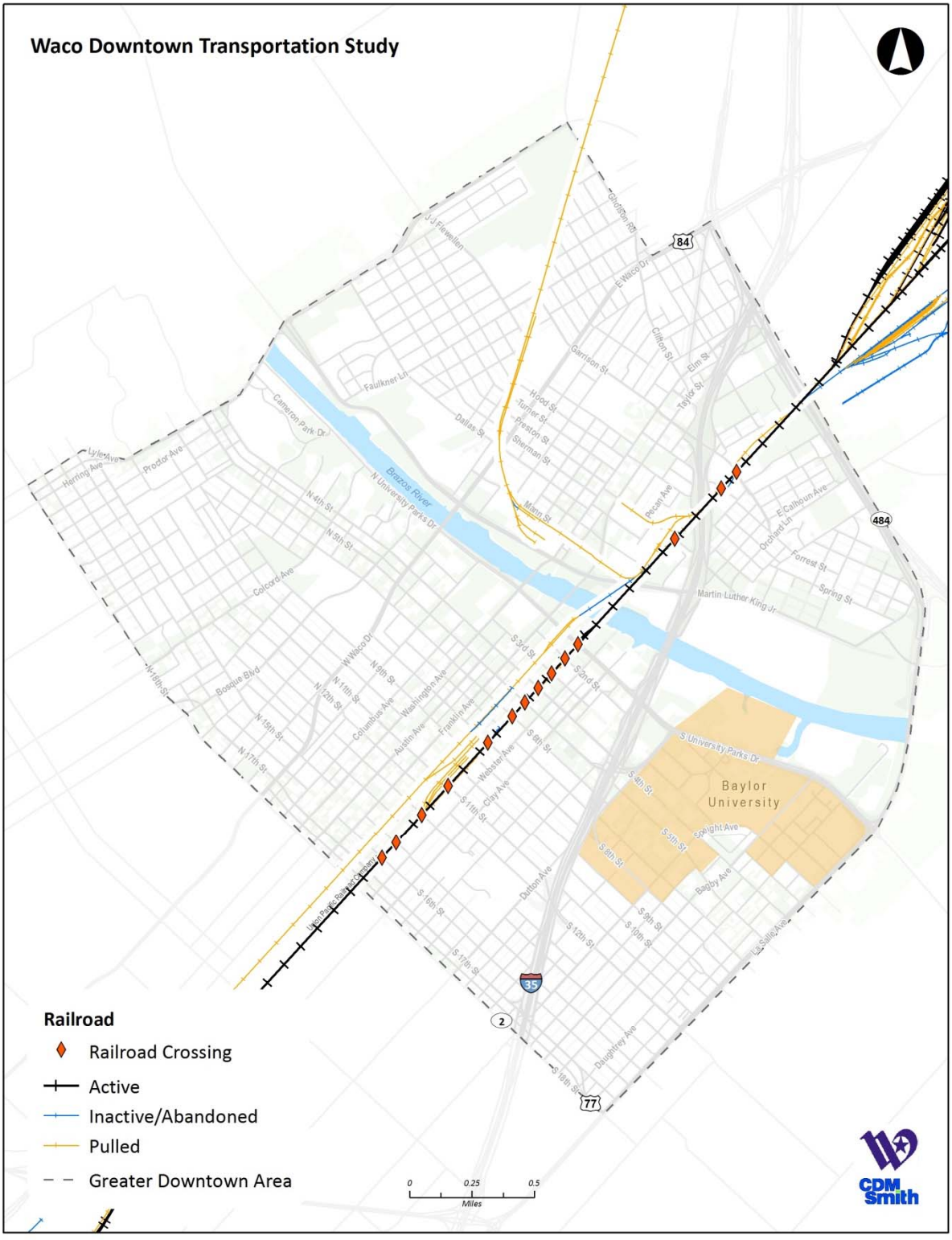


Figure 3-28: Railroad and Crossings



One-way Streets Transitions

- One-way street systems maximize traffic capacity and also minimize the number of potential traffic stops. Increased capacity is achieved by eliminating left turning conflicts. The number of stops is reduced through the ability to more efficiently time traffic lights to provide progression in the one direction traffic is traveling. The most common difficulty with one-way streets is where they transition into two-way streets. The 17th Street transition to 18th Street/Homan Avenue is such a location where motorists might find it difficult to understand the street pattern.

Atypical One-Way Street Spacing

- Most one-way street pairs are located one block apart, which tends to minimize out-of-direction travel and simplifies the understanding of traffic patterns for motorists. The Washington Avenue and Franklin Avenue one-way couplet is separated by two blocks. With Austin Avenue providinglocal circulation between the two one-way pair streets, the main problem seems to be motorist understanding of the street traffic pattern.

Hierarchy of Streets

- It is difficult to distinguish visually which streets while driving in downtown are major traffic carriers and which are local access and circulation streets. The MPO's classification system tends to focus on regional categories – expressway, arterial, collector, and local roads. It will be beneficial to establish the classification for urban downtown streets.

3.5 Pedestrian and Bicycle

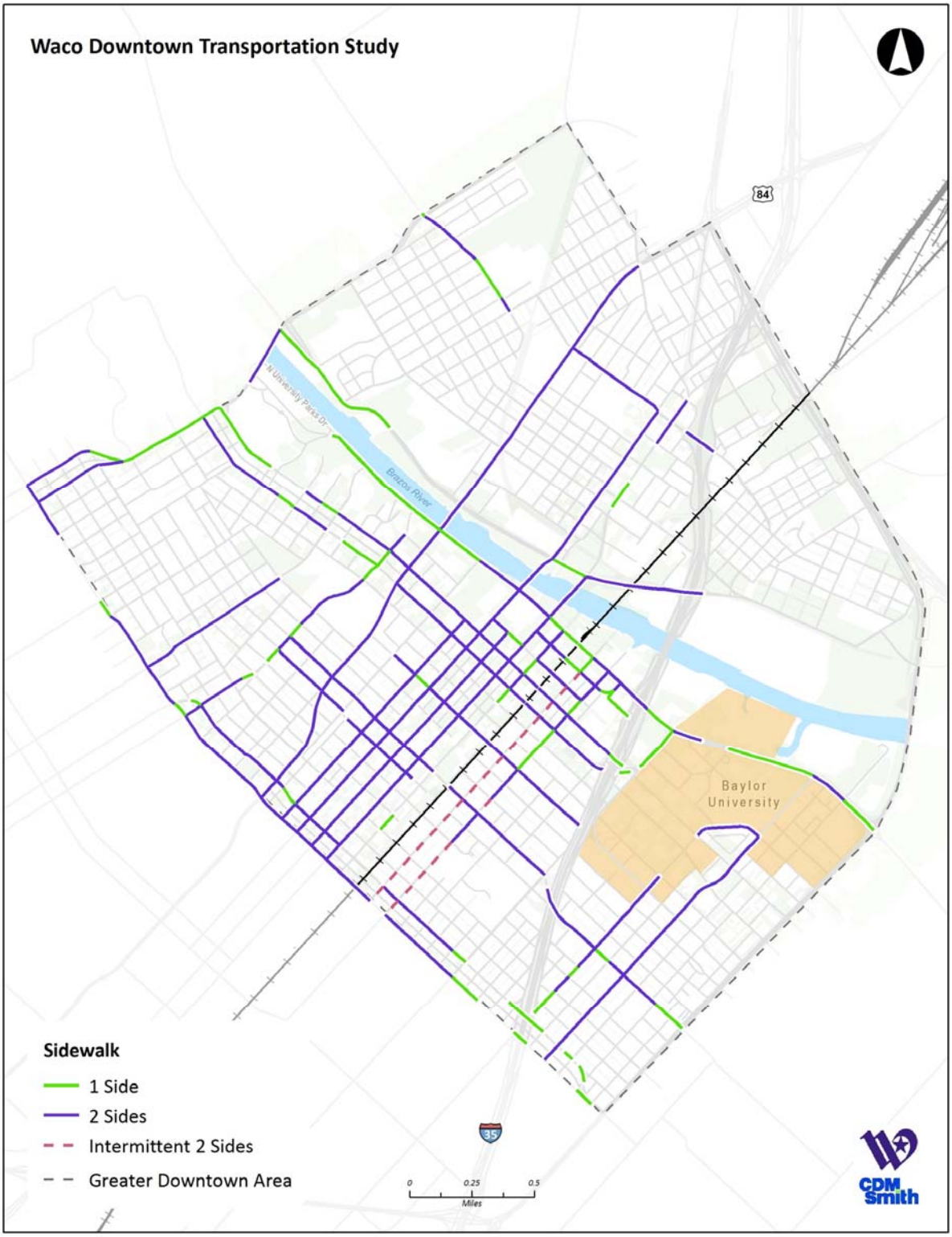
The scale of Greater Downtown Waco, the vernacular of open space, shady areas, and pleasant architecture, and the high Level of Service (LOS) on most streets all contribute towards making the area a pleasant environment for walking and riding bicycles. This overall environment greatly strengthens the potential of the area to serve pedestrian and bicycle trips as Greater Downtown Waco continues to develop downtown housing, employment, and destinations. This review of the pedestrian and bicycle modes focused on four attributes:

- network facilities
- accessibility and condition
- distances between destinations
- wayfinding

3.5.1 Facilities

Sidewalks were inventoried on streets in Greater Downtown Waco which were classified as Collector or above, with several additional local streets inventoried as well. Data were recorded for the presence of sidewalks on one or both sides of the street, the width, and the presence of sidewalk ramps. The existing high level sidewalk inventory is shown in **Figure 3-29**.

Figure 3-29: Sidewalk Network



In general, sidewalks are available on both sides of the street throughout the urban core of Greater Downtown Waco. Sidewalk ramps are generally available, although not all ramps could be considered compliant with the requirements of the Americans With Disabilities Act (ADA). In particular, curb cuts at driveways and at surface parking lot entrances often encroached on sidewalks.

Sidewalks in the suburban area of Greater Downtown Waco are generally located on both sides of the street for the west side of the study area. On the east side, the lack of sidewalks isnotable. Sidewalk ramps are much less common in the older suburban areas. Additionally, the physical condition of sidewalks are often deteriorated in some of the older neighborhoods. Intermittent sidewalks were also noted, both from sidewalks not being built to some deteriorating to the point where they were not usable. As with the urban core, in the suburban areas, sidewalks were sometimes subsumed by driveways and curb cuts from surface parking lots.

The bicycle mode of transportation can access all roads and sidewalks in the Waco network. Waco has dedicated bike lanes in several locations, as shown in **Figure 3-30**. The bike lanes are present on:

- 4th Street from the I-35 southbound frontage road to Jefferson Ave.
- 5th Street from Barron Ave. to Cleveland Ave.
- Washington Ave. from University Parks Dr. to 5th St.
- Bagby Ave. from University Parks Dr. to 4th Street on the Baylor campus

In spite of the presence of dedicated bike lanes, no other specific facilities, such as bicycle racks or stations for parking and locking a bicycle were noted. However, all buses in the Waco Transit System are equipped with bike racks.

3.5.2 Accessibility and Conditions

While sidewalks are generally present on both sides of the street throughout the west side of Greater Downtown Waco, two issues stand out. First, there is a striking lack of sidewalks in the east side. Second, connectivity within the flow of the existing sidewalks is sometimes broken because of driveways and curb cuts, deteriorated condition, no sidewalks present, or interruptions in the sidewalk. Interruptions, such as that shown in **Figure 3-31** on the Herring Ave. bridge, are rare. The more common condition is shown in **Figure 3-32**, where the sidewalk on Austin Ave., just south of 11th Street, is interrupted by the curb cut.

The connectivity of bicycle lanes is an attribute to be improved in the future, given they are not prevalent in the existing transportation network. There is also a connectivity issue with the existing network in that the bicycle lanes on 4th Street and on 5th Street both end just west of I-35. If these lanes are to serve the Baylor University population, they would need to be extended to reach the Baylor campus.

Figure 3-30: Bike Lanes

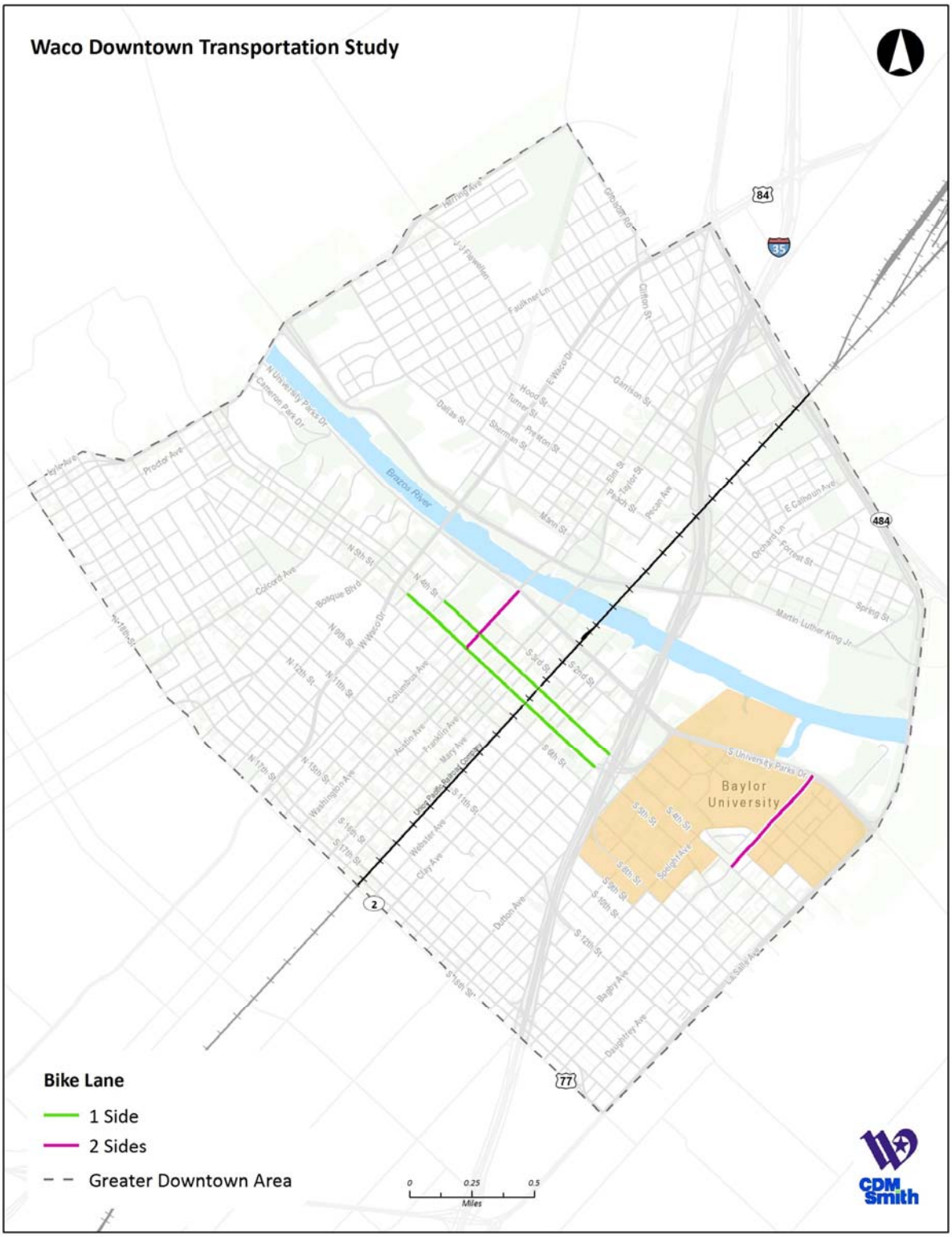


Figure 3-31: Sidewalk at Herring Ave Bridge

Figure 3-32: Sidewalk on Austin Ave

3.5.3 Walk Time Between Destinations

Many destinations in Greater Downtown Waco are within easy walking distance of each other. **Figure 3-33** shows popular destinations in Greater Downtown Waco which were arbitrarily selected to illustrate walking distances. **Table 3-4** lists the walking times between these destinations in minutes, calculated based on the typical walking speed of 3.5 feet per second.

Table 3-4: Walking Time in Minutes Between Selected Destinations in Greater Downtown Waco

	Baylor	Baylor Stadium	Brazos Commons	Chamber/ Visitor's	Convention Center	Elm Avenue Clinic	Food Court	Hippodrome	Shops	Waco Transit System
Baylor										
Baylor Stadium	28.7									
Brazos Commons	16.6	19.7								
Chamber / Visitor's	30.2	33.3	13.6							
Convention Center	30.4	33.4	13.8	6.0						
Elm Avenue Clinic	43.8	23.5	27.2	21.5	17.6					
Food Court	13.2	25.5	10.9	15.5	25.7	39.2				
Hippodrome	34.4	44.8	27.0	9.5	19.5	28.9	21.1			
Shops	26.2	29.2	9.6	2.0	8.0	19.5	15.7	13.6		
Waco Transit System	30.4	44.8	23.1	9.5	19.5	30.8	17.1	3.9	11.5	
Zoo	**62.3**	**65.6**	**45.7**	**40.0**	**36.0**	**45.5**	**57.6**	**47.3**	**42.0**	**49.3**

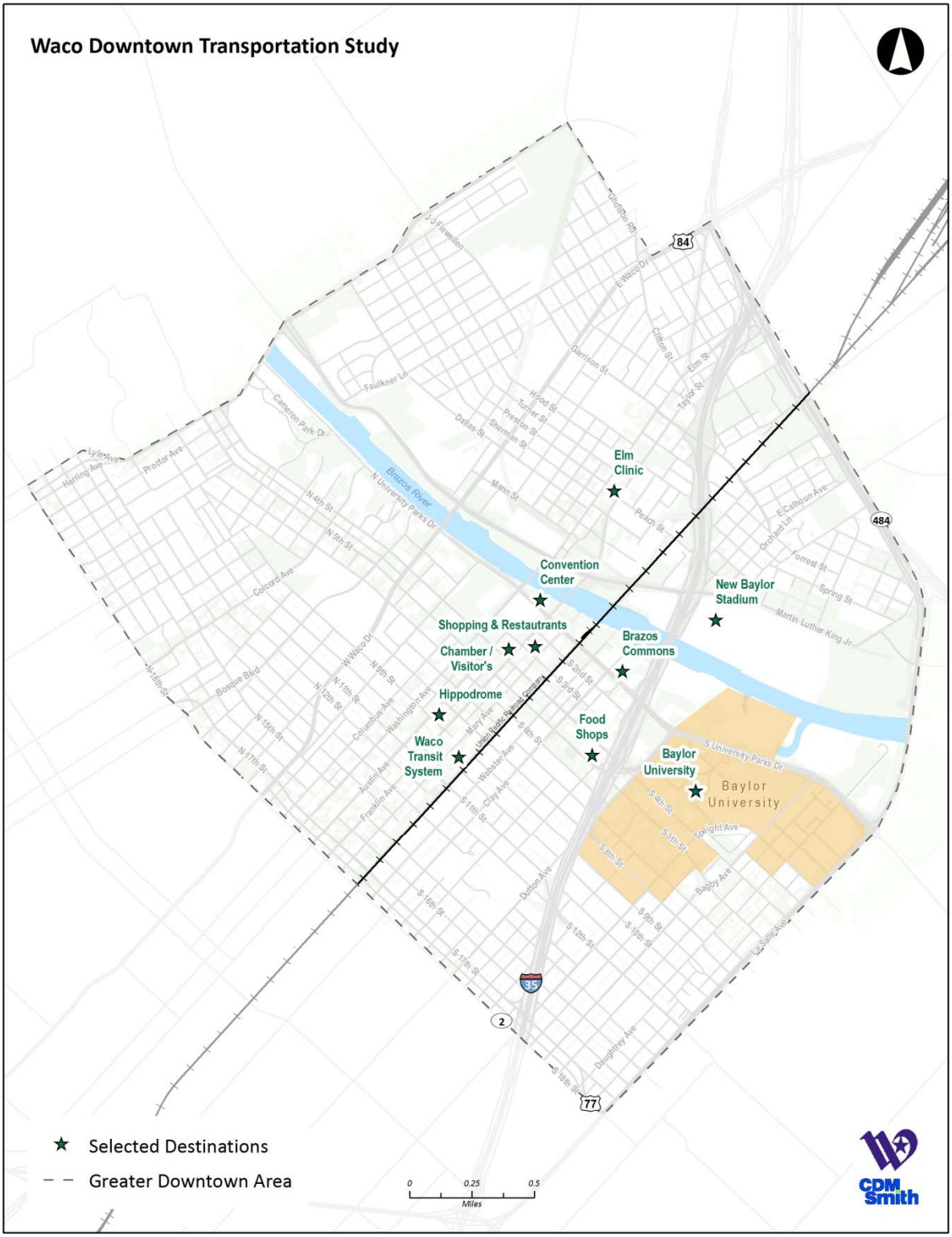
It should be noted the averagewalking time between all the selected destinations, excluding the Cameron Park Zoo, was 22 minutes. When the zoo is included in the calculation, the average walking time increases to 26 minutes. Within the urban core, the average walking time is less than 17 minutes. All of the destinations are served by the Waco Transit System, but the walking time between destinations illustrates the compactness and convenience of Greater Downtown Waco.

3.5.4 Wayfinding

Wayfinding is an important element which can make travel in a downtown area more convenient for pedestrians, bicyclists, and auto drivers who are unfamiliar with the area and are looking for destinations or parking. There are several instances of wayfinding signs in Greater Downtown Waco, although there does not appear to be a comprehensive program throughout the area.

Large signs at the I-35 / University Parks Dr. gateway are located on eastbound University Parks on the east side of I-35, and on the southbound frontage road on the west side. Both signs list popular destinations and point in their direction. Another sign at the Herring Ave. / 5th St. gateway points to three destinations in the immediate area. All three signs are clear and readable. However, the two gateways' signs do not match visually, nor do they provide travel distances.

Figure 3-33: Selected Destinations in Greater Downtown Waco



The implementation of a comprehensive wayfinding signage program would guide pedestrians, motorists, and bicyclists efficiently and effectively to key destinations and parking areas throughout the city. Wayfinding signage can take many forms and can potentially contribute to the character of the downtown through decorative or distinctive signage. Using signage to enhance downtown character can be especially beneficial with pedestrian wayfinding signage, such as urban trails stamped in the sidewalk that lead pedestrians to major destinations. The most basic function of wayfinding signage is to provide information about the direction of popular destinations at critical decision making points during the course of travel. Wayfinding signage should direct both motorists and pedestrians to activity centers and parking and then from these centers to the many other destinations throughout the downtown. By clearly indicating how to reach major destinations, both motorists and pedestrians can confidently and quickly navigate the city.

3.6 Parking

Parking is an essential element to both economic and livability objectives. In many cities, the provision of convenient, free parking is seen as essential to support downtown retail and attract office employment and residential development in the downtown area. The vision for Greater Downtown Waco is for substantial growth and increased vibrancy, both of which will boost the demand for parking.

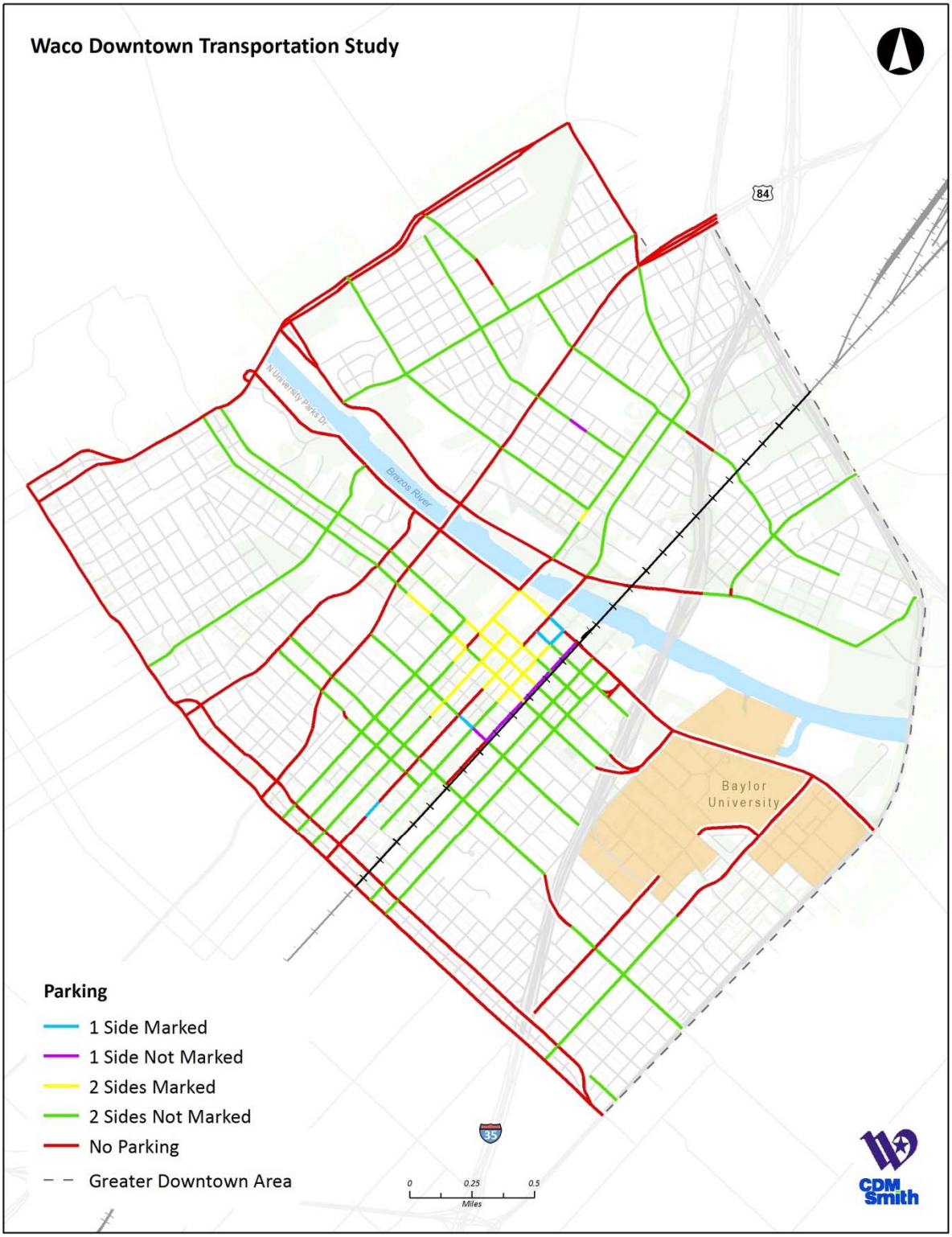
In an economically vibrant downtown, motorists are more willing to walk longer distances from their parking space to their destination. This is particularly true of long term employee parking, but even special event parkers are willing to tolerate longer walking distances. Shoppers, diners, and downtown residents tend to insist on short walks to parking. A factor in calculating the distance parkers are willing to walk includes the trip purpose, length of parking stay, cost of parking, mobility features of the parkers, weather, security and features of the pedestrian system. Too much parking, as well as poorly designed and located parking facilities, detract from efforts to achieve a vibrant and livable community.

These considerations illustrate the importance of an inventory of parking spaces and facilities. The onsite field review included a high level on-street parking inventorty, where it isallowed, both for marked spots and for unmarked roads, and for parking garages.

3.6.1 On-Street Parking

On-street parking is shown in **Figure 3-34**. The inventory shows marked on-street parking is present only in the core downtown area, principally between Washington Ave. and Jackson Ave. and between 3rd St. and 5th St. Unmarked parking on both sides of the road is predominant for most streets with a functional class of collector or above. Streets where no on-street parking was allowed are the busier arterial streets such as Herring Ave., Bosque Blvd., Waco Dr., Franklin Ave.-south of 6th St., Speight Ave., Bagby Ave.-north of 8th St., Gholson Rd. west of Waco Dr., Martin Luther King Jr. Blvd.- west of I-35, and University Parks Dr. on either side of the core urban area.

Figure 3-34: On-Street Parking



3.6.2 Surface Parking Lots

Surface parking lots are shown in **Figure 3-35**. The Greater Downtown Waco area features a multitude of surface parking lots of all sizes, which are well-distributed to serve destinations. All of the larger destinations, such as the convention center, the courthouse, the shopping area on Franklin, and the Waco Independent School District building, are well-served with convenient larger surface parking lots. Locations of the parking garages are shown in Figure 3-35.

3.6.3 Parking Garages

Six parking garages serve Greater Downtown Waco on the west side of I-35, with another five structures located east of I-35 on the Baylor campus. Some of the newer structures, particularly on the Baylor campus, are multi-purpose, with office or retail uses on the ground floor.

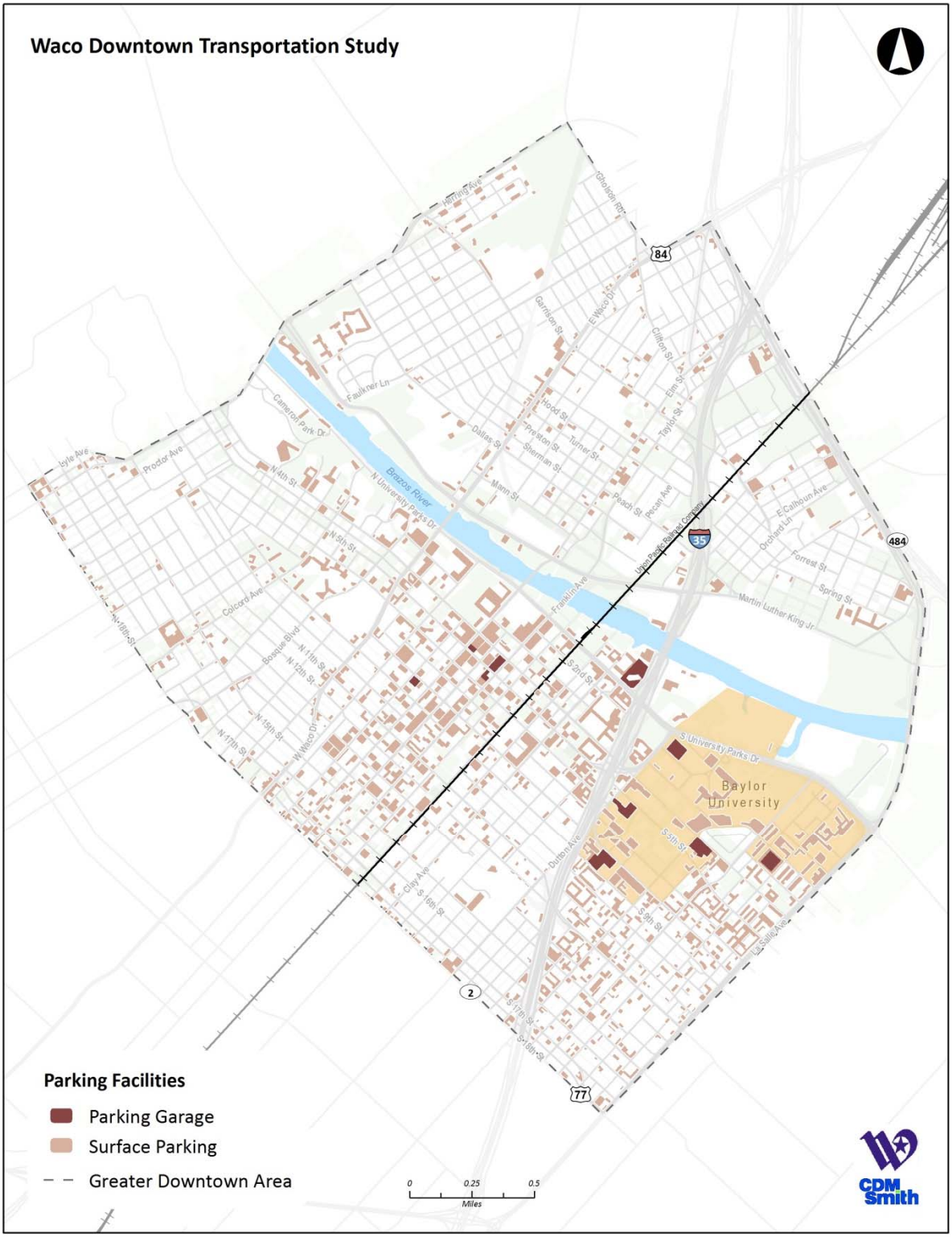
The west side structures include:

- American Amicable Life Insurance garage at 5th & Washington, serving the Alico building with five parking stories
- City of Waco garage at 4th & Franklin, with 4 parking levels
- Waco ISD garage at 5th & Franklin, with parking on 2 levels
- A 5-level garage serving the Baylor University office building at 8th & Columbus
- A 2-level garage at the Compass Bank at 10th & Washington
- 2-story garage serving Baylor University's Clifton Robinson Tower at University Parks & the west side of I-35

On the Baylor University campus, the five parking structures are:

- 4-story garage at University Parks Dr. @ Dutton Ave
- 5-story garage at the Baylor bookstore at 5th St & Dutton Ave
- 4-story garage at 8th St & the M L Daniel Esplanade
- 4-story Speight Plaza building, at 4th St & Speight Ave, which also houses the Baylor police department
- 4-story garage at 2nd St & Daughtrey Ave

Figure 3-35: Parking Facilities



3.6.4 Parking Capacity and Use

When most parking spaces are occupied, increased effort is required by motorists to find an open space. Thus, most parking systems are planned to provide some proportion of the total number of parking spaces to be open. The "effective capacities" that are used to size parking facilities generally ranges from 80 percent to 95 percent of the total number of spaces. Convenient parking is important to support office and retail markets.

Onsite field review observations were conducted on weekdays and on one Saturday in February 2014. Minimal issues were found with finding a parking space close to a desired destination. At the more local level, on-street parking was more crowded on specific blocks, particularly along Austin Ave. and along 4th St. in the core urban area. The surface parking lot serving the shops at Franklin between University Parks Dr. and 3rd St.was crowded on every observed occasion.

3.7 Transit

The Waco Transit System (WTS) has extensive coverage in Greater Downtown Waco, in part due to all routes centering at the Waco downtown transit terminal at 8th and Mary, which is the major transfer hub between routes for WTS. The nature of the hub-and-spoke service design is to primarily move people in and out of Greater Downtown Waco. Ten WTS fixed routes operate from the downtown terminal every 60 minutes. This does not include the Baylor University Shuttle service or the DASH service, which operates from the Baylor campus to downtown Waco on Friday nights when the university is in session. The ten fixed routes, the four Baylor shuttle routes, and DASH shuttle are shown in **Figure 3-36**, and listed in **Table 3-5**.

WTS operates Monday through Friday from 5:00 am to 7:00 pm. Saturday hours are 6:00 am to 8:00 pm, and there are no services on Sunday. The Waco Transit System fixed route service operates as a flag stop system. Anyone may flag the bus at any safe location along any route.

Figure 3-36: WTS Fixed Route Service

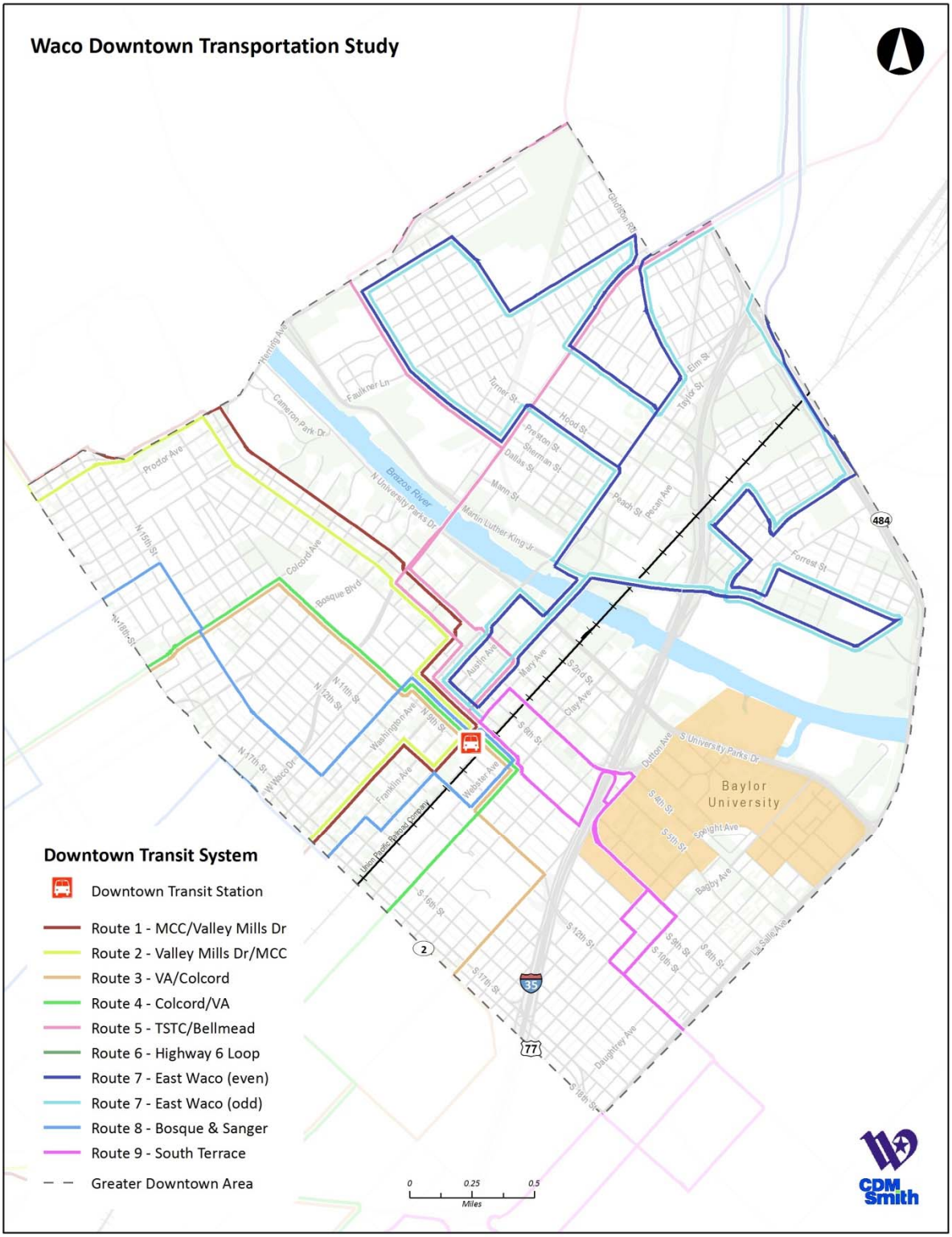
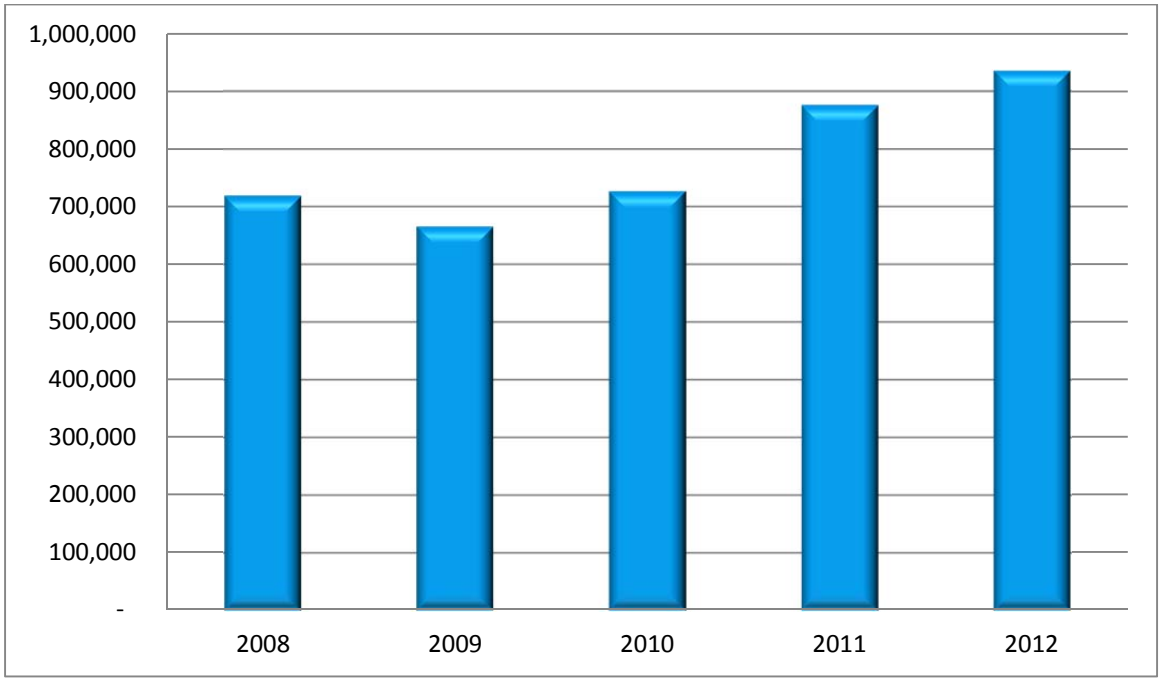


Table 3-5: Waco Transit Service Routes

Route Designation
Route 1 – MCC/Valley Mills Dr.
Route 2 – Valley Mills Dr./MCC
Route 3 – VA/Colcord
Route 4 – Colcord/VA
Route 6 – Highway 6 Loop
Route 7 – East Waco (odd hours)
Route 7 – East Waco (even hours)
Route 8 – Bosque & Sanger
Route 9 – South Terrace
Route 10 – Waco, Marlin & Robinson
Baylor Shuttles
Friday Night Dash

WTS provided approximately 937,000 annual one-way trips in 2012, with approximately 991,000 annual revenue vehicle miles and 66,000 annual revenue vehicle hours. WTS operates 15 vehicles for fixed-route services during the peak hour and 9 vehicles for paratransit service. Approximately 3,300 one-way trips are provided each weekday. WTS has seen consistent ridership increases over the past five years, as shown in **Figure 3-37**.

Figure 3-37: Waco Transit System Ridership Trends



3.7.1 WTS Boarding/Alighting Data

WTS conducted a ridecheck survey to collect the boarding and alighting counts over a one week time period in January 2014. The primary purpose of the ridecheck survey is to develop an understanding of the usage of public transportation in the study area, which establishes the baseline transit ridership information. This effort involved counting all passengers who boarded on all trips, all routes, thus resulting in a 100 percent passenger count of the WTS system. The results of this analysis show which parts of a route are most heavily used and which stops are busiest. Passenger boarding and alighting patterns for Greater Downtown Waco are illustrated in the accompanying tables and maps. **Figure 3-38** and **Figure 3-39** show average weekday boardings and alightings for WTS in the downtown area. **Table** 3-6 lists the top activity boarding locations for WTS. Several locations, including the WTS Downtown Transit Terminal located at 8th Street and Mary, 5th Street and Dutton- adjacent to Baylor University, and 3rd Street and Washington are primary WTS bus stops.

Figure 3-38: WTS Boarding Data

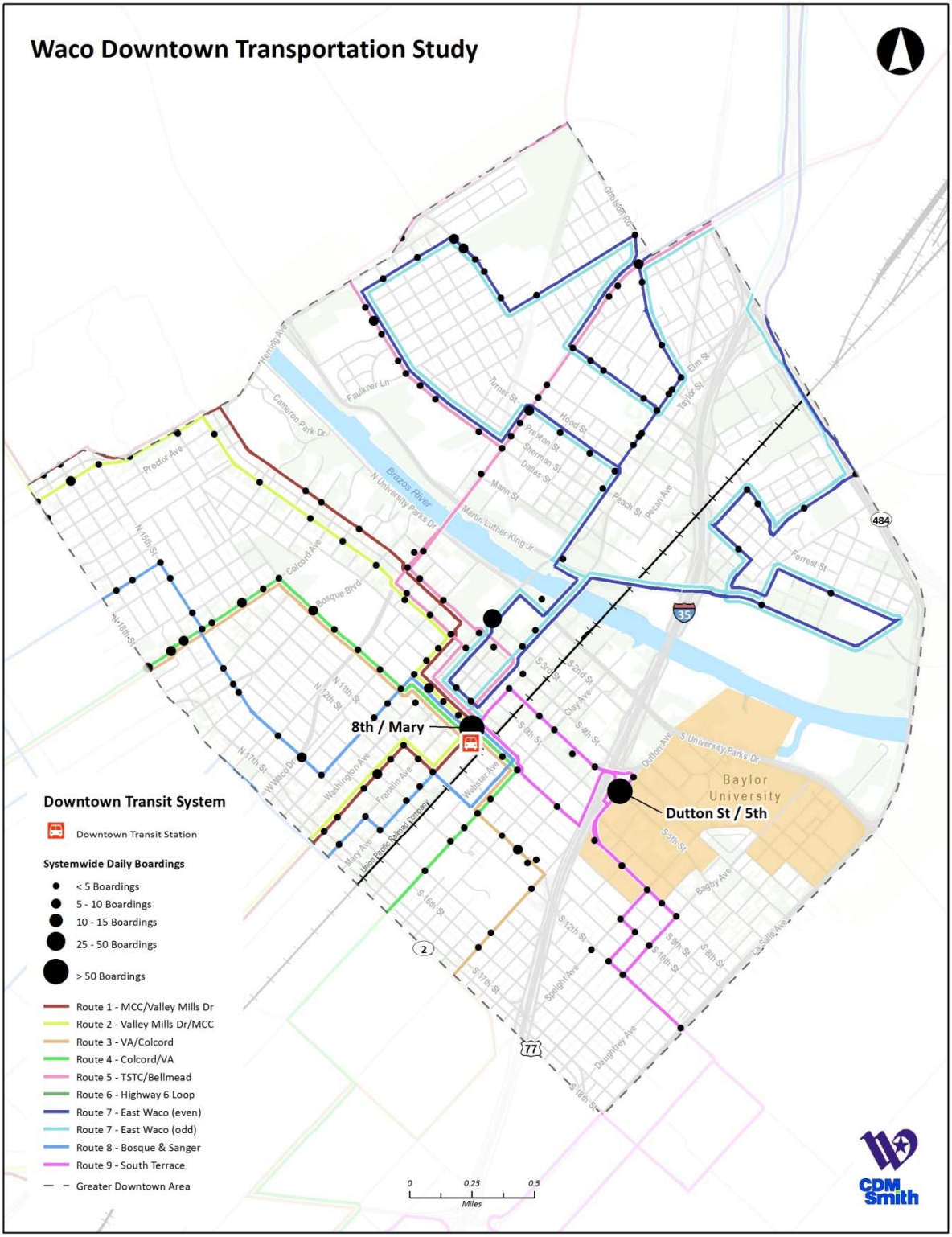


Figure 3-39: WTS Alighting Data

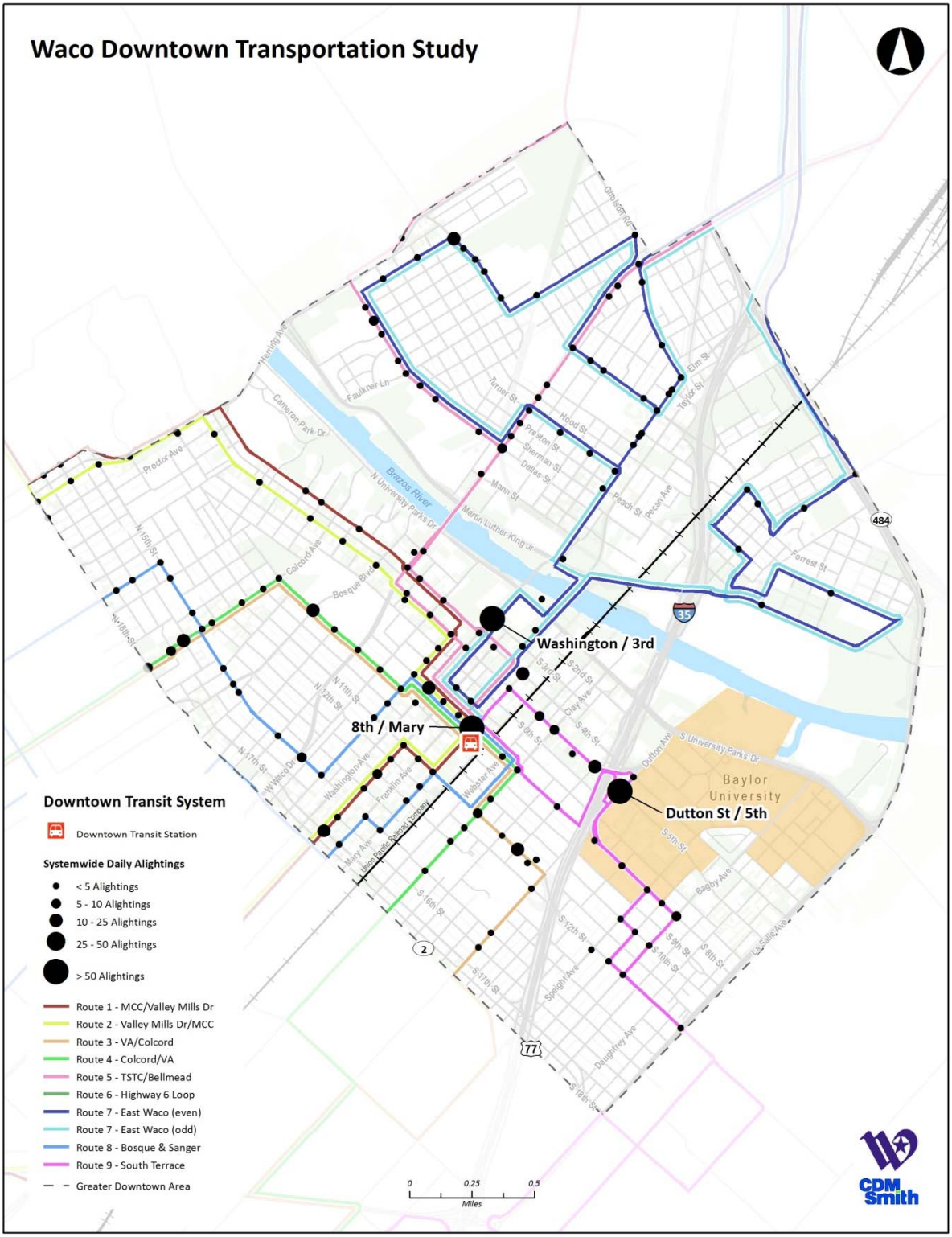


Table 3-6: WTS Busiest Bus Stops - Daily Passenger Boards/Alightings

Stop	Cross Street	On	Off
8th	Mary	868	733
Dutton St	5th	104	113
Sanderson Farms		55	6
Richland Mall		45	31
University Park Dr.	I-35	42	40
Kohl's		39	39
McLennan Community College		37	34
Wooded Acres	H-E-B Grocery Store	35	12
Washington	3rd	33	98
New Road	Walmart	27	22
New Road	Memorial	24	14
Central Texas Market Place		18	17
Campus Dr.	Scott Circle	14	10
Interstate Highway 35	Wal-Mart	14	10
12th	Primrose Dr	13	2
State Highway 6 Fwy.	Providence	12	9
Bosque Blvd	Panda Express	12	4
Primrose Dr.	Robinson Rd	10	10
Jack Kultgen	6th	10	1
Garden Dr.	Old Robinson Rd	10	0
19th	Meridian	10	1
Austin	13th	10	9

4. Key Issues

The analysis of Greater Downtown Waco existing conditions presented in this report revealed several key issues to be considered during the next phase of the study, alternatives development. While all of the observations and issues identified through this evaluation are helpful in creation of alternatives, the key issues identified below summarize the overall findings.

4.1 Challenges

Known Challenges
Access into downtown is not difficult.
Traffic on most of the roadways in Greater Downtown Waco fall within a daily traffic of 2,500 to 10,000. The exception areas include parts of 17th Street, South University Parks Blvd and Loop 484, each recording between 10,000 and 20,000 vehicles per day.
One-way traffic flow design is confusing in areas of the downtown due to complex changing from one-way to two-way, especially for those unfamiliar with the downtown area. The one-way patterns require drivers to make circuitous navigation to their destination.
The one-way traffic patterns detract from the pedestrian and bicycle environment by inducing traffic to travel at higher speeds in the same direction.
The one-way to two-way existing street transitions are awkward with atypical one-way street spacing between the one-way couplet streets.
Pedestrian facilities are lacking on the east side of Greater Downtown Waco. Existing sidewalks within the urban core need upgraded.
Sufficient parking is available in Greater Downtown Waco; however signage to 'Free Parking' is inadequate, which may lead to the perception of no parking available in the busier corridors.
The general bicycle environment—some bicycle facilities, one-way streets, and wide street cross sections—is uninviting for casual bicyclists, resulting in limited use of bicycles downtown or bicyclists using the sidewalk.
Larger block size in the outer areas of Greater Downtown Waco limit the number of paths pedestrians and bicyclists have in downtown, potentially contributing to longer travel times.
The Brazos River is a barrier from between east and west sides of Greater Downtown Waco.
There is inadequate wayfinding signage for vehicles, bicyclists, and pedestrians.
The majority of WTS bus stops are not signed, making it difficult for pedestrians to know where to catch the bus in some areas of downtown.
The street network must be capable of supporting Baylor University special events.
The uses planned for Greater Downtown Waco require good pedestrian facilities, both within the core areas and connecting to other portions of the downtown.

4.2 Opportunities

From the summary of key issues above, many opportunities exist to find solutions for improving overall mobility for vehicles, pedestrians, transit, and bicyclists within Greater Downtown Waco. While many of these transportation challenges facing the greater downtown area will already be obvious to residents and visitors, identifying the appropriate solutions for addressing these key issues can be complicated.

Based on the information and data collected through this existing conditions analysis, the CDM Smith project team, in coordination with local stakeholders, will develop a set of alternatives that will offer the most effective solutions for addressing many of the key issues uncovered through this study. In the development of these alternatives, an emphasis will be placed on identifying at a high level improvement projects that are attainable in the near future as funding becomes available. The ability of an alternative to satisfy project goals and objectives also helps guide development of alternatives particularly tailored to meet the current transportation needs in downtown. By developing alternatives targeting key transportation issues that could realistically be implemented in a short time frame, the project team has ensured the City of Waco has a variety of options that they can begin to plan and design immediately to improve downtown mobility for all users and which will help guide the City's development into the future.

- Land use in Greater Downtown Waco is undergoing a significant shift from the 1970s patterns to the vibrant, walkable, livable community planned for the future. Successful examples such as Brazos Commons, the new Baylor stadium, Heritage Quarters, and Tinsley Place are setting the stage for new developers to see the Waco vision.
- The current downtown infrastructure will support increased mobility for all modes, including roadway, bicycle, pedestrian and transit. Unlike in some communities, right-of-way constraints are not generally prevalent in the downtown area and will work in the favor of implementing new designs to accommodate all modes.
- The existing WTS transit service operates at 60 minute headways. To encourage more citizens and visitors to use WTS, frequent and convenient service must operate to/from primary activity centers.
- Roadway capacity and traffic volumes on adjacent streets to the existing one-way corridors support the conversion from one-way to two-way conversions.
- The core urban area enjoys good quality sidewalks with 12 foot widths, access ramps, good connectivity, and a generally pleasant environment with decorative brick treatments, landscaping, and shade. Extending those conditions throughout Greater Downtown Waco will be important as the downtown continues to develop.

- Sidewalk compliance with the Americans with Disabilities Act (ADA) is an issue in which the City is addressing, as evidenced by the many textured and colored access ramps having been retrofitted to sidewalks throughout the urban core. Other ADA requirements such as width, continuity, cross-slope, and access to storefronts should also be examined in detail. As designated WTS bus stops are implemented to supplement the existing flag stop system, they must be fully ADA compliant.

- The general lack of sidewalks on the east side of downtown Waco is evident. While all the bridges have sidewalks, and the old suspension bridge provides an additional pedestrian path, connectivity to the east side is as much of a challenge as is circulation within its neighborhoods. There is opportunity within the infrastructure to address these connections and to ensure all new facilities would be compliant with the ADA.

- Bicycle travel is accommodated in the current downtown area, but currently not widely visible. The grid street system provides convenient alternate paths so that riders can choose routes with less auto traffic. Challenges to the bicycle system will increase as the downtown develops and traffic volumes become more intense. Additional bicycle lanes between common destinations will be necessary to maintain the downtown area's current pleasant and friendly feel. Extending the existing bicycle lanes to connect to the Baylor campus would also be beneficial. Bicycle racks and bicycle stations should be implemented to allow users to secure their bikes while still leaving plenty of sidewalk space for pedestrians. These amenities support the goals of increased bicycle use.

- Safety is an issue of perception as well as of physical attributes. Street lighting, safely marked pathways, streetscape environment, and bright storefronts also contribute to the sense of safety.

- Wayfinding is important for all visitors to the downtown area for all transportation modes. Visitors need to be able to have confidence in the directions and distances of travel to activity centers and to convenient parking. The implementation of a consistent and convenient wayfinding system which conforms to the existing pleasant feel of Greater Downtown Waco is needed for the future.

- Parking occupancy is relatively low for the downtown area. However, parking at particular activity centers, such as the shops on Franklin Ave and Austin Ave., anticipated parking near the Brazos Commons development, and for game days around the new Baylor McLane stadium may pose future challenges. Many surface parking lots are present in downtown, which could be used as shared lots. Parking demand for retail, restaurant, and church uses each have peaks at different times or days of the week. As the downtown develops and as parking in specific areas becomes more constrained, formal agreements to share parking at specific times, and to clearly post those times, will address future parking challenges.

4.3 Next Steps

Developing alternatives for Greater Downtown Waco is the next step for the Downtown Transportation Study. Based upon goals and objectives, as well as input from local agencies, stakeholders, the community, and existing baseline data, the key issues were identified, which will feed into future alternatives. A range of creative, but realistic improvement alternatives will be developed. The alternatives will be analyzed with a set of evaluation criteria. CDM Smith will also discuss the advantages and disadvantages of each alternative. The evaluation criteria will be used to assess the impacts of the proposed alternatives. The proposed criteria presented below will be discussed during the next phase of the project. These draft criteria will be a starting point for discussion with the local Waco project team, stakeholders, and the community during the spring public open house meeting.

4.3.1 Proposed Evaluation Criteria

Criteria	
A. Enhance Safety	B. Improve Pedestrian Mobility
C. Reduce Congestion	D. Enhance Bicycle Mobility
E. Enhance Transit Ridership	F. Enhance Aesthetics
G. Consistent with Imagine Waco plan	H. Ease of Implementation

CDM Smith