Edmond

A GREAT PLACE TO GROW

Transportation Plan

prepared by

Wilbur Smith Associates

ENGINEERS
PLANNERS
ECONOMISTS

GUERNSEY

Chapter 1
Introduction

To prepare for future development and better coordinate transportation and land use objectives, the City of Edmond is preparing a Transportation Plan that will identify current and future transportation needs and improvements within the community. A well planned and coordinated transportation system will enhance mobility and facilitate the movement of people and goods in a safe and efficient manner.

The Edmond Transportation Plan will serve as an important tool in facilitating orderly urban and rural development, by identifying the location and type of roadway facilities that are needed to meet the area's projected growth. The Transportation Plan allows the City to determine and plan for their existing and future transportation improvement needs and to acquire adequate rights-of-way. A transportation plan is a means of assuring that basic infrastructure needs and right-of-way will be available when travel demand or development warrants new or improved roadway facilities.

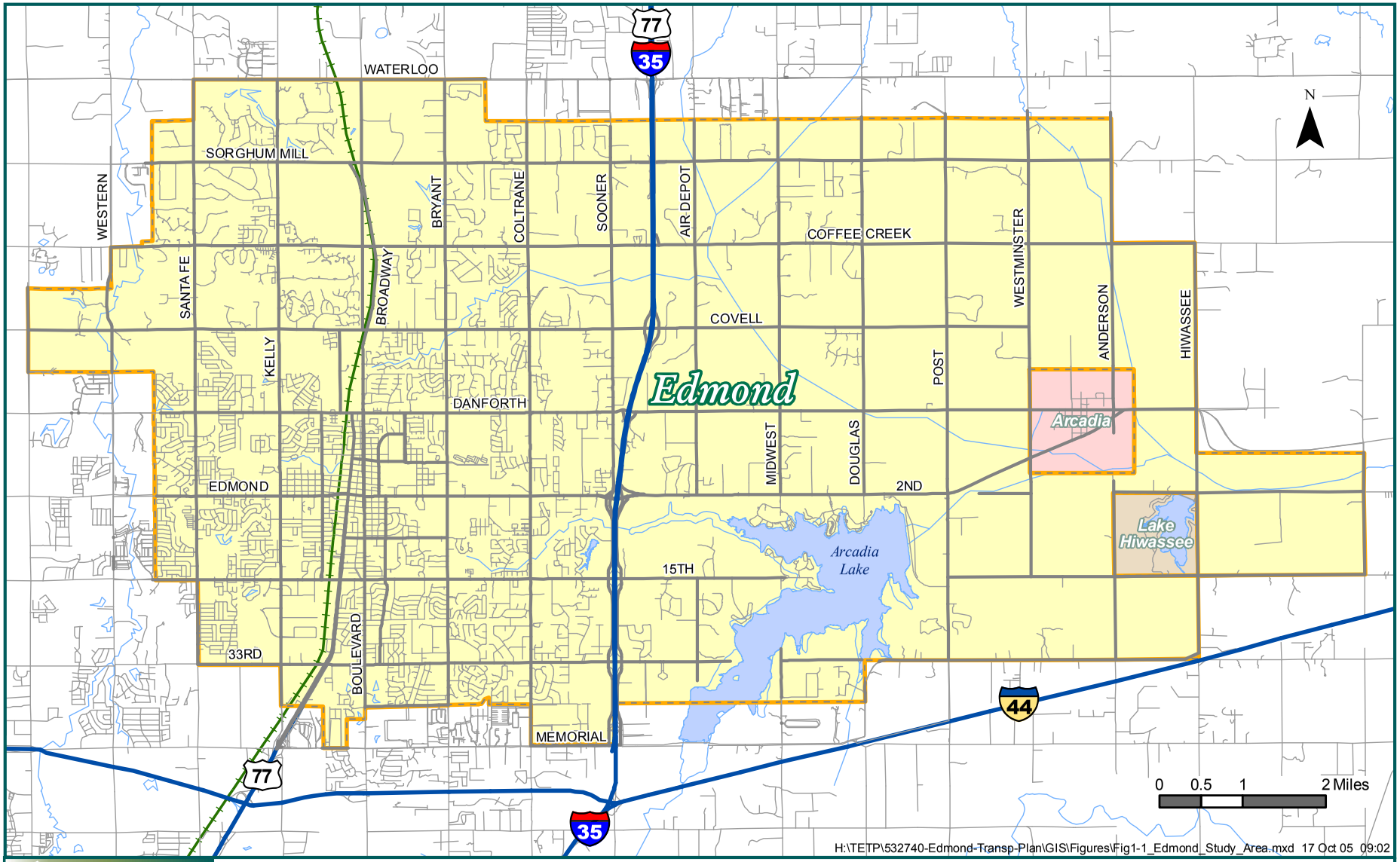
STUDY PURPOSE

Over the past decade the City of Edmond's population has grown from 52,315 in 1990 to 68,315 in 2000, an annual growth rate of 2.7 percent. Since 2000, additional residential and commercial developments have occurred in the community, and this trend is expected to continue over the next 25 years. Forecasts developed by the Association of Central Oklahoma Governments (ACOG) project population in the Edmond area to grow to 112,850 by 2030. Coupled with these development pressures, the University of Central Oklahoma is also growing and will continue to attract students from throughout the region. This growth in the community will place increasing demands on the transportation system resulting in the need for mobility and access improvements.

The purpose of the Edmond Transportation Plan is to identify and recommend transportation improvements needed to accommodate future travel demands. The plan includes an implementation program which prioritizes improvements according to short- and long-term objectives of the study and the feasibility of project implementation. The Transportation Plan ensures the preservation of future corridors for transportation system development, as the need arises, but does not recommend or prioritize the timing for future land use development. Potential roadway development includes the widening of some roadways, extensions of others, and construction of new facilities.

STUDY AREA

As shown in **Figure 1-1**, the study area encompasses the City of Edmond, which includes an area of approximately 87 square miles. Edmond is located on the northeastern edge of Oklahoma City. Major thoroughfares in the City include I-35, 2nd Street (U.S 77), and Broadway (U.S. 77).



Edmond Transportation Plan

Figure 1-1 Study Area

Introduction

Goals and Objectives

One of the initial tasks of this study was the establishment of goals and objectives for use as guidelines in developing and evaluating alternative transportation systems. The goals and objectives developed for this study provide a framework for developing the Transportation Plan and maintaining it as a dynamic document. They set forth value judgments and direction to guide local government officials in planning and implementing transportation improvements.

The transportation section of Edmond Plan III, a comprehensive planning document developed by the City, provided the goals and objectives that were the driving force behind the development of the Edmond Transportation Plan. These goals and objectives ensure coordination and consistency with Edmond's land use objectives and with policies already established by the city. The following goals and objectives from the transportation section of Edmond Plan III served as the basis for this transportation plan:

- For the foreseeable future, the private automobile will continue to carry the majority of trips within Edmond, and the City will need to provide reasonable capacity to serve travel demand and to prevent cut-through trips from impacting residential neighborhoods;
- Classify city streets according to their function, so that needed traffic capacity may be preserved, and planned street improvements will be consistent with those functions. (Refer to Chapter 21.04.040 of City Codes for full details);
- Support the land use vision of Edmond Plan III, while reducing use of single-occupant vehicles, making trips shorter, and reducing the need to travel;
- Expand the use of Access Management, the process that provides reasonable access to land development while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity, and speed. Constantly growing traffic congestion, concerns over traffic safety, and the ever increasing cost of upgrading our roads require more active community management of the issue of access to our system of arterial streets. The City of Edmond has adopted a Driveway Policy that includes some Access Management elements;
- Employ Best Transportation Practices wherever possible in community transportation planning and subdivision platting; and,
- Recognize that the transportation system and particularly the roadways are community facilities and must be developed and maintained to serve the entire community.

Study Participants

The development of the Edmond Transportation Plan was a cooperative effort between the City of Edmond and other local governmental agencies and organizations. Edmond City Council served as the Advisory Committee for this study

and provided technical guidance, expertise and review throughout the development of the project. Members of City Council include:

- Saundra G. Naifeh, Mayor
- Wayne Page, Council Member
- Paula Sanford, Council Member
- Charles Lamb, Council Member
- David Miller, Council Member

Purpose and Benefits of Transportation Planning

Transportation planning is the process used by municipalities and other governmental entities to provide for the development of an efficient and appropriate transportation system to meet existing and future travel needs. The primary purpose is to ensure the orderly and progressive development of the urban and rural street system to serve the mobility and access needs of the public. Transportation planning is interrelated with other components of the urban planning and development process.

The Edmond Transportation Plan is a 25 year transportation planning document that provides a framework for addressing the area's transportation needs. The plan will serve as the City's guide for transportation system improvements, including the existing and planned extension of major roadways. The transportation system is comprised of existing and planned freeways/expressways, arterials, collectors and local streets, which could require wider or new rights-of-way for needed improvements, transit services, and bicycle and pedestrian facilities. One objective of the Plan is to ensure the preservation of adequate right-of-way (ROW) on appropriate alignments and of sufficient width to allow the orderly and efficient expansion and improvement of the transportation system to serve existing and future transportation needs.

The benefits provided by effective transportation planning are realized by achieving the following objectives:

- Maximizing mobility while minimizing the negative impacts of street widening and construction on neighborhood areas and the overall community by recognizing where future improvements may be needed and incorporating thoroughfare needs;
- Preservation of adequate rights-of-way for future long-range transportation improvements;
- Making efficient use of available resources by designating and recognizing the major streets that will likely require improvements;
- Minimizing the amount of land required for street and highway purposes;
- Identifying the functional role that each street should be designed to serve in order to promote and maintain the stability of traffic and land use patterns;

Introduction

- Informing citizens of the streets that are intended to be developed as arterial and collector streets, so that private land use decisions can anticipate which streets will become major traffic facilities in the future;
- Providing information on thoroughfare improvement needs, which can be used to determine priorities and schedules in the City's Capital Improvement Program (CIP); and,
- Providing an implementation program to prioritize improvements and identify funding sources.

Elements of the Transportation Plan

The Edmond Transportation Plan delineates a system of thoroughfare classes, representing the location, alignment, and functional relationship for different types of roadways, including freeways, arterial streets, collectors and local streets. It consists of an officially adopted thoroughfare system map, along with supporting design criteria and implementation policies. Typically, thoroughfare system maps indicate the planned extensions of thoroughfares on new alignments where right-of-way needs to be acquired in the future. Development of the Transportation Plan involved careful consideration of the community's growth and traffic patterns, availability of right-of-way and impacts on surrounding land uses.

An implementation program was also developed, which prioritizes improvements for short-term and long-range projects. Order-of-magnitude construction costs were developed for the improvements.

Relationship Between Transportation and Land Use Planning

Coordinating land use and transportation decisions serves as an important role in improving mobility needs, promoting economic development and enhancing quality of life. Recommended future roadway alignments, street cross sections, and the location and design of major intersections will influence future development patterns in a community and potentially benefit or adversely impact existing neighborhoods and developed areas. Transportation improvements require careful consideration of impacts to neighborhood quality and integrity, pedestrian and bicycle mobility and safety, and community aesthetics and corridor quality. Additional considerations include accessibility of shopping and entertainment districts and major public facilities, and linear park and trail opportunities coordinated with the roadway network.

The basic aim of thoroughfare planning is to ensure the orderly and progressive development of roadways to serve mobility and access needs. But such planning is also critical to future land use, housing, environmental protection, public utilities management and other key components of urban and regional planning. Roadway functional classifications, design, and access management strategies must all be geared toward the prospective development, and associated development regulations for the area to be served. This ranges from high-capacity, controlled access facilities for longer distances to local streets, possibly with sidewalks, trails or bikeways, accommodating limited vehicular traffic and encouraging safe, enjoyable short-distance trips close to home or work.

Land use impacts and growth patterns were carefully considered in the development of the Edmond Transportation Plan. The Plan along with other development tools, such as the city's subdivision and zoning ordinances, will help the city effectively coordinate land use and transportation decisions.

PUBLIC INVOLVEMENT

Public involvement is an important component of the Plan and included several activities to involve the general public, public agencies and stakeholders throughout the Plan development process. Public involvement activities center on obtaining meaningful input from key stakeholders and many others on transportation issues in the area.

Public outreach and involvement activities for the Edmond Transportation Plan included the following:

- **Key Person Interviews** –Interviews were held with key agencies in the community, including the University of Central Oklahoma (UCO), the Association of Central Oklahoma Governments (ACOG), Edmond Public Schools and the Central Oklahoma Parking and Transit Authority (COPTA), to solicit input and gather any available information on existing traffic conditions and future growth projections and patterns. Meeting minutes from these interviews are included in **Meeting Minutes.**

- **Presentations to City Council** – City Council served as the advisory committee for the Edmond Transportation Plan. Three meetings were held with City Council at key milestones throughout the plan development process. The purpose of these meetings were to review plan elements, identify transportation issues and improvements, and prioritize improvements.

- **Public Meetings/Open Houses**–A public meeting was held on October 25, 2005 to introduce the Edmond Transportation Plan project and solicit input from the public on key issues and trends in the community. Approximately 50 people attended the meeting and 23 comments were received regarding transportation issues in the City. A second public meeting was held on January 24, 2006 to present the draft Transportation Plan. The presentation and written comments regarding the Transportation Plan from each public meeting are included in **Meeting Minutes**.

Chapter 2
Existing Transportation System

Understanding the existing physical features and transportation system in the City of Edmond is an important step in developing the Transportation Plan and in making recommendations regarding future improvements. Existing environmental and physical features may impact transportation improvements, while the existing street network and traffic patterns serve as the basis in identifying future transportation conditions and needs.

General Features and Topography

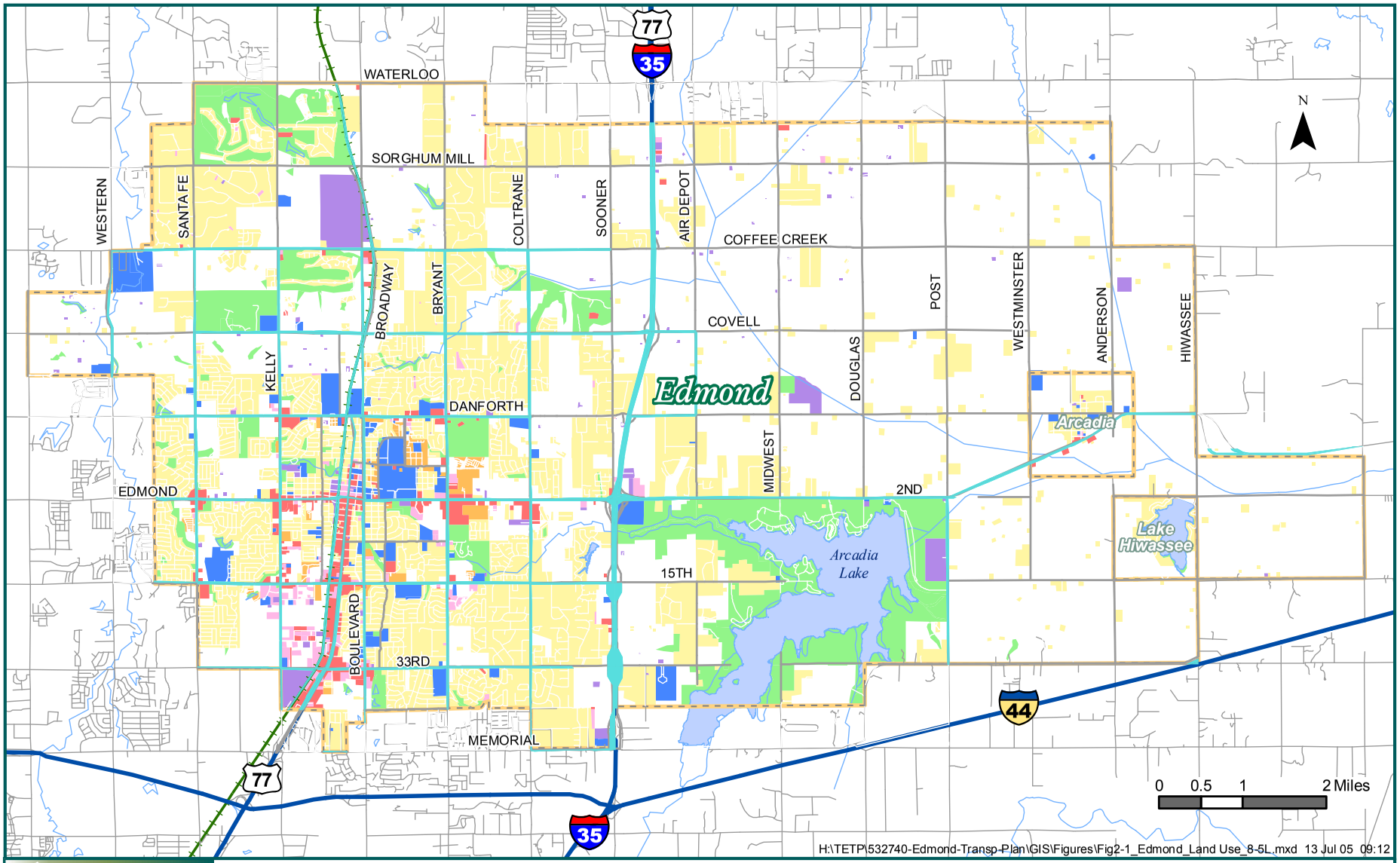
Edmond is located on the north side of the Oklahoma City metropolitan area and covers approximately 87 square miles. The City of Edmond has many unique features that create varying environmental settings throughout the City. Undeveloped areas in the western half of Edmond are predominantly characterized by prairie grasslands or agriculture; whereas the eastern half of the City exhibits large forested areas and rolling topography characteristic of the western edge of the Crosstimbers. The City is underlain by the Garber-Wellington formation, a large source for groundwater in central Oklahoma. Major surface water resources include Lake Arcadia, the Deep Fork River, Spring Creek, Coffee Creek, Soldier Creek, and Chisholm Creek. The City's varying landscape and abundant water resources provide habitat for a wide range of flora and fauna.

Land Use

Future development trends within a community are partially influenced by current land use patterns, development regulations and policy, and a city's future land use plan. A review of existing and proposed land uses within the City of Edmond will help guide projected growth and direct transportation needs within the community.

Over the past decade, the City of Edmond has grown 31 percent from a population of 52,315 in 1990 to 68,315 in 2000. As shown in **Figure 2-1**, the majority of this growth has occurred to the west of I-35, with single family residential homes constituting the primary land use. Commercial development has occurred primarily along the Broadway corridor and along Danforth and 2nd Street/Edmond Road. East of I-35 consists primarily of vacant land with some large lot rural subdivisions. The Arcadia Lake District located south of Edmond Street and east of I-35, is characterized by single family homes, parks, and unimproved open spaces.

The City of Edmond will continue to experience growth and development over the next several decades. The majority of this development, both residential and commercial, is anticipated to continue to occur on the west side of the city. However, based on the City's land use plans, it is anticipated that some growth will occur to the east of I-35, including commercial development along both sides of the I-35 corridor, and commercial development along Air Depot, and residential development throughout the eastern part of the city.



Edmond Transportation Plan

Edmond City Limits

Existing Land Use Classification:

- Single Family Residential
- Multi-Family Residential
- Commercial / Mixed Use
- Office Center
- Institutional
- Industrial
- Parks / Open Space / Flood Plain
- Transportation Corridors

Figure 2-1 Existing Land Use

Existing Conditions

ENVIRONMENTAL & DEVELOPMENT CONSTRAINTS

There are some environmental features that could create constraints to development or warrant additional study. **Figure 2-2** depicts several potential environmental constraints including floodplains, wildlife habitat, historical sites, and hazardous waste sites. There are large floodplains associated with Spring Creek, Coffee Creek, Soldier Creek, the Deep Fork River, and Lake Arcadia that should be recognized for future planning. These water bodies and surrounding wooded areas have been identified by the US Fish and Wildlife Service (USFWS) as areas that could potentially harbor protected bird species at certain times of the year. The USFWS has documented Bald Eagles roosting and feeding during the winter months at Lake Arcadia, although there have been no confirmed nesting sites recorded. Based upon a recommendation from the USFWS, ACOG established a one-mile buffer surrounding the lake to identify potential habitat for federal or state listed species. Planning or development activities in these areas should be sensitive to the potential presence of these species. Historical sites and hazardous waste sites are usually typical occurrences in urbanized areas. Several documented historical sites exist in Edmond, and are primarily associated with the Edmond Road/2nd Street corridor. Several documented hazardous waste sites were identified; however, issues at each site have been resolved in accordance with state and federal regulations.

AREA ROADWAY SYSTEM

The City of Edmond is served by a network of roadways which include freeway and tollway facilities, one U.S. highway, one state highway, and an arterial grid system that serves as the basic transportation network in the city. The Oklahoma Department of Transportation (ODOT) maintains the Interstates, U.S. Highways, and other state roadways located in this area and the Oklahoma Turnpike Authority manages the turnpike system. The respective city and county agencies maintain the other roadways. Within the study area, primary roadways range from a six-lane Interstate freeway, I-35, to two-lane local streets. Existing travel lanes for the roadway network are shown in **Figure 2-3**.

Freeway and Tollway Facilities

The primary freeway that serves the City of Edmond is I-35. It travels from the U.S-Mexico border through Texas, Oklahoma, the central plains states, and terminates in Minnesota. I-35 traverses north-south just east of the urban area of Edmond and provides access to downtown Oklahoma City to the south. It is a controlled access facility with grade-separated interchanges at several arterial crossings, and has a frontage road system on the east and west sides of the freeway between 33rd Street and Edmond Road/2nd Street.

Within the city limits of Edmond, I-35 is an asphalt roadway with a posted speed limit of 70 miles per hour (mph). North of Edmond Road/2nd Street, the facility is a four-lane divided highway with an outside shoulder. South of Edmond Road/2nd Street, the facility is a six-lane divided highway with inside and outside shoulders and two-way frontage roads of one to two lanes in each direction.

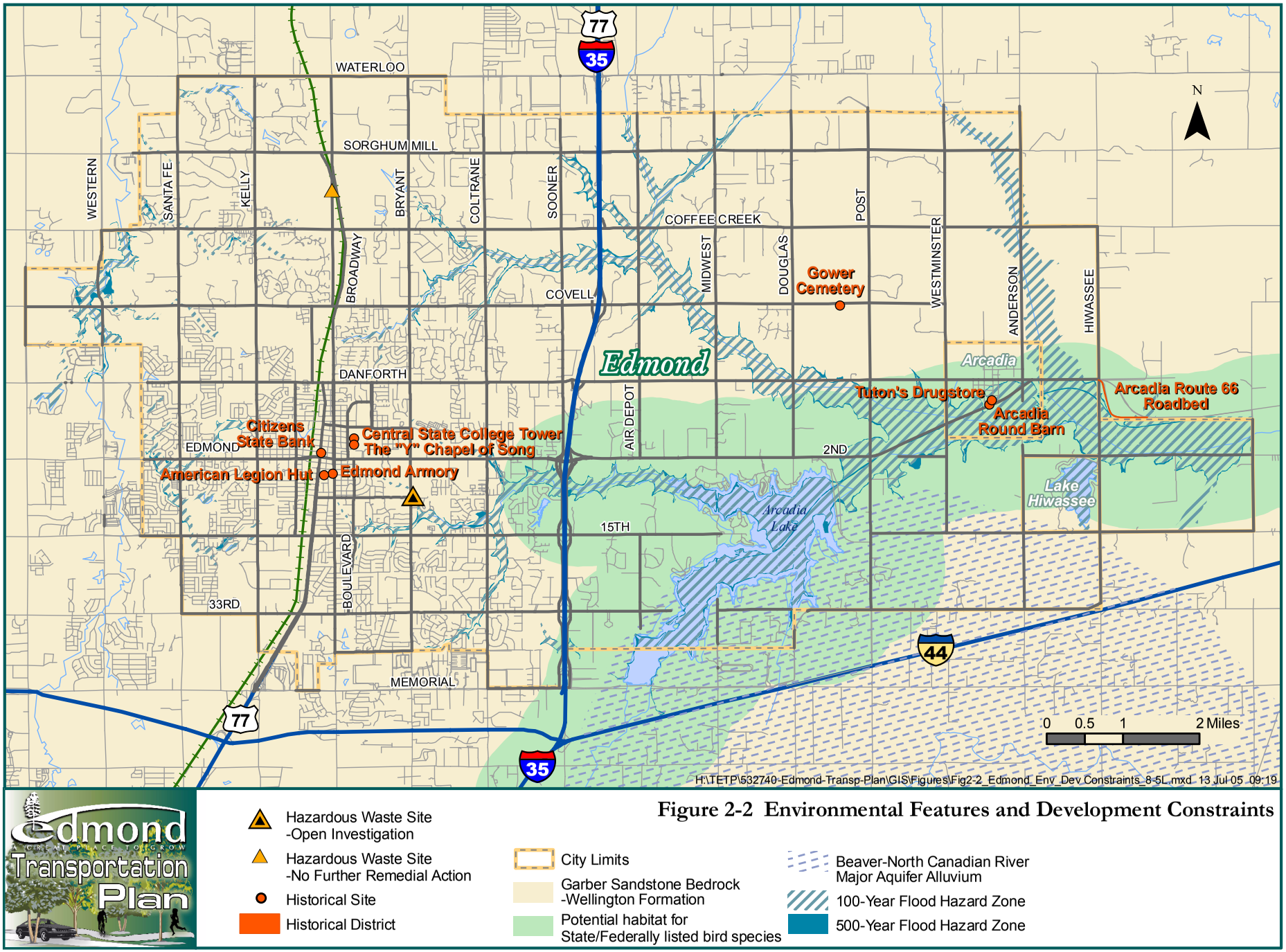


Figure 2-2 Environmental Features and Development Constraints

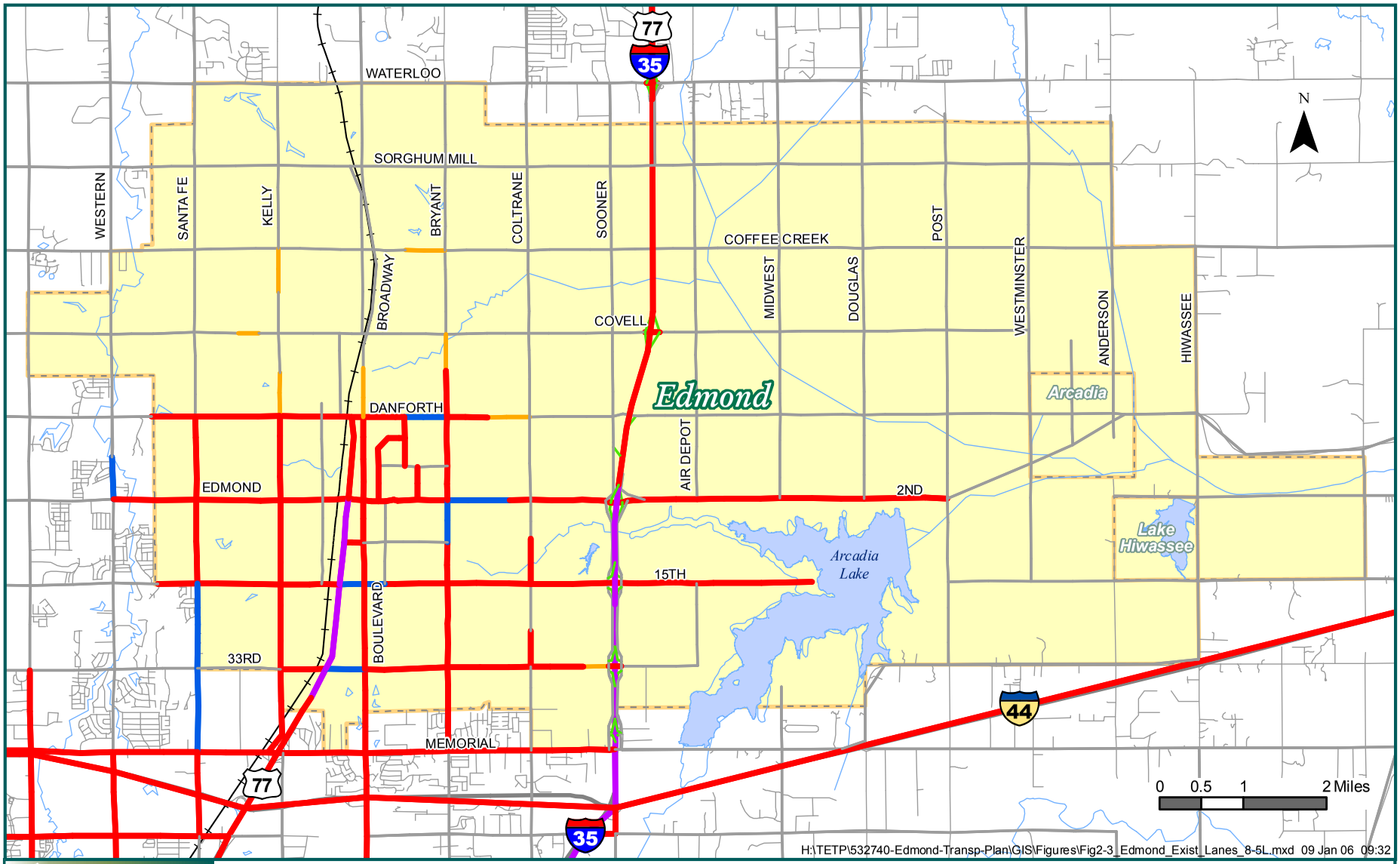


Figure 2-3 Existing Roadway Travel Lanes

- 6-Lane Roadway
- 5-Lane Roadway
- 4-Lane Roadway
- 3-Lane Roadway
- 2-Lane Roadway
- 1-Lane Roadway
- City Limits

The City of Edmond is also within close proximity to I-44 (Turner Turnpike), a mileage-based toll facility that traverses in an east-west direction extending east from I-35 towards Tulsa. The John Kilpatrick Turnpike extending west of the I-35/Turner Turnpike interchange is a northern bypass around Oklahoma City.

U.S. and State Highways

U.S. Highway 77 serves the southern urban core of the City of Edmond as S. Broadway, a western parallel to the I-35 corridor. US 77 is a six-lane divided arterial south of 2nd Street with posted speed limits of 35-45 mph. S. Broadway also forms an arterial pair with Boulevard Street, and is considered the primary north-south arterial in Edmond. In the central urban area, U.S. Highway 77 departs S. Broadway and traverses east-west as Edmond Road/2nd Street, then joins I-35, returning to the north-south orientation. Edmond Road/2nd Street serves as the primary east-west arterial between S. Broadway and I-35 and is a four-lane undivided roadway with posted speed limits between 30-45 mph.

Arterials/Major Collectors

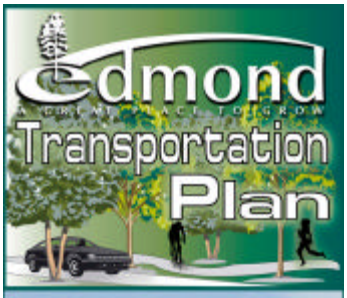
The road network for the City of Edmond primarily consists of an arterial/major collector grid system. The arterial/major collector system connects residential neighborhoods within each grid to retail centers and special generators. Edmond's arterial/major collector roadways range from two-lane undivided paved streets to four-lane divided streets with curbs and gutters. The following table lists arterials in Edmond by direction of travel.

Table 2-1
Arterials/Major Collectors

East – West	North – South
Waterloo Road	Santa Fe Avenue
Sorghum Mill Road	Kelly Avenue
Coffee Creek Road	Bryant Avenue
Covell Road	Coltrane Road
Danforth Road	Air Depot Street
15th Street	Midwest Boulevard
33rd Street	Douglas Boulevard
2nd Street/Edmond	Post Road
	Boulevard
	S. Broadway

EXISTING FUNCTIONAL CLASSIFICATION

Functional classification of transportation facilities describes the hierarchical arrangement and interaction between various roadways. Classification is based on each roadway's functional role in the overall network, including traffic movement and access. These classifications may change over time, as the function of roadways changes to serve different land uses or other transportation facilities. As an area becomes more developed, roads that have previously been classified in one category may be reclassified to a higher category.



The current functional classification system for the City of Edmond, is shown in **Figure 2-4**, and is described by the following categories:

Freeways

Freeway facilities, including interstate highways, freeways, and expressways, provide for the rapid and efficient movement of large volumes of traffic between regions and across the urban area. Direct access to abutting property is not an intended function of these facilities. Design characteristics support the function of traffic movement by providing multiple travel lanes, a high degree of access control, and few or no intersections at grade.

Tollways

Tollway facilities generally serve the same purpose as freeway facilities with access control and goods and traffic movement between major roadways. However, access control and traffic flow is managed through toll plazas collecting tolls along the main lanes and access ramps of the tollway.

Arterial Streets

Arterials primarily provide for traffic movement with a secondary function being the provision of direct access to abutting property. Major arterials typically serve as connections between major traffic generators and land use concentrations, and facilitate large volumes of through traffic traveling across the community. Minor arterials typically serve as connections between local/collector streets and major arterials, and facilitate the movement of large traffic volumes over shorter distances within the community. Because direct access to abutting property is a secondary function of arterial streets, access should be carefully managed to avoid adverse impacts on the movement function intended for these facilities.

Collector Streets

Collector streets provide for a balance of the traffic movement and property access functions. Traffic movement is often internal to local areas and connects residential neighborhoods, parks, churches, etc., with the arterial street system. As compared to arterial streets, collector streets accommodate smaller traffic volumes over shorter distances.

Local Streets

Local streets function to provide access to abutting property and to collect and distribute traffic between parcels of land and collector or arterial streets. The primary function of local streets is to provide access, so travel speeds and traffic volumes are low and travel distances on local streets are short.

EXISTING TRAFFIC CONTROL

Facilitation of traffic flow on the roadway network is provided through the application of traffic control devices such as traffic signals, traffic signs, and pavement markings. Of these, traffic signals have the greatest impact on traffic flow and roadway capacity. The City of Edmond has approximately 63 traffic signals within the city limits.

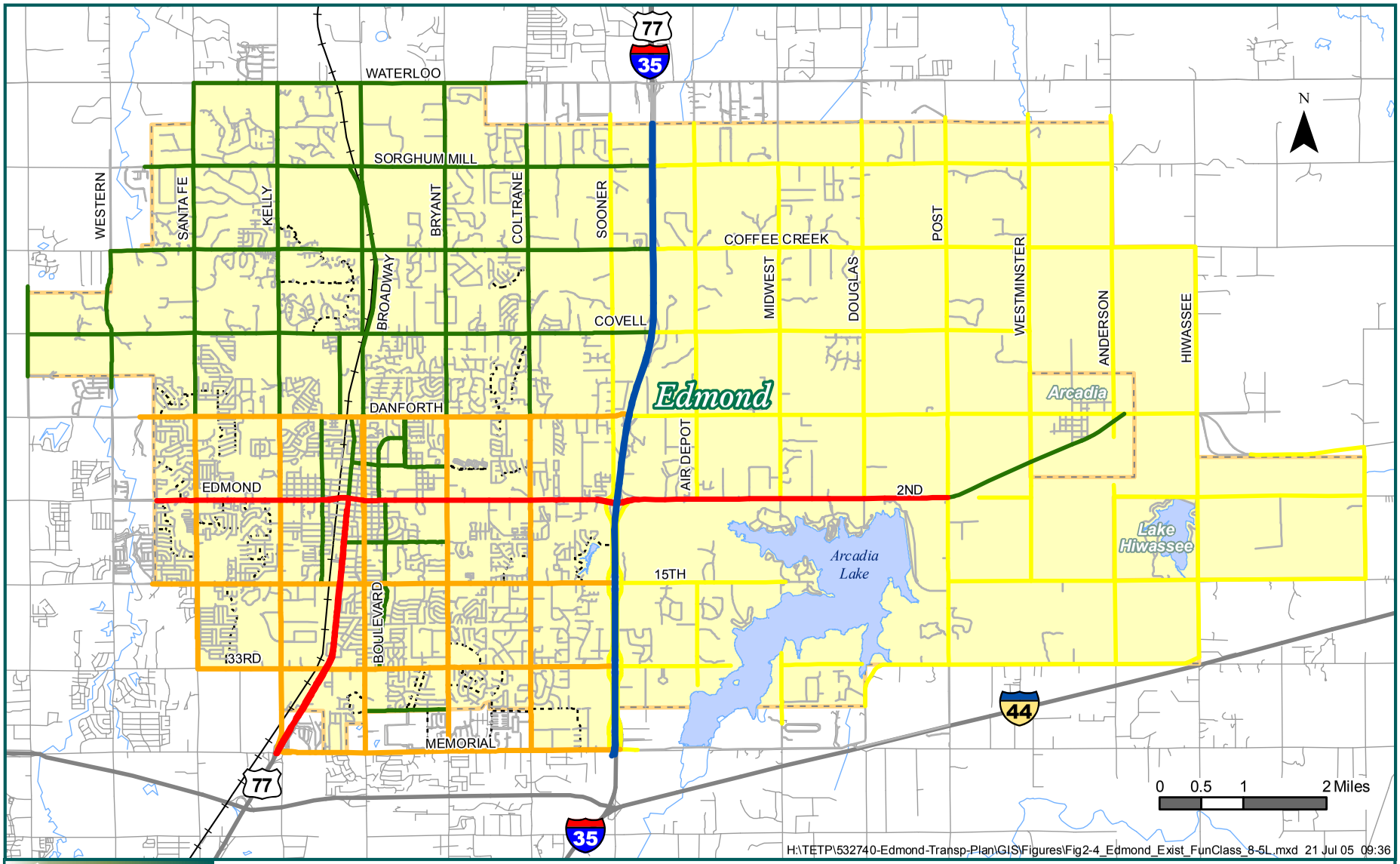
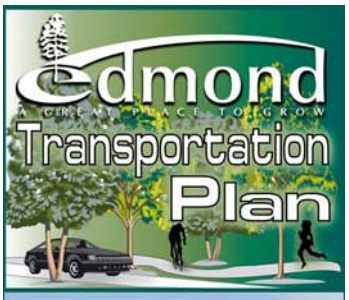


Figure 2-4 Existing Functional Classifications

- Interstate
- Major Arterials
- Minor Arterials
- Major Collectors
- Minor Collectors
- Local Streets
- Recreational Roads
- City_Limits

Source: City of Edmond

Existing Conditions



The City of Edmond maintains traffic signals throughout the city. Arterial corridors with several traffic signals include Danforth, 2nd Street/Edmond Road, 15th Street, 33rd Street, Kelly Avenue, Broadway, Boulevard and Bryant Avenue. **Figure 2-5** identifies existing traffic signal locations within the City of Edmond.

TRAFFIC VOLUMES

Figure 2-6 displays existing daily traffic volumes along major roadways in the study area. These volumes were derived from a number of sources including ODOT and the City of Edmond. As shown, existing daily traffic volumes along major roadway facilities within the study area range from 44,000 vehicles per day (vpd) on I-35, south of 2nd Street to 300 vpd along 33rd Avenue, in the eastern part of the city. Traffic volumes along the most heavily traveled roadways are discussed below:

I-35 – Average daily traffic volumes along I-35 range from 36,200 vpd between 2nd Street and Danforth Road to 44,400 vpd between 15th Street and 2nd Street.

2nd Street/Edmond Road – 2nd Street is one of the most heaviest traveled arterials in the City with average daily traffic volumes ranging from 23,300 vpd between Kelly Avenue and Boulevard to 6,600 vpd towards the eastern edge of the city. Traffic volumes within the vicinity of the University (between Bryant and Boulevard) are 21,700 vpd.

US 77/Broadway – Traffic volumes range from 45,900 vpd at the southern part of the study area, to 31,500 vpd north of 15th Street. In the northern part of the city, traffic volumes along Broadway are 6,700 vpd.

Table 2-2 identifies daily traffic volume counts for 1994 and 2004 along selected segments of major roadways in the Edmond area. As shown, growth in traffic has ranged from an annual increase of 1.4 percent on Bryant Avenue between 2nd and 15th Streets to 16.9 percent along Covell between Bryant and Coltrane. The majority of roadways experienced an annual growth rate of 2 to 5 percent, with one segment along Broadway experiencing a slight decline in traffic.

Table 2-2
Historic Traffic Volumes

Street Location	From Intersection	To Intersection	1994 ADT	2004 ADT	Annual % Increase
33rd Street	Santa Fe	Kelley	7,795	11,582	4.0%
33rd Street	Kelley	S. Broadway	11,464	16,888	3.9%
15th Street	Bryant	Coltrane	7,887	11,461	3.8%
Covell	Western	Santa Fe	1,136	3,116	10.6%
Covell	Bryant	Coltrane	1,527	7,261	16.9%
S. Broadway	33rd Street	15th Street	37,483	44,361	1.7%
S. Broadway	15th Street	2nd Street	31,572	31,473	0.0%
N. Broadway	Covell	Coffee Creek	5,330	6,704	2.3%
Bryant	33rd Street	15th Street	11,032	17,200	4.5%
Bryant	15th Street	2nd Street	17,887	20,638	1.4%
Coltrane	15th Street	33rd Street	4,197	5,569	2.9%

Source: City of Edmond, 2004

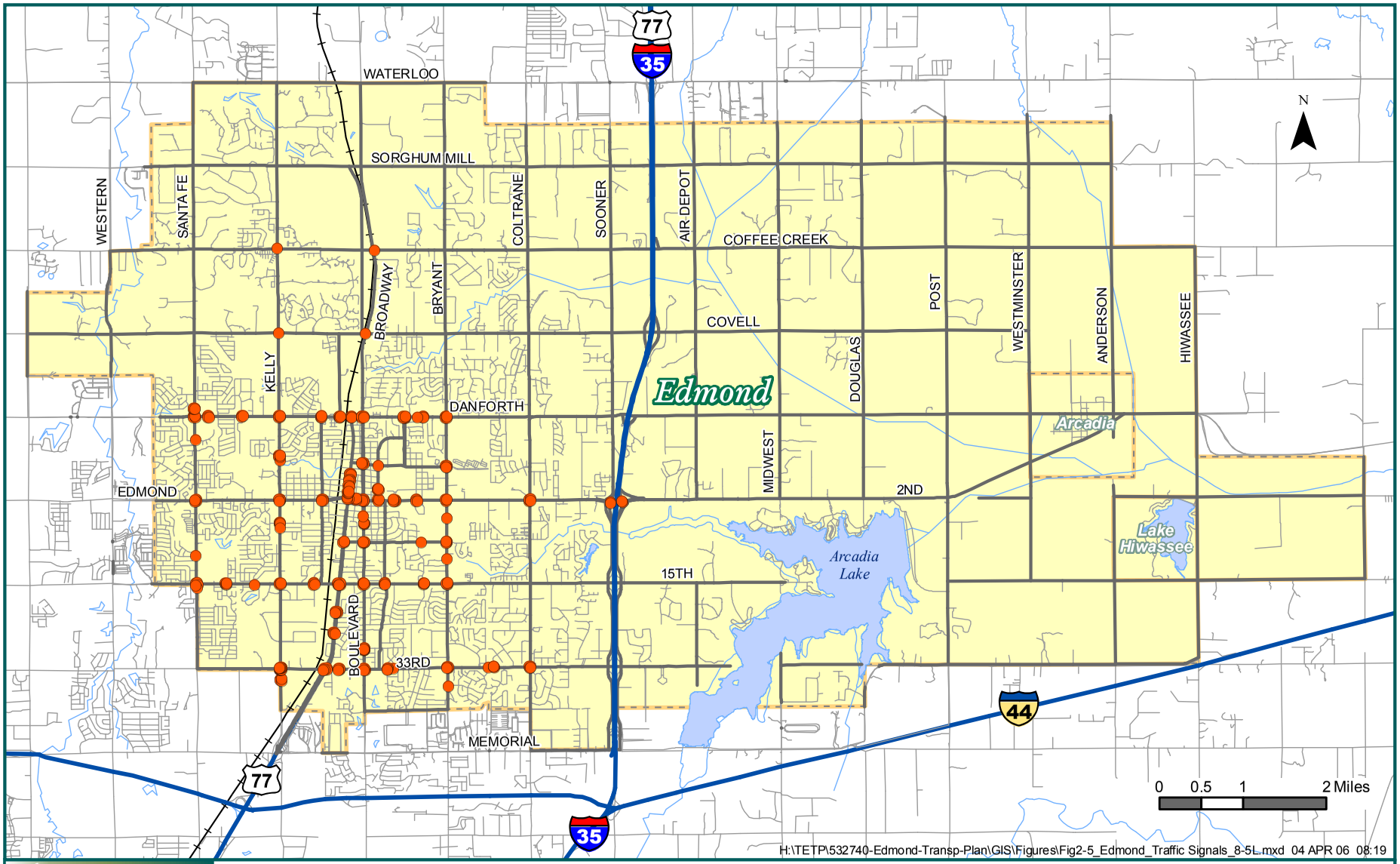


Figure 2-5 Traffic Signals

Traffic Signal

Edmond City Limits

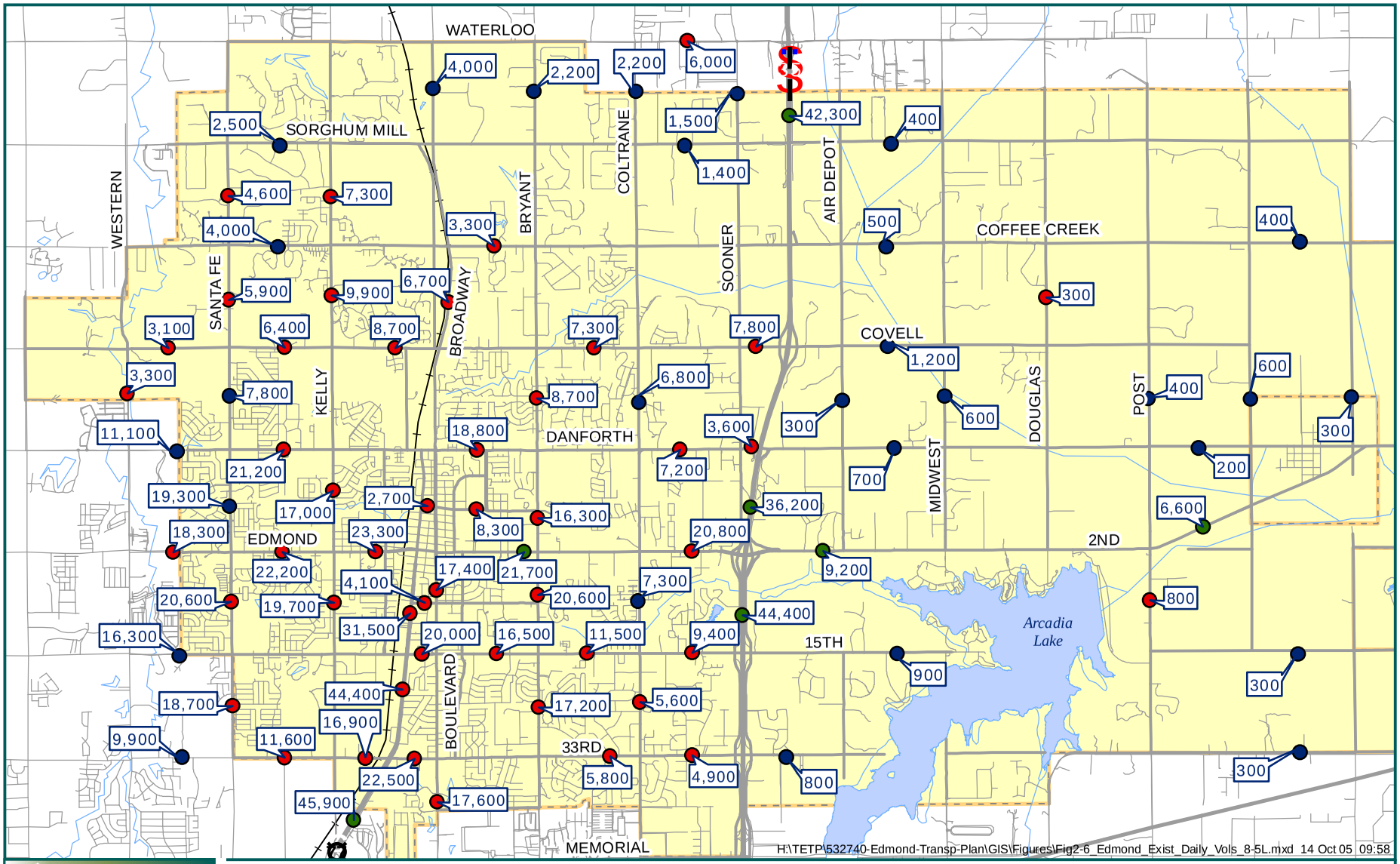


Figure 2-6 Existing Daily Traffic Volumes

1,000 Two-Way 24-Hour Traffic Volumes

- 2003 24-hour traffic counts from ODOT
- 2004 24-hour traffic counts from the City of Edmond
- 2005 24-hour traffic counts from the City of Edmond

Table 2-3 displays peak hour traffic characteristics for selected roads in the study area. Peak hour volumes represent the average number of vehicles per hour during the morning (7 to 9 AM) and evening (4 to 6 PM) peak hours. As shown the greatest peak hour volumes occur on S. Broadway between 33rd Street and 15th Street and between 15th Street and 2nd Street. The K-factor, which is the proportion of the total 24-hour volume that occurs during the peak hour, and the directional distribution, which is the percent of the two-way peak hour volume that travels in the peak direction, are also identified in **Table 2-3**.

EXISTING RAILROAD FACILITIES

The City of Edmond has one railroad track that parallels the S. Broadway corridor, heading north from Oklahoma City. This rail line is operated by Burlington Northern and Santa Fe (BNSF) railroads, and connects their Fort Worth hub with rail lines in Kansas. Within Edmond there are 13 railroad crossings, only one of which is grade separated (2nd Street). Two other grad separated crossings are located in close proximity to the north city limit (Waterloo Road) and the south city limit (Kilpatrick Turnpike). The majority of the remaining crossings have active warning devices, including gates and flashing lights.

UNIVERSITY OF CENTRAL OKLAHOMA

The University of Central Oklahoma (UCO) began in December 1890 as a training facility for teachers, and was considered the first higher educational facility in Oklahoma. After undergoing several collegiate changes, UCO became a formal university in July 1991. UCO currently provides undergraduate and graduate studies in the areas of business, arts and liberal arts, education, and math and science, and enrolls about 16,000 students and 1,200 employees (including 600 faculty and staff).

UCO is considered in the top seven colleges within its class size, with 7,000 students residing locally in Edmond (1,800 students in campus housing and 200 in married housing) and 9,000 students commuting mostly from the Oklahoma City metropolitan area. In fact, most commuters travel from south of Edmond, via I-44, S. Broadway and Boulevard, and access parking lots on the east side of campus using 2nd Street. As a result, traffic congestion occurs regularly at the S. Broadway and Boulevard intersections along 2nd Street.

UCO has a fairly equal distribution of commuting students attending morning, afternoon, and evening classes. However, most of the traffic congestion occurs during the 8:30 to 9:00 AM peak time period and the 11:30 AM to 1:00 PM transition period for the afternoon classes. Bicycle activity has increased in the last year, and students are able to use the Eddy trolleys and the express route as transit alternatives for commuting to and from the Oklahoma City metropolitan area.

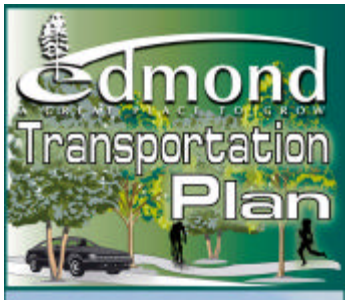


Table 2-3
Peak Hour Volumes

Street Location	From Intersection	To Intersection	Volume	AM Peak		PM Peak		AM Peak		PM Peak	
				NB/EB Volume	SB/WB Volume	NB/EB Volume	SB/WB Volume	K-Factor	Dir. Dist.	K-Factor	Dir. Dist.
15th Street	S. Broadway	Boulevard	19,994	612	635	1,044	826	0.06	0.51	0.09	0.56
15th Street	Boulevard	Bryant	16,542	668	501	809	788	0.07	0.57	0.10	0.51
15th Street	Coltrane	I-35	9,404	518	315	506	561	0.09	0.62	0.11	0.53
2nd Street	Coltrane	I-35	20,835	647	1,008	929	1,095	0.08	0.61	0.10	0.54
33rd Street	Santa Fe	Kelly	11,582	626	259	410	694	0.08	0.71	0.10	0.63
33rd Street	S. Broadway	Boulevard	22,528	525	641	1,139	970	0.05	0.55	0.09	0.54
33rd Street	Coltrane	I-35	4,920	287	139	233	345	0.09	0.67	0.12	0.60
Ayers	University	Chowning	8,290	298	254	428	220	0.07	0.54	0.08	0.66
Ayers	N. Broadway	Boulevard	2,657	51	97	75	160	0.06	0.66	0.09	0.68
Boulevard	15th Street	2nd Street	17,449	571	574	968	689	0.07	0.50	0.09	0.58
S. Broadway	33rd Street	15th Street	44,361	1,354	1,256	2,101	1,472	0.06	0.52	0.08	0.59
S. Broadway	15th Street	2nd Street	31,473	1,099	1,180	1,580	995	0.07	0.52	0.08	0.61
N. Broadway	Covell	Coffee Creek	6,704	143	467	327	210	0.09	0.77	0.08	0.61
Bryant	15th Street	2nd Street	20,638	684	578	977	887	0.06	0.54	0.09	0.52
Bryant	2nd Street	Danforth	16,253	635	549	895	686	0.07	0.54	0.10	0.57
Bryant	Danforth	Covell	8,696	171	462	395	267	0.07	0.73	0.08	0.60
Coffee Creek	Boulevard	Hutton	3,315	165	146	164	143	0.09	0.53	0.09	0.53
Coltrane	15th Street	33rd Street	5,569	140	201	272	283	0.06	0.59	0.10	0.51
Covell	Western	Santa Fe	3,116	156	156	181	199	0.10	0.50	0.12	0.52
Covell	Kelly	N. Broadway	8,703	412	208	306	442	0.07	0.66	0.09	0.59
Covell	Bryant	Coltrane	7,261	297	293	270	410	0.08	0.50	0.09	0.60
Danforth	Santa Fe	Kelly	21,228	755	420	985	1,033	0.06	0.64	0.10	0.51
Danforth	Boulevard	Bryant	18,792	726	683	882	870	0.07	0.52	0.09	0.50
Danforth	Coltrane	Sooner	7,211	555	166	294	513	0.10	0.77	0.11	0.64
Douglass	Coffee Creek	Covell	284	14	15	15	5	0.10	0.52	0.07	0.75
Edmond Road	Santa Fe	Kelly	22,178	1,011	487	713	1,096	0.07	0.67	0.08	0.61
Edmond Road	Kelly	S. Broadway	23,335	1,027	618	905	1,146	0.07	0.62	0.09	0.56
Edmond Road	Western	Santa Fe	18,282	720	466	851	861	0.06	0.61	0.09	0.50
Kelly	15th Street	Edmond Road	19,711	349	1,121	1,182	761	0.07	0.76	0.10	0.61
Kelly	Edmond Road	Danforth	17,015	369	778	912	593	0.07	0.68	0.09	0.61
Kelly	Coffee Creek	Sorghum Mill	7,333	265	420	364	329	0.09	0.61	0.09	0.53
Santa Fe	Covell	Coffee Creek	5,872	91	278	358	179	0.06	0.75	0.09	0.67
Santa Fe	Coffee Creek	Sorghum Mill	4,566	53	229	291	147	0.06	0.81	0.10	0.66
Waterloo	Coltrane	Sooner Road	6,009	365	151	213	328	0.09	0.71	0.09	0.61

EDMOND PUBLIC SCHOOLS

The Edmond Public School System has grown significantly over the past 35 years. From an enrollment of about 4,000 students in 1970, the school system has become the 5th largest school district in Oklahoma with about 18,500 students. Currently, the Edmond School District has the following number of schools and enrollment by school type: 14 elementary schools (with 8,436 students), 5 middle schools (with 4,137 students), and 3 high schools (with 5,945 students). The high schools themselves each have a capacity of 2,600 students, with North High School serving the area north of Danforth Road, Memorial High School covering the area south of Danforth and east of Kelly Road, and Santa Fe High School serving the area south of Danforth and west of Kelly.

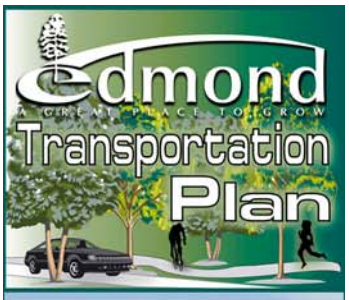
The school bus system consists of two daily route systems; the first route system covers both high schools and middle schools and is completed by 7:30 AM, and the second route for elementary schools finishes by 9:30 AM. The bus system contains 90 buses that have a morning route between 6:45 and 9:30 AM and an afternoon route between 2:00 and 4:30 PM, and 25 special education buses that run throughout the day. Bus service is not provided to the district's two choice schools, Clegern and Russell Dougherty Elementary.

The Edmond School District provided data for school enrollment during the Spring 2005 semester, and a set of one-day bus rider counts for each bus route between 2003 and early 2005. As shown in **Table 2-4**, approximately 55 percent of enrolled students ride the bus to school with middle school students having the highest ridership rate of nearly 70 percent. Analysis of the data also shows that the three school zones (Memorial, North, and Santa Fe) have a fairly equal number of bus riders for each zone (within a range of 3,000 to 4,000 riders).

Table 2-4
Percentage of Enrolled Students that Commute by Bus

School Type	Enrolled Students	Bus Rider Counts	Percent Bus Riders
High Schools	5,784	2,535	43.8 %
Middle Schools	4,139	2,871	69.4 %
Elementary Schools	8,098	4,494	55.5 %
TOTALS	**18,021**	**9,900**	**54.9 %**

Source: Edmond Public Schools



EXISTING TRAFFIC OPERATIONS

Existing traffic operations are evaluated by conducting a capacity/level-of-service analysis. Roadway capacity is defined as the maximum number of vehicles that can be accommodated on a roadway facility during a particular time period under prevailing roadway, traffic, and control conditions. An important result of a capacity analysis is the determination of level-of-service.

Level-of-Service (LOS) is a qualitative measure of operating conditions at a location and is directly related to the volume-to-capacity ratio along roadways, as shown in **Table 2-5**. LOS is given a letter designation ranging from A to F (free flow to heavily congested), with LOS D considered in most urban areas as the limit of acceptable operation. For example, LOS can be related to the grading scale of a report card: A – Excellent, B – Good, C – Average, D – Acceptable, E – Needs improvement, and F – Failing. Utilizing procedures identified in the 2000 Highway Capacity Manual and the available traffic data identified previously, level-of-service was determined for principal roadways within the study area.

Figure 2-7 identifies existing LOS for principal roadways within the City of Edmond. As shown, the majority of roadways are operating at a LOS of A to D, meaning that traffic volumes are below capacity and the roadways are providing acceptable traffic operations. However, there are several roadway segments, particularly in the southwest part of the city, that are operating at LOS E conditions, meaning that they are near capacity. These roadways include portions of Covell, Danforth, 2nd Street, Broadway, Santa Fe, Kelly, and Bryant. One roadway segment within the city is operating at LOS F, meaning it exceeds capacity. This segment is Broadway between the city limits boundary and 15th Street.

Table 2-5
Level-of-Service Definitions for Principal Roadways

Source: Adapted from Highway Capacity Manual, Transportation Research Board, 2000

Level-of-Service (LOS)	Maximum Volume-to-Capacity Ratio (v/c)			Description
	Two-Lane Roadways	Multi-Lane Arterials	Freeways	
A	0.10	0.35	0.35	Very low vehicle delays, traffic signal progression extremely favorable, free flow, most vehicles arrive during given signal phase
B	0.25	0.50	0.50	Good signal progression, more vehicles stop and experience higher delays than for LOS A.
C	0.40	0.65	0.70	Stable flow, fair signal progression, significant number of vehicles stop at signals.
D	0.60	0.80	0.85	Congestion noticeable, longer delays and unfavorable signal progression, many vehicles stop at signals.
E	1.00	1.00	1.00	Limit of acceptable delay, unstable flow, poor signal progression, traffic near roadway capacity, frequent cycle failures.
F	> 1.00	> 1.00	> 1.00	Unacceptable delay, extremely unstable flow, and congestion, traffic exceeds roadway capacity, stop-n-go conditions.

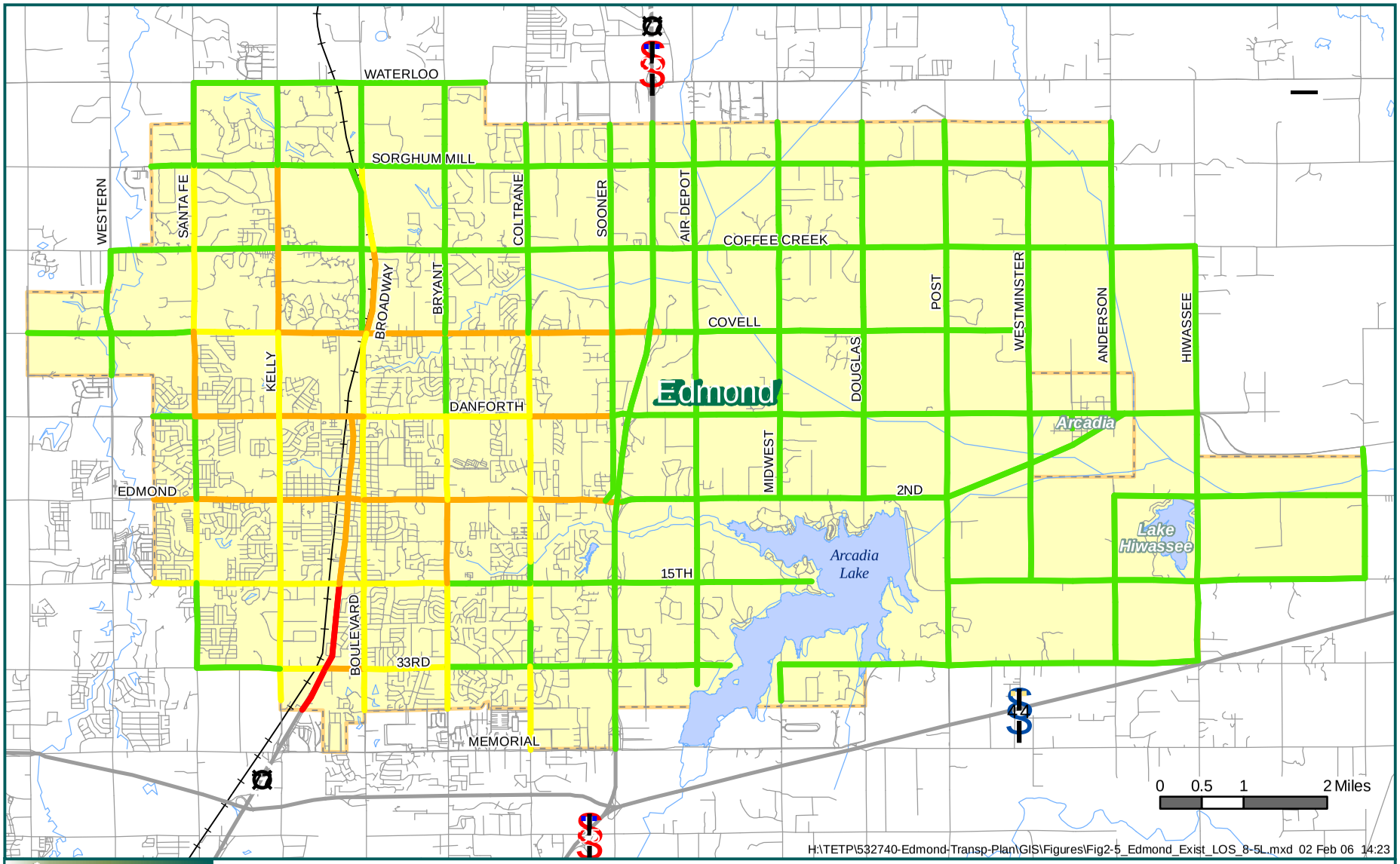


Figure 2-7 Existing Roadway Level-of-Service (LOS)

- LOS F
- LOS E
- LOS D
- LOS A-C

TRANSIT SERVICES

The City of Edmond receives urban transit service from the Central Oklahoma Transit and Parking Authority (COTPA), the metropolitan transit authority for the greater Oklahoma City region. The COTPA metro transit service has been in operation for the last thirty years and has a service area that includes more than 800,000 persons throughout the Oklahoma City metropolitan area. As for the Edmond urban area, COTPA provides two types of transit services: an express route connecting Edmond to several Oklahoma City locations, and trolley routes connecting various activity centers within Edmond.

COTPA's Route 37 (the Edmond Express route) provides limited-stop service from stops in downtown Edmond and the University of Central Oklahoma campus to destinations like the State Capitol and Medical Center in downtown Oklahoma City and the convention center and other business buildings along I-40. The Edmond Express operates between the hours of 6:30 AM to 6:30 PM on weekdays (no Saturday service provided), with 30-minute headways for peak service and approximately 1-hour headways during off-peak service. Regular fares for the express service are $2.25 per person (one-way), while elderly and disabled persons receive a reduced fare.

There are five trolley routes (nicknamed the Eddy) that operate within the City of Edmond, including two UCO shuttle loops, as shown in **Figure 2-8**. The Eddy trolleys provide connections from downtown and UCO to retail/activity centers at Danforth and Santa Fe and 2nd and Bryant Streets. The Maroon/Gold route operates with 60-minute headways between 7:00 AM and 5:30 PM daily and 10 AM and 5 PM on Saturdays, while the Green route has 30-minute headways from about 2 PM to 7 PM on weekdays (and starts at 10 AM on Saturdays). In addition, the Green route functions as the UCO shuttle route from about 7 AM to 2 PM on weekdays only. The Eddy trolleys charge a regular fare of 50 cents per person, and special 25 cent fares for elderly and disabled persons, while UCO students and staff are not charged a fare if they provide a valid ID.

Average daily ridership data by route and patron was summarized from COTPA's current 10-month ridership reports for the express and trolley routes. Based on service reports between July 2004 and April 2005, the Edmond Express route recorded an average ridership of about 97 riders per day, with nearly 74% of all riders paying by Rider Pass, 12% by cash fares, 11% through student ID, and roughly 3 percent were special fares for the elderly and disabled riders. Conversely, the Eddy trolleys recorded an average weekday ridership of about 78 riders per day, while Saturday service averaged 73 riders per day during the same time period.

Additionally, the Eddy trolleys recorded 39 riders per weekday on the Green route, while the Gold and Maroon routes recorded 22 and 16 riders per weekday respectively. **Table 2-6** presents the average daily ridership per month for each transit service type, based on COTPA's 10-month ridership reports. As shown in the table, monthly ridership remains steady on the Edmond Express, while the trolley ridership increases during months when schools are in session versus the summer and other holiday months.

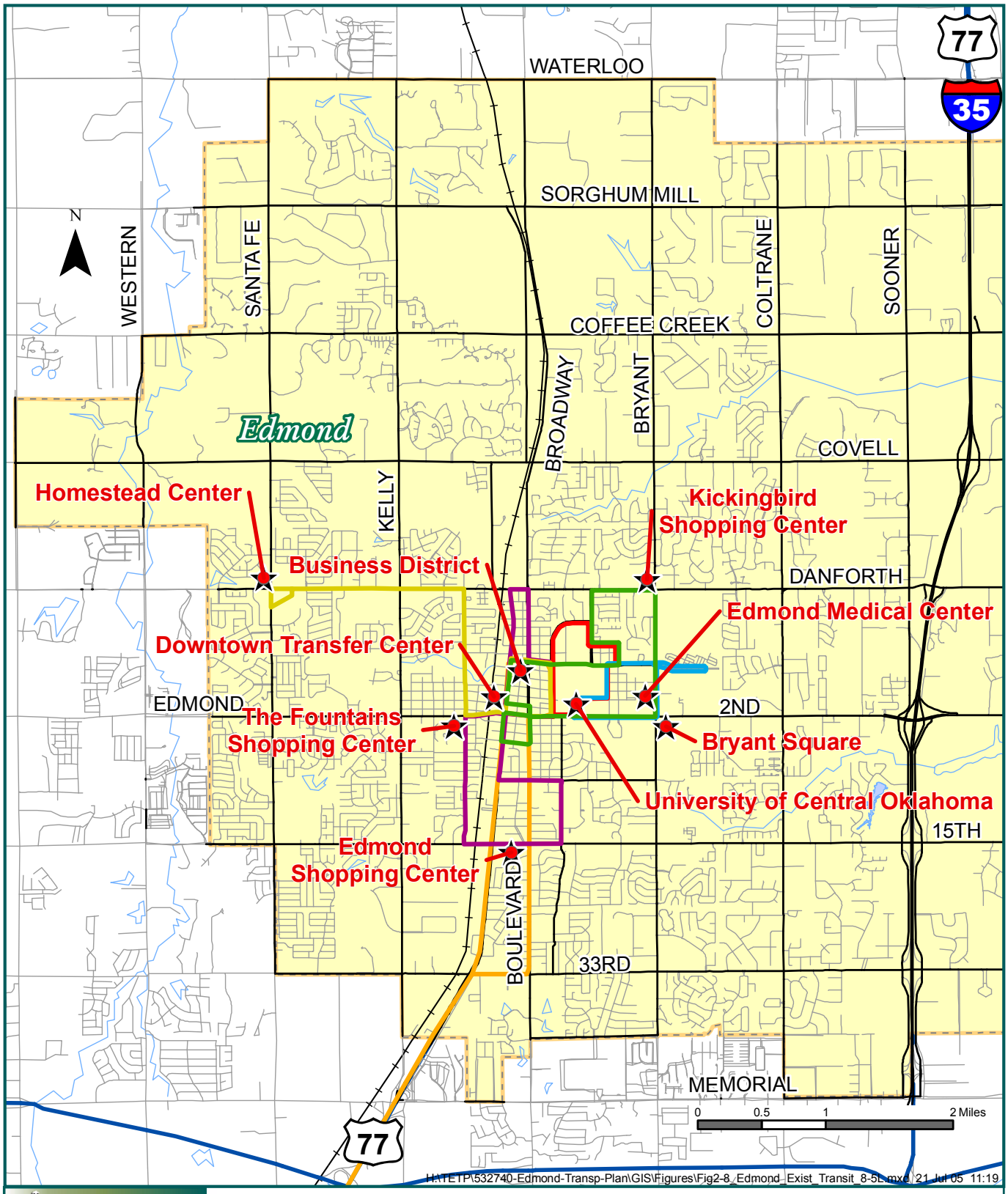


Figure 2-8 Existing Public Transit Service

Edmond City Limits
Transit Activity Center
Edmond Express

Eddy Trolley Service:
Gold Line
Green Line
Maroon Line
UCO Loop 1
UCO Loop 2

Table 2-6
Average Daily Ridership of Edmond Transit Services

Daily Ridership by Month	Express (Weekday)	Trolley (Weekday)	Trolley (Saturday)
July 2004	93	66	46
August 2004	96	68	103
September 2004	102	76	82
October 2004	105	81	73
November 2004	99	77	79
December 2004	83	66	69
January 2005	98	67	47
February 2005	100	84	72
March 2005	96	83	83
April 2005	98	109	80
OVERALL	**97**	**78**	**73**

Source: COTPA, 2005

In April 2005, COTPA conducted choice-rider surveys aimed at employment locations (like schools, businesses, and medical facilities). The transit survey was mostly answered by Edmond residents, with some participants expressing interest in current transit services. However of those who responded, few had actually ridden the Edmond Express route to work. Results of the survey showed work arrival times occurring between 6:30 and 9:00 AM and departure times from 2:00 to 5:30 PM, with some respondents willing to change their commute time to ride the express route.

BICYCLE AND PEDESTRIAN INFRASTRUCTURE

Bicycle and pedestrian facilities are important components of the city's transportation system. They serve as alternative modes of travel and provide for recreational opportunities for local residents.

Figure 2-9 identifies existing and proposed bicycle and pedestrian improvements throughout the City of Edmond. As shown, exiting trails and bike paths are currently limited and located within community parks. However, the Edmond Plan III proposes an extensive system of trails and sidewalks linking parks, key attractions and generators in the community. The proposed system will help connect bicyclists and pedestrians to park facilities around Arcadia Lake, the JL Mitch and Hafer community parks, the University of Central Oklahoma, and other activity centers.

TRAFFIC ACCIDENTS

The City of Edmond has collected data on the top 25 intersections for accidents including information about the number of collisions per intersection, accident rates, collision types, and possible remedial actions.

As shown in **Table 2-7**, nearly half of the top 25 intersections have experienced more than 20 collisions occurring at a particular intersection. The majority of the incidents occurred in the western portions of Edmond along primary arterial corridors providing access to the Oklahoma City metropolitan area. The intersections of 2nd and Bryant, 33rd and Broadway, 15th and Broadway, and Danforth and Kelly, have experienced the highest number of accidents each with at least 40 or more collisions in 2004.

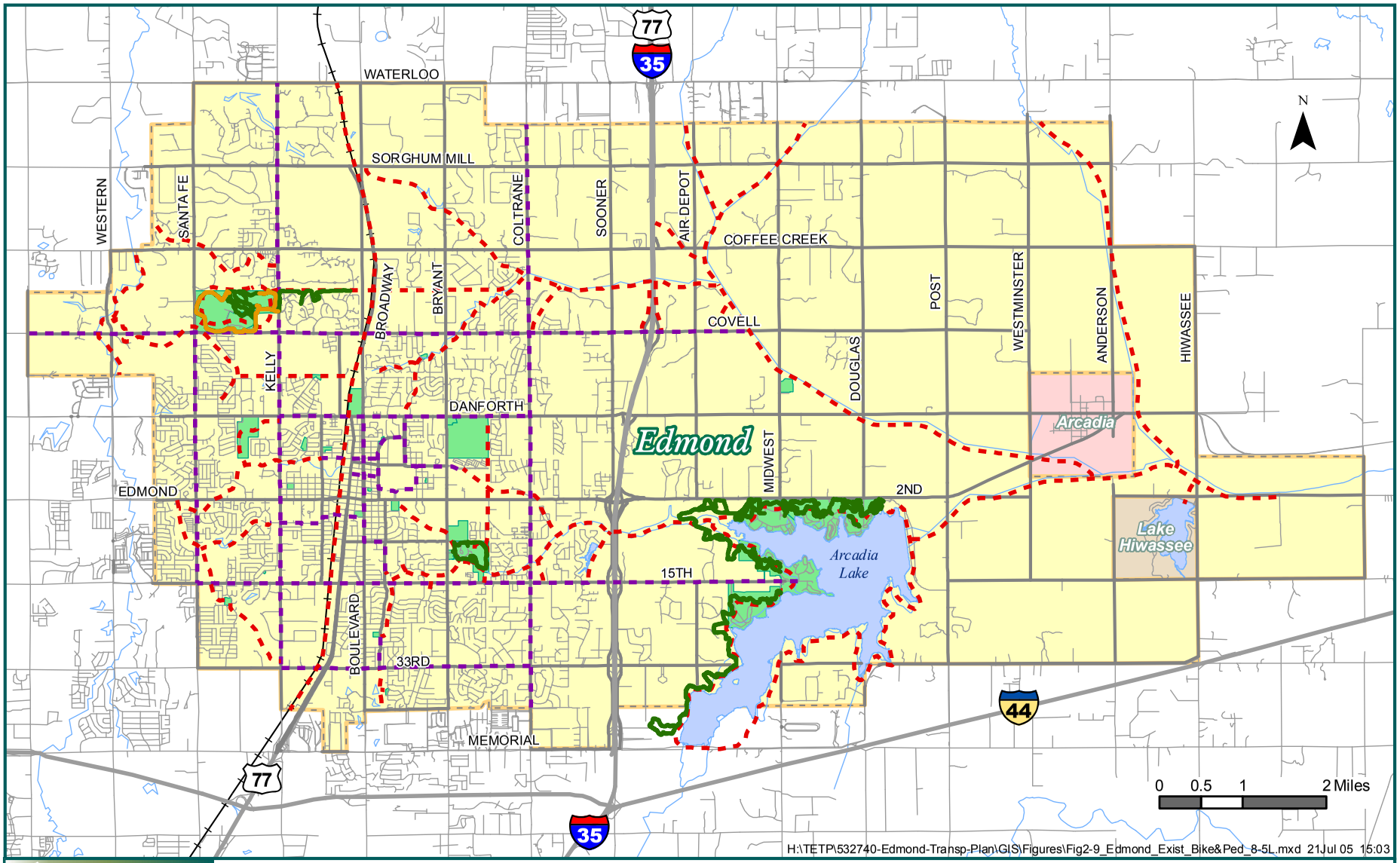


Figure 2-9 Bicycle and Pedestrian Facilities

- Bike Path
- Existing Trail
- Planned Trail
- Planned Sidewalk Link
- Park or Open Space
- Edmond City Limits

Table 2-7
Top 25 Intersections by Number of Collisions in 2004

Location	Number of Collisions	Collision Rate Per/Million Vehicles entering	Highest Collision Type
2nd and Bryant	66	3.41	Rear-end
33rd and Broadway	64	2.26	Rear-end
15th and Broadway	61	2.33	Rear-end
Danforth and Kelly	46	3.21	Angle
Edmond and Santa Fe	37	2.44	Angle
15th and Boulevard	33	2.16	Angle
Danforth and Santa Fe	30	3.30	Angle
Bryant and Danforth	23	2.12	Angle
2nd and Broadway	22	1.18	Rear-end
15th and Kelly	21	1.35	Angle
Edmond Rd and Kelly	21	1.25	Angle
15th and Pine Oak	20	2.89	Rear-end
2nd and Littler	19	1.55	Rear-end
15th and Bryant	18	1.35	Rear-end
33rd and Boulevard	18	1.08	Angle
2nd and Baumann Avenue	17	1.31	Rear-end
15th and Santa Fe	16	1.05	Angle
2nd and Coltrane	16	1.43	Rear-end/angle
2nd St. and Vista Lane	16	1.59	Rear-end/angle
Boulevard and Danforth	16	1.45	Angle
15th St. and Rankin St.	15	1.69	Rear-end
Broadway and Danforth	13	1.39	Rear-end
Edmond Rd and Fretz Ave	13	1.00	Angle
2nd St. and Boulevard	12	0.61	Rear-end
33rd and Wynn	12	n/a	Angle

Source: City of Edmond, 2004

The number of intersection accidents was also compared to the traffic volumes along Edmond's arterial and collector system to determine a collision rate, in number of collisions per million vehicle entering the intersection. As shown in Table 2-7, nine intersections in 2004 experienced a collision rate of greater than 2 collisions per million vehicles entering the intersection.

A majority of the accidents occurring at the top 25 intersections are related to vehicles speeding, following too closely, or failing to yield during turning movements. In particular, only one-third of the accidents occurring at the six intersections with the highest number of collisions were injury-related, while the remaining intersections experienced much lower rates for injury-related accidents. As a result, the most likely improvements that the City of Edmond is considering for these intersections includes adding separate turn bays and lanes and evaluating clearance and gap timings for both signalized and stop-controlled intersections.

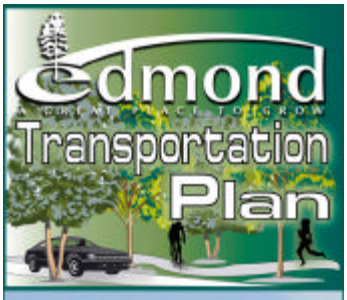


Table 2-8 identifies historical accident rankings for selected intersections. As shown several intersections along the S. Broadway and Kelly corridors have consistently ranked within the top 10 intersections with high accident rates during the last five years. Additionally, several intersections including Edmond at Santa Fe and Danforth at Bryant experienced a much higher accident ranking in 2004 when compared to 2000.

Table 2-8
Total Accident Ranking for Selected Intersections

Intersection Location	2004 Number of Collisions	2004 Rank	2003 Rank	2002 Rank	2001 Rank	2000 Rank	1999 Rank
2nd and Bryant	66	1	3	1	5	20	N/A
33rd and Broadway	64	2	2	2	6	1	2
15th and Broadway	61	3	1	3	1	10	4
Danforth and Kelly	46	4	5	9	7	7	6
Edmond and Santa Fe	37	5	6	6	10	49	24
15th and Boulevard	33	6	9	18	24	17	15
Danforth and Santa Fe	30	7	8	11	14	51	7
Bryant and Danforth	23	8	15	21	N/A	N/A	45
2nd and Broadway	22	9	11	5	18	5	30
15th and Kelly	21	10	4	10	8	4	22

Source: Top 25 Intersections by Total Accidents, City of Edmond, Oklahoma, 2004.

Chapter 3
Demographics and Model

As part of the development of the Edmond Transportation Plan, a travel demand model was developed to estimate existing and future trip generation and traffic volumes for area roadways. The development of the travel demand model included development of demographic forecasts (population and employment) and development of the roadway network itself.

DEMOGRAPHIC DATA

The purpose of this section is to review existing and future demographic characteristics that were used as inputs to the area travel demand computer model. Demographic variables discussed in this section include population, employment and school enrollment. Analysis of these variables and development of forecasts assisted in evaluating and identifying future transportation needs in Edmond. The transportation networks and travel demand model developed for this study are discussed in further detail later in this chapter.

Methodology

This chapter addresses existing and future conditions that are closely associated with travel demand and trip generation characteristics of the Edmond area. Demographic estimates were prepared for the base year 2005 and forecasts were prepared for 2015 and 2030. Base year estimates and forecasts were developed for the Edmond area at the Traffic Analysis Zone (TAZ) level. Traffic Analysis Zones (TAZs) define geographic areas (similar to Census block groups) which are used to relate travel demand to socioeconomic characteristics.

The Association of Central Oklahoma Governments (ACOG) prepares and maintains the regional transportation plan (Oklahoma City Area Regional Transportation Study–OCARTS) for the Central Oklahoma area, which includes the City of Edmond. As part of the OCARTS plan, demographic forecasts at the TAZ level were developed. These TAZ boundaries and associated forecasts served as the basis for the Edmond Transportation Plan. However, because ACOG's transportation plan forecasts travel demand at a more regional scale, for the purposes of the Edmond Transportation Plan, ACOG's TAZs and associated demographics were split to allow for a more focused evaluation of local conditions. As shown in **Figure 3-1**, ACOG's original 47 zones within the Edmond area were split to 287 zones. Demographic variables examined within each TAZ include:

- Population
- Households
- Total Employment
- Retail Employment
- School Enrollment

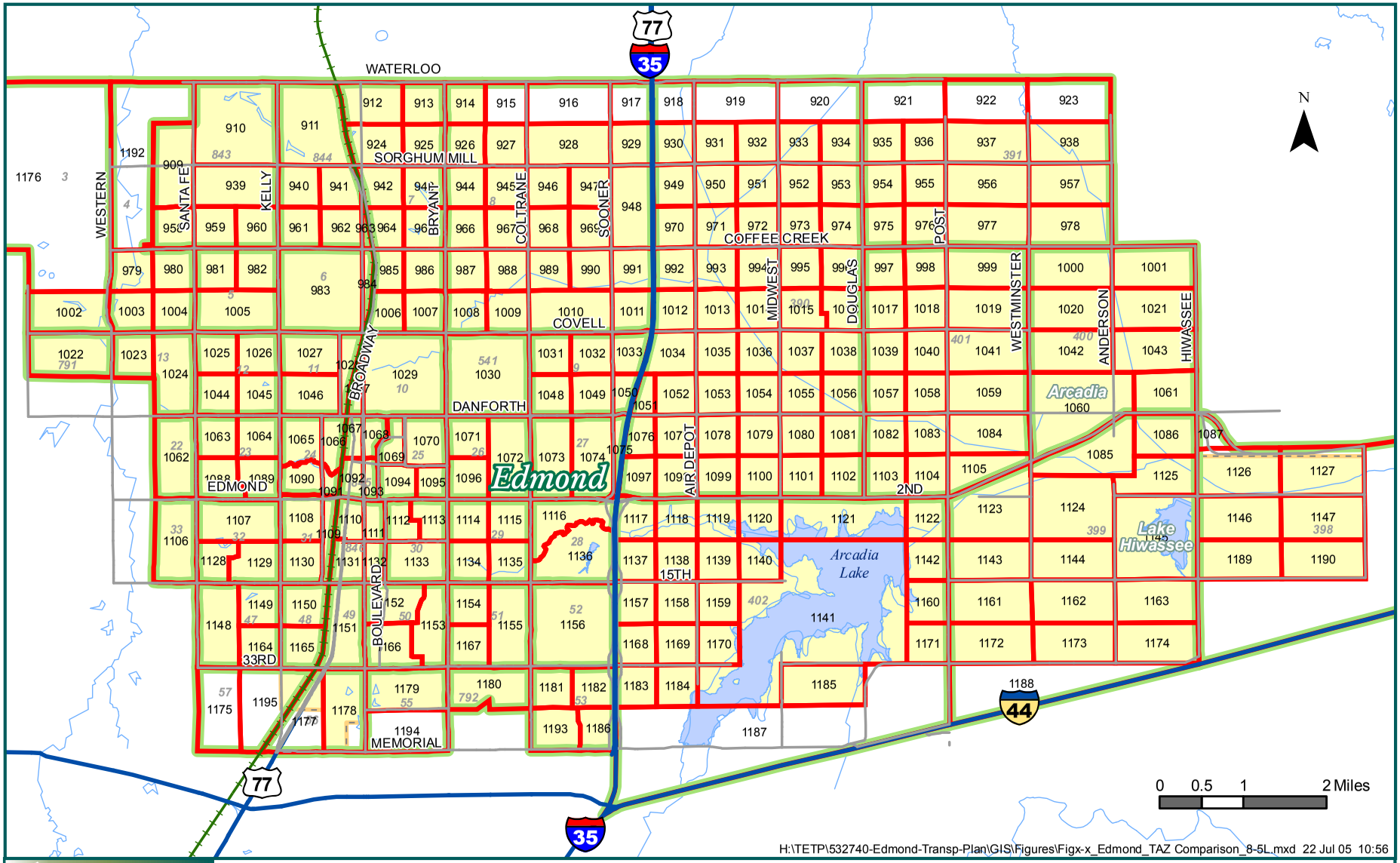


Figure 3-1 Comparison of Old and New TAZ's

Original TAZ Boundary
1000 Original TAZ Number
New TAZ Boundary
1000 New TAZ Number
City Limits

Note: There are 47 Original TAZ's and 287 New TAZ's.

Demographics and Model

Base Year Estimates

Population and Households

An initial step in developing 2005 estimates for population and households involved disaggregating ACOG's 2000 population and household data from the 47 original TAZs in the Edmond area to the 287 new TAZs developed for the purposes of this study. This was accomplished through utilizing Geographic Information Systems (GIS) to aggregate 2000 US Census Bureau block level data to the TAZ level. For census blocks that were split by TAZ boundaries, a sub block was created. Data for this block was disaggregated based on the share the sub block represented of the total block area. Sub-blocks were then aggregated to the TAZ level. Utilizing ACOG's 2030 forecast for the Edmond area as a control total, an annual growth was calculated per TAZ between the Years 2000 and 2030. This annual growth rate was then applied to the 2000 population figures to arrive at 2005 base year estimates.

Employment

As with the population estimates, developing 2005 estimates for employment involved disaggregating ACOG's 2000 employment data from the 47 original TAZs in the Edmond area to the 287 new TAZs developed for this study. This process involved obtaining a database of employers and their number of employees in Edmond from an outside vendor. Employee size (e.g. 1-5) and their Standard Industrial Classification Code (SIC) were provided for each employer in the city. Utilizing a mid-range employment size, this database was used to disaggregate employment to the TAZ level. Utilizing ACOG's 2030 forecast for the Edmond area as a control total, an annual growth was calculated per TAZ between the Years 2000 and 2030. This annual growth rate was then applied to the 2000 employment figures to arrive at 2005 base year estimates.

Enrollment

School enrollment for the Year 2005 was obtained from the Edmond Public School System and the University of Central Oklahoma.

Base Year Data

Table 3-1 displays base year estimates for the Edmond area. As shown, population is estimated to equal 77,832 people. Employment is estimated to equal 28,179, with retail employment accounting for 33 percent of total employment. **Figures 3-2** and **3-3** display 2005 total population and employment by TAZ for the study area. Demographic data by TAZ is shown in **Appendix A.**

Table 3-1
Base Year Data

Variable	2005
Population	77,832
Group Quarters	2,999
Households	28,539
Employment	28,179
Retail Employment	9,223
Enrollment	33,137

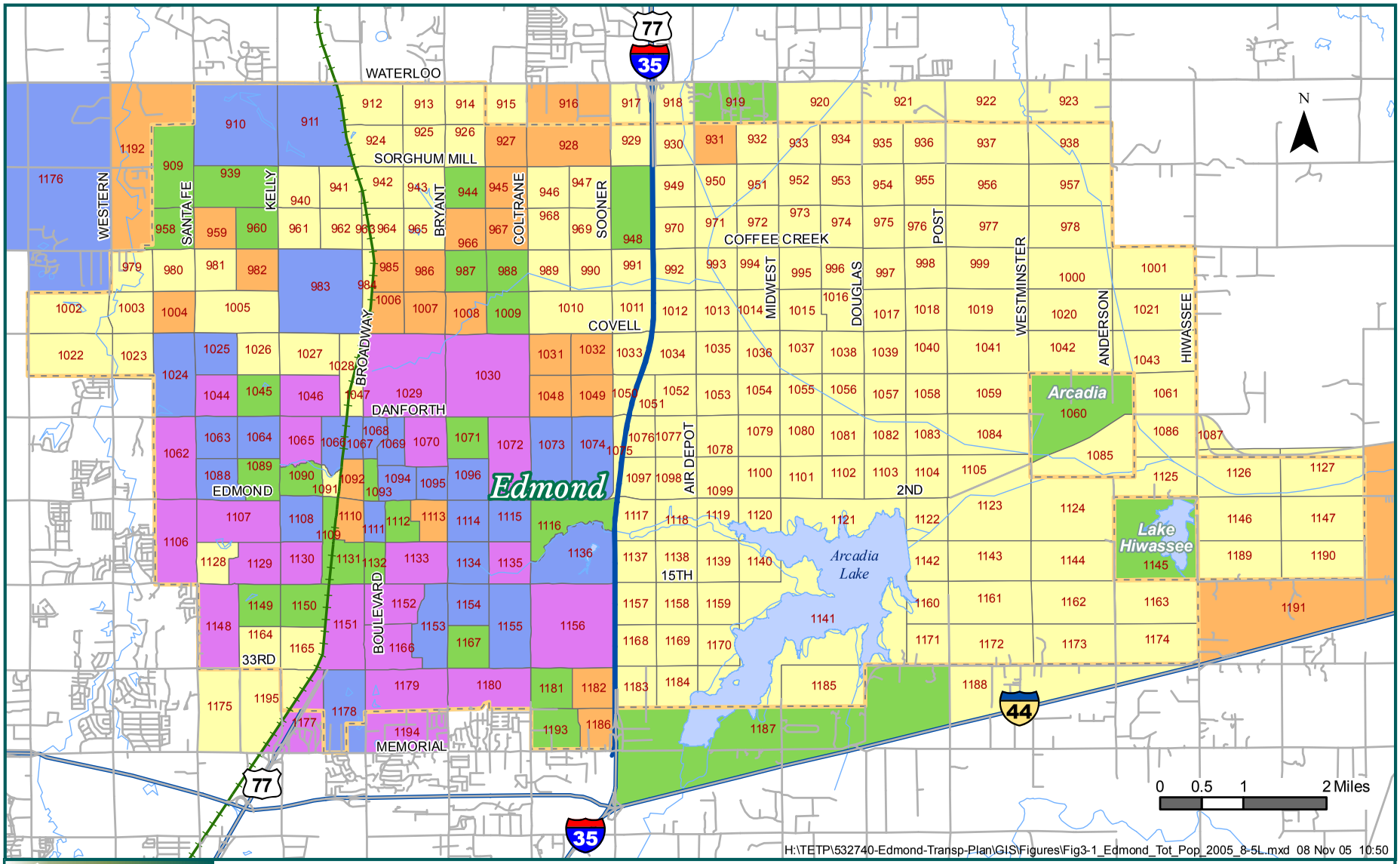


Figure 3-2 Total Population 2005

Total Persons :

- 0 - 100
- 101 - 250
- 251 - 500
- 501 - 1000
- Over 1000

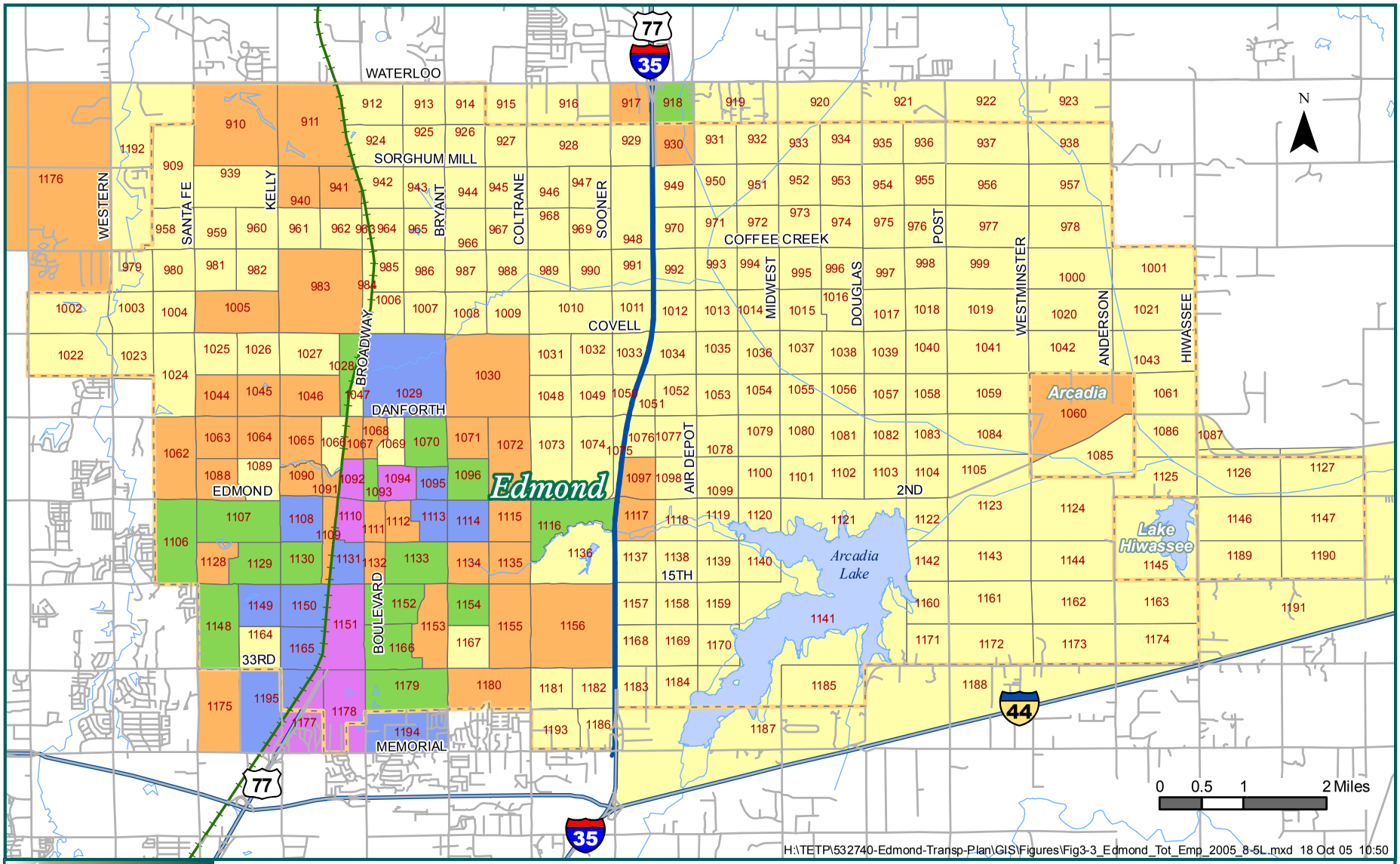


Figure 3-3 Total Employment 2005

Total Persons Employed:

- 0 - 50
- 51 - 250
- 251 - 500
- 501 - 1000
- Over 1000

SPECIAL GENERATORS

Special generators are major employers, institutions and attractors which create unique travel patterns. Post-secondary schools have peak travel times other than the typical rush hours. Regional shopping malls also have heavy traffic during mid-day rather than from 7:00 to 9:00 AM and 4:00 to 6:00 PM. Regional/state parks and entertainment centers also create unique traffic patterns and peak times. Additionally, hospitals work around the clock creating heavier-than-normal traffic in the off-hours. The primary special generator identified for the City of Edmond is The University of Central Oklahoma.

Forecasts

Population and Employment

Initially, ACOG's 2030 population and employment forecasts were used as control totals for the Edmond area. These forecasts were disaggregated from the 47 original ACOG TAZs to the 287 new TAZs developed for this study based on the share the smaller TAZs represented of the total area of the larger TAZs. Once the population and employment data was disaggregated, ACOG's allocation of growth was reviewed and revised as necessary to account for recent and planned developments and current trends within the community. Upon review of the data it was found that ACOG's regional forecasts allocated the majority of growth in Edmond to the area west of I-35. Although the majority of growth thus far has occurred on the west, it is anticipated the area east of I-35 will experience additional development over the next 25 years. To account for this, while still keeping with ACOG's overall demographic totals for the area, population and employment was shifted from areas that were built out in the west to areas most likely to develop on the east. Additional revisions were made to TAZs on the west to account for recent developments that were not reflected in ACOG's allocation. Upon further review of the data it was found that ACOG's 2030 employment control total did not reflect the city's economic development initiatives and policies of encouraging new employment and growth in the community. As a result the 2030 employment control total was increased to reflect an annual growth rate similar to population. **Figure 3-4** displays how ACOG's population and employment growth was shifted from TAZs in the west to anticipated growth areas in the east.

In developing a 2015 interim year forecast, an annual growth rate between 2000 and 2030 was calculated and applied to the base year.

Enrollment

In developing enrollment forecasts for 2030, ACOG's enrollment projections were reviewed and revised as necessary to account for recent information and forecasts received from the University of Central Oklahoma and Edmond Public Schools. Edmond Public Schools also provided information on the general location of new schools. As the exact location of these new schools is currently unknown this information was accounted for by assigning enrollment projections for the new schools to TAZs where residential growth was expected to occur by 2030. An annual growth rate between 2000 and 2030 was then calculated and applied to the base year to arrive at a 2015 interim year forecast.

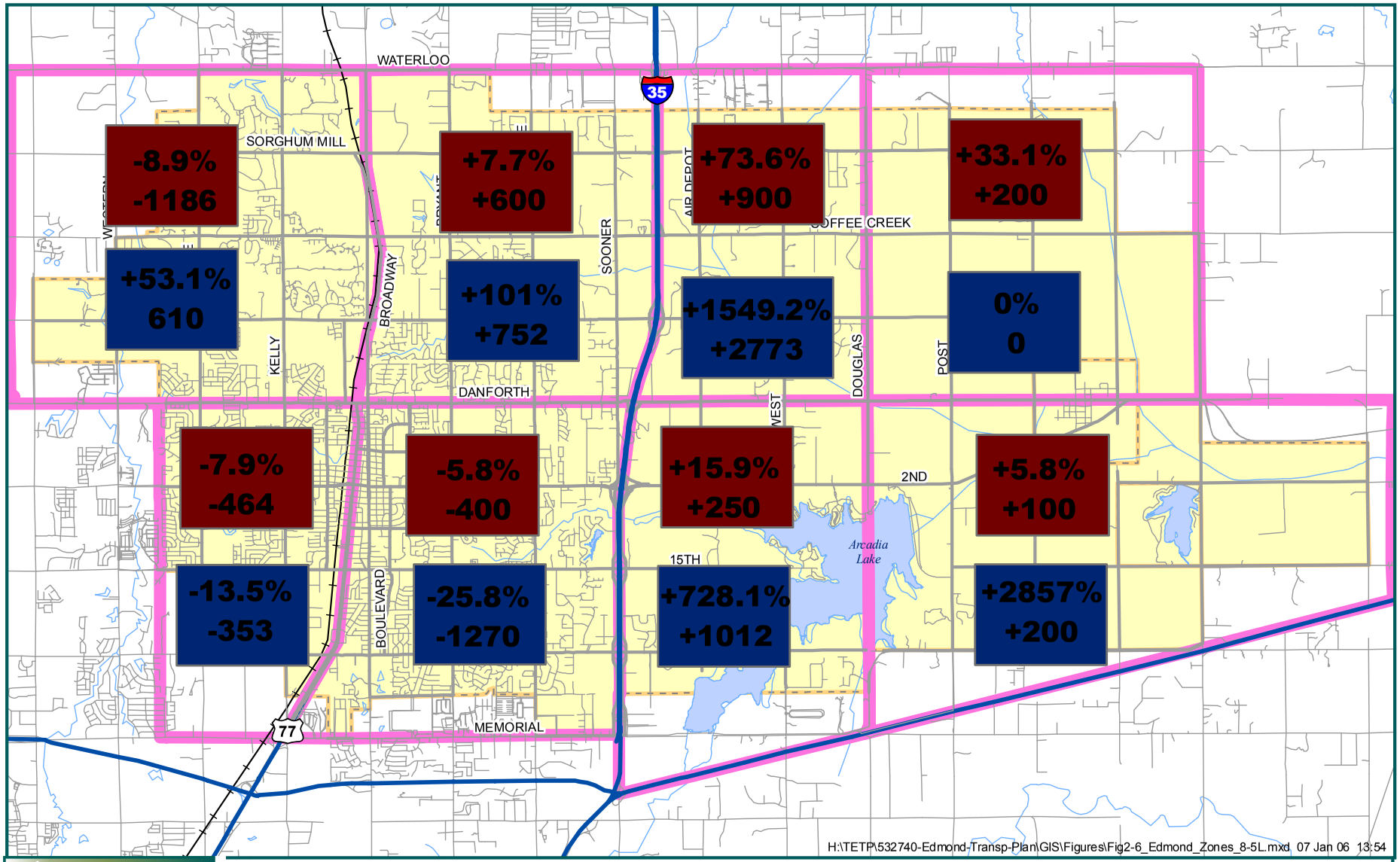


Figure 3-4 Shift in 2030 Population and Employment Growth

Zone Boundary

Population

Employment

The numbers reflect the percent and total increase or decrease between ACOGs original allocation of employment and population growth and the revised allocation used for the Transportation Plan

Forecast Year Data

A summary of forecast year data is presented in **Table 3-2**. Detailed demographic data by TAZ is included in **Appendix A – Demographic Data**.

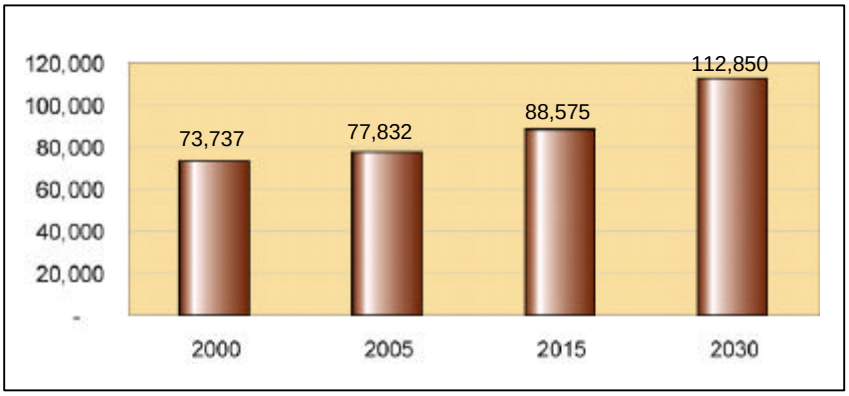
Table 3-2
Forecast Year Data

	2005	2015	2030
Population	77,832	88,575	112,850
Group Quarters	2,999	3,168	3,371
Households	28,539	32,556	41,672
Employment	28,179	32,075	40,857
Retail Employment	9,223	10,418	13,720
Enrollment	33,137	39,094	47,568

Population

Figure 3-5 displays base and forecast year population for the Edmond area. As shown, Edmond is expected to experience continued growth over the next several decades. Population is projected to increase from 73,737 in 2000 to 112,850 in 2030, an annual increase of 1.4%. Population by TAZ for 2030 is shown in **Figure 3-6**.

Figure 3-5
Population



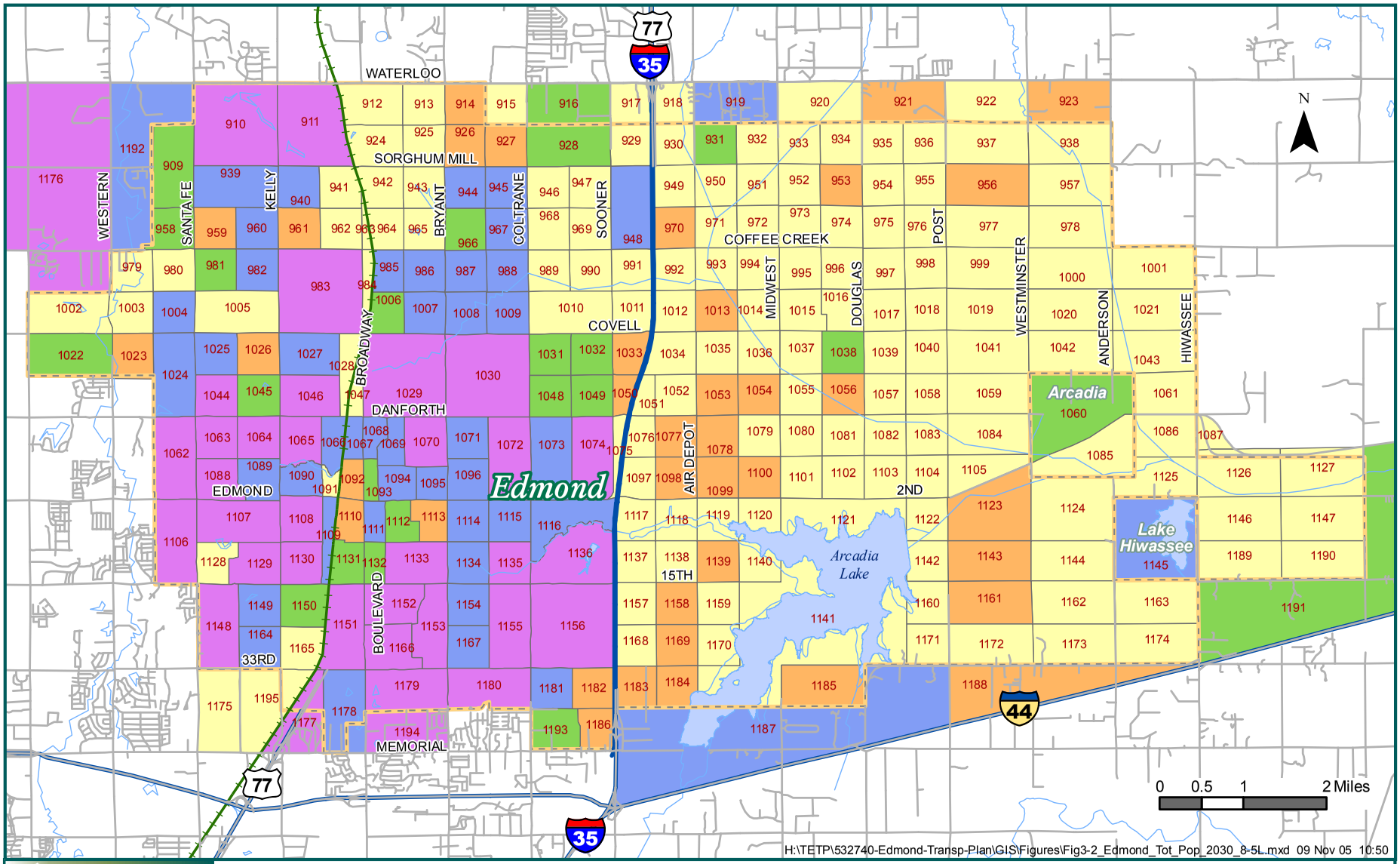


Figure 3-6 Total Population 2030

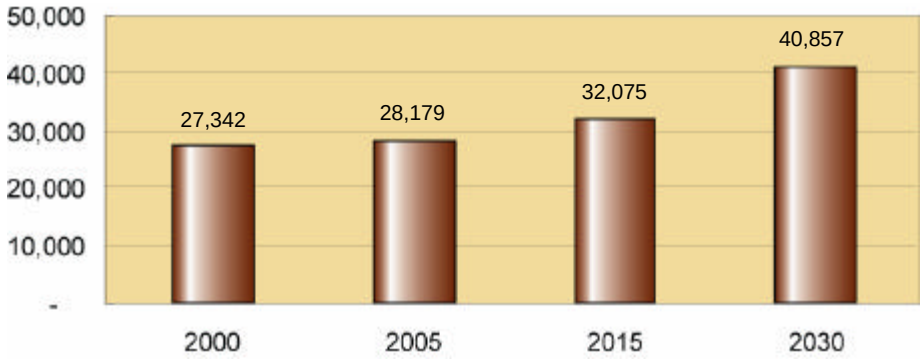
Total Persons:

- 0 - 100
- 101 - 250
- 251 - 500
- 501 - 1000
- Over 1000

Employment

As shown in **Figure 3-7**, Edmond is expected to experience continued growth in employment over the next several decades. Within the area, over 10,000 jobs are expected be added to the economy by 2030, increasing employment from 28,179 in 2005 to 40,857 in 2030. This represents an annual increase of 1.5 percent. Employment by TAZ for 2030 is shown in **Figure 3-8**.

Figure 3-7
Employment



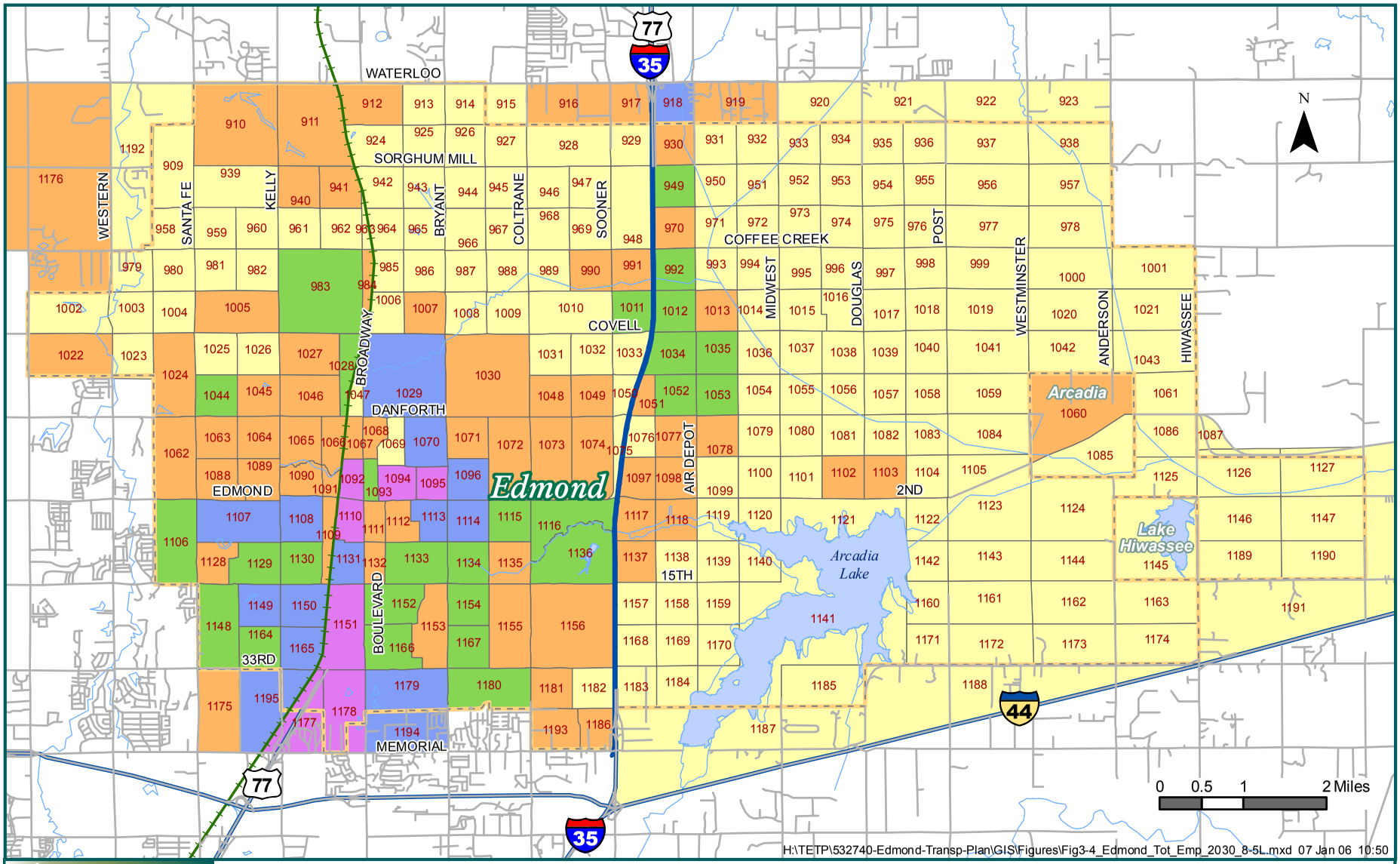


Figure 3-8 Total Employment 2030

TRAVEL DEMAND MODEL DEVELOPMENT

In addition to the demographics previously discussed, another major input to the travel demand model is the transportation networks. The following section describes refinements to these networks and validation of the transportation model that was used for evaluating existing travel conditions and forecasting future travel demand for the City of Edmond. The development of mathematical models capable of simulating existing traffic patterns and projecting future travel demand is a very important phase of the transportation planning process.

Model Networks

The model network used in this study is a geographical depiction of the regional roadway system. A travel demand model compares demand for travel to the supply of the roadway system within a defined study area. Travel demand is derived from population and employment, while the supply side of the equation is the roadway system on which travel occurs. Similar to socioeconomic and demographic data previously described, network attributes describe the characteristics of the roadway system.

For this study, the regional transportation model maintained by the Association of Central Oklahoma Governments (ACOG), the Metropolitan Planning Organization (MPO) for the Oklahoma City Metropolitan Area, was used as the basis for updating the network for the City of Edmond. Utilizing the overall existing zone structure, zones were further subdivided (as discussed earlier in this chapter) to enable the model to be more focused in the study area. The entire regional model was used in the modeling for the City of Edmond in order to maintain the integrity of the original modeling network structure and capability to predict trips on both a localized as well as a regional level.

Roadway capacities and speeds were derived from ACOG's model to maintain consistency with the regional modeling efforts currently underway. From the "base" (Year 2000) model, the TAZ structure and roadway network were further refined to allow analysis of arterial and collector roadways within the City of Edmond.

The following model network features are used to develop a geographical representation of a road thoroughfare system:

- Links;
- Nodes;
- Centroid Connectors; and,
- Centroids.

Links are used to represent roadway sections. Nodes are used to split links where roadway attributes differ (i.e., speed limits, number of lanes, or facility type) or where intersections or interchanges occur. Interchanges differ from intersections in that multiple links and nodes are needed. Interchanges require links representing access and egress ramps and require nodes where those ramp connections occur with the intersecting roadway.

Demographics and Model

Special links and nodes are used to "load" traffic onto the network. Traffic originates from and is destined to geographic areas called traffic analysis zones (TAZs). Special nodes called "centroids" are used to represent TAZs in the network. Special links called "centroid connectors" are used to represent local streets contained in a TAZ and provide access between centroids and the network. Also, a centroid can have more than one centroid connector.

Figure 3-9 presents the layout for the Year 2000 network. In addition to the graphical depiction of the network, a database is also associated with the model network. The database is used to store link attribute data including but not limited to length (typically in feet), direction of flow (one-way vs. two-way), functional class, area type, number of lanes, posted speeds, model-adjusted speeds and travel times (typically in minutes), directional and total roadway capacities, and observed traffic count data where collected. The base network for the ACOG model was originally calibrated to 1995 traffic counts, for use in the development of the 2025 Oklahoma City Area Regional Transportation Study (OCARTS) Plan.

In the OCARTS model, speeds along network links are coded by facility functional type. The most important factor in determining the distribution of trips throughout the network is travel time. The travel time is a function of link distance and link speeds.

The number of lanes is also an important roadway feature, representing network supply. Generally speaking, the more lanes a facility has; the greater its carrying capacity. These three variables (functional class, area type, and number of lanes) are used to assign speed and capacity values to a network link. In OCARTS model, the link speeds are used by functional classification and are summarized below in **Table 3-3**.

Table 3-3
Link Speeds by Functional Classification

Functional Classification	OCARTS Model Network Speeds (mph)
Interstate	60
Principal Arterial	45
Minor Arterial	40
Collectors	30
Turnpikes	60
Central Business District (CBD)	25
Centroid Connectors	15

Source: Association of Central Oklahoma Governments

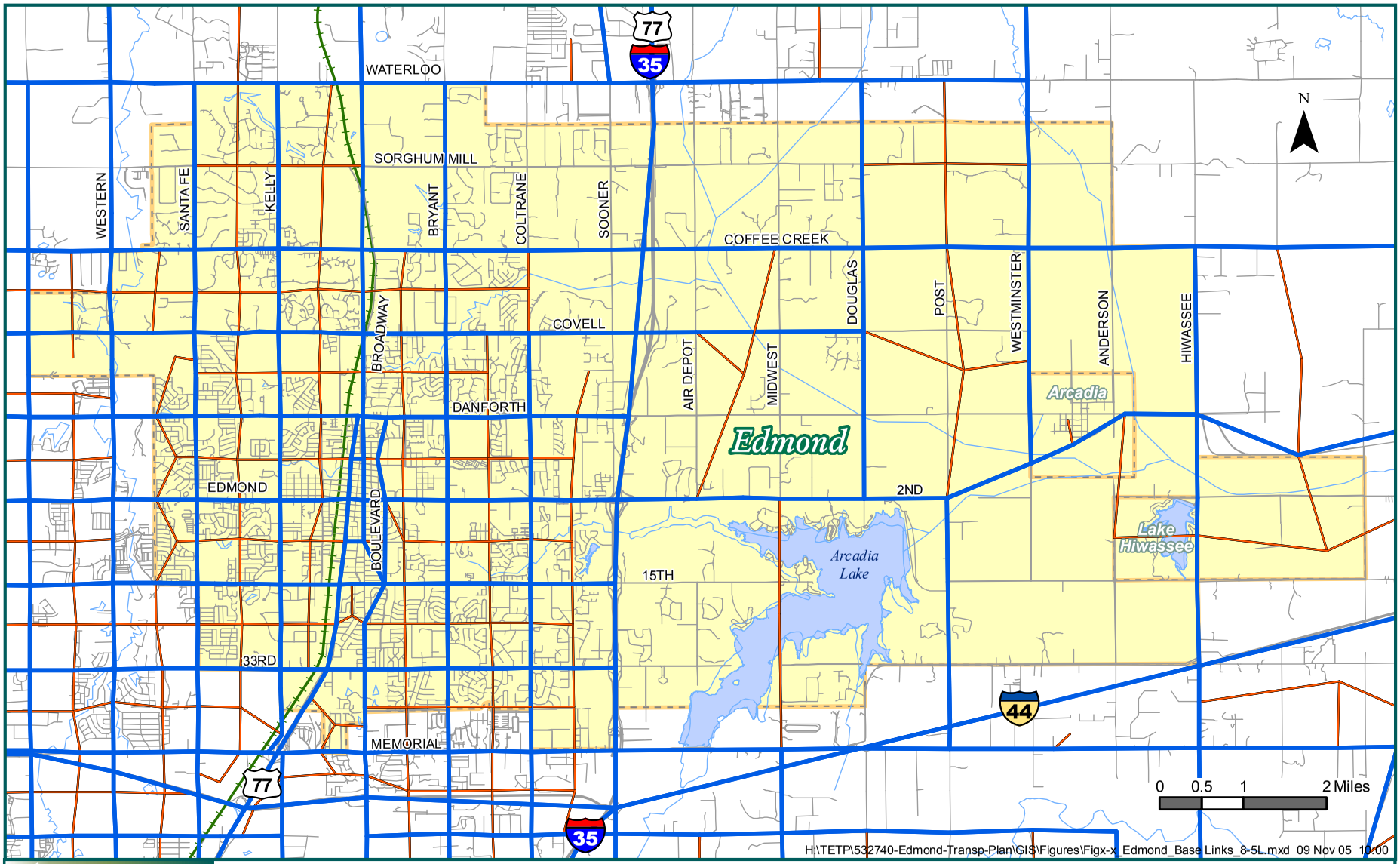


Figure 3-9 Edmond Base Network

Demographics and Model

The base year model was used to refine the City of Edmond network to better reflect existing roadway network (links) and local street access (centroid connectors). The OACRTS transportation network was reviewed for existing roadway coverage within the City of Edmond and updated to include all arterials, collectors, frontage roads and freeway ramps. Next, the consultant team staff conducted a field verification of roadway lanes and posted speed limits within the study area (and also utilized aerial imagery in the verification). **Figure 3-10** illustrates the new roadway links added to refine the base network. As a result, the City of Edmond travel model provided a stronger focus for analyzing transportation conditions within the study area. **Figure 3-11** displays the overall refined transportation network with updated links and centroid connectors.

Model Validation

The entire network development and review process described above is often referred to as network coding. Once network coding is completed, the model network is used as an input to the travel demand model. Prior to forecasting travel demand, the base year model results should be compared to existing traffic patterns of the base year, which is a process referred to as model validation.

In order to test the ability of the model to predict future behavior, validation requires comparing the model predictions with information other than that used in estimating the model. This step is typically an iterative process linked to model calibration. It involves checking the model results against observed data and adjusting parameters until model results fall within an acceptable range of error.

For this study purpose, Year 2005 model was developed for validation that contained an updated transportation network (ready for coding proposed transportation improvements) and existing year (2005) population, household, and employment data which was projected using OCARTS base (2000) socio-economic variables.

Comparisons of observed counts (actual ground counts collected from the field) and assigned daily volumes (24-hour traffic flows from the model) for the existing year model run are shown in **Table 3-4**. Overall, the estimated trips are within 0.2 percent of observed traffic.

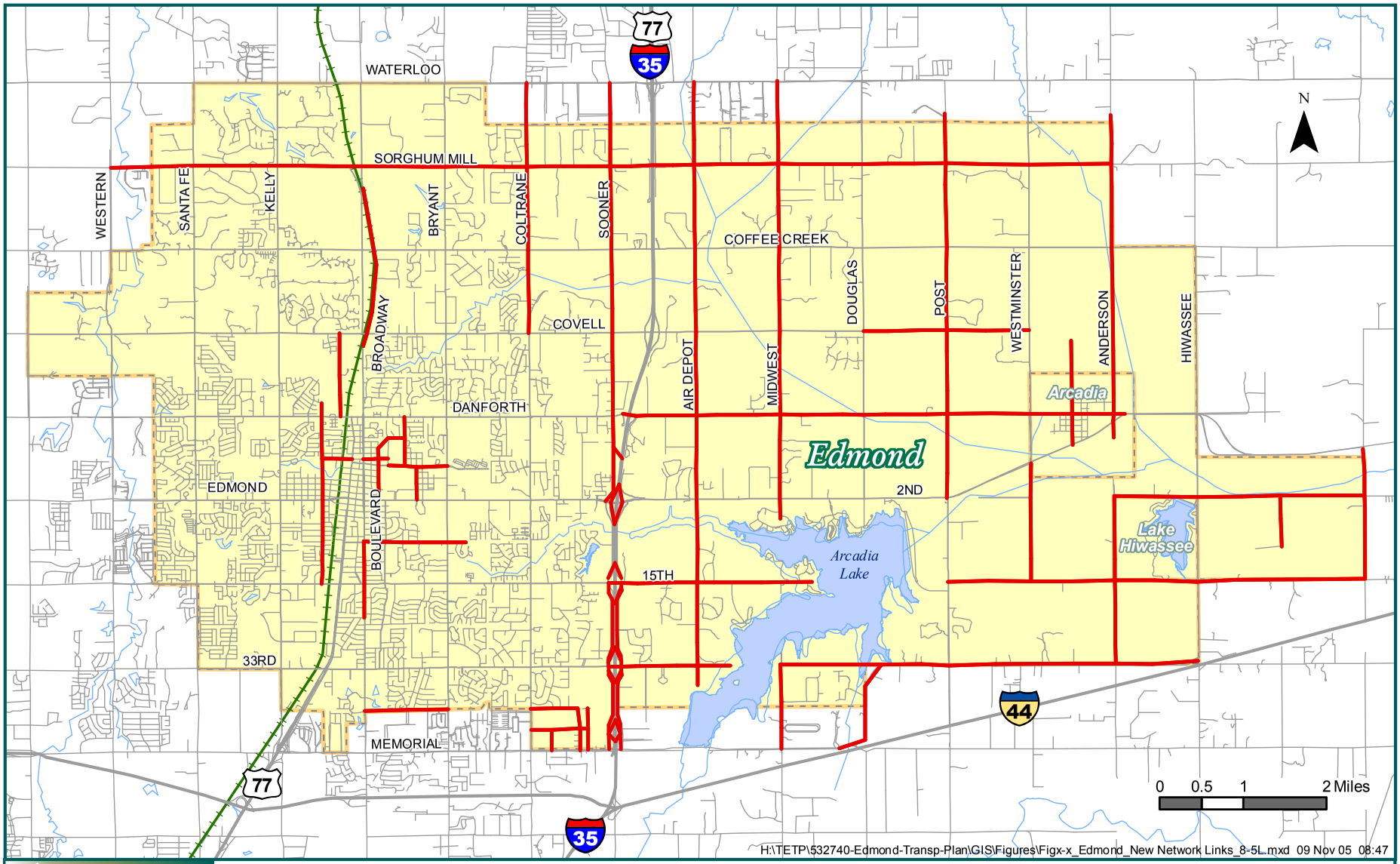


Figure 3-10 Added Links in the Edmond Base Network

Modified Base Roadway

City Limits

Edmond A GREAT PLACE TO GROW Transportation Plan

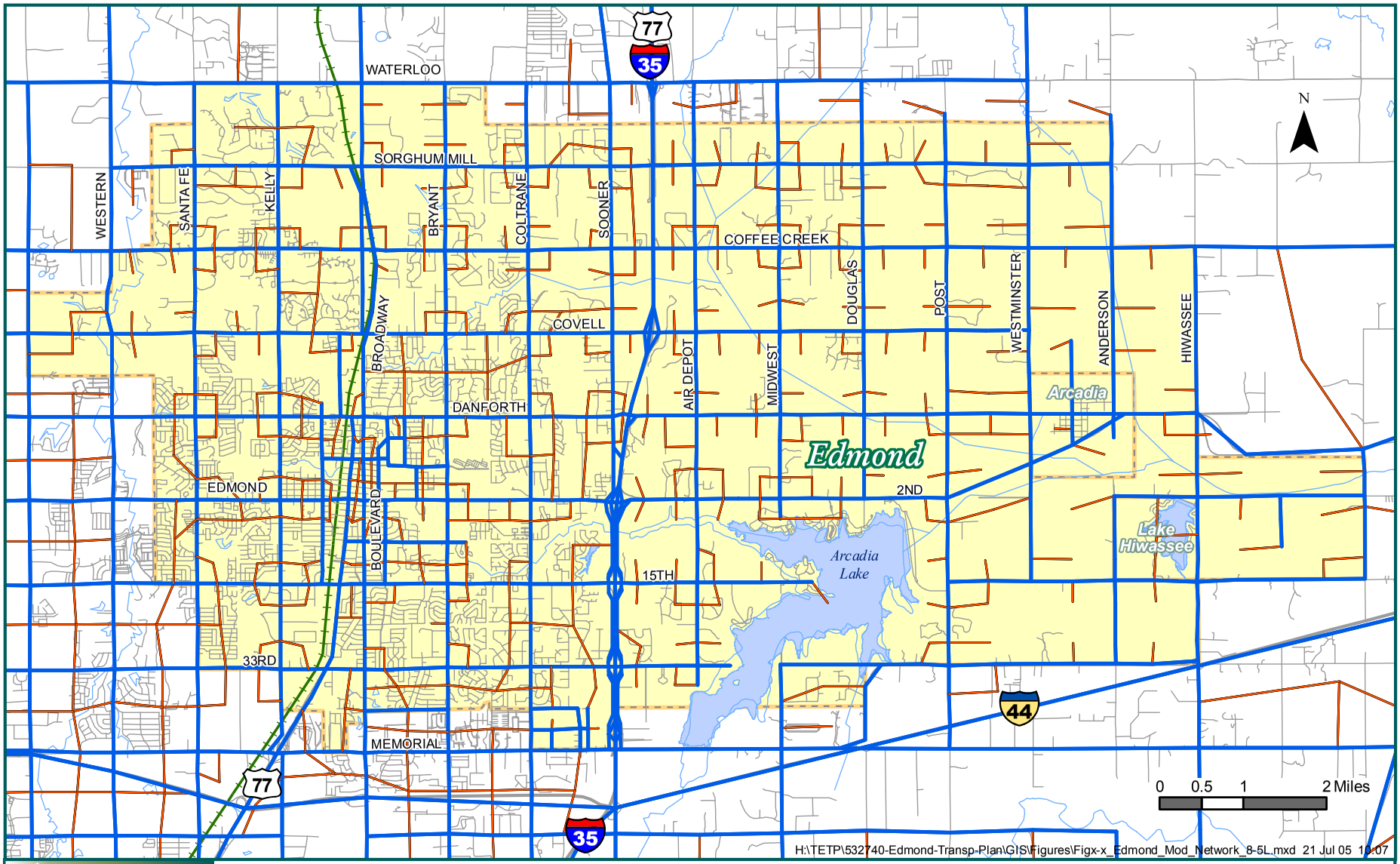


Figure 3-11 Edmond Modified Base Network

Table 3-4
Comparison Of Observed Versus Assigned Traffic Volumes

Street	Link_Id (two-way links)	2005 Observed Volumes (Both Directions)	2005 assigned Volumes (Both Directions)	Percent Difference
Anderson	8348 - 8550	270	214	-21%
Ayers	8464 - 8465	8,300	7,903	-5%
Broadway	8489 - 8490	6,700	6,639	-1%
Bryant	8461 - 8462	2,200	2,181	-1%
Bryant	8716 - 8773	8,700	9,226	6%
Bryant	8457 - 8458	16,300	16,355	0%
Bryant	1270 - 8452	17,200	15,200	-12%
Bryant	1196 - 8454	20,600	18,581	-10%
Coffee Creek	8191 - 8671	400	427	7%
Coffee Creek	3816 - 8207	3,300	3,409	3%
Coffee Creek	8212 - 8213	4,000	3,893	-3%
Coltrane	8447 - 8448	2,200	1,979	-10%
Coltrane	8800 - 1273	5,600	4,678	-16%
Coltrane	8441 - 8442	6,849	6,622	-3%
Covell	8224 - 8225	1,180	1,143	-3%
Covell	8708 - 8709	6,400	8,028	25%
Covell	8229 - 8230	7,800	7,715	-1%
Covell	8712 - 8713	8,700	8,991	3%
Danforth	8244 - 8245	230	218	-5%
Danforth	8253 - 8254	740	719	-3%
Danforth	8755 - 8260	7,200	6,272	-13%
Danforth	8536 - 8759	18,800	17,481	-7%
Danforth	8266 - 8766	21,200	18,654	-12%
Eastern	8486 - 8487	4,000	5,080	27%
Eastern	1199 - 8481	17,400	19,117	10%
Eastern	1302 - 8470	17,600	19,940	13%
Edmond (2nd Street)	8280 - 8281	9,200	8,649	-6%
Edmond (2nd Street)	8693 - 8692	22,200	20,023	-10%
Edmond (2nd Street)	8294 - 8695	23,300	22,238	-5%
I-35	8420 - 8419	36,200	41,783	15%
I-35	8422 - 8600	42,300	46,715	10%
I-35	8418 - 8798	44,400	45,317	2%
Kelly	8506 - 8507	7,300	7,138	-2%
Kelly	8505 - 8711	9,900	9,042	-9%
Kelly	8501 - 8502	17,000	16,169	-5%
Kelly	8499 - 8500	19,700	20,660	5%
N 150th	1258 - 1259	9,900	12,014	21%
N 150th	3735 - 8330	11,600	11,121	-4%
N 164th	1210 - 1211	16,300	15,606	-4%
N 178th	8690 - 8688	18,300	16,838	-8%
N 192nd	8767 - 8770	11,100	9,483	-15%

Table 3-4 (Continued)
Comparison Of Observed Versus Assigned Traffic Volumes

Street	Link_Id (two-way links)	2005 Observed Volumes (Both Directions)	2005 assigned Volumes (Both Directions)	Percent Difference
N 248th	3853 - 8653	6,000	5,717	-5%
S 15th	8311 - 8312	11,500	11,869	3%
S 15th	1197 - 8313	16,500	17,363	5%
S 15th	1200 - 1201	20,000	23,061	15%
S 33rd	8324 - 8325	770	703	-9%
S 33rd	1274 - 8327	4,900	4,155	-15%
S 33rd	1271 - 1272	8,600	8,385	-3%
S 33rd	1262 - 1264	16,900	15,797	-7%
S 33rd	1265 - 8329	22,500	21,633	-4%
Santa Fe	8512 - 8513	4,600	4,513	-2%
Santa Fe	8510 - 8511	5,900	6,120	4%
Santa Fe	8768 - 8769	12,000	11,601	-3%
Santa Fe	1207 - 1260	18,700	20,917	12%
Santa Fe	8509 - 8786	19,348	20,481	6%
Santa Fe	1209 - 8691	20,600	22,802	11%
Sorghum Mill	8175 - 8176	1,400	1,599	14%
Sorghum Mill	8185 - 8664	2,500	2,555	2%
US 66	8731 - 8732	6,600	6,921	5%
US 77	2704 - 8476	31,500	29,421	-7%
US 77	1201 - 2588	44,400	45,684	3%
US 77	1307 - 1308	45,900	46,989	2%
Western	8703 - 8771	3,300	4,163	26%
Westminster	8357 - 8720	570	542	-5%
Total		**838,357**	**847,224**	**1%**

Source: Wilbur Smith Associates

Typically the validation processes focus only on the overall performance of the travel demand model, especially the flow of trips from/to the study area at screenline crossings. Screenline analysis compares the results of trip assignment with the actual traffic count data collected from the field. It is a process of comparing the sum of ground count counts across a screenline with the sum of the assigned traffic volumes across the same screenline. Screenline analysis is a useful tool for the calibration and validation of trip assignment models, and it can also be used for more general purposes of calculating flows that cross a screenline.

The following seven screenlines were established to intercept major traffic flows across the City of Edmond study area. **Figure 3-12** depicts each screenline used in the validation of the existing model.

1. Danforth (North)–east-west screenline
2. I-35 (East)–north-south screenline
3. I-35 (West)–north-south screenline

4. S 33rd (North)–east-west screenline
5. Santa Fe (West)–north-south screenline
6. Sorghum Mill (North)–east-west screenline
7. Westminster (East)–north-south screenline

The National Cooperative Highway Research Program (NCHRP) established guidelines for screenline volumes in 1982 that have been used extensively in validating travel demand models. The comparison of the City of Edmond screenline volumes with the maximum desirable deviation for screenline volumes established by these guidelines are summarized in **Table 3-5** and illustrated in **Figure 3-13**.

Table 3-5
Comparison Of Observed Versus Assigned Traffic Volumes

Screenline	Number of Count Locations	Total Observed Volume	Total Assigned Volume	Diff	Absolute % Diff	NCHRP Targets
Westminster (East)	5	7,890	8,320	430	5%	44%
I-35 (East)	6	12,833	12,433	-400	3%	34%
I-35 (West)	8	60,800	62,286	1,486	2%	18%
Sorghum Mill (North)	7	64,100	68,291	4,191	7%	17%
Santa Fe (West)	7	78,600	77,588	-1,012	1%	14%
Danforth (North)	13	86,089	89,866	3,777	4%	13%
S 33rd (North)	6	123,200	125,457	2,257	2%	13%
TOTAL	**52**	**433,512**	**444,241**	**10,729**	**2%**	

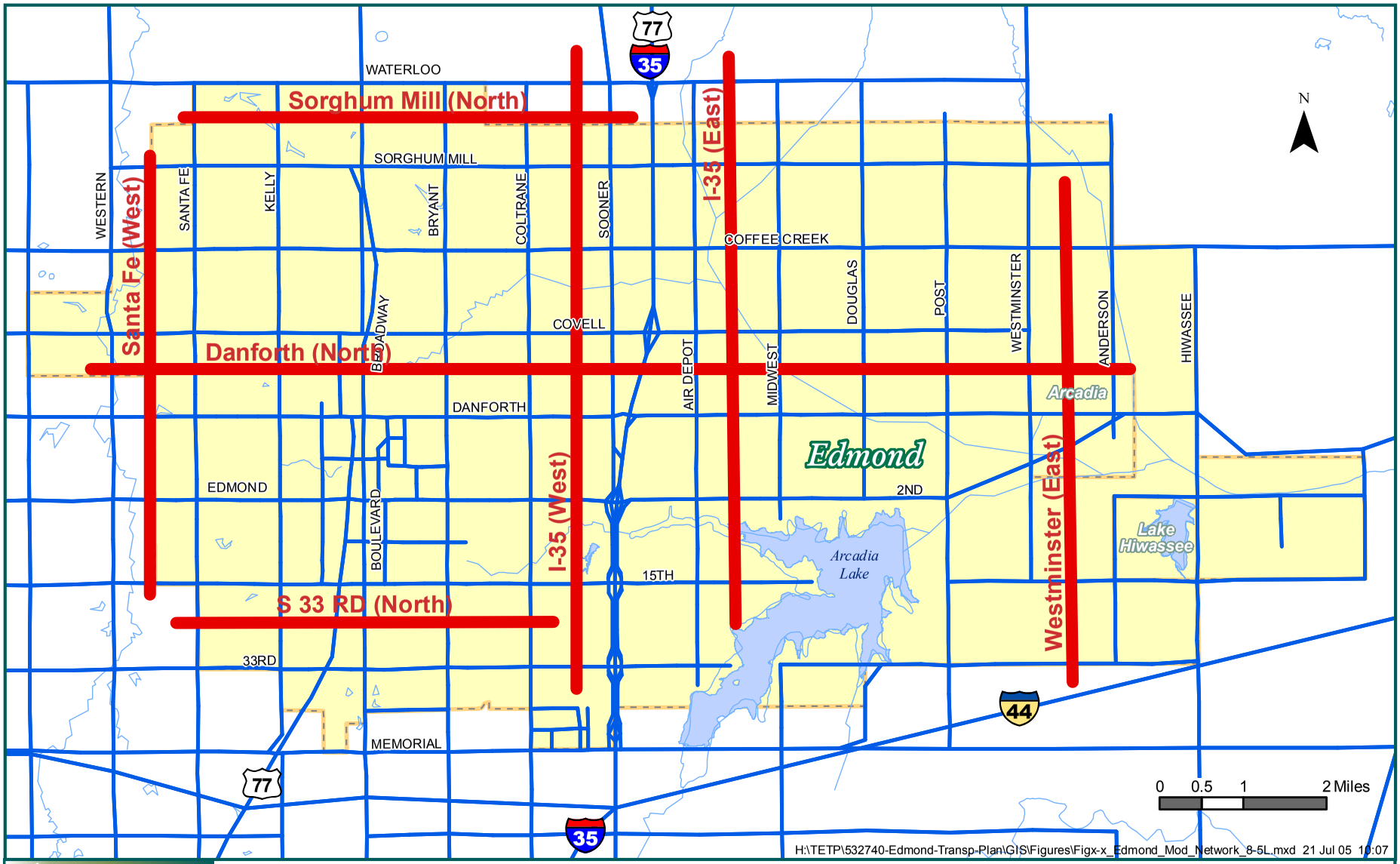
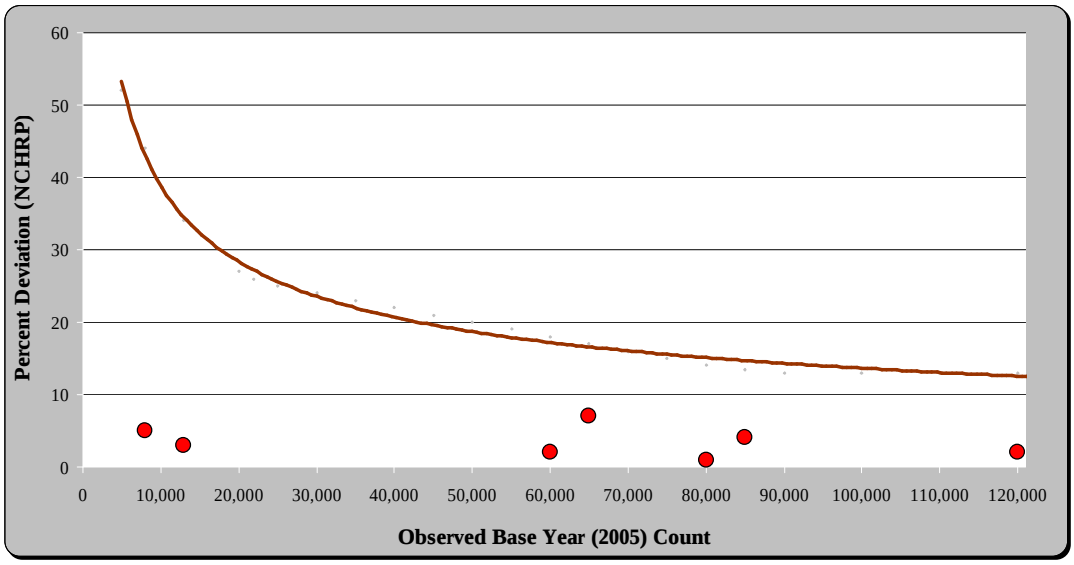


Figure 3-12 Screenline Locations

Figure 3-13
Maximum Desirable Deviation in Screenline Volumes
City of Edmond Transportation Plan
Edmond, Oklahoma



As can be seen, all locations fall below the curve of maximum desirable deviation as defined in the National Cooperative Highways Research Program (NCHRP) 255 report.

The validation results indicate that the model is performing within an acceptable range. Once confident in its performance, the model can be utilized to test the adequacy of proposed transportation improvements for serving projected demand. Travel model forecasting also works in conjunction with land use forecasts, since both depend largely on the following factors:

- Socioeconomic conditions affecting trip productions and attractions,
- Land use patterns based on locations and intensities of use, and
- The type, extent, and quality of transportation networks and facilities.

Model Forecasting

The OCARTS model forecasting process is based on the traditional 4-step analysis. This forecasting process includes trip generation, trip distribution, and traffic assignment steps, as well as a model validation procedure previously described.

Trip generation is the initial modeling step, which provides an estimation of the amount of travel. This method determines the number of trip ends produced from and attracted to each TAZ, and also classifies these trip ends by trip purposes. The trip generation model used for the OCARTS area uses five trip purposes:

Demographics and Model

1. Home-Based Work (HBW)
2. Home-Based Shopping (HBSH)
3. Home-Based Social/Recreation (HBSR)
4. Home-Based Other (HBO)
5. Non-Home Based (NHB)

In addition, truck, internal-external and external-external trips are estimated. Productions in the OCARTS area are estimated using the disaggregated (household based) cross-classification model. Trip attractions (trip destinations) are calculated based on multiple regression analysis.

Trip distribution is the second step performed by the model. Trip distribution uses the TAZ productions and attractions output from trip generation, and assigns each production to a destination and each attraction to an origin for all possible zones in the study area. The OCARTS area model uses the gravity model for distribution of internal-internal and internal-external trips. The gravity model analyzes the frequency of trip interchange between zone pairs based on the relationship between each zone's productions and attractions and the travel time between the zones.

Traffic assignment is the final step which is an iterative process. The trip productions and attractions (from trip generation) are converted to origins and destinations (from trip distribution). The output of trip distribution is an origin-destination (O-D) matrix which contains total vehicle trips for each O-D pair. The O-D matrix is assigned to the network using a minimum path algorithm based on travel time and capacity restraints. The OCARTS model uses equilibrium load technique for assignment, which runs iterative minimum path assignments and readjusts travel times according to link delays.

Link delays increase as a result of congestion on a particular link. As link volumes approach link capacity, the V/C ratio increases for that link. The result is a decrease in the LOS on that link and travel time is reduced. As travel time is reduced due to congestion, vehicles divert to other links with faster travel times. This process is continued until no one vehicle can further reduce their travel time. At this point, the assignment is said to have reached "equilibrium". The results of the equilibrium assignment are displayed in the network database for further analysis and for presentation purposes.

The results obtained from the assignment are then compared back to the ground counts for validation of the base model (previously discussed). Once the model has been validated, through feedback loops, it is ready for use in the planning and development of forecast networks.

WSA3TAZ	POP_2000	GQ2000	P_GQ2000	HH_2000	2005POP	P_GQ2005	GQ2005	2005HH	P_2015	HH_2015	GQ_2015	P_GQ_2015	POP2030	GQ2030	P_GQ2030	HH2030	EMP2000	RETAIL2000	EMP2005	RET2005	EMP2015	RETAIL2015	EMP2030	RETAIL2030	ENRLL_2000	ENRLL_2005	ENRLL_2015	ENRLL_2030
909	236	0	236	81	258	258	0	89	310	106	0	310	407	0	407	138	19	4	20	4	23	4	28	5			0	
910	830	0	830	307	938	938	0	346	1199	441	0	1199	1731	0	1731	634	64	0	68	0	77	9	93	17			0	
911	518	0	518	192	650	650	0	241	1026	381	0	1026	2031	0	2031	758	197	3	203	4	217	8	239	20			0	
912	20	0	20	6	26	26	0	8	43	13	0	43	93	0	93	29	16	1	21	1	38	2	88	4			0	
913	15	0	15	9	19	19	0	12	32	20	0	32	70	0	70	43	0	0	0	0	0	0	0	0			0	
914	57	0	57	15	72	72	0	20	115	34	0	115	234	0	234	77	0	0	0	0	0	0	0	0			0	
915	4	0	4	2	5	5	0	2	6	3	0	6	9	0	9	5	1	0	1	0	1	0	2	0			0	
916	142	0	142	62	164	164	0	72	218	97	0	218	335	0	335	151	41	14	45	14	54	14	72	14			0	
917	14	0	14	4	16	16	0	5	21	6	0	21	33	0	33	10	82	19	90	20	122	25	236	43			0	
918	20	0	20	11	23	23	0	13	32	18	0	32	51	0	51	29	467	29	486	37	536	60	643	129			0	
919	309	0	309	107	361	361	0	126	492	175	0	492	784	0	784	286	24	5	25	5	32	6	56	11			0	
920	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	2	0			0	
921	44	0	44	20	52	52	0	24	73	33	0	73	121	0	121	55	0	0	0	0	0	0	0	0			0	
922	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
923	38	0	38	16	45	45	0	19	63	27	0	63	106	0	106	45	5	0	5	0	5	0	6	0			0	
924	18	0	18	5	23	23	0	6	39	11	0	39	84	0	84	24	0	0	0	0	0	0	0	0			0	
925	15	0	15	7	19	19	0	9	32	15	0	32	70	0	70	33	4	0	6	0	13	1	41	1			0	
926	57	0	57	13	66	66	0	15	87	20	0	87	134	0	134	31	0	0	0	0	0	0	0	0			0	
927	126	0	126	50	136	136	0	54	158	63	0	158	197	0	197	80	2	0	2	1	2	1	3	1			0	
928	184	0	184	63	212	212	0	73	283	98	0	283	434	0	434	152	8	0	9	1	16	1	45	6			0	
929	27	0	27	9	31	31	0	10	42	14	0	42	64	0	64	22	2	0	2	1	2	1	3	1			0	
930	9	0	9	2	11	11	0	2	14	3	0	14	23	0	23	5	71	6	84	9	122	20	242	73			0	
931	104	0	104	36	121	121	0	42	166	59	0	166	264	0	264	96	0	0	0	0	0	0	0	0			0	
932	16	0	16	6	19	19	0	7	26	10	0	26	41	0	41	16	0	0	0	0	0	0	0	0			0	
933	8	0	8	5	9	9	0	6	13	8	0	13	20	0	20	13	16	14	17	14	18	14	20	14			0	
934	8	0	8	2	9	9	0	2	13	3	0	13	20	0	20	5	22	0	23	5	25	3	28	6			0	
935	1	0	1	1	1	1	0	1	2	2	0	2	3	0	3	3	0	0	0	0	0	0	0	0			0	
936	1	0	1	1	1	1	0	1	2	2	0	2	3	0	3	3	0	0	0	0	0	0	0	0			0	
937	2	0	2	1	2	2	0	1	3	2	0	3	6	0	6	3	0	0	0	0	0	0	0	0			0	
938	13	0	13	4	15	15	0	5	22	7	0	22	36	0	36	11	0	0	0	0	0	0	0	0			0	
939	303	0	303	105	332	332	0	115	398	137	0	398	522	0	522	179	8	1	9	1	10	1	12	2			0	
940	0	0	0	0	0	0	0	0	257	106	0	257	514	0	514	212	98	0	104	13	127	10	193	24	639	857	924	1034
941	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51	0	54	7	66	5	97	12			0	
942	14	0	14	4	18	18	0	5	30	9	0	30	65	0	65	19	0	0	0	0	0	0	0	0			0	
943	14	0	14	4	18	18	0	5	30	9	0	30	65	0	65	19	0	0	0	0	0	0	0	0			0	
944	242	0	242	80	279	279	0	93	372	124	0	372	571	0	571	192	9	0	10	1	12	2	16	3			0	
945	213	0	213	67	246	246	0	78	327	104	0	327	502	0	502	162	9	0	10	1	12	2	16	3			0	
946	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
947	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
948	252	0	252	89	291	291	0	103	387	138	0	387	594	0	594	214	2	0	2	0	2	1	3	1	0	0	415	830
949	26	0	26	10	30	30	0	12	41	16	0	41	66	0	66	27	9	0	15	4	47	27	289	68			0	
950	4	0	4	1	5	5	0	1	6	2	0	6	10	0	10	3	0	0	0	0	0	0	0	0			0	
951	5	0	5	2	6	6	0	2	8	3	0	8	13	0	13	5	0	0	0	0	0	0	0	0			0	
952	12	0	12	4	14	14	0	5	19	7	0	19	30	0	30	11	16	14	17	14	18	14	20	14			0	
953	11	0	11	4	17	17	0	6	38	14	0	38	128	0	128	48	0	0	0	0	0	0	0	0			0	
954	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
956	6	0	6	2	10	10	0	3	26	9	0	26	117	0	117	43	0	0	0	0	0	0	0	0			0	
957	13	0	13	5	15	15	0	6	22	8	0	22	36	0	36	14	0	0	0	0	0	0	0	0			0	
958	230	0	230	77	252	252	0	84	302	100	0	302	397	0	397	130	24	5	26	5	29	6	35	7			0	
959	122	0	122	41	134	134	0	45	160	54	0	160	210	0	210	70	2	0	2	1	2	1	3	1			0	
960	334	0	334	101	366	366	0	110	439	132	0	439	576	0	576	172	7	0	7	1	8	1	10	2			0	
961	1	0	1	1	2	2	0	2	14	9	0	14	207	0	207	81	0	0	0	0	0	0	0	0			0	
962	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
964	11	0	11	4	14	14	0	5	24	9	0	24	51	0	51	19	1	0	1	0	3	1	10	1			0	
965	13	0	13	4	17	17	0	5	28	9	0	28	61	0	61	19	0	0	0	0	0	0	0	0			0	
966	170	0	170	59	196	196	0	68	261	92	0	261	401	0	401	142	5	0	6	0	7	1	9	2			0	
967	151	0	151	52	205	205	0	71	380	134	0	380	956	0	956	345	0	0	0	0	0	0	0	0			0	
968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
970	62	0	62	22	72	72	0	26	99	36	0	99	157	0	157	59	4	0	7	2	25	19	231	66			0	
971	9	0	9	3	11	11	0	4	14	5	0	14	23	0	23	8	0	0	0	0	0	0	0	0			0	
972	1	0	1	1	1	1	0	1	2	2	0	2	3	0	3	3	0	0	0	0	0	0	0	0			0	
973	11	0	11	4	13	13	0	5	18	7	0	18	28	0	28	11	0	0	0	0	0	0	0	0			0	
974	11	0	11	4	13	13	0	5	18	7	0	18	28	0	28	11	0	0	0	0	0	0	0	0			0	
975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
977	6	0	6	2	9	9	0	3	18	6	0	18	57	0	57	21	0	0	0	0	0	0	0	0			0	
978	16	0	16	6	19	19	0	7	27	10	0	27	44	0	44	17	0	0	0	0	0	0	0	0			0	
979	2	0	2	1	3	3	0	1	5	2	0	5	11	0	11	6	17	0	19	1	23	1	30	2			0	
980	4	0	4	1	5	5	0	1	9	2	0	9	21	0	21	6	0	0	0	0	0	0	0	0			0	
981	70	0	70	18	89	89	0	23	144	37	0	144	295	0	295	76	0	0	0	0	0	0	0	0			0	
982	190	0	190	62	241	241	0	79	390	127	0	390	801	0	801	261	15	4	16	4	18	4	22	4			0	

WSA3TAZ	POP_2000	GQ2000	P_GQ2000	HH_2000	2005POP	P_GQ2005	GQ2005	2005HH	P_2015	HH_2015	GQ_2015	P_GQ_2015	POP2030	GQ2030	P_GQ2030	HH2030	EMP2000	RETAIL2000	EMP2005	RET2005	EMP2015	RETAIL2015	EMP2030	RETAIL2030	ENRLL_2000	ENRLL_2005	ENRLL_2015	ENRLL_2030
983	650	0	650	229	823	823	0	297	1320	500	0	1320	2679	0	2679	1092	68	20	85	27	136	52	294	142			0	
984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	14	17	15	27	19	53	25			0	
985	114	0	114	40	147	147	0	52	246	87	0	246	531	0	531	191	1	0	1	0	3	0	10	0			0	
986	125	0	125	46	162	162	0	60	270	100	0	270	583	0	583	219	1	0	1	0	3	0	10	0			0	
987	294	0	294	103	339	339	0	119	451	160	0	451	693	0	693	248	12	5	13	5	16	5	21	5			0	
988	248	0	248	84	286	286	0	97	381	131	0	381	585	0	585	203	10	0	11	1	13	2	17	3			0	
989	3	0	3	1	3	3	0	1	5	1	0	5	7	0	7	2	0	0	0	0	0	0	0	0			0	
990	0	0	0	0	0	0	0	0	1	1	0	1	2	0	2	1	6	0	10	6	26	26	144	96			0	
991	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	22	144	58			0	
992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	130	93	294	211			0	
993	0	0	0	0	0	0	0	0	2	1	0	2	3	0	3	1	0	0	0	0	0	0	0	0			0	
994	2	0	2	1	2	2	0	1	3	2	0	3	5	0	5	3	0	0	0	0	0	0	0	0			0	
995	14	0	14	5	16	16	0	6	22	8	0	22	36	0	36	13	5	0	5	0	5	1	6	1			0	
996	14	0	14	5	16	16	0	6	22	8	0	22	36	0	36	13	0	0	0	0	0	0	0	0			0	
997	0	0	0	0	0	0	0	0	2	1	0	2	3	0	3	1	0	0	0	0	0	0	0	0			0	
998	0	0	0	0	0	0	0	0	2	1	0	2	3	0	3	1	0	0	0	0	0	0	0	0			0	
999	3	0	3	1	4	4	0	1	5	2	0	5	9	0	9	3	0	0	0	0	0	0	0	0			0	
1000	6	1	5	2	9	8	1	3	20	6	2	18	69	5	64	17	0	0	0	0	0	0	0	0			0	
1001	2	0	2	1	2	2	0	1	2	1	0	2	3	0	3	2	20	0	21	0	23	1	27	2			0	
1002	7	0	7	2	9	9	0	2	13	4	0	13	25	0	25	7	0	0	0	0	0	0	0	0			0	
1003	5	0	5	2	7	7	0	3	12	5	0	12	27	0	27	12	0	0	0	0	0	0	0	0			0	
1004	98	0	98	35	130	130	0	47	226	87	0	226	523	0	523	215	17	4	19	4	23	4	30	4			0	
1005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94	4	100	5	122	11	192	35	0	812	966	1254
1006	100	0	100	37	129	129	0	48	216	81	0	216	466	0	466	176	0	0	0	0	0	0	0	0			0	
1007	139	0	139	51	180	180	0	66	300	111	0	300	648	0	648	243	5	0	7	0	19	1	94	2	0	0	425	850
1008	217	0	217	73	250	250	0	84	333	113	0	333	512	0	512	175	0	0	0	0	0	0	0	0			0	
1009	349	0	349	100	403	403	0	116	536	155	0	536	823	0	823	241	5	0	6	0	7	1	9	1			0	
1010	31	0	31	11	36	36	0	13	48	17	0	48	73	0	73	27	21	0	23	5	29	4	48	9			0	
1011	2	0	2	1	2	2	0	1	3	1	0	3	5	0	5	2	0	0	0	0	113	13	288	33			0	
1012	2	0	2	1	2	2	0	1	3	2	0	3	5	0	5	3	0	0	0	0	135	27	337	67			0	
1013	4	0	4	3	8	8	0	5	29	16	0	29	210	0	210	82	1	0	1	0	18	0	87	0	0	0	1300	2600
1014	2	0	2	1	2	2	0	1	3	2	0	3	5	0	5	3	0	0	0	0	0	0	0	0			0	
1015	15	0	15	5	18	18	0	6	24	8	0	24	38	0	38	13	0	0	0	0	0	0	0	0			0	
1016	13	0	13	5	15	15	0	6	21	8	0	21	33	0	33	13	1	1	1	1	1	1	1	1			0	
1017	1	0	1	1	1	1	0	1	2	1	0	2	3	0	3	1	0	0	0	0	0	0	0	0			0	
1018	0	0	0	0	0	0	0	0	2	1	0	2	3	0	3	1	0	0	0	0	0	0	0	0			0	
1019	4	0	4	2	5	5	0	2	7	3	0	7	12	0	12	6	0	0	0	0	0	0	0	0			0	
1020	6	1	5	2	6	5	1	2	7	2	1	6	9	1	8	3	0	0	0	0	0	0	0	0			0	
1021	3	0	3	1	3	3	0	1	3	1	0	3	4	0	4	2	0	0	0	0	0	0	0	0			0	
1022	7	0	7	2	13	13	0	4	50	14	0	50	357	0	357	102	21	2	24	2	37	2	93	4			0	
1023	70	0	70	23	83	83	0	27	117	38	0	117	196	0	196	64	0	0	0	0	0	0	0	0			0	
1024	457	0	457	145	509	509	0	162	633	201	0	633	876	0	876	278	7	0	12	6	37	37	238	124	0	0	425	850
1025	513	7	506	177	562	555	7	197	676	242	10	666	890	13	877	332	12	0	13	4	17	4	24	7			0	
1026	0	0	0	0	0	0	0	0	100	37	2	99	200	3	197	74	0	0	0	0	0	0	0	0			0	
1027	2	0	2	1	6	6	0	3	43	18	4	39	904	7	897	335	0	0	0	0	76	30	192	75			0	
1028	7	0	7	2	8	8	0	2	10	3	0	10	14	0	14	4	332	0	349	0	386	0	449	0			0	
1029	3099	0	3099	1043	3190	3190	0	1075	3379	1141	0	3379	3685	0	3685	1249	848	508	865	512	898	520	952	533	1183	937	1112	1439
1030	2285	0	2285	732	2311	2311	0	742	2364	761	0	2364	2446	0	2446	792	95	29	101	31	123	38	192	60			0	
1031	107	0	107	37	125	125	0	44	169	62	0	169	268	0	268	103	0	0	0	0	0	0	0	0			0	
1032	113	0	113	38	132	132	0	45	179	63	0	179	283	0	283	106	0	0	0	0	0	0	0	0			0	
1033	44	0	44	15	51	51	0	18	70	25	0	70	110	0	110	42	0	0	0	0	0	0	0	0			0	
1034	32	0	32	11	37	37	0	13	51	18	0	51	81	0	81	29	0	0	0	0	132	0	320	0			0	
1035	4	0	4	2	5	5	0	2	6	3	0	6	10	0	10	5	0	0	0	0	129	57	294	129			0	
1036	9	0	9	4	11	11	0	5	14	7	0	14	23	0	23	11	0	0	0	0	0	0	0	0			0	
1037	2	0	2	1	2	2	0	1	3	2	0	3	5	0	5	3	0	0	0	0	0	0	0	0			0	
1038	2	0	2	1	4	4	0	2	23	10	0	23	255	0	255	96	0	0	0	0	0	0	0	0			0	
1039	19	0	19	7	23	23	0	8	33	12	0	33	56	0	56	22	0	0	0	0	0	0	0	0			0	
1040	20	0	20	7	24	24	0	8	34	12	0	34	59	0	59	22	7	0	7	0	8	0	10	0			0	
1041	13	0	13	5	16	16	0	6	23	9	0	23	40	0	40	16	7	1	7	1	8	1	10	1			0	
1042	6	1	5	3	6	5	1	3	7	4	1	6	9	1	8	5	0	0	0	0	0	0	0	0			0	
1043	3	0	3	3	3	3	0	3	3	3	0	3	4	0	4	4	0	0	0	0	0	0	0	0			0	
1044	1059	15	1044	359	1161	1146	15	399	1395	493	20	1375	1837	26	1811	676	160	7	168	9	198	17	289	49			0	
1045	250	4	246	91	274	270	4	101	329	125	5	324	434	6	428	171	60	0	67	20	94	20	189	58			0	
1046	1468	12	1456	495	1540	1528	12	524	1695	586	13	1682	1957	15	1942	694	111	60	121	60	152	65	241	81	2653	2986	3259	3716
1047	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
1048	186	0	186	59	217	217	0	70	294	99	0	294	466	0	466	165	5	2	6	2	17	7	89	40			0	
1049	194	0	194	68	226	226	0	81	307	114	0	307	486	0	486	190	24	1	27	2	47	7	137	64			0	
1050	57	0	57	21	66	66	0	25	90	35	0	90	143	0	143	59	7	0	8	3	10	4	15	7			0	
1051	13	0	13	5	15	15	0	6	21	8	0	21	33	0	33	13	9	0	12	0	29	1	139	5			0	
1052	26	0	26	9	30	30	0	11	41	15	0	41	66	0	66	24	0	0	0	0	130	27	294	60			0	
1053	4	0	4	2	7	7	0	3	21	8	0	21	110	0	110	36	0	0	0	0	129	57	294	129			0	
1054	7	0	7	3	11	11	0	5	29	12	0	29	118	0	118	45	0	0	0	0	0	0	0	0			0	
1055	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	4	1	5	1			0	
1056	2	0	2	1	4	4	0	2	18	8	0	18	155	0	155	59	0	0	0	0	0	0	0	0			0	

WSA3TAZ	POP_2000	GQ2000	P_GQ2000	HH_2000	2005POP	P_GQ2005	GQ2005	2005HH	P_2015	HH_2015	GQ_2015	P_GQ_2015	POP2030	GQ2030	P_GQ2030	HH2030	EMP2000	RETAIL2000	EMP2005	RET2005	EMP2015	RETAIL2015	EMP2030	RETAIL2030	ENRLL_2000	ENRLL_2005	ENRLL_2015	ENRLL_2030
1057	19	0	19	7	23	23	0	8	33	12	0	33	56	0	56	22	0	0	0	0	0	0	0	0			0	
1058	19	0	19	7	23	23	0	8	33	12	0	33	56	0	56	22	0	0	0	0	0	0	0	0			0	
1059	12	0	12	4	14	14	0	5	21	7	0	21	37	0	37	13	0	0	0	0	0	0	0	0			0	
1060	271	26	245	104	288	262	26	112	324	129	28	296	387	30	357	160	61	3	64	3	70	4	81	5	0	0	0	0
1061	1	0	1	1	1	1	0	1	1	1	0	1	1	0	1	1	0	0	0	0	0	0	0	0			0	
1062	2420	0	2420	789	2428	2428	0	792	2445	797	0	2445	2470	0	2470	805	155	104	162	106	184	114	244	141			0	
1063	798	0	798	294	904	904	0	333	1161	426	0	1161	1688	0	1688	617	162	131	172	136	196	147	247	174			0	
1064	597	0	597	221	676	676	0	250	868	320	0	868	1262	0	1262	464	51	26	57	30	79	45	144	93			0	
1065	1636	8	1628	659	1662	1654	8	670	1715	693	9	1706	1798	10	1788	728	150	43	161	46	187	53	232	65			0	
1066	801	4	797	383	814	810	4	389	840	402	4	836	881	5	876	422	42	1	45	2	52	4	65	18			0	
1067	599	62	537	223	602	540	62	223	609	223	63	546	620	64	556	223	49	1	56	2	72	6	106	39			0	
1068	904	93	811	464	909	816	93	464	919	464	94	825	935	96	839	465	159	3	162	4	170	9	181	30			0	
1069	831	245	586	246	842	596	246	250	864	257	257	608	899	269	630	269	41	11	42	11	45	11	50	11			0	
1070	1818	536	1282	707	1842	1304	538	717	1892	738	562	1329	1968	590	1378	771	457	174	472	174	503	174	553	174	713	781	913	1153
1071	381	0	381	178	405	405	0	190	458	217	0	458	551	0	551	265	78	0	83	25	94	17	113	34			0	
1072	1018	0	1018	423	1082	1082	0	452	1224	516	0	1224	1471	0	1471	630	49	2	52	3	59	6	71	21			0	
1073	460	0	460	156	501	501	0	174	593	216	0	593	764	0	764	298	37	19	46	22	70	28	132	40			0	
1074	637	0	637	222	693	693	0	247	821	306	0	821	1058	0	1058	423	30	0	37	11	57	16	107	32			0	
1075	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	6	2	9	3	18	5			0	
1076	20	0	20	9	23	23	0	11	32	15	0	32	51	0	51	24	0	0	0	0	25	0	50	0			0	
1077	44	0	44	22	51	51	0	26	70	36	0	70	112	0	112	59	1	0	2	0	7	0	51	0			0	
1078	24	0	24	8	33	33	0	11	62	21	0	62	161	0	161	53	0	0	0	0	125	50	250	100			0	
1079	32	0	32	11	37	37	0	13	51	18	0	51	81	0	81	29	22	0	23	5	25	3	28	6			0	
1080	12	0	12	5	16	16	0	7	31	13	0	31	80	0	80	32	2	0	2	0	2	1	3	1			0	
1081	12	0	12	5	14	14	0	6	19	8	0	19	30	0	30	13	0	0	0	0	0	0	0	0			0	
1082	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
1083	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
1084	7	0	7	2	8	8	0	2	12	3	0	12	22	0	22	6	0	0	0	0	0	0	0	0			0	
1085	8	0	8	4	10	10	0	5	16	8	0	16	32	0	32	16	2	0	2	0	2	0	3	0			0	
1086	2	0	2	1	3	3	0	1	4	2	0	4	8	0	8	4	0	0	0	0	0	0	0	0			0	
1087	4	0	4	3	5	5	0	4	8	6	0	8	17	0	17	13	0	0	0	0	0	0	0	0			0	
1088	765	0	765	284	848	848	0	314	1042	385	0	1042	1418	0	1418	523	50	39	56	42	71	50	101	65			0	
1089	316	0	316	125	374	374	0	147	524	205	0	524	868	0	868	337	8	0	12	8	24	24	73	50			0	
1090	461	2	459	203	468	466	2	206	483	213	2	481	507	3	504	224	96	0	103	28	119	21	148	41	447	470	558	723
1091	84	0	84	44	85	85	0	45	88	46	1	87	92	1	91	49	58	10	62	12	72	16	90	25			0	
1092	150	14	136	75	151	137	14	75	152	75	14	138	155	15	140	75	1366	263	1380	266	1409	271	1453	280	247	263	311	400
1093	375	37	338	155	377	340	37	155	381	155	37	344	388	38	350	155	337	30	344	32	359	36	383	44	260	260	283	320
1094	720	210	510	20	730	519	211	20	749	21	220	529	779	231	548	22	2014	20	2034	20	2086	20	2192	21	13989	16000	16993	18600
1095	576	175	401	278	584	408	176	282	599	291	183	416	623	192	431	304	963	263	979	263	1019	265	1095	270			0	
1096	487	0	487	239	518	518	0	255	586	292	0	586	704	0	704	356	379	136	390	138	429	149	537	180			0	
1097	26	0	26	11	30	30	0	13	41	18	0	41	66	0	66	29	113	9	118	11	137	20	193	52			0	
1098	49	0	49	20	57	57	0	24	78	33	0	78	124	0	124	53	8	0	8	0	23	3	88	18			0	
1099	25	0	25	9	34	34	0	12	64	22	0	64	163	0	163	56	4	0	4	0	4	1	5	1			0	
1100	49	0	49	21	57	57	0	25	78	34	0	78	124	0	124	56	0	0	0	0	0	0	0	0			0	
1101	12	0	12	6	14	14	0	7	19	10	0	19	30	0	30	16	1	0	1	0	1	0	1	0			0	
1102	12	0	12	5	14	14	0	6	19	8	0	19	30	0	30	13	0	0	0	0	105	17	210	33			0	
1103	14	0	14	5	17	17	0	6	24	9	0	24	40	0	40	16	0	0	0	0	100	10	200	20			0	
1104	12	0	12	5	14	14	0	6	21	9	0	21	37	0	37	16	3	0	3	0	3	0	4	0			0	
1105	3	0	3	1	4	4	0	1	5	2	0	5	9	0	9	3	4	0	4	0	5	0	6	0			0	
1106	2821	0	2821	1013	2853	2853	0	1026	2919	1052	0	2919	3021	0	3021	1092	262	140	272	144	304	160	390	202			0	
1107	2914	0	2914	1037	2972	2972	0	1058	3093	1101	0	3093	3283	0	3283	1168	382	197	402	197	444	197	517	197			0	
1108	894	0	894	378	918	918	0	389	967	413	0	967	1046	0	1046	452	488	194	503	194	533	194	582	194	711	705	857	1150
1109	463	0	463	181	475	475	0	186	500	198	0	500	541	0	541	216	170	47	180	49	201	53	238	59			0	
1110	196	1	195	104	197	196	1	104	198	105	1	197	201	1	200	107	1204	794	1222	801	1257	814	1313	834			0	
1111	564	4	560	255	566	562	4	256	571	259	4	567	579	4	575	263	92	3	94	4	100	7	108	15	244	253	302	395
1112	378	17	361	155	387	370	17	159	405	166	18	387	434	20	414	178	113	3	118	5	138	13	194	58			0	
1113	150	6	144	76	153	147	6	78	161	82	6	154	172	7	165	88	872	205	886	217	922	245	995	297	753	847	956	1146
1114	521	0	521	261	538	538	0	267	572	280	0	572	629	0	629	300	516	443	527	444	555	449	616	469			0	
1115	574	0	574	287	592	592	0	294	631	308	0	631	693	0	693	330	225	91	236	103	260	130	300	187			0	
1116	463	0	463	201	497	497	0	216	573	250	0	573	709	0	709	311	339	33	354	41	388	62	443	117			0	
1117	6	0	6	2	7	7	0	2	9	3	1	9	14	1	13	5	160	12	170	13	194	17	247	26	802	802	944	1207
1118	5	0	5	2	6	6	0	2	7	3	1	7	11	1	10	5	4	0	4	0	17	12	94	37			0	
1119	15	1	14	6	17	16	1	7	23	9	1	22	34	1	33	14	0	0	0	0	25	5	49	10			0	
1120	7	0	7	3	8	8	0	3	11	5	1	10	16	1	15	7	2	0	2	0	2	0	3	0			0	
1121	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	3	0	4	0			0	
1122	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
1123	32	0	32	11	40	40	0	14	64	22	0	64	130	0	130	43	0	0	0	0	0	0	0	0			0	
1124	6	0	6	3	8	8	0	4	12	6	0	12	24	0	24	12	0	0	0	0	0	0	0	0			0	
1125	3	0	3	1	4	4	0	1	6	2	0	6	12	0	12	4	0	0	0	0	0	0	0	0			0	
1126	7	0	7	4	9	9	0	5	14	8	0	14	30	0	30	18	0	0	0	0	0	0	0	0			0	
1127	3	0	3	1	4	4	0	1	6	2	0	6	13	0	13	4	0	0	0	0	0	0	0	0			0	
1128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	180	104	189	104	210	104	244	104	1691	1815	2096	2600
1129	1435	0	1435	487	1464	1464	0	497	1523	517	0	1523	1617	0	1617	549	239	13	251	17	278	30	324	71			0	
1130	1298	0	1298	556	1332	1332	0	573	1404	608	0	1404	1518	0	1518	664	382	62	394	70	419	89	459	127			0	

WSA3TAZ	POP_2000	GQ2000	P_GQ2000	HH_2000	2005POP	P_GQ2005	GQ2005	2005HH	P_2015	HH_2015	GQ_2015	P_GQ_2015	POP2030	GQ2030	P_GQ2030	HH2030	EMP2000	RETAIL2000	EMP2005	RET2005	EMP2015	RETAIL2015	EMP2030	RETAIL2030	ENRLL_2000	ENRLL_2005	ENRLL_2015	ENRLL_2030
1131	461	3	458	197	463	460	3	198	467	200	3	464	474	3	471	203	616	256	625	265	644	283	673	312	488	488	521	575
1132	423	3	420	221	425	422	3	222	429	225	3	426	435	3	432	229	157	3	161	4	170	8	184	20			0	
1133	1493	67	1426	564	1528	1461	67	577	1600	605	72	1528	1715	78	1637	650	282	13	289	17	312	29	373	71	963	880	975	1136
1134	595	0	595	299	614	614	0	306	654	321	0	654	719	0	719	344	216	121	227	127	258	144	342	189			0	
1135	1037	0	1037	355	1070	1070	0	363	1139	380	0	1139	1252	0	1252	407	50	1	52	2	63	7	96	60			0	
1136	769	0	769	234	826	826	0	252	951	291	0	951	1177	0	1177	362	9	2	16	5	56	26	390	375			0	
1137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	23	170	68			0	
1138	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
1139	71	3	68	24	81	78	3	28	107	36	4	103	161	5	156	55	2	0	2	0	2	0	3	0			0	
1140	21	1	20	8	24	23	1	9	32	12	1	31	48	1	47	18	0	0	0	0	0	0	0	0			0	
1141	32	1	31	12	37	36	1	14	48	18	1	47	73	2	71	28	1	0	1	0	1	0	1	0			0	
1142	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
1143	33	0	33	13	42	42	0	16	66	26	0	66	134	0	134	51	0	0	0	0	0	0	0	0			0	
1144	4	0	4	2	5	5	0	3	8	4	0	8	16	0	16	8	0	0	0	0	0	0	0	0			0	
1145	211	0	211	97	266	266	0	122	425	191	0	425	856	0	856	377	0	0	0	0	0	0	0	0			0	
1146	4	0	4	2	5	5	0	3	8	4	0	8	17	0	17	9	0	0	0	0	0	0	0	0			0	
1147	4	0	4	2	5	5	0	3	8	4	0	8	17	0	17	9	0	0	0	0	0	0	0	0			0	
1148	2154	105	2049	796	2205	2100	105	810	2310	838	112	2198	2478	120	2358	882	371	371	383	377	416	399	493	453			0	
1149	351	17	334	139	380	363	17	150	446	173	22	424	567	28	539	216	568	11	590	18	636	47	712	200			0	
1150	298	0	298	153	306	306	0	156	322	162	0	322	348	0	348	171	691	200	708	200	743	200	798	200			0	
1151	1356	55	1301	536	1360	1305	55	538	1368	541	55	1313	1381	56	1325	546	1712	1070	1735	1073	1781	1080	1852	1090			0	
1152	1447	49	1398	573	1453	1404	49	576	1466	582	49	1416	1485	50	1435	591	413	127	419	127	432	127	452	127	1923	1931	2175	2600
1153	942	32	910	332	990	958	32	350	1092	388	37	1055	1267	43	1224	453	202	25	205	25	216	26	246	28			0	
1154	641	0	641	211	679	679	0	224	761	252	0	761	904	0	904	300	378	18	392	19	421	22	470	27			0	
1155	726	0	726	262	769	769	0	278	862	313	0	862	1023	0	1023	373	53	5	56	5	62	5	73	5			0	
1156	1140	0	1140	388	1185	1185	0	404	1281	438	0	1281	1440	0	1440	495	89	8	97	8	126	10	219	16			0	
1157	43	2	41	14	49	47	2	16	65	21	2	62	97	3	94	32	0	0	0	0	0	0	0	0			0	
1158	70	3	67	21	80	77	3	24	105	32	4	102	159	5	154	48	13	0	14	0	16	1	19	2			0	
1159	26	1	25	10	30	29	1	11	39	15	1	38	59	2	57	23	0	0	0	0	0	0	0	0			0	
1160	4	0	4	2	5	5	0	2	6	3	0	6	9	0	9	5	0	0	0	0	0	0	0	0			0	
1161	8	0	8	3	13	13	0	5	32	11	0	32	132	0	132	44	0	0	0	0	0	0	0	0			0	
1162	15	0	15	6	19	19	0	8	30	12	0	30	61	0	61	23	0	0	0	0	0	0	0	0			0	
1163	8	0	8	4	10	10	0	5	16	8	0	16	32	0	32	16	0	0	0	0	0	0	0	0			0	
1164	0	0	0	0	0	0	0	0	268	110	13	255	536	26	510	220	0	0	0	0	72	43	318	191			0	
1165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	673	98	685	100	709	105	747	112			0	
1166	1409	48	1361	516	1423	1375	48	522	1452	533	49	1403	1496	50	1446	551	445	93	452	96	466	101	487	110	560	629	728	906
1167	366	0	366	124	388	388	0	132	435	148	0	435	516	0	516	177	11	0	12	0	57	0	263	0			0	
1168	37	1	36	13	42	41	1	15	56	20	1	54	84	2	82	30	0	0	0	0	0	0	0	0			0	
1169	47	2	45	15	54	52	2	17	71	23	2	68	107	3	104	34	0	0	0	0	0	0	0	0			0	
1170	24	1	23	8	27	26	1	9	36	12	1	35	54	2	52	18	5	0	5	0	6	1	7	1			0	
1171	5	0	5	2	6	6	0	2	7	3	1	7	11	1	10	5	0	0	0	0	0	0	0	0			0	
1172	8	0	8	3	10	10	0	4	16	6	0	16	32	0	32	12	0	0	0	0	0	0	0	0			0	
1173	14	0	14	5	18	18	0	6	28	10	0	28	57	0	57	19	0	0	0	0	0	0	0	0			0	
1174	6	0	6	2	8	8	0	3	12	4	0	12	24	0	24	8	0	0	0	0	0	0	0	0			0	
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1176	466	0	466	141	535	535	0	156	704	193	0	704	1064	0	1064	263	95	2	99	2	120	2	190	3			0	
1177	1270	0	1270	501	1316	1316	0	521	1414	562	0	1414	1574	0	1574	631	1086	727	1094	728	1112	731	1138	736			0	
1178	491	0	491	178	543	543	0	197	664	243	0	664	899	0	899	331	1221	871	1229	872	1246	874	1271	878			0	
1179	1560	471	1089	627	1581	1109	472	632	1623	641	493	1130	1688	516	1172	656	489	133	499	134	519	135	550	137	806	765	894	1130
1180	1717	0	1717	570	1721	1721	0	574	1729	582	0	1729	1742	0	1742	595	148	8	154	9	184	12	285	25	590	656	762	954
1181	417	0	417	130	448	448	0	140	519	162	0	519	645	0	645	203	24	0	30	23	45	34	85	68			0	
1182	112	0	112	34	120	120	0	37	139	42	0	139	173	0	173	53	0	0	0	0	0	0	0	0			0	
1183	51	2	49	19	58	56	2	22	77	29	3	74	116	4	112	44	3	0	3	0	3	0	4	0			0	
1184	61	3	58	14	70	67	3	16	92	21	3	88	138	4	134	32	25	0	27	9	30	2	36	4			0	
1185	59	3	56	16	68	65	3	18	89	24	3	85	134	4	130	37	1	0	1	0	1	0	1	0			0	
1186	134	0	134	44	144	144	0	47	167	55	0	167	207	0	207	69	33	5	41	7	62	11	117	25			0	
1187	279	12	267	93	320	308	12	107	420	141	15	405	632	19	613	214	9	0	10	0	11	1	13	1			0	
1188	50	0	50	23	63	63	0	29	101	45	0	101	203	0	203	89	0	0	0	0	0	0	0	0			0	
1189	4	0	4	1	5	5	0	1	8	2	0	8	17	0	17	4	0	0	0	0	0	0	0	0			0	
1190	7	0	7	3	9	9	0	4	14	6	0	14	30	0	30	13	0	0	0	0	0	0	0	0			0	
1191	89	0	89	35	114	114	0	45	185	73	0	185	386	0	386	152	9	4	9	4	10	5	12	7			0	
1192	133	0	133	38	166	166	0	49	260	79	0	260	510	0	510	166	18	0	20	0	24	0	33	0			0	
1193	253	0	253	90	272	272	0	97	315	112	0	315	391	0	391	140	17	0	21	4	32	7	60	13			0	
1194	2085	624	1461	512	2113	1487	626	516	2169	523	653	1516	2257	684	1573	535	706	143	714	149	731	161	757	181				
1195	0		0	0	0	0	0	0	0	0	0	0	0		0	0	546	64	568	66	614	71	691	79			0	
Total	**73,737**	**2,991**	**70,746**	**27,025**	**77,832**	**74,833**	**2,999**	**28,539**	**88,575**	**32,556**	**3,168**	**85,405**	**112,850**	**3,371**	**109,479**	**41,672**	**27,342**	**8,836**	**28,179**	**9,223**	**32,075**	**10,418**	**40,857**	**13,720**	**29,662**	**33,137**	**39,094**	**47,568**

Chapter 4
Future Traffic Impacts

In identifying appropriate and effective transportation improvements for the Edmond area, a series of alternative scenarios, comprised of varying transportation projects, were developed in order to evaluate their impacts on travel demand in the area. Projects identified in the scenarios included roadway capacity improvements, interchange/overpass improvements, and consideration of commuter rail and access management features. The Edmond Travel Demand Model played an important factor in evaluating the alternatives and was used to develop future travel demand forecasts based on projected land use and development patterns in the area. In addition to traffic service, factors such as maximum utilization of the existing transportation system, community acceptance, impact on land development, and conformance with growth policies and community goals and objectives were considered in developing and evaluating transportation plan alternatives.

Transportation Improvement Needs

One of the initial steps in identifying transportation improvements in the City of Edmond was to determine future deficiencies by projecting 2030 traffic demands and needs along the existing roadway network.

Future deficiencies were determined by conducting a capacity/level-of-service analysis of the roadway system. Roadway capacity is defined as the maximum number of vehicles that can be accommodated on a roadway facility during a particular time period under prevailing roadway, traffic, and control conditions. Roadway capacity is determined by several contributing factors, including the functional class of the roadway, type and intensity of adjacent development, and the number of travel lanes. Other contributing factors of roadway capacity include intersection spacing, efficiency of signalized intersections, traffic composition, traffic controls and regulations. Capacities along the roadway network that were utilized in calculating level-of-service in Edmond are shown in **Table 4-1**.

Table 4-1
Roadway Capacities

FC/Lanes	Major Arterial	Minor Arterial	Major Collector
2-lane roadway	13,500	12,500	11,500
3-lane roadway	15,780	14,610	13,450
4-lane Undivided	27,000	25,000	23,000
4-lane Divided	31,050	28,750	-
5-lane roadway	29,500	27,100	-

An important result of a capacity analysis is the determination of Level-of-Service. Level-of-Service (LOS) is a qualitative measure of operating conditions at a location and is directly related to the volume-to-capacity ratio along roadways. LOS is given a

letter designation ranging from A to F (free flow to heavily congested), with LOS D considered in most urban areas as the limit of acceptable operation. For example, LOS can be related to the grading scale of a report card: A – Excellent, B – Good, C – Average, D – Acceptable, E – Needs improvement, and F – Failing. LOS criteria used to evaluate projected future traffic deficiencies were identified previously in Chapter 2.

Future Committed Projects

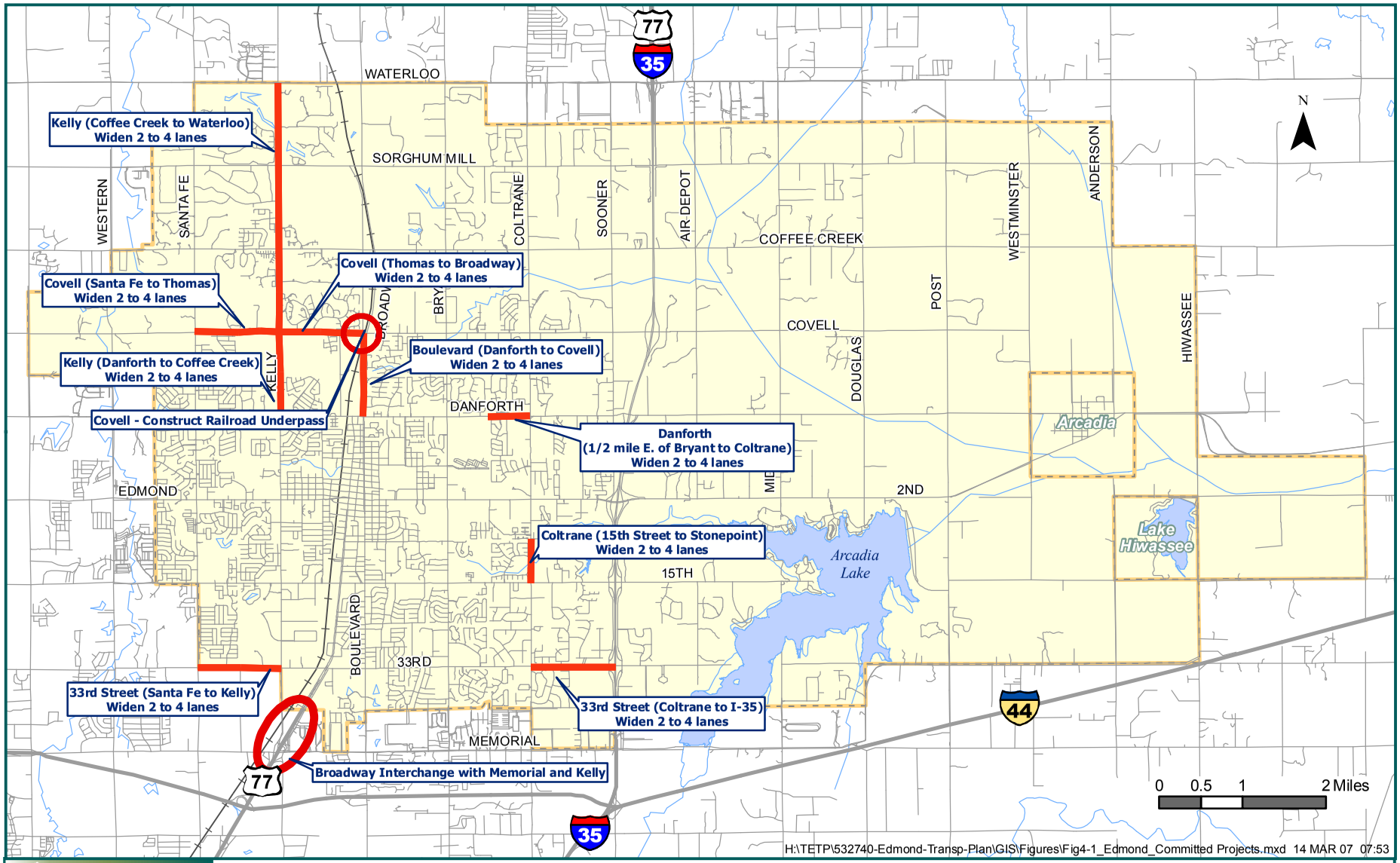
In determining the transportation improvement needs for the City of Edmond, a base network of the existing roadway system in 2005 was developed. All added capacity and regionally significant roadway projects that would be completed by the end of the year were also added to the base network.

Upon completion of the base network, an Existing Plus Committed (E+C) Network was developed. The E+C Network includes the existing roadway network plus facilities under construction or committed (programmed) for implementation. Because the Edmond model is based on ACOG's regional model, projects shown in the OCARTS 2030 plan were used as the starting point in identifying projects to be included in the E+C Network. For the Edmond area this included projects for which funding was identified and secured and were included in the city's CIP or in the TIP. Projects in the City of Edmond included in the E+C Network are shown in **Table 4-2** and **Figure 4-1**. All short and long-term projects outside the study area's limits were also included in the E+C Network.

Table 4-2
Committed Projects

Street	From	To	Description	TIP
Covell	Santa Fe	Thomas	2 to 4 lanes	2008
Covell	Thomas	Broadway	2 to 4 lanes	2007
Danforth	½ Mile E. of Bryant	Coltrane	2 to 4 lanes	
33rd Street	Santa Fe	Kelly	2 to 4 lanes	
33rd Street	Coltrane	I-35	2 to 4 lanes	2008
Western	Edmond Rd.	Covell	2 to 4 lanes	
Kelly	Danforth	Coffee Creek	2 to 4 lanes	
Kelly	Coffee Creek	Waterloo	2 to 4 lanes	2007
Boulevard	Danforth	Covell	2 to 4 lanes	2006

Once the E+C Network was developed, projected capacity deficiencies were identified along the roadway system using the 2030 demographic forecasts and travel demand model developed for the study area, as outlined in Chapter 3. This alternative analyzed how future traffic volumes were distributed on the existing network if only the committed transportation improvements were implemented during that time period. The 2030 E+C network served as the base network to which all other alternative scenario networks would be compared.



Edmond Transportation Plan

Figure 4-1 Committed Projects

Committed Projects

Projected future year 2030 daily traffic volume assignments and LOS on the E+C network are shown in **Figure 4-2** The traffic volume and LOS distributions for each network are based on trip assignments that are described as part of the travel model forecasting process in Chapter 3: Travel Demand Modeling and Demographics. The trip assignments utilize data inputs provided by ACOG that are originally based on demographic data for the 2030 forecast years.

With continued growth and development occurring over the next 25 years, traffic conditions along area roadways will worsen, in particularly in the southwest part of the city. Volumes along some of the most heavily traveled roadways are projected to increase by 17 to 72 percent, as shown in **Table 4-3**. If only the committed roadway improvements are implemented over the course of the next 25 years, many of the area roadways are projected to operate at unacceptable LOS conditions by 2030, as shown in **Figure 4-1**. Roadways operating at a LOS F in 2030 include segments of Covell, Broadway, Danforth, 2nd Street, 15th Street, Santa Fe and Kelly. Given these conditions, Edmond is in need of transportation improvements to help accommodate existing and projected traffic growth in the area.

Table 4-3
Projected Growth in Volumes

Location	2005	2030 E+C	%change
2nd Street (Santa Fe and Kelly)	22,200	27,600	24.3%
2nd Street (Kelly and Boulevard)	23,300	27,300	17.2%
2nd Street (Coltrane and Sooner)	20,800	26,000	25.0%
Broadway (33rd and 15th)	44,400	54,400	22.5%
Broadway (15th and 2nd)	31,500	44,100	40.0%
Danforth (Broadway and Bryant)	18,800	26,500	41.0%
Kelly (Danforth and Edmond)	17,000	26,500	55.9%
Kelly (2nd and 15th)	19,700	28,000	42.1%
I-35 (2nd and Danforth)	36,200	62,400	72.4%
Santa Fe (Danforth and Edmond)	19,300	28,900	49.7%

DEVELOPMENT OF ALTERNATIVES

Four scenarios were developed to test traffic reactions to various combinations of improvements. These improvements represent capacity enhancements to the existing streets, usually by adding additional lanes. This testing is required because traffic will not continue in the same pattern when one or more streets is improved. The enhanced capacity of the improved street will attract additional traffic from parallel routes. Thus, volumes will increase on the enhanced street and decrease on parallel streets. Because the traffic is diverting from the current pattern, the streets perpendicular to the improved streets will also show changes in volume, either increasing or decreasing. The volume changes will generally be less the farther a street is from the street segment being improved. By running a series of scenarios, the effects of each set of improvements can be compared.

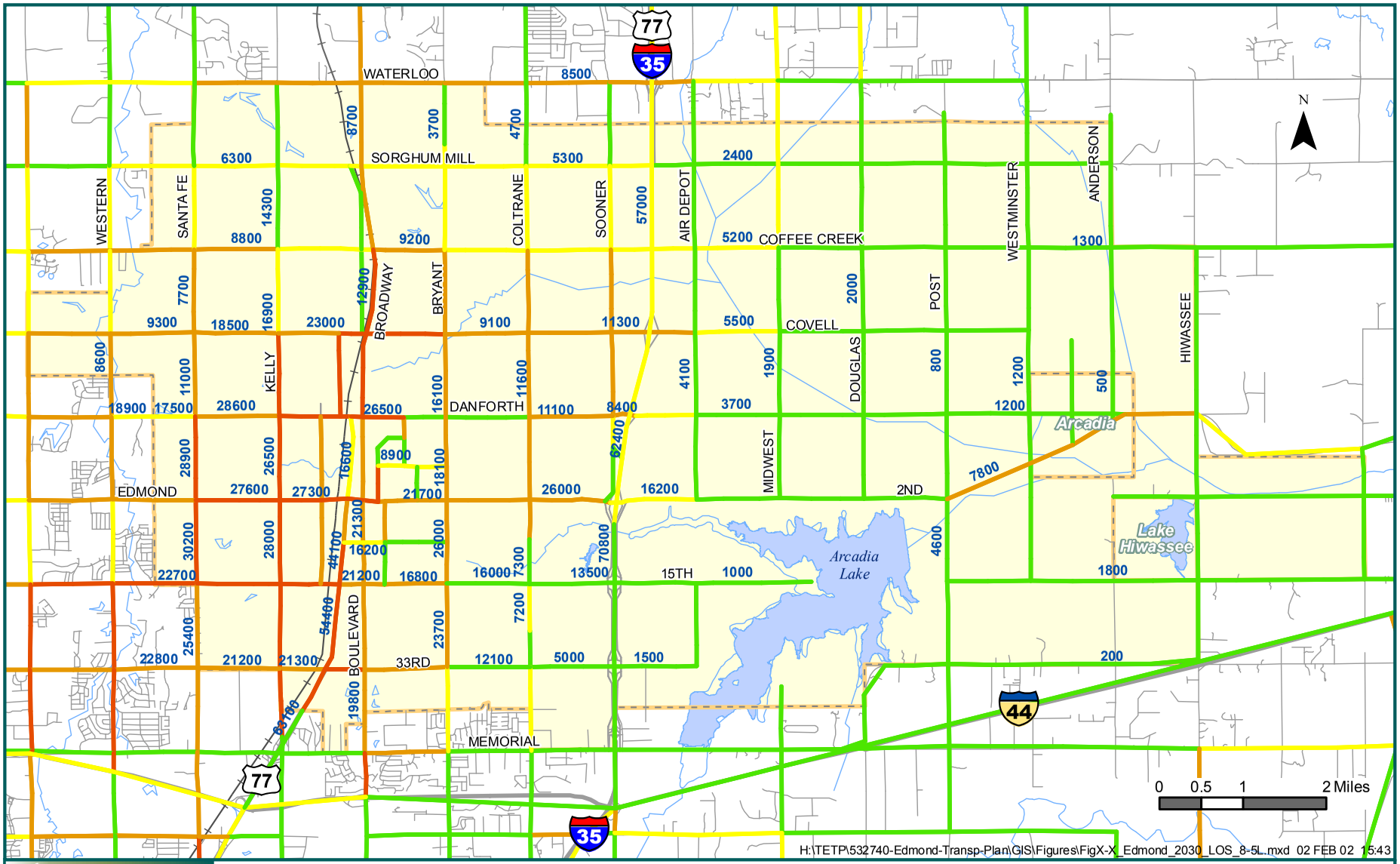


Figure 4-2 Year 2030 E+C Network Roadway Level-of-Service (LOS) and Traffic Volumes

- LOS F
- LOS E
- LOS D
- LOS A-C
- 12000 Average Daily Traffic Volume

For each of the scenarios, a certain set of common improvements, primarily in northwest Edmond, was used. These common improvements reflect the increased need for capacity due to anticipated growth in this part of the city. In most cases, the anticipated widening would be the responsibility of developers whose property fronts the street. Unless the street segment is being otherwise improved in a scenario, these common or "base scenario" improvements are:

- Western from south city limits to Covell – Widen to four lanes (this continues Western from the E+C widening in Oklahoma City that assumed a four lane street to the south city limits)
- Santa Fe from Danforth to Coffee Creek–Widen to four lanes
- Broadway from Covell to Waterloo–Widen to four lanes
- Bryant from one-half mile south of Covell to Coffee Creek–Widen to four lanes
- Coltrane from one-half mile south of 15th to 15th and from one-half mile south of 2nd to Coffee Creek–Widen to four lanes
- Sooner from I-35 south-bound on ramp to Coffee Creek – Widen to four lanes
- Highway 66 from Post to Hiwassee–Widen to four lanes
- Danforth from Coltrane to I-35 interchange–Widen to four lanes
- Covell from west city limits to Santa Fe and from Broadway to Air Depot–Widen to four lanes
- Coffee Creek from west city limits to Bryant–Widen to four lanes (requires cooperation with Oklahoma City for west one-half mile)
- Waterloo from west city limits to I-35 interchange – Widen to four lanes (must be done in cooperation with Oklahoma County and Logan County)

Scenario 1

Scenario 1 features the capacity enhancement of Edmond's most heavily traveled streets:

- South Broadway from south city limits to 2nd Street–Widen to eight lanes
- 33rd Street from west city limits to Bryant–Widen to six lanes
- Interchange at Broadway and 33rd Street–Take Broadway up and over 33rd Street, with ramps and frontage roads to provide for movements between the two streets
- 2nd Street from west city limits to I-35–Widen to six lanes

The improvements that are included in Scenario 1 are shown on **Figure 4-3**.

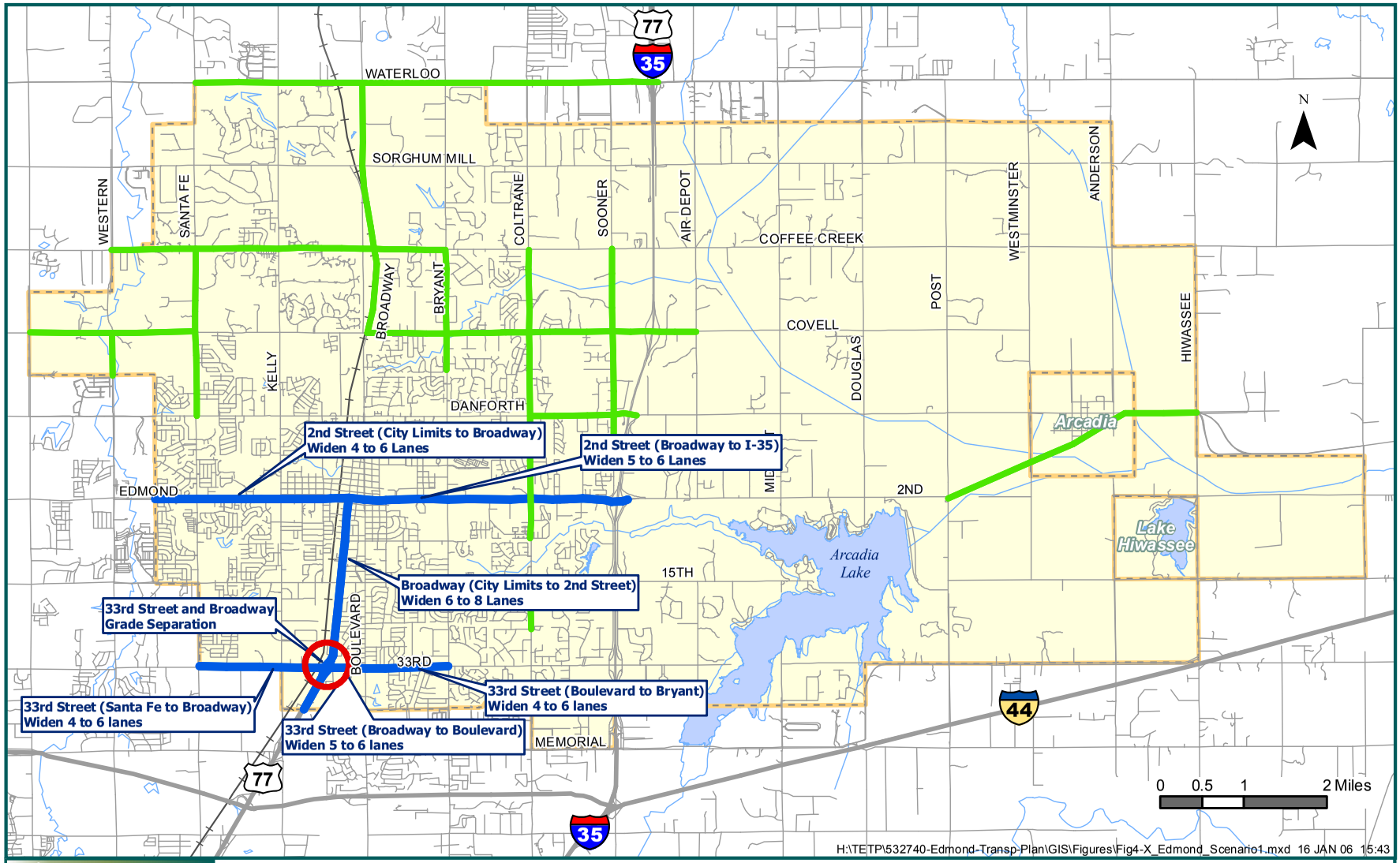


Figure 4-3 Scenario 1 Projects

Projects common to all scenarios (Widen 2 to 4 lanes)

Scenario 1 Projects

Grade Separation

Scenario 2

Scenario 2 features improvements to a group of streets that provide alternative routes to the streets improved in Scenario 1:

- Kelly from the committed Broadway interchange to Covell – Widen to six lanes (must be done in cooperation with Oklahoma City from the Broadway interchange to 33rd)
- Bryant from Memorial to Covell – Widen to six lanes (must be done in cooperation with Oklahoma City from Memorial to the south city limits)
- 15th from west city limits to I-35 interchange – Widen to six lanes (requires cooperation with Oklahoma City west of Santa Fe)
- Covell from Kelly to Air Depot – Widen to four lanes

The improvements that are included in Scenario 2 are shown on **Figure 4-4**.

Scenario 3

Traffic in Edmond has a very noticeable north-south orientation, with a generally lower Level-of-Service on north-south streets than on east-west streets. Scenario 3 was included to test improvements to three east-west corridors to determine if increased traffic could be drawn to I-35 and to the improved SH-74 in Oklahoma City. The three corridors selected for improvement were:

- 33rd from Santa Fe to I-35 interchange – Widen to six lanes (requires cooperation with Oklahoma City for the west one mile)
- Edmond Road / 2nd from west city limits to I-35 interchange – Widen to six lanes
- Covell from west city limits to I-35 interchange – Widen to six lanes
- I-35 from 2nd to Covell – Widen to six lanes (represents a major project for the Oklahoma Department of Transportation and would include upgrades to the Danforth interchange)

The improvements that are included in Scenario 3 are shown on **Figure 4-5**.

Scenario 4

Comments were received from various sources after the first Public Meeting. Several of these comments recommended specific transportation system modifications. To determine the effect of each recommendation, a fourth scenario was created with these specific improvements:

- Santa Fe at the Kilpatrick Turnpike – Add an interchange (requires a major project for the Oklahoma Turnpike Authority)
- Bryant at the Kilpatrick Turnpike – Add an interchange (requires a major project for the Oklahoma Turnpike Authority)
- Memorial from Western to I-35 – Widen to six lanes (requires cooperation with Oklahoma City)

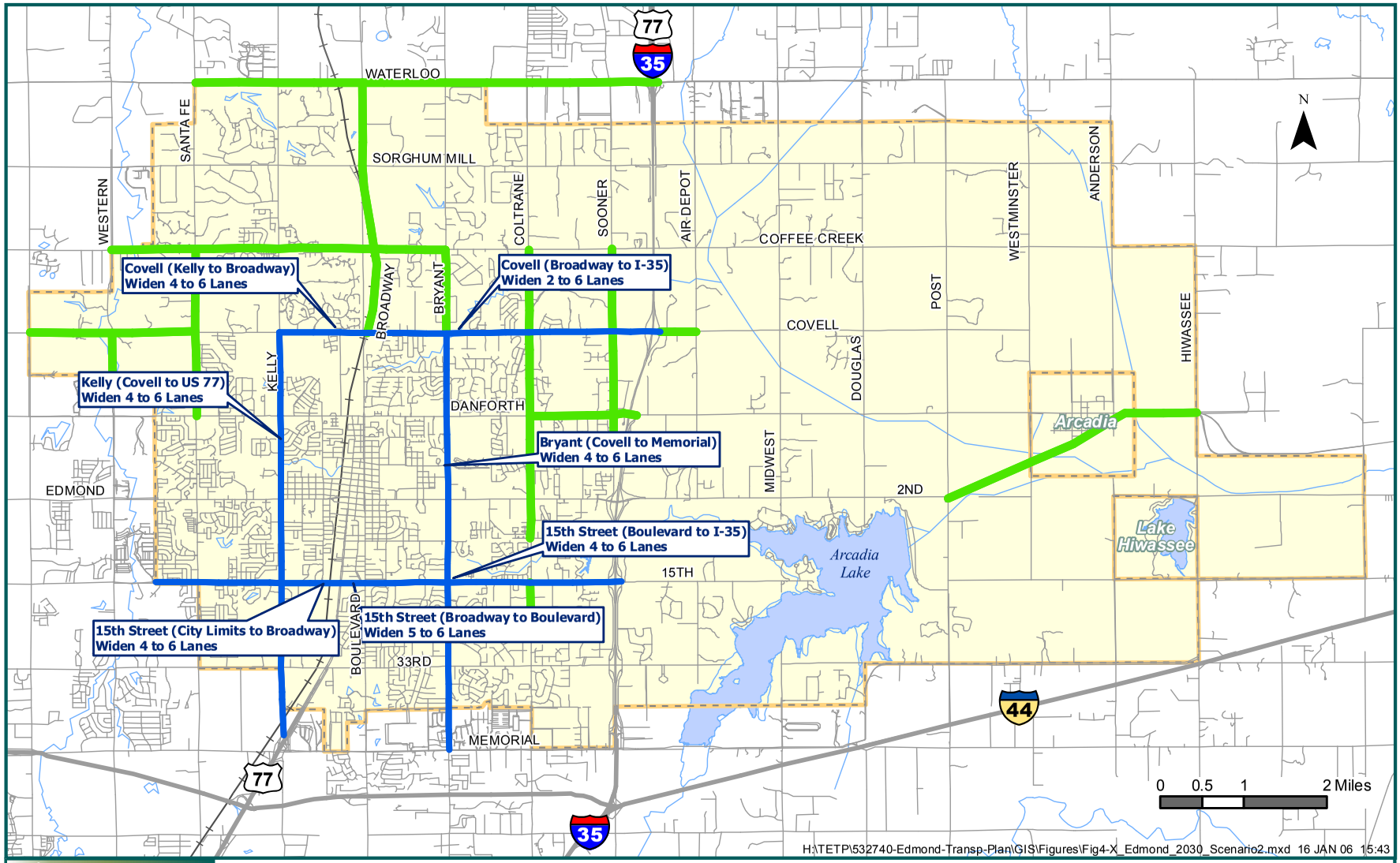


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Figure 4-4 Scenario 2 Projects

Projects common to all scenarios (Widen 2 to 4 lanes)

Scenario 2 Projects

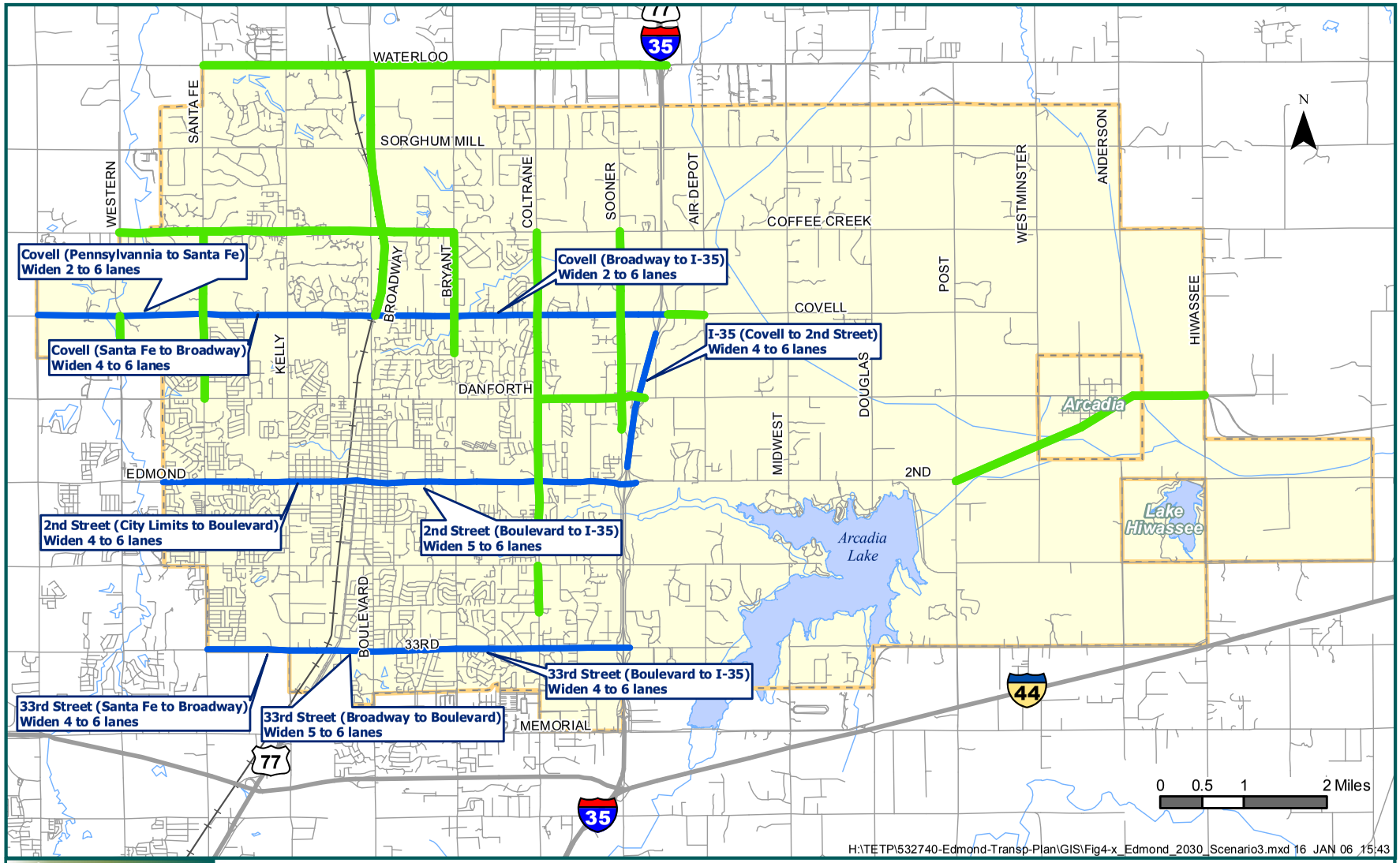

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Figure 4-5 Scenario 3 Projects

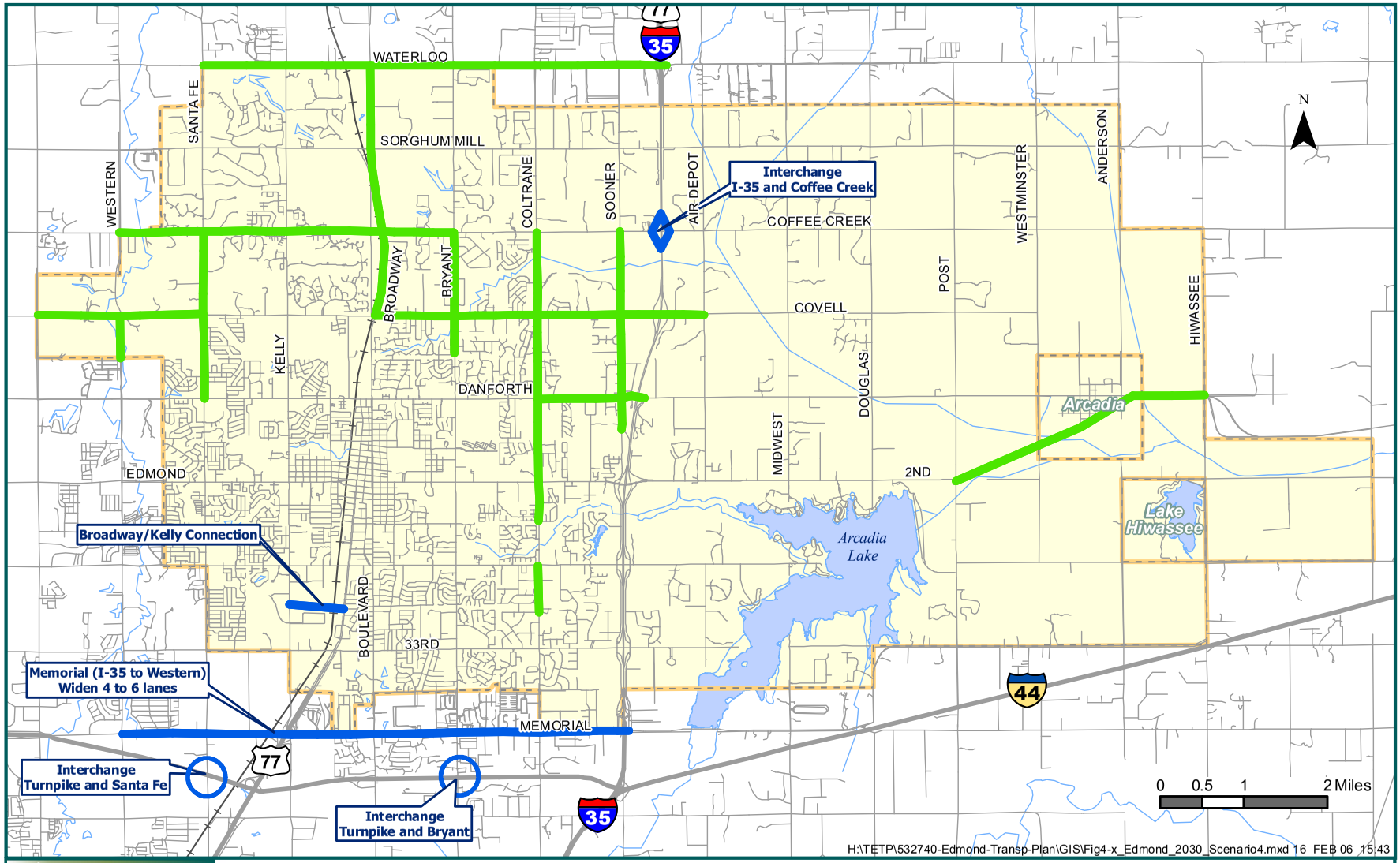
Projects common to all scenarios (Widen 2 to 4 lanes)

Scenario 3 Projects

Future Traffic Impacts

- New connector from Kelly to Broadway between 33rd and 15th–Construct a new railroad overpass
- Coffee Creek at I-35–Add an interchange (requires a major project for the Oklahoma Department of Transportation)
- Commuter Rail Service–Add commuter rail stations adjacent to the BNSF tracks at 2nd Street and at Memorial Road (based on COTPA Fixed Guideway Study Phase III Improvements contemplated to be constructed between 2020 and 2025)

The improvements that are included in Scenario 4 are shown on **Figure 4-6**.



edmond Transportation Plan

Figure 4-6 Scenario 4 Projects

Projects common to all scenarios (Widen 2 to 4 lanes)

Scenario 4 Projects

Scenario 4 includes commuter rail line from Edmond to Oklahoma City

Future Traffic Impacts

Future Traffic Impacts Of Scenario Networks

Once the four scenarios were developed, projects in each of the scenarios were added to the E+C Network, and a model assignment was run to determine their effectiveness in improving traffic conditions. All scenario networks provided improved traffic operations in the Edmond area, with certain improvements performing better than other alternatives. Level-of-service improvements and changes in future traffic volume forecasts varied for the various scenarios as shown in **Figures 4-7, 4-8**, **4-9** and **4-10**.

Scenario 1 Impacts

Implementation of Scenario 1 results in mobility and capacity improvements in the northwest part of the study area, primarily due to the implementation of the "base scenario" projects (projects common to all scenarios that involved widening key segments of section line roadways from 2 to 4 lanes). Widening of 2nd Street to 6 lanes provides improved mobility, between Broadway and I-35, however to the west of Broadway, although capacity increases, level-of-service remains at an unacceptable E. Widening of Broadway to 8 lanes improves capacity and level-of-service to acceptable conditions. Additional traffic improvements occur along 33rd Street, Memorial, and Boulevard.

Scenario 2 Impacts

Scenario 2 provides mobility improvements in the Edmond area, particularly along roadways where capacity improvements are identified. As shown in **Figure 4-8**, traffic capacity improves in the northwest area with the implementation of the "base scenario" projects. Additionally, traffic movements improve on Covell and Bryant Street. Improvements along 15th street occur between Kelly and Bryant; however to the west of Kelly, level-of-service remains at an unacceptable E or F. Kelly, which was widened from 4 to 6 lanes in this scenario, resulted in very little traffic improvements, with the majority of the corridor (south of Danforth) remaining at a LOS E or F.

Although capacity improvements occur with the implementation of this scenario, several of the roadways still operate at an unacceptable level-of-service including segments of Edmond, 15th, 33rd, Danforth, Covell, Santa Fe, Kelly, Broadway and Boulevard.

Scenario 3 Impacts

Implementation of Scenario 3 results in improved traffic conditions in the northwest part of the city, with the widening of the "base scenario" projects and Covell. Additional traffic capacity improvements occur along I-35, which was widened to 6 lanes in this scenario, Coltrane and 33rd Street. Edmond (2nd Street) which was widened to 6 lanes improved from a LOS E (between Broadway and I-35) to a LOS D, however to the west of I-35, although capacity improves; it still remains at an unacceptable LOS E.

Roadways that still operate at an unacceptable level-of-service with the implementation of this scenario include segments of Danforth, 2nd Street, 15th, Santa Fe, Kelly, Broadway, Boulevard and Bryant.

Scenario 4 Impacts

Implementation of the Scenario 4 projects had little effect on improving capacity in the Edmond area. As with the other scenarios, traffic congestion improves in the northwest part of town with the implementation of the "base scenario" projects. Additional improvements occur along Coltrane, which was also widened to 4 lanes as part of the base scenario and Memorial. Apart from those improvements, many of the area roadways, in particularly in the southwest part of the city, still operate at an unacceptable level-of-service of E or F.

Evaluation of Alternatives

After the four scenarios were developed projects were evaluated based on traffic impacts (including projected volumes and level of service), local community acceptance and consistency of the proposed projects with the community's goals, objectives, and policies. A recommended scenario, which includes a combination of projects from all four scenarios, was then developed. The recommended scenario provides the greatest level of congestion relief to the area while taking into account the community's goals and policy considerations. A key policy of the community that served as the basis for the recommended transportation plan was the encouragement of access management measures along area roadways, including adding medians, turn lanes and controlled access of driveways, as opposed to widening roadways to 6 or 8 lanes.

Development of Recommended Plan Process

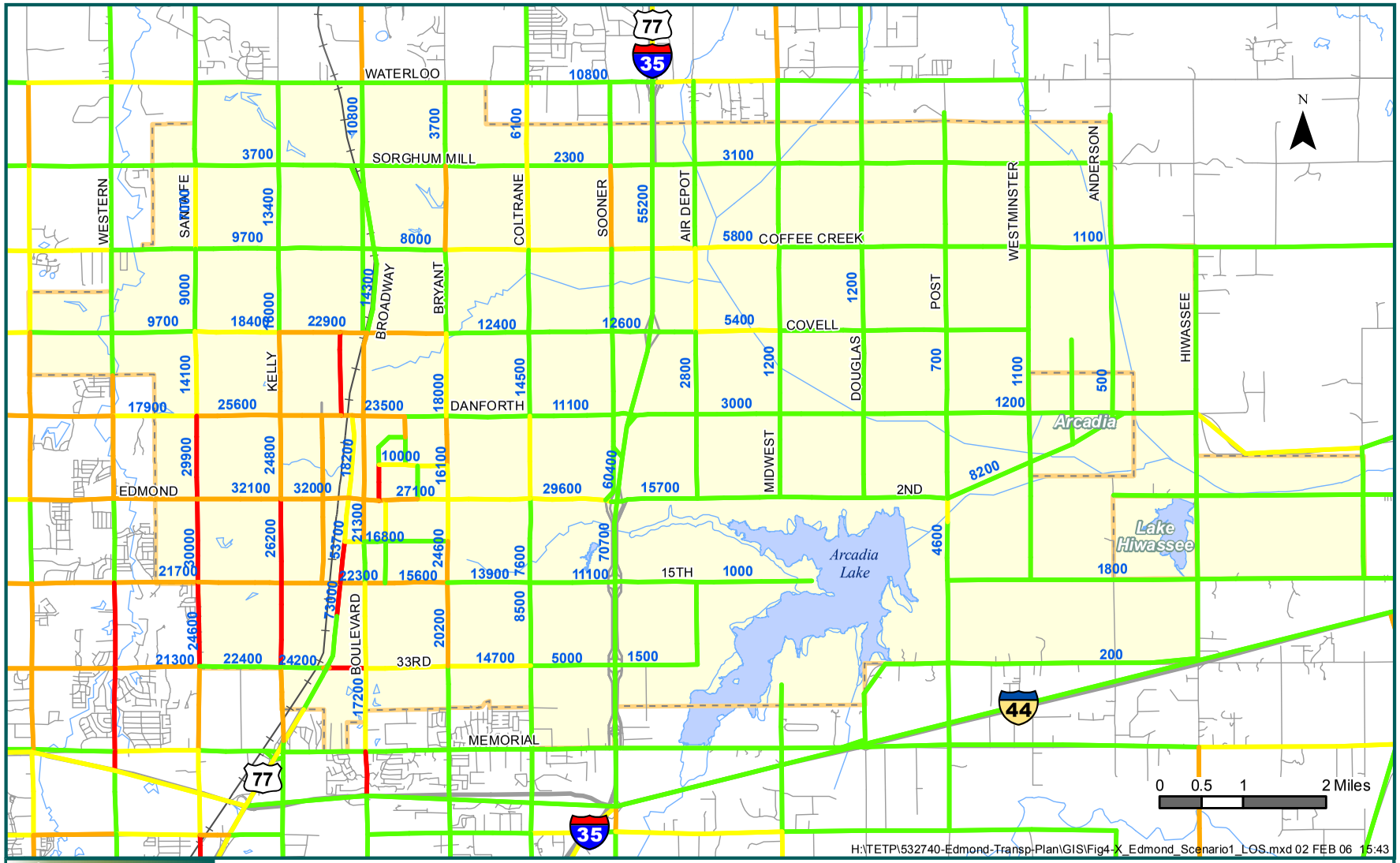


Figure 4-7 Year 2030 Scenario 1 Network Roadway Level-of-Service (LOS) and Traffic Volumes

- LOS F
- LOS E
- LOS D
- LOS A-C
- 12000 Average Daily Traffic Volume

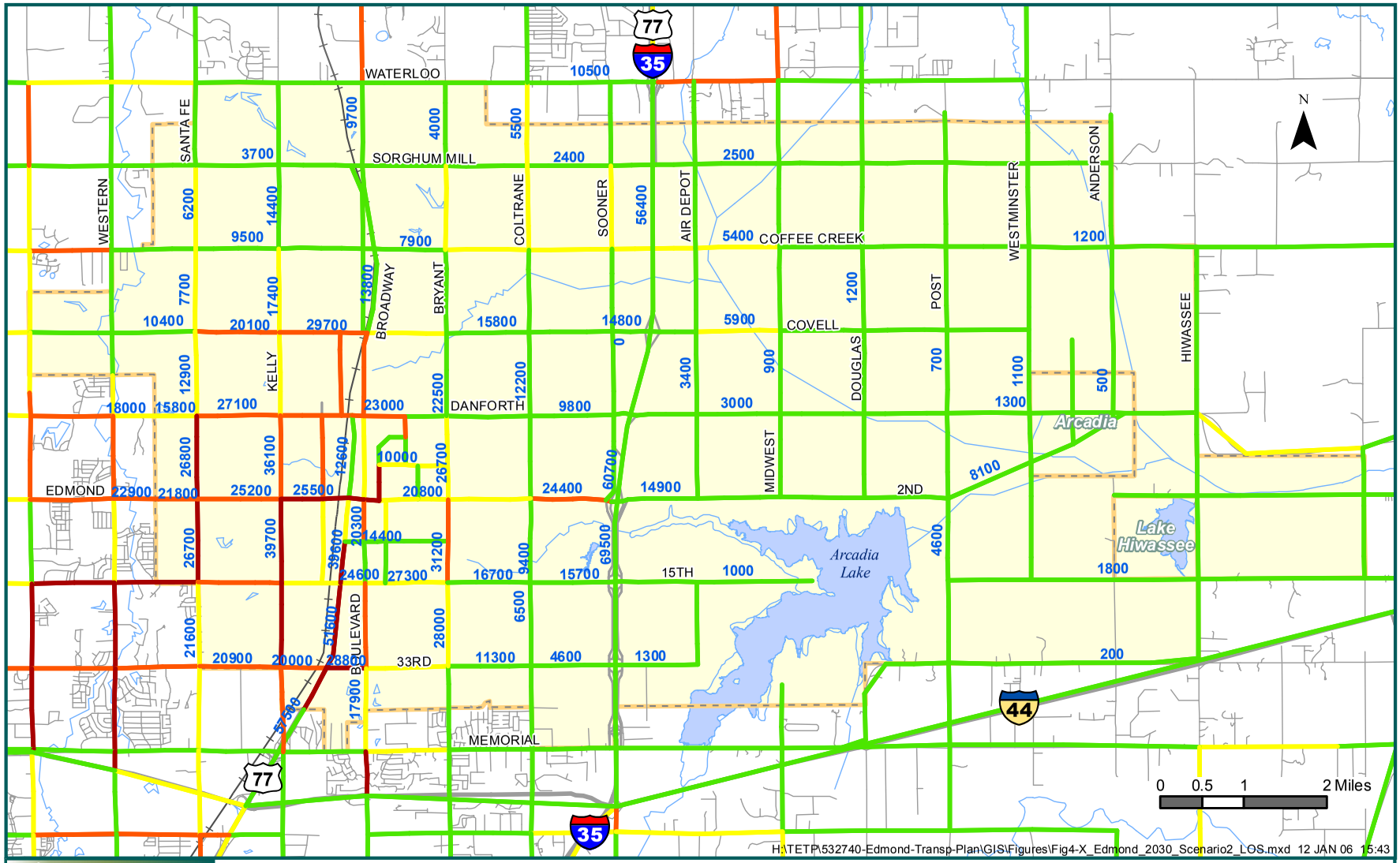


Figure 4-8 Year 2030 Scenario 2 Network Roadway Level-of-Service (LOS) and Traffic Volumes

- LOS F
- LOS E
- LOS D
- LOS A-C
- 12000 Average Daily Traffic Volume

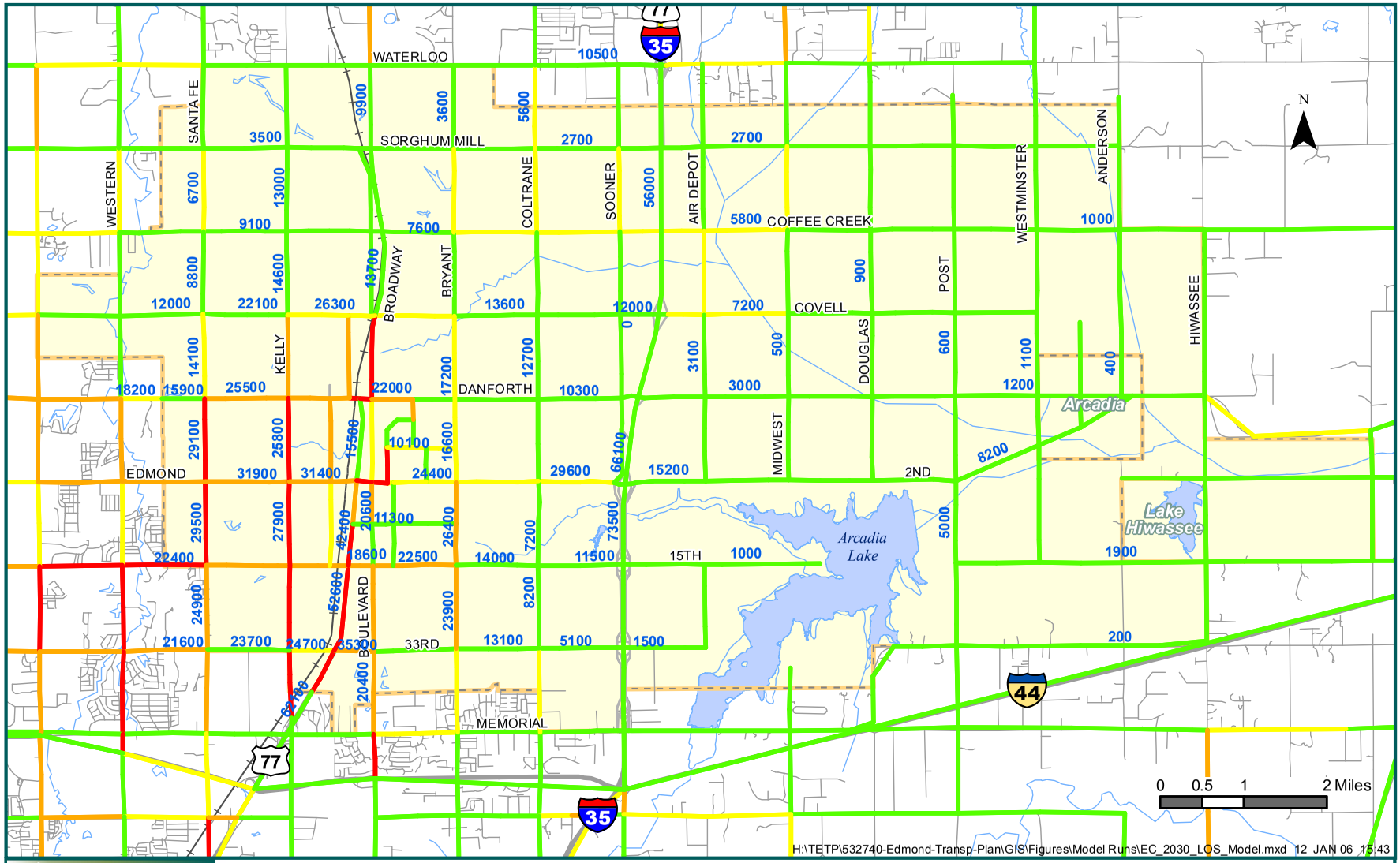


Figure 4-9 Year 2030 Scenario 3 Network Roadway Level-of-Service (LOS) and Traffic Volumes - Model

- LOS F
- LOS E
- LOS D
- LOS A-C
- 12000 Average Daily Traffic Volume

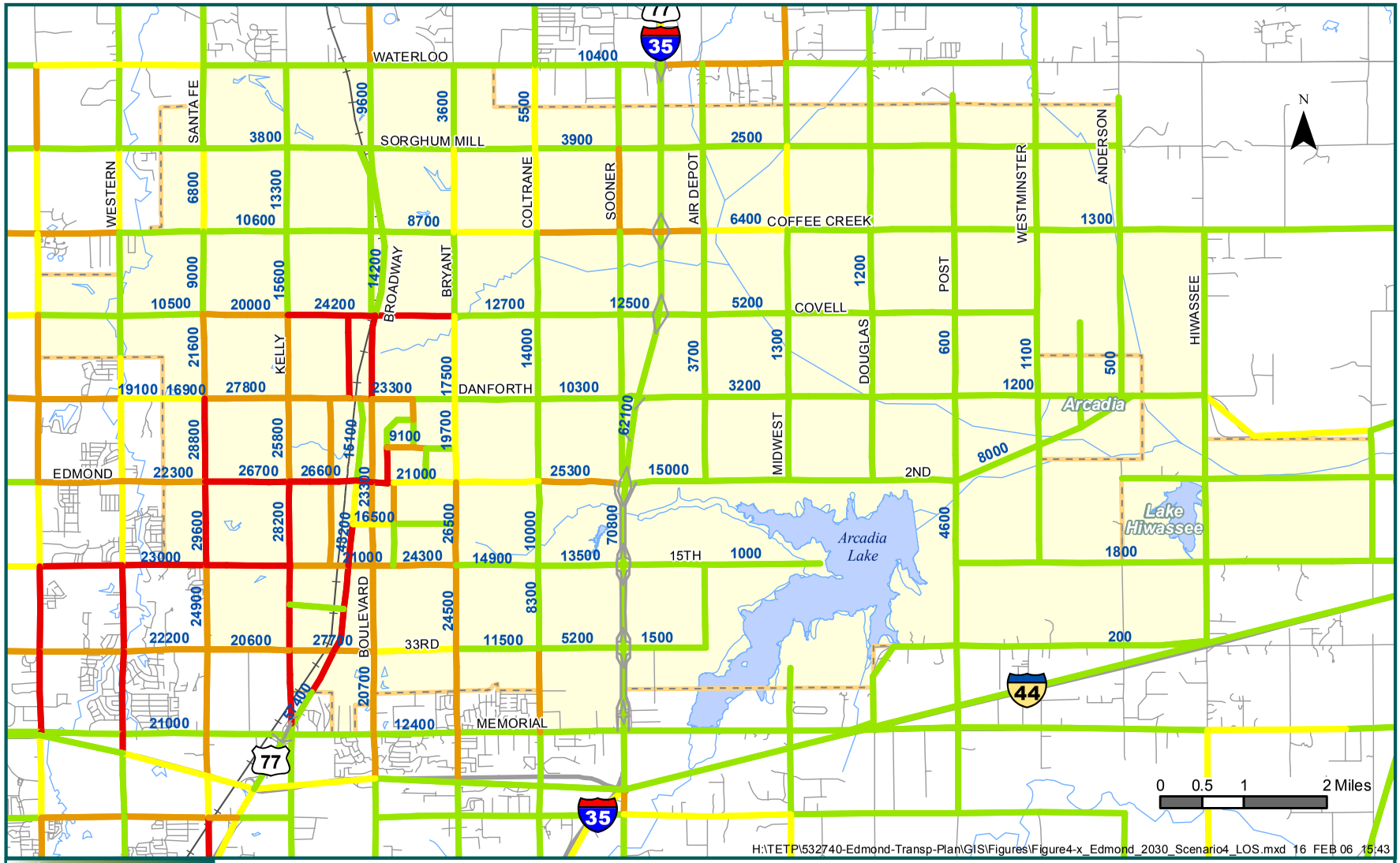


Figure 4-10 Year 2030 Scenario 4 Network Roadway Level-of-Service (LOS) and Traffic Volumes

- LOS F
- LOS E
- LOS D
- LOS A-C
- 12000 Average Daily Traffic Volume

Chapter 5
Recommended Transportation Plan

The recommended Transportation Plan for the City of Edmond consists of improvements that best meet the projected traffic needs of the community over the next 25 years. The development of the recommended plan was based on future traffic volumes and level-of-service, transportation network continuity, environmental constraints, community acceptance, impact on land development, and conformance with growth policies and community goals and objectives. This Chapter identifies the recommended transportation plan as well as other recommendations for improving traffic conditions such as implementation of transportation system management and access management measures.

POLICY GUIDANCE

Policy guidelines included in this Recommended Transportation Plan are:

- Potential right-of-way acquisitions that would require purchases of large numbers of houses or businesses will be avoided. These purchases are typically triggered when the depth of the right-of-way take includes all of a homes front or back yard, or a significant portion of a businesses parking space. The effect of this policy guidance on the Recommended Transportation Plan was to eliminate from consideration six-lane arterials in areas with significant current development. In-lieu-of the six lane arterials, four-lane arterials with either a divided median or a continuous center turn lane are used. Which one is used for a particular section will depend upon the number of intersecting streets and driveways.
- Curb cut policies are recommended to be formally adopted by the City. The Access Management and Driveway Control section of this chapter gives suggested criteria.
- Connectivity policies, other than by the section line streets, are recommended to be formally adopted by the City. The Access Management and Driveway Control section of this chapter also gives suggested criteria.
- Traffic impact assessment or analysis (TIA) for development activity is recommended to be formally adopted by the City. Criteria is shown for what type of activity will trigger the need for a TIA, what level of development will trigger the need for a TIA, and who will perform the TIA.
- Street improvements in the southwest portion of the city need to be coordinated with the City of Oklahoma City. In particular, improvements to north-south streets west of Boulevard and south of Danforth indicate a large level of attraction for residents of Oklahoma City to use when the street capacity is improved. This plan is based on coordination with Oklahoma City to upgrade Western to the same capacity as the Edmond upgrade of Kelly. Similarly, this plan is also based on coordination with

Oklahoma City to upgrade Kelly and Bryant south of the south Edmond city limits.

- Interstate and turnpike upgrades need to be coordinated with the respective state agency: the Oklahoma Department of Transportation (ODOT) for the Coffee Creek interchange and additional lanes on I-35 and the Oklahoma Turnpike Authority (OTA) for the Bryant interchange.

RECOMMENDED TRANSPORTATION PLAN

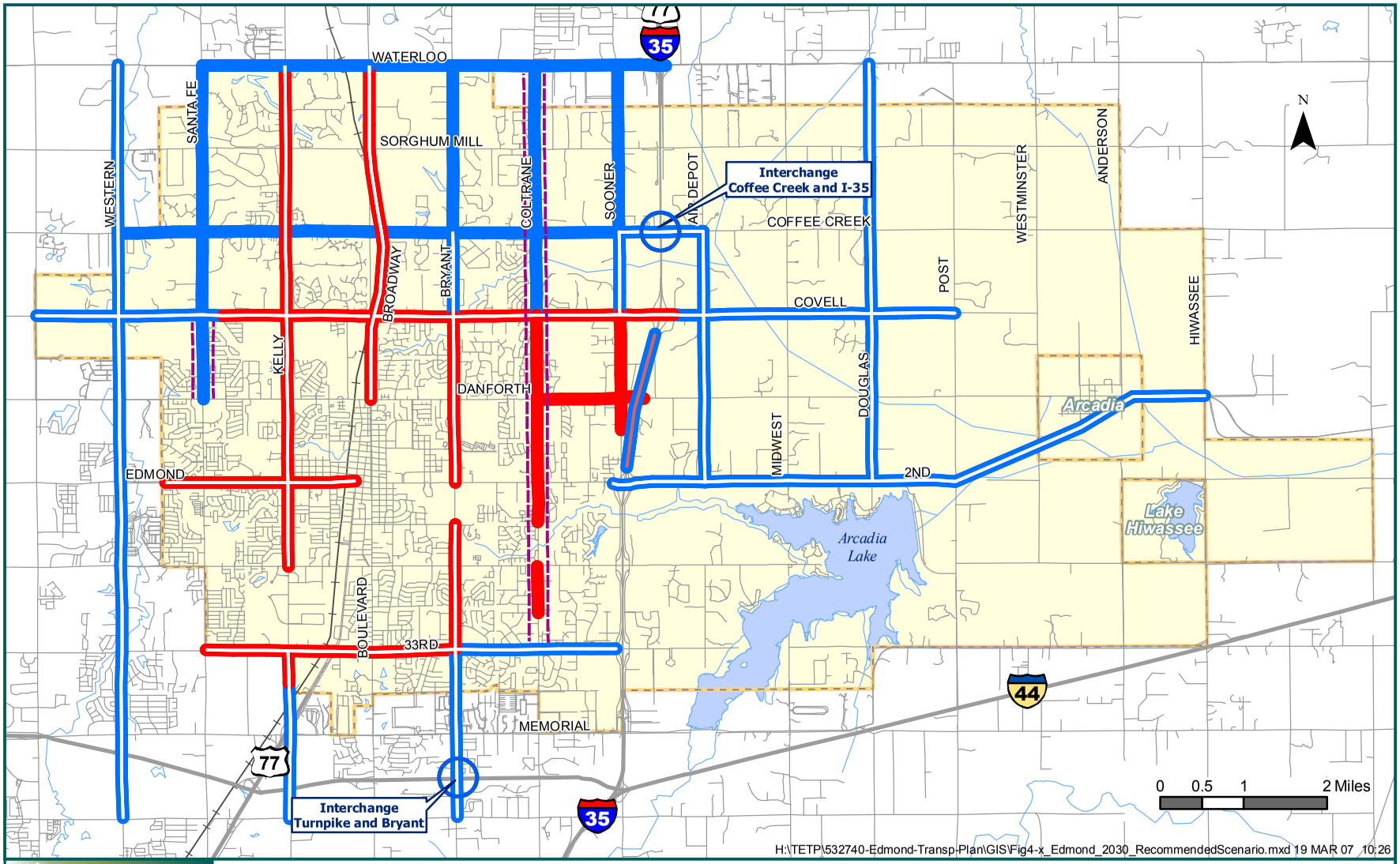
The recommended Transportation plan for the City of Edmond includes roadway capacity improvements, interchange/overpass improvements, and consideration of commuter rail and access management features.

Roadway capacity improvements provide for additional travel lanes to relieve congested roadway conditions and were recommended in locations where future projected traffic volumes were approaching or exceeding capacities. Roadway widenings provide for more efficient travel and in most cases were recommended in locations where additional right-of-way could be acquired with minimal impact to adjacent land uses. In Edmond, roadway capacity improvements were recommended along major and minor arterials if warranted by future volumes. In some cases, the capacity improvement involved adding a median for improved traffic flow and safety.

The transportation plan includes both a short-term (2006-2015) and long-term (2016-2025) implementation plan. Also included are additional long range plan improvements that may eventually be needed in certain areas as land use development warrants. The recommended plan is shown in **Figure 5-1.**

Recommended Short-Term Improvements (2006 to 2015)

Short-term improvements in Edmond include roadway capacity improvements along several major and minor arterials to accommodate growth over the next 10 years. The recommended short-term program is identified in **Table 5-1**. The projects for implementation provide adequate capacity and level-of-service to most of the transportation system, as shown in **Figure 5-2**. Roadways within the City that will operate at a LOS of E or F include sections of Santa Fe, Kelly, Broadway and Covell. Based on the level-of-service projections for Covell, several of the Covell segments have been included in the Short-Term Improvements plan.



Year 2015 - Widen to 4 lanes undivided
Year 2015 - Widen to 4 lanes divided
Year 2030 - Widen to 4 lanes undivided
Year 2030 - Widen to 4 lanes divided
Year 2030 - Widen to 6 lanes divided
Bike Lane

Figure 5-1 Recommended Plan

2030 Recommended scenario includes commuter rail line from Edmond to Oklahoma City

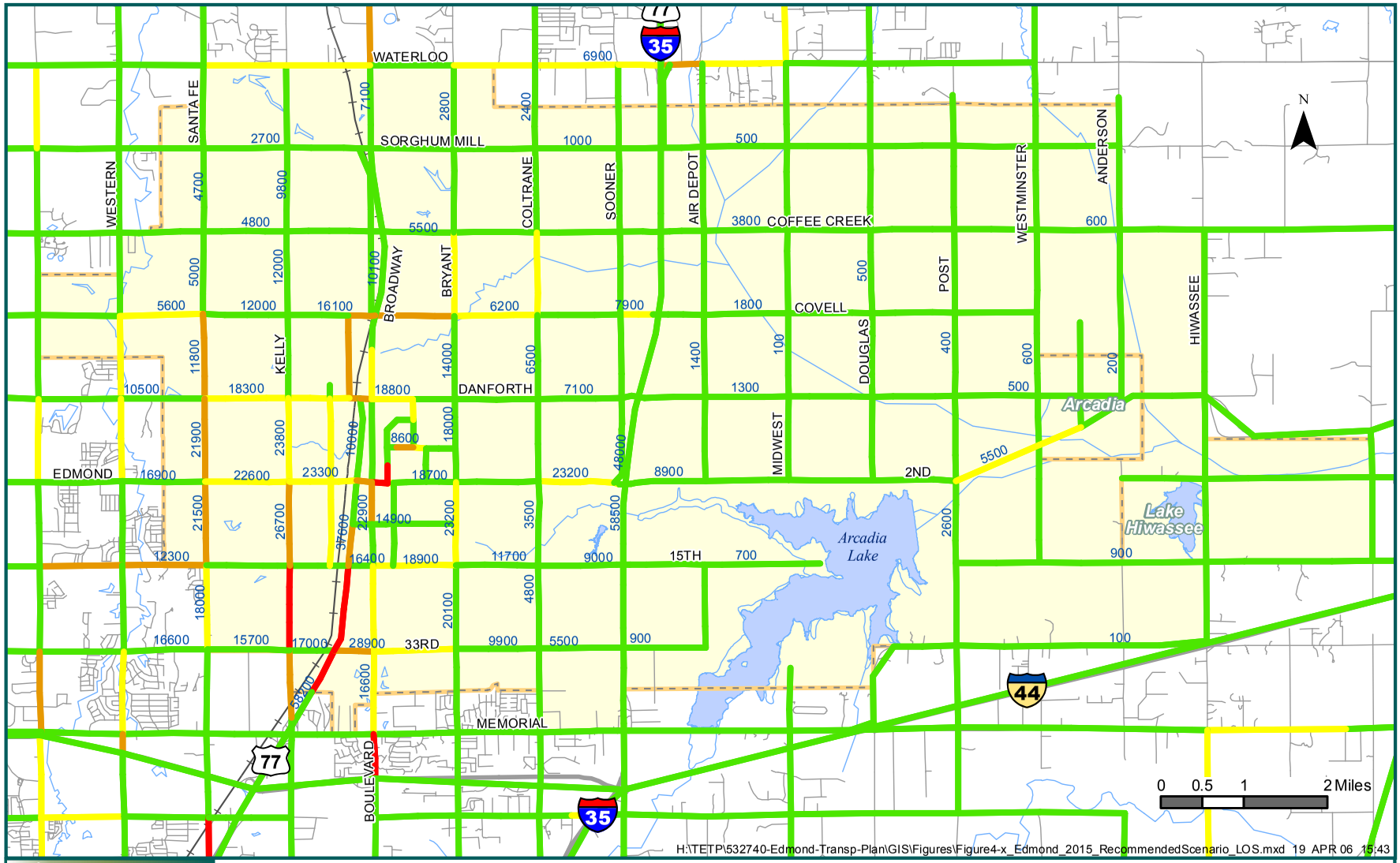


Figure 5-2 Year 2015 Scenario Recommended Network Roadway Level-of-Service (LOS) and Traffic Volumes

- LOS F
- LOS E
- LOS D
- LOS A-C
- **12000** Average Daily Traffic Volume

Table 5-1
Short-Term Improvements

Improvement	Order-of-Magnitude Construction Cost	Responsible Agency
Kelly – City Limits to 33rd[d] & 15th to Waterloo – 4 Lane Divided	29.3 M	City
Boulevard – Danforth to Covell – 4 Lane Divided	4.5 M	City
Broadway – Covell to Waterloo – 4 Lane Divided	12.0 M	City
Bryant – 33rd to 9th & 2nd to Covell – 4 Lane Divided	17.5 M	City
Coltrane – Old Farm to 15th & Stonepoint to Covell – 4 Lane Undivided	6.0 M	City
Sooner – I-35 Southbound On-Ramp South of Danforth to Covell – 4 Lane Undivided	2.3 M	City
33rd – Santa Fe to Bryant – 4 Lane Divided	15.0 M	City/OKC
Edmond Road – West City Limits to Broadway – 4 Lane Divided	12.5 M	City
Danforth – Coltrane to I-35 – 4 Land Undivided	2.5 M	City
Covell – Marilyn Williams Drive to I-35 – 4 Lane Divided	25.5 M	City
Total Estimated Order-of-Magnitude	**127.1 M**	

Recommended Long-Term Improvements (2016 to 2030)

Based on roadway deficiencies identified by the travel demand model in 2030, recommended transportation improvements for the long-term were developed. The long-term improvement program includes several roadway capacity improvements, two interchanges and consideration of commuter rail. A list of long-term improvements is identified in **Table 5-2**. Commuter rail cost considerations are not included in this table. **Figure 5-3** displays future traffic volumes and level-of-service with the implementation of the long-term program. As shown, traffic improves to acceptable conditions along area roadways where projects were implemented. However, in the central part of the city, although capacity and level-of-service improves, there are still segments of several roadways that operate at a level-of-service of E or F.

Table 5-2
Long-Term Improvements

Improvement	Order-of-Magnitude Construction Cost	Responsible Agency
Western – Memorial to Waterloo – 4 Lane Divided	40.5 M	OKC/City
Santa Fe – Danforth to Waterloo – 4 Lane Undivided	8.0 M	City
Kelly – 122nd to City Limits – 4 Lane Divided	6.8 M	OKC
Bryant – 122nd to 33rd – 4 Lane Divided	9.0 M	OKC/City
Bryant – Kilpatrick Turnpike – Interchange	8.0 M	OTA
Bryant – Covell to Coffee Creek – 4 Lane Divided	4.5 M	City
Bryant – Coffee Creek to Waterloo – 4 Lane Undivided	4.0 M	City
Coltrane – Covell to Waterloo – 4 Lane Undivided	6.0 M	City/County
Sooner – Covell to Coffee Creek – 4 Lane Divided	4.5 M	City
Sooner – Coffee Creek to Waterloo – 4 Lane Undivided	4.0 M	City/County
I-35 – 2nd to Covell – 6 Lane Freeway	24.0 M	ODOT
Air Depot – 2nd to Coffee Creek – 4 Lane Divided	13.5 M	City
Douglas – 2nd to Waterloo – 4 Lane Divided	22.5 M	City
33rd – Bryant to I-35 – 4 Lane Divided	9.0 M	City
2nd / SH-66 – I-35 to Hiwassee – 4 Lane Divided	31.5 M	City/ODOT
Covell – Pennsylvania to Marilyn Williams Drive and I-35 to Post – 4 Lane Divided	27.0 M	City

Table 5-2 (Continued)
Long-Term Improvements

Coffee Creek – Western to Sooner – 4 Lane Undivided	12.0 M	City
Coffee Creek – Sooner to Air Depot – 4 Lane Divided	4.5 M	City
Coffee Creek - I-35 – Interchange	15.0 M	ODOT
Waterloo – Santa Fe to I-35 – 4 Lane Undivided	19.3 M	City/County
Total Estimated Order-of-Magnitude	**273.6 M**	

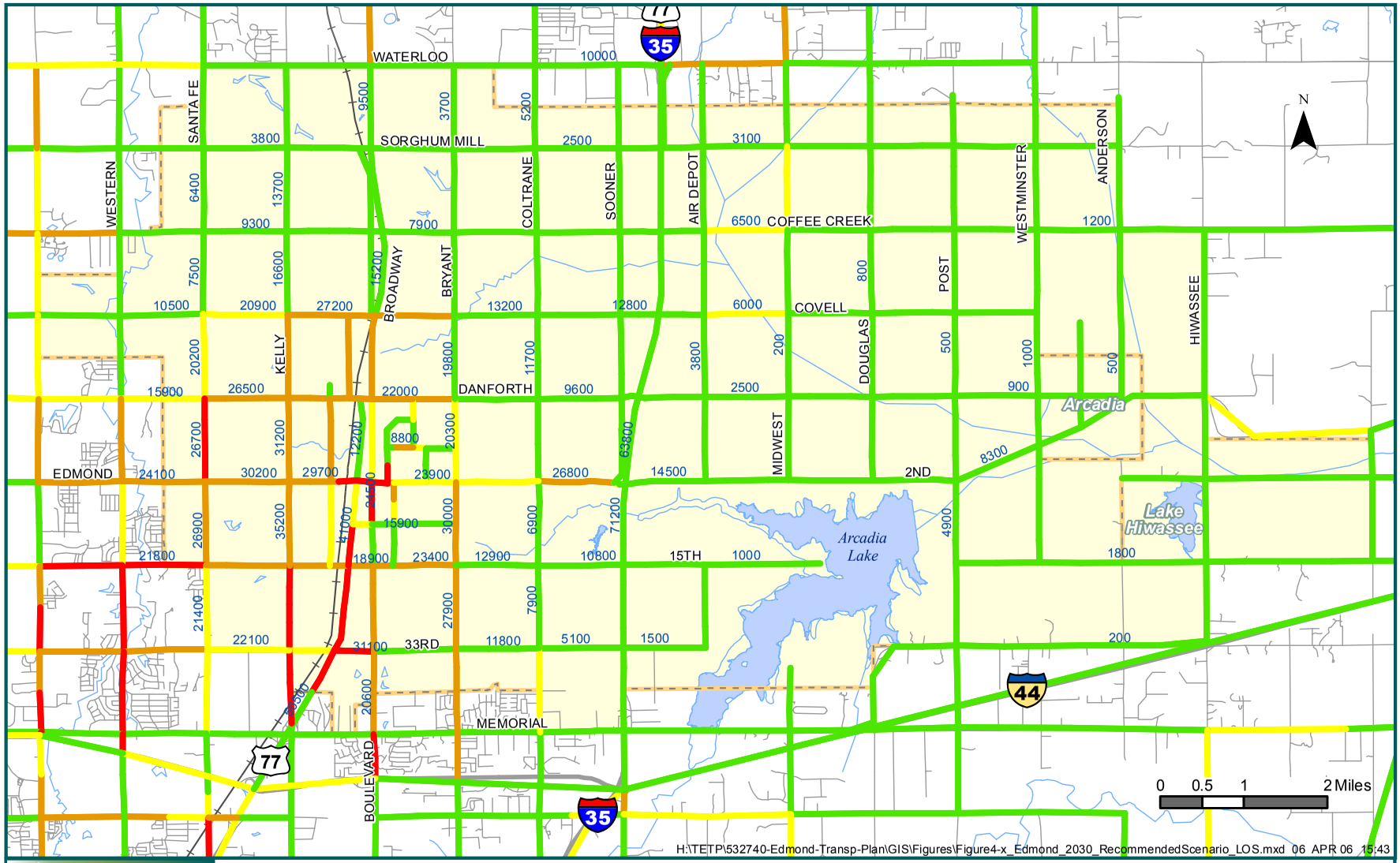
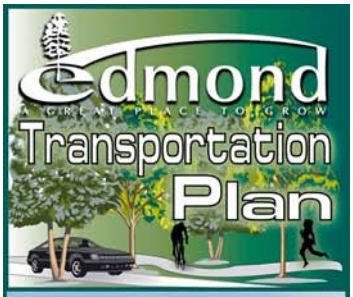


Figure 5-3 Year 2030 Scenario Recommended Network Roadway Level-of-Service (LOS) and Traffic Volumes

- LOS F
- LOS E
- LOS D
- LOS A-C
- **12000** Average Daily Traffic Volume



Additional Long-Range Plan Improvements

Additional roadway improvements will be needed in certain areas as land use development warrants. Some of these improvements may not need to occur until after 2030, while others may occur sooner if development occurs, necessitating the improvement to be expedited. Each of these corridors is identified in **Table 5-3** and should be preserved for future development.

Table 5-3
Additional Long-Range Improvements

Improvement	Order-of-Magnitude Construction Cost	Responsible Agency
Post – Memorial to 2nd / SH-66	13.5 M	City
Post – Turner Turnpike Interchange	15.0 M	OTA
Total Estimated Order-of-Magnitude	**28.5 M**	

The time schedule for implementing these improvements is dependent upon the pace of future development. Some of the facilities may be needed within the 10 to 20 year time frame, while others may not be needed for 30 to 40 years. However, it is very important to preserve the right-of-way in these corridors so that when the time for implementation arrives, the right-of-way for widening will be available.

Effectiveness of Recommended Transportation Plan

The effectiveness of the recommended transportation plan can be evaluated by reviewing projected traffic volumes, level-of-service, and can be measured in terms of daily vehicle-hours traveled. A comparison of the existing year 2005 network, year 2015 and 2030 E+C network, and the year 2015 and 2030 recommended transportation plan networks is presented in **Table 5-4**.

As shown in **Table 5-4**, implementation of the recommended year 2030 transportation plan is estimated to save area motorists more than 3,357 hours of time each day spent traveling in their vehicles.

Table 5-4
Comparison of Daily Vehicle Hours of Travel

Year	Network	Total Trips	Vehicle Miles of Travel	Vehicle Hours of Travel (hours per day)	Hours Saved Per Day Verses E+C
2005	Base Year	286,590	1,528,854	37,716	
2015	Existing Plus Committed	315,280	1,752,895	42,972	
	Recommended Transportation Plan		1,755,788	42,826	146
2030	Existing Plus Committed	388,450	2,404,745	63,239	
	Recommended Transportation Plan		2,402,065	59,882	3,357

Multi Modal Considerations

The commuter rail stations that affect the Edmond Transportation Plan are located adjacent to the BNSF tracks at 2nd Street and at Memorial Road. Direct costs to the City for these stations, track upgrades and rail stock purchase are not included in this table. Additionally, any subsidy required by the City for commuter rail operations is not included.

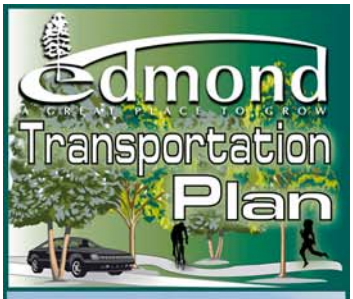
Additional transit use within the city, as a percentage of total trips, will decrease the projected traffic volumes on some street segments. This will require a major mind-set change that cannot be foreseen at this time. Should social or economic conditions change during the life of this plan such that transit use increases markedly, modifications to the plan will be necessary.

Construction Cost Estimates

Construction costs included in the tables above are based on 2006 dollars and should be considered to be order-of-magnitude estimates. Development of the estimates is based on recent bid prices and discussions with both City and State officials. Changes in material and labor costs in future years will need to be taken into account in budgeting these projects. Budgets will need to be established for design-related activities, such as geotechnical investigations, surveying and engineering. Additionally, budgets will need to be established for construction-related activities, such as supervision, inspection and overhead.

Right-of-Way and Utility Relocation Needs

The listed projects will require a wide range of right-of-way and utility relocations. To the extent possible, adequate right-of-way should be obtained from developers based on the functional classification of the adjacent street as discussed in the next

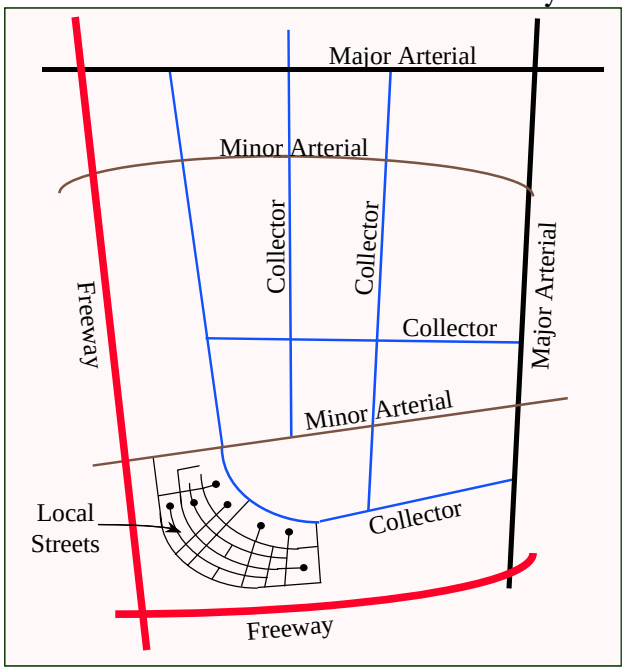


section. Due to the extent of existing development, some right-of-way purchases will be required for almost all projects. The budget for each individual project needs to include the anticipated right-of-way purchases and the professional services required to develop right-of-way plans and make the acquisitions. Utility relocations must also be budgeted for each individual project. This will entail relocation of City-owned utilities and private utilities. Payment must be made for private utilities with previously-established rights. The budget also needs to allow for utility relocation coordination.

FUNCTIONAL CLASSIFICATION

The functional classification system is a hierarchical organization of streets and highways that facilitates the safe and efficient operation of vehicles along different types of facilities. As indicated in **Figure 5-4**, a functional roadway system facilitates a progressive transition in the flow of traffic from the provision of access to the provision of movement. Freeway and arterial facilities are at one end of the spectrum, primarily providing the function of moving vehicles. Collector and local streets are at the opposite end of the spectrum, providing access to property. **Figure 5-5** shows schematically how various street classifications relate to each other in terms of movement and access.

Figure 5-4
Hierarchical Functional Classification System



To enable streets and highways to accomplish their intended function, the planning and design of the facilities should consider those elements that support the intended functions. Descriptions of the various roadway functional types and related planning and design considerations are provided in the following section.

FREEWAYS

These facilities include interstate highways, freeways, expressways and parkways, and provide for the rapid and efficient movement of large volumes of traffic between regions and within one region. Direct access to abutting property is not an intended function of these facilities. Design characteristics support the function of traffic movement by providing multiple travel lanes, a high degree of access control, and no at-grade intersections.

ARTERIALS

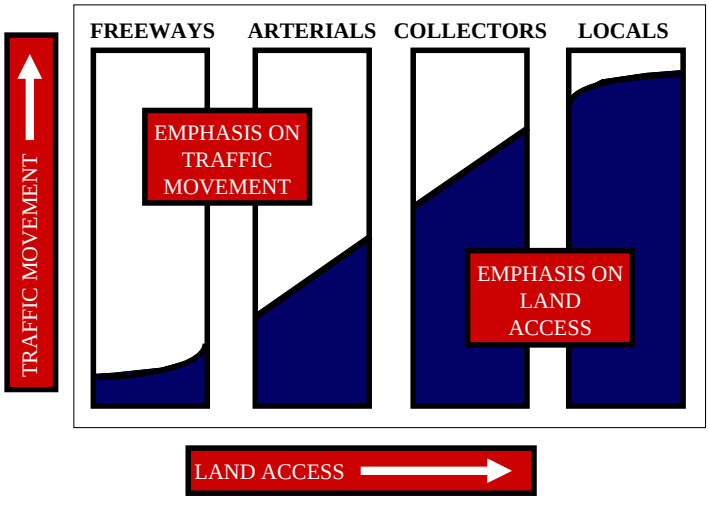
Arterials primarily provide for traffic movement, with a secondary function of providing direct access to abutting property. Major arterials typically serve as connections between major traffic generators and land use concentrations, and facilitate large volumes of through traffic traveling across a community. Minor arterials typically serve as connections between local and collector streets and the major arterials, and facilitate the movement of large traffic volumes over shorter distances within the community. Because direct access to abutting property is a secondary function of arterial streets, access should be carefully managed to avoid adverse impacts on the movement function intended for these facilities.

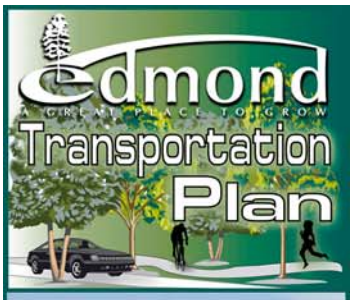
Major Arterials

Major arterials are streets and highways that provide a high degree of mobility, serve relatively high traffic volumes, have high operational speeds (45 mph or greater), and serve a significant portion of through travel or long-distance trips. They are continuous over long distances and serve trips entering and leaving the area as well as trips within it. These facilities generally serve high volume travel corridors that connect major traffic generators, but lower volume roadways that are continuous over long distances may also function as major arterials, particularly in fringe and rural areas. They may vary from multi-lane roadways with four to six lanes or more, down to two-lane roadways in developing fringe and rural areas, where traffic volumes have not increased to the point that more travel lanes are needed. Functional classification is not dependent on the existing number of lanes, since the functional role served by a roadway typically remains constant over time, while the roadway's cross section is improved to accommodate increasing traffic volumes. Major arterials form an interconnecting network for citywide and regional movement of traffic, including connections to freeways and expressways, and to minor arterials and collectors. A one to two-mile spacing is generally desirable between major arterials, with a one-mile spacing between a major arterial and a minor arterial or freeway.

Since traffic movement, not land access, is the primary function of major arterials, access management is essential. Driveways connecting directly onto a major arterial should be minimized

Figure 5-5
Functional Classification System Hierarchy





to avoid traffic congestion and delays caused by turning movements for vehicles entering and exiting driveways. Off-peak travel speeds on major arterials are typically 40 to 55 mph, and peak period speeds are about 30 to 40 mph. Intersections with other public streets and private access should be designed to limit speed differentials between turning vehicles and other traffic to no more than 10 to 15 mph. Signalized intersection spacing should be long enough to allow a variety of signal cycle lengths and timing plans that can be adjusted to meet changes in traffic volumes and maintain traffic progression (desirably one-third to one-half mile consistent spacing). Also, major arterials should be constructed or retrofitted with raised medians where possible to increase roadway safety and improve traffic operations.

Minor Arterials

Minor arterials are similar in function to major arterials, except that they provide a higher degree of local access than major arterials. Minor arterials include all remaining arterial streets and highways in the urbanized area and serve less concentrated traffic generating areas, such as neighborhood shopping centers and employment centers. Although minor arterials are very similar in function to major arterials, this class typically distributes medium traffic volumes for shorter distance trips than major arterials. In general, the projected future traffic volumes on minor arterials will be lower than the volumes carried by major arterials.

Minor arterials are generally continuous over shorter distances than major arterials. Travel speeds along minor arterials are typically 30 to 45 mph in off-peak periods, and 20 to 35 mph in peak periods. Minor arterials serve as boundaries to neighborhoods and collect traffic from collectors and local streets. Although a minor arterial typically provides more local access than a major arterial, the primary function is still traffic movement. Major and minor arterials are generally spaced at one mile intervals in an alternating grid pattern. In addition, any minor arterial that currently exceeds a daily ADT of 20,000 or is forecasted to reach that traffic volume should have a raised median for safety and to improve traffic operations.

Collectors

Collector streets provide for a balance of traffic movement and property access functions. Traffic movement is often internal to localized areas, with collectors connecting residential neighborhoods, parks, churches, etc. with the arterial system. As compared to arterial streets, collectors accommodate smaller traffic volumes over shorter distances. Collector streets are the connectors between arterials and local streets that serve to collect traffic and distribute it to the arterial network. Collectors also serve to provide direct access to a wide variety of residential, commercial and other land uses, and their design involves site-specific considerations. They provide service to neighborhoods and other local areas, and may border or traverse neighborhood boundaries. Parking may be permitted on-street in residential areas.

Since collectors are used for short distance trips between local streets and arterials, they should be continuous in the spaces between arterials. Collectors may also extend across arterials. To provide efficient traffic circulation and preserve amenities of neighborhoods, collectors should desirably be spaced at about one-quarter to one-half mile intervals. Subdivision street layout plans should include collectors as well as local streets in order to provide efficient traffic access and circulation. Operating speeds for collectors are typically about 30 to 35 mph. Since speeds are slower and more turn movements are expected, a higher speed differential and much closer intersection/access spacing can be used than on arterials. On-street parking may be permitted in residential areas. Direct access to abutting land is essential; parking and traffic controls may be necessary for safe and efficient through movement of moderate to low traffic volumes at key intersections.

Collectors may be constructed with or without center turn lanes, and may permit or restrict parking, depending on the cross section design chosen. Collectors serve an important role in collecting and distributing traffic between major/minor arterials and local streets. Their identification is essential in planning and managing traffic ingress/egress and movement within residential neighborhoods as well as commercial and industrial areas.

Local Streets

Local streets function to provide access to abutting property and to collect and distribute traffic between individual parcels of land and collector or arterial streets. Local streets include all other streets and roads that are not included in higher functional classes. They include internal and access streets that allow direct access to residential and commercial properties and similar traffic destinations. Direct access to abutting land is their primary role, for all traffic originates or is destined to abutting land. On-street parking may be permitted. Trip lengths on local streets are short, volumes are low, and speeds are slow, generally 20 to 30 mph. Local streets typically comprise between 65 to 80 percent of the total roadway system.

Through traffic and excessive speeds should be discouraged on local streets by using appropriate geometric designs, traffic control devices, curvilinear alignments, and discontinuous streets. Local streets should be designed for low speed traffic with an emphasis on providing access. One factor in the functional classification of roadways is their existing and proposed traffic volumes. **Table 5-5** shows ranges of vehicles per day along with the corresponding roadway functional classification.

Table 5-5
Traffic Volumes and Functional Classification

Functional Classification	Volume Ranges (vehicles per day, vpd)
Local Streets	< 2,500 vpd
Residential Collectors	2,500 to 5,000 vpd
Major Collectors	5,000 to 8,500 vpd
Minor Arterials	8,500 to 24,000 vpd
Major Arterials	24,000 to 36,000 vpd
Freeways/Expressways	> 36,000 vpd

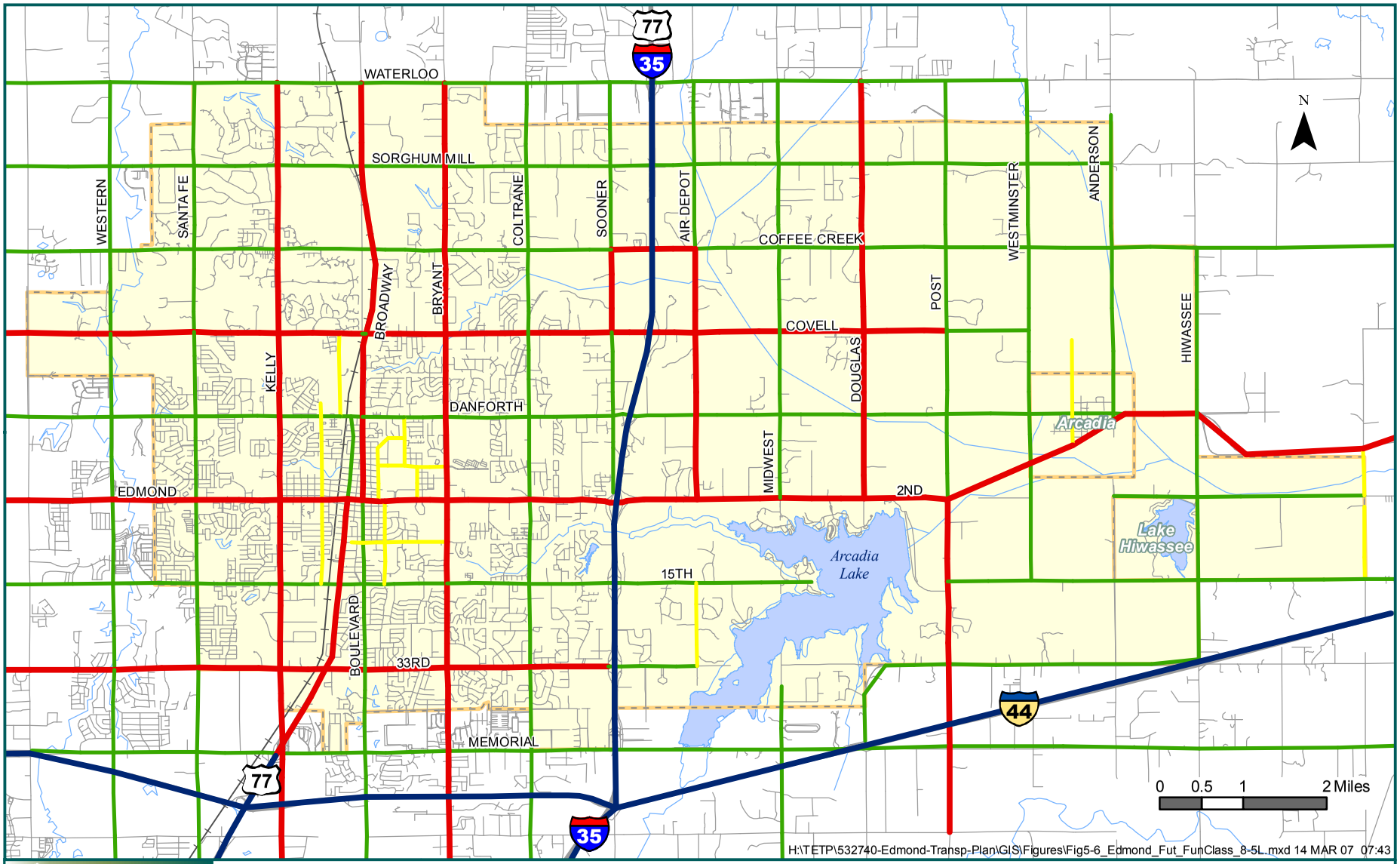
Recommended Functional Classification System

The proposed functional classification system is shown in **Figure 5-6**. The City's existing functional classification system is shown in Figure 2-4 in Chapter 2. This existing functional classification system was used as the basis for developing the recommended Functional Classification System, which also incorporates the recommended improvements discussed earlier in this chapter. This proposed system was developed based upon field reconnaissance, physical characteristics, traffic volumes, and input from City Staff and the Advisory Committee.

Key recommended changes to the existing Functional Classification System include revising functional classification so it is based on function rather than number of lanes and consolidating collectors into one category. Major roadways primarily used for through movement and that carry higher volumes of traffic were classified as Major Arterials. In Edmond these roadways include Kelly, Broadway, Bryant, Post, Covell, 2nd Street and 33rd. The remaining section line roadways were classified as minor arterials.

Recommended Roadway Design Standards for Major Arterials

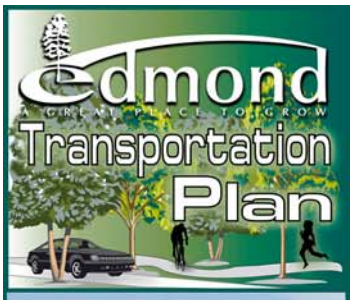
Major arterial standards need to reflect the primary function of a major arterial – movement of vehicles through the corridor. As discussed in earlier chapters of this report, all of the major arterials can be justified to be six lanes. However, existing improvements along most of the length of each street prevents the use of six lanes. If it is determined that some segments can be built to this standard, the typical section shown in **Figure 5-7** is recommended to be adopted. With the total traffic volumes that warrant a six lane street, a dividing median as shown for this typical section should be used. This median is wide enough to protect most vehicles that would be trying to make a left turn from an intersecting street. The median also allows sufficient width for left turn lanes and can accommodate most U-turn movements.



Edmond Transportation Plan

Figure 5-6 Proposed Functional Classification

- Freeway
- Major Arterial
- Minor Arterial
- Major Collector
- Local



Major arterials that are four lanes need to have either a median or a continuous left turn lane, also as shown on **Figure 5-7**. The median width will allow functions similar to those mentioned above for the six lane typical section. Only if additional right-of-way absolutely cannot be obtained should a narrower median width be used. Implementation of an access management policy should minimize the need for continuous left turn lane sections. Where existing development has resulted in closely spaced streets and drives, the five lane section may be the only viable alternative. The standards applicable to major arterials are summarized as follows:

- Medians 30 feet to 50 feet wide
- Utilities and sidewalks accommodated between the curb and the property line
- Double left turn and right turn lanes at major (section line) intersections
- Requires 180-foot right-of-way; Major intersections require 200-foot right-of-way extending 500 feet in both directions from the section line

Recommended Roadway Design Standards for Minor Arterials

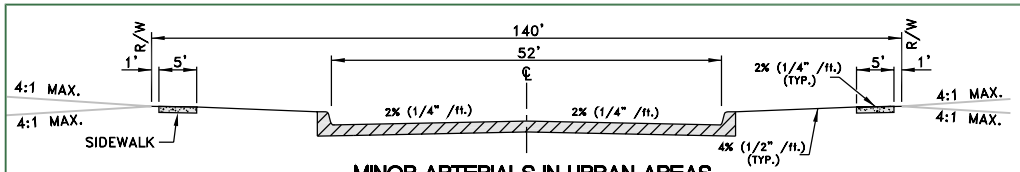
Figure 5-7 also shows the recommended standards for minor arterials. These sections can typically be built in a 140-foot right-of-way, even with sloping terrain. For locations with higher traffic volumes and a number of street or drive intersections, the five-lane section will be appropriate. The character of the land development and traffic volumes in the arterial corridor will dictate if the "urban" or "rural" typical section will be used. Even in "rural" areas, these standards recommend the addition of a paved shoulder for all two lane arterials.

Minor arterials are the highest classification of street for which bike lanes should be considered. **Figure 5-8** shows the additional pavement that is required for a bike lane. This additional widening will be needed on both sides of the street. A critical feature is to pave the bike lane continuously with the same material, thereby minimizing edges. This results in offsetting the bike lane from the curb when a standard concrete gutter pan is used on an asphalt street. The standards applicable to minor arterials are summarized as follows:

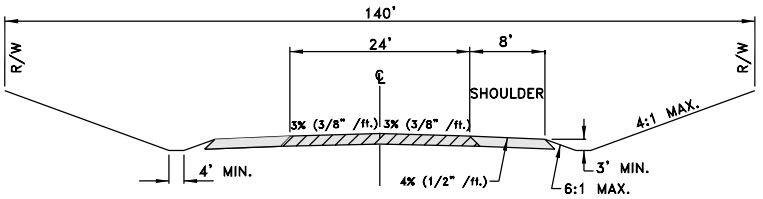
- Medians up to 30 feet wide
- Utilities and sidewalks accommodated between the curb and the property line
- Single left turn and right turn lanes at major (section line) intersections
- Requires 140-foot right-of-way; Major intersections require 160-foot right-of-way extending 500 feet in both directions from the section line

Recommended Roadway Design Standards for Collectors

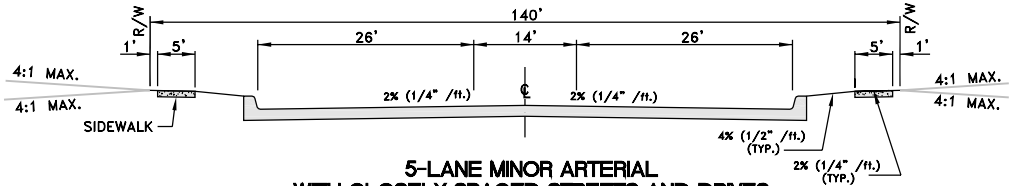
Figure 5-8 shows the recommended typical sections for collectors. The 32-foot wide section can be used for access and parking. A 32-foot to 36-foot wide collector can be used for access and bike lanes. As shown, a wider section is required if access, parking and bike lanes are to be accommodated.



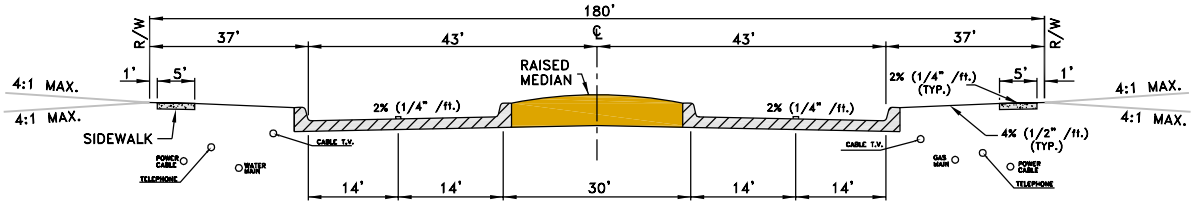
MINOR ARTERIALS IN URBAN AREAS
AND MINOR ARTERIALS IN RURAL AREAS
WITH HIGH VOLUMES



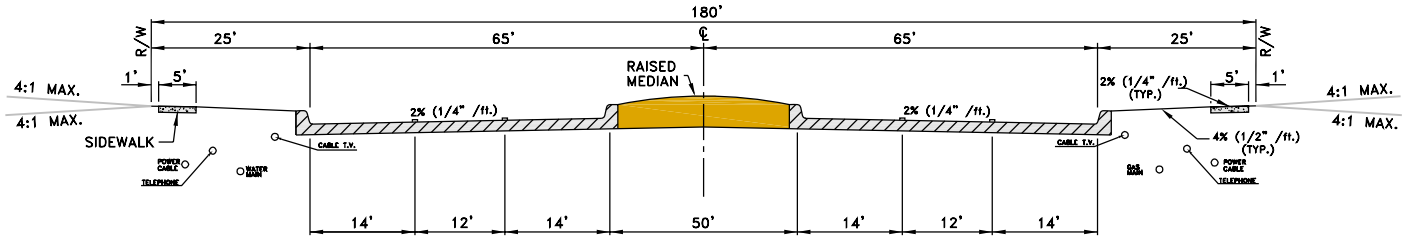
MINOR ARTERIALS IN RURAL AREAS
WITH LOW VOLUMES



5-LANE MINOR ARTERIAL
WITH CLOSELY SPACED STREETS AND DRIVES

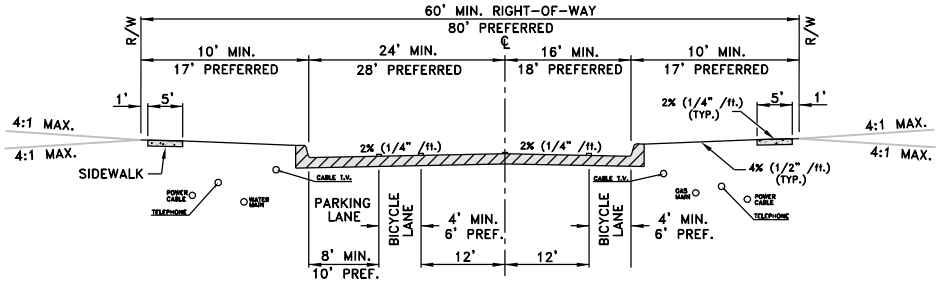


DIVIDED 4-LANE MAJOR ARTERIAL

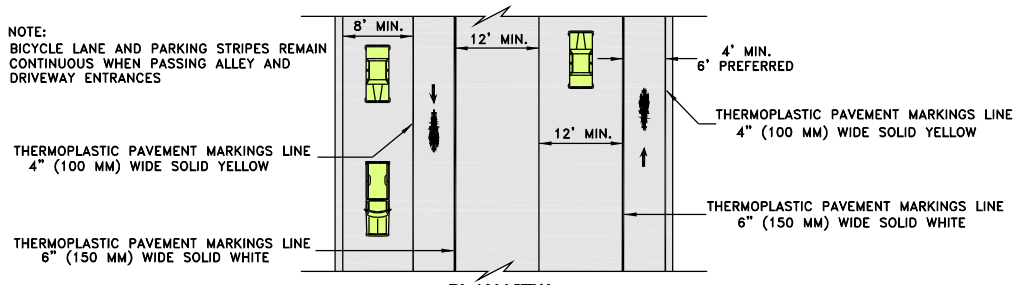


6-LANE MAJOR ARTERIAL

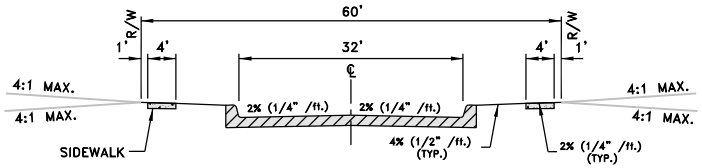
Figure 5-7 Typical Sections
Proposed Arterial Standards



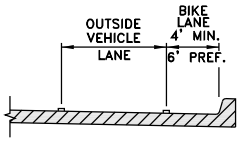
COLLECTOR WITH PARKING AND BIKE LANES



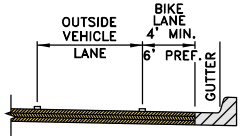
PLAN VIEW
COLLECTOR WITH PARKING AND BIKE LANES



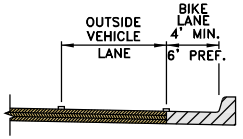
COLLECTOR



CONCRETE STREET



ASPHALT STREET ALT NO.1



ASPHALT STREET ALT NO.2

BIKE LANE ADDITION TO COLLECTORS OR MINOR ARTERIALS - NO PARKING

Figure 5-8 Typical Sections Proposed Collector Standards and Bike Lane Standards

POLICY AND PERFORMANCE RECOMMENDATIONS

Transportation System Management Improvements

In addition to the recommended roadway improvements, it is recommended that traditional traffic operational practices and transportation system management (TSM) techniques be employed at critical locations to alleviate deficiencies that may remain with the Transportation Plan improvements. These types of improvements are typically cost effective methods that improve traffic flow by making better use of the existing transportation system. Examples of these improvements include provisions of intersection turn lanes and other geometric improvements, coordinated signal systems that efficiently accommodate travel demands and improve safety, effective utilization of traffic control devices, lane channelization, on-street parking prohibitions, and turn restrictions. Operational improvements are also important considerations in the interim when partial implementation of some thoroughfare improvements may cause capacity overloads on other system facilities. This discussion of TSM type improvements is general in nature as more detailed studies are required on a case by case basis to identify the specific locations and what type of improvements and programs will be needed.

Access Management and Driveway Access Control

In addition to the proposed roadway improvements identified in this plan, there are other non-capacity transportation-related recommendations that can enhance the transportation system in Edmond, such as access management and driveway control. Access management is defined as the protecting of the capacity of existing transportation routes and systems by controlling access rights from adjacent properties. Access management techniques serve to limit and separate vehicle (and pedestrian) conflict points, reduce locations requiring vehicle deceleration, remove vehicle turning movements from through lanes, create intersection spacings that facilitate signal progression, and provide adequate on-site capacity to accommodate ingress and egress traffic movements. Limiting access of new developments will not require additional cost from the City. However, elimination of existing access rights may require compensation by the City.

Access management techniques are extremely important for managing congestion on existing transportation facilities. The implementation of applicable techniques, or a combination of techniques, can eliminate the need for expensive roadway widenings or potential right-of-way acquisitions. Studies have shown that increasing the signalized intersection spacing to uniform intervals of one-half mile and the use of a non-traversable median to restrict left-turns will increase the capacity of a four-lane urban arterial by about 50 percent as compared to quarter-mile signal spacing and unrestricted left-turns. This is the same increase in capacity that can be obtained by widening a four-lane divided arterial to six lanes. Also, safety will be increased and congestion reduced to a greater extent than by the roadway widening. Research has consistently shown that access management helps to reduce the rate and severity of traffic accidents and improves pedestrian and bicycle safety.

Recommended Transportation Plan

From a land development perspective, access management assists in the orderly layout and use of land and helps to discourage poor subdivision and site design. Poorly designed entrances and exits to major developments not only present a traffic hazard, but also cause increased congestion, which can create a negative image of the development. In addition, access management techniques, such as reducing the number and frequency of driveways and median openings, improve the appearance of major corridors. Scenic and environmental features can be increased, which improves the image of streetscapes and can attract additional economic development.

Access management relies on a variety of access control techniques to promote efficient vehicular movements. These include the following:

- Limit number of conflict points;
- Separate conflict points;
- Limit deceleration in through lanes;
- Remove turning vehicles from through lanes;
- Limit or remove left turns by using medians;
- Space major intersections to facilitate progressive travel speeds along arterials;
- Signal coordination; and,
- Provide adequate on-site storage to accommodate both ingress and egress traffic.

The City of Edmond currently enforces some of these access management techniques through a variety of policies and guidelines. The City of Edmond Driveway Policy adopted in February 1996 identifies design guidelines related to driveway to intersection spacing, driveway to driveway spacing, driveway widths, curb radii, and driveway location. Other access management techniques are applied through other means, such as the Subdivision Regulations, while other access management techniques are not enforced at the present time. **Table 5-6** identifies access management techniques that are recommended to be implemented within the City of Edmond, as well as their current status and enforcement.

Driveway Access Control

Driveway access control is recommended for the City of Edmond, including appropriate standards for the location, spacing, width, radius, and other design considerations for driveways on arterials, collectors, and local streets. The development of this type of policy or ordinance should include input from local officials, local residential developers, and local commercial developers and should be compatible with the Transportation Plan.

Table 5-6
Access Management Recommendations

Strategy	Existing Edmond Policy	Specifications	Application/ Purpose	Recommended Action
Signal Coordination and Signalized Intersection Spacing				
Signal Coordination	None	Traffic Signal Synchronization Programs and Actuated Signal Control	Improved progression on existing arterial streets.	Continue signal coordination efforts and develop new interconnected signal systems
Signal Spacing	None – Driveway policy mentions progression	Major Arterials – Consistent ½ mile Minor Arterials - Consistent ¼ to ½ mile	New signal installations and proposed arterial roadways.	Develop policy to maintain consistent signal spacings on major and minor arterials
Medial Access				
Median Type	None	Major Arterials – Raised Medians Minor Arterials - Raised Medians (future volume > 20,000 vpd) or CTWLTL (future volume < 20,000 vpd)	Develop designated major arterials with raised medians and minor arterials with appropriate median type.	Adopt new roadway cross sections standards
Median Width	None	Major Arterials - Minimum 30 feet Minor Arterials - Minimum 20 feet	Median widths consistent with recommended roadway cross section standards.	Adopt new roadway cross sections standards
Median Channelization (Left-Turn Bays)	None	Major Arterials - At cross streets and major mid-block median openings Minor Arterials - Primarily at cross streets	Left-turn channelization provided to remove turning vehicles from traffic stream to improve vehicle flow.	Develop policy in conjunction with new roadway cross sections standards
Spacing of Median Openings	None	Major Arterials –Minimum 600 feet Minor Arterials - Minimum 450 feet	Minimum median spacing needed to limit speed differential between vehicles and reduce accident rate.	Develop policy in conjunction with new roadway cross sections standards

Table 5-6 (Continued)
Access Management Recommendations

Marginal Access				
Driveway/ Unsignalized Intersection Spacing	City of Edmond Driveway Policy, Feb. 1996	The number of unsignalized intersections/driveways should be limited to 12 to 15 per mile for Arterials (minimum of 325 feet between intersections).	Reduces speed differential between through and turning vehicles and reduces accident rate.	Consider increasing driveway/ intersection spacing to 325 ft. on Arterials.
Right-Turn Bays	None	Provided at major intersections and major mid-block developments with high turning volumes (generally greater than 100 vph).	Improved traffic operations and reduced delay at signalized and unsignalized intersections.	Incorporate into Driveway Policy
Subdivision Access				
Collector Streets within a Subdivision	City of Edmond Subdivision Regulations	Connectivity through large subdivisions should be provided with collector streets that provide multiple access points to the arterial street system.	Reduces congestion at arterial access points and better distributes traffic flow to the adjacent roadway system.	Modify subdivision regulations to require collector streets without driveway access where appropriate.

TRAFFIC IMPACT ASSESSMENT (TIA)

A Traffic Impact Assessment (TIA – also referred to as a Traffic Impact Analysis) is completed to help assess the impact to the transportation system of a specific development that is considered to be a significant generator of traffic. A TIA is typically required for a zoning change, PUD, special use permit, plat approval, and site plan approval. A TIA should accomplish four primary goals, 1) ensure that development does not adversely affect the transportation network, 2) identify traffic problems associated with the development, 3) delineate solutions to potential problems, and 4) incorporate solutions into development plans. It is recommended that a TIA be prepared by the Owner's or Developer's engineer and submitted to the City for approval.

A TIA is recommended when one of three conditions is met:

- The total potential development generates 100 or more trips (in + out) during the adjacent roadway's peak hour; or,
- The total potential development generates 100 or more trips (in + out) during the development's peak hour; or,
- The total potential development generates less than 100 trips (in + out), but the City Engineer determines there are localized safety or capacity deficiencies.

Trip Generation

The Institute of Transportation Engineers (ITE) publishes and updates a Trip Generation Manual which can be used for estimating the number of trips a particular development is likely to generate. It is recommended the City adopt the most recent edition as the standard for trip generation. Some examples taken from the current edition are shown in **Table 5-7** below.

Table 5-7
ITE Trip General Manual Examples

Land Use and Peak Hour	100 Peak Hour Trips*
Single Family Residential (PM)	100 units
Apartments (PM)	160 units
Shopping Center (PM)	26,700 sq. ft.
Fast Food Restaurant (AM)	1,900 sq. ft.
C-Store with Fuel	7 pumps

*Based on ITE Trip Generation Manual, 7th Edition

Pass-By Trips

The ITE trip generation rates are considered 'at the driveway', but not all of these trips represent new trips added to the system. A 'pass-by' trip is an intermediate stop by a

vehicle that is already on the system and reduces the number of new trips added to the system, depending upon the development type. **Table 5-8** lists several examples.

Table 5-8
Pass-By Trip Rate Examples

Land Use	Pass-By Percentage
Large Shopping Center (>400,000 sq. ft)	20%
Small Shopping Center (<100,000 sq. ft.)	35%
Sit-Down Restaurant	15%
Fast Food Restaurant	40%

Internal Trips

The issue of an 'internal trip' only applies for a large multi-use development. A 'capture rate' is established based on the mix of uses in the development. The number of new trips applied to the system and the number of driveway and side street turn movements are reduced.

Amending A TIA

An existing TIA should be amended based on changes to a proposed development whose access has changed or the trip generation has increased by more than 15%. If the original TIA is less than two years old, an amendment identifying and discussing those items that have changed should be prepared and submitted to the City for approval. If the original TIA is more than two years old, or it no longer complies with current standards, a new TIA should be prepared and submitted to the City for approval.

A proposed development whose access has not changed and trip generation has increased by less than 15% requires less modification of an existing TIA. If the original TIA is less than two years old, a letter documenting the change should be prepared and submitted to the City for approval. If the original TIA is more than two years old, or no longer conforms to current standards, an amendment should be prepared and submitted to the City for approval. The two year requirement can be increased to five years for portions of a master PUD.

TIA Outline

The following outline is recommended for the preparation of a TIA:

1) Introduction
   a) Existing and Proposed Site Description and Uses
   b) Study Area Boundaries (as approved by the City Engineer prior to commencing the preparation of the TIA)
   c) Existing and Proposed Nearby Uses
   d) Existing and Proposed Roadways and Intersections
   e) Identification of Peak Hours and Access Points

2) Existing Conditions
   a) Daily and Peak Hour Traffic Volume
   b) Capacity Analyses at Critical Points
   c) Levels of Service at Critical Points
3) Future Conditions Without Development
   a) Daily and Peak Hour Traffic Volume
   b) Capacity Analyses at Critical Points
   c) Levels of Service at Critical Points
4) Trip Generation
   a) Trip Generation Rates and Source
   b) Traffic Generated During Peak Hours and Total
   c) Pass-By Traffic Analysis
5) Trip Distribution
   a) Method Used to Distribute Traffic
   b) Internal Capture Rate
   c) Estimated Traffic Movements by Direction
6) Traffic Assignment
   a) Assignment of Traffic to Intersections and Drives
   b) Recommended Access Design Improvements
7) Future Conditions With Development
   a) Daily and Peak Hour Traffic Volume
   b) Capacity Analyses at Critical Points
   c) Levels of Service at Critical Points
8) Recommended System Improvements
   a) Proposed Recommended Improvements
   b) Responsible Party for Improvements
   c) Capacity Analyses at Critical Points
   d) Levels of Service at Critical Points
9) Conclusion

Coordinating Transportation Planning Activities and Current Development Activities

Transportation planning activities, including the implementation of the Edmond Transportation Plan, should be highly coordinated with current and future development activities within the community. As previously mentioned, coordinating development activities including land use planning and transportation decisions serves as an important role in improving mobility needs, promoting economic development and enhancing quality of life. The extent to which future land uses follow the year 2030 development projections will determine, to a large degree, the actual implementation schedule of the transportation plan. Conversely, the extent to which major components of future land use projections are realized will be dependent upon the adequacy of the transportation system.

Additionally, improved coordination and cooperative efforts among various local and state officials, including the City of Edmond, City of Oklahoma City, Oklahoma and Logan Counties and ODOT, must be continued to fully realize the benefits of the Transportation Plan. Coordinating with these local and state officials on their current

and future development activities and transportation improvements and needs will contribute to a regionally efficient and effective transportation system.

IMPORTANCE OF ADOPTING A TRANSPORTATION PLAN

The Edmond Transportation Plan will be formally considered for adoption by the City Council, in accordance with the City's policies and procedures. Adoption of the Transportation Plan is necessary to officially recognize and confirm the status of the plan as a part of the policies of the local community. While it is recognized that unforeseen developments can and do call for periodic revisions to the Transportation Plan, this does not invalidate the need for the plan to be officially adopted and enforced.

Data Needs

Data	Status
Mapping and Aerials of Roadways, Railroads, Streams, and Other Natural Features	✓
Historic (last 10 years if available) and Existing Traffic Volume Data	✓
Historic and Existing Truck Traffic Volume Data	
ACOG Travel Demand Model and existing and future model assignment networks, including TAZ information and trip tables	✓
Location of Traffic Signals	✓
Accident Data/Rates by Accident Type and Highway Type (Last Five Years)	✓
Origin-Destination Survey/Information	
Roadway Inventory Information (number of lanes, cross sections, ROW widths, speed limits, traffic signal locations, pavement conditions, etc.) of Major Facilities	✓
Existing Functional Classification of Roadways (Thoroughfare Plan)	✓
Location and Operational Characteristics of Intermodal Facilities (Airports, Major Rail Facilities, etc.)	
Planned Transportation/Highway Improvements and Programs (STIP, TIP, CIP, etc.)	✓
Existing and Future Socioeconomic Variables (Population, Employment, etc.) for Base, Ten, and Twenty-five Year Horizons.	✓
Current Land Use Inventories and Future Land Use Plans (Comprehensive Plan)	✓
Location and Information of Major Employers, Tourist Attractions, and Major Traffic Generators	✓
Planned Major Development	✓
Average Unit Construction Costs	
Average Operations and Maintenance (O&M) Costs by Highway Type	
Average ROW Acquisition Costs (urban, suburban, rural)	
Drainage Master Plan	
Existing and Planned Major Utilities	
Environmental Resources and Sensitive Areas/Constraints (Recharge Zone and Flood Plains)	✓
Recorded Hazardous Material Sites	✓
Historic Properties and Archeological Sites and Map of Historic Districts	✓
Threatened and Endangered Species	✓

Data Needs

Data	Received
Parks Master Plan and Open Space Plan	
NWI Wetlands Digital Quad Files	
University Plans, Enrollment Projections, and/or Transportation Studies	✓
Bus Route/Transit Information	✓
University Parking Information, Including Locations, Sizes, and Planned Facilities	✓
University Class Schedule Loading, Student Populations, On-Campus Housing Totals	✓
Grade School Bus Route Information	✓
Existing and Projected Future Enrollment for Each Campus, including both Students and Faculty	✓
Parking Information, Including Locations, Sizes, and Planned Facilities	✓
Locations of Existing and Planned School Campuses	✓

Project Overview

A well planned and coordinated transportation system will enhance mobility and facilitate the movement of people and goods in a safe and efficient manner. The City of Edmond is preparing a Transportation Plan to identify current and future transportation needs and improvements within the City. The Edmond Transportation Plan will identify critical components of the transportation system including infrastructure and special generators and will utilize a multi-modal travel demand process to identify mobility needs and improvements. Alternative improvements will be prioritized according to short- and long-term objectives of the study and the feasibility of project implementation. Public involvement is an important component of this study and will include coordination with other local and regional agencies including the Association of Central Oklahoma Governments, Central Oklahoma Transit and Parking Authority, University of Central Oklahoma and Edmond Public Schools.

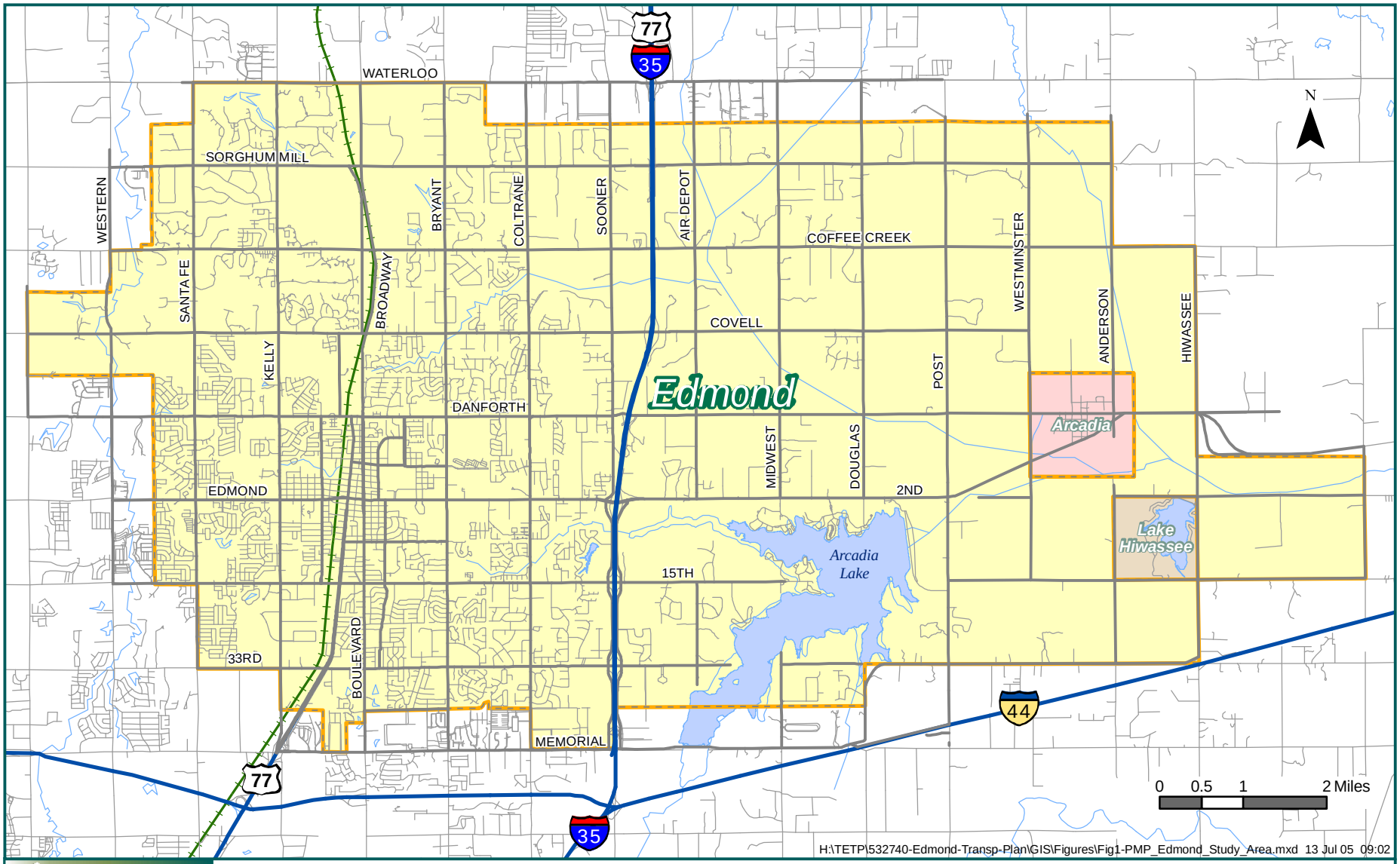
Study Area

As shown in Figure 1, the study area encompasses the City of Edmond, which includes an area of approximately 87 square miles. Edmond is located on the northeastern edge of Oklahoma City. Major thoroughfares in the City include I-35, 2nd Street (U.S 77), and Broadway (U.S. 77).

Key Issues

One of the key issues of the plan is to ensure that the city has adequate facilities to accommodate not only existing but future traffic needs as well. Edmond, as with the rest of the Oklahoma Metropolitan Area, continues to face pressures of increased growth and development which often results in traffic and congestion problems. The majority of growth in the community is occurring to the west of I-35, however the area east of I-35 is expected to develop significantly over the next 25 years. As part of the study process future growth will be projected and its impact on the transportation system will be evaluated and used to help determine mobility needs in the area.

The University of Central Oklahoma is the major traffic generator in the City and thus another important issue for the plan. UCO attracts students from all over the Oklahoma Metropolitan Area resulting in congestion and traffic problems around the campus. UCO is anticipated to grow over the next 25 years and will be developing satellite campuses. The plan will evaluate existing and future transportation needs around the campus and will include not only looking at thoroughfare improvements in the area but also enhancing transit, bicycle and pedestrian needs as well.



Edmond Transportation Plan

Highway
Major Road
Local Street
Railroad
Stream
Lake
City Limits

Figure 1 Study Area

Meeting Schedule

Meeting Type	Approximate Date	Agenda
City Council		
Kickoff Meeting and Advisory Committee Meeting No. 1	July 25, 2005	• Review Project Management Plan • Review existing and projected demographics • Review Travel Demand Model Network • Review Existing Conditions Evaluation • Review Existing Conditions Evaluation • Identify Transportation Issues • Coordination for Public Meeting No. 1
Meeting No. 2	November 28, 2005	• Review Public Meeting No. 1 • Review Future Travel Forecasts and Needs • Identify and Discuss Potential Mobility Improvements • Coordination for Public Meeting No. 2
Meeting No. 3	February 22, 2006	• Review Public Meeting No. 2 • Review Evaluation of Mobility Improvements • Review Traffic Impact Analysis Requirements
Meetings with Other Agencies		
UCO	May 24, 2005	• Obtain traffic and parking information
Edmond Schools	May 24, 2005	• Obtain traffic and parking information
ACOG	May 24, 2005	• Obtain traffic and parking information
COTPA	May 24, 2005	• Obtain traffic and parking information
Public Meetings		
Meeting No. 1	October 25, 2005	• Present Study Purpose and Objectives • Present Initial Data Findings • Present Existing Transportation Conditions • Obtain Comments on Transportation Issues
Meeting No. 2	January 24, 2006	• Review Improvements and their Effects • Review Prioritization of Improvements
Agency Presentations		
City Council	May 1, 2006	• Review Draft Transportation Plan
ACOG Presentation	?	• Present Final Transportation Plan

Edmond Transportation Plan
Council Workshop Minutes
February 22, 2006

C.H. Guernsey & Company (GUERNSEY) and Wilbur Smith Associates (WSA) conducted a workshop on the evening of February 22, 2006 in the Edmond Downtown Community Center to obtain input and direction from the City Council on transportation improvements and policy decisions that will be integrated into the transportation plan. Workshop participants included the following:

- Mayor Saundra Naifeh, City of Edmond
- Council Member Wayne Page, City of Edmond
- Council Member Paula Sanford, City of Edmond
- Council Member Charles Lamb, City of Edmond
- Council Member David Miller, City of Edmond
- Stephen Murdock, City of Edmond
- Larry Stevens, City of Edmond
- Jerry Smith, City of Edmond
- Steve Manek, City of Edmond
- Bob Schiermeyer, City of Edmond
- Jan Fees, City of Edmond
- Karl Stickley, GUERNSEY
- Jimmie Hammontree, GUERNSEY
- Bob Hamm, WSA

Members of the public observing the workshop included the following:

- Tim Tillman, ECO Edmond
- Josh Wienig, ECO Edmond

Mayor Naifeh called the meeting to order and introduced Karl Stickley with GUERNSEY who spoke briefly about the purpose of the workshop. The following provides a brief summary of the discussions that occurred in each segment of the workshop:

Traffic Impact Studies

- GUERNSEY and WSA provided a table outlining examples of other local and regional cities' requirements for Transportation Impact Assessment (TIA) studies.
- Mayor Naifeh noted that the City of Edmond does not currently have an official policy for traffic impact studies. The existing approach is mostly like Oklahoma City's policy.
- Council Member Lamb noted that fast food establishments create a significant amount of trips compared to other types of developments.
- Steve Manek indicated that fast food developments generate so many trips that they can skew the overall traffic numbers at a large development. The City

currently looks at the worst case scenario for pad sites and assumes that small pads sites will be fast food unless zoning does not permit it.

- A lengthy discussion ensued identifying the processes which could trigger a TIA, and the benefits of having multiple triggers including:
    - Zoning
    - Site Plan review
    - Plan amendment request
    - Size and/or use
    - Platting
- Council Member Lamb identified three potential scenarios for performing TIAs:
    - Developer pays a fee to have the City perform the modeling
    - Developer performs TIA independent of the City
    - Both sides perform an analysis
- Council Member Page indicated that at some point City staff would need to be looking at traffic impact.
- Karl Stickley indicated that it may be cheaper to have the city perform the TIA if they will be performed at a high frequency.
- Developers would still need to be responsible for studies justifying individual turning movements.
- The City may choose to perform some trials where traffic counts are performed after a development goes in. This can be used to help calibrate the model. This has been done in the past and has been a useful exercise.
- Bob Schiermeyer noted that the City has repeat problems with housing developments that are created with only one way in and out. The limited access at these types of developments creates issue. A TIA at the platting stage would help prohibit this.
- Council Member Lamb inquired about the possibility of using the transportation model to analyze the impacts of ingress/egress on subdivision developments. Could the model be used to determine the impacts of a quarter section sized housing development on adjacent arterials.
- Karl Stickley explained that the model in its current state cannot do this. We have set it up to look at the big picture. However, the information can be geared down to level. It would require more work by City staff to code in a finer street network and disaggregate the population and demographic information. It would take some work to get down to this level of detail.
- GUERNSEY will create a somewhat open ended recommendation regarding who should perform the TIA. This would give the City a chance to try a few scenarios and determine how easy or cumbersome it will be for staff.

Functional Classifications

- GUERNSEY provided handouts showing the proposed functional classifications for Edmond and proposed cross sections and details.
- The proposed functional classification network contains arterials at one mile spacing, and principle arterials at two mile intervals.

- Proposed arterial standards are provided for arterials with four lanes and two lanes.
- GUERNSEY recommends divided four lane arterials.
- Six lane arterials should have a median for improved flow and safety. The median should be wide enough to "hide" a car making a turn across traffic.
- GUERNSEY is showing the introduction of bike lanes on the standards. Bike lanes should not be added to principle arterials. They should be considered for major collectors and minor arterials. GUERNSEY recommends following AASHTO standards.
- Council Member Lamb asked if it was good planning to have bike lanes with on street parking. Karl Stickley explained that if you need parking and wish to have a striped bike lane, this is the only way you could do it. You could choose not to use markings to identify the bike lane, but rather designate the facility as "shared use."

Alternative Scenarios

- Karl Stickley provided an overview of scenarios 1 through 3 from the public meetings. Handouts were provided showing the proposed improvements associated with each scenario and the resulting level of service.
- Karl Stickley then presented scenario 4 which includes improvements suggested by the public along with the recommendations from the fixed guideway study. Passenger rail stations were included at 2nd Street and Memorial Road. The following additional improvements were modeled:
    - Interchange at Coffee Creek and I-35
    - Broadway – Kelley connection over railroad
    - Widening of Memorial Road
    - Interchanges on the Kilpatrick Turnpike at Bryant and Sante Fe
- The COTPA study identifies 565 boardings and 260 commuter parking spaces at the 2nd Street station; 88 boardings and 10 commuter parking spaces were identified for the Memorial Road station. GUERNSEY took the boardings/trips off the network and included more trips for the Edmond (2nd Street) station that were diverted from the Oklahoma City Station.
- Scenario 4 reduced the vehicle miles traveled (VMT) more than any other scenario. The vehicle hours traveled (VHT) showed a decrease, but not as good as Scenarios 2 and 3.
- Council Member Lamb expressed concerns about the feasibility of getting an interchange at Coffee Creek and I-35 and creating a Broadway-Kelly interchange.
- Mayor Naifeh suggested that the Coffee Creek interchange may have some validity in the long term.
- Right of way would not be an issue for the widening of Kelly. The City currently has 140'. The City does not have 140' on Sante Fe.
- Mayor Naifeh inquired about the feasibility of reversible lanes. Bob Hamm briefly discussed some of the issues with reversible lanes including:

    - Choke points would be created at each end of the reversible section, and
    - Signalization would have to be redesigned.
- The new interchange at Kelly and Broadway will provide a limitation to the amount of traffic that can get on the Broadway Extension. Kelly can be widened, but the new on ramp is the limiting factor. The on ramp may need additional work to increase capacity by 2030.
- None of the scenarios tested affect Kelly to a great degree. Some of the problem may be attributed to Oklahoma City traffic using Kelly to access Broadway.
- Infrastructure improvements alone will not be able to address the level of service issues on the west side of Edmond. Limiting density on the west side would likely result in the high density developments crossing the border into Oklahoma City and the problem would still exist.
- Mayor Naifeh suggested that maybe there is a way to encourage more commercial/industrial developments on the west side and keep Edmond residents from commuting to Oklahoma City.
- Bob Hamm noted that this is a policy question that goes along with the land use study:
    - Is there something the City is comfortable with to change the pattern on the west side? One example would be to speed up infrastructure improvements on the east side of Edmond to encourage more development east of I-35.
    - Does the council want to maintain development levels on the west side of town with known traffic issues or do you want to influence development patters on the east side to use the good transportation infrastructure there?
- Mayor Naifeh suggested that Edmond should be interacting with Oklahoma City to address some of these problems on a larger scale (e.g. Portland Avenue).

Transportation Plan Development

- Karl Stickley requested input from the workshop attendees on the reality of some of the improvements depicted in scenarios 1 through 4.
- Steve Manek indicated that as a general rule right of way would not be an issue west of Broadway. The City maintains enough right of way to widen to four or more lanes. Widening east of Broadway will be tough, even getting to four lanes.
- Council Member Miller suggested that some combination of scenarios 2 and 4 might me appropriate.
- Council Member Page noted that scenarios 1 and 3 should the least amount of red on the level of service maps west of Broadway.
- Bob Hamm indicated that scenarios 2 and 3 show the best impact to VHT.
- There is an opportunity to create connectivity through policy. The Homestead development is good example of how to plat.
- There should be some commuter bicycle routes especially near the university.

- Karl Stickley asked about the feasibility of improvements in scenario 1 if there are major right of way expenses. Council Member Page expressed optimism while Council Member Lamb and Mayor Naifeh suggested otherwise.
- Council Member Lamb inquired about the possibility of a left turn overpass at Broadway and 33rd.
- Mayor Naifeh suggested that the transportation plan should try to refocus on moving people east and west. We should consider a combination of scenarios 2 and 3.
- Karl Stickley polled the workshop attendees on moving forward with a combination of scenarios 2 and 3. The general consensus was that this would be the most appropriate direction for the transportation plan.
- Mayor Naifeh stated that the Coffee Creek interchange at I-35 is not too far fetched and should be considered along with the Kilpatrick Turnpike and Bryant interchange. The Sante Fe interchange is probably not feasible. We should also consider a Post Road interchange with the Turner Turnpike. This would eleveate Post Road's role as a major north-south corridor in east Edmond.
- Council Member Miller stated that the policy on the east should be to move traffic toward I-35 and south to the turnpike. This may mean that the City needs to begin acquiring right of way at this time.
- Mayor Naifeh stated that it might be beneficial for the City to annex south to the turnpike.
- Council Member Lamb asked if the City should begin acquiring more right of way now.
- Karl Stickley suggested that would be a good idea. The transportation will provide a proposed functional class and cross sections that can be used as the rule for the amount of right of way the City needs for any given roadway project.
- Council Member Miller suggested that the City begin acquiring between 70 and 90 feet of right of way.
- Bob Hamm indicated that the City needs to formalize the policy on curb cuts.
- Mayor Naifeh indicated that the City needs to also formalize the policy on connectivity.
- The draft transportation plan recommendations will be presented at the next meeting.

ENGINEERS
PLANNERS
ECONOMISTS
Wilbur Smith Associates

9800 Richmond Ave., Suite 400
Houston, TX 77042-4521
(713) 785-0080
Fax (713) 785-8797
www.wilbursmith.com

June 9, 2005

Mr. Steven E. Manek P. E.
Director of Engineering
City of Edmond
10 S. Littler
Edmond, OK 73083-2970

RE: Meetings with Key Agencies
Edmond Transportation Plan

Dear Mr. Manek:

As part of the public involvement process for the Edmond Transportation Plan, Wilbur Smith Associates and C.H. Guernsey & Company met with a series of key agencies on May 24, 2005. These agencies included the University of Central Oklahoma, Edmond Public Schools, Association of Central Oklahoma Governments, and Metro Transit. Below is a summary of comments received during those meetings:

University of Central Oklahoma (UCO)

Tuesday, May 24, 2005, 9:00 AM

Persons in attendance:

- Jeff Harp, UCO
- Steve Kreidler, UCO
- Darryl Brandon, C.H. Guernsey & Company
- Bob Hamm, Wilbur Smith Associates
- Naina Magon, Wilbur Smith Associates

Information obtained from UCO related to enrollment, future growth and development patterns, and parking and traffic issues and included the following:

<u>UCO Current Student Enrollment and Characteristics:</u>

- 16,000 students, one of the top 7 universities by size;
- Metropolitan University Model (Similar to Rice University in Houston);
- 1,800 students in on-campus housing;
- 200 students in married housing;
- 7,000 students with an Edmond Address;
- 9,000 commuters (mostly from the Oklahoma City Metropolitan Area);
- National trend is changing, moving towards having more first time freshmen;

- 15 percent of student body lives on campus;
- Majority of the parking is on the east side of campus; and,
- 1,200 permanent employees.

UCO Traffic Issues

- Peak hours: 8:30 - 9:00, 11:30 – 1:00, transition between morning and afternoon classes, morning classes are the most desirable;
- 2nd Street is the main route to and from the University;
- All commuter traffic coming from the south;
- Most leave through the south and west, Boulevard and 2nd and Broadway and 2nd are the worst intersections (they take this route to the turnpike);
- South of the turnpike, near the mall there is a cluster of apartments where many of the students live;
- Larger daytime population with adults returning to take classes;
- Secondary transition in the evening for classes, everyone goes home by 9:00;
- 7,000 students in the morning, 7,000 in the afternoon and 7,000 in the evening;
- Turn around time 10 minutes before and after classes, in particular in the morning it is a gridlock; and,
- Not successfully moving people to Ayres (4 lane to Bryant) and Danforth.

UCO Future Growth

- Campus will expand west with the State Crime lab which is 4 to 5 years away from development. South of 2nd street, the old Ramada Hotel will be used for a dorm and will have parking. These developments will result in more foot traffic;
- A new master plan will be developed between now and December;
- Developing an arts oriented district in the Stevenson Park area (boundaries: Littler Street, Boulevard, 4th and 5th), this will become Edmond's Art District with a small theater and museum;
- Growth will occur south (there are several commercial tear down rental properties);
- Currently have partnerships with Rose College (Midwest City) and Oklahoma Community College to offer 4 year degrees;
- Need a method (transit) to move people to and from satellite campuses;
- Eventually developing satellite campuses in other rural areas;
- Eventually the university will become a more residential campus;
- Over the next 10 years growth is expected to equal 16,000 to 18,000 students with another 4,000 to 5,000 at satellite campuses (depending on ability and funding to build facilities);
- In thirty years the university will double in size;
- Rebuilding stadium (10,000 seats), the high schools will also use this facility. Facility will be used Thursday, Friday and Saturday nights;
- Will be developing additional housing adjacent to campus (new apartment complex near stadium); and,
- Fraternity zones should only be allowed in certain places.

UCO Bicycle, Pedestrian and Transit issues

- Bicycle activity is low but has increased in the past year;
- Need to change behavior patterns through HOV lots, marketing transit and promoting bicycle use;
- Contribute $90,000 to the Eddy Transit, City contributes $180,000;
- Metro transit connects to Oklahoma City;
- Would like to have a multi-modal facility near parking lot on the east side (park and ride) in the future; and,
- Need better connections to downtown.

Edmond Public Schools

Tuesday, May 24, 2005, 11:00 AM

Persons in attendance:

- Bret Towne, Edmond Public Schools
- Tom Minnick, City of Edmond
- Bob Schiermeyer, City of Edmond
- Daryl Brandon, C.H. Guernsey & Company
- Bob Hamm, Wilbur Smith Associates
- Naina Magon, Wilbur Smith Associates

Information obtained from Edmond Schools related to enrollment, future growth, parking and traffic issues and included the following:

- Three high schools with an enrollment of 2,000 students each, maximum capacity 2,600 students;
- No additional growth at existing schools, however new schools will be built;
- Ashford Oaks (Covelle, west of Bryant), new elementary school will be built in 2006, 850 students, 15 acre site;
- In five years a new middle school will be built west of I-35, north of Covelle, south of Sorgum Mill and not further west than Coltraine;
- In ten years a new high school will be built somewhere between Midwest Boulevard and Sooner and between Danforth and Sorgum Mill;
- Within 5 to 7 years a new elementary school will be needed near Covelle and the Western Santa Fe area;
- High School parking will be expanded by 300-400 spaces;
- High School and Middle School routes are completed by 7:30 am (high schools and middle schools are on the same route, elementary schools are a second route);
- Elementary routes start between 8:30-9:00 am;
- There are two Choice Schools; Clegern Russell and Russell Dougherty Elementary Schools , these schools do not have bus service;
- Buses leave bus barn at 6:45 am, 90 route buses, 25 special ed buses (they run all day), back in the barn at 9:30 am and then leave at 2:00 pm and are back in at 4:30 pm;
- ACOG projections are low;

- Current enrollment summary:
    - Elementary – 8,436;
    - Middle School – 4,137;
    - High School – 5,945; and,
- Edmond Schools will provide additional data, including enrollment, employment, and bus ridership numbers.

Association of Central Oklahoma Council of Governments (ACOG)

Tuesday, May 24, 2005, 1:30 PM

Persons in attendance

- Linda Koenig, ACOG
- Doug Rex, ACOG
- John Sharp, ACOG
- Tom Minnick, City of Edmond
- Daryl Brandon, C.H. Guernsey & Company
- Bob Hamm, Wilbur Smith Associates
- Naina Magon, Wilbur Smith Associates

The primary purpose of this meeting was to obtain information on the regions travel demand model, functional classification system and environmental data. Key items discussed include the following:

- Base and forecast years for the travel demand model are 2000 and 2030;
- The travel demand model was developed using CUBE software;
- ACOG completed origin/destination surveys in 1995, which are included in the calibration of the model;
- The consultants should utilize ACOG's definition of arterials, collectors, etc.;
- Collector level facilities are typically included in functional class plan but not in the travel demand model;
- ACOG will provide environmental data including endangered species, underground storage sites, hazardous waste sites and historical sites;
- Transit related data should be obtained form Larry Hopper, COTPA; and,
- A transit study was recently completed, and the recommendations of the Edmond Public Transportation Committee should be considered in our plan.

Metro Transit, Central Oklahoma Transportation and Parking Authority (COTPA)

Tuesday, May 24, 2005, 3:00 PM

Persons in attendance

- Larry Hopper, COTPA
- Daryl Brandon, C.H. Guernsey & Company

- Bob Hamm, Wilbur Smith Associates
- Naina Magon, Wilbur Smith Associates

There are two routes that serve the Edmond area. The "Eddy" is a trolley system that runs within the City of Edmond and Route 37 is an express route that runs from Edmond to downtown Oklahoma City.

- Eddy (Trolley)
  - 1 ½ years old, 100 persons per day (weekday ridership);
  - Ridership drops off during Christmas and spring break, which indicates that students are a significant part of the ridership levels; and,
  - Weather influences the use of the trolley, April was a good month. Overall increase of 300 percent over previous system.
- Route 37 Express
  - Goes from Wal-Mart in south Edmond to downtown Oklahoma City, ridership has increased by 15 percent to approximately 100 people per day;
  - City of Edmond provides most of the funding;
  - Considering UCO generating revenue through a per credit fee to help fund transit;
  - Considering expanding express service to Capital area;
  - Regional Fixed Guideway Study – 10-12 corridors currently under study, downtown Oklahoma City to Edmond will likely be a good corridor (looking at Bus Rapid Transit, HOV, Light Rail);
  - Adding bicycle racks to buses;
  - Gold and Maroon routes currently have 1 hour headways, trying to get to 30 minutes;
  - 2nd street is a traffic problem;
  - Ayres extension to the west would help;
  - Some areas they can't serve due to lack of turn lanes and traffic signals;
  - New senior center has been suggested as a potential for a route; and,
  - Park and ride needs – currently Wal-Mart (south) is used as a park and ride, however they are going to move Wal-Mart and need a new location for park and ride. Broadway will be reconfigured at Memorial and ODOT has agreed to allow the use of SW side of this intersection for Park and Ride once the improvements are made.

Please advise me if you have any questions or comments regarding the above items or the status of the project. Thank you.

Sincerely,

WILBUR SMITH ASSOCIATES

Robert A. Hamm, P.E.
Sr. Transportation Planning Manager

Edmond Transportation Plan
Public Meeting No. 1 Comments

The initial public meeting for the Edmond Transportation Plan was conducted on October 25, 2005 at the Downtown Edmond Community Center. Approximately 50 attendees were present. Comments were solicited at the meeting through written comment forms, questionnaires, and a project specific email address. The public comment period lasted from October 25, 2005 to November 15, 2005. A total of 16 handwritten/faxed comments and 7 emailed comments were received.

The following presents a summary of the public comments received during the public comment period:

- Reducing traffic congestion, improving everyday travel conditions, and improving safety were top ranking issues identified by meeting attendees.
- Improve signalization timing on major thoroughfares, and add signals at other busy intersections.
- Widen roads and increase the number of turn lanes to improve flow.
- Incorporate bicycle lanes into major streets to allow safe cycling as a form of transportation.
- Increase the number of sidewalks and trails.
- Enhance traffic law enforcement to improve safety.
- Balance congestion mitigation against impacts to the environment/natural areas.
- Recognize other travel alternatives rather than constructing extensive roadways.
- Encourage Oklahoma City to improve streets that intersect Edmond Road.
- Improve public transportation system routes and usage.
- Enhance Covell as a major east/west thoroughfare.
- Improve utility system coverage.
- Consider the “outer loop.”
- The current method of allowing developers to widen only small portions of major roadways creates safety and flow problems. Consider another approach.
- Several comments were received relating to specific issues with congestion on 15th, 33rd, and Broadway.
- Consider a railroad overpass to improve flow of traffic and emergency vehicles when trains are present.
- Consider serving areas between Edmond and Oklahoma City public transportation services such as areas near the Oklahoma Christian University.

Edmond Transportation Plan
Public Meeting No. 2 Comments

The second public meeting for the Edmond Master Transportation Plan was held on January 24, 2006 at the Downtown Edmond Community Center. Over 61 attendees were present. Comments were solicited at the meeting through written comment forms and a project specific email address. The public comment period was from January 24, 2006 through February 14, 2006. A total of 13 written comments and 18 emailed comments were received.

The following presents a summary of the public comments received during the public comment period:

- A railroad underpass is needed at 33rd Street or 15th Street.
- The intersections of 15th Street and Broadway and 33rd and Broadway should be a priority. Add eastbound right turn lanes.
- Several comments were received suggesting that a synchronized signalization system be implemented.
- Address parts of the city where lanes increase and then decrease again forming bottlenecks (e.g. Coltrane).
- One member of the public expressed that the Scenario 2 concept presented was the best approach.
- Consider impacts at Rankin and 9th including potential traffic conflicts with area schools.
- Consider light rail access.
- Consider a railroad underpass at 33rd Street and Covell Road.
- How would extremely high gas prices affect the transportation system?
- Consider other forms of transportation in future planning (i.e. bike lanes, light rail, bus routes).
- Add more commuter parking along Broadway Avenue to facilitate carpooling.
- Consider relocating the train tracks to the east of Broadway.
- Upgrade Memorial Road and 122nd Street connections and upgrade Eastern/Boulevard.
- Use signal synchronization to promote north/south flow during rush hour and east/west flow during other times of the day.
- Extend parkway right of way along Covell Road to Arcadia for long range use.
- Improve access to north Edmond.
- Study traffic flows on more frequent basis and find ways to improve flow during peak hours.
- Stagger business hours and UCO's class times to relieve congestion during morning rush hour.
- A development is being planned for three corners of the Covell Road and I-35 intersection. Please consider this in the transportation plan.
- Include sidewalks in future roadway designs.

A significant amount of comments received from the bicycling community. The following summarizes the comments that were specific to bicycling issues:

- Add bike racks to every city bus.
- Nineteen comments were received expressing the need/desire for bike lanes throughout the city.
- TEA-21 grants can be used as matching funds for bike lanes.

Project Participants

City of Edmond

100 E. First
Edmond, OK 73034

City Staff

Larry Stevens, City Manager	(405) 359-4500 larry.stevens@ci.edmond.ok.us
Steve Manek, Director of Engineering	(405) 359-4771 steve.manek@ci.edmond.ok.us
Thomas Minnick, Traffic Planner	(405) 359-4775 tom.minnick@ci.edmond.ok.us
Sara Cobb, GIS Manager	(405) 359-4517 sara.cobb@ci.edmond.ok.us
Bob Schiermeyer, Director of Planning	(405) 359-4790 bob.schiermeyer@ci.edmond.ok.us

Mayor and City Council

Saundra G. Naifeh, Mayor	sgnaifeh@cox.net
Wayne Page, Council Member	wayne@waynepage.com
Paula Sanford, Council Member	pspaulak@aol.com
Charles Lamb, Council Member	chukolamb@aol.com
David Miller, Council Member	dcmiller@sbcglobal.net

Consultant Team

C.H. Guernsey & Company

5555 North Grand Boulevard
Oklahoma City, OK 73112

Project Manager

Karl E. Stickley, P.E. Vice President	(405) 416-8217 karl.stickley@chguernsey.com
Ken Senour, QEP, CEP	(405) 416-8140 ken.senour@chguernsey.com
Nathan Madenwald, EI	(405) 416-8133 nathan.madenwald@chguernsey.com

Project Participants

Jimmie Hammontree
(405) 416-8324
jimmie.hammontree@chguernsey.com

Daryl Brandon
(405) 416-8167
daryl.brandon@chguernsey.com

Wilbur Smith Associates
2940 Kerry Forest Parkway, Suite 201
Tallahassee, Florida 32309

Bob Hamm, PE
(850) 309-0838
bhamm@wilbursmith.com

Wilbur Smith Associates
9800 Richmond Avenue, Suite 400
Houston, Texas 77041

Robert Babineaux, Jr., PE
(713) 785-0080 ext. 38
bbabineaux@wilbursmith.com

Naina Magon, AICP
(713) 785-0080 ext. 43
nmagon@wilbursmith.com

Laura Kulecz, AICP
(713) 785-0080 ext. 28
lkulecz@wilbursmith.com

Ashish Loney
(713) 785-0080 ext. 24
alooney@wilbursmith.com

Wilbur Smith Associates
9009 Mountain Ridge Drive, Suite 250
Austin, Texas 78759

Will Smithson, AICP
(512) 502-0481
wsmithson@wilbursmith.com

Scope of Services

Task 1 - Project Management

The management of project activities will ensure the efficient and timely delivery of study results that are of exceptional quality and of practical use by the City of Edmond. Three objectives for the project management program are described below:

- Cost Control - Continuously track project expenditures versus the projected level of effort;
- Schedule Control - Identify and track critical path activities; and,
- Quality Control - Systematic review of ongoing processes and project deliverables.

CONSULTANT will be responsible for achieving the defined project management objectives through the following set of activities.

Task 1.1 - Progress Reports and Schedule - CONSULTANT will prepare monthly progress reports identifying activities performed during the subject month. In addition, CONSULTANT will prepare a detailed work schedule that will allow for the aggressive implementation of study activities while maintaining adequate opportunity for Edmond staff to review and comment. The project schedule identifies dates for key project milestones, meetings, and project deliverables.

Task 1.2 - Project Kick-Off Meeting - CONSULTANT will conduct a project kick-off work session with the Advisory Committee after receiving the notice-to-proceed. The work session will provide a basis for establishing appropriate goals and objectives for the project in addition to the following:

- Clarify the limits and area of study;
- Identify Goals, Strategies, and Objectives; and,
- Identify and define problems and issues affecting transportation in Edmond.

As part of the Project Kick-off Meeting, CONSULTANT will prepare and distribute 10 copies of a Project Management Plan (PMP) for advisory committee members. The PMP will include contact names, project scope, project schedule, and tentative dates for meetings. The PMP will be developed in a three ring binder to facilitate updates throughout the course of the project.

Task 1.3 - Advisory Committee Meetings - CONSULTANT will organize and coordinate three Advisory Committee meetings throughout the duration of the project. It is anticipated that Advisory Committee meetings will be held at regular intervals throughout the project, as identified in the project schedule. Close coordination will be maintained between CONSULTANT and the Advisory Committee to ensure that project deliverables conform to project goals and objectives. The third and final advisory committee meeting will include members

of the City Council and Planning Commission and be conducted in the form of a workshop.

Task 2 - Public Involvement

Public involvement is an important part of the development of a transportation plan and will be accomplished with the following subtasks.

Task 2.1 - Public Meeting Number 1 - A public workshop is tentatively scheduled to be held near the beginning of the project to describe the study goals and objectives, the study process, and study time schedule. In addition, the public will be invited to provide public comment on existing transportation problems or concerns within the City of Edmond. CONSULTANT will develop advertisements, mail-outs, and handouts for the meeting, as well as the meeting presentation materials. The City of Edmond will be responsible for posting all advertisements in appropriate newspapers/publications, copying and distributing all mail-outs, and copying all meeting handouts. The City of Edmond will also be responsible for securing the meeting location and making arrangements for appropriate accommodations, including sound equipment and refreshments, if desired. Following the public meeting, CONSULTANT will prepare a written summary of comments received at the meeting.

Task 2.2 - Meetings with other Agencies - CONSULTANT will meet with the University of Central Oklahoma (UCO) and the Association of Central Oklahoma Governments (ACOG) to solicit input and gather any available information such as past traffic studies, future growth projections and patterns. CONSULTANT is to determine the use of ITS technology and how it fits into the Edmond Transportation Plan. Following any meetings, CONSULTANT will prepare a written summary of comments received at the meeting. CONSULTANT will make a PowerPoint presentation to ACOG's Transportation Committee upon completion of Final Plan.

Task 2.3 - Public Meeting Number 2 - A formal public meeting is also scheduled to be held near the end of the project prior to completion of the recommended transportation plan. This meeting will allow public input to be incorporated into the development of the recommended transportation plan. CONSULTANT will develop advertisements, mail out's, and handouts for the meeting, as well as the meeting presentation materials: The City of Edmond will be responsible for posting all advertisements in appropriate newspapers/publications, copying and distributing all mail out's, and copying all meeting handouts. The City of Edmond will also be responsible for securing the meeting location and making arrangements for appropriate accommodations, including sound equipment and refreshments, if desired. Following the public meeting, CONSULTANT will prepare a written summary of comments received at the meeting.

Task 3 - Data Collection and Existing Conditions

This task involves the identification and inventory of existing data, the collection of additional data needed for the completion of the study, and the evaluation of existing traffic operations.

Task 3.1 - Data Collection - Available data sources will provide important data, such as traffic counts, base maps, land use, socioeconomic data, and environmental data. Data compiled as part of this study will be maintained in a project database. Data collected will include the following:

- **Traffic Volumes** - The City of Edmond will provide available traffic volume counts and conduct additional traffic volume counts at locations requested by CONSULTANT;
- **Traffic Signal Locations**- The City of Edmond will provide a list of all traffic signals located within the City of Edmond;
- **Functional Classification** - The City of Edmond will provide a list that identifies the existing functional classification of all roadways within the City of Edmond;
- **Number of Travel Lanes** - The City of Edmond will identify the number of roadway travel lanes on all roadways within the City, provided in the form of a hand-drawn or colored map;
- **Speed -Limits** - The City of Edmond will identify the existing speed limit along roadways within the City, provided in the form of a hand-drawn or colored map;
- **On-Street Parking** - The City of Edmond will identify locations of on-street parking along major roadways, such as arterial and collector streets, within the City;
- **Roadway Right-of- Way** - During the development of the recommended roadway improvements in Task 5 and 6, the City of Edmond will provide existing right-of-way information on selected roadways, as requested by CONSULTANT;
- **Accident Data** - CONSULTANT will request existing accident data from the Oklahoma Department of Public Safety and/or Oklahoma Department of Transportation;
- **Socioeconomic Data** - Existing socioeconomic data, such as population, employment and number of households, will be retrieved from the US Census Bureau.

Task 3.2 - Special Generator Surveys - Special traffic generators in the area (ie: University of Central Oklahoma), will be asked to provide socioeconomic data (employment, etc.) and traffic operations data (size and location of parking facilities, hours of operation, employee shift hours, etc.). Information will be requested from each special generator during the project kick-off meeting, with follow-up meetings conducted by conference call via telephone. In addition, the City of Edmond will conduct traffic counts at selected special generator locations as requested by CONSULTANT or advisory committee members.

Task 3.3 - Existing Conditions Evaluation - CONSULTANT will evaluate existing transportation conditions along major roadways in the study area to determine existing roadway Level-of-Service (LOS). The evaluation of existing conditions will provide a baseline of current traffic operations to use during the comparison and evaluation of alternative improvements. The LOS procedure will use volume-to-capacity ratio to calculate roadway LOS.

Task 4 - Develop Travel Demand Model

This task will involve the development of a travel demand model using Transcad travel demand modeling software.

Task 4.1 - Data Analysis and Forecasting - Socioeconomic data variables will be developed for each traffic analysis zone within the study area. The five socioeconomic data variables needed for the travel demand model, and the process used to forecast them, include the following:

- **Population** - Number of persons residing in the metropolitan area and in each census tract and traffic analysis zone;
- **Total Employment** - Number of total employees in the metropolitan area and in each census tract and traffic analysis zone;
- **Retail Employment** - Number of retail employees in the metropolitan area and in each census tract and traffic analysis zone, based on the North American Industry Classification (NAIC) code definitions;
- **Number of Households** - Number of occupied houses, individual apartment and duplex units, in the metropolitan area and in each census tract and traffic analysis zone; and,
- **School Enrollment** - The total number of enrolled students within the traffic analysis zone where school facilities are located (coordinated with the special generator data collected as part of Task 3.2.).

Estimates of the Base Year 2000 planning variables and projections of Interim Year 2010 and Horizon Year 2020 for the metropolitan area will be assembled. Projections previously prepared by the City, Edmond Chamber of Commerce, and other local or regional agencies will be compiled and reviewed for relevance to the study. Use of the 1990 and 2000 (as available) U.S. Census data will provide important benchmarks of demographic conditions.

Projections for 2015 and 2030 will be developed using a range of demographic forecasting techniques, including trend analysis, ratio trend, step-down, and correlation methods. An area-wide control total projection will be developed for the Edmond metropolitan area, which will include total population, total employment, retail employment, households and school enrollment. Information on new or proposed development that has occurred or is about to occur, based upon the City staff's knowledge of local conditions, will be utilized and incorporated into the projections. Once the control total population is determined, CONSULTANT will solicit input from the Advisory Committee to identify the zones that are suitable for future development and most likely to develop by

Interim Year 2010 and Horizon Year 2020, which will guide the assignment of future population and employment.

The procedure for disaggregating the control total planning variable forecasts to the traffic analysis zone level will be performed using Geographic Information System technology. The 2000 base year data for the zones will be the starting point for developing the zonal forecasts. The changes from the 1990 Census baseline data will provide a useful guide for identifying which zones are experiencing near-term changes for the different parameters. The growth assumptions underlying the forecasts and disaggregation process will be carefully reviewed and considered. A three-step process will be followed in developing the zonal forecasts, including the following steps:

Step One: The area-wide base year and forecast year control totals for each data element will be disaggregated to the census tract level;

Step Two: Within each census tract, the planning variable forecasts for 2010 and 2020 will be disaggregated to the individual traffic analysis zones; and,

Step Three: The resulting forecasts for census tracts and traffic analysis zones will be reviewed and refined as necessary, based on reasonableness tests and review comments received from the City.

Occupied dwelling unit forecasts will be developed based upon the population forecasts and the average number of persons per household, taking into consideration the current and projected trends in average household size within the area. Comparisons with the 1990 Census data will be made to identify any significant variations, which will be analyzed and justified. Employment will be disaggregated based upon analysis of trends and growth assumptions, which will be developed and reviewed in coordination with the City staff and the Advisory Committee. The use of existing and future land use data, zoning and other local data will be utilized to assign the existing and projected future employment to the traffic analysis zone level. The total employment will also be disaggregated by retail industry, which will be developed using the North American Industry Classification (NAIC) codes. The 1990 U.S. Census Transportation Planning Package (CTPP) tabulations by area of work will be utilized to assess the reasonable accuracy of the data and to identify any inconsistencies. Trend data for employment will also be taken into consideration in the development of economic projections. The school enrollment data will be acquired through the special generator survey conducted as part of Task 3.2. School enrollment will be reported as the total number of enrolled students within the zones where schools are currently located and planned to be located (as data and information is available).

Reasonableness tests will be conducted to validate the projections, based upon parameters such as the average number of persons per household, number of employees per 1000 population, occupancy rates based upon total and occupied dwelling units, projected dwelling units and employment changes in relation to

undeveloped acres available to accommodate future residential and nonresidential development. The projections will be validated against the control total projections approved by the City for use in the study.

Existing land use, known development plans, and economic development plans will be considered in the process of disaggregating the projections within the study area. Planned improvements in transportation facilities, public utilities, and public services will also be considered.

The five socioeconomic variables will be developed for the Year 2000 base year, Year 2010 interim year, and Year 2020 horizon year. The socioeconomic variables will be forecasted by traffic analysis zone and will serve as input for the analysis of alternatives and travel demand modeling.

Task 4.2 - Travel Demand Model Development - CONSULTANT will develop a travel demand model using Transcad travel demand modeling software. The travel demand model will utilize the data collected in Task 2, including existing traffic volumes, travel speeds, roadway travel lanes, socioeconomic data, existing roadway network, and the results of the special generator surveys.

The developed travel demand model will be calibrated to replicate existing transportation conditions in the Edmond area. Fol1owing development of a calibrated Year 2000 travel demand model for the City of Edmond, a Year 2010 model and a Year 2020 model using the forecasted socioeconomic variables and committed transportation improvements will be developed. The future year models will be utilized to evaluate future transportation conditions in the following task.

Task 5 - Evaluate Future Transportation System

This task will include an iterative multi-modal travel demand modeling process, development of cost estimates, identification of mobility improvements, and evaluation of environmental impacts. Alternative improvements will be prioritized according to the short- and long-term objectives of the study and the feasibility of project implementation. This task will be accomplished with the following subtasks.

Task 5.1 - Identification of Mobility Improvements - Anticipated mobility and access improvements will be identified and modeled to determine their impact in improving the future Transportation system. Roadway segments identified with a decreasing quality of level-of-service (LOS) will be investigated to determine if the deficiencies are caused by geometric constraints. Recommendations for improvements will be based on AASHTO's Policy on Geometric Design of Highways and Streets.

Task 5.2 - Travel Demand Modeling - The future year travel demand model developed in Task 4 will be utilized to evaluate future transportation needs. Quantification of the transportation problems and key issues is an important step in this study because it provides benchmarks against which the impacts of the tested transportation system alternatives can be measured.

Task 5.3 - Functional Classification System - A functional classification system will be developed for the City of Edmond's transportation system. The classification system will identify typical cross sections and typical ROW widths. A system map will be produced identifying the City's proposed classification system.

Task 5.4 - Preliminary Cost Estimates - Preliminary cost estimates will be developed for each improvement alternative based on functional classification and unit costs from ODOT's average construction bids. Preliminary right-of-way (ROW) costs will be determined for all alternatives based upon existing data provided by the City of Edmond using an average ROW cost for the region.

Task 5.5 - Environmental Impacts - The primary purpose of this subtask is to perform a "fatal-flaw" environmental evaluation, with particular focus paid to the traditional "hot topics". Factors which should be considered include existing topography, preservation of natural trees, floodplains, archaeological and historic sites, wildlife habitat, and unique geologic features.

Task 5.6 - Traffic Impact Studies - Identify thresholds, standards, and guidelines that would commonly trigger a requirement for a Traffic Impact Study for new commercial and residential developments.

Task 6 - Recommended Transportation Plan

This task involves the preparation of a Draft and Final Transportation Plan to be presented to the City of Edmond (City Council and Planning Commission). All study activities will be documented throughout the duration of the project so as to maintain accurate and consistent records of all data collection and forecast activities and alternative assessments and recommendations.

Task 6.1 - Prioritization of Improvements - The systematic and detailed analysis used to evaluate potential transportation improvements in Task 5 will provide important information regarding the prioritization of proposed improvements. The analysis will provide a clear systematic evaluation of each scenario, and a recommended ranking order for the alternative scenarios will be included in the report. This ranking order will be used to prioritize implementation in the short- and long-term horizons, based on demand and feasibility.

Task 6.2 - Draft Final Report - Throughout the study, all activities will be documented. All data collected will be maintained in an electronic database, which will identify the source and date of each data element. The forecasting methodology and results will be recorded. All alternatives and recommendations will be described and documented. The documentation of study tasks in concurrence with ongoing study activities will allow for efficient integration of study information into the final report. A draft report documenting the methodology findings, and recommendations for the study effort, will be prepared and presented for approval. Thirty copies (30) of the Draft Final Report will be submitted to the City of Edmond.

Task 6.3 - Final Report - After receiving comments from the City of Edmond, Project Advisory Committee, City Council, and Planning Commission, a Final modified Study Report will be prepared. The Final Report will be presented to the City Council and Planning Commission for final acceptance. Thirty copies (30) of the Final Report will be submitted to the City of Edmond.

Task 6.4 - Travel Demand Model Documentation and Training - Documentation on all assumptions, inputs and outcomes of the travel demand modeling effort, including the travel networks and system coding, will be prepared and submitted to the City of Edmond.

CONSULTANT will provide model software according to the needs of the Edmond computer system as well as training to the City of Edmond staff regarding the development and use of the travel demand model. Training will involve a two-day work session with CONSULTANT and City of Edmond Staff to discuss the modeling software, use, and development of the City of Edmond's model. CONSULTANT staff will then be available by telephone to provide assistance to the City of Edmond for a three-week period while City of Edmond staff becomes familiar with the operations of the model. Following the three-week period, CONSULTANT staff will conduct an additional one-day training session with City of Edmond staff to answer additional questions and conduct hands-on modeling activities.

Additional Services

CONSULTANT is available to provide additional services to the City of Edmond upon request and contract amendment.

Edmond Transportation Plan

Public Meeting No. 1

October 25, 2005

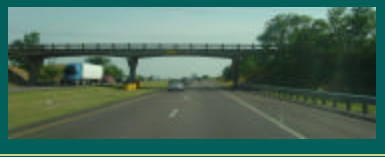
Welcome . . .

. . . To the first Public Meeting for the *Edmond Transportation Plan*. The purpose of this meeting is to:

1. Identify the study purpose, study tasks, and study process;
2. Present findings on existing transportation issues and needs within the study area;
3. Present future population and employment forecasts;
4. Obtain your input on existing transportation issues and potential solutions.

Study Purpose

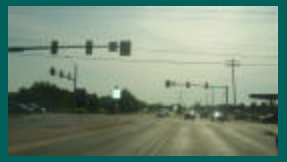
- Develop a transportation plan which prioritizes transportation improvements:
  - Short Term Program – 2005 to 2015
  - Long Term Program – 2015 to 2030
- Develop a plan to include all modes of transportation (roadway, transit, bicycle, and pedestrian)



Study Area

- City of Edmond City Limits
- Travel Demand Model includes Oklahoma City region

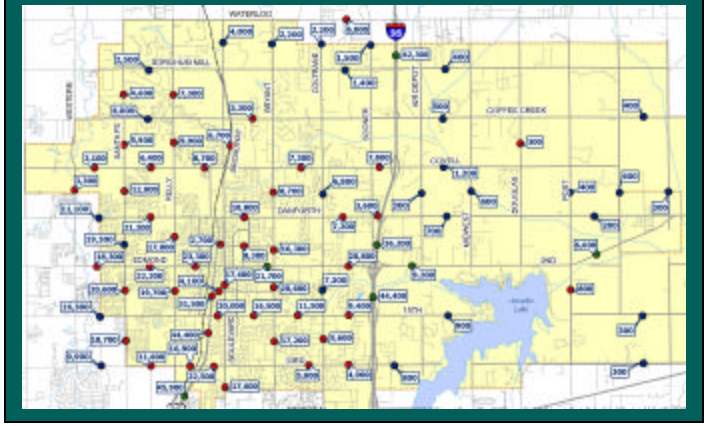
Study Tasks



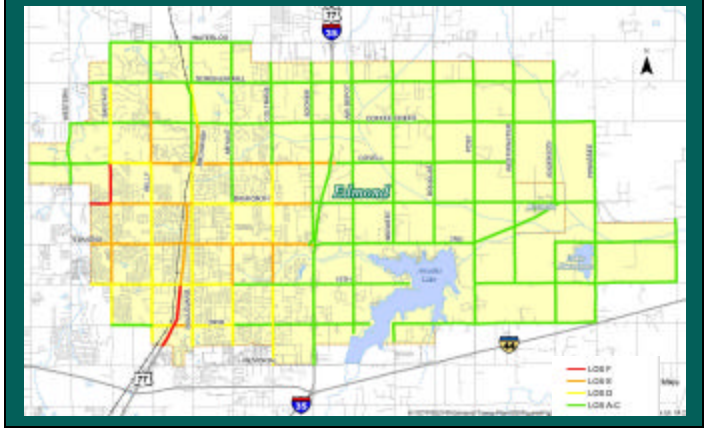
- Public Involvement
- Data Collection
- Evaluate Existing Conditions
- Forecasting and Travel Demand Model Development
- Evaluate Future Transportation System
- Develop Transportation Master Plan

City of Edmond

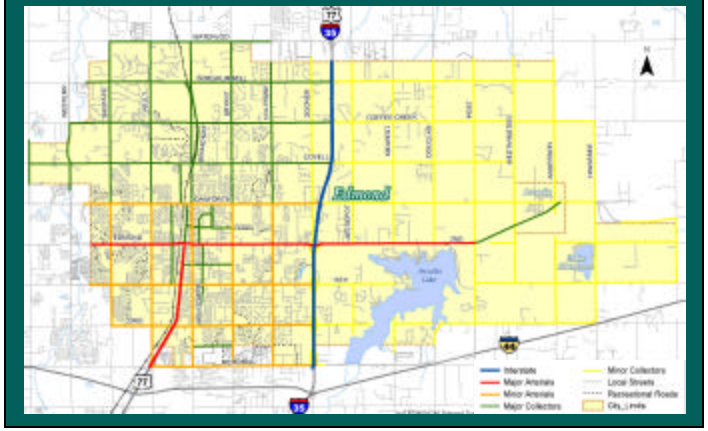
Existing Daily Traffic Volumes



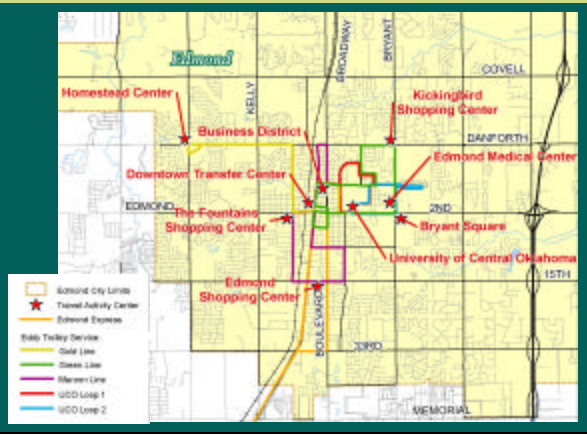
Existing Level-of-Service



Existing Functional Classification



Existing Transit Service



Existing Bicycle / Pedestrian Facilities

Existing Environmental Constraints

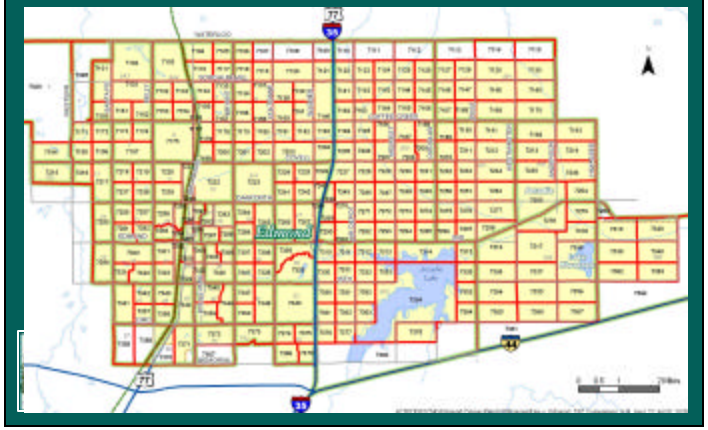
Travel Demand Model Development

- Travel Demand Model used to forecast future traffic volume levels
- ACOG's Regional Oklahoma City model used as base
- Model further refined, with more detail added within Edmond city limits:
  - ACOG: 48 Analysis Zones
  - New: 287 Analysis Zones

City of Edmond

Existing ACOG Traffic Analysis Zones

Proposed WSA Traffic Analysis Zones



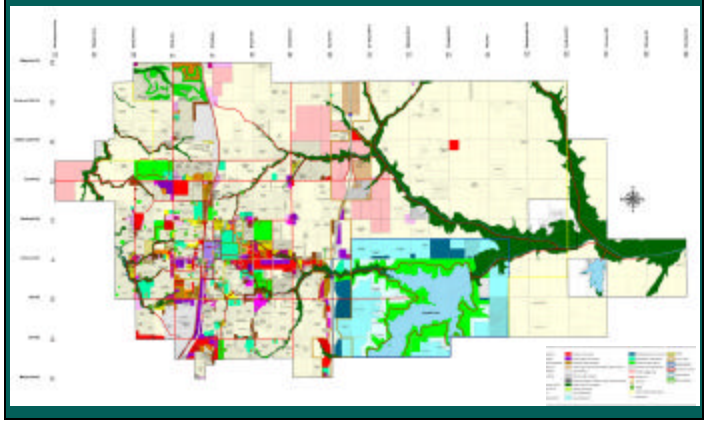
Socioeconomic Forecasts

- Population and Employment forecasts form the basis of Travel Demand Model Trip Generation;
- ACOG Control Totals for Edmond:

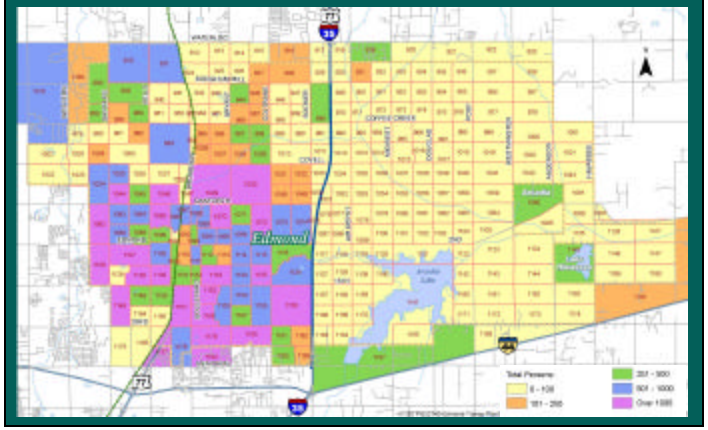
	2005	2030	Annual % Change
Population	77,832	112,850	1.5 %
Employment	28,179	37,133	1.1 %

City of Edmond

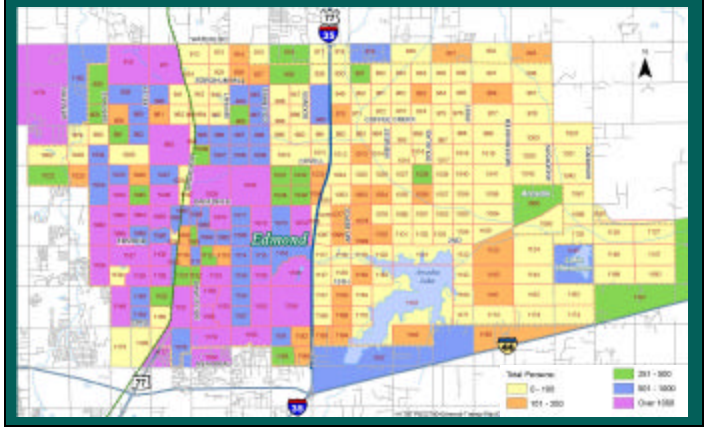
2030 Land Use Projection Master Transportation Plan - Draft



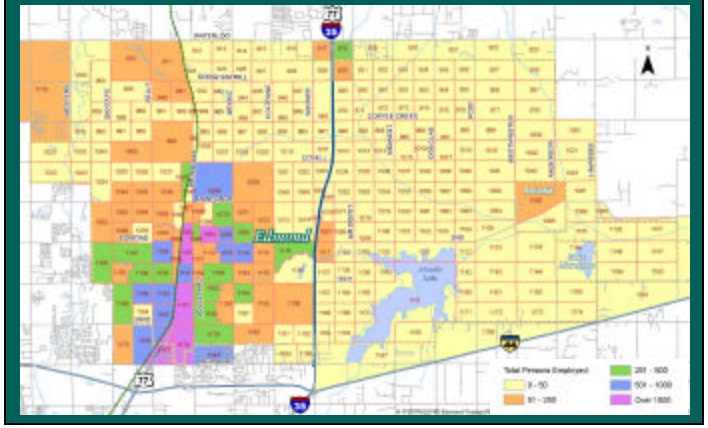
2005 Population Distribution



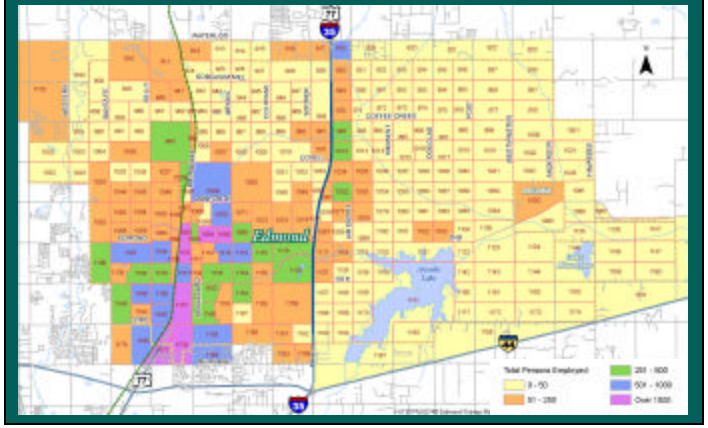
2030 Population Distribution



2005 Employment Distribution

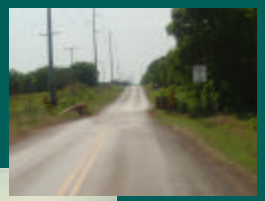


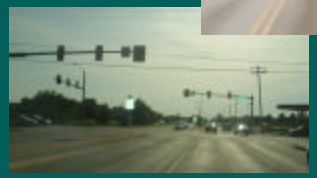
2030 Employment Distribution



Public Involvement

- Two Public Meetings
- Three Advisory Committee Meetings
- Presentations to Key Policymakers





City of Edmond

Meetings / Deliverables Completed to Date

Notice to Proceed	*May 16, 2005*
Kick-off Meeting	*February 14, 2005 and July 25, 2005*
Meetings with Other Agencies	*May 24, 2005*
Advisory Committee Meeting No. 1	*July 25, 2005*
Submitted Project Management Plan	*July 25, 2005*

City of Edmond

Upcoming Meetings / Deliverables

Public Meeting No. 1	*Tonight (October 25, 2005)*
Advisory Committee Meeting No. 2	*November 28, 2005*
Public Meeting No. 2	*January 24, 2006*
Advisory Committee Meeting No. 3	*late February 2006*
Draft Final Report	*March 2006*
Final Report	*April 2006*
Final Report to City Council	*April 2006*
Final Report Presentation to ACOG	*April 2006*
City Staff Travel Demand Model Training	*May 2006*

City of Edmond

Your Turn . . .

- Please provide input to the City of Edmond regarding existing transportation issues and potential solutions.

- You can provide input by:
  1. Completing a Questionnaire;
  2. Completing a Comment Form; and / or
  3. Send an email to: edmondtransportationplan@chguernsey.com

City of Edmond

Edmond Transportation Plan

Public Meeting No. 2

January 24, 2006

Welcome . . .

. . . To the second Public Meeting for the *Edmond Transportation Plan*. The purpose of this meeting is to:

1. Identify the study purpose, study tasks, and study process;
2. Present findings on alternative transportation improvements; and,
3. Obtain your input on alternative transportation solutions.

Study Purpose

- Develop a transportation plan which prioritizes transportation improvements:
  - Short Term Program – 2005 to 2015
  - Long Term Program – 2015 to 2030
- Develop a plan to include all modes of transportation (roadway, transit, bicycle, and pedestrian)

Study Area

- City of Edmond City Limits
- Travel Demand Model includes Oklahoma City region

Study Tasks

- Public Involvement
- Data Collection
- Evaluate Existing Conditions
- Forecasting and Travel Demand Model Development
- Evaluate Future Transportation System
- Develop Transportation Master Plan

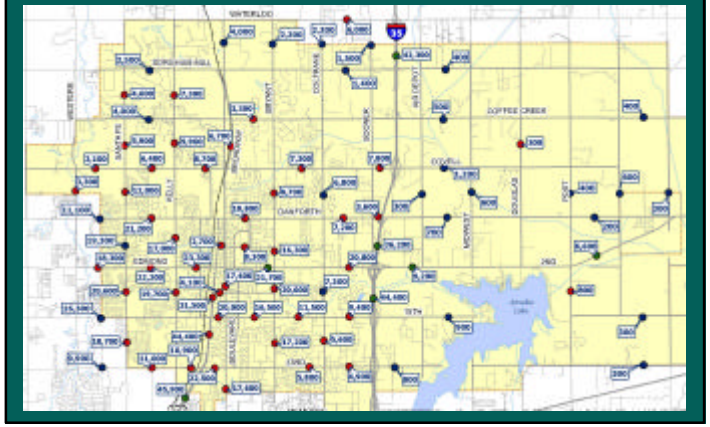
Meetings / Deliverables Completed to Date

Notice to Proceed	*May 16, 2005*
Kick-off Meeting	*February 14, 2005 and July 25, 2005*
Meetings with Other Agencies	*May 24, 2005*
Advisory Committee Meeting No. 1	*July 25, 2005*
Submitted Project Management Plan	*July 25, 2005*
Public Meeting No. 1	*October 25, 2005*
Advisory Committee Meeting No. 2	*November 28, 2005*

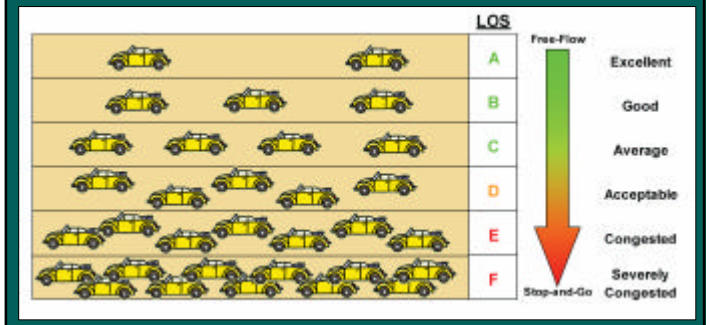
Upcoming Meetings / Deliverables

Public Meeting No. 2	*Tonight (January 24, 2006)*
Advisory Committee Meeting No. 3	*February 22, 2006*
Draft Final Report	*March 2006*
Final Report	*April 2006*
Final Report to City Council	*April 2006*
Final Report Presentation to ACOG	*April 2006*
City Staff Travel Demand Model Training	*May 2006*

Existing Daily Traffic Volumes



Level-of-Service



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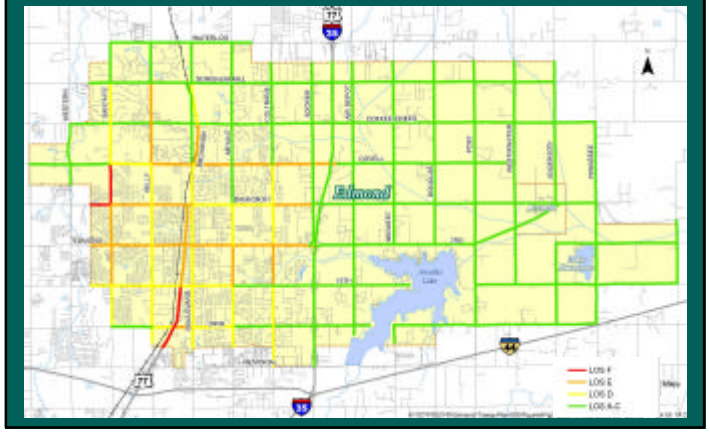
Existing Level-of-Service



Travel Demand Model Development

- Travel Demand Model used to forecast future traffic volume levels
- ACOG's Regional Oklahoma City model used as base
- Model further refined, with more detail added within Edmond city limits:
  - ACOG: 48 Analysis Zones
  - New: 287 Analysis Zones

City of Edmond

Socioeconomic Forecasts

- Population and Employment forecasts form the basis of Travel Demand Model Trip Generation;
- ACOG Control Totals for Edmond:

	2005	2030	Annual % Change
Population	77,832	112,850	1.5 %
Employment	28,179	40,857	1.5 %

City of Edmond

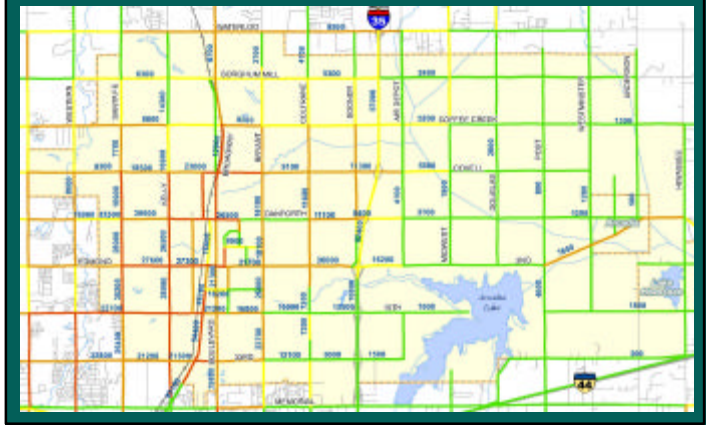
Committed Projects

- Projects that are considered "committed" by local agencies include projects that:
  - Have dedicated funding; or,
  - Are under construction; or,
  - Have engineering design work completed.

City of Edmond

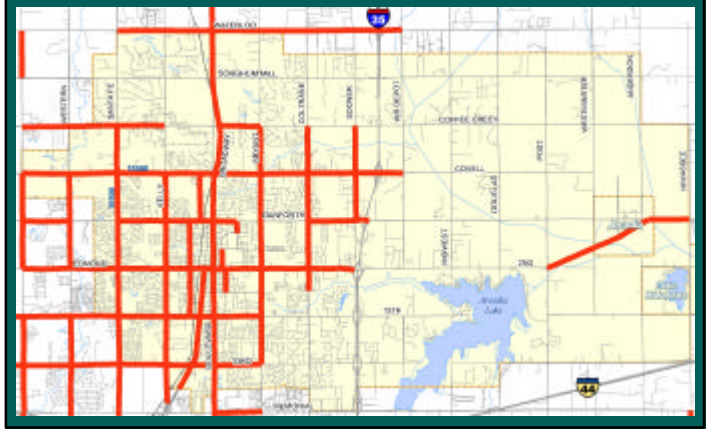
Committed Projects

Future 2030 E+C Volumes and LOS



Attempt to Fix Everything . . . . .

Attempt to Fix Everything . . . . .

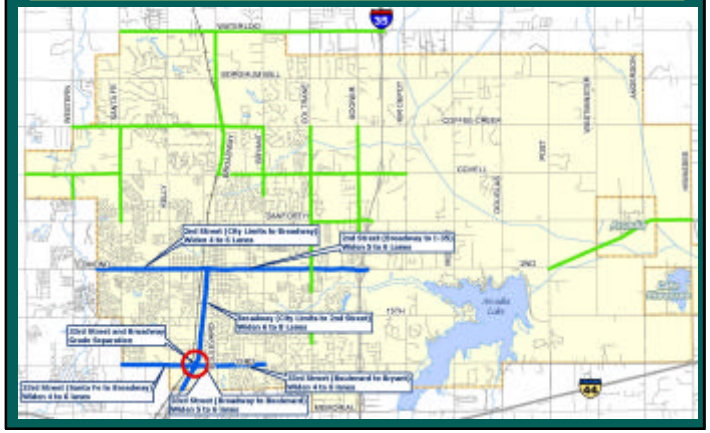


Project Scenarios

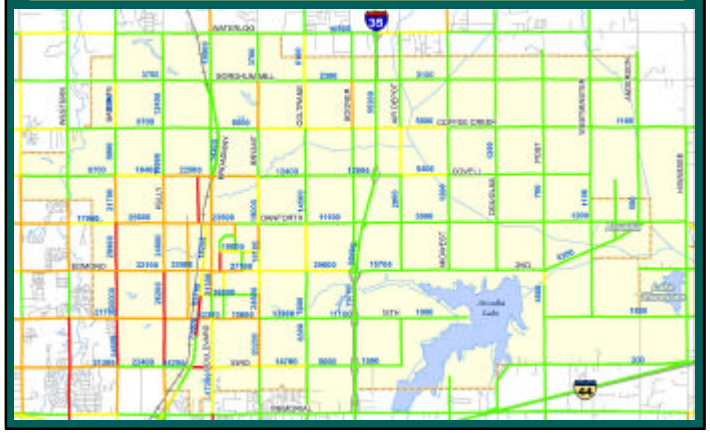
- Project Scenarios were developed to test alternative improvement concepts.
- All Scenarios included some basic identical improvements (shown in green).
  - Scenario 1 – Focus on Broadway/2nd Street
  - Scenario 2 – Focus on Parallel Corridors
  - Scenario 3 – East/West Corridors to I-35

City of Edmond

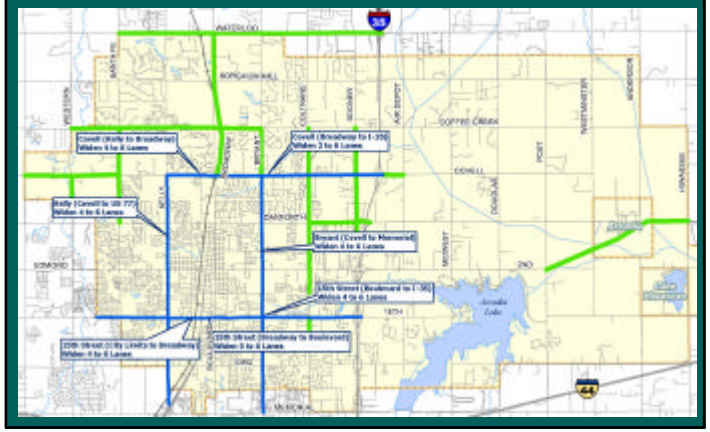
Scenario 1 – Broadway/2nd Street



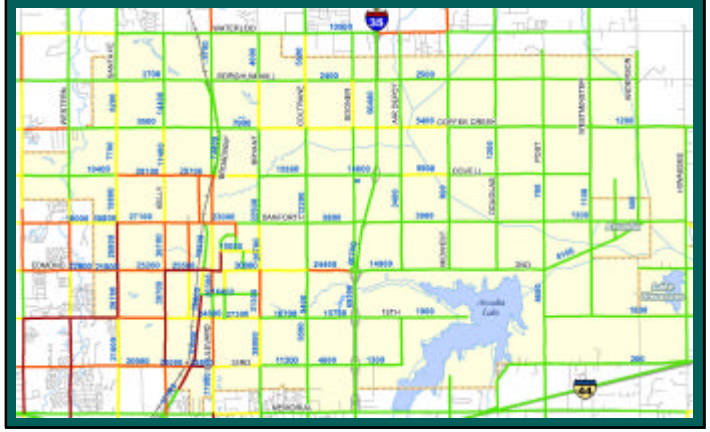
Future 2030 Scenario 1Volumes and LOS



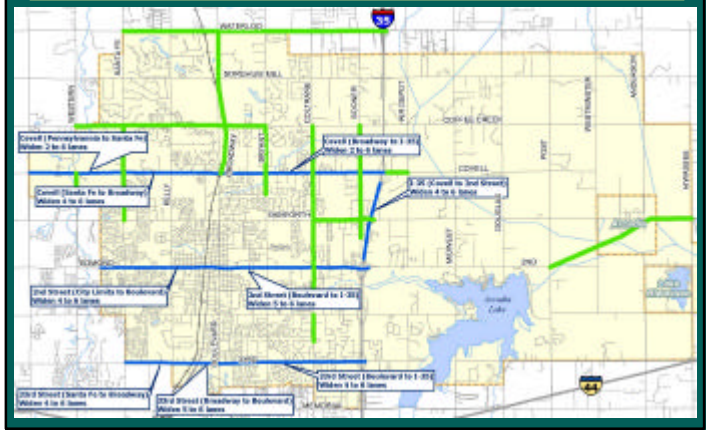
Scenario 2 – Parallel Corridors



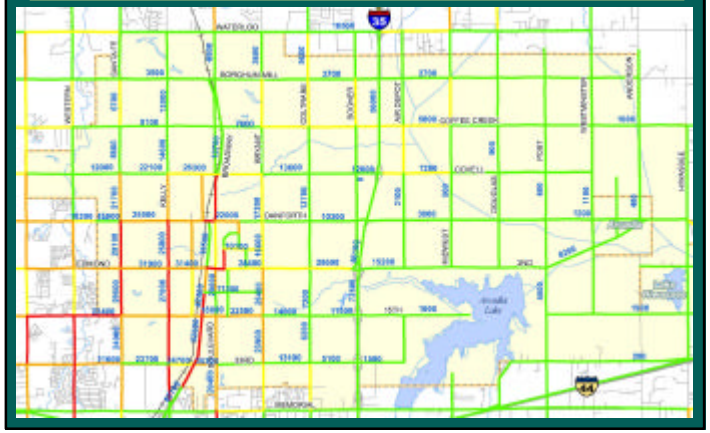
Future 2030 Scenario 2 Volumes and LOS



Scenario 3 – East/West Access to I-35



Future 2030 Scenario 3 Volumes and LOS



Scenario Comparison

- Measures of Effectiveness (MOEs):
  - VHT – Vehicle Hours Traveled
  - VMT – Vehicle Miles Traveled

Scenario Comparison: VHT

	VHT	% Difference from E+C
E+C	63,239	
Scenario 1	61,240	- 3.2%
Scenario 2	60,341	- 4.6%
Scenario 3	60,577	- 4.2%

Scenario Comparison: VMT

	VMT	% Difference from E+C
E+C	2,404,745	
Scenario 1	2,448,163	+ 1.8%
Scenario 2	2,407,098	+ 0.1%
Scenario 3	2,402,714	- 0.1%

Additional Scenarios

- Results of Fixed Guideway Study;
- Bicycle/Pedestrian Improvements;
- Comments from Public; and,
- Comments from City Council.

Next Steps

- Advisory Committee Workshop No. 3;
- Recommend Transportation Plan;
- Submit Draft and Final Reports; and,
- Travel Demand Model Training with City Staff.

Your Turn . . .

- Please provide input to the City of Edmond regarding potential solutions.

- You can provide input by:
  1. Completing a Comment Form; and/or
  2. Send an email to: edmondtransportationplan@chguernsey.com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