TOWN OF SHADY SHORES
PLANNING AND ZONING COMMISSION
REGULAR SESSION
MARCH 10, 2022; 7:00 PM
SHADY SHORES COMMUNITY CENTER
101 S. SHADY SHORES ROAD
SHADY SHORES, TX 76208

AGENDA

TO VIEW THE MEETING LIVE: https://shadyshorestx.civicclerk.com/

1. CALL TO ORDER

2. ROLL CALL
   Establish a quorum

3. REGULAR BUSINESS
   1. Minutes- Consider and act on approval of the minutes of the November 4, 2021 and the February 10, 2022 Planning and Zoning Commission Meeting Minutes.

4. WORKSESSION
   1. 1. Review of the Town of Shady Shores Parking Ordinance
      2. Review of the Town of Shady Shores Zoning Map and discussion
      3. Review of the Town of Shady Shores Thoroughfare Map.

5. FUTURE AGENDA ITEMS

6. ADJOURN

I, _____, _____ of the Town of Shady Shores do hereby certify that the above notice of the Planning and Zoning Commission was posted on the bulletin board at the Community Center, 101 S. Shady Shores Road, Shady Shores, Texas on _____ Day of _____, _____, at _____ _____.M.

IN ADDITION, A QUORUM OF CITY COUNCIL MEMBERS MAY CHOOSE TO ATTEND THE PLANNING AND ZONING MEETING POSTED ABOVE. THEREFORE, THIS IS NOTICE OF A CITY COUNCIL MEETING AT THE SAME TIME AND PLACE, WITH THE SAME AGENDA AS THE P&Z MEETING. IN THE EVENT A QUORUM OF COUNCIL IS PRESENT AT THE MEETING, NO ACTION OF THE COUNCIL WILL BE TAKEN. THIS NOTICE IS POSTED AT THE TIME STATED ABOVE.

_____
Wendy Withers, Town Secretary

AGENDA MEMORANDUM

DATE: March 10, 2022

TO: Planning and Zoning Commission

FROM: Wendy withers, Town Administrator

SUBJECT: **Minutes- Consider and act on approval of the minutes of the November 4, 2021 and the February 10, 2022 Planning and Zoning Commission Meeting Minutes.**

BACKGROUND/INFORMATION:

FINANCIAL IMPLICATIONS:

RECOMMENDATION/ACTION DESIRED:

ATTACHMENTS/SUPPORTING DOCUMENTATION:

1. 11042021PZMINUTES
2. PZ Minutes 02.10.2022

REVIEWED BY:

SHADY SHORES PLANNING AND ZONING COMMISSION
SPECIAL CALLED MEETING
NOVEMBER 4, 2021; 7:00 PM
SHADY SHORES COMMUNITY CENTER
101 S. SHADY SHORES ROAD
SHADY SHORES, TX 76208

MINUTES

MEMBERS PRESENT

Josh Juve	Chairman	Present
Rebecca Morgan	Vice-Chairman	Present
Paul Brown	Commissioner	Present
Frank Graham	Commissioner	Present
Nathan Abato	Commissioner	Present
Randall DuPape	Commissioner-Alternate	Present
Michael Young	Commissioner-Alternate	Present

Staff Present: Wendy Withers, Town Administrator; Amber Schuler, Deputy Town Secretary; Katie Klein, Community Relations Admin, Jim Shepherd, Town Attorney; Richard Arvizu, Town Engineer
Bill Emsoff; Council Liaison

1. CALL TO ORDER

   The meeting was called to order at 7:00 pm.

2. ROLL CALL

   Establish a quorum

   The roll was called and quorum was established for the record.

3. REGULAR BUSINESS

   1. Minutes- Consider and act on approval of the minutes of the October 14, 2021 Planning and Zoning Commission and the September 2, 2021 Special Called Planning and Zoning Commission meeting minutes.

Josh Juve made a motion to approve the minutes of the September 2, 2021 and the October 14th 2021 Planning and Zoning Commission Meeting. Frank Graham seconded the motion.

Discussion: None
Ayes: Brown, Abato, Graham,Juve, Morgan
Nays: None
The motion passed unanimously.

2. Election of Chairman- Consider and act on nominating and electing a member to serve as the Chairman of the Planning and Zoning Commission.

Frank Graham made a motion to appoint Josh Juve to serve as the Chairman of the Planning and Zoning Commission. Nathan Abato seconded the motion.

Discussion: None
Ayes: Brown, Morgan, Abato, Graham, Juve
Nays: None
The motion passed unanimously.

3. Election of Vice-Chairman- Consider and act on electing a member to serve as the Vice-Chairman of the Planning and Zoning Commission.

Paul Brown made a motion to approve Rebecca Morgan to serve as the Vice-Chairman of the Planning and Zoning Commission. Frank Graham seconded the motion

Discussion: None
Ayes: Brown, Morgan, Abato, Graham, Juve
Nays: None
The motion passed unanimously.

4. Public Hearing- Conduct a public hearing relative to a request made by ECM Development for a preliminary plat of 30 acres in the subdivision to be known as Lakeshore Bluffs; more legally described as 30 acres in the JC Bullard Survey Abstract 1566 TR 6A (204 Dobbs Road) .

Frank Graham noted that he would be abstaining from any discussion relative to the proposed project as he lived on property that was adjacent to the subject property..

A) Staff Presentation-

Richard Arvizu- Town Engineer gave his comments and recommendations

B) Open Public Hearing- The public Hearing was opened
C) Applicant
Nikki Moore was present on behalf of ECM Development and addressed changes that had been made to the plat as a result of suggestions made by residents and the Town Council.

D) Those in Favor of the Request

No one spoke in favor of the request.

E) Those Opposed to the Request

Judy Graham from 314 S Shady Shores Road, asked if the Developer would consider changing the name of Bluewood Road because there is another street with the same name in the area.

Phillip Groves from 324 S Shady Shores Road, asked questions about the trees, sidewalks, wildlife in the pond and also explained that he believes people are trespassing on his property to perform the survey on Dobbs Road.

F) Rebuttal if Desired- None
G) Close Public Hearing The Public hearing was closed at 7:45 pm.

TJ Moore, representing ECM Development discussed the scope of the project.

5. Action Regarding Public Hearing- Consider and act on approval of a request made by ECM development for approval of a preliminary plat to be known as Lakeshore Bluffs; more legally described as 30 acres in the JC Bullard Survey Abstract 1566 TR 6A (204 Dobbs Road) .

Rebecca Morgan made a motion to recommend approval of the preliminary plat submitted by ECM Development. Paul Brown seconded the motion.

Discussion: None
Ayes: Brown, Morgan, Abato, Juve
Nays: None
Abstain: Frank Graham abstained from voting.

The motion passed unanimously.

4. FUTURE AGENDA ITEMS

5. ADJOURN

The meeting adjourned at 8:05 p.m.

PASSED AND APPROVED THIS THE _____ DAY OF _____, 2022

APPROVED:

_____
Josh Juve, Chairman

ATTEST:

_____
Wendy Withers, Town Administrator/Secretary

SHADY SHORES PLANNING AND ZONING COMMISSION
FEBRUARY 10, 2022; 7:00 PM
REGULAR SESSION
SHADY SHORES COMMUNITY CENTER
101 S. SHADY SHORES ROAD
SHADY SHORES, TX 76208

MINUTES

MEMBERS PRESENT

Josh Juve	Chairman	Present
Rebecca Morgan	Vice-Chairman	Present (Virtual)
Nathan Abato	Commissioner	Absent
Paul Brown	Commissioner	Absent
Frank Graham	Commissioner	Present
Randall DuPape	Commissioner-Alternate	Present
Michael Young	Commissioner-Alternate	Absent

Staff Present: Wendy Withers, Town Administrator; Amber Schuler, Deputy Town Secretary; Katie Klein, Community Relations Admin, Jim Shepherd, Town Attorney; Bill Emsoff- Councilmember Liaison

1. CALL TO ORDER
   Chairman Josh Juve called the meeting to order at 7:00 pm.

2. ROLL CALL
   Establish a quorum
   Chairman Juve called the roll and a quorum was established for the record.

3. REGULAR BUSINESS

   1. Minutes- Consider and act on approval of the minutes of the November 4, 2021 Planning and Zoning Commission meeting.
      The minutes of the last meeting were tabled.

4. WORKSESSION

   1. Conduct a worksession relative to future discussion topics for the Planning and Zoning Commission.
      Commissioners conducted a worksession relative to future work projects:

It was agreed that the Planning and Zoning Commission would begin to review the Land Use Plan and the Thoroughfare Plan and begin discussions about future designations. In addition the group will review parking and open space storage for the Zoning Ordinance.

Commissioner Frank Graham stated he would like to discuss a Tree Care Ordinance.

5. FUTURE AGENDA ITEMS

6. ADJOURN

Randall DuPape made a motion to adjourn. Rebecca Morgan seconded the motion. The meeting was adjourned at 7:46 pm.

PASSED AND APPROVED THIS THE _____ DAY OF _____, 2022.

APPROVED:

_____
Josh Juve, Chairman

ATTEST:

_____
Wendy Withers, Town Administrator/Secretary

AGENDA MEMORANDUM

DATE: March 10, 2022

TO: Planning and Zoning Commission

FROM: Wendy withers, Town Administrator

SUBJECT:
1. Review of the Town of Shady Shores Parking Ordinance
2. Review of the Town of Shady Shores Zoning Map and discussion
3. Review of the Town of Shady Shores Thoroughfare Map.

BACKGROUND/INFORMATION:

Parking Ordinance Issues- In 2017, the Planning and Zoning Commission made a recommendation to the Town Council regarding parking on vacant lots in the Town of Shady Shores. Code Enforcement Officer Char Dupree has made a recommendation that the Ordinance be reviewed for ***parking and outside storage restrictions for vacant lots. Per the current ordinance,*** only motor vehicles are prohibited from parking on vacant lots. This leaves it open for property owners to park trailers, campers and other materials on vacant property. The result is, these properties become open storage areas that reduce property values and often become unsightly. A copy of the current parking Ordinance is attached.

Commissioners agreed at the last meeting that there would be a review of the current Zoning Map and Thoroughfare plan for the Town of Shady Shores. A copy of each is attached. Vice Chairman Rebecca Morgan is working to provide an updated copy of the Zoning Map for your review.

FINANCIAL IMPLICATIONS:

RECOMMENDATION/ACTION DESIRED:

conduct a worksession and make recommendations to the Town Council for Ordinance updates.

ATTACHMENTS/SUPPORTING DOCUMENTATION:

1. ARTICLE_12_03_PARKING_
2. 2018-07-02 OFFICIAL Shady Shores Zoning & Sub-divisions Updated 2021-03-15
3. 2017-06-02 OFFICIAL Thoroughfare Plan Updated 2021-05-10
4. Denton County Thoroughfare Plan Map (PDF)
5. Denton County Thoroughfare Plan Final (PDF)

REVIEWED BY:

ARTICLE 12.03 PARKING*

Sec. 12.03.001 Definitions

For purposes of this article, the following words, terms, and phrases shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Motor vehicle, whether it be a passenger vehicle, truck, tractor or other motorized vehicle, as defined in the Texas Transportation Code.

Recreational vehicle means:

(1) A vehicle primarily designed as temporary living quarters for recreational camping or travel use, including a travel trailer, camping trailer, truck camper, and motor home.

(2) A boat, boat trailer, personal watercraft, and similar equipment.

(Ordinance 254-3-2013, sec. 1, adopted 5/6/13)

Sec. 12.03.002 Penalty

Any person, firm or corporation (collectively referred to as “person”) violating any of the provisions of this article shall be subject to the penalty as provided herein, and upon conviction shall be punished by a fine not to exceed the sum of five hundred dollars ($500.00) for each offense, and each and every day such violation shall continue shall be deemed to constitute a separate offense. (Ordinance 254-3-2013, sec. 9, adopted 5/6/13)

Sec. 12.03.003 Parking of recreational vehicles in right-of-way

It shall be unlawful for the owner, occupant or person in charge of property zoned for residential district uses to permit the parking, standing or storing of recreational vehicles within the right-of-way of any town or county street or highway located within the municipal limits of the town. (Ordinance 254-3-2013, sec. 2, adopted 5/6/13)

Sec. 12.03.004 Parking of certain vehicles prohibited in residential zones

(a) It shall be unlawful to park or stand the following vehicles upon property zoned for residential district uses, or any street, alley or public or private property adjacent to such property:

(1) Box-truck, box-van, tow-truck, dump truck, concrete-mixing truck, road tractor, truck tractor, tractor trailer, semi-tractor, truck equipped with a boom or platform or similar vehicles.

(2) Motor vehicle, truck, van, bus or similar vehicle which is more than 23 feet in length, eight feet in width or ten feet in height.

(b) This section does not prohibit the parking of any of the vehicles listed in subsections (a)(1) and (2) above for the purpose of expeditiously loading or unloading passengers, freight or merchandise, a recreational vehicle, as defined in section 12.03.001, that is parked or stored in accordance with said section, or the storage of vehicles customary and incidental to the operation of a school or child care center.

(Ordinance 254-3-2013, sec. 3, adopted 5/6/13)

Sec. 12.03.005 Parking of trailers in right-of-way

(a) Definitions. For purposes of this section, the following words, terms and phrases shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Trailer means a vehicle without means of motivation and designed to be towed, hauled or pulled by a motor vehicle.

(b) Prohibition. It shall be unlawful for the owner, occupant or person in charge of property zoned for residential use to permit the parking, standing or storing of a trailer on public right(s)-of-way.

(c) Exceptions. This section does not prohibit the temporary parking of a trailer for the purpose of expeditiously loading or unloading freight or merchandise, or a recreational vehicle as defined in section 12.03.001 that is parked or stored in accordance with that section, or the storage of trailers customary and incidental to the operation of a school.

(Ordinance 254-3-2013, sec. 4, adopted 5/6/13)

Sec. 12.03.006 Overnight parking on public street

No motor vehicles, tractors, trailers, boats, recreational vehicles, or motor home shall be parked on a public street or road easement at any time between the hours of 1:00 a.m. through 5:00 a.m. on any day of a week. Said motor

vehicles, tractors, trailers, boats, recreational vehicles, or motor home need not be parked on the public street continuously between the hours of 1:00 a.m. through 5:00 a.m. to be in violation of this section. (Ordinance 254-3-2013, sec. 5, adopted 5/6/13; Ordinance 289-03-2016 adopted 3/14/16)

Sec. 12.03.007 Parking junked or abandoned motor vehicle on street or street easement

Junked or abandoned motor vehicles shall not be parked on a public street or street easement at any time. (Ordinance 254-3-2013, sec. 6(A), adopted 5/6/13)

Sec. 12.03.008 Parking of motor vehicles in the front yards of developed lots, and in vacant lots

(a) Findings of fact.

(1) The foregoing recitals are incorporated into this section by reference as findings of fact as if expressly set forth herein.

(2) The parking of automobiles, including light trucks, commercial vehicles, box trucks, semi-tractor and other trucks of greater than a half ton payload designation, hereinafter referred to as “motor vehicles” in this section, can lower property values, reduce the appearance of the neighborhood and thereby lower the quality of life within the town; justifying reasonable limitations on the parking of motor vehicles in the front yards of residential properties, and undeveloped lots.

(b) Regulations for parking; definitions. The following words, terms, and phrases, when used in this section, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Front yard. That area of a developed lot between the front building line and the nearest to the front building line of the following:

(1) The front property line.

(2) The outside edge (closest to the residence) of the drainage bar ditch.

(3) The curb.

(4) The edge of the surface of the road closest to the residence.

Such area being bounded on each side by the property lines on each side of the front yard.

Residence. A dwelling structure on a platted or lot described by metes and bounds of an area equal to or greater than one fourth acre, and not more than one acre.

Undeveloped lot. A tract of land on which a dwelling has not been constructed, and a dwelling is not under construction.

(c) Parking regulations; penalties; exceptions.

(1) The parking of a motor vehicle in the front yard is prohibited and a violation of this code, unless the vehicle is parked in compliance with the following requirements:

(A) Parked in the front yard on an all-weather surface in good condition, such surface being of asphalt, concrete, gravel, crushed limestone, or other similar surface acceptable to the city building inspector.

(B) The all-weather surface must not cover more than 20% of the front yard, as measured by the square footage of the front yard as defined in this section. The 20% area includes the driveway and all other impervious and all-weather surfaces in the front yard.

(C) The all-weather surface parking area must be contiguous and accessed by the driveway of the residence.

(2) Exceptions. The parking regulations above do not apply to:

(A) Lots of less than one fourth acre, or larger than one acre.

(B) Recreational vehicles - except as regulated elsewhere in this municipal code.

(3) Undeveloped lot. No parking of motor vehicles is permitted on an undeveloped lot.

(Ordinance 312-02-2018 adopted 2/12/18)

Sec. 12.03.009 Parking at the town hall

(a) Tractors, trailers, boats, recreational vehicles, or motor homes shall not be parked on the parking lot or grounds at Shady Shores Town Hall, 101 South Shady Shores, Shady Shores, TX (the “town

hall"), at any time of the day or night. An exception to the rule is granted for such vehicles and trailers parked at town hall during regular business hours, during which the driver/owner/occupant of the vehicle is in the town hall on business with the town.

(b) Passenger cars, vans, or light trucks may not be parked on the parking lot or grounds at town hall between the hours of 1:00 a.m. and 5:00 a.m. on any night without previously applying and receiving a permit to do so. The failure to obtain and display the permit on the vehicle while parked during those hours is a violation of this section. Permits are issued in the discretion of the city staff based on the anticipated public uses of the parking lot the day before or after the requested overnight parking. There is no charge for a permit.

(c) No motor vehicle or trailer may be parked on the parking lot or grounds of town hall at any time which is placed there for the purpose of displaying the motor vehicle or trailer for sale or rent.

(Ordinance 319-10-2018 adopted 10/8/18)

Sec. 12.03.010 Parking prohibitions

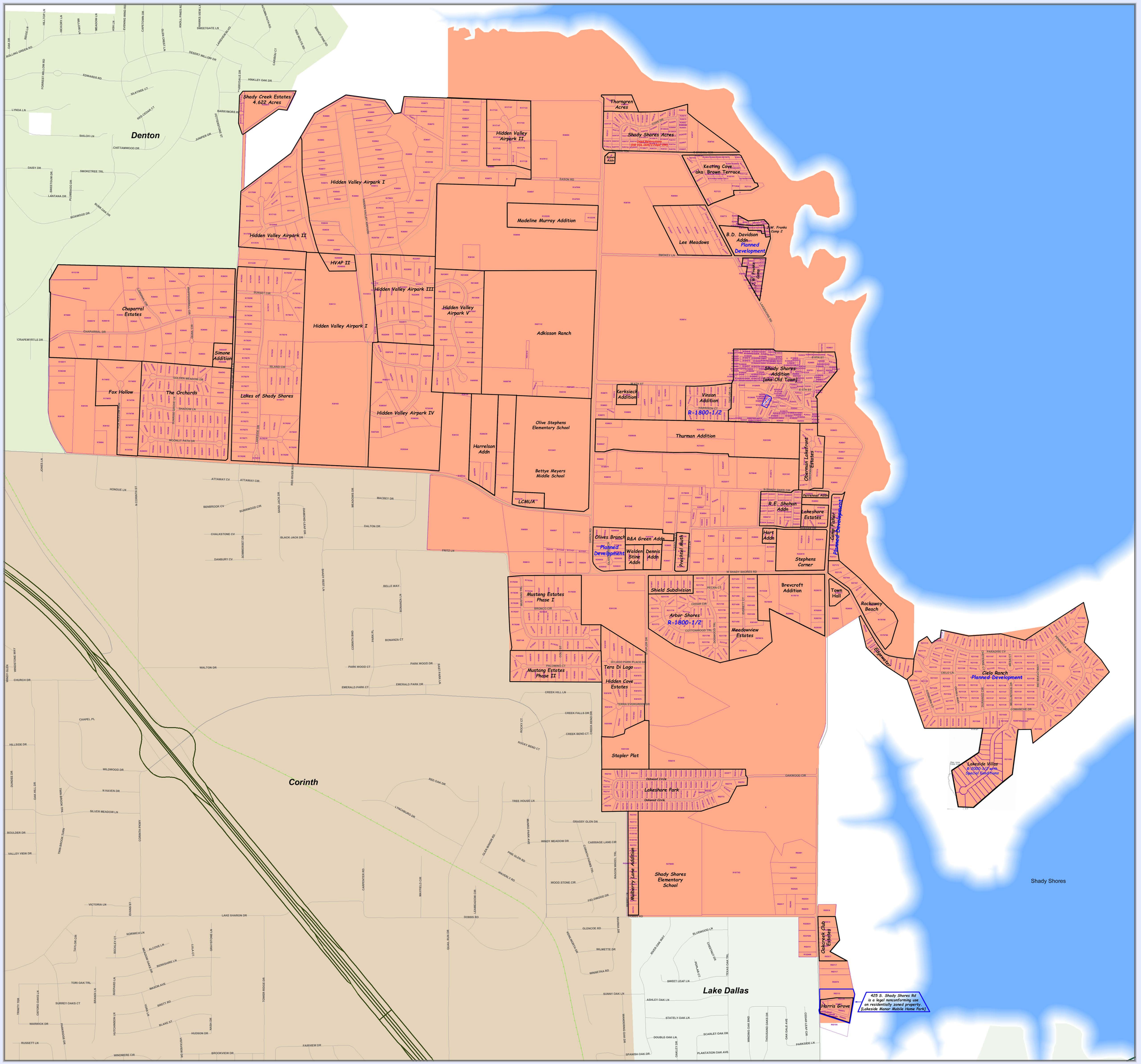
(a) Lakeshore Drive. No parking is permitted at any time in the right-of-way of Lakeshore Drive from the intersection of Oberman Lane and Lakeshore Drive to the intersection of Coe Road and Lakeshore Drive.

(b) Garza Road. No parking is permitted at any time in the right-of-way of Garza Road from the intersection of Brown Terrace and Garza Road northward on Garza Road to the end of Garza Road.

(Ordinance 336-07-2020 adopted 7/13/20)

DENTON COUNTY

Shady Shores - Zoning Map



SHADY SHORES
TEXAS

All properties located within the limits of the Town of Shady Shores, Texas are zoned R-2000-1/2 unless otherwise indicated

Zoning Districts:

R 1350-1
R 1500-3/4
R 1800-1/2
R 2000-1/2
H 1200-4300
Planned Development

On the 13th Day of August In The Year 2018
This Document Was Approved As
The Official Zoning Map of
The Town of Shady Shores
by These Representatives.

TOWN OFFICIALS

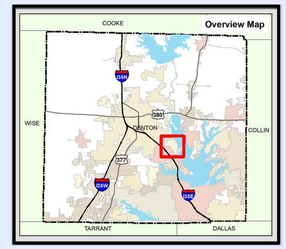
Cindy Aughinbaugh, Mayor
Paula Woolworth, Mayor Pro-tem,
Alderman Place 2
Matthew Haines, Alderman Place 1
Tom Newell, Alderman Place 3
Jack Nelson, Alderman Place 4
Charles Grimes, Alderman Place 5
Wendy Withers, Town Secretary
Jim Shepherd, Town Attorney

PLANNING & ZONING COMMISSIONERS

Allen Lea, Chairman, Place 4
Rebecca Morgan, Vice Chairman, Place 2
Paul Brown, Place 1
Tom Spencer, Place 3
Tillman Strahan, Place 5
Linda Winter, Alternate

ANNEXATION ORDINANCES

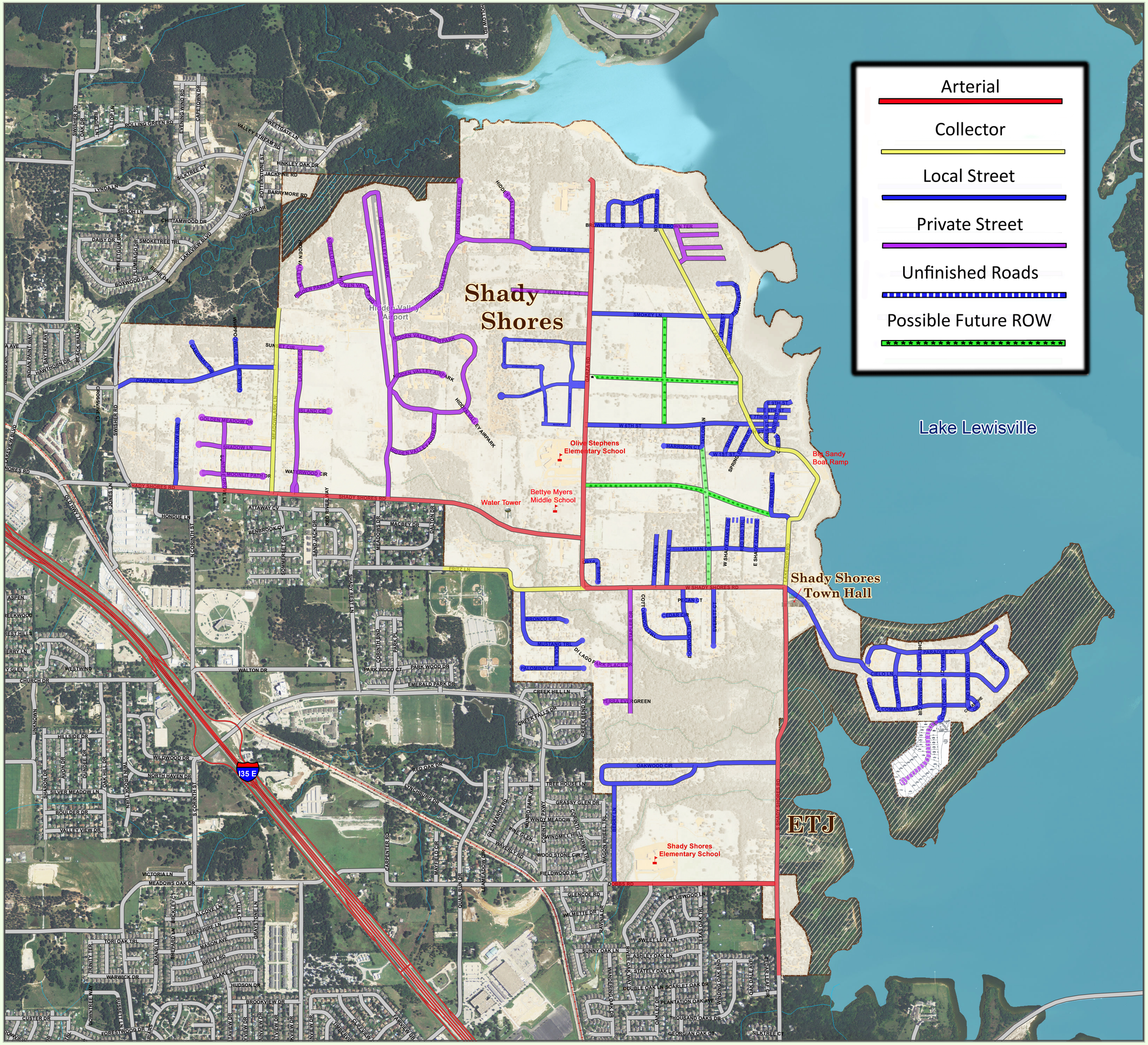
# 3	(11-08-1960)
#22	(10-13-1970)
#26	(05-11-1971)
#27	(06-08-1971)
#28	(06-28-1971)
#29	(10-17-1971)
#31	(12-14-1971)
#33	(06-12-1973)
#36	(08-14-1973)
#39	(11-18-1974)
#74	(10-17-1983)
#122-98-24	(01-24-1998)
#125-99	(08-11-1999)
#126-8-99	(08-11-1999)
#145-10-2002	(10-07-2002)
# 341-11-2020	(11-09-2020)



N
W E
S
1 inch = 0.1 mile

Zoning & Sub-division information on Map Created by Rebecca Morgan

THE TOWN OF SHADY SHORES, TEXAS


Shady Shores
Hidden Valley Airport
Lake Lewisville
ETJ
Olive Stephens Elementary School
Bettye Myers Middle School
Water Tower
Shady Shores Town Hall
Shady Shores Elementary School
Big Sandy Boat Ramp
SHADY SHORES RD
W SHADY SHORES RD
S SHADY SHORES RD
I35 E
CHAPARRAL DR
HIDDEN VALLEY AIRPARK
SMOKEY LN
W 6TH ST
HARRISON CT
BROWN TER
DASON RD
GARZA RD
SPRING CREEK RD
ROLLING GREEN RD
LAKEVIEW BLVD
WALTON DR
DOBBS RD
OAKWOOD CIR
TERRA LEVER GREEN
CREEK HILL LN
CREEK FALLS DR
MEADOWS OAK DR
VICTORIA LN
FIELDWOOD DR
WOOD STONE CIR
WINDY MEADOW
WINDMILL HILL
GLENCOE RD
SWEET LEAF LN
SUNNY OAK LN
ASHLEY OAK LN
STATELY OAK LN
DOUBLE OAK LN
SCARLET OAK DR
PLANTATION OAK AVE
THOUSAND OAKS DR
GEORGIAN OAK CT
SILKTREE CT
PARADISE CV
CIELO LN
COMANCHE DR
CHEROKEE TRL
APACHE TRL
SIOUX TRL
CHEYENNE TRL
MUSTANG TRL
BRONCO CIR
PALOMINO CT
DI LAGO PARK PLACE DR
CEDAR DR
PERRY CT
EVERETT CT
SHAHAN DR
W SHAHAN DR
E SHAHAN DR
CARGILL LN
OLIVE DR
HOLLOW RD
HIDDEN VALLEY AIRPARK
HIDDEN VALLEY RD
HIDDEN VALLEY PL
HIDDEN VALLEY CIR
HIDDEN VALLEY LN
HIDDEN VALLEY PLACE
HIDDEN VALLEY TRL
HIDDEN VALLEY TERRACE
HIDDEN VALLEY TERRACE CT
HIDDEN VALLEY TERRACE DR
HIDDEN VALLEY TERRACE PL
HIDDEN VALLEY TERRACE TRL
HIDDEN VALLEY TERRACE WAY
HIDDEN VALLEY TERRACE CIR
HIDDEN VALLEY TERRACE LN
HIDDEN VALLEY TERRACE PLACE

DENTON COUNTY TEXAS

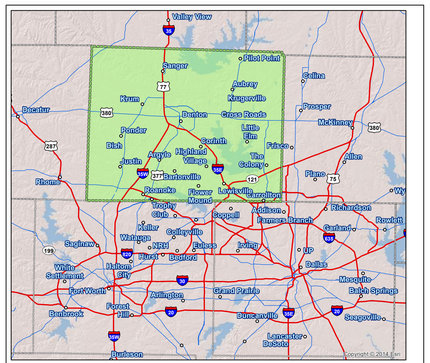
Denton County Thoroughfare Plan

Approved: April 18, 2017

LEGEND

Road Types

- Freeway/Highway
- Toll Road
- Principal Arterial 6 Lane Divided (120' to 160' ROW)
- Principal Arterial 4 Lane Divided (100' to 120' ROW
- Major Arterial 6 Lane Divided (120' to 140' ROW)
- Major Arterial 4 Lane Divided (100' to 120' ROW)
- Minor Arterial 4 Lane Undivided / 3 Lane (80' to 100' ROW)
- One-way Couplet (Lanes and ROW vary)
- Minor Arterial 2 Lane (70' ROW)
- County Line
- Airport
- Rail Line
- Lakes
- 1-Percent Flood Risk Zones (FEMA)



Relationship to the Region

0 0.5 1 2 3 4 Miles

FREESE AND NICHOLS

Denton County Thoroughfare Plan

Adopted: April 18, 2017

Order No.: 17-0309

FREESE AND NICHOLS

TABLE OF CONTENTS

CHAPTER 1. BASIS FOR THE PLAN 1

Purpose of the Plan 1

Current Transportation Plans Influencing Denton County 1

CHAPTER 2. TRANSPORTATION NETWORK NEEDS 7

County Demographics and Growth 7

Transportation Framework 12

Planned Transportation Improvements in Denton County 16

Existing Roadway and Bridge Conditions 18

Forecast Transportation Conditions 20

Thoroughfare Plan Needs 25

CHAPTER 3: TRANSPORTATION SYSTEM PLAN 27

The Denton County Thoroughfare Plan Network 27

Functional Street Classifications and Typical Capacities 35

Recommended Roadway Design Standards 37

Thoroughfare Design Considerations 44

APPENDICES

A. City and Adjacent County Thoroughfare Plans

B. Case Study: Outer Loop

ACKNOWLEDGEMENTS

County Commissioners Court

The Honorable Mary Horn, County Judge

The Honorable Hugh Coleman, Commissioner Precinct 1

The Honorable Ron Marchant, Commissioner Precinct 2

The Honorable Bobbie J. Mitchell, Commissioner Precinct 3

The Honorable Andy Eads, Commissioner Precinct 4

Innovative Transportation Solutions (ITS)

John Polster, President

Claud Elsom, P.E.

Consultant: Freese and Nichols

Edmund Haas, AICP, Project Manager

Kevin St. Jacques, P.E., PTOE, PTP

Staron Faucher, AICP

David Paine, PTP

Stan Lynch, P.E.

CHAPTER 1. BASIS FOR THE PLAN

Purpose of the Plan

The Thoroughfare Plan serves as guide for the identification and implementation of long-range transportation investments in Denton County. Based on projected needs of the county, this plan has been coordinated with other locally adopted municipal plans and adjacent counties and regional transportation agencies. Because the thoroughfare plan guides the preservation of rights-of-way needed for the development of long-range transportation system improvements, it has far-reaching implications for the growth and development of urban and rural areas.

Reference Document for Land Use and Transportation Growth – The thoroughfare network is one of the most visible elements of public service experienced by travelers – be it on foot, bicycle, or behind the wheel. Thoroughfare networks are a relatively permanent framework for county-wide growth. As development occurs, it becomes increasingly difficult to make changes to the thoroughfare network without significant cost and disruption. This long-range plan establishes the framework for thoroughfare system implementation, and it allows private development to continue at its own pace, individuals to make independent choices, and infrastructure to be placed when it is needed. Through advance planning for identification and preservation of corridor rights-of-way, communities and stakeholders are able to develop strategies that maximize the relationship between land use and transportation.

Guidance Document for Transportation Network Development – Development of the transportation network at the county and regional level involves many partners over an extended period of time to plan, fund, design and implement roadway improvements. This document will be used to facilitate coordination and support decisions between Denton County, cities, the Texas Department of Transportation (TXDOT), North Central Texas Council of Governments (NCTCOG), and other regional partners and is meant to be used in combination with other locally adopted planning documents in Denton County and adjacent counties. This plan also reflects other existing local and regional plans and considers current and projected needs and county goals for network connectivity and continuity.

Current Transportation Plans Influencing Denton County

Denton County recognizes that, by not having a county-wide thoroughfare plan in place, continued growth and development may encroach on needed transportation corridors and, hence, may result in the possible displacement of businesses or homes in order to meet the county's long-range mobility needs. This plan identifies the general location and sizing of major thoroughfares and, thus, serves as a notification to the public on intended corridor implementation. The development of a connected county-wide thoroughfare network, capable of supporting long-range growth and development, is the focus of this planning study.

TxDOT and NTTA Facilities in Denton County

Denton County is traversed by a network of regional roadways developed and managed by TxDOT and North Texas Tollway Authority (NTTA), as shown in **Figure 1-1**. Denton County has collaborated with TxDOT and NTTA over the years to provide for regional and countywide conveyance of traffic and access to Denton County destinations.

Figure 1-1. TxDOT and NTTA Major Roadways in Denton County

Adjacent County Thoroughfare Plans

Denton County adjoins Dallas, Tarrant, Wise, Cooke, Grayson, and Collin Counties. Dallas and Tarrant Counties to the south are mostly encompassed by cities and have a long history of transportation planning and implementation. Their roadway network is maturing and improvements to roadways and major arterials have been planned to accommodate the planned growth. Wise County to the west and Cooke and Grayson Counties to the north are sparsely developed with a dispersed network of major roadways. Collin County to the east is rapidly developing with an emerging grid-type network throughout most of the county. Critically important are access points with the Dallas North Tollway (DNT) and connectivity with other established roadway corridors.

Metropolitan Transportation Plan

The North Central Texas Council of Governments (NCTCOG) has compiled the arterial roadway network from the available city thoroughfare plans within its eight member counties into a 2035 Metropolitan Transportation Plan (MTP) for its regional transportation development and funding coordination efforts, as depicted in Figure 1-2. However, the MTP is financially constrained and thus includes only those facilities that can be implemented by the horizon year.

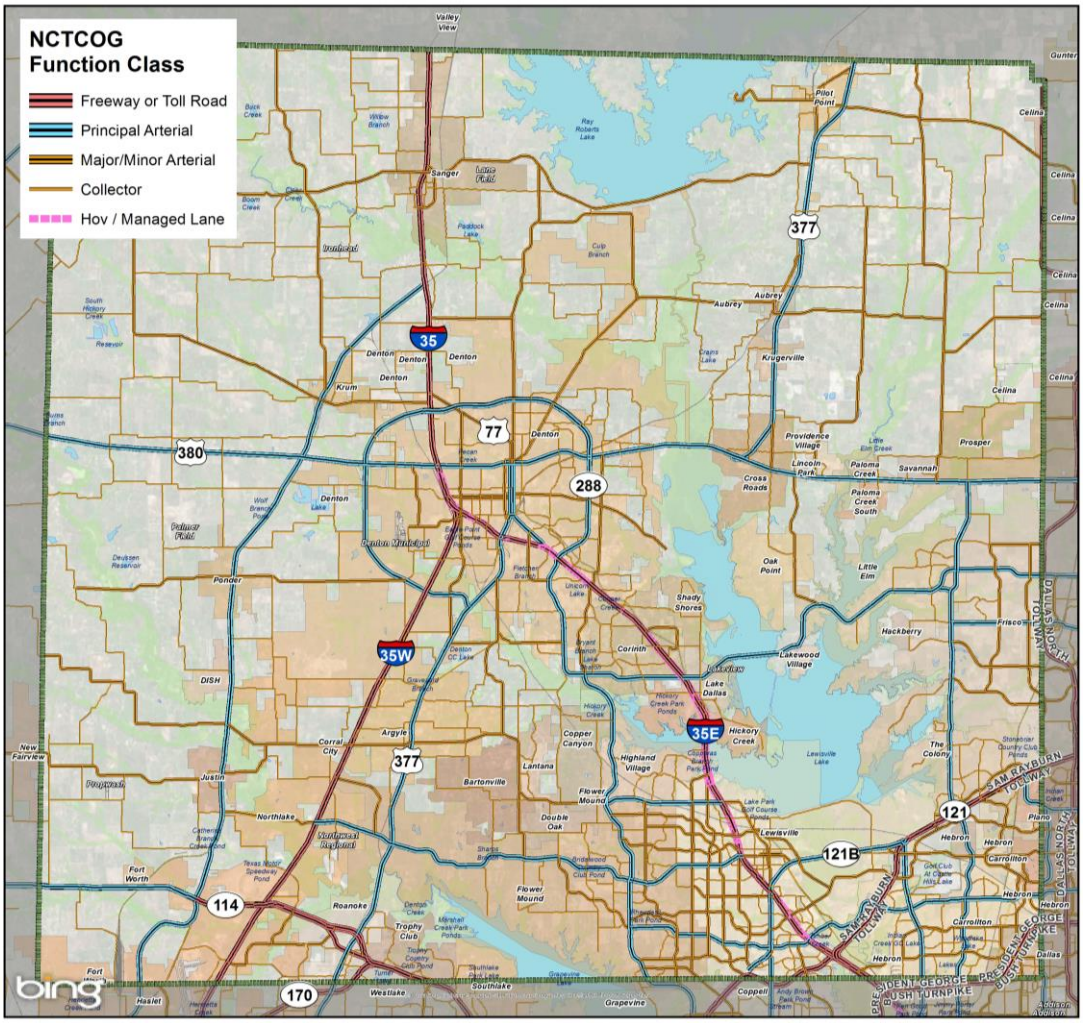


Figure 1-2. NCTCOG 2035 Model Representation of Major Roadways in Denton County

City Thoroughfare Plans

Denton County includes 44 cities and towns, as represented in **Figure 1-3**, most with their own transportation plans. Thus, a number of existing localized transportation plans were compiled to create the Denton County Thoroughfare Plan. The list of the plans incorporated into the Denton County plan are included in **Appendix A** and include current city and adjacent county transportation plans, future land use and development plans, transit agency plans, and the metropolitan transportation plan. Adjoining major cities have coordinated their thoroughfare plans over the years. However, since the county does not currently have an officially adopted thoroughfare plan, the smaller and remote cities and unincorporated areas of the county lack a coordinated system of roadways that provide for area mobility for the future.

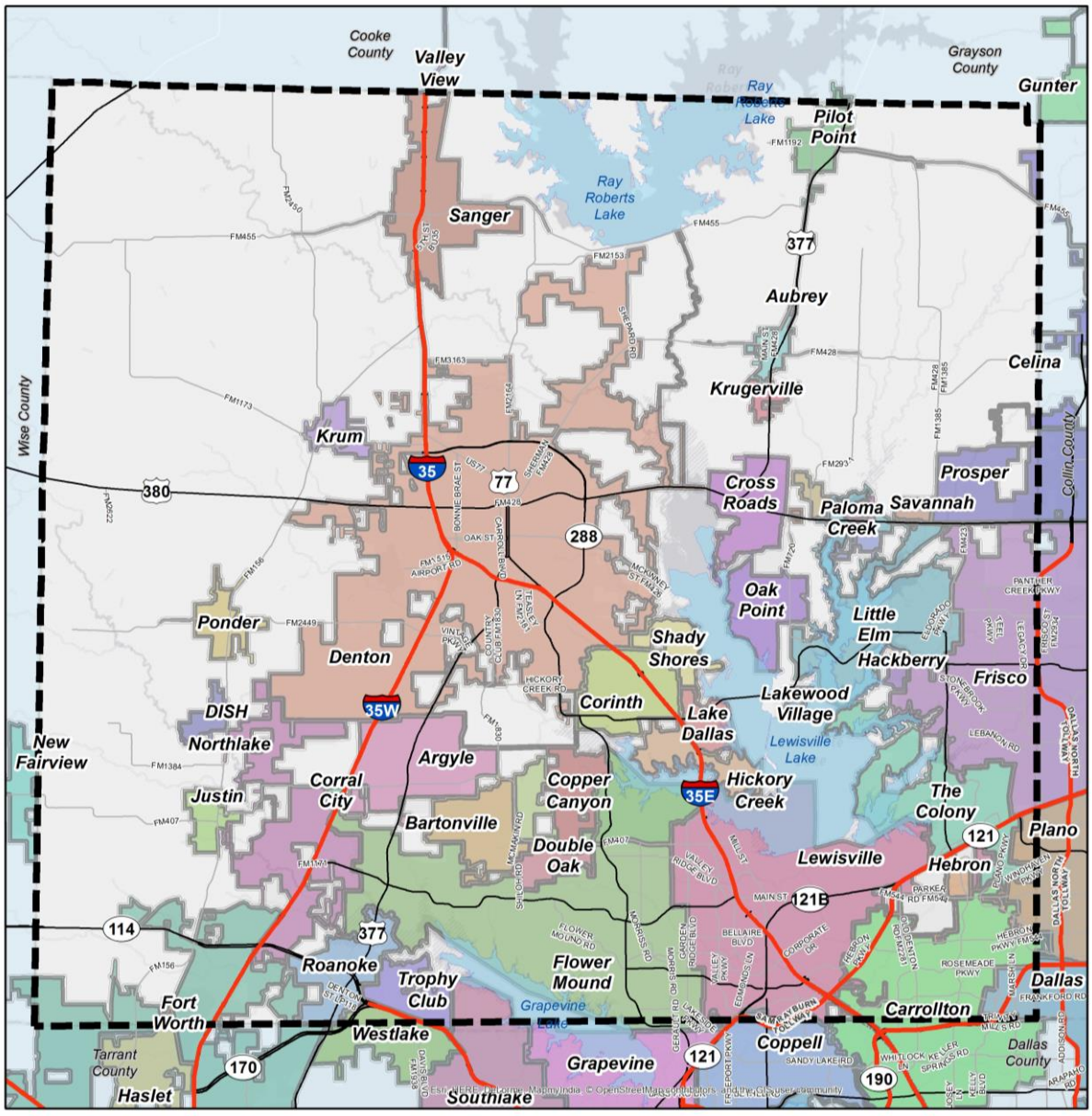
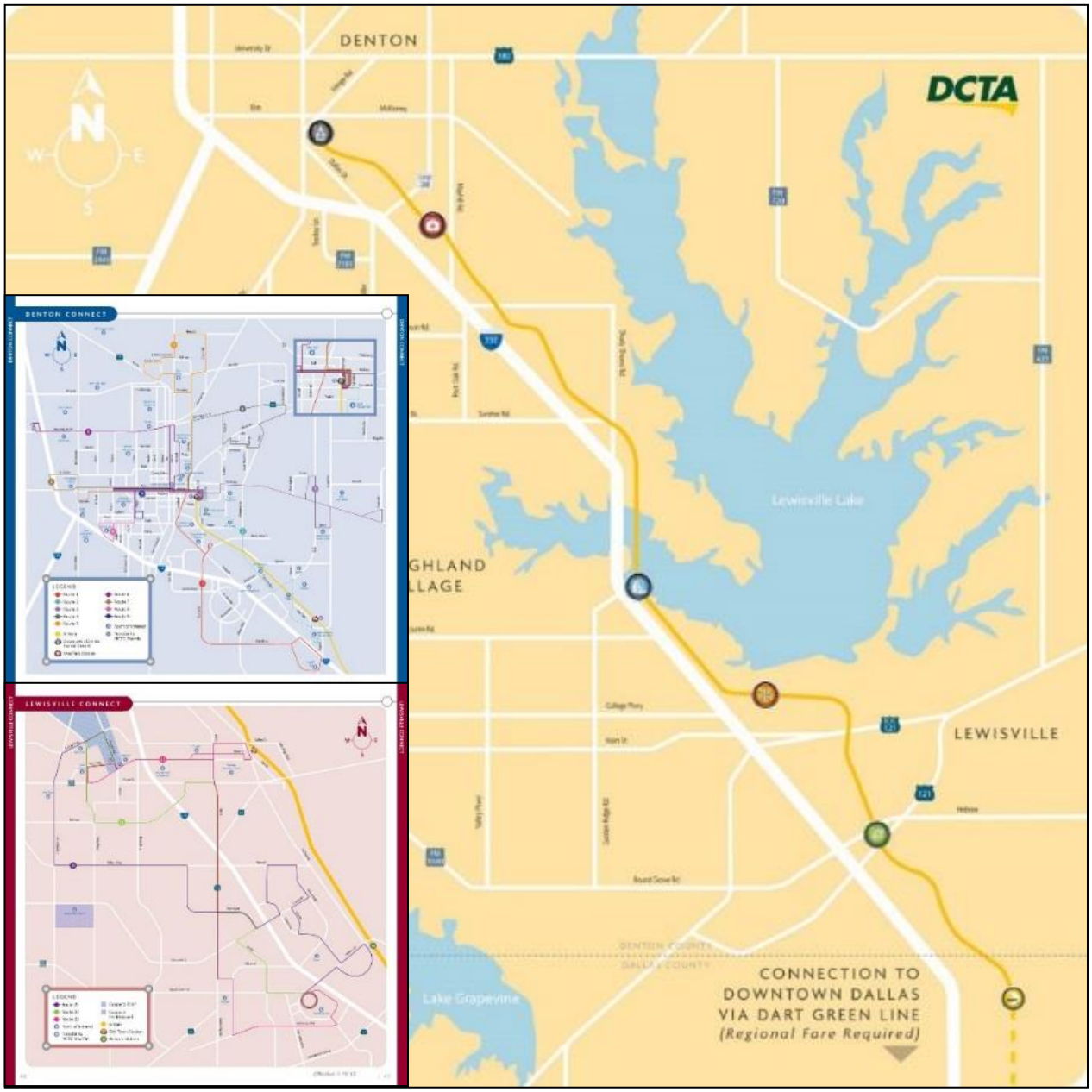


Figure 1-3. Referenced City Thoroughfare Plans within Denton County

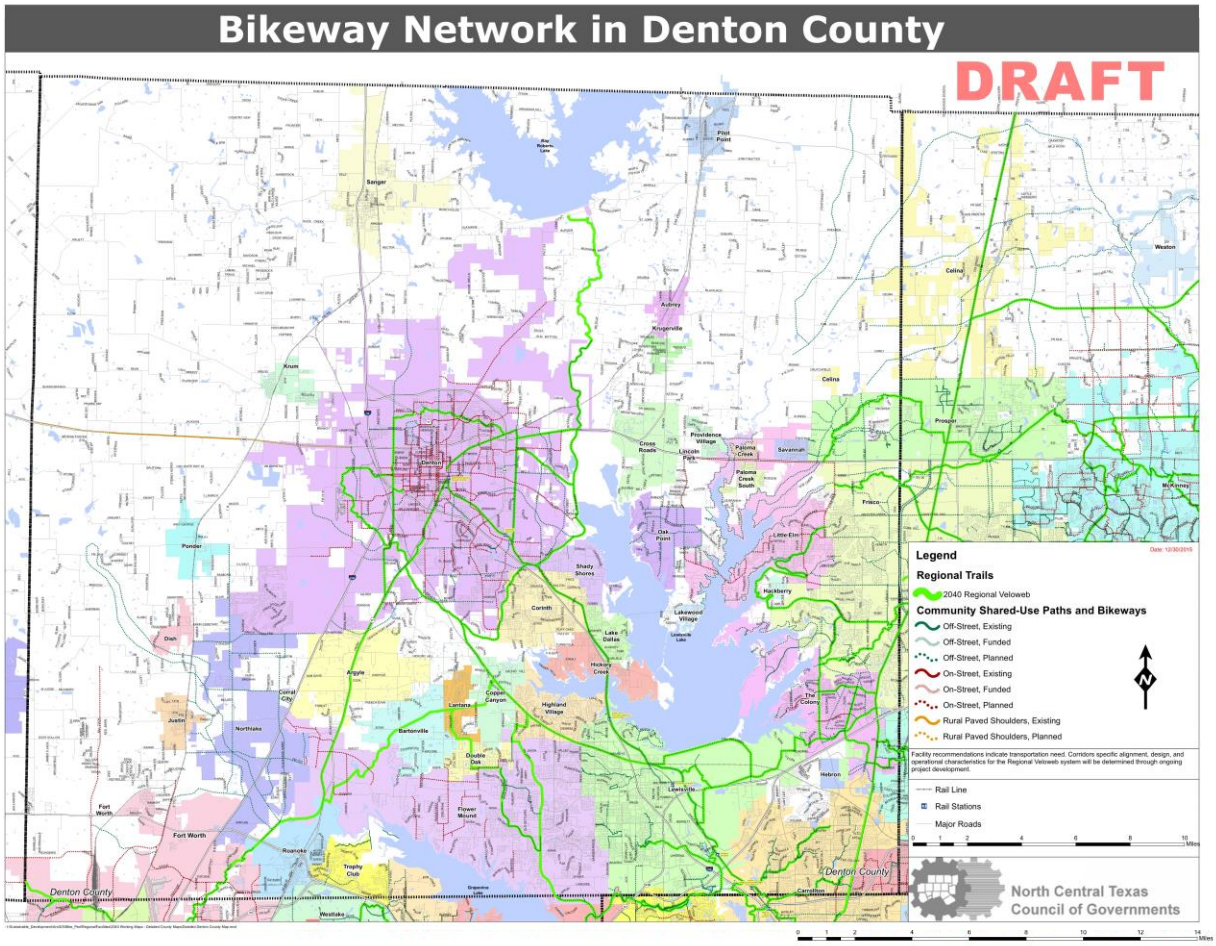
DCTA Transit Plan

The Denton County Transit Authority (DCTA) develops and manages the plan for public transportation services in Denton County. Services include the commuter rail service "A Train" (pictured below), fixed route bus services in the cities of Denton and Lewisville and surrounding service areas, and demand responsive services throughout the county. **Transit planning is not part of the focus of this Denton County Thoroughfare Plan**, though bus transit issues are generally considered in its development.



City and Regional Bicycle and Pedestrian Plans

The City of Denton and other cities within Denton County have developed localized area plans for bicycle and pedestrian off-street trails and on-street bikeways. The North Central Texas Council of Governments has compiled the plans from the local agencies into a regional veloweb of trails that connect the cities in the Metroplex. **Bicycle and pedestrian planning is not a focus of this Denton County Thoroughfare Plan**, though some on-street bicycling issues are considered in its development.



CHAPTER 2. TRANSPORTATION NETWORK NEEDS

Suburban communities of healthy and successful metropolitan areas are constantly challenged to accommodate emerging growth in economic and development activity, within an existing and planned transportation network.

County Demographics and Growth

NCTCOG projections for the North Central Texas region as a whole indicate continued significant growth, with the population forecasted to increase from about 6.5 million in 2010 to about 9.8 million persons by 2035, a compound annual growth rate (CAGR) of 1.89% over 20 years. The corresponding employment in North Central Texas is expected to increase from 4.2 million to 6.2 million employees (1.76% CAGR) during the period.

Within Denton County, the population is projected to increase from 714,000 persons in 2015 to 1,050,000 persons in 2035 as shown in **Table 2-1**. During that period, employment is anticipated to increase from 250,000 to 410,000 employees. These estimates represent compound annual growth rates of 1.9% for population and 2.5% for employment. The 2040 socio-demographic data for the county and region will soon be concurred by the NCTCOG regional partners but were not available for the preparation of this plan.

Table 2-1. Population Growth Trends in Denton County

Select Cities [T]	2035 Household Population	Population Growth Rate*	2035 Employment	Employment Growth Rate*
Denton	150,000	1.2%	100,000	1.7%
Flower Mound	90,000	1.6%	30,000	3.2%
Frisco	158,000	2.8%	60,000	2.2%
Lewisville	130,000	1.0%	77,000	1.8%
The Colony	41,000	1.3%	12,000	2.5%
Denton County	**1,050,000**	**1.9%**	**410,000**	**2.5%**

*Compound annual growth rate calculated using base population, employment from 2005 data. The population of Denton County in 2015 was reported to be 714,000.
[T] Cities in the county with a population greater than 30,000 in 2010. Approximately 1/3 of Frisco is situated in Denton County.

According to the U.S. Census Bureau, Denton County has a total area of 953 square miles, of which 879 square miles is land and 74 square miles (7.8%) is water. Forty-four cities and towns have a portion of their area in the county, though several cities, such as Dallas and Ft. Worth, have only a very small portion in the county. Each of the cities can be expected to absorb a portion of growth projected, apportioned according to their market conditions and available zoning. With current land-use policy and projections, the majority of employment growth is expected to be absorbed by the five larger cities, as shown in Table 2-1. However, only half of the projected residential growth is anticipated to be located in these larger cities. The remaining half of the residential development will be located in smaller communities such as Little Elm, Sanger, Aubrey, Argyle, and surrounding areas in Denton County.

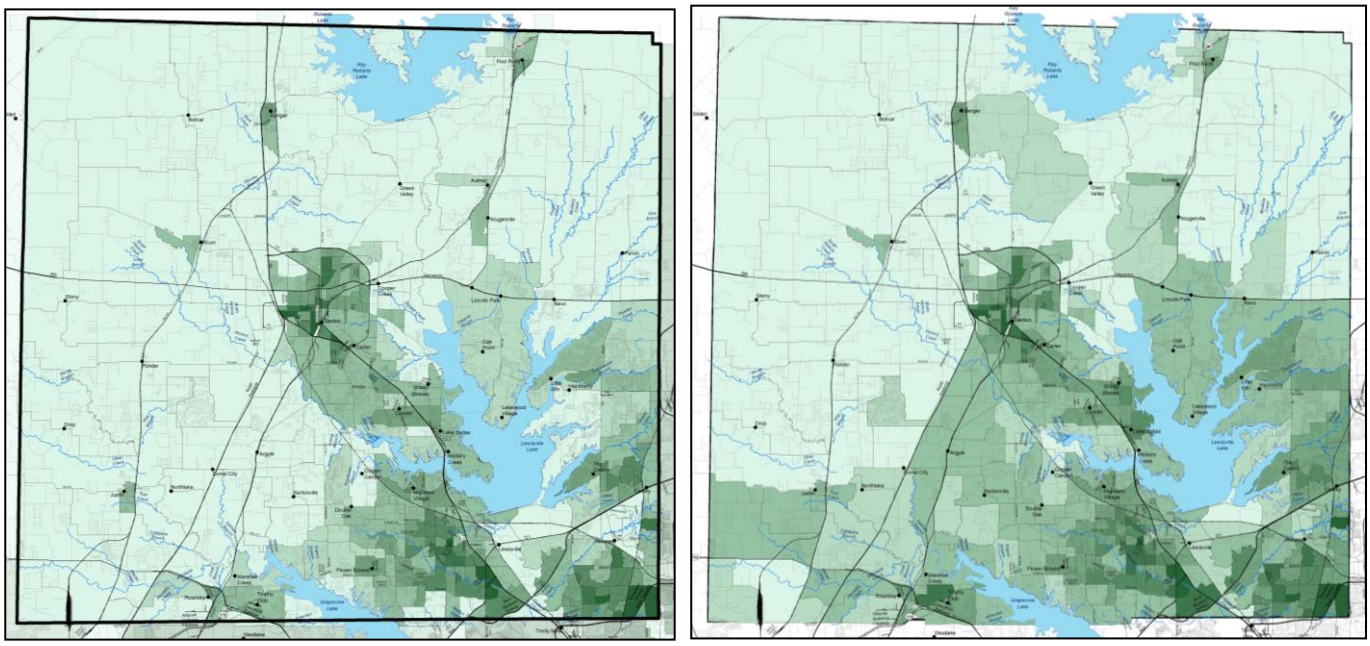
Residential

The NCTCOG population density (people per square mile) in 2013 and projections from the 2035 MTP, are shown in the two panels of **Figure 2-2**. A comparison of the two images shows the anticipated change residential density in the county, and indicates that growth and densification will continue to expand into Denton County, from the more urban and developed area in the south and southwest to growth in central and north Denton County, with some densification along the I-35E and I-35W corridors.

The darker bands of green highlight the changes in density and illustrate the patterns and potential challenges of suburban growth in the coming 20 years. To accommodate this growth, improvements to existing facilities and expansion of the network will be needed.

2013 Population Density

2035 Population Density



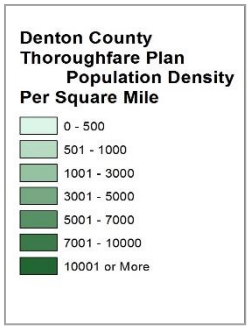


Figure 2-2. Population Density in 2013 and in 2035

2. TRANSPORTATION NETWORK NEEDS

A review of the population mapping of net population growth from 2013 to the regional forecast estimates for 2035, is shown in **Figure 2-3.** An assessment of the mapping of 20-year forecast of net population growth indicates that:

- The northeast segment of the county and southwest quadrant are anticipated to see more significant residential development, though still at suburban densities of about 2 dwellings to the acre.
- The northwest and west sectors of the county are projected to remain rural, with a density of less than one dwelling per acre, but with some community development in clusters. Portions of Denton County sit atop the Barnett Shale, a geological formation believed to contain large quantities of natural shale gas. Between 1995 and 2007, the number of natural gas wells in the county increased from 156 to 1,820, which has relegated the western portion of Denton County less desirable for residential development.

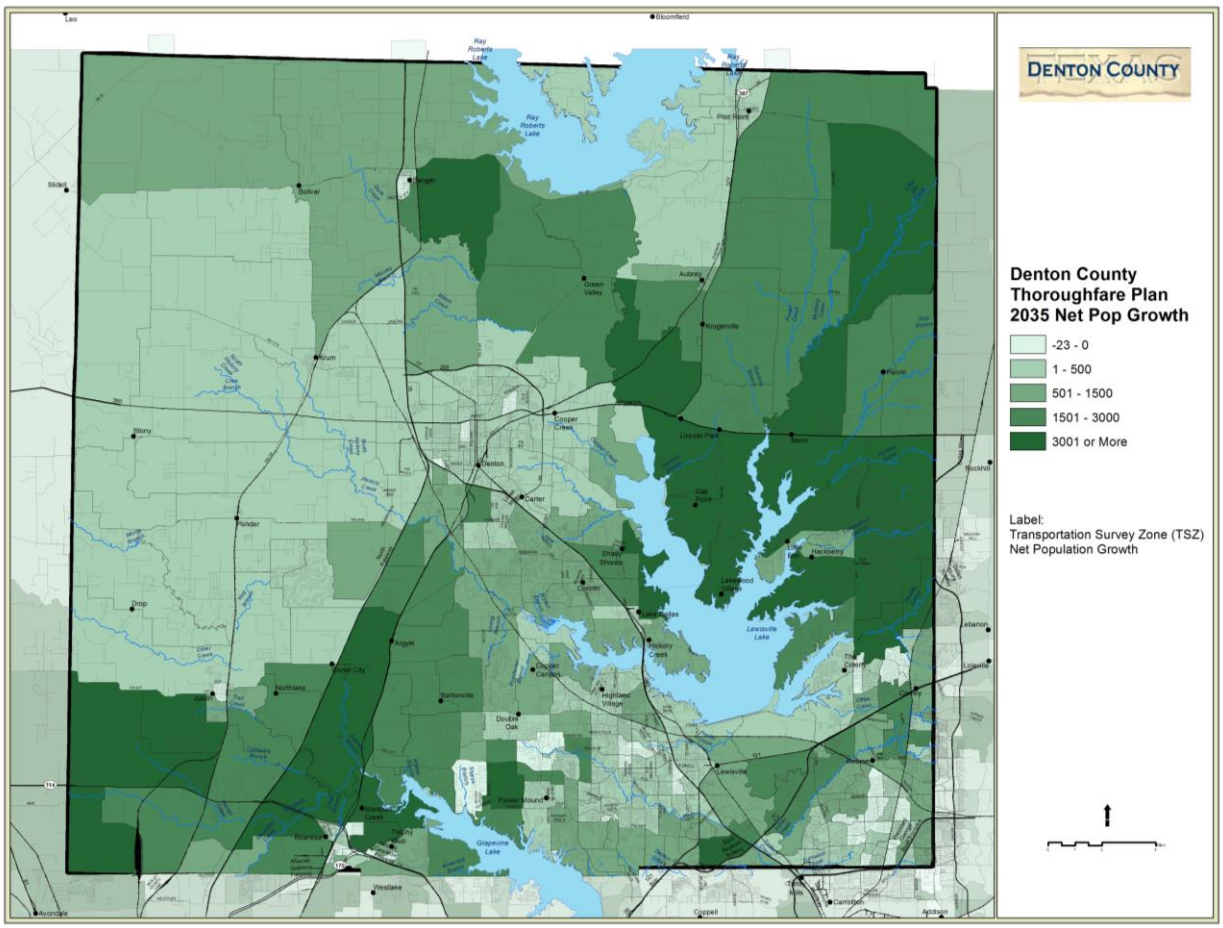


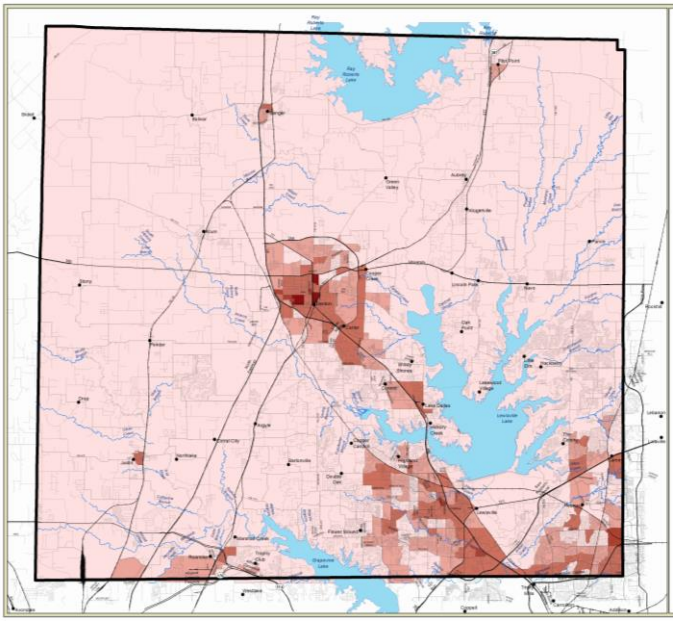
Figure 2-3. Net Increase in Population 2013-2035

Employment

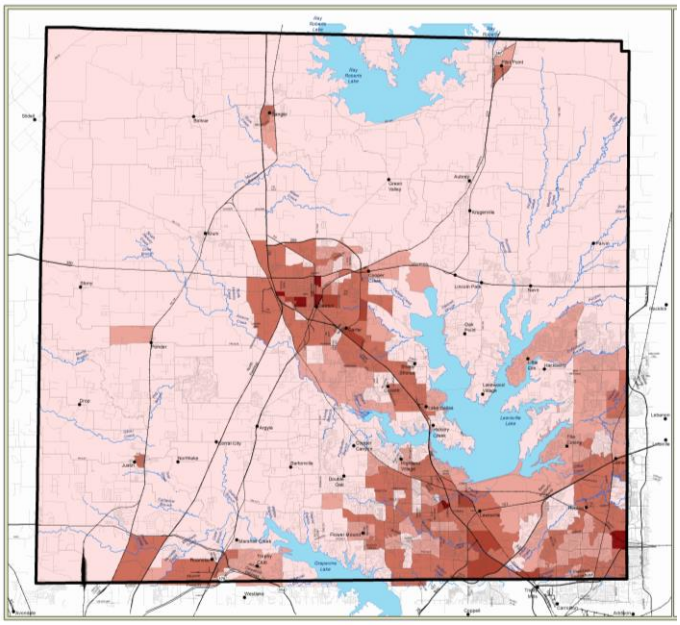
The NCTCOG employment projections from the 2035 MTP are depicted in the side-by-side comparison of the two panels of **Figure 2-4**. The approximately 160,000 net increase in jobs forecast for Denton County over the next 20 years is expected to be distributed across the county. Some concentration will take place along the I-35W and I-35 corridor, as shown in the middle panel, with additional clusters of more dense employment in the southeast sector of the county, west Denton, and the area near Alliance Airport and the BNSF Railway Intermodal Facility.

The darker bands of red highlight the densification of employment in currently developed areas and illustrate the pattern of suburban growth. Together, these maps indicate the areas that will be experiencing the greatest growth in employment in the coming 20 years. To accommodate this growth, improvements to existing facilities and expansion of the network will be needed.

2013 Employment Density



2035 Employment Density



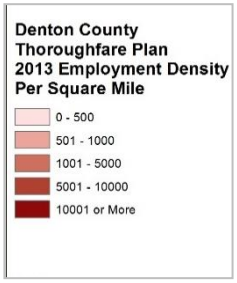


Figure 2-4. Employment Density in 2013 and in 2035

A review of the mapping of the net employment growth forecast, from 2013 to the regional estimates for 2035, is shown in **Figure 2-5**. The mapping indicates that:

- The southeast quadrant of the county and center of Denton are anticipated to remain focal points for commercial development.
- A concentration of employment is expected to fill in along the I-35W and Sam Rayburn Tollway corridors.
- New employment centers are emerging in the area along I-35W in northern Fort Worth near Alliance Airport and the BNSF Railway Intermodal Facility.
- A major new employer, the Nebraska Furniture Mart in The Colony, added to the intensity of employment in the southeastern quadrant of Denton County.

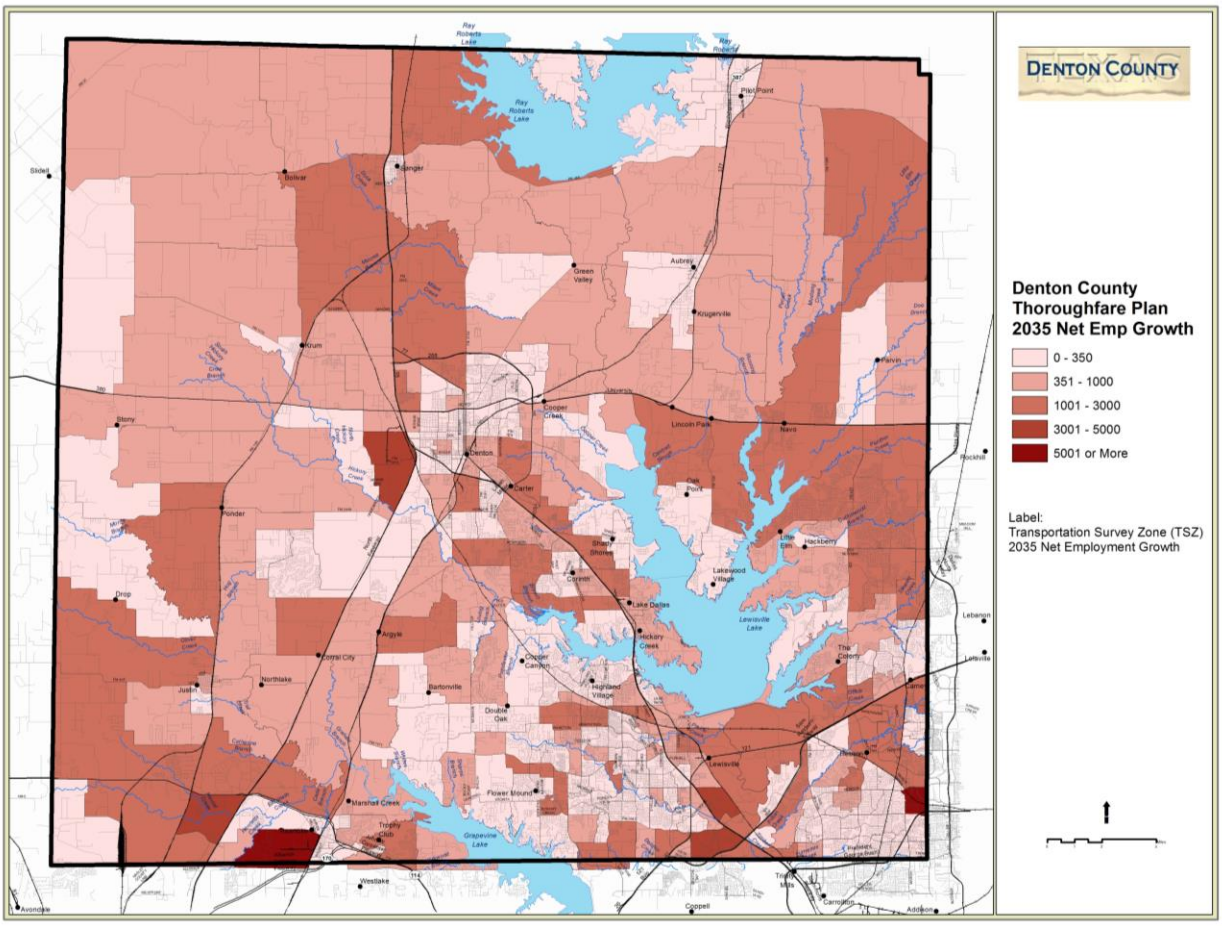


Figure 2-5. Net Increase in Employment 2013-2035

Transportation Framework

Denton County has a vast roadway network spanning approximately 525 centerline miles and provides access through a dynamic mix of rural and urban contexts throughout the county and adjacent areas. Density and context will be very important components of this thoroughfare plan as different jurisdictions within the county may have different levels of density planned within their limits. The key will be the development of a framework that efficiently accommodates all city thoroughfare plans and provides effective connectivity between incorporated and unincorporated areas. This section examines the existing roadway conditions within Denton County to identify network needs and deficiencies, develop solutions, and inform transportation policy decisions at the county level.

Functional Street Classification
The functional classification of streets is used to identify the hierarchy, function, and dimensions of a facility. The functional class designated for a street represents its ultimate function in the network over time. Functional class can be updated over time if surrounding land uses and traffic volumes change significantly. Population and land use densification may change the functional class of a roadway as the area becomes more urbanized and walkable. Streets and highways are grouped into classes based on facility characteristics, such as geometric design, speed, and traffic capacity.

Freeways, Tollways, and Managed Lanes - These higher speed, limited access roadways are regional, and interstate roadways are generally developed by TxDOT and NTTA to move high volumes of traffic expeditiously.

Principal and Major Arterials - Principal and major arterials are ideally designed to allow large volumes of traffic to operate at a high level of mobility. They are designed for longer distance trips within the region and provide access to major activity centers and adjacent cities within the county and region. The roadways should only connect to other principal arterials or freeways and should have a limited number of driveways directly accessing them. A principal arterial is often longer and has a more regional context than a major arterial and may include considerations for grade separations at major intersections.

Minor Arterials - Minor arterials connect traffic from collectors to arterials or between arterial roadways. They are designed to accommodate moderate traffic volume at relatively low speeds, and they often connect growth areas. In certain situations, minor arterials may accommodate on-street parking.

Collectors - Collector roads are designed for short trips and low speeds along their segments. They serve primarily to connect trips to higher functional class facilities, collecting traffic from local streets and taking it to the arterial street network, and the reverse.

Variation of Design Within Functional Classifications

In order to allow roadways to be designed within the context of their surroundings, the design of a roadway within any classification may vary along the length of the roadway corridor. Design standards also vary from city to city within Denton County as illustrated in **Table 2-2**. Since the Denton County Thoroughfare Plan incorporates the thoroughfare plan network from each city and ties them together, the variation in design standards of the various cities will need to be considered in the design guidelines contained within the County Thoroughfare Plan.

Table 2-2. Thoroughfare Classification Comparison of Cities in Denton

City Thoroughfares	ROW	Lanes	Median
Denton			
Primary Major Arterial	130-160	6	Yes
Secondary Major Arterial		4	Yes
Main street/ Mixed Use Collector	70	2	No
Commercial/ Mixed Use Center Collector	73	4	No
Residential Street	50	2	No
The Colony			
Major Arterial	140	8	Yes
Major Arterial	120	6	Yes
Major Arterial	100	6	Yes
Minor Arterial	100	4	Yes
Major Collector	80	4	No
Major Collector	60	4	No
Minor Collector	60	2	No
Local	50	2	No
Flower Mound			
Major Arterial	120	6	Yes
Greenway Major Arterial	120	4	Yes
Urban Minor Arterial	90-120	4	Yes
Urban Collector	60	2	No
Rural Collector	70	2	No
Local Residential Urban	50	2	No
Rural Residential	26	2	No
Lewisville			
Principal Arterial	120	6	Yes
Principal Arterial	100	4	Yes
Collector	80	4	No
Collector	60	2	No

Regional Roadway Context

Denton County is situated at the northern entry/exit of I-35 gateway to the North Central Texas Region, providing a dynamic land use and transportation context that transitions the region from urban to rural. The county's development context transitions from very urban in the south and southeast, to very rural in the north and northwest. The transition is fueled by the burgeoning influx of people moving into southeastern Denton County cities, such as The Colony and Frisco. The network of tollways, highways, and principal arterial roadways that connect Denton County to the rest of the Dallas-Fort Worth Metroplex is depicted in **Figure 2-6**.

Figure 2-6. Highway, Tollway and Regional Arterial Network in Denton County

North-South Mobility - The spine of Denton County's north-south transportation network is provided by I-35, which is split between I-35E and I-35W south of the City of Denton. I-35 conveys not only daily peak direction commutes to and from the activity cores of the major cities; but also it carries interstate and international trade routes. I-35E south of Denton is under construction to be improved from the current 4-lane freeway to provide six or more freeway lanes plus managed lanes in Denton County, in order to greatly improve its traffic operations. The Dallas North Tollway (DNT) runs north-south along the eastern border of Denton County and extends from the center of the City of Dallas to US 380, with planned expansion northward into Grayson County. US Highway 377 is a regional arterial roadway that runs parallel to I-35W, crosses I-35E, passes through the City of Denton, and then continues northward midway between I-35 and DNT/US 75 into Oklahoma. North-south mobility is somewhat constrained by Lake Lewisville, with I-35 and DNT providing the two major passageways into the major urbanized areas of Denton County. Dallas North Tollway (DNT) extends from Dallas northward to US 380. Its planned extension will run generally along the western edge of Collin County/eastern edge of Denton County.

East-West Mobility - East-west mobility in Denton County is significantly interrupted by Lake Lewisville, Lake Roberts, and Lake Grapevine. The Sam Rayburn Tollway (SH 121) provides a direct link from the east of the county to DFW Airport through the core of the urbanized area of the county and extends diagonally across the southeastern corner of Denton County south of Lake Lewisville. FM 1171 extends from I-35E south of Lake Lewisville and north of Lake Grapevine, and extends westward from I-35E passing through Lewisville and Flower Mound as a six-lane roadway to I-35W. US Highway 380 passes between Lake Lewisville and Lake Ray Roberts and extends across north Texas connecting across I-35, DNT, and US 75 as a four- and six-lane roadway. Approximately 10 years ago, a new toll bridge across Lake Lewisville was built, connecting FM 2181 at I-35E to El Dorado Parkway, which passes through Little Elm and connects to DNT in Frisco. The mobility constraint imposed by the three significant lakes constrain east-west connectivity between major north-south highways leading to few route alternatives and notable overloading of these major highways, particularly US 380.

Manmade Constraints to Thoroughfare Plan Development

The built environment within Denton County has a great influence on its transportation infrastructure, network, and functionality.

- The existing railroad corridors are significant constraints to development of the arterial and collector roadway network in sectors of Denton County.
- The existing freeways and tollways constrain the number of crossings to predominantly Principal and Major Arterial roadways, concentrating traffic to those locations.
- Pervasive natural gas well drilling activity constrains development in western Denton County, as well as the supporting roadway network.
- The land development in growing communities is placing restrictions on the advancement and improvement of the thoroughfare network.

Planned Transportation Improvements in Denton County

Transportation planning occurs regularly at the regional and county levels to address anticipated needs perceived by regional and county leaders. These plans have been utilized over the years to initiate transportation improvements in and around Denton County. Numerous pending and ongoing regional initiatives will continue to address the transportation needs in Denton County. The projects are represented in **Figure 2-7**.

Regional Initiatives

Dallas North Tollway Extension
The Dallas North Tollway (DNT) currently ends south of US 380 with service roads extending north of US 380. The initial planning and environmental assessments have been completed by NTTA for a proposed 17.6-mile extension of the DNT north from US 380 to the Denton/Collin/Grayson County lines (Phases 4A and 4B) and from the Denton/Collin/Grayson County lines to FM 121 (Phase 5A). The extension will be a limited access toll road, running generally along the border between Denton and Collin Counties to benefit both counties, with three main lanes and three frontage road lanes in each direction.

Interstate 35 Expansion
TxDOT is in the process of reconstructing I-35. Construction includes approximately 30 miles of freeway and HOV lanes on I-35E from I-635 north, through and including the I-35E/I-35W interchange, to US 380. The improved roadway will generally consist of 8 main lanes south of Corinth and 6 lanes north of Corinth. Additional improvements include new continuous frontage roads, two (2) reversible managed lanes, and a multi-use path. The Design-Build project is expected to relieve traffic congestion along one of the most heavily traveled corridors in the North Central Texas region.

US Highway 380
The portion of US 380 from FM 156 to the Denton/Wise county line was recently widened to a four-lane rural section by TxDOT; a widening of the section from SH 156 to I-35 to a six-lane divided urban section will soon be completed. The portion of US 380 from Bonnie Brae Road to US 377 is currently being widened from four to a six-lane urban divided roadway. Further studies of potential improvements on US 380 through Denton and Collin Counties are planned by TxDOT.

US Highway 377
Various improvements are currently underway along US 377 throughout Denton County. Among the programmed improvements are a six-lane railroad underpass, roadway widening from I-35E to SH 170, reconstruction, repairs, and operational improvements such as left-turn lanes and traffic signalization.

Regional Outer Loop
The concept for an outer loop north of US 380 has been considered regionally for many years. The most recent update to the Collin County Thoroughfare Plan includes the

Outer Loop as a tolled facility extending east from the DNT Extension. The road then extends east past US 75 before veering south into Rockwall County. The Outer Loop is also included in the most recent Rockwall County Thoroughfare Plan.

NCTCOG Transportation Improvement Program (TIP)

The NCTCOG TIP currently includes 178 roadway improvement projects within Denton County. The program also includes an additional 538 spot improvement or ITS projects. **Figure 2-7** illustrates the planned transportation improvements in relation to the existing thoroughfare network.

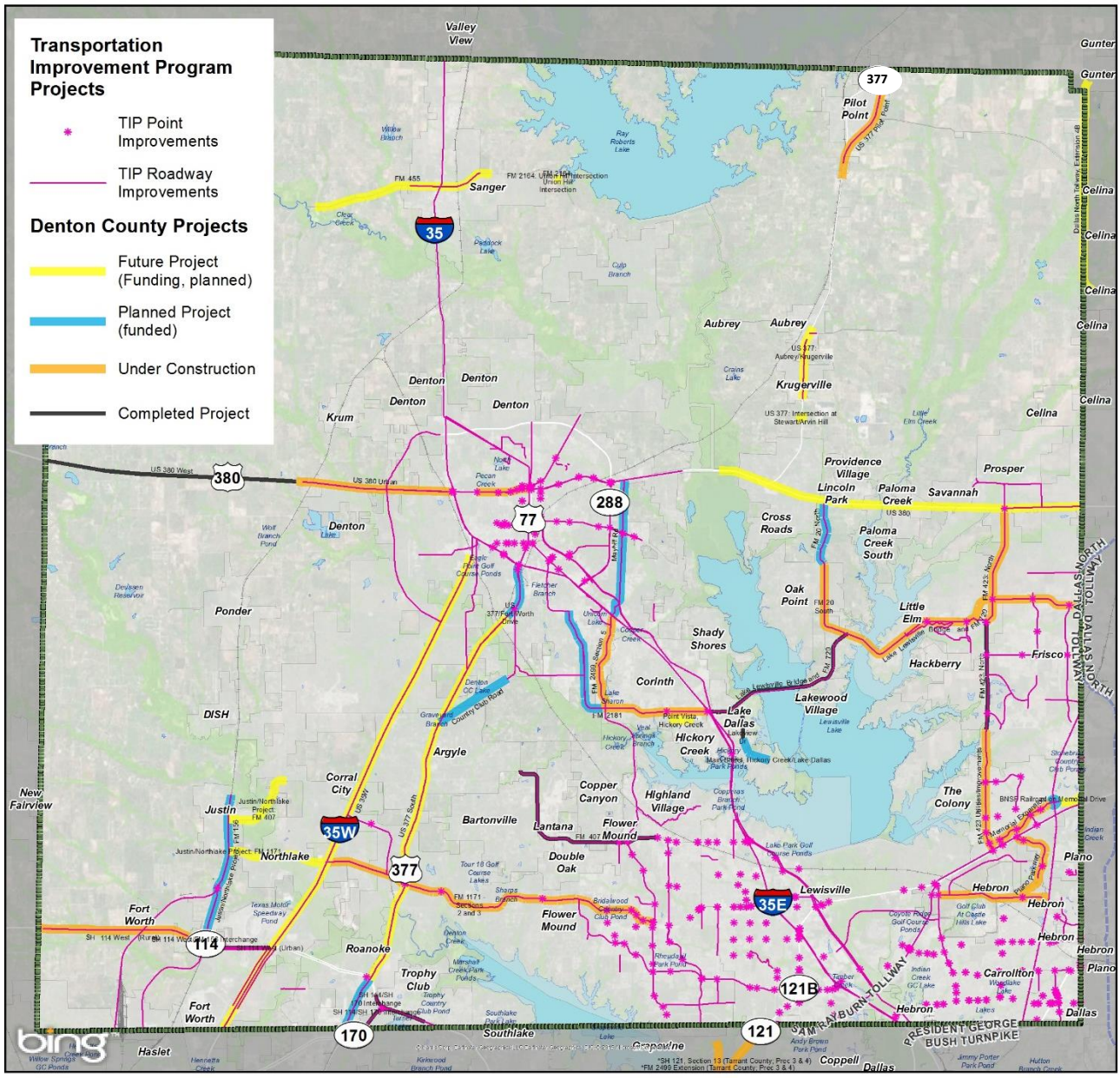


Figure 2-7. Regional Local and County Roadway Infrastructure Initiatives

County Level Initiatives

The Regional Transportation Improvement Program includes projects funded by TxDOT, counties, and local governments. Some Denton County projects are co-financed by the county and other agencies, such as TxDOT. Those projects included in the fiscally constrained 2035 MTP are depicted in Figure 2-7 by the red lines (roadway improvements or enhancements) and dots (intersection improvements) in red. The status of some recent and ongoing projects with county participation are also shown in the figure as being recently completed, under construction, in planning/design or planned/funded for the near future.

Existing Roadway and Bridge Conditions

Proper maintenance will keep a road or bridge in good operating condition for many years beyond a normal useful life of 40 years. Even with proper maintenance, the road or structure will eventually deteriorate to a level requiring reconstruction. This section provides an overview of pavement and bridge conditions. This information is used by county officials to help determine which facilities are in need of reconstruction.

Roadway Conditions

TxDOT conducts a visual survey of the surface condition of a majority of the functionally classified system every two to three years. The survey consists of observing the presence or absence of the following conditions: travel path cracking, patching, weathering, potholes, and edge cracking. The results, shown in **Figure 2-8**, indicate that the highway, principal and major arterial network had mostly acceptable pavement surface conditions in Denton County in 2015. Note that I-35E through Denton County, US 380 from I-35 to FM 156 and some other roadways were undergoing re-construction during this evaluation cycle. Notable roadways in poor condition in 2015 include: Portions of Josey Lane near Sam Rayburn Tollway and portions of Parker Road. Both of these roadways are currently programmed for improvement within the next 5 years.

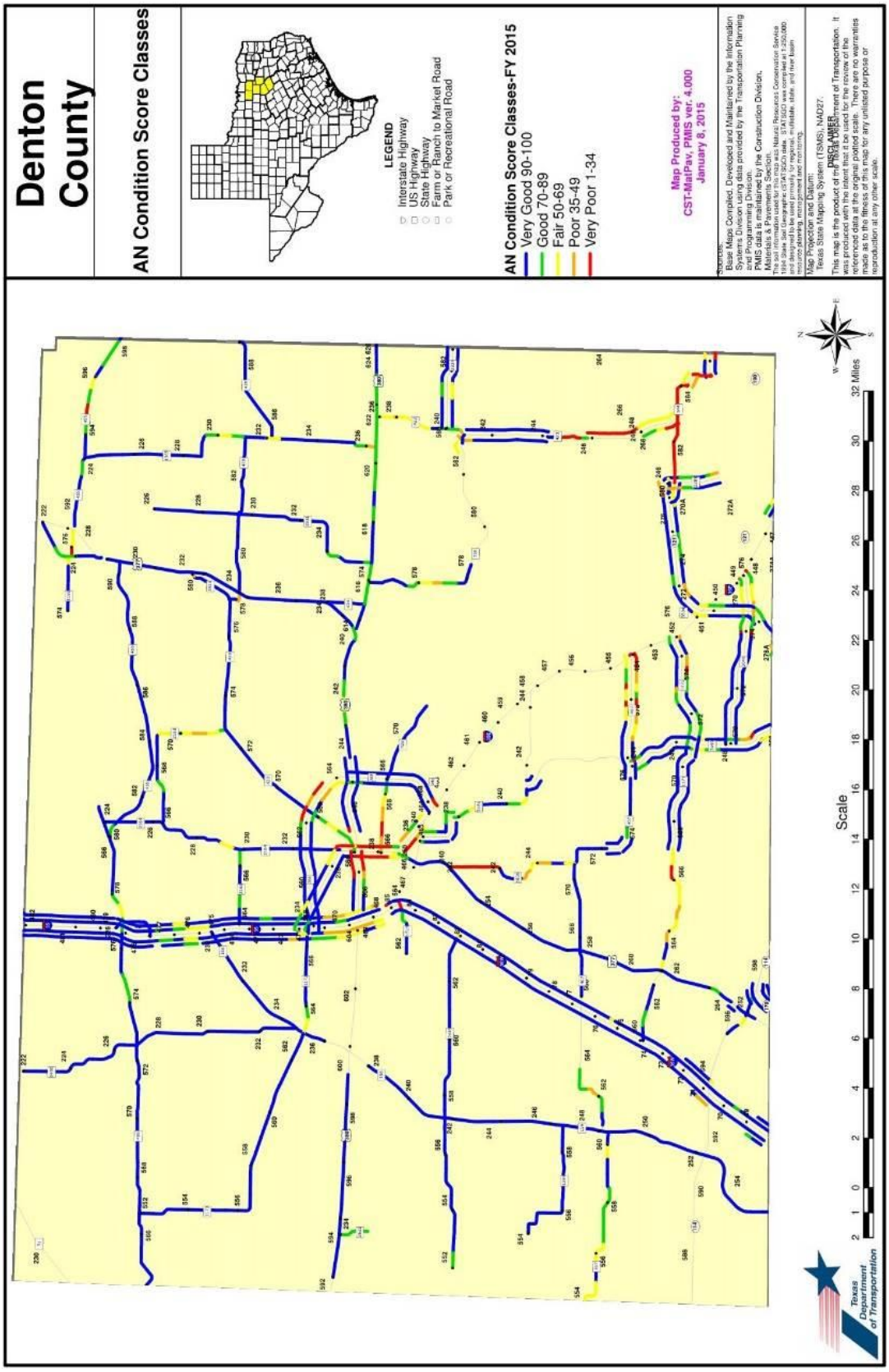


Figure 2-8. Denton County 2015 Pavement Conditions

Forecast Transportation Conditions

The Dallas Fort Worth Regional Travel Model for the Extended Area (DFX), maintained by the North Central Texas Council of Governments (NCTCOG) was developed, not only to inform decisions on transportation operations and needs, but also to aid in the prioritization of funding and implementation. The DFX forecasts trips in the region based on a number of factors, including trip purposes (work, home, and shopping), trip length, and congestion. The primary method that trips are forecasted in the region is based on future projections of population and employment. These projections help determine how many trips are going to be produced on a daily basis and where these trips are going. The model takes into account traffic circulation both within Denton County and throughout the North Central Texas Region.

Forecast of Travel Demand

NCTCOG is in the final stages of updating their 2040 forecast year travel demand model. Because 2040 numbers were not available yet for this study, the 2035 model output was provided by NCTCOG for use in the analysis. The analysis for the regional travel demand model included 2035 demographics for the Traffic Survey Zones (TSZ) in the entire North Central Texas Region, concurred regionally back in 2010. Thus, the assessment of travel demands in Denton County includes traffic flowing through the county to and from adjacent counties and the region. However, the 2035 forecast does not include advancements in land use forecasts based on the events of the last five years. The program of financially constrained transportation facilities in the model were updated by NCTCOG in 2014 to reflect the most currently available programming of local and regional projects, and this is the version of the model output that was provided for use in development of the Denton County Thoroughfare Plan.

Review of NCTCOG Model Representation of Denton County

The 2035 MTP travel demand model network and demographics provided by NCTCOG were reviewed for consistency with existing and currently envisioned future conditions in Denton County regarding the roadway network representation, population projections, and employment projections.

- Network – The network of roadways represented in the model were compared to the most recent versions of the thoroughfare plans of each of the cities and towns in Denton County. The need for additional connecting network between cities within the county was also noted. Some localized irregularities in the modeled network were also identified.
- Population and Employment – Plots of the 2014 and 2035 population and employment densities and net growth within each model traffic study zone were reviewed with each of the County Commissioners to get their feedback on the relative accuracy of the representation of each precinct for current population intensities and growth potential. Though considered to be low overall, the relative patterns of growth and density were for the most part concurred.

Modeled Traffic Volumes and Level of Service

Traffic Volumes – Model traffic volumes are different from actual traffic counts because they are an estimate of the number of trips to and from an area based on set demographic parameters (population and employment). For calibration of the model, model traffic volumes may vary from actual counts by about 10 percent on highways and principal/major arterials, but may vary significantly from actual counts on minor arterials and collectors.

Level of Service (LOS) - LOS is a qualitative measure to understand the amount of traffic on a roadway and its impact on the flow of vehicles. Though qualitative in nature, LOS is derived from the ratio of traffic volume to overall roadway capacity. The LOS ranking is based on a scale of A-F. At LOS A, vehicles experience an uncongested condition and are able to travel at the posted speed limit with no issue. At each letter interval, congestion gets worse until reaching LOS F. At LOS F, traffic congestion is highest, and travelers experience severe delay in travel time. **Figures 2-9, 2-10** and **2-11** provide comparative illustrations of 2014 and 2035 traffic volumes and the AM and PM peak hour Level of Service (LOS) on the roadways, respectively.

Forecast Traffic Volumes and LOS in 2014 - In Figure 2-9, the thicker lines denote the more heavily traveled interstates, US highways and tollways in the county, as well as some of the more travelled FM roads. Figures 2-10 and 2-11 show the 2014 model results for the AM and PM peak period network performance in terms of LOS in the peak direction of travel on each roadway. The LOS F conditions on I-35E, Sam Rayburn Tollway, US 380, SH 114, and other roadways are the driving force behind current initiatives to improve those and other roadway corridors.

Forecast Traffic Volumes and LOS in 2035 - Figure 2-9 indicates an increasing number of higher volume roadways in Denton County in 2035 compared to 2014. The US 380 corridor volumes increase across the entirety of the county. I-35 volumes increase significantly, as do many of the roadways that provide parallel conveyance to I-35, such as US 377, FM 156, and FM 2499. The FM roads and local network in southeast Denton County increase significantly with the emerging residential and commercial development in those cities. The DNT and parallel north-south roadways including FM 423 and FM 1385 increase significantly through the county.

The modeled network includes numerous roadway additions and improvements by TxDOT, NTTA, and various cities which were included by NCTCOG into the 2035 MTP, which were shown graphically in Figure 2-7. With those improvements in place, Figures 2-10 and 2-11 show that, with the expected growth in traffic volumes, there will still be many areas that are expected to experience LOS F during the AM and/or PM peak periods, including: I-35E south of Lewisville, US 380 east of Denton, Loop 288, and the majority of the major roadway network in the southeastern corner of the county near Sam Rayburn Tollway. I-35 north of US 380 would begin to experience LOS F, as would other major arterial roadways, including FM 428 and FM 2164. Southwest Denton County would experience LOS F on I-35W, SH 114, FM 156, and other arterial roadways.

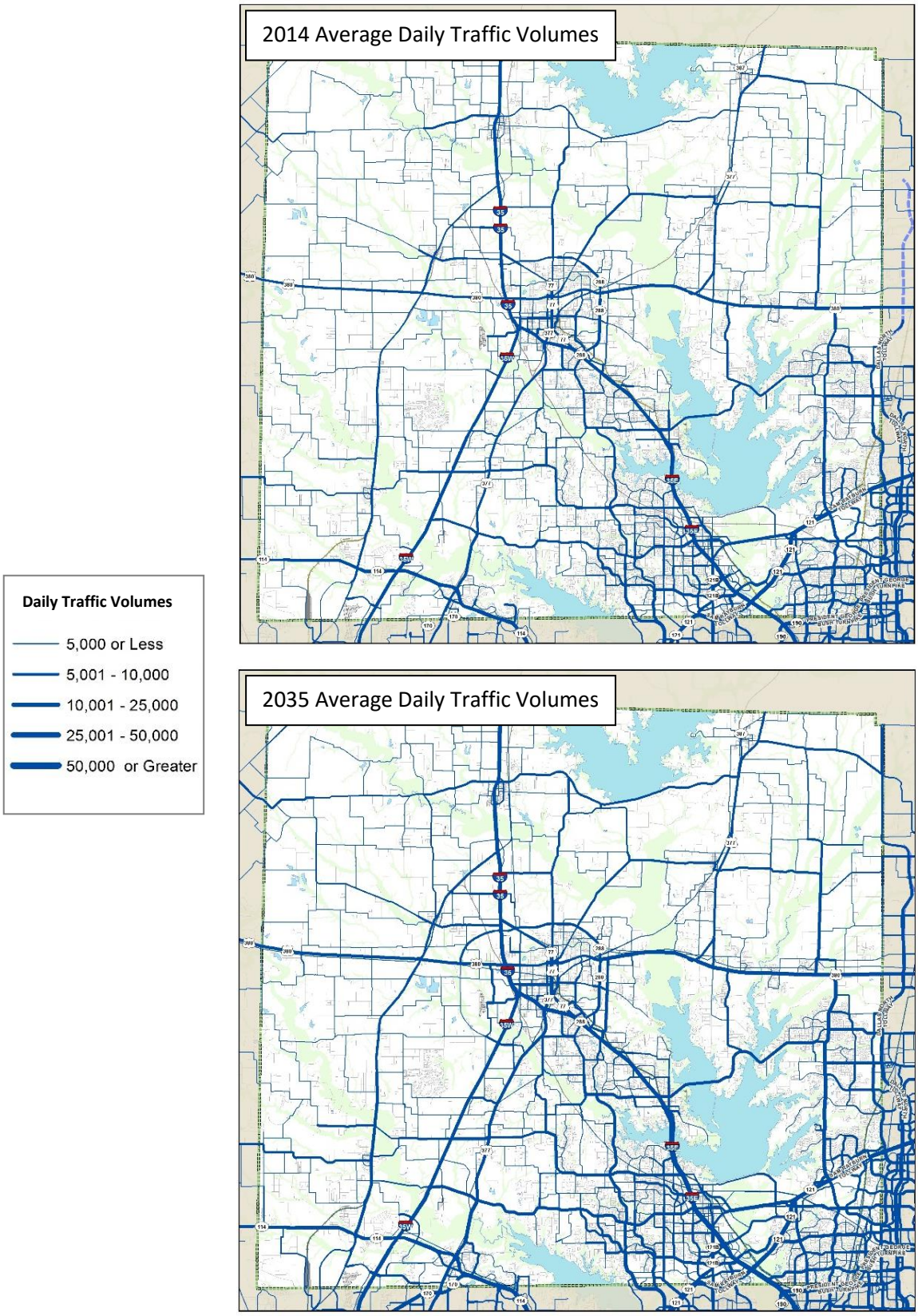


Figure 2-9. Comparison of 2014 and 2035 Average Daily Traffic Volumes

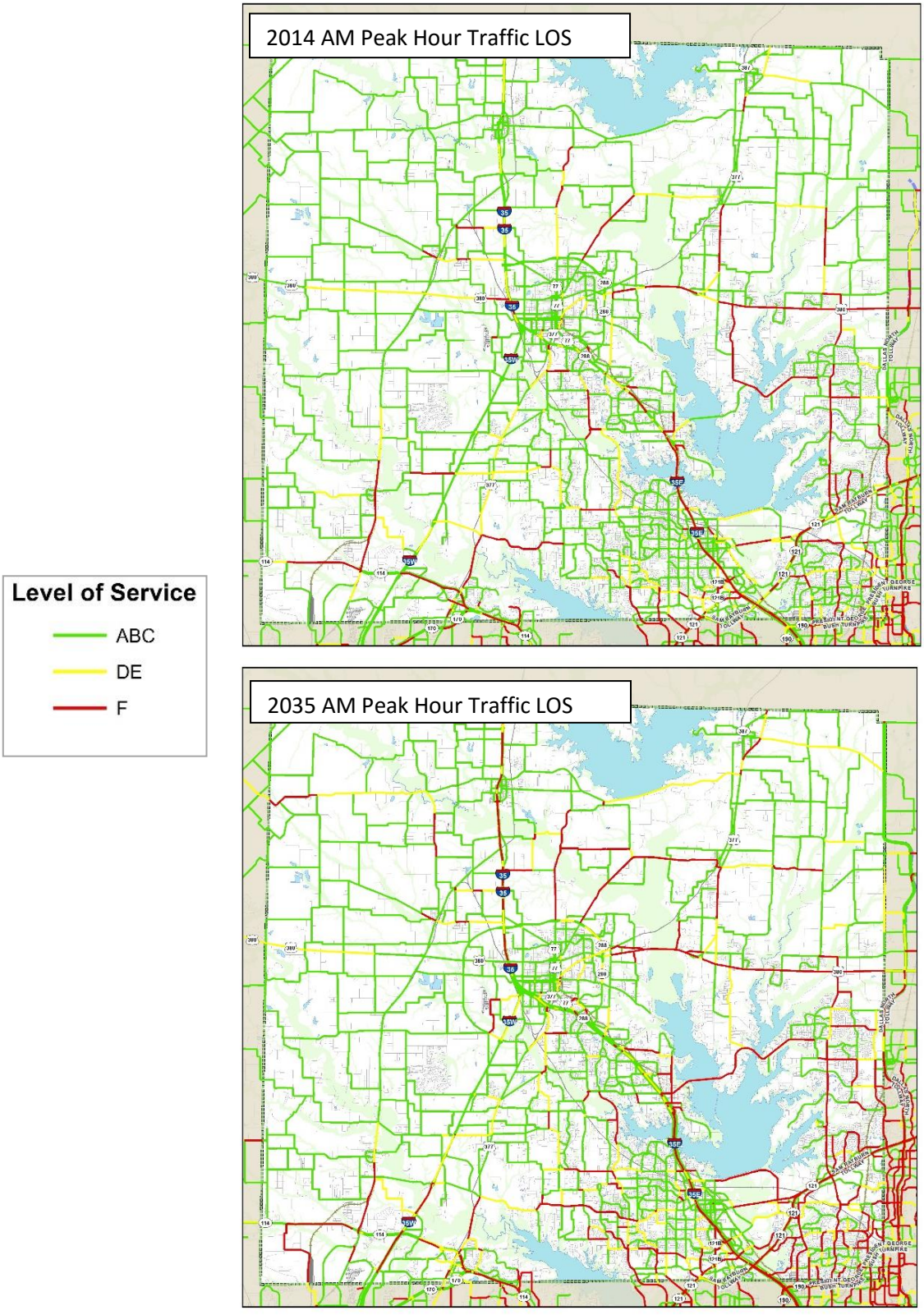


Figure 2-10. Comparison of NCTCOG Model AM Peak Period LOS in 2014 and 2035

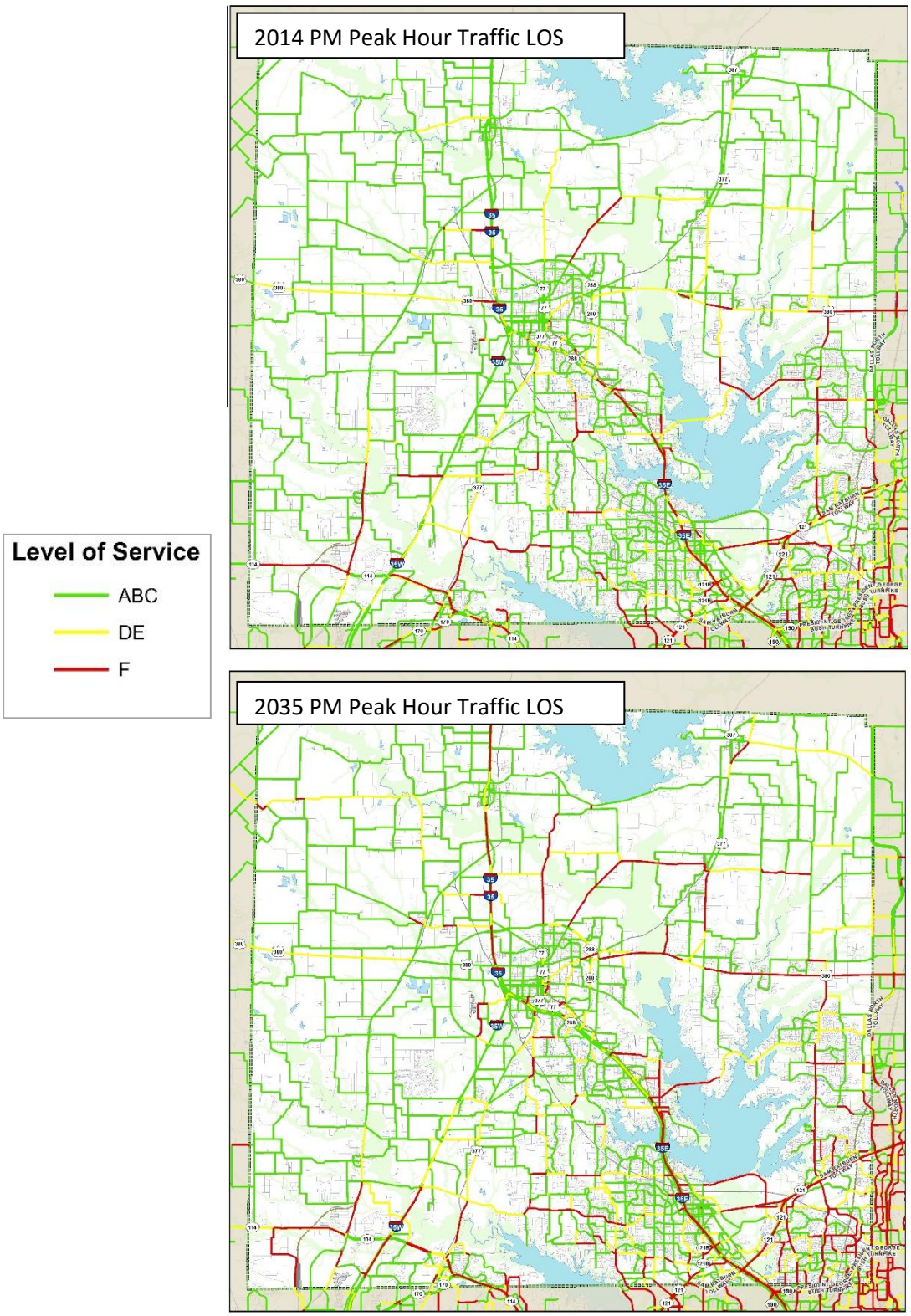


Figure 2-11. Comparison of NCTCOG Model PM Peak Period LOS in 2014 and 2035

Thoroughfare Plan Needs

Standard Functional Street Classifications and Configurations

As described previously, many cities within Denton County, in the preparation of their cities' thoroughfare plans, have differing definitions of the configuration of the various roadway classifications. For example, one smaller city's arterial street may be similar to another city's collector street. The naming convention for these roadway classifications was also different for many cities. When compiling into a county thoroughfare plan, standardizing the naming and physical configuration of the roadway classifications will facilitate countywide coordination. Defining a standard right-of-way width for each classification will also facilitate planning for the expansion of the roadway network in the unincorporated county.

Address City Thoroughfare Plan Network Gaps and Differentials

The thoroughfare plans of the various cities that lie within Denton County were compiled for incorporation into the county thoroughfare plan and are included in Appendix A. Upon compilation of these city plans, a number of thoroughfare plan disconnects were identified between adjacent cities. Many of the noted disconnects included roadways that were sized differently in adjacent jurisdictions or were operating under a different functional classification. Other planned facilities were misaligned. Operationally, many of the roadways are disconnected in terms of speed limits or the presence of intelligent transportation systems (ITS). Other causes of disconnect include conflicting land use plans and philosophies, population disparities, and a simple lack of communication between adjacent cities, developers, NCTCOG, and the county.

As part of the network assessment and refinement, the study team compiled thoroughfare plans from the twelve cities within the county that have adopted comprehensive plans or thoroughfare plans (compiled in Appendix A) and compared their alignments, right-of-way (ROW), and functional classifications to the network characteristics in the DFX. Particular attention was given to the examination of regionally significant corridors' major links along the county boundary. Discrepancies in three categories were documented and reviewed with NCTCOG, Denton County, and affected Denton County cities to inform the overall regional modeling effort. The three categories noted were:

1) Significant disconnects or conflicts between two adopted city plans, either functional classification or number of lanes;
2) Significant updates to/or omissions from the NCTCOG regional model; and
3) Functional classification or number of lanes discrepancies between city plans and the regional model.

While a large number of differences were documented, only discrepancies believed to reflect system-level performance were included in the refined model run. Conflicts between adjacent cities' adopted plans were communicated to the respective city governments along with recommendations for transition points for classification changes. Cities also received information on roadway capacity needs to accommodate recommended functional classification updates.

CHAPTER 3: TRANSPORTATION SYSTEM PLAN

The thoroughfare plans from each of the cities within Denton County, compiled in Appendix A, were reviewed and incorporated into the Denton County Thoroughfare Plan to the extent possible. The county thoroughfare plan extends the city thoroughfare plans to connect between cities and across the county to provide inter-local and regional connectivity and allow for logical expansion of the roadway network to accommodate growth.

The county plan focuses on the coordination of roadway corridors and classifications of arterial and larger facilities. The plan network map does include some of the cities' minor arterial and major collector roadways, where appropriate, for definition of the network serving the incorporated areas. Select rural collector roadways outside of the cities' ETJs are shown for definition of rural access roadways in Denton County.

The Denton County Thoroughfare Plan Network

A map of the recommended plan is presented in **Figure 3-1**. The following are key elements of the thoroughfare network for Denton County:

1. The most recently available information regarding the planned transportation infrastructure for each city in Denton County is incorporated into the plan. Generally, the updated city plans included the following significant changes from what is already included in the regional transportation plan:
    a. Network added to the north and west sectors of the City of Denton to accommodate planned growth.
    b. Network added in northeastern Denton County to accommodate growth in Prosper, Celina, Little Elm, Aubrey, Krugerville, and Cross Roads.
    c. Network added in southwestern Denton County to accommodate growth in northern Fort Worth, Justin, Northlake, and Argyle.
2. Changes to the Prosper and Celina thoroughfare plans respond to the proposed NTTA extension of the Dallas North Tollway to just south of Grayson County over the next several years.
    a. Connection of Legacy Drive to County Line Road to create an arterial corridor parallel to the DNT extension to improve circulation for local development along the west of the DNT.
    b. Extension of Teel Parkway north of US 380 paralleling the Legacy Drive extension and the DNT extension to create a grid of north-south arterials supporting development north of US 380.
    c. Connection of FM 423 to FM 1385 to extend the principal arterial nearly completely through Denton County. North of the proposed Outer Loop, two parallel arterial corridors would extend into Grayson County.
3. Creation of a functional network of minor arterial roadways in the northeast sector of Denton County balances the access and mobility needs of this mostly rural and low density part of the county with the emerging development along the DNT extension and US 377 corridors.

4. Extension of Frontier Parkway as a 4- to 6-lane arterial roadway roughly parallel to and north of US 380 through the eastern part of Denton County to connect to US 377 provides an alternative to travel on US 380 for sub-regional movements between the cities in Denton and Collin County, especially Aubrey, Krugerville, Crossroads, Little Elm, Prosper, and Celina.
5. Creation of a parallel network of arterial and collector roadways, to the extent possible, parallel to the south of US 380, to accommodate local circulation and reduce local traffic activity on US 380.
6. Extension of Main Street/King Road west from FM 423 to tie to FM 720/El Dorado Parkway to relieve congestion on FM 423 between El Dorado Parkway and Main Street.
7. Extension of Corporate Drive between the city limits of Carrollton and Lewisville to complete the network parallel to and between SH 121 and the Sam Rayburn Tollway.
8. Extension of the Outer Loop from Collin County through Denton County as a major facility to connect to I-35 as an east-west regional corridor and providing an alternative to travel on US 380.
9. Provision for arterial roadways parallel to the East-West Connector in the northern areas of the city of Denton to serve as backage roads for future planned development along the East-West Connector corridor.
10. Connection of Trietsch Road extending southward from the city of Sanger to Bonnie Brae Road extending northward from the city of Denton, creating an arterial roadway corridor parallel to I-35.
11. Extension of the Loop 288 corridor as a freeway west of the city of Denton, between I-35E and I-35W.
12. Provision of a peripheral roadway west of the city of Krum to allow traffic on FM 156 and FM 1173 the option to bypass the increasingly congested downtown area of Krum.
13. Creation of a north-south arterial extending from the Krum bypass at FM 156 southward through western Denton ETJ and connecting through the Robson Ranch development area and tying to the extension of FM 407.
14. Grade separations on US 380 at key high volume cross streets, including FM 423/FM 1835, Navo Road (at location of new high school), and at FM 720.

NCTCOG 2035 MTP Network Modifications for Denton County

The thoroughfare plan contains many additions and modifications to the thoroughfare network represented for Denton County in the NCTCOG 2035 MTP. A map of the differences is presented in **Figure 3-2**. The highlighted network changes reflect the emerging growth areas of Denton County. Some of the network additions reflect the unconstrained nature of the thoroughfare plan in contrast to the constrained 20-year MTP network.

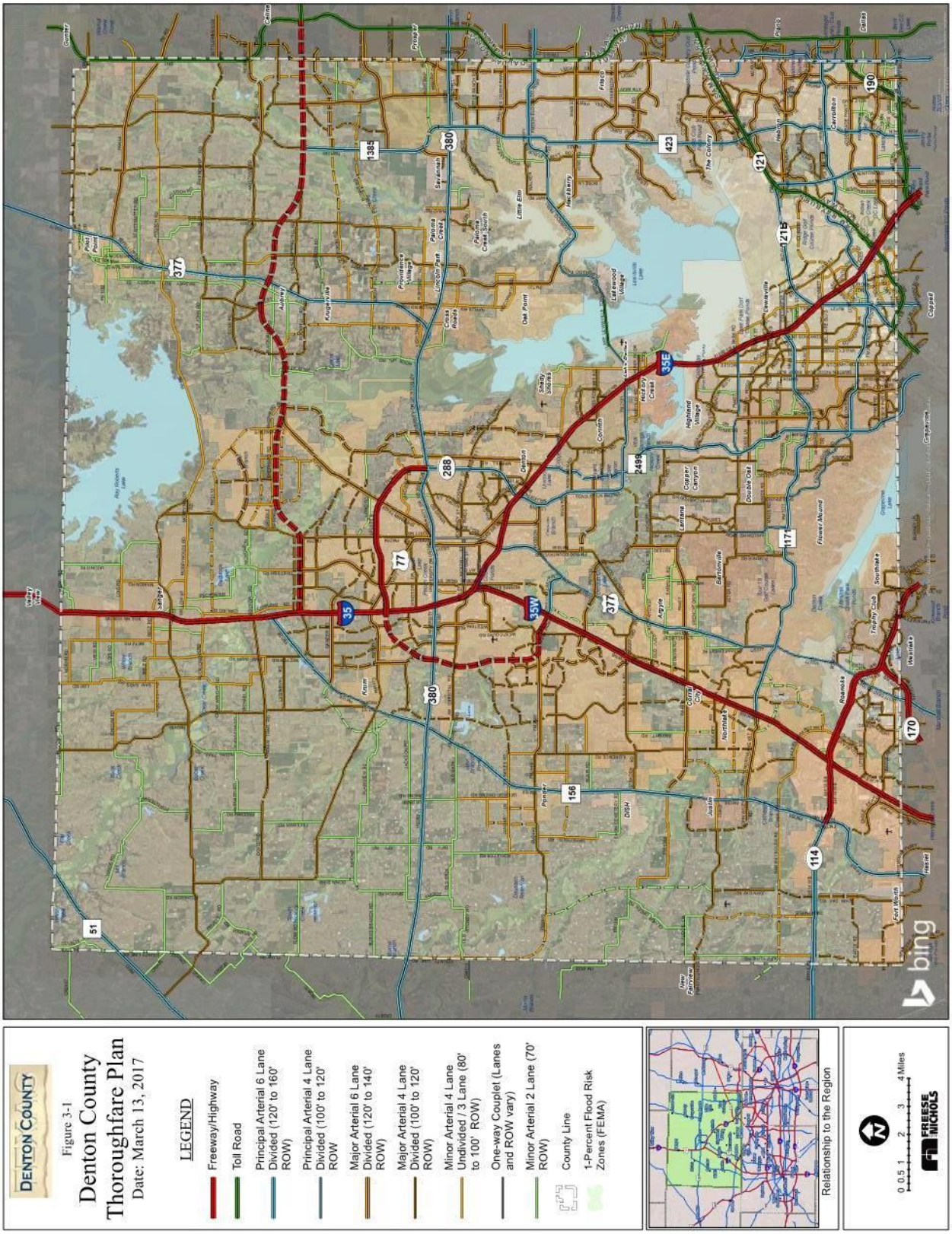


Figure 3-1. Denton County Thoroughfare Plan

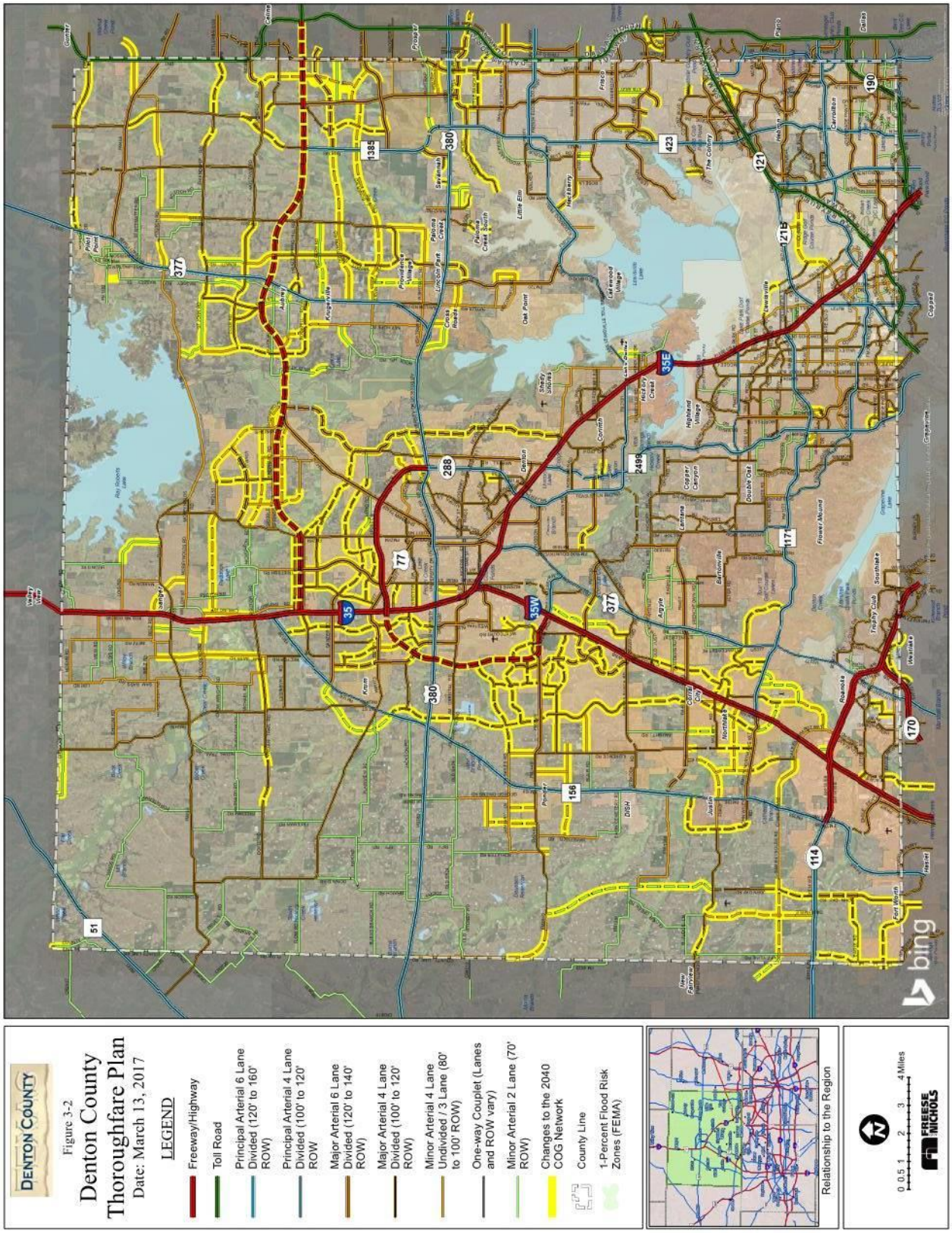


Figure 3-2. Denton County Thoroughfare Plan Changes from NCTCOG 2035 MTP

Regional Network Performance in Denton County

Overall, the Level of Service is anticipated to be very good on highways and arterial roadway in Denton County in 2035, with the exception of a few over-capacity corridors, as depicted in **Figure 3-3** (AM Peak) and **3-4** (PM Peak). These capacity challenged corridors are anticipated to include:

- I-35 main lanes north of US 380 are planned to remain as two lanes in each direction by 2035. This corridor from Denton northward into the adjoining county is anticipated to operate at LOS F, exceeding the roadway capacity during the peak periods. Planned implementation of ITS improvements along this corridor may not improve capacity based LOS.
- I-35E south of the Corinth area is anticipated to operate at LOS F during the peak periods, even after completion of the planned improvements to provide additional lanes of capacity. I-35E is a highly traveled corridor through the eastern part of the DFW Metroplex. Increase utilization of the DCTA commuter rail along with increased vehicle occupancy encouraged by HOV pricing in the managed lanes may help to alleviate the peak period over-capacity operations.
- FM 455 across Ray Roberts Lake is expected to exceed the capacity of the existing 2-lane roadway and approach the capacity of a four-lane roadway, predominantly during the PM peak period. Provision of the Outer Loop through Denton County would reduce the anticipated future volumes by over one third.
- US 380 is projected to exceed its six-lane capacity and operate at LOS F during the PM peak period in the section east of Loop 288 to the DNT. Provision of the East-West Connector through Denton County would only reduce traffic on US 380 from about 92,000 to about 87,000 vehicles per day (vpd). There is a latent demand for use of any available capacity on US 380 in eastern Denton County.
- Even after expansion to an 8-lane tollway, the Sam Rayburn Tollway will experience LOS F during the AM and PM peak periods in 2035.

Regional Outer Loop Extension in Denton County as East-West Connector to I-35

The Thoroughfare network was modeled with and without the extension of the Outer Loop west of DNT, as the East-West Connector to I-35, to assess the comparative performance impact on the rest of the network. A further description of this assessment is contained in Appendix B.

Option A: East-West Connector as a Freeway between DNT and I-35 - Model results show that, if the East-West Connector were developed ultimately as a 6-lane freeway in Denton County, between I-35 and the DNT, with connection to the Outer Loop freeway/tollway being developed in Collin County, is anticipated that it would attract about 76,100 vpd by 2035, measured between US 377 and FM 428 north of Denton, at the freeway crossing of the Greenbelt. The model forecasts lesser volumes between DNT and US 377 and between FM 428 and I-35. This latter model result indicates that the segment of the Outer Loop between US 377 and FM 428 should be planned for more capacity in each direction than the rest of the Outer Loop between I-35 and DNT.

Option B: East-West Connector as a Principal Arterial between DNT and I-35 - When modeled as a 6-lane principal arterial roadway between I-35 and DNT, with at-grade interruptions at major intersections, model results indicated that the corridor attracted one-third less traffic volumes, or about 51,600 vpd to the crossing of the Greenbelt. Access management and some grade separated intersections would be needed to maintain average travel speeds that would attract east-west regional movements.

Option C: East-West Connector as an Assemblage of Arterial Corridors between DNT and I-35 - Without the continuous extension of a continuous roadway facility between I-35 and the DNT Extension at the Outer Loop, the FM 428 roadway that crosses the Greenbelt is projected to carry about 30,400 vpd in 2035 - not much more traffic than it currently carries.

Recommended Configuration of the East-West Connector in Denton County

The East-West Connector could be expected to generate much higher volumes than forecast in the NCTCOG model between I-35 and DNT as the regional model needs to be further refined to incorporate development patterns in these northern extents of the model. Travel demand forecasts for the corridor are expected to increase once the land use assumptions in the NCTCOG travel demand model are updated for 2040 and beyond.

Collin County has committed to the Outer Loop as a freeway within a 500-foot ROW and are assessing the increased development density that could be established along the corridor. The City of Aubrey has included a 500-foot wide corridor for the East-West Connector in their most recent thoroughfare plan. The City of Denton's thoroughfare plan included roadways parallel to the East-West Connector that would serve as backage roads for anticipated development along the highway.

The East-West Connector (Denton County's segment of the Outer Loop) should include:

- Ultimate 6-lane highway section, with frontage roads as appropriate, from Collin County to I-35;
- Ultimate 6 to 8 lanes with limited access and no frontage roads through floodplain, from US 377 to FM 428 northeast of city of Denton;
- ROW width:
    - 400 to 500 feet, depending on frontage road and drainage needs;
    - 150 to 200 feet through environmentally constrained areas; and
- Interchanges at I-35, FM 2164, FM 428/Post Oak Road, US 377, FM 2951, FM 1385, and Teel Parkway.

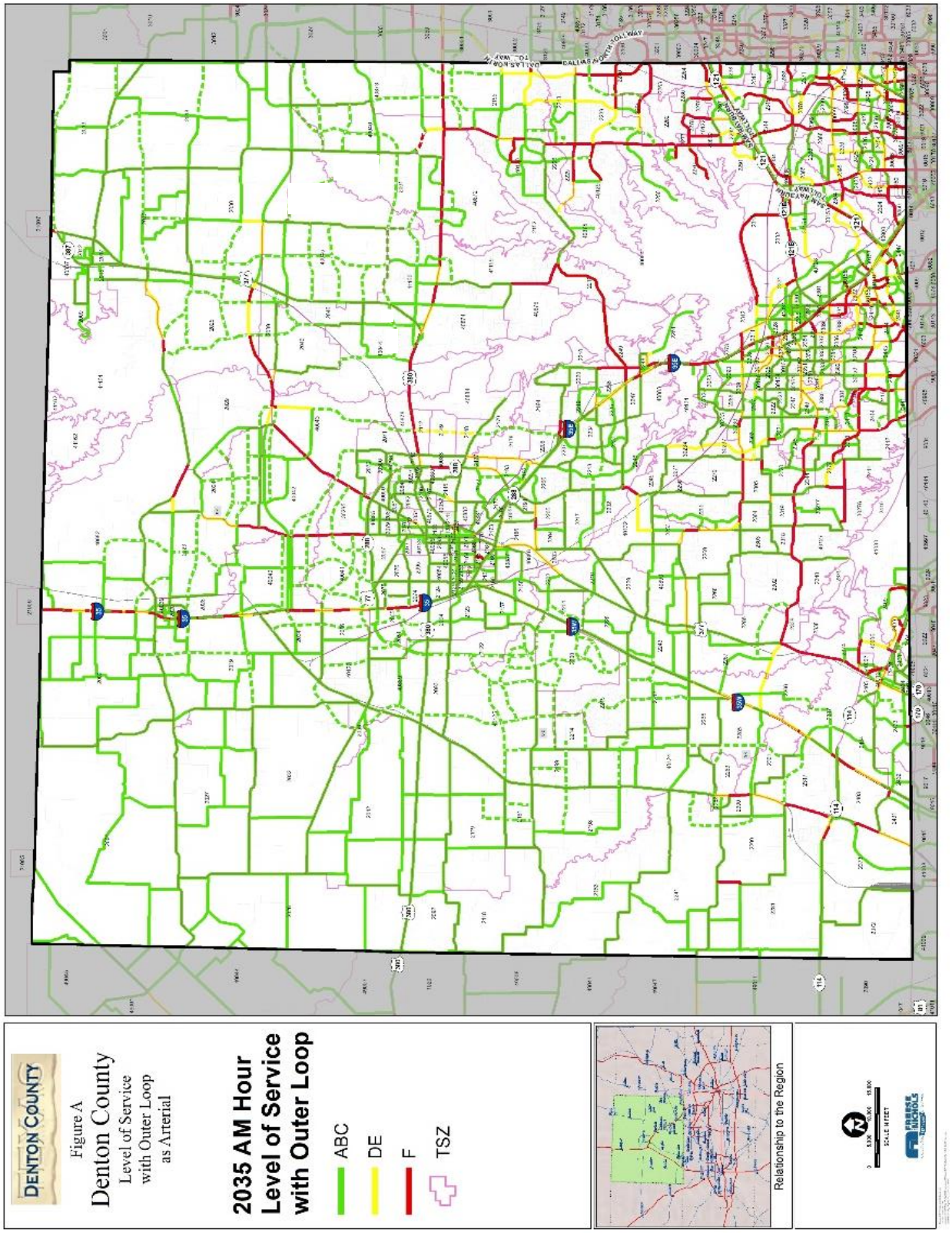


Figure 3-3. NCTCOG Model 2035 AM Peak Period LOS

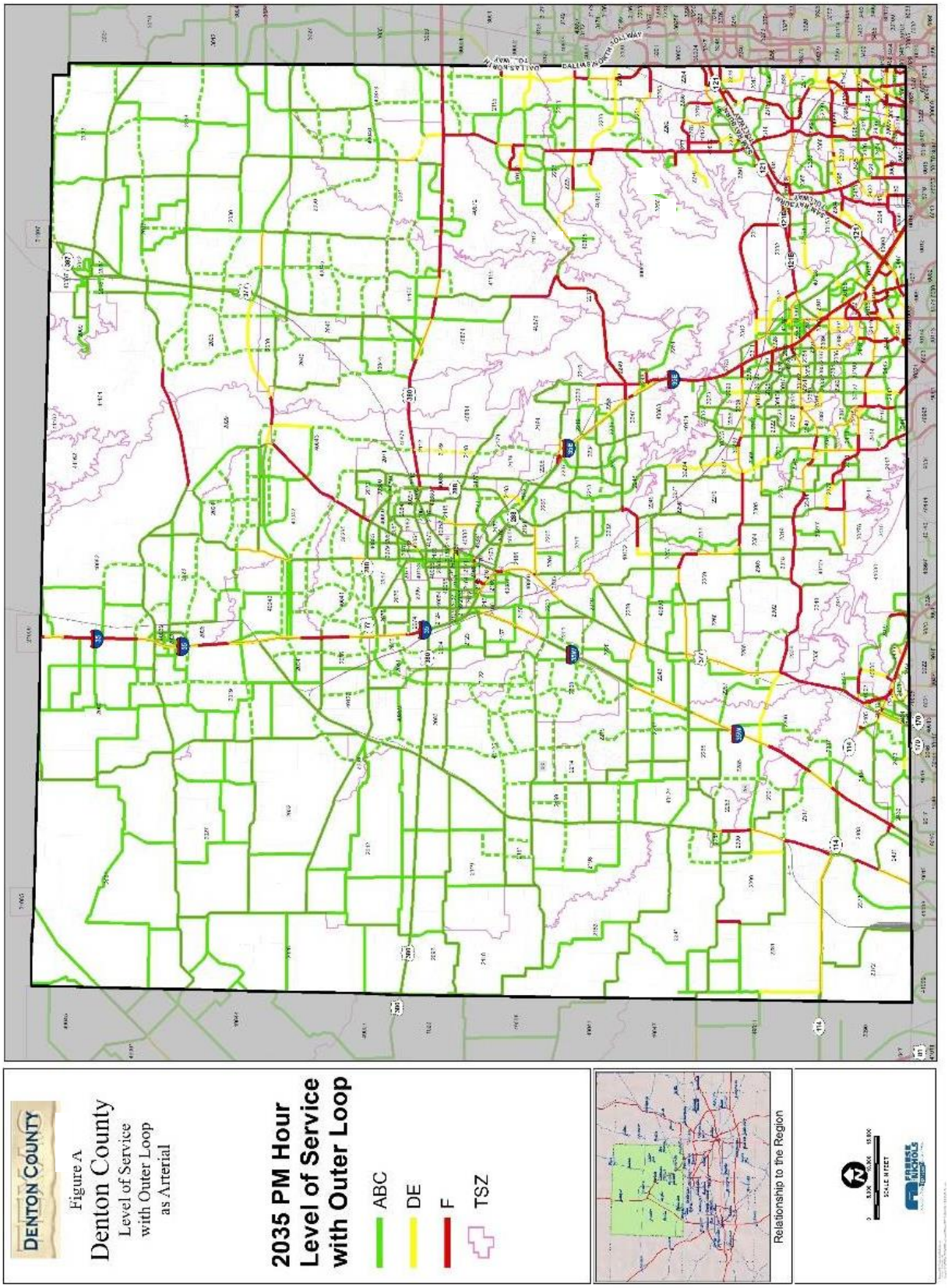


Figure 3-4. NCTCOG Model 2035 PM Peak Period LOS

Functional Street Classifications and Typical Capacities

The various levels of classifications of streets within Denton County can be provided in a myriad of configurations to best serve the context of their surroundings. A street typical section may change from segment to segment, though the functional classification continues. The functional classification of a street may change from one major intersection to the next depending on the collection zone of that street segment.

- **Freeways and Tollways** - The limited access freeway and tollway network includes the Interstate Highways, some US and State Highways controlled by TxDOT, and most of the tollways controlled by NTTA. Limited access roadways are those that control access to the facility at designated locations, typically at other freeways and arterial streets. They carry large volumes of traffic long distances at relatively high rates of uninterrupted speed across the region and beyond.
- **Principal Arterials** – Principal arterial roadways carry traffic across major segments of the county, with a primary function of throughput, rather than access. Driveway access onto principal arterials is often limited by spacing requirements, and parking along arterial roadways is not allowed. Principal arterials typically are planned to have four or more travel lanes and are often divided by a flush or raised median. Grade separations at crossing of major and some minor arterials may be considered.
- **Major Arterials** - Major arterial roadways carry traffic across major segments of a city and between adjoining cities, with a primary function of throughput, rather than access. Driveway access onto major arterials is often limited by spacing requirements, and parking along arterial roadways is seldom allowed. Major arterials typically are planned to have four or more travel lanes and are often divided by a flush or raised median.
- **Minor Arterials** – Minor Arterial roadways also carry traffic across major segments of a city, with a primary function of throughput, rather than access. Driveway access onto minor arterials is not as constrained as on principal and major arterials, and parking along minor arterial roadways is sometimes allowed befitting the local surroundings. Minor arterial roadway cross sections can range from three-lane streets to four-lane boulevard sections.

Typical Roadway Capacities

Table 3-1 presents planning guidelines for threshold values of traffic carrying capacity for various lane configurations by facility type. In general, adding lanes and auxiliary lanes increases the vehicular capacity of the roadway. For general planning purposes, the capacity ranges for roadway configurations is shown in **Table 3-1**. These values can be used when considering roadways for the need for widening. They also can be used for initial assessments of the potential for lane reductions of existing roadways to add bike lanes or to “right-size” a roadway during a re-construction project. NCTCOG has provided guidelines for peak hour traffic capacities for roadways operating al LOS E, and are shown in **Table 3-2**.

Table 3-1
Planning Level Estimates of Typical Daily Vehicular Capacities for Roadways

Route Type	Lanes	LOS E Capacity
Freeways	4 lane freeway	80,000 vpd
	6 lane freeway	125,000 vpd
	8 lane freeway	165,000 vpd
City Arterials	2 lane arterial[1,2]	17,100 vpd
	4 lane arterial (undivided)[1]	34,200 vpd
	4 lane arterial (divided)	38,000 vpd
	5 lane arterial (center turn lane)	36,000 vpd
	6 lane arterial (undivided)	52,300 vpd
	6 lane arterial (divided)	58,000 vpd
	One way street (per lane)	11,000 vpd

[1]Apply 20% reduction if no left turn lanes provided within corridor

[2]Apply 5% increase for continuous center turn lane

Table 3-2
NCTCOG Planning Level Estimates of Typical Peak Hour Vehicular Capacities

Area Type	Hourly Capacity Per Lane – Divided or One-Way Roads						
	Freeway	Principal Arterial	Major/Minor Arterial	Collector	Freeway Ramp	Frontage Road	HOV
CBD	2300	725	725	475	1250	725	2050
Outer Business District	2300	775	775	500	1375	775	2125
Urban Residential	2300	850	825	525	1425	850	2150
Suburban Residential	2300	925	900	575	1600	900	2225
Rural	2300	1025	975	600	1725	975	2300
	Hourly Capacity Per Lane – Undivided Roads						
CBD	n/a	650	650	425	1250	650	n/a
Outer Business District	n/a	725	725	450	1375	725	n/a
Urban Residential	n/a	775	750	475	1425	750	n/a
Suburban Residential	n/a	875	825	525	1600	825	n/a
Rural	n/a	925	875	550	1725	875	n/a

Notes: 1. The service volumes shown are at LOS = E.
2. Service volumes increase as density of conflicting roadway grid diminishes.

Recommended Roadway Design Standards

Each city has its own definition of arterial and collector roadways, how much pavement and median is provided, and how much right-of-way is required to install the roadway and associated roadside treatments and utilities. Design typical sections for the county thoroughfare plan were developed for each of the non-freeway roadway classifications that would best prepare the county corridors to be compatible to the city roadways when extended into the county. The county standards would not override the requirements of the city standards, but rather complement their future extensions. **Table 3-3** lists the county typical design sections intended to align with the range of comparable existing city typical street standards.

Table 3-3. Recommended County Roadway Typical Sections

Roadway Class	No. of Lanes	Area Type	Recommended County Standards, feet				
			Min. ROW	Travel Lane Pavement	Median (flush/ raised)	Shoulders (Left/Right)	Sidewalks (Left/Right)
Principal Arterial	6	Urban	140	2@38	16 / 20	-	5/5
	6	Rural	140	2@36	16 / 20	4-8/8-10	optional
	4	Urban	120	2@26	16 / 20	-	5/5
	4	Rural	120	2@24	16 / 20	4-8/8-10	optional
Major Arterial	6	Urban	120	2@38	14 / 20	-	5/5
	6	Rural	120	2@36	14 / 20	2-4/4-8	optional
	4	Urban	100	2@26	14 / 20	-	5/5
	4	Rural	100	2@24	14 / 20	2-4/4-8	optional
Minor Arterial	4	Urban	80	46	no	-	5/5
	4	Rural	80	44	no	4	optional
Minor Arterial/ Collector	3	Urban	80	38	no	-	5/5
	3	Rural	80	36	no	4	optional
	2	Urban	60	30	no	-	5/5
	2	Rural	60	24	no	4	optional

Notes:

1. Transitions from existing roadway pavements to planned roadway classifications may be done in stages using design typical sections for other classifications.
2. Rural roadways may require additional ROW depending on topography and drainage requirements of the roadway corridor.
3. Provision of dedicated bicycle accommodations on urban roadways may require additional pavement width.
4. Provision of a sidepath along rural corridors is optional and may require additional ROW depending on topography and drainage requirements of the roadway corridor.

Principal Arterials, Urban

Urban principal arterial roadways provide the predominant passageways through the urbanized portions of the community and connect to the regional freeway network, and can serve as a defacto highway by providing grade separations at key intersections. Typical roadway sections for 4 and 6-lane divided urban principal arterial roadways are depicted in **Figure 3-5**.

DESIGN ELEMENT	CHARACTERISTIC
PAVEMENT SECTION	12’ travel lanes, 2 each direction, minimum Curb gutter width in addition to lane width
MEDIAN	Raised median preferred, flush optional Median openings infrequent Left turn bays at openings, typical Landscaping in median optional
ROADSIDE PROVISIONS	Curb and gutter drainage to underground culverts, typical Landscaping of area beyond curb preferred as buffer for sidewalks
BICYCLISTS & PEDESTRIANS	Bicyclist use of lanes allowed but not preferred 5’ to 10’ Sidewalks/paths each side, within street ROW
ACCESS MANAGEMENT	Minimize direct driveway access to the extent possible Side street connections for collectors or arterials only, preferred Line up side streets at median openings, preferred

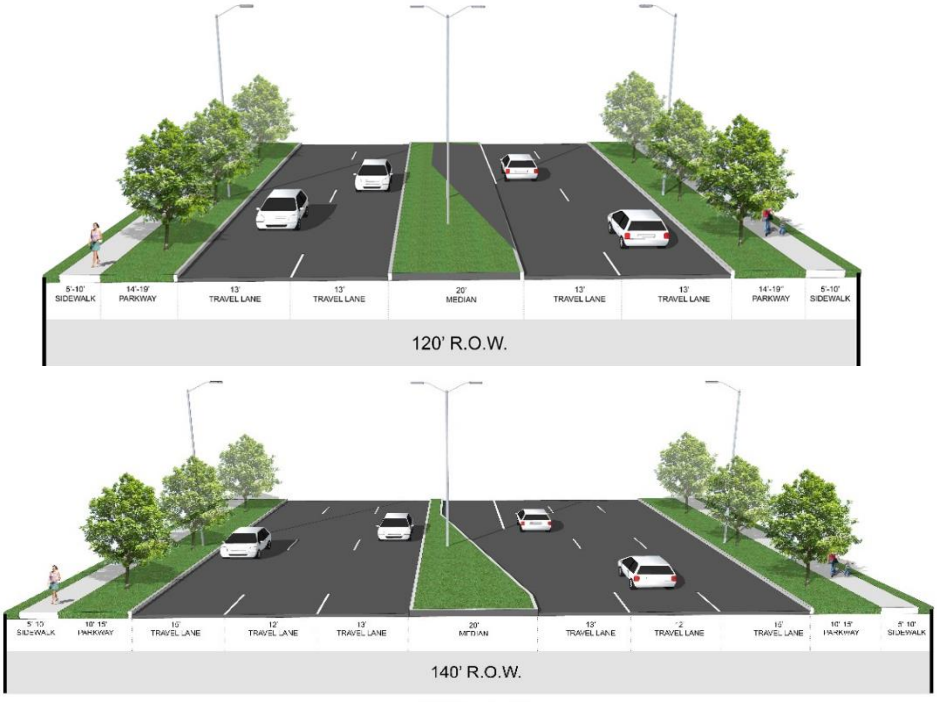


Figure 3-5. Typical Section of Urban Principal Arterial Roadways

Principal Arterials, Rural

Rural principal arterial roadways provide the predominant passageways through the rural portions of the community and connect to the regional arterial and freeway network, typically providing for open ditch drainage. Typical roadway sections for 4 and 6-lane divided rural principal arterial roadways are depicted in **Figure 3-6**.

DESIGN ELEMENT	CHARACTERISTIC
PAVEMENT SECTION	12’ travel lanes, 2 each direction, minimum Shoulders, full depth, 4’ left, 10’ right preferred Design speeds: 45 to 55 MPH
MEDIAN	Raised or landscaped median preferred, flush optional Median openings infrequent Left turn bays at openings, typical Landscaping in median optional Median ditch drainage optional
ROADSIDE PROVISIONS	Open ditch drainage, with culverts as needed Landscaping along edge of ROW preferred
BICYCLISTS & PEDESTRIANS	Bicyclist use of shoulders allowed Sidewalks/paths optional in additional easement
ACCESS MANAGEMENT	Minimize direct driveway access to the extent possible Target local street connections for collectors or arterials Line up side streets at median openings, as feasible

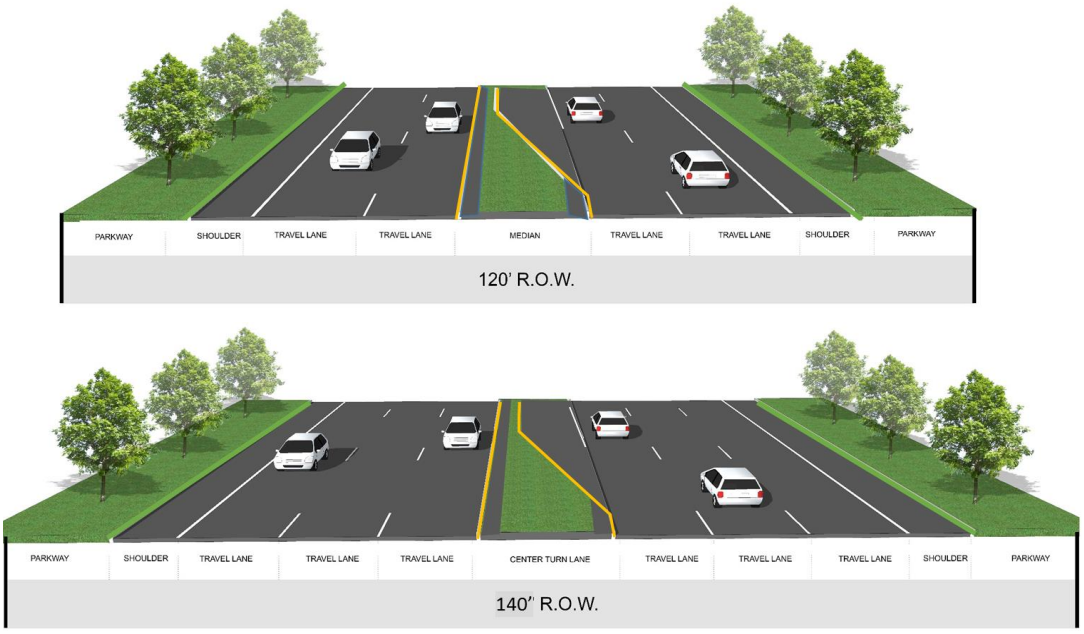


Figure 3-6. Typical Section of Rural Principal Arterial Roadways

Major Arterials, Urban

Urban major arterial roadways provide passageways across segments of the urbanized portions of the community and connect to the regional freeway and arterial network, typically providing access to significant development in the community. Typical roadway sections for 4 and 6-lane divided urban major arterial roadways are depicted in **Figure 3-7**.

DESIGN ELEMENT	CHARACTERISTIC
PAVEMENT SECTION	11 to 12’ travel lanes, 2 each direction, minimum Curb gutter width in addition to lane width Design speeds: 35 to 45 MPH
MEDIAN	Raised median preferred, flush optional Median openings for arterials and collector streets plus as needed Left turn bays at openings, typical Landscaping in median optional
ROADSIDE PROVISIONS	Curb and gutter drainage to underground culverts, typical Landscaping of area beyond curb preferred as buffer for sidewalks
BICYCLISTS & PEDESTRIANS	Bicyclist use of lanes allowed but not preferred 5’ to 10’ Sidewalks/paths each side, within street ROW
ACCESS MANAGEMENT	Minimize spacing of direct driveway access to the extent possible Line up side streets at median openings, as feasible

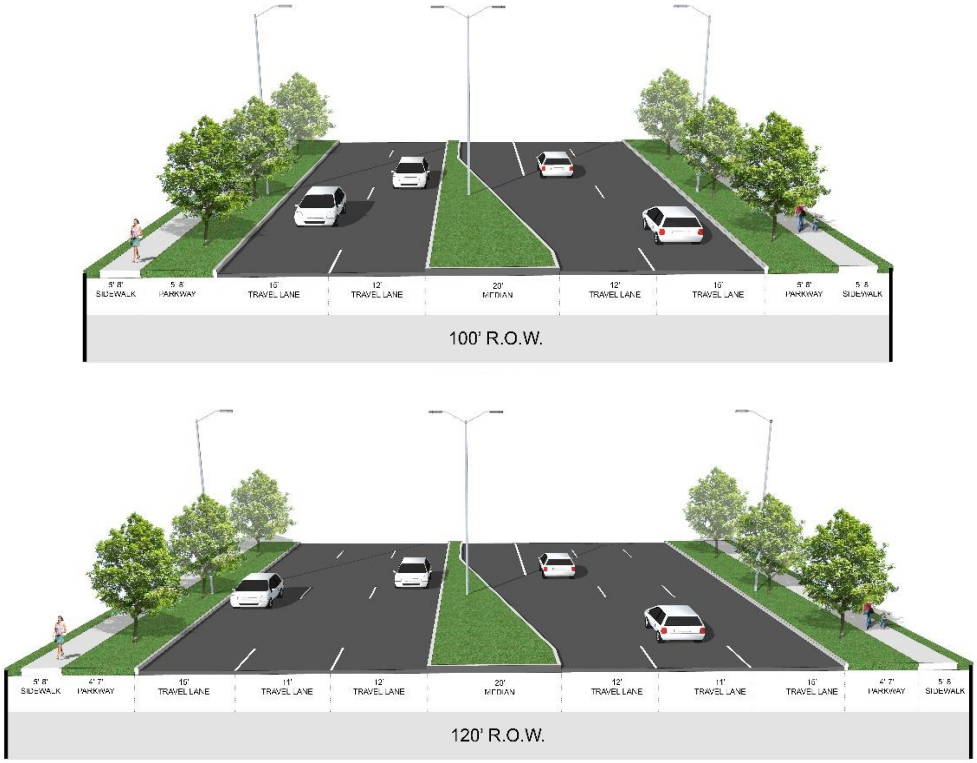


Figure 3-7. Typical Section of Urban Major Arterial

Major Arterials, Rural

Rural major arterial roadways also provide passageways across segments of the urbanized portions of the community and connect to the regional freeway and arterial network, but typically provide open ditch drainage to portray a rural character. Typical roadway sections for 4 and 6-lane divided rural major arterial roadways are depicted in **Figure 3-8**.

DESIGN ELEMENT	CHARACTERISTIC
PAVEMENT SECTION	11 to 12’ travel lanes, 2 each direction, typical Shoulders, full depth, 2’ left, 8’ right preferred Design speeds: 35 to 45 MPH
MEDIAN	Raised or landscaped median preferred, flush optional Median openings for arterials and collector streets Left turn bays at openings, typical Landscaping in median optional
ROADSIDE PROVISIONS	Open ditch drainage, with culverts as needed Landscaping along edge of ROW preferred
BICYCLISTS & PEDESTRIANS	Bicyclist use of shoulders encouraged Sidewalks/paths optional in additional easement
ACCESS MANAGEMENT	Minimize spacing of direct driveway access to the extent possible Line up side streets at median openings, as feasible

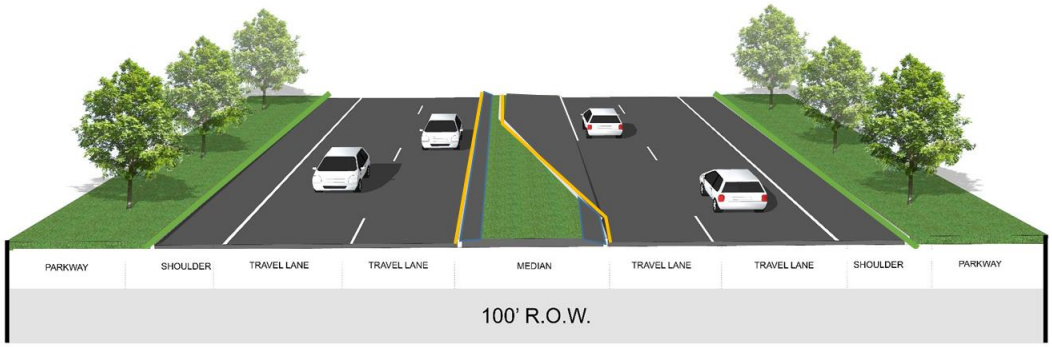


Figure 3-8. Typical Section of Rural Major Arterial Roadways

Minor Arterials, Urban

Urban minor arterial roadways provide passageways across segments of the urbanized portions of the community and connect to the major arterial network, typically providing direct access to adjacent development. Typical roadway sections for 4 and 6-lane divided urban major arterial roadways are depicted in **Figure 3-9**.

DESIGN ELEMENT	CHARACTERISTIC
PAVEMENT SECTION	11 to 12’ travel lanes for 4 lane or 3 lane configuration Curb gutter width in addition to lane width Design speeds: 30 to 35 MPH
MEDIAN	3-lanes: 12 to 14’ flush median typical, 20’ raised median optional Median openings for collector streets plus as needed Left turn bays at openings, typical, landscaping in median optional 4-lanes: flare to provide left turn lane at critical intersections
ROADSIDE PROVISIONS	Curb and gutter drainage to underground culverts, typical Landscaping of area beyond curb preferred as buffer for sidewalks
BICYCLISTS & PEDESTRIANS	Bicyclist use of lanes allowed, with special accommodation desired 5 to 6’ bike lanes or 14 to 15’ wide outside lanes (wider pavement) 5’ to 10’ Sidewalks/paths each side, within street ROW
ACCESS MANAGEMENT	Minimize spacing of direct driveway access to the extent possible Merge adjoining parking areas to minimize driveway entries

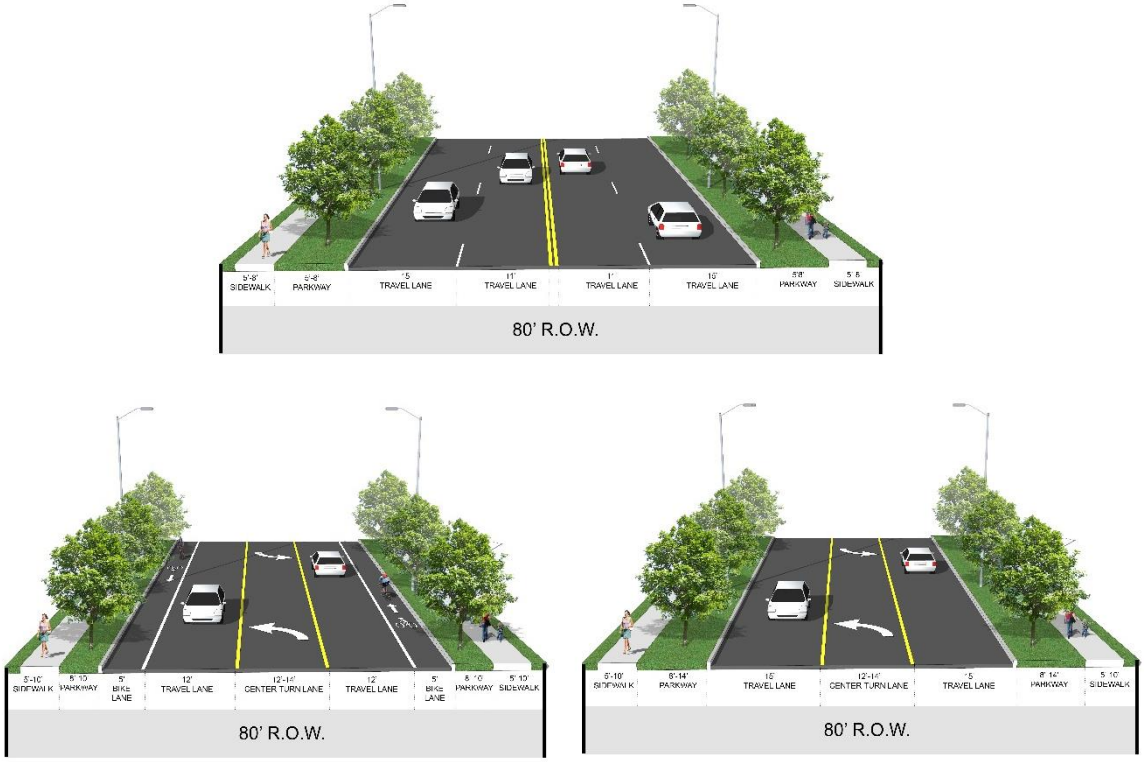


Figure 3-9. Typical Section of Urban Minor Arterial Roadways

Minor Arterials, Rural

Rural minor arterial roadways provide passageways across segments of the rural portions of the community and connect to the major arterial network, typically providing for open-ditch drainage to portray a rural character and direct access to adjacent development. Typical roadway sections for 4 and 6-lane divided urban major arterial roadways are depicted in **Figure 3-10**. These configurations may be utilized in the interim stages of development of a major or principal arterial roadway.

DESIGN ELEMENT	CHARACTERISTIC
PAVEMENT SECTION	11 to 12’ travel lanes for 4 lane or 3 lane configuration Shoulders, full depth, 4’ typical, more if bike route Design speeds: 35 to 45 MPH
MEDIAN	3-lanes: 12 to 14’ flush median, typical 4-lanes: flare to provide left turn lane at critical intersections
ROADSIDE PROVISIONS	Open ditch drainage, with culverts as needed Landscaping along edge of ROW preferred
BICYCLISTS & PEDESTRIANS	Bicyclist use of shoulders encouraged Sidewalks/paths optional, in additional easement if needed
ACCESS MANAGEMENT	Minimize spacing of direct driveway access to the extent possible Line up side streets at median openings, as feasible

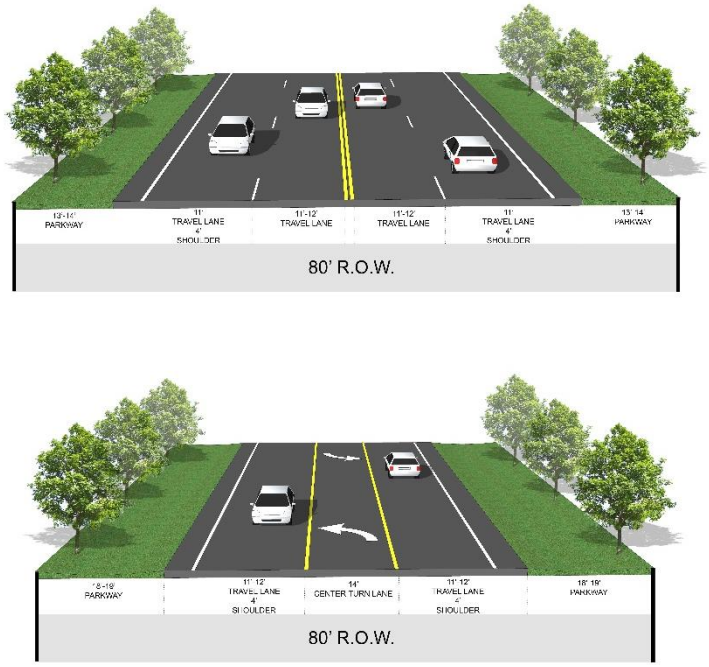


Figure 3-10. Typical Section of Rural Minor Arterial Roadways

Thoroughfare Design Considerations

Design Standards

There are established standards for design that are utilized by communities across the United States; these standards have been established based on research and field experience. These are the anticipated guidelines for implementation of the transportation system plan:

For Roadways:

- American Association of State Highway and Transportation Officials (AASHTO), A Policy on Geometric Design of Highways and Streets, latest edition
- Transportation Research Board Highway Capacity Manual, latest edition
- Texas Manual on Uniform Traffic Control Devices, latest edition

For Bikeways:

- AASHTO Guide for the Design of Bicycle Facilities
- National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide

For Sidewalks and Paths:

- AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities
- North Central Texas Council of Governments (NCTCOG) Landscape/Tree Ordinance

For Transit Facilities:

- Transportation Research Board (TRB) Transit Capacity and Quality of Service Manual
- Denton County Transit Authority (DCTA) Facilities and Vehicles Design Standards

In addition to these established design standards, there are additional guidelines for design applications to best suit the current and anticipated conditions along the street corridor.

Context Sensitive Solutions

Though a roadway corridor on the thoroughfare plan may be of a particular classification designation, whether it is principal arterial, minor arterial, or collector, its typical section may transition along its corridor depending upon the traffic volumes and relation to the adjacent land uses. In many cases, an arterial roadway may pass through rural into urban and sequentially commercial into residential settings and back again within a segment of the corridor. The typical sections to be considered for these roadways should be sufficiently adaptable to the context of its current surroundings and potential development. Similarly, the development of land adjacent to arterial roadways should be sensitive to the mobility function of the corridor.

Roadway Access Management

Complementing the roadway development concepts of Context Sensitive Design is the management of access points to and from a roadway to facilitate traffic flow and safety. Access management addresses the classic trade-off between the two chief functions of major roadways: (1) accommodating higher speed and through traffic, and (2) providing

access to abutting properties. Roads that are designed to move the most traffic also become almost immediately attractive for adjoining land development given both the visibility and the volume of passers-by that the roads offer to frontage properties. However, vehicles turning into and out of driveways – and slowing down and accelerating to do so – introduce "friction" into the system. As traffic volumes increase and more access points occur along a roadway, it becomes more challenging to prevent traffic congestion and reduced travel speeds. Once these trends set in, the full traffic-carrying potential of a road goes to waste. Subsequently, efforts are expended to try to improve the capacity of the roadway and most often involve adding travel lanes.

Access management strategies have a broad reach, drawing principles from transportation, land use, urban design, and planning to create functional and aesthetically pleasing streetscapes. These elements can be incorporated into plans, policies, land development regulations, design standards, and guidelines. Access management treatments predominantly include raised medians and driveway consolidation, but also can involve auxiliary lanes, pedestrian sidewalks/sidepaths and crossings, landscaping and signage, and bicycling and transit accommodations.

Raised Medians

Raised medians limit cross-street movements and improve traffic flow. They have been proven in studies sponsored by the Federal Highway Administration (FHWA) to reduce crashes by over 40 percent in urban areas and over 60 percent in rural areas. Medians also serve as a safe refuge for pedestrians and bicyclists crossing the street, especially compared to two-way left-turn lanes. The placement of the median opening depends on the type of thoroughfare system. Priority should be given to thoroughfares providing mobility and access throughout the entire community. Openings should be provided only for street intersections or major developed areas. Spacing between median openings must accommodate left-turn lanes with proper deceleration and storage lengths. Median treatments can take on many different forms, including full median openings and channelized openings.

Driveway Consolidation

Research sponsored by FHWA shows that the density and design of driveways have a direct impact on roadway safety – the more access connections, the more accidents. The purpose of driveway consolidation and spacing is to limit the number of conflict points while ensuring convenient and safe access to businesses. Driveway consolidation involves the removal of existing access connections, or driveways, for the primary purpose of improving safety. This technique will impact multiple stakeholders, typically requiring cooperative agreements between each property owner and governing agency attempting to consolidate the driveways. Each driveway presents a potential conflict point; thus, a safer redesign would use an internal circulation system to funnel site roadway traffic through one major access point. Driveway realignment involves the relocation of driveways so that they mirror or offset one another to minimize potential conflicts.

Auxiliary Lanes

Deceleration and acceleration lanes at major driveways can provide refuge for turning vehicles while maintaining travel speeds for traffic though lanes. Auxiliary turn lanes at intersections allow turning traffic to get out of the way of through traffic and wait to

turn using gaps in opposing traffic. These treatments increase the capacity and average travel speed of the roadway, while enhancing driver safety.

Pedestrian Sidewalks/Sidepaths and Crossings

Pedestrians are a critical user group of intra-city travel, especially in urban and mixed-use centers. Well-designed pedestrian environments not only encourage walking, but also they separate pedestrians from vehicular traffic to increase the safety and enjoyment of this experience. Well-designed, safe, convenient, and attractive pedestrian environments will increase the viability of walking as an alternative transportation mode. Intersections are the most dangerous pedestrian environments. The location and design of crosswalks, median rests, curb ramps, and pedestrian signals help to improve the safety and accessibility of pedestrian crossings.

Landscape and Streetscape

Landscaping provides functional and aesthetic benefits to the streetscape through the use of scale, shade, and color. Improvements may include shade trees, hanging flower baskets, flower boxes, decorative signage, and entry features. Planting amenities can require higher maintenance costs than streetscape and street furniture, but they offer natural beauty and a much grander scale. Landscaping is also used as a traffic calming device to reduce the speed of automobiles. When street trees are placed along the sidewalk edge or in the median, their presence creates the appearance of reduced area of the roadway available to vehicles. This influence has a “traffic calming” effect.

Signage

With regard to access management, roadway signs create order to traffic flow and thus improve its efficiency by:

- Regulating and channelizing motorists along streets and highways;
- Informing motorists of conflicting routes and speeds, such as driveways, intersections, and parking areas;
- Directing motorists to streets, highways, cities, towns, villages, or other significant destinations;
- Alerting motorists of changes or hazards within the roadway; and
- Providing other information of value to road users.

Referenced Thoroughfare Plans
Considered During Development of
Denton County Thoroughfare Plan

Town of Argyle (2010)
City of Aubrey (2015)
Town of Bartonville (2012)
City of Carrollton (2007)
City of Celina (2014)
Town of Copper Canyon (2009)
City of Corinth (2014)
City of Cross Roads (2015)
City of Denton (2015)
Town of Flower Mound (2013)
City of Fort Worth (2016)
City of Frisco (2006, 2014 update)
Grayson County (2014 Draft)
Town of Highland Village (2008)
Town of Hickory Creek (2008)
City of Justin (2013)
City of Krugerville (2004)
City of Krum (2005)
Town of Lakewood Village (2014)
City of Lewisville (2007)
Town of Little Elm (2017)
Town of Northlake (2016)
City of Oak Point (2006)
City of Pilot Point (not dated)
Town of Ponder (2004)
Town of Prosper (2014)
City of Roanoke (2007)
City of Sanger (2007)
Town of Shady Shores (2016)
City of The Colony (2012)
Town of Trophy Club (2013 land use)
Town of Westlake (not dated)

APPENDIX B East-West Connector Scenarios Comparison

Three thoroughfare network scenarios were tested in the NCTCOG model to gauge the impact of extending the Collin County Outer Loop as the East-West Connector between DNT and I-35 in Denton County's thoroughfare network. The base "No Build" scenario examined the network without the East-West Connector, Scenario Two (2) examined it as an arterial corridor, and Scenario Three (3) as a freeway. The scenarios looked at the East-West Connector's overall impact on traffic volumes throughout the county to help inform future policy decisions regarding the corridor. The following section summarizes the three East-West Connector scenarios and their impact on the County transportation. Given the vastness of the network, four key roadways were reviewed to provide a focal point for comparison: US 380, FM 455, the Lewisville Toll Bridge and FM 428/East-West Connector. These other three roadways, in theory, are in close enough proximity to the East-West Connector corridor to be significantly impacted by its presence. Other county facilities, such as SH 121, which has the highest 2035 projected volumes in the county (up to 145,600) are not significantly affected by the implementation of the East-West Connector.

East-West Connector - Base No Build Scenario

If Denton County continued to grow as projected through 2035 without an East-West Connector, congestion levels on the selected comparison corridors would reach poor levels of service during both AM and PM peak period conditions by 2035. Daily level-of-service would reach Level-of-Service F as well. A tabulation of the 2035 forecast volumes on major east-west corridors in the No-Build scenario is presented in **Table B1,** and the forecast Level of Service on the modeled network for the daily, AM peak (3 hours) and PM peak (3.5 hours) time periods are shown in **Figures B1, B2,** and **B3**, respectively.

- US 380, a six (6) lane principal arterial in 2035, is projected to carry about 92,300 vehicles per day with AM peak period volumes of 14,566 and PM Peak period volumes of 21,403.
- FM 455, a four (4) lane minor arterial in 2035, has a daily volume of about 30,400, and AM and PM peak period volumes of 6,311 and 5,462 respectively. Interestingly, AM peak period level-of-service is at a level DE and PM Peak period level-of-service is at level F – despite the lower projected volume.
- The Lewisville Toll Bridge is projected to reach daily volumes of about 38,500 by 2035. AM peak period volumes are projected to reach 6,719 and PM peak period volumes are projected to reach 10,329.
- FM 428 would be a four (4) lane minor arterial in 2035, projected for carry about 23,750 trips per day at level-of-service F. The AM peak period volumes are projected to reach 7,017 and PM peak period volumes are projected at 9,505.

Table B1. 2035 No Build Scenario East-West Connector Traffic Volumes

Road	Daily Volume	AM Peak Period	PM Peak Period
FM 455	30,373	6,311	5,462
FM 428	23,751	7,017	9,505
US 380	92,357	14,566	21,403
Lewisville Toll Bridge	38,436	6,719	10,329
Total Screen Line	184,917	34,613	46,699

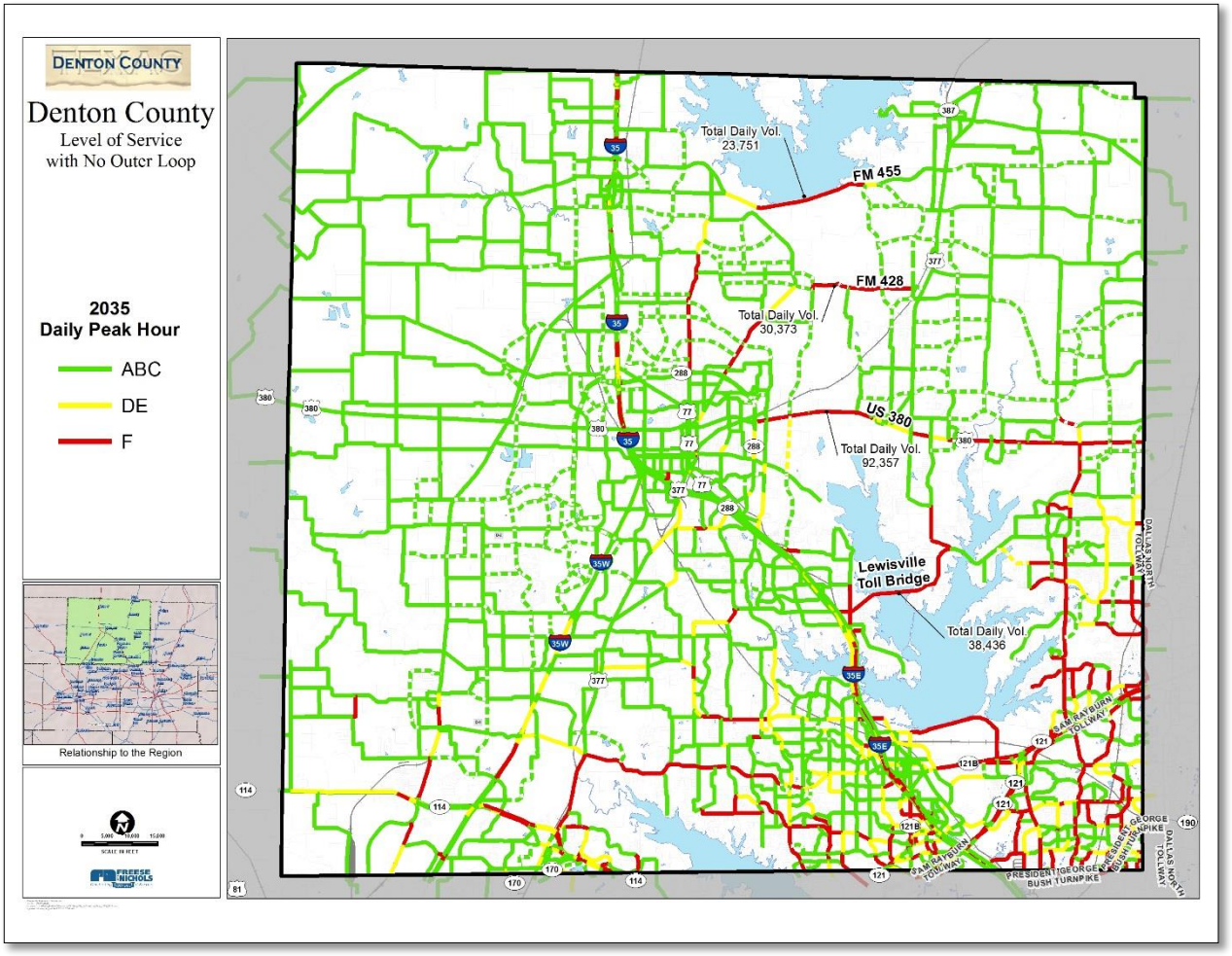


Figure B1. Denton County 2035 Daily Level-of-Service - No Build East-West Connector Scenario

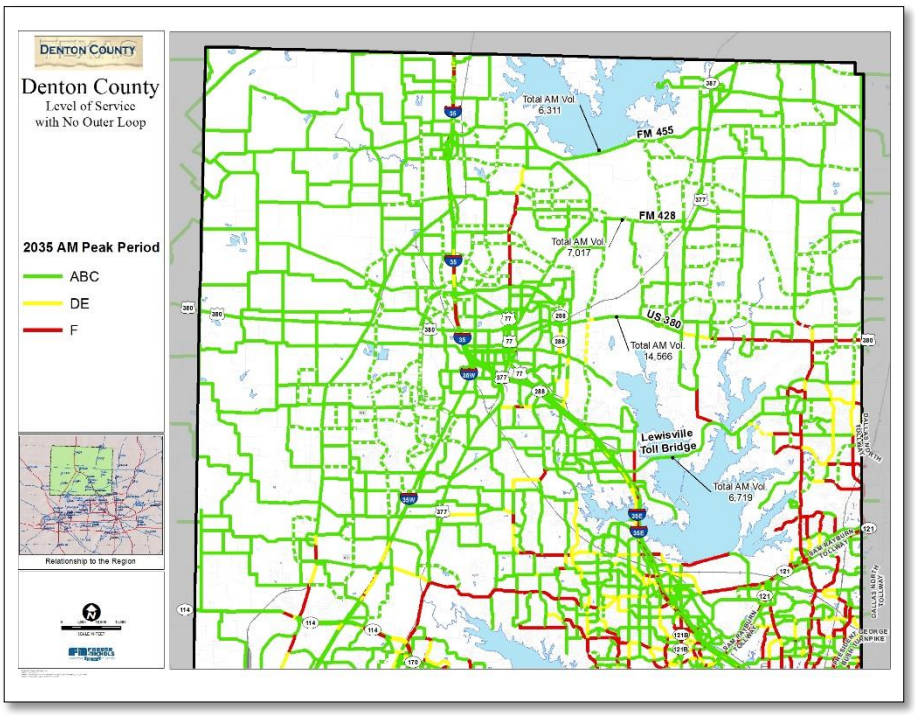


Figure B2. Denton County 2035 AM Peak Period Level-of-Service – No Build East-West Connector Scenario

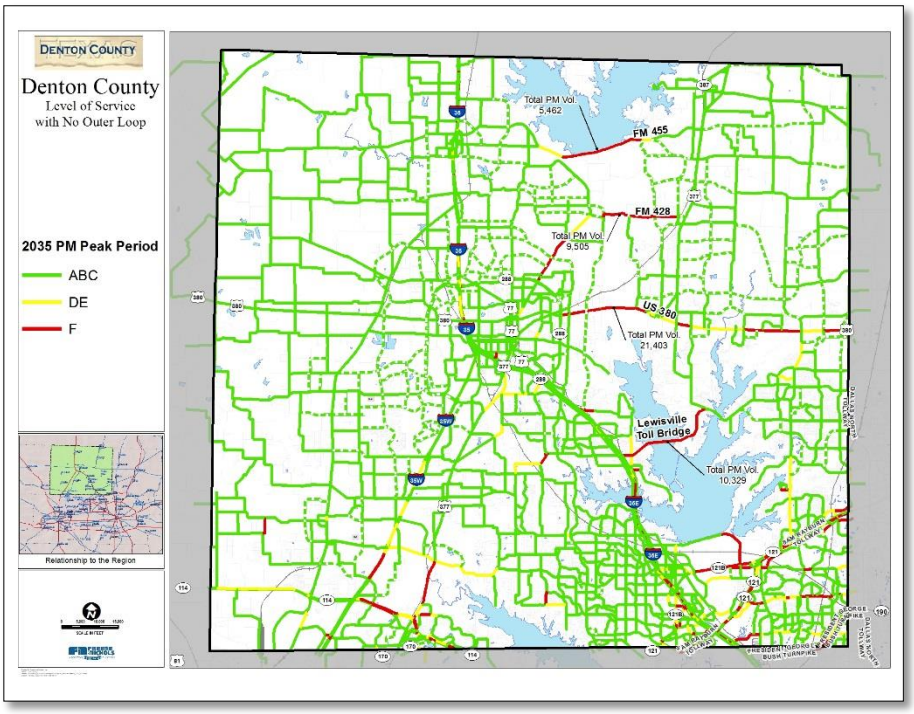


Figure B3. Denton County PM Peak Period Level-of-Service – No Build East-West Connector Scenario

East-West Connector – Arterial Scenario

As a principal arterial, the East-West Connector would be a four-lane partial access controlled facility. As such, the East-West Connector is projected to have a 2035 daily volume of about 51,600 and operate at a daily Level-of-Service F, indicating that it should be six lanes or greater. AM peak period volumes are projected around 11,900 (LOS F), and PM peak period volumes are about 15,300 (LOS F). With the exception of FM428, the impact on four key roadways was minimal. The volumes decreased, but not enough the improve level of service. A tabulation of the 2035 forecast volumes on the four major east-west corridors in the East-West Connector - Arterial scenario is presented in **Table B2,** and the forecast Level of Service on the modeled network for the daily, AM peak (3 hours) and PM peak (3.5 hours) periods are shown in **Figures B4, B5** and **B6**, respectively.

- Daily volumes along US 380 decreased by about 3,250 vehicles per day (by about 4%) to about 89,100. The AM peak period volumes decreased by about 8% to 13,761, and PM peak period volumes decreased by about 5% to 20,334.
- Daily volumes along FM 455 were 18 percent lower in the Arterial scenario at 19,438 and PM peak period volumes were 13 percent lower at 4,740. Interestingly, AM Peak period volumes, were 49 percent higher than the no-build scenario at 5,399.
- 2035 volumes along the Lewisville Toll Bridge were not largely affected in the Arterial Outer Loop scenario. Daily volumes decreased three (3) percent to 37,500, and the level-of-service remained at F. AM peak period volumes decreased one (1) percent to 6,646, and PM peak period volumes decreased two (2) percent to 10,089.
- Daily volumes on the FM 428 corridor increased by 23,850 vehicles per day (by 117%) to about 51,600 vehicles per day when configured as an arterial East West Connector with enhanced connectivity.
- Notably, the total east-west volumes across the screen line increase above that in the base scenario by about 12,750 vehicles per day. This amount represents a larger regional re-allocation of trips across the county due to the enhancement of east-west mobility, adding a major east-west arterial roadway corridor.

Table B2. 2035 Arterial East-West Connector Scenario Traffic Volumes

Road	Daily Volume	AM Peak Period	PM Peak Period
FM 455	19,438	5,399	4,740
East-West Connector	51,608	11,858	15,336
US 380	89,111	13,761	20,334
Lewisville Toll Bridge	37,515	6,649	10,089
Total Screen Line	197,672	37,667	50,499

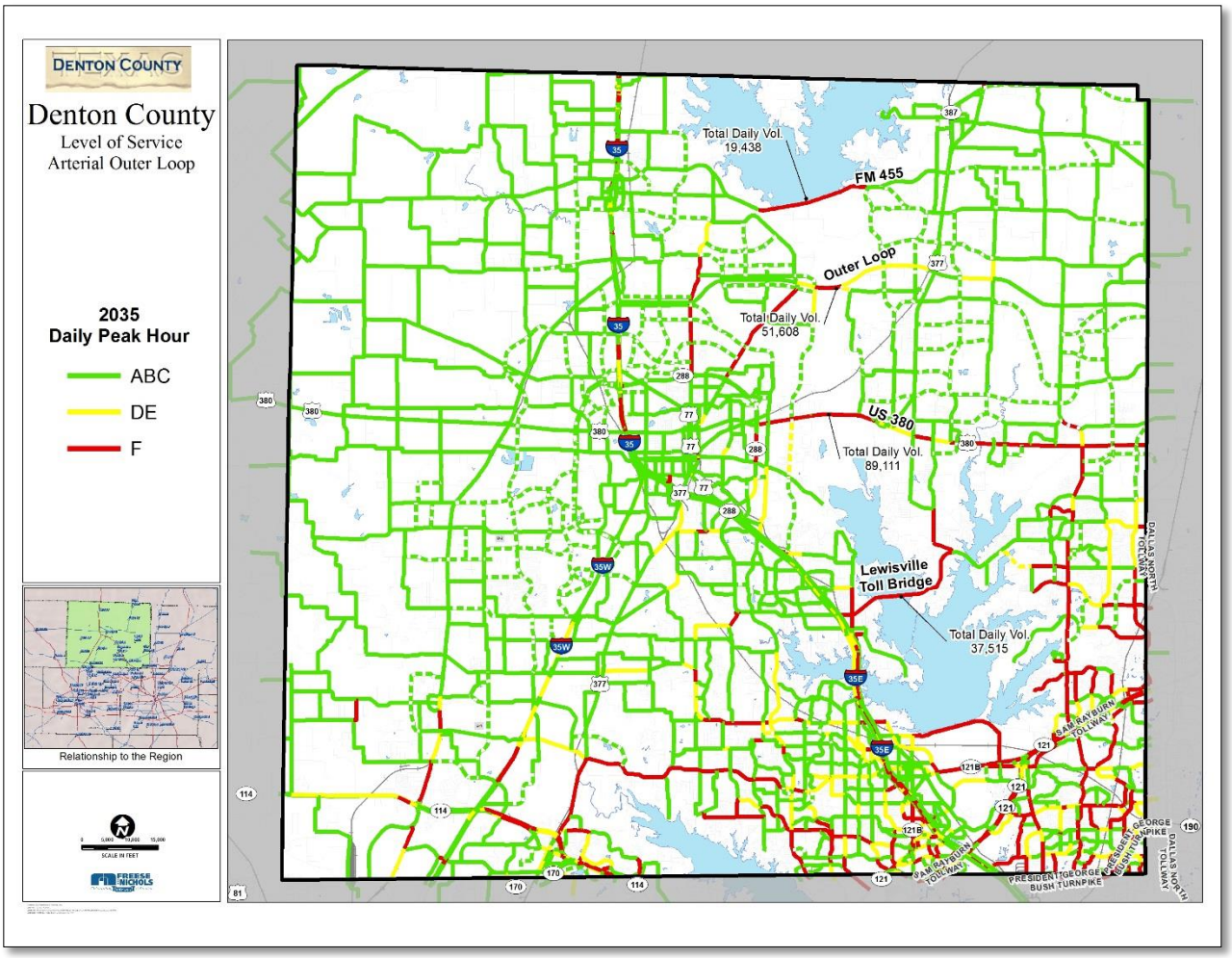


Figure B4. Denton County 2035 Daily Traffic Volumes - Arterial East-West Connector Scenario

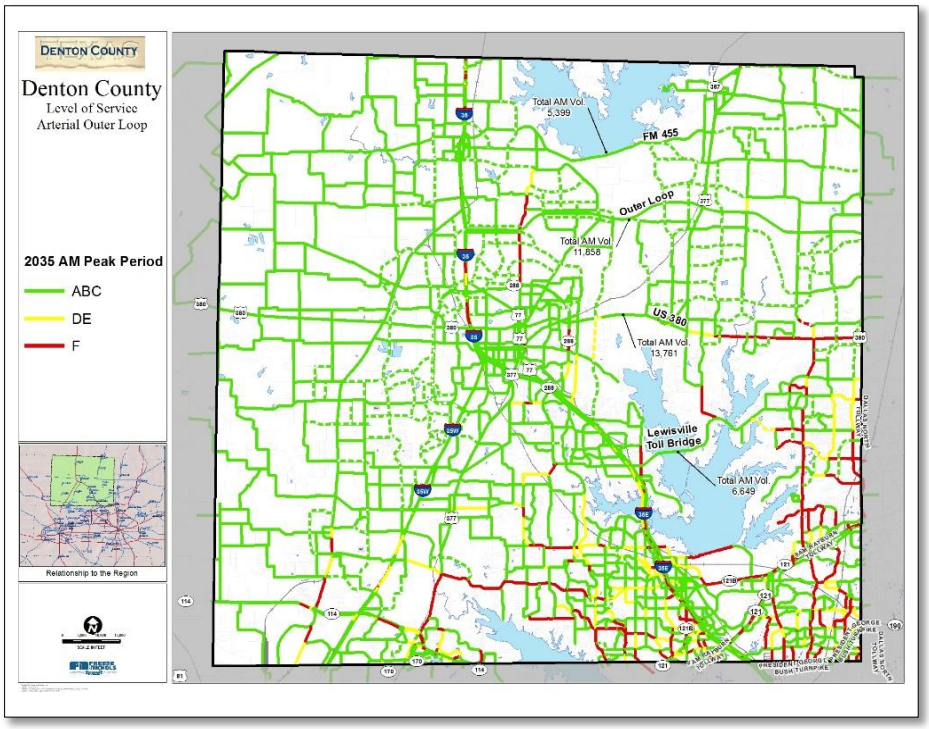


Figure B5. Denton County 2035 AM Peak Period Level-of-Service – Arterial East-West Connector Scenario

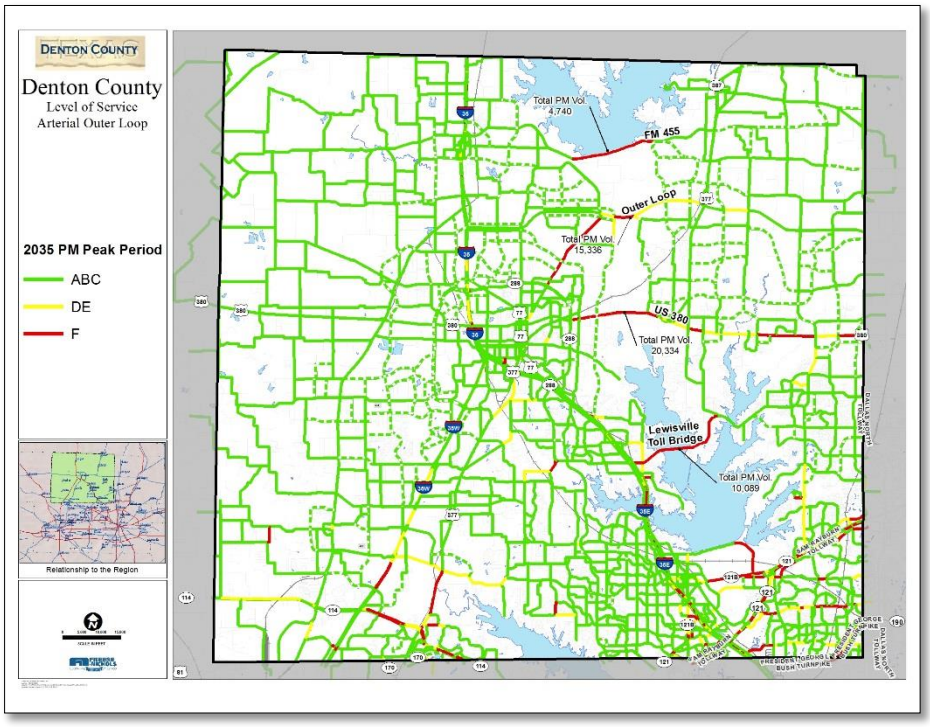


Figure B6. Denton County 2035 PM Peak Period Level-of-Service – Arterial East-West Connector Scenario

East-West Connector – Freeway Scenario

As a freeway, the East-West Connector would be a six-lane access controlled facility designed to provide significant regional mobility. As a freeway, the East-West Connector is projected to have a 2035 daily volume of about 76,100 vehicles per day and operate at a daily level-of-service F. This is 47% more traffic than the facility is projected to accommodate as an arterial. AM peak period volumes are projected around 14,933 (LOS F), and PM peak period volumes are about 20,325 (LOS F). Similar to the Arterial Scenario, the Freeway scenario only showed a significant impact on FM 428. The volumes decreased, but the level-of-service remained at F. A tabulation of the 2035 forecast volumes on major east-west corridors in the East-West Connector - Freeway scenario is presented in **Table B3,** and the forecast Level of Service on the modeled network for the daily, AM peak and PM peak periods are shown in **Figures B7, B8** and **B9**, respectively.

- Daily volumes along US 380 are projected to reach 87,100, two (2) percent lower than the arterial scenario, AM peak period volumes were three percent higher at 13,807, and PM peak period volumes decreased one (1) percent to 20,223.

- Volumes along FM 455 were significantly lower in the Freeway Outer Loop Scenario. Daily volumes along the facility were 33 percent lower than the no-build scenario with 15,844 trips. Level-of-service, however remained at F. Despite significantly lower daily volumes, AM Peak period volumes were actually higher in the Freeway Scenario, with volumes 16 percent higher (4,177 vehicles) than the no-build scenario. PM peak period volumes, however, were 24 percent lower than the base scenario at 4,157 vehicles.

- 2035 volumes along the Lewisville Toll Bridge were not largely affected by the construction of the Outer Loop as a freeway. Daily volumes were 5 percent lower than the base scenario at 36,546, and AM peak period volumes were one (1) percent lower at 6,641. PM peak period volumes were three (3) percent lower at 9,971.

- Notably, the total east-west volumes across the screen line increase above that in the base scenario by about 30,700 vehicles per day. This amount represents a larger regional re-allocation of trips across the county due to the enhancement of east-west mobility, adding a major east-west arterial roadway corridor. The screen line increase is about 18,000 more than for the East-West Corridor as an arterial, and carrying nearly slightly more than US 380 during the AM and PM peak periods, indicating the significance of creating the freeway corridor rather than an arterial corridor.

Table B3. 2035 Freeway East-West Connector Scenario Traffic Volumes

Road	Daily Volume	AM Peak Period	PM Peak Period
FM 455	15,844	4,177	4,157
East-West Connector	76,102	17,518	20,235
US 380	87,100	13,807	20,223
Lewisville Toll Bridge	36,564	6,641	9,971
Total Screen Line	215,610	42,143	54,586

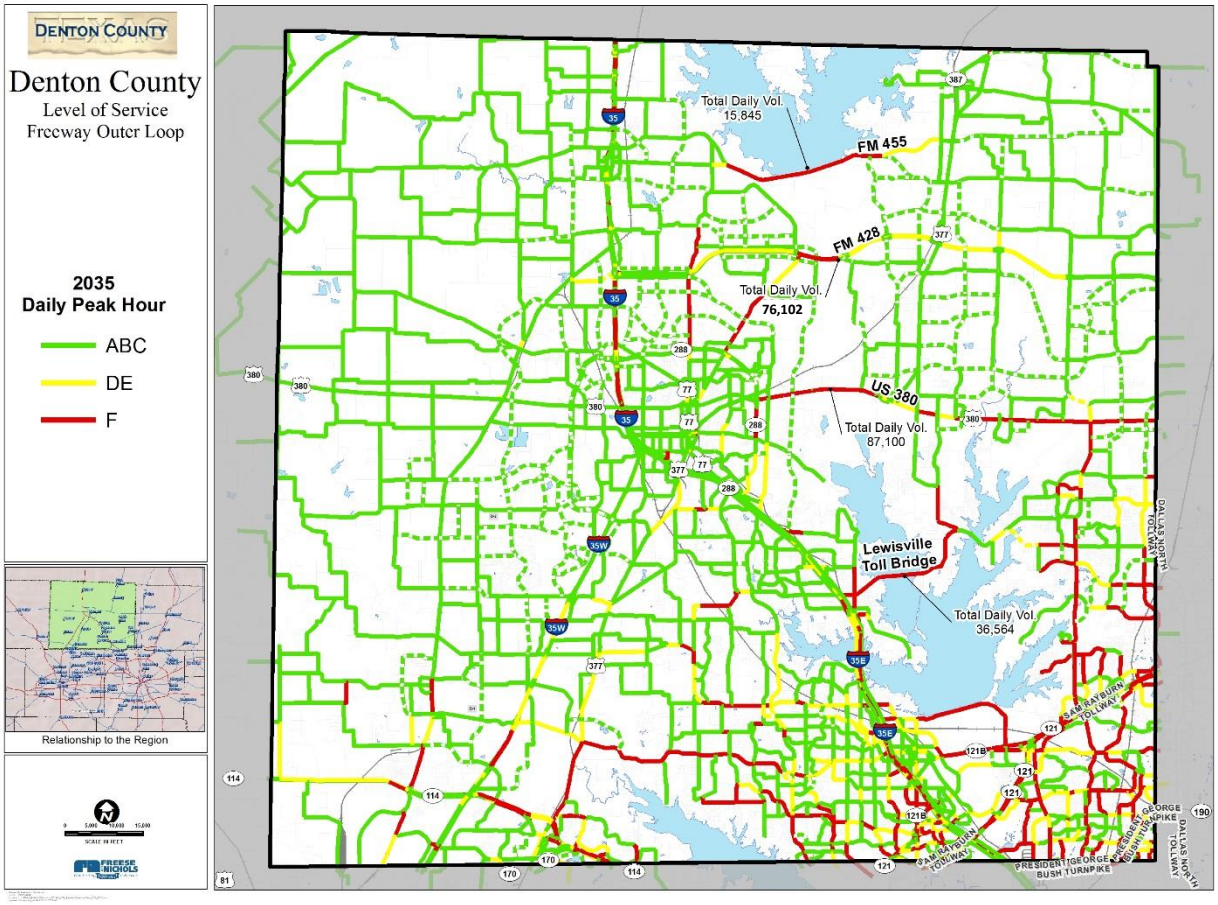


Figure B7. Denton County 2035 Daily Level-of-Service - East-West Connector Freeway Scenario

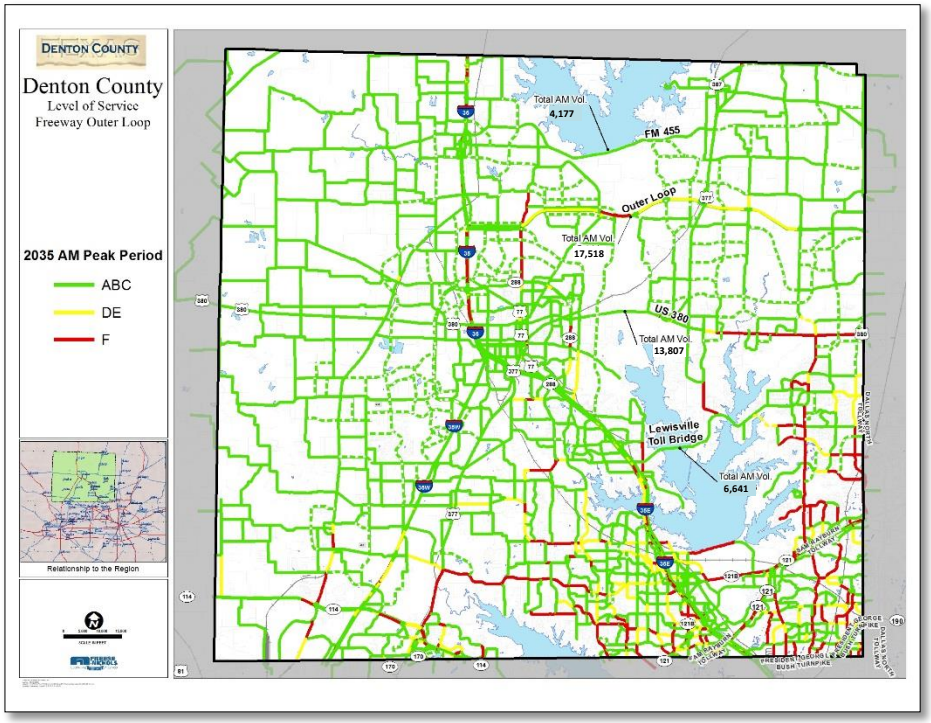


Figure B8. Denton County 2035 AM Peak Period Level-of-Service – East-West Connector Freeway Scenario

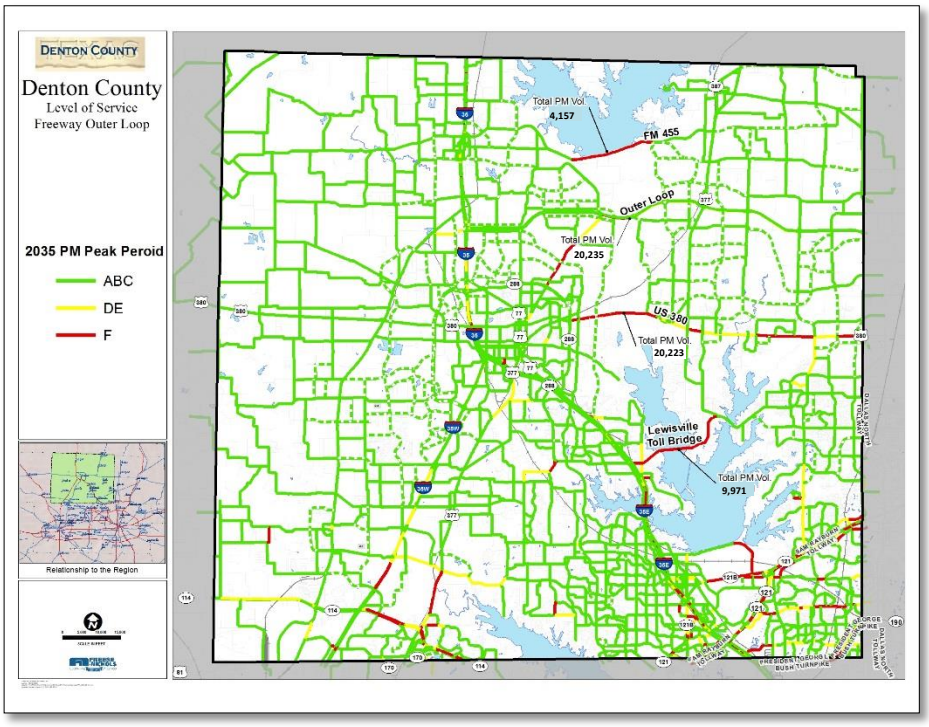


Figure B9. Denton County 2035 PM Peak Period Level-of-Service – East-West Connector Freeway Scenario

Recommended Configuration

The East-West Connector is projected to divert a high volume of traffic from paralleling east – west corridors whether it is constructed as an arterial or freeway. This will be further realized as development patterns realign to capitalize on the utility of the corridor, and the NCTCOG travel demand model is updated to capture the subsequent development trends. The East-West Connector, however, is not a fix-all solution for congestion in Denton County as a whole or along its parallel corridors. Despite the high volumes of traffic diverted to the East-West Connector, the adjacent corridors will still experience high congestion.

To address the 2035 east-west mobility needs for Denton County, the following recommendations were developed for the East-West Connector Corridor:

- Ultimate six-lane highway section, with frontage roads as appropriate, from DNT in Collin County to I-35;
- Ultimate 6-lane to 8-lane highway section with limited access and no frontage roads through floodplain, from US 377 to FM 428 northeast of city of Denton;
- Typical Roadway Section: Rural divided highway with shoulders and open ditch drainage;
- ROW width: Up to 500 feet at rural sections with frontage roads, 150 to 200 feet through environmentally sensitive areas for main lanes only; and
- Interchanges at I-35, FM 2164, FM 428/Post Oak Road, US 377, FM 2951, FM 1385, and Teel Parkway.