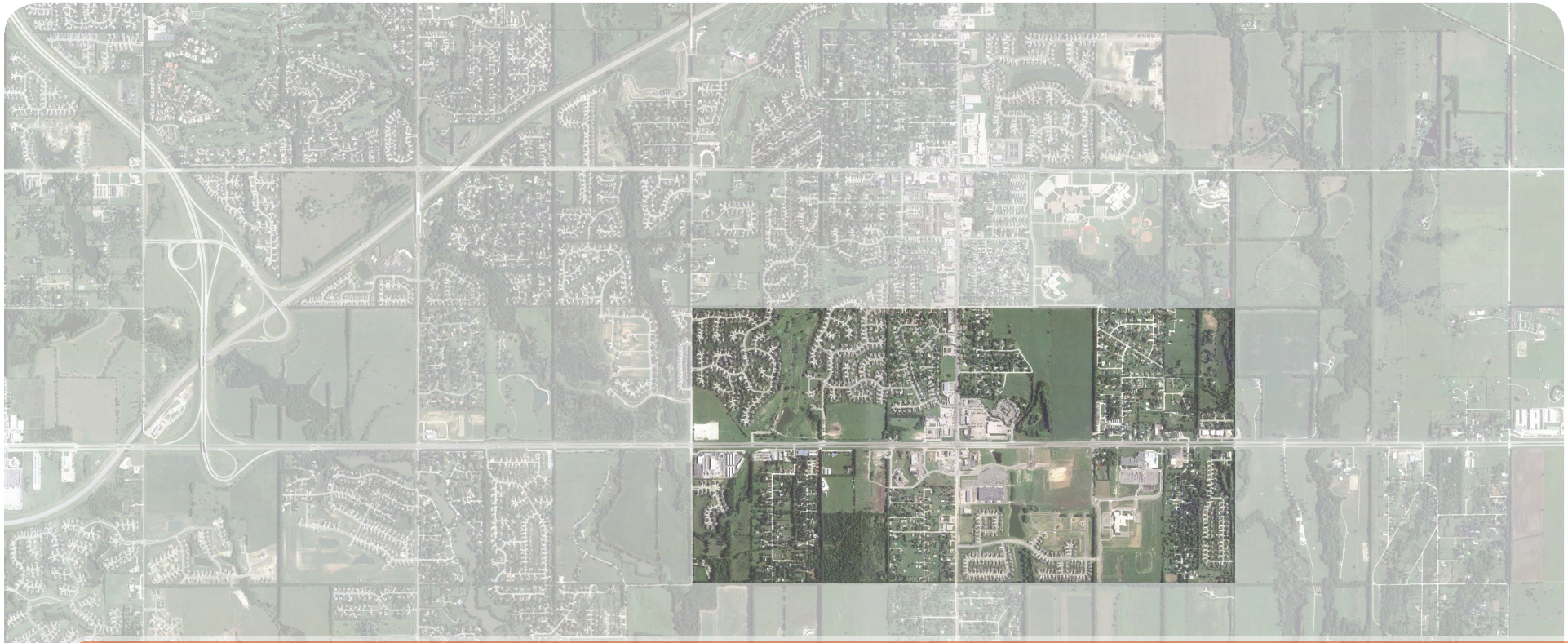

City of Andover

US 54/400 Corridor Study

December 2011

ANDOVER KANSAS

Kansas Department of Transportation

WAMPO
Wichita Area Metropolitan Planning Organization

PARSONS BRINCKERHOFF

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The suggestions and recommendations made in this report are for the purposes of discussion and debate in regard to corridor redevelopment. Some of the ideas contained herein have regard to private and public lands. These ideas have been developed as a professional service without the full consultation of property owners.

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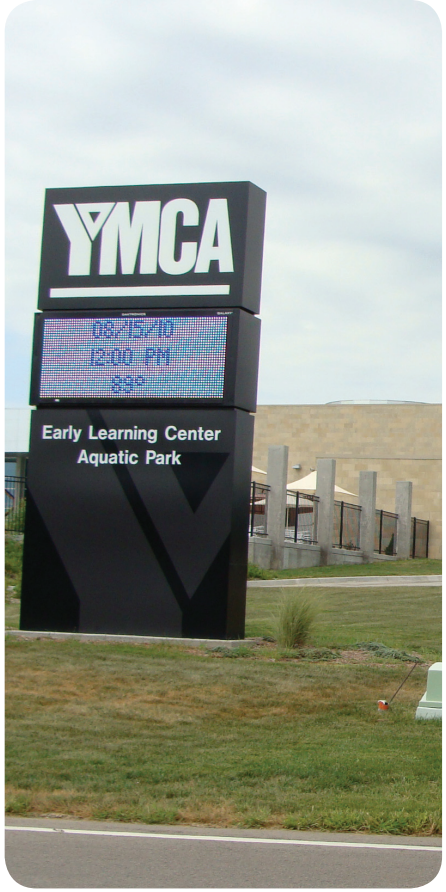
Executive Summary

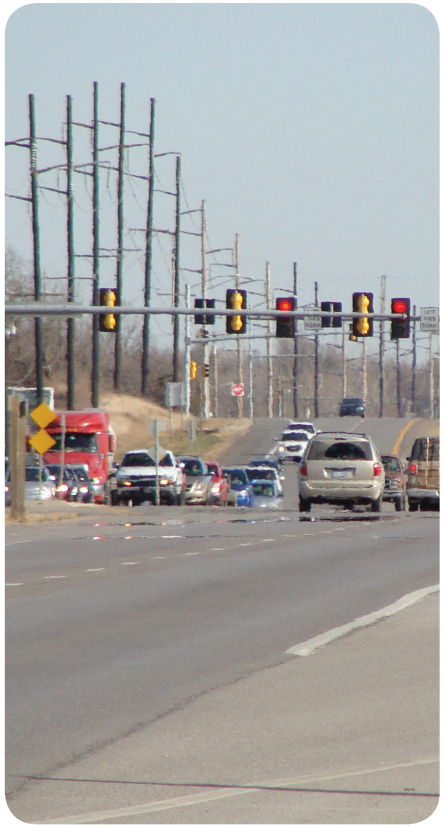
The City of Andover, Kansas in collaboration with the Kansas Department of Transportation and the Wichita Area Metropolitan Planning Organization initiated a two and a half mile corridor study along US 54/400 from 159th Street (Sedgwick/Butler County line) to a half mile east of Prairie Creek Road. Increased traffic from the growth occurring in adjacent Sedgwick County and the City of Wichita as well as western Butler County and the City of Andover is straining existing transportation infrastructure. The US 54/400 Corridor Study is the initial step to identify and preserve a corridor footprint for future construction. The study also includes an urban design analysis; to provide direction for the integration of land use and transportation, and corridor character principles; to provide direction of the overall character of development for the City of Andover. US 54/400 bisects the City of Andover, and the City is concerned about the impact an expanded freeway footprint will have on its ability to maintain and promote the small-town quality of life it is known for. Drawing dense new development to the US 54/400 corridor will capture a high volume of new vehicle trips within the east-west corridor, minimizing increased congestion on the north-south roads. This would preserve the character of the City of Andover while providing an economic development catalyst to increase municipal revenues.

To accommodate the increased density envisioned for the corridor a robust transportation network is needed. Representatives from the City of Andover, Kansas Department of Transportation, Wichita Area Metropolitan Planning Organization, Federal Highway Administration, Butler County, Sedgwick County, and the City of Wichita with input from public officials and other stakeholders developed and evaluated four horizontal roadway alternates and two vertical alternatives. Traffic analysis, corridor uniformity, driver expectancy, and safety determined that the preferred alternative was providing three full interchanges at the mile line roads (159th Street, Andover Road, and Prairie Creek Road) with frontage roads. Public officials and the community recommended depressing the freeway section under Onewood Drive, Andover Road, and Yorktown Road despite the additional construction, operational, and maintenance costs associated with this option. The corridor width that needs to be preserved to implement the recommendations is 350 feet, 175 feet north and south of the proposed centerline. This width takes into account US 54/400, associated frontage roads, and utility easements north and south of US 54/400.



This plan provides a series of integrated strategies that can be used to guide public and private investment and allow the City to realize their community vision.

Project Description



The City of Andover, Kansas in collaboration with the Kansas Department of Transportation and the Wichita Area Metropolitan Planning Organization has initiated a two and a half mile corridor study along US 54/400 from 159th Street (Sedgwick/Butler County line) to a half mile east of Prairie Creek Road. Most of the corridor is within Andover's city limits. Increased traffic from the growth occurring in adjacent Sedgwick County and the City of Wichita as well as western Butler County and the City of Andover is straining the transportation infrastructure.

The US 54/400 Corridor Study is part of an ongoing effort begun in the 1980s to upgrade US 54/400 to a freeway standard through the cities of Goddard, Wichita, and Andover. Expanding the roadway from a four lane expressway to a six lane freeway began in 1990 in Wichita's Central Business District with the Kellogg Flyover. Subsequent projects have extended the freeway section both east and west, and with the completion of the Rock Road section US 54/400 is a 13 mile long six lane freeway from 111th Street on the west side to Cypress Road on the east side. In 2007, the City of Wichita initiated the final design for Cypress to 127th Street and the development of right-of-way plans from 127th Street to 159th Street. In 2009, Andover began developing concepts from 159th Street to one half-mile east of Prairie Creek Road. This effort built upon the work presented in the September 2002 US-54 Highway Alignment Report prepared for Butler County by Poe & Associates.

Andover views this study as an initial step needed to identify and preserve a corridor footprint for future construction. Because this six-lane freeway will bisect the City of Andover, which is very concerned about its ability to maintain and promote a small town quality of life, the planning study includes an urban design analysis and corridor character principles. The inclusion of these elements in the corridor study will help the City of Andover make development decisions along the corridor that promote their desired vision.

The goal of the US 54/400 Corridor Study is to develop a plan that is safe, functional, consistent with the community vision and eligible for funding.

Purpose

The purpose of the US 54/400 Corridor Study is to develop a plan for the US 54/400 corridor that improves overall functionality, capacity and safety that is consistent with the community vision and regional concerns and that remains eligible for all possible sources of funding. The purpose has two elements: 1) develop a design concept for expanding the roadway between 159th Street to one half mile east of Prairie Creek Road from a four lane expressway to a six lane freeway and 2) create a corridor development framework that represents Andover's development vision and planning principles. The expansion of US 54/400 is viewed as a catalyst for enhancing economic development in the corridor, and the development framework describes and specifies how Andover would like the corridor to develop.

Why the Study is Needed

1. *Transportation demands exceed capacity.* The continued growth of the City of Andover, Butler County, the City of Wichita, and Sedgwick County are straining the current transportation infrastructure. As the major regional east-west corridor, improvements to US 54/400 Highway are needed to sustain future growth. Upgrading US 54/400 to a six lane freeway between Goddard and Andover has been a regional transportation priority since the mid-1980s.

2. *Right of way identification and preservation protects future economic development opportunities.* The US 54/400 corridor improvements through Andover will shape the city's future. In order to ensure that Andover gets the future it desires, the right of way for improvements needs to be identified and preserved. Protecting the right of way reduces disruptions to homes and businesses by limiting possible conflicts in the right of way. It can also reduce the eventual cost of acquiring the land, which reduces the overall cost of constructing a project.

3. *Andover desires a new way to grow.* Residents have seen the vacant big box stores along other parts of US 54/400 and want to avoid that outcome. Andover wants to maintain its small town feel and needs to create a plan that allows development today while protecting future opportunities.

Study Objectives

The objectives of the US 54/400 Corridor Study are to:

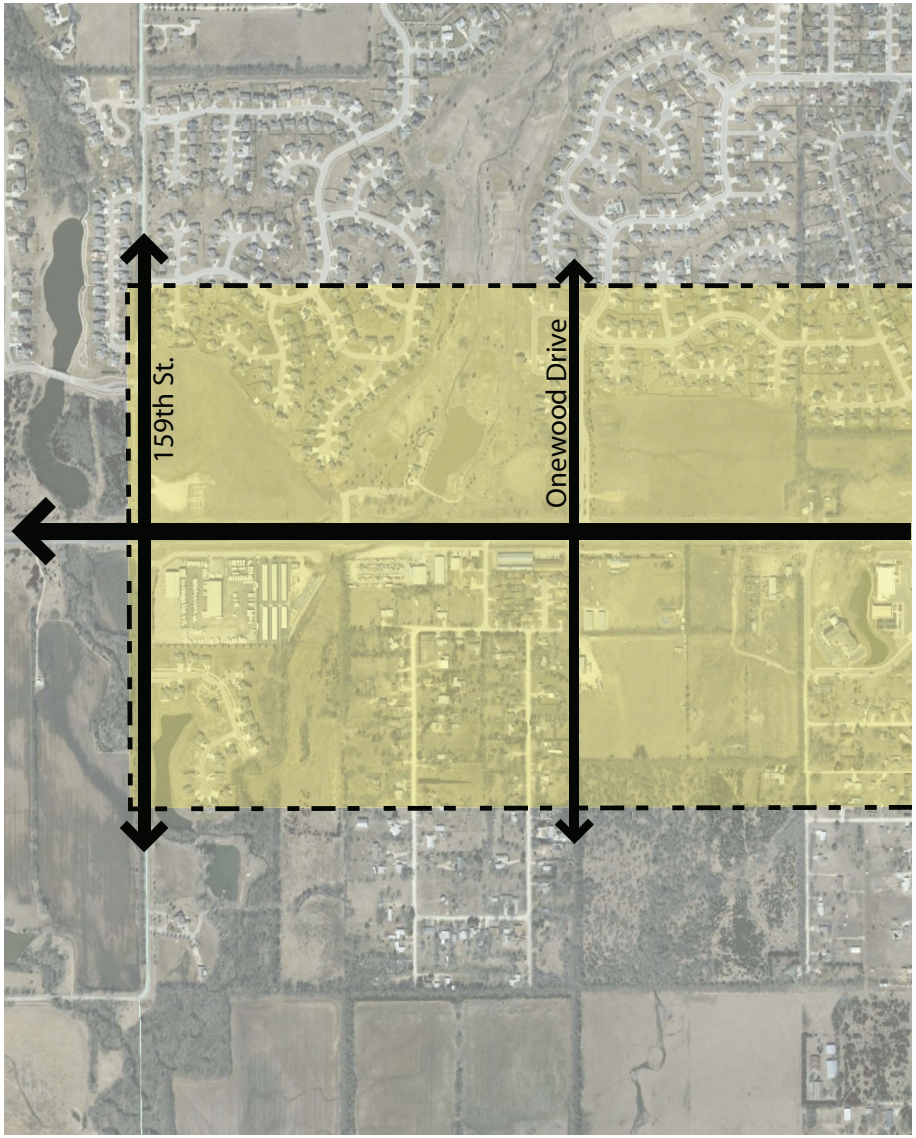
- Recommend improvements to US 54/400 that serve national, regional, and local traffic needs in terms of safety, capacity, and travel time.
- Identify transportation improvements that create opportunities within the community for economic development, accessibility, and a better quality of life.
- Develop an action plan that ensures funding eligibility now and in the future by adhering to local, state, and federal requirements including but not limited to environmental compliance, right of way compliance, and social justice.
- Propose a plan that is economically feasible and maximizes opportunities for phased progress.
- Motivate the public, elected officials, and other stakeholders to take action in support of the recommended improvements.
- Provide public officials with a development framework that can be used as a decision making tool to evaluate new development proposals in proximity to the corridor.

Existing Corridor

Existing Andover Road

Study Area

The study area is in Butler County and is approximately a one half mile wide corridor centered on two and a half miles along US 54/400, between 159th Street and a half mile east of Prairie Creek Road. Figure 1 shows the study area.



Study Partners

A study of this magnitude is not done alone or by one agency. The City of Andover is working with the Kansas Department of Transportation (KDOT), the Wichita Metropolitan Planning Organization (WAMPO), and the Federal Highway Administration (FHWA) to prepare the US 54/400 Corridor Study. Each agency has a different function in the study and in the implementation of the recommendations.

The City of Andover is responsible for the planning, design, and construction oversight of the city's infrastructure needs.

KDOT is responsible for the planning, development, and operation of various modes and systems of transportation within the state. KDOT is primarily responsible for maintaining and improving the state highway system.

WAMPO is responsible for shaping the transportation planning process for the City of Witchita, the City of Mulvane, Sedgwick County, a portion of unincorporated Sumner County, and a portion of Butler County, which includes the City of Andover.

FHWA is responsible for administering and overseeing Federal highway programs to ensure Federal funds are used efficiently.

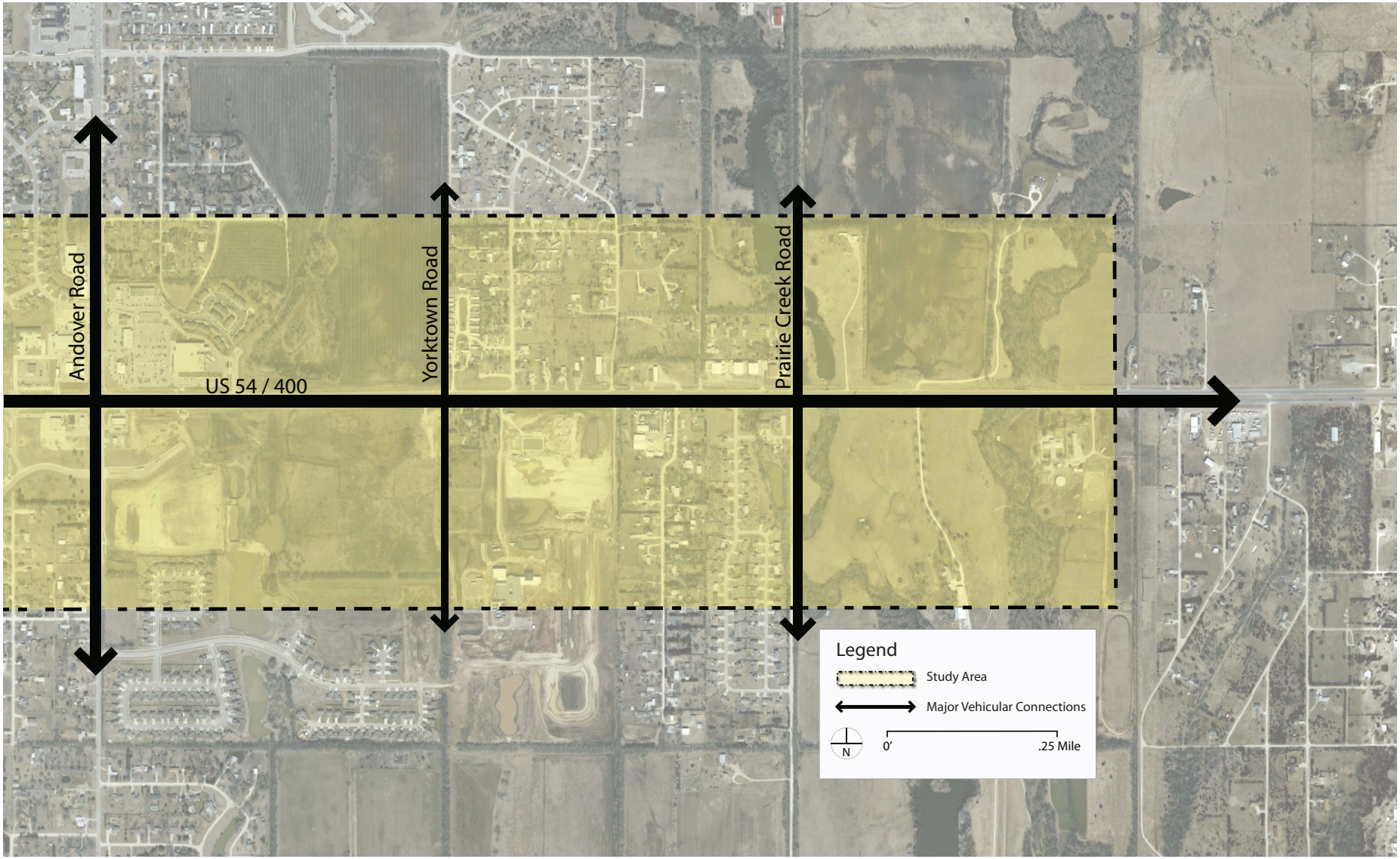


Figure 1: Study Area Map

Public Participation

To keep stakeholders and the public informed about the US 54/400 Corridor Study and to solicit their feedback on the study's direction, assumptions, and outcomes a number of different engagement strategies were used. See Appendix A for comment cards and evaluation matrix.

Core Team

The Core Team consisted of the study partners and provided a forum for communicating with the design team. The City of Andover, Kansas Department of Transportation (KDOT), Wichita Area Metropolitan Planning Organization (WAMPO), Federal Highway Administration (FHWA), Butler County, Sedgwick County, and the City of Wichita were members of the Core Team. The Core Team received updates on project progress, provided input on key issues, and addressed study concerns.

One of the Core Team's first assignments was to develop, in collaboration with Andover officials, the project's purpose, need, and objectives. This was done by polling participants about what SHALL, SHOULD, and MAY be required for a successful project. The design team used this information to develop alternatives. Once the alternatives were developed, the Core Team provided input on the alternatives and the interchangeable features associated with them. This discussion provided the design team with information needed to refine the alternatives. The Core Team discussed the refined alternatives and recommended moving forward with a single, preferred alternative, which would be further refined based on land use, redevelopment potential, environmental review, drainage impacts, and traffic data.

Public/Stakeholder engagement provided substantive input, ensured stakeholder and public concerns received fair consideration.

Community Meeting

In addition to WAMPO's involvement on the Core Team, the design team made presentations at two of WAMPO's Transportation Policy Board meetings. The first meeting introduced the study area, the purpose and need, the schedule, and anticipated agency engagement. At the second meeting the design team presented the study findings.

Public Officials

To keep community leaders up-to-date on study progress and to gain their insights into the issues important to their constituents, a series of meetings were held with members of the Andover City Council, Andover City Planning Commission, and Andover Site Review Committee. The meetings provided opportunities for city officials to give input on key issues and raise study concerns.

Maintaining quality of life and Andover's sense of community and its small-town atmosphere were felt to be critical to ensuring Andover's success, and participants felt that traffic problems would do more to undermine quality of life than any other single contributor. This input, combined with that of the Core Team's, was used to create the study's purpose, need, and objectives. Subsequent meetings with the design team focused on the urban design and planning options associated with the corridor development framework.

Community Stakeholders

To gain feedback from the community, meetings were held with organizations, individuals, and the public. On October 22, 2009 the design team presented to the Andover Rotary and Andover Chamber of Commerce, and on October 26, 2009 and October 27, 2009 stakeholder interviews were held with Andover Schools USD 385, Andover YMCA, and local developers and property owners. Economic development, safety, access, immediate improvement of the US 54/400 and 159th Street intersection, and pedestrian access were the themes ranked highest in priority.

On May 6, 2010 the design team held a public meeting on the proposed improvements to US 54/400. Design team members answered questions from the public and explained the different alternatives. The public was encouraged to provide their comments on the proposed plan, and the request for comments was made at the public meeting, posted on the City's website, and advertised on Channel 7. Comments were accepted from May 6, 2010 to May 21, 2010. The comments were compiled, and based on the comments received, area residents

- Prefer US 54/400 to be a depressed freeway and go under Andover Road
- Support burying the electric transmission line through local financing
- Prefer to use "off the shelf" retaining wall treatments rather than more expensive custom treatments
- Prefer green amenities (landscaping) over hardscape amenities (pavement and structure treatments)

Community Meeting

To update community and civic leaders and gain additional feedback the design team presented the goals of the planning effort and corridor vision themes to the Andover Chamber of Commerce on October 26, 2010 and Andover Connect, a future-focused business group working to stay ahead of the community growth opportunities, on December 8, 2010.

Real Estate Professionals

To gain a local perspective on the corridor development framework, individual meetings were held with eight local real estate professionals in late October and early November of 2010. The overall response to the framework was positive, and they provided the following feedback:

- Capturing the majority of future trips (density) within the US 54/400 corridor would be good for Andover. It would allow for economic development and growth in Andover while maintaining the small-town feel of the community.
- The corridor has development and redevelopment potential, and marketing the plan should occur at the regional and national level.
- Retail alone will not drive development; increasing residential densities makes development more viable; higher densities will promote development, but how much density can be obtained is uncertain.
- Demand exists for “for sale” (non-assisted) multi-family housing, and multi-family housing can increase residential densities, which can lead to more mixed use development.
- Andover’s school system is a strong asset and attracts people to the city.
- The development framework is necessary, but there are differing opinions regarding how strong a role Andover should play in controlling development through policy.
- The plan is long term and a significant absorption period should be assumed.

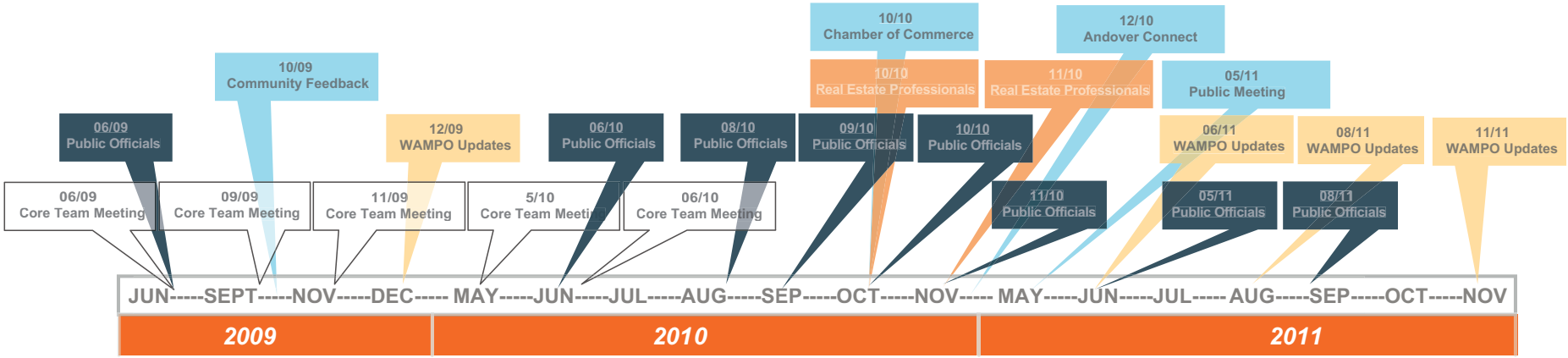
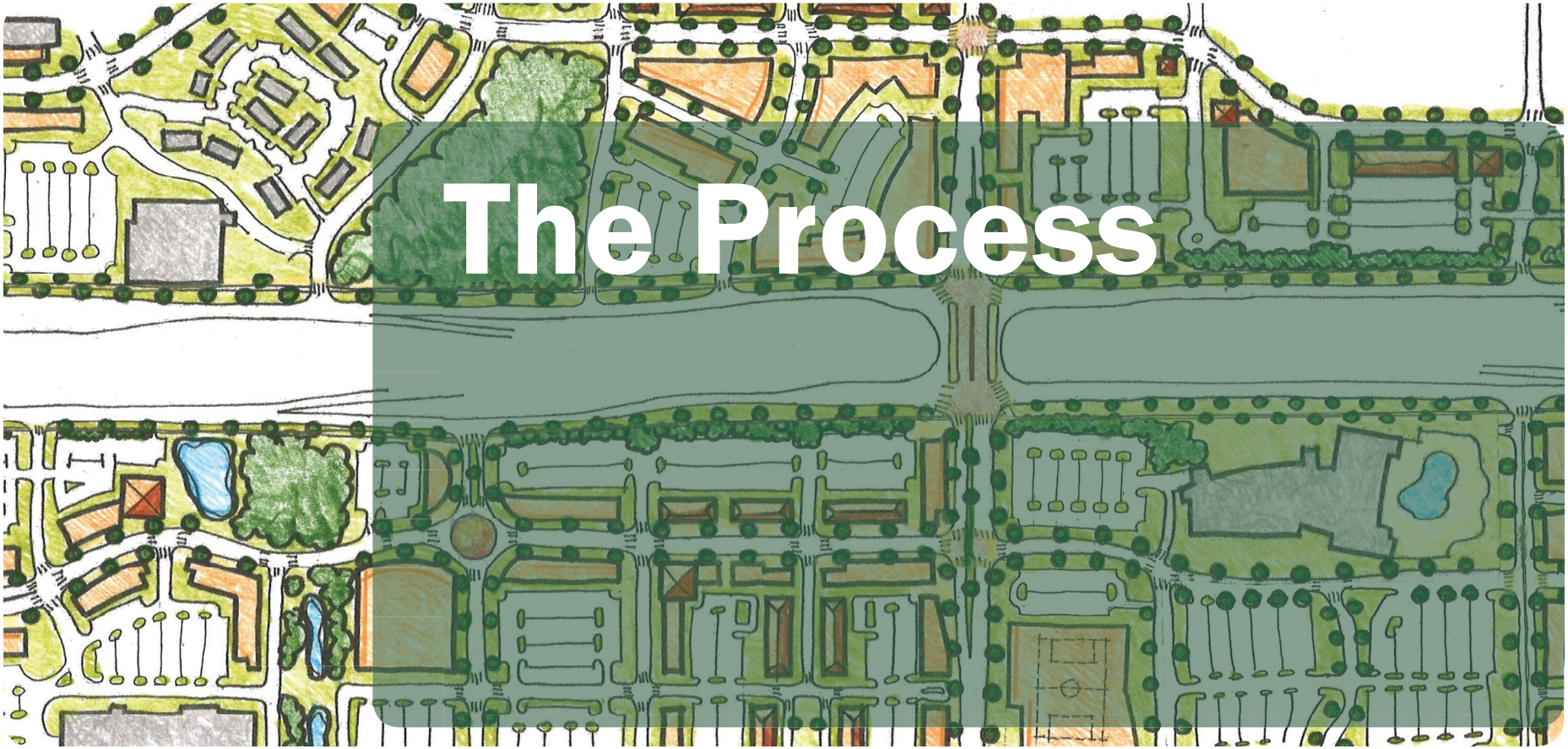


Figure 2 - Stakeholder Timeline



The Process

Integrating Land Use and Transportation

Upgrading US 54/400 has been envisioned for this corridor since the mid-80s. However, as the project became more of a reality to the City of Andover, the potential negative impacts of such an expansion became clearer; they did not want their city bisected by a freeway. They recognized the transportation value and importance of the project, but wanted to ensure that the expansion brought local benefit as well. As a result, the City created a corridor development framework, which describes how they want the corridor to develop. An important first step in developing that vision was to understand the current transportation and land use conditions.

Transportation Considerations

US 54/400 is a major regional corridor on the National Highway System and serves as the main east-west route through south central Kansas. It includes direct links locally to I-235, I-135, I-35, K-42, K-96, and US-77. It is classified as an urban freeway/expressway by the Wichita Area Metropolitan Planning Organization (WAMPO). Within the study area US 54/400 is a four-lane divided expressway, and Andover Road is the major north-south connector intersecting with US 54/400. Andover Road is a four-lane arterial connecting to I-35 at 21st Street north of Andover and to K-15 through the town of Rosehill south of Andover. The region's growth is straining the existing transportation infrastructure, primarily along US 54/400 and Andover Road. Increasing traffic volumes suggest adding additional capacity to these two major routes. Widening the transportation footprint to add capacity is in direct conflict with the community's wish to preserve the "small town feel" of Andover and not divide the city.

When developing alternatives for accommodating increased travel demand in the study area, the study team considered previous studies and designs for the area, interchange and intersection spacing, current system circulation, and traffic volumes.

The process integrated land use and transportation and created a community vision for development along the corridor.

Alternative Alignment Study

An alternative alignment study for US 54/400 from the K-96 interchange in Sedgwick County to the US-77 interchange east of Augusta was completed by Poe & Associates in September 2002 for the City of Andover and Butler County. To determine the best location for the highway the existing alignment was evaluated against construction of offset alignments. The report recommended that US 54/400 be upgraded to freeway design standards on the existing US 54/400 alignment from K-96 to Santa Fe Lake Road; that recommendation provides the foundation for the current corridor study.

Adjacent Freeway Design

Concept design plans for US 54/400 west of the study area (East Kellogg Improvements from 127th Street to 159th Street) were completed by Parsons Brinckerhoff for the City of Wichita in March 2011. The concept design plans established a right of way footprint and set the geometric and vertical parameters along this stretch of US 54/400 including the interchange at 159th Street. The US 54/400 Corridor Study utilized the design parameters established in the East Kellogg improvement plans for 127th Street to 159th Street because the same pool of drivers will be traveling the corridor and it is important to maintain consistency because drivers expect the intersections and roadway to operate similarly. East Kellogg (US 54/400) would be a six-lane freeway system with a tight diamond urban interchange at 159th Street. US 54/400 and 159th Street would be grade separated, elevating US 54/400 over 159th Street because of drainage issues at the Four Mile Creek crossing.

Interchanges and Intersections

Interchange spacing has a pronounced effect on freeway operations; the further apart the interchanges, the more smoothly traffic flows. Minimum spacing of interchanges is determined by weaving volumes, ability to sign, signal progression, and length of auxiliary acceleration/deceleration lanes. A Policy on Geometric Design of Highways and Streets (2004) supports one-mile minimum spacing in urban areas and two-miles in rural areas. The freeway design to the west of the Andover study area has made use of this recommendation and has placed interchanges at the mile line arterial roads.

When a series of interchanges are being designed, as is the case along US 54/400, attention needs to be given to the group of interchanges as a whole. Interchange uniformity reduces driver confusion, which can increase capacity and safety. Because tight diamond urban interchanges have been used in previously designed portions of the US 54/400 corridor, the study team recommends continuing with that design through Andover.

Tight diamond urban intersections are recommended at interchanges where frontage roads intersect arterial connectors (Figure 3 Diamond Interchange). An important characteristic of the tight diamond urban intersection is the free flow U-turn. One-way frontage road traffic may use these U-turns thus avoiding the delay associated with the intersection signal timing. Because this type of intersection is now prevalent along the US-54/400 corridor, local drivers use, and expect, the U-turn.

System Circulation

To provide more local access between the interchanges, the adjacent freeway projects have utilized continuous parallel frontage roads. Frontage roads link the freeway system to the local street system. Because frontage roads are becoming standard along the corridor and it is desirable to provide uniformity in traffic patterns, the study team recommends that frontage roads be considered in this corridor.

Traffic Volume

Traffic Counts

A.M. and P.M. peak hour traffic volumes were collected at the existing study intersections Onewood Drive, Andover Road, and Prairie Creek Road) between August 26, 2009 and September 10, 2009 from 7:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 6:00 p.m. The 159th Street and US 54/400 intersection count data from 2008 was used. In general, the peak hours for all study intersections were determined to be from 7:15 a.m. to 8:15 a.m. and from 4:45 p.m. to 5:45 p.m. Twenty-four hour counts were collected during the week of September 2, 2009 at the following locations:

- 159th Street north of US 54
- 159th Street south of US 54
- US 54 west of Onewood Drive
- US 54 west of Prairie Creek
- Andover Road north of US 54
- Andover Road south of US 54

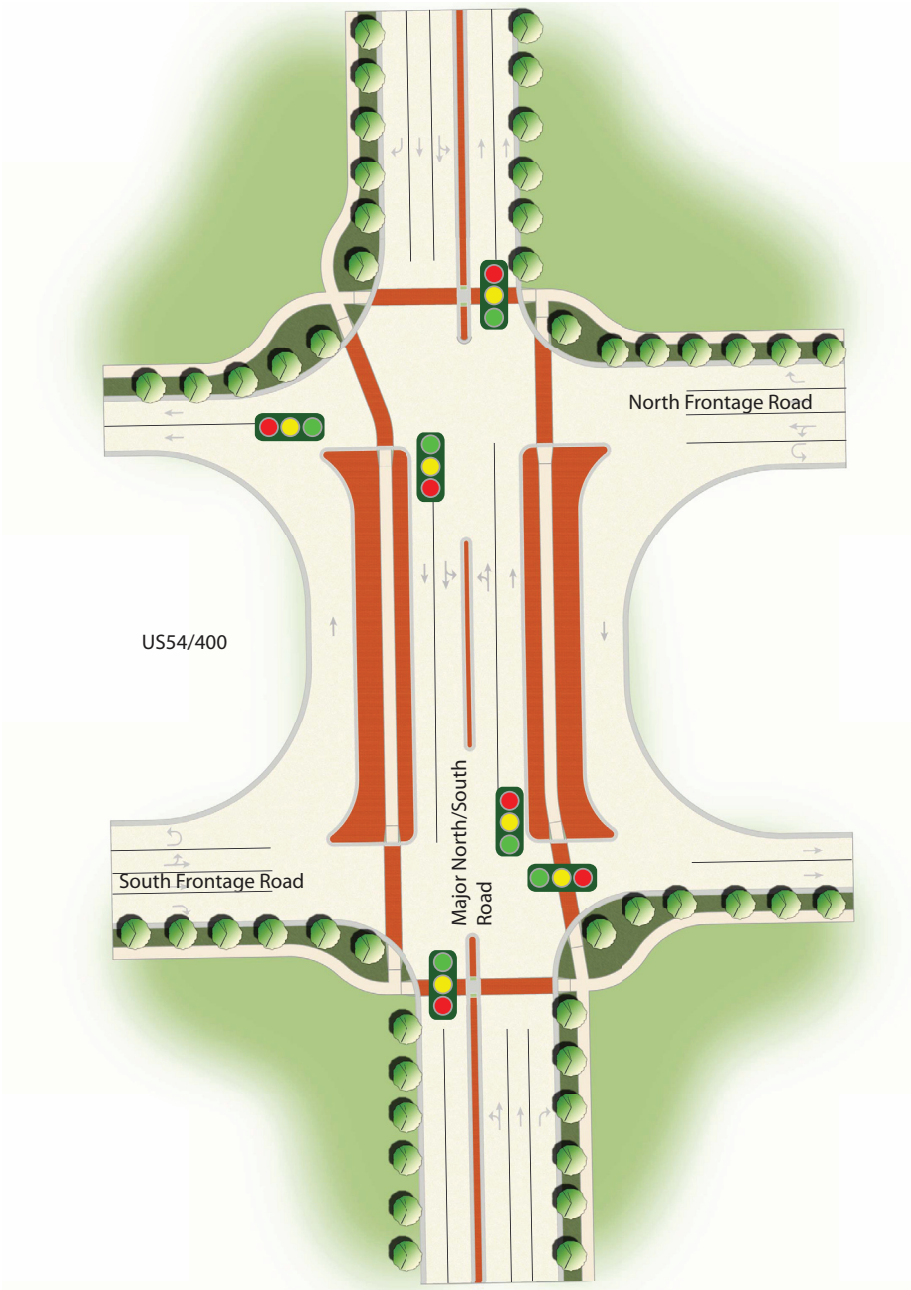


Figure 3 - Tight Diamond Intersection

The highest volume of intersecting traffic in the study area occurs at signalized intersection of US 54/400 and Andover Road. The existing daily traffic volumes on US 54/400 and Andover Road are approximately 26,500 and 22,265 respectively at this junction. Existing daily traffic volumes are shown on Figure 4 and detailed peak hour turning movements are shown in the appendix C.

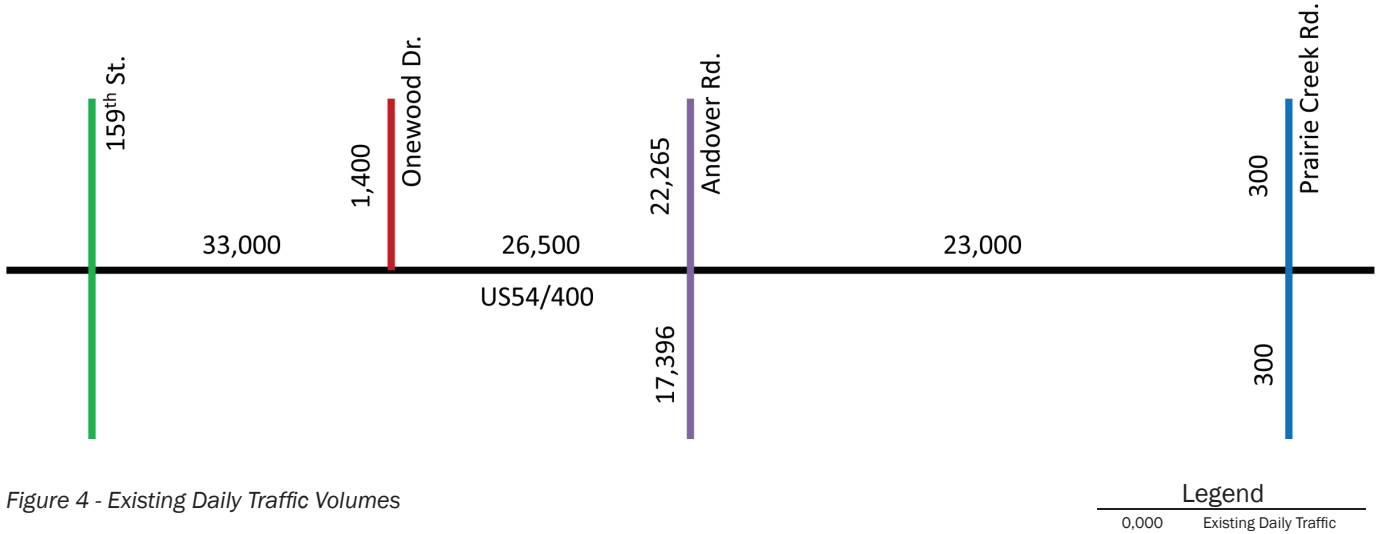


Figure 4 - Existing Daily Traffic Volumes

Historical Growth

Historic data and previous traffic studies were used to develop growth rates for the US 54/400 Corridor Study and to create a study area travel demand model in conjunction with projected land uses and anticipated traffic generation from those uses. Historical traffic count maps from Kansas Department of Transportation (KDOT) were reviewed to understand historical growth patterns. Figure 5 shows the annual average daily traffic trend between 1998 and 2010 on US 54/400 at four locations, two within and two adjacent to the study area.

The Butler Road Study (2008), which used a base year 2002 version of the WAMPO travel demand model, was reviewed. This model did not assume conversion of US 54/400 to a freeway. The East Kellogg Study (2009) also developed alternative model runs using the WAMPO model; however this study assumed conversion of US 54/400 to a freeway up to 159th Street. Conversion of US 54/400 to a freeway was not assumed east of 159thStreet. Future year 2040 forecasts from the WAMPO travel demand model base year 2010 were reviewed to assess the growth projections from a regional perspective. The WAMPO model did not assume US 54/400 as a freeway section with interchanges east of 159th Street.

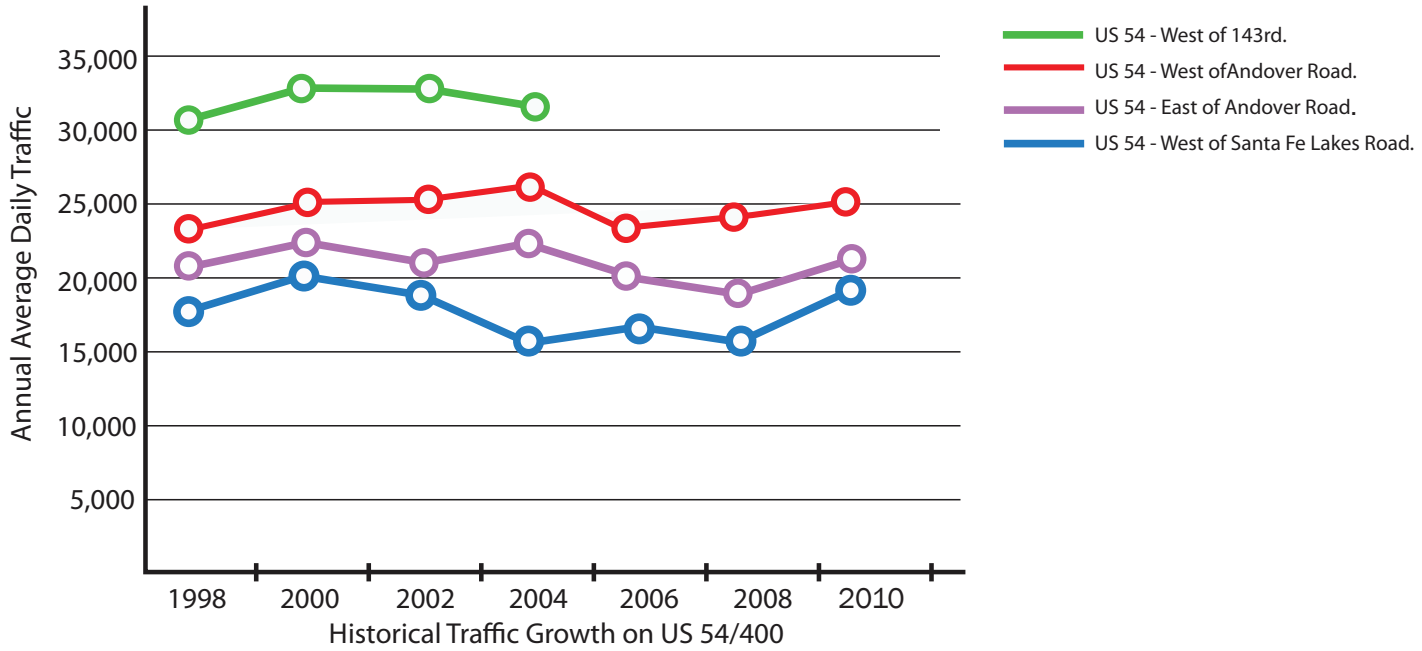


Figure 5- Historical Traffic Growth on US 54/400

Table 1 shows comparative growth percentages for important roadway sections in the study area and the growth rates used in the US 54/400 Corridor Study. Decline in the ADT in 2004 is due to construction at the US-54/400 and Andover Road intersection.

Location	Butler Road Study Model 2008	E. Kellogg Study Model 2009	WAMPO Revised Model 2010	US 54/400 Growth Rate
US 54/400 west of 159th St	3.72%	4.39%	3.54%	2.6%
US 54/400 west of Andover Rd	3.43%	1.61%	3.06%	2.6%
US 54/400 west of Prairie Creek Rd	3.38%	1.75%	2.22%	2.6%
US 54/400 east of Prairie Creek Rd	3.77%	1.62%	1.86%	1.3%
159th Street	5.92%	6.40%	2.30%	5.5%
Andover Road	3.07%	2.44%	2.46%	3.0%
Prairie Creek Road	14.37%	4.61%	3.55%	9.0%

Table 1 - Study Area Traffic Growth – Various Sources

Land Use Considerations

Existing land use patterns and the future land use map in the City's comprehensive plan suggest a future of strip development along this corridor similar to areas west of Andover. The 2003-2013 Comprehensive Development Plan for the Andover Area describes the character of the US 54/400 corridor as:

> "The design of the highway and its wide right-of-way creates another visual separation, difficult crossing conditions and, while a great benefit to transportation, it also acts as a deterrent to cohesive and efficient community development." (p. 7- 6)

The corridor is not built out, and this provides opportunities for Andover to develop and redevelop the corridor so that it better reflects the desired outcome. Approximately 50 percent of the frontage is developed and that development is fairly low intensity uses. The pattern of development is traditional strip development with the fronts of the buildings facing US 54/400 with large setbacks. The primary mode of access in the corridor today is by personal automobile. The area is not conducive to walking or bicycling. See figure 6 for a map of the future land use in the City of Andover.

Current Zoning

The existing zoning in the area is predominately commercial – either B-3: Central Shopping, B-4: Central Business, or B-5: Highway Business. The lot size and bulk regulations for these three zones are very different from each other. B-4 does not have a minimum lot size, minimum lot width, or minimum lot depth while B-3 requires a 10,000 square foot lot with a minimum width of 75 feet and minimum depth of 100 feet and B-5 requires a minimum lot size of 20,000 square feet, 100 feet minimum lot width, and 320 foot depth measured from the centerline of US 54/400. Maximum building heights range from 65 feet in B-4 and 45 feet in B-3 and B-5. Front setbacks vary from 35 feet in B-3 to 100 feet (abutting an arterial) or 35 feet (abutting a collector or local street) to 200 feet from the centerline of US 54/400 within 1,000 feet of an arterial. Maximum lot coverage varies as well; from 30% in B-4 to 35% in B-3 to 50% in B-5. Building setback in B-4 district is 100 feet and 200 feet in B-5 district. These variations have the potential to create an inconsistent and conflicting development pattern along the corridor. See Figure 6 for a map of current zoning in the City of Andover.

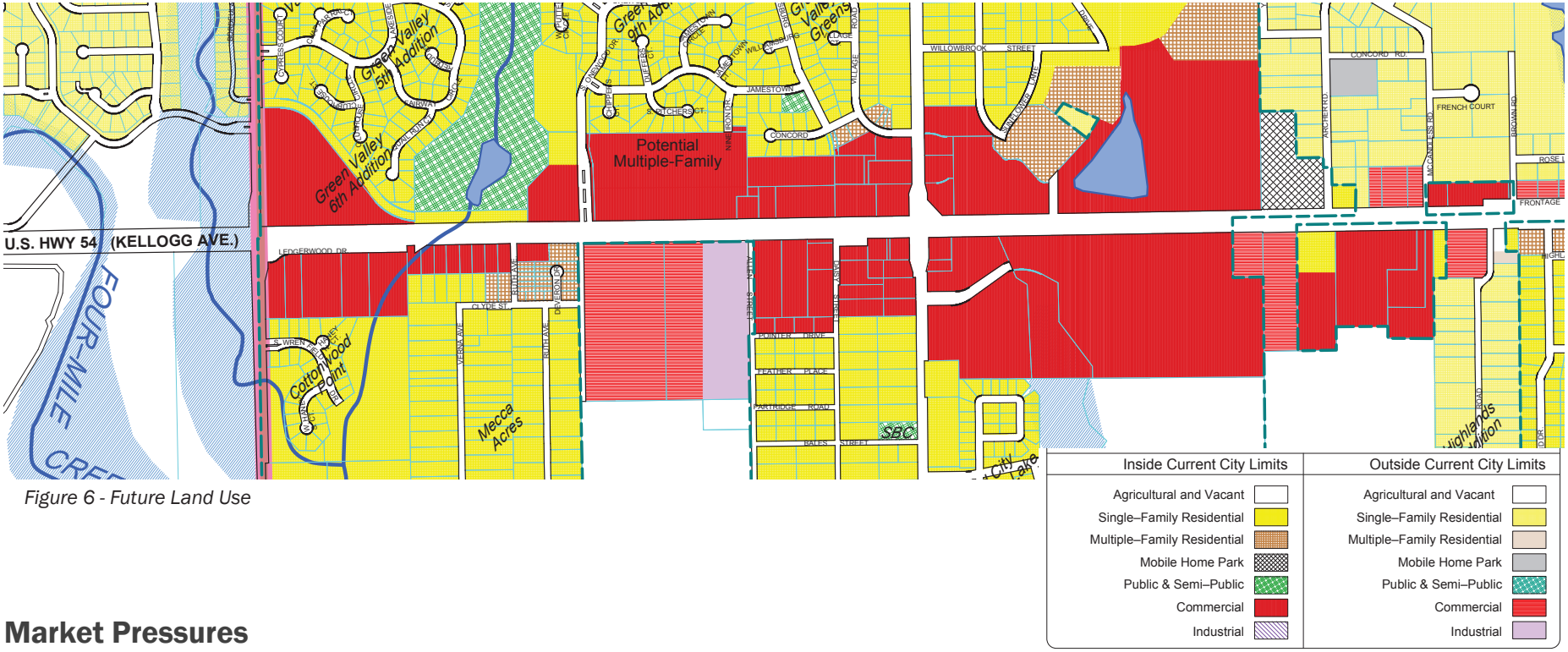


Figure 6 - Future Land Use

Market Pressures

Interviews with real estate professionals confirmed a demand for commercial market along the corridor. They also identified a demand for upscale multifamily; there is little available in the community and many people would like to live in Andover.

Commercial development from Wichita to the west has been extending east, with the closest existing development along the corridor occurring between Webb Road and the Kansas Turnpike, two miles from Andover's city limits. Andover is the next urbanized community east of the turnpike with undeveloped land. This land presents an opportunity for increased commercial development along US 54/400. The new Dillon's development east of Andover Road illustrates existing market pressure to develop along the corridor. While the Dillon's provides needed services for the community, local stakeholders worry that this development could realize the same fate as similar, but now vacant, large box development along this corridor west of Andover. One reason these sites remain vacant after the original tenant moves out is the high cost of redeveloping a large single use site and the lack of advance planning to facilitate redevelopment. If the US 54/400 corridor is to remain viable for decades and multiple development cycles, a long term vision is required.

Creating a Vision for the Future

Stakeholders repeatedly expressed a desire to maintain the “hometown” feel of the community with strong schools, safe neighborhoods, and good accessibility to jobs. For the City to continue to provide this quality of life, it is essential that the municipal revenues increase to accommodate rising costs. It is possible that the US 54/400 corridor could develop as a strong and sustainable economic engine that could provide higher revenues than are currently envisioned based on the future municipal land use map. By mixing uses, increasing density, and maintaining appropriate balance between demand (economic development) and supply (transportation capacity), the US 54/400 corridor could become a regional destination; a place where people can live, work, shop and play. The increased densities could leverage a higher tax base and provide the community with the financial resources to continue to provide its current quality of life and thereby protect its hometown feel.

The stated goal for this corridor is the eventual creation of a place where people desire to live and spend money, rather than spending available retail monies outside the community. Many communities in Kansas, even major metropolitan communities such as Lawrence, are continually vexed by retail pull factors of less than 1.0 (available retail dollars are leaving the community rather than being captured within the community). “Bedroom” communities will find it increasingly difficult to maintain revenue streams while relying upon traditional sources such as ad-velorem tax revenues. This undermines quality of life, and contributes to decline.

The vision for the US 54/400 corridor is for it to be Andover’s “Lifestyle Corridor”. It will provide a variety of jobs, housing choices, recreational opportunities, and community services for residents and visitors. The vision recognizes that development in the corridor will evolve over time. It will transition from auto-dominated, strip development to pedestrian-oriented, compact development with an emphasis on nodal development separated by open space. The framework will encourage today’s development to occur in a manner that supports the desired future, even if that future is many years away. US 54/400’s relationship with Andover will improve and become a feature that benefits the community by encouraging a new, interconnected, community-and region-oriented development pattern.

The drive along the US 54/400 corridor through Andover will provide a range of experiences that can be interpreted in the physical design of the spatial elements throughout the corridor. This corridor contains modulation through topography, compression of the right-of-way in areas where the highway is depressed, and openness as the highway crests to expansive views of the region. On a smaller scale, the corridor passes over/under bridges that will serve as landmarks and along a variety of walled conditions. Through the journey, the corridor passes along watercourses and open spaces, which are amenities to local neighborhoods. These experiences provide inspiration that can form the design of elements at the scale of the entire corridor and at smaller neighborhood scales.

Supporting the vision are development themes and planning and development principles. Each of these describe qualities and characteristics Andover would like to see in the US 54/400 corridor.

The vision for the US 54/400 corridor is for it to be Andover’s “Lifestyle Corridor”. It will provide a variety of jobs, housing choices, recreational opportunities, and community services for residents and visitors.

Development Themes

The vision is built upon five themes the desired development character Andover would like to see in the US 54/400 corridor. They are based on existing adopted public policies and feedback received through the public process. In addition to describing the desired character of the corridor, the themes identify the elements that must be included in any future design work or policy adoption.

Revitalizing the US 54/400 corridor will require maintaining the established "small town" character.

- Corridor design should honor the form and function of Andover.
- New buildings should incorporate design that respects the architectural style of existing key buildings.
- The core business area at Central Avenue and Andover Road should be connected to the corridor through the use and placement of similar streetscape and identity treatments.

Creating memorable destinations will require creating authentic and diverse public places, while expanding the range of attractions and economic development opportunities that the corridor offers.

- A variety of civic uses should be located in the corridor to strengthen it as a civic destination for the neighborhoods and the region.
- The backage roads, which will be the primary access road to parcels located next to the US 54/400, should be enhanced as diverse, pedestrian oriented shopping streets integrated with living spaces and working spaces.
- Andover Road should be enhanced as a regional gateway to core business area at Central Avenue and Andover Road.
- Corridor streetscape areas should be designed with consistent materials to provide an enjoyable and safe experience for the pedestrian.
- Parks and open spaces should support a variety of events and activities.

Integrating the neighborhoods will require a mix of infill housing and services for local neighbors.

- Corridor densities should be increased and include a vibrant mix of civic, office, retail, and residential uses.
- Underutilized buildings and parcels should be redeveloped to contain a mix of uses, such as office, retail, and housing.
- Adjacent neighborhoods should be revitalized in accordance with accepted neighborhood plans to maintain the quality of the neighborhoods and attract new families within the corridor.
- A variety of housing choices should be provided in the corridor to create seamless neighborhoods.
- Parks and open spaces should be connected to regional parks and destinations through a bike and pedestrian trail system.

Achieving a more accessible corridor will require improving the transportation system to minimize barriers and provide regional transportation alternatives.

- Andover Road, near the corridor area, should use several means for slowing down traffic to allow safer pedestrian crossings.
- Parking should be integrated with corridor uses and be sufficient in terms of quantity and location.
- Future transit connections and stations should be identified within the corridor and integrated with local and regional transit connections.

Realizing a sustainable high quality of life will require balancing the needs of social issues, the natural environment, and economic development.

- Preserve contiguous open spaces for environmental corridors and recreation.
- Create solutions that reduce net energy needs.
- Minimize reliance on ground water use by implementing water conservation practices.
- Create walkable neighborhoods that reduce the reliance on single occupancy vehicles.
- Approve development applications that integrate Andover's long-term development vision.

When asked to rank the elements from most important to least important Andover officials ranked the following five elements as the most important.

1. Approve development applications that integrate Andover's long-term development vision.
2. Create walkable neighborhoods that reduce the reliance on single occupancy vehicles.
3. A variety of housing choices should be provided in the corridor to create seamless residential neighborhoods.
4. Corridor densities should be increased and include a vibrant mix of civic, office, retail, and residential uses.
5. Parks and open spaces should be connected to regional parks and destinations through a bike and pedestrian trail system.

It is interesting to note that the element selected as most important is an implementation tool – approve development applications that further the vision – rather than a policy statement about what the vision should be. This highlights the importance of not only creating a vision, but adopting the zoning and subdivision regulations necessary to achieve the vision.

Planning and Development Principles

Based on the development themes and ranking of the elements, three planning and development principles have been defined to guide development along the corridor. These principles, together with the development visions themes, are transformational ideas that form the foundation of the corridor development framework and create an opportunity to create a distinctive place in the region, rather than building a highway that could further divide the city by the expanded highway.

Capture a high percentage of new vehicles trips within the corridor area

The intent of this principle is to reduce the spread of more intense uses into the community and to create denser development along the corridor. The expansion of US 54/400 will bring new trips to the area, and Andover would like them to stay close to the corridor rather than disperse into the surrounding area. In addition, creating denser development in the corridor will reduce infrastructure costs, create a higher tax base, and reduce ongoing road maintenance costs for existing roads. Developing in a denser manner is a more efficient use of land and infrastructure resources.

Create destinations along the corridor

For the corridor to be successful it needs to have destinations along it and not simply be an endless strip of stores. It needs to have places where people want to be and include a mix of community and regional activities and uses. Nodal development, which concentrates development at key locations, will provide focus and create destinations in the corridor. So that people can easily and pleasantly travel between the development centers, it is important to create attractive streets that connect the destinations.

Connect to the community

The development along US 54/400 needs to connect to and be compatible with the existing character of Andover. Building heights should be compatible with the existing development, and the activities that occur in those buildings should be neighborhood- as well as corridor-serving. The street amenities such as sidewalks, lighting, trees, and street furniture that will be installed along the new streets created in the corridor should be extended into the existing community as appropriate.

Transportation Recommendations

Identifying, analyzing, and testing a preferred transportation alternative for the US 54/400 corridor is a critical part of the US 54/400 Corridor Study. This section describes the roadway alternatives, presents a preferred alternative, tests its suitability, and discusses access management and bicycle, pedestrian, and transit issues.

Selecting a Preferred Alternative

To achieve the increased density envisioned for the corridor a robust transportation network is needed. The study team, in collaboration with the Core Team and input from public officials and other stakeholders, developed and evaluated four horizontal roadway alternatives and two vertical alternatives. The horizontal alternatives consider the location of interchanges and whether to include frontage roads. The vertical alternatives consider whether US 54/400 should be elevated over or depressed under grade separated street crossings. The horizontal and vertical alternatives are independent of each other; that is, choosing a preferred alternative for one dimension does not preclude or predetermine which alternative will be required in the other dimension.

Horizontal Alternatives

Four horizontal alternatives were developed. They are summarized in the Table 2 below and describe in detail on the subsequent pages.

	Intersection Treatment					
	159th Street	Onewood Drive	Andover Road	Yorktown Road	Prairie Creek Road	Frontage Roads
Concept 1	Partial Interchange	Full Interchange	No Interchange	Full Interchange	Partial Interchange	Yes
Concept 2	Full Interchange	No Interchange	Full Interchange	No Interchange	Full Interchange	Yes
Concept 3	Partial Interchange	Full Interchange	No Interchange	Full Interchange	Partial Interchange	No
Concept 4	Full Interchange	No Interchange	Full Interchange	No Interchange	Full Interchange	No

Table 2 - Summary of Horizontal Roadway Concepts for US 54 / 400

Identifying, analyzing, and testing a preferred transportation alternative for the US 54/400 corridor is a critical part of the US 54/400 Corridor Study.

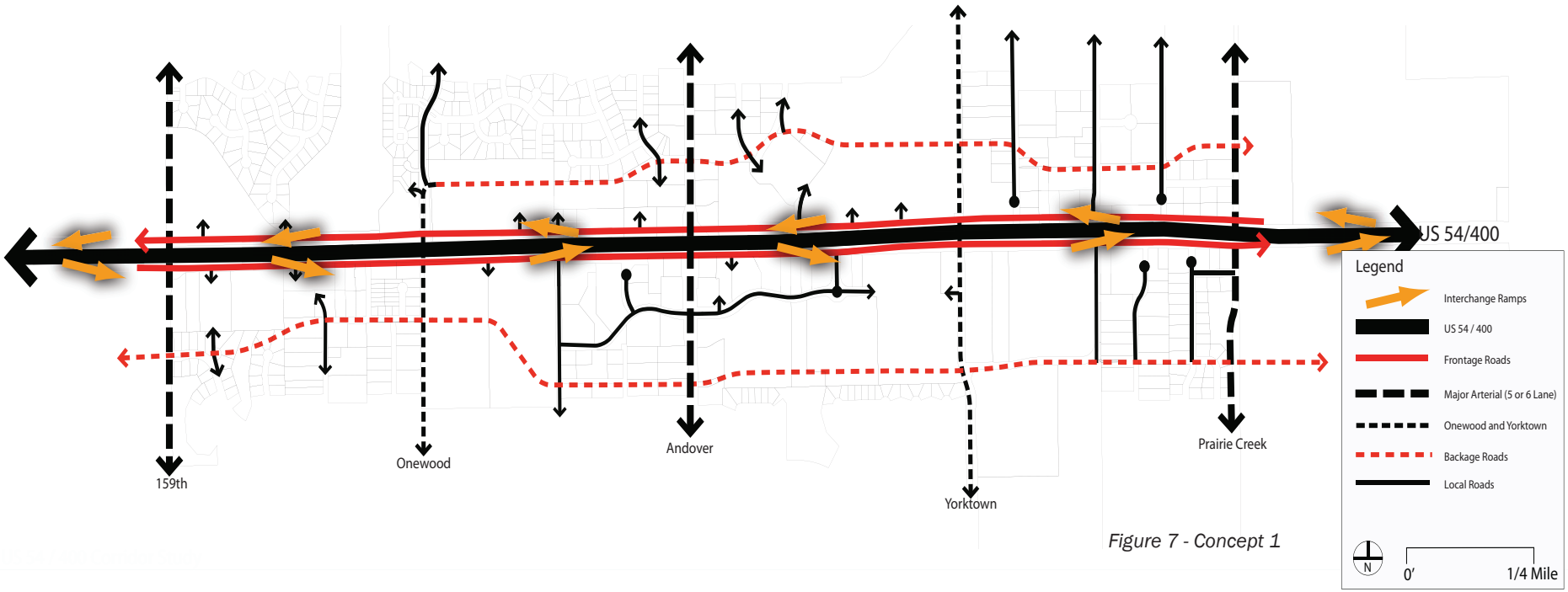


Figure 7 - Concept 1

Concept Option 1

Contains frontage roads with full access interchanges at Onewood and Yorktown. Both 159th Street and Prairie Creek Road would be partial interchanges. This concept de-emphasizes Andover Road by not allowing direct freeway access and increasing north-south connectivity. This was done to preserve Andover's "small town feel" and keep the intersection of Andover Road and US 54/400 pedestrian friendly. Access to frontage roads would be limited to platted streets. Access to all properties would be provided solely by the backage roads and existing collectors. Concept 1 is a three tiered system (backage road, frontage road, and freeway) and serves more intense development. (See figure 7)

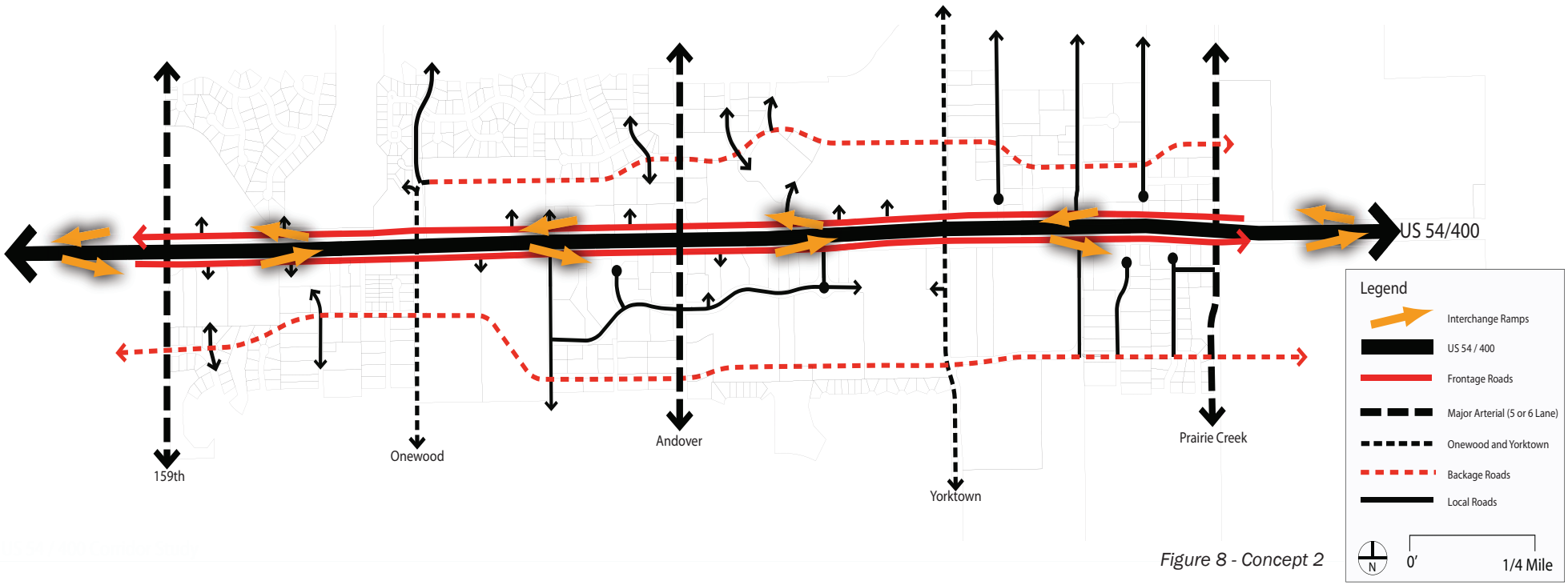


Figure 8 - Concept 2

Concept Option 2

Contains frontage roads with full access interchanges at 159th Street, Andover Road, and Prairie Creek Road – the mile line roads. North-south connectivity would be allowed at these interchanges but would be emphasized at Onewood and Yorktown, which will have no direct freeway access. Access to frontage roads would be limited to platted streets. Access to all properties would be provided solely by the backage roads and existing collectors. This is a three tiered system (backage road, frontage road, and freeway) and serves more intense development. (See figure 8)

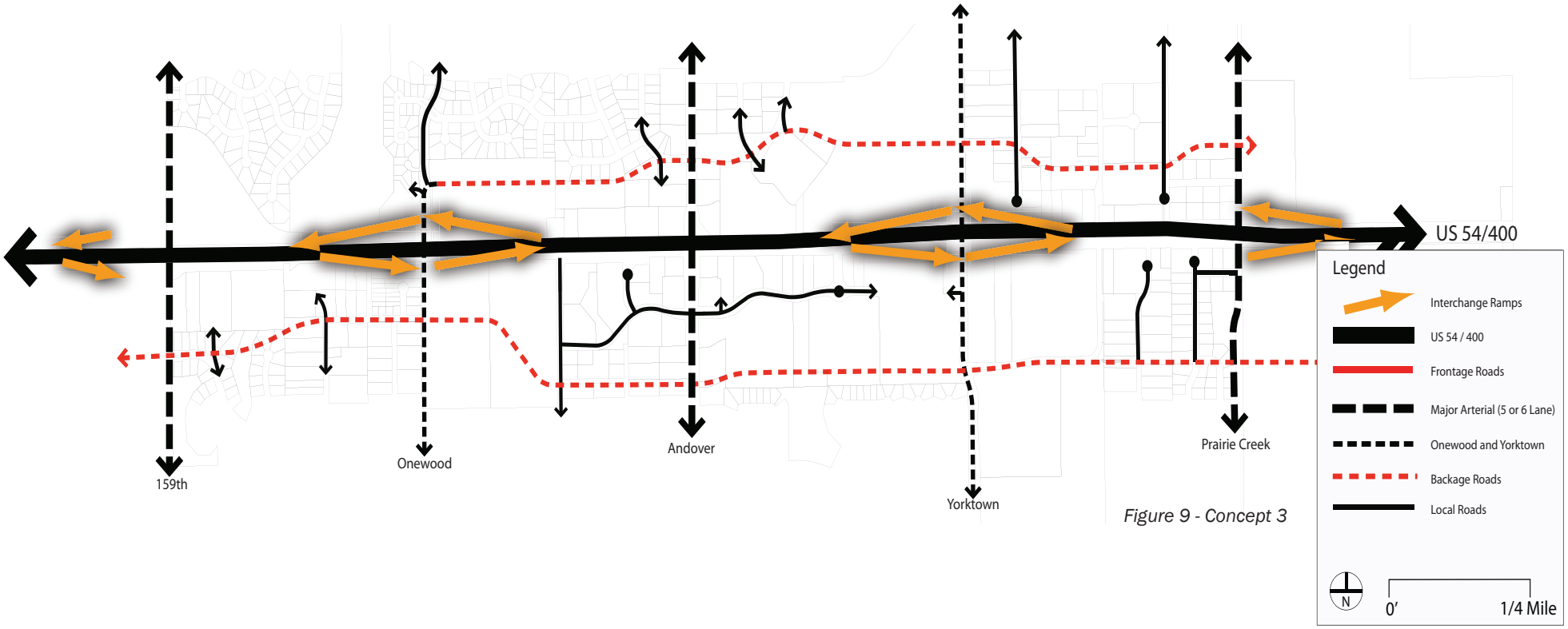


Figure 9 - Concept 3

Concept Option 3

This option is similar to Option 1 with full access interchanges at Onewood and Yorktown, however it does not include frontage roads. Both 159th Street and Prairie Creek Road would be considered partial interchanges. This concept de-emphasizes Andover Road by not allowing direct freeway access and thereby increasing north-south connectivity here. This was done to preserve Andover's "small town feel" and keep the intersection of Andover Road and US 54/400 pedestrian friendly. Access to all properties would be provided by the backage and existing roads. This is a two tiered system (backage road and freeway) and lends itself to less intense development. (See Figure 9)

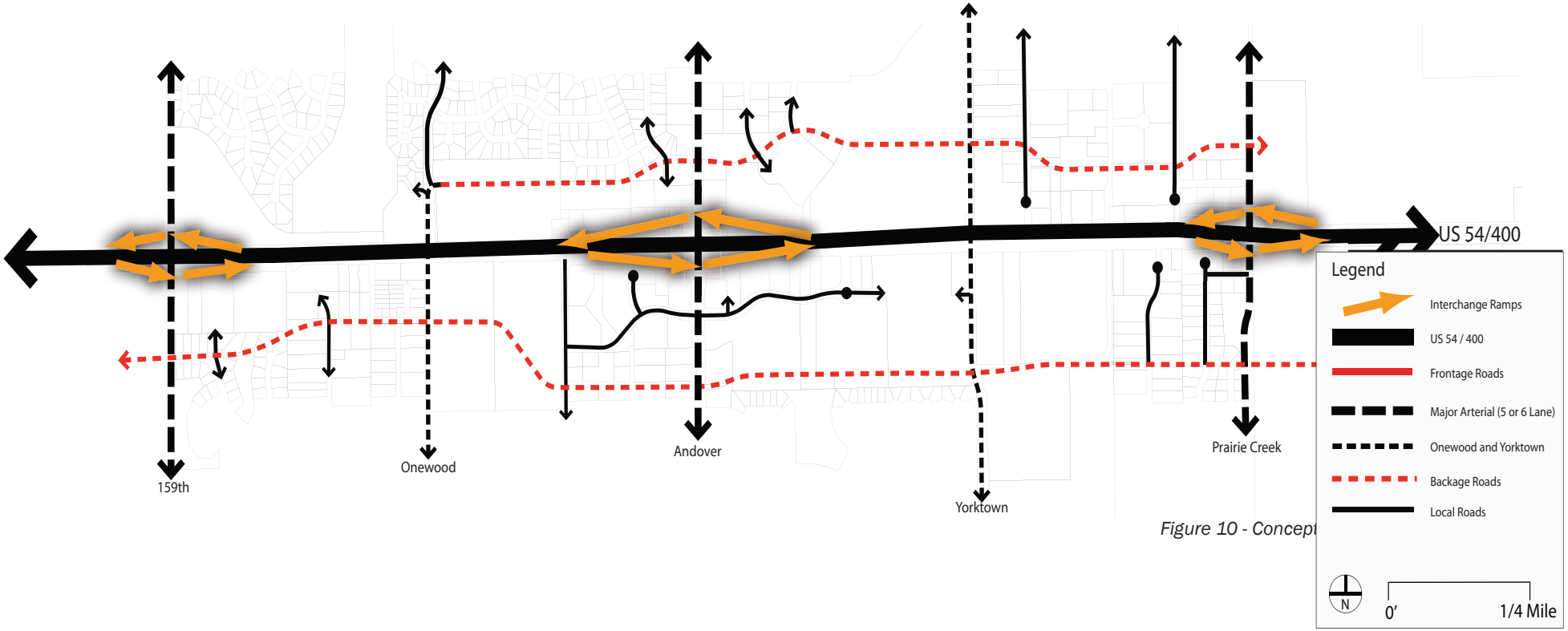


Figure 10 - Concept

Concept Option 4

This option is similar to Option 2 with full access interchanges 159th Street, Andover Road, and Prairie Creek Road – the mile line roads. North-south connectivity would be allowed at these interchanges but would be emphasized at Onewood and Yorktown, which will have no direct freeway access. Access to all properties would be provided solely by the backage and existing roads. This is considered a two tiered system (backage road and freeway) and lends itself to less intense development. (See Figure 10)

Vertical Alternatives

Two vertical alignment options were developed. One concept was an elevated freeway section at Andover Road. The other was a depressed freeway section at Onewood Drive, Andover Road, and Yorktown Road. Because retaining walls will be used, the vertical profile of the freeway has little influence in determining the corridor footprint and the horizontal alternative selected. See figures 11 and 12 for examples of depressed and elevated sections.

Figure 11 - Depressed Freeway Section

Figure 12 - Elevated Freeway Section

Due to the close proximity of relatively large stream channels, the freeway is elevated over 159th Street and Prairie Creek Road in all vertical options. The drainage areas for these channels are too large for the storm water pump stations that would be required if the freeway was depressed at these locations. An additional benefit of elevating the freeway at 159th Street and Prairie Creek Road is that it provides the highway user a panoramic view of much of the City of Andover. See figures 13 for vertical alternatives.

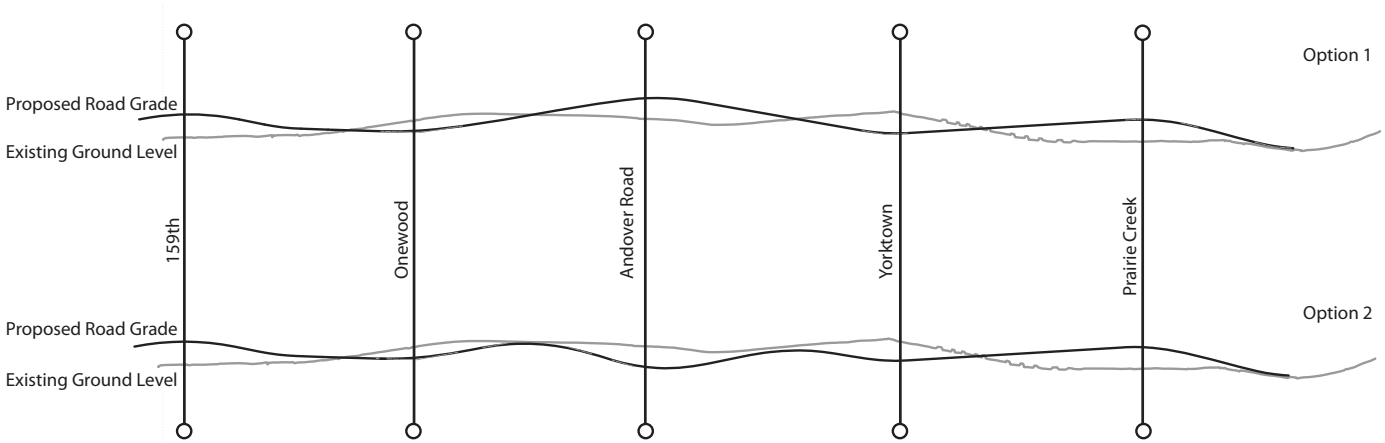


Figure 13 - Vertical Alternatives

Evaluation of Alternatives

The study team, in collaboration with the Core Team and other stakeholders, screened alternatives based upon parameters relating to issues such as amount of congestion relief, construction cost, safety considerations, and physical feasibility. The goal was to integrate the initial findings including traffic circulation, capacity needs, access needs, land use, public policy, and economic findings to evaluate the overall benefit of design alternatives, including their associated impacts and conceptual-level costs.

Horizontal Alternatives

There are two primary differences between the four horizontal alternatives: the use of frontage roads (Options 1 and 2 vs. Options 3 and 4) and the interchange locations (Options 1 and 3 vs. Options 2 and 4). Each difference will be discussed in turn.

Frontage Roads

Options 3 and 4 (which do not have frontage roads) would have a smaller pavement footprint and would directly link the local road system to the freeway. Freeway ramps would connect directly to the north south arterial roads. The additional burden of carrying frontage road traffic on the local road system would necessitate making both the connecting arterials and the backage roads wider for increased capacity over options containing frontage roads.

By facilitating freeway traffic during construction, frontage roads would eliminate the cost of temporary freeway pavement or eliminating the need to utilize the backage road system to carry the freeway construction traffic. Frontage roads also allow for the commonly used U-Turns at the grade separated crossings that are now expected by motorists familiar with the US 54/400 corridor to the west.

Interchange Locations

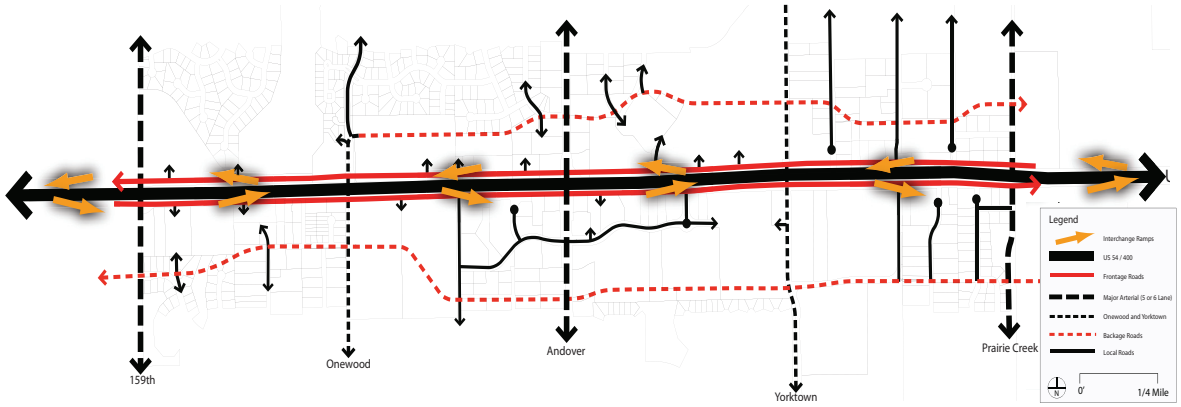
It is typical to place full access interchanges at the points of highest traffic volume. In this corridor the point of highest traffic volume is Andover Road. Options 1 and 3 do not provide direct access to Andover Road. Options 2 and 4 do provide a full access interchange at Andover Road. In addition, Options 2 and 4 preserve driver expectancy of interchanges at mile line roads (i.e., 159th Street, Andover Road, and Prairie Creek Road) and keeps traffic on the freeway for longer distances.

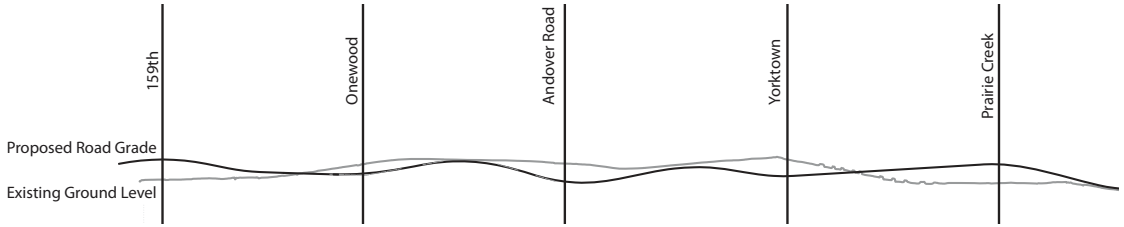
The impact of two versus three interchanges on the frontage road network (that is, the Option 1 condition) is that more traffic will be on the frontage roads for longer distances. This changes the function of the frontage roads, which are intended to move traffic for a short distance from the freeway to the arterial roadways. In addition, there is the potential for drivers to use the backage roads to avoid the congestion and intersections on the frontage roads, which may increase the number of lanes needed, and additional lanes would be required at the 159th Street interchange ramps to carry the increased traffic demands. Finally, the frontage road U-turns at both Onewood and Yorktown would be stressed with the additional traffic attempting to access Andover Road.

Vertical Alternatives

Planning level, relative cost estimates were prepared for the vertical alternatives to assist in the evaluation process.

- The least expensive alternative is elevating US 54/400 at Andover Road. It is considered the base cost, and the other alternatives' costs are compared to it.
- Depressing US 54/400 at Andover Road would add approximately $10 million to the project. The increase includes a stormwater pump station and constructing a depressed retaining wall system. The annual operation and maintenance cost associated with the stormwater pump station is not included in this figure. It is important to note that the stormwater pump station's operation and maintenance costs would be the sole responsibility of the City of Andover.
- The most expensive option is a fully elevated viaduct throughout the corridor, similar to Wichita's Central Business District. It would add approximately $20 million to the base cost.





Preferred Alternative: Option 2

Not dividing Andover and preserving the "small town feel" are two issues of great concern to Andover's officials and stakeholders. Stakeholders felt that elevating US 54/400 would create a wall and divide the city. Community response suggests a preference for depressing the freeway section under Onewood Drive, Andover Road, and Yorktown Road. Public officials and the community were in support of the depressed freeway option despite the additional construction, operational, and maintenance costs associated with this option.

The highest volume of intersecting traffic in the study area occurs at the intersection of US 54/400 and Andover Road. This high traffic volume dictates that an interchange is necessary at Andover Road so as to not overload adjacent interchanges/intersections.

Traffic analysis, corridor uniformity, driver expectancy, and safety support providing three full interchanges at the mile line roads (159th Street, Andover Road, and Prairie Creek Road) with frontage roads (Option 2).

The corridor width that needs to be preserved to implement the above recommendations is 350 feet, 175 feet north and south of the proposed centerline. This width takes into account US 54/400, associated frontage roads, and utility easements north and south of US 54/400. Proposed freeway centerline geometrics are provided in the appendix.

Street Types

The roadway alternatives for the US 54/400 corridor are made up of six street typologies: freeway, frontage roads, reverse access roads or backage roads, six-lane arterial, five-lane arterial, and four-lane collector. The freeway, frontage roads, and backage roads would provide east/west travel. The arterials would provide north/south travel.

Freeway

A divided highway with full access control except at grade separated interchanges. US 54/400 is the only designated freeway in the study area. It would have six, 12-foot travel lanes (three lanes in each direction) and each direction will have two, 12-foot shoulders on each side of the travel lanes. (See Figures 14 and 15)

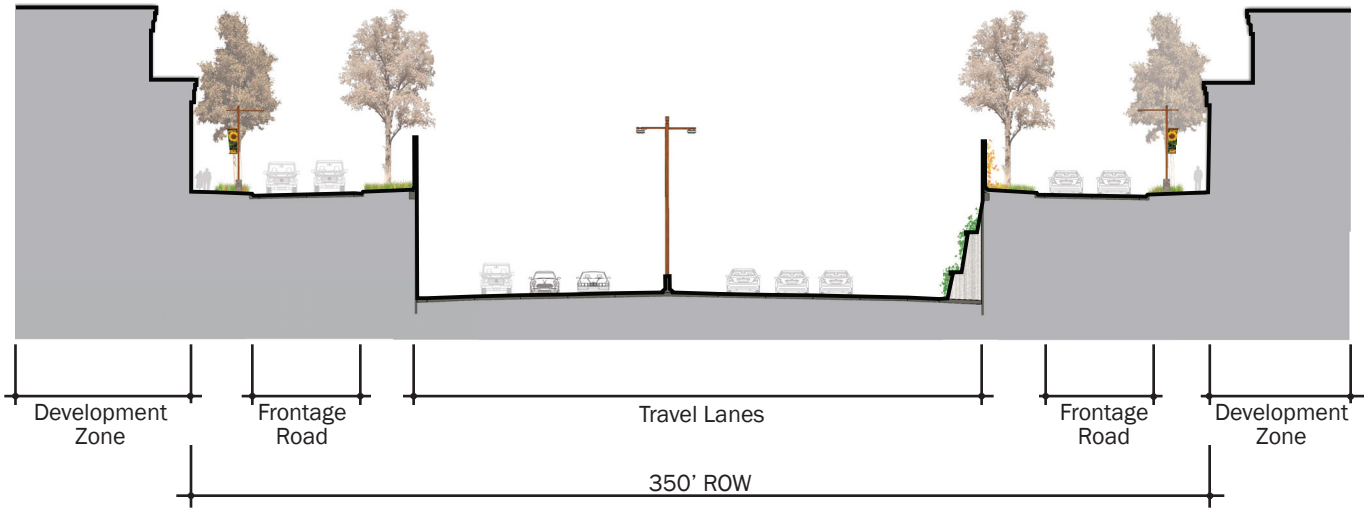


Figure 14 - US 54/400 Depressed

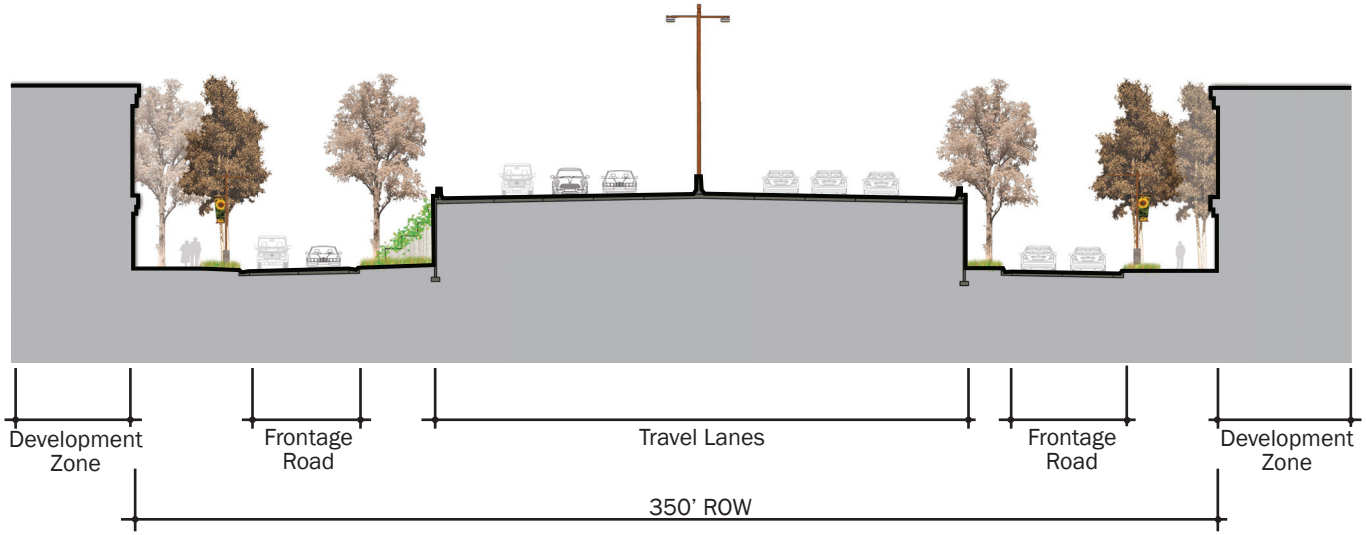


Figure 15 - US 54/400 Elevated

Frontage Roads
A partially limited access road running parallel to the freeway. It feeds traffic to the freeway at appropriate points of access such as at arterials and interchanges. The alternatives look at the impact of having two-lane, one-way frontage roads on each side of US 54/400. Each lane is proposed to be 12-feet wide. Planting strips of various widths would be provided between US 54/400 and the frontage roads and between the frontage roads and pedestrian pathways. Access from the frontage roads will be limited to the north/south streets. Access to parcels adjacent to the frontage roads and US 54/400 will be accomplished through backage or reverse access roads.

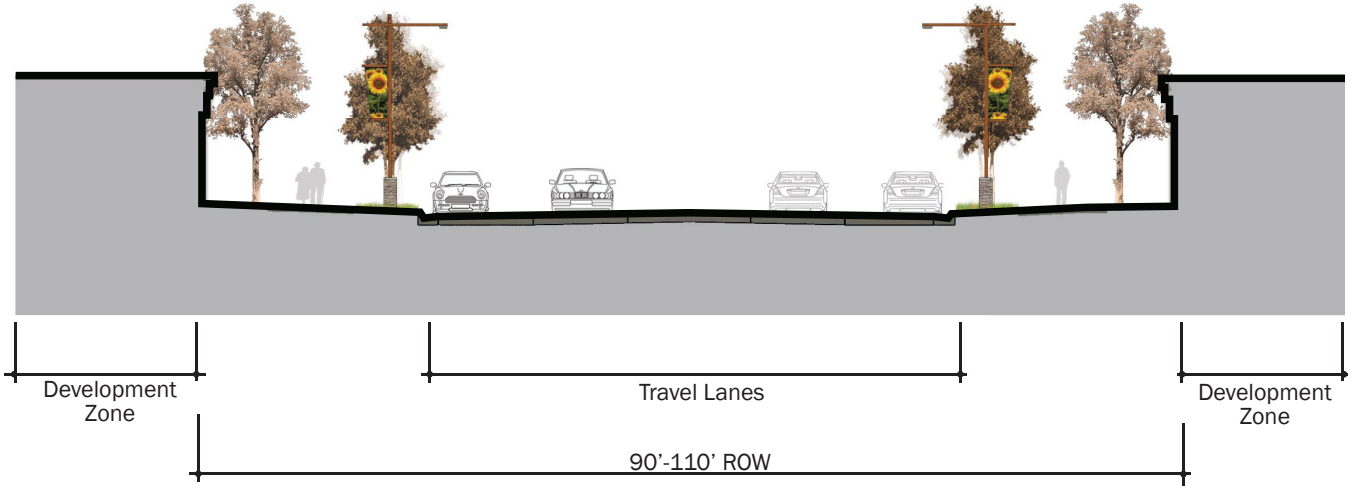


Figure 16 - Backage Road

Backage/Reverse Access Roads
A non-limited access road providing full access to adjacent properties as well as accommodating general traffic circulation. The backage roads will have one travel lane in each direction with a shared center turn lane. They will also have a 10-foot parking lane on each side, a 6-foot tree zone, and 10-foot sidewalks. Backage roads will not only provide access to the parcels adjacent to US 54/400 and frontage road rights-of-way, but will create additional opportunities to travel east/west through the corridor – without having to travel

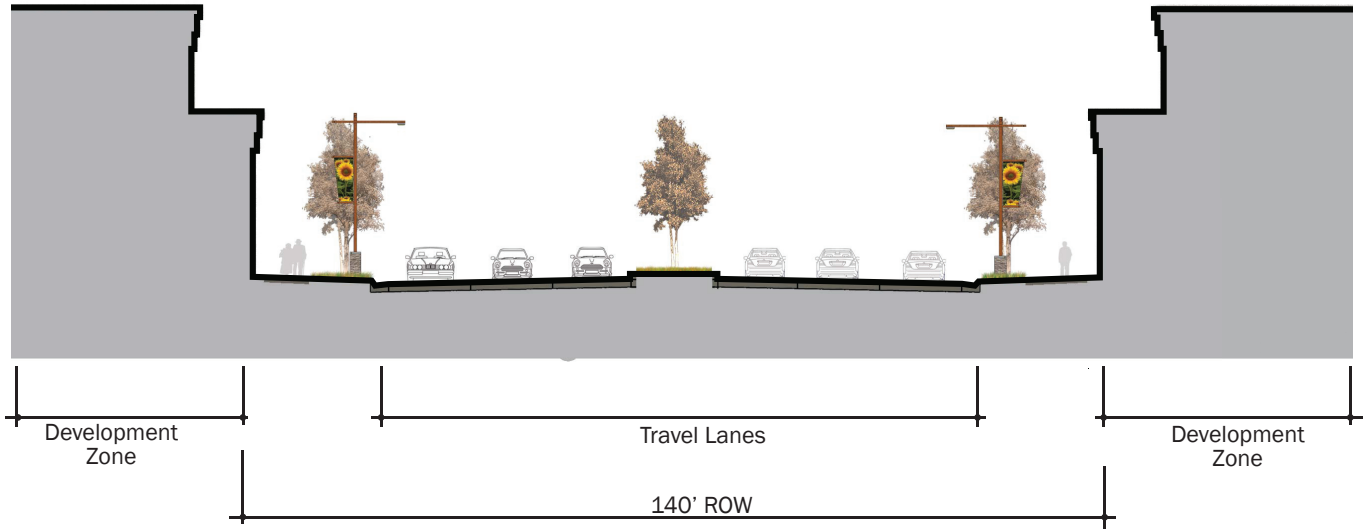


Figure 17 - Six-lane Arterial

on the frontage roads or US 54/400. The desired outcome is to create a pedestrian-friendly "main street" roughly parallel to US 54/400. (See Figure 16)

Arterials

A high capacity urban road delivering traffic from the backage and local roads to the freeway. Andover Road would become a six-lane arterial. It would have a 12-foot landscaped median; three, 11-foot travel lanes in each direction; a five-foot sidewalk on one side; a ten-foot sidewalk on the other; and tree zones on each side separating the roadway from the sidewalk. (See Figure 17)

159th Street and Prairie Creek Road are proposed to be five-lane arterials. They would have an 18-foot landscaped median; two, 11-foot travel lanes in each direction; ten-foot sidewalks on each side of the roadway; and tree zones on each side separating the roadway from the sidewalk. (See Figure 18)

Onewood Drive and Yorktown Road are proposed to be four-lane collectors. They would have two, 11-foot travel lanes in each direction; a five-foot sidewalk on one side; a ten-foot sidewalk on the other; and tree zones on each side separating the roadway from the sidewalk. (See Figure 19)

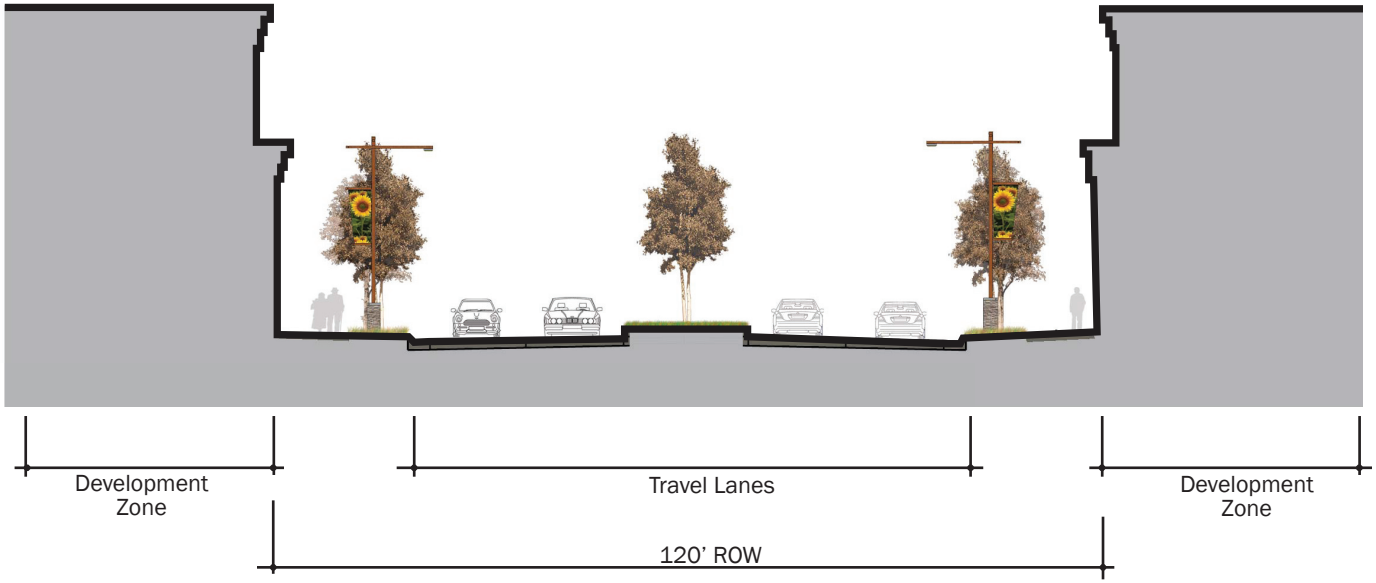


Figure 18 - Five-lane Arterial

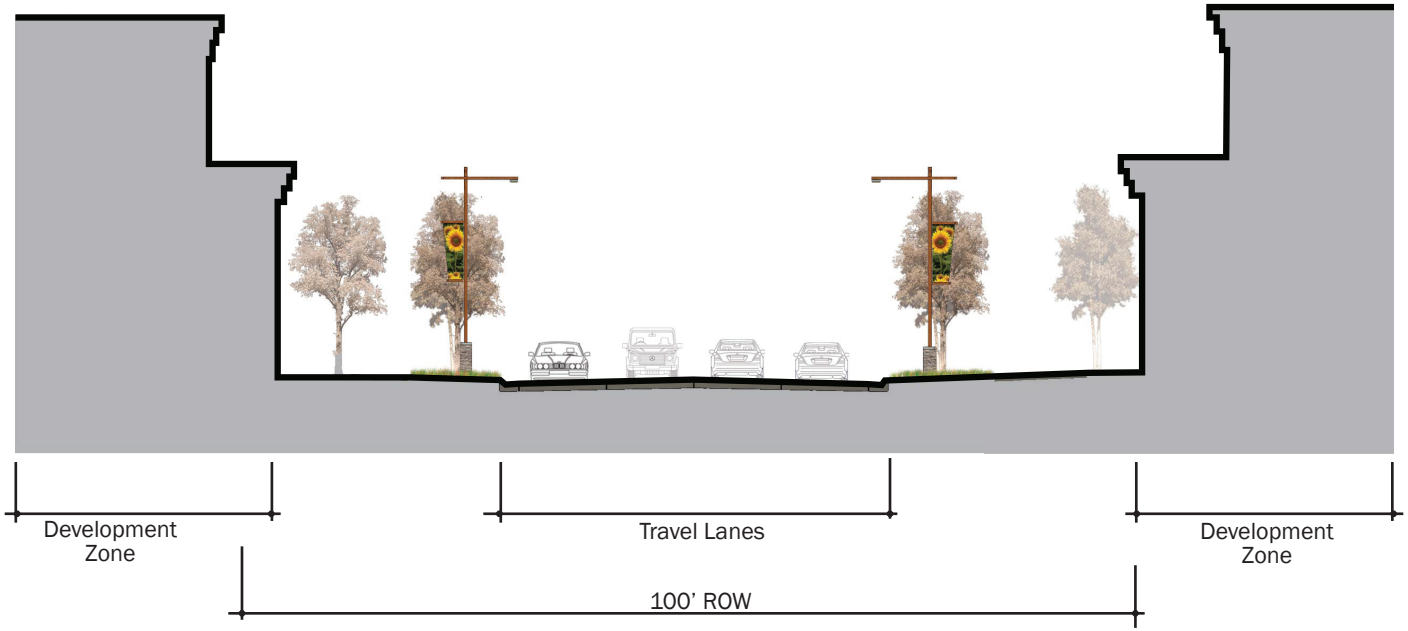


Figure 19 - Four-lane Arterial

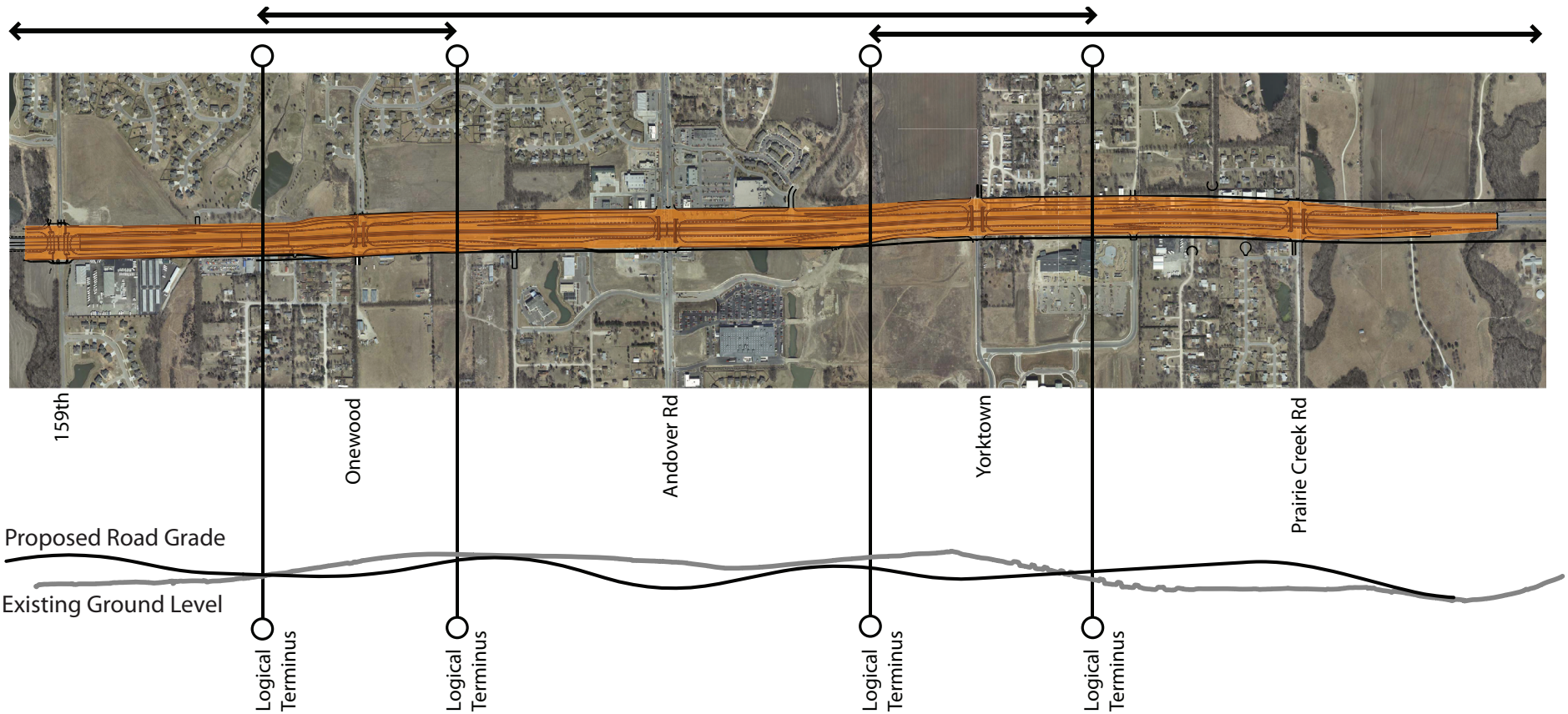


Figure 20 - Possible Logical Termini

Feasibility and Phasing

As it is likely that the corridor will be constructed utilizing separate construction packages, logical project termini were established in the development of the vertical profiles. The ability to break the corridor improvements into segments allows flexibility in funding smaller and thus more likely construction packages. Such termini are locations where the proposed horizontal and vertical alignments of US 54/400 could transition with adjacent existing sections. Figure 20 shows possible logical termini based on the study recommended transportation improvements.

From a funding perspective backage roads would be financed separately from the freeway and frontage road improvements. Most likely, the backage roads will be designed and constructed as the corridor develops, independent of freeway construction.

Traffic Analysis

Identifying, analyzing, and testing a preferred transportation alternative for the US 54/400 corridor is a critical part of the US 54/400 Corridor Study.

The traffic analysis tested how well the preferred US 54/400 alternative would accommodate the proposed land use vision. Option 2, providing three full interchanges at the mile line roads (159th Street, Andover Road, and Prairie Creek Road with frontage roads), was refined through the traffic analysis process. Details such as number of lanes, intersection treatments and access control were configured as the study progressed. Some roadway network assumptions were made to serve the proposed concept efficiently. The analysis started with a minimal number of lanes on all roadways and additional lanes were added after a review of level of service for each roadway section or simulation performance.

There were two components of the analysis a travel demand analysis, which is used to determine traffic distributions generated by adjacent land uses, and a traffic operation assessment, which determines how well the transportation system operates with the volumes assigned to it.

Travel Demand Model

Process

The WAMPO travel demand model provided the basis for developing the subarea model used in the US 54/400 Corridor Study's travel demand assessment. Because the WAMPO model does not assume US 54/400 as a freeway with interchanges east of 159th Street, a travel demand model was created in TransCAD. The model area is larger than the study area with the boundaries of the model Douglas Avenue to the north and Minneha Avenue in the south. The east and west boundaries are consistent with the study area.

Results

The origin and destination trips calculated using the trips rates were divided in to internal-internal trips and internal-external trips. External-external trips were appended to the OD matrix for each peak hour. The external-external trips were assessed based on historical traffic trends and WAMPO travel demand model outputs. TransCAD's inbuilt gravity model procedure was used to distribute A.M. and P.M. origin and destination trips to all the zones. Table 3 shows the summary of all trips.

	Internal-Internal Trips	Internal-External Trips	External-Internal Trips	External-External Trips	Total Trips
AM Peak Hour	900	2,760	2,596	8,364	14,621
PM Peak Hour	1,278	5,574	5,414	8,312	20,578

Table 3 - Summary of Origin-Destination Trips from the Study Area Model

Traffic Operation Assessment

Process

The study team performed future year operational analysis on US 54/400 and the surrounding roadways. VISSIM, a micro-simulation tool that simulates traffic flow through the network and collects and summarizes operational information, was used to analyze US 54/400. Synchro, an intersection-based capacity analysis software tool, was used for the arterial operations. Additionally, Highway Capacity Manual (HCM) analysis was also performed for freeway sections. HCM intersection capacity analysis was performed using Synchro. Two separate simulation models were developed for projected conditions using both the software programs for AM and PM peak hours. The entire transportation network was included in the VISSIM simulation models.

VISSIM simulation and HCM analysis during the AM peak hour under ultimate development conditions indicate that traffic operates at acceptable levels of service in the study area. Westbound on US 54/400 is the peak direction during AM peak hour and both VISSIM and HCS analysis results indicate that despite being a heavily traveled highway, the freeway sections operate acceptably. The intersection analysis indicates that the Andover Road intersection with the frontage road operates at LOS D with some delay. If the delay becomes longer or if the closely spaced intersections pose circulation issues, improving alternate north-south traffic routes should be considered.

In the PM Peak Hour, the Andover Road intersection is heavily congested and some maneuvers on the eastbound frontage road and northbound Andover Road require more lane changes than usually expected by the drivers. Although the intersection at the north backage road and Andover Road is signalized, the westbound left-turning traffic from the north backage road causes some local queuing. This is partly because a majority of left-turning traffic needs to make a right-turn at the westbound frontage road intersection and the distance is not sufficient to make lane changes quickly. The traffic on the ramps can cause occasional back-ups on the freeway but queues interrupting the through traffic on the freeway were not observed. The eastbound frontage road section between 159th Street and adjacent on-ramp could potentially be a three-lane section but this was not assumed as no major delays were observed.

The Synchro analysis indicates that the LOS for several intersections during the PM Peak Hour is D. This denotes reasonable operation with some delays. It should be noted that other parallel routes such as Central Avenue are available if queuing becomes excessive. Some all-way stop controlled intersections along the backage roads cause some queuing, but these intersections represent a group of driveways assumed for VISSIM network to serve as traffic generators.

With the exception of Andover Road, no major queuing is observed or indicated at other intersections in the VISSIM or Synchro analyses. The proposed dual southbound right-turn lanes and dual north-bound left-turn lanes at Andover Road intersections enable heavy westbound traffic to make smoother progression through the signals. All intersections operate at LOS D or better and the traffic operations using the design concept for US 54/400 in Andover are acceptable under ultimate development conditions.

Access Control Recommendations

Why Access Management is Important

Access management balances traffic safety and efficiency with reasonable property access. The Transportation Research Board Access Management Manual 2003 defines access management as "the systematic control of the location, spacing, design, and operations of driveways, median opening, interchanges, and street connections to a roadway." Access management techniques are recommended to shape the current and future transportation network along the US 54/400 corridor. When properly implemented good access management techniques preserve transportation systems by reducing the number of access points along a roadway while still providing reasonable access to the parcels adjacent to it.

Common access related issues that can degrade the street system are:

- Driveways or side streets in close proximity to major intersections
- Driveways or side streets spaced close together
- Lack of left-turn lanes to store turning vehicles
- Deceleration of turning traffic in through lanes
- Traffic signals too close together

Motorists, pedestrians, businesses, and the government benefit from access management. Motorists benefit from fewer decision points and traffic conflicts. Pedestrians benefit by crossing vehicle paths less often due to fewer driveways. Businesses benefit from a more efficient road system, which expands their market area. Government benefits from being able to deliver a safe and efficient transportation system at a lower cost.

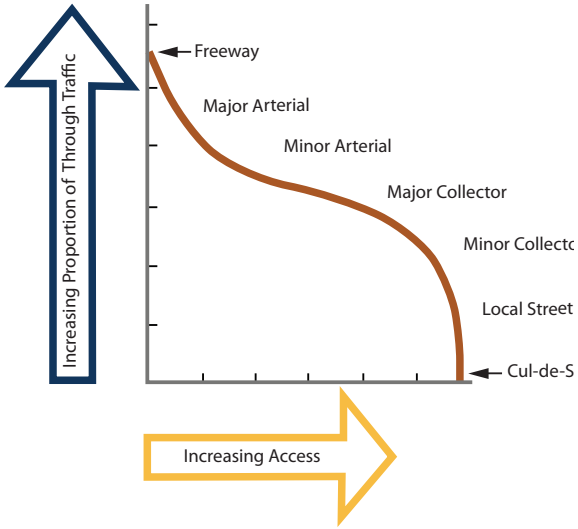


Figure 21 - Conceptual Roadway Functional Hierarchy Source: 2003 TRB Access Management Manual

Many cities, including Andover, use a functional classification system to define roadways in their network. Andover currently uses three primary classifications as described in the City's "Resolution 04-09, Resolution of Street Policy". These three classifications are residential, collector, and arterial streets which each contain further subcategories describing right-of-way width and construction materials among other variables. These three classifications align well with aspects of both the Federal Highway Administration (FHWA) categories and the Transportation Research Board's (TRB) Access Management Manual, 2003. The US 54/400 Corridor Study includes additional roadway classifications within the City of Andover that should be added to the list. The additional roadway classifications are: freeways, one-way frontage roads on a freeway system, and backage roads.

The differences between interstate, arterial, collector and residential roadways represent a trade-off between providing mobility and providing access. Figure 22 shows that as the amount of through traffic increases, access decreases. For example, freeways, whose primary function is to serve through traffic, have limited access – typically only occurring at grade separated interchanges. On the other end of the spectrum are cul-de-sacs, which have no through traffic, but every lot has access to the roadway.

One of the principle strengths of the transportation network recommended in this study is that it demonstrates the feasibility, and the economic sustainability, of a complete transportation system. Freeways, arterial roadways, collector streets, and local roads are all present and all are allowed to perform their intended functions. This fact, plus the appropriate and consistent application of access management principles, helps to create a development environment that is high quality, high value, and economically sustainable. Inappropriate management of the transportation network (incomplete systems, or inappropriate management of access) is the most dramatic and preventable cause of the degradation of transportation capacity. As the ability of the transportation network to carry traffic is lost, the corresponding degradation of market penetration is dramatic. Because of the geometric relationship between operating speed (travel time) and market penetration, as operating speeds drop – market area is lost according to the "ratio of the squares". In other words, a 50% drop in operating speed on the network leaves the area with only 25% of its original market area. The transportation network and accompanying access management program ensures sustainability of market penetration. This helps maintain quality of life that the community prizes.

Reduction in Average Speed	Market Area Relative to Previous Size
0%	100%
10%	81%
20%	65%
30%	45%
40%	36%
50%	25%

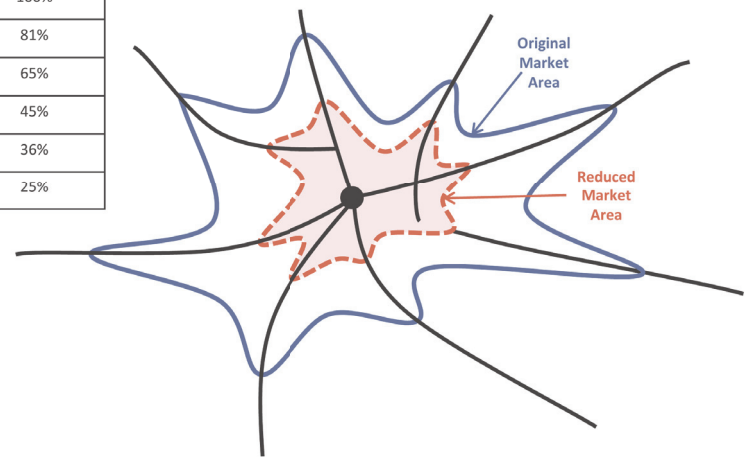


Figure 22 - Effects of Travel Time on Market Area.
Source: 2003 TRB Access Management Manual

Roadway Recommendations

The traffic circulation system designed for the study area from the freeway to nearby businesses is provided through various roadway classes. The freeway is for through traffic travelling long distances. The one-way frontage roads (or connector roads) move traffic travelling alongside the freeway to the nearest north/south arterials and collectors, which are platted streets by the city. No private access or driveways are allowed on the frontage roads. The backage roads are accessed through north-south arterials, collectors, or platted local street connections. The backage roads provide access to properties. A function of traffic circulation is the nodal spacing or distance between intersections. The recommended distance between the frontage road and backage road intersections with north/south arterials and collectors are provided in Table 4 . The distances shown were adopted for design and simulation analysis for efficient traffic operations. Figure 23 shows recommended locations for signalized full access interchanges.

	Roadway			
	North Backage Road		South Backage Road	
	*Recommended Distance (ft.)	**TRB Calculated Distance (ft.)	*Recommended Distance (ft.)	**TRB Calculated Distance (ft.)
Roadway				
159th Street	825	860	820	960
Onewood	570	905	570	540
Andover	735	1115	1160	940
Yorktown	850	990	1020	945
Prairie Creek Road	800	1060	985	800

Table 4 - Intersection Spacing on Arterial Streets

Note: All distances are measured in feet from East - West Section Line to Centerline of Backage Road and are based upon the recommended roadway alignment and geometrics of this report.

* Nodal distances (distance between intersections) adopted for design and simulation analysis based upon existing development, available developable property and drainage considerations. Nodal distances are supported by traffic analysis/modeling.

** Nodal distances (distance between intersections) calculated using the methods described within the TRB Access Management Manual 2003.

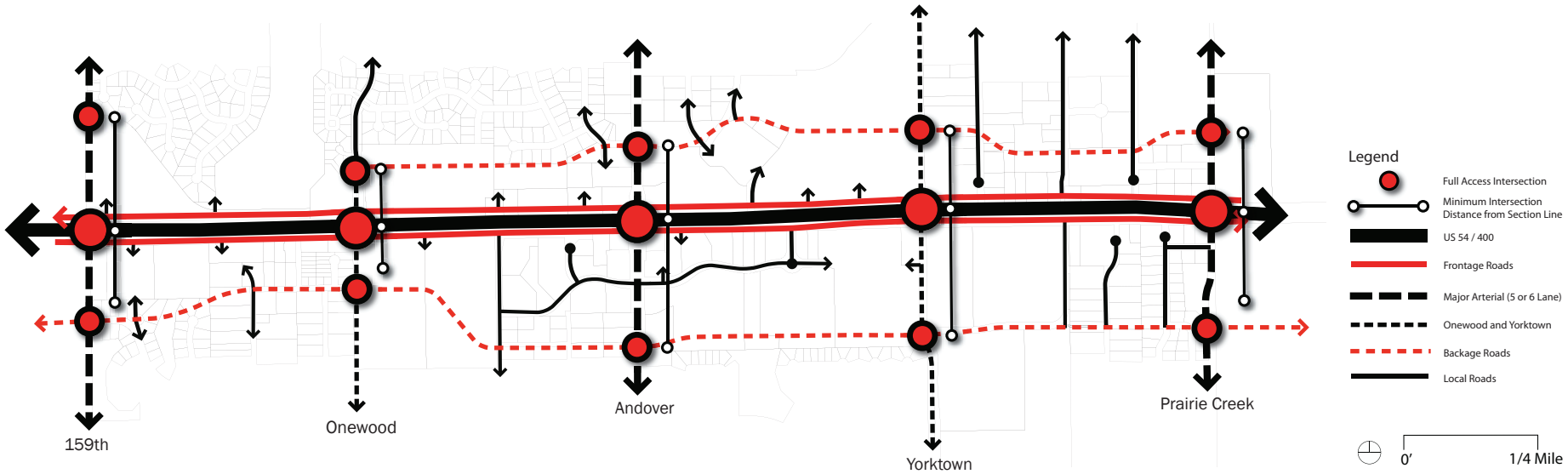


Figure 23 - Signal Location

Freeways
Freeways are fully access controlled facilities with access on and off the system provided only by interchanges. Cross streets providing access to the freeway are grade separated and connected using ramps. US54/400 would be upgraded to a freeway with access provided by ramp connections to 159th Street, Andover Road, and Prairie Creek Road.

One-way Frontage Roads on a Freeway System
One-way frontage roads adjacent to a freeway system, also called connector roads in some locations, provide the link between the freeway and arterials/collectors. The frontage roads provide access with arterial and collector roads within the City of Andover to and from the US54/US-400 freeway. The one-way connector roads are not be used to provide direct access to individual businesses. Connections from the frontage road should be limited to platted streets.

Arterials
Arterials are of regional importance and typically serve, or are expected to serve, high volumes of traffic traveling long distances. Arterials often have multiple lanes and higher posted speed limits than collectors. Arterials prioritize mobility over access. Arterial streets within the study area are 159th Street, Andover Road, and Prairie Creek Road.

Collector Streets
Collectors link arterial streets to residential streets. The traffic volumes on collectors are less than arterials and more than residential streets, and trip lengths are generally no more than a few miles. Collectors must balance mobility with access, and they generally provide limited direct property access. Collector streets within the study area are Onewood Drive and Yorktown Road.

Residential Streets
Residential streets provide local, direct access to property. Access to property is frequent, although not excessive in either the number of access points granted or the frequency at which they occur along a roadway. Residential streets typically serve the lowest volume of traffic and trips of short lengths.

Backage or Reverse Access Roads
A non-limited access road providing full access to adjacent properties as well as accommodating general traffic circulation.

Interchange and Intersection Recommendations

The functional area of a junction is the area where additional connections or access points can negatively impact the safety of the junction and decrease the traffic flow through the intersection and along the two intersecting roads. Access should be denied within the defined functional area of a roadway. The functional area of interchanges and intersections includes not just the immediate junction, but distances up and downstream on each intersecting road. The guidance in this section would apply to areas where development has not yet occurred and roads have not yet been constructed. However existing access locations should be reviewed during any redevelopment or changes in land use to see if modifications can be made to bring the roadway into compliance with these recommendations. The spacing suggested in this study are recommended values, however if a traffic impact study or other approved analysis shows other distance values are acceptable they should be considered.

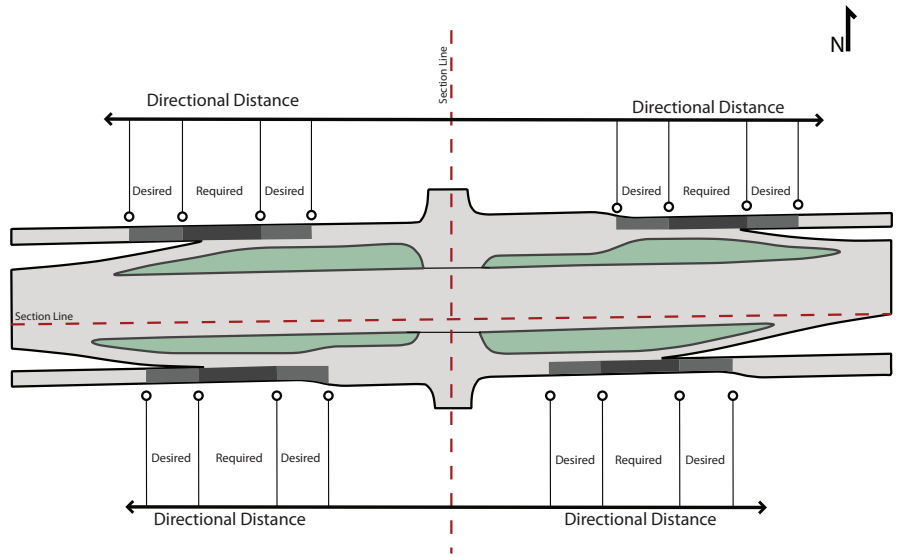


Figure 24 - Functional Interchange Recommendations

Interchange Functional Areas

Interchanges are any location where two grade separated roads are connected by on and off-ramps or slip ramps. Interchange functional areas apply to the future US 54/400 freeway configuration where ramps connect to the one-way frontage roads. Separation should be provided between slip ramps and local streets along the frontage road. At locations where an existing local street access point would be within the future interchange functional area, adjustments should be made to prohibit access within the designated functional area. The required and desirable functional areas based on the recommended interchange locations (159th Street, Andover Road, and Prairie Creek Road) are shown in Table 5. Figure 24 shows the range of functional areas for proposed ramps.

	Interchange Functional Area			
	East Bound Frontage		Westbound Frontage	
	Full Access Control Required Range Distance from Section Line (ft.)	Full Access Control Desired Range Distance from Section Line (ft.)	Full Access Control Required Range Distance from Section Line (ft.)	Full Access Control Desired Range Distance from Section Line (ft.)
Section Line / Direction				
159th Street / West	1165 to 1670	775 to 1870	1460 to 1760	1260 to 2050
159th Street / East	775 to 1075	575 to 1275	545 to 850	345 to 1050
Andover Road / West	670 to 975	470 to 1175	740 to 1040	540 to 1240
Andover Road / East	580 to 885	380 to 1085	835 to 1140	635 to 1340
Prairie Creek Road / West	730 to 1035	530 to 1235	820 to 1125	620 to 1325
Prairie Creek Road / East	630 to 935	430 to 1135	N/A	N/A

Note: All distances are measured in feet from identified North - South Section and are based upon the recommended roadway alignment and geometrics of this report and are supported by traffic analysis/modeling.

Table 5 - Interchange Functional Areas

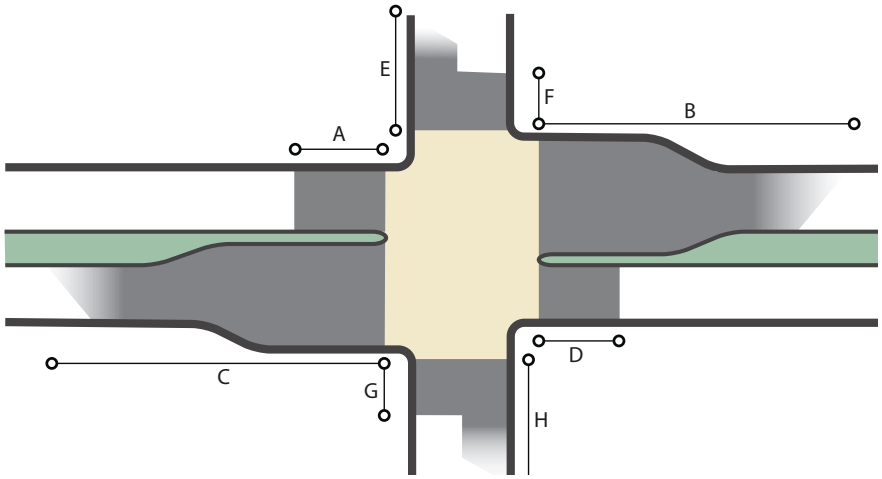


Figure 25 - Functional Intersection Recommendations

Intersection Functional Areas

The functional area of an intersection is determined by the deceleration, turning, merging, and stopping distances of vehicles (Figure 25). The functional area will vary for each intersection based on traffic volume, speed limit, and the traffic control at the intersection. Typically the upstream functional area (approach) is longer than the downstream functional area (departure). The functional areas for arterial and frontage roads within the study areas were calculated using the methods described within the TRB Access Management Manual 2003 for the upstream distance in combination with stopping sight distance (SSD) from AASHTO's "A Policy on Geometric Design of Highway and Streets", better known as the "Green Book," for the downstream distance. These distances are measured from the end of the curb return to the end of the curb return and not center-line to center-line. The functional areas for backage streets and unsignalized intersections within the study areas were calculated using SSD from the Green Book. Because the backage roads are intended to emphasize access over mobility, TRB's guidance for upstream functional areas is less applicable given the intended function and design of the backage roads. Using SSD on the backage roads for locations where the backage road intersected with an arterial for both the approach and departure was used. The SSD for 30 mph is 200 feet while the SSD for 40 mph is 305 feet.

The study acknowledges that due to existing development, available developable property, and drainage considerations access points may be located within intersection functional areas as calculated using the methods described within the TRB Access Management Manual 2003. Placing the access points in suggested locations that would meet the functional area guidance was not feasible. In these cases access points were located on the city streets as far as possible from each other. These access locations were included in the traffic simulation analysis which under ultimate development conditions provided acceptable traffic operations. The information provided in Table 6 shows both the calculated functional areas, based on TRB's guidance and the recommended functional areas based on traffic analysis.

	Intersection Functional Area															
	*Required Distance (ft.)	#Desired Distance (ft.)	*Required Distance (ft.)	#Desired Distance (ft.)	*Required Distance (ft.)	#Desired Distance (ft.)	*Required Distance (ft.)	#Desired Distance (ft.)	**Required Distance (ft.)	#Desired Distance (ft.)	**Required Distance (ft.)	#Desired Distance (ft.)	**Required Distance (ft.)	#Desired Distance (ft.)	**Required Distance (ft.)	#Desired Distance (ft.)
Intersection	A		B		C		D		E		F		G		H	
159th & North Backage (NB)	265	200	245	200	270	235	245	200	***	715	***	305	***	305	***	880
159th & North Frontage (NF)	1760	305	1130	1040	N/A	N/A	N/A	N/A	810	620	470	305	N/A	N/A	N/A	N/A
159th & South Frontage (SF)	N/A	N/A	N/A	N/A	635	660	430	305	N/A	N/A	N/A	N/A	490	305	905	720
159th & South Backage (SB)	240	200	260	200	240	200	260	200	***	305	***	305	***	305	***	305
Onewood & NB	220	200	310	200	225	200	310	200	***	305	***	305	***	305	***	305
Onewood & NF	300	305	800	675	N/A	N/A	N/A	N/A	555	630	530	305	N/A	N/A	N/A	N/A
Onewood & SF	N/A	N/A	N/A	N/A	1105	1065	450	305	N/A	N/A	N/A	N/A	480	305	550	765
Onewood & SB	210	200	300	200	200	200	300	200	***	305	***	305	***	305	***	305
Andover &NB	320	200	315	440	330	515	330	200	***	800	***	305	***	305	***	730
Andover &NF	440	305	1035	920	N/A	N/A	N/A	N/A	720	800	715	305	N/A	N/A	N/A	N/A
Andover &SF	N/A	N/A	N/A	N/A	1170	1060	430	305	N/A	N/A	N/A	N/A	540	305	520	710
Andover & SB (Cloud)	310	200	320	200	310	200	310	200	***	305	***	305	***	305	***	305
Yorktown & NB	295	200	215	200	295	200	220	200	***	305	***	305	***	305	***	305
Yorktown & NF	445	305	760	710	N/A	N/A	N/A	N/A	835	650	590	305	N/A	N/A	N/A	N/A
Yorktown & SF	N/A	N/A	N/A	N/A	880	750	365	305	N/A	N/A	N/A	N/A	370	305	790	705
Yorktown & SB (Cloud)	320	200	N/A	200	320	200	N/A	200	***	305	***	305	***	305	***	305
Yorktown & SB (East Leg)	295	200	220	200	295	200	220	200	***	305	***	305	***	305	***	305
Prairie Creek & NB	260	200	260	590	265	355	260	200	***	620	***	305	***	305	***	465
Prairie Creek & NF	420	305	880	785	N/A	N/A	N/A	N/A	785	765	540	305	N/A	N/A	N/A	N/A
Prairie Creek & SF	N/A	N/A	N/A	N/A	940	855	410	305	N/A	N/A	N/A	N/A	440	305	750	615
Prairie Creek & SB	265	200	N/A	200	265	200	N/A	200	***	305	***	305	***	305	***	305

* Required intersection Functional Area distances are measured from identified North - South Section Line and are based upon the recommended roadway alignment and geometrics of this report and supported by study traffic analysis/modeling.

** Required intersection Functional Area distances are measured from identified East - West Section Line and are based upon the recommended roadway alignment and geometrics of this report and supported by study traffic analysis/modeling.

*** TRB desired distances are required.

Intersection Functional Area distances calculated using the methods described within the TRB Access Management Manual 2003 and are measured from end of intersection return.

Table 6 - Intersection Functional Areas

Drainiage Considerations

The study recommendations considered drainage aspects; in particular the floodplains associated with Brookhaven Creek, Green Valley Tributary, Fourmile Creek Tributary, Republican Creek Tributary and Republican Creek which drain north to south within the limits of the study corridor. Two significant assumptions were made that would require additional review outside the parameters of this study. First, depressing US 54/400 at Andover Road would require the construction of a stormwater pump station to accommodate drainage associated with the Fourmile Creek Tributary. Secondly, for the purpose of this study, the future expansion of Prairie Creek Road was assumed to be located on the section line consistent with the existing roadway alignment. The existing Prairie Creek Road is within the limits of the designated floodplain for the Republican Creek Tributary. Any future re-alignment of Prairie Creek Road should consider the future needs for the City of Andover including the proximity to both the Republican Creek Tributary and the Republican Creek floodplains, future development, roadway overtopping and drainage design frequency that extend beyond the scope and/or limits of this study.

Mobility Recommendations

Pedestrian, Bicycle, and Transit Recommendations

One reason the plan proposes creating a node at Andover Road and US 54/400 is to create a model for transit-supportive, mixed-use development in the corridor, which could then be replicated along it. These multimodal nodes could be served by regional transit with local transit service radiating from them. In addition, the nodes would provide for multimodal connectivity, which would encourage people to walk, bike, ride the bus rather than take their personal vehicles within the node. For such connectivity to be effective, the needs of pedestrians, bicyclists, and transit riders must be considered and planned for. This means including sidewalks, multi-use paths, and bike lanes and installing appropriately-designed lighting, landscaping, and signage. The street sections shown in Figures 16-19 show the intent of the pedestrian amenities of the various street types proposed along the corridor.

For example, pedestrian-scale lighting is positioned over the sidewalk, rather than over the street. Improving sidewalk illumination can increase pedestrian traffic and enhance community safety. Landscaping can provide shade, generate visual interest to draw walkers down the sidewalk, and create an illusion of speed that subconsciously slows down drivers. Pedestrian-friendly signage provides visual interest and does not block sidewalks and walkways. The urban design recommendations section of this report further illustrate how mobility and development form are integrated to provide pedestrian friendly places, thereby encouraging multi-modal use.

Land Use Recommendations

Based on the corridor vision described in Section 5, the study team, working closely with the City of Andover, developed a plan for a mixed use, lifestyle corridor along US 54/400. The proposed future land use is described below, as are the short- and long-term development opportunity areas that could kick start the development process in the corridor. Detailed urban design recommendations can be found in Section 8.

Future Land Use

The proposed land use and zoning framework for the study area calls for nodes of mixed use commercial at the intersections of US 54/400 and 159th Street, Andover Road, and Prairie Creek Road. Mixed use commercial is envisioned to be three to six stories with 50-70 percent lot coverage. It should include ground floor retail and office, with office and residential allowed above on higher floors. To accommodate changing market conditions, both horizontal and vertical mix of uses are encouraged.

The intersections of US 54/400 and Onewood Drive and US 54/400 and Yorktown Road are proposed to be mixed use residential. In addition, there are several other blocks designated mixed use residential in the area – between the YMCA facility and the commercial mixed use along Prairie Creek Road. This designation allows for 6 to 20 dwelling units per acre in two to five story buildings with 50 to 70 percent lot coverage. Retail and community services should be on the ground floor with a mix of residential uses above. To accommodate changing market conditions, both horizontal and vertical mix of uses are encouraged. For a detailed map of proposed land use please see Figure 26.

The plan also proposes that commercial development occur next to US 54/400 in the areas between the mixed use nodes.

Set back from US 54/400 are two residential districts: multifamily residential with eight to 15 dwelling units per acre and single family attached residential at three to seven dwelling units per acre.

Mixed use commercial is envisioned to be three to six stories with 50-70 percent lot coverage. It will include ground floor retail and office with office and residential allowed above. It will allow for a horizontal and vertical mix of uses.

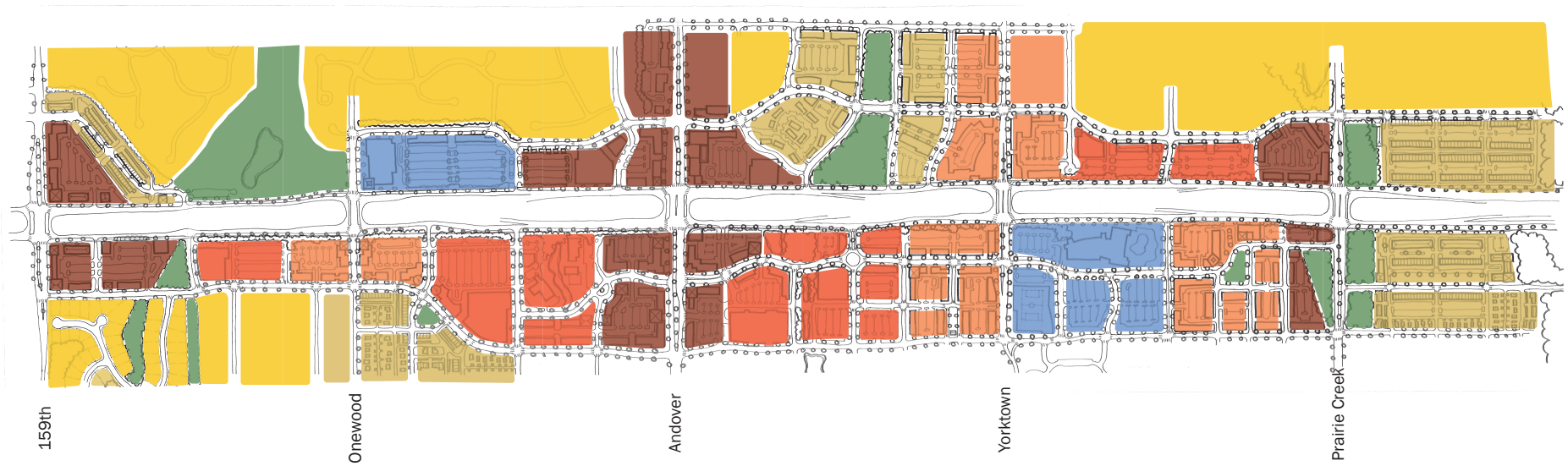


Figure 26 - Proposed Future Land Use

Legend

- Single Family
- Multi-Family
- Commercial
- MXD Residential
- MXD Commercial
- Civic
- Open Space

Development Opportunities

There are several areas along the corridor that are ready to develop or re-develop, Figure 27 outlines these areas. The economic outlook for the Wichita metropolitan area is generally quite positive, and most every sector expects positive absorption of available inventory in 2011, and an overall stabilization in vacancies and asking rents. There are a few locations along this corridor that show above average potential as the economic recovery continues – they are :

- The northeast quadrant of US 54/400 and 159th Street: This quadrant will be served by interchange and frontage road access and is currently undergoing preliminary development planning for a mixed use area.
- The northwest quadrant of US 54/400 and Yorktown Road: This area possesses an unusual blend of synergies. Upon freeway construction, it will be buffered from freeway traffic by the grade on US 54/400, but Yorktown Road will overpass US 54/400 without interchanging. This creates strong potential for a mixed use residential development that will enjoy pedestrian access to the YMCA and the elementary school south of US 54/400 while having vehicular access to US 54/400 via the reverse access or frontage roads. The linkages in this area are unique along this corridor.

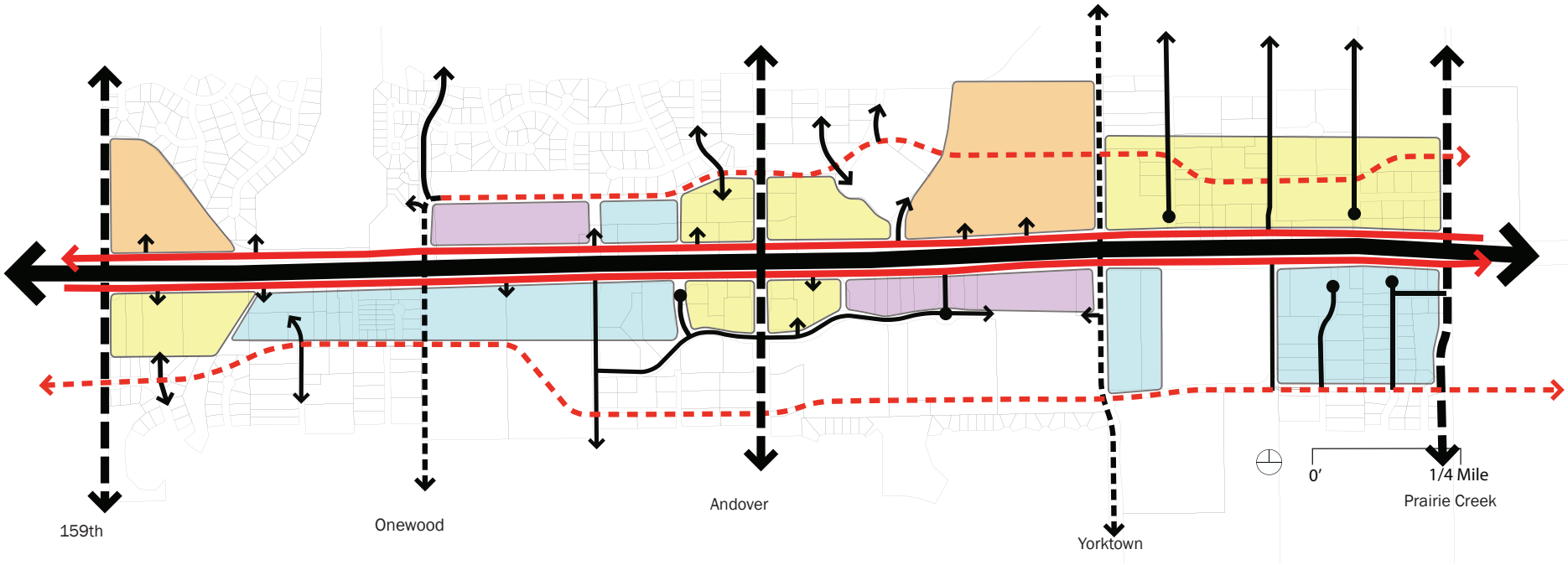
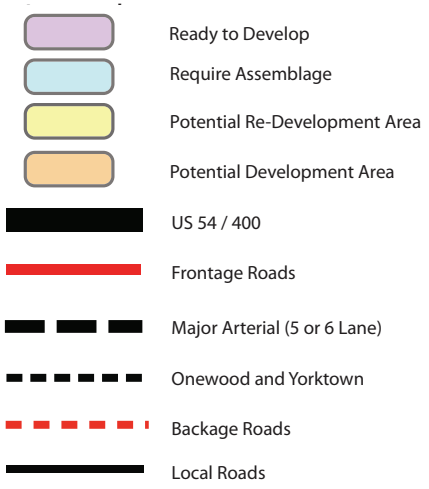


Figure 27 - Development Opportunities



Areas Requiring Significant Assemblage and/or Redevelopment

There are also some areas that will require significant assemblage and redevelopment following the right-of-way and access control acquisitions. The most notable of these include:

- Southeast quadrant US 54/400 and 159th Street – This area is sandwiched between the frontage road and the reverse access road. Assemblage and redevelopment of this "box" will likely be necessary.
- US 54/400/Andover Road – All four quadrants of this major interchange will be significantly impacted. Major efforts at assemblage and redevelopment will be necessary.
- Northwest quadrant of US 54/400 and Prairie Creek Road – As it currently exists, this quadrant relies entirely upon direct access to US 54/400 or access to a frontage road. In the after condition, circuitry of travel to reach westbound US 54/400 will be significantly increased. Alternative access to Prairie Creek Road will need to be established.

Urban Design Recommendations

An important aspect of the US 54/400 Corridor Study is the creation of a long-term vision that describes how Andover would like the area around US 54/400 to develop. To accomplish this vision, Andover will need to take the long view and plan for multi-generational development and specify how it wants future development to look and feel. This vision includes not only how future development along the corridor will look, but also how the US 54/400 right-of-way will look. This section describes the vision for the US 54/400 right-of-way, the development framework for new development, corridor character principles, sustainability opportunities, and an illustrative plan. Together, these components form the foundation for Andover achieving its desired development outcomes.

Right-of-Way Treatments and Strategies

Along the freeway right-of-way the retaining walls, bridges, landscaping, signage, and accent lighting will act as organizing principles and offer a series of impressions of how the environment shapes identity. Artist input will be included in concept development and the designs will emphasize how Andover's reflections and inspirations can be interpreted and integrated into the infrastructure design. The designs will strive to:

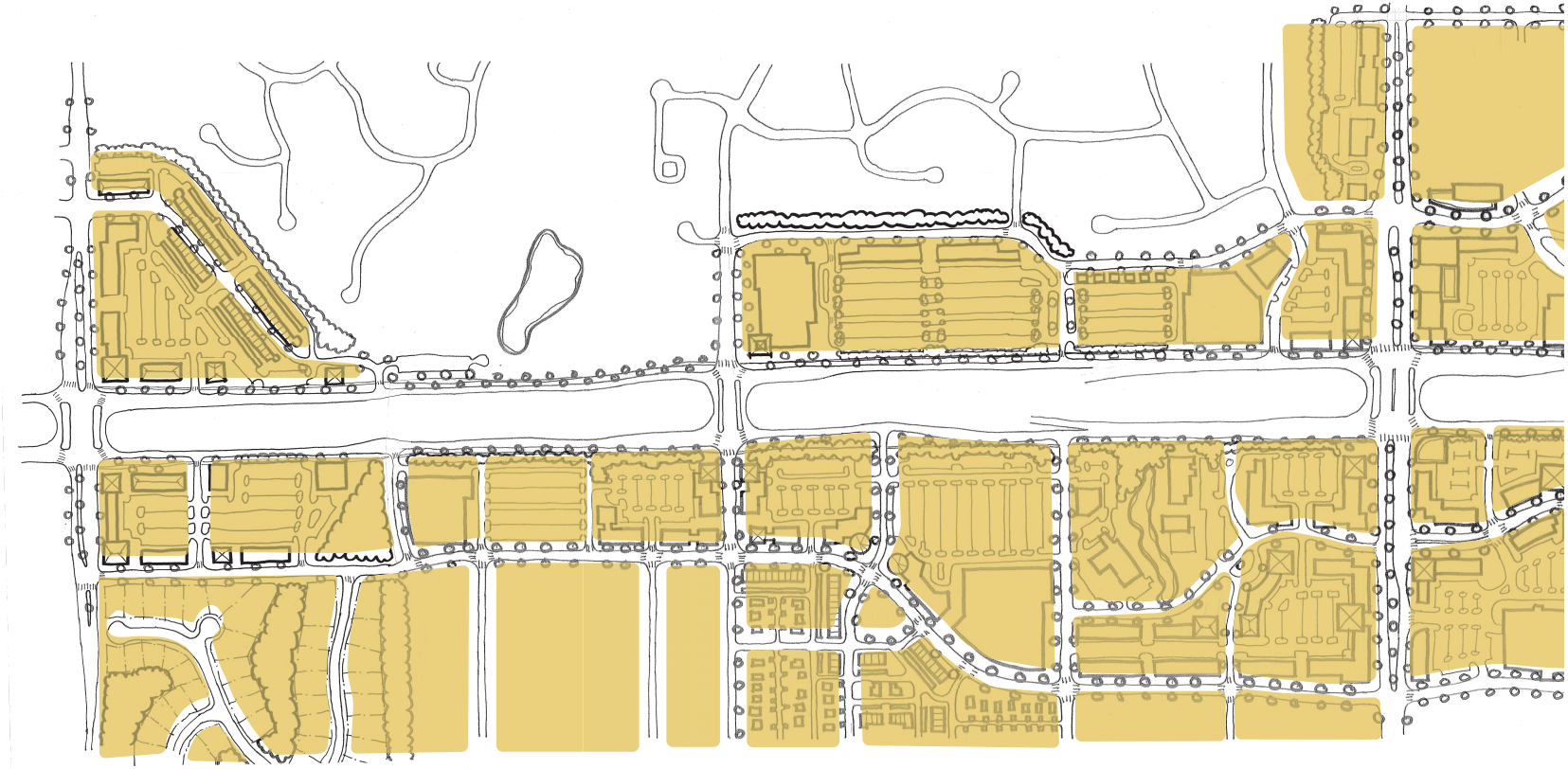
- enhance awareness of place,
- mitigate a tunneling effect through form, color, texture, and lighting,
- encourage the integration of infrastructure and landscape, and
- provide a restorative experience for all users of the corridor – drivers, walkers, bicyclists.

The intent is to create a sense of awareness of place and space as well as create a visually-exciting experience for those traveling along the corridor.

Multi-generational Development

Multi-generational development is a concept that acknowledges achieving a desired development pattern and urban form may take multiple development cycles to occur and that each development cycle must address the requirements of the current development market while preserving opportunities for efficient future redevelopment. Successful multi-generational development embraces three design and development principles, and if Andover wishes to achieve multi-generational development it should consider these principles when encouraging and evaluating development proposals along the US 54/400 corridor.

The Vision includes not only how future development along the corridor will look, but also how the US 54/400 right-of-way will look.



Establish a long-term development vision and framework

Based on the corridor vision, the multi-generational framework locates the primary multimodal circulation network and identifies a possible future street and block system. When possible, future street easements should be located along existing property lines so that new streets can be constructed with future development.

Provide infrastructure for more intense future development

Upgrading infrastructure is costly and can be a significant deterrent to achieving redevelopment. Over-sizing some infrastructure elements where more dense development could be realized within the next one to two development cycles may facilitate desired redevelopment to occur sooner and take the desired future form based on the planned vision.

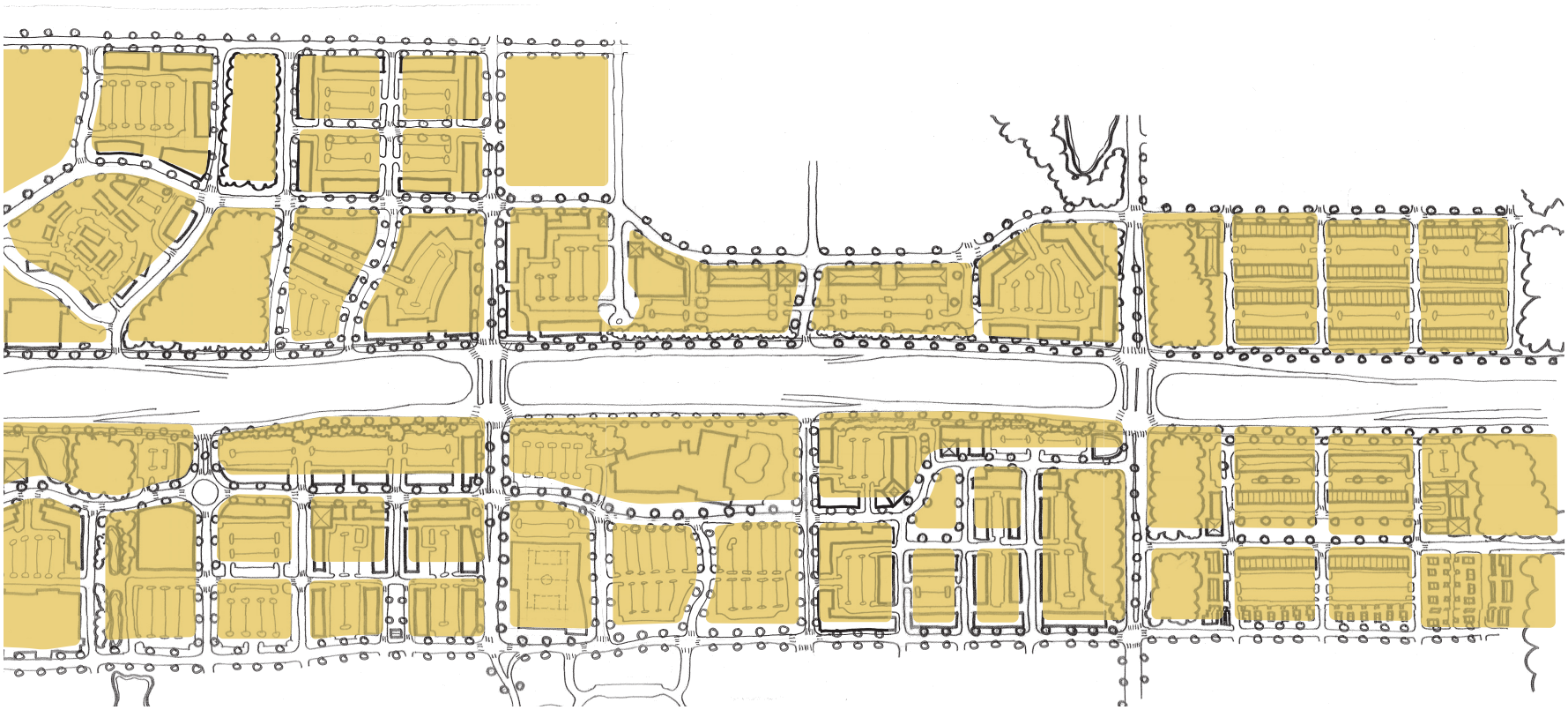


Figure 28 - Block Size

Legend

Proposed Block Sizes

NTS

Locate buildings clear of possible future road easements

The location and size of buildings on parcels can either facilitate or impede redevelopment. To increase the likelihood of successful redevelopment, when possible, buildings should be located and designed to accommodate a future planned street based on the long-term vision. When buildings are located in the center of a parcel, future subdivision of the parcel can be difficult from a land use and cost perspective. If it is possible to subdivide the parcel, it could result in undersized parcels and scale issues, which could be a deterrent to redevelopment and do not fulfill the development vision.

Corridor Development Framework

The US 54/400 corridor development framework is the land use representation of Andover's vision for enhancing economic development along the corridor. KDOT's expansion efforts in the corridor will be the catalyst for this change, but in order to prepare for the roadway expansion and accomplish the desired outcomes, Andover needs to describe and specify what it wants the corridor to be and how it wants the corridor to develop. The corridor development framework describes the "look and feel" Andover would like to see in the US 54/400 corridor. It discusses block size, building heights and orientations, view terminations, sidewalks, trails, and bike paths.

Block Size and Urban Form

The plan proposes that a new development pattern be created in the study area. It proposes a grid pattern with blocks sized approximately 660 feet by 440 feet. (Figure 28)

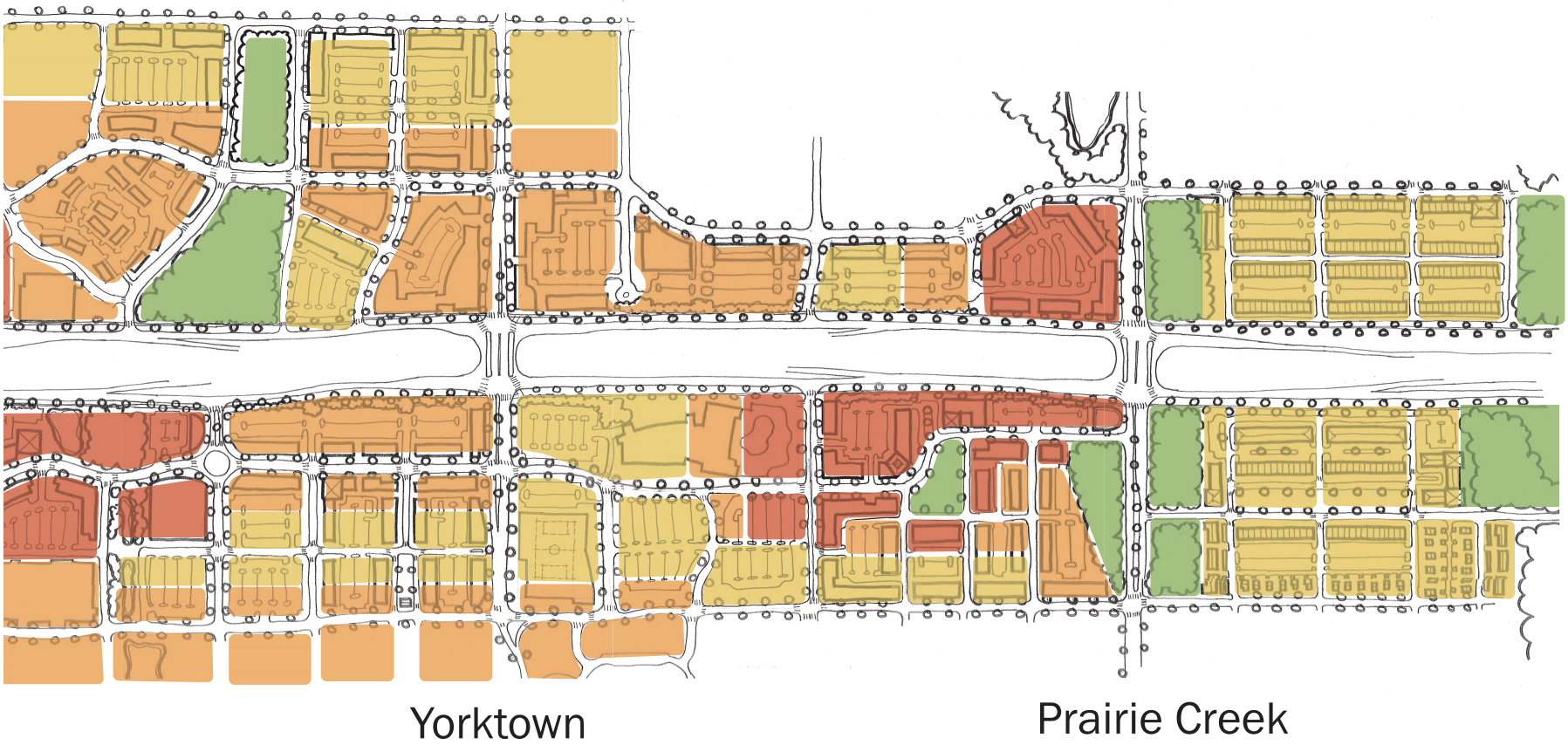


Figure 29 - Building Heights

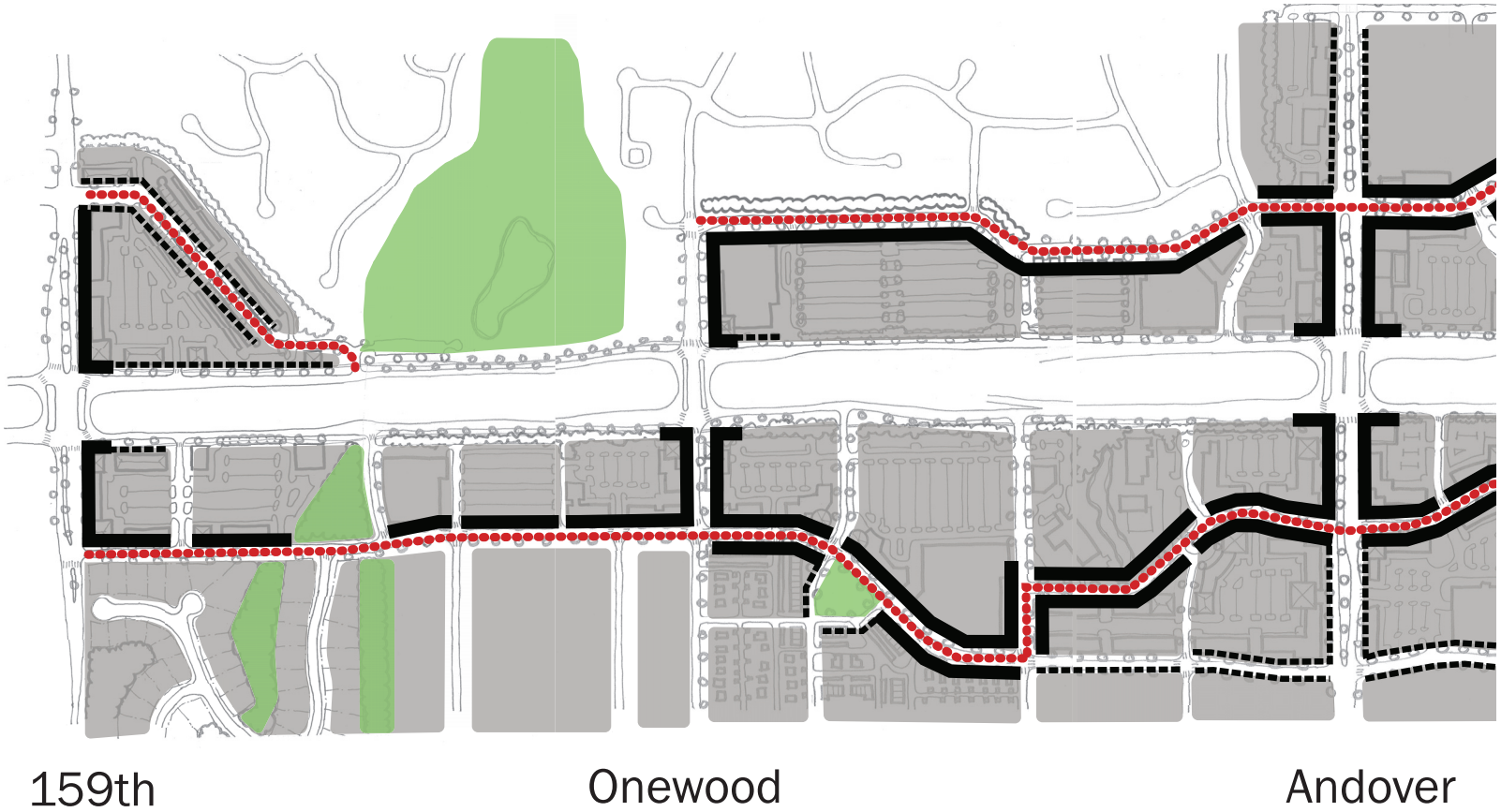
Building Heights

In order to ensure new development is compatible with existing development, the plan proposes different building heights along the corridor. The highest buildings, proposed to be between four and six stories, are planned for 159th Street, Andover Road, and Prairie Creek Road. Three to five story development is proposed at Onewood Drive, and Yorktown Road. Development outside of those nodes is proposed to be two and three stories. This pattern provides development focus at key intersections while providing compatible development heights adjacent to existing single family residential neighborhoods.(Figure 29)

Legend

- 4 - 6 Stories
- 3 - 5 Stories
- 2 - 3 Stories
- Open Space

NTS



Building Orientation

To create a more pedestrian-friendly and downtown or Main Street environment within the study area, the plan proposes that certain sides of development parcels be designated “primary building orientation”. These sides will have a 15-foot maximum setback from curb to building face. In addition, the primary orientation will have special façade and fenestration treatments and will be the primary building entry location. The map makes it clear that the backage or reverse access roads will become the front door for the businesses and residences that locate within the study area. (Figure 30)

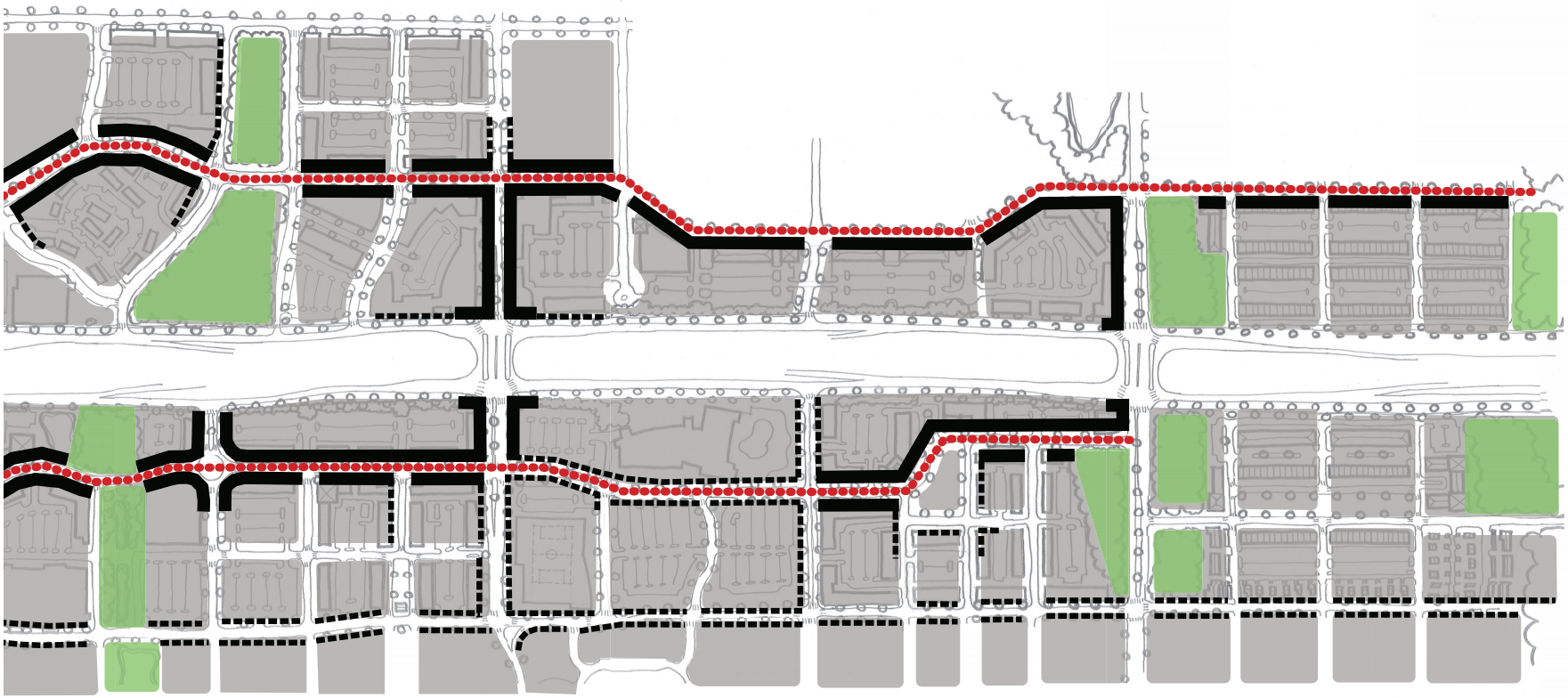


Figure 30 - Building Orientation

Legend

- Main Streets
- Primary Building Frontage
- Secondary Building Frontage
- Parks and Open Space

NTS

View Terminations

An important element in the creation of place is the visual experience one has when there. To this end, it is important to consider view termination – the building, monument, or open space one sees when looking down a street. The map below shows the important view termination points and sight lines that must be considered when designing a building or laying out development on a parcel. The view must be considered in the design and will require higher quality architectural and design treatments. At a minimum, view termination points cannot include trash enclosures, service entrances, or truck access. The view terminations are based on sight lines from the road alignment. (Figure 31)

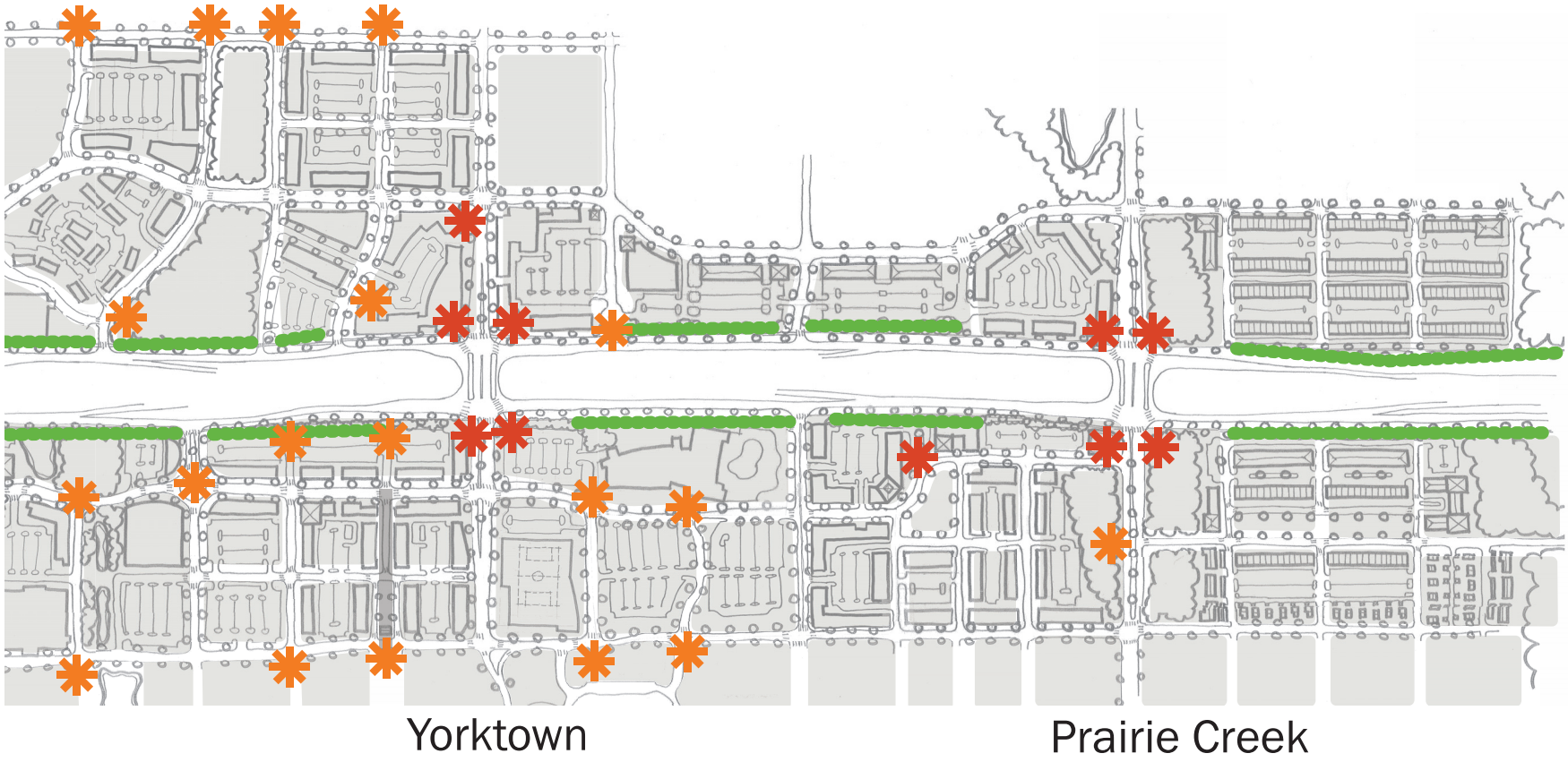
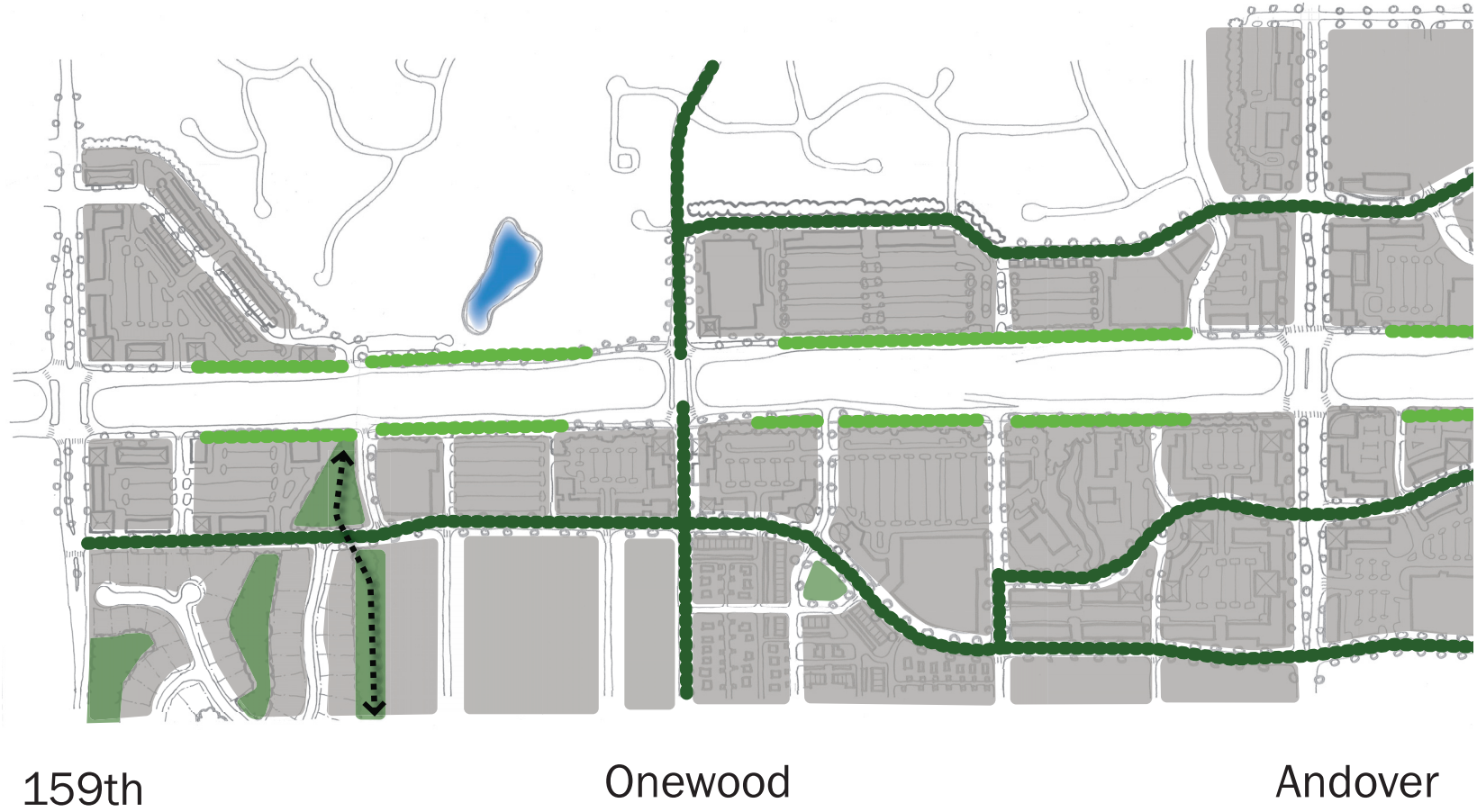


Figure 31 - View Terminations Along Streets

Legend

- Proposed Street Network
- Landscape Buffer
- Primary View Termination Points
- Secondary View Termination Points

NTS



Open Space and Trails

The plan envisions an interconnected series of open spaces, and expanding the current open space land uses categories to include greenways, landscape buffers, and stormwater gardens. Together, natural open spaces and parks could be connected through a series of green streets, landscape buffers and off-street trials. (Figure 32)

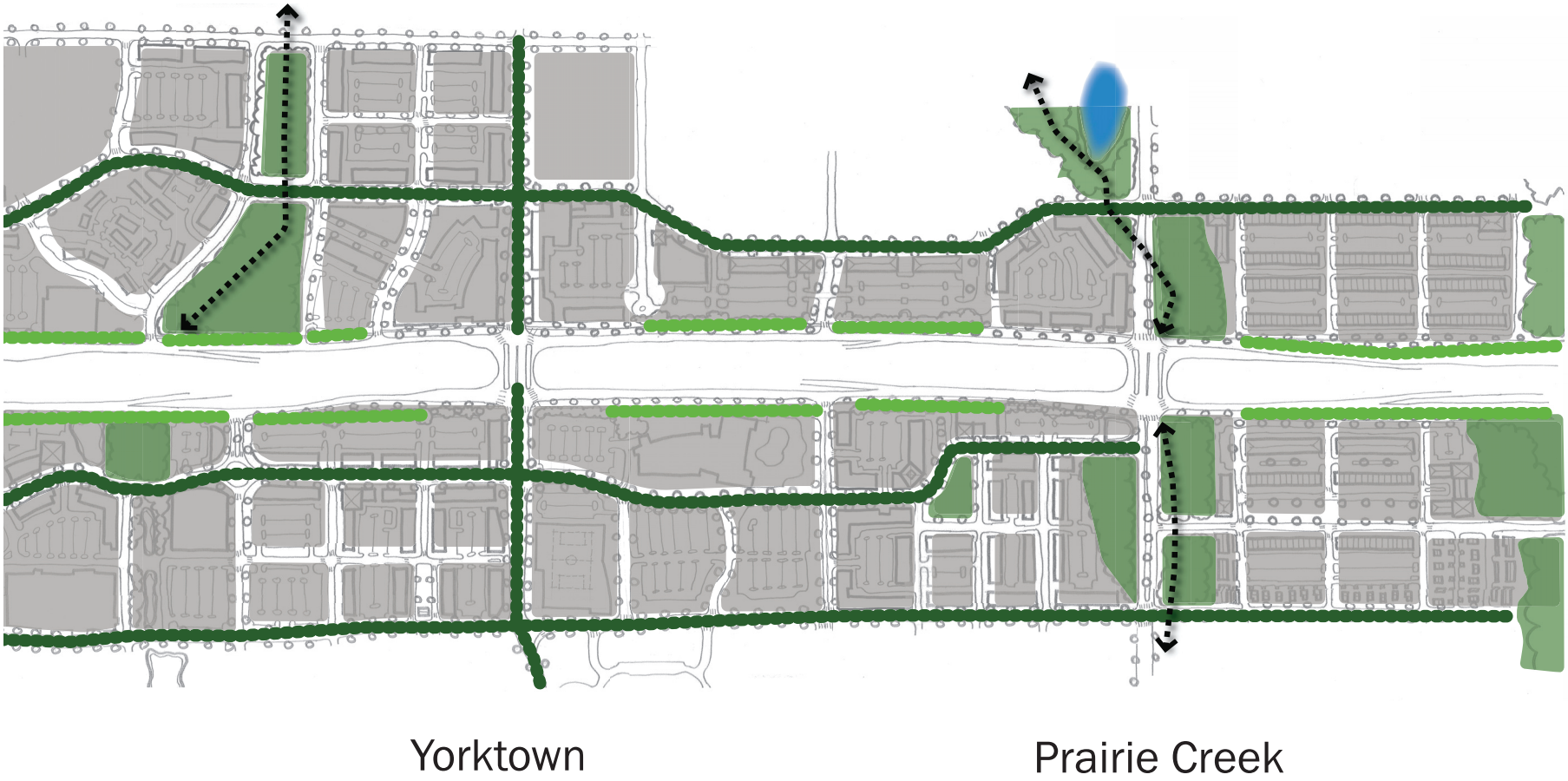


Figure 32 - Open Space and Trails

Legend

- Proposed Open Space
- Proposed Landscape Buffer
- Proposed Green Streets
- Proposed Off-Street Trails

NTS

Sidewalks Bike Paths

Throughout the study area the plan proposes sidewalks on both sides of streets. The backage roads, 159th Street, and Prairie Creek Road are proposed to have 10-foot sidewalks on each side. Onewood Drive, Andover Road, and Yorktown Road are proposed to have a 10-foot sidewalk on one side and a five-foot sidewalk on the other. The frontage roads along US 54/400 will have pedestrian pathways no smaller than 5 feet. All sidewalks will have a vegetated buffer between the sidewalk and the roadway.

The plan proposes the creation of bike paths on the backage and main north/south streets. Bike paths on the frontage roads are proposed when needed for connectivity. A grade-separated bike and pedestrian crossing is proposed west of 159th Street. (Figure 33)

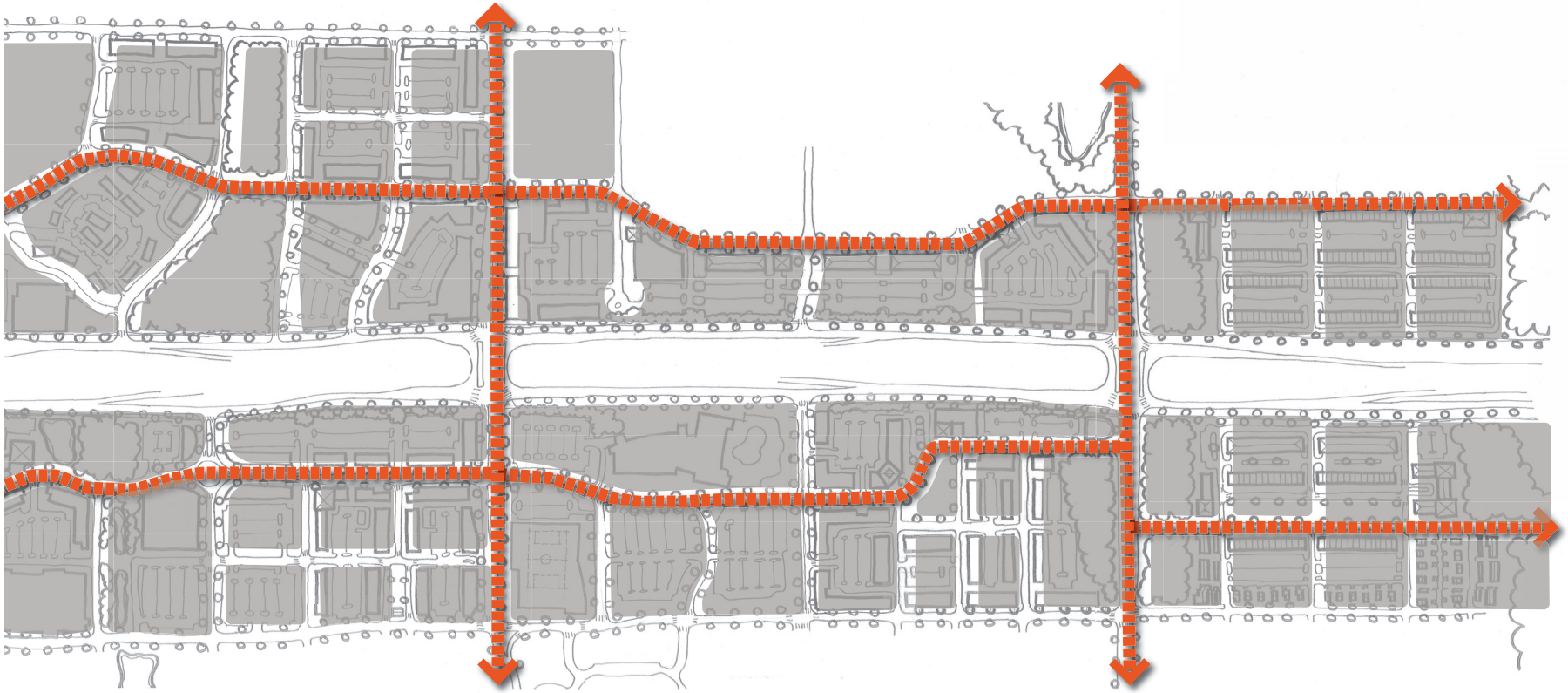


Figure 33 - Bike Routes

Legend

Proposed Bike Routes

NTS

Corridor Character Principles

The corridor character principles provide a thematic vision for the corridor. The purpose of providing a unifying theme is to present a consistent brand for Andover and to inform drivers of the range of experiences and opportunities contained in this corridor. One of the most impressive natural resources along this corridor is its rural setting, which is in contrast to the more urban character of communities to the west. During work sessions with stakeholder groups this rural character was identified as the most recognizable asset to the city and the theme of nature was proposed as a unifying theme for the corridor. This theme can be interpreted in many different ways, including color selection and aesthetic treatments within the right-of-way, and can influence the character of private development adjacent to the corridor.

The experience and character of the corridor will be communicated through the design and treatment of its spatial elements. Following are design principles for the primary spatial elements that will be experienced throughout the corridor. Each of the spatial elements described below should be designed to complement the unifying theme and respective subarea themes. The principles can be used to provide guidance during the decision-making process when evaluating detailed concepts for proposed aesthetic treatments along the corridor.

Landmarks and gateways take the form of natural features and designed elements. They include bridges, intersection treatments, development form, and significant open space areas.

Intent: *Landmarks identify and brand the City of Andover and its neighborhoods.*

Intent: *Landmarks form a mental map for wayfinding purposes and can be created through natural or man-made means.*

Intent: *Gateways identify particular areas within the city or particular neighborhoods.*

Principle: To provide a consistent gateway treatment, gateways should be elements that either span across a highway or path or be symmetrical elements located on each side of the highway right-of-way or path and requires users to either pass under or pass through.

Principle: To promote the diversity that exists in Andover, three landmark locations should be designed in this corridor, one at each of the mile line roads (159th Street, Andover Road, and Prairie Creek Road).

Principle: To diversify community image, landmark and gateway treatments should contain a minimum of three exterior materials.

Principle: To promote visual clarity, gateway treatments should be a minimum of eight-feet tall at any dimension from the ground or base condition.

Principle: To incorporate nodal development, landmarks and gateway treatments should be integrated with intersection design at 159th Street, Andover Road, and Prairie Creek Road.

Gateway Feature

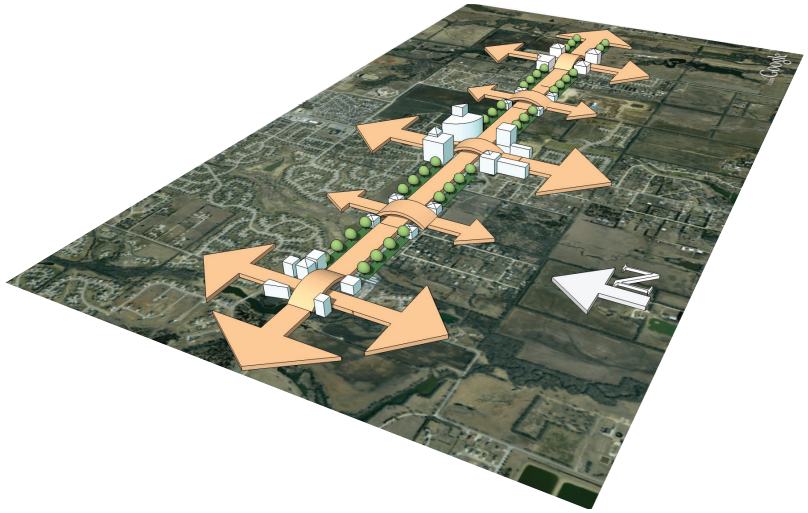


Figure 34 - Nodal Development Pattern

Ground Floor Retail

Wide Sidewalks

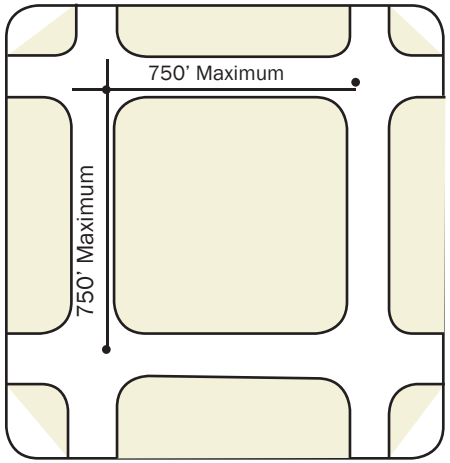


Figure 35 - Maximum Block Size

Development patterns describe how buildings, roads, and open space are organized together in a particular area. These patterns have a strong influence on the spatial character of the freeway. Figure 34.

Intent: *Development is composed of compact centers, or nodes, of mixed use development.*

Intent: *Environments are designed to be comfortable to pedestrians and bicyclists.*

Intent: Networks of transportation modes interconnect development and open space.

Intent: Land use and transportation are linked to create active, engaging places.

Principle: To reduce sprawl, create development nodes that capture a higher number of vehicle trips accessing the corridor than traditional development.

Principle: To promote active places, create centers of mixed-use developments near a variety of residential densities.

Principle: To promote active places, site design for major projects should allow for increased densities over time.

Principle: To reduce the occurrence of strip development, new development should be nodal in character and concentrated along the highway at planned areas, which are separated by open space.

Principle: To leverage transportation access, the tallest and densest development patterns should occur within 700 feet to one-quarter mile radius of planned nodes.

Principle: To improve development character, parking locations should be less prominent and located to the rear of buildings or in parking structures.

Principle: To promote active streets, pedestrian-oriented uses should be located on ground floors of buildings.

Principle: To facilitate more active places, sidewalks should be wider in planned development nodes than in other lower density areas.

Principle: To provide amenities for pedestrians, sidewalks should incorporate street trees, benches, kiosks, and plazas.

Principle: To promote active streets, auto-oriented uses including service stations and drive through facilities should be discouraged within one-quarter mile radius of planned nodes.

Principle: To provide a pedestrian-friendly street network, street block sizes should not exceed 600,000 square feet. Figure 35.

Right-of-way treatments include the treatments to elements commonly located within the highway right-of-way and can include the treatment of bridges, walls, fencing, landscaping, and lighting.

Intent: *Right-of-way treatments embody the unifying and subarea themes described in this plan.*

Intent: *Aesthetic treatments are visually consistent for public and private lands when viewed from the corridor.*

Principle: To improve aesthetic quality, bridges should contain a minimum of three exterior materials and include accent lighting in addition to standard safety lighting.

Principle: To improve aesthetic quality, no chain link fencing is allowed within direct view of the corridor or fifty feet outside the public owned right-of-way.

Principle: To improve the aesthetic quality, welded wire mesh may be provided in areas that require safety fencing.

Principle: To improve the aesthetic quality, fencing treatments should incorporate live, drought-tolerant vegetation where direct transparency for safety is not required.

Principle: To improve the aesthetic quality, landscape treatments including flowering plants should be provided adjacent to gateways and landmark areas.

Principle: To reduce a canyon effect in the corridor, vertical surfaces of walls should not exceed twenty feet without at least a twelve inch horizontal break.

Principle: To break down the scale of walls, patterns should be created that are a maximum of four feet in any direction.

Principle: To promote a pedestrian-oriented environment, pedestrian routes should be buffered from fast-moving traffic and expanses of parking.

Public art and improved pedestrian railings

Improved vehicular fencing adjacent to highway

Fence with screening adjacent to parking lot

Openspace Adjacent to a Highway

Bioswale adjacent to roadway provides stormwater filtration

Open spaces take the form of a wide range of passive and active natural spaces; regional and local parks; pedestrian paths and plazas; and include waterways, wetlands, and stormwater drainage areas.

Intent: *Natural spaces complement and separate areas of nodal development and enhance the natural surroundings.*

Intent: *Natural spaces represent interconnected systems and are organized to facilitate system-wide drainage.*

Intent: *View corridors provide expansive views out of the corridor and identify landmarks when appropriate.*

Principle: To facilitate pedestrian connectivity, natural spaces should create linear systems, particularly east-west along the US 54/400 corridor.

Principle: To maintain a sustainable landscape, only native plantings should be used.

Principle: To promote expansive views, low plantings should be used in open spaces that are designated to frame long views.

Principle: To improve water quality, native landscape materials should be used to provide primary filtration of stormwater prior to entering sewer system.

Access locations include the location of curb cuts and intersections on frontage roads, arterial streets, and intersections within the corridor.

Intent: *Frontage roads facilitate local circulation parallel to the highway and provide access to the local street system.*

Intent: *Local streets provide the majority of access to private property along the corridor.*

Principle: To promote access, street patterns should form an interconnected grid that simplifies access for all transportation modes.

Principle: To improve multimodal circulation, bridges should include pedestrian paths and bicycle lanes.

Principle: To increase capacity of the frontage road system, curb cuts should be minimized.

Nighttime treatments include the organization and design of safety and accent lighting on spatial elements, including landmarks, key building and landscape treatments, bridge and wall treatments, and open spaces.

Intent: *Corridor treatments should be designed for daytime and nighttime users.*

Intent: *Effect lighting should attempt to replicate the daytime experience for nighttime users so that the visual experience is the same whether viewing during the day or at night.*

Intent: *Lighting for safety should be integrated with effect lighting and continue a consistent design theme.*

Principle: To improve the aesthetic quality, accent lighting should be included in right-of-way treatments.

Principle: To express the design theme in each subarea, safety lighting should be incorporated with effect lighting.

Principle: To promote walking during nighttime, pedestrian-scaled lighting should be included on all walkways within one-quarter mile of defined nodes.

Pedestrian-scale Lighting

Sustainable landscaping in parking lots improves water quality

Bus stop landscaping increase water quality and provides natural cover for users

Street stormwater filtration provided by adjacent street tree planters

Sustainability Opportunities

Stormwater Management

Stormwater management for redevelopment opportunity sites along the US 54/400 Corridor should be aggregated to address larger regional stormwater issues. This aggregation to areas less prominent for development help to congregate appropriate land use in an urban form and allow for highest and best use based on market conditions. It also allows for an opportunity to solve historic stormwater issues in existing, adjacent neighborhoods, which can aid in building community support for redevelopment.

There are two core issues to address when handling stormwater: 1) volume and timing of runoff (detention and conveyance) and 2) contaminants carried in the water (water quality). Addressing the core issues of stormwater throughout its cycle in an urban setting maximizes sustainable regeneration of the resource and minimizes the impact to the built environment and urban design of place. Techniques must be utilized at the source point for cleaning the water as well as using land-based solutions to handle stormwater detention and conveyance.

Integrate Solutions into Urban Design

Low Impact Development (LID) offers several techniques including stormwater harvest, infiltration to restore the natural recharge of groundwater, biofiltration or bioorientation (e.g.,rain gardens) to store and treat runoff and release it at a controlled rate to reduce impact on streams and wetland treatments. This stores and controls runoff rates and provides habitat in urban areas. Curb modifications for at-source retention are required to collect run-off water into bioswales, and provide at source water quality. Permeable pavements can enhance the streetscape and contribute to the character while serving as LID. Green roofs are also another low cost solution. These applications largely address water quality at the point source prior to connecting into the larger system for conveyance and detention. All techniques should be evaluated to understand which best address the climate and geographic conditions of the site.

Use Open Space System for Multiple Functions

Detention ponds, bioswales, infiltration trenches, and sustainable pavements (such as pervious) should be utilized throughout redevelopment sites and integrated into the built environment, public rights-of-way, and within the open space system. Using a hybrid of subsurface stormwater infrastructure from the built environment to convey loads unable to be addressed though LID, park systems can receive large events and detain, release, and convey stormwater through a

greenway in a regional park system. These management elements should be designed to coexist into the park character and can be used as amenities for passive and active recreation.

Energy

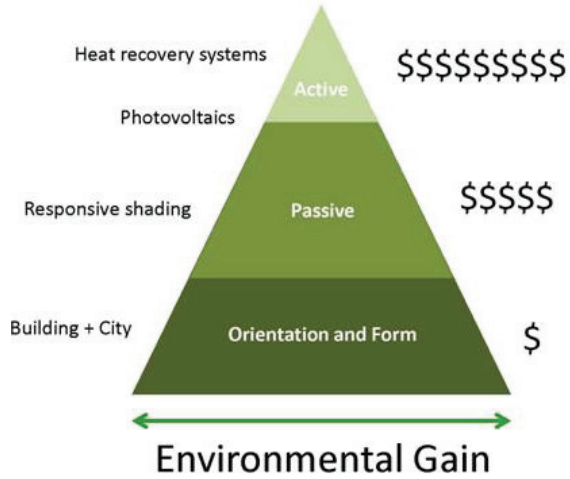
When considering a carbon neutral redevelopment project, the first task is to design, engineer, and specify buildings that minimize energy use. This can be achieved through a combination of active and passive design measures:

- Exemplary standards of thermal performance
- Efficient and responsive building services
- Incorporation of cost-efficient renewable energies
- Adherence to passive design principles such as minimizing solar gain in summer, maximizing solar gain in winter, orientation, etc.

In the context of passive solar building design the aim is normally to maximize solar gain within the building in the winter (to reduce space heating demand) and to control it in summer (to minimize cooling requirements). Thermal mass may be used to even out the fluctuations during the day and to some extent between days. Awnings, canopies, and street trees play an important role in providing effective responsive shading at low costs, reduce heat gains in roadways and buildings, and enhance the streetscape of urban corridors.

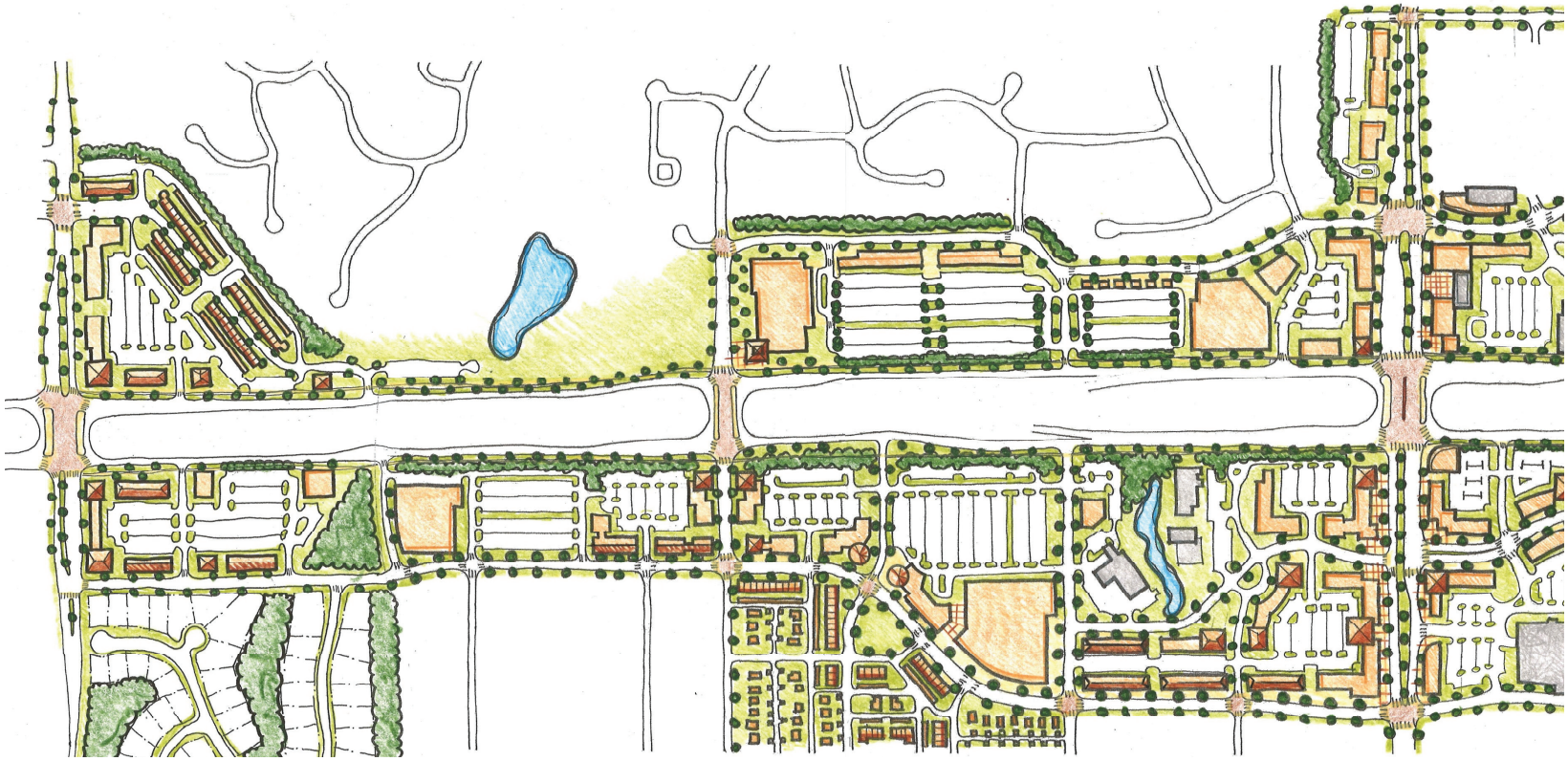
In direct solar gain systems, the composition and coating of the building glazing can also be manipulated to optimize the greenhouse effect, while its size, position and shading can be used to optimize solar gain. Solar gain can also be transferred to the building by indirect or isolated solar gain systems.

The Environmental Gain diagram illustrates the cost effectiveness of orientation and form of redevelopment projects and sighting of buildings. Passive solar design is the next tool to implement that still can be implemented, but at a higher cost and finally more active tools such as photovoltaics and heat recovery systems may offer sustainable solutions, but often at a prohibitive cost.



Green roofs increase permeable surfaces

Planting beds increase permeable surfaces



Illustrative Plan

The illustrative plan is based on the overall planning frameworks and shows one possible development scenario at ultimate build out. Many other development scenarios could also be achieved based on the vision frameworks contained in the plan. The following illustration demonstrates how development could be achieved over time as a series of planning districts including commercial mixed use and residential.

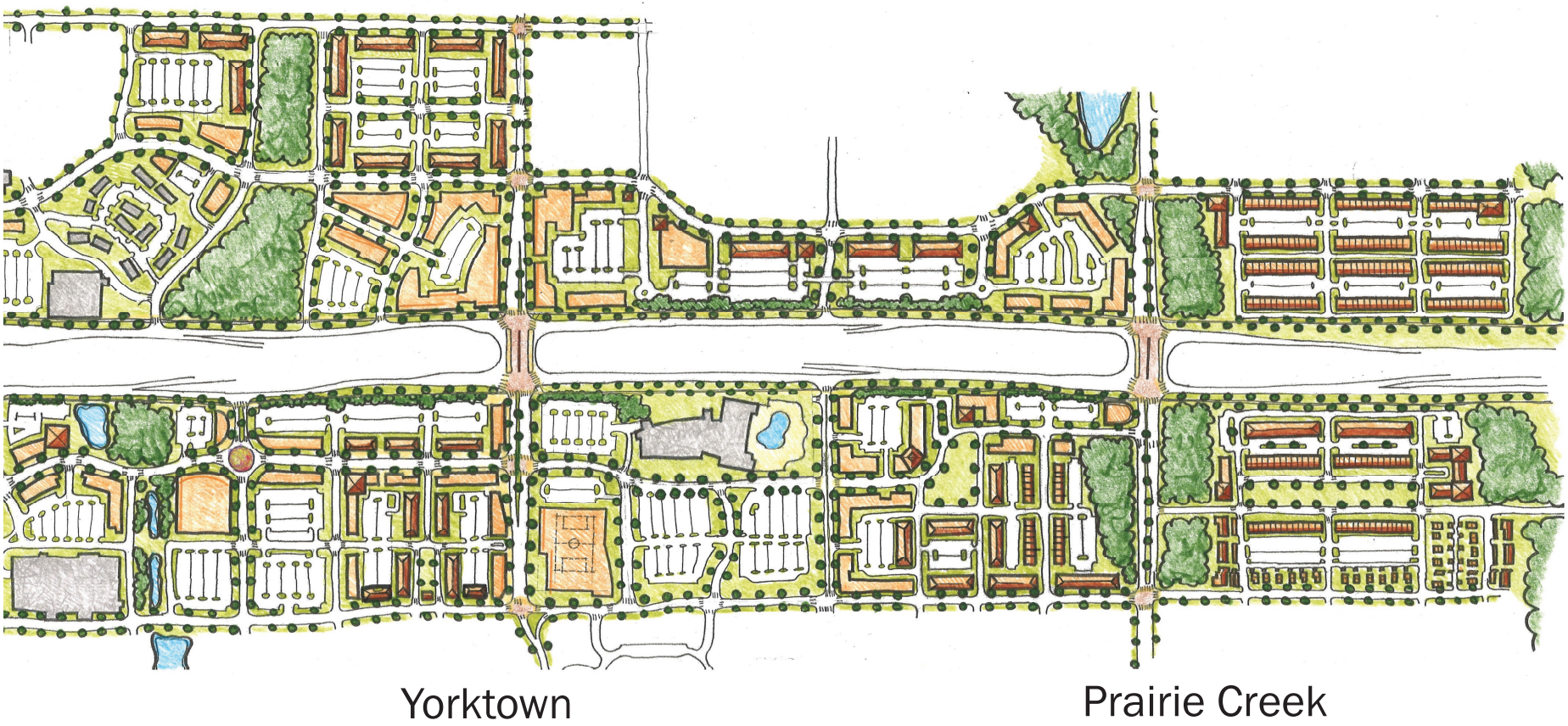


Figure 36- Illustrative Plan

Utility Recommendations

The study team contacted local utility companies with facilities in the corridor area. Information provided by the utilities was used to create a utility location map, which indicates the approximate location of each utility within the corridor zone. Utilities identified within the designated right of way footprint would be required to relocate in some capacity for the recommended transportation improvements to be realized.

Through the stakeholder process, it was determined that the City of Andover would prefer to have utilities located underground. The aesthetic enhancement was considered worth the additional cost associated with burying existing overhead utilities.

Through the stakeholder process, it was determined that the City of Andover would prefer to have utilities located underground. The aesthetic enhancement was considered worth the additional cost associated with burying existing overhead utilities.

Existing Utility Corridors

US 54/400 serves as a major utility corridor. Westar has an overhead electric distribution main and an overhead electric transmission line running along the north side of US 54/400 within a private utility easement. Kansas Gas Service has an underground distribution main that runs mostly along the south side of US 54/400. It runs along the north side for about 1400 feet from Andover Road to the west and from about 350 feet east of Yorktown Road to Prairie Creek Road. AT&T has a significant underground communications duct bank running along the south side of US 54/400. Cox Communications has overhead cable television and fiber optic lines along the north side of US 54/400. Also, there is a 12” water main along the north side of US 54/400.

In addition to the utilities that are parallel to US 54/400 (east-west) there are several major utilities crossing the corridor (north-south). Three sanitary sewer interceptors have been identified crossing US 54/400, one approximately 1100 feet east of 159th Street, another approximately 600 feet east of Andover Road, and one approximately 500 feet west of Prairie Creek Road. Six waterline crossings have been identified, a 12 inch main at 159th Street, an 8 inch main approximately 500 feet west of Onewood Drive, a 12 inch main approximately 1200 feet east of Andover Road, an 8 inch main approximately 600 feet east of Andover Road, a 12 inch main at Andover Road, and an 8 inch main approximately 400 feet east of Prairie Creek Road. Approximately a half mile east of Prairie Creek Road, Conoco Phillips has an 18” underground gas pipeline that crosses beneath US 54/400.

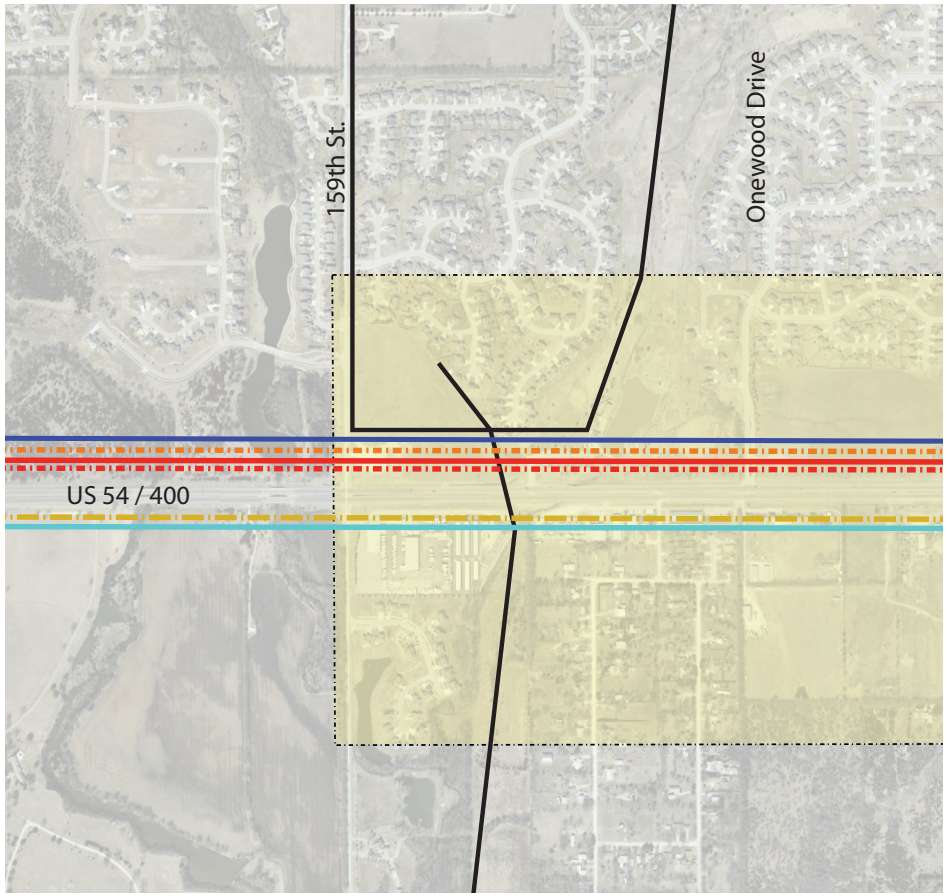
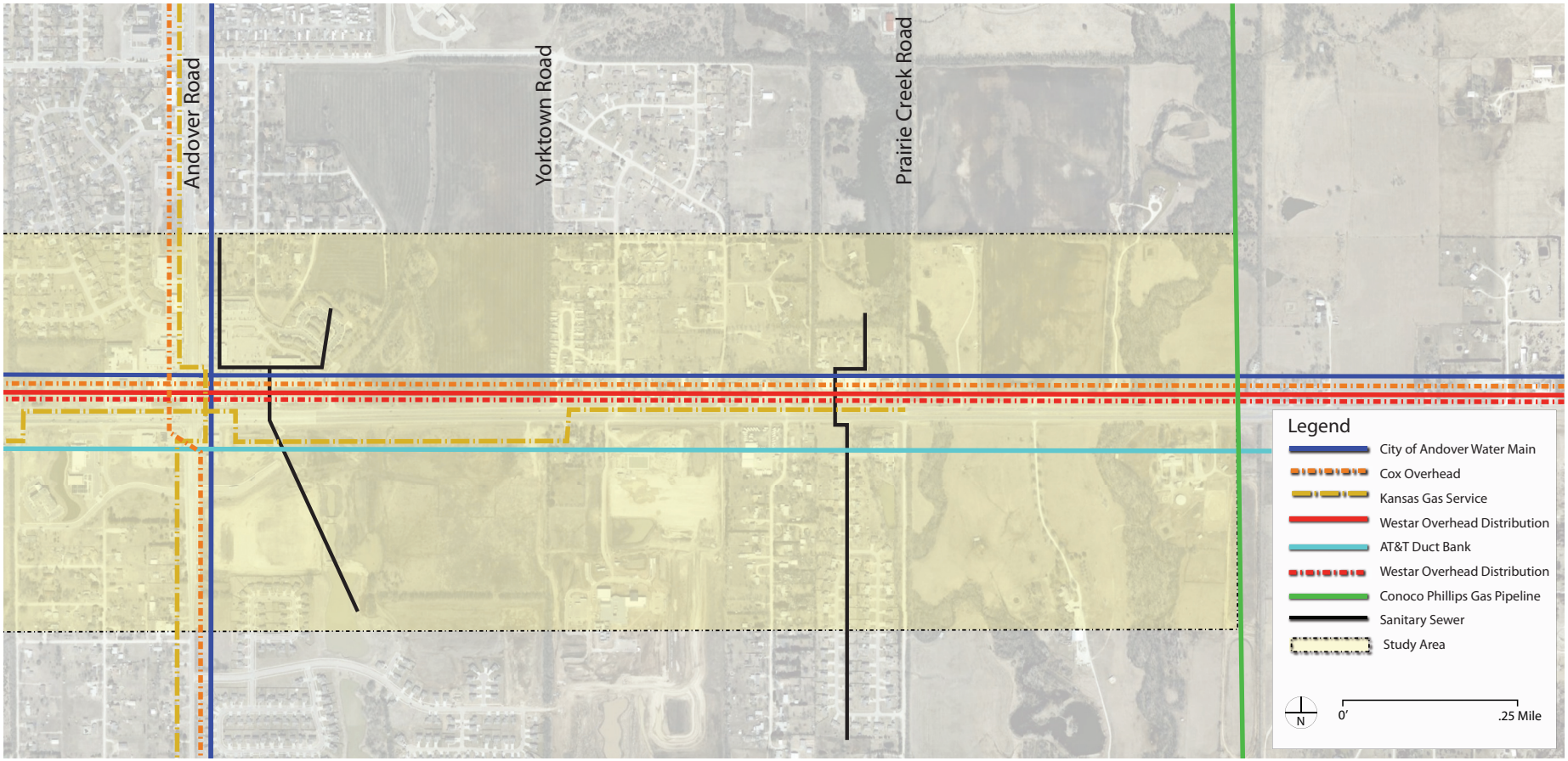


Figure 37 - Existing Utilities

Andover Road also serves as a major utility corridor. Kansas Gas Service has an underground distribution line crossing US 54/400. Westar has overhead distribution lines, and Cox Communications has overhead cable television and fiber optic lines. There is a 12” water main along the east side of Andover Road.

In addition to the major facilities outlined above, telephone, electric, natural gas, water, sewer, cable television, and fiber optic communication lines branch off to provide services to customers along US 54/400.



Planned Utility Corridors

The City of Andover desires to have all public and private utilities along US 54/400 placed underground. To meet the goals of the utility relocation effort and to improve aesthetics in the area, underground utility corridors have been identified along both sides of US 54/400 between the frontage roads and the right-of-way lines. It is also desired to place all the utilities underground along the side roads and backage road systems. Designating utility corridors within the right of way footprint can reduce utility conflicts and simplify relocation efforts, which reduces the overall cost of constructing a project .

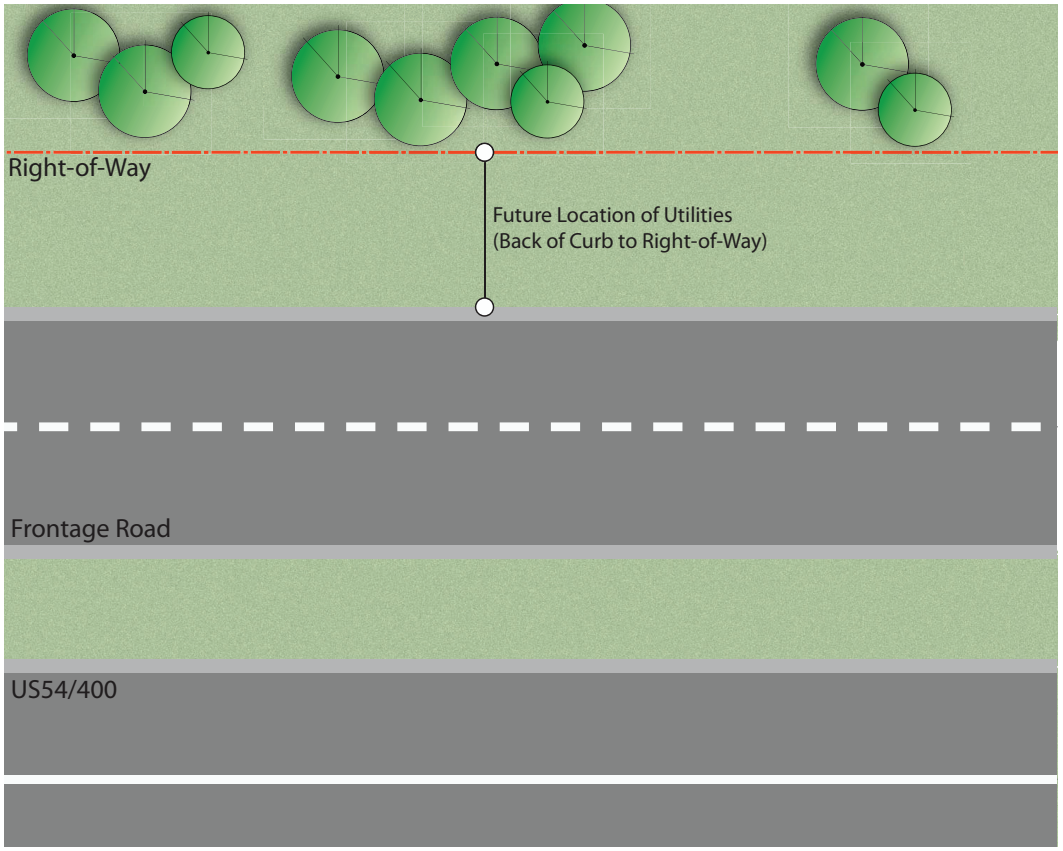


Figure 38 - Proposed Utility Corridors

Andover
Express
INN
Lubbers

Environmental Review

Summary of Findings

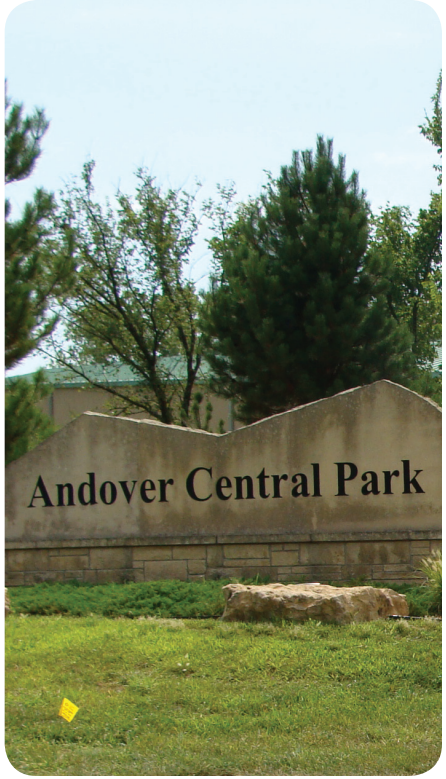
A Preliminary Environmental Review was completed by the Kansas Department of Transportation April 28, 2010. Environmental tasks were performed and the findings were as follows:

- Archeology: No significant cultural resources were found within the study area, resulting in a finding of no historic properties affected.
- Cultural & Historical: The State Historical Preservation Office determined that the proposed project will not adversely affect buildings or structures listed or eligible for listing n the National Register of Historical Places.
- Wetlands: Investigation indicated the presence of wetlands within the study corridor. These wetlands are associated with drainages, stream channels, and ponds.
- Streams: None of the stream segments within in the study area are classified in the Kansas Department of Health & Environment, Dec. 19, 2007 Kansas surface Water Register.
- Wildlife: The Kansas Department of Wildlife & Parks lists the endangered American Burying Beetle, threatened Eastern Spotted Skunk, endangered Eskimo Curlew, endangered Least Tern, threatened Piping Plover, threatened Sharp Hornsnail, threatened Snowy Plover, threatened Topeka Shiner, and endangered Whooping Crane in Butler County. A Designated Critical Habitat for the Topeka Shiner has been established in Butler County but is not within the study area.
- Floodplains: Federal Emergency Management Agency Flood Insurance Maps show 100-year flood zones and floodways within the study corridor. Floodways are present on Fourmile Creek tributaries and on the Republican Creek and its tributary.
- Hazardous Waste: A database search did not reveal any hazardous waste sites within the study corridor; however, a field survey indicated five sites that may pose hazardous waste concerns.

See Appendix F for Environmental Review Summary

Great places are defined in large part by great streets. Jane Jacobs said it well: “Streets and their sidewalks, the main public places of a city, are its most vital organs.”

Next Steps



The US 54/400 Corridor Study has described an ambitious transportation and development program for Andover, and this study represents the first of many steps Andover needs to take if it is to achieve its vision. The initial step has identified a footprint for future freeway construction and illustrated how Andover will retain its small town feel while promoting economic development. However, it will not be possible to achieve this vision if Andover stops now, after taking this first step. In order to be successful and create the kind of development it wishes to see, the City must create legally-binding ordinances and regulations to govern how the area adjacent to US 54/400 will develop.

Comprehensive Plan Update

Before Andover can change its ordinances and regulations it needs to explain why it thinks the changes are needed, and the Comprehensive Plan is the place to make the case for the new development pattern. The Comprehensive Plan will establish development goals, broadly define the location of land uses, provide basic guidance on the types of uses encouraged or discouraged, and describe how it would like the development to look. Much of this information has been described in the US 54/400 Corridor Study and should be used to create the Comprehensive Plan amendment.

The US 54/400 Corridor Study has described an ambitious transportation and development program for Andover, and this study represents the first of many steps Andover needs to take if it is to achieve its vision.

Zoning Ordinance Update

Implementing the vision described in the Comprehensive Plan will require creating at least one new zoning district and modifying current development regulations.

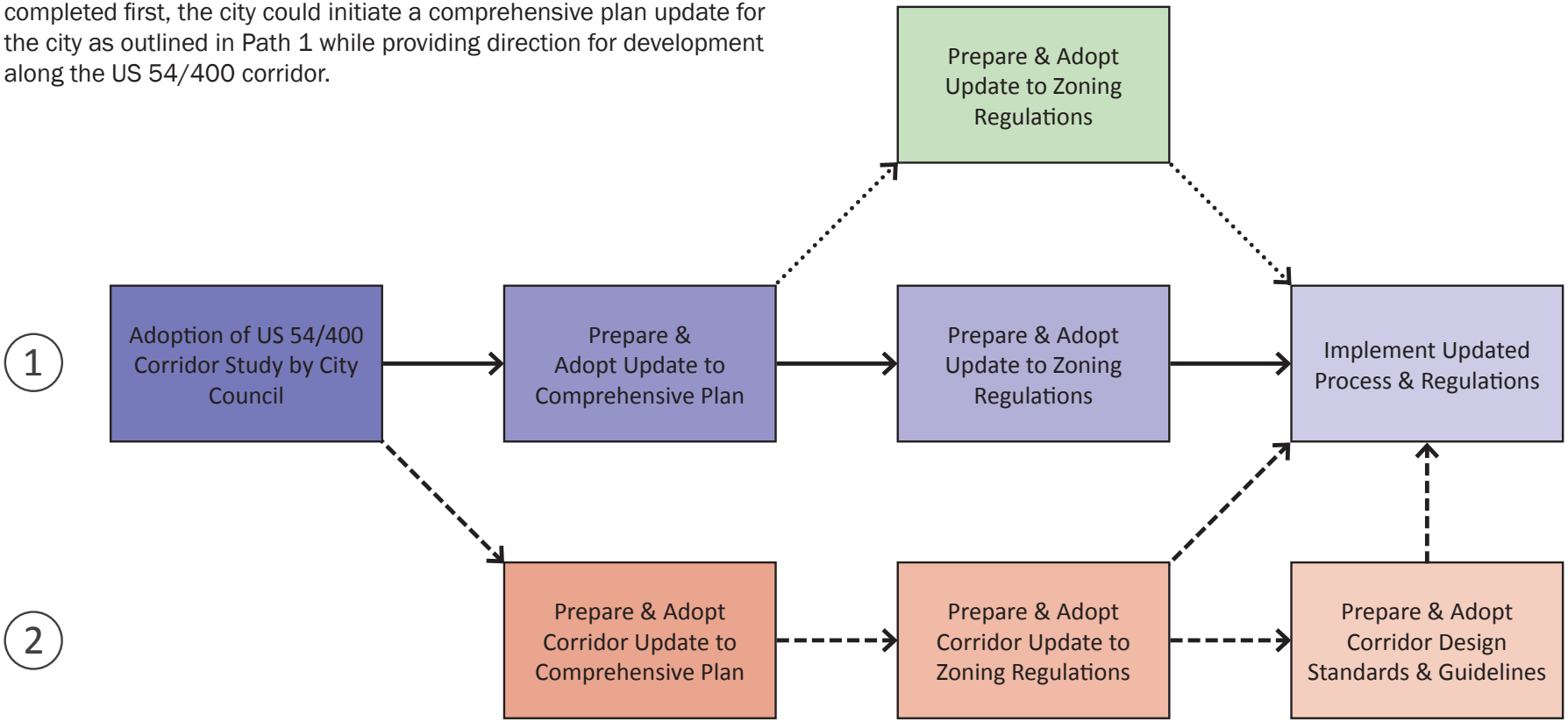
The information in Chapter 8: Urban Design Recommendations, specifically the development framework and the corridor character principles, can provide Andover with ideas about the types and content of development standards and performance measures that need to be met in the district.

Comprehensive Transportation Plan Update

A key component of the corridor vision is converting US 54/400 into a freeway. To do this, the corridor footprint needs to be preserved. In addition, access control needs to be implemented to ensure that the freeway and the roadways around the corridor function as planned. Revising the comprehensive transportation plan to address these issues also needs to occur. The spacing recommendations provided in Chapter 6 can provide a starting point for revising the access management portion of the comprehensive transportation plan.

Economic Opportunities

There are tremendous economic opportunities that exist within this corridor, but there is also a great deal of work that needs to be done to make the corridor – and the community – ready to take advantage of those opportunities. It is necessary for Andover to invest hard dollars in the development of the identified transportation network, and it is in Andover's best interests to participate financially in the development of the corridor – particularly in the early stages. It is not necessary, however, for Andover to take on these investments (and the commensurate risks) alone. Partnering with other regulatory entities will provide additional opportunities for funding, but partnering with non-traditional, private sector partners will provide other opportunities that regulatory partners cannot. The opportunities for various public-private partnerships along this corridor should be carefully investigated in the implementation phase of this effort.

Next Steps

There are two possible paths to implement the recommendations contained in this study. Path 1 illustrates a process based on the preparation of a comprehensive plan update that would integrate the corridor study recommendations. Path 1 could take between 12 to 18 months and could integrate the corridor into a broader city planning process. Path 2 illustrates an implementation process to recognize the corridor study independent of a comprehensive plan update. Path 2 could be initiated at the adoption of this study and provide the city with regulatory tools to address current development pressures. If Path 2 is completed first, the city could initiate a comprehensive plan update for the city as outlined in Path 1 while providing direction for development along the US 54/400 corridor.