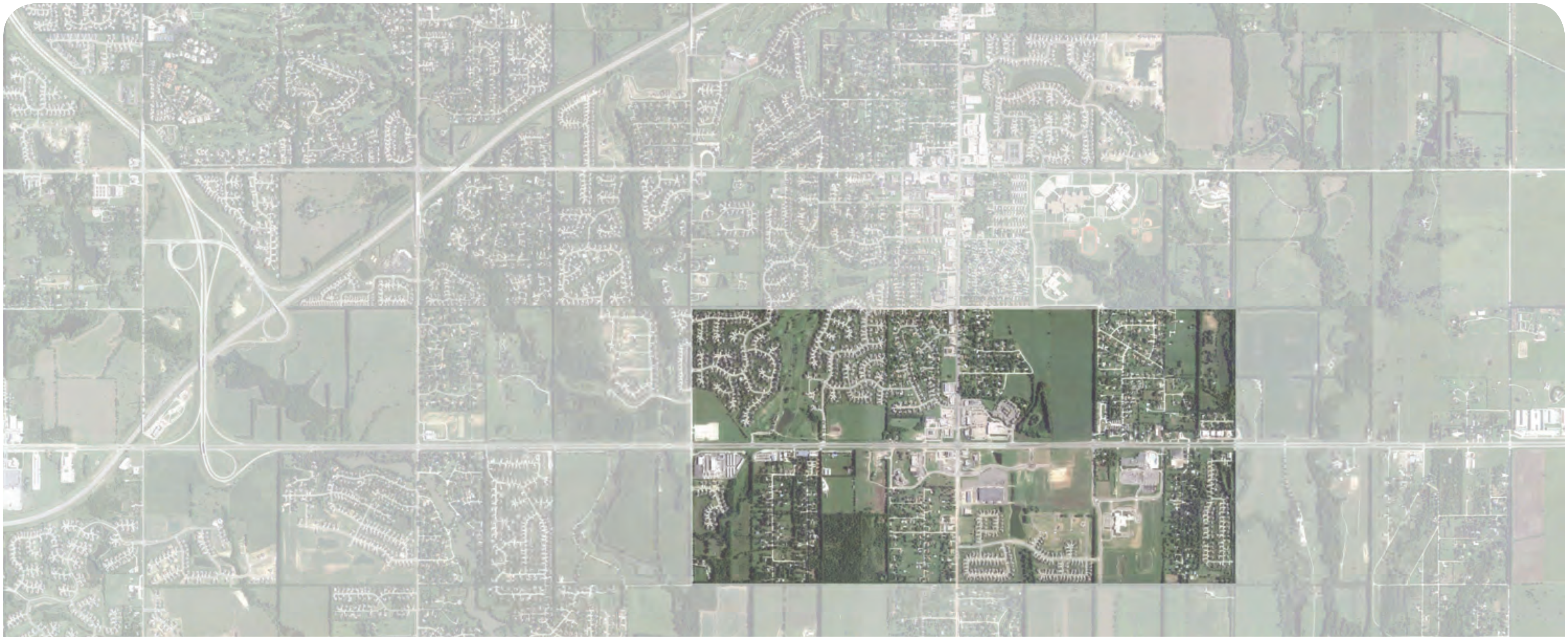

City of Andover

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.

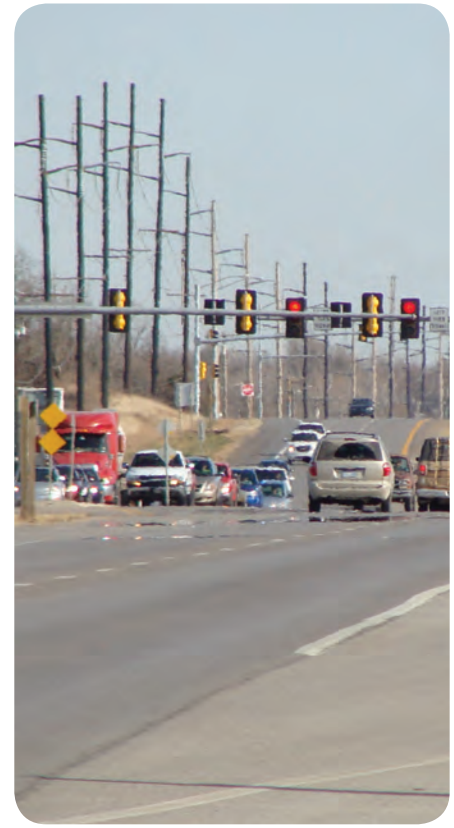
This plan provides a series of integrated strategies that can be used to guide public and private investment and allow the City to realize their community vision.

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.

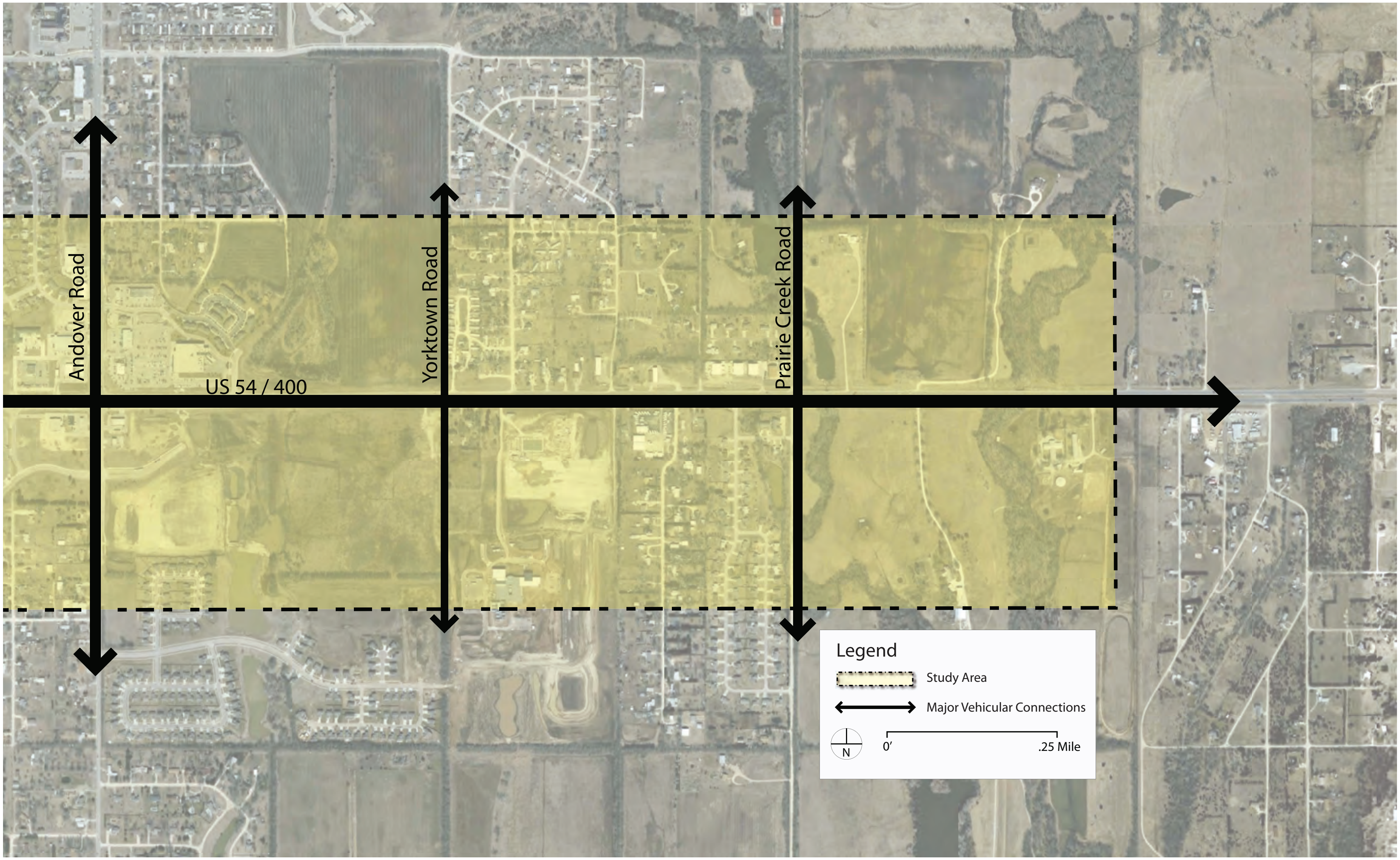


Figure 1: Study Area Map

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.

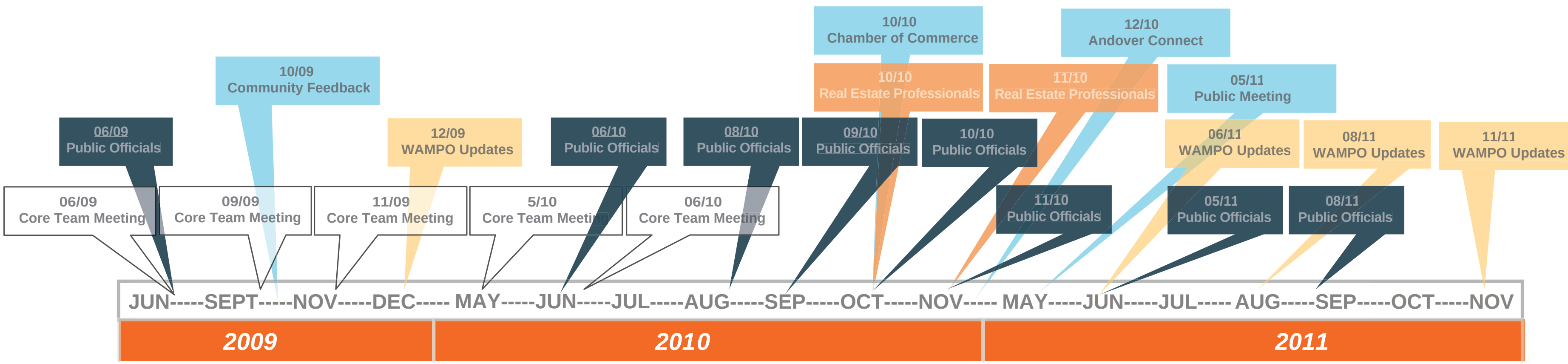
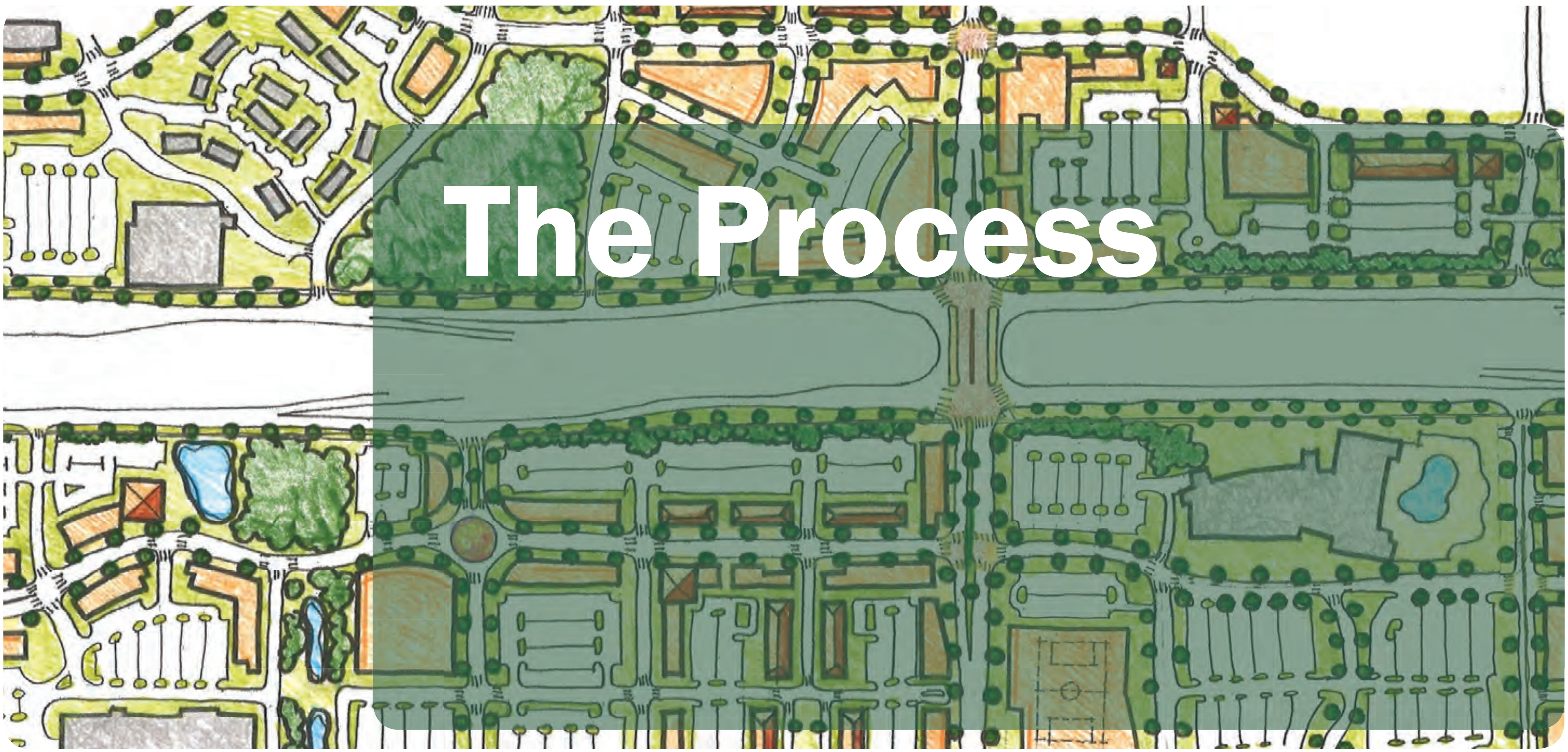


Figure 2 - Stakeholder Timeline



The Process

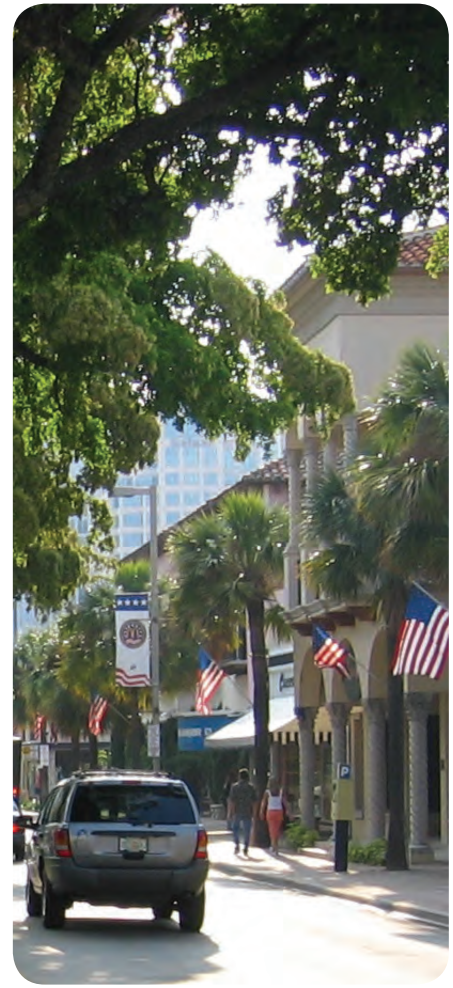
Integrating Land Use and Transportation

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.

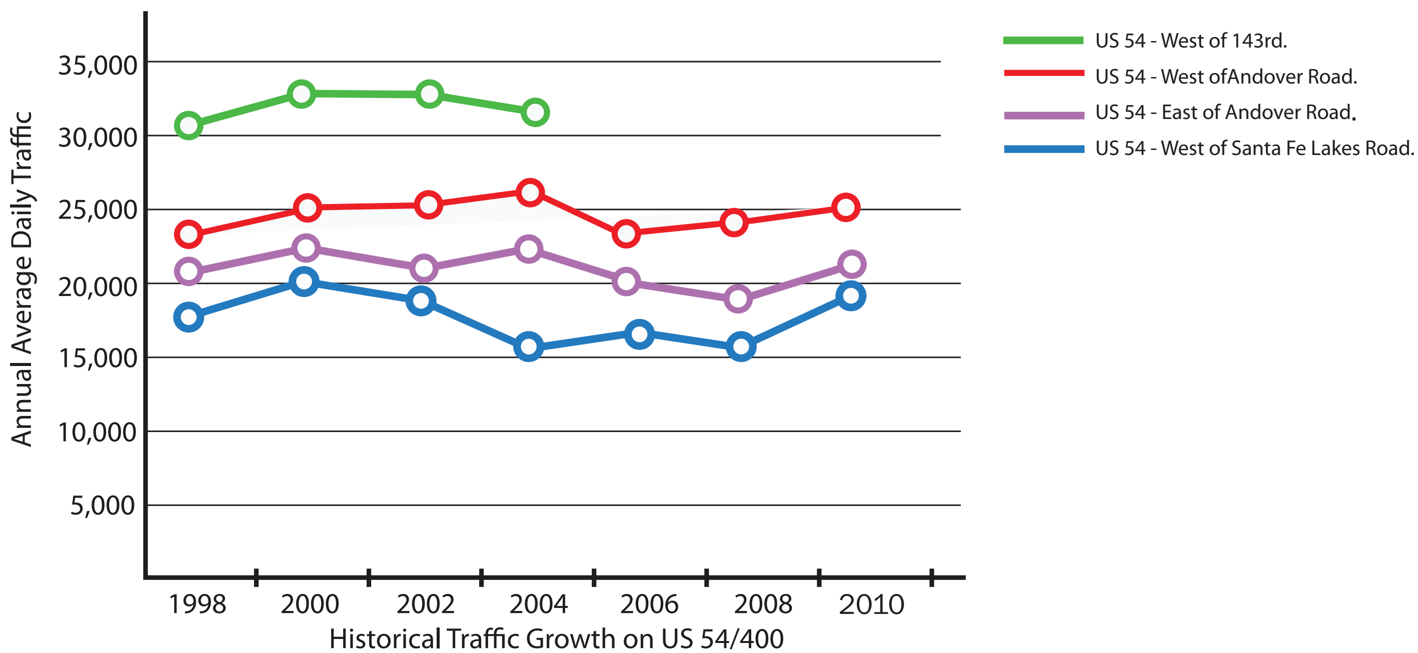


Figure 5- Historical Traffic Growth on US 54/400

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.

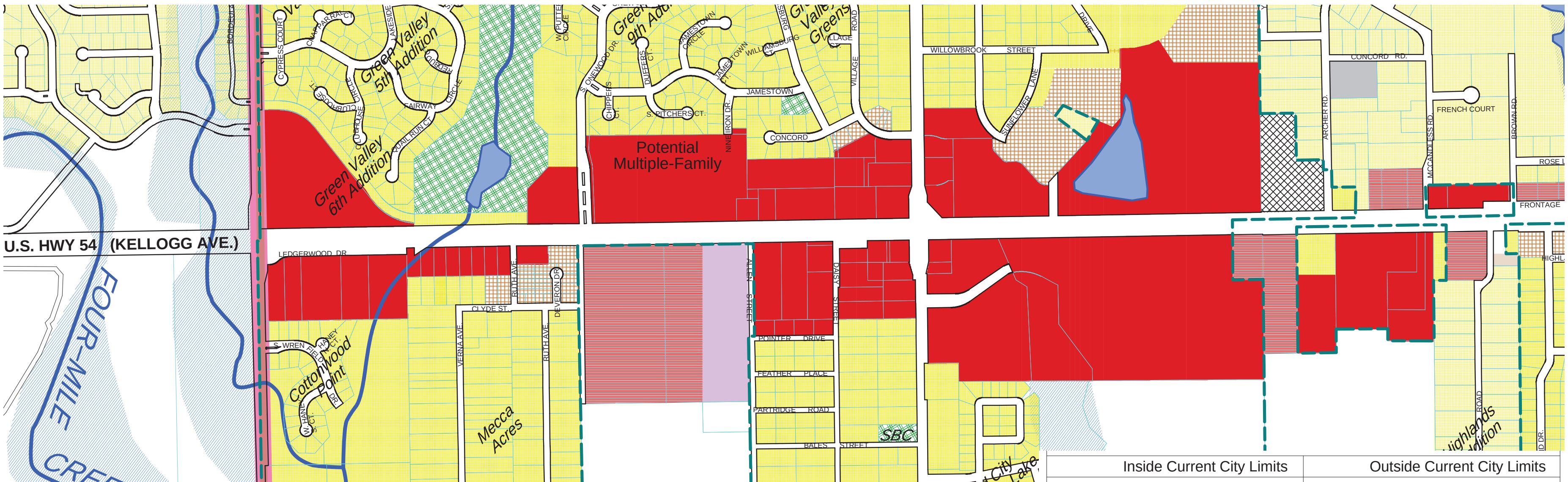


Figure 6 - Future Land Use

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

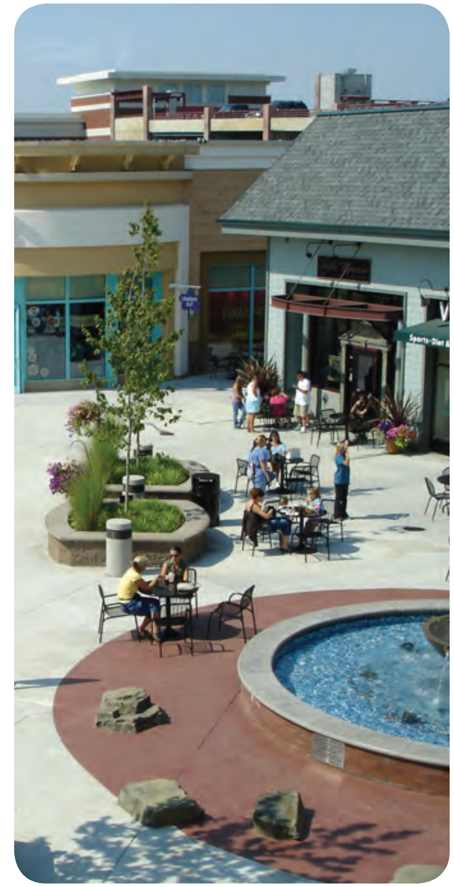
Stakeholders repeatedly expressed a desire to maintain the “hometown” feel of the community with strong schools, safe neighborhoods, and good accessibility to jobs. For the City to continue to provide this quality of life, it is essential that the municipal revenues increase to accommodate rising costs. 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.

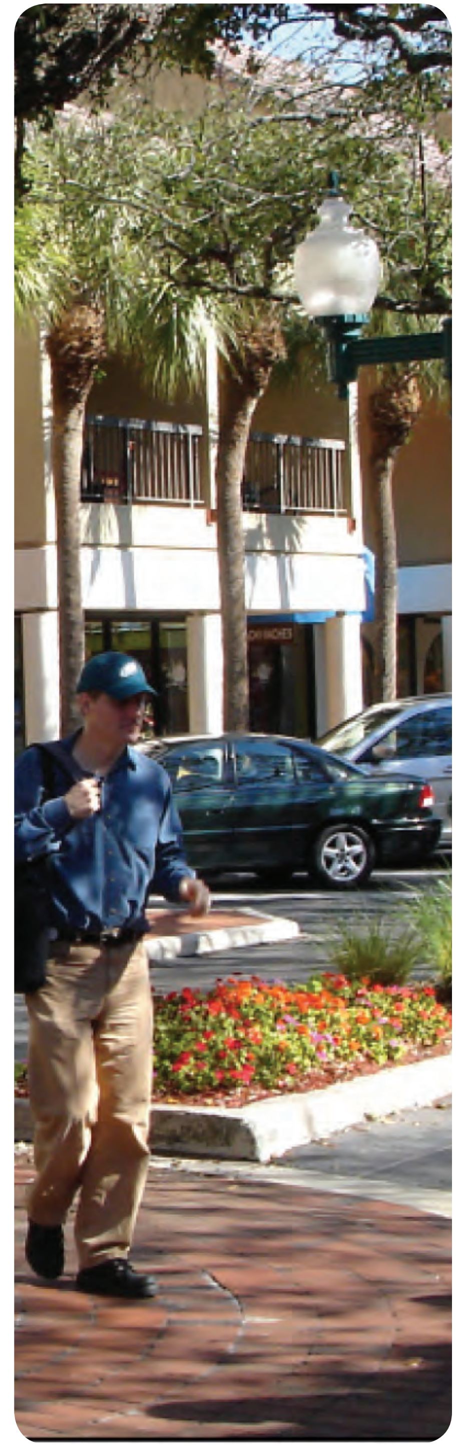
- A variety of civic uses should be located in the corridor to strengthen it as a civic destination for the neighborhoods and the region.
- The backage roads, which will be the primary access road to parcels located next to the US 54/400, should be enhanced as diverse, pedestrian oriented shopping streets 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.

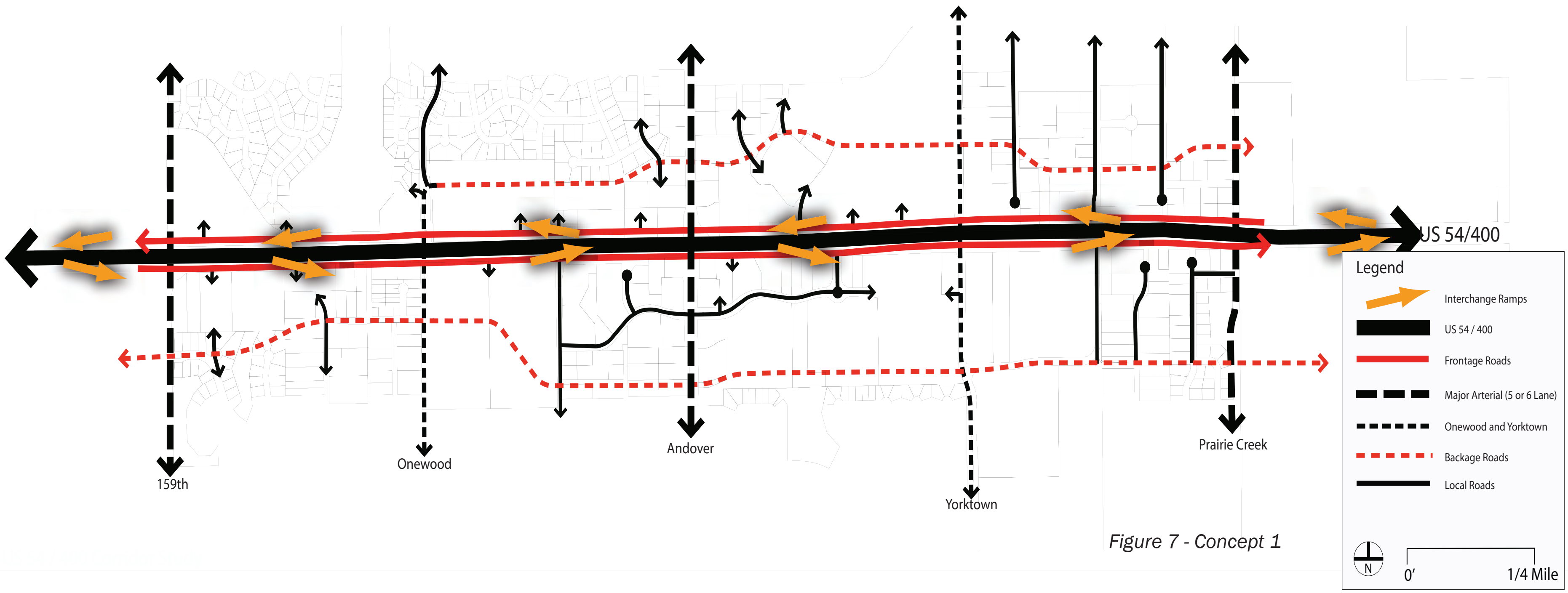


Figure 7 - Concept 1

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)

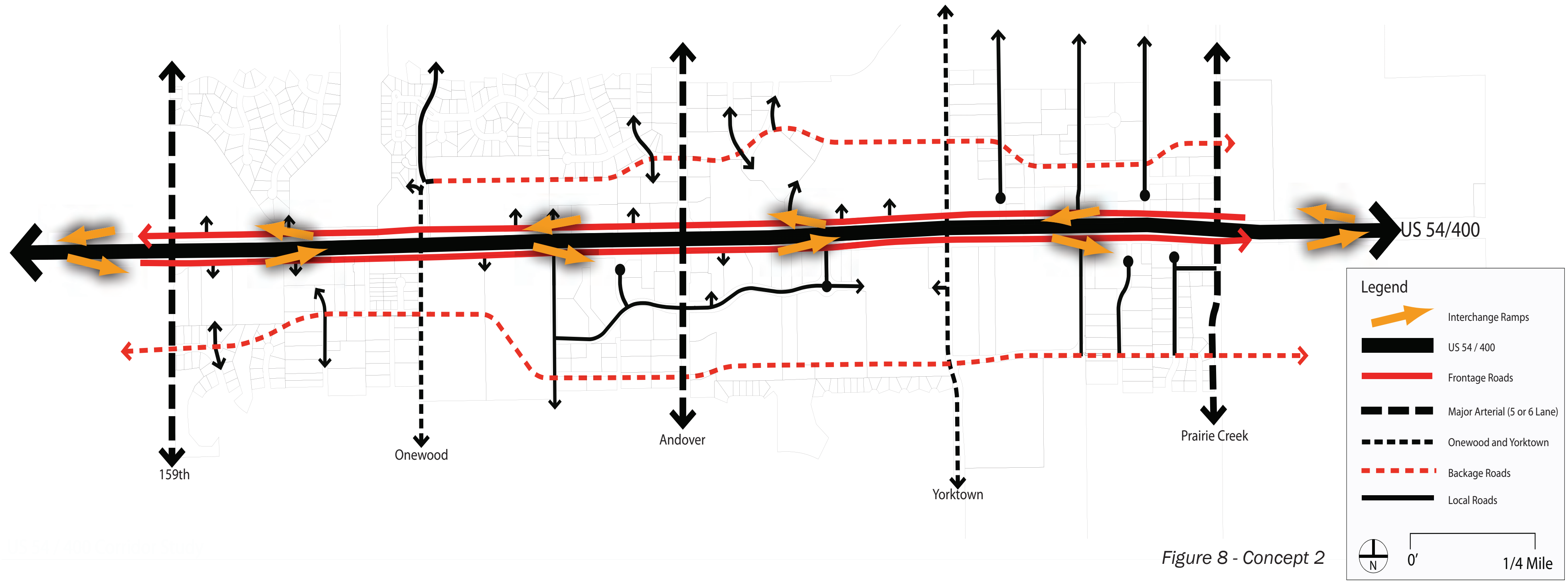


Figure 8 - Concept 2

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)

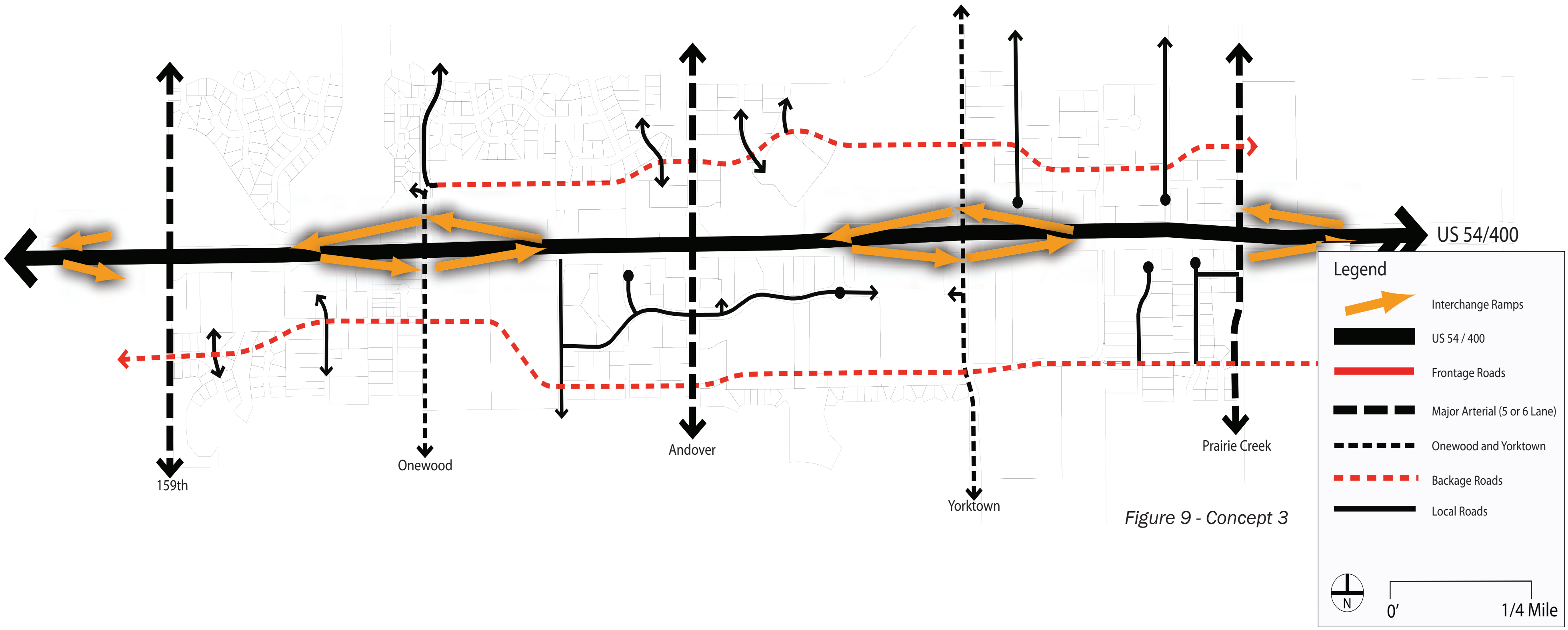


Figure 9 - Concept 3

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)

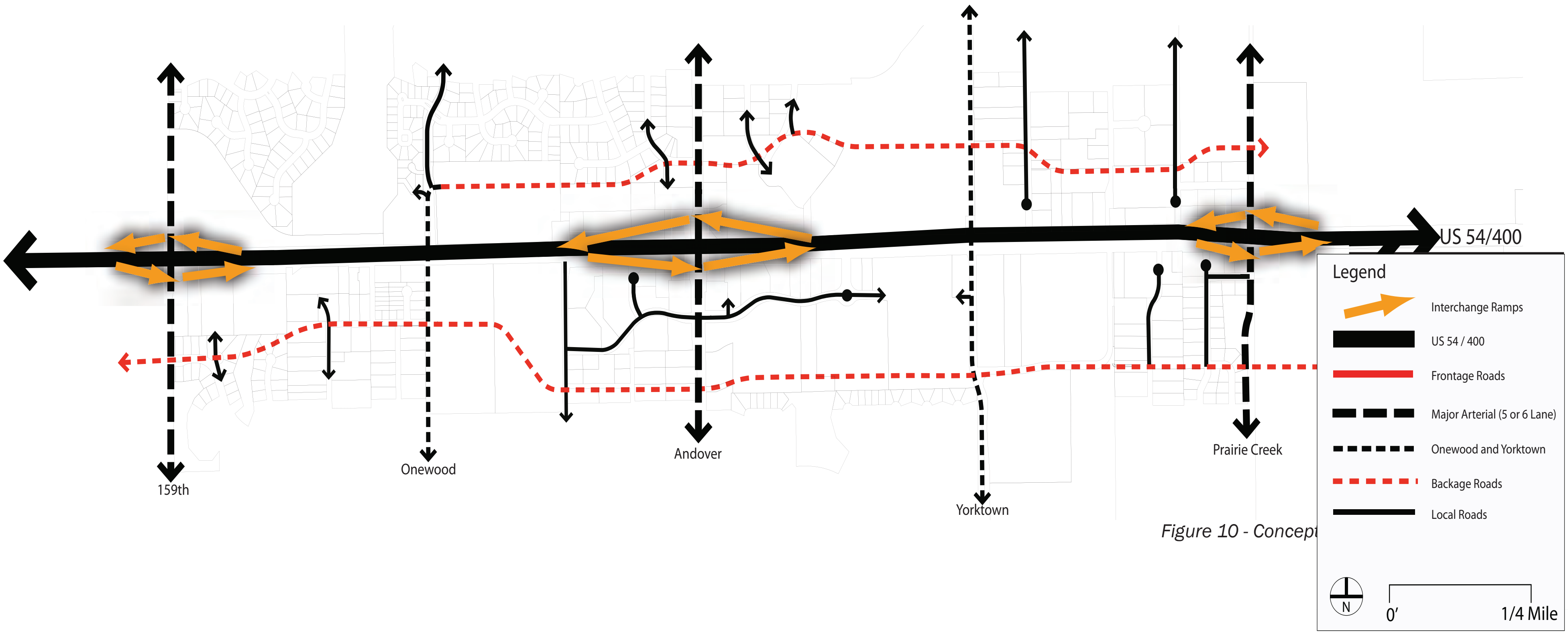


Figure 10 - Concept

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.

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 11 - Depressed Freeway Section

Figure 12 - Elevated Freeway Section

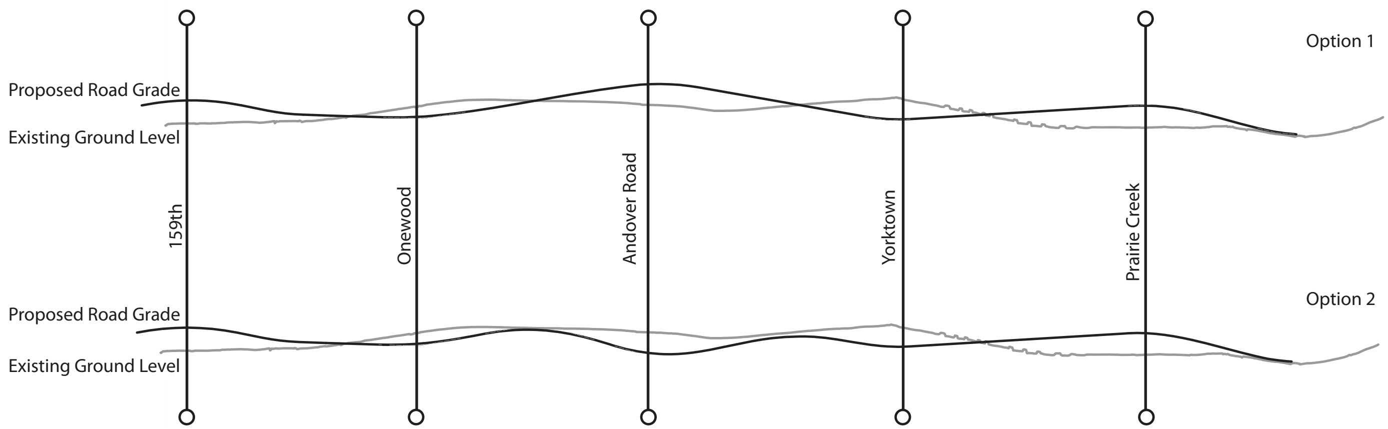


Figure 13 - Vertical Alternatives

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

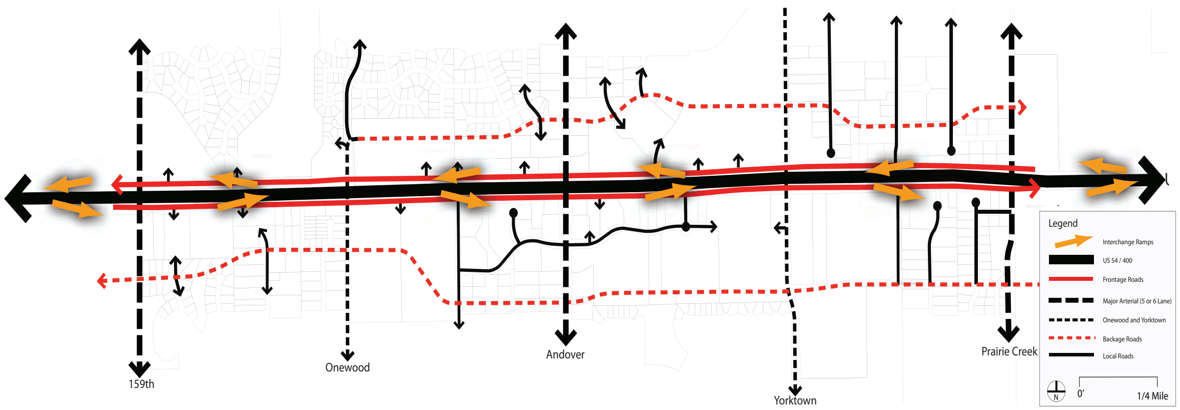
It is typical to place full access interchanges at the points of highest traffic volume. In this corridor the point of highest traffic volume is Andover Road. Options 1 and 3 do not provide direct access to Andover Road. Options 2 and 4 do provide a full access interchange at Andover Road. In addition, 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.

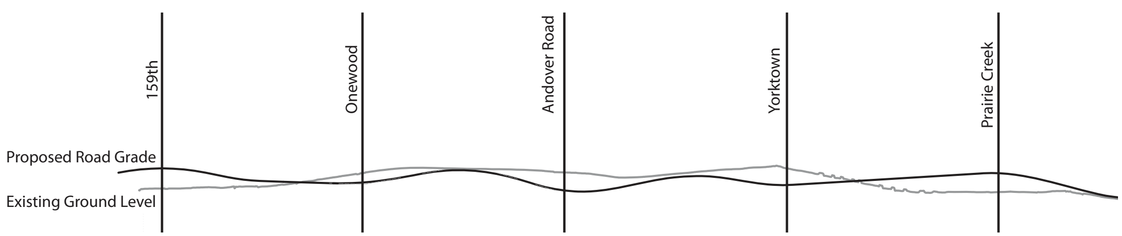
The impact of two versus three interchanges on the frontage road network (that is, the Option 1 condition) is that more traffic will be on the frontage roads for longer distances. This changes the function of the frontage roads, which are intended to move traffic for a short distance from the freeway 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)

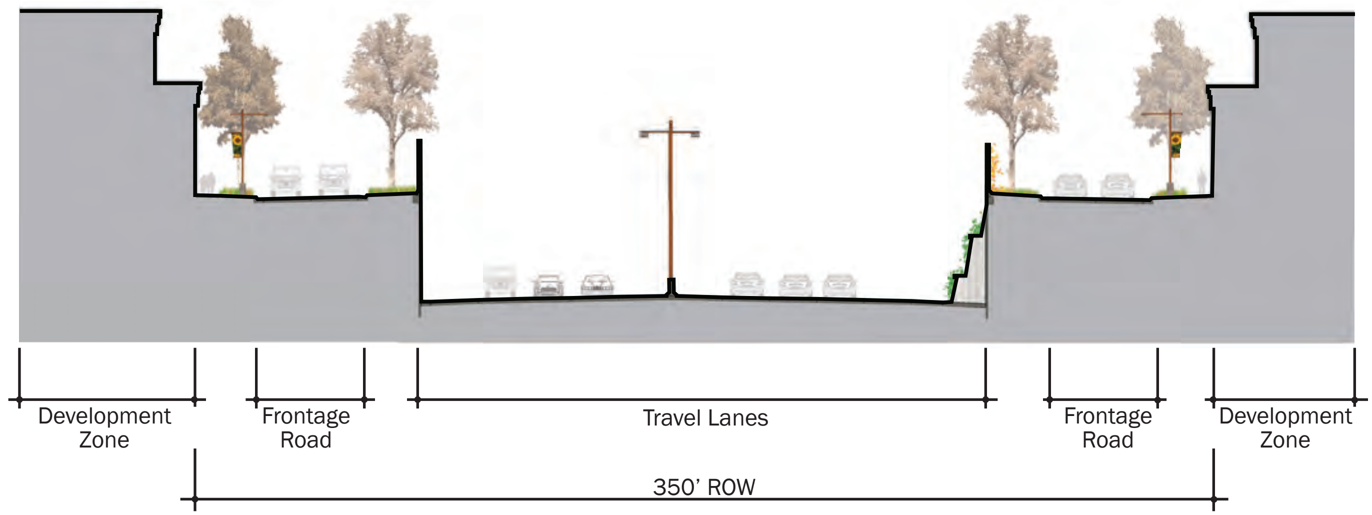


Figure 14 - US 54/400 Depressed

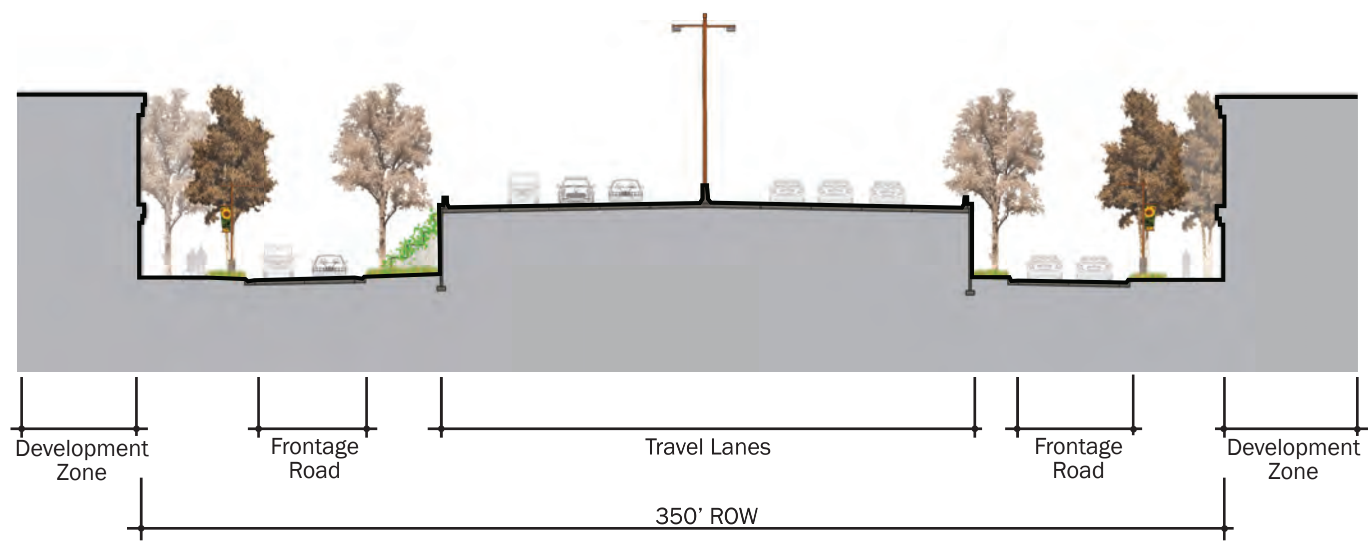


Figure 15 - US 54/400 Elevated

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.

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

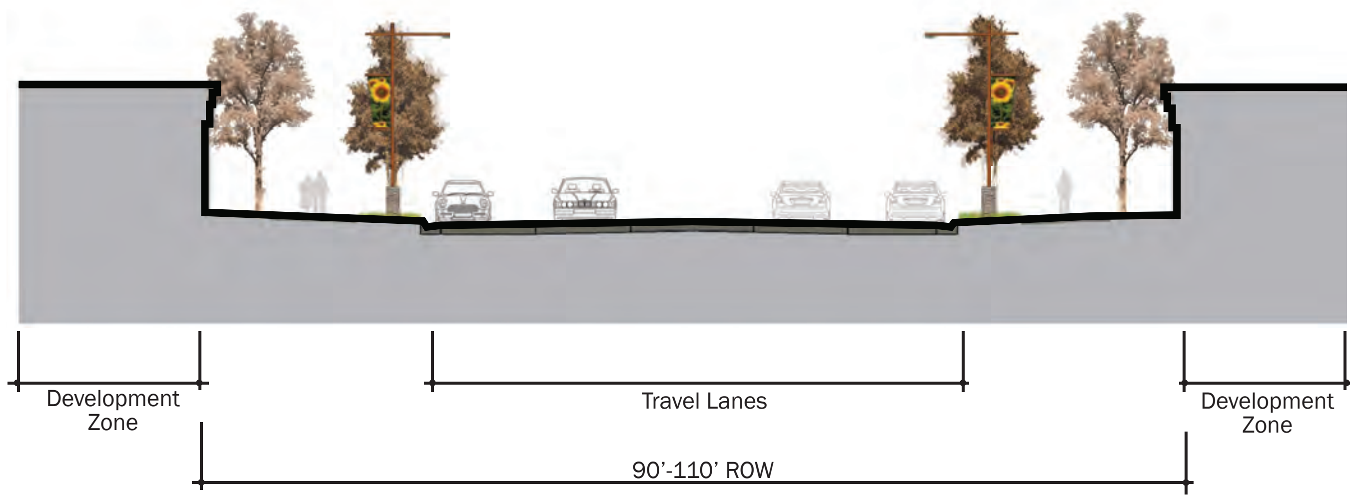


Figure 16 - Backage Road

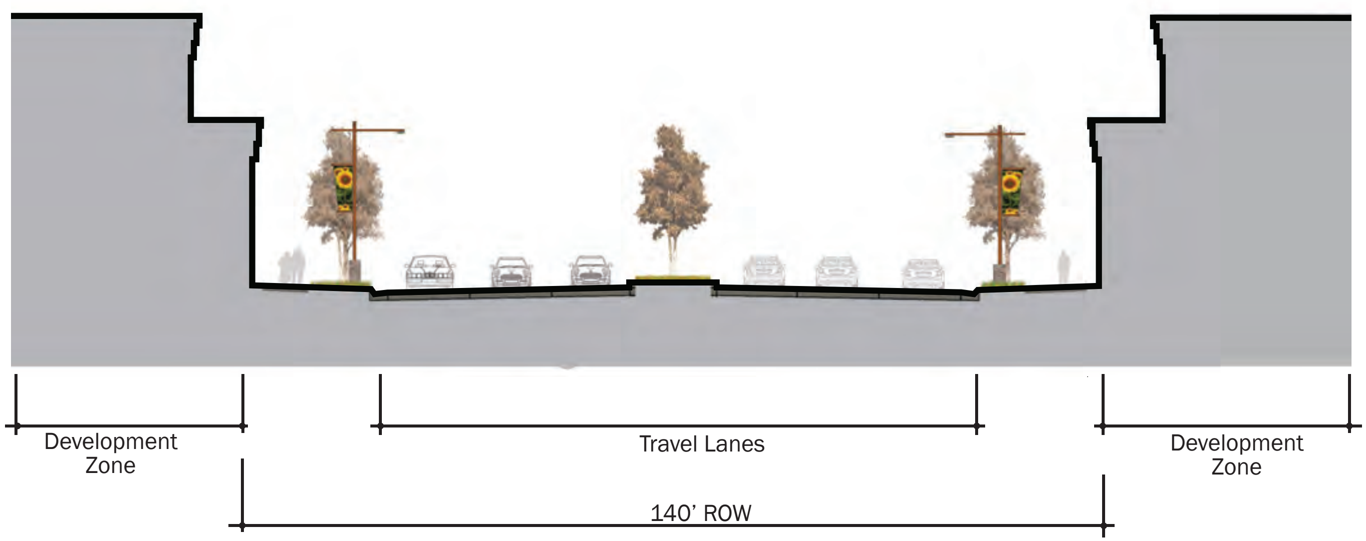


Figure 17 - Six-lane Arterial

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)

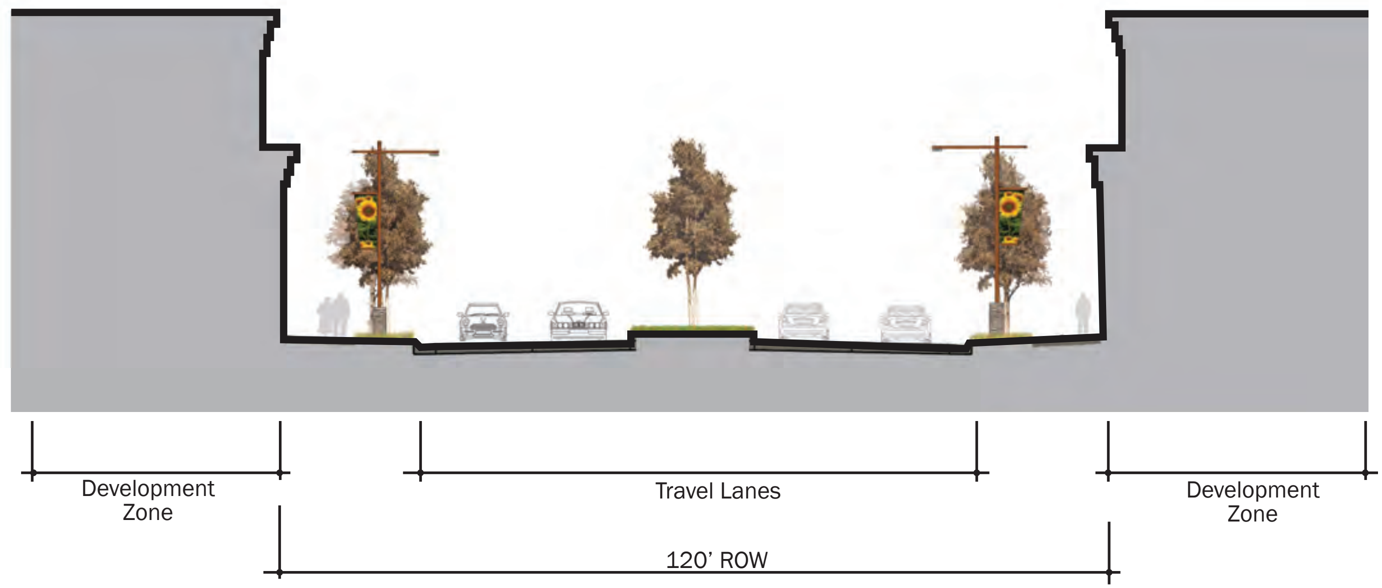


Figure 18 - Five-lane Arterial

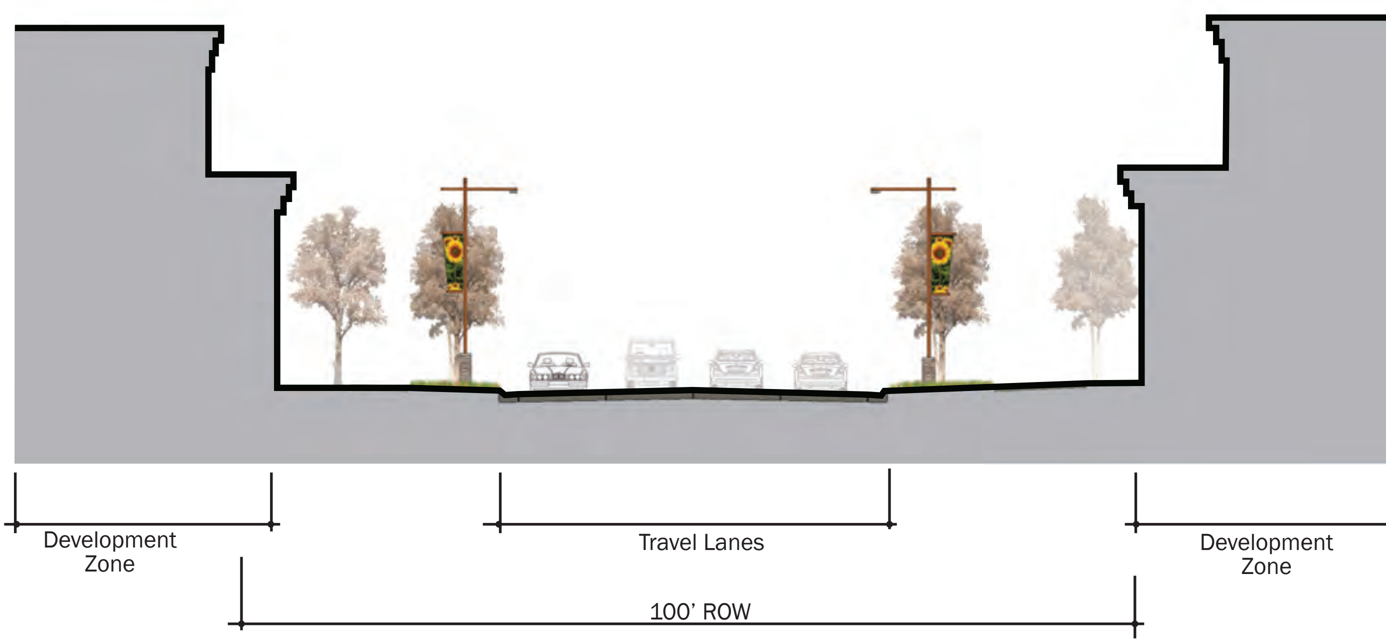


Figure 19 - Four-lane Arterial

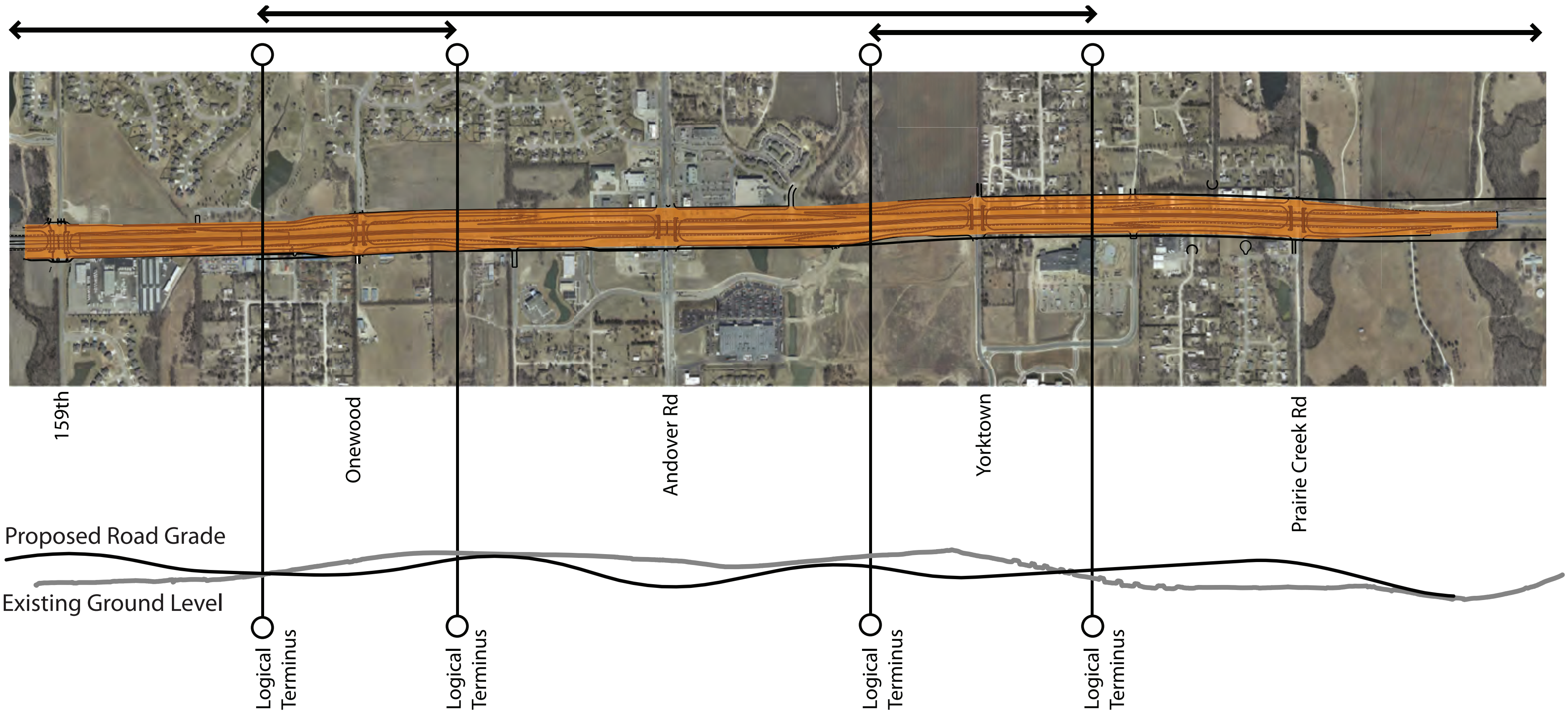


Figure 20 - Possible Logical Termini

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

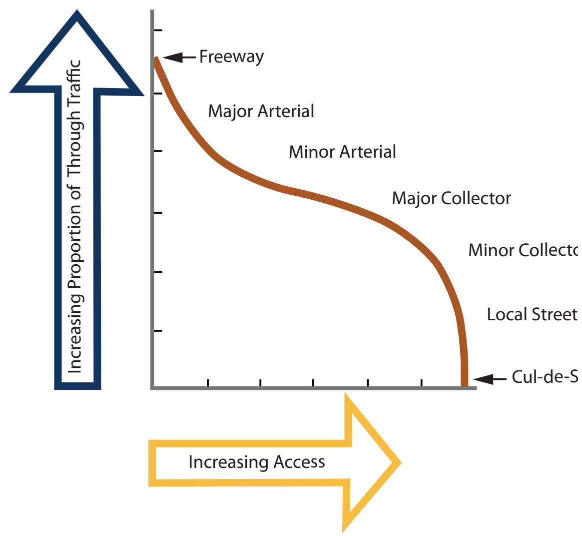


Figure 21 - Conceptual Roadway Functional Hierarchy Source: 2003 TRB Access Management Manual

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.

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%

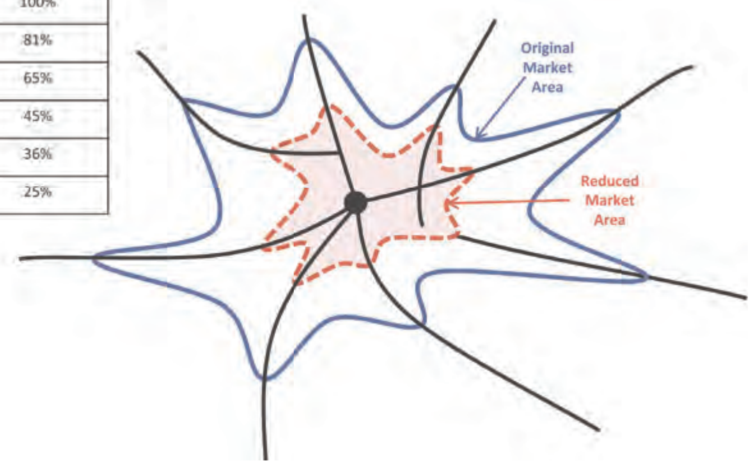


Figure 22 - Effects of Travel Time on Market Area.
Source: 2003 TRB Access Management Manual

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.

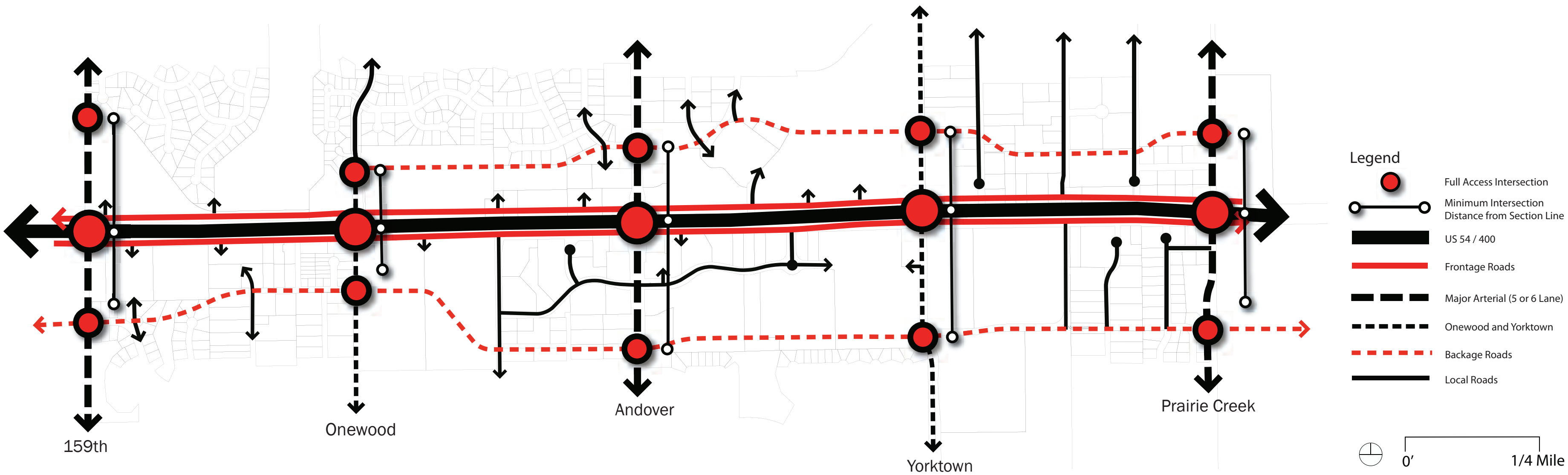


Figure 23 - Signal Location

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 down-stream 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.

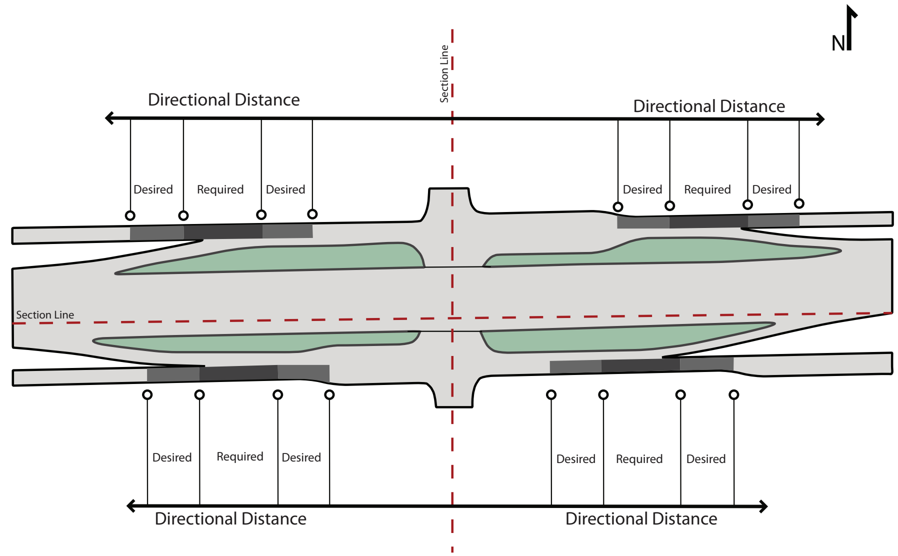


Figure 24 - Functional Interchange Recommendations

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

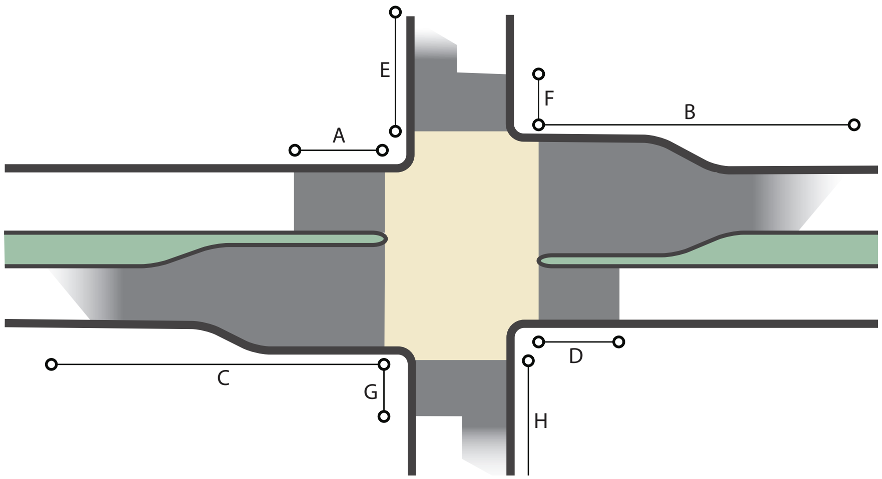


Figure 25 - Functional Intersection Recommendations

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

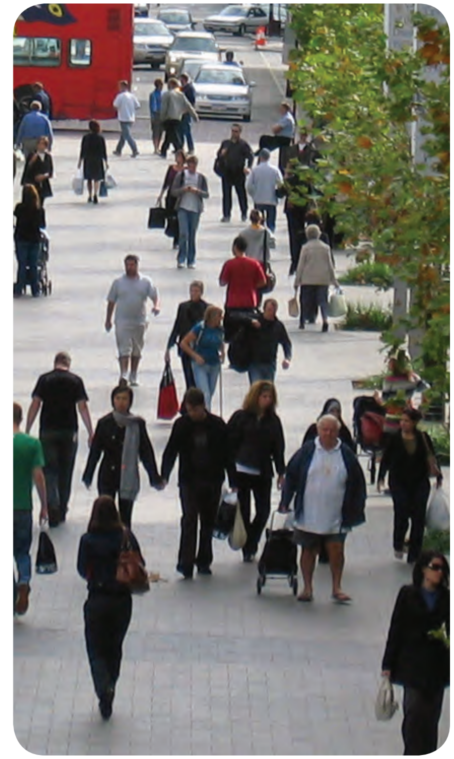
Pedestrian, Bicycle, and Transit Recommendations

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.

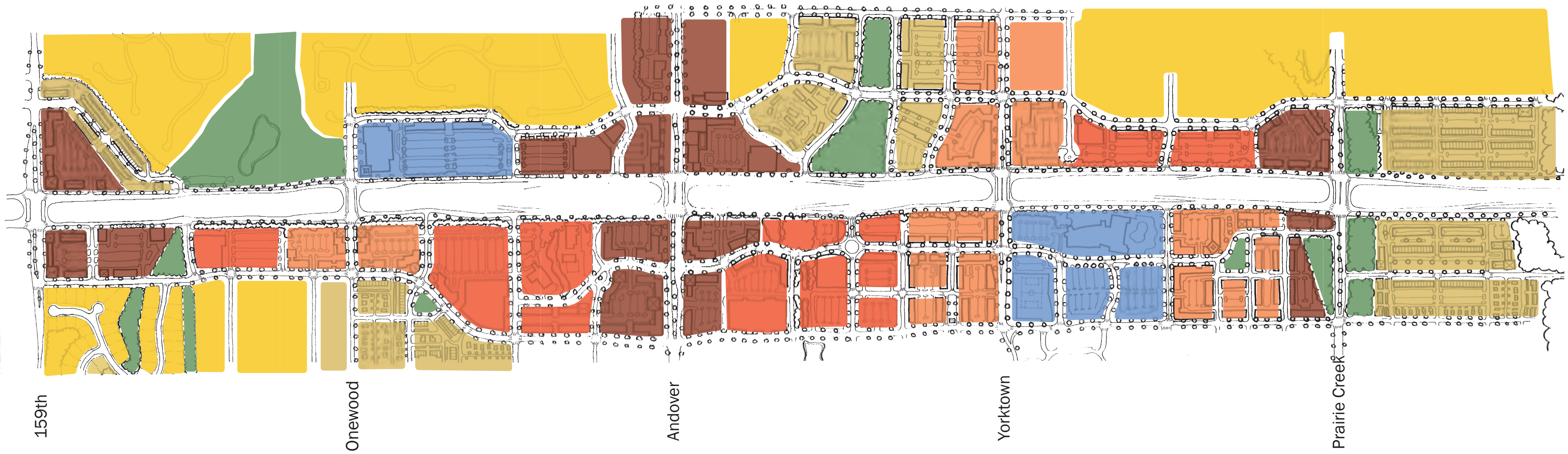


Figure 26 - Proposed Future Land Use

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.

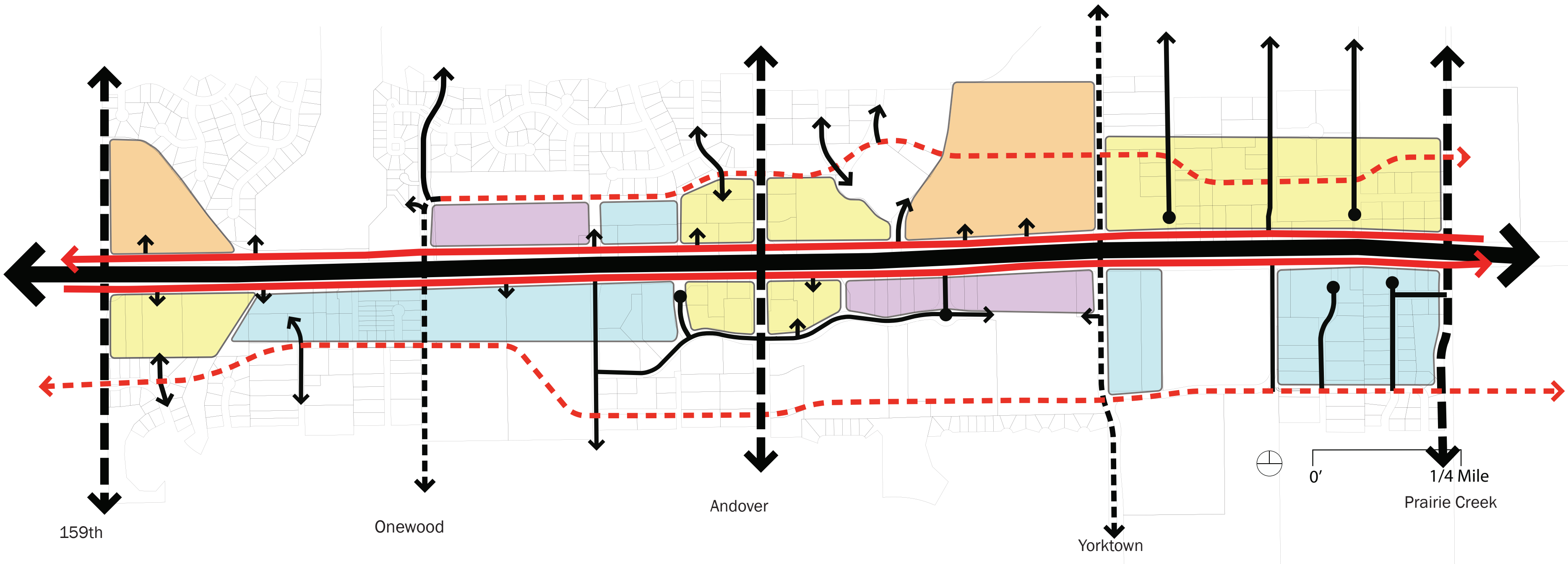


Figure 27 - Development Opportunities

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:

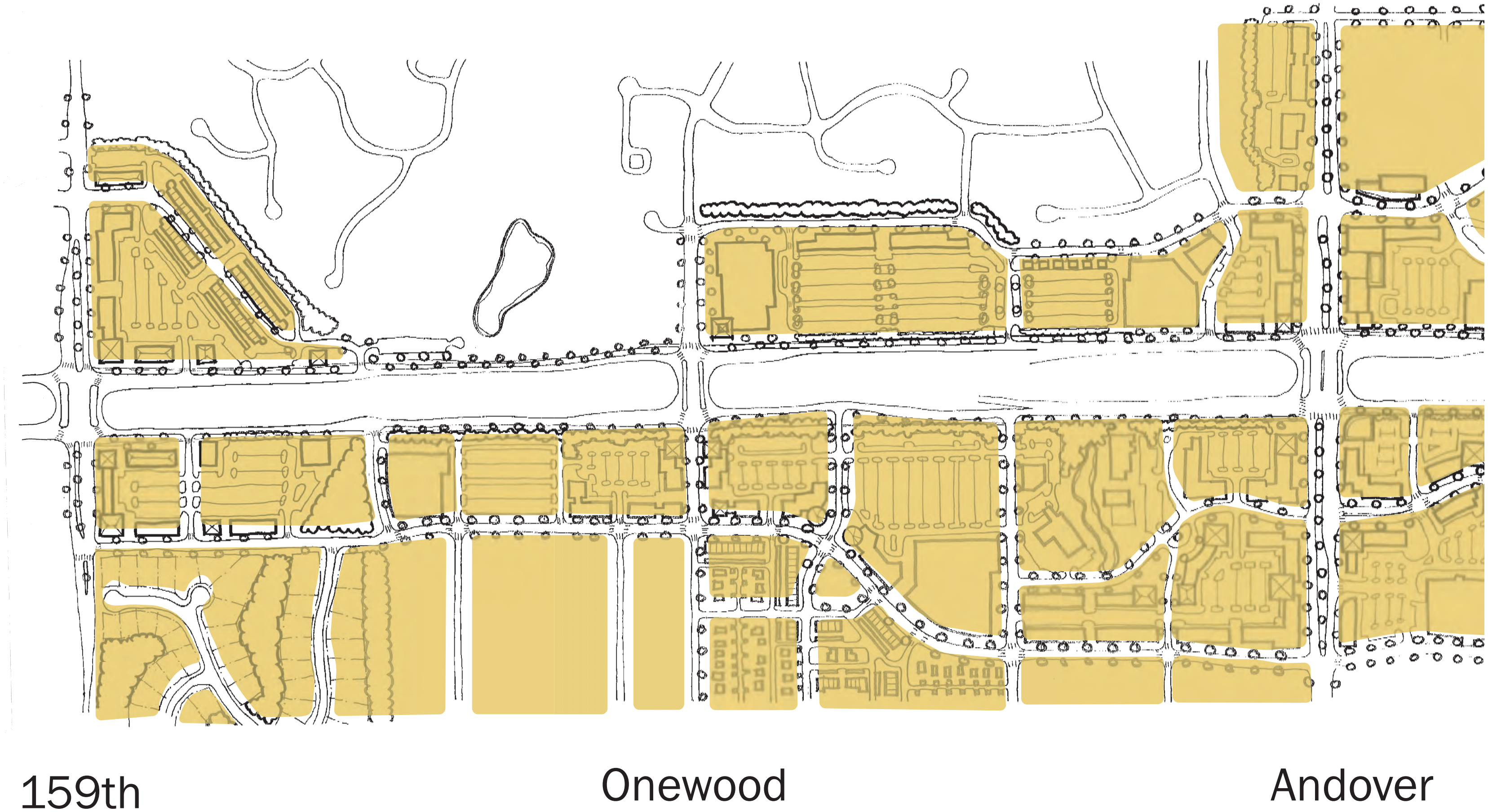
- enhance awareness of place,
- mitigate a tunneling effect through form, color, texture, and lighting,
- encourage the integration of infrastructure and landscape, and
- provide a restorative experience for all users of the corridor – drivers, walkers, bicyclists.

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.

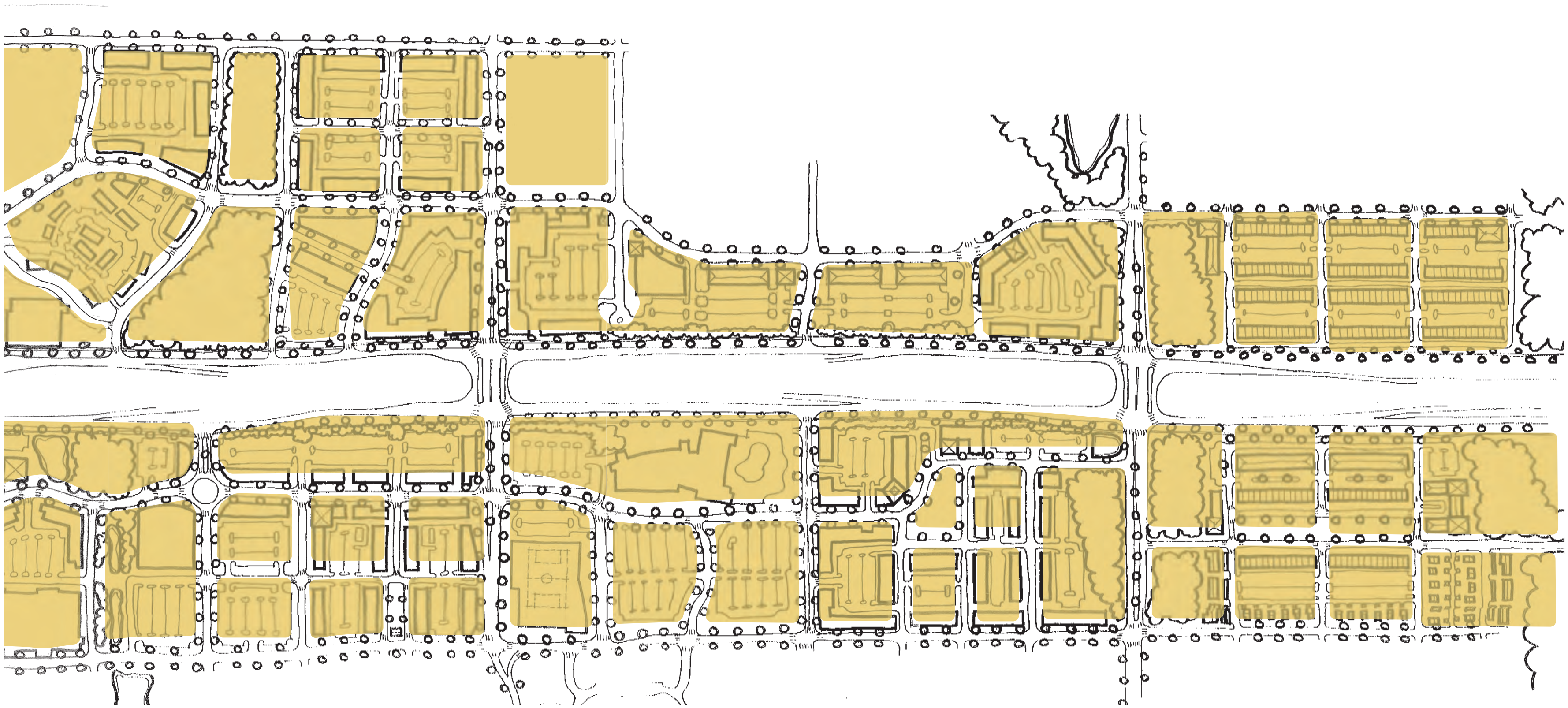


Establish a long-term development vision and framework

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.



Yorktown

Prairie Creek

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.

Figure 28 - Block Size

Legend

Proposed Block Sizes

NTS

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)

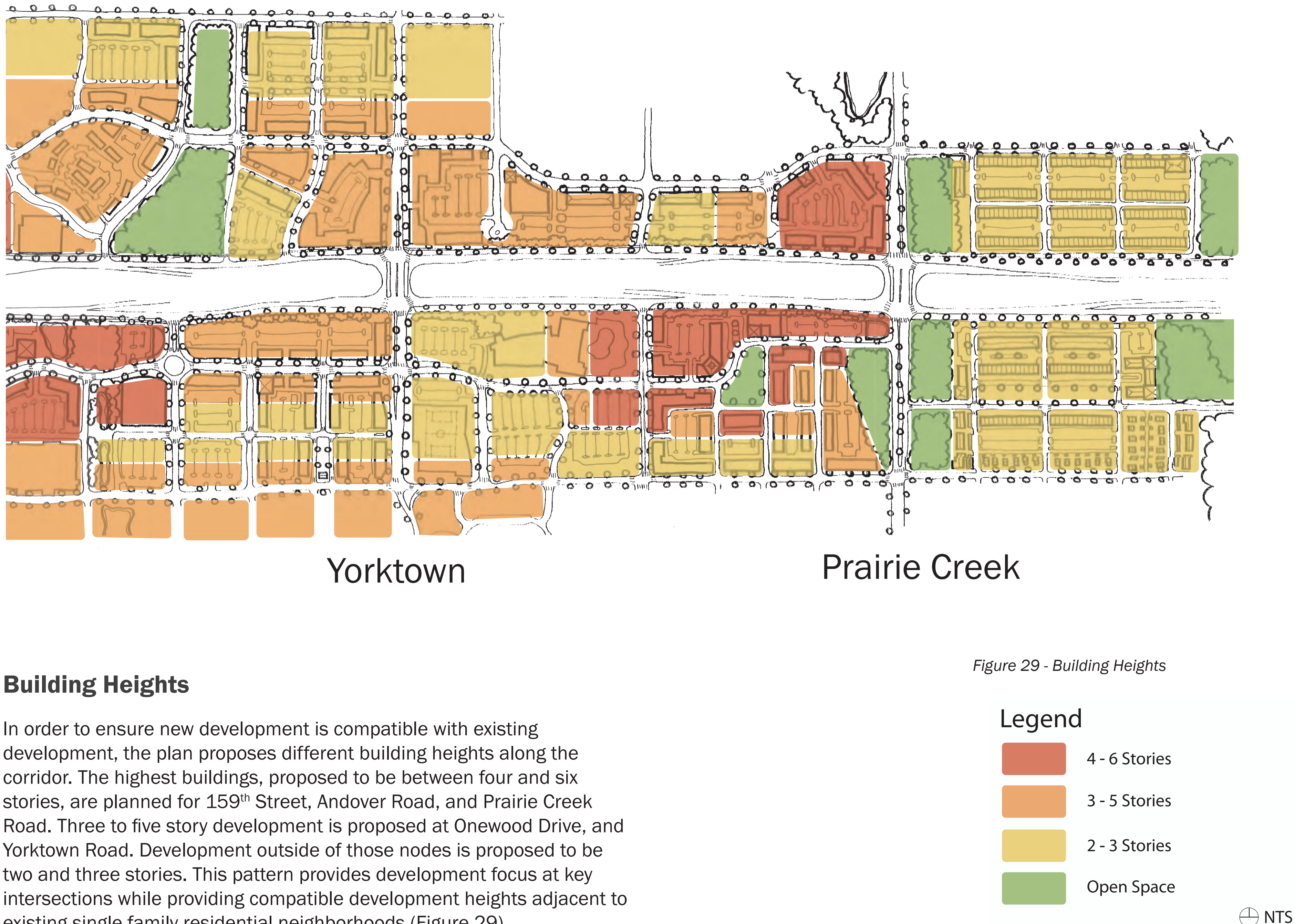
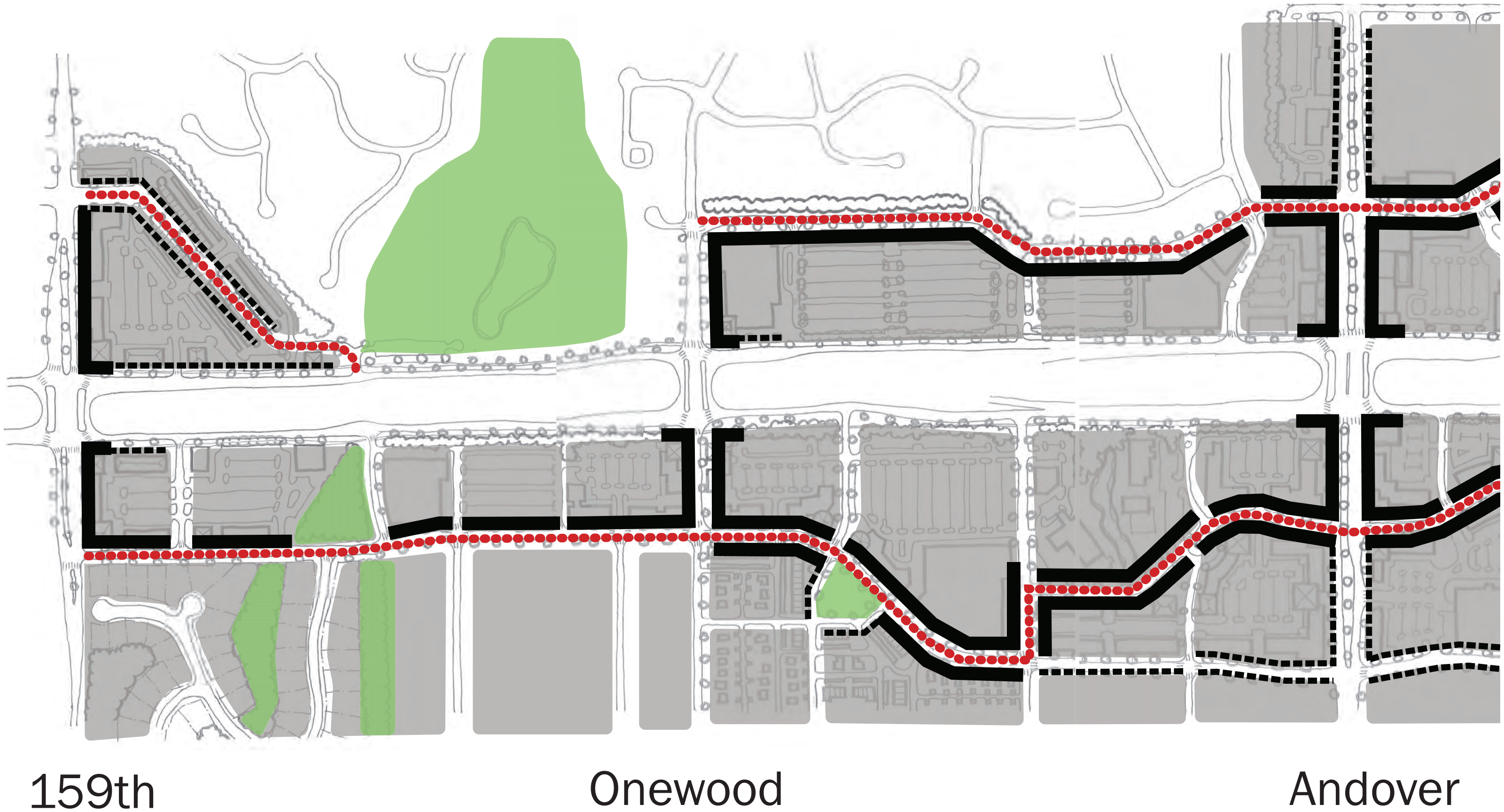


Figure 29 - Building Heights

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)



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)

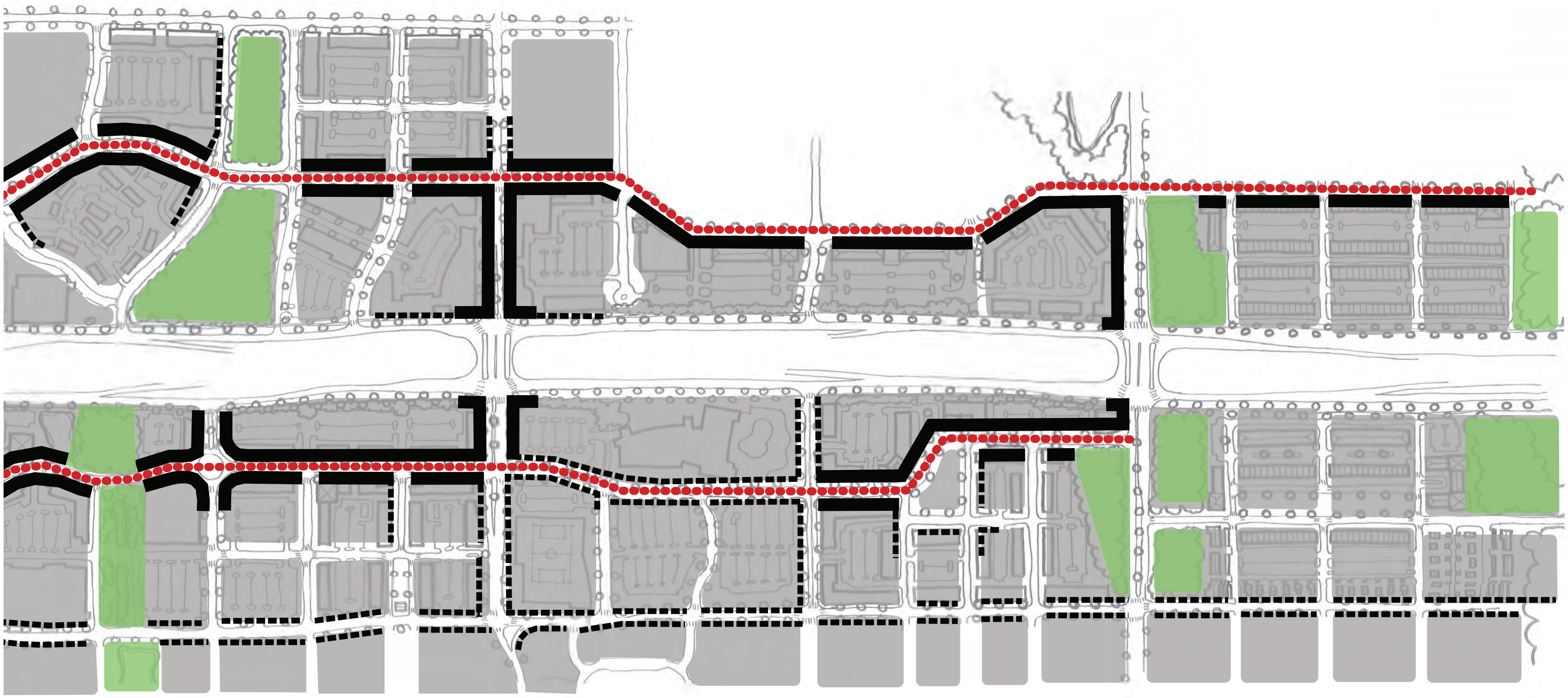
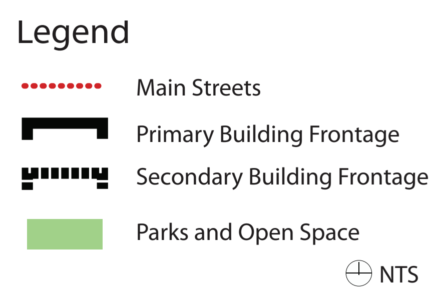


Figure 30 - Building Orientation



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)

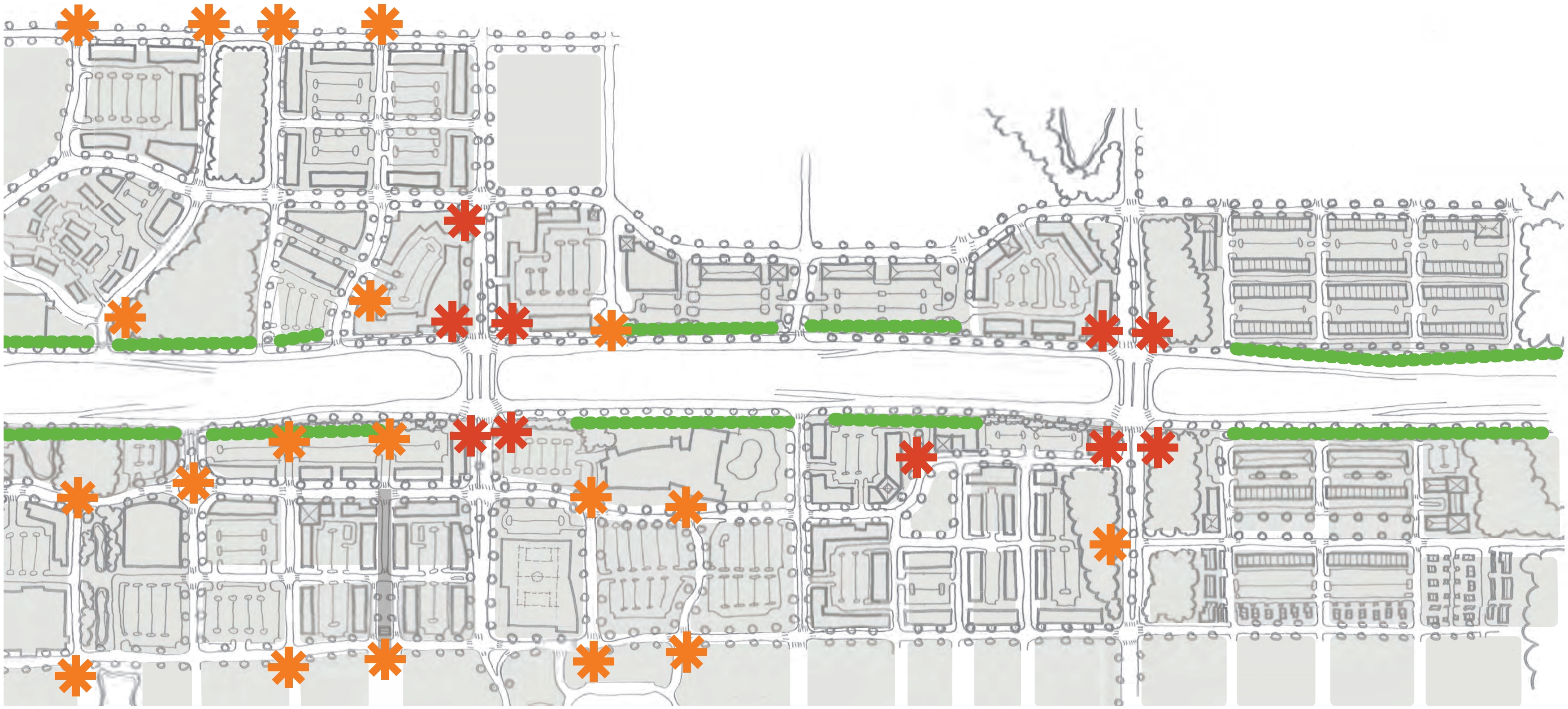


Figure 31 - View Terminations Along Streets

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)

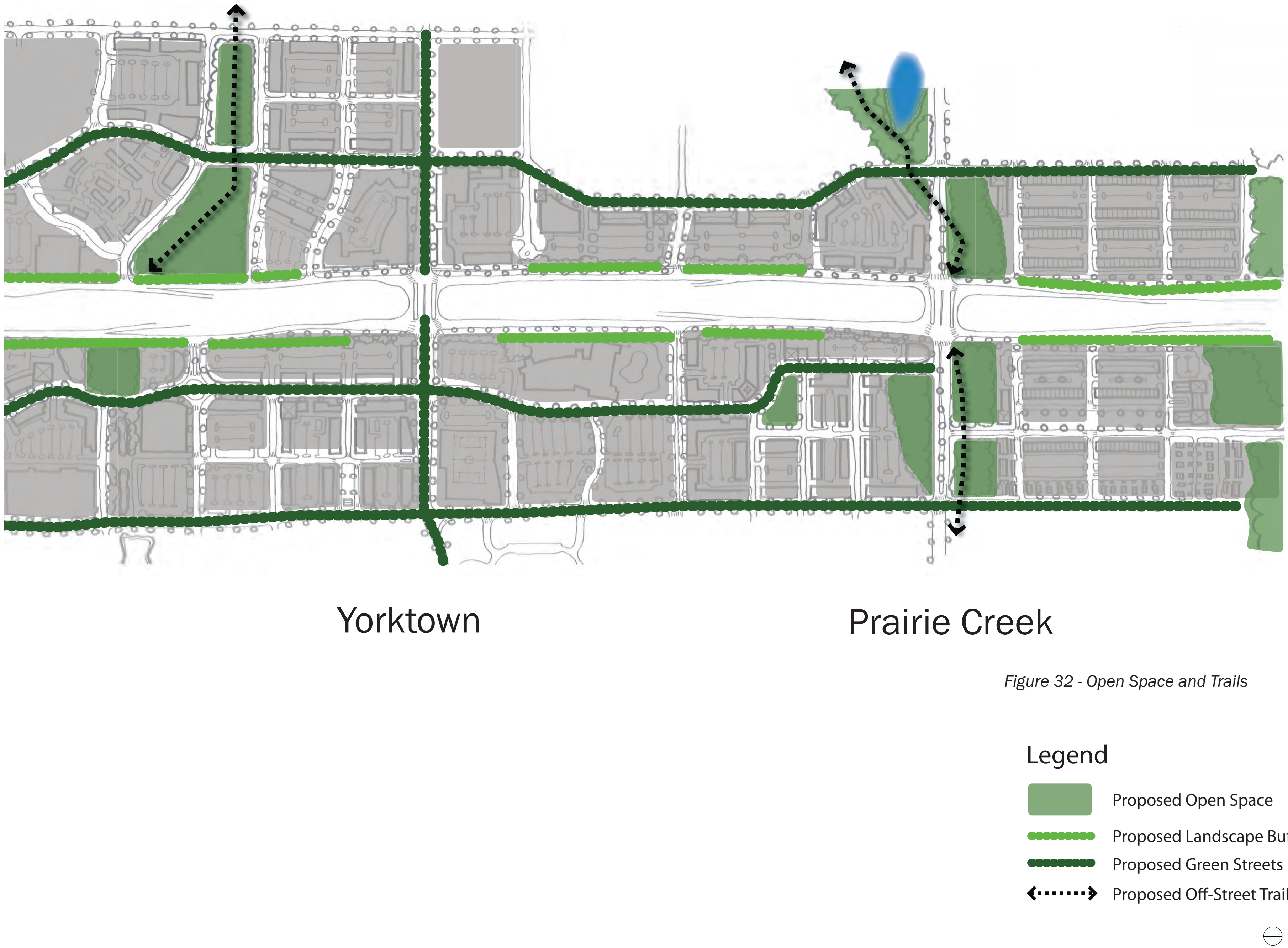
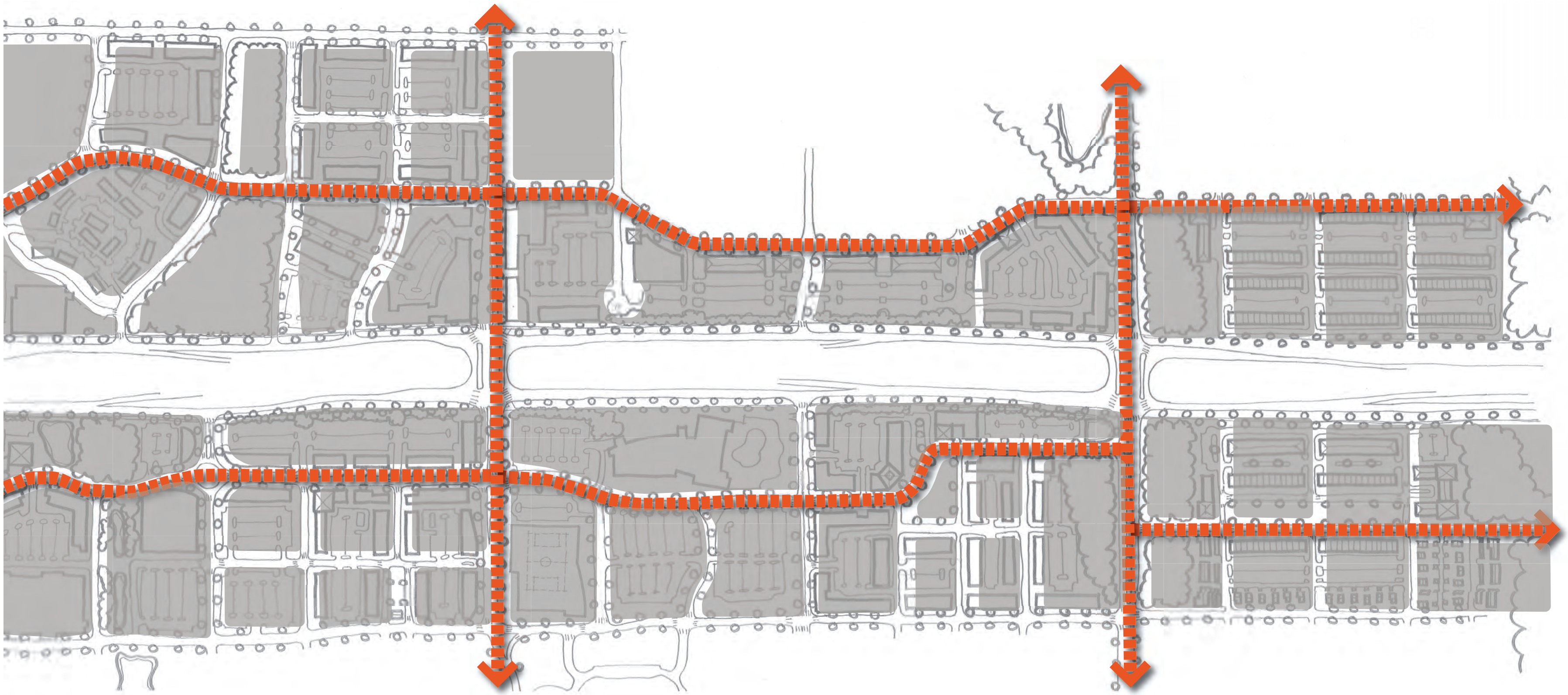


Figure 32 - Open Space and Trails

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)



Yorktown

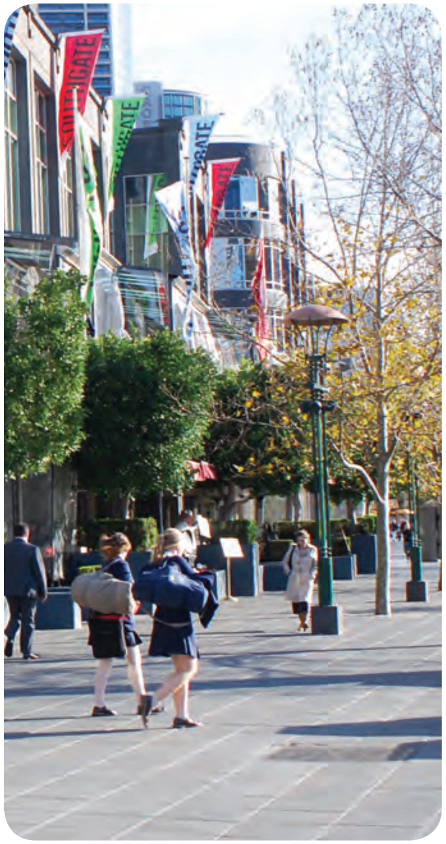
Prairie Creek

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

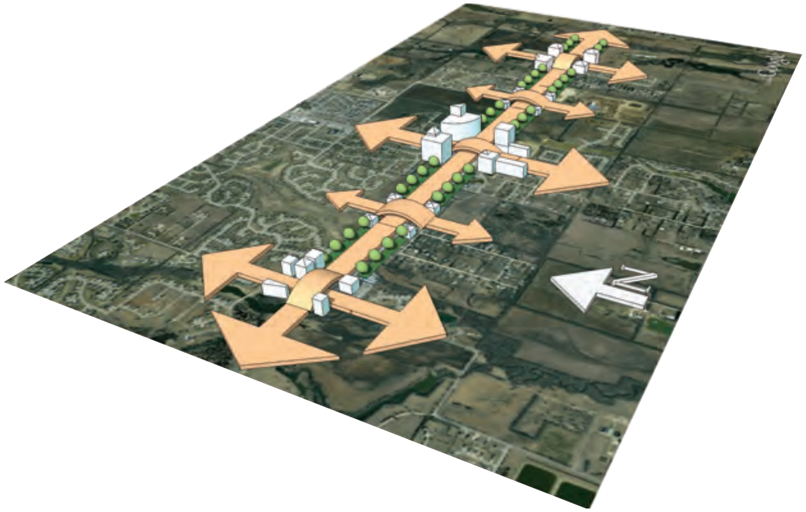


Figure 34 - Nodal Development Pattern

Urban Design Recommendations

Ground Floor Retail

Wide Sidewalks

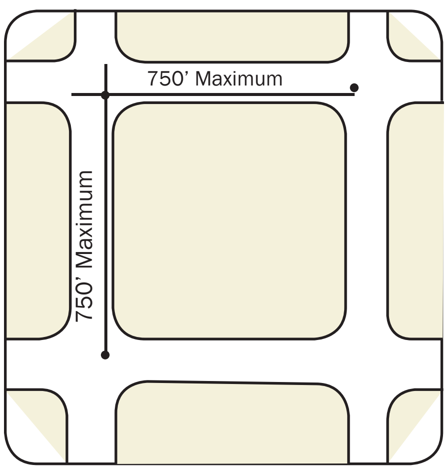


Figure 35 - Maximum Block Size

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.

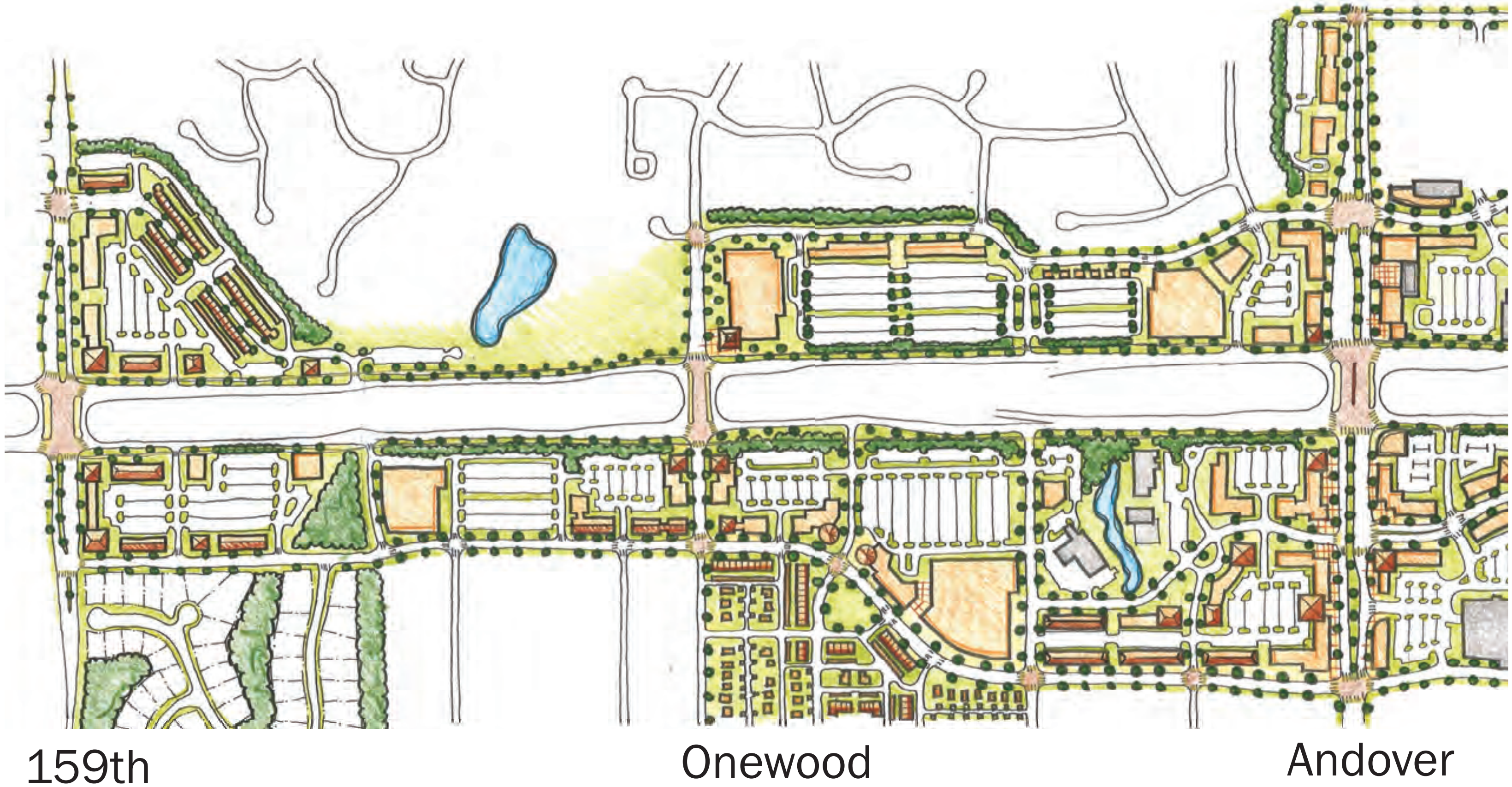
In the context of passive solar building design the aim is normally to maximize solar gain within the building in the winter (to reduce space heating demand) and to control it in summer (to minimize cooling requirements). Thermal mass may be used to even out the fluctuations during the day and to some 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.

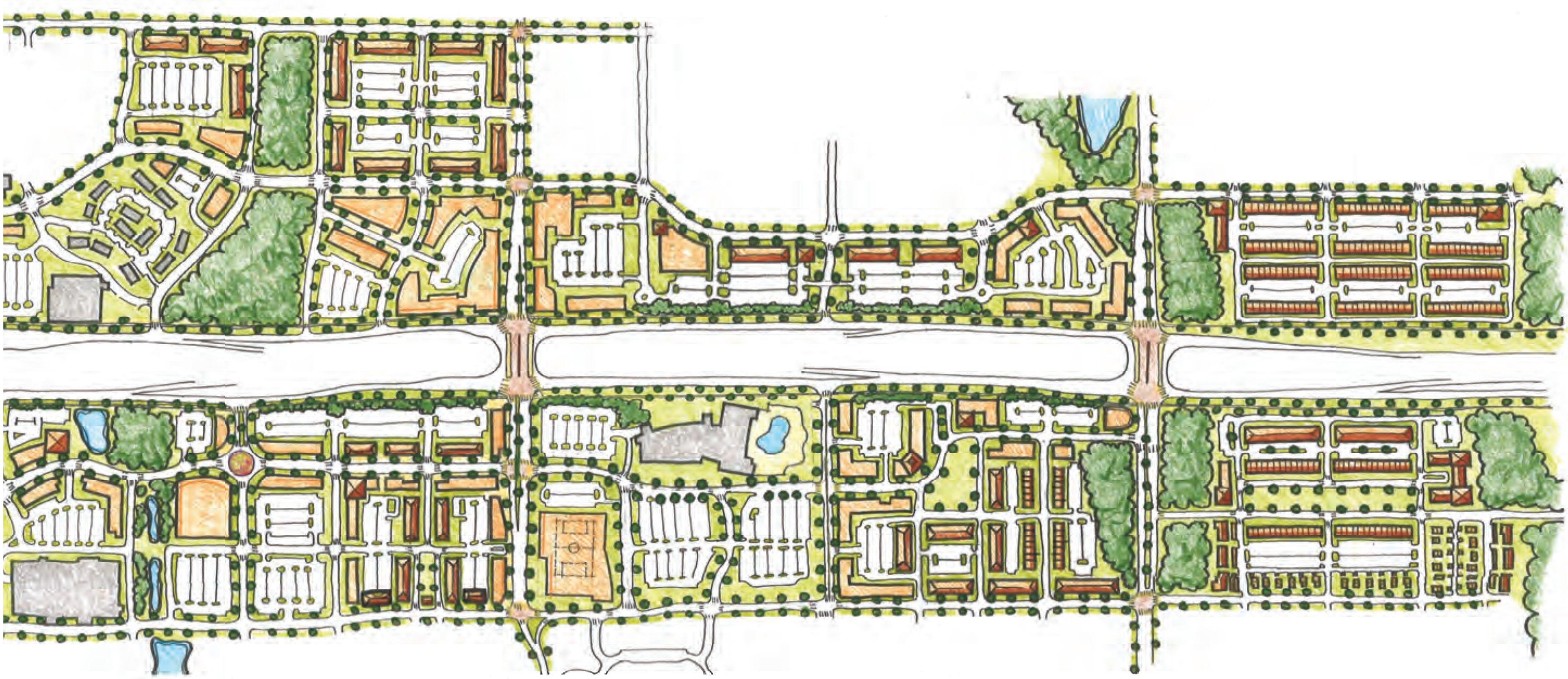


Figure 36- Illustrative Plan

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.

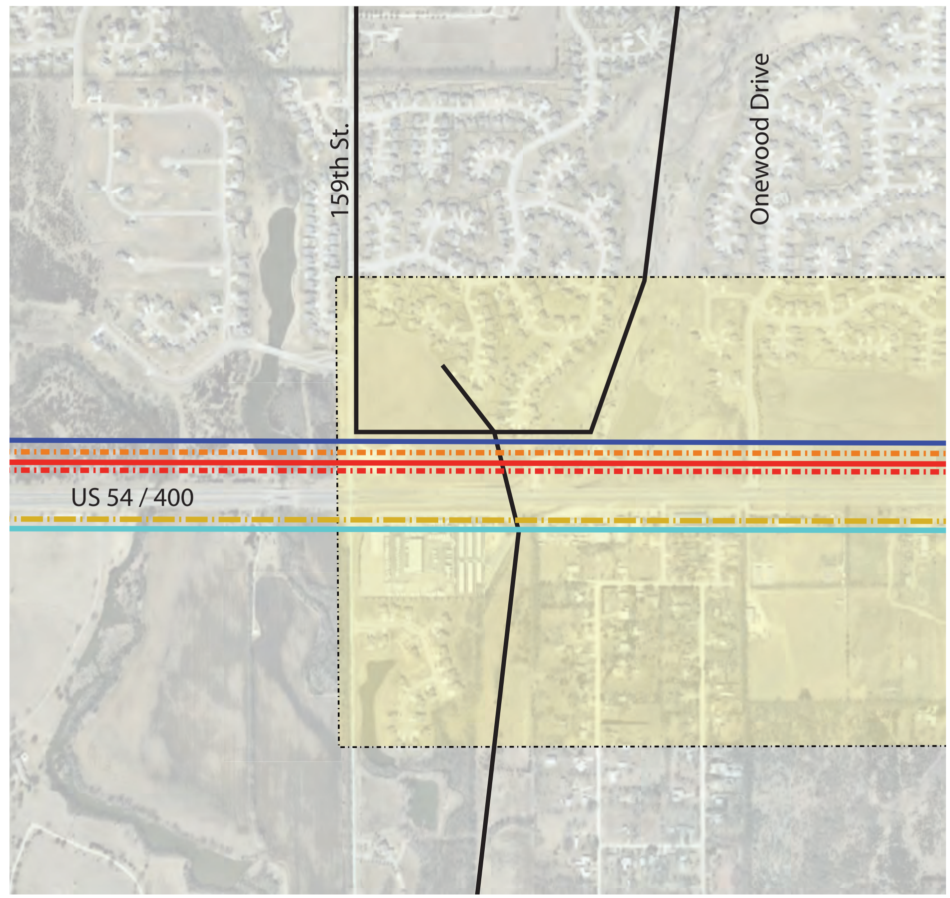
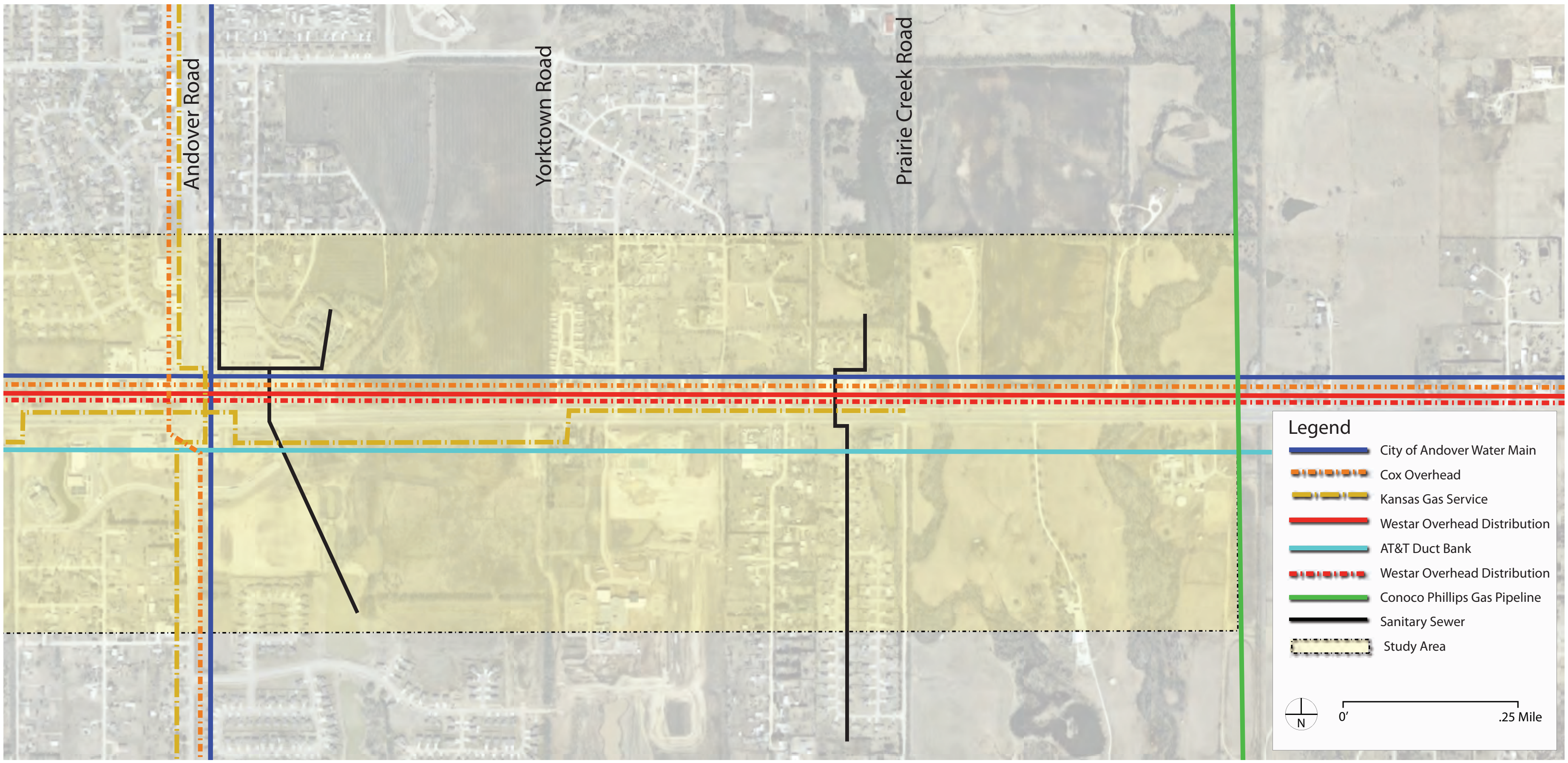


Figure 37 - Existing Utilities

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.

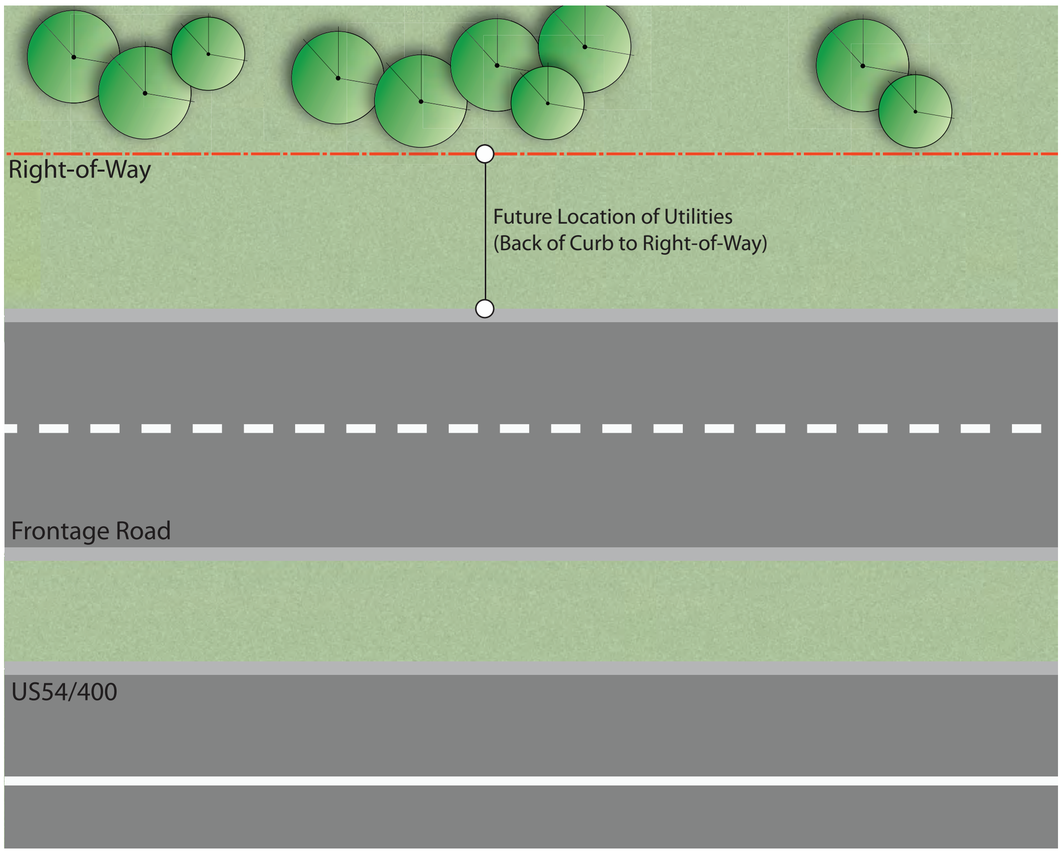


Figure 38 - Proposed Utility Corridors


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

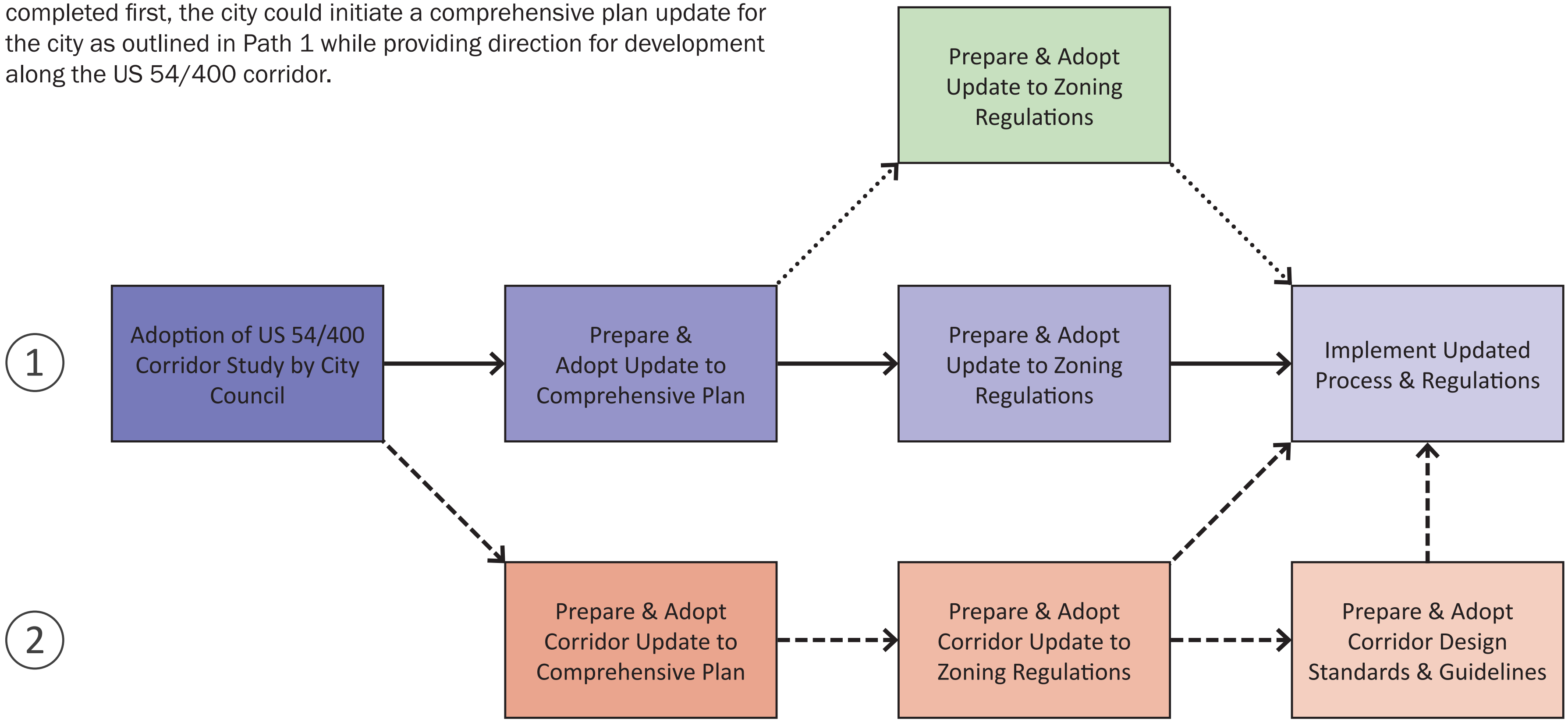
A key component of the corridor vision is converting US 54/400 into a freeway. To do this, the corridor footprint needs to be preserved. In addition, access control needs to be implemented to ensure that the freeway and the roadways around the corridor function as planned. Revising the comprehensive 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.



City of Andover

US 54/400 Corridor Study Appendix

December 2011

ANDOVER KANSAS

Kansas Department of Transportation

WAMPO Wichita Area Metropolitan Planning Organization

PARSONS BRINCKERHOFF

This plan has been prepared by Parsons Brinckerhoff and their subconsultants for the City of Andover, Kansas.

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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.

Table of Contents - Appendix

Meetings Summary and Comment Cards

Core Team

A project core team was established to provide a forum for the City of Andover and study partners to directly communicate with the design team regarding progress on the project and to receive input on key issues and address study concerns.

Core Team Members included representatives from the following agencies:

- City of Andover
- Kansas Department of Transportation (KDOT)
- Wichita Area Metropolitan Planning Organization (WAMPO)
- Federal Highway Administration (FHWA)
- Butler County
- Sedgwick County
- City of Wichita

Meetings Summary

June 23, 2009

The purpose of the initial meeting was to allow the Core Team to provide input on the range of community needs and the range of impacts and perception to help define the goal and objectives for the project that are achievable. Nominal group technique was used to poll participants for their insights into what SHALL, SHOULD and MAY be required for a successful project. The design team prioritized the input of the study partners in conjunction with input from City of Andover officials to develop the project goal and objectives. The knowledge obtained helped guide the design team's process in developing alternatives that addressed the project issues identified.

September 22, 2009

The second Core Team meeting allowed the study partners to review and comment on the proposed development and vision based alternatives. Four options were presented for discussion purposes with features of each option that could be used interchangeably with features of others. The knowledge obtained guided the design team's process in refining alternatives that addressed the project issues identified.

November 17, 2009

The third Core Team meeting allowed the study partners to review and comment on the revised vision based alternatives. Comments from this meeting guided the design team's decision to move forward with a single preferred alternative. This alternative would be refined based on land use and potential redevelopment, drainage impacts and the traffic analysis.

May 6, 2010

Key findings from the preliminary environmental review, traffic data and assumptions, the planning perspective and vertical profiles options were presented to the Core Team. Study partners were asked to comment on the preferred alternative and complete the comment form to be used for public survey. The knowledge obtained from the Core Team and public comment guided the design team's process in selecting a profile alternative.

June 22, 2010

At the final Core Team meeting the design team presented the preferred alternative in conjunction with the study objectives.

Public Officials

A series of meetings were held with public officials to keep community leaders apprised of project progress. The meeting discussions provided the Andover City Council, Andover City Planning Commission, and Andover Site Review Committee opportunity to provide input on key issues and address study concerns with the design team.

Meetings Summary

June 23, 2009

The Design Team conducted a workshop for members of the Andover City Council, Andover City Planning Commission, and Andover Site Review Committee. Nominal group technique was used to poll participants for their insights into what is required to make their community successful over the planning horizon and what would inhibit the success of the community. The meeting was concluded with an open forum discussion on the question of how US54/400 fits with their vision of a successful community. Reponses were collected in each of four work groups, categorized and prioritized as follows:

- **Quality of Life:** Quality of life was the central theme of discussion in all four work groups. Participants felt strongly that, in order to be successful, Andover:
  - Must not lose its sense of community, and its small-town atmosphere
  - Must avoid chronic business vacancy / blight, and must actively pursue specific opportunities for compatible economic development
  - Must take proactive steps to avoid population decline with particular emphasis on youth, and must bring jobs and activities to the community that will encourage youth to remain
  - Must take proactive steps to achieve integration of open spaces, land uses, and modes of travel
  - Must work for a positive relationship between government and
  - Must maintain high achievement in all performance measures in the public school system (4 occurrences of this theme).
  - Must continue sufficient infrastructure planning and maintenance, including reserve for replacement (3 occurrences of this theme).
  - Must pursue jobs that will allow citizens to live AND work in the community
  - Must maintain its own identity, and not be swallowed by Wichita
  - Must avoid deterioration of property values, poverty of its citizens, and high taxes with no visible benefit.

- **The Role of US54/400**: The role of US54/400 in the quality of life of the community was discussed in an open forum discussion; however, traffic concerns, including congestion, safety, air quality, loss of market area, noise, and accessibility were a prominent feature of the Nominal Group discussion. There were 19 occurrences of traffic related concerns expressed by the groups, more than any other single topic. Participants felt strongly that traffic problems would do more to undermine the quality of life in the community than any other single contributor.

The design team prioritized the input of the City of Andover officials in conjunction with input from study partners to develop the project goal and objectives.

June 22, 2010

The Design Team updated City officials on the study progress at a workshop for members of the Andover City Council, Andover City Planning Commission, and Andover Site Review Committee. The preferred alternative was presented in conjunction with the study objectives with the emphasis and core presentation addressing urban design and planning options. As a result of the meeting discussion an Advisory Committee consisting of a select group of representatives from each of the City Council, Planning Commission and Site Review Committee was formed to help guide the design team's process in establishing the purpose and developing the goals of the planning effort.

August 3, 2010

The Advisory Committee was given the opportunity to confirm the planning area boundary, review the draft land use plans, road hierarchy and street sections and discuss policy themes. The knowledge obtained from the Advisory Committee guided the design team's process in establishing the planning area, identifying the land planning framework and developing vision themes based on existing adopted public policies and a public process.

September 27, 2010

The design team conducted a workshop to allow City Council , Planning Commission and Site Review Committee members the opportunity to review and pose questions and concerns regarding the recommended planning area, vision themes and land planning framework.

October 25, 2010

The design team presented local corridor redevelopment challenges, examples of phasing corridor development and examples of recent corridor development to the City Council, Planning Commission and Site Review Committee members. Meeting attendees discussed the corridor vision themes and were asked to prioritize project values as determined by the Advisory Committee.

November 15, 2010

City Council, Planning Commission and Site Review Committee members were given the opportunity to discuss how a compact development form preserves small town character and the advantages and disadvantages of planning now for the future. The design team presented options on how the corridor could evolve in the next 50 years, discussed the public input needed at this time, and reviewed the data from the evaluation forms. Public officials prioritized the top five highest project values:

- Should approve development based on long term development vision
- Should create walkable neighborhoods that reduce the need for vehicles
- Should provide a variety of housing choices
- Should connect parks & open space
- Should increase corridor densities to achieve vibrant mix of uses.

As a result of the meeting discussion public officials approved the direction of the planning effort.

May 17, 2011

City of Andover Planning Commission members were given the opportunity to review and discuss the study information as presented in an outline of the study report by members of the study team.

August 16, 2011

City of Andover Planning Commission members were given the opportunity to review and comment on the draft study report presented by members of the study team.

WAMPO Updates

Representatives from the Wichita Area Metropolitan Planning Organization (WAMPO) attended the public meetings and were key participants in the Core Team meetings. To keep WAMPO apprised of the study progress and recommendations the design team presented study information at the following meetings:

December 8, 2009

The initial presentation to the WAMPO Transportation Policy Body (TRB) introduced the study area, purpose and need, anticipated schedule and agency engagement.

July 27, 2011

Members of the design team met with WAMPO Staff to present the preferred alternative in conjunction with the study objectives

August 22, 2011

Presentation to the WAMPO Technical Advisory Committee (TAC) provided an overview of the preferred alternative in conjunction with the study objectives.

November 8, 2011

Presentation to the WAMPO Transportation Policy Body (TRB) provided an overview of the preferred alternative in conjunction with the study objectives.

Community Stakeholders

Meetings were held with organizations, individuals and the public to gain feedback from the community.

October / November 2009 Meetings Summary

October 22, 2009

Study material was presented to the Andover Rotary and Andover Chamber of Commerce. The purpose was to gain community feedback from individual perspectives. Comment cards were distributed at the meeting and made available both Andover City Hall and the Andover Chamber of Commerce. Electronic versions of the comment forms were made available on both the City of Andover and Andover Chamber of Commerce websites.

- 19 Rotary members were in attendance
- 12 Chamber guests were in attendance
- 14 comment cards received
- 8 emails received

October 26 and October 27, 2009

Individual stakeholder interviews were held with Andover Schools USD 385, Andover YMCA, and local developers and property owners at the Lodge at Central Park in Andover.

- 10 individual stakeholders contacted
- 5 appointments scheduled
    - 1 scheduled appointment canceled
- 2 declined appointments
- 2 never confirmed appointments
- 1 requested conference call

Priorities based upon use:

- Area Residents highest priorities were access, traffic needs, and economic development; lowest priority was a wall effect of dividing the community.
- Adjacent businesses and land owners highest priority was access; lowest priority was congestion.
- Combined highest priorities were economic development and access; lowest priority was congestion.

Information themes from stakeholders ranked highest to lowest in priority:

- Safety
- Access

- Improve the intersection of US54 and 159th now
- Pedestrian access
- Favor a depressed freeway over an elevated freeway
- Preferred mile line node interchanges – direct ramp access to Andover Road
- Not directly impacted
- Timeliness of project completion
- Right-of-way and setbacks
- Favor an elevated freeway over a depressed freeway
- Extended interchange is favored – no direct ramp access to Andover Road
- Construction interference

October 26, 2010

To update community leadership and gain additional feedback the design team presented the goals of the planning effort and corridor vision themes to the Andover Chamber of Commerce.

December 8, 2010

To update community leadership and gain additional feedback the design team presented the goals of the planning effort and corridor vision themes to the Andover Connect group.

Public Meeting Summary

May 6, 2010

Citizens attended a public meeting for the proposed improvements for the East Kellogg freeway from Sedgwick/Butler County Line east to Prairie Creek Road. The Study Team members were present to answer questions from the public. They were explained the different options with the aid of concept drawings. The main purpose of this meeting was to present the proposed concepts for East Kellogg Improvements to the public and gain valuable public and stakeholder feedback to the options being presented.

Public Comment

The request for public comment was noted at the May 6, 2010 public meeting, posted on the City of Andover's website and advertised on Andover's Channel 7. Comment cards were available for the public from May 6, 2010, to May 21, 2010. The data from the comment forms was compiled and analyzed to help the Design Team understand the general public perception of the concepts and the freeway.

Based on comments and feedback given, the prevalent comments received were the following:

- In general, the area residents do not prefer the artwork on highway walls.
- In general, the area residents prefer the maintaining of roadside landscaping.

- The area residents prefer East Kellogg to be a depressed freeway and to go under Andover Road

Other Statistics of note:

- Total Comment Card Respondents: 26
- % Residential Commuter: 65%
- % Core Team: 35%

Real Estate Professionals Feedback

To gain a local perspective on the conceptual urban development plan, meetings were held with local developers and marketing professionals.

October 26, 2010

Individual stakeholder interviews were held with five local developers. The overall response of the developers to the urban development concept was positive. The following feedback was provided:

- Capturing the majority of future trips (density) within the US54/400 corridor would be good for the community. The higher densities would promote development.
    - One developer thought that the density plan was too high and could not be obtained
- Andover has an upper end school system which is a great asset and draw to the community
- Andover needs more mixed use development
    - Retail alone will not drive development
    - Increasing residential densities make development more viable and multi-family would lead the way to mixed use. There currently is a void in multi-family options in the Andover community. There is a' for sale' market or non-assisted multi-family if the community would not oppose it.
- There was consensus that a development plan was necessary; however, there were differing opinions regarding the role the City of Andover should have in restricting development.
    - One developer opposed any restrictions on developers noting that developers need the flexibility
    - Two developers were in favor of the City controlling development through policy. Dictating policy would maintain a level of quality of development throughout the corridor

November 8 and November 15, 2010

Individual stakeholder interviews were held with three local marketing professions. The overall response of the marketing professionals was positive and consistent to feedback from developers. The following points were offered:

- The corridor has development and redevelopment potential
- The marketing effort should be at a regional and national level
- The plan is long term and a significant absorption period should be assumed

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US54/400 Improvements
from County Line east to Prairie Creek

We want your input!

Name & Address (Optional)*

Name: Email:
Address: Phone:
*Name, address, email, and phone number are only needed if your input requires a response.

I am interested in this project as a….

- ☐ Area Resident
- ☐ Daily Commuter through the Corridor
- ☐ Adjacent Business Owner
- ☐ Other:

Based on your overall experience including both driving and visual aspects, rank in order of preference the section of the US54/400 freeway through Wichita: (1 = lowest preference, 3 = highest preference)

Depressed freeway "East Kellogg" from Hillside to Rock **1 2 3**

"cross street view" "aerial freeway view" "view from freeway"

Elevated freeway "Kellogg Flyover" through the Wichita Central Business District **1 2 3**

"cross street view" "aerial freeway view" "view from freeway"

Elevated freeway "West Kellogg" from Maize to Tyler **1 2 3**

"cross street view" "aerial freeway view" "view from freeway"

Which amenities of the US54/400 freeway through Wichita would you *like* incorporated at Andover?
(If you need more room, use blank space at end of survey)

Which amenities of the US54/400 freeway through Wichita would you *not like* incorporated at Andover?
(If you need more room, use blank space at end of survey)

US54/400 Improvements
from County Line east to Prairie Creek

We want your input!

Would you support local financing mechanisms such as special taxes, assessments and/or developer contributions to pay for improvements to US54/400?

Based on an estimated construction cost of $100 Million in today's (2010) dollars to improve US54/400 to a freeway system with one way frontage roads (base option would elevate US54/400 over Andover Road using retaining walls), what additional amenities would you be willing to support through local financing:

(Y = would support, N = would not support)

*Additional $ 20 Million dollars to elevate US54 on a structure throughout the corridor **Y N**

"elevated structure"

An elevated structure throughout The corridor means that US54 would be set on piers above the crossing streets and would allow an open view from north to south under the bridge Examples are the Central Business District and the Canal Route in Wichita

*Additional $ 10 Million dollars to depress US54 under Andover Road **Y N**

"pump station" "depressed freeway"

** includes construction cost for a storm water pump station as well as additional cost required to construct a depressed retaining wall system*
*** annual operation and maintenance cost for storm water pump station are not included*

Additional $ 4 Million to bury electric transmission line **Y N**

Additional $ 6 Million for custom treatment of retaining walls and bridges **Y N**

--Examples of generic treatment (no additional cost)

--Examples of custom treatment (additional cost)

US54/400 Improvements
from County Line east to Prairie Creek

We want your input!

In your opinion should US54/400 be elevated (over) or depressed (under) Andover Road? (circle one)

Over

Under

"elevated w/bridge"
(additional cost)

"elevated w/walls"
(no additional cost)

"depressed freeway"
(additional cost)

Additional Comments:

Thank you for sharing your perspective!

Comments will be accepted for the project record today, May 6, 2010, through May 20, 2010. Should you require additional time to prepare your comments, you may mail this self-addressed form no later than May 20.

-- FOLD HERE --

Place First Class Postage Here

US54/400,
County Line east
to Prairie Creek
5940 E. Central,
Ste. 200
Wichita, KS 67208

US54/400, County Line east to Prairie Creek
c/o Mike Thompson
5940 E. Central, Ste. 200
Wichita, KS 67208

SECURE HERE

US54/400 Improvements
from County Line east to Prairie Creek

We want your input!

Name & Address (Optional)*

Name: Email:
Address: Phone:
*Name, address, email, and phone number are only needed if your input requires a response.

I am interested in this project as a….

- ☐ Area Resident
- ☐ Daily Commuter through the Corridor
- ☐ Adjacent Business Owner
- ☐ Other:

Based on your everyday experiences, what are your highest priorities to be addressed by the US54/400 Improvements?

(1 = not important, 4 = very important)

Congestion along US54/400	1	2	3	4
Congestion on cross streets accessing US54/400	1	2	3	4
Access to adjacent properties	1	2	3	4
Future development and growth in the area	1	2	3	4

Based on your everyday experiences, rank in order of importance the following identified objectives in which improvements to US54/400 would:

(1 = lowest priority, 5 = highest priority)

Serve national, regional and local traffic needs in terms of safety, capacity and speed	1	2	3	4	5
Create opportunities within the community for economic development	1	2	3	4	5
Ensure funding eligibility now and in the future	1	2	3	4	5
Not create a wall effect, dividing the community into North and South	1	2	3	4	5
Provide accessibility to the community / pedestrian friendly	1	2	3	4	5

What do you perceive important for the US54/400 corridor to provide?

On average, how many times per week do you use US54/400 between the County Line and Prairie Creek Rd?

Additional Comments:

Thank you for sharing your perspective!

Comments will be accepted for the project record today, October 22, 2009, through November 6, 2009. Should you require additional time to prepare your comments, you may mail this self-addressed form no later than November 6.

ANDOVER KANSAS

FOLD HERE

Place First Class Postage Here

ANDOVER KANSAS

US54/400,
County Line east
to Prairie Creek
5940 E. Central,
Ste. 200
Wichita, KS 67208

US54/400, County Line east to Prairie Creek
c/o Mike Thompson
5940 E. Central, Ste. 200
Wichita, KS 67208

SECURE HERE

ANDOVER KANSAS

US54/400 Corridor Vision Themes

Vision themes have been developed based on existing adopted public policies and a public process. They are statements of intent that reflect the character of Andover and identify elements that must be employed in any future design work or policy adoption.

Revitalizing the US54/400 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 downtown area 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 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 downtown.
- 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 residential 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 of 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.

ANDOVER KANSAS

US54/400 Evaluation Criteria

No.	Evaluation Criteria (Determined by Advisory Committee comments) (Project Values)	Combined Average Weight – Importance Ranking	Alternatives (Evaluation by Project Team) (Technical Performance, Scale 1 to 10) Alt 1	Alt 2	Alt 3
1	Corridor design should honor the form and function of Andover.				
2	New buildings should incorporate design that respects the architectural style of existing key buildings.				
3	The downtown area should be connected to the corridor through the use and placement of similar streetscape and identity treatments.				
4	A variety of civic uses should be located in the corridor to strengthen it as a civic destination for the neighborhoods and the region.				
5	The backage roads should be enhanced as diverse, pedestrian oriented shopping streets integrated with living spaces and working spaces.				
6	Andover Road should be enhanced as a regional gateway to downtown.				
7	Corridor streetscape areas should be designed with consistent materials to provide an enjoyable and safe experience for the pedestrian.				
8	Parks and open spaces should support a variety of events and activities.				
9	Corridor densities should be increased and include a vibrant mix of civic, office, retail and residential uses.				
10	Underutilized buildings and parcels should be redeveloped to contain a mix of uses, such as office, retail and housing.				
11	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.				
12	A variety of housing choices should be provided in the corridor to create seamless residential neighborhoods.				
13	Parks and open spaces should be connected to regional parks and destinations through a bike and pedestrian trail system.				
14	Andover Road, near the corridor area, should use several means for slowing down traffic to allow safer pedestrian crossings.				
15	Parking should be integrated with corridor uses and be sufficient in terms of quantity and location.				
16	Future transit connections and stations should be identified within the corridor and integrated with local and regional transit connections.				
17	Preserve contiguous open spaces for environmental corridors and recreation				
18	Create solutions that reduce net energy needs.				
19	Minimize reliance of ground water use by implementing water conservation practices.				
20	Create walkable neighborhoods that reduce the reliance on single occupancy vehicles.				
21	Approve development applications that integrate Andover's long-term development vision.				
	Maximum Possible Score				
	Alternative Raw Performance Score (Sum of All Raw Scores)		0	0	0
	Weighted Score (Individual Criteria Weight x Raw Score)		0	0	0
	Percent of Maximum Possible Score				

Preferred Alternative Design Parameters

US54/400 Corridor Study Geometric Design Criteria

Description	US 54 Mainline		US 54 Ramps		Frontage Roads		N/S Arterial Streets		Backage Roads		Criteria
	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	
Route Classification	B										[1] Pg. 5-2
Functional Classification	Urban Principal Arterial - Freeway		Urban Principal Arterial - Freeway		Urban Principal Arterial - Other		Urban Principal/Minor Arterial		Urban Collector		[2] Pg. 8 - 12
Access Control	Full		Full		Partial		Partial		Partial		[1]
Traffic Volume	Traffic Analysis		Traffic Analysis		Traffic Analysis		Traffic Analysis		Traffic Analysis		Based on ultimate development
Design Speed	70 mph		60 mph	40 mph	40 mph		40 mph		30 mph		[1] Table 7.2.1-2 [1] Table 7.2.1-3
Design Vehicle	WB-67		WB-67		WB-67						
Horizontal Alignment											
Control Location	Centerline Roadway		Outside Edge of Pavement		Inside Edge of Lanes		Centerline Roadway		Centerline Roadway		
Minimum Radius (w/super)	3150'	1810'	2320'	444'	965'	444'	485'	444'	231'	214'	[2] Exhibit 3-16, Pg. 151 [2] Exhibit 3-27, Pg. 170
Superelevation	6%	8%	6%	8%	6%	8%	6%	8%	6%	8%	[1] Table 7.2.1-2 [1] Table 7.2.1-3
Vertical Alignment											
Control Location	Centerline Roadway		Outside Edge of Lane		Inside Edge of Lanes		Centerline Roadway		Centerline Roadway		
Maximum Gradient	3%		5%		5%		5%		5%		[1] Table 7.2.1-2 [1] Table 7.2.1-3
Minimum Gradient	0.30%	0.10%	0.30%	0.10%	0.30%	0.10%	0.30%	0.10%	0.30%	0.10%	
Stopping Sight Distance	730'		570'	305'	305'		305'		200'		[1] Table 7.2.1-2 [2] Exhibit 3-72, Pg. 272
Crest Curve K-Value	247		151	44	44		44		19		[2] Exhibit 3-72, Pg. 272
Sag Curve K-Value	181		136	64	64		64		37		[2] Exhibit 3-75, Pg. 277
Verical Clearance (Roads over highway)	16'-4"		16'-4"		16'-4"		16'-4"		16'-4"		[1] Table 7.2.1-2
Verical Clearance (Highway over local roads)	16'-4"		16'-4"		16'-4"		16'-4"		16'-4"		[1] Table 7.2.1-2
Cross Sectional Elements											
Roadway Width	Varies	122'-6"	Varies	28'-0"	29'-0"	29'-0"	Varies	49'-0"	Varies	41'-0"	
Lanes (per direction)	Traffic Analysis	3	Traffic Analysis	1	Traffic Analysis	2	Traffic Analysis	1	Traffic Analysis	1	Traffic Analysis
Lane Widths											
Thru Lanes	12'		16'	12'	12'		11'		11'		
Auxiliary Turn Lanes	12'		N/A		12'		12'		14'		
Usable Shoulder Widths											
Inside	12'		4'	4'	2.5' Curb & Gutter		2.5' Curb & Gutter		2.5' Curb & Gutter		
Outside	12'		8'	8'	2.5' Curb & Gutter		2.5' Curb & Gutter		2.5' Curb & Gutter		
Median	N/A		N/A		N/A		1.75' Curb & Gutter		N/A		
Cross Slope											
Lanes	2%		2%		2%		3%		3%		[1] & [4]
Shoulders	2.5%		2.5%		N/A		N/A		N/A		
Median Width	High Conc. Median Safety Barrier		N/A		N/A		Varies		N/A		
Side Slopes											
Within Clear Zone	6:1 (Max.)		6:1 (Max.)		4%		4%		4%		[1] Table 7.2.1-2 [1] Table 7.2.1-3
Outside Clear Zone - fills <=30'	4:1 (Max.)		4:1 (Max.)		4:1 (Max.)		4:1 (Max.)		4:1 (Max.)		[1] Table 7.2.1-2 [1] Table 7.2.1-3
Outside Clear Zone - fills >30'	3:1 (Max.)		3:1 (Max.)		3:1 (Max.)		3:1 (Max.)		3:1 (Max.)		[1] Table 7.2.1-2 [1] Table 7.2.1-3
Clear Zone Width	34'	34'				6'		6'		6'	[5]
Usual ROW Width	350' (mailine, ramps & front. rds.)		350' (mailine, ramps & front. rds.)		350' (mailine, ramps & front. rds.)		Varies	100'	110'	90'	

Notes: [1] KDOT Design Manual, 2008, Kansas Department of Transportation
[2] AASHTO = A Policy on Geometric Design of Highways and Streets, 2004, American Association of State Highway and Transportation Officials ("Green Book")
[3] AASHTO = Guidelines for Geometric Design of Very-Low Volume Local Roads (ADT≤ 400), 2001, American Association of State Highway and Transportation Officials
[4] City of Andover
[5] Clear Zone measured from edge of driving lane or back of curb when present.

US 54/400 Corridor Study Project Survey Control

Project Coordinates x 0.9998848748 = NGS State Plane Coord.
NAD 1983

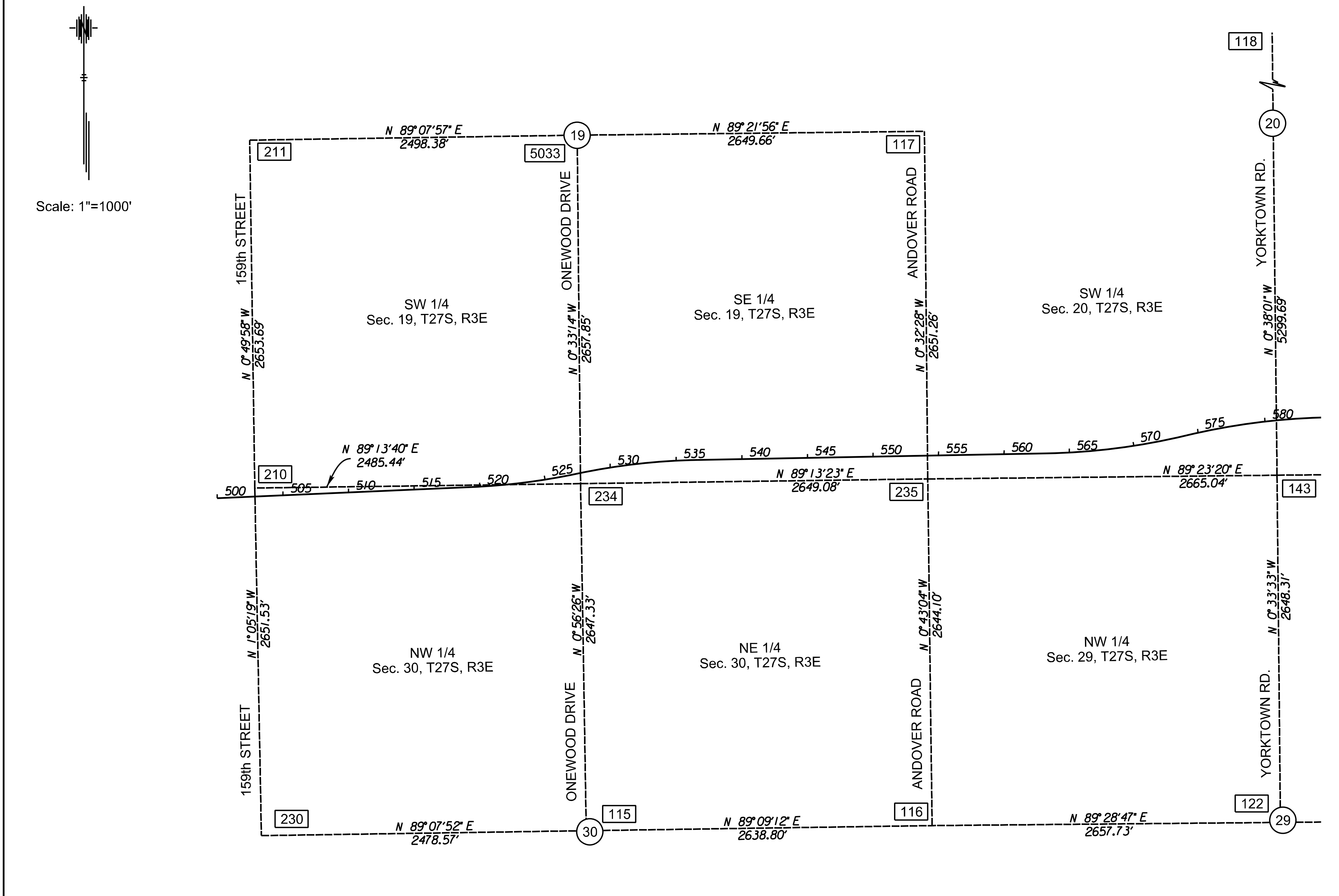
VERTICAL DATUM: NAVD 1988

Datum Benchmark: USGS Benchmark Designation-R 39
NAVD 1988 Elev. = 1361.74

Proj. Corridor Benchmark: USGS benchmark monument
75' N. & 42' E. of Sec. Cor. at 159th & Kellogg
NAVD 1988 Elev. = 1302.21

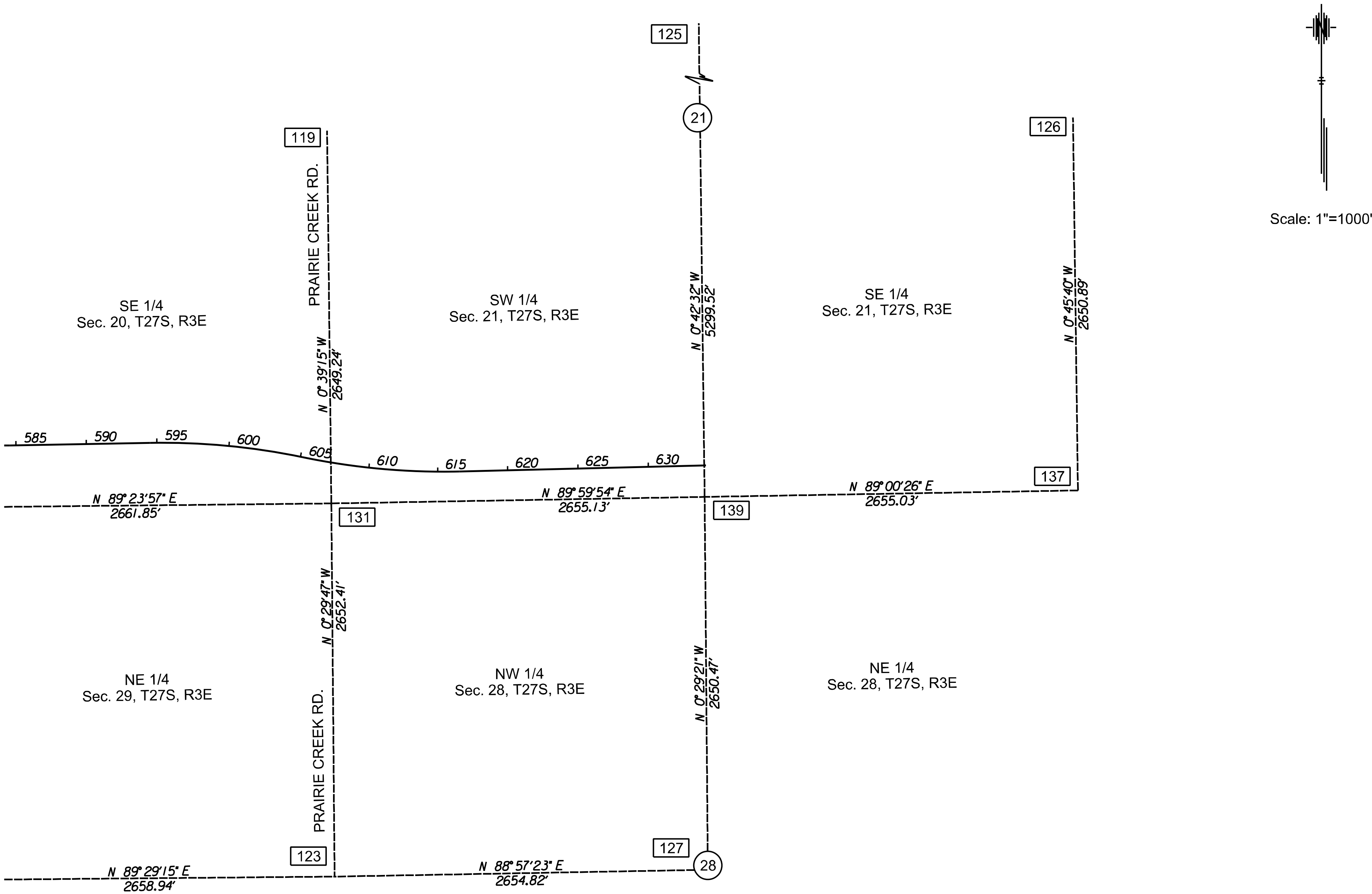
US 54/400 Corridor Study Section Corners

Sec / Cor No.	Quarter Corner Location	Coordinates		Station	Offset (ft)	Angle
		Northing	Easting			
115	Center of Sec. 30, T27S, R3E	1681516.53	1704850.35			
116	E 1/4 Cor. Sec. 30, T27S, R3E	1681555.52	1707488.86			
117	E 1/4 Cor. Sec. 19, T27S, R3E	1686850.56	1707430.70	554+20.17	2,614.67 Lt.	90^ 04' 12" NW
118	N 1/4 Cor. Sec. 20, T27S, R3E	1689527.21	1710062.02	580+86.53 (Ahd. Tan.)	5,196.36 Lt.	89^ 58' 39" NW (Ahd. Tan.)
119	E 1/4 Cor. Sec. 20, T27S, R3E	1686904.83	1712752.09	607+49.55 (Bk. Tan.)	2,593.89 Lt.	86^ 17' 20" NW (Bk. Tan.)
122	Center of Sec. 29, T27S, R3E	1681579.66	1710146.48			
123	E 1/4 Cor. Sec. 29, T27S, R3E	1681603.44	1712805.31			
125	N 1/4 Cor. Sec. 21, T27S, R3E	1689601.29	1715371.48			
126	E 1/4 Cor. Sec. 21, T27S, R3E	1686998.84	1718056.47			
127	Center of Sec. 28, T27S, R3E	1681651.79	1715459.69			
131	SE Cor. Sec. 20, T27S, R3E	1684255.76	1712782.33	607+49.55 (Bk. Tan.) 50+56.69 Prairie Creek Road	55.35 Rt. 0.00 Lt.	86^ 17' 20" SE (Bk. Tan.)
137	SE Cor. Sec. 21, T27S, R3E	1684348.18	1718091.69			
139	S 1/4 Cor. Sec. 21, T27S, R3E	1684302.17	1715437.06	634+04.94	18.88 Rt.	90^ 00' 23" SW
143	N 1/4 Cor. Sec. 29, T27S, R3E	1684227.84	1710120.63	580+86.53 (Ahd. Tan.) 50+98.52 Yorktown Road	103.33 Rt. 39.52 Lt.	89^ 58' 39" SE (Ahd. Tan.) 90^ 01' 21" NE
210	SW Cor. Sec. 19, T27S, R3E	1684130.00	1702321.69	502+84.77 49+89.78 159th Street	10.22 Lt. 0.00 Lt.	89^ 55' 48" NW
211	W 1/4 Cor. Sec. 19, T27S, R3E	1686783.41	1702283.12			
230	W 1/4 Cor. Sec. 30, T27S, R3E	1681478.95	1702372.07	502+84.77	2,641.31 Rt.	89^ 55' 48" SE
234	S 1/4 Cor. Sec. 19, T27S, R3E	1684163.50	1704806.90	527+70.66 (Bk. Tan.) 50+23.14 Onewood Drive	20.82 Rt. 48.50 Rt.	93^ 10' 09" SE (Bk. Tan.) 90^ 13' 23" NW
235	SE Cor. Sec. 19, T27S, R3E	1684199.42	1707455.74	554+20.17 50+36.59 Andover Road	36.59 Rt. 0.00 Lt.	90^ 04' 12" SE
5033	Center of Sec. 19, T27S, R3E	1686821.23	1704781.21	527+70.66 (Bk. Tan.)	2,637.03 Lt.	93^ 10' 09" NW (Bk. Tan.)



Note: Distances shown are from Section Corner to Section Corner

US 54/400 CORRIDOR STUDY
SECTION CORNERS



Note: Distances shown are from Section Corner to Section Corner

US 54/400 CORRIDOR STUDY
SECTION CORNERS

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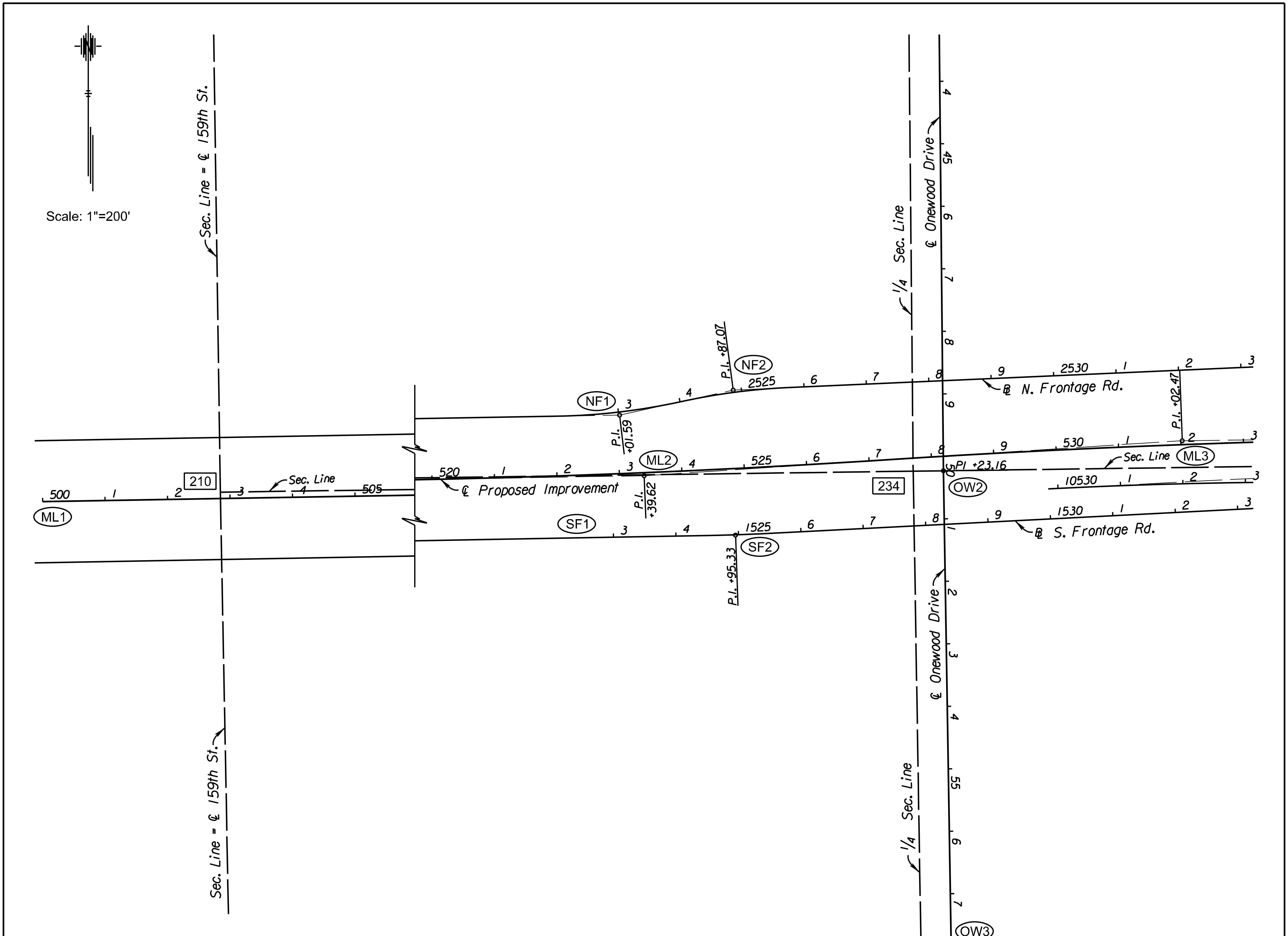
US54/400 Corridor Study Horizontal Control

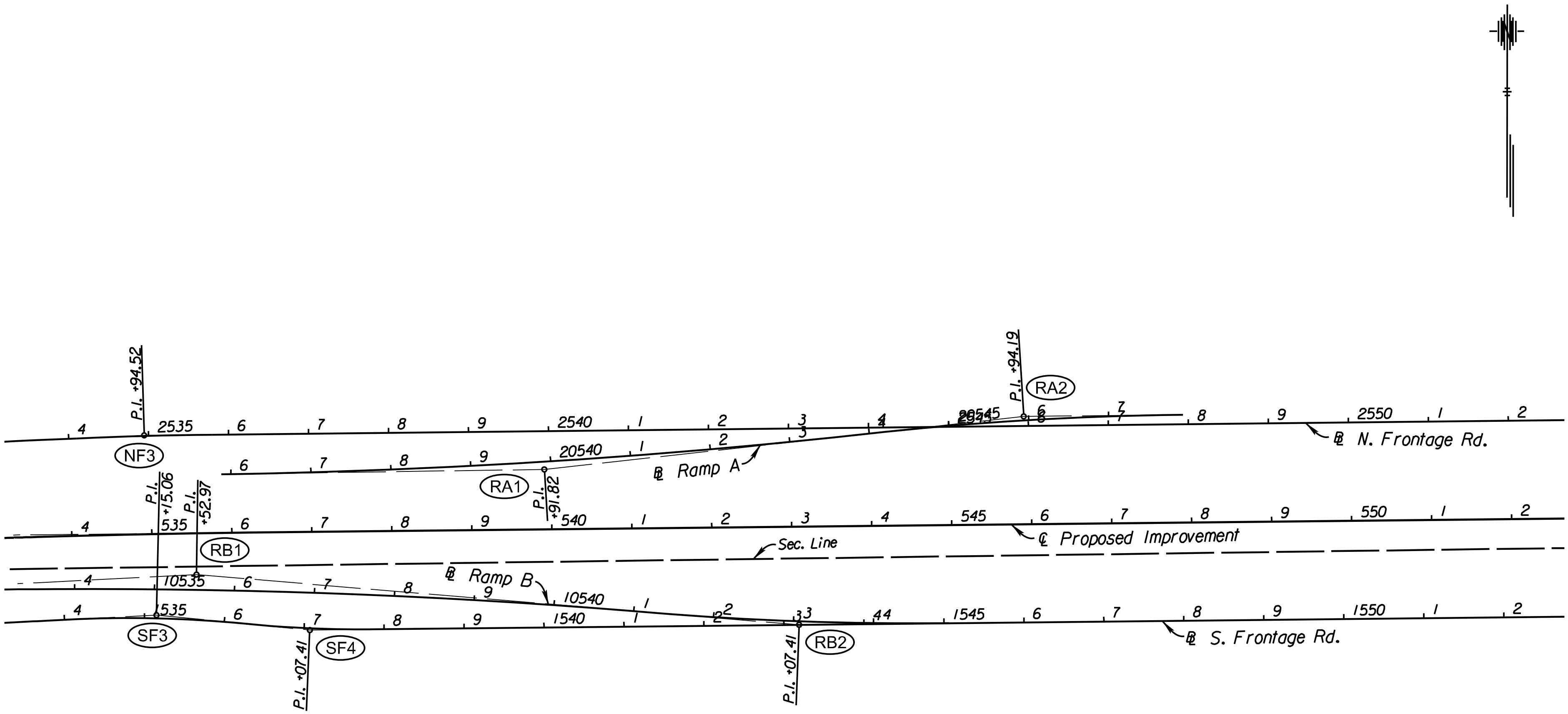
Horizontal Curve / Point Data

Curve / Pt. No.	Alignment	P.I.				P.C.			P.T.			Delta	Radius	Tangent	Length	External	Super
		Back Sta.	Ahead Sta.	Northing	Easting	Sta.	Northing	Easting	Sta.	Northing	Easting	(DMS)	(ft)	(ft)	(ft)	(ft)	
ML1	US54/400	500+00.00		1684114.7211	1702037.1612												
ML2	US54/400	523+39.62	523+39.47	1684156.3218	1704376.4108	519+38.39	1684149.1875	1703975.2402	527+40.70	1684182.3745	1704776.7981	02^42'14.72" Lt.	17000.00	401.23	802.31	4.73	N.C.
ML3	US54/400	532+02.47	532+02.25	1684212.3575	1705237.5877	527+40.70	1684182.3745	1704776.7981	536+64.01	1684217.2823	1705699.3254	03^06'42.62" Rt.	17000.00	461.76	923.31	6.27	N.C.
ML4	US54/400	568+53.55	568+53.20	1684251.2991	1708888.6870	563+20.71	1684245.6163	1708355.8792	573+86.04	1684290.3380	1709420.0930	03^35'25.86" Lt.	17000.00	532.84	1065.33	8.35	N.C.
ML5	US54/400	579+18.88	579+18.53	1684329.3769	1709951.4990	573+86.04	1684290.3380	1709420.0930	584+51.37	1684335.0596	1710484.3068	03^35'25.86" Rt.	17000.00	532.84	1065.33	8.35	N.C.
ML6	US54/400	599+92.53	599+92.15	1684351.4963	1712025.3802	594+48.19	1684345.6909	1711481.0723	605+36.49	1684322.4681	1712568.9445	03^40'04.66" Rt.	17000.00	544.34	1088.30	8.71	N.C.
ML7	US54/400	610+94.41	610+94.01	1684292.7160	1713126.0648	605+36.49	1684322.4681	1712568.9445	616+51.92	1684299.5563	1713683.9370	03^45'33.74" Lt.	17000.00	557.91	1115.43	9.15	N.C.
ML8	US54/400	634+04.94		1684321.0490	1715436.8214												
SF1	South Frontage Road	1522+37.29		1684056.7134	1704264.5759												
SF2	South Frontage Road	1524+95.33	1524+95.32	1684061.3016	1704522.5760	1524+45.02	1684060.4070	1704472.2708	1525+45.63	1684063.8826	1704572.8230	01^55'17.91" Lt.	3000.00	50.31	100.61	0.42	N.C.
SF3	South Frontage Road	1535+15.06	1535+14.65	1684113.6125	1705540.9731	1534+03.37	1684107.8831	1705429.4321	1536+26.34	1684102.7599	1705652.1327	08^30'59.86" Rt.	1500.00	111.69	222.97	4.15	N.C.
SF4	South Frontage Road	1537+07.41	1537+07.25	1684094.8825	1705732.8186	1536+26.34	1684102.7599	1705652.1327	1537+88.32	1684095.7471	1705813.8835	06^11'14.05" Lt.	1500.00	81.07	161.98	2.19	N.C.
SF5	South Frontage Road	1570+70.36	1570+69.33	1684130.7505	1709095.7372	1569+18.45	1684129.1303	1708943.8341	1572+21.24	1684162.7932	1709244.2311	11^33'56.77" Lt.	1500.00	151.91	302.79	7.67	N.C.
SF6	South Frontage Road	1573+54.03	1573+53.33	1684190.8016	1709374.0290	1572+21.24	1684162.7932	1709244.2311	1574+86.12	1684195.5727	1709506.7287	10^07'03.66 Rt.	1500.00	132.79	264.88	5.87	N.C.
SF7	South Frontage Road	1582+99.42	1582+99.41	1684224.7957	1710319.5017	1582+36.23	1684222.5253	1710256.3546	1583+62.60	1684225.4696	1710382.6860	01^26'53.10" Rt.	5000.00	63.19	126.37	0.40	N.C.
SF8	South Frontage Road	1599+81.88	1599+81.78	1684242.7394	1712001.8735	1598+30.68	1684241.1269	1711850.6856	1601+32.98	1684235.2137	1712152.8826	03^27'50.81" Rt.	5000.00	151.20	302.30	2.29	N.C.
SF9	South Frontage Road	1611+06.79	1611+06.72	1684186.7432	1713125.4830	1610+05.84	1684191.7680	1713024.6545	1612+07.67	1684188.5079	1713226.4211	03^51'16.88" Lt.	3000.00	100.95	201.83	1.70	N.C.
SF10	South Frontage Road	1618+96.80		1684200.5548	1713915.4454												
NF1	North Frontage Road	2523+01.59	2523+00.93	1684253.2411	1704337.0343	2522+01.76	1684251.4661	1704237.2210	2524+00.76	1684274.7130	1704434.5268	11^24'06.44" Lt.	1000.00	99.83	199.00	4.97	N.C.
NF2	North Frontage Road	2524+87.08	2524+86.64	1684293.2788	1704518.8241	2524+00.76	1684274.7130	1704434.5268	2525+72.96	1684297.1249	1704605.0559	09^52'00.50" Rt.	1000.00	86.32	172.20	3.72	N.C.
NF3	North Frontage Road	2534+94.52	2534+94.50	1684338.1874	1705525.6987	2534+09.74	1684334.4100	1705441.0070	2535+79.28	1684339.0915	1705610.4698	01^56'33.84" Rt.	5000.00	84.78	169.54	0.72	N.C.
NF4	North Frontage Road	2572+23.74	2572+23.07	1684377.9601	1709254.7207	2570+64.59	1684376.2627	1709095.5776	2573+82.22	1684404.8047	1709411.5925	09^05'58.46" Lt.	2000.00	159.15	317.63	6.32	N.C.
NF5	North Frontage Road	2575+40.98	2575+40.31	1684431.5823	1709568.0729	2573+82.22	1684404.8047	1709411.5925	2576+99.07	1684433.3381	1709726.8183	09^04'37.06" Rt.	2000.00	158.76	316.85	6.29	N.C.
NF6	North Frontage Road	2596+72.45	2596+72.41	1684455.1631	1711700.0790	2595+64.24	1684453.9664	1711591.8795	2597+80.62	1684451.6778	1711808.2289	02^28'46.25" Rt.	5000.00	108.21	216.38	1.17	N.C.
NF7	North Frontage Road	2614+42.58		1684398.1460	1713469.3188												
RA1	Ramp A	20539+91.82	20539+91.21	1684295.6577	1706025.9947	20535+87.90	1684289.5419	1705622.1243	20543+95.13	1684340.0429	1706427.4653	05^26'28.51" Lt.	8500.00	403.92	807.23	9.59	N.C.
RA2	Ramp A	20545+94.18	20545+93.86	1684361.9162	1706625.3122	20543+95.13	1684340.0429	1706427.4653	20547+92.91	1684364.0392	1706824.3533	05^41'51.83" Rt.	4000.00	199.05	397.78	4.95	N.C.
RB1	Ramp B	10535+52.97	10535+51.27	1684164.0696	1705591.0256	10529+84.24	1684135.2750	1705023.0274	10541+20.00	1684116.9377	1706157.7968	07^39'20.92" Rt.	8500.00	568.73	1135.76	19.01	N.C.
RB2	Ramp B	10543+07.41	10543+07.14	1684101.4071	1706344.5551	10541+20.00	1684116.9377	1706157.7968	10544+94.54	1684103.4058	1706531.9474	05^21'53.19" Lt.	4000.00	187.40	374.53	4.39	N.C.
RC1	Ramp C	20564+71.34	20564+71.23	1684373.9313	1708501.9284	20563+33.29	1684372.4589	1708363.8861	20566+09.28	1684365.8830	1708639.7437	03^57'11.79" Rt.	4000.00	138.05	275.99	2.38	N.C.
RC2	Ramp C	20571+12.37	20571+11.20	1684336.5530	1709141.9822	20566+09.28	1684365.8830	1708639.7437	20576+14.29	1684366.6728	1709644.1739	06^46'28.16" Lt.	8500.00	503.09	1005.01	14.88	N.C.
RD1	Ramp D	10562+67.36	10562+66.73	1684118.3737	1708310.3699	10560+18.76	1684115.7224	1708061.7817	10565+15.33	1684151.7856	1708556.7168	07^06'46.03" Lt.	4000.00	248.60	496.57	7.72	N.C.
RD2	Ramp D	10568+34.78	10568+34.47	1684194.7191	1708873.2669	10565+15.33	1684151.7856	1708556.7168	10571+53.92	1684213.7718	1709192.1467	04^18'16.46" Rt.	8500.00	319.45	638.59	6.00	N.C.
RE1	Ramp E	20591+93.58	20591+93.11	1684404.2219	1711225.8239	20588+21.88	1684400.2577	1710854.1425	20595+64.81	1684440.6160	1711595.7405	05^00'28.31" Lt.	8500.00	371.70	742.93	8.12	N.C.
RE2	Ramp E	20598+25.75	20598+25.01	1684466.1651	1711855.4255	20595+64.81	1684440.6160	1711595.7405	20600+85.95	1684457.7602	1712116.2290	07^27'53.17" Rt.	4000.00	260.94	521.14	8.50	N.C.
RF1	Ramp F	10590+51.07	10590+50.60	1684280.2091	1711084.6337	10586+81.19	1684276.2643	1710714.7749	10594+20.48	1684252.0108	1711453.4370	04^59'00.02" Rt.	8500.00	369.88	739.29	8.04	N.C.
RF2	Ramp F	10595+94.54	10595+94.33	1684238.7410	1711626.9916	10594+20.48	1684252.0108	1711453.4370	10597+68.39	1684240.5974	1711801.0428	04^59'00.02" Lt.	4000.00	174.06	347.91	3.79	N.C.
RG1	Ramp G	20615+16.12	20615+16.11	1684395.6090	1713548.0396	20614+37.36	1684398.1460	1713469.3188	20615+94.87	1684389.9752	1713626.5994	02^15'21.82" Rt.	4000.00	78.76	157.51	0.78	N.C.
RG2	Ramp G	20619+51.45	20619+51.03	1684364.4688	1713982.2669	20615+94.87	1684389.9752	1713626.5994	20623+07.61	1684368.8407	1714338.8210	04^48'15.76" Lt.	8500.00	356.58	712.74	7.48	N.C.
RH1	Ramp H	10614+09.73	10614+09.47	1684176.3306	1713445.1995	10612+23.90	1684173.0820	1713259.3945	10615+95.30	1684196.7924	1713629.9029	05^19'11.67" Lt.	4000.00	185.83	371.40	4.31	N.C.
RH2	Ramp H	10620+12.43	10620+11.76	1684242.7227	1714044.5041	10615+95.29	1684196.7924	1713629.9029	10624+28.90	1684247.8370	1714461.6103	05^37'08.66" Rt.	8500.00	417.14	833.61	10.23	N.C.
OW1	Onewood Drive	42+00.00		1684987.2551	1704847.4397												
OW2	Onewood Drive	50+23.16		1684164.1324	1704855.3962							00^23'11.97" Lt.					
OW3	Onewood Drive	57+99.84		1683387.5618	1704868.1441												
YT1	Yorktown Road	37+83.02		1685542.8444	1710066.5682												
YT2	Yorktown Road	50+98.52		1684227.4215	1710081.1173							00^04'28.29" Rt.					
YT3	Yorktown Road	58+00.00		1683525.9773	1710087.9631												

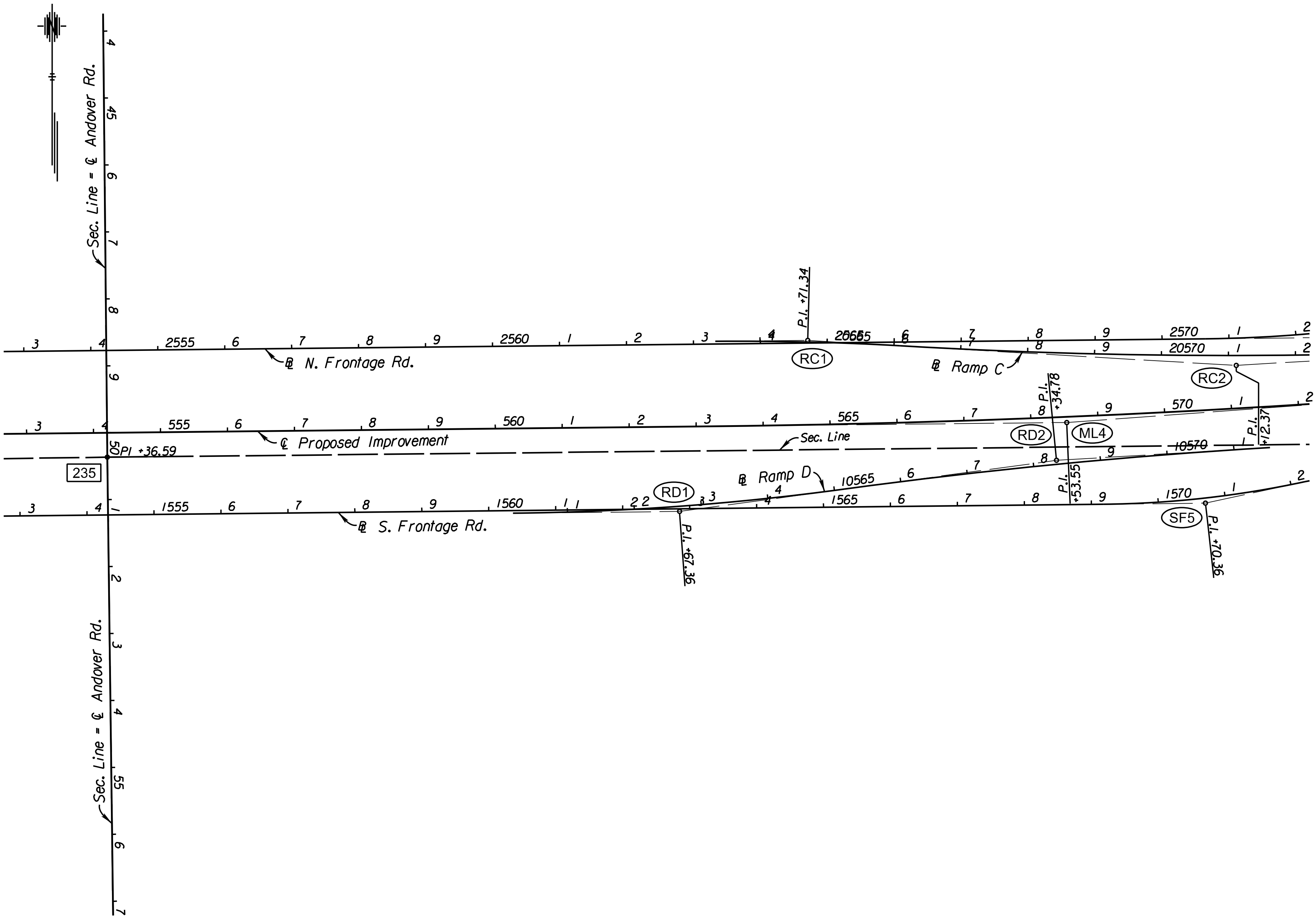
The centerlines of 159th Street, Andover Road, and Prairie Creek Road are on Section Lines.



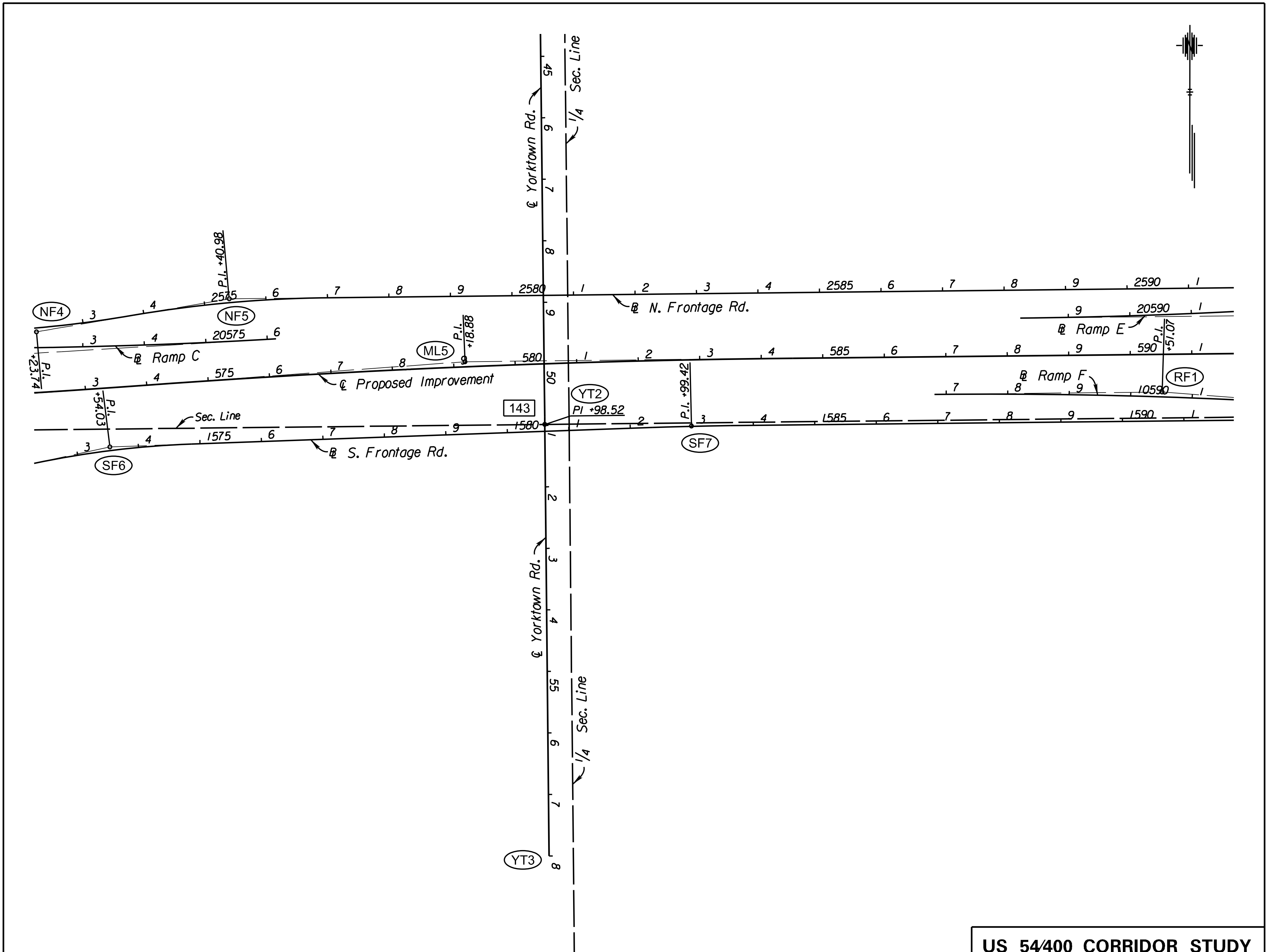
US 54/400 CORRIDOR STUDY
HORIZONTAL CONTROL



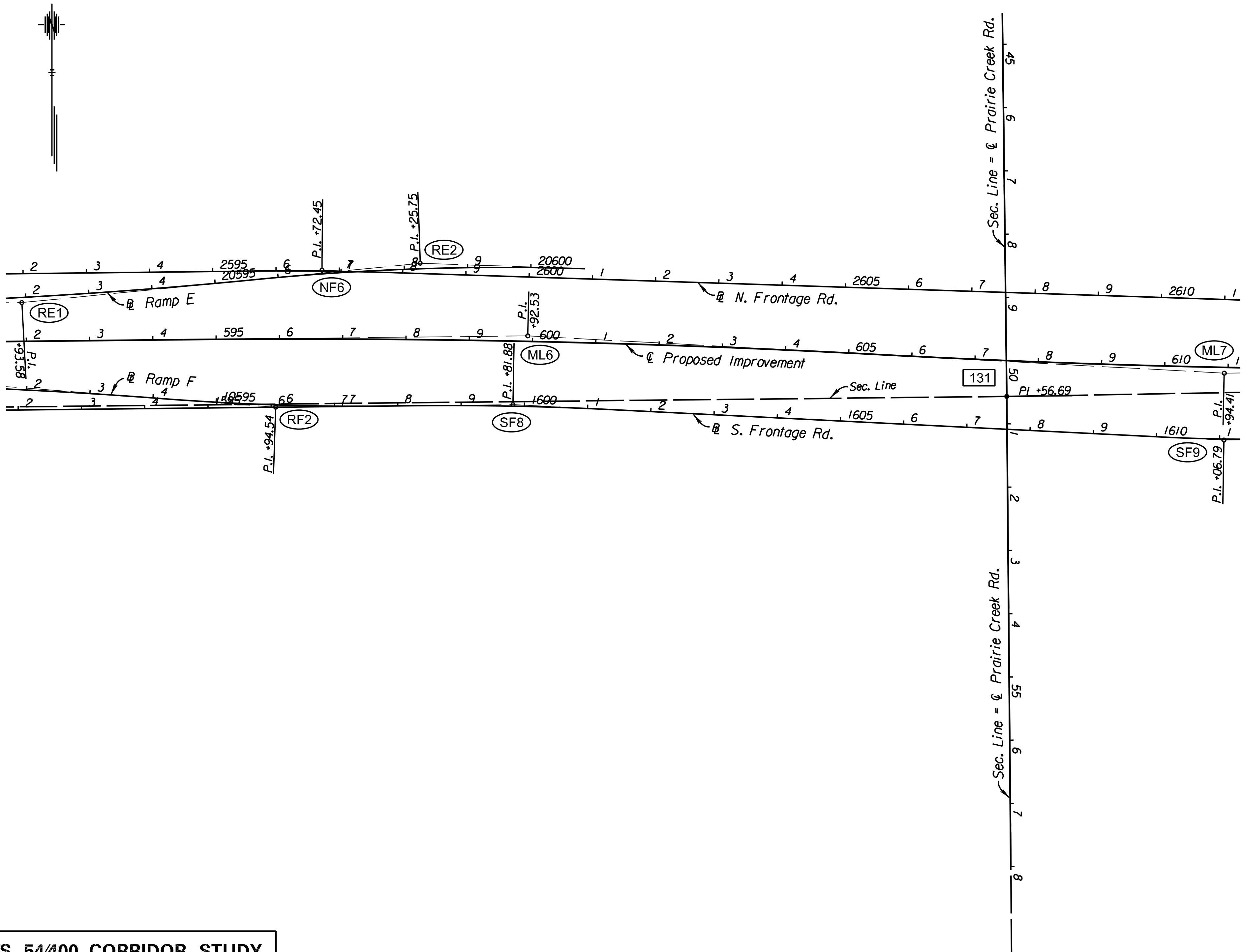
US 54/400 CORRIDOR STUDY
HORIZONTAL CONTROL



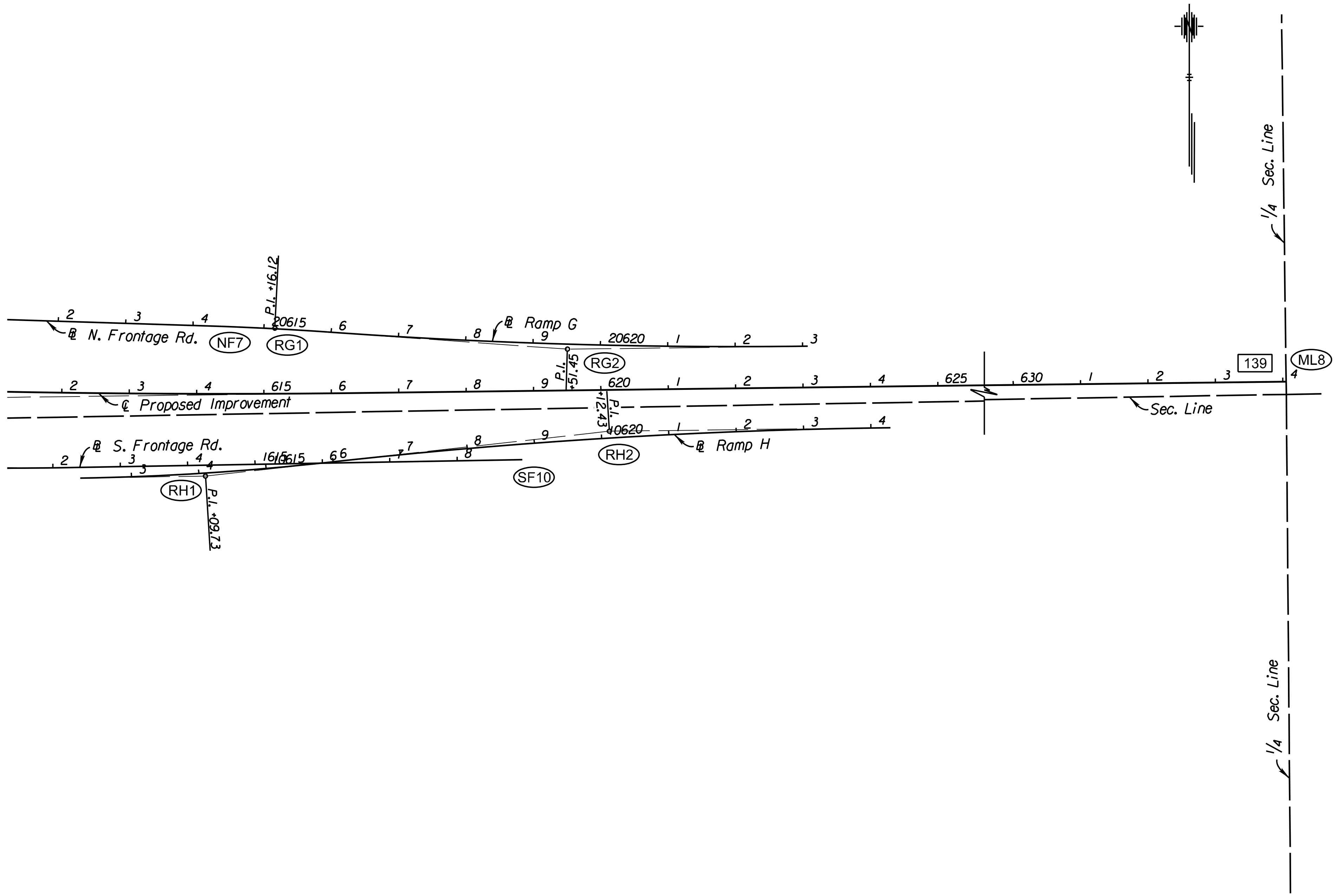
US 54/400 CORRIDOR STUDY
HORIZONTAL CONTROL



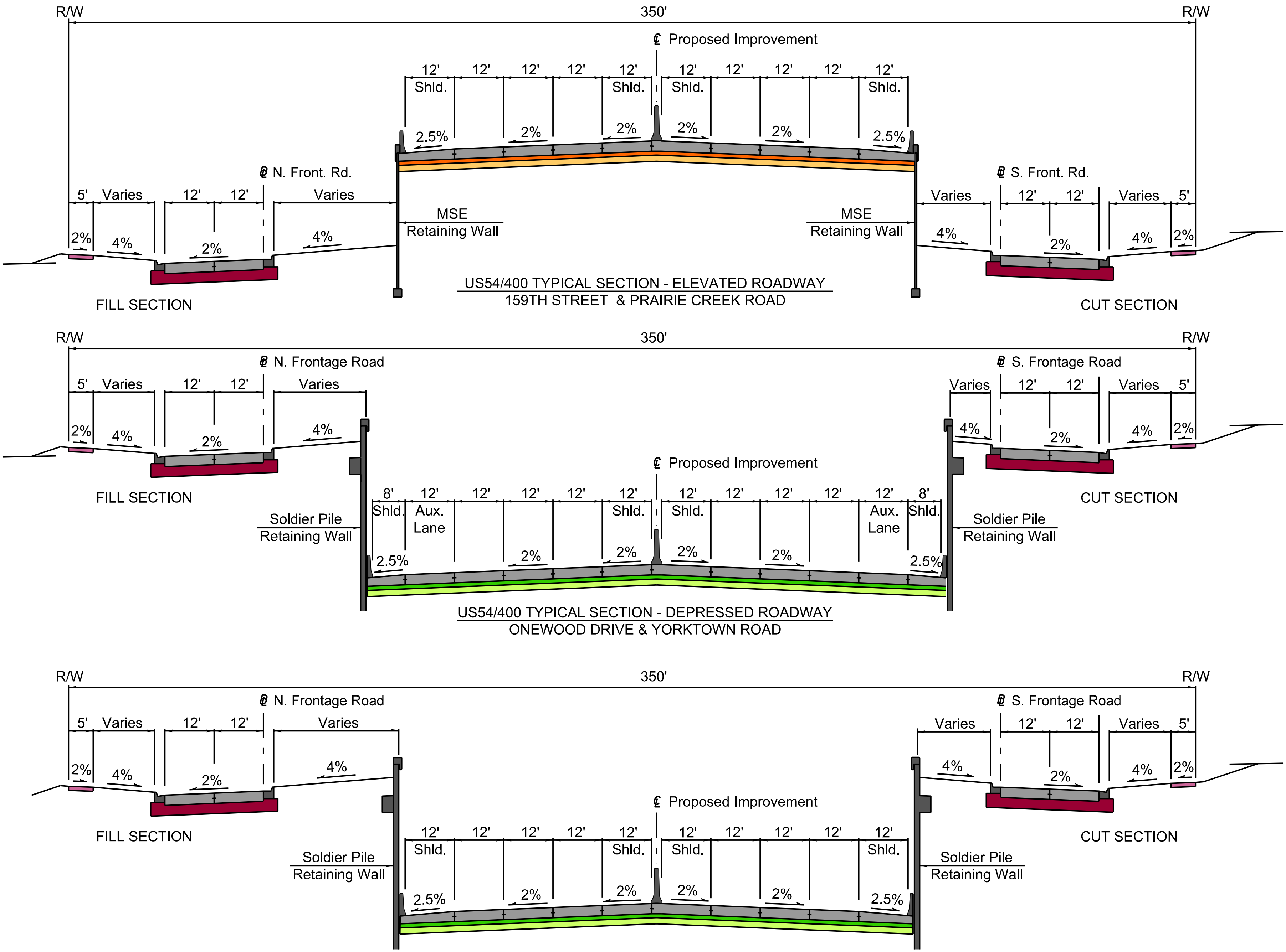
US 54/400 CORRIDOR STUDY
HORIZONTAL CONTROL



US 54/400 CORRIDOR STUDY
HORIZONTAL CONTROL



US 54/400 CORRIDOR STUDY
HORIZONTAL CONTROL



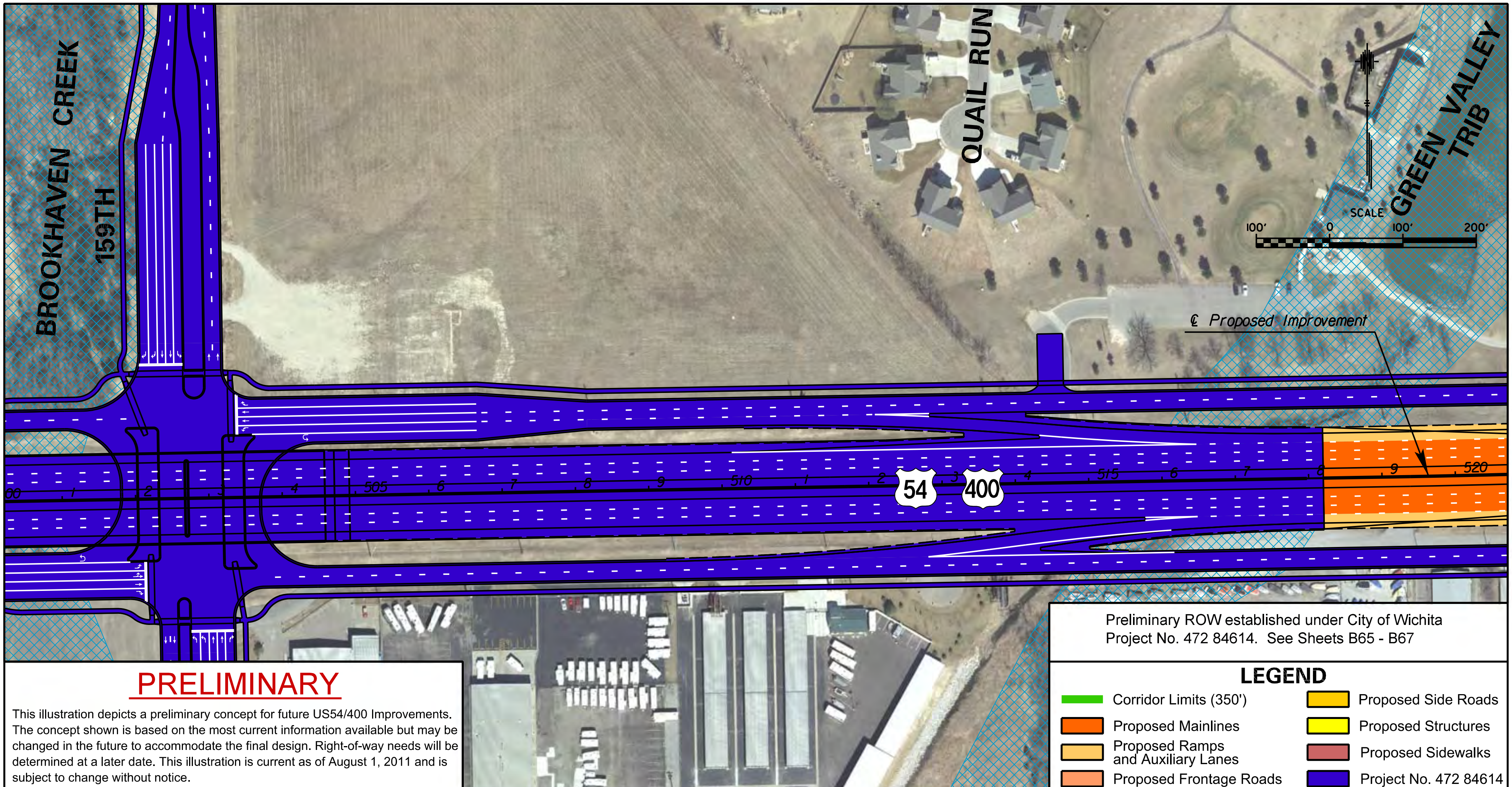
US54/400 TYPICAL SECTION - DEPRESSED ROADWAY
ANDOVER ROAD

PRELIMINARY

This illustration depicts a preliminary concept for future US54/400 Improvements. The concept shown is based on the most current information available but may be changed in the future to accommodate the final design. Right-of-way needs will be determined at a later date. This illustration is current as of August 1, 2011 and is subject to change without notice.

LEGEND

- 10" Concrete Pavement
- 4" Cement Treated Base
- 6" Cement Treated Subgrade
- 10" Geogrid Reinforced Base
- Walls, Curbs & Safety Barriers
- 4" Bound Drainable Base
- 6" Lime Treated Subgrade
- 4" Concrete Sidewalk



Preliminary ROW established under City of Wichita Project No. 472 84614. See Sheets B65 - B67

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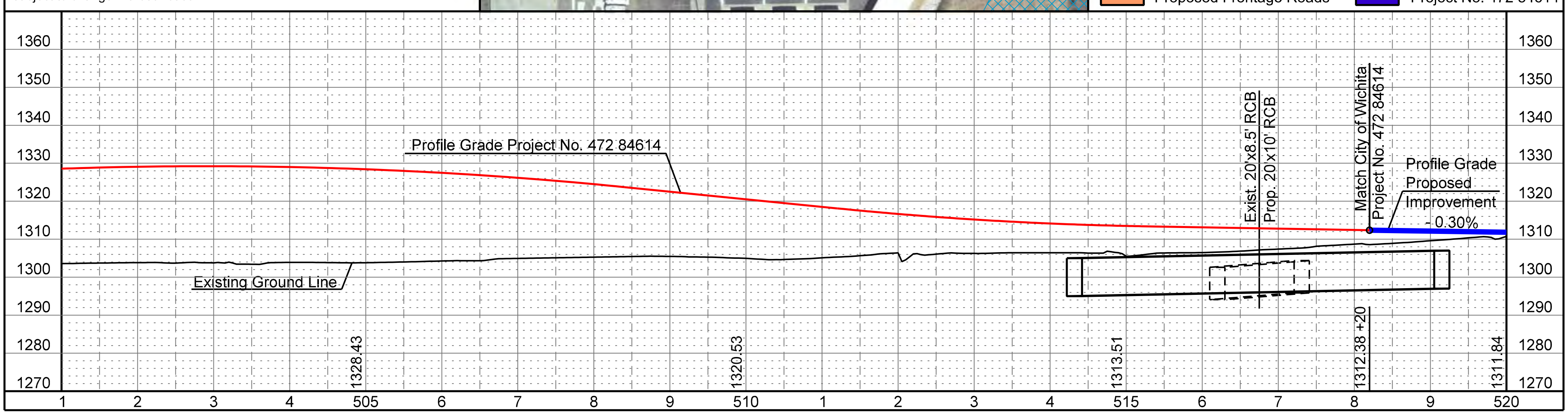
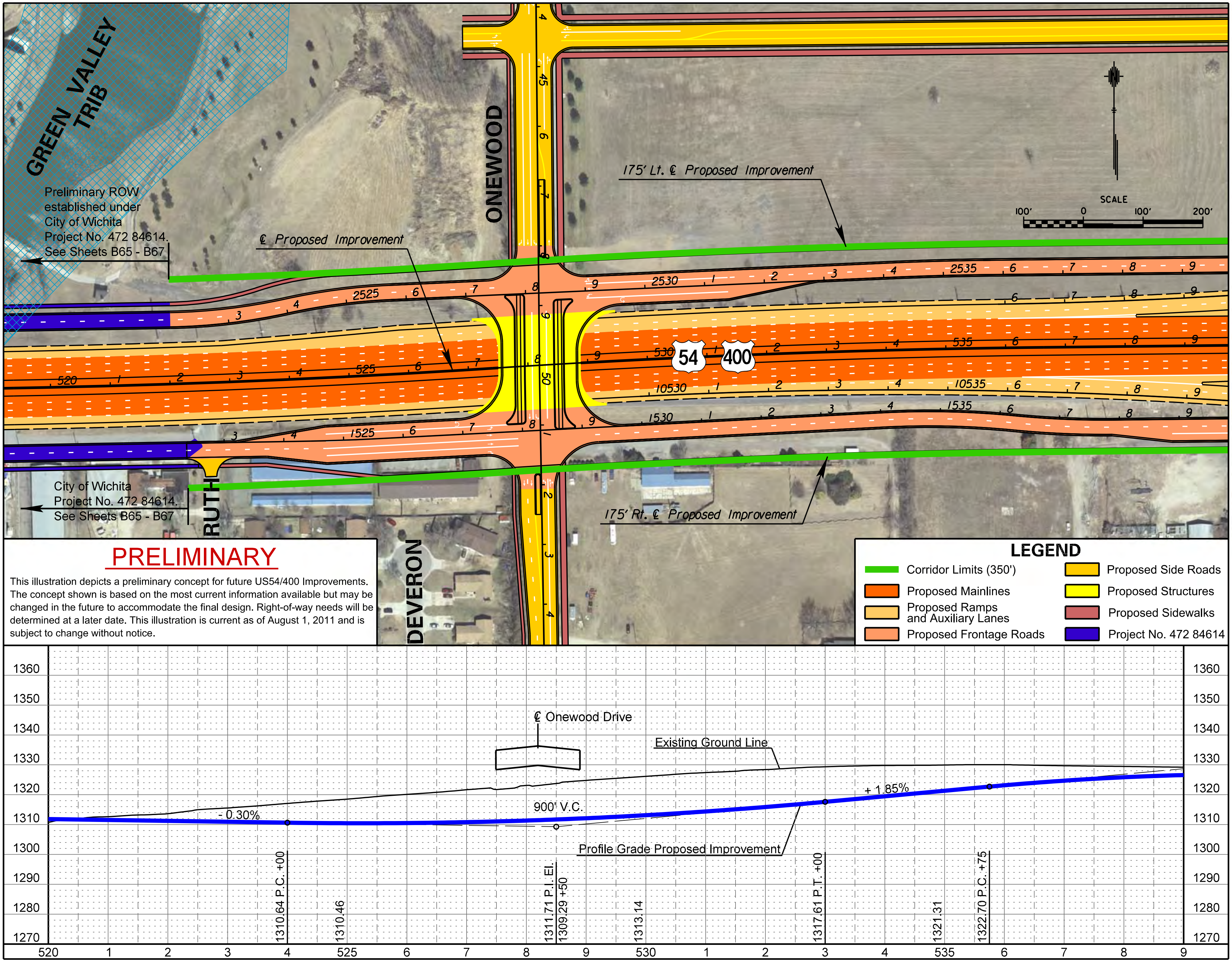
LEGEND

- Corridor Limits (350')
- Proposed Mainlines
- Proposed Ramps and Auxiliary Lanes
- Proposed Frontage Roads
- Proposed Side Roads
- Proposed Structures
- Proposed Sidewalks
- Project No. 472 84614





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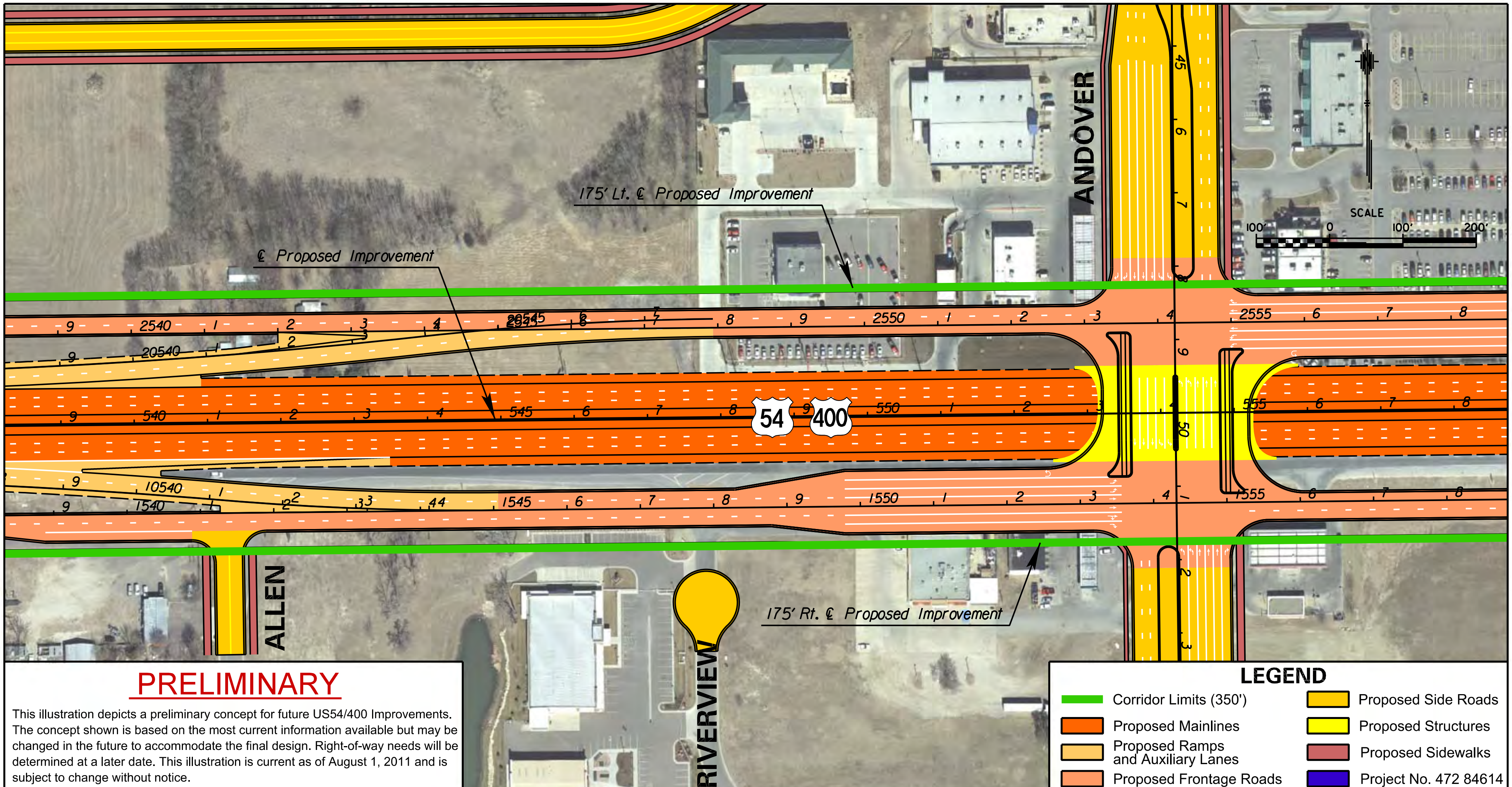

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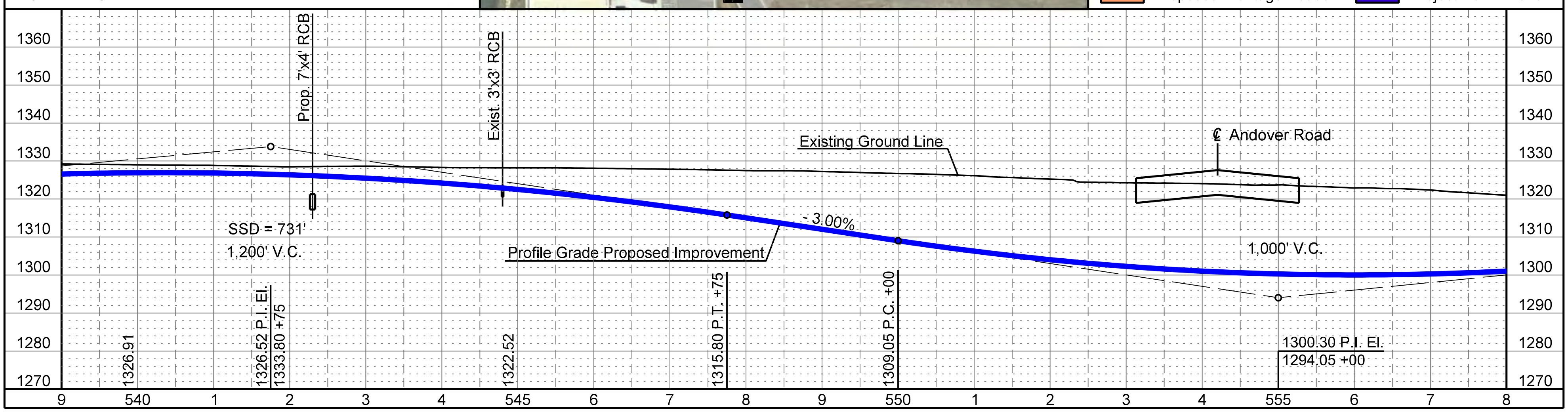

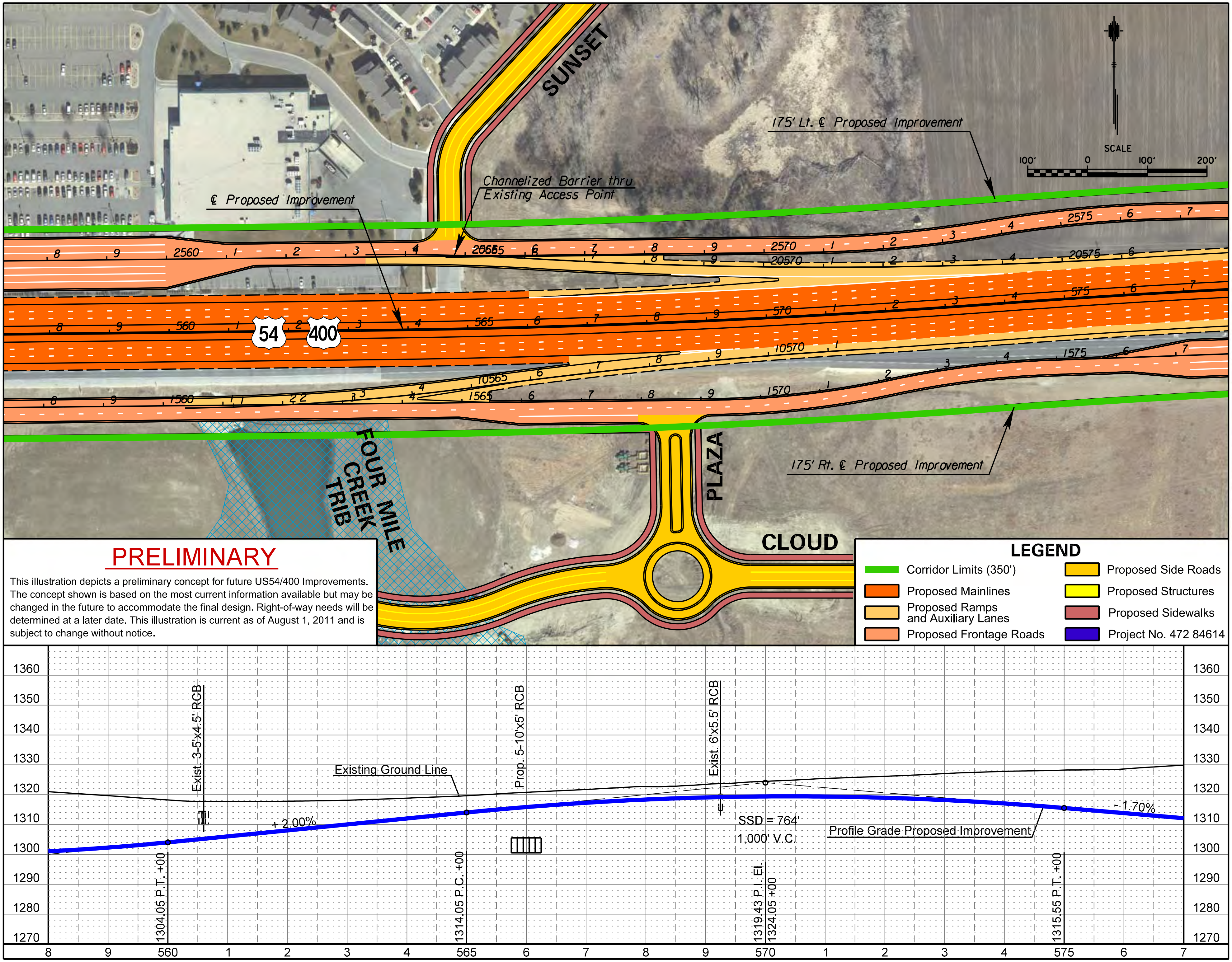

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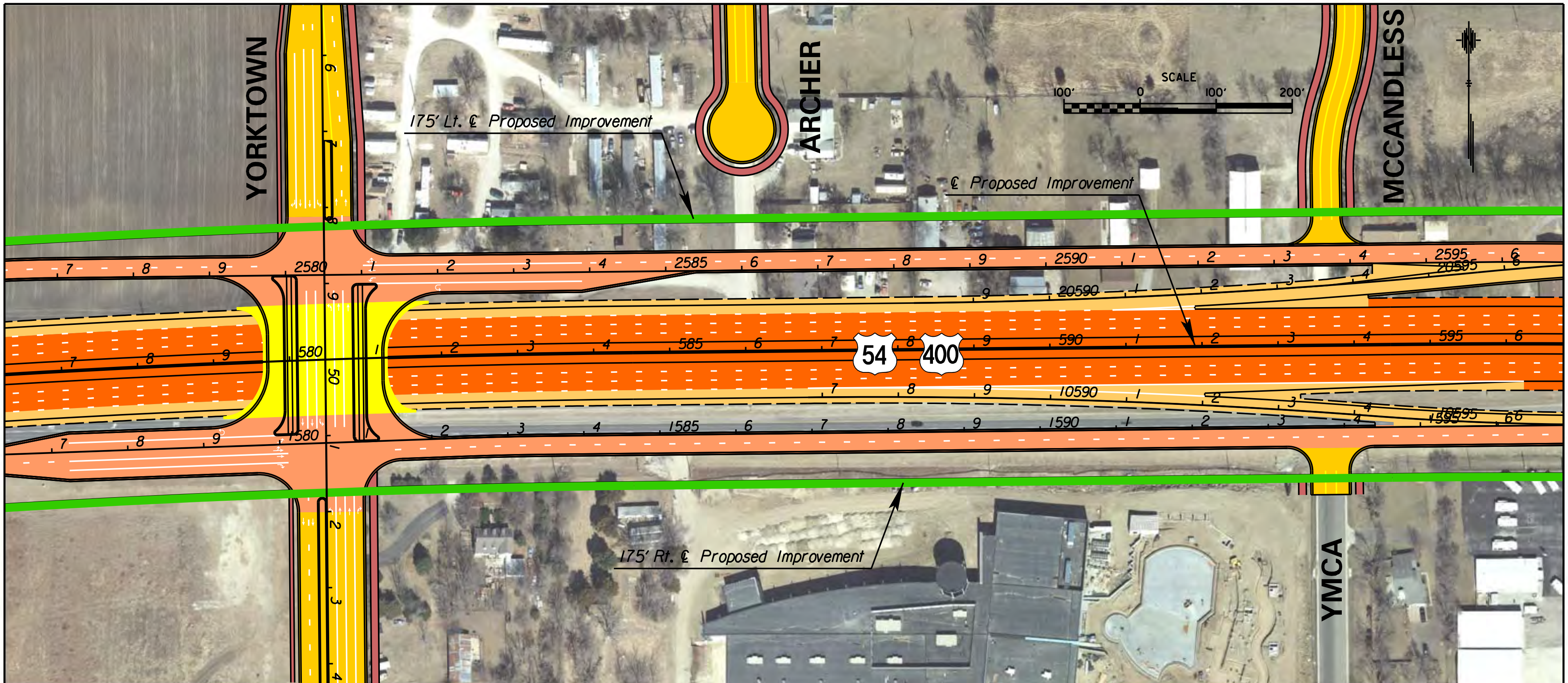

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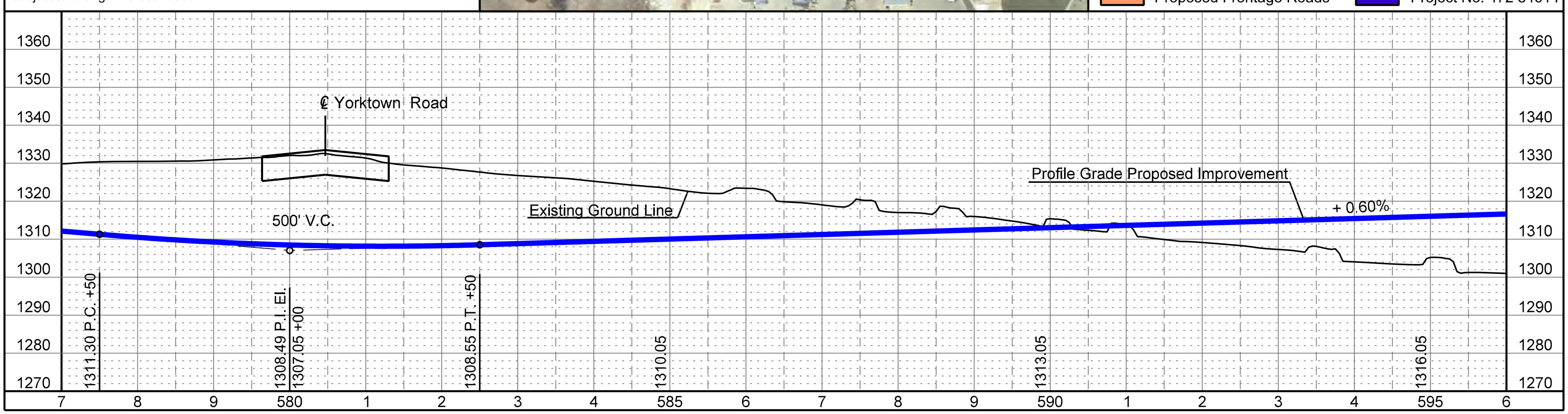
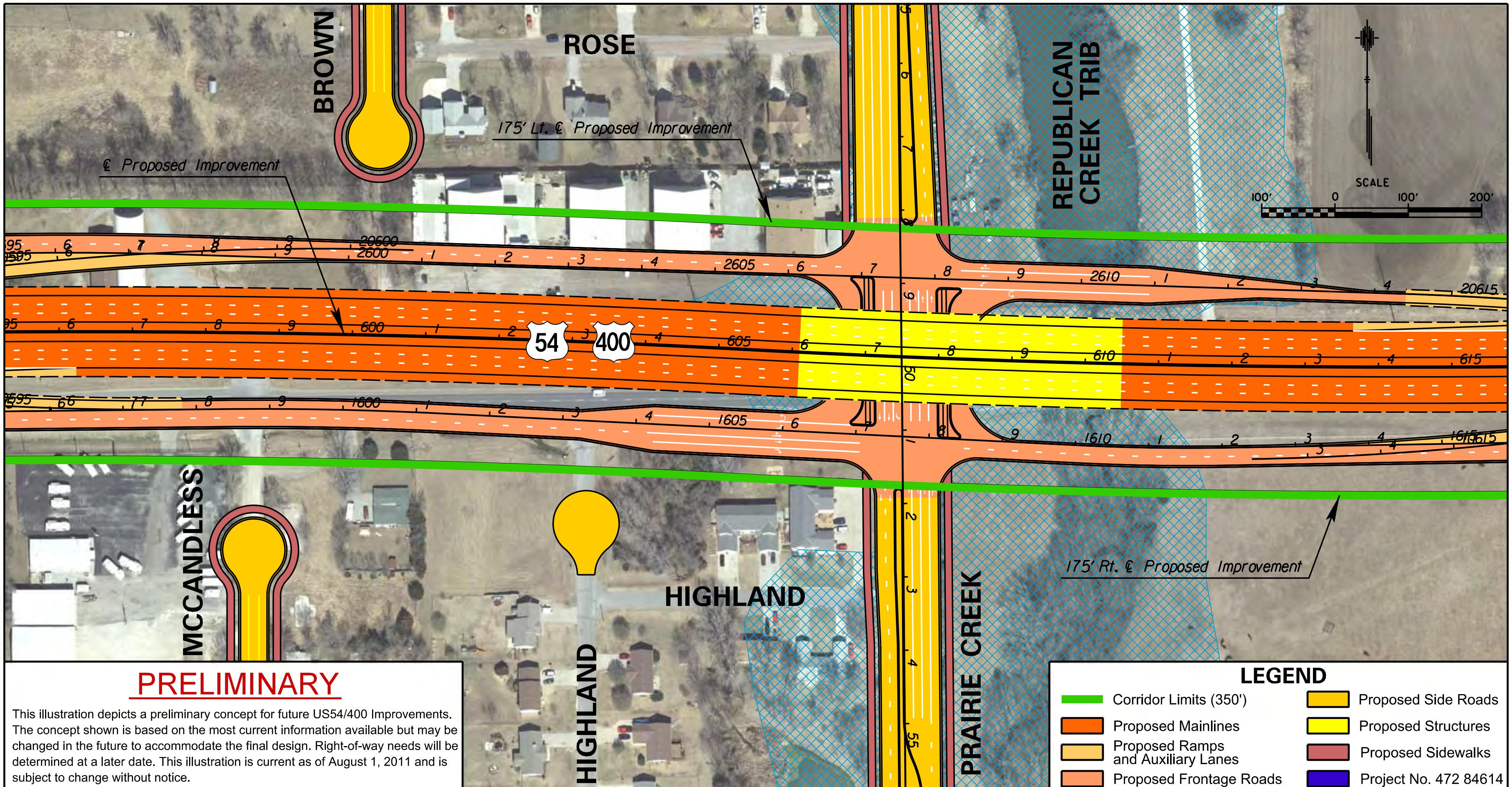
- Proposed Sidewalks
- Project No. 472 84614





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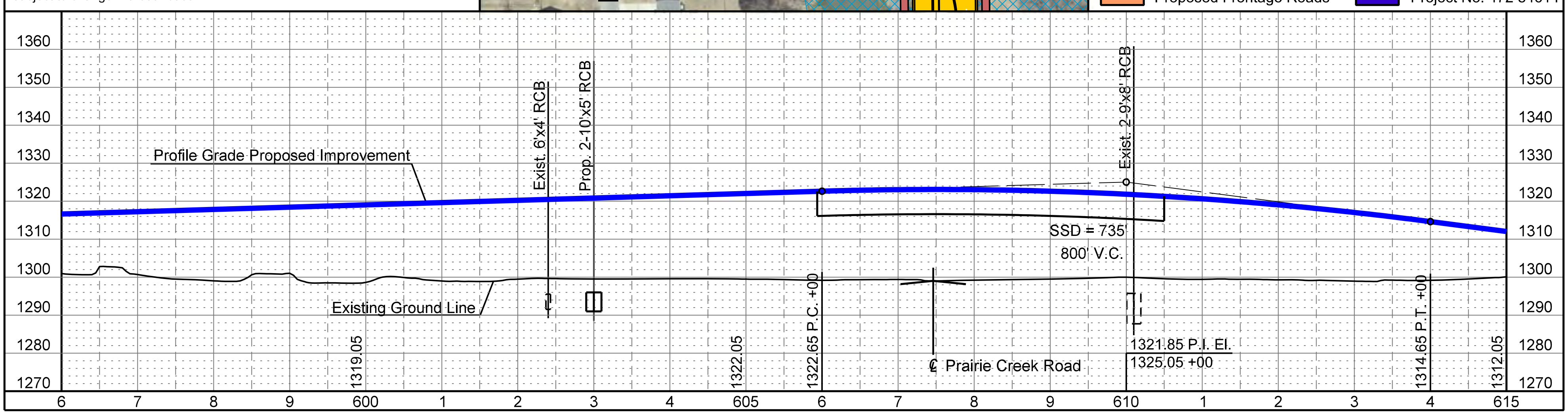

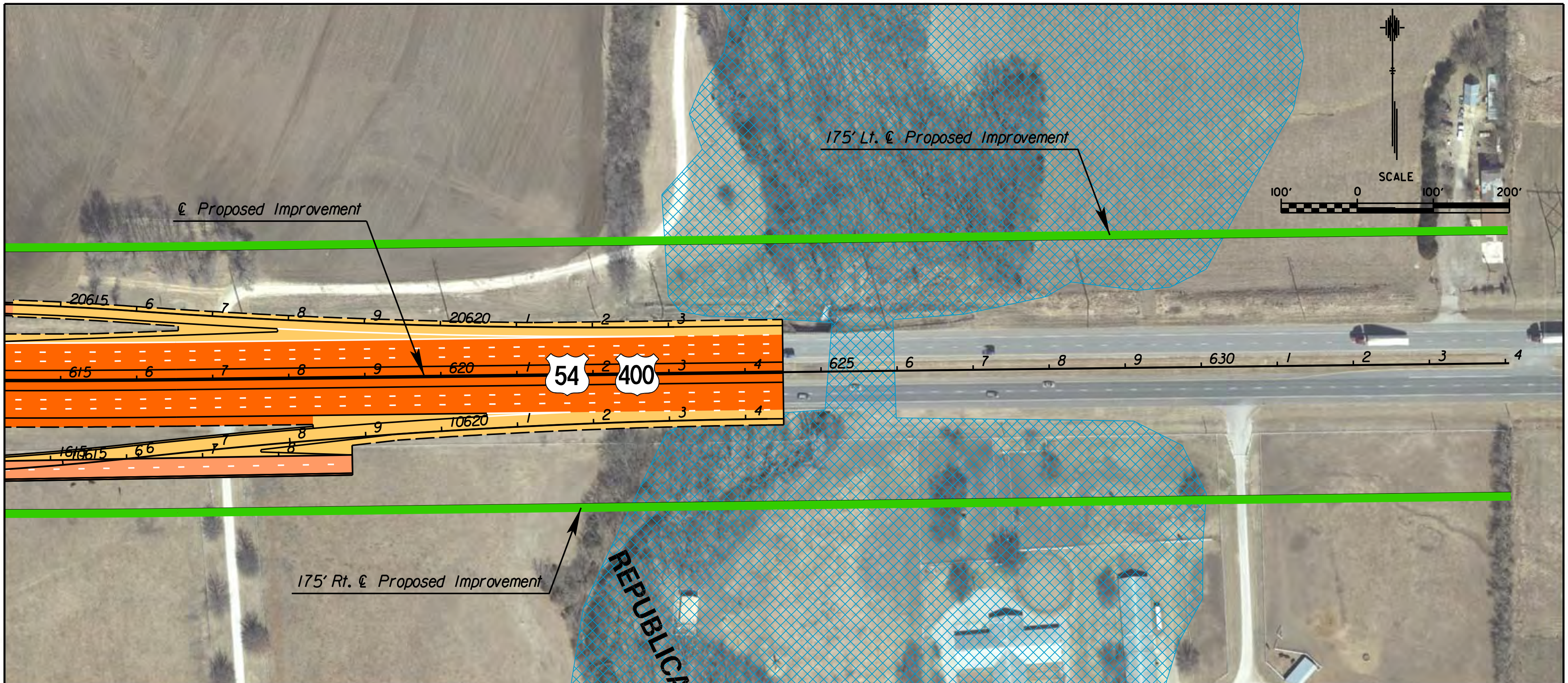

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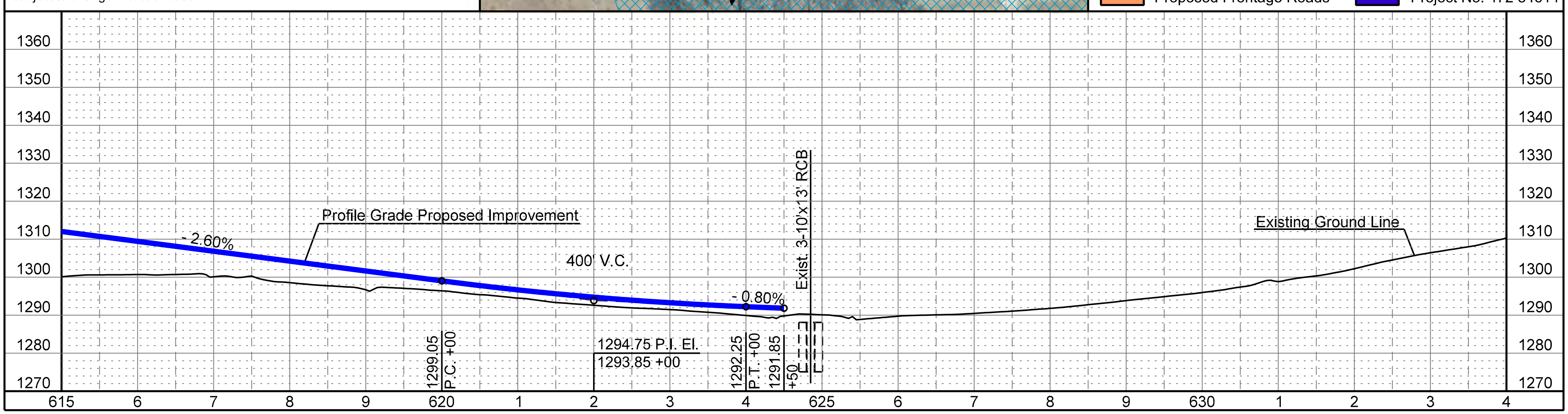

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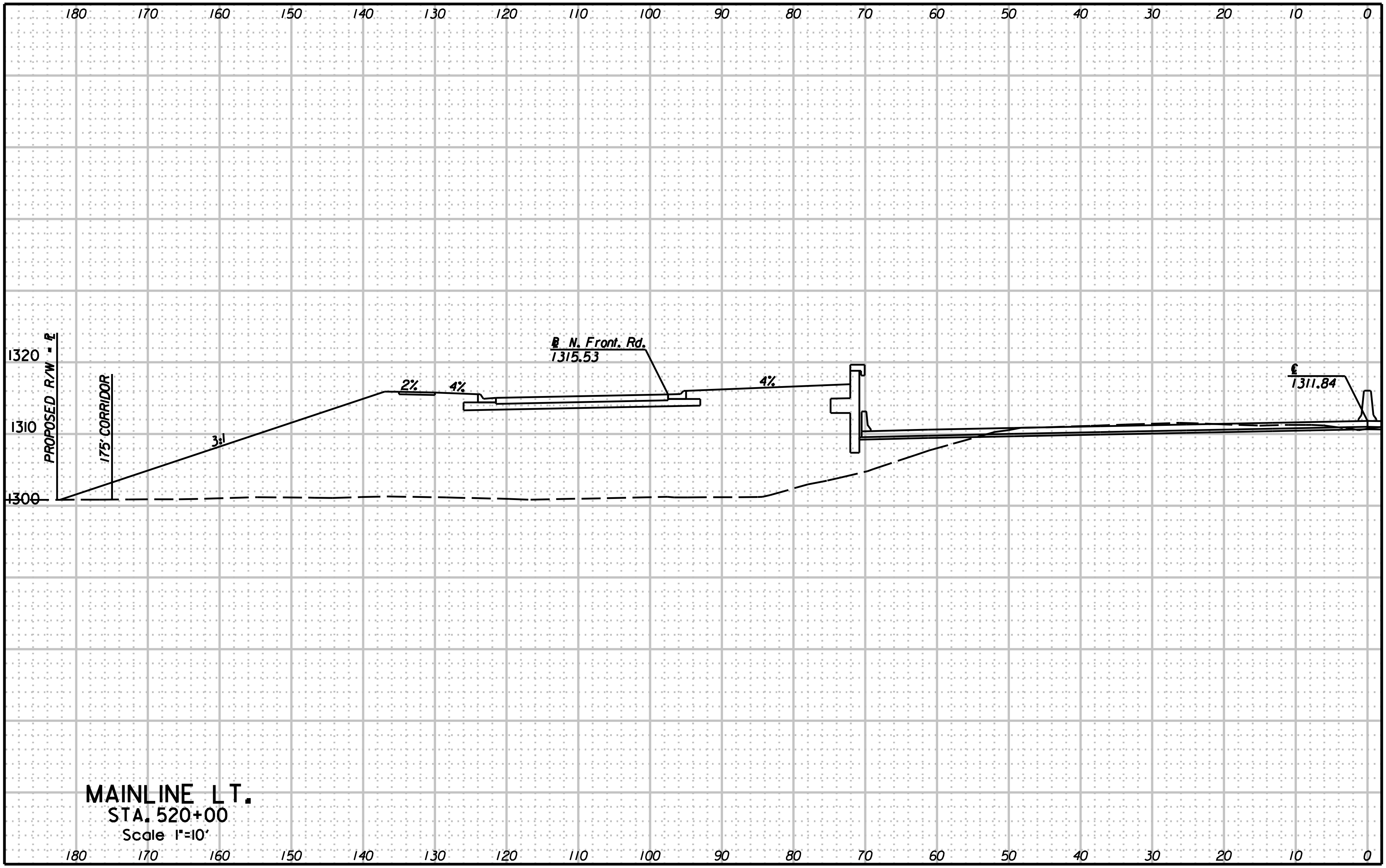
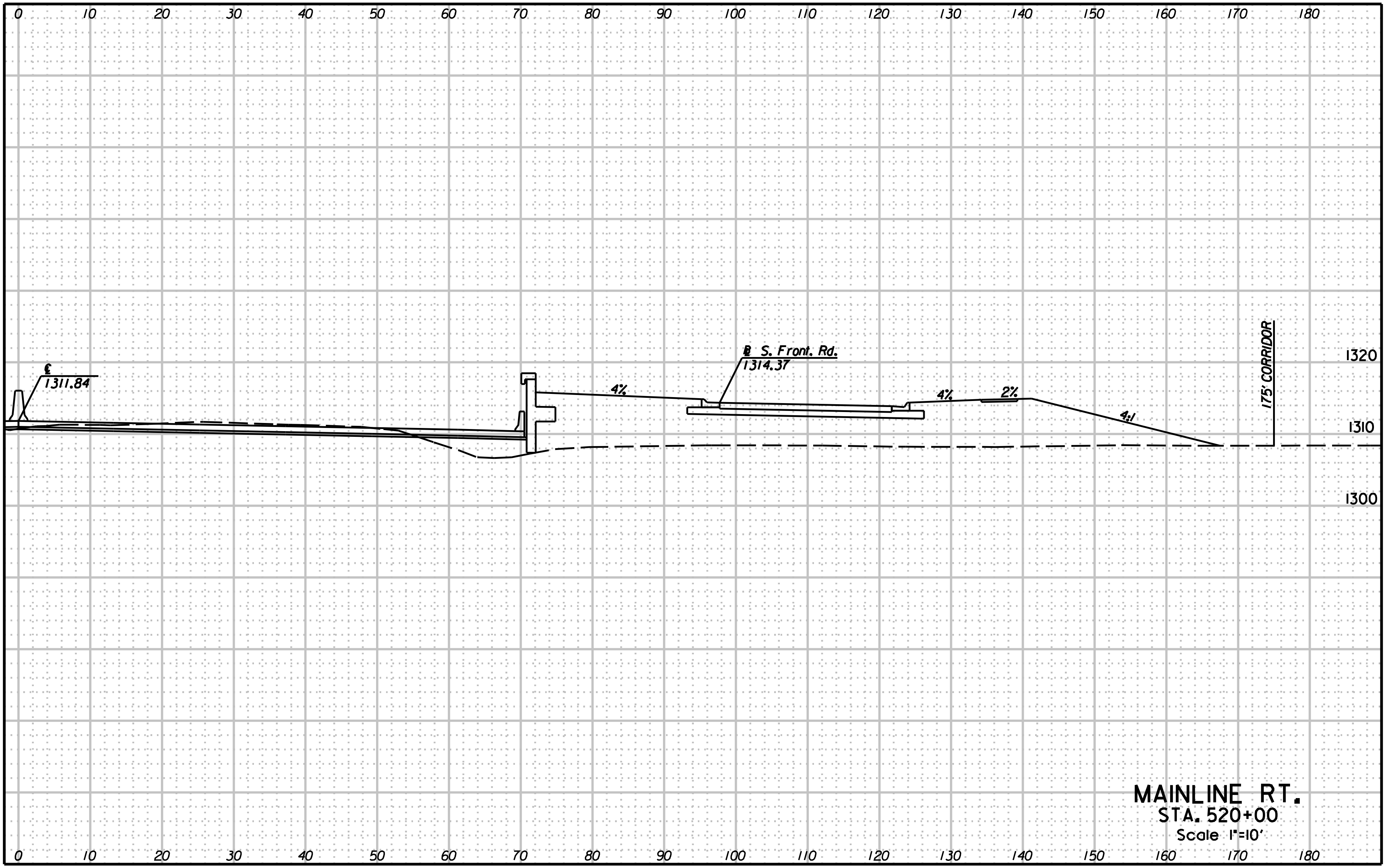
Cross-Sections

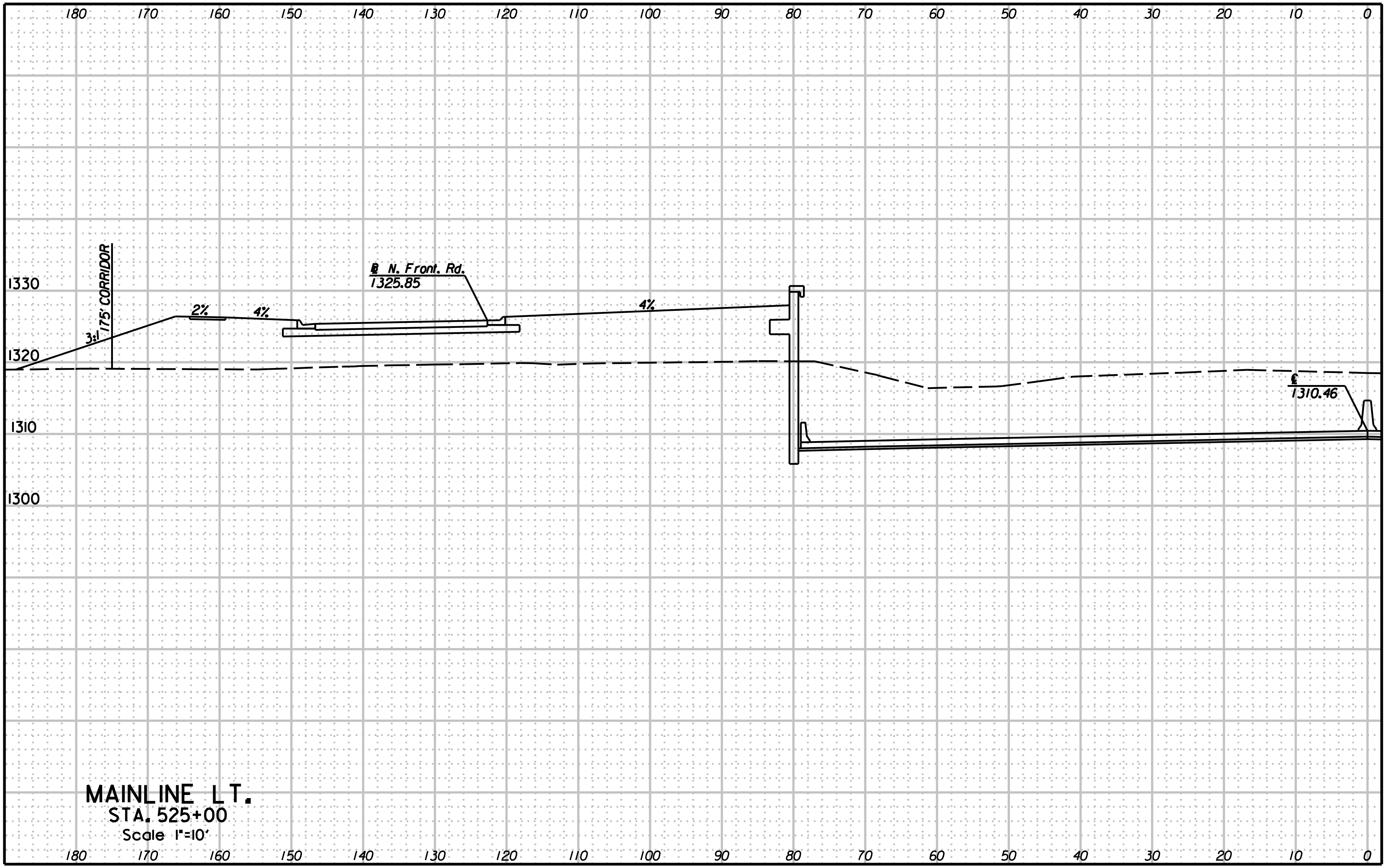
Note: Where construction limits extend outside the proposed 175’ Corridor north and south as depicted on the enclosed sections, it is anticipated that temporary and/or permanent easements will be acquired to facilitate construction.

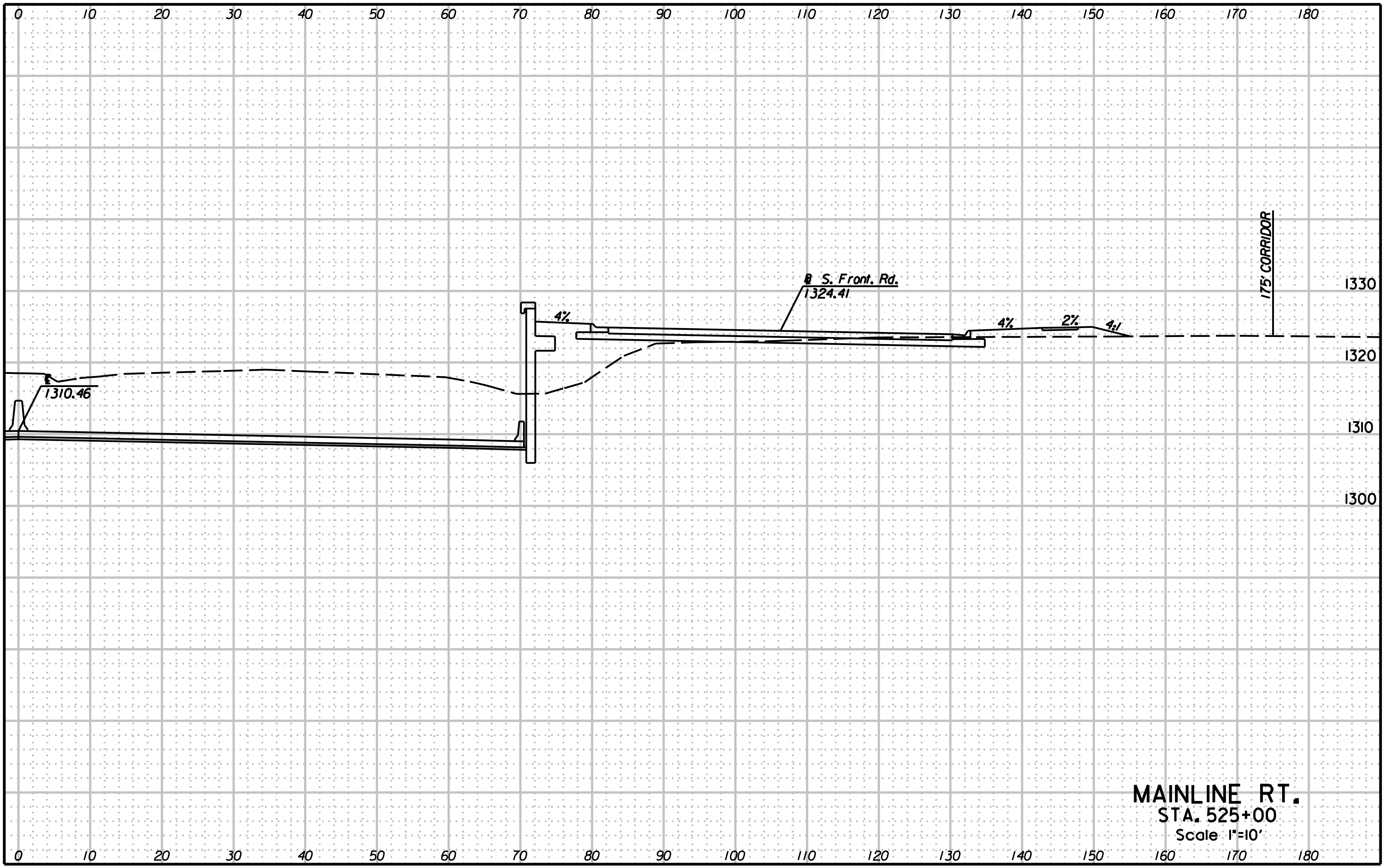


180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1320
1310
1300
PROPOSED R/W = ℄
175' CORRIDOR
3:1
2%
4%
℄ N. Front. Rd.
1315.53
4%
℄
1311.84
MAINLINE LT.
STA. 520+00
Scale 1"=10'

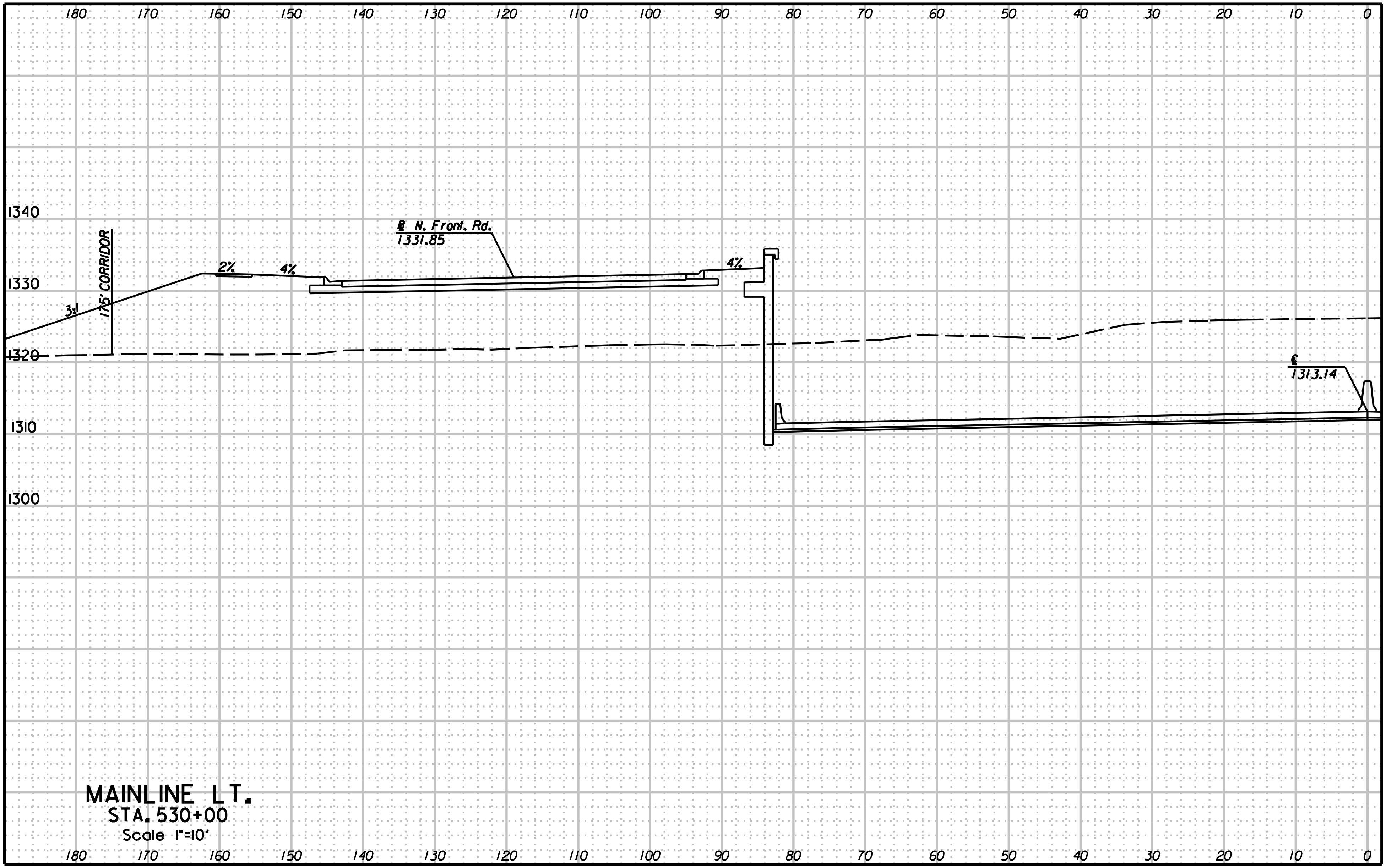


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
℄
1311.84
4%
℄ S. Front. Rd.
1314.37
4%
2%
4:1
175' CORRIDOR
1320
1310
1300
MAINLINE RT.
STA. 520+00
Scale 1"=10'

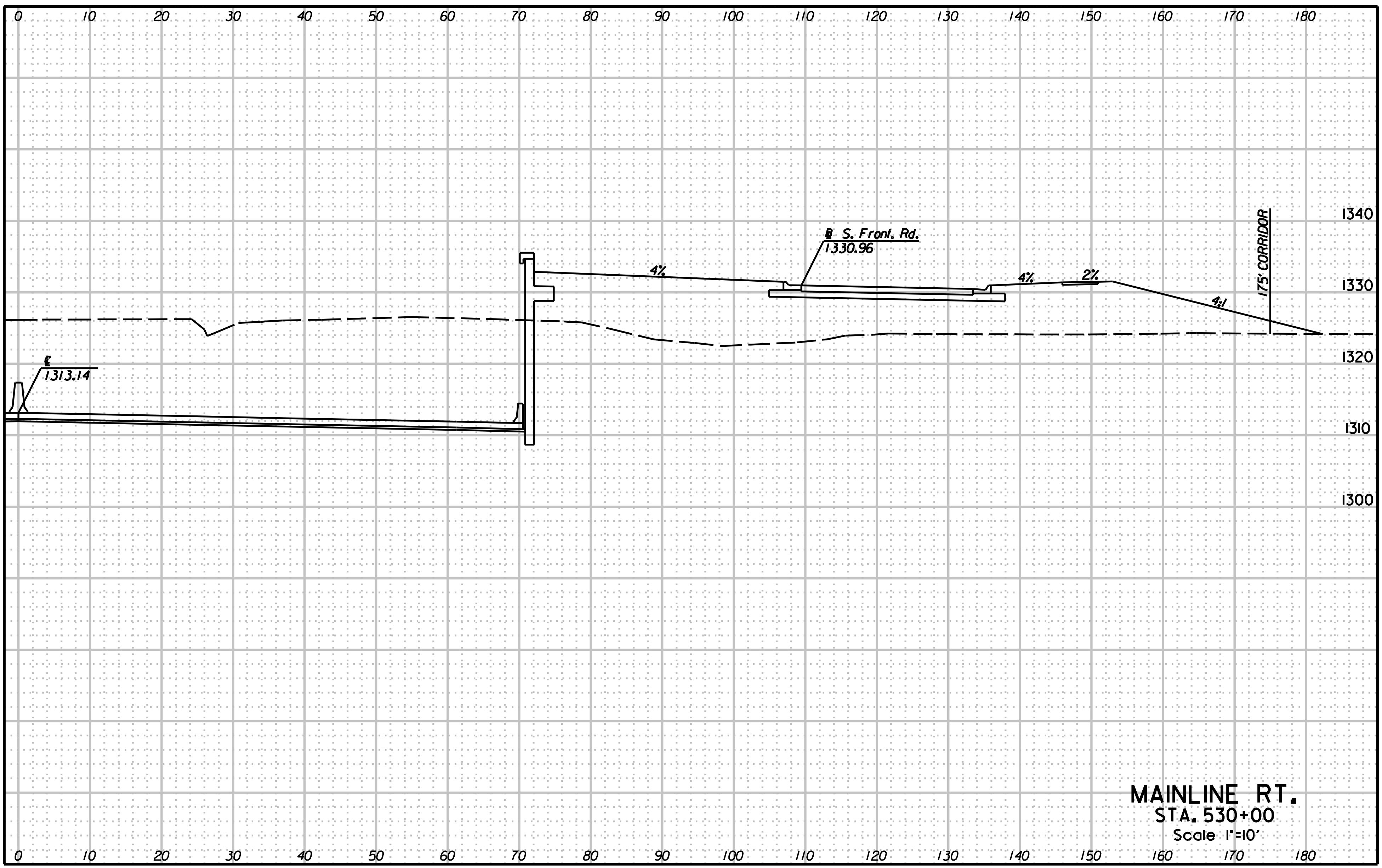

180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
1330
1320
1310
1300
175' CORRIDOR
3:1
2%
4%
℄ N. Front. Rd.
1325.85
4%
℄
1310.46
MAINLINE LT.
STA. 525+00
Scale 1"=10'



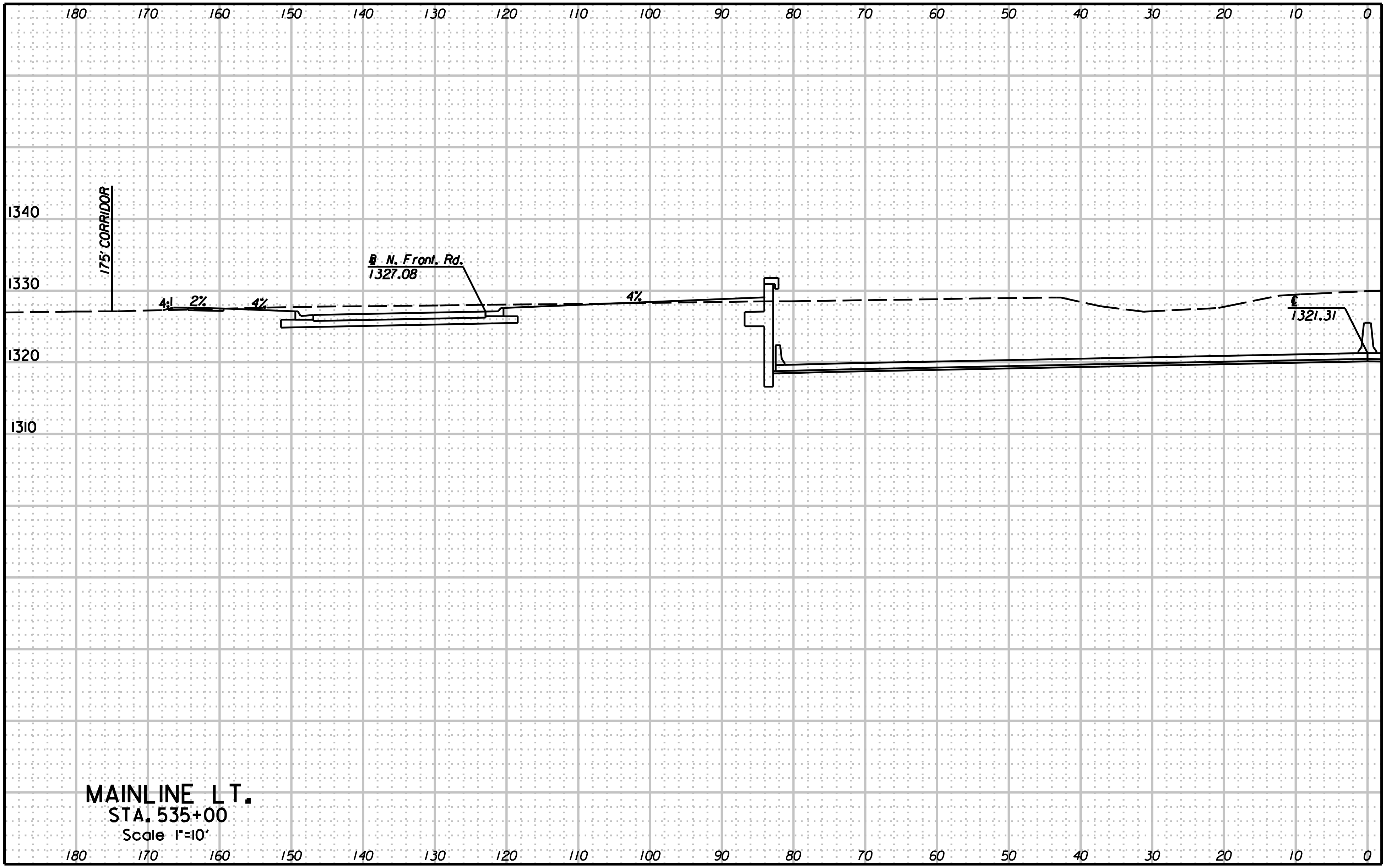
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
℄ S. Front. Rd.
1324.41
175' CORRIDOR
1330
1320
1310
1300
4%
4%
2%
4:1
℄
1310.46
MAINLINE RT.
STA. 525+00
Scale 1"=10'



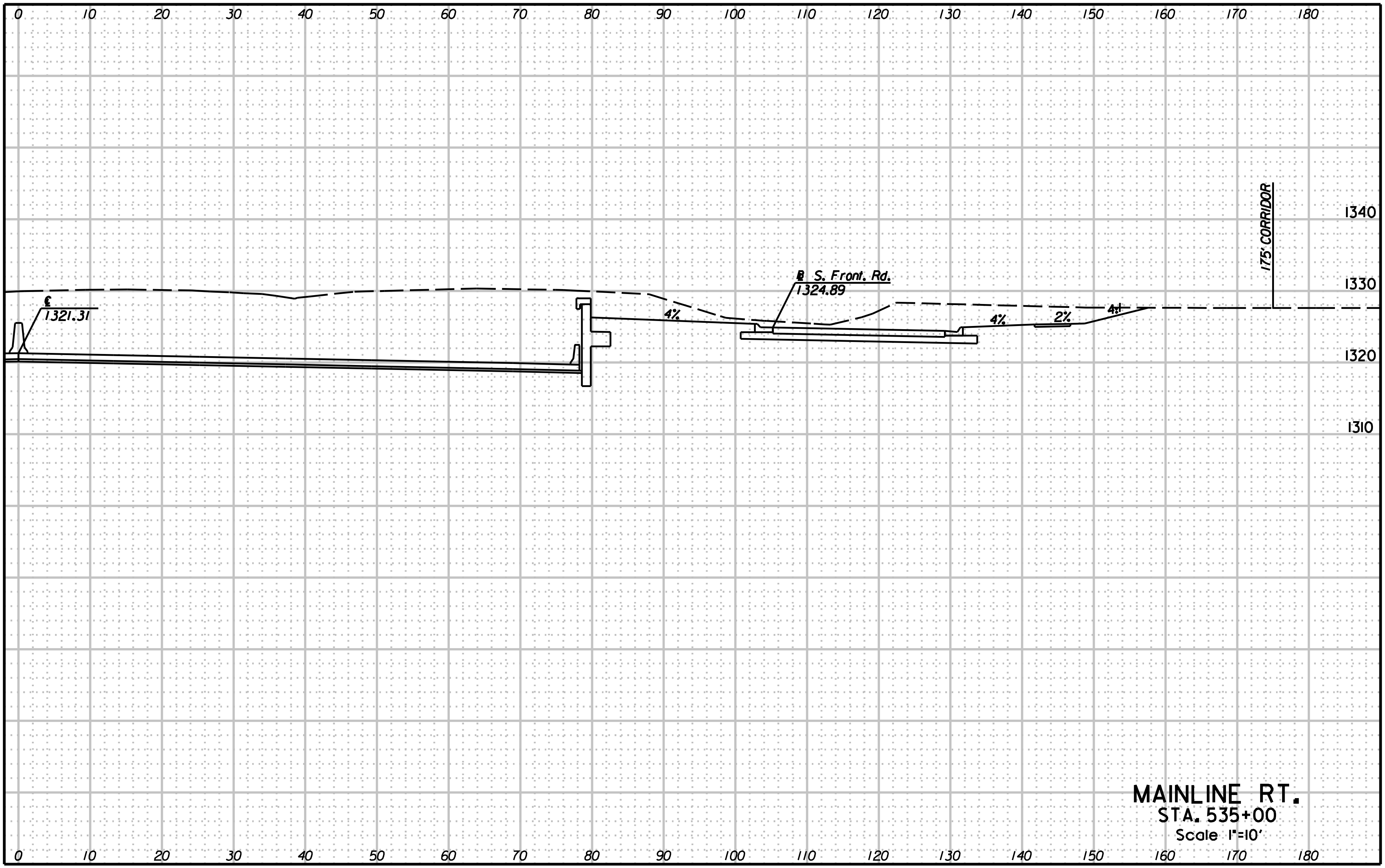
MAINLINE LT.
STA. 530+00
Scale 1"=10'



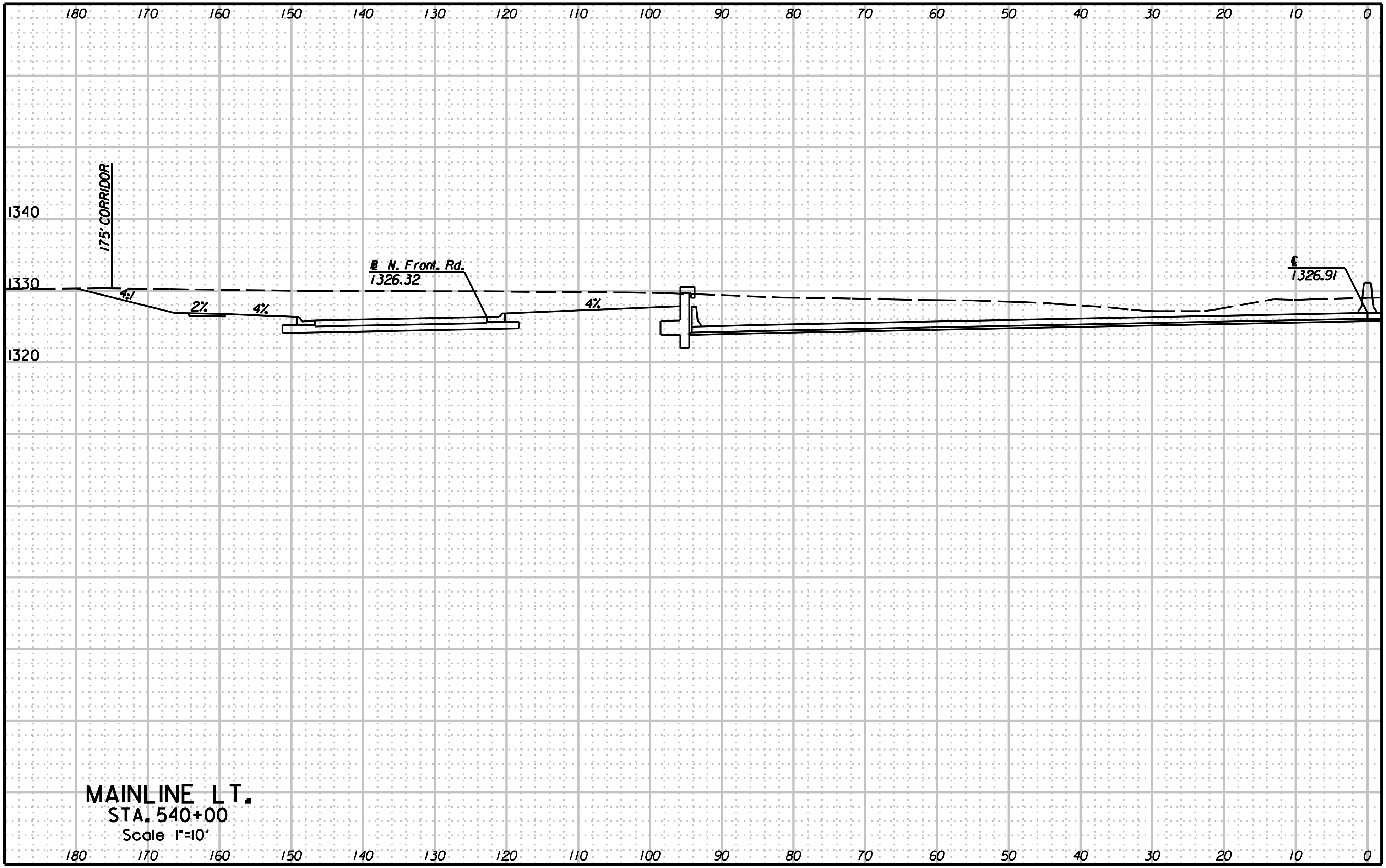
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
1340
1330
1320
1310
1300
℄ S. Front. Rd.
1330.96
4%
4%
2%
4:1
175' CORRIDOR
℄
1313.14
MAINLINE RT.
STA. 530+00
Scale 1"=10'

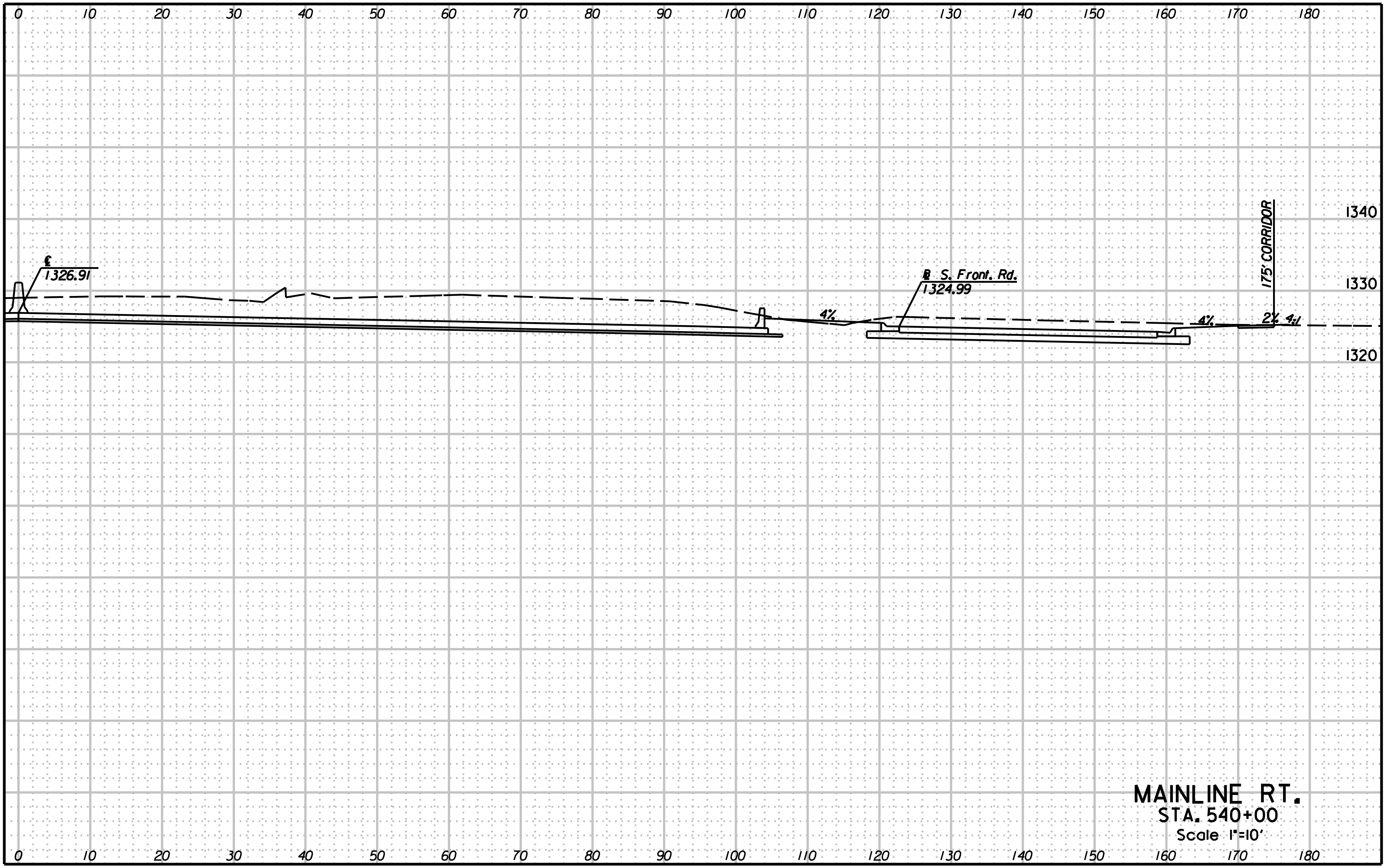


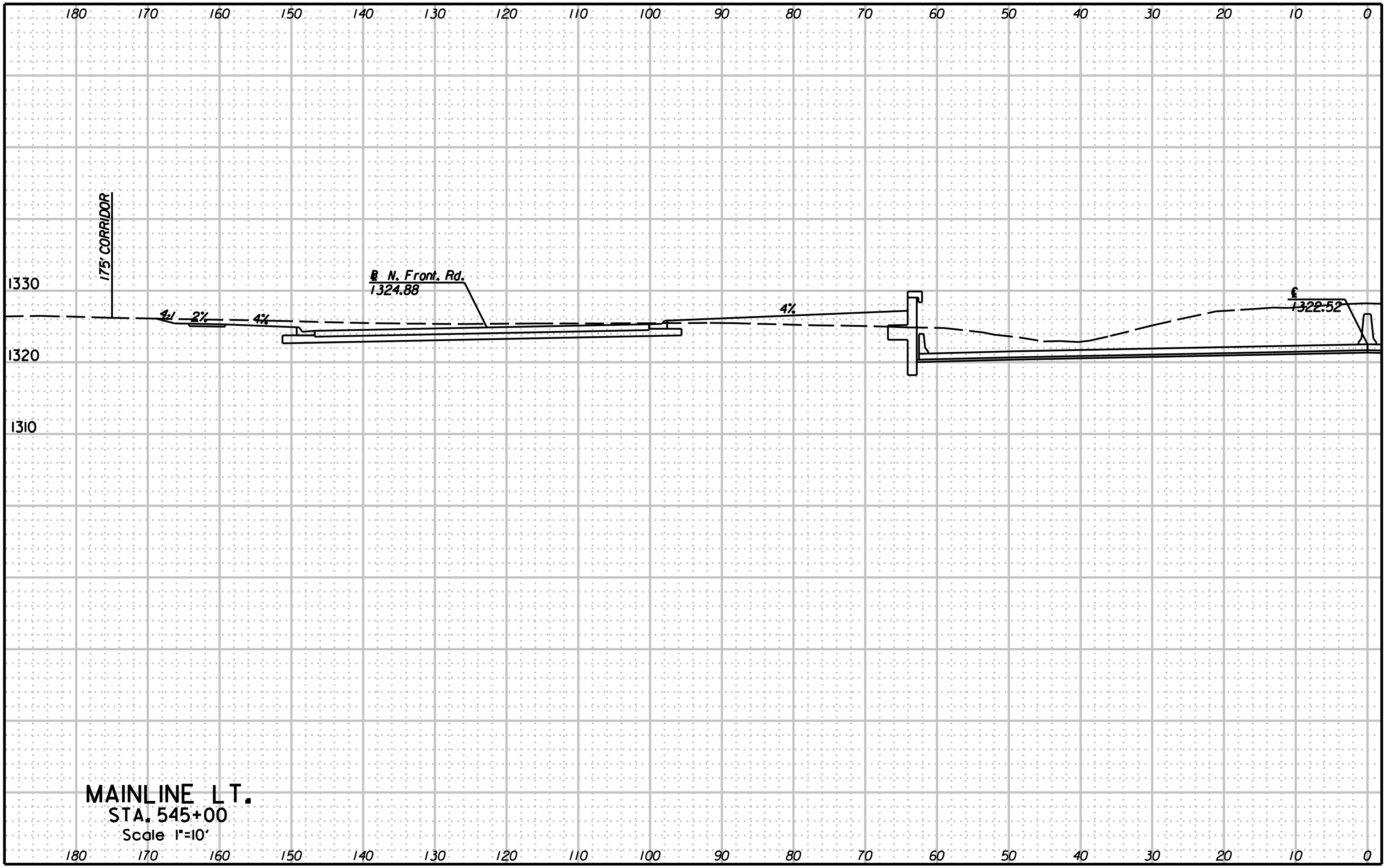
MAINLINE LT.
STA. 535+00
Scale 1"=10'

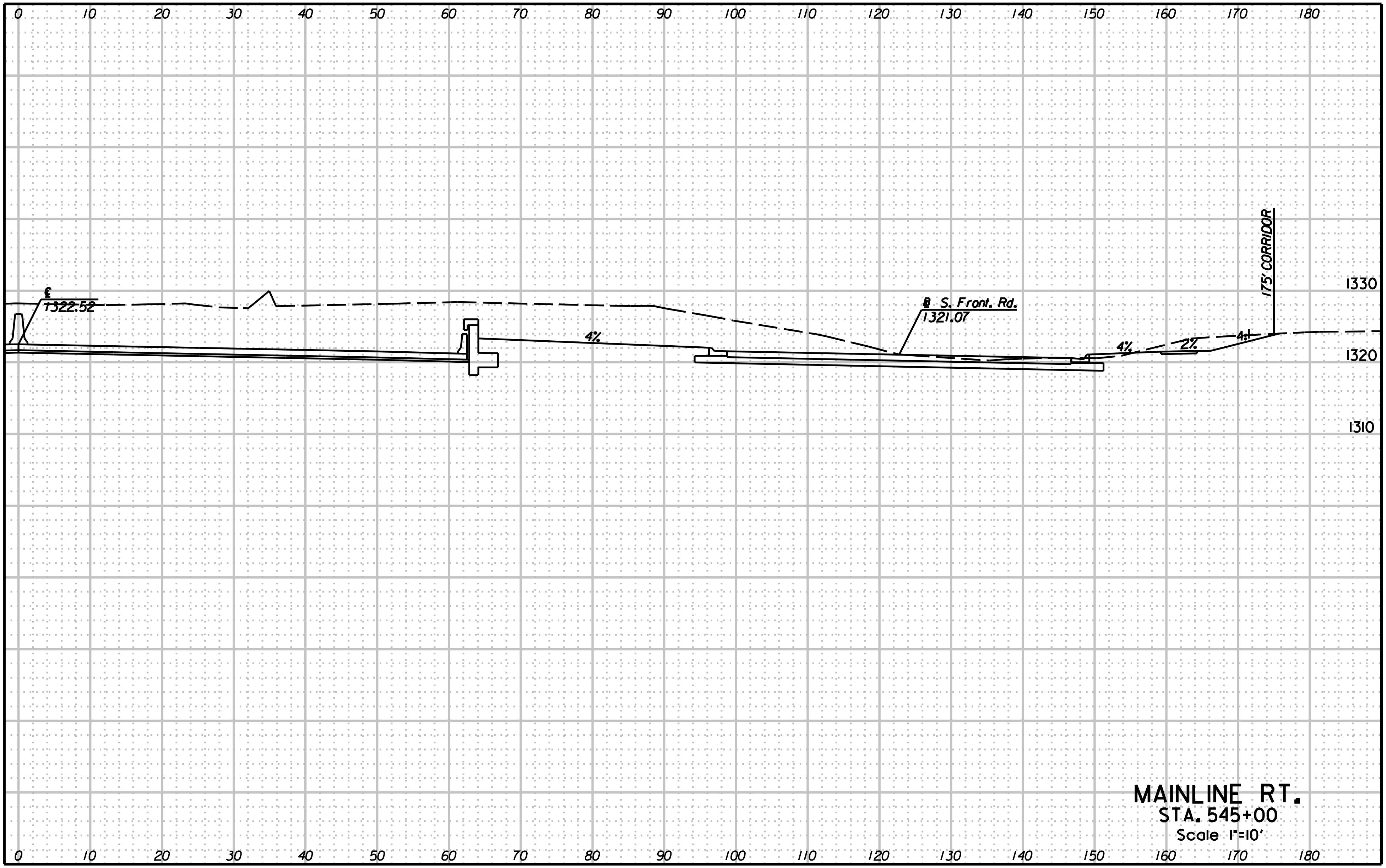


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
1340
1330
1320
1310
175' CORRIDOR
℄ S. Front. Rd.
1324.89
℄
1321.31
4%
4%
2%
4:1
MAINLINE RT.
STA. 535+00
Scale 1"=10'

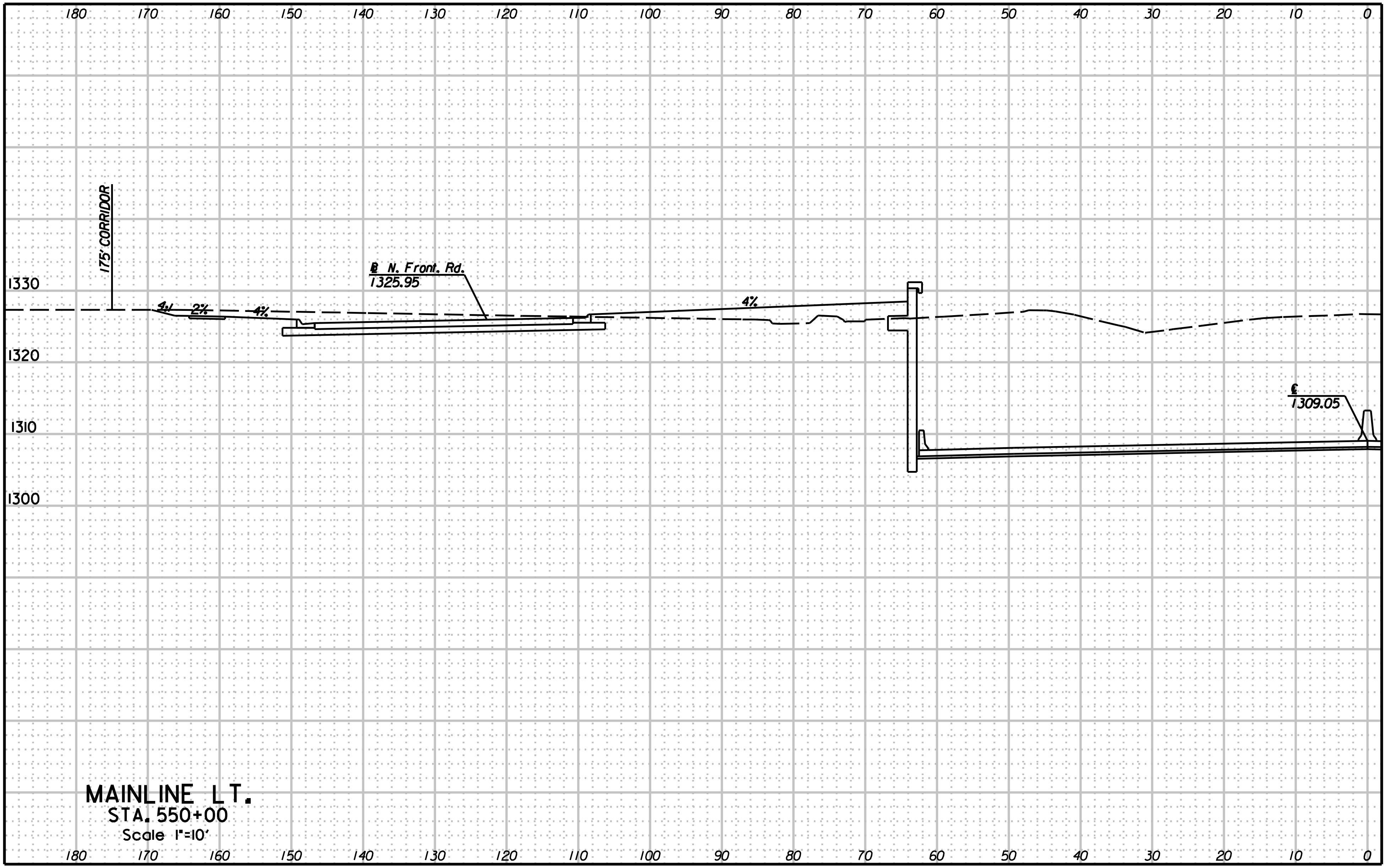

180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
1340
1330
1320
175' CORRIDOR
4:1
2%
4%
℄ N. Front. Rd.
1326.32
4%
℄
1326.91
MAINLINE LT.
STA. 540+00
Scale 1"=10'


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
℄
1326.91
℄ S. Front. Rd.
1324.99
175' CORRIDOR
4%
4%
2% 4:1
1340
1330
1320
MAINLINE RT.
STA. 540+00
Scale 1"=10'

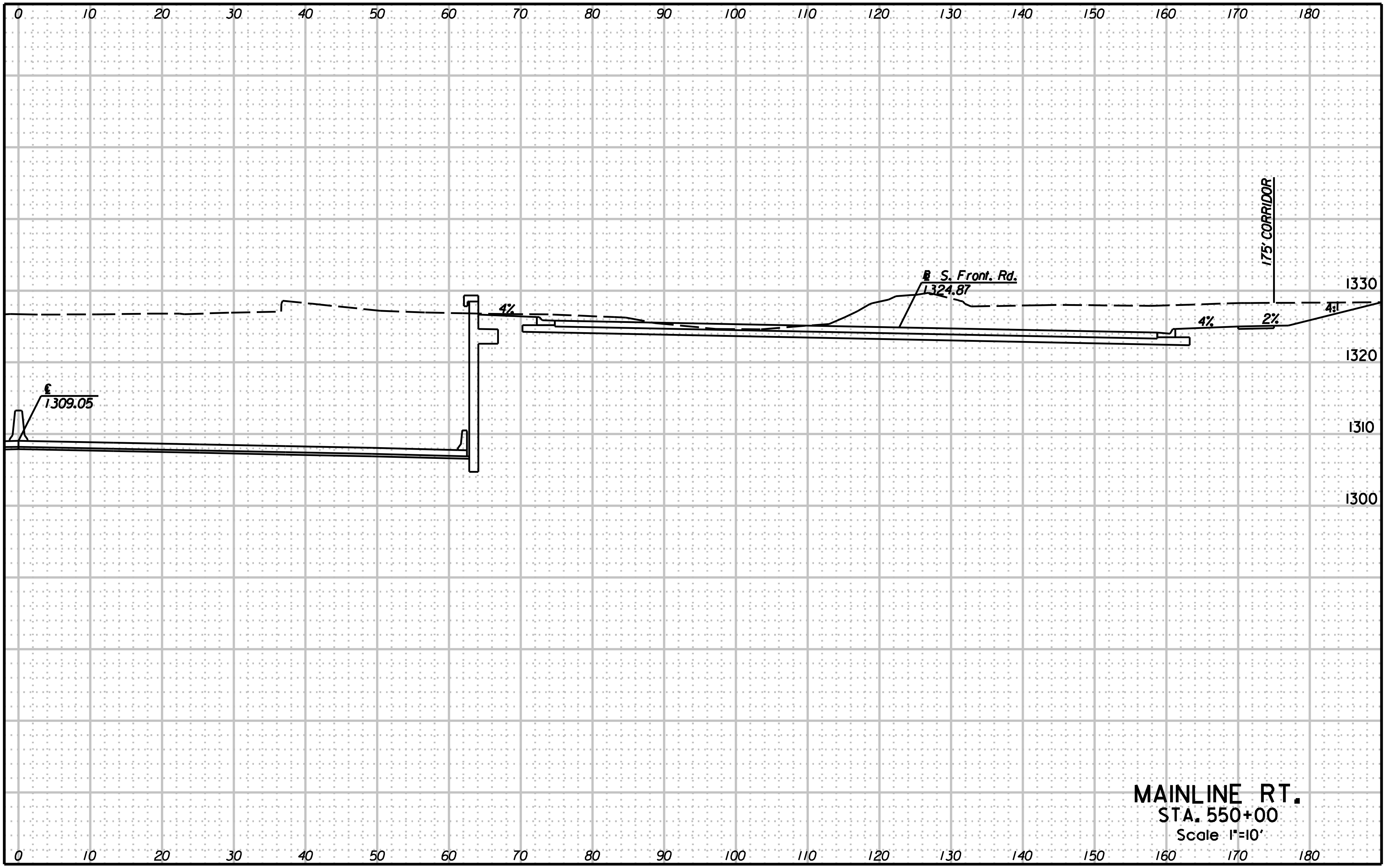

180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
1330
1320
1310
175' CORRIDOR
℄ N. Front. Rd.
1324.88
4:1
2%
4%
4%
℄
1322.52
MAINLINE LT.
STA. 545+00
Scale 1"=10'



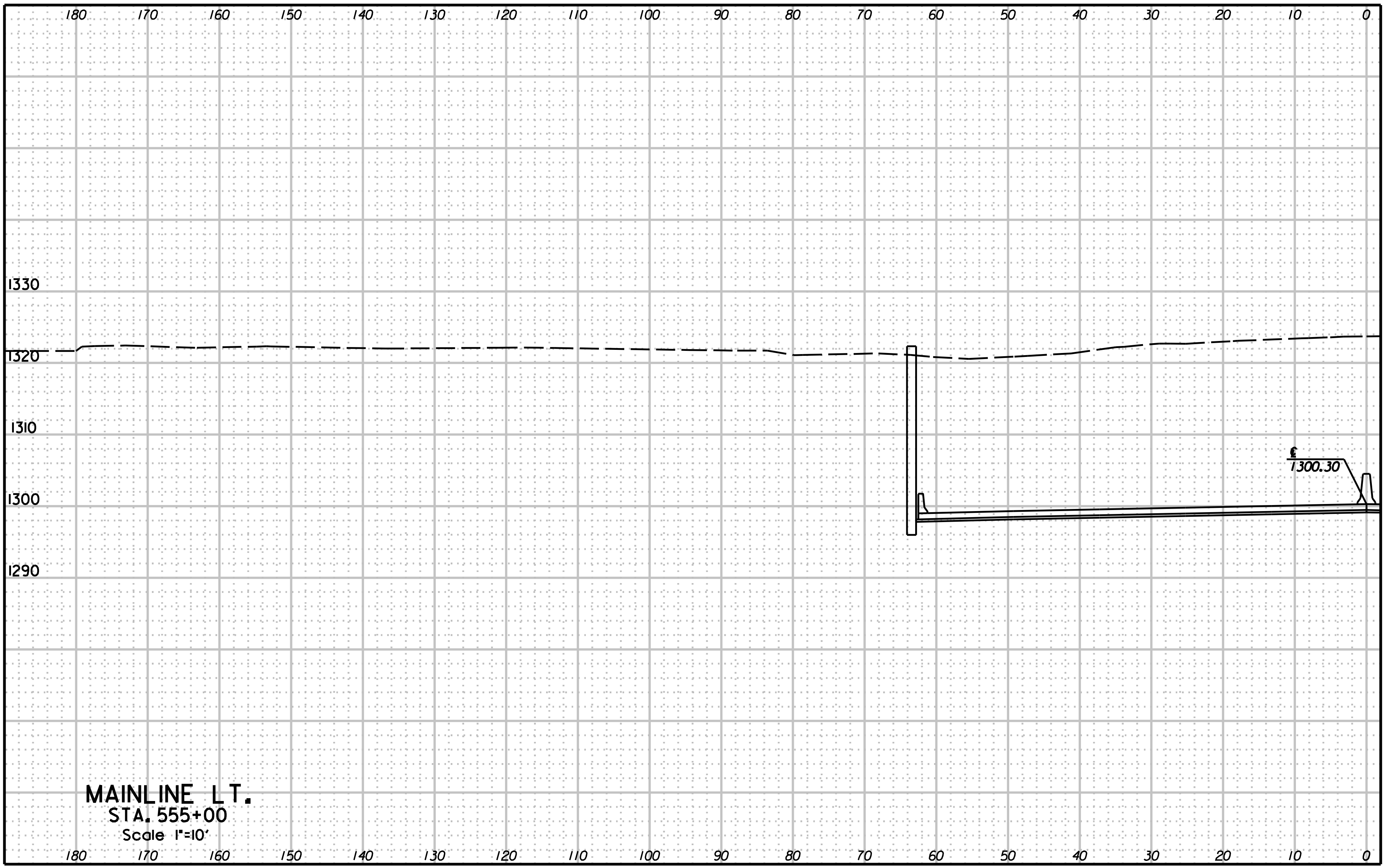
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
℄
1322.52
4%
℄ S. Front. Rd.
1321.07
175' CORRIDOR
4%
2%
4:1
1330
1320
1310
MAINLINE RT.
STA. 545+00
Scale 1"=10'



180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
175' CORRIDOR
℄ N. Front. Rd.
1325.95
1330
1320
1310
1300
4:1
2%
4%
4%
℄
1309.05
MAINLINE LT.
STA. 550+00
Scale 1"=10'



0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
175' CORRIDOR
℄ S. Front. Rd.
1324.87
1330
4%
4%
2%
4:1
1320
℄
1309.05
1310
1300
MAINLINE RT.
STA. 550+00
Scale 1"=10'
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180



180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
1330
1320
1310
1300
1290
℄
1300.30
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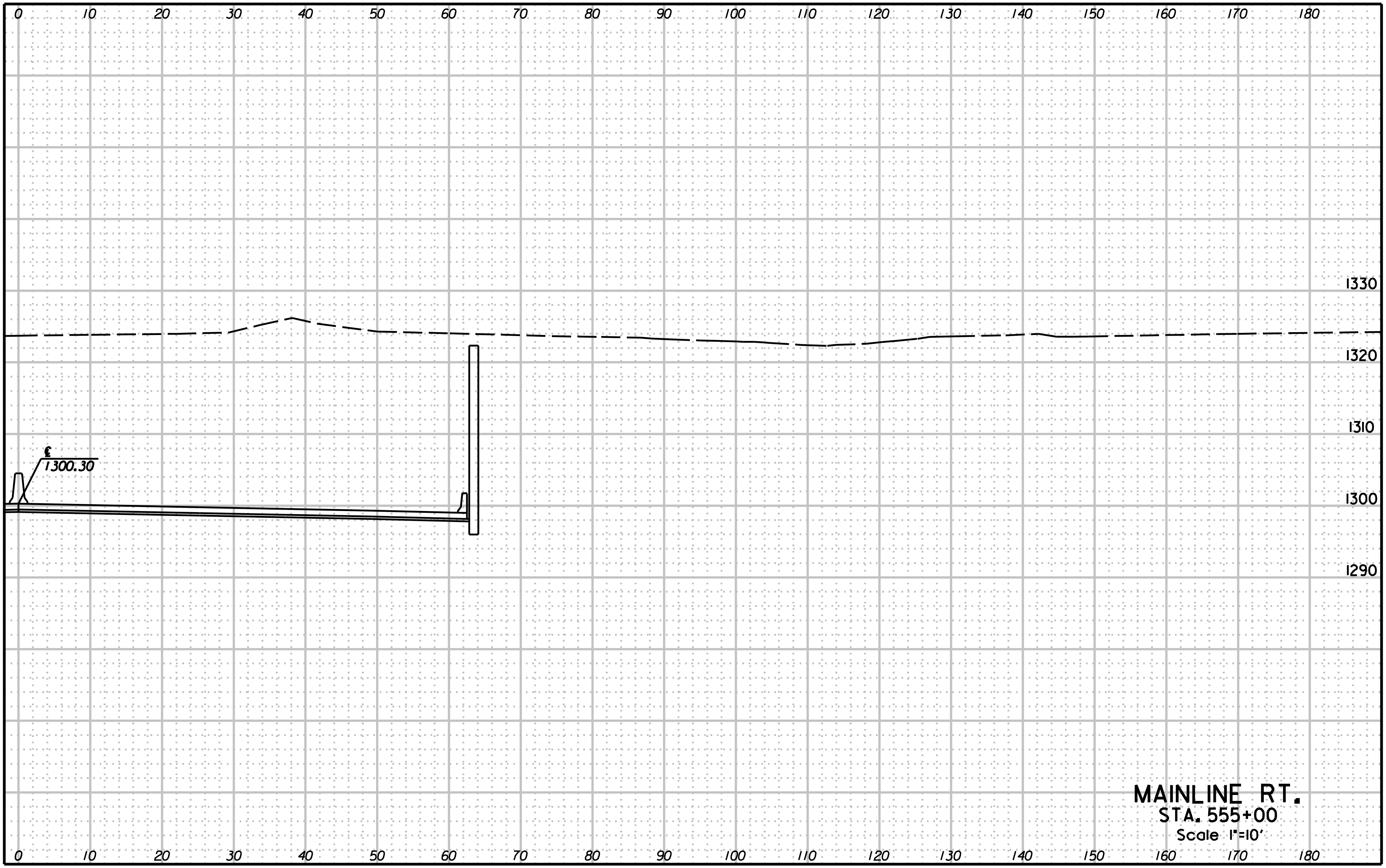
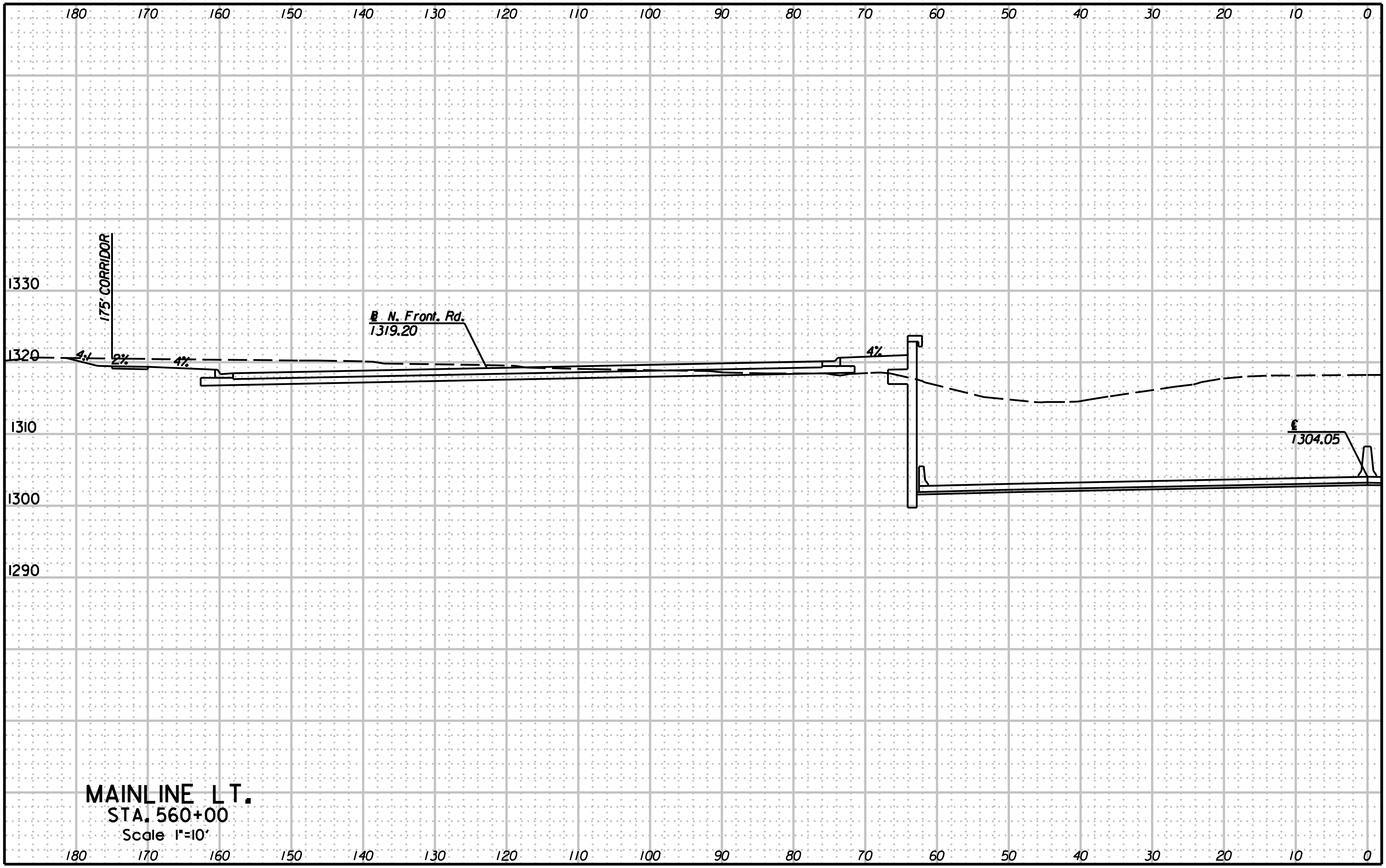
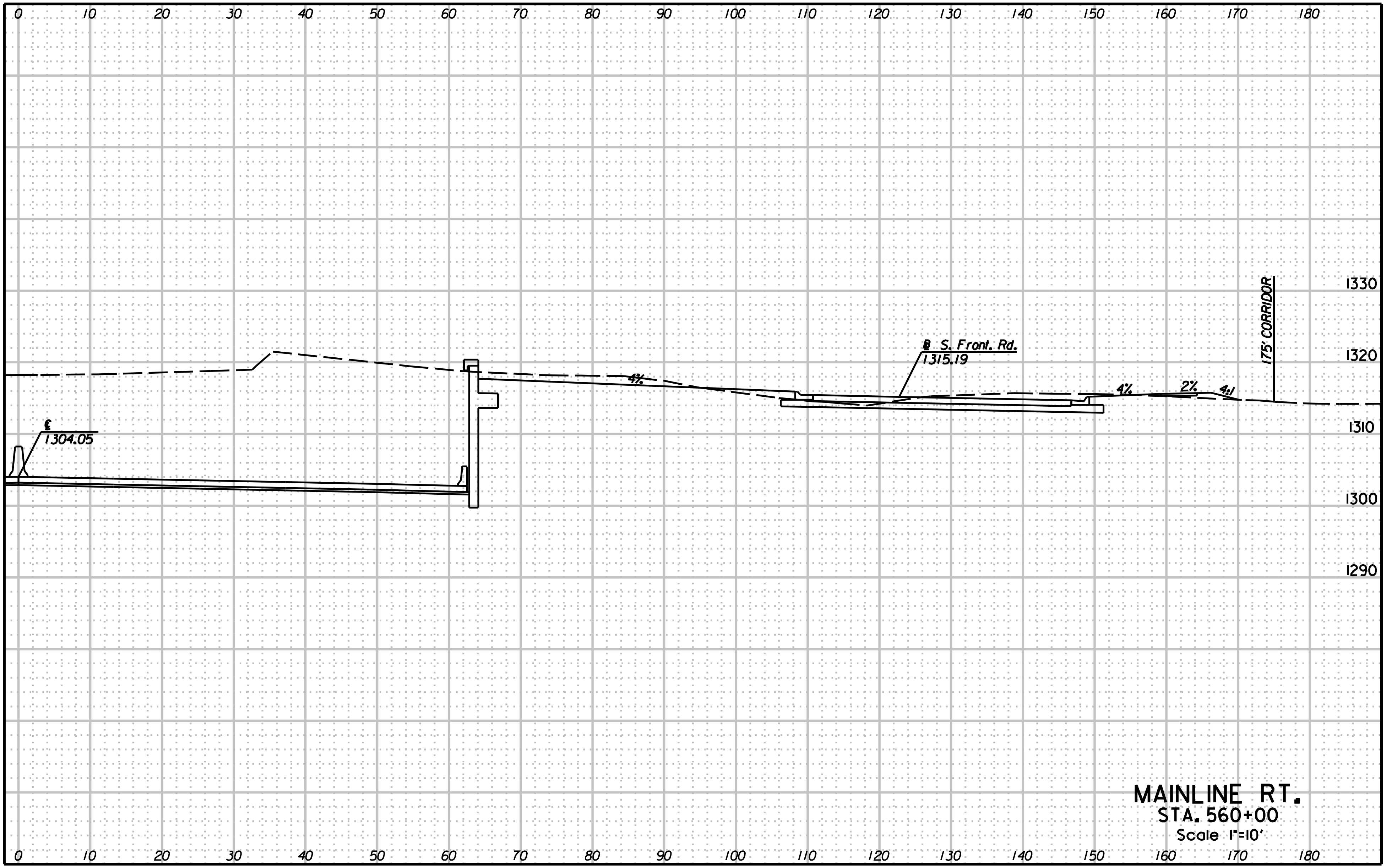
STA. 555+00
Scale 1"=10'

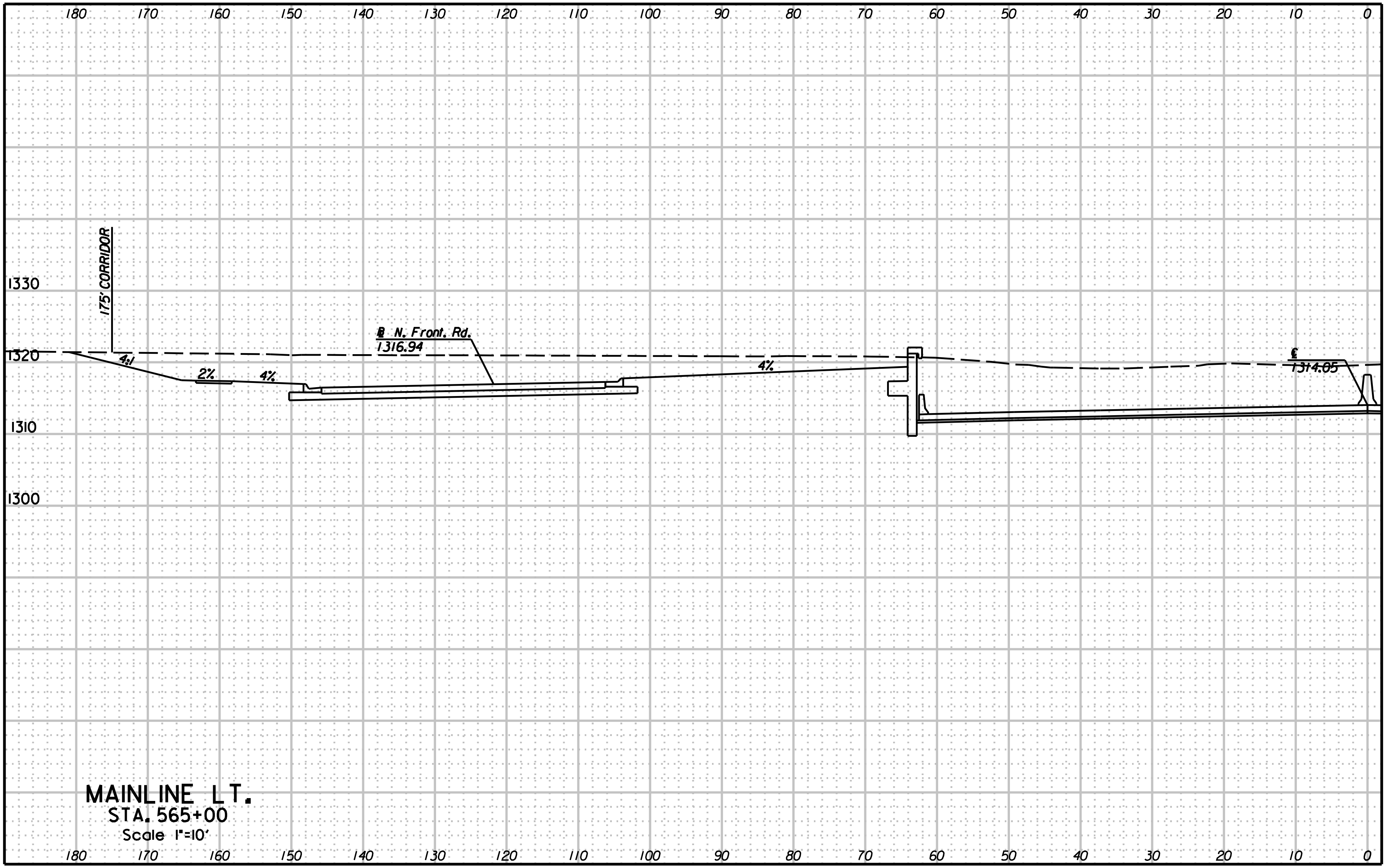


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
1330
1320
1310
1300
1290
℄
1300.30
MAINLINE RT.
STA. 555+00
Scale 1"=10'

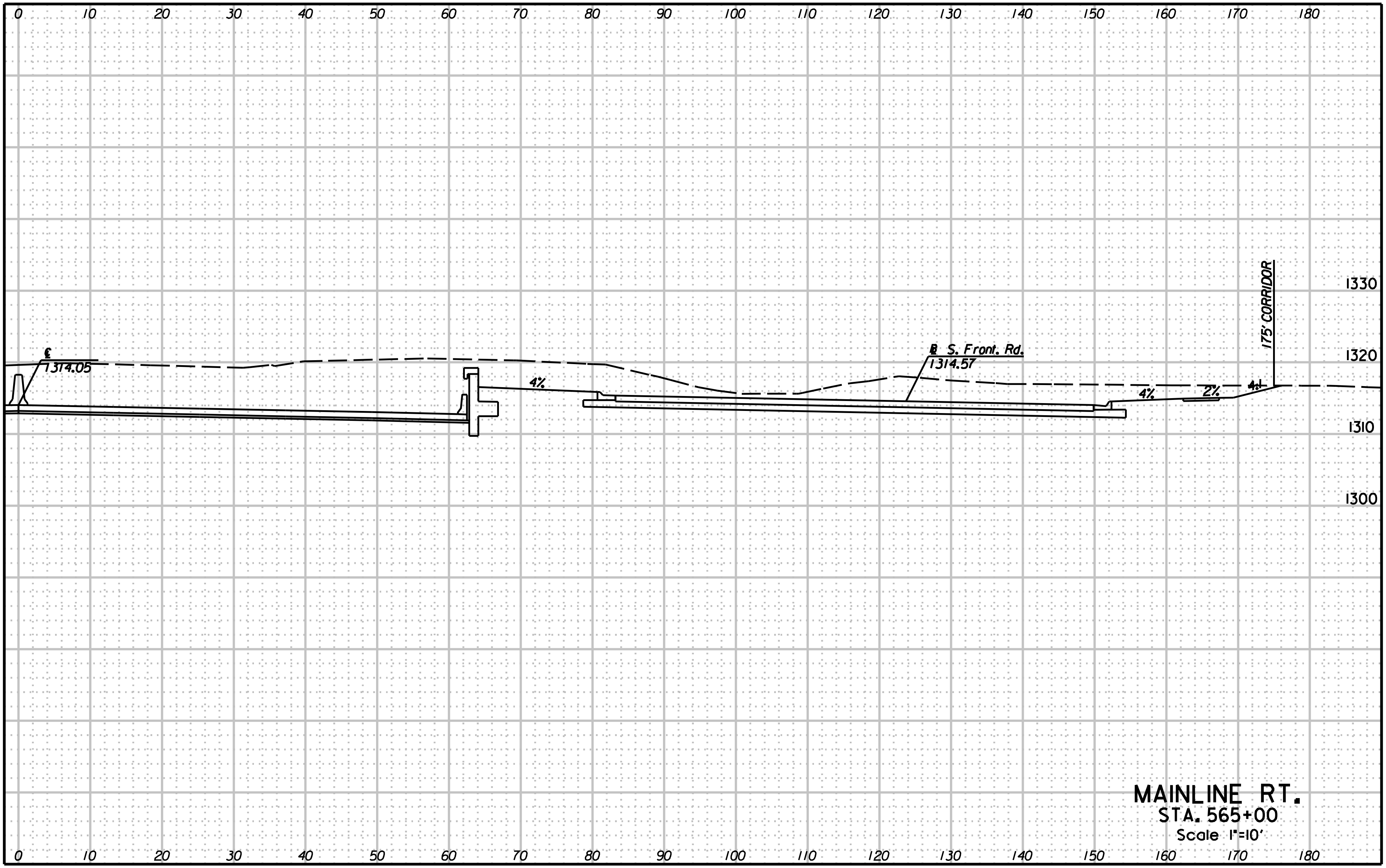

180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
1330
1320
1310
1300
1290
175' CORRIDOR
℄ N. Front. Rd.
1319.20
4:1
2%
4%
4%
℄
1304.05
MAINLINE LT.
STA. 560+00
Scale 1"=10'



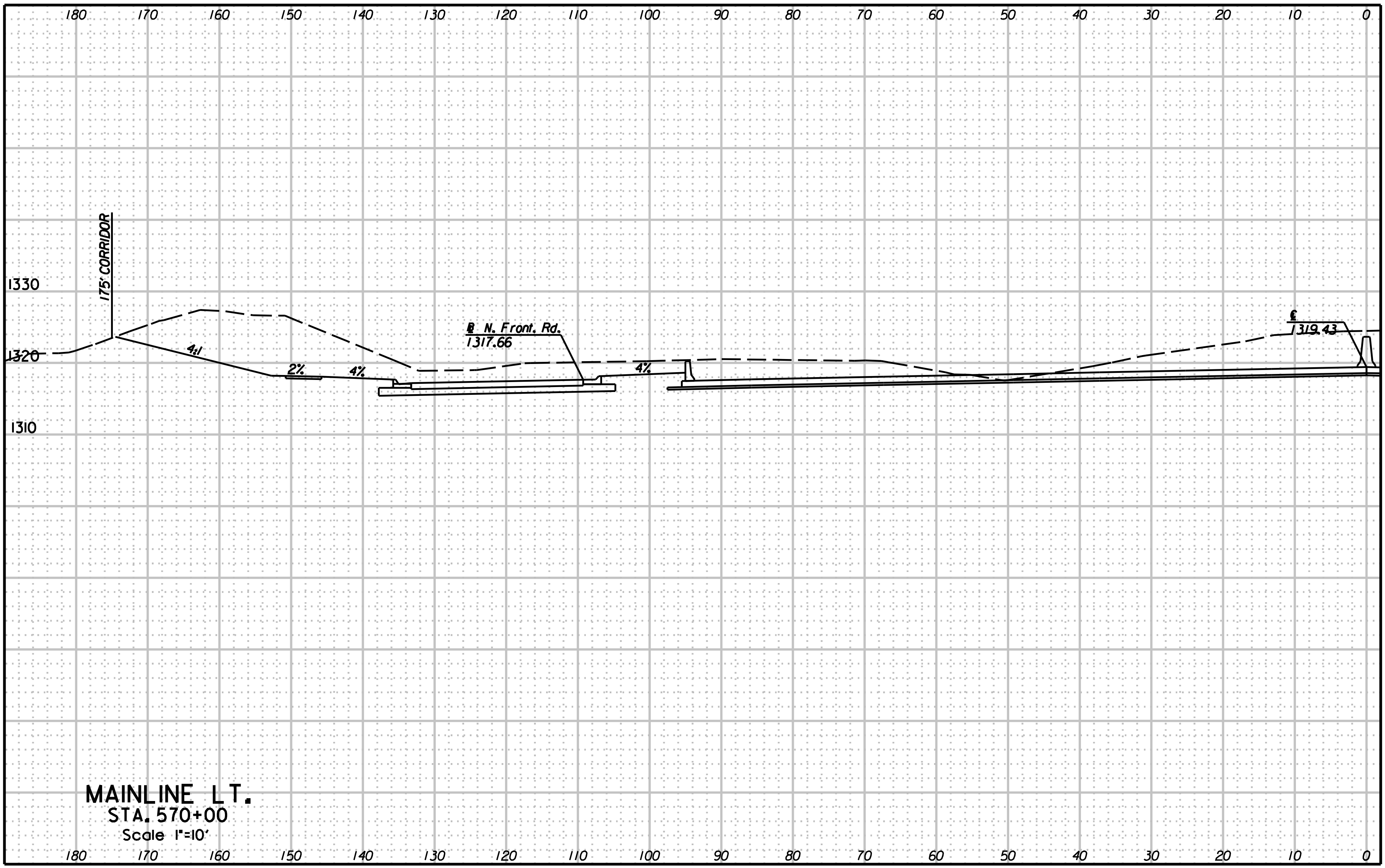
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
1330
1320
1310
1300
1290
℄ 1304.05
℄ S. Front. Rd.
1315.19
4%
4%
2%
4:1
175' CORRIDOR
MAINLINE RT.
STA. 560+00
Scale 1"=10'

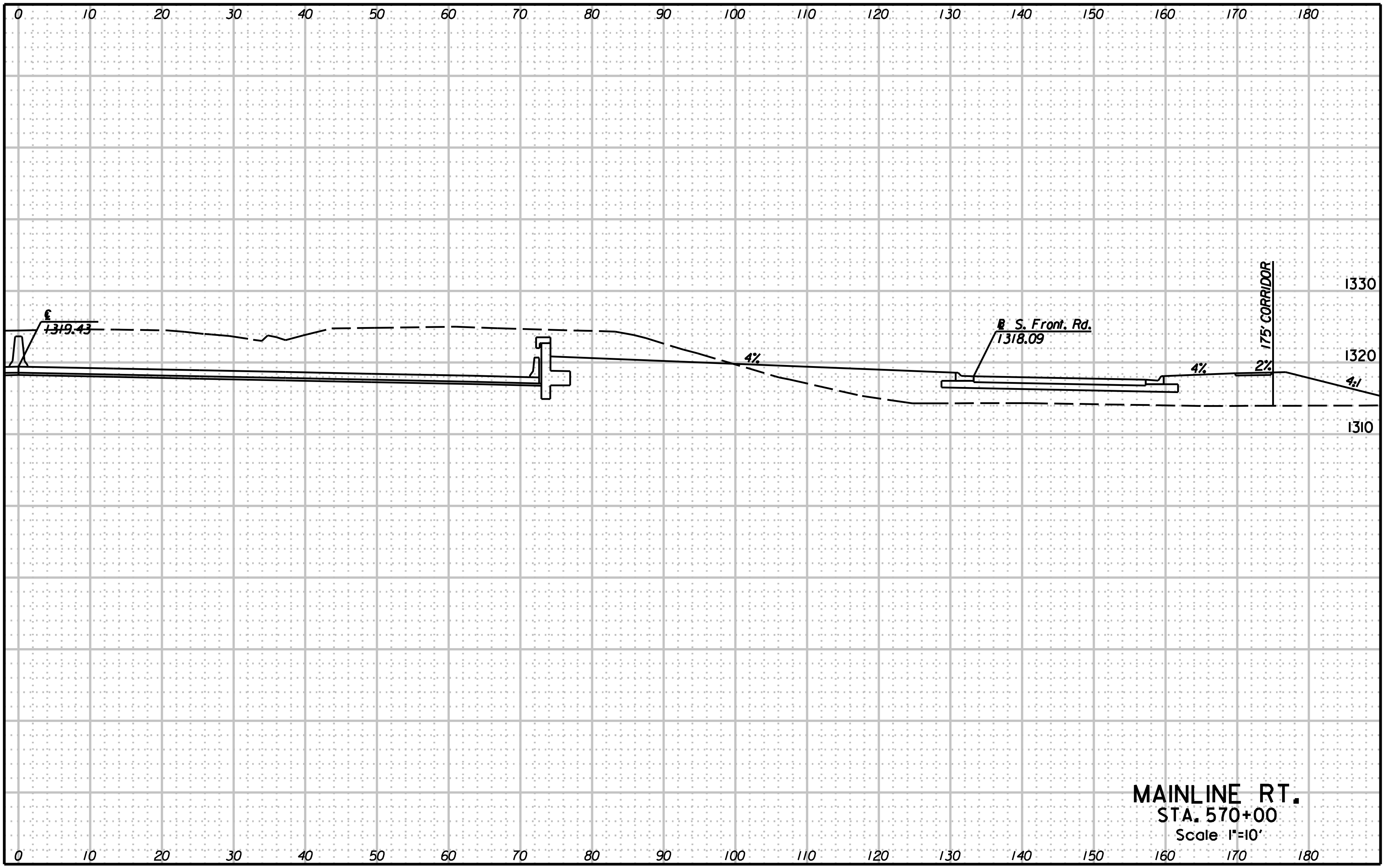


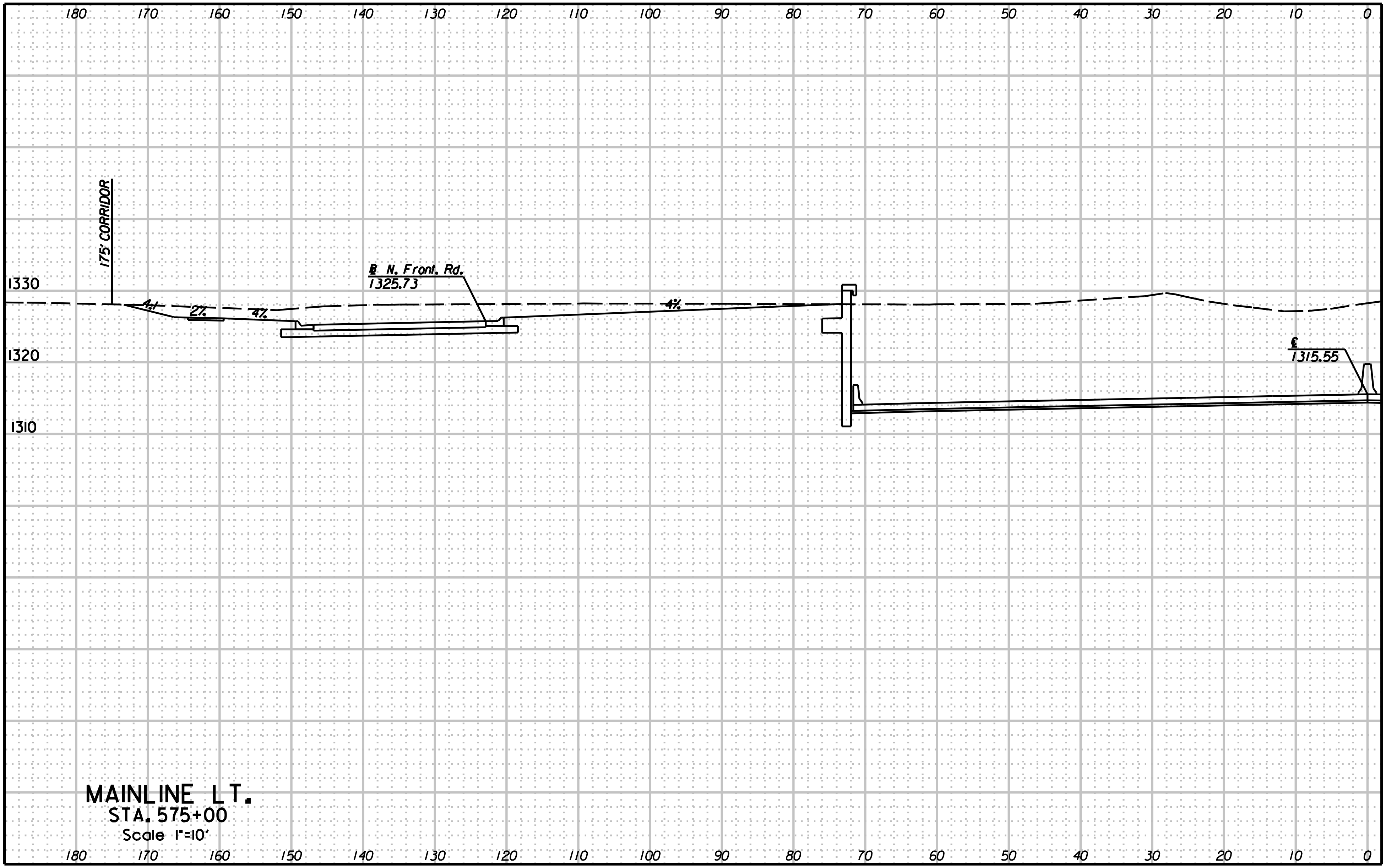
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1330
1320
1310
1300
175' CORRIDOR
4:1
2%
4%
℄ N. Front. Rd.
1316.94
4%
℄
1314.05
MAINLINE LT.
STA. 565+00
Scale 1"=10'

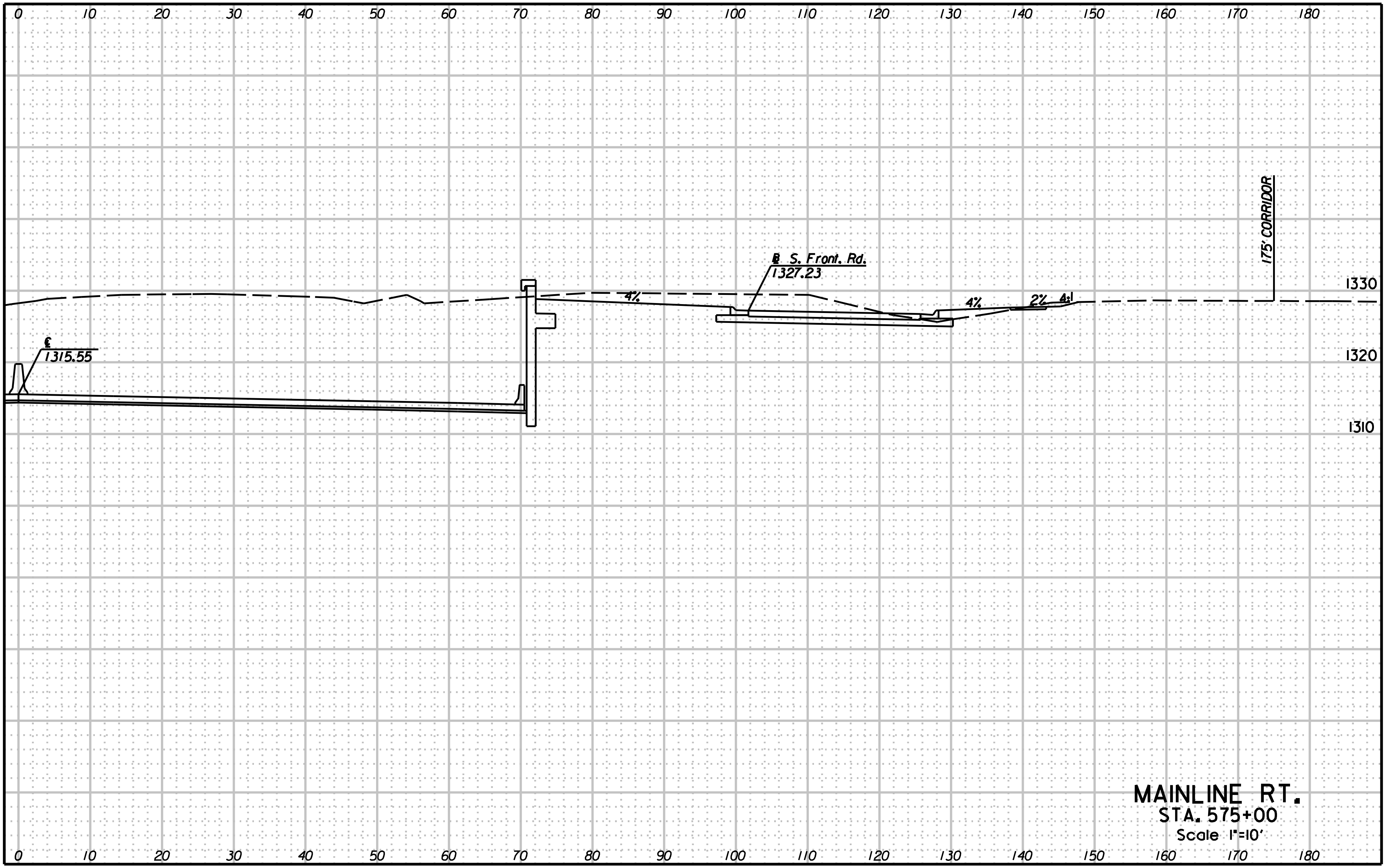


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
℄
1314.05
4%
℄ S. Front. Rd.
1314.57
175' CORRIDOR
4%
2%
4:1
1330
1320
1310
1300
MAINLINE RT.
STA. 565+00
Scale 1"=10'
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180

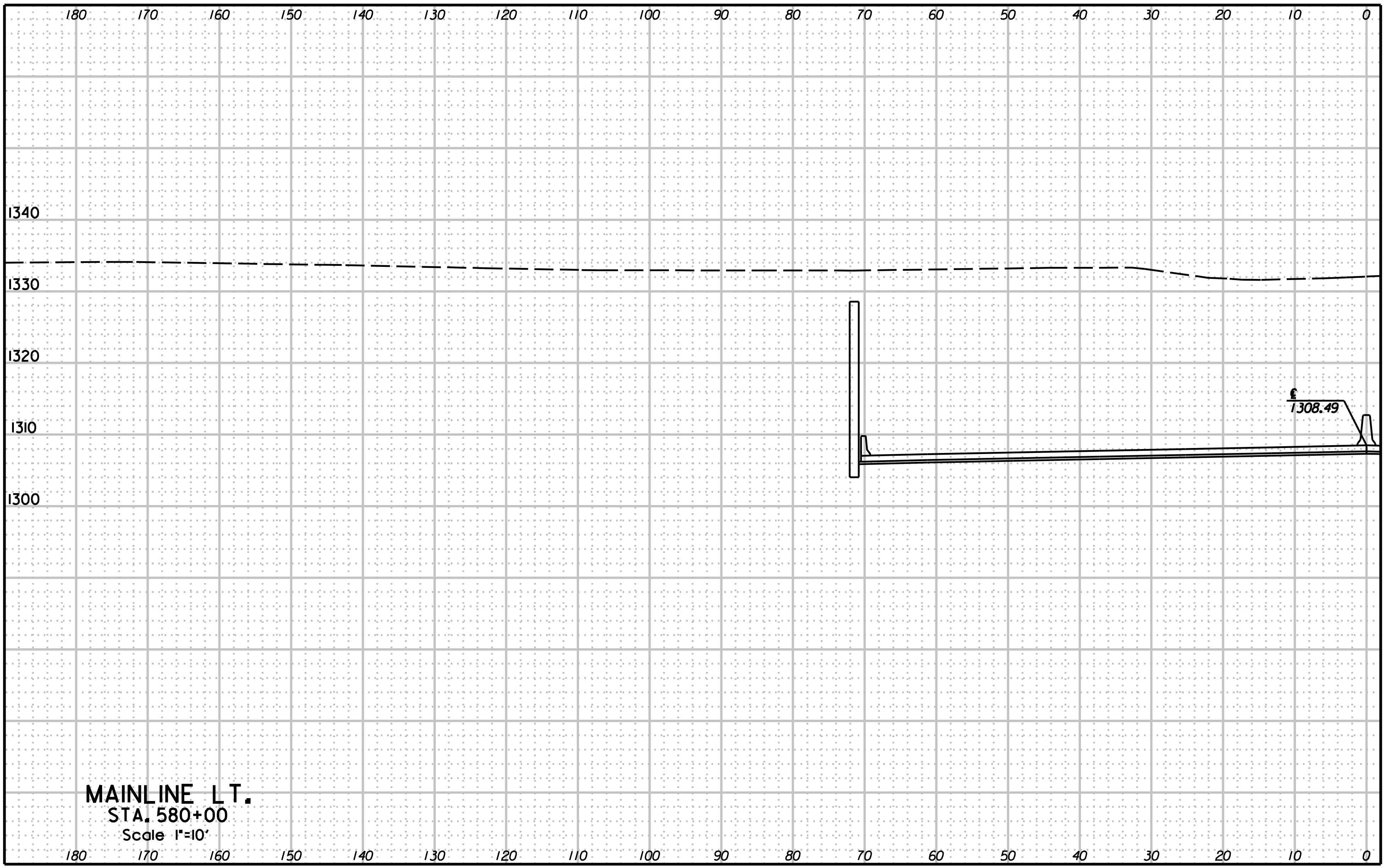

180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
1330
1320
1310
175' CORRIDOR
4:1
2%
4%
℄ N. Front. Rd.
1317.66
4%
℄
1319.43
MAINLINE LT.
STA. 570+00
Scale 1"=10'


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
℄
1319.43
℄ S. Front. Rd.
1318.09
175' CORRIDOR
4%
4%
2%
4:1
1330
1320
1310
MAINLINE RT.
STA. 570+00
Scale 1"=10'

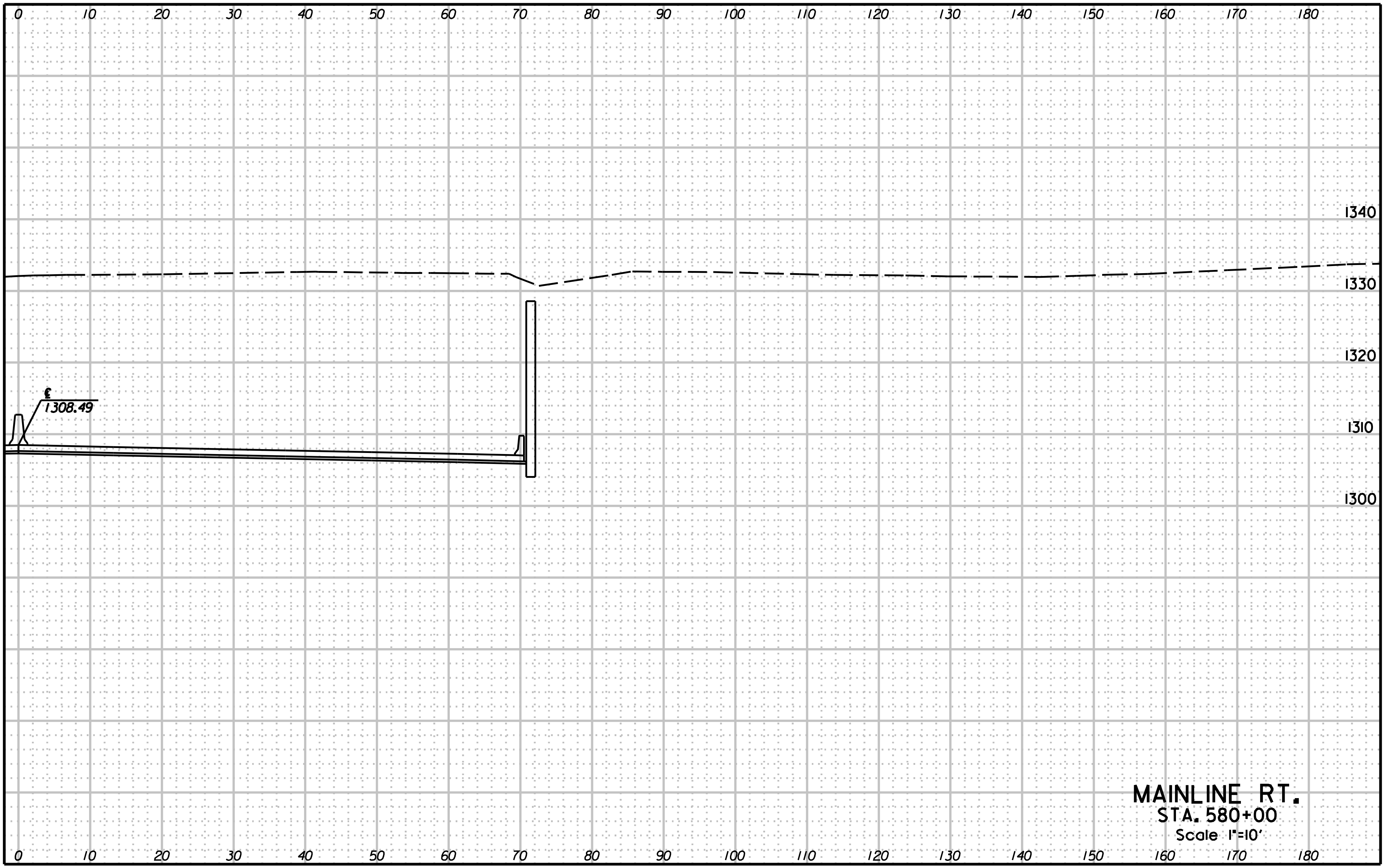

180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
175' CORRIDOR
℄ N. Front. Rd.
1325.73
1330
1320
1310
4:1
2%
4%
4%
℄
1315.55
MAINLINE LT.
STA. 575+00
Scale 1"=10'

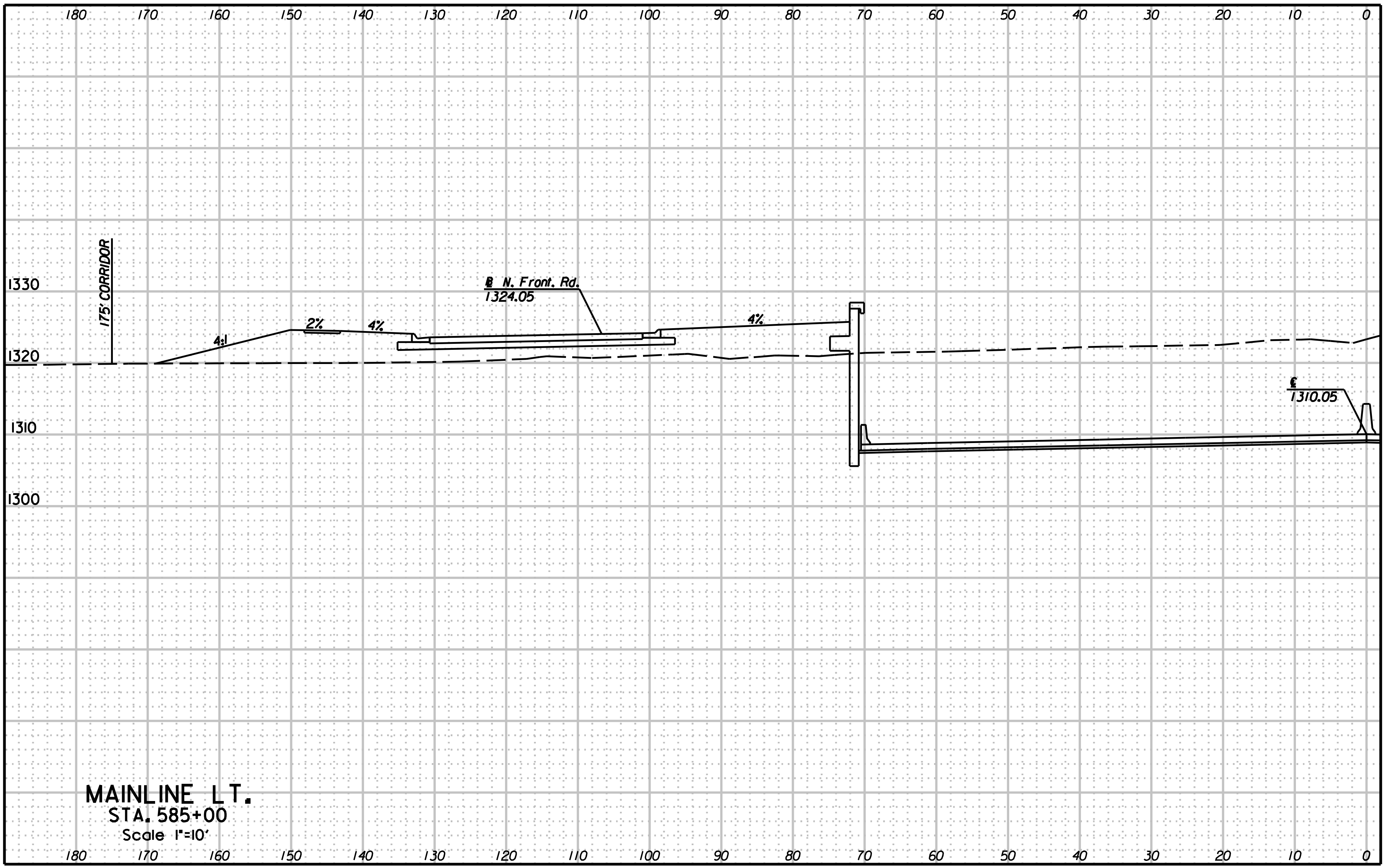


MAINLINE RT.
STA. 575+00
Scale 1"=10'

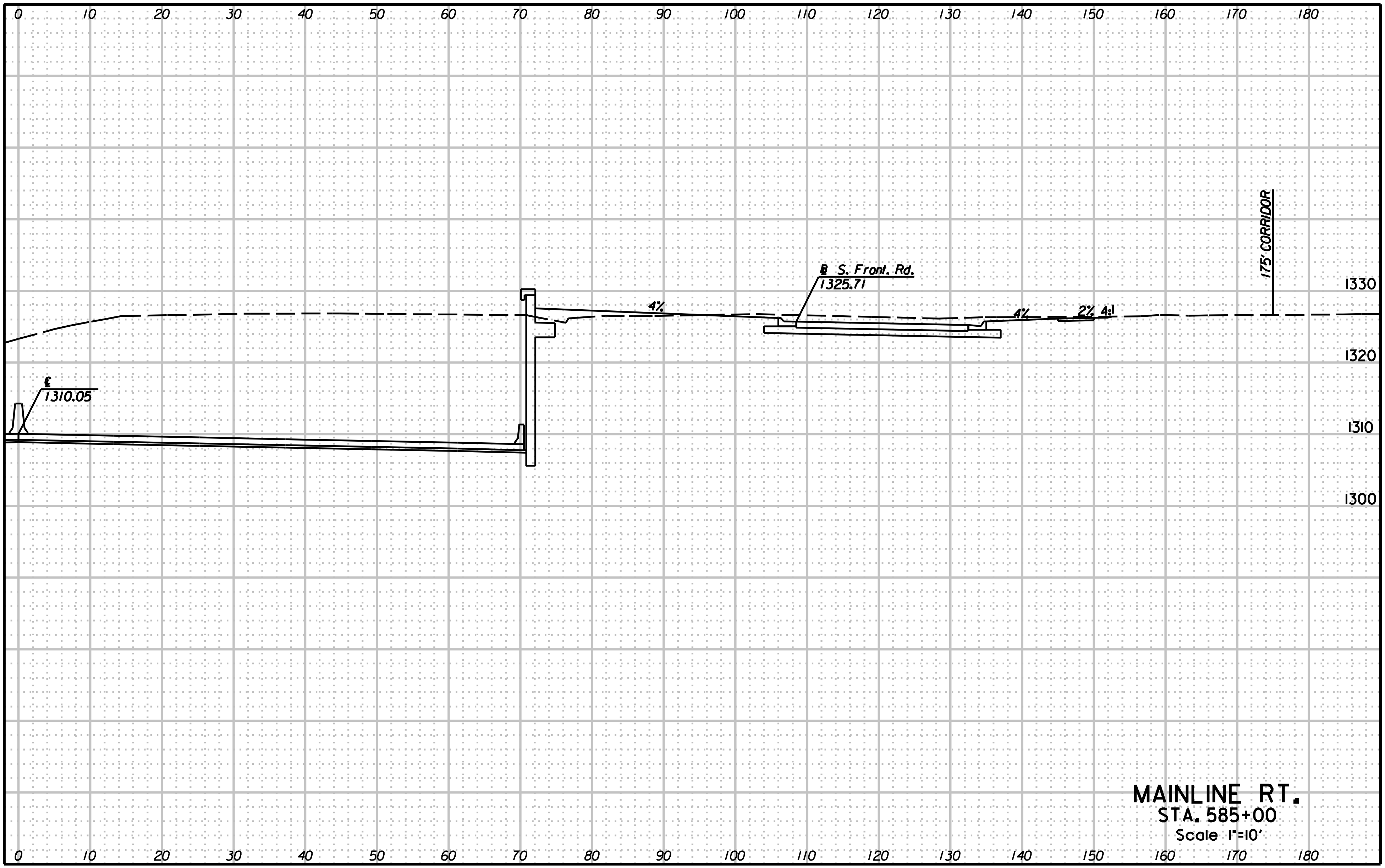


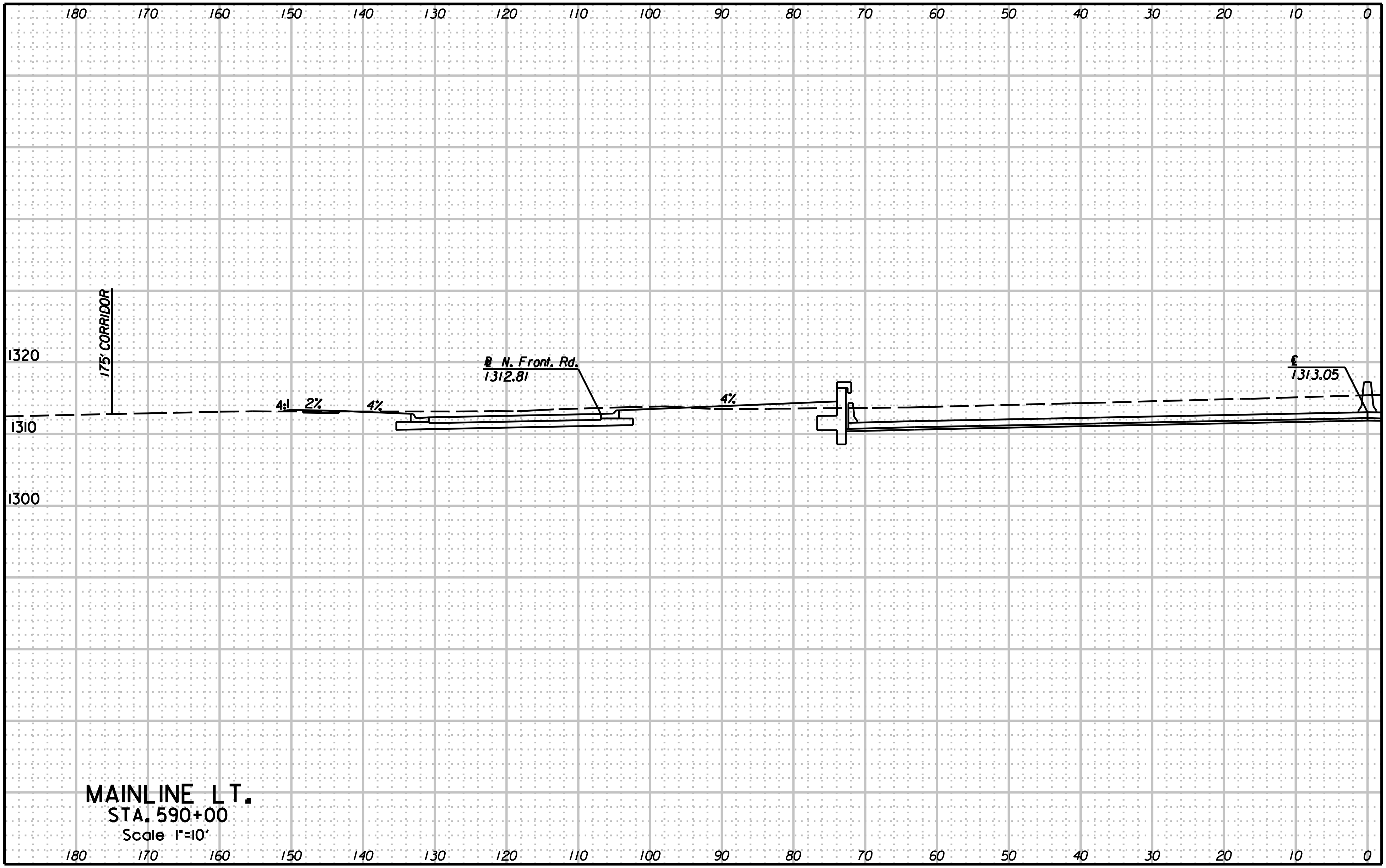
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
1340
1330
1320
1310
1300
℄
1308.49
MAINLINE LT.
STA. 580+00
Scale 1"=10'

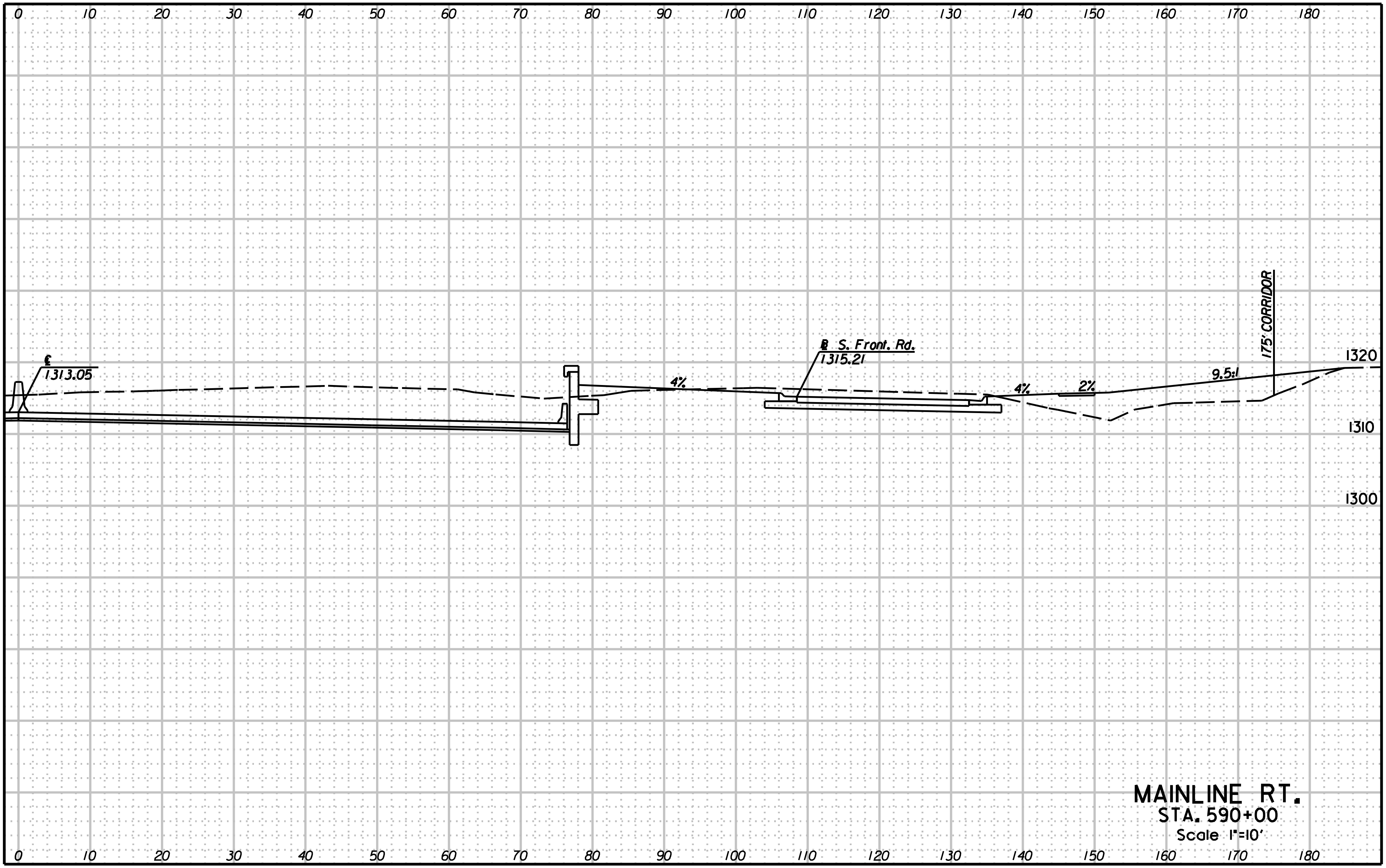

0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
1340
1330
1320
1310
1300
℄
1308.49
MAINLINE RT.
STA. 580+00
Scale 1"=10'



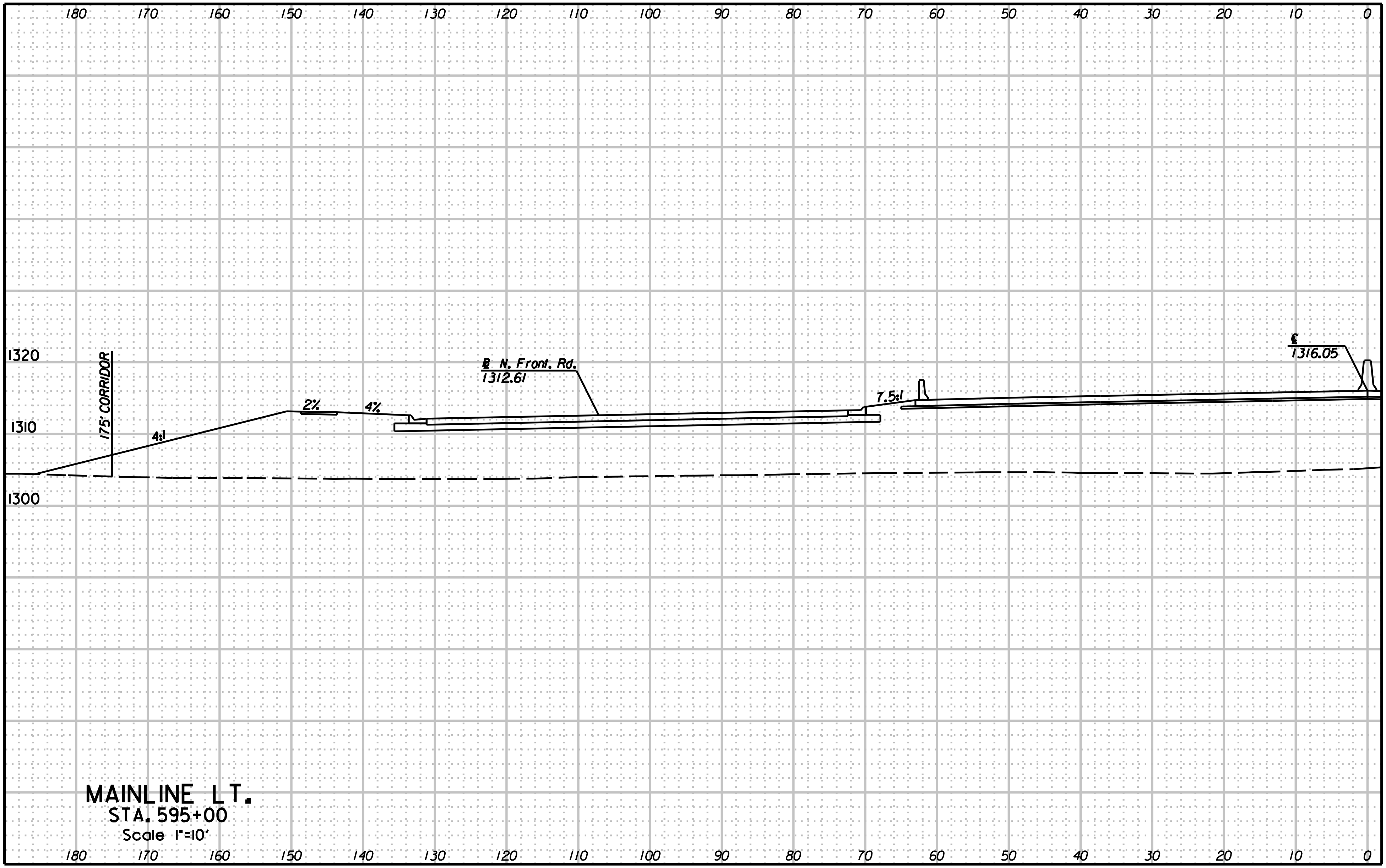
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1330
1320
1310
1300
175' CORRIDOR
4:1
2%
4%
℄ N. Front. Rd.
1324.05
4%
℄
1310.05
MAINLINE LT.
STA. 585+00
Scale 1"=10'

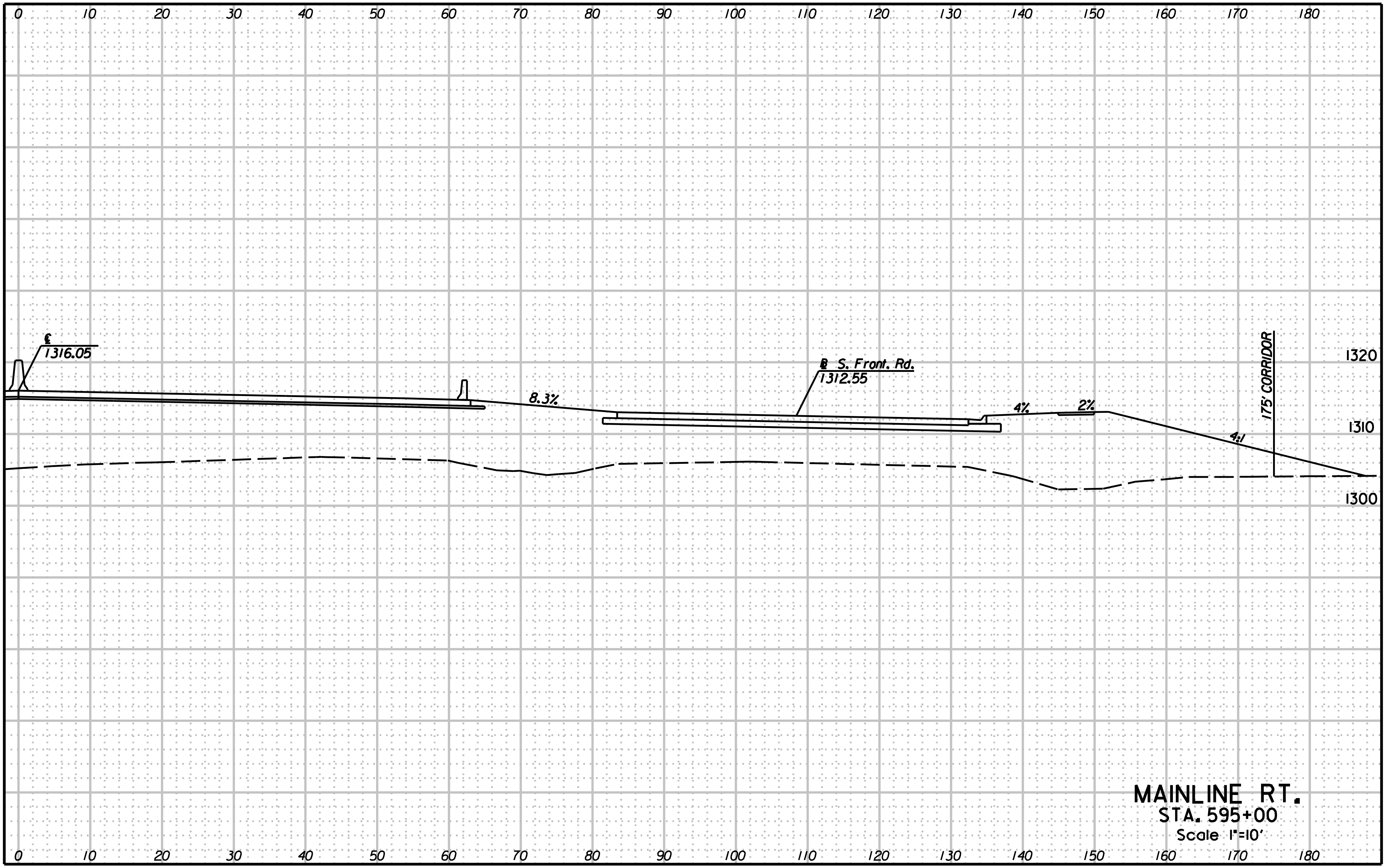

0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
175' CORRIDOR
℄ S. Front. Rd.
1325.71
1330
4%
4%
2% 4:1
℄
1310.05
1320
1310
1300
MAINLINE RT.
STA. 585+00
Scale 1"=10'

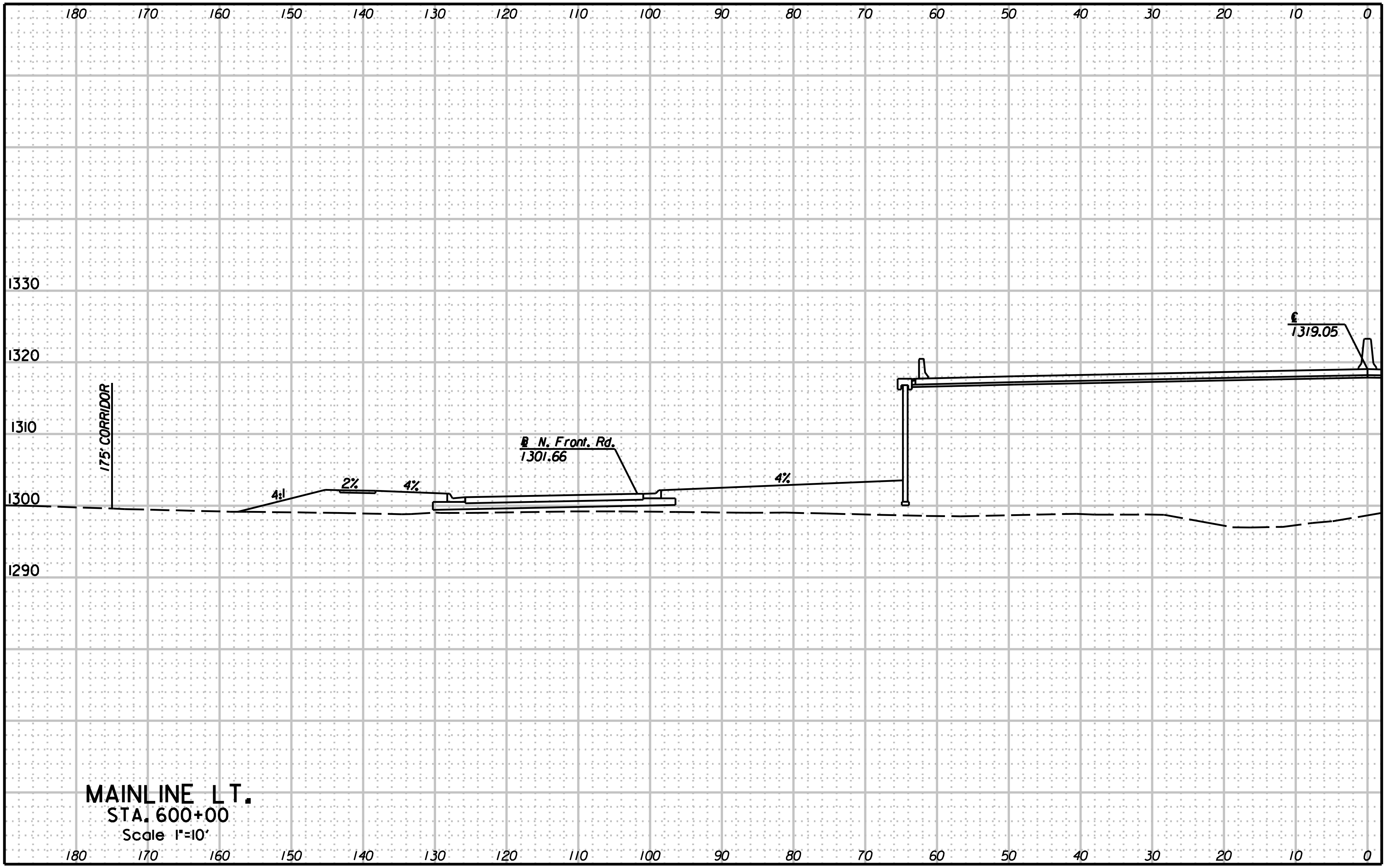

180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
1320
1310
1300
175' CORRIDOR
4:1
2%
4%
℄ N. Front. Rd.
1312.81
4%
℄
1313.05
MAINLINE LT.
STA. 590+00
Scale 1"=10'



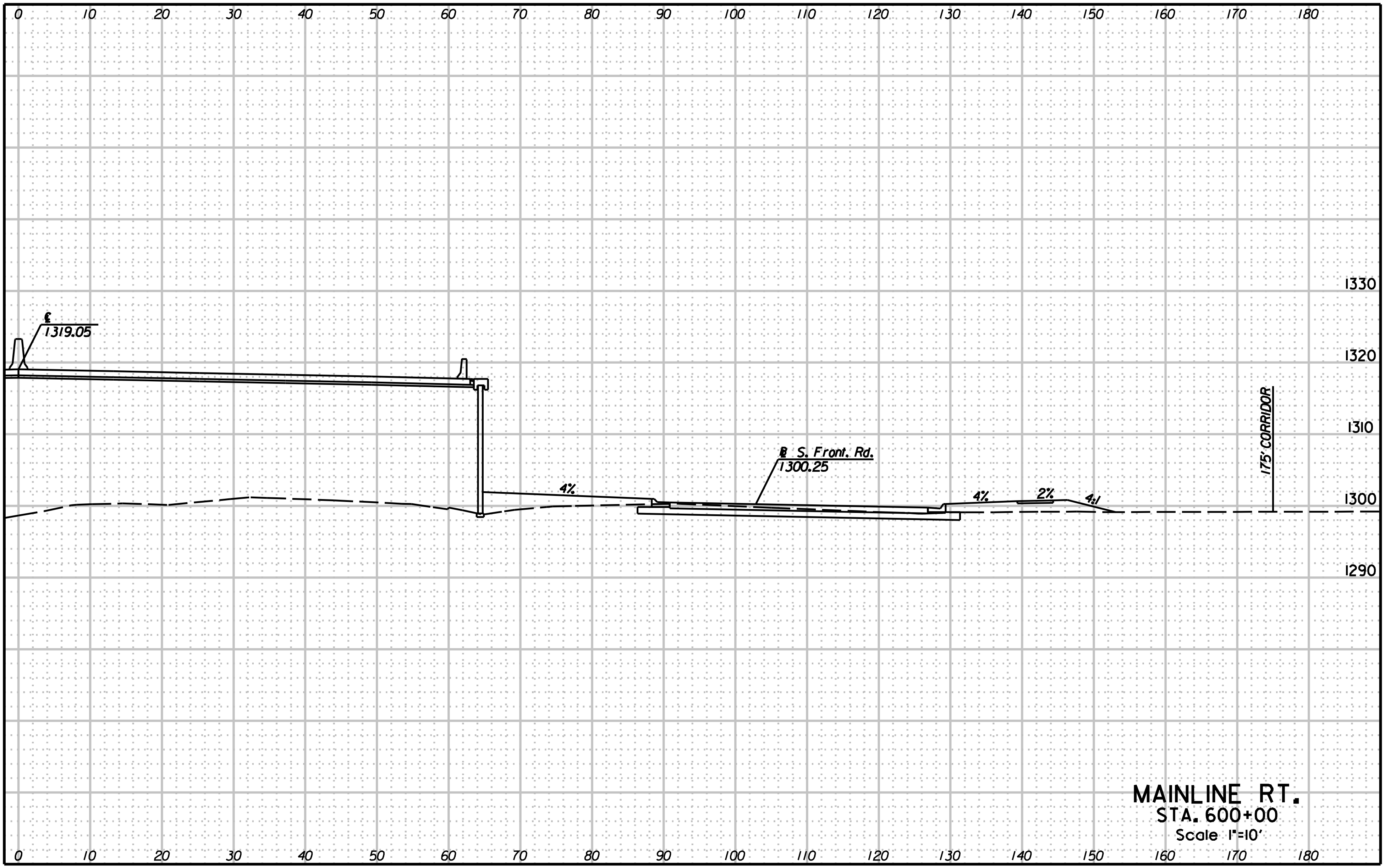
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
℄
1313.05
℄ S. Front. Rd.
1315.21
4%
4%
2%
9.5:1
175' CORRIDOR
1320
1310
1300
MAINLINE RT.
STA. 590+00
Scale 1"=10'


180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1320
1310
1300
175' CORRIDOR
4:1
2%
4%
℄ N. Front. Rd.
1312.61
7.5:1
℄
1316.05
MAINLINE LT.
STA. 595+00
Scale 1"=10'

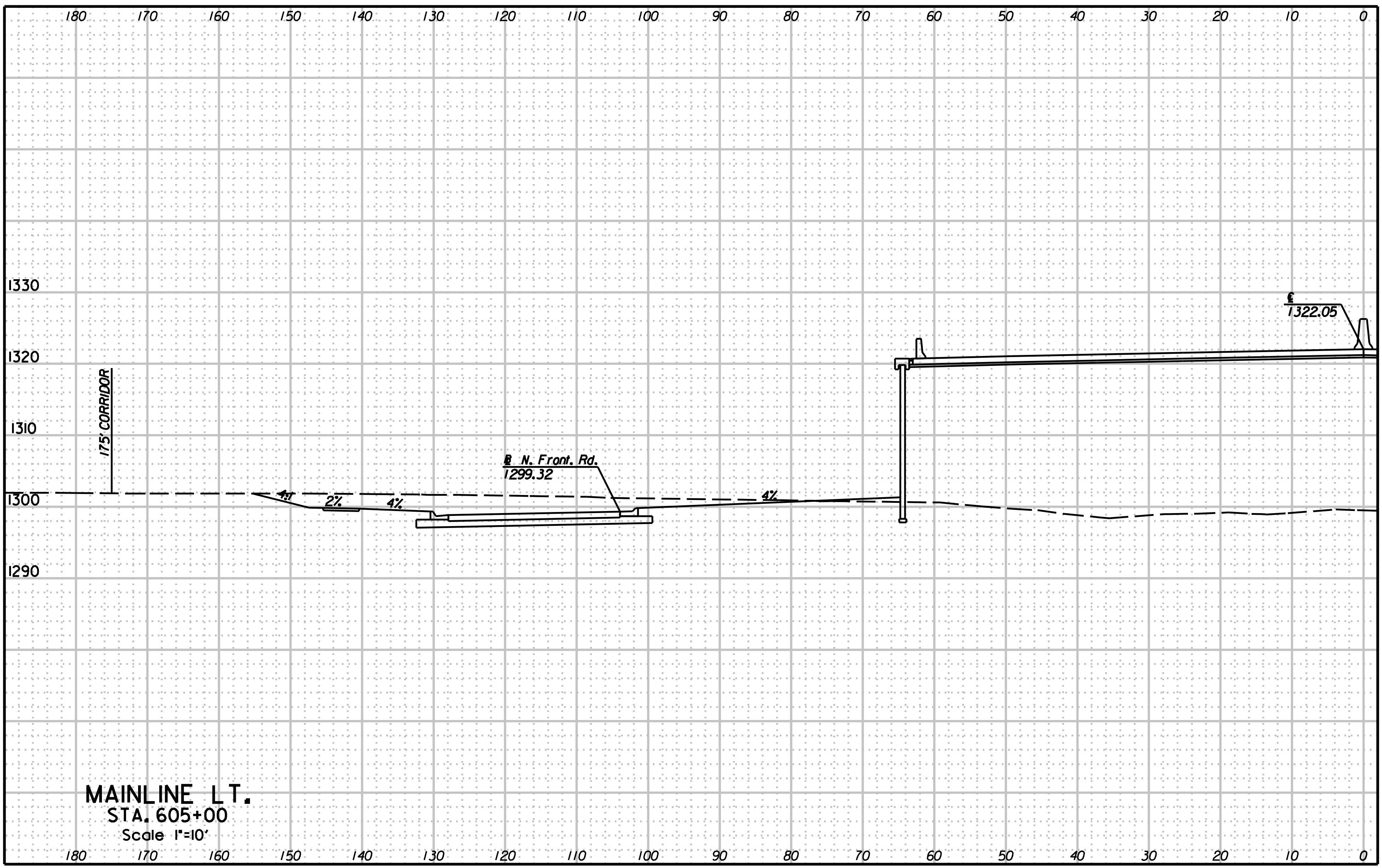

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
℄
1316.05
8.3%
℄ S. Front. Rd.
1312.55
4%
2%
4:1
175' CORRIDOR
1320
1310
1300
MAINLINE RT.
STA. 595+00
Scale 1"=10'



180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
1330
1320
1310
1300
1290
175' CORRIDOR
4:1
2%
4%
℄ N. Front. Rd.
1301.66
4%
℄
1319.05
MAINLINE LT.
STA. 600+00
Scale 1"=10'



℄
1319.05
℄ S. Front. Rd.
1300.25
4%
4%
2%
4:1
175' CORRIDOR
1330
1320
1310
1300
1290
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
MAINLINE RT.
STA. 600+00
Scale 1"=10'



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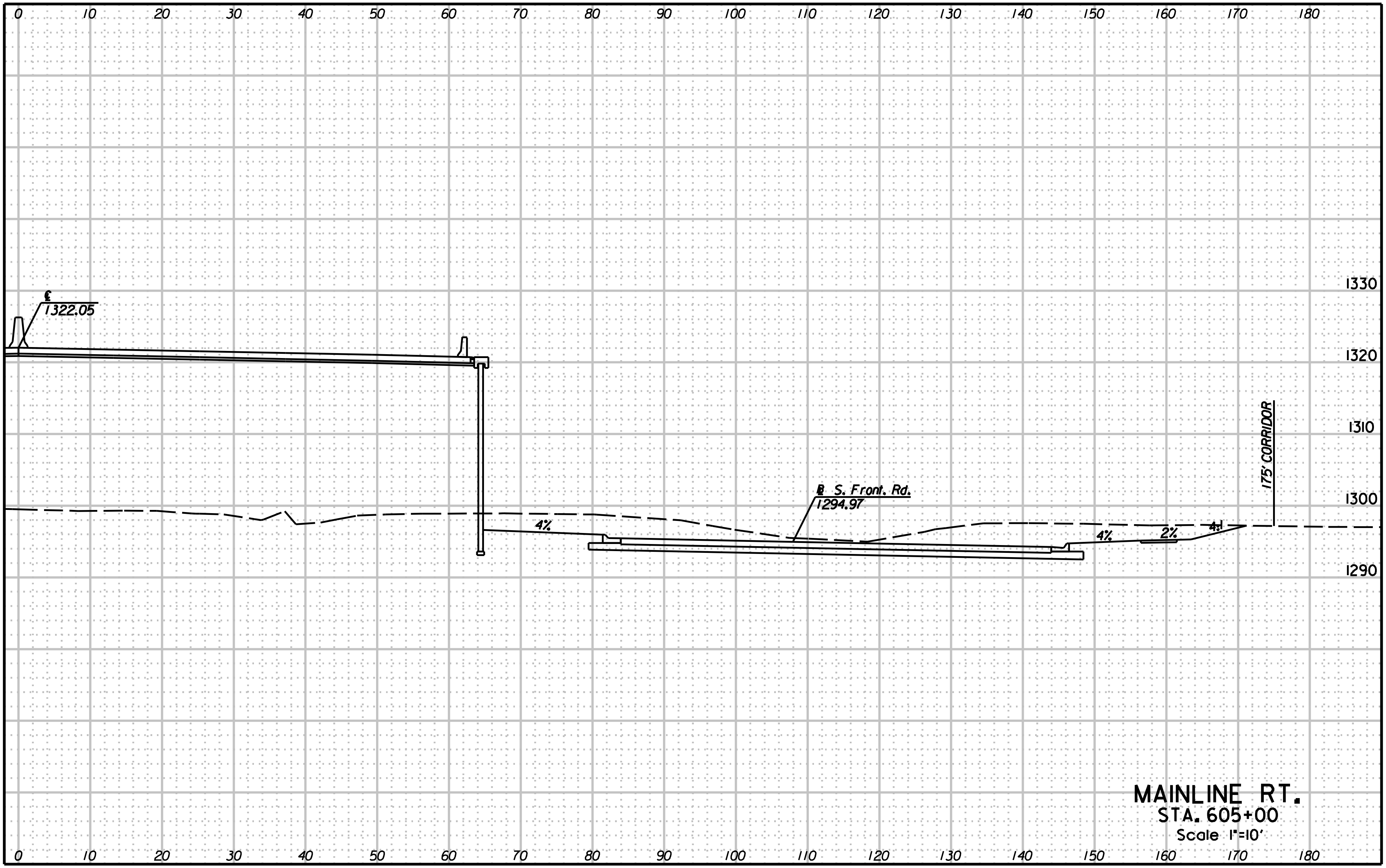
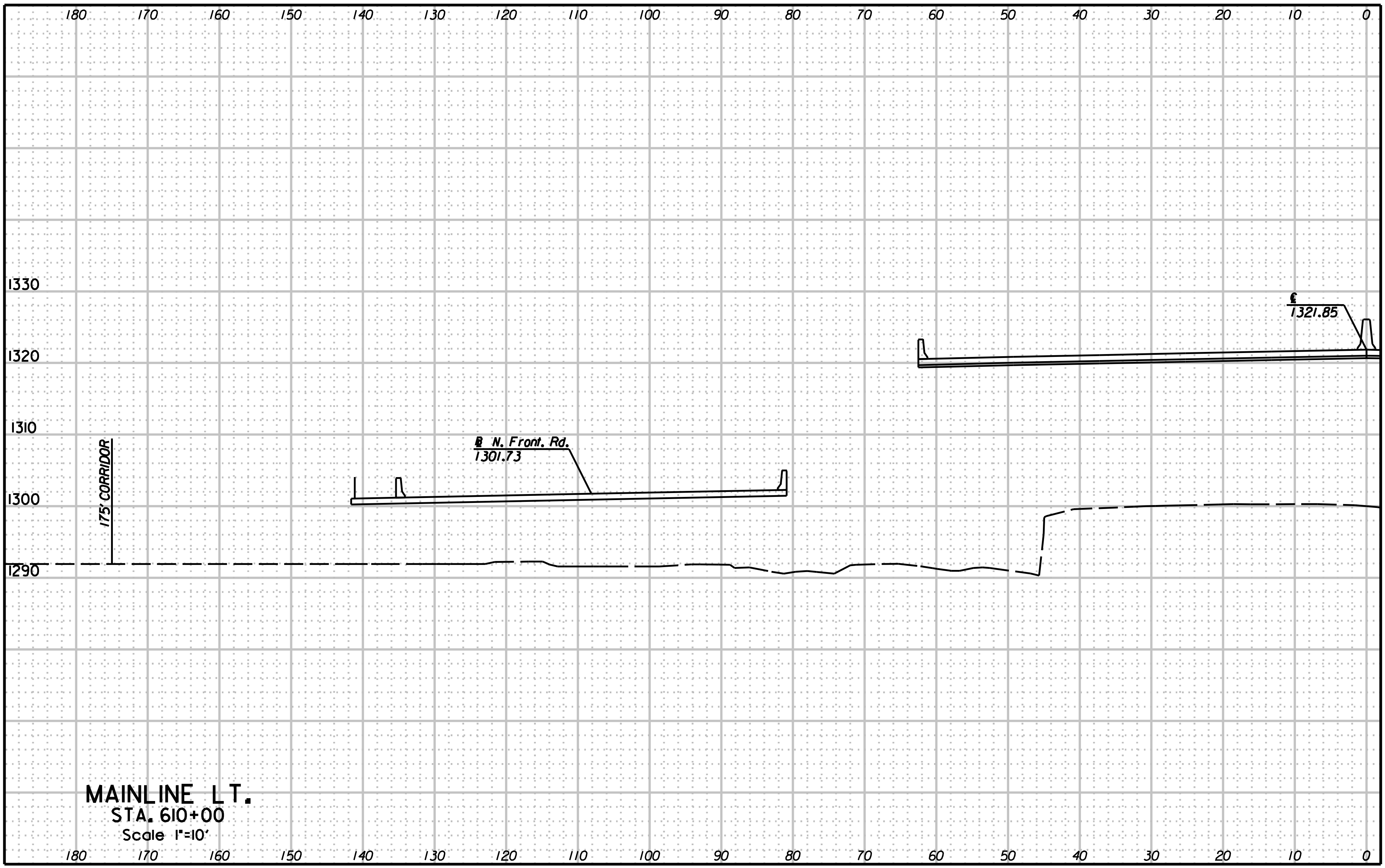
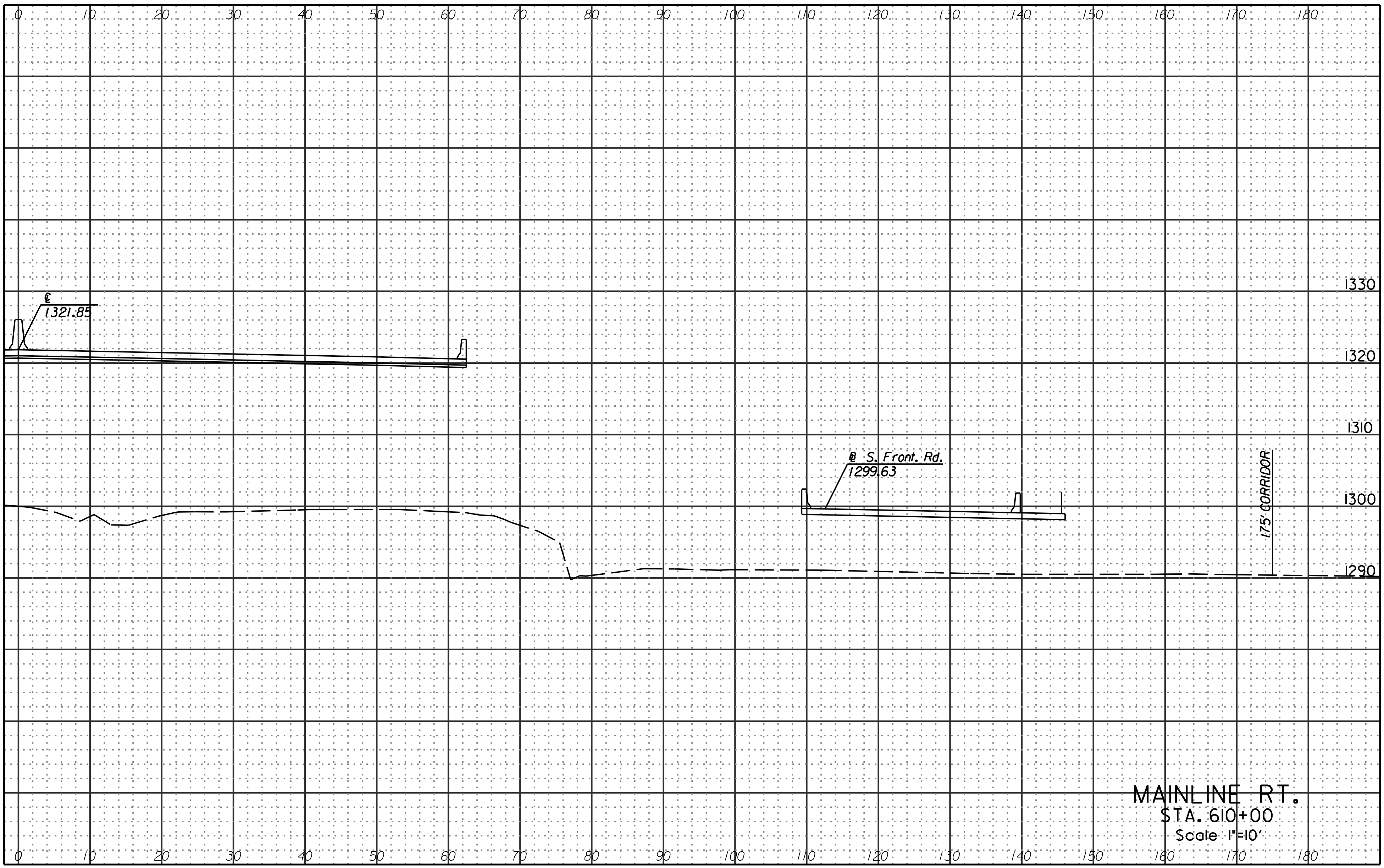
1330
1320
1310
1300
1290
175' CORRIDOR
℄ N. Front. Rd.
1299.32
℄
1322.05
4:1
2%
4%
4%
MAINLINE LT.
STA. 605+00
Scale 1"=10'

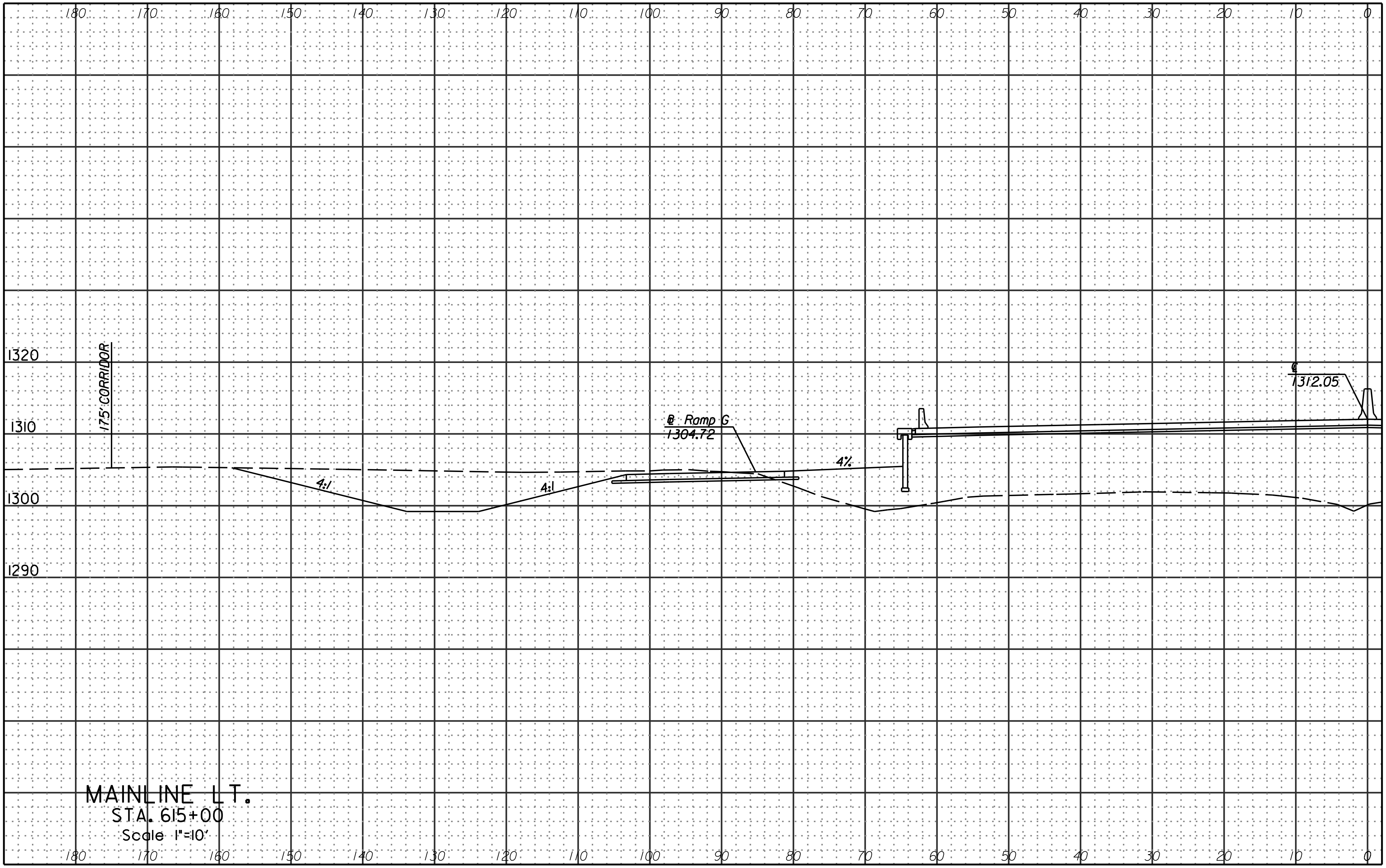

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
℄
1322.05
1330
1320
1310
1300
1290
175' CORRIDOR
℄ S. Front. Rd.
1294.97
4%
4%
2%
4:1
MAINLINE RT.
STA. 605+00
Scale 1"=10'
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180



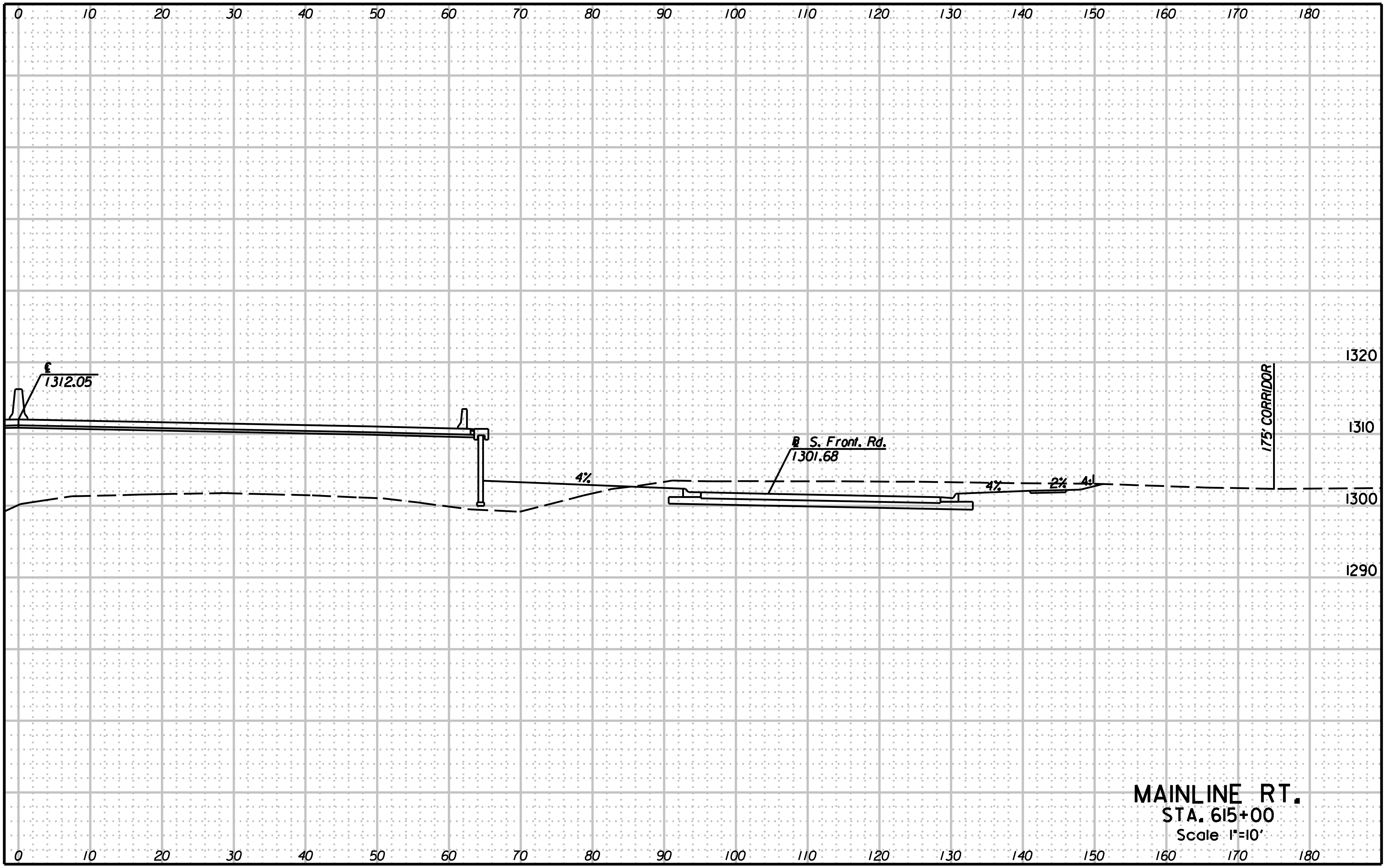
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
1330
1320
1310
1300
1290
℄
1321.85
℄ N. Front. Rd.
1301.73
175' CORRIDOR
MAINLINE LT.
STA. 610+00
Scale 1"=10'



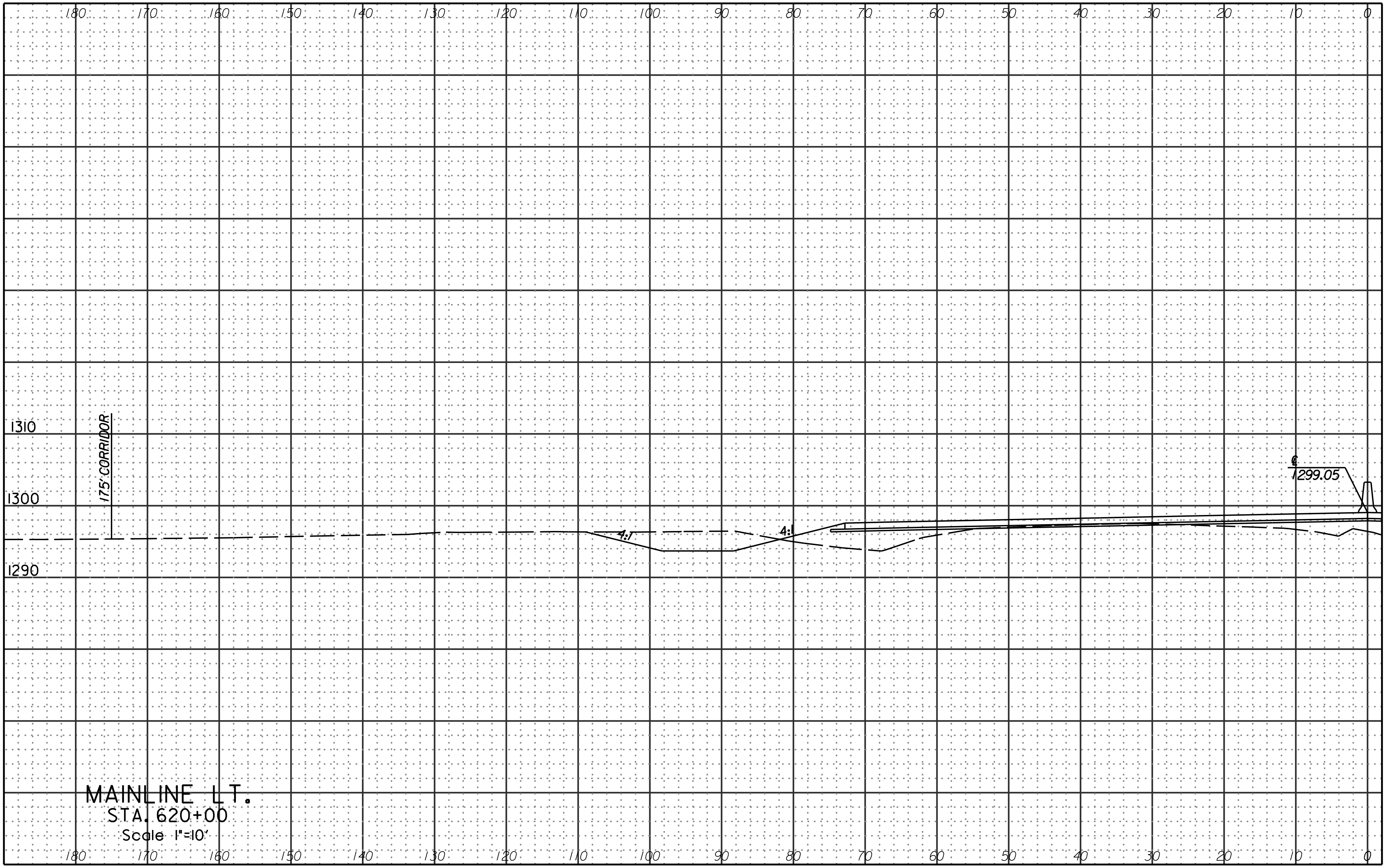
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
℄
1321.85
℄ S. Front. Rd.
1299.63
175' CORRIDOR
1330
1320
1310
1300
1290
MAINLINE RT.
STA. 610+00
Scale 1"=10'

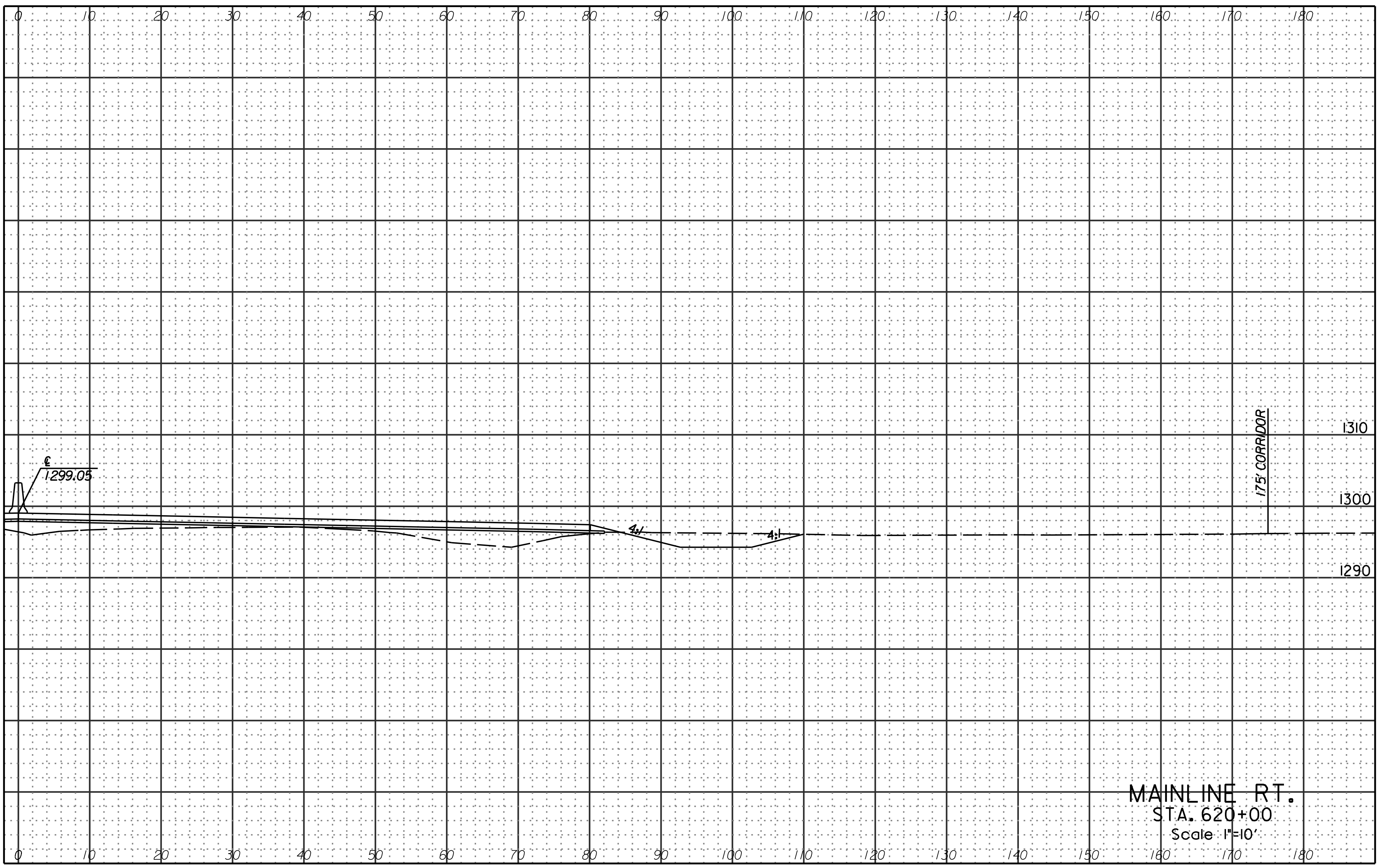


180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
1320
1310
1300
1290
175' CORRIDOR
℄ Ramp G
1304.72
℄
1312.05
4:1
4:1
4%
MAINLINE LT.
STA. 615+00
Scale 1"=10'

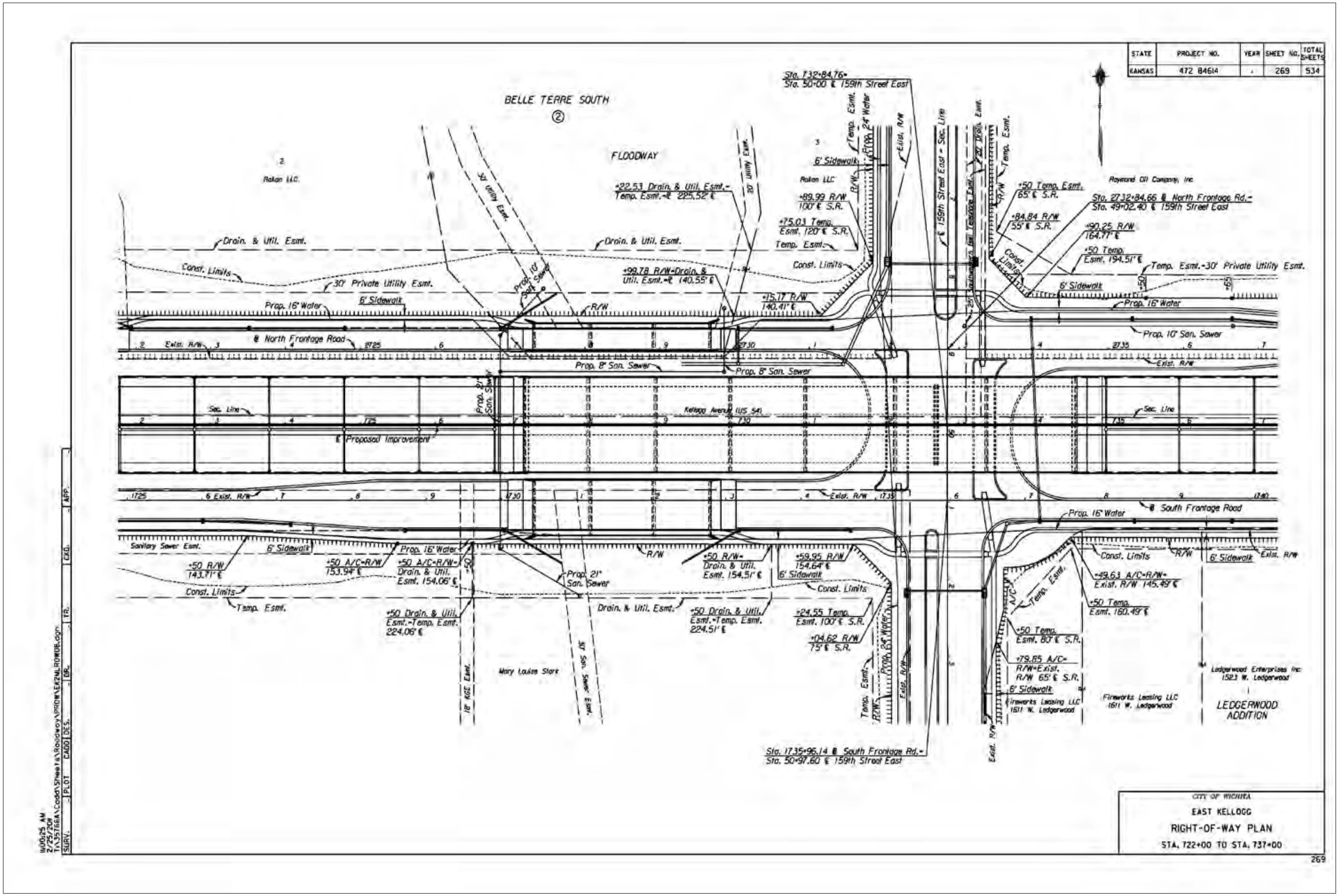


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
℄
1312.05
℄ S. Front. Rd.
1301.68
4%
4%
2%
4:1
175' CORRIDOR
1320
1310
1300
1290
MAINLINE RT.
STA. 615+00
Scale 1"=10'

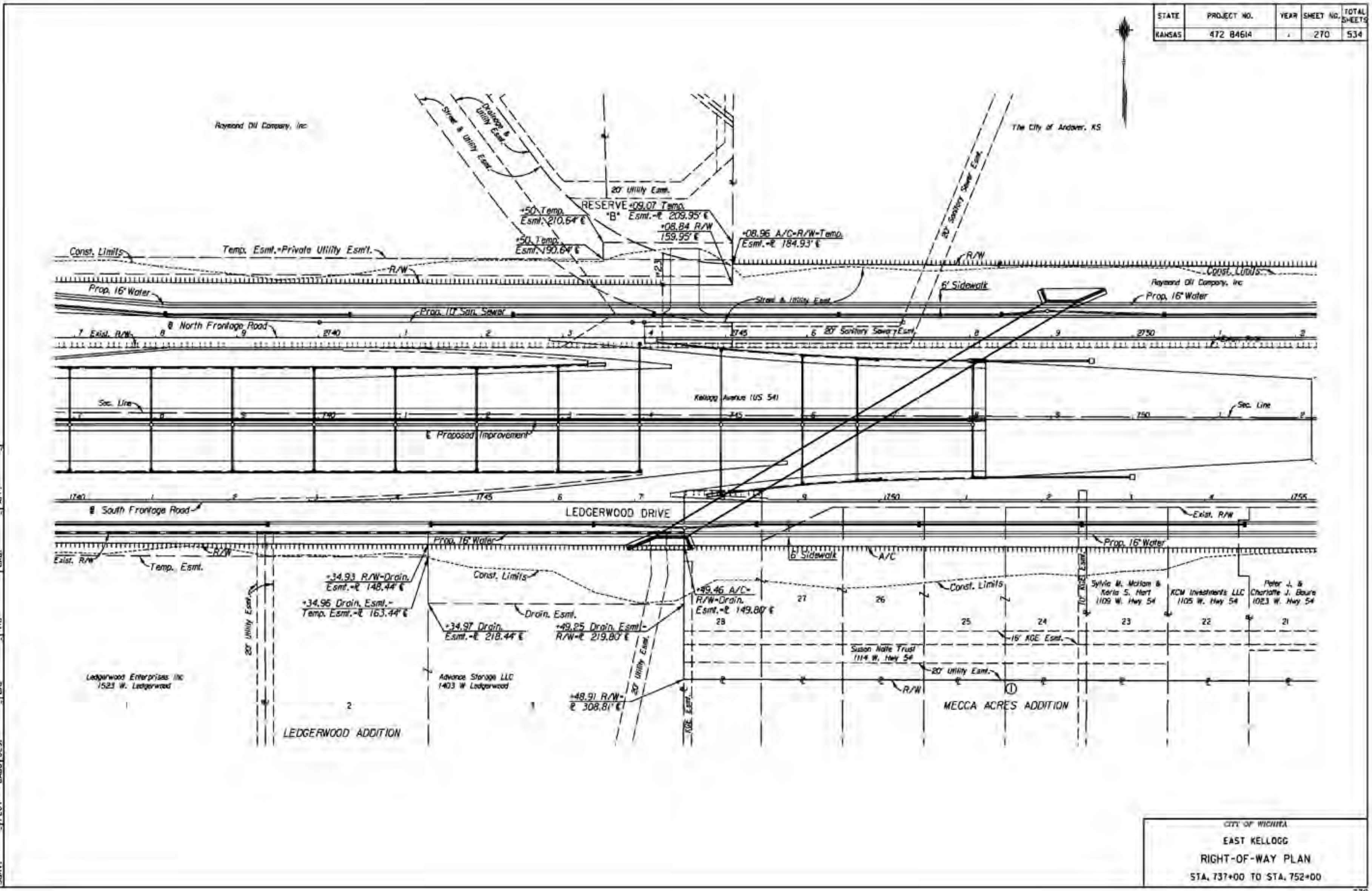

180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
1310
1300
1290
175' CORRIDOR
4:1
4:1
℄
1299.05
MAINLINE LT.
STA. 620+00
Scale 1"=10'

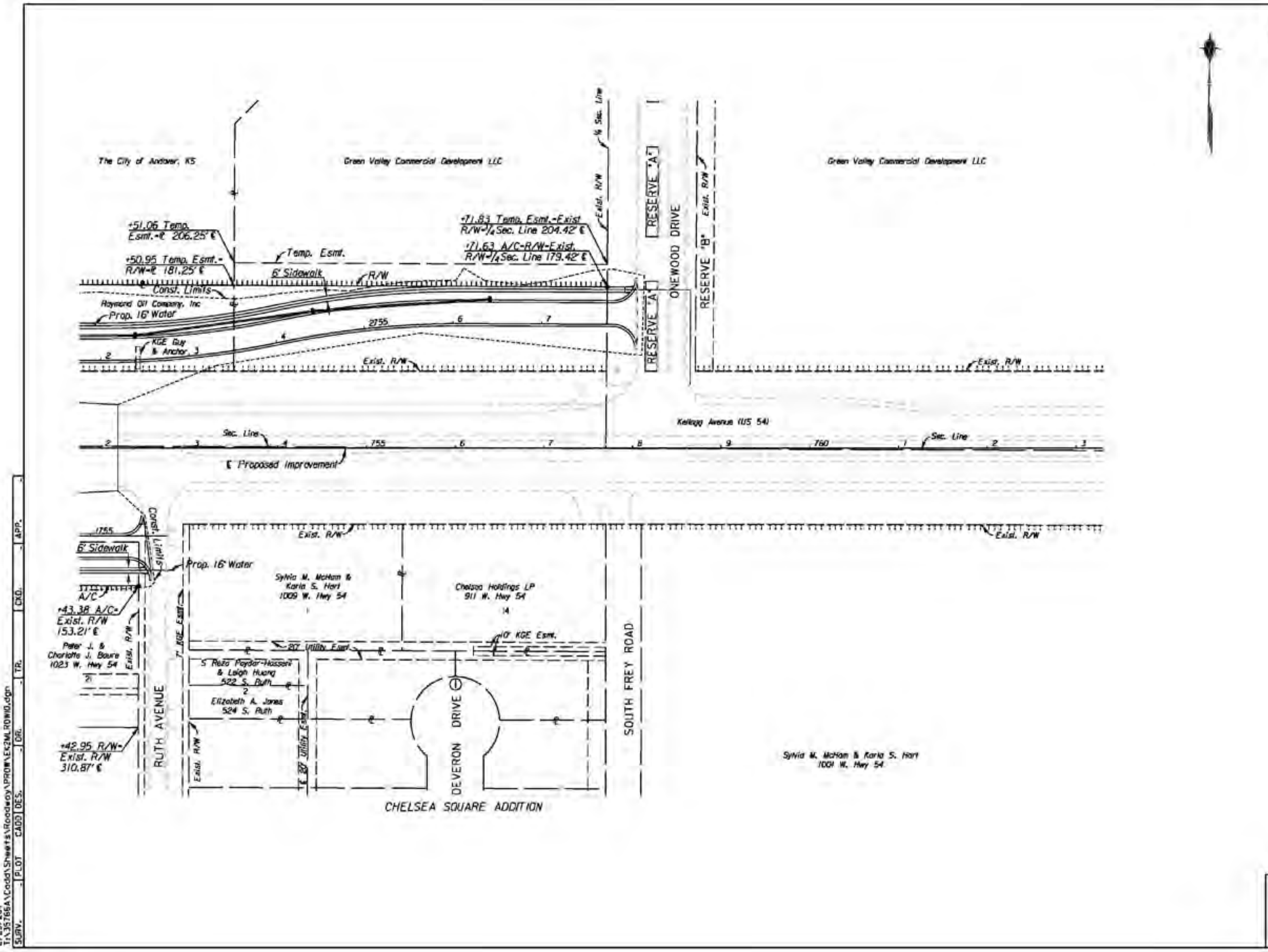


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
℄
1299.05
4:1
4:1
175' CORRIDOR
1310
1300
1290
MAINLINE RT.
STA. 620+00
Scale 1"=10'



STATE | PROJECT NO. | YEAR | SHEET NO. | TOTAL SHEETS
KANSAS | 472 84614 | | 269 | 534
BELLE TERRE SOUTH
FLOODWAY
Sta. 732+84.76= Sta. 50+00 ℄ 159th Street East
Sta. 2732+84.66 ℄ North Frontage Rd.= Sta. 49+02.40 ℄ 159th Street East
Raymond Oil Company, Inc.
Drain. & Util. Esmt.
Const. Limits
30' Private Utility Esmt.
6' Sidewalk
Prop. 16' Water
℄ North Frontage Road
Prop. 8" San. Sewer
Kellogg Avenue (US 54)
Sec. Line
℄ Proposed Improvement
℄ South Frontage Road
Sanitary Sewer Esmt.
Temp. Esmt.
Mary Louise Stark
Fireworks Leasing LLC 1611 W. Ledgerwood
Ledgerwood Enterprises Inc 1523 W. Ledgerwood
LEDGERWOOD ADDITION
Sta. 1735+96.14 ℄ South Frontage Rd.= Sta. 50+97.60 ℄ 159th Street East
CITY OF WICHITA
EAST KELLOGG
RIGHT-OF-WAY PLAN
STA. 722+00 TO STA. 737+00
269


STATE
PROJECT NO.
YEAR
SHEET NO.
TOTAL SHEETS
KANSAS
472 84614
270
534
Raymond Oil Company, Inc
The City of Andover, KS
Drainage & Utility Esmt.
Street & Utility Esmt.
20' Utility Esmt.
RESERVE "B"
+50 Temp. Esmt. 210.64' ℄
+09.07 Temp. Esmt.-℄ 209.95' ℄
+08.84 R/W 159.95' ℄
+50 Temp. Esmt. 190.64' ℄
+08.96 A/C-R/W-Temp. Esmt.-℄ 184.93' ℄
20' Sanitary Sewer Esmt.
Const. Limits
Temp. Esmt.-Private Utility Esm't.
R/W
Prop. 16" Water
Prop. 10" San. Sewer
6' Sidewalk
Street & Utility Esmt.
Raymond Oil Company, Inc
℄ North Frontage Road
Exist. R/W
20' Sanitary Sewer Esmt.
Kellogg Avenue (US 54)
Sec. Line
℄ Proposed Improvement
℄ South Frontage Road
LEDGERWOOD DRIVE
Exist. R/W
Temp. Esmt.
Prop. 16" Water
6' Sidewalk
A/C
+34.93 R/W-Drain. Esmt.-℄ 148.44' ℄
+34.96 Drain. Esmt.-Temp. Esmt.-℄ 163.44' ℄
Const. Limits
Drain. Esmt.
+34.97 Drain. Esmt.-℄ 218.44' ℄
+49.25 Drain. Esmt.-R/W-℄ 219.80' ℄
+49.46 A/C-R/W-Drain. Esmt.-℄ 149.80' ℄
+48.91 R/W-℄ 308.81' ℄
20' Utility Esmt.
16' KGE Esmt.
Sylvia M. McHan & Karla S. Hart 1109 W. Hwy 54
KCM Investments LLC 1105 W. Hwy 54
Peter J. & Charlotte J. Boure 1023 W. Hwy 54
Susan Nolte Trust 1114 W. Hwy 54
Ledgerwood Enterprises Inc 1523 W. Ledgerwood
Advance Storage LLC 1403 W Ledgerwood
LEDGERWOOD ADDITION
MECCA ACRES ADDITION
CITY OF WICHITA
EAST KELLOGG
RIGHT-OF-WAY PLAN
STA. 737+00 TO STA. 752+00
270



STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472 84614	.	271	534

CITY OF WICHITA
EAST KELLOGG
RIGHT-OF-WAY PLAN
STA. 752+00 TO STA. 763+00

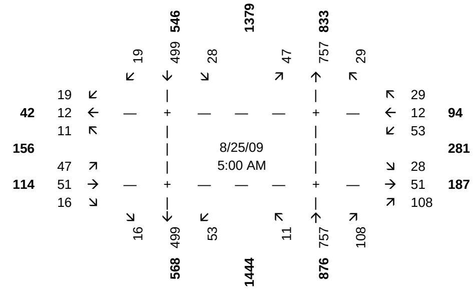
271

Traffic Analysis

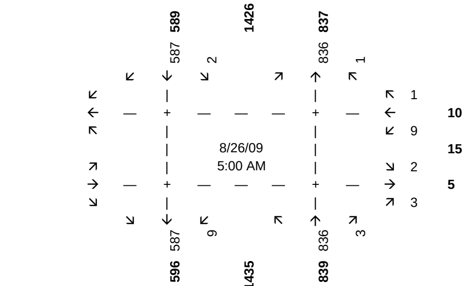
US-54 Concept Study
Andover, Kansas

Existing Traffic Volumes
AM Peak Hour

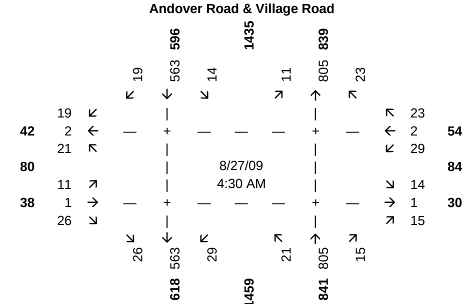
Andover Road & Douglas Avenue



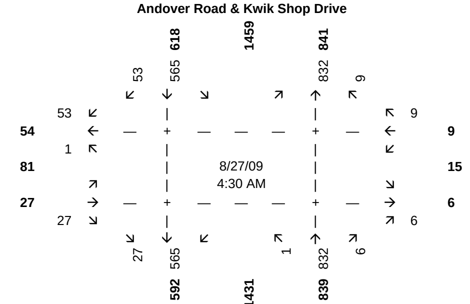
Andover Road & Willowbrook Street



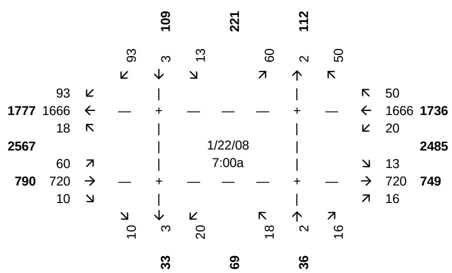
Andover Road & Village Road



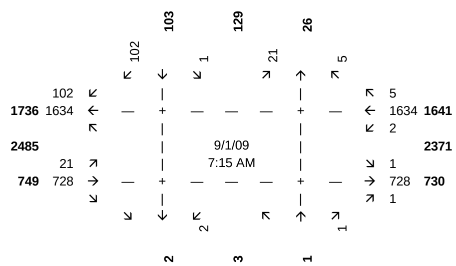
Andover Road & Kwik Shop Drive



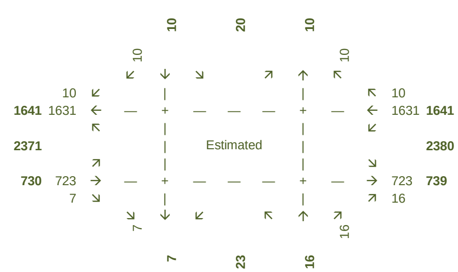
US 54 & 159th



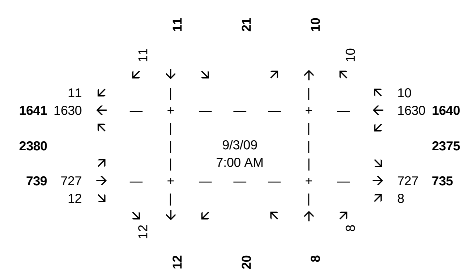
US-54 & Onewood Drive



US-54 & Allen Street



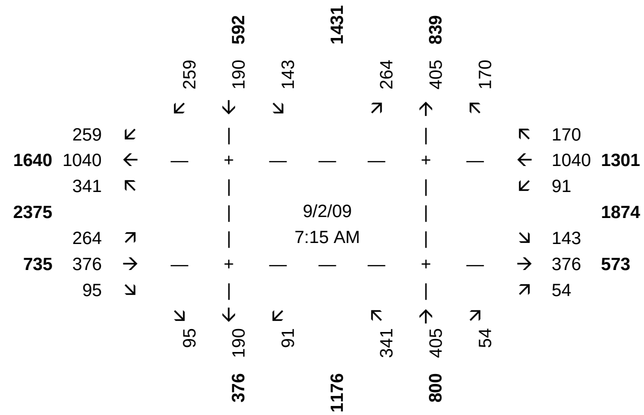
US-54 & Riverview Street



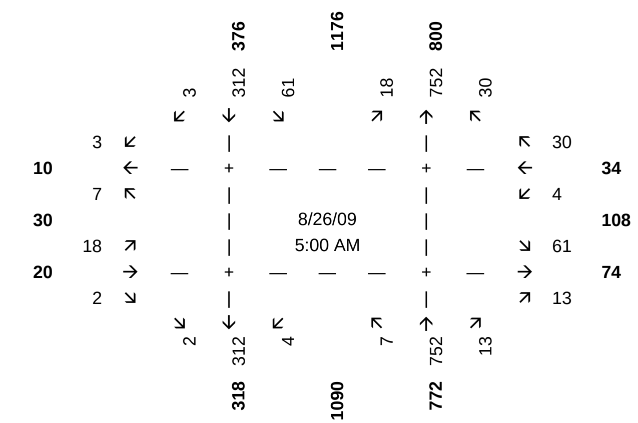
US-54 Concept Study
Andover, Kansas

Existing Traffic Volumes
AM Peak Hour

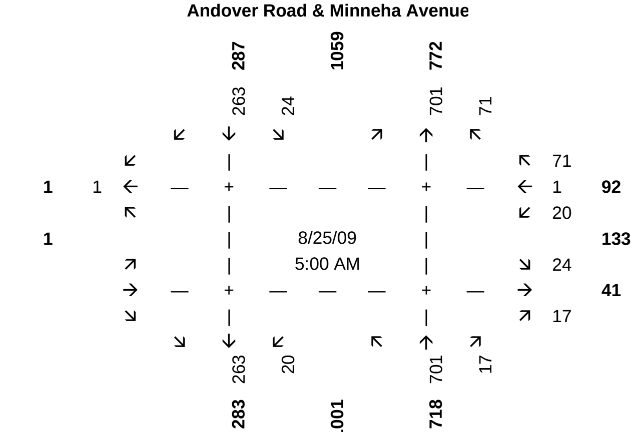
US-54 & Andover Road



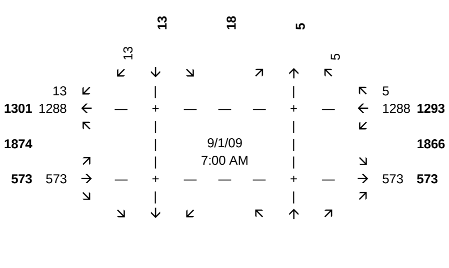
Andover Road & Cloud Avenue



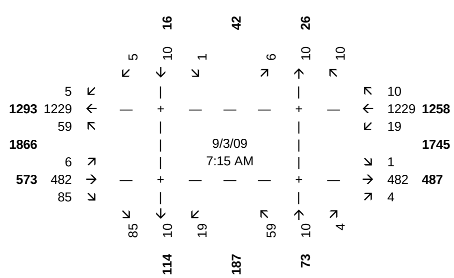
Andover Road & Minneha Avenue



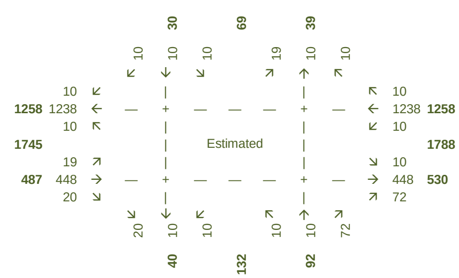
US-54 & Sunset Drive



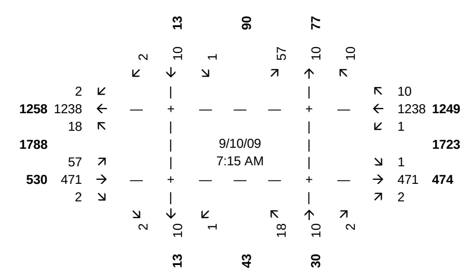
US-54 & Yorktown Road



US-54 & Housing Developments



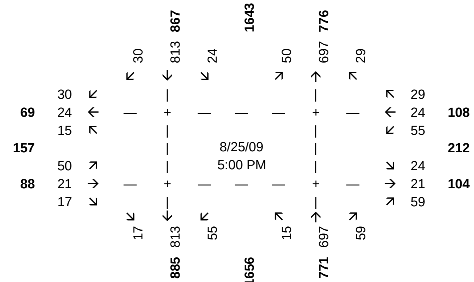
US-54 & Prairie Creek Road



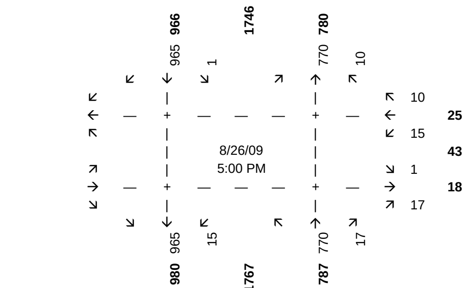
US-54 Concept Study
Andover, Kansas

Existing Traffic Volumes
PM Peak Hour

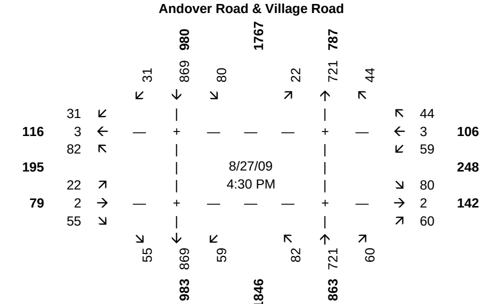
Andover Road & Douglas Avenue



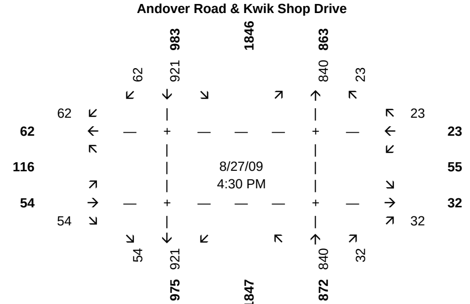
Andover Road & Willowbrook Street



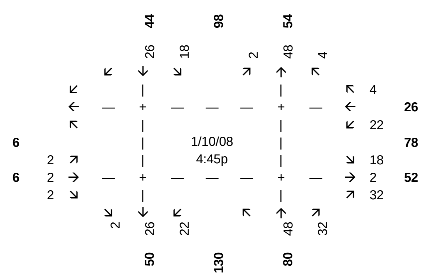
Andover Road & Village Road



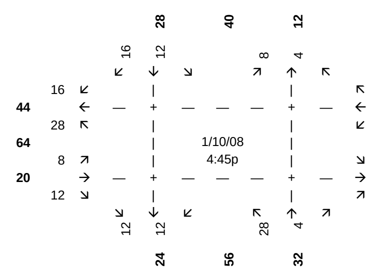
Andover Road & Kwik Shop Drive



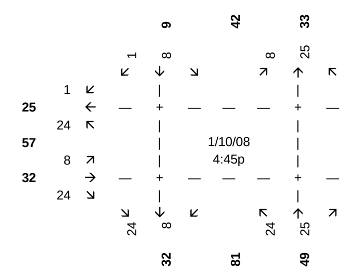
Jamestown & Onewood Dr



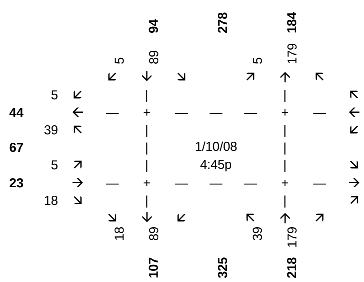
Jamestown & Williamsburg



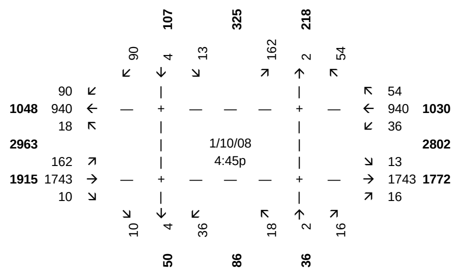
Concord Dr & Village Road



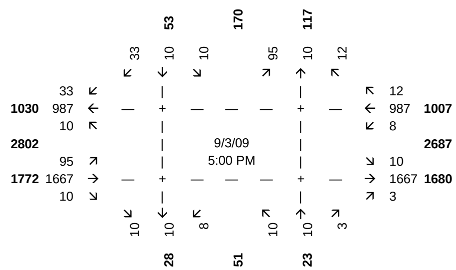
Willowbrook & 159th



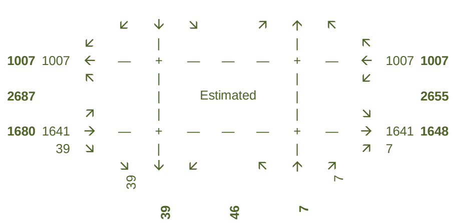
US 54 & 159th



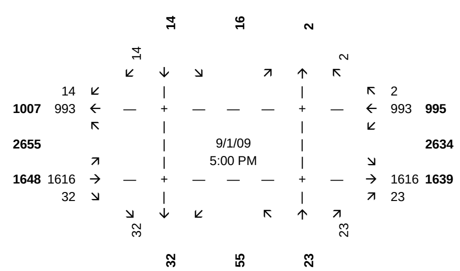
US-54 & Onewood Drive



US-54 & Allen Street



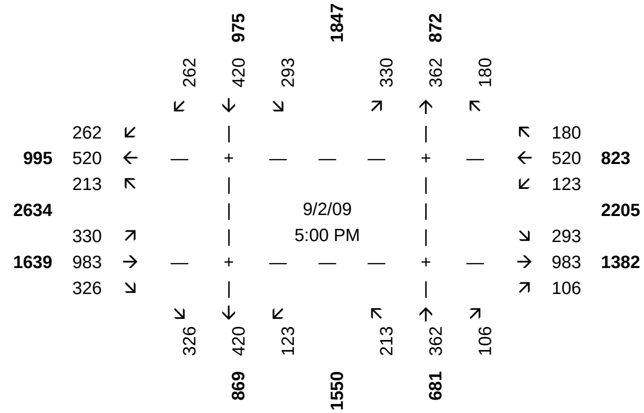
US-54 & Riverview Street



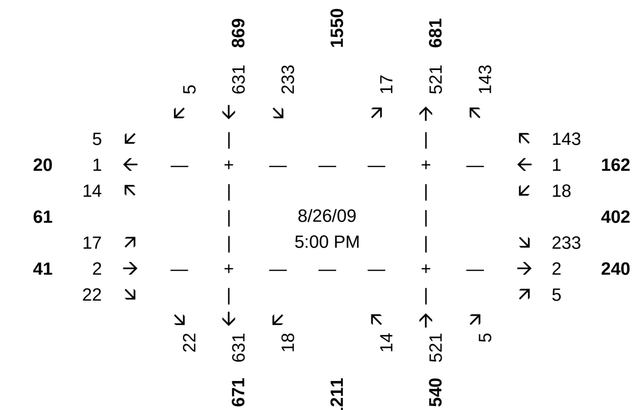
US-54 Concept Study
Andover, Kansas

Existing Traffic Volumes
PM Peak Hour

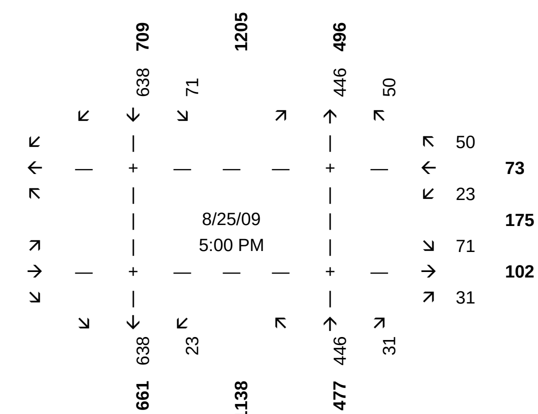
US-54 & Andover Road



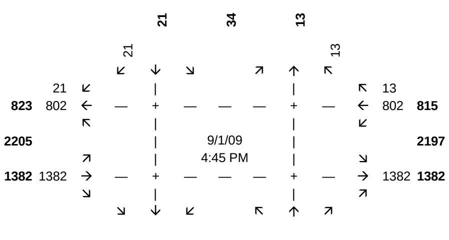
Andover Road & Cloud Avenue



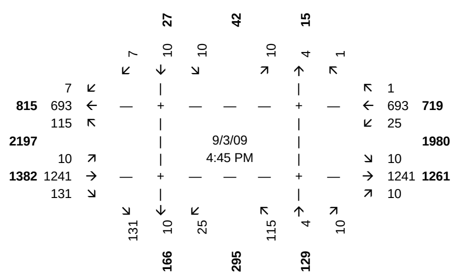
Andover Road & Minneha Avenue



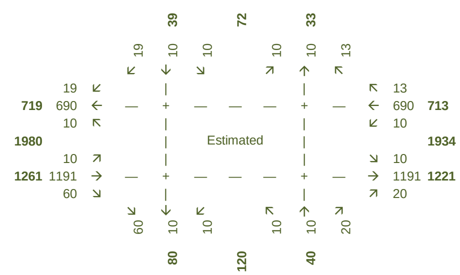
US-54 & Sunset Drive



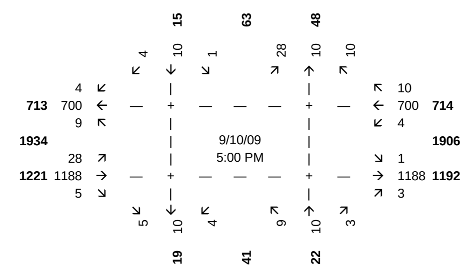
US-54 & Yorktown Road



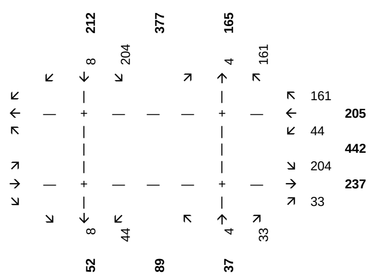
US-54 & Housing Developments

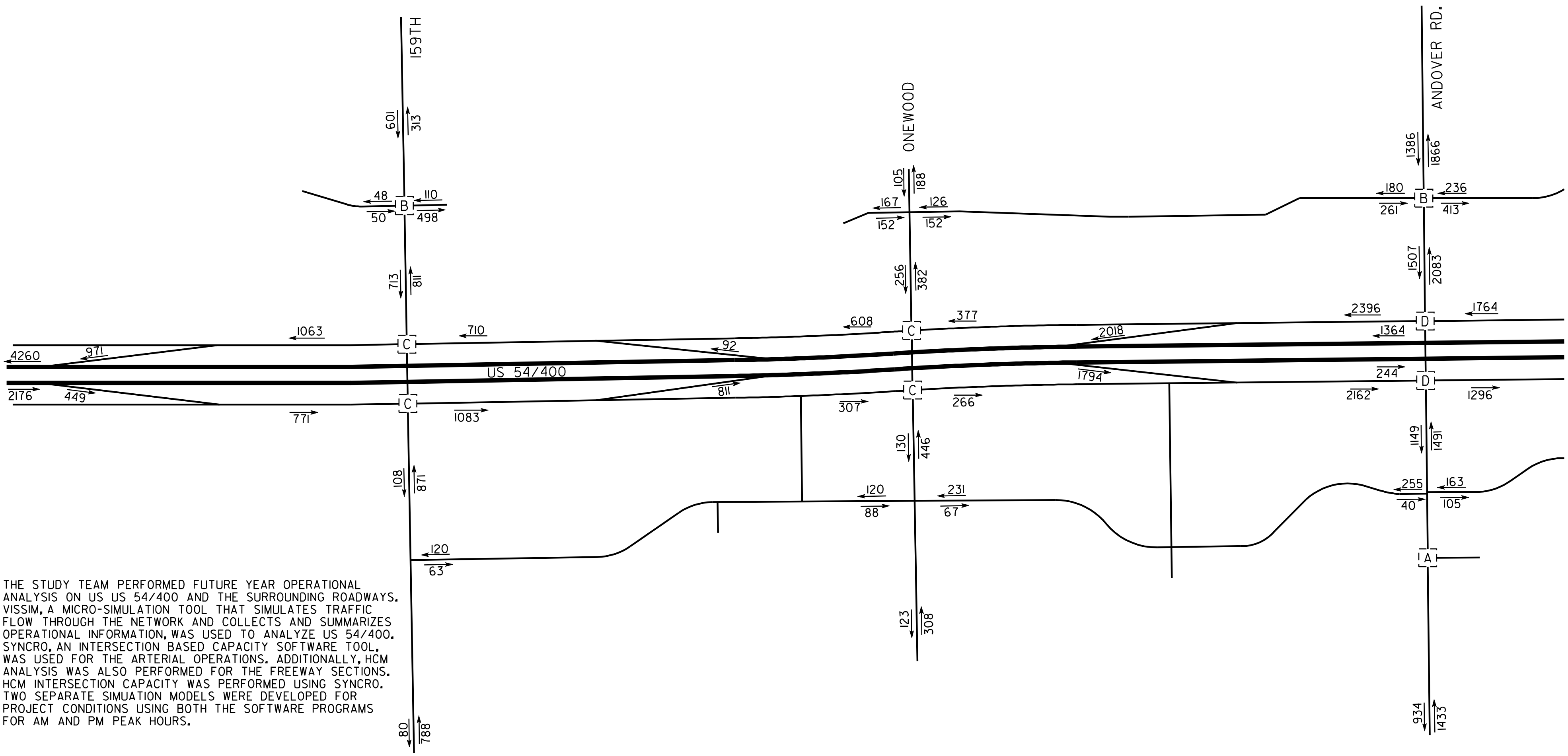


US-54 & Prairie Creek Road



YMCA Drive & Yorktown Road





THE STUDY TEAM PERFORMED FUTURE YEAR OPERATIONAL ANALYSIS ON US 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. SYNCRO, AN INTERSECTION BASED CAPACITY SOFTWARE TOOL, WAS USED FOR THE ARTERIAL OPERATIONS. ADDITIONALLY, HCM ANALYSIS WAS ALSO PERFORMED FOR THE FREEWAY SECTIONS. HCM INTERSECTION CAPACITY WAS PERFORMED USING SYNCRO. TWO SEPARATE SIMUATION MODELS WERE DEVELOPED FOR PROJECT CONDITIONS USING BOTH THE SOFTWARE PROGRAMS FOR AM AND PM PEAK HOURS.

FIGURE 5a

AM PEAK HOUR PROJECTED FUTURE YEAR TRAFFIC VOLUMES & LEVEL OF SERVICE

TranSystems

B AM LEVEL OF SERVICE (SIGNALIZED INTERSECTIONS)

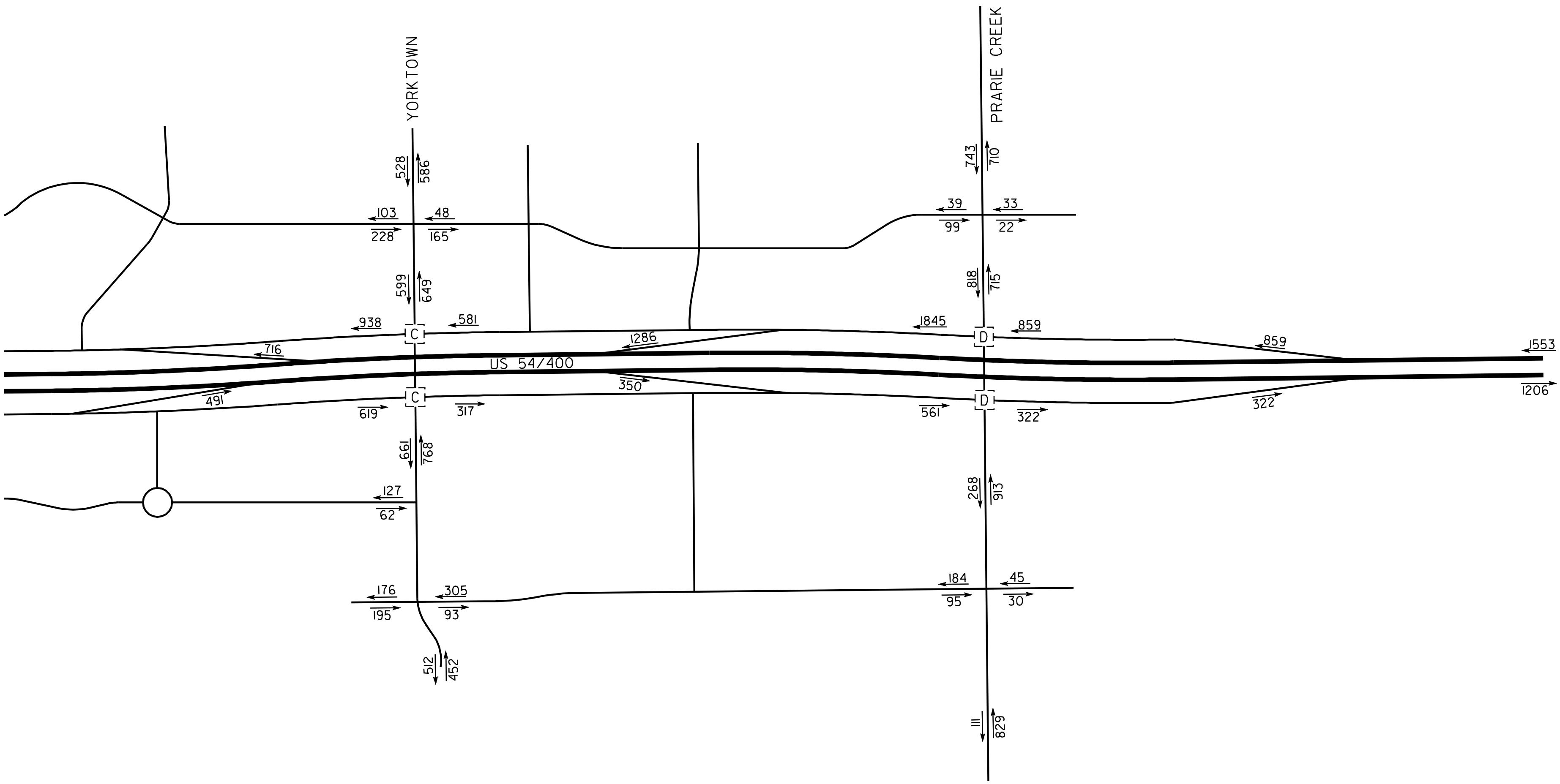


FIGURE 5b

AM PEAK HOUR PROJECTED FUTURE YEAR
TRAFFIC VOLUMES & LEVEL OF SERVICE

TranSystems

B AM LEVEL OF SERVICE (SIGNALIZED INTERSECTIONS)

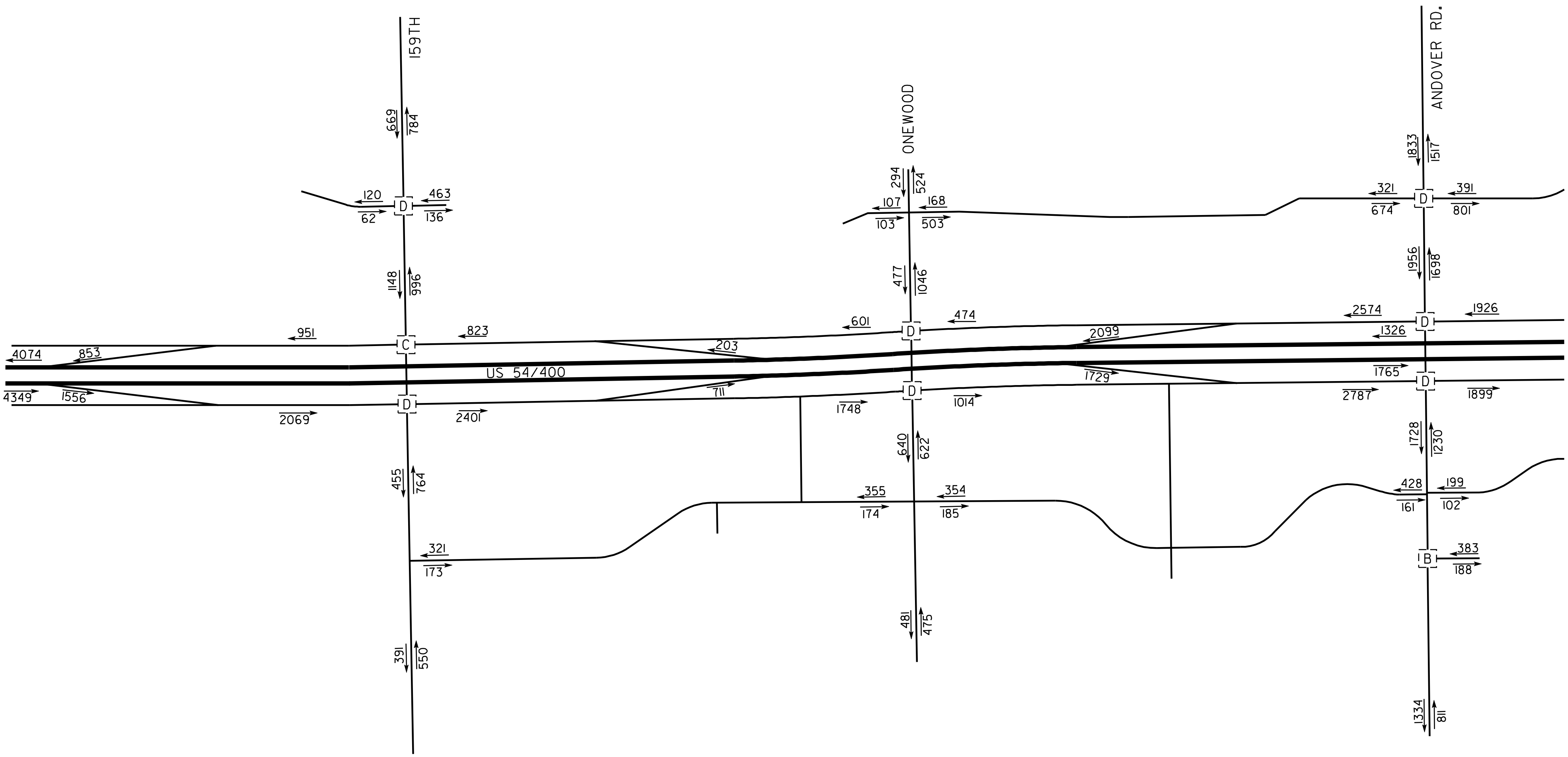


FIGURE 6a

PM PEAK HOUR PROJECTED FUTURE YEAR TRAFFIC VOLUMES & LEVEL OF SERVICE

TranSystems

B PM LEVEL OF SERVICE (SIGNALIZED INTERSECTIONS)

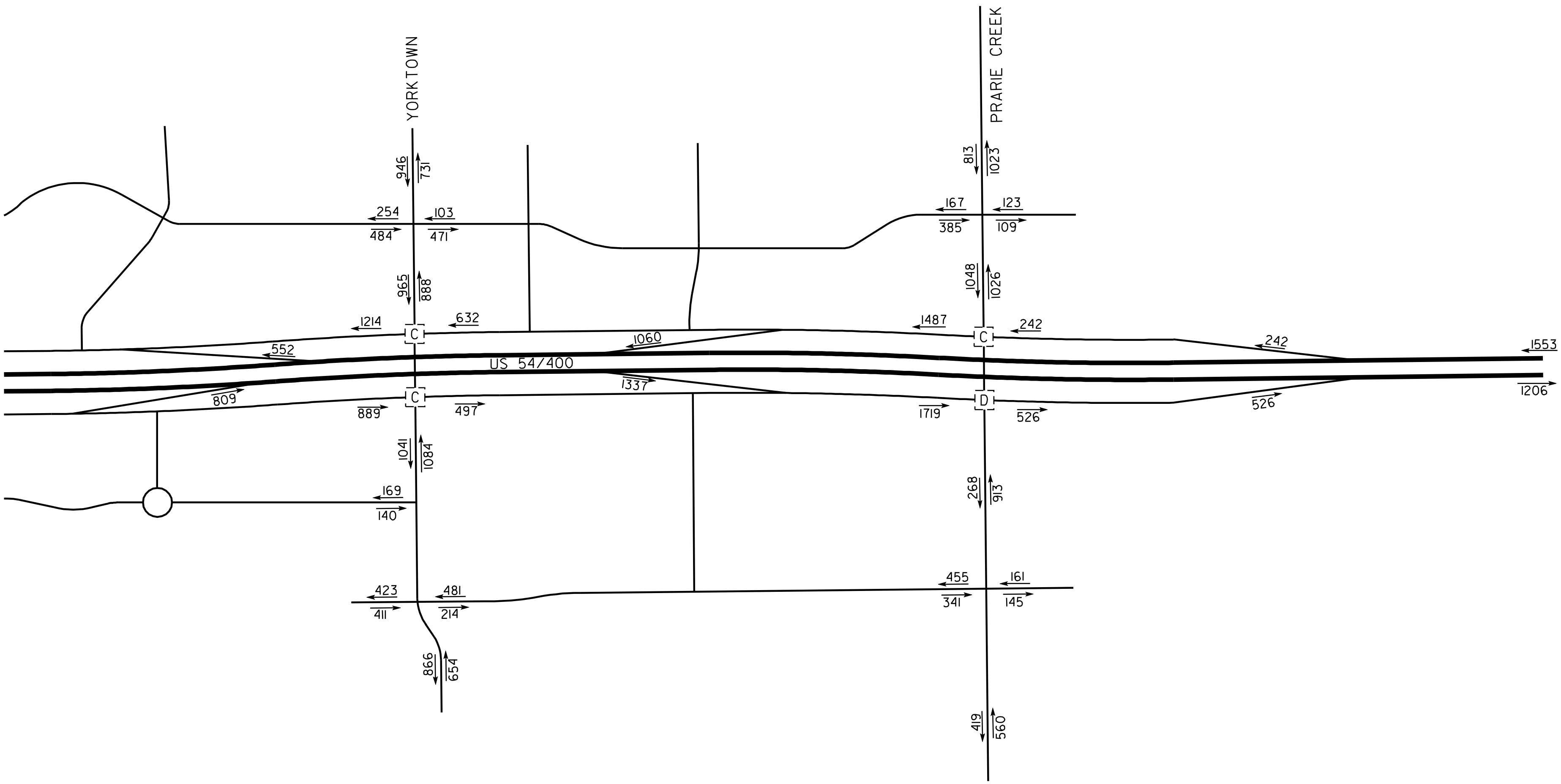
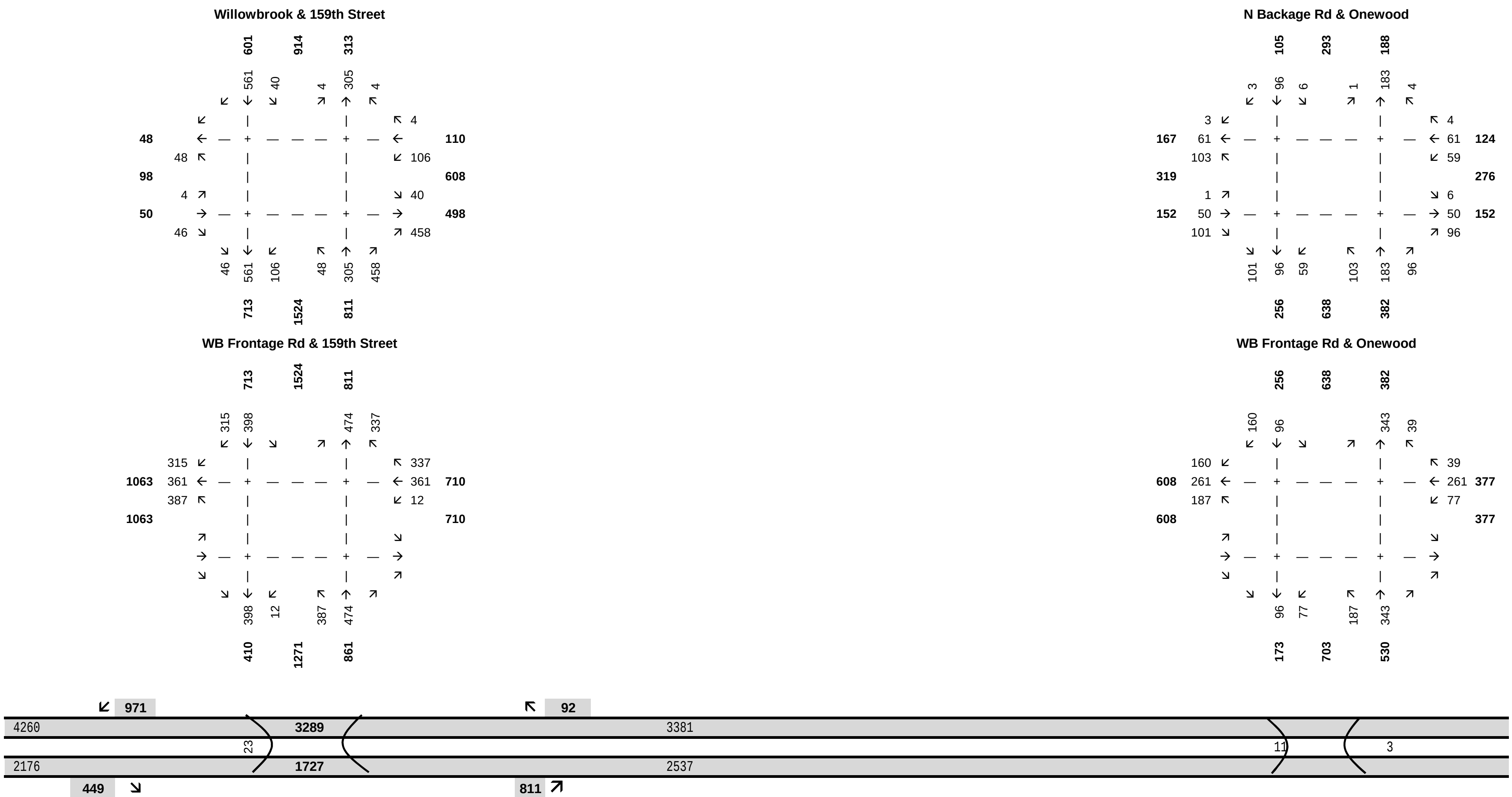


FIGURE 6b

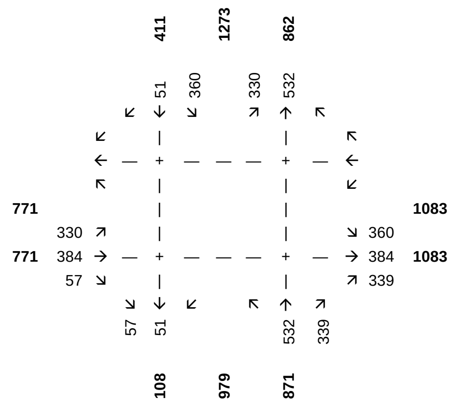
PM PEAK HOUR PROJECTED FUTURE YEAR TRAFFIC VOLUMES & LEVEL OF SERVICE

TranSystems

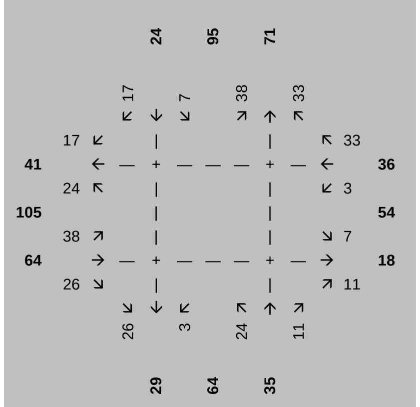
B PM LEVEL OF SERVICE (SIGNALIZED INTERSECTIONS)


Willowbrook & 159th Street
N Backage Rd & Onewood
WB Frontage Rd & 159th Street
WB Frontage Rd & Onewood
971
92
4260
3289
3381
23
11
3
2176
1727
2537
449
811

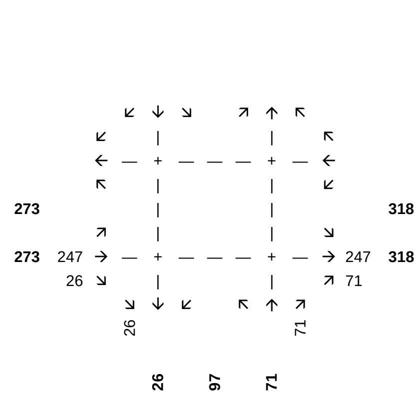
EB Frontage Rd & 159th Street



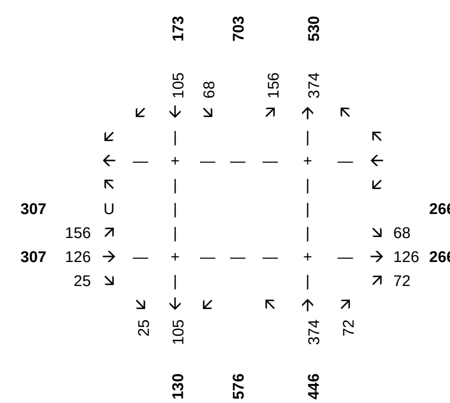
Mid Drive & Ruth



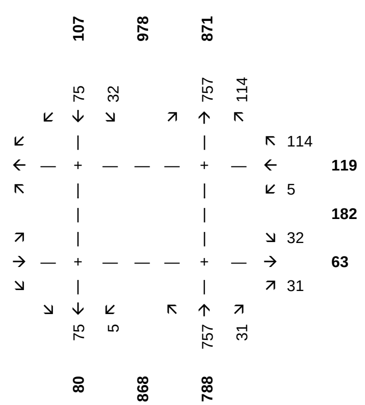
EB Frontage Rd & Ruth



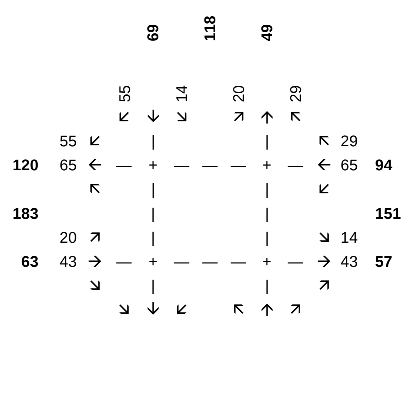
EB Frontage Rd & Onewood



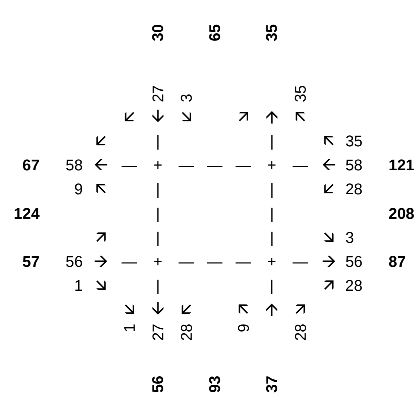
S Backage Rd & 159th Street



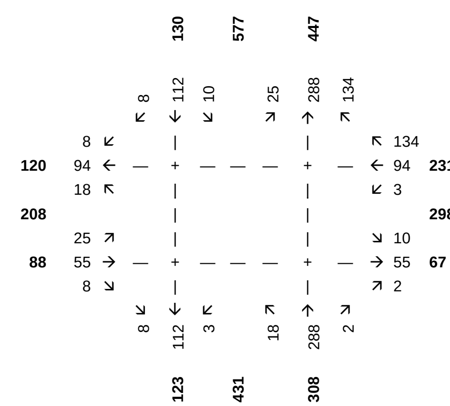
S Backage Rd & Drive

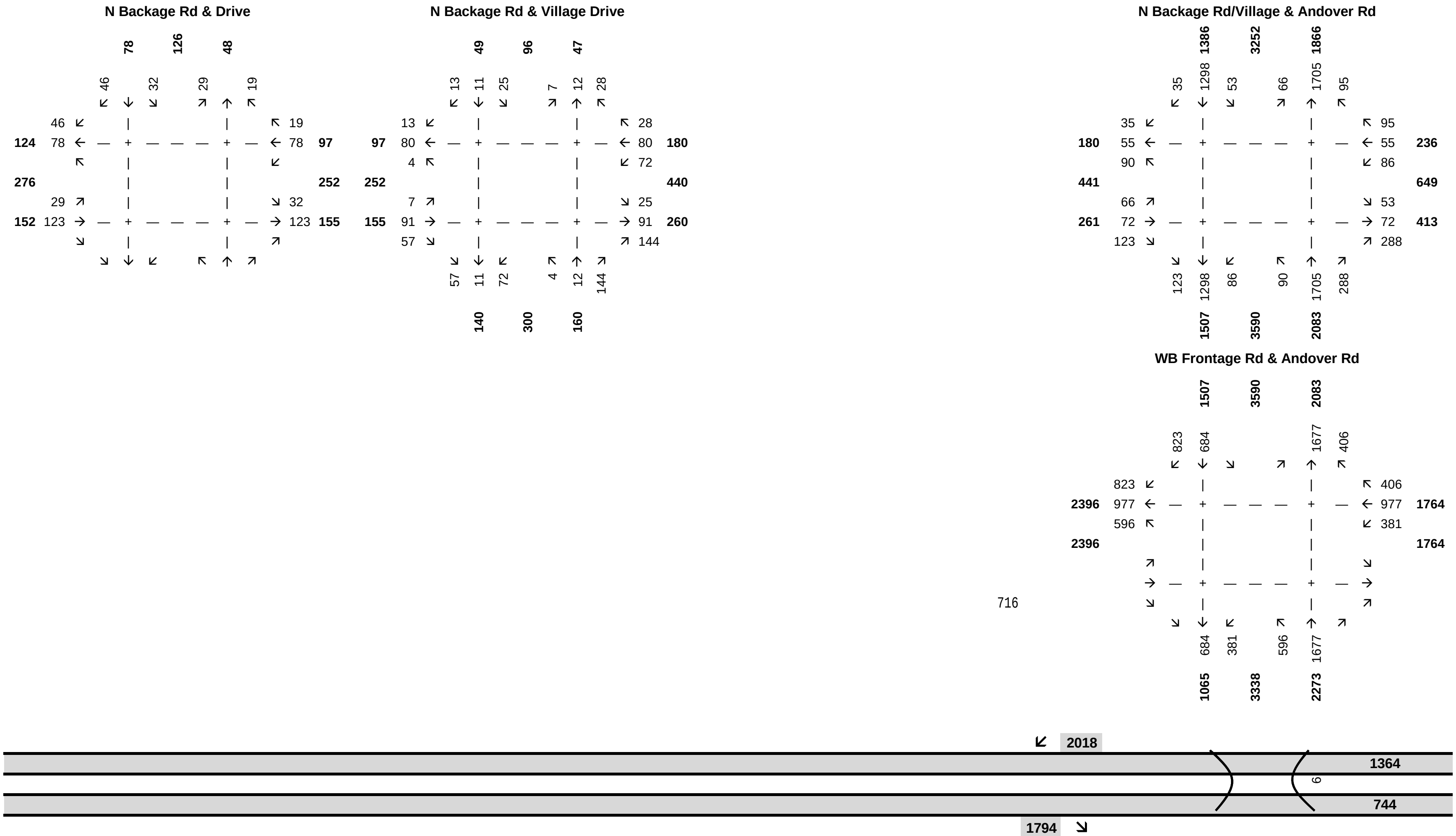


S Backage Rd & Ruth

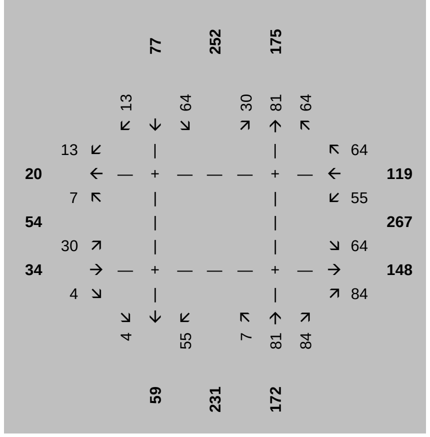


S Backage Rd & Onewood

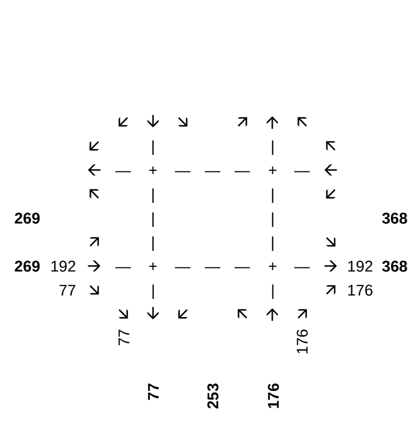



N Backage Rd & Drive
78 126 48
46 32 29 19
46 19
124 78 78 97
276 252
29 32
152 123 123 155
N Backage Rd & Village Drive
49 96 47
13 11 25 7 12 28
13 28
97 80 80 180
4 72
252 440
7 25
155 91 91 260
57 144
57 11 72 4 12 144
140 300 160
N Backage Rd/Village & Andover Rd
1386 3252 1866
35 1298 53 66 1705 95
35 95
180 55 55 236
90 86
441 649
66 53
261 72 72 413
123 288
123 1298 86 90 1705 288
1507 3590 2083
WB Frontage Rd & Andover Rd
1507 3590 2083
823 684 1677 406
823 406
2396 977 977 1764
596 381
2396 1764
716
684 381 596 1677
1065 3338 2273
2018
1364
6
744
1794

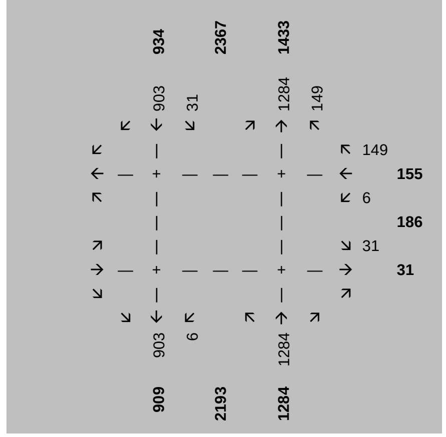
Mid Dr & Allen



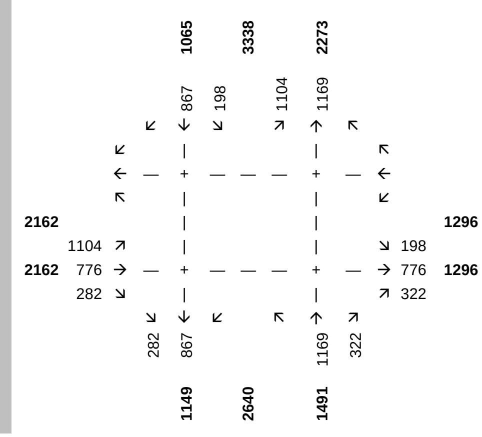
EB Frontage Rd & Allen



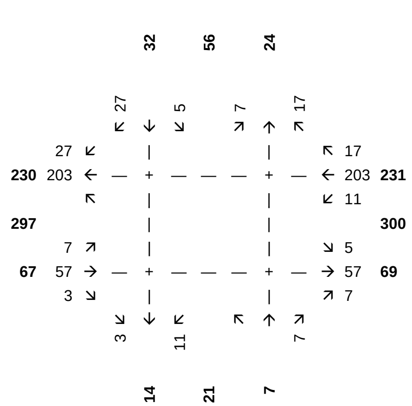
Dillons & Andover Rd



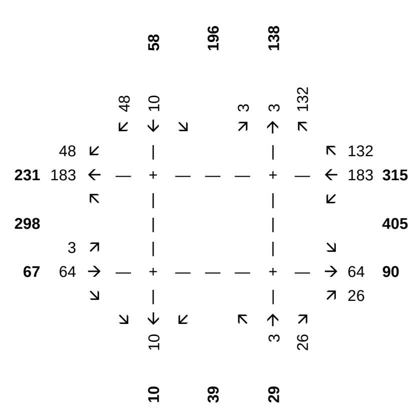
EB Frontage Rd & Andover Rd



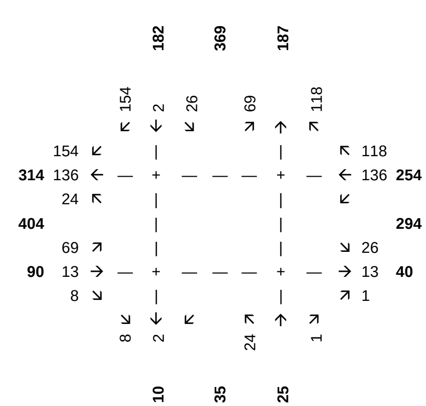
S Backage Rd & Drive



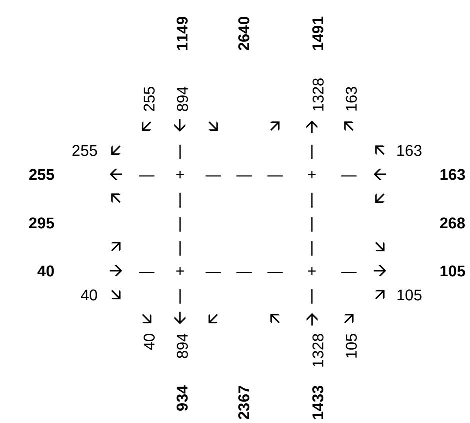
S Backage Rd & Allen

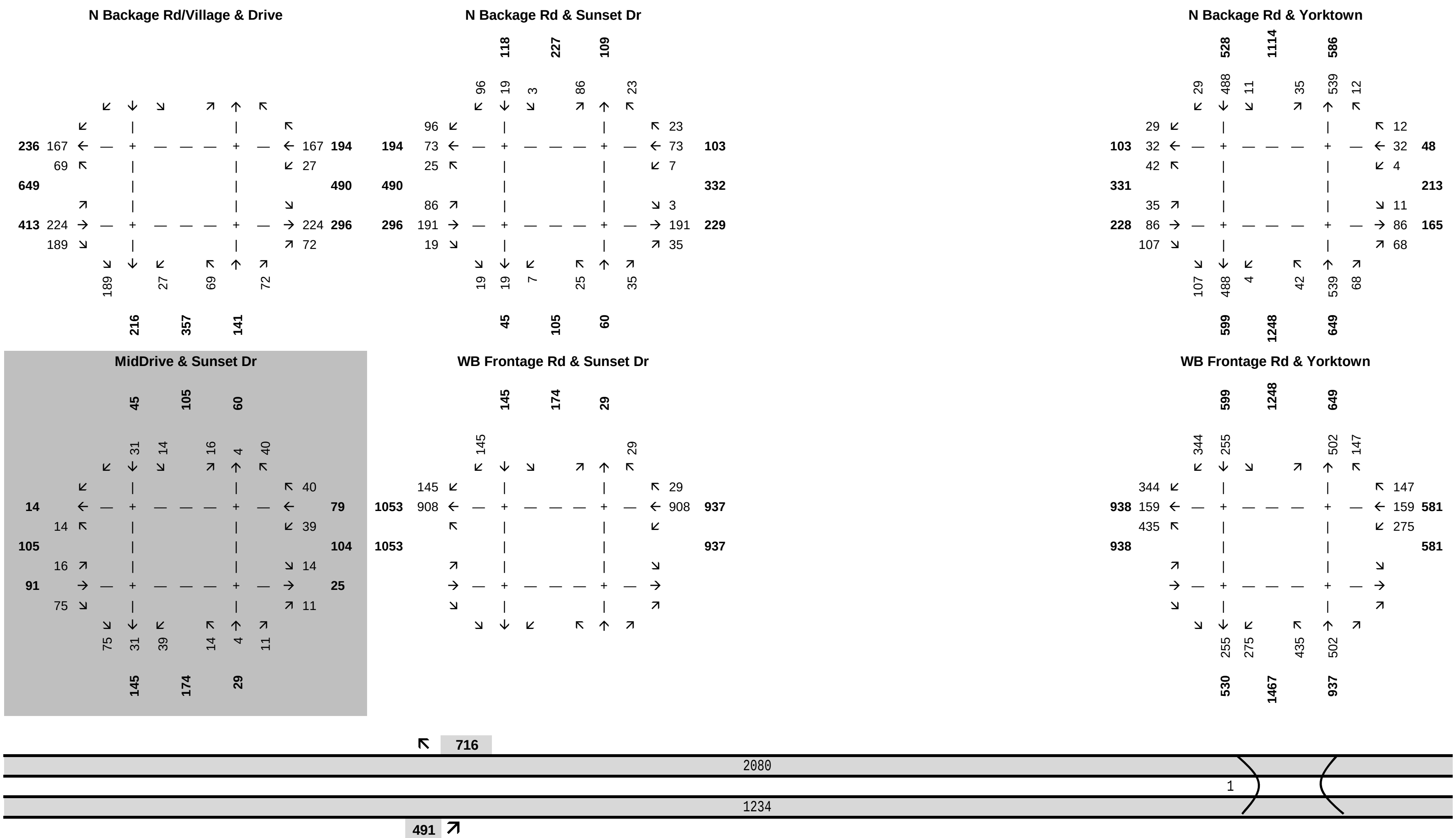


S Backage Rd & Riverview



S Backage Rd/Cloud & Andover Rd

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N Backage Rd & Sunset Dr
N Backage Rd & Yorktown
MidDrive & Sunset Dr
WB Frontage Rd & Sunset Dr
WB Frontage Rd & Yorktown
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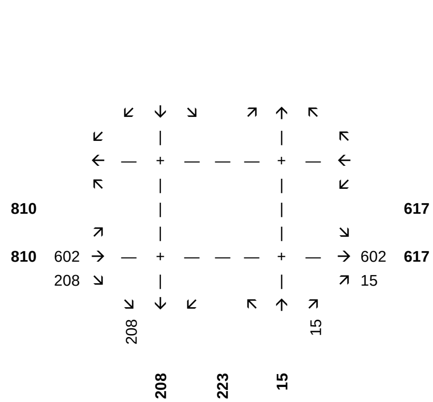
2080
1
1234
491

EB Frontage Rd & Roundabout Dr



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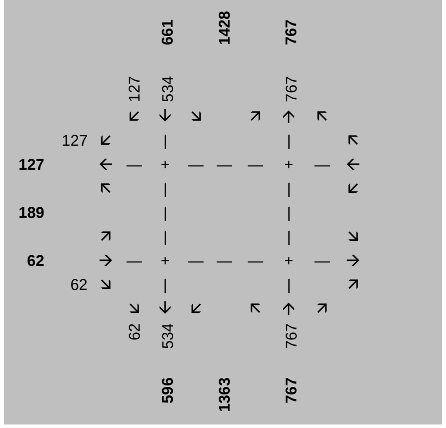

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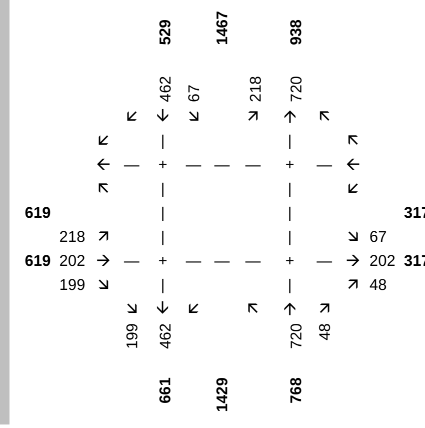
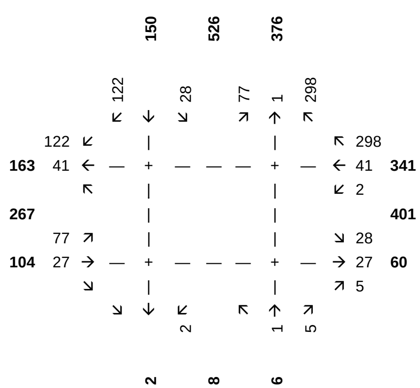


Dillons Dr & Cloud



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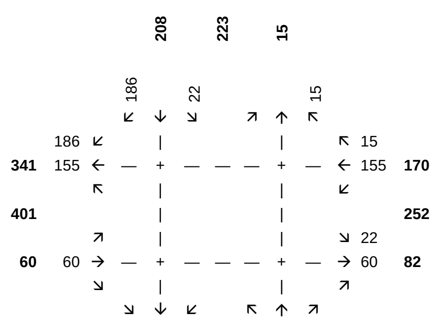

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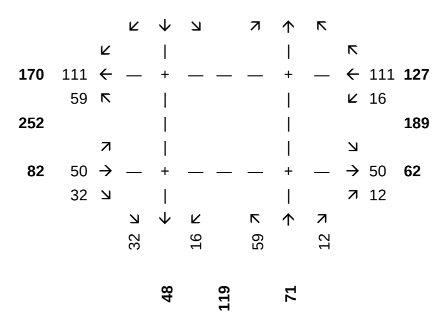

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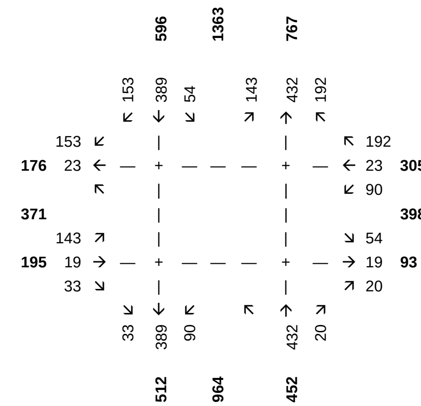
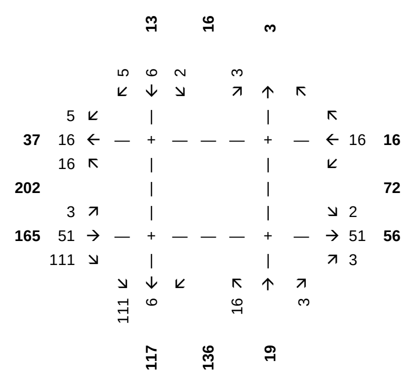
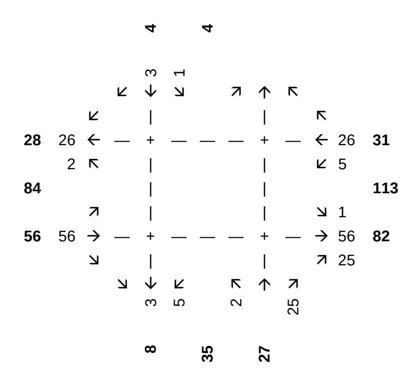


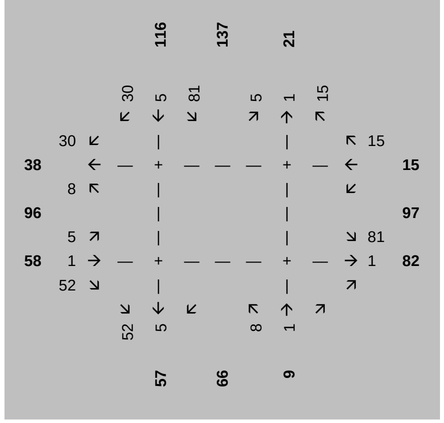
N Bakcage Rd & Archer



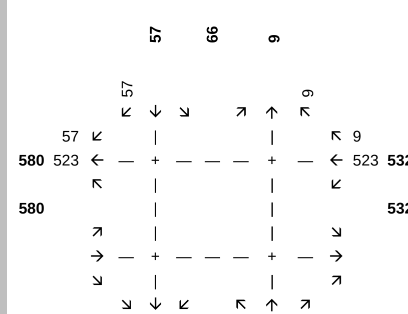
N Backage Rd & McCandless



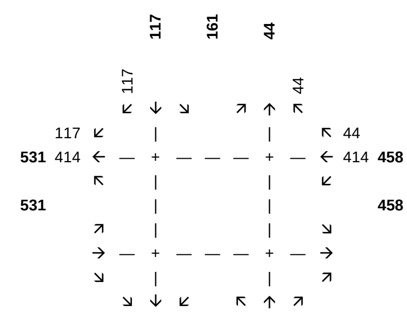
Mid Drive & Archer



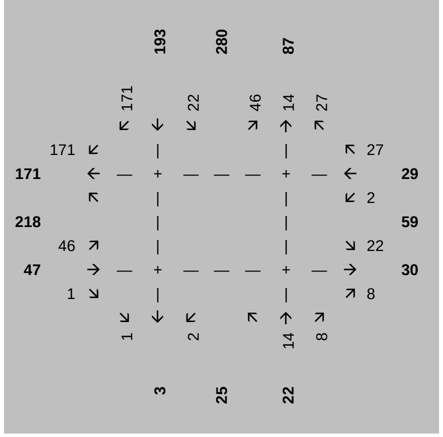
WB Frontage Rd & Archer



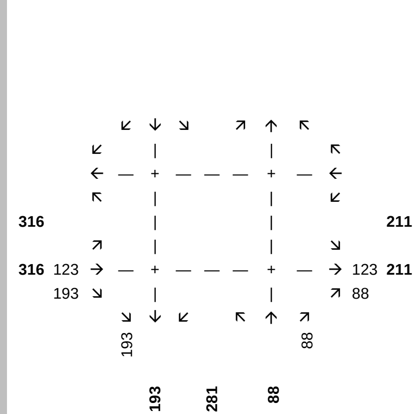
WB Frontage Rd & McCandless



Mid Drive & YMCA Dr



EB Frontage Rd & YMCA Dr



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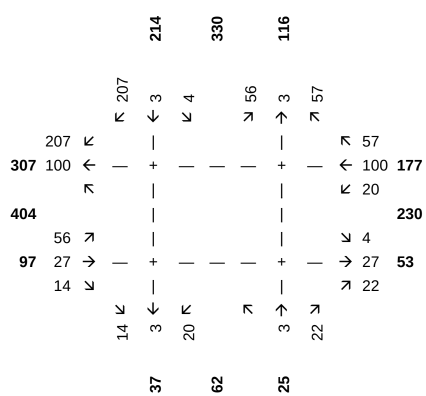

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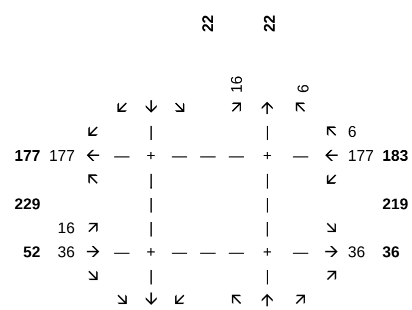
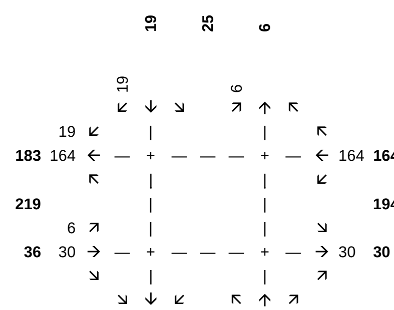
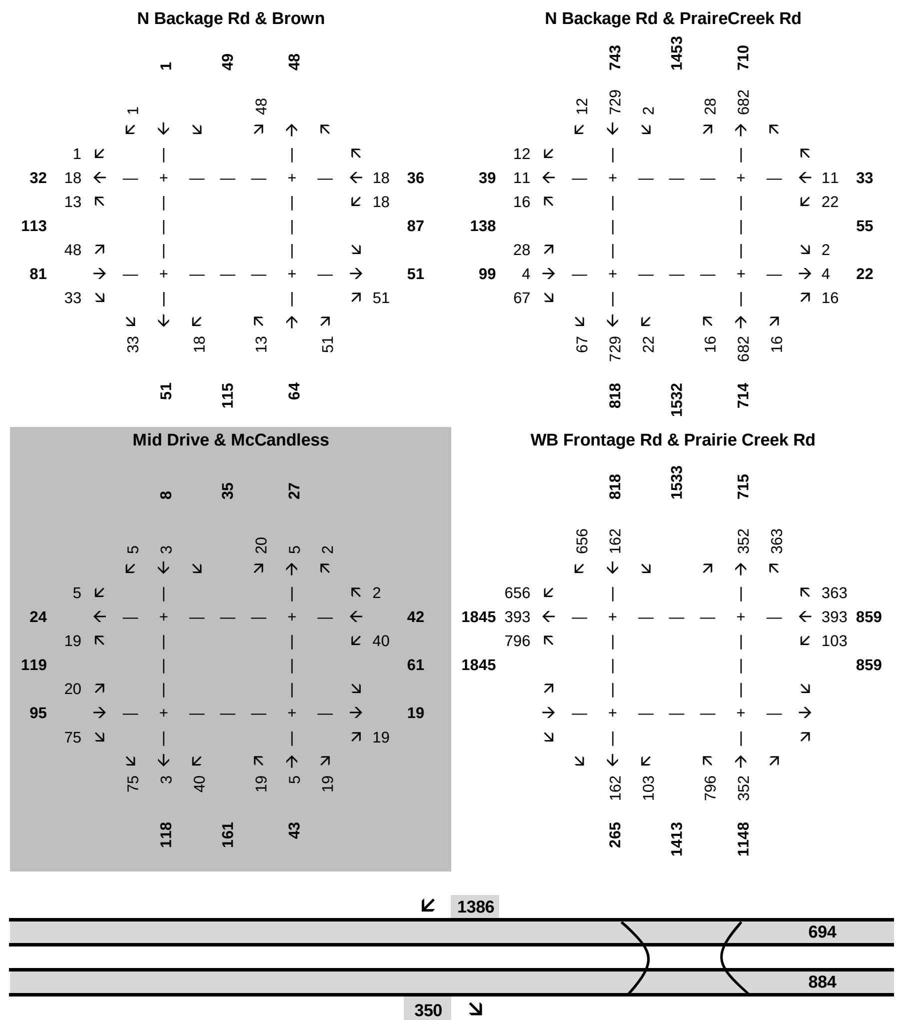


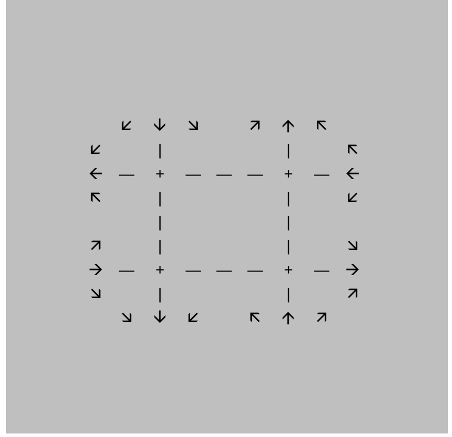
S Backage Rd & McCandless



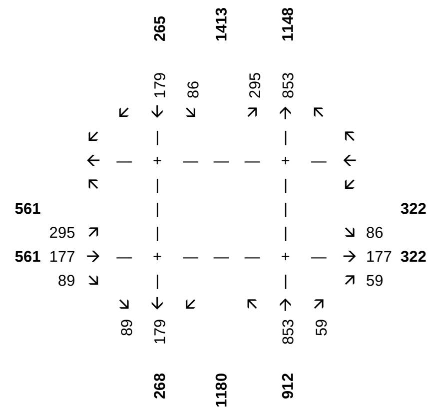


N Backage Rd & Brown
1 49 48
1 48
1
32 18 18 36
13 18
113 87
48
81 51
33 51
33 18 13 51
51 115 64
N Backage Rd & PraireCreek Rd
743 1453 710
12 729 2 28 682
12
39 11 11 33
16 22
138 55
28 2
99 4 4 22
67 16
67 729 22 16 682 16
818 1532 714
Mid Drive & McCandless
8 35 27
5 3 20 5 2
5 2
24 42
19 40
119 61
20
95 19
75 19
75 3 40 19 5 19
118 161 43
WB Frontage Rd & Prairie Creek Rd
818 1533 715
656 162 352 363
656 363
1845 393 393 859
796 103
1845 859
162 103 796 352
265 1413 1148
1386
694
884
350

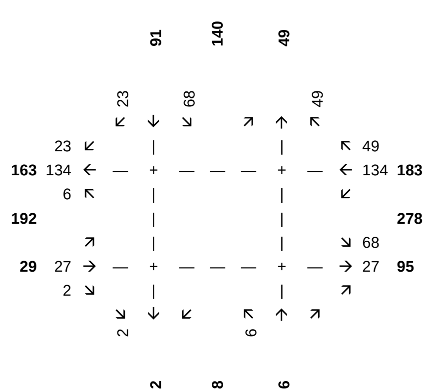
MidDrive and Prairie Creek Rd



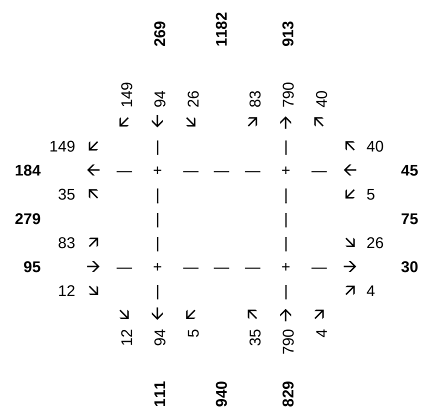
EB Frontage Rd & Prairie Creek Rd

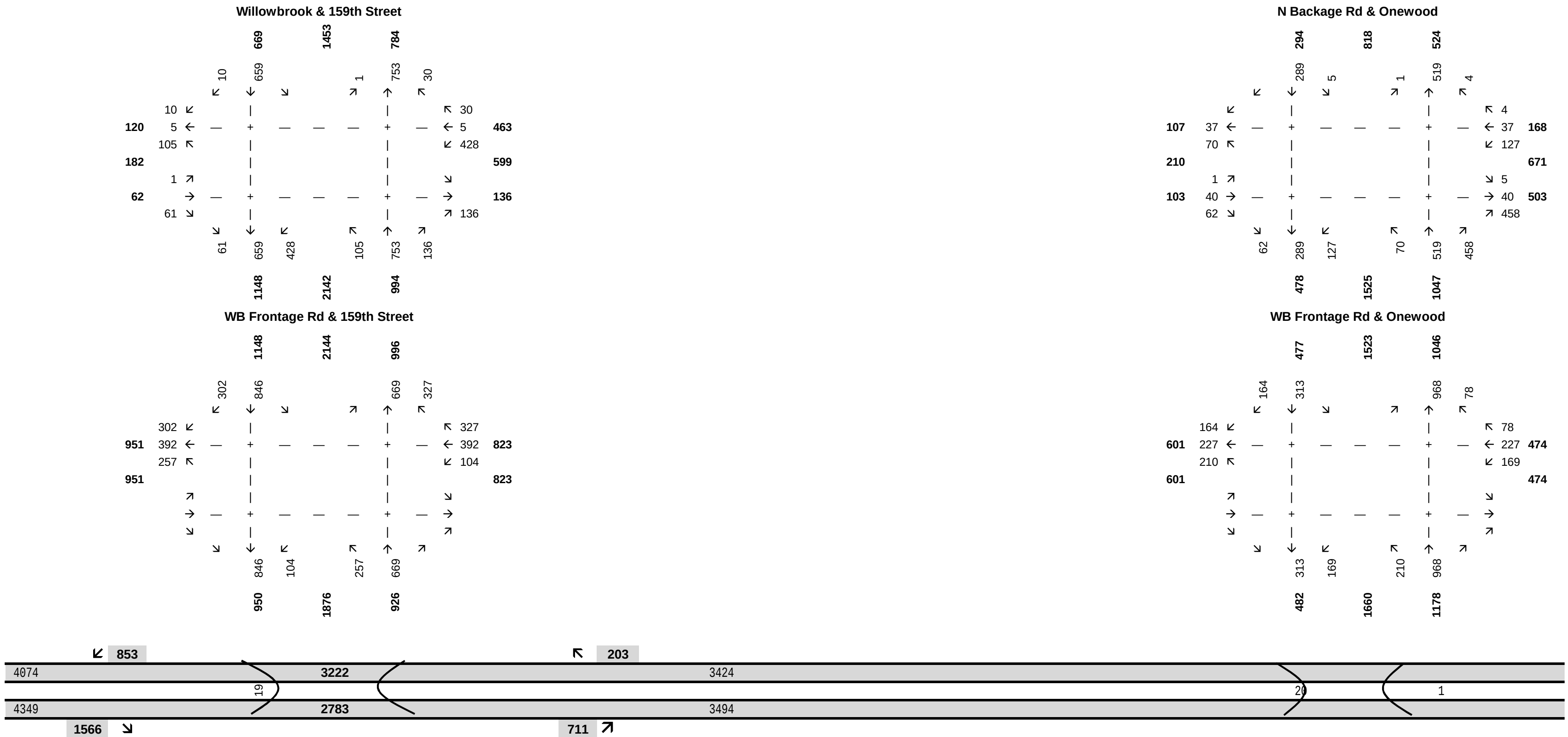


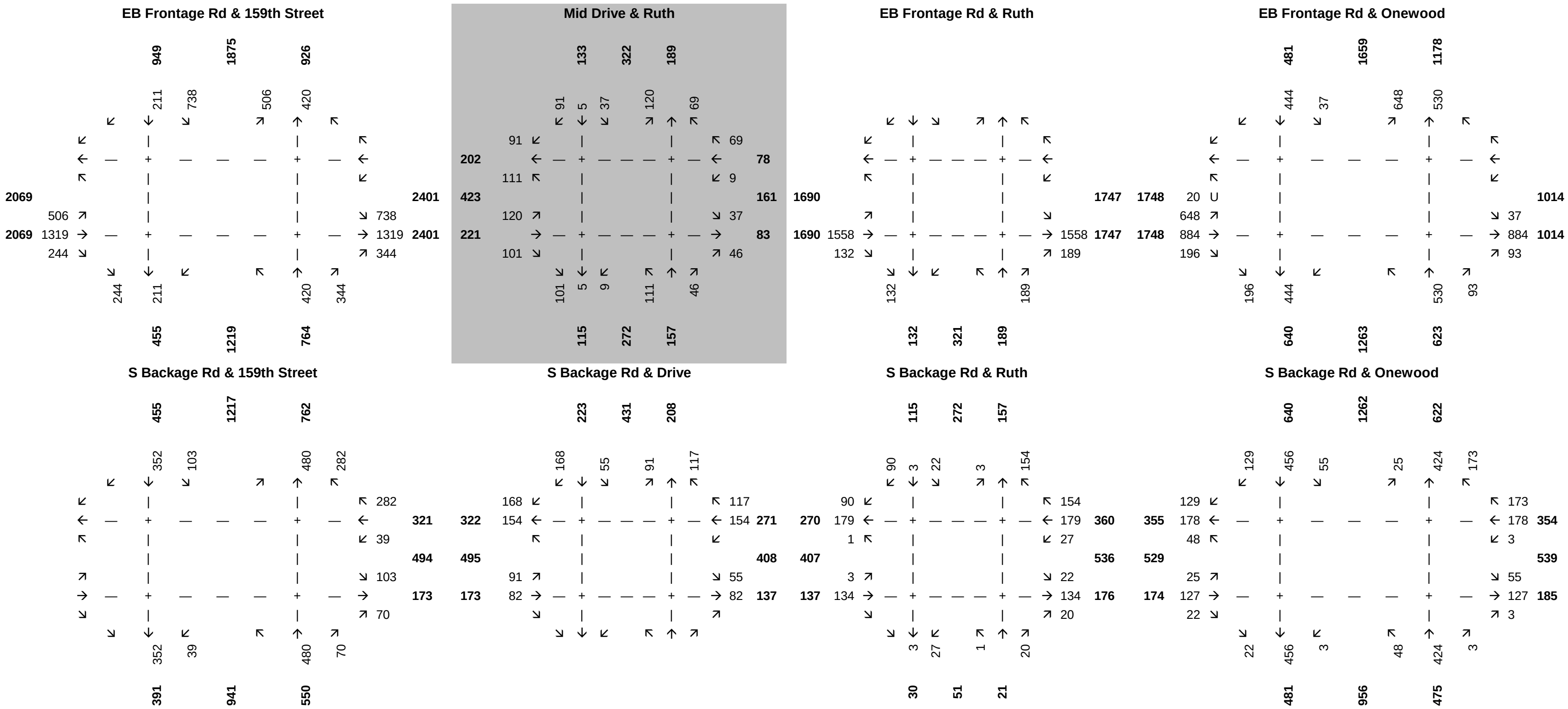
S Backage Rd & Highland

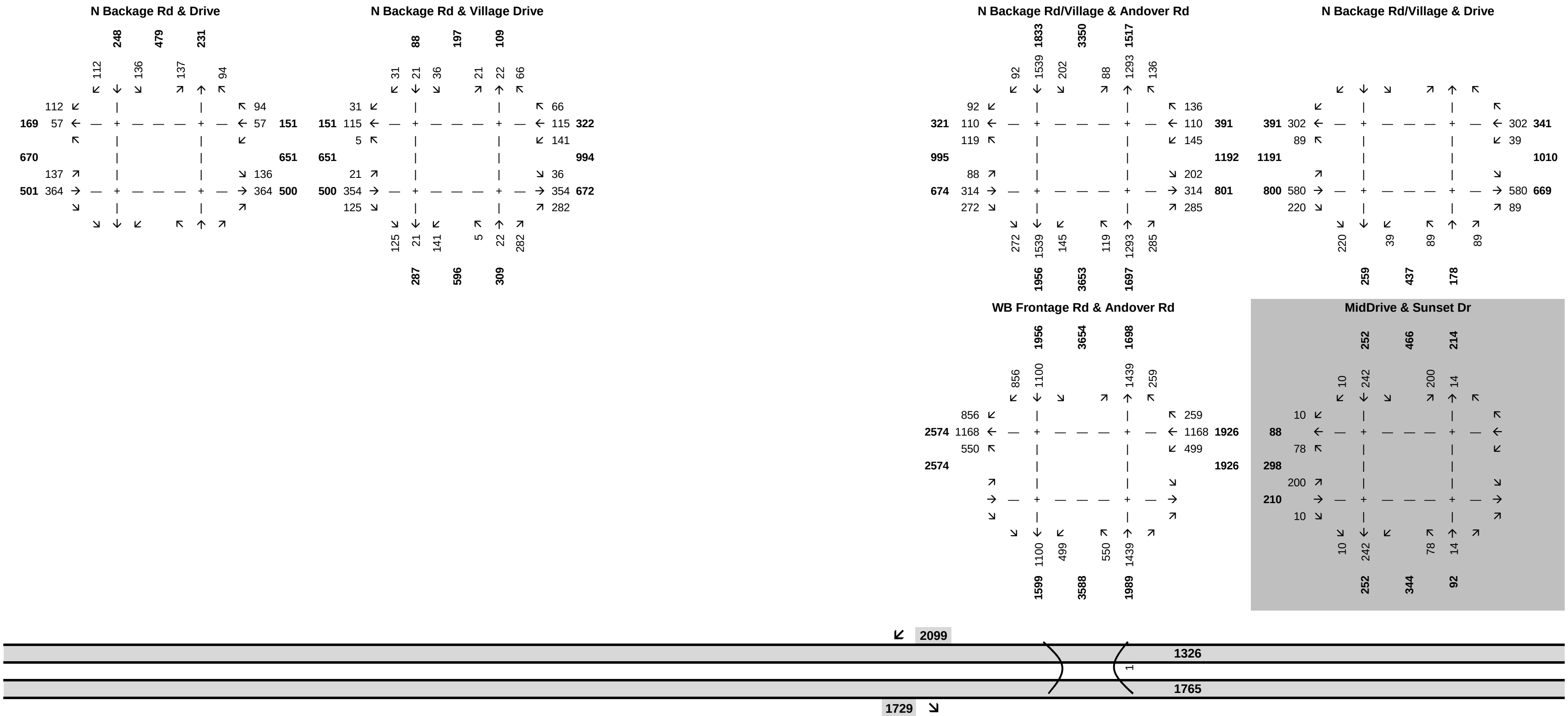


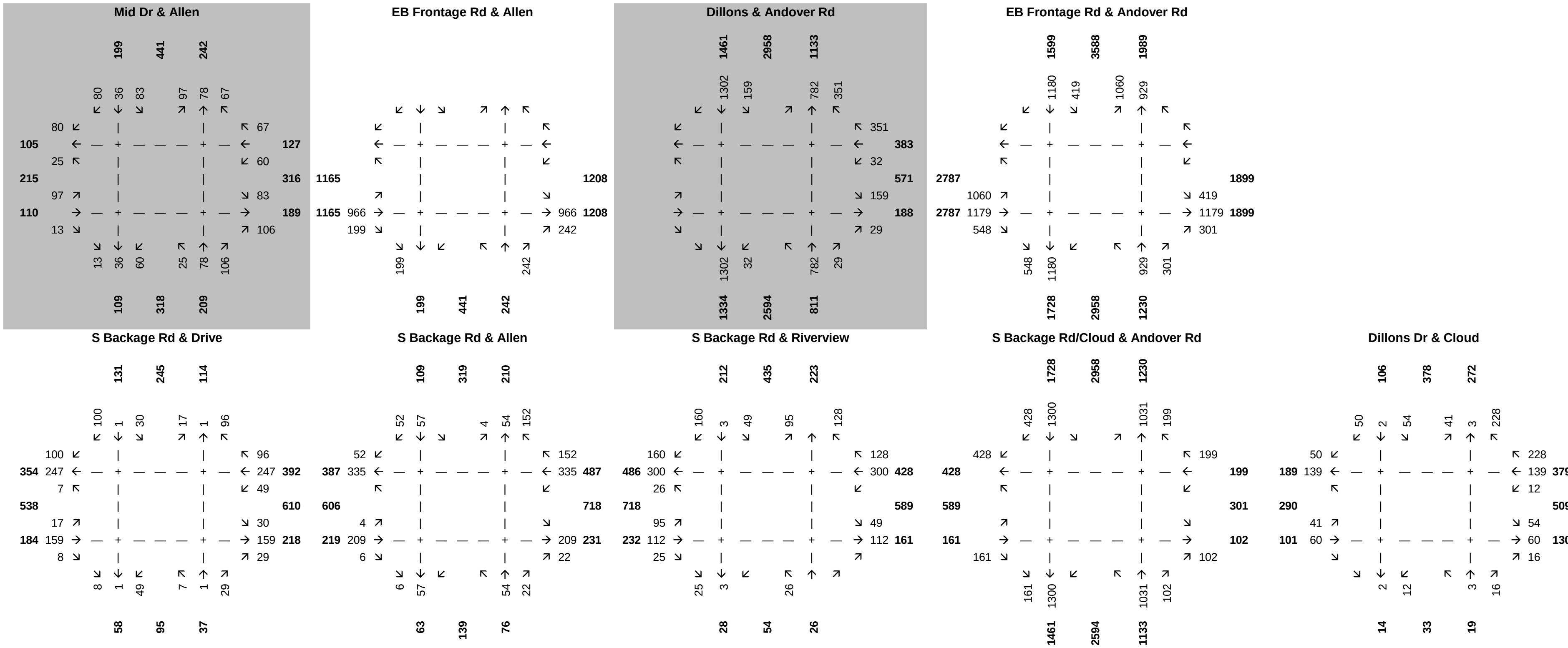
S Backage Rd & PrairieCreek Rd

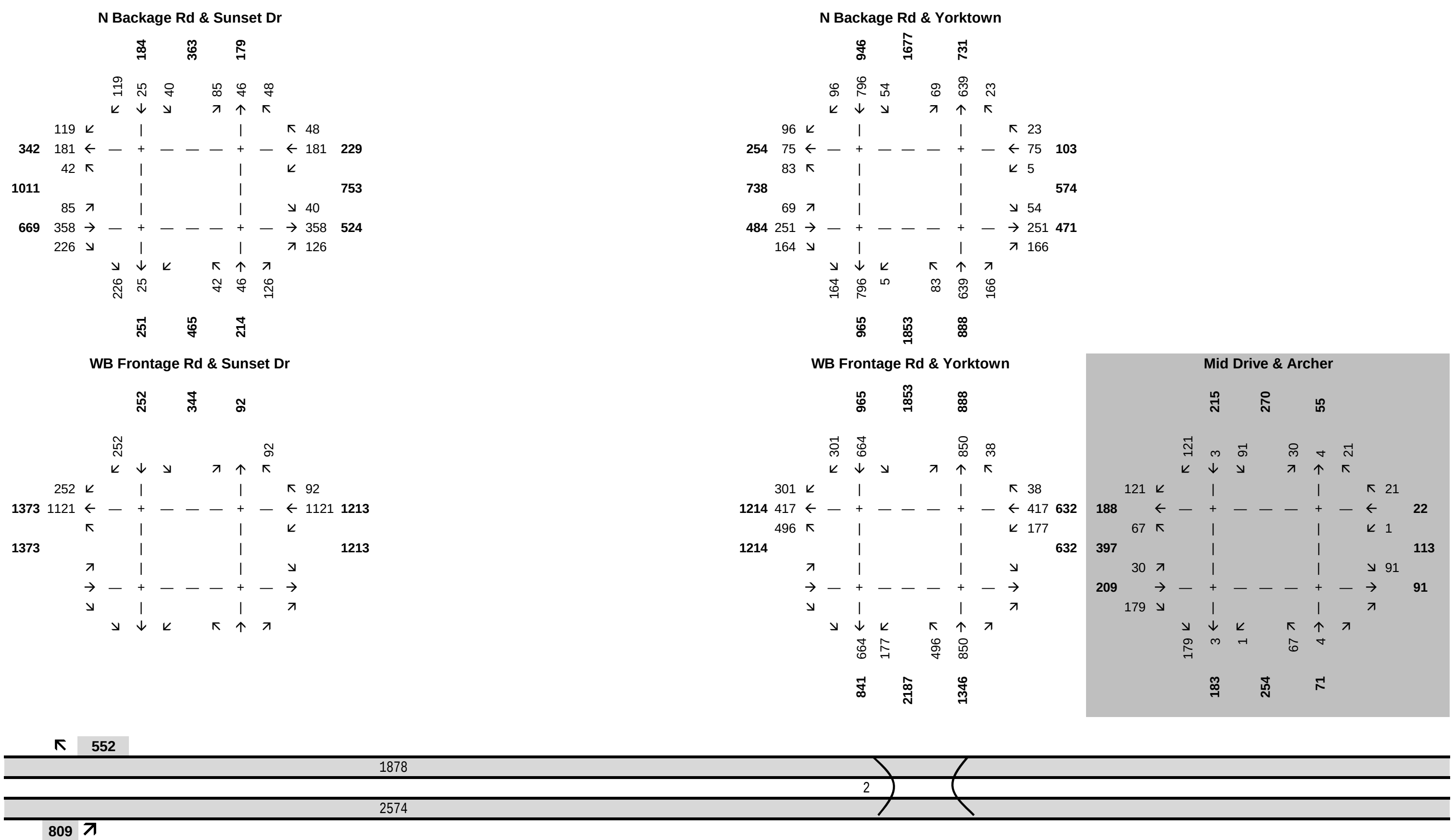



Willowbrook & 159th Street
N Backage Rd & Onewood
WB Frontage Rd & 159th Street
WB Frontage Rd & Onewood
853
203
4074
3222
3424
4349
2783
3494
1566
711

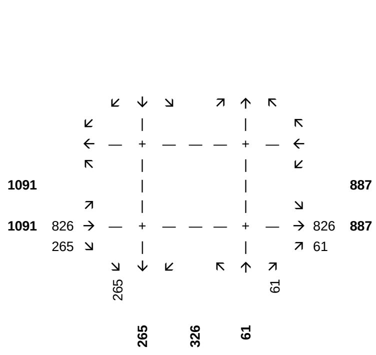

EB Frontage Rd & 159th Street
Mid Drive & Ruth
EB Frontage Rd & Ruth
EB Frontage Rd & Onewood
S Backage Rd & 159th Street
S Backage Rd & Drive
S Backage Rd & Ruth
S Backage Rd & Onewood


N Backage Rd & Drive
N Backage Rd & Village Drive
N Backage Rd/Village & Andover Rd
N Backage Rd/Village & Drive
WB Frontage Rd & Andover Rd
MidDrive & Sunset Dr
2099
1326
1765
1729


Mid Dr & Allen
EB Frontage Rd & Allen
Dillons & Andover Rd
EB Frontage Rd & Andover Rd
S Backage Rd & Drive
S Backage Rd & Allen
S Backage Rd & Riverview
S Backage Rd/Cloud & Andover Rd
Dillons Dr & Cloud


N Backage Rd & Sunset Dr
N Backage Rd & Yorktown
WB Frontage Rd & Sunset Dr
WB Frontage Rd & Yorktown
Mid Drive & Archer
552
1878
2
2574
809

EB Frontage Rd & Roundabout Dr



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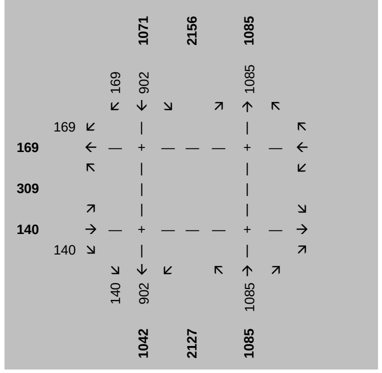

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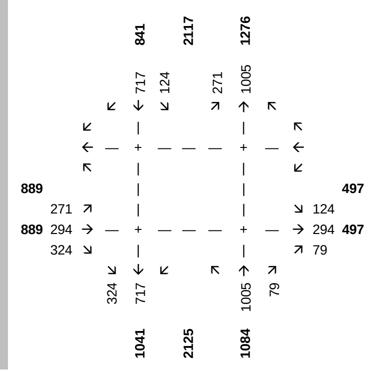

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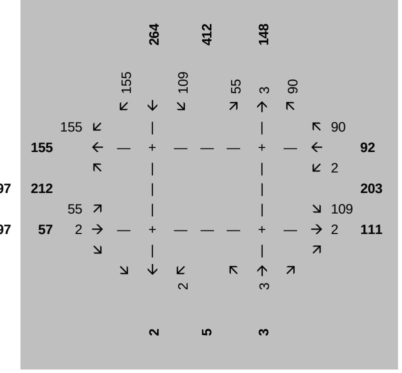
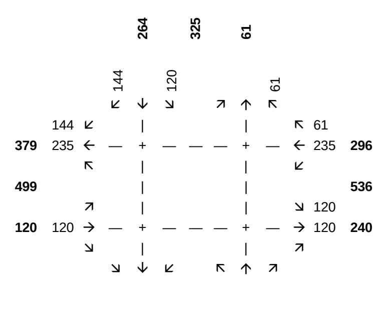


S Backage Rd & Roundabout Dr



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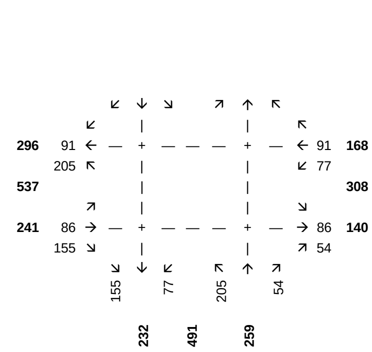

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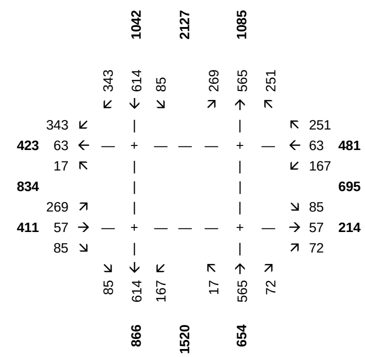
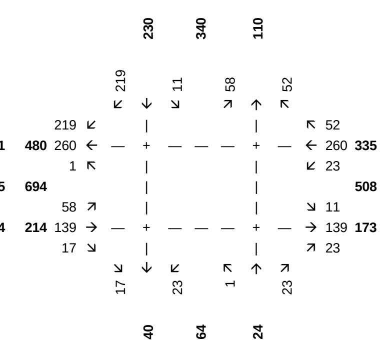
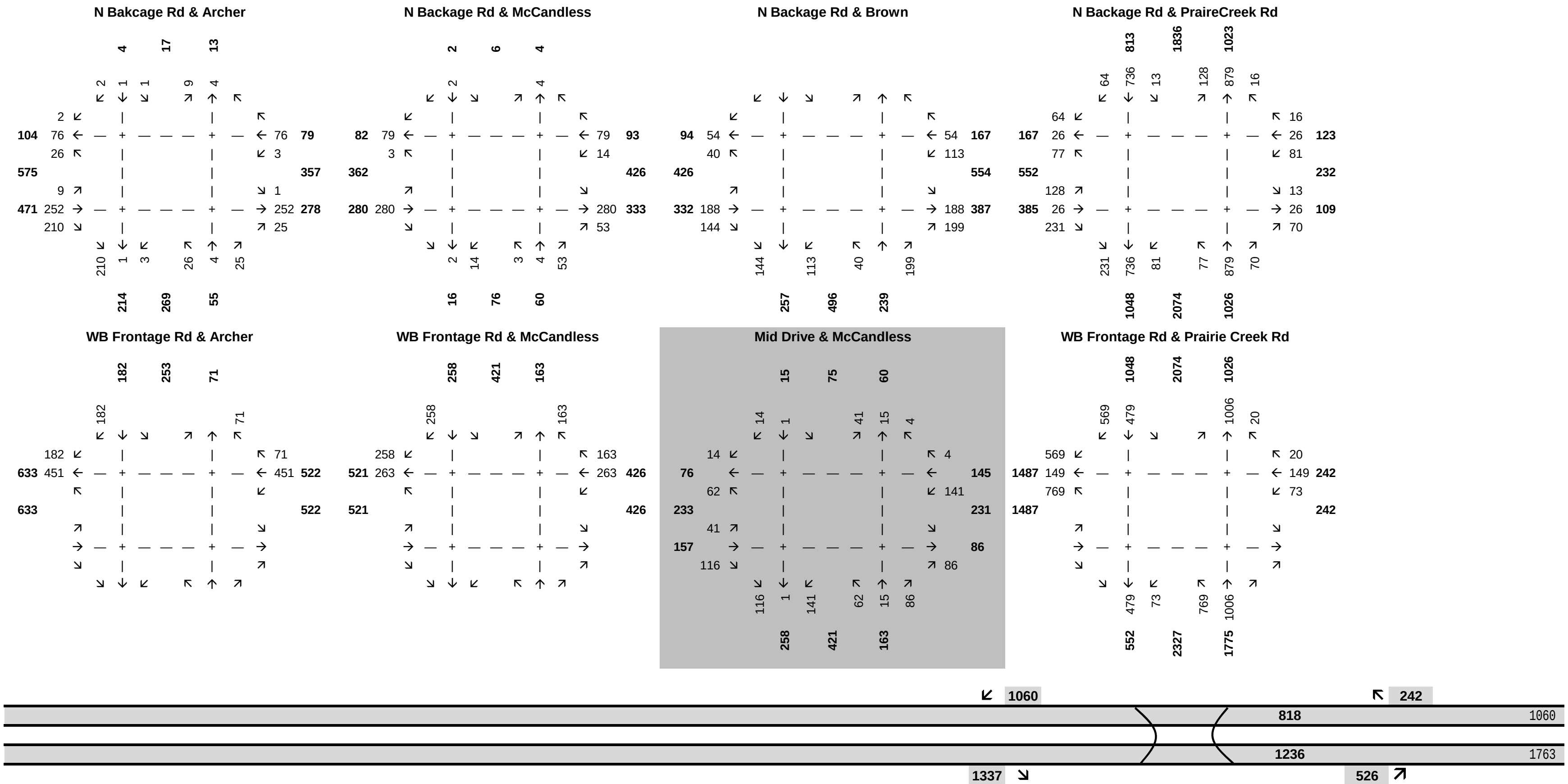
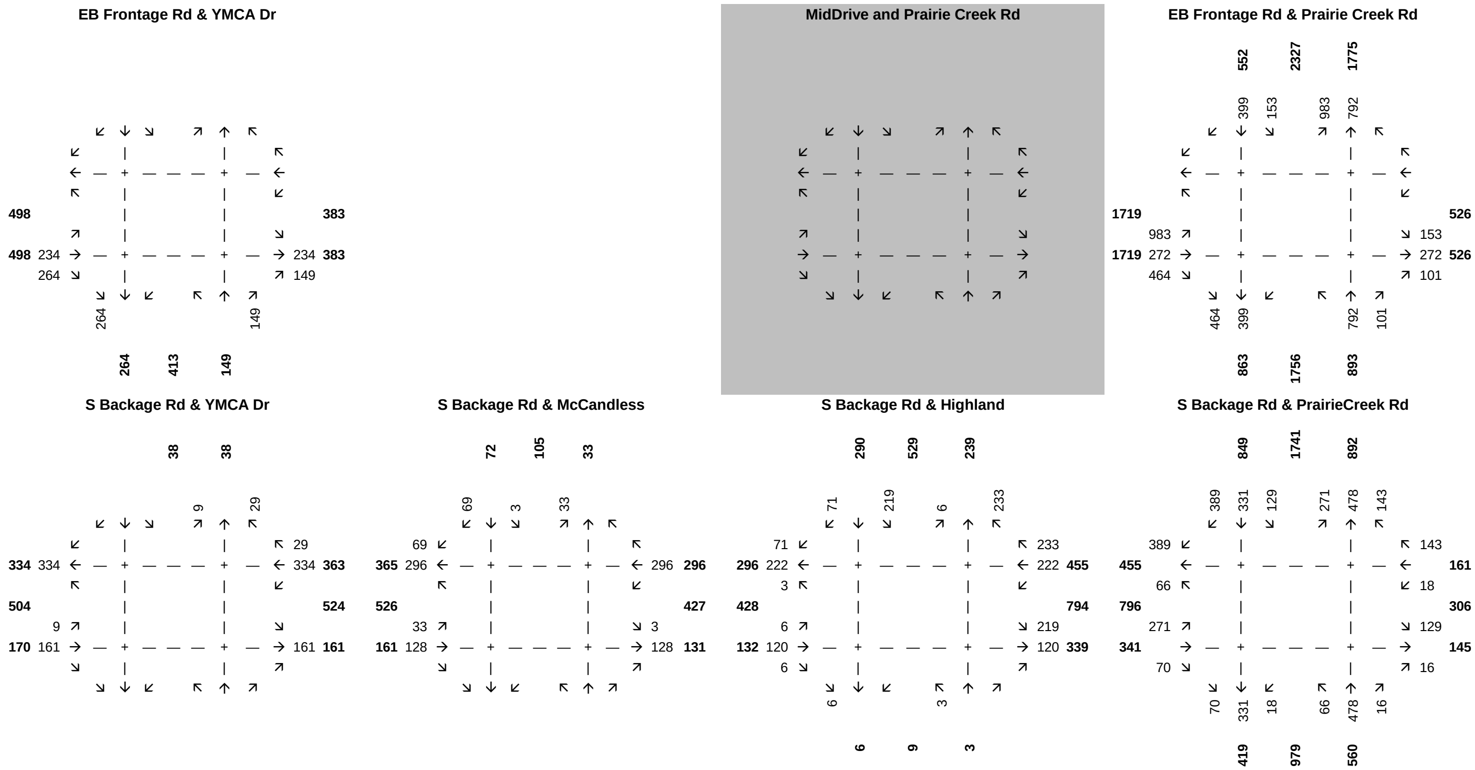


S Backage Rd & YMCA Dr




N Bakcage Rd & Archer
N Backage Rd & McCandless
N Backage Rd & Brown
N Backage Rd & PraireCreek Rd
WB Frontage Rd & Archer
WB Frontage Rd & McCandless
Mid Drive & McCandless
WB Frontage Rd & Prairie Creek Rd
1060
242
818
1060
1236
1763
1337
526



EB Frontage Rd & YMCA Dr
498
383
498 234
264
234 383
149
264
149
264 413 149
MidDrive and Prairie Creek Rd
EB Frontage Rd & Prairie Creek Rd
552 2327 1775
399 153 983 792
1719
526
983
1719 272
464
153
272 526
101
464 399 792 101
863 1756 893
S Backage Rd & YMCA Dr
38 38
9 29
29
334 334
334 363
504
524
9
170 161
161 161
S Backage Rd & McCandless
72 105 33
69 3 33
69
365 296
296 296
526
427
33
3
161 128
128 131
S Backage Rd & Highland
290 529 239
71 219 6 233
71
233
296 222
222 455
3
428
794
6
219
132 120
120 339
6
6 3
6 9 3
S Backage Rd & PrairieCreek Rd
849 1741 892
389 331 129 271 478 143
389
143
455
161
66
18
796
306
271
129
341
145
70
16
70 331 18 66 478 16
419 979 560

Synchro analysis was developed using 2040 traffic volumes that were developed by a combination of the WAMPO Travel Demand Model, the study team's future year land use plan and VISSIM simulation software. Synchro helped develop intersection level capacities, lane arrangements, level of service analysis and queue lengths. The queue length results also help determine adjacent intersection node placement to achieve appropriate intersection spacing.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	330	384	57	0	0	0	0	532	339	360	51	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0					6.0	6.0	6.0	6.0	
Lane Util. Factor	0.97	0.95	1.00					0.81	0.81	0.97	0.95	
Frt	1.00	1.00	0.85					0.96	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	3539	1583					5816	1282	3433	3539	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.34	1.00	
Satd. Flow (perm)	3433	3539	1583					5816	1282	1234	3539	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	330	384	57	0	0	0	0	532	339	360	51	0
RTOR Reduction (vph)	0	0	45	0	0	0	0	64	139	0	0	0
Lane Group Flow (vph)	330	384	12	0	0	0	0	638	30	360	51	0
Turn Type	Perm		Perm						Perm	custom		
Protected Phases		2						4		6	6	
Permitted Phases	2		2						4	8	4 8	
Actuated Green, G (s)	19.1	19.1	19.1					16.0	16.0	30.9	46.9	
Effective Green, g (s)	19.1	19.1	19.1					16.0	16.0	30.9	46.9	
Actuated g/C Ratio	0.21	0.21	0.21					0.18	0.18	0.34	0.52	
Clearance Time (s)	6.0	6.0	6.0					6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	729	751	336					1034	228	815	2316	
v/s Ratio Prot		c0.11						c0.11		c0.08	0.00	
v/s Ratio Perm	0.10		0.01						0.02	c0.07	0.01	
v/c Ratio	0.45	0.51	0.04					0.62	0.13	0.44	0.02	
Uniform Delay, d1	30.9	31.3	28.1					34.2	31.2	21.7	10.4	
Progression Factor	1.00	1.00	1.00					1.00	1.00	0.10	0.07	
Incremental Delay, d2	2.0	2.5	0.2					2.8	1.2	0.4	0.0	
Delay (s)	32.9	33.8	28.3					36.9	32.3	2.6	0.8	
Level of Service	C	C	C					D	C	A	A	
Approach Delay (s)		33.0			0.0			36.0			2.3	
Approach LOS		C			A			D			A	

Intersection Summary			
HCM Average Control Delay	28.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	12	361	337	387	474	0	0	398	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0	6.0	6.0	6.0			6.0	6.0
Lane Util. Factor				1.00	0.95	1.00	0.97	0.95			0.86	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1583	3433	3539			6408	1583
Flt Permitted				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1583	3433	3539			6408	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	12	361	337	387	474	0	0	398	315
RTOR Reduction (vph)	0	0	0	0	0	281	0	0	0	0	0	45
Lane Group Flow (vph)	0	0	0	12	361	56	387	474	0	0	398	270
Turn Type				Perm		Perm	Split					custom
Protected Phases					8		4	4			6	6
Permitted Phases				8		8		2 6				2
Actuated Green, G (s)				14.9	14.9	14.9	16.0	51.1			16.0	35.1
Effective Green, g (s)				14.9	14.9	14.9	16.0	51.1			16.0	35.1
Actuated g/C Ratio				0.17	0.17	0.17	0.18	0.57			0.18	0.39
Clearance Time (s)				6.0	6.0	6.0	6.0	6.0			6.0	6.0
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				293	586	262	610	2481			1139	617
v/s Ratio Prot					c0.10		c0.11	0.03			0.06	c0.08
v/s Ratio Perm				0.01		0.04		0.10				0.09
v/c Ratio				0.04	0.62	0.21	0.63	0.19			0.35	0.44
Uniform Delay, d1				31.5	34.9	32.5	34.3	9.4			32.4	20.2
Progression Factor				1.00	1.00	1.00	0.25	0.03			0.81	0.73
Incremental Delay, d2				0.1	1.9	0.4	3.9	0.1			0.8	2.2
Delay (s)				31.6	36.8	32.9	12.3	0.4			27.2	16.9
Level of Service				C	D	C	B	A			C	B
Approach Delay (s)		0.0			34.9			5.8			22.6	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM Average Control Delay	20.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	156	126	25	0	0	0	0	374	72	68	105	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0					6.0			6.0	
Lane Util. Factor	1.00	0.95	1.00					0.95			0.95	
Frt	1.00	1.00	0.85					0.98			1.00	
Flt Protected	0.95	1.00	1.00					1.00			0.98	
Satd. Flow (prot)	1770	3539	1583					3454			3471	
Flt Permitted	0.95	1.00	1.00					1.00			0.74	
Satd. Flow (perm)	1770	3539	1583					3454			2603	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	156	126	25	0	0	0	0	374	72	68	105	0
RTOR Reduction (vph)	0	0	19	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	156	126	6	0	0	0	0	431	0	0	173	0
Turn Type	Perm		Perm							custom		
Protected Phases		2						4		6	6	
Permitted Phases	2		2							8	4 8	
Actuated Green, G (s)	23.0	23.0	23.0					22.0			50.1	
Effective Green, g (s)	23.0	23.0	23.0					22.0			50.1	
Actuated g/C Ratio	0.24	0.24	0.24					0.23			0.52	
Clearance Time (s)	6.0	6.0	6.0					6.0			6.0	
Vehicle Extension (s)	3.0	3.0	3.0					3.0			3.0	
Lane Grp Cap (vph)	419	838	375					783			1477	
v/s Ratio Prot		0.04						c0.12			c0.02	
v/s Ratio Perm	c0.09		0.00								c0.04	
v/c Ratio	0.37	0.15	0.02					0.55			0.12	
Uniform Delay, d1	31.0	29.3	28.4					33.2			12.1	
Progression Factor	1.00	1.00	1.00					1.00			0.18	
Incremental Delay, d2	2.5	0.4	0.1					2.8			0.0	
Delay (s)	33.5	29.7	28.5					35.9			2.2	
Level of Service	C	C	C					D			A	
Approach Delay (s)		31.5			0.0			35.9			2.2	
Approach LOS		C			A			D			A	

Intersection Summary			
HCM Average Control Delay	28.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	97.1	Sum of lost time (s)	24.0
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

25: WB KELLOGG FRONTAGE ROAD & ONEWOOD DRIVE 9/27/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	77	261	39	187	343	0	0	96	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0			6.0			6.0	6.0
Lane Util. Factor				1.00	0.95			0.95			0.95	1.00
Frt				1.00	0.98			1.00			1.00	0.85
Flt Protected				0.95	1.00			0.98			1.00	1.00
Satd. Flow (prot)				1770	3470			3478			3539	1583
Flt Permitted				0.95	1.00			0.57			1.00	1.00
Satd. Flow (perm)				1770	3470			2031			3539	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	77	261	39	187	343	0	0	96	160
RTOR Reduction (vph)	0	0	0	0	12	0	0	0	0	0	0	135
Lane Group Flow (vph)	0	0	0	77	288	0	0	530	0	0	96	25
Turn Type				Split			custom					Perm
Protected Phases				8	8		4	4			6	
Permitted Phases							2	2 6				6
Actuated Green, G (s)				13.1	13.1			60.0			15.0	15.0
Effective Green, g (s)				13.1	13.1			60.0			15.0	15.0
Actuated g/C Ratio				0.13	0.13			0.62			0.15	0.15
Clearance Time (s)				6.0	6.0			6.0			6.0	6.0
Vehicle Extension (s)				3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)				239	468			1583			547	245
v/s Ratio Prot				0.04	c0.08			c0.08			0.03	
v/s Ratio Perm								c0.13				0.02
v/c Ratio				0.32	0.62			0.33			0.18	0.10
Uniform Delay, d1				38.0	39.6			8.9			35.7	35.3
Progression Factor				1.00	1.00			0.14			1.00	1.00
Incremental Delay, d2				0.8	2.4			0.5			0.7	0.8
Delay (s)				38.8	42.0			1.7			36.4	36.1
Level of Service				D	D			A			D	D
Approach Delay (s)		0.0			41.4			1.7			36.2	
Approach LOS		A			D			A			D	

Intersection Summary			
HCM Average Control Delay	22.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	97.1	Sum of lost time (s)	24.0
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	66	72	123	86	55	95	90	1705	288	53	1298	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.91		1.00	0.91	
Frt	1.00	0.91		1.00	0.91		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3204		1770	3203		1770	4975		1770	5065	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3204		1770	3203		1770	4975		1770	5065	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	66	72	123	86	55	95	90	1705	288	53	1298	35
RTOR Reduction (vph)	0	112	0	0	86	0	0	17	0	0	2	0
Lane Group Flow (vph)	66	83	0	86	64	0	90	1976	0	53	1331	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	8.0	10.4		9.0	11.4		11.7	68.6		8.0	64.9	
Effective Green, g (s)	8.0	10.4		9.0	11.4		11.7	68.6		8.0	64.9	
Actuated g/C Ratio	0.07	0.09		0.08	0.10		0.10	0.57		0.07	0.54	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	278		133	304		173	2844		118	2739	
v/s Ratio Prot	0.04	c0.03		c0.05	0.02		0.05	c0.40		0.03	c0.26	
v/s Ratio Perm												
v/c Ratio	0.56	0.30		0.65	0.21		0.52	0.69		0.45	0.49	
Uniform Delay, d1	54.3	51.4		54.0	50.1		51.5	18.3		53.9	17.2	
Progression Factor	1.00	1.00		1.00	1.00		1.19	0.28		1.00	1.00	
Incremental Delay, d2	5.6	0.6		10.3	0.3		2.3	1.1		2.7	0.6	
Delay (s)	59.9	52.0		64.3	50.5		63.6	6.3		56.6	17.8	
Level of Service	E	D		E	D		E	A		E	B	
Approach Delay (s)		54.0			55.5			8.8			19.3	
Approach LOS		D			E			A			B	

Intersection Summary			
HCM Average Control Delay	18.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1104	776	282	0	0	0	0	1169	322	198	867	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0					6.0	6.0	6.0	6.0	
Lane Util. Factor	0.97	0.86	0.86					0.81	1.00	0.97	0.91	
Frt	1.00	0.99	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	4764	1362					7544	1583	3433	5085	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	4764	1362					7544	1583	3433	5085	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1104	776	282	0	0	0	0	1169	322	198	867	0
RTOR Reduction (vph)	0	5	106	0	0	0	0	0	39	0	0	0
Lane Group Flow (vph)	1104	819	128	0	0	0	0	1169	283	198	867	0
Turn Type	Perm		Perm						custom	Prot		
Protected Phases		2						4	4	6	6 4	
Permitted Phases	2		2						8		8	
Actuated Green, G (s)	38.0	38.0	38.0					18.0	44.0	14.0	64.0	
Effective Green, g (s)	38.0	38.0	38.0					18.0	44.0	14.0	64.0	
Actuated g/C Ratio	0.32	0.32	0.32					0.15	0.37	0.12	0.53	
Clearance Time (s)	6.0	6.0	6.0					6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0		
Lane Grp Cap (vph)	1087	1509	431					1132	580	401	2966	
v/s Ratio Prot		0.17						c0.15	c0.07	c0.06	0.09	
v/s Ratio Perm	c0.32		0.09						0.11		0.08	
v/c Ratio	1.02	0.54	0.30					1.03	0.49	0.49	0.29	
Uniform Delay, d1	41.0	33.8	30.9					51.0	29.3	49.7	15.5	
Progression Factor	1.00	1.00	1.00					0.92	0.67	0.39	0.08	
Incremental Delay, d2	31.3	1.4	1.8					35.2	0.6	2.7	0.0	
Delay (s)	72.3	35.2	32.7					82.2	20.2	21.8	1.2	
Level of Service	E	D	C					F	C	C	A	
Approach Delay (s)		53.9			0.0			68.8			5.1	
Approach LOS		D			A			E			A	

Intersection Summary			
HCM Average Control Delay	47.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	117.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	381	977	406	596	1677	0	0	684	823
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0	6.0	6.0	6.0			6.0	6.0
Lane Util. Factor				0.97	0.91	1.00	0.97	0.91			0.81	0.88
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				3433	5085	1583	3433	5085			7544	2787
Flt Permitted				0.95	1.00	1.00	0.11	1.00			1.00	1.00
Satd. Flow (perm)				3433	5085	1583	380	5085			7544	2787
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	381	977	406	596	1677	0	0	684	823
RTOR Reduction (vph)	0	0	0	0	0	31	0	0	0	0	0	504
Lane Group Flow (vph)	0	0	0	381	977	375	596	1677	0	0	684	319
Turn Type				Perm		Perm	custom					Perm
Protected Phases					8		4	4 6			6	
Permitted Phases				8		8	2	2				6
Actuated Green, G (s)				26.0	26.0	26.0	56.0	76.0			14.0	14.0
Effective Green, g (s)				26.0	26.0	26.0	56.0	76.0			14.0	14.0
Actuated g/C Ratio				0.22	0.22	0.22	0.47	0.63			0.12	0.12
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	6.0
Vehicle Extension (s)				3.0	3.0	3.0	3.0				3.0	3.0
Lane Grp Cap (vph)				744	1102	343	635	3475			880	325
v/s Ratio Prot					0.19		c0.14	0.15			0.09	
v/s Ratio Perm				0.11		c0.24	c0.30	0.18				c0.11
v/c Ratio				0.51	0.89	1.09	0.94	0.48			0.78	0.98
Uniform Delay, d1				41.4	45.6	47.0	47.0	11.6			51.5	52.9
Progression Factor				1.00	1.00	1.00	0.65	0.00			0.74	1.45
Incremental Delay, d2				0.6	8.8	75.6	3.5	0.0			6.0	42.6
Delay (s)				42.0	54.4	122.6	34.2	0.0			44.0	119.4
Level of Service				D	D	F	C	A			D	F
Approach Delay (s)		0.0			67.4			9.0			85.1	
Approach LOS		A			E			A			F	

Intersection Summary			
HCM Average Control Delay	48.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	117.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	275	159	147	435	502	0	0	255	344
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0		6.0	6.0			6.0	6.0
Lane Util. Factor				1.00	0.95		1.00	0.95			0.91	1.00
Frt				1.00	0.93		1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3284		1770	3539			5085	1583
Flt Permitted				0.95	1.00		0.21	1.00			1.00	1.00
Satd. Flow (perm)				1770	3284		392	3539			5085	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	275	159	147	435	502	0	0	255	344
RTOR Reduction (vph)	0	0	0	0	120	0	0	0	0	0	0	302
Lane Group Flow (vph)	0	0	0	275	186	0	435	502	0	0	255	42
Turn Type				Perm			custom					Perm
Protected Phases					8		4	4			6	
Permitted Phases				8			2	2 6				6
Actuated Green, G (s)				18.3	18.3		44.0	56.0			12.0	12.0
Effective Green, g (s)				18.3	18.3		44.0	56.0			12.0	12.0
Actuated g/C Ratio				0.19	0.19		0.45	0.57			0.12	0.12
Clearance Time (s)				6.0	6.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)				3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				330	611		526	2448			621	193
v/s Ratio Prot					0.06		c0.21	0.05			c0.05	
v/s Ratio Perm				c0.16			c0.16	0.09				0.03
v/c Ratio				0.83	0.31		0.83	0.21			0.41	0.22
Uniform Delay, d1				38.5	34.5		31.1	10.3			39.9	38.9
Progression Factor				1.00	1.00		0.53	0.00			1.00	1.00
Incremental Delay, d2				16.3	0.3		11.9	0.2			2.0	2.6
Delay (s)				54.8	34.8		28.3	0.2			41.9	41.5
Level of Service				D	C		C	A			D	D
Approach Delay (s)		0.0			44.3			13.2			41.7	
Approach LOS		A			D			B			D	

Intersection Summary			
HCM Average Control Delay	29.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	98.3	Sum of lost time (s)	24.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	218	202	199	0	0	0	0	720	48	67	462	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0					6.0	6.0	6.0	6.0	
Lane Util. Factor	0.97	1.00	1.00					0.91	1.00	1.00	0.95	
Frt	1.00	1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	1863	1583					5085	1583	1770	3539	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.37	1.00	
Satd. Flow (perm)	3433	1863	1583					5085	1583	683	3539	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	218	202	199	0	0	0	0	720	48	67	462	0
RTOR Reduction (vph)	0	0	161	0	0	0	0	0	36	0	0	0
Lane Group Flow (vph)	218	202	38	0	0	0	0	720	12	67	462	0
Turn Type	Perm		Perm						Perm	custom		
Protected Phases		2						4		6	6	
Permitted Phases	2		2						4	8	4 8	
Actuated Green, G (s)	19.0	19.0	19.0					25.0	25.0	30.3	55.3	
Effective Green, g (s)	19.0	19.0	19.0					25.0	25.0	30.3	55.3	
Actuated g/C Ratio	0.19	0.19	0.19					0.25	0.25	0.31	0.56	
Clearance Time (s)	6.0	6.0	6.0					6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	664	360	306					1293	403	343	2423	
v/s Ratio Prot		c0.11						c0.14		0.02	c0.02	
v/s Ratio Perm	0.06		0.02						0.01	0.04	0.11	
v/c Ratio	0.33	0.56	0.13					0.56	0.03	0.20	0.19	
Uniform Delay, d1	34.2	35.9	32.8					31.8	27.5	24.4	10.5	
Progression Factor	1.00	1.00	1.00					1.00	1.00	0.01	0.39	
Incremental Delay, d2	1.3	6.2	0.8					1.7	0.1	0.3	0.0	
Delay (s)	35.5	42.1	33.6					33.6	27.7	0.5	4.1	
Level of Service	D	D	C					C	C	A	A	
Approach Delay (s)		37.0			0.0			33.2			3.7	
Approach LOS		D			A			C			A	

Intersection Summary			
HCM Average Control Delay	26.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	98.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	103	393	363	796	352	0	0	162	656
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.0		6.0	6.0			6.0	6.0
Lane Util. Factor					0.95		0.97	0.95			0.86	0.86
Frt					0.94		1.00	1.00			0.90	0.85
Flt Protected					0.99		0.95	1.00			1.00	1.00
Satd. Flow (prot)					3295		3433	3539			4323	1362
Flt Permitted					0.99		0.31	1.00			1.00	1.00
Satd. Flow (perm)					3295		1112	3539			4323	1362
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	103	393	363	796	352	0	0	162	656
RTOR Reduction (vph)	0	0	0	0	132	0	0	0	0	0	88	88
Lane Group Flow (vph)	0	0	0	0	727	0	796	352	0	0	402	240
Turn Type				Perm			custom					Perm
Protected Phases					8		4	4			6	
Permitted Phases				8			2	2 6				6
Actuated Green, G (s)					23.0		32.0	53.0			21.0	21.0
Effective Green, g (s)					23.0		32.0	53.0			21.0	21.0
Actuated g/C Ratio					0.23		0.32	0.53			0.21	0.21
Clearance Time (s)					6.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)					3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					758		797	2300			908	286
v/s Ratio Prot							c0.19	0.03			0.09	
v/s Ratio Perm					0.22		c0.13	0.07				c0.18
v/c Ratio					0.96		1.00	0.15			0.44	0.84
Uniform Delay, d1					38.0		37.2	12.0			34.4	37.9
Progression Factor					1.00		0.72	0.00			1.00	1.00
Incremental Delay, d2					22.9		25.7	0.1			1.6	24.3
Delay (s)					61.0		52.3	0.1			36.0	62.2
Level of Service					E		D	A			D	E
Approach Delay (s)		0.0			61.0			36.3			46.5	
Approach LOS		A			E			D			D	

Intersection Summary			
HCM Average Control Delay	46.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	87.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	295	177	89	0	0	0	0	853	59	86	179	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0					6.0		6.0	6.0	
Lane Util. Factor	0.97	1.00	1.00					0.86		1.00	0.95	
Frt	1.00	1.00	0.85					0.99		1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00		0.95	1.00	
Satd. Flow (prot)	3433	1863	1583					6346		1770	3539	
Flt Permitted	0.95	1.00	1.00					1.00		0.28	1.00	
Satd. Flow (perm)	3433	1863	1583					6346		530	3539	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	295	177	89	0	0	0	0	853	59	86	179	0
RTOR Reduction (vph)	0	0	77	0	0	0	0	11	0	0	0	0
Lane Group Flow (vph)	295	177	12	0	0	0	0	901	0	86	179	0
Turn Type	Perm		Perm							custom		
Protected Phases		2						4			6	
Permitted Phases	2		2							6 8	4 8	
Actuated Green, G (s)	13.0	13.0	13.0					19.0		50.0	63.0	
Effective Green, g (s)	13.0	13.0	13.0					19.0		50.0	63.0	
Actuated g/C Ratio	0.13	0.13	0.13					0.19		0.50	0.63	
Clearance Time (s)	6.0	6.0	6.0					6.0			6.0	
Vehicle Extension (s)	3.0	3.0	3.0					3.0			3.0	
Lane Grp Cap (vph)	446	242	206					1206		265	2654	
v/s Ratio Prot		c0.10						c0.14			0.01	
v/s Ratio Perm	0.09		0.01							c0.16	0.04	
v/c Ratio	0.66	0.73	0.06					0.75		0.32	0.07	
Uniform Delay, d1	41.4	41.8	38.1					38.2		14.9	7.1	
Progression Factor	1.00	1.00	1.00					1.00		0.34	0.71	
Incremental Delay, d2	7.5	17.7	0.5					4.3		0.6	0.0	
Delay (s)	48.9	59.5	38.6					42.5		5.8	5.1	
Level of Service	D	E	D					D		A	A	
Approach Delay (s)		50.6			0.0			42.5			5.3	
Approach LOS		D			A			D			A	

Intersection Summary			
HCM Average Control Delay	39.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	87.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	4	0	46	106	5	4	48	305	458	40	561	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		0.97	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.85		1.00	0.93		1.00	0.91		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1583		3433	1739		1770	3221		1770	3535	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1583		3433	1739		1770	3221		1770	3535	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	4	0	46	106	5	4	48	305	458	40	561	5
RTOR Reduction (vph)	0	42	0	0	3	0	0	240	0	0	1	0
Lane Group Flow (vph)	4	4	0	106	6	0	48	523	0	40	565	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	2.0	8.4		8.0	14.4		6.1	42.9		6.7	43.5	
Effective Green, g (s)	2.0	8.4		8.0	14.4		6.1	42.9		6.7	43.5	
Actuated g/C Ratio	0.02	0.09		0.09	0.16		0.07	0.48		0.07	0.48	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	39	148		305	278		120	1535		132	1709	
v/s Ratio Prot	0.00	c0.00		c0.03	c0.00		0.03	c0.16		0.02	c0.16	
v/s Ratio Perm												
v/c Ratio	0.10	0.03		0.35	0.02		0.40	0.34		0.30	0.33	
Uniform Delay, d1	43.1	37.1		38.5	31.9		40.2	14.7		39.4	14.3	
Progression Factor	1.00	1.00		1.00	1.00		1.09	0.30		1.00	1.00	
Incremental Delay, d2	1.2	0.1		0.7	0.0		2.1	0.6		1.3	0.5	
Delay (s)	44.3	37.2		39.2	31.9		46.0	4.9		40.7	14.8	
Level of Service	D	D		D	C		D	A		D	B	
Approach Delay (s)		37.7			38.7			7.4			16.5	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	30.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	6	49	1284	1	31	903
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	0.91		1.00	0.91
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	5085		1770	5085
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	5085		1770	5085
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	6	49	1284	1	31	903
RTOR Reduction (vph)	0	43	0	0	0	0
Lane Group Flow (vph)	6	6	1285	0	31	903
Turn Type		pm+ov			Prot	
Protected Phases	8	1	2		1	6
Permitted Phases		8				
Actuated Green, G (s)	2.0	14.8	87.2		12.8	106.0
Effective Green, g (s)	2.0	14.8	87.2		12.8	106.0
Actuated g/C Ratio	0.02	0.12	0.73		0.11	0.88
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	30	274	3695		189	4492
v/s Ratio Prot	c0.00	0.00	c0.25		0.02	c0.18
v/s Ratio Perm		0.00				
v/c Ratio	0.20	0.02	0.35		0.16	0.20
Uniform Delay, d1	58.2	46.2	6.0		48.7	1.0
Progression Factor	1.00	1.00	1.00		0.57	0.77
Incremental Delay, d2	3.3	0.0	0.3		0.4	0.1
Delay (s)	61.5	46.3	6.3		28.3	0.9
Level of Service	E	D	A		C	A
Approach Delay (s)	47.9		6.3			1.8
Approach LOS	D		A			A

Intersection Summary			
HCM Average Control Delay	5.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	44.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	506	1319	244	0	0	0	0	420	344	738	211	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0					6.0	6.0	6.0	6.0	
Lane Util. Factor	0.97	0.95	1.00					0.81	0.81	0.97	0.95	
Frt	1.00	1.00	0.85					0.96	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	3539	1583					5772	1282	3433	3539	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.39	1.00	
Satd. Flow (perm)	3433	3539	1583					5772	1282	1401	3539	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	506	1319	244	0	0	0	0	420	344	738	211	0
RTOR Reduction (vph)	0	0	127	0	0	0	0	34	34	0	0	0
Lane Group Flow (vph)	506	1319	117	0	0	0	0	558	138	738	211	0
Turn Type	Perm		Perm						Perm	custom		
Protected Phases		2						4		6	6	
Permitted Phases	2		2						4	8	4 8	
Actuated Green, G (s)	43.0	43.0	43.0					12.0	12.0	31.0	43.0	
Effective Green, g (s)	43.0	43.0	43.0					12.0	12.0	31.0	43.0	
Actuated g/C Ratio	0.39	0.39	0.39					0.11	0.11	0.28	0.39	
Clearance Time (s)	6.0	6.0	6.0					6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1342	1383	619					630	140	727	1770	
v/s Ratio Prot		c0.37						0.10		c0.17	0.02	
v/s Ratio Perm	0.15		0.07						c0.11	c0.12	0.04	
v/c Ratio	0.38	0.95	0.19					0.89	0.99	1.02	0.12	
Uniform Delay, d1	23.9	32.5	22.0					48.3	48.9	36.5	21.4	
Progression Factor	1.00	1.00	1.00					1.00	1.00	0.61	0.19	
Incremental Delay, d2	0.8	15.4	0.7					16.7	72.6	28.9	0.0	
Delay (s)	24.7	47.9	22.7					65.1	121.6	51.2	4.1	
Level of Service	C	D	C					E	F	D	A	
Approach Delay (s)		39.3			0.0			77.8			40.7	
Approach LOS		D			A			E			D	

Intersection Summary			
HCM Average Control Delay	47.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	101.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	104	392	327	257	669	0	0	846	302
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0	6.0	6.0	6.0			6.0	6.0
Lane Util. Factor				1.00	0.95	1.00	0.97	0.95			0.86	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1583	3433	3539			6408	1583
Flt Permitted				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1583	3433	3539			6408	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	104	392	327	257	669	0	0	846	302
RTOR Reduction (vph)	0	0	0	0	0	288	0	0	0	0	0	12
Lane Group Flow (vph)	0	0	0	104	392	39	257	669	0	0	846	290
Turn Type				Perm		Perm	Split					custom
Protected Phases					8		4	4			6	6
Permitted Phases				8		8		2 6				2
Actuated Green, G (s)				13.0	13.0	13.0	12.0	73.0			18.0	61.0
Effective Green, g (s)				13.0	13.0	13.0	12.0	73.0			18.0	61.0
Actuated g/C Ratio				0.12	0.12	0.12	0.11	0.66			0.16	0.55
Clearance Time (s)				6.0	6.0	6.0	6.0	6.0			6.0	6.0
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				209	418	187	375	2735			1049	878
v/s Ratio Prot					c0.11		c0.07	0.03			c0.13	c0.05
v/s Ratio Perm				0.06		0.02		0.16				0.13
v/c Ratio				0.50	0.94	0.21	0.69	0.24			0.81	0.33
Uniform Delay, d1				45.4	48.1	43.8	47.2	7.4			44.3	13.4
Progression Factor				1.00	1.00	1.00	0.65	0.02			0.79	1.07
Incremental Delay, d2				1.9	28.5	0.6	4.4	0.2			5.2	0.8
Delay (s)				47.3	76.6	44.4	35.1	0.3			40.2	15.0
Level of Service				D	E	D	D	A			D	B
Approach Delay (s)		0.0			60.1			10.0			33.6	
Approach LOS		A			E			A			C	

Intersection Summary			
HCM Average Control Delay	33.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	101.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	648	884	196	0	0	0	0	530	93	37	444	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0					6.0			6.0	
Lane Util. Factor	1.00	0.95	1.00					0.95			0.95	
Frt	1.00	1.00	0.85					0.98			1.00	
Flt Protected	0.95	1.00	1.00					1.00			1.00	
Satd. Flow (prot)	1770	3539	1583					3460			3526	
Flt Permitted	0.95	1.00	1.00					1.00			0.82	
Satd. Flow (perm)	1770	3539	1583					3460			2890	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	648	884	196	0	0	0	0	530	93	37	444	0
RTOR Reduction (vph)	0	0	116	0	0	0	0	13	0	0	0	0
Lane Group Flow (vph)	648	884	80	0	0	0	0	610	0	0	481	0
Turn Type	Perm		Perm							custom		
Protected Phases		2						4		6	6	
Permitted Phases	2		2							8	4 8	
Actuated Green, G (s)	45.0	45.0	45.0					20.0			41.0	
Effective Green, g (s)	45.0	45.0	45.0					20.0			41.0	
Actuated g/C Ratio	0.41	0.41	0.41					0.18			0.37	
Clearance Time (s)	6.0	6.0	6.0					6.0			6.0	
Vehicle Extension (s)	3.0	3.0	3.0					3.0			3.0	
Lane Grp Cap (vph)	724	1448	648					629			1135	
v/s Ratio Prot		0.25						c0.18			c0.04	
v/s Ratio Perm	c0.37		0.05								c0.12	
v/c Ratio	0.90	0.61	0.12					0.97			0.42	
Uniform Delay, d1	30.3	25.6	20.2					44.7			25.7	
Progression Factor	1.00	1.00	1.00					1.00			0.63	
Incremental Delay, d2	15.9	1.9	0.4					29.2			0.1	
Delay (s)	46.2	27.5	20.6					73.9			16.3	
Level of Service	D	C	C					E			B	
Approach Delay (s)		33.7			0.0			73.9			16.3	
Approach LOS		C			A			E			B	

Intersection Summary			
HCM Average Control Delay	39.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	169	77	78	210	968	0	0	313	314
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0			6.0			6.0	6.0
Lane Util. Factor				1.00	0.95			0.95			0.95	1.00
Frt				1.00	0.92			1.00			1.00	0.85
Flt Protected				0.95	1.00			0.99			1.00	1.00
Satd. Flow (prot)				1770	3272			3508			3539	1583
Flt Permitted				0.95	1.00			0.52			1.00	1.00
Satd. Flow (perm)				1770	3272			1835			3539	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	169	77	78	210	968	0	0	313	314
RTOR Reduction (vph)	0	0	0	0	70	0	0	0	0	0	0	285
Lane Group Flow (vph)	0	0	0	169	85	0	0	1178	0	0	313	29
Turn Type				Split			custom					Perm
Protected Phases				8	8		4	4			6	
Permitted Phases							2	2 6				6
Actuated Green, G (s)				11.0	11.0			75.0			10.0	10.0
Effective Green, g (s)				11.0	11.0			75.0			10.0	10.0
Actuated g/C Ratio				0.10	0.10			0.68			0.09	0.09
Clearance Time (s)				6.0	6.0			6.0			6.0	6.0
Vehicle Extension (s)				3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)				177	327			1555			322	144
v/s Ratio Prot				c0.10	0.03			c0.14			c0.09	
v/s Ratio Perm								c0.38				0.02
v/c Ratio				0.95	0.26			0.76			0.97	0.20
Uniform Delay, d1				49.3	45.7			11.5			49.9	46.3
Progression Factor				1.00	1.00			0.40			1.00	1.00
Incremental Delay, d2				54.0	0.4			1.3			43.6	3.1
Delay (s)				103.3	46.2			5.9			93.4	49.4
Level of Service				F	D			A			F	D
Approach Delay (s)		0.0			76.0			5.9			71.4	
Approach LOS		A			E			A			E	

Intersection Summary			
HCM Average Control Delay	35.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	128	26	231	81	26	16	77	879	67	13	736	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.94		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1612		1770	1756		1770	3502		1770	3497	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1612		1770	1756		1770	3502		1770	3497	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	128	26	231	81	26	16	77	879	67	13	736	64
RTOR Reduction (vph)	0	205	0	0	15	0	0	4	0	0	5	0
Lane Group Flow (vph)	128	52	0	81	27	0	77	942	0	13	795	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	16.2	11.4		10.8	6.0		8.2	51.8		2.0	45.6	
Effective Green, g (s)	16.2	11.4		10.8	6.0		8.2	51.8		2.0	45.6	
Actuated g/C Ratio	0.16	0.11		0.11	0.06		0.08	0.52		0.02	0.46	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	287	184		191	105		145	1814		35	1595	
v/s Ratio Prot	c0.07	c0.03		0.05	0.02		0.04	c0.27		0.01	c0.23	
v/s Ratio Perm												
v/c Ratio	0.45	0.28		0.42	0.26		0.53	0.52		0.37	0.50	
Uniform Delay, d1	37.8	40.6		41.7	44.9		44.1	15.9		48.4	19.1	
Progression Factor	1.00	1.00		1.00	1.00		1.15	0.19		1.00	1.00	
Incremental Delay, d2	1.1	0.9		1.5	1.3		3.5	1.0		6.5	1.1	
Delay (s)	39.0	41.4		43.2	46.2		54.1	4.0		54.9	20.3	
Level of Service	D	D		D	D		D	A		D	C	
Approach Delay (s)		40.6			44.2			7.8			20.8	
Approach LOS		D			D			A			C	

Intersection Summary			
HCM Average Control Delay	19.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	88	314	272	145	110	136	119	1293	285	202	1539	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.91		1.00	0.91	
Frt	1.00	0.93		1.00	0.92		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3293		1770	3246		1770	4948		1770	5042	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3293		1770	3246		1770	4948		1770	5042	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	88	314	272	145	110	136	119	1293	285	202	1539	92
RTOR Reduction (vph)	0	114	0	0	110	0	0	24	0	0	4	0
Lane Group Flow (vph)	88	472	0	145	136	0	119	1554	0	202	1627	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	11.7	23.6		15.2	27.1		14.8	57.4		19.8	62.4	
Effective Green, g (s)	11.7	23.6		15.2	27.1		14.8	57.4		19.8	62.4	
Actuated g/C Ratio	0.08	0.17		0.11	0.19		0.11	0.41		0.14	0.45	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	148	555		192	628		187	2029		250	2247	
v/s Ratio Prot	0.05	c0.14		c0.08	c0.04		0.07	0.31		c0.11	c0.32	
v/s Ratio Perm												
v/c Ratio	0.59	0.85		0.76	0.22		0.64	0.77		0.81	0.72	
Uniform Delay, d1	61.9	56.5		60.6	47.5		60.0	35.5		58.3	31.8	
Progression Factor	1.00	1.00		1.00	1.00		1.03	0.37		1.00	1.00	
Incremental Delay, d2	6.3	11.9		15.5	0.2		6.3	2.6		17.2	2.1	
Delay (s)	68.1	68.4		76.1	47.7		68.2	15.8		75.4	33.8	
Level of Service	E	E		E	D		E	B		E	C	
Approach Delay (s)		68.4			58.2			19.5			38.4	
Approach LOS		E			E			B			D	

Intersection Summary			
HCM Average Control Delay	37.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	30.0
Intersection Capacity Utilization	88.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1060	1179	548	0	0	0	0	929	301	419	1180	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0					6.0	6.0	6.0	6.0	
Lane Util. Factor	0.97	0.86	0.86					0.81	1.00	0.97	0.91	
Frt	1.00	0.98	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	4720	1362					7544	1583	3433	5085	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	4720	1362					7544	1583	3433	5085	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1060	1179	548	0	0	0	0	929	301	419	1180	0
RTOR Reduction (vph)	0	12	55	0	0	0	0	0	8	0	0	0
Lane Group Flow (vph)	1060	1326	334	0	0	0	0	929	293	419	1180	0
Turn Type	Perm		Perm						custom	Prot		
Protected Phases		2						4	4	6	6 4	
Permitted Phases	2		2						8		8	
Actuated Green, G (s)	44.0	44.0	44.0					19.0	51.0	21.0	78.0	
Effective Green, g (s)	44.0	44.0	44.0					19.0	51.0	21.0	78.0	
Actuated g/C Ratio	0.31	0.31	0.31					0.14	0.36	0.15	0.56	
Clearance Time (s)	6.0	6.0	6.0					6.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0		
Lane Grp Cap (vph)	1079	1483	428					1024	577	515	3051	
v/s Ratio Prot		0.28						c0.12	c0.07	c0.12	0.13	
v/s Ratio Perm	c0.31		0.25						0.12		0.10	
v/c Ratio	0.98	0.89	0.78					0.91	0.51	0.81	0.39	
Uniform Delay, d1	47.6	45.8	43.6					59.6	34.7	57.6	17.5	
Progression Factor	1.00	1.00	1.00					0.86	0.78	0.35	0.06	
Incremental Delay, d2	23.5	8.7	13.2					13.0	0.7	4.1	0.0	
Delay (s)	71.1	54.5	56.8					64.1	27.9	24.3	1.1	
Level of Service	E	D	E					E	C	C	A	
Approach Delay (s)		61.1			0.0			55.2			7.1	
Approach LOS		E			A			E			A	

Intersection Summary			
HCM Average Control Delay	44.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	113.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	499	1168	259	550	1439	0	0	1100	856
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0	6.0	6.0	6.0			6.0	6.0
Lane Util. Factor				0.97	0.91	1.00	0.97	0.91			0.81	0.88
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				3433	5085	1583	3433	5085			7544	2787
Flt Permitted				0.95	1.00	1.00	0.09	1.00			1.00	1.00
Satd. Flow (perm)				3433	5085	1583	329	5085			7544	2787
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	499	1168	259	550	1439	0	0	1100	856
RTOR Reduction (vph)	0	0	0	0	0	51	0	0	0	0	0	507
Lane Group Flow (vph)	0	0	0	499	1168	208	550	1439	0	0	1100	349
Turn Type				Perm		Perm	custom					Perm
Protected Phases					8		4	4 6			6	
Permitted Phases				8		8	2	2				6
Actuated Green, G (s)				32.0	32.0	32.0	63.0	90.0			21.0	21.0
Effective Green, g (s)				32.0	32.0	32.0	63.0	90.0			21.0	21.0
Actuated g/C Ratio				0.23	0.23	0.23	0.45	0.64			0.15	0.15
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	6.0
Vehicle Extension (s)				3.0	3.0	3.0	3.0				3.0	3.0
Lane Grp Cap (vph)				785	1162	362	569	3487			1132	418
v/s Ratio Prot					c0.23		c0.13	0.14			c0.15	
v/s Ratio Perm				0.15		0.13	c0.30	0.15				0.13
v/c Ratio				0.64	1.01	0.57	0.97	0.41			0.97	0.83
Uniform Delay, d1				48.7	54.0	48.0	56.7	12.2			59.2	57.8
Progression Factor				1.00	1.00	1.00	0.64	0.00			0.61	0.99
Incremental Delay, d2				1.7	27.7	2.2	17.5	0.1			16.0	12.2
Delay (s)				50.4	81.7	50.2	54.0	0.1			52.1	69.4
Level of Service				D	F	D	D	A			D	E
Approach Delay (s)		0.0			69.3			15.0			59.7	
Approach LOS		A			E			B			E	

Intersection Summary			
HCM Average Control Delay	47.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	113.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	177	417	38	496	850	0	0	664	301
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0		6.0	6.0			6.0	6.0
Lane Util. Factor				1.00	0.95		1.00	0.95			0.91	1.00
Frt				1.00	0.99		1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3495		1770	3539			5085	1583
Flt Permitted				0.95	1.00		0.18	1.00			1.00	1.00
Satd. Flow (perm)				1770	3495		339	3539			5085	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	177	417	38	496	850	0	0	664	301
RTOR Reduction (vph)	0	0	0	0	6	0	0	0	0	0	0	254
Lane Group Flow (vph)	0	0	0	177	449	0	496	850	0	0	664	47
Turn Type				Perm			custom					Perm
Protected Phases					8		4	4			6	
Permitted Phases				8			2	2 6				6
Actuated Green, G (s)				15.9	15.9		53.0	70.0			17.0	17.0
Effective Green, g (s)				15.9	15.9		53.0	70.0			17.0	17.0
Actuated g/C Ratio				0.14	0.14		0.48	0.64			0.15	0.15
Clearance Time (s)				6.0	6.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)				3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				256	506		567	2641			787	245
v/s Ratio Prot					c0.13		c0.25	0.09			c0.13	
v/s Ratio Perm				0.10			c0.18	0.15				0.03
v/c Ratio				0.69	0.89		0.87	0.32			0.84	0.19
Uniform Delay, d1				44.7	46.1		34.1	9.1			45.2	40.5
Progression Factor				1.00	1.00		0.42	0.01			1.00	1.00
Incremental Delay, d2				7.8	17.0		12.7	0.3			10.7	1.7
Delay (s)				52.5	63.1		27.0	0.3			55.9	42.2
Level of Service				D	E		C	A			E	D
Approach Delay (s)		0.0			60.1			10.2			51.6	
Approach LOS		A			E			B			D	

Intersection Summary			
HCM Average Control Delay	34.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	109.9	Sum of lost time (s)	24.0
Intersection Capacity Utilization	85.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	341	294	354	0	0	0	0	1005	79	124	717	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0					6.0	6.0	6.0	6.0	
Lane Util. Factor	0.97	1.00	1.00					0.91	1.00	1.00	0.95	
Frt	1.00	1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	1863	1583					5085	1583	1770	3539	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.27	1.00	
Satd. Flow (perm)	3433	1863	1583					5085	1583	508	3539	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	341	294	354	0	0	0	0	1005	79	124	717	0
RTOR Reduction (vph)	0	0	226	0	0	0	0	0	57	0	0	0
Lane Group Flow (vph)	341	294	128	0	0	0	0	1005	22	124	717	0
Turn Type	Perm		Perm						Perm	custom		
Protected Phases		2						4		6	6	
Permitted Phases	2		2						4	8	4 8	
Actuated Green, G (s)	22.0	22.0	22.0					31.0	31.0	32.9	63.9	
Effective Green, g (s)	22.0	22.0	22.0					31.0	31.0	32.9	63.9	
Actuated g/C Ratio	0.20	0.20	0.20					0.28	0.28	0.30	0.58	
Clearance Time (s)	6.0	6.0	6.0					6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	687	373	317					1434	447	347	2444	
v/s Ratio Prot		c0.16						c0.20		0.06	c0.05	
v/s Ratio Perm	0.10		0.08						0.01	c0.05	0.16	
v/c Ratio	0.50	0.79	0.40					0.70	0.05	0.36	0.29	
Uniform Delay, d1	39.0	41.7	38.2					35.3	28.7	29.0	11.6	
Progression Factor	1.00	1.00	1.00					1.00	1.00	0.06	0.31	
Incremental Delay, d2	2.6	15.5	3.8					2.9	0.2	0.3	0.0	
Delay (s)	41.6	57.2	42.0					38.2	28.9	2.0	3.7	
Level of Service	D	E	D					D	C	A	A	
Approach Delay (s)		46.4			0.0			37.5			3.4	
Approach LOS		D			A			D			A	

Intersection Summary			
HCM Average Control Delay	30.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	109.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	85.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	73	149	20	769	1006	0	0	479	569
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.0		6.0	6.0			6.0	6.0
Lane Util. Factor					0.95		0.97	0.95			0.86	0.86
Frt					0.99		1.00	1.00			0.94	0.85
Flt Protected					0.99		0.95	1.00			1.00	1.00
Satd. Flow (prot)					3443		3433	3539			4537	1362
Flt Permitted					0.99		0.13	1.00			1.00	1.00
Satd. Flow (perm)					3443		466	3539			4537	1362
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	73	149	20	769	1006	0	0	479	569
RTOR Reduction (vph)	0	0	0	0	6	0	0	0	0	0	108	236
Lane Group Flow (vph)	0	0	0	0	236	0	769	1006	0	0	656	48
Turn Type				Perm			custom					Perm
Protected Phases					8		4	4			6	
Permitted Phases				8			2	2 6				6
Actuated Green, G (s)					10.0		49.0	66.0			17.0	17.0
Effective Green, g (s)					10.0		49.0	66.0			17.0	17.0
Actuated g/C Ratio					0.10		0.49	0.66			0.17	0.17
Clearance Time (s)					6.0		6.0	6.0			6.0	6.0
Vehicle Extension (s)					3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					344		762	2760			771	232
v/s Ratio Prot							c0.18	0.07			c0.14	
v/s Ratio Perm					0.07		c0.31	0.22				0.04
v/c Ratio					0.69		1.01	0.36			0.85	0.21
Uniform Delay, d1					43.5		37.7	7.6			40.3	35.7
Progression Factor					1.00		0.66	0.12			0.65	0.86
Incremental Delay, d2					5.6		29.5	0.1			10.3	1.8
Delay (s)					49.0		54.3	1.0			36.5	32.4
Level of Service					D		D	A			D	C
Approach Delay (s)		0.0			49.0			24.1			35.4	
Approach LOS		A			D			C			D	

Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	983	272	464	0	0	0	0	792	101	153	399	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0					6.0		6.0	6.0	
Lane Util. Factor	0.97	1.00	1.00					0.86		1.00	0.95	
Frt	1.00	1.00	0.85					0.98		1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00		0.95	1.00	
Satd. Flow (prot)	3433	1863	1583					6299		1770	3539	
Flt Permitted	0.95	1.00	1.00					1.00		0.29	1.00	
Satd. Flow (perm)	3433	1863	1583					6299		541	3539	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	983	272	464	0	0	0	0	792	101	153	399	0
RTOR Reduction (vph)	0	0	306	0	0	0	0	23	0	0	0	0
Lane Group Flow (vph)	983	272	158	0	0	0	0	870	0	153	399	0
Turn Type	Perm		Perm							custom		
Protected Phases		2						4			6	
Permitted Phases	2		2							6 8	4 8	
Actuated Green, G (s)	31.0	31.0	31.0					18.0		33.0	45.0	
Effective Green, g (s)	31.0	31.0	31.0					18.0		33.0	45.0	
Actuated g/C Ratio	0.31	0.31	0.31					0.18		0.33	0.45	
Clearance Time (s)	6.0	6.0	6.0					6.0			6.0	
Vehicle Extension (s)	3.0	3.0	3.0					3.0			3.0	
Lane Grp Cap (vph)	1064	578	491					1134		179	2017	
v/s Ratio Prot		0.15						c0.14			0.03	
v/s Ratio Perm	c0.29		0.10							c0.28	0.08	
v/c Ratio	0.92	0.47	0.32					0.77		0.85	0.20	
Uniform Delay, d1	33.4	27.9	26.4					39.0		31.3	16.6	
Progression Factor	1.00	1.00	1.00					1.00		0.30	0.32	
Incremental Delay, d2	14.4	2.7	1.7					5.0		16.7	0.0	
Delay (s)	47.8	30.6	28.2					44.0		26.1	5.4	
Level of Service	D	C	C					D		C	A	
Approach Delay (s)		39.8			0.0			44.0			11.1	
Approach LOS		D			A			D			B	

Intersection Summary			
HCM Average Control Delay	36.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	0	61	428	5	30	105	753	136	1	659	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.85		1.00	0.87		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1583		1770	1623		1770	3458		1770	3531	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1583		1770	1623		1770	3458		1770	3531	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1	0	61	428	5	30	105	753	136	1	659	10
RTOR Reduction (vph)	0	55	0	0	19	0	0	12	0	0	1	0
Lane Group Flow (vph)	1	6	0	428	16	0	105	877	0	1	668	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	2.0	11.6		29.7	39.3		12.1	42.7		2.0	32.6	
Effective Green, g (s)	2.0	11.6		29.7	39.3		12.1	42.7		2.0	32.6	
Actuated g/C Ratio	0.02	0.11		0.27	0.36		0.11	0.39		0.02	0.30	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	32	167		478	580		195	1342		32	1046	
v/s Ratio Prot	0.00	c0.00		c0.24	0.01		0.06	c0.25		0.00	c0.19	
v/s Ratio Perm												
v/c Ratio	0.03	0.04		0.90	0.03		0.54	0.65		0.03	0.64	
Uniform Delay, d1	53.0	44.2		38.7	22.9		46.3	27.6		53.0	33.6	
Progression Factor	1.00	1.00		1.00	1.00		1.20	0.85		1.00	1.00	
Incremental Delay, d2	0.4	0.1		18.9	0.0		2.7	2.3		0.4	3.0	
Delay (s)	53.4	44.3		57.6	23.0		58.2	25.9		53.4	36.6	
Level of Service	D	D		E	C		E	C		D	D	
Approach Delay (s)		44.4			55.0			29.3			36.6	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM Average Control Delay	37.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	1	175	782	29	159	1302
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	0.91		1.00	0.91
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	5058		1770	5085
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	5058		1770	5085
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1	175	782	29	159	1302
RTOR Reduction (vph)	0	65	2	0	0	0
Lane Group Flow (vph)	1	110	809	0	159	1302
Turn Type		pm+ov			Prot	
Protected Phases	8	1	2		1	6
Permitted Phases		8				
Actuated Green, G (s)	2.0	46.0	76.0		44.0	126.0
Effective Green, g (s)	2.0	46.0	76.0		44.0	126.0
Actuated g/C Ratio	0.01	0.33	0.54		0.31	0.90
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	25	588	2746		556	4577
v/s Ratio Prot	0.00	c0.06	0.16		0.09	c0.26
v/s Ratio Perm		0.01				
v/c Ratio	0.04	0.19	0.29		0.29	0.28
Uniform Delay, d1	68.1	33.6	17.4		36.2	0.9
Progression Factor	1.00	1.00	1.00		0.71	0.54
Incremental Delay, d2	0.7	0.2	0.3		0.3	0.1
Delay (s)	68.7	33.8	17.7		25.9	0.6
Level of Service	E	C	B		C	A
Approach Delay (s)	34.0		17.7			3.4
Approach LOS	C		B			A

Intersection Summary			
HCM Average Control Delay	10.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	330	384	57	702	169	360	51
v/c Ratio	0.45	0.51	0.15	0.64	0.46	0.44	0.02
Control Delay	33.9	34.8	9.9	33.4	9.9	3.4	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	34.8	9.9	33.4	9.9	3.4	0.4
Queue Length 50th (ft)	86	104	0	102	0	0	0
Queue Length 95th (ft)	129	152	32	136	66	0	0
Internal Link Dist (ft)		148		634			161
Turn Bay Length (ft)					200		
Base Capacity (vph)	729	752	381	1098	367	814	2315
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.51	0.15	0.64	0.46	0.44	0.02

Intersection Summary

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	12	361	337	387	474	398	315
v/c Ratio	0.04	0.62	0.62	0.63	0.19	0.35	0.48
Control Delay	30.5	39.4	9.4	12.4	0.3	27.3	8.4
Queue Delay	0.0	0.0	0.0	0.1	0.3	0.0	0.0
Total Delay	30.5	39.4	9.4	12.4	0.6	27.3	8.4
Queue Length 50th (ft)	6	99	0	16	1	25	17
Queue Length 95th (ft)	21	143	72	32	1	47	81
Internal Link Dist (ft)		111			161	676	
Turn Bay Length (ft)							300
Base Capacity (vph)	334	668	572	610	2482	1139	662
Starvation Cap Reductn	0	0	0	6	1344	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.54	0.59	0.64	0.42	0.35	0.48

Intersection Summary

Lane Group	EBL	EBT	EBR	NBT	SBT
Lane Group Flow (vph)	156	126	25	446	173
v/c Ratio	0.37	0.15	0.06	0.56	0.12
Control Delay	34.6	30.5	12.1	35.2	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	34.6	30.5	12.1	35.2	1.5
Queue Length 50th (ft)	81	32	0	123	2
Queue Length 95th (ft)	144	58	21	180	3
Internal Link Dist (ft)		101		392	161
Turn Bay Length (ft)					
Base Capacity (vph)	419	838	394	798	1477
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.37	0.15	0.06	0.56	0.12

Intersection Summary

Lane Group	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	77	300	530	96	160
v/c Ratio	0.32	0.62	0.33	0.18	0.42
Control Delay	41.6	43.8	1.2	37.3	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	43.8	1.3	37.3	10.0
Queue Length 50th (ft)	44	88	3	27	0
Queue Length 95th (ft)	88	133	3	52	57
Internal Link Dist (ft)		62	161	403	
Turn Bay Length (ft)					200
Base Capacity (vph)	291	583	1583	547	380
Starvation Cap Reductn	0	0	122	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.26	0.51	0.36	0.18	0.42

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	66	195	86	150	90	1993	53	1333
v/c Ratio	0.45	0.50	0.53	0.38	0.52	0.67	0.36	0.48
Control Delay	62.5	25.0	64.0	23.1	69.9	6.3	59.3	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.5	25.0	64.0	23.1	69.9	6.3	59.3	18.3
Queue Length 50th (ft)	50	27	65	21	66	106	39	231
Queue Length 95th (ft)	97	65	119	53	m99	m201	82	301
Internal Link Dist (ft)		634		786		505		357
Turn Bay Length (ft)	200		200		200		200	
Base Capacity (vph)	148	482	177	509	187	2958	148	2790
Starvation Cap Reductn	0	0	0	0	0	44	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.40	0.49	0.29	0.48	0.68	0.36	0.48

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	1104	824	234	1169	322	198	867
v/c Ratio	1.02	0.54	0.44	1.03	0.52	0.49	0.29
Control Delay	72.1	35.1	14.0	81.4	11.9	22.0	1.2
Queue Delay	0.0	0.0	0.0	1.6	0.0	0.0	0.2
Total Delay	72.1	35.1	14.0	82.9	11.9	22.0	1.4
Queue Length 50th (ft)	~452	201	51	~240	97	11	4
Queue Length 95th (ft)	#597	248	137	#288	68	m34	5
Internal Link Dist (ft)		92		406			154
Turn Bay Length (ft)					200		
Base Capacity (vph)	1087	1514	537	1132	619	401	2966
Starvation Cap Reductn	0	0	0	0	0	0	1241
Spillback Cap Reductn	0	0	0	5	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.02	0.54	0.44	1.04	0.52	0.49	0.50

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	381	977	406	596	1677	684	823
v/c Ratio	0.51	0.89	1.09	0.94	0.48	0.78	0.99
Control Delay	44.3	56.4	111.6	33.3	0.0	44.1	49.8
Queue Delay	0.0	0.0	0.0	0.0	1.6	0.0	0.0
Total Delay	44.3	56.4	111.6	33.3	1.7	44.1	49.8
Queue Length 50th (ft)	135	270	~328	90	0	130	217
Queue Length 95th (ft)	185	#343	#529	m81	m0	156	#275
Internal Link Dist (ft)		102			154	505	
Turn Bay Length (ft)							200
Base Capacity (vph)	744	1102	374	635	3475	880	830
Starvation Cap Reductn	0	0	0	0	1539	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.89	1.09	0.94	0.87	0.78	0.99

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	275	306	435	502	255	344
v/c Ratio	0.83	0.42	0.83	0.21	0.41	0.69
Control Delay	60.7	19.6	29.4	0.2	42.5	12.8
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	60.7	19.6	29.4	0.4	42.5	12.8
Queue Length 50th (ft)	167	45	125	0	56	0
Queue Length 95th (ft)	#291	84	#238	0	83	85
Internal Link Dist (ft)		48		150	558	
Turn Bay Length (ft)						200
Base Capacity (vph)	360	785	526	2448	621	496
Starvation Cap Reductn	0	0	0	1216	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.39	0.83	0.41	0.41	0.69

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	218	202	199	720	48	67	462
v/c Ratio	0.33	0.56	0.43	0.56	0.11	0.20	0.19
Control Delay	36.2	43.2	8.3	34.1	9.4	1.4	2.3
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.4
Total Delay	36.2	43.2	8.3	34.2	9.4	1.4	2.7
Queue Length 50th (ft)	62	118	0	147	0	0	4
Queue Length 95th (ft)	97	192	59	188	28	0	m29
Internal Link Dist (ft)		60		290			150
Turn Bay Length (ft)					200		
Base Capacity (vph)	663	360	467	1293	439	343	2423
Starvation Cap Reductn	0	0	0	0	0	0	1375
Spillback Cap Reductn	0	0	0	53	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.56	0.43	0.58	0.11	0.20	0.44

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	859	796	352	490	328
v/c Ratio	0.97	1.00	0.15	0.49	0.87
Control Delay	54.2	53.5	0.1	28.4	50.0
Queue Delay	0.0	0.0	0.7	0.0	0.0
Total Delay	54.2	53.5	0.8	28.4	50.0
Queue Length 50th (ft)	236	100	0	81	160
Queue Length 95th (ft)	#366	#192	m0	118	#347
Internal Link Dist (ft)	42		161	530	
Turn Bay Length (ft)					400
Base Capacity (vph)	890	797	2300	997	375
Starvation Cap Reductn	0	0	1573	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.97	1.00	0.48	0.49	0.87

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	295	177	89	912	86	179
v/c Ratio	0.66	0.73	0.31	0.75	0.32	0.07
Control Delay	49.3	60.6	12.0	42.2	8.4	2.4
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	49.3	60.6	12.0	42.3	8.4	2.4
Queue Length 50th (ft)	93	110	0	159	6	7
Queue Length 95th (ft)	138	#208	44	196	52	m10
Internal Link Dist (ft)		81		504		161
Turn Bay Length (ft)						
Base Capacity (vph)	446	242	283	1216	265	2654
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	23	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.73	0.31	0.76	0.32	0.07

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	4	46	106	9	48	763	40	566
v/c Ratio	0.02	0.09	0.28	0.03	0.24	0.37	0.19	0.27
Control Delay	36.0	0.3	38.7	24.8	43.0	2.4	38.2	14.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.0	0.3	38.7	24.8	43.0	2.4	38.2	14.9
Queue Length 50th (ft)	2	0	28	2	24	3	20	117
Queue Length 95th (ft)	12	0	53	17	m41	15	52	164
Internal Link Dist (ft)		433		1040		676		292
Turn Bay Length (ft)	200		200		200		200	
Base Capacity (vph)	197	570	383	366	199	2069	211	2084
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.08	0.28	0.02	0.24	0.37	0.19	0.27

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	6	49	1285	31	903
v/c Ratio	0.04	0.18	0.32	0.14	0.18
Control Delay	51.3	11.8	5.6	27.8	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	11.8	5.6	27.8	0.6
Queue Length 50th (ft)	4	0	96	17	0
Queue Length 95th (ft)	18	31	195	m44	38
Internal Link Dist (ft)	365		643		311
Turn Bay Length (ft)				200	
Base Capacity (vph)	236	295	4001	236	4899
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.03	0.17	0.32	0.13	0.18

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	506	1319	244	592	172	738	211
v/c Ratio	0.38	0.95	0.33	0.89	0.99	1.02	0.12
Control Delay	25.0	48.5	6.1	62.4	104.8	51.1	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.0	48.5	6.1	62.4	104.8	51.1	2.9
Queue Length 50th (ft)	129	469	16	120	119	~131	1
Queue Length 95th (ft)	173	#622	67	#177	#297	#156	m14
Internal Link Dist (ft)		148		634			161
Turn Bay Length (ft)					200		
Base Capacity (vph)	1342	1383	746	663	174	727	1770
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.95	0.33	0.89	0.99	1.02	0.12

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	104	392	327	257	669	846	302
v/c Ratio	0.50	0.94	0.69	0.69	0.24	0.81	0.34
Control Delay	54.4	79.6	13.3	35.3	0.2	40.4	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.3	0.3	0.0
Total Delay	54.4	79.6	13.3	35.3	0.5	40.7	7.4
Queue Length 50th (ft)	70	146	0	34	1	154	9
Queue Length 95th (ft)	127	#241	87	m46	m1	m199	m93
Internal Link Dist (ft)		111			161	676	
Turn Bay Length (ft)							300
Base Capacity (vph)	209	418	475	375	2735	1049	890
Starvation Cap Reductn	0	0	0	0	1334	0	0
Spillback Cap Reductn	0	0	0	0	0	24	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.94	0.69	0.69	0.48	0.83	0.34

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NBT	SBT
Lane Group Flow (vph)	648	884	196	623	481
v/c Ratio	0.90	0.61	0.26	0.97	0.42
Control Delay	47.2	27.8	3.8	73.1	11.9
Queue Delay	0.0	0.0	0.0	12.9	0.1
Total Delay	47.2	27.8	3.8	86.0	12.0
Queue Length 50th (ft)	419	254	0	226	29
Queue Length 95th (ft)	#644	321	43	#346	m32
Internal Link Dist (ft)		101		392	161
Turn Bay Length (ft)					
Base Capacity (vph)	724	1448	763	642	1135
Starvation Cap Reductn	0	0	0	0	134
Spillback Cap Reductn	0	0	0	34	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.90	0.61	0.26	1.02	0.48

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	169	155	1178	313	314
v/c Ratio	0.95	0.39	0.76	0.97	0.73
Control Delay	107.1	26.7	5.0	94.2	16.4
Queue Delay	1.1	0.0	0.5	0.0	0.0
Total Delay	108.2	26.7	5.5	94.2	16.4
Queue Length 50th (ft)	121	26	42	117	0
Queue Length 95th (ft)	#256	60	m77	#209	#93
Internal Link Dist (ft)		62	161	403	
Turn Bay Length (ft)					200
Base Capacity (vph)	177	398	1554	322	429
Starvation Cap Reductn	0	0	96	0	0
Spillback Cap Reductn	1	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.96	0.39	0.81	0.97	0.73

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	128	257	81	42	77	946	13	800
v/c Ratio	0.45	0.66	0.39	0.22	0.43	0.46	0.07	0.46
Control Delay	43.2	16.5	46.6	32.2	55.8	3.4	42.0	20.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.2	16.5	46.6	32.2	55.8	3.4	42.0	20.6
Queue Length 50th (ft)	78	15	48	15	35	4	8	188
Queue Length 95th (ft)	130	89	95	48	m76	183	26	272
Internal Link Dist (ft)		250		422		530		409
Turn Bay Length (ft)	200				200		200	
Base Capacity (vph)	306	479	206	260	181	2069	177	1725
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.54	0.39	0.16	0.43	0.46	0.07	0.46

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	88	586	145	246	119	1578	202	1631
v/c Ratio	0.59	0.88	0.76	0.33	0.64	0.77	0.81	0.72
Control Delay	78.4	58.1	84.1	21.9	75.8	16.0	81.8	35.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	78.4	58.1	84.1	21.9	75.8	16.2	81.8	35.0
Queue Length 50th (ft)	78	212	129	43	116	422	178	469
Queue Length 95th (ft)	137	#292	#215	83	183	462	#283	531
Internal Link Dist (ft)		634		786		505		357
Turn Bay Length (ft)	200		200		200		200	
Base Capacity (vph)	164	704	215	786	215	2052	278	2253
Starvation Cap Reductn	0	0	0	0	0	58	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.83	0.67	0.31	0.55	0.79	0.73	0.72

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	1060	1338	389	929	301	419	1180
v/c Ratio	0.98	0.89	0.81	0.91	0.52	0.81	0.39
Control Delay	70.9	54.1	48.8	64.2	17.4	25.1	1.0
Queue Delay	0.0	0.0	0.0	0.3	0.0	1.9	0.4
Total Delay	70.9	54.1	48.8	64.6	17.4	26.9	1.5
Queue Length 50th (ft)	494	446	309	209	142	40	5
Queue Length 95th (ft)	#642	515	#504	#248	106	m46	m6
Internal Link Dist (ft)		92		406			154
Turn Bay Length (ft)					200		
Base Capacity (vph)	1079	1495	483	1024	584	515	3051
Starvation Cap Reductn	0	0	0	0	0	28	1235
Spillback Cap Reductn	0	0	0	7	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	0.89	0.81	0.91	0.52	0.86	0.65

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	499	1168	259	550	1439	1100	856
v/c Ratio	0.64	1.01	0.63	0.97	0.41	0.97	0.92
Control Delay	53.0	81.0	43.4	52.8	0.1	53.0	29.1
Queue Delay	0.0	0.0	0.0	0.0	1.3	0.0	0.0
Total Delay	53.0	81.0	43.4	52.8	1.4	53.0	29.1
Queue Length 50th (ft)	213	~395	160	96	0	252	288
Queue Length 95th (ft)	274	#502	259	m#136	m0	#311	#380
Internal Link Dist (ft)		102			154	505	
Turn Bay Length (ft)							200
Base Capacity (vph)	785	1162	413	569	3487	1132	926
Starvation Cap Reductn	0	0	0	0	1735	0	0
Spillback Cap Reductn	0	0	0	0	46	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	1.01	0.63	0.97	0.82	0.97	0.92

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	177	455	496	850	664	301
v/c Ratio	0.69	0.89	0.87	0.32	0.84	0.60
Control Delay	59.9	66.3	28.2	0.3	56.3	10.4
Queue Delay	0.0	0.0	0.0	0.3	0.0	0.0
Total Delay	59.9	66.3	28.2	0.6	56.3	10.4
Queue Length 50th (ft)	120	165	109	0	168	0
Queue Length 95th (ft)	#211	#256	#217	0	#227	79
Internal Link Dist (ft)		48		150	558	
Turn Bay Length (ft)						200
Base Capacity (vph)	257	515	568	2641	787	499
Starvation Cap Reductn	0	0	0	1085	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.88	0.87	0.55	0.84	0.60

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	341	294	354	1005	79	124	717
v/c Ratio	0.50	0.79	0.65	0.70	0.16	0.36	0.29
Control Delay	41.9	58.0	15.5	38.4	7.5	2.9	2.2
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.2	0.8
Total Delay	41.9	58.0	15.5	38.5	7.5	3.2	3.0
Queue Length 50th (ft)	111	199	42	232	0	1	21
Queue Length 95th (ft)	157	#330	142	283	36	m0	m31
Internal Link Dist (ft)		60		290			150
Turn Bay Length (ft)					200		
Base Capacity (vph)	688	373	543	1435	503	348	2444
Starvation Cap Reductn	0	0	0	0	0	31	1333
Spillback Cap Reductn	0	0	0	32	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.79	0.65	0.72	0.16	0.39	0.65

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	242	769	1006	764	284
v/c Ratio	0.69	1.01	0.36	0.87	0.61
Control Delay	53.3	53.4	0.5	32.9	9.4
Queue Delay	0.0	0.0	1.0	0.0	0.0
Total Delay	53.3	53.4	1.5	32.9	9.4
Queue Length 50th (ft)	77	84	0	157	90
Queue Length 95th (ft)	#121	#119	m15	#219	54
Internal Link Dist (ft)	42		161	530	
Turn Bay Length (ft)					400
Base Capacity (vph)	351	762	2760	879	467
Starvation Cap Reductn	0	0	1406	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.69	1.01	0.74	0.87	0.61

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	983	272	464	893	153	399
v/c Ratio	0.92	0.47	0.58	0.77	0.86	0.20
Control Delay	48.6	31.2	6.6	43.0	36.5	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.5
Total Delay	48.6	31.2	6.6	43.0	36.5	4.0
Queue Length 50th (ft)	310	139	9	154	39	13
Queue Length 95th (ft)	#434	217	88	192	m45	m22
Internal Link Dist (ft)		81		504		161
Turn Bay Length (ft)						
Base Capacity (vph)	1064	578	796	1157	178	2017
Starvation Cap Reductn	0	0	0	0	0	1175
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.47	0.58	0.77	0.86	0.47

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	1	61	428	35	105	889	1	669
v/c Ratio	0.01	0.15	0.90	0.06	0.54	0.54	0.01	0.56
Control Delay	46.0	0.8	61.2	10.6	65.0	20.6	46.0	33.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.0	0.8	61.2	10.6	65.0	20.6	46.0	33.8
Queue Length 50th (ft)	1	0	280	2	77	159	1	217
Queue Length 95th (ft)	6	0	#459	27	m119	295	6	288
Internal Link Dist (ft)		433		1040		676		292
Turn Bay Length (ft)	200		200		200		200	
Base Capacity (vph)	161	445	506	642	201	1655	161	1203
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.14	0.85	0.05	0.52	0.54	0.01	0.56

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	1	175	811	159	1302
v/c Ratio	0.01	0.29	0.28	0.29	0.26
Control Delay	61.0	15.4	15.8	27.1	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	15.4	15.8	27.1	0.4
Queue Length 50th (ft)	1	51	121	85	0
Queue Length 95th (ft)	7	93	193	m131	50
Internal Link Dist (ft)	365		643		311
Turn Bay Length (ft)				200	
Base Capacity (vph)	228	598	2922	556	4925
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.00	0.29	0.28	0.29	0.26

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Access Control

Appendix D

US 54 /400 Study Area

Proposed Access Management Code

City of Andover, KS

Table of Contents

Section 1: Purpose

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." Along the US 54/US-400 Corridor, access management techniques are recommended to plan for appropriate access located along future roadways and undeveloped areas. When properly executed, good access management techniques help preserve transportation systems by reducing the number of access points in developed or undeveloped areas while still providing "reasonable access". Common access related issues which could degrade the street system are:

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

Why Access Management Is Important

Access management balances traffic safety and efficiency with reasonable property access. Access that may seem reasonable given today's roadway configuration and traffic volumes may be perceived differently in the future. The roadway system should function in the present and the future. Arterial streets are the key to mobility within the city and connection to local properties should be limited on arterial streets. Direct local property access is intended for collector and local streets. The ultimate responsibility for implementing access management concepts is dependent on multiple disciplines including traffic engineering, land use planning, and transportation planning, among others. Access management should be understood and accepted by transportation professionals, but there should also be a level of understanding and acceptance by the public and local elected officials.

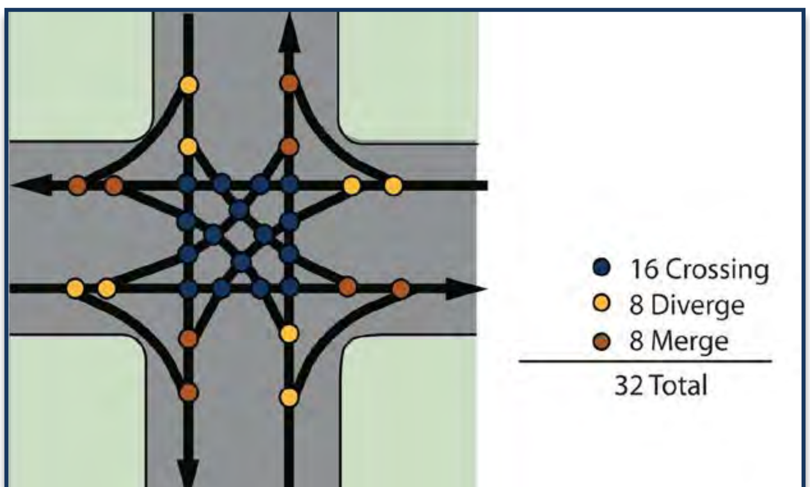


Figure 1: Vehicular Conflict Points in a Typical Four Leg Intersection (Without Access Management)

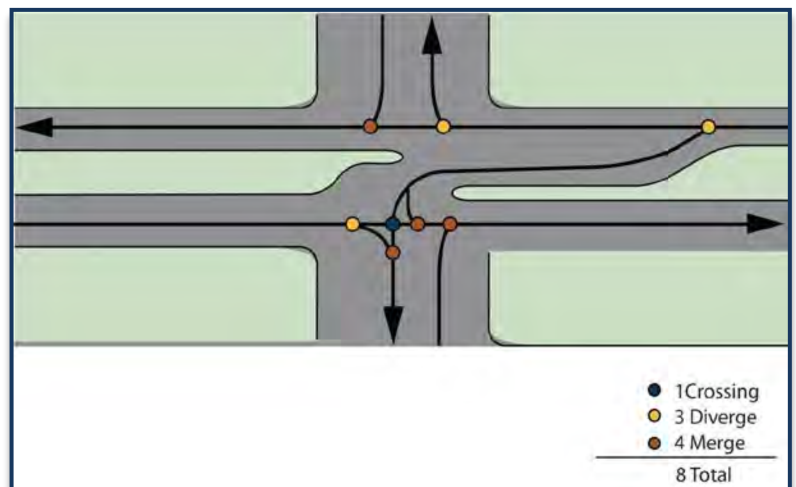


Figure 2: Vehicular Conflict Points in a Directional Median Opening (Managed Access)

The benefits of access management are imparted on motorists, pedestrians, businesses, and the government among others. Motorists benefit from fewer decision points and traffic conflicts (Figures 1 and 2). Pedestrians benefit by a reduced number of vehicle paths to cross 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.

Section 2: Applicability

This code applies to all roadways and roadway right-of-ways (public and private) within the study area as designated in the City of Andover US 54/400 Corridor Study August 2011 as well as to all properties adjacent to these roadways. This code is in addition to other state or local standards and requirements that may be in force on these roadways (such as the Access Management Policy of the Kansas Department of Transportation (KDOT) for US 54/400). Refer to Section 4 of this document when there are conflicts between this code and other documents. The general access management policy of the City of Andover will apply to all areas outside of the designated study area. Once the City of Andover has updated the Comprehensive Plan, it is recommended that this study area be designated as an overlay district for which this code specifically applies.

Figure 3: US 54/400 Study Area

Section 3: Conformance with Plans, Regulations, and Statutes

This code is adopted to implement the plans and policies as set forth in the City of Andover US 54/400 Corridor Study August 2011. In addition, this Code is intended to conform to, support, and supplement policies and plans of KDOT and the Wichita Area Metropolitan Planning Organization (WAMPO).

Section 4: Conflicts and Revisions

While efforts have been made to make sure that this Access Management Code does not conflict with the Andover Municipal Code, Subdivision Regulations, Zoning Ordinance, Technical Specifications for Public Improvements, and other City of Andover planning and design regulations or documents, there may be occasions where discrepancies between these documents arise. Upon such an occasion, the City of Andover shall determine the more restrictive provision and it shall apply. This decision can be appealed to the City Planning Commission. If there are conflicts between this code and the requirements or standards of another agency, city staff will coordinate with staff from the other agency to determine which standards or requirements control.

Section 5: Functional Classification for Access Management

Many cities, including Andover, use a functional classification system to separate roadways in their network from each other. 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. This planning study incorporates 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 or reverse access roads.
At a high level, the differences between interstate, arterial, collector and residential roadways represent a trade-off between providing mobility and providing access (Figure 4).

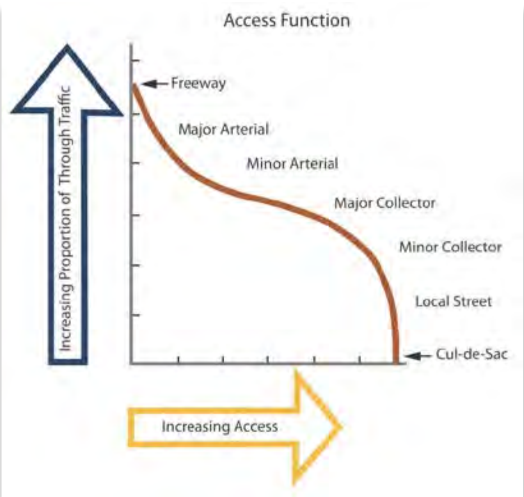


Figure 4: Conceptual Roadway Functional Classifications (Mobility vs. Access)
Source: 2003 TRB Access Management Manual

Street Types

The roadway alternatives for the US 54/400 corridor are made up of six street typologies: freeway, frontage roads, backage roads or reverse access 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 freeway is 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 5 and 6)

Frontage Road

A frontage road is a partially limited access road running parallel to the freeway (See Figures 5 and 6). 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.

Backage/Reverse Access Roads

Backage/reverse access roads are non-limited access roads 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 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 7)

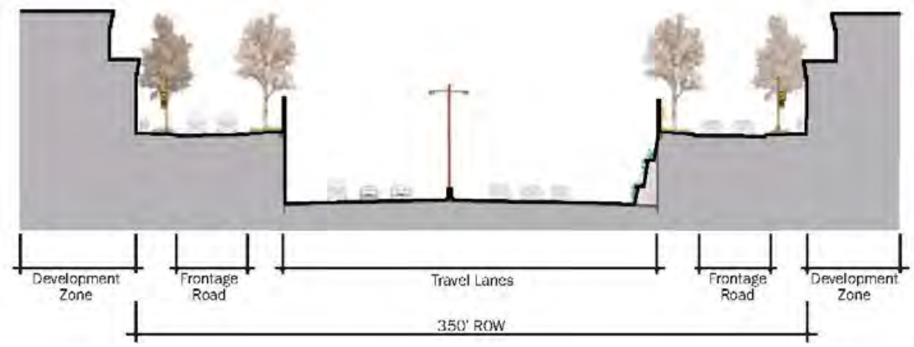


Figure 5: Depressed Freeway

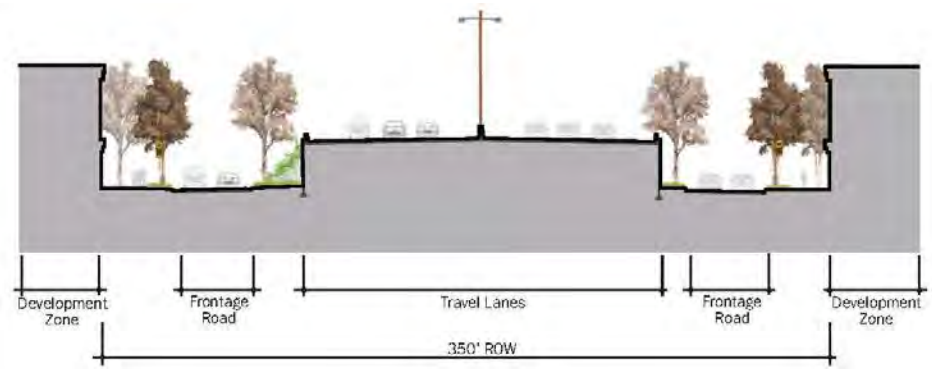


Figure 6: Elevated Freeway

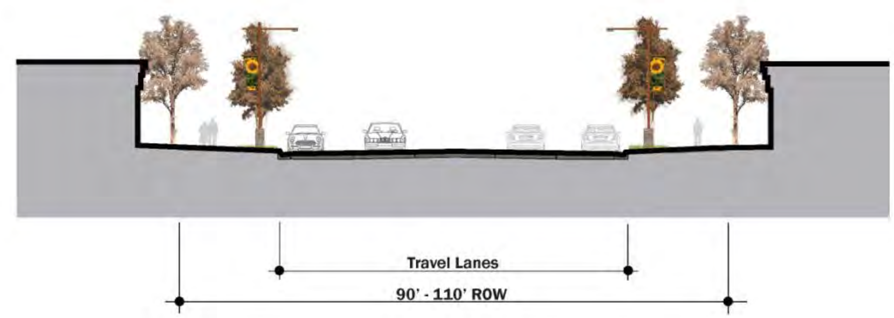


Figure 7: Backage Road

Arterials/Collectors

Arterials/collectors are high capacity urban roads 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 8)

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 9)

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 10)

Local Roads

Local roads include all remaining roads in the system. Local roads provide the highest frequency of access, connections to the collectors, and primarily serve short trips.

Figure 11 shows the City of Andover's future roadway network with the designated roadway classifications within the study area. Please note that the classifications are based on the projected future function and operation of each roadway. US 54/400 is the only highway within the city limits and is classified according to the state classification system as "B" Route and is also designated on the National Highway System. US 54/400 is designated as a protected corridor in KDOT's District 5 Corridor Management Plan because of critical role in the east-west movement of people and goods in the region and because of pressures of development.

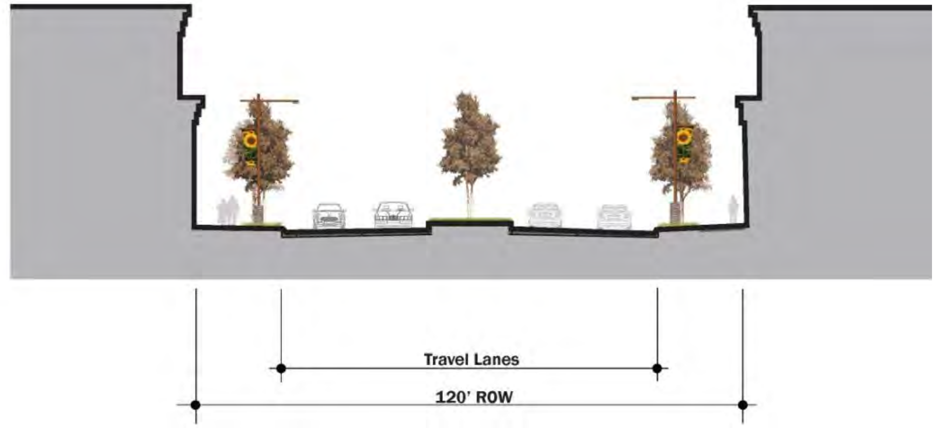


Figure 8: Six-lane Arterial

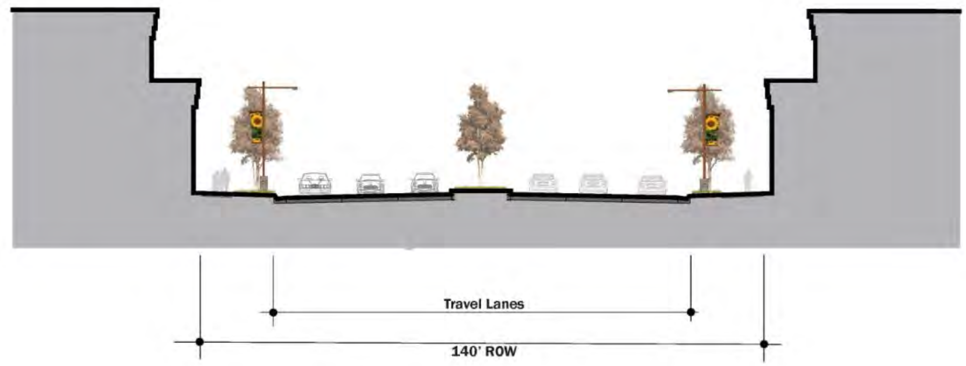


Figure 9: Five-lane Arterial

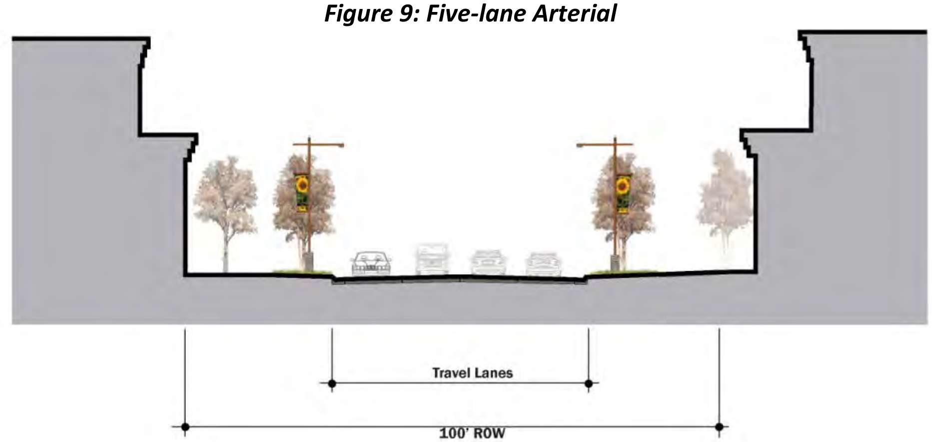


Figure 10: Four-lane Collector

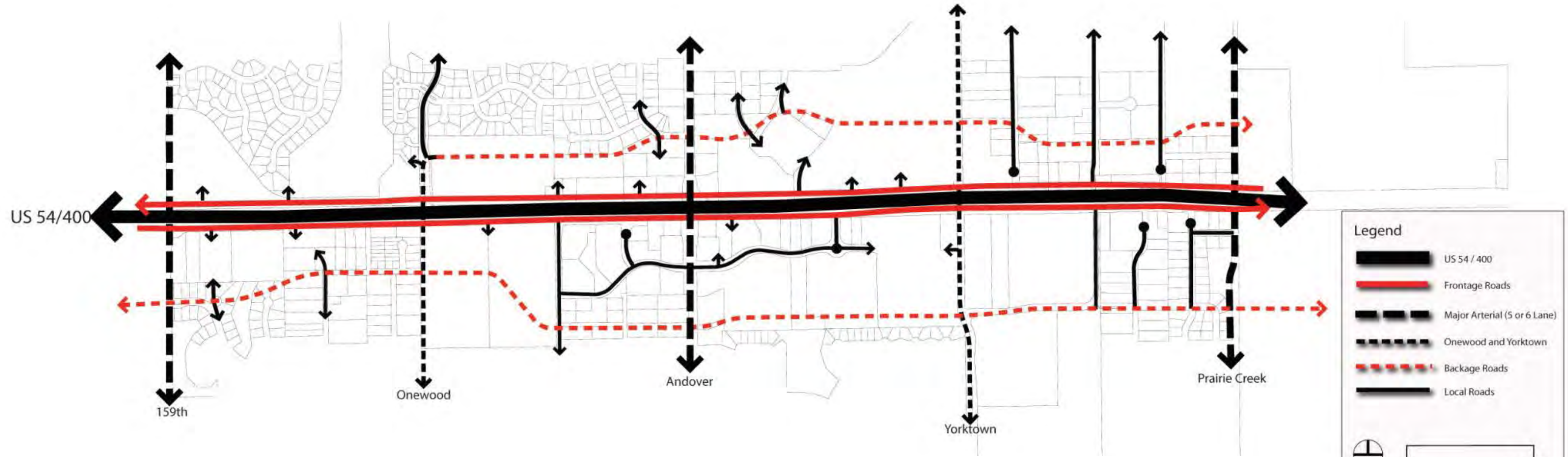


Figure 11: US 54/400 Overlay District Functional Classification Map

Section 6: Access Control Recommendations

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 traffic travelling alongside the freeway to the nearest north/south arterial or collector, which are streets platted by the city. Private access or driveways should be limited along the frontage roads and located outside of the function area of the interchanges and adjacent intersections. 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 1. The distances shown were adopted for design and simulation analysis for efficient traffic operations. Figure 12 shows recommended locations for signalized full access intersections.

	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

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

Table 1: Intersection Spacing on Arterial Streets

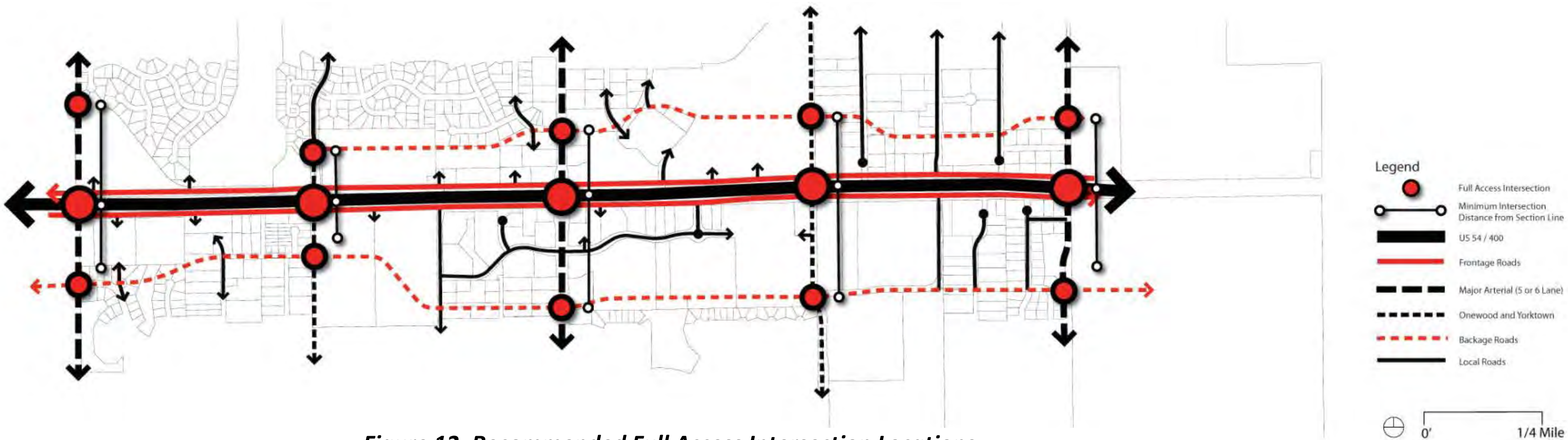


Figure 12: Recommended Full Access Intersection Locations

The functional area of an intersection is the area where additional connections or access points can negatively impact safety 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 down-stream 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.

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 2. Figure 13 shows the range of functional areas for proposed ramps.

Intersection Functional Areas

The functional area of an intersection is determined by the deceleration, turning, merging, and stopping distances of vehicles (Figure 14). 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" (2004), better known as the "Green Book," for the downstream distance. These distances are measured from the end of the curb return and not from center-line. The functional areas for backage streets and unsignalized intersections within the study areas were calculated using Stopping Sight Distance (SSD) from the 2004 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 efficient traffic operations. The information provided in Table 3 shows both the calculated functional areas, based on TRB's guidance and the recommended functional areas based on traffic analysis.

	Interchange Functional Area			
	East Bound Fronatage		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	755 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
Priarie 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 Line and are based upon the recommended roadway alignment and geometrics of this report and are supported by study traffic analysis/modeling

Table 2: Interchange Functional Areas

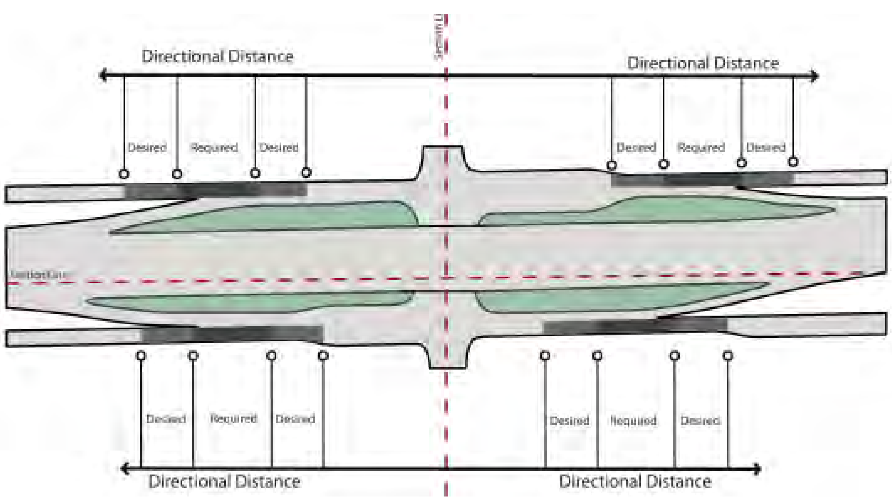


Figure 13: Functional Interchange Recommendations

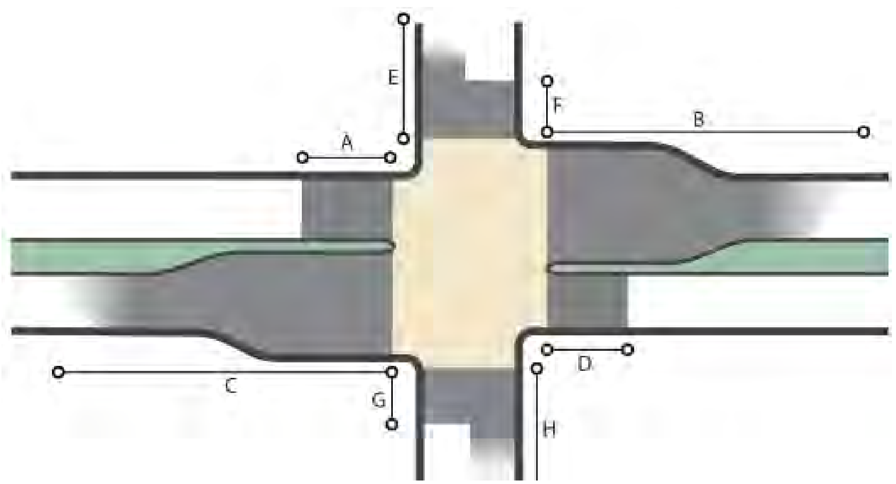


Figure 14: Functional Intersection Recommendations

	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

Note:
* 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 analysis/modeling.
*** TRB desired distances are recommended.
# 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 3: US 54/400 Study Intersection Functional Areas (See Figure 14 for Labels A-H)

Section 7: Medians

Median openings are used to provide access to other roads, driveways or access points. Medians can be restrictive (also called non-traversable), painted, or two-way left-turns medians. Medians can improve the safety of the roadway by limiting the number of conflict points on a roadway and make traffic flow more smoothly by only allowing turning movements at specific locations. In general, raised medians should be considered on all major arterial roadways (four-lane or six-lane with channelized left-turn lanes) and major collectors. Efforts should be made to reduce the number of access points on the roadway by utilizing shared-use or joint-use driveways and access points before construction of a two-way left-turn lane.

Research conducted as part of NCHRP Report 420 showed that crash rates at restrictive medians for non-traversable medians in urban and suburban areas were 5.6 crashes per million vehicle miles travelled (VMT) while roadways with no medians have 9.0 crashes per million VMT. Two-way left-turn medians have a crash rate of 6.9 crashes per million VMT. Restrictive medians are recommended for use on multi-lane arterial roadways in Andover.

Median openings may allow up to four types of movements. These possible turning movements include left-in, left-out, right-in, and right-out. A full access median opening would include all four movements (Figure 15). A directional, or restricted, opening would include less than all four possible turning movements and possibly only one turning movement (Figures 16 and 17). Often when turning movements are restricted they only allow right-in and right-out turns.

The proposed right-in right-out movement on Andover Rd. at Cloud St. is an example of a restricted driveway access. A drawing of this potential access can be seen in Figure 17, part a.

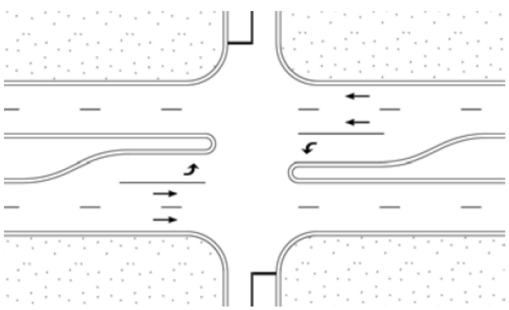


Figure 15: Full Access Median
Source: Lee's Summit, MO Access Management Code 2004

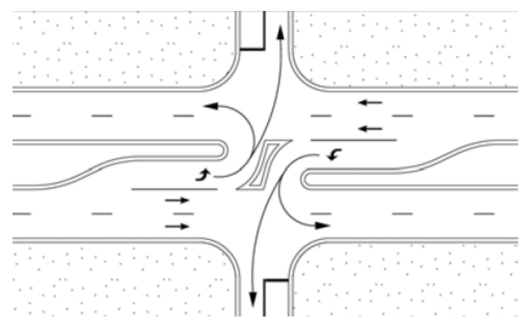


Figure 16: Restricted Access Median (Left-Out Restricted)
Source: Lee's Summit, MO Access Management Code 2004

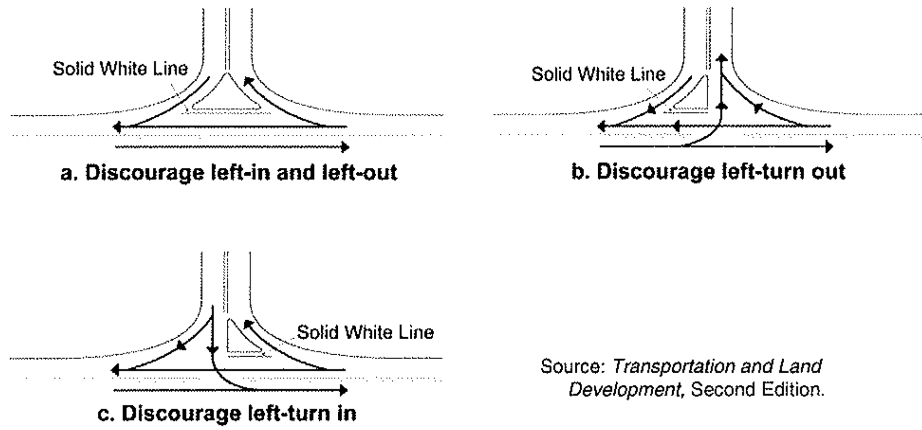


Figure 17: Restricted Access Driveway Islands
Source: Transportation and Land Development, 2nd Ed.

Section 8: Street and Connection Spacing Requirements

Adequately spacing access points along the street improves traffic safety, flow, and mobility. Access points should avoid intersection functional areas as mentioned in the previous section, but also be appropriately spaced from other access points.
Roadways with higher functional classes typically have higher spacing requirements than roadways in lower functional classes. Higher functional class roadways often have higher speed limits and higher volumes of traffic than lower functional class roads. If access is provided on higher functional class roadways, a small number of turning vehicles can disrupt a large number of through vehicles, limiting the capacity of the roadway.

One method to prevent this from happening is to limit access by the level of access (Table 4). This method should still be checked against the functional area of any individual intersection nearby.

With access to local businesses being provided by backage roads with two-way left-turn lanes (TWLTL), there is still a need to provide adequate spacing between access points. It is desirable to align driveways so that drivers in the TWLTL are not trying to make left turns while each blocking the other’s movement. If driveways are aligned on opposite sides of the backage road from each other or spaced far enough apart, this is less likely to occur.

Functional Class of Roadway	Undivided Roadway	Divided Roadway: Full Median Opening	Divided Roadway: Right In/Out Only	Divided Roadway: Directional Median Opening
Strategic Arterial	Not Applicable	2640	Typically Not Permitted	Typically Not Permitted
Principal Arterial	2640	2640	1320	1320
Minor Arterial	660	1320	330	660
Collector	330	Not Applicable, Medians Typically Not Used		
Local Road	100			

[a]Typically designed for left turns from the major roadway or left turns and U-turns.
[b]Not applicable; strategic arterials are divided roadways with nontraversable median.

Table 4: Example of Guidelines for Access Spacing (ft) on Suburban Roads
Source: TRB Access Management Manual 2003, Page 156

Section 9: Auxiliary Lanes

Auxiliary lanes are additional lanes added parallel to the through lanes for turning movements. Auxiliary lanes are composed of a taper, deceleration length, and storage length (Figure 18). Left and right-turn lanes provide vehicles a way to turn without excessive disruption to through traffic flow. Auxiliary lanes provide an intersection with additional vehicular capacity and assist with providing safe turning movements. Auxiliary lanes should be at least as wide as the through lane on the same approach (typically 12 feet).

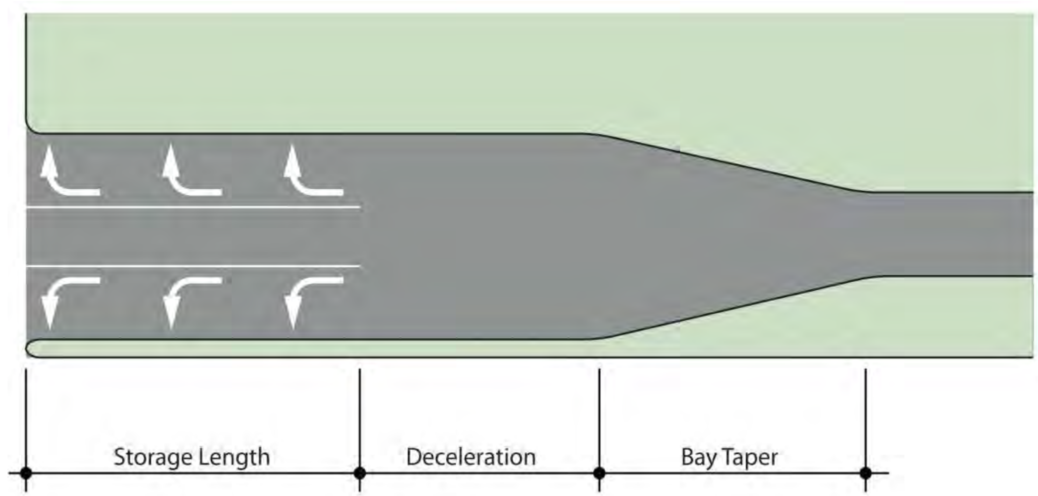


Figure 18: Auxiliary Lane Composition

Jurisdictions use different criteria for requiring auxiliary lanes and the length of those auxiliary lanes. Often the criteria for requiring auxiliary lanes are based on the posted speed limit, the volume of approaching vehicles, opposing vehicles, and the volume of turning vehicles. Those same criteria of speed and volume also determine the taper, deceleration, and storage lengths.

Tapers

Tapers may be a fixed length or depend on the posted roadway speed. Some jurisdictions use a fixed length for all tapers, often 100 feet. Other jurisdictions use a straight line ratio (length:width) for entering tapers based on the speed limit of the roadway.

Short tapers may be advantageous as they may appear a better target for drivers while longer tapers may mislead through vehicles into thinking it is a through lane. The 2004 Green Book states that most tapers are between 8:1 and 15:1 and that they can be straight line tapers or symmetrical-reverse curve tapers. Taper ratios shown in Table 5 shall be used for auxiliary lane design unless constraints are present such that a reduced bay taper length is needed (with approval by the City Engineer).

Deceleration Length

It is desirable that the deceleration length be long enough to account for drivers' perception and reaction time along with the braking distance required for stopping sight distance. All deceleration will occur within the deceleration portion of the turn lane unless specific constraints are present such that this is not practical. This may not be possible, particularly in urban areas or in areas where previous developments make it unrealistic. As a result, a 10mph speed reduction in the through lane will be allowed. AASHTO's Green Book (2004) is often used to determine deceleration lengths. One option for uncontrolled right turns is to provide deceleration to 15 mph if the vehicle does is not required to stop. Such instances occur on uncontrolled right turning movements, and would shorten the deceleration length required.

Posted Speed (mph)	Bay Taper Ratio
30 or less	8:1 (100ft taper)
35 to 45	15:1

Table 5: Bay Taper Ratios for Auxiliary Lanes in Developed Areas

Source: AASHTO's A Policy on Geometric Design of Highways and Streets, 2004.

Posted Highway Speed (MPH)	Recommended Deceleration Distance (ft) (to stop)	Minimum Deceleration Distance (ft) (to turn at 15 mph)
65	570	540
60	530	500
55	480	450
50	435	405
45	375	350
40	315	295
35	270	240
30	235	185

Note: Dimensions do not include required storage lengths
Recommended decelerations lengths are used for left-turn lanes and signalized right-turn lanes
Minimum deceleration lengths are used for non-signalized right-turn lanes

Table 6: Guideline to Determine Deceleration Lane Lengths

Source: AASHTO's A Policy on Geometric Design of Highways and Streets, 2004.

Table 6 provides both recommended and minimum deceleration distances which are based on all deceleration occurring in the deceleration lane. These values shall be used for auxiliary lane design unless prior approval is obtained by the City Engineer.

Storage Length

At unsignalized intersections, storage length is calculated based on the number of vehicles arriving in an average two minute period within the peak hour and assuming each vehicle occupies 25 feet of space. A minimum storage length of 100 ft will be used in urban areas. Where truck percentages exceed 10% of the total volume, the minimum storage should provide for one truck and one passenger car equaling approximately 110 feet. At signalized intersections, storage length is base on the signal cycle length (seconds), signal phasing arrangement, and the rate of arrivals and departures of turning vehicles.

Output from various capacity analysis programs including Highway Capacity Software (HCS) and/or Synchro/SimTraffic is also used to compute storage length at both unsignalized and signalized intersections. These programs often provide various confidence intervals for the maximum queue length with the 95th percentile queue length often being used to determine the storage length.

The storage length is a function of the probability of occurrence and should usually be one and a half to two times the average calculated storage length. As a result, the storage length used for auxiliary lane design shall be twice the calculated average queue length to avoid spillover into the through lanes.

Section 10: Land Development Access Guidelines

The way land is developed impacts the transportation network. Poor land use planning may limit the ability of the road network to safely support current and expected traffic and properties.

Land uses that may be subdivided should be divided by so they do not create "flag" lots as shown in Figure 19.

Lots that are subdivided should be divided so all lots are accessed through the lower functional classification road if two different roadway classifications are available.

Single lots should be accessed through a lower classification road if two different roadway classifications are available.

Residential driveway access to individual one-family and two-family lots should be prohibited on arterial and collector streets unless approved by the City Engineer.

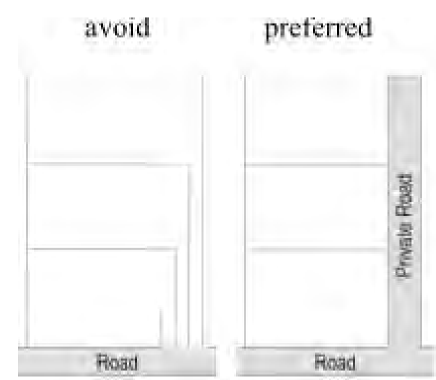


Figure 19: "Flag" Lots

Source: City of Gardner, KS Proposed Access Management Code

Supporting streets such as collectors and arterials should still provide a balanced network so that people can travel from one land use to another without necessarily requiring the use of arterials when the two land uses are close by. Without an interconnected street network and proper land use planning, all local trips are forced onto arterials resulting in unnecessary congestion and capacity issues on arterial streets. Residential streets should not be designed to encourage through traffic, but should encourage connectivity to the network as a whole. Figures 20 and 21 show a small street network that has improved connectivity after the redesign when compared with the original version.

The poorly designed road network impedes walking, bicycling, and transit use. It also increased local trip which must use higher classified roads (arterials) causing congestion. It also impedes development as some properties are unable to be developed properly.

The well designed road network enables shorter trips which may be more multimodal. It increases the opportunities for internal site access for multiple developments. The well designed network also spreads the traffic throughout the network and does not force all trips to use arterial roads. The well designed network utilizes a backage road to provide access to the local businesses and removes access points from the main road which provides higher mobility around the city.

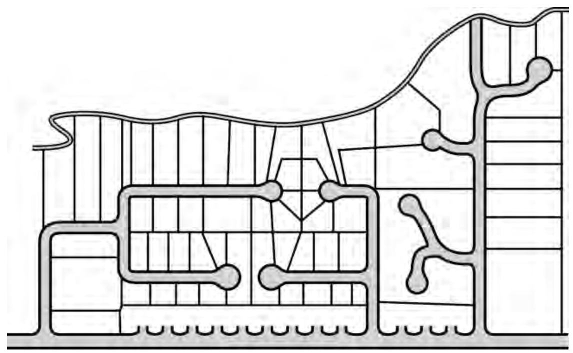


Figure 20: Poor Network Connectivity

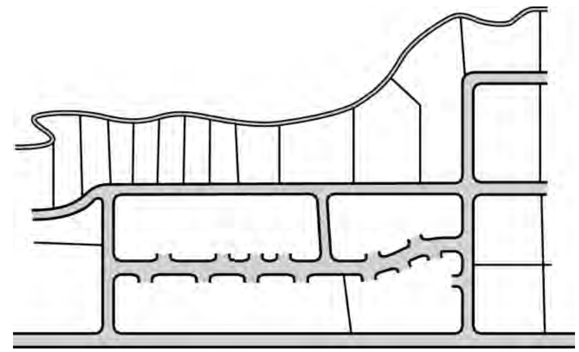


Figure 21: Improved Network Connectivity

Section 11: Circulation and Unified Access

The circulation system designed for Andover 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 are provided to move traffic travelling alongside the freeway to the nearest north/south arterials and collectors which are streets platted by the city. Platted streets should be limited along the frontage roads and located outside of the function area of the interchanges and adjacent intersections. The backage roads are accessed through the arterials or collectors running north/south and the backage roads provide access to properties. Where possible, groups of businesses should be accessed using a limited number of shared driveways on the backage road.

Unifying access and circulation between adjoining properties reduces the number of access points on the adjacent road and may eliminate turning movements onto and off of the adjacent road, especially when drivers plan on accessing the adjacent property if they are trip-chaining. This shared, joint, or cross-access is particularly applicable to commercial development.

Shared or joint access is where two or more properties each utilize a single access point, often on the line dividing the two properties. The access point entrance may be on property "A", while the exit may be on property "B", but both properties have full use of the access. A cross-access is where two or more properties may need to traverse an adjoining property to gain access to the road network. This is often done through either the site's internal road network or a parking lot isle. Unified accesses reduce the number of access points on the roadway network which increase the safety and mobility of drivers. Travel speeds are often higher on access controlled roads which increases the market area of the businesses.

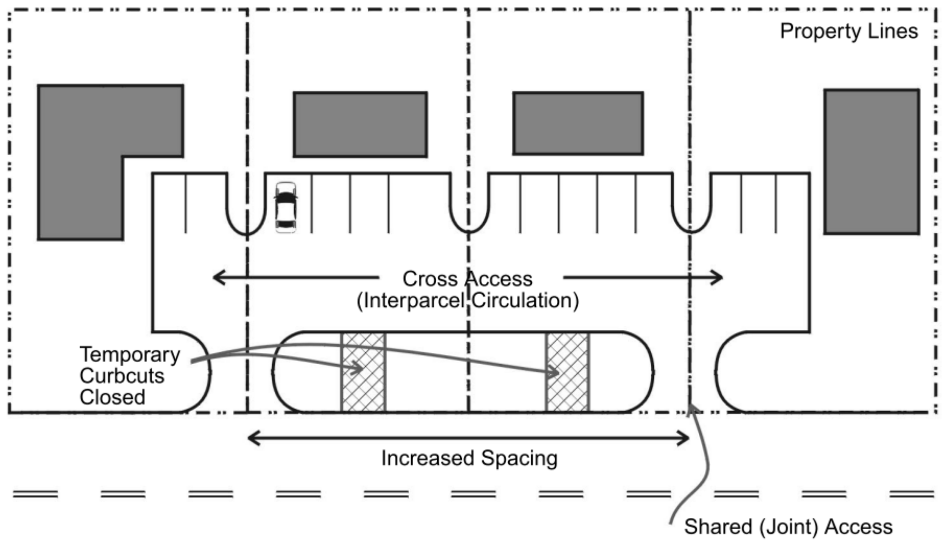


Figure 22: Joint and Cross-Access
Source: TRB Access Management Manual 2003, Page 315

Adjacent commercial properties should have joint or cross-access to and from their properties. Site developers should limit the number of access points to their development and encourage cross-access to other sites within their development.

New developments or redevelopments should be allowed the minimum number of access points to provide reasonable access and not the maximum number possible given the frontage available along the road.

Outparcels on a development shall be provided access through the development's internal roadway circulation and not from the external public roadways.

All joint, shared, and cross-access agreements should be recorded in writing and attached to the property deed.

Section 12: Driveway Connection Geometry

Driveway design affects the speed at which vehicles enter and exit a property. A large speed differential is created between turning traffic and thru traffic when auxiliary lanes are not provided. Large speed differentials are associated with higher crash rates and decreased traffic flow. Inadequate or poorly designed areas for vehicles to continue traversing a property create the potential for spill-back queues onto the road network.

The corner radii at intersections or driveways is often affected by the design vehicle's off-tracking characteristics. Off-tracking occurs most noticeable with semi-trucks when turning a corner where the front wheels successfully navigate a corner, but the trailing wheels run over the curb, green space, or sidewalk. This can be avoided by increasing the radius of the corner. Figure 23 shows the wheel path of a semi-truck when turning a corner.

Lower functional class roadways such as collector and residential roads may have features such as bike lanes or on street parking which create a larger effective radius than the physical curb radius. The actual turning radius of vehicles may be closer to the effective radius due to parked cars or a bike lane (Figure 24). This may enable the city to reduce the curb radius requirements at intersections or driveways where such features are located which may improve the function of pedestrian facilities adjacent to the roadway. Pedestrian facilities may be improved due to the decreased driveway pavement which must be crossed when walking along the road.

The design of driveways should meet the following guidelines:

- Driveways should align with driveways on the opposite side of the roadway where the medians are traversable.
- Driveways allowing two-way access to the property should be aligned at as close to a 90 degree angle to the main roadway as possible. The minimum allowable angle for two-way access driveways is 80 degrees. A driveway which only allows one-way access to or from the property may be aligned with a minimum angle of 60 degrees.
- The width of the driveway required for a given design vehicle is a combination of the corner radius and the width of the driveway. A smaller radius requires a larger width driveway, whereas a larger radius requires a smaller driveway width.
- Corner radii should be large enough for vehicles to turn the corner at 10 mph to 15 mph. Increasing the corner radius should be balanced with the roadway speed limit, land use, sight distance, and the increased time it will take pedestrians to cross the driveway.
    - o AASHTO's Green Book suggests driveway corner radii of 10 to 15 feet for urban areas, but 15 to 25 feet for minor cross streets. As the functional classification of the roadway increases, corner radii also typically increase, up

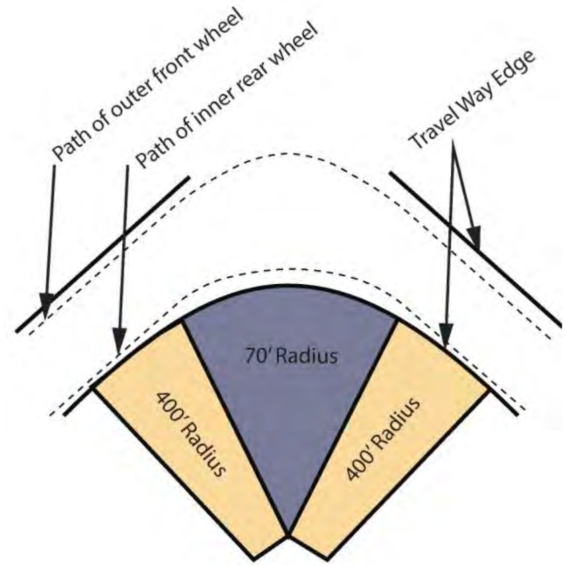


Figure 23: Vehicle Off-tracking when turning
Source: Florida DOT Driveway Information Guide, 2008

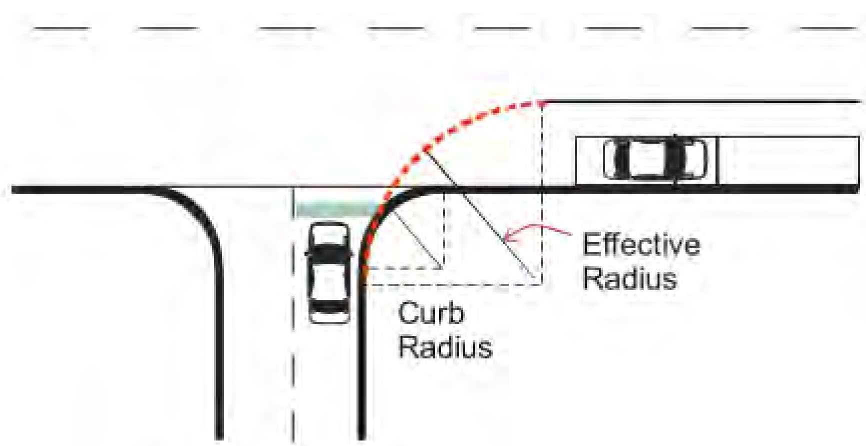


Figure 24: Effective Radius vs. Curb Radius
Source: Florida DOT Driveway Information Guide, 2008

to 50 feet. If a radius greater than 50 feet is needed, a compound radius, 3-centered curve, or a taper-radius-taper combination would be suggested to eliminate excess pavement.

  - The TRB Access Management Manual (2003) suggests driveway radii of between 10 to 40 feet which varies with the width of the driveway.
  - Table 7 from NCHRP Report 659, Guide for the Geometric Design of Driveways, suggested driveway widths and corner radii for different categories of land use and roadway speeds.

- Driveways should accommodate pedestrians using sidewalks or paths. Crosswalk and ramps should be placed so pedestrians do not cross an inordinate amount of pavement while exposed to vehicles, yet also not deviate excessively from the natural path the sidewalk. If pedestrians crossing a driveway must cross four or more lanes an island should be added between entering and exiting traffic as a refuge.
- Driveways should have a minimum throat length to minimize or eliminate vehicles queuing back onto the main street when multiple vehicles attempt to enter the property at once. There are multiple different equations or suggestions for the throat length including: equations for signalized driveways, parking lot size, or the entry or exit condition. A simplified throat length may be based on the following and is shown in Figure 25.
  - Driveways should provide at least 50 feet of throat length adjacent to local streets and 100 feet adjacent to collector and arterial streets.
  - Driveways with more than one exit lane typically have longer throat lengths, but the lengths required can vary by 50% depending on the jurisdiction or publication.
- Driveways should be designed for trucks or busses when the driveway serves more than two or three trucks or busses per hour.
- Driveways should be designed to meet sight distance requirements as defined by AASHTO.
- Driveways should be aligned so they are across from each other, and not offset minimally.

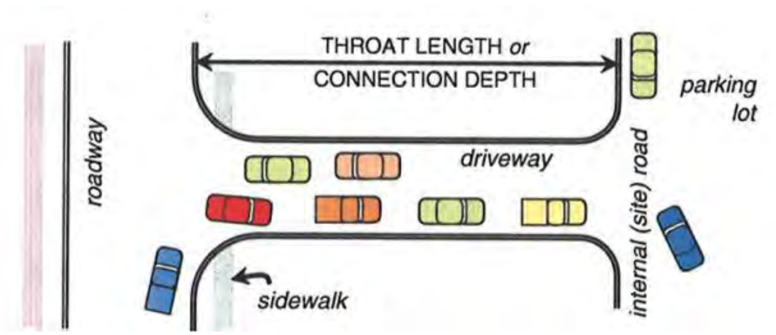


Figure 25: Driveway Throat Length
Source: NCHRP 659, Page 57

Category	Description of Common Applications (Note: These descriptions are intended to help the designer form a mental image of some of the more common examples of the category.	Driveway Width	Driveway Curb Radius (in ft)		
			Higher Speed Road	**Moderate Speed Road**	**Lower Speed Road**
STANDARD DRIVEWAYS					
Very High Intensity	Urban Activity Center, With almost constant driveway use during hours of operation.	Many justify two lanes in, two to three lanes out. Refer to street design guides	30-50	25-40	NA
Higher Intensity	Medium-size office or retail (e.g., community shopping center) with frequent driveway use during hours of operation.	One entry lane: 12-13 ft wide Two exit lanes: 11-13 ft wide.	25-40	20-35	NA
Medium Intensity	Smaller office or retail, with occasional driveway use during hours of operation. Seldom more than one exiting vehicle at any time	Two lanes: 24-26 ft total width	20-35	15-30	NA
Lower Intensity	Single-family or duplex residential, other types with low use on lower speed/volume roadways. May not apply to rural residential.	May be related to the width of the garage, or driveway parking. Single lane: 9-12 ft Double: 16-20 ft	15-25	10-15	5-10
SPECIAL SITUATION DRIVEWAYS					
Central business district	Building faces are close to the street.	Varies greatly depending on use.	NA	20-25	10-15
Farm or ranch; Field	A mix of design vehicles; some may be very low volume.	Min. 16 ft, desirable 20 ft Affected by widths of field machinery.	30-40	20-30	NA
Industrial	Driveways are often used by large vehicles.	Minimum 26 ft	50-75	40-60	40-60

NOTES:

These widths do not include space for a median or a parallel bike lane or sidewalk.
Additional width may be needed if the driveway has a curved horizontal alignment.
For a flare/taper design, use the radius as the dimension of the triagular legs.
For industrial or other driveways frequented by heavy vehicles, consider a simple curve with a taper or a 3-centered curve design.
For connection angles greatly different than 90 degrees, check the radius design with turning templates. For connection corners at which turn is prohibited, a very small radius is appropriate. Also see the section, Driveway Horizontal Alignment and Angle.
Driveways crossing an open ditch should have a minimum 2 ft shoulder on each side. (source: Statewide Urban Design and Specifications, Iowa State U., Ames IA (October 21, 2008) p. 4.)
If the roadway has a usable shoulder, a somewhat smaller radius may perform acceptably.

Table 7: Driveway Widths and Corner Radii

Source: NCHRP Report 659, Page 40

Section 13: Outparcels and Shopping Center Access

Unified access and circulation plans shall be prepared for all development sites that consist of more than one building site. This applies to sites with one owner as well as sites with multiple owners that are consolidated for the purposes of development. In addition, the following shall apply:

- The number of connections shall be the minimum number necessary to provide reasonable access to the overall development and not the maximum available for the development's frontage.
- Direct outparcel access shall be provided from the development's interior roadways and aisles and not from the development's external frontage.
- All necessary easements and agreements shall be recorded in an instrument that runs with the deed to the property.
- Unified access for abutting properties under different ownership and not part of an overall development plan shall be addressed through the Joint and Cross-Access provisions below.

Joint and Cross-Access

Joint and cross-access policies promote connections between major developments, as well as between smaller businesses along a corridor. These policies help to achieve unified access and circulation systems for individual developments under separate ownership that could not otherwise meet access spacing standards or that would benefit from interconnection, e.g., adjacent shopping centers or office parks that abut shopping centers and restaurants.

Adjacent commercial or office properties and major traffic generators, e.g. shopping plazas, shall provide a cross-access drive and pedestrian accessway to allow circulation between adjacent properties. This requirement shall also apply to a building site that abuts an existing developed property unless the City Engineer finds that this would be impractical.

To promote efficient circulation between smaller development sites, the City Engineer may require dedication of a 30-foot easement that extends to the edges of the property lines of the development site under consideration to provide for the development of a service road system. The service road shall be of sufficient width to accommodate two-way travel aisles and incorporate stub-outs and other design features that make it visually obvious that abutting properties may be tied in to it. Abutting properties shall be required to continue the service road as they develop or redevelop in accordance with the requirements of this policy. The easement may be provided to the front or rear of the site or across the site where it connects to a public roadway.

Property owners shall record all necessary easements and agreements, including an easement allowing cross-access to and from the adjacent properties, an agreement to close driveways provided for access in the interim after construction of the joint use driveway(s) or service road system, and a joint maintenance agreement defining maintenance responsibilities of property owners that share the joint-use driveway and cross-access system.

Joint and cross-access requirements may be waived when, in the City Engineer's judgment, such a waiver is warranted. Instances in which a waiver may be warranted include incompatible uses (e.g., a gas station next to a child care center), or major physical constraints (e.g., significant change in grade between properties).

Where properties are under the same ownership or consolidated for the purposes of development, the local street shall be constructed by the developer. Where the street will serve properties under separate ownership, a method will be established by the City Engineer to apportion the costs of initiating and constructing the street. In either case, the street shall be constructed prior to issuing building permits for the site.

Section 14: Redevelopment Application

The access management requirements of this code do not affect existing access along existing roadways. Existing access connections are “grandfathered” in based on the requirements in place when they were constructed. This protects the existing property owners’ rights and recognizes the expense of bringing non-conforming properties into conformity. However, the goal of this document is to bring the roadway system into compliance over time. A parcel of land shall be required to adhere to the access management guidelines as described in the following sections.

Requirements

Properties with non-conforming access connections shall be brought into compliance with the Access Management Code to the maximum extent possible when one or more of the following conditions occur.
Otherwise, the existing access connection shall be allowed to continue.

- When the roadway with the access connections is modified
- When a new access connection is requested or required
- When a preliminary and/or final development plan is required
- When a proposed redevelopment, in comparison to the existing use, is forecasted to experience an increase of 50 trips or more, as determined by one of the following methods:
    - An estimation based on the ITE Trip Generation manual (latest edition) for typical land uses, or
    - Traffic counts made at similar traffic generators in the metropolitan area, or
    - Traffic counts conducted during the peak hour of adjacent roadway traffic for the property.
- If the principal activity on a property is discontinued for a period of one year or more, or construction has not been initiated for a previously approved development plan within a period of one year from the date of approval, then the property must be brought into conformance with all applicable access management requirements of this policy, unless otherwise exempted by the City Engineer. This shall include the need to update any previously approved transportation impact study where new traffic projections are available. For uses or approved plats in existence upon adoption of this policy, the one-year period for the purposes of this section begins upon the effective date of these requirements.
- Access to all change-in-use activities shall be approved by the City Engineer. All relevant requirements of this code shall apply.

Section 15: Traffic Impact Study Requirements

The purpose of this section is to clearly outline the minimum requirements for Traffic Impact Studies (TIS) prepared as part of the land development approval process in the City of Andover. A TIS identifies and quantifies the potential impacts of site development on the local and regional transportation system and specifies the measures necessary to mitigate those impacts.

TIS Process - Flow Chart

The general process for scoping and preparing a TIS is outlined in Figure 26. The completed draft TIS should be submitted to the City Engineer 14 days prior to the preliminary plan submission. The revised TIS must be submitted 14 days prior to the planning commission meeting requesting plan approval. Failure to meet these submittal deadlines shall be cause for rejection of the submittal and/or rescheduling to a later Planning Commission meeting. The subsequent sections present more detailed information on the TIS preparation requirements.

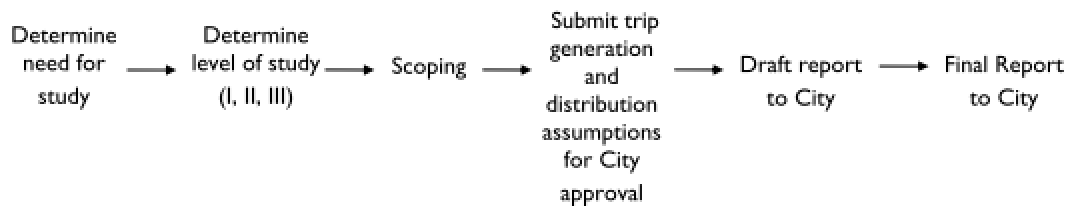


Figure 26: TIS Process Flow Chart

Study Triggers and Thresholds

The following situations will require a TIS:

- A currently undeveloped property proposed for development and/or rezoning
- A currently developed property proposed for expansion, intensification, or redevelopment to a level that requires City approval
- A previously approved project in either category above that has not been developed within time frames specified in this section and is re-starting the development process

The final determination of whether a traffic study is required shall be made by the City Engineer.

The scope of the traffic study for a proposed development is a function of the amount of new traffic trips the development, redevelopment, or expansion is expected to add to Andover's roadway system. The City has established three Levels of study, depending on the magnitude of traffic generated. The thresholds for these Levels are shown in Table 8. The City Engineer can request a TIS and/or modify the scope requirements of a TIS based on local conditions and knowledge.

Level of Study	Threshold	Typical Scope
Level 1	20-99 vph[1]	trip generation and site review
Level 2	≥100 vph	full study
Level 3	≥500 vph	full study with extended study area

Note: vph = vehicles per hour - new trips generated by the development during traffic peak hours

Table 8: Traffic Impact Study Thresholds

Study Scope

The specific scope of a study will vary depending on the level of study. At the outset of the study, the applicant (or their authorized representative) should contact the City to begin the scoping process. The City Engineer must approve the scope of work and technical approach.

Study Area

Level 1: Site only

Level 2: To the nearest arterial or collector intersection in either direction bordering the site

Level 3: At least to the nearest arterial in all major directions of travel, further if necessary to adequately assess the potential traffic impacts

The City Engineer shall make the final determination as to the extent of the study area.

Study Scenarios

Level 1: No analysis scenarios. The study needs to provide a forecast of the project trip generation and a review of the site to ensure compliance with the City's Access Management Code.

Level 2: Existing, Opening Day/Full Build (with and without project), 20-year horizon (with project)

Level 3: Existing, Opening Day/Full Build (with and without project), Near-Term (5 years after build-out with and without project), 20-year horizon (with project)

If a project is phased, the opening day for each major phase should be studied as well as the full build-out. For later-year phases, an updated traffic study will be required if the original study is more than two years old, unless the applicant can demonstrate that the nature of the proposed development, and the near-term and long-term forecasted background traffic conditions, have not changed substantially, as determined by the City Engineer.

Traffic Analysis Methodology

Other items to be considered and approved either during the scoping phase or as the study progresses include: time periods to be analyzed (daily, am/pm peak periods, other peak periods), trip generation assumptions, trip distribution and assignment assumptions, planned public and private roadway and intersection improvement assumptions, baseline traffic counts, traffic projection methods, signal timing/phasing assumptions, acceptable mitigation measures, and the Study Elements listed in Section 15 shall be considered unless otherwise approved by the City Engineer.

Study Elements

The TIS shall be prepared according to generally acceptable professional practice and shall address the following study elements. The City Engineer must approve all major assumptions. The ITE Trip Generation Handbook: An ITE Recommended Practice (2nd edition, 2004 or latest edition) should be used as the primary reference if further detail is needed on study elements. The ITE document "Transportation Impact Analysis for Site Development: An ITE Recommended Practice" should be reviewed when conducting Level 3 studies.

Executive Summary

This section should summarize all of the key findings of the study, including the identified impacts and proposed mitigation.

Introduction and Study Scope
This section should explain the context of the study and the scope of the work.

Project Description
This section should provide the following information:

- Proposed project description including site location, layout, access, land-uses, and phasing
- Existing access and land-uses
- Information on nearby parcels' access and land-use and their relationship to the proposed project

Existing Conditions
The TIS will document the existing traffic conditions at the study intersections and on the study roadways. This will include the following:

- Description of the existing roadway system (street classifications, number of through lanes, number of turn lanes, intersection controls, etc.)
- Traffic Volumes (daily and study peak hours)
- Current operational results (Levels of Service, queueing, etc.)
- Safety analysis
- Parking conditions (if appropriate)
- Pedestrian and bicycle conditions
- Public transit conditions

Opening Day Conditions (No Project)
The TIS should present the background traffic conditions on the assumed opening day. The background conditions must include background traffic growth between the existing year counts and the expected opening day year. Background growth will address approved but not completed or occupied developments and background growth from other sources (based on historic traffic growth and other variables). All of the items addressed in the existing conditions section should be addressed here to the extent applicable.

Opening Day Conditions (With Project)
This section will present the opening day conditions with the proposed project. Key items will include:

- Trip Generation – The trip generation calculations will be based on the most recent version of ITE's Trip Generation: An ITE Informational Report (8th Ed, 2008 or latest edition) unless otherwise approved by the City Engineer.
- Trip Distribution and Assignment – The trip distribution and assignment will be based on available local data and will be approved by the City Engineer. Both the distribution and assignment should be clearly shown in figures with explanatory test as necessary.

The topics addressed in the Existing Conditions section should be addressed in this section. In addition, potential impacts to any facility or mode should be highlighted.

Near-Term Conditions (5 years after build-out, with and without project)
This section will present conditions 5 years after project build-out, and shall analyze conditions both with and without the project. If any project trip generation or distribution patterns are anticipated to change in this time horizon, the study should incorporate those assumptions.

The 5-year horizon should include background traffic growth assumptions based on a methodology approved by the City Engineer. Typically, a combination of growth factors plus forecasted trip generation from approved or anticipated development will be adequate to develop these assumptions.

Long-Term (20-Year) Conditions (with project only)
For most studies, this scenario should be based on traffic forecasts provided by the City. The goal of this analysis is to provide the City with a clear picture of how the proposed project affects the City's long-range roadway and land-use planning. A detailed impact comparison is not required. For large projects (more than 500 peak-hour trips), the applicant should develop a forecasting methodology subject to approval by the City Engineer.

Proposed Mitigation
This section will outline the improvements required to address the identified impacts. These improvements could be on- or off-site and could affect any of the study modes (auto, truck, bus, bicycle, or pedestrian). Typical mitigation measures include the addition of turn lanes, installation of traffic signals (if warranted), provision of sidewalk connections, or other such improvements. The study shall demonstrate that the proposed measures will restore operations to acceptable levels.

Technical Approach Information
The following items outline key methods and requirements for preparing a TIS for the City of Andover.

Data Collection
The applicant is responsible for collecting all of the required traffic data. The applicant should check with City staff regarding available data in the City's possession. Both peak hour and daily counts should be less than two years old and should have been conducted on a Tuesday, Wednesday, or Thursday (except for special studies when weekends or Monday/Friday counts are needed). Typically, both the a.m. and p.m. peak hours should be studied. If it can be demonstrated that the project will not generate traffic during one of the peak hours (for example, a restaurant that is only open for lunch and dinner), the City Engineer may waive the requirement to analyze one of the peak hours.

Trip Generation
Trip generation calculations will be prepared using the most recent version of the ITE's Trip Generation: An ITE Informational Report (8th Ed, 2008 or latest edition). For redevelopment or rezoning projects, the applicant should calculate both the total project trip generation and the net difference. The trip generation assumptions and calculations must be approved by the City Engineer prior to initiation of the operational analysis.

Trip Distribution and Assignment

The applicant will clearly present and support the assumed trip distribution. Similarly, the major assignment assumptions will be presented and explained. For redevelopment or rezoning projects, the applicant will need to determine whether the distribution of the proposed project differs from that of the previously approved or zoned use, because the assignment will need to represent the net difference. Pass-by, diverted linked trips, and multi-use developments should be analyzed using information available in the ITE Trip Generation Handbook if a notable impact is expected on any of the trip generation, distribution, and assignment phases of the TIS. All assumptions must be reviewed by the City Engineer for comments prior to initiation of the detailed operational analysis.

Operational Analysis Methods

Highway and intersection operational analyses will be performed using the methods described in the most recent version of the Transportation Research Board's Highway Capacity Manual. If required by the City Engineer, the applicant shall perform a traffic simulation for closely spaced intersections, improvements relying on signal timing/phasing, or complex traffic conditions.

Impact Thresholds

The impact thresholds in use in the City of Andover are as follows:

- Level of Service (LOS) A – C are acceptable on all arterials and collectors
- LOS A – C are acceptable on all other roadways (the highest class of road defines an intersection)

Final acceptable Level of Service will be determined by the City Engineer.

Queuing

The study will include queuing analyses for each study intersection. 95th percentile queues should be reported along with the existing (or proposed) queue storage.

Access Management Review

The applicant will compare the proposed site access to the City's Access Management Codes as outlined in this document as well as other applicable design standards and guidelines, and shall submit a proposal that meets the City's Access Management Codes. If the applicant wishes to deviate from the Access Management Code, the applicant should submit a concept plan to the City Engineer for review and comment prior to making application.

On-Site Circulation

The analysis will include a section evaluating and commenting on the on-site circulation. This will include an assessment of on-site intersections and driveways/roadways with respect to operations and safety (including driveway throat length, vehicle turning radii, sight distance, etc.). Shared access and cross-parcel traffic flows should also be considered. It will also address on-site truck circulation and parking.

Multi-modal Considerations

Includes bicycle, pedestrian, transit, and truck considerations. Describe current and proposed: transit services, transit facilities, bicycle facilities and pedestrian facilities in and around the site. Describe any impact trucks or other large vehicles may have on traffic operations in and around the study area.

Responsibility and Qualifications
It is the applicant's responsibility to prepare the traffic impact study, including all necessary data collection. The individual preparing the traffic study must be a registered engineer, qualified in preparing traffic impact studies. The City Engineer will make the final determination as to whether a particular individual is qualified.

For all traffic studies, the City of Andover recommends the usage of the above outline format for consistency. The City Engineer must approve other formats prior to submittal.

A minimum of two copies of a draft report shall be submitted to the City Engineer for review. After the applicant receives the City's comments, a minimum of two copies of a final report shall be submitted to the City Engineer. The report shall contain, in Appendices, any detailed calculations supporting the main body of the report such as intersection LOS analysis.

Any deviations from the above guidance should be approved by the City Engineer.

Section 16: Review / Exceptions Process

Flexibility is essential when administering access spacing requirements to balance access management objectives with the needs and constraints of a development site. The following administrative procedures are intended to provide flexibility, while maintaining a fair, equitable and consistent process for access management decisions. The exception/waiver process described below applies to all of the guidelines in this code.

Approval Required
No person shall construct or modify any access connection to a roadway within the City of Andover without approval from the City. Approval is typically granted through the preliminary and final development plan processes and/or engineering approval of construction plans for roadways. All requests for connections to a roadway within the City after the date of adoption of the Access Management Code shall be reviewed for conformance with this Access Management Code, except as noted below.

Access connections that do not conform to this policy and were constructed before the effective date of this code shall be considered legal nonconforming connections and may continue until a change in use occurs as described in Section 14. Temporary access connections are legal nonconforming connections until such time as the temporary condition expires.

Any access connection constructed without approval after the adoption of this policy shall be considered an illegal nonconforming connection and shall be issued a violation notice and may be closed or removed.

Requests for Modification
Access connections deemed in conformance with this policy may be authorized by the City Engineer. Any requests for modification shall require approval by the City Engineer.

The City Engineer may reduce the connection, median opening, traffic signal, or roadway spacing requirements by up to 10 percent or 100 feet (whichever is less) where it is impractical to meet the standards, except where prohibited by this code.

Modifications greater than those described in the above paragraph shall require documentation justifying the need for the modification and an access management plan for the site that includes site frontage plus the distance of connection spacing standards from either side of the property lines. The analysis shall address existing and future access for study area properties, evaluate impacts of the proposed plan versus impacts of adherence to standards, and include improvements and recommendations necessary to implement the proposed plan.

Variances

Based on an engineering study, the standards outlined in this code may be altered or waived by the City Engineer to accommodate existing street or property limitations or extraordinary conditions.

Waiver for Nonconforming Situations

Where the existing configuration of properties and driveways in the vicinity of the subject site precludes spacing of a connection in accordance with the spacing standards of this code, the City Engineer, in consultation with appropriate City departments, shall be authorized to waive the spacing requirement if all of the following conditions have been met:

- No other reasonable access to the property is available.
- The connection does not create a potential safety or operational problem as determined by the City Engineer based on a review of a transportation impact study (TIS) prepared by the applicant's professional engineer.
- The access connection along the property line farthest from the intersection may be allowed. The construction of a median may be required on the street to restrict movements to right-in/right-out and only one drive shall be permitted along the roadway having the higher functional classification.
- Joint access shall be considered with the property adjacent to the farthest property line. In these cases:
    - A joint-use driveway with cross-access easements will be established to serve two abutting building sites,
    - The building site is designed to provide cross-access and unified circulation with abutting sites; and
    - The property owner agrees to close any pre-existing curb cuts after the construction of both sides of the joint use driveway.

Interim Access

A development that cannot meet the connection spacing standards of this policy and has no reasonable alternative means of access to the public road system may be allowed an interim connection. When adjoining parcels develop where joint or cross-access can be provided, permission for the interim connection shall be rescinded and the property owner must remove the interim access and apply for another connection. Conditions shall be included in the approval of an interim connection including, but not limited to the following:

- Applicants must sign an agreement to participate in any future project to consolidate access points.
- Applicants must sign an agreement to abandon the interim access when adequate alternative access becomes available.
- The transportation impact study should consider both the interim and final access/circulation plan.

A limit may be placed on the development intensity of small corner properties with inadequate corner clearance, until alternative access becomes available.

Section 17: Glossary

AASHTO: American Association of State Highway and Transportation Officials

Access Point: See definition for "Connection"

ADT: Average Daily Traffic. The average number of vehicle trips generated over a specific time period.

Connection: Any street or driveway intersection with a public street. It also includes median openings on public streets.

City Engineer: The City Engineer can authorize a designee to make decisions where the text authorizes the City Engineer to make decisions

Driveway throat: The portion of the driveway extending back from the public street, uninterrupted by any internal site access points (through physical prohibition by raised islands)

FHWA: Federal Highway Administration

Flag lots: Lots created such that each parcel has access to the main roadway instead of the preferred method in which the parcels connect on a private drive or local roadway

KDOT: Kansas Department of Transportation

LOS: Level of service. A measure of effectiveness that determines the quality of service on transportation infrastructure.

Outparcels: Lots on the perimeter of a larger parcel that break its frontage along a roadway. They are often created along arterial street frontage of shopping center sites, and leased or sold separately to businesses that desire the visibility of major street locations.

Queue: A line of vehicles

Trip Generation: Prediction of the amount of traffic originating from a particular location

V/C: The ratio of demand flow rates to capacity for a given type of transportation facility

WAMPO: Wichita Area Metropolitan Planning Organization

Parcel Analysis

Corridor Parcel Analysis - Summary Statistics and General Conclusions

All information and conclusions are based upon the available information, and are subject to change as additional and more refined right-of-way information becomes available.

In no case does any of this work represent an opinion of market value of any tract, nor can this information be utilized to develop an opinion of value without additional research and analysis. In no way can any of this information be construed as a USPAP compliant report of market value.

Only the public golf course (Tract #4) and the YMCA (Tract #177) are considered to be in their highest and best use throughout the planning horizon for this project. All other tracts are considered to be in a transitional use. However, current use is evaluated for purposes of assessing impacts from this proposed configuration, particularly with regard to accessibility.

There are an estimated 38 Total Takings with approximately 36 potential relocations. Most of these are tracts with uneconomic remnants after the acquisition, or where parking is severely impacted, or where existing improvements are impacted.

There are approximately 100 tracts with little to no direct impact from the proposed configuration.

Approximately 70 other tracts are impacted, but probably not to an extent that constitutes a total taking.

There are four areas identified within the project area that merit special consideration as redevelopment areas. These are:

1. Southeast quadrant of US-54 & 159th Street. This area generally stretches from 159th Street to Onewood, and from Clyde to US-54. There are a number of impacts to improvements and changes in accessibility in this area that may require assemblage and redevelopment.
2. Northwest quadrant of US-54 & Andover Road. This area generally stretches from US-54 to the proposed reverse-access road, and from the edge of Lots #54 and #56 to Andover Road. There are direct impacts from takings under the proposed configuration, but the larger impact is the need to completely redesign the accessibility to this entire quadrant.
3. Southwest quadrant of US-54 & Andover Road. This area generally stretches from Allen to Andover Road, and from Cloud to US-43. Impacts to existing improvements along US-54 and the need for access control along Andover Road will mean significant changes in traffic circulation and accessibility in this area.
4. The eastern end of the project from Yorktown to Prairie Creek Road on the north side of US-54 to the proposed reverse-access road. There are significant numbers of total takings in this area due to uneconomic remainders that will require assemblages and new traffic circulation patterns.

It is recommended that, for these areas of special consideration, full redevelopment strategies be developed – complete with marketing elements and implementation plans. It is suggested that real estate brokerage/appraisal/development firms be surveyed for their interest in a public-private partnership with the City of Andover. It is suggested that this shared risk/shared reward model will result in a great deal more exposure to a national pool of investors, and that the success of such implementation efforts will depend upon such partnerships.

Corridor Parcel Analysis - Assessment of Impact

Tract #	**Parcel ID #**	**(Hi, Mod, or Low)**
1	3093002003023000	Hi

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	YES
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed reverse access road, due to the necessary offset and corresponding access control, will result in commercial traffic into what is now a residential area. The access control necessary will result in very limited accessibility to this parcel. Assemblage and redevelopment into a larger parcel will almost certainly be required. Mitigations in the form of noise and visual screening may be required to buffer this area from the residential area to the south.

Tract #	**Parcel ID #**	**(Hi, Mod, or Low)**
2	3041903001007010	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

This parcel currently includes an access control break on US-54 highway, which is located on the narrow strip that is the easternmost portion of the tract. This access control break does not comply with the current Corridor Master Plan between City and KDOT, nor will it be workable under the proposed configuration. Accessibility needs will be dictated by the land uses proposed as well as proposed site configuration (development plan). Access control requirements along the proposed frontage roads, as well as along 159th Street should be ascertained prior to approval of any development plan Negotiations over development plans should include reservation of rights of way, closure of all non-conforming A/C breaks, and internal circulation streets.

3 3093002003004050 Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Accessibility to Firework's stand will have to be reconfigured to reverse access road. Access control requirements along the proposed frontage roads, as well as along 159th Street likely along all frontage. Highest and best use may be impacted by site circulation issues, and HBU may be in combination with Tracts 1 (to restore accessibility) and Tract may be required in order to create a developable tract with sufficient accessibility and on-site traffic circulation capacity.

4 3041903001001000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this public golf course (NEPA 4f resource) have been avoided. If the alignment were to shift north, it could impact this property and trigger NEPA clearance requirements.

5 3093002003024000 Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	YES

The proposed reverse access road, due to the necessary offset and corresponding access control, will result in commercial traffic into what is now a residential area. The accessibility to this particular tract does not change; however, assemblage and redevelopment into a larger parcel will almost certainly be required. Mitigations in the form of noise and visual screening may be required to buffer this area from the residential area to the south.

Tract #	Parcel ID #	(Hi, Mod, or Low)
6	3041903001007020	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

This parcel is currently undeveloped, and should be considered transitional. Accessibility needs to the proposed frontage road, or to relocated Onewood Drive will be dictated by the land uses proposed as well as proposed site configuration (development plan). Access control requirements along the proposed frontage roads, as well as along Onewood should be ascertained prior to approval of any development plan Negotiations over development plans should include reservation of rights of way, closure of all non-conforming A/C breaks, and internal circulation streets.

7	3093002003025000	Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	YES

The proposed reverse access road, due to the necessary offset and corresponding access control, will result in commercial traffic into what is now a residential area. The accessibility to this particular tract does not change; however, assemblage and redevelopment into a larger parcel will almost certainly be required. Mitigations in the form of noise and visual screening may be required to buffer this area from the residential area to the south.

8 304190300504800R Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

It appears that the highest and best use of this parcel is as buffer space (or other public use) both before and after the freeway concept. The current concept does not appear to impact this tract.

9 3093002003004060 Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Accessibility to this tract will have to be reconfigured to reverse access road. Access control requirements along the proposed frontage road possible along all frontage. Highest and best use may be impacted by site circulation issues, and HBU may be in combination with Tract 3 or 17 (creation of a larger parcel).

10 3041903005045000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	(Hi, Mod, or Low)
11	3093002003026000	Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	YES

The proposed reverse access road, due to the necessary offset and corresponding access control, will result in commercial traffic into what is now a residential area. The accessibility to this particular tract does not change; however, assemblage and redevelopment into a larger parcel will almost certainly be required. Mitigations in the form of noise and visual screening may be required to buffer this area from the residential area to the south.

12	3041903005046000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

13	3093002003027000	Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	YES

The proposed reverse access road, due to the necessary offset and corresponding access control, will result in commercial traffic into what is now a residential area. The accessibility to this particular tract does not change; however, assemblage and redevelopment into a larger parcel will almost certainly be required. Mitigations in the form of noise and visual screening may be required to buffer this area from the residential area to the south

14	3041903005042000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

15	3093002003028000	Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	YES

The proposed reverse access road that will restore accessibility to the commercial lots to the north of this parcel does not directly affect this parcel, but proximity of commercial traffic to possible future residential use may impact market value. Mitigations may include screenings (plantings) for noise reduction and enhanced aesthetics.

16	3041903005030000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	(Hi, Mod, or Low)
17	3093002003004020	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Accessibility to this tract will have to be reconfigured to reverse access road. Access control requirements along the proposed frontage road possible along all frontage. Highest and best use may be impacted by site circulation issues, and HBU may be in combination with Tract 9 (creation of a larger parcel).

18	3041903005031000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

19	3093002003029000	Hi

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	YES
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	YES

The proposed reverse access road results in uneconomic remnants, indicating a likely total take. It would be advantageous to arrange for the early acquisition of this parcel – or accept it as dedication through a platting process, in order to avoid paying damages to structure(s) and relocation expenses.

20	3041903005032000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

21, 23, 25	3093002003004070	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Three recently platted parcels under common ownership at the time of this analysis. Impacts by this proposed configuration are minimal to nonexistent. If, however, the reverse access road contemplated to the west were to be extended across the Fourmile Creek drainage to provide access to Clyde at Verna Street, then impacts to these three parcels could be felt.

22	3041903005033000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	(Hi, Mod, or Low)
24	3041904003001020	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Future accessibility needs (including alignment of proposed side road) will be dictated by the land uses proposed as well as proposed site configuration (development plan). Access control requirements along the proposed frontage road should be ascertained prior to approval of any development plan Negotiations over development plans should include reservation of rights of way, closure of all non-conforming A/C breaks, and internal circulation streets.

26	3041904015004000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

27	93002003004000	Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	POSSIBLE
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

Accessibility to this tract may have to be reconfigured to reverse access road. Access control requirements along the proposed frontage road possible along all frontage. Takings for the FRONTAGE road and the proposed side road will impact improvements and will impact the highest and best use. Non-residential relocation is likely to be required if land use does not change.

28 3041904015003000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

29 3093002003005000 Mod

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	POSSIBLE
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Proposed configuration of reverse access road may result in a total taking of this parcel.

30 3041904015002000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	**Parcel ID #**	**(Hi, Mod, or Low)**
31	3093002003003000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

32	3041904003002000	Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration leaves an uneconomic remnant that most likely cannot support a highest and best use after setbacks, parking requirements, and floor-area ratios are taken into account. The result is essentially a total take and relocation, with only contributory value to a larger parcel remaining after acquisition. Highest and best use after acquisition is most likely assemblage for development purposes.

33	3093002003002000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

34	3041904003003000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

The proposed configuration does not impact this parcel, which likely has only contributory value to a larger parcel both before and after acquisition.

35	3093002002003000	Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	POSSIBLE
Likely Relocation?	POSSIBLE
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

Access to the proposed frontage road will have to be carefully analyzed. The acquisitions proposed for this configuration may create setback problems and/or parking problems under current zoning. Acquisition of additional ground (from Tracts 31 and 33) to overcome these challenges may be required. If redevelopment precedes acquisition, then dedications of rights of way and access control, as well as any necessary “swaps” can take place at that time. If acquisition precedes redevelopment, then non-residential relocation may apply.

36	3041904003006000	Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Future accessibility needs (including alignment of proposed side road) will be dictated by the land uses proposed as well as proposed site configuration (development plan). Negotiations over development plans should include reservation of rights of way and internal circulation streets.

Tract #	Parcel ID #	(Hi, Mod, or Low)
37	3093002004002000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

38	3041904005010000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

The proposed side road shown for Tract #36 does not directly affect this parcel, but proximity of commercial traffic to possible future residential use may impact market value. Mitigations may include screenings (plantings) for noise reduction and enhanced aesthetics.

39	3093002003001000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

40 3041904003004000 Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration may leave an uneconomic remnant that cannot support a highest and best use after setbacks, parking requirements, and floor-area ratios are taken into account. The result is essentially a total take and relocation, with only contributory value to a larger tract remaining after acquisition. Highest and best use after acquisition is most likely assemblage for development purposes.

41 3093002002002000 Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	POSSIBLE
Likely Relocation?	POSSIBLE
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

Access to the proposed frontage road will have to be carefully analyzed. The acquisitions proposed for this configuration will impact existing improvements and may create setback problems and/or parking problems under current zoning. Assemblage (with Tracts 47 and 51) to overcome these challenges may be required. If redevelopment precedes acquisition, then dedications of rights of way and access control, as well as any necessary “swaps” can take place at that time. If acquisition precedes redevelopment, then non-residential relocation will likely apply.

Tract #	Parcel ID #	(Hi, Mod, or Low)
42	3041904005011000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

The proposed side road shown for Tract #36 does not directly affect this parcel, but proximity of commercial traffic to possible future residential use may impact market value. Mitigations may include screenings (plantings) for noise reduction and enhanced aesthetics.

43	3093002004001000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

44	3041904003005000	Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	YES
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration leaves a remnant with a very high width to depth ratio that adversely impacts the functional utility of the tract. Support of a highest and best use after setbacks, parking requirements, and floor-area ratios are taken into account is unlikely, particularly given that the site will need to provide for on-site circulation of traffic. The result is essentially a total take with only contributory value to a larger parcel remaining. Highest and best use after acquisition is most likely assemblage for development purposes.

45 3093002002001030 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

46 3041904005012000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

The proposed side road shown for Tract #36 does not directly affect this parcel, but proximity of commercial traffic to possible future residential use may impact market value. Mitigations may include screenings (plantings) for noise reduction and enhanced aesthetics.

47 3093002002001020 Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	POSSIBLE
Likely Relocation?	POSSIBLE
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

Access to the proposed frontage road will have to be carefully analyzed. The acquisitions proposed for this configuration will impact existing improvements and may create setback problems and/or parking problems under current zoning. Assemblage (with Tracts 41 and 51) to overcome these challenges may be required. If redevelopment precedes acquisition, then dedications of rights of way and access control, as well as any necessary "swaps" can take place at that time. If acquisition precedes redevelopment, then non-residential relocation will likely apply.

Tract #	Parcel ID #	(Hi, Mod, or Low)
48	3041904005013000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

The proposed side road shown for Tract #36 does not directly affect this parcel, but proximity of commercial traffic to possible future residential use may impact market value. Mitigations may include screenings (plantings) for noise reduction and enhanced aesthetics.

49	3093002002001000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

50	3041904005014000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

The proposed side road shown for Tract #36 does not directly affect this parcel, but proximity of commercial traffic to possible future residential use may impact market value. Mitigations may include screenings (plantings) for noise reduction and enhanced aesthetics.

51 3093002002001010 HI

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	POSSIBLE
Likely Relocation?	POSSIBLE
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

Access to the proposed frontage road will have to be carefully analyzed. The acquisitions proposed for this configuration will impact existing improvements and may create setback problems and/or parking problems under current zoning. Assemblage (with Tracts 41 and 47) to overcome these challenges may be required. If redevelopment precedes acquisition, then dedications of rights of way and access control, as well as any necessary “swaps” can take place at that time. If acquisition precedes redevelopment, then non-residential relocation will likely apply.

52 3041904005015000 Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	POSSIBLE

The proposed side road shown for Tract #36 directly impacts this parcel and proximity of commercial traffic to a residential use may impact market value. Mitigations may include screenings (plantings) for noise reduction and enhanced aesthetics.

53 3093002005001000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	(Hi, Mod, or Low)
54	3041904003006070	Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration leaves a remnant with a high width to depth ratio that adversely impacts the functional utility of the tract. Also, given proximity of proposed ramps and the high likelihood of access control requirement on Andover Road, it is highly likely that the access to this entire quadrant will have to be reconfigured. Given the changes in accessibility, the proximity of the proposed right of way line to the existing improvements, and the need for on-site traffic circulation and parking, support of a highest and best use as an independent lot is unlikely. The result is essentially a total take with after acquisition value only as contributory to an assemblage. Highest and best use after acquisition is most likely assemblage for redevelopment purposes.

55	3093002001009000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

56 3041904003006060 Hi

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	POSSIBLE
Likely Relocation?	POSSIBLE
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration means that access to this entire quadrant will have to be completely reconfigured, as will on-site circulation and parking. Highest and best use after acquisition may be assemblage for redevelopment purposes, depending upon the ability of the final design to relocate access and restore traffic circulation without irrecoverable impact to the existing improvements.

57 3093002001010000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

58 3041904004001000 Hi

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	YES
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration leaves a very odd-shaped remnant with very limited functional utility. The result is essentially a total take with after acquisition value only as contributory to an assemblage. Highest and best use after acquisition is most likely assemblage for redevelopment purposes.

Tract #	Parcel ID #	(Hi, Mod, or Low)
59	3093002001008000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

60	3041904004003000	Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

The proposed side road shown does not directly affect this parcel, but proximity of commercial traffic to possible residential use may impact market value. Mitigations may include screenings (plantings) for noise reduction and enhanced aesthetics.

61	3093002001007000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

62	3041904004003010	Hi

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	POSSIBLE
Likely Relocation?	POSSIBLE
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	POSSIBLE

The proposed side roads under this configuration directly impacts this parcel. Final design of side roads may show creation of nonconformities with setback under zoning. The result may be a total take with relocation.

63	3093002001006000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

64	3041904006018000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	POSSIBLE
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	POSSIBLE
Highest and Best Use impacted by proposed configuration?	NO

Access may be modified slightly to the realigned Village Drive, but impacts should be minimal.

Tract #	Parcel ID #	(Hi, Mod, or Low)
65	3093002001005000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

66	3041904006019000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	POSSIBLE
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	POSSIBLE
Highest and Best Use impacted by proposed configuration?	NO

Access may be modified slightly to the realigned Village Drive, but impacts should be minimal.

67	3093002001004000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

68 3041904007015000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	POSSIBLE
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	POSSIBLE
Highest and Best Use impacted by proposed configuration?	NO

Access may be modified slightly to the realigned Village Drive, but impacts should be minimal.

69 3093002001003000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

70 3041904007014000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	POSSIBLE
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	POSSIBLE
Highest and Best Use impacted by proposed configuration?	NO

Access may be modified slightly to the realigned Village Drive, but impacts should be minimal.

Tract #	Parcel ID #	(Hi, Mod, or Low)
71	3093002001002000	Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

Access to the proposed frontage road will have to be carefully analyzed. The proposed configuration leaves an uneconomic remnant that most likely cannot support a highest and best use after setbacks, parking requirements, and floor-area ratios are taken into account. The result is essentially a total take and relocation, with only contributory value to a larger tract remaining after acquisition. Highest and best use after acquisition is most likely assemblage for redevelopment purposes.

72	3041904007013000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	POSSIBLE
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	POSSIBLE
Highest and Best Use impacted by proposed configuration?	NO

Access may be modified slightly to the realigned Village Drive, but impacts should be minimal.

73	3093002001011000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

74 3041904003006050 Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration leaves a remnant that, given proximity of proposed ramps and the high likelihood of access control requirement on Andover Road, will likely require a complete reconfiguration of access. Given the changes in accessibility, the proximity of the proposed right of way line to the existing improvements and the need for on-site traffic circulation and parking, support of a highest and best use as an independent lot is unlikely. The result is essentially a total take with only contributory value to an assemblage remaining after acquisition. Highest and best use after acquisition is most likely assemblage for redevelopment purposes.

75 3093002001012000 Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

76 3041904003006020 Hi

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	POSSIBLE
Likely Relocation?	POSSIBLE
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

Given the access control requirements on Andover Road, it is highly likely that the access to this entire quadrant will have to be reconfigured. Given the changes in accessibility, it is possible that on-site traffic circulation and parking cannot be supported for the current use. The result is a possible total take with after acquisition value only as contributory to an assemblage. Highest and best use after acquisition may be assemblage for redevelopment purposes.

Tract #	Parcel ID #	(Hi, Mod, or Low)
77	3093002001013000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

78	3041904004001010	Hi

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	POSSIBLE
Likely Relocation?	POSSIBLE
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

Given the access control requirements on Andover Road, it is highly likely that the access to this entire quadrant will have to be reconfigured. Given the changes in accessibility, it is possible that on-site traffic circulation and parking cannot be supported for the current use. The result is a possible total take with after acquisition value only as contributory to an assemblage. Highest and best use after acquisition may be assemblage for redevelopment purposes.

79 3093002001014000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

80 3041904007015010 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	POSSIBLE
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	POSSIBLE
Highest and Best Use impacted by proposed configuration?	NO

Access may be modified slightly to the realigned Village Drive, but impacts should be minimal.

81 3093002001015000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	(Hi, Mod, or Low)
82	3041904007015020	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	POSSIBLE
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	POSSIBLE
Highest and Best Use impacted by proposed configuration?	NO

Access may be modified slightly to the realigned Village Drive, but impacts should be minimal.

83	3093002001016000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

84	3041904007024000	Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	POSSIBLE
Highest and Best Use impacted by proposed configuration?	NO

It is possible that some taking for side road construction, and some modification to access will be necessary, but probably will not constitute a total take.

85 3093002001017000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

86 3041904007023010 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

87 3093002001018000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	(Hi, Mod, or Low)
88	3041904007023000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	Assessment of Impact (Hi, Mod, or Low)
89	3093002007001000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

90 3042003001003050 Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration leaves a remnant that, given proximity of proposed ramps and the high likelihood of access control requirement on Andover Road, will likely require a complete reconfiguration of access. Given the changes in accessibility, the proximity of the proposed right of way line to the existing improvements and the need for on-site traffic circulation and parking, support of a highest and best use as an independent lot is unlikely. The result is essentially a total take with after acquisition value only as contributory to an assemblage. Highest and best use after acquisition is most likely assemblage for redevelopment purposes.

91 3093002006001000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

92 3042003001003040 Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Given the access control requirements on Andover Road, it is highly likely that the access to this entire quadrant will have to be reconfigured to be entirely internal. Given the potential taking along Andover Road, and changes in accessibility, it is possible that some site reconfiguration will be required. While a total take is possible, costs of cure to redirect access and site circulation is more likely. Highest and best use after acquisition may be altered.

Tract #	Parcel ID #	(Hi, Mod, or Low)
93	3093002001022000	Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Screenings to mitigate noise and proximity from improved Clyde and Onewood Streets may be necessary, and small acquisitions to construct the street improvements may be required.

94	3042003001003030	Hi

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	POSSIBLE
Likely Relocation?	POSSIBLE
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

Given the access control requirements on Andover Road, it is highly likely that the access to this entire quadrant will have to be reconfigured. Given the potential taking along Andover Road, and changes in accessibility, it is possible that setback requirements cannot be met, and that on-site traffic circulation and parking cannot be supported for the current use. The result is a possible total take with after acquisition value only as contributory to an assemblage. Highest and best use after acquisition may be assemblage for redevelopment purposes.

95 3093002001021000 Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Screenings to mitigate noise and proximity from improved Onewood Street may be necessary, and small acquisitions to construct the street improvements may be required.

96 3042003001003020 Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	POSSIBLE
Highest and Best Use impacted by proposed configuration?	NO

It is possible that some taking for side road construction, and some modification to access will be necessary, but probably will not constitute a total take.

97 3093002001020000 Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Screenings to mitigate noise and proximity from improved Onewood Street may be necessary, and small acquisitions to construct the street improvements may be required.

Tract #	Parcel ID #	(Hi, Mod, or Low)
98	3042003006003000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

99	3093002001019000	Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Screenings to mitigate noise and proximity from improved Onewood Street may be necessary, and small acquisitions to construct the street improvements may be required.

100	3042003006002000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

101 3093002001001000 Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

Access to the proposed frontage road will have to be carefully analyzed as will access control requirements on Onewood. The proposed configuration leaves an uneconomic, land-locked remnant that most likely cannot support a highest and best use on its own. The result is essentially a total take and relocation, with the only value remaining after acquisition as contributory to a larger parcel. Highest and best use after acquisition is most likely assemblage for redevelopment purposes.

102 3042003001003010 Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	POSSIBLE
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	POSSIBLE

The proposed configuration leaves a large enough tract for a similar highest and best use; however, setback from the proposed take line to the existing improvements may pose a challenge, as may relying entirely upon the proposed northern side road for access. Given the changes in accessibility, and the proximity of the proposed right of way line to the existing improvements, some redevelopment may be required, and the density of traffic generator supportable on the site should be carefully analyzed at the time of final design. Change in highest and best use after acquisition is possible, but retail uses are still supportable.

Tract #	Parcel ID #	(Hi, Mod, or Low)
103	3093001003002000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Access to this site will need to be redirected to the proposed side road as access control requirements along the proposed frontage road are unknown at this time. While it is possible that highest and best use will be impacted, the site is still large enough to support a variety of uses.

104	3042003005005000	Hi

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	YES
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration leaves a very odd-shaped remnant with very limited functional utility. The result is essentially a total take with after acquisition value only as contributory to an assemblage. Highest and best use after acquisition is most likely assemblage for redevelopment purposes.

105	3093001003001000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Access to this site will need to be redirected to the proposed side road as access control requirements along the proposed frotnage road are unknown at this time. While it is possible that highest and best use will be impacted, the site is still large enough to support a variety of uses.

106 3042003001003000 Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

It is highly likely that the access to this tract will have to be reconfigured, and that some rights of way will have to be acquired for construction of proposed side roads, but it does not appear that the highest and best use of the tract will be altered, and relocations do not seem likely.

107 3093001004004000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

108 3042003005006000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	(Hi, Mod, or Low)
109	3093001004003000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

110	3042003005007000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

111	3093001002006000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

112	3042003001001000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Future accessibility needs (including alignment of proposed side road) will be dictated by the land uses proposed as well as proposed site configuration (development plan). Access control requirements along the proposed frontage road should be ascertained prior to approval of any development plan Negotiations over development plans should include reservation of rights of way, closure of all non-conforming A/C breaks, and internal circulation streets.

113	3093001002005000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Access to this site will need to come from Allen Street as access control requirements along the proposed frontage road are unknown at this time. While it is possible that highest and best use will be impacted, the site is still large enough to support a variety of uses.

114	3042003001002000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	(Hi, Mod, or Low)
115	3093001004002000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

116	3042004007003000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	POSSIBLE

There will be some loss of lots in this trailer park, and some relocations if acquisition precedes redevelopment. Access to this site will need to be redirected to Archer and Yorktown and, with costs of cure, should improve. If redevelopment precedes acquisition, then conveyances of rights of way and access control, as well as provision for on-site circulation and parking should take place prior to approval of any development plan.

117	3093001004001000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

118	3042004007007000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

119	3093001002003000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	POSSIBLE

The setback from the right of way to the existing improvements will need to be verified at the time of final design. This site will not need to redirect the access and should be largely unscathed by the proposed configuration. If, however, a nonconforming use is created by setback violation, then highest and best use could be impacted; however, the site is still large enough to support a variety of uses.

120	3042004007008000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	(Hi, Mod, or Low)
121	3093001010002000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

122	3042004007009000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

123	3093001001011000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

124	3042004007004000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

125	3093001001012000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

126	3042004007005000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	(Hi, Mod, or Low)
127	3093001001001010	Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	POSSIBLE
Likely Relocation?	POSSIBLE
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

Access to the proposed frontage road is unlikely given the location between ramps and Andover Road intersection. The acquisitions proposed for this configuration will impact existing improvements and may create setback problems and/or parking problems under current zoning. Assemblage (with Tracts 137 and 139) to overcome these challenges may be required. If redevelopment precedes acquisition, then dedications of rights of way and access control, as well as any necessary "swaps" can take place at that time. If acquisition precedes redevelopment, then the complete loss of access will likely result in a total take, and non-residential relocation will likely apply.

128	3042004007006000	Hi

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	YES

The proposed location and orientation of the side road leaves a remainder with a very high width to depth ratio and low functional utility. If the side road is constructed as shown, it will likely mean a total taking of this tract, with a highest and best use of the remainder as assemblage for redevelopment.

129 3093001001007000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

130 3042004006009000 Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration of US-54 shifts to the north of existing centerline in this area in order to avoid the YMCA facility on the south side. This leaves an uneconomic remnant that most likely cannot support a highest and best use after setbacks, parking requirements, and floor-area ratios are taken into account. The result is essentially a total take and relocation, with the only value remaining after acquisition as contributory to a larger parcel. Highest and best use after acquisition is most likely assemblage for redevelopment.

131 3093001001006000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	(Hi, Mod, or Low)
132	3042004006008000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

133	3093001001005000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

134	3042004006007000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

135 3093001010008000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

While impacts due to right of way requirements on Andover Road are not known at this time, the impacts to this parcel from the proposed configuration should be minimal.

136 3042004006005000 Hi

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	YES

The proposed location and orientation of the side road leaves two uneconomic remainders with very low functional utility. If the side road is constructed as shown, it will likely mean a total taking of this tract, with a highest and best use of the remainders as assemblage for redevelopment.

137 3093001001010000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

While impacts due to right of way requirements on Andover Road are not known at this time, the impacts to this parcel from the proposed configuration should be minimal.

Tract #	**Parcel ID #**	**(Hi, Mod, or Low)**
138	3042004006004000	Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	POSSIBLE
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	POSSIBLE

The proposed location and orientation of the side road leaves an uneconomic remainder in the southwest corner, but there may still be a usable tract. If the side road is constructed as shown, the eastern remainder may still be large enough to support a variety of highest and best uses.

139	3093001001002000	Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

Access to the proposed frontage road is unlikely given proximity to ramps and Andover Road intersection. The acquisitions proposed for this configuration will impact existing improvements and may create setback problems and/or parking problems under current zoning. Assemblage (with Tracts 127 and 137) to overcome these challenges may be required. If redevelopment precedes acquisition, then dedications of rights of way and access control, as well as any necessary “swaps” can take place at that time. If acquisition precedes redevelopment, then the complete loss of access will likely result in a total take, and non-residential relocation will likely apply.

140	3042004006003000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

141	3092902002034000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

142	3042004006002000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

143	3092902002035000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	(Hi, Mod, or Low)
144	3042004006010000	Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration of US-54 shifts to the north of existing centerline in this area in order to avoid the YMCA facility on the south side. This leaves an uneconomic remnant that most likely cannot support a highest and best use after setbacks, parking requirements, and floor-area ratios are taken into account. The result is essentially a total take and relocation, with the only value remaining after acquisition as contributory to a larger parcel. Highest and best use after acquisition is most likely assemblage for redevelopment.

145	3092902002036000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

146	3042004006006000	HI

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	POSSIBLE
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	POSSIBLE
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Alignment of the proposed side road will need to be carefully considered in the case of this tract. The proposed side road may isolate the tract from Archer Street. If this happens prior to construction of the side road, then the tract will be landlocked, and a total take may result. If construction of the side road coincides with its acquisition, then alternative access may prevent a total take.

147 3092902011009000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

While impacts due to right of way requirements on Andover Road are not known at this time, the impacts to this parcel from the proposed configuration should be minimal.

148 3042004006011000 Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration of US-54 shifts to the north of existing centerline in this area in order to avoid the YMCA facility on the south side. This leaves an uneconomic remnant that most likely cannot support a highest and best use after setbacks, parking requirements, and floor-area ratios are taken into account. The result is essentially a total take and relocation, with the only value remaining after acquisition as contributory to a larger parcel. Highest and best use after acquisition is most likely assemblage for redevelopment.

149 3092902011008000 Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

Access to the proposed frontage road is unknown given proximity to ramps and Andover Road intersection. The acquisitions proposed for this configuration will impact existing improvements and may create setback problems and/or parking problems under current zoning. Assemblage (with Tracts 147 and 151) to overcome these challenges may be required. If redevelopment precedes acquisition, then dedications of rights of way and access control, as well as any necessary “swaps” can take place at that time. If acquisition precedes redevelopment, then the complete loss of access will likely result in a total take, and non-residential relocation will likely apply.

Tract #	**Parcel ID #**	**(Hi, Mod, or Low)**
150	3042004006014000	Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Future accessibility needs (including alignment of proposed side road) will be dictated by the land uses proposed as well as proposed site configuration (development plan). Negotiations over development plans should include dedication of rights of way for side roads, and adequate internal circulation.

151	3092902011007000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Access to the proposed frontage road is unknown given the location between ramps and Andover Road intersection. Dedications of rights of way and access control should take place prior to approval of any development plan for this tract.

152	3042004006015010	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

153	3092902011006000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Access to the proposed frontage road is unlikely given the proximity to the proposed ramps. Dedications of rights of way and access control should take place prior to approval of any development plan for this tract.

154	3042004006012000	Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration of US-54 shifts to the north of existing centerline in this area in order to avoid the YMCA facility on the south side. This leaves a potentially uneconomic remnant that may not support a highest and best use after setbacks, parking requirements, and floor-area ratios are taken into account. This is particularly true given the unknown access control requirements on the frontage road. The result is a potential total take and relocation, with the only value remaining after acquisition as contributory to a larger parcel. Highest and best use after acquisition may be assemblage for redevelopment.

Tract #	Parcel ID #	(Hi, Mod, or Low)
155	3092902011004000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Accessibility to the proposed frontage road is unknown at this time, and primary access should be sought from the reverse access road already in place. Dedications of rights of way and access control should take place prior to approval of any development plan for this tract.

156	3042004006013000	HI

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration of US-54 shifts to the north of existing centerline in this area in order to avoid the YMCA facility on the south side. This, plus probable improvement to McCandless Street, leaves an uneconomic remnant that most likely cannot support a highest and best use after setbacks, parking requirements, and floor-area ratios are taken into account. The result is essentially a total take and relocation, with the only value remaining after acquisition as contributory to a larger parcel. Highest and best use after acquisition is most likely assemblage for redevelopment.

157 3092902011003000 Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Accessibility to the proposed frontage road is unknown at this time, and primary access should be sought from the reverse access road already in place. Dedications of rights of way and access control should take place prior to approval of any development plan for this tract.

158 3042004006015000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

159 3092902011002000 Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Accessibility to the proposed frontage road is unknown at this time, and primary access should be sought from the reverse access road already begun. Dedications of rights of way and access control should take place prior to approval of any development plan for this tract.

Tract #	Parcel ID #	(Hi, Mod, or Low)
160	3042004001021000	Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration of US-54 shifts to the north of existing centerline in this area in order to avoid the YMCA facility on the south side. This, plus probable improvement to McCandless Street, leaves an uneconomic remnant that most likely cannot support a highest and best use after setbacks, parking requirements, and floor-area ratios are taken into account. The result is essentially a total take and relocation, with the only value remaining after acquisition as contributory to a larger parcel. Highest and best use after acquisition is most likely assemblage for redevelopment.

161	3092902002031010	Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this tract from the proposed configuration should be limited to location and cross-section of proposed side road. Any required dedications should be secured as part of the development process.

162 3042004001022000 Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration of US-54 shifts to the north of existing centerline in this area in order to avoid the YMCA facility on the south side. This leaves an uneconomic remnant that most likely cannot support a highest and best use after setbacks, parking requirements, and floor-area ratios are taken into account. The result is essentially a total take and relocation, with the only value remaining after acquisition as contributory to a larger parcel. Highest and best use after acquisition is most likely assemblage for redevelopment.

163 3092902011001000 Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Accessibility to the proposed frontage road is unknown at this time, and primary access should be sought from the continuation of the reverse access road. Dedications of rights of way and access control should take place prior to approval of any development plan for this tract.

164 3042004001020000 Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Future accessibility needs (including alignment of proposed side road) will be dictated by the land uses proposed as well as proposed site configuration (development plan). Negotiations over development plans should include dedication of rights of way for side roads, and adequate internal circulation.

Tract #	**Parcel ID #**	**(Hi, Mod, or Low)**
165	3092902001013000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Accessibility to the proposed frontage road is unknown at this time, and primary access should be sought from the continuation of the reverse access road. Dedications of rights of way and access control should take place prior to approval of any development plan for this tract.

166	3042004001019000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

167	3092902001012000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Accessibility to the proposed frontage road is unknown at this time, and primary access should be sought from the continuation of the reverse access road. Dedications of rights of way and access control should take place prior to approval of any development plan for this tract.

168 3042004001018000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

169 3092902001002000 Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Future accessibility needs (including alignment of proposed side road) will be dictated by the land uses proposed as well as proposed site configuration (development plan). Access control requirements along the proposed frontage road should be ascertained prior to approval of any development plan Negotiations over development plans should include reservation of rights of way, closure of all non-conforming A/C breaks, and internal circulation streets.

170 3042004008005000 Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration of US-54 shifts to the north of existing centerline in this area in order to avoid the YMCA facility on the south side. This leaves an uneconomic remnant that most likely cannot support a highest and best use after setbacks, parking requirements, and floor-area ratios are taken into account. The result is essentially a total take and relocation, with the only value remaining after acquisition as contributory to a larger parcel. Highest and best use after acquisition is most likely assemblage for redevelopment.

Tract #	Parcel ID #	(Hi, Mod, or Low)
171	3092902001001000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Future accessibility needs (including alignment of proposed side road) will be dictated by the land uses proposed as well as proposed site configuration (development plan). Access control requirements along the proposed frontage road should be ascertained prior to approval of any development plan Negotiations over development plans should include reservation of rights of way, closure of all non-conforming A/C breaks, and internal circulation streets.

172	3042004008004000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

173 3092901001008000 Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Future accessibility needs will be dictated by the land uses proposed as well as proposed site configuration (development plan). Access control requirements along the proposed FRONTAGE road should be ascertained prior to approval of any development plan Negotiations over development plans should include reservation of rights of way, closure of all non-conforming A/C breaks, and internal circulation streets.

174 3042004001023000 Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	POSSIBLE
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Location and orientation of proposed side road may create proximity concerns to existing structure, but will not likely result in a total taking.

175 3092901001049000 Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Future accessibility needs will be dictated by the land uses proposed as well as proposed site configuration (development plan). Access control requirements along the proposed FRONTAGE road should be ascertained prior to approval of any development plan Negotiations over development plans should include reservation of rights of way, closure of all non-conforming A/C breaks, and internal circulation streets.

Tract #	Parcel ID #	(Hi, Mod, or Low)
176	3042004001001000	Moderate

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Future accessibility needs (including alignment of proposed side road) will be dictated by the land uses proposed as well as proposed site configuration (development plan). Negotiations over development plans should include reservation of rights of way, closure of all non-conforming A/C breaks, and internal circulation streets.

177 3092901001048000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

The baseline of the proposed improvements have been shifted north to avoid impacts to the YMCA facility on this tract.

178 3042004008006000 Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration of US-54 shifts to the north of existing centerline in this area in order to avoid the YMCA facility on the south side. This leaves an uneconomic remnant that most likely cannot support a highest and best use after setbacks, parking requirements, and floor-area ratios are taken into account. The result is essentially a total take and relocation, with the only value remaining after acquisition as contributory to a larger parcel. Highest and best use after acquisition is most likely assemblage for redevelopment.

179	3092901001010000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Location and orientation of proposed side road may create proximity concerns to existing structure, but will not likely result in a total taking.

180	3042004008003000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

181	3092901001005000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Access to the proposed frontage road will have to be carefully analyzed. The acquisitions proposed for this configuration may impact existing improvements and may create setback problems and/or parking problems under current zoning. Assemblage (with Tract 183) to overcome these challenges may be required. If redevelopment precedes acquisition, then dedications of rights of way and access control, as well as any necessary "swaps" can take place at that time. If acquisition precedes redevelopment, then relocation may apply.

Tract #	Parcel ID #	(Hi, Mod, or Low)
182	3042004001024000	Low

Directly impacted by mainline takings? NO
Directly impacted by proposed side-roads? NO
Total Taking? NO
Likely Relocation? NO
Accessibility impacted by proposed configuration? NO
Highest and Best Use impacted by proposed configuration? NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

183 3092901001004000 Moderate

Directly impacted by mainline takings? YES
Directly impacted by proposed side-roads? YES
Total Taking? NO
Likely Relocation? NO
Accessibility impacted by proposed configuration? YES
Highest and Best Use impacted by proposed configuration? NO

Access to the proposed frontage road will have to be carefully analyzed. The acquisitions proposed for this configuration may impact existing improvements and may create setback problems and/or parking problems under current zoning. Assemblage (with Tract 181) to overcome these challenges may be required. If redevelopment precedes acquisition, then dedications of rights of way and access control, as well as any necessary "swaps" can take place at that time. If acquisition precedes redevelopment, then relocation may apply.

184 3042004008007000 Hi

Directly impacted by mainline takings? YES
Directly impacted by proposed side-roads? NO
Total Taking? YES
Likely Relocation? YES
Accessibility impacted by proposed configuration? YES
Highest and Best Use impacted by proposed configuration? YES

The proposed configuration of US-54 shifts to the north of existing centerline in this area in order to avoid the YMCA facility on the south side. This leaves an uneconomic remnant that most likely cannot support a highest and best use after setbacks, parking requirements, and floor-area ratios are taken into account. The result is essentially a total take and relocation, with the only value remaining after acquisition as contributory to a larger parcel. Highest and best use after acquisition is most likely assemblage for redevelopment.

185 3092901001042000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

186 3042004008002000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

187 3092901001043000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	(Hi, Mod, or Low)
188	3042004001025000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

189	3092901001003000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Access should come from McCandless Road rather than the proposed frontage road. The acquisitions proposed for this configuration may impact existing improvements and may create setback problems and/or parking problems under current zoning. Assemblage (with Tracts 187 & 191) to overcome these challenges may be required. If redevelopment precedes acquisition, then dedications of rights of way and access control, as well as any necessary “swaps” can take place at that time. If acquisition precedes redevelopment, then relocation may apply.

190	3042004008008000	Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	YES
Likely Relocation?	YES
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	YES

The proposed configuration of US-54 shifts to the north of existing centerline in this area in order to avoid the YMCA facility on the south side. This, plus probable improvement to Priarie Creek Road, leaves an uneconomic remnant that most likely cannot support a highest and best use after setbacks, parking requirements, and floor-area ratios are taken into account. The result is essentially a total take and relocation, with the only value remaining after acquisition as contributory to a larger parcel. Highest and best use after acquisition is most likely assemblage for redevelopment.

191	3092901001002000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Access to the proposed frontage road will have to be carefully analyzed. The acquisitions proposed for this configuration may impact existing improvements and may create setback problems and/or parking problems under current zoning. Assemblage (with Tracts 189 & 197) to overcome these challenges may be required. If redevelopment precedes acquisition, then dedications of rights of way and access control, as well as any necessary "swaps" can take place at that time. If acquisition precedes redevelopment, then relocation may apply.

192	3042004008001000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

193	3092901001001030	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	(Hi, Mod, or Low)
194	3042004001026000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

195	3092901001001020	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

196	3052100000004000	Low

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Future accessibility needs will be dictated by the land uses proposed as well as proposed site configuration (development plan). Access control requirements along the proposed frontage road and Prairie Creek Road should be ascertained prior to approval of any development plan Negotiations over development plans should include reservation of rights of way, closure of all non-conforming A/C breaks, and internal circulation streets.

197 3092901001001010 Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Access to this tract should come from Highland Road, and not the frontage road. The acquisitions proposed for this configuration may not significantly limit highest and best use, but accessibility will play a role. Dedications of rights of way, provisions for internal circulation, and closure of any non-conforming access control breaks should take place during the development process.

198 3052100000005000 Low

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Future accessibility needs will be dictated by the land uses proposed as well as proposed site configuration (development plan). Access control requirements along the proposed frontage road should be ascertained prior to approval of any development plan Negotiations over development plans should include reservation of rights of way, closure of all non-conforming A/C breaks, and internal circulation streets.

199 3092901003004000 Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

Tract #	Parcel ID #	(Hi, Mod, or Low)
201	3092901002003000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	NO

Access to this tract should come from Highland road, and not from the proposed frontage road. The acquisitions proposed for this configuration will not significantly limit highest and best use, but accessibility will play a role. Dedications of rights of way, provisions for internal circulation, and closure of any non-conforming access control breaks should take place during the development process.

203	3092901003003000	Low

Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	NO
Highest and Best Use impacted by proposed configuration?	NO

Impacts to this parcel from the proposed configuration are minimal to nonexistent.

205	3092901002002000	Moderate

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	NO
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Access to the proposed frontage road is unlikely given proximity to the Prairie Creek Road intersection, and access to this tract should come from Highland Road. The acquisitions proposed for this configuration may impact existing improvements and may create setback problems and/or parking problems under current zoning. Assemblage (with Tracts 201 & 209) to overcome these challenges may be required. If redevelopment precedes acquisition, then dedications of rights of way and access control, as well as any necessary "swaps" can take place at that time. If acquisition precedes redevelopment, then relocation may apply.

207 3092901003002000 Moderate

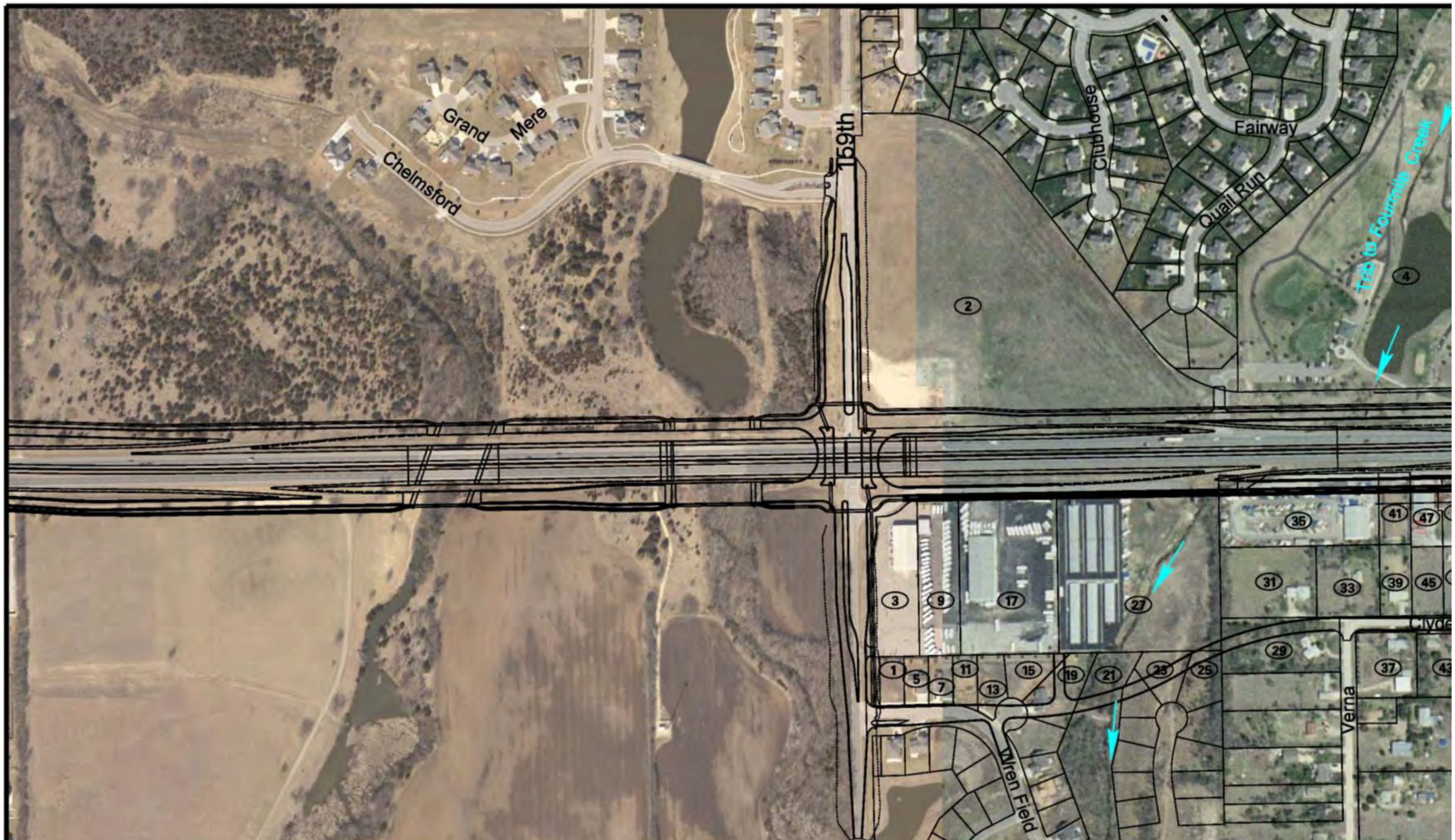
Directly impacted by mainline takings?	NO
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	NO
Accessibility impacted by proposed configuration?	POSSIBLE
Highest and Best Use impacted by proposed configuration?	NO

It is possible that improvements to Prairie Creek Road will impact this tract, but a total taking or relocation is not likely.

209 3092901002001000 Hi

Directly impacted by mainline takings?	YES
Directly impacted by proposed side-roads?	YES
Total Taking?	NO
Likely Relocation?	POSSIBLE
Accessibility impacted by proposed configuration?	YES
Highest and Best Use impacted by proposed configuration?	POSSIBLE

Access to the proposed frontage road is unlikely given proximity to the Prairie Creek Road intersection, and access control requirements on Prairie Creek Road make accessibility to this tract challenging. The acquisitions proposed for this configuration may impact existing improvements and may create setback problems and/or parking problems under current zoning. Assemblage (with Tract 205) to overcome these challenges may be required. If redevelopment precedes acquisition, then dedications of rights of way and access control, as well as any necessary "swaps" can take place at that time. If acquisition precedes redevelopment, then relocation may apply.



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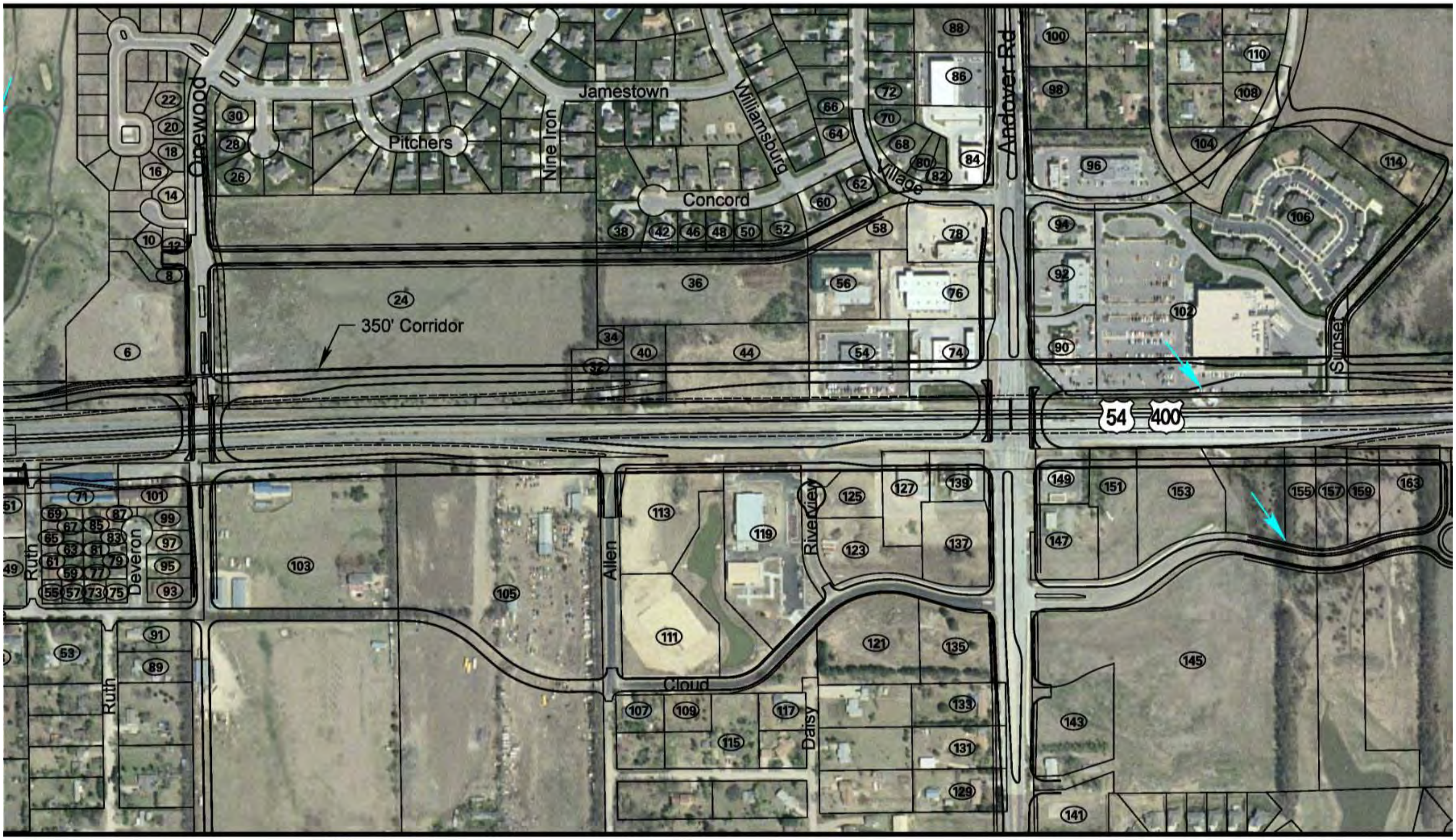

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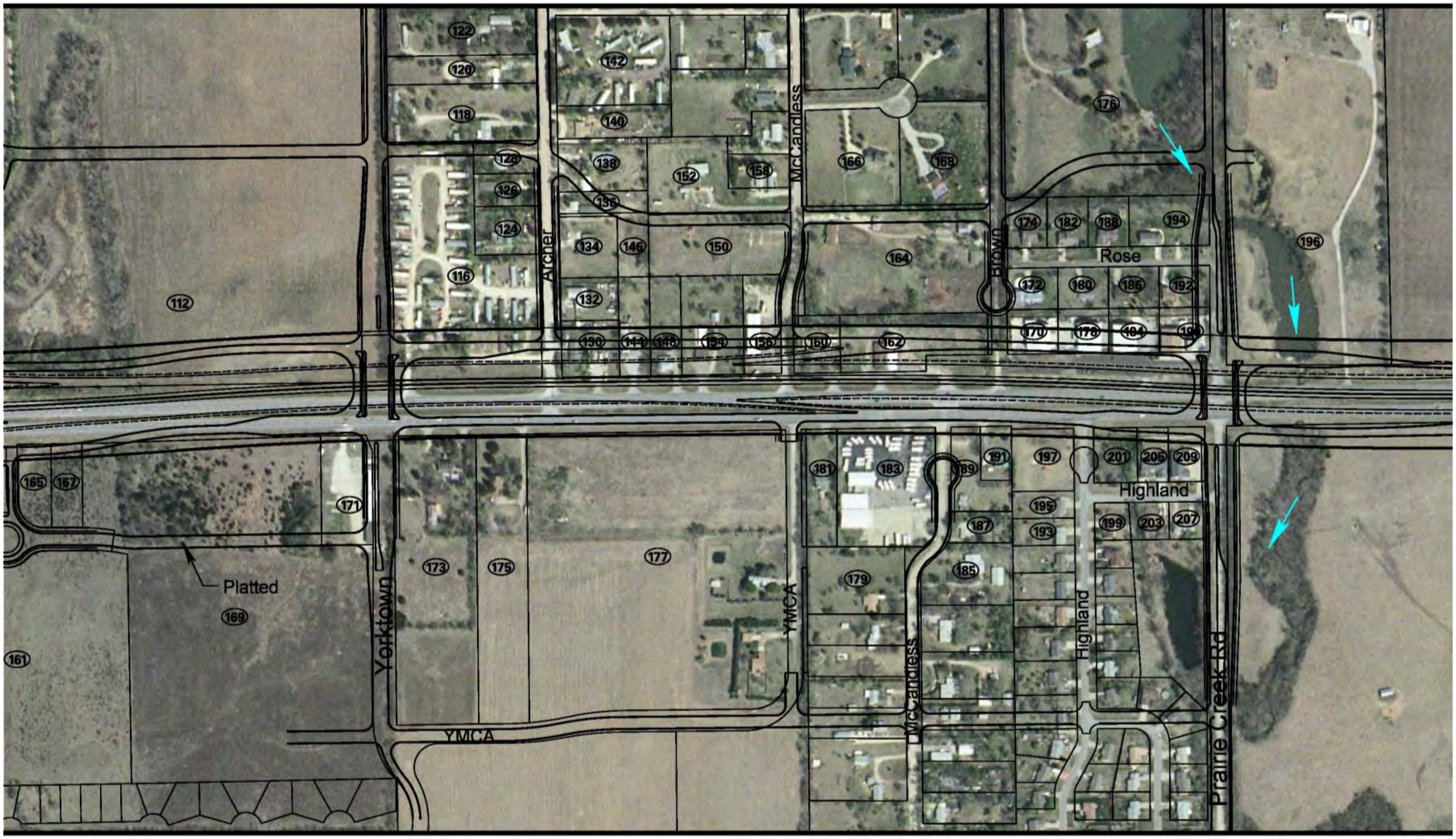

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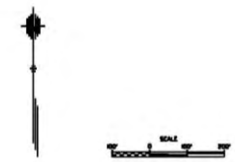
US 54/400
159th St to Prairie Creek Rd



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Environmental Summary

Kansas Department of Transportation

MEMO TO: Michael Moriarty, Corridor Management Administrator
Bureau of Transportation Planning

FROM: Scott Vogel, Chief
Environmental Services Section

DATE: April 28, 2010

SUBJECT: Preliminary Environmental Review
54-8 KA-1156-01
Butler County

A Preliminary Environmental Review for the US54/400 Design Concept Study was initiated for the City of Andover based on a study area map (US54/400 Study Limits City of Andover) received January 20, 2010. The following is a summary of each environmental task evaluated.

ARCHEOLOGY: CLEARED - A Phase I investigation for the study area was requested January 21, 2010. Based on archival research, a Phase II field survey was recommended. The field survey was conducted April 5th and 6th, 2010. No significant cultural resources were found within the attached study area, resulting in a finding of no historic properties affected on April 8, 2010. However, due to the buried nature of these resources, cultural deposits could be encountered during construction. If that occurs, the remains should be left in place and the State Archeologist contacted immediately.

CULTURAL & HISTORICAL: CLEARED – An Activity I field survey was conducted by KDOT personal on January 21, 2010. Photographs were taken of all potentially historic standing structures. A total of six (6) structures were photographed and submitted to the State Historic Preservation Office (SHPO) for review. Based on these photographs the SHPO determined that the proposed project will not adversely affect buildings or structures listed or eligible for listing in the National Register of Historic Places on February 3, 2010.

WETLANDS: The attached National Wetlands Inventory (NWI) map (NWI Mapped Wetlands and Waters of the U.S.) indicates the presence of wetlands within the study corridor. Emergent wetlands are shown as PEMC and PEMA, scrub-shrub wetlands are shown as PSSA and PSSAh, forested wetlands are shown as PFOA and PFOAh, aquatic bed wetlands are shown as PABFh and PABFx, and unconsolidated shore wetlands are shown as PUSCx. These wetlands are associated with drainages, stream channels, and ponds.

A field visit by Environmental Services staff on Jan. 21, 2010 found the following changes from what is indicated on the NWI map. The stream channel located in the SW ¼ Sec. 19 and NW ¼ Sec. 30, shown as a forested wetland (PFOA) on the NWI map, has emergent wetlands in the channel. The NWI map shows an aquatic bed wetland (PABFh) and scrub-shrub wetland (PSSAh) located south of US-54 in the NE ¼ Sec. 30. This low area appears to have been re-shaped and lengthened into a pond. The NWI map shows a stream channel with emergent

wetlands (PEMC) located in the SW ¼ SW ¼ Sec. 20. This stream has been relocated underneath the parking lot. On the same stream south of US-54 in the NW ¼ Sec. 29 the NWI map shows scrub-shrub (PSSA) and emergent (PEMC) wetlands associated with the stream channel. This stream has been modified into a series of ponds and no wetlands were observed on the date of the field visit. The NWI map shows an aquatic bed wetland (PABFh) located south of US-54 in the NW ¼ NE ¼ Sec. 29. This appears to have been filled. The pond located just north of US-54 in the SW ¼ Sec. 20, shown on the NWI map as an aquatic bed (PABFh) and forested wetland (PFOAh), has become a large emergent and scrub/shrub wetland surrounded by trees. The channel of Republican Creek located near the east end of the study corridor is a potential forested wetland.

National Wetlands Inventory maps were developed by the US Fish & Wildlife Service (USFWS) using high altitude aerial photographs. National Wetlands Inventory mapped wetlands may or may not qualify as Corps of Engineers (COE) jurisdictional wetlands when wetland determinations are performed following the methods described in the March 2008 Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region.

Fill or excavation in COE jurisdictional wetlands requires Section 404 permits and mitigation. Emergent wetlands are normally replaced at a 1.5:1 ratio, while scrub-shrub and forested wetlands are replaced at a 2:1 ratio. The COE normally requires impacted wetlands to be replaced in the same watershed where the impact occurs.

STREAMS: Beginning at 159th Street at the west end of the study corridor and working east the corridor crosses three tributaries to Fourmile Creek in Sec. 19-T27S-R3E. The first is located in the SW ¼ Sec. 19, the second is located in the SE ¼ Sec. 19 at the south section line, and the third is located in the SE ¼ Sec. 19 near the east section line. A field visit on Jan. 21, 2010 found the stream channel in the SE ¼ Sec. 19 at the south section line to be COE non-jurisdictional north of US-54. As shown on the topography map this stream barely extends north of US-54. In the SW ¼ Sec. 20 two tributaries to Fourmile Creek are crossed. As previously mentioned the tributary to the west is now underneath the parking lot. Further east in the SW ¼ Sec. 21 the corridor crosses a tributary to Republican Creek and Republican Creek. None of the stream segments within the study corridor are classified in the Kansas Department of Health & Environment, Dec. 19, 2007 Kansas Surface Water Register.

The USGS topography map and aerial photographs show ponds within the study corridor located in the SW ¼ Sec. 19 (north of US-54), NW ¼ and NE ¼ Sec. 30 (south of US-54), SW ¼ and SE ¼ Sec. 20 (north of US-54), NW ¼ and NE ¼ Sec. 29 (south of US-54), and SW ¼ Sec. 21 (north of US-54). The field visit found that the pond located in the SW ¼ Sec. 20 is now a large emergent and scrub-shrub wetland. The pond located in the SW ¼ Sec. 19, north of US-54, is not shown on the topography map but is shown on the aerial photograph.

Streams and ponds are COE jurisdictional if they are connected to other waters of the US by jurisdictional streams. Fill or excavation in COE jurisdictional streams and ponds requires

Section 404 permits and mitigation. The COE normally requires mitigation to occur in the same watershed where the impact occurs.

In Butler County the Kansas Department of Agriculture, Division of Water Resources (DWR), has jurisdiction over stream obstructions such as culverts and bridges, and channel changes, on streams having drainage areas over 240 acres. Construction or modification of bridges or culverts, or changes in the cross section of stream channels on DWR jurisdictional streams requires permits from the DWR. The DWR requires new stream channels to have 50 ft. wide vegetated buffers on both sides of the new channel.

WILDLIFE: In Butler County the USFWS lists the endangered Topeka Shiner. The USFWS has not established designated critical habitat (DCH) for the Topeka Shiner in Kansas. The USFWS indicated the Topeka Shiner occurs in the South Fork Cottonwood River and its tributaries located in the northeast corner of Butler County. A project within the study corridor will not affect Topeka Shiner habitat.

In Butler County the Kansas Department of Wildlife & Parks (KDWP) 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.

Designated Critical Habitat (DCH) has been established for the Topeka Shiner and is described by KDWP as, "South Fork Cottonwood River and its tributaries in Butler County from the Butler/Chase County line (Sec. 4-T23S-R8E) upstream to its headwaters (Sec. 21-T23S-R8E)". This DCH is located in the northeast corner of Butler County and is not within the study corridor.

FLOODPLAINS: The attached Federal Emergency Management Agency, Flood Insurance Rate Maps 20015C0467E, and 20015C0486E show the 100-year flood zones and floodways within the study corridor. Floodways are present on Fourmile Creek tributaries in the NW ¼ Sec. 30, and NW ¼ Sec. 29, and the Republican Creek tributary in the SW ¼ Sec. 21 and NW ¼ Sec. 28, and Republican Creek in the SW ¼ Sec. 21 and NW ¼ Sec. 28.

In Butler County the DWR has jurisdiction over floodplain fills averaging over 1 ft. in height that are placed within the 100-year floodplains of streams having drainage areas over 240 acres. Floodplain fills averaging over 1 ft. in height require floodplain fills permits from the DWR. The DWR considers any increase in the elevation of the design and base flood profiles within a floodway, or an increase in the elevation of the design and base flood profiles of more than one foot at any location outside a floodway to be an unreasonable affect.

HAZARDOUS WASTE: A data base search for hazardous waste sites within the sections included in the study corridor did not reveal any hazardous waste sites. The data bases searched included the Kansas Department of Health & Environment (KDHE) Identified Sites, KDHE Landfills, National Priorities List (NPL), and Environmental Protection Agency Super Fund (CERCLIS).

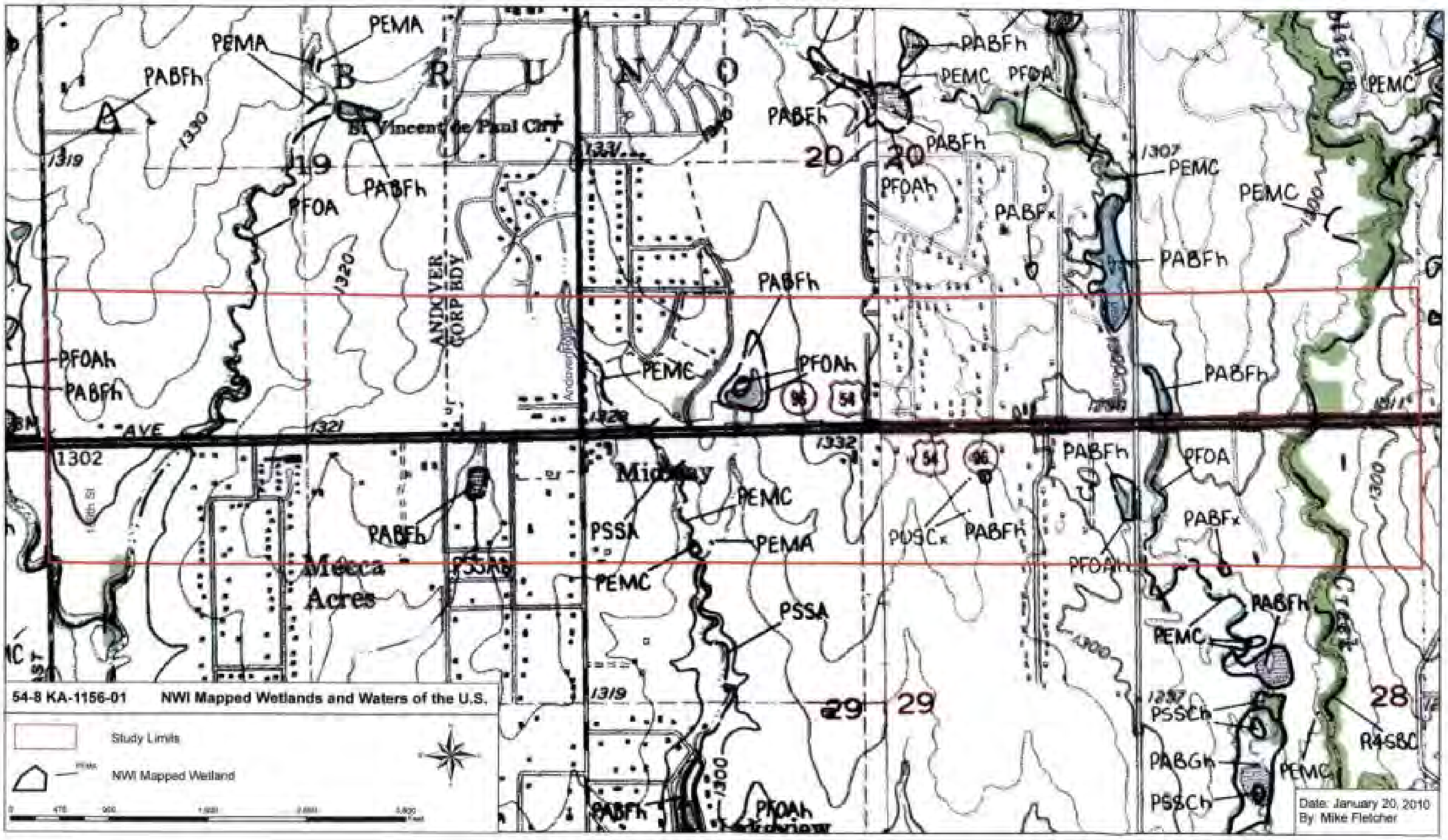
A field survey conducted February 2010 identified the following sites that may pose hazardous waste concerns. A wholesale fireworks building located in the NW NW NW Sec. 30-T27S-R3E. A pet cemetery located in the NE NW NE Sec. 30-T27S-R3E. An active Valero gas station with three underground storage tanks (USTs) approximately 130 ft. south of the US-54 centerline located in the NE NE NE ¼Sec. 29-T27S-R3E. An active Presto gas station with two USTs approximately 130 ft. south of the US-54 centerline located in the SE SE SE Sec. 19-T27S-R3E. An active Kwik Shop gas station with three USTs located approximately 95 ft. north of the US-54 centerline located in the SE SE SE Sec. 19-T27S-R3E.

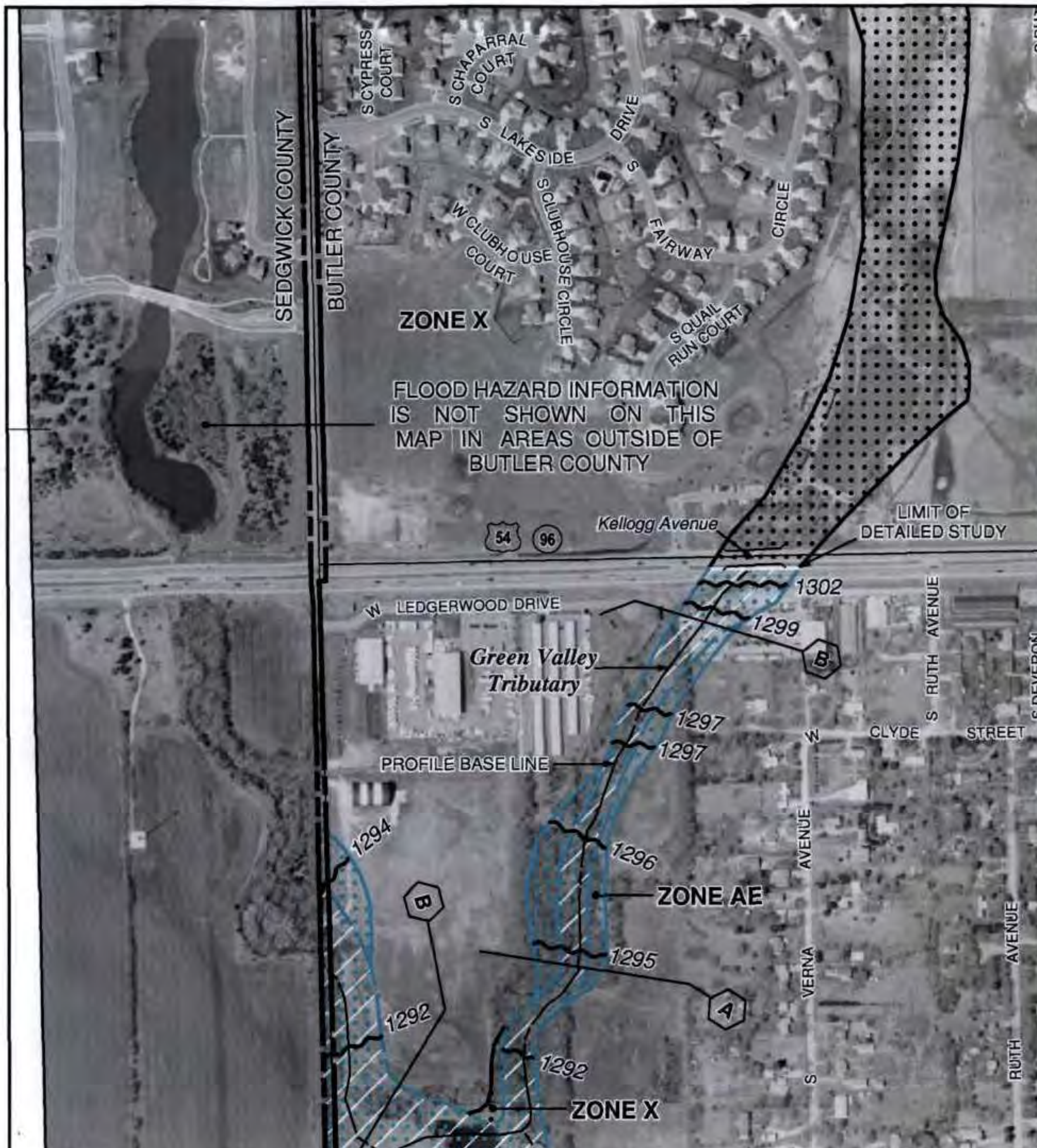
If you have any questions contact this office at (785) 296-0853.

SPV:MPF
Attachments

54-8 KA-1156-01
US54/400 City of Andover

54-8 KA-1156-01
US54/400 City of Andover





he Flood Insurance Study report for this jurisdiction.

nce is available in this community, contact your insurance
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N

MAP SCALE 1" = 500'

0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0467E

FIRM

FLOOD INSURANCE RATE MAP

BUTLER COUNTY, KANSAS

AND INCORPORATED AREAS

PANEL 467 OF 900

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BUTLER COUNTY	200037	0467	E
ANDOVER, CITY OF	200383	0467	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
20015C0467E

EFFECTIVE DATE
JUNE 2, 2009

Federal Emergency Management Agency

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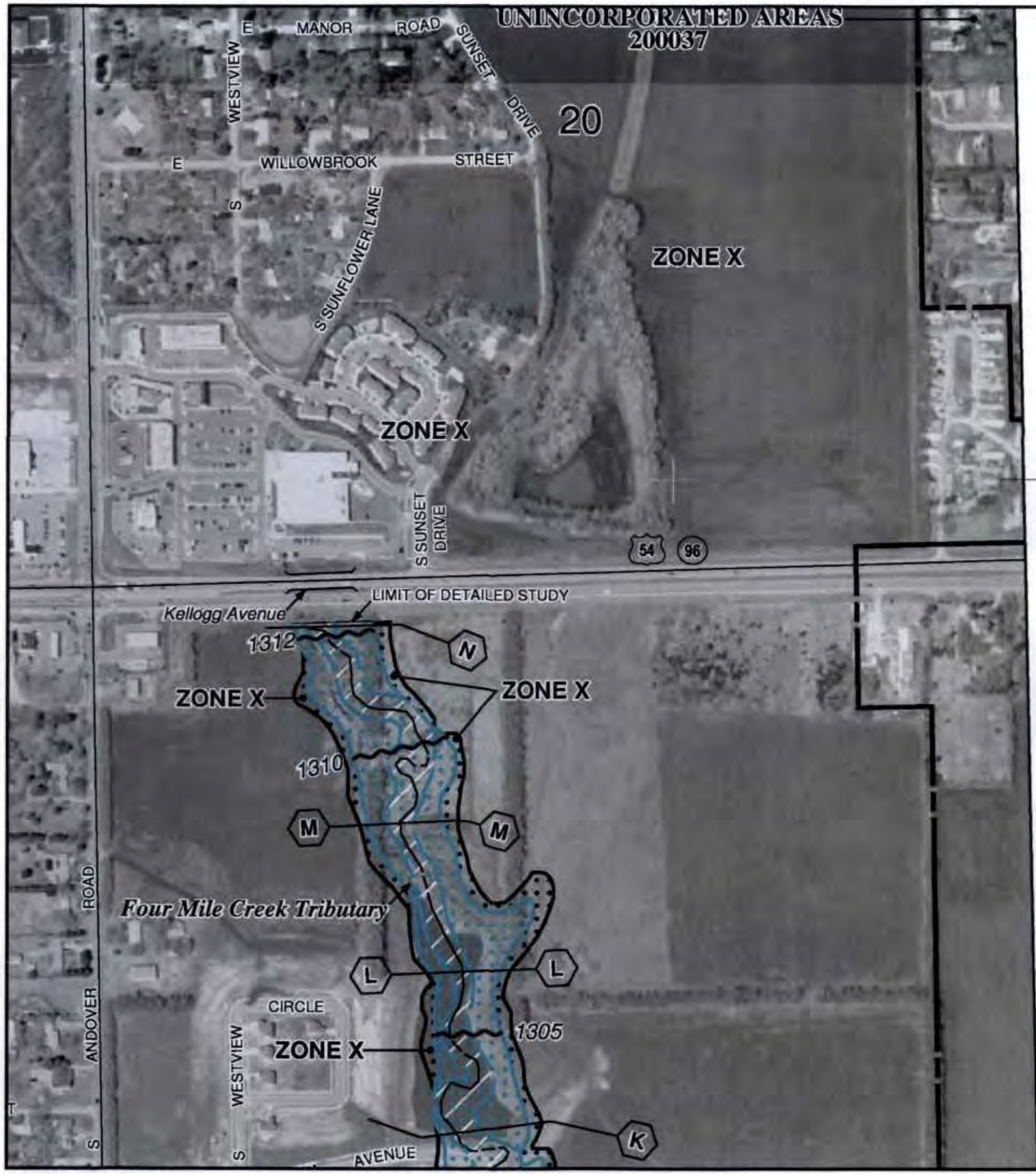

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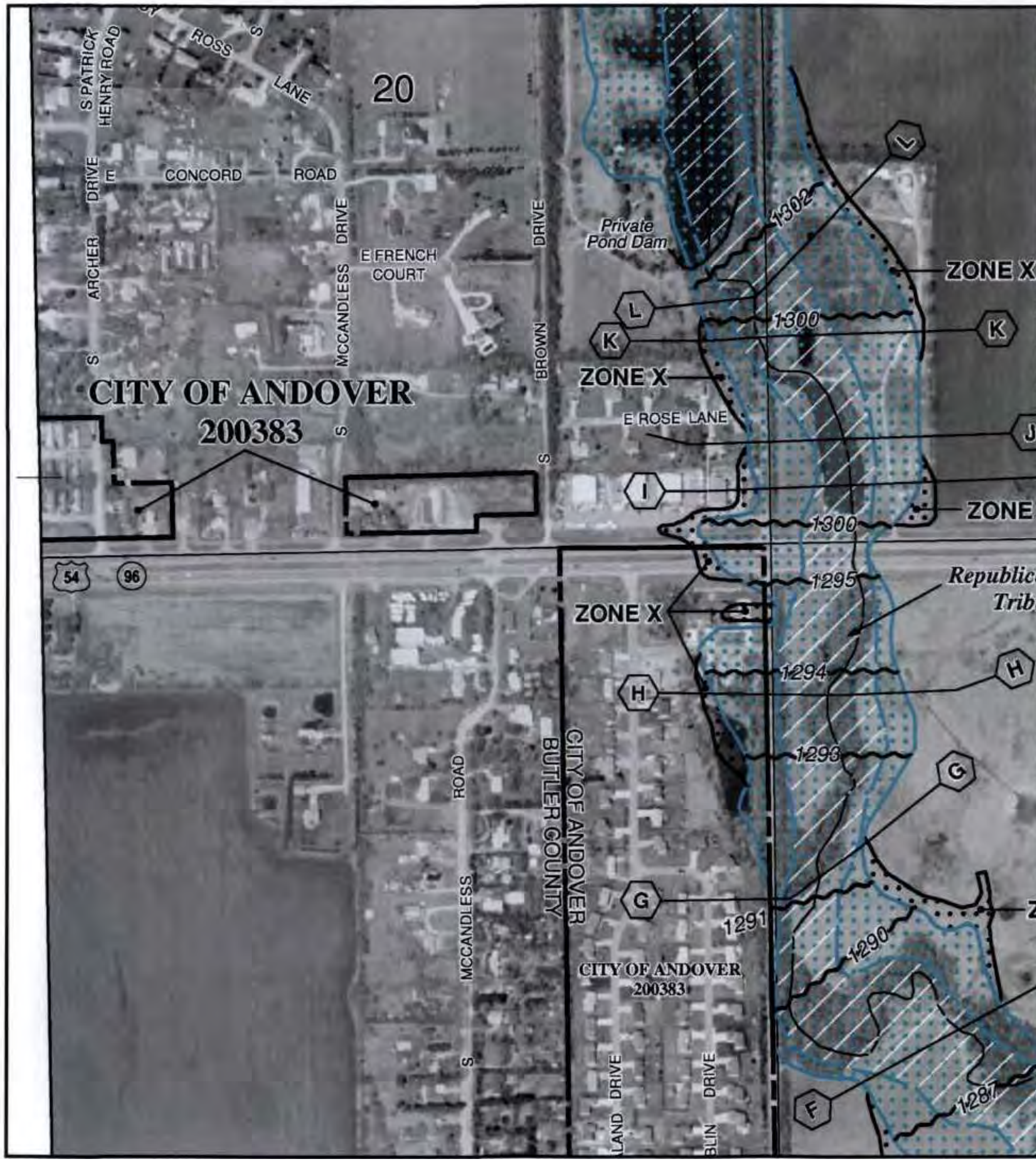

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NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0486E

FIRM
FLOOD INSURANCE RATE MAP

BUTLER COUNTY, KANSAS

AND INCORPORATED AREAS

PANEL 486 OF 900

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

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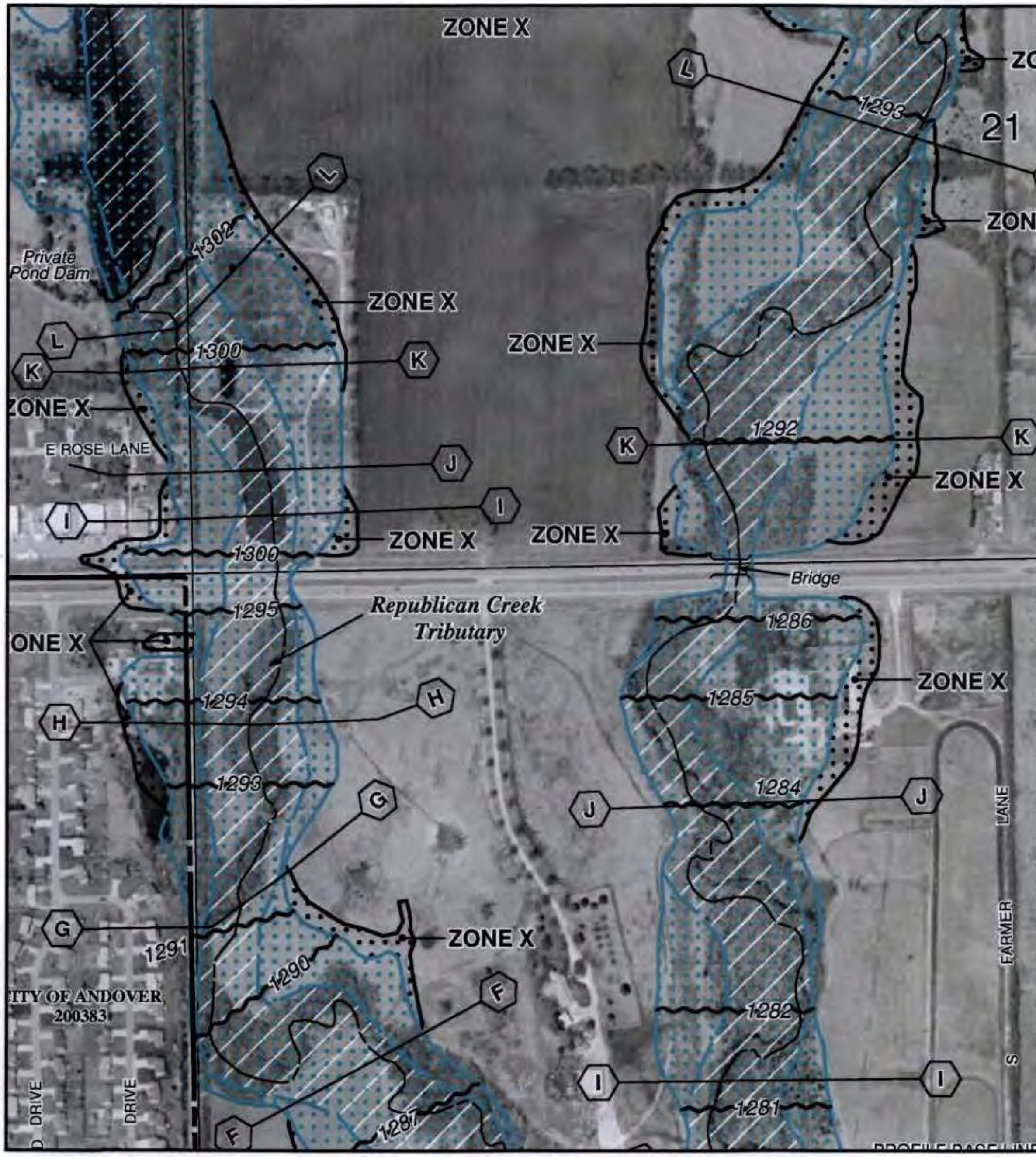

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LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

he Flood Insurance Study report for this jurisdiction.

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METERS
0 150 300

NFIP

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Design Guidelines

These design guidelines are intended to enable the City to work together with the development and business communities in achieving the vision for the US 54/400 corridor. That vision includes five framework themes:

- Revitalizing the US 54/400 corridor will require maintaining the established “small town” character.
- 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.
- Integrating the neighborhoods will require a mix of infill housing and services for local neighbors.
- Achieving a more accessible corridor will require improving the transportation system to minimize barriers and provide regional transportation alternatives.
- Realizing a sustainable high quality of life will require balancing the needs of social issues, the natural environment, and economic development.

The guidelines contained in this document are general statements describing ideal development along the corridor. The use of the guidelines is intended to give flexibility to the developer and/or applicant to respond and contribute to the corridor vision in advance of a submittal, to give the City of Andover a basis on which to make judgments so that its determinations are not arbitrary, and to give certainty to the City of Andover and its citizens that the corridor vision is met and that the quality described is maintained. The images in this section reflect examples from across the country, which exemplify the written standards.

As time passes and the city and its partners in the public and private sector advance in achieving the corridor vision, conditions along the corridor will change. Design Standards can be added to provide more specificity and amended over time. The guidelines and standards serve as a tool to ensure that the corridor vision and quality of corridor redevelopment remains consistently high.

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.”

Authority

It is the intent of the Design Review Guidelines to provide a basis for the review of development projects within the corridor overlay area. These general guidelines are intended to be adopted formally with future amendments to the Comprehensive Plan, Zoning Regulations, and Subdivision Regulations. More specific detailed guidelines, policies, and standards may be developed over time to aid in the review process.

Applicability and Review

The City of Andover has an established Site Plan Review Procedure and Criteria for the review of non-residential building projects by a Site Plan Review Committee (SPRC) made up of appointed volunteer design professionals and businessmen. In addition to the SPRC the City Subdivision Committee, Planning Commission, and City Engineering Staff are charged with the review of subdivision plats and design of public improvements. The SPRC would have the responsibility of reviewing all of the private development of building and private amenities projects while the design of access management and public improvements, such as water, sewer, streets, drainage structures, and sidewalks within the public right of way would be reviewed by the Subdivision Committee, Planning Commission, and City Engineering Staff.

Amendments

Once these Guidelines have been formally adopted they may only be amended by the Governing Body with a recommendation from the Planning Commission, however the specific policies and standards adopted by the review committees may be amended from time to time.

Format

The format of the following design guidelines consists of development conditions defined by design guideline statements. Development conditions are described for Site Plan, Architecture, Landscape and Signage. Guidelines describe the design intent for each listed condition and should be incorporated into design treatments of each listed condition. Standards describe the specific treatments that, if incorporated, require no further SPRC review. However, if standards cannot be achieved due to outstanding conditions, the SPRC may evaluate specific condition proposed treatments against the stated Guidelines. If the SPRC approves the proposed treatments no further SPRC review is required. Appeals of decisions made by the SPRC may be made to the Board of Zoning Appeals.

A. SITE PLAN

A1 Building orientation

Guidelines

A1.g1 The front facades and main entries of buildings should be oriented toward streets and plazas.

A1.g2 Building orientation should provide views of adjoining publicly accessible streets and open spaces in order to provide passive viewing for safety.

A1.g3 Pedestrian activity should be encouraged through the incorporation of active uses such as retail, commercial and/or institutional uses at the ground level.

A1.g4 Buildings should define the street or public open space.

A1.g5 Buildings should be located to promote sun and sky exposure to public streets and plazas.

A1.g6 Buildings should be sited to create active outdoor spaces where possible, such as outdoor restaurant seating where appropriate.

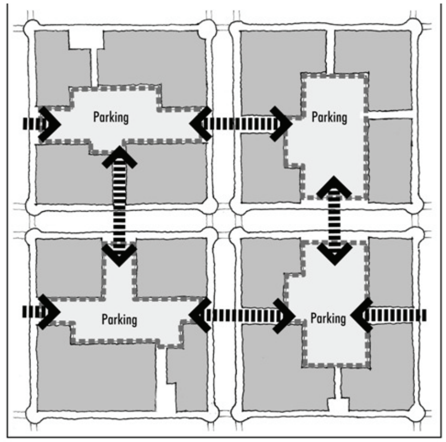
Standards

A1.s1 Buildings shall line a street at the Right of Way or the build-to line to the greatest extent possible.

A1.s2 Buildings shall use the full width of the lot for the primary structure and/or active outdoor space.

Facades and entries oriented toward street

Driveway across sidewalk identified by material change



Identify clear access points for parking

A2 Access and driveways

Guidelines

A2.g1 Access points, including alleys, and driveways should be located to promote the safe and efficient movement of vehicles, pedestrians and bicyclists.

A2.g2 Uninterrupted pedestrian-ways should be maximized in order to improve walkability.

A2.g3 The width of driveways and curb cuts should be minimized to reduce the overall impact of vehicular access across a sidewalk.

A2.g4 Driveways and ramps to underground parking should be perpendicular or generally perpendicular to the street.

A2.g5 Block frontages should have as few curb cuts as possible.

A2.g6 Sharing of vehicle entries between two adjacent lots is strongly encouraged.

Standards

A2.s1 Developments shall provide access for service vehicles via alleys or parking lots.

A3 Parking lot and structure location

Guidelines

A3.g1 Buildings should be located to minimize the visual impact of parked vehicles within lots and structures.

A3.g2 Parking lot location should minimize the impact of parked vehicles on the continuity of active commercial, mixed use, and/or residential frontages.

A3.g3 Parking lots and structures should be located to minimize the impact of vehicle noise and headlights from within parking lots and structures onto adjacent residential neighborhoods.

A3.g4 Whenever possible, parking structures should be sited internally to the block so that parking structure street frontages are avoided. If internal siting is not feasible, then the parking structure should be oriented so that the shortest dimension fronts the street.

A3.g5 If it is only feasible to orient the long dimension of a parking structure along a street, then the structure's street facade should exhibit the same high level of quality in its design, detailing and use of material as is provided in the adjoining commercial and/or mixed use buildings.

A3.g6 Parking structures that are sited with exposed street frontage should orient the exposed frontage to commercial activities, rather than residential uses.

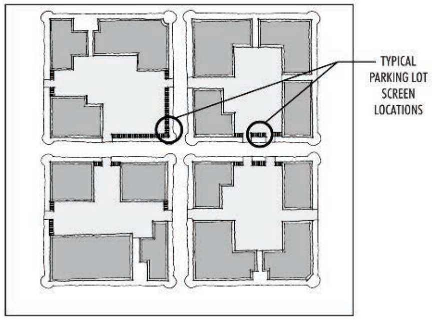
Standards

A3.s1 Surface parking areas shall be located at the side or rear of buildings only.

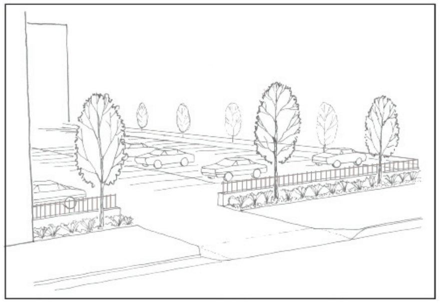
A3.s2 Parking structures with exposed street frontage shall not be oriented toward residential uses.

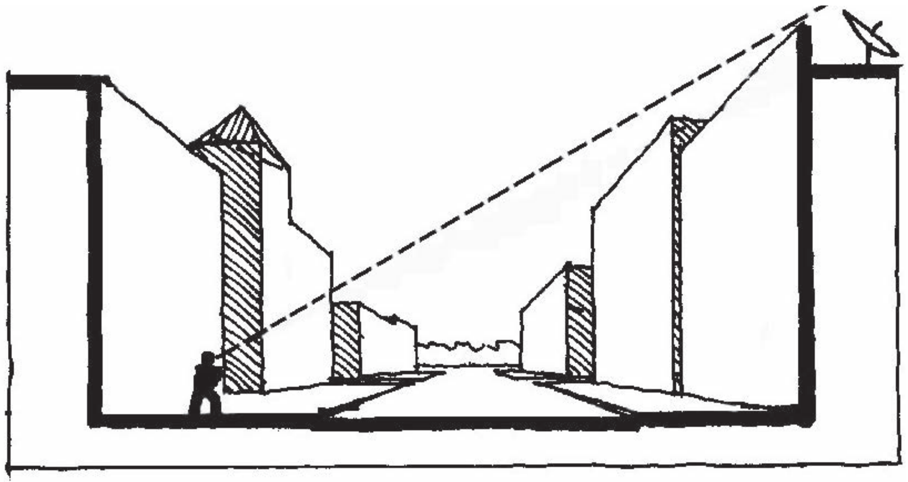
Active uses at street level of parking structure and high quality facade

Parking structure with retail on ground floor, quality materials, and detail



Parking lot screen




Utility screening

A4 Utility location and screening

Guidelines

A4.g1 Service areas and utility pedestals should be located to minimize the visual impact of service areas, refuse storage and mechanical/electrical equipment on streets, public open spaces and adjoining development.

A4.g2 Utility appurtenances should be located behind the sidewalk and out of the sidewalk amenity zone wherever possible. Where it must be in the tree lawn or amenity zone, such equipment should be centered on the tree line and aligned with but no closer than 42 inches from the face of curb. This includes switch boxes, telephone pedestals, transformers, meters, irrigation, and similar equipment.

A4.g3 The use of alleys is encouraged to locate all mechanical, electrical, and utility equipment to the extent possible.

Standards

A4.s1 Service areas and refuse storage areas shall not front onto streets and public open spaces. Such areas shall be located to the rear or side of buildings, and screened from view from the street and/or public open space.

A4.s2 Refuse storage and pick-up areas shall be combined with other service and loading areas.

A5 Pedestrian access

Guidelines

A5.g1 Pedestrian entries to buildings should promote security on a street or public open space through frequent points of access and sources of activity.

A5.g2 In general, ground floor uses with exterior exposure should each have an individual public entry directly located on a public sidewalk along a street, or on a sidewalk or plaza leading directly to a street.

Standards

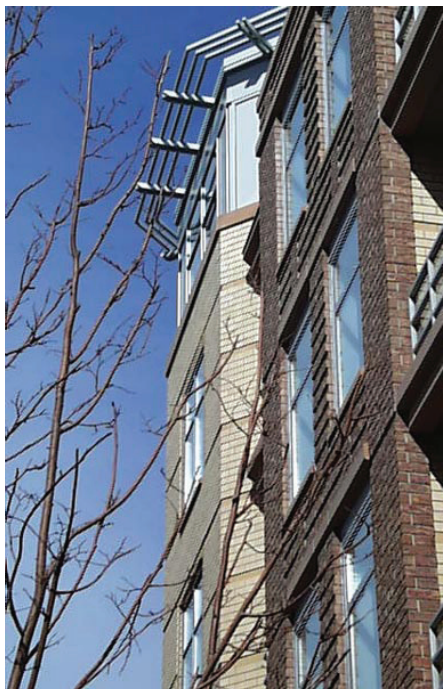
A5.s1 Primary building entrances shall be oriented toward streets, parks or pedestrian plazas.

A5.s2 Each block face shall have multiple building entries. A building occupying an entire city block shall include more than one building entrance along each block face.

A5.s3 All secondary building entries shall be well lit and directly connected to the street.

Primary building entrances oriented toward streets

Human scaled development with interest and variety



Variations of material, color, and texture

B Architecture

B1 Building Character

Guidelines

B1.g1 Building character should be creative and within a visually comfortable and familiar environment.

B1.g2 Buildings should be designed to provide human scale, interest, and variety while maintaining an overall sense of relationship with adjoining or nearby buildings.

B1.g3 Art integrated into building facades or forms, and/or specially designed architectural ornament is encouraged.

Standards

B1.s1 All buildings shall be designed specifically for the context and character of the corridor. 'Iconic' corporate standard building design is encouraged at identified gateway and landmark locations.

B1.s2 The majority of the building(s) of a development shall possess an architectural character that respects traditional design principles, such as:

- Variation in the building form such as recessed or projecting bays;
- Expression of architectural or structural modules and detail;
- Diversity of window size, shape or patterns that relate to interior functions;

- Emphasis of building entries through projecting or recessed forms, detail, color or materials;
- Variations of material, modules, expressed joints and details, surface relief, color, and texture to scale;
- Tighter, more frequent rhythm of column/ bay spacing, subdividing the building façade into smaller, more human scaled elements.

B2 Building Form

Guidelines

B2.g1 New development should create occasional special building forms that terminate views, create a unique skyline, and aid in way-finding.

B2.g2 Building form should emphasize important components of a building, such as an entry, or a special internal space.

B2.g3 Lower building heights or upper level stepbacks are encouraged on the south or east side of the street or public open space in order to provide more sun penetration to the ground level.

B2.g4 Taller buildings adjacent to lower buildings shall establish scale relationships with lower, neighboring buildings through methods such as: compatible horizontal alignment of architectural features and fenestration, and height and form transitions from one building to another.

Standard

B2.s1 Building form shall employ a uniform level of quality on all sides of the building.

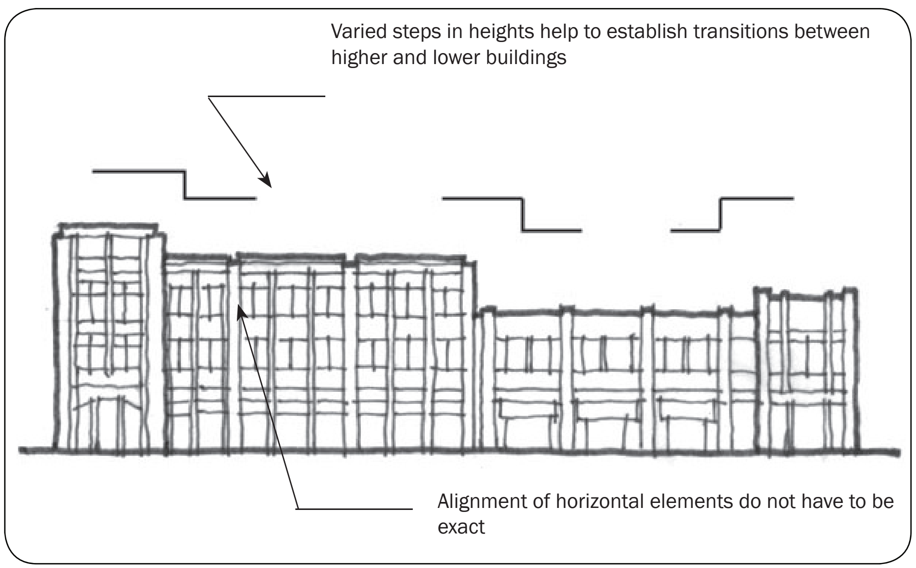
Example of upper level stepbacks



Emphasis on entry or special internal space

Varied steps in height

Vertical divisions in facade



Scale relationships

B3 Building Facade

Guidelines

B3.g1 Building facades should be designed to provide human scale and detail and to avoid large areas of undifferentiated or blank facades.

B3.g2 Each building facade oriented to the street or public space should provide architectural variety and scale through the use of such elements as: expressions of building structure; patterns of window, door or other openings that provide surface variation through change of plane, change in color; change in texture; change in material module or pattern; art or ornament integral with the building.

B3.g3 Primary building facades should include some elements that provide a change in plane that create interest through the interplay of light and shadow. Examples of such elements are:

- recessed windows, at least 3 inches;
- recessed entries and doors;
- projecting sills;
- recessed or projecting balconies;
- projecting pilasters, columns, bays;
- projecting cornices, roofs.

B3.g4 Each ‘base’ should be composed of the first floor or first two floors of the building.

B3.g5 Each ‘base’ in its entirety should be designed to give the appearance of greater height than any single floor of the middle.

Design Guidelines

B3.g6 Each ‘base’ should have a greater level of transparency than the ‘middle’ or ‘top’.

B3.g7 The architectural treatment of the ‘top’ should be designed to create a sense of distinctly completing the dominant architectural theme of the ‘middle’ of the building. This architectural completion may be accomplished by such strategies as: change in the window rhythm, change in apparent floor height, setback, use of other materials, or a combination of these elements.

B3.g8 Distinctive corner, entry treatments and other architectural features designed to interact with contextual features may be designed differently than the ‘base’, ‘middle’, and ‘top’. This difference would allow the addition of vertical emphasis at significant architectural points along the building facade.

B3.g9 The ‘top’ of buildings above four (4) stories may have a ‘cap’ set back above the lower stories, which is distinctive in shape and smaller than the previous floor.

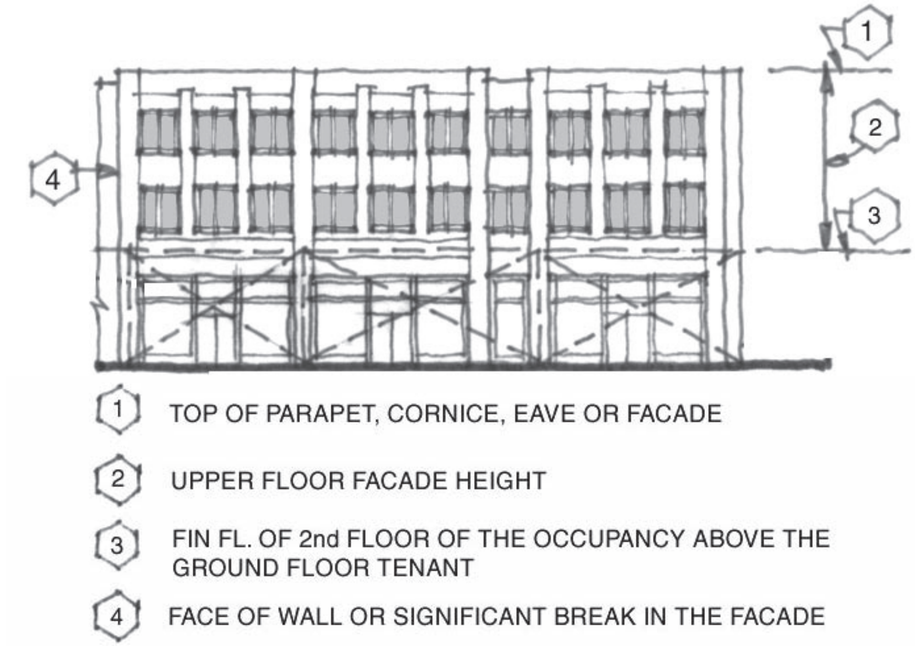
Standards

B3.s1 The building facade shall generally have three vertical divisions: ‘bases’, ‘middles’, and ‘tops’. In buildings of three stories or less in height, the ‘top’ may be comprised of an ornamental ‘cap’ or cornice rather than the articulation of an entire floor of habitable space.

B3.s2 The design of ‘roofscape’ elements of tall buildings shall relate directly to the building walls.

B3.s3 Building design shall create varied roof parapet and cornice lines in order to create interesting and human scaled skylines.

Vertical divisions in facade



Upper floor transparency

Building transparency

B4 Building transparency

Guidelines

B4.g1 Where functionally appropriate, the ground floor, street-facing facade shall be made of transparent materials designed to allow pedestrians to view activities inside the buildings, retail goods for sale, or display lighted windows related to these activities.

B4.g2 When transparency is not functionally appropriate, other means should be used to provide activity along the street-facing façade such as public art; architectural ornament or detailing; or material, texture, or color patterns.

B4.g3 Buildings should incorporate a window or glazing-to-wall ratio that is sufficient to establish the visual solidity of the building form.

B4.g4 Reflective glass should be used sparingly, if at all, to reduce glare, reduce the opacity or ‘blankness’ of the facade. Coated or tinted glass may be considered to reduce heat gain, particularly on west and south facades.

B4.g5 Windows or glazing on upper levels should be sufficiently transparent to provide an awareness of internal activities when viewed from the street or public spaces.

Standards

B4.s1 Glass without coatings or tints shall be used for all retail glazing. In no case shall highly reflective glass be used.

B5 Building Entries

Guidelines

B5.g1 For mixed-use buildings with residential units, one or more separate building entrances from the sidewalk should be used to provide access to the residential units.

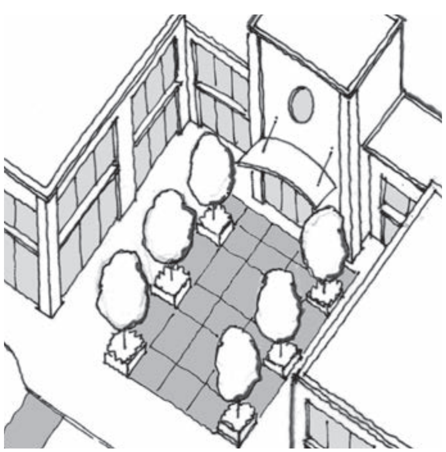
B5.g2 Detailed and elaborate entries should be used as another way to create street level interest and architectural variety.

B5.g3 Major building entries should be emphasized through such design devices as changes in plane, differentiation in material and/or color, greater level of detail, enhanced lighting, ornament, art, and/or building graphics.

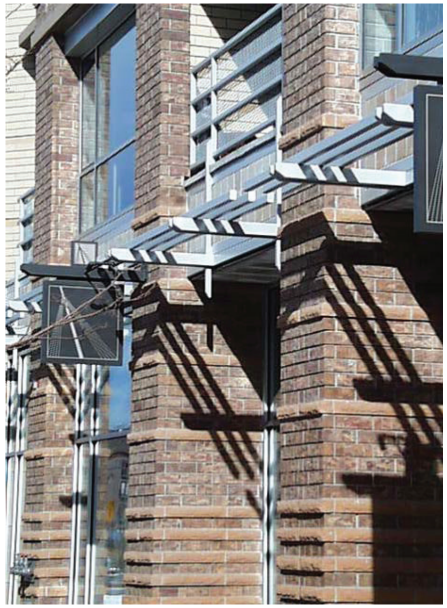
B5.g4 Primary building entries should be oversized, and generally break the storefront/ground floor façade pattern.

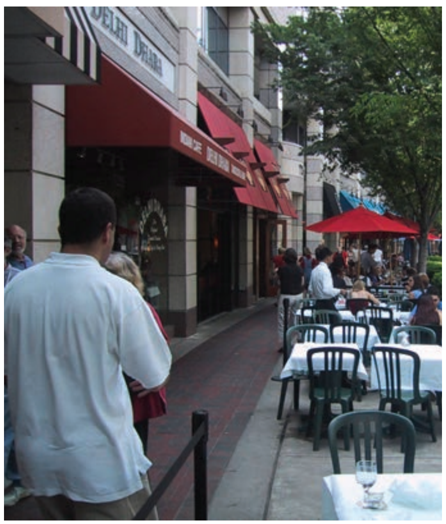
Standard

B5.s1 Each multi-story building shall have one clearly identifiable 'front door' that addresses the street. In addition to this 'front door,' a building occupying an entire city block shall include at least one other building entrance along each block face.



Emphasis on building entry





High quality materials

B6 Building Materials

Guidelines

B6.g1 New development should use materials and colors that possess a comfortable and familiar character, convey a sense of quality and attention to detail, and are compatible with materials of adjacent buildings.

B6.g2 New development should use lasting materials that weather well, need little maintenance, and resist vandalism.

B6.g3 Materials and/or detailing at retail frontages should distinguish between the structural parts of a building (columns, walls and beams), and the infill parts of a building (wall panels, frames, windows and doors).

B6.g4 Infill materials should have a non-structural appearance.

Standards

B6.s1 A significant portion of the facade facing a street or public open space (not including windows, doors and their framing systems), shall be composed of highly durable materials such as: brick, stone, cast stone, specially treated concrete masonry units, terra-cotta, and/or glass. All building materials shall be integrally tinted.

B6.s2 Building materials shall maintain a uniform level of quality on all sides of the building.

B7 Parking Structures

Guidelines

B7.g1 The exterior of parking structures should be wrapped with mixed-use space in order to minimize the visual impact of parking on the pedestrian experience, and the street environment and to increase pedestrian activity and interest along the street by locating active uses at the street level of parking garages

B7.g2 Garage facades visible from public streets and open spaces should be compatible in character and quality with adjoining buildings.

B7.g3 Parking structures should create visually interesting facades that provide human scale and detail while avoiding large areas of undifferentiated or blank facades.

B7.g4 Openings should be vertically and horizontally aligned.

Standards

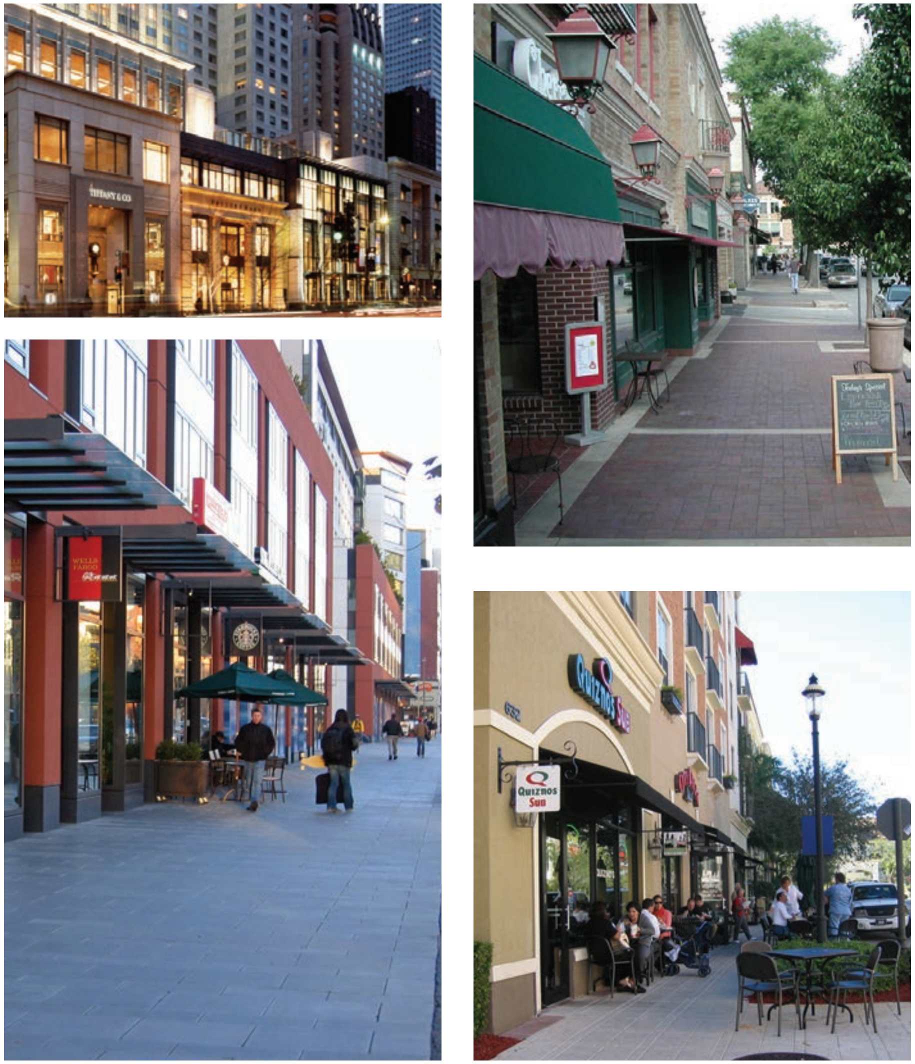
B7.s1 Street oriented facades shall conceal or effectively reduce the impact of parked cars and light sources from the exterior view for the full height of the structure.

B7.s2 Multi-story parking structures (3 levels or more) with facades facing public streets shall provide commercial, live-work, residential and/or institutional space for not less than 50% of the garage's ground level street facing frontage, or the design and structure of the ground floor street frontage should be able to accommodate in the future one of the above listed uses.

B7.s3 Sloping ramps shall not be visible within the street facade of any parking structure.

Retail wrap and compatible facade on upper stories of parking structure

Street facade of parking structure that screens parked cars



Lighting at building entries

B8 Building Lighting

Guidelines

B8.g1 Building lighting should accentuate important architectural components of the building, such as entries, towers or roof elements, or repetitive columns or bays, and include decorative lighting.

B8.g2 Building lighting should provide indirect or direct lighting for adjoining sidewalks and open spaces.

B8.g3 Primary building entries should be externally lit so as to promote a more secure environment at the door, emphasize the primary point of entry into the building, and provide sufficient lighting for efficient access into the building.

B8.g4 Steps and/or ramps at or leading to a primary building entry should be illuminated sufficiently for safe access.

Standard

B8.s1 Entry lighting shall complement the building's architecture. Standard security lighting such as wallpacks shall not be allowed.

B9 Rooftop design

Guidelines

B9.g1 Rooftop design should maintain the integrity of architecturally designed building tops and help create interesting and varied skylines.

B9.g2 In mixed use development, if residential uses are located near mechanical equipment, care should be taken to mitigate the impacts of noise and odors.

B9.g3 Antennae that extend over five feet above the roof line are encouraged to have screening techniques applied such as color and material to minimize visibility.

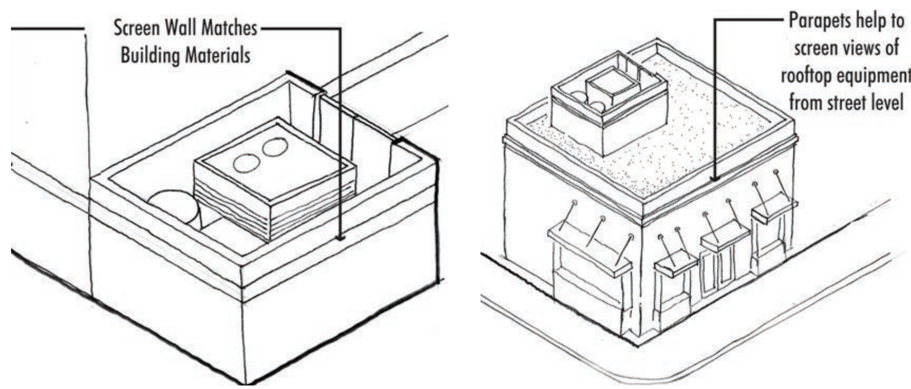
B9.g4 Streetscape within the corridor area should not be cluttered by utility elements.

B9.g5 Utility boxes should be located so that they do not obstruct pedestrian traffic or block sight lines at intersections.

Standards

B9.s1 All roof mounted mechanical and electrical equipment, communication antennae or dishes shall be enclosed, screened, organized, designed and/or located as part of the architectural expression and shall not be visible from the public right of way. Any equipment shall be covered or screened to its full height.

B9.s2 Switch boxes, transformers, electrical and gas meters, and other above ground utility elements shall be screened or located out of view from the street.



Screening of rooftop mechanical equipment

Perimeter landscaping design

C. LANDSCAPE

C1 Perimeter Landscaping

Guidelines

C1.g1 Perimeter landscaping design should create street and plaza spaces that join buildings, uses, pedestrian areas, and streets into a unified urban place.

C1.g2 Perimeter landscaping should reinforce the pedestrian environment established in the adjoining street right of way.

C1.g3 Perimeter landscaping should be designed to provide seamless transitions between buildings, uses, and open spaces that promote the mixing of commercial, residential, and institutional uses.

C1.g4 Where a landscape perimeter area occurs between a building frontage and a street right of way, it should be designed to extend the pedestrian amenities of the street, such as increased walkway widths, areas for outdoor café/restaurant seating, increased sidewalk widths to allow window shopping out of the stream of pedestrian traffic, and space for the temporary display of a retailer's goods.

C1.g5 Where space permits, planting in containers, raised planters, or cutouts in the paving is encouraged.

Standard

C1.s1 Where a side setback landscape perimeter area occurs, it shall be designed to contribute to a pedestrian amenity zone such as a passageway, or contribute to a paved driveway or alley.

C2 Internal courtyards, plazas and open spaces

Guidelines

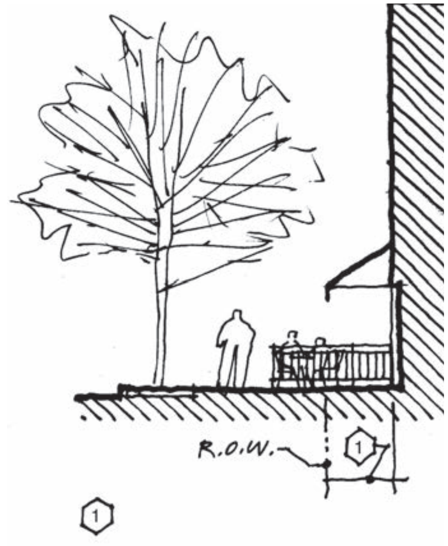
C2.g1 Internal courtyards, plazas, or open spaces should be designed to create useable open spaces, suitable for passive recreational activities such as informal play, reading, and sitting in the sun or shade.

C2.g2 All open spaces accessible to the general public should be open a minimum of 12 hours per day.

C2.g3 Private open space may be fenced with wrought iron, masonry or comparable decorative fencing or otherwise controlled for security.

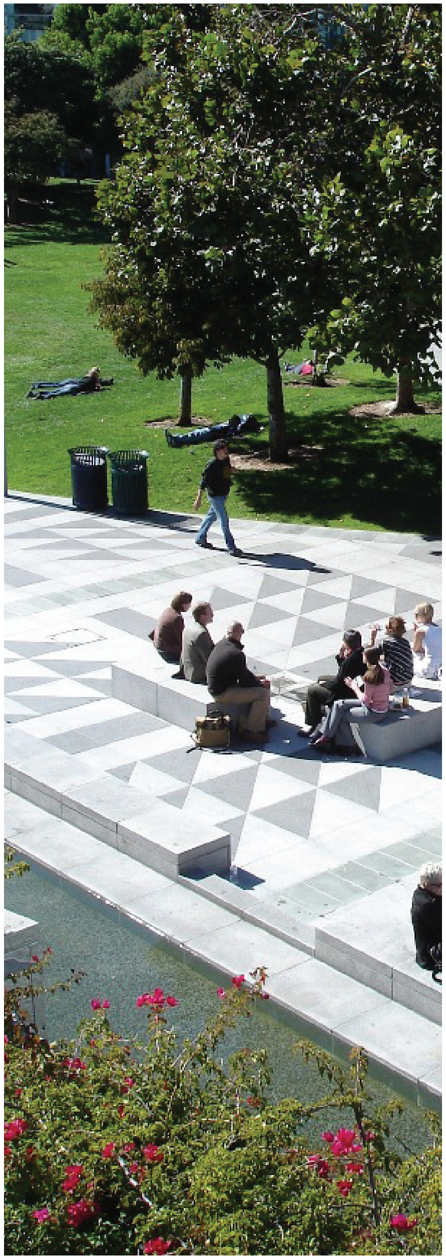
Standard

C2.s1 All public and private open space not used for recreation shall be attractively landscaped with plant material and hard surfaces.



Setback where outdoor seating occurs

Internal courtyards



Variety in sidewalk paving materials

C3 Hardscape Design

Guidelines

C3.g1 Hardscape design should provide a quality of paving materials and patterns consistent with the quality of the surrounding architecture and open spaces and provide safe paving conditions for all persons.

C3.g2 Hardscape design should create interest and variation within paved surfaces that includes but is not limited to public art, coloring, or materials.

C3.g3 Special paving should be carefully chosen for structural capability and durability in the local climate. Uncolored concrete, colored concrete, brick, hydraulically pressed concrete unit pavers or stone is recommended.

C3.g4 Special paving patterns and materials should be used to emphasize important building entries, provide interest and variation, and differentiate between sidewalks, plazas, medians, and crosswalks.

Standards

C3.s1 Sidewalks shall be separated or buffered from vehicle travel lanes by street/pedestrian lights, and/or street trees in grates or in a tree lawn.

C3.s2 In transition areas, sidewalks shall be separated from the street by trees in tree lawns.

C4 Landscape: Trees and Plant Materials

Guidelines

C4.g1 Landscaping should create a strong identity for each street and use quality plant materials that are located, sized, and provided in quantities sufficient to emphasize important streets.

C4.g2 Landscaping should use plant materials that tolerate an urban condition.

C4.g3 Trees should align parallel and perpendicularly across the street with each other whenever possible.

C4.g4 Ornamental trees should not be used in a street right-of-way.

C4.g5 Tree grates or planting cut-outs should be used in paved areas to prevent excessive soil compaction.

C4.g6 Large tree pits that allow for a broader canopy are preferred over typical street trees.

C4.g7 All tree lawns and street trees in cut-outs, tree pits, and grates should be irrigated with an automatic irrigation system. Drought tolerant turf or low, continuous ground covers should be used as the primary ground cover for continuous tree lawns.

C4.g8 To the maximum extent feasible, topsoil that is removed during construction activity should be conserved for later use on areas requiring re-vegetation and landscaping.

Tree lawns in right-of-way


Pedestrian lighting that provides an identity

Alignment of pedestrian lighting

Standards

C4.s1 No artificial trees, shrubs, turf, or plants shall be used to fulfill the minimum requirements for landscaping.

C4.s2 Tree lawns shall be a minimum of 6 feet in width, measured from the back of curb to the edge of the sidewalk.

C4.s3 Street trees shall be centered within the width of the tree lawn.

C4.s4 Street trees in tree grates shall be at least 2 feet 6 inches from the face of the curb. Tree grates shall be at least 24 sq. ft. with openings no more than 1/4 inch to 3/8 inch in width and should be designed to allow for tree trunk growth.

C5 Street and Pedestrian Lighting

Guidelines

C5.g1 Lighting should provide a safe and secure environment for motorists, bicyclists, and pedestrians.

C5.g2 Lighting should create an identity for the development and/or special streets.

C5.g3 Lighting should enhance the quality of streets in the commercial core through the design of the light poles, bases, fixtures, and attachments.

C5.g4 Street and/or pedestrian light poles should be aligned with and centered between street trees.

C5.g5 Where the light source is directly visible, the luminaries should be designed to incorporate elements to reduce glare, such as translucent, internal refracting surfaces to direct light down and away from adjoining private property; lower height poles; lower wattage or pole location.

Standards

none in this section

C6 Street Furniture

Guidelines

C6.g1 Seating should be durable, comfortable, attractive, securely anchored, and easy to maintain. Seating surfaces should be 16 to 18 inches high with a minimum depth of 16 inches for seats without backs and 14 inches for seats with backs.

C6.g2 Where bus stops occur within tree lawns, a minimum of one 6-foot long bench should be placed on a concrete pad. Where a bus stop occurs on a wide attached sidewalk, a 6 foot long bench should be provided within the sidewalk's amenity zone.

C6.g3 Trash receptacles should be conveniently located near benches and other activity nodes.

C6.g4 Trash receptacles should relate in appearance and color to other street furniture. They should be firmly attached to paving to avoid vandalism. Covered tops and sealed bottoms should be included to keep the contents dry and out of sight at all times.


Consolidated newsracks


Durable and comfortable seating

Wayfinding signs

C6.g5 Bicycle racks should be placed near entrances or gathering places, but out of pedestrian and bicycle traffic areas where they may create tripping or other safety hazards. If possible, locate racks where parked bicycles are visible from the inside of adjacent buildings.

C6.g6 Newspaper racks and trash receptacles should be located at areas where high pedestrian activity is anticipated.

C6.g7 Newspaper boxes should be clustered together and screened by specially designed railings. They should be located adjacent to pedestrian activity, but not so as to obstruct drivers' views at intersections, or car overhang/door swings at the curb.

Standards

none in this section

C7 Wayfinding Elements

Guidelines

C7.g1 Wayfinding should compliment and enrich the pedestrian experience and create interesting streets and spaces.

C7.g2 Wayfinding information should be conveyed clearly and efficiently with high quality sign and graphic design.

C7.g3 Information should be provided for events on-site as well as within the City.

C7.g4 To provide art, whimsy and contrast to the civic structure of the street furnishings, wayfinding elements should relate to local culture and flavor.

C7.g5 Information kiosks and wayfinding elements should be located near pedestrian origin points such as parking structure stairs and elevators, public plazas and near entrances to public buildings.

Standards

none in this section

C8 Gateway Elements and Public Art

Guidelines

C8.g1 Public art should engage the community, and express community identity.

C8.g3 Art should create experiences for the senses and opportunities for surprise, wonder, interest, contemplation, reflection, humor, interaction and play.

C8.g4 Art should provide shade structures at appropriate locations, particularly on the north side of the street.

C8.g5 Commissioned works should exhibit superior craftsmanship and design, and be fabricated of durable, low maintenance materials using proven technologies. A range of signature pieces should include integrated urban design elements, architectural detailing and interactive features.

C8.g6 Art should be sited to create areas of emphasis within the urban fabric while supporting the social function of each space.

Public Art

C8.g7 Selected artworks should include interactive elements allowing residents and visitors to walk through, play, sit on, and otherwise physically interact with the finished work.

C8.g8 Artwork, where appropriate, should be integrated into infrastructure and site furnishings (i.e. hardscape/landscape elements, building facades, tree grates, wayfinding devices, seating, etc.).

Standards

C8.s1 All plaza areas shall include public art.

C8.s2 Artwork shall be designed and sited to correlate with surrounding activity patterns.

D. Signage

D1 General Criteria

Guidelines

D1.g1 Signs should be located, sized, and designed for single or multiple uses so as to eliminate conflicts, predict the impact and effects of the signs on adjoining properties, avoid clutter and achieve the desired character of their application.

D1.g2 In an effort to limit the variety of sign types used on a single building along the corridor, the following combinations should be considered:

- One (1) wall sign per use; window signs limited to 10 percent of any window area; one (1) monument sign per use, but awning signs, pole signs, or projecting signs are discouraged in this combination.

- Window signs limited to 20 percent of the window area, awning signs, and one (1) projecting sign per use, but wall signs, pole signs, or monument signs are discouraged in this combination.
- One (1) wall sign per use, one (1) projecting sign per use if located or designed so as not to visually conflict, window signs limited to 10 percent of any window area, but awning signs, pole signs, or monument signs are discouraged in this combination.

Standards

D1.s1 Rehabilitated buildings shall provide a sign plan showing locations, sizes, heights, and probable design and illumination of all sign types to be used on the building or its site.

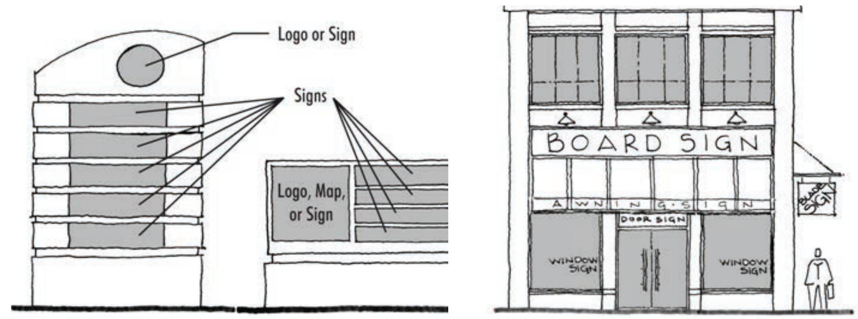
D2 General Number and Location of Signs

Guidelines

D2.g1 Signs should be limited in number commensurate with the needs of the uses in the building.

D2.g2 Signs should respect the architectural character and design of the building in their number and location.

D2.g3 Sign clutter, where the number and size of signs dominate the storefront or façade of the building, should be avoided.



Signage examples

Awning sign

Projecting sign

Wall sign

Window sign

Standards

D2.s1 Wall, window, awning, and projecting signs shall not be allowed above the ground floor with the exception of the following with the discretion of the design review committee:

- Painted, face-lit wall signs;
- Internally lit channel letter signs and/or logos;
- Painted wall murals with a minor component for the identification of a business;
- One unlit window sign per business;
- The extension of a ground floor projecting sign;
- The name of the building integrated into the material and/or design of the facade; In no case shall an internally lighted, cabinet type wall sign be allowed above the ground floor.

D2.s2 Signs shall not be located within the residential portion of the facade of any mixed use building.

D2.s3 A maximum combination of three sign types shall be used for any building frontage. Such sign types are: wall, projecting, ground, window, awning, marquee and arcade.

D3 General Size and Height

Guidelines

D3.g1 The size of signs should be related to the location and speed of movement of the typical person viewing the sign.

Standards

none in this section

D4. General Design and Illumination

Guidelines

D4.g1 Signs should respect the architectural character and design of the building.

D4.g2 Signs should be expressive of the activity, product, or use for which they are displayed.

D3.g3 Signs should be compatible with existing residential uses.

Standards

D4.s1 Materials for signs shall compliment the color, material and overall character of the architecture.

D4.s2 Signs shall be constructed of high quality, durable materials. All materials must be finished to withstand corrosion. All mechanical fasteners shall be of hot-dipped galvanized steel, stainless steel, aluminum, brass or bronze.

D4.s3 All conduits, transformers, and other equipment shall be concealed, and shall have UL ratings.

D4.s4 Exterior lighting of signs shall be oriented down onto the face of the sign, not up from below to minimize night sky light pollution.

D4.s5 Sign illumination shall not create objectionable glare to pedestrians, motorists, and adjoining residents.

D4.s6 A business's corporate logo or typical sign design may be allowed by the design review committee. However, the design review committee shall retain complete control over the design, dimensions, location, number and type of the sign.

D4.s7 Hand painted signs shall not be allowed, unless painted by a sign contractor specializing in hand painted or hand crafted signs.

Signs compliment color, material and character of architecture

Acceptable projecting wall sign

Wall sign with mounted letters

D4.s8 Sign illumination shall be integrated into the design of the sign. Signs may be externally lit so long as the external lighting has been conceived and controlled as part of the sign design.

D4.s9 Internally illuminated sign cabinets, either for wall or projecting signs, shall not have white or light colored back-lit translucent face panels.

D5 Wall Signs

Guidelines

D5.g1 Wall signs should be integrated with the architecture of the building.

D5.g2 In general, wall mounted sign cabinets should be discouraged.

Standards

D5.s1 Wall signs shall be located within any sign areas clearly designed for signs on existing or proposed building facades.

D5.s2 Lighted wall signs shall not be located at the top of a building's facade if the facade is higher than two stories and shall not directly face a residential neighborhood.

D5.s3 Maximum wall sign size shall not be increased by an increase in sign height.

D5.s4 No more than one wall sign shall be allowed per use.

D5.s5 Wall signs shall not overlap, or generally conflict with important architectural features such as windows, cornices, belt courses, or other details.

D5.s6 Wall signs located on the side wall of a building that faces a side property line, alley, or parking area (including a side property line along a street), shall not be lighted above the ground floor.

D5.s7 Wall signs shall be composed of individually mounted letters, logos or icons without sign backing panels, or letters/logos mounted on a backing panel.

D5.s8 Phone/Fax numbers on all signs, with the exception of window signs, shall not be allowed.

D5.s9 Neon signs, except those located in a window, shall not be allowed.

Appropriately scaled lighting and signage

D6 Projecting Signs

Guidelines

D6.g1 Projecting signs should not be closer than 50 feet apart, and no more than 3 for 300 feet of street frontage.

Standards

D6.s1 Each use by right shall be limited to one projecting sign for each of that use's street frontage.

D6.s2 Projecting signs shall not be located above the ground floor.

D6.s3 All projecting sign structures on a building shall be located at the same height as the other sign structures.

D6.s4 Projecting signs shall be located above or below non-signed awnings, but not in line with the awnings.

Desirable ground sign

Desirable window signs

D6.s5 Projecting signs shall not be greater in size than 12 square feet per face or 24 square feet per sign.

D6.s6 Projecting signs shall be externally lit. Internally lit sign cabinets are generally discouraged except where the sign face is composed of metal with back lit cut out letters or logos.

D7 Ground Signs

Guidelines

D7.g1 Ground signs should be refined, creative and unique.

D7.g2 ‘Designed’ pole or post signs are encouraged when the vertical supports are integrated into the design of the sign.

D7.g3 The design of a joint identification sign should be unified, uncluttered, easily readable, and of high quality. Ways to avoid a cluttered appearance are:

- The sign text for most components is composed of the same type face and size.
- The sign structure or frame is dominant enough or simple enough to visually organize varied components.
- The sign has a clear hierarchy or importance in its components.

D7.g4 The height of ground signs should incorporate the vertical alignment of the highway and not be excessively tall.

Standards

D7.s1 Only one (1) monument or per street frontage sign shall be allowed per building. The monument sign may also be a joint identification sign.

D7.s2 Ground signs shall have no more than one sign cabinet or backing panel.

D7.s3 If lighted, monument signs should be externally lit with a shielded or directed light source.

D8 Window Signs

Guidelines

D8.g1 Window signs should emphasize a window's transparency and sense of openness to the interior.

D8.g1 Window signs should avoid clutter 1) within the text and graphic components of the window signs, and 2) in combination with the objects of view through the window.

Standards

D8.s1 Window signs shall generally be located in the lower or upper 25 percent of the window area. Window signs may be located in the middle portion of the window, but should not substantially obscure the activities or displays beyond the window.

D8.s2 Window signs should not be larger than 10 percent of each window or door area, except that window signs may be as large as 20 percent of each window area if no wall sign is provided.

D8.s3 Storefront window signs shall be limited to either the tenant's name or logo. Operating hours may be applied onto the glass, but shall be kept small, preferably on the windows next to the front door.

D8.s4 Window signs on glazing shall be either vinyl, back-painted, metal-leafed, or sand-blasted onto the glass.

Desirable awning signs

D9 Awning Signs

Guidelines

D9.g1 Awning signs should be carefully controlled so as not to become substitutes for wall signs or projecting signs

Standards

D9.s1 Each awning may have a sign printed on its valence.

D9.s2 Awning signs shall not be allowed above the ground floor. Awnings without signs may be allowed above the ground floor if they are compatible with the architecture.

D9.s3 Awnings shall be consistent in color and visually balanced over the façade of the building.

D9.s4 Standard residential type aluminum awnings shall not be used. Awnings shall be composed of non-combustible acrylic fabric.

D9.s5 Back-lit translucent awnings with or without signs shall not be allowed. Shielded down lights within an awning that light only the paving under the awning may be acceptable.

D9.s6 Entry canopies shall not be allowed if they extend more than 4 feet from the building face.

D9.s7 Awning signs shall be located primarily on the awning valence that faces the street, not on a valence that is generally perpendicular to the street.

D9.s8 If side panels are provided, such panels should not carry signs greater in area than 20 percent of the area of the awning sign panel.

D9.s9 Text on awning valences shall not be greater than 8 inches high. A valence drop length shall be no greater than 12 inches.

D9.s10 Awnings shall not extend vertically beyond a building's or storefront's individual bays.

D9.s11 Awnings shall be composed of traditional forms, and compliment the window or bay within which it occurs. Straight, more steeply sloped awnings are preferred. Rounded 'barrel' awnings are discouraged. Rounded awnings designed to fit arched windows or bays are acceptable.

Glossary of Streetscape Terms

Glossary of Streetscape Terms

Awning signs Attached or printed on a canopy that protects people from the sun and the elements.

Bike Lane A portion of a roadway which has been designated by striping and pavement markings for the exclusive use of bicyclists.

Bollards A three to four foot tall post or column constructed of concrete, stone, or metal designed to separate pedestrian and vehicular traffic, define property lines, protect a work of public art, or otherwise for property protection, traffic control and pedestrian safety.

Crosswalk Portion of a roadway designated and marked for a pedestrian crossing, typically at intersections, but potentially at designated midblock locations

Curb cut A cut in the curb associated with a driveway to provide access for vehicles into a parking area, alley, or loading zone.

Curb zone The area from the inside of the curb to the sidewalk. This zone is where streetscape elements such as street trees, trash receptacles, bollards, news racks, benches, bike racks, and light fixtures should be located

Gateway A distinctive element which marks the entrance of a district.

Grade Separation The vertical separation of conflicting travelways with a structure, such as a pedestrian underpass or railroad bridge over a roadway.

Crosswalk


Kiosk


Refuge island in median

Ground signs Typically self supportive by a post or posts mounted into -the ground.

Intersection The area where streets intersect one another that facilitates both pedestrian and vehicular movement.

Kiosks A display element for timely information to help pedestrians find their way, direction them to destinations, or provide information on activities.

Median The portion of the roadway which separates opposing traffic streams, preferably designated with curb, gutter, and trees.

Pedestrian friendly Design qualities that make walking attractive, including places people want to go and good facilities on which to get there.

Pedestrian zone The area of the sidewalk that must be kept clear for pedestrian movement, and free of all obstacles.

Pedestrian lighting Lighting that illuminates the sidewalk at a level that is consistent with pedestrian activities rather than vehicular activity.

Projecting signs Typically attached to a building and cantilever horizontally over the sidewalk.

Public art Art located in the public realm such as in a plaza or as a part of the streetscape.

Public right-of-way The composite public area dedicated exclusively to circulation-both physical and social-including the roadway and pedestrian area.

Glossary of Streetscape Terms

Refuge Island A non traversable section of median or channelization device on which pedestrians can take refuge while crossing a street.

Sidewalks A walkway separated from the roadway with a curb, constructed of a durable, hard and smooth surface, designed for preferential or exclusive use by pedestrians.

Signage An informative public sign system that is incorporated into the corridor streetscape.

Street furniture Elements typically located in the public right of way for use by pedestrians such as benches, trash receptacles, and bike racks.

Street trees Trees located in a tree lawn or tree grate to provide an effective canopy over the sidewalk and portion of the street.

Streetscape The entire system of streets, sidewalks, landscaping, street furniture ,and open spaces, by which people circulate through and experience the corridor.

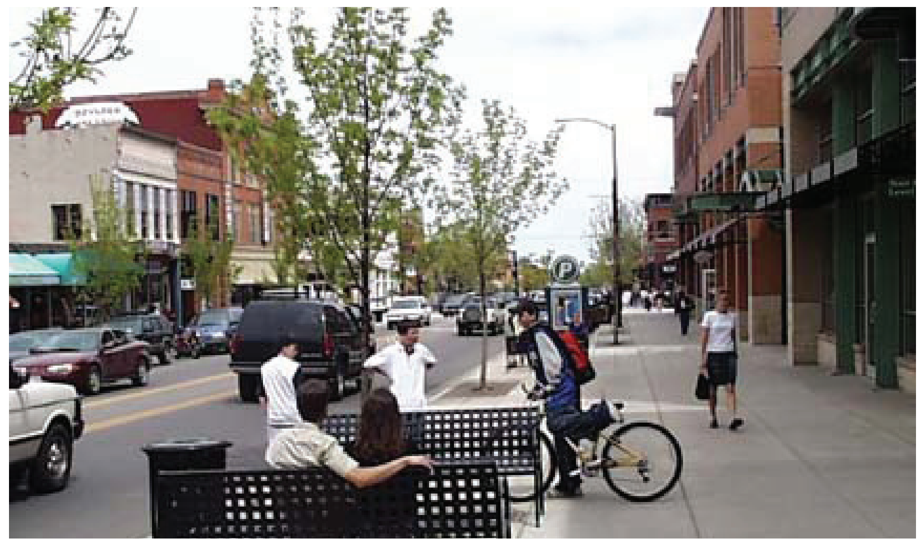
Travelway The section of the street in which vehicles and bicycles travel. It includes bicycle lanes, vehicle lanes, turning lanes, and medians.

Tree grate A metal covering for a tree pit in the sidewalk.

Tree lawns A landscaped strip between the back of curb and sidewalk in which street trees may be located.


Pedestrian light in the curb zone


Travelway


Street furniture

Wall signs Typically flat signs fixed to a building facade.

Window signs Typically silk screened, back-painted, metal-leafed, or sandblasted onto a glass window.

Wayfinding A system of directional public signs that helps lead pedestrians and vehicles to destinations.

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