Laredo Mobility Study

Feasibility Report

August 2018

Laredo, Texas
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Texas Department of Transportation - Rail Division
Prepared in cooperation with the
City of Laredo, Texas
Laredo Metropolitan Planning Organization
Kansas City Southern Railway
Union Pacific Railroad
Webb County
Federal Highway Administration

Executive Summary

The purpose of the Laredo Mobility Study is to identify potential grade separations, grade crossing closures, railroad relocations, or other transportation system improvements along railroad corridors in the City of Laredo. With input via several stakeholder meetings, the study assesses the technical, financial, and institutional feasibility of selected concepts. Overall, the assessment delivers a program of short, medium, and long-range projects to improve mobility in the community. Any future implementation will be the responsibility of the City of Laredo and other interested stakeholders.

Stakeholder engagement was conducted throughout the study process at six formal meetings with representatives from the City of Laredo, Texas Department of Transportation (TxDOT), Kansas City Southern Railway (KCS), Union Pacific Railroad (UP), City of Laredo, Laredo Metropolitan Planning Organization, Webb County, and Federal Highway Administration. One-on-one meetings were held with the City of Laredo, TxDOT Laredo District, KCS, and UP to review concepts that directly impact assets owned and operated by these stakeholders. TxDOT staff also received direct feedback through letters, email, and phone conversations that were reviewed to help inform decisions on concepts. Comments were also received from the Los Olvidados community group and other residents from La Ladrillera who expressed concerns regarding heavy truck traffic on the neighborhood streets and their opposition to closing highway-railroad grade crossings.

Existing Conditions

The majority of land uses currently surrounding the railroad corridors are industrial in nature, but the closely spaced street grid associated with an older, established community also includes residential and commercial development. Even with a closely spaced grid network of streets, continuity is limited and disjointed. This lack of continuity contributes to the concerns expressed by the Los Olvidados community group and other residents from La Ladrillera area. Railroad operations in the study area are influenced by border operations, the proximity of railroad yards, and the ability to stage trains entering Mexico. Train speeds, volumes, and industrial movements cause delay at highway-railroad grade crossings.

The need for improved mobility is demonstrated by the limited continuity in the roadway network and increasingly frequent railroad operations, resulting in delay for motorists at highway-railroad grade crossings. The mix of land use types and the intermingling of modes (i.e., trucks, passenger vehicles, railroads) to reach development demonstrate the need for access improvements.

Concept Evaluation

An initial set of improvement concepts were developed and grouped into packages. The packages allow for comparison between grade separations on the existing rail alignments to rail relocation concepts, along with comparison between different grade separation locations.

A benefit-cost analysis was also developed to compare the total costs (improvements and operation) with projected impacts to ascertain if society is "better-off" with the proposed infrastructure.

Implementation Recommendations

Using measures of technical, financial, and institutional feasibility, improvement concepts were selected from the package evaluations and refined to create a program of short, medium, and long-range projects to enhance mobility in the community as outlined in Table E-1. The time periods for these categories are 0 to 5 years, 6 years to 15 years, and 16 or more years.

Table E-1. Short, Medium and Long-Range Recommendations

	Short Term	Medium Term	Long Term
KCS Corridor	Southbound I-35 Ramp Modifications Various warning device upgrades and crossing consolidations A pedestrian overpass at Zaragoza Street	One-way couplet grade separation underpass	Rail relocation options
UP Corridor	Various warning device upgrades and crossing consolidations Pedestrian overpasses at Zaragoza Street, Chicago, Scott Street	RG Track railroad relocation along with an overpass of the Laredo Subdivision at Jefferson Street	Secure railroad corridor Rail relocation options

Source: TranSystems.

A series of other initiatives include:

- Transportation Network Planning: A comprehensive transportation network plan is recommended in the study area to improve overall mobility and access while considering the most efficient truck routes for through movements as well as access to industrial properties, particularly in the Ladrillera neighborhood.
- New Technologies: On-going technology enhancements to warning devices, positive train control, intelligent transportation systems, and traffic signals can benefit users of highway-railroad grade crossings. Providing new technologies, as appropriate, should be considered on an on-going basis for the crossings in Laredo.

- Border Crossing Policies: The KCS and UP work with United States and Mexican authorities to actively improve operations through policy changes. This on-going collaboration will benefit users of highway-railroad grade crossings.
- Railroad Relocation: As vehicular and train traffic increase over time, mobility and access issues will remain in Downtown Laredo. Long-range consideration of railroad relocation options outside of the study area should remain under consideration by the City of Laredo, TxDOT, and the KCS.

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Introduction

The purpose of the Laredo Mobility Study is to identify potential grade separations, grade crossing closures, railroad relocations, or other transportation system improvements along railroad corridors in the City of Laredo. With input via several stakeholder meetings, the study assessed the technical, financial, and institutional feasibility of selected concepts. Overall, the assessment delivered a program of short, medium, and long-range projects to improve mobility in the community.

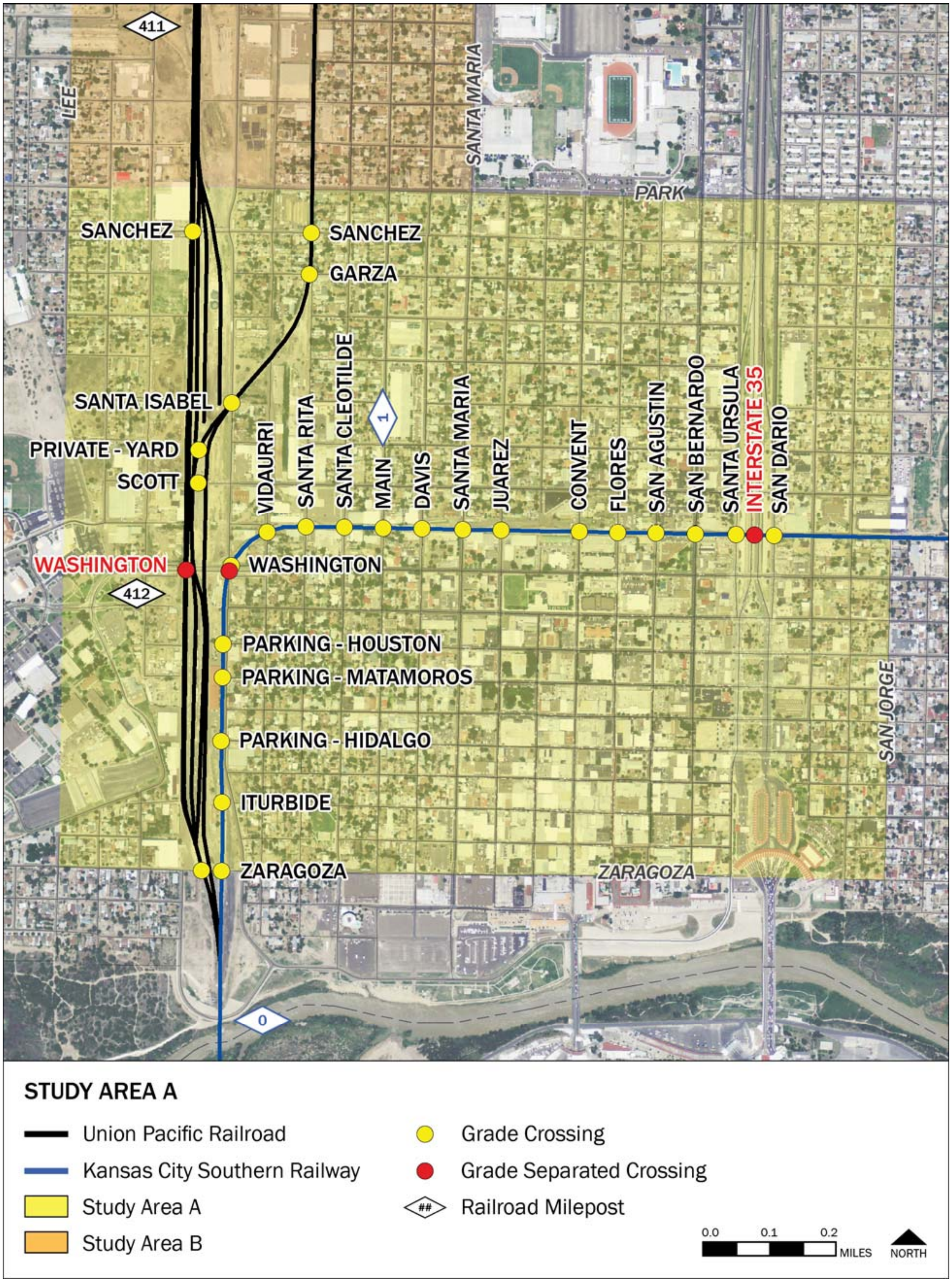
Study Area

The assessment includes two study areas. Study Area A consists of the Kansas City Southern Railway (KCS) and Union Pacific Railroad (UP) corridors generally bounded by Park Street, San Dario Avenue, Zaragoza Street, and San Ignatius Avenue. Study Area A includes 25 public highway-railroad at-grade crossings and one private at-grade crossing. The existing grade separated highway-railroad crossings in Study Area A are Interstate 35 and Washington Street. Study Area B consists of the UP corridor generally bounded by Industrial Boulevard, Santa Maria Avenue, Park Street, and Riverside Drive/Lee Avenue. Study Area B includes 31 public highway-railroad at-grade crossings and two private at-grade crossings. The existing grade separated highway-railroad crossing in Study Area B is Lafayette Street and another grade separated highway-railroad crossing is programmed for construction in 2019 at Calton Road (CSJ 0922-33-093). The two study areas are displayed in Figure 1.

Study Process

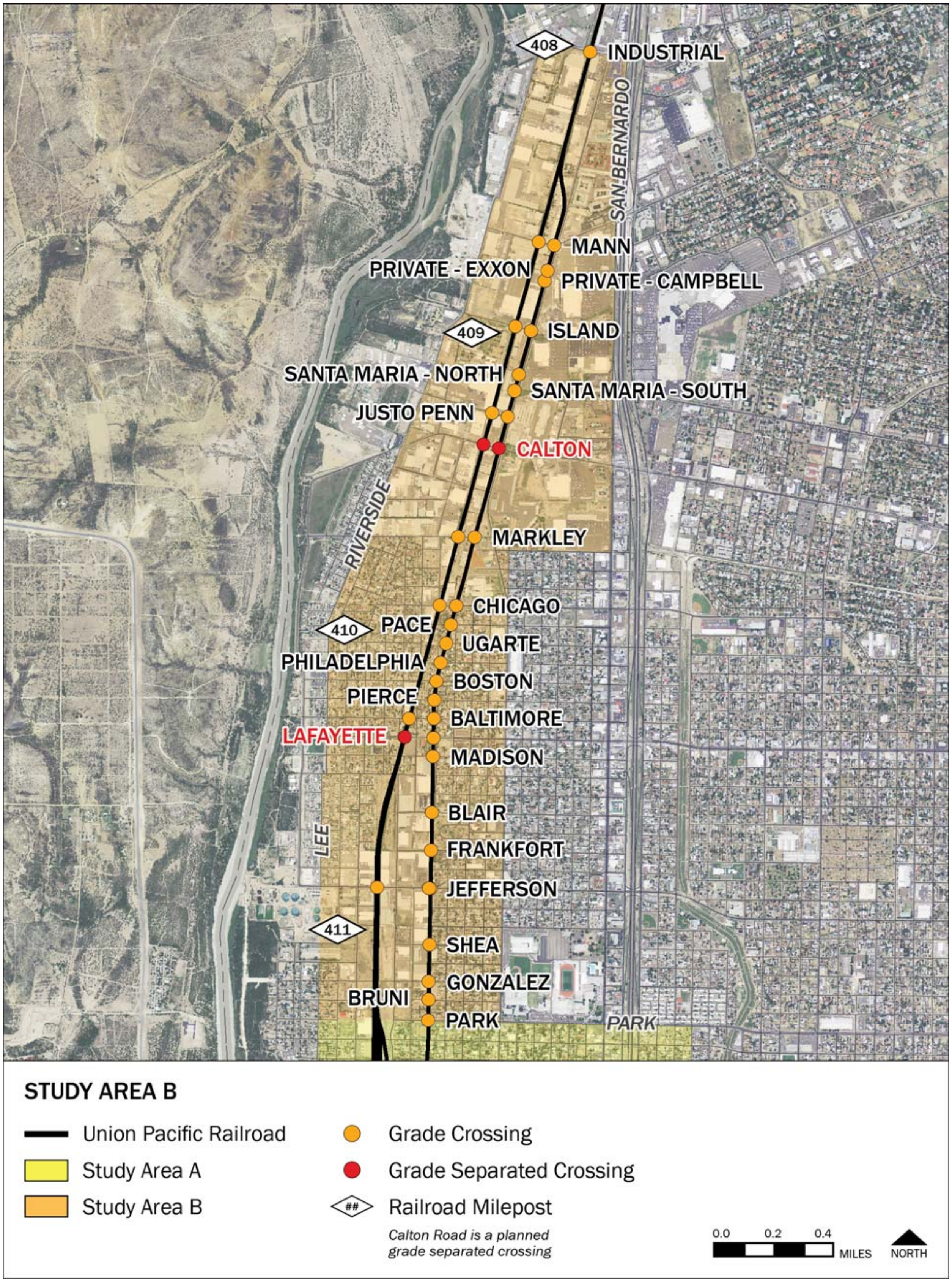
The study process illustrated in Figure 2 outlines the steps completed to develop a program of projects. The process started with a review of existing conditions. Through an assessment of physical and operational data, along with stakeholder feedback throughout the study, improvement concepts in three categories were identified. The grade separation, railroad relocation, and crossing enhancement concepts were screened for technical feasibility to develop improvement packages. Various improvement packages were evaluated for financial feasibility through a benefit-cost analysis. Finally, an improvement recommendation for advancement with continued institutional review is presented.

Figure 1A: Study Area A



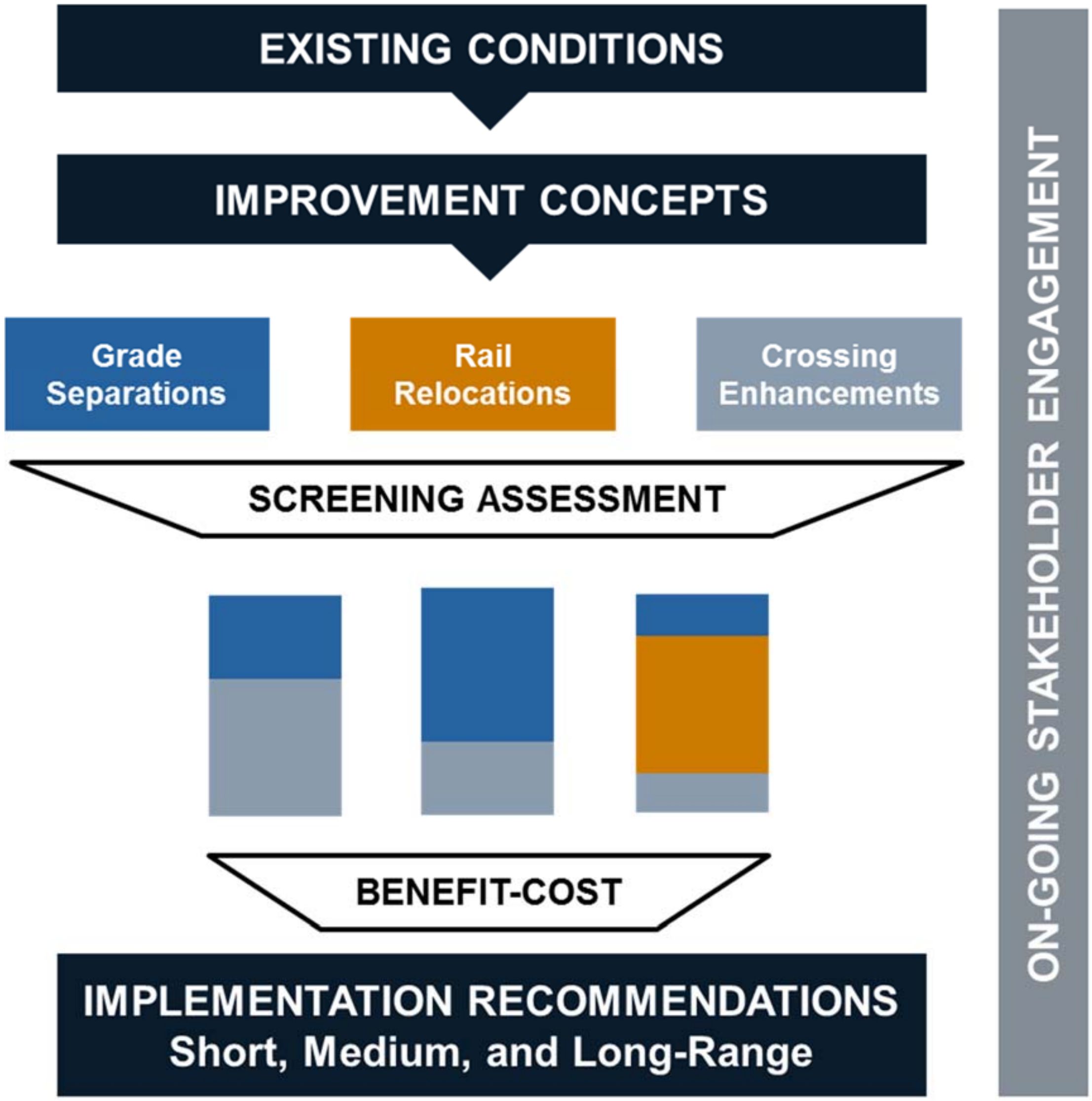
Source: TranSystems and Federal Railroad Association (2016).

Figure 1B: Study Area B



Source: TranSystems and Federal Railroad Association (2016).

Figure 2: Study Process Flow Chart



Source: TranSystems.

Stakeholder Engagement

Stakeholder engagement was conducted throughout the study process through formal meetings and targeted feedback. Stakeholders included representatives from the City of Laredo, Texas Department of Transportation (TxDOT), KCS, UP, City of Laredo, Laredo Metropolitan Planning Organization (MPO), Webb County, and Federal Highway Administration (FHWA).

Formal meetings were held at key points during the study process to gather input, as shown in Table 1. At the meetings stakeholders were asked to provide feedback on existing conditions, improvement concepts, screening assessment, and implementation.

Table 1: Stakeholder Meeting Dates and Topics

Meeting Date	Topic
January 20, 2017	Kick off Meeting
February 24, 2017	Existing Conditions
May 15, 2017	Concept Options
September 18, 2017	Concept Screening
November 28, 2017	Implementation
May 15, 2018	Scott Street Review

Source: TranSystems.

Targeted feedback was gathered through one-on-one meetings and through direct communication with TxDOT staff. One-on-one meetings were held with the City of Laredo, TxDOT Laredo District, KCS, and UP to review concepts that directly impact assets owned and operated by these stakeholders. TxDOT staff also received direct feedback through letters, email, and phone conversations that were reviewed to help inform decisions on concepts. Comments were also received from the Los Olvidados community group and other residents from La Ladrillera who expressed concerns regarding heavy truck traffic on the neighborhood streets and their opposition to closing local road crossings, particularly Scott Street.

Previous Plans and Studies Overview

Numerous transportation plans and studies conducted in Laredo relate to mobility with freight railroad and highway-railroad grade crossings. Major study recommendations and outcomes are outlined in Table 2. Within Study Area A, common improvement concepts (based upon two or more study recommendations) include grade separations at the following roadways: San Dario, Santa Ursula, San Bernardo, Santa Maria, Scott, and Sanchez. Highway-railroad at-grade crossing closures were recommended at the following roadways: San Agustin, Juarez, Vidaurri, and Zaragoza. Within Study Area B, common improvement concepts (based upon two or more study recommendations) include grade separations at the following roadways: Jefferson, Chicago, and Calton (planned for construction in 2019).

Table 2: Major Study Outcomes

Year	Study Outcome
2005	Short-term grade separation projects are identified at Calton and Jefferson. Long-term projects are identified at San Dario, Santa Ursula, and San Bernardo. Other projects should resources become available include Chicago, Sanchez, and Scott. *(Laredo Metropolitan Transportation Plan)*
2005	Federal legislation allocated $10 million for a high-priority grade separation project at Calton Road. *(SAFETEA-LU)*
2006	Highlights emergency access issues in Laredo and includes long-term solutions for 16 grade separated crossings with short-term technology solutions for alternative routes. (*Impact of Blocked Highway-Rail Grade Crossings on Emergency Services)*
2006	Evaluation of two existing railroad corridors and three alternative corridors determined that the two existing corridors were the preferred solutions. (*Railroad Relocation Feasibility Study*)
2006	Evaluation of six Quiet Zone scenarios that included improvements ranging from roadway closures to crossing gate improvements. Twenty crossings were recommended for closure. (*Railroad Quiet Zone Study)*
2007	East Loop Bypass is identified as the best location for a new railroad border crossing to relieve downtown congestion. *(Feasibility Study for Proposed International Rail Bridge)*
2011	Two grade separation projects, Jefferson and Calton, and six crossing closures are identified within the study area. *(Lower Rio Grande Valley and Laredo Region Freight Study)*
2011	Three major roadways are identified as the most appropriate to convert to a grade separated crossing: San Bernardo, Convent, and Santa Maria. *(Laredo Downtown Master Plan)*
2012	Train crossing information and regional railroad priorities that focus on an East Loop Rail Bypass project. (*Laredo Border Master Plan)*
2014	Recommendation for a program to construct grade separated railroad crossings, but stakeholders note it has been difficult to justify investment given discussion of the potential for railroad relocation. *(Laredo Metropolitan Transportation Plan 2015-2040)*
2015	Preferred Quiet Zone scenario includes the closure of seven crossings and other improvements at nine crossings. *(Kansas City Southern Railroad Quiet Zone Study)*

Year	Study Outcome
2016	The City's Capital Improvement Plan allocates funds for the study and design of a grade separation project between Scott and Sanchez. *(Proposed 2017-2021 Capital Improvement Plan)*
2016	Assessment of impacts that delays at border crossings, most commonly because of inspections and crew changes, have on port-of-entry communities. Reports approximately 16 to 19 minutes per train in Laredo. (U.S. Border Communities: Efforts Could Help Address Impacts of Freight, GAO)
2016	The MPO's Transportation Improvement Plan programs funding for construction of a grade separation at Calton Road. *(Transportation Improvement Plan 2017-2020)*

Source: TranSystems.

Existing Conditions

Existing data related to the physical and operational conditions in the study area identifies needs. Data related to land use, railroad and roadway network, railroad and roadway operations, and crashes defines needs related to mobility and accessibility in the study area.

Physical Conditions

The review of physical conditions focuses upon the railroad and highway transportation network, particularly at highway-railroad grade crossings. The physical conditions overview includes:

- Land Use
- Railroads
- Roadways

Land Use

The City of Laredo zoning map was used to generalize land use information in Study Area A and B. In general, land uses immediately adjacent to the railroad corridors are industrial with light manufacturing uses, highway commercial, and central business district uses, and residential areas. Generalized land use information is displayed in Figure 3.

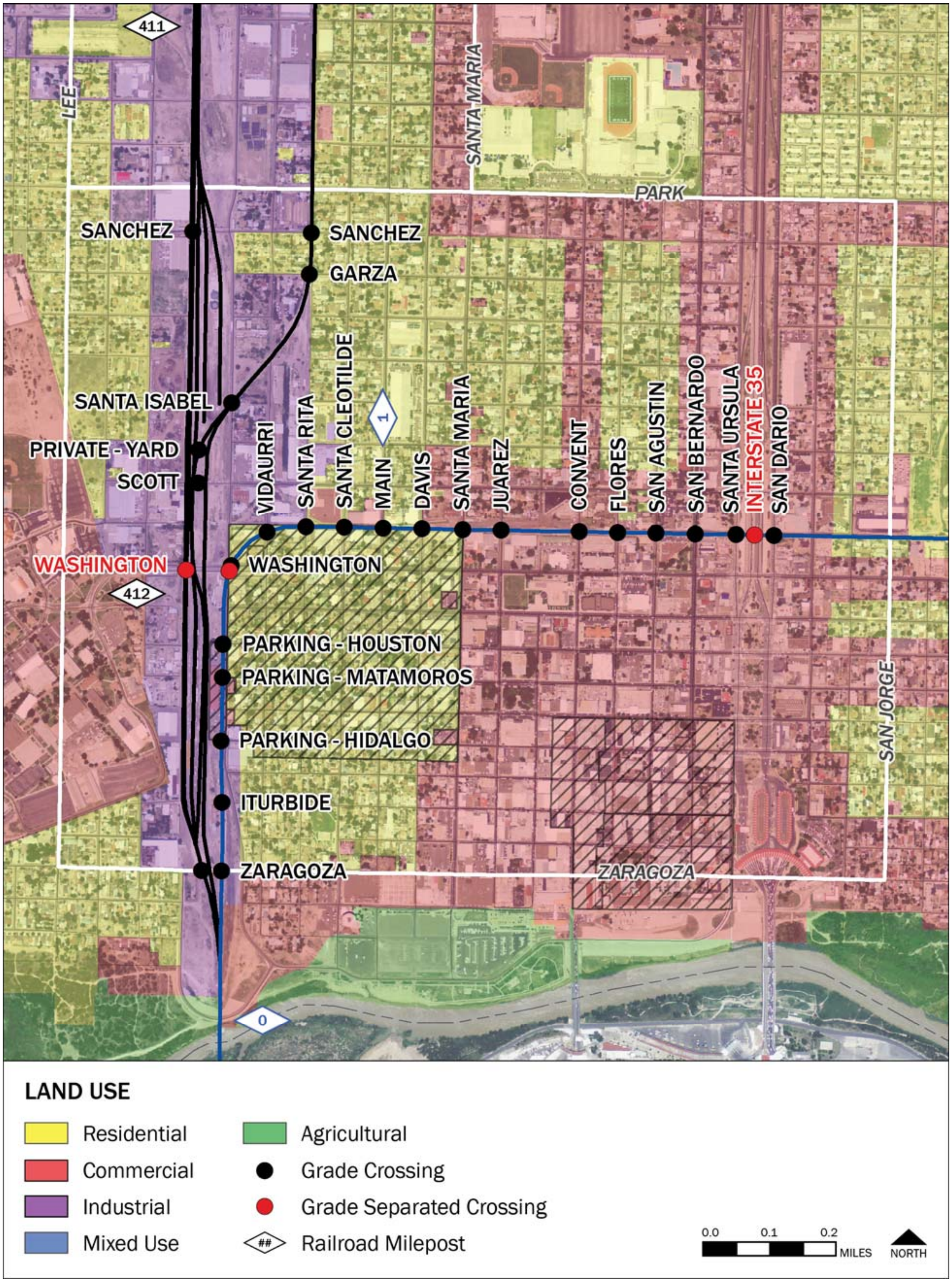
Study Area A includes downtown Laredo and several historic districts. Land uses in the downtown area include a mixture of industrial, commercial, institutional, residential, and recreational uses. The Union Pacific corridor within Study Area B varies from predominantly industrial land uses from Park Street to Burnside Street, to predominantly residential land uses from Burnside Street to Markley Lane, to a mix of industrial and commercial land uses from Markley Lane to Industrial Boulevard.

Railroads

UP and KCS are Class I railroads that operate in Texas. Railroad Class is determined by the U.S. Surface Transportation Board based on annual revenue dollars. In 2012 dollars, a railroad with operating revenues greater than $433.2 million for at least three consecutive years is considered a Class I railroad.

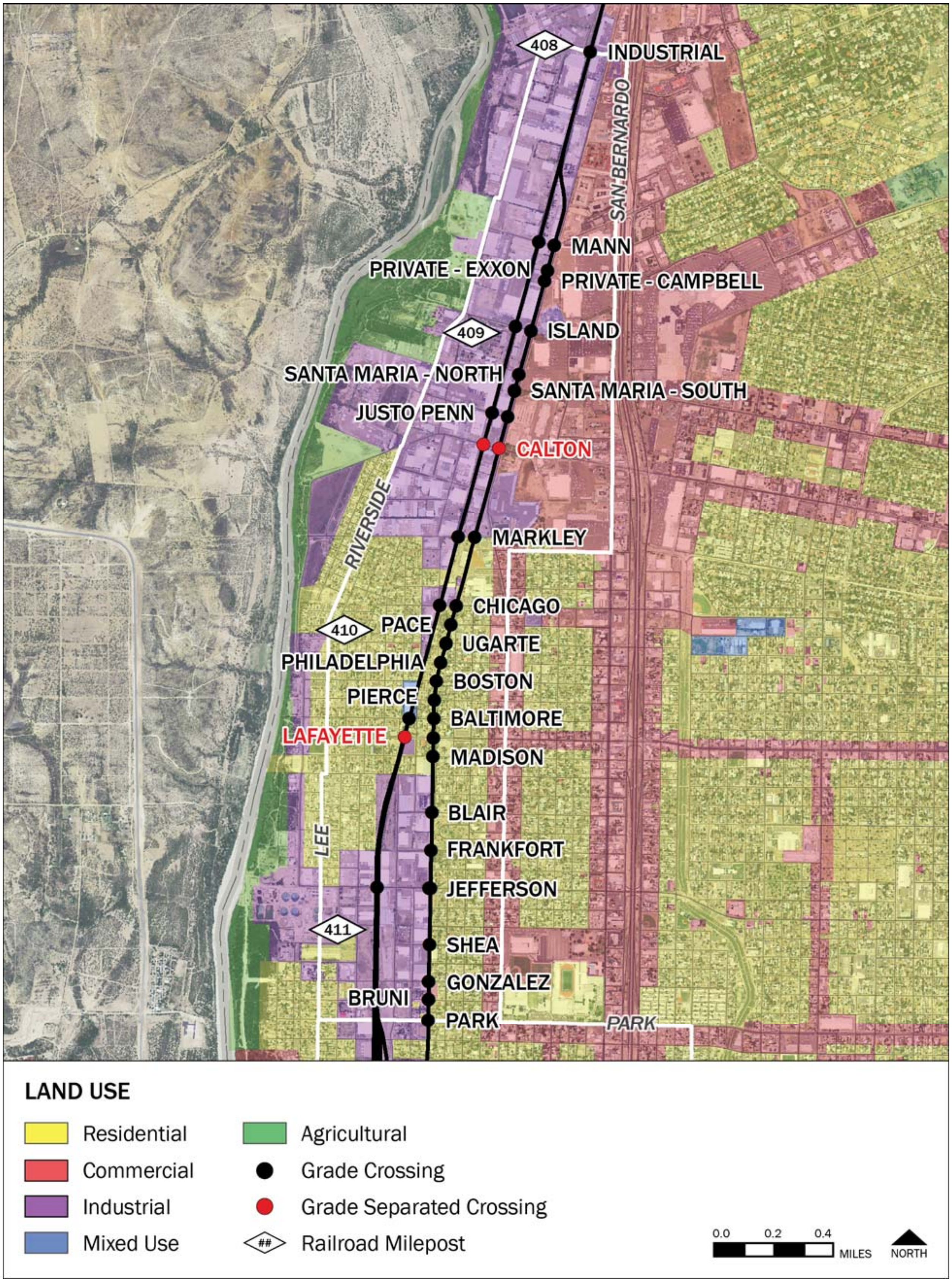
Five of the seven United States-Mexico railroad border crossings are located in Texas: Brownsville, Laredo, Eagle Pass, Presidio (inactive), and El Paso. Laredo is the leading port-of-entry for rail freight between the United States (U.S.) and Mexico in terms of total trains and loaded railroad containers. A description of the UP and KCS railroad system within Laredo is included below and displayed in Figure 4.

Figure 3A: Land Use - Study Area A



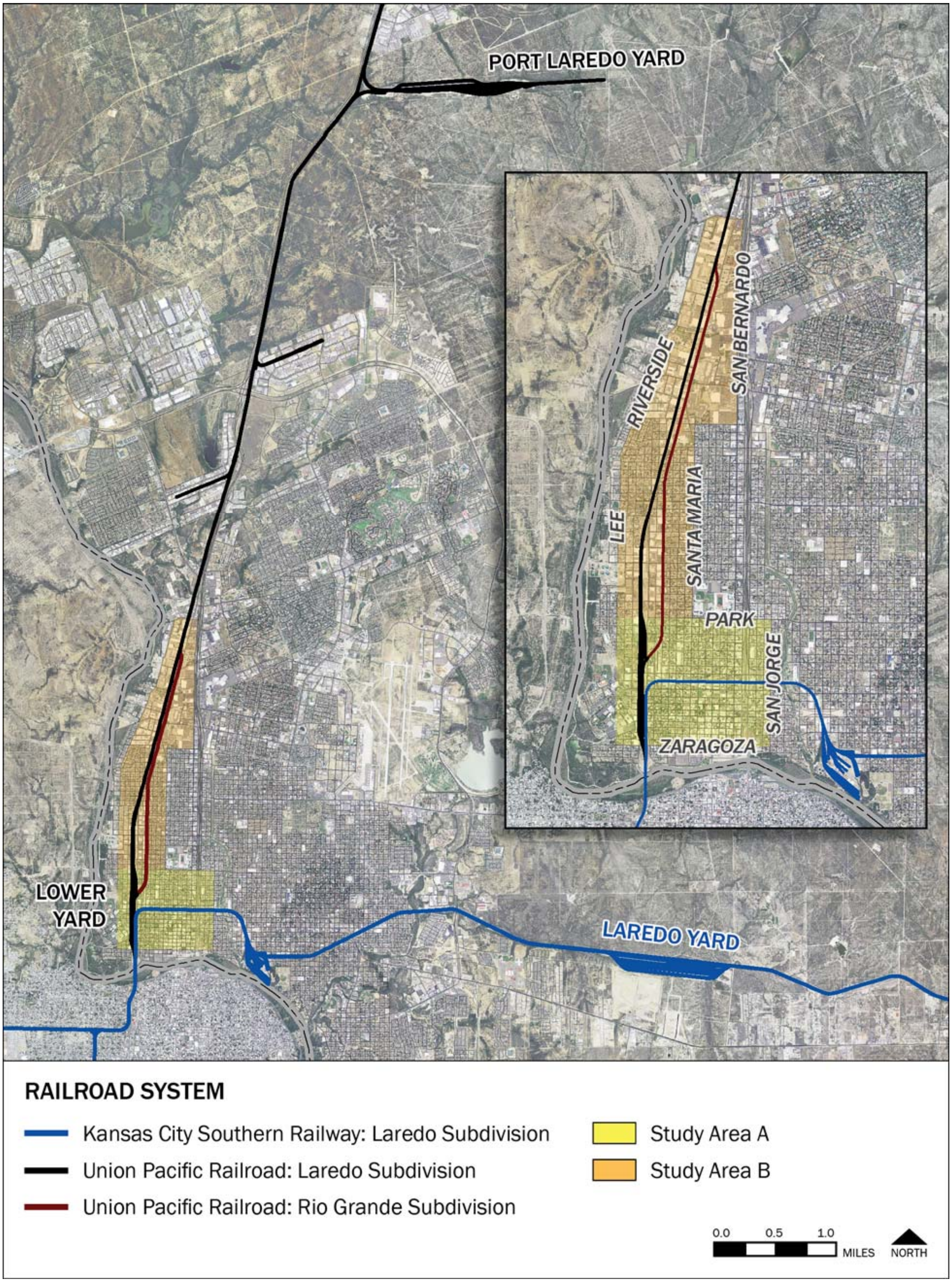
Source: City of Laredo (2016).

Figure 3B: Land Use - Study Area B



Source: City of Laredo (2016).

Figure 4: Railroad System



Source: Federal Railroad Association (2016).

Within the UP network, the major east-west corridors connect California with the Gulf Coast. The north-south NAFTA corridor connects Mexico to the northeast U.S. and Canada markets. Dallas, Fort Worth, Austin, and San Antonio are each on the high-volume railroad corridor connecting Laredo with the Upper Midwest region. The UP Laredo Subdivision includes railroad service from near the Laredo International Railway Bridge in Laredo (MP 412.51) to San Antonio (MP 260.71), connecting to other parts of UP's system. The UP Port of Laredo Yard (MP 400.25) is located in Webb County north of Loop 20.

The northern limits of Study Area B begin at Industrial Boulevard (MP 408.11). UP operates two parallel railroad lines approximately between Mann Road (MP 408.38) and Scott Street (MP 411.90), a distance of approximately 3.3 miles. The mainline track along the western edge of the railroad corridor is the Laredo Subdivision. Typically, southbound trains operate on the Laredo Subdivision. The Rio Grande Runaround Track (RG Track) is located along the eastern edge of the railroad corridor. Typically, northbound trains operate on the RG Track. Along both lines are several railroad spur tracks providing service to industries. The Lower Yard located between Washington Street and Zaragoza Street has between five tracks to fifteen tracks.

The KCS network includes over 900 miles of track in Texas (including the Texas Mexican Railway which was acquired in 2004) and has connections to Laredo, Corpus Christi, Houston, Dallas/Fort Worth, and Beaumont. The KCS owns and operates the Laredo International Railway Bridge. KCS provides connections between the Port of Entry at Laredo to Corpus Christi as well as connecting Victoria to the Houston/Galveston area. The KCS Laredo Subdivision includes railroad service from the U.S.-Mexico border on the Rio Grande River (MP 0.0) to Corpus Christi (MP 157.0). Track charts indicate a former yard with as many as six tracks was located between Pedregal Street and Lincoln Street. Another former yard with as many as four tracks was also located north of Moctezuma Street between Main Street and Flores Avenue. There are numerous industrial leads and industry service connections between downtown and the Kansas City Southern Laredo Yard located east of downtown Laredo (MP 7.0).

Roadways

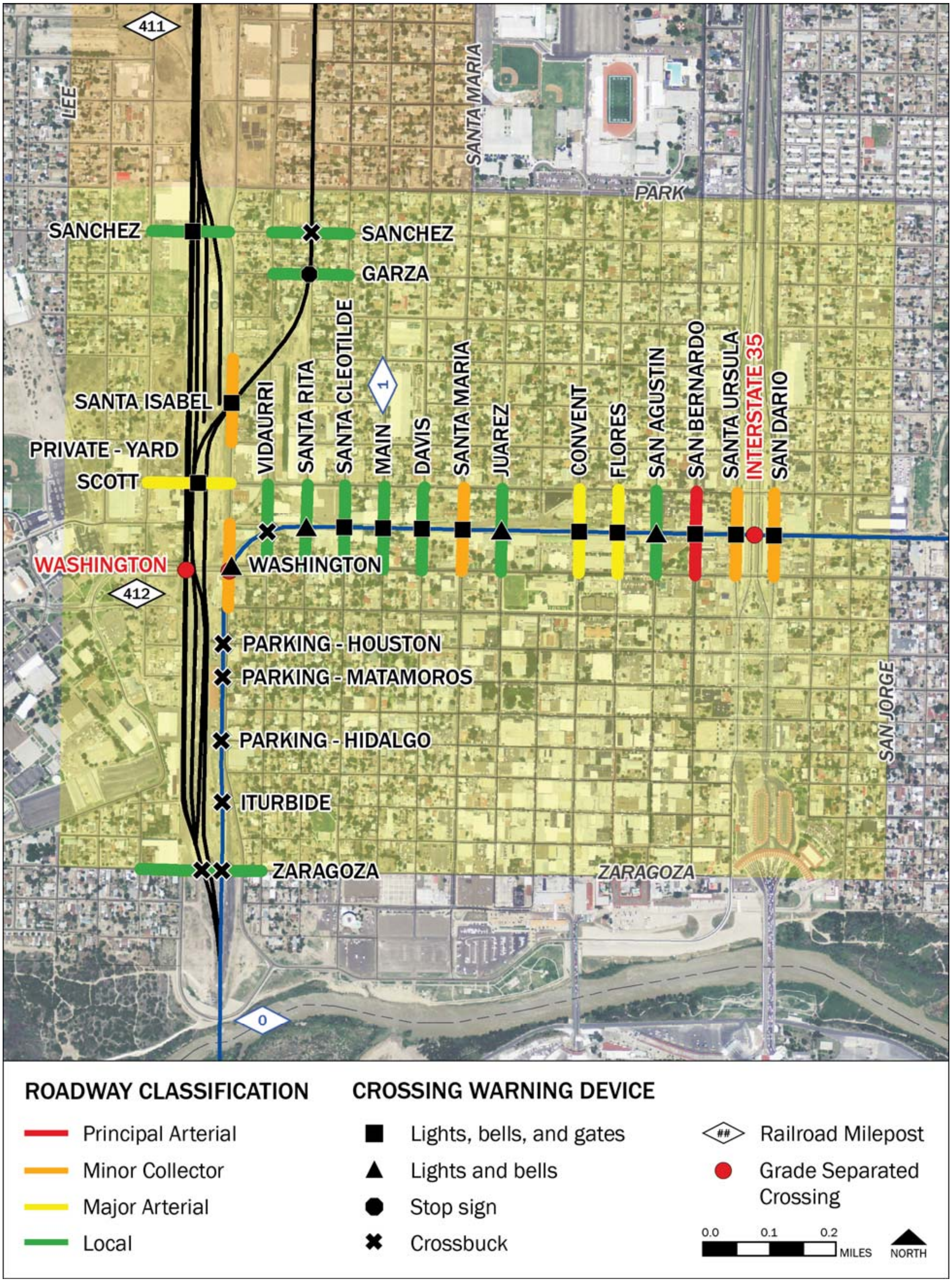
The roadway network in the study area consists of local, collector, arterial, and highway routes. The functional classification is based upon the TxDOT *Statewide Planning Map*. The DOT Crossing Inventory provides information on the highway-railroad grade crossings including warning device, as displayed in Figure 5.

Several roadways that cross the railroad corridors are designated by the City of Laredo as truck routes. The truck routes include Calton Road, Santa Isabel Avenue, Jefferson Street (westbound only), and Scott Street (westbound only). The north-south route of Santa Isabel Avenue has a northern terminus at Lafayette Street and a southern terminus at Markley

Lane. The connecting routes in this area are identified as Jefferson Street, Anna Road, and Calton Road. The truck routes are displayed in Figure 6.

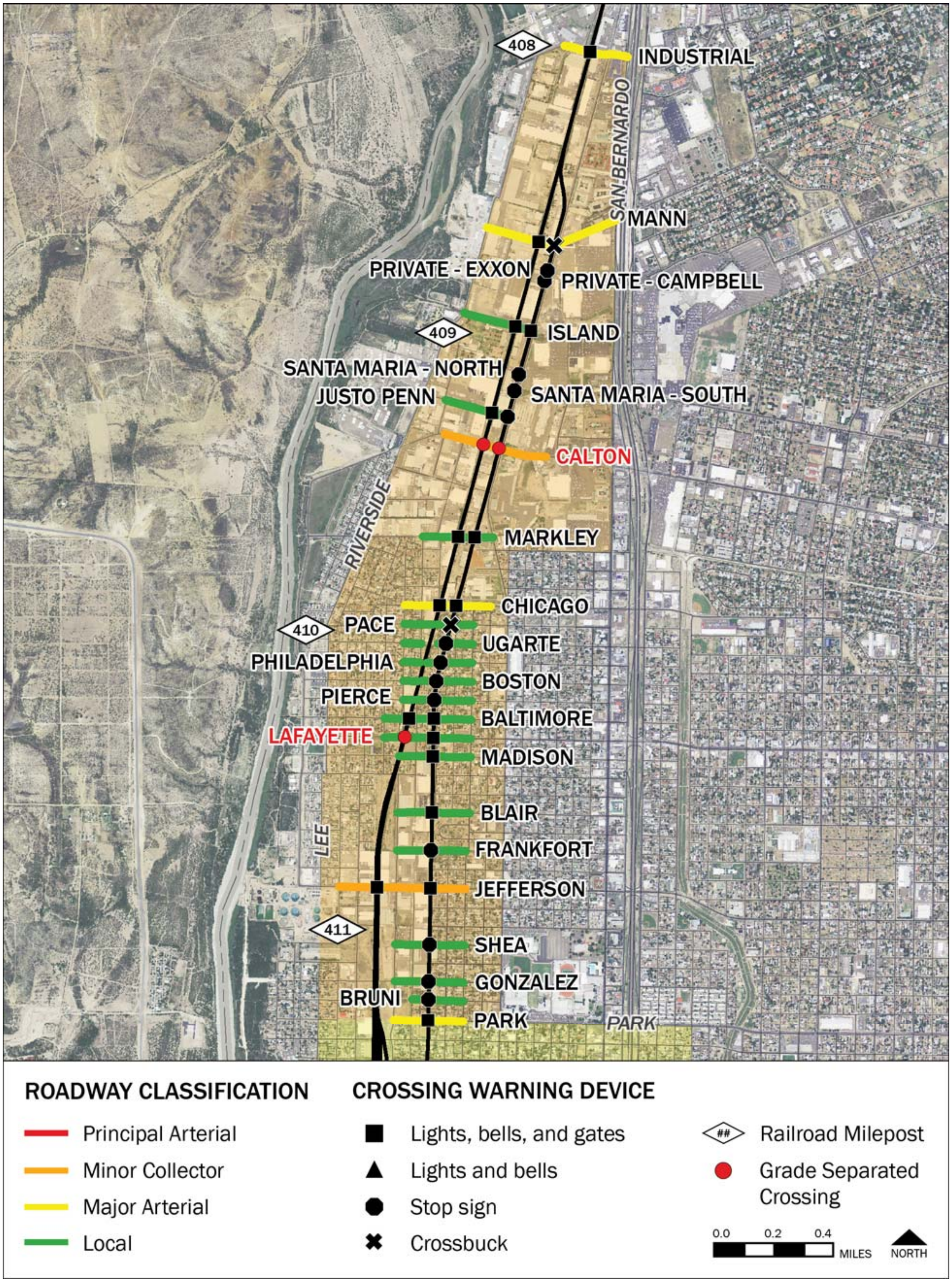
TxDOT operates an Intelligent Information System, referred to as STRATIS (South Texas Regional Advanced Transportation Information System), within the Laredo area. Cameras and in pavement detectors in the system monitor Interstate 35, Loop 20, U.S. Route 83, and FM 1472. Information on travel delays and crashes is displayed on Dynamic Message Signs (DMS). The closest DMS location to the study area is located on southbound Interstate 35 near Jefferson Street and a camera near Garza Street in the southbound direction. Additional traveler information is provided by the U.S. Customs and Border Protection (CBP) as well as by the City of Laredo with cameras on the International Bridges.

Figure 5A: Roadway Functional Classification (FRA) and Warning Device - Study Area A



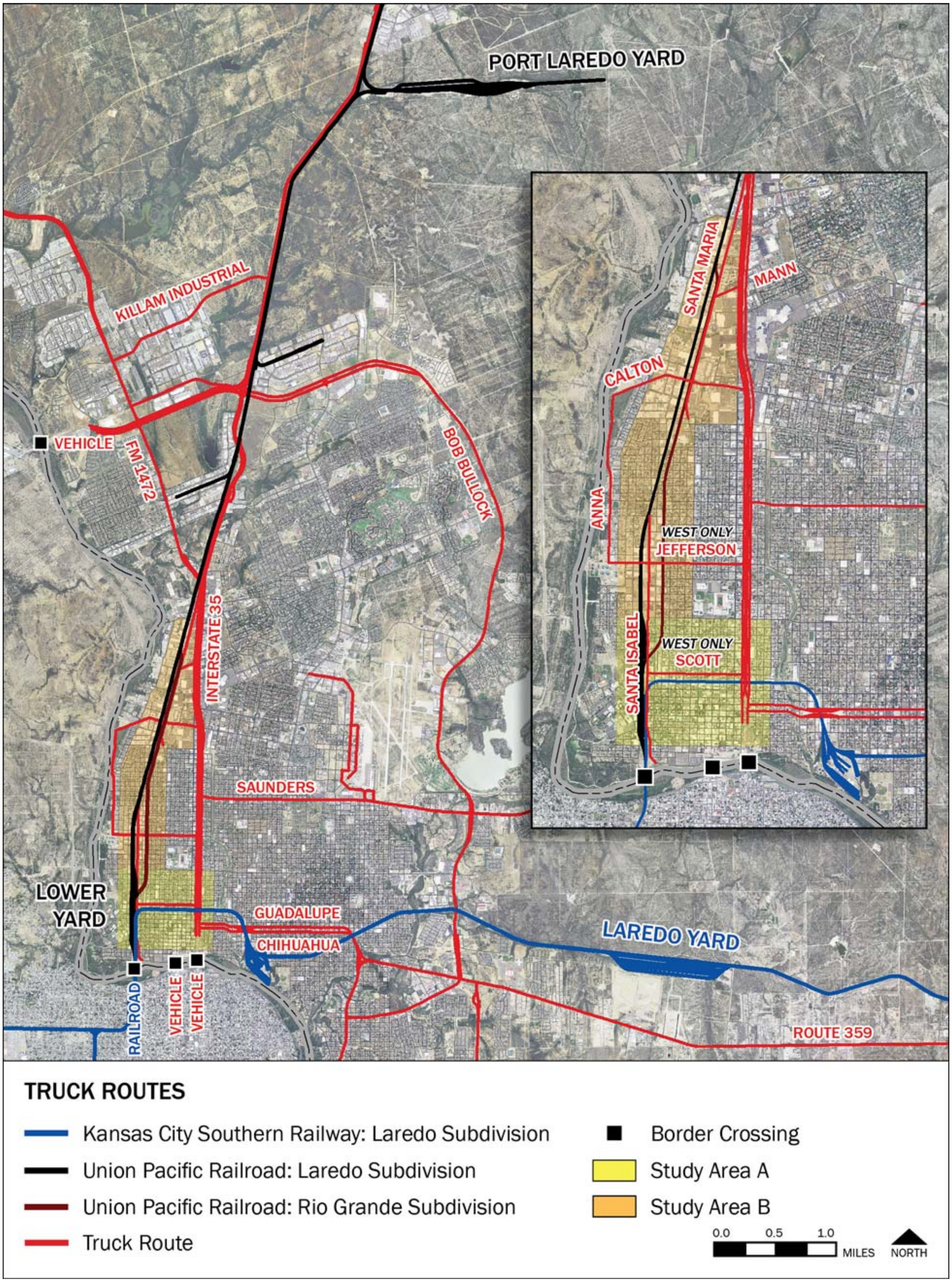
Source: Federal Railroad Association (2016).

Figure 5B: Roadway Functional Classification (FRA) and Warning Device - Study Area B



Source: Federal Railroad Administration (2016).

Figure 6: Truck Routes



Source: City of Laredo (2012).

Operational Conditions

Operational conditions of railroad and roadway traffic volumes and patterns, particularly at highway-railroad grade crossings were reviewed. Crash data was reviewed at highway-railroad grade crossings. The operational conditions overview includes:

- Railroads
- Roadways
- Crash Experience

Railroads

Train volumes are listed in the U.S. DOT Crossing Inventory by day through trains, night through trains, and switching trains. Along the UP, the information indicates a consistent ten (10) through trains during the day and ten (10) through trains during the night on both the Laredo Subdivision and RG Track. The information also indicates ten (10) through trains during the day and ten (10) through trains during the night on the Laredo Subdivision north of where the RG Track joins the Laredo Subdivision. Switching movements vary from 12 movements at Baltimore Street to 20 movements at Jefferson Street to 50 movements at Sanchez, Scott, and Zaragoza Streets near the Lower Yard.

Along the KCS, the U.S. DOT data lists a consistent eight (8) through trains during the day and eight (8) through trains during the night on the Laredo Subdivision. No switching movements are provided. The KCS reported five (5) westbound trains and five (5) eastbound trains evenly spread throughout the day as of February 2017. Through train lengths varied between 5,000 to 7,000 feet or approximately 75 to 110 cars. Typical speeds were reported at 20 mph with the exception of trains operating over the international bridge. Those trains operate at 4 mph due to inspection equipment restrictions. KCS noted during stakeholder activities that railroad traffic has increased by 18 percent in March 2017 compared to March 2016.

Border operations include inspection procedures that require specific operating protocols. The KCS reported that, on average, international train maneuvers take between 16 and 24 minutes per train. The practical capacity of the bridge is 26 trains/day based on CBP protocols and train crew restrictions. Considering these operating conditions, the highway-railroad grade crossings in the study area could be occupied by trains for more than 25 percent of the day.

Non-stop movement between railroad yards reduces risk, and both CBP and Mexico Servicio de Administración Tributaria (SAT) would prefer more containers to move via railroad than truck. Therefore, the KCS developed a Secure Corridor Vision to eliminate the need for trains to stop at the border. Their vision includes three governing principles: (1) provide security to both the U.S. and Mexico, (2) increase railroad traffic throughput and efficiency, and (3) facilitate trade between the U.S. and Mexico.

Implementation of the Secure Corridors Vision will occur in three phases. Phase I includes the implementation of international crews. Phase II prepares U.S. and Mexico Customs Secondary Examination facilities to reduce the need to physically inspect trains. Phase III supports collaboration between CBP and Mexico SAT to conduct unified cargo examinations. Pilot programs began testing in July 2017 for process improvements that would not require stopping at the border. Other operational characteristics such as crew change locations and identifying operating windows when the trains move to reduce the impact to peak vehicular traffic may improve fluidity. (KCS Secure Corridor Vision presentation, January 20, 2017)

Roadways

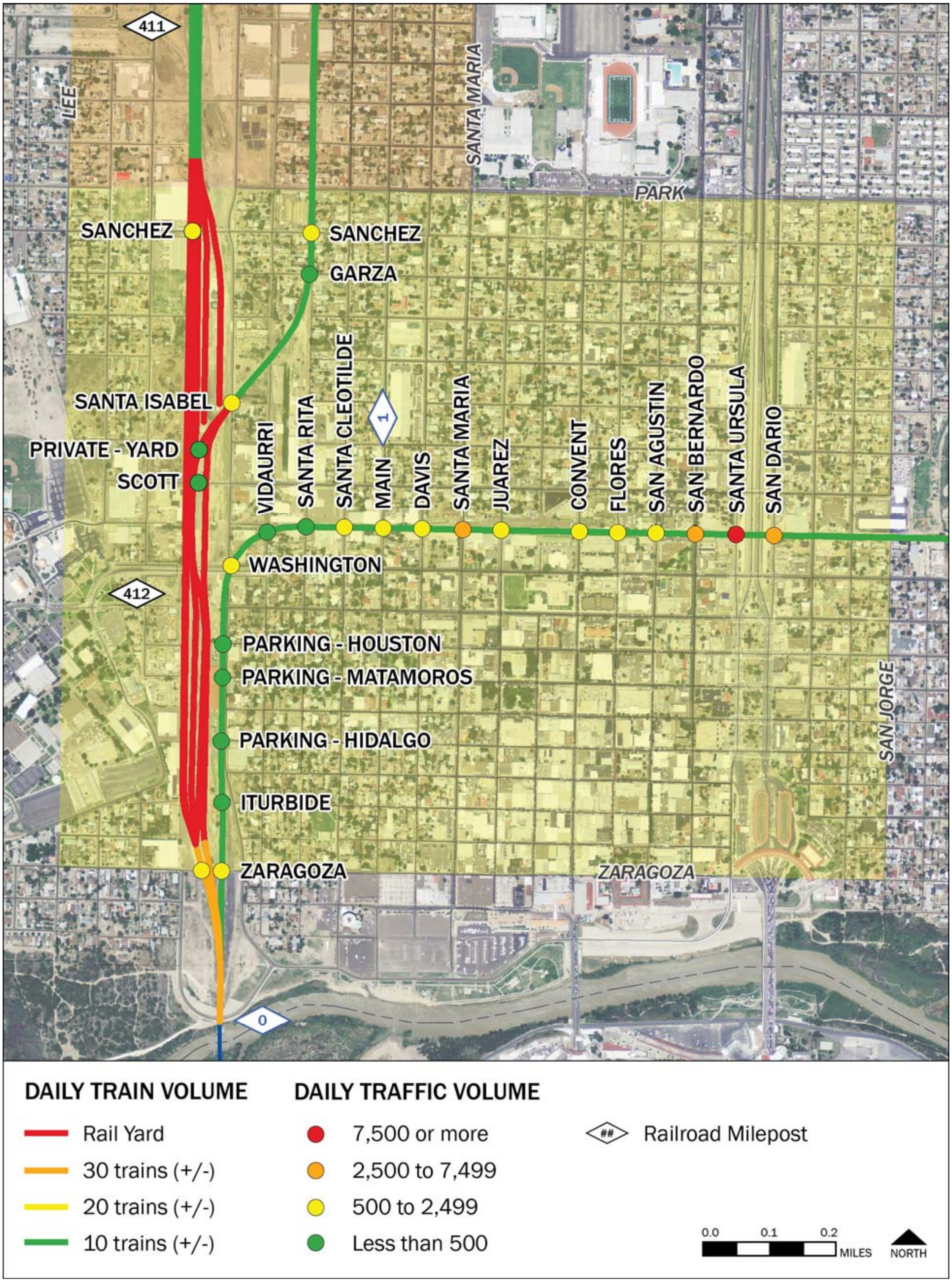
Roadway traffic operations review included assessing the traffic volumes and patterns in the study area. Traffic volumes are listed in the U.S. DOT Crossing Inventory: however, more recent data from the *Kansas City Southern Quiet Zone Study (2015)* was used for analysis.

The total north-south daily traffic across the KCS highway-railroad grade crossings, not including Interstate 35, is approximately 40,000 vehicles per day. The most heavily travelled roadways include San Dario (northbound) and Santa Ursula (southbound), which operates as the one-way Interstate frontage roads with 5,200 and 10,600 vehicles per day, respectively. This couplet represents nearly 45 percent of the screen line traffic volume. The next heavily travelled roadways are San Bernardo and Santa Maria.

The total east-west daily traffic across the UP highway-railroad grade crossings, is approximately 10,000 vehicles per day. Based on this data, many of the crossings have nominal traffic volumes of less than 500 vehicles per day and typically less than 30 vehicles per hour. The low traffic volumes may be indicative of the frequency and duration the highway-railroad grade crossings are occupied by moving trains or trains staged for border clearance. Roadways with low traffic volumes could be candidates for roadway closure, particularly if a grade separation were provided nearby.

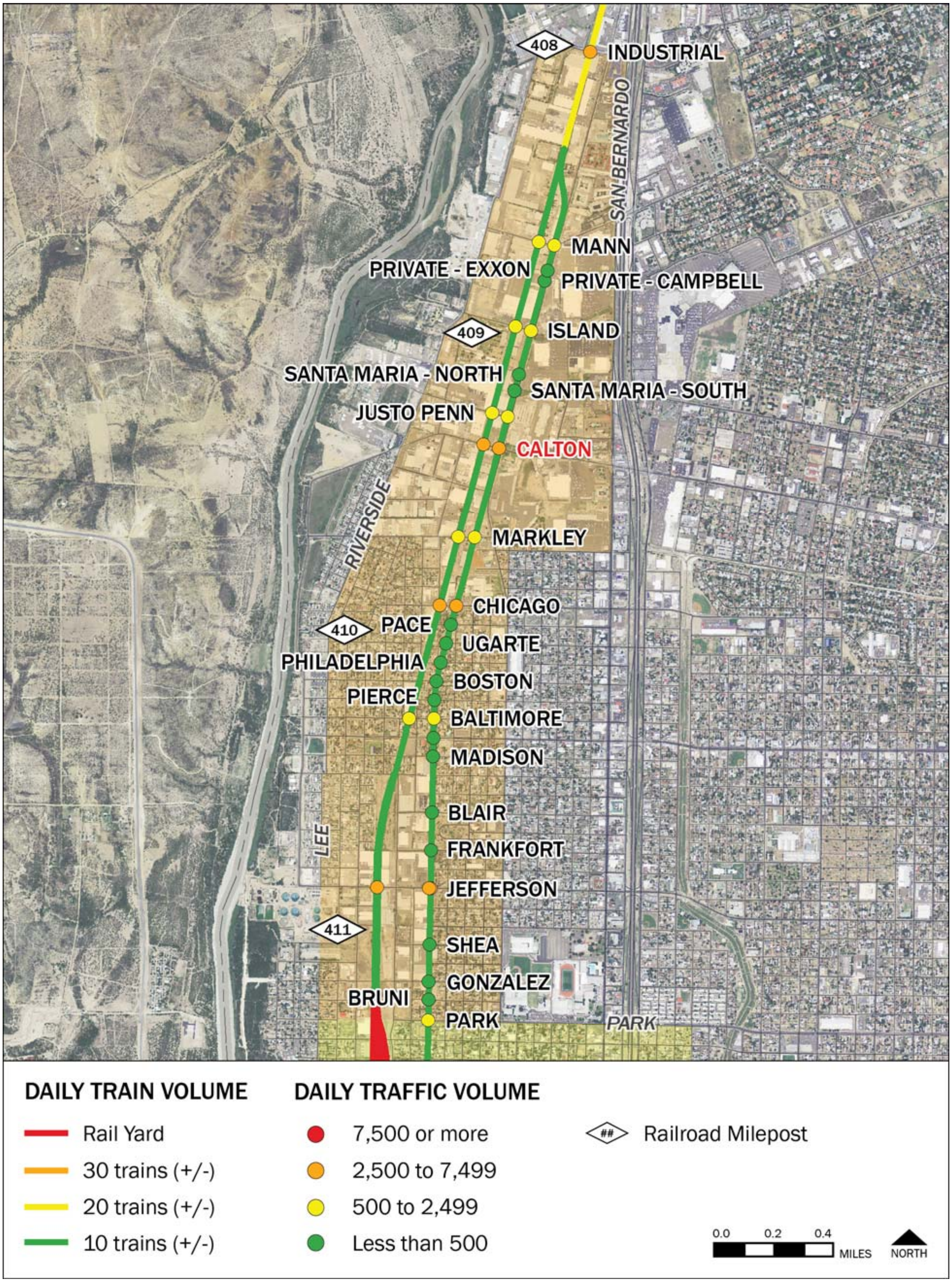
Train volumes and roadway traffic volumes are displayed in Figure 7.

Figure 7A: Train Volume and Roadway Traffic Volume - Study Area A



Source: Federal Railroad Administration (2016), Traffic Data Survey (2014), MPO Traffic Counts (2013).

Figure 7B: Train Volume and Roadway Traffic Volume - Study Area B



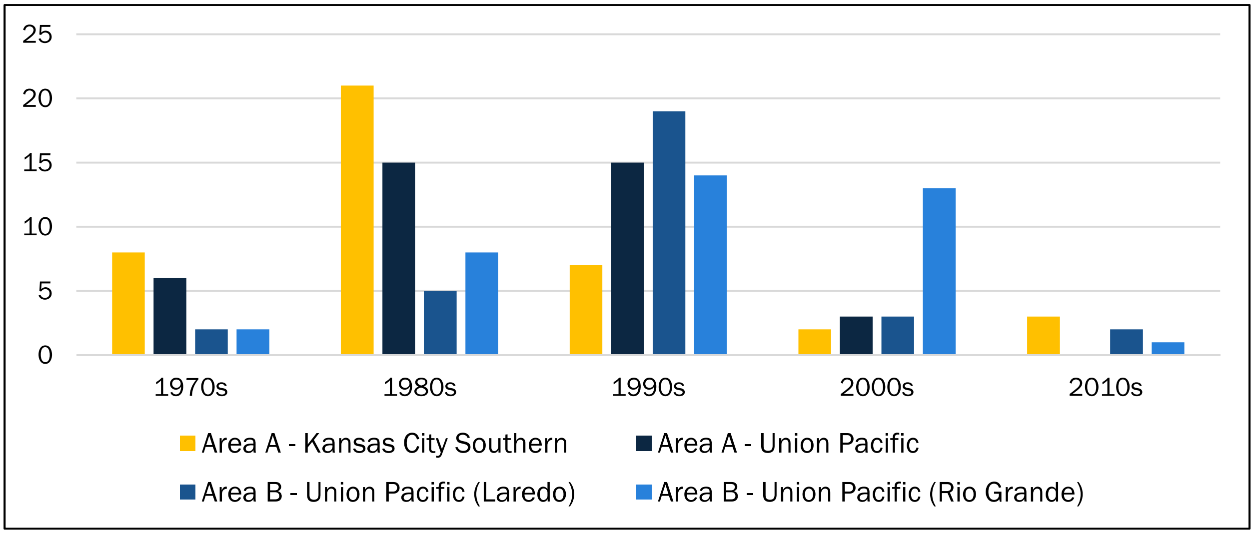
Source: Federal Railroad Administration (2016), Traffic Data Survey (2014), MPO Traffic Counts (2013).

Crash Experience

The Federal Railroad Administration (FRA) maintains records of crashes occurring at highway-railroad grade crossings. The time series available enables a long-term and short-term assessment of crashes. A short and long-term review is necessary to identify trends or patterns as the overall number of crashes have diminished over time and may be the result of past crossing improvements.

Within the study area, 149 crashes have been reported since 1975. Eighty (80) crashes occurred in Study Area A and 69 crashes occurred in Study Area B. Crashes were divided into five different time periods by decade (1975 to 1979, 1980 to 1989, 1990 to 1999, 2000 to 2009, and 2010 to 2016 as available). While the number of crashes has decreased over time, the most recent data demonstrates a relatively equal number by study area as well as by railroad. Overall, crashes peaked in the 1980s and 1990s and have diminished in recent years. Crashes by study area and railroad are displayed in Figure 8.

Figure 8: Crashes by Study Area



Source: Federal Railroad Administration (2016).

Since 2010, six (6) crashes occurred in the study area. Three crashes occurred in Study Area A and three crashes occurred in Study Area B. All crashes were at individual crossing locations and none resulted in a fatality. While three crashes occurred in February 2010, this common month is seen as an anomaly. There is limited data to draw conclusions; however, collision types indicate that commonly motorists do not obey highway-railroad grade crossing warning devices. Characteristics of the crashes are outlined in Table 3.

Table 3: Crashes in Short-Term Assessment

Crossing	Rail	Date	Vehicle	Speed[2]	Train	Collision	Injury
Santa Cleotilde	KCS	2/23/10 11:15 AM	Auto	35 mph	Standing	Drove around gate	No
San Agustin	KCS	2/16/10 10:25 PM	Auto	5 mph	Unit Pulling	Vehicle did not stop	Yes
San Bernardo	KCS	2/19/10 1:10 AM	Auto	-	Standing	Other	No
Justo Penn	UP (L)[1]	10/30/14 4:40 PM	Truck Trailer	30 mph	Unit Pulling	Drove around gate	No
Calton	UP (L)[1]	12/7/14 4:50 AM	Pick-up Truck	20 mph	Standing	Drove around gate	No
Baltimore	UP (RG)[1]	9/26/10 1:26 AM	Auto	5 mph	Unit Pulling	Drove around gate	No

Source: Federal Railroad Administration (2016).

[1] (L) Laredo Subdivision, (RG) Rio Grande Runaround Track; [2] Vehicle speed

Identification of Needs

The existing physical and operational conditions in the study area provide an understanding of the surrounding environment and its land use, roadway network, and railroad network. Based on this information, along with stakeholder input, transportation needs of mobility and access were identified.

The majority of land use currently surrounding the railroad corridors are industrial in nature but the closely spaced street grid associated with an older, established community also includes residential and commercial development. In certain locations, the land use changes from one side of the railroad tracks to the other. This is the case along the majority of the RG Track with industrial development to the west and residential development to the east. Additional residential land uses to the west of UP's Laredo Subdivision further mix traffic composition across the Laredo Subdivision and the RG Track corridors. The newly developed retail outlet shops south of Zaragoza has increased traffic near the KCS corridor.

Along the UP corridor, even with a closely spaced grid network of streets, continuity is limited and disjointed. East-west arterial streets crossing the Laredo Subdivision and RG Track generally align with the interchange locations on I-35. However, collector streets are discontinuous. North-south mobility along the two streets parallel to and west of the UP Laredo Subdivision (Pinder Ave and San Ignacio Avenue) are hindered by lack of continuity. This is the case at the southern edge near the Washington Street grade separation where Pinder Avenue terminates at Moctezuma Street and San Ignacio has a circuitous crossing beneath the Washington Street viaduct. To the north, Pinder Avenue has one discontinuous block between Poggenpohl and Shea Streets.

This lack of continuity contributes to the concerns expressed by the Los Olvidados community group and other residents from La Ladrillera area regarding heavy truck traffic on the neighborhood streets, the impact to emergency services access, and their opposition to closing local road crossings.

The KCS corridor changes direction from a north-south orientation after crossing the Rio Grande River and paralleling Santa Isabel Street to an east-west orientation along Moctezuma Street. The east-west segment of the KCS corridor is paralleled by Scott Street to the north and Washington Street to the south. Washington Street is one-way westbound and is paired in the eastbound direction with Victoria Street. In the north-south direction, the I-35 frontage roads, along with San Bernardo provide the most network continuity but they are focused in the east part of the study area. Santa Maria connects to the secondary vehicular border crossing.

Railroad operations in the study area are influenced by border operations as well as by the proximity of railroad yards and the ability to stage trains entering into Mexico. Train speeds, volumes, and industrial movements cause delay at highway-railroad grade crossings. Train lengths are anticipated to increase rather than an increase in the number of trains due to capacity of the international bridge. Increasing train length will likely increase the delay at highway-railroad grade crossings in the study area.

The need for improved mobility is demonstrated by the limited continuity in the roadway network and increasingly frequent railroad operations resulting in delay for motorists at highway-railroad grade crossings. The mix of land use types and the intermingling of modes (i.e., trucks, passenger vehicles) to reach development demonstrate the need for access improvements.

Improvement Concepts

The basic improvement types considered include grade separations, railroad relocations, and other forms of crossing enhancements. The overall intent of the improvement concepts is to improve mobility and access within and through the study area by reducing or eliminating railroad and roadway conflicts.

Locations reviewed for implementation of an improvement type focused on the roadway transportation network coupled with the understanding of travel patterns to and from existing and proposed major generators and destinations. Connectivity to the regional transportation system also influenced locations considered. An understanding of railroad operations was also essential in developing potential improvement concepts. This includes the use of the RG Track for northbound movements as well as the location of major railroad yards several miles outside of Downtown Laredo. Improvement concepts considered abandonment of the existing RG Track and the construction of a new track in the Laredo Subdivision right-of-way (even beyond the study area), which could eliminate multiple crossings on the RG Track.

Toolbox Overview

The toolbox of potential improvement types includes grade separations, railroad relocations, and crossing enhancements. Each improvement type is described below along with general design criteria. The design criteria serve as a measurement to assess the technical feasibility of a concept, as well as, in comparing different design configurations at various crossing locations.

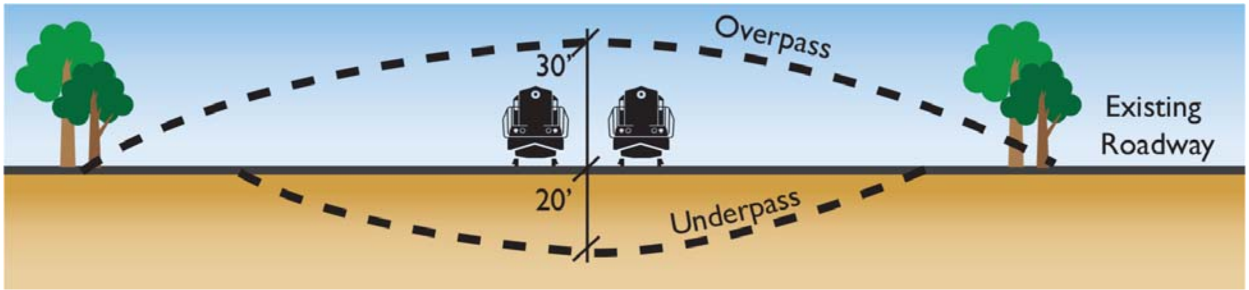
Grade Separations

Grade separations eliminate an existing highway-railroad grade crossing by elevating either the highway or the railroad tracks, thus allowing traffic to move unimpeded at crossings. The elimination of a grade crossing by grade separation removes the possibility of a collision at the crossing and therefore greatly increases vehicular safety at the location. Also, it lessens motorist delay by eliminating the need to stop when a train occupies the crossing. Grade separations are costly projects which may require the financial support of federal, state and/or local agencies as well as the cooperation of the railroad.

Grade separations can be accomplished through a roadway focus or a railroad focus. Highway grade separations take the roadway over or under the railroad. Railroad elevations/depressions take the railroad tracks over or under the highway. An illustration of a highway grade separation overpass and underpass is provided in Figure 9.

The grade separation locations were selected based upon the roadway's integration with the transportation network and ability to achieve the goals of improved mobility and access. The number of locations reviewed for potential grade separation should not be inferred as all of the locations advancing to implementation.

Figure 9: Highway Grade Separation Illustration



Source: TranSystems.

The general planning-level design elements considered include:

- Vertical profile grade: The roadway profile grades are 4% maximum desirable grade, 5% maximum grade and a 6% absolute maximum grade. In some circumstances, the design guidelines may not be achievable; however, a profile grade is shown to illustrate various design constraints.
- Railroad vertical clearance: For planning purposes, the vertical distance from top of rail to roadway profile will be approximately 30 feet, which includes the required vertical clearance of 23 feet – 6 inches over the railroad tracks plus the depth of roadway structure assumed to be 6 feet – 6 inches. Depth of structure may vary and is dependent upon various factors including but not limited to span length and soil conditions.
- Roadway vertical clearance: For planning purposes, the vertical distance from the roadway profile to the proposed top of rail will typically be 20 feet, which includes an arterial roadway vertical clearance of 16 feet – 6 inches plus a depth of railroad structure assumed to be 3 feet – 6 inches. Depth of structure may vary and is dependent upon factors including but not limited to span length and soil conditions. An absolute minimum roadway vertical clearance of 13 feet – 6 inches.
- Horizontal alignment: The horizontal alignment follows the center of the existing right-of-way. Further refinements may warrant adjustments when more information is available.
- Design speed: Typically, the existing posted speed on a roadway is used for design speed. Circumstances where design constraints dictate lower speeds are documented.
- Access Roads: Access is assumed to remain to adjacent properties along the roadway, from an access road below the viaduct structure (where elevation allows) or from side street access. Typically, vehicular access roads would not have a highway-railroad grade crossing with the railroad tracks. However, as is the case with the

existing Lafayette and the proposed Calton Road grade separations, at-grade crossings may remain at the RG Track to gain access to adjacent parcels. Site-specific access needs further refinement when more information is available.

Refinements to the design parameters are expected as the various concepts proceed in more detail. Table 4 lists the locations for grade separation concepts to review.

Table 4. Grade Separation Concept Locations

Grade Separations		UP		KCS		
Crossing Location	Type Road OVER Rail or Road UNDER Rail	Laredo Subdivision	RG Track	Laredo Subdivision	One-Way Couplet	Pedestrian Only
Chicago	OVER UNDER	X X	X X			
Jefferson	OVER OVER	X X	X			
Gonzalez	OVER	X				
Sanchez	OVER OVER	X X	X			
Scott	OVER OVER	X X				 X
Zaragoza	OVER UNDER OVER UNDER	X X X X		 X X		 X X
Santa Maria	OVER UNDER			X X		
Santa Maria/Convent	OVER UNDER			X X	X X	
Flores/San Agustin	UNDER			X	X	
San Bernardo	OVER UNDER			X X		

Source: TranSystems.

Railroad Relocation

A railroad relocation realigns or relocates the railroad corridor, horizontally or vertically, to achieve the result of improved mobility and access.

For the KCS corridor, the railroad relocation concept involves changing the vertical profile of the existing corridor in order to allow roadways to pass under the elevated railroad corridor.

For the UP corridor, the railroad relocation concept involves providing a replacement track for the RG Track in order to consolidate train movements and reduce the number of roadway-railroad conflict locations (at-grade crossings).

Basic railroad design parameters to consider include maximum grade, minimum vertical clearance and track centers. Generally, the maximum desirable grade for a mainline railroad is 1%, however, the ruling (or highest) grade in a territory should be reviewed and maintained so that locomotive power does not have to be adjusted in an existing route. The minimum vertical clearance over the railroad must be 23.5 feet. The vertical clearance over streets and highways can vary from 13.5 feet for a city street to 16.5 feet for a State highway. Track centers range from 15 to 20 feet depending on track usage and right-of-way available.

Other Crossing Enhancements

Three types of additional crossing enhancements were considered: warning device upgrade, roadway consolidation or closure, and network modification. Each of these tools in the toolbox is site specific and is described in more detail with each concept.

Active warning device systems inform motorists and pedestrians of the approach or presence of trains on or near highway-railroad at-grade crossings. Active warning devices include flashing lights, bells, and gates. Passive warning device systems also inform motorists and pedestrians of the potential presence of trains at crossings through signs and pavement markings. Passive warning devices include crossbucks, stop or yield signs, and advance pavement markings on the road surface.

The potential list of crossing locations to consider for warning device upgrades in conjunction with grade separation and railroad relocation concepts:

- Industrial Boulevard: upgrade to four-quadrant gates
- Baltimore: upgrade to four-quadrant gates (Laredo and RG) and modify parallel street
- Sanchez: upgrade to four-quadrant gates (Laredo) and flashing light and gates (RG)
- Santa Isabel: upgrade to flashing lights and gates
- Santa Maria: upgrade to four-quadrant gates
- San Bernardo: upgrade to four-quadrant gates

Crossing consolidation is a term used to reference the closure of redundant grade crossings in a corridor with numerous, closely spaced crossings. Consolidating grade crossings alleviates the possibility of a collision where the crossing once was located and redirects traffic to a nearby route. To be successful, crossing consolidation requires the cooperation of local and state governments, and the operating railroad.

Crossing consolidations are considered in conjunction with grade separation and railroad relocation concepts.

Specific network modifications are solutions that look at adjacent improvements that could provide mobility and access around highway-railroad grade crossings. The design of the Interstate 35 ramp modifications is intended to provide an alternate route around the frontage road crossings when they are occupied by a train.

Assessment

Each concept is assessed for three types of feasibility: technical, financial, and institutional. This assessment leads to the selection of concepts for further design refinement.

Methodology

The assessment seeks to evaluate the improvement concepts for various design issues and potential impacts by evaluating technical, financial, and institutional feasibility. Technical feasibility focuses upon a design that does not affect railroad operations, generally meets design criteria for geometry and capacity, and can provide access to properties. Financial feasibility begins by preparing an opinion of probable costs that identifies programming costs including right-of-way costs. The estimate is based upon defined project limits and measured quantities as well as giving consideration to construction sequencing. A more detailed description of the program cost estimating procedure is presented later in this chapter. Institutional feasibility attempts to qualify the social and environmental effects by balancing potential impacts to natural and man-made resources compared to improved mobility and access at improvement locations.

For technical feasibility, sketch-level design concepts were developed to allow for consistent evaluation against design criteria and corresponding costs. At this stage of evaluation, the sketch-level design concept is based on publicly available topographic data – not field surveys. Unless otherwise noted, the projects should have minimal if any effect upon railroad operations. The concept is also assessed for constructability. For example, if phased construction is anticipated, such actions are noted and are reflected through the probable costs for the project.

The order of magnitude cost estimate for use in assessing the financial feasibility is presented in five categories that include:

- Right-of-way
- Construction
- Design
- Construction Inspection
- Contingency (unallocated)

The sum of these cost categories provide a total program cost in 2017 dollars. Even when projects are assigned to an implementation schedule, costs as shown remain in constant 2017 dollars.

At this stage in the development of the improvement concepts, there is insufficient information to estimate right-of-way costs. At a sketch-level design, it is unknown if only portions of a parcel will need to be acquired or if the entire parcel must be acquired and ensuing costs for relocation assistance necessary. Consequently, a summary of adjacent properties was reviewed by type and most recent assessed value. This is not implying that all or any of these properties will be directly or indirectly affected, but merely serves as a tool to understand the number of potential properties affected, their land use, and their assessed value based upon Webb County assessment data. Later, as selected concepts are advanced, the design can be refined to a point to determine the degree of potential impacts, if any. The right-of-way cost range should only be used for programming and budgeting purposes until further design refinement occurs.

The construction category is subdivided into major construction components including:

- Structural Items
- Roadway Items
- Railroad Items
- Miscellaneous
- Contingency

Each of the categories and items included are dependent upon the conditions at each site location and will vary according to available information as well as engineering judgement. Unless specified, each element has been quantified based upon the concept plan developed. The item may be a measured length, area, or volume applicable to developing a unit price for the item. Structural items can include retaining walls, bridge structure, and support systems. Structural items were distinguished by either highway or railroad use. Roadway items include removals, new pavement area, new sidewalk area, and new length of curb. The extent of earthwork is applied as a factor to the cost of pavement. Additional items such as drainage or lighting is included as either a lump sum or a percentage of construction cost within the miscellaneous category. Railroad items include track removal and new track construction, as applicable. Also included is railroad flagging and insurance for construction work around the railroad tracks. Miscellaneous items are typically applied as a percentage of a subtotal (i.e., mobilization, traffic control, erosion control) and may vary by location. Utility costs are included in the miscellaneous category and may be estimated as either an allowance or lump sum at this stage. A contingency is applied to each construction category and varies based upon the complexity of the design concept.

The design and construction inspection categories are applied as a percentage of the construction subtotal cost. The unallocated contingency is applied as four (4) percent of the subtotal of all cost categories. The unallocated contingency is a reserve fund to account for uncertain costs and to account for finance charges.

Concept Screening

One method to assess multivariate data is through a radar chart. A two-dimensional radar chart provides a graphical method of displaying data for three or more variables represented on axes starting from the same point. This study's assessment began with six variables including one variable each from Financial and Institutional feasibility and four variables from Technical feasibility including:

- Design guidelines and constructability
- Street continuity and connectivity
- Property access
- Utility impacts

While the quantified elements appear weighted towards technical feasibility, this is consistent with available information and the planning/engineering elements of the concepts. For simplicity in representation, the technical assessment is shown as one combined variable. The rating system uses a five-scale measure of:

- Very poor (1)
- Poor (2)
- Fair (3)
- Good (4)
- Very Good (5)

If the radar chart is full, then all variables rate very good. The radar chart, with an example shown in Figure 10, allows for a visual review of a balanced concept where each variable is rated equally versus an unbalanced concept where one or more variables is rated higher or lower than another.

Figure 10: Example Radar Assessment Chart

Source: TranSystems.

At this stage, the financial and institutional elements are typically rated on a conservative basis with only a few concepts rated good or very good and are described in Table 5.

Grade Separations

Table 5. Screening of Grade Separation Concept Locations

Grade Separations		UP		KCS				
Crossing Location	Type	Laredo Sub	RG Track	Laredo Sub	One-Way	Pedestrian	Description	Radar Assessment
Chicago	OVER	X	X				A long viaduct structure is needed to span the two railroad corridors separated by approximately 300 feet. Limited vertical clearance requires the closure of cross street access at Vidaurri and Main Streets. The profile grade exceeds 5% requiring additional sidewalk treatments. Access is restricted to industrial and residential properties in between the two corridors and the Elementary school on the east side. Estimated Cost: $11.3 million	
Chicago	UNDER	X	X				Special construction phasing (i.e., all trains on one subdivision) is needed to reduce impacts to railroad operations. The profile grade is less than 5% but structure length results in the closure of cross street access at Vidaurri, Santa Rita, Santa Cleotilde and Main. Access restricted to industrial and residential properties in between the two corridors and the Elementary school on the east side. Estimated Cost: $25.9 million	

Grade Separations		UP		KCS		Pedestrian	Description	Radar Assessment
Crossing Location	Type	Laredo Sub	RG Track	Laredo Sub	One-Way			
Jefferson	OVER	X	X				A long viaduct structure is needed to span the two railroad corridors separated by approximately 900 feet. Profiles grades on the west reach 6.5% to tie in at Pinder Avenue. Limited vertical clearance requires the closure of cross street access at San Ignacio Avenue. Access is restricted to industrial properties in between the two corridors, especially loading docks. The profile grade exceeds 5% requiring additional sidewalk treatments. Estimated Cost: $17.3 million	
Jefferson	OVER	X					A viaduct structure is needed to span only the Laredo Subdivision. A grade crossing would remain at the RG Track separated by approximately 900 feet. Profiles grades on the west reach 6.5% to tie in at Pinder Avenue. Limited vertical clearance requires the closure of cross street access at San Ignacio Avenue. Access is restricted to industrial properties in between the two corridors, especially loading docks. The profile grade exceeds 5% requiring additional sidewalk treatments. Estimated Cost: $11.6 million	

Grade Separations		UP		KCS				
Crossing Location	Type	Laredo Sub	RG Track	Laredo Sub	One-Way	Pedestrian	Description	Radar Assessment
Gonzalez	OVER	X					Gonzalez Street is not currently an at-grade crossing. A grade separation concept at this location could minimize potential property impacts due to less intense development. This concept also includes the extension of Pinder Ave between Poggenpohl and Shea Streets to provide north-south continuity west of the railroad. Limited vertical clearance requires the closure of cross street access at San Ignacio and Vidaurri Avenues. The profile grade exceeds 5% requiring additional sidewalk treatments. Estimated Cost: $9.8 million	
Sanchez	OVER	X	X				This multi-track crossing currently has a pedestrian overpass. A long viaduct structure is needed to span the two railroad corridors separated by approximately 900 feet. Limited vertical clearance requires the closure of cross street access at San Ignacio and Santa Cleotilde Avenue. Access is restricted to industrial properties in between the two corridors. The profile grade exceeds 5% requiring additional sidewalk treatments. Estimated Cost:$16.8 million	

Grade Separations		UP		KCS				
Crossing Location	Type	Laredo Sub	RG Track	Laredo Sub	One-Way	Pedestrian	Description	Radar Assessment
Sanchez	OVER	X					This multi-track crossing currently has a pedestrian overpass. A viaduct structure is needed to span only the Laredo Subdivision. Limited vertical clearance requires the closure of cross street access at San Ignacio. Access is restricted to industrial properties in between the two corridors, especially loading docks. The profile grade exceeds 5% requiring additional sidewalk treatments. Estimated Cost: $10.0 million	
Scott	OVER	X					A viaduct structure is needed to span the two railroad corridors separated by approximately 200 feet. Limited vertical clearance requires the closure of cross street access at San Ignacio and Vidaurri. KCS right-of-way (inactive track) on the east side may complicate the ability to touchdown near Vidaurri. The profile grade exceeds 5% requiring additional sidewalk treatments. This location is immediately north of the existing grade separation at Washington Street. Estimated Cost: $11.3 million	

Grade Separations		UP		KCS				
Crossing Location	Type	Laredo Sub	RG Track	Laredo Sub	One-Way	Pedestrian	Description	Radar Assessment
Scott	OVER	X				X	This grade separation design for pedestrians would be similar to the existing Sanchez pedestrian overpass. Vehicular access to Scott could remain open, be closed, or a temporary closure be used to provide flexibility for use in certain circumstances. Estimated Cost: $4.2 million	
Zaragoza	OVER	X					A viaduct structure is needed to span both the KCS and UP Laredo Subdivisions, four tracks. Limited vertical clearance requires the closure of cross street access at Evans and Vidaurri Streets. The profile grade exceeds 5% requiring additional sidewalk treatments. Estimated Cost:$12.3 million	

Grade Separations		UP		KCS				
Crossing Location	Type	Laredo Sub	RG Track	Laredo Sub	One-Way	Pedestrian	Description	Radar Assessment
Zaragoza	UNDER	X					Special construction phasing associated with boring or excavation under several railroad tracks is needed to reduce impacts to railroad operations. The profile grade is less than 5% but structure length results in the closure of cross street access at Evans and Vidaurri Streets. Roadway bridges over the depressed Zaragoza could be provided at Eagle Pass and Santa Isabel Streets (not included in cost estimate). Estimated Cost:$32.7 million	
Zaragoza	OVER	X		X		X	This grade separation design for pedestrians would be similar to the existing Sanchez pedestrian overpass. Vehicular access to Zaragoza could remain open, be closed, or temporarily closed to provide flexibility in certain circumstances. Estimated Cost:$4.3 million	

Grade Separations		UP		KCS				
Crossing Location	Type	Laredo Sub	RG Track	Laredo Sub	One-Way	Pedestrian	Description	Radar Assessment
Zaragoza	UNDER	X		X		X	Special construction phasing associated with boring or excavation under several railroad tracks is needed to reduce impacts to railroad operations. Vehicular access to Zaragoza could remain open, be closed, or a temporarily closed to provide flexibility in certain circumstances. Estimated Cost: $7.2 million	
Santa Maria	OVER			X			An approximate 10% profile grade is needed to grade separate Santa Maria over the KCS and maintain intersections with Scott and Washington Streets (still raises intersection approximately 2 feet). A flatter grade would extend through these adjacent cross streets and impact adjacent property access. The design speed is lowered with a 10% profile grade. Access is restricted to all properties on Santa Maria in between Scott and Washington Streets with a two-way roadway. The profile grade exceeds 5% requiring additional sidewalk treatments. Estimated Cost: $8.2 million	

Grade Separations		UP		KCS				
Crossing Location	Type	Laredo Sub	RG Track	Laredo Sub	One-Way	Pedestrian	Description	Radar Assessment
Santa Maria	UNDER			X			An approximate 7% profile grade with 15-foot vertical clearance is needed to grade separate Santa Maria under the KCS and maintain intersections with Scott and Washington Streets (minor regrading). Construction phasing (i.e., shoo fly) is needed to reduce impacts to railroad operations. Potential utility impacts occur with an underpass. The profile grade exceeds 5% requiring additional sidewalk treatments. Estimated Cost: $17.5 million	
Santa Maria/Convent	OVER			X	X		Design elements are similar to the grade separation of Santa Maria over the KCS listed above. This grade separation concept converts these streets to a one-way couplet to provide one-lane of southbound traffic on Santa Maria and one-lane of northbound traffic on Convent Avenue. The one-way couplet fits within the existing right-of-way while providing property access to adjacent development on one side. Access to properties on the other side would either be limited or provided by side street frontage. Additional network modifications,	

Grade Separations		UP		KCS		Pedestrian	Description	Radar Assessment
Crossing Location	Type	Laredo Sub	RG Track	Laredo Sub	One-Way			
							such as changes to traffic signals at several locations are anticipated. Estimated Cost: $14.2 million	
Santa Maria/Convent	UNDER			X	X		Design elements are similar to the grade separation of Santa Maria under the KCS listed above. This grade separation concept converts these streets to a one-way couplet to provide one-lane of southbound traffic on Santa Maria and one-lane of northbound traffic on Convent Avenue. The one-way couplet fits within the existing right-of-way while providing property access to adjacent development on one side. Access to properties on the other side would either be limited or provided by side street frontage. Additional network modifications, such as changes to traffic signals at several locations, anticipated. Construction phasing (i.e., shoo fly) is needed to reduce impacts to railroad operations. Estimated Cost: $33.0 million	

Grade Separations		UP		KCS		Pedestrian	Description	Radar Assessment
Crossing Location	Type	Laredo Sub	RG Track	Laredo Sub	One-Way			
Flores/San Agustin	UNDER			X	X		This grade separation would operate as a one-way couplet using a similar design concept as the U.S.-83 (Guadalupe/ Chihuahua) overpass of the KCS Laredo Subdivision. Two-lanes of southbound traffic on Flores and two-lanes of northbound traffic on San Augustin are provided. The configuration allows for a slightly longer length that could result in less side street modifications to Washington and Scott Streets and the potential to reduce utility impacts. All properties between the one-way couplet are acquired with this concept. Moctezuma is a paved two-way street in between Flores and San Agustin that could pass over the one-way couplet with an additional bridge. Network modifications are needed through a portion of Downtown Laredo. Construction phasing (i.e., shoo fly) is needed to reduce impacts to railroad operations. Estimated Cost: $23.5 million	

Grade Separations		UP		KCS		Pedestrian	Description	Radar Assessment
Crossing Location	Type	Laredo Sub	RG Track	Laredo Sub	One-Way			
San Bernardo	OVER			X			An approximate 10% profile grade is needed to grade separate San Bernardo over the KCS and maintain intersections with Scott and Washington Streets (still raises intersection approximately 2 feet). A flatter grade would extend through these adjacent cross streets and impact adjacent property access. The design speed is lowered with a 10% profile grade. Access is restricted to all properties on San Bernardo in between Scott and Washington Streets. The profile grade exceeds 5% requiring additional sidewalk treatments. Moctezuma could connect to the San Bernardo access road(s) with a redesigned transportation network. Estimated Cost: $9.0 million	

Grade Separations		UP		KCS		Pedestrian	Description	Radar Assessment
Crossing Location	Type	Laredo Sub	RG Track	Laredo Sub	One-Way			
San Bernardo	UNDER			X			An approximate 7% profile grade with 15-foot vertical clearance is needed to grade separate San Bernardo under the KCS and maintain intersections with Scott and Washington Streets (minor regrading). Construction phasing (i.e., shoo fly) is needed to reduce impacts to railroad operations. Moctezuma is a paved two-way street crossing San Bernardo that could pass over a grade separation with an additional bridge. Network modifications needed through a portion of Downtown Laredo. Potential utility impacts occur with an underpass. The profile grade exceeds 5% requiring additional sidewalk treatments. Estimated Cost: $18.7 million	

Source: TranSystems.

Railroad Relocation Concepts

The intent of the KCS railroad relocation concept is to provide grade separations for several of the closely spaced north-south highway-railroad grade crossings. In Downtown Laredo there are 17 at-grade crossings within the one-mile segment between the Washington Street overpass and the railroad bridge over Zacate Creek.

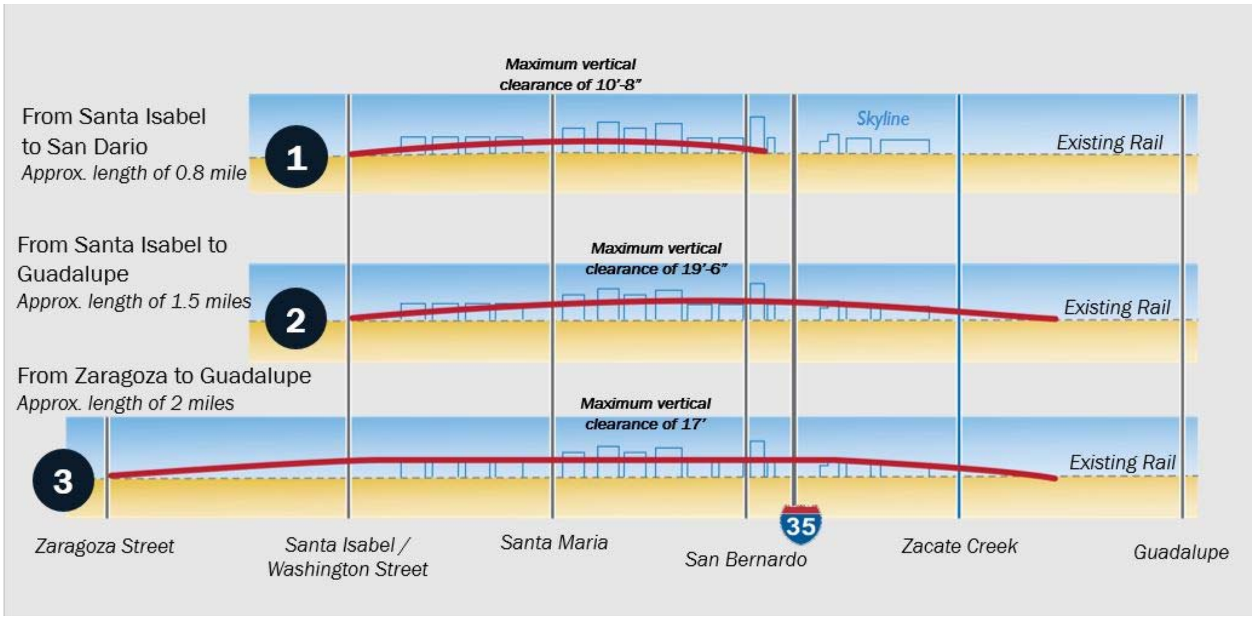
Two basic vertical designs were considered; an elevated railroad section and a depressed railroad section. The elevated railroad section places the railroad over the highway and requires 13.5 feet to 16.5 feet of vertical clearance. The depressed railroad section places the railroad under the highway and requires 23.5 feet vertical clearance to span over the railroad. The depressed section was considered between Washington Street on the west and Santa Ursula on the east. The depressed railroad section cannot extend further east because of the existing depressed section of Interstate 35, without an extensive reconfiguration of I-35. Consequently, the depressed railroad corridor concept was not reviewed further.

Three conceptual elevated railroad concepts were developed to assess technical feasibility. The profiles are based upon top of rail survey information provided by the KCS. Figure 11 shows the length of the three elevated railroad concepts. Figure 12 shows the profile of the three elevated railroad concepts.

Figure 11: KCS Railroad Relocation (Elevation) Plan View

Source: TranSystems.

Figure 12: KCS Railroad Relocation (Elevation) Profiles



Source: TranSystems.

Option 1 extends from Washington Street to San Dario with a maximum railroad grade of 0.8%. The depth of structure is assumed at 4.5 feet. The maximum vertical clearance provided is around 11 feet near Santa Maria Avenue. Lowering side street profiles at six locations is required. At-grade crossings would remain at Santa Ursula and San Bernardo where the roadway profile would be raised between 1.0 and 3.0 feet. While the proposed profile physically ties in at San Dario, the existing railroad structure over Interstate 35 would require replacement.

Option 2 extends from Washington Street to east of Zacate Creek with a maximum railroad grade of 0.8% grade. While this design modification improves the vertical clearance over San Bernardo and the Interstate 35 frontage roads, it shifts the challenges of maintaining cross street continuity across the railroad to points further east at Monterrey Street and Corpus Christi.

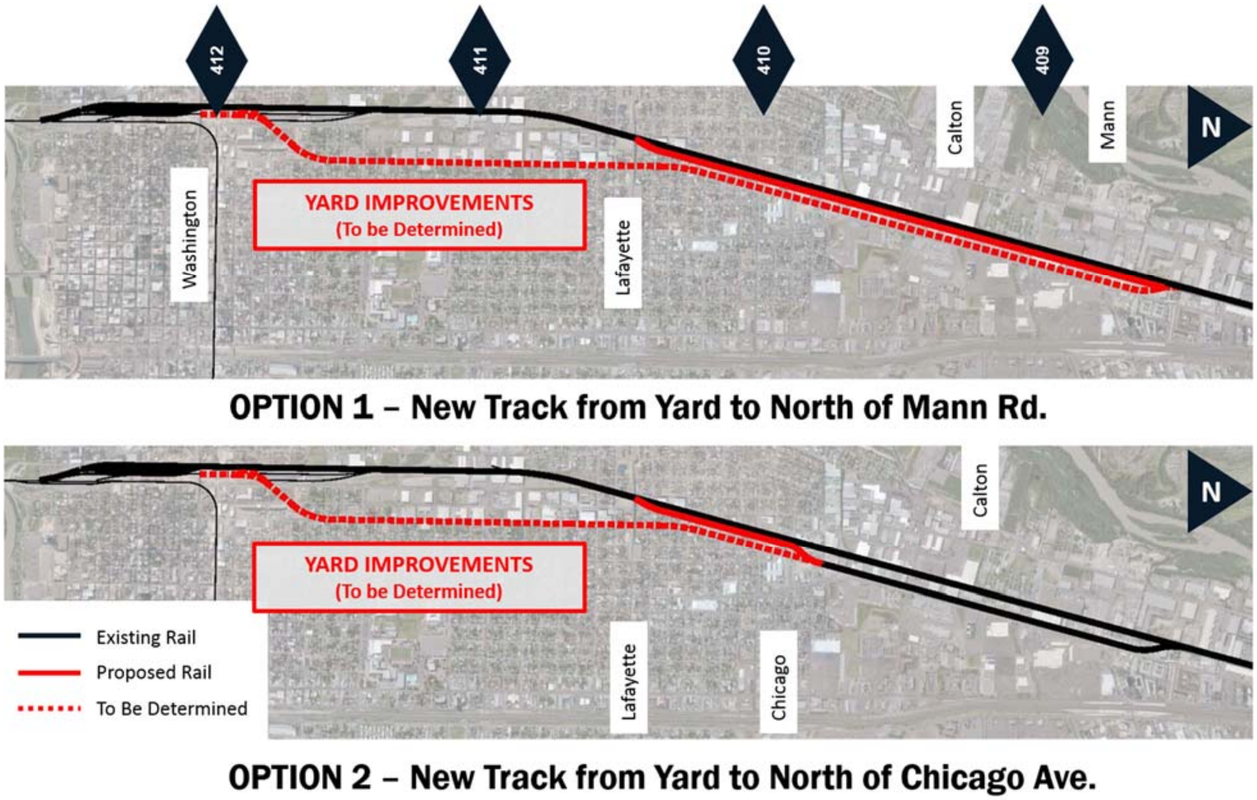
Option 3 extends from Zaragoza Street to east of Zacate Creek, a two-mile long segment. To provide sufficient vertical clearance for trains, the Washington Street viaduct would need to be reconstructed. Although there are fewer road crossings along the KCS corridor west of Santa Isabel, access to the Union Pacific Depot would be affected.

A rough order of magnitude cost for these options ranges from $75 to $200 million.

The intent of the UP railroad relocation concept is to provide a second main essentially from Scott Street north to the study limits at Mann Road/Industrial Blvd along the Laredo

Subdivision. A second main on the Laredo Subdivision would substantially lessen the need for trains to occupy the RG Track, thereby only the Laredo Subdivision would need to be grade separated. Figure 13 shows the plan view of the UP railroad relocation concepts.

Figure 13: UP Railroad Relocation Concepts



Source: TranSystems.

Option 1 constructs the new track adjacent to the existing Laredo Subdivision from around Scott Street to Mann Road. The new track would be constructed on the east side of the existing yard at Scott Street, roughly following Santa Isabel. This configuration minimizes conflicts with yard operations. An additional track would be constructed at Jefferson Street.

Option 2 constructs the new track adjacent to the existing Laredo Subdivision from around Scott Street to north of Markley Lane. Between Markley Lane and Mann Road, trains would continue to operate on the RG Track. The latter alignment option requires less construction of new track.

A segment within the railroad corridor has a 50-foot right-of-way, while the majority of the corridor has a right-of-way width of 100 feet or more. In the 50-foot wide segment two alternatives for constructing the second main track are considered. One design alignment constructs the new track at 15-foot track centers to the east, while the second alignment option shifts the existing mainline to provide a 20-foot track center. The second design option requires more track construction.

Each of the alignment options is compatible with four operating scenarios that address future use of the RG Track. After implementation of the additional main on the Laredo Subdivision four alternative operating scenarios should be considered for the RG Track.

- Track and operation remain as is
- Track is removed north of industry service locations and operation is for industry service only
- Track remains and operation is for industry service and emergency use only
- Track is removed and industry service relocated to another location

UP indicated that the operational viability of this concept is dependent upon carrying the second track farther north to Port Laredo, which is outside the limits of the study area. A schematic assessment confirms the eight-mile extension is possible within the existing UP right-of-way. A rough order of magnitude cost for the options within the study area ranges from $15 to $20 million.

Crossing Enhancements

Three types of additional crossing enhancements are being explored: warning device upgrade, crossing consolidation or closure, and transportation network modifications.

Warning device upgrades are site specific and influenced by the location of adjacent roadways and property access. A potential list of crossing locations as proposed, include:

- Industrial Boulevard – upgrade to four-quadrant gates
- Baltimore – upgrade to four-quadrant gates (Laredo and RG) and modify parallel street
- Santa Isabel – upgrade to flashing lights and gates
- Santa Maria – upgrade to four-quadrant gates
- San Bernardo – upgrade to four-quadrant gates

Crossing consolidations are directly associated with a proposed grade separation. For every grade separation it is anticipated that two (2) to four (4) adjacent crossings are consolidated (closed). For example, if a grade separation is proposed at Jefferson Street, then the likely result could be crossing closures across the Rio Grande Runaround Track at Frankfort, Blair, Shea and Gonzalez Streets. The majority of traffic is assumed to reroute to the proposed grade separation.

The transportation network enhancement specific to this study is at the KCS crossing of Santa Ursula and San Dario (Interstate 35 frontage roads). The volume of traffic on the frontage roads and the length of time that trains occupy those crossings causes substantial queuing. The improvement concept retains the existing frontage road at-grade crossings, while modifying access to Interstate 35 so drivers can use the underpass to avoid the at-grade crossing. Four ramp configurations were considered in the review of traffic operations and weaving conditions.

Option 1 removes the existing southbound off-ramp and northbound on-ramp and replaces them with a southbound on-ramp and a northbound off-ramp. This operation results in a no weave condition.

Option 2 shifts the existing southbound off-ramp and northbound on-ramp farther to the north and adds the southbound on-ramp and a northbound off-ramp. This operation results in a weave condition on the frontage roads.

Option 3 shifts the existing southbound off-ramp and northbound on-ramp farther to the south and adds the southbound on-ramp and a northbound off-ramp. This operation results in a weave condition on the highway.

Options 4 considers a braided ramp configuration that results in a no weave condition on the highway nor the frontage roads.

Real time information is proposed to be supplied to motorists via dynamic message boards when the frontage roads are blocked by a crossing train. The enhancement provides an alternate route but does not permanently grade separate the highway-railroad crossings at the frontage roads. A rough order of magnitude cost for these options ranges from $5 to $10 million.

An additional review of transportation network enhancements around the Scott Street highway-railroad grade crossing was completed and document in Appendix D.

Summary of Concepts to Advance

Grade Separations

On the KCS corridor the grade separation concepts at Santa Maria/Convent Avenue and Flores/San Agustin were selected to advance to provide comparisons between traffic capacity and property impacts. Both concepts involve a one-way transportation network. The Santa Maria and Convent Avenue couplet provides one-lane in each direction within the existing right-of-way. The Flores and San Agustin couplet provides two-lanes in each direction though its design requires acquiring a two square block area. It is important to note that these concepts are independent of each other and are not intended to be combined.

On the UP corridor grade separations over both the Laredo and Rio Grande Subdivisions at Jefferson and Sanchez Streets were selected to advance.

Railroad Relocation Concepts

The KCS Option 2 relocation concept was selected to advance. This option meets basic design criteria while providing numerous grade separations.

Along the UP corridor the basic concept of shifting the northbound mainline west from Scott Street to Mann Road is advanced. Along with the track shift, grade separations of only the Laredo Subdivision are advanced at Jefferson and Sanchez. The Gonzalez Street grade separation is included to illustrate alternative designs to addressing property access and street continuity as well as probable property impacts and costs.

Crossing Enhancements

In conjunction with other concepts (grade separations and rail relocations) various, non-specific warning device upgrades and crossing consolidation are advanced.

The Interstate 35 ramp modifications are advanced for further consideration.

Concept Refinement

Concept refinement involves addressing project phasing, constructability, specific design aspects and cost estimates. Once the individual concepts are refined, they are assembled into packages that are evaluated through a benefit-cost analysis. The benefit-cost analysis allows for a comparison of the different design concepts.

Concept Refinement Descriptions

Grade Separations

For the grade separation concepts, the refinement process involves selecting a horizontal alignment to assess potential property impacts for cost as well as social and environmental impacts. Further review of any concept for design and environmental impacts will be completed if a project is selected for implementation. While crossing consolidations are associated with each grade separation, the location of such crossing consolidations and warning devices upgrades will vary. The following grade separation locations are advanced:

- Jefferson Street (across Laredo Subdivision)
- Jefferson Street (across Laredo Subdivision and RG Track)
- Sanchez Street (across Laredo Subdivision)
- Sanchez Street (across Laredo Subdivision and RG Track)
- Gonzalez Street (across Laredo Subdivision)
- Santa Maria / Convent (one-way one-lane couplet)
- Flores / San Agustin (one-way two-lane couplet)

Figure 14 illustrates the UP grade separation concepts advanced. Figure 15 illustrates the KCS grade separation concepts advanced.

Figure 14: UP Grade Separations Advanced

Source: TranSystems.

- Jefferson Street (across Laredo Subdivision): Jefferson Street has 60 feet of existing right-of-way. The typical section for this concept is 80 feet wide, requiring acquisition of 20 feet of right-of-way. Acquisition is shown on the south side of the roadway between Pinder and San Ignacio Avenues as well as west of Santa Rita Ave. The at-grade crossing of the four tracks on the Laredo Subdivision would be closed. As the length of UP trains increases, an overpass at Jefferson Street would align with the longer trains.

  Access to adjacent businesses occurs via San Ignacio or Santa Isabel. Delivery dock access to several properties along Jefferson Street presents a significant challenge and may result in total property acquisition due to adverse operating conditions. Current industry operations use the public street right-of-way to maneuver and dock trailers, essentially along a continuous curb cut for private access. Another option for internal site circulation access could be through the former rail spur alignment south of Jefferson between Pinder and San Ignacio Avenues. A design assumption is that the spur alignment immediately west of the Laredo Subdivision is inactive and vertical clearance for railroad activities need not be provided.

This grade separation concept is paired with the UP rail relocation concept. This concept focuses on only grade separating the Laredo Subdivision because the RG Track will have limited use.

- Jefferson Street (across Laredo Subdivision and RG Track): This concept is similar to the grade separation of Laredo Subdivision only but it spans over the RG Track, as well.

  This grade separation concept assumes the RG Track will continue in use.

- Sanchez Street (across Laredo Subdivision): Sanchez Street has 60 feet of existing right-of-way. The typical section for this concept is 80 feet wide, requiring acquisition of 20 feet of right-of-way. Acquisition is shown on the south side of the roadway between Santa Isabel and Santa Rita Avenues as well as west of Santa Rita Ave. The at-grade crossing of the four tracks on the Laredo Subdivision would be closed.

  Access to adjacent businesses occurs via San Ignacio Avenue. Residential property access provided between Pinder and San Ignacio. The additional 20 foot of right-of-way on the south side between Santa Isabel and Santa Rita would require the complete acquisition of the residential properties.

  This grade separation concept is paired with the UP rail relocation concept. This concept focuses on only grade separating the Laredo Subdivision because the RG Track will have limited use.

- Sanchez Street (across Laredo Subdivision and RG Track): This concept is similar to the grade separation of Laredo Subdivision only but it spans over the RG Track, as well.

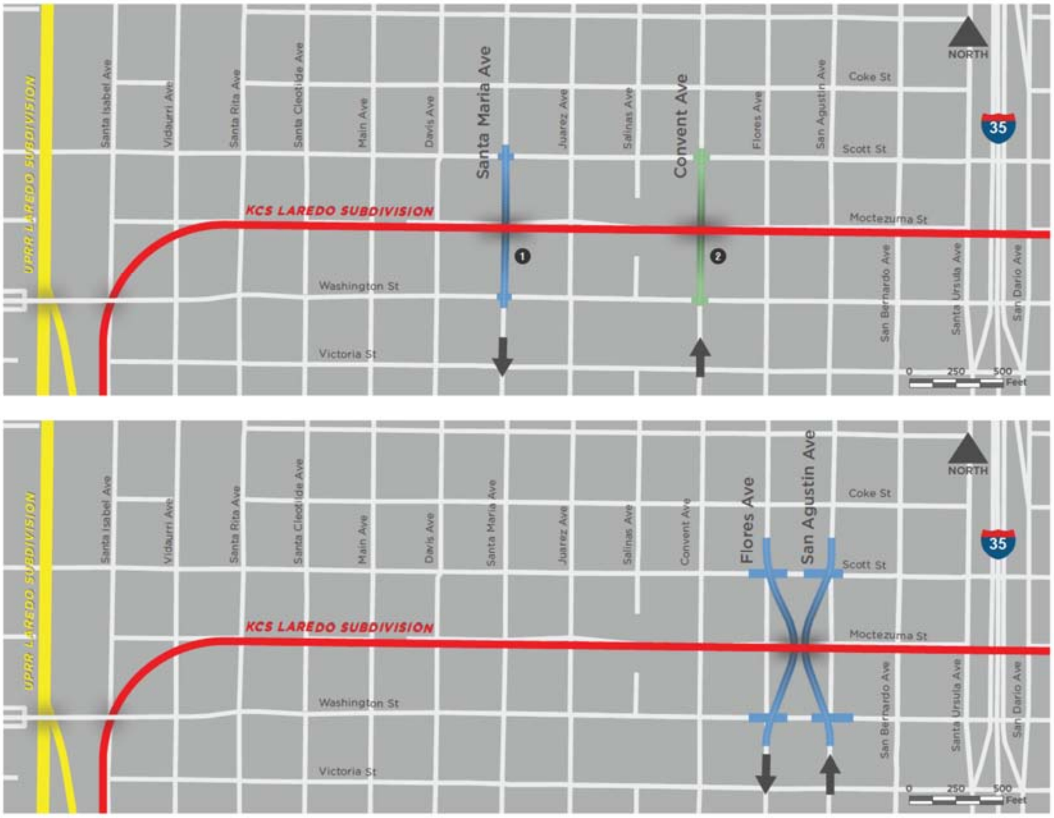
  This grade separation concept assumes the RG Track will continue in use.

- Gonzalez Street (across Laredo Subdivision): Gonzalez Street right-of-way varies from 44 to 56 feet. The north and south right-of-way lines along Gonzalez appear to shift between Pinder and Vidaurri Avenues. The typical section for this concept is 60 feet wide. The only access road is on the south side between Pinder and San Ignacio Avenues. Fewer access roads are needed because the existing larger industrial properties have existing access to other side streets.

  Realigning San Ignacio and Santa Isabel to pass under Gonzalez Street maintains north-south street continuity.

  This grade separation concept is paired with the UP rail relocation concept. This concept focuses on only grade separating the Laredo Subdivision because the RG Track will have limited use.

Figure 15: KCS Grade Separations Advanced



Source: TranSystems.

- Santa Maria / Convent (one-way, one-lane couplet): Santa Maria and Convent Streets right-of-way varies, with a minimum width of 60 feet. Santa Maria is proposed as one-way southbound and Convent Avenue as one-way northbound. To remain within the existing right-of-way, the typical section only provides an access road on the west side. The at-grade crossings with the KCS Laredo Subdivision would be closed.

  The access road for Santa Maria is shown on the west side between Scott and Moctezuma Streets. Due to the one-way traffic pattern of the concept, vehicles on the access road would utilize Moctezuma Street west to Davis Street to circulate. The Holding Institute has an access point 100 feet north of Washington Street. A new access configuration would allow vehicles to access this driveway and a new access point through the property’s parking lot between Davis and Santa Maria. Vehicular access to properties on the east side of Santa Maria would be restricted and require partial or complete acquisition. Property access to the east side of Santa Maria is only provided via the sidewalk.

  The access road for Convent is shown on the west side between Washington Street and the KCS railroad. Due to the one-way traffic pattern, vehicles on the access road would utilize Salina and Juarez to circulate. The parking garage exit from the Webb County office building would be realigned to pass over the depressed Convent Ave and connect to Salina Street. No access road is located between Moctezuma and Scott Street as the parcel can be accessed from Juarez Street. Property access to the east side of Convent Avenue is only provided via the sidewalk.

- Flores / San Agustin (one-way, two-lane couplet): Flores and San Agustin Streets right-of-way varies from 40 to 65 feet. Flores Avenue is proposed as one-way southbound and San Agustin Avenue as one-way northbound. The concept requires right-of-way between the east side of Flores and the west side of San Agustin. The proposed typical section for the one-way two-lane configuration is 60 feet. The configuration of this design utilizes the existing streets as the access roads.

  Access to the Webb County parking garage is maintained on Flores Avenue with an at-grade crossing of the KCS railroad. The at-grade crossing of the KCS Laredo Subdivision with San Agustin Avenue would be closed. The one-way circulation pattern of the parking lot for the Library would be reversed and is proposed to operate in the direction from west to east. Access to and from the IBC office parking lots can be provided via Moctezuma Street to circulate with the one-way pattern on San Agustin. Access may be restricted during construction because of the temporary railroad relocation in order to construct the underpass.

Railroad Relocations

For the railroad relocation concepts, the refinement process involves selecting an option to maximize railroad operations and vehicular mobility. Further review of any concept for design and environmental impacts will need to be completed if a project is selected for implementation. While crossing consolidations and warning devices upgrades are associated with each rail relocation, the location of such crossing consolidations will vary.

The UP railroad relocation concept relocates the RG Track within the Laredo Yard and alongside the Laredo Subdivision corridor for a distance of approximately 3.3 miles. Plan views of the relocated track within the study area as well as the potential to extend the additional track farther north to Port Laredo are shown in the Appendix. The RG Track (on the east side) primarily serves northbound train movements and joins the Laredo Subdivision north of Mann Road. Service is also provided to several industries. The relocation would reduce train movements on the RG Track from approximately eight trains per day to approximately 2 to 3 trains per week. Train movements on the Laredo Subdivision would combine and become 20 trains per day. The four alternative operating scenarios previously discussed remain viable.

With the RG Track relocation, any grade separations over the UP tracks needs only to cross the Laredo Subdivision, reducing the length of highway structure and its associated cost. The relocated track is envisioned to be located with existing UP right-of-way. Offsets between track centers may vary in different segments in order to fit within the existing right-of-way and to accommodate grading and any associated drainage. Review of the distance to piers at existing structures from the proposed track indicates the need to modify the pedestrian overpass at Sanchez Street. Offsets to piers at Lafayette and the proposed Calton Road overpass appear adequate. Universal cross overs are provided between the existing and proposed tracks around Lafayette. Industry service connections are also reconfigured as necessary. The construction cost estimate for this concept is at $17.1 million. The cost does include track modifications to maintain access to the RG Track for industry service. The cost does not include any highway grade separations.

The KCS railroad relocation concept elevates the rail corridor through Downtown Laredo. Refinements to the vertical and horizontal design elements in conjunction with constructability issues were reviewed in more detail. A conceptual plan and profile of the elevated rail corridor used to estimate probable construction costs is included in the Appendix.

The top of rail profile provided by KCS was checked against publicly-available GIS data and KCS track charts for the maximum grade. The maximum grades between MP 0 and Laredo Yard are 0.5% for westbound traffic and 0.8% for eastbound traffic. Because the grades within the limits described above are relatively short and would not typically be considered a ruling grade, a maximum grade of 0.8% is proposed, which complies with design criteria for KCS-operated unit trains on KCS Standard Drawing RB-301. Use of a 0.8% grade allows the proposed elevation to provide 16’-6” of vertical clearance at the I-35 frontage roads of Santa Ursula and San Dario with minimal adjustment of the road profile through the use of shallow through-plate girder or truss steel spans having a structure depth of 4’-6” from top of rail to low chord. Several other grade separations are possible along the KCS corridor.

The KCS right-of-way between Santa Rita Avenue (MP 0.90) and San Jorge Avenue (MP 1.80) averages approximately 56’ in width with average offsets of 22 feet south of the existing main track and 34 feet north of the existing main track. Due to insufficient offset distance to adjacent development and the proximity of the existing I-35 overpass it is not feasible to construct the KCS elevation while maintaining service in the corridor during construction. This means that a temporary shoo-fly detour would not fit in the available right-of-way. However, if it were possible to reroute traffic to UP under a trackage rights agreement, then the proposed elevation could be constructed. KCS trains would need to access Laredo via the UP Laredo Subdivision from San Antonio. These physical constraints mean that the railroad elevation would be only a single-track viaduct structure.

The construction cost estimate for this concept is at $140 million. The majority of the cost is associated with bridge structures and retaining walls. Costs are included for side street crossing adjustments, as well as accounting for utility protection or relocation.

Crossing Enhancements

For the crossing enhancement concepts, the refinement process involves reviewing traffic volume data and geometry as well as social and environmental impacts for the I-35 Ramp Modification concept. Further review of any concept for design and environmental impacts will be completed if a project is selected for implementation. While crossing consolidations and warning device upgrades are part of the crossing enhancement category of improvements, they are generally associated with each grade separation and rail relocation concept. Consolidations and warning device upgrades will vary.

TxDOT Laredo District conducted traffic volume counts in July 2017 on I-35, select entrance and exit ramps, and the frontage roads near the KCS corridor. A sketch-level analysis using this information allowed review of potential weaving conditions with the various options for ramp modifications. Combined traffic volumes at the southbound off-ramp for Scott/Washington and Park/Sanchez are 1,000 vehicles per hour (vph) during the AM peak and 2,100 vph during PM peak. At 2,100 vph, the rate of traffic flow begins to approach capacity for a one-lane ramp. A high-level review of profile grades and weaving distances indicate that ramp modifications would need to provide adequate spacing for movements to/from the frontage roads and the main lanes for sight distance and acceleration. The only design option that meets volume and design constraints is a braided ramp configuration.

The southbound braided ramp concept starts at the I-35 southbound exit ramp at the crest of the vertical curve near Sanchez Street and continues the elevated roadway to cross over the proposed entrance ramp from the frontage road. This allows the entrance ramp to access I-35 at a point where the frontage road and the interstate are at a common elevation. Figure 16 presents a depiction of the braided ramp concept.

Northbound traffic volumes reflect existing use of the grade separation of Northbound I-35 and the KCS corridor. Therefore, no modifications are suggested for the northbound ramp configurations.

Figure 16: I-35 Ramp Modification Rendering

Source: TranSystems.

Packages and Project Timing

An initial set of concept packages compare benefits and costs comprehensively in the study area. The packages allow for comparison between the grade separations on the existing rail alignments to rail relocation concepts, along with comparison between different grade separation locations.

A product of the Laredo Mobility Study is a program of projects with implementation time frames of short, medium, and long terms. The time periods for these categories are 0 to 5 years, 6 years to 15 years, and 16 or more years. Assigning a project to a time frame is dependent upon several factors including the complexity of a project, need for environmental review and permitting, the financial elements of a project, and priority of a project. Generally, individual or independent projects seen as a high priority can be accomplished in the short term (e.g., warning device upgrades). However, multiple projects or highly complex projects should be categorized in the medium to long-range time frame.

Figure 17 shows the concept packages reviewed on the UP corridor. Figure 18 shows the concept packages reviewed on the KCS corridor. A summary of the package costs is listed in Table 6.

Figure 17: UP Concept Packages Reviewed

Crossing Name	LRD	RG	PACKAGE 1	PACKAGE 2	PACKAGE 3		PACKAGE 4	
Industrial Blvd			Warning Device Upgrade	Warning Device Upgrade	Warning Device Upgrade		Warning Device Upgrade	
Mann Rd								
Island Dr								
Justo Penn								
Calton Rd			*Grade Separation already programmed - construction scheduled to begin Fall 2017*					
Markley								
Chicago			Pedestrian Overpass	Pedestrian Overpass		Pedestrian Overpass		Pedestrian Overpass
Pace			Crossing Closure TBD	Crossing Closure TBD				
Ugarte								
Philadelphia								
Boston			Crossing Closure TBD	Crossing Closure TBD				
Pierce								
Baltimore			Warning Device Upgrade	Warning Device Upgrade		Warning Device Upgrade		Warning Device Upgrade
Lafayette			*Existing Grade Separation*		RAIL RELOCATION		RAIL RELOCATION	
Madison								
Blair			Crossing Closure TBD	Crossing Closure TBD				
Franfort								
Jefferson			Grade Separation	Grade Separation		Grade Separation		Grade Separation
Shea			Crossing Closure TBD	Crossing Closure TBD				
Gonzalez								Grade Separation
Bruni								
Park								
Sanchez			Grade Separation	Warning Device Upgrade		Grade Separation		Xing Clos. / Ex. Ped. Over TBD
Garza			Crossing Closure TBD					
Santa Isabel			Warning Device Upgrade	Warning Device Upgrade				
Scott			Xing Closure or Overpass TBD	Xing Closure or Overpass TBD	Xing Closure or Overpass TBD		Xing Closure or Overpass TBD	
Zaragoza			Pedestrian Overpass	Pedestrian Overpass	Pedestrian Overpass		Pedestrian Overpass	
	2017 $		**$42.2 Million**	**$29.8 Million**	**$44.9 Million**		**$45.3 Million**	

Source: TranSystems.

Figure 18: KCS Concept Packages Reviewed

<table>
<tr><th></th><th>PACKAGE 1</th><th>PACKAGE 2</th><th colspan="2">PACKAGE 3</th></tr>
<tr><td>Zaragoza</td><td>Pedestrian Overpass</td><td>Pedestrian Overpass</td><td colspan="2">Pedestrian Overpass</td></tr>
<tr><td>Santa Isabel</td><td>Warning Device Upgrade</td><td>Warning Device Upgrade</td><td colspan="2">Warning Device Upgrade</td></tr>
<tr><td>Vidaurri</td><td rowspan="3">Crossing Closure TBD</td><td rowspan="3">Crossing Closure TBD</td><td rowspan="18">RAIL RELOCATION</td><td rowspan="3">Crossing Closure TBD</td></tr>
<tr><td>Santa Rita</td></tr>
<tr><td>Santa Cleotilde</td></tr>
<tr><td>Main St</td><td></td><td></td><td rowspan="14">Grade Separation</td></tr>
<tr><td>Davis</td><td>Crossing Closure TBD</td><td>Crossing Closure TBD</td></tr>
<tr><td>Santa Maria</td><td>Grade Separation</td><td>Warning Device Upgrade</td></tr>
<tr><td>Juarez</td><td>Crossing Closure TBD</td><td>Crossing Closure TBD</td></tr>
<tr><td>Convent</td><td>Grade Separation</td><td>Crossing Closure TBD</td></tr>
<tr><td>Flores</td><td></td><td>Grade Separation</td></tr>
<tr><td>San Agustin</td><td>Crossing Closure TBD</td><td>Grade Separation</td></tr>
<tr><td>San Bernardo</td><td>Warning Device Upgrade</td><td>Warning Device Upgrade</td></tr>
<tr><td>Santa Ursula</td><td>Ramp Modification</td><td>Ramp Modification</td></tr>
<tr><td>San Dario</td><td></td><td></td></tr>
<tr><td>San Eduardo</td><td></td><td></td></tr>
<tr><td>San Francisco</td><td></td><td></td></tr>
<tr><td>San Jorge</td><td></td><td></td><td>Crossing Closure TBD</td></tr>
<tr><td>2017 $</td><td>$27.5 Million</td><td>$27.4 Million</td><td colspan="2">$145.3 Million</td></tr>
</table>

Grade Separations	Short Range	Mid Range	Long Range
Rail Relocation	Short Range	Mid Range	Long Range
Crossing Enhancements	Short Range	Mid Range	Long Range

Source: TranSystems.

Table 6: Costs by Expense and Improvement Type (millions of 2017$)

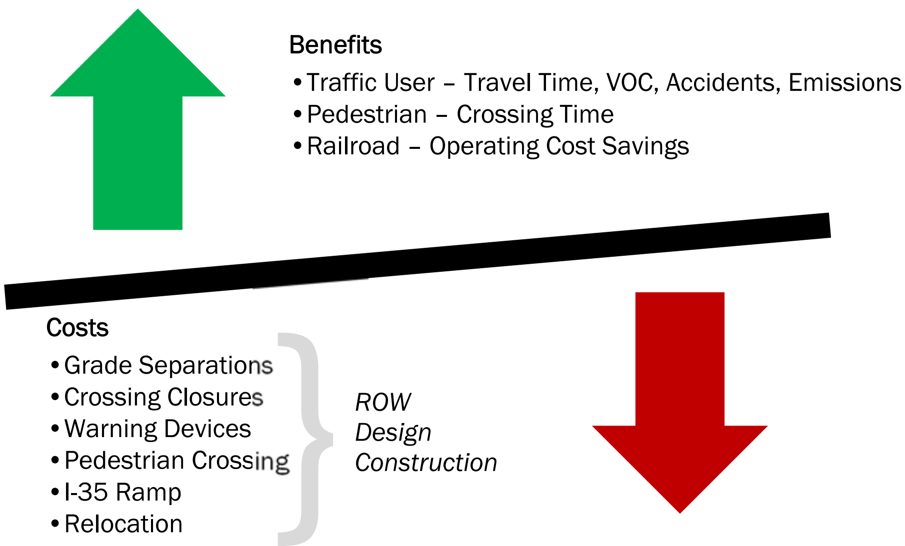
	KCS1	KCS2	KCS3	UP1	UP2	UP3	UP4
Expense Type							
Construction	$25.1	$22.0	$137.8	$39.0	$27.8	$42.1	$42.9
P/E	$1.4	$1.2	$7.5	$2.1	$1.5	$2.2	$2.3
ROW	$1.1	$4.3	$0.0	$1.3	$0.5	$0.6	$0.1
Total	*$27.5*	*$27.4*	*$145.3*	*$42.4*	*$29.8*	*$44.9*	*$45.3*
Improvement Type							
Grade Separation	$16.4	$15.9	$0.0	$26.5	$13.7	$16.0	$16.3
I-35 Ramp	$5.1	$5.1	$0.0	$0.0	$0.0	$0.0	$0.0
Ped. Overpass	$4.3	$4.3	$4.3	$12.7	$12.7	$10.8	$10.8
Crossing Closure	$0.8	$0.8	$0.5	$1.4	$0.8	$0.1	$0.3
Warning Device	$0.9	$1.4	$0.5	$1.8	$2.8	$0.9	$0.9
Relocation	$0.0	$0.0	$140.0	$0.0	$0.0	$17.1	$17.1
Total	*$27.5*	*$27.4*	*$145.3*	*$42.4*	*$29.8*	*$44.9*	*$45.3*

Source: TranSystems.

Benefit-Cost Analysis

In a benefit-cost analysis (BCA), benefits associated with improvements are compared to the total costs (improvements and operation) to ascertain if society is "better-off" with the proposed infrastructure. Conceptually, the improvement cost and benefit types are outlined in Figure 19.

Figure 19: Improvement-Costs and Benefits Types



Source: CDM Smith.

Discounted project benefits are compared with discounted project costs across the multi-year analysis period from three perspectives. While the results from each perspective indicate the same feasibility finding (yes or no), the three metrics provide different perspective as to the dollar magnitude, relativity, and robustness:

- Net Present Value (NPV): discounted benefits less discounted costs; a positive monetary value indicates the investment is economically feasible.
- Benefit-Cost Ratio (BCR): discounted benefits divided by discounted costs; a ratio greater than 1.0 indicates the project is economically feasible.
- Internal Rate of Return (IRR): discount rate at which the present-value of the benefits is equal to the present-value of the costs; an IRR > than the threshold discount rate (either 3% or 7%) indicates the project is economically feasible.

Table 7 presents a comparison of the various economic evaluation metrics for each package.

Table 7: Package Economic Evaluation Metric Comparison

Improvement Package	NPV (m. of 2017$) 3%	NPV (m. of 2017$) 7%	BCR 3%	BCR 7%	IRR
KCS Package 1	$73.9	$27.8	3.82	2.45	17.6%
KCS Package 2	$23.0	$4.4	1.90	1.23	9.2%
KCS Package 3	$36.7	-$4.0	1.32	0.94	6.2%
UP Package 1	$5.4	-$8.7	1.13	0.71	4.0%
UP Package 2	-$23.0	-$18.1	0.19	0.12	-11.2%
UP Package 3	$2.4	-$8.5	1.06	0.68	3.5%
UP Package 4	-$1.0	-$8.8	0.98	0.67	2.8%

Source: CDM Smith.

- KCS Packages: Of the three KCS packages, the KCS1 clearly yields the most favorable economic feasibility metrics given the sketch-level benefits evaluated, with a 17.6% IRR and BCRs > 2.0. The KCS2 package is also strong, while the KCS3 is modest given the IRR (6.2%) is less than the 7% discount rate.
- UP Packages: All four UP packages yield poorer economic feasibility returns than the lowest KCS package (KCS3). Of these, the UP2 is very weak, suggesting only marginal vehicular traffic benefits. UP4 is also weak with an IRR < 3%. UP1 and UP3 yield similarly uncertain economic benefits with feasible outcomes at the 3% discount rate (IRR > 3%), but unfeasible outcomes at the 7% discount rate. One must consider that UP3 and UP4's feasibility results would be more favorable had railroad benefits been quantified and incorporated into the BCA.

Implementation Recommendations

The purpose of the Laredo Mobility Study is to identify potential grade separations, grade crossing closures, railroad relocations, or other transportation system improvements along railroad corridors in the City of Laredo. Using measures of technical, financial, and institutional feasibility, improvement concepts are selected to create a program of short, medium, and long-range projects to enhance mobility in the community. Projects could be implemented as shown in the packages, individually, or not at all. Any future implementation will be the responsibility of the City of Laredo and other interested stakeholders.

The Laredo Mobility Study primarily focused on technical and financial measures. Early aspects of institutional feasibility were incorporated including high-level environmental and socioeconomic resources along with stakeholder input. However, institutional measures will take on a greater role as projects advance.

KCS Corridor Package to Advance

All three of the KCS packages are beneficial, yet the rail elevation concept has significant challenges in terms of constructability and overall costs especially with future maintenance and replacement costs.

The two packages with the highway-rail grade separations provide a positive benefit-cost ratio as well as similar construction costs. The major differences between the two packages are traffic capacity (number of lanes), property access, and potential property acquisition. Both concepts require changes to travel patterns, yet they match with existing one-way street patterns south of Washington Street. Other aspects that require further investigation include impacts to potentially eligible historic properties and the cost of relocating utilities associated with underpass construction.

Consequently, the decision to proceed with either KCS1 or KCS2 depends upon further consideration by stakeholders of design parameters, property impacts, and transportation network modifications.

Short-Range Projects

In the short term, projects included in the KCS packages such as the southbound I-35 Ramp Modifications, warning device upgrades, and crossing consolidations should be advanced while grade separation locations are decided. Final locations for warning device upgrades and crossing consolidations should incorporate community input. In addition, a pedestrian overpass at Zaragoza Street affords pedestrian mobility and allows a safe crossing of both the KCS and UP tracks. The most suitable configuration for the pedestrian overpass should be advanced with input from residents, KCS, and UP.

Medium-Range Projects

An underpass as a one-way couplet system is recommended to be advanced. The location should be reviewed in a holistic manner by the City of Laredo and KCS to further consider input from community members on design parameters, property impacts, and transportation network modifications. Continued coordination with KCS is necessary because the underpass design requires a temporary railroad relocation during construction. Depending upon location, the project may affect access along Moctezuma Street. It is recommended that the planning of the grade separation begin in the short-range, yet the environmental review process and partnership with the KCS may result in the construction of the project occurring in the medium-range time period.

Long-Range Projects

As vehicular and train traffic increase over time, mobility and access issues will remain in Downtown Laredo. While a grade separation will alleviate mobility and access issues, long-range consideration of rail relocation options should remain under consideration by the City of Laredo and the KCS.

UP Corridor Package to Advance

The four packages represent two basic concepts of highway-railroad grade separations either with the existing railroad network or in conjunction with a railroad relocation. UP1 and UP3 illustrate the differences between the packages with and without a railroad relocation. UP1 requires acquisition of more properties, especially residential properties; limits north-south continuity; and limits access to adjacent properties especially between the two rail corridors. UP3 shows lesser impacts in these categories because the length of any overpass is shortened with the RG Track relocated closer to the Laredo Subdivision.

Short-range projects

In the short term, projects included in the UP packages such as warning device upgrades and crossing consolidations should be advanced while grade separation locations with a railroad relocation are decided. Final locations for warning device upgrades and crossing consolidations should incorporate community input. In addition, a pedestrian overpass at Zaragoza Street affords pedestrian mobility and allows a safe crossing of both the KCS and UP tracks. The most suitable configuration for the pedestrian overpass should be advanced with input from residents, KCS, and UP. A pedestrian crossing at Chicago should be advanced due to the proximity of the school. A crossing closure with a pedestrian crossing or a roadway grade separation at Scott Street should be considered due to the amount of time this crossing is blocked on a daily basis and the spacing of access points into the neighborhoods on the west side of the railroad tracks.

Medium-range projects

The RG Track railroad relocation along with an overpass of the Laredo Subdivision is recommended to be advanced. An overpass at Jefferson Street provides consistent spacing in the overall transportation network with existing and programmed grade separations. Additionally, as the length of UP trains increases an overpass at Jefferson Street would align with longer trains.

The grade separation location should be reviewed in a holistic manner by the City of Laredo and UP to further consider input from the community on design parameters, property impacts, and transportation network modifications. Continued coordination with UP is necessary because the RG Track relocation is directly associated with infrastructure they own and operate. It is recommended that the planning of the railroad relocation and grade separation begin in the short-range, yet the environmental review process and partnership with the UP may result in the construction of the project occurring in the medium-range time period.

An equally important discussion is the disposition of the RG Track. The greatest benefits to the community may be with the physical removal of the track, yet this would require additional construction costs as well as property costs to relocate several rail served businesses. Further consideration of the four alternative operating scenarios by the City of Laredo and UP is needed.

Long-Range Projects

As vehicular and train traffic increase over time, mobility and access issues will remain in Downtown Laredo. While a grade separation with consolidation of the two UP corridors through a railroad relocation will alleviate mobility and access issues, long-range consideration of a secure railroad corridor along the UP should remain under consideration by the City of Laredo, TxDOT, and the UP.

Other Initiatives

New technologies, advanced engineering concepts and operating policies need to be monitored as highway-railroad mobility and access conflicts will continue with increasing vehicular and train traffic.

Transportation Network Planning

The City of Laredo's transportation network is impacted by railroad operations, including those associated with international border crossings, creating the need for one-way streets for efficient flow yet with the result that street continuity is disjointed. Additionally, issues concerning truck routes in the study area, especially to/from/through the La Ladrillera neighborhood, were raised. During the study process, transportation network changes were considered in conjunction with crossing consolidations to ensure that mobility and access were maintained.

A comprehensive transportation network plan is recommended in the study area to improve overall mobility and access while considering the most efficient truck routes for through movements as well as access to industrial properties. This is especially important to consider with new grade separations, as trucks will likely use those routes. Continued coordination between local stakeholders, City of Laredo, and the railroads should consider options reviewed specifically in the Scott Street area (Appendix D) to improve mobility in Laredo.

New Technologies

On-going technology enhancements to warning devices, positive train control, intelligent transportation systems, and traffic signals can benefit users of highway-railroad grade crossings. Providing new technologies, as appropriate, should be considered on an on-going basis for the crossings in Laredo.

Border Crossing Policies

The international crossing between the U.S. and Mexico requires different operating parameters for railroads over a standard mainline operation. The KCS and UP work with CBP and Mexican authorities to actively improve operations through policy changes. This on-going collaboration will benefit users of highway-railroad grade crossings.

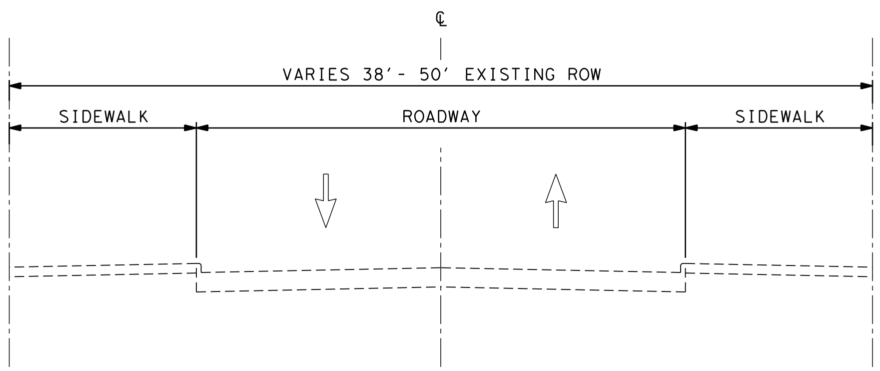
Railroad Relocation

As vehicular and train traffic increase over time, mobility and access issues will remain in Downtown Laredo. While consolidation of the two UP corridors through a railroad relocation is recommended in this study, long-range consideration of railroad relocation options outside of the study area should remain under consideration by the City of Laredo and the KCS. While options are considered, the UP should also be included in concepts for a holistic review of opportunities to improve mobility and access.

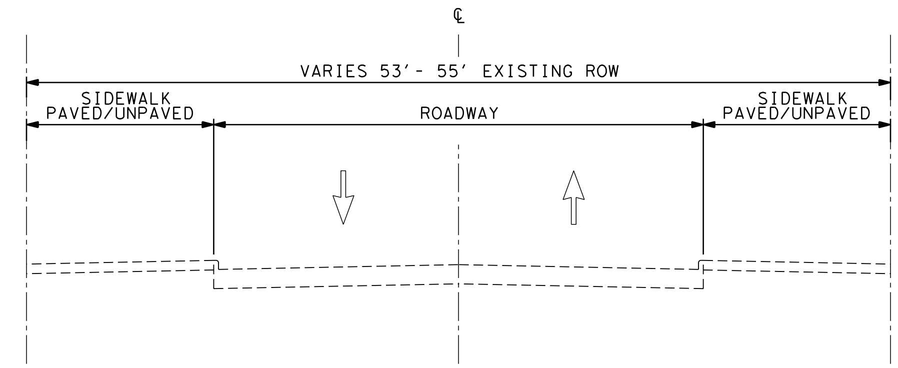
Next Steps

Numerous, past transportation studies conducted in Laredo focused on freight railroad mobility and highway-railroad grade crossing issues. As the program of projects advances, the local, state and private parties need to continue to engage their common interest towards successful implementation. It is suggested that the appropriate parties among the City of Laredo, KCS, and UP execute a MOU for advancing the entire program, specific projects of interest, or continued engagement to further investigate solutions for mobility and access in Laredo.

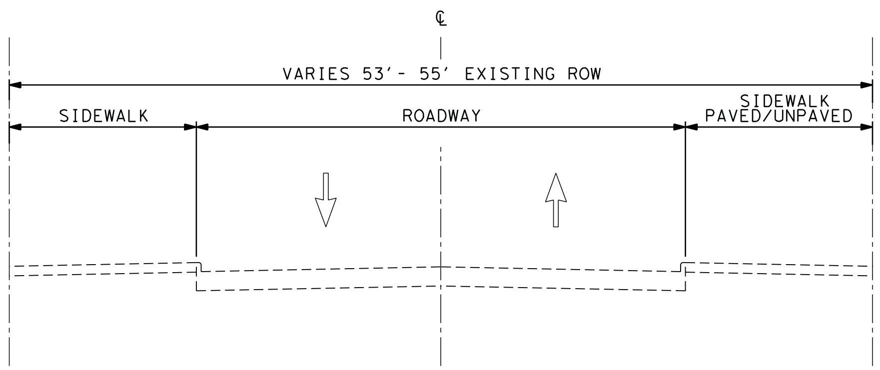
Appendix A. Grade Separation Concepts Reviewed



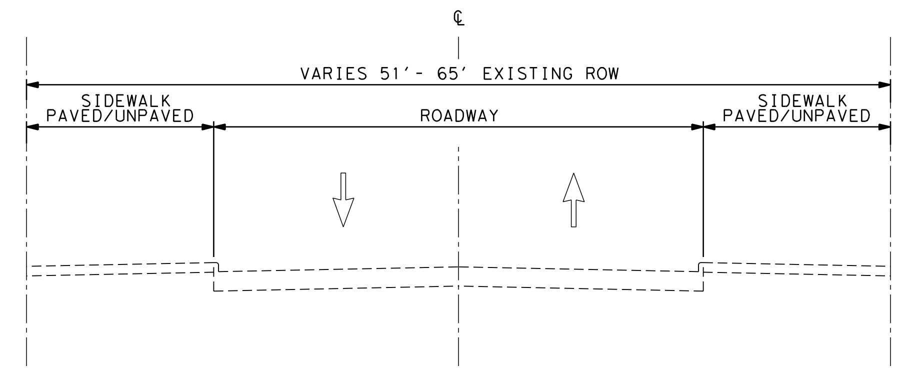
MARKLEY LN TYPICAL SECTION



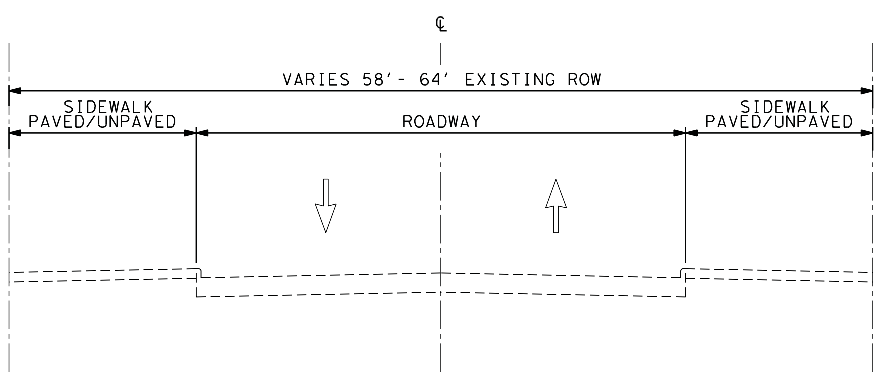
GONZALEZ ST TYPICAL SECTION



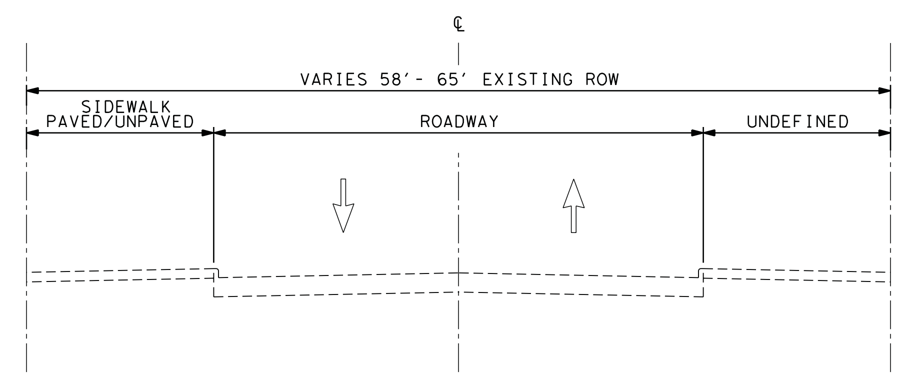
CHICAGO ST TYPICAL SECTION



SANCHEZ ST TYPICAL SECTION



JEFFERSON ST TYPICAL SECTION



SCOTT ST TYPICAL SECTION

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4:12:34 PM
4/11/2017

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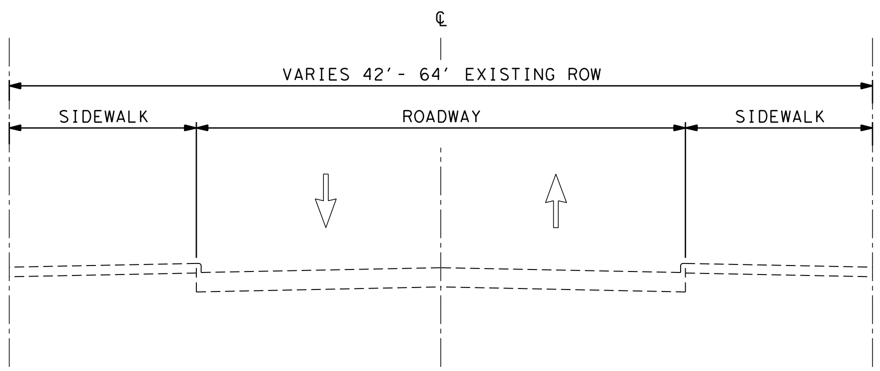
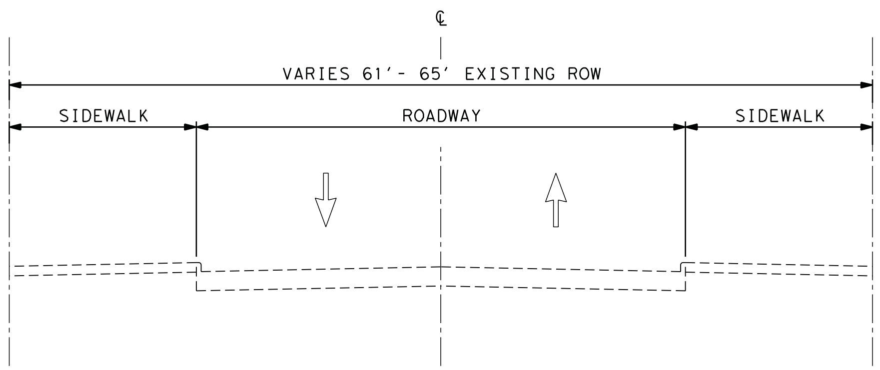
LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

EXISTING TYPICAL SECTIONS

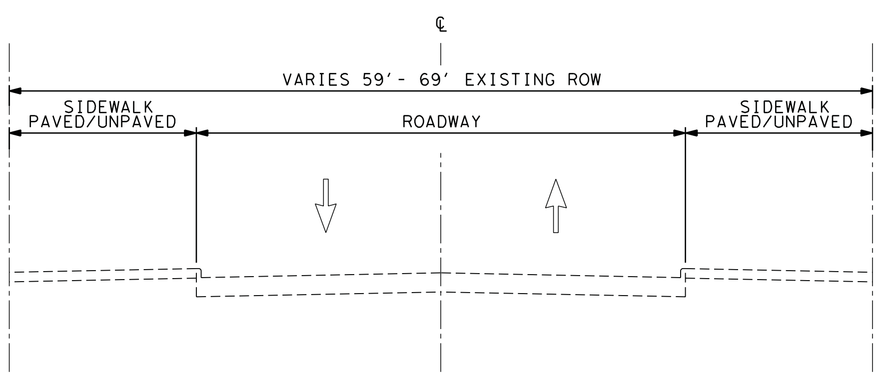
CONTRACT NO.
DRAWING NO. C-01
REVISION
SHEET NO.
SCALE AS SHOWN



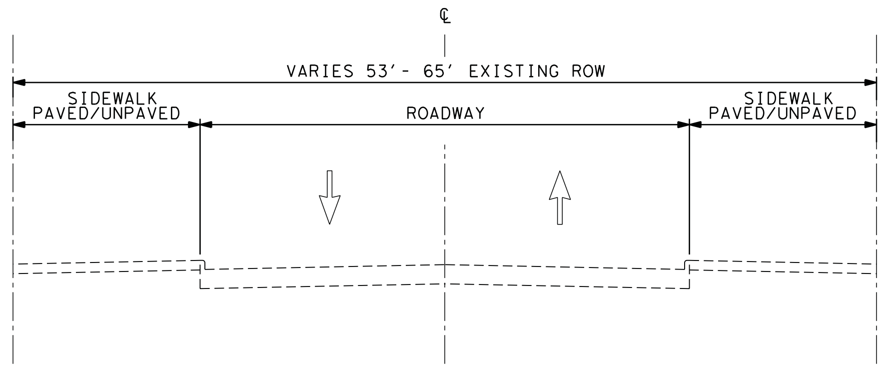
ZARAGOZA ST TYPICAL SECTION



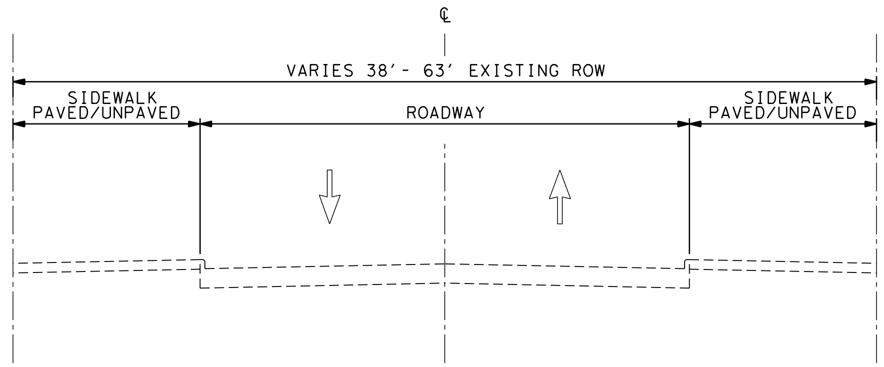
SANTA MARIA AVE TYPICAL SECTION



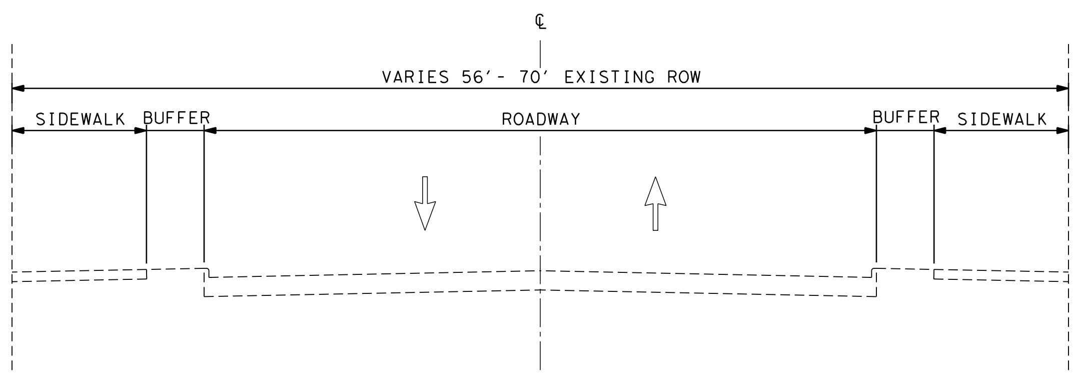
CONVENT AVE TYPICAL SECTION



FLORES AVE TYPICAL SECTION



SAN AGUSTIN AVE TYPICAL SECTION



SAN BERNARDO AVE TYPICAL SECTION

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

EXISTING TYPICAL SECTIONS

CONTRACT NO.	
DRAWING NO.	C-01
REVISION	SHEET NO.
SCALE	AS SHOWN

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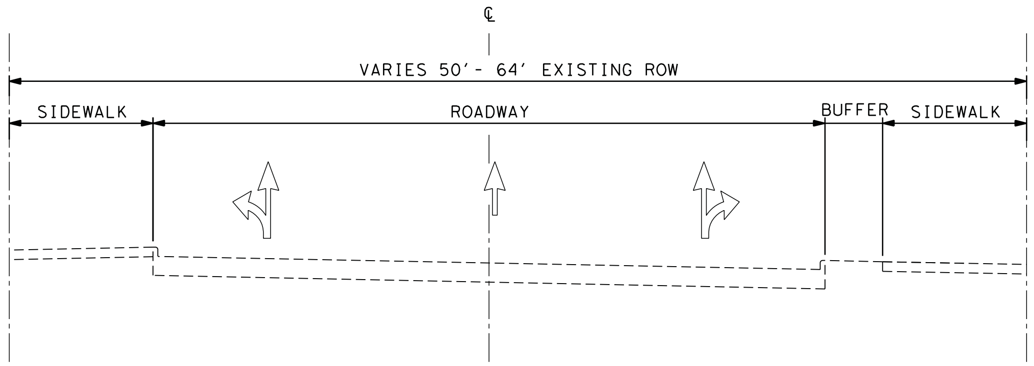
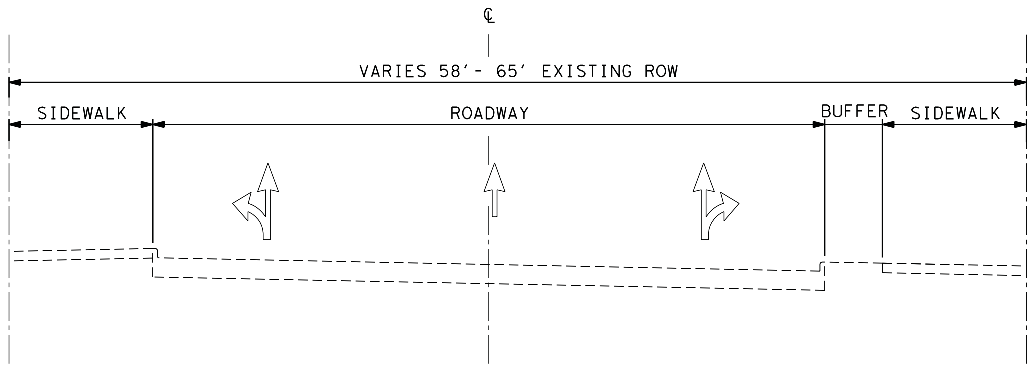


SANTA URSULA AVE TYPICAL SECTION



SAN DARIO AVE TYPICAL SECTION

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WEBB COUNTY, TEXAS

EXISTING TYPICAL SECTIONS

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DRAWING NO. C-01	
REVISION	SHEET NO.
SCALE AS SHOWN	

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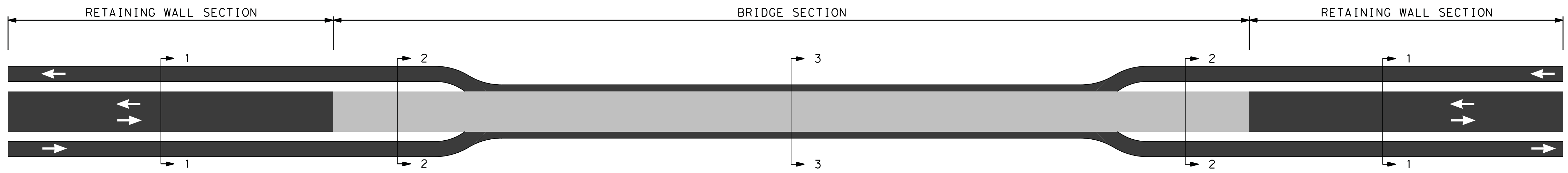
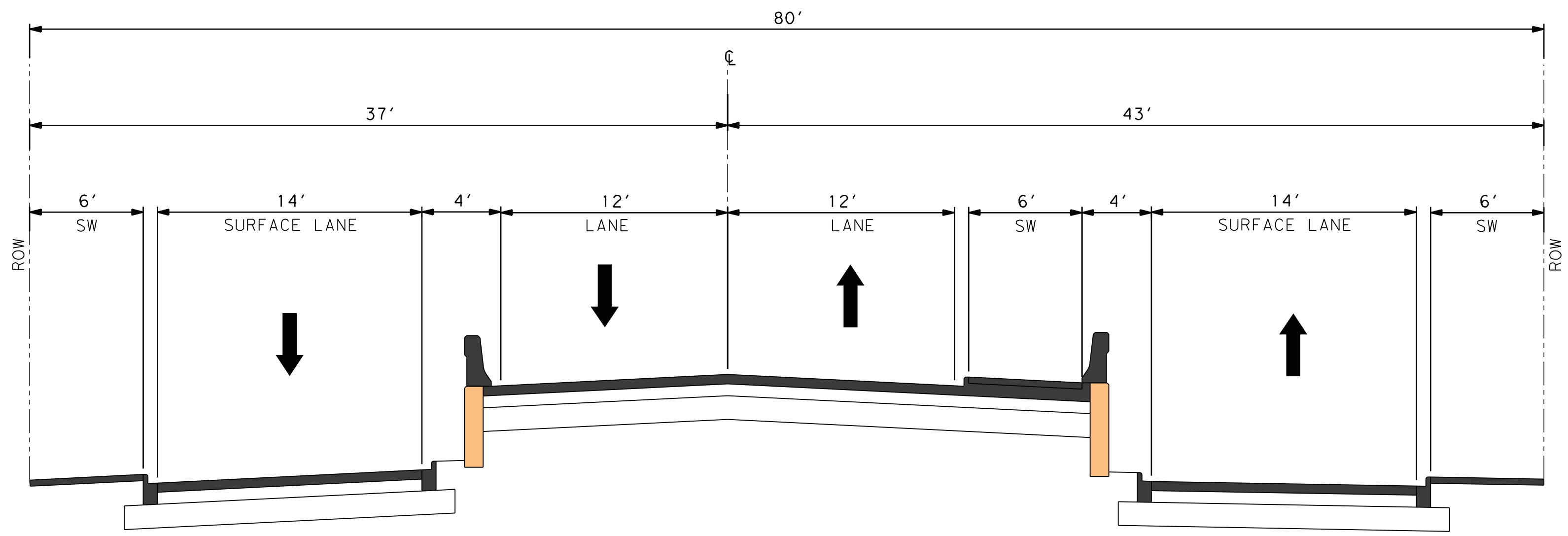
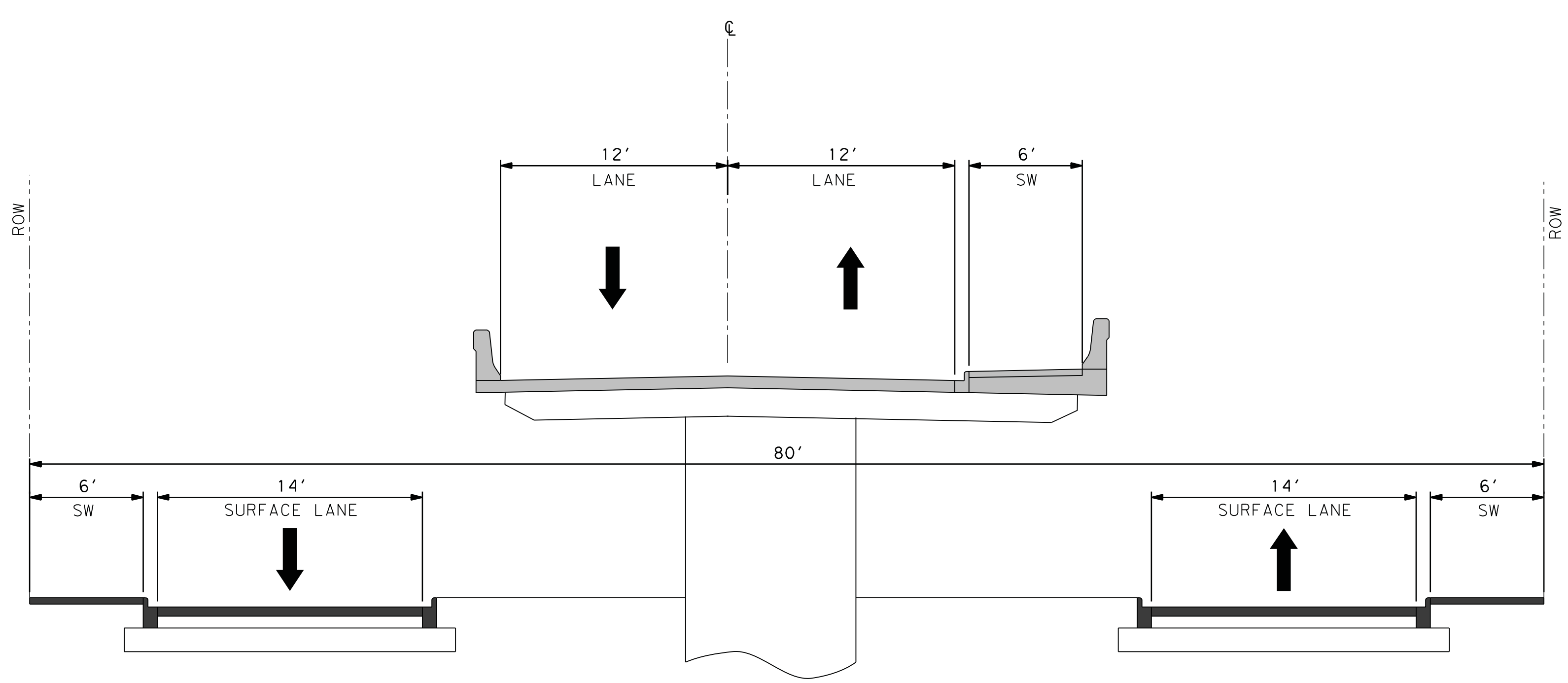




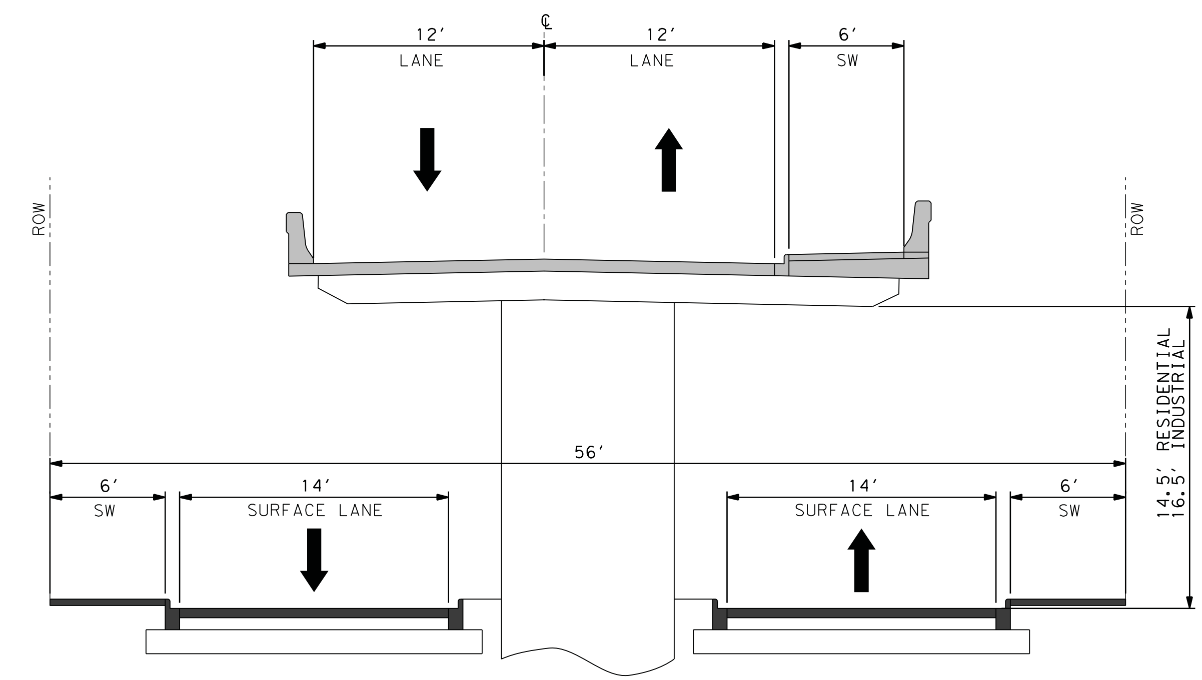
SECTION 1-1

APPLICABLE AT:

MARKLEY
CHICAGO
JEFFERSON
GONZALEZ
SANCHEZ
SCOTT
SANTA MARIA
SAN BERNARDO



SECTION 2-2



SECTION 3-3

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS
TYPICAL SECTIONS
TWO-WAY OVERPASS

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO.
SCALE AS SHOWN

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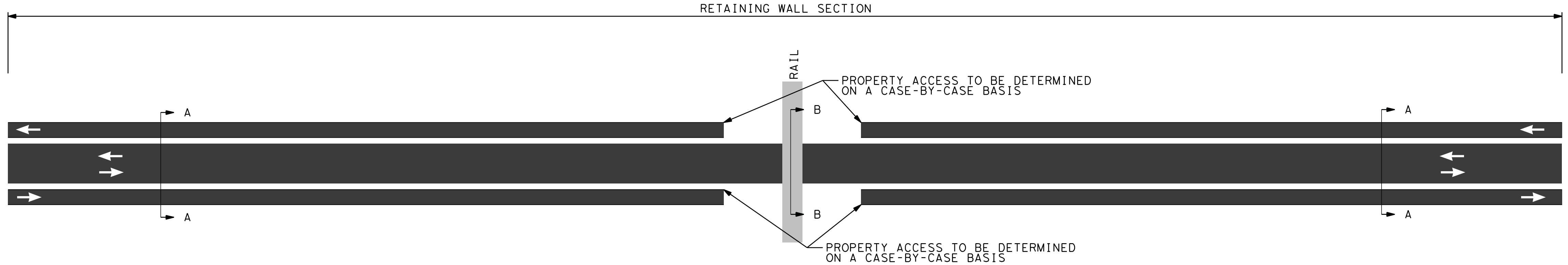
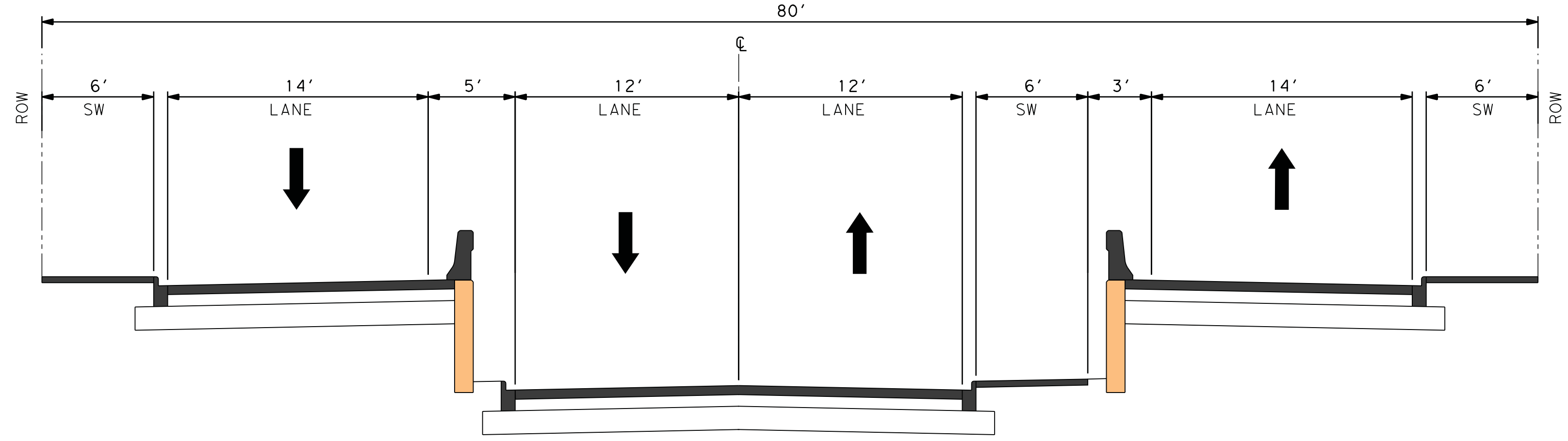
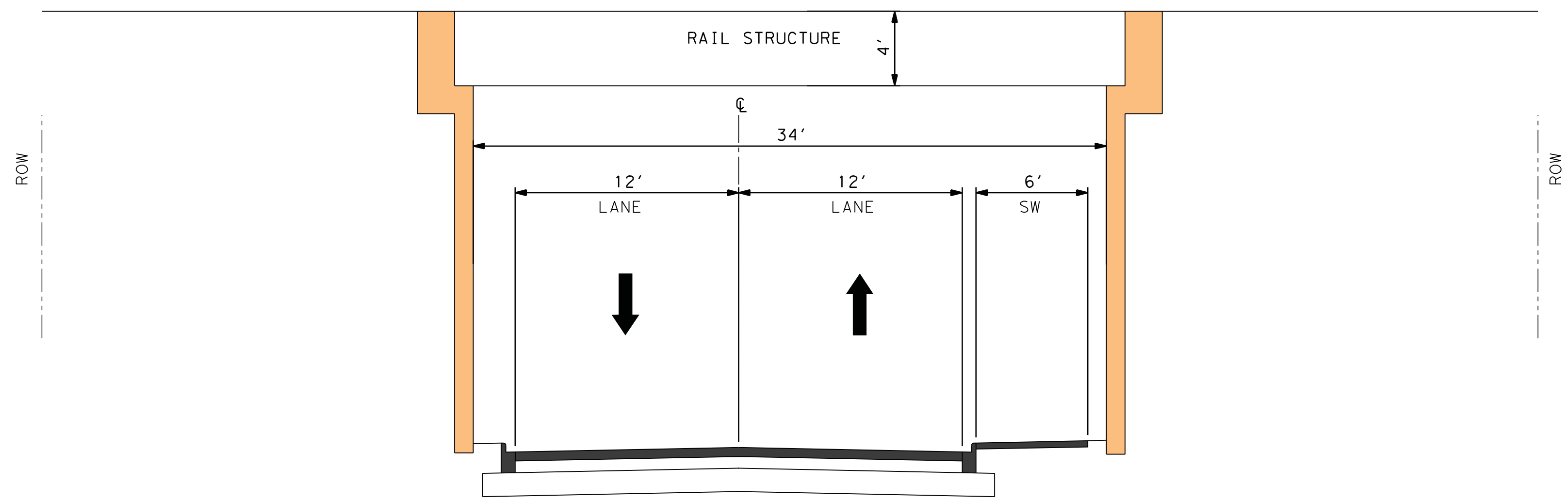




SECTION A-A

APPLICABLE AT:
CHICAGO
ZARAGOZA
SANTA MARIA
SAN BERNARDO



SECTION B-B

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS
TYPICAL SECTIONS
TWO-WAY UNDERPASS

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO.
SCALE AS SHOWN

Pen Table File
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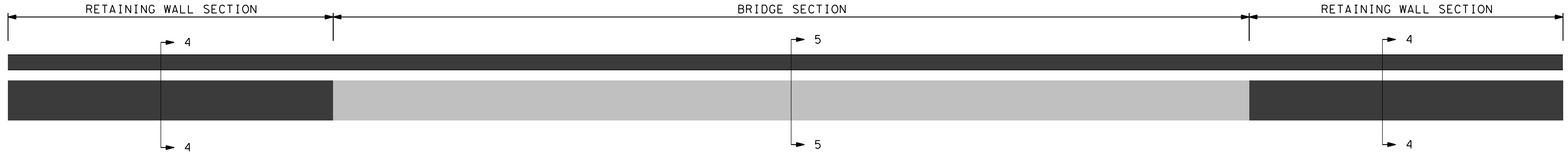
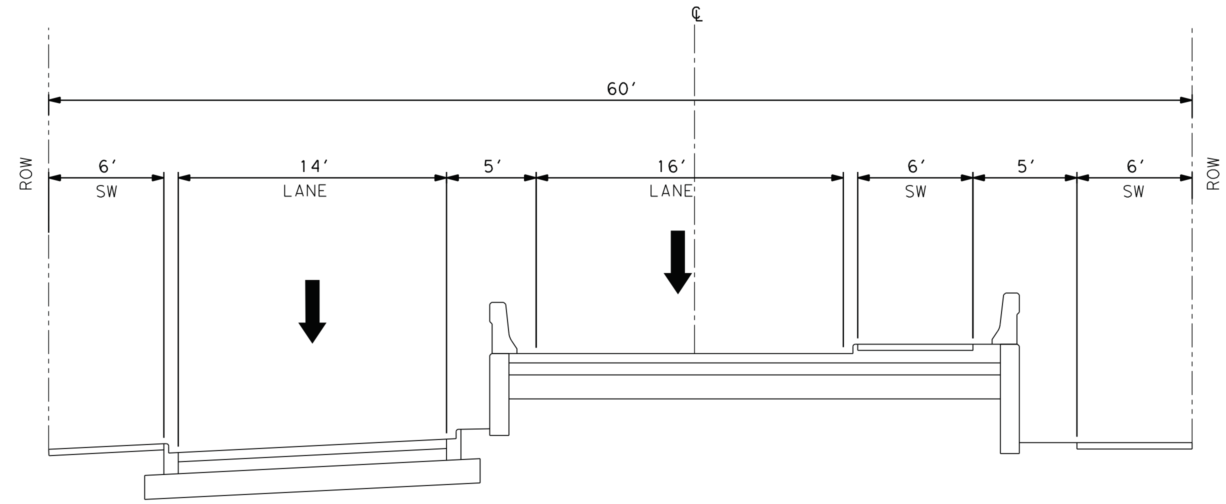
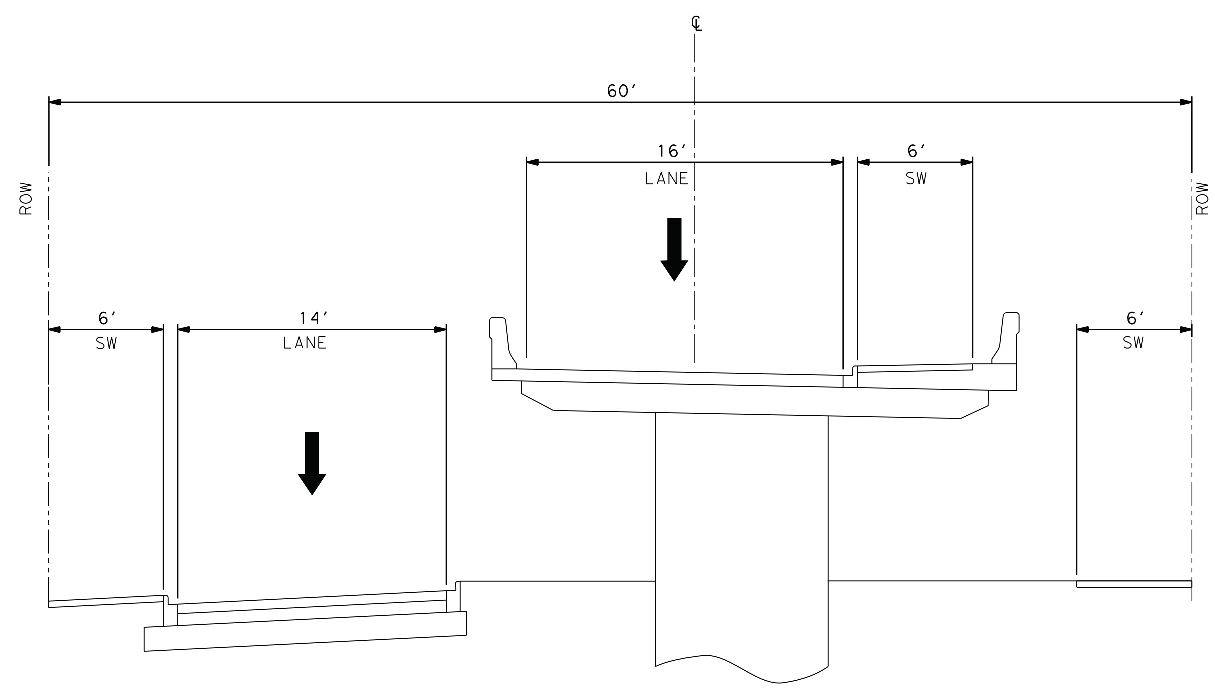




SECTION 4-4

APPLICABLE AT:

SANTA MARIA
CONVENT



SECTION 6-6

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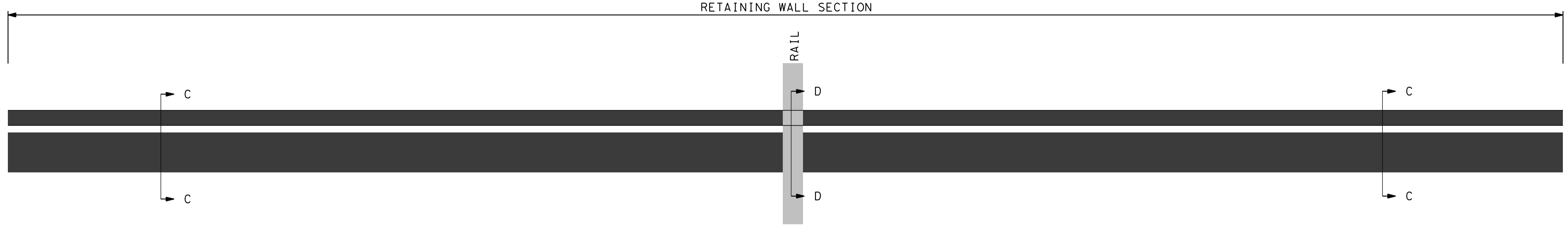
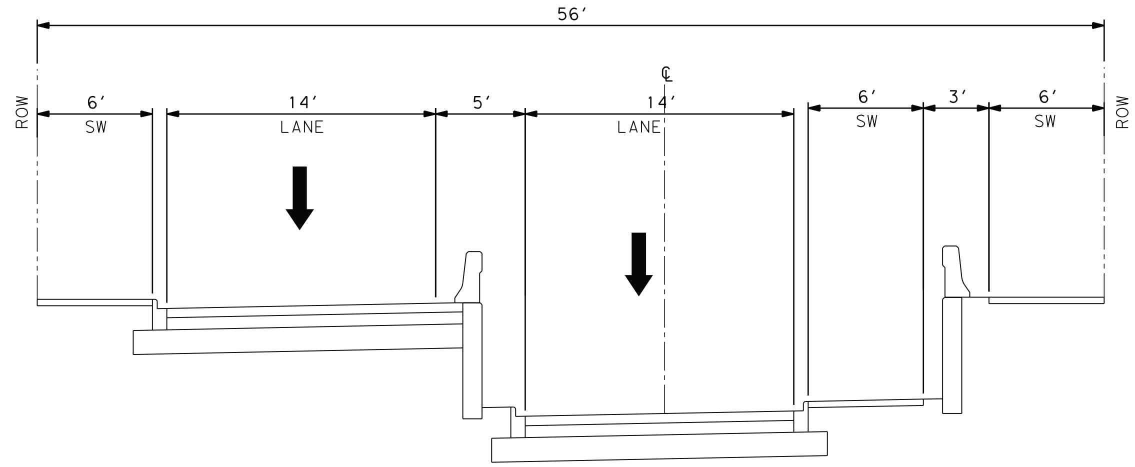
LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS
TYPICAL SECTIONS
ONE-WAY OVERPASS

CONTRACT NO.	
DRAWING NO.	C-01
REVISION	SHEET NO.
SCALE	AS SHOWN

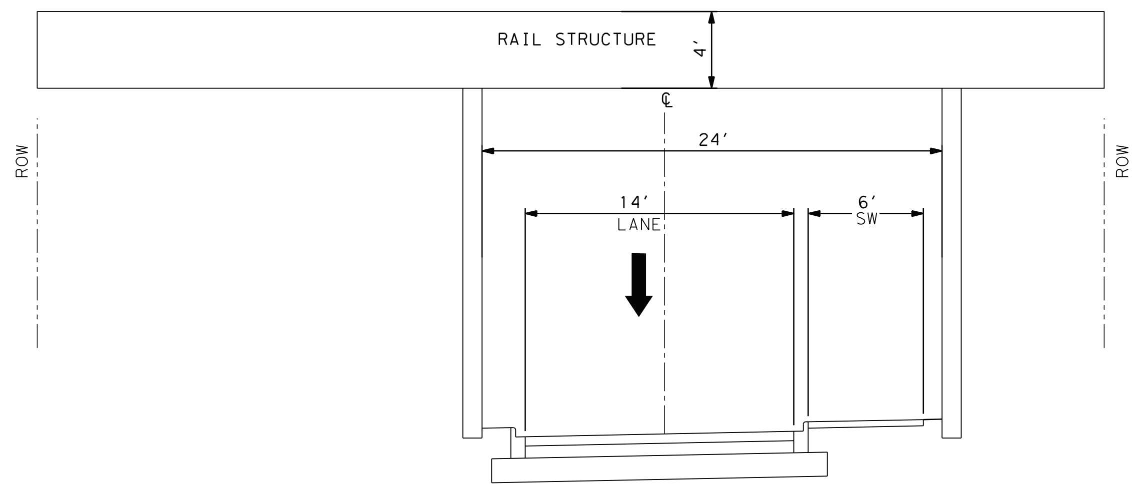




SECTION C-C

APPLICABLE AT:

SANTA MARIA
CONVENT



SECTION D-D

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4/11/2017

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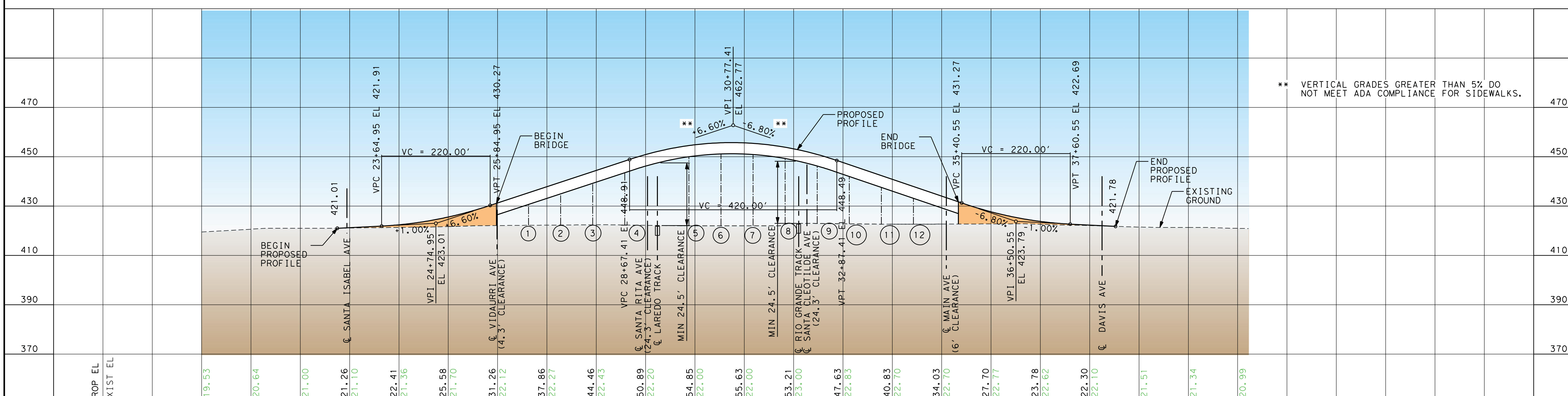
LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS
TYPICAL SECTIONS
ONE-WAY UNDERPASS

CONTRACT NO.	
DRAWING NO.	C-01
REVISION	SHEET NO.
SCALE	AS SHOWN

PLAN

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT



PROFILE

LEGEND

ASPHALT PAVEMENT	RETAINING WALL	PARCEL ROW
CONCRETE STRUCTURE	ROAD ACCESS CLOSED	RAILROAD ROW

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CONCEPTUAL OVERPASS CHICAGO PLAN & PROFILE

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 2
SCALE AS SHOWN

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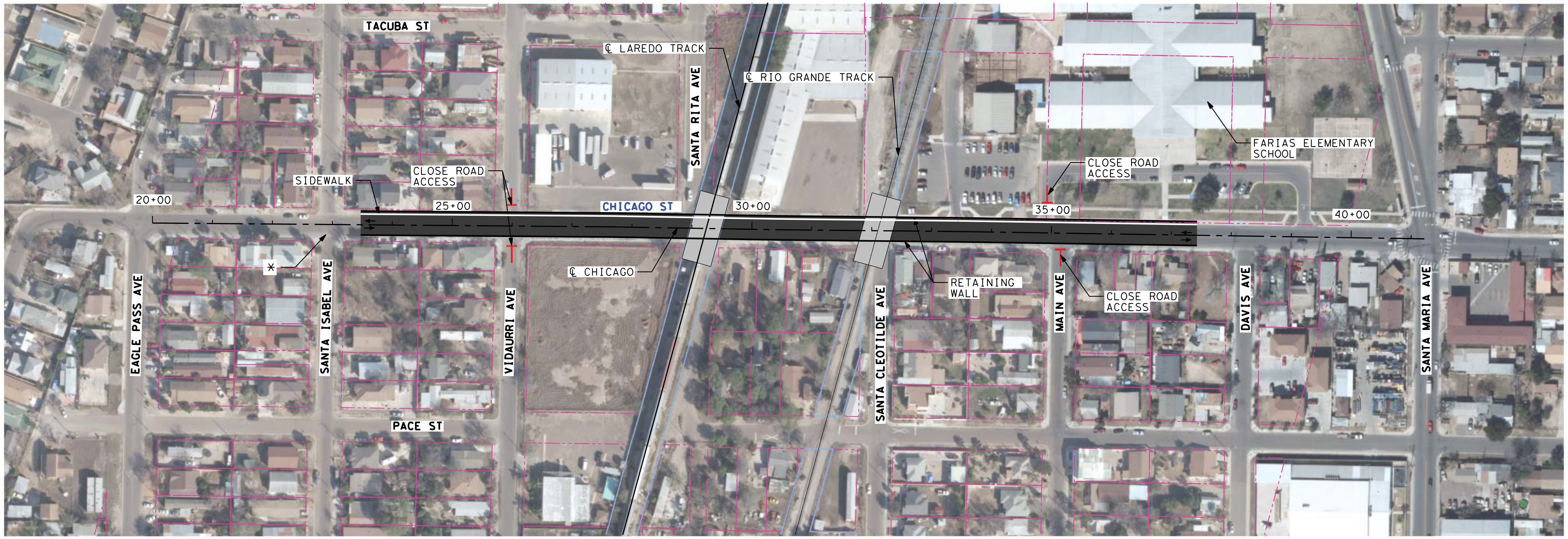
4/12/2017



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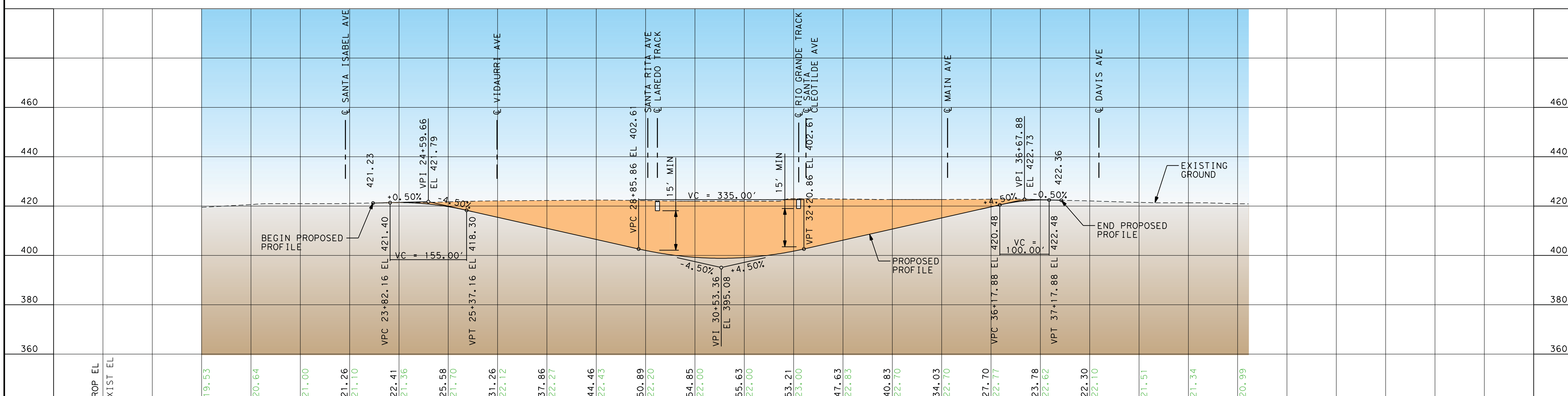
GRAPHIC SCALE: HORIZ. 1" = 200'

GRAPHIC SCALE: VERT. 1" = 40'

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

ASPHALT PAVEMENT
CONCRETE STRUCTURE
RETAINING WALL
ROAD ACCESS CLOSED
PARCEL ROW
RAILROAD ROW

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL UNDERPASS CHICAGO PLAN & PROFILE

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 3
SCALE AS SHOWN

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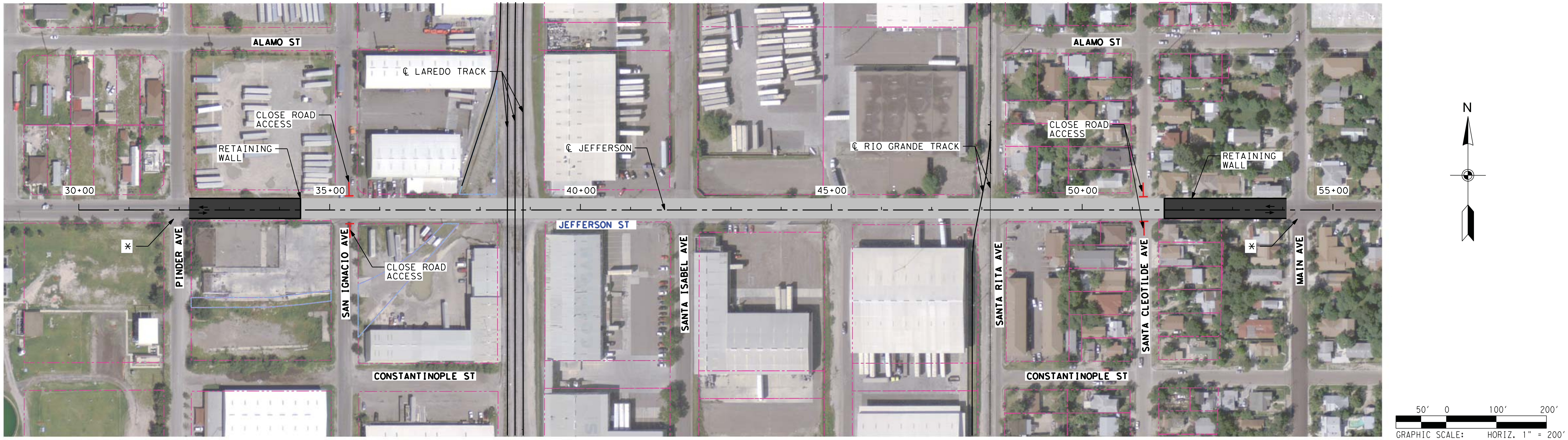
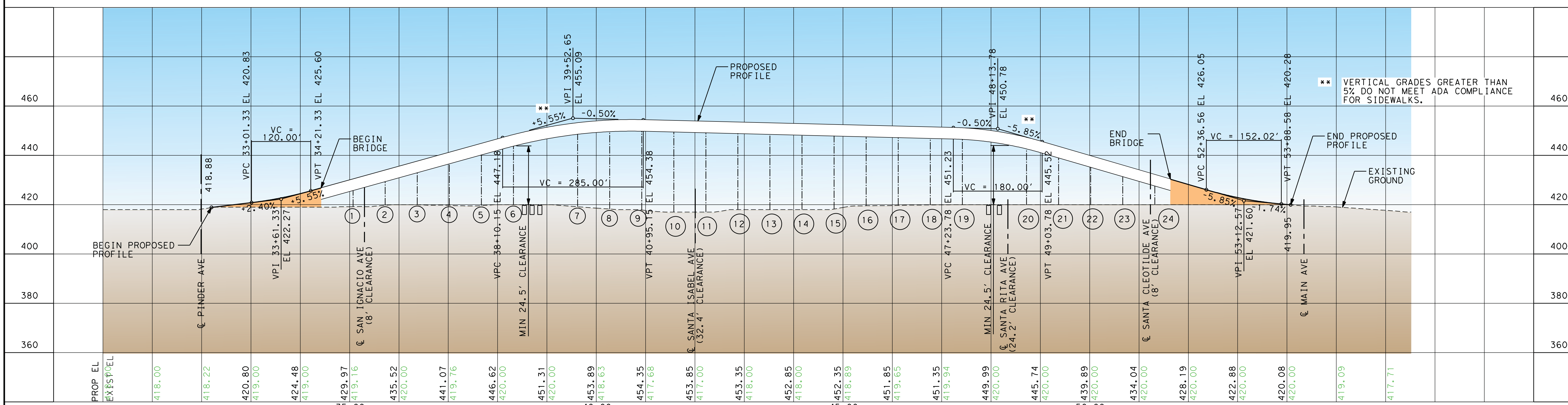


NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

ASPHALT PAVEMENT	RETAINING WALL	PARCEL ROW
CONCRETE STRUCTURE	ROAD ACCESS CLOSED	RAILROAD ROW

Texas Department of Transportation

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL OVERPASS JEFFERSON PLAN & PROFILE

CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO. 4
SCALE	AS SHOWN

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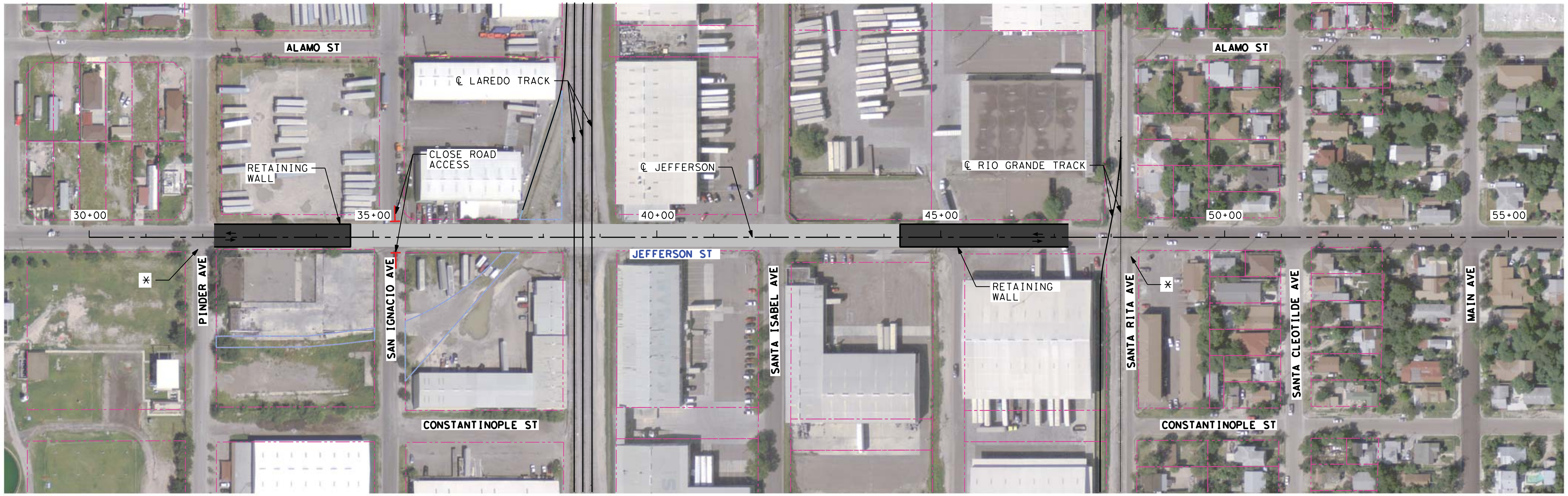

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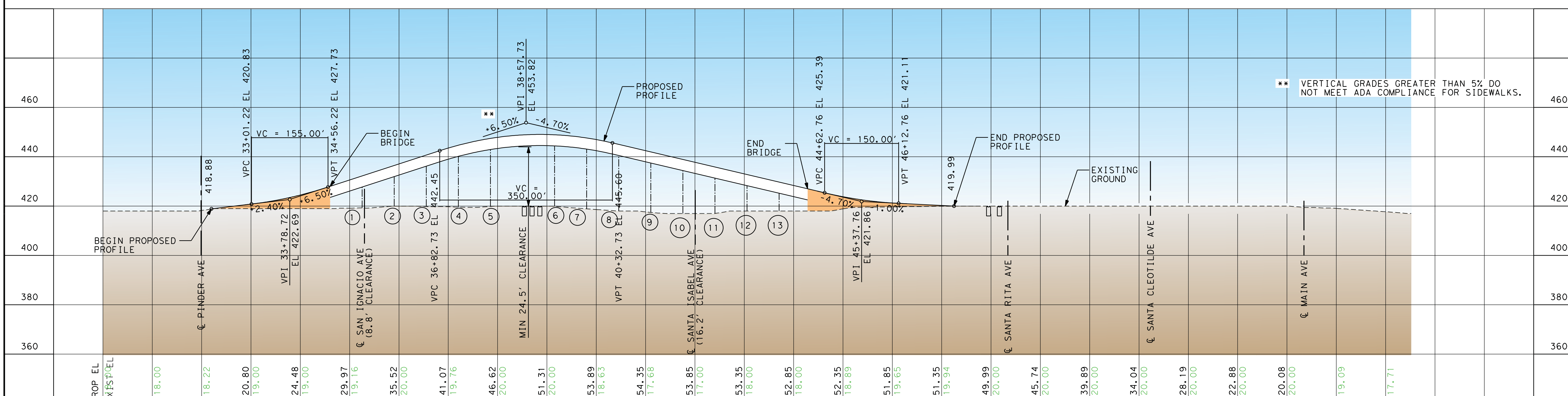
50' 0 100' 200'
GRAPHIC SCALE: HORIZ. 1" = 200'

10' 0 20' 40'
GRAPHIC SCALE: VERT. 1" = 40'

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW	
CONCRETE STRUCTURE		ROAD ACCESS CLOSED		RAILROAD ROW	

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CONCEPTUAL OVERPASS COMBINED JEFFERSON PLAN & PROFILE

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 5
SCALE AS SHOWN

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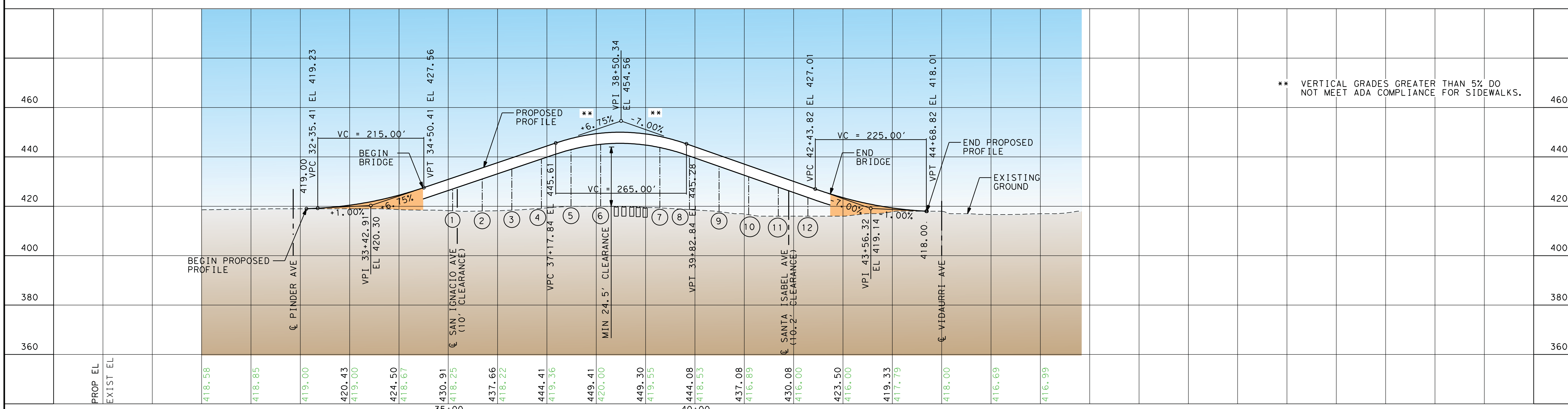
PLAN

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT



PROFILE

LEGEND

ASPHALT PAVEMENT
CONCRETE STRUCTURE
RETAINING WALL
ROAD ACCESS CLOSED
PARCEL ROW
RAILROAD ROW

Texas Department of Transportation

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL OVERPASS GONZALEZ PLAN & PROFILE

CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO. 6
SCALE	AS SHOWN

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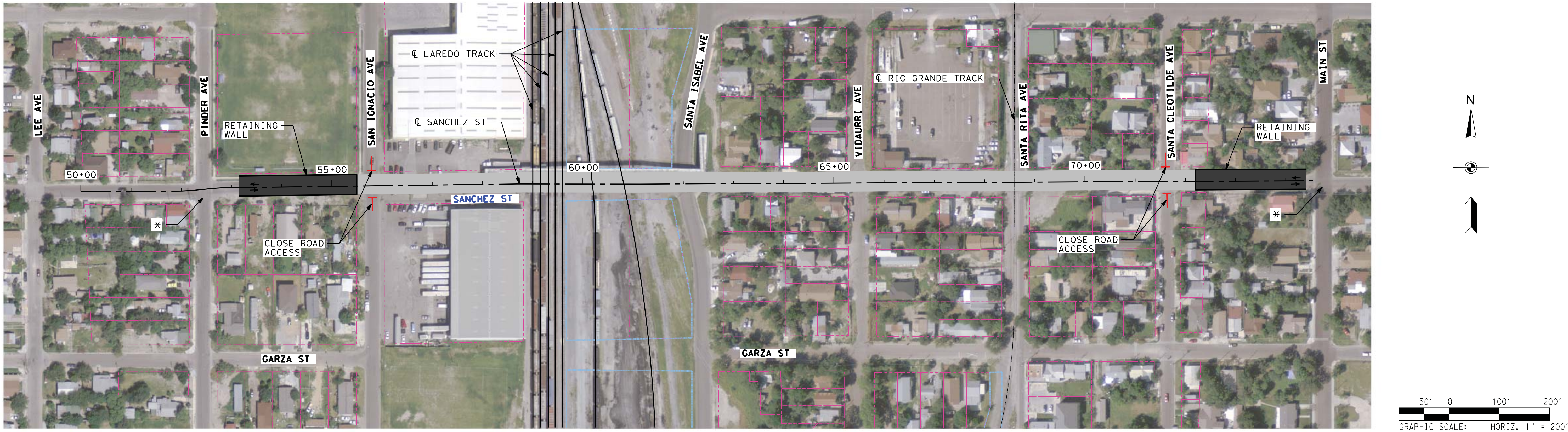
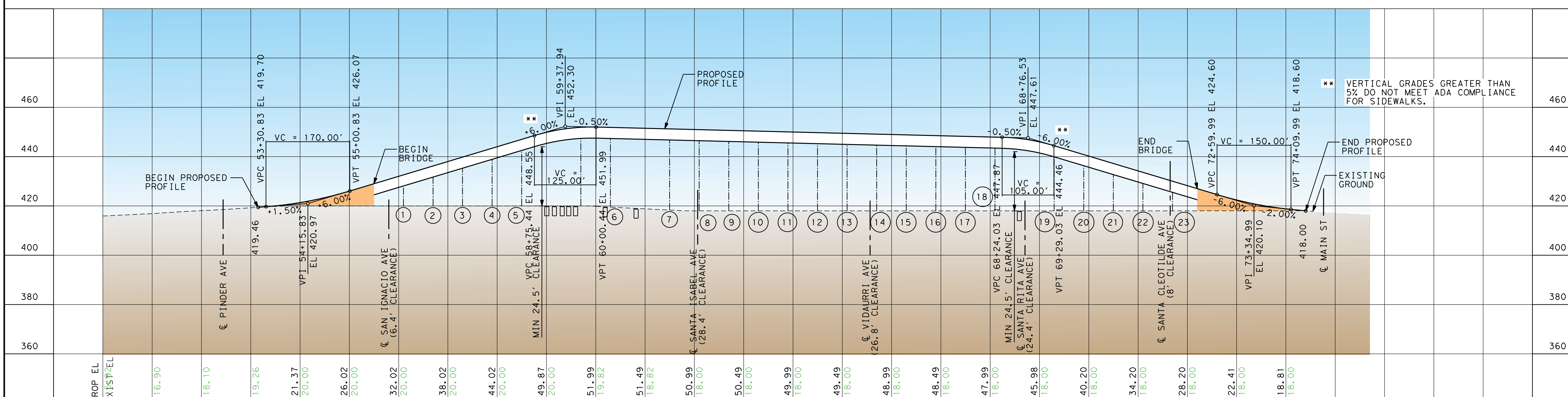


50' 0 100' 200'
GRAPHIC SCALE: HORIZ. 1" = 200'
10' 0 20' 40'
GRAPHIC SCALE: VERT. 1" = 40'

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

	ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW
	CONCRETE STRUCTURE	⊢	ROAD ACCESS CLOSED		RAILROAD ROW

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL OVERPASS BOTH SANCHEZ PLAN & PROFILE

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 7
SCALE AS SHOWN

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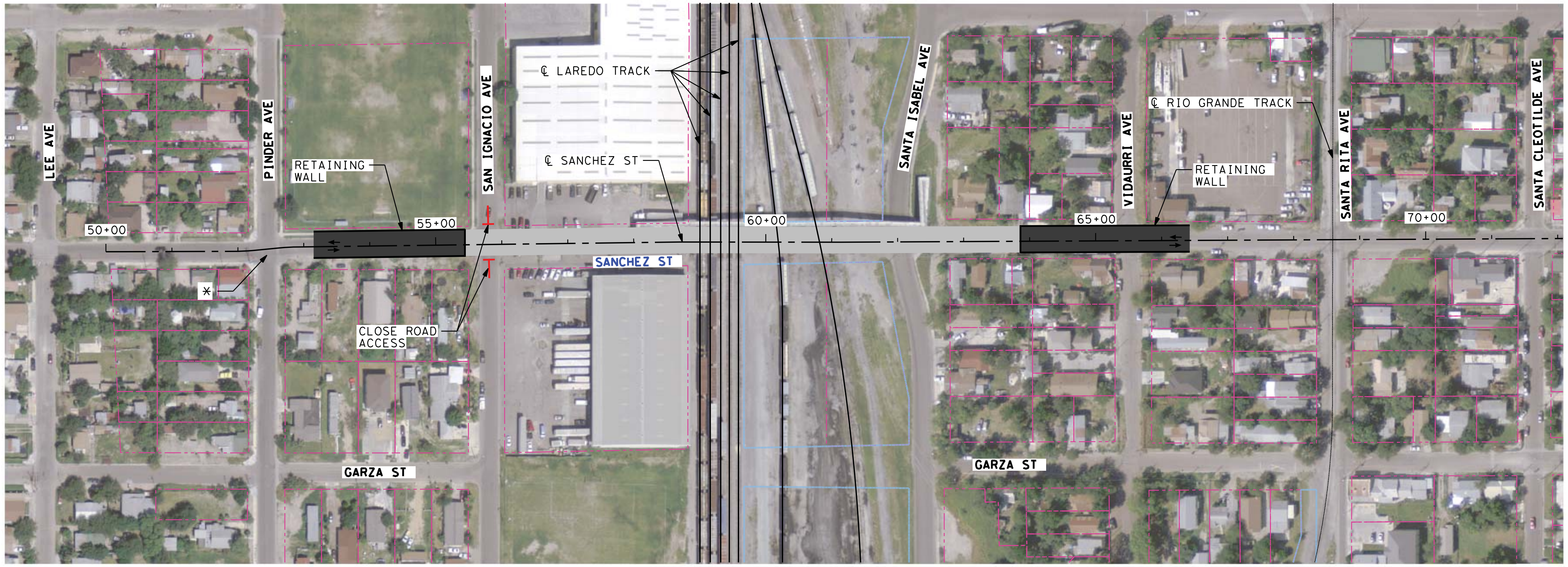

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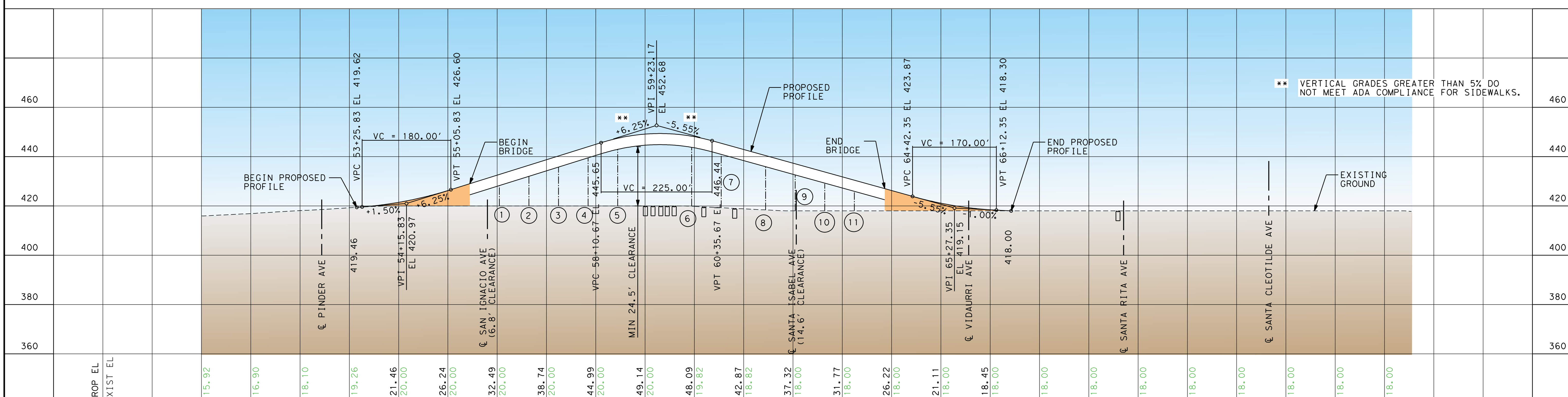
50' 0 100' 200'
GRAPHIC SCALE: HORIZ. 1" = 200'
10' 0 20' 40'
GRAPHIC SCALE: VERT. 1" = 40'

PLAN

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT



PROFILE

LEGEND

	ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW
	CONCRETE STRUCTURE		ROAD ACCESS CLOSED		RAILROAD ROW

Texas Department of Transportation

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL OVERPASS COMBINED SANCHEZ PLAN & PROFILE

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 8
SCALE AS SHOWN

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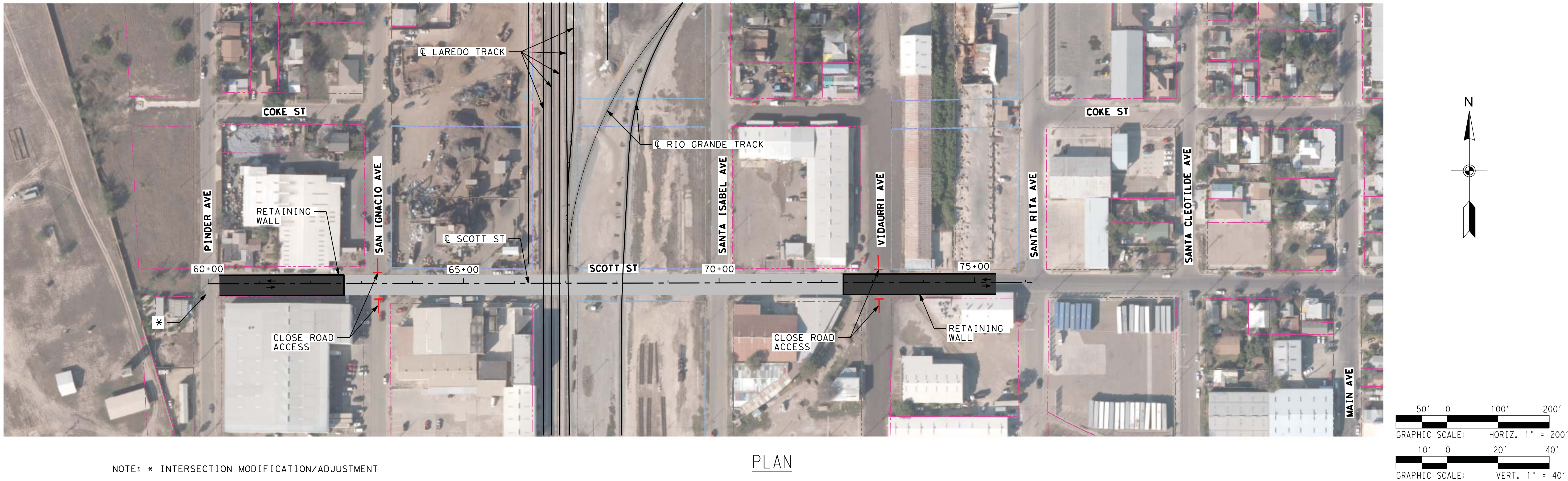
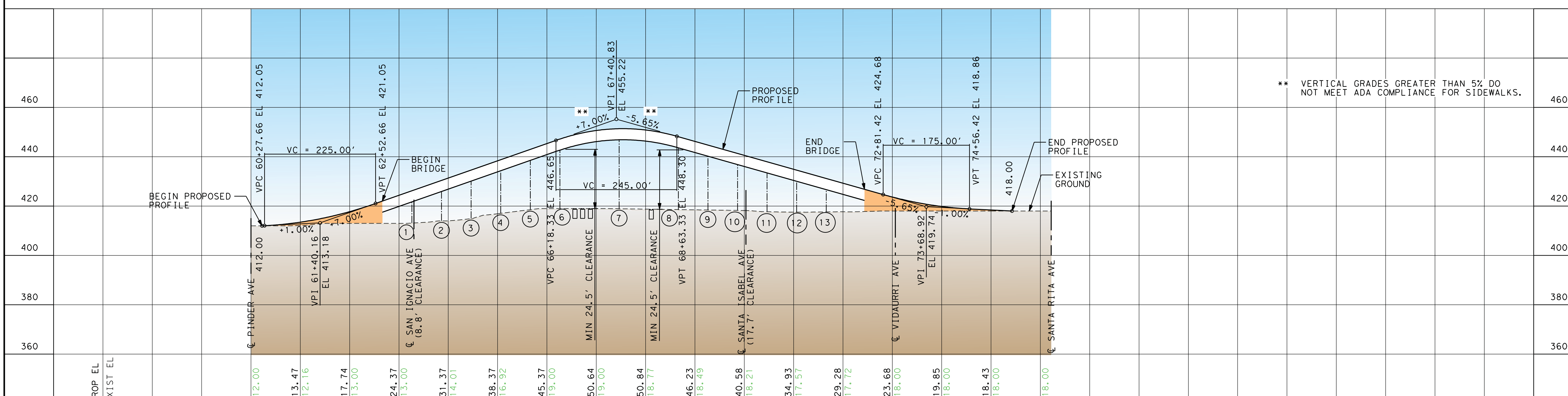


NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

ASPHALT PAVEMENT
CONCRETE STRUCTURE
RETAINING WALL
ROAD ACCESS CLOSED
PARCEL ROW
RAILROAD ROW

Texas Department of Transportation

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL OVERPASS SCOTT PLAN & PROFILE

CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO. 9
SCALE	AS SHOWN

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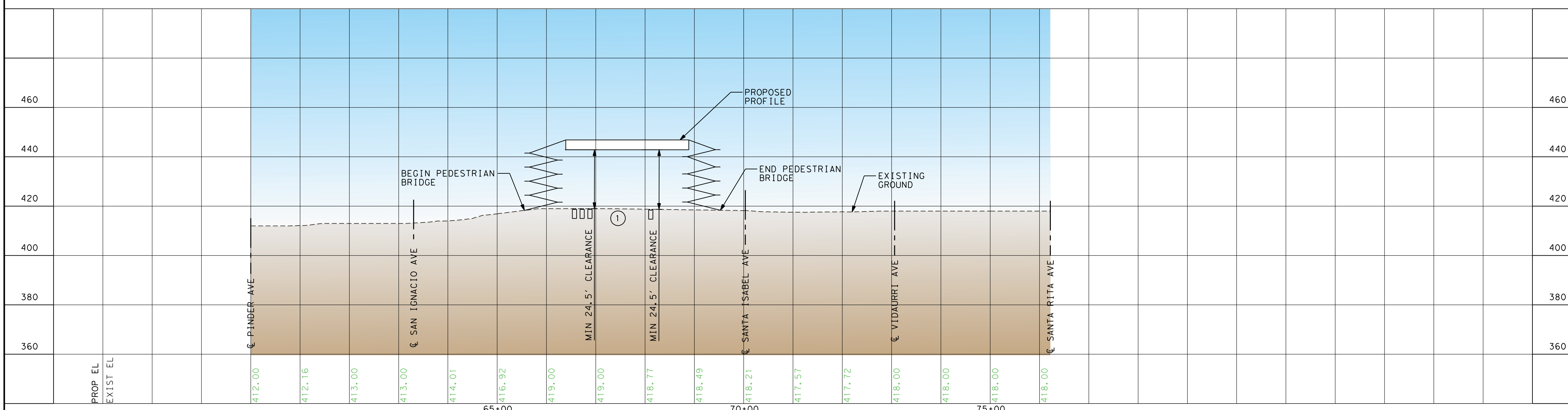
4/12/2017

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

	ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW
	CONCRETE STRUCTURE		ROAD ACCESS CLOSED		RAILROAD ROW

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL PEDESTRIAN OVERPASS SCOTT PLAN & PROFILE

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 10
SCALE AS SHOWN

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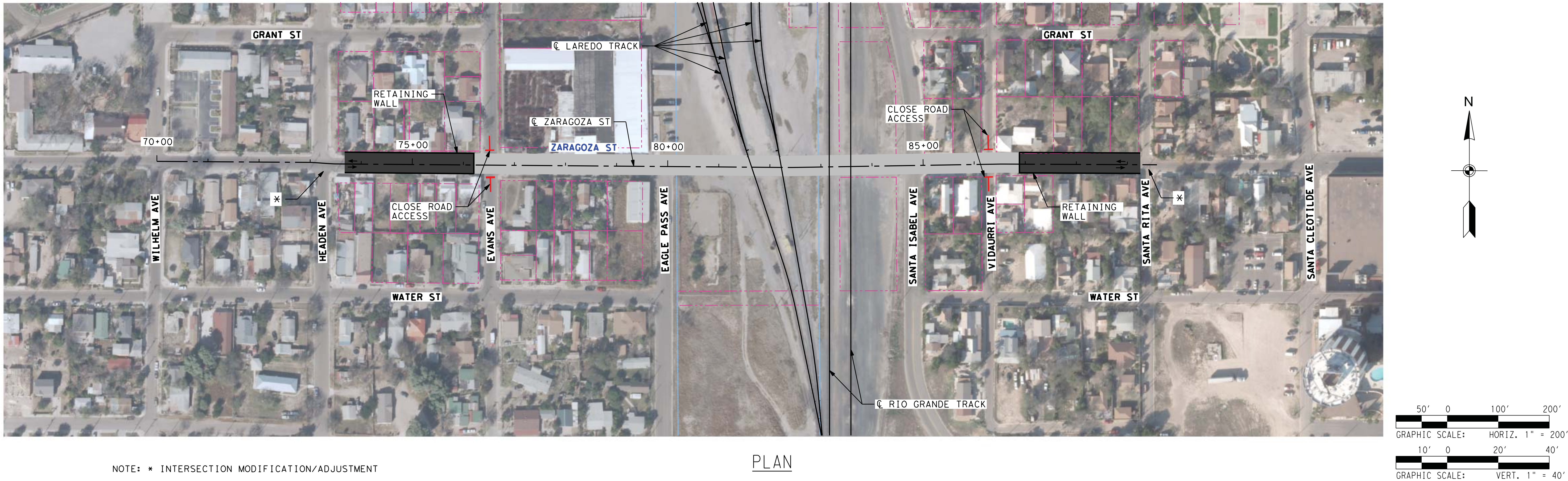
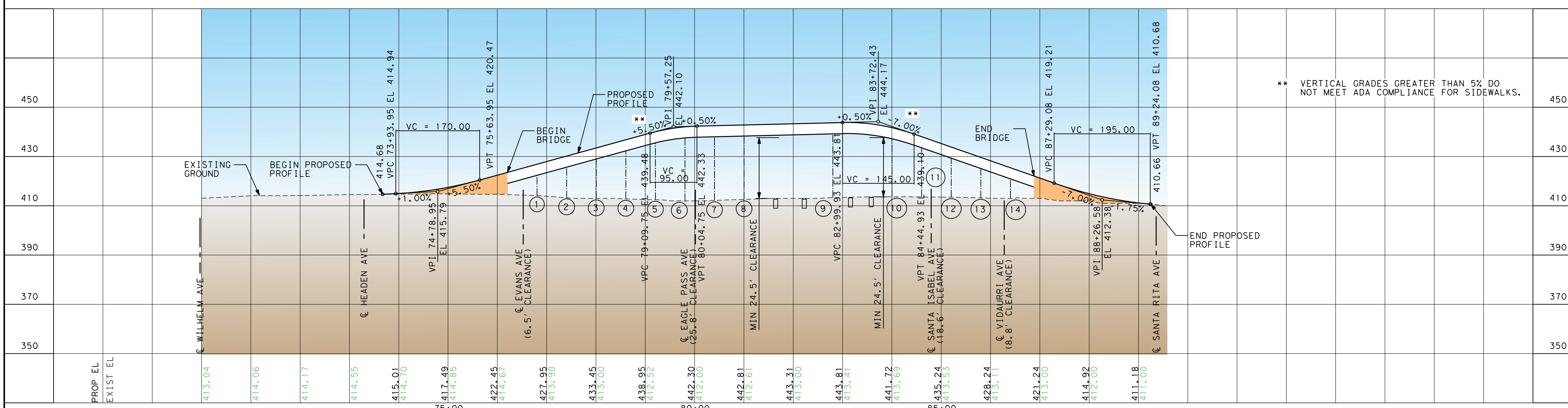


PLAN

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT



PROFILE

LEGEND

■	ASPHALT PAVEMENT	■	RETAINING WALL	— · —	PARCEL ROW
■	CONCRETE STRUCTURE	⊢	ROAD ACCESS CLOSED	——	RAILROAD ROW

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL OVERPASS ZARAGOZA PLAN & PROFILE

CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO. 11
SCALE	AS SHOWN

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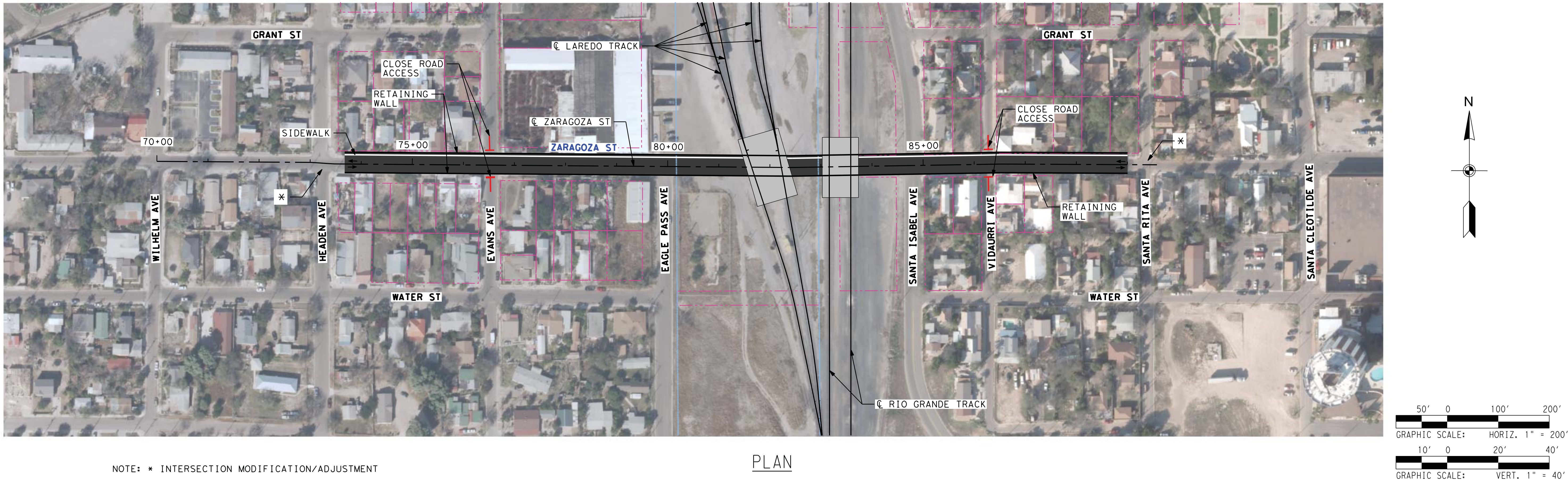

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

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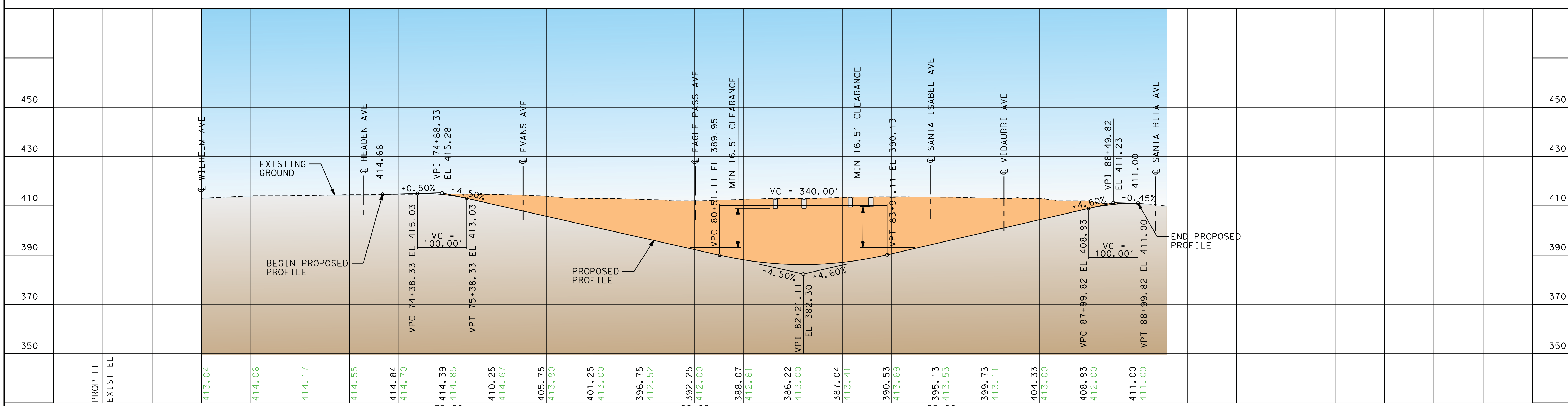

PROFILE

LEGEND

	ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW
	CONCRETE STRUCTURE		ROAD ACCESS CLOSED		RAILROAD ROW

Texas Department of Transportation

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL UNDERPASS ZARAGOZA PLAN & PROFILE

CONTRACT NO.
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REVISION
SHEET NO. 12
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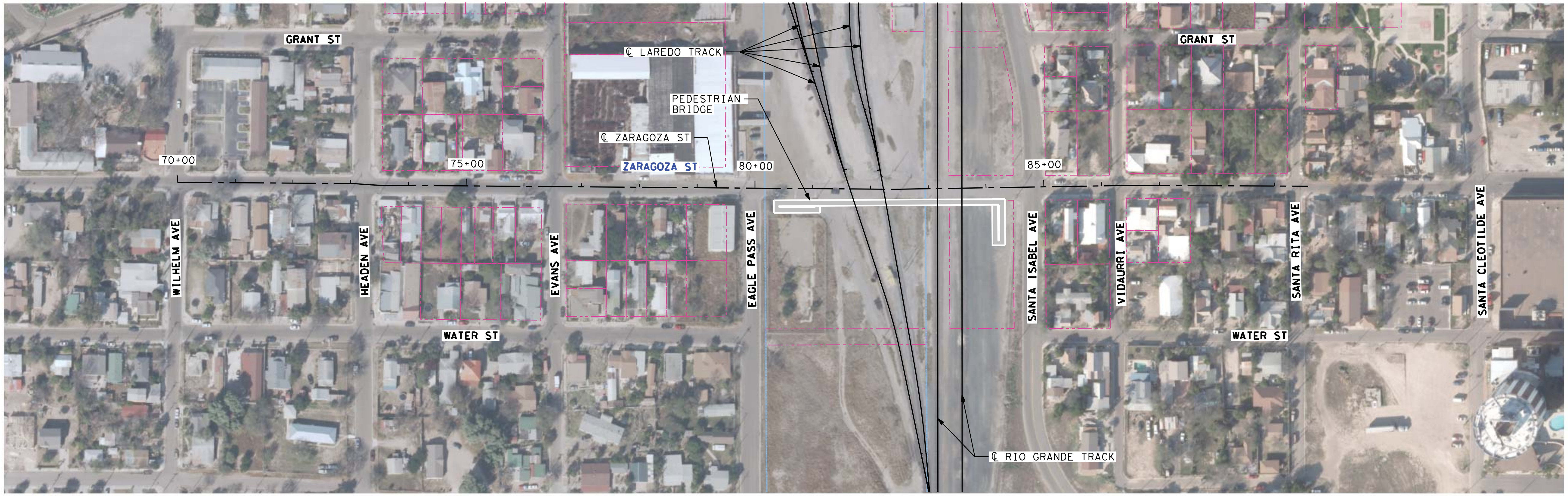

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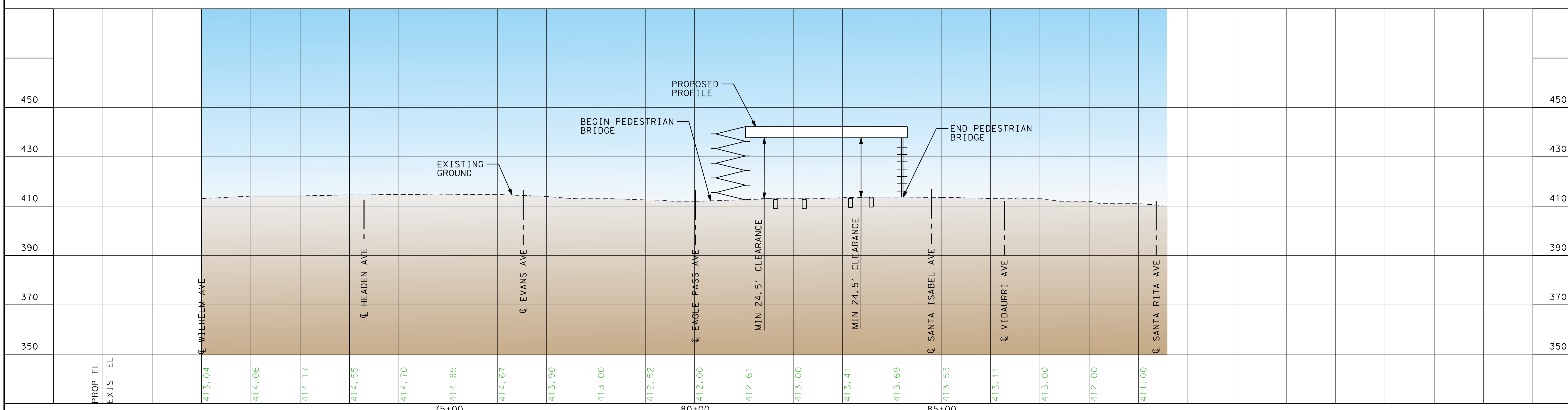
50' 0 100' 200'
GRAPHIC SCALE: HORIZ. 1" = 200'

10' 0 20' 40'
GRAPHIC SCALE: VERT. 1" = 40'

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

	ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW
	CONCRETE STRUCTURE		ROAD ACCESS CLOSED		RAILROAD ROW

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL PEDESTRIAN OVERPASS ZARAGOZA
PLAN & PROFILE

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 13
SCALE AS SHOWN

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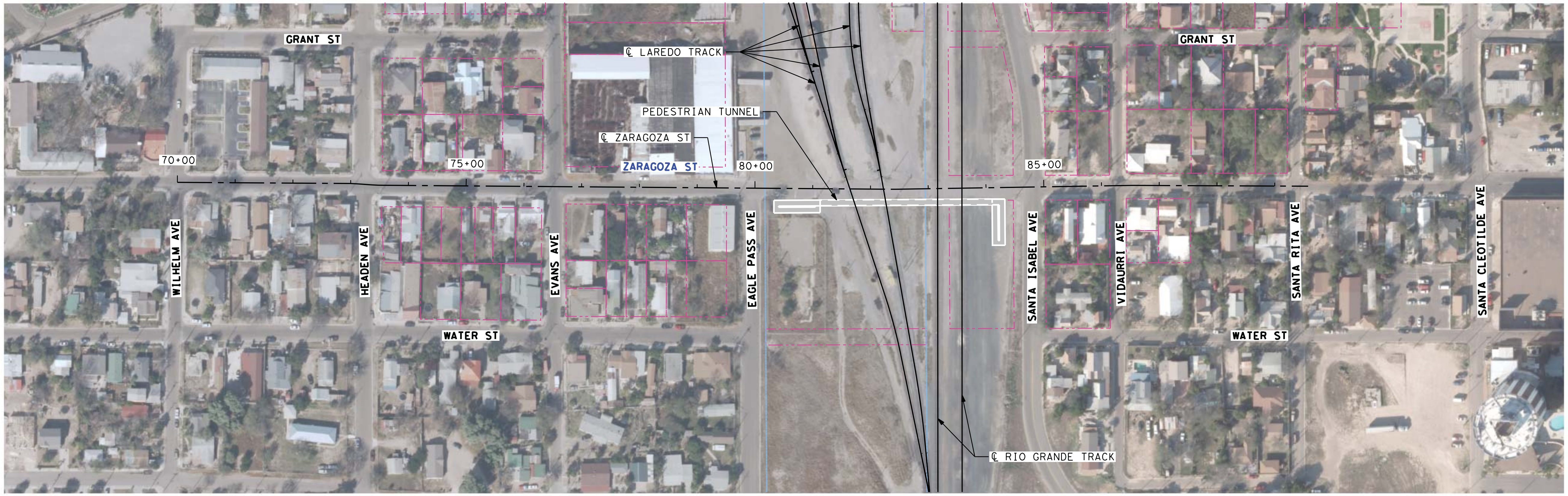

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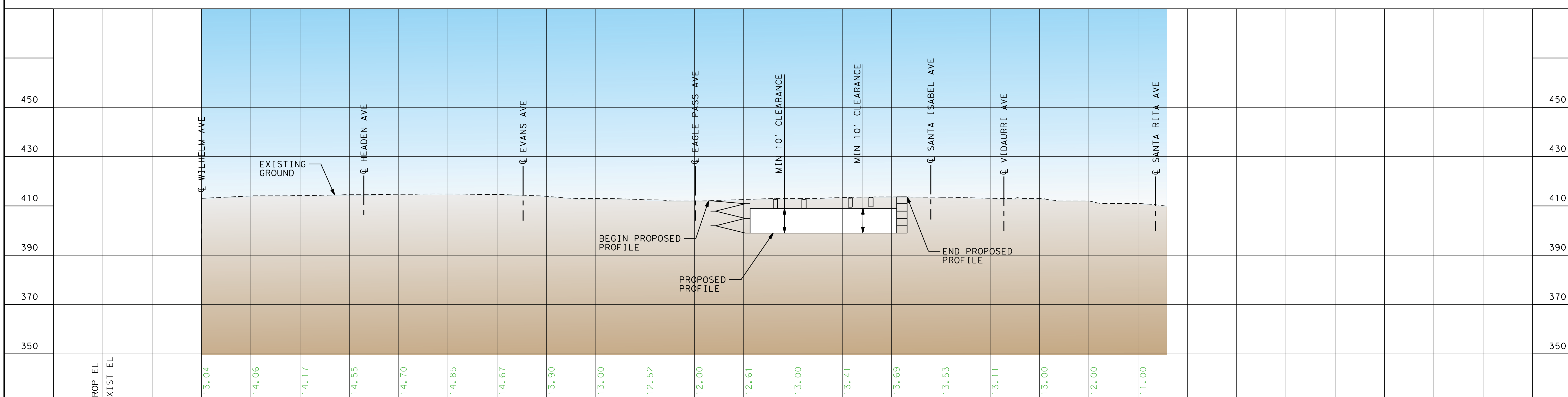
GRAPHIC SCALE: HORIZ. 1" = 200′
10′ 0 20′ 40′
GRAPHIC SCALE: VERT. 1" = 40′

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

	ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW
	CONCRETE STRUCTURE		ROAD ACCESS CLOSED		RAILROAD ROW

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CONCEPTUAL PEDESTRIAN UNDERPASS ZARAGOZA
PLAN & PROFILE

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 14
SCALE AS SHOWN

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4/12/2017

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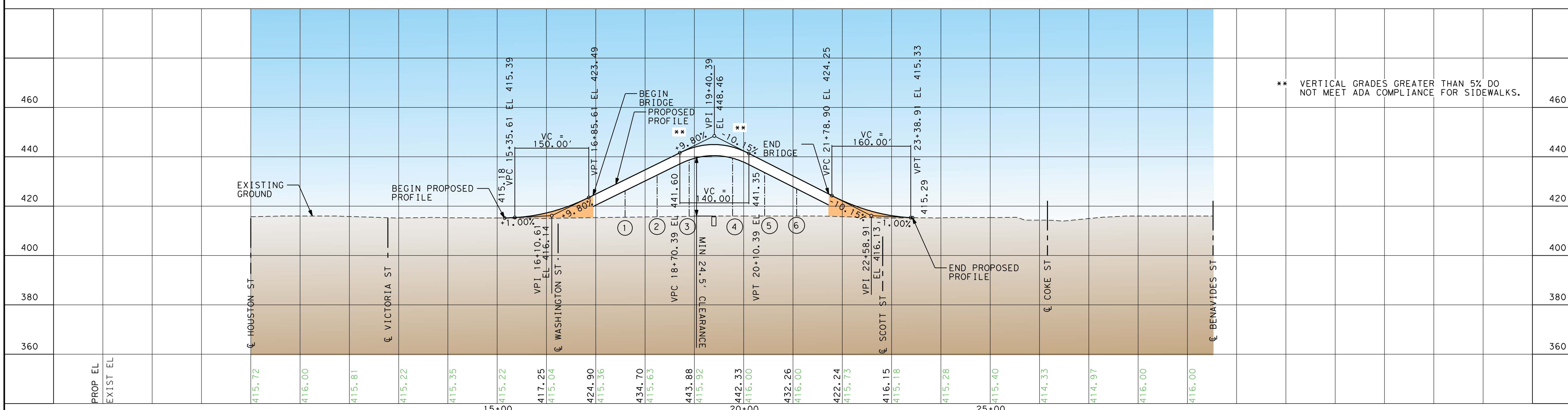
GRAPHIC SCALE: VERT. 1" = 40'

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW	
CONCRETE STRUCTURE		ROAD ACCESS CLOSED		RAILROAD ROW	

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL OVERPASS SANTA MARIA PLAN & PROFILE

CONTRACT NO.
DRAWING NO. C-01
REVISION
SHEET NO.
SCALE AS SHOWN

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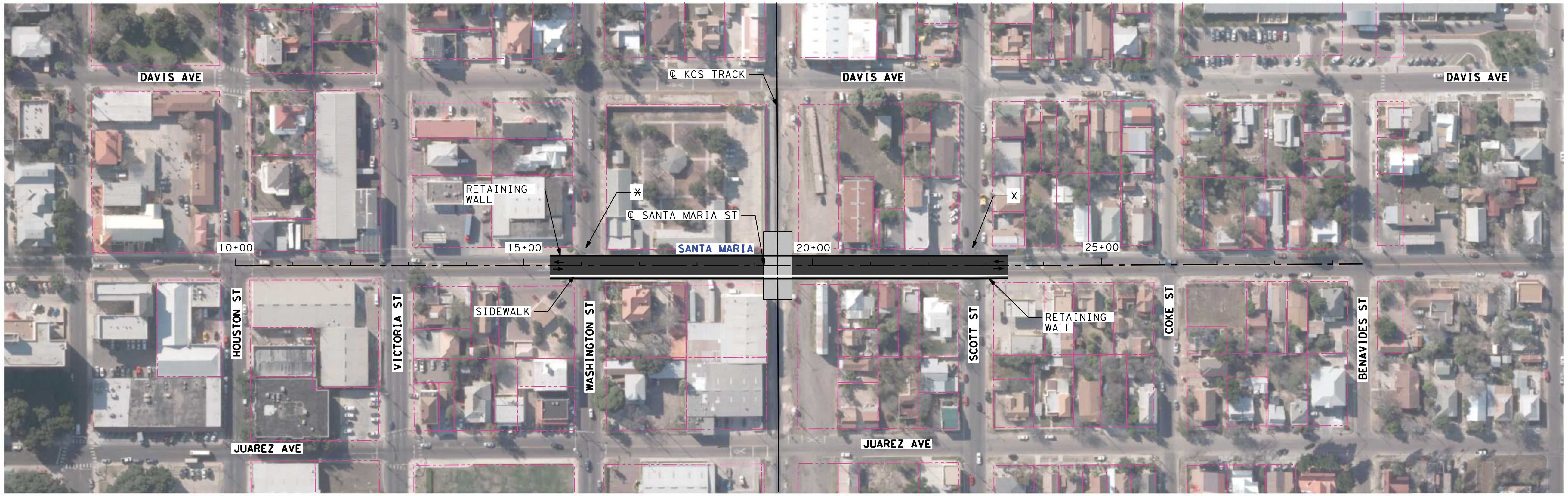
4/11/2017



GRAPHIC SCALE: HORIZ. 1" = 200'
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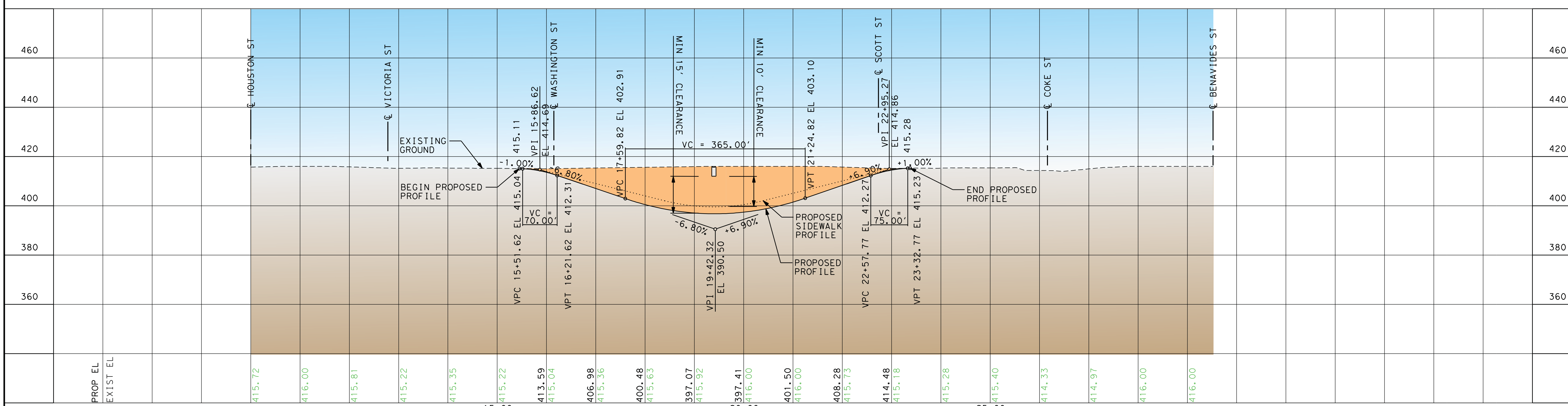
GRAPHIC SCALE: VERT. 1" = 40'
10' 0 20' 40'

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

	ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW
	CONCRETE STRUCTURE		ROAD ACCESS CLOSED		RAILROAD ROW

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CONCEPTUAL UNDERPASS SANTA MARIA PLAN & PROFILE

CONTRACT NO.
DRAWING NO. C-01
REVISION
SHEET NO.
SCALE AS SHOWN

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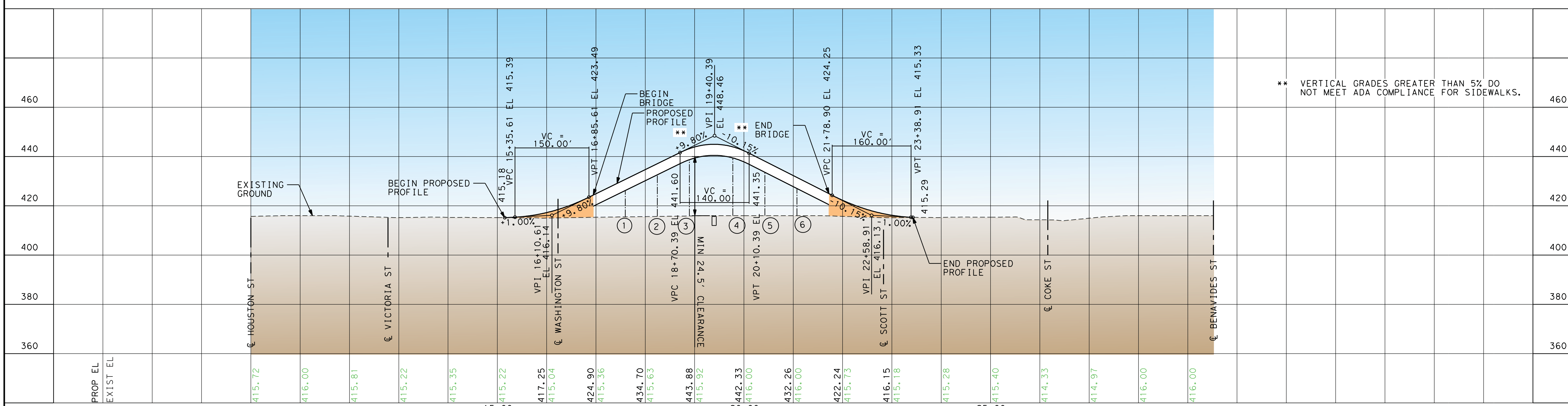
NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

ASPHALT PAVEMENT
CONCRETE STRUCTURE
RETAINING WALL
ROAD ACCESS CLOSED
PARCEL ROW
RAILROAD ROW

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL ONE-WAY OVERPASS SANTA MARIA
PLAN & PROFILE

CONTRACT NO.
DRAWING NO. C-01
REVISION
SHEET NO.
SCALE AS SHOWN

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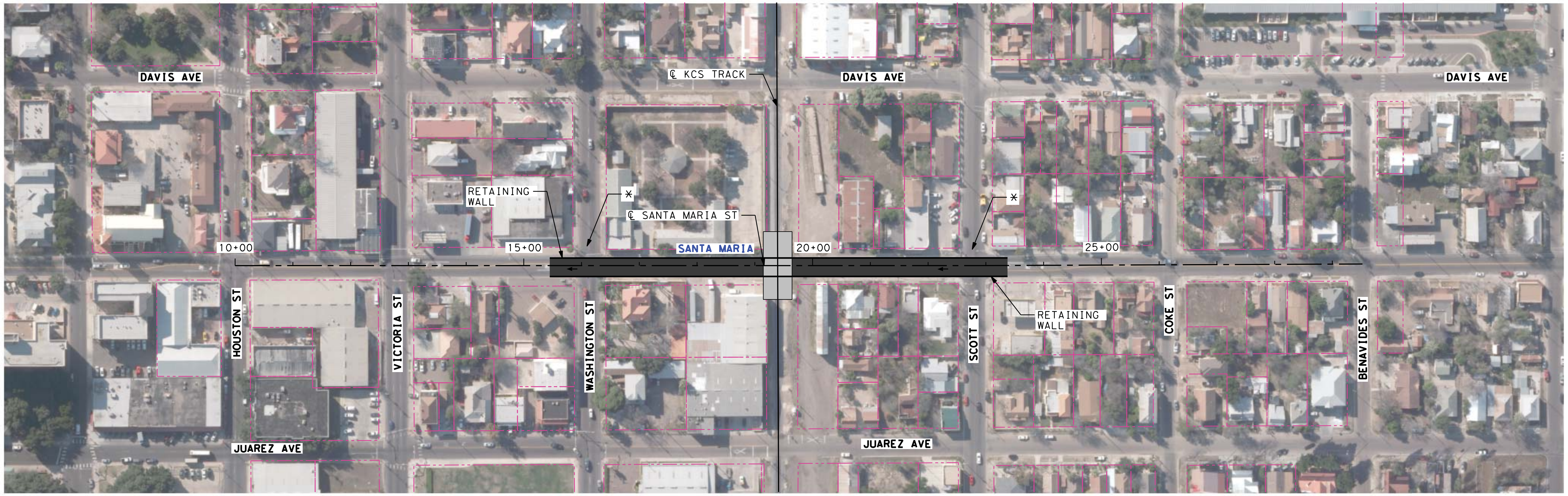

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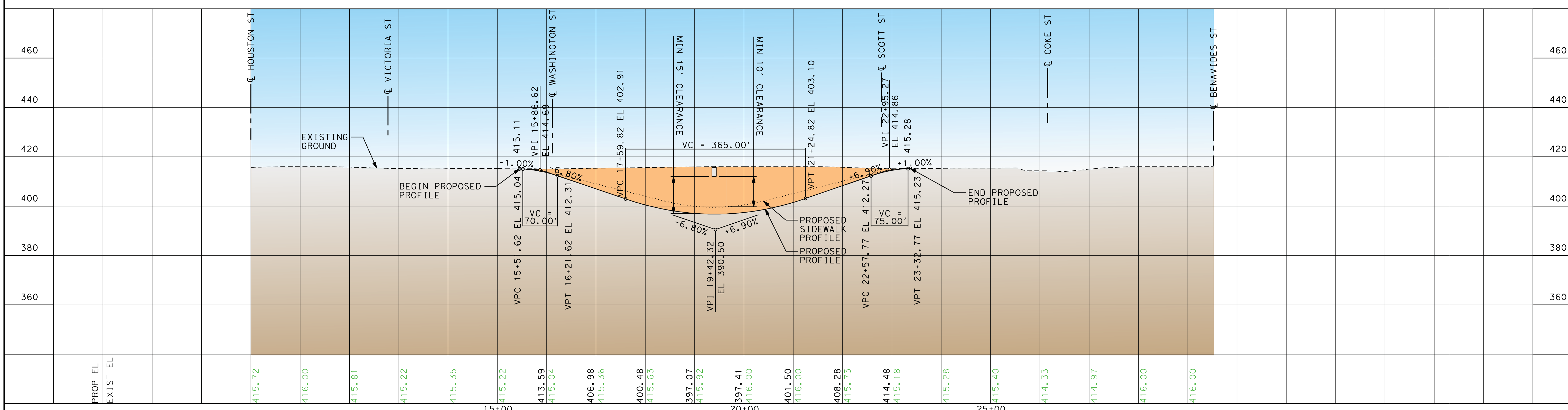
GRAPHIC SCALE: HORIZ. 1" = 200'
10' 0 20' 40'
GRAPHIC SCALE: VERT. 1" = 40'

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

	ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW
	CONCRETE STRUCTURE		ROAD ACCESS CLOSED		RAILROAD ROW

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CONCEPTUAL ONE-WAY UNDERPASS SANTA MARIA
PLAN & PROFILE

CONTRACT NO.
DRAWING NO. C-01
REVISION
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SCALE AS SHOWN

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NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

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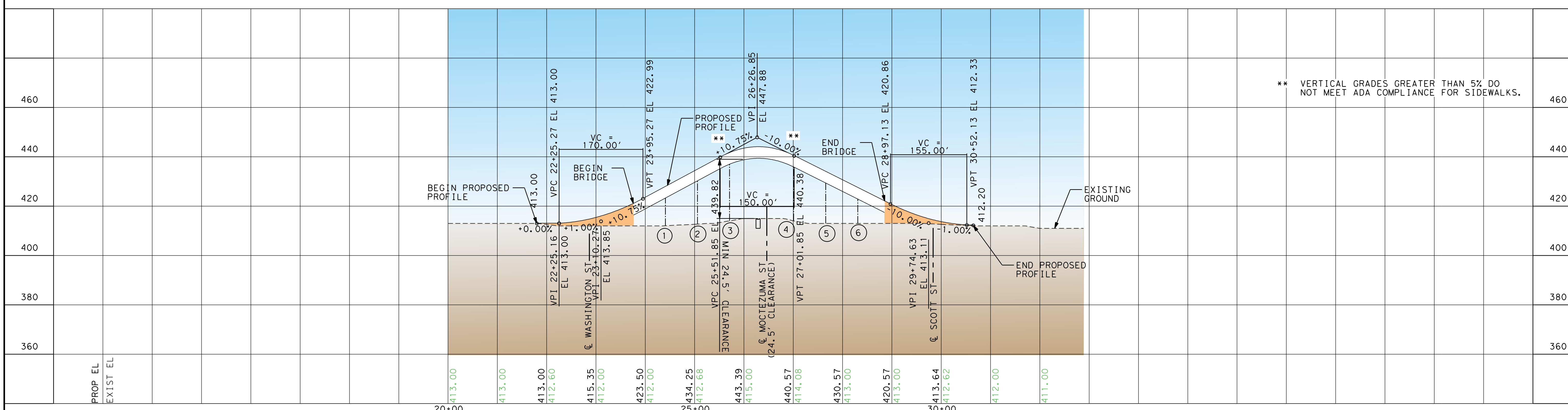

PROFILE

LEGEND

	ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW
	CONCRETE STRUCTURE		ROAD ACCESS CLOSED		RAILROAD ROW

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL ONE-WAY OVERPASS CONVENT PLAN & PROFILE

CONTRACT NO.
DRAWING NO. C-01
REVISION
SHEET NO.
SCALE AS SHOWN

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4/11/2017

WEBB COUNTY PLANNING DEPARTMENT

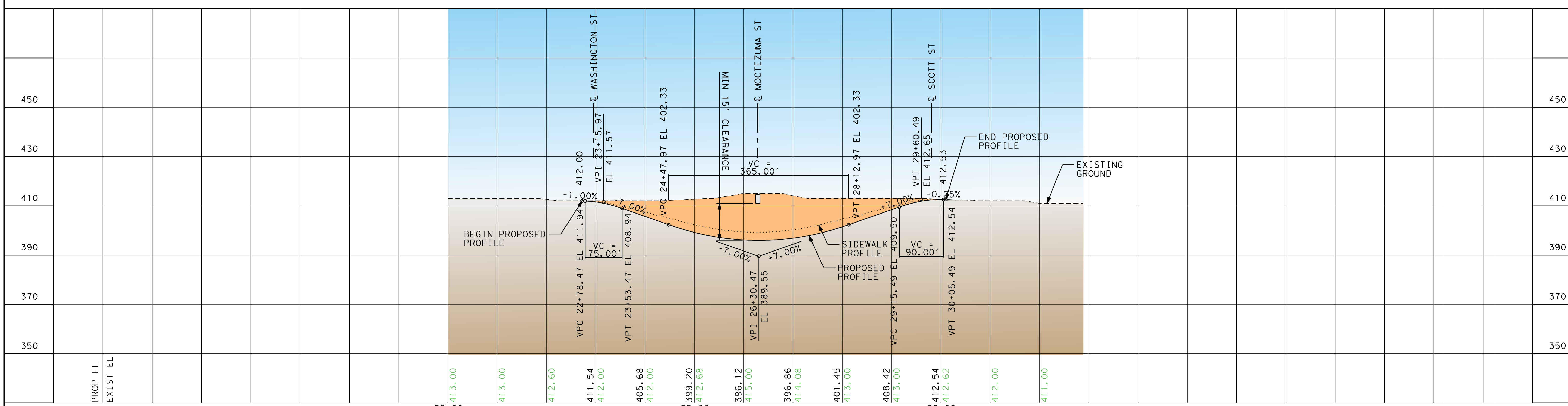
NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN

N

GRAPHIC SCALE: HORIZ. 1" = 200'

GRAPHIC SCALE: VERT. 1" = 40'



PROFILE

LEGEND

ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW	
CONCRETE STRUCTURE		ROAD ACCESS CLOSED		RAILROAD ROW	

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CONCEPTUAL ONE-WAY UNDERPASS CONVENT PLAN & PROFILE

CONTRACT NO.

DRAWING NO. C-01

REVISION

SHEET NO.

SCALE AS SHOWN

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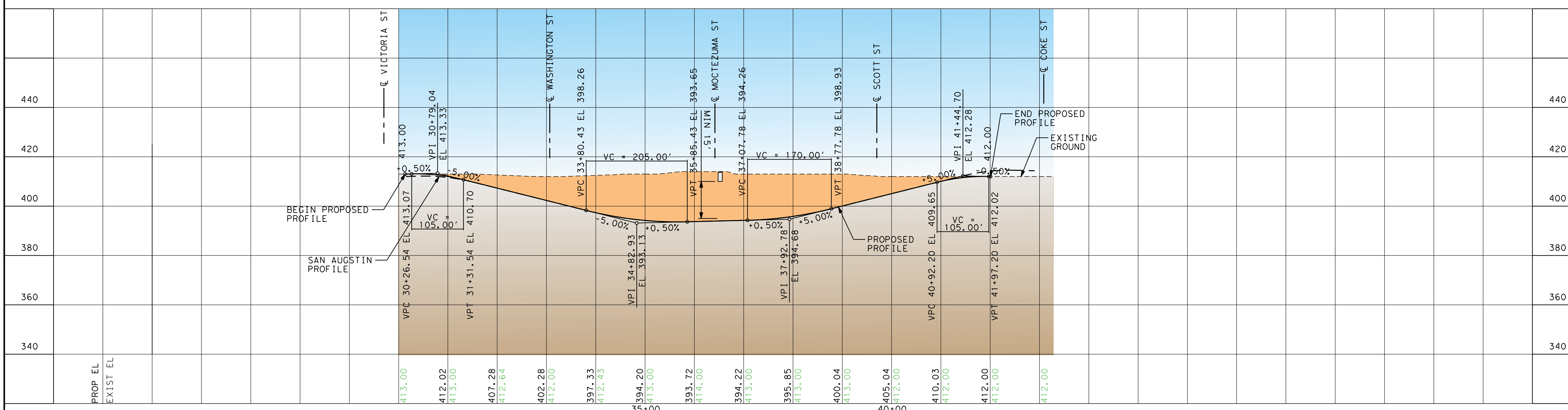
NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

	ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW
	CONCRETE STRUCTURE		ROAD ACCESS CLOSED		RAILROAD ROW

Texas Department of Transportation

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL TWO-LANES UNDERPASS FLORES AVE
PLAN & PROFILE

CONTRACT NO.
DRAWING NO. C-01
REVISION
SHEET NO.
SCALE AS SHOWN

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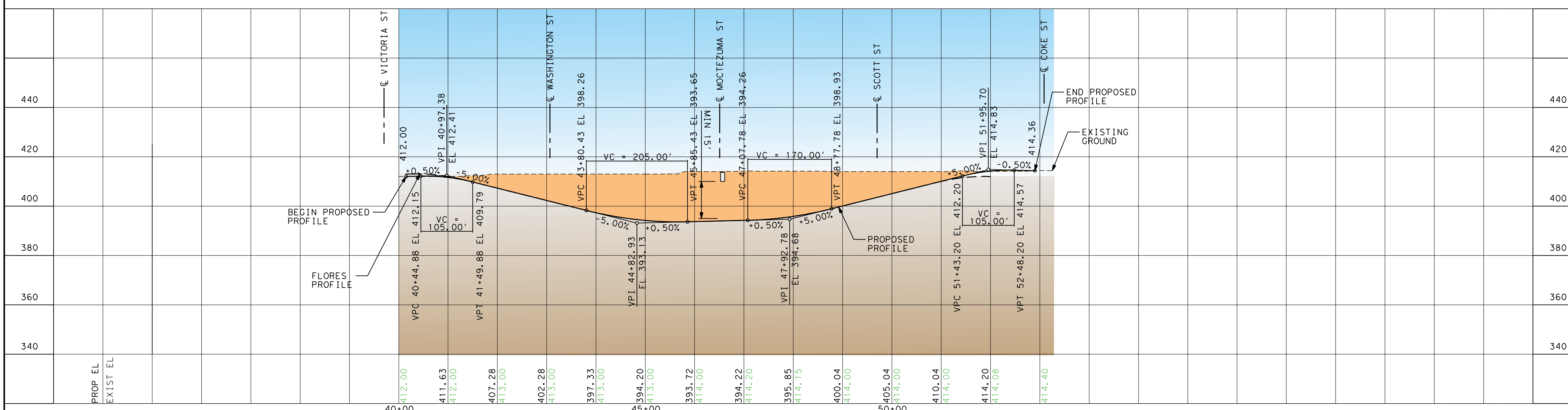
NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

	ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW
	CONCRETE STRUCTURE		ROAD ACCESS CLOSED		RAILROAD ROW

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL TWO-LANES UNDERPASS SAN AGUSTIN AVE
PLAN & PROFILE

CONTRACT NO.	
DRAWING NO.	C-01
REVISION	SHEET NO.
SCALE	AS SHOWN

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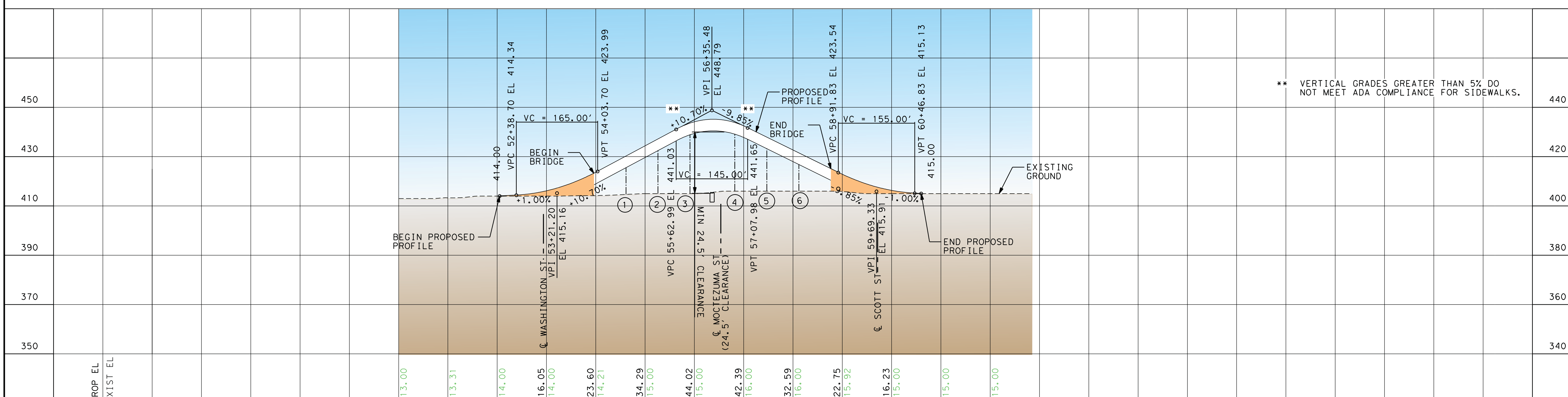
10′ 0 20′ 40′
GRAPHIC SCALE: VERT. 1" = 40′

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



** VERTICAL GRADES GREATER THAN 5% DO NOT MEET ADA COMPLIANCE FOR SIDEWALKS.

PROFILE

LEGEND

	ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW
	CONCRETE STRUCTURE		ROAD ACCESS CLOSED		RAILROAD ROW

Texas Department of Transportation

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL OVERPASS SAN BERNARDO AVE
PLAN & PROFILE

CONTRACT NO.
DRAWING NO. C-01
REVISION
SHEET NO.
SCALE AS SHOWN

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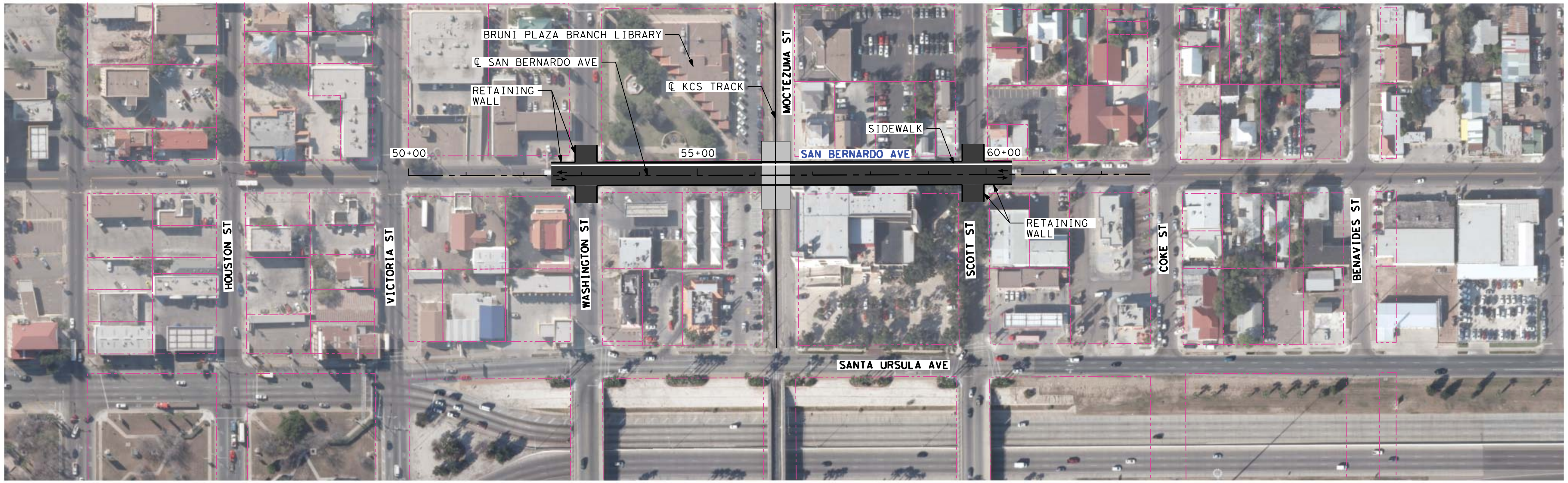

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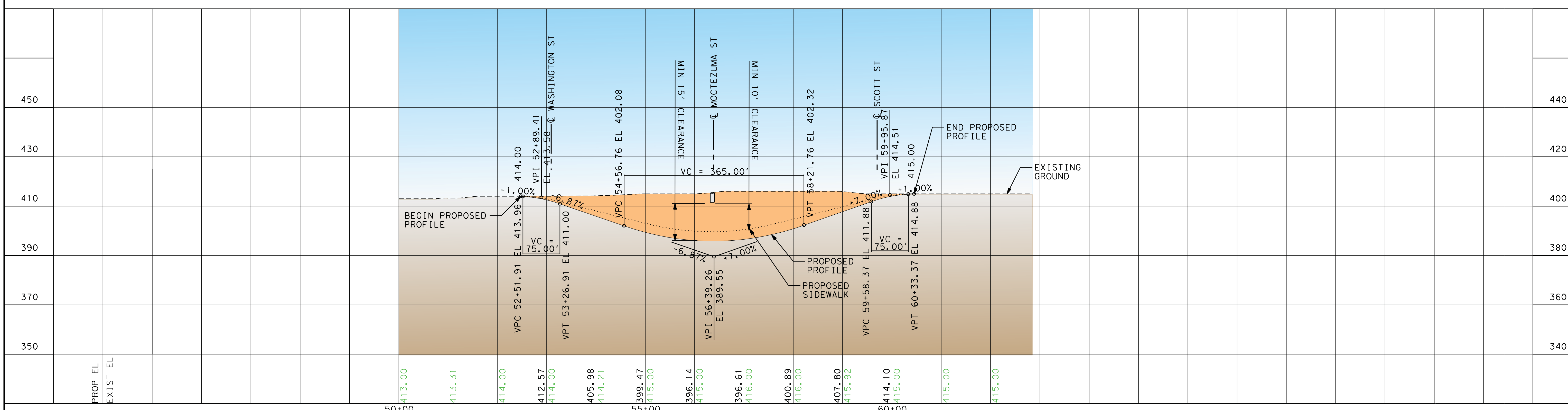
10' 0 20' 40'
GRAPHIC SCALE: VERT. 1" = 40'

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

	ASPHALT PAVEMENT		RETAINING WALL		PARCEL ROW
	CONCRETE STRUCTURE		ROAD ACCESS CLOSED		RAILROAD ROW

Texas Department of Transportation

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL UNDERPASS SAN BERNARDO AVE
PLAN & PROFILE

CONTRACT NO.
DRAWING NO. C-01
REVISION
SHEET NO.
SCALE AS SHOWN

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NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

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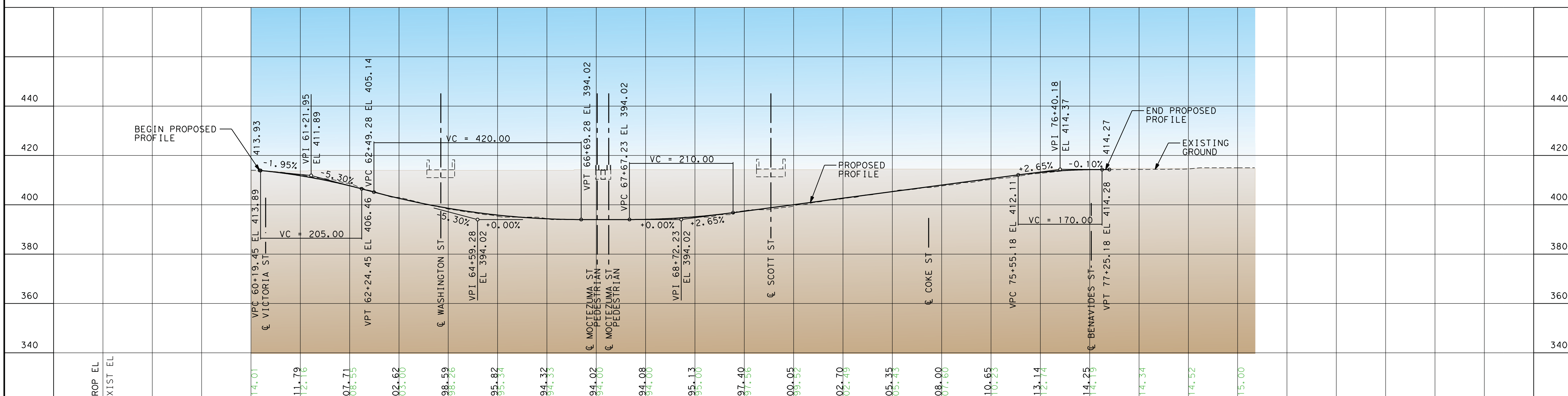

PROFILE

LEGEND

ASPHALT PAVEMENT	RETAINING WALL	PARCEL ROW
CONCRETE STRUCTURE	ROAD ACCESS CLOSED	RAILROAD ROW

Texas Department of Transportation

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL RAMP SANTA URSULA AVE
PLAN & PROFILE

CONTRACT NO.	
DRAWING NO.	C-01
REVISION	SHEET NO.
SCALE	AS SHOWN

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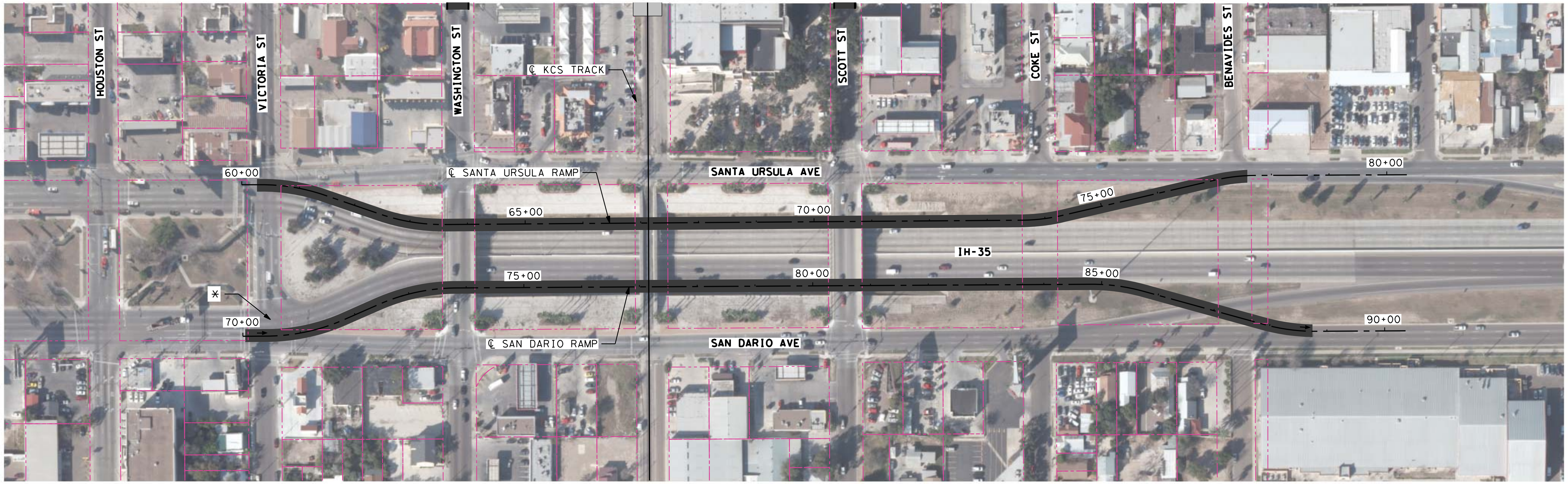

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN

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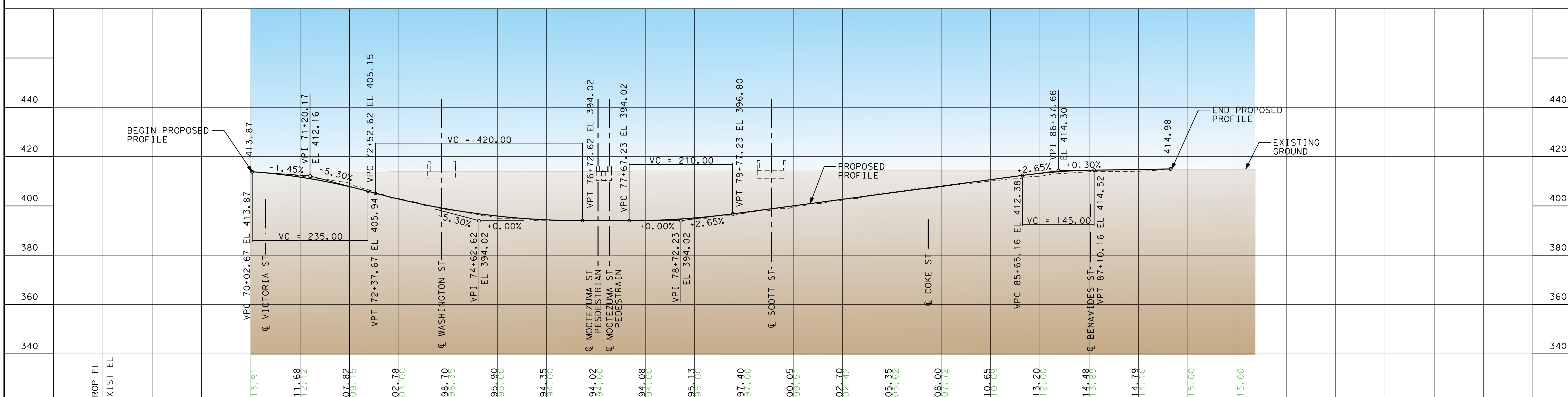
50' 0 100' 200'
GRAPHIC SCALE: HORIZ. 1" = 200'

10' 0 20' 40'
GRAPHIC SCALE: VERT. 1" = 40'



PROFILE

LEGEND

ASPHALT PAVEMENT	RETAINING WALL	PARCEL ROW
CONCRETE STRUCTURE	ROAD ACCESS CLOSED	RAILROAD ROW

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL RAMP SAN DARIO AVE
PLAN & PROFILE

CONTRACT NO.

DRAWING NO. C-01

REVISION | SHEET NO.

SCALE AS SHOWN

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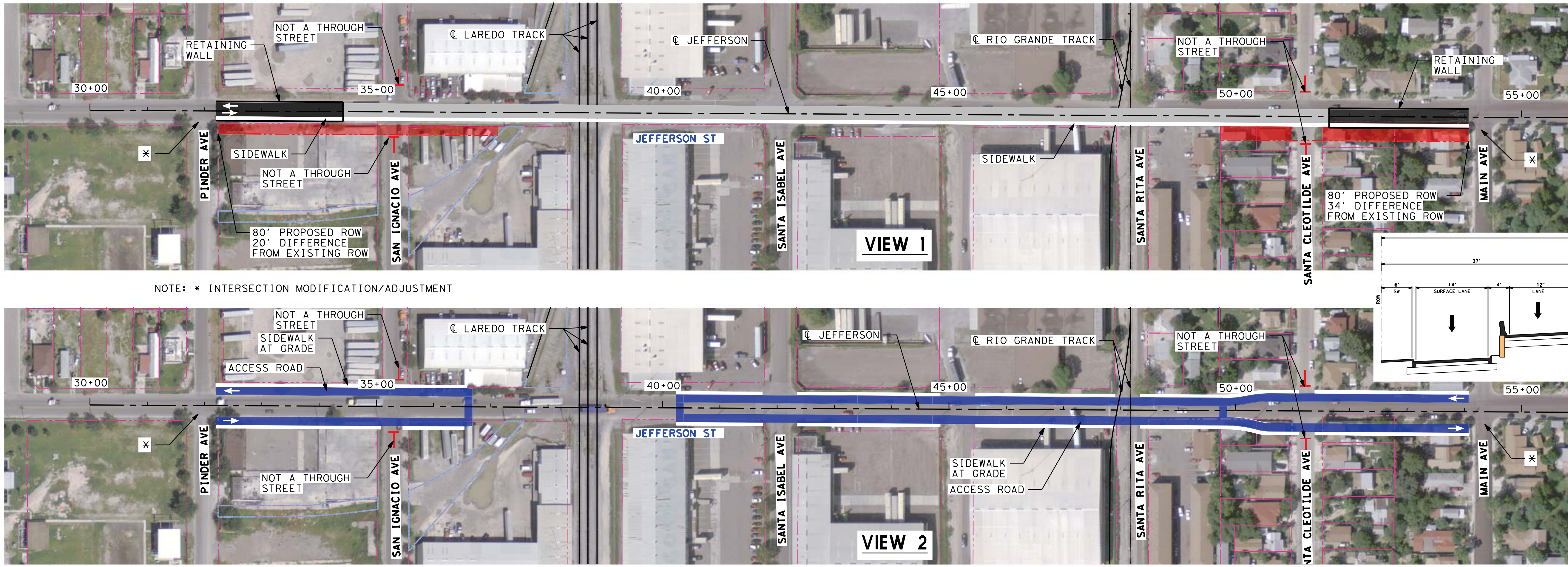
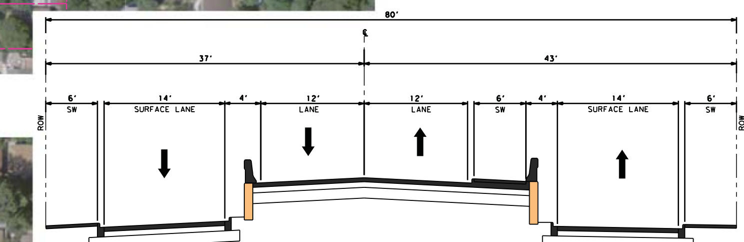
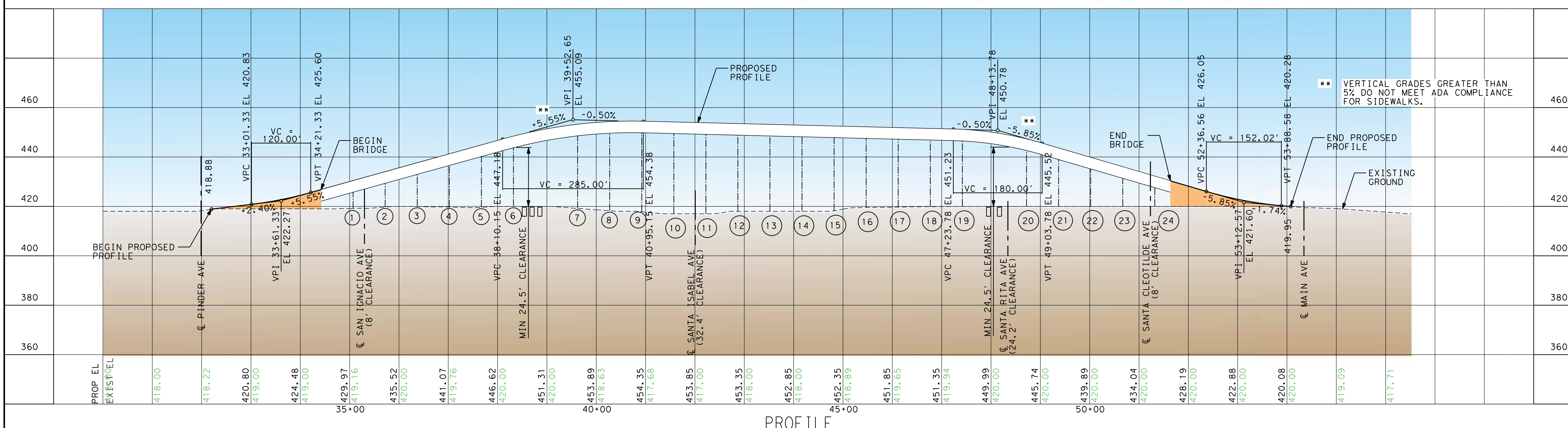
4/11/2017

Appendix B. Grade Separation Concepts Detailed Review







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424.48	419.00
429.97	419.16
435.52	420.00
441.07	419.76
446.62	420.00
451.31	420.00
453.89	418.63
454.35	417.68
453.85	417.00
453.35	418.00
452.85	418.00
452.35	418.89
451.85	419.65
451.35	419.94
449.99	420.00
445.74	420.00
439.89	420.00
434.04	420.00
428.19	420.00
422.88	420.00
420.08	420.00
	419.09
	417.71

LEGEND

- ASPHALT PAVEMENT
- CONCRETE STRUCTURE
- ACQUIRED PROPERTY
- RETAINING WALL
- ACCESS ROAD
- NOT A THROUGH STREET
- PARCEL ROW
- PROPOSED ROW
- RAILROAD ROW

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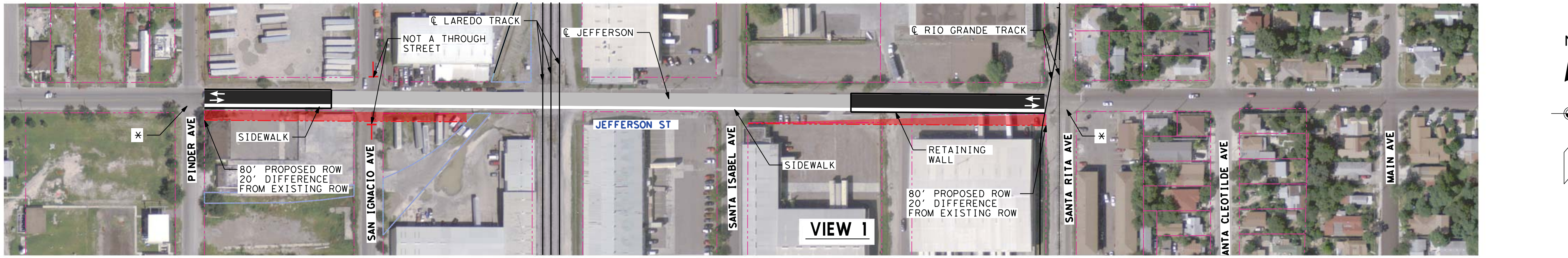
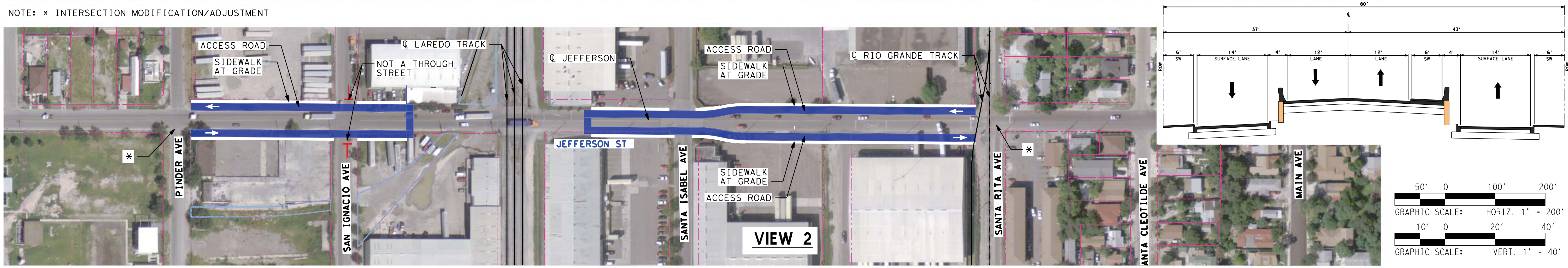
LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

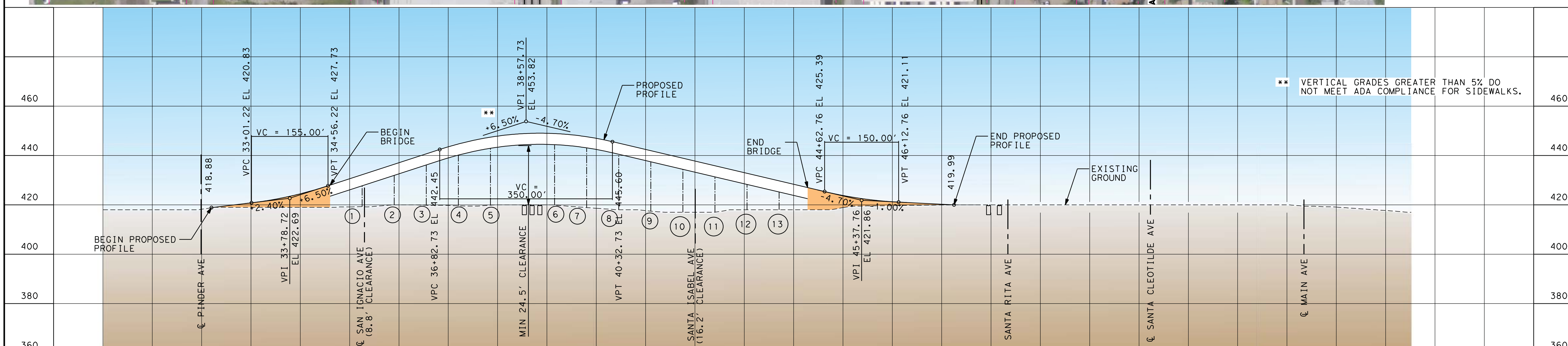
CONCEPTUAL OVERPASS JEFFERSON PLAN & PROFILE

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 4
SCALE AS SHOWN



NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT





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EXIST EL	418.00	418.22	419.00	419.00	419.16	420.00	419.76	420.00	420.00	418.63	417.68	417.00	418.00	418.00	418.89	419.65	419.94	420.00	420.00	420.00	420.00	420.00	420.00	420.00	419.09	417.71

35+00 40+00 45+00 50+00

PROFILE

LEGEND

ASPHALT PAVEMENT		ACQUIRED PROPERTY		NOT A THROUGH STREET	
CONCRETE STRUCTURE		RETAINING WALL		PARCEL ROW	
		ACCESS ROAD		PROPOSED ROW	
				RAILROAD ROW	

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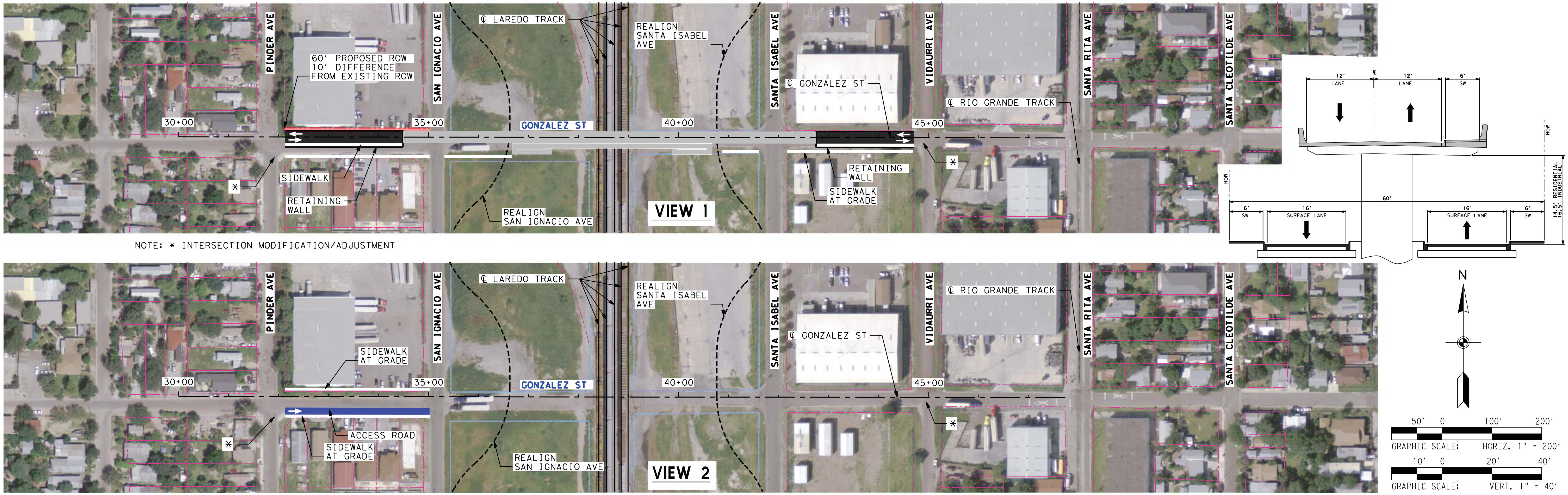
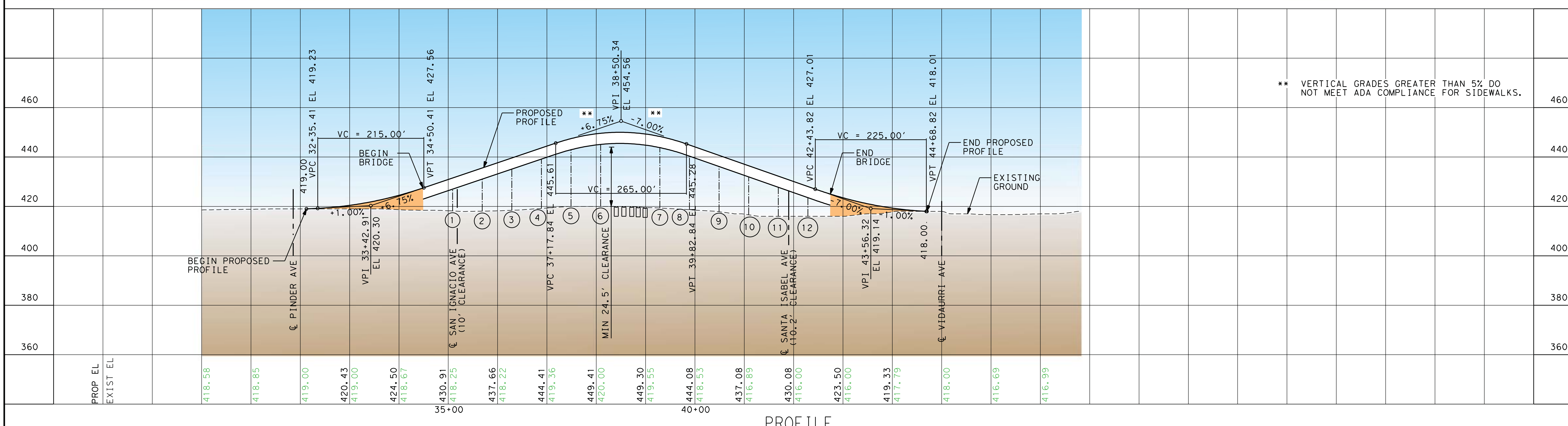
LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL OVERPASS COMBINED JEFFERSON PLAN & PROFILE

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 5
SCALE AS SHOWN





LEGEND

ASPHALT PAVEMENT	ACQUIRED PROPERTY	NOT A THROUGH STREET
CONCRETE STRUCTURE	RETAINING WALL	PARCEL ROW
	ACCESS ROAD	PROPOSED ROW
		RAILROAD ROW

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WEBB COUNTY, TEXAS

CONCEPTUAL OVERPASS GONZALEZ PLAN & PROFILE

CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO. 6
SCALE	AS SHOWN

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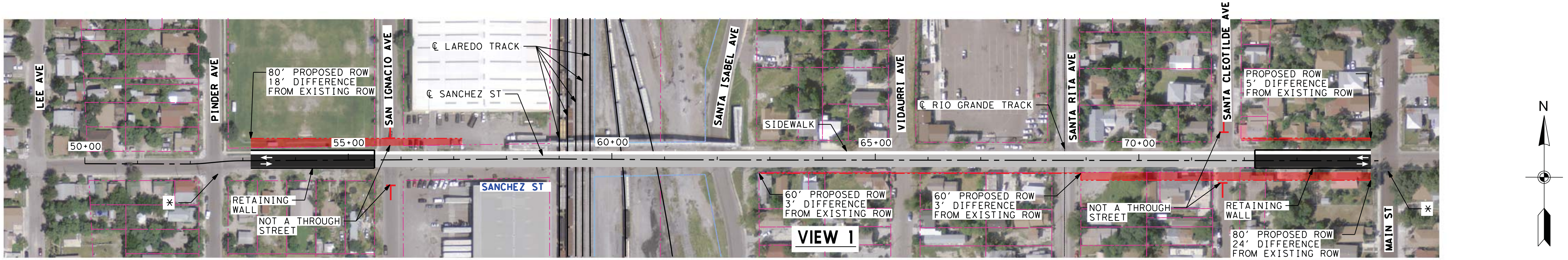

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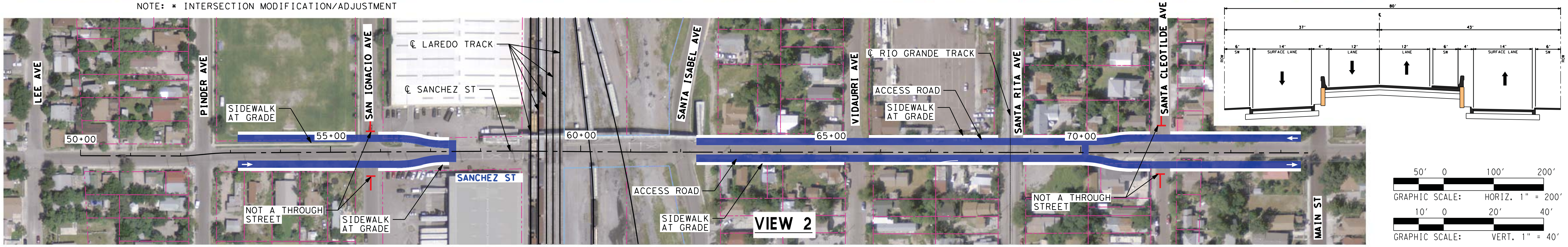

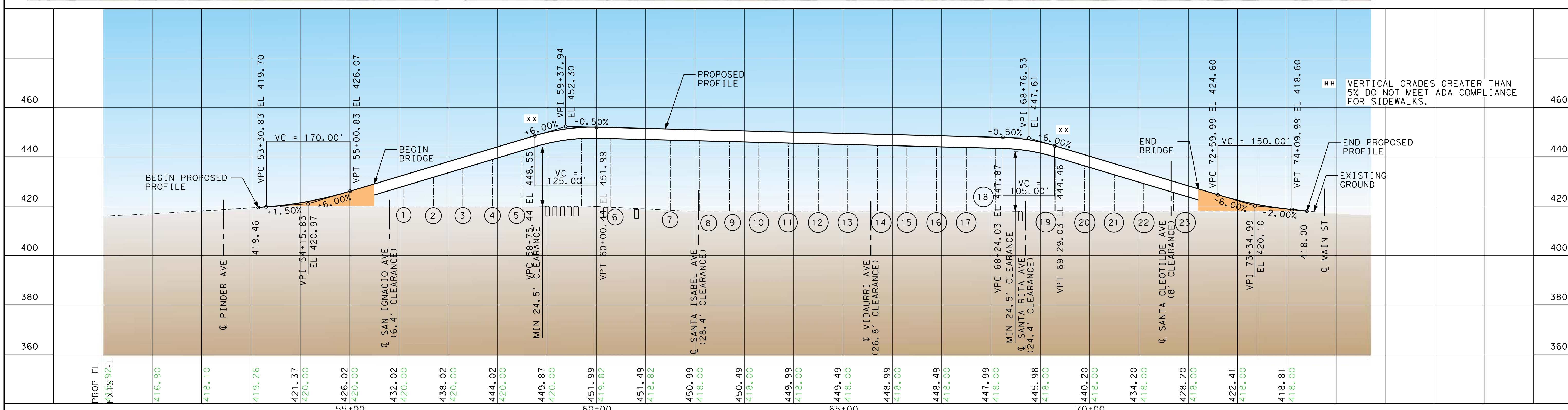

PROFILE

LEGEND

- ASPHALT PAVEMENT
- CONCRETE STRUCTURE
- ACQUIRED PROPERTY
- RETAINING WALL
- ACCESS ROAD
- NOT A THROUGH STREET
- PARCEL ROW
- PROPOSED ROW
- RAILROAD ROW

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WEBB COUNTY, TEXAS

CONCEPTUAL OVERPASS BOTH SANCHEZ PLAN & PROFILE

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 7
SCALE AS SHOWN

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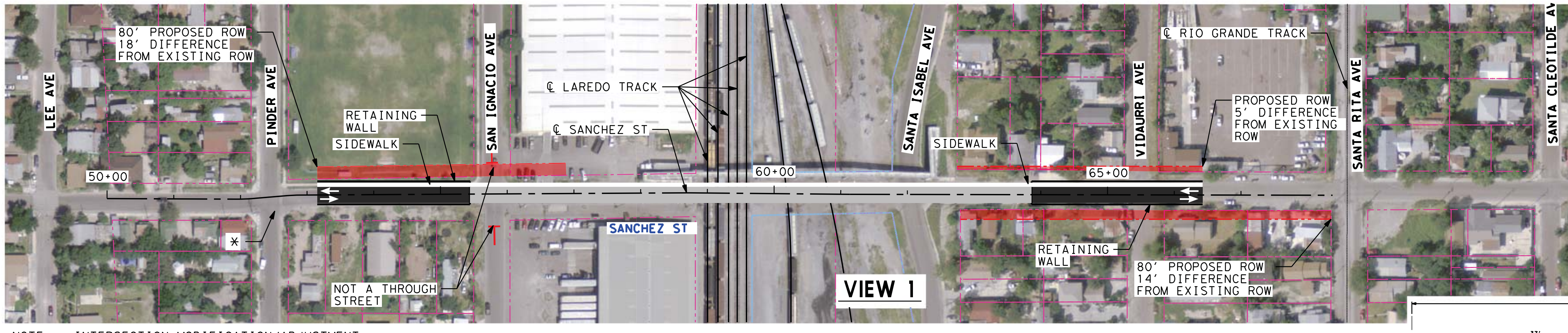

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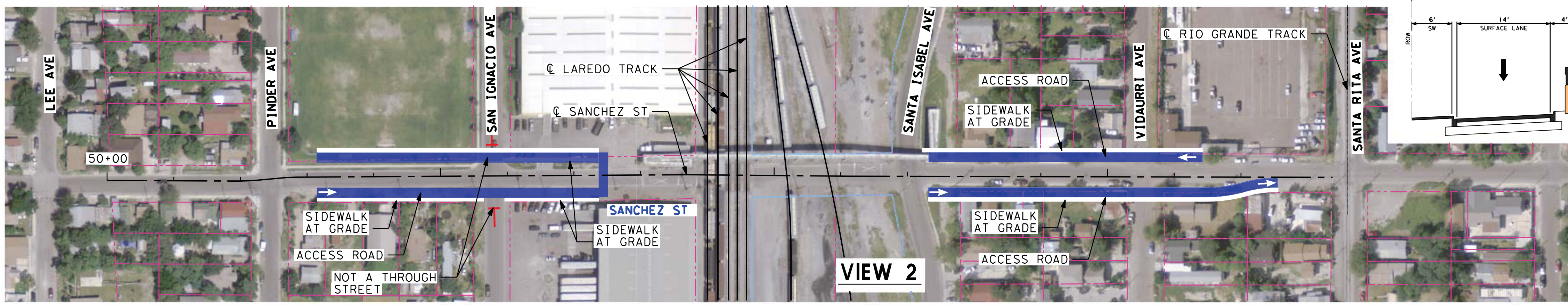

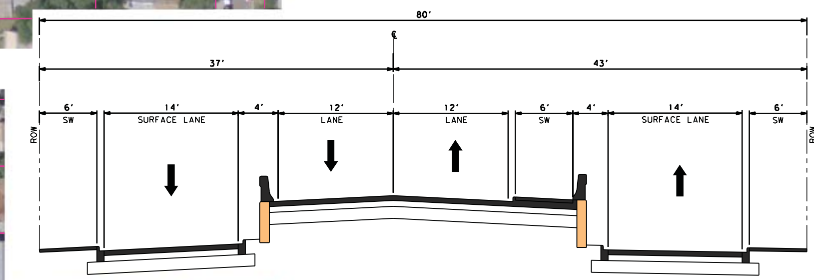

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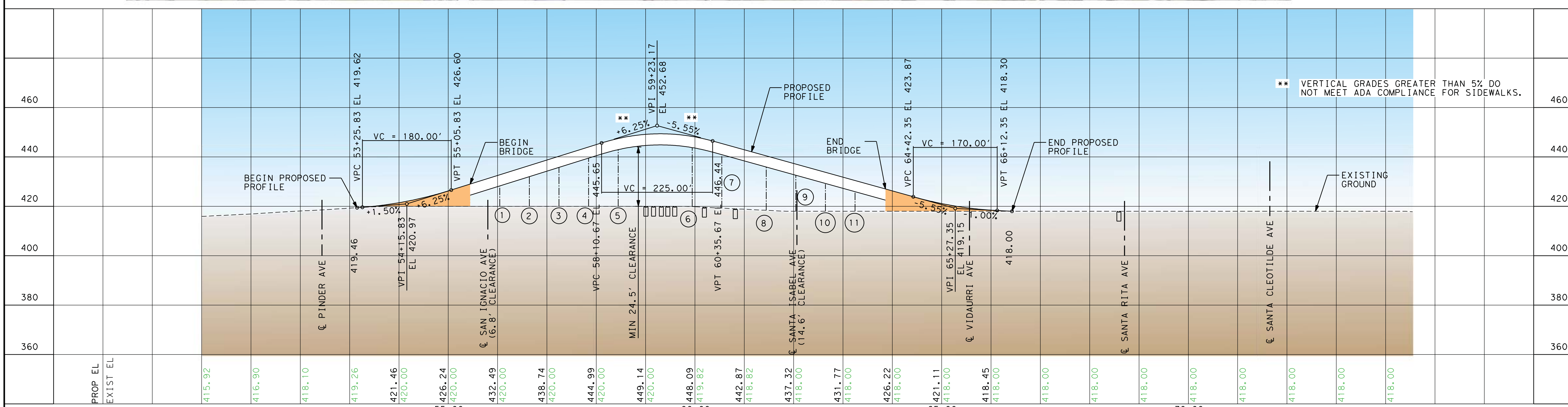
GRAPHIC SCALE: VERT. 1" = 40'



PROFILE

LEGEND

ASPHALT PAVEMENT

CONCRETE STRUCTURE

ACQUIRED PROPERTY

RETAINING WALL

ACCESS ROAD

NOT A THROUGH STREET

PARCEL ROW

PROPOSED ROW

RAILROAD ROW

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CONCEPTUAL OVERPASS COMBINED SANCHEZ PLAN & PROFILE

CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO. 8
SCALE	AS SHOWN

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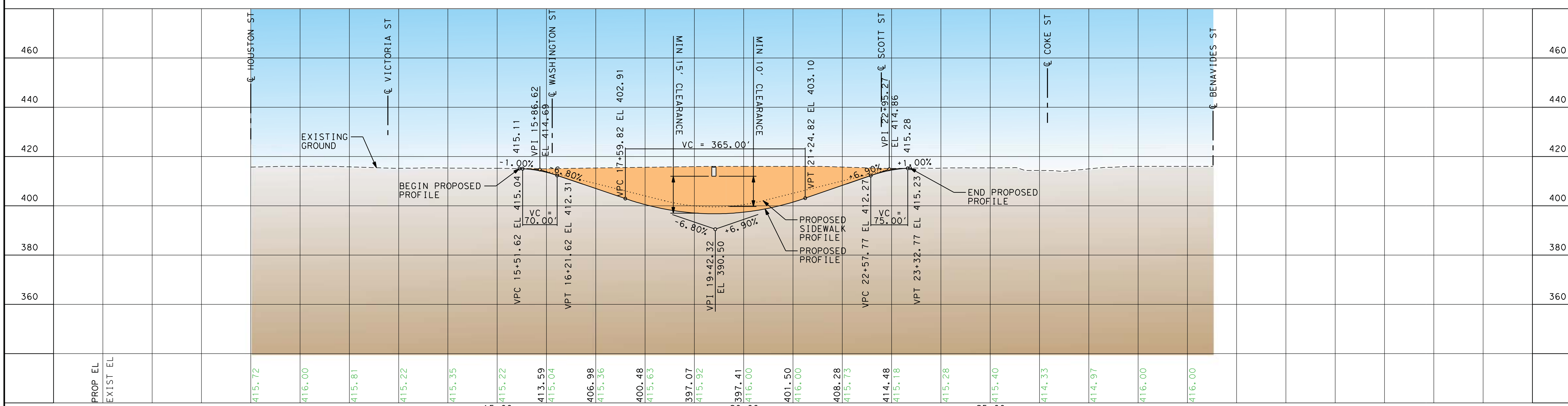
PROPERTY REDEVELOPMENT ASSOCIATED WITH LACK OF ACCESS TO SANTA MARIA AVE.

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

ASPHALT PAVEMENT	ACQUIRED PROPERTY	NOT A THROUGH STREET
CONCRETE STRUCTURE	RETAINING WALL	PARCEL ROW
	ACCESS ROAD	PROPOSED ROW
		RAILROAD ROW

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CONCEPTUAL ONE-WAY UNDERPASS SANTA MARIA
PLAN & PROFILE

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 18
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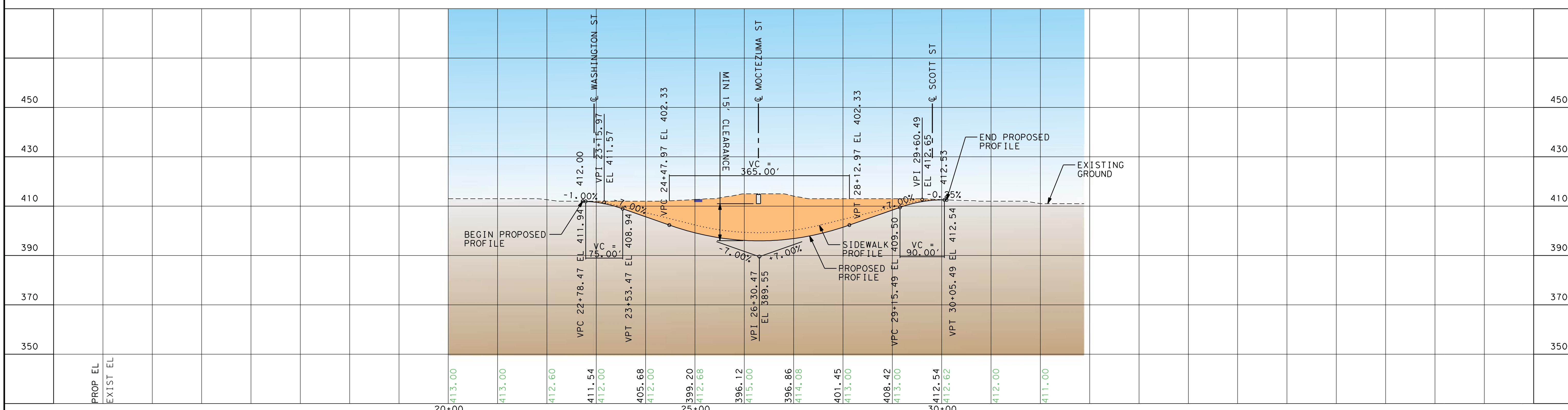
7/7/2017

NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PLAN



PROFILE

LEGEND

	ASPHALT PAVEMENT		ACQUIRED PROPERTY		NOT A THROUGH STREET
	CONCRETE STRUCTURE		RETAINING WALL		PARCEL ROW
			ACCESS ROAD		PROPOSED ROW
					RAILROAD ROW

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LAREDO MOBILITY STUDY
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CONCEPTUAL ONE-WAY UNDERPASS CONVENT PLAN & PROFILE

CONTRACT NO.

DRAWING NO.

REVISION

SHEET NO. 20

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NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

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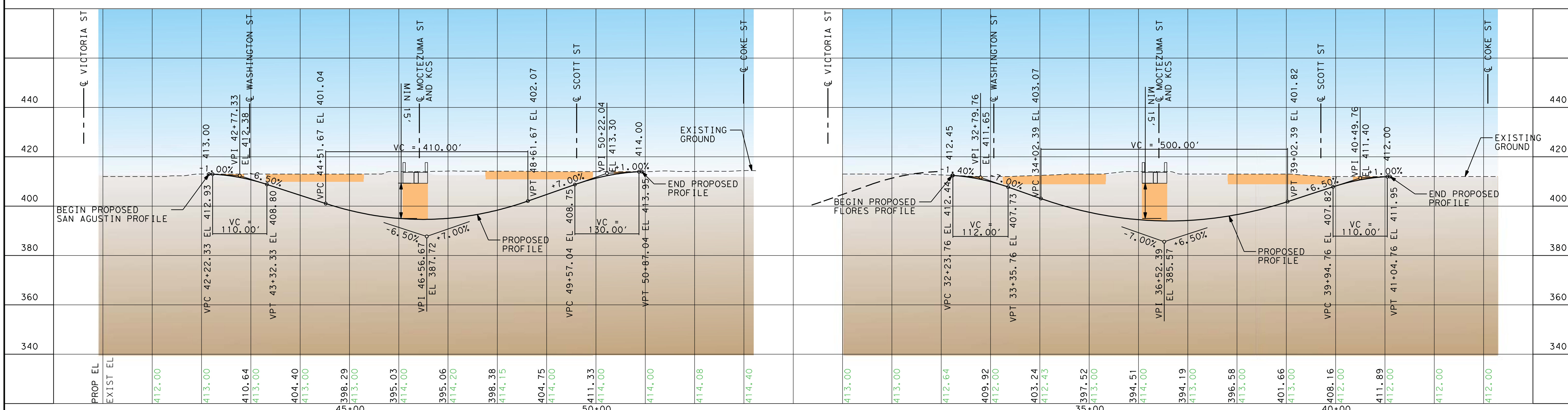

PROFILE

LEGEND

ASPHALT PAVEMENT		ACQUIRED PROPERTY		NOT A THROUGH STREET	
CONCRETE STRUCTURE		RETAINING WALL		PARCEL ROW	
		ACCESS ROAD		PROPOSED ROW	
				RAILROAD ROW	

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CONCEPTUAL TWO-LANES UNDERPASS FLORES AVE
PLAN & PROFILE

CONTRACT NO.

DRAWING NO.

REVISION

SHEET NO. 21

SCALE AS SHOWN

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LEGEND

4

ASPHALT PAVEMENT	ACQUIRED PROPERTY	NOT A THROUGH STREET	
CONCRETE STRUCTURE	GRASS	PARCEL ROW	
	ACCESS ROAD	PROPOSED ROW	
		RAILROAD ROW	

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS
CONCEPTUAL RAMP I-35 BRAIDED RAMPS
PLAN

CONTRACT NO.

DRAWING NO.

REVISION

SHEET NO.

SCALE AS SHOWN

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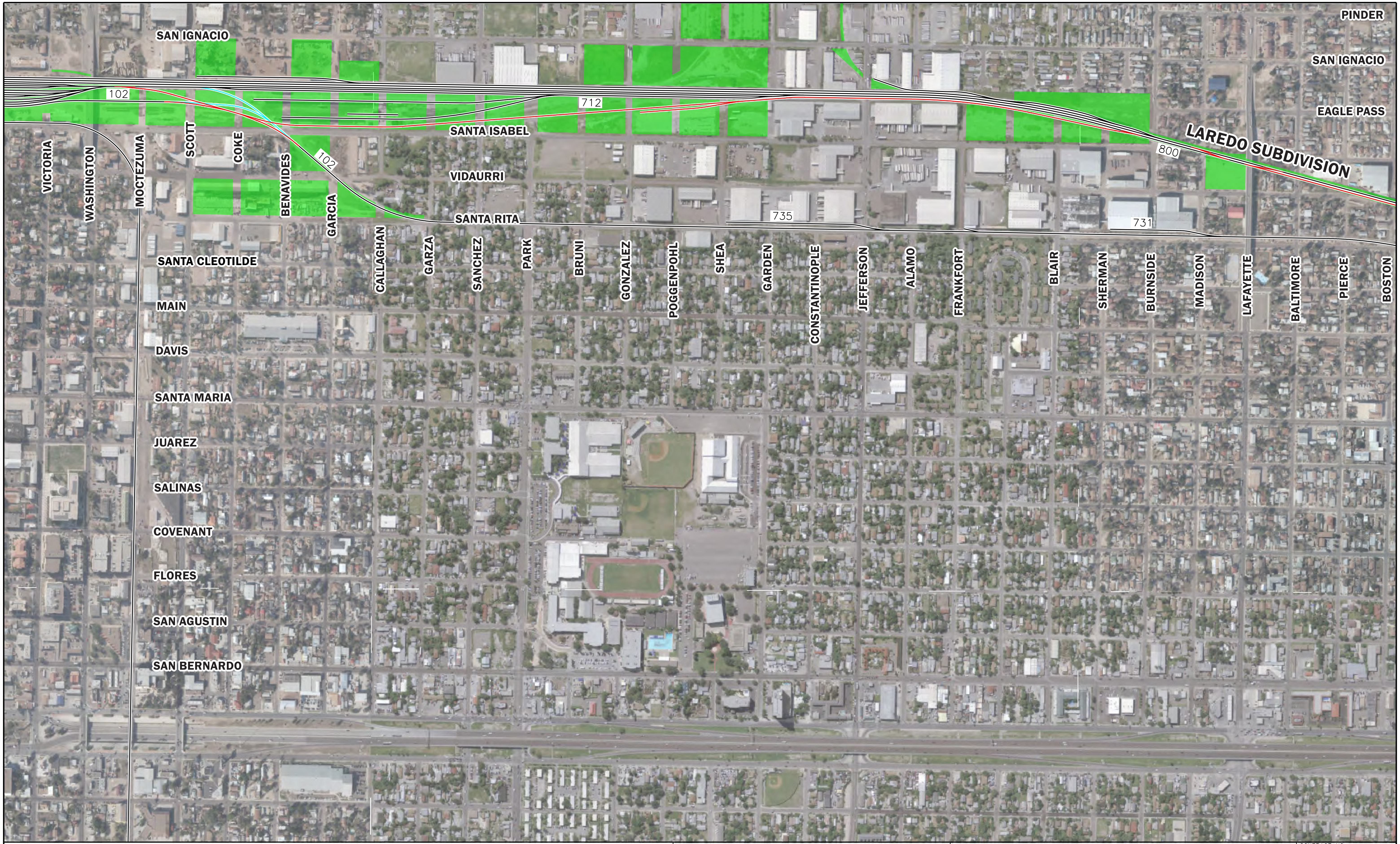
Appendix C. Rail Relocation Concepts Reviewed



LEGEND

EXISTING TRACK

UPRR PROPERTY

REMOVE TRACK

PROPOSED TRACK

N

0 300 600 900

SCALE FEET

1" = 300'

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DRAWING NO.	
REVISION	SHEET NO.
SCALE AS SHOWN	

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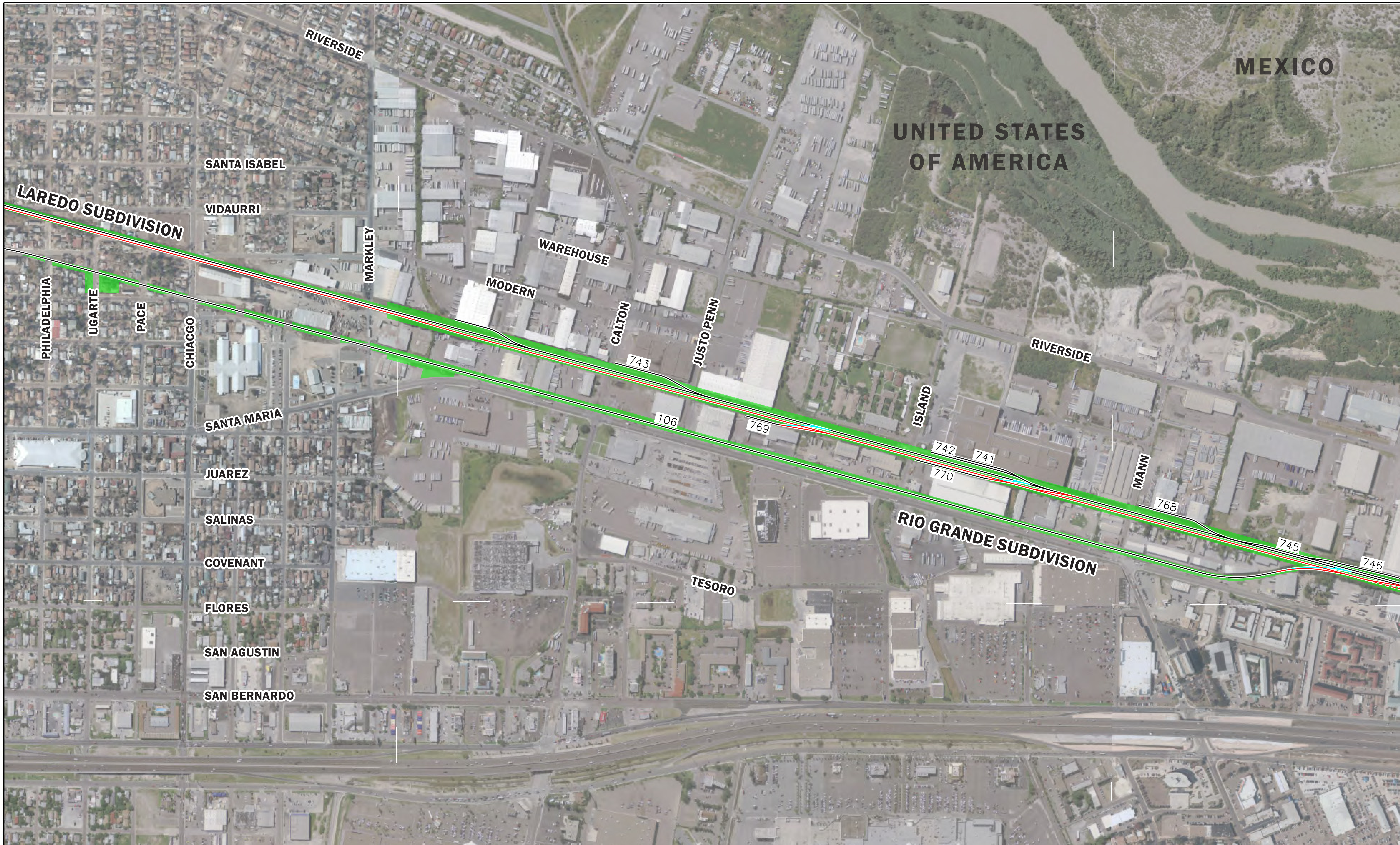

LEGEND

EXISTING TRACK

UPRR PROPERTY

REMOVE TRACK

PROPOSED TRACK

PROPOSED TRACK BY OTHERS

N

0 300 600 900

SCALE FEET

1" = 300'

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REVISION

SHEET NO.

SCALE AS SHOWN

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LEGEND

EXISTING TRACK

UPRR PROPERTY

REMOVE TRACK

PROPOSED TRACK

PROPOSED TRACK BY OTHERS

Z

0 300 600 900

SCALE FEET

1" = 300'

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CONTRACT NO.	
DRAWING NO.	
REVISION	SHEET NO.
SCALE	AS SHOWN

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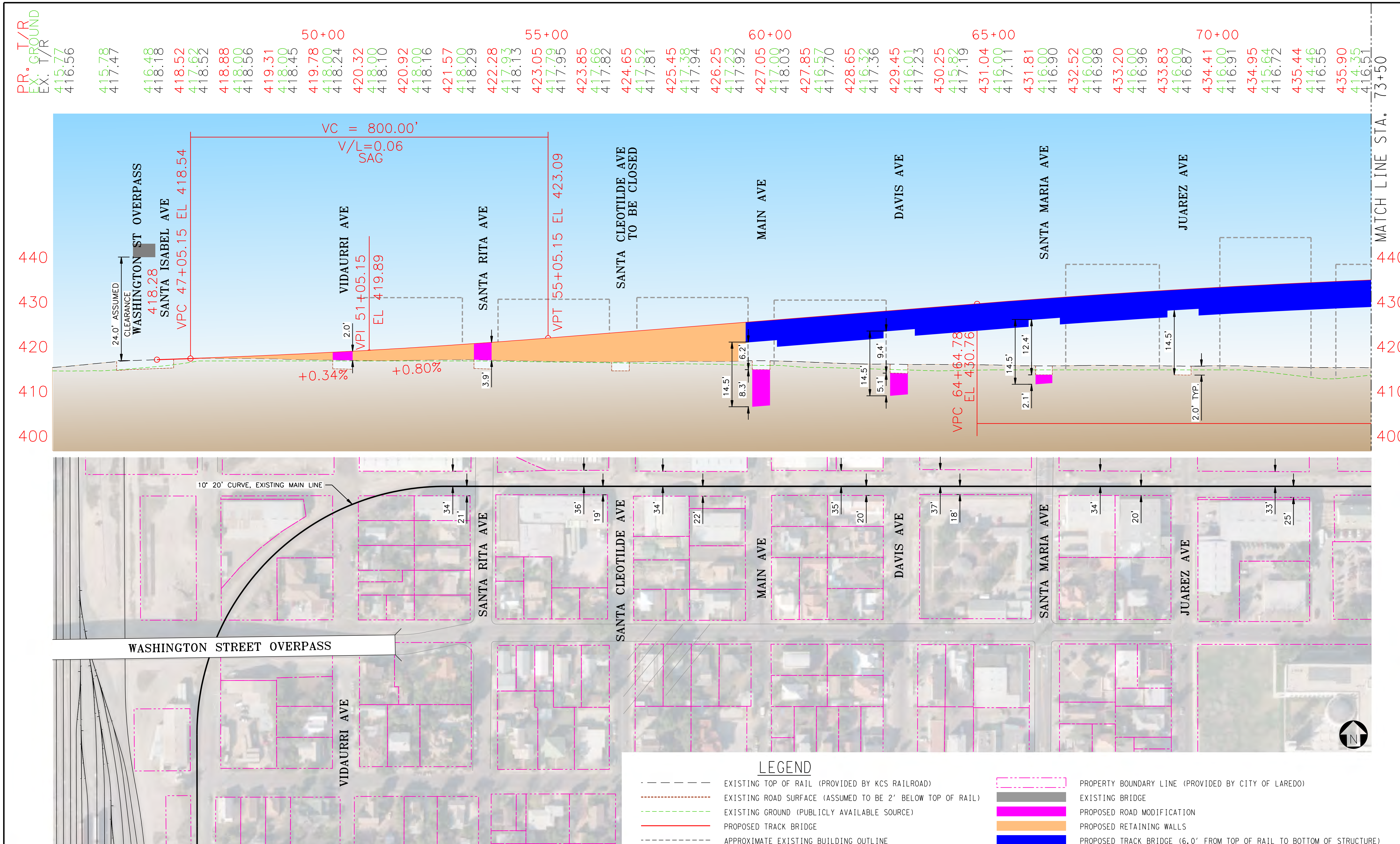

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10' 0 10' 20'
GRAPHIC SCALE: VERT. 1" = 20'

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LAREDO CORRIDOR STUDY
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KCS FLYOVER OPTION 2

CONTRACT NO.
DRAWING NO. EX10-1
REVISION
SHEET NO.
SCALE AS SHOWN

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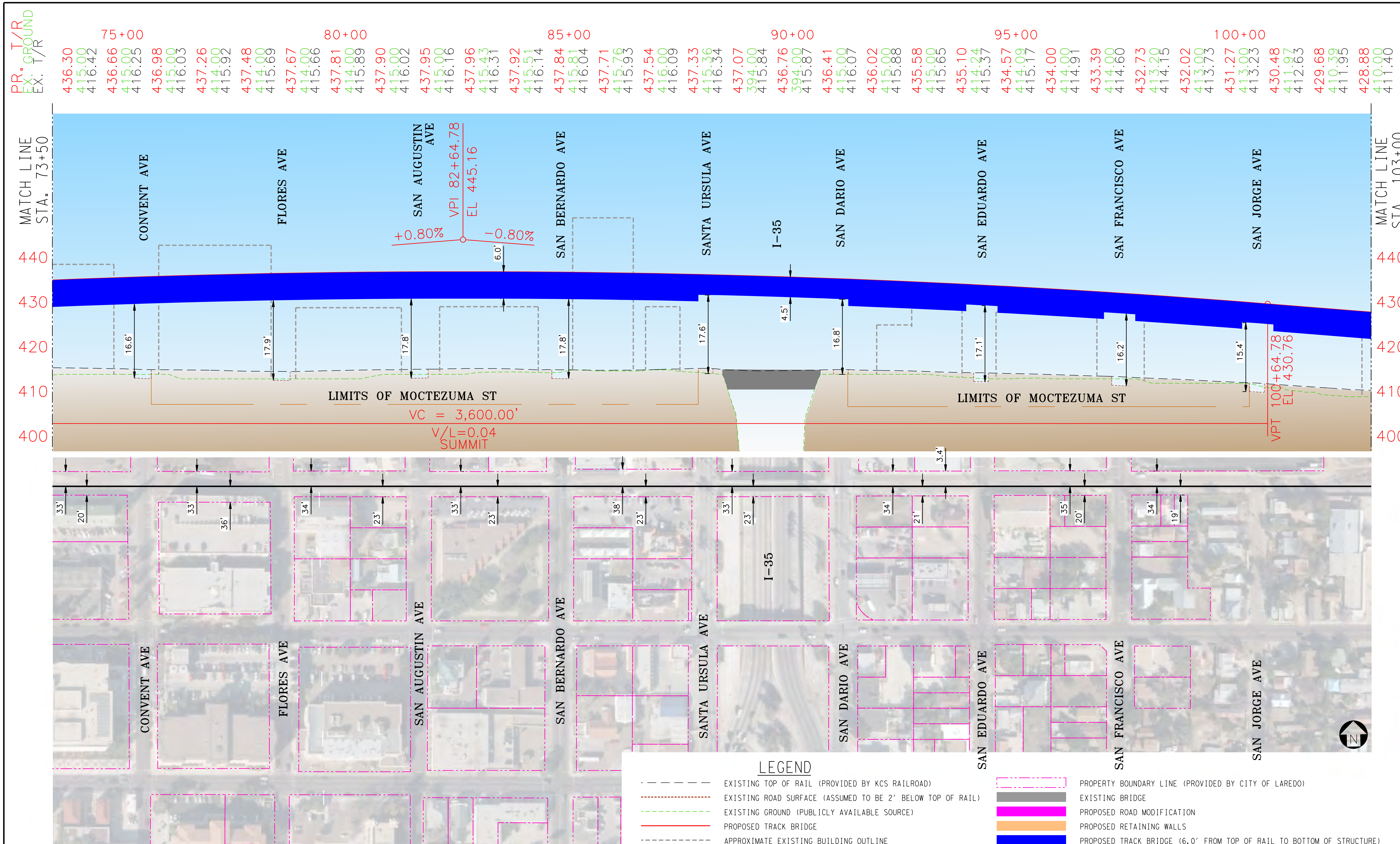
11/17/2017



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11/17/2017

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GRAPHIC SCALE: VERT. 1" = 20'

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LAREDO CORRIDOR STUDY
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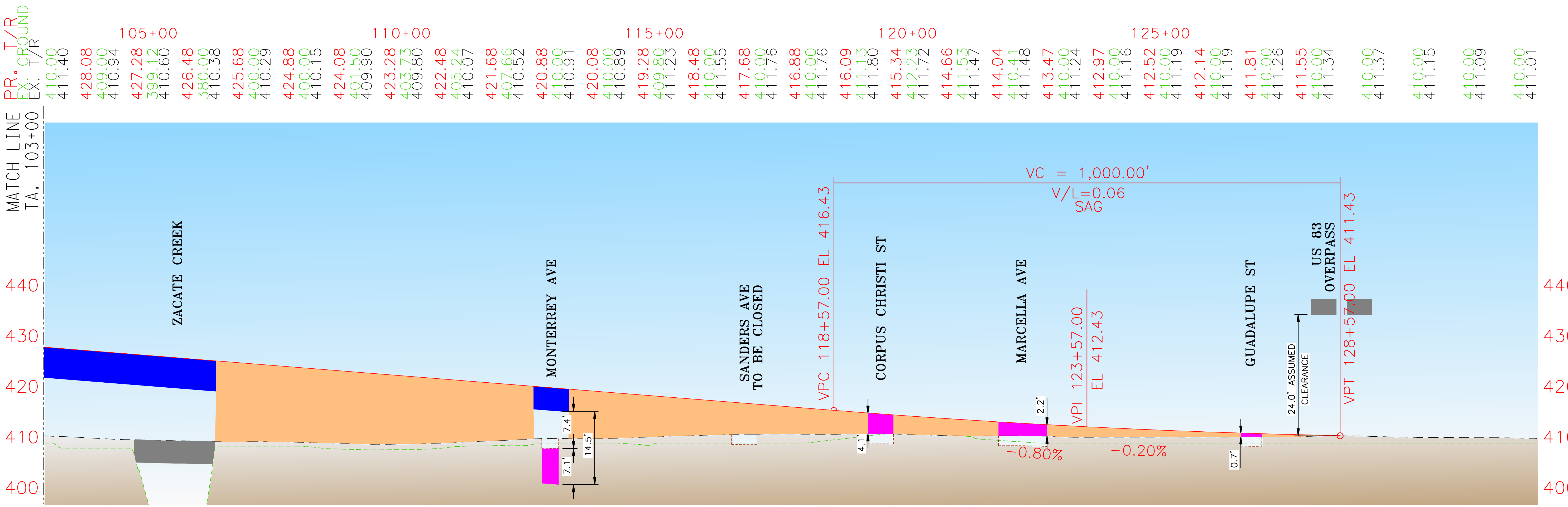
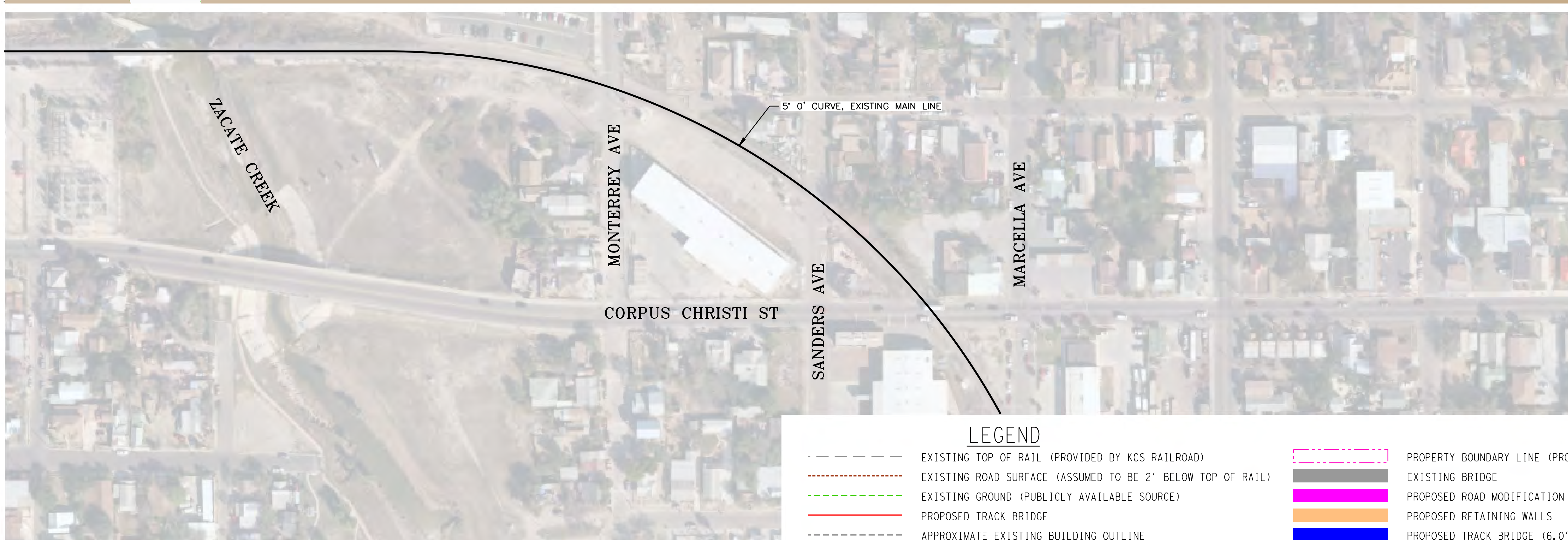
KCS FLYOVER OPTION 2

CONTRACT NO.
DRAWING NO. EX10-2
REVISION
SHEET NO.
SCALE AS SHOWN





LEGEND

— — — —	EXISTING TOP OF RAIL (PROVIDED BY KCS RAILROAD)
....	EXISTING ROAD SURFACE (ASSUMED TO BE 2' BELOW TOP OF RAIL)
- - - - -	EXISTING GROUND (PUBLICLY AVAILABLE SOURCE)
———	PROPOSED TRACK BRIDGE
----------	APPROXIMATE EXISTING BUILDING OUTLINE
	PROPERTY BOUNDARY LINE (PROVIDED BY CITY OF LAREDO)
	EXISTING BRIDGE
	PROPOSED ROAD MODIFICATION
	PROPOSED RETAINING WALLS
	PROPOSED TRACK BRIDGE (6.0' FROM TOP OF RAIL TO BOTTOM OF STRUCTURE)

Pen Table File
12:21:46 PM
11/17/2017

100' 0 100' 200'
GRAPHIC SCALE: HORIZ. 1" = 200'

10' 0 10' 20'
GRAPHIC SCALE: VERT. 1" = 20'

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LAREDO CORRIDOR STUDY
WEBB COUNTY, TEXAS

KCS FLYOVER OPTION 2

CONTRACT NO.
DRAWING NO. EX10-3
REVISION
SHEET NO.
SCALE AS SHOWN

Appendix D. Scott Street Subarea Review

As part of the Laredo Mobility Study additional review of the subarea around the Scott Street highway-railroad grade crossing was completed.

The additional review included:

- Physical and operational data review of truck routes, land use and development initiatives
- Field observations including peak hour traffic counts and manual train movement observations
- Right-of-way research
- Conceptual layouts of grade separation concepts and a transportation network improvement
- Cost estimates
- Stakeholder meetings

Physical and Operational Data Review

The only roadways with a designated functional classification west of the railroad tracks that cross the tracks are Washington Street and Jefferson Street. Washington Street is shown to terminate at the extension of Pinder Avenue, although it curves south to Victoria Street. Washington Street is classified as a major collector but is not a designated truck route. Jefferson Street is classified as a major collector from I-35 to Anna Street.

Jefferson Street is designated a truck route in the westbound direction from I-35 to Santa Isabel Avenue. This section of Jefferson crosses the Rio Grande Runaround track. The truck route designation on Jefferson continues westerly to Anna Street, where two-way truck traffic is allowed. There are no north-south designated truck routes on the west of the railroad tracks. On the east side of the railroad tracks, Santa Isabel is a north-south designated truck route. Scott Street is a designated a truck route in the westbound direction from I-35 to Santa Isabel Avenue.

According to city ordinance, trucks are allowed to travel on non-designated routes if it is the shortest and most direct route with a destination to a truck facility. Trucks travel on local roadways west of the UP tracks to access several industrial, warehousing and storage facilities. Truck traffic counts found that San Ignacio (south of Scott Street) has more trucks in the PM peak hour than Santa Isabel Avenue.

Other observations note a lack of system continuity in the north-south direction with Pinder Avenue being discontinuous for a block between Shea Street and Poggenpohl Street. San Ignacio also terminates at Matamoras Street, where it connects at Eagle Pass Avenue.

The land use on the west of the railroad tracks includes several warehousing and storage facilities with truck docks along San Ignacio and Eagle Pass Avenue. These streets are not designated truck routes but trucks operate on these streets. There are several “No Trucks” signs posted on streets such as Victoria and San Ignacio south of Victoria. The shortest and most direct route to industrial land uses west of the railroad tracks from a designated truck route (north of Washington Street) is likely from Jefferson Street via San Ignacio.

Field Observations

Traffic counts were conducted at four intersections in the AM and PM peak periods to record vehicle turning movements, including trucks. The counts were conducted on Tuesday afternoon on March 13, Wednesday morning and evening on March 14, and Thursday morning on March 15, 2018. The counts were conducted at the following locations:

- San Ignacio and Scott Street
- Santa Isabel and Scott Street
- San Ignacio and Victoria Street
- Santa Isabel and Vidaurri Streets

All of the streets are two-way with one lane in each direction. Santa Isabel is a designated truck route in both directions, while Scott Street east of Santa Isabel is a truck route in the westbound direction only. Five Union Pacific railroad tracks cross Scott Street between Santa Isabel and San Ignacio. During the traffic counts, the Scott Street crossing was occupied by trains for the 2 hours in the morning and 2 hours in the afternoon. At the Santa Isabel and Vidaurri intersection, the Kansas City Southern (KCS) single track travels diagonally through the intersection. The track was only occupied by a train in the morning until 7:08 AM, when traffic counts began.

Traffic counts were analyzed in order to determine a peak hour. For consistency purposes, and because the four intersections are close to each other, a common peak hour was chosen at 8-9 AM and 4-5 PM. This generally reflects the actual peaking characteristics at each intersections. With relatively low traffic volumes, there are only minor variations in traffic characteristics. Truck traffic volumes by approach are shown in Table D-1. The AM and PM peak hour turning movements are shown in Figures D-1 and D-2.

The following are summary statements about the traffic volumes and patterns.

- Overall, the traffic volumes are very low with an estimated 24-hour traffic volume of approximately 900 vehicles per day on San Ignacio (south of Scott Street) and approximately 1,300 vehicles per day on Santa Isabel (south of Scott Street).
- Peak hour traffic volumes are very low on all approaches. Traffic volumes in the PM period are higher than the AM period, typically by a factor of two. In the AM peak

most streets average 1 vehicle per minute. In the PM peak most streets average around 2 vehicles per minute.

- Traffic patterns on Santa Isabel favor the northbound direction (81%) in the AM peak hour and are essentially equally distributed in the PM peak hour.
- Traffic patterns on San Ignacio are essentially equally distributed in the AM peak hour and favor the northbound direction (77%) in the PM peak hour.
- Based on field observations, vehicles experienced little to no delay at the intersections.
- In general, truck volumes on an absolute basis are low. San Ignacio has more trucks in the PM peak hour (27) than the designated truck route of Santa Isabel (19). Truck percentages may appear high, yet that is a reflection of the overall low total traffic volumes.

Table D-1: Truck and Traffic Count

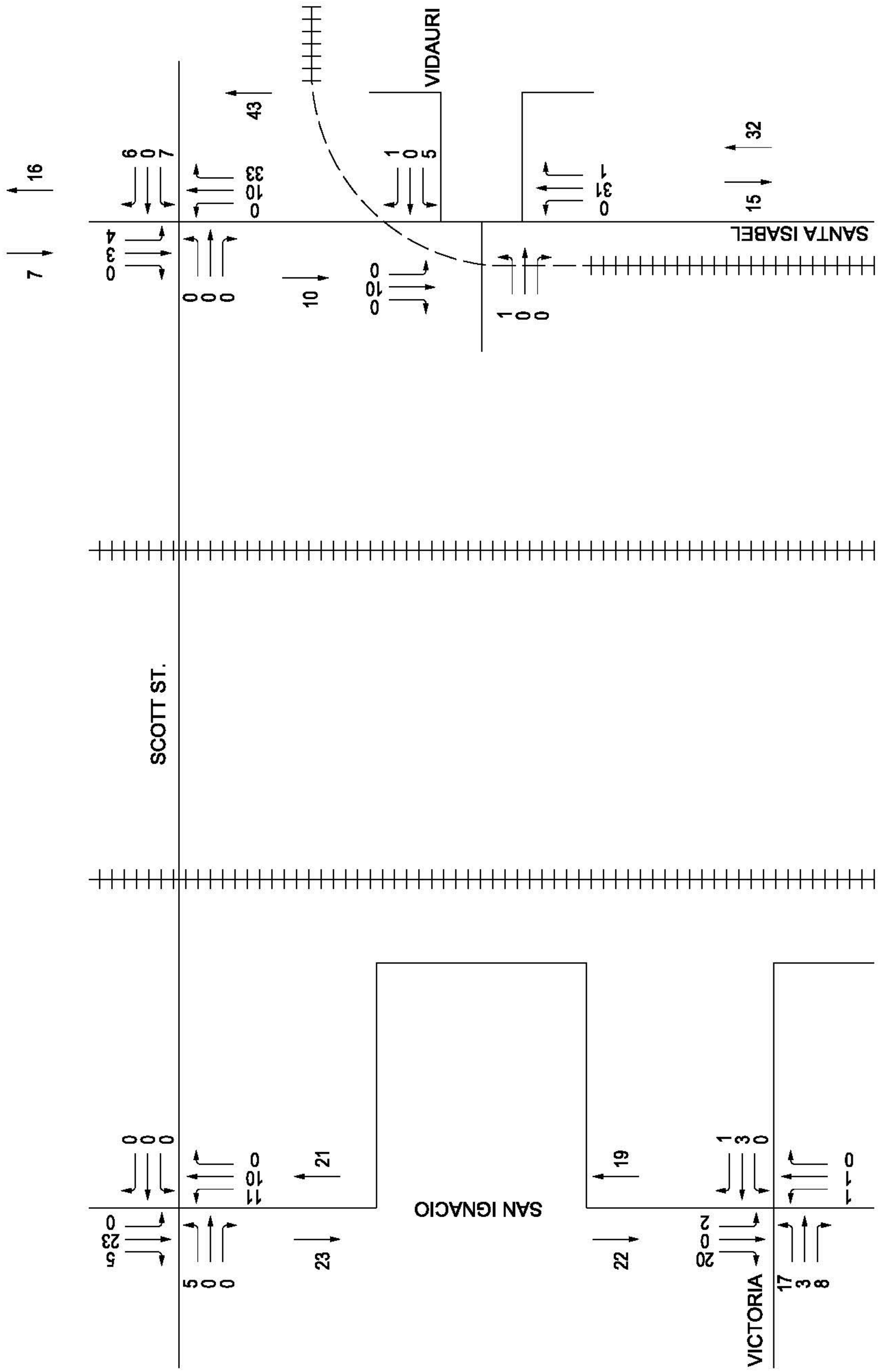
Location	AM Peak				PM Peak			
San Isabel								
North of Scott	SB	NB	Total	Percentage	SB	NB	Total	Percentage
Trucks	1	1	2	9%	3	3	12	12%
Total	7	16	23		51	50	101	
South of Scott								
Trucks	1	5	6	11%	16	3	19	14%
Total	10	43	53		69	63	132	
Scott								
East of Santa Isabel	WB		Total	Percentage	WB		Total	Percentage
Trucks	0			0%	20			48%
Total	13				42			
San Ignacio								
North of Scott	SB	NB	Total	Percentage	SB	NB	Total	Percentage
Trucks	0	4	4	9%	2	17	19	25%
Total	28	15	43		26	51	77	
South of Scott								
Trucks	0	6	6	14%	0	27	27	30%
Total	23	21	44		21	70	91	
Victoria								
East of Santa Isabel	WB	EB	Total	Percentage	WB	EB	Total	Percentage
Trucks	2	2	4	8%	3	3	6	6%
Total	24	28	52		58	48	106	

Source: TranSystems.

In addition to the traffic counts, truck observations were made during the off-peak hours. The observations involved tracking truck movements to identify route paths. Of interest were truck paths along San Ignacio. Several trucks traveling northbound on San Ignacio were observed to follow Anna Street, a designated truck route. A few trucks were observed traveling eastbound on Jefferson Street. On one occasion an eastbound truck was observed on Jefferson Street. Jefferson Street is designated a truck route in the westbound direction only. Truck observation on Scott Street, also designated truck route in the westbound direction only, noted no trucks traveling in the eastbound direction during the observation period.

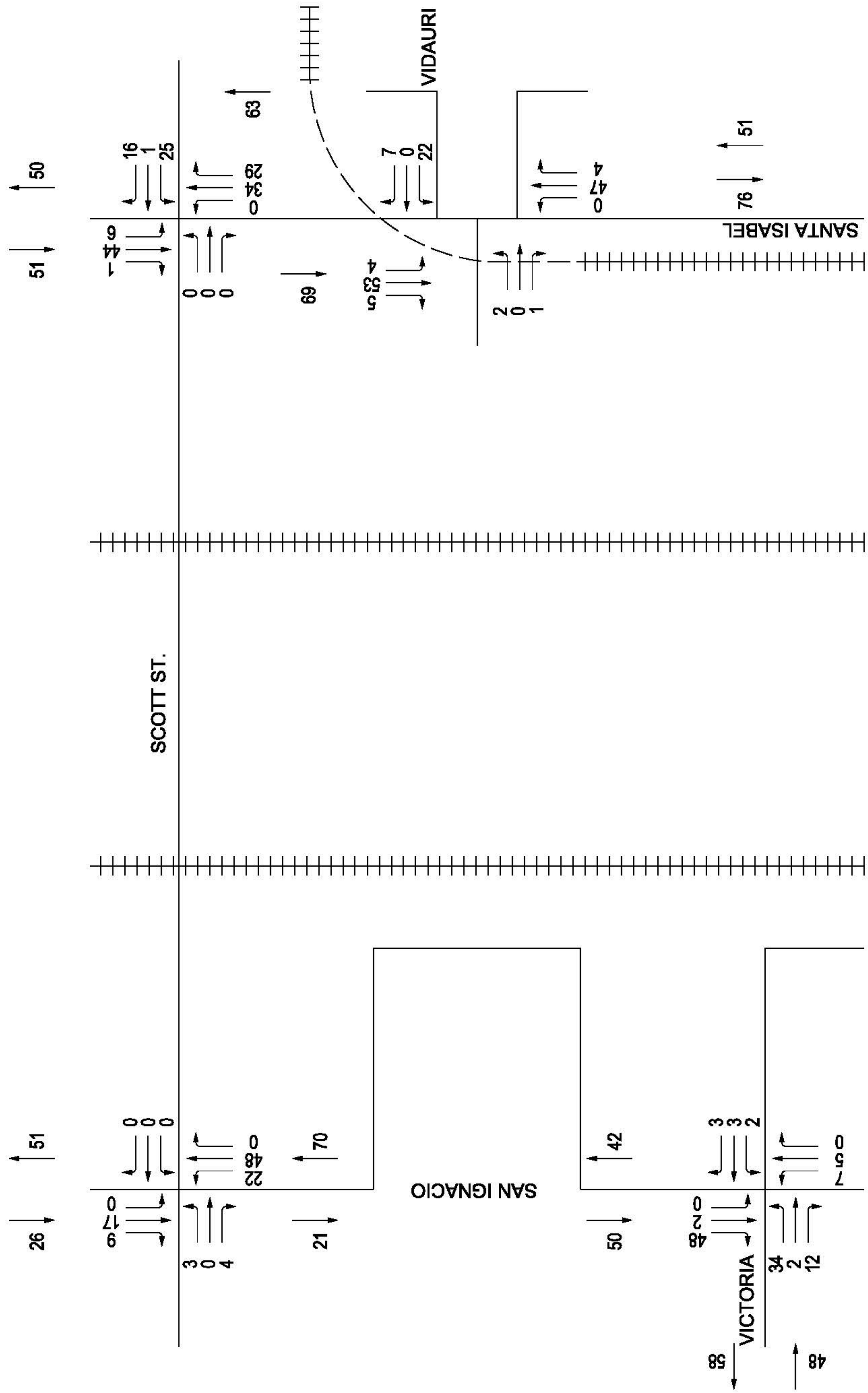
On one occasion, two westbound trucks stopped at the Scott Street railroad crossing (west of Santa Isabel). The railroad crossing gates were down and the crossing was occupied by trains. The trucks waited for nearly 30 minutes before turning around and traveling southbound on Santa Isabel.

Figure D-1. AM Peak Period Traffic Counts



Source: TranSystems.

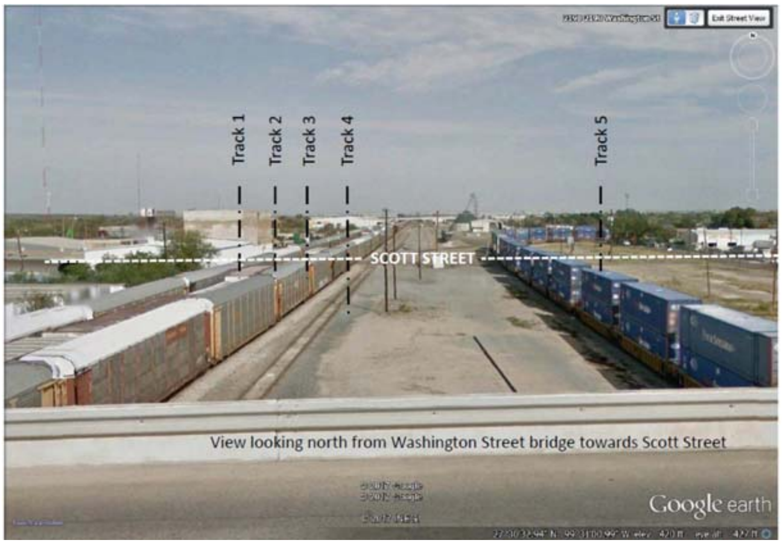
Figure D-2. PM Peak Period Traffic Counts



Source: TranSystems.

Train movement observations were conducted on Friday, January 27, 2018 for a 10-hour period from 8 AM until 6 PM by viewing Scott Street from the Washington Street viaduct, similar to the view shown in Figure D-3.

Figure D-3: Viewing Location



Source: TranSystems and Google.

Train movements on each of the five Union Pacific tracks were recorded. Observations were recorded in five-minute increments, yet any train movement was recorded to the minute. Based on these observations, Scott Street is effectively occupied by trains for nine hours of the ten hours of observation. Two or more tracks were occupied for a continuous period of five hours and fifty minutes.

- Track 1 was occupied by a train from 11:38 AM to 4:37 PM, a period of 5 hours
- Track 2 was occupied from 9:05 AM until 2:21 PM (a period of more than 5 hours) and again from 4:15 PM until 5:43 PM (a period of nearly 1.5 hours)
- Track 3 was occupied 10:51 AM until 11:29 AM and again from 2:22 PM until 4:41 PM (a period of more than 2 hours)
- Track 4 remained unoccupied throughout the observed period
- Track 5 was occupied from 8:33 AM until 8:53 AM

The Los Olvidados Residents Association conducted prior video observations. Their data presents as many as 70 occurrences where trains occupied the Scott Street crossing over a period of 41 days. For comparison, their data includes four separate Fridays where a train occupied the crossing at Scott Street. The following are summaries of the overall durations on Fridays:

- February 17, 2017 more than 7 hours beginning at 6:50 AM
- April 28, 2017 more than 2 hours beginning at 5:45 AM and more than 8 hours beginning at 10:08 AM

- May 5, 2017 more than 2 hours beginning at 4:12 PM
- May 19, 2017 more than 3 hours beginning at 7:27 AM and for 3 hours beginning at 3:54 PM

Stationary trains at Scott Street also have the potential to occupy the Sanchez crossing due to their overall length. If this were the case, it means that trains could also occupy the Sanchez crossing for nine out of ten hours. Trains may also occupy the crossing at Zaragoza; however, assuming a duration is not easy due to the KCS trains operating at this crossing, as well.

Figure D-4 is a summary of the observations made on January 27, 2018.

Figure D-4: Train Movement Observation Log

LEGEND
O = open track (no train)
X = Stationary train on track
M = Moving train on track
Show direction of travel for train by arrow when moving
Up arrow for northward direction and Down arrow for southward direction

OBSERVATION LOG
Viewing from Washington Street bridge looking north towards Scott Street, Laredo, Texas

	Beginning Time	Ending Time	Track 1	Direction	Track 2	Direction	Track 3	Direction	Track 4	Direction		Track 5	Direction	Comments - add start and stop times for trains by circling track #		
8 to 9 AM	8:00 AM	8:05 AM	O		O		O		O			O		1 2 3 4 5		
	8:05 AM	8:10 AM	O		O		O		O			O		1 2 3 4 5		
	8:10 AM	8:15 AM	O		O		O		O			O		1 2 3 4 5		
	8:15 AM	8:20 AM	O		O		O		O			O		1 2 3 4 5		
	8:20 AM	8:25 AM	O		O		O		O			O		1 2 3 4 5		
	8:25 AM	8:30 AM	O		O		O		O			O		1 2 3 4 5		
	8:30 AM	8:35 AM	O		O		O		O			O/M	N	1 2 3 4 5	Start 8:33	
	8:35 AM	8:40 AM	O		O		O		O			M/X	N	1 2 3 4 5	Stop 8:36	
	8:40 AM	8:45 AM	O		O		O		O			X	N	1 2 3 4 5	Stopped	
	8:45 AM	8:50 AM	O		O		O		O			X/M	N	1 2 3 4 5	Moving 8:48	
	8:50 AM	8:55 AM	O		O		O		O			M/O	N	1 2 3 4 5	End 8:53	
	8:55 AM	9:00 AM	O		O		O		O			O		1 2 3 4 5		
9 to 10 AM	9:00 AM	9:05 AM	O		O		O		O			O		1 2 3 4 5		
	9:05 AM	9:10 AM	O		M		O		O			O		1 2 3 4 5	Start 9:05 - stopped 9:10	
	9:10 AM	9:15 AM	O		X		O		O			O		1 2 3 4 5		
	9:15 AM	9:20 AM	O		X		O		O			O		1 2 3 4 5		
	9:20 AM	9:25 AM	O		X		O		O			O		1 2 3 4 5		
	9:25 AM	9:30 AM	O		X		O		O			O		1 2 3 4 5		
	9:30 AM	9:35 AM	O		X		O		O			O		1 2 3 4 5		
	9:35 AM	9:40 AM	O		X		O		O			O		1 2 3 4 5		
	9:40 AM	9:45 AM	O		X		O		O			O		1 2 3 4 5		
	9:45 AM	9:50 AM	O		X		O		O			O		1 2 3 4 5		
	9:50 AM	9:55 AM	O		X		O		O			O		1 2 3 4 5		
	9:55 AM	10:00 AM	O		X		O		O			O		1 2 3 4 5		
10 to 11 AM	10:00 AM	10:05 AM	O		X		O		O			O		1 2 3 4 5		
	10:05 AM	10:10 AM	O		X		O		O			O		1 2 3 4 5		
	10:10 AM	10:15 AM	O		X		O		O			O		1 2 3 4 5		
	10:15 AM	10:20 AM	O		X		O		O			O		1 2 3 4 5		
	10:20 AM	10:25 AM	O		X		O		O			O		1 2 3 4 5		
	10:25 AM	10:30 AM	O		X		O		O			O		1 2 3 4 5		
	10:30 AM	10:35 AM	O		X		O		O			O		1 2 3 4 5		
	10:35 AM	10:40 AM	O		X		O		O			O		1 2 3 4 5		
	10:40 AM	10:45 AM	O		X		O		O			O		1 2 3 4 5		
	10:45 AM	10:50 AM	O		X		O		O			O		1 2 3 4 5		
	10:50 AM	10:55 AM	O		X		M	N	O			O		1 2 3 4 5		Start 10:51
	10:55 AM	11:00 AM	O		X		X		O			O		1 2 3 4 5		Stopped 10:55
11 AM to Noon	11:00 AM	11:05 AM	O		X		X/M	N	O			O		1 2 3 4 5		Moving 11:05
	11:05 AM	11:10 AM	O		X		M	N	O			O		1 2 3 4 5		
	11:10 AM	11:15 AM	O		X		M/X	N	O			O		1 2 3 4 5		Stopped 11:14
	11:15 AM	11:20 AM	O		X		X		O			O		1 2 3 4 5		
	11:20 AM	11:25 AM	O		X		X		O			O		1 2 3 4 5		
	11:25 AM	11:30 AM	M	N	X		X/M/O	N	O			O		1 2 3 4 5	Moving 11:29	Moving 11:27 Stopped 11:29
	11:30 AM	11:35 AM	M	N	X		O		O			O		1 2 3 4 5		
	11:35 AM	11:40 AM	M/X	N	X		O		O			O		1 2 3 4 5	Stopped 11:38	
	11:40 AM	11:45 AM	X		X		O		O			O		1 2 3 4 5		
	11:45 AM	11:50 AM	X		X		O		O			O		1 2 3 4 5		
	11:50 AM	11:55 AM	X		X		O		O			O		1 2 3 4 5		
	11:55 AM	12:00 PM	X		X		O		O			O		1 2 3 4 5		
Noon to 1 PM	12:00 PM	12:05 PM	X		X		O		O			O		1 2 3 4 5		
	12:05 PM	12:10 PM	X		X		O		O			O		1 2 3 4 5		
	12:10 PM	12:15 PM	X		X		O		O			O		1 2 3 4 5		
	12:15 PM	12:20 PM	X		X		O		O			O		1 2 3 4 5		
	12:20 PM	12:25 PM	X		X/M	S	O		O			O		1 2 3 4 5	Moving 12:22	
	12:25 PM	12:30 PM	X		M/X	S	O		O			O		1 2 3 4 5	Stopped 12:28	
	12:30 PM	12:35 PM	X		X		O		O			O		1 2 3 4 5		
	12:35 PM	12:40 PM	X		X		O		O			O		1 2 3 4 5		
	12:40 PM	12:45 PM	X		X/M	S	O		O			O		1 2 3 4 5	Moving 12:43	
	12:45 PM	12:50 PM	X		M/X	S	O		O			O		1 2 3 4 5	Stopped 12:46	
	12:50 PM	12:55 PM	X		X/M	S	O		O			O		1 2 3 4 5	Moving 12:50	
	12:55 PM	1:00 PM	X		X		O		O			O		1 2 3 4 5	Stopped 12:54	
1 to 2 PM	1:00 PM	1:05 PM	X		X		O		O			O		1 2 3 4 5		
	1:05 PM	1:10 PM	X		X		O		O			O		1 2 3 4 5		
	1:10 PM	1:15 PM	X		X		O		O			O		1 2 3 4 5		
	1:15 PM	1:20 PM	X		X		O		O			O		1 2 3 4 5		
	1:20 PM	1:25 PM	X		X/M	S	O		O			O		1 2 3 4 5	Moving 1:25	
	1:25 PM	1:30 PM	X		M/X	S	O		O			O		1 2 3 4 5	Stopped 1:27 Moving 1:28	
	1:30 PM	1:35 PM	X		M/X	S	O		O			O		1 2 3 4 5	Stopped 1:35	
	1:35 PM	1:40 PM	X		X		O		O			O		1 2 3 4 5		
	1:40 PM	1:45 PM	X		X/M	S	O		O			O		1 2 3 4 5	Moving 1:45	
	1:45 PM	1:50 PM	X		M	S	O		O			O		1 2 3 4 5		
	1:50 PM	1:55 PM	X		M/O	S	O		O			O		1 2 3 4 5	End 1:51	
	1:55 PM	2:00 PM	X		O/M	S	O		O			O		1 2 3 4 5	Moving 1:58	
2 to 3 PM	2:00 PM	2:05 PM	X		M	S	O		O			O		1 2 3 4 5		
	2:05 PM	2:10 PM	X		M/X	S	O		O			O		1 2 3 4 5	Stopped 2:06	
	2:10 PM	2:15 PM	X		X/M	S	O		O			O		1 2 3 4 5	Moving 2:12	
	2:15 PM	2:20 PM	X		M/O	S	O		O			O		1 2 3 4 5	End 2:17	
	2:20 PM	2:25 PM	X		O		M	S	O			O		1 2 3 4 5	Start 2:22	
	2:25 PM	2:30 PM	X		O		M/X	S	O			O		1 2 3 4 5	Stopped 2:28	
	2:30 PM	2:35 PM	X		O		X		O			O		1 2 3 4 5		
	2:35 PM	2:40 PM	X		O		X		O			O		1 2 3 4 5		
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	2:45 PM	2:50 PM	X		O		X		O			O		1 2 3 4 5		
	2:50 PM	2:55 PM	X		O		X		O			O		1 2 3 4 5		
	2:55 PM	3:00 PM	X		O		X		O			O		1 2 3 4 5		

Figure D-4 (continued): Train Movement Observation Log

LEGEND
O = open track (no train)
X = Stationary train on track
M = Moving train on track
Show direction of travel for train by arrow when moving
Up arrow for northward direction and Down arrow for southward direction

OBSERVATION LOG
Viewing from Washington Street bridge looking north towards Scott Street, Laredo, Texas

	Beginning Time	Ending Time	Track 1	Direction	Track 2	Direction	Track 3	Direction	Track 4	Direction		Track 5	Direction	Comments - add start and stop times for trains by circling track #		
3 to 4 PM	3:00 PM	3:05 PM	X		O		X		O			O		1 2 3 4 5		
	3:05 PM	3:10 PM	X		O		X		O			O		1 2 3 4 5		
	3:10 PM	3:15 PM	X		O		X		O			O		1 2 3 4 5		
	3:15 PM	3:20 PM	X		O		X		O			O		1 2 3 4 5		
	3:20 PM	3:25 PM	X		O		X		O			O		1 2 3 4 5		
	3:25 PM	3:30 PM	X		O		X		O			O		1 2 3 4 5		
	3:30 PM	3:35 PM	X		O		X		O			O		1 2 3 4 5		
	3:35 PM	3:40 PM	X		O		X		O			O		1 2 3 4 5		
	3:40 PM	3:45 PM	X		O		X		O			O		1 2 3 4 5		
	3:45 PM	3:50 PM	X		O		X		O			O		1 2 3 4 5		
	3:50 PM	3:55 PM	X		O		X		O			O		1 2 3 4 5		
	3:55 PM	4:00 PM	X		O		X		O			O		1 2 3 4 5		
4 to 5 PM	4:00 PM	4:05 PM	X		O		X		O			O		1 2 3 4 5		
	4:05 PM	4:10 PM	X		O		X		O			O		1 2 3 4 5		
	4:10 PM	4:15 PM	X		O		X		O			O		1 2 3 4 5		
	4:15 PM	4:20 PM	X		M/X	S	X/M	S	O			O		1 2 3 4 5	Moving 4:15 stopped 4:19	Moving 4:19
	4:20 PM	4:25 PM	X		X		M/X	S	O			O		1 2 3 4 5		Stopped 4:23
	4:25 PM	4:30 PM	M/X	N	X		X		O			O		1 2 3 4 5	Moving 4:27 stopped 4:28	
	4:30 PM	4:35 PM	X		X		X/M/X	S	O			O		1 2 3 4 5		Moving 4:32 Stopped 4:34
	4:35 PM	4:40 PM	X/M	N	X		X/M	S	O			O		1 2 3 4 5	Moving 4:36 End 4:39	Moving 4:37
	4:40 PM	4:45 PM	O		X		M/O	S	O			O		1 2 3 4 5		End 4:41
	4:45 PM	4:50 PM	O		X		O		O			O		1 2 3 4 5		
	4:50 PM	4:55 PM	O		X		O		O			O		1 2 3 4 5		
	4:55 PM	5:00 PM	O		X		O		O			O		1 2 3 4 5		
5 to 6 PM	5:00 PM	5:05 PM	O		X		O		O			O		1 2 3 4 5		
	5:05 PM	5:10 PM	O		X		O		O			O		1 2 3 4 5		
	5:10 PM	5:15 PM	O		X		O		O			O		1 2 3 4 5		
	5:15 PM	5:20 PM	O		X		O		O			O		1 2 3 4 5		
	5:20 PM	5:25 PM	O		M		O		O			O		1 2 3 4 5	Moving 5:20	
	5:25 PM	5:30 PM	O		M		O		O			O		1 2 3 4 5		
	5:30 PM	5:35 PM	O		M/X		O		O			O		1 2 3 4 5	Stopped 5:31	
	5:35 PM	5:40 PM	O		X		O		O			O		1 2 3 4 5		
	5:40 PM	5:45 PM	O		X/M/O		O		O			O		1 2 3 4 5	Moving 5:40 End 5:43	
	5:45 PM	5:50 PM	O		O		O		O			O		1 2 3 4 5		
	5:50 PM	5:55 PM	O		O		O		O			O		1 2 3 4 5		
	5:55 PM	6:00 PM	O		O		O		O			O		1 2 3 4 5		

Right-of-way Research

Right-of-way information was gathered from the Webb County Appraisal District parcel mapping system. Information on UP and KCS right-of-way was inferred form parcel data and through information provided by the railroads.

Washington Street is a privately maintained roadway west of the bridge abutments as the roadway enters Laredo Community College property. Portions of Victoria Street are privately maintained west of San Ignacio Street.

Mobility Options

In an effort to address stakeholder concerns regarding truck traffic on the west side of the UP tracks and the physical characteristics of the area, a series of potential improvements in and around the Scott Street crossing were reviewed. The potential improvements include:

1. No change
2. Close Scott Street and designate San Ignacio as truck route
3. Grade separation at Scott Street
4. Roundabout connection at Pinder Avenue
5. Route via Victoria Street

6. Route via Victoria Street with Washington Street bridge modifications
7. Designate Eagle Pass south of Washington Street as a truck route

Design concept drawings for some of these options are included at the end of Appendix D.

No Change

No physical improvements or changes to the transportation network would be considered with this option. Based on observations, Scott Street is occupied by trains for nine of ten hours during the day making vehicles travel a different path to access the west side of the tracks. Therefore, trucks would continue to access industrial businesses or warehouses via the shortest and most direct path, as they do currently. With this option, increasing the level of enforcement for truck safety and shortest routes could address local stakeholder concerns. Additionally, providing education on truck routes and proper load securement to local businesses and truck drivers could encourage better driving practices.

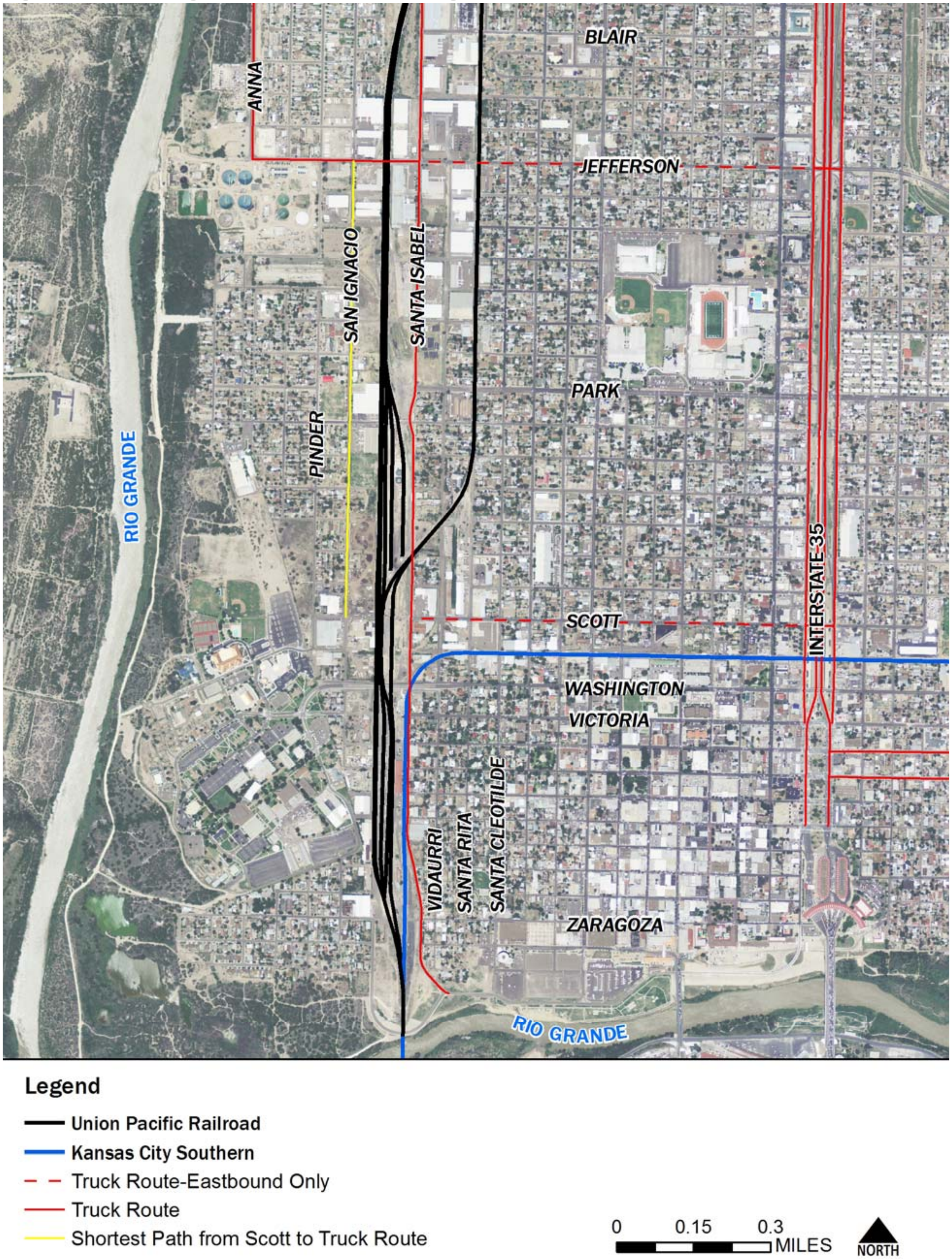
Close Scott Street and designate San Ignacio as truck route

This option would formally close Scott Street by removing the warning device and installing a barrier to prohibit crossing the tracks. The closure of Scott Street was part of a package of improvements included in the *Laredo Mobility Study* in conjunction with other mobility improvements across the Union Pacific tracks. The package included a grade separation of Jefferson Street as well as potential relocation of the Rio Grande Runaround track.

A formal truck route designation on San Ignacio would focus truck traffic to the roadway with the most industrial and warehouse land uses, likely the route currently used. While there are still some residential properties along this roadway, it is the shortest and most direct path to the Jefferson Street truck route. Again, providing education on truck routes and proper load securement to local businesses and truck drivers could encourage better driving practices. It may not be necessary to formally designate a truck route on San Ignacio, but it could assist in better defining acceptable routes for truck drivers.

Figure D-5 illustrates the existing truck routes and highlights the shortest path via San Ignacio Street.

Figure D-5: Existing Truck Routes with San Ignacio Shortest Path



Source: TranSystems.

Grade Separation at Scott Street

A road over rail grade separation at Scott Street was investigated in the *Laredo Mobility Study*. The grade separation concept spanned over five railroad tracks and Santa Isabel, a parallel north-south street. The length required for the grade separation created an expensive project with property acquisition and restricted access to adjacent parcels. The grade separation would be 700 feet north of the existing Washington Street grade separation. The profile ties in at Pinder Avenue on the west and Santa Rita on the east. It is unclear if the former KCS tracks going north along Vidaurri Avenue still remain in KCS ownership. If the grade separation would need to span over the former railroad corridor, the eastern tie in point would be closer to Santa Cleotilde.

An underpass option was not developed because of the level topography in the area, constructability issues with the number of railroad tracks and maintaining active use during construction, lack of adjacent property access with below ground retaining walls, and low traffic volumes to be served.

Roundabout connection at Pinder Avenue

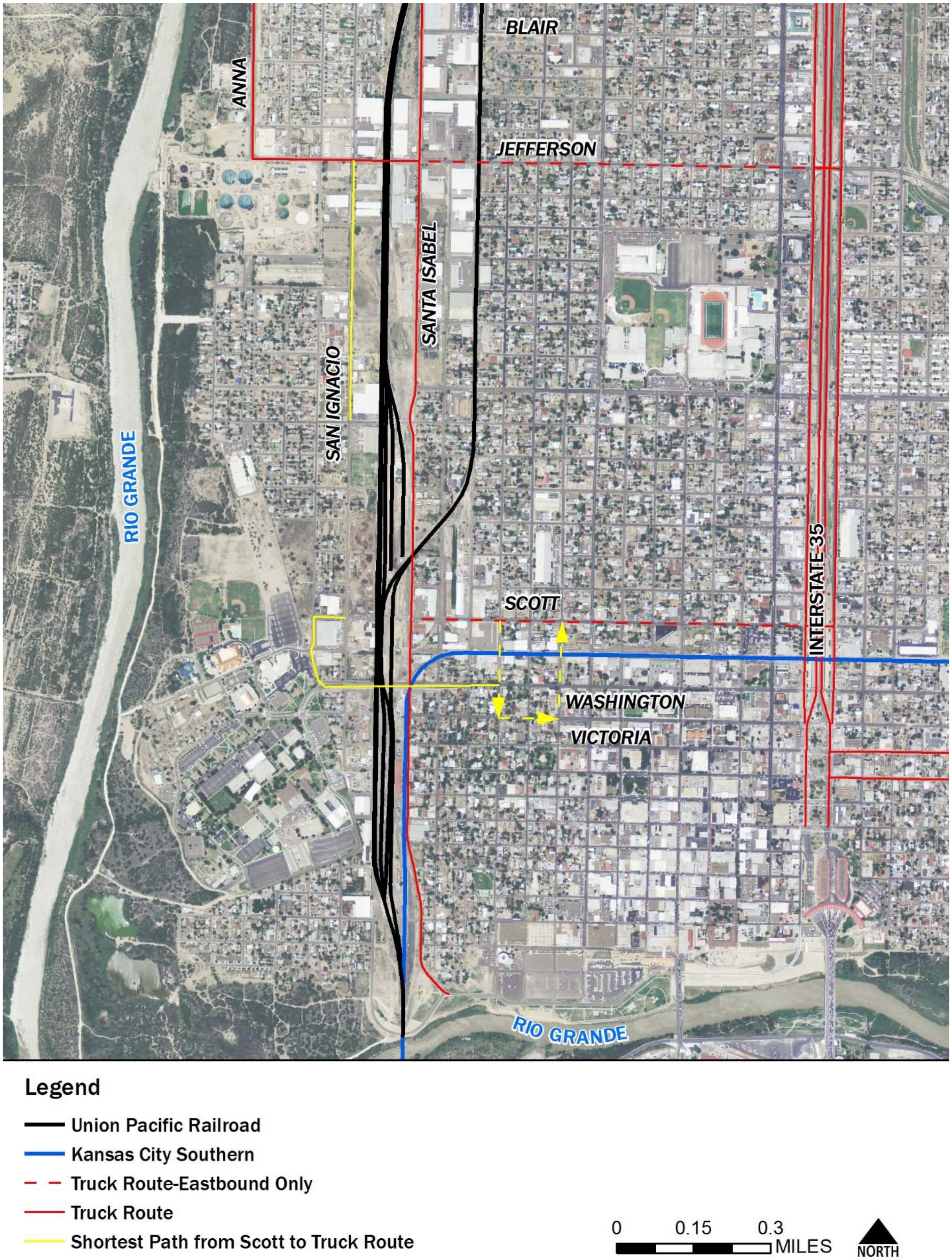
Review of historic maps and aerial photography show how the Washington Street bridge connection on the west side was originally developed to tie into former Fort McIntosh and an access way to Pinder Avenue. Now Washington Street swings southerly and connects to Victoria Street, forcing access to the north in a counter clockwise movement or in a circuitous manner through the Laredo Community College. An option was developed to re-establish a direct connection to the north. This involves extending Pinder Avenue through private property and creating a roundabout on Washington Street. The option was developed to a screening level; not all design aspects are finalized but a qualitative evaluation assessed the degree of potential impact.

The roundabout adds a third leg to Washington Street at the extension of Pinder Avenue. The design as shown retains the existing traffic signal at Victoria Street. The roundabout is designed to accommodate WB-62 trucks. The Washington Street bridge has three lanes, two westbound and one eastbound. At the Victoria Street intersection, the outermost westbound lane becomes an exclusive right-turn lane. The roundabout configuration would taper the westbound lanes to one lane to enter the roundabout. The existing bridge structure transitions from aerial structure to retaining wall structure at the west side of San Ignacio. The proposed improvement would alter the retaining walls but not affect the aerial structure. Detail of maintaining access and property acquisition along the Washington Street frontage road have yet to be determined.

On the east side of Washington Street the route a truck would take to return to the designated truck route on Scott Street may require turning radius and other spot improvements. This option does require trucks to circulate in the downtown area to return to the designated truck route. Additionally, for trucks accessing the warehouses along San Ignacio north of Park Street, the shortest path would maintain use of San Ignacio for trucks.

Figure D-6 illustrates the existing truck routes and highlights the shortest path via San Ignacio Street.

Figure D-6: Truck Route options with Roundabout at Pinder and Washington



Source: TranSystems.

Route via Victoria Street

A review of the existing path via San Ignacio beneath the Washington Street viaduct identified some constraints to truck movements. The existing turning radii cannot accommodate a WB 62 truck and trucks are unable to simultaneously travel in opposing directions. Consequently, improvements would be required to accommodate trucks routinely using this path.

Minor improvements would require corner radii improvements at:

- San Ignacio and Washington Street (north) NE quadrant
- San Ignacio and Washington Street (north) NE quadrant
- San Ignacio and Victoria Street NW quadrant

More comprehensive improvements could realign San Ignacio to connect with Victoria Street. Two options were developed:

- San Ignacio routes parallel to the UP tracks to align with Eagle Pass Avenue
- San Ignacio swings through the properties north and south of Washington Street (the north block is owned by Wilkinson Iron, the south block is undeveloped)

Figure D-7 illustrates the route via San Ignacio under the Washington Street viaduct and highlights the shortest path via San Ignacio Street.

Route via Victoria Street with Washington Street bridge modifications

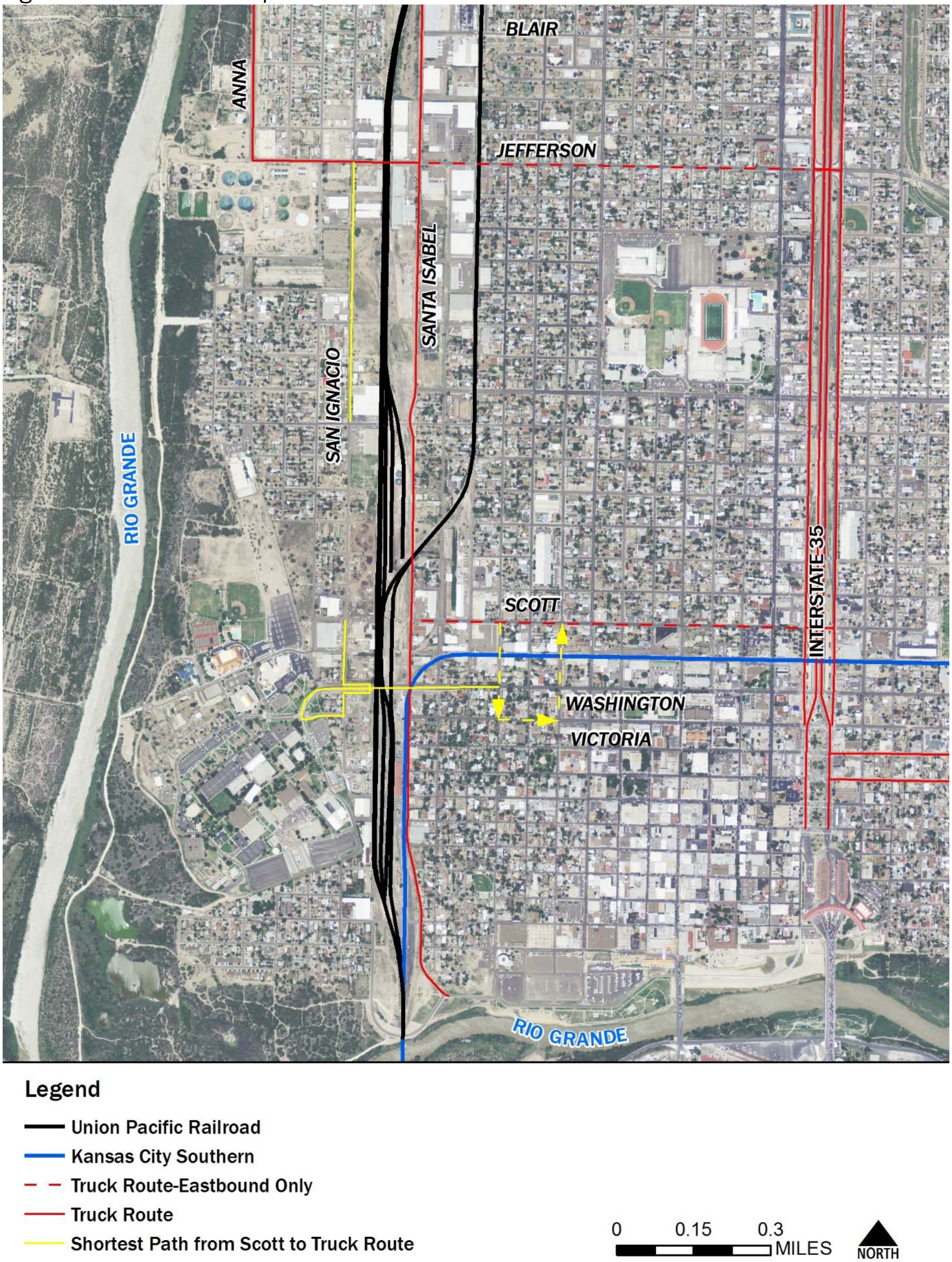
The use of the existing Washington Street viaduct for truck movements on the west side of the UP railroad tracks requires a review of access to/from the east side of the railroad tracks. On the east side, there are existing truck routes on Santa Isabel and westbound on Scott Street yet they are without direct access to the Washington Street bridge. For example, the most direct route for an eastbound movement to Santa Isabel after crossing the Washington Street bridge requires a right turn onto Santa Cleotilde, left onto Victoria Avenue (one-way eastbound) and then a left at Main Street to travel north across the KCS railroad tracks before reaching Scott Street. Once at Scott Street, a truck would need to turn left again to head back to Santa Isabel.

Consequently, alternate means of access were investigated to reach Santa Isabel in a more direct manner. One option could create a raised (elevated) intersection with Santa Isabel and Washington Street. Significant design challenges would occur to maintain ground level access if the alignment were to remain along the existing Santa Isabel right-of-way. Yet if the connection could be separate and parallel to Santa Isabel, then ground level access could be maintained. The concept evolved to place a two-way ramp west of Santa Isabel while tying in at Scott Street. This alignment would facilitate truck access westbound to the Washington Street bridge. The reverse truck route would allow return movements to

Interstate 35 via Santa Isabel northbound to Jefferson Street westbound to Anna Street northbound to Calton Street eastbound.

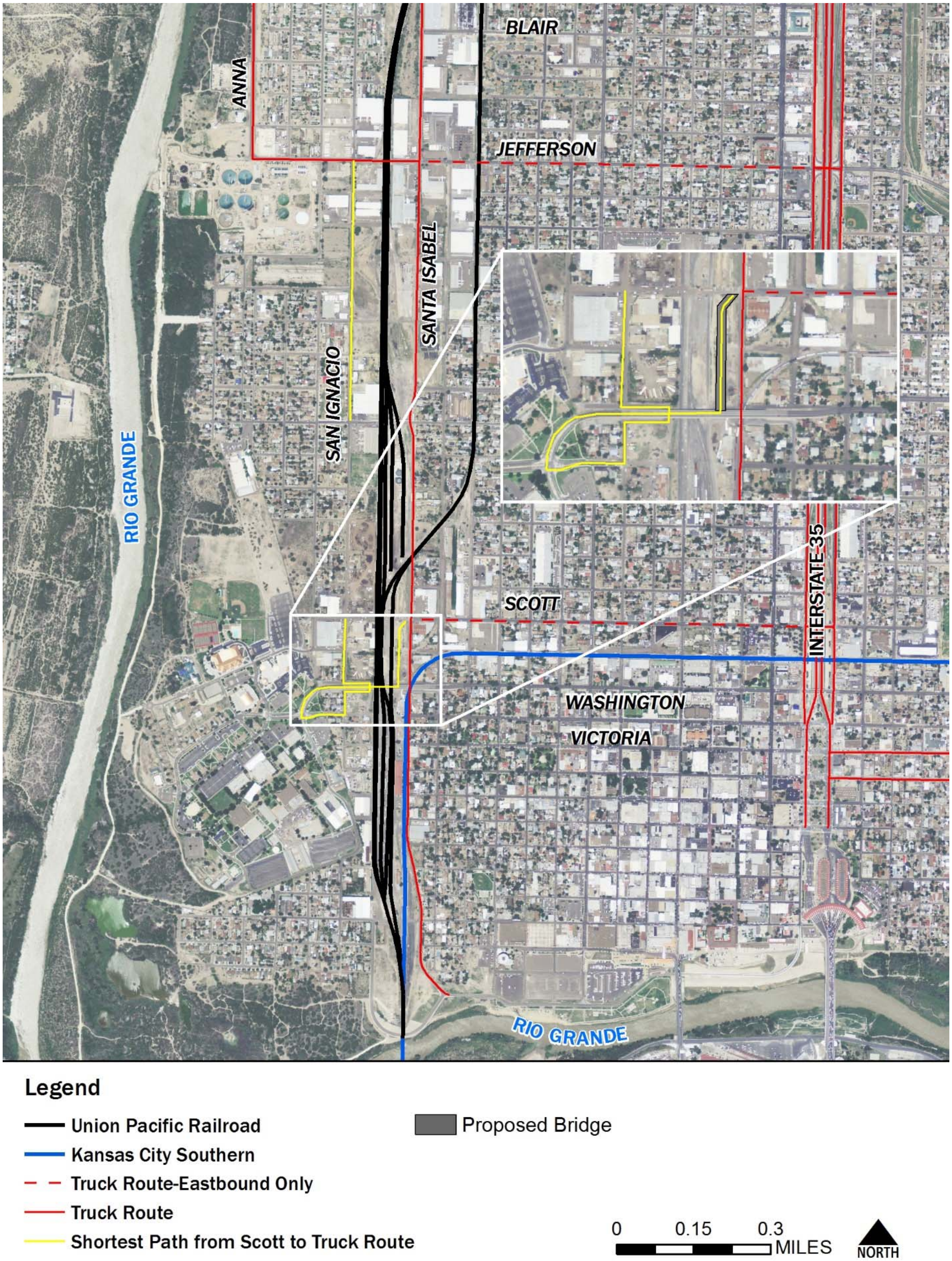
Figure D-8 illustrates the new route connecting to the Washington Street viaduct.

Figure D-7: Truck Route options via Victoria Street



Source: TranSystems.

Figure D-8: Truck Route options via Victoria Street with Washington Street bridge modifications



Source: TranSystems.

Designate Eagle Pass south of Washington Street as a truck route

Stakeholders and the City of Laredo expressed interest in the potential to use Eagle Pass between Washington Street and Zaragoza Street for trucks.

South of Zaragoza Street on the west side of the Union Pacific and KCS railroad corridor, Eagle Pass Avenue is a public street with one-lane of travel in each direction (north-south). Eagle Pass provides a connection under the KCS International Railway Bridge via San Francisco Javier Avenue.

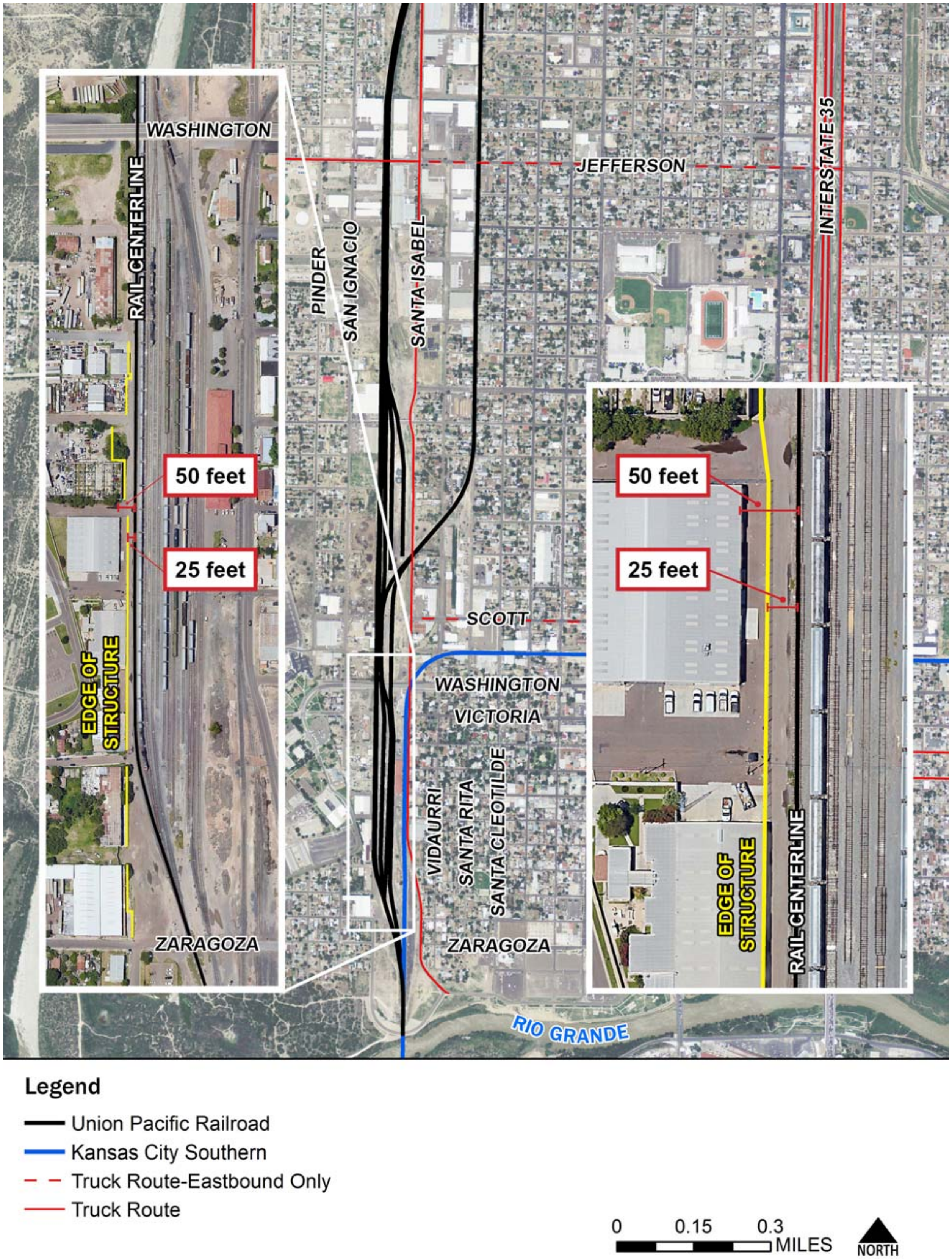
North of Zaragoza Street there is no formally defined public way for Eagle Pass between the Union Pacific tracks and the private buildings to the west; it is not confirmed but this area is likely all Union Pacific right-of-way. Along this corridor the space between the centerline of the westernmost Union Pacific track and the private property line appears to be around 25 feet. In some cases, the private property line appears to be the edge of the physical structure (no setback distance). Figure D-9 shows the distance from track centerline to the private property line in this area.

Generally, a 25-foot separation is desired from the nearest existing, or planned future, track centerline to any adjacent activity or permanent feature. This can include construction or maintenance activity; or bridge piers, abutments, fencing or other similar physical features. Texas Administrative Code states that "A loading platform, house, fence, or other structure built, and lumber, wood, or other material placed, along a railroad in this state, either on or near the right-of-way of a main line or on or near a spur, switch, or siding of the railroad, shall be built or placed so that the nearest edge of the platform, the wall of the building, or the material is at least 8-1/2 feet from the center of the main line, spur, switch, or siding." (Transportation Code, §191.002). The 8-1/2 foot measurement represents the minimum clearance envelope around a train car that should be clear of obstructions. This envelope only accounts for the train car's physical dimension and any sway in the train car while moving.

Roadway design standards vary but generally a travel lane should be 10-12 feet wide. Roadway's carrying truck traffic generally need a hard surface pavement thickness that can tolerate heavy loads without damage by use over time. Eagle Pass does not appear to be a hard surface (asphalt or concrete) pavement.

Coordination between the City of Laredo and the Union Pacific is needed to determine if exceptions to standard design guidelines would allow the use of Eagle Pass for truck traffic. At a minimum, hard surface pavement would be needed to prevent rutting and drainage concerns. Additionally, it may only be possible to provide one traffic lane if current buildings and fencing are retained.

Figure D-9: Dimensions on Eagle Pass



Source: TranSystems.

Conclusion

These options are intended to provide a range of concepts to test impacts and benefits for mobility. It is acknowledged that new issues may arise with each of these options that would need further evaluation, including the use of Washington Street for trucks. Input and feedback from stakeholders on these options may assist in determining what options should be further explored in the Scott Street area.

N

25' 0 25' 50'

GRAPHIC SCALE: HORIZ. 1" = 50'

PLAN

LEGEND

ASPHALT PAVEMENT		ACQUIRED PROPERTY		NOT A THROUGH STREET	
CONCRETE STRUCTURE		RETAINING WALL		PARCEL ROW	
		ACCESS ROAD		PROPOSED ROW	
				RAILROAD ROW	

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WEBB COUNTY, TEXAS
CONCEPTUAL SAN IGNACIO PLAN

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 1
SCALE AS SHOWN

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2/22/2018

PLAN

LEGEND

ASPHALT PAVEMENT	ACQUIRED PROPERTY	NOT A THROUGH STREET
CONCRETE STRUCTURE	RETAINING WALL	PARCEL ROW
	ACCESS ROAD	PROPOSED ROW
		RAILROAD ROW

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REVISION
SHEET NO. 2
SCALE AS SHOWN

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PLAN

LEGEND

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CONCRETE STRUCTURE		RETAINING WALL		PARCEL ROW	
		ACCESS ROAD		PROPOSED ROW	
				RAILROAD ROW	

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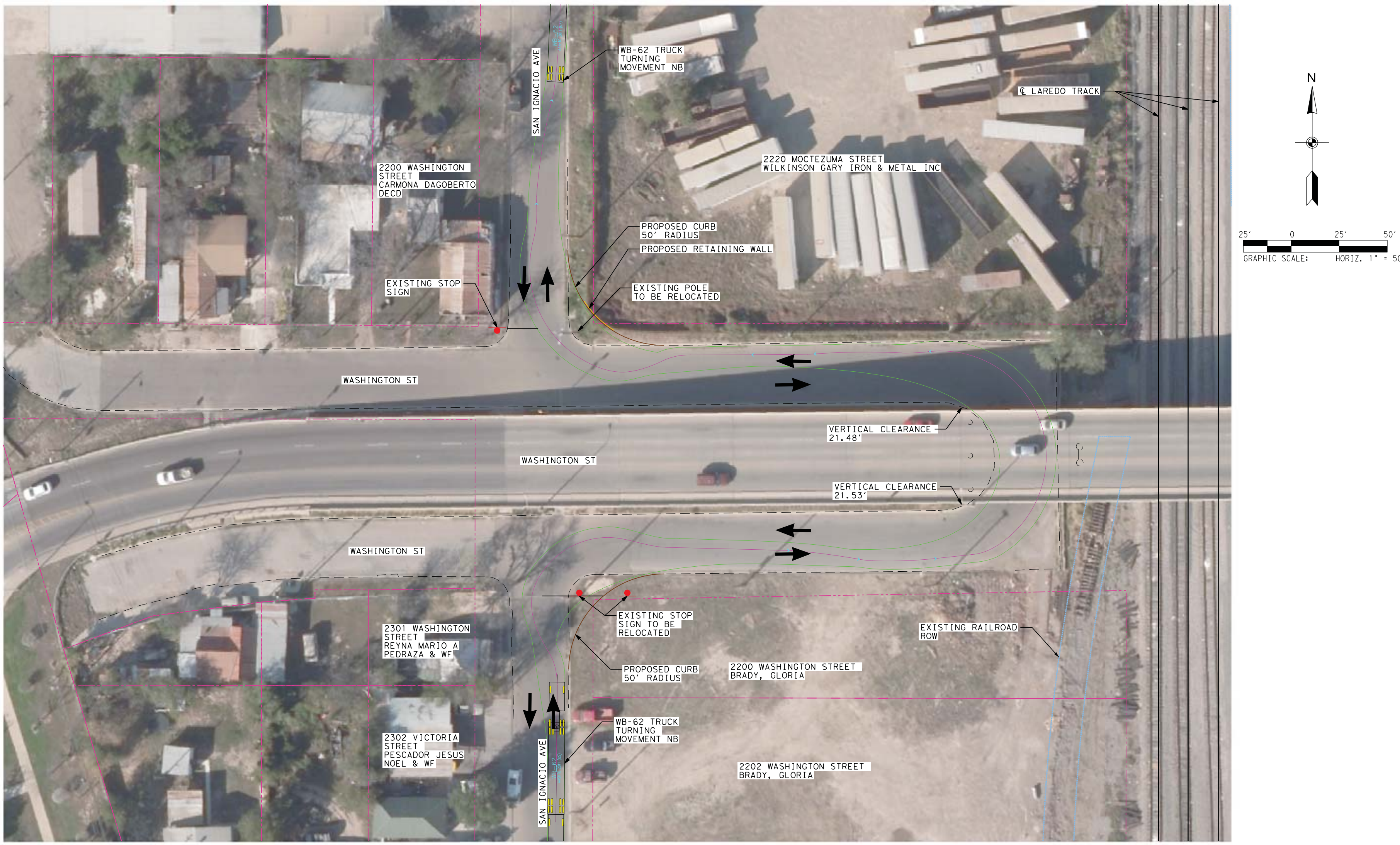

PLAN

LEGEND

ASPHALT PAVEMENT		ACQUIRED PROPERTY		NOT A THROUGH STREET	
CONCRETE STRUCTURE		RETAINING WALL		PARCEL ROW	
		ACCESS ROAD		PROPOSED ROW	
				RAILROAD ROW	

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REVISION
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SCALE AS SHOWN

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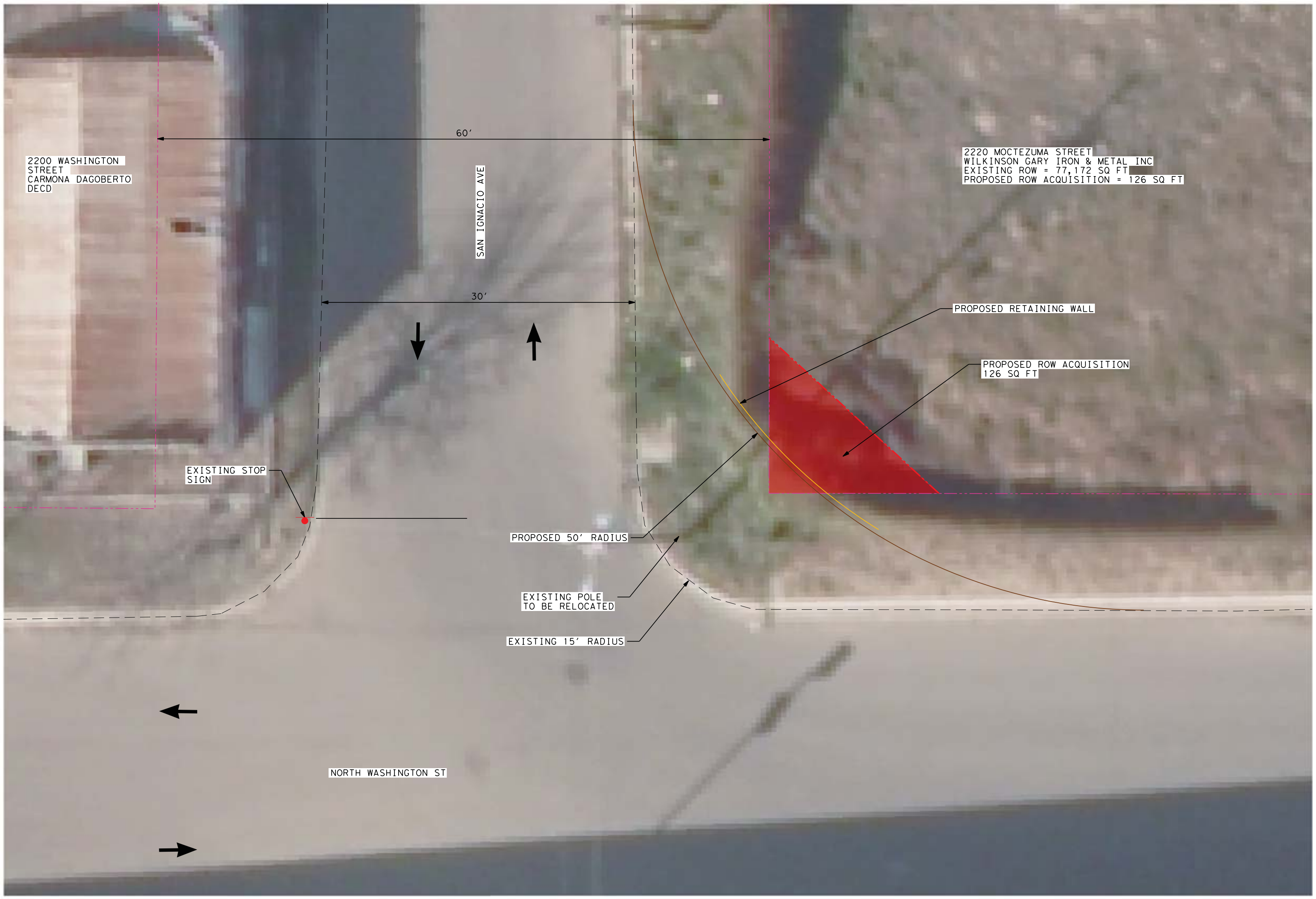

N

5' 0 5' 10'
GRAPHIC SCALE: HORIZ. 1" = 10'

PLAN

LEGEND

ASPHALT PAVEMENT		ACQUIRED PROPERTY		NOT A THROUGH STREET	
CONCRETE STRUCTURE		RETAINING WALL		PARCEL ROW	
		ACCESS ROAD		PROPOSED ROW	
				RAILROAD ROW	

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS
CONCEPTUAL SAN IGNACIO PLAN

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 5
SCALE AS SHOWN

Pen Table File
3:21:55 PM
2/22/2018

N

5' 0 5' 10'
GRAPHIC SCALE: HORIZ. 1" = 10'

PLAN

LEGEND

ASPHALT PAVEMENT		ACQUIRED PROPERTY		NOT A THROUGH STREET	
CONCRETE STRUCTURE		RETAINING WALL		PARCEL ROW	
		ACCESS ROAD		PROPOSED ROW	
				RAILROAD ROW	

Texas Department of Transportation
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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS
CONCEPTUAL SAN IGNACIO PLAN

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 6
SCALE AS SHOWN

Pen Table File
3:21:57 PM
2/22/2018

PLAN

* INTERSECTION MODIFICATION/ADJUSTMENT

LEGEND

ASPHALT PAVEMENT	ACQUIRED PROPERTY	NOT A THROUGH STREET	
CONCRETE STRUCTURE	RETAINING WALL	PARCEL ROW	
	ACCESS ROAD	PROPOSED ROW	
		RAILROAD ROW	

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS
CONCEPTUAL EAGLE PASS AVE PLAN

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 13
SCALE AS SHOWN

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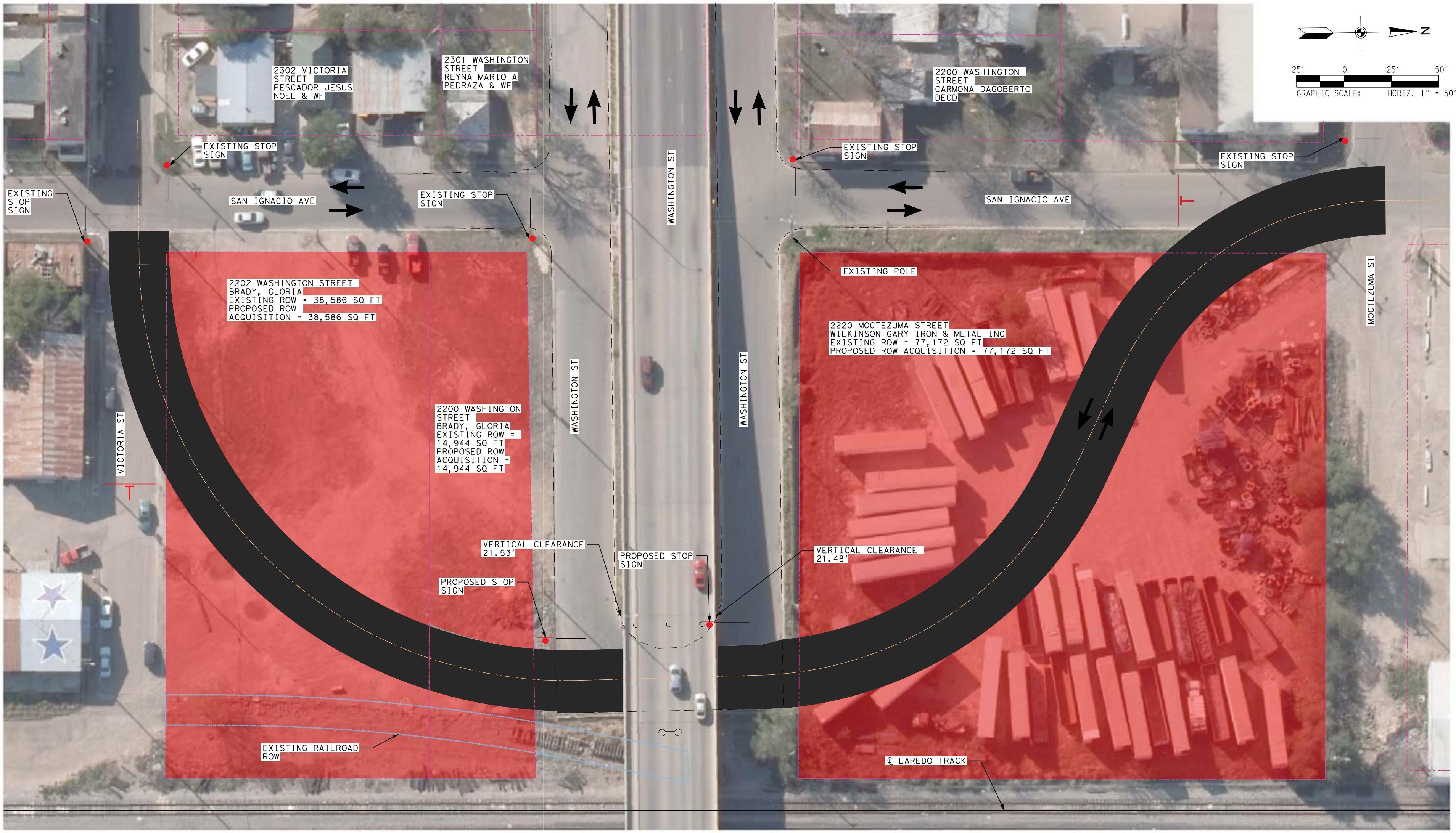
5/2/2018



PLAN

LEGEND

■	ASPHALT PAVEMENT	■	ACQUIRED PROPERTY	⊢	NOT A THROUGH STREET
■	CONCRETE STRUCTURE	■	RETAINING WALL	— · —	PARCEL ROW
		■	ACCESS ROAD	— · —	PROPOSED ROW
				——	RAILROAD ROW

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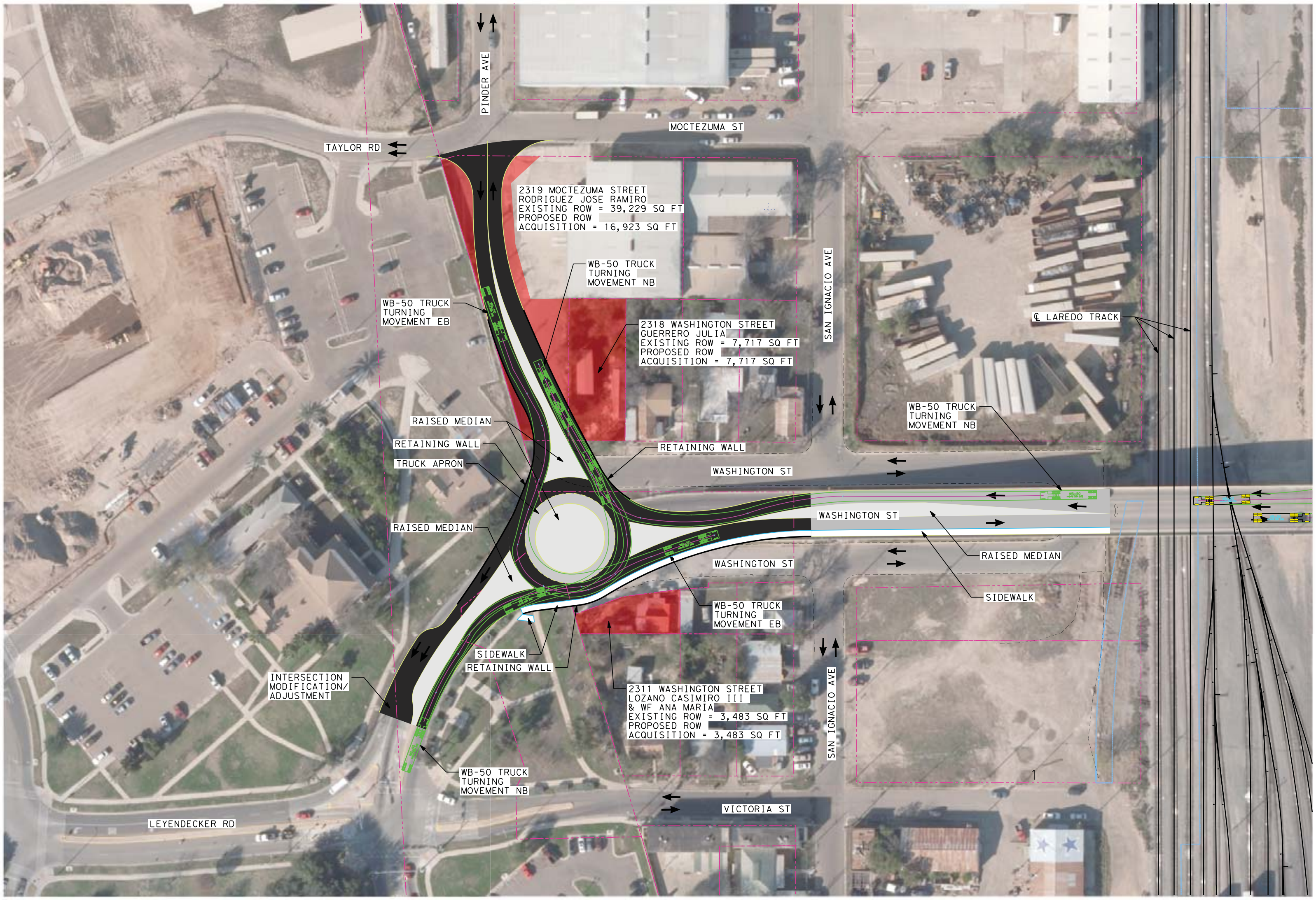
LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS
CONCEPTUAL SAN IGNACIO PLAN

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 12
SCALE AS SHOWN



N

50' 0 50' 100'

GRAPHIC SCALE: HORIZ. 1" = 100'

PLAN

LEGEND

ASPHALT PAVEMENT	ACQUIRED PROPERTY			NOT A THROUGH STREET	
CONCRETE STRUCTURE	RETAINING WALL			PARCEL ROW	
	ACCESS ROAD			PROPOSED ROW	
				RAILROAD ROW	

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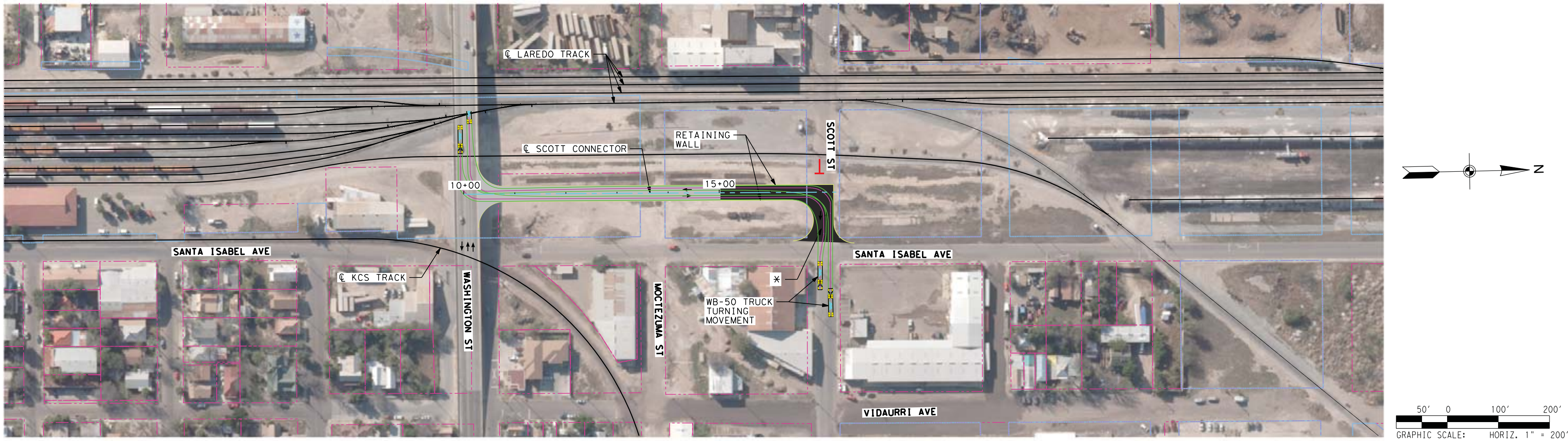
LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS
CONCEPTUAL WASHINGTON ST PLAN
ROUNDABOUT

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 1
SCALE AS SHOWN

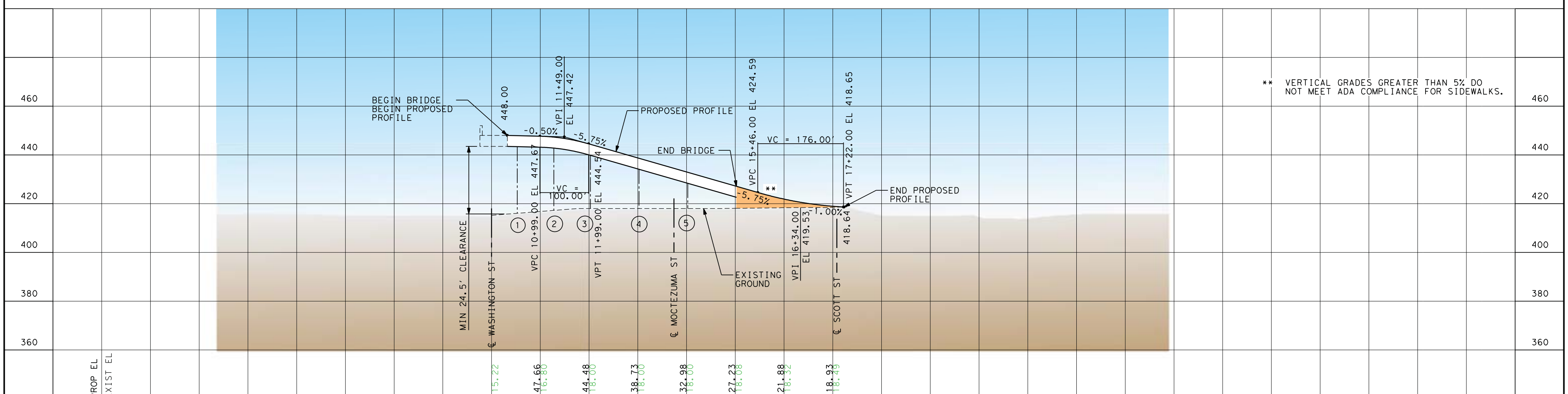
Pen Table File
10:59:34 AM
4/12/2018

PLAN



NOTE: * INTERSECTION MODIFICATION/ADJUSTMENT

PROFILE



LEGEND

	ASPHALT PAVEMENT		ACQUIRED PROPERTY		NOT A THROUGH STREET
	CONCRETE STRUCTURE		RETAINING WALL		PARCEL ROW
			ACCESS ROAD		PROPOSED ROW
					RAILROAD ROW

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LAREDO MOBILITY STUDY
WEBB COUNTY, TEXAS

CONCEPTUAL SCOTT CONNECTOR PLAN & PROFILE

CONTRACT NO.
DRAWING NO.
REVISION
SHEET NO. 1
SCALE AS SHOWN

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4/12/2018