

President George Bush Turnpike Western Extension PGBT WE Engineering Report

HNTB Corporation
Engineers Architects Planners

5910 West Plano Parkway
Suite 200
Plano, Texas 75093

Telephone (972) 661-5626
Facsimile (972) 661-5614
www.hntb.com

HNTB

Mr. Allen Clemson
Executive Director
North Texas Tollway Authority
P.O. Box 260729
Plano, Texas 75026

April 6, 2011

Dear Mr. Clemson:

HNTB Corporation, the North Texas Tollway Authority's General Engineering Consultant, is pleased to present the attached amended Engineering Report describing the engineering features, costs and schedule of the President George Bush Turnpike Western Extension (PGBT WE) previously referred to as State Highway 161 Project as currently proposed for construction. On July 30, 2009, the NTTA and the Texas Department of Transportation (TxDOT) executed a Project Agreement outlining the terms and conditions of the PGBT WE Project. The NTTA and TxDOT have executed subsequent amendments of the Project Agreement: March 23, 2010; September 20, 2010; December 22, 2010 and February 24, 2011.

The attached report is an update to the May 25, 2010 PGBT WE Engineering Report and includes an estimate of the Project's current construction costs, estimated annual operations and maintenance expenses through August 31, 2061, and a layout plan of the proposed construction, which serves as the basis for the estimated cost.

The conclusions of the engineering, planning and studies indicate that the Project can be constructed at an estimated cost of \$546,598,381, excluding \$53,302,298 for future expansions and exclusive of interest and financing costs, including an additional \$1,672,091 for remaining utility relocation by agreement with TxDOT. It is estimated that the Project can be substantially complete in October 2012.

We wish to acknowledge the cooperation, advice and assistance of the staff, legal counsel, traffic engineers and financial advisors of the Authority, TxDOT, North Central Texas Council of Governments, Dallas County and the cities of Grand Prairie and Irving for their dedicated efforts in the development of the Project.

Stephanie Halliday

Stephanie L. Halliday, P.E.
General Engineering Consultant Project Director

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Gerald E. Carrigan - Assistant Executive Director of Project Delivery

Clayton Howe - Assistant Executive Director of Operations



Allen Clemson



Janice D. Davis



Gerald E. Carrigan



Clayton Howe

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Executive Summary

Introduction

The North Texas Tollway Authority (NTTA) is a regional tollway authority and political subdivision of the State of Texas created in accordance with Chapter 366 of the Texas Transportation Code. The NTTA is authorized to acquire, design, construct, maintain, repair and operate turnpike projects; to raise capital for construction projects through issuance of turnpike revenue bonds; and to collect tolls to operate, maintain and pay debt services on those projects in Dallas, Collin, Denton and Tarrant counties in Texas. The NTTA has two representatives from each of these four counties on its Board of Directors, as well as one member appointed by the Governor of Texas from a county adjacent to the NTTA's four-county service area. The NTTA is dedicated to fulfilling its mission, which is to enhance mobility through responsible and innovative tolling solutions.

This report describes the location, engineering design features, schedule, construction cost estimates and estimates of the operations and maintenance costs for the proposed President George Bush Turnpike Western Extension (PGBT WE) previously referred to as State Highway SH 161 Toll Project ("Project") in Dallas County from Interstate (I) 20 crossing I-30 and terminating at SH 183, a distance of approximately 11.5 miles. In addition, this report includes the engineering design standards, typical sections and plan and profile for the Project.

Project Description

The PGBT WE extends SH 161 approximately 11.5 miles, growing the loop around the City of Dallas and its suburbs. The Project begins at the existing SH 183 interchange and extends south, crossing I-30 and tying into direct connection ramps at I-20. Because of interchanges at I-30 and I-20, limited portions of the Project will be located in Tarrant County.

The Project is a joint effort of the NTTA, the Texas Department of Transportation (TxDOT) and the Regional Transportation Council (RTC) of the North Central Texas Council of Governments (NCTCOG). The Project was divided into four phases for purposes of managing and expediting the design and construction (refer to Figure 1 on page 2).

- Phase 1 of the Project consists of the frontage roads and cross streets that are open to traffic from north of I-30 (at North Carrier Parkway) to I-20. In addition, Phase 1 consists of the SH 183/SH 161 interchange improvements. Phase 1 was constructed by TxDOT and is complete and open to traffic. The NTTA is not responsible for constructing additional project elements in Phase 1.
- Phase 2 of the Project consists of the frontage roads, cross streets, slip ramps and main lanes from SH 183 (at Conflans Road) to north of I-30 (south of North Carrier Parkway). On August 2, 2009, two lanes in each direction opened to traffic as a temporary configuration while work continued on the remaining elements of Phases 2 and 3 of the Project. The roadway elements associated with the frontage roads and slip ramps were constructed by TxDOT and are complete and open to traffic. The NTTA was responsible for the design and construction of additional signing, adding pavement markings, and installing all-Electronic Tolling Collection (ETC) and an Intelligent Transportation System (ITS) in Phase 2. This work is also complete and open to traffic.
- Phase 3 of the Project consists of slip ramps and main lanes from SH 183 (at Conflans Road) to immediately north of I-30 (south of North Carrier Parkway). TxDOT is responsible for the design and construction of the roadway elements in Phase 3, which opened to traffic ahead of schedule on April 11, 2010. The NTTA is responsible for the design and construction of additional signing, pavement markings, and installing all-ETC and ITS equipment in Phase 3. Phase 3 opened with three main lanes in each direction.
- Phase 4 of the Project consists of direct connection ramps at I-30 and I-20, slip ramps, frontage roads, main lanes from I-30 (south of North Carrier Parkway) and the Union Pacific Railroad (UPRR) bridge to I-20. At the I-30 interchange, the proposed improvements consist of a fully directional, five-level interchange with direct connection ramps. At the I-20 interchange, the proposed improvements consist of constructing a four-level interchange with direct connection ramps. The NTTA is responsible for designing and constructing main lanes, slip ramps, direct connection ramps, sound walls, signing, pavement markings, landscaping, and all-ETC and ITS equipment.

The NTTA's improvements are anticipated to be substantially complete in October 2012. Based on the Project Agreement, the NTTA and TxDOT have agreed to allow for the option to have a phased opening of the lower volume direct connection ramps at I-30. The two high volume direct connection ramps at I-30 which consist of the East to North and the South to West direct connections will be substantially completed in October 2012. The remaining six direct connection ramps have lower traffic volumes. If the NTTA and TxDOT determine that it would be beneficial to delay the opening of the lower volume direct connection ramps in order to reduce construction delays along I-30, the NTTA can exercise the option to complete the remaining lower volume direct connection ramps up to six months later which would be April 2013.

Within the limits of Phase 4 of the Project, there is a separate portion of the Project consisting of the construction of a railroad bridge over the future PGBT WE main lanes and the construction of two new at-grade crossings of the PGBT WE frontage roads and Main Street and Jefferson Boulevard ("UPRR work"). Additionally two expansion lane widenings are planned along the Project, subject to the capacity thresholds projected by the NTTA's traffic and revenue consultant, Wilbur Smith Associates (WSA). The first expansion lane widening will consist of adding one lane in each direction in the center median of the main lanes from I-30 to I-20, which is planned to be opened to traffic by January 2020, per the current projections of WSA. The second expansion lane widening will consist of adding one lane in each direction from SH 183 to I-20, which is planned to be opened to traffic by January 2031, per the projections of WSA. Both expansion lane widenings are to be designed and constructed by the NTTA.

Table 1 summarizes the Project phases, limits, description, responsible agency and projected substantial completion dates.

A total of 18 ramp connections to the Project will have overhead gantries to allow placement of ETC equipment that has the ability to read transponders issued by the NTTA (TollTag) and TxDOT (TxTag) and the ability to read license plates of vehicles that don't have transponders. All toll collection lanes are dedicated, non-stop express lanes to expedite the flow of traffic through the gantries and provide for ease of maintenance.

TABLE 1: PROJECT PHASES

Phase	Phase Limits	Description	Responsible Agency (Design & Construction)	Projected Substantial Completion Date
Phase 1	North of I-30 (at N. Carrier Parkway) to I-20 to SH 183/SH 161 Interchange Phase II	Frontage roads and cross streets	TxDOT/RTC	January 2009
Phase 2	SH 183 (at Conflans Road) to North of I-30 (south of Carrier Parkway)*	Cross streets, and NB main lanes	TxDOT/RTC	August 2009
Phase 2	SH 183 (at Conflans Road) to North of I-30 (south of N. Carrier Parkway)*	Additional signage, pavement markings, ETC/ ITS equipment	NTTA	August 2009
Phase 2	SH 183 (at Conflans Road) to North of I-30 (south of N. Carrier Parkway)*	Frontage Roads and NB slip ramps	TxDOT/RTC	April 2010
Phase 3	SH 183 (at Conflans Road) to North of I-30 (south of N. Carrier Parkway)*	SB main lanes	TxDOT/RTC	April 2010
Phase 3	SH 183 (at Conflans Road) to North of I-30 (south of N. Carrier Parkway)*	SB slip ramps	TxDOT/RTC	April 2010
Phase 3	SH 183 (at Conflans Road) to North of I-30 (south of N. Carrier Parkway)*	Additional signage, pavement markings, ETC/ ITS equipment	NTTA	May 2011
Phase 4	North of I-30 (south of N. Carrier Parkway) to I-20	Two direct connection ramps, slip ramps, frontage roads, main lanes, and ETC/ITS equipment	NTTA	October 2012
Phase 4	I-30 interchange	Six lower volume direct connection ramps	NTTA	April 2013
Phase 4	UPRR line between Main Street and Jefferson Blvd.	UPRR work	TxDOT/RTC/ NTTA	October 2012
First Widening	North of I-30 (south of N. Carrier Parkway) to I-20	Expansion lane widening - 1	NTTA	January 2020
Second Widening	SH 183 to I-20	Expansion lane widening - 2	NTTA	January 2031

*Phase 2 and 3 project limits overlap

Project Costs

Based on the Project Agreement, TxDOT was responsible for the design and construction of Phases 1 through 3 and the NTTA will be responsible for the design and construction of Phase 4 as well as the ETC/ITS equipment in Phases 2 and 3. The UPRR work was designed by TxDOT and will be constructed by NTTA. The current estimated total Project cost for Phase 4 as well as the ETC/ITS equipment in Phases 2 and 3, excluding the \$23,434,604 and \$29,867,694 future expansion lane widenings, is \$546,598,381 in 2010 dollars. By agreement with TxDOT and the NCTCOG, the NTTA will finish utility relocations, previously the responsibility of TxDOT, adding \$1,672,091 to the cost, bringing the total to \$546,598,381

The estimated project cost was compiled from a combination of actual bids and project estimates. The estimated quantities and unit prices for similar NTTA and TxDOT construction in the Dallas area were used to estimate the total construction cost for items without firm bids. The total Project cost was then escalated to the mid-point of construction using a construction cost index (CCI) developed by the NTTA from historical data.

Phase 4 of the Project will be constructed utilizing the design-build delivery method. The design-build delivery method allows the NTTA to secure a lump-sum contract for all design and construction, as well as shift significant portions of the contractual risk to the design-builder. NTTA has entered into a contract with a design-builder and issued all notices-to-proceed necessary to complete the Phase 4 construction.

Factors, including unforeseen escalation of prices and wages, labor or material shortages and changes in economic conditions, can significantly affect (escalate or reduce) construction costs. Negotiated contingencies were added to the Project cost to compensate for potential unforeseen escalations. The estimated Project cost reflects our professional judgement of the construction industry, and it is our belief that the Project can be constructed within the limits described for the estimated cost given herein. However, due to the uncertainty of the construction industry, we cannot and will not guarantee that the actual Project cost will not vary from the estimated cost.

Environmental Considerations

An Environmental Impact Statement (EIS) was developed by TxDOT to determine the social, economic and environmental effects of the Project on the environment as required by the National Environmental Policy Act (NEPA) of 1969. This environmental document was cleared by the FHWA in 1997. As a result of revisions to the Project a re-evaluation was prepared and ultimately approved in June 2004. After the re-evaluation was approved, SH 161 was designated as a toll facility by the RTC. Two public meetings and a public hearing were convened as part of the environmental study for tolling the corridor. Final documentation submitted to TxDOT and the Federal Highway Administration (FHWA) was approved on February 29, 2008.

Under Section 404 of the Clean Waters Act, the U.S. Army Corps of Engineers (USACE) regulates the discharge of dredged or fill material into waters of the United States, including wetlands. Therefore, authorization by the USACE in the form of a nationwide permit is required for the discharge of dredged or fill materials and for construction of box culverts and/or bridges in waters of the United States that exist on the Project site. An Individual Section 404 Permit developed by TxDOT was obtained in February 2008 for the crossing of the Trinity River. Additionally, the NTTA acquired an additional NWP 14 to complete the remaining construction from I-30 to I-20 (Phase 4). The permit was acquired on February 24, 2009.

Other environmental considerations for the Project are two hazardous material sites. An unregulated landfill near Sunnyvale Road, located in Phases 2 and 3 of the Project, was identified and a Waste Excavation and Relocation Plan was developed by TxDOT and approved by the Texas Commission on Environmental Quality (TCEQ). Additionally, contaminated soil was identified near Marshall Drive in Phase 4. A Soil, Groundwater and Surface Water Construction Management Plan was developed by TxDOT to manage the excavation and removal of any contaminated soil. Since the contaminated soil has been identified in Phase 4 of the Project, NTTA will fulfill the requirements specified in the Soil, Groundwater and Surface Water Construction Management Plan.

Schedule

Construction began on the SH 183/SH 161 interchange in 2004. In 2005, construction began on the frontage roads and cross streets from I-30 to I-20. Both of these sections are included in Phase 1 of the Project, which was completed by TxDOT in 2009. The substantial completion dates as stipulated in TxDOT's Phase 2 and 3 construction contracts are October 2009 and January 2011, respectively. NTTA's substantial completion dates for Phases 2 and 3 are August 2009 and December 2010. TxDOT is ahead of schedule and Phase 3 was substantially complete prior to the contractual delivery date. Phase 4 and the UPRR work is anticipated to be substantially complete in October 2012. If the NTTA exercises the option to phase the construction of the six lower volume direction ramps at I-30, the anticipated substantial completion date of those direct connection ramps would be April 2013. Refer to Table 1 for milestone schedule dates.

Introduction

The Project, located in Dallas County, begins at the existing SH 183 interchange and extends south, crossing I-30 and tying into direct connection ramps at I-20. There are limited portions of the Project, resulting from the interchanges at I-30 and I-20 that will be located in Tarrant County. Along SH 161 from the SH 183 interchange north to the beginning of the President George Bush Turnpike (PGBT), there is an approximate 3-mile section that is a part of the State Highway system maintained and controlled by TxDOT. The 3-mile section is not considered as part of the Project; however, this section provides connectivity from the Project to the beginning of PGBT. The PGBT is currently open to traffic (approximately 30 miles) from Belt Line Road in Irving to State Highway 78 (SH 78) in Garland, the majority of which is parallel to Interstate Highway 635 (LBJ Freeway) in the Dallas area. The purpose of the Project described in this report is to extend SH 161 and create a direct link from SH 183 to I-20 to meet the growing traffic demand in Tarrant and Dallas counties. Due to the proposed development occurring from residential, retail, commercial and major trip generators (such as the new Dallas Cowboys Stadium in Arlington), the Project will provide increased mobility in the area. The Project was divided into four phases for purposes of managing and expediting the design and construction (refer to Figure 1 on page 2).

Description of Project

The President George Bush Turnpike Westen Extension (PGBT WE) corridor Project formerly known as State Highway 161 was initiated by TxDOT in May 1969. TxDOT conducted the initial corridor studies, processed the EIS and obtained the right of way (ROW) for the Project. As outlined in Senate Bill 792, passed by the 80th Legislature, PGBT WE has undergone a market valuation process, which was a joint effort between the NTTA and TxDOT. The Project will result in a new 11.5 mile link in the growing loop around Dallas and the cities in Dallas County while providing increased mobility with Tarrant County.

The proposed ultimate typical section along the Project generally consists of three-lane frontage roads in each direction, ultimately eight main lanes (four lanes in each direction), and one- or two-lane slip ramps. The initial main lane construction from

I-30 to I-20 will consist of four main lanes (two lanes in each direction). Two expansion lane widenings in the center median, to be implemented one lane at a time, are planned in the future for this section. The initial main lane configuration from I-30 to SH 183 will consist of six main lanes (three lanes in each direction). One expansion lane widening via restriping in the center median is planned in the future for this section. Once all of the expansion lane widenings are completed, the entire Project corridor will be an eight-lane facility (four lanes in each direction).

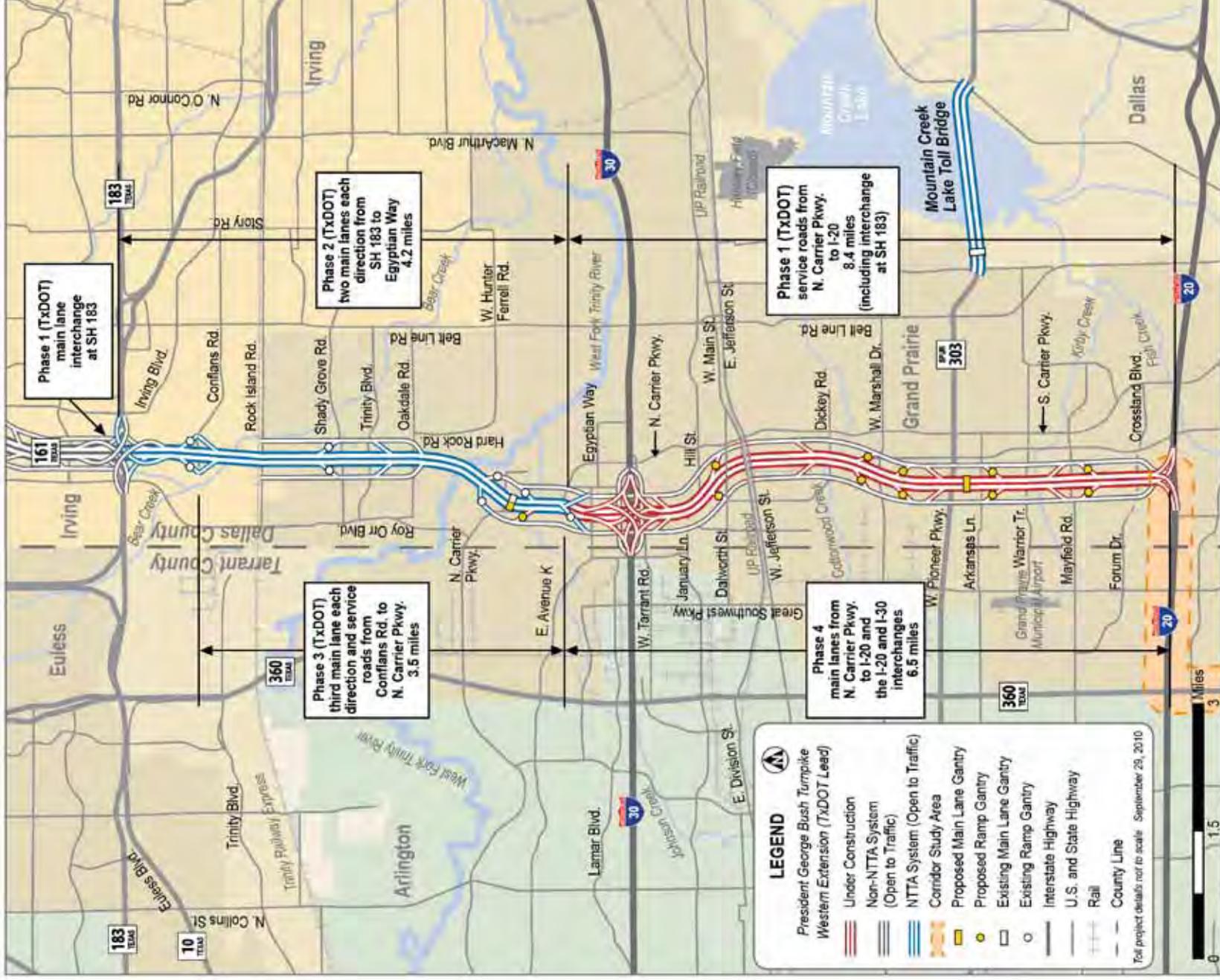
Phase 1

Phase 1 of the Project, begins at I-30 (at North Carrier Parkway) and extends to I-20, PGBT WE centerline station 100+00 to station 426+00. The improvements designed and constructed by TxDOT consist of frontage roads and cross streets. The frontage road improvements consist of three lanes in each direction. The cross-street improvements consist of four- to six-lane thoroughfares with U-turns. The frontage roads and cross-streets constructed in Phase 1 have been completed and are open to traffic. Phase 1 also includes the fully directional SH 183/SH 161 interchange improvements south to Conflans Road, PGBT WE centerline station 665+00 to station 712+00, which is complete and open to traffic. The Phase 1 plan and profile are shown on Plates 3, 5 through 19, and 25 through 27 in the Appendix.

Phase 2

Phase 2 of the Project begins at SH 183 (at Conflans Road) and extends to north of I-30 (at North Carrier Parkway), PGBT WE centerline station 450+00 to 672+00. The improvements designed and constructed by TxDOT consist of frontage roads, cross streets, slip ramps and main lanes. The frontage road improvements consist of three lanes in each direction. The cross-street improvements consist of four- to six-lane thoroughfares with U-turns. In the northbound direction, one permanent slip ramp entrance and one temporary slip ramp exit was constructed. In the southbound direction, one permanent and one temporary exit slip ramp were constructed until Phase 3 (southbound half of main lane construction) was completed. The temporary slip ramps will remain open until Phase 4 is opened to traffic. Main lane improvements will consist of the northbound half of construction for the entire length of Phase 2. The completed Phase 2 main lanes will provide two lanes in each direction and will open to traffic when Phase 3 is completed. The northbound main lane bridges consist

Figure 1: PGBT WE Corridor Location and Phases



of the structures over the Trinity River, Rock Island Road, Dallas Area Rapid Transit Trinity Railway Express (DART TRE) rail line, Bear Creek and Conflans Road. All of the main lane bridges were constructed to a width that could accommodate 10 lanes, but will only be striped to eight lanes (four lanes in each direction) in the ultimate configuration. However, the initial condition is six lanes (three lanes in each direction) when Phase 3 opens to traffic. On August 2, 2009, two lanes in each direction opened to traffic in a temporary configuration while work continued on the remaining elements of Phases 2 and 3 of the Project. To collect tolls when Phase 2 was opened to traffic, NTTA designed and constructed the additional signing, pavement markings, and all-ETC and ITS equipment required to implement the three ETC ramp gantries and one main lane gantry, between Conflans Road and North Carrier Parkway in Phase 2. The Phase 2 plan and profile at completion are shown on Plates 19 through 25 in the Appendix.

Phase 3

Phase 3 of the Project begins at SH 183 (at Conflans Road) and extends to immediately north of I-30 (south of Carrier Parkway), PGBT WE centerline station 441+00 to 672+00. The improvements designed and constructed by TxDOT consist of permanent slip ramps, a temporary slip ramp and main lanes. In the southbound direction, four permanent slip ramp entrances and two permanent slip ramp exits were constructed. The southernmost permanent slip ramp entrance will remain closed to traffic until Phase 4 is completed and the temporary exit ramp were removed from the southern end of the Project. In the northbound direction, two permanent slip ramp entrances and four permanent slip ramp exits will be constructed. Main lane improvements consist of the southbound half of construction for the entire length of Phase 3. The remaining southbound half of the main lane bridges consists of the structures over the Trinity River, Rock Island Road, DART TRE rail line, Bear Creek and Conflans Road. All of the main lane bridges were constructed to a width that will accommodate 10 lanes by TxDOT, but will only be striped to eight lanes (four lanes in each direction) in the ultimate configuration. However, the initial condition was six lanes (three lanes in each direction) when Phase 3 opened to traffic on April 11, 2010. To collect tolls, NTTA designed and constructed the additional signing, pavement markings, and all-ETC and ITS equipment required to implement the six ETC ramp

gantries and one main lane gantry, between North Carrier Parkway and Sunnyvale Road/Lower Tarrant Road, in Phase 3. The Phase 3 plan and profile are shown on Plates 19 through 25 in the Appendix.

Phase 4

Phase 4 of the Project begins at I-30 (south of North Carrier Parkway) and extends to I-20, PGBT WE centerline station 100+00 to station 450+00. The improvements to be designed and constructed by the NTTA consist of direct connection ramps, slip ramps, main lanes, frontage roads, ETC and ITS equipment. At the I-20 interchange, the improvements consist of constructing a four-level interchange with four direct connection ramps. All of the direct connection ramps are proposed as two lanes. Main lane bridges for Forum Road/Crossland Road, Mayfield Road, Kirby Creek, Warrior Trail, Arkansas Lane, Pioneer Parkway, Marshall Drive, Cottonwood Creek, SE 14th Street/Dickey Road and January Lane/Hill Street are included in this phase of construction. Cross-street bridges for Jefferson Street, Main Street, Dalworth Street, and Tarrant Road are included in this phase of construction. All of the main lane bridges will be constructed to an ultimate configuration of eight lanes (four lanes in each direction) but striped to accommodate an initial condition of four lanes (two lanes in each direction). Main lane pavement will be constructed to accommodate four lanes (two lanes in each direction).

Eighteen slip ramps will be constructed in this phase of construction. Ten of the slip ramps will require the implementation of ETC ramp gantries. In addition, a main lane gantry is located between Arkansas Lane and Pioneer Parkway which will require ETC equipment. The ITS equipment will be installed along with the ETC equipment.

At the I-30 interchange, the proposed improvements consist of a fully directional, five-level interchange with eight direct connection ramps. All of the direct connection ramps are proposed as two lanes but may initially be striped as one lane. Three of the direct connection ramps are depressed underneath the frontage road intersection box. To accommodate the depressed direct connection ramps as well as the main lanes of PGBT WE, frontage road bridges will be constructed. Phase 4 is anticipated to be substantially complete in October 2012. Based on the Project Agreement, the NTTA and TxDOT have agreed to allow for the option of a phased opening of the

direct connection ramps at I-30. The two high volume direct connection ramps at I-30, which consist of the East to North and the South to West direct connections, will be substantially complete in October 2012. The remaining six direct connection ramps have lower traffic volumes. If the NTTA and TxDOT determine that it would be beneficial to delay the opening of the lower volume direct connection ramps in order to reduce construction delays along I-30, the NTTA can exercise the option to complete the remaining lower volume direct connection ramps up to six months later which would be April 2013. The Phase 4 plan and profile are shown on Plates 2 through 19 in the Appendix.

Within the limits of Phase 4 of the Project there is a separate portion consisting of the construction of a railroad bridge over the future PGBT WE main lanes and the construction of two new at-grade crossings of the PGBT WE frontage roads and Main Street and Jefferson Boulevard (“UPRR work”). As established in the Project Agreement, TxDOT was responsible for the development of the plans for the UPRR work. NTTA has obtained an agreement with UPRR, TxDOT, and the City of Grand Prairie for the development and construction of the UPRR work. The UPRR work will be constructed as part of the Phase 4 work and anticipated to be substantially complete in October 2012.

Future Improvements

The NTTA will construct additional main lanes in the future as traffic volumes warrant. From I-30 to I-20 the proposed typical section consists of four lanes (two lanes in each direction) for the initial construction. The inside shoulders will be 12 feet wide with adequate space in the median to accommodate an eight-lane (four lanes in each direction) facility. Based on the current traffic projections, two expansion lane widenings are anticipated for this section. The first widening, which would consist of adding a 12-foot inside shoulder in the center median in both directions, is forecasted to be open to traffic by January 2020. The second expansion lane widening, consisting of adding a 10-foot inside shoulder in the center median in both directions, is forecasted to be open to traffic by January 2031. Both expansion lane widenings will not require any additional ROW since the widenings will occur in the median. All main lane and overpass structures will be initially constructed to accommodate the ultimate eight lane condition.

From I-30 to SH 183 the proposed typical section is wide enough to accommodate the ultimate condition. Re-striping from SH 183 to I-30 will coincide with the expansion lane widening from I-30 to I-20. By January 2031, the entire Project corridor would be an eight-lane (four lanes in each direction) facility as the forecasted traffic demands warrant.

Engineering Geology

A preliminary subsurface investigation was conducted through the acquisition and testing of borings gathered for Phases 1 through 3 of the Project by TxDOT. The subsurface borings were tested to determine the geologic conditions and how those conditions might affect the design and construction of the roadways, bridges and retaining walls. The tests included field and laboratory tests performed on the boring samples to determine the composition, characteristics and engineering properties of the various soils encountered along the route.

The Project crosses many different soil strata throughout the route and for reference these soils will be described relative to a general soil series. The soil series include one or more major soils in association with minor soils. The Project will cover three soil series: the Houston-Black-Heiden (HBH), the Trinity-Frio (TF) and the Silawa-Silstid-Bastil (SSB).

The Project covers two major geologic formations in the area, the Eagle Ford and the Woodbine formations. Both geologic formations are generally dated from the Upper Cretaceous Period being formed from sediments deposited in marine environments.

The preliminary subsurface investigation conducted by TxDOT determined that the subsurface conditions were capable of supporting the typical structures that are a part of a project of this type and magnitude with and without modifications to the existing materials. The NTTA has conducted an independent subsurface investigation that was applied to design and construction.

The overlying surface clays are highly plastic with above average expansive characteristics, including a high Plasticity Index (PI) value. The majority of the Project roadways will be constructed on fill or structures above the plastic clays. Any fill will consist of low PI clays and sands from on-site or materials obtained from off-site

locations. Where the roadway is constructed using the clay soils as the pavement sub-grade, it will be modified as required to reduce the plasticity and shrink-swell potential.

Design Standards

The design proposed for the Project incorporates and conforms to geometric design criteria that are consistent with the current standards and practices of the American Association of State Highway and Transportation Officials (AASHTO) and TxDOT. The Project is also designed to comply with the technical requirements of the Federal Highway Administration (FHWA), the Transportation Infrastructure Finance and Innovation Act (TIFIA), U.S. Department of Transportation and NHTA design guidelines.

Roadway

Designs were based on a desirable speed of 70 miles per hour (mph) for main lanes, 40 mph (minimum) to 50 mph (desirable) for slips ramps, 35 mph (minimum) to 50 mph (desirable) for direct connection ramps, and 45 mph for frontage roads. Desirable values for designs were used when possible to maximize safety. These design speeds provide safety in terms of vertical alignment and stopping sight distance without significantly increasing project costs. All interchange ramps are designed to provide a smooth and safe transition between the PGBT WE main lanes, frontage roads, and intersecting cross streets.

The initial construction of the Project from I-30 to I-20 (Phase 4) will consist of four lanes (two lanes in each direction) with provisions for widening to eight lanes in the future as traffic volumes warrant. The initial construction of the Project from SH 183 to I-30 (Phases 2 through 3) would accommodate up to 10 lanes, but will be initially striped to six lanes (three lanes in each direction) with provisions for re-striping to eight lanes in the future as traffic volumes warrant.

PGBT WE main lanes will be 12 feet wide throughout the Project; the right (outside) shoulder will be 10 feet wide; and the left (inside) shoulder will be 12 feet wide to allow a disabled vehicle to stop without interfering with the through traffic lanes. Both shoulders will match the adjoining pavement section. In sections with the paving grade significantly below natural ground, a shoulder with traffic-rail protection along retaining

walls may be employed. From Mayfield Road to I-20, a 122-foot-wide median with a concrete median barrier between opposing directions of traffic will be provided to prevent vehicles from crossing through the median. If in the future, traffic volumes support the need for a toll connector from PGBT WE to SH 360, the median will accommodate up to four lanes (two lanes in each direction) for a potential future toll connector separate from this Project. From Mayfield Road to I-30, a 72-foot-wide median with a concrete median barrier between opposing directions of traffic will be provided to prevent vehicles from crossing through the median. When additional lane capacity is required in the future, the median will accommodate two additional standard 12-foot lanes and a 10-foot shoulder in each direction while maintaining an adequate center median for safety.

From SH 183 to I-30, a section wide enough to accommodate 10 lanes was constructed by TxDOT but was striped to a six-lane section (three lanes in each direction), which provides a 72-foot-wide median with a concrete median barrier between opposing directions of traffic to prevent vehicles from crossing through the median. When additional lane capacity is required in the future, the median will be re-striped to accommodate a 22-foot shoulder in each direction while maintaining an adequate center median for safety.

Frontage roads are provided for local traffic circulation along much of the Project. Generally, these one-way frontage roads have three 12-foot lanes in each direction parallel to the main lane alignment. Many of the cross streets will have Texas U-turns to enhance traffic circulation.

The typical one-lane slip ramps are 14 feet in width with an eight-foot outside shoulder and a four-foot inside shoulder. The typical one-lane direct connection ramps are 14 feet in width with a nine-foot outside shoulder and a five-foot inside shoulder. The additional width on the one lane direct connection ramps is to accommodate a future two-lane ramp when traffic volumes warrant the need. The typical two-lane slip ramps and direct connection ramps are 24 feet in width with an eight-foot outside shoulder and a four-foot inside shoulder. In restricted areas, it may be necessary to reduce the width of the ramp pavement. However in all ramp locations, adequate shoulder and ramp pavement width will be provided to allow traffic to pass a stalled vehicle.

The pavement lanes will be clearly marked. In addition, to aid in the safety of traffic operations, overhead safety lighting (not continuous), guide signs, warning signs and dynamic message signs (DMS) will be provided to inform motorists of upcoming roadway conditions.

Typical sections for the PGBT WE main lanes are shown on Plate 1 in the Appendix. The frontage roads are also shown, indicating their relative position to the PGBT WE main lanes.

Pavement

Two separate pavement design methodologies will be used within the Project limits. Pavement for Phases 1 through 3 of the Project was designed and constructed by TxDOT while the pavement for Phase 4 will be designed and constructed by the NTTA.

The TxDOT pavement design based on the construction documents for the main lanes and slip ramps consists of 13 inches of continuously reinforced concrete pavement (CRCP) supported by four inches of hot-mixed asphalt pavement (HMAC) base over six inches of lime treated sub-grade (LTS). Because of the presence of the existing expansive clays in the Project area, the pavement section is supported by up to 10 feet of low PI fill over moderate PI embankment fill as required. The frontage road pavement is comprised of 10 inches of CRCP over the identical HMAC base and LTS sub-grade. The NTTA pavement design for the main lanes and ramps are planned based upon an independent evaluation in conjunction with the NTTA Pavement Design Manual.

Generally, the shoulders of all roadways will be constructed with the identical pavement section as the roadway lanes. All pavement sections will be designed for increasing truck traffic anticipated along the Project throughout the pavement life.

Structures

All main lane overpass and underpass structures will be designed for HL-93 loading in accordance with the 2008 edition of AASHTO's Load and Resistance Factor Design (LRFD) Bridge Design Specifications. The UPRR overpass bridge was designed by TxDOT for the appropriate railroad loading in accordance with the requirements of the railroad company. Bridges are anticipated to be steel-reinforced concrete construction

for standard spans and steel plate or tub girders for long and or highly curved spans. Retaining walls will be steel-reinforced concrete and reinforced-earth construction. Drilled-shaft or soil-nail retaining walls will be used where required by geometric and/or staging restrictions (such as when excavating next to an open roadway) and where soil-bearing capacity limitations prohibit the use of mechanically stabilized earth (MSE) walls. In general, MSE walls will be used in fill conditions wherever drilled-shaft or soil-nail walls are not required.

From I-20 to I-30, the PGBT WE main lane structures will be constructed for the ultimate eight-lane facility (four lanes in each direction), with each directional roadway on a separate structure. The section will be initially striped to four 12-foot lanes (two lanes in each direction). The outside and inside shoulders will be 10 feet and 34 feet in width, respectively, plus one foot for a traffic rail on the outside and two feet on the inside for the center barrier, which creates a typical total bridge width of 71 feet in each direction.

The PGBT WE main lane structures were constructed by TxDOT to accommodate 10 lanes from SH 183 to I-30. The initial striping consists of six 12-foot lanes (three lanes in each direction). The outside and inside shoulders will be 22 feet in width each, plus one foot for a traffic rail on the outside and two feet on the inside for the center barrier, which creates a typical total bridge width of 83 feet in each direction. When traffic volumes warrant, the main lane widening will be a re-striping to the ultimate eight lane (four lanes in each direction) section.

Cross street bridges consist of a varying number of 12-foot traffic lanes and sidewalks. One-lane slip-ramp bridges will consist of a 14-foot travel lane, an eight-foot outside and four-foot inside shoulder and one foot of rail on each side, which creates a typical total bridge width of 28 feet. One-lane direct connection ramp bridges will consist of a 14-foot travel lane, a nine-foot outside and five-foot inside shoulder and one foot of rail on each side, which creates a typical total bridge section width of 30 feet. The additional width on the one-lane direct connection ramp bridges is to accommodate a future two-lane ramp as traffic volumes warrant. Two-lane direct connection ramp and slip-ramps bridges will consist of two 12-foot travel lanes, an eight-foot outside and four-foot inside shoulder and one foot of rail on each side, which creates a typical total bridge section width of 38 feet.

Drainage

As with any limited access facility of this nature, it is important to provide a drainage system that will remove storm water from the pavement in a rapid and efficient manner. The collection and disposal of all surface water will be accomplished by a system of ditches, inlets and pipes along PGBT WE and the use of existing natural swales and artificial conduits. All drainage designs will conform to standard TxDOT and NTTA specifications for the project.

NTTA Design Guidelines

NTTA Design Guideline elements such as structural signing, bridges, retaining walls, ROW fencing, lighting, toll gantry and landscaping promote visual consistency and sustainability on NTTA facilities. These aesthetic elements are provided to enhance the NTTA customers' driving experience and maximize safety for the motorists.

Landscape

The NTTA will plant landscaping in key focus areas of the Project. These focus areas typically fall into one of three categories: interchanges, underpasses and overpasses. These focus areas will be carefully examined within the context of the whole system and prioritized for improvements. Plant materials will be carefully selected for specific characteristics, such as low water requirement, native or adapted qualities, sustainability and seasonal interest. The landscaping improvements will satisfy the requirements specified in the Project Agreement between NTTA and TxDOT.

Illumination

The Project is not a continuously illuminated corridor, however illumination will be provided at signalized intersections per TxDOT's Traffic Operations Manual, Highway Illumination, April 1995. All toll gantries will be illuminated to provide safety and improve visibility, operations and security. Within Phase 4 safety illumination will be provided to improve nighttime visibility and maximize safety at the main lane entry and exit points. NTTA Design Guideline poles and fixtures will be used along Phase 4 of the Project.

Signing

Signing is used extensively on high-volume roadways to inform, warn and guide drivers. Therefore, it must be an integral part of the design process. Guide signs, which provide motorists information on routes and destinations along with regulatory and warning signs are included on the Project and conform to the Texas Manual of Uniform Traffic Control Devices and NTTA and TxDOT guidelines.

Signs on the Project will be reflective to enhance nighttime visibility and will be designed to withstand appropriate wind loads for the given area. Roadside mounted signs and overhead signs will be utilized as necessary to ensure that the signs are clearly visible to the motorists. In addition to signs along the Project, trailblazer signs are anticipated to be installed on major arterials in the vicinity of the Project to direct motorists to the nearest PGBT WE access. Also, four dynamic message signs (DMS) will be provided to inform motorists of current and upcoming roadway conditions. The signs will be strategically located throughout the Project corridor.

Toll Collection

All toll collection systems on the Project will be 100 percent open road tolling using an all-ETC system. There are no provisions for cash toll collections in the lanes. Vehicles that are equipped with a TollTag (NTTA) or TxTag (TxDOT) transponder will be tolled electronically as they travel through the toll gantries. Any vehicles using the Project that do not have either of these transponders will be sent an invoice for their tolls and be encouraged to obtain a TollTag to maximize their savings when traveling throughout the NTTA system of tolled facilities.

A total of 18 entrance and exit ramps along to or from the Project will have overhead gantries to allow for placement of toll collection equipment. In Phases 2 and 3 of the Project, immediately south of North Carrier Parkway, there will be a temporary gantry and slip ramp located in the southbound direction to allow for the tolling of traffic until Phase 4 can be completed. There are two main lane ETC gantries located on the Project. South of I-30, a main lane gantry is located between Arkansas Lane and Pioneer Parkway and will provide for four toll collection lanes (two lanes in each direction with provisions for two future expansion lane widenings in each direction).

equipped for both TollTag and TxTag collection as well as license plate capability. North of I-30 a main lane gantry is located between North Carrier Parkway and Sunnyvale Road/Lower Tarrant Road and will provide for six toll collection lanes (three lanes in each direction with provisions for one future expansion lane widening) equipped for both TollTag and TxTag collection as well as license plate capture capability.

All toll collection lanes are dedicated, non-stop express lanes to expedite the flow of traffic through the gantries, improve safety and air quality and provide for ease of maintenance. All vehicles using the Project will be monitored with video-enforced toll collection systems. Vehicles that are not equipped with a TollTag or TxTag will be detected and will be billed monthly at a higher rate by capturing license plate data and linking it to the registered owner of the vehicle.

Sound Mitigation

Where warranted in accordance with the TxDOT and NTTA Sound Mitigation Policies, the NTTA will construct sound walls to mitigate sound levels that exceed acceptable FHWA Noise Abatement Criteria along the Project. Through the environmental review process, it was determined that Phases 3 and 4 of the Project will require sound walls. The NTTA and TxDOT will construct the sound walls in their respective phases of the Project.

Right of Way

The NTTA has the authority to acquire property and easements by purchase or condemnation for the construction, maintenance and operation of toll roads. The ROW limits have been established based on the proposed location of roadways, bridges and intersections. Based on the current plans for the Project, limited easement acquisition may be necessary. Since TxDOT has previously acquired ROW for the Project, it is not anticipated that the NTTA will acquire any additional ROW other than possible easements. The NTTA anticipates providing only ROW verification services for the Project. The potential exists for the acquisition of drainage easements for Phase 4 construction. The Design-Builder is responsible for obtaining any required easements.

Utility Adjustments

The Project is located in an area with various utilities. Due to the Phase 1 frontage road improvements that are complete by TxDOT, it is anticipated that the majority of the major utility relocations have occurred on the Project. However, the NTTA has included minimal costs for potential unidentified utility relocations in the estimated Project cost. The Design-Builder is responsible, at their cost, for all identified utility relocations as part of the lump-sum contract price.

Public Involvement

A Record of Decision (ROD) from FHWA was received in 1997 that considered public input. However, revisions to the Project in a few areas during the design process required an environmental re-evaluation. A re-evaluation was prepared and ultimately approved in June 2004. After the re-evaluation was approved, SH 161 was designated as a toll facility by the RTC. To meet the requirements of the toll re-evaluation process, two public meetings were held, on May 5, 2005, and May 9, 2005, to discuss the implication of tolling SH 161 and provide the public an opportunity to comment on the proposed changes. A public hearing was held on September 21, 2006, in which the Project received support from the affected governmental agencies and favorable comments from the public. Final documentation was submitted to TxDOT and FHWA and was approved on February 29, 2008.

On August 20, 2009, a public hearing was held to disclose financial information prior to the NTTA entering into a contract for the construction of a toll project, per Texas Transportation Code Chapter 371 Section 371.153. In accordance with the Texas Transportation Code, the NTTA is required to publish certain information pertaining to the contract and financing being undertaken to fund the Project.

- The issuance of toll revenue bonds and other debt to pay for the design and construction of the project
- Interest over the life of the bonded debt
- Repayment of the accumulated debt

- Continuation of tolls after all debt has been repaid
- The process for setting toll rates
- The established toll rates
- Competing facilities provisions
- Termination for convenience provisions
- Concessionaire involvement

Environmental Considerations

An EIS was developed by TxDOT to determine the social, economic and environmental effects of the Project as required by NEPA. This environmental document was cleared by the FHWA in 1997. As a result of revisions to the Project, a re-evaluation was prepared and ultimately approved in June 2004. After the re-evaluation was approved, SH 161 was designated a toll facility by the RTC. Two public meetings and a public hearing were held as part of the environmental study for tolling the corridor. Final documentation submitted to TxDOT and FHWA was approved on February 29, 2008.

Based on the investigations conducted, the Project will have no significant impact on the quality of the human environment and have no serious effects on the factors that were evaluated. Implementation of the proposed tolling of PGBT WE would not appreciably increase the potential for impacts beyond those considered in previous environmental documents and subsequent approvals. No further environmental documentation beyond the aforementioned documents is required. The design and construction of the Project will be compliant with NEPA and adhere to environmental commitments contained in the approved environmental documents.

The proposed implementation of tolling on PGBT WE would support the overall Project need and purpose by responding to population increases and development, which have created congestion, and by generating revenue for the construction, operation and maintenance of PGBT WE as well as funding potential additional Regional Toll Revenue Funding Initiative projects. Tolling PGBT WE would allow the main lanes to be constructed five to 10 years earlier than previously programmed, and all main lane

sections could be open to traffic in late 2012. Accelerating project delivery by using a Design-Build approach for Phase 4 will help meet the need and purpose of PGBT WE to improve the transportation network and level of service within the region.

The Project meets all air- and water-quality requirements, including the revisions to PGBT WE's original schematic. An air-quality analysis was conducted by modeling the anticipated carbon monoxide (CO) levels resulting from the construction of PGBT WE. It was determined that the construction of PGBT WE would not adversely impact CO levels. The Project will not hinder the Texas State Implementation Plan to meet national ambient air-quality standards. In addition, no long-term water-quality impacts are expected from the Project. Control measures will be implemented during the construction process to minimize water pollution. These measures include preserving existing vegetation, limiting the amount of disturbed earth and utilizing temporary erosion control practices.

Re-evaluation of noise impacts was performed based on revisions to the Project and revised traffic projections. One additional noise barrier was proposed in addition to previously identified affected areas. The Project should not have a significant impact on exterior noise levels, according to the Noise Abatement Criteria for the Design Year 2030 as defined by the Guidelines for Analysis and Abatement of Highway Traffic Noise.

Other environmental considerations for the Project are one hazardous material site and one contaminated soil site. An unregulated landfill near Sunnyvale Road, located in Phases 2 and 3 of the Project, was identified and a Waste Excavation and Relocation Plan was developed by TxDOT and approved by the TCEQ. Additionally, contaminated soil was identified near Marshall Drive in Phase 4. A Soil, Groundwater and Surface Water Construction Management Plan was developed by TxDOT to manage the excavation and removal of any contaminated soil. Since the contaminated soil has been identified in Phase 4 of the Project, the NTTA will fulfill the requirements specified in the Soil, Groundwater and Surface Water Construction Management Plan.

Commitments and Permits

Under Section 404 of the Clean Waters Act, the USACE regulates the discharge of dredged or fill material into waters of the United States, including wetlands. Therefore, authorization by the USACE in the form of a nationwide permit is required for the discharge of dredged or fill materials and for construction of box culverts and/or bridges in waters of the United States that exist on the Project site. An Individual Section 404 Permit developed for TxDOT was obtained in February 2008 for the crossing of the Trinity River and included 11.3 banking credits to the South Forks Trinity River Wetlands Mitigation Bank. Additionally, the NTTA acquired on February 24, 2009 an additional NWP 14 to complete the remaining construction from I-20 to I-30 (Phase 4), and includes 2.3 credits to the South Forks Trinity River Wetlands Mitigation Bank. The Section 4(f) mitigation to C.P. Waggoner Park (a 10-acre taking) included a 75.4 acre link from C.P. Waggoner Park to Mike Lewis Park. The additional link was constructed and opened to the public in the spring of 2008.

Design-Build Procurement

For Phase 4 of the Project, the NTTA elected to implement the Design-Build (D-B) delivery method. The D-B delivery method is designed to give the NTTA the ability to identify the best combination of price and value, reduce the project risk to NTTA, and to ensure that a quality project is delivered on time. The major phases of the D-B procurement process are as follows: Request for Qualifications (RFQ); Draft Request for Detailed Proposal (RFDP); Request for Detailed Proposals (RFDP); and then the selection phase where the Authority's Board of Directors award the D-B contract. In the RFQ phase, the RFQ is issued to the public and requests that firms submit statement of qualifications from which a short list of qualified firms or proposers is generated. The NTTA issued the RFQ in December 2008. In the Draft RFDP phase, the Instructions to Proposers (ITP) along with the D-B agreement are sent to the proposers. Once the Draft RFDP is submitted to the proposers, they have the opportunity to submit questions and meet with the Authority. The NTTA issued the Draft RFDP in January 2009.

In the RFDP phase, the proposers had the opportunity to present innovative ideas

referred to as Alternative Technical Concepts (ATC's) to demonstrate potential cost savings opportunities and/or Value Added Concepts (VAC's) for the Project. Based on input from the Authority, the firms had the option to include accepted ATC's and VAC's to be included in their final RFDP submittal. The NTTA issued the RFDP in April of 2009 with the detailed proposal due in June 2009. After the NTTA reviewed the detailed proposals, a final recommendation for the best value proposer was presented in August 2009 to the Authority's Board of Directors to award the D-B contract. The NTTA has entered into a contract with a Design-Builder and issued all Notices-to-Proceed required for completion of the Phase 4 work.

Project Cost Estimates

Phase 1 actual construction, ROW and pre-development costs, provided by TxDOT, totaled \$279,567,561. Phases 2 and 3 costs for the Project were negotiated through the SH 161 Market Valuation process. In conformance with the Project Agreement between NTTA and TxDOT dated July 30, 2009, the agreed upon total Project costs for Phases 2 and 3 in 2007, un-escalated dollars, was \$231,614,424 and \$90,265,397 respectively and the agreed upon negotiated value for Phases 1 through 3, in terms of a payment to TxDOT, was \$458,000,000. The \$458,000,000 payment to TxDOT is in addition to the costs shown in Table 2.

In accordance with the Project Agreement, TxDOT was responsible for the development of the plans for the UPRR work. NTTA has obtained an agreement with UPRR, TxDOT and the City of Grand Prairie for the development and construction of the UPRR work. The NTTA is responsible for all construction costs for the UPRR work, up to \$22,622,544. Any costs in excess of \$22,622,544, will be the responsibility of TxDOT.

The cost estimate for the NTTA portion of the Project (including Phase 4, the ETC/ITS project equipment in Phases 2 and 3, UPRR work and landscaping) is a combination of actual bids received and estimates that include the following major cost assumptions:

- The D-B contract is approximately 75 percent of the overall NTTA project cost. This is a fixed value contract with a majority of the cost risk shifted to the D-B contractor.

- The estimated quantities and the unit prices for construction items on similar projects in the Dallas/Ft Worth area were used to estimate the construction cost of the few contracts not yet bid (such as landscaping, Phase 3 gantries, sand stockpile, and Phase 4 toll collection equipment).
- Based on the study of inflationary trends, including the 20-year average of the CCI published by Engineering News Report, an average escalation rate of 4.685 percent has been applied to the midpoint of construction for the few contracts not yet bid.
- In addition, a contingency of 6.5 percent has been applied to the construction contracts underway while a contingency of 20 percent has been added to those not. An FHWA recognized approach to contingency risk assessment was performed to evaluate the adequacy of the project contingency shown in Table 2. The results reveal that with a 90 percent confidence level, a \$27 million contingency should be considered sufficient.

Table 2 shows a summary of the estimated NTTA Project costs. The total Project costs include engineering, legal and administrative, materials testing and utility relocation costs that are NTTA's responsibility. The current estimated total Project cost for Phase 4, as well as the ETC/ITS equipment in Phases 2 and 3, excluding the future expansion lane widenings, is \$546,598,381.

The Project cost for the first and second expansion lane widenings are \$23,434,604 and \$29,867,694 respectively. For both the anticipated widenings an inflationary rate of 3.5 percent per year was added to the mid-point of construction. The contingency for both widenings is 20 percent for the construction and agency costs.

Several factors, including unforeseen escalation of prices and wages, labor or material shortages and changes in economic conditions, can significantly affect (escalate or reduce) construction costs. The estimated Project cost reflects our professional judgment of the construction industry and it is our belief that the Project can be constructed within the limits described for the estimated cost given herein. However, due to the unpredictable nature of the construction industry, we cannot and will not, guarantee that the actual Project cost will not vary from the estimated cost.

No.	Description	Cost
1	Administration (Incl. Corridor Management, Legal)	\$22,100,000
2	Planning	\$8,500,000
3	Design	\$5,000,000
4	Construction, Construction Management, Miscellaneous Construction	\$461,904,130
5	ITS and Toll Gantry Equipment	\$12,146,440
6	ROW, Utilities	\$1,989,145
7	Project Contingency	\$34,958,666
NTTA Project Total (1-7)		\$546,598,381

Operation and Maintenance

Estimated costs of operations and maintenance (O&M) of the Project have been prepared taking into consideration the NTTA's current system operations and maintenance model for the NTTA System and the commitments as set forth in agreements with TxDOT. The estimates reflect that the NTTA will operate the facility in a manner that will fulfill the commitments as set forth in agreements with TxDOT.

Based on NTTA standard practices, the costs of administration, management, and maintenance of roadways and structures, ETC, contract maintenance activity and miscellaneous other costs associated with the operation of the system are included in the estimates. The estimated annual Operations and Maintenance Fund (OMF) and Reserve Maintenance Fund (RMF) expenses for Major Maintenance for the Project are provided in Table 3. To determine operation and maintenance cost for the Project, an estimate of the personnel and expenses required to operate each department was developed. The sum of these expenses comprises the PG&T WE

cost estimate in 2009 dollars. The escalation applied in the estimate varies by service category experience. O&M costs are escalated at the rate of 2.75 percent per year and Customer Service Center costs are escalated at 2.41 percent per year. Reserve Maintenance Fund (Major Maintenance) activities are escalated at the rate of 3.50 percent per year.

The NTTA is responsible for maintenance of all main lanes, ramps and frontage roads within the Project limits at a standard no less than the requirements described in Exhibit G of the Project Agreement with TxDOT, including the forecasted expansions in 2020 and 2031. In accordance with NTTA standards, Roadway Customer Service (Courtesy Patrol) and/or Police and accident response support on the main lanes and ramps will be provided by the NTTA. Driveway and utility permitting, signalization operation and maintenance are TxDOT's responsibility (or through TxDOT's municipal signalization agreements) and are therefore not included in this estimate.

TABLE 3: ESTIMATE OF ANNUAL OPERATIONS AND MAINTENANCE EXPENSE

Year	PGBT WE O&M	Reserve Maintenance Fund Estimate for PGBT WE	Year	PGBT WE O&M	Reserve Maintenance Fund Estimate for PGBT WE
2009	98,157	0	2036	34,609,724	49,385,318
2010	3,828,420	259,427	2037	35,661,409	6,184,504
2011	5,939,322	400,916	2038	36,901,048	1,747,482
2012	7,312,203	425,285	2039	38,047,406	57,621,630
2013	13,521,248	673,301	2040	39,399,734	9,061,165
2014	15,532,562	2,074,064	2041	40,474,351	8,885,429
2015	16,473,244	701,001	2042	41,825,747	10,495,728
2016	16,719,450	2,070,669	2043	43,081,835	146,255,158
2017	16,935,974	3,205,936	2044	44,580,085	8,668,663
2018	17,281,335	840,941	2045	45,851,607	2,197,819
2019	17,652,042	10,889,189	2046	47,388,135	76,209,564
2020	18,435,287	981,539	2047	48,743,748	11,166,253
2021	19,762,977	2,758,050	2048	50,420,025	6,558,673
2022	20,222,887	7,547,090	2049	51,879,602	4,156,974
2023	20,693,855	851,361	2050	53,674,991	75,050,516
2024	21,268,939	3,219,184	2051	55,274,738	30,989,034
2025	21,255,976	2,432,982	2052	57,112,433	14,097,164
2026	21,682,547	6,703,441	2053	58,721,442	91,848,255
2027	22,353,753	10,588,378	2054	60,792,796	15,173,272
2028	23,180,383	1,827,706	2055	62,600,371	7,773,138
2029	23,914,384	35,518,768	2056	64,834,901	8,531,513
2030	24,814,461	1,208,569	2057	66,634,057	96,929,996
2031	26,590,359	3,524,435	2058	68,862,835	12,953,690
2032	29,902,763	50,883,968	2059	71,562,668	25,747,981
2033	30,963,488	8,024,126	2060	74,788,593	117,323,454
2034	32,246,316	4,382,170	2061	76,947,383	24,256,115
2035	33,431,142	10,673,352			

Note: Costs are expressed in TxDOT Fiscal Years (September 1st through August 31st)

Appendix

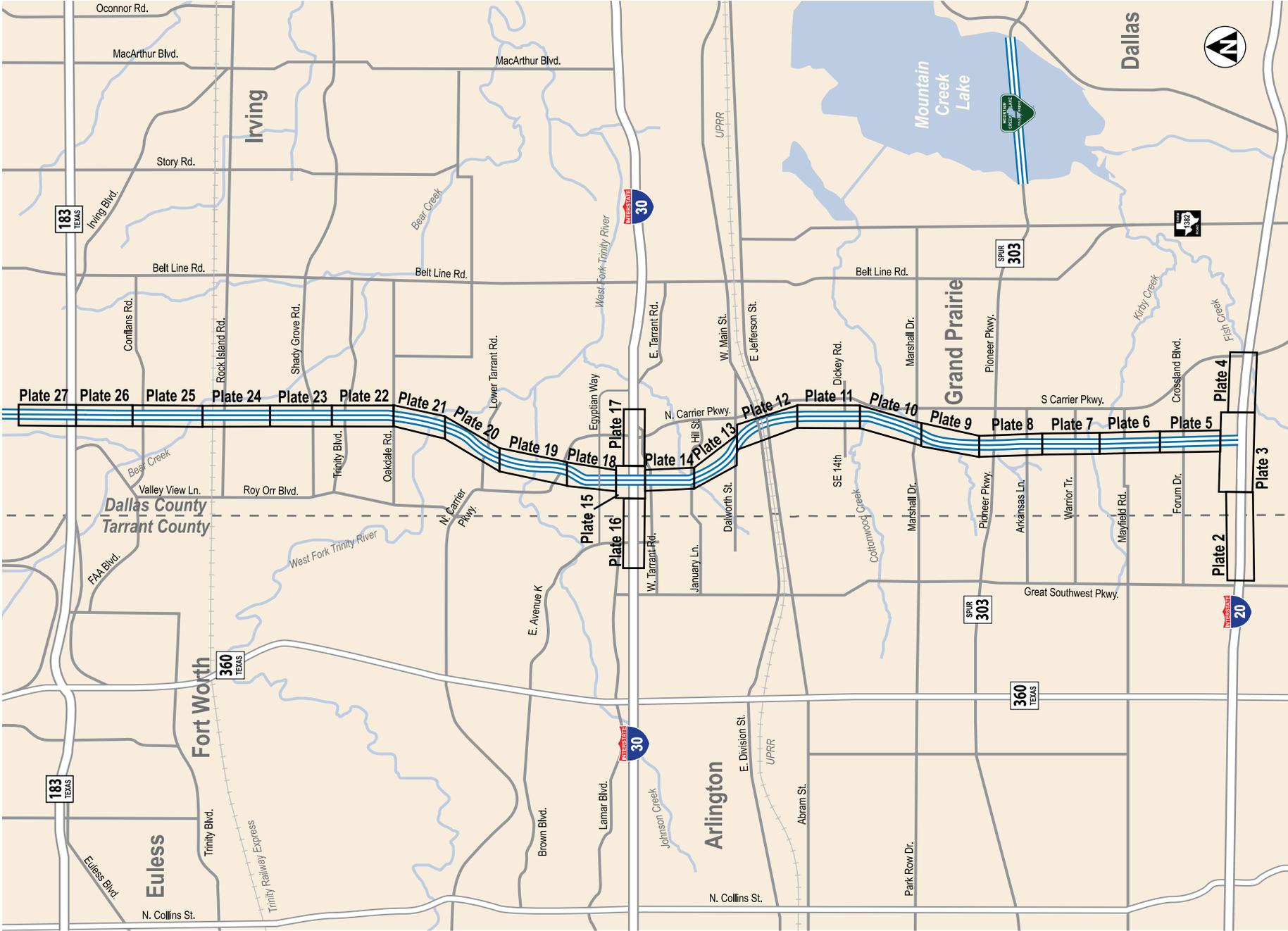
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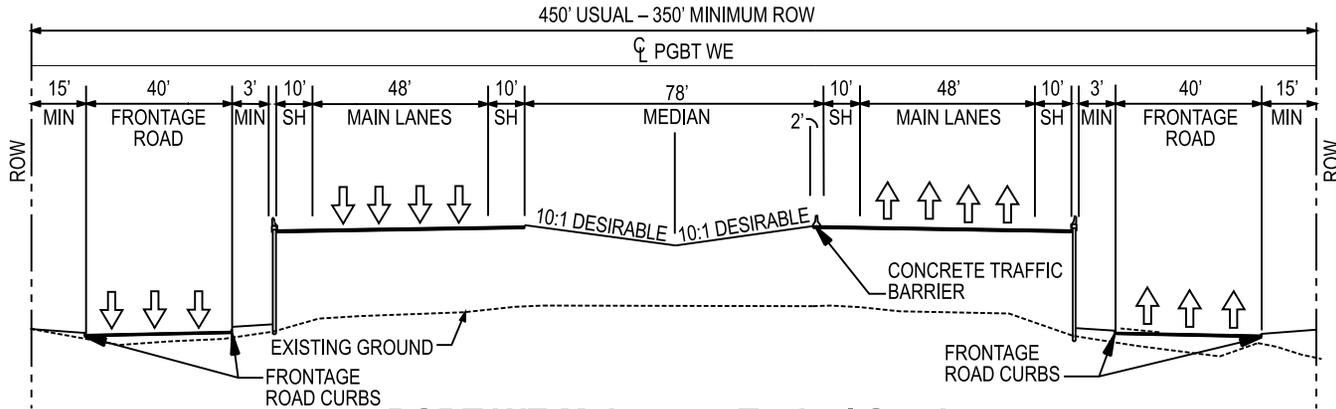
Acronym Definitions

TABLE 4: ACRONYM DEFINITIONS

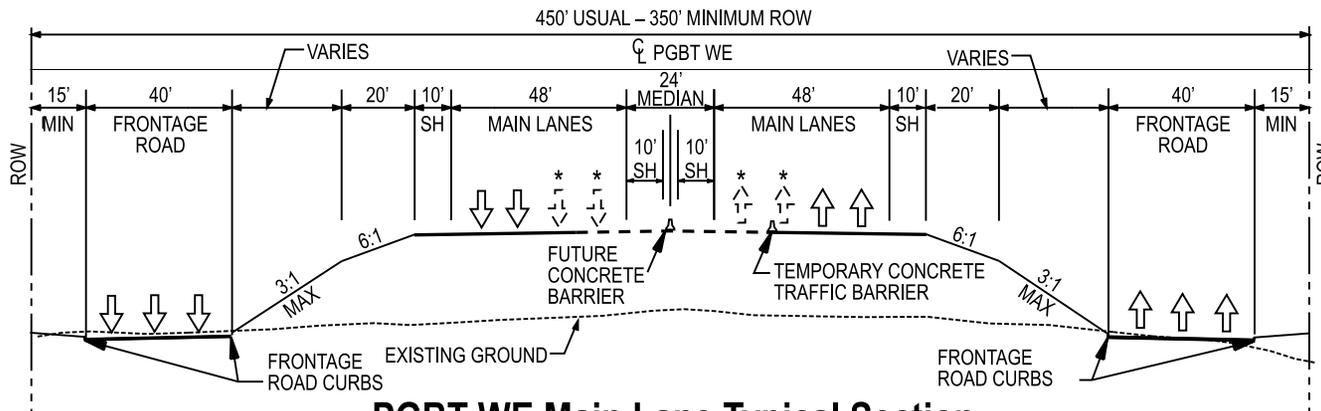
Acronym	Definition	Acronym	Definition
AASHTO	American Association of State Highway and Transportation Officials	NWP 14	Nationwide Permit 14
ATCs	alternative technical concepts	O&M	Operation and Maintenance
CCI	Construction Cost Index	OMF	Operations and Maintenance Fund
☉	center line	PCN	Pre-construction Notification
CO	carbon monoxide	PGBT	President George Bush Turnpike
CRCP	continuously reinforced concrete pavement	PGBT WE	President George Bush Turnpike Western Extension
CSS	cement stabilized subgrade	PGL	profile grade line
DART TRE	Dallas Area Rapid Transit Trinity Railway Express	PI value	Plasticity Index value
D-B	design-build	PS&E	plans, specifications and estimates
DMS	dynamic message signs	RFDP	request for detailed proposal
EB	east bound	RFQ	request for qualifications
EIS	environmental impact statement	RMF	Reserve Maintenance Fund
ETC	electronic toll collection	ROD	record of decision
FHWA	Federal Highway Administration	ROW	right of way
HBH	Houston-Black-Heiden soil series	RTC	Regional Transportation Council
HMAC	hot-mixed asphalt concrete	SB	south bound
I	interstate	SH	state highway
ITP	instructions to proposers	SSB	Silawa-Silstid-Bastsil soil series
ITS	Intelligent Transportation System	TCEQ	Texas Commission on Environmental Quality
mph	miles per hour	TxDOT	Texas Department of Transportation
LTS	lime-treated subgrade	TF	Trinity-Frio soil series
MOU	Memorandum of Understanding	TIFIA	Transportation Infrastructure Finance and Innovation Act
MSE walls	mechanically stabilized earth walls	UPRR	Union Pacific Railroad
NB	north bound	USACE	United States Army Corps of Engineers
NCTCOG	North Central Texas Council of Governments	VACs	value added concepts
NTTA	North Texas Tollway Authority	WB	west bound
NEPA	National Environmental Policy Act		



Typical Sections

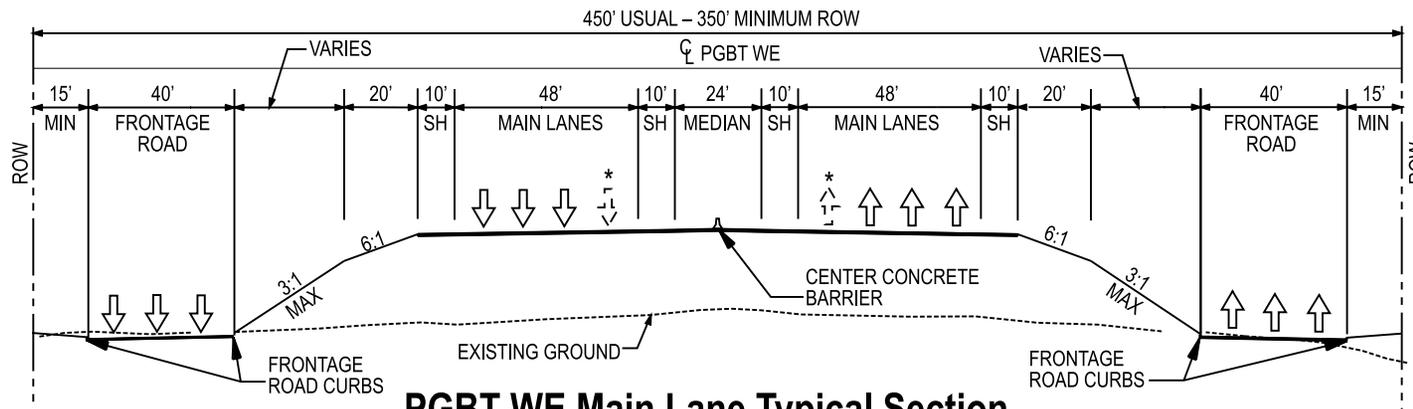


**PGBT WE Main Lane Typical Section
 from IH 20 to Mayfield Rd.**



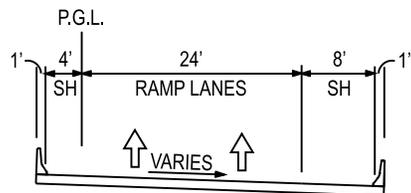
**PGBT WE Main Lane Typical Section
 from Mayfield Rd. to IH 30**

*Future Expansion Lane Widening

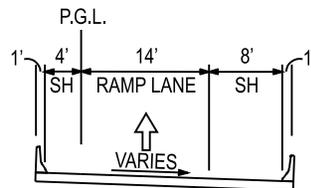


**PGBT WE Main Lane Typical Section
from IH 30 to SH 183**

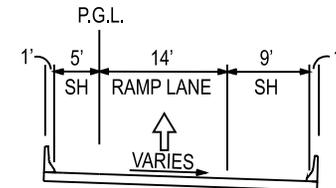
*Future Expansion Lane Widening



**Two Lane Direct Connector/
Slip Ramp Typical Section**

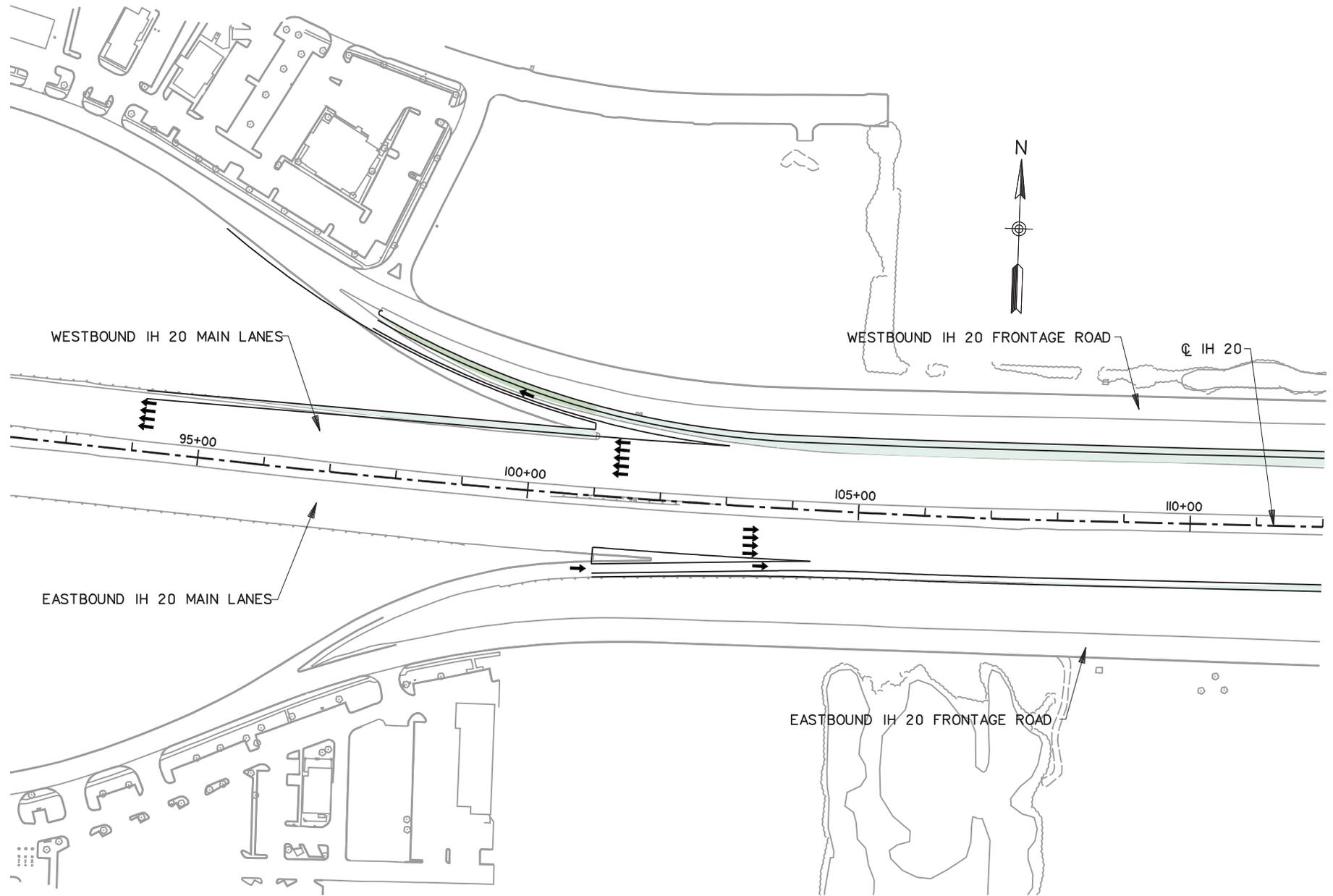


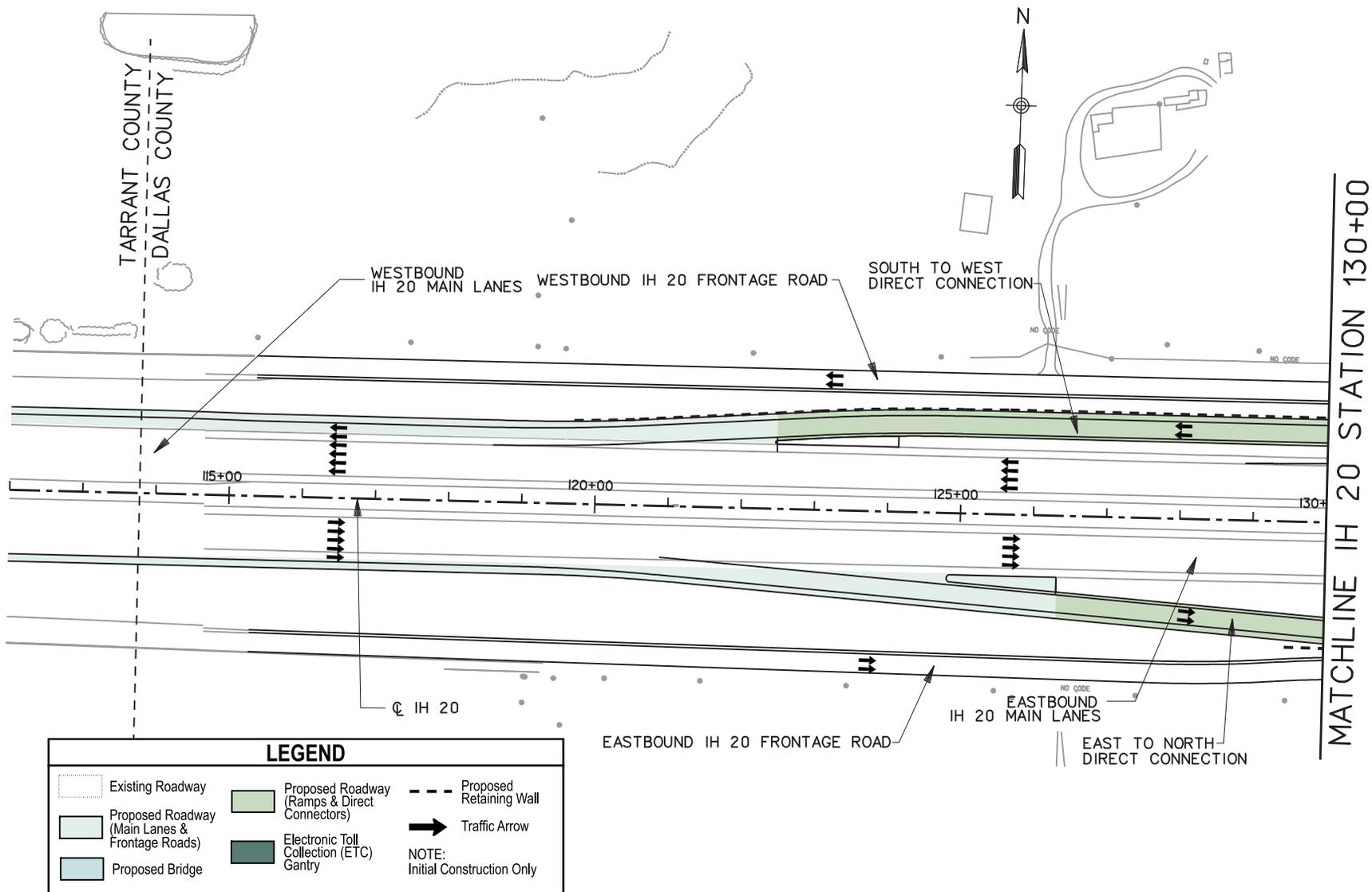
**One Lane Ramp
Typical Section**



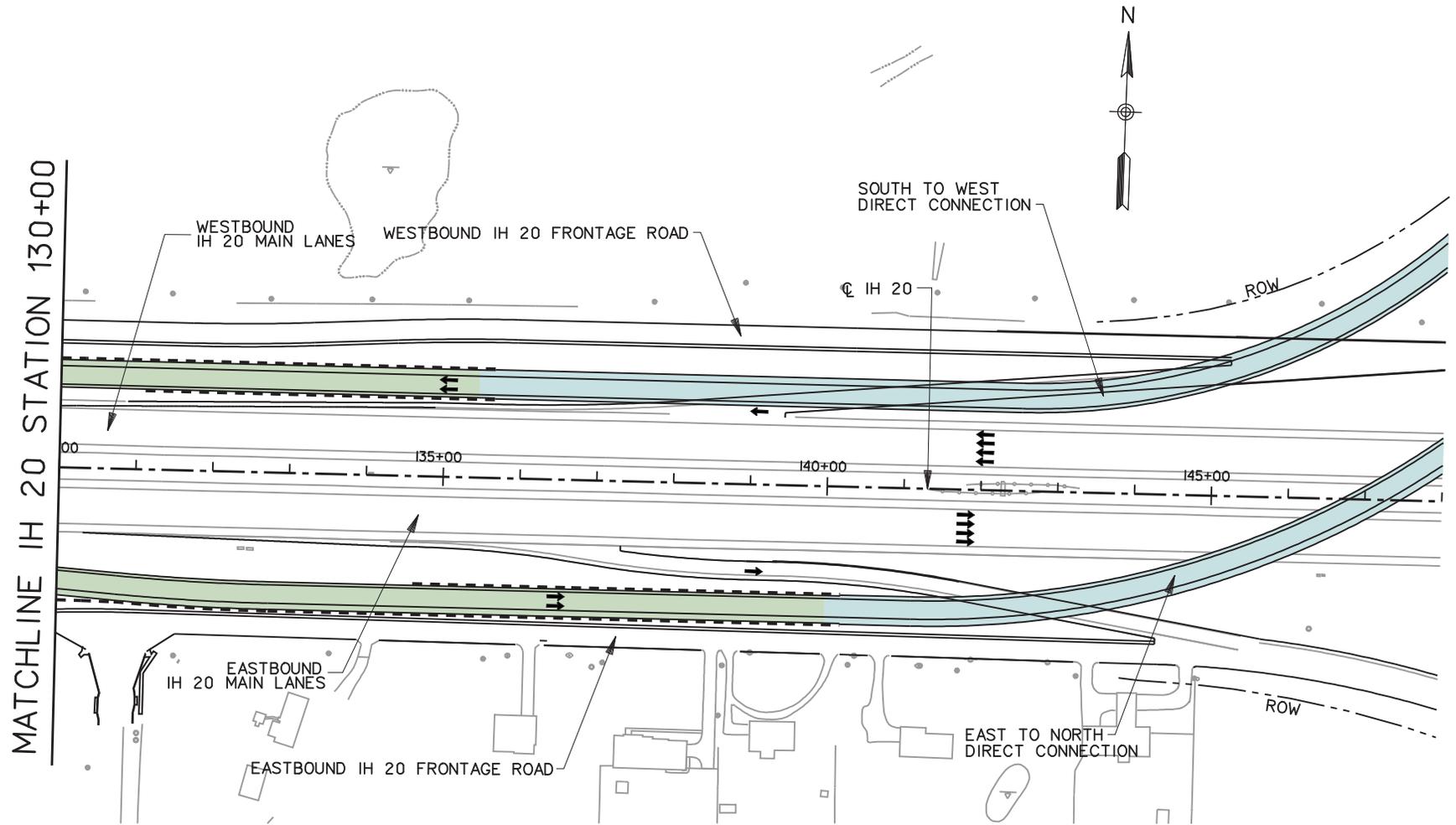
**One Lane Direct Connector
at SH 161/IH 30 Interchange
Typical Section**

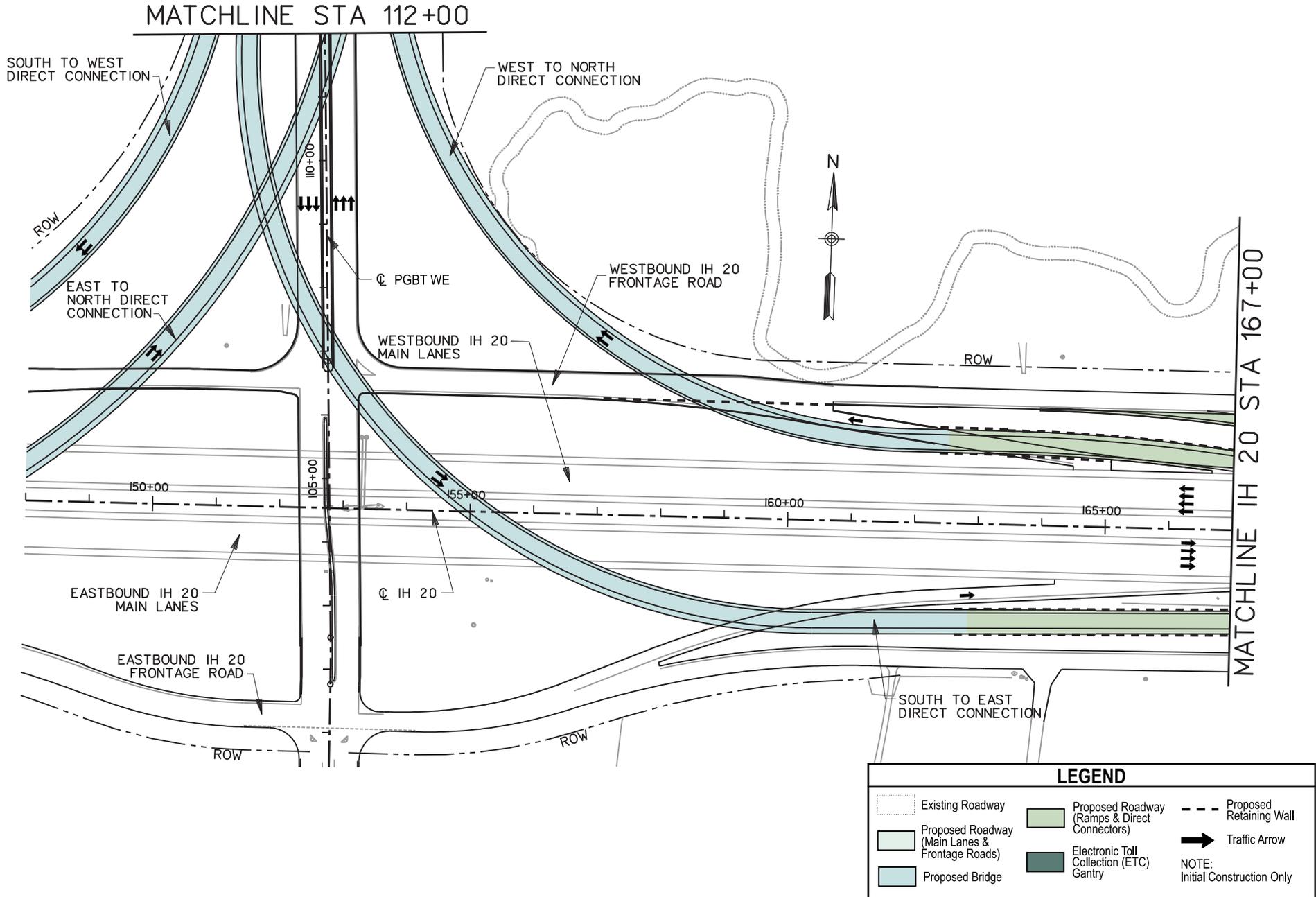
Plans and Profiles

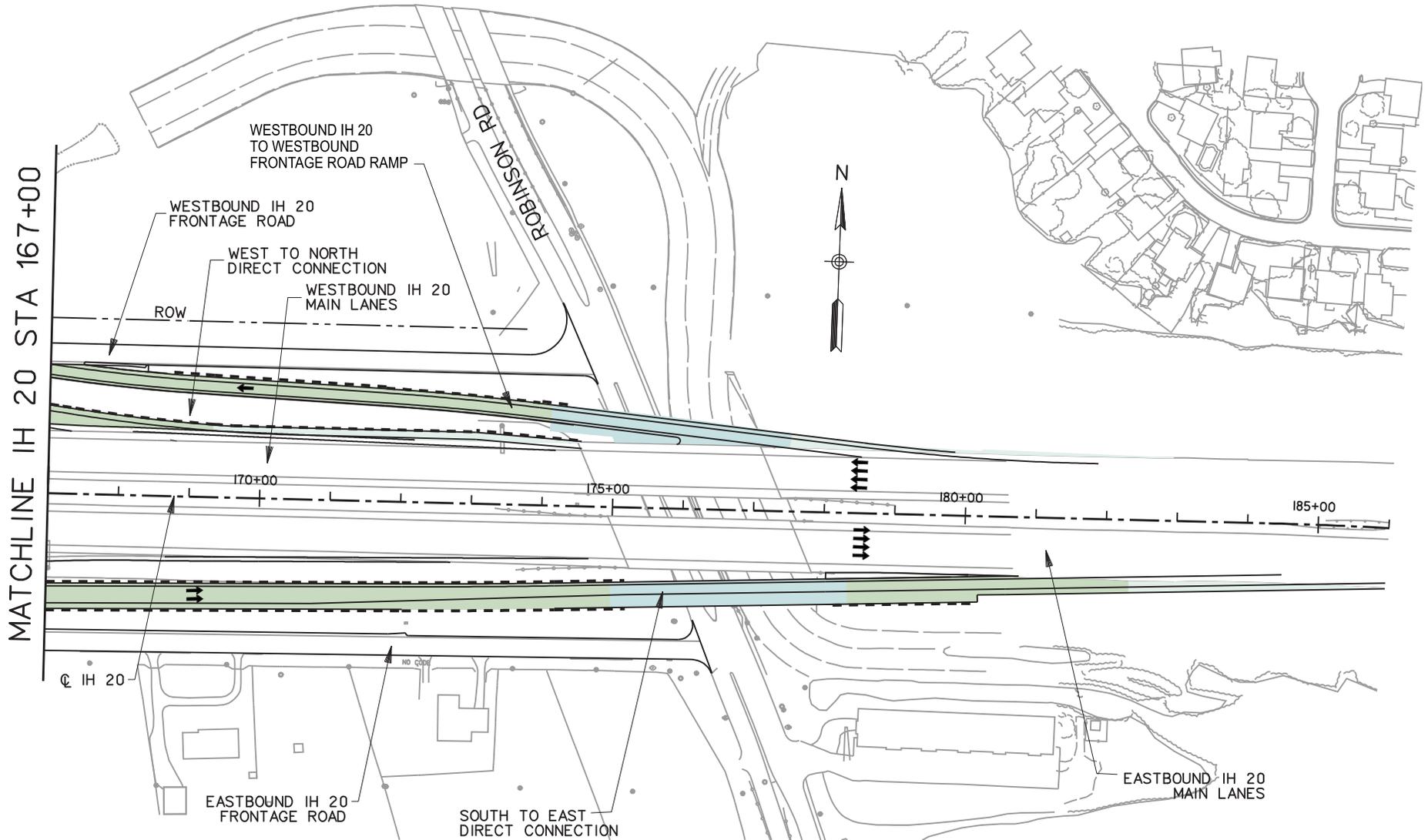




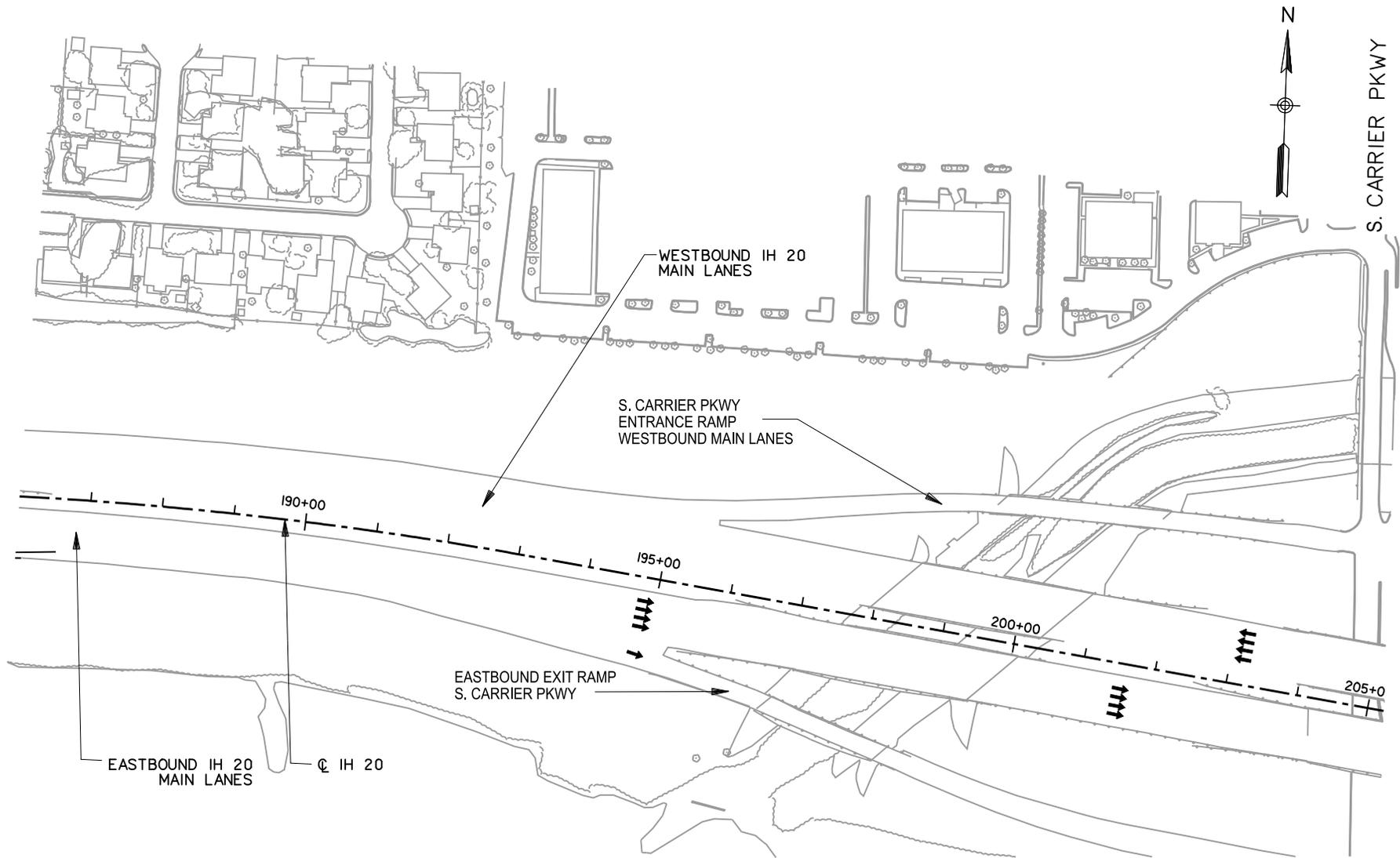
LEGEND			
	Existing Roadway		Proposed Roadway (Ramps & Direct Connectors)
	Proposed Roadway (Main Lanes & Frontage Roads)		Electronic Toll Collection (ETC) Gantry
	Proposed Bridge		Proposed Retaining Wall
			Traffic Arrow
NOTE: Initial Construction Only			

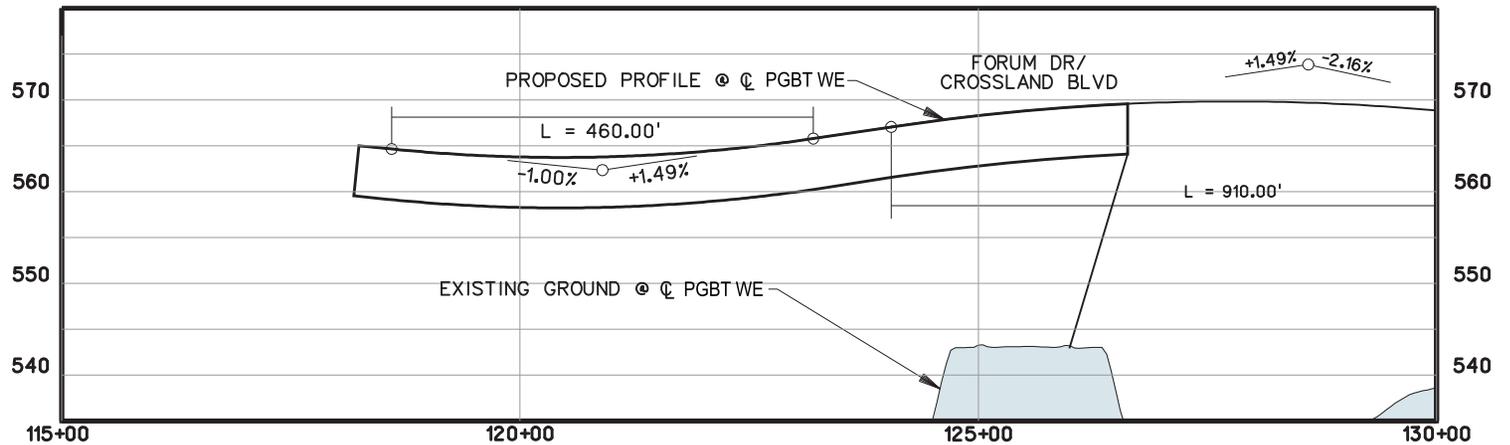
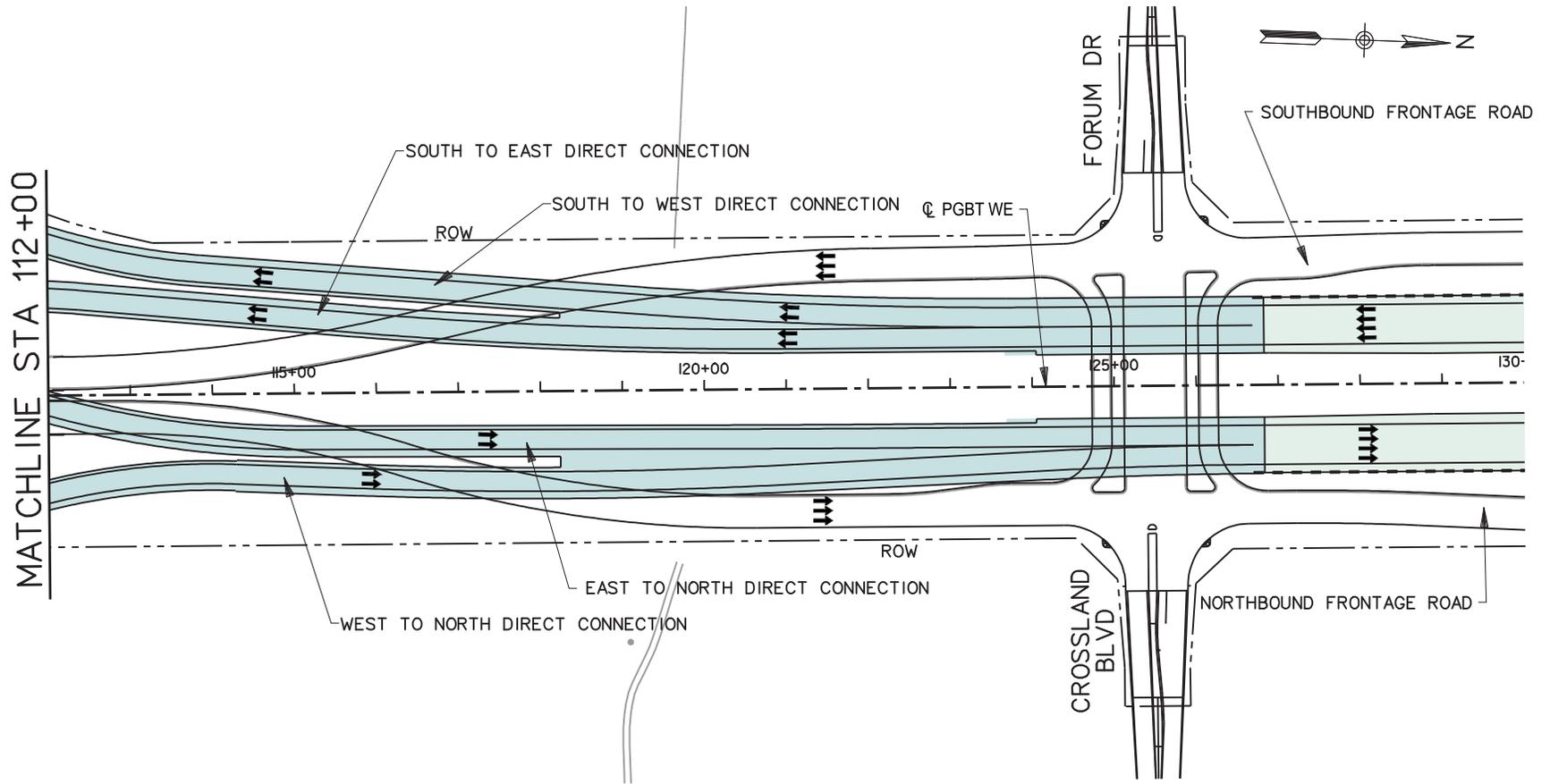


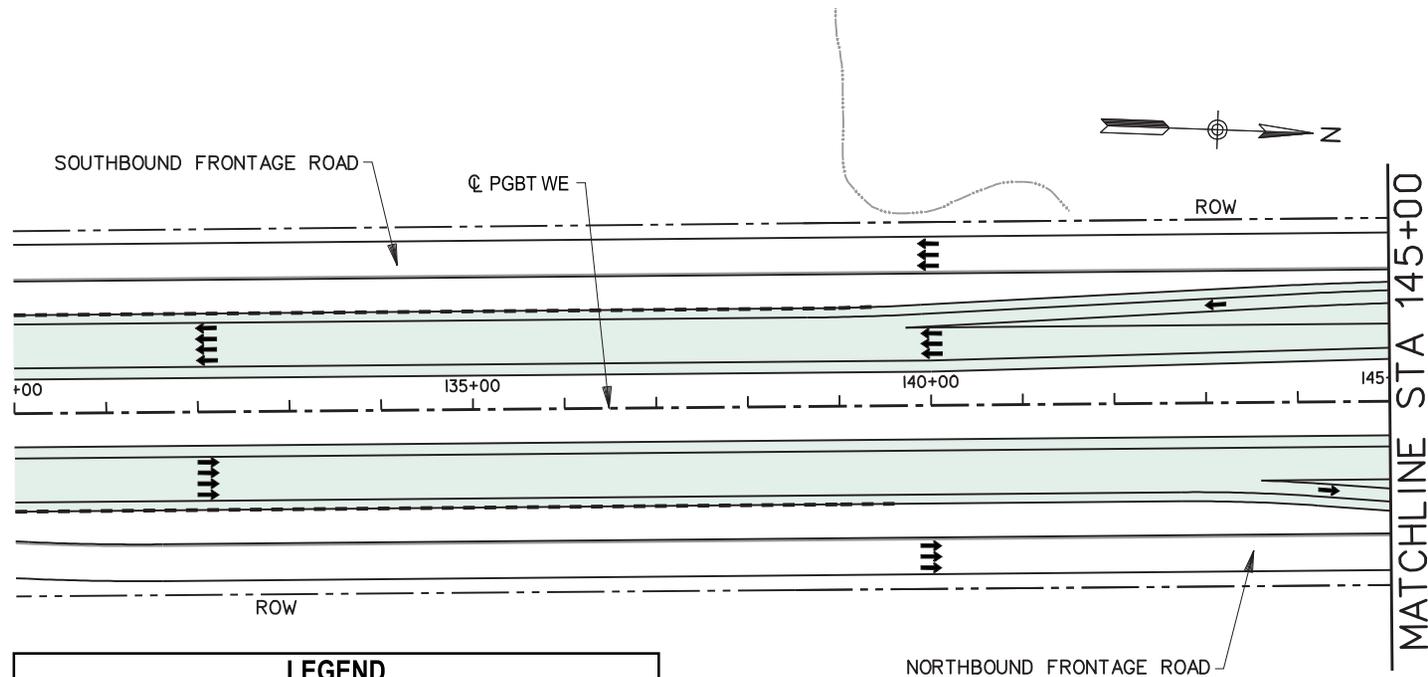




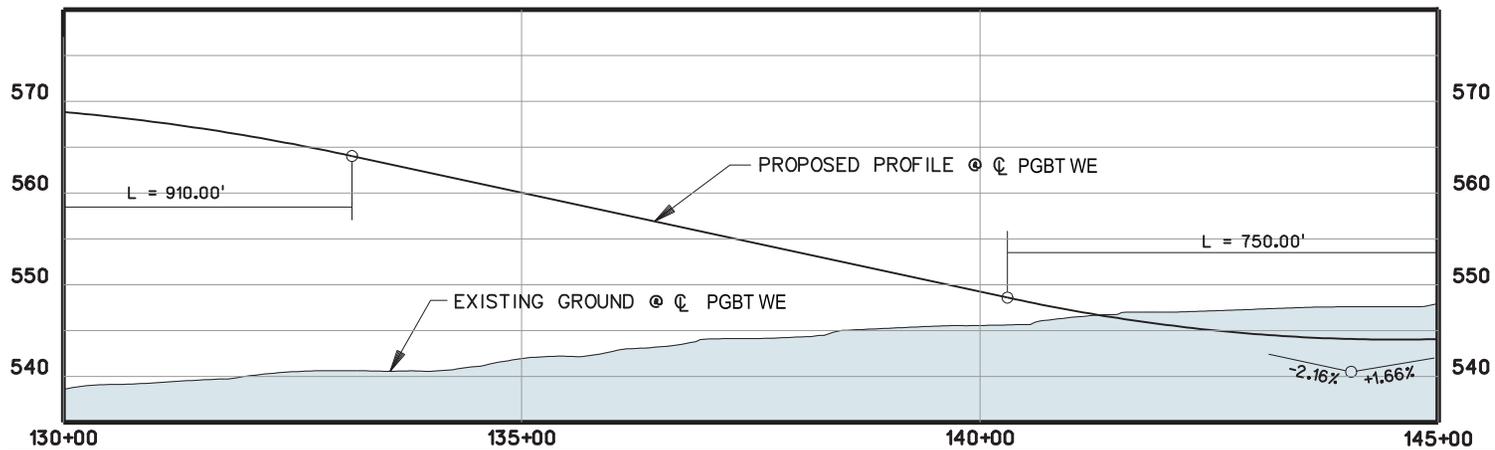
LEGEND			
	Existing Roadway		Proposed Roadway (Ramps & Direct Connectors)
	Proposed Roadway (Main Lanes & Frontage Roads)		Electronic Toll Collection (ETC) Gantry
	Proposed Bridge		Proposed Retaining Wall
			Traffic Arrow
NOTE: Initial Construction Only			

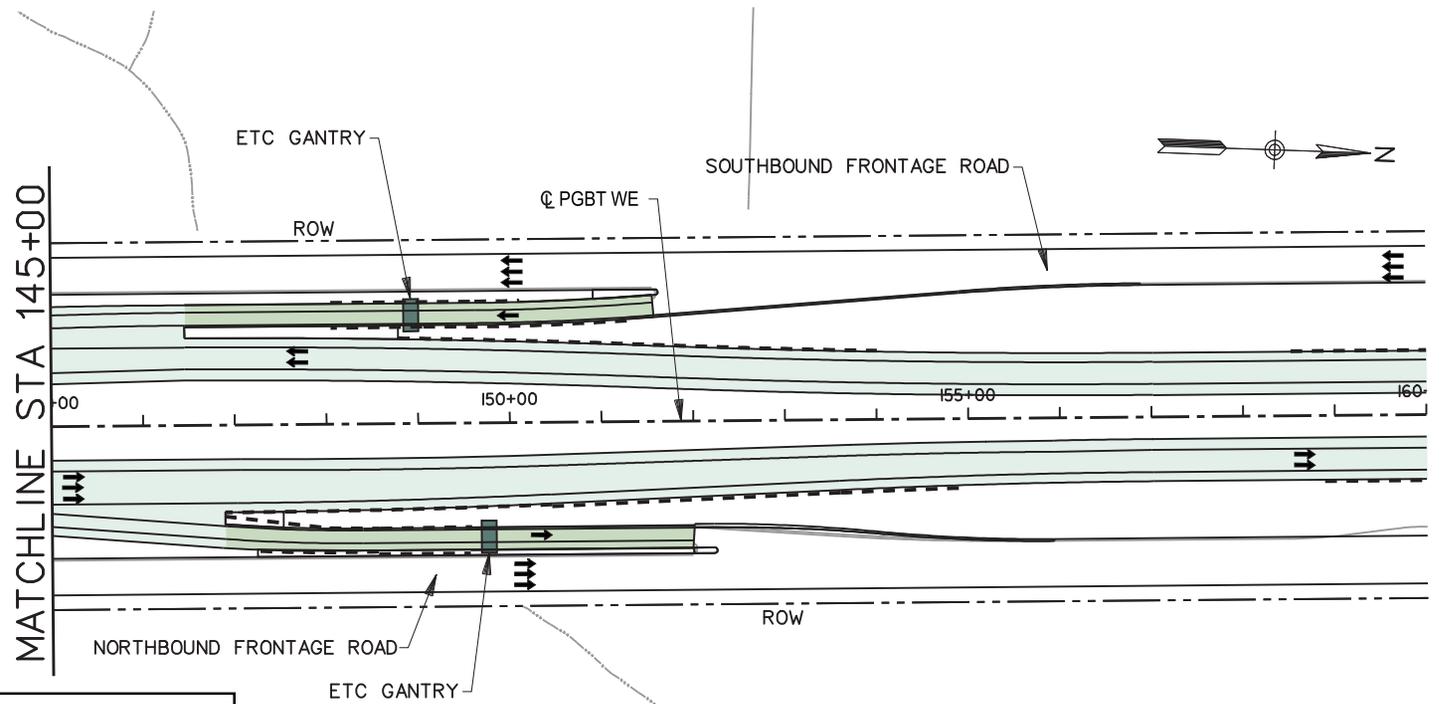




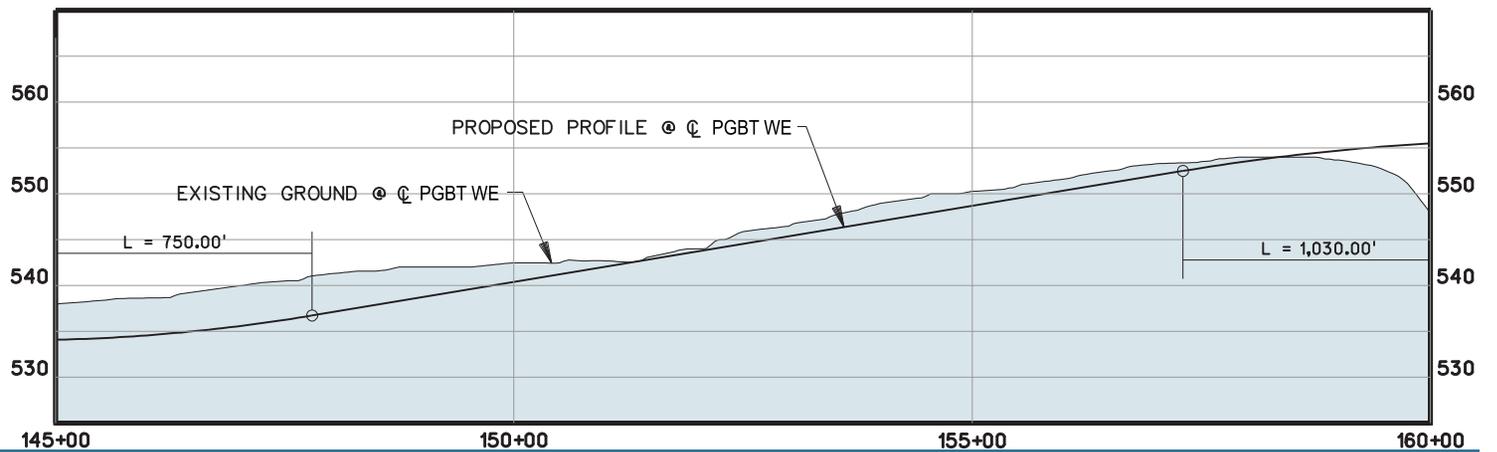


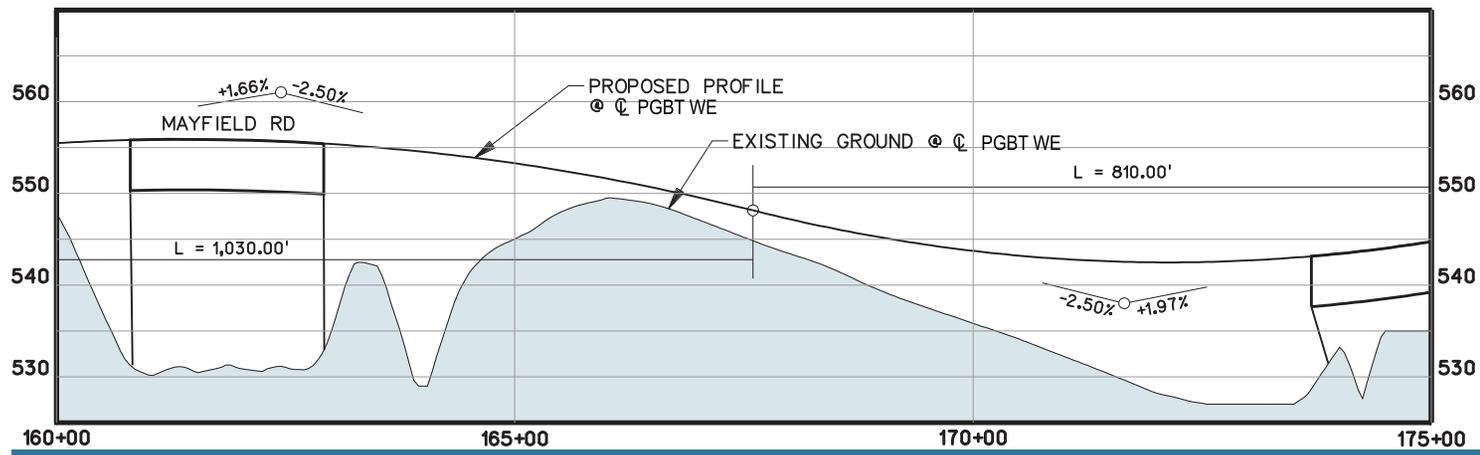
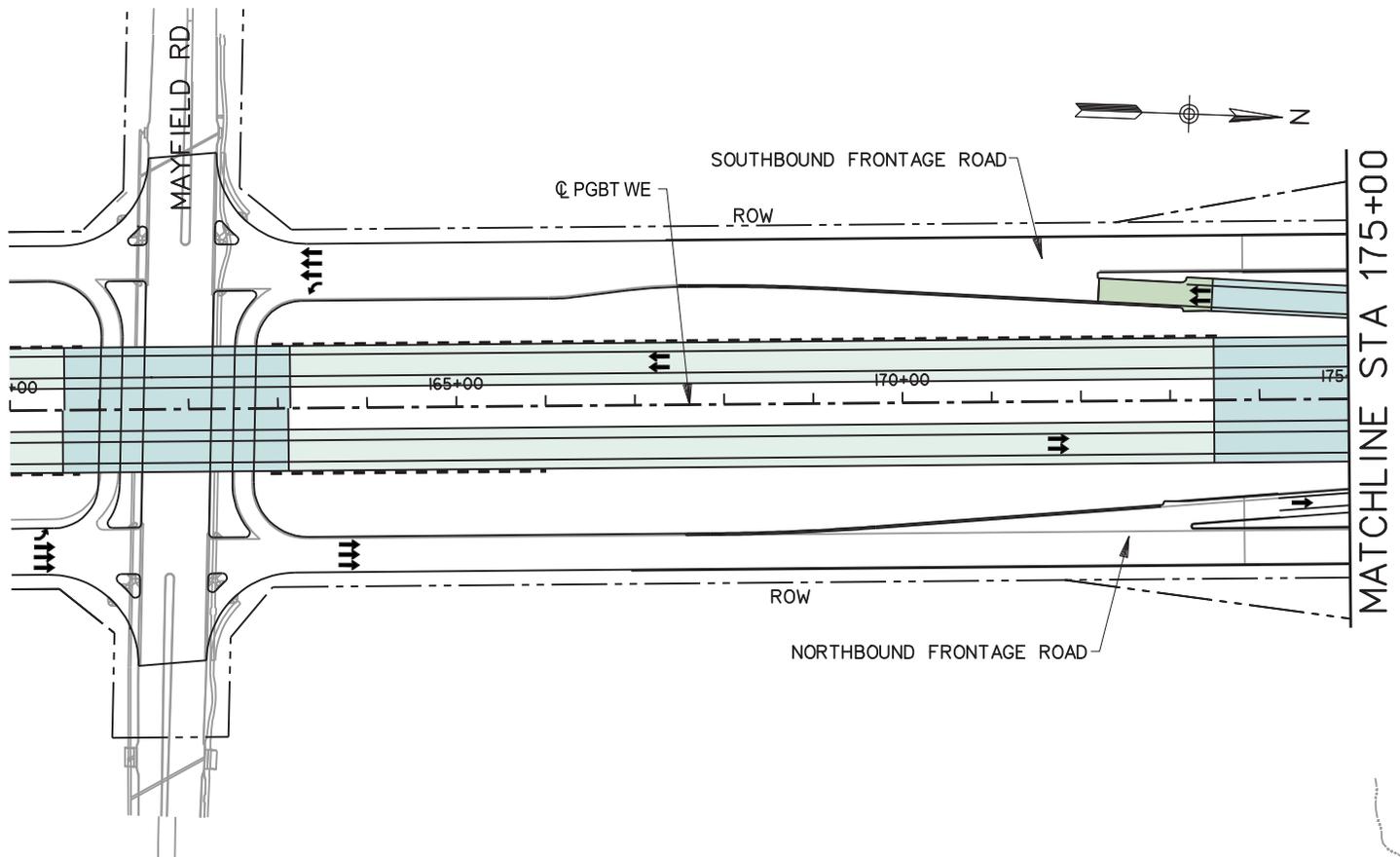
LEGEND			
	Existing Roadway		Proposed Retaining Wall
	Proposed Roadway (Main Lanes & Frontage Roads)		Traffic Arrow
	Proposed Bridge	NOTE: Initial Construction Only	
	Proposed Roadway (Ramps & Direct Connectors)		Electronic Toll Collection (ETC) Gantry

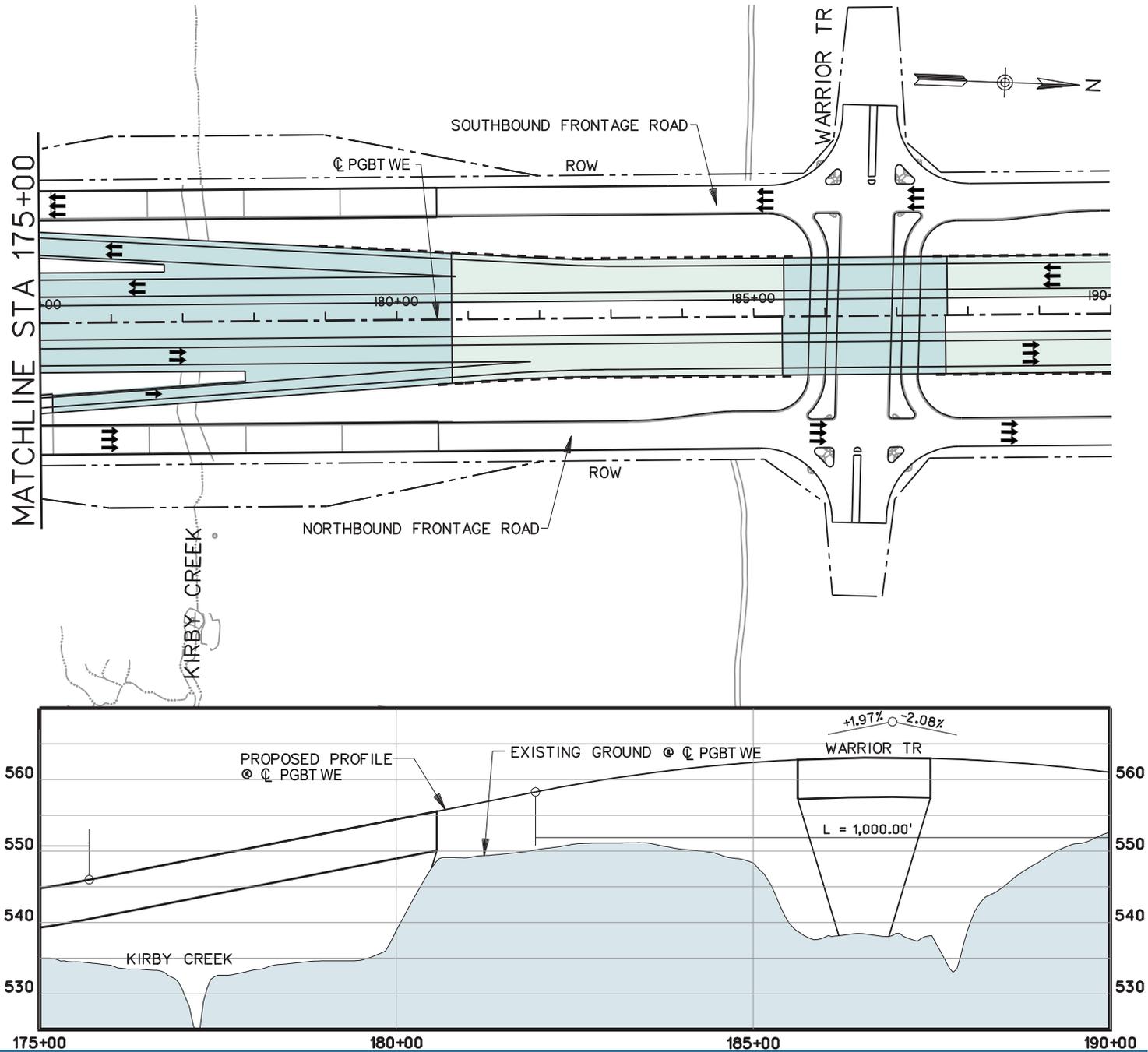


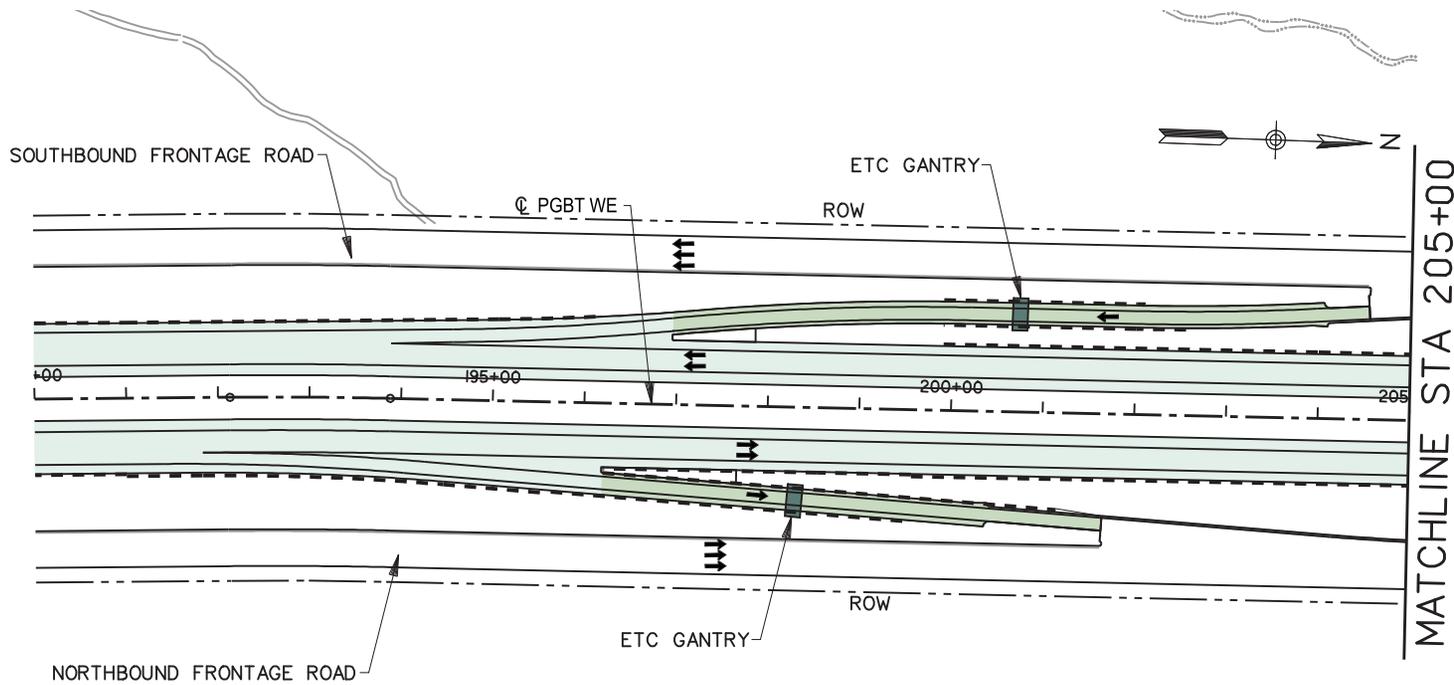


LEGEND			
	Existing Roadway		Proposed Roadway (Ramps & Direct Connectors)
	Proposed Roadway (Main Lanes & Frontage Roads)		Electronic Toll Collection (ETC) Gantry
	Proposed Bridge		Proposed Retaining Wall
			Traffic Arrow
			NOTE: Initial Construction Only

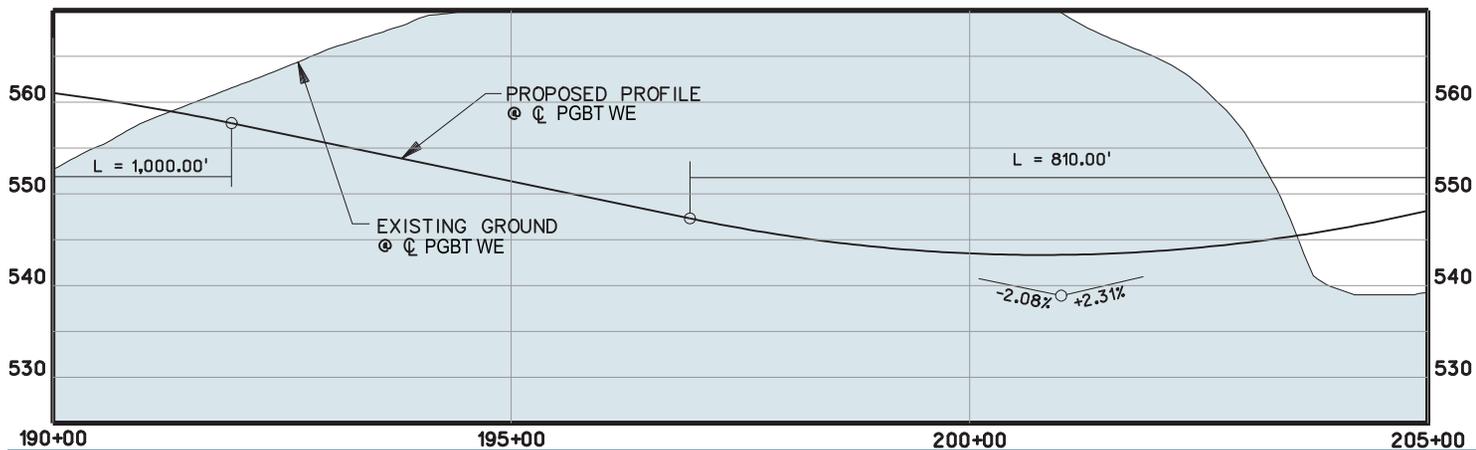


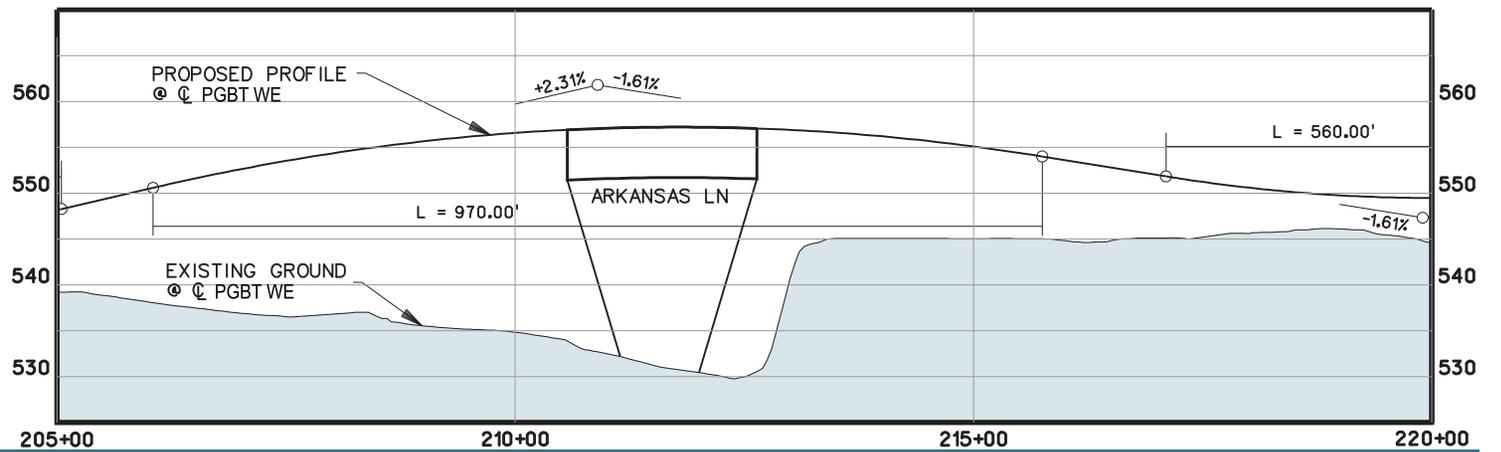
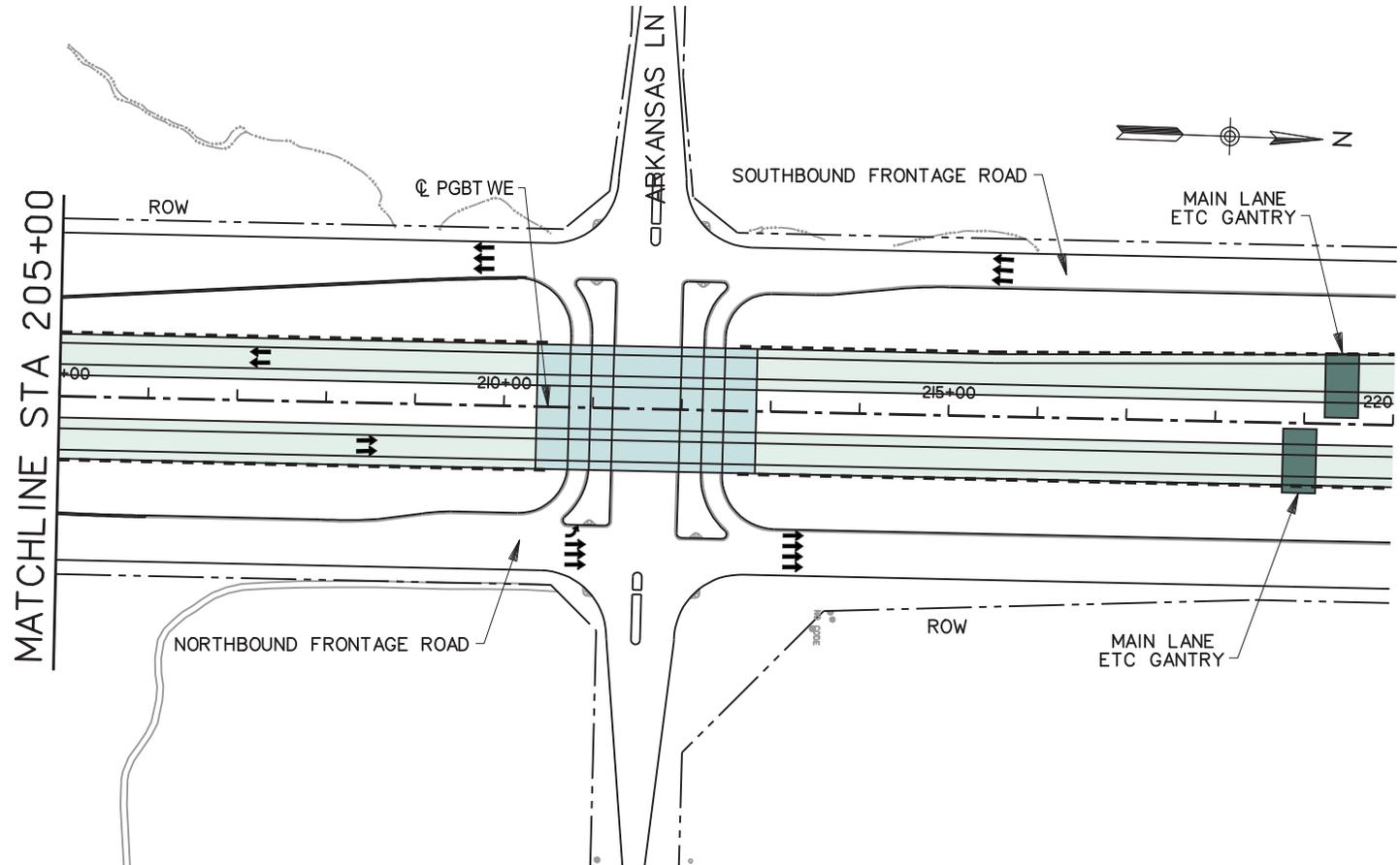


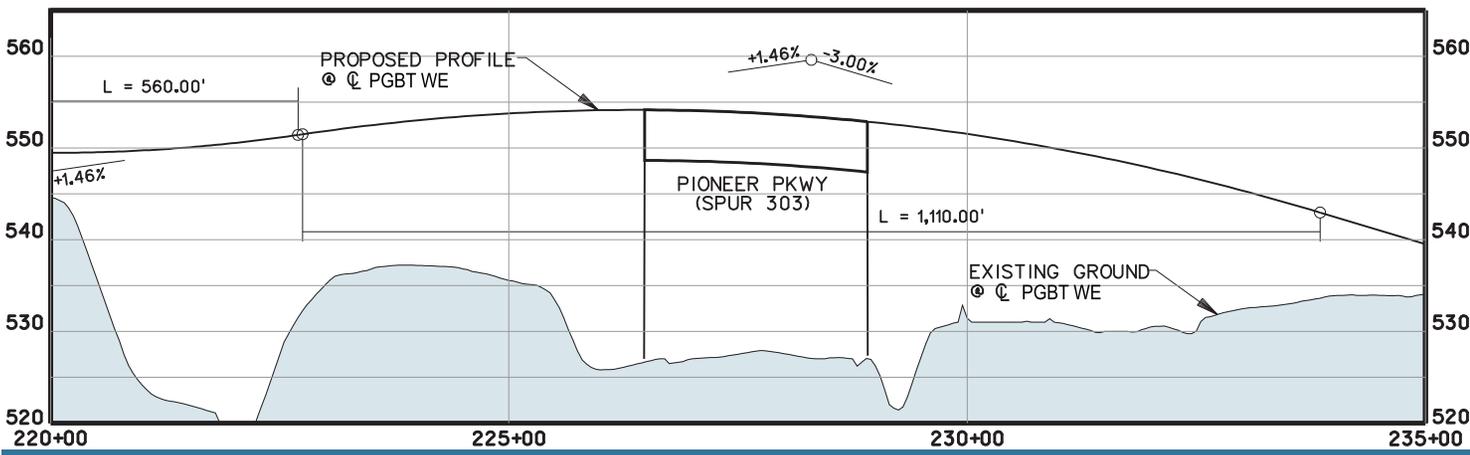
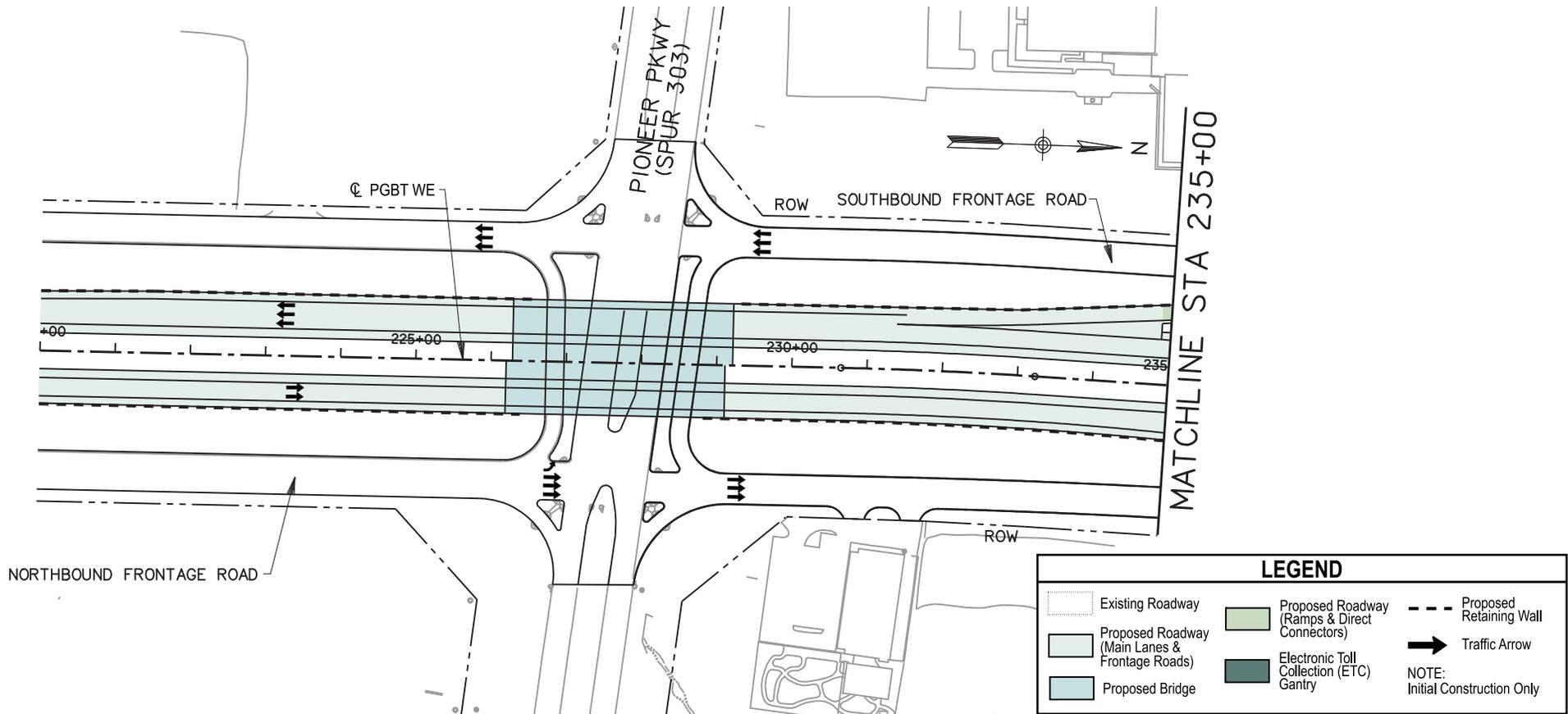


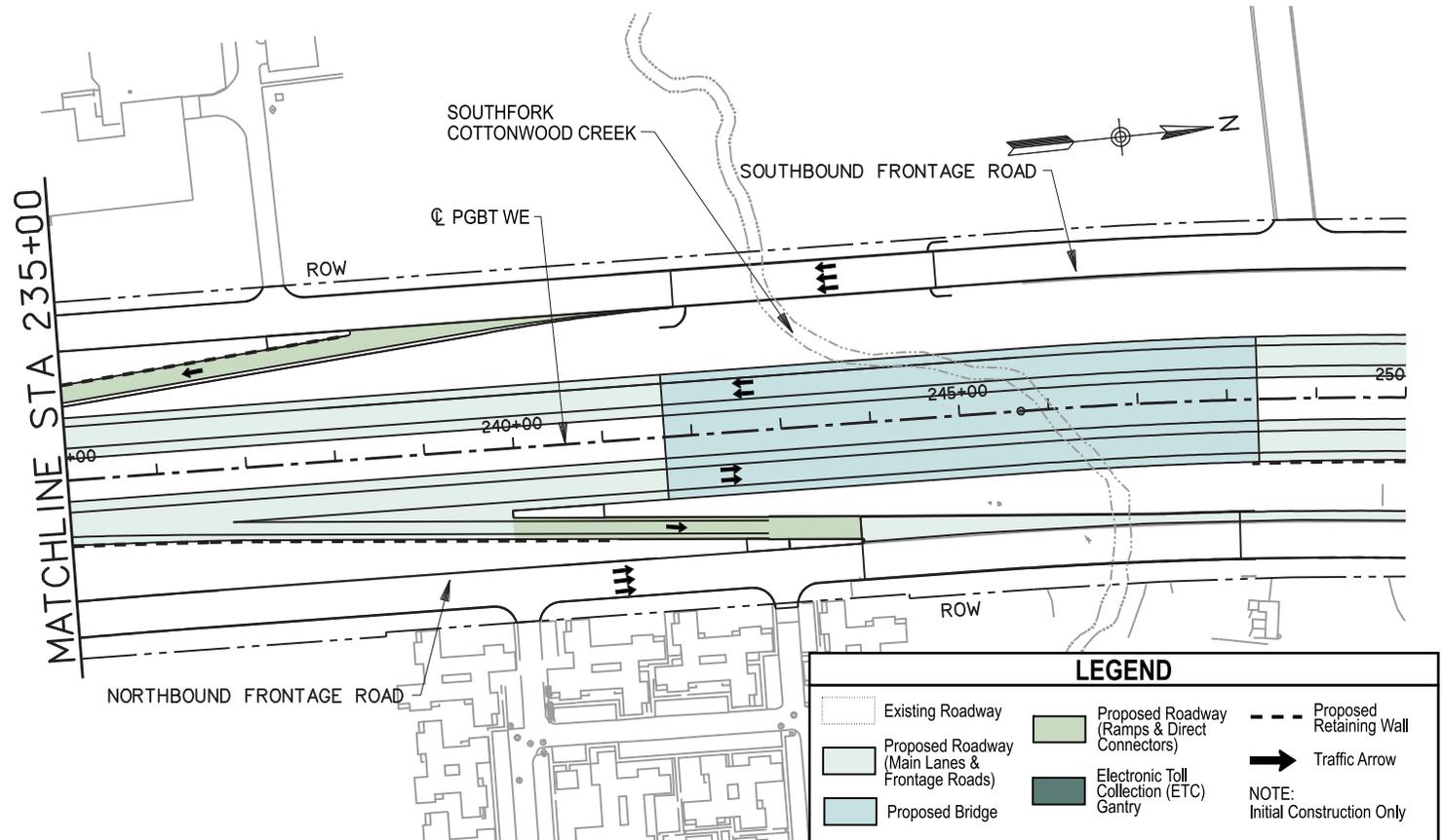


LEGEND			
	Existing Roadway		Proposed Roadway (Ramps & Direct Connectors)
	Proposed Roadway (Main Lanes & Frontage Roads)		Electronic Toll Collection (ETC) Gantry
	Proposed Bridge		Proposed Retaining Wall
			Traffic Arrow
			NOTE: Initial Construction Only

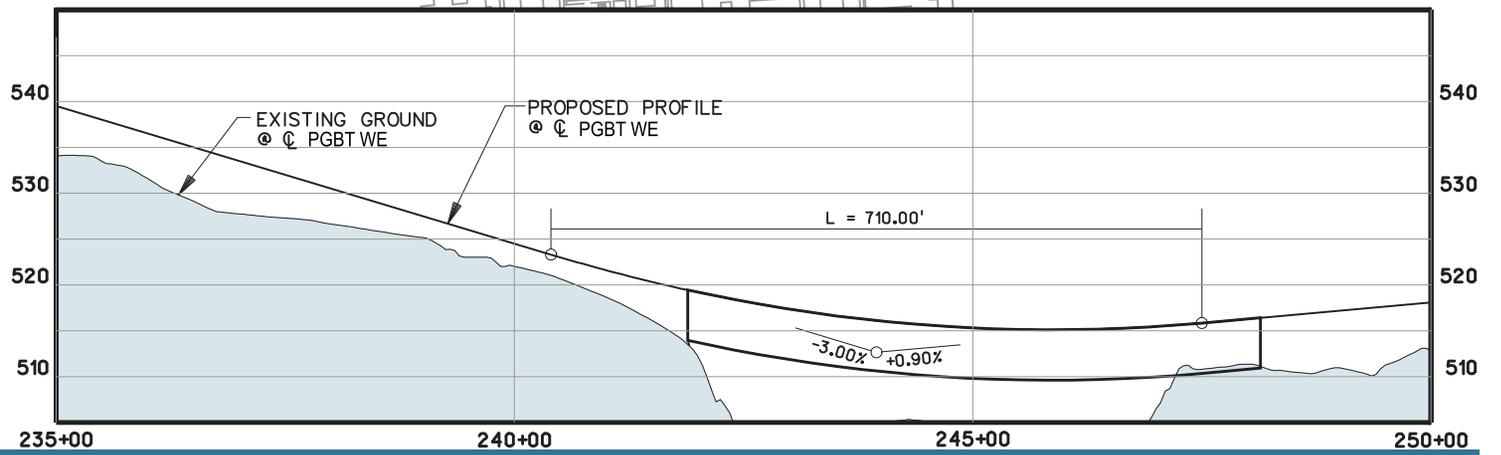


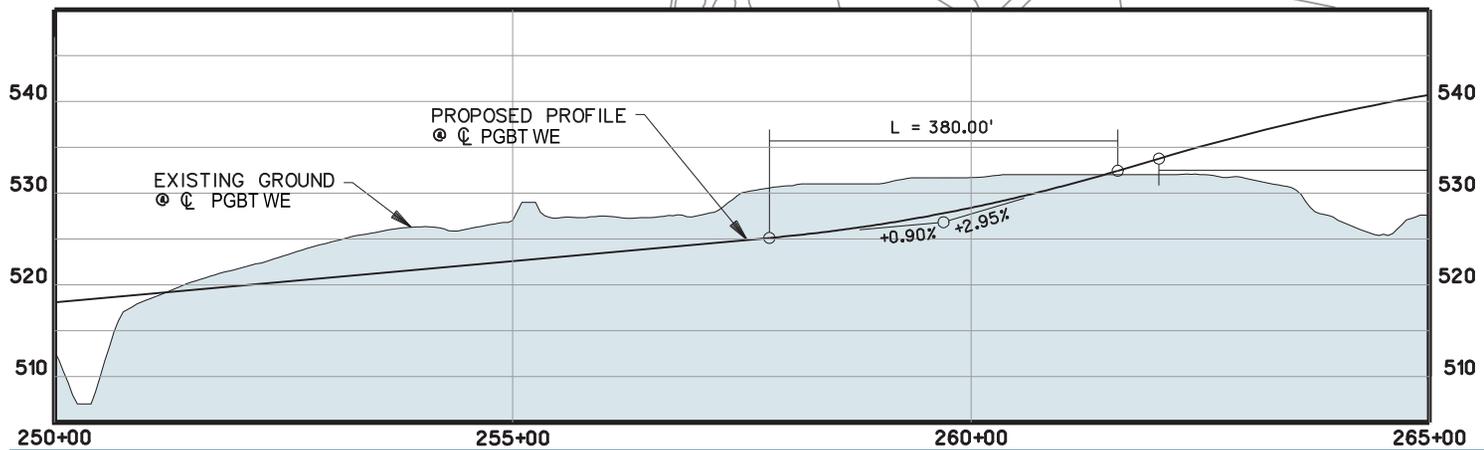
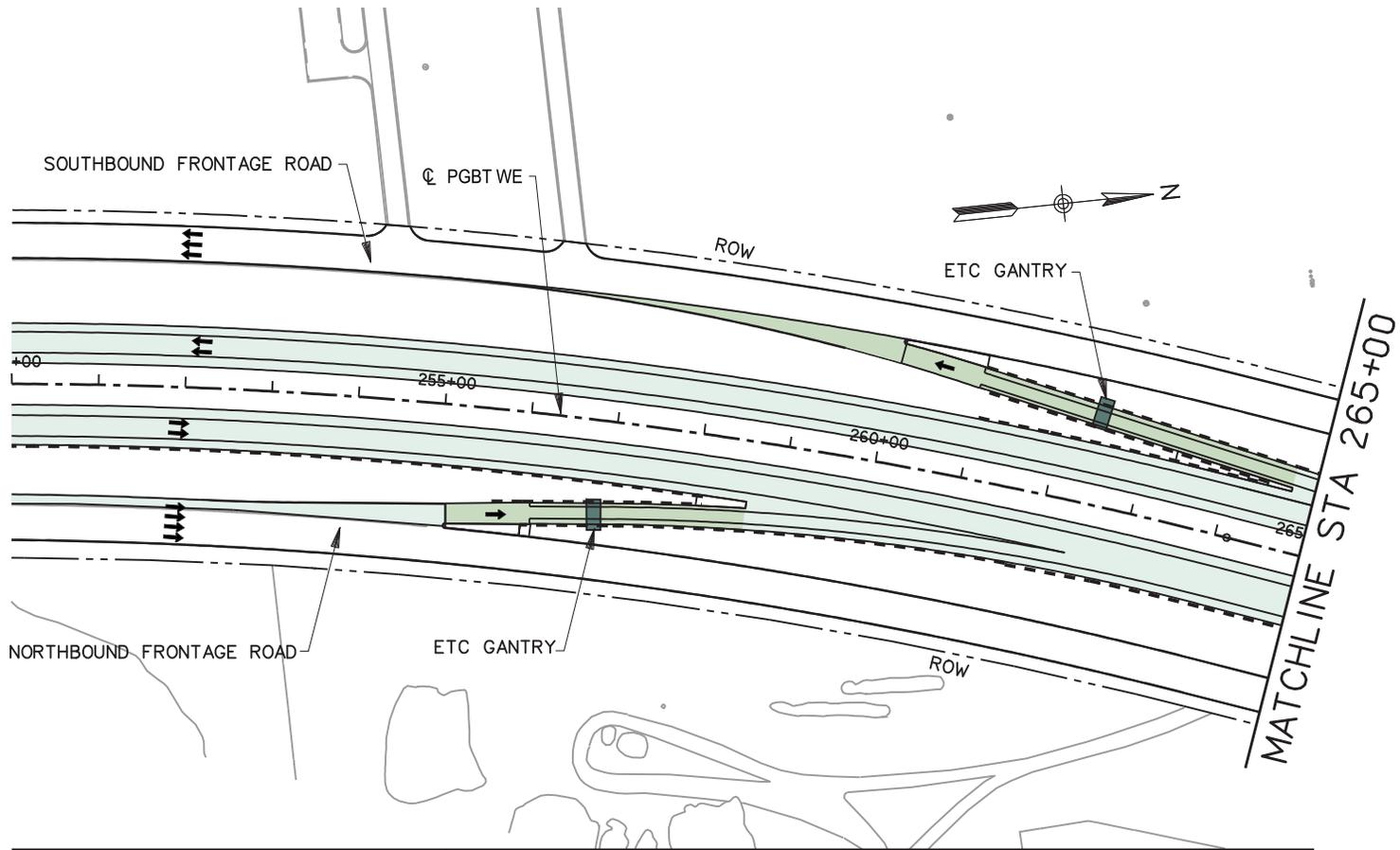


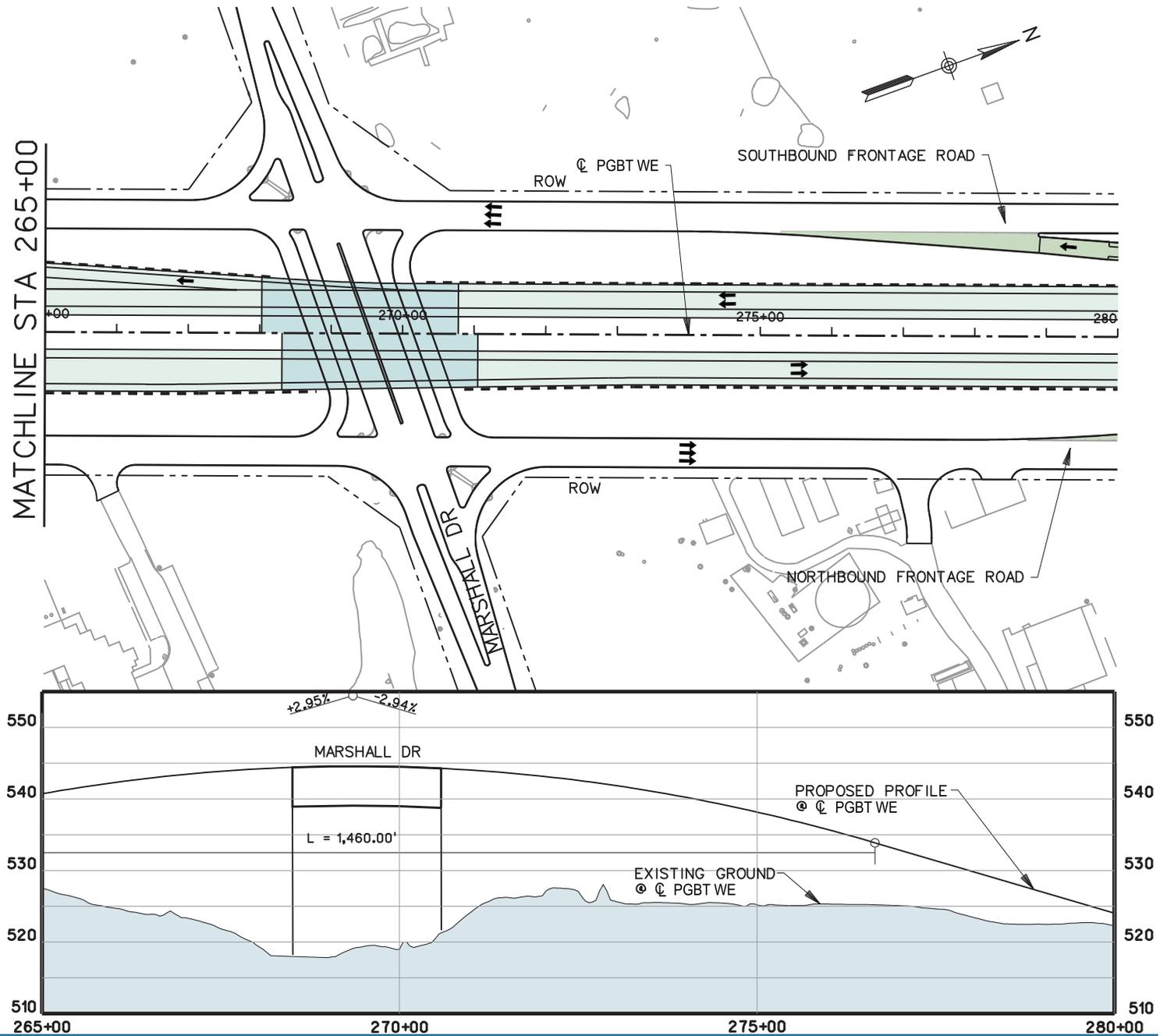


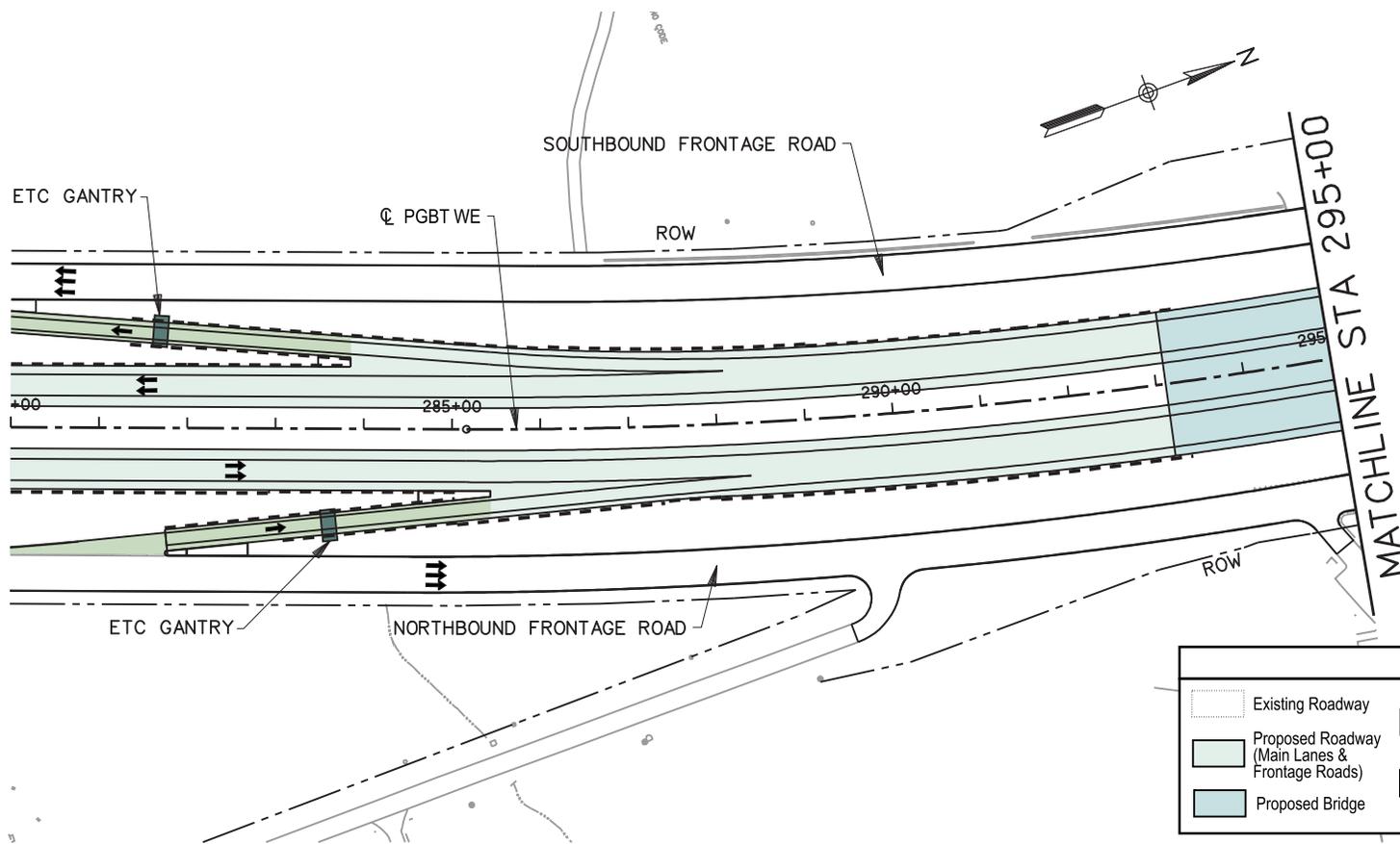


LEGEND			
	Existing Roadway		Proposed Retaining Wall
	Proposed Roadway (Main Lanes & Frontage Roads)		Electronic Toll Collection (ETC) Gantry
	Proposed Bridge		Traffic Arrow
			NOTE: Initial Construction Only

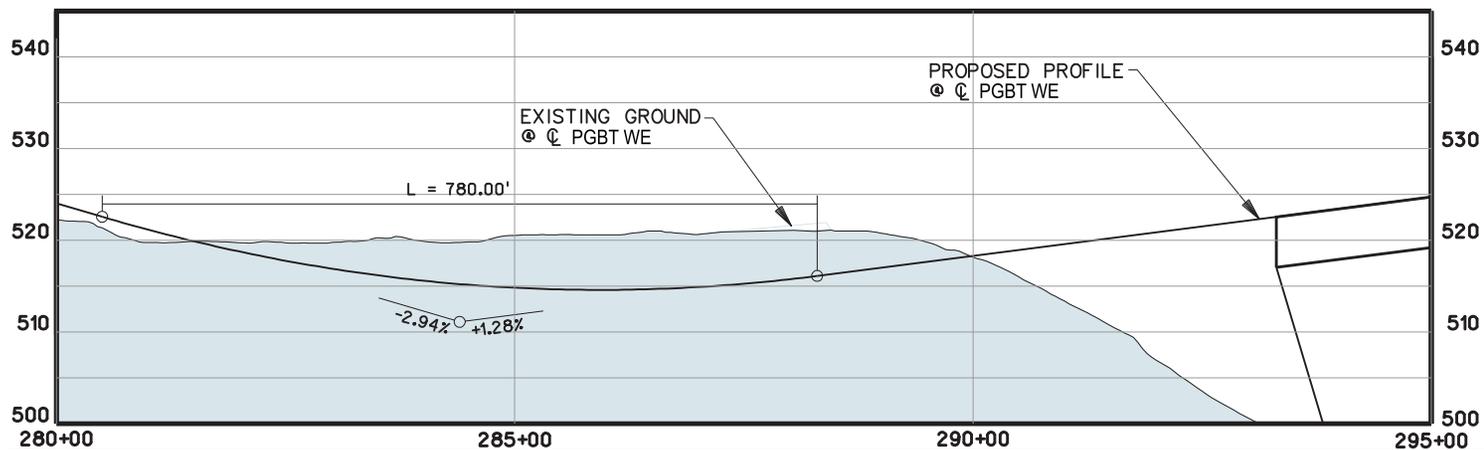


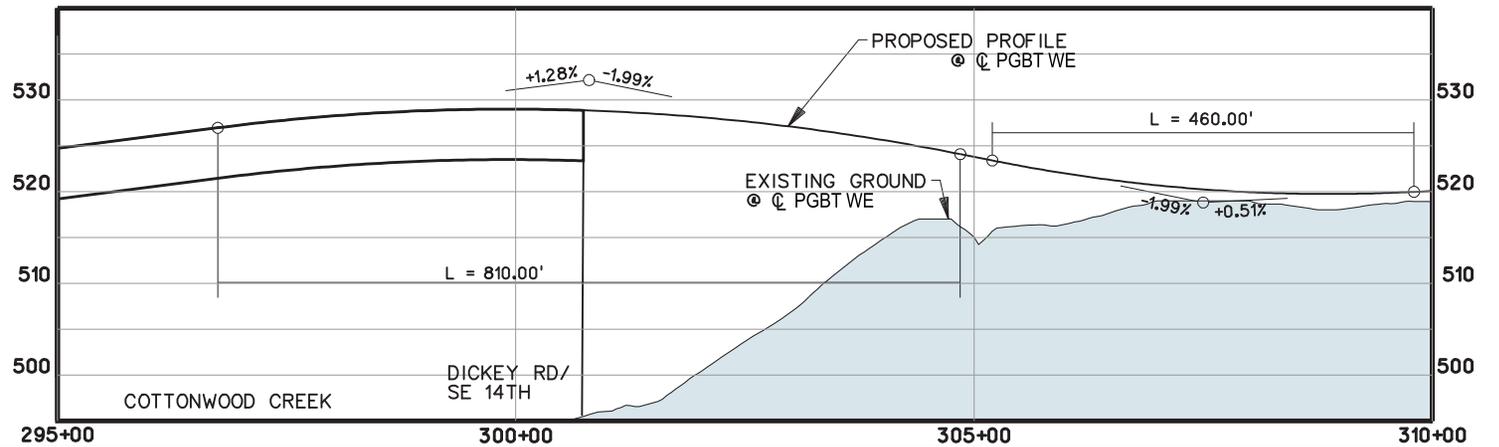
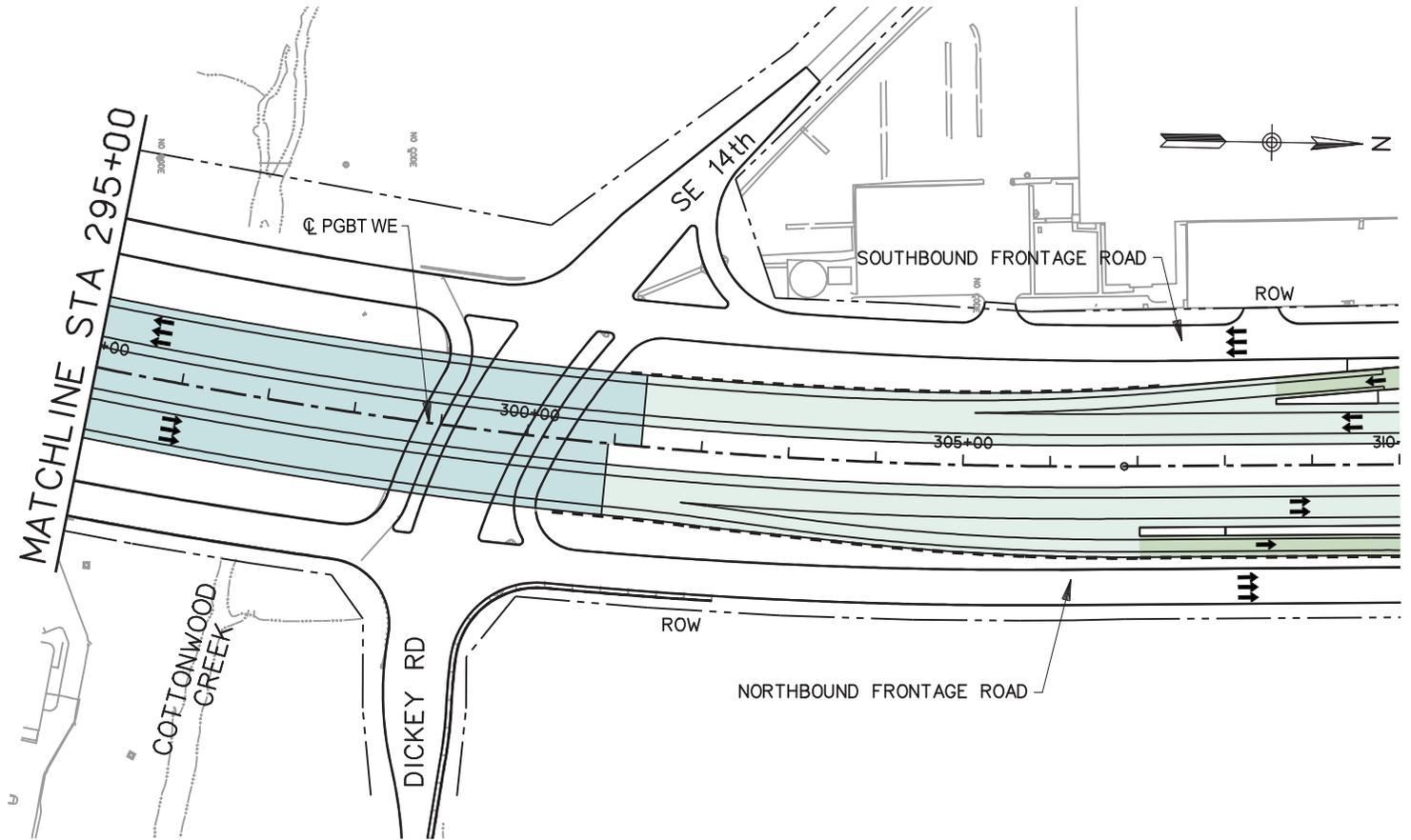


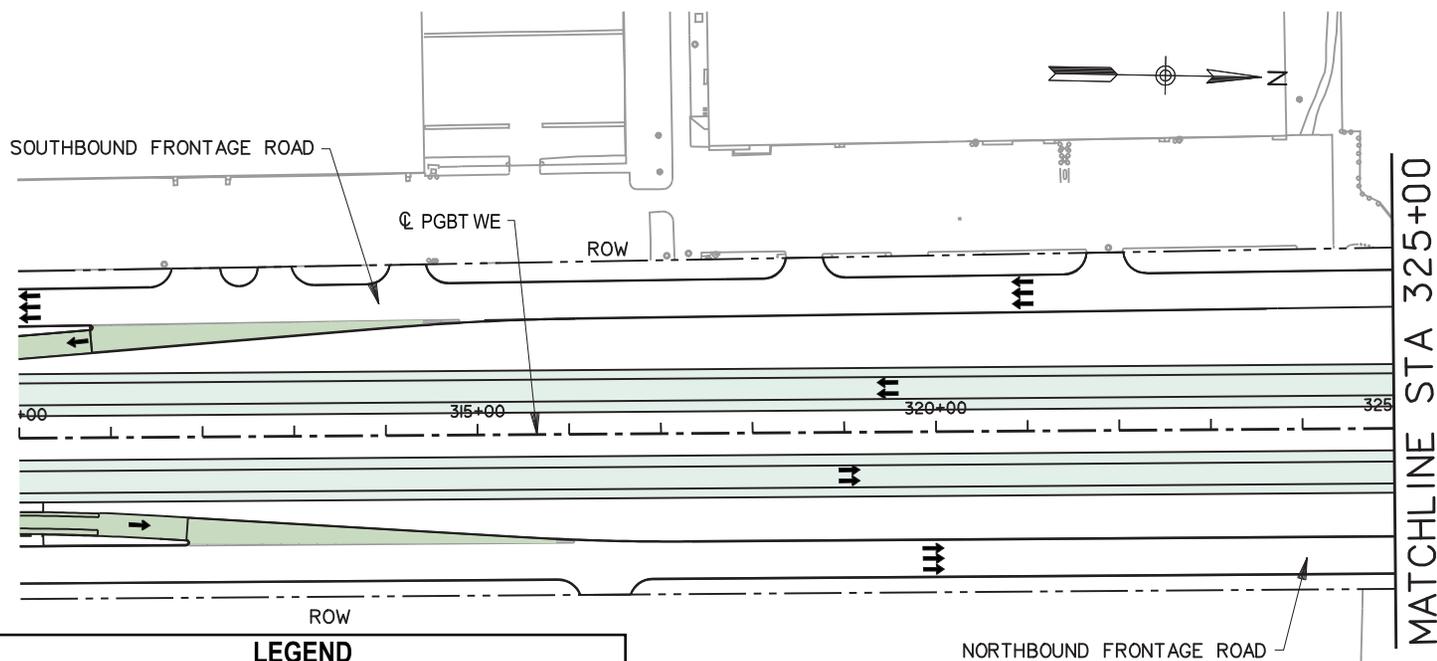




LEGEND			
	Existing Roadway		Proposed Retaining Wall
	Proposed Roadway (Main Lanes & Frontage Roads)		Electronic Toll Collection (ETC) Gantry
	Proposed Bridge		Traffic Arrow
			NOTE: Initial Construction Only

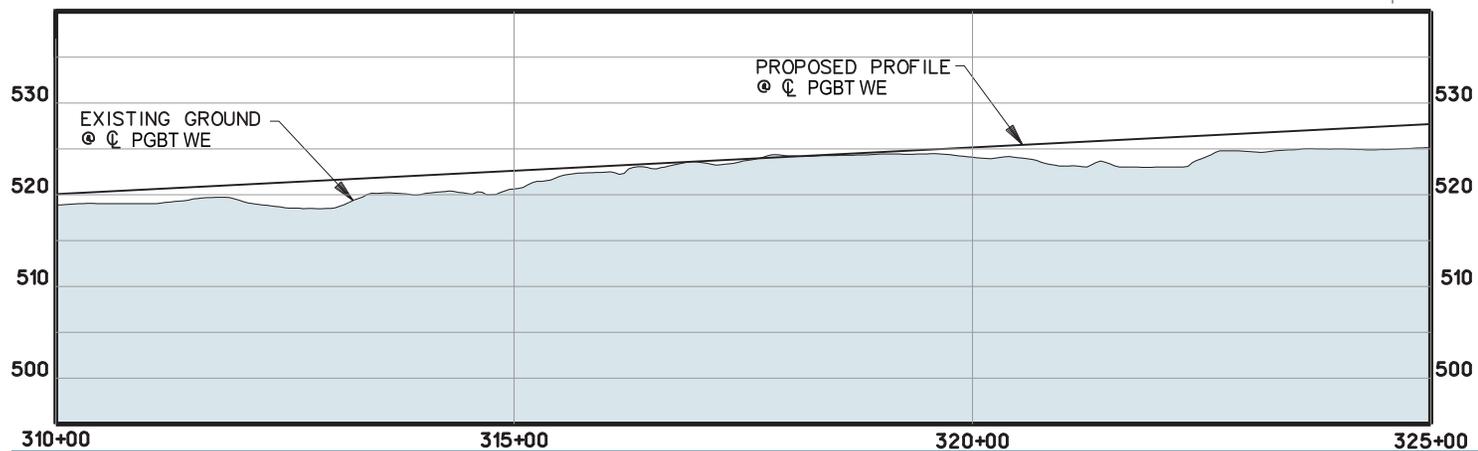


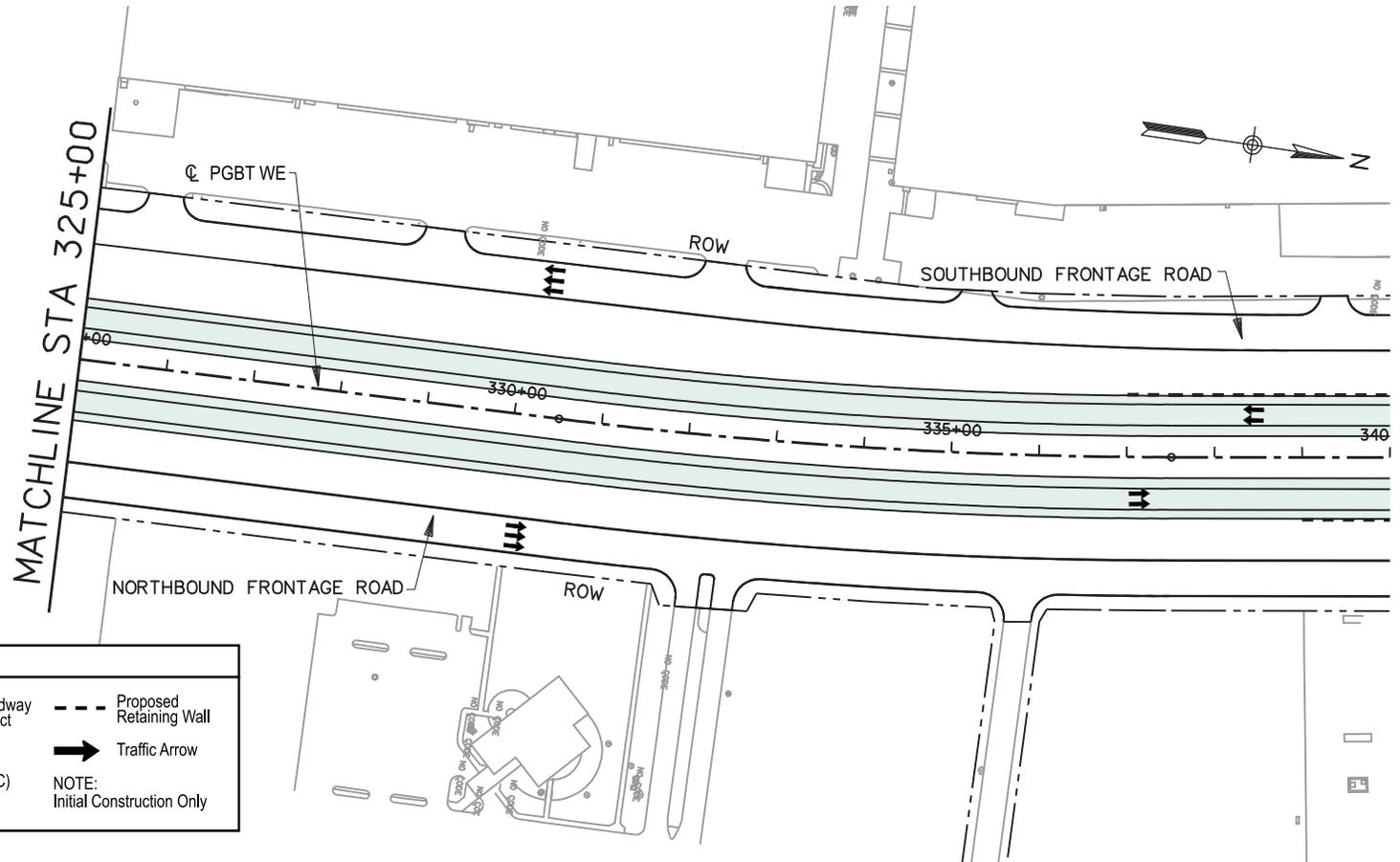




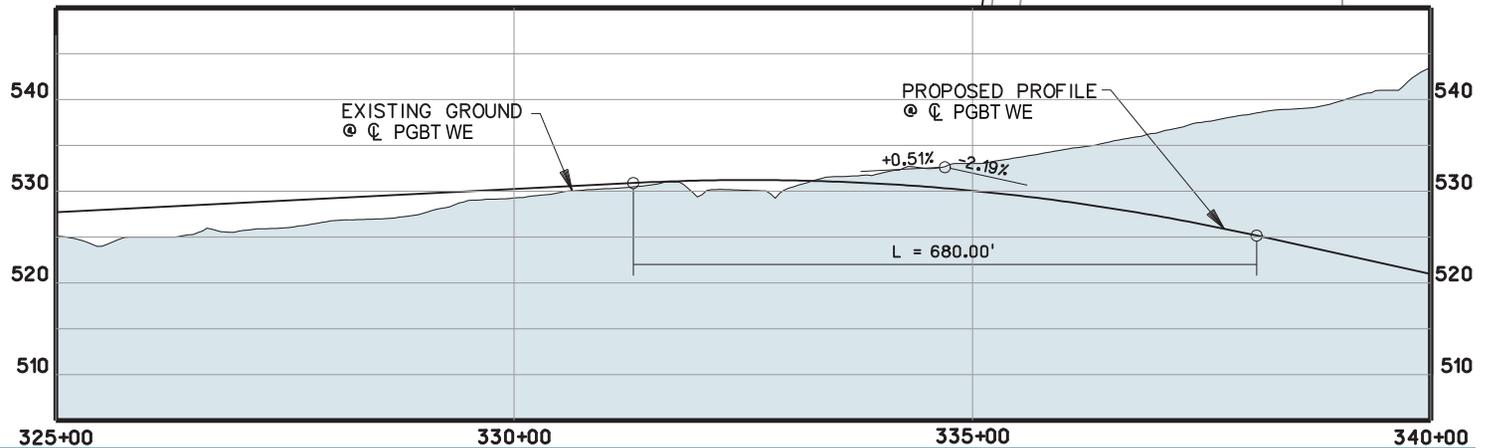
LEGEND

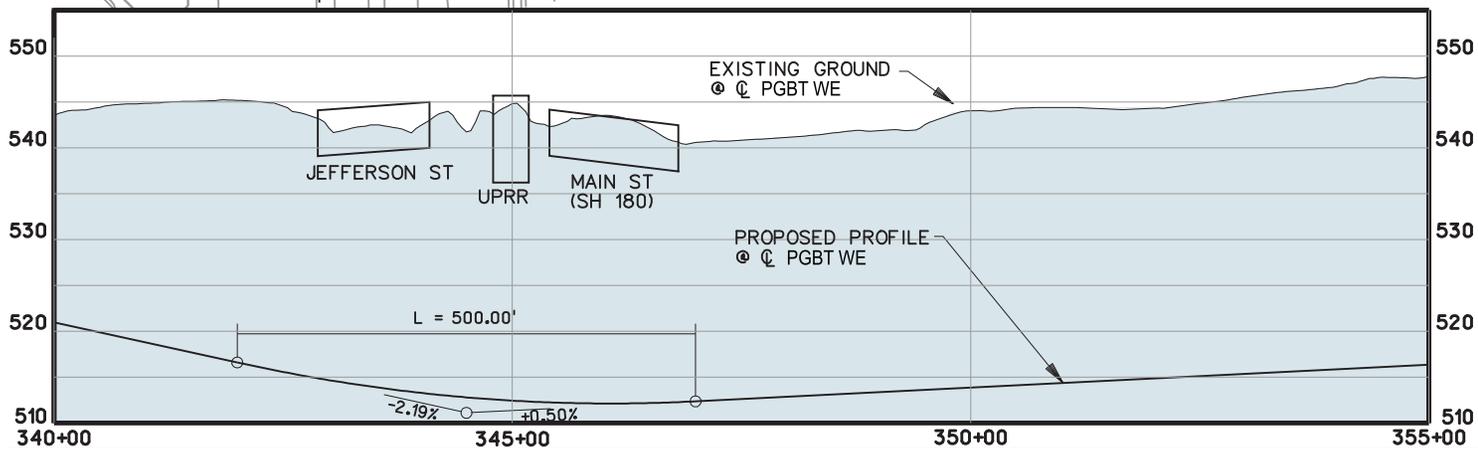
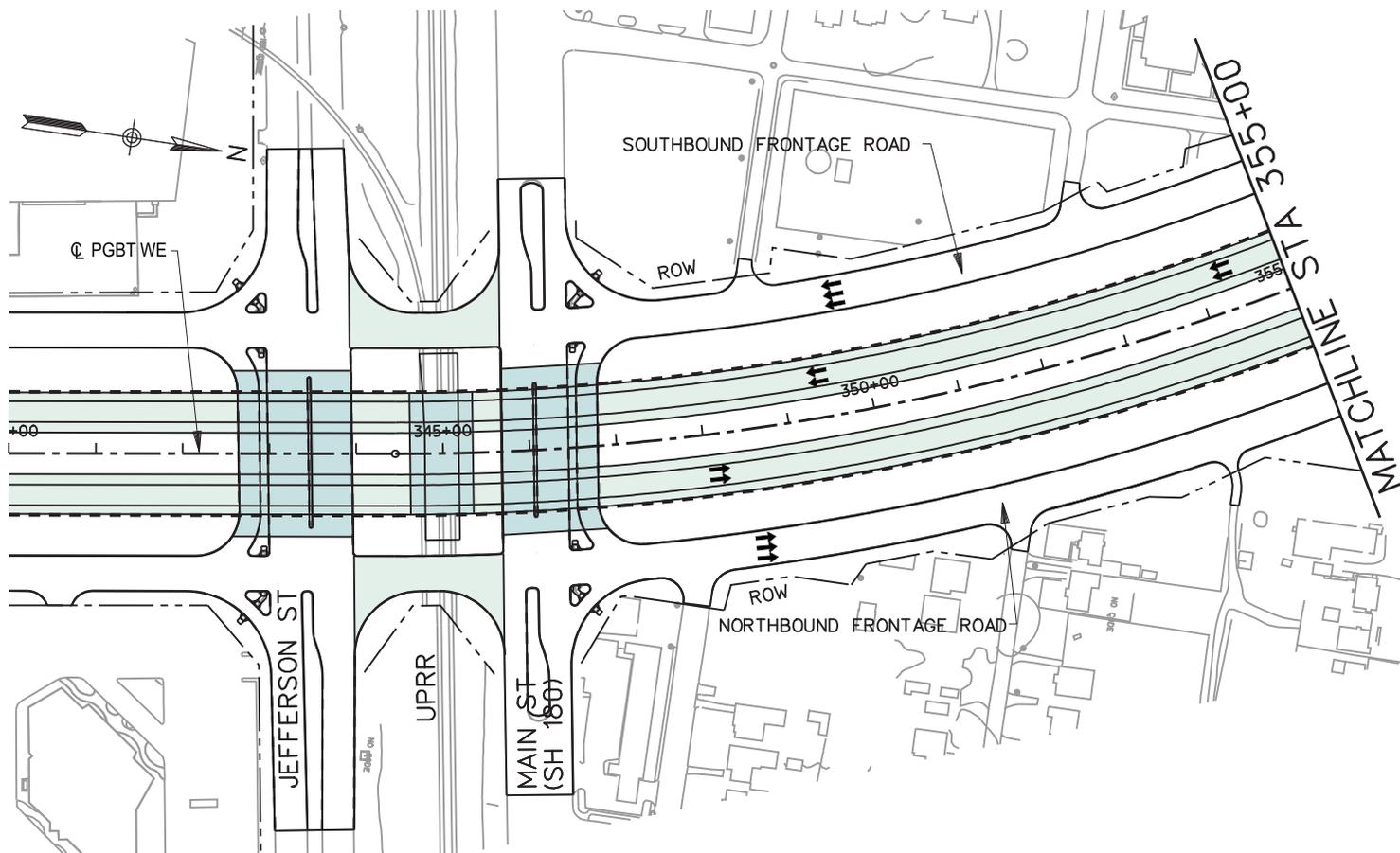
	Existing Roadway		Proposed Roadway (Ramps & Direct Connectors)		Proposed Retaining Wall
	Proposed Roadway (Main Lanes & Frontage Roads)		Electronic Toll Collection (ETC) Gantry		Traffic Arrow
	Proposed Bridge				NOTE: Initial Construction Only

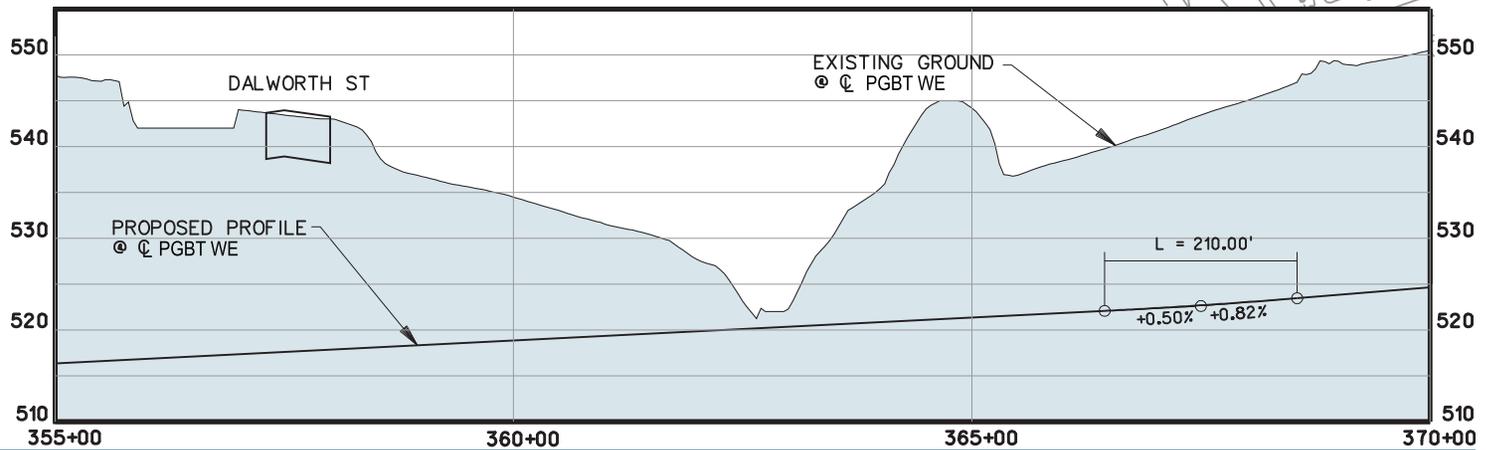
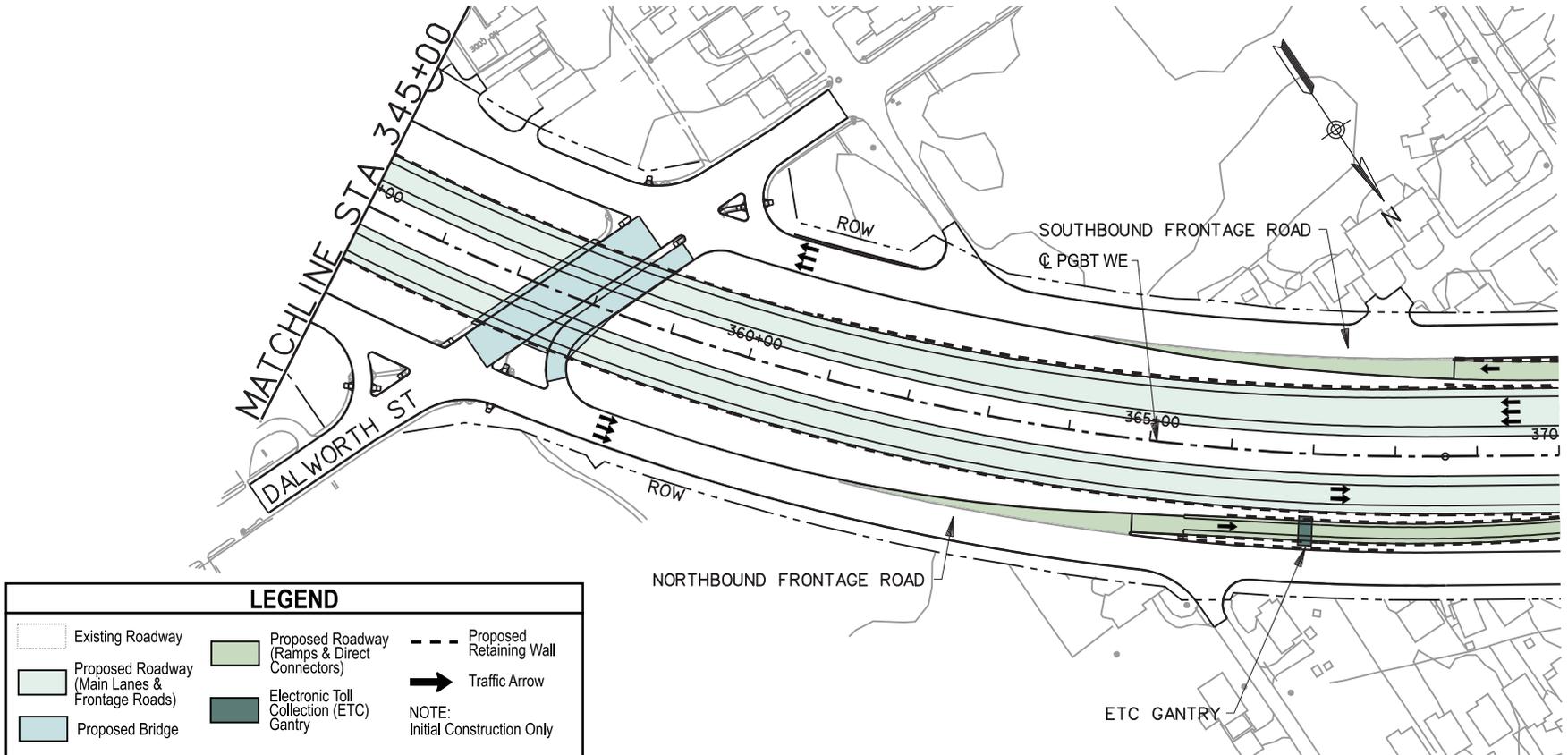


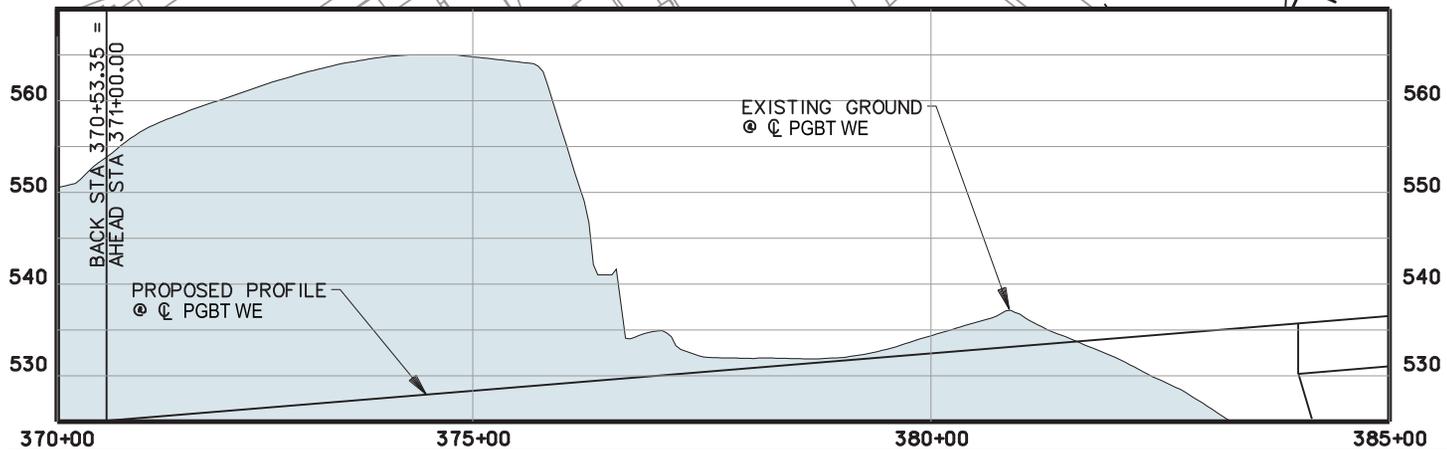
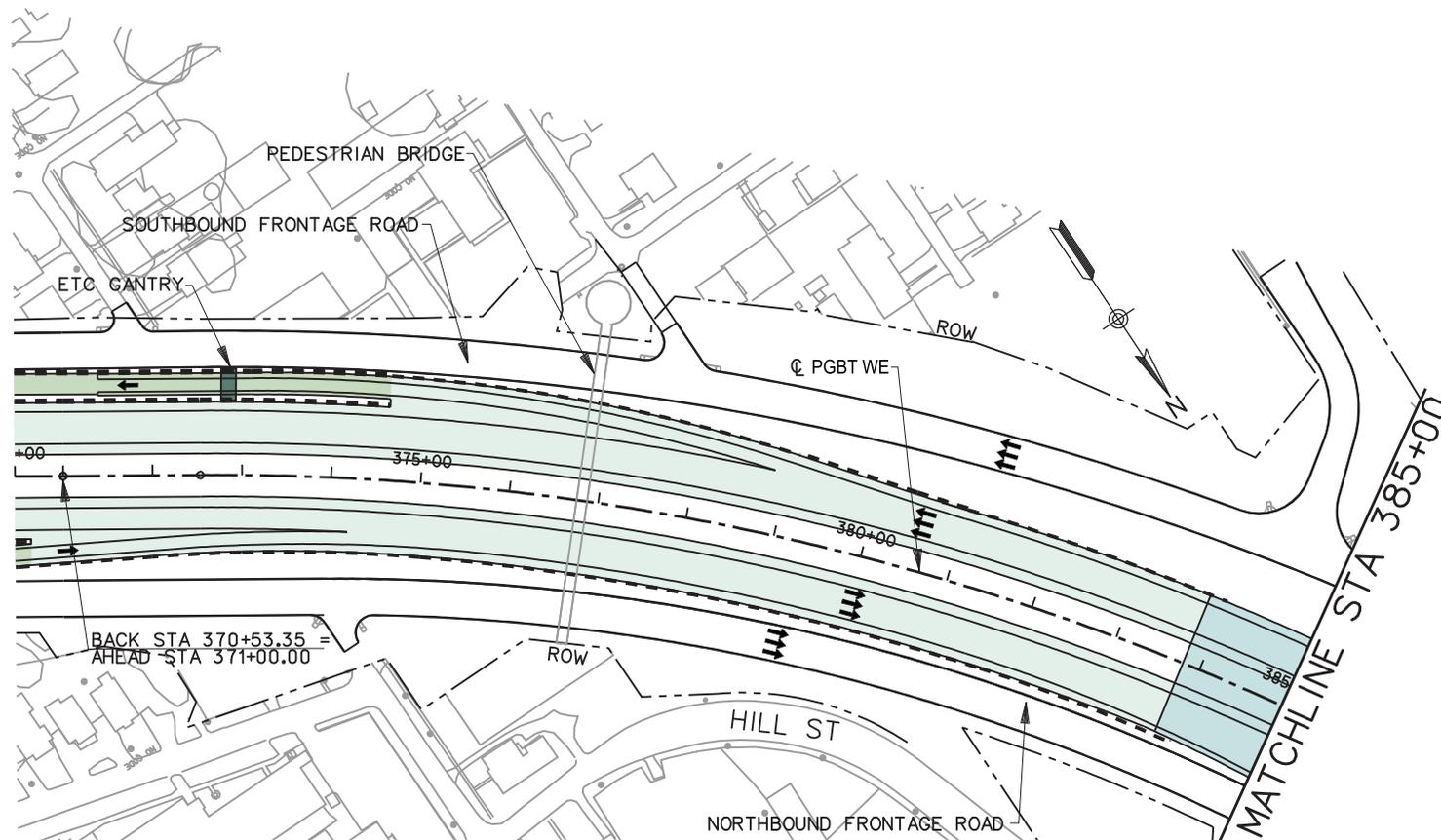


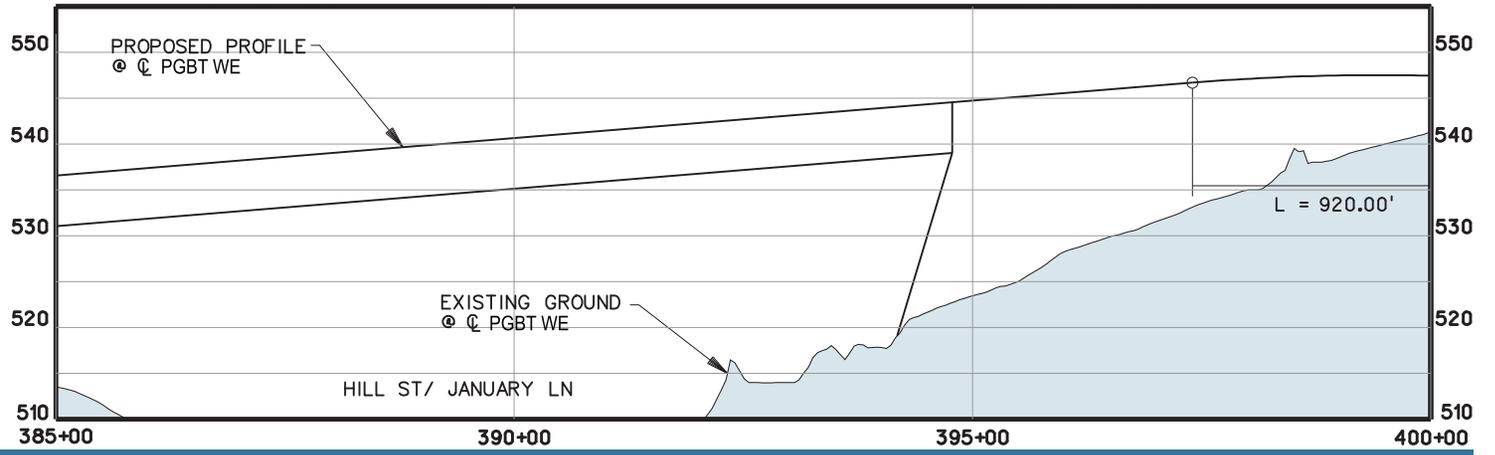
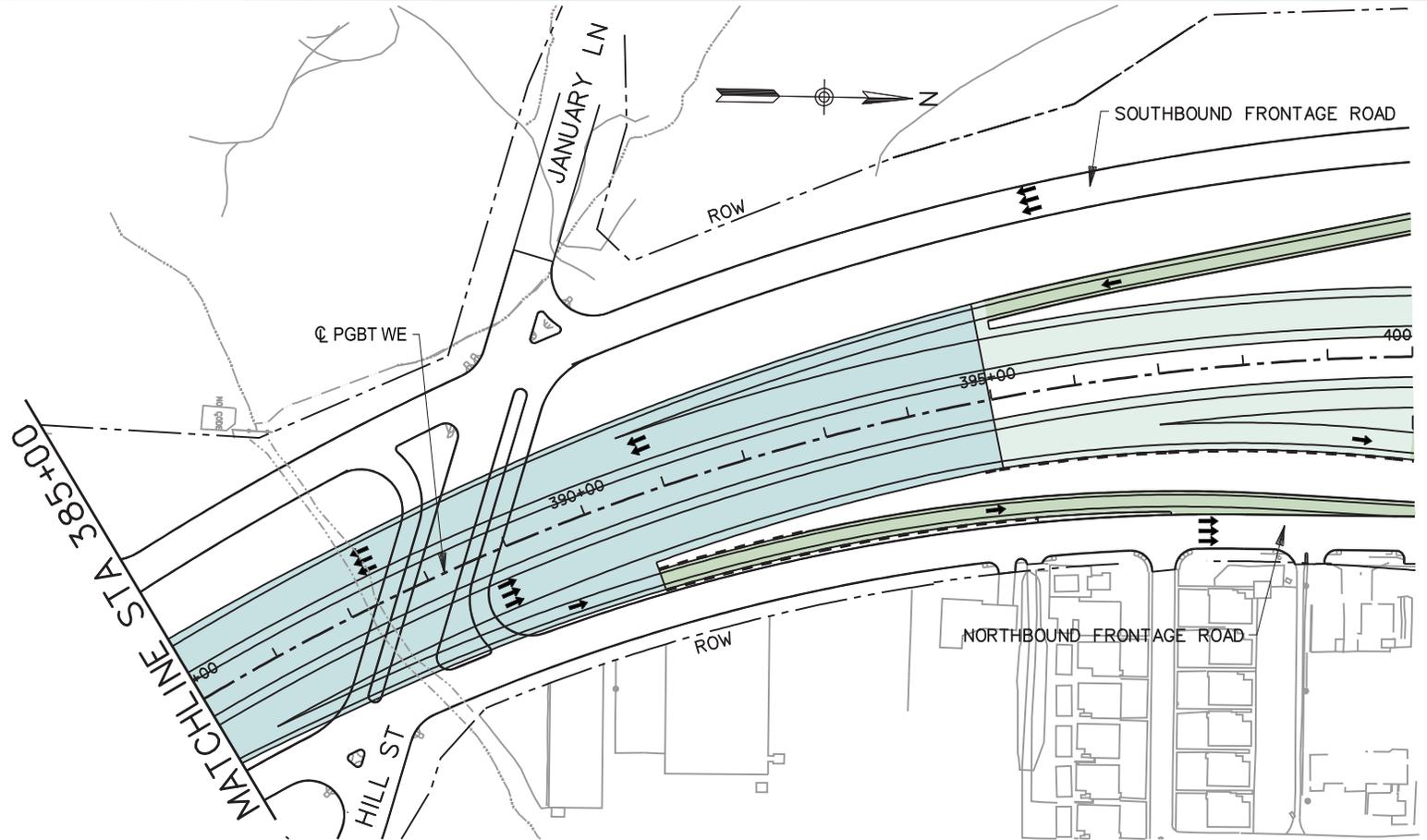
LEGEND			
	Existing Roadway		Proposed Retaining Wall
	Proposed Roadway (Main Lanes & Frontage Roads)		Traffic Arrow
	Proposed Bridge	NOTE:	Initial Construction Only
	Proposed Roadway (Ramps & Direct Connectors)		
	Electronic Toll Collection (ETC) Gantry		

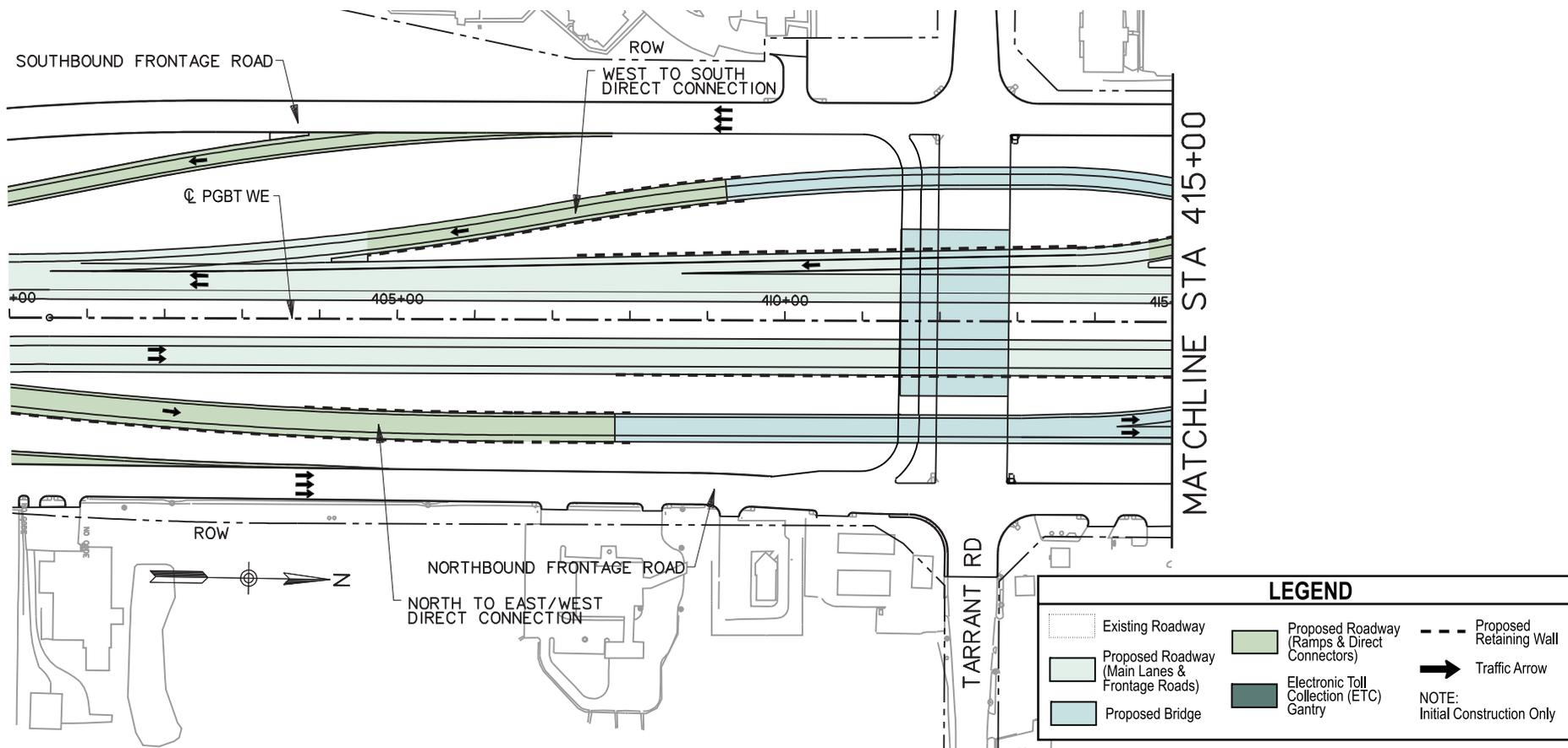




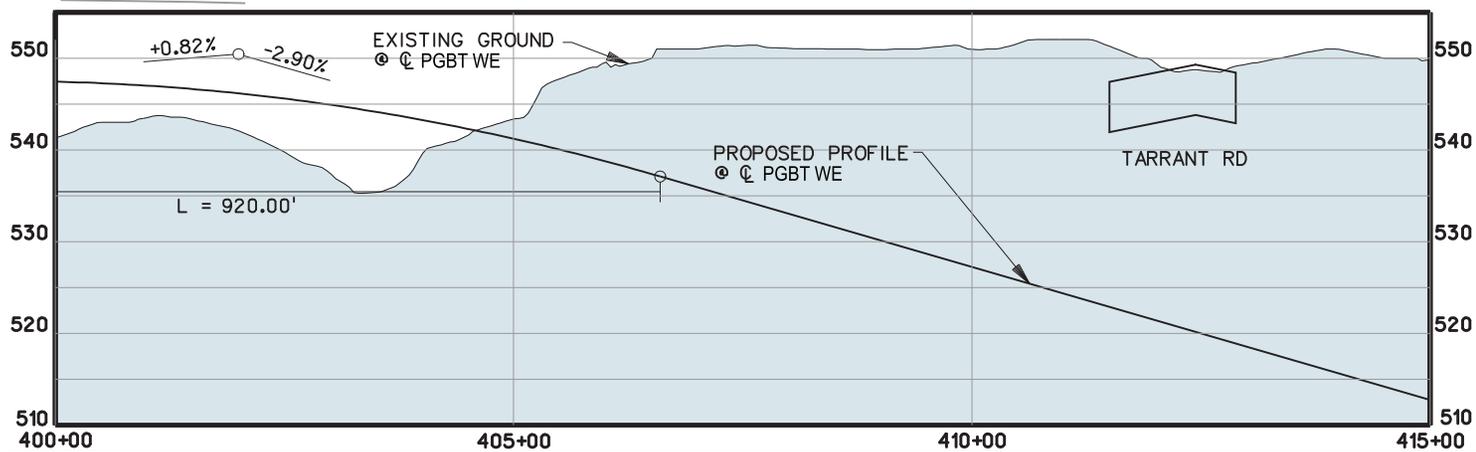


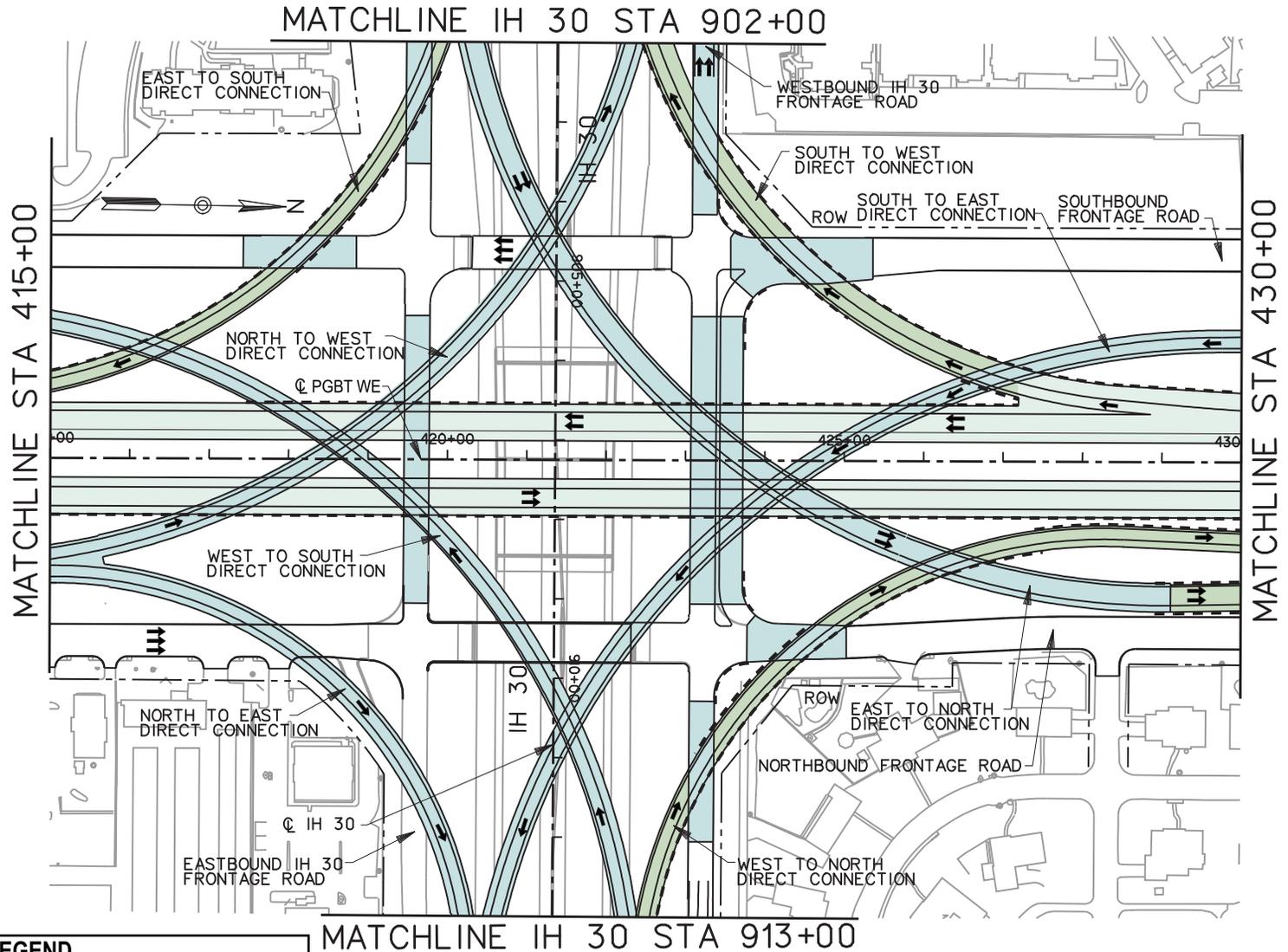






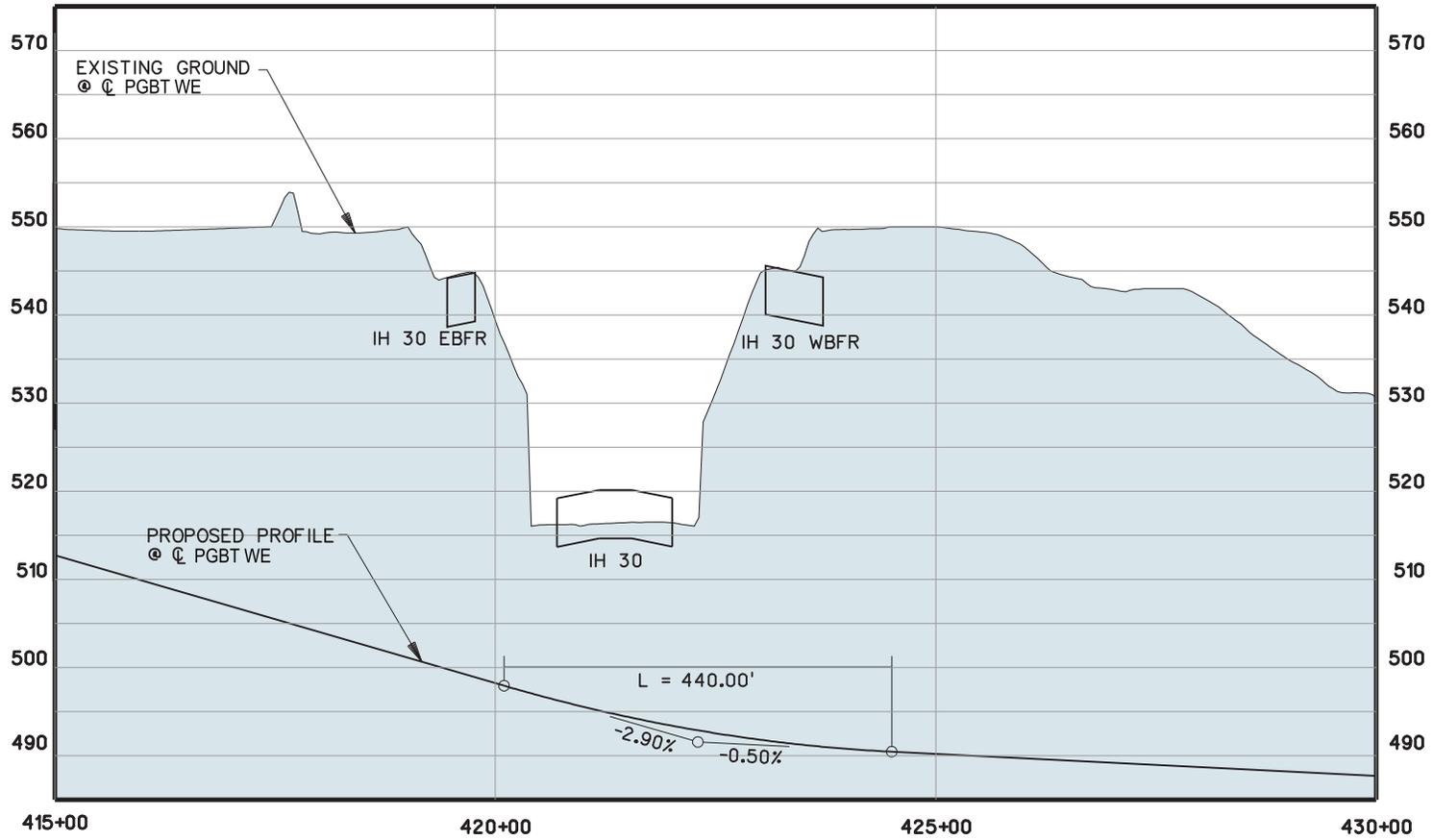
LEGEND			
	Existing Roadway		Proposed Retaining Wall
	Proposed Roadway (Ramps & Direct Connectors)		Traffic Arrow
	Proposed Roadway (Main Lanes & Frontage Roads)		Electronic Toll Collection (ETC) Gantry
	Proposed Bridge		NOTE: Initial Construction Only

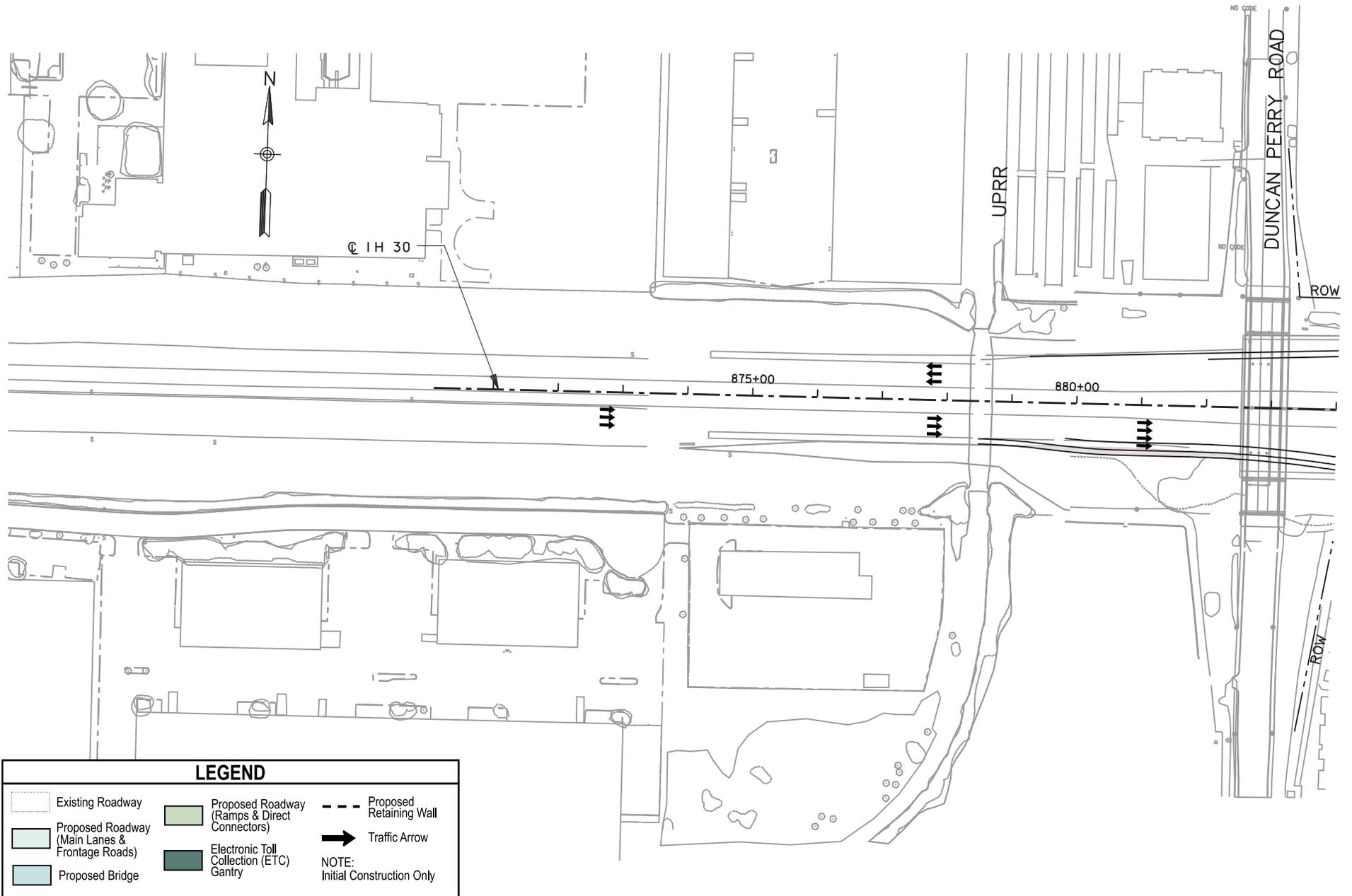


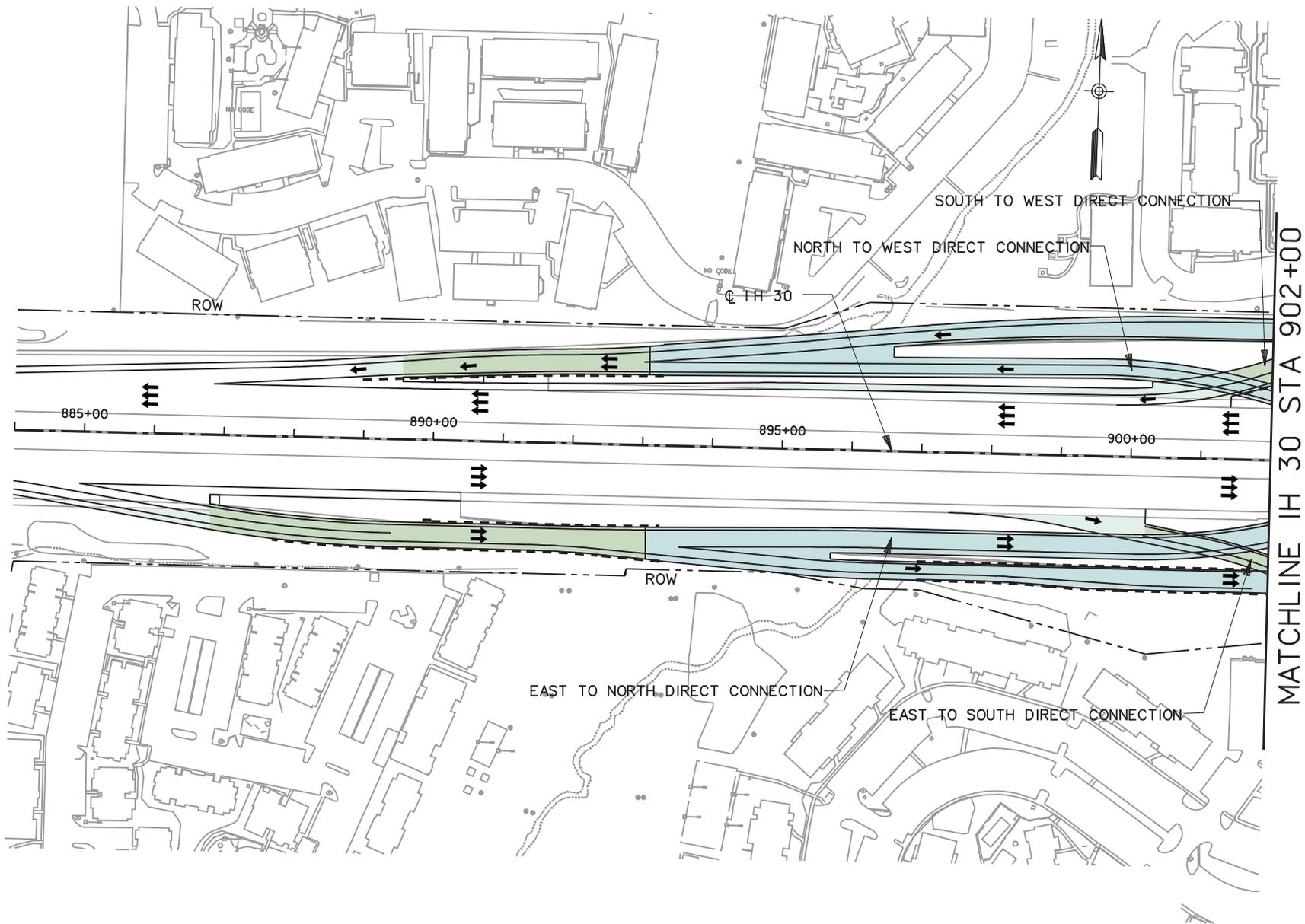


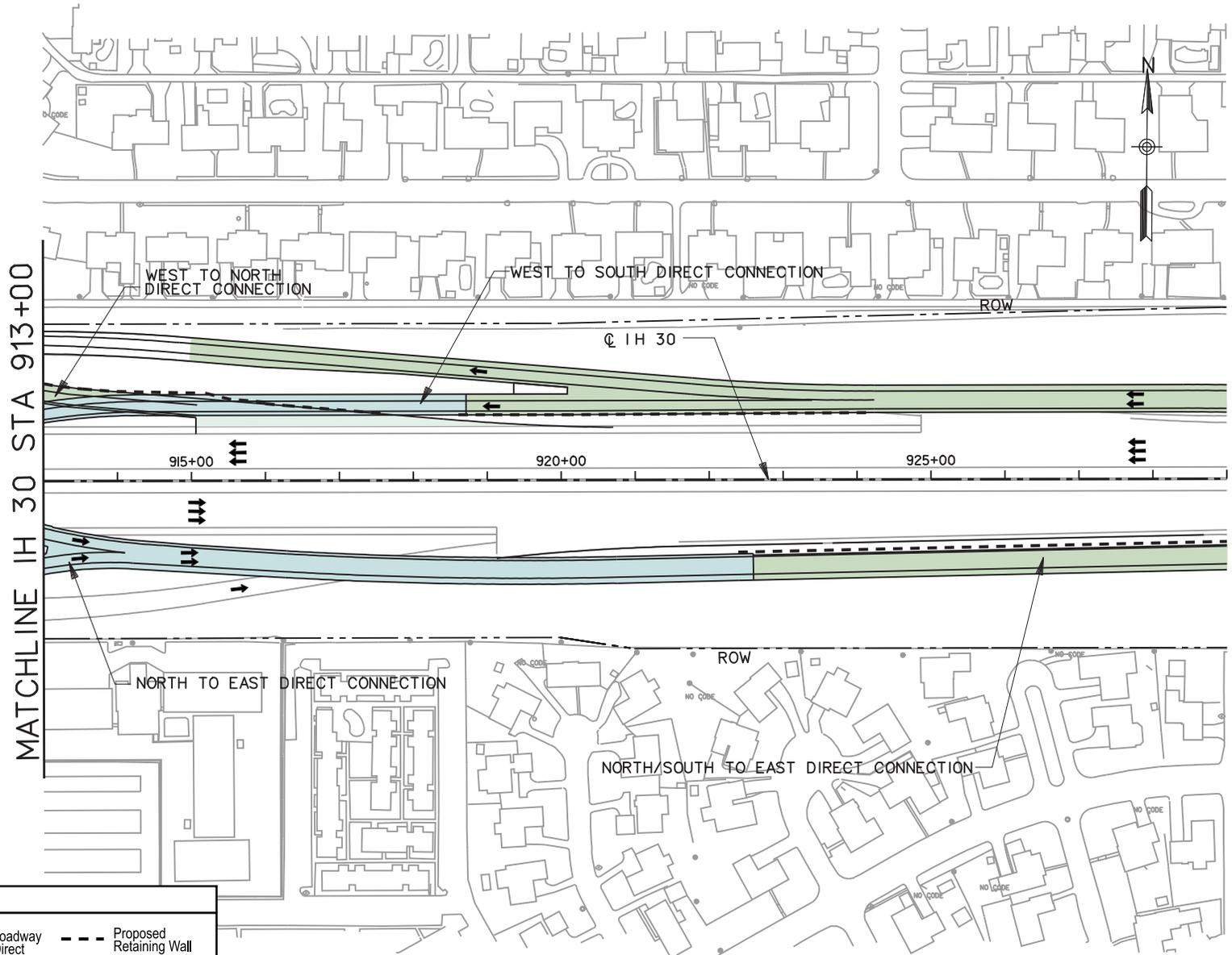
LEGEND			
	Existing Roadway		Proposed Retaining Wall
	Proposed Roadway (Main Lanes & Frontage Roads)		Electronic Toll Collection (ETC) Gantry
	Proposed Bridge		Traffic Arrow
	Proposed Roadway (Ramps & Direct Connectors)	NOTE: Initial Construction Only	

Plate 15 Profile



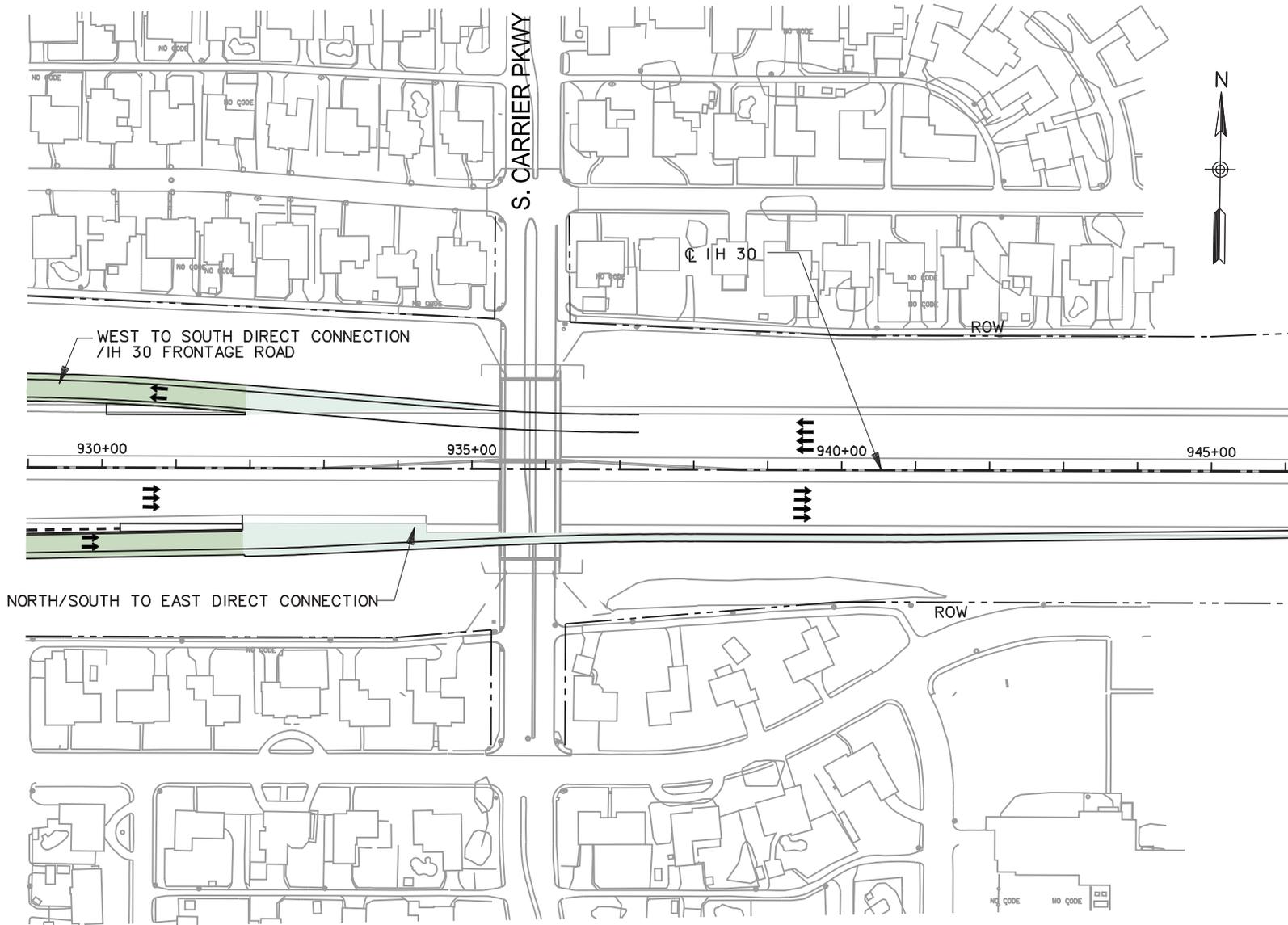


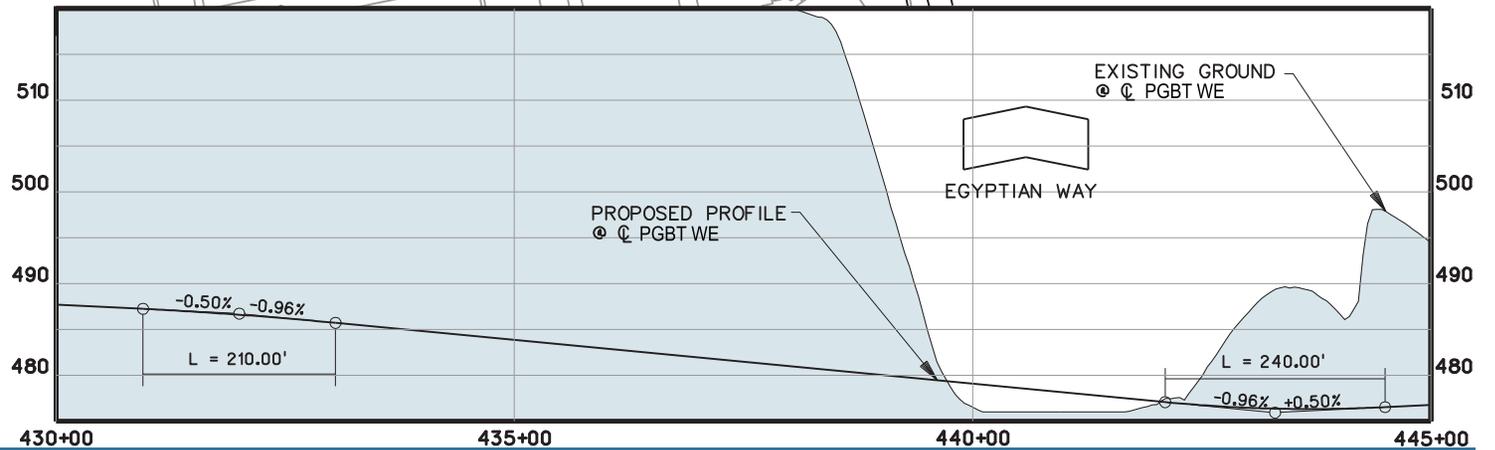
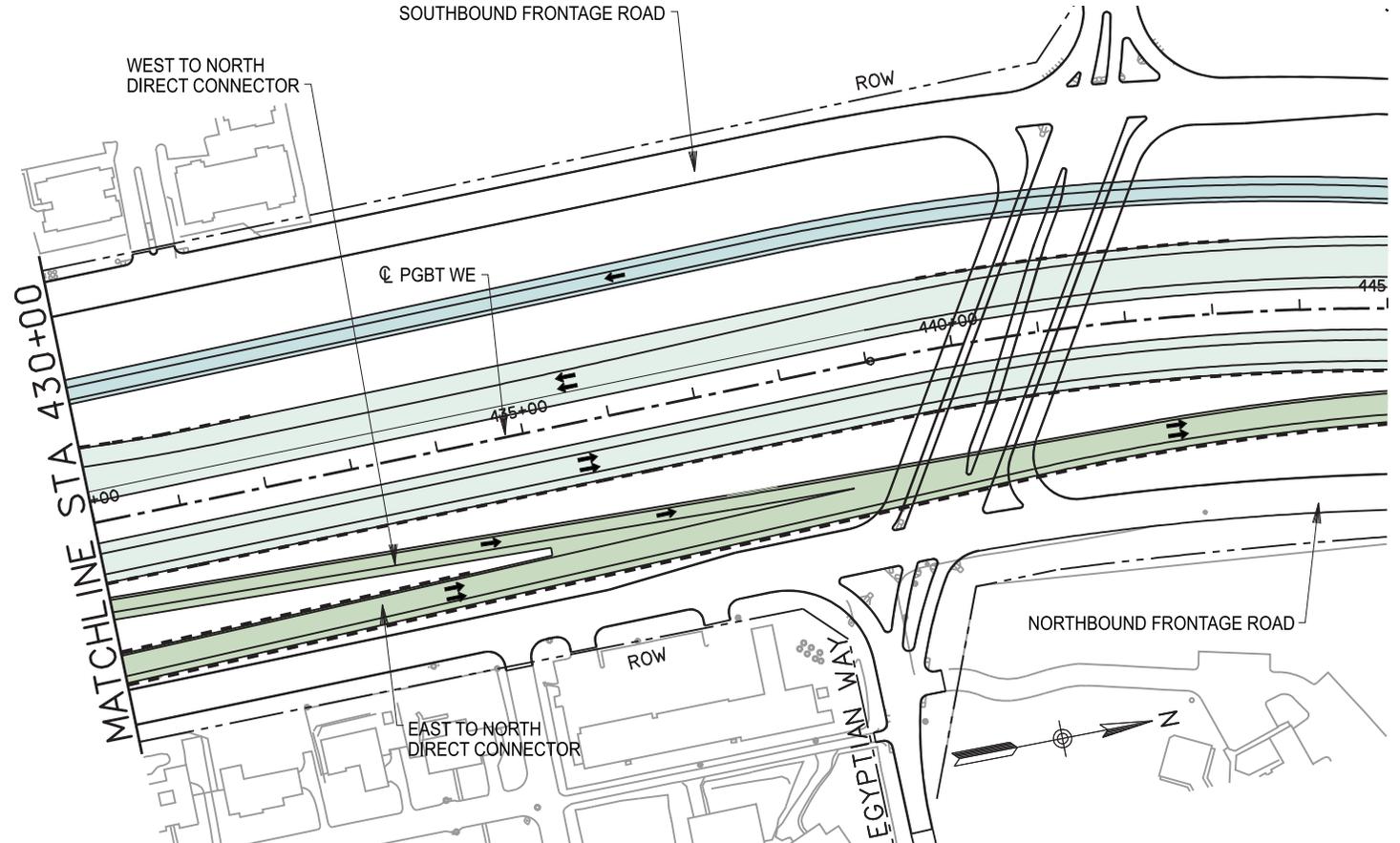


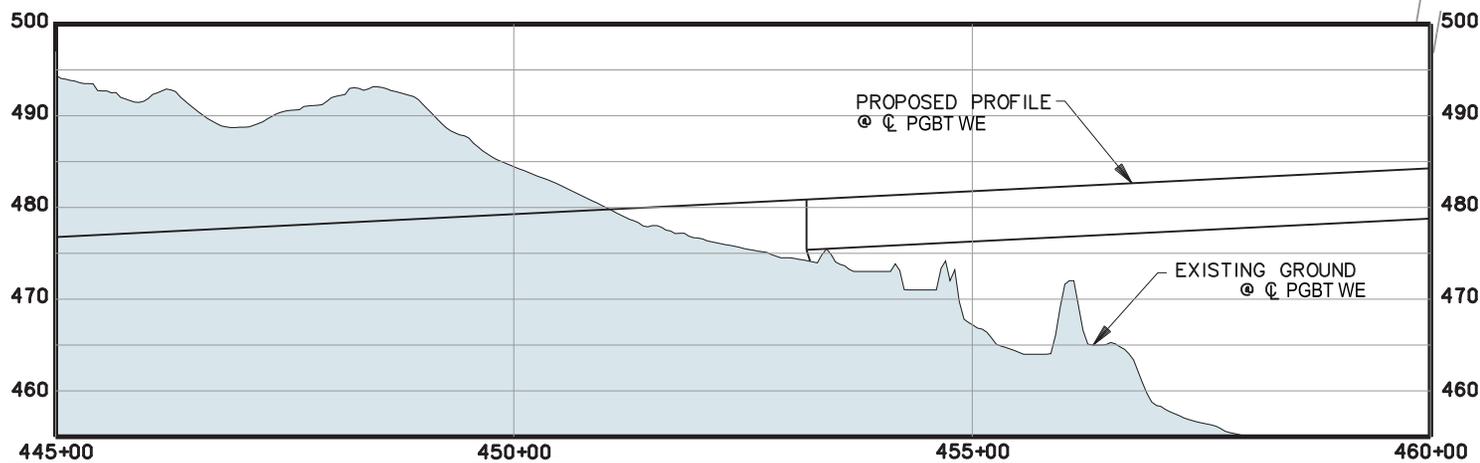
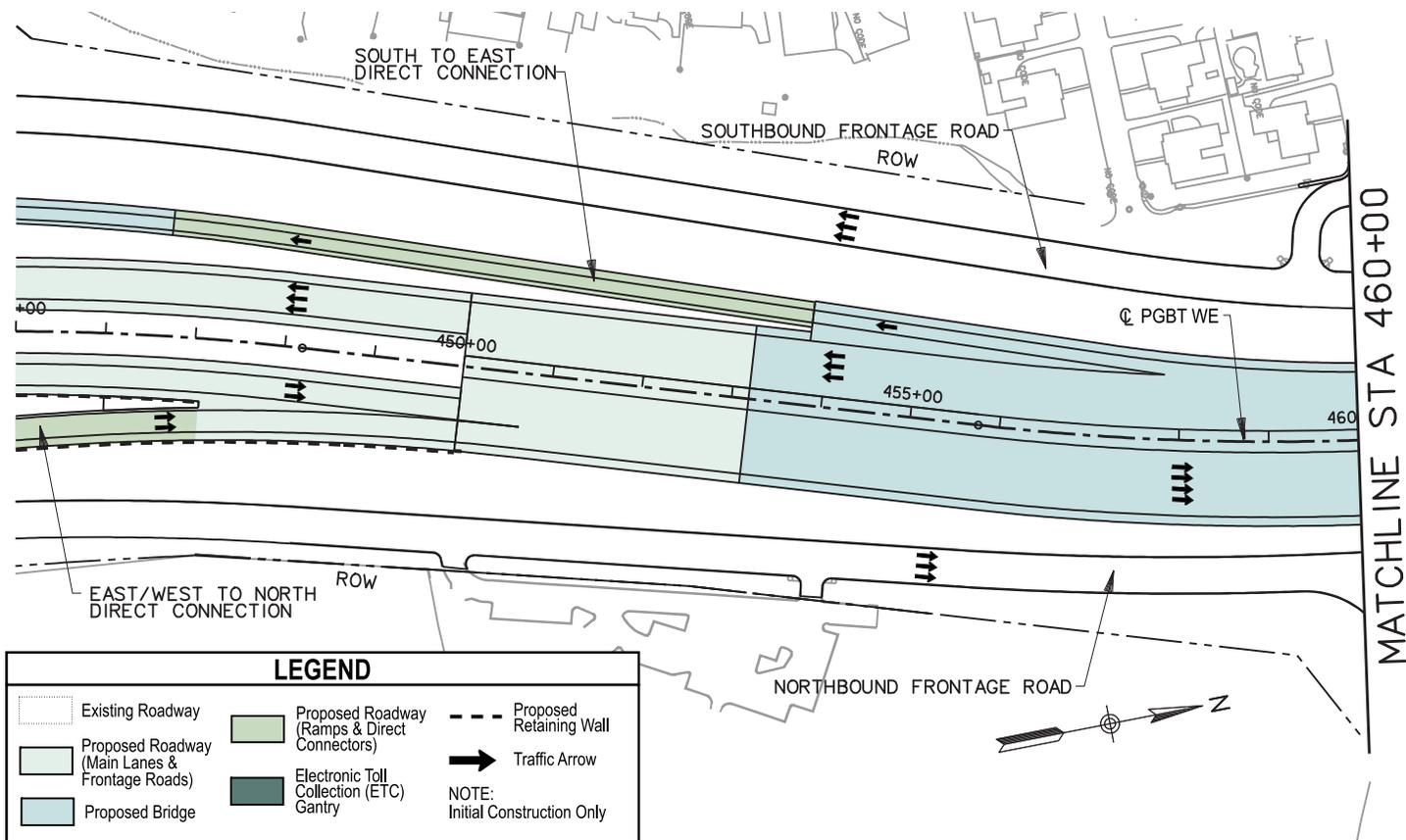


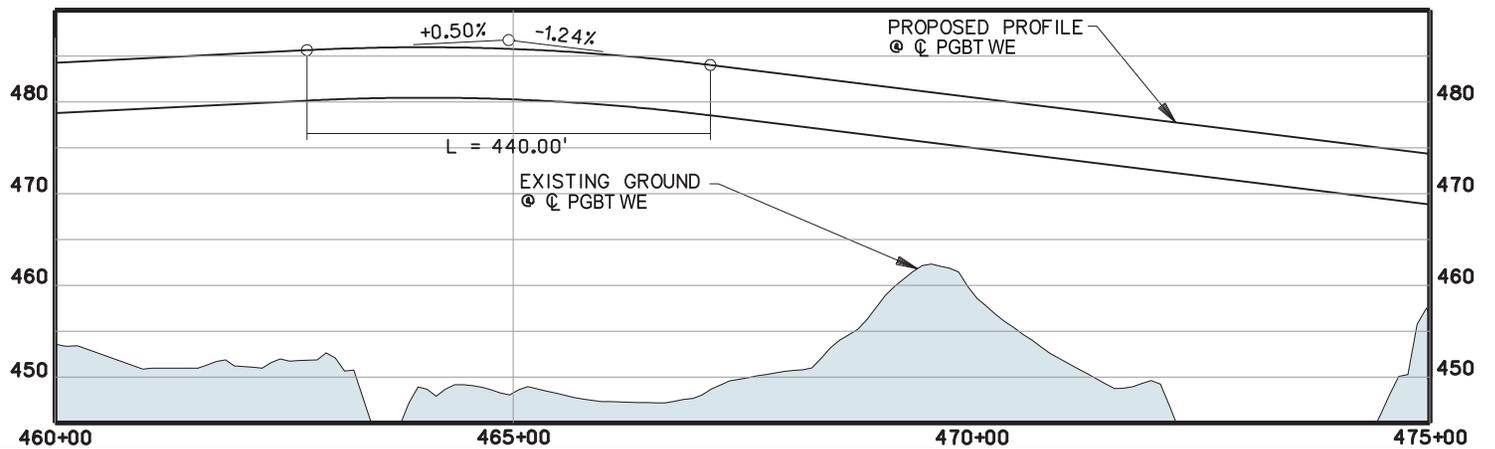
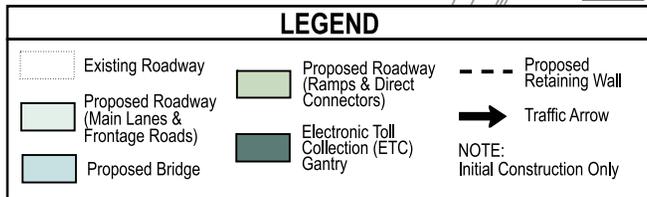
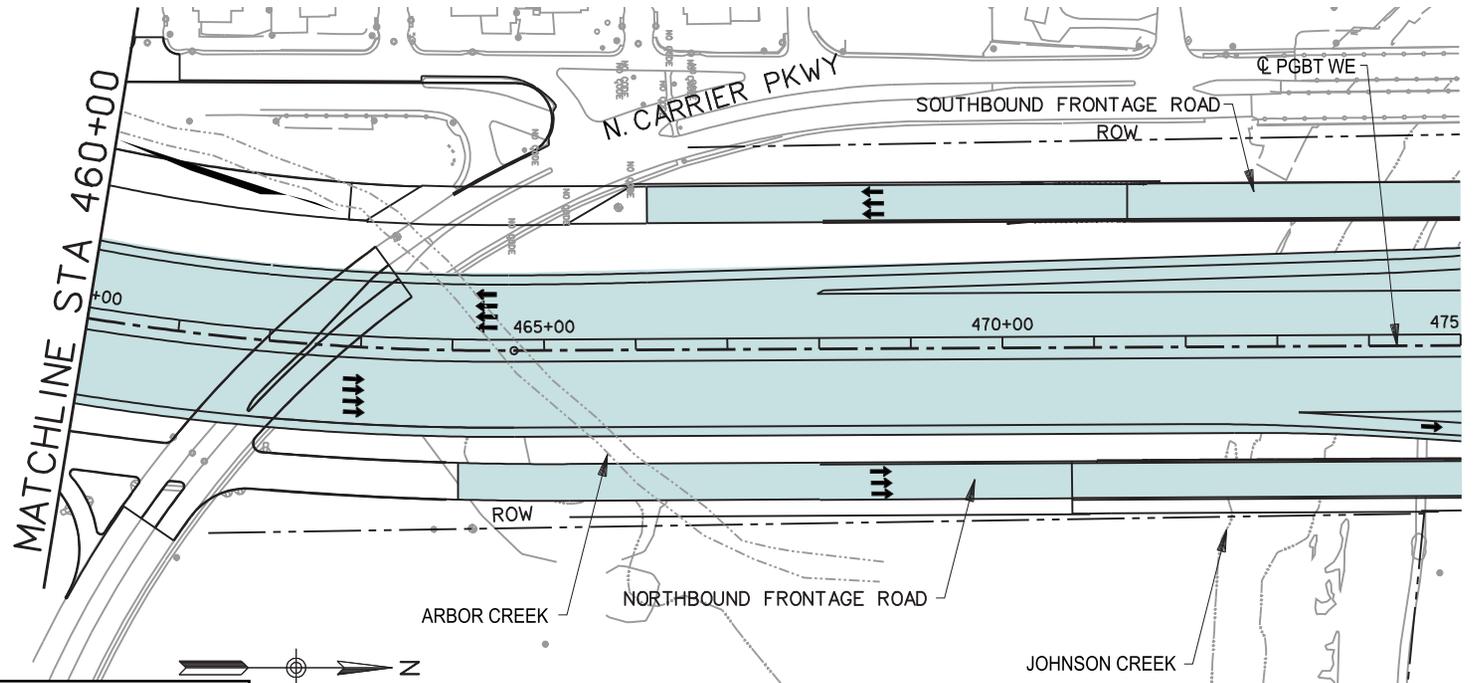
MATCHLINE IH 30 STA 913+00

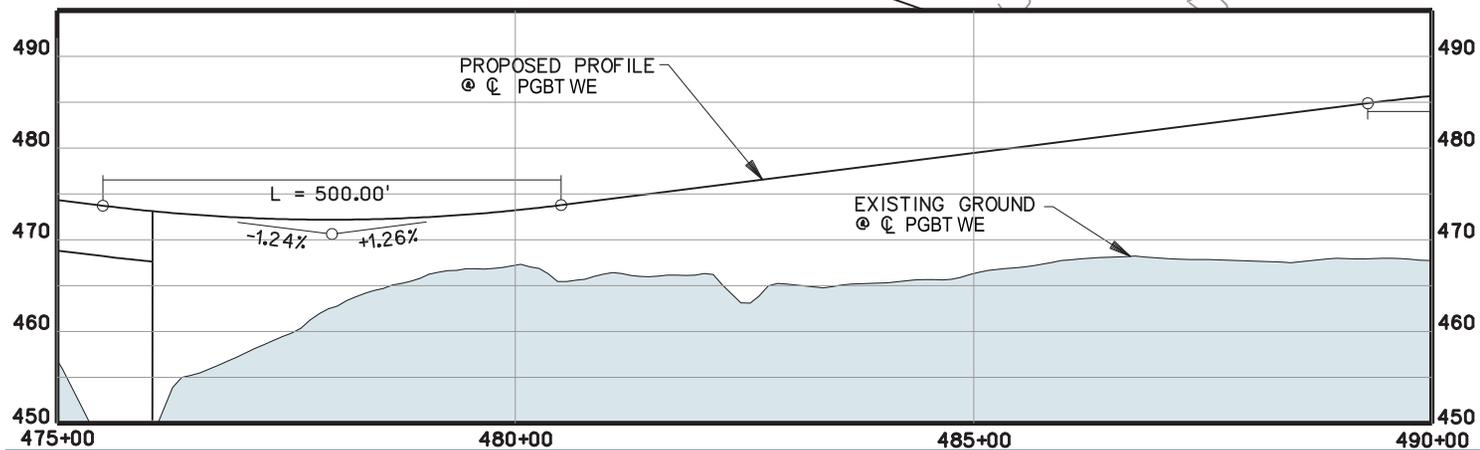
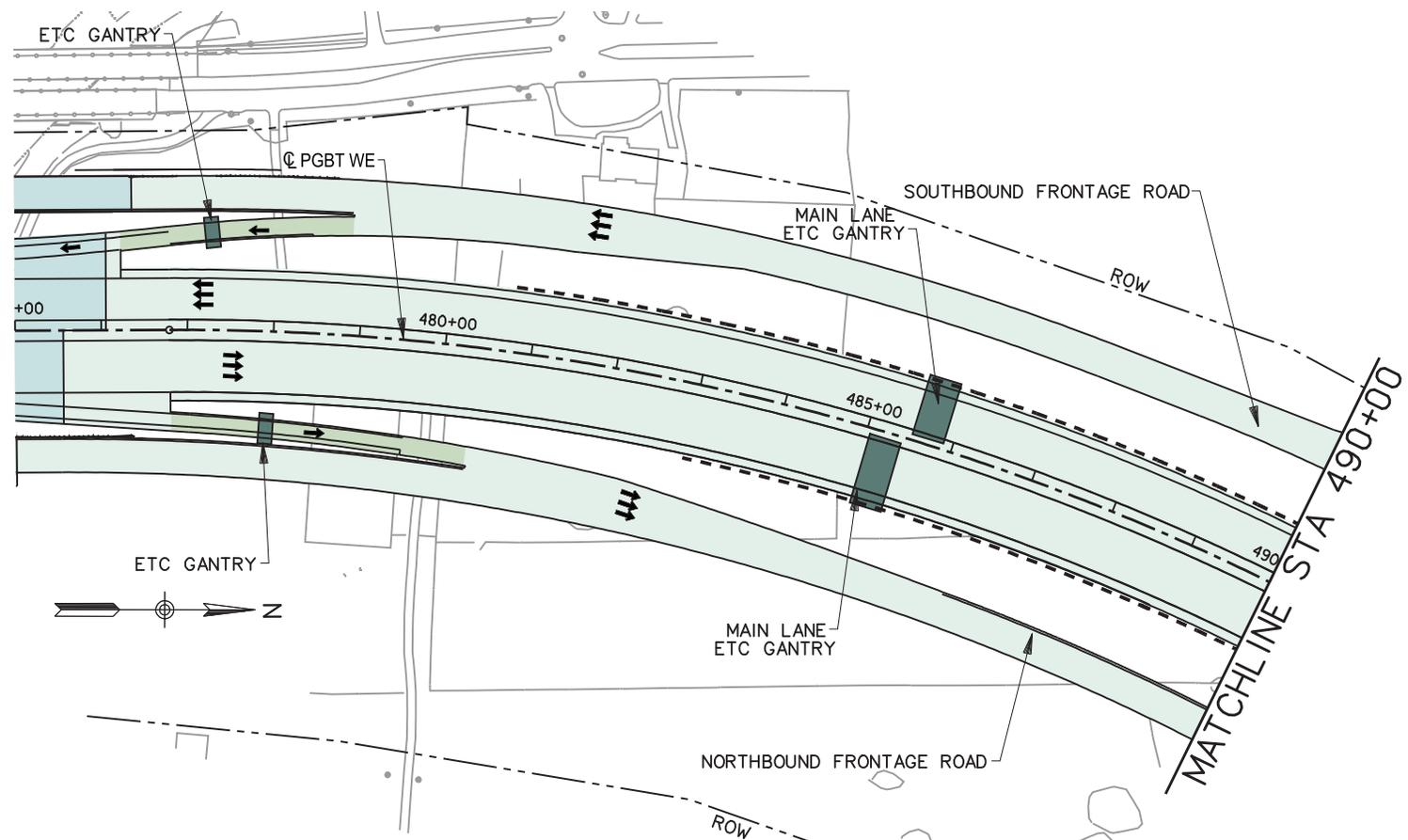
LEGEND			
	Existing Roadway		Proposed Retaining Wall
	Proposed Roadway (Main Lanes & Frontage Roads)		Traffic Arrow
	Proposed Bridge		Electronic Toll Collection (ETC) Gantry
	Proposed Roadway (Ramps & Direct Connectors)	NOTE: Initial Construction Only	

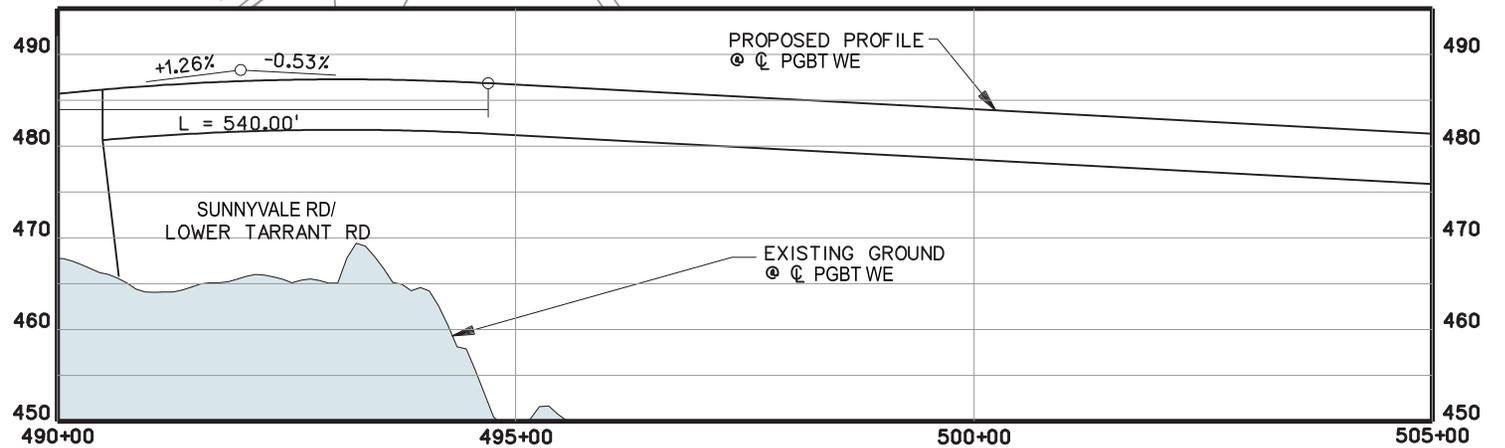
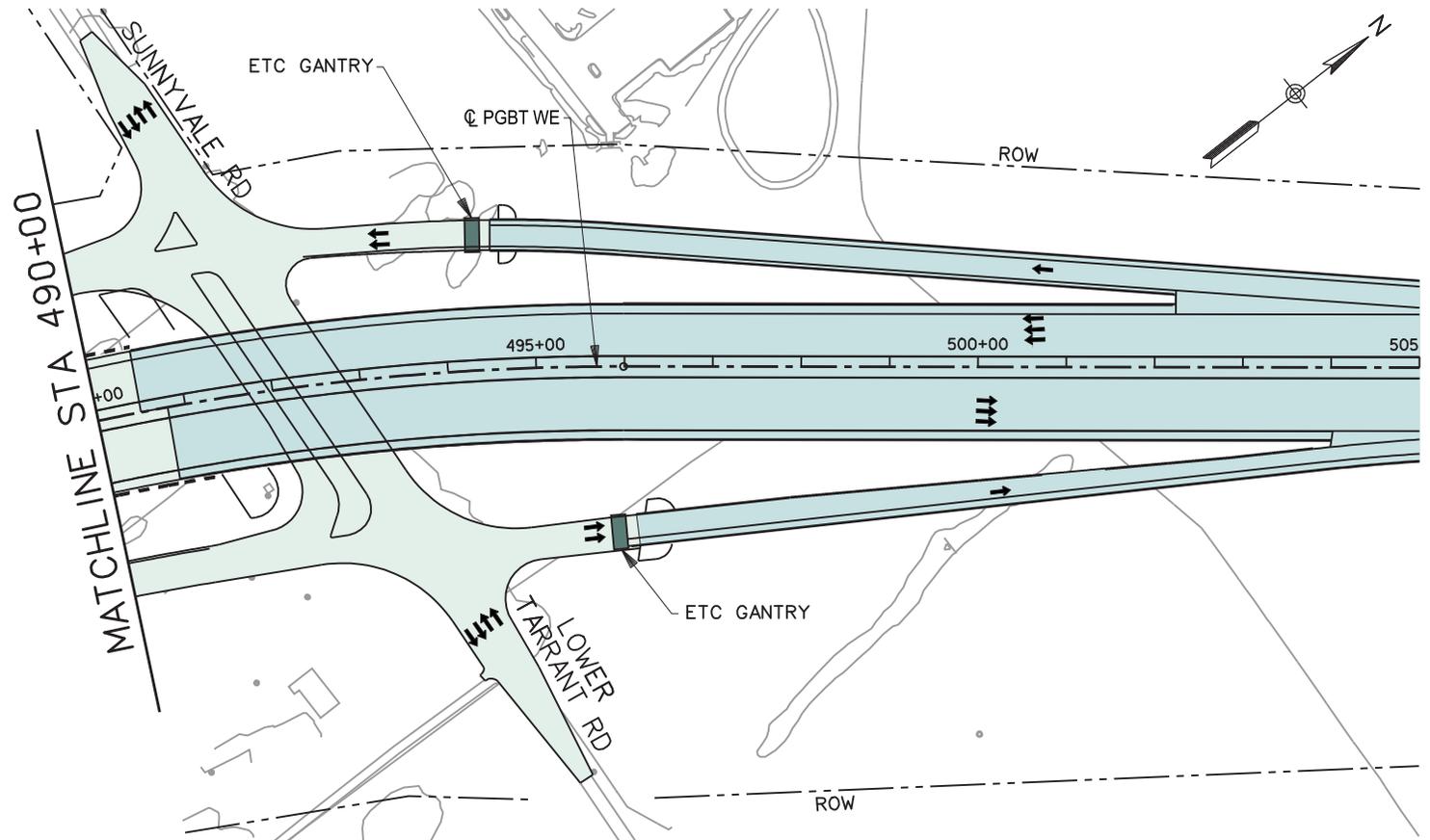


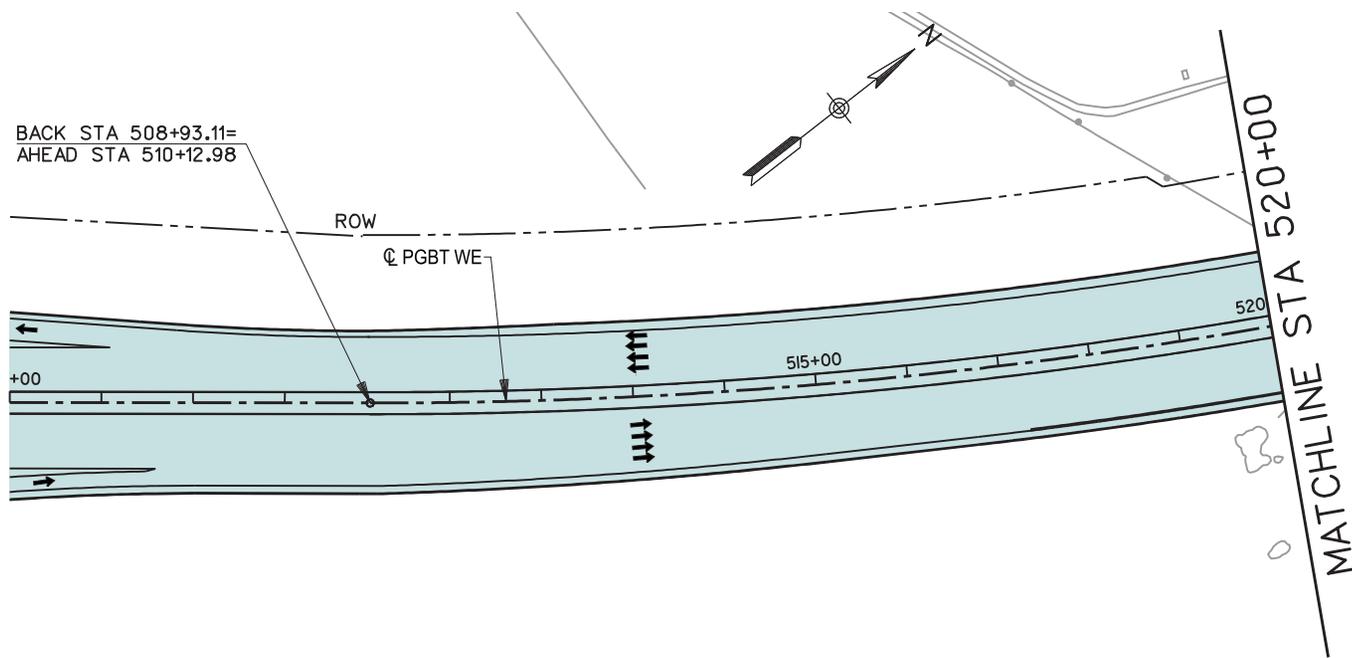




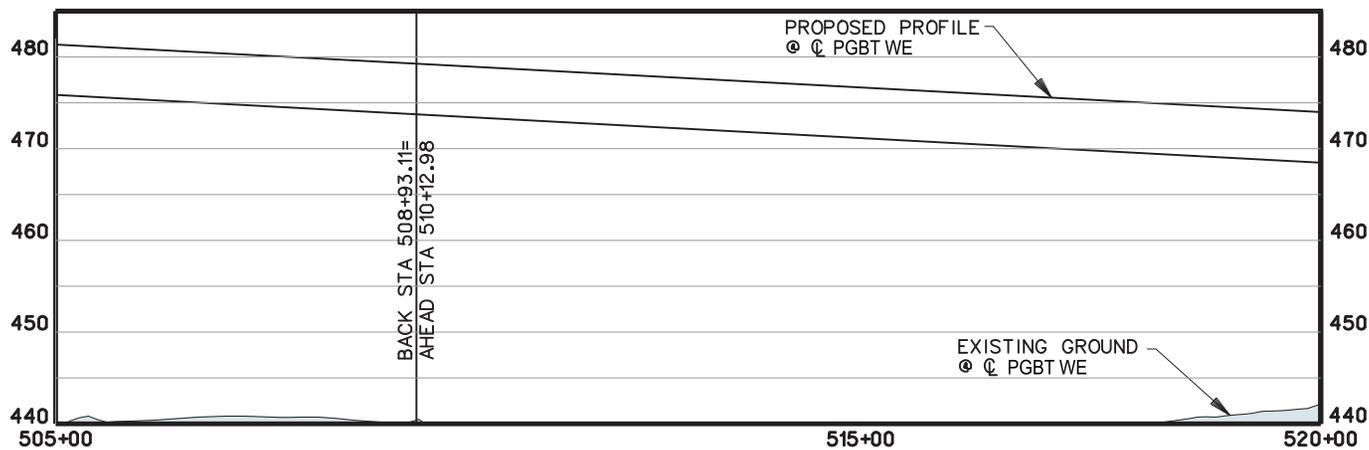


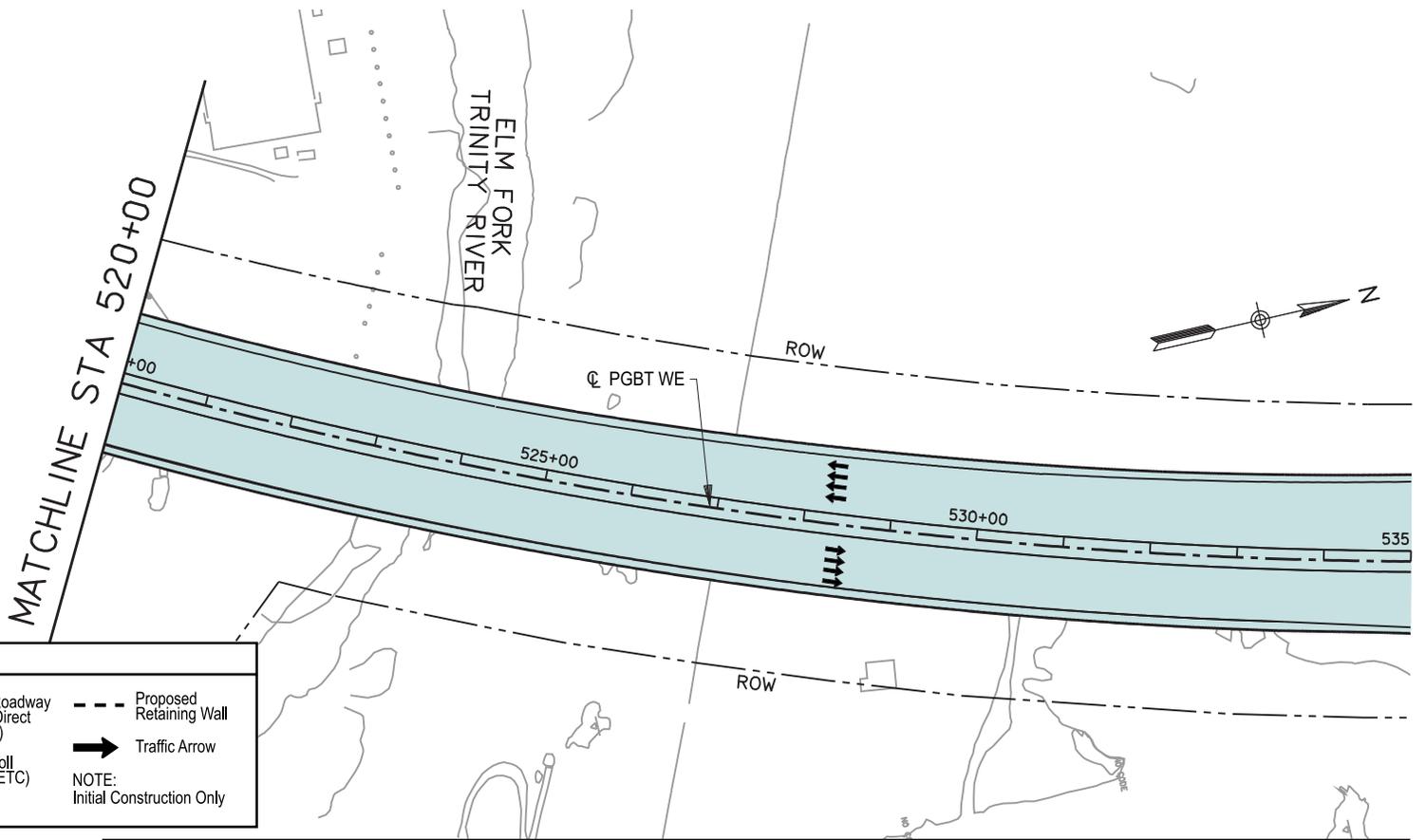






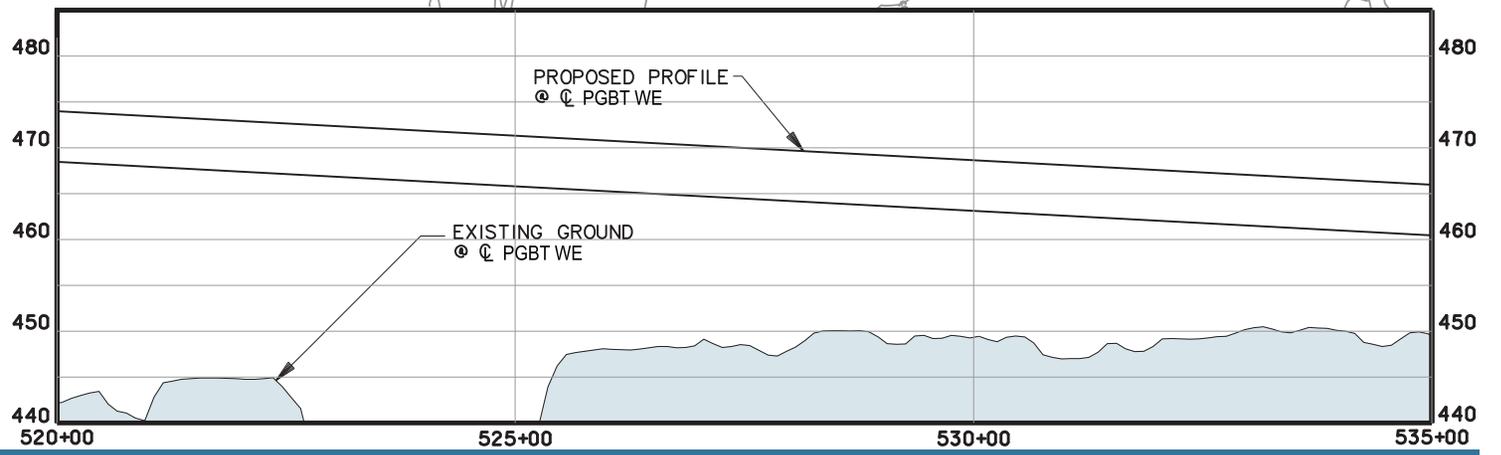
LEGEND			
	Existing Roadway		Proposed Retaining Wall
	Proposed Roadway (Main Lanes & Frontage Roads)		Electronic Toll Collection (ETC) Gantry
	Proposed Bridge		Traffic Arrow
			NOTE: Initial Construction Only

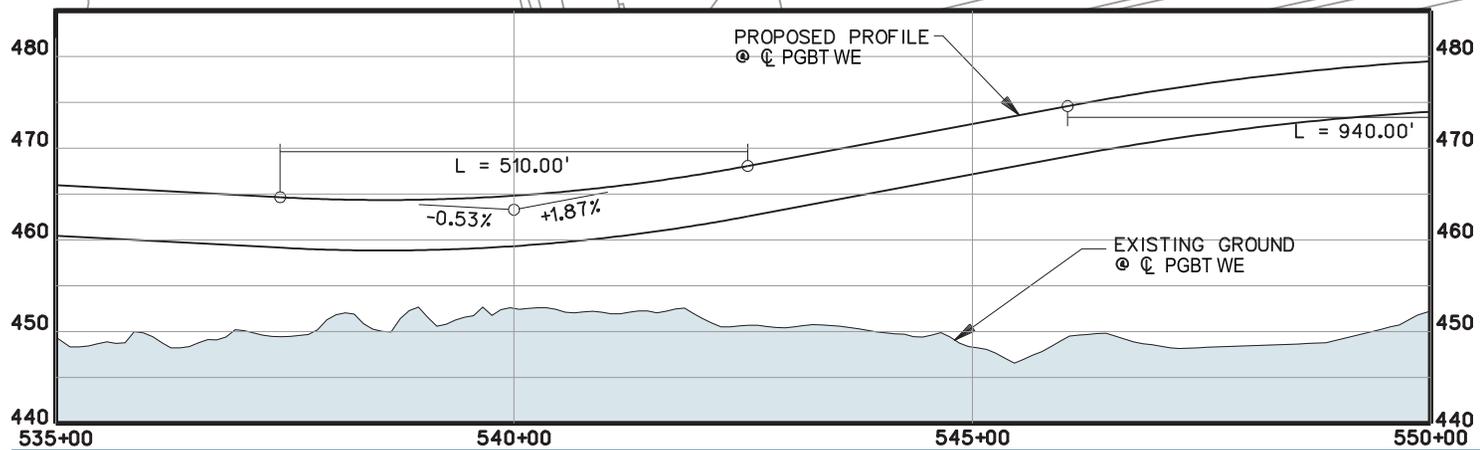
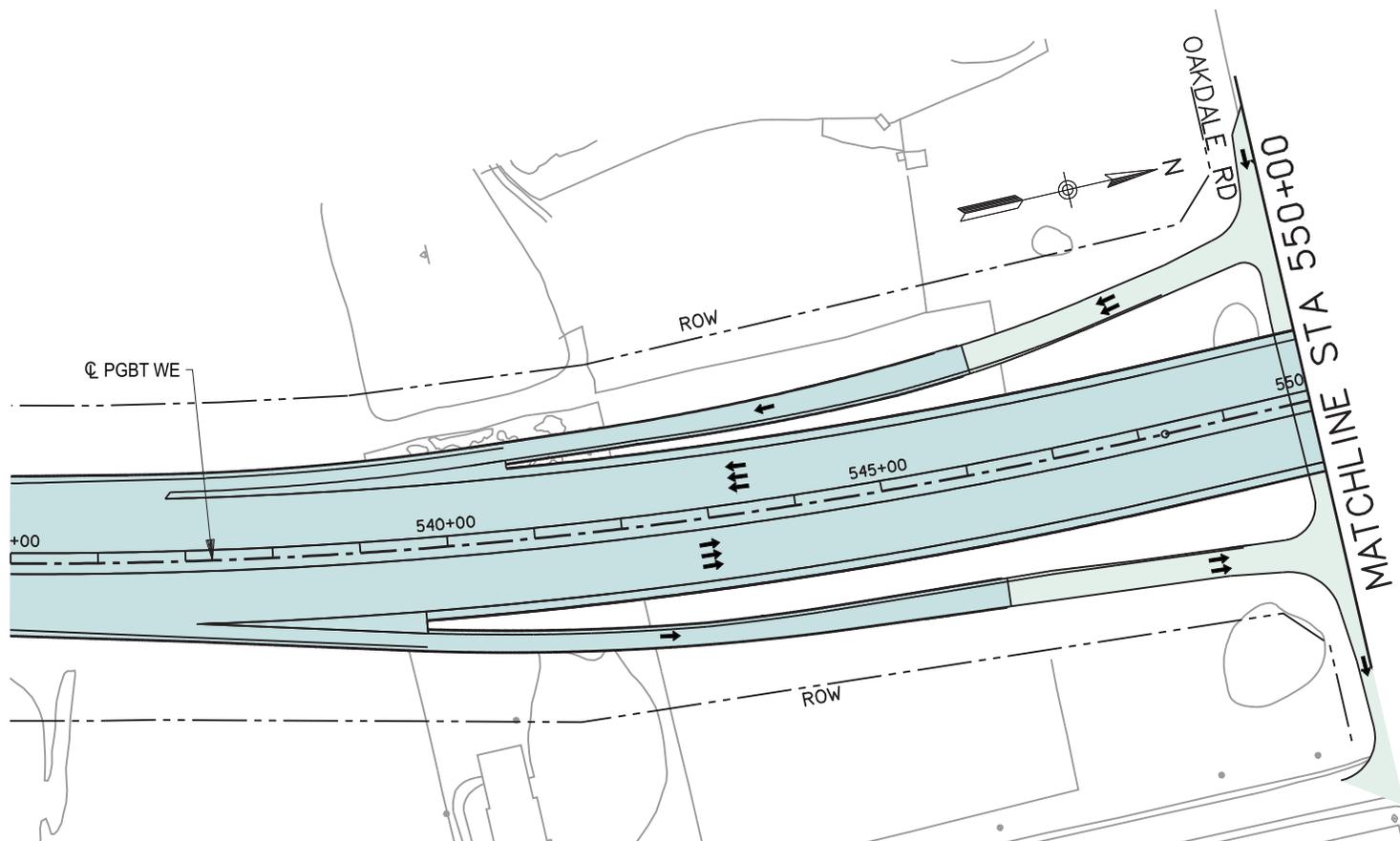


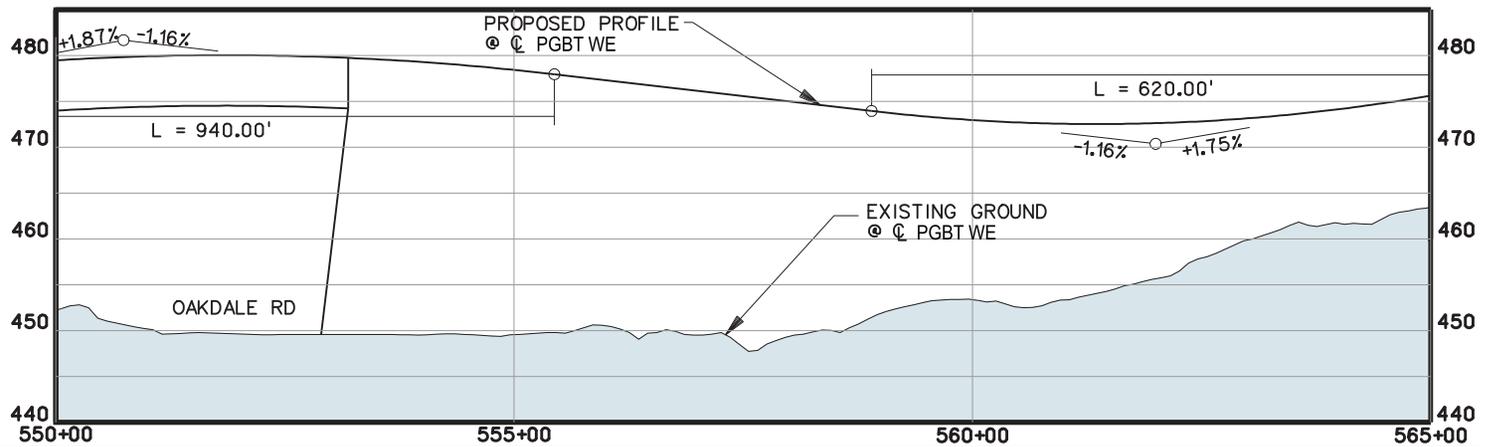
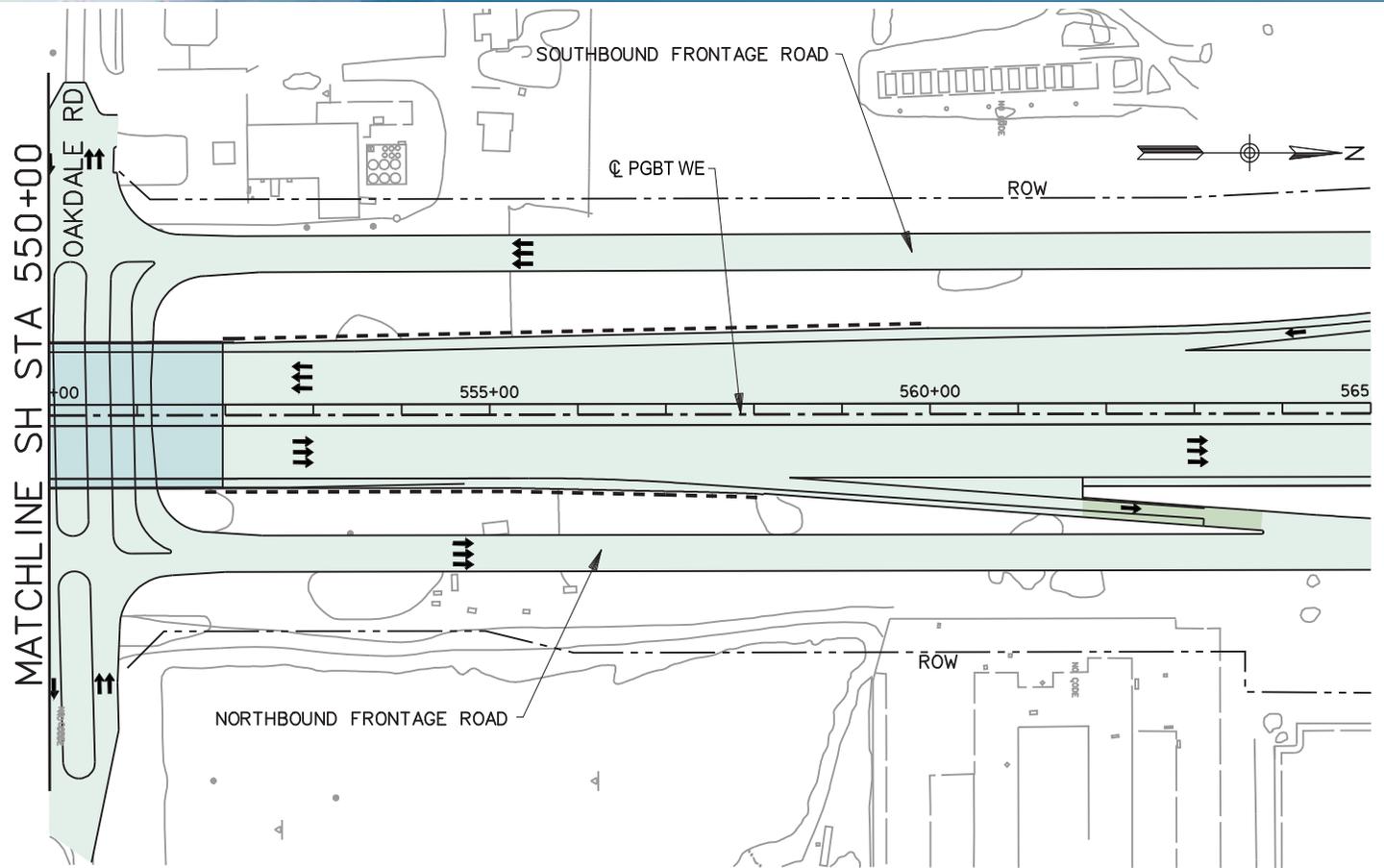


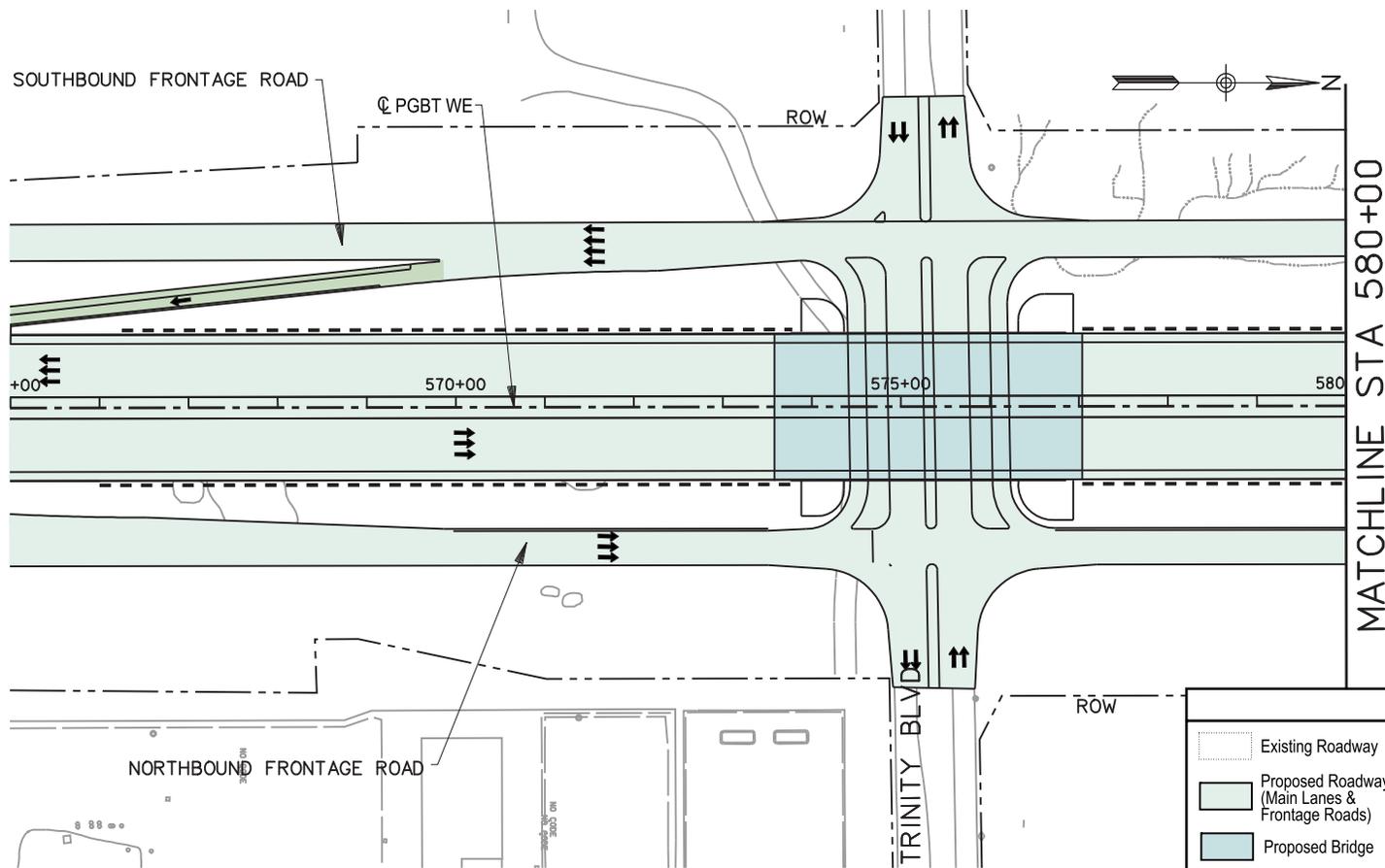
LEGEND

	Existing Roadway		Proposed Roadway (Ramps & Direct Connectors)		Proposed Retaining Wall
	Proposed Roadway (Main Lanes & Frontage Roads)		Electronic Toll Collection (ETC) Gantry		Traffic Arrow
	Proposed Bridge				NOTE: Initial Construction Only

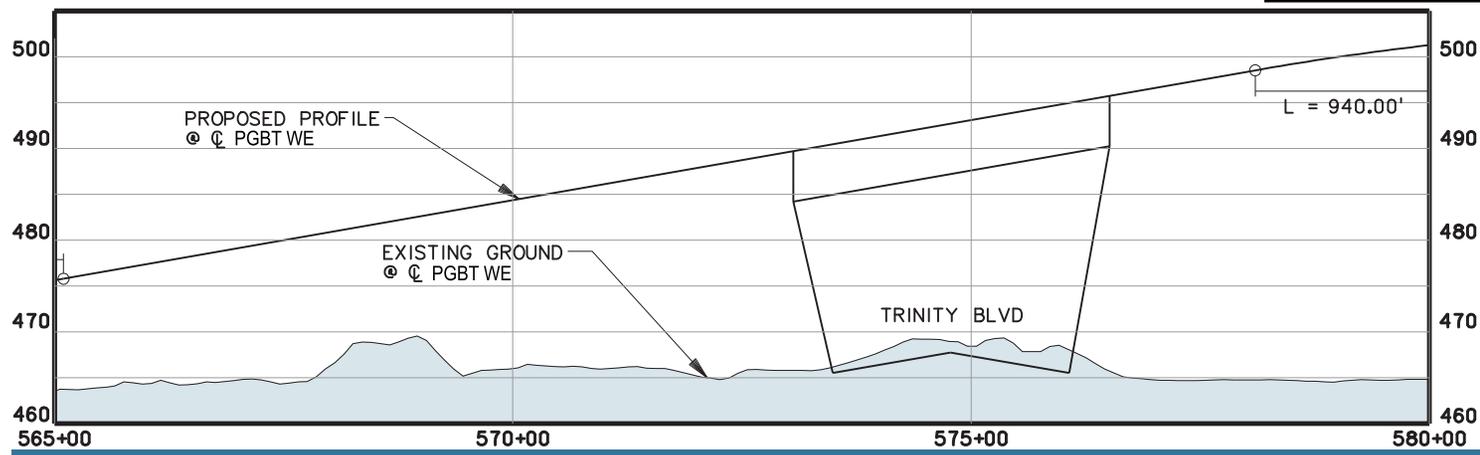


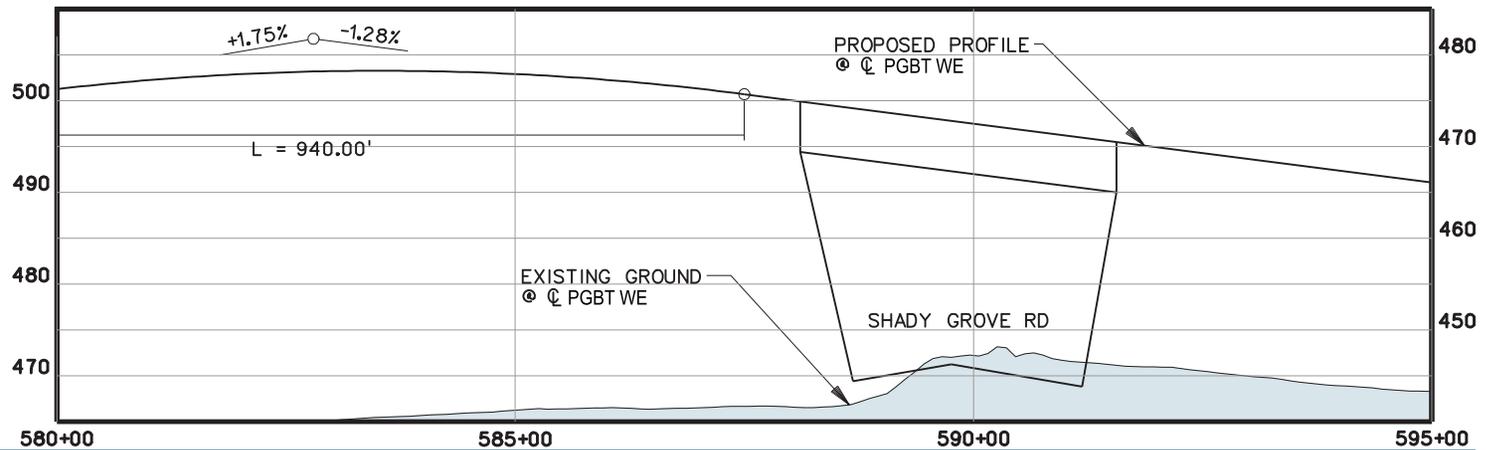
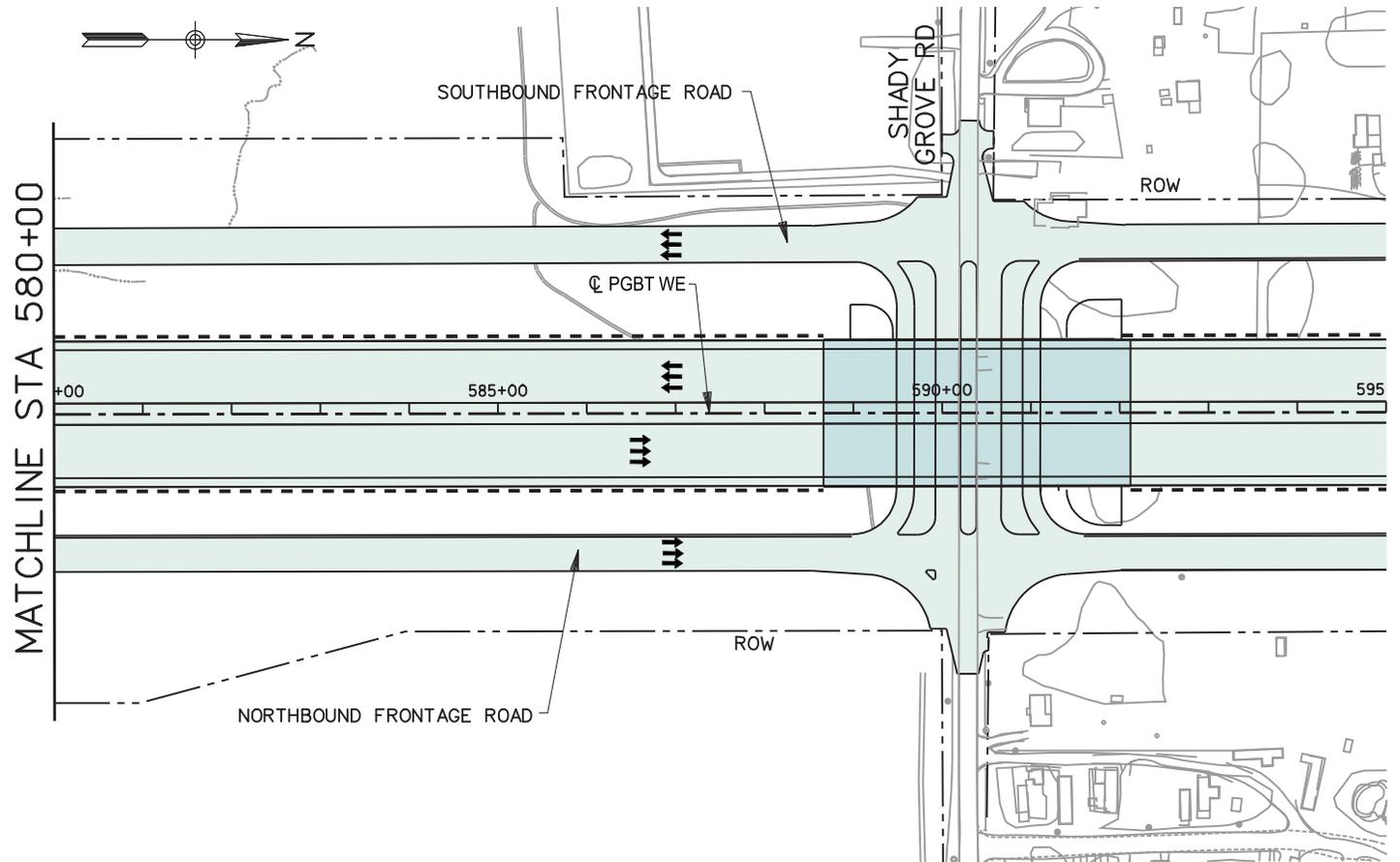


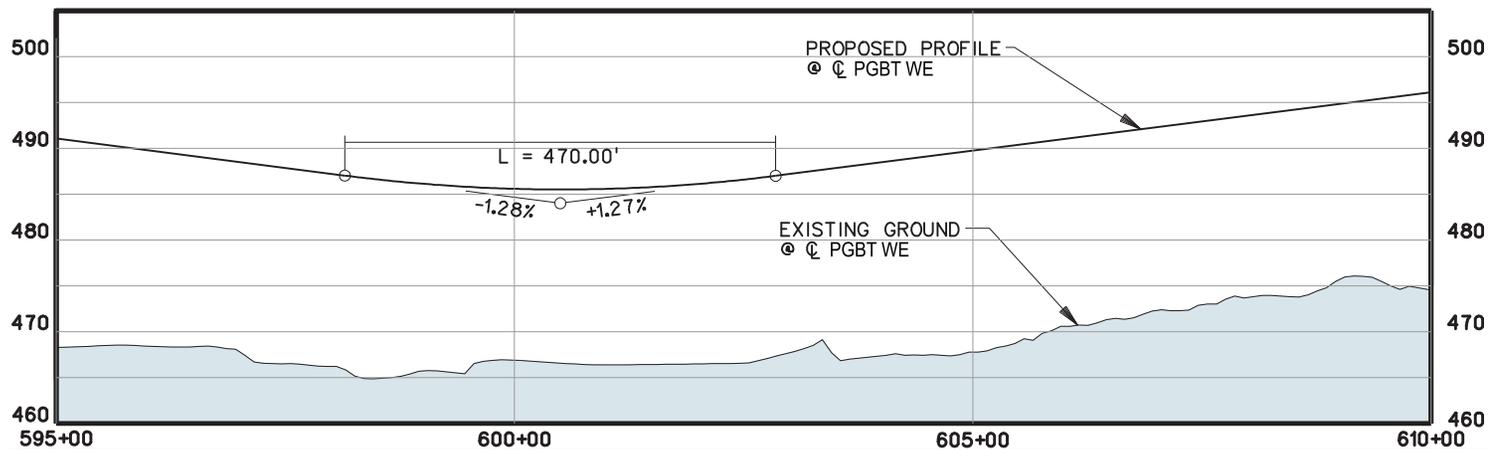
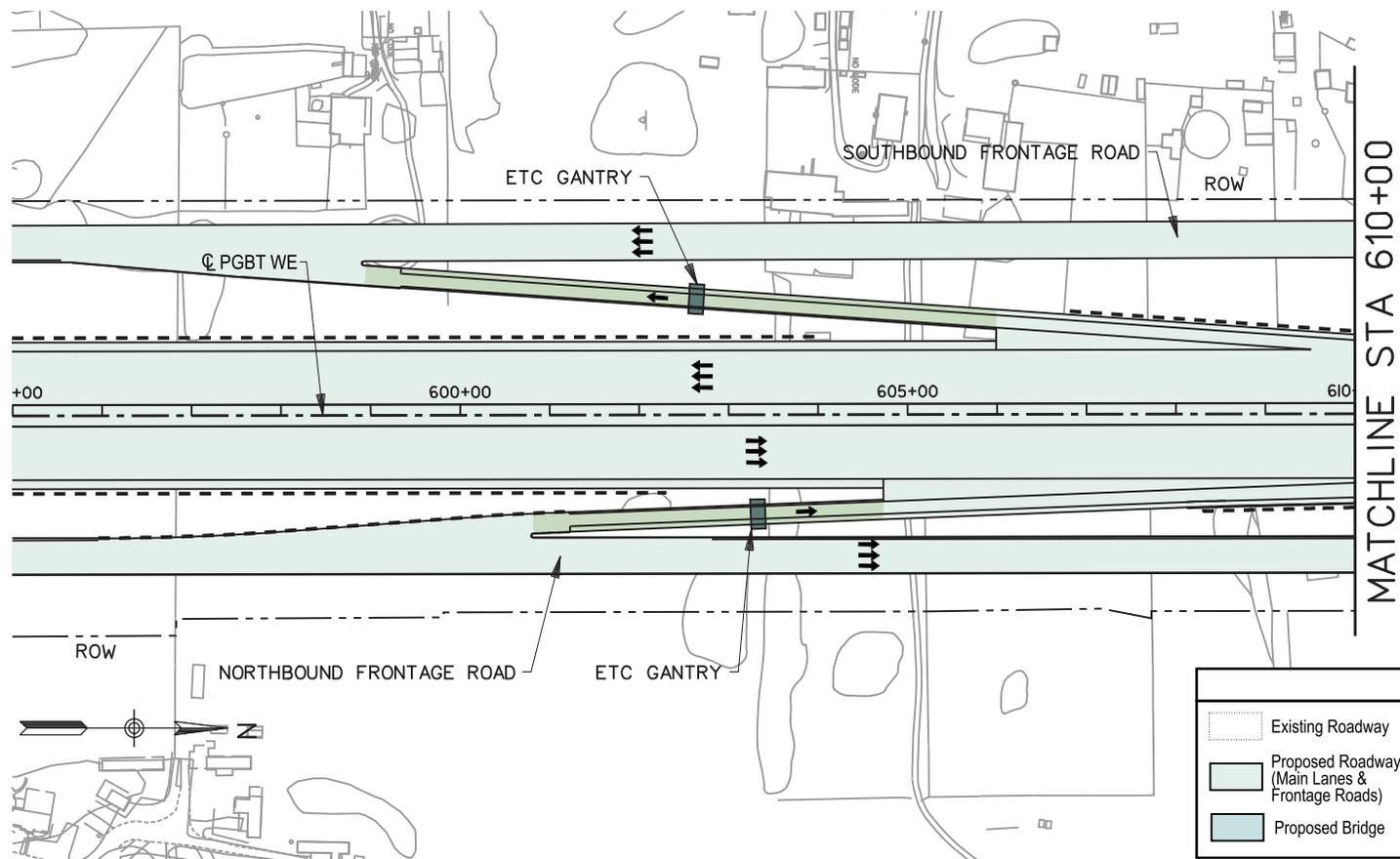


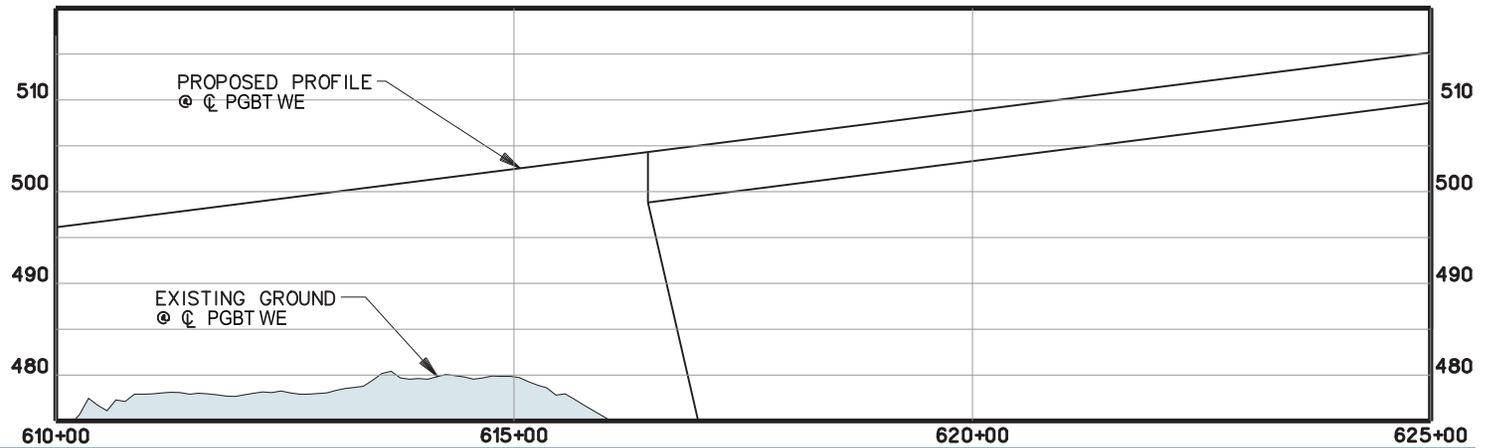
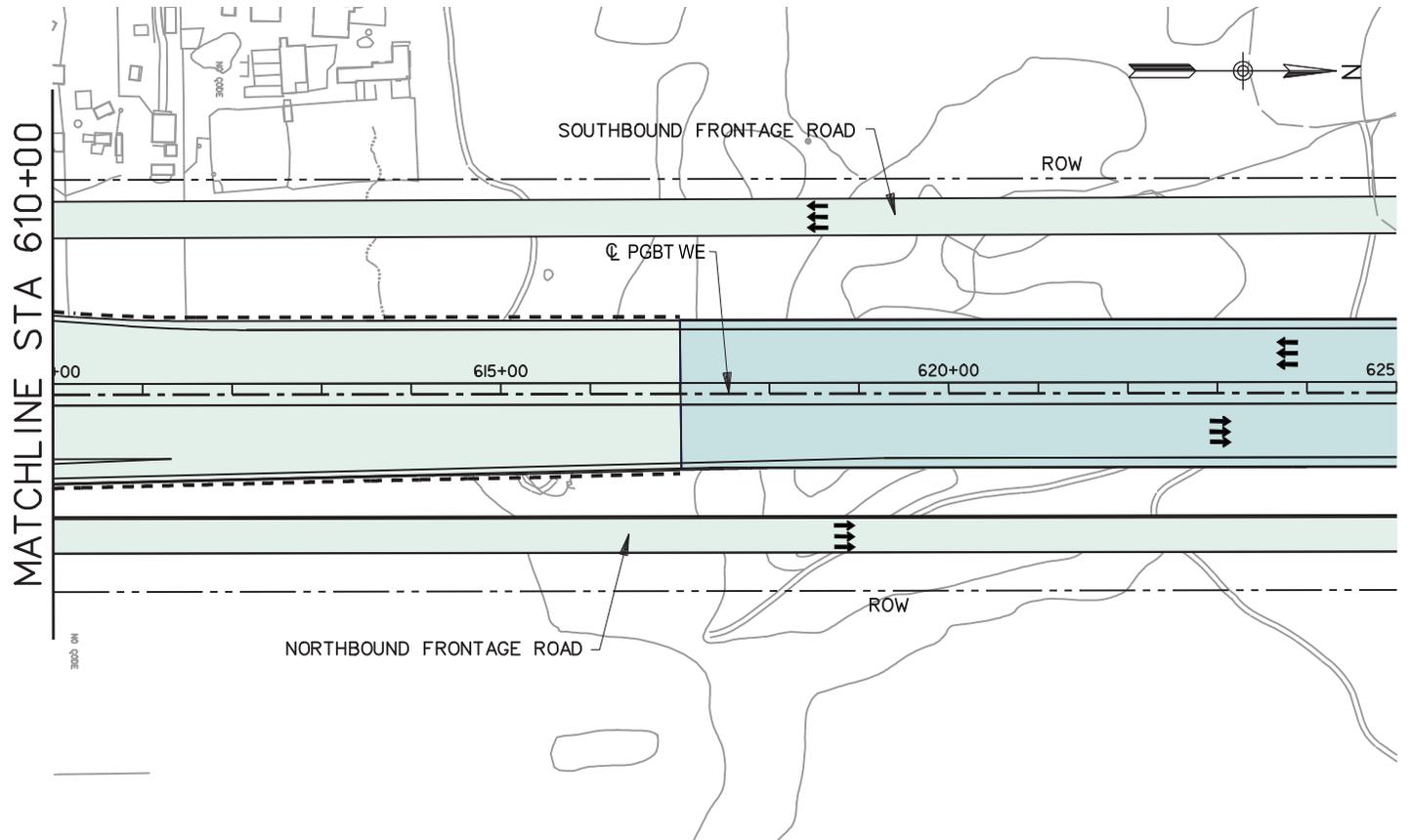


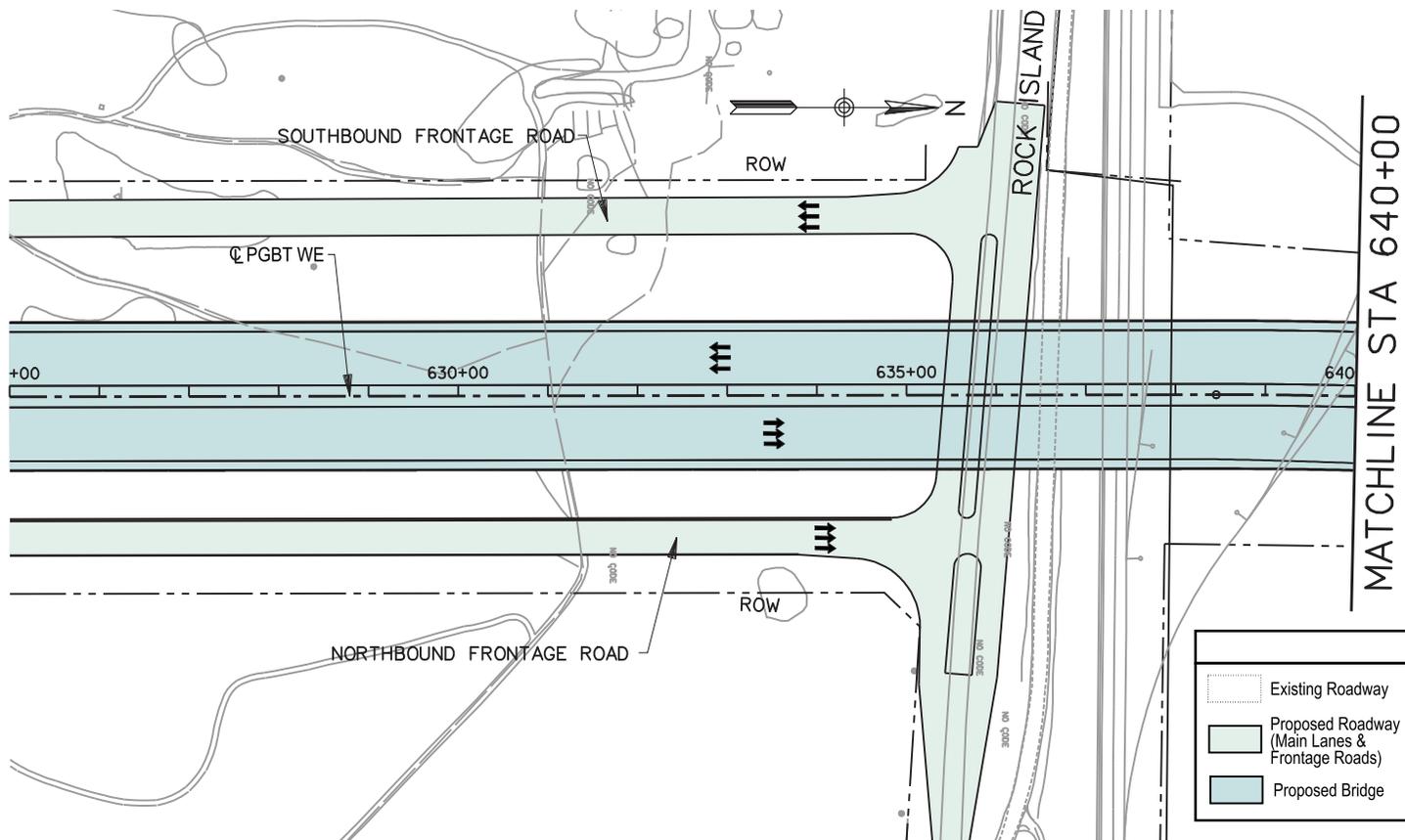
LEGEND			
	Existing Roadway		Proposed Retaining Wall
	Proposed Roadway (Main Lanes & Frontage Roads)		Electronic Toll Collection (ETC) Gantry
	Proposed Bridge		Traffic Arrow
			NOTE: Initial Construction Only



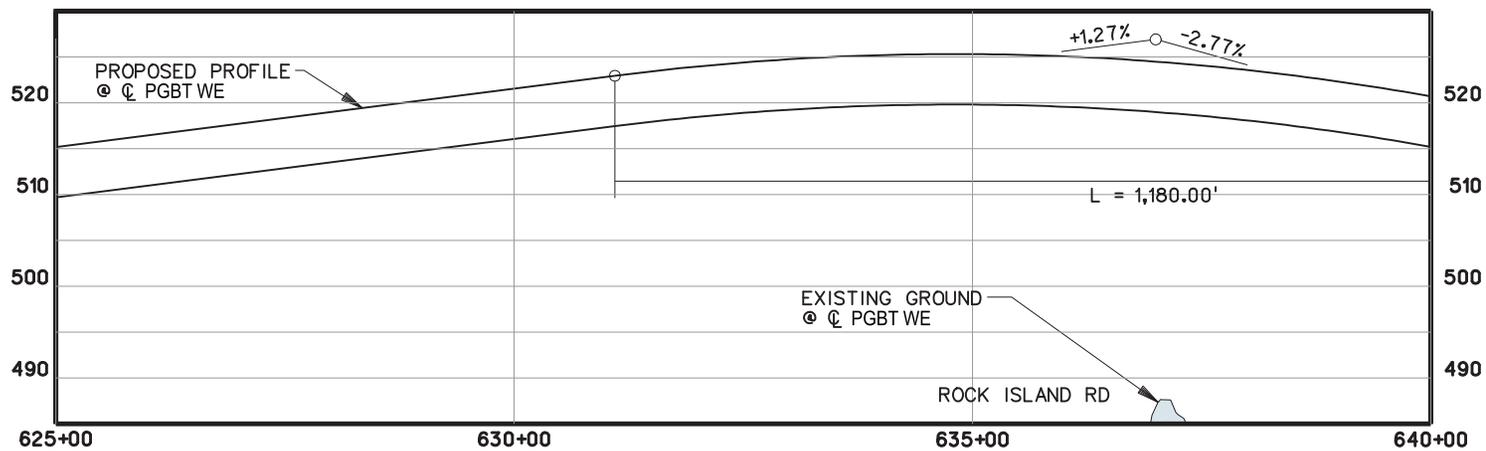


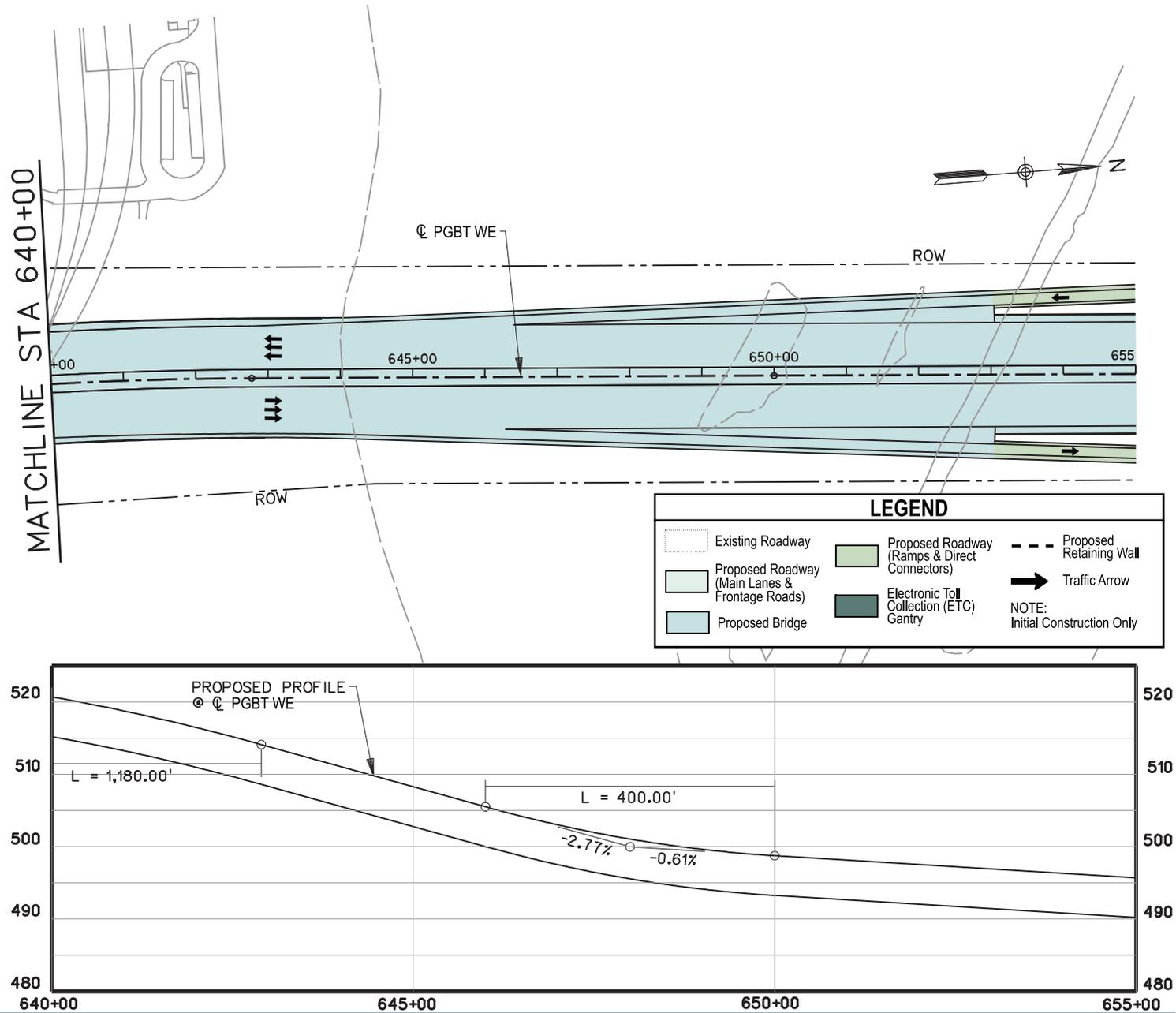


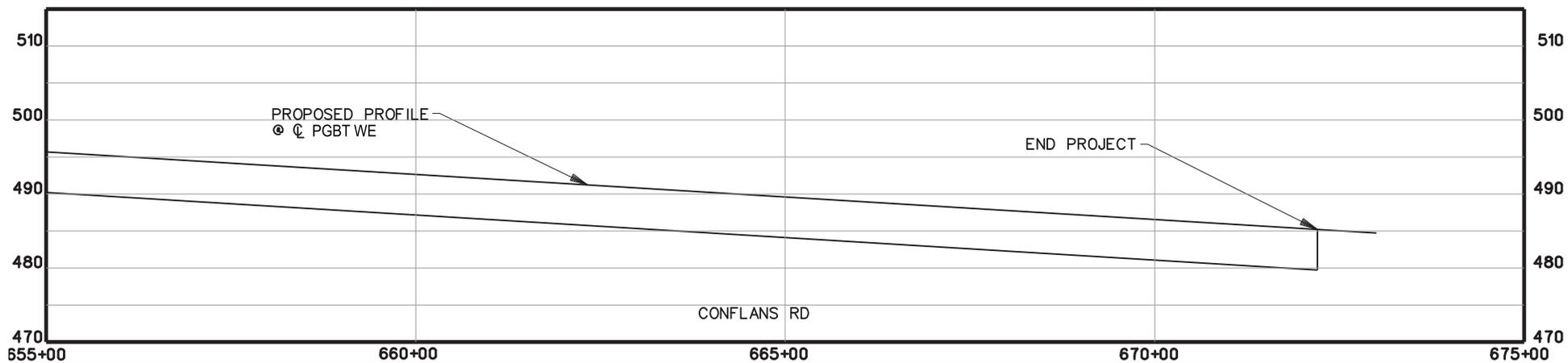
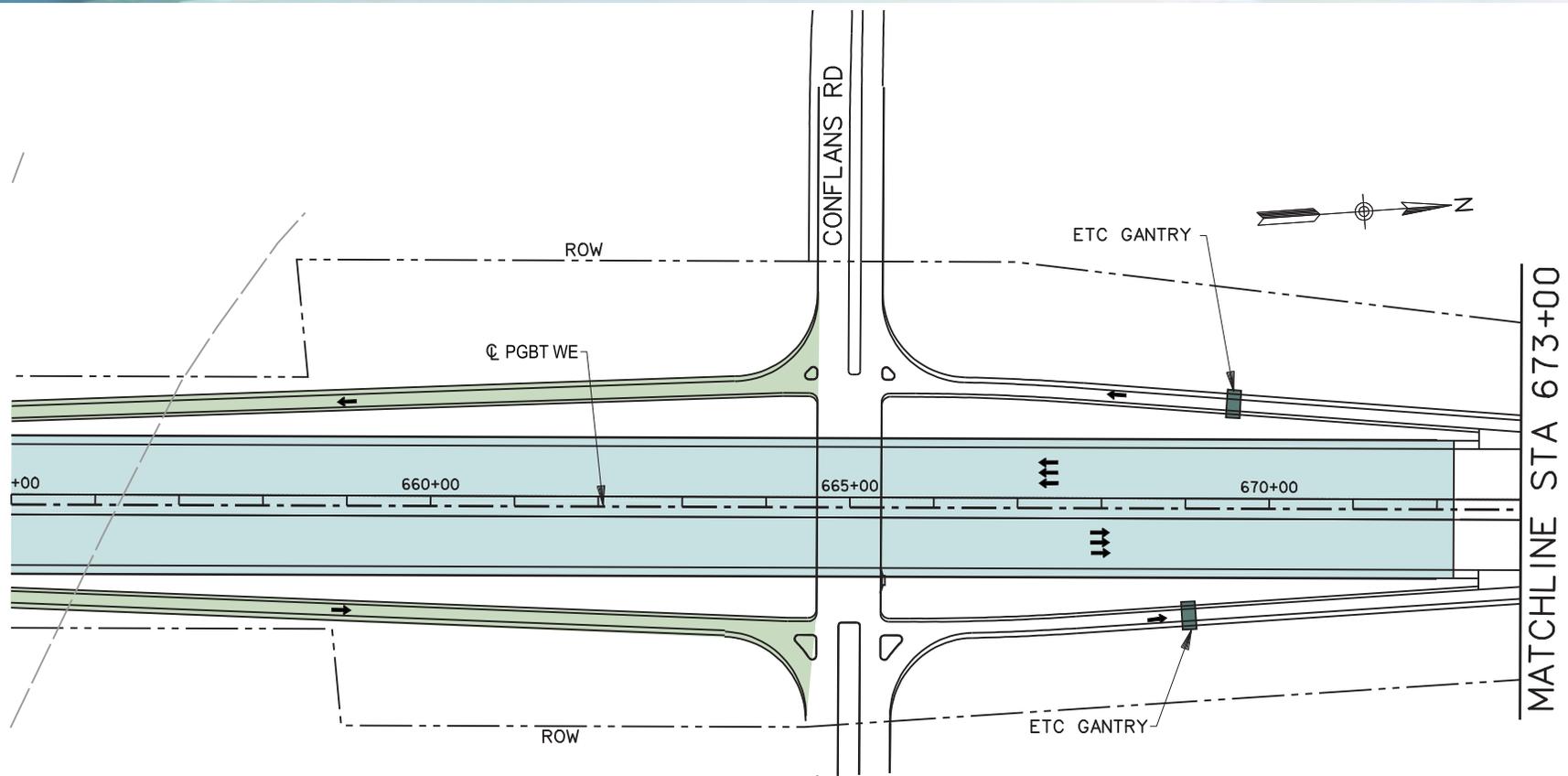


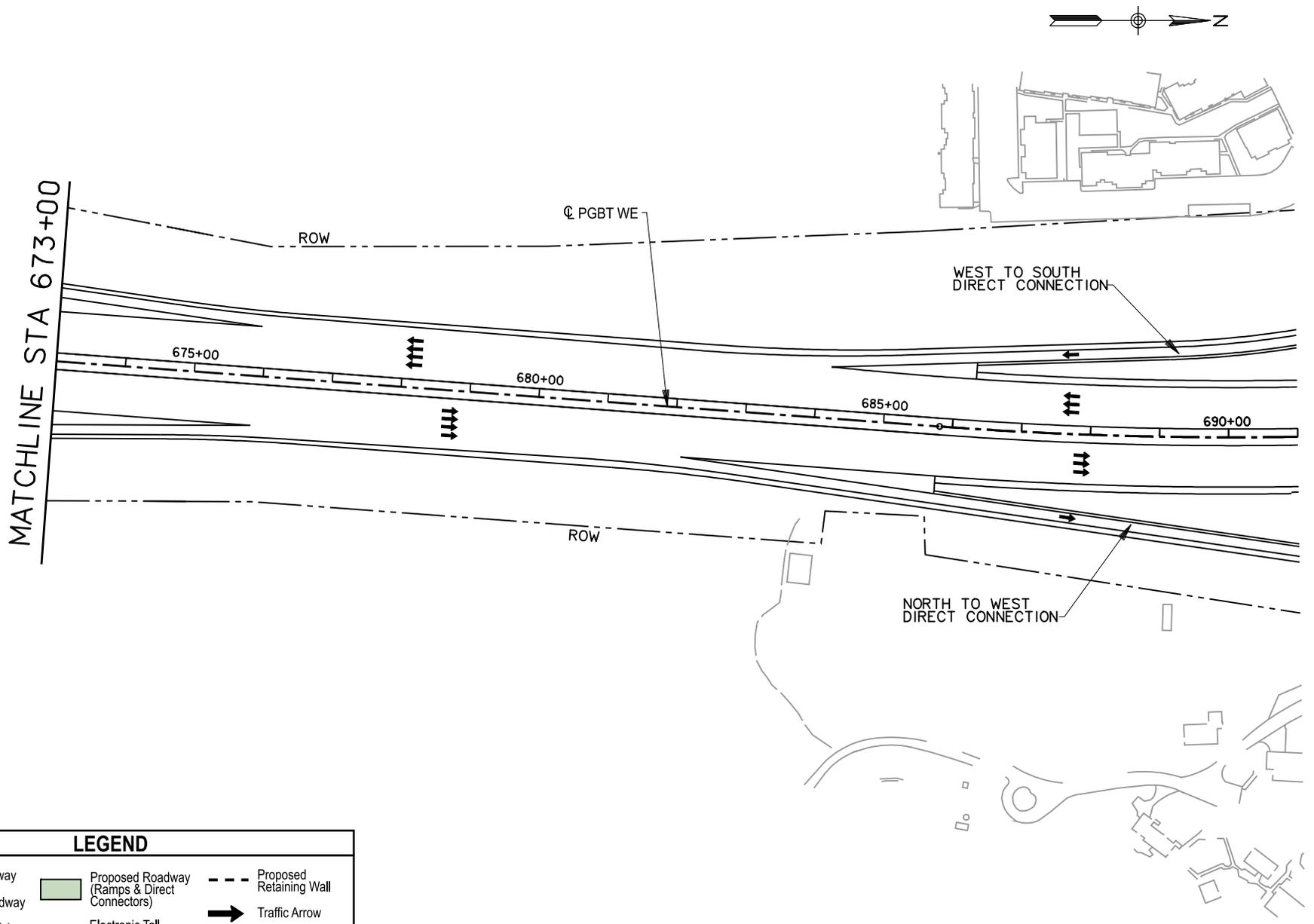


LEGEND			
	Existing Roadway		Proposed Retaining Wall
	Proposed Roadway (Main Lanes & Frontage Roads)		Electronic Toll Collection (ETC) Gantry
	Proposed Bridge		Traffic Arrow
			NOTE: Initial Construction Only









LEGEND			
	Existing Roadway		Proposed Retaining Wall
	Proposed Roadway (Main Lanes & Frontage Roads)		Traffic Arrow
	Proposed Bridge		NOTE: Initial Construction Only
	Proposed Roadway (Ramps & Direct Connectors)		
	Electronic Toll Collection (ETC) Gantry		

