Travis County Passenger Rail Engineering Feasibility Study

Agreement No. 4400008338

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1.0 Introduction/Background

1.1 Introduction

Travis County has engaged with HNTB to perform a high-level assessment of a potential passenger rail corridor connecting Austin-Bergstrom International Airport (AUS) to San Antonio, generally following State Highway 130 (SH 130) and Interstate 10 (I-10). This review excludes any shared track or service with Union Pacific Railroad (UPRR) existing freight infrastructure in the region. The scope of services outlined in this technical memorandum includes:

- Data collection, including previous reports, projects within the region, and publicly available materials for use in design activities
- Identification and review of a passenger rail route from AUS to San Antonio using SH 130 and I-10 rights of way
- Determination of potential termini at AUS and San Antonio and possible passenger rail connectivity to those termini
- High-level engineering feasibility review of the passenger rail route, including analysis of possible passenger rail speed limitations/restrictions along the route
- Potential order-of-magnitude capital costs and operations/maintenance costs for the passenger rail system

1.2 Background

The San Antonio and Austin region has seen significant growth since 2000. The Capital Area Metropolitan Planning Organization (CAMPO) *2050 Transportation Plan* anticipates that the Central Texas region's population "will more than double to over 4.7 million residents by 2050"[1], and the Alamo Area Metropolitan Planning Organization (AAMPO) *Mobility 2050* expects its area population to increase to 4.2 million by 2050.[2] This increase has caused the zone between the two cities to begin to merge into one large, combined area.

Regional transit and transportation services beyond personal vehicles exist throughout Austin and San Antonio, but many of those options are focused locally within Austin (Capital Metro Transportation Authority's bus, MetroRapid, and MetroRail commuter rail services) and San Antonio (VIA Metropolitan Transit's bus and Rapid services). Other

[1] https://www.campotexas.org/wp-content/uploads/2025/05/CAMPO-2050-RTP-Main-Document-and-Project-List-2025-05-12.pdf
[2] https://www.alamoareampo.org/plans/mtp/files/Mobility2050/MTP2050-Final.pdf

available Austin-San Antonio intracity options are generally one trip per day (Amtrak *Texas Eagle* passenger rail) or are through private bus companies. Direct flights do not currently exist between Austin and San Antonio.

Expanding existing passenger rail service has been studied and discussed within the Austin-San Antonio region since the 1990s. TxDOT prepared the *Austin-San Antonio Commuter Rail Study* in 1999, which concluded that a commuter rail corridor was feasible within the existing UPRR right of way (either through dedicated track or shared tracks with freight operations), and a study update by the Austin-San Antonio Intermunicipal Commuter Rail District (ASAICRD) in its *2004 Feasibility Study Update* confirmed the 1999 study's findings as well as elaborated on the potential of a shared corridor with UPRR. Further study and action through the Lone Star Rail District (LSRD) continued movement for an intercity passenger rail corridor with a potentially relocated freight corridor, but by late 2016 LSRD was effectively decommissioned.

Since then, TxDOT has reviewed a potential passenger rail system through its *Texas-Oklahoma Passenger Rail Study*, and a study through the North Central Texas Council of Governments (NCTCOG) released the *Fort Worth to Laredo High-Speed Transportation Study* in 2020. These studies focused on a statewide corridor rather than a specific Austin-San Antonio intercity pair. TxDOT is currently re-evaluating the existing UPRR corridor for a shared-track passenger rail system between Austin and San Antonio as part of an independent study. Also, the Texas Passenger Rail Advisory Committee was recently formed to "develop and drive key strategies and tactics for advancing passenger rail across Texas."[3]

1.3 Data Collection

This study's passenger rail feasibility review assessed information from previous studies and planned/proposed projects, and additional data was gathered from public sources for use in the potential passenger rail alignment review efforts. The following subsections provide additional details on the available data used in this study.

1.3.1 Passenger Rail Studies

TxDOT *Austin-San Antonio Commuter Rail Study* (1999)

This study looked at an initial list of transportation options such as a high-occupancy toll (HOT)/high-occupancy vehicle (HOV) lanes and alternatives within existing railroad right of

[3] https://www.traviscountytx.gov/commissioners-court/county-judge/tprac

way, such as busway, shared track, and dedicated track. These were taken through a Tier 1 study to further analyze and determine which transportation options to move forward for additional study. A major finding in this study is that a commuter rail system is feasible between Austin and San Antonio. Next steps stated within this study included an agreement with UPRR, the identification of a responsible agency, a funding source, implementation of the National Environmental Policy Act (NEPA) process, and implementation strategy/financial approach, among others.

ASAICRD *2004 Feasibility Study Update* (2004)

The ASAICRD update continued the work from the TxDOT *Austin-San Antonio Commuter Rail Study* and further identified feasibility and opportunities for a potential commuter rail corridor. The update included ridership analysis, possible alternative routes for commuter rail analysis, discussion of operations and maintenance needs, and financial analysis. The proposed commuter rail was proposed as a new double-track section within existing UPRR right of way generally separated from the host railroad.

Lone Star Rail District

The LSRD moved forward with a project plan to implement passenger rail between Austin and San Antonio, including improving passenger rail speeds up to 79 mph (with provisions to incrementally increase to 110 mph) within the existing UPRR corridor, additional track infrastructure to allow UPRR to maintain its operations to customers, and relocation of the through freight railroad movements to a new freight corridor to the east. Ultimately, UPRR ended a feasibility study agreement in 2016 due to concerns that passenger rail operations would impact freight operations were not addressed. Soon thereafter, CAMPO removed the potential commuter rail line from its long-range plan, effectively ending the project.

TxDOT *Texas-Oklahoma Passenger Rail Study Environmental Impact Statement* (2017)

This TxDOT study and subsequent environmental impact statement (EIS) reviewed the possibility of a passenger rail system from Edmond, Oklahoma to Laredo, Texas through Austin and San Antonio and identified acceptable options to move forward from an environmental standpoint. Between Austin and San Antonio, conventional passenger rail service was assumed to connect to anticipated LSRD service, and a higher-speed greenfield alignment was noted near AUS to San Antonio.

NCTCOG *Fort Worth to Laredo High-Speed Transportation Study* (2020)

The NCTCOG study provided a high-level review of six different transportation modes: guaranteed transit, conventional rail, higher-speed rail (up to 150 mph), high-speed rail (over 150 mph), magnetic levitation (maglev), and hyperloop. Additionally, potential

corridors focused on the existing UPRR freight right of way, I-35, and utility and greenfield alignments east of Austin/San Antonio. The study identified hyperloop and a greenfield/highway corridor as the highest-ranking technology/corridor combination.

TxDOT *Austin-San Antonio Passenger Rail Study* (ongoing)

Amtrak service of one train per day exists along UPRR corridors between Austin and San Antonio. A study led by TxDOT's Rail Division is underway to review the potential for additional passenger rail service on these UPRR corridors, which includes railroad operations modeling, ridership, and market analysis for different operating scenarios. This initial study phase is anticipated to be completed in 2026.

Texas Passenger Rail Advisory Committee (TPRAC) (ongoing)

TPRAC was formed by Travis County and Bexar County Judges in February 2024 to expand passenger rail opportunities within the Austin-San Antonio region. The Committee is looking to leverage the Federal-State Partnership Program and Texas legislature to move forward with investment into implementation of intercity passenger rail.

1.3.2 Planned Transportation Projects

Austin Light Rail

Austin Transit Partnership (ATP) is in the process of implementing a light rail system within the Austin area. The initial system is proposed to generally be located within street right of way along Guadalupe Street ROW, from 38th Street, through the University of Texas and downtown, then continuing south and east through downtown, across Lady Bird Lake, connecting to South Congress Avenue and extending to Oltorf Street through the South Congress shopping district. The initial system also includes an eastern portion running along Riverside Drive to SH 71. A priority extension is shown extending to AUS via Riverside Drive and the south side of SH 71 along the northwest side of AUS property. Construction of the initial phase of the Austin Light Rail project is anticipated to begin in 2027 with possible system opening in 2033.

AUS Expansion

AUS is undergoing a significant expansion with near-term improvements, a new arrivals and departures hall, a midfield 20+ gate concourse, new multi-level parking garages, additional surface parking, and other projects within the airport property. Project timeframes extend from 2026 to the early 2030s.

VIA Rapid Green and Silver Lines

VIA Metropolitan Transit (VIA) is constructing two additional bus rapid transit (Rapid) lines that could provide opportunities for connectivity to a potential future passenger rail project. The VIA Rapid Green Line extends north near the San Antonio International Airport through downtown and south to the Brooks Transit Center; it plans to be in service by 2028. VIA's Rapid Silver Line will run east-west from Commerce Street/General McMullen Drive on the west side to the Frost Bank Center east of town with connectivity to the Rapid Green Line downtown; it is projected to open in 2029.

1.3.3 Other Area Projects

San Antonio Sports & Entertainment District (Project Marvel)

The City of San Antonio is planning to redevelop the Hemisfair area within downtown to include multiple significant projects, including 25+ acres of mixed-use development, expansion of the Convention Center, a potential downtown basketball arena, upgrades to the Alamodome, and a deck park over I-37 connecting Hemisfair to the East Side in addition to other projects. The redevelopment is anticipated to occur through the early 2030s.

1.3.4 Publicly Available Design Data

The engineering feasibility review included the use of publicly available data from multiple sources to assess potential horizontal and vertical constraints and alignments for the potential passenger rail corridor. Publicly available data sources include:

- Aerial photography through Microsoft Bing
- Existing elevation data for review of vertical elements through the Texas Geographic Information Office (TxGIO)
- Reviews of specific locations through Google Maps (street view)

Review of maximum allowable design speeds for the potential passenger rail alignment utilized the following sources:

- Amtrak horizontal alignment design criteria
- Brightline (Florida) horizontal alignment design criteria

The data collection log is in **Appendix A**, which details available information used for this feasibility review effort.

2.0 Engineering Feasibility Review

The potential passenger rail engineering feasibility review considers the following items at a concept level:

- Passenger rail alignment review
    - Potential passenger rail system requirements, including infrastructure, operations and maintenance facility, and vehicles
    - Horizontal and vertical review within the defined corridor limits and anticipated speed limitations within public rights of way
- Termini review
    - Potential termini at AUS and at strategic locations within San Antonio (including opportunities to access transit)
    - Potential route options to access termini

The following subsections detail the feasibility review for these items.

2.1 Passenger Rail Alignment Review

A potential passenger rail alignment was reviewed along the following public right-of-way corridors:

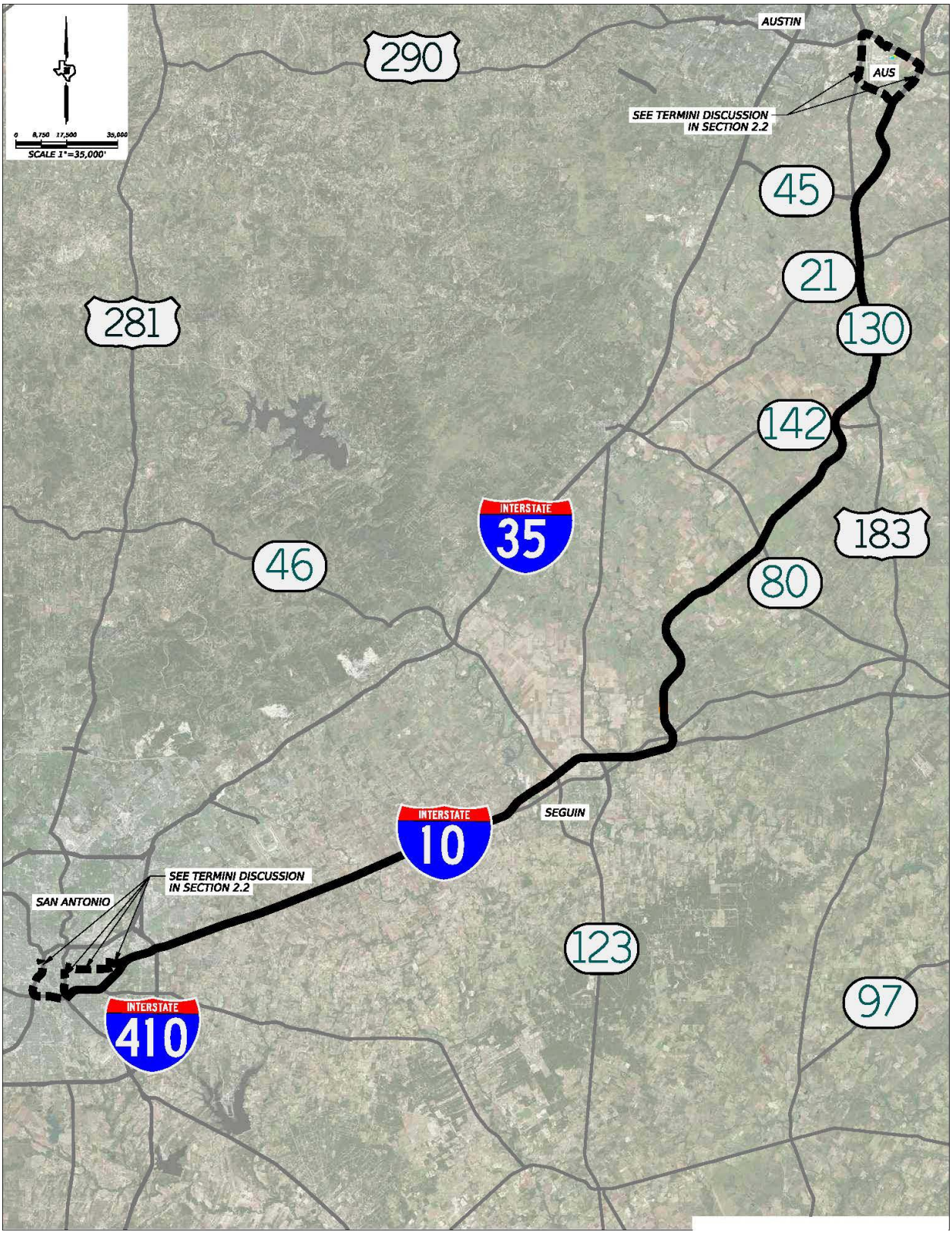
- SH 130 from SH 71 to I-10
- I-10 from SH 130 to I-37

Exhibit 1 below shows the general location of the potential passenger rail alignment.

One of the requirements of the engineering feasibility review is to stay within existing public rights of way where possible. While some locations at this stage are shown to shift the potential passenger rail alignment outside of existing highway right of way to confirm geometric feasibility, most of the alignment is within existing public right of way.

Connectivity to potential termini within San Antonio and AUS may vary from this potential alignment and are further discussed in Section 2.2.

Exhibit 1: Potential Passenger Rail Alignment Location (SH 130/I-10)



2.1.1 Passenger Rail System Requirements

It is anticipated that the potential passenger rail system will require the following infrastructure items prior to starting revenue service:

- Infrastructure – The passenger rail infrastructure would need to be constructed, including track, structures, stations, wayside signals/positive train control, and other ancillary features to meet FRA and state/regional/local requirements.
- Operations and maintenance facility (OMF) – The OMF provides a location for train storage, cleaning, and general maintenance of assets (both passenger rail vehicles and maintenance operations for rail infrastructure). Right-of-way acquisition would likely be required for the OMF site.
- Vehicles – The vehicle type and quantity of passenger rail rolling stock would need to be determined and procured. Vehicle selection and anticipated quantity of trains can also impact other decisions related to design, storage requirements, and operational headways/trips per day.
- Operator/maintainer of system – Operations and maintenance of the passenger rail system is a key consideration and component for state of good repair of the overall system and minimizing potential passenger delays. In many cases, operations and maintenance activities are contracted to a third party specializing in these activities.

See Section 4 for some of the next steps beyond this engineering feasibility scope of services to move forward with many of these items for revenue service.

2.1.2 Methodology

High-level concept assumptions for the passenger rail system include:

- Horizontal/plan
  - A 50-foot-wide passenger rail corridor footprint at this concept stage
  - No acquisition of private right of way except where use of public roadway right of way is not viable or potential alignment clearances at conflict locations cannot be confirmed at this stage of design due to unknown/missing data
  - Interchanges are reviewed with a feasible solution – more cost-effective solutions may be determined if further information is available in future efforts (note the simplest feasible solution may not be the most cost effective, and refined design solutions may be developed at a later stage to increase cost efficiency)

- Vertical/profile
  - At-grade and elevated potential passenger rail vertical elements were considered at this stage in design; potential underground/tunnel elements were not considered due to potential unknown impacts, which could impact feasibility
  - No at-grade roadway-rail crossings for the potential passenger rail corridor (all potential crossings are grade-separated at this stage in design)
  - Existing roadway overpasses along passenger rail route generally assume passenger rail to be over the roadway overpass due to unknown passenger rail equipment height requirements/lack of vertical clearance information
  - Detailed passenger rail profile not developed at this stage in design

2.1.3 Horizontal Alignment Review

A potential horizontal alignment was developed to review the engineering feasibility of a passenger rail corridor within the SH 130/I-10 right of way. The potential passenger rail horizontal alignment is assumed to be placed in the following locations within SH 130 and I-10:

- SH 130
  - Alignment is assumed to be within the existing highway median (between mainlanes) except at potential areas of conflict.
  - Areas of at-grade alignments are possible due to the wide existing median but would likely require embankment/retaining walls and adjustments to existing drainage as a portion of the highway drains toward the large ditch in the center of the median.
  - For elevated section of the alignment, it is assumed that the columns would have a negligible impact on the existing drainage.
- I-10
  - Alignment generally follows the centerline of the interstate where possible except at major interchanges or other potential areas of conflict. There is the potential for placing the alignment between mainlanes and WB frontage road where practical.
  - With minimal existing median width along the centerline, most of this section of alignment is assumed to be elevated due to the constrained available width.

Appendix B provides concept-level typical sections generally showing the location of the potential passenger rail route within the SH 130 and I-10 rights of way.

As part of the engineering feasibility study, a review of locations with potential constraints and challenges was conducted along the passenger rail route. Refer to **Appendix C** for a table detailing potential alignment conflict locations for additional review and resolution. In general, these locations for additional review and resolution include:

- Interchanges – Major interchanges along the SH 130/I-10 route have multi-level roadway infrastructure with direct connector ramps and columns that make it challenging (both horizontally and vertically) to achieve clearances for a passenger rail alignment. Major roadway interchanges along the SH 130/I-10 route include:
    - SH 130/SH 45 – Direct connectors from SH 45 EB-SH 130 SB and SH 130 NB-SH 45 WB present numerous column locations within the interchange area. Further, there are three levels of roadway elements (frontage roads, SH 130 mainlane overpasses, and direct connectors) that create vertical constraints for passenger rail corridor clearance.
    - SH 130/I-10 – The NB and EB SH 130 mainlanes access the EB and WB I-10 mainlanes through four direct connectors at the interchange. The entwined direct connectors within the interchange present horizontal and vertical challenges in maintaining the passenger rail corridor clearances within the median areas of both highways through the interchange.
    - I-10/I-410 – In addition to the existing cloverleaf interchange providing connectivity in each direction between I-10 and I-410, two direct connectors (I-10 WB-I-410 SB and I-410 NB-I-10 EB) have recently been constructed within the interchange. This is similar to the SH 130/SH 45 interchange in terms of columns and vertical constraints.
- Vertical clearances at roadway overpasses – There are many cross-street overpasses over the SH 130 and I-10 roadway mainlanes. In most cases the existing vertical clearance from bottom of bridge to top of ground/proposed passenger rail is not known in addition to unknown vertical requirements for the potential passenger rail vehicle. Further, reconstruction of the cross-street overpass structure to increase that vertical clearance may not be viable in many instances due to adjacent frontage roads and associated businesses. At many of these locations the review assumes the potential passenger rail would be elevated (over the cross-street overpass) to assure feasibility of clearance; however, further review and refinement of these locations should be considered in subsequent future design phases.
- Constrained right of way – There are many locations of constrained right of way (minimal space available outside of mainlanes/frontage roads), which presents a

challenge in accommodating/maintaining sufficient clearance for a potential passenger rail corridor within the median along I-10.

Note that resolution of these types of constraints generally increases the overall capital cost of a potential passenger rail route due to either significant highway facility reconstruction or additional elevated passenger rail structures.

Based on the initial horizontal alignment assumptions for the potential passenger rail route, speed impacts due to possible curve limitations are identified in **Appendices D and E**. Potential curve speed limitations were calculated assuming:

- The use of Amtrak (up to a maximum 79 mph design speed) and Brightline (Florida) (up to a maximum 125 mph design speed) passenger rail horizontal design criteria for each exhibit as noted
- The application of maximum superelevation for each curve calculation based on each system's design criteria requirements
- Vertical alignment impacts to curve speeds are not considered at this stage in development

Calculations for a potential travel time on the potential passenger rail route used the following assumptions:

- Curve speeds as identified in **Appendices D and E**
- Acceleration and deceleration rates for typical passenger rail vehicles as vehicle type is not defined at this stage in design
- No intermediate station stops between AUS and San Antonio termini
- Potential passenger rail profile speed impacts are not included at this stage in design

Based on high-level initial calculations, it is anticipated that travel times ranging from 55 minutes to 1 hour 5 minutes for a train up to a maximum speed of 125 mph and from 1 hour 20 minutes to 1 hour 30 minutes for a train up to a maximum speed of 79 mph could potentially be expected along the SH 130/I-10 passenger rail route.

2.1.4 Vertical Alignment Review

A high-level passenger rail vertical review was conducted to identify locations of vertical constraints throughout the potential passenger rail alignment. See Section 2.1.1 for assumptions and details related to the review of a potential passenger rail vertical alignment.

Appendix F provides an exhibit detailing the results of the high-level vertical review. Based on design assumptions from the alignment review/resolution table in **Appendix C**, the anticipated alignment lengths of at-grade and elevated system (minus termini) are:

- At grade: 35.9 miles
- Elevated: 53.7 miles

2.2 Termini Review

As part of this passenger rail engineering feasibility review, a high-level identification of potential station termini at AUS and in the general downtown San Antonio area was conducted to determine if potential passenger rail routes would be able to access those potential termini.

The following subsections detail reviews of potential termini and associated potential passenger rail routes to AUS and San Antonio.

2.2.1 AUS

AUS is on the southeast side of Austin located south of SH 71 between SH 130 and US 183. Its main terminal (Barbara Jordan Terminal) is on the north side of the AUS property and is accessed from SH 71 via Presidential Boulevard. AUS is currently undergoing a multi-year facilities expansion; Section 1.3.2 provides additional details on the AUS expansion.

2.2.1.1 Potential Termini

It is anticipated that the terminus at AUS for the potential passenger rail service would provide connectivity (as direct as possible) to the Barbara Jordan main terminal on the north side of AUS property. With multiple projects planned within AUS and the proposed ATP Austin Light Rail priority extension to AUS, a potential terminus would need to be coordinated with those projects in subsequent future design phases.

2.2.1.2 Potential AUS Passenger Alignment Routes

The following subsections examine potential passenger rail routes for accessing AUS. **Appendix G** provides the locations of each reviewed potential terminus at AUS, while the subsections below offer additional details on the routes leading to the potential AUS passenger rail station terminus.

Note that the Federal Aviation Administration (FAA) is required to review projects in close proximity to runway and taxiway facilities, and these reviews have the potential to introduce additional project risk.

East Approach into AUS

A potential route was reviewed to access AUS from the east, which included:

- A curve outside the southwest quadrant of the SH 130/SH 71 interchange to avoid impacts to existing interchange infrastructure
- Staying on the south side of SH 71
- Grade separations at other roadways within AUS property

Refer to **Appendix G** for additional information related to the potential east approach route location.

Constraints for the potential east route approach into AUS include:

- Runway protection zone – Due to requirements in the runway approach area, a conservative profile assumption is to be at ground level (at-grade) through the runway protection zone for runway 17L, which is between Presidential Boulevard and Golf Course Road along SH 71 and just north of the Presidential Boulevard/Hotel Drive intersection. To accommodate the at-grade sections, it is assumed that relocation of Golf Course Road/TxDOT Flight Services connection would be needed. The potential route should be able to match the existing Presidential Boulevard profile over Hotel Drive.
- Curves – At least two locations will likely require reductions in maximum passenger rail speeds due to curves: alignment around the SH 130/SH 71 interchange and near the SH 71/Presidential Boulevard intersection.
- Right of way – It is likely that right of way would need to be acquired from AUS to accommodate the proposed rail corridor along the north side of AUS.
- AUS access – Grade separations across other roadways within the AUS property may be required depending on ultimate location of the station.

Based on the route, potential impacts, and constraints the potential east approach route location appears to be feasible from an engineering perspective.

West Approach into AUS

A potential passenger rail route to AUS via the west was reviewed, which generally followed:

- The north side of Burleson Road between SH 130 and US 183
- US 183 from Burleson Road to the US 183/SH 71 interchange
- Curve outside the southeast quadrant of the US 183/SH 71 interchange to avoid impacts to existing interchange infrastructure
- Staying on the south side of SH 71 due to runway protection zone (assumed at-grade alignment) and following the Austin Light Rail priority extension alignment
- Grade separations at other roadways within AUS property

Refer to **Appendix G** for additional information related to the potential west approach route location.

Constraints for the potential west route approach into AUS include:

- Available right of way – Additional right of way would appear to be required north of Burleson Road to accommodate the potential route. This would be AUS-owned right of way and would need to be discussed with AUS prior to further consideration of this route.
- Austin Light Rail /SH 71 eastbound frontage road – The proposed Austin Light Rail priority extension has a proposed future alignment along a portion of this potential route from the US 183/SH 71 interchange along SH 71 into AUS. TxDOT is also planning a frontage road along the south side of SH 71 for AUS's air freight services. Additional passenger rail infrastructure separate from the light rail system (and accounting for the proposed frontage road) would require additional space in the SH 71 corridor, which would likely require additional right of way.
- Runway protection zone – Due to requirements in the runway approach area, a conservative profile assumption is to be at ground level (at-grade) through the runway protection zone, which is crossed at two locations on this potential route:
    - Burleson Road for around 1600 feet west of Emma Browning Avenue at the south end of runway 36L and
    - Potential spot locations from US 183/SH 71 interchange to west of Spirit of Texas Drive (from existing runway 17R and future runway 17C.

Accommodation for an at-grade section within the runway protection zone along Burleson Road may require additional AUS ROW for infrastructure construction and possible minor impacts to the existing perimeter fence and access road.

- Curves – Four locations, at a minimum, will likely require reductions in maximum passenger rail speeds due to curves: Burleson Road curves to US 183 and SH 130, the southeast quadrant of the US 183/SH 71 interchange, and entrance into AUS (possibly near Spirit of Texas Drive).
- AUS access – Grade separations across other roadways within the AUS property may be required depending on ultimate location of the station.

This potential route is likely not feasible due to the potential need for extensive AUS right of way along Burleson Road and additional space needed to accommodate the Austin Light Rail priority extension/TxDOT frontage road project along SH 71.

A review of using US 183 from the SH 130/SH 45 interchange to AUS – in lieu of the Burleson Road connection – was also conducted. Some of the same challenges existing from the previous route, but additional challenges utilizing US 183 to SH 130/SH 45 include:

- Available right of way – US 183 is typically an undivided four-lane highway between SH 130/SH 45 and Burleson Road with commercial properties along its extents. The TxDOT right of way would likely not be able to accommodate the assumed 50-foot passenger rail corridor without additional right-of-way acquisition along this stretch. There are also potential historical sites along this stretch of roadway, which would make right-of-way acquisition in certain locations along US 183 more challenging.
- Access through SH 130/SH 45 interchange – Additional review, including data to confirm existing column locations and roadway profile information, would be required to determine if a potential route could be accommodated horizontally and vertically through the interchange.

This potential route is also considered likely not feasible due to the right-of-way impacts and associated challenges listed in the previous route evaluation.

2.2.2 Downtown San Antonio Area

The following subsections review potential termini in the San Antonio area for access to the downtown areas as well as potential passenger rail routes to access those termini.

2.2.2.1 Potential San Antonio Termini

A review of potential termini locations for the study focused on a 3-mile radius from the downtown San Antonio area with connectivity into the downtown area via transportation/transit options. Identification of these locations were identified through:

- Identification of potential destinations within the San Antonio area
- Review of proposed projects in the area that would either become desired destinations or provide connectivity to those destinations
- Internal workshop to identify opportunity locations and applicable connectivity via transportation/transit modes

Appendix H details the location of each of the reviewed potential termini in the San Antonio area, and the following subsections provide additional detail on those potential passenger rail station termini.

Downtown

One potential terminus would be near downtown San Antonio within the area of the Sports & Entertainment District (see Section 1.3.3 for additional information on planned improvements). While an exact potential station location has not been defined as part of this feasibility review, the assumption for the terminus would be in the general vicinity of I-37 and the Alamodome/Convention Center to provide connectivity to the activity centers as well as other transportation modes (Amtrak, VIA bus service).

VIA Centro

A major transit hub for VIA's bus system, VIA Centro Plaza (909 W Houston Street) is located about a mile west of downtown San Antonio and would provide passenger rail riders with options for last-mile multimodal/transit as well as transit connectivity to much of the remaining portions of VIA's service system. I-10 is two blocks east of Centro Plaza, while UPRR freight tracks are a block to the west.

VIA Green Line Connection

A potential passenger rail terminus near I-10/Roosevelt Avenue would provide connectivity to multiple San Antonio destinations through VIA's future Rapid Green Line service (see Section 1.3.2). VIA is proposing Green Line stops along Roosevelt Avenue at Steves Avenue and Highland Boulevard, and a potential station location could consider using existing I-10 right of way near Roosevelt Avenue.

Potential Frost Bank Center Redevelopment

One of the goals of the San Antonio Sports & Entertainment District (see Section 1.3.3 for additional information on planned improvements) is to construct a new arena for the San Antonio Spurs that would move the basketball team from the Frost Bank Center to downtown. This may provide an opportunity for redevelopment of the current Frost Bank Center site (1 Frost Bank Center Drive), and that redevelopment opportunity could provide an impetus for a terminus location just off I-10 with future VIA Rapid Silver Line connectivity to downtown.

2.2.2.2 Potential San Antonio Passenger Alignment Routes

Based on potential passenger rail termini in the San Antonio area defined in Section 2.2.2.1, high-level concept alignment routes were developed and reviewed for engineering feasibility to reach those particular termini locations. The following subsections detail the potential passenger rail routes to each of the termini, the challenges/constraints with each route, and potential feasibility.

Downtown

A potential route was reviewed to access a downtown terminus near the San Antonio Sports & Entertainment District, which includes:

- I-10 from the east to the I-10/I-37 interchange
- Curve outside the northeast quadrant of the I-10/I-37 interchange to avoid impacts to existing interchange infrastructure
- East side of I-37 to terminus in the downtown area

Refer to **Appendix H** for additional information related to the downtown terminus route location.

Constraints for the potential downtown San Antonio terminus route include:

- Available right of way – The east side of I-37 presents minimal right of way for passenger rail infrastructure and would require an elevated structure adjacent to residential properties, which may present challenges to mitigate during the environmental process.
- Curves – The potential route is shown to follow the north side of the I-10/I-37 interchange, which will decrease the passenger rail speed in this area.
- Station location – While a location for a station in the downtown area has not been defined, there are limited opportunities for station placement. These opportunities

may include minimal space within I-37 and available undeveloped space outside TxDOT right of way.

Based on the route, potential impacts, and constraints the potential downtown terminus route location appears to be feasible from an engineering perspective pending a defined station location.

Another potential route to access downtown San Antonio would be via Commerce Street through an elevated station location just east of the existing UPRR tracks/St Paul Square. This route would consist of:

- I-10 from the east to its connection with Commerce Street
- Commerce Street from I-10 to east of St Paul Square (elevated passenger rail and station) prior to crossing UPRR tracks

Refer to **Appendix H** for additional information related to the Commerce Street route location.

Possible constraints for the Commerce Street potential route include:

- Available right of way – The Commerce Street right of way is largely occupied by Commerce Street pavement and sidewalk facilities, with little room for additional surface infrastructure. There are many commercial and residential properties along this corridor as well, and it is assumed that significant right-of-way acquisition is not feasible along this route.
- Impacts to roadway section – Commerce Street varies from two lanes with wide shoulders/parking to four lanes. To construct the elevated rail system, the roadway configuration would need to be adjusted to accommodate the columns and associated column protection. This could impact the number of lanes, removal of parking, or sidewalk width impacts if agreed to by the City of San Antonio.
- Elevated station configuration – An elevated station within the roadway would require ingress to/egress from the station, which may require connections from the station to nearby parcels/right of way for that station access. Additionally, an elevated structure through an existing neighborhood may present challenges and/or mitigate during the environmental process.

This potential route is considered likely not feasible due to the challenges with roadway impacts and availability of right of way.

VIA Centro

The potential route for a passenger rail terminus near the VIA's Centro Plaza includes:

- I-10 from the east to the I-10/I-35 interchange
- Curve outside the northeast quadrant of the I-10/I-35 interchange to avoid impacts to existing interchange infrastructure
- Transition from east side of I-10/I-35 to west side around San Pedro Creek
- Frio Street from connection with I-10/I-35 to Centro Plaza

Refer to **Appendix H** for additional information related to the VIA Centro Plaza potential passenger rail route location.

Challenges identified in the VIA Centro Plaza route consist of:

- Available right of way – The I-10/I-35 segment of the potential route has minimal space for passenger rail elevated construction due to the roadway infrastructure and residential/commercial properties adjacent to the freeway right of way. This would be a significant constraint for this potential route without acquisition of properties.
- Impacts to roadway section – Frio Street is typically a four-lane roadway with a turn lane/median between the lanes. While columns and column protection can generally be placed within the turn lane/median area, this effectively creates challenges for left turns from driveways and may limit locations for turning left off Frio Street due to space between columns. Roadway changes to Frio Street would need to be agreed to by the City of San Antonio.
- Elevated station configuration – An elevated station within the roadway would require ingress to/egress from the station, which may require connections from the station to nearby parcels/right of way for that station access.
- Curves – The potential route is shown to follow the northeast side of the I-10/I-35 interchange as well as connect to Frio Street, both of which will decrease the passenger rail speed in this area.

This potential route is considered likely not feasible due to the challenges with roadway impacts and availability of right of way.

VIA Green Line Connection

A potential passenger rail route was reviewed to connect to stations along the future VIA Rapid Green Line, which includes:

- I-10 from the east through the I-10/I-37 interchange
- North side of I-10 to terminus near Roosevelt Avenue

Refer to **Appendix H** for additional information related to the VIA Green Line Connection route location.

Possible constraints for the potential VIA Green Line connection at Roosevelt Avenue route include:

- I-10/I-37 interchange – To access a potential station location at I-10/Roosevelt Avenue, the potential route would need to go through or over the freeway interchange. While the route appears feasible to go through or around the interchange, it would require horizontal curves and/or profile grades that may be sharper or steeper than desired.
- Available right of way – The north side of I-10 near Roosevelt Avenue presents minimal right of way for passenger rail infrastructure and would require an elevated structure adjacent to residential and commercial properties.
- Station placement – There is minimal space within I-10 right of way for placement of an elevated station near Roosevelt Avenue, there is not available undeveloped space outside TxDOT right of way, and existing UPRR tracks limit the placement of the station as well.

Based on the route, and despite potential impacts to property and other constraints, the potential VIA Green Line/Roosevelt Avenue route location appears to be feasible from an engineering perspective.

<u>Potential Frost Bank Center Redevelopment</u>

The potential route for a passenger rail terminus within the current Frost Bank Center area includes:

- I-10 from the east to Houston Street
- Houston Street from I-10 to the Frost Bank Center area

Refer to **Appendix H** for additional information related to the Frost Bank Center area route location.

Challenges identified in the Frost Bank Center passenger rail route consist of:

- Available right of way – The Houston Street right of way is largely occupied by Houston Street pavement and sidewalk facilities. Houston Street is also adjacent to

many commercial properties throughout much of the corridor. It is assumed that additional significant right of way would not be available along this route.

- Impacts to roadway section – Within the potential route location, Houston Street is a four- to five-lane roadway with varying westbound/eastbound use due to reversible lanes that change based on the time of day. To construct the potential elevated passenger rail system, the roadway configuration would need to be adjusted to accommodate the columns and associated column protection. This would impact the number of lanes and possibly the ability for directional lane flexibility if agreed to by the City of San Antonio.
- Curves – The potential route is proposed to take a sharp curve at the Commerce Street/Houston Street intersection, which will decrease the passenger rail speed in this area.

While this potential route appears feasible, it would require significant City of San Antonio coordination for likely changes to Houston Street traffic operations.

3.0 Potential System Costs

This section focuses on potential order-of-magnitude capital and O&M costs related to the potential Austin-to-San Antonio passenger rail system. The high-level cost review assumes commuter or higher-speed (up to 125 mph) passenger rail system and not a true high-speed corridor (speeds greater than 125). It is anticipated that a high-speed rail corridor is more expensive than the costs included in this technical memo due to the specific vehicles, requirements for the facilities, and technology requirements.

3.1 Capital Costs

Items typically included as part of capital costs for a passenger rail system include:

- Track, structures, signals, stations, and associated infrastructure for the passenger rail corridor
- Operations and maintenance facility (OMF)
- Rolling stock (i.e., passenger rail vehicles)

Review of potential capital cost values utilized publicly available information from similar projects around the U.S. with the goal of identifying comparable systems that can be used as a basis for an overall project capital cost estimation. Sources considered for this review include:

- Trinity Metro TEX Rail – TEX Rail is a commuter rail system in the Fort Worth area that connects the Dallas-Fort Worth International Airport with downtown Fort Worth. It is primarily a single-track railroad with passing sidings and stations along an abandoned rail corridor. Based on publicly available data, the commuter rail system cost approximately $959 million to construct 26.8 miles in 2017, which calculates to approximately $60 million per mile in 2026. Additionally, a 2.1-mile urban extension of the system is being proposed that is anticipated to cost $167 million (approximately $80 million per mile). Note that this system is primarily at grade, although it does have some lengths of elevated guideway structure.
- Rio Metro Regional Transit District Rail Runner – This is a shared-track commuter rail system in New Mexico with sidings and additional track as part of an existing freight rail corridor. This project was not used for capital costs due to the shared-track system, which would be less than a new, dedicated corridor.
- Utah Transit Authority FrontRunner – Similar to the Rail Runner project, this is also shared-track commuter rail within an existing freight corridor and was not used for determining capital costs.

- Brightline (Florida) – The Brightline project in Florida is a higher-speed rail system (up to 125 mph) that has a segment with shared track and another with dedicated passenger rail-only single track with passing sidings at strategic locations. Based on publicly available data, the dedicated passenger rail-only segment costs $5 billion for the 168-mile segment in 2023, which equates to approximately $35 million per mile in 2026. Note that the Brightline system is also mainly at grade, and the potential Austin-San Antonio passenger rail corridor, at this stage in design, is assumed to primarily be on structure.

A OMF would likely be needed for a new Austin-San Antonio passenger rail service as well. While headways, number of round trips, and other factors determining OMF size has not been determined at this stage, a comparable project is likely the Front Range project in the Denver area. This project is looking at a 173-mile passenger rail corridor linking Pueblo, Colorado Springs, Denver, and Fort Collins and is assuming $300 million at its current stage in design for the project's OMF.

The cost for rolling stock can vary greatly depending on headways/train trips, anticipated ridership, and desired number of spare vehicles. As an example, the Front Range project (commuter rail) is calculating each train set with $18 million locomotives (assuming two locomotives – one at each end of the train) and $8 million coach cars (assuming three coach cars per trip for this estimate). These values total $60 million per train. Assuming four trains in service and two spare trains (six total), this would equate to $360 million for rolling stock costs for revenue service. Higher-speed and high-speed passenger rail vehicles would likely be a higher cost per vehicle based on the technology, and the number of required train sets and coach cars per set would vary based on the factors noted above.

Based on the findings above, a high-level anticipated cost for the Austin-San Antonio passenger rail may consist of:

- Passenger rail infrastructure
    - At-grade section - $40 million/mile for approximately 35.9 miles
    - Elevated section - $80 million/mile for approximately 53.7 miles
    - Termini - $120 million/mile (due to complexity/access) for up to 9.0 miles
- OMF – $300 million
- Vehicles – $360 million (commuter)
- Contingency – Based on the Federal Railroad Administration's *Capital Cost Estimating Guidance for Project Sponsors*[4], the rule-of-thumb for projects within the planning/concept design stage include 25%-35% allocated and 10%-20%

[4] https://railroads.dot.gov/elibrary/capital-cost-estimating-guidance-final

unallocated contingencies for totals ranging from an overall contingency range of 35%-55%. For the purposes of this capital cost, a mid-range contingency of 45% is assumed at this stage.

- Professional services – Additional "soft costs", such as preliminary engineering/final design, project management, construction administration and management, legal costs, surveys/testing/inspection activities, and start-up costs, are assumed at 25% of overall project costs for the purposes of this exercise.

These separate capital cost items calculate to around $13.5 billion in 2026 dollars for a potential commuter or higher-speed (up to 125 mph) passenger rail system between Austin and San Antonio using the existing SH 130 and I-10 rights of way. Note that this capital cost assumes:

- Minimal reconstruction of existing SH 130/I-10 and other roadway facilities
- Minimal right-of-way acquisition
- Minimal utility impacts due to use of highway median areas
- No interest payment/bonds related to the project infrastructure

3.2 Operations and Maintenance (O&M) Costs

Cost related to O&M typically consist of:

- Maintenance of track, structures, signals, stations, facilities, and other infrastructure
- Maintenance/repair of rolling stock
- Operations related to revenue service
- Other ancillary costs such as staffing, utilities, insurance, and other items required to operate and maintain the passenger rail system

Review of potential O&M costs for a potential passenger rail system focused on similar systems using the National Transit Database[5] . The Database provides agency information related to its different assets, such as overall O&M costs and route miles associated with the system. Determination of O&M costs per mile of passenger rail can assist in defining an order-of-magnitude estimate for the Austin-San Antonio passenger rail system O&M expectations. Note that these values do not account for fare revenue due to unknown ridership at this stage or potential interest payments as part of infrastructure bonds.

[5] https://www.transit.dot.gov/ntd

The following passenger rail systems were reviewed as potential comparable systems for O&M costs:

- Trinity Metro TEX Rail – TEX Rail is a mostly dedicated facility that is mainly single track with strategic sidings. From the National Transit Database, Trinity Metro spent around $38 million in operating expenses in 2024 on the TEX Rail system. This equates to around $1.4 million for operating costs per mile of corridor.
- Rio Metro Regional Transit District Rail Runner – Since this is a shared-use facility between passenger and freight trains, these O&M costs are likely not comparable to the potential SH 130/I-10 passenger rail corridor.
- Utah Transit Authority FrontRunner – Similar to the Rail Runner project, this system are likely not comparable due to the shared track with freight trains.
- Brightline (Florida) – Based on publicly available data from news articles, the Brightline higher-speed rail system in Florida amassed operating expenses of $341 million in 2024, which averages to approximately $2 million per corridor mile.

Based on similar projects, a general value of $1.5 million to $2 million per mile can be assumed at this stage for future operations and maintenance costs related to the Austin-San Antonio passenger rail system along the SH 130/I-10 corridor. This totals between $140 million to $190 million per year in O&M costs in 2026 dollars.

To summarize capital and O&M costs detailed in Sections 3.1 and 3.2:

- Capital costs – See section 3.1 for assumptions related to the estimated $13.5 billion anticipated capital costs.
- O&M costs – Approximately $190 million per year is assumed for operations and maintenance based on previous projects included in section 3.2.

4.0 Findings/Next Steps

This section details the high-level findings of the engineering feasibility review of a potential Austin-San Antonio SH 130/I-10 passenger rail corridor and recommended potential next steps.

4.1 Findings

In general, a potential passenger rail corridor has not yet identified any fatal flaws from an engineering perspective along the SH 130/I-10 corridors provided:

- TxDOT and other public agencies allow for use of their rights of way for implementation of the passenger rail system;
- Minor additional right-of-way impacts, such as the SH 130/SH 45 and I-10/I-410 interchanges as well as OMF, are either allowed or mitigated in future subsequent design efforts; and
- Termini are coordinated and further vetted with affected parties to validate locations and confirm potential station sites.

This engineering feasibility study is a high-level planning analysis only focused on confirmation of viability from a horizontal, vertical, and system elements perspective and does not review potential passenger rail system ridership, market analysis, station locations beyond system termini, and other items that would need to be reviewed in additional detail to move the potential passenger rail corridor forward.

4.2 Recommended Next Steps

This engineering feasibility study has taken a first step in the overall review for the viability of this corridor for passenger rail service. Below are some of the next steps that would continue the potential Austin-San Antonio SH 130/I-10 passenger rail alignment's progress.

4.2.1 Confirmation of Use of TxDOT/Public Agency Right of Way

One of the major assumptions for engineering feasibility and overall capital cost of the Austin-San Antonio passenger rail system alignment is the use of existing SH 130 and I-10 public rights of way. Coordination and agreements with TxDOT, AUS, and other public agencies as required would be necessary to construct the passenger rail corridor within those rights of way as well as any conditions related to use of that right of way.

4.2.2 Coordination with TxDOT Passenger Rail Study

TxDOT is currently conducting a study reviewing the potential for additional Austin-San Antonio intercity passenger rail service (beyond Amtrak's schedule) utilizing the existing UPRR Austin Subdivision corridor. While the TxDOT alignment and this alignment are likely different in terms of location, speed, and impacts, the two studies are ultimately trying to accomplish the same goal: to provide reliable intercity passenger rail service between Austin and San Antonio. At a minimum, discussion and coordination between the two studies should occur to determine if one or both should move forward and plan for those next steps.

4.2.3 Continued Planning Efforts

As noted in the memorandum findings (Section 4.1), the engineering feasibility study is only the first step in determining viability of the SH 130/I-10 passenger rail alignment. Additional preliminary study items to confirm initial viability may include but would not be limited to:

- Market analysis/ridership and possible revenue service schedules
- Further development of termini
- Conceptual engineering development
- Environmental/NEPA reviews
- Potential implementation strategy

4.2.4 Initial Funding Strategy

This study provides high-level capital and O&M costs for the passenger rail system based on comparable systems throughout the U.S. Funding will be a key component to help make this project a reality. Items that should be considered as part of that strategy may include:

- Potential federal funding opportunities
- Potential local funding (either for federal funding match or for entire project funding)
- Possibility of private-owned company to construct/operate the system

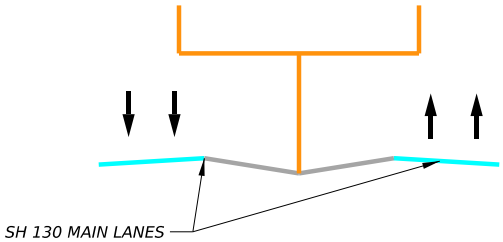
Additionally, O&M costs would need to also be considered minus revenue from the service, and those costs in perpetuity would be a component in that funding strategy as well.

Appendix A: Data Collection Log

Travis County Austin-San Antonio Passenger Rail Engineering Feasibility Study
Data Collection

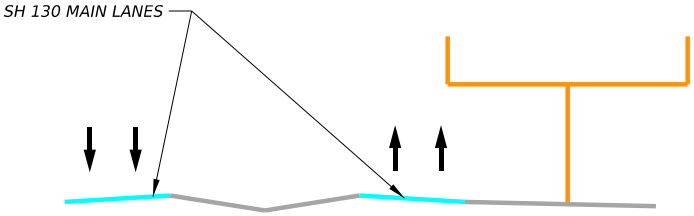
Item	Source	Notes
TxDOT Austin-San Antonio Commuter Rail Study (1999)	Website/report	https://library.ctr.utexas.edu/Presto/content/Detail.aspx?ctID=UHVibGljYXRpb25fMTE2MTA%3D&rID=MTI0MDY%3D&ssid=c2NyZWVuSURfMTQ2MDk%3D&bmdc=MQ%3D%3D
ASAICRD Feasibility Study Update (2004)	Website/report	https://library.ctr.utexas.edu/Presto/content/Detail.aspx?ctID=UHVibGljYXRpb25fMTE2MTA%3D&rID=MjYxMDQ%3D&ssid=c2NyZWVuSURfMjEzMjI%3D&bmdc=MQ%3D%3D
Lone Star Rail District information	Web summary (2013)	https://services.austintexas.gov/edims/document.cfm?id=202458
TxDOT Texas-Oklahoma Passenger Rail Study EIS	Website/report	https://railroads.dot.gov/sites/fra.dot.gov/files/fra_net/16563/Texas-Oklahoma%20Passenger%20Rail%20Study%20Service-Level%20DEIS-MAIN%20TEXT.pdf
NCTCOG Fort Worth to Laredo High-Speed Transportation Study	Website/report	https://www.nctcog.org/trans/plan/lumo/transit-management-and-planning/general-public-information/transit-planning-activities/transit-planning-projects/high-speed-rail/fw-to-laredo-high-speed-transportation-stu
ATP Austin Light Rail (Airport priority extension)	Website/map	https://www.atptx.org/current-map/
AUS terminal reconstruction	Website	https://www.austintexas.gov/AUSJourney
San Antonio Sports and Entertainment District (Project Marvel)	Website	https://www.sa.gov/Directory/Initiatives/Sports-Entertainment-District
VIA Rapid Green Line	Website/map	https://keepsamoving.com/projects/via-rapid-green-line/
VIA Rapid Silver Line	Website/map	https://keepsamoving.com/projects/via-rapid/via-rapid-silver-line/

Appendix B: Potential Alignment General Typical Sections

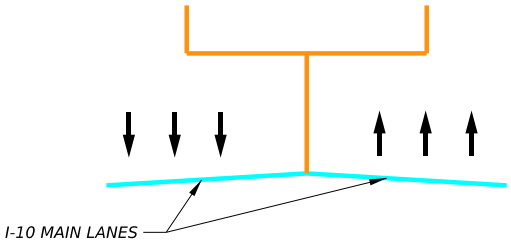


SH 130 ELEVATED MEDIAN

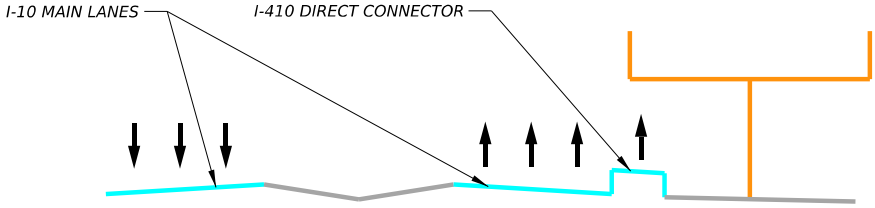
SH 130 AT-GRADE MEDIAN



SH 130/SH 45 INTERCHANGE



I-10 ELEVATED MEDIAN



I-10/I-410 INTERCHANGE

TYPICAL SECTIONS
LEGEND

- ELEVATED RAIL
- AT GRADE RAIL
- ROADWAY
- GROUND

HNTB
TEXAS PE FIRM REG. #420

COUNTY OF TRAVIS
STATE OF TEXAS

TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

TYPICAL SECTIONS EXHIBITS

CK:
DW:
CK:
DN:

DATE: 12/29/2025 1:36:07 PM
FILE: pw://hw-int.hntb.com:BWCentralDivDocuments:Austin Projects:93549 TravisCo Pass Rail:PW01 Passenger Rail Study:CADD:Sheet/Track/93549-PW01 TxDOT TypicalSections.dgn

Appendix C: Potential Alignment Conflict Points/ Resolution Table

Intersection	Issue	Possible Solutions	Google Maps Link	Project Link	Action Taken
SH 71/SH 130 interchange	Complex interchange	Either elevated passenger rail alignment over interchange direct connectors or smaller curve radius in southwest quadrant of interchange to avoid interchange impacts.	https://maps.app.goo.gl/eu4AHVyfuAhoBAUc8		Smaller curve radius to avoid interchange impacts.
SH 130/Elroy Road	Unknown vertical clearance/vehicle type for passenger rail design under Elroy Road overpass	Elevated passenger rail over roadway overpass or potential reconstruction of Elroy Road overpass to accommodate passenger rail envelope	https://maps.app.goo.gl/Pg9Dz614AzfEMw6t5		Elevated passenger rail at this stage in design.
SH 130/Moore Road	Unknown vertical clearance/vehicle type for passenger rail design under Moore Road overpass	Elevated passenger rail over roadway overpass or potential reconstruction of Moore Road overpass to accommodate passenger rail envelope	https://maps.app.goo.gl/NzvTf6s2oRr1X5Z4A		Elevated passenger rail at this stage in design.
SH 130/SH 45/US 183 interchange	Complex interchange	Potential passenger rail clearance envelope between interchange direct connectors/mainlanes/frontage roads or alignment outside of interchange	https://maps.app.goo.gl/SUFBm8A1aykUg3TW6		Alignment east of interchange to avoid interchange impacts (requires additional right of way).
SH 130/Schuelke Road	Unknown vertical clearance/vehicle type for passenger rail design under Schuelke Road overpass	Elevated passenger rail over roadway overpass or potential reconstruction of Schuelke Road overpass to accommodate passenger rail envelope	https://maps.app.goo.gl/xouwhzbXmJt8J5Jd7		Elevated passenger rail at this stage in design.
SH 130/US 183 turnaround	Unknown vertical clearance/vehicle type for passenger rail design under US 183 turnaround	Elevated passenger rail over roadway overpass or potential reconstruction of US 183 turnaround to accommodate passenger rail envelope	https://maps.app.goo.gl/9i8w69Qn9CZPS18j8		Elevated passenger rail at this stage in design.
SH 130/US 183 interchange (Lockhart)	Unknown vertical clearance/vehicle type for passenger rail design through interchange and potential direct connector pier conflicts	Potential passenger rail clearance envelope between interchange direct connectors/mainlanes or elevated passenger rail over roadway interchange	https://maps.app.goo.gl/wjz1bqfuVP4g4rE98		Elevated passenger rail over interchange at this stage in design.
SH 130 Culvert	Rail alignment over existing culvert structure	Simple rail bridge over existing culvert or reconstruction of culvert to meet passenger rail loadings	https://maps.app.goo.gl/c3xqvwYSbVwwwrv8A		Passenger rail bridge over culvert at this stage in design.

SH 130/Borchert Loop	Unknown vertical clearance/vehicle type for passenger rail design under Borchert Loop	Elevated passenger rail over roadway overpass or potential reconstruction of Borchert Loop to accommodate passenger rail envelope	https://maps.app.goo.gl/FwKTWATcjQSf6wky6	Elevated passenger rail at this stage in design.
SH 130/Maple Street	Unknown vertical clearance/vehicle type for passenger rail design under Maple Street	Elevated passenger rail over roadway overpass or potential reconstruction of Maple Street to accommodate passenger rail envelope	https://maps.app.goo.gl/MCP6SeGyzJhTmVWK7	Elevated passenger rail at this stage in design.
SH 130/Boggy Creek Road	Unknown vertical clearance/vehicle type for passenger rail design under Boggy Creek Road	Elevated passenger rail over roadway overpass or potential reconstruction of Boggy Creek Road to accommodate passenger rail envelope	https://maps.app.goo.gl/gxbFYc8x6E5WQBYTA	Elevated passenger rail at this stage in design.
SH 130/Black Ankle Road	Unknown vertical clearance/vehicle type for passenger rail design under Black Ankle Road	Elevated passenger rail over roadway overpass or potential reconstruction of Black Ankle Road to accommodate passenger rail envelope	https://maps.app.goo.gl/cHDUGTNRJ5P7N3Hf8	Elevated passenger rail at this stage in design.
SH 130/SH 80	Unknown vertical clearance/vehicle type for passenger rail design under SH 80	Elevated passenger rail over roadway overpass or potential reconstruction of SH 80 to accommodate passenger rail envelope	https://maps.app.goo.gl/rdEWUHC7avXYpcDh6	Elevated passenger rail at this stage in design.
SH 130/FM 621	Unknown vertical clearance/vehicle type for passenger rail design under FM 621	Elevated passenger rail over roadway overpass or potential reconstruction of FM 621 to accommodate passenger rail envelope	https://maps.app.goo.gl/Jc4WVJLerTFeGtXu5	Elevated passenger rail at this stage in design.
SH 130 Culvert	Rail alignment over existing culvert structure	Simple rail bridge over existing culvert or reconstruction of culvert to meet passenger rail loadings	https://maps.app.goo.gl/FS78yBLFjS11cvyt5	Passenger rail bridge over culvert at this stage in design.
SH 130/Bylerpool Road	Unknown vertical clearance/vehicle type for passenger rail design under Bylerpool Road	Elevated passenger rail over roadway overpass or potential reconstruction of Bylerpool Road to accommodate passenger rail envelope	https://maps.app.goo.gl/CDQaGh9GPKo1iVP2A	Elevated passenger rail at this stage in design.
Existing SH 130 compound curve	Roadway curve appears to be compound and may be more challenging to have passenger rail alignment along median centerline	Passenger rail compound curve or elevate alignment to allow for simple curve	https://maps.app.goo.gl/tfd6AZCC2EKHtKJA7	Compound curve used during curve detail design
SH 130/FM 20	Unknown vertical clearance/vehicle type for passenger rail design under FM 20	Elevated passenger rail over roadway overpass or potential reconstruction of FM 20 to accommodate passenger rail envelope	https://maps.app.goo.gl/YPPqEXX5E8bWeJYC6	Elevated passenger rail at this stage in design.

SH 130/Tschoepe Road	Unknown vertical clearance/vehicle type for passenger rail design under Tschoepe Road	Elevated passenger rail over roadway overpass or potential reconstruction of Tschoepe Road to accommodate passenger rail envelope			Elevated passenger rail at this stage in design.
SH 130 to I-10 EB direct connector	Potential conflict at grade between direct connector/ passenger rail alignment	Elevated passenger rail over or outside of direct connector or potential reconstruction of direct connector to accommodate passenger rail envelope	https://maps.app.goo.gl/8Y1fi8vT9atZJ9168		Alignment north/west of interchange to avoid interchange impacts.
I-10 WB mainlanes (to get into median)	Potential conflict at grade between mainlanes/ passenger rail alignment	Elevated passenger rail over roadway mainlanes	https://maps.app.goo.gl/rzecZKAdLaNpAiFr9		Elevated passenger rail over roadway mainlanes.
I-10/FM 464	Unknown vertical clearance/vehicle type for passenger rail design under FM 464	Elevated passenger rail over roadway overpass or potential reconstruction of FM 464 to accommodate passenger rail envelope	https://maps.app.goo.gl/2o4JCqCHQz8MqCx69		Elevated passenger rail at this stage in design.
I-10/Schwab Road	Unknown vertical clearance/vehicle type for passenger rail design under Schwab Road	Elevated passenger rail over roadway overpass or potential reconstruction of Schwab Road to accommodate passenger rail envelope	https://maps.app.goo.gl/XV41PQS5B27NX9qs5		Elevated passenger rail at this stage in design.
I-10/FM 465	Unknown vertical clearance/vehicle type for passenger rail design under FM 465	Elevated passenger rail over roadway overpass or potential reconstruction of FM 465 to accommodate passenger rail envelope	https://maps.app.goo.gl/XEgfJgjZhku6qw3L9		Elevated passenger rail at this stage in design.
Cibolo Creek	Potential alignment shift from between I-10 mainlanes to available space for passenger rail alignment if available	Passenger rail tangent at angle relative to mainlanes or maintain within median area/create space for passenger rail columns	https://maps.app.goo.gl/gmd4dbJ67b7BKArY8		Maintain passenger rail alignment between I-10 mainlanes/placement of columns at this stage in design.
SH 130/FM 2538	Unknown vertical clearance/vehicle type for passenger rail design under FM 2538	Elevated passenger rail over roadway overpass or potential reconstruction of FM 2538 to accommodate passenger rail envelope	https://maps.app.goo.gl/dqKgJDCUCinnVskp6		Elevated passenger rail at this stage in design.
I-10/FM 1518	Unknown vertical clearance/vehicle type for passenger rail design under FM 1518	Elevated passenger rail over roadway overpass or potential reconstruction of FM 1518 to accommodate passenger rail envelope	https://maps.app.goo.gl/Gj12Lo9hniMLQqU87		Elevated passenger rail at this stage in design.
I-10/N Foster Road	Unknown vertical clearance/vehicle type for passenger rail design under N Foster Road	Elevated passenger rail over roadway overpass or potential reconstruction of N Foster Road to accommodate passenger rail envelope	https://maps.app.goo.gl/to2uwe12AFP8rGZR8		Elevated passenger rail at this stage in design.
I-10/I-410 interchange	Potential conflict at grade between direct connector/ passenger rail alignment	Elevated passenger rail over or outside of direct connector or potential rail alignment/clearance through the direct connector to accommodate passenger rail envelope	https://maps.app.goo.gl/moQeUTfRjdwv8txcA	https://www.txdot.gov/projects/projects-studies/san-antonio/i10east-i410-bexar-guadalupe.html	Alignment north of direct connector to avoid interchange impacts.

I-10/Roland Road	Unknown vertical clearance/vehicle type for passenger rail design under Roland Road	Elevated passenger rail over roadway overpass or potential reconstruction of Roland Road to accommodate passenger rail envelope	https://maps.app.goo.gl/UHB6psrXMVq9NYgdA	Elevated passenger rail at this stage in design.
I-10/Walters Street	Unknown vertical clearance/vehicle type for passenger rail design under Walters Street	Elevated passenger rail over roadway overpass or potential reconstruction of Walters Street to accommodate passenger rail envelope	https://maps.app.goo.gl/1yHdmjVJC4RZRZqh6	Elevated passenger rail at this stage in design.
I-10/Gevers Street	Unknown vertical clearance/vehicle type for passenger rail design under Gevers Street	Elevated passenger rail over roadway overpass or potential reconstruction of Gevers Street to accommodate passenger rail envelope	https://maps.app.goo.gl/1yHdmjVJC4RZRZqh6	Elevated passenger rail at this stage in design.
I-10/S New Braunfels Avenue	Unknown vertical clearance/vehicle type for passenger rail design under S New Braunfels Avenue	Elevated passenger rail over roadway overpass or potential reconstruction of S New Braunfels Avenue to accommodate passenger rail envelope	https://maps.app.goo.gl/1yHdmjVJC4RZRZqh6	Elevated passenger rail at this stage in design.

Appendix D: Potential Horizontal Alignment Curve Speeds Tables

Amtrak Design Criteria - Proposed Conditions

Note: Yellow < 79 MPH, Red < 60 MPH

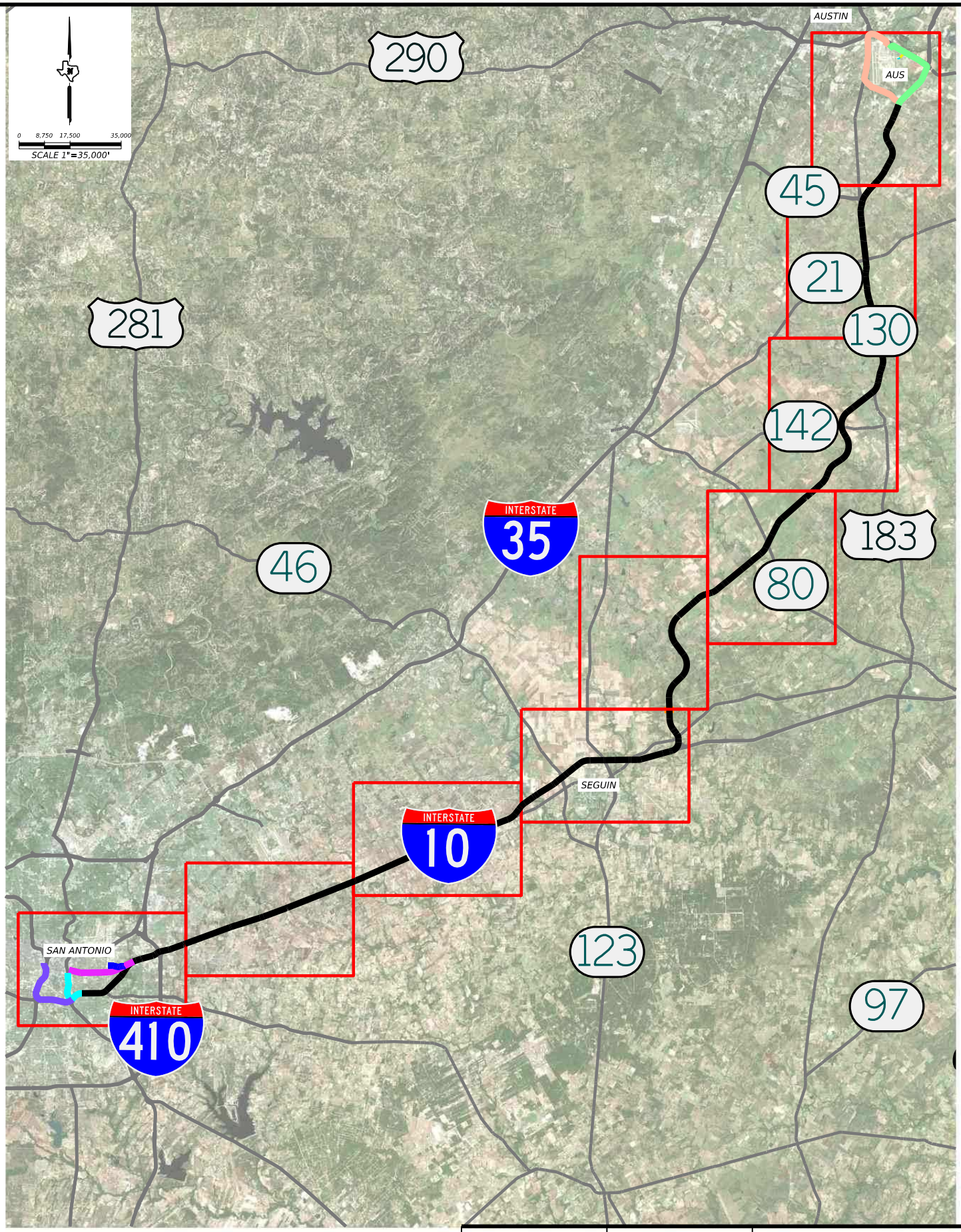
	STA	Description	Radius (R) (ft)	Angle	Min Speed	Max Speed	Min Eq	Max Eq	Min Ea	Max Ea	Eu	Spiral Length Min Ea	Sprial Length Max Ea	Sprial Length Runoff Criteria Min Ea	Sprial Length Runoff Criteria Max Ea	Length of Curve Max Ea
							=Min Ea + Eu	=Max Ea + Eu	Ea(min) = .5	Ea(max) = 5.5	Eu(max) = 4	=Ea/.5 or Ea/.375	=Ea/.5 or Ea/.375	=1.63VEu	=1.63VEu	=0.82VEu
	15+21	At grade	500	74	23	34	4.500	9.500	0.5	5.50	4.00	62.00	341.00	155.00	248.00	645.77
	110+23	At Grade	5000	7	74	79	4.500	5.250	0.5	1.25	4.00	62.00	124.00	496.00	527.00	610.87
	141+52	Elevated	750	76	29	42	4.500	9.500	0.5	5.50	4.00	62.00	341.00	217.00	279.00	994.84
	188+75	At-grade	6000	24	79	79	4.250	4.250	0.5	0.50	3.75	62.00	62.00	496.00	496.00	2513.27
	282+97	Elevated	4500	25	71	79	4.500	5.750	0.5	1.75	4.00	62.00	155.00	465.00	527.00	1963.50
	338+98	At-grade/bridge	10000	5	79	79	2.750	2.750	0.5	0.50	2.25	62.00	62.00	310.00	310.00	872.66
	398+55	At-grade	3850	56	65	79	4.500	6.750	0.5	2.75	4.00	62.00	248.00	434.00	527.00	3762.93
	456+24	Elevated	3850	58	65	79	4.500	6.750	0.5	2.75	4.00	62.00	248.00	434.00	527.00	3897.32
	534+14	At-grade/bridge	15000	14	79	79	1.750	1.750	0.5	0.50	1.25	62.00	62.00	186.00	186.00	3665.19
	593+24	Elevated	6000	5	79	79	4.250	4.250	0.5	0.50	3.75	62.00	62.00	496.00	496.00	523.60
	627+04	Elevated	5000	19	74	79	4.500	5.250	0.5	1.25	4.00	62.00	124.00	496.00	527.00	1658.06
	661+28	Elevated	5000	15	74	79	4.500	5.250	0.5	1.25	4.00	62.00	124.00	496.00	527.00	1309.00
	682+76	Elevated	10000	4	79	79	2.750	2.750	0.5	0.50	2.25	62.00	62.00	310.00	310.00	698.13
	847+21	At-grade	5000	15	74	79	4.500	5.250	0.5	1.25	4.00	62.00	124.00	496.00	527.00	1309.00
	868+73	At-grade	5000	15	74	79	4.500	5.250	0.5	1.25	4.00	62.00	124.00	496.00	527.00	1309.00
	930+77	At-grade	20000	9	79	79	1.500	1.500	0.5	0.50	1.00	62.00	62.00	155.00	155.00	3141.59
	1002+89	At-grade	10000	4	79	79	2.750	2.750	0.5	0.50	2.25	62.00	62.00	310.00	310.00	698.13
	1104+51	At-grade/bridge	10000	2	79	79	2.750	2.750	0.5	0.50	2.25	62.00	62.00	310.00	310.00	349.07
	1147+37	At-grade	5000	32	74	79	4.500	5.250	0.5	1.25	4.00	62.00	124.00	496.00	527.00	2792.53
	1182+82	Elevated	10000	7	79	79	2.750	2.750	0.5	0.50	2.25	62.00	62.00	310.00	310.00	1221.73
	1235+24	Elevated	5000	41	74	79	4.500	5.250	0.5	1.25	4.00	62.00	124.00	496.00	527.00	3577.92
	1393+76	Elevated	5100	82	75	79	4.500	5.000	0.5	1.00	4.00	62.00	93.00	496.00	527.00	7298.97
	1488+59	Elevated	5100	87	75	79	4.500	5.000	0.5	1.00	4.00	62.00	93.00	496.00	527.00	7744.03
	1557+44	Elevated	5100	34	75	79	4.500	5.000	0.5	1.00	4.00	62.00	93.00	496.00	527.00	3026.40
	1604+88	Elevated	6000	25	79	79	4.250	4.250	0.5	0.50	3.75	62.00	62.00	496.00	496.00	2617.99
	1663+67	At-grade	10000	2	79	79	2.750	2.750	0.5	0.50	2.25	62.00	62.00	310.00	310.00	349.07
	1685+54	At-grade	10000	2	79	79	2.750	2.750	0.5	0.50	2.25	62.00	62.00	310.00	310.00	349.07
	1795+06	At-grade	6000	22	79	79	4.250	4.250	0.5	0.50	3.75	62.00	62.00	496.00	496.00	2303.83
	1899+90	Elevated	5000	24	74	79	4.500	5.250	0.5	1.25	4.00	62.00	124.00	496.00	527.00	2094.40
	2099+08	At-grade	6000	17	79	79	4.250	4.250	0.5	0.50	3.75	62.00	62.00	496.00	496.00	1780.24
	2111+71	At-grade	6000	6	79	79	4.250	4.250	0.5	0.50	3.75	62.00	62.00	496.00	496.00	628.32
	2142+45	At-grade	6000	26	79	79	4.250	4.250	0.5	0.50	3.75	62.00	62.00	496.00	496.00	2722.71
	2297+15	At-grade	6350	84	79	79	4.000	4.000	0.5	0.50	3.50	62.00	62.00	465.00	465.00	9309.59
	2421+97	Elevated/at-grade	5200	81	76	79	4.500	5.000	0.5	1.00	4.00	62.00	93.00	496.00	527.00	7351.33
	2508+35	At-grade	6000	47	79	79	4.250	4.250	0.5	0.50	3.75	62.00	62.00	496.00	496.00	4921.83
	2615+71	At-grade	5750	34	78	79	4.250	4.500	0.5	0.75	3.75	62.00	62.00	496.00	496.00	3412.12
	2661+47	Elevated	2500	35	52	76	4.500	9.500	0.5	5.50	4.00	62.00	465.00	341.00	496.00	1527.16
	2699+98	Elevated	2750	75	55	79	4.500	9.500	0.5	5.50	4.00	62.00	465.00	372.00	527.00	3599.74
	2821+20	At-grade	5000	14	74	79	4.500	5.250	0.5	1.25	4.00	62.00	124.00	496.00	527.00	1221.73
	2995+54	At-grade	4750	38	73	79	4.500	5.500	0.5	1.50	4.00	62.00	124.00	496.00	527.00	3150.32
	3115+38	Elevated	4750	6	73	76	4.500	5.000	0.5	1.00	4.00	62.00	93.00	496.00	496.00	497.42
	3177+14	Elevated	20000	3	79	79	1.500	1.500	0.5	0.50	1.00	62.00	62.00	155.00	155.00	1047.20
	3230+55	Elevated	5500	17	78	79	4.500	4.750	0.5	0.75	4.00	62.00	62.00	527.00	527.00	1631.88
	3283+01	Elevated	5550	31	78	79	4.500	4.750	0.5	0.75	4.00	62.00	62.00	527.00	527.00	3002.84
	3432+51	Elevated	10000	3	79	79	2.750	2.750	0.5	0.50	2.25	62.00	62.00	310.00	310.00	523.60
	3518+75	Elevated	5500	6	78	79	4.500	4.750	0.5	0.75	4.00	62.00	62.00	527.00	527.00	575.96
	3811+39	Elevated	10000	6	79	79	2.750	2.750	0.5	0.50	2.25	62.00	62.00	310.00	310.00	1047.20
	4052+14	Elevated	20000	1	79	79	1.500	1.500	0.5	0.50	1.00	62.00	62.00	155.00	155.00	349.07
	4126+33	Elevated	20000	3	79	79	1.500	1.500	0.5	0.50	1.00	62.00	62.00	155.00	155.00	1047.20
	4229+37	Elevated	10000	3	79	79	2.750	2.750	0.5	0.50	2.25	62.00	62.00	310.00	310.00	523.60
	4381+87	Elevated	10000	1	66	74	1.750	2.250	0.5	1.00	1.25	62.00	93.00	155.00	155.00	174.53
	4386+62	Elevated	10000	1	66	74	1.750	2.250	0.5	1.00	1.25	62.00	93.00	155.00	155.00	174.53
	4432+12	Elevated	5000	7	74	79	4.500	5.250	0.5	1.25	4.00	62.00	124.00	496.00	527.00	610.87
	4468+64	Elevated	2500	26	52	76	4.500	9.500	0.5	5.50	4.00	62.00	465.00	341.00	496.00	1134.46
	4483+93	Elevated	2500	23	52	76	4.500	9.500	0.5	5.50	4.00	62.00	465.00	341.00	496.00	1003.56
	4526+33	Elevated	5000	3	58	66	2.750	3.500	0.5	1.25	2.25	62.00	124.00	217.00	248.00	261.80
	4564+84	Elevated	5825	40	79	79	4.500	4.500	0.5	0.50	4.00	62.00	62.00	527.00	527.00	4066.62
	4608+44	Elevated	5825	13	79	79	4.500	4.500	0.5	0.50	4.00	62.00	62.00	527.00	527.00	1321.65
	4689+29	Elevated	2900	44	57	79	4.500	8.750	0.5	4.75	4.00	62.00	403.00	372.00	527.00	2227.04

Brightline (Florida) Design Criteria - Proposed Conditions

Note: Yellow < 125 MPH, Red < 79 MPH

	STA	Description	Radius (R) (ft)	Angle	Min Speed	Max Speed	Min Eq	Max Eq	Min Ea	Max Ea	Eu	Spiral Length Min Ea	Sprial Length Max Ea	Sprial Length Runoff Criteria Min Ea	Sprial Length Runoff Criteria Max Ea	Length of Curve Max Ea
							=Min Ea + Eu	=Max Ea + Eu	Ea(min) = .375	Ea(max) = 6	Eu(max) = 5	=62'	=82.66Ea	=1.63VEu	=1.63VEu	=0.82VEu
	15+21	At grade	500	74	25	37	5.375	11.000	0.375	6.00	5.00	62.00	496.00	217.00	310.00	645.77
	110+23	At Grade	5000	7	77	80	4.875	5.250	0.375	0.75	4.50	62.00	62.00	589.00	589.00	610.87
	141+52	Elevated	750	76	31	45	5.375	11.000	0.375	6.00	5.00	62.00	496.00	279.00	372.00	994.84
	188+75	At-grade	6000	24	89	125	5.375	10.500	0.375	5.50	5.00	62.00	465.00	744.00	1023.00	2513.27
	282+97	Elevated	4500	25	77	111	5.375	11.000	0.375	6.00	5.00	62.00	496.00	651.00	930.00	1963.50
	338+98	At-grade/bridge	10000	5	110	117	4.875	5.500	0.375	1.00	4.50	62.00	93.00	837.00	868.00	872.66
	398+55	At-grade	3850	56	71	102	5.375	11.000	0.375	6.00	5.00	62.00	496.00	589.00	837.00	3762.93
	456+24	Elevated	3850	58	71	102	5.375	11.000	0.375	6.00	5.00	62.00	496.00	589.00	837.00	3897.32
	534+14	At-grade/bridge	15000	14	125	125	4.375	4.375	0.375	0.38	4.00	62.00	62.00	837.00	837.00	3665.19
	593+24	Elevated	6000	5	78	79	4.125	4.250	0.375	0.50	3.75	62.00	62.00	496.00	496.00	523.60
	627+04	Elevated	5000	19	91	117	5.375	11.000	0.375	6.00	5.00	62.00	496.00	682.00	961.00	1658.06
	661+28	Elevated	5000	15	91	117	5.375	11.000	0.375	6.00	5.00	62.00	496.00	682.00	961.00	1309.00
	682+76	Elevated	10000	4	104	104	4.375	4.375	0.375	0.38	4.00	62.00	62.00	682.00	682.00	698.13
	847+21	At-grade	5000	15	81	117	5.375	11.000	0.375	6.00	5.00	62.00	496.00	682.00	961.00	1309.00
	868+73	At-grade	5000	15	81	117	5.375	11.000	0.375	6.00	5.00	62.00	496.00	682.00	961.00	1309.00
	930+77	At-grade	20000	9	125	125	3.375	3.375	0.375	0.38	3.00	62.00	62.00	620.00	620.00	3141.59
	1002+89	At-grade	10000	4	104	104	4.375	4.375	0.375	0.38	4.00	62.00	62.00	682.00	682.00	698.13
	1104+51	At-grade/bridge	10000	2	80	90	2.625	3.250	0.375	1.00	2.25	62.00	93.00	310.00	341.00	349.07
	1147+37	At-grade	5000	32	91	117	5.375	11.000	0.375	6.00	5.00	62.00	496.00	682.00	961.00	2792.53
	1182+82	Elevated	10000	7	115	125	5.375	6.500	0.375	1.50	5.00	62.00	124.00	961.00	1023.00	1221.73
	1235+24	Elevated	5000	41	81	117	5.375	11.000	0.375	6.00	5.00	62.00	496.00	682.00	961.00	3577.92
	1393+76	Elevated	5100	82	82	118	5.375	11.000	0.375	6.00	5.00	62.00	496.00	682.00	992.00	7298.97
	1488+59	Elevated	5100	87	82	118	5.375	11.000	0.375	6.00	5.00	62.00	496.00	682.00	992.00	7744.03
	1557+44	Elevated	5100	34	82	118	5.375	11.000	0.375	6.00	5.00	62.00	496.00	682.00	992.00	3026.40
	1604+88	Elevated	6000	25	89	125	5.375	10.500	0.375	5.50	5.00	62.00	465.00	744.00	1023.00	2617.99
	1663+67	At-grade	10000	2	80	86	2.625	3.000	0.375	0.75	2.25	62.00	62.00	310.00	341.00	349.07
	1685+54	At-grade	10000	2	80	90	2.625	3.250	0.375	1.00	2.25	62.00	93.00	310.00	341.00	349.07
	1795+06	At-grade	6000	22	89	125	5.375	10.500	0.375	5.50	5.00	62.00	465.00	744.00	1023.00	2303.83
	1899+90	Elevated	5000	24	81	117	5.375	11.000	0.375	6.00	5.00	62.00	496.00	682.00	961.00	2094.40
	2099+08	At-grade	6000	17	89	125	5.375	10.500	0.375	5.50	5.00	62.00	465.00	744.00	1023.00	1780.24
	2111+71	At-grade	6000	6	83	88	4.625	5.250	0.375	1.00	4.25	62.00	93.00	589.00	620.00	628.32
	2142+45	At-grade	6000	26	89	125	5.375	10.500	0.375	5.50	5.00	62.00	465.00	744.00	1023.00	2722.71
	2297+15	At-grade	6350	84	92	125	5.375	10.000	0.375	5.00	5.00	62.00	434.00	775.00	1023.00	9309.59
	2421+97	Elevated/at-grade	5200	81	83	119	5.375	11.000	0.375	6.00	5.00	62.00	496.00	682.00	992.00	7351.33
	2508+35	At-grade	6000	47	89	125	5.375	10.500	0.375	5.50	5.00	62.00	465.00	744.00	1023.00	4921.83
	2615+71	At-grade	5750	34	87	125	5.375	11.000	0.375	6.00	5.00	62.00	496.00	713.00	1023.00	3412.12
	2661+47	Elevated	2500	35	57	82	5.375	11.000	0.375	6.00	5.00	62.00	496.00	465.00	682.00	1527.16
	2699+98	Elevated	2750	75	60	86	5.375	11.000	0.375	6.00	5.00	62.00	496.00	496.00	713.00	3599.74
	2821+20	At-grade	5000	14	81	117	5.375	11.000	0.375	6.00	5.00	62.00	496.00	682.00	961.00	1221.73
	2995+54	At-grade	4750	38	79	114	5.375	11.000	0.375	6.00	5.00	62.00	496.00	651.00	930.00	3150.32
	3115+38	Elevated	4750	6	71	73	4.375	4.500	0.375	0.50	4.00	62.00	62.00	465.00	496.00	497.42
	3177+14	Elevated	20000	3	125	125	3.375	3.375	0.375	0.38	3.00	62.00	62.00	620.00	620.00	1047.20
	3230+55	Elevated	5500	17	85	122	5.375	11.000	0.375	6.00	5.00	62.00	496.00	713.00	1023.00	1631.88
	3283+01	Elevated	5550	31	86	123	5.375	11.000	0.375	6.00	5.00	62.00	496.00	713.00	1023.00	3002.84
	3432+51	Elevated	10000	3	91	99	3.375	4.000	0.375	1.00	3.00	62.00	93.00	465.00	496.00	523.60
	3518+75	Elevated	5500	6	79	80	4.625	4.750	0.375	0.50	4.25	62.00	62.00	558.00	558.00	575.96
	3811+39	Elevated	10000	6	115	125	5.375	6.500	0.375	1.50	5.00	62.00	124.00	961.00	1023.00	1047.20
	4052+14	Elevated	20000	1	102	117	2.125	2.750	0.375	1.00	1.75	62.00	93.00	310.00	341.00	349.07
	4126+33	Elevated	20000	3	125	125	3.375	3.375	0.375	0.38	3.00	62.00	62.00	620.00	620.00	1047.20
	4229+37	Elevated	10000	3	91	99	3.375	4.000	0.375	1.00	3.00	62.00	93.00	465.00	496.00	523.60
	4381+87	Elevated	10000	1	63	74	1.625	2.250	0.375	1.00	1.25	62.00	93.00	155.00	155.00	174.53
	4386+62	Elevated	10000	1	63	74	1.625	2.250	0.375	1.00	1.25	62.00	93.00	155.00	155.00	174.53
	4432+12	Elevated	5000	7	77	80	4.875	5.250	0.375	0.75	4.50	62.00	62.00	589.00	589.00	610.87
	4468+64	Elevated	2500	26	57	82	5.375	11.000	0.375	6.00	5.00	62.00	496.00	465.00	682.00	1134.46
	4483+93	Elevated	2500	23	57	82	5.375	11.000	0.375	6.00	5.00	62.00	496.00	465.00	682.00	1003.56
	4526+33	Elevated	5000	3	59	59	2.875	2.875	0.375	0.38	2.50	62.00	62.00	248.00	248.00	261.80
	4564+84	Elevated	5825	40	86	125	5.375	11.000	0.375	6.00	5.00	62.00	496.00	744.00	1023.00	4066.62
	4608+44	Elevated	5825	13	88	125	5.375	11.000	0.375	6.00	5.00	62.00	496.00	744.00	1023.00	1321.65
	4689+29	Elevated	2900	44	62	89	5.375	11.000	0.375	6.00	5.00	62.00	496.00	527.00	744.00	2227.04

Appendix E: Potential Horizontal Alignment Curve Speeds Exhibits



TERMINI LEGEND

- VIA CENTRO APPROACH
- DOWNTOWN APPROACH
- COMMERCE ST APPROACH
- FROST BANK CENTER APPROACH
- AUS EASTERN APPROACH
- AUS WESTERN APPROACH

HNTB
TEXAS PE FIRM REG. #420

COUNTY OF TRAVIS STATE OF TEXAS

TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

KEY MAP EXHIBIT

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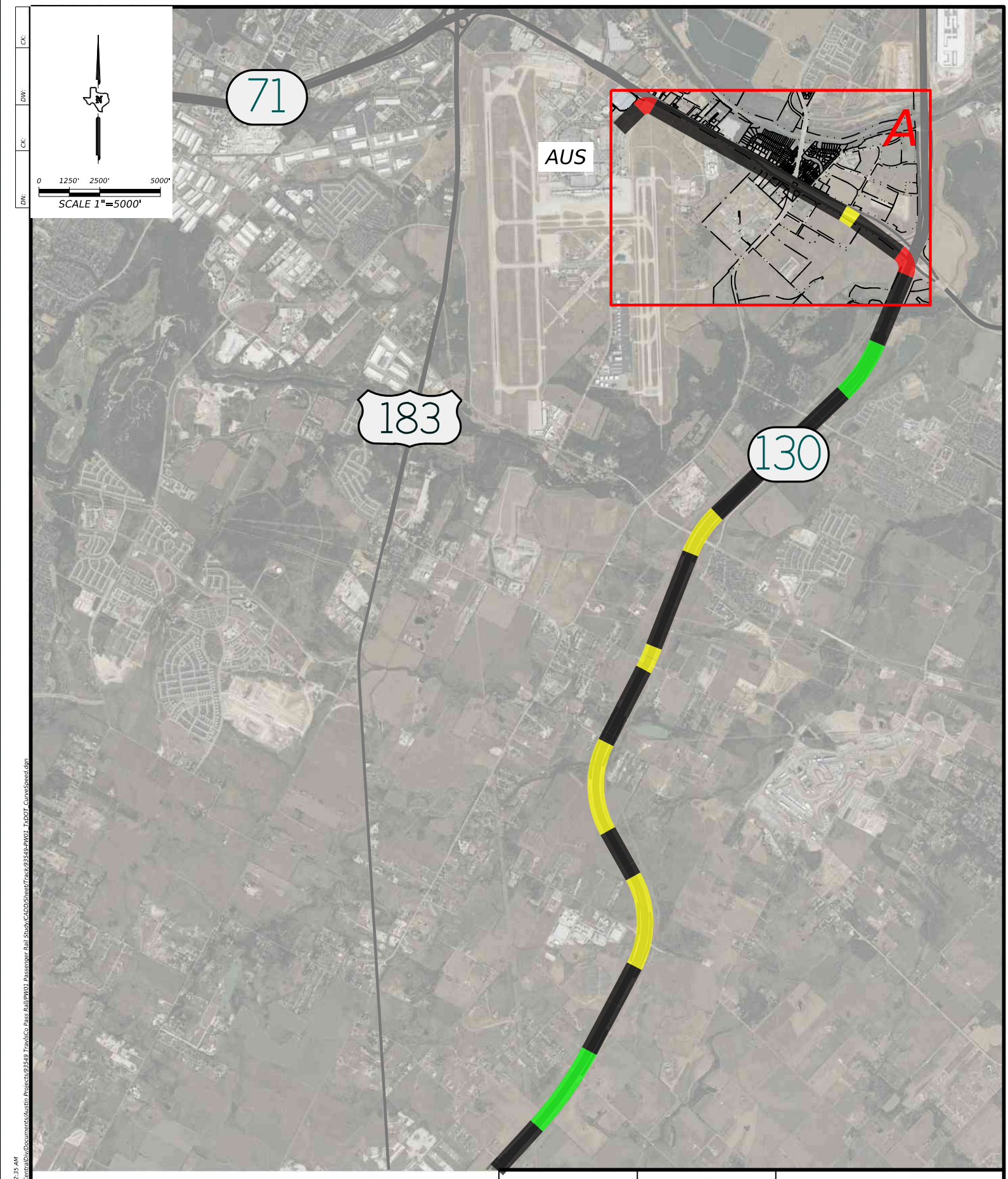

PRELIMINARY CURVE SPEEDS (MAX ACTUAL SUPERELEVATION = 6.0")

- SPEED < 50 MPH
- 50 MPH < SPEED < 79 MPH
- 79 MPH < SPEED < 125 MPH
- SPEED = 125 MPH
- TANGENT

HNTB
TEXAS PE FIRM REG. #420

COUNTY OF TRAVIS STATE OF TEXAS

TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

CURVE SPEED EXHIBIT
SHEET 1 OF 9

DATE: 6/16/2026 9:32:35 AM
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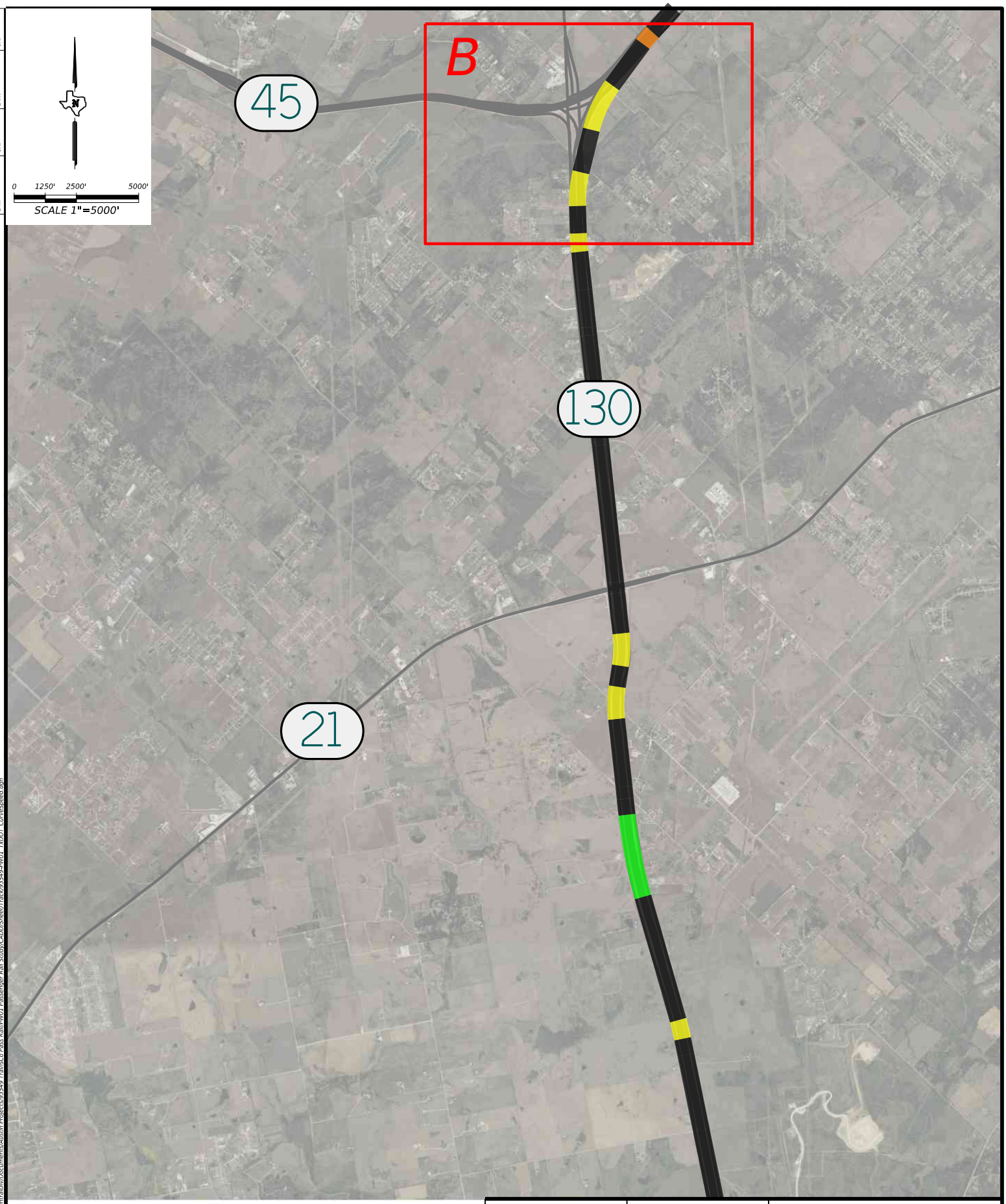


PRELIMINARY CURVE SPEEDS (MAX ACTUAL SUPERELEVATION = 6.0")

- SPEED < 50 MPH
- 50 MPH < SPEED < 79 MPH
- 79 MPH < SPEED < 125 MPH
- SPEED = 125 MPH
- TANGENT

HNTB
TEXAS PE FIRM REG. #420

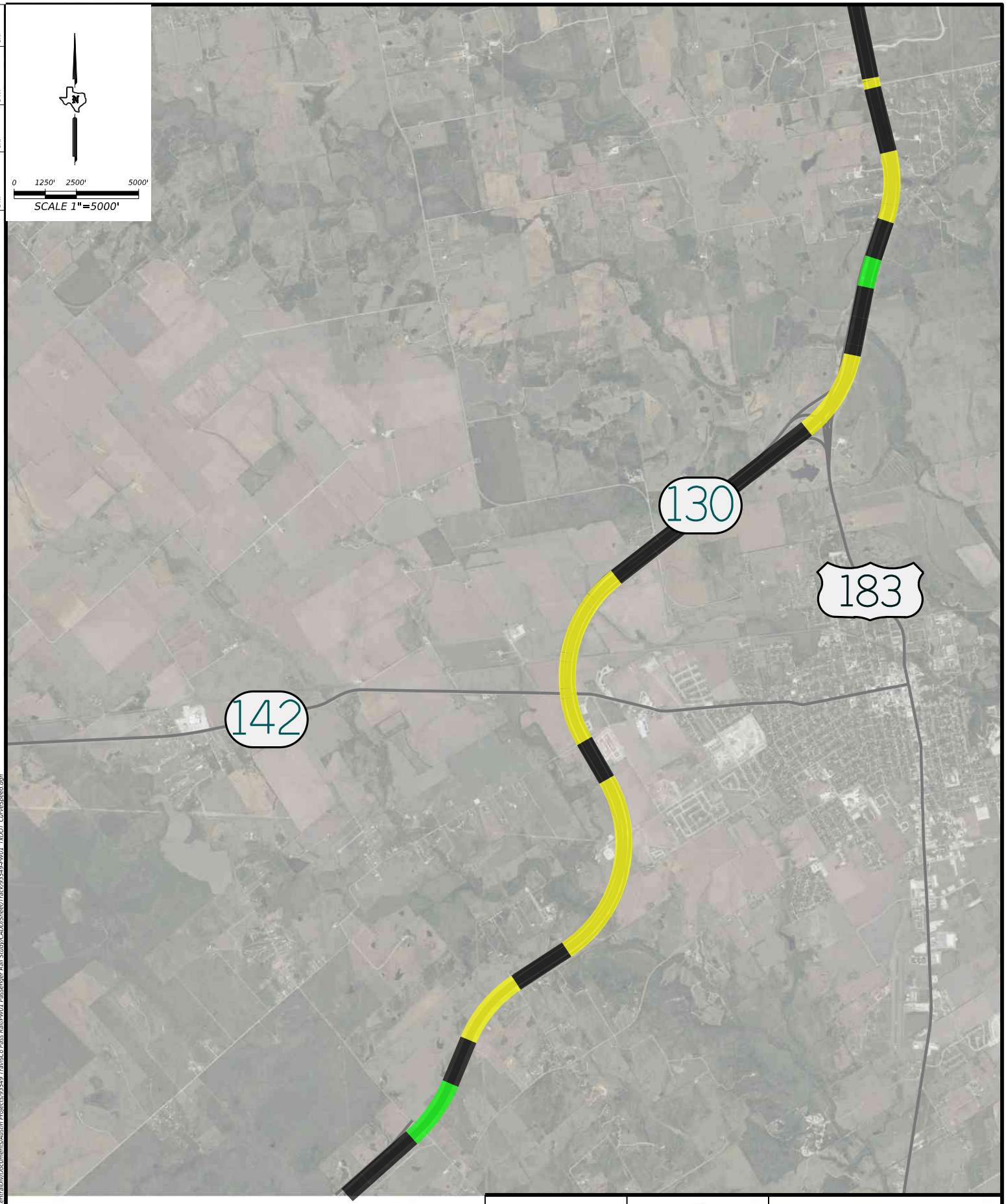
COUNTY OF TRAVIS
STATE OF TEXAS

TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

CURVE SPEED EXHIBIT
SHEET 2 OF 9

DN: CK: DW: CK:

DATE: 12/29/2025 12:56:48 PM
FILE: pw://pw-int.hntb.com:BNCentralDiv/Documents/Austin Projects/93549 TravisCo Pass Rail/PW01 Passenger Rail Study/CADD/Sheet/Track/93549-PW01 TxDOT CurveSpeed.dgn



PRELIMINARY CURVE SPEEDS (MAX ACTUAL SUPERELEVATION = 6.0")

- SPEED < 50 MPH
- 50 MPH < SPEED < 79 MPH
- 79 MPH < SPEED < 125 MPH
- SPEED = 125 MPH
- TANGENT

HNTB
TEXAS PE FIRM REG. #420

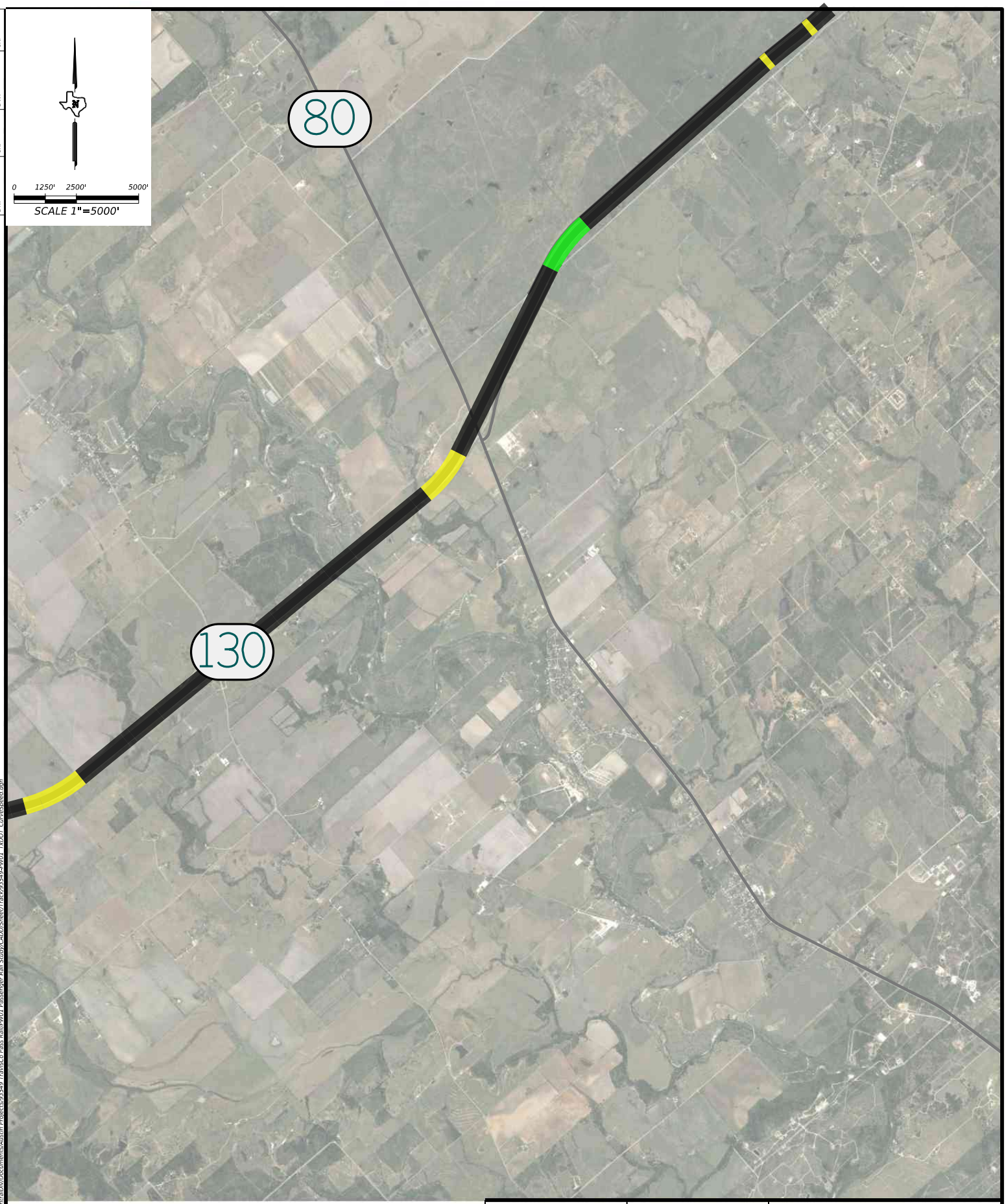
COUNTY OF TRAVIS STATE OF TEXAS

TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

CURVE SPEED EXHIBIT
SHEET 3 OF 9

CK:
DW:
CK:
DN:

DATE: 12/29/2025 12:58:04 PM
FILE: pw://pw-int.hntb.com:BWCentralDivDocuments:Austin Projects:93549 TravisCo Pass Rail:PW01 Passenger Rail Study:CADD:Sheet/Track/93549-PW01 TxDOT CurveSpeed.dgn



PRELIMINARY CURVE SPEEDS (MAX ACTUAL SUPERELEVATION = 6.0")

- SPEED < 50 MPH
- 50 MPH < SPEED < 79 MPH
- 79 MPH < SPEED < 125 MPH
- SPEED = 125 MPH
- TANGENT

HNTB
TEXAS PE FIRM REG. #420

TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

CURVE SPEED EXHIBIT
SHEET 4 OF 9

DN: CK: DW: CK:

DATE: 12/29/2025 12:59:40 PM
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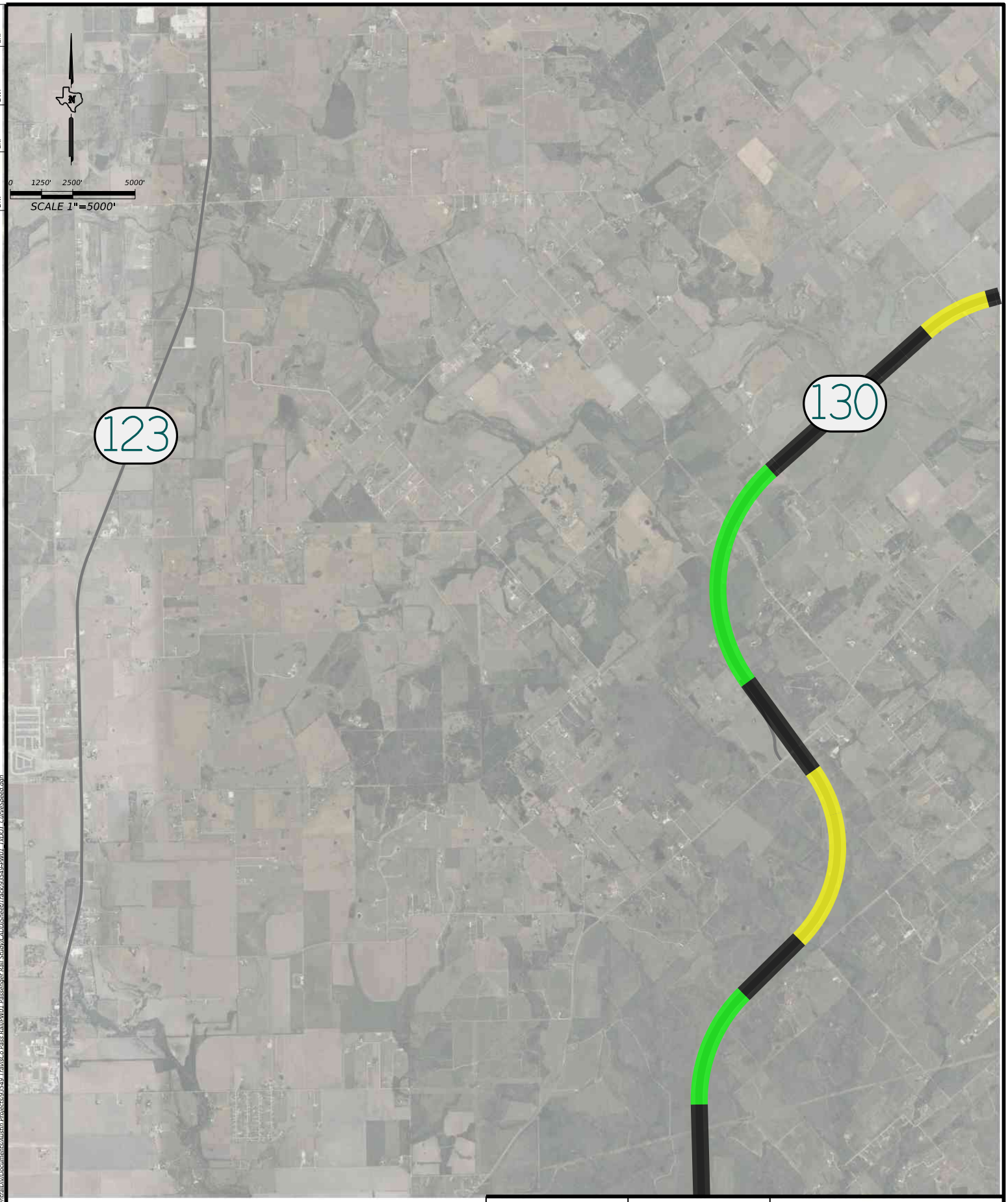

PRELIMINARY CURVE SPEEDS (MAX ACTUAL SUPERELEVATION = 6.0")

- SPEED < 50 MPH
- 50 MPH < SPEED < 79 MPH
- 79 MPH < SPEED < 125 MPH
- SPEED = 125 MPH
- TANGENT

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COUNTY OF TRAVIS
STATE OF TEXAS

TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

CURVE SPEED EXHIBIT
SHEET 5 OF 9

DATE: 12/29/2025 1:00:38 PM
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DN: CK: DW: CK:

DATE: 12/29/2025 1:14:22 PM
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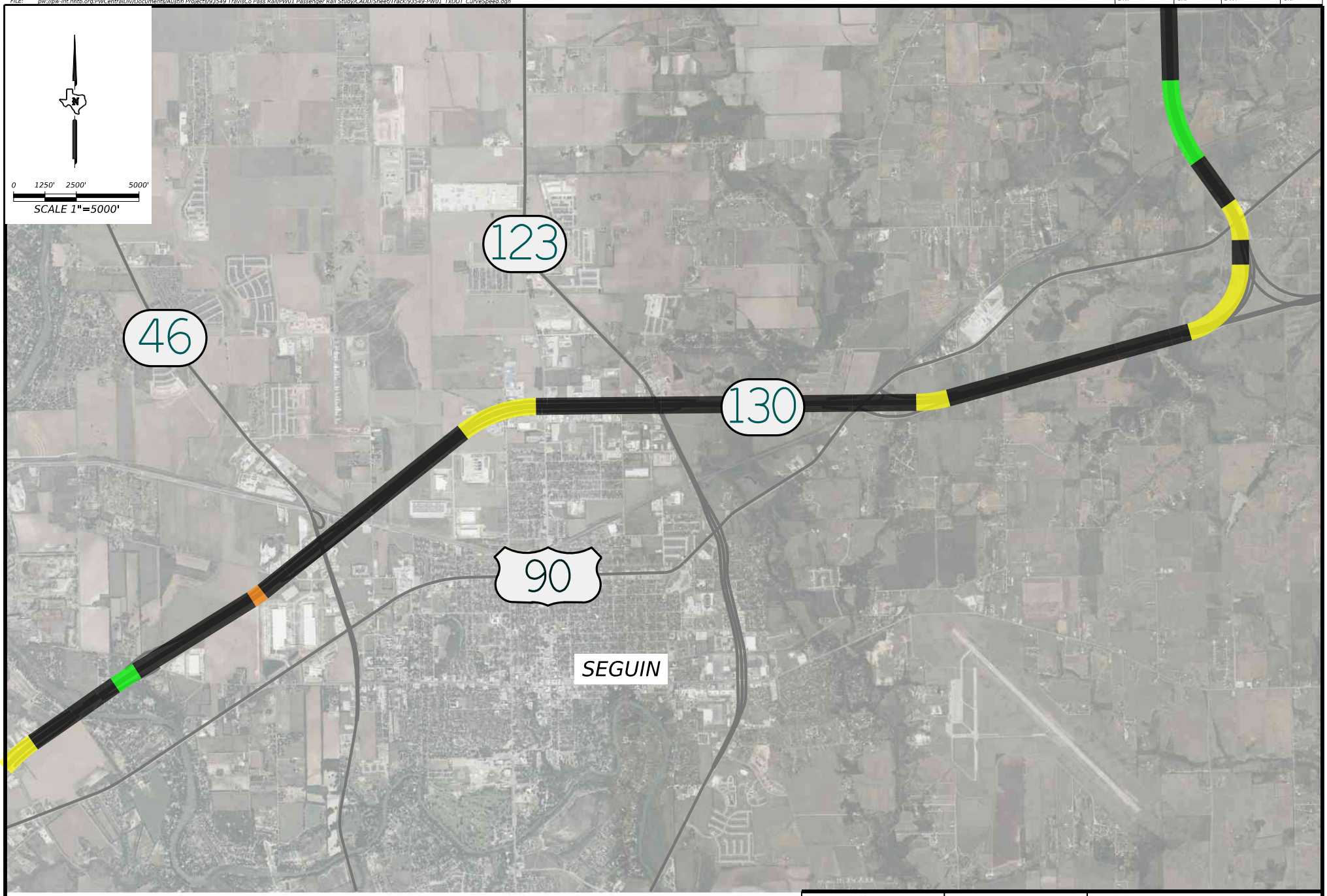
DN:	CK:	DW:	CK:



PRELIMINARY CURVE SPEEDS (MAX ACTUAL SUPERELEVATION = 6.0")

- SPEED < 50 MPH
- 50 MPH < SPEED < 79 MPH
- 79 MPH < SPEED < 125 MPH
- SPEED = 125 MPH
- TANGENT

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COUNTY OF TRAVIS STATE OF TEXAS

TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

CURVE SPEED EXHIBIT
SHEET 6 OF 9

DATE: 12/29/2025 1:02:17 PM
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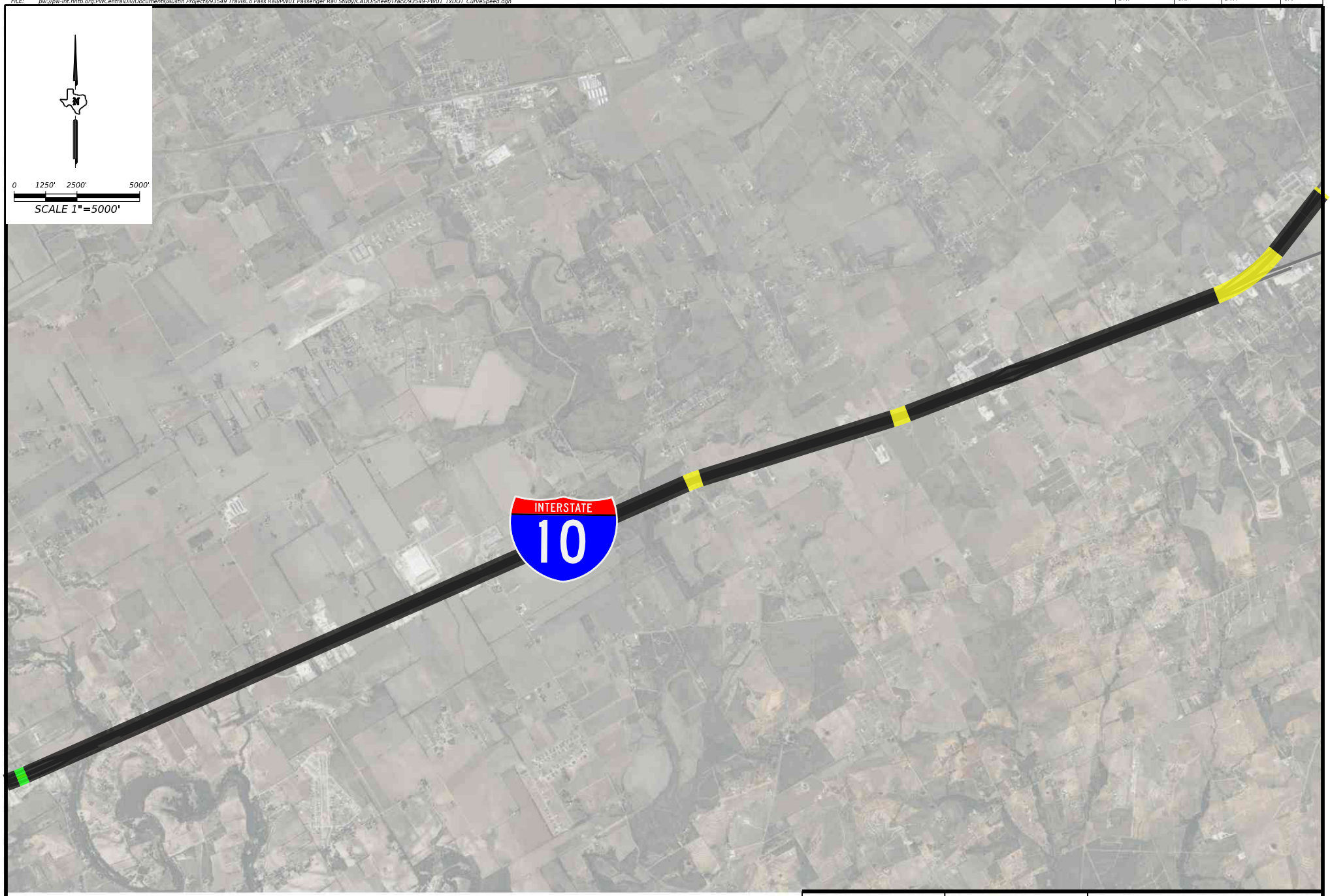
DN:	CK:	DW:	CK:



PRELIMINARY CURVE SPEEDS (MAX ACTUAL SUPERELEVATION = 6.0")

- SPEED < 50 MPH
- 50 MPH < SPEED < 79 MPH
- 79 MPH < SPEED < 125 MPH
- SPEED = 125 MPH
- TANGENT

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TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

CURVE SPEED EXHIBIT
SHEET 7 OF 9

DATE: 12/29/2025 1:03:19 PM
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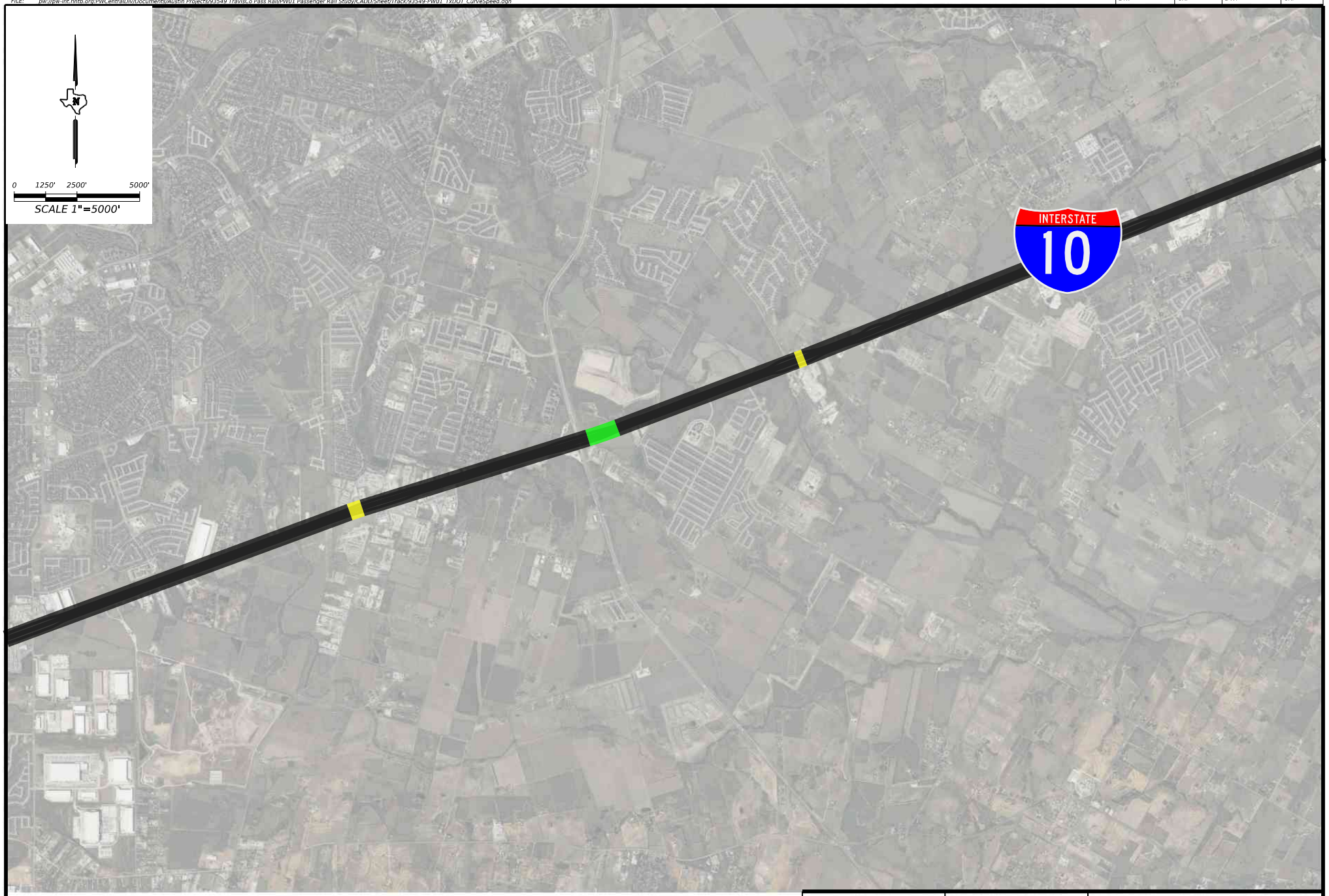

PRELIMINARY CURVE SPEEDS (MAX ACTUAL SUPERELEVATION = 6.0")

- SPEED < 50 MPH
- 50 MPH < SPEED < 79 MPH
- 79 MPH < SPEED < 125 MPH
- SPEED = 125 MPH
- TANGENT

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TEXAS PE FIRM REG. #420

TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

CURVE SPEED EXHIBIT
SHEET 8 OF 9

DATE: 12/29/2025 1:04:00 PM
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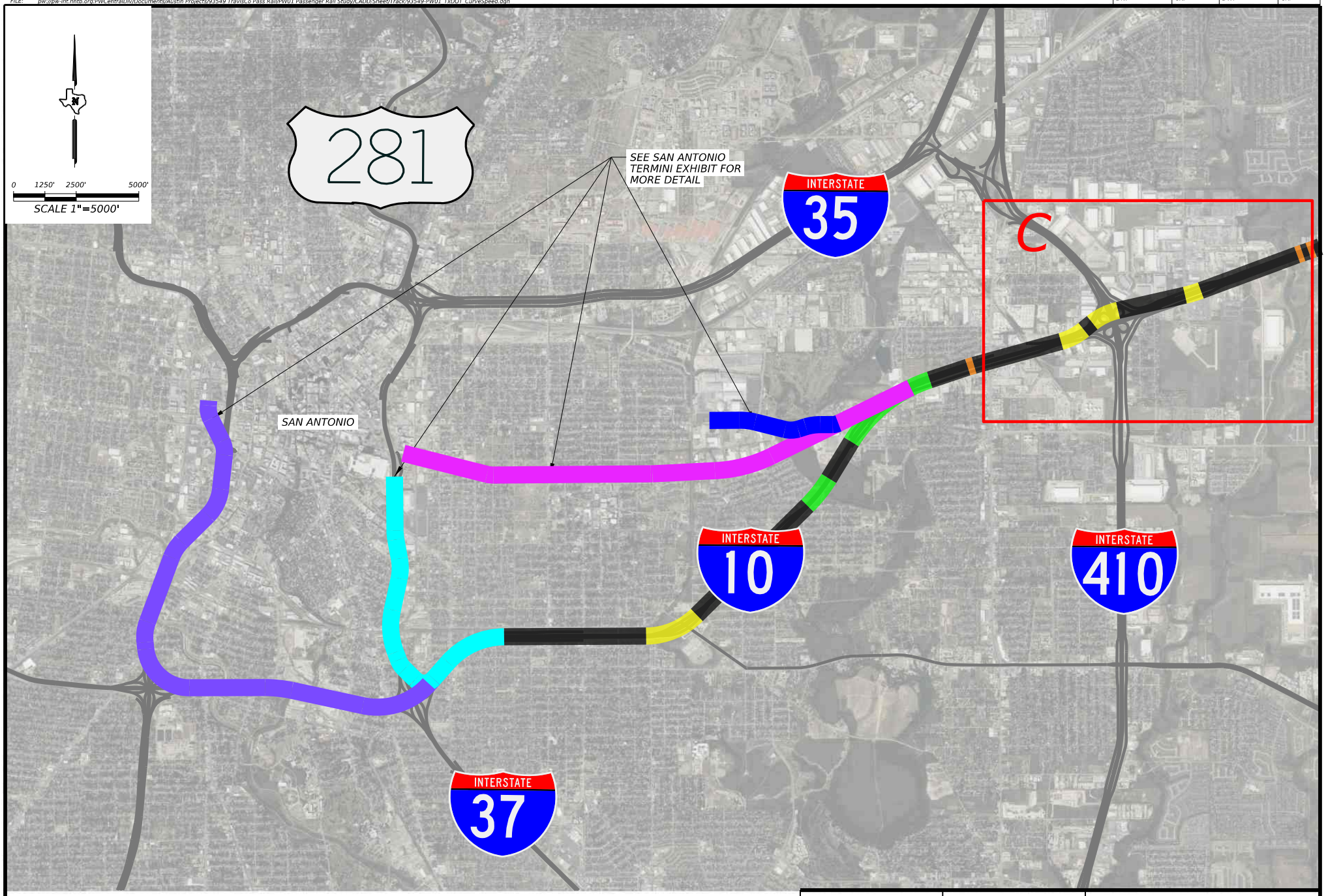
DN:	CK:	DW:	CK:



PRELIMINARY CURVE SPEEDS (MAX ACTUAL SUPERELEVATION = 6.0")

- SPEED < 50 MPH
- 50 MPH < SPEED < 79 MPH
- 79 MPH < SPEED < 125 MPH
- SPEED = 125 MPH
- TANGENT

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TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

CURVE SPEED EXHIBIT
SHEET 9 OF 9

DATE: 12/30/2025 1:23:31 PM
FILE: pw://pw-int.hntb.org:PWCentralDiv/Documents/Austin Projects/93549 TravisCo Pass Rail/PW01 Passenger Rail Study/CADD/Sheet/Track/93549-PW01_TxDOT_CurveSpeed.dgn

DN:	CK:	DW:	CK:

PRELIMINARY CURVE SPEEDS (MAX ACTUAL SUPERELEVATION = 6.0")

- SPEED < 50 MPH
- 50 MPH < SPEED < 79 MPH
- 79 MPH < SPEED < 125 MPH
- SPEED = 125 MPH
- TANGENT

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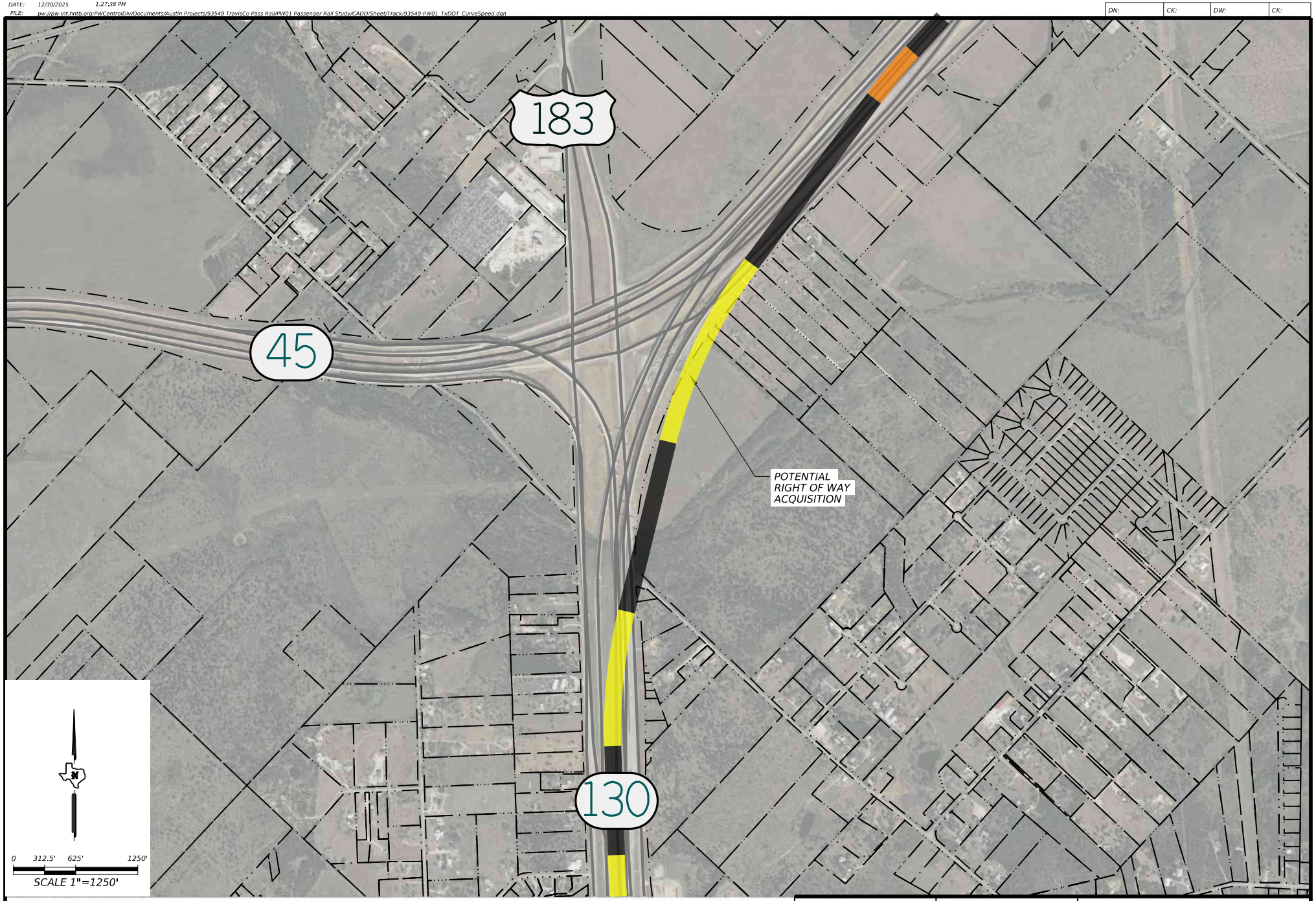
COUNTY OF TRAVIS STATE OF TEXAS

TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

CURVE SPEED EXHIBIT
EXHIBIT A

DATE: 12/30/2025 1:27:38 PM
FILE: pw://pw-int.hntb.org:PWCentralDiv/Documents/Austin Projects/93549 TravisCo Pass Rail/PW01 Passenger Rail Study/CADD/Sheet/Track/93549-PW01_TxDOT_CurveSpeed.dgn

DN:	CK:	DW:	CK:



PRELIMINARY CURVE SPEEDS (MAX ACTUAL SUPERELEVATION = 6.0")

- SPEED < 50 MPH
- 50 MPH < SPEED < 79 MPH
- 79 MPH < SPEED < 125 MPH
- SPEED = 125 MPH
- TANGENT

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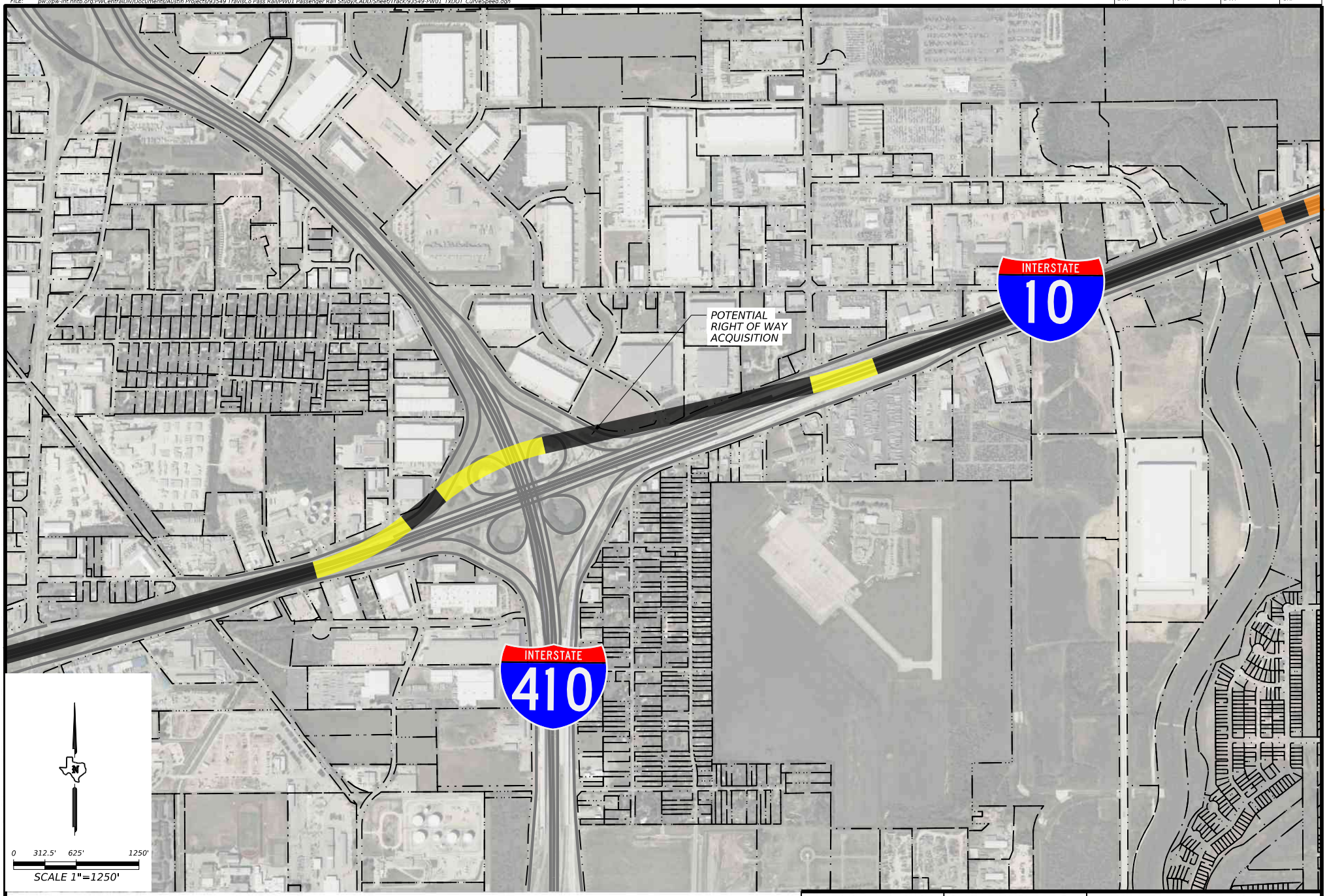
COUNTY OF TRAVIS STATE OF TEXAS

TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

CURVE SPEED EXHIBIT
EXHIBIT B

DATE: 12/30/2025 1:29:50 PM
FILE: pw://pw-int.hntb.org:PWCentralDiv/Documents/Austin Projects/93549 TravisCo Pass Rail/PW01 Passenger Rail Study/CADD/Sheet/Track/93549-PW01_TxDOT_CurveSpeed.dgn

DN:	CK:	DW:	CK:



PRELIMINARY CURVE SPEEDS (MAX ACTUAL SUPERELEVATION = 6.0")

- SPEED < 50 MPH
- 50 MPH < SPEED < 79 MPH
- 79 MPH < SPEED < 125 MPH
- SPEED = 125 MPH
- TANGENT

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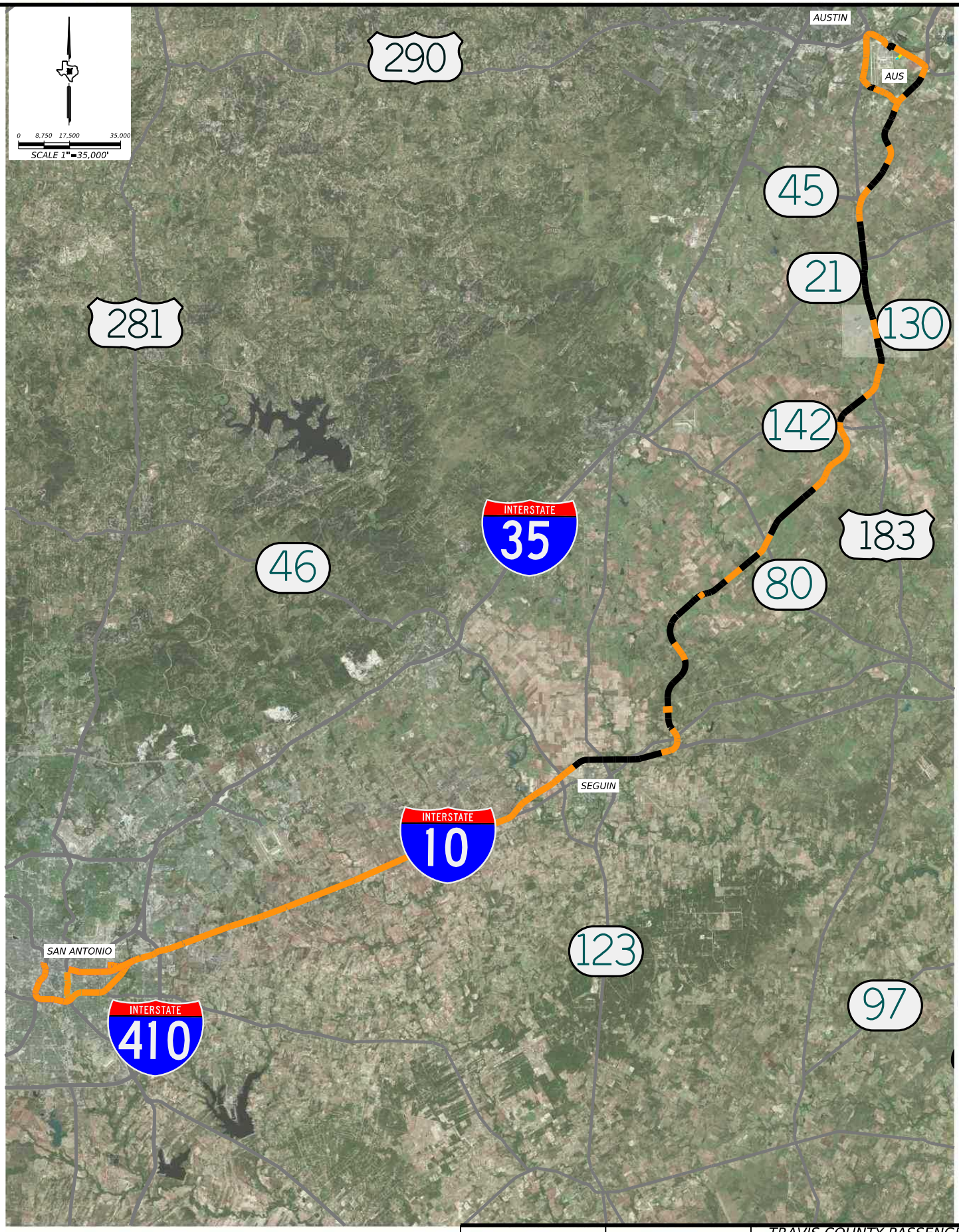
COUNTY OF TRAVIS STATE OF TEXAS

TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

CURVE SPEED EXHIBIT
EXHIBIT C

Appendix F: Potential Vertical At-Grade vs. Elevated Exhibits



LEGEND

ELEVATED

AT-GRADE

HNTB

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COUNTY OF TRAVIS STATE OF TEXAS

TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

POTENTIAL PASSENGER RAIL VERTICAL ELEMENTS EXHIBIT

CK:
DW:
CK:
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DATE: 12/30/2025 1:38:39 PM
FILE: pw://pw-int.hntb.com:BNCentralDiv/Documents/Austin Projects/93549 TravisCo Pass Rail/PW01 Passenger Rail Study/CADD/Sheet/Track/93549-PW01 TxDOT AtGrade-Elevated.dgn

Appendix G: AUS Terminus Route Exhibits

DATE: 6/16/2026 9:26:42 AM
FILE: pw://pw-int.hntb.org:PWCentralDiv/Documents/Austin Projects/93549 TravisCo Pass Rail/PW01 Passenger Rail Study/CADD/Sheet/Track/93549_PW01_TxDOT_AUS-Terminus.dgn

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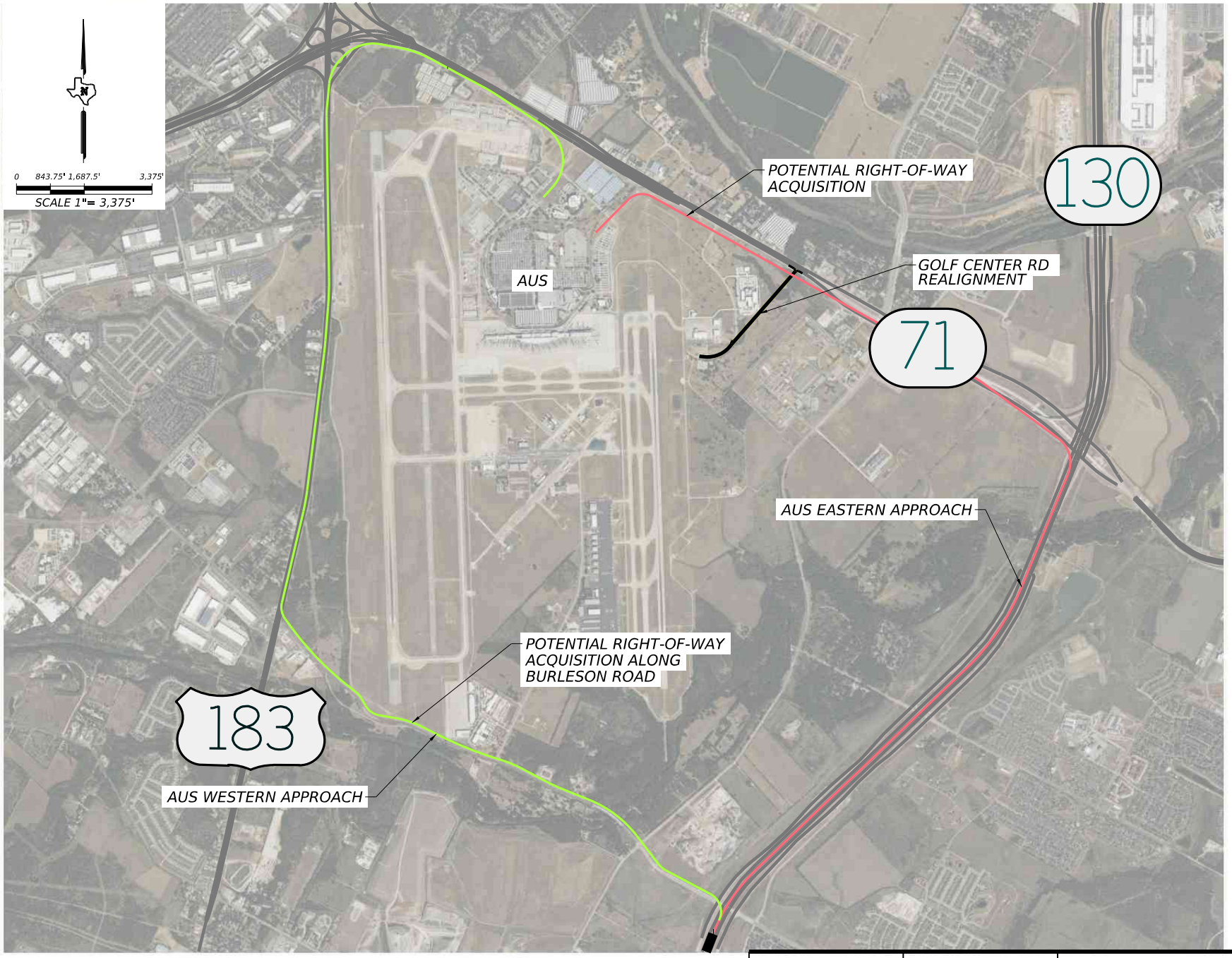

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COUNTY OF TRAVIS STATE OF TEXAS

TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

AUS TERMINI EXHIBIT

Appendix H: San Antonio Termini Route Exhibits

DATE: 12/30/2025 2:16:14 PM
FILE: pw://pw-int.hntb.org:PWCentralDiv/Documents/Austin Projects/93549 TravisCo Pass Rail/PW01 Passenger Rail Study/CADD/Sheet/Track/93549_PW01_TxDOT_SAT-Terminus.dgn

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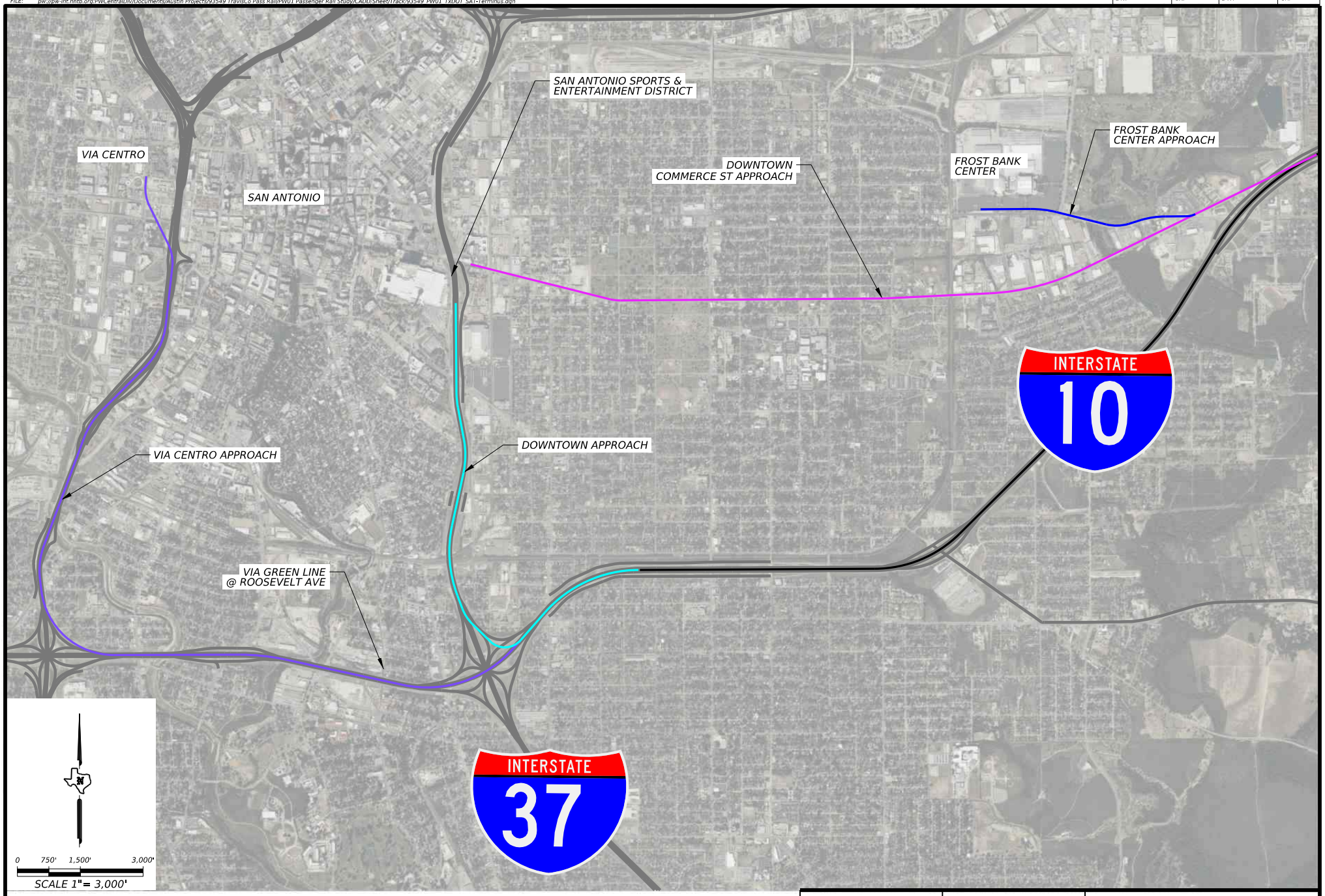

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COUNTY OF TRAVIS STATE OF TEXAS

TRAVIS COUNTY PASSENGER RAIL ENGINEERING FEASABILITY STUDY

SAN ANTONIO TERMINI EXHIBIT