DESIGN	FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
GRAPHICS	6	F 2021(575)			1
CHECKED	STATE	STATE DIST.	COUNTY		
	TEXAS	12	HARRIS		
CHECKED	CONT.	SECT.	JOB	HIGHWAY NO.	
	0912	72	610	VARIOUS	

SEE SHEET 2 FOR INDEX OF SHEETS

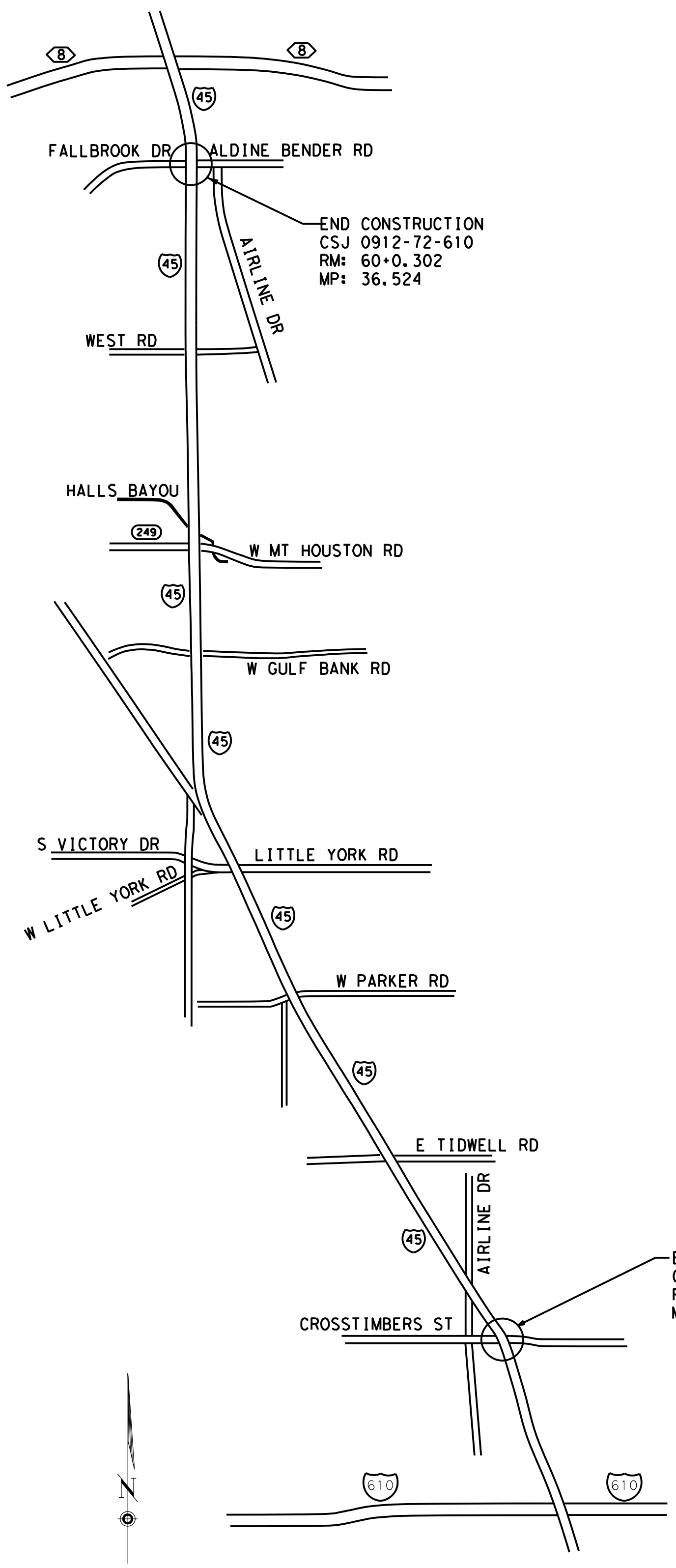
STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

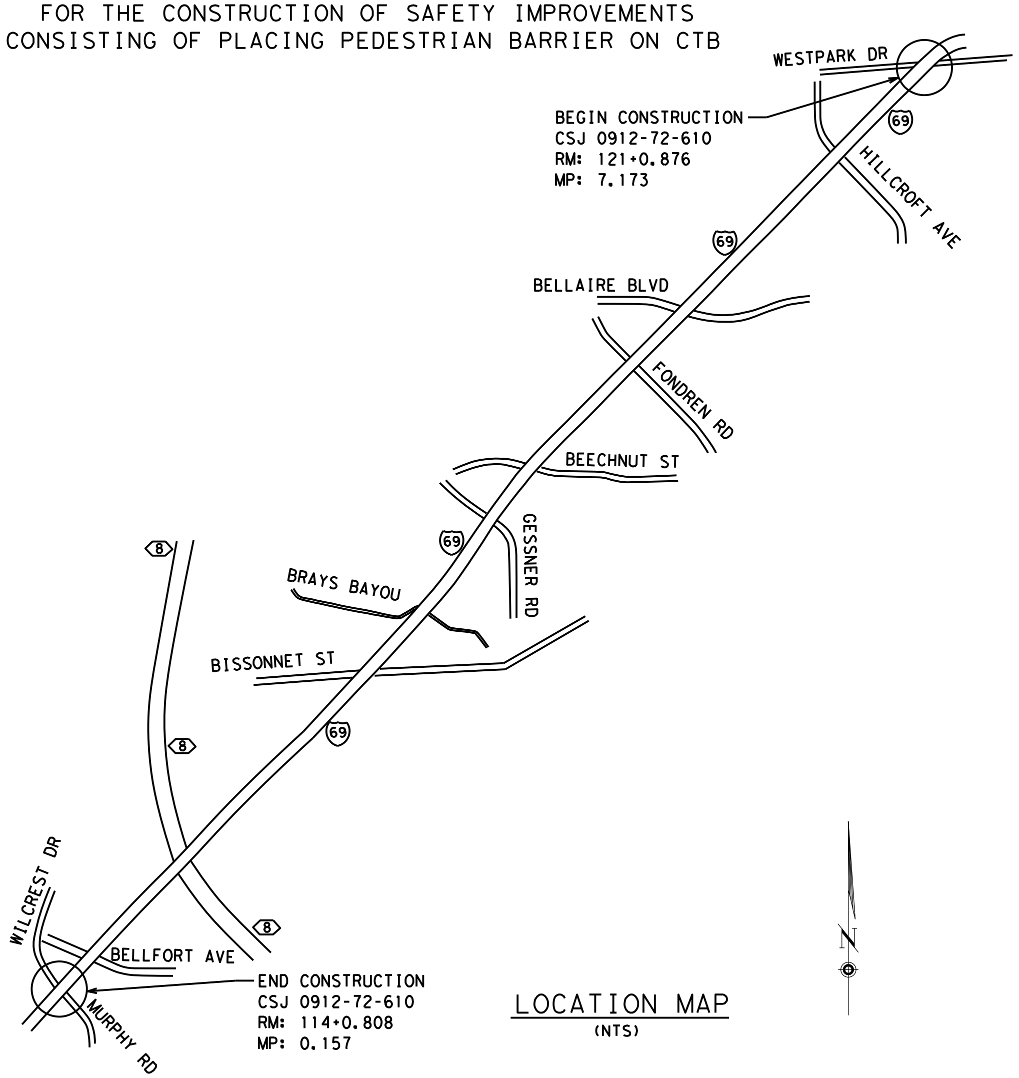
PROJECT NO.: F 2021(575)
CSJ: 0912-72-610

COUNTY: HARRIS
LIMITS: VARIOUS LOCATIONS

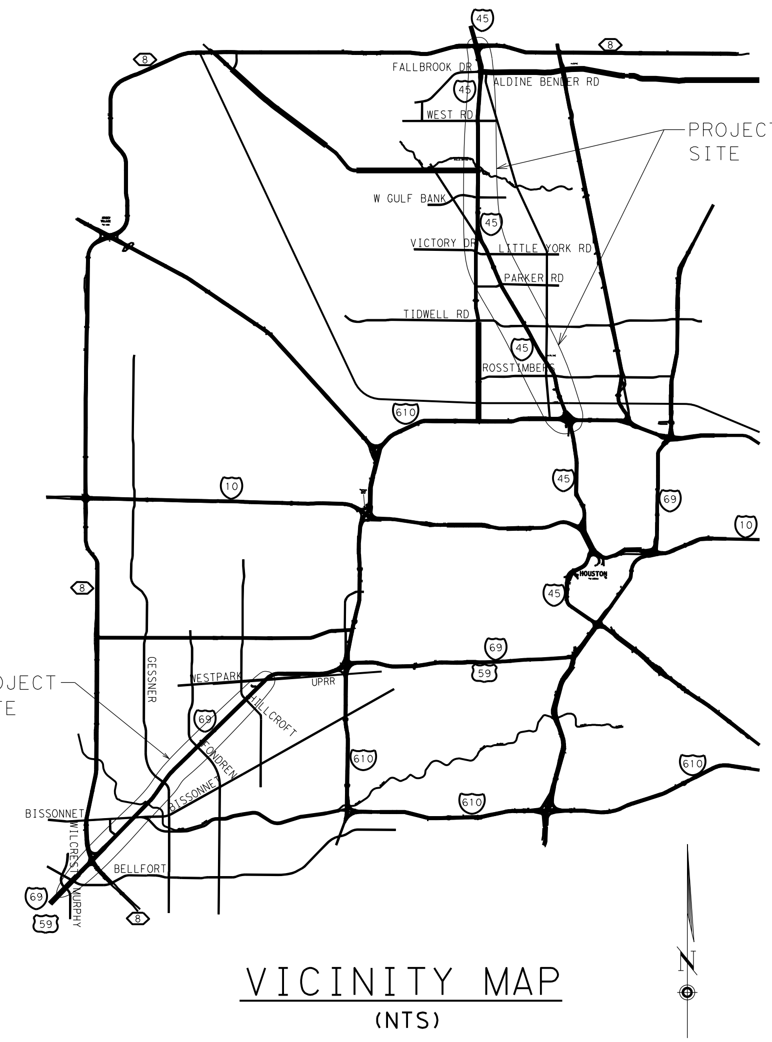
NET LENGTH OF PROJECT= 14.765 MILES
FOR THE CONSTRUCTION OF SAFETY IMPROVEMENTS
CONSISTING OF PLACING PEDESTRIAN BARRIER ON CTB



LOCATION MAP
(NTS)



LOCATION MAP
(NTS)



VICINITY MAP
(NTS)

ROADWAY CLASSIFICATION : N/A
DESIGN SPEED : N/A

ADT			CSJ	PROJECT NO.	HIGHWAY	LIMITS	LENGTH	
MAINLANES							FT.	MI.
2020	2040	2050						
261,405	366,000	418,300	0912-72-610	F 2021(575)	IH 45	FROM CROSSTIMBER ST TO FALLBROOK DR	40,914.72	7.749
246,033	344,500	393,700	0912-72-610	F 2021(575)	IH 69	FROM MURPHY RD TO WESTPARK DR	37,044.48	7.016
						TOTAL	77,959.2	14.765

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISION, FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA-1273, MAY 2012)

RR CROSSINGS : NONE
EQUATIONS : NONE
EXCEPTIONS : NONE

TEXAS DEPARTMENT OF TRANSPORTATION ®

3/31/2021

SUBMITTED FOR LETTING:
DocuSigned by:
Alexine Stittiams-Ward P.E.
SUPERVISING DESIGN ENGINEER
9D6BA739BD7743D...

4/1/2021

APPROVED FOR LETTING:
DocuSigned by:
Larry W. Blackburn, P.E.
For DISTRICT ENGINEER
B9928A69F03F42F...

COUNTY HARRIS PROJ. NO. F 2021(575)
HWY. NO. VARIOUS LETTING DATE JUNE 2021
DATE ACCEPTED

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INDEX OF SHEETS: (CSJ: 0912-72-610)

SHEET NO.	DESCRIPTION
	GENERAL
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2	INDEX OF SHEETS
3	IH 45 TYPICAL SECTION
4	IH 69 TYPICAL SECTION
5A-5E	GENERAL NOTES
6	ESTIMATE & QUANTITY
7	SUMMARY OF QUANTITIES
8-9	SUMMARY OF SMALL SIGNS
	TRAFFIC CONTROL PLANS
10	CONSTRUCTION SEQUENCE
11-19,19A	IH 45 TCP LAYOUT
20-28	IH 69 TCP LAYOUT
	TRAFFIC CONTROL STANDARDS
29	#BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS BC (1) - 14
30	#BARRICADE AND CONSTRUCTION PROJECT LIMIT BC (2)- 14
31	#BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT BC (3)- 14
32	#BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES BC (4)- 14
33	#BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT BC (5)- 14
34	#BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS) BC (6)- 14
35	#BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR BC (7)- 14
36	#BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES BC (8)- 14
37	#BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES BC (9)- 14
38	#BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES BC (10)- 14
39	#BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS BC (11)- 14
40	#BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS BC (12)- 14
41	#TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS TCP (1-5)- 18
42	#TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS TCP (2-6)- 18
43	#TRAFFIC CONTROL MOBILE OPERATIONS DIVIDED HIGHWAYS TCP (3-2)- 13
44	#TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS/ EXPRESSWAYS TCP (5-1)- 18
45	#TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES TCP (6-1)- 12
46	#WORK ZONE GIVE US A BREAK SIGNS WZ (BRK)- 13
	PLAN LAYOUTS
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SHEET NO.	DESCRIPTION
	TRAFFIC STANDARDS
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120	#SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS SMD (SLIP-1)-08
121	#SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS SMD (SLIP-2)-08
122	#SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS SMD (SLIP-3)-08
123	#SIGN MOUNTING DETAILS SMD (2-1)-08
124	#TYPICAL SIGN REQUIREMENTS TSR (4)-13
125	#TYPICAL SIGN REQUIREMENTS TSR (5)-13
125A	#DELINEATOR AND OBJECT MARKER MATERIAL DESCRIPTION D&OM (1)-20
125B	#DELINEATOR AND OBJECT MARKER MATERIAL DESCRIPTION D&OM (2)-20
	CTB REPAIR PLANS
126	CTB REPAIR DETAILS
127-136	IH 45 CTB REPAIR NOTES AND DETAILS
137-144	IH 69 CTB REPAIR NOTES AND DETAILS
145	CONCRETE TRAFFIC BARRIER PORTABLE AND PRECAST CTB(P&P)(SPL)
146	CONCRETE TRAFFIC BARRIER TYPE I PRECAST OR CAST-IN-PLACE BRIDGE CTBI(I)-85
	ENVIRONMENTAL PLANS
147	TXDOT STORM WATER POLLUTION PREVENTION PLAN-SWP3
148	ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)
149	#EROSION CONTROL LOG ECL-12

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE(*) HAVE BEEN SELECTED BY ME, OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...
SIGNATURE

5/3/2021
DATE

® INDEX OF SHEETS
Texas Department of Transportation

SCALE: NTS SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		2

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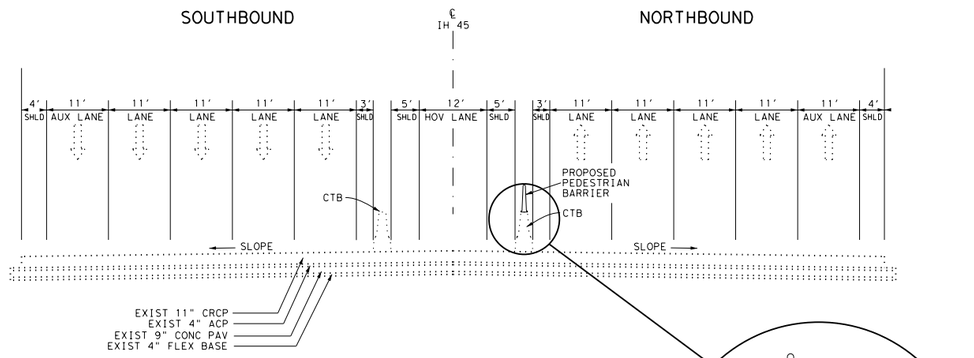
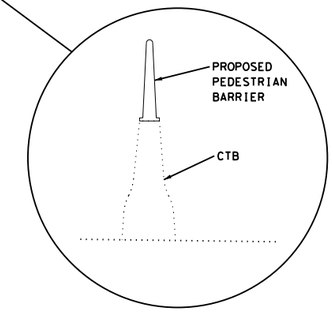
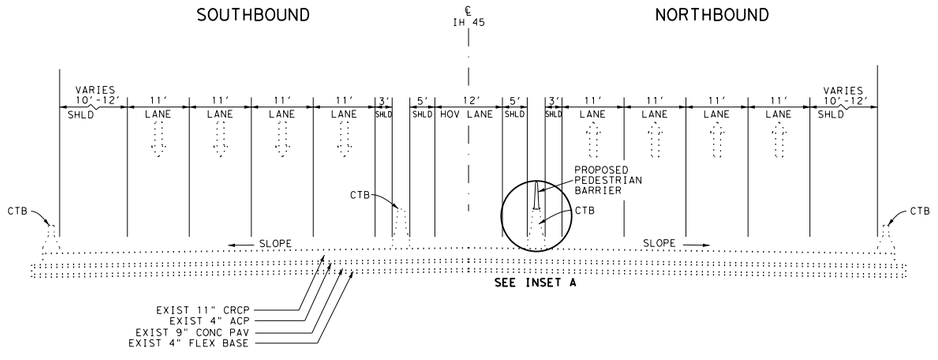


TYPICAL SECTION
IH 45 MAINLANES

STA. 285+00 TO STA. 299+00
STA. 514+00 TO STA. 542+30
STA. 559+70 TO STA. 582+00
STA. 615+00 TO STA. 639+00
STA. 668+00 TO STA. 690+00



INSET A



TYPICAL SECTION
IH 45 MAINLANES

STA. 299+00 TO STA. 514+00
STA. 542+30 TO STA. 559+70
STA. 582+00 TO STA. 615+00
STA. 639+00 TO STA. 668+00

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 45
TYPICAL SECTION

NTS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		3

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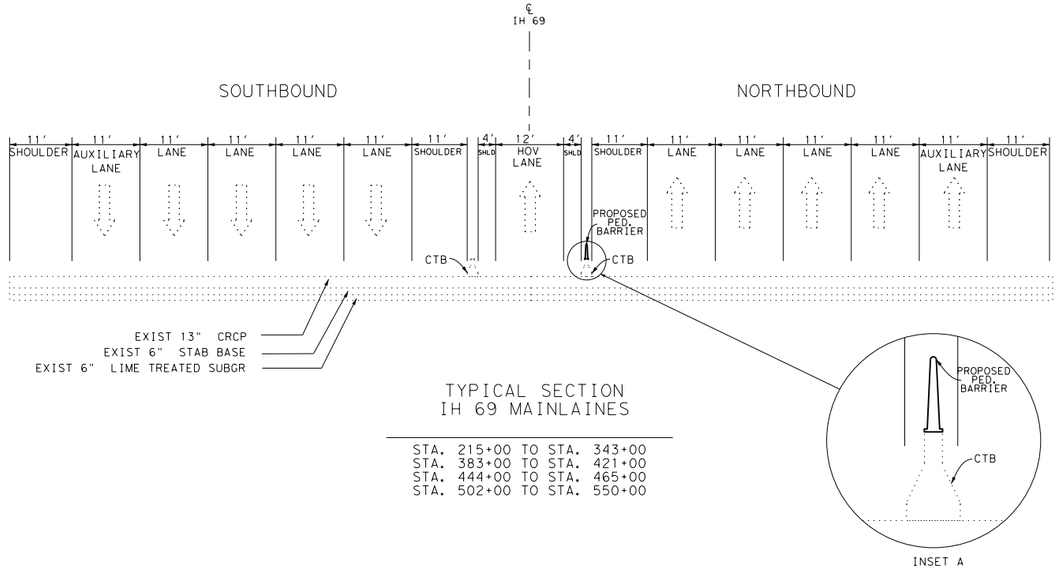

TYPICAL SECTION
IH 69 MAINLAINES

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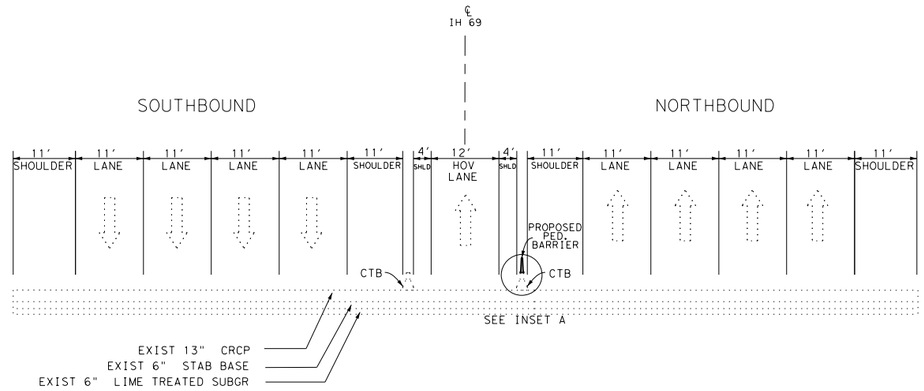
STA. 383+00 TO STA. 421+00
STA. 444+00 TO STA. 465+00
STA. 502+00 TO STA. 550+00



TYPICAL SECTION
IH 69 MAINLAINES

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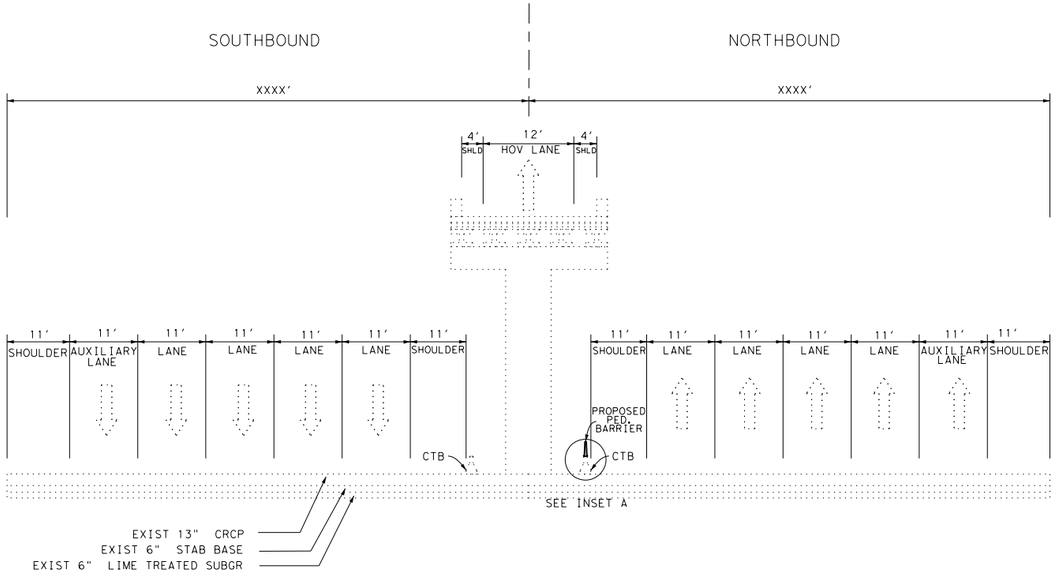
STA. 421+00 TO STA. 444+00
STA. 465+00 TO STA. 502+00



TYPICAL SECTION
IH 69 MAINLANES

STA. 537+50 TO STA. 580+00

2/8/2021

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED
PROFESSIONAL ENGINEER

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69 TYPICAL SECTION

SCALE: NTS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		4

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County: Harris **Control:** 0912-72-610

Highway: Various

General Notes:

General:

Contractor questions on this project are to be addressed to the following individual(s):

Area Engineer:
Hamoon Bahrami *Hamoon.Bahrami@txdot.gov*
Assistant Area Engineer:
Brett H. McLeod *Brett.Mcleod@txdot.gov*

Contractor questions will be accepted through email, phone, and in person by the above individuals. Contractor questions will be reviewed by the Area Engineer or Assistant Area Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following address:

https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/

Questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, and CCSJ/Project Name.

References to manufacturer's trade name or catalog numbers are for the purpose of identification only. Similar materials from other manufacturers are permitted if they are of equal quality, comply with the specifications for this project, and are approved, except for roadway illumination, electrical, and traffic signal items.

The cost for materials, labor, and incidentals to provide for traffic across the roadway and for ingress and egress to private property in accordance with Section 7.2.4 of the standard specifications is subsidiary to the various bid items. Restore access roadways to their original condition upon completing construction.

Unless otherwise shown on the plans or otherwise directed, commence work after sunrise and ensure construction equipment is off the road by sunset

Tolls incurred by the Contractor are incidental to the various bid items

Procure permits and licenses, which are to be issued by the City, County, or Municipal Utility District.

General: Site Management

Do not mix or store materials, or store or repair equipment, on top of concrete pavement or bridge decks unless authorized by the Engineer. Permission will be granted to store materials on surfaces if no damage or discoloration will result.

Mow the grass and weeds within the project limits a maximum of 3 times a year as directed. This work is subsidiary to the various bid items.

County: Harris **Control:** 0912-72-610

Highway: Various

Personal vehicles of employees are not permitted to park within the right of way, including sections closed to public traffic. Employees may park on the right of way at the Contractor's office, equipment, and materials storage yard sites.

Assume ownership of debris and dispose of at an approved location. Do not dispose of debris on private property unless approved in writing by the District Engineer.

Control the dust caused by construction operations. For sweeping the base material in preparation for laying asphalt and for sweeping the finished concrete pavement, use one of the following types of sweepers or approved equal:

Tricycle Type	**Truck Type - 4 Wheel**
Wayne Series 900	M-B Cruiser II
Elgin White Wing	Wayne Model 945
Elgin Pelican	Mobile TE-3
	Mobile TE-4
	Murphy 4042

General: Traffic Control and Construction

When design details are not shown on the plans, provide signs and arrows conforming to the latest "Standard Highway Sign Designs for Texas" manual.

General: Utilities

Consider the locations of underground utilities depicted in the plans as approximate and employ responsible care to avoid damaging utility facilities. Depending upon scope and magnitude of planned construction activities, advanced field confirmation by the utility owner or operator may be prudent. Where possible, protect and preserve permanent signs, markers, and designations of underground facilities.

If the Contractor damages or causes damage (breaks, leaks, nicks, dents, gouges, etc.) to the utility, contact the utility facility owner or operator immediately.

Be aware that an operational Computerized Transportation Management System (CTMS) exists within the limits of this project and that the system must remain operational throughout construction. If the Contractor damages or causes damage to this system, repair such damage within 8 hours of occurrence at no cost to the Department. In the event of system damage, notify the Director of Traffic Management Systems at 713-881-3283 within one hour of occurrence. Failure of the Contractor to repair damage to the main fiber optic cable and CCTV cable trunk lines, which convey all corridor information to TranStar, will result in the Contractor being billed for the full cost of emergency repairs.

At least 72 hours before starting work, make arrangements for locating existing Department-owned above ground and underground fiber optic, communications, power, illumination, and traffic signal cabling and conduit. Do this by calling the Department's Houston District Traffic Signal Operations Office at 713-802-5662 to schedule marking of underground lines on the ground. Use caution if working in these areas to avoid damaging or interfering with existing facilities.

If overhead or underground power lines need to be de-energized, contact the electrical service provider to perform this work. Costs associated with de-energizing the power lines or other protective measures required are at no expense to the Department.

If working near power lines, comply with the appropriate sections of Texas State Law and Federal Regulations relating to the type of work involved.

Perform electrical work in conformance with the National Electrical Code (NEC) and Department's standard sheets.

Item 5: Control of Work

Table 1
2014 Construction Specification Required Shop/Working Drawing Submittals - TxDOT Generated Plans

Spec Item No.'s	Product	Submittal Required	Approval Required (Y/N)	Contractor/ Fabricator P.E. Seal Required	Reviewing Party	Shop or Working Drawing (Note 1)
420	Formwork/Falsework	Y	Y	Y	A	WD
SS	Pedestrian Barrier	Y	Y	Y	A	SD

Notes:
1. Document flow for Working Drawings differs from Shop Drawings in that Working Drawings must be submitted to the Engineer rather than the Engineer of Record and they are for the information of the Engineer only; an approval stamp and distribution to all project offices is not required.

Key to Reviewing Party

A - Area Office

Area Office	Email Address
North Harris Area Office	HOU-NHAShpDrwgs@txdot.gov
West/Central Harris Area Office	HOU-WWCHAOShpDrwgs@txdot.gov

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Item 7: Legal Relations and Responsibilities

The Contractor may proceed with activities in PSLs that do not affect a USACE permit area if a self-determination has been made that the PSL is non-jurisdictional or if proper USACE clearances have been obtained in jurisdictional areas or have been previously evaluated by the

USACE as part of the permit review of this project. The Contractor is solely responsible for documenting any determinations that their activities do not affect a USACE permit area. Maintain copies of their determinations for review by the Department or any regulatory agency. The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to October 1). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document "Avoiding Migratory Birds and Handling Potential Violations" found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for field Biologist and Ornithologist qualifications).

This project does not require a U.S. Army Corps of Engineers (USACE) Section 404 Permit before letting, but if a permit is needed during construction, assume responsibility for preparing the permit application. Submit the permit application to the Department's District Environmental Section for approval. Once the permit application is approved, the Department will submit it to the USACE. Assume responsibility for the requested revisions, in coordination with the Department's District Environmental Section.

Do not store any material in Waters of the United States inside the right of way without written approval.

Maintain the roadway slope stability. Maintaining slope stability is subsidiary to the various bid items.

The nesting / breeding season for migratory birds is February 15 through September 30.

Conduct any tree removal outside of the migratory bird nesting season. If this is not possible due to scheduling, then exercise caution to remove only those trees with no active nests. Do not destroy nests on structures or in trees within the project limits during the nesting / breeding season.

Take measures to prevent the building of nests on any structures or trees within the project limits throughout the duration of the construction if work / removal will be performed during the nesting / breeding season. This can be accomplished by application of bird repellent gel, netting by hand every 3 to 4 days, or any other non-threatening method approved by the Houston District Environmental Section. Obtain this approval well in advance of the planned use. Contact the Houston District Environmental Section at 713-802-5244. The cost of this work is subsidiary to the various bid items.

This project is on a hurricane evacuation route. Provide at the pre-construction meeting a written plan outlining procedures to suspend work, secure the job site, and safely handle traffic through and across the project in the event of a hurricane evacuation.

During the hurricane season (June 1 through November 30), do not close any travel lanes except when the Contractor can demonstrate that he/she can provide labor, equipment, material, a work plan, and quality of work to satisfactorily return all lanes to an open, all-weather travel surface

within 3 days of receiving written or verbal notice but no later than 3 days before the predicted hurricane landfall. Construction of temporary lanes to an all-weather surface will be paid for in accordance with Article 9.7, "Payment for Extra Work and Force Account Method."

In addition to lane closures, cease work 3 days before the predicted hurricane landfall on or near the roadway that adversely impacts the flow of traffic and reduces the capacity of the highway during an evacuation. Vehicles of the Contractor, subcontractors, or material suppliers will not be allowed to enter or exit the traffic stream, including those for the purpose of material hauling and delivery, and mobilization or demobilization of equipment. When directed, this prohibition will include a reasonable time period for the evacuees to return to their point of origin.

No significant traffic generator events have been identified.

Item 8: Prosecution and Progress

The Department will supply bidders, upon written request, one electronic copy of the time determination schedule. The time determination schedule provided is for informational use only and is not intended for bidding or construction purposes.

The Department will not adjust the number of days for the project and milestones, if any, due to differences in opinion regarding any assumptions made in the preparation of the schedule or for errors, omissions, or discrepancies found in the time determination schedule.

Working days will be computed and charged based on Nighttime Work and Daytime Requiring Inspector in accordance with Section 8.3.3.2.2.

The Lane Closure Assessment Fee is Mainlanes:
IH 45: Crosstimbers St to Fallbrook Dr - $6500
IH 69: Murphy Rd to Westpark Dr - $6000

This fee applies to the Contractor for closures or obstructions that overlap into restricted hour traffic for each hour or portion thereof, per lane, regardless of the length of lane closure or obstruction. For Restricted Hours subject to Lane Assessment Fee refer to the Item, "Barricades, Signs, and Traffic Handling."

Item 502: Barricades, Signs, and Traffic Handling

Use a traffic control plan for handling traffic through the various phases of construction. Follow the phasing sequence unless otherwise agreed upon by the Area Engineer and the Project Manager. Ensure this plan conforms to the latest "Texas Manual on Uniform Traffic Control Devices" and the latest Barricade and Construction (BC) Standard Sheets.

Submit changes to the traffic control plan to the Area Engineer. Provide a layout showing the construction phasing, signs, striping, and signalizations for changes to the original traffic control plan.

Furnish and maintain the barricades and warning signs, including the necessary temporary and portable traffic control devices, during the various phases of construction. Place and construct

these barricades and warning signs in accordance with the latest "Texas Manual on Uniform Traffic Control Devices" for typical construction layouts.

Cover work zone signs when work related to the signs is not in progress, or when any hazard related to the signs no longer exists.

Keep the delineation devices, signs, and pavement markings clean. This work is subsidiary to the Item, "Barricades, Signs, and Traffic Handling."

Before detouring traffic onto the mainlane shoulders, remove dirt, debris, vegetation, and other deleterious material from the surface of the shoulders. Appropriately sign the detour in an approved manner. This work is subsidiary to the various bid items.

Do not mount signs on drums or barricades, except those listed in the latest Barricades and Construction standard sheets.

Do not reduce the existing number of lanes open to traffic except as shown on the following time schedule:

One Lane Closure

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday	9:00 AM - 3:00 PM	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Tuesday	9:00 AM - 3:00 PM	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Wednesday	9:00 AM - 3:00 PM	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Thursday	9:00 AM - 3:00 PM	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Friday	9:00 AM - 3:00 PM	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Saturday	*	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	N/A
Sunday	*	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	N/A

* As approved by Engineer.

The above times are approved for the traffic control conditions listed. The Area Engineer may approve other closure times if traffic counts warrant. The Area Engineer may reduce the above times for special events.

Law enforcement assistance will be required for this project and is expected to be required for major traffic control changes and lane closures. Coordinate with local law enforcement and arrange for law enforcement as directed or agreed by the Engineer. Before payment will be made, complete the "Daily Report on Law Enforcement Force Account Work" (Form 318),

provided by the Department and submit daily invoices that agree with this form for any day during the month in which approved services were provided.

Provide full-time, off-duty, uniformed, certified peace officers, as part of traffic control operations. The peace officers must be able to show proof of certification by the Texas Commission on Law Enforcement Officers Standards. The cost of the officers is paid for on a force account basis.

A minimum of 7 days in advance of any total closure, notify the Houston District Public Information Office of which roadways, ramps, intersections, or lanes will be closed, the dates they will remain closed, and when they will be opened again to traffic.

A minimum of 7 days in advance of any total closure, place a portable changeable message (PCM) sign at the location of each total closure which informs the traveling public of the details of the closure. Alternately, if the Traffic Control Plan provides a positive barrier at the location, a non-trailer mounted static message board sign behind the positive barrier may be used in place of a PCM.

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Item 506: Temporary Erosion, Sedimentation and Environmental Controls

The use of hay bales is not permitted as Storm Water Pollution Prevention Plan (SWP3) measures.

Due to the nature of the work involved, a Storm Water Pollution Prevention Plan (SWP3) is not required. However, if a SWP3 becomes necessary, it will be paid as extra work.

The Storm Water Pollution Prevention Plan (SWP3) consists of temporary erosion control measures needed and provided for under this Item. The disturbed area is less than one acre and use of erosion control measures is not anticipated. If physical conditions encountered at the job site require necessary controls, BMP installation, maintenance, and removal will be paid as extra work on a force account basis per Articles 4.4 and 9.7.

A Storm Water Pollution Prevention Plan (SWP3) is not required. Since the disturbed area is less than 5 acres, a "Notice of Intent" (NOI) is not required.

Use appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction staging area. Remove and dispose of materials in compliance with State and Federal laws.

Before starting construction, review with the Engineer the SWP3 used for temporary erosion control as outlined on the plans. Before construction, place the temporary erosion and sedimentation control features as shown on the SWP3.

Implement temporary and permanent erosion control measures to comply with the National Pollution Discharge Elimination System (NPDES) general permit under the Clean Water Act.

Before starting grading operations and during the project duration, place the temporary or permanent erosion control measures to prevent sediment from leaving the right of way.

Item 636: Signs

Include aluminum route markers, exit only panels, routing signs, and other special panels attached to guide signs in the unit bid price for the parent guide sign material.

Item 644: Small Roadside Sign Assemblies

Sign locations shown on the plans are approximate. Before placing them, obtain approval of and then stake the exact locations for these signs.

Use the Texas Universal Triangular Slip Base with the concrete foundation for small ground mounted signs, unless otherwise shown in the plans.

When design details are not shown on the plans, provide signs and arrows conforming to the latest "Standard Highway Sign Designs for Texas" manual.

Item 738: Cleaning and Sweeping Highways

Sweep the roadway within the project limits according to the following chart for the duration of the project or as directed. This work is paid for under their respective bid items.

Cleaning and Sweeping Highways
2 cycles

Item 6185: Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

A shadow vehicle with Truck Mounted Attenuators (TMAs) or Trailer Attenuators (TAs) is required as shown on the appropriate Traffic Control Plan (TCP) sheets. TMAs/TAs must meet the requirements of the Compliant Work Zone Traffic Control Device List.

Level 3 Compliant TMAs/TAs are required for this project.

A total of one (1) shadow vehicle with a TMA/TA is required for the work with the exception of Pavement Marking Operations. The Contractor is responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed on the project.

County: Harris

Control: 0912-72-610

Highway: Various

In addition to the shadow vehicles with TMAs/TAs that are specified as being required on the TCP layout sheets for this project, provide additional shadow vehicles with TMAs/TAs as shown on the TCP Standard sheets. The Contractor is responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed on the project.

QUANTITY SHEET

CONTROLLING PROJECT ID 0912-72-610 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY Various

		CONTROL SECTION JOB		**0912-72-610**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00133757**			
		COUNTY		**Harris**			
		HIGHWAY		**Various**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	420-6074	CL C CONC (MISC)	CY	1.551		1.551	
	500-6001	MOBILIZATION	LS	100.00%		100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	13.000		13.000	
	636-6001	ALUMINUM SIGNS (TY A)	SF	118.000		118.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	118.000		118.000	
	658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	7,002.000		7,002.000	
	738-6001	CLEANING / SWEEPING (CENTER MEDIAN)	CYC	2.000		2.000	
	780-6001	CNC CRACK REPAIR (DISCRETE)(GRAVITY)	LF	57.500		57.500	
	5117-6001	PEDESTRIAN BARRIER (INSTALL)	LF	70,015.000		70,015.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	130.000		130.000	
	6185-6002	TMA (STATIONARY)	DAY	40.000		40.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	184.000		184.000	
	18	LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

INSTALLATION OF PEDESTRIAN BARRIERS

CSJ	420	500	502	636	644	658	738	780	6001	6185	6185	5117
	6074	6001	6001	6001	6001	6026	6001	6001	6001	6002	6005	6001
	CL C Conc (Misc)	Mobilization	Barricades, Signs, and Traffic Handling	Aluminum Signs (TY A)	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	Cleaning/ Sweeping (Center Median)	CNC Crack Repair (Discrete)	Portable Changeable Message Sign	TMA (Stationary)	TMA (Mobile Operation)	Pedestrian Barrier (Install)
	CY	LS	MO	SF	EA	EA	CYC	LF	DAY	DAY	DAY	LF
0912-72-610 IH 45: Crosstimbers St to Fallbrook Dr	1.312	60.00	7.00	61.00	61.00	3947.00	1	20	75	22	103	39465.48
0912-72-610 IH 69: Murphy Rd to Westpark Dr	0.239	40.00	6.00	57.00	57.00	3055.00	1	37.5	55	18	81	30549.80
Total:	1.551	100.00	13.00	118.00	118.00	7002.00	2	57.5	130	40	184	70015.28

SUMMARY OF QUANTITIES

SHEET 1 OF 1

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			**7**
STATE	STATE DIST. NO.	COUNTY	
TEXAS	**HOU**	Harris, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	72	610	VARIOUS

SUMMARY OF SMALL SIGNS

LAYOUT SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (IN)	PLYWOOD SIGNS	ALUMINUM SIGNS TYPE A	644 - INS SM RD SN SUP & AM TYPE OF MOUNT																	
							6001 10BWG (1) SA (P) EA	6002 10BWG (1) SA (P-BM) EA	6004 10BWG (1) SA (T) EA	6005 10BWG (1) SA (T-2EXT) EA	6006 10BWG (1) SA (U) EA	6017 10BWG (2) SA (P) EA	6019 10BWG (2) SA (T-2EXT) EA	6027 S80 (1) SA (P) EA	6040 S80 (1) SA (P-BM) EA	6030 S80 (1) SA (T) EA	6031 S80 (1) SA (T-2EXT) EA	6033 S80 (1) SA (U) EA	6034 S80 (1) SA (U-1EXT) EA	6035 S80 (1) SA (U-2EXT) EA	6036 S80 (1) SA (U-BM) EA	6037 S80 (1) SA (U-WC) EA	6050 S80 (2) SA (P) EA	6052 S80 (2) SA (T-2EXT) EA
48	1	R9-3		30" X 30"		X	X																	
48	2	R9-3		30" X 30"		X	X																	
49	1	R9-3		30" X 30"		X	X																	
50	1	R9-3		30" X 30"		X	X																	
50	2	R9-3		30" X 30"		X	X																	
50	3	R9-3		30" X 30"		X	X																	
51	1	R9-3		30" X 30"		X	X																	
51	2	R9-3		30" X 30"		X	X																	
52	1	R9-3		30" X 30"		X	X																	
52	2	R9-3		30" X 30"		X	X																	
53	1	R9-3		30" X 30"		X	X																	
53	2	R9-3		30" X 30"		X	X																	
54	1	R9-3		30" X 30"		X	X																	
54	2	R9-3		30" X 30"		X	X																	
55	1	R9-3		30" X 30"		X	X																	
55	2	R9-3		30" X 30"		X	X																	
56	1	R9-3		30" X 30"		X	X																	
56	2	R9-3		30" X 30"		X	X																	
56	3	R9-3		30" X 30"		X	X																	
57	1	R9-3		30" X 30"		X	X																	
57	2	R9-3		30" X 30"		X	X																	
58	1	R9-3		30" X 30"		X	X																	
58	2	R9-3		30" X 30"		X	X																	
59	1	R9-3		30" X 30"		X	X																	
59	2	R9-3		30" X 30"		X	X																	
60	1	R9-3		30" X 30"		X	X																	
60	2	R9-3		30" X 30"		X	X																	
60	3	R9-3		30" X 30"		X	X																	
61	1	R9-3		30" X 30"		X	X																	
61	2	R9-3		30" X 30"		X	X																	
62	1	R9-3		30" X 30"		X	X																	
62	2	R9-3		30" X 30"		X	X																	
63	1	R9-3		30" X 30"		X	X																	
63	2	R9-3		30" X 30"		X	X																	
66	1	R9-3		30" X 30"		X	X																	
66	2	R9-3		30" X 30"		X	X																	
66	3	R9-3		30" X 30"		X	X																	
67	1	R9-3		30" X 30"		X	X																	
69	1	R9-3		30" X 30"		X	X																	
69	2	R9-3		30" X 30"		X	X																	
70	1	R9-3		30" X 30"		X	X																	
70	2	R9-3		30" X 30"		X	X																	
71	1	R9-3		30" X 30"		X	X																	
71	2	R9-3		30" X 30"		X	X																	
72	1	R9-3		30" X 30"		X	X																	
72	2	R9-3		30" X 30"		X	X																	
73	1	R9-3		30" X 30"		X	X																	
73	2	R9-3		30" X 30"		X	X																	
74	1	R9-3		30" X 30"		X	X																	
74	2	R9-3		30" X 30"		X	X																	
74	3	R9-3		30" X 30"		X	X																	
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79	1	R9-3		30" X 30"		X	X																	
79	2	R9-3		30" X 30"		X	X																	
80	1	R9-3		30" X 30"		X	X																	
80	2	R9-3		30" X 30"		X	X																	
81	1	R9-3		30" X 30"		X	X																	
81	2	R9-3		30" X 30"		X	X																	
85	1	R9-3		30" X 30"		X	X																	
86	1	R9-3		30" X 30"		X	X																	
86	2	R9-3		30" X 30"		X	X																	
87	1	R9-3		30" X 30"		X	X																	
87	2	R9-3		30" X 30"		X	X																	
89	1	R9-3		30" X 30"		X	X																	
89	2	R9-3		30" X 30"		X	X																	
90	1	R9-3		30" X 30"		X	X																	
90	2	R9-3		30" X 30"		X	X																	
90	3	R9-3		30" X 30"		X	X																	
91	1	R9-3		30" X 30"		X	X																	
91	2	R9-3		30" X 30"		X	X																	
92	1	R9-3		30" X 30"		X	X																	
92	2	R9-3		30" X 30"		X	X																	
93	1	R9-3		30" X 30"		X	X																	
93	2	R9-3		30" X 30"		X	X																	
93	3	R9-3		30" X 30"		X	X																	
94	1	R9-3		30" X 30"		X	X																	
95	1	R9-3		30" X 30"		X	X																	
96	1	R9-3		30" X 30"		X	X																	
97	1	R9-3		30" X 30"		X	X																	
97	2	R9-3		30" X 30"		X	X																	
98	1	R9-3		30" X 30"		X	X																	
98	2	R9-3		30" X 30"		X	X																	

GENERAL NOTES:

ALL SIGNS SHALL BE ERECTED ACCORDING TO THE LOCATION SHOWN ON THE LAYOUT SHEETS EXCEPT THAT THE ENGINEER MAY SHIFT A SIGN IN ORDER TO SECURE A MORE DESIRABLE LOCATION. THE CONTRACTOR WILL STAKE ALL SIGN LOCATIONS, AND NO CHANGES IN THOSE LOCATIONS SHALL BE MADE WITHOUT PRIOR APPROVAL OF THE ENGINEER.

ALUMINUM SIGN BLANKSTY A)

Square Ft.	Min. Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

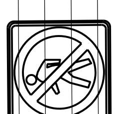
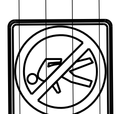
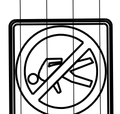
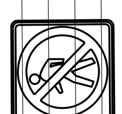
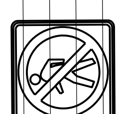
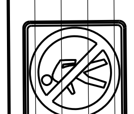
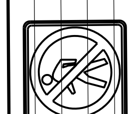
SUMMARY OF SMALL SIGNS

DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET
HOU	HARRIS	0912	72	610	VARIOUS

STD-N29

SUMMARY OF SMALL SIGNS

644 - INS SM RD SN SUP & AM — TYPE OF MOUNT

LAYOUT SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (IN)	PLYWOOD SIGNS	ALUMINUM SIGNS TYPE A	6001 10BWG (1) SA (P) EA	6002 10BWG (1) SA (P-BM) EA	6004 10BWG (1) SA (T) EA	6005 10BWG (1) SA (T-2EXT) EA	6006 10BWG (1) SA (U) EA	6017 10BWG (2) SA (P) EA	6019 10BWG (2) SA (T-2EXT) EA	6027 S80 (1) SA (P) EA	6040 S80 (1) SA (P-BM) EA	6030 S80 (1) SA (T) EA	6031 S80 (1) SA (T-2EXT) EA	6033 S80 (1) SA (U) EA	6034 S80 (1) SA (U-1EXT) EA	6035 S80 (1) SA (U-2EXT) EA	6036 S80 (1) SA (U-BM) EA	6037 S80 (1) SA (U-WC) EA	6050 S80 (2) SA (P) EA	6052 S80 (2) SA (T-2EXT) EA
98	3	R9-3		30" X 30"		X	X																	
99	1	R9-3		30" X 30"		X	X																	
99	2	R9-3		30" X 30"		X	X																	
100	1	R9-3		30" X 30"		X	X																	
100	2	R9-3		30" X 30"		X	X																	
101	1	R9-3		30" X 30"		X	X																	
101	2	R9-3		30" X 30"		X	X																	
102	1	R9-3		30" X 30"		X	X																	
102	2	R9-3		30" X 30"		X	X																	
103	1	R9-3		30" X 30"		X	X																	
103	2	R9-3		30" X 30"		X	X																	
103	3	R9-3		30" X 30"		X	X																	
104	1	R9-3		30" X 30"		X	X																	
105	1	R9-3		30" X 30"		X	X																	
105	2	R9-3		30" X 30"		X	X																	
105	3	R9-3		30" X 30"		X	X																	
106	1	R9-3		30" X 30"		X	X																	
107	1	R9-3		30" X 30"		X	X																	
107	2	R9-3		30" X 30"		X	X																	
108	1	R9-3		30" X 30"		X	X																	
108	2	R9-3		30" X 30"		X	X																	
108	3	R9-3		30" X 30"		X	X																	
109	1	R9-3		30" X 30"		X	X																	
109	2	R9-3		30" X 30"		X	X																	
110	1	R9-3		30" X 30"		X	X																	
110	2	R9-3		30" X 30"		X	X																	
111	1	R9-3		30" X 30"		X	X																	
111	2	R9-3		30" X 30"		X	X																	
112	1	R9-3		30" X 30"		X	X																	
112	2	R9-3		30" X 30"		X	X																	
113	1	R9-3		30" X 30"		X	X																	
113	2	R9-3		30" X 30"		X	X																	
113	3	R9-3		30" X 30"		X	X																	

GENERAL NOTES:

ALL SIGNS SHALL BE ERECTED ACCORDING TO THE LOCATION SHOWN ON THE LAYOUT SHEETS EXCEPT THAT THE ENGINEER MAY SHIFT A SIGN IN ORDER TO SECURE A MORE DESIRABLE LOCATION. THE CONTRACTOR WILL STAKE ALL SIGN LOCATIONS, AND NO CHANGES IN THOSE LOCATIONS SHALL BE MADE WITHOUT PRIOR APPROVAL OF THE ENGINEER.

ALUMINUM SIGN BLANKS(TY A)

Square Ft.	Min. Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

SUMMARY OF SMALL SIGNS

 SHEET 2 OF 2

STATE DISTRICT	FEDERAL REGION	PROJECT NO.			SHEET
HOU	6				9
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
HARRIS		0912	72	610	VARIOUS

STD-N29

GENERAL

THE SEQUENCE OF WORK FOR EACH PHASE IS OUTLINED BELOW:

THE CONTRACTOR MAY ALTER OR COMBINE SEQUENCE TO IMPROVE OPERATIONS BASED ON FIELD CONDITIONS AND UPON ENGINEER'S APPROVAL.

CONTRACTORS ATTENTION IS CALLED TO COORDINATE WITH THE ADJACENT PROJECT CONSTRUCTION, OR AS DIRECTED BY ENGINEER TO ENSURE SMOOTH TRANSITION OF TRAFFIC OPERATIONS DURING CONSTRUCTION.

BEFORE COMMENCEMENT OF CONSTRUCTION, PLACE ADVANCED WARNING SIGNS AND TRAFFIC CONTROL DEVICES AS SHOWN ON TRAFFIC CONTROL PLANS AND AS DIRECTED BY THE ENGINEER. PLACE SWP3 DEVICES IN ACCORDANCE WITH THE SWP3 STANDARDS AND AS DIRECTED BY THE TXDOT PROJECT MANAGER.

SEQUENCE OF CONSTRUCTION

PHASE 1: REPAIR EXISTING CTB AS SHOWN IN PLANS. INSTALL PEDESTRIAN BARRIER ON IH 45 NB HOV CTB FROM STA 291+10 TO STA 681+20.

STEP 1: REPAIR CTB OF IH 45 NB HOV CTB. TMA (STATIONARY), TMA (MOBILE OPERATION), AND PCMS WILL BE USED DURING REPAIR CONSTRUCTION ACTIVITIES AS DIRECTED BY THE TCP STANDARDS AND THE TXDOT PROJECT MANAGER. REFER TO IH 45 PLAN LAYOUTS FOR MORE DETAILS.

STEP 2: INSTALL PEDESTRIAN BARRIER ON IH 45 NB HOV CTB. TMA (STATIONARY), TMA (MOBILE OPERATION), AND PCMS WILL BE USED DURING INSTALLATION. REFER TO IH 45 PLAN LAYOUTS FOR MORE DETAILS.

STEP 3: PERFORM CLEANING AND SWEEPING ALONG THE MEDIAN SHOULDER AND HOV LANE.

STEP 4: INSTALL SMALL ROADSIDE SIGNS AS SHOWN IN THE PLANS.

PHASE 2: REPAIR CTB AND INSTALL PEDESTRIAN BARRIER ON IH 69 NB HOV FROM STA 227+10 TO STA 567+00.

STEP 1: REPAIR CTB OF IH 69 NB HOV. TMA (STATIONARY), TMA (MOBILE OPERATION), AND PCMS WILL BE USED DURING REPAIR. REFER TO IH 45 PLAN LAYOUTS FOR MORE DETAILS.

STEP 2: INSTALL PEDESTRIAN BARRIER ON IH 69 NB HOV CTB. TMA (STATIONARY), TMA (MOBILE OPERATION), AND PCMS WILL BE USED DURING INSTALLATION. REFER TO IH 45 PLAN LAYOUTS FOR MORE DETAILS.

STEP 3: PERFORM CLEANING AND SWEEPING ALONG THE MEDIAN SHOULDER AND HOV LANE.

STEP 4: INSTALL SMALL ROADSIDE SIGNS AS SHOWN IN THE PLANS.

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED
PROFESSIONAL ENGINEER

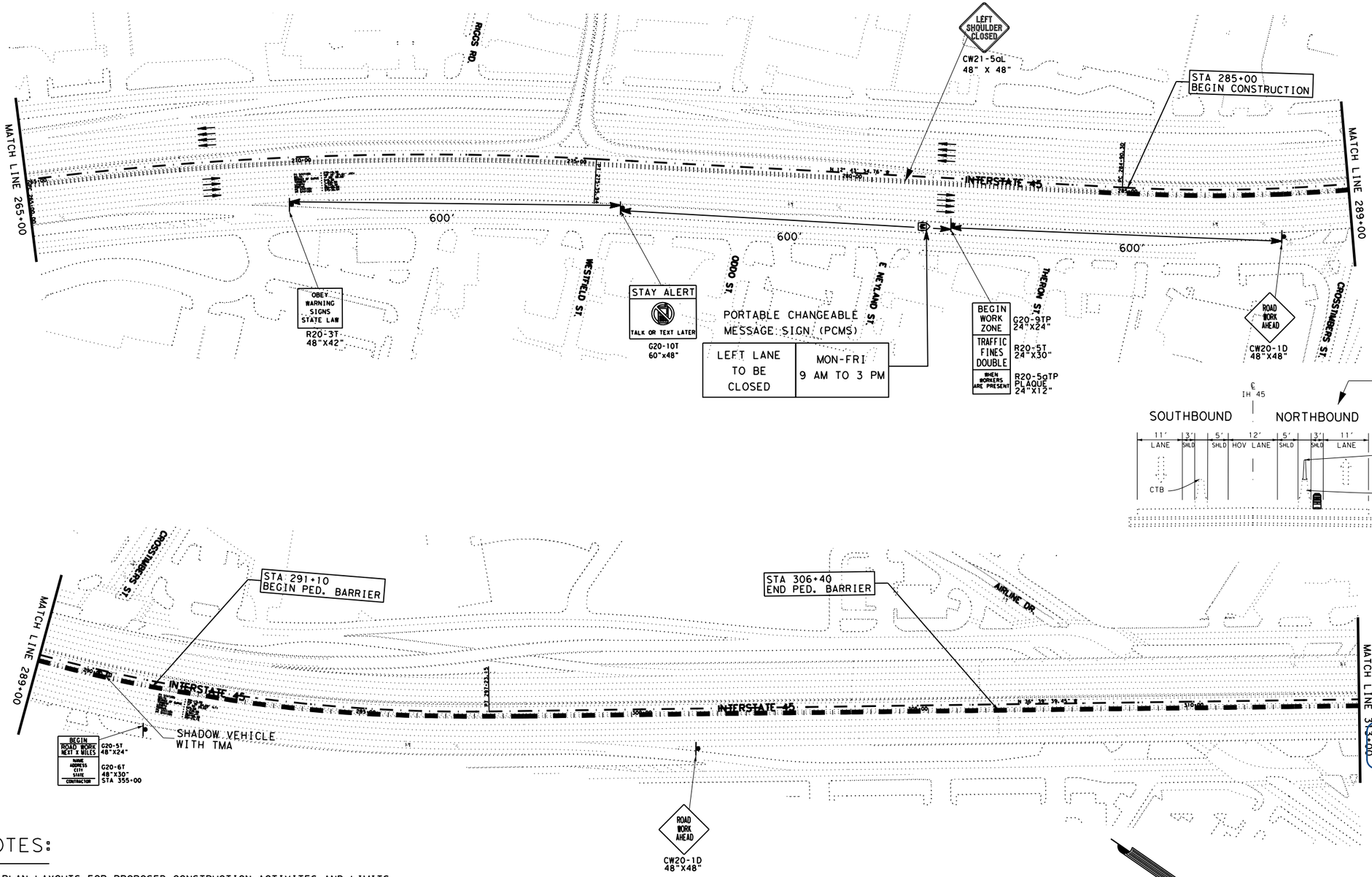
2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

CONSTRUCTION SEQUENCE

SHEET 1 OF 1

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			10
STATE	DIST.	COUNTY	
	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
0912	72	610	VARIOUS



NOTES:

1. SEE PLAN LAYOUTS FOR PROPOSED CONSTRUCTION ACTIVITES AND LIMITS.
2. EXACT WORDING AND LOCATION OF PCMS ARE TO BE APPROVED BY THE FIELD ENGINEER.
3. PLACEMENT OF ADVANCE WARNING SIGNS IS REPRESENTED ON THE LAYOUT. THE SPACING OF SIGNS WILL CONSIDER THE CURRENT LEGAL SPEED LIMIT, SEE STANDARD BC(2)-14. FINAL SIGN POSITION WILL BE APPROVED BY THE AREA ENGINEER.
4. THE CONTRACTOR SHALL HAVE 4 PCMS UNITS AVAILABLE FOR USE. PLACEMENT MUST BE IN ADVANCE OF THE LIMITS WHERE CONSTRUCTION ACTIVITES WILL OCCUR. THE PLACEMENT LOCATION SHALL BE APPROVED BY THE TXDOT PROJECT MANAGER.
5. THE CONSTRUCTION WORK FOR PHASE 1 AND 2 INVOLVING SHOULDER CLOSURE AND/OR LEFT LANE CLOSURE SHALL BE DONE UTILIZING STANDARDS TCP(1-5)-18, TCP(5-1)-18, OR (6-1)-12.
6. THE NB INSIDE SHOULDER SHALL BE ALLOWED TO REMAIN CLOSED CONTINUOUSLY DURING CONSTRUCTION ACTIVITES. THE INSIDE LEFT LANE CLOSURE SHALL BE AS INDICATED UNDER GENERAL NOTES UNDER ITEM 502.
7. THE PCMS AND TMA UNITS WILL BE USED THROUGHOUT THE PROJECT LIMITS AS NEEDED TO ESTABLISH THE SHOULDER AND/OR LANE CLOSURES.

LEGEND

PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

SHADOW VEHICLE WITH TMA

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 45 TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 1 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		11

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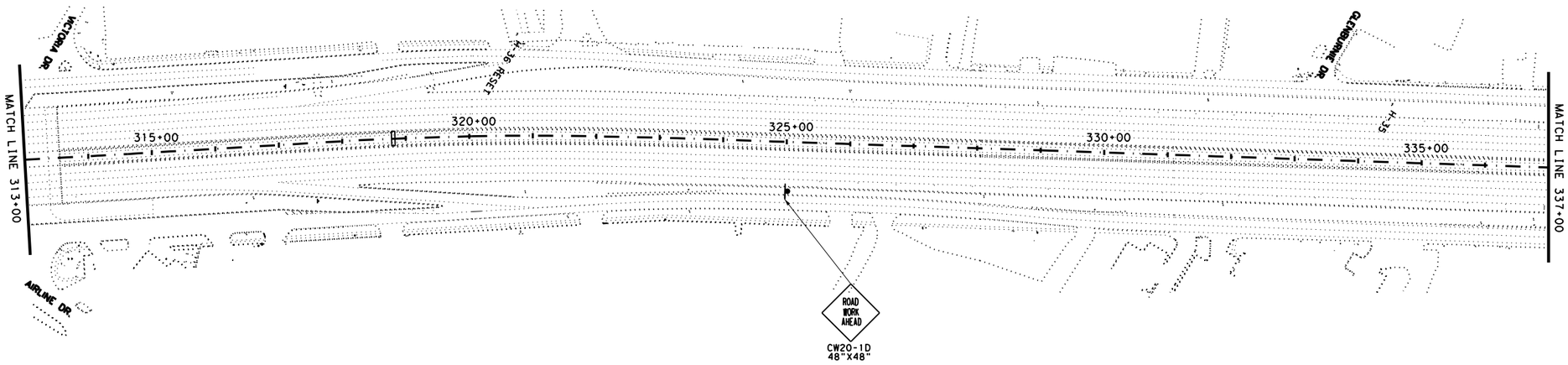

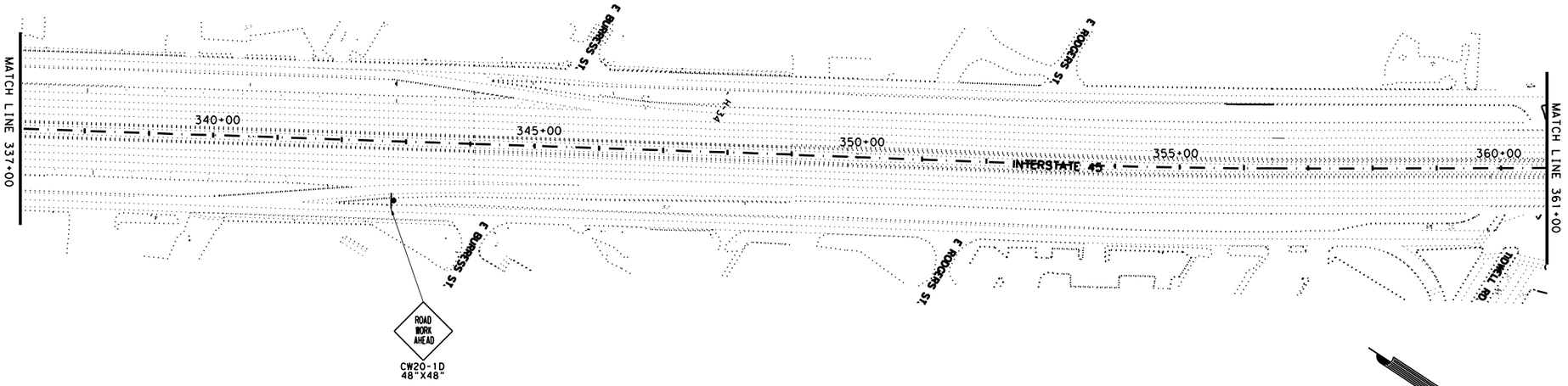

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LEGEND

PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

SHADOW VEHICLE WITH TMA

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 45
TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 2 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		12

DATE: 12/7/2020 9:36:34 AM
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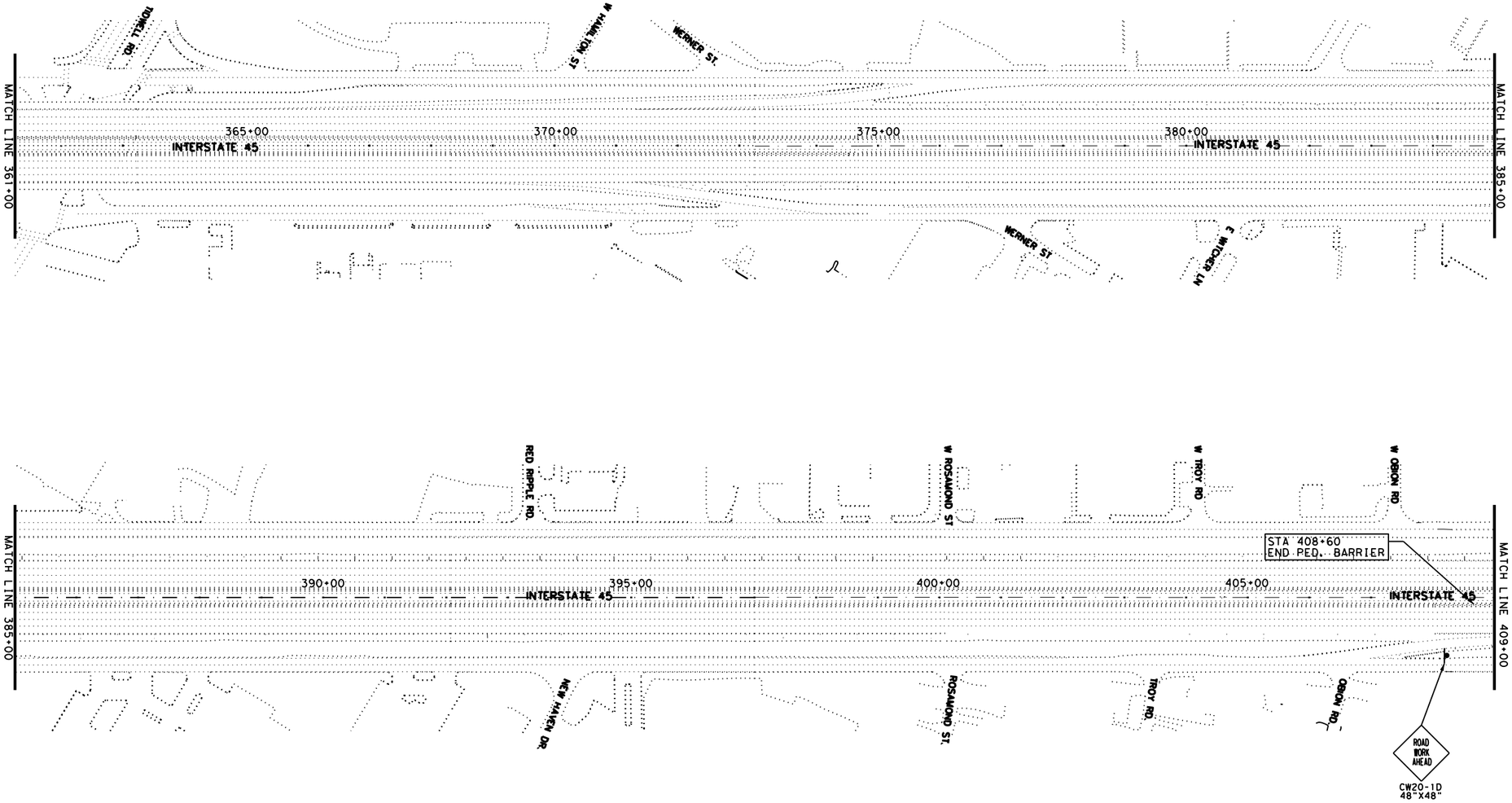

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PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

SHADOW VEHICLE WITH TMA

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

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9D6BA739BD7743D...

IH 45 TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 3 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		13

DATE: 12/15/2020 1:10:13 PM
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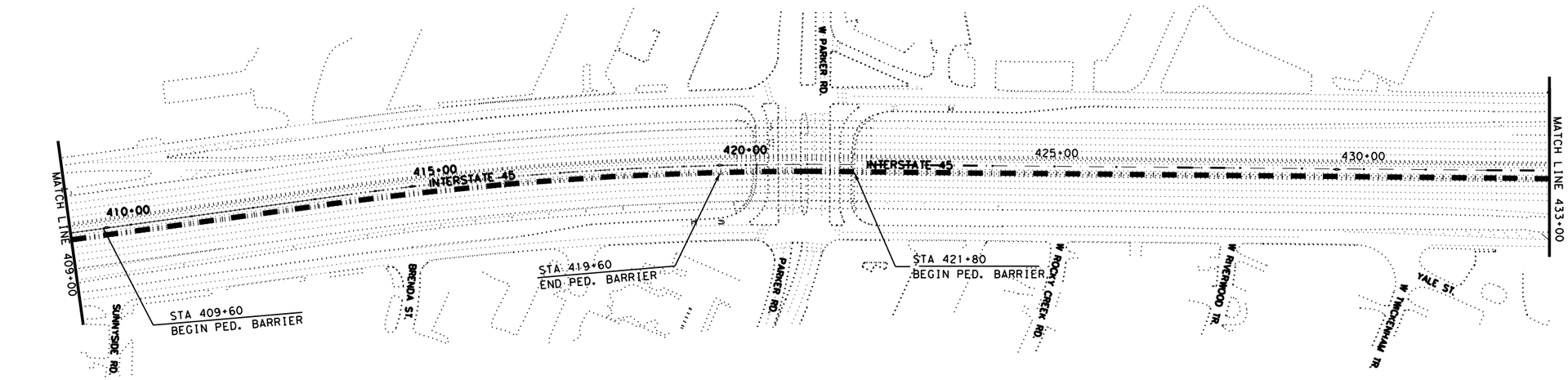

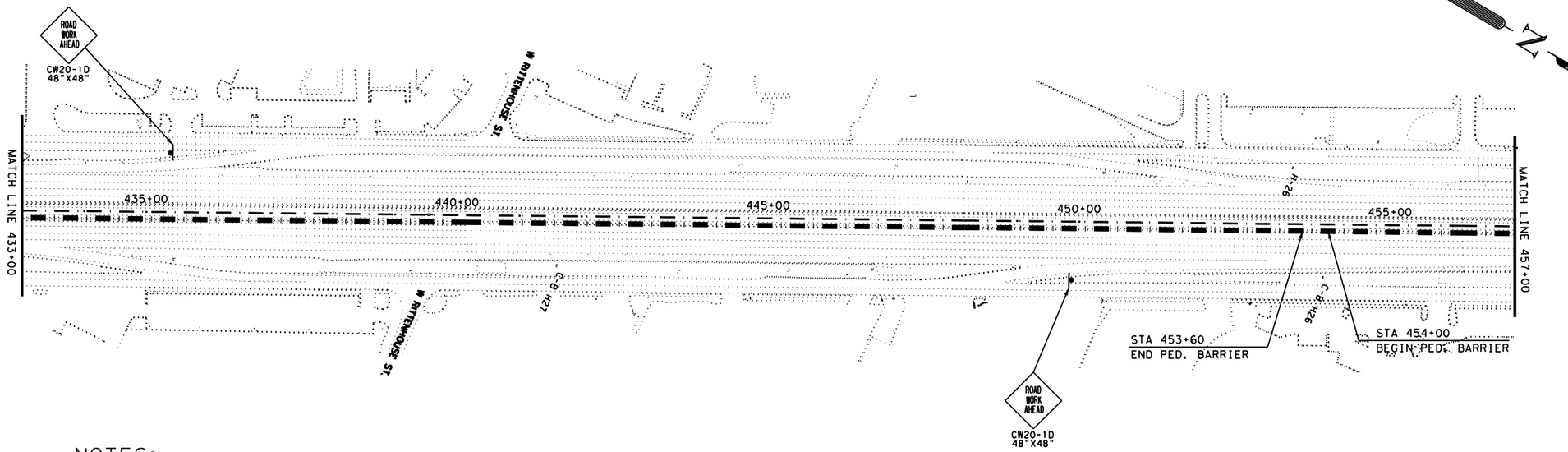

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SHADOW VEHICLE WITH TMA

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
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2/8/2021

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Alexine Stittiams-Ward P.E.
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IH 45
TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 4 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		14

DATE: 12/15/2020 1:14:48 PM
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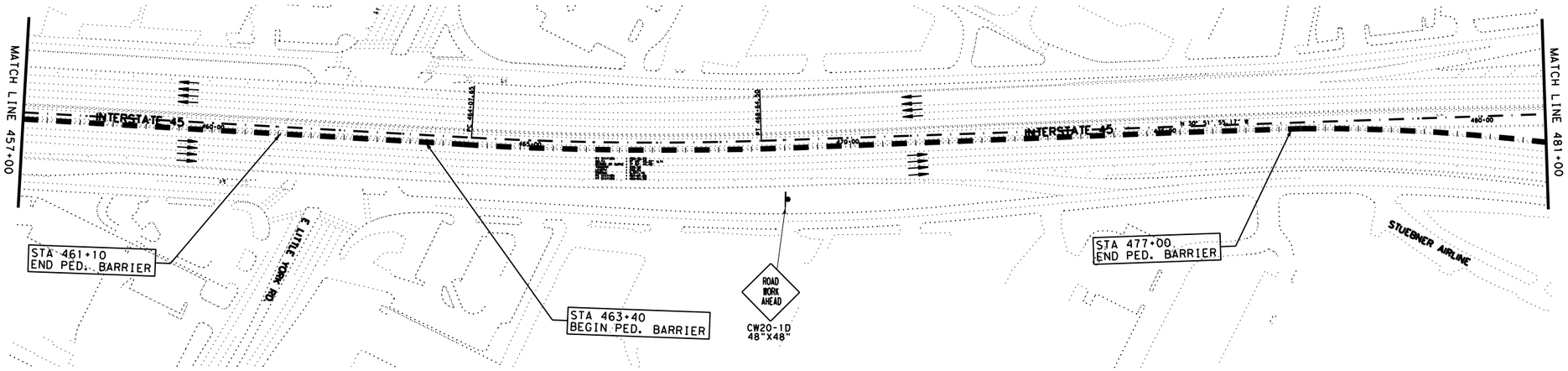

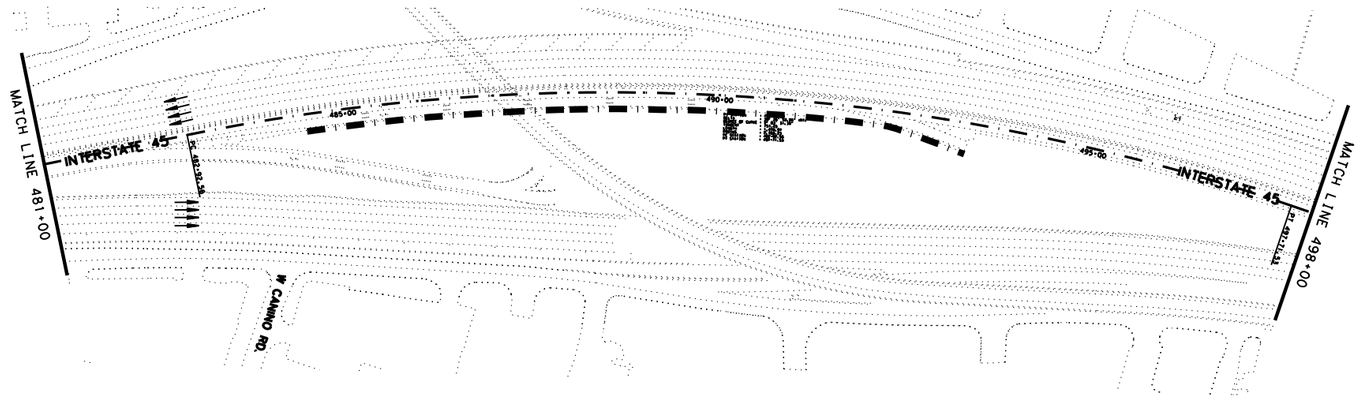

2/8/2021

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
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PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

SHADOW VEHICLE WITH TMA

IH 45 TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 5 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		15

DN: CK: DW: CK:

DATE: 12/7/2020 11:06:29 AM
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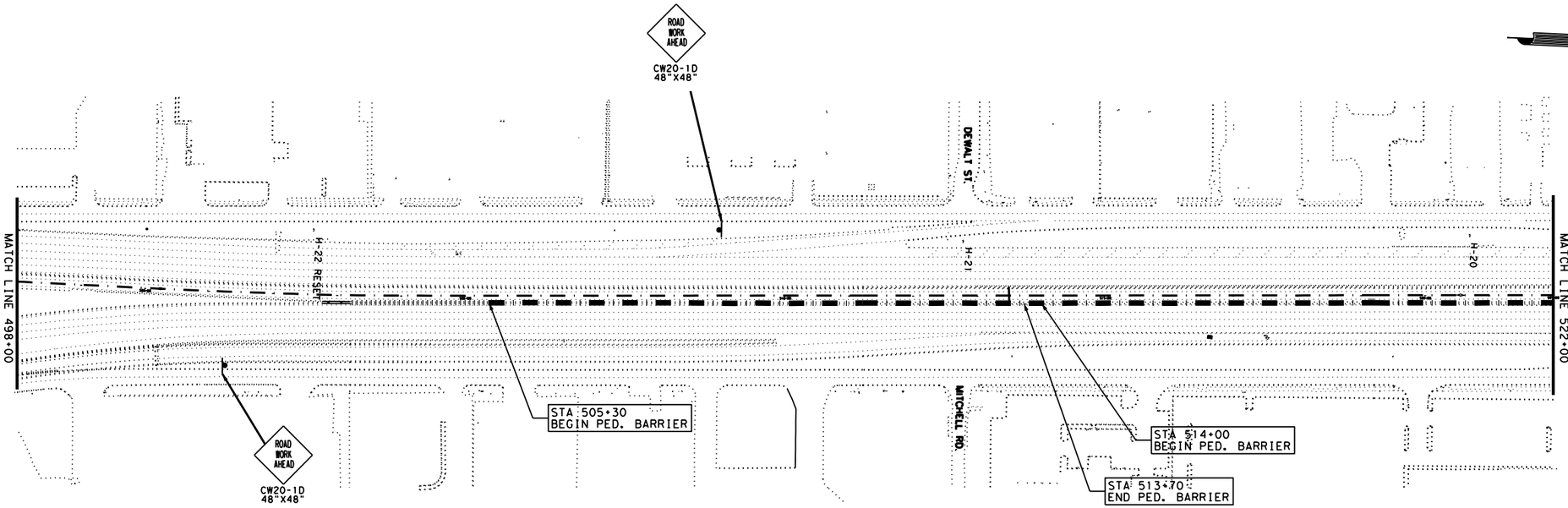

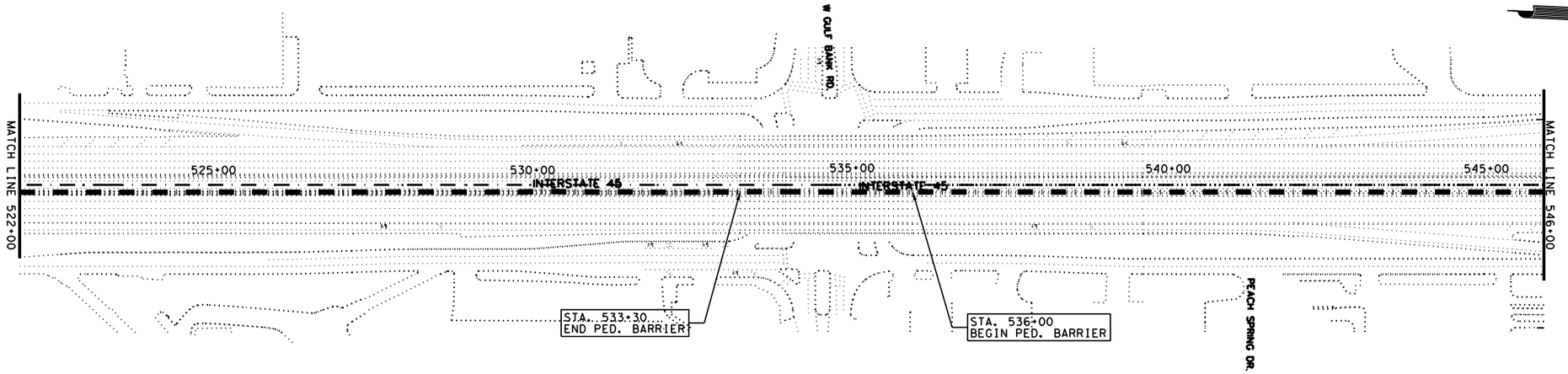

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SHADOW VEHICLE WITH TMA

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 45
TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 6 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		16

DATE: 2/4/2021 4:46:20 PM
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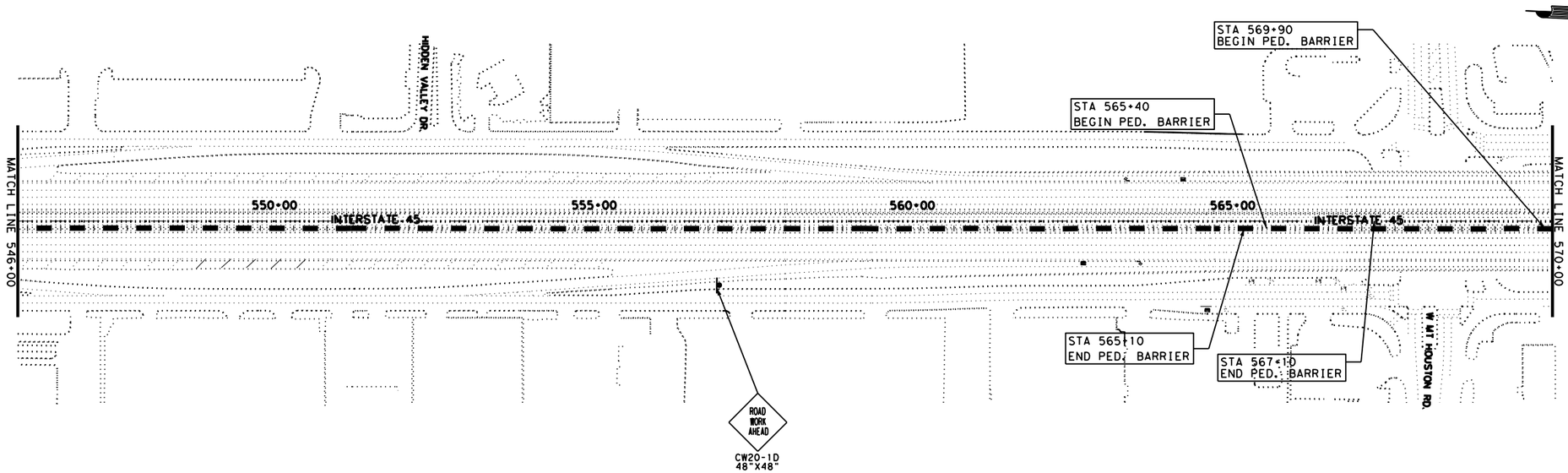

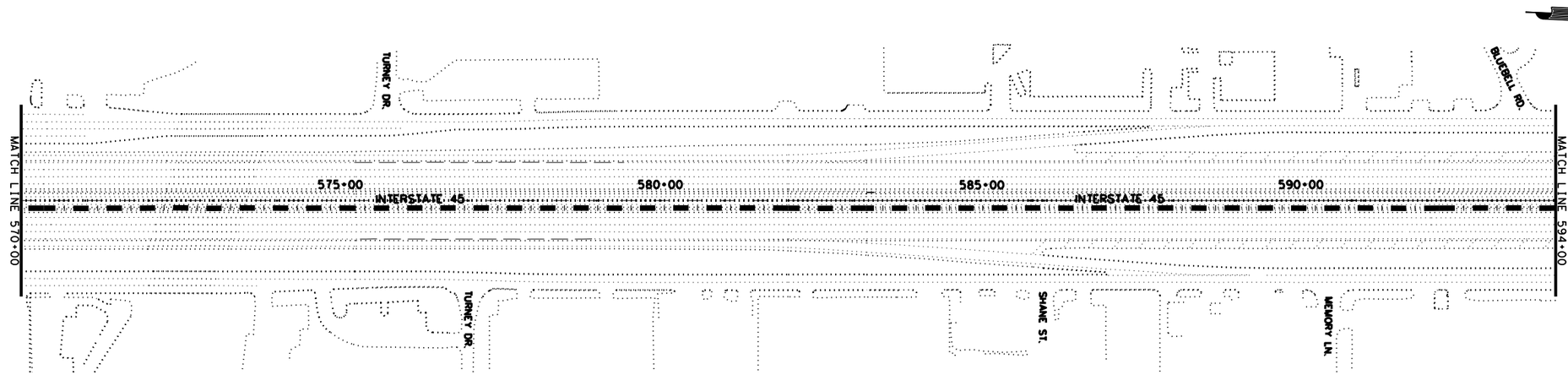

2/8/2021

STATE OF TEXAS
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LEGEND

PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

SHADOW VEHICLE WITH TMA

IH 45
TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 7 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		17

DATE: 12/7/2020 11:36:42 AM
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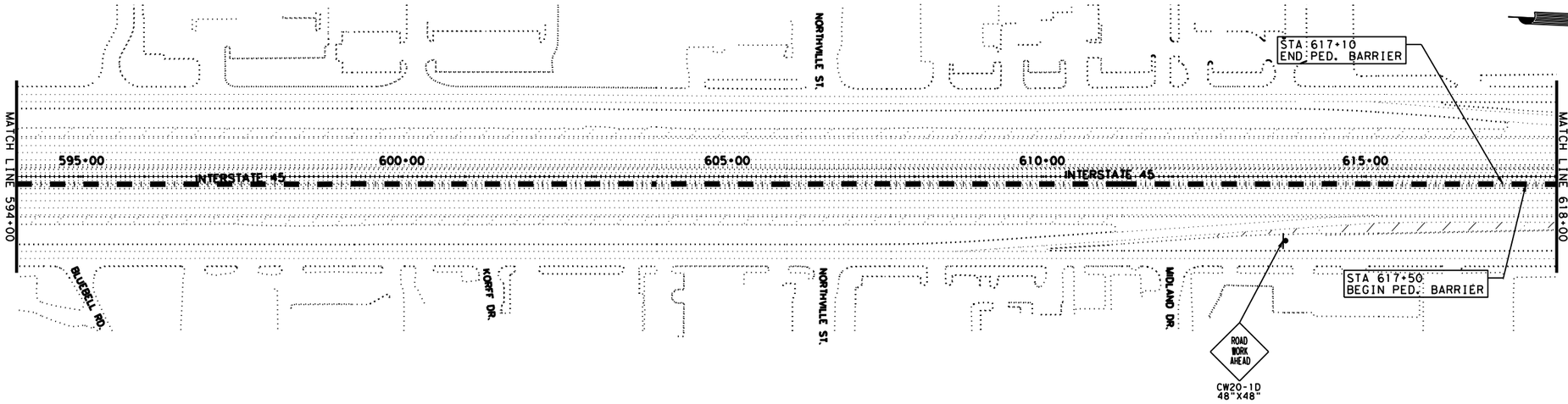

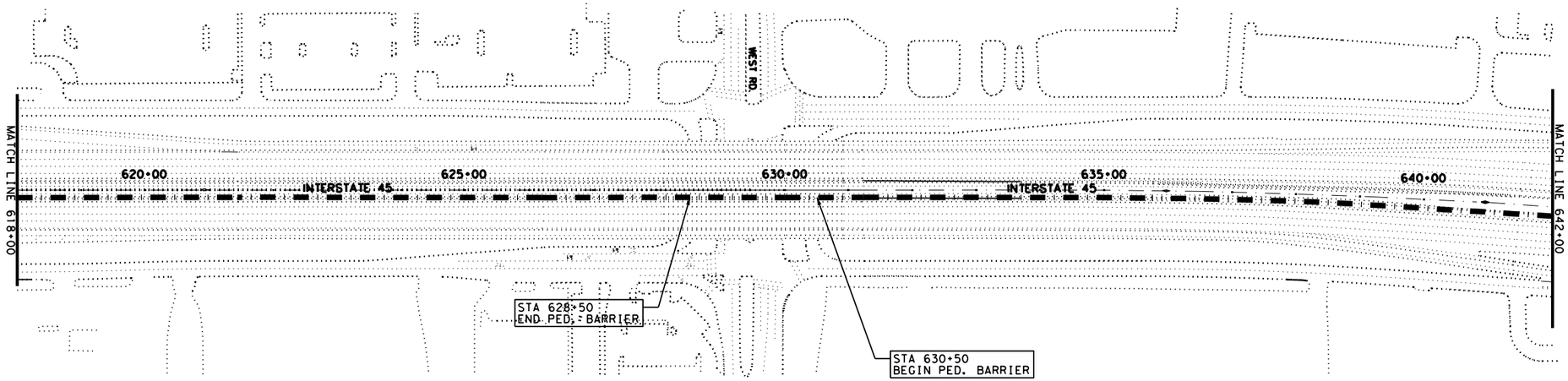

2/8/2021

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
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LEGEND

PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

SHADOW VEHICLE WITH TMA

IH 45
TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 8 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		18

DATE: 12/7/2020 11:41:07 AM
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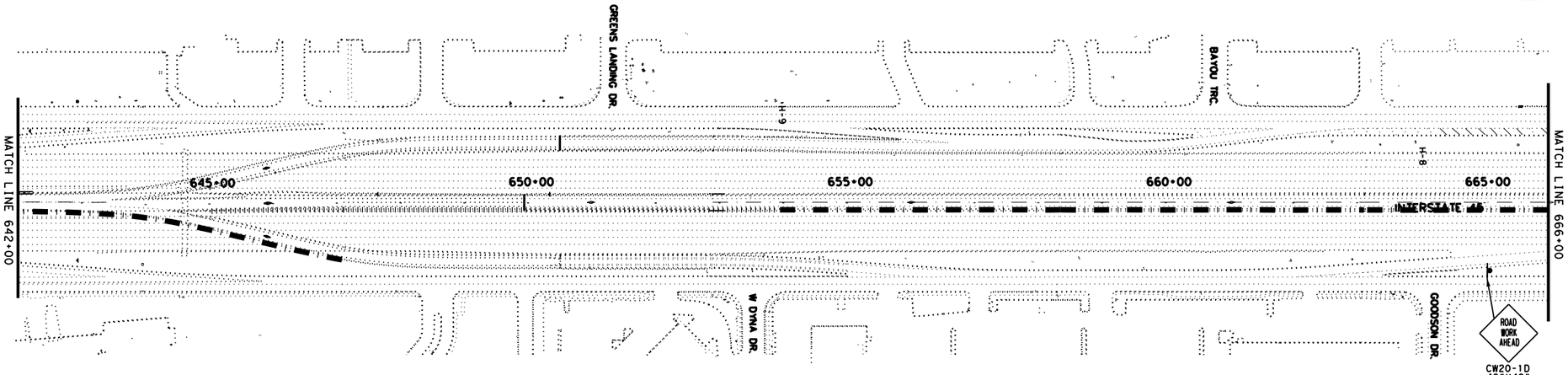

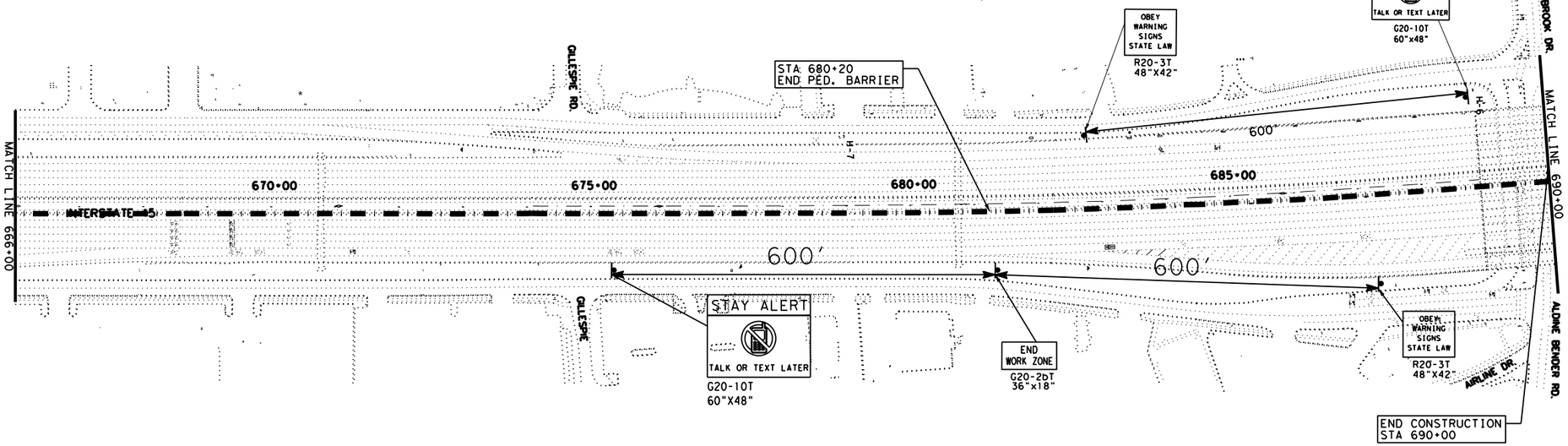

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SHADOW VEHICLE WITH TMA

STATE OF TEXAS
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REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
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9D6BA739BD7743D...

IH 45 TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 9 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		19

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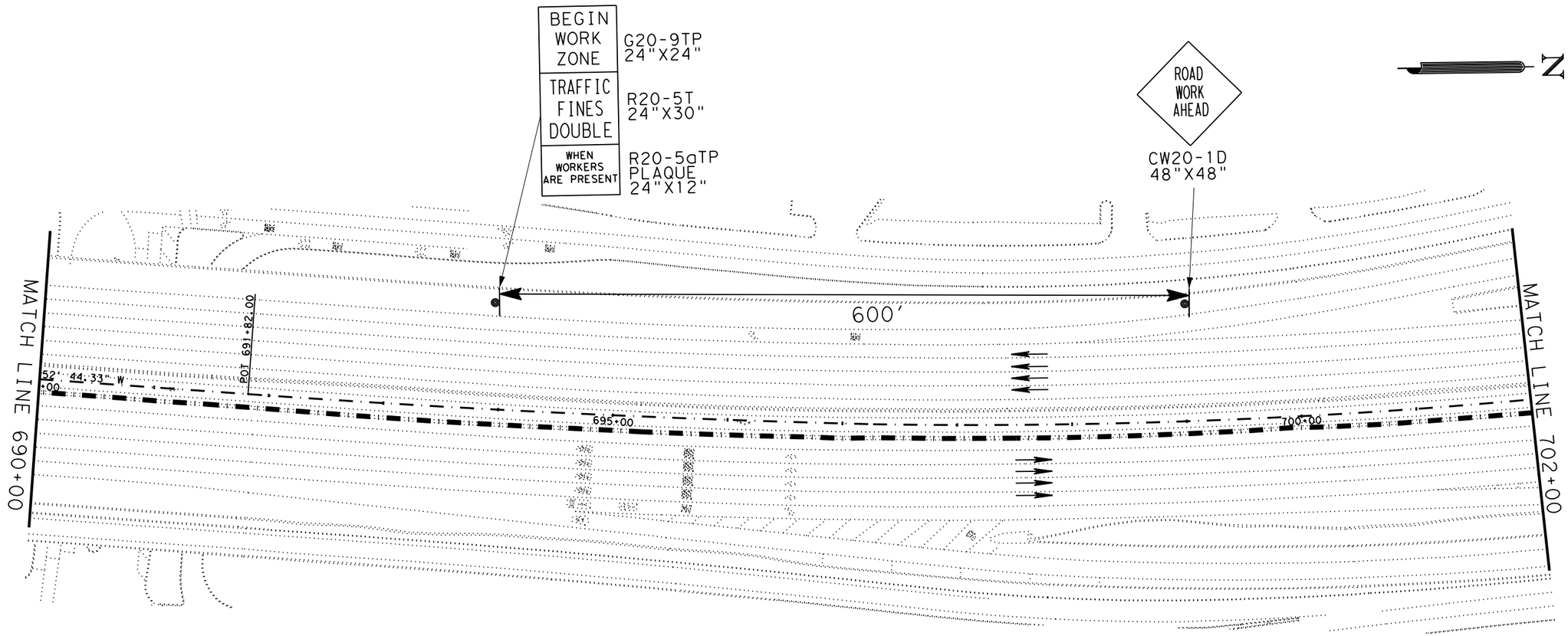

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IH 45 TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=100' SHEET 10 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		19A

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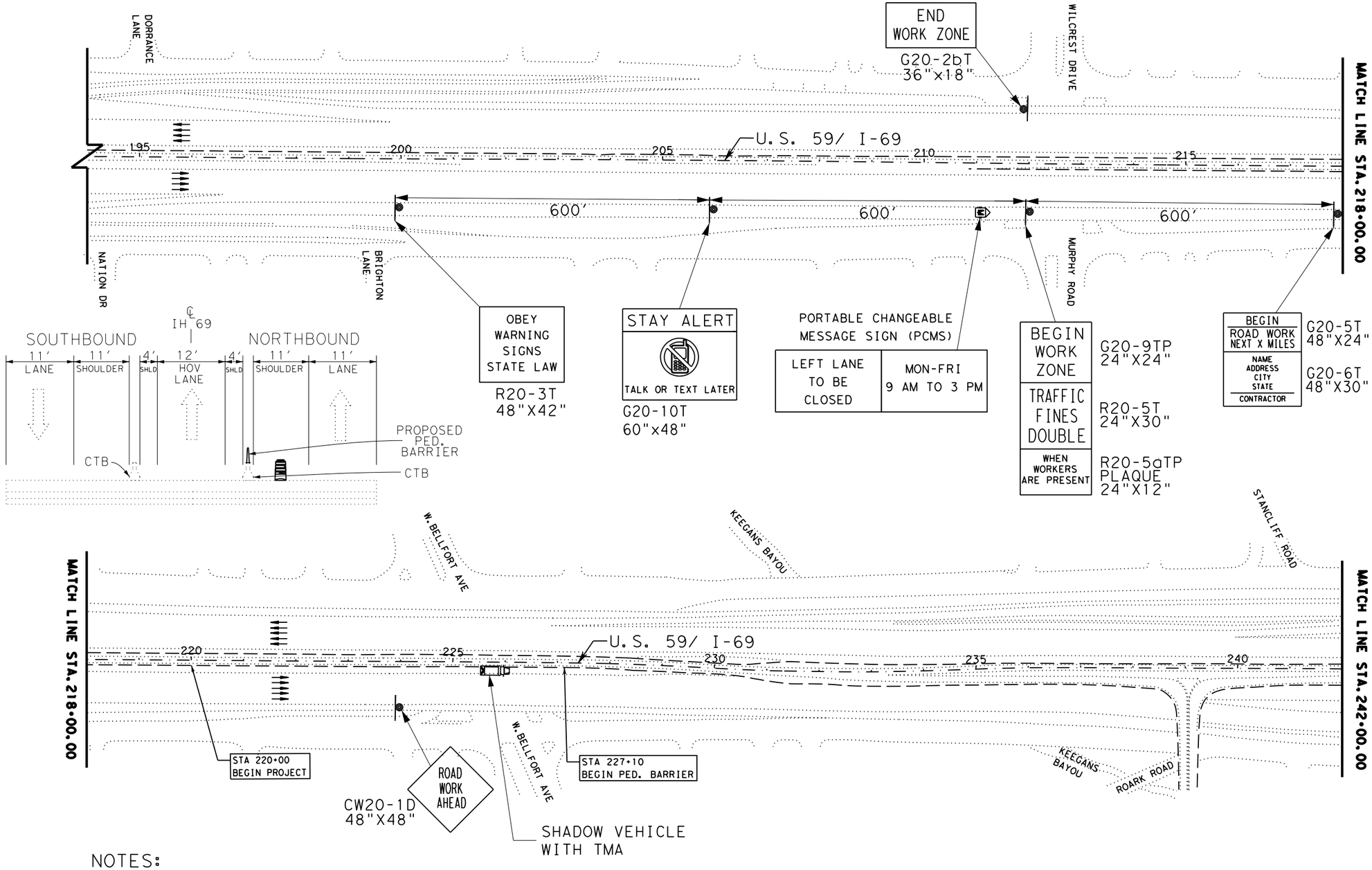

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LEGEND

PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

SHADOW VEHICLE WITH TMA

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69 TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 1 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		20

DATE: 2/4/2021 3:06:38 PM
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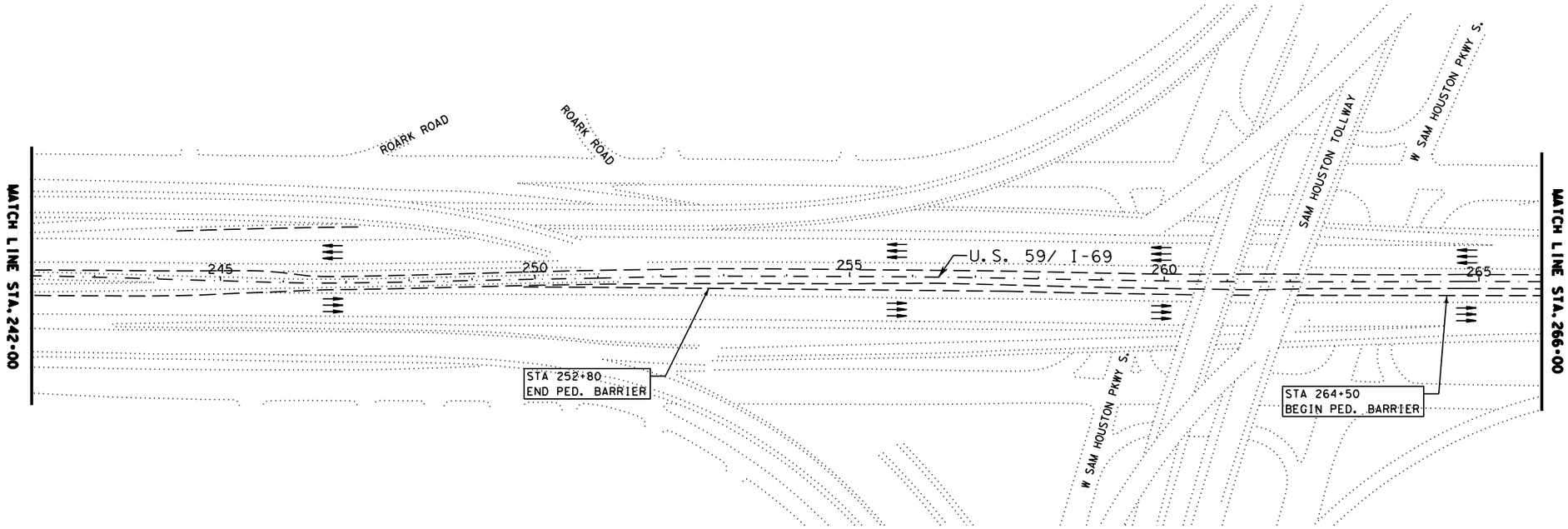

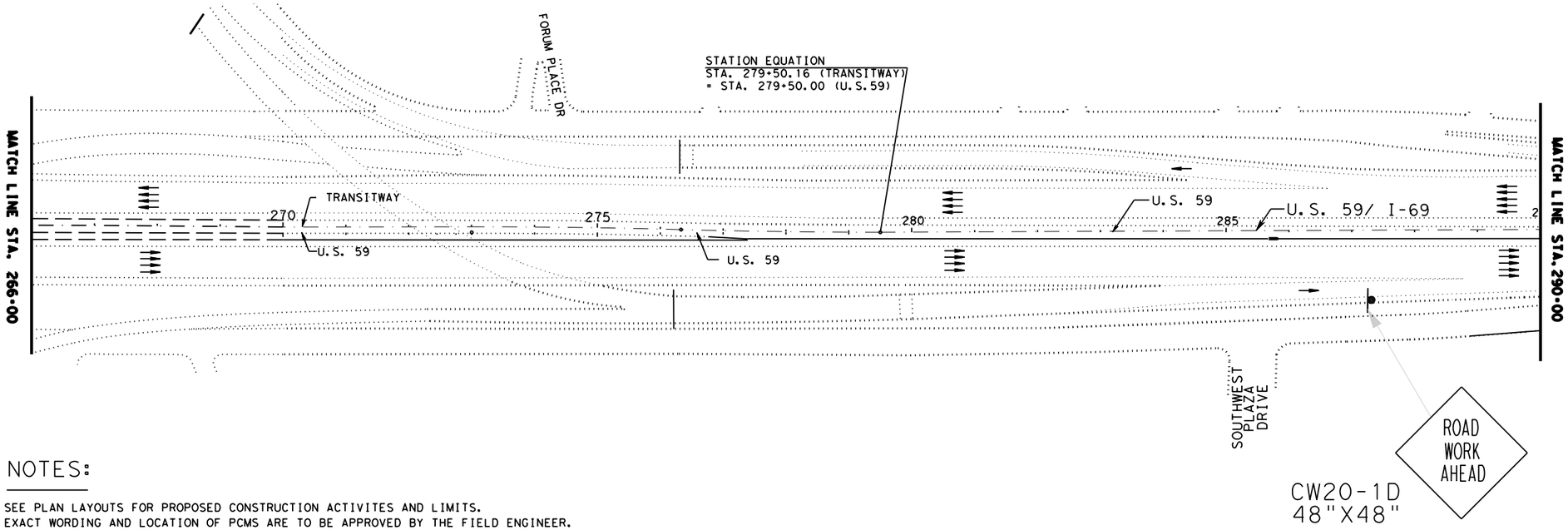

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LEGEND

PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

SHADOW VEHICLE WITH TMA

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69 TRAFFIC CONTROL PLAN LAYOUT

SCALE:1"=200' SHEET 2 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		21

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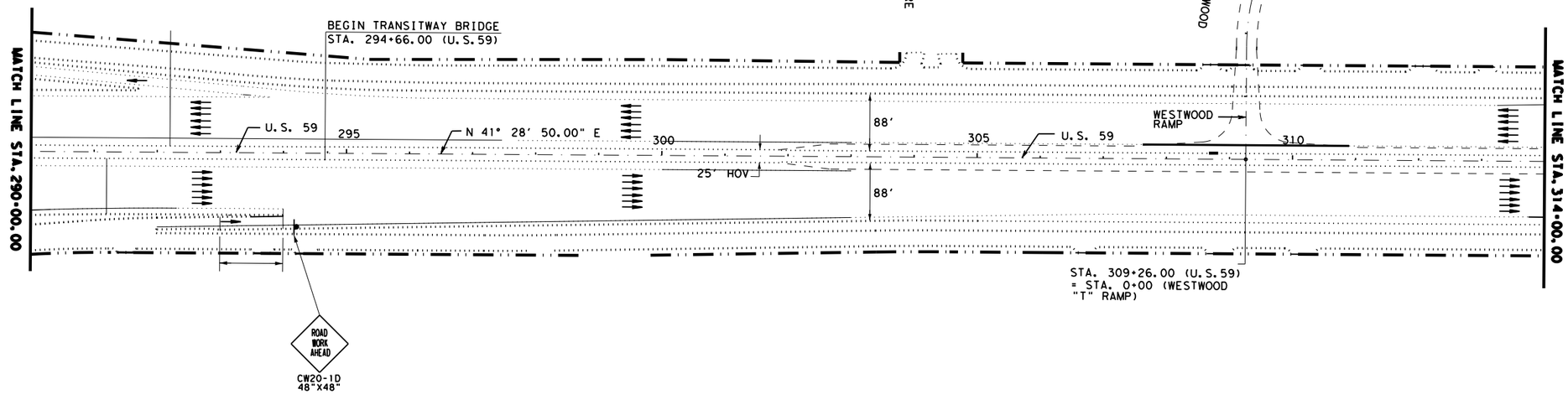

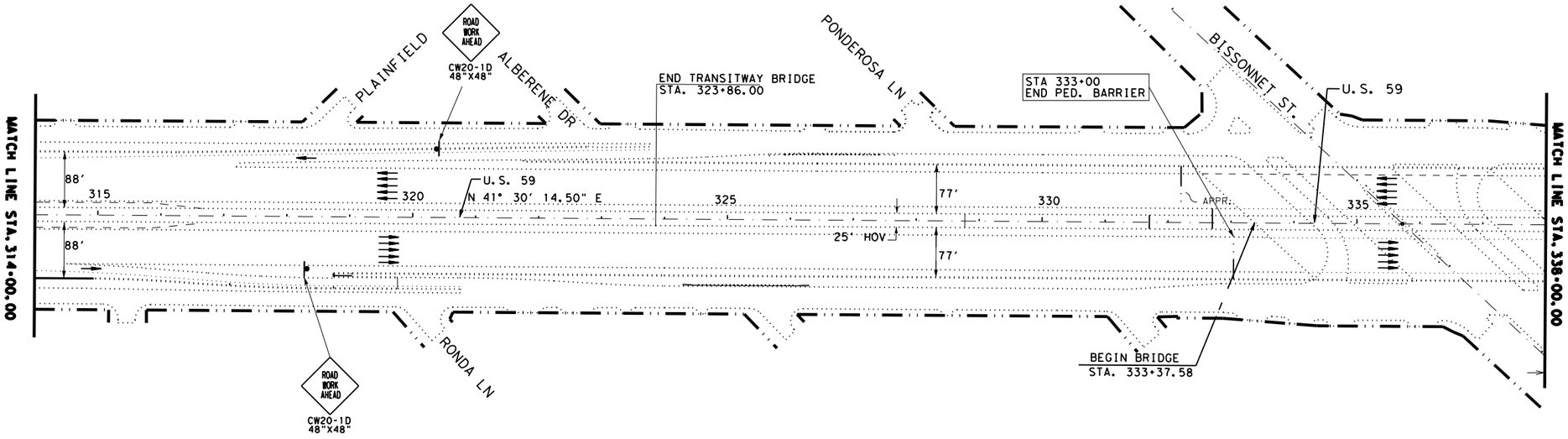

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PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

SHADOW VEHICLE WITH TMA

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69
TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 3 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		22

DATE: 12/15/2020 1:46:12 PM
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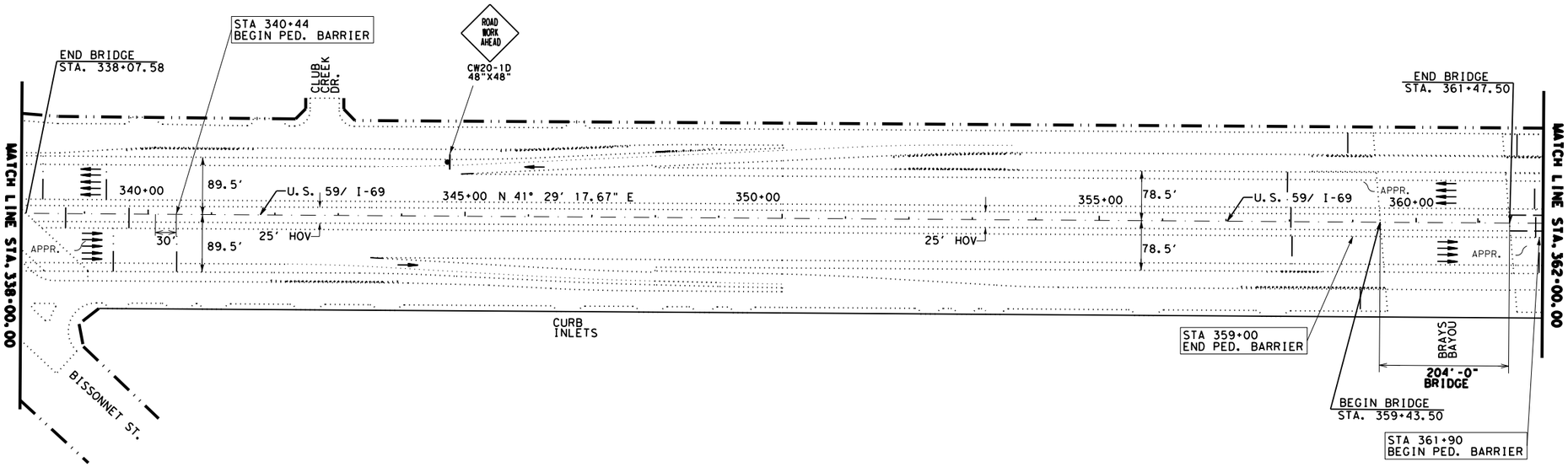

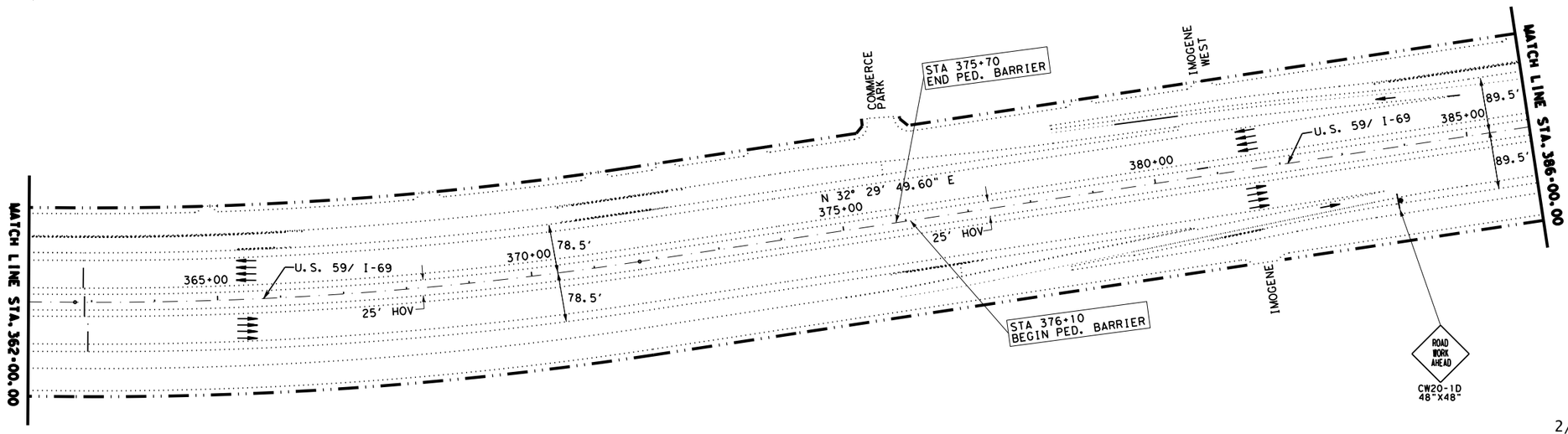

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LEGEND

PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

SHADOW VEHICLE WITH TMA

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69 TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 4 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		23

DATE: 2/4/2021 12:48:58 PM
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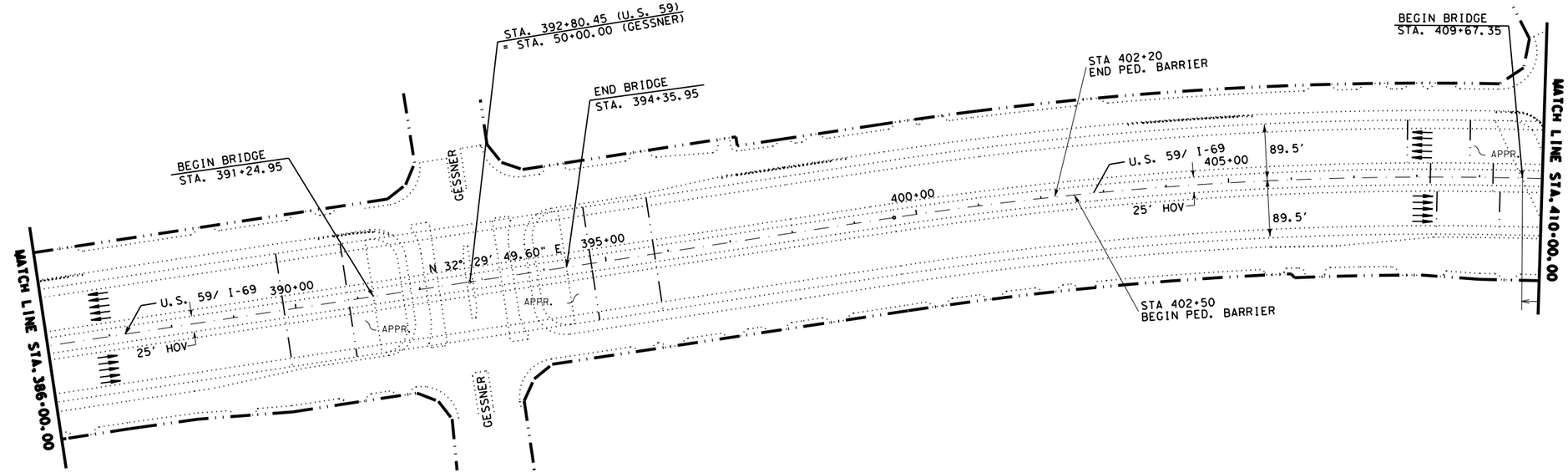

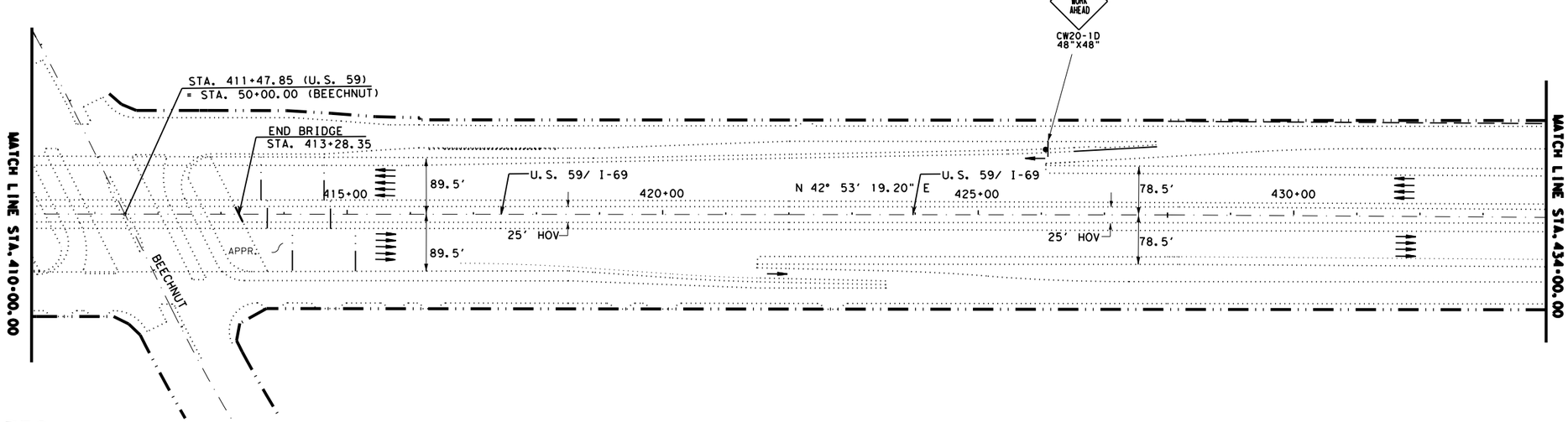

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PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

SHADOW VEHICLE WITH TMA

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69
TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 5 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		24

DATE: 12/8/2020 11:17:28 AM
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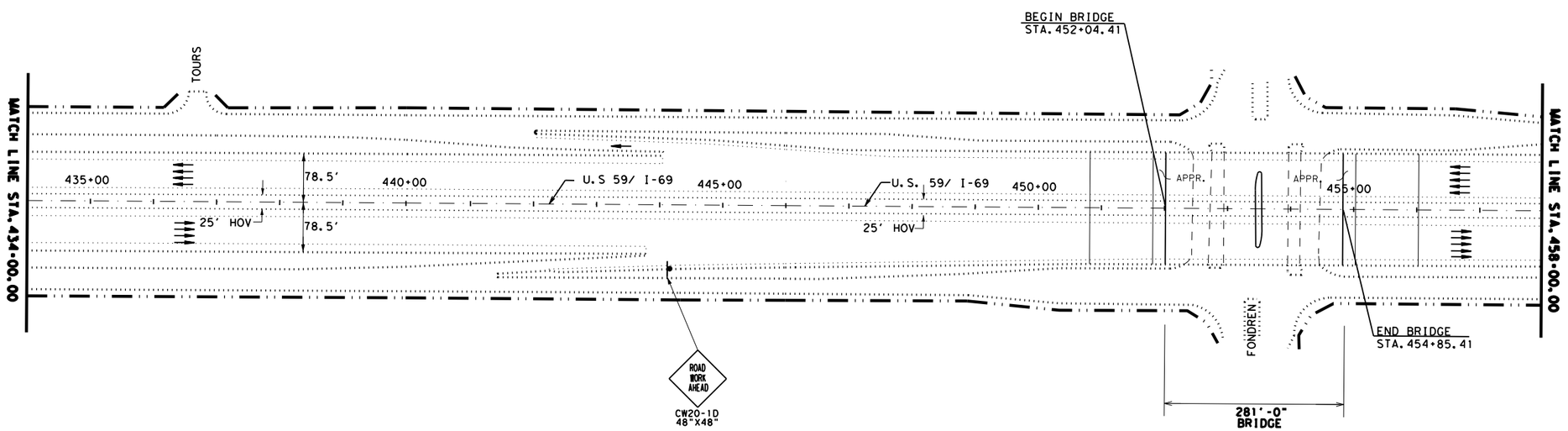

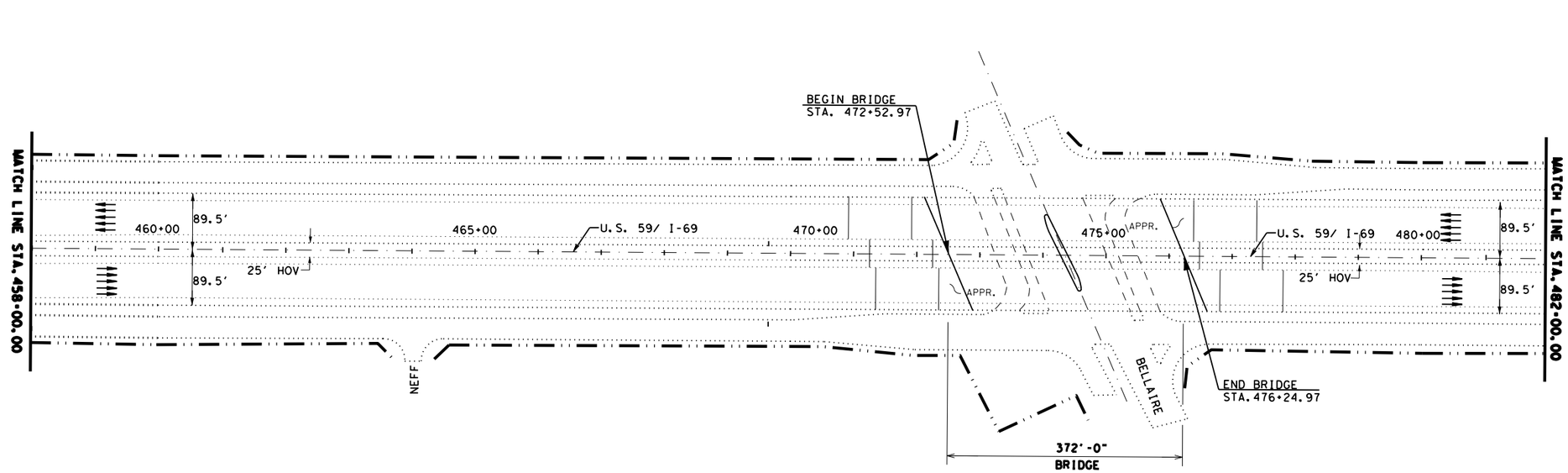

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LEGEND

PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

SHADOW VEHICLE WITH TMA

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69 TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 6 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		25

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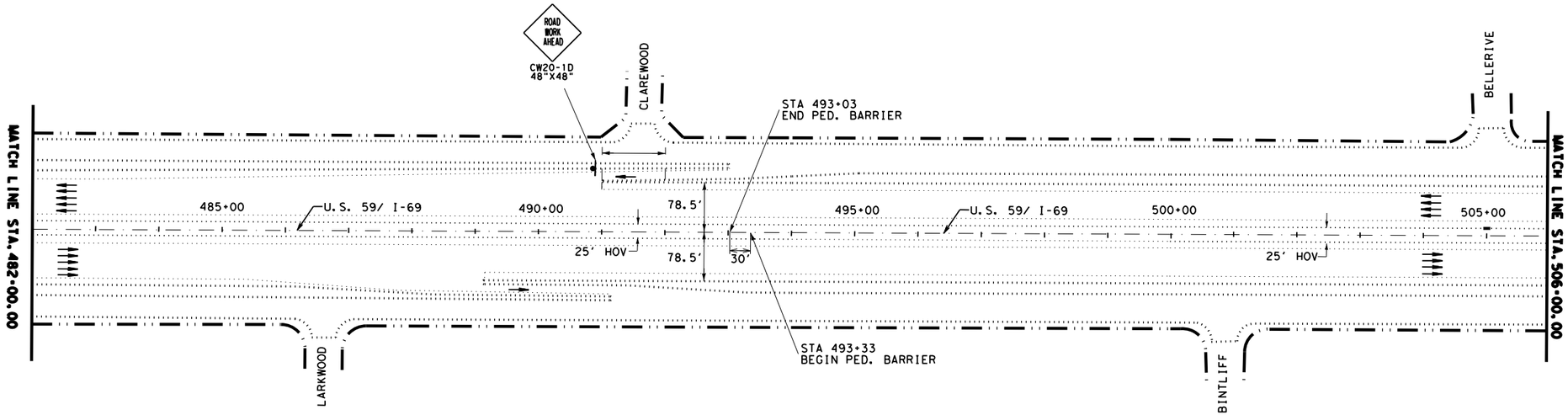

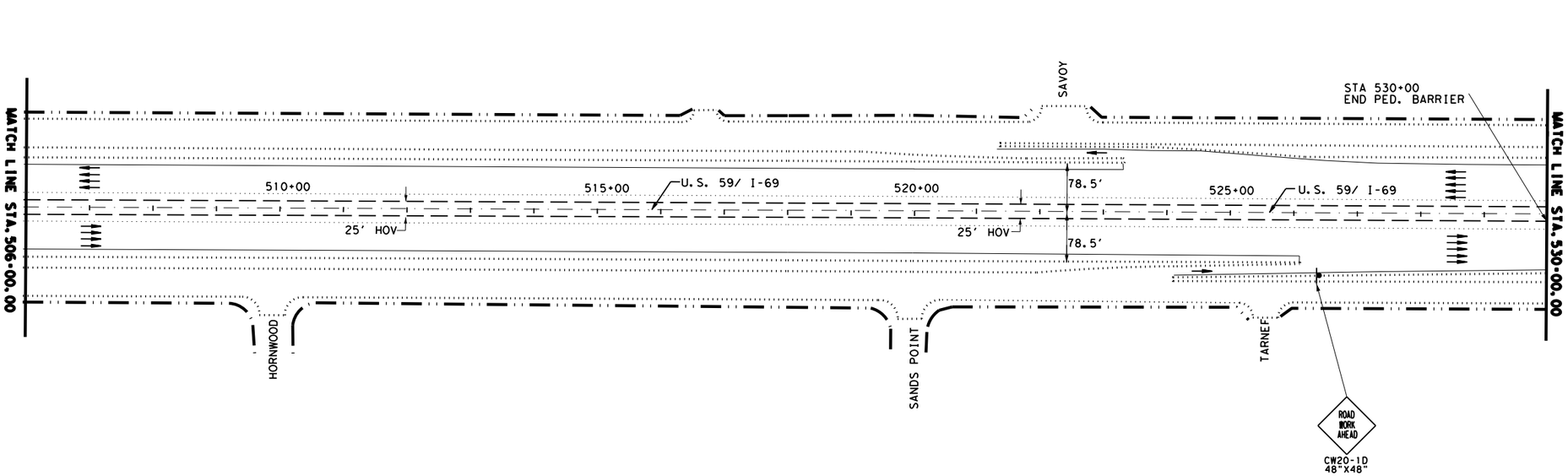

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LEGEND

PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

SHADOW VEHICLE WITH TMA

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69 TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 7 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		26

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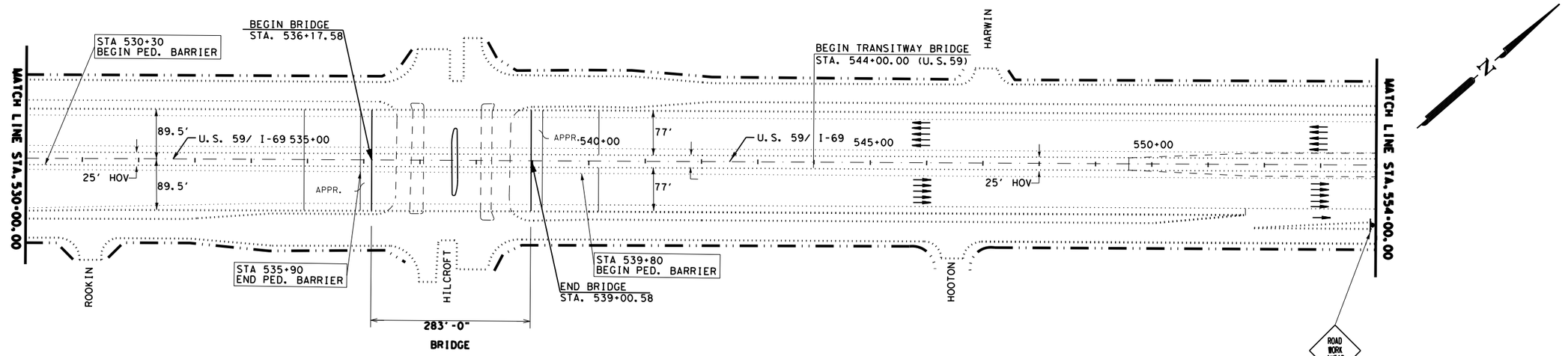

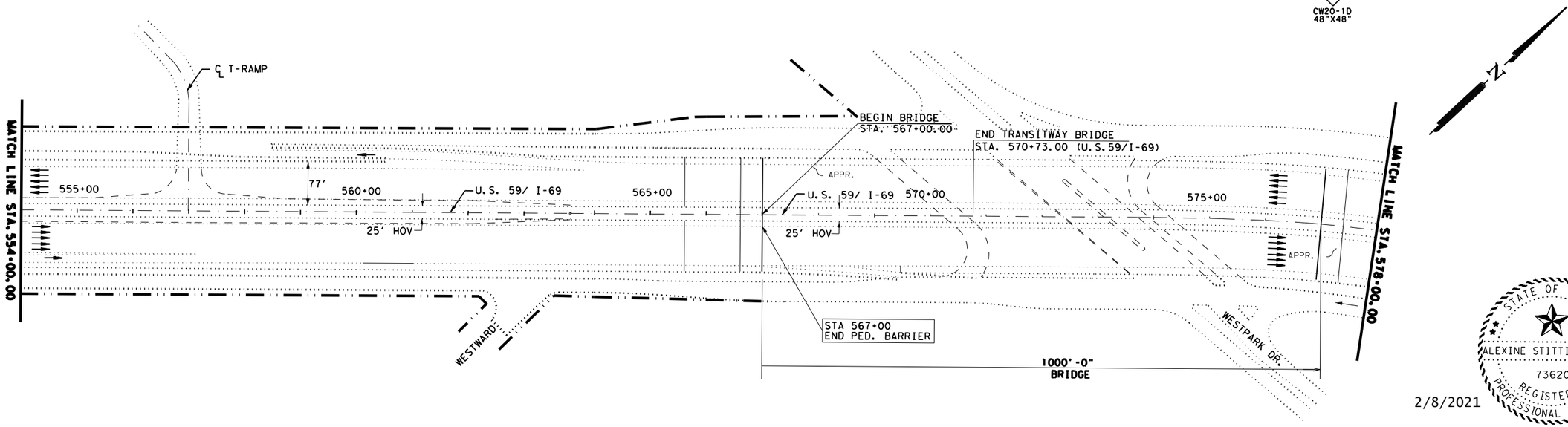

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PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

SHADOW VEHICLE WITH TMA

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED
PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69 TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 8 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		27

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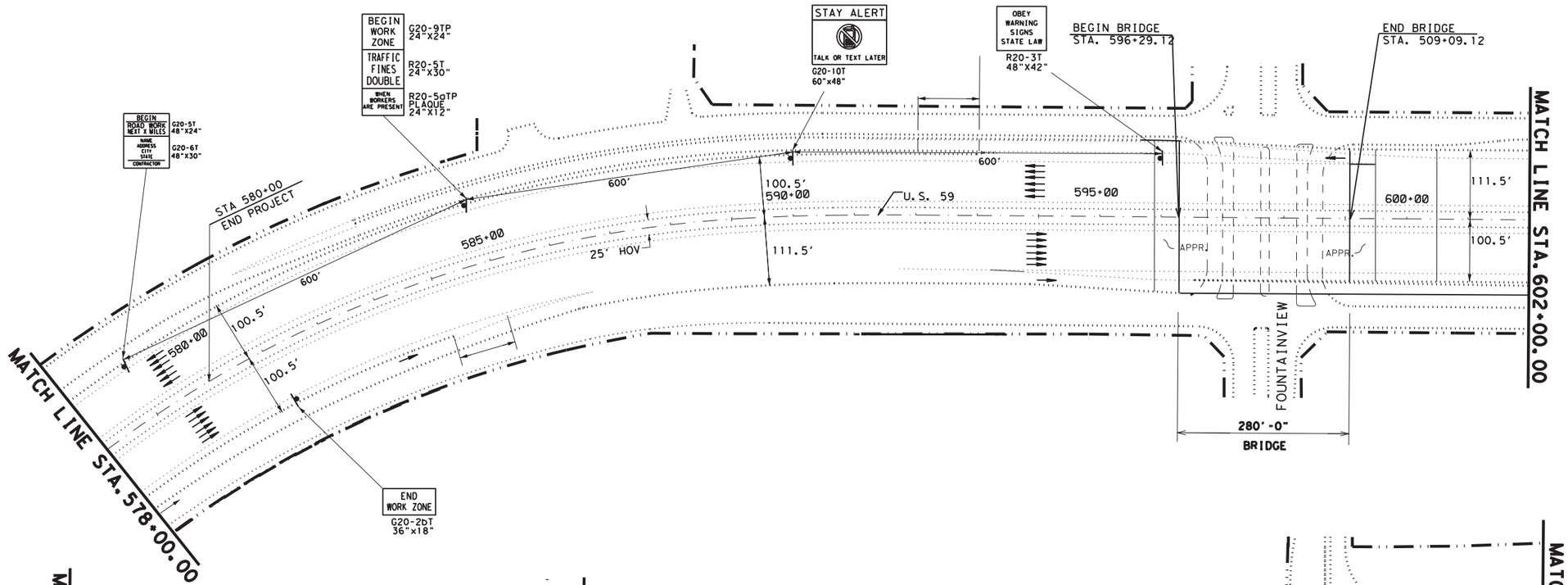

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SHADOW VEHICLE WITH TMA

STATE OF TEXAS
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2/8/2021

DocuSigned by:
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9D6BA739BD7743D...

IH 69 TRAFFIC CONTROL PLAN LAYOUT

SCALE: 1"=200' SHEET 9 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		28

DATE: 12/8/2020 11:35:29 AM
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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP)is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.

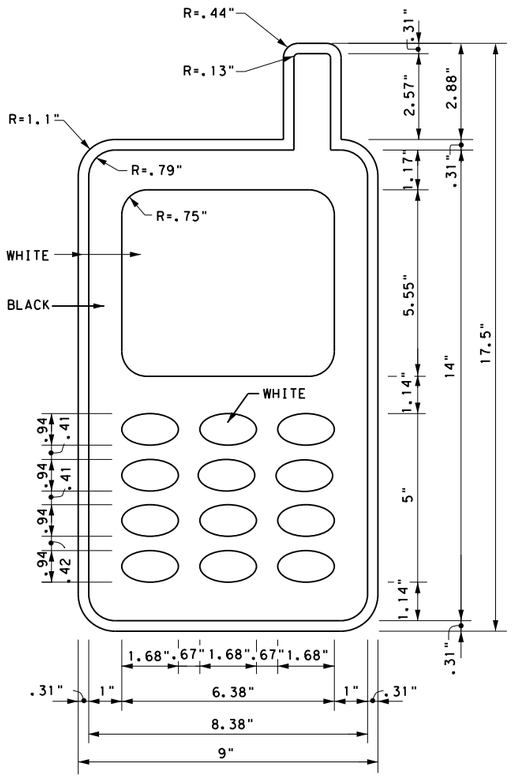
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

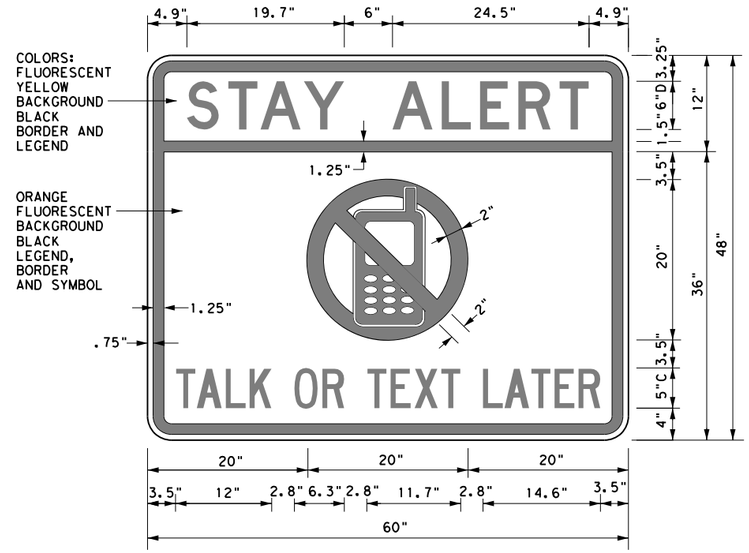
12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY APPAREL NOTES:

1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.





COLORS:
FLUORESCENT YELLOW BACKGROUND
BLACK BORDER AND LEGEND

ORANGE FLUORESCENT BACKGROUND
BLACK LEGEND, BORDER AND SYMBOL

3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow;
[STAY ALERT] Font: D
3.0" Radius, 1.25" Border, 0.75" Indent, Black on Orange;
[TALK OR TEXT LATER] Font: C specified length;

SIGN DETAIL (G20-10T)

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation
Traffic Operations Division - TE
Phone (512) 416-3118

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	610	VARIOUS
4-03 5-10 8-14	DIST	COUNTY		SHEET NO.
9-07 7-13	HOU	HARRIS		29

DATE: 12/7/2020 2:43:54 PM
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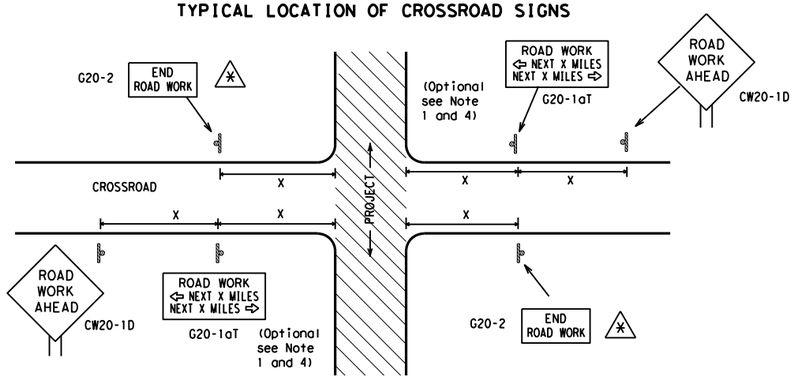
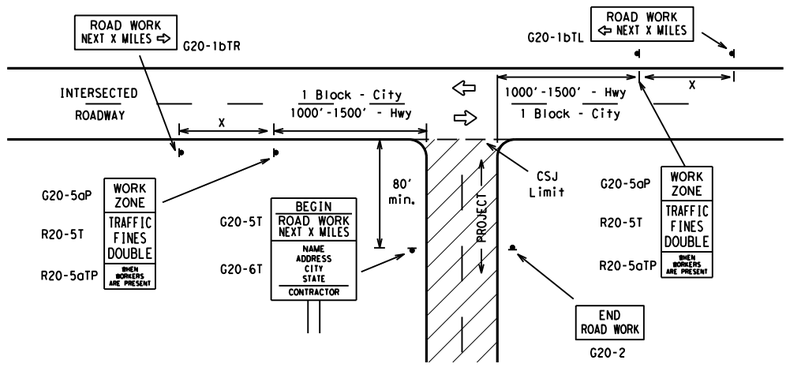
TYPICAL LOCATION OF CROSSROAD SIGNS



✱ May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume. This information shall be shown in the plans.
3. Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
4. The "ROAD WORK NEXT X MILES"(G20-1aT)sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
2. If construction closes the road at a T-intersection the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING[1,5,6]

SIZE

Sign Number or Series	Conventional Road	Expressway/ Freeway
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"

SPACING

Posted Speed	Sign Spacing "X" △
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500[2]
60	600[2]
65	700[2]
70	800[2]
75	900[2]
80	1000[2]
✱	✱[3]

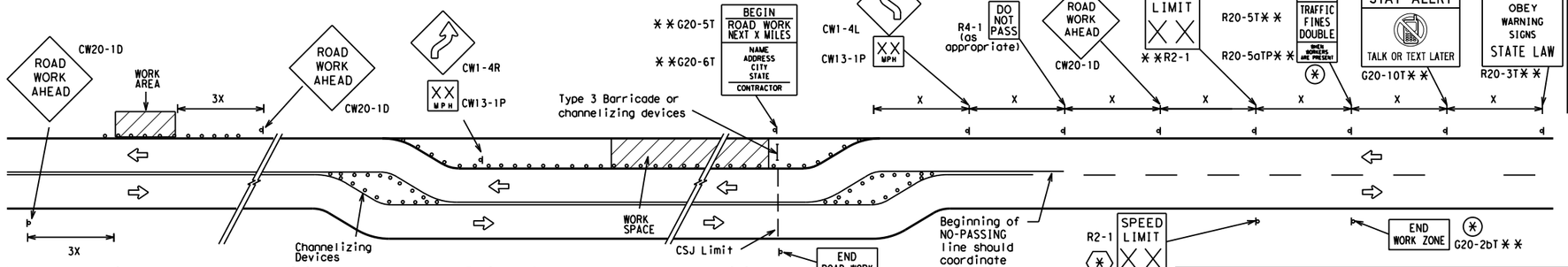
✱ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

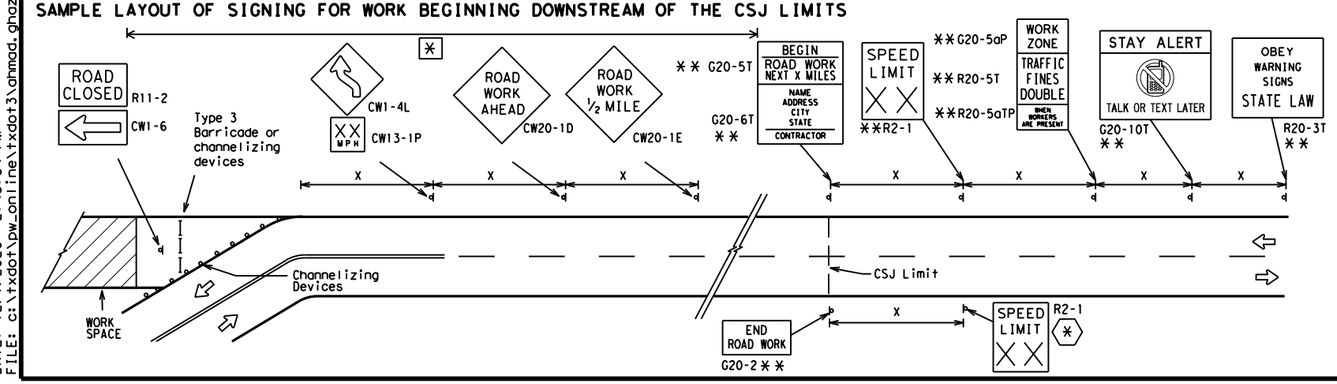
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS



NOTES

The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES"(G20-5T)sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.

(✱) The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.

✱✱ Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.

[✱] Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.

(✱) Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND

⊢	Type 3 Barricade
○ ○ ○	Channelizing Devices
▬	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	610	VARIOUS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	HOU	HARRIS		30

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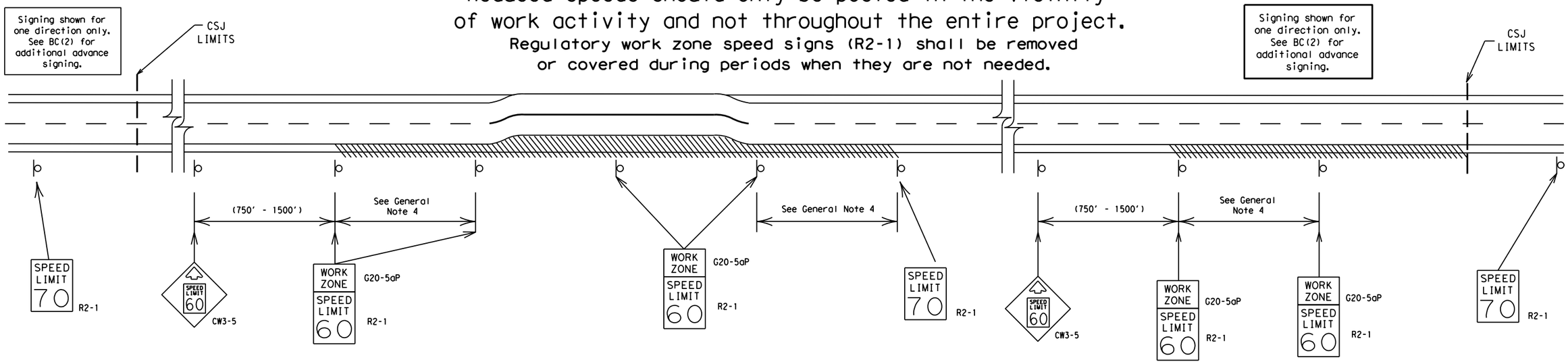
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the travelled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered.
(See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the"ADVANCE SPEED LIMIT"(CW3-5)sign, "WORK ZONE"(G20-5aP) plaque and the "SPEED LIMIT"(R2-1)signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

Texas Department of Transportation

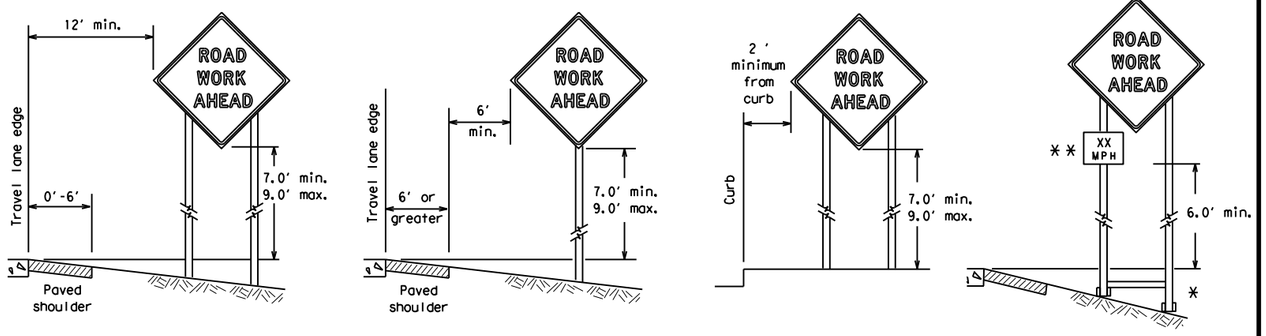
Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	0912	72	610	VARIOUS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		31

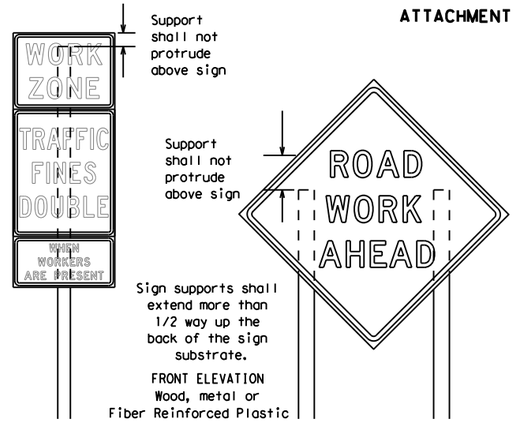
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

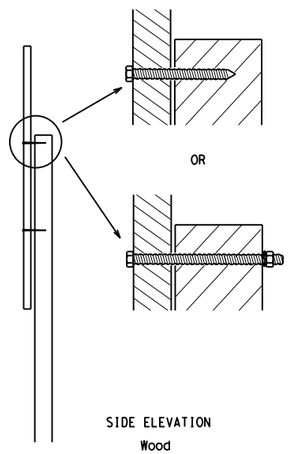


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS





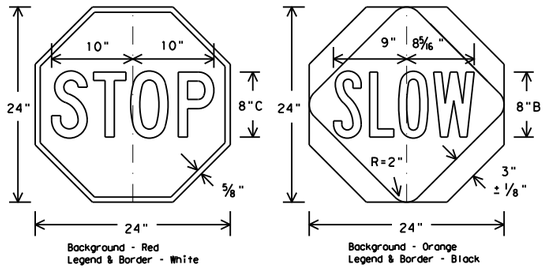
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the spice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24" as detailed below.
2. When used at night, the STOP/SLOW paddle shall be retroreflectorized.
3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
4. Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD). The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)

1. The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
   a. Long-term stationary - work that occupies a location more than 3 days.
   b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
   c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
   d. Short, duration - work that occupies a location up to 1 hour.
   e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
2. The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

SIZE OF SIGNS

1. The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

SIGN SUBSTRATES

1. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
3. All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B_{FL} or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
4. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

1. Flags may be used to draw attention to warning signs. When used the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

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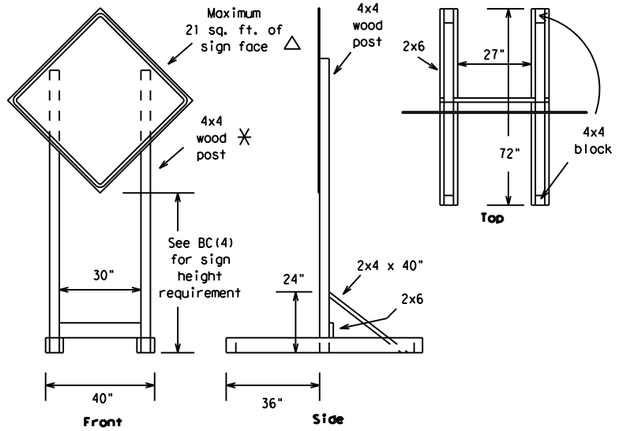
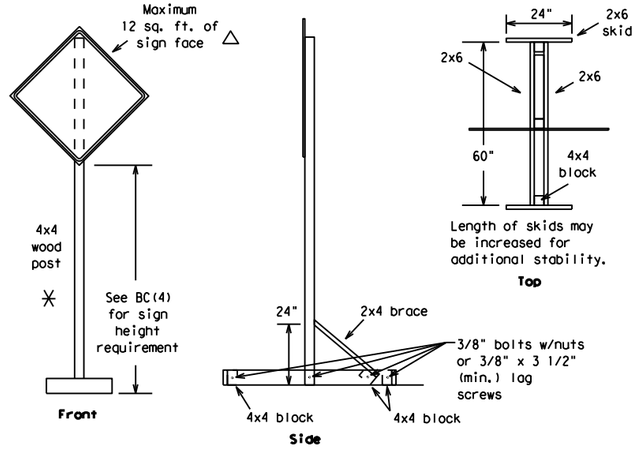
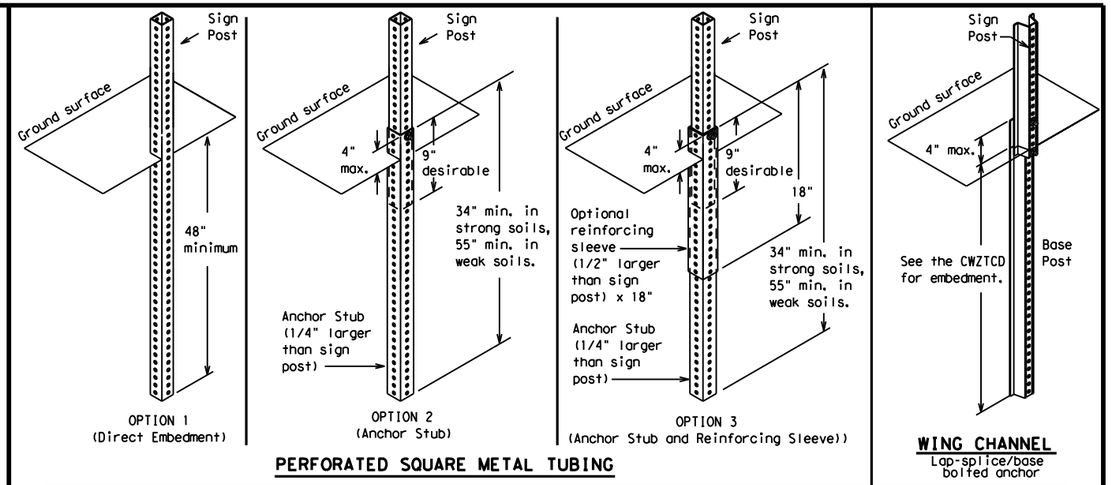




SKID MOUNTED WOOD SIGN SUPPORTS

LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □



PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.
The maximum sign square footage shall adhere to the manufacturer's recommendation.
Two post installations can be used for larger signs.

Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS

WEDGE ANCHORS

Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

OTHER DESIGNS

MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

□ See BC(4) for definition of "Work Duration."

✳ Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.

△ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

SHEET 5 OF 12

SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
2. Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
4. Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
6. When in use the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
8. The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
11. Do not use the word "Danger" in message.
12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
15. PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
16. Each line of text should be centered on the message board rather than left or right justified.
17. If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

Roadway designation * IH-number, US-number, SH-number, FM-number

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

- FREEWAY CLOSED X MILE
- FRONTAGE ROAD CLOSED
- ROAD CLOSED AT SH XXX
- SHOULDER CLOSED XXX FT
- ROAD CLSD AT FM XXXX
- RIGHT LN CLOSED XXX FT
- RIGHT X LANES CLOSED
- RIGHT X LANES OPEN
- CENTER LANE CLOSED
- DAYTIME LANE CLOSURES
- NIGHT LANE CLOSURES
- I-XX SOUTH EXIT CLOSED
- VARIOUS LANES CLOSED
- EXIT XXX CLOSED X MILE
- EXIT CLOSED
- RIGHT LN TO BE CLOSED
- MALL DRIVEWAY CLOSED
- X LANES CLOSED TUE - FRI
- XXXXXXXX BLVD CLOSED

Other Condition List

- ROADWORK XXX FT
- ROAD REPAIRS XXXX FT
- FLAGGER XXXX FT
- LANE NARROWS XXXX FT
- RIGHT LN NARROWS XXXX FT
- TWO-WAY TRAFFIC XX MILE
- MERGING TRAFFIC XXXX FT
- CONST TRAFFIC XXX FT
- LOOSE GRAVEL XXXX FT
- UNEVEN LANES XXXX FT
- DETOUR X MILE
- ROUGH ROAD XXXX FT
- ROADWORK PAST SH XXXX
- ROADWORK NEXT FRI-SUN
- BUMP XXXX FT
- US XXX EXIT X MILES
- TRAFFIC SIGNAL XXXX FT
- LANES SHIFT *

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

- MERGE RIGHT
- FORM X LINES RIGHT
- DETOUR NEXT X EXITS
- USE XXXXX RD EXIT
- USE EXIT XXX
- USE EXIT I-XX NORTH
- STAY ON US XXX SOUTH
- USE I-XX E TO I-XX N
- TRUCKS USE US XXX N
- WATCH FOR TRUCKS
- WATCH FOR TRUCKS
- EXPECT DELAYS
- EXPECT DELAYS
- PREPARE TO STOP
- REDUCE SPEED XXX FT
- END SHOULDER USE
- USE OTHER ROUTES
- WATCH FOR WORKERS
- STAY IN LANE *

Location List

- AT FM XXXX
- BEFORE RAILROAD CROSSING
- NEXT X MILES
- PAST US XXX EXIT
- XXXXXXX TO XXXXXXX
- US XXX TO FM XXXX

Warning List

- SPEED LIMIT XX MPH
- MAXIMUM SPEED XX MPH
- MINIMUM SPEED XX MPH
- ADVISORY SPEED XX MPH
- RIGHT LANE EXIT
- USE CAUTION
- DRIVE SAFELY
- DRIVE WITH CARE

** Advance Notice List

- TUE-FRI XX AM- X PM
- APR XX-XX X PM-X AM
- BEGINS MONDAY
- BEGINS MAY XX
- MAY X-X XX PM - XX AM
- NEXT FRI-SUN
- XX AM TO XX PM
- NEXT TUE AUG XX
- TONIGHT XX PM- XX AM

* STAY IN LANE in Phase 2 must be used with LANES SHIFT in Phase 1.

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AHEAD may be used instead of distances if necessary.
7. FT and MI, MILE and MILES interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Flagger Symbol"(CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	HOU	HARRIS		34

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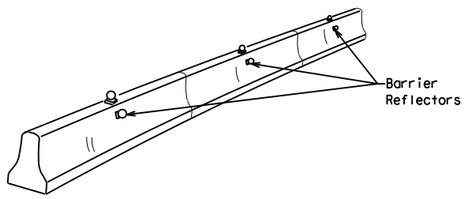
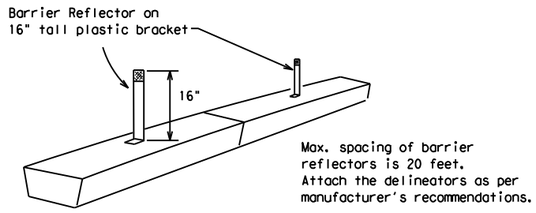
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.

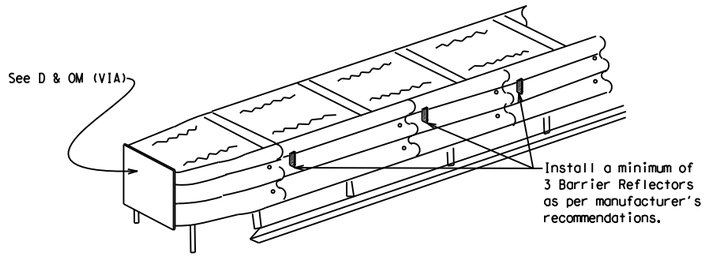


CONCRETE TRAFFIC BARRIER (CTB)

3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
4. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional)while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.



LOW PROFILE CONCRETE BARRIER (LPCB)

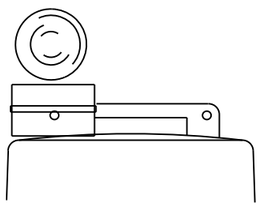


DELINEATION OF END TREATMENTS

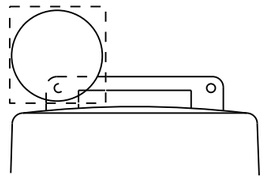
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

WARNING LIGHTS

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B_{FL} or C_{FL} Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
4. Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
7. When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

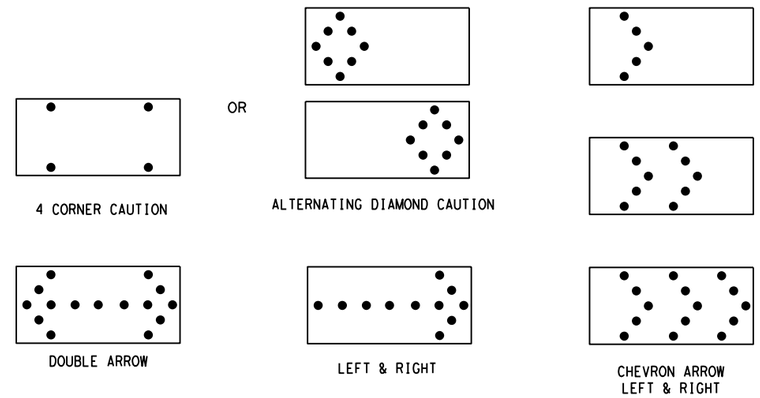
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS

1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
6. The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

1. The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
3. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
4. The Flashing Arrow Board should be able to display the following symbols:



5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
8. Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
9. The sequential arrow display is NOT ALLOWED.
10. The flashing arrow display is the TxDOT standard; however, the sequential Chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

ATTENTION
Flashing Arrow Boards shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR

BC(7)-14

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

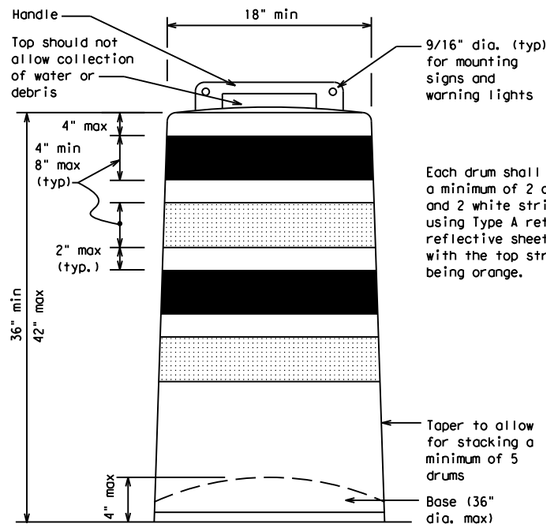
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

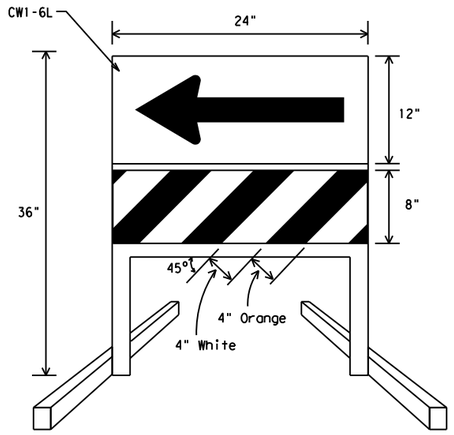
RETROREFLECTIVE SHEETING

1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

BALLAST

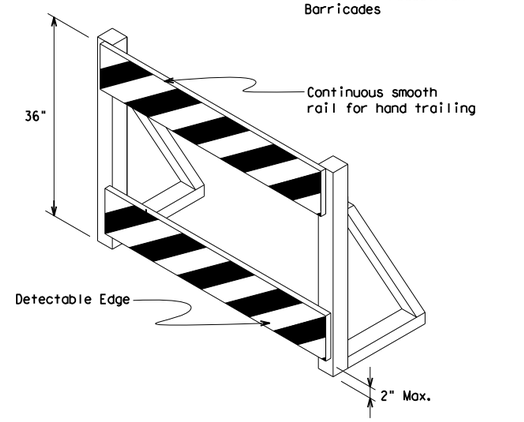
1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
2. Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
5. When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.





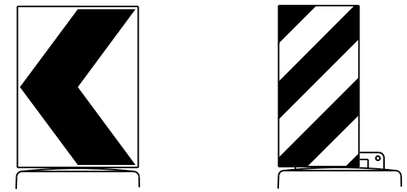
DIRECTION INDICATOR BARRICADE

1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B_{FL} or Type C_{FL} Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
4. Double arrows on the Direction Indicator Barricade will not be allowed.
5. Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.



DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" and should not be used as a control for pedestrian movements.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades may use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



18" x 24" Sign
(Maximum Sign Dimension)
Chevron CW1-8, Opposing Traffic Lane Divider, Driveway sign D70a, Keep Right R4 series or other signs as approved by Engineer

12" x 24"
Vertical Panel
mount with diagonals sloping down towards travel way

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
8. R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

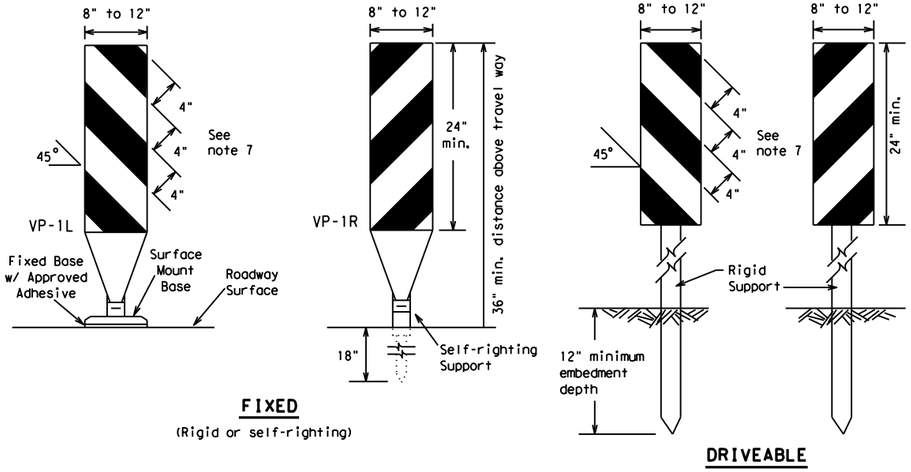
Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

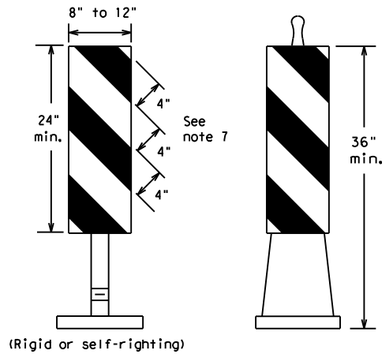
BC(8)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	610	VARIOUS
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	HOU	HARRIS		36



FIXED
(Rigid or self-righting)

DRIVEABLE

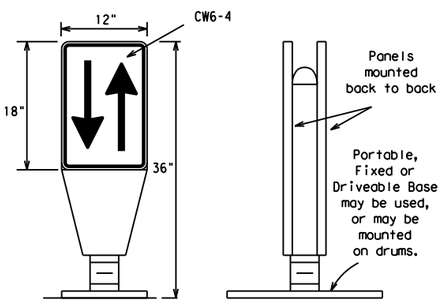


(Rigid or self-righting)

PORTABLE

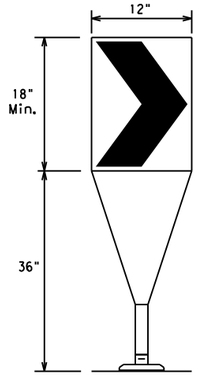
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of VP's for drop-offs.
3. VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
6. Sheeting for the VP's shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

VERTICAL PANELS (VPs)



1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
2. The OTLD may be used in combination with 42" cones or VPs.
3. Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
4. The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

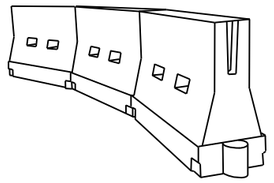
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
2. Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
3. Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
4. To be effective, the chevron should be visible for at least 500 feet.
5. Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
6. For Long Term Stationary use on tapers or transitions on freeways and divided highways self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10) placed near the top of the LCD along the full length of the device.

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS

GENERAL NOTES

1. Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
3. Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
4. The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
5. Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
6. Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
7. The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L = WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80		800'	880'	960'	80'	160'

** Taper lengths have been rounded off.
L=Length of Taper (FT.) W=Width of Offset (FT.)
S=Posted Speed (MPH)

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	0912	72	610	VARIOUS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		37

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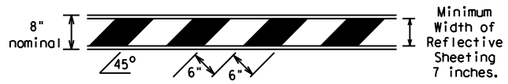
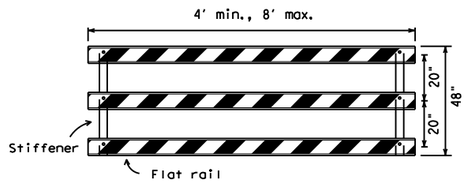
TYPE 3 BARRICADES

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. Sheeting for barricades shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



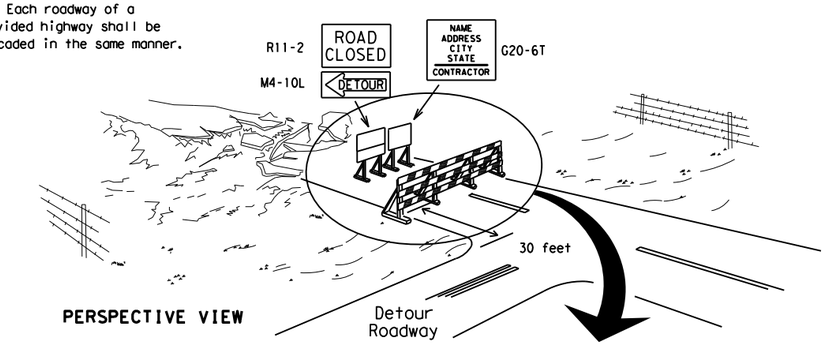
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

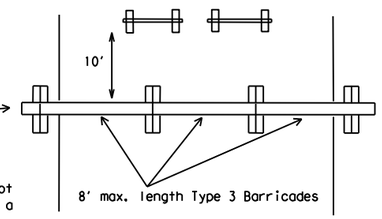
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

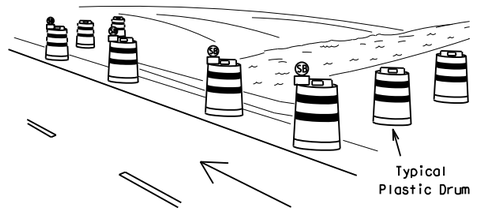
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

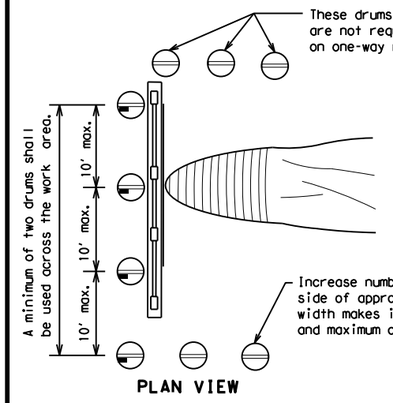
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

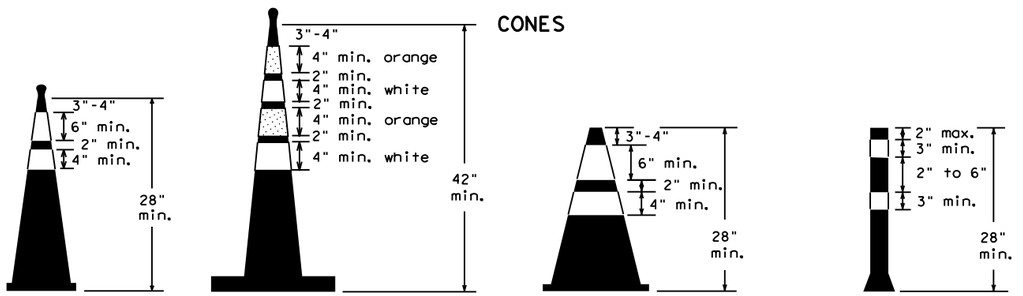
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.



LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

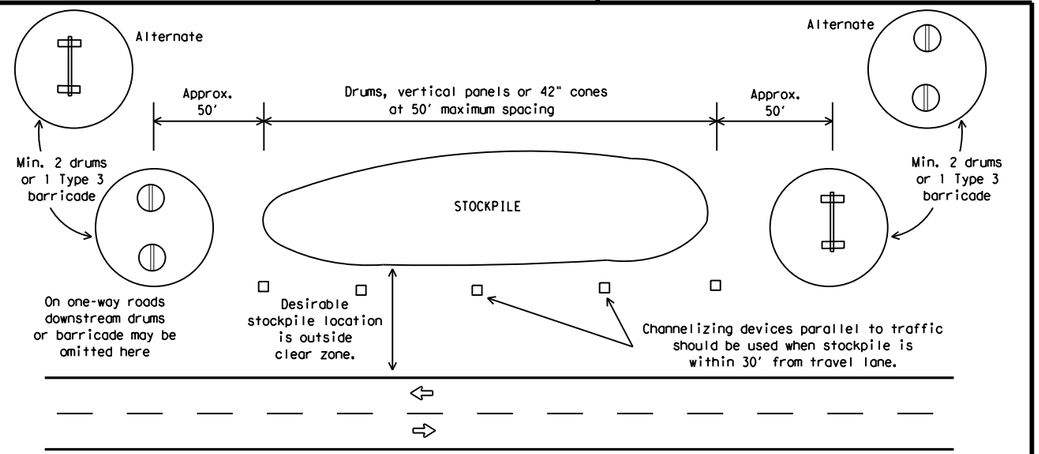
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



28" Cones shall have a minimum weight of 9 1/2 lbs.

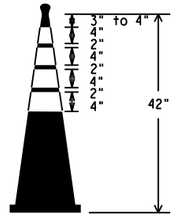
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers used at night shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



EDGELINE CHANNELIZER

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	0912	72	610	VARIOUS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		38

DATE: 12/7/2020 3:13:29 PM
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WORK ZONE PAVEMENT MARKINGS

GENERAL

1. The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(12).
2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

1. Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
2. Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

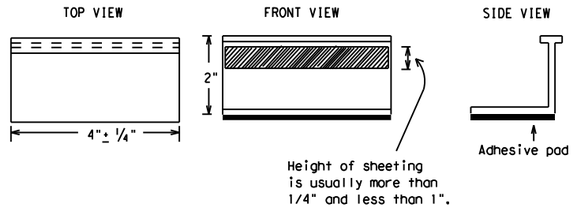
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
2. The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
3. Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
   B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
3. Small design variances may be noted between tab manufacturers.
4. See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - (two amber reflective surfaces with yellow body).
WHITE - (one silver reflective surface with white body).

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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2-98 9-07	DIST	COUNTY		SHEET NO.
1-02 7-13	HOU	HARRIS		39
11-02 8-14				

105

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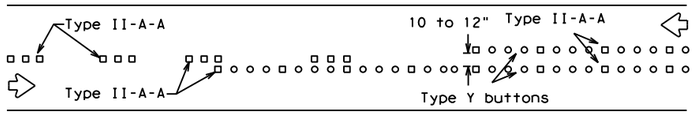
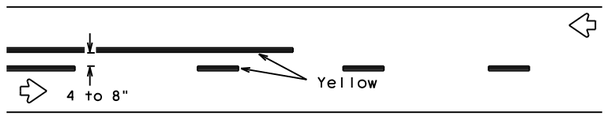
PAVEMENT MARKING PATTERNS

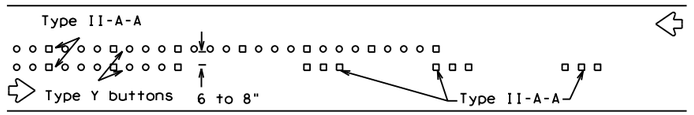
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



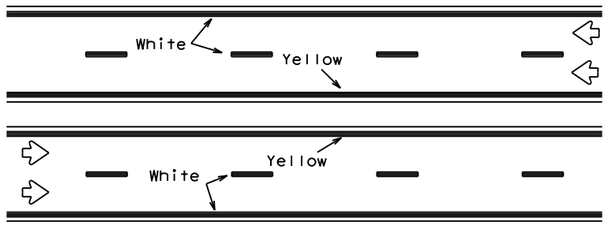
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



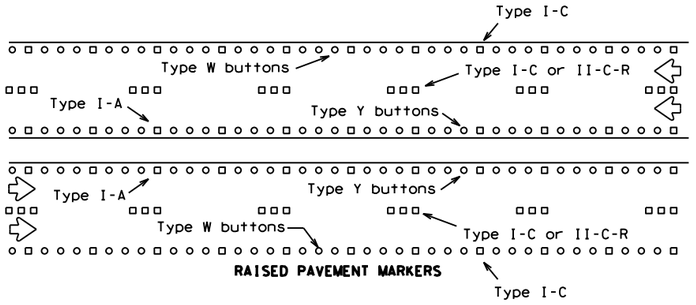
RAISED PAVEMENT MARKERS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer.
Prefabricated markings may be substituted for reflectorized pavement markings.

CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



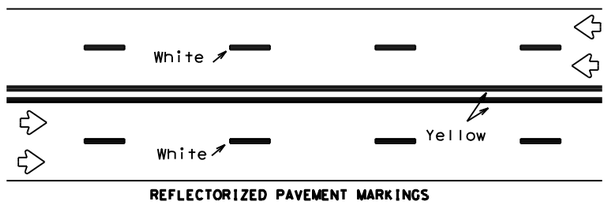
REFLECTORIZED PAVEMENT MARKINGS



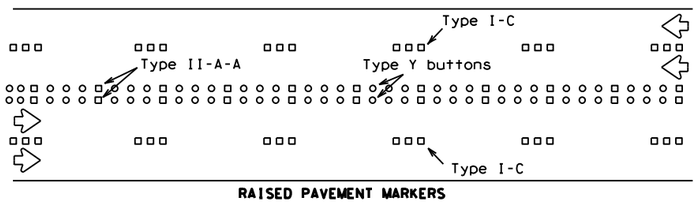
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



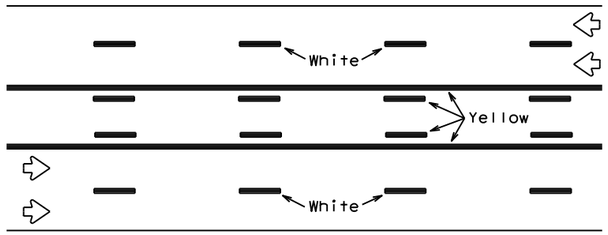
REFLECTORIZED PAVEMENT MARKINGS



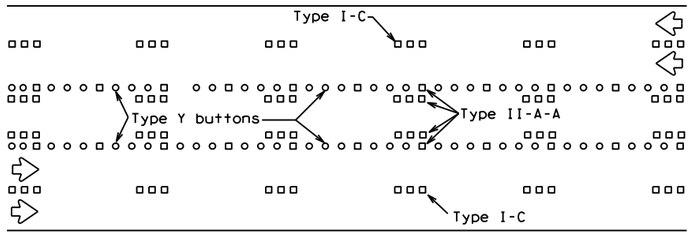
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

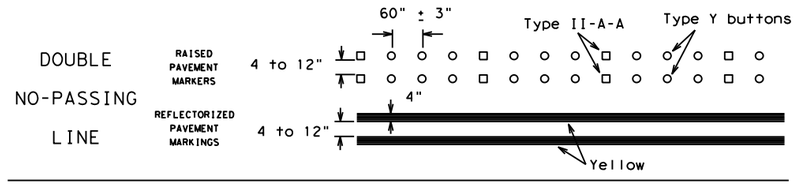
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

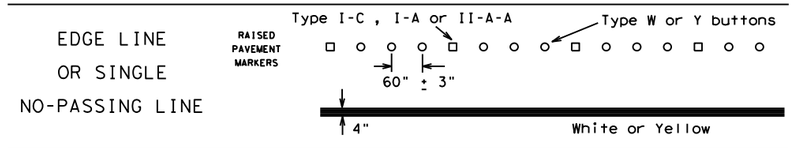
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

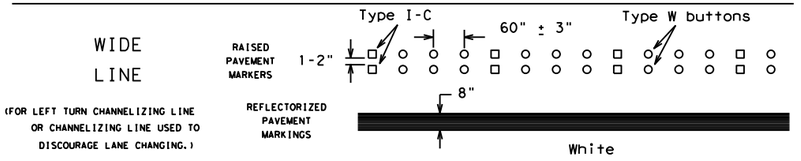


EDGE LINE OR SINGLE NO-PASSING LINE



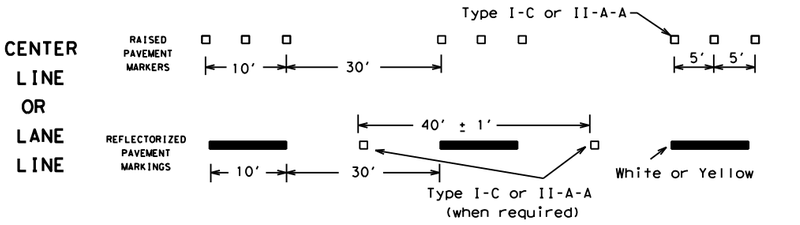
WIDE LINE

(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

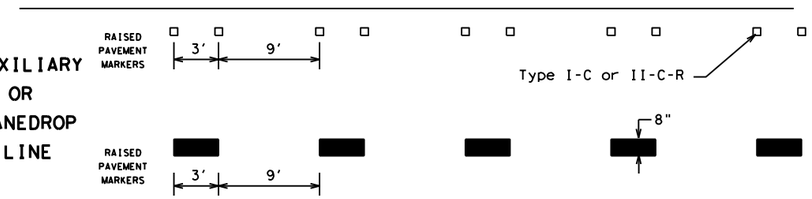


BROKEN LINES

CENTER LINE OR LANE LINE

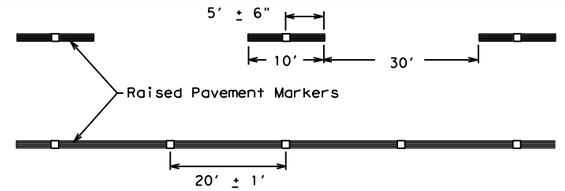


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shall be applied to the top of the tape at the approximate mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows an easier removal of raised pavement markers and tape.



Centerline only - not to be used on edge lines

Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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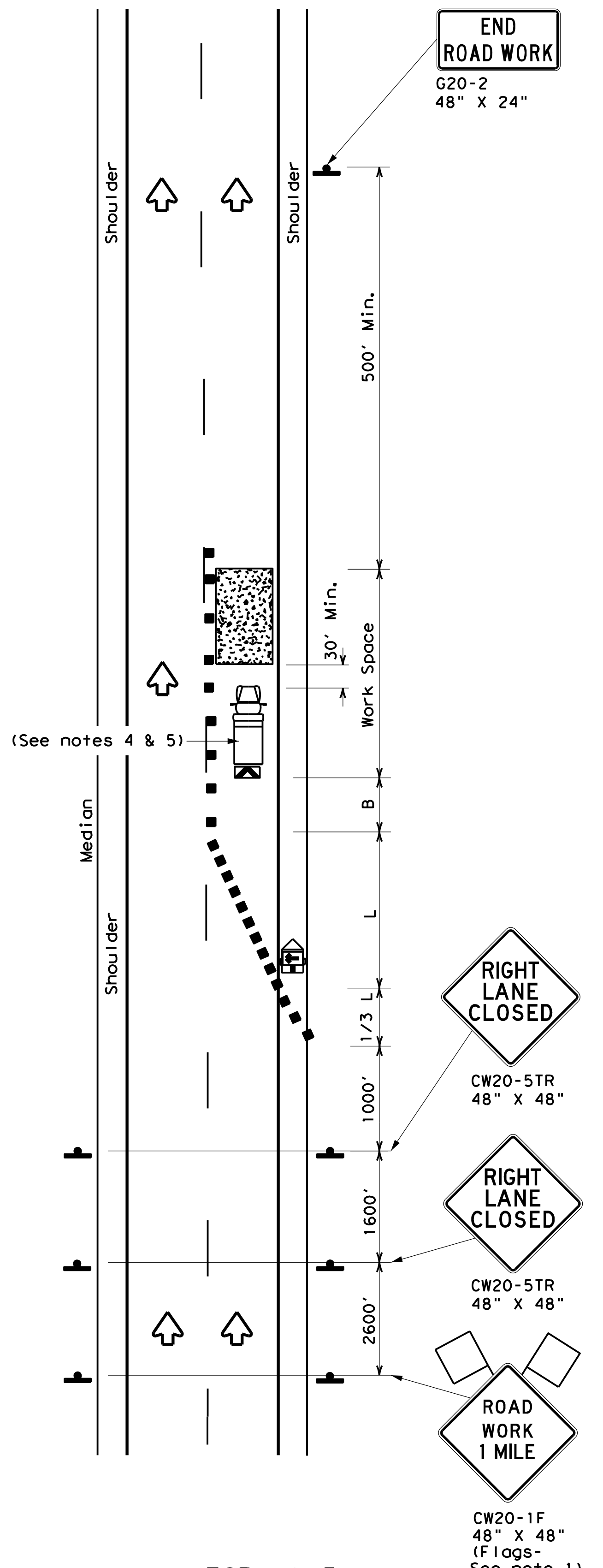
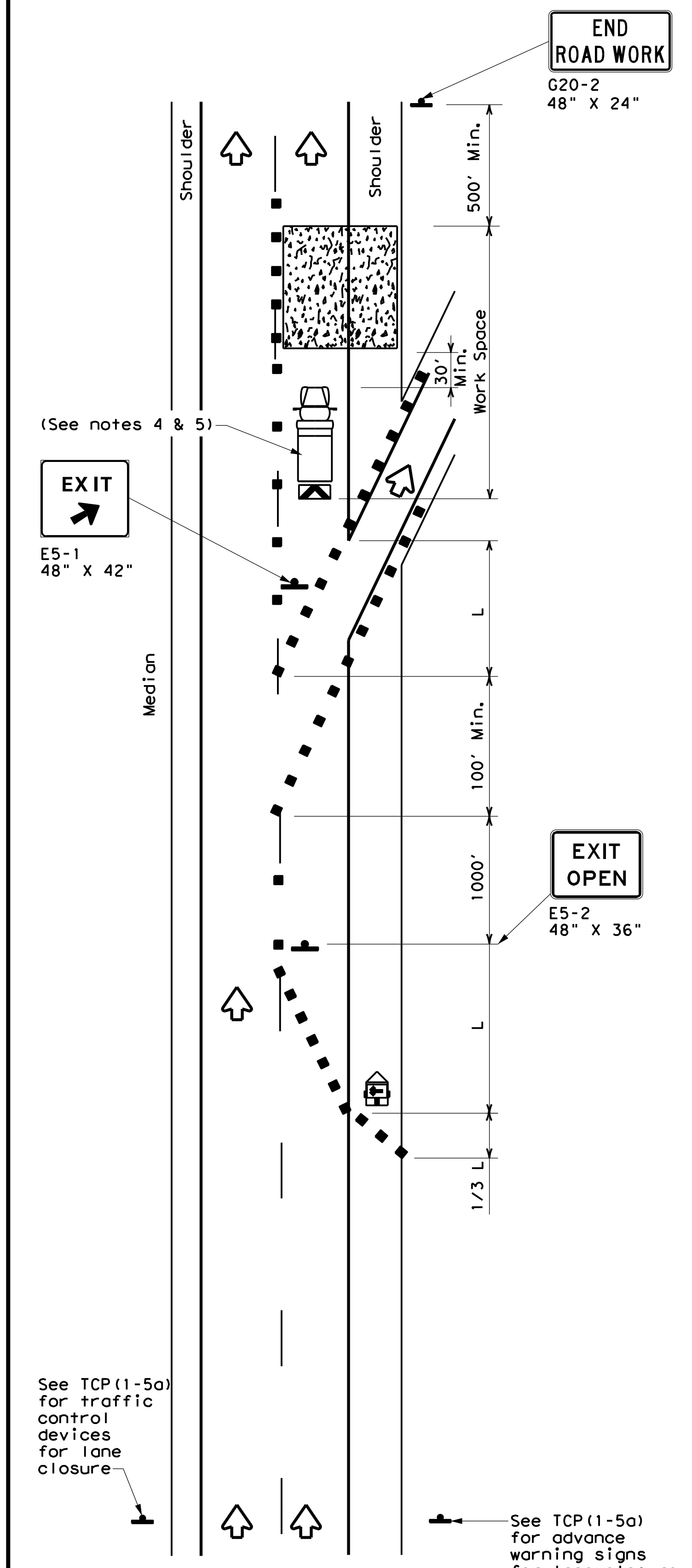
2-98 7-13	HOU	HARRIS		40
11-02 8-14				



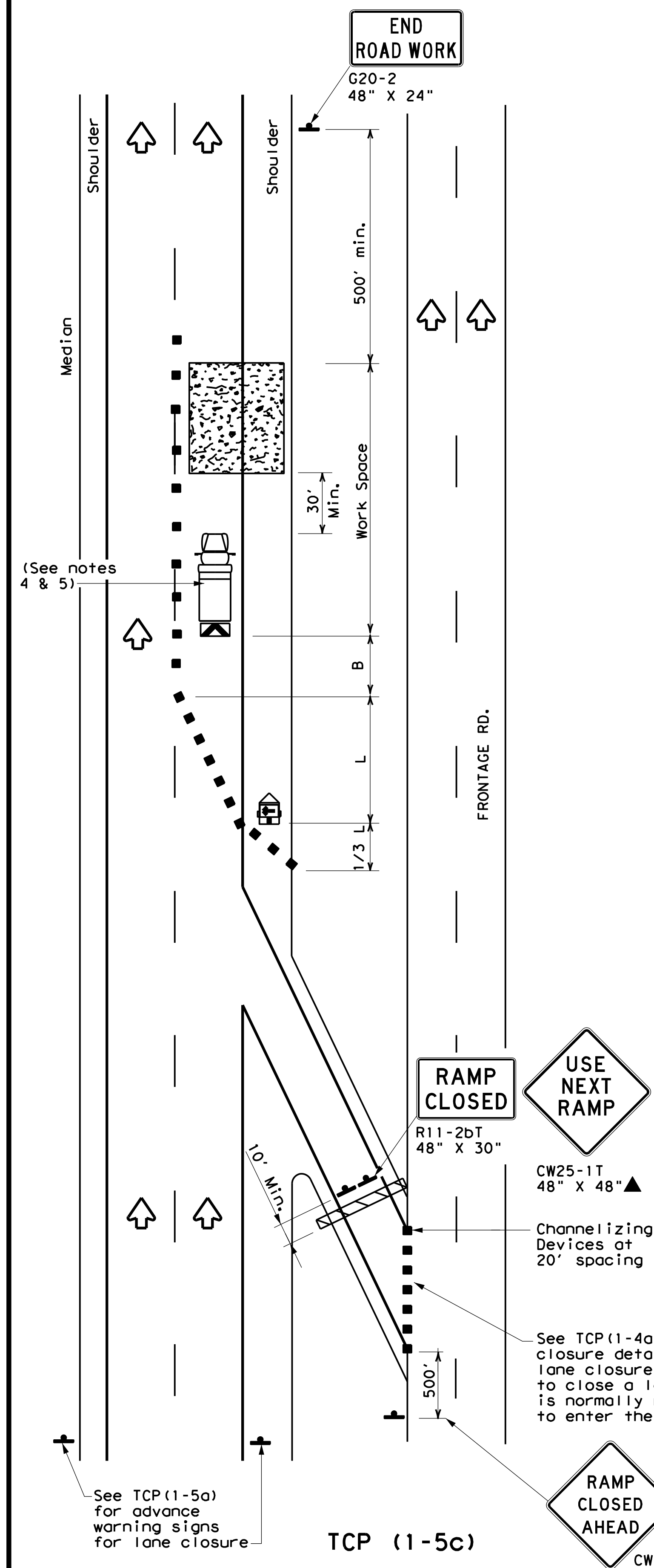
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

LANE CLOSURE NEAR ENTRANCE RAMPS

LEGEND

Symbol	Description	Symbol	Description
(barricade)	Type 3 Barricade	■ ■	Channelizing Devices
(vehicle)	Heavy Work Vehicle	(TMA)	Truck Mounted Attenuator (TMA)
(arrow board)	Trailer Mounted Flashing Arrow Board	(M)	Portable Changeable Message Sign (PCMS)
(sign)	Sign	(arrow)	Traffic Flow
(flag)	Flag	(flagger)	Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
		✓		

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

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	DIST		COUNTY	SHEET NO.
	HOU		HARRIS	41

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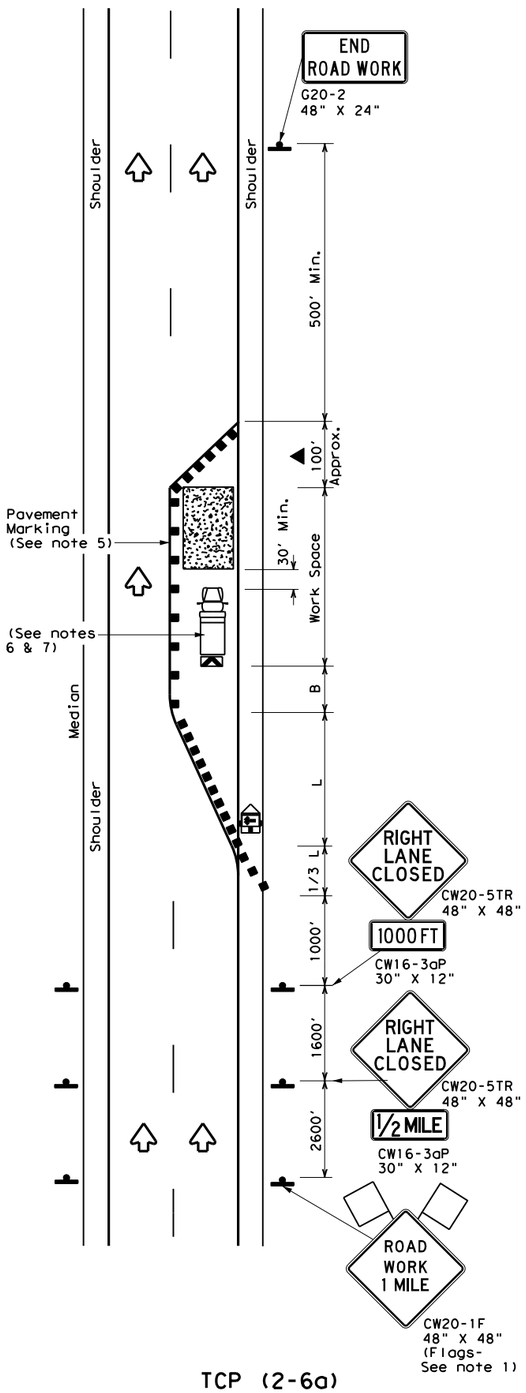
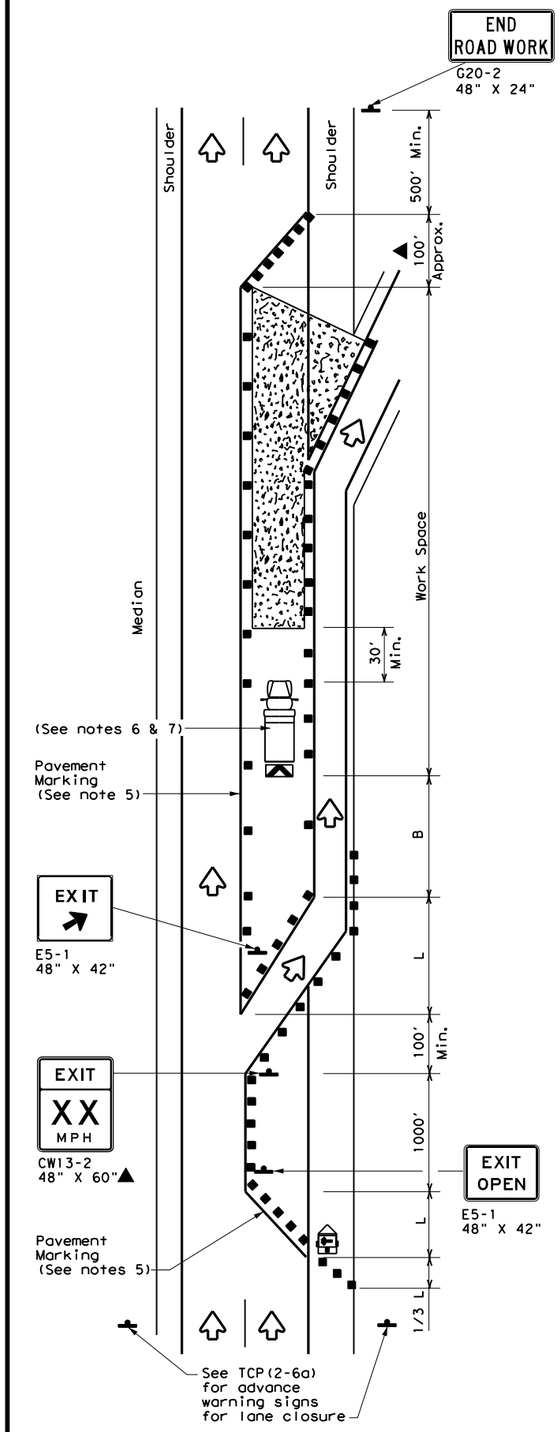


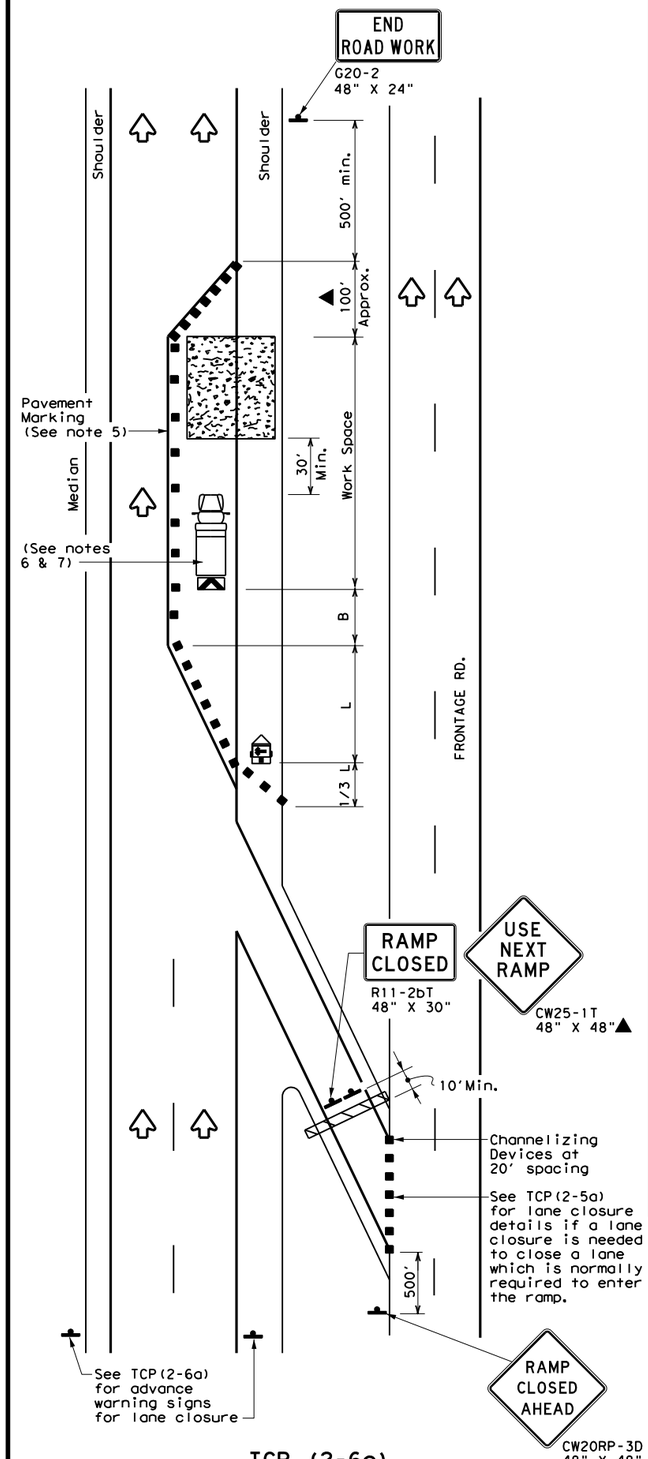
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
			✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Channelizing devices used along the work space or along tangent sections may be supplemented with vertical panels (VP) placed on everyother channelizing device. If night time conditions make it difficult to see at least two VPs, the VPs may be placed on each channelizing device.
5. The placement of pavement markings may be omitted on Intermediate-term stationary work zones with the approval of the Engineer.
6. Shadow Vehicle with TMA and high intensity rotating, flashing,oscillating or strobe lights. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP(2-6)-18

FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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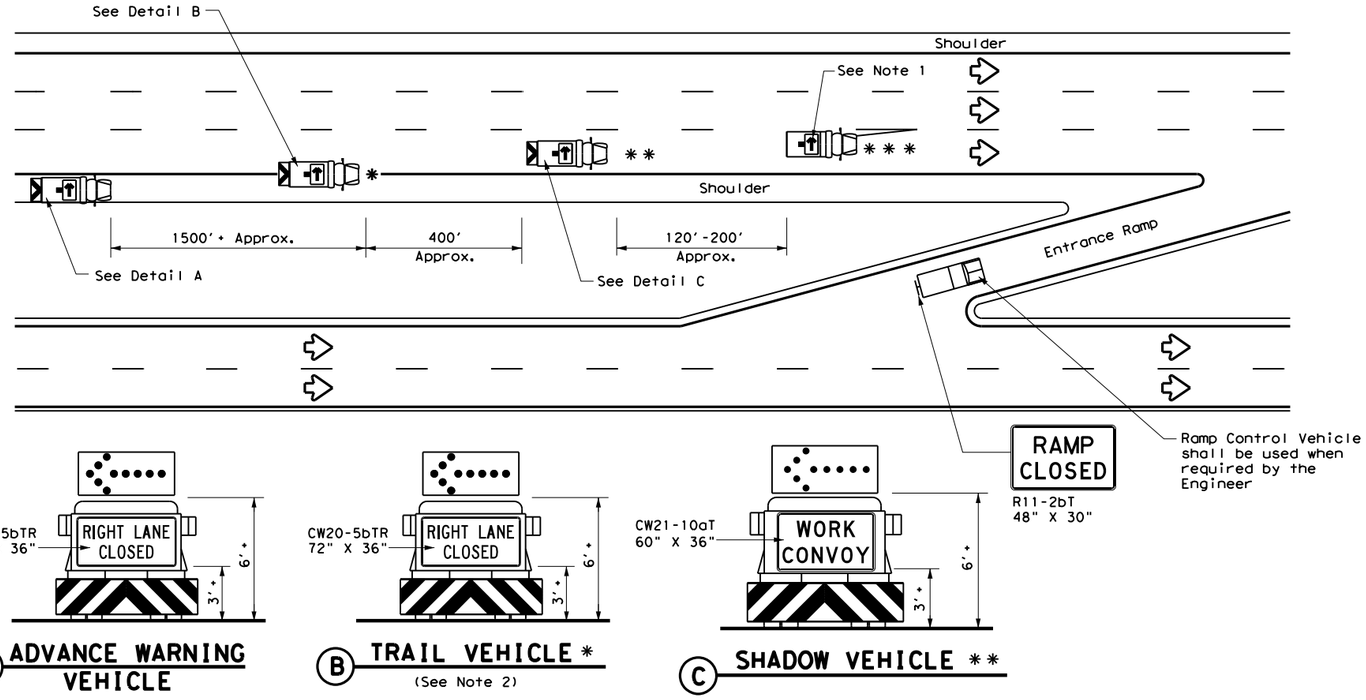
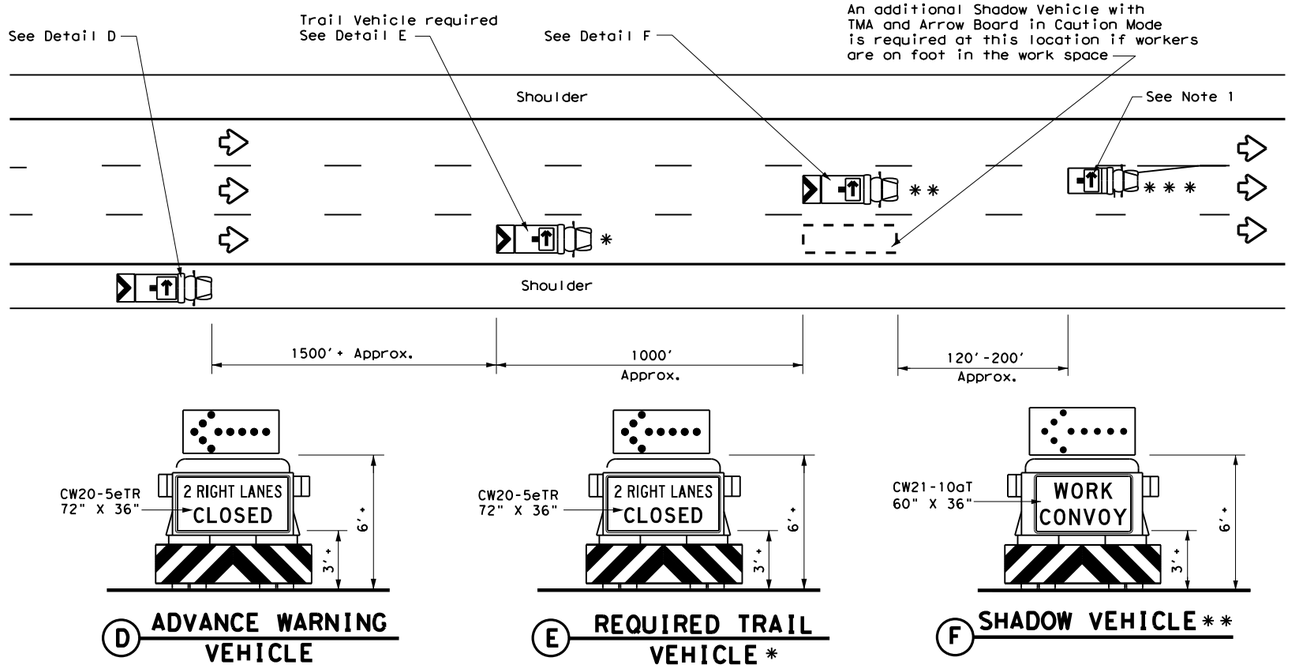
	HOU	HARRIS		42



RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)



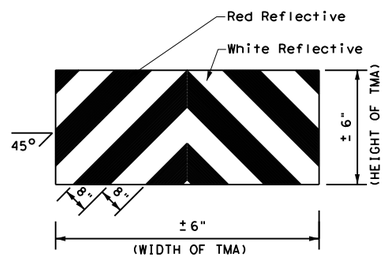
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
✓				

GENERAL NOTES

1. ADVANCE WARNING, TRAIL and SHADOW vehicles shall be equipped with Type B or Type C flashing arrow boards as per the Barricade and Construction (BC) standards. Arrow boards on WORK vehicles will be optional based on the type of work being performed. The arrow boards shall be operated from inside the vehicle.
2. For TCP(3-2a) the Engineer will determine if the TRAIL VEHICLE is required based on prevailing roadway conditions, traffic volume, and sight distance restrictions. All other vehicles shown for both TCP(3-2a) and TCP(3-2b) are required.
3. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
4. The use of truck mounted attenuators (TMA) on the ADVANCE WARNING, SHADOW, and TRAIL vehicles are required.
5. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DMS 8300, Type A.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE may vary according to terrain, work activity and other factors.
9. Standard 48" X 48" diamond shaped warning signs with the same message as those shown may be used where adequate mounting space exists.
10. The signs shown should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or a truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board, must be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
12. The principles on this sheet may be used to close lanes from the left side of the roadway considering the number of lanes, shoulder width, sight distance, and ramp frequency.
13. Signs and flashing arrow board modes shall be appropriately altered when implementing left lane closures or interior closures which close the left lanes.
14. The Advance Warning Vehicle may straddle the edgeline when shoulder width makes it necessary.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	HOU	HARRIS		43
1-97				

176

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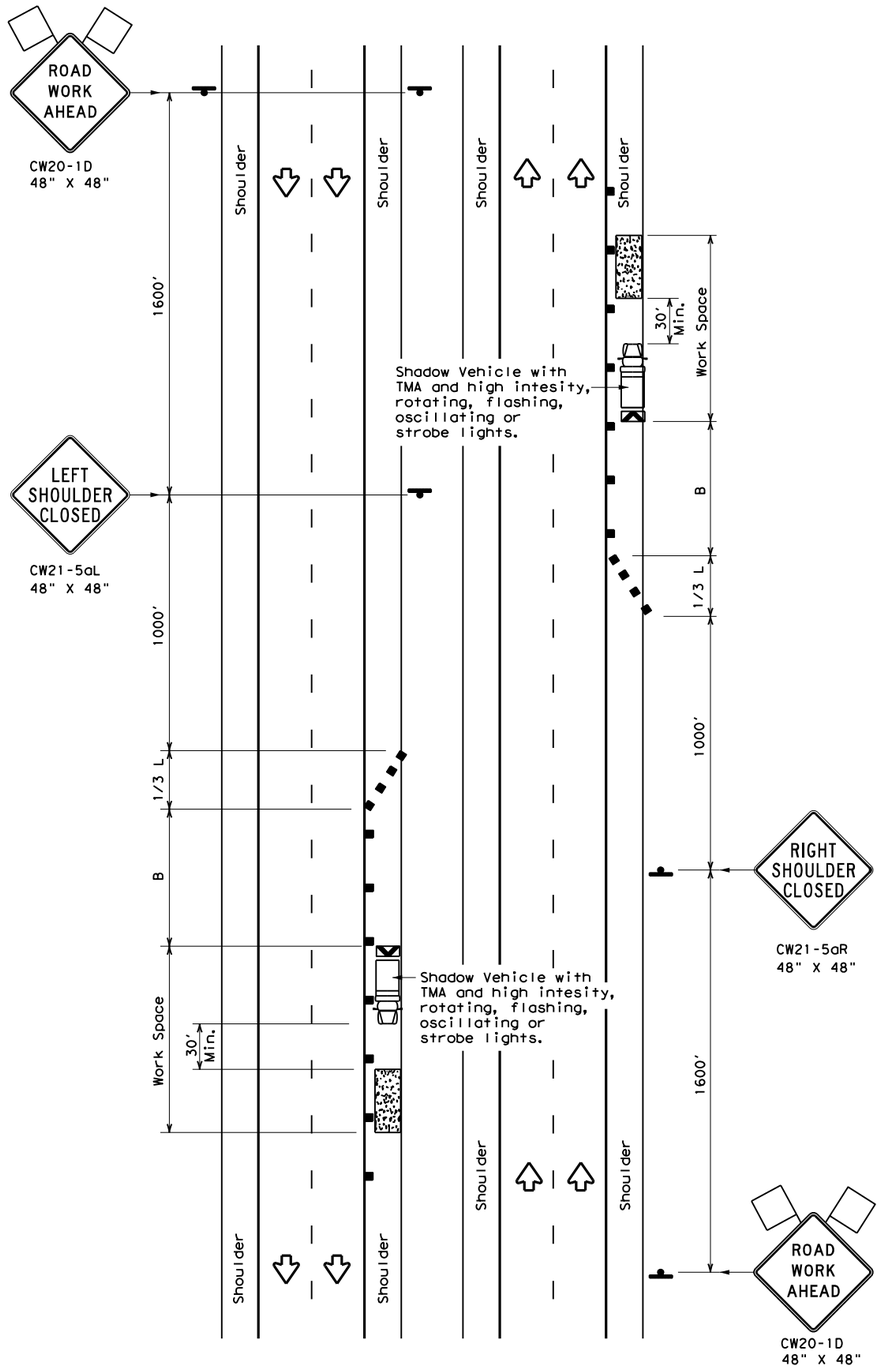
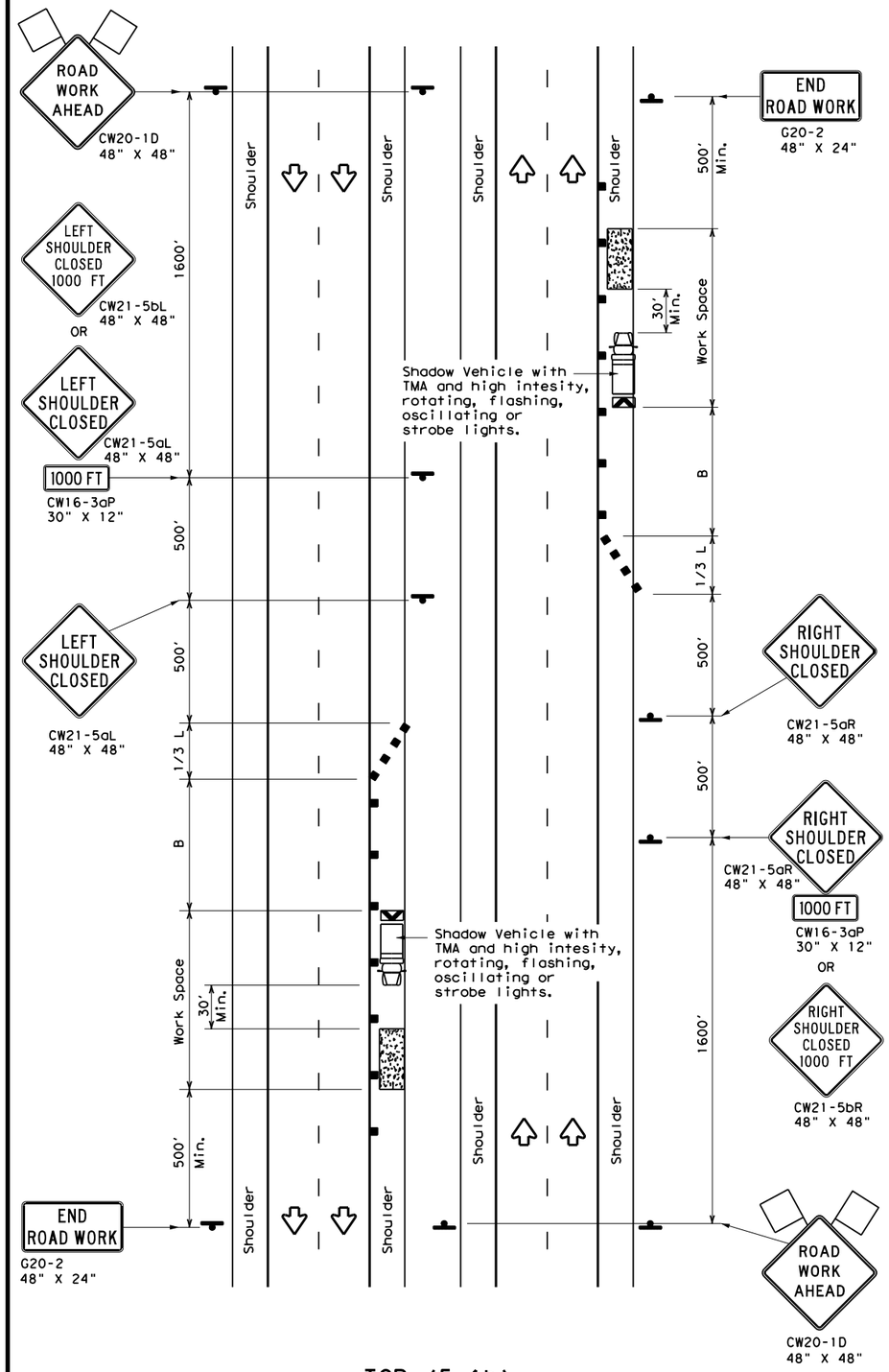


TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

LEGEND

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	90'
35		205'	225'	245'	35'	70'	120'
40		265'	295'	320'	40'	80'	155'
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE

MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	TCP(5-1a)	TCP(5-1b)	TCP(5-1b)	

GENERAL NOTES

1. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30' to 100' in advance of the area of crew exposure without adversely effecting the performance or quality of the work. Type 3 barricades or drums may be substituted when workers on foot are no longer present when approved by the Engineer.
2. 28" tall or taller one-piece cones will be allowed only for Short Duration or Short Term stationary operations when workers are present to maintain the devices upright and in proper location. Intermediate Term stationary work areas should use Drums, Vertical Panels or 42" tall two-piece cones.

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Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

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©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	0912	72	610	VARIOUS
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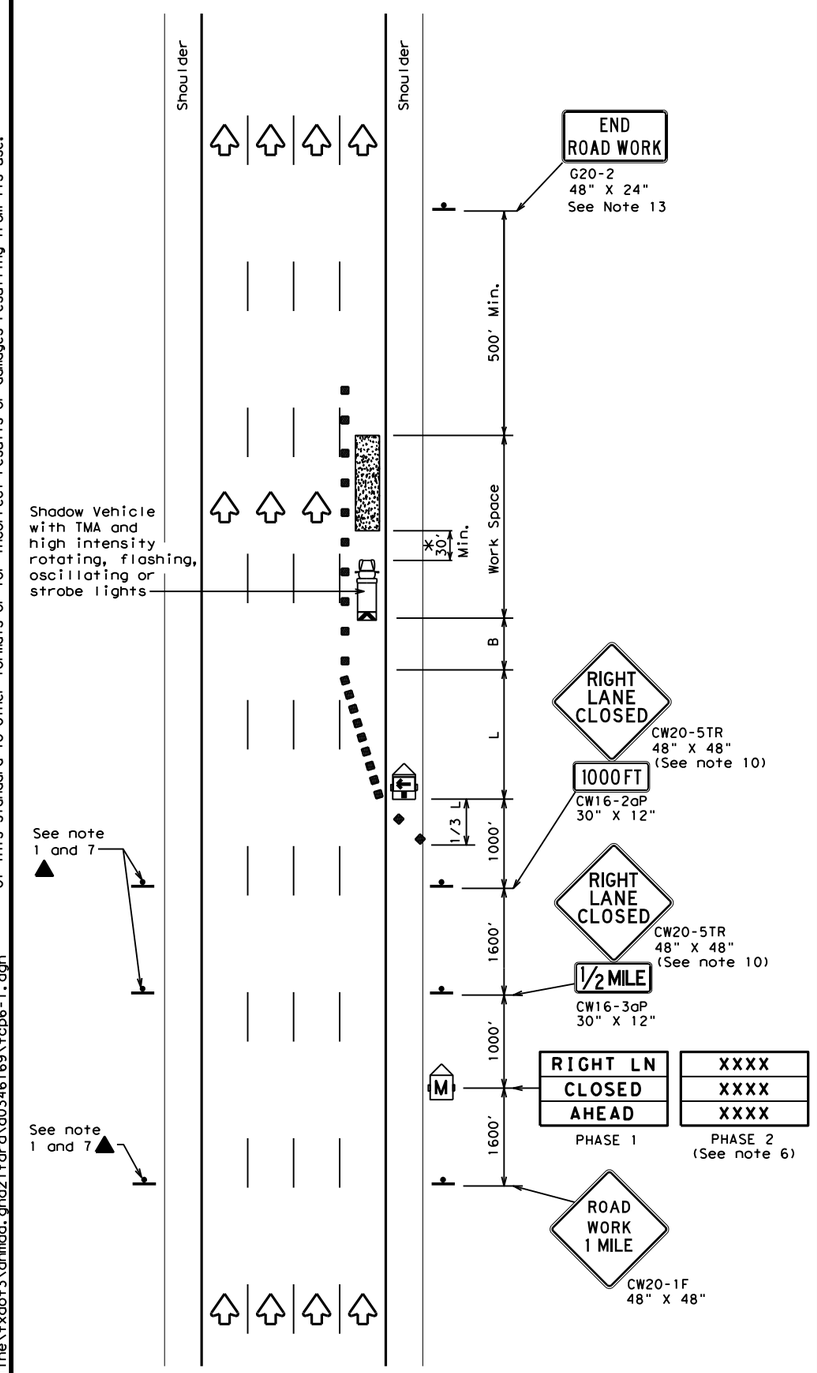
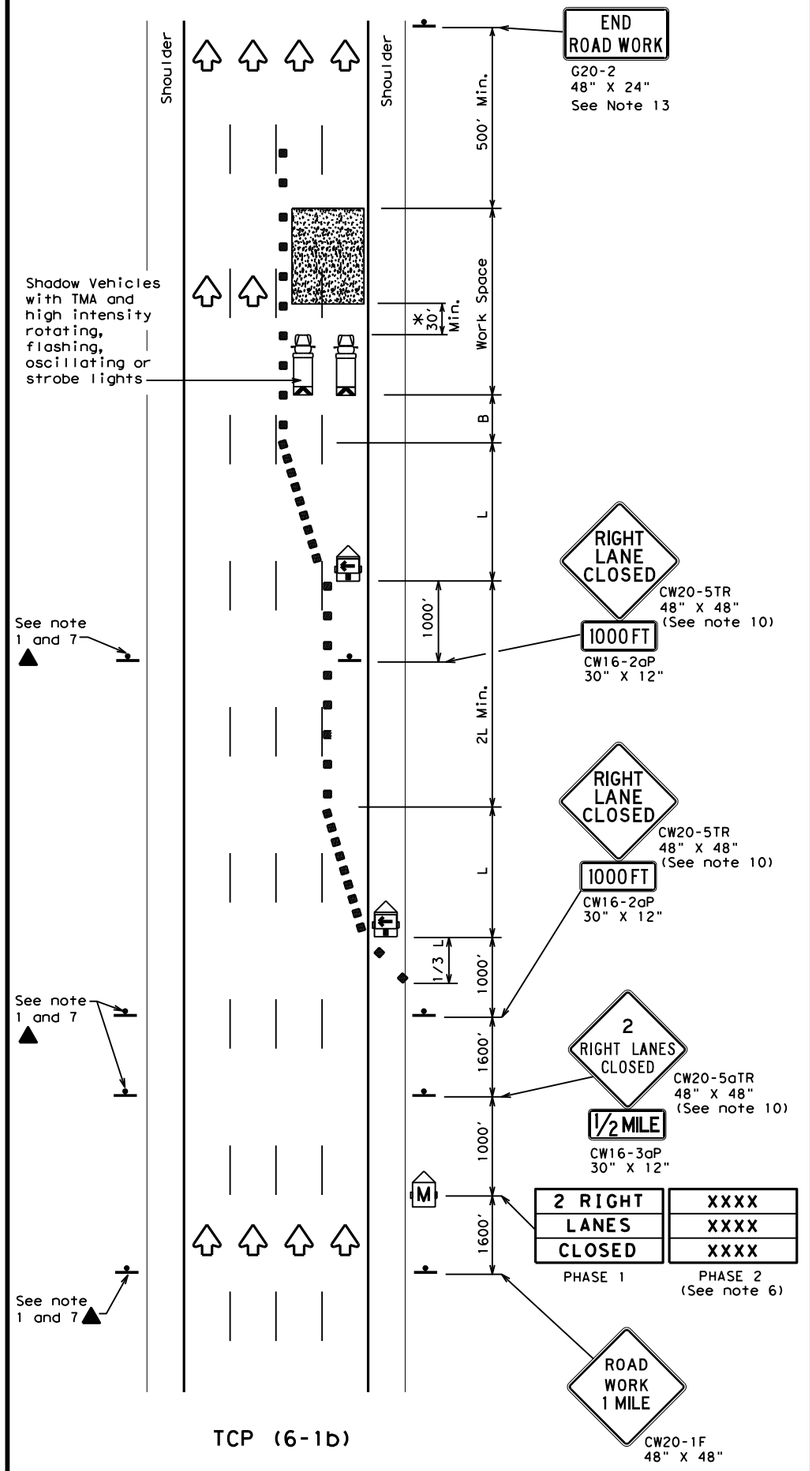
	HOU	HARRIS		44



TCP (6-1a)

TYPICAL FREEWAY ONE LANE CLOSURE



TCP (6-1b)

TYPICAL FREEWAY TWO LANE CLOSURE

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	✓	

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. Drums or 42"cones are the typical channelizing devices. For Intermediate Term Stationary work, drums shall be used on tapers with drums or 42" cones used on tangent sections. Other channelizing devices may be used as directed by the Engineer.
3. All construction signs and barricades placed during any phase of work shall remain in place until removal is approved by the Engineer.
4. The Engineer may direct the Contractor to furnish additional signs and barricades as required to maintain traffic flow, detours and motorist safety during construction.
5. Static message boards or changeable message signs stating the date and duration of ramp or freeway lane closures shall be placed a minimum of seven (7) calendar days in advance of the actual closure.
6. Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE LEFT," recommended advisory speed, delay information, or other specific warnings.
7. Duplicate construction warning signs should be erected on the medians side of freeways where median width will permit and traffic volume justifies the signing.
8. The number of closed lanes may be increased provided the spacing of traffic control devices, taper lengths and tangent lengths meet the requirements of the TMUTCD.
9. Warning signs for intermediate term stationary work should be mounted at 7' to the bottom of the sign.
10. Warning signs shown shall be appropriately altered for left lane closures. When signs are mounted at 1' height for short term stationary or short duration work, sign versions shown in the SHSD for Texas with distances on the sign face rather than mounted on a plaque below the sign may be used.
11. When possible, PCMS units should be located in advance of the last available exit ramp prior to the lane closure to allow motorists an alternate route. They may also be relocated to improve advance warning in case of unanticipated queuing or congestion.
12. For Intermediate Term Stationary work at night, floodlights should be used to illuminate the work area and equipment crossings. Floodlights shall not produce a disabling glare condition for road users or workers.
13. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

TCP(6-1)-12

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8-12	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		45

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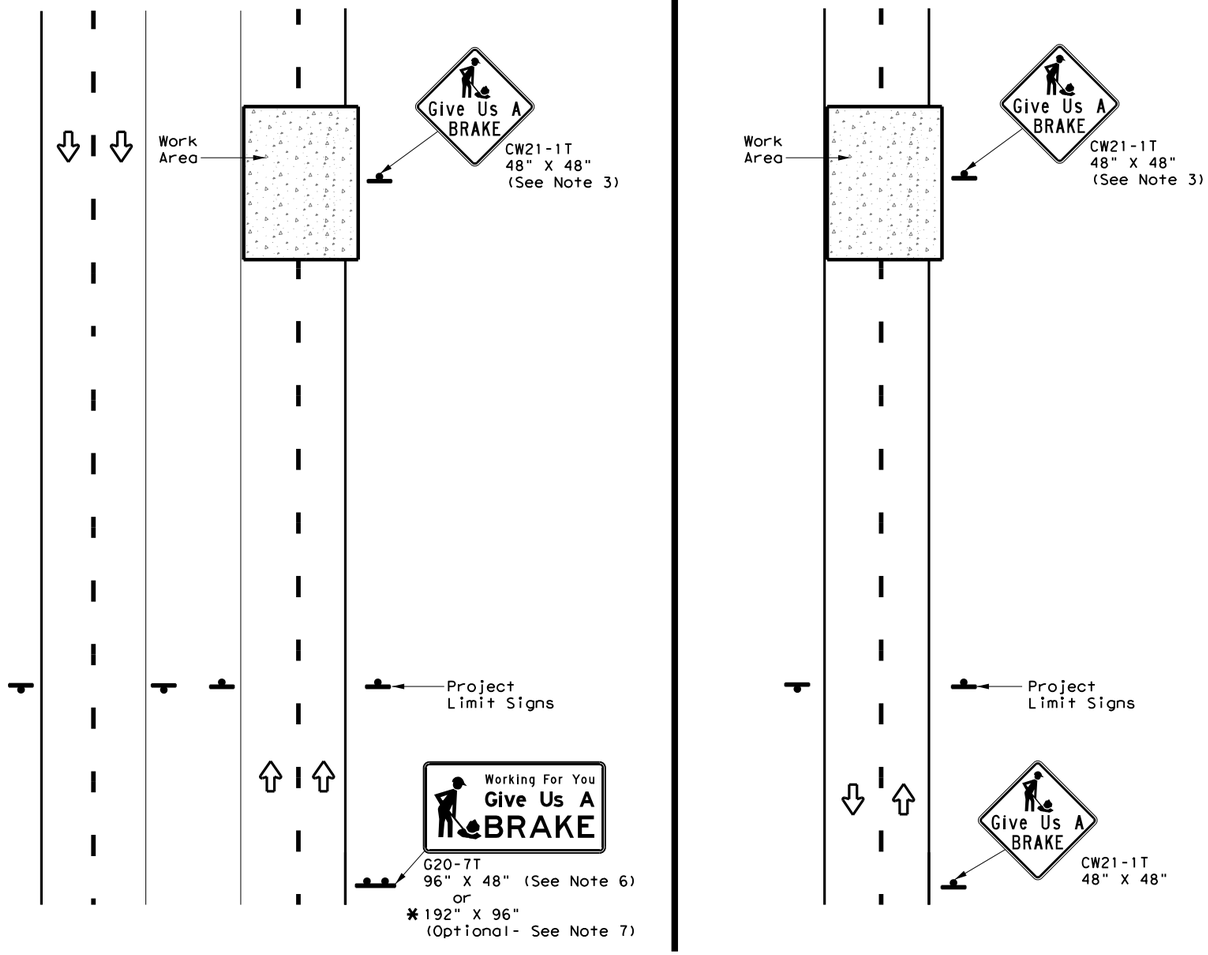

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL			DRILLED SHAFT 24" DIA. (LF)
						Size	(LF) ①	(LF) ②	
Orange	G20-7T	Working For You Give Us A BRAKE	96" X 48"	Type B_{FL} or C_{FL}	32	▲	▲	▲	▲
Orange	G20-7T	Working For You Give Us A BRAKE	192" X 96"	Type B_{FL} or C_{FL}	128	W8x18	16	17	12

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL}
BLACK	LEGEND & BORDERS	NON-REFLECTIVE ACRYLIC FILM

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   Item 636 - Aluminum Signs
   Item 647 - Large Roadside Sign Supports and Assemblies.
   Item 416 - Drilled Shaft Foundations
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

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8-96 3-03	HOU	HARRIS		46

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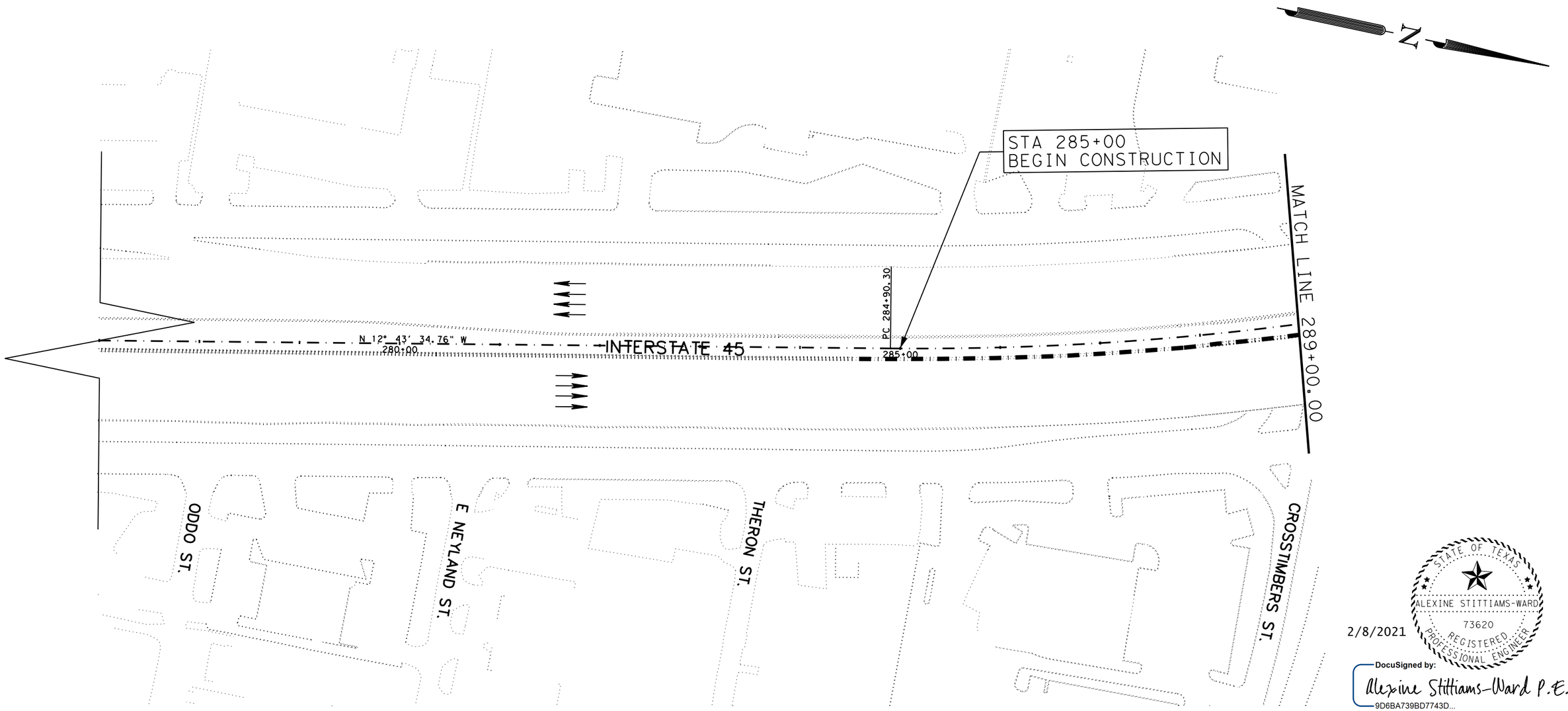

LEGEND:

- PORTABLE CTB
- CAST IN PLACE CTB
- PROPOSED SMALL SIGN ID
- PROPOSED SMALL SIGN

NOTES:

1. REFER TO THE PEDESTRIAN BARRIER DETAILS SHEETS
2. REFER TO THE CTB REPAIR DETAIL SHEETS
3. THE CONTRACTOR SHALL ENSURE THAT HE/SHE ENDS THE BARRIER IN A WAY THAT ALLOWS STANDARD BARRIER LENGTH TO BE USED AND PREVENTS ANY INTERFERENCE WITH HOV GATE OPERATIONS

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 1 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		47

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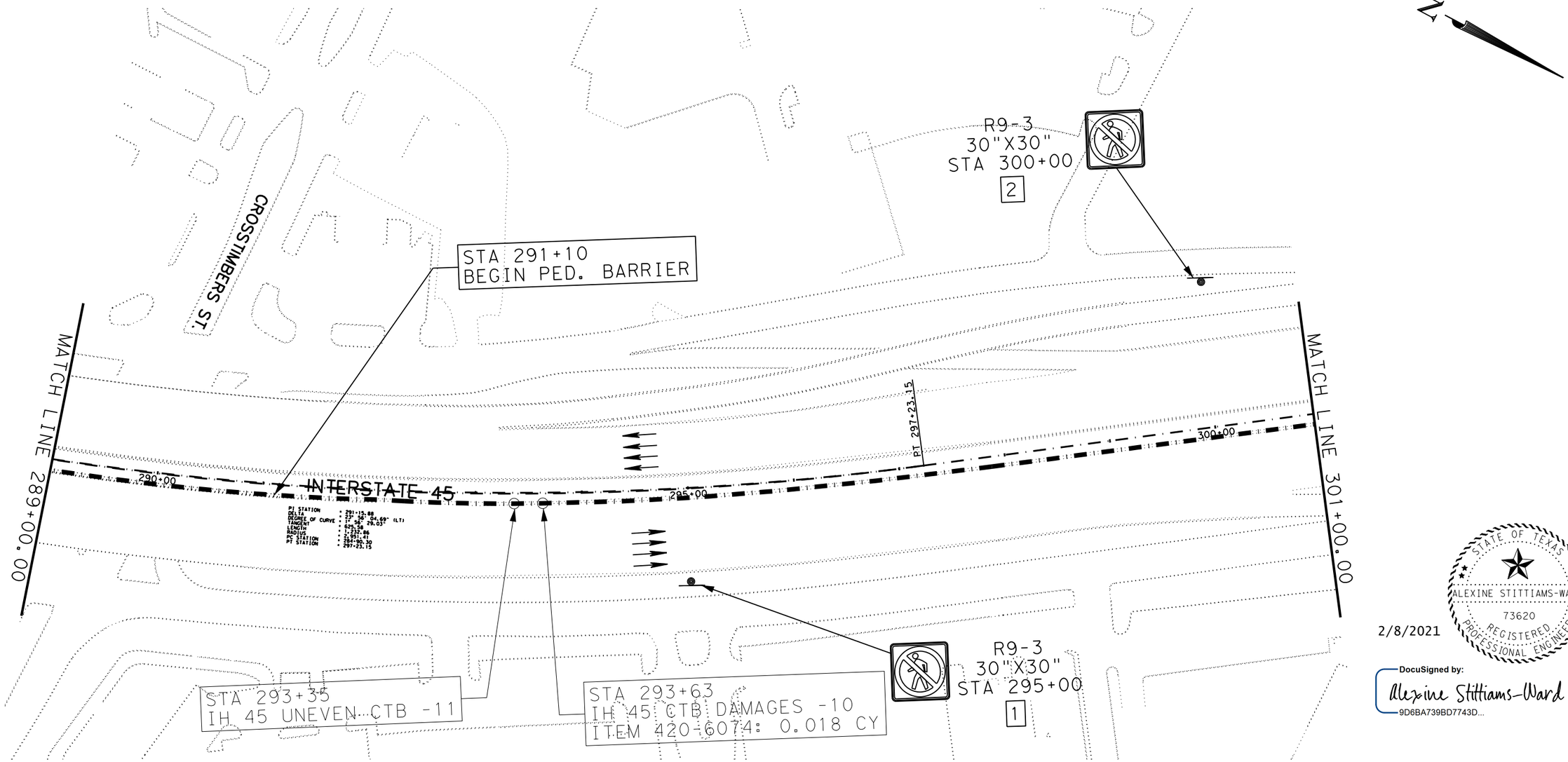

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PLAN LAYOUT

SCALE: 1"=100' SHEET 2 OF 36

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CONT	SECT	JOB	HIGHWAY
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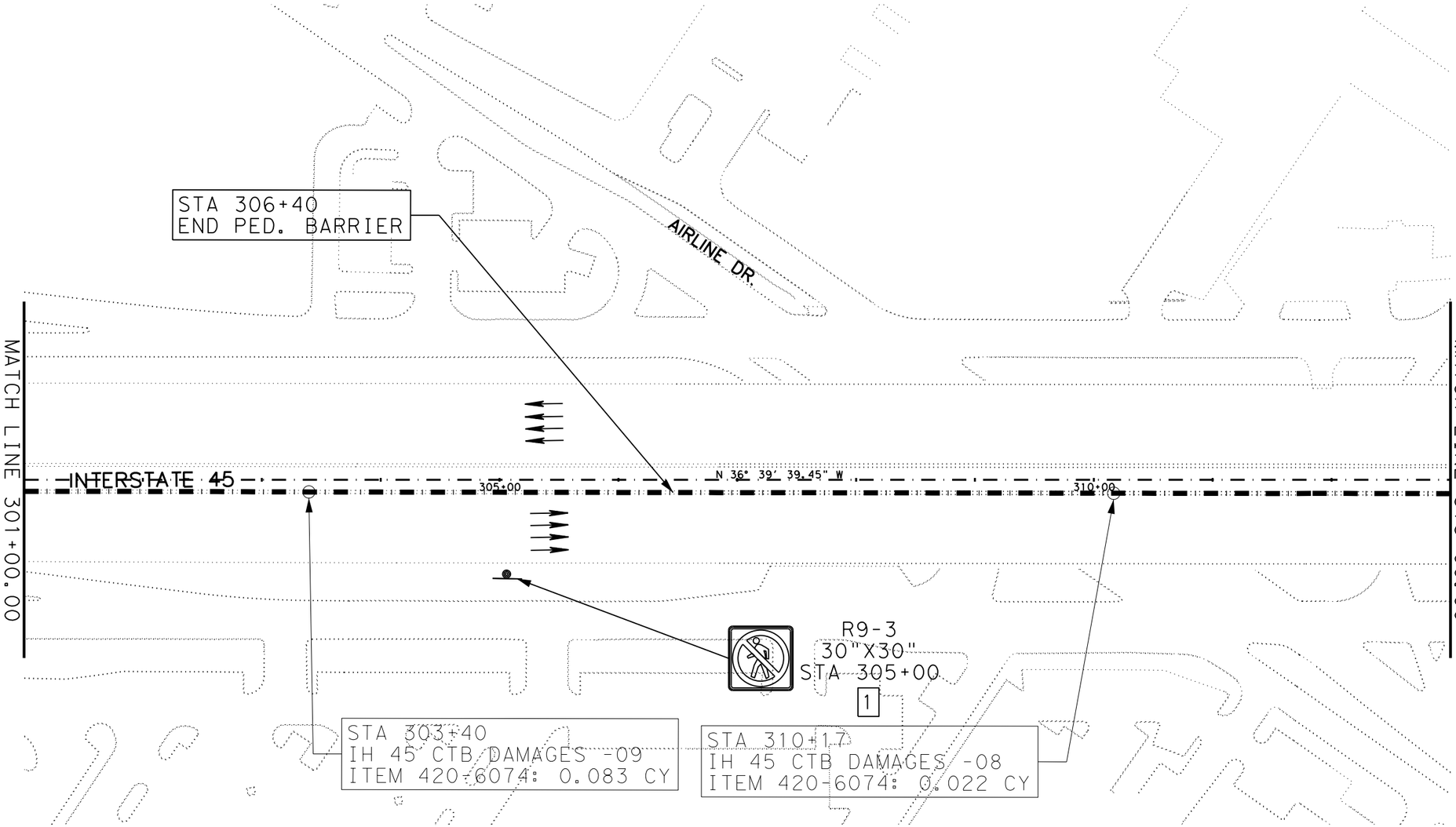

LEGEND:

- PORTABLE CTB
- CAST IN PLACE CTB
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PLAN LAYOUT

SCALE: 1"=100' SHEET 3 OF 36

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CONT	SECT	JOB	HIGHWAY
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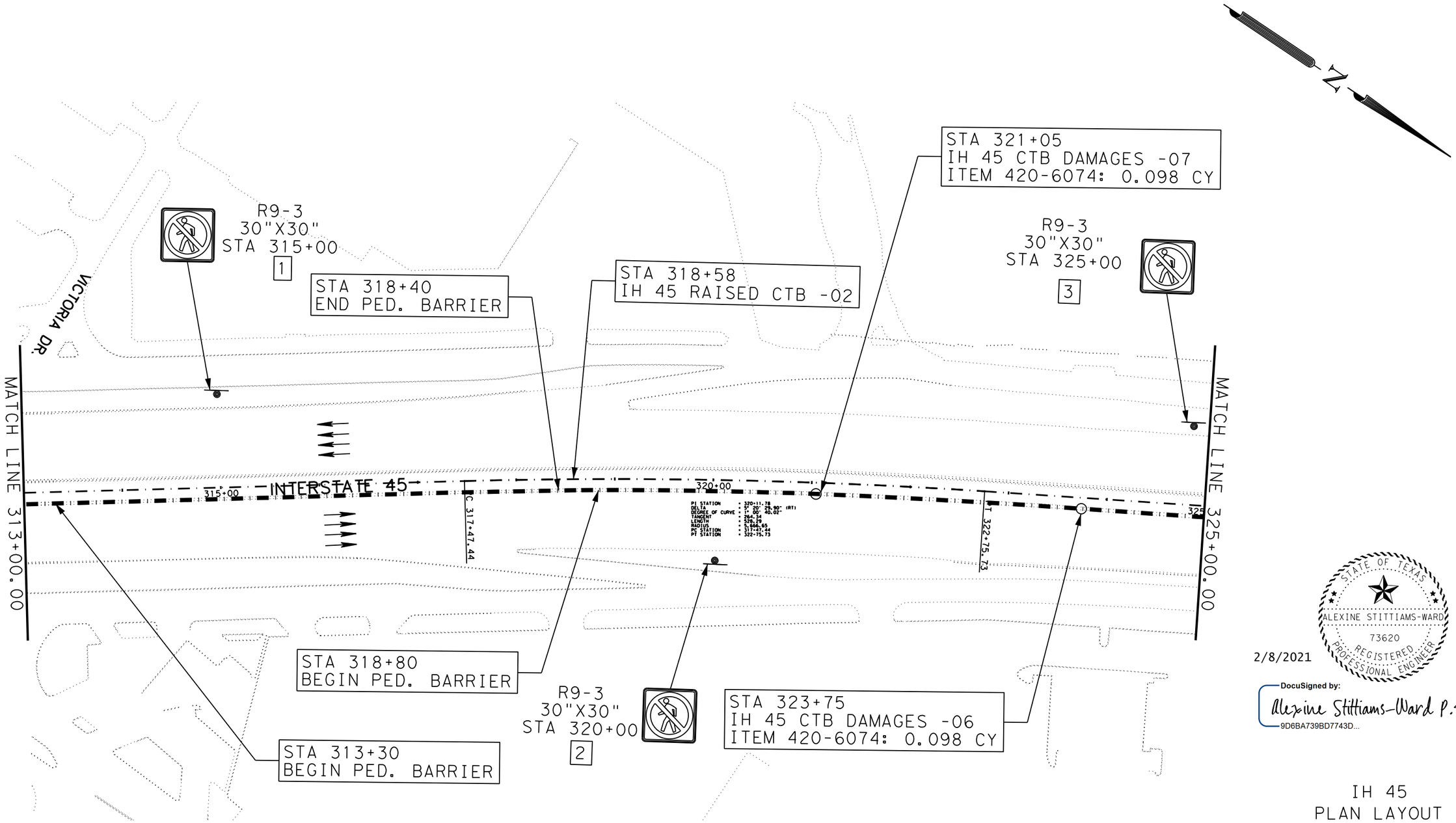

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73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

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PLAN LAYOUT

SCALE: 1"=100' SHEET 4 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
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HOU	HARRIS		50

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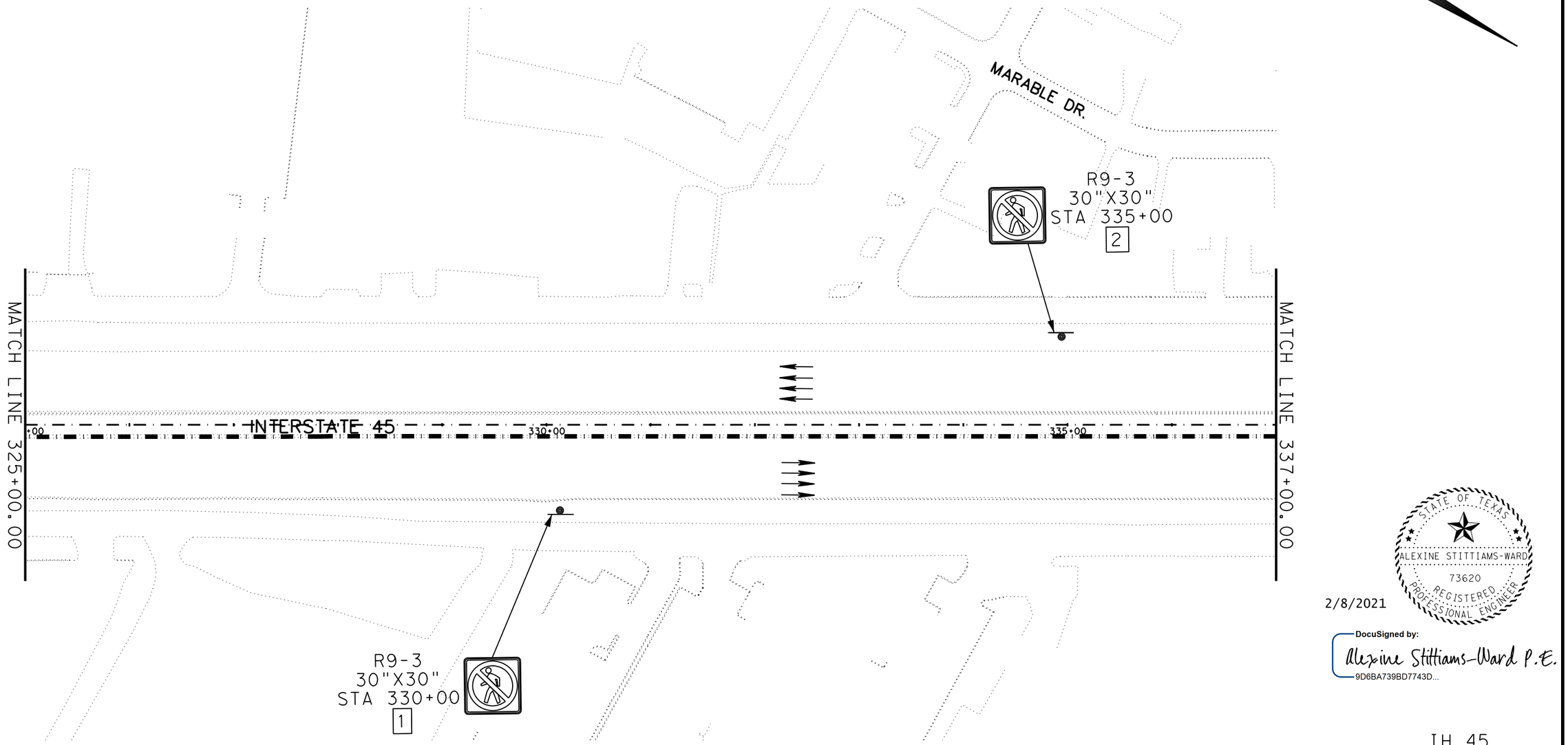

LEGEND:

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PLAN LAYOUT

SCALE: 1"=100' SHEET 5 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
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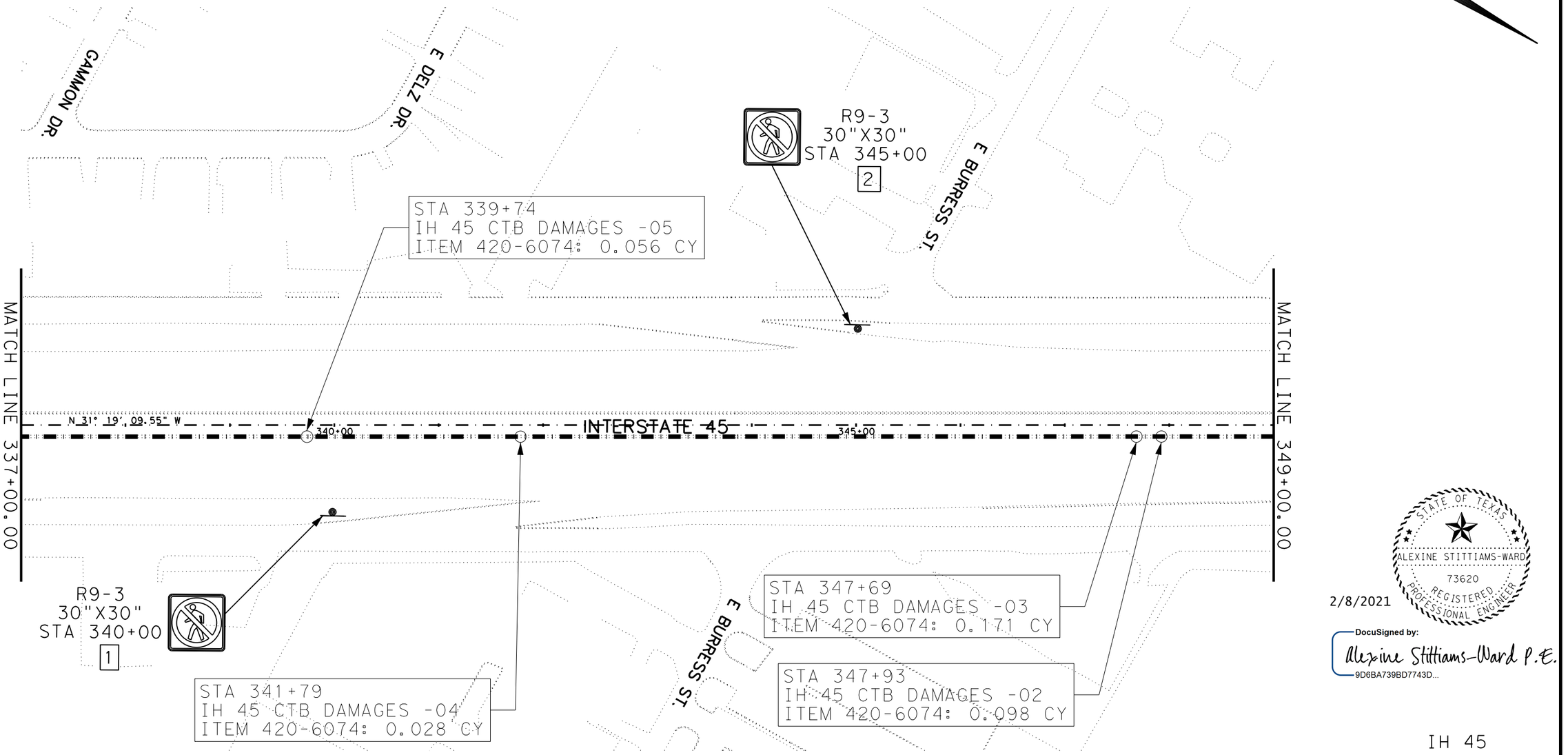

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PLAN LAYOUT

SCALE: 1"=100' SHEET 6 OF 36

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CONT	SECT	JOB	HIGHWAY
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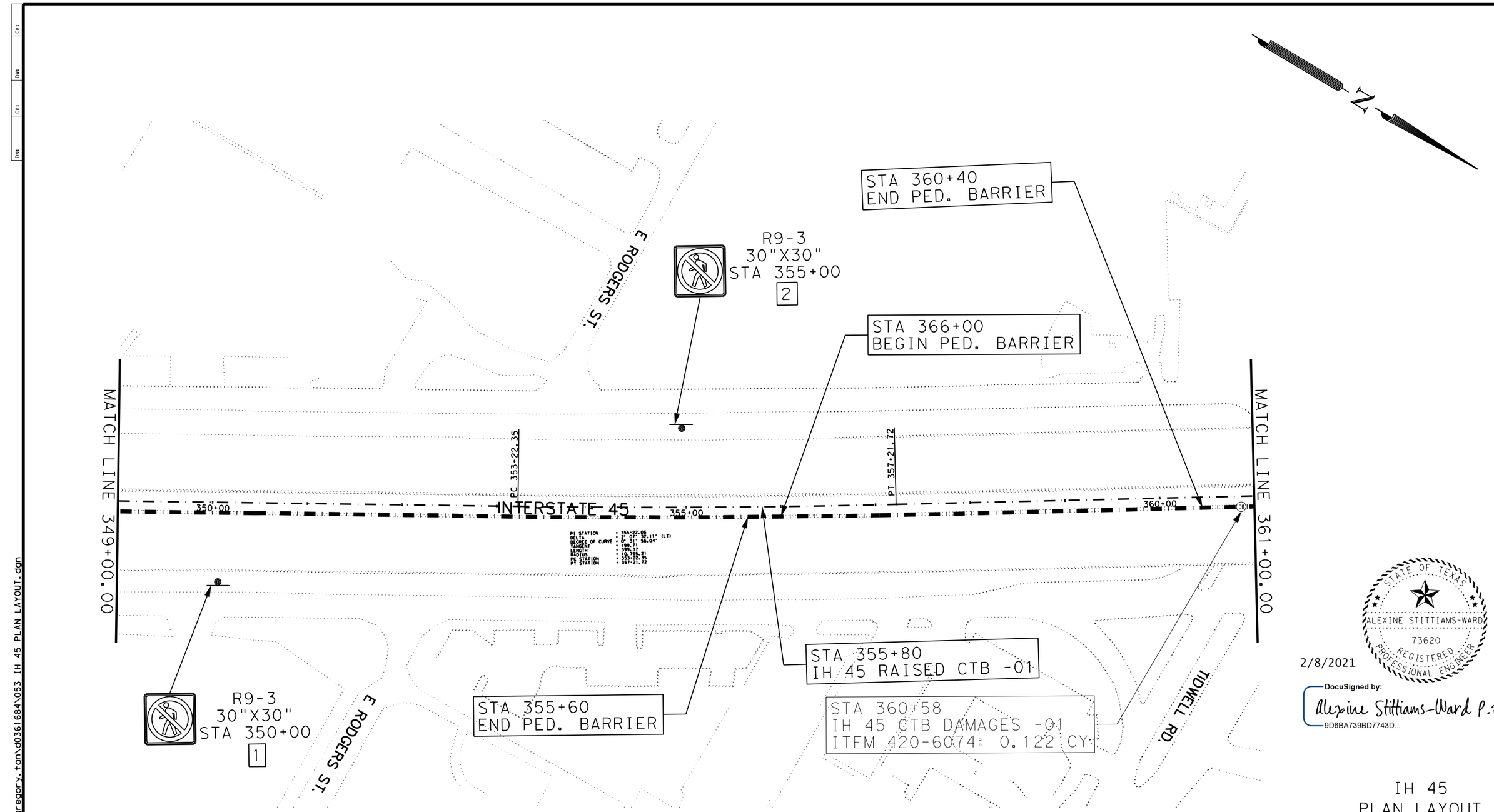

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STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 7 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		53

DATE: Wed, 12/16/2020 8:30:51 AM
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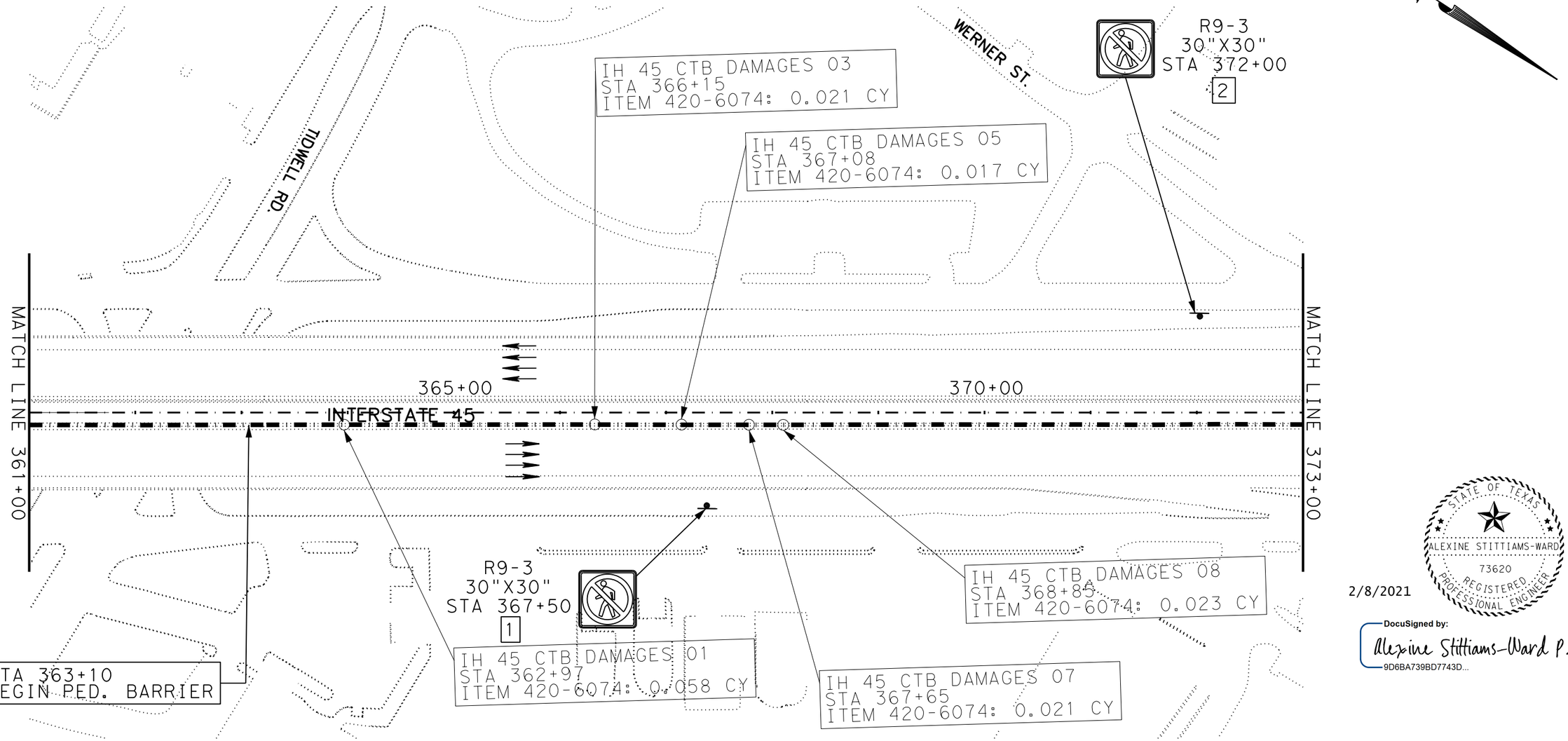

LEGEND:

- PORTABLE CTB
- CAST IN PLACE CTB
- PROPOSED SMALL SIGN ID
- PROPOSED SMALL SIGN

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IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 8 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		54

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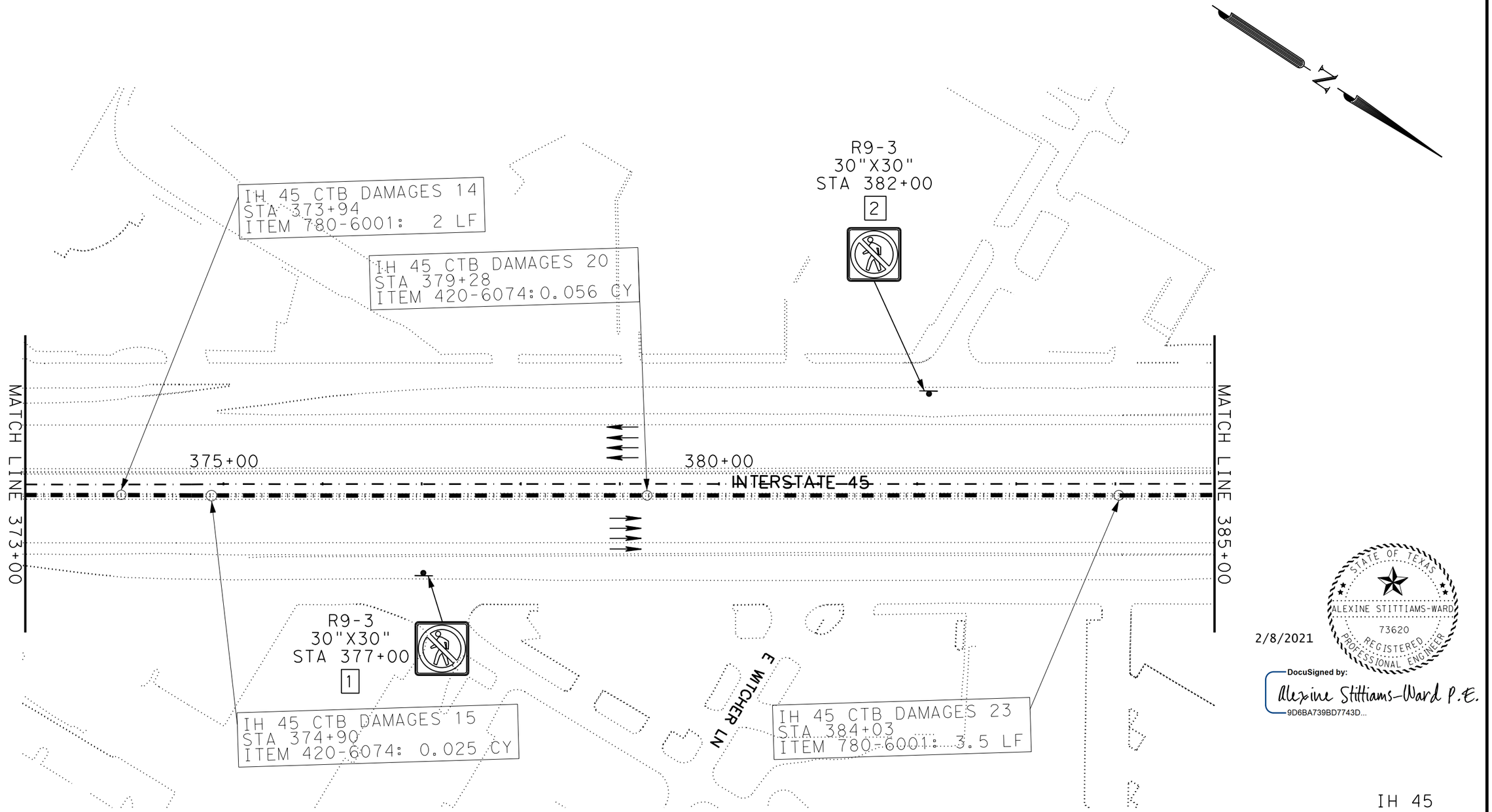

LEGEND:

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IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 9 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		55

DATE: Wed,12/16/2020 8:31:22 AM
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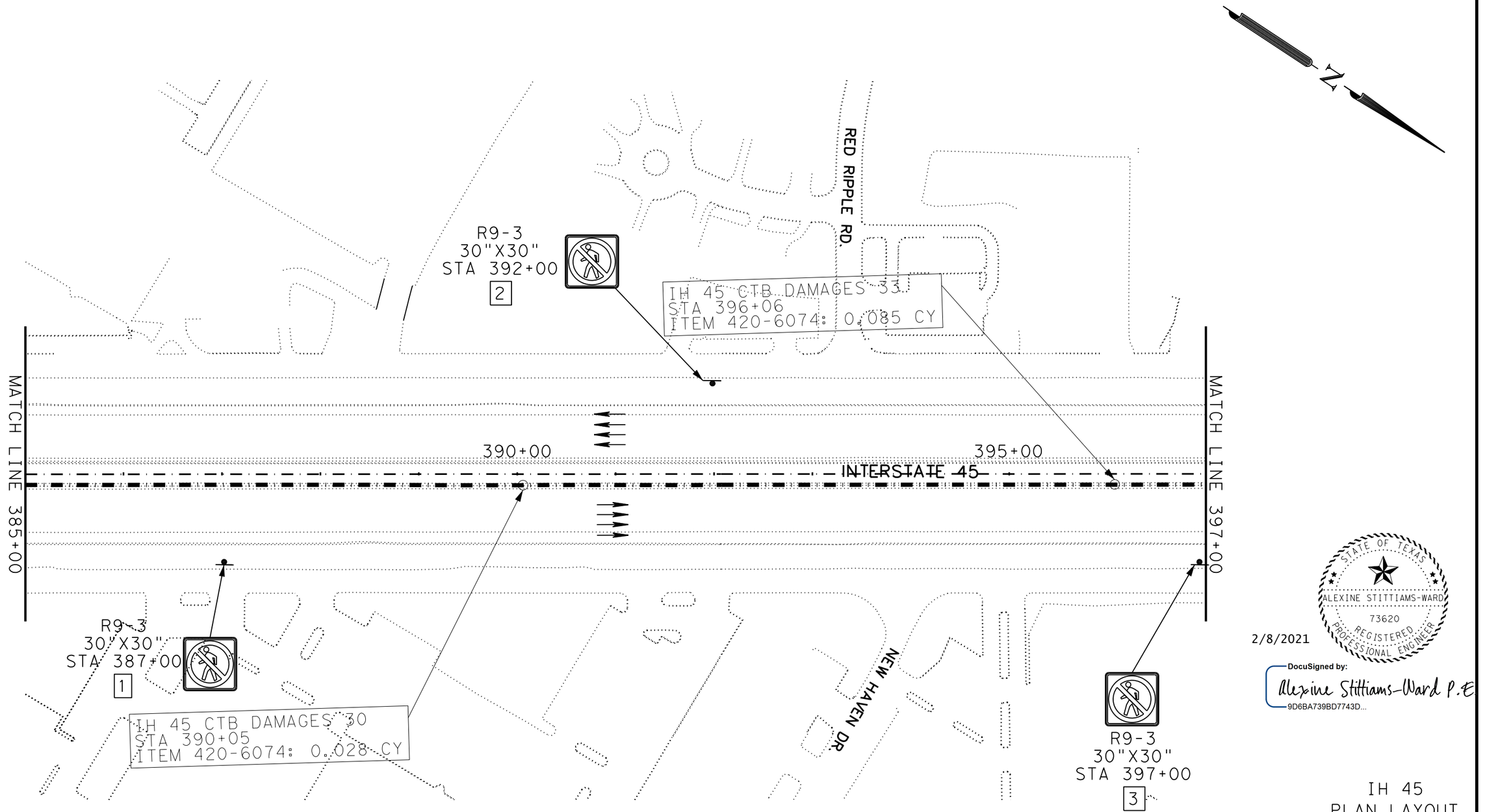

LEGEND:

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IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 10 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		56

DATE: Wed,12/16/2020 8:31:29 AM
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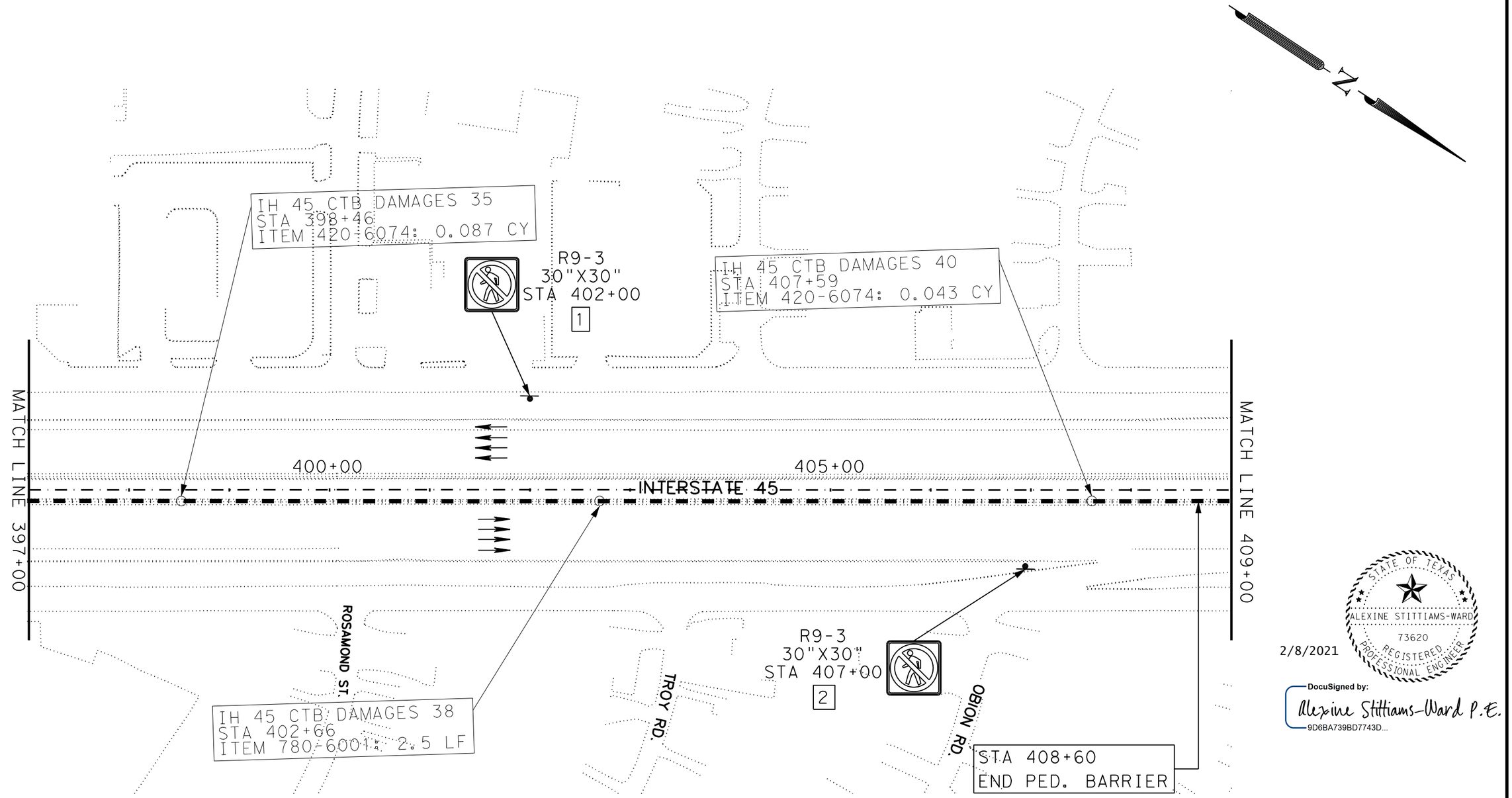

LEGEND:

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IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 11 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		57

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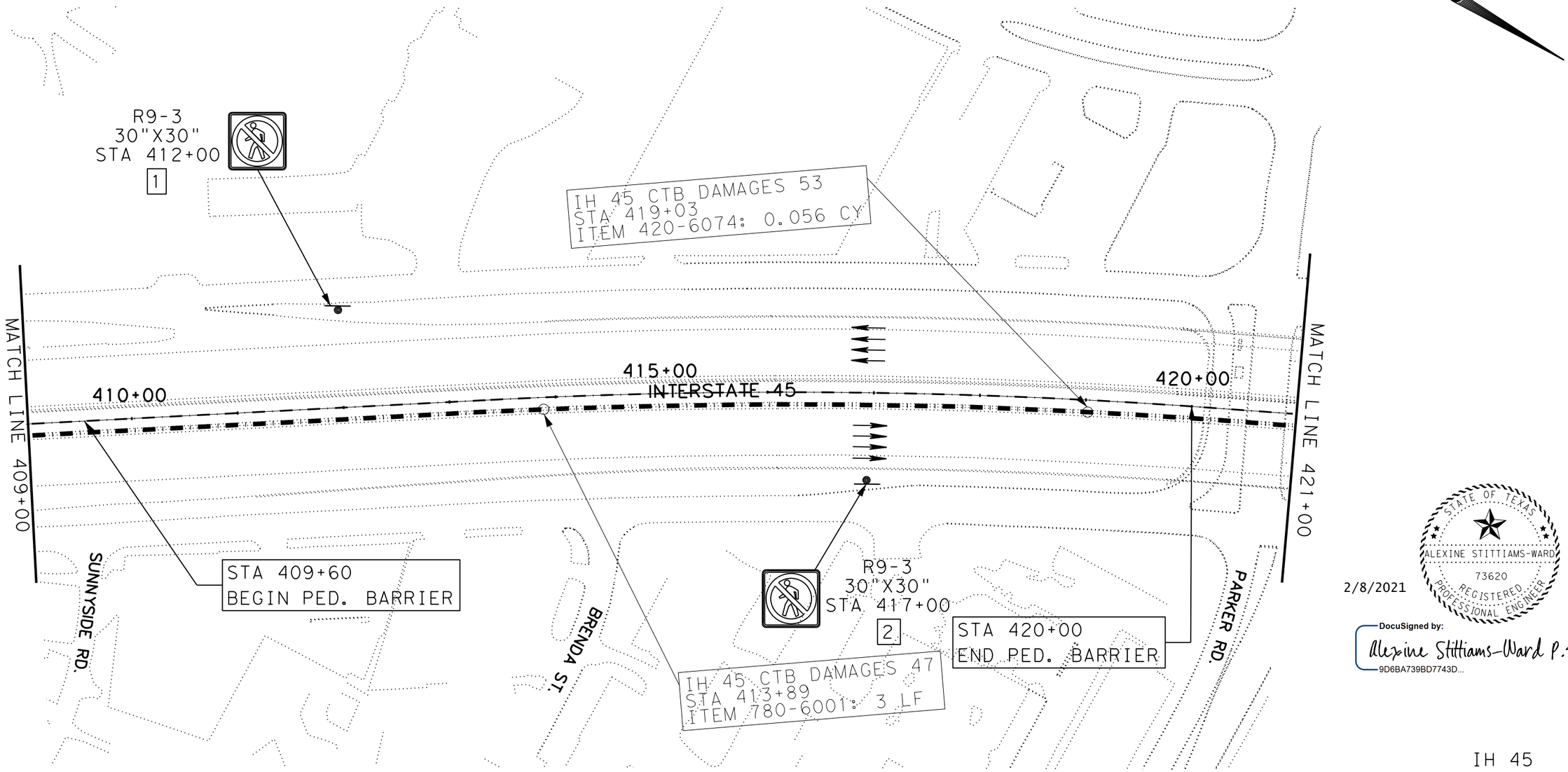

LEGEND:

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9D6BA739BD7743D...

IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 12 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		58

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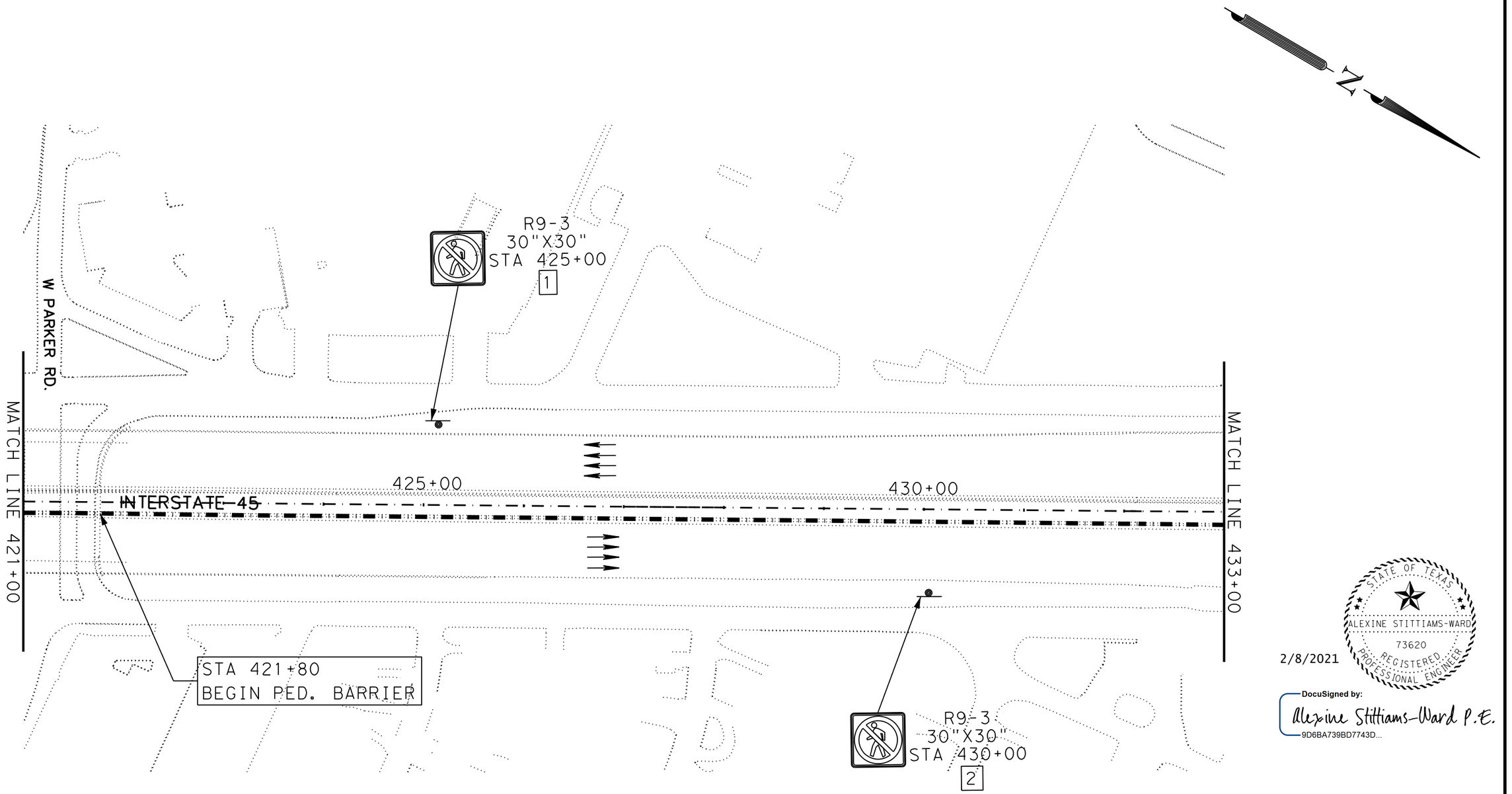

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IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 13 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		59

DATE: Wed, 12/16/2020 8:31:52 AM
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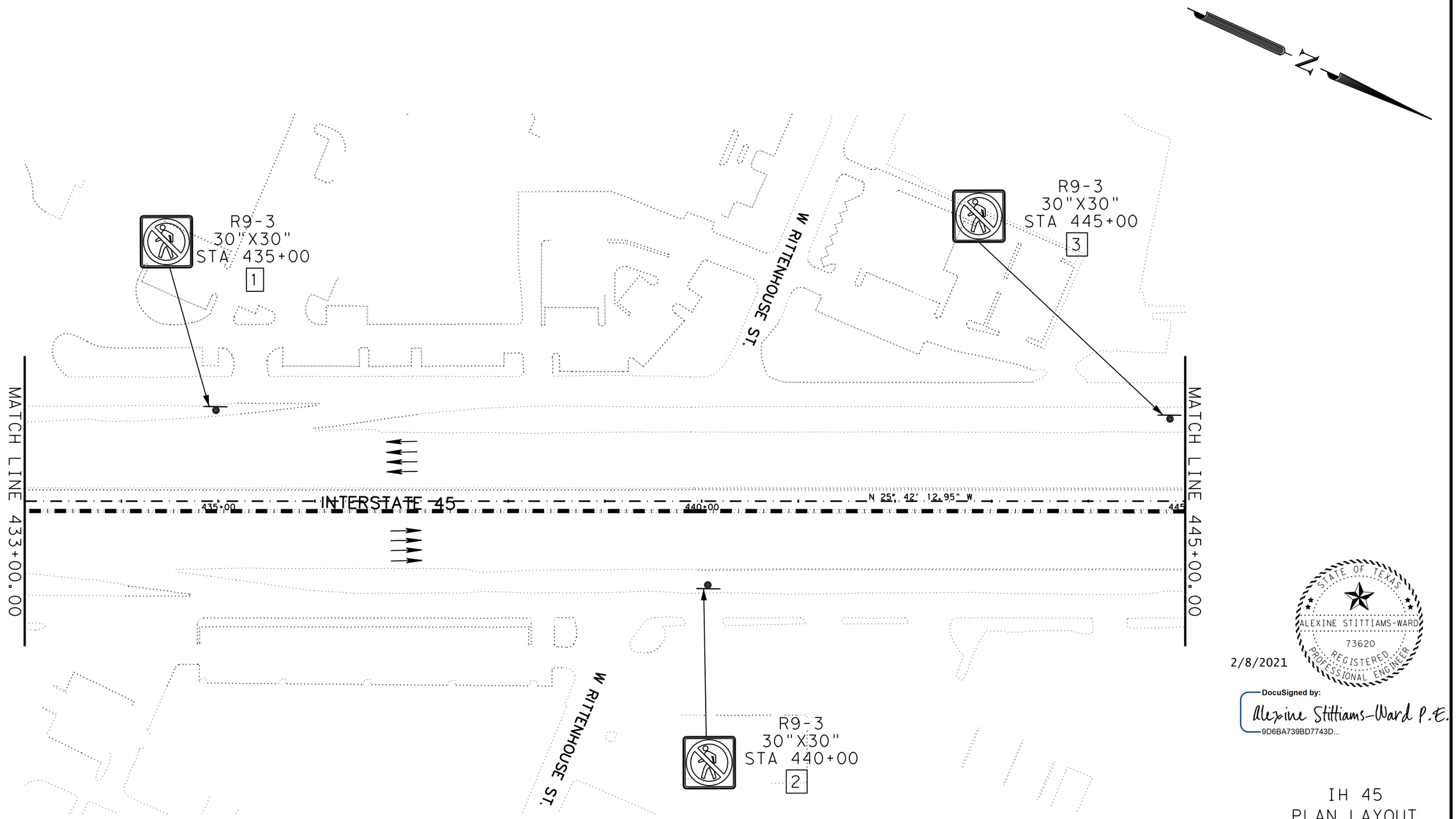

LEGEND:

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IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 14 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		60

DATE: Wed, 12/16/2020 8:32:00 AM
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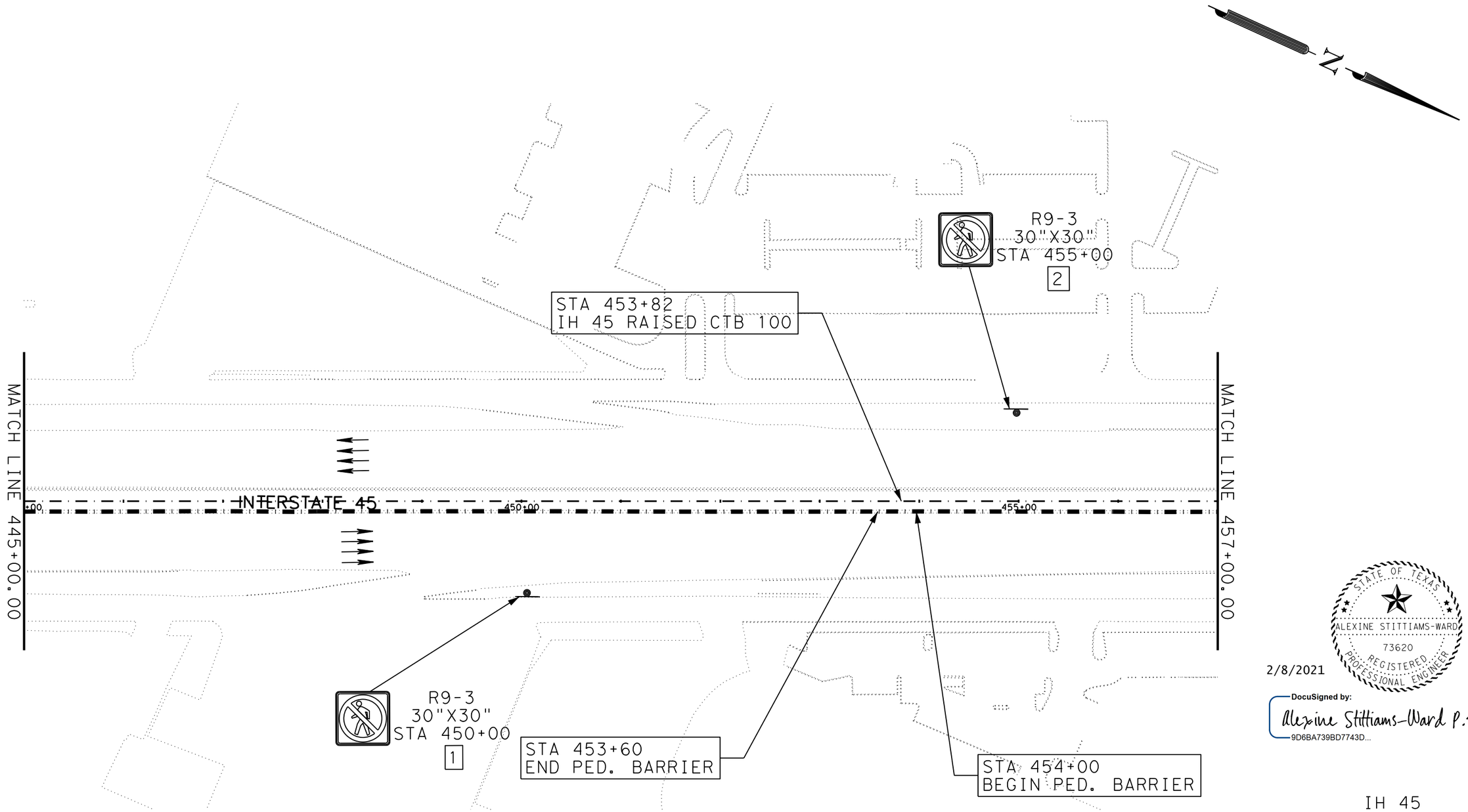

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IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 15 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		61

DATE: Wed, 12/16/2020 8:32:08 AM
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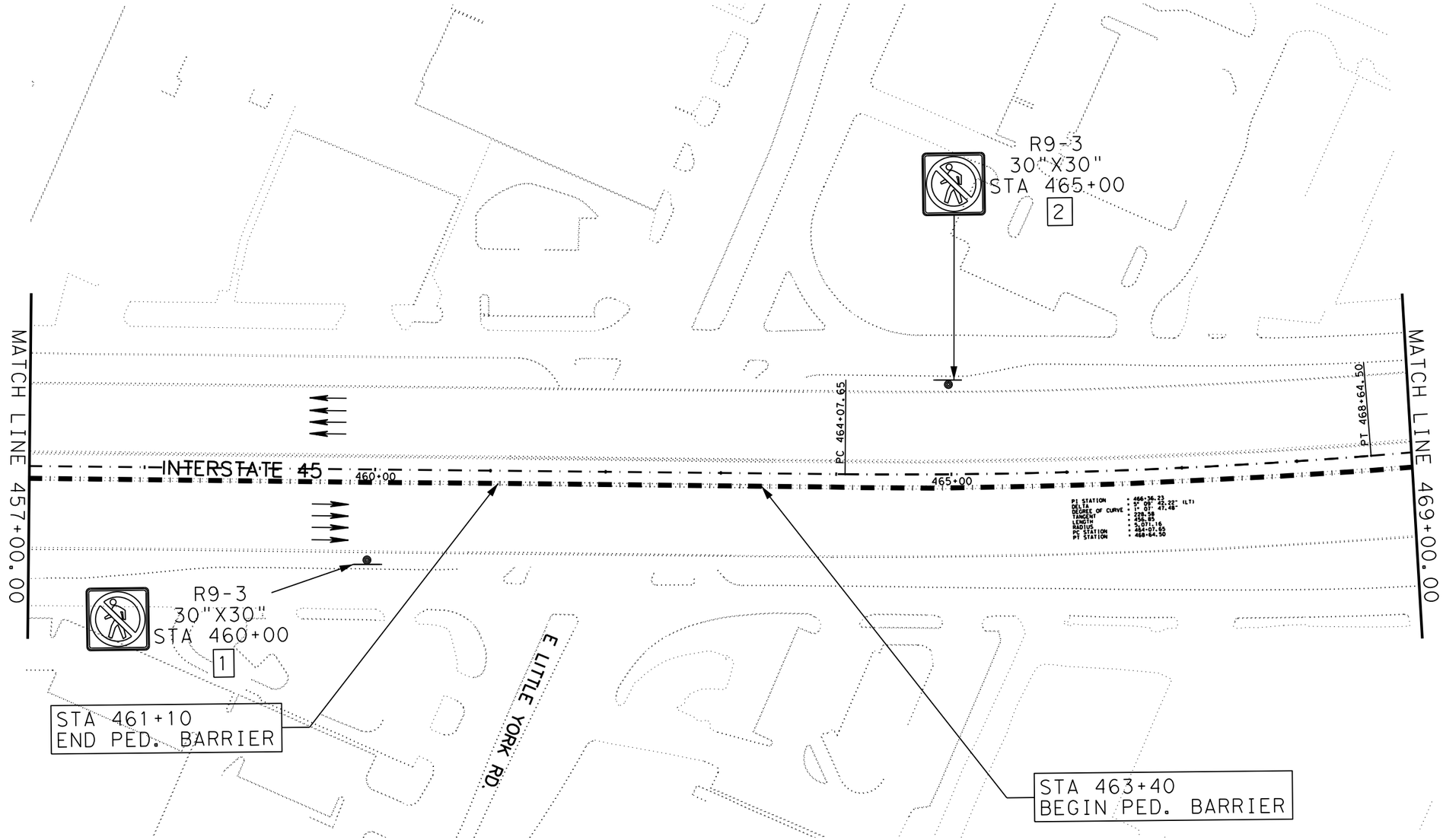

LEGEND:

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9D6BA739BD7743D...

IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 16 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		62

DATE: Wed,12/16/2020 8:32:16 AM
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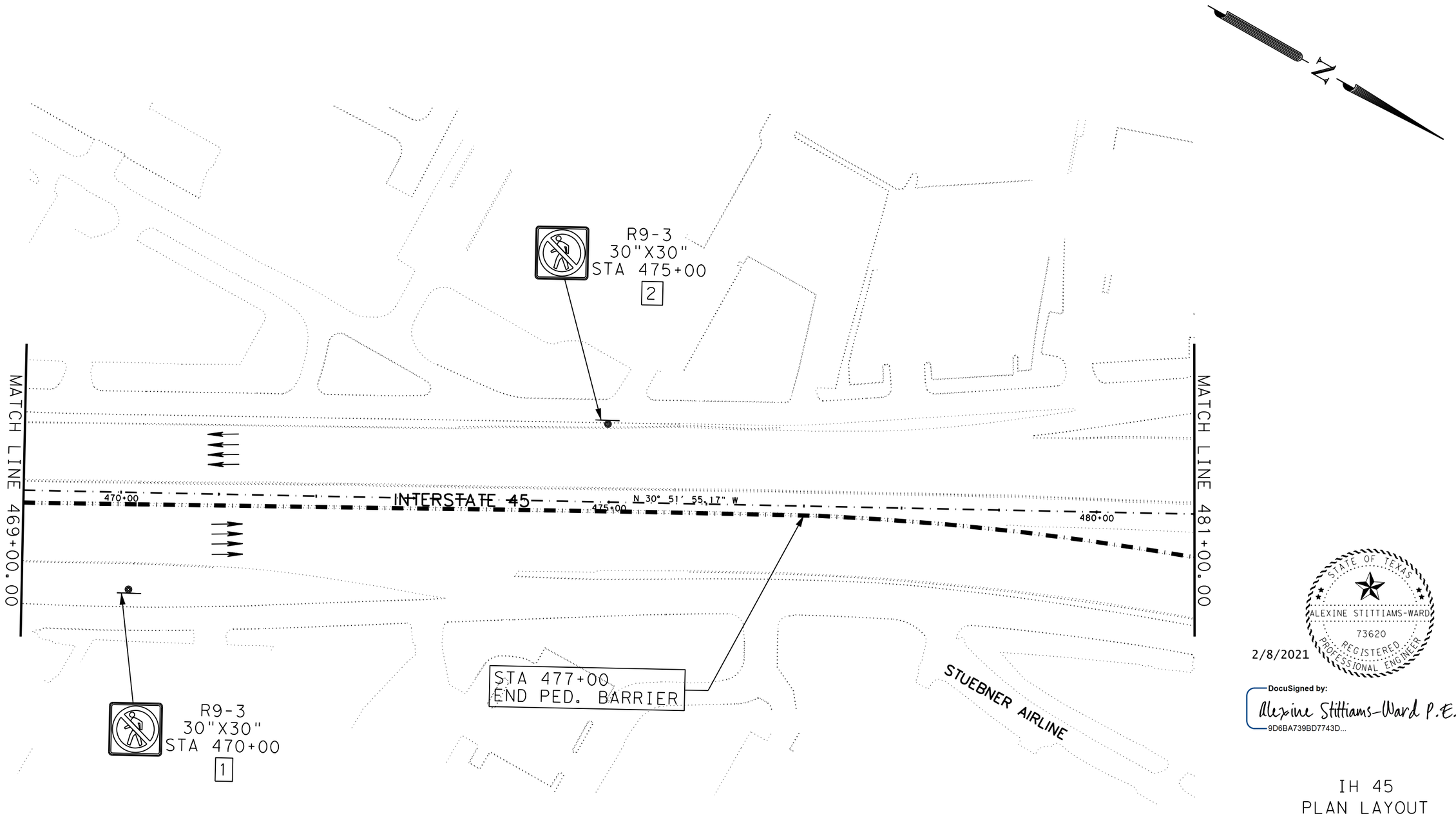

LEGEND:

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9D6BA739BD7743D...

IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 17 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		63

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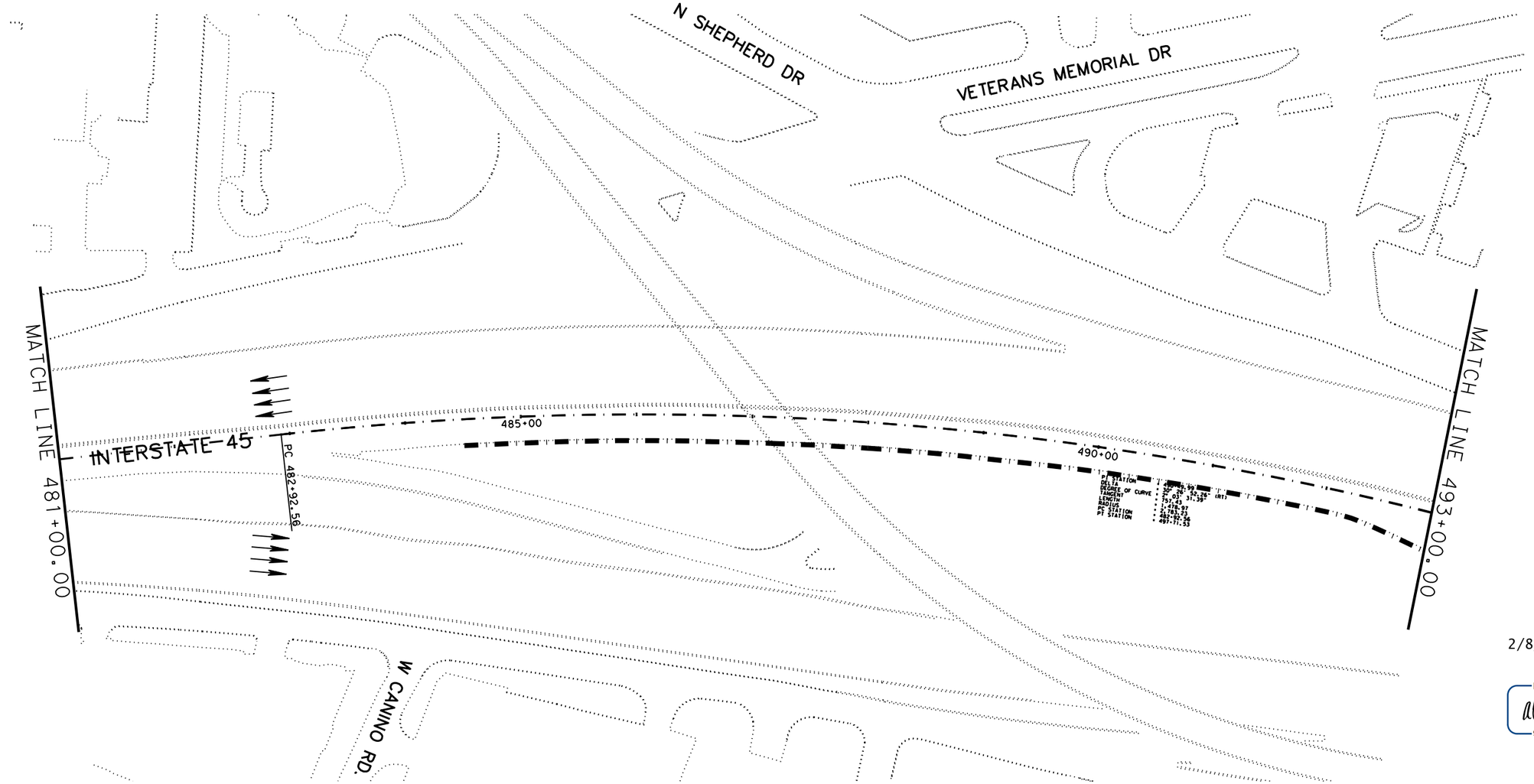

N

LEGEND:

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IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 18 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		64

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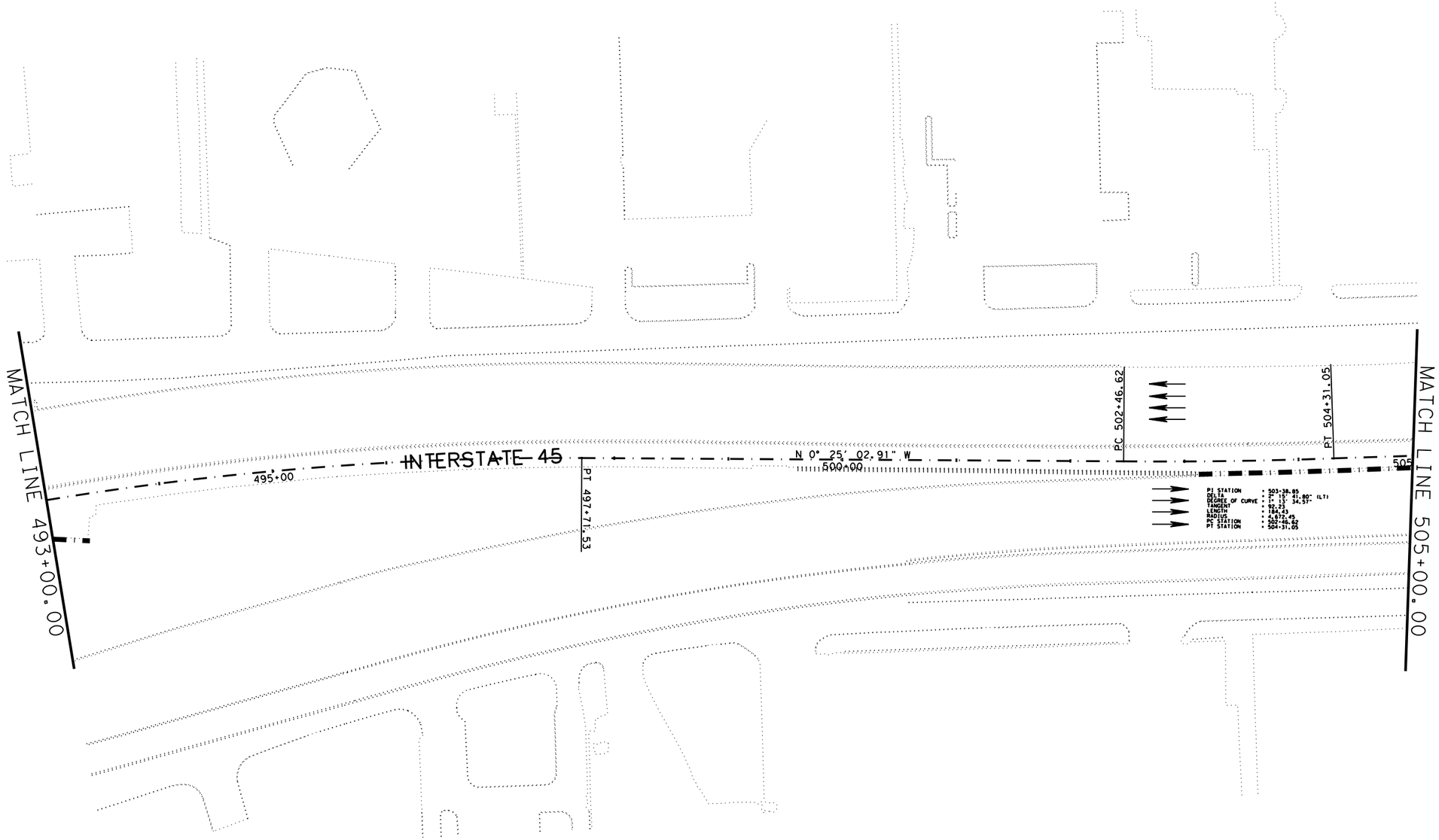

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PLAN LAYOUT

SCALE: 1"=100' SHEET 19 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		65

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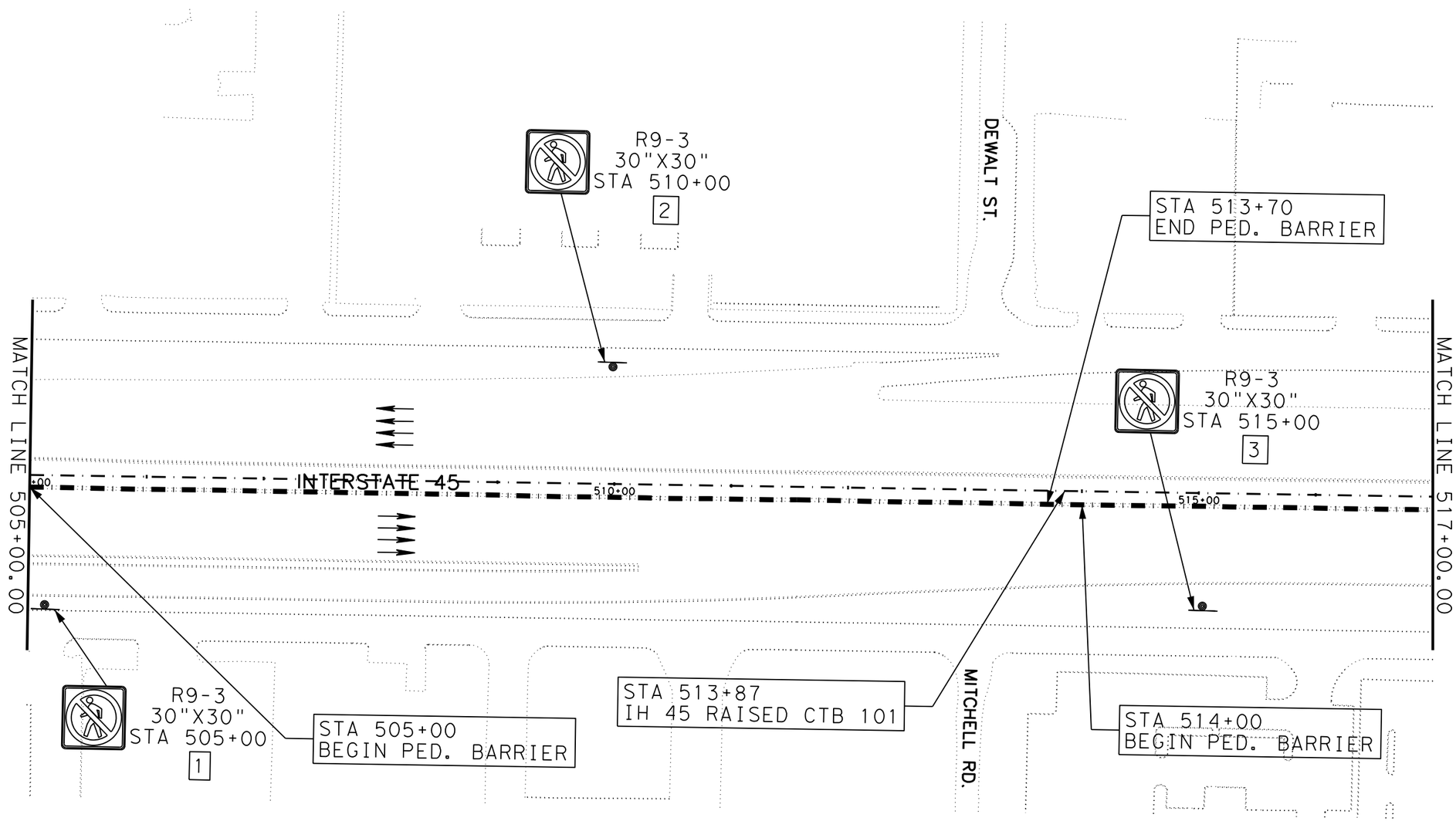

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PLAN LAYOUT

SCALE: 1"=100' SHEET 20 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		66

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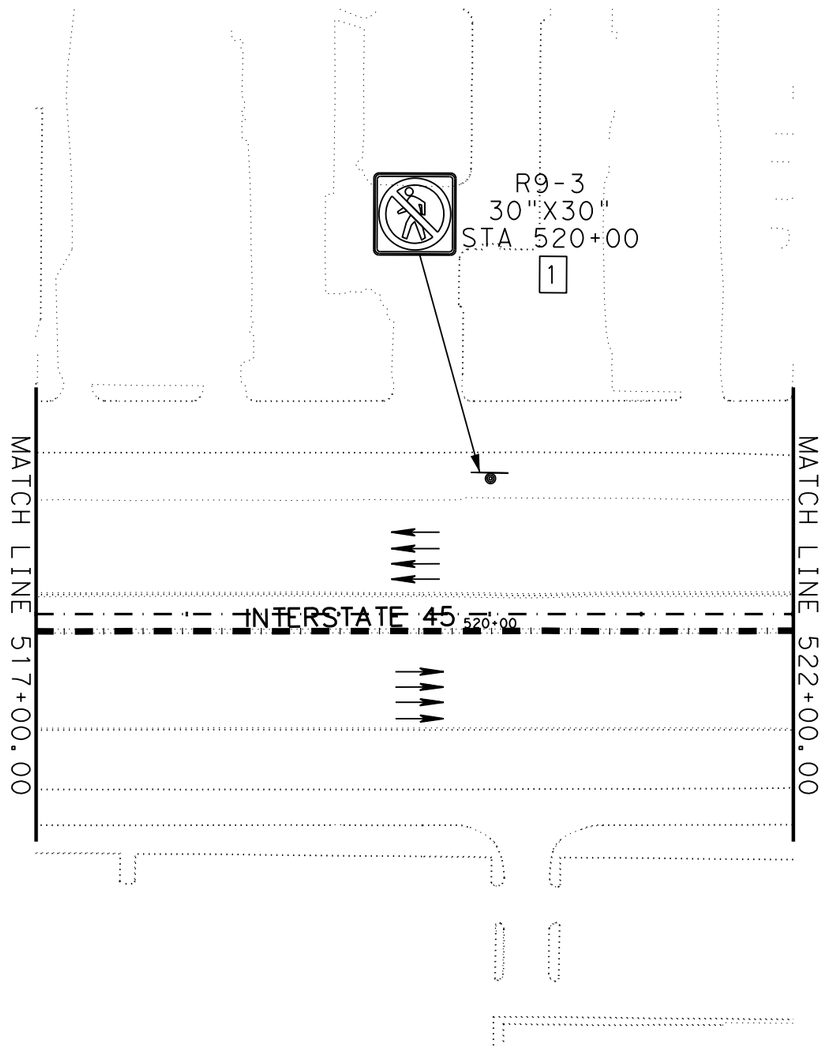

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PLAN LAYOUT

SCALE: 1"=100' SHEET 21 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		67

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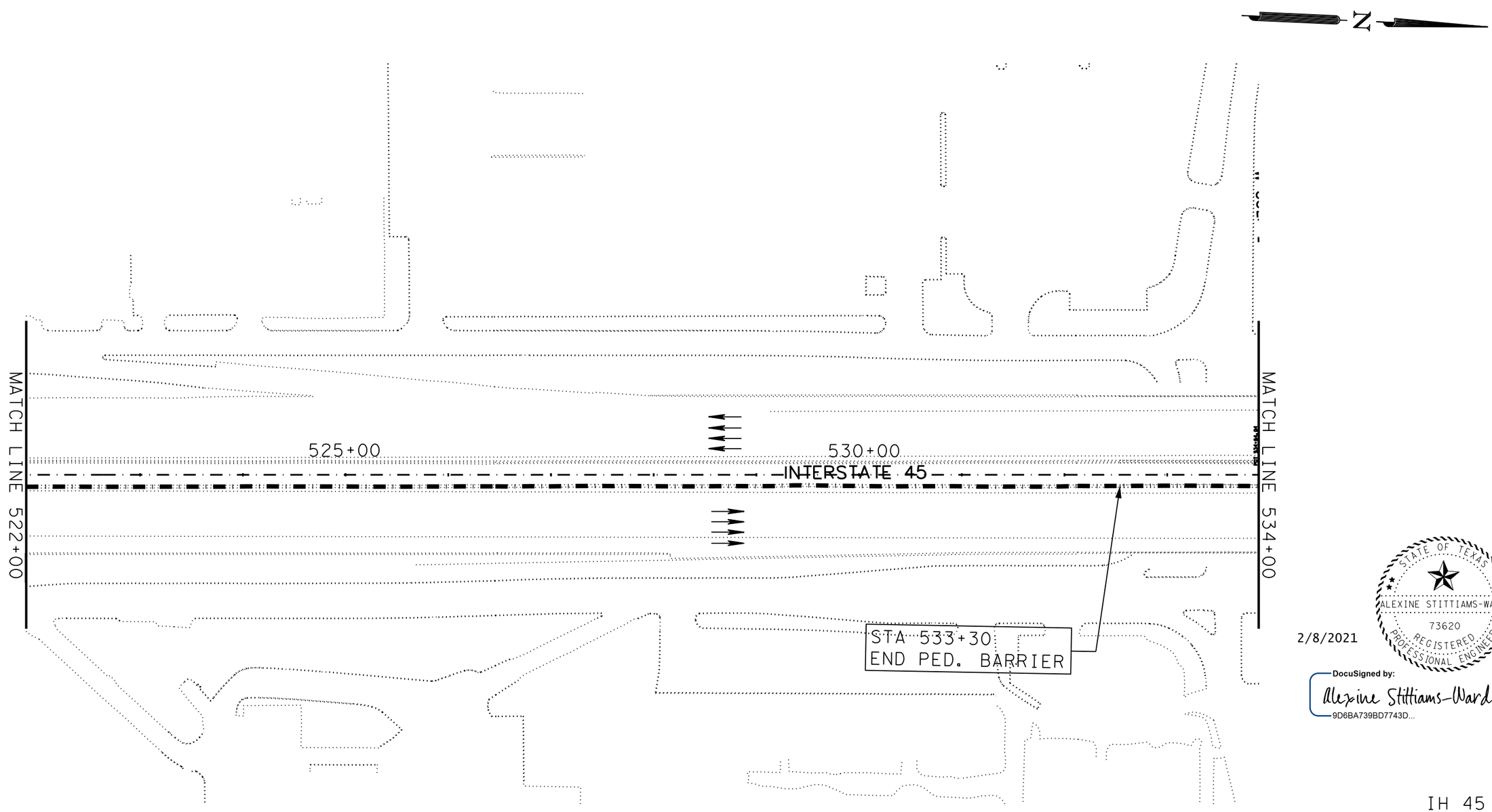

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PLAN LAYOUT

SCALE: 1"=100' SHEET 22 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		68

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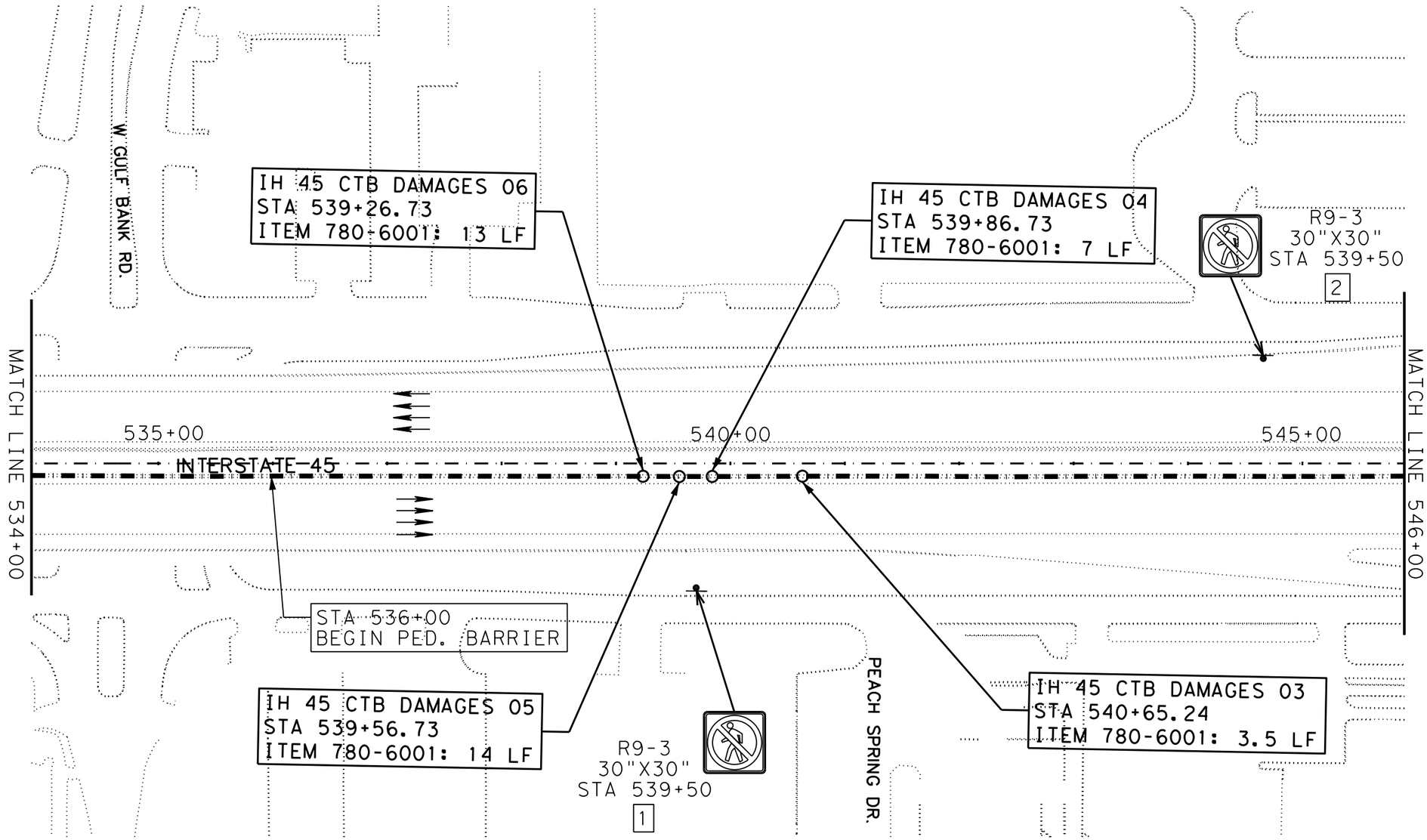

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IH 45
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SCALE: 1"=100' SHEET 23 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		69

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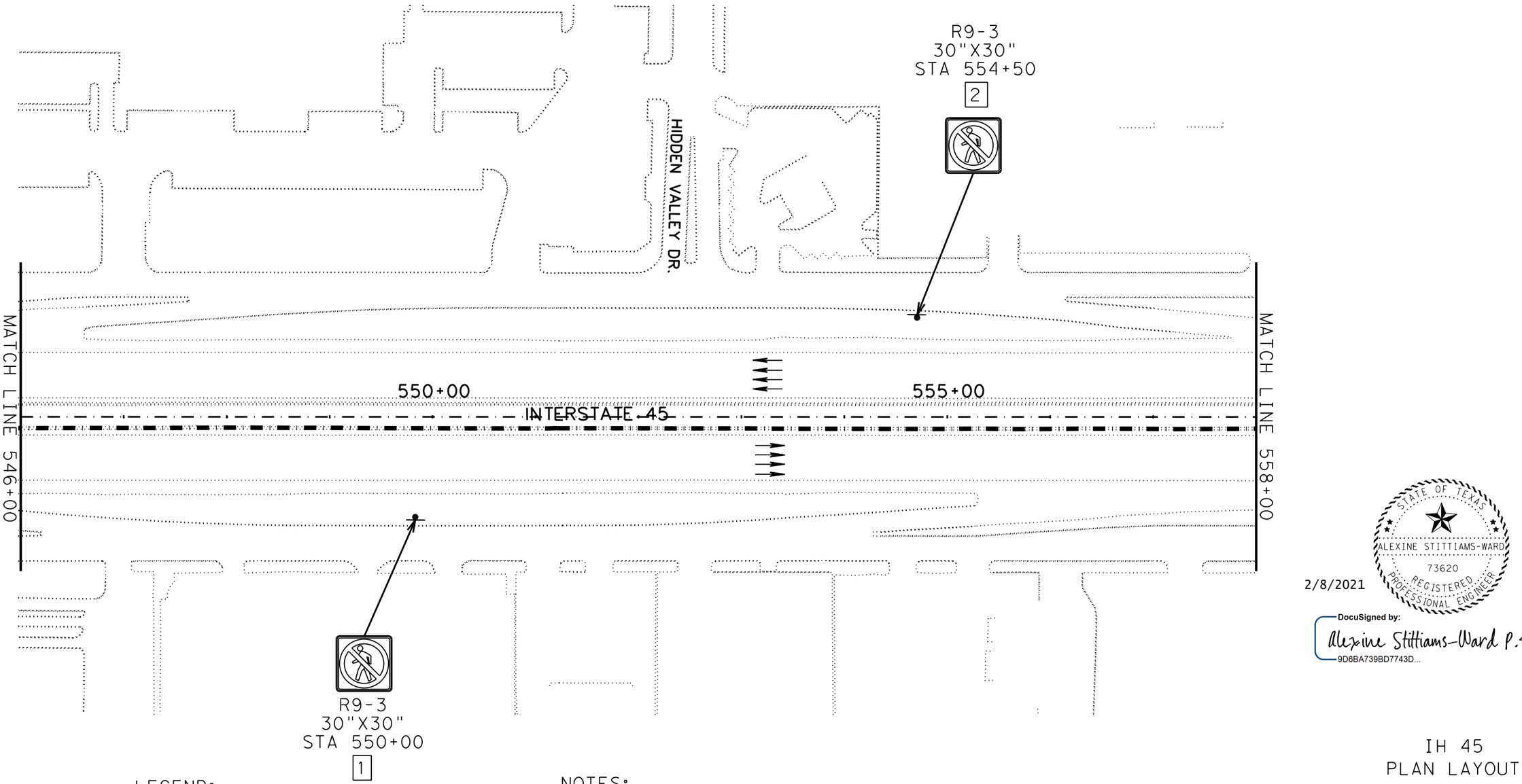

LEGEND:

- PORTABLE CTB
- CAST IN PLACE CTB
- PROPOSED SMALL SIGN ID
- PROPOSED SMALL SIGN

NOTES:

1. REFER TO THE PEDESTRIAN BARRIER DETAILS SHEETS
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3. THE CONTRACTOR SHALL ENSURE THAT HE/SHE ENDS THE BARRIER IN A WAY THAT ALLOWS STANDARD BARRIER LENGTH TO BE USED AND PREVENTS ANY INTERFERENCE WITH HOV GATE OPERATIONS

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 24 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		70

DATE: Wed, 12/16/2020 8:33:23 AM
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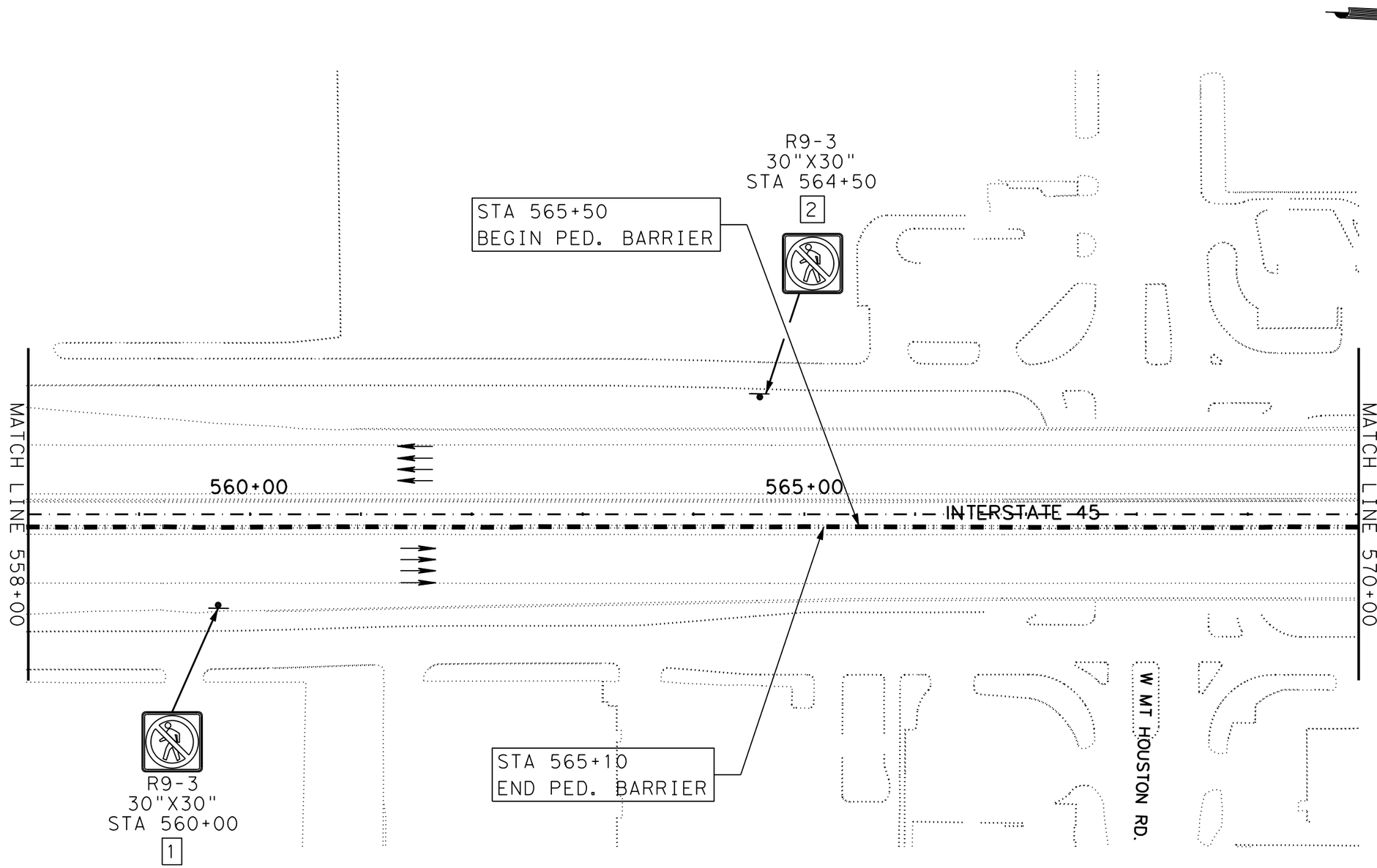

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9D6BA739BD7743D...

IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 25 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		71

DATE: Wed, 12/16/2020 8:33:30 AM
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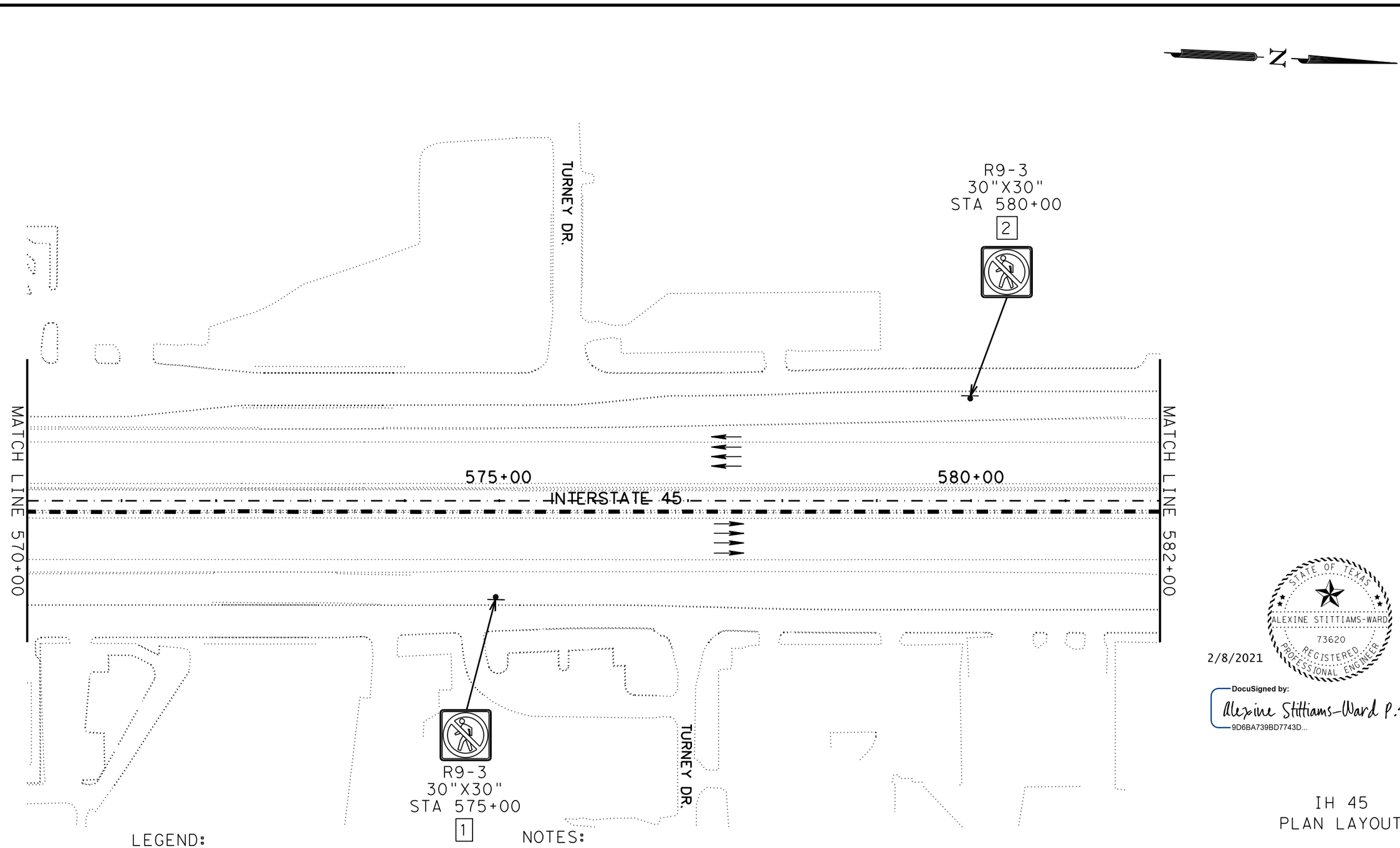

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IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 26 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		72

DATE: Wed, 12/16/2020 8:33:37 AM
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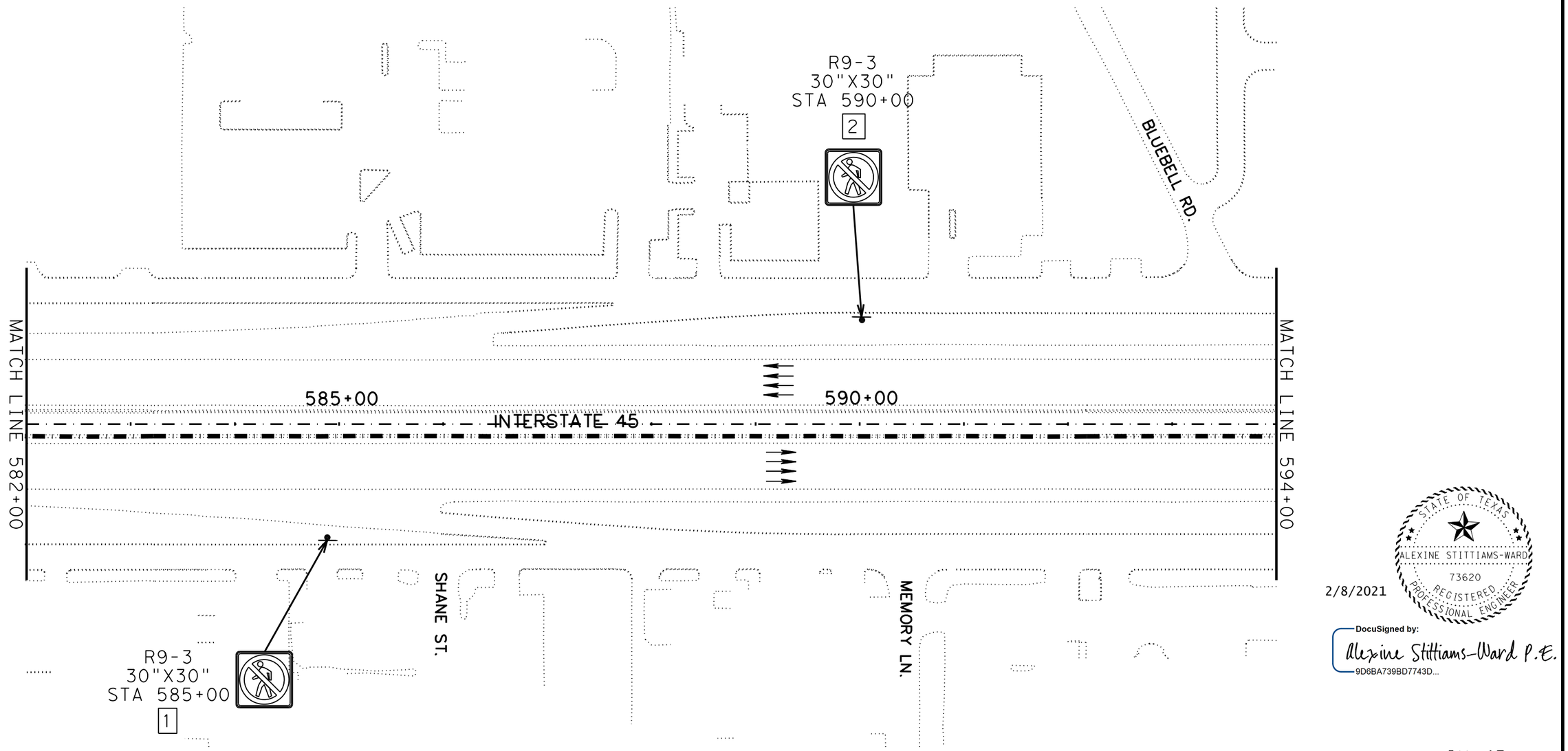

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IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 27 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		73

DATE: Wed, 12/16/2020 8:33:43 AM
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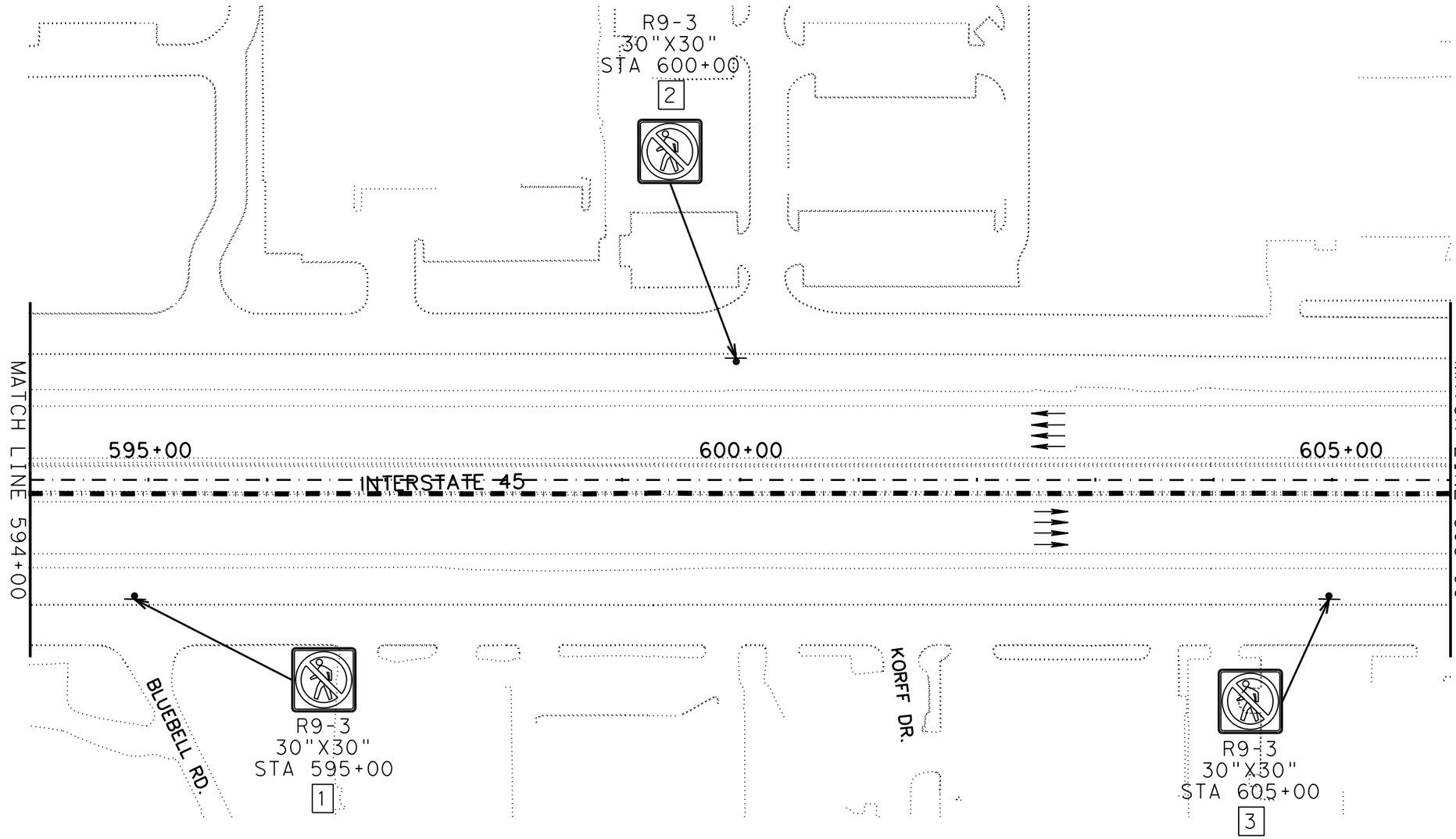

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IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 28 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		74

DATE: Wed, 12/16/2020 8:33:49 AM
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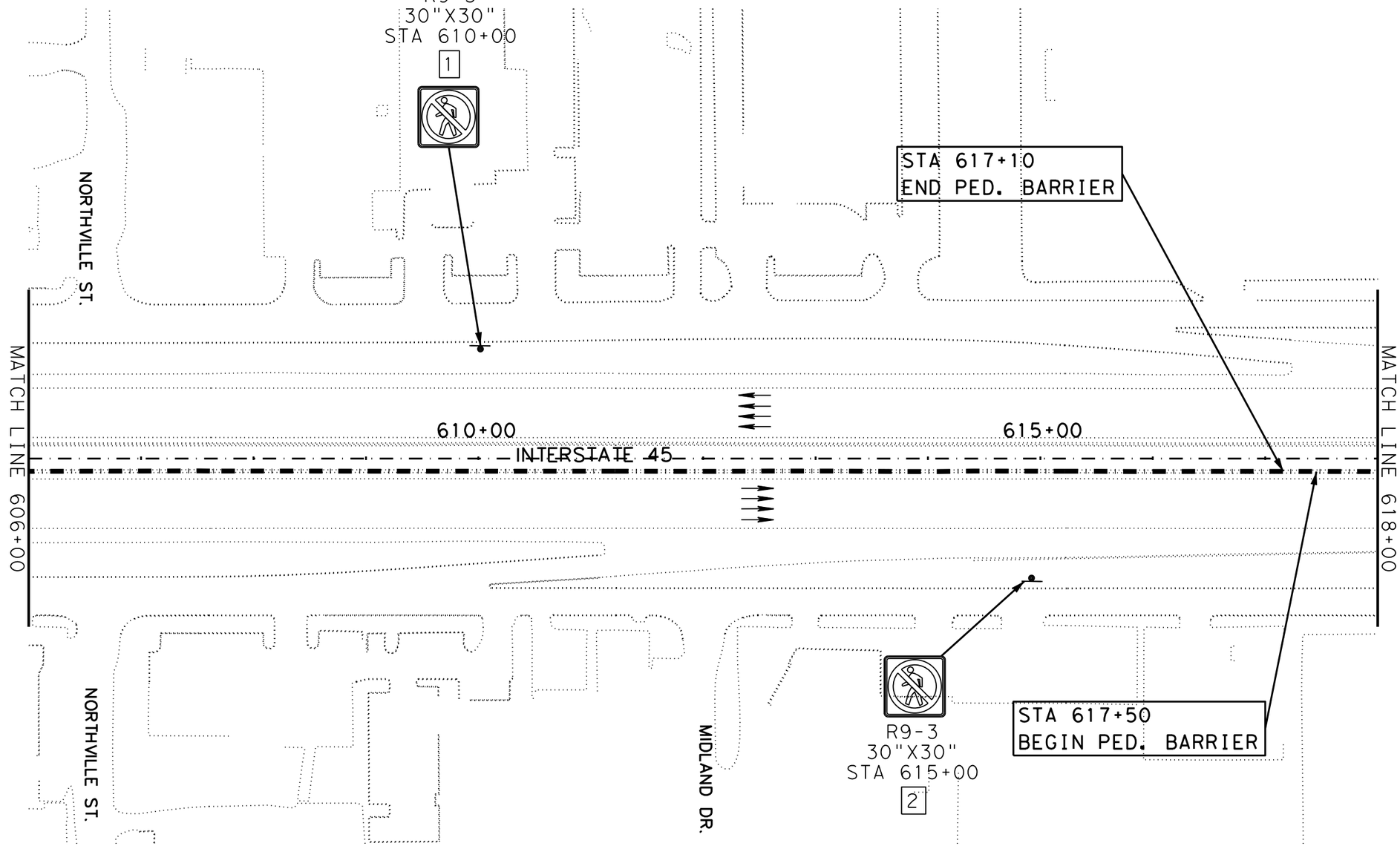

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IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 29 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		75

DATE: Wed, 12/16/2020 8:33:55 AM
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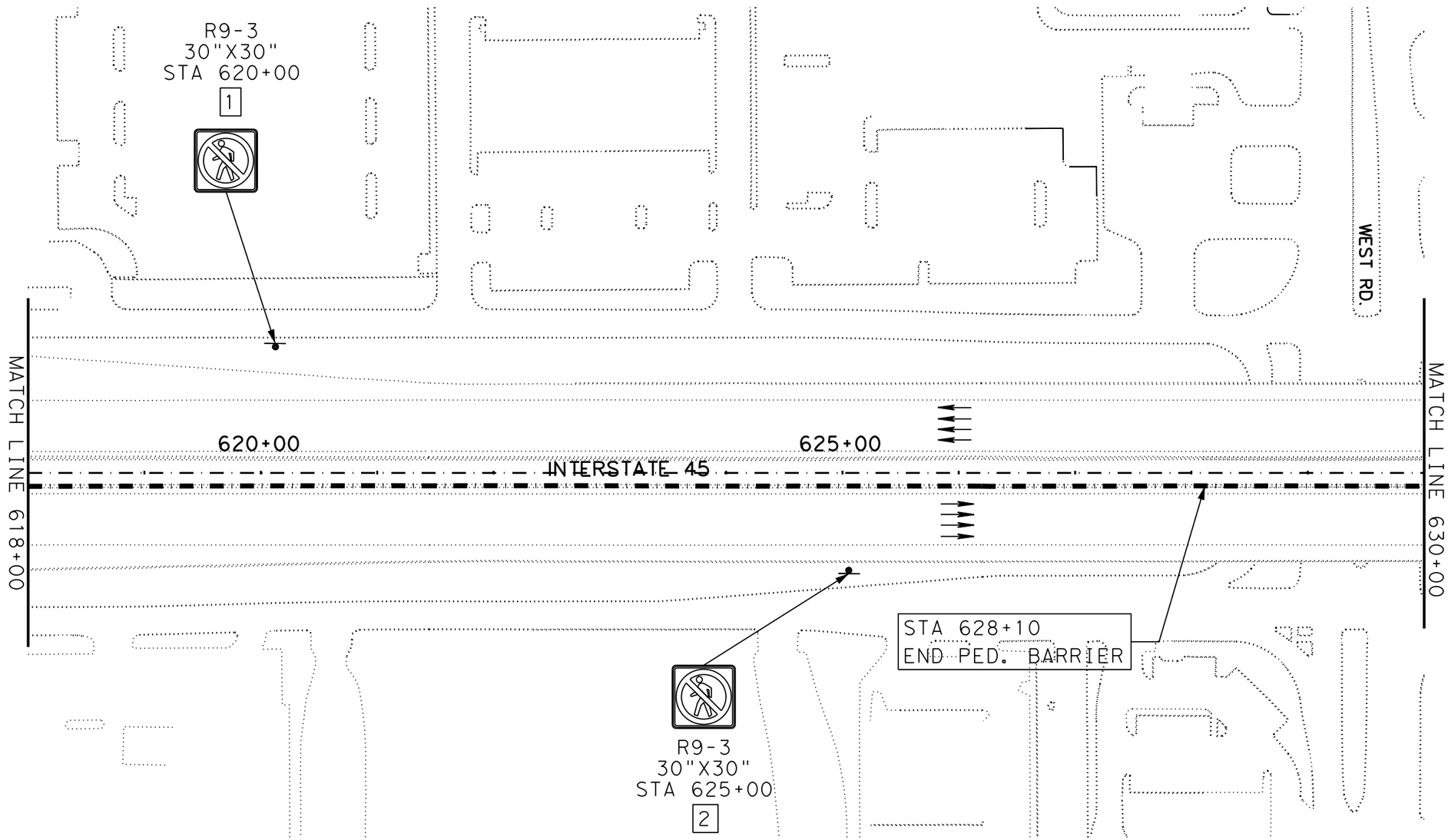

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9D6BA739BD7743D...

IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 30 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		76

DATE: Wed,12/16/2020 8:34:04 AM
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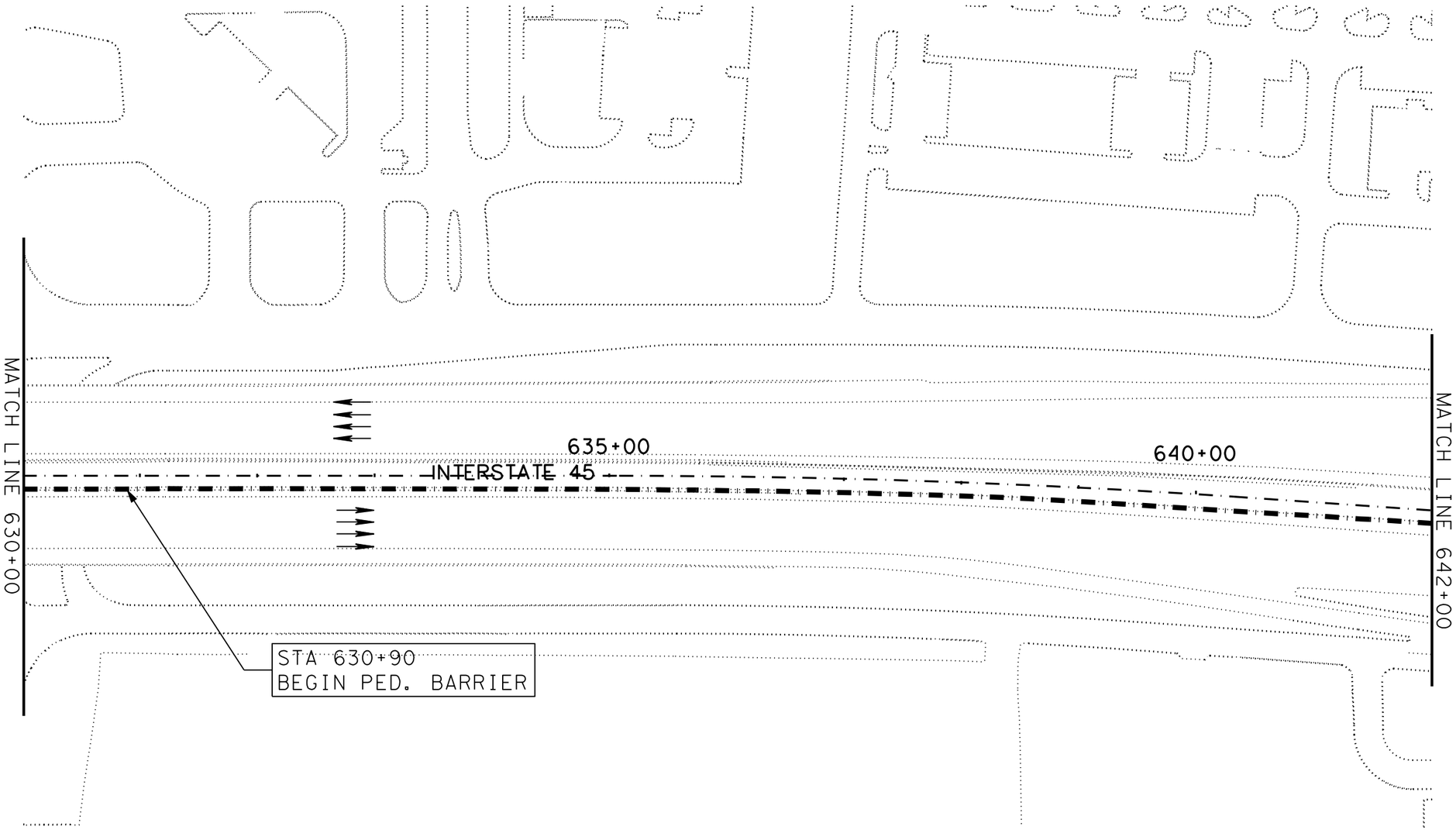

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IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 31 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		77

DATE: Wed, 12/16/2020 8:34:10 AM
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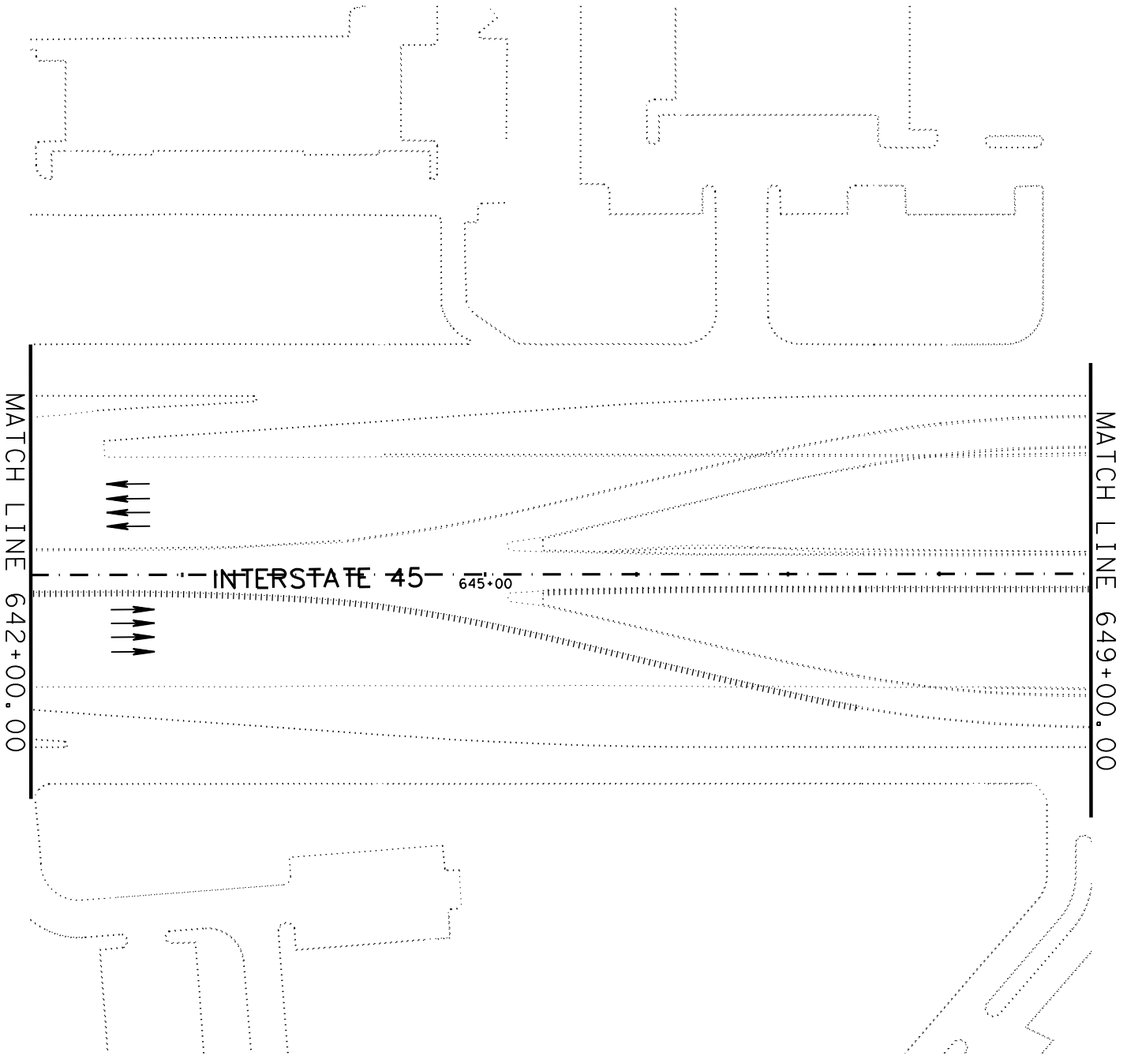

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9D6BA739BD7743D...

IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 32 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		78

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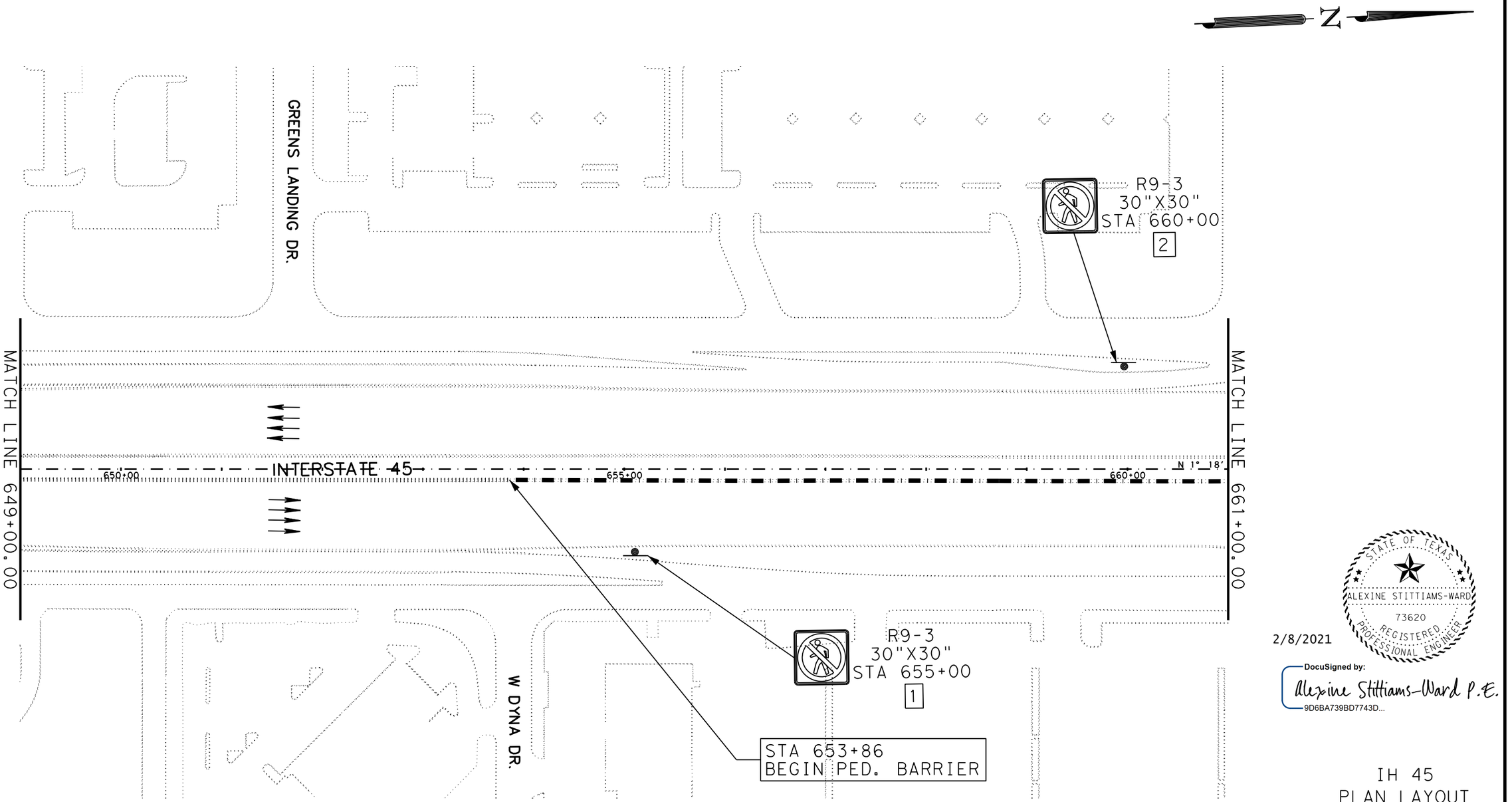

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STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
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2/8/2021

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Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 33 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		79

DATE: Wed, 12/16/2020 8:34:24 AM
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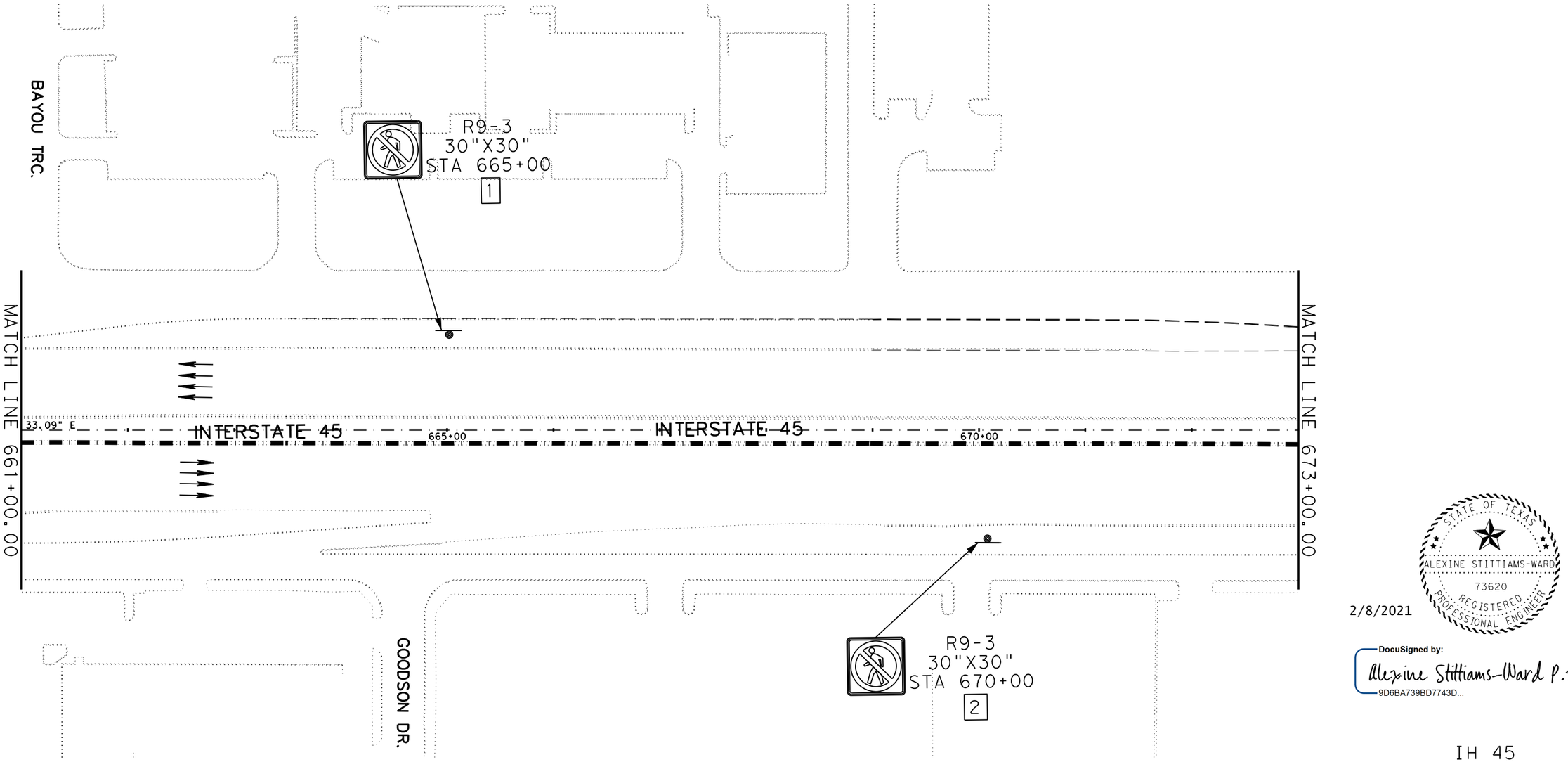

LEGEND:

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STATE OF TEXAS
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2/8/2021

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9D6BA739BD7743D...

IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 34 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		80

DATE: Wed, 12/16/2020 8:34:33 AM
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DN: | CK: | DW: | CK:

N

GILLESPIE RD.

R9-3
30"X30"
STA 675+00
1

MATCH LINE 673+00.00

675+00

INTERSTATE 45

680+00

685

MATCH LINE 685+00.00

PC 681+02.25

PT 682+90.97

PI STATION = 681+96.62
DELTA = 1° 46' 08.29" (LT)
DEGREE OF CURVE = 0° 56' 13.28"
TANGENT = 94.37
LENGTH = 188.73
RADIUS = 6,114.74
PC STATION = 681+02.25
PT STATION = 682+90.97

GILLESPIE

R9-3
30"X30"
STA 680+00
2

STA 681+16
END PED. BARRIER

LEGEND:

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2/8/2021

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9D6BA739BD7743D...

IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 35 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		81

DATE: Wed, 12/16/2020 8:34:42 AM
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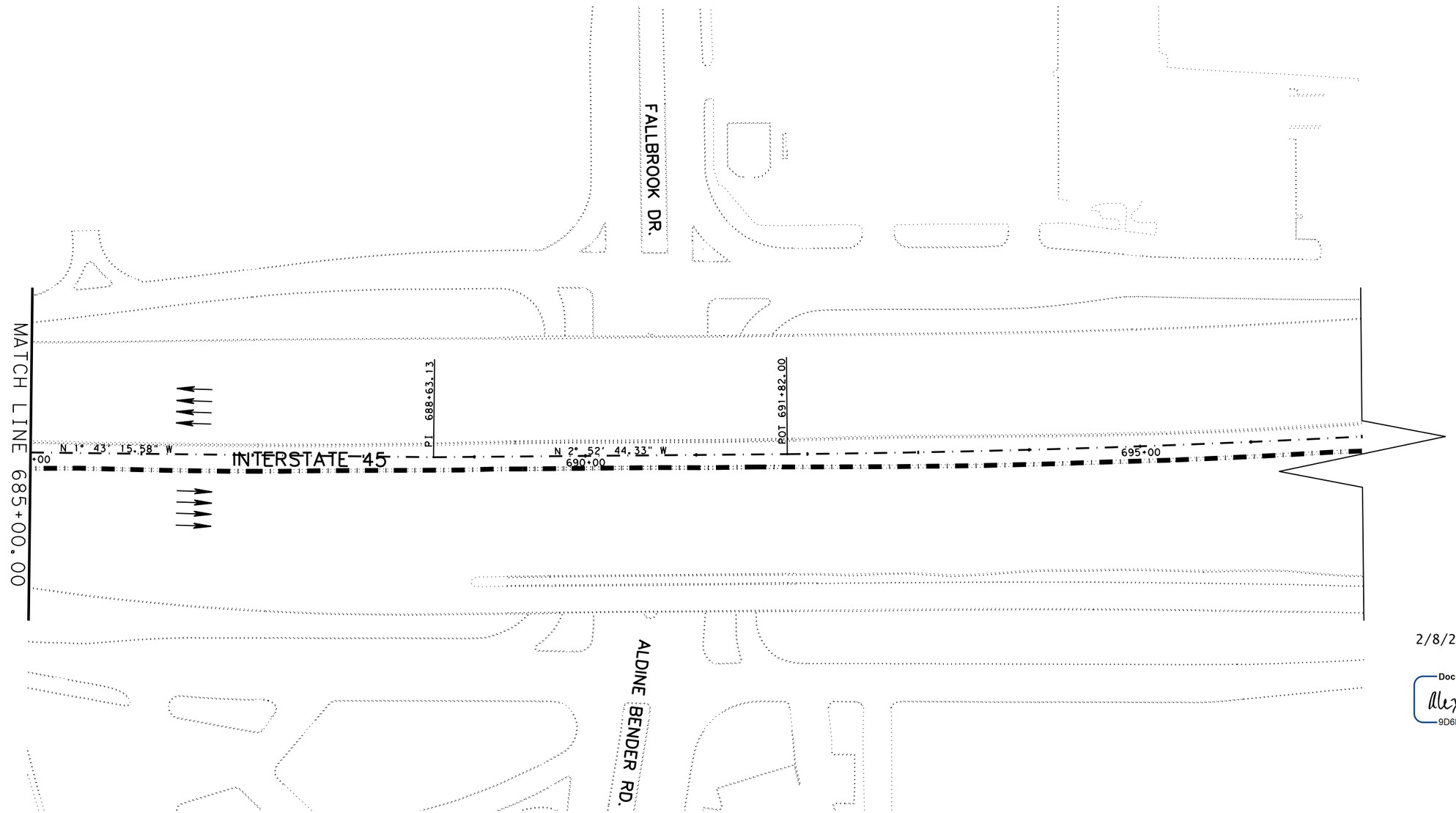

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9D6BA739BD7743D...

IH 45
PLAN LAYOUT

SCALE: 1"=100' SHEET 36 OF 36

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		82

DATE: Wed, 12/16/2020 8:34:49 AM
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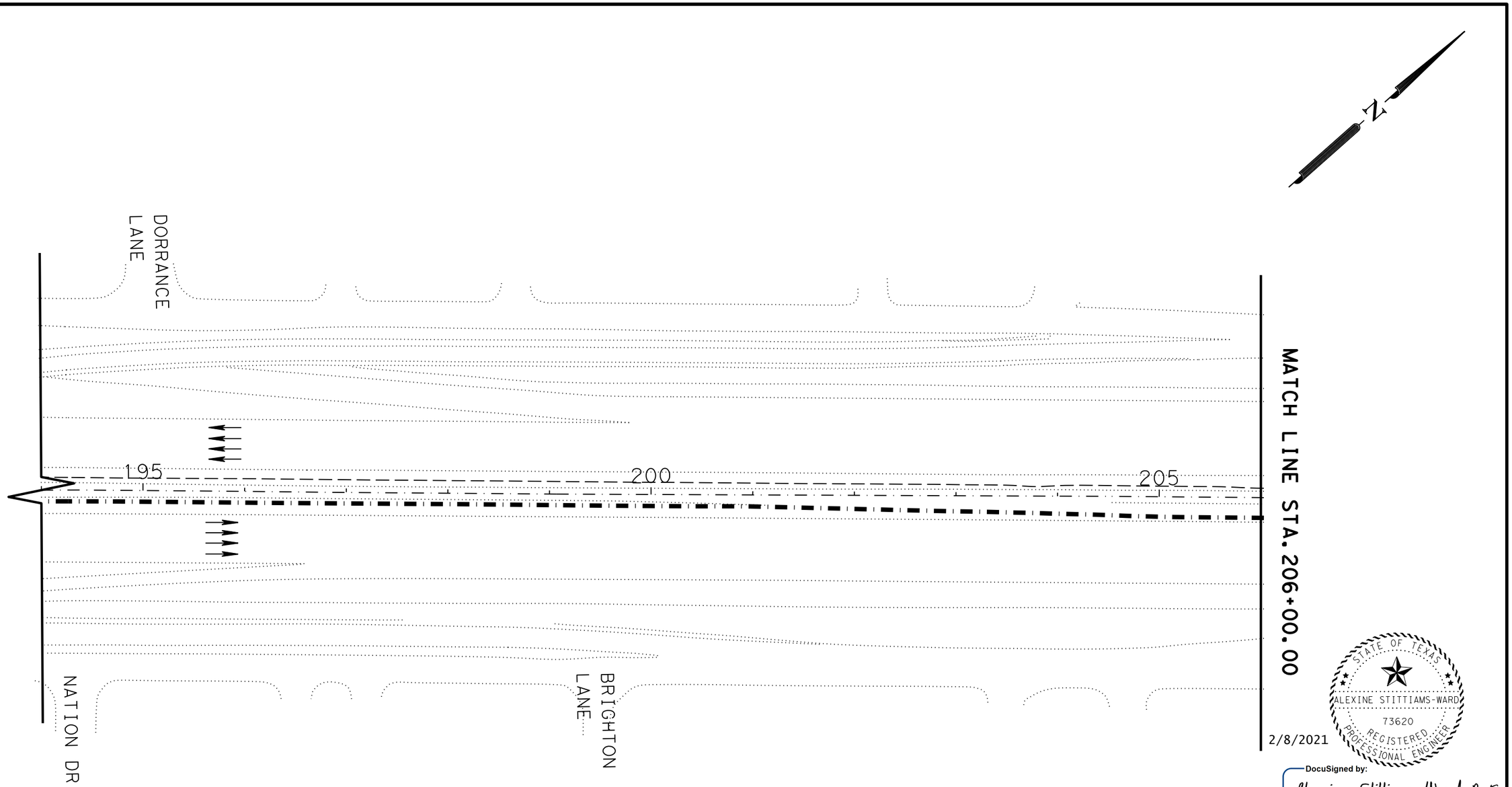

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2/8/2021

DocuSigned by:
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9D6BA739BD7743D...

IH 69
PLAN LAYOUT

LEGEND:

- PORTABLE CTB
- CAST IN PLACE CTB
- [X] PROPOSED SMALL SIGN ID
- PROPOSED SMALL SIGN

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SCALE: 1"=100' SHEET 1 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		83

DATE: 12/16/2020 2:14:55 PM
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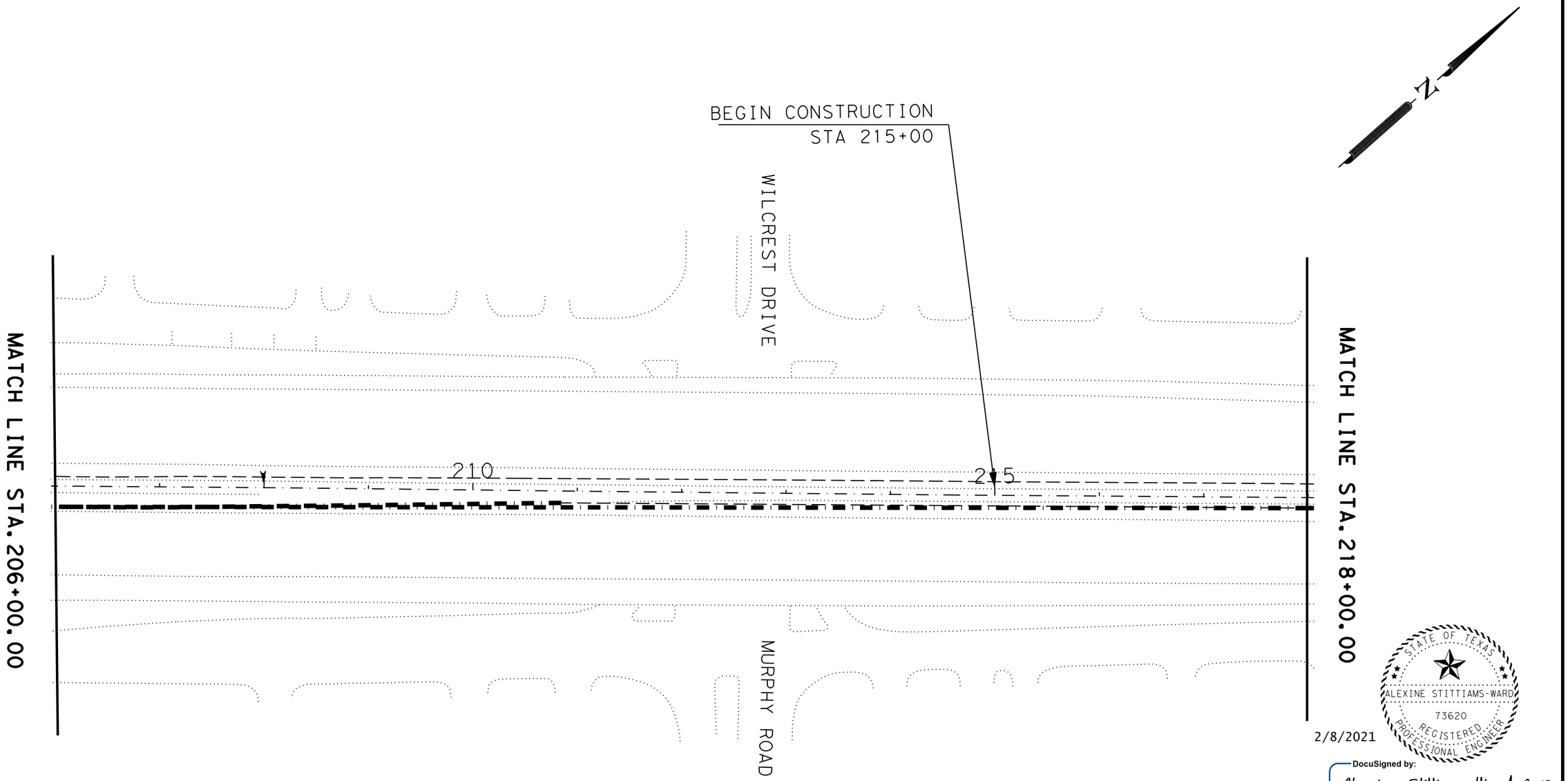

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9D6BA739BD7743D...

IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 2 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		84

DN: CK: DW: CK:

DATE: 12/16/2020 2:15:07 PM
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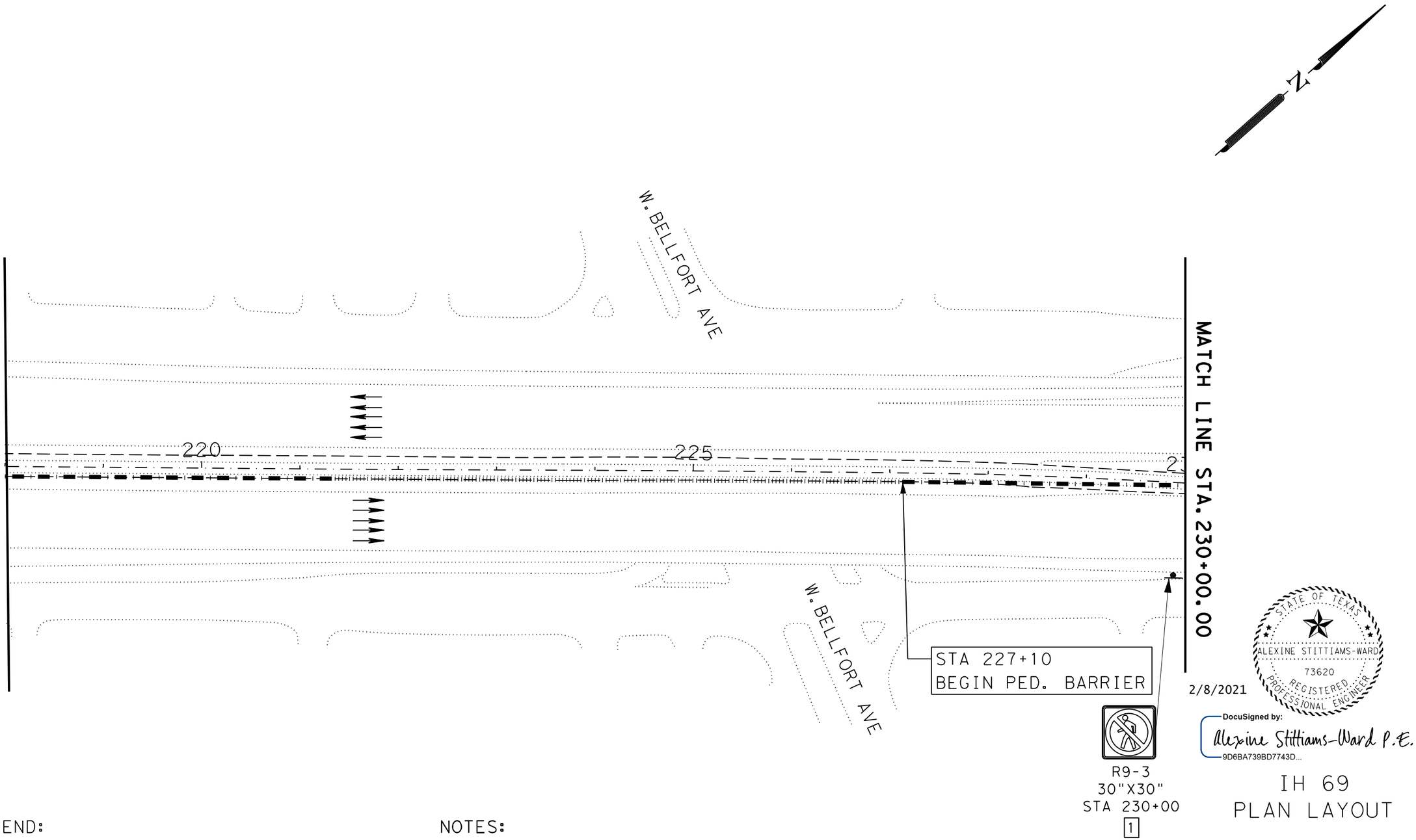

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IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 3 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		85

DN: CK: DW: CK:

DATE: 12/16/2020 2:15:23 PM
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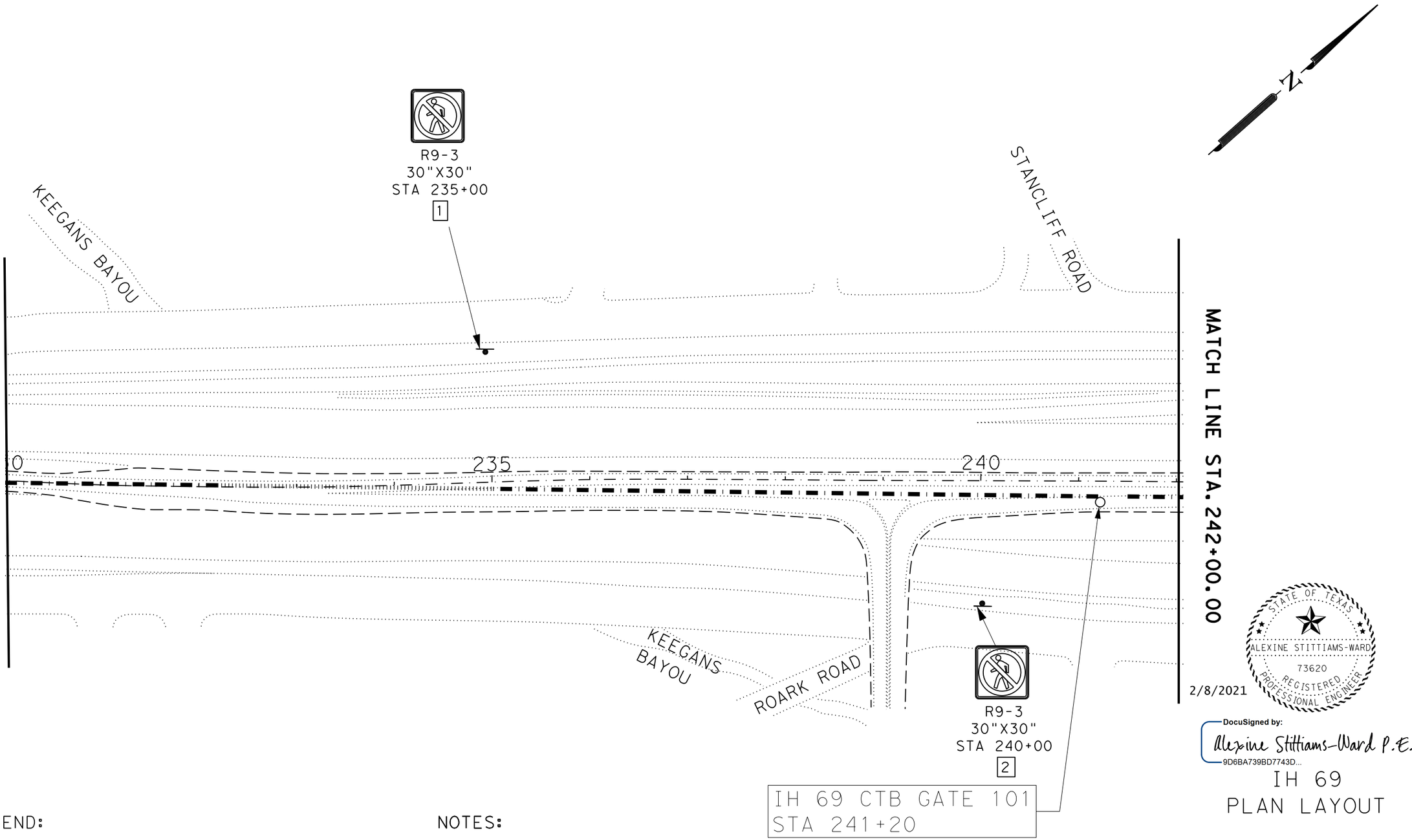

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STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 4 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		86

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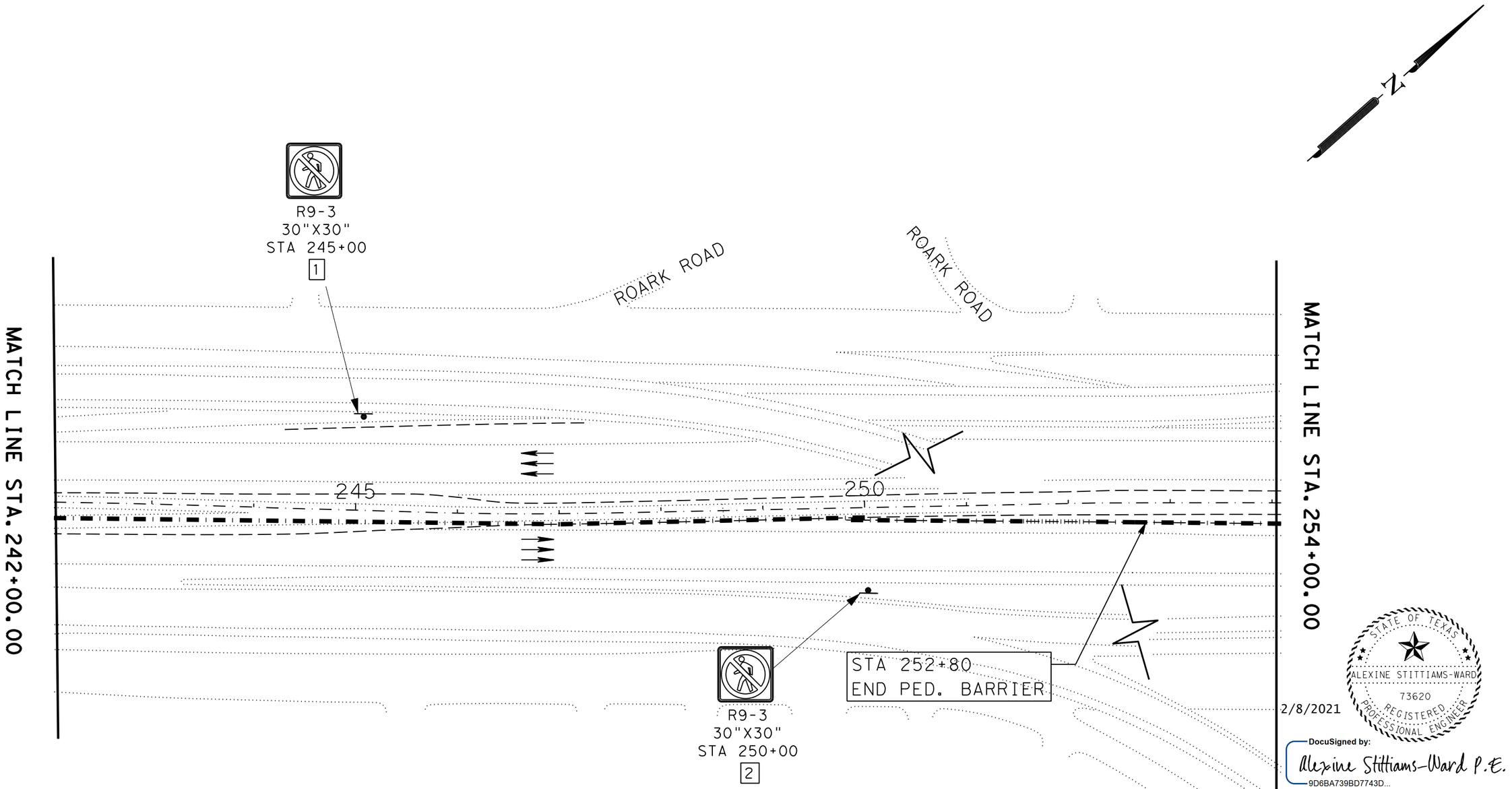

LEGEND:

- PORTABLE CTB
- CAST IN PLACE CTB
- [X] PROPOSED SMALL SIGN ID
- PROPOSED SMALL SIGN

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IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 5 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		87

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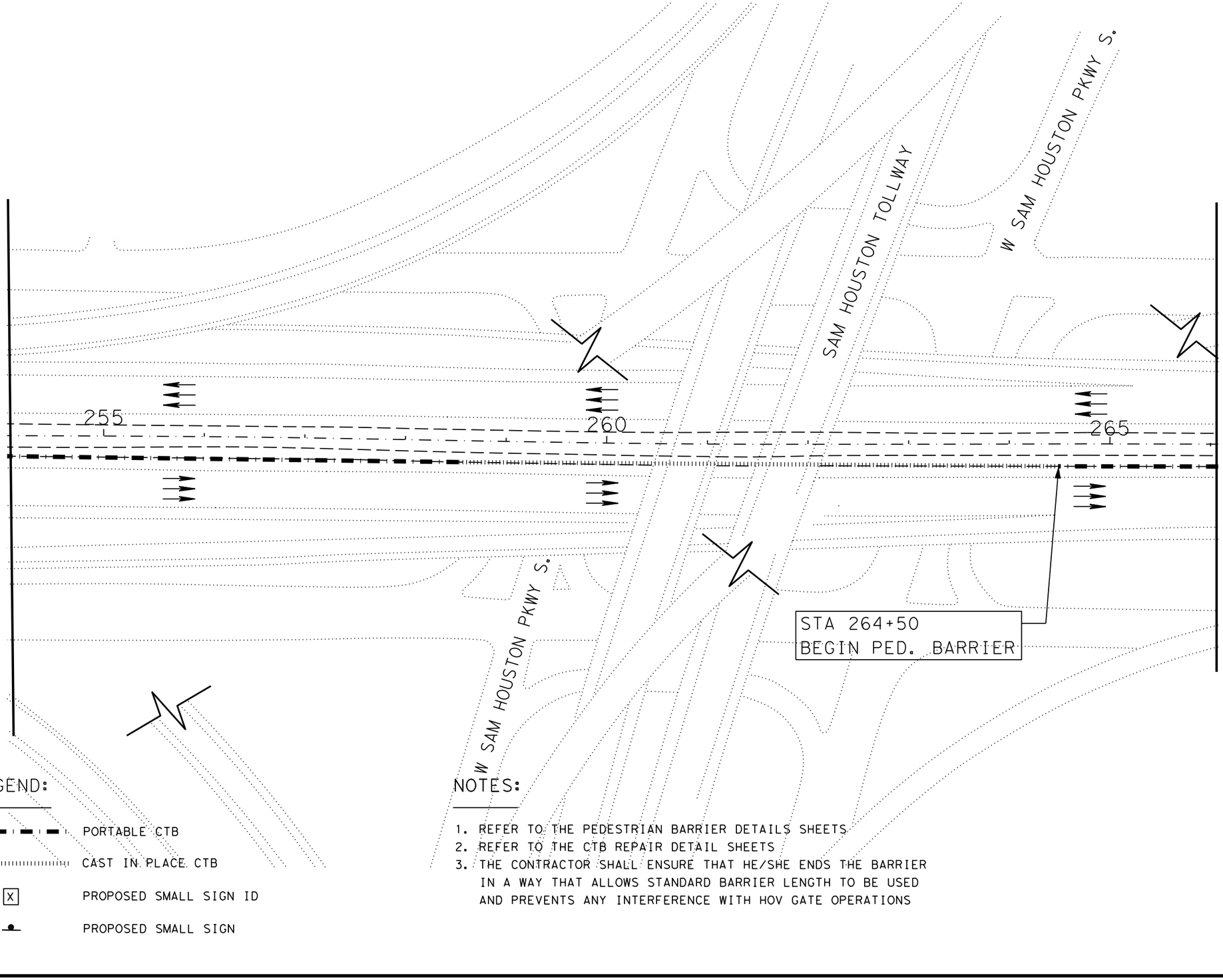

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IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 6 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		88

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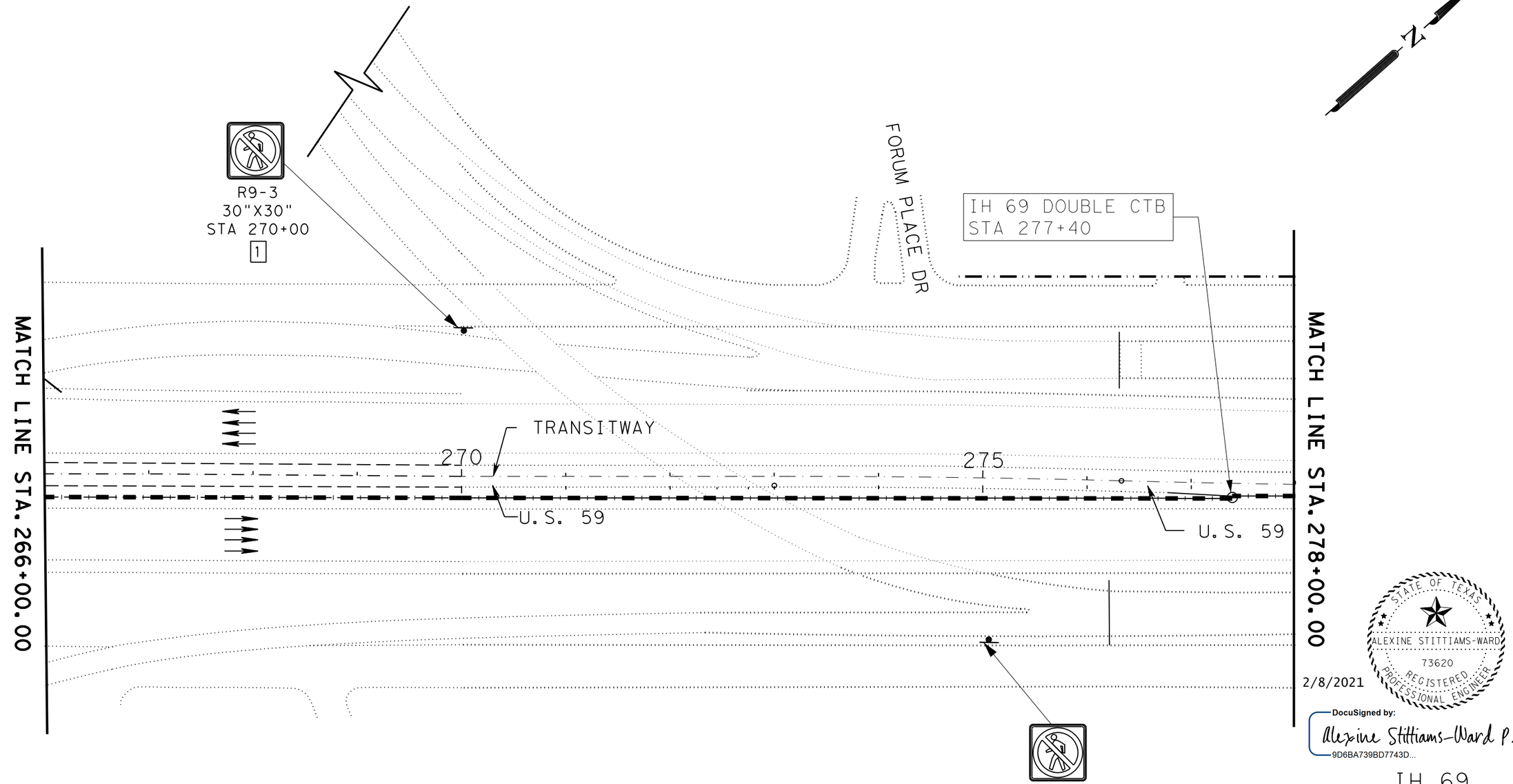

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PLAN LAYOUT

SCALE: 1"=100' SHEET 7 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		89

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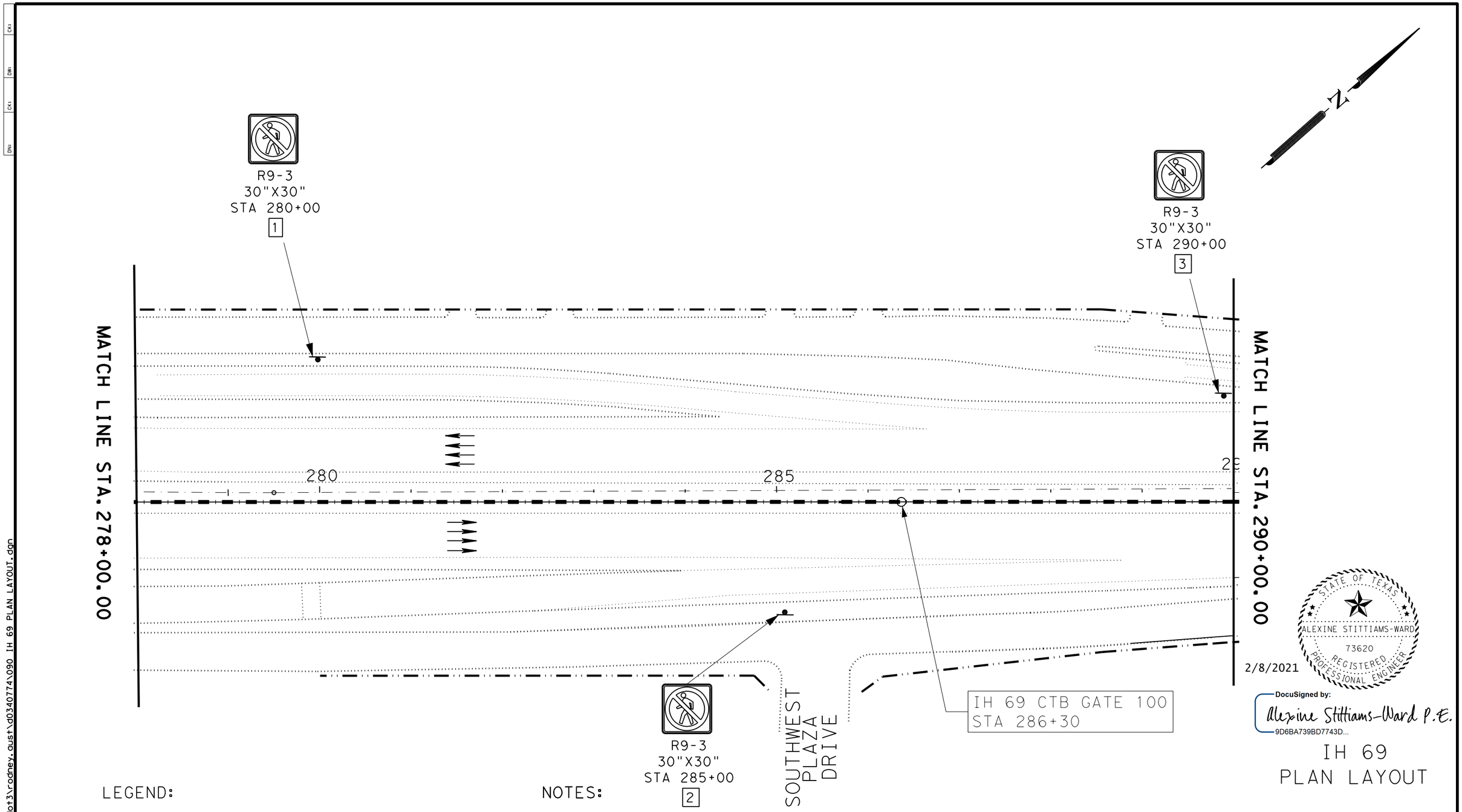

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PLAN LAYOUT

SCALE: 1"=100' SHEET 8 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		90

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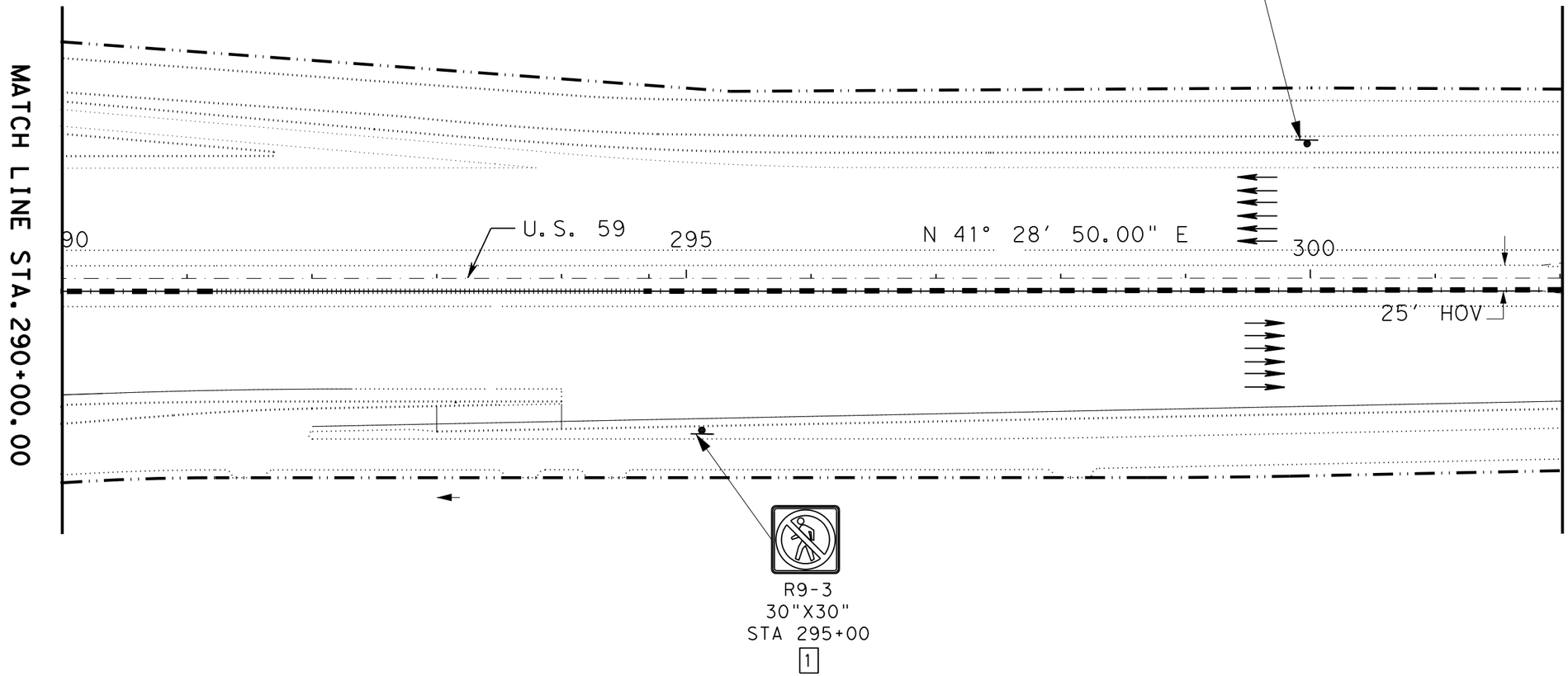

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IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 9 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		91

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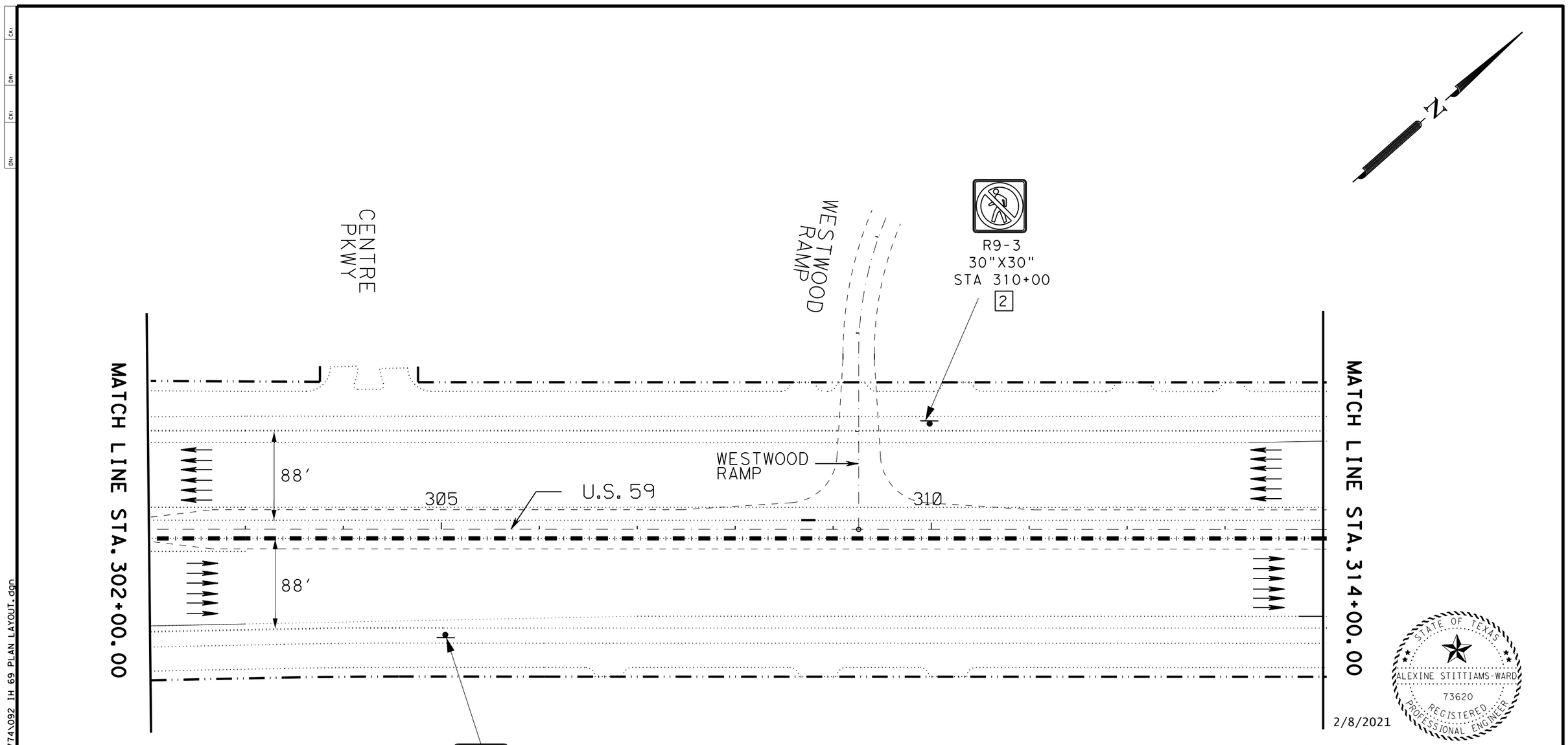

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IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 10 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		92

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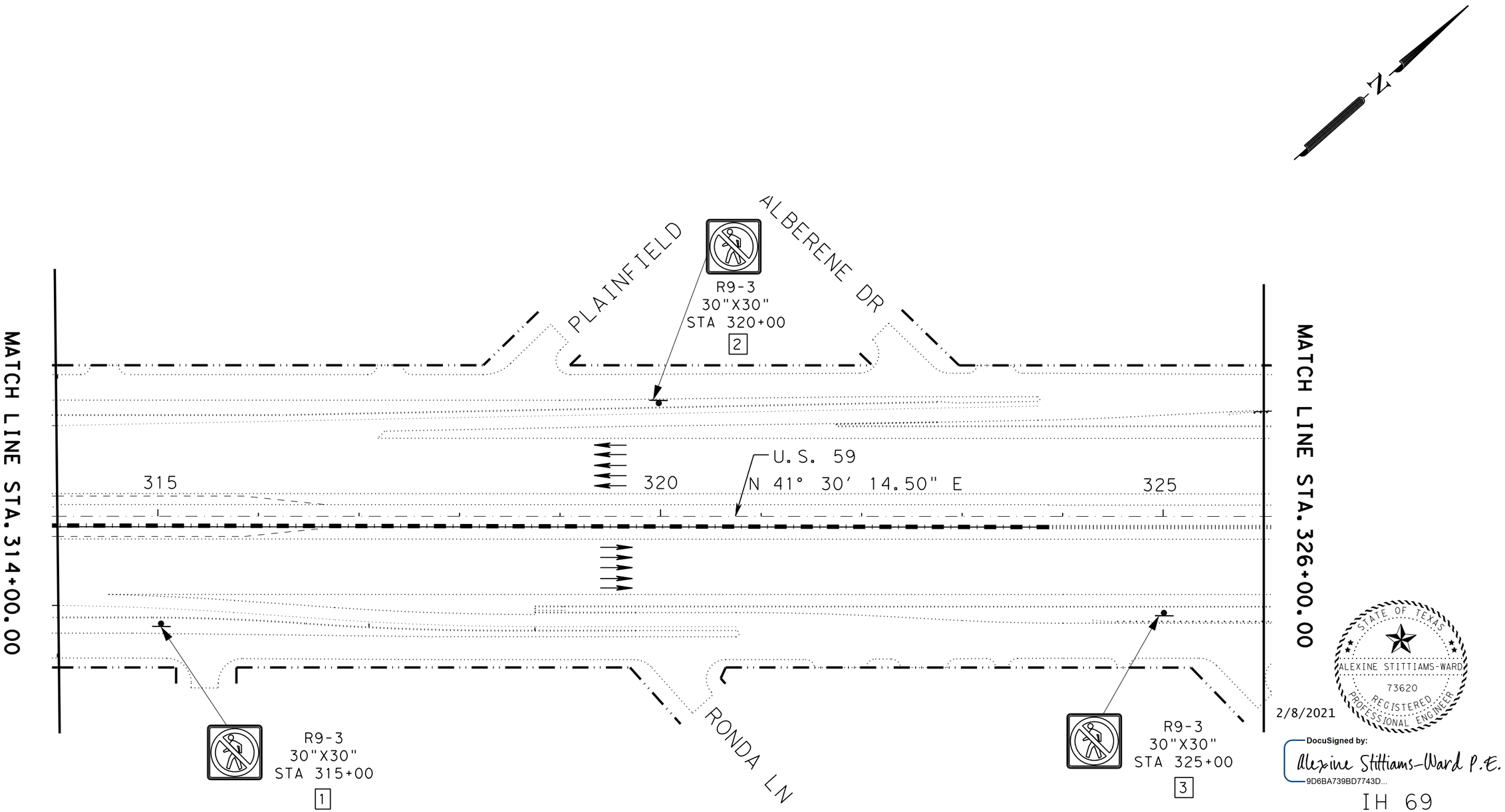

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IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 11 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		93

DATE: 12/16/2020 2:17:22 PM
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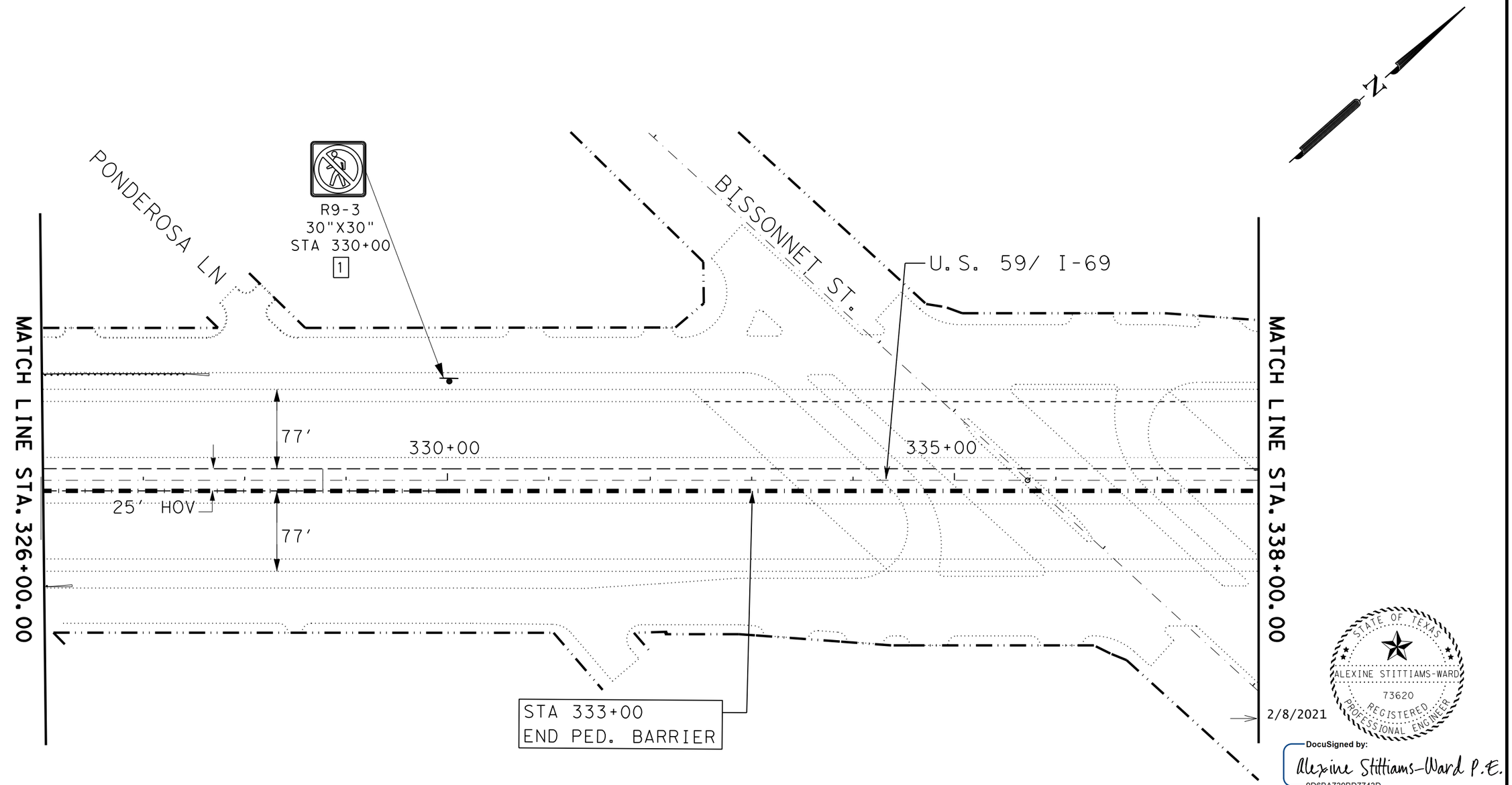

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SCALE: 1"=100' SHEET 12 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		94

DATE: 12/16/2020 2:17:38 PM
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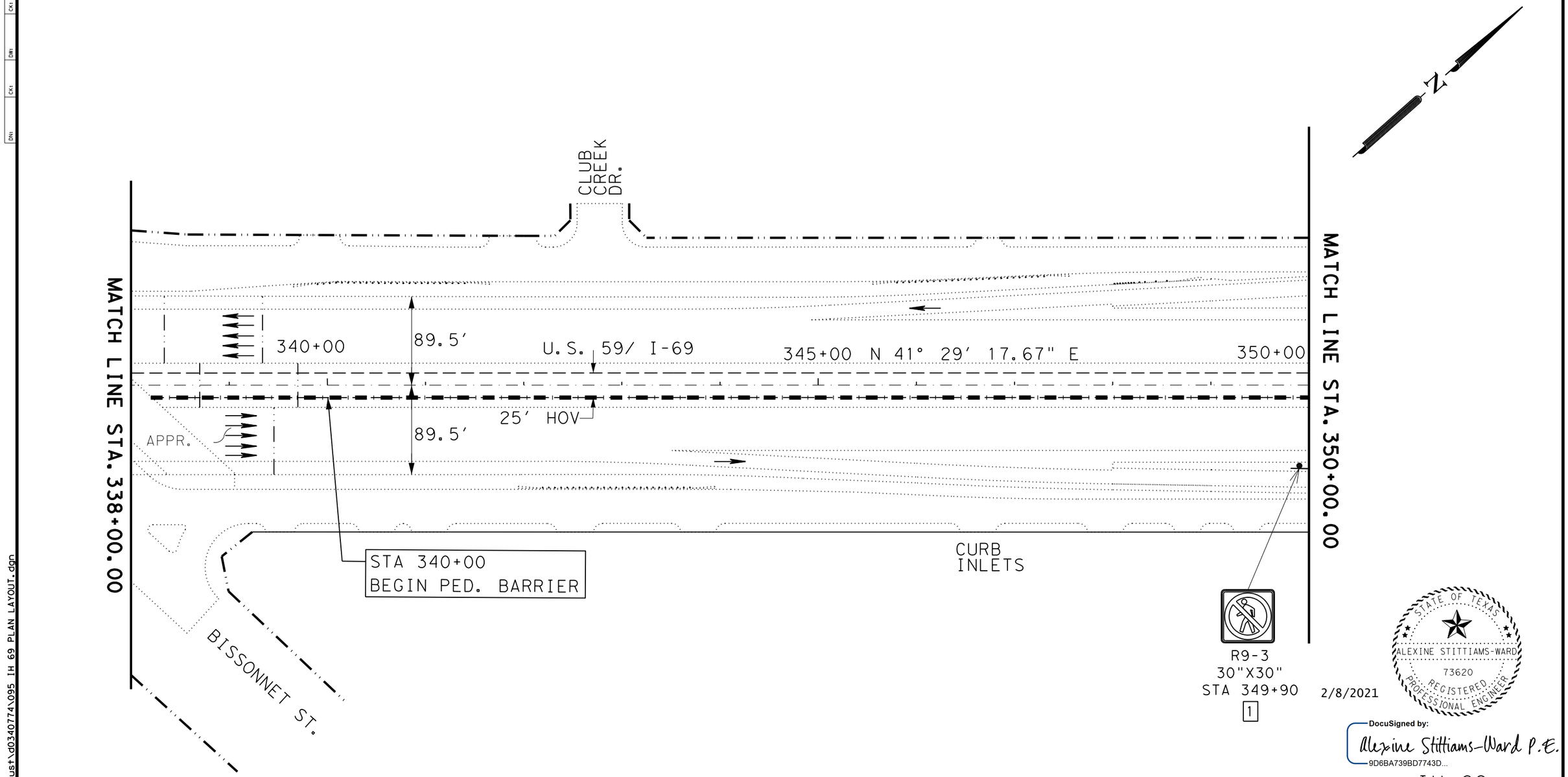

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9D6BA739BD7743D...

IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 13 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		95

DATE: 12/16/2020 2:17:53 PM
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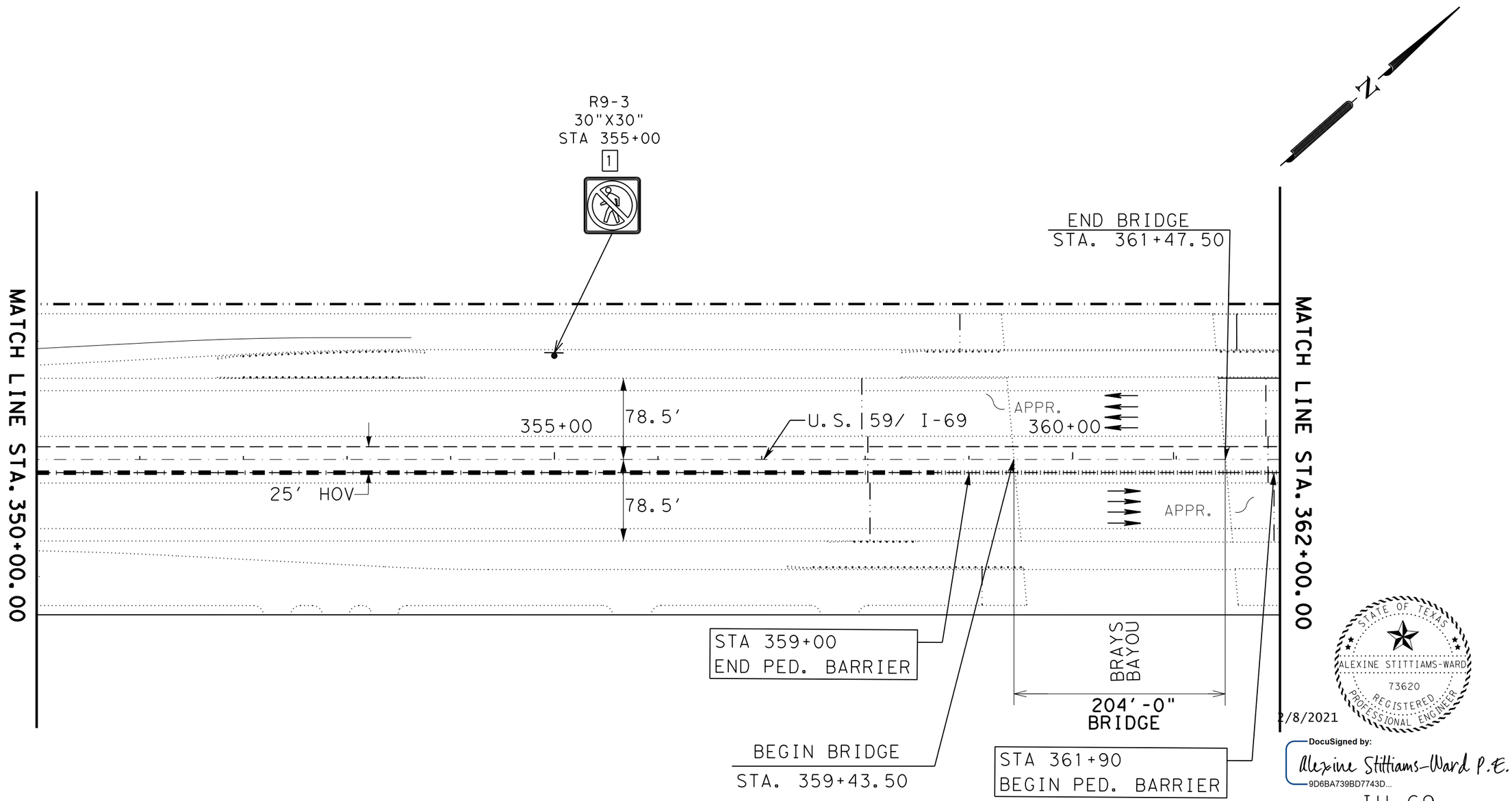

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IH 69
PLAN LAYOUT

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SCALE: 1"=100' SHEET 14 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		96

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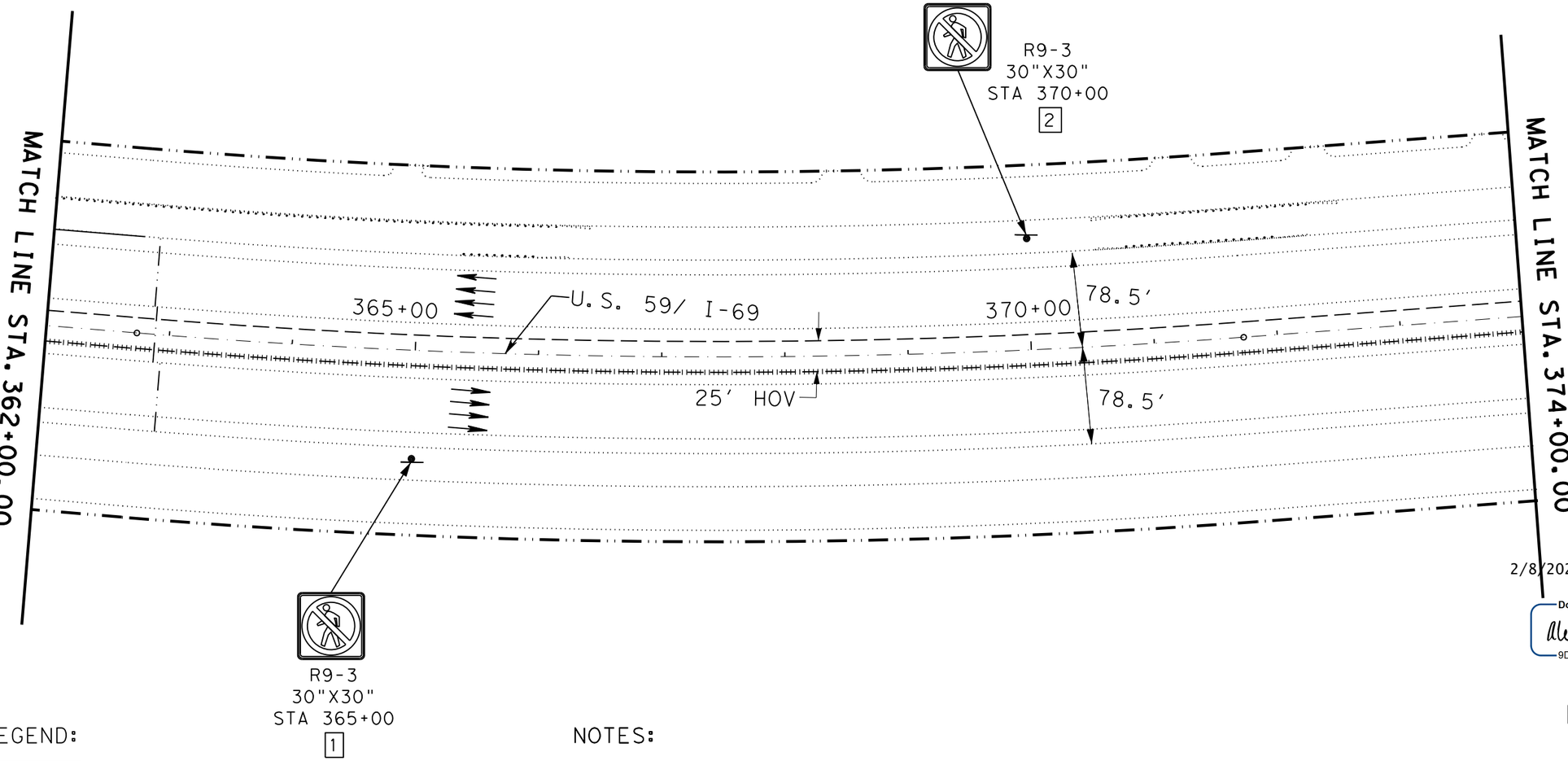

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LEGEND:

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IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 15 OF 33

Texas Department of Transportation

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0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		97

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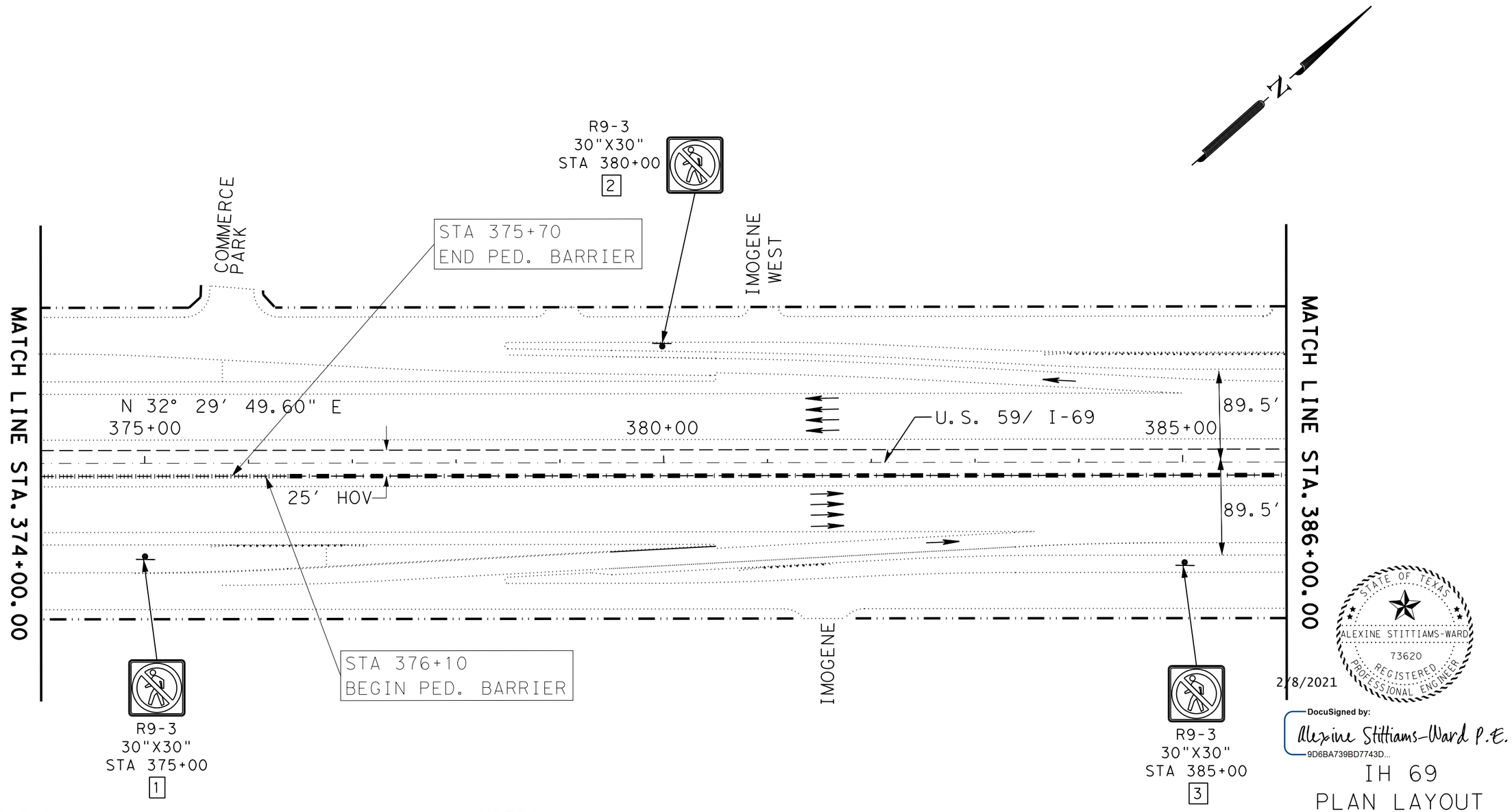

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SCALE: 1"=100' SHEET 16 OF 33

Texas Department of Transportation

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0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		98

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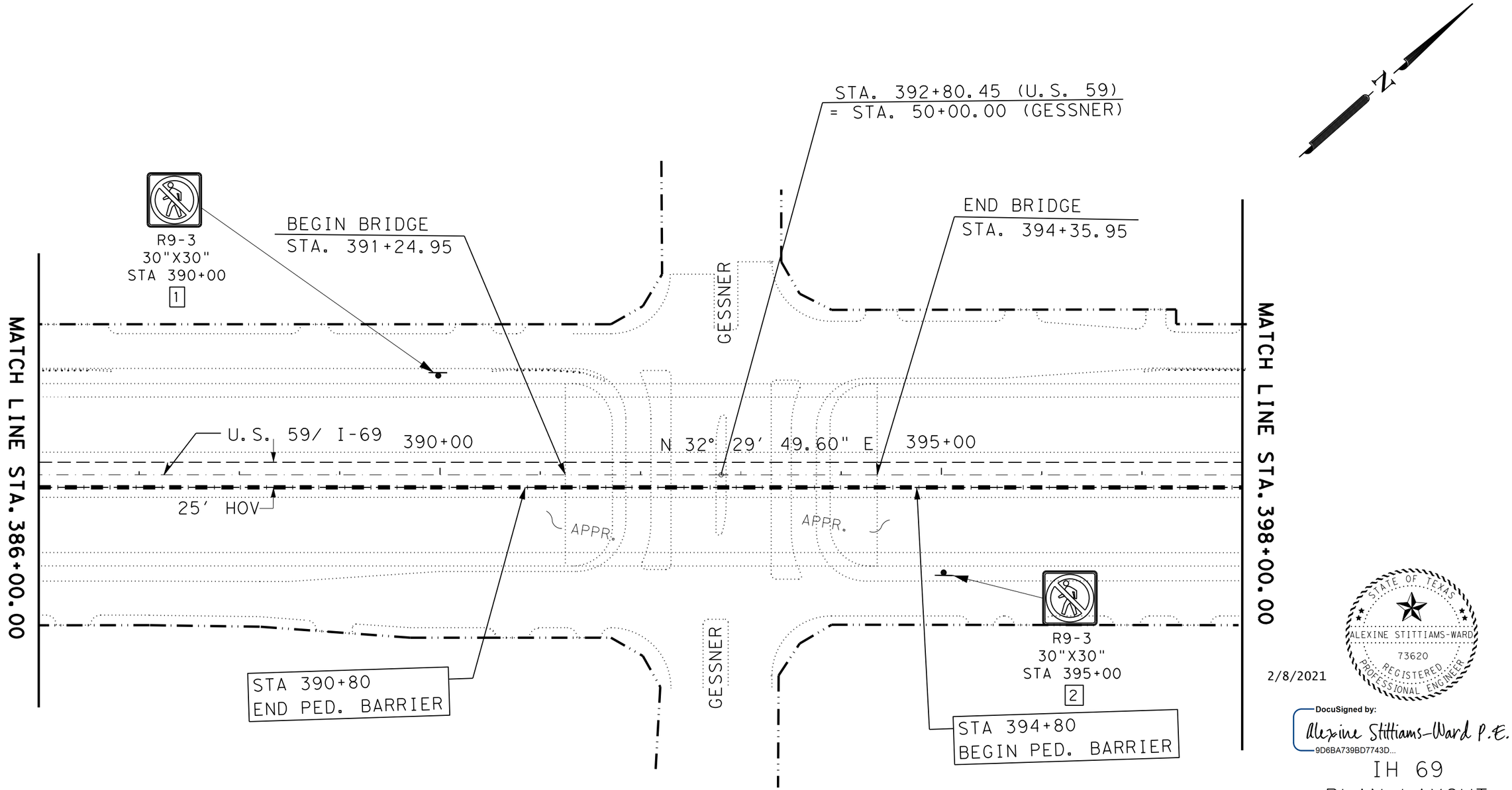

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SCALE: 1"=100' SHEET 17 OF 33

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0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		99

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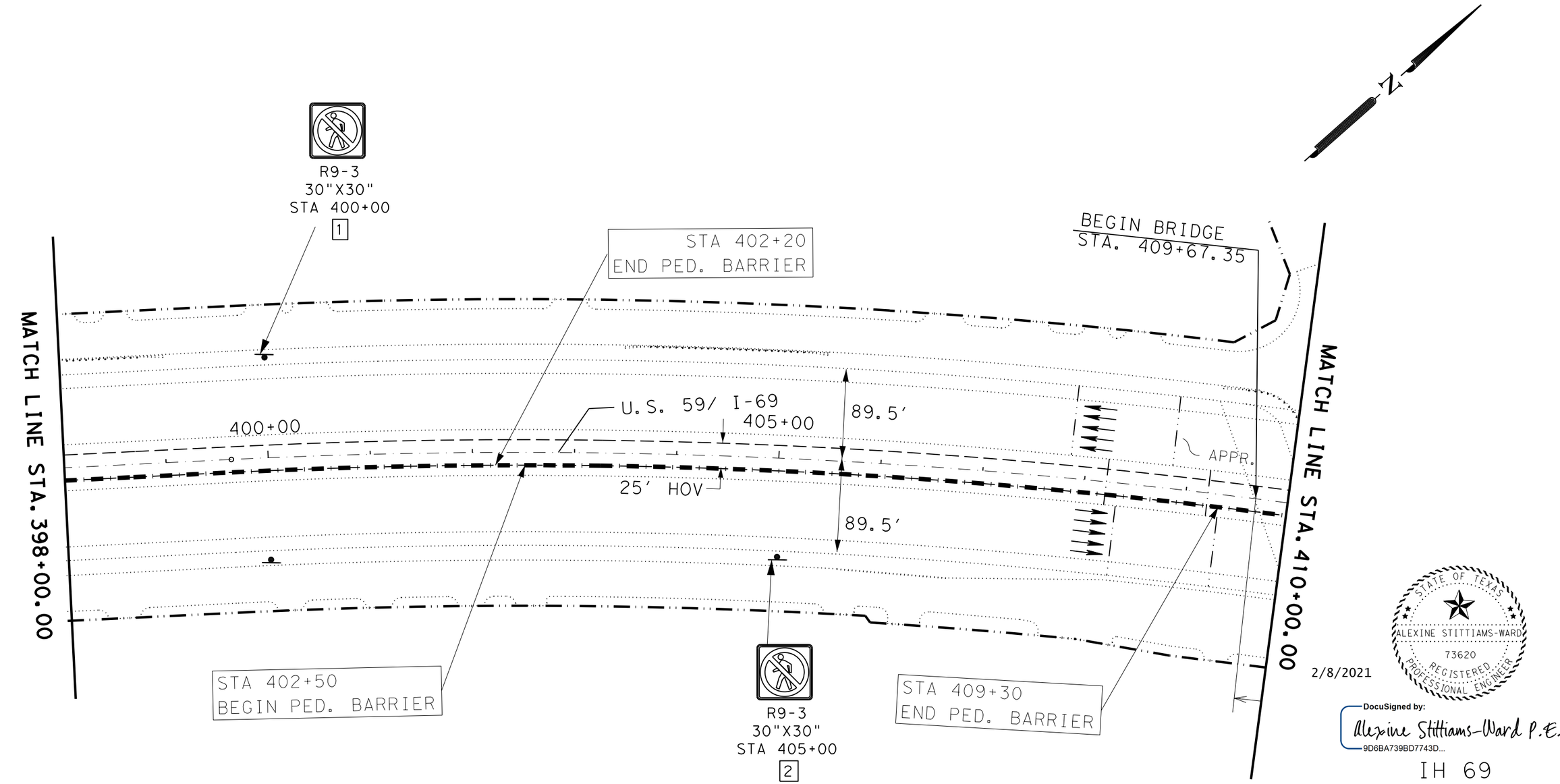

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PLAN LAYOUT

SCALE: 1"=100' SHEET 18 OF 33

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0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		100

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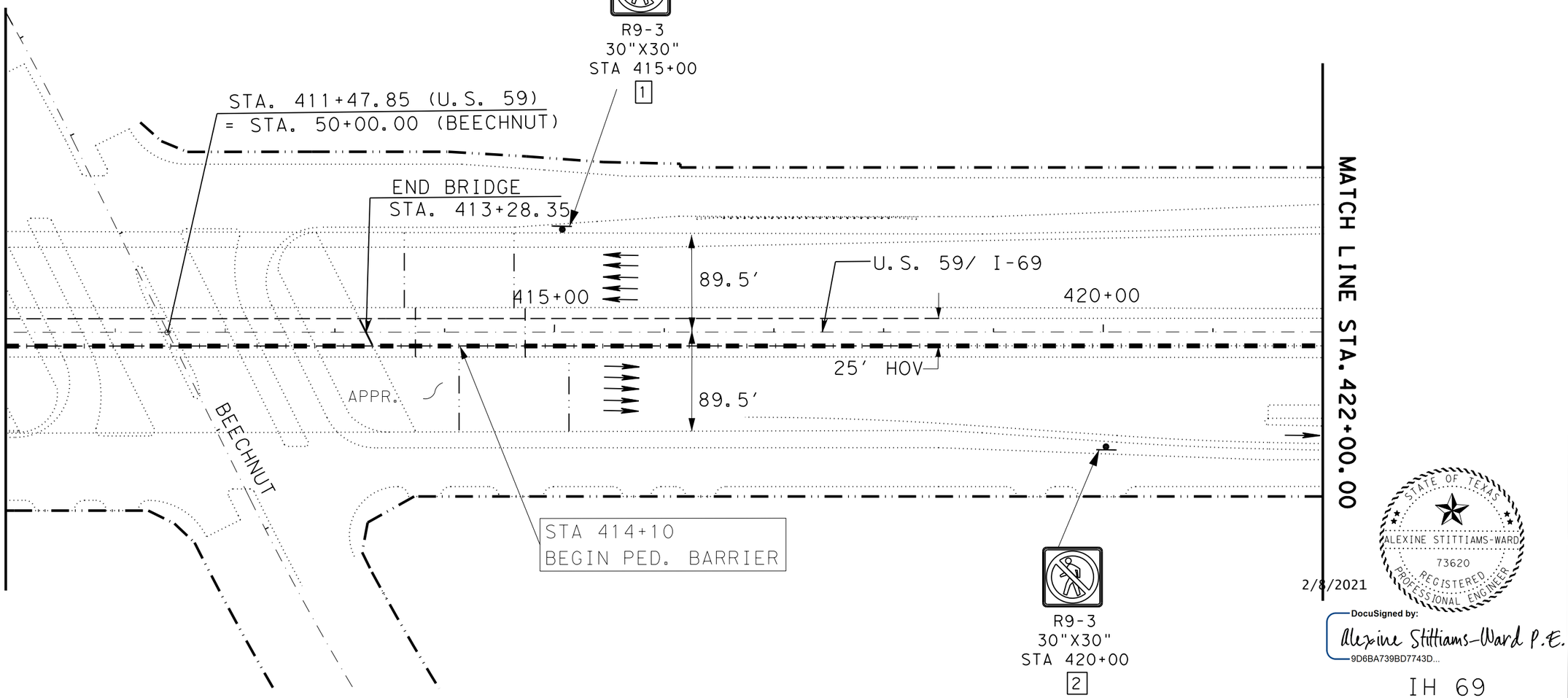

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SCALE: 1"=100' SHEET 19 OF 33

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0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		101

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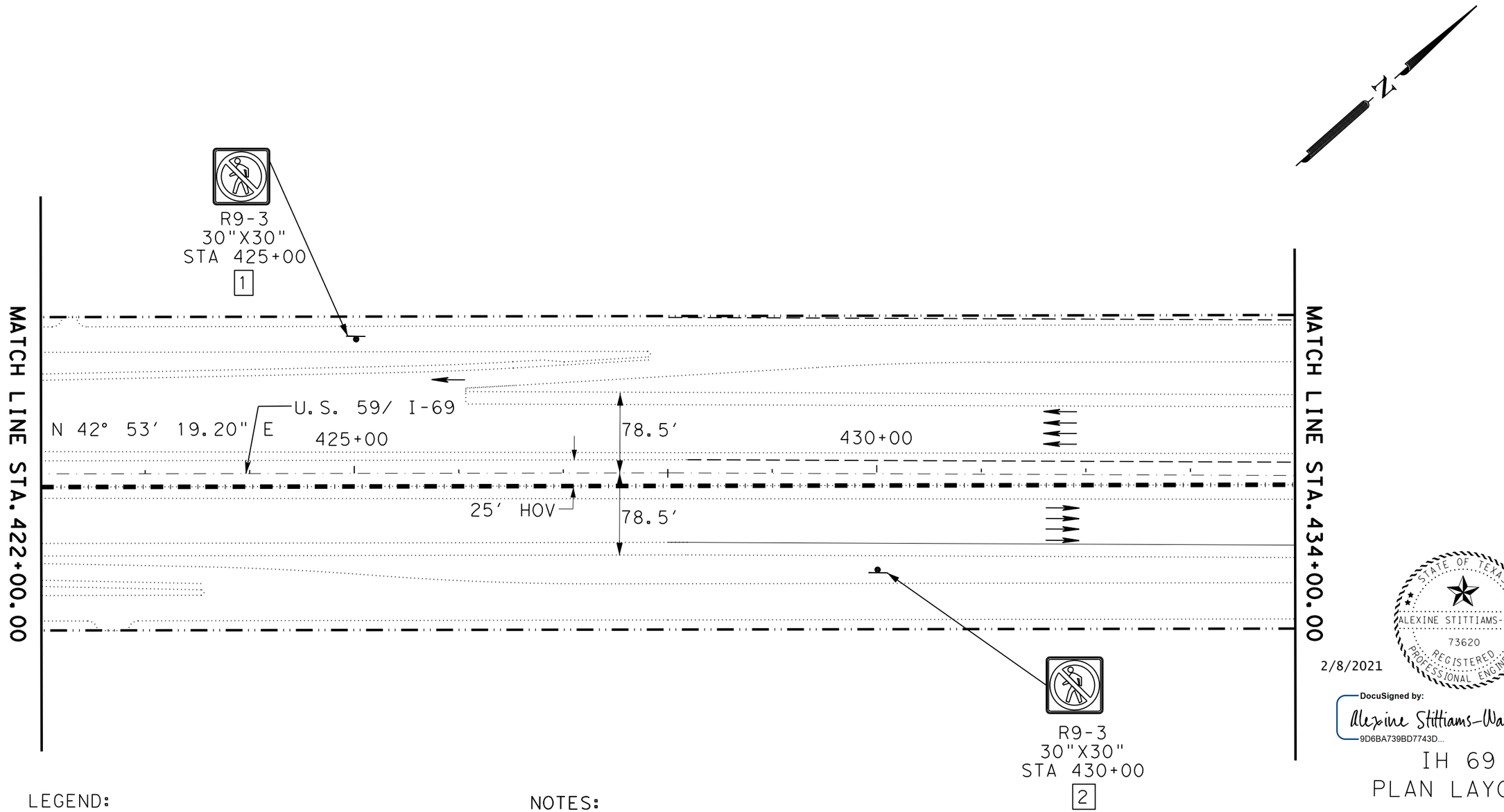

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PLAN LAYOUT

SCALE: 1"=100′ SHEET 20 OF 33

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CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		102

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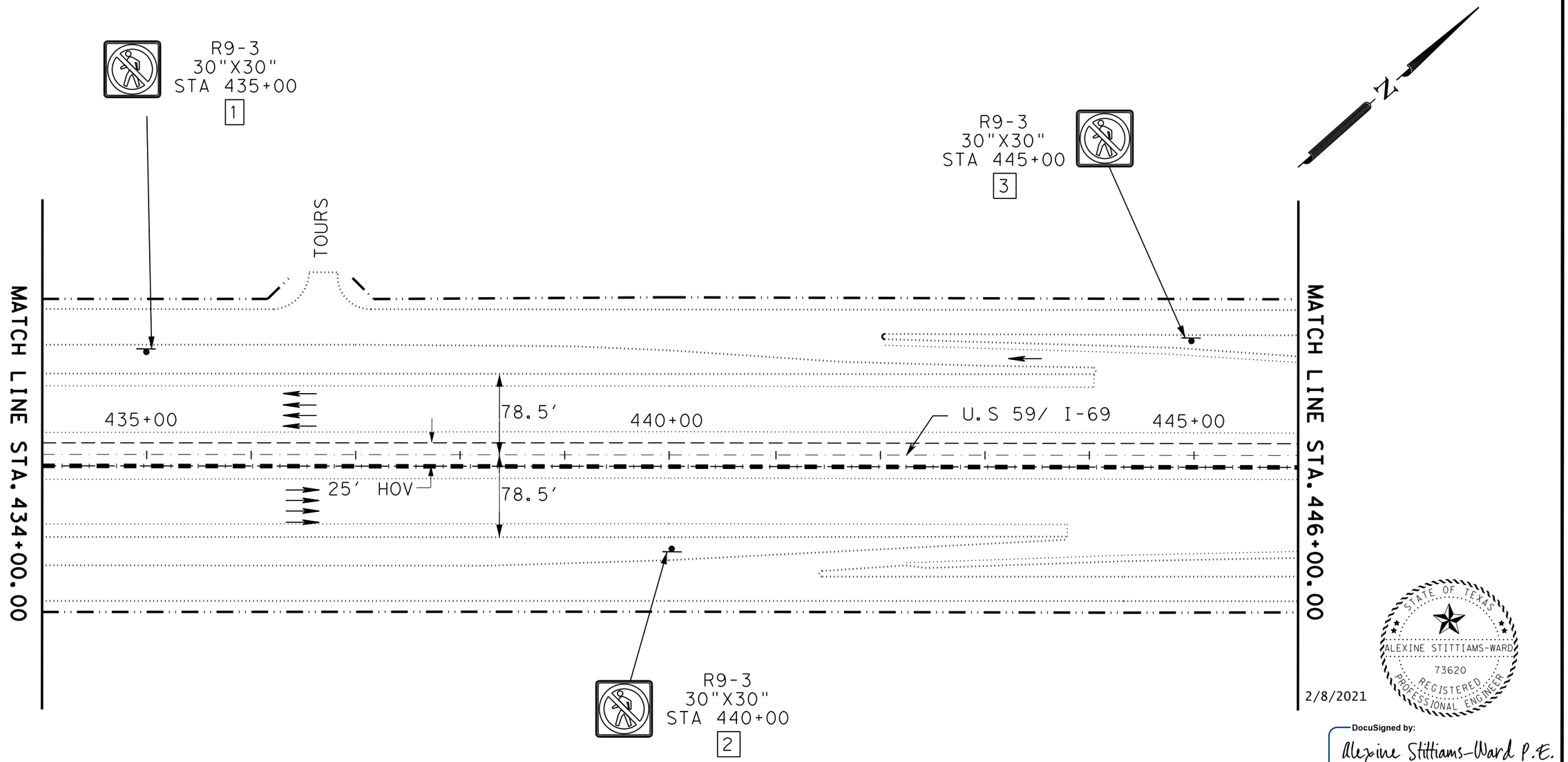

LEGEND:

- PORTABLE CTB
- CAST IN PLACE CTB
- [X] PROPOSED SMALL SIGN ID
- PROPOSED SMALL SIGN

NOTES:

1. REFER TO THE PEDESTRIAN BARRIER DETAILS SHEETS
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STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

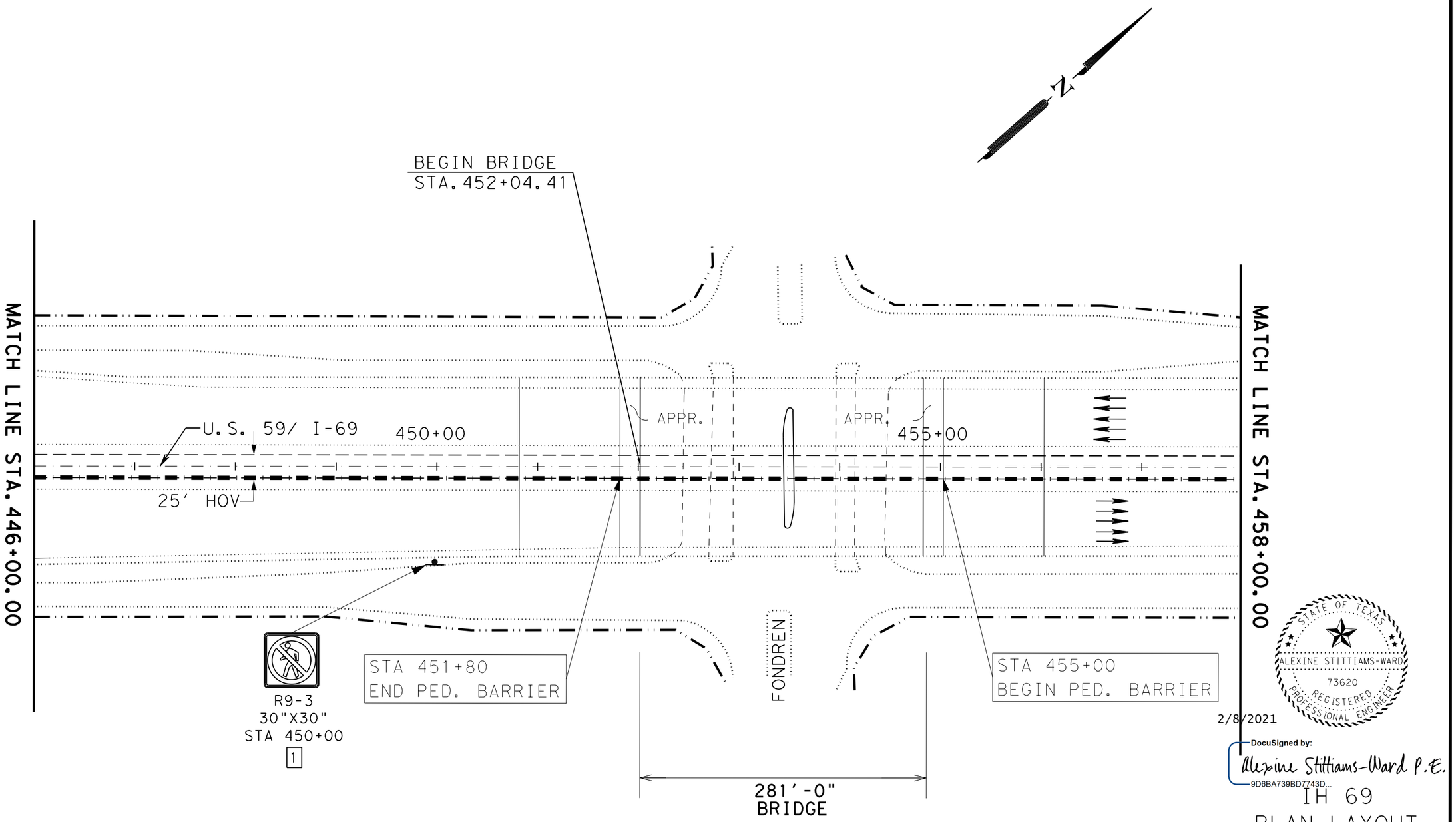
IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 21 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		103

DATE: 12/16/2020 2:19:44 PM
FILE: c:\txdot\pw_online\txdot3\rodney.aust\d0340774\103 IH 69 PLAN LAYOUT.dgn



LEGEND:

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2/8/2021

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9D6BA739BD7743D...

IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 22 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		104

DATE: 12/16/2020 2:19:53 PM
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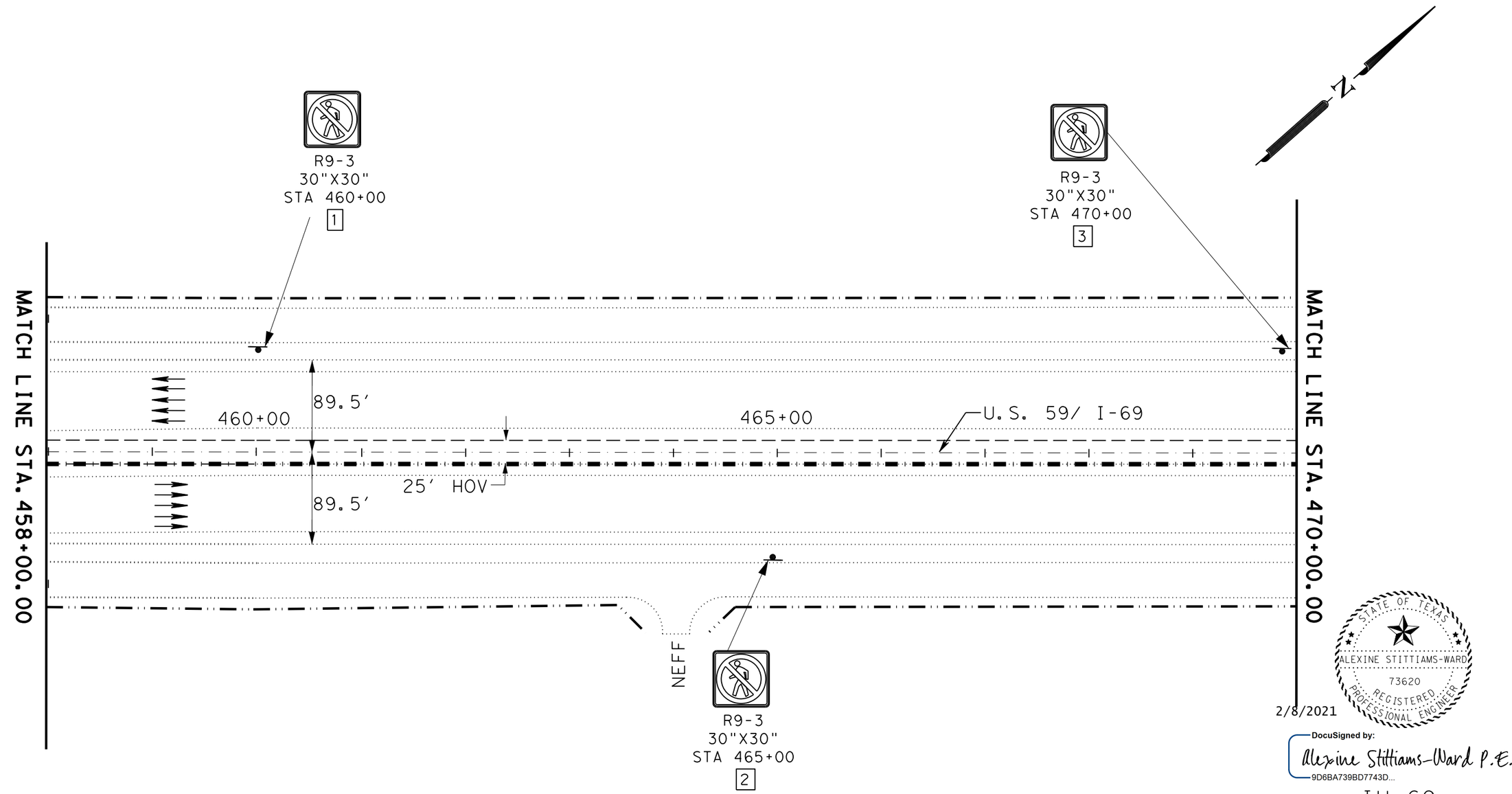

LEGEND:

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IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 23 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		105

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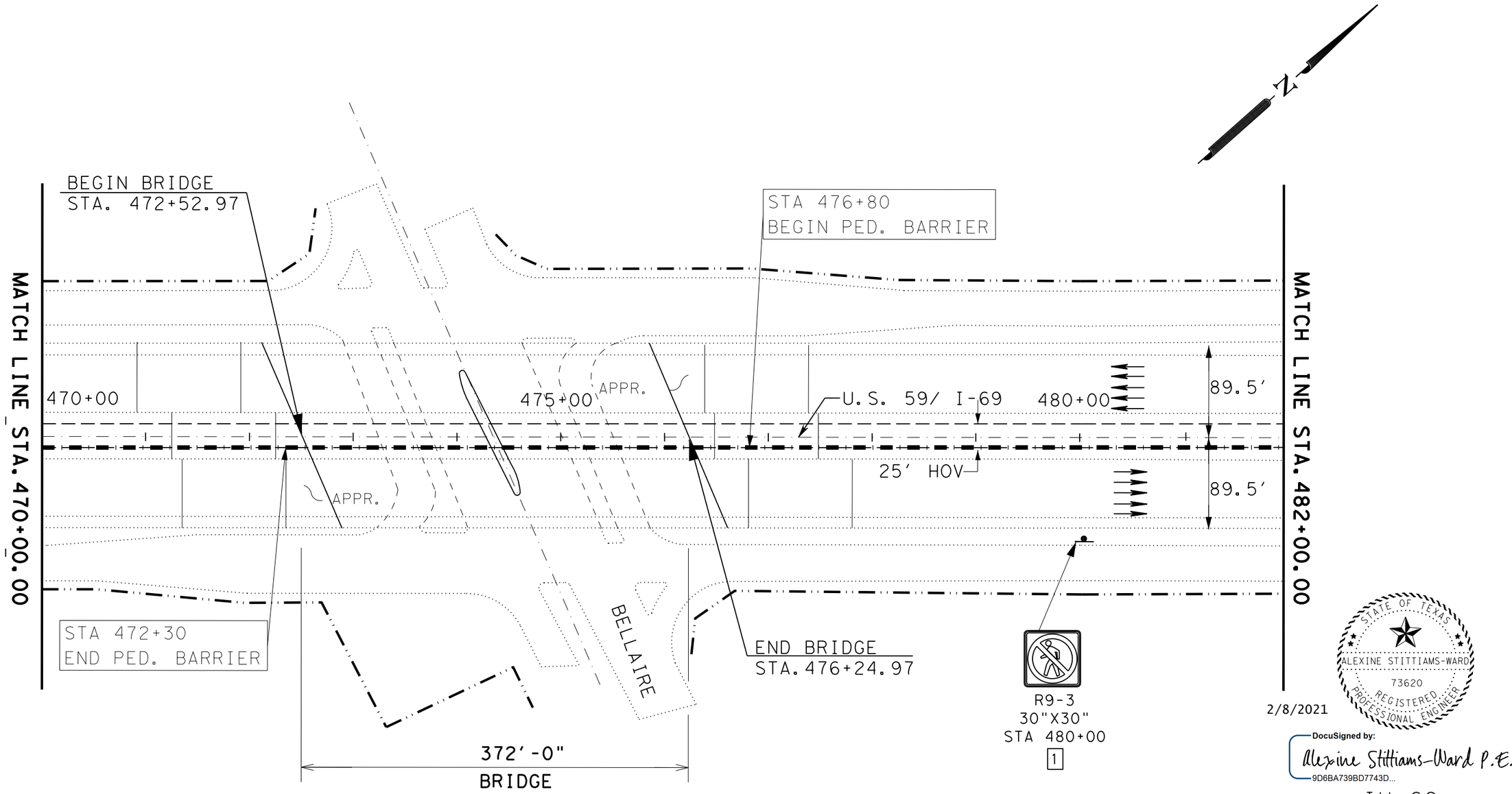

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STATE OF TEXAS
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IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 24 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		106

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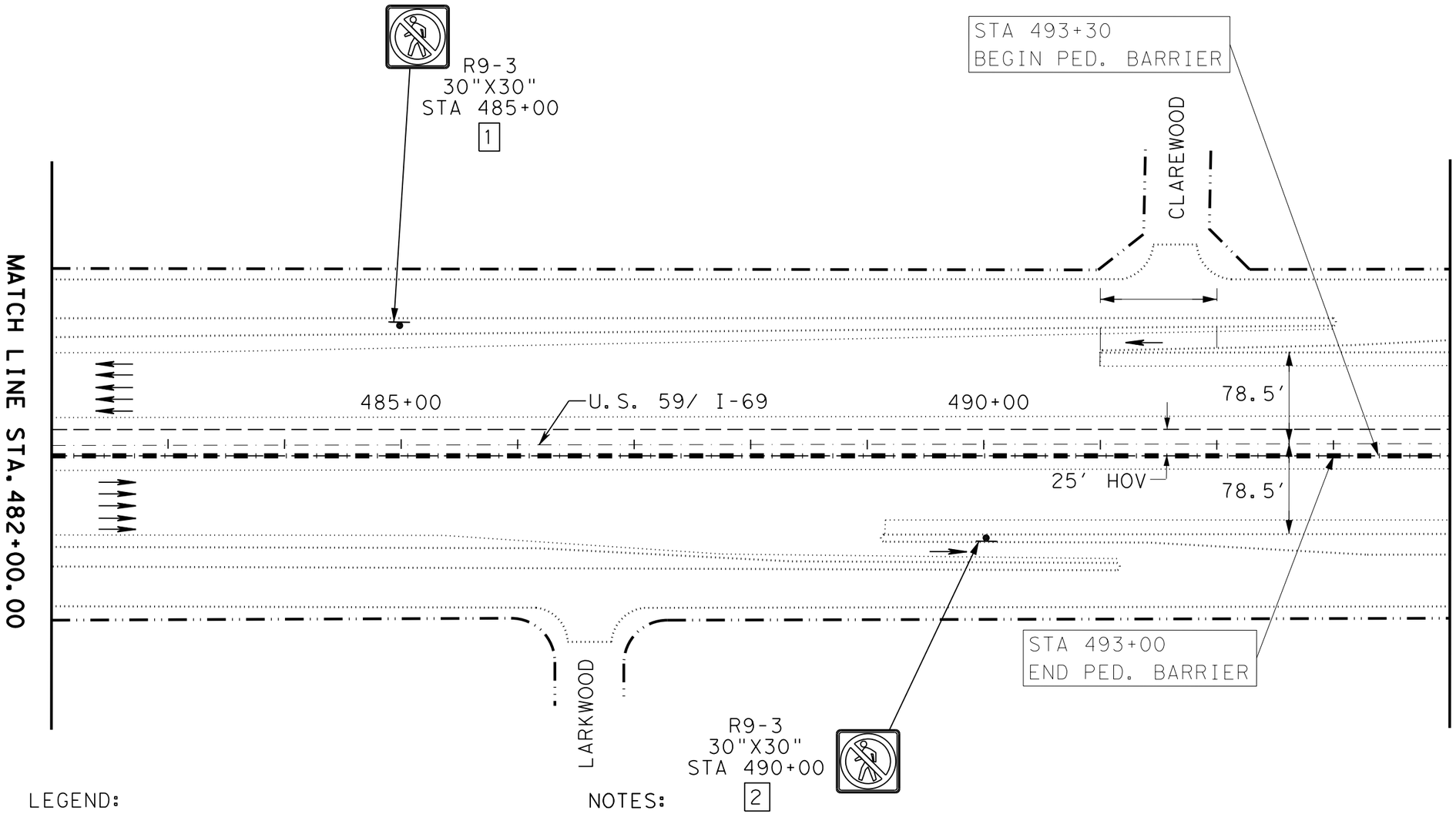

LEGEND:

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STATE OF TEXAS
ALEXINE STITTIAMS-WARD
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Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 25 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		107

DATE: 12/16/2020 2:20:25 PM
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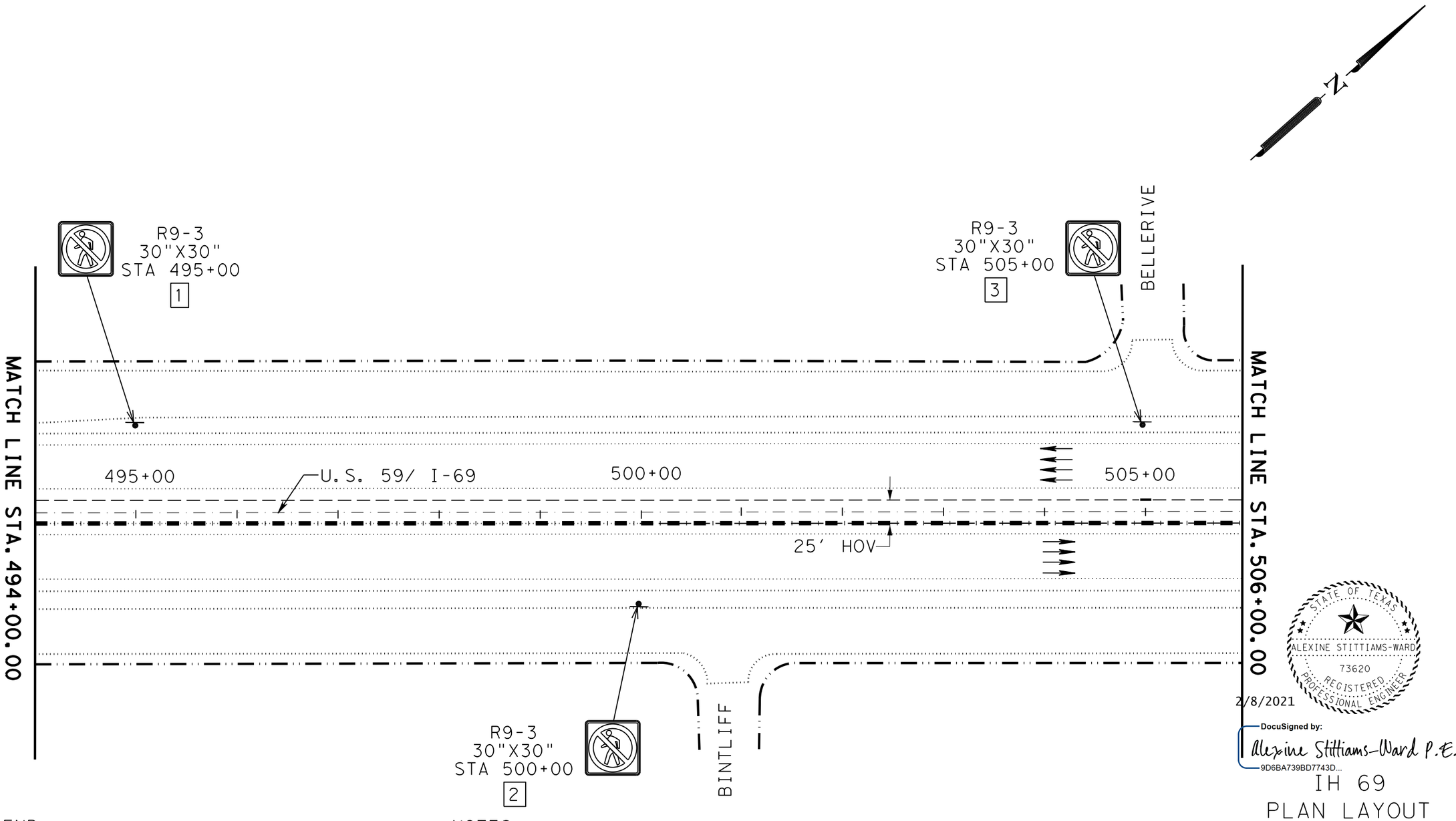

LEGEND:

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STATE OF TEXAS
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IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 26 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		108

DATE: 12/16/2020 2:20:35 PM
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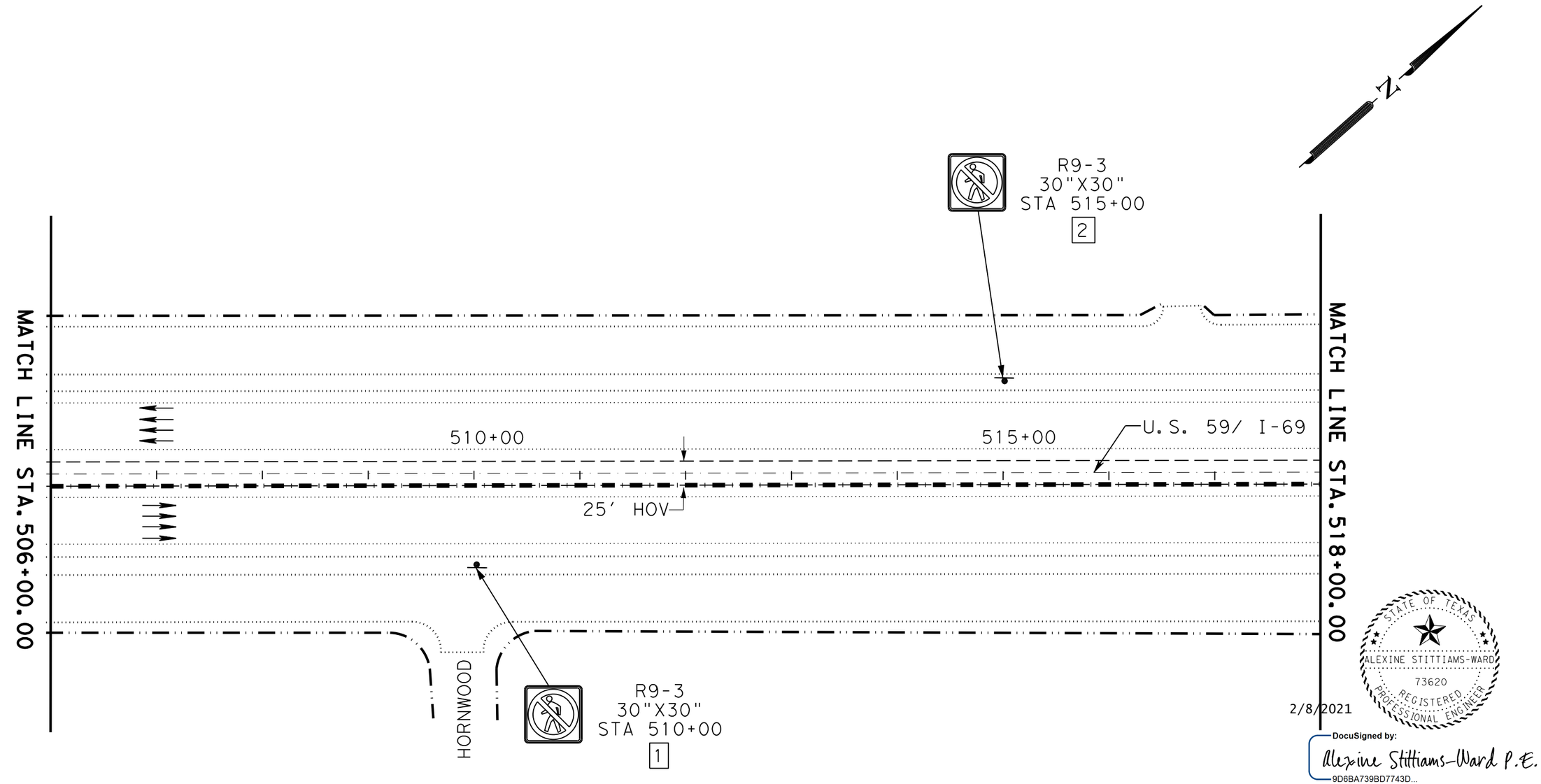

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STATE OF TEXAS
ALEXINE STITTIAMS-WARD
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2/8/2021

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9D6BA739BD7743D...

IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 27 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		109

DATE: 12/16/2020 2:20:44 PM
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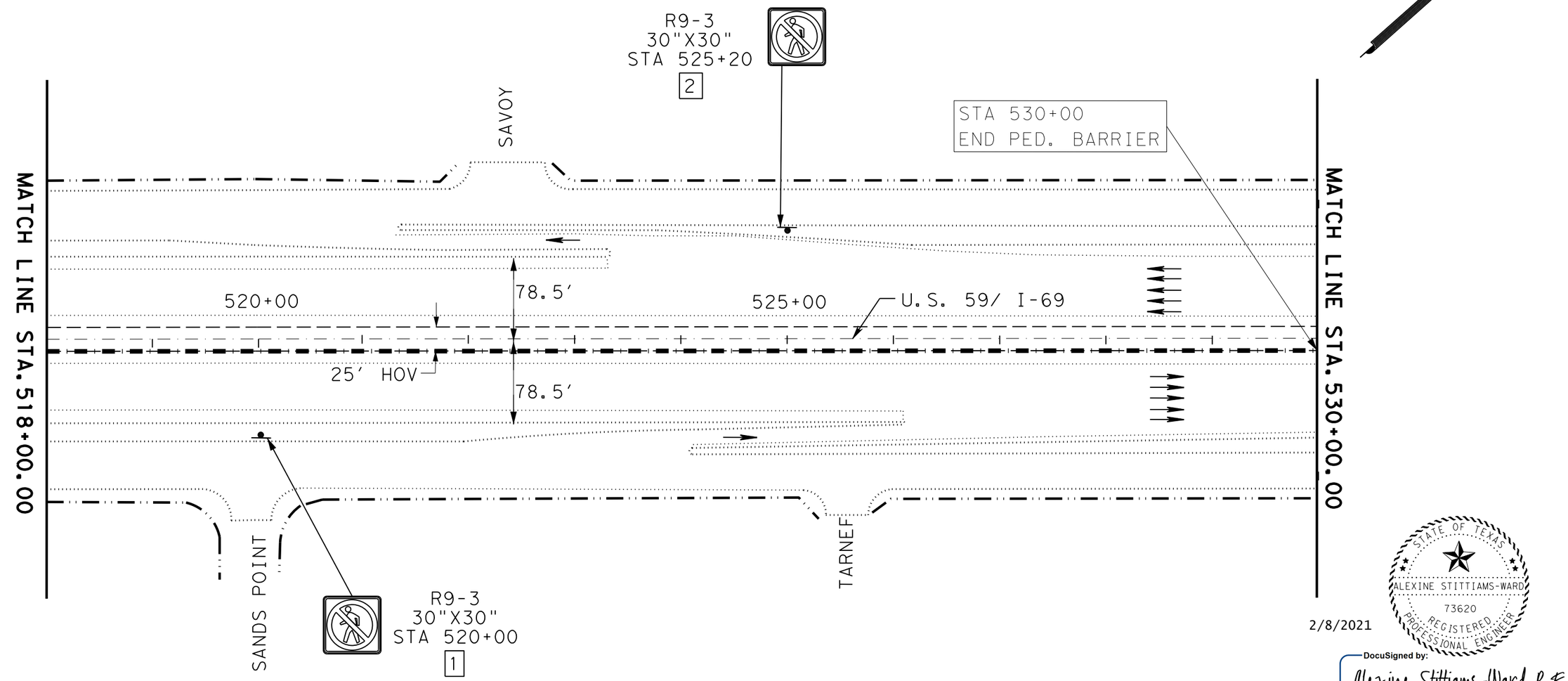

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STATE OF TEXAS
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9D6BA739BD7743D...

IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 28 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		110

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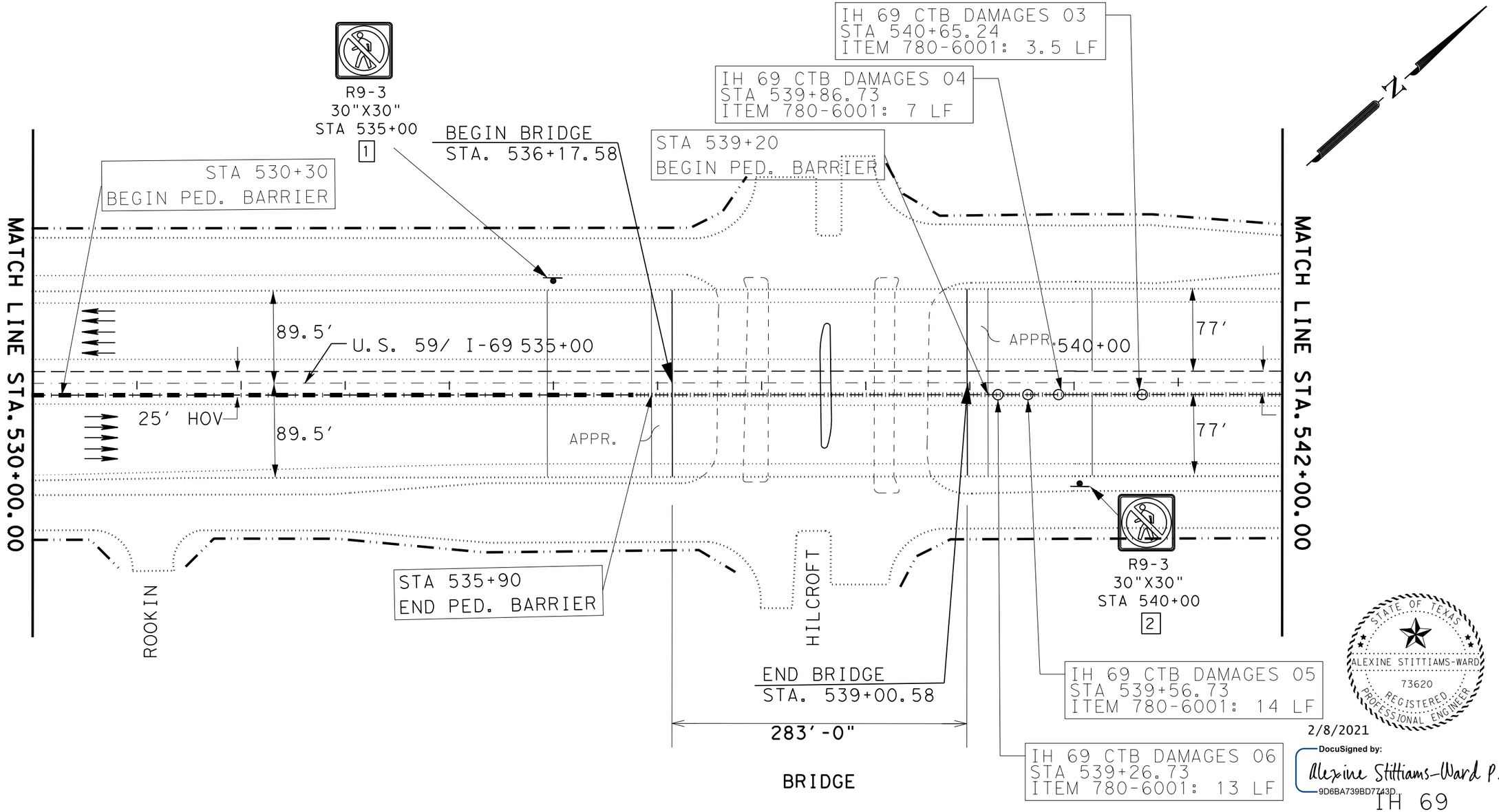

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2/8/2021

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9D6BA739BD7743D...

IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 29 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		111

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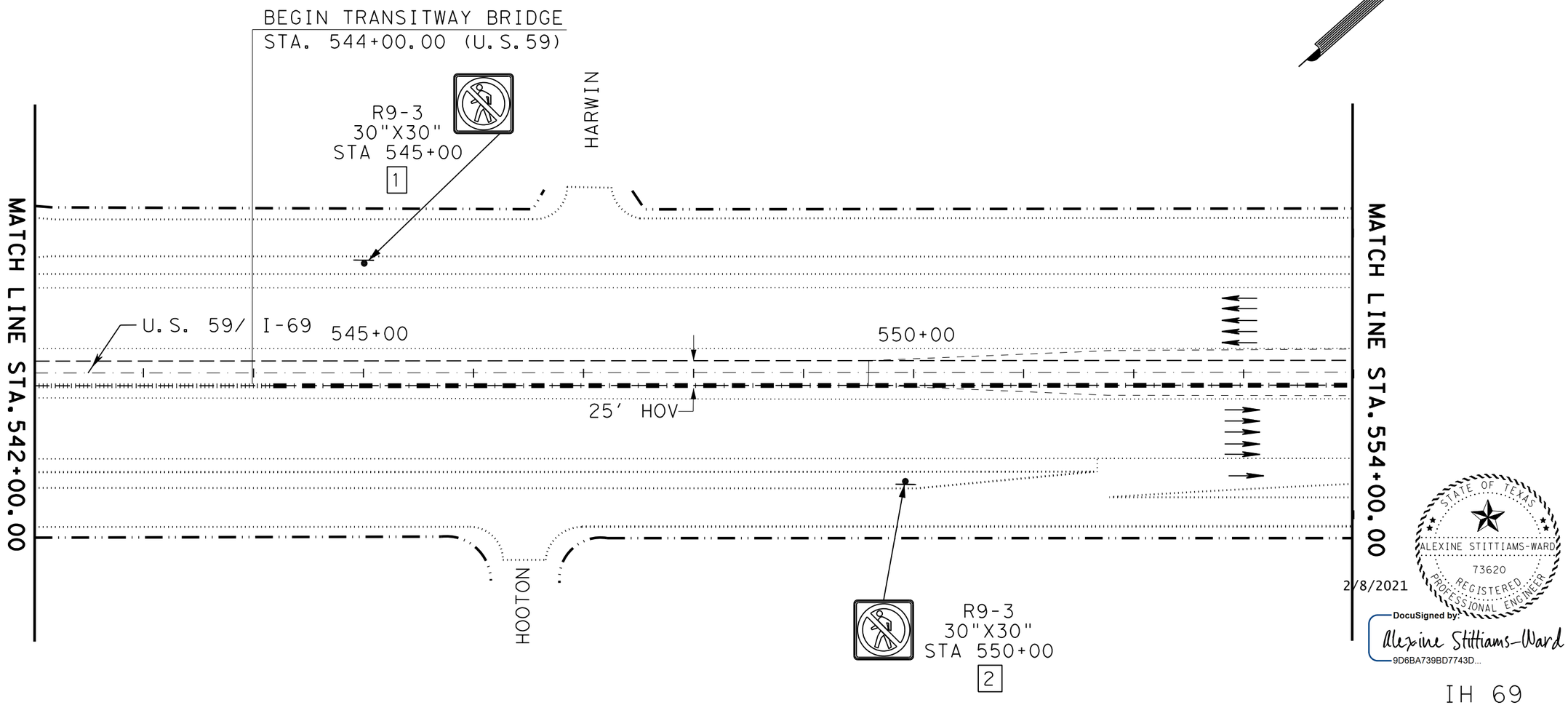

LEGEND:

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STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

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9D6BA739BD7743D...

IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 30 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		112

DATE: 12/16/2020 2:21:13 PM
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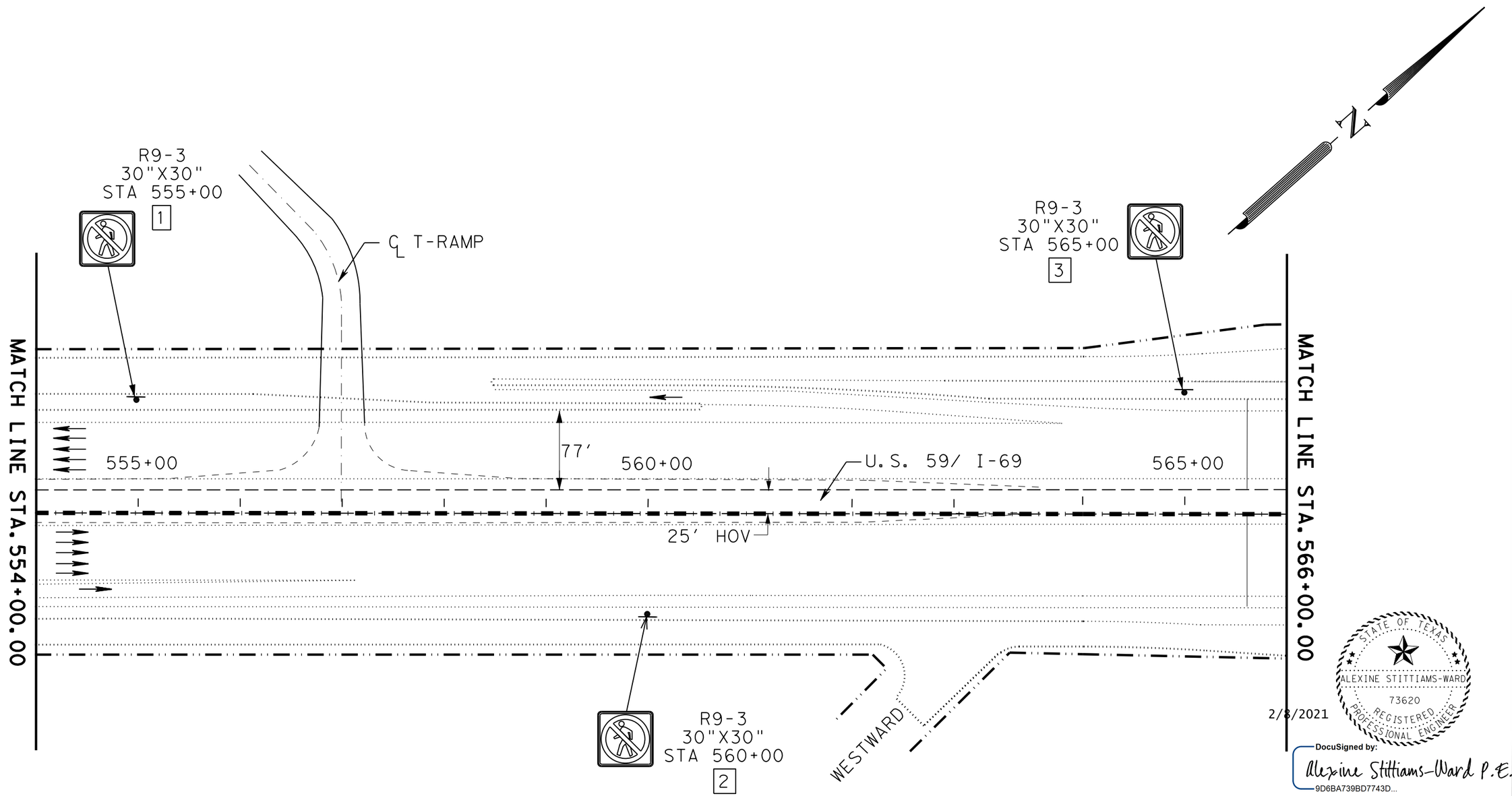

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STATE OF TEXAS
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73620
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PROFESSIONAL ENGINEER

2/8/2021

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9D6BA739BD7743D...

IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 31 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		113

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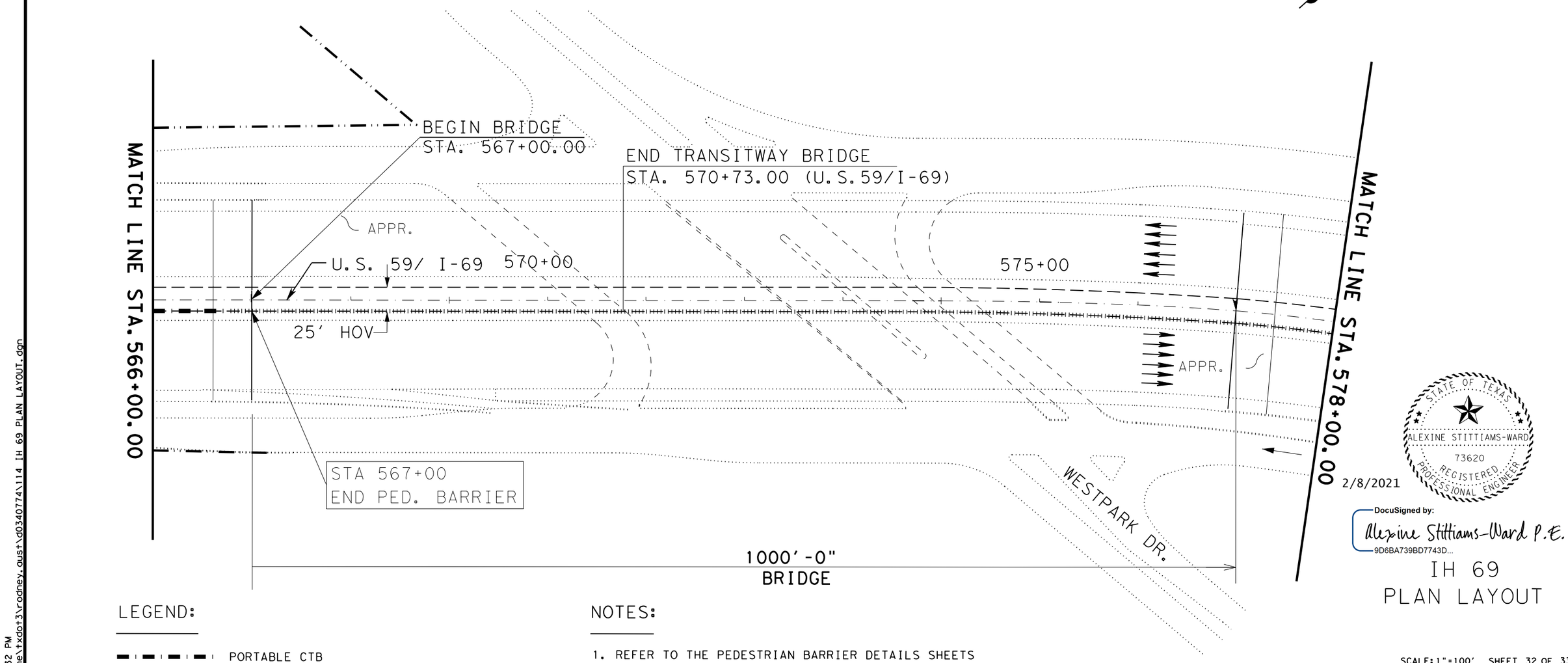

LEGEND:

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2/8/2021

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9D6BA739BD7743D...

IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 32 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		114

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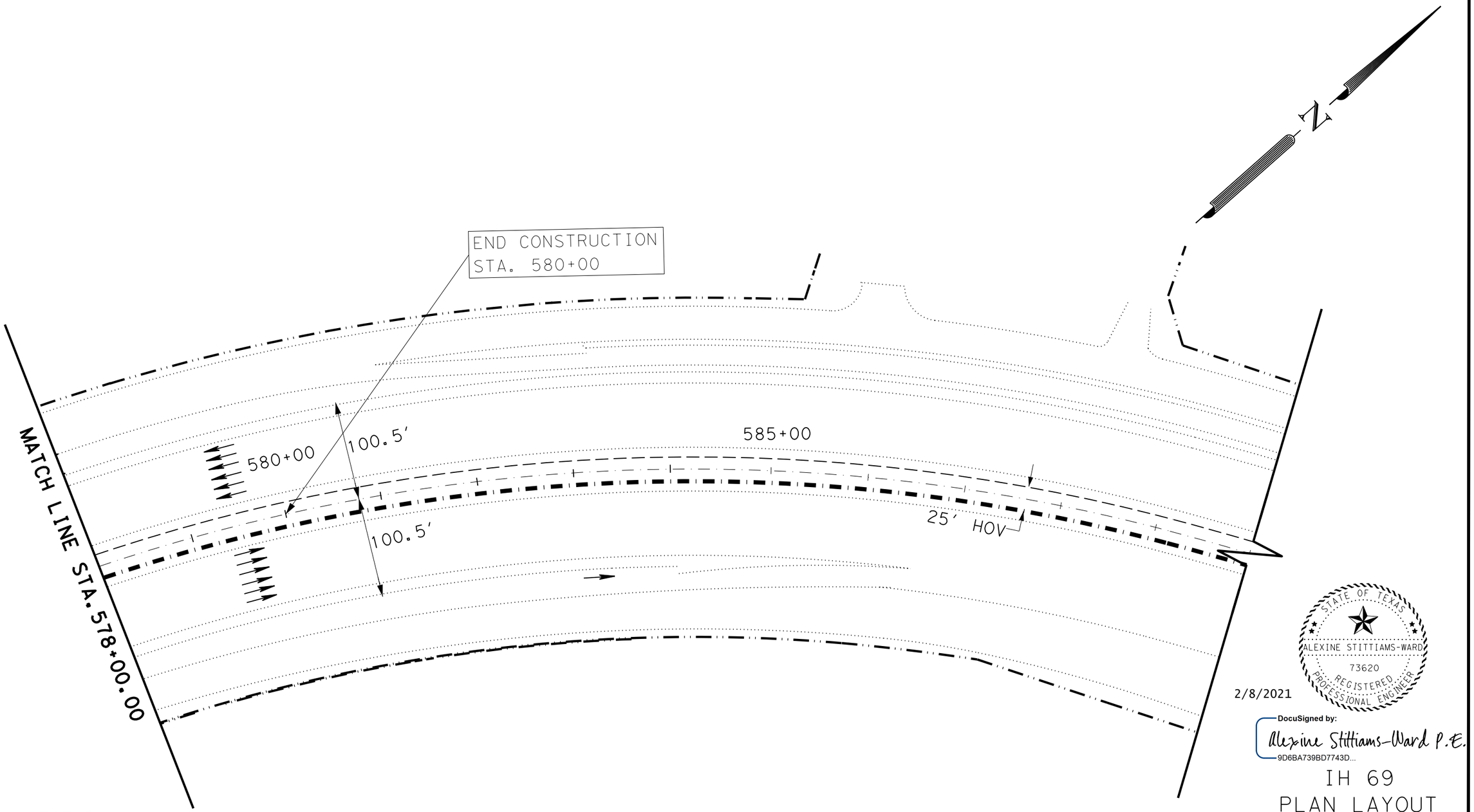

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IH 69
PLAN LAYOUT

SCALE: 1"=100' SHEET 33 OF 33

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		115

DATE: 2/4/2021 5:50:56 PM
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DW:
CK:
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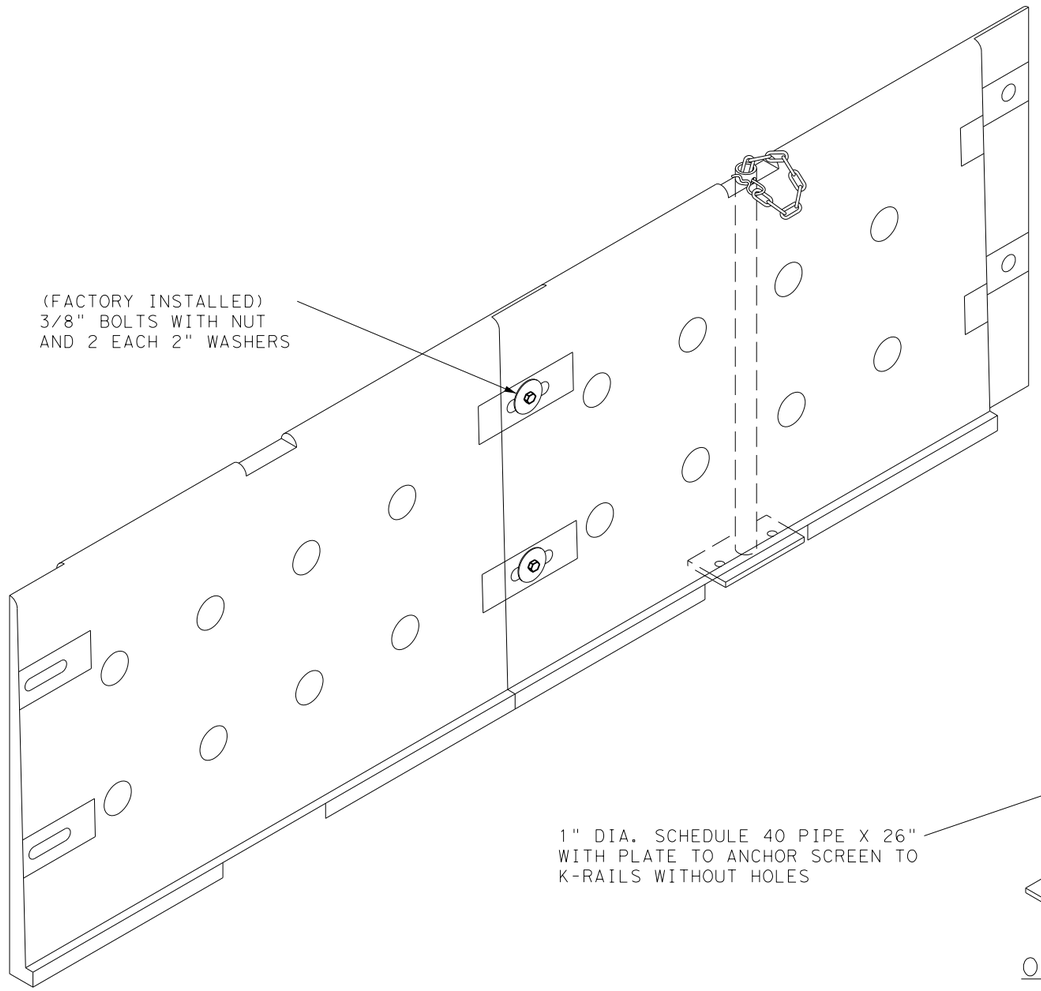
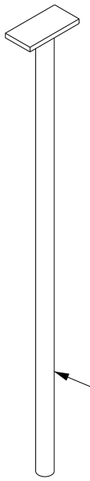
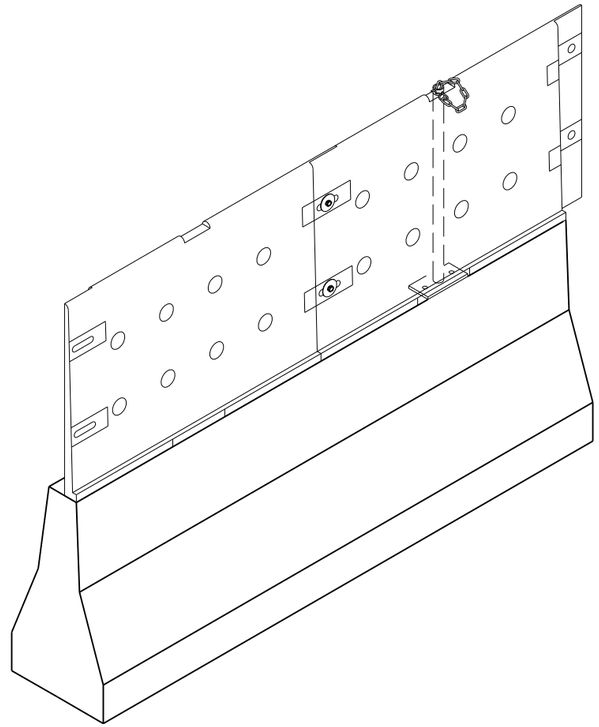
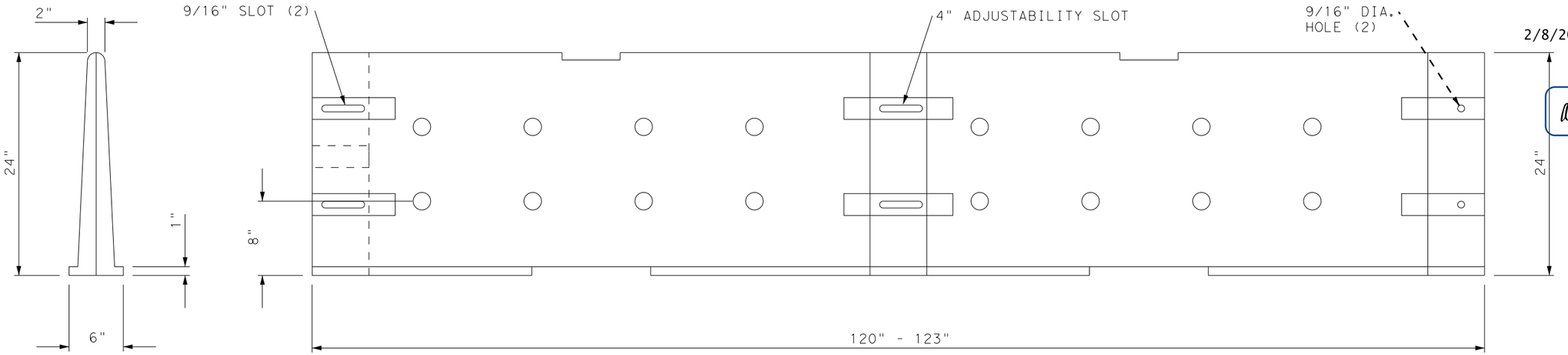


OPTION 1



OPTION 2





APPROX. WEIGHT = 25 LBS

2/8/2021

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
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REGISTERED
PROFESSIONAL ENGINEER

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PEDESTRIAN BARRIER NOTES & DETAILS

SCALE: NTS SHEET 1 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		116

DATE: 12/9/2020 3:50:25 PM
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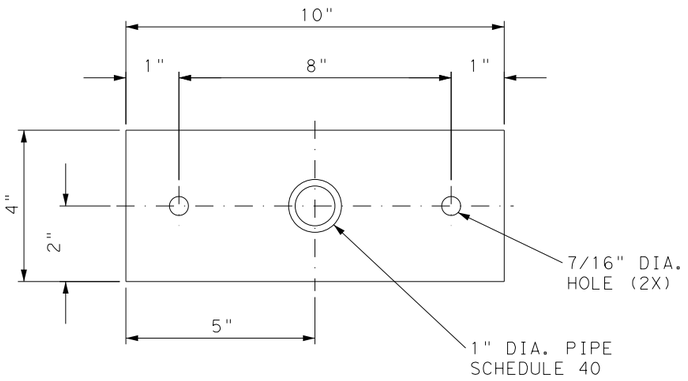

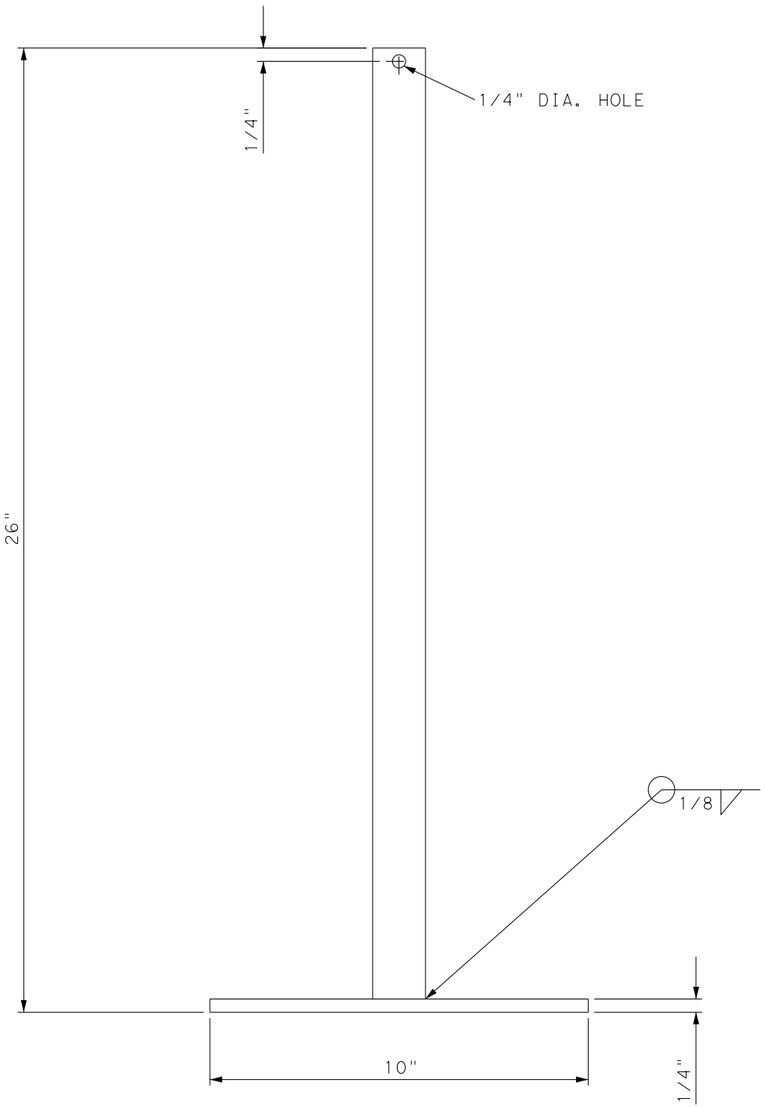

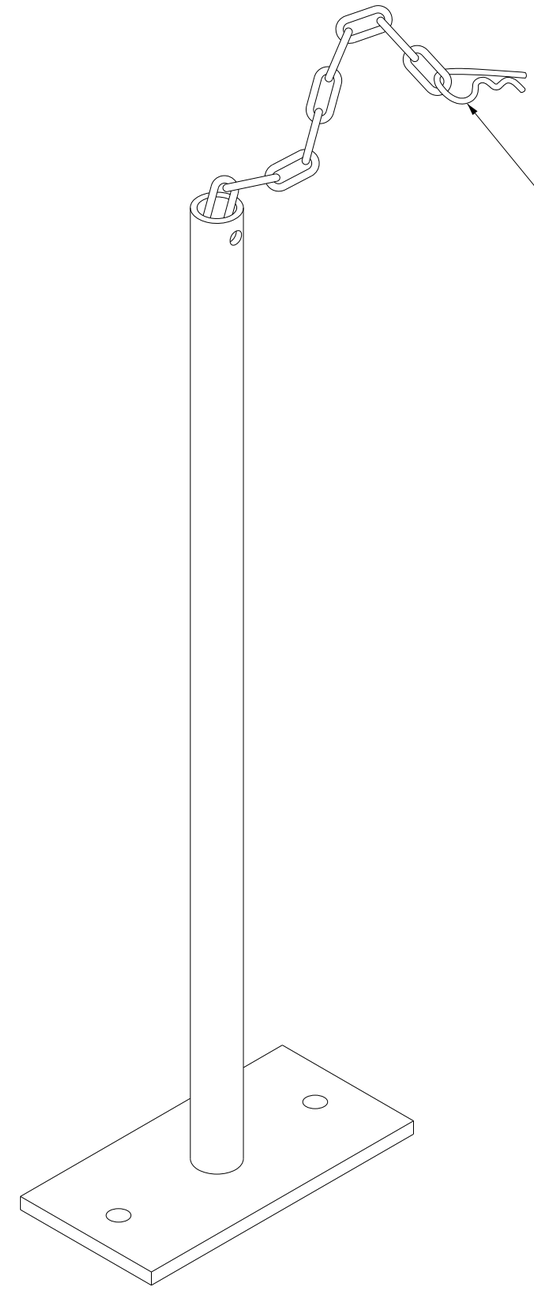

OPTION 1

STATE OF TEXAS
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2/8/2021

DocuSigned by:
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9D6BA739BD7743D...

PEDESTRIAN BARRIER NOTES & DETAILS

SCALE: NTS SHEET 2 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		117

DATE: 12/9/2020 3:51:48 PM
FILE: c:\txdot\pw_online\txdot3\rodney.aust\d0340952\PD01 Pedestrian Barrier.dgn

NOTES:

1. SURFACE FINISHING AND GROUTING (WHERE REQUIRED) SHALL BE TWO PARTS SAND ONE PART CEMENT WITH ENOUGH WATER TO MAKE THE MIXTURE PLASTIC. GROUTING SHALL BE DONE IN A MANNER THAT WILL ASSURE A SMOOTH SURFACE. SURFACE FINISHING SHALL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS INVOLVED.
2. CONTRACTOR SHALL ENSURE THAT THE PRODUCT MANUFACTURER PROVIDES SPECIFIC INFORMATION REGARDING MATERIALS USED TO FABRICATE THE PEDESTRIAN BARRIER. THE PLAN DETAIL PROVIDES INFORMATION ABOUT THE EXPECTED DIMENSIONS FOR THE PEDESTRIAN BARRIER AND THE GENERAL FASTENING AND MOUNTING REQUIREMENTS. ONCE A PRODUCT IS SELECTED FOR USE, CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR APPROVAL PRIOR TO ANY INSTALLATION.
3. CONTRACTOR SHALL ENSURE THAT THE PEDESTRIAN BARRIER DOES NOT CONFLICT WITH ANY EXISTING EXCEPTION AREAS. ALL PEDESTRIAN BARRIER PLACEMENTS MUST BE IN SECTIONS OF 10 FEET.
4. COST OF ANCHOR BOLTS, WASHERS, NUTS, TEMPLATES, AND OTHER COMPONENTS NEEDED FOR THE INSTALLATION OF THE PEDESTRIAN BARRIER ON THE EXISTING CONCRETE TRAFFIC BARRIER SHALL NOT BE PAID FOR DIRECTLY BUT SHALL BE CONSIDERED INCIDENTAL TO ITEM "PEDESTRIAN BARRIER".
5. GALVANIZING SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
6. THREADS OF ANCHOR BOLTS SHALL BE 8 UNC THREADS.

CK2 DW2 CK1 DN2

DATE: 12/9/2020 3:53:09 PM
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STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

PEDESTRIAN BARRIER NOTES & DETAILS

SCALE: NTS SHEET 3 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		118

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

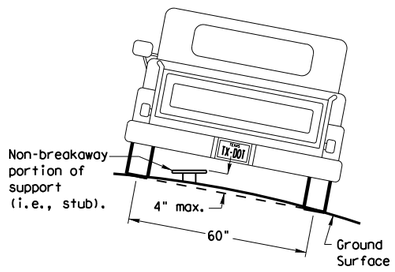
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

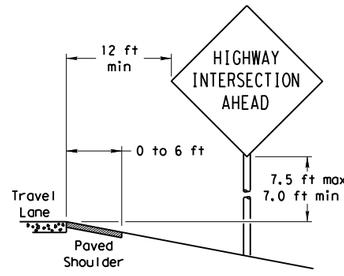
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

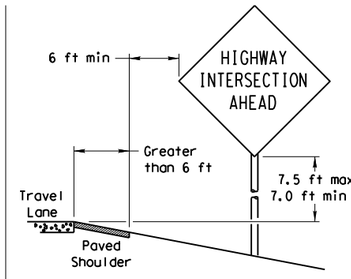
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

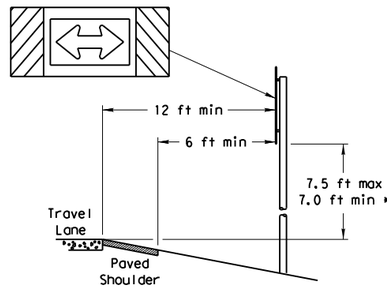
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



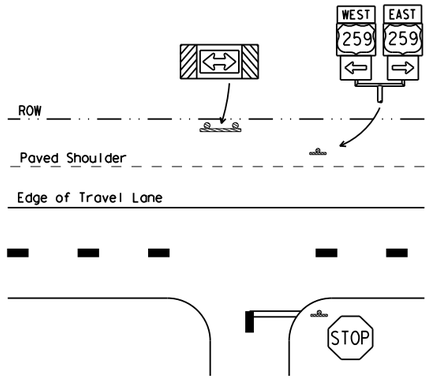
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

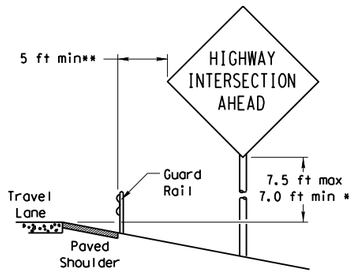
T-INTERSECTION



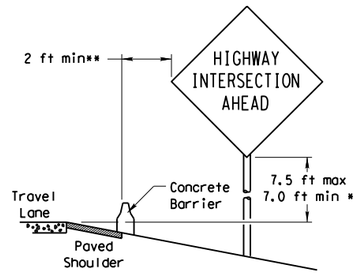
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

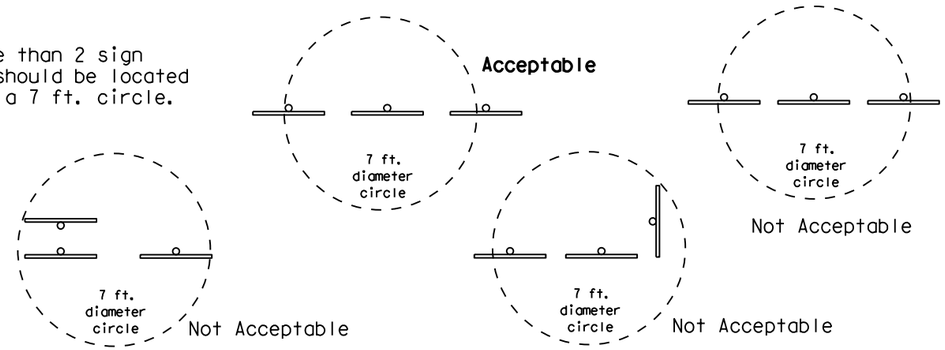
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

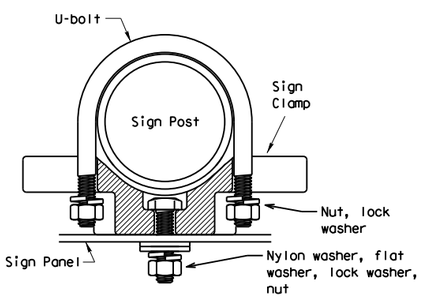
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

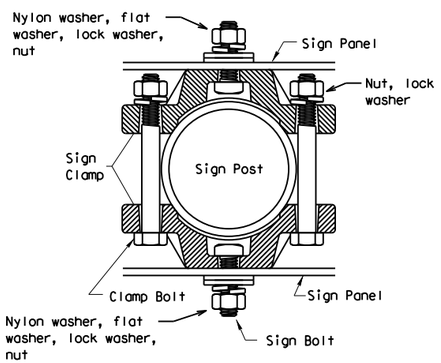


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

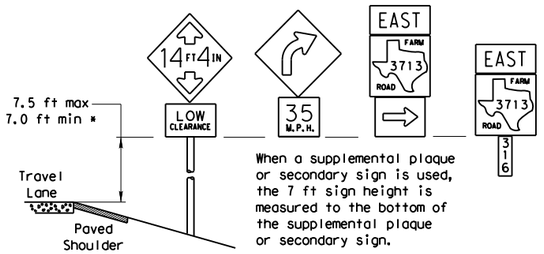
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



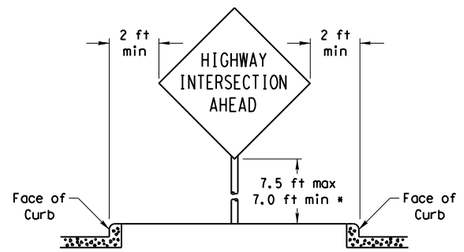
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



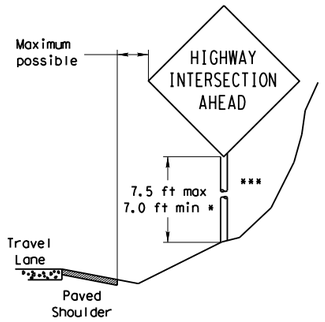
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0912	72	610	VARIOUS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		119

DATE: 12/10/2020 8:42:07 AM
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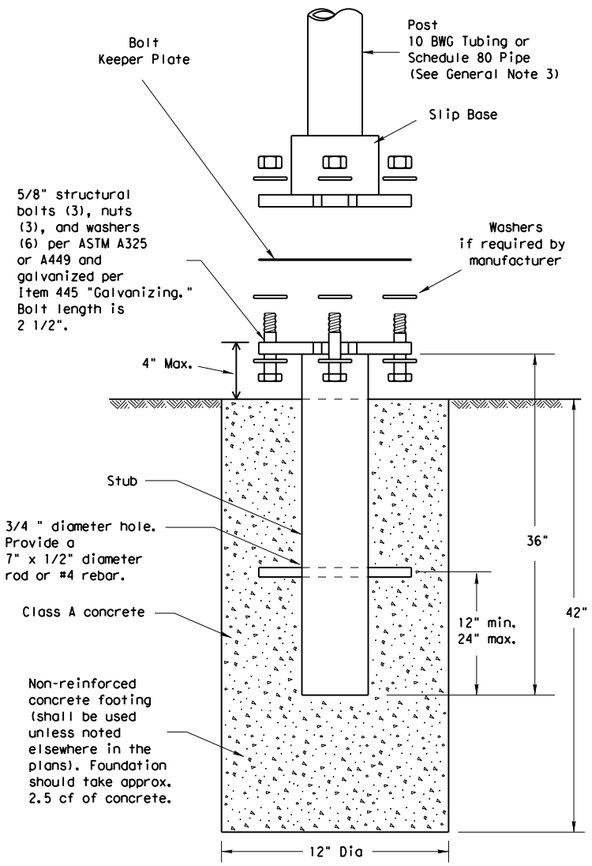
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

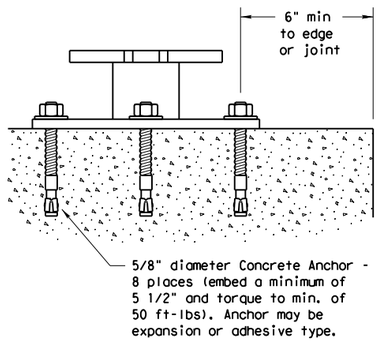
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

©TxDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0912	72	610	VARIOUS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		120

DATE: 12/10/2020 9:04:42 AM
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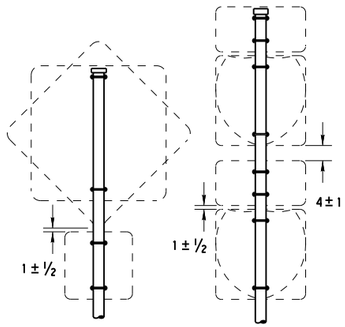
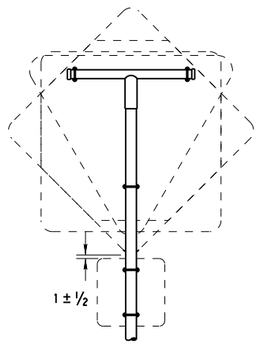


SM RD SGN ASSM TY XXXXX(1)XX(P)



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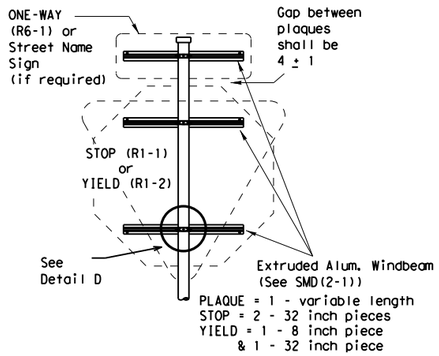

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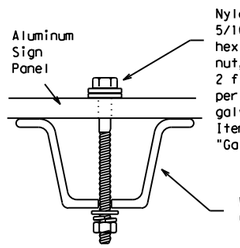
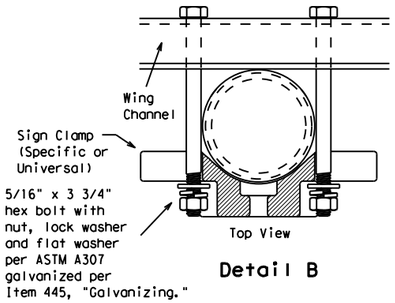
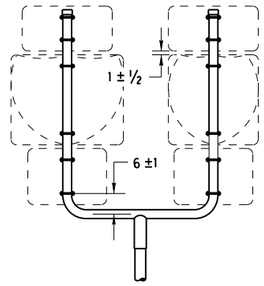


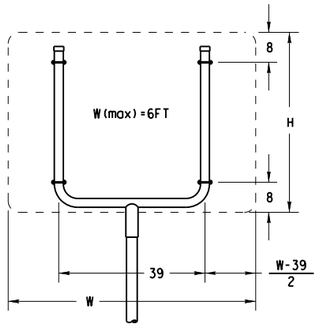
Detail A



Detail B



SM RD SGN ASSM TY XXXXX(1)XX(U)



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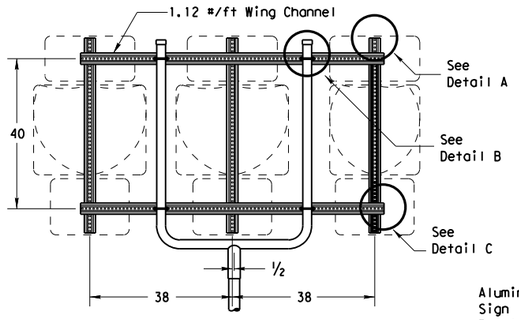
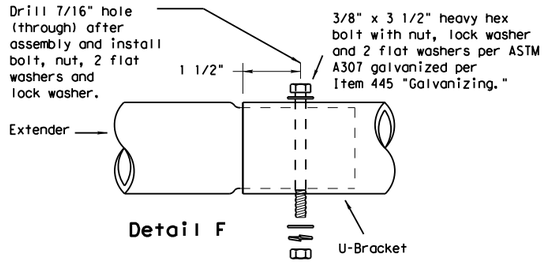
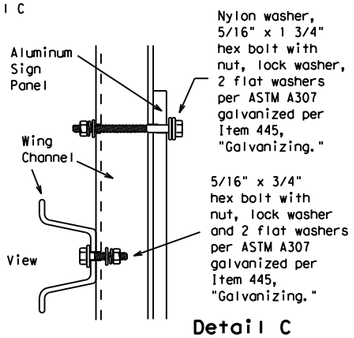


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

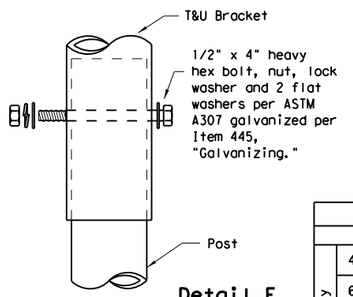


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



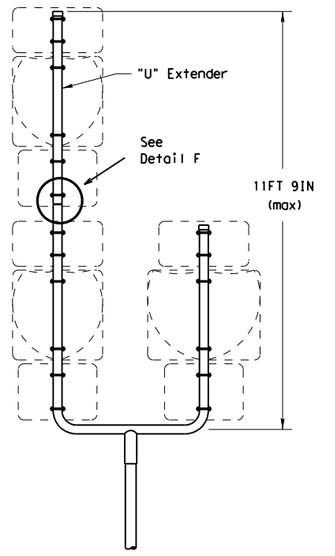
Detail E

GENERAL NOTES:

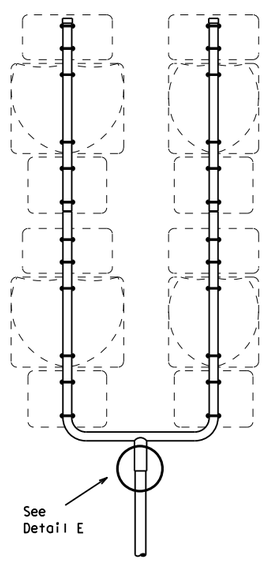
1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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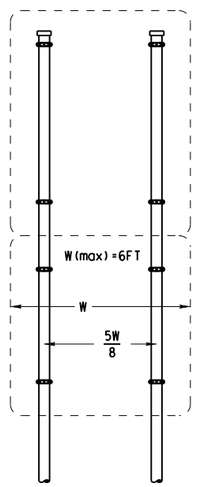
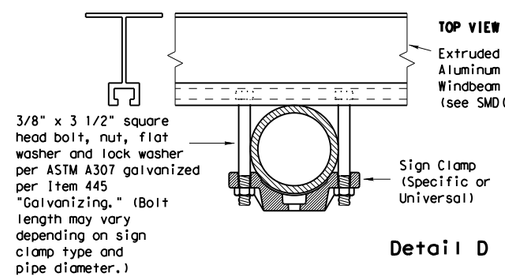
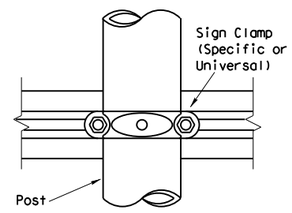


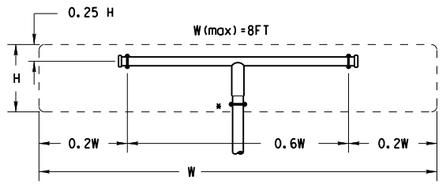
SM RD SGN ASSYM TY XXXXX(2)XX(P)



Detail D



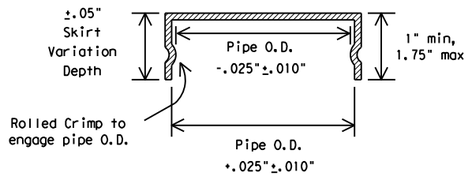
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0912	72	610	VARIOUS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		121

DATE: 12/10/2020 9:09:10 AM
FILE: c:\txdot\pw*online\txdot3\rodney.aust\d0346169\smds2.dgn

DATE: 12/10/2020 9:11:33 AM
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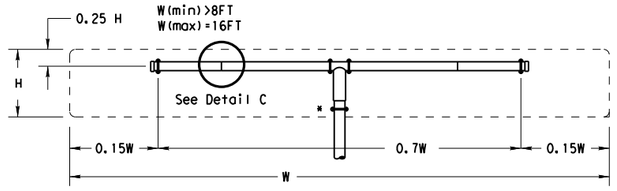
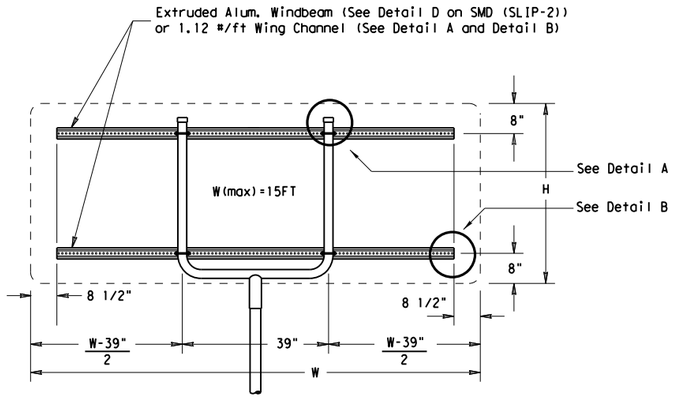
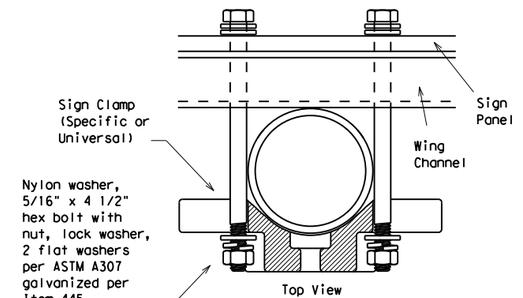


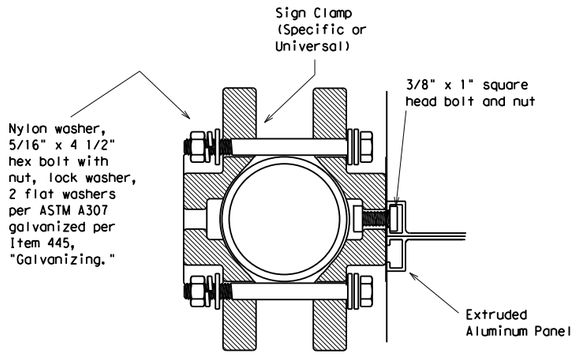
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



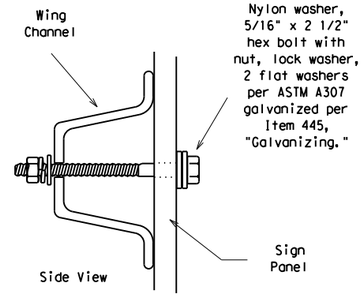
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



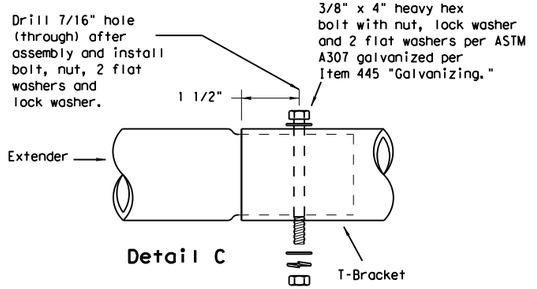
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

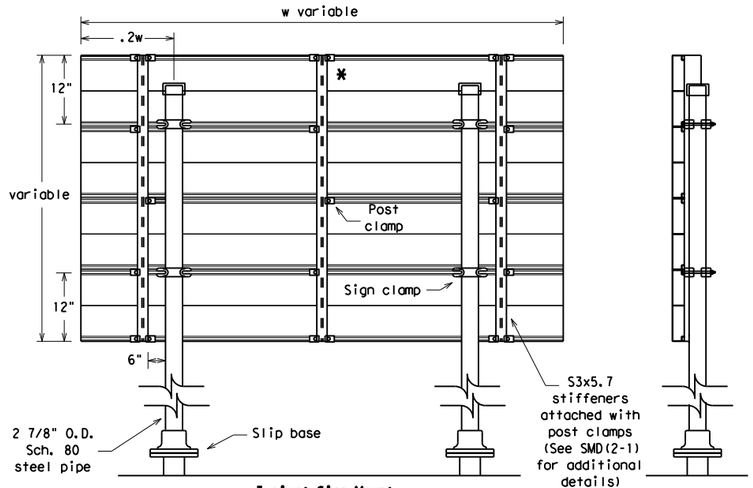


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

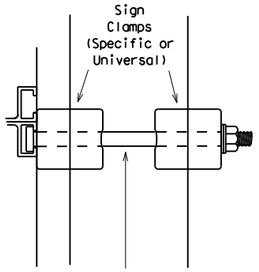


Typical Sign Mount

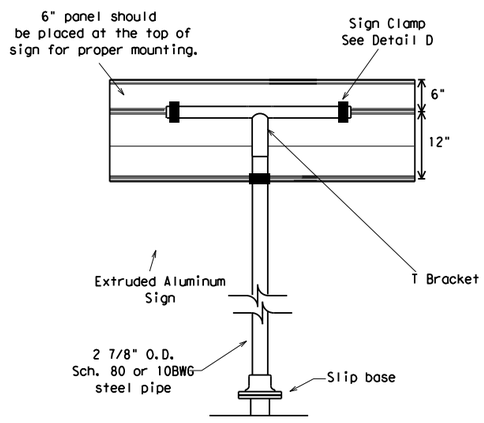
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

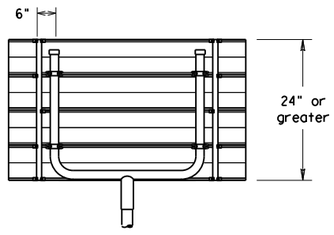
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.

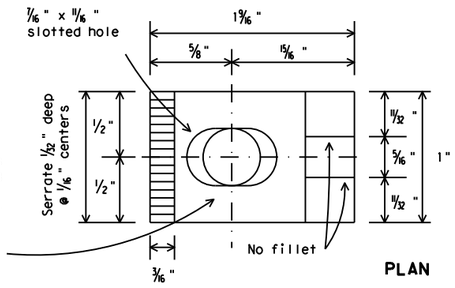
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

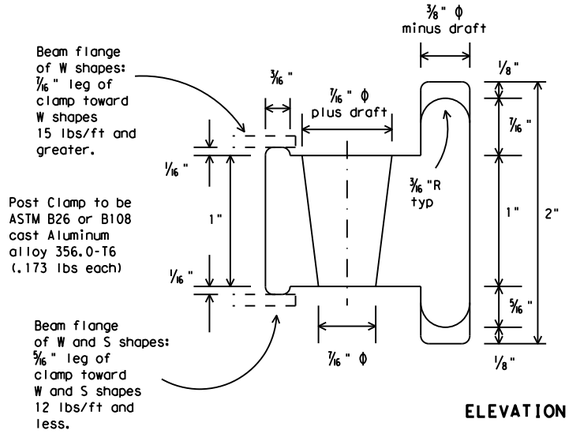
SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0912	72	610	VARIOUS
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		122



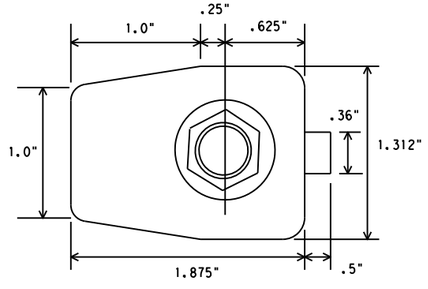
NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.

PLAN

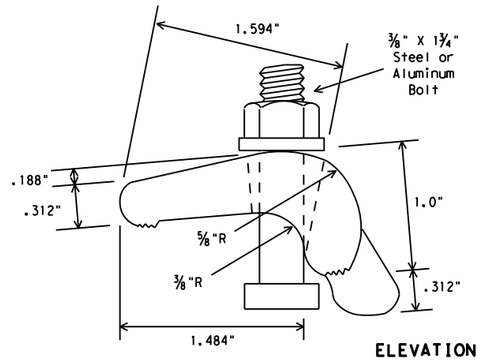


ELEVATION

POST CLAMP DETAIL

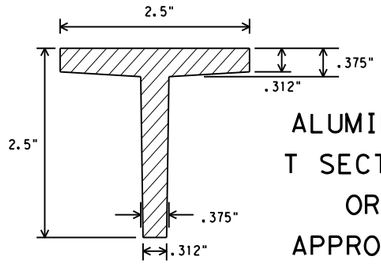


PLAN



ELEVATION

ALTERNATE POST CLAMP DETAIL

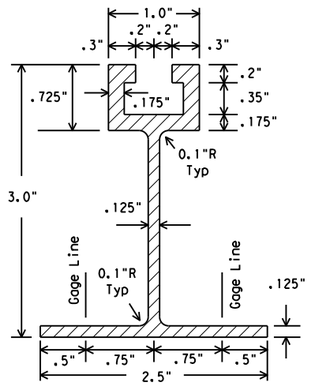


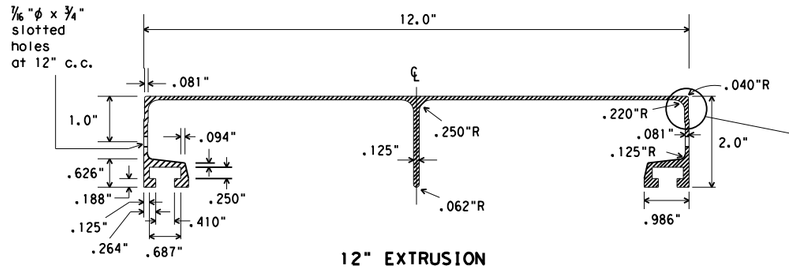
1.912 lbs/ft

ALUMINUM
T SECTION
OR
APPROVED
ALTERNATIVE

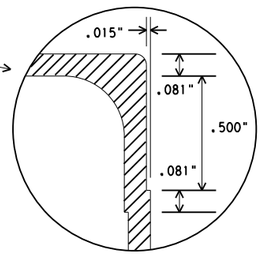
WINDBEAM
CROSS
SECTION

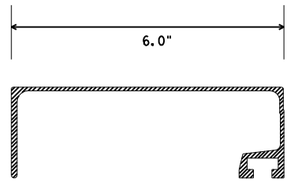
Windbeam to be
extruded aluminum
(1.175 lbs/ft)
or approved
alternative





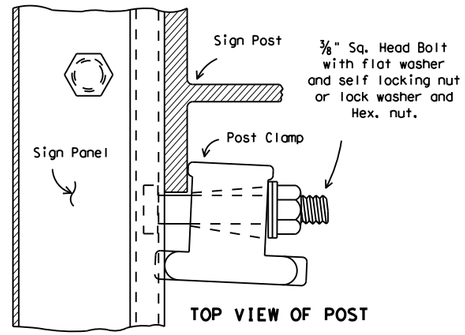
12" EXTRUSION



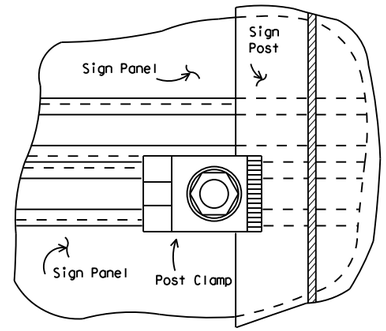


6" EXTRUSION

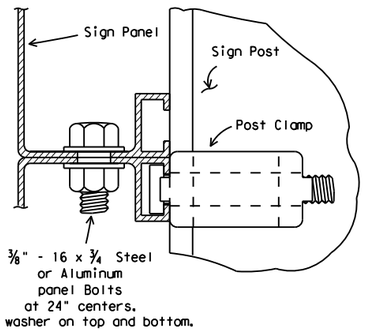
ALUMINUM SIGN PANEL EXTRUSION DETAILS



TOP VIEW OF POST

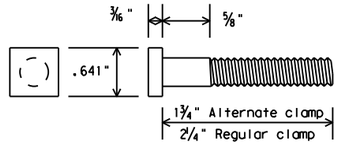


TOP VIEW OF CLAMP



SIDE VIEW OF PANELS

CONNECTION DETAILS



POST CLAMP BOLT DETAIL

DEPARTMENTAL MATERIAL SPECIFICATIONS

SIGN HARDWARE	DMS-7120

GENERAL NOTES:

1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."
4. For fiberglass substrate connection details, see manufacturer's recommendations.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

SMD(2-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0912	72	610	VARIOUS

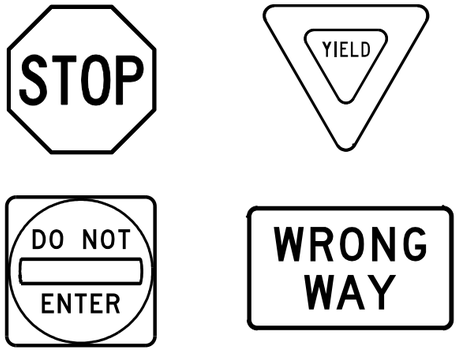
DIST	COUNTY	SHEET NO.
HOU	HARRIS	123

DATE: 12/10/2020 9:17:17 AM
FILE: c:\txdot\pw\online\txdot3\rodney.aust\d0346169\smd21-08.dgn

DATE: 12/10/2020 9:20:25 AM
FILE: c:\txdot\pw_online\txdot3\rodney.aust\d0346169\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

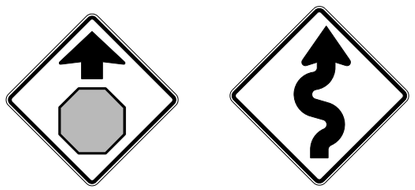
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

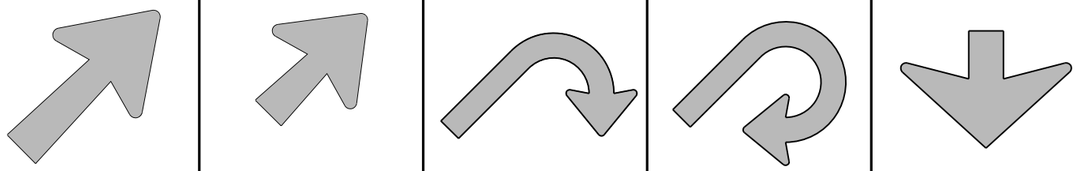
TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	610	VARIOUS
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		124

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

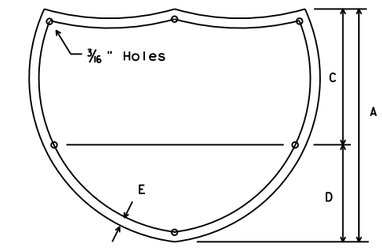
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

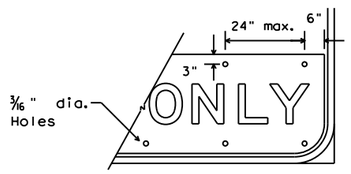
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

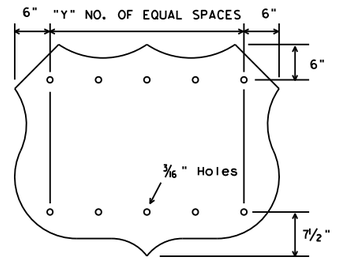


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

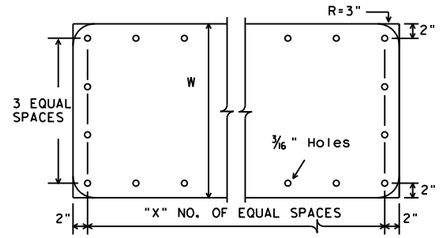


EXIT ONLY PANEL



U.S. ROUTE MARKERS

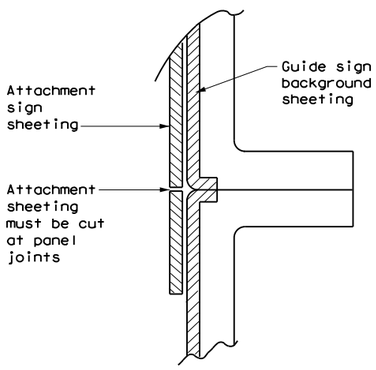
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

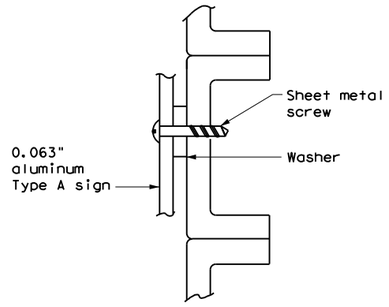
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



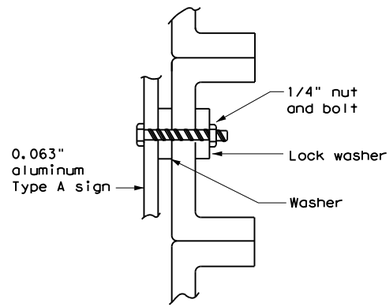
DIRECT APPLIED ATTACHMENT

NOTE:

1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".



SCREW ATTACHMENT



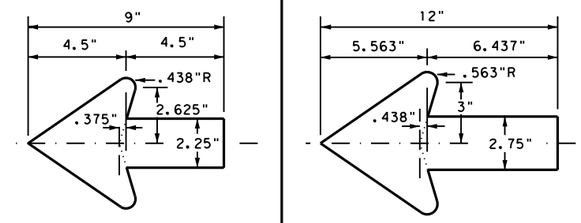
NUT/BOLT ATTACHMENT

NOTE:

Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.

Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

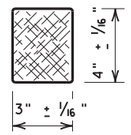
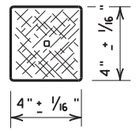
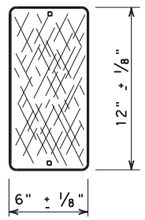
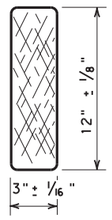
Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

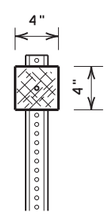
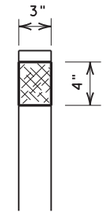
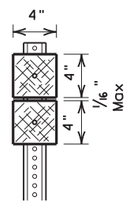
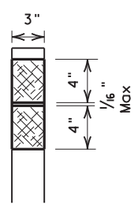
TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	610	VARIOUS
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	HOU	HARRIS		125

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX) SZ X (XXXX) XXX (XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX) XXX (XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

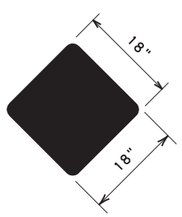
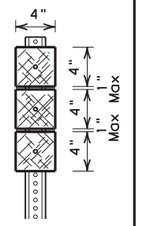
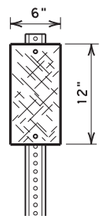
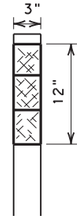
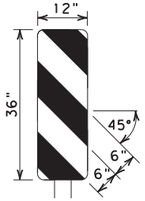
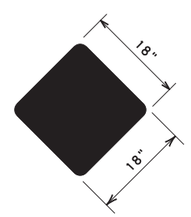
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

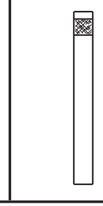
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

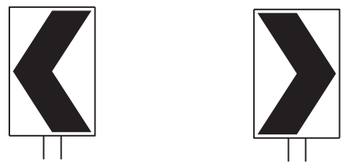
DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

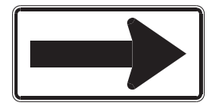
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	
NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).			

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

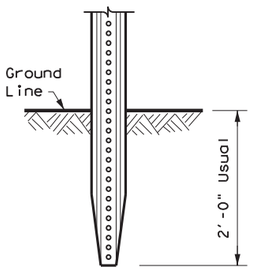
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	610	VARIOUS
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	HOU	HARRIS		125A

DATE: 5/3/2021 8:49:45 AM
FILE: c:\txdot\pw_online\txdot3\gregory.tan\d0346169\D&OM (1)-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

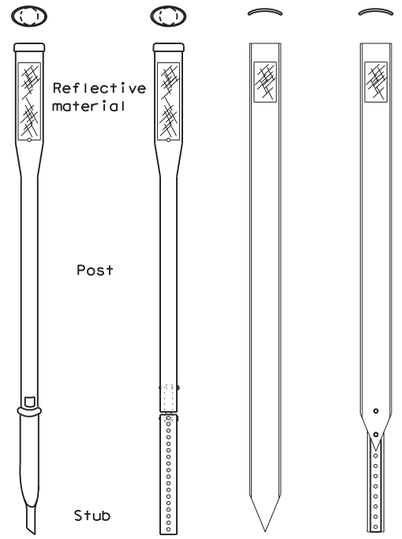


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

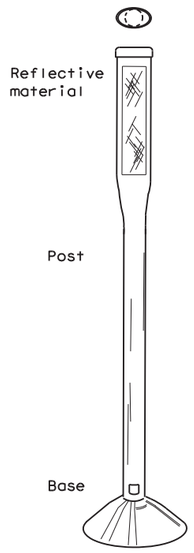
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



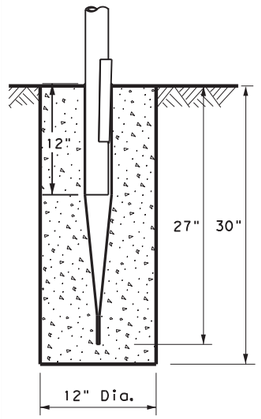
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

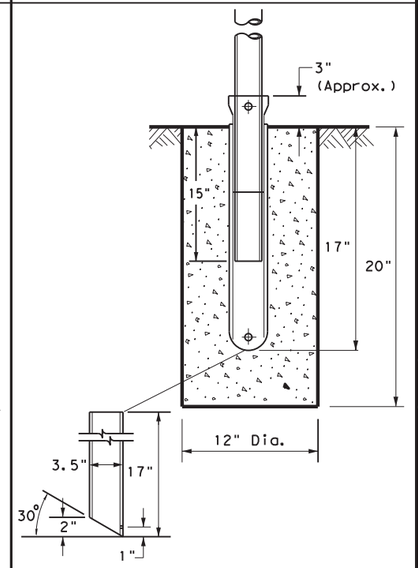
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

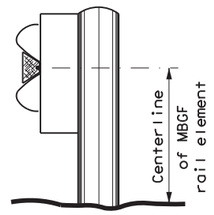
NOTE

1. Install per manufacturer's recommendations.

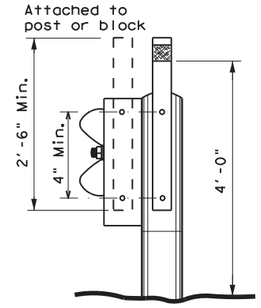
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

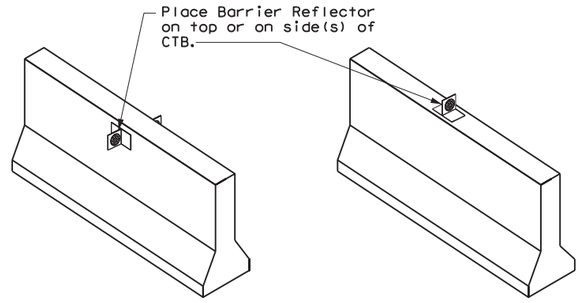
GF1



GF2



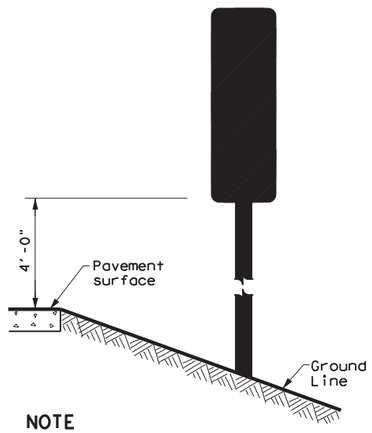
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

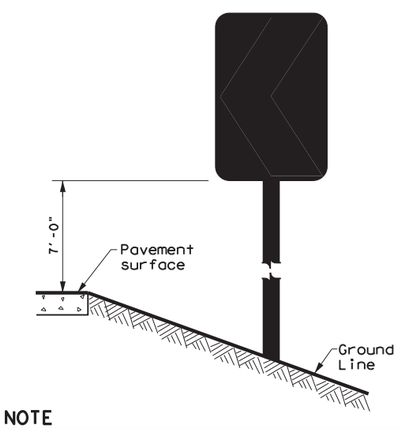
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

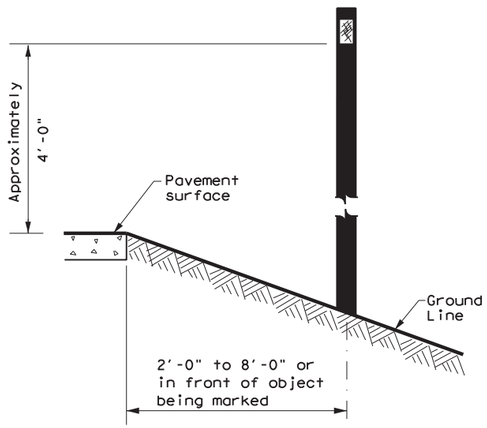
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

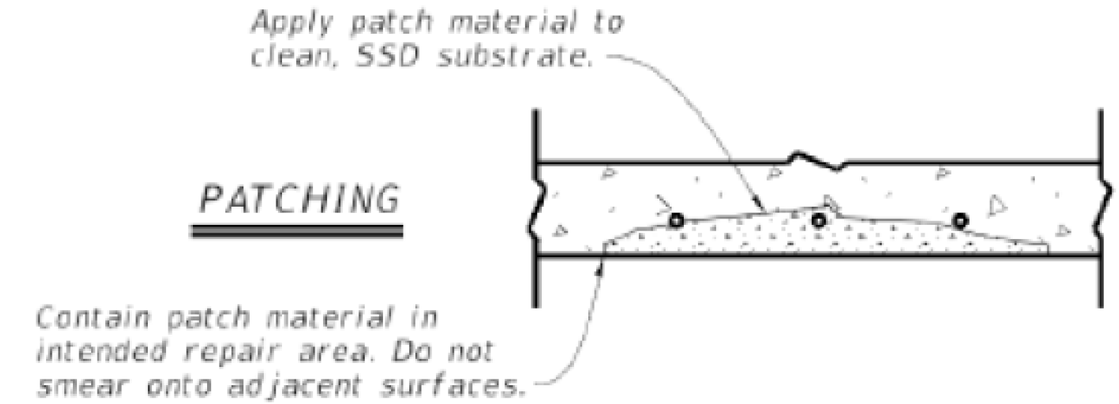
DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

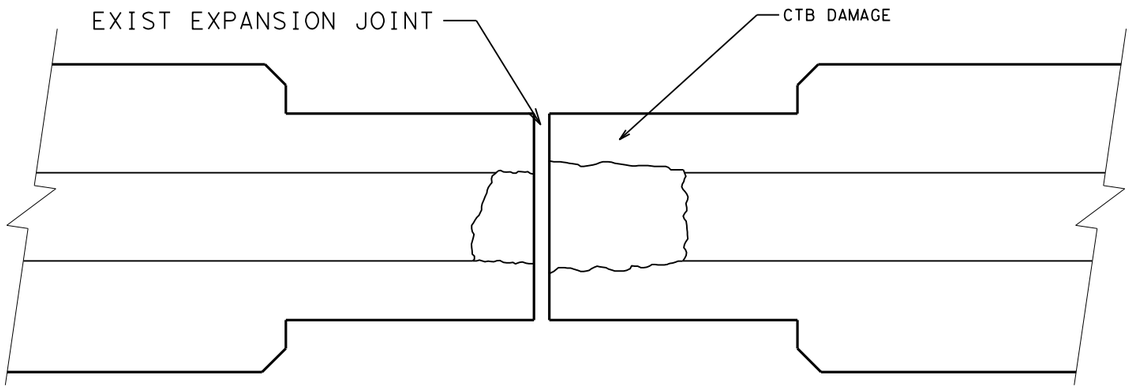
FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	610	VARIOUS
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	HOU	HARRIS		125B

20B

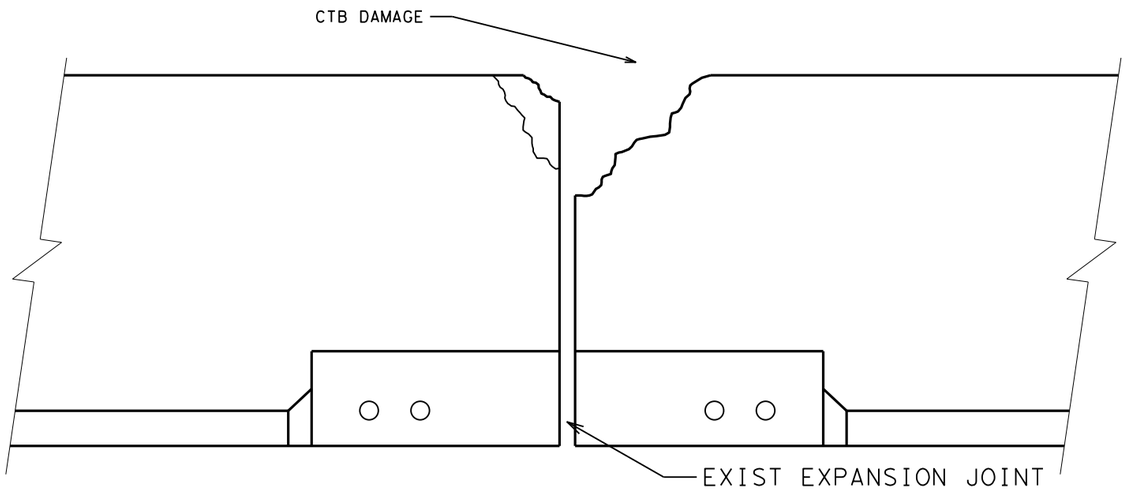
DATE: 5/3/2021 8:51:10 AM
FILE: c:\txdot\pw_online\txdot3\gregory.tan\d0346169\D80M (2)-20.dgn



PATCHING



PLAN VIEW
CTB END

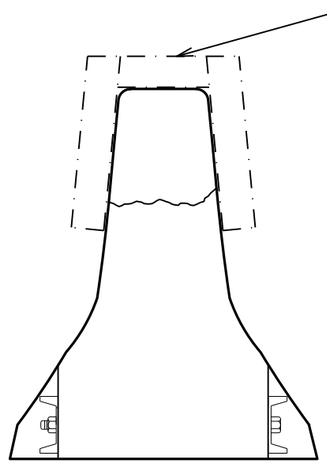


ELEVATION
CTB END

NOTES:

1. CTB SECTION TAKEN FROM AS-BUILT PLAN SHEETS 145, 146 IN THIS PLAN SET
2. REMOVE ANY DAMAGED OR LOOSE CONCRETE WITHIN THE AREA TO BE REPAIRED. TAKE CARE TO NOT DISTURB THE EXISTING STEEL REINFORCEMENT. IF REINFORCEMENT IS DAMAGED, IT CAN BE REPAIRED AS APPROVED BY THE TXDOT ENGINEER.
3. FOR SEALING CRACKS AT THE OUTER CONCRETE SURFACE, APPLY A PREAPPROVED TYPE VIII OR TYPE X EPOXY.
4. THE TEMPERATURE OF THE PATCH MATERIAL AND THE CONCRETE SUBSTRATE AT THE TIME OF APPLICATION MUST BE BETWEEN 40°F AND 95°F.
5. IN FORM-AND-POUR APPLICATIONS, LEAVE FORMS IN PLACE FOR A MINIMUM OF 72 HOURS AFTER PLACING THE REPAIR MATERIAL.
6. CONCRETE REPAIR MATERIAL SHALL BE INSTALLED IN DIRECT CONTACT WITH THE DAMAGED SURFACES OF THE EXISTING SPALLS AND DEFECTS IN CONCRETE MEMBERS.
7. INSULATE THE REPAIR MATERIAL TO ENSURE THAT THERE IS ADEQUATE HEAT FOR CURING IF AMBIENT TEMPERATURE IS EXPECTED TO FALL BELOW 50°F. IF USING ARTIFICIAL HEATING METHODS, DO NOT HEAT THE REPAIR MATERIAL TO ABOVE 130°F.
8. WET THE REPAIR SURFACE BEFORE PLACING CONCRETE.
9. MAINTAIN THE EXISTING EXPANSION JOINT FOR THE FULL HEIGHT OF THE CTB AS THE REPAIR CONCRETE IS PLACED. KEEP THE JOINT OPEN BY INSERTING FOAM INTO THE JOINT BEFORE CONCRETE PLACEMENT.
10. TOUCH UP ANY SCRAPES OR OTHER MINOR DAMAGE TO STEEL ELEMENTS IN ACCORDANCE WITH STANDARD DISTRICT MAINTENANCE PRACTICES. IF ANY GALVANIZED ELEMENTS ARE IMPACTED, THEN THE ENGINEER SHOULD EVALUATE TO DETERMINE APPROPRIATE REPAIR PROCEDURES, SUCH AS TOUCH-UP USING ZINC-RICH PAINT OR OTHER PROCESSES.
11. USE ABRASIVE BLASTING OR OTHER APPROVED TECHNIQUE TO REMOVE RUST FROM EXPOSED STEEL SURFACES
12. CLEAN AND STRAIGHTEN EXPOSED REINFORCING.

CREATE FORM AROUND DAMAGE TO ALLOW PLACEMENT OF CONCRETE REPAIR PATCH. ENSURE FORM IS FASTENED IN A MANNER THAT ALLOWS EASY REMOVAL. ONCE FORM IS REMOVED, THE PATCH SURFACE SHOULD BE CHECKED FOR FLAWS AND CORRECTED AS NECESSARY. SURFACE FINISHING AND GROUTING (WHERE REQUIRED) SHALL BE TWO PARTS SAND ONE PART CEMENT WITH ENOUGH WATER TO MAKE THE MIXTURE PLASTIC. GROUTING SHALL BE DONE IN A MANNER THAT WILL ASSURE A SMOOTH SURFACE. SURFACE FINISHING SHALL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS INVOLVED.



END VIEW

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

CTB REPAIR DETAILS

SCALE: NTS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		126

DATE: 2/5/2021 10:40:26 AM
FILE: c:\txdot\pw_online\txdot3\gregory.tan\d0340952\126 CTB REPAIR DETAILS.dgn

IH 45 CTB DAMAGES
STA 362+97

IH 45 CTB DAMAGES
STA 366+15

IH 45 CTB DAMAGES
STA 367+08

IH 45 CTB DAMAGES
STA 367+65

NOTES:
1. SEE PLAN LAYOUTS FOR ALL REPAIR LOCATIONS. EACH LOCATION SHALL BE CONFIRMED WITH THE TXDOT PROJECT MANAGER. IF ADDITIONAL REPAIR AREAS ARE IDENTIFIED, THEY MUST BE APPROVED BY THE TXDOT PROJECT MANAGER.
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STATE OF TEXAS
ALEXINE STITTIAMS-WARD
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2/8/2021

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9D6BA739BD7743D...

IH 45
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 1 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		127

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CK2 DW2 CK1 DN2

IH 45 CTB DAMAGES
STA 368+85

IH 45 CTB DAMAGES
STA 373+94

IH 45 CTB DAMAGES
STA 374+90

IH 45 CTB DAMAGES
STA 379+28

NOTES:
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STATE OF TEXAS
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2/8/2021

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IH 45
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 2 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		128

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IH 45 CTB DAMAGES
STA 384+03

IH 45 CTB DAMAGES
STA 390+05

IH 45 CTB DAMAGES
STA 396+06

IH 45 CTB DAMAGES
STA 398+46

NOTES:
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IH 45
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 3 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		129

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DN: | CK: | DW: | CK:

IH 45 CTB DAMAGES
STA 402+66

IH 45 CTB DAMAGES
STA 407+59

IH 45 CTB DAMAGES
STA 413+89

IH 45 CTB DAMAGES
STA 419+03

NOTES:
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IH 45
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 4 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		130

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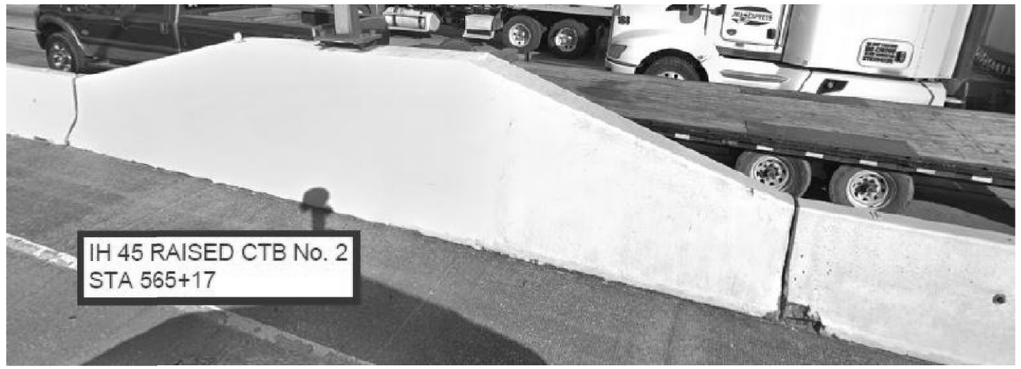
IH 45 RAISED CTB
STA 408+64



IH 45 RAISED CTB
STA 565+17

IH 45 RAISED CTB
STA 617+12

NOTES:

1. IN CASES WHERE THE EXISTING CTB HEIGHT IS UNEVEN, THE PEDESTRIAN BARRIER WILL NOT BE INSTALLED ACROSS THE JOINT. THE PEDESTRIAN BARRIER WILL END TO EITHER SIDE OF THE JOINT, LEAVING THE SMALLEST GAP POSSIBLE.
2. THE PEDESTRIAN BARRIER SHALL NOT BE INSTALLED ACROSS THE TOP OF ANY EXISTING BARRIER THAT IS NOT HORIZONTAL.

2/8/2021

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
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IH 45
CTB REPAIR
NOTES & DETAILS

SCALE: NTS

SHEET 5 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		131

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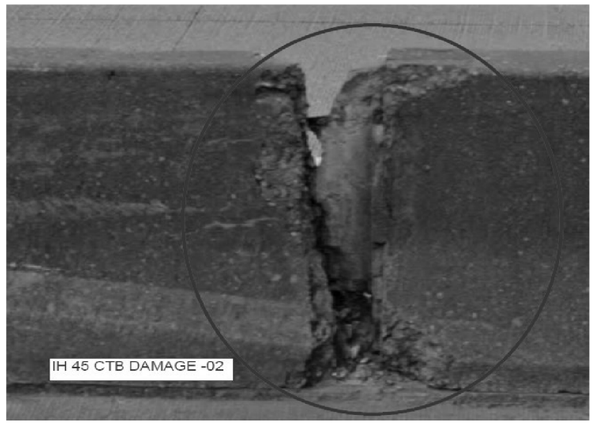
IH 45 CTB DAMAGES
STA 360+58

IH 45 CTB DAMAGES
STA 360+58



IH 45 CTB DAMAGES
STA 347+93

NOTES:
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STATE OF TEXAS
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IH 45
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 6 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		132

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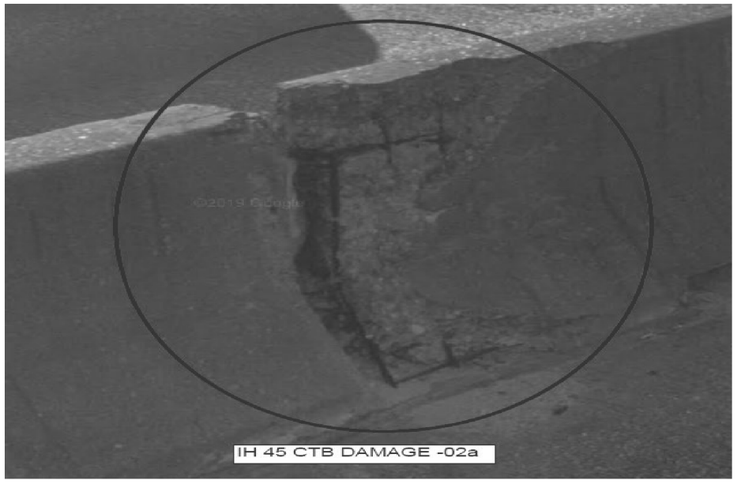
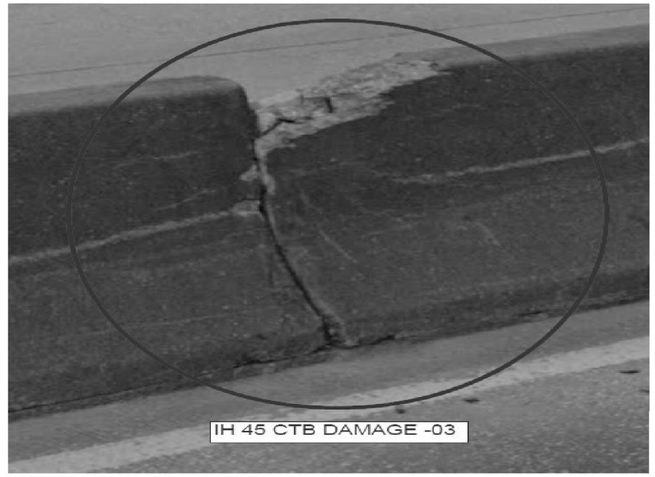
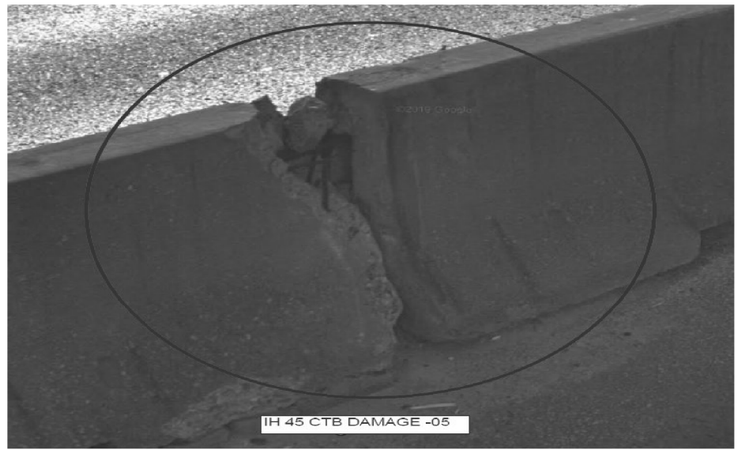


IH 45 CTB DAMAGES
STA 347+93



IH 45 CTB DAMAGES
STA 347+69

IH 45 CTB DAMAGES
STA 341+79



IH 45 CTB DAMAGES
STA 339+74

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STATE OF TEXAS
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IH 45
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 7 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		133

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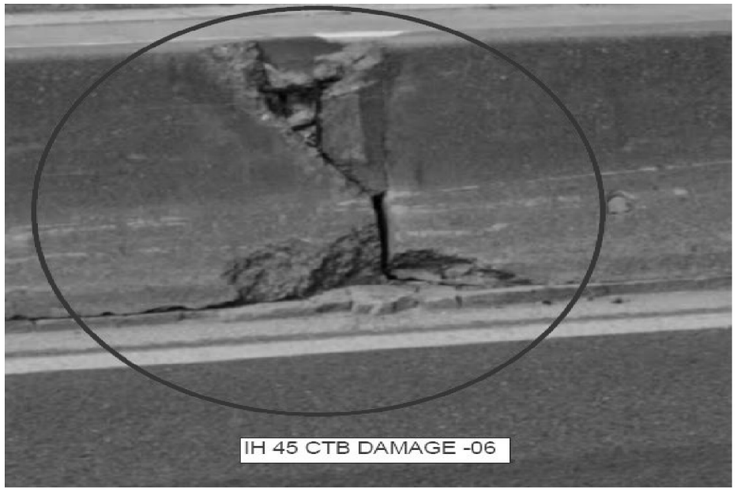
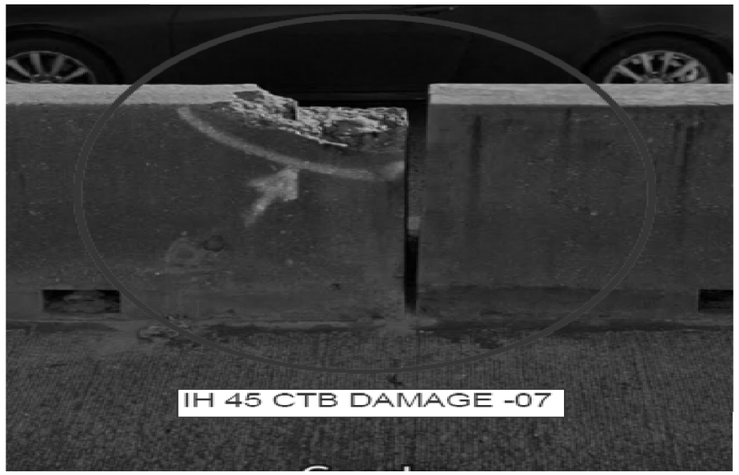


IH 45 CTB DAMAGES
STA 323+75



IH 45 CTB DAMAGES
STA 321+05

IH 45 CTB DAMAGES
STA 310+17

IH 45 CTB DAMAGES
STA 303+40

NOTES:
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IH 45
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 8 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		134

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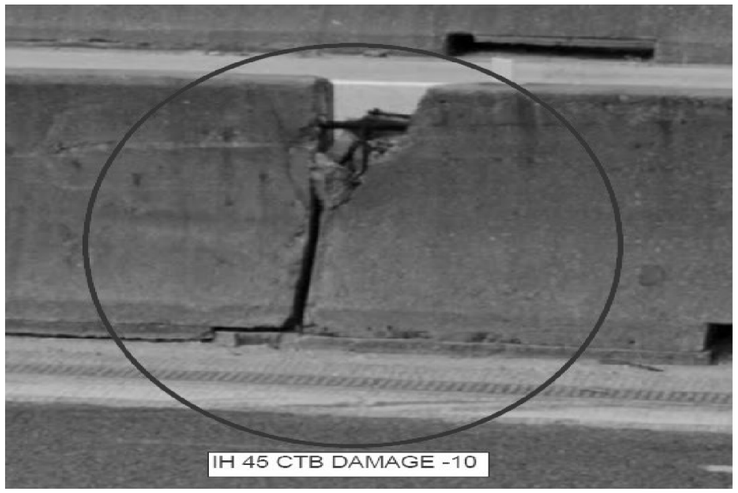
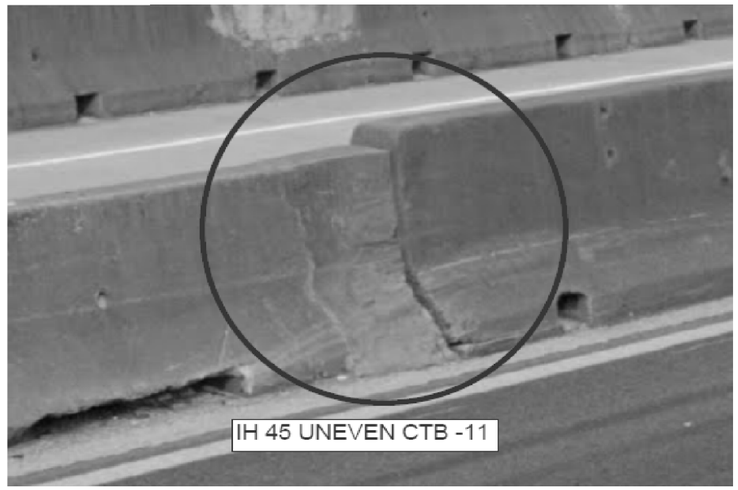


IH 45 CTB DAMAGES
STA 293+63



IH 45 UNEVEN CTB
STA 293+35

NOTES:
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2/8/2021

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
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IH 45
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 9 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		135

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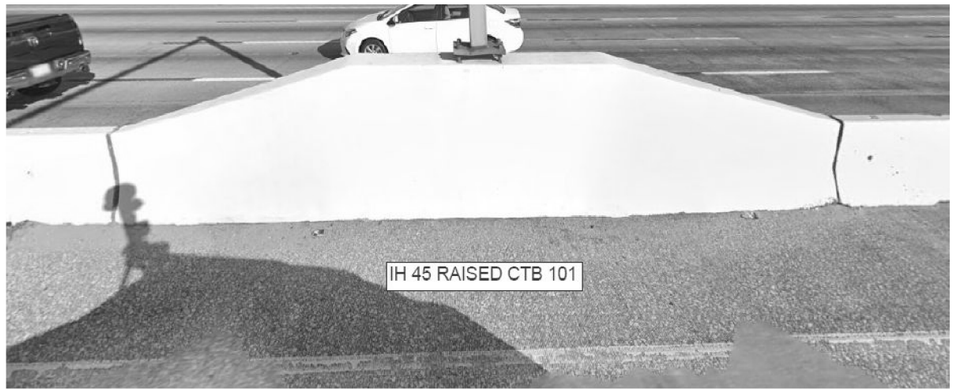
IH 45 RAISED CTB
STA 355+80

IH 45 RAISED CTB
STA 318+58

IH 45 RAISED CTB
STA 453+82



IH 45 RAISED CTB
STA 513+87

NOTES:
1. IN CASES WHERE THE EXISTING CTB HEIGHT IS UNEVEN, THE PEDESTRIAN BARRIER WILL NOT BE INSTALLED ACROSS THE JOINT. THE PEDESTRIAN BARRIER WILL END TO EITHER SIDE OF THE JOINT, LEAVING THE SMALLEST GAP POSSIBLE.
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STATE OF TEXAS
ALEXINE STITTIAMS-WARD
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2/8/2021

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IH 45
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 10 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		136

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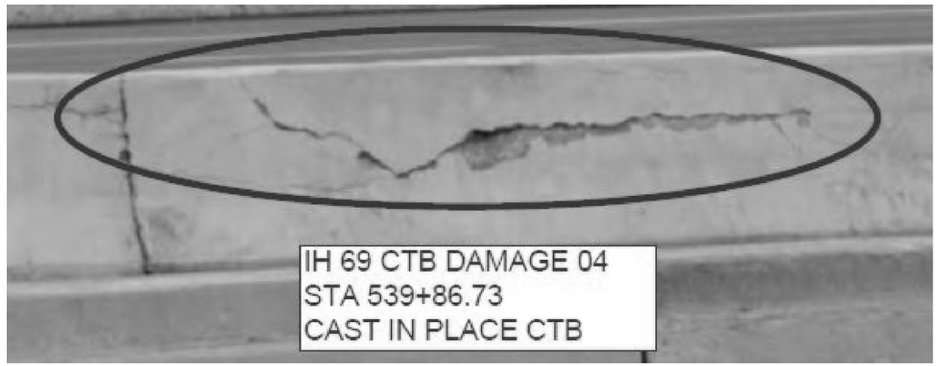
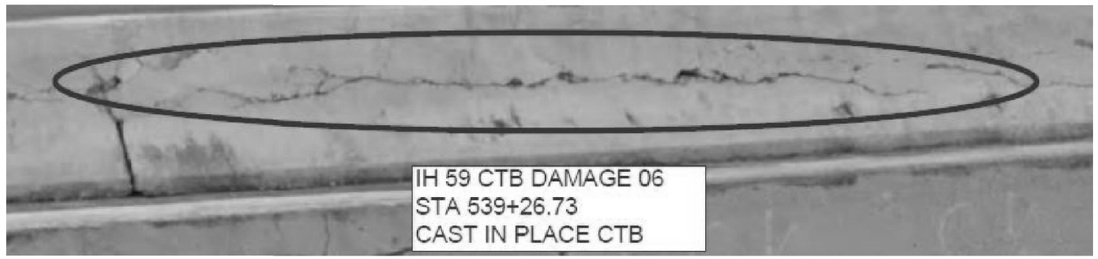
IH 69 CTB DAMAGES
STA 540+65.24



IH 69 CTB DAMAGES
STA 539+86.73

IH 69 CTB DAMAGES
STA 539+56.73



IH 69 CTB DAMAGES
STA 539+26.73

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Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 1 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		137

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IH 69 CTB DAMAGES
STA 476+70.79

IH 69 CTB DAMAGES
STA 444+02

IH 69 CTB DAMAGES
STA 401+86

IH 69 CTB DAMAGES
STA 394+85

NOTES:
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IH 69
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 2 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		138

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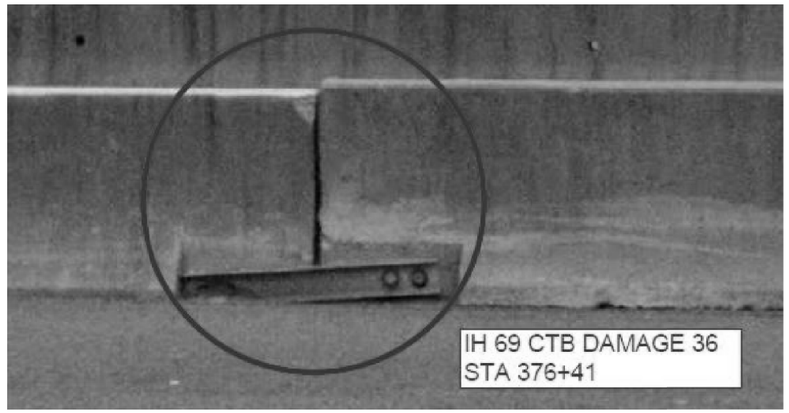

IH 69 CTB DAMAGES
STA 376+41

NOTE:
1. IN CASES WHERE THE EXISTING CTB HEIGHT IS UNEVEN. THE PEDESTRIAN BARRIER WILL NOT BE INSTALLED ACROSS THE JOINT. THE PEDESTRIAN BARRIER WILL END TO EITHER SIDE OF THE JOINT. LEAVING THE SMALLEST GAP POSSIBLE.

IH 69 CTB DAMAGES
STA 340+24.59

NOTE:
1. IN CASES WHERE THE EXISTING CTB HEIGHT IS UNEVEN. THE PEDESTRIAN BARRIER WILL NOT BE INSTALLED ACROSS THE JOINT. THE PEDESTRIAN BARRIER WILL END TO EITHER SIDE OF THE JOINT. LEAVING THE SMALLEST GAP POSSIBLE.
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STATE OF TEXAS
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IH 69
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 3 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		139

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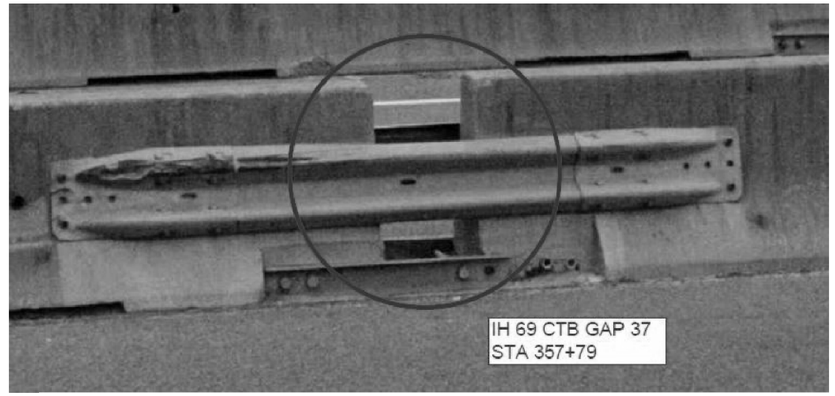
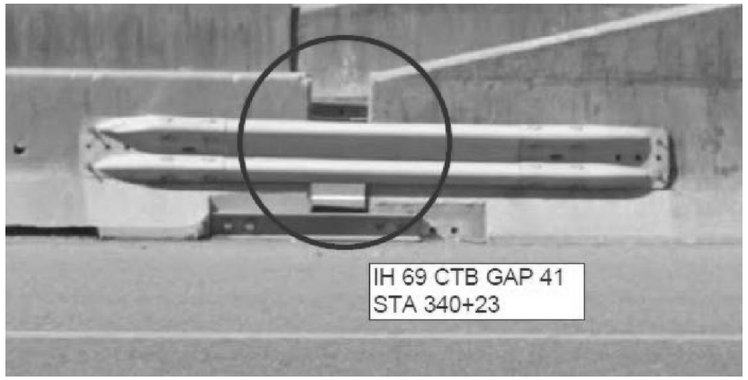
IH 69 CTB DAMAGES
STA 434+00



IH 69 CTB GAP
STA 357+79



IH 69 CTB GAP
STA 340+23

NOTE:
1. IN CASES WHERE THE EXISTING CTB HEIGHT IS UNEVEN. THE PEDESTRIAN BARRIER WILL NOT BE INSTALLED ACROSS THE JOINT. THE PEDESTRIAN BARRIER WILL END TO EITHER SIDE OF THE JOINT. LEAVING THE SMALLEST GAP POSSIBLE.
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IH 69
CTB REPAIR
NOTES & DETAILS

SCALE:NTS SHEET 4 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		140

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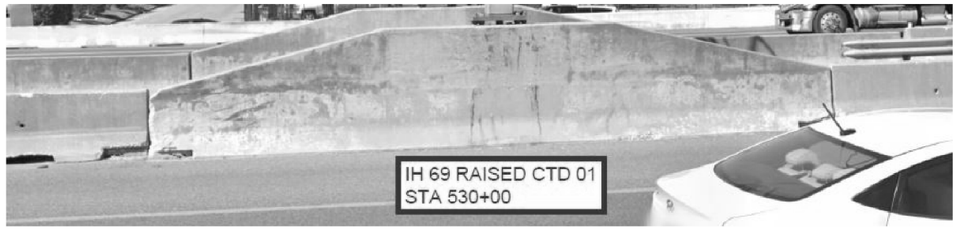
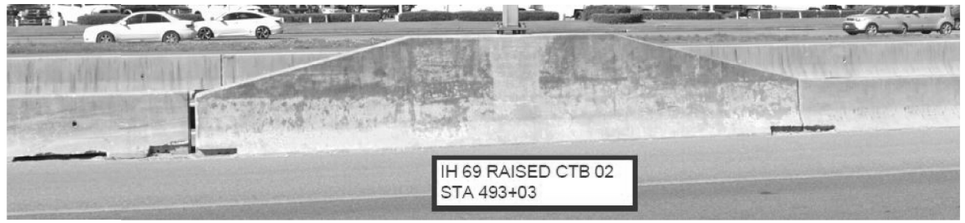


IH 69 RAISED CTB
STA 530+00



IH 69 RAISED CTB
STA 493+03

IH 69 RAISED CTB
STA 434+01

IH 69 RAISED CTB
STA 375+79

IH 69 RAISED CTB
STA 340+24.58

NOTE:
1. IN CASES WHERE THE EXISTING CTB HEIGHT IS UNEVEN. THE PEDESTRIAN BARRIER WILL NOT BE INSTALLED ACROSS THE JOINT. THE PEDESTRIAN BARRIER WILL END TO EITHER SIDE OF THE JOINT. LEAVING THE SMALLEST GAP POSSIBLE.
2. THE PEDESTRIAN BARRIER SHALL NOT BE INSTALLED ACROSS THE TOP OF ANY EXISTING BARRIER THAT IS NOT HORIZONTAL.

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 5 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		141

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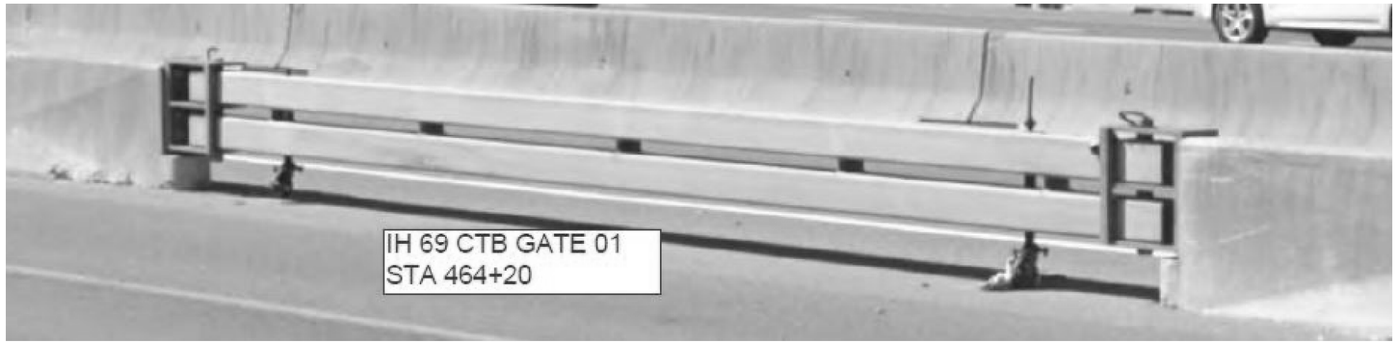

IH 69 CTB GATE
STA 464+20

IH 69 CTB GATE
STA 402+20

NOTE:
1. THE PEDESTRIAN BARRIER WILL NOT BE INSTALLED ACROSS THE HOV GATE. THE PEDESTRIAN BARRIER WILL END TO EITHER SIDE OF THE HOV GATE.

2/8/2021

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 6 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		142

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IH 69 DUAL CTB'S
STA 277+40

NOTES:
1. SEE PLAN LAYOUTS FOR ALL REPAIR LOCATIONS. EACH LOCATION SHALL BE CONFIRMED WITH THE TXDOT PROJECT MANAGER. IF ADDITIONAL REPAIR AREAS ARE IDENTIFIED, THEY MUST BE APPROVED BY THE TXDOT PROJECT MANAGER.
2. REFER TO THE CTB REPAIR DETAILS PLAN SHEET FOR MORE INFORMATION.

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 7 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		143

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IH 69 CTB GATE
STA 286+30

IH 69 CTB GATE
STA 241+20

NOTE:
1. THE PEDESTRIAN BARRIER WILL NOT BE INSTALLED ACROSS THE HOV GATE.
   THE PEDESTRIAN BARRIER WILL END TO EITHER SIDE OF THE HOV GATE.

2/8/2021

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED
PROFESSIONAL ENGINEER

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 69
CTB REPAIR
NOTES & DETAILS

SCALE: NTS SHEET 8 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0912	72	610	VARIOUS
DIST	COUNTY		SHEET NO.
HOU	HARRIS		144

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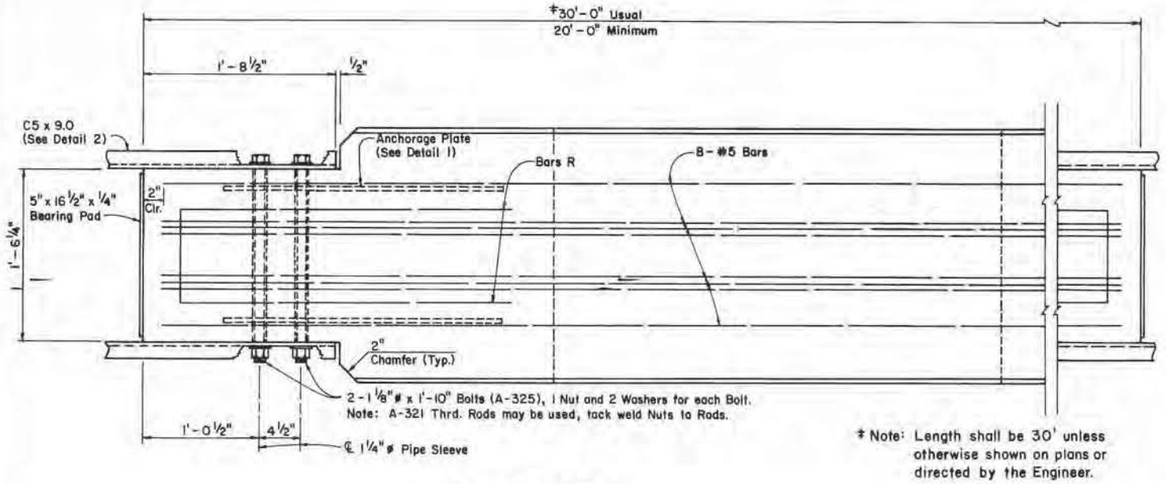
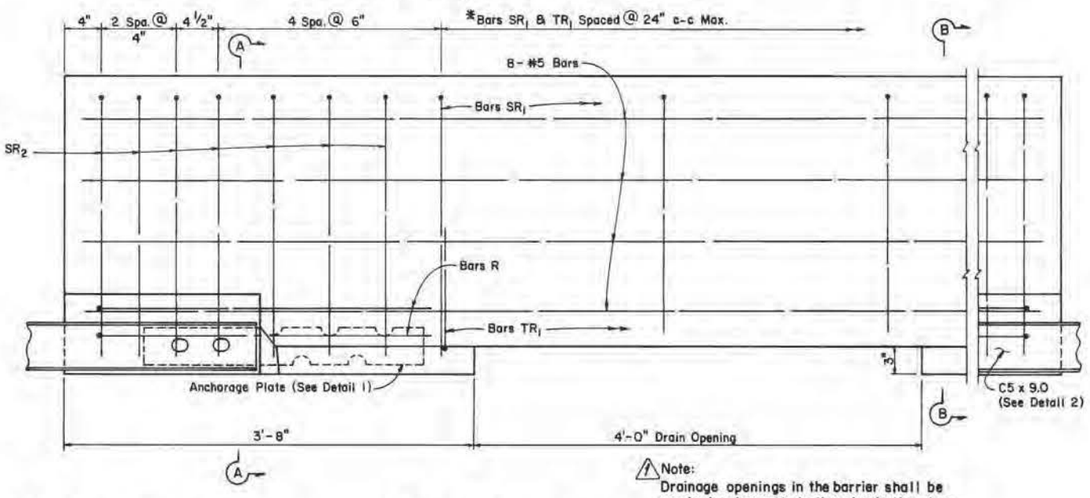


* Note: Length shall be 30' unless otherwise shown on plans or directed by the Engineer.

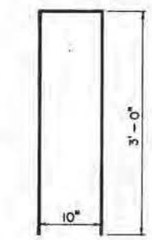
PLAN VIEW
(TYP. BOTH ENDS)



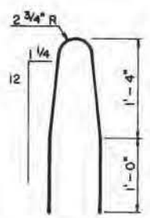
*Omit Bars TR_1 at drain openings and field cut Bars SR_1 to clear drain openings by 1½".

ELEVATION
(TYP. BOTH ENDS)

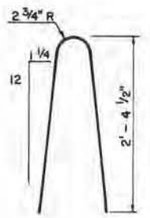
⚠ Note:
Drainage openings in the barrier shall be required unless noted otherwise in the plans. Approval of the engineer shall be obtained prior to omitting drainage openings in areas not specifically designated in the plans. Where drainage openings are required, there shall be three 4'-0" openings in each 30' section, one of which shall be centered within the length of the barrier.



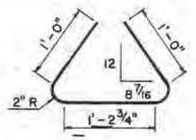
BAR R
(#6)



BAR SR_2
(#4)



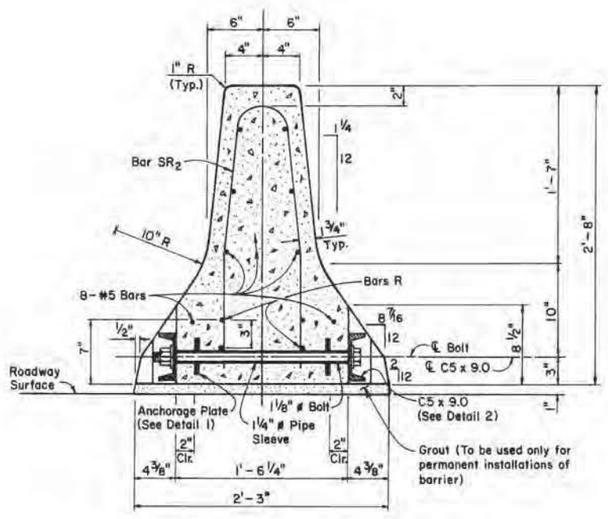
BAR SR_1
(#4)



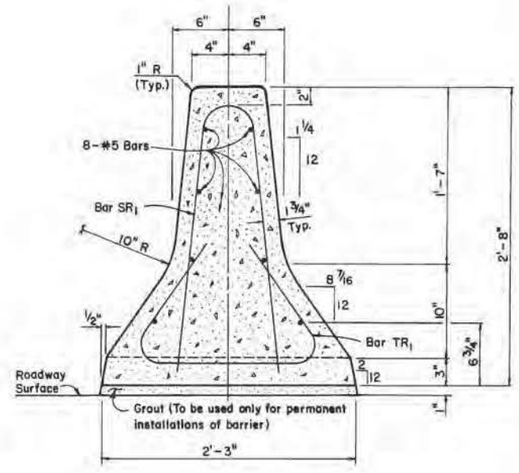
BAR TR_1
(#4)

GENERAL NOTES

1. CHANNEL SECTIONS AND ALL STEEL PLATES SHALL CONFORM TO ASTM DESIGNATION A36.
2. BEARING PADS SHALL BE MADE OF AN ELASTOMERIC MATERIAL WITH A HARDNESS OF 70 DUROMETER AND ARE TO BE EPOXIED TO BARRIER UNIT AFTER CASTING.
3. ALL CONCRETE SHALL BE CLASS A, C OR H.
4. ALL LONGITUDINAL REINFORCING STEEL SHALL BE GRADE 60. ALL VERTICAL REINFORCING STEEL SHALL BE GRADE 40.
5. EACH BARRIER SHALL BE DELIVERED WITH 2 CHANNEL SHAPES (C5 x 9.0) AND CONNECTING HARDWARE.
6. WHEN BARRIER IS TO BE PLACED IN A CURVING ALIGNMENT, THE C5 x 9.0 CHANNEL SECTIONS MAY BE HEATED AT THE MIDPOINT AND PRE-BENT.
7. ALL C5 x 9.0 CHANNELS SHALL BE HOT-DIP GALVANIZED IN CONFORMANCE TO ASTM DESIGNATION A123. BOLTS, NUTS, AND WASHERS SHALL BE HOT-DIP GALVANIZED TO CONFORM TO ASTM DESIGNATION A153.
8. 2" ø LIFTING HOLES SHALL BE FORMED IN EACH SECTION OF CONCRETE TRAFFIC BARRIER. THEY SHALL BE LOCATED 1'-5" ABOVE THE BASE, 5'-0" FROM EACH END AND AT THE MID-POINT.
9. REINFORCING STEEL, BOLTS, NUTS, WASHERS, CHANNEL SECTIONS, AND ANCHORAGE PLATES SHALL BE INCLUDED IN THE PRICE PAID PER LINEAR FOOT FOR CONCRETE TRAFFIC BARRIER.
10. WHEN SERVING TO CHANNELIZE TRAFFIC IN NIGHTTIME SITUATIONS, THE BARRIER SHOULD BE LIGHT IN COLOR AND SHALL BE SUPPLEMENTED BY THE USE OF STANDARD DELINEATION OR CHANNELIZATION MARKINGS OR DEVICES SUCH AS DELINEATORS OR VERTICAL PANELS.



SECTION A-A



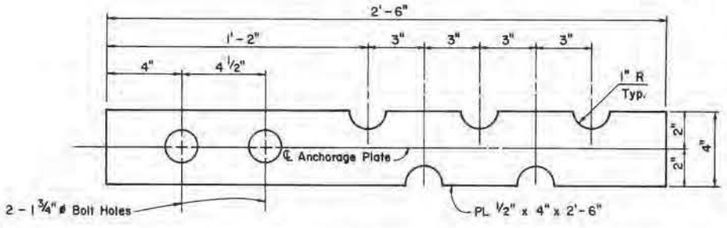
SECTION B-B

FOR CONTRACTOR INFORMATION ONLY

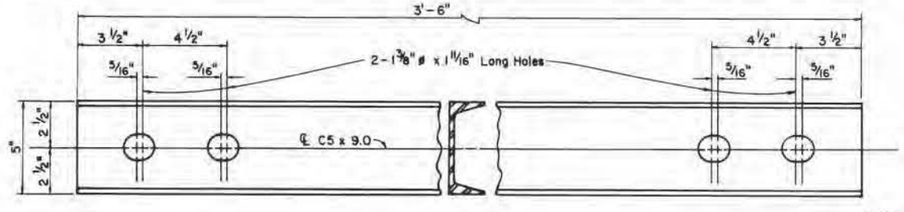
*APPROXIMATE QUANTITIES FOR A 30 FT. SECTION		
CONCRETE	CY	3.27
REINFORCING STEEL	LBS	390

Approximate weight per foot is 442 Lbs.

*For Contractor's Information Only.



DETAIL 1



DETAIL 2

SHEET 145

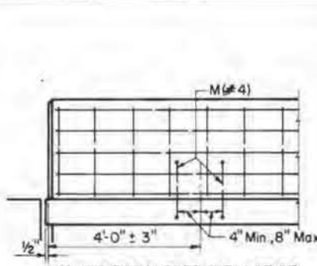
STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

CONCRETE TRAFFIC BARRIER PORTABLE AND PRECAST

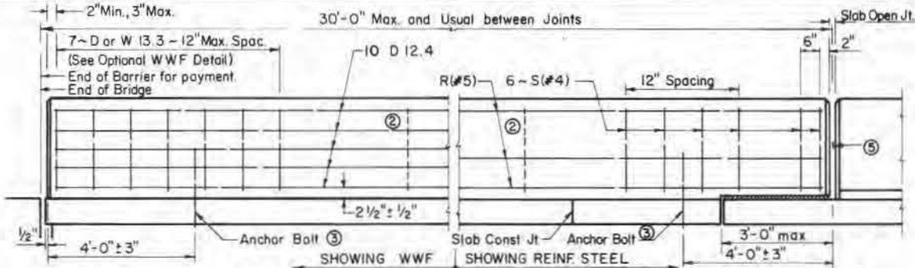
CTB (P&P) (SPL)

DN	DRAWING	DATE	FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			HIGHWAY NO.
CK DN		Sept., 1986	6	TEXAS	F514(B6)			US 59
DW RNB	⚠ Revised By TC&B 7/87		STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	SHEET NO.
CK DW MGA			12	HARRIS	27	13	126	116
TR								
CK TR								

Larry E. Jones 1/20/88

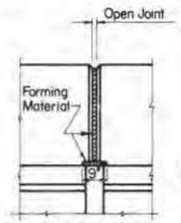


SHOWING TWO M BARS IN PLACE OF ONE ANCHOR BOLT ASSEMBLY



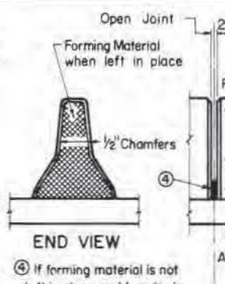
ELEVATION OF TRAFFIC BARRIER

② Note: Additional vertical wires or auxiliary conventional reinforcing shall be placed as necessary to provide cage stability. At least one vertical wire or bar is necessary at the mid point (± 1 ft.) of the segment.



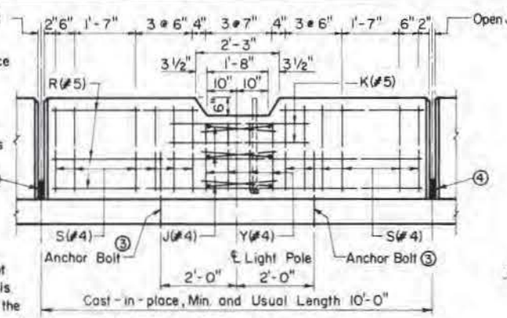
BARRIER JOINT FOR PRESTR. CONC. BOX BEAMS

⑤ No forming material to be left in place adjacent to slab expansion joints.



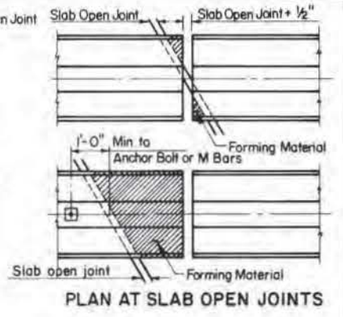
END VIEW

④ If forming material is not left in place, and barrier is on low side of roadway, the bottom 6" shall be plugged with concrete or joint sealing compound.

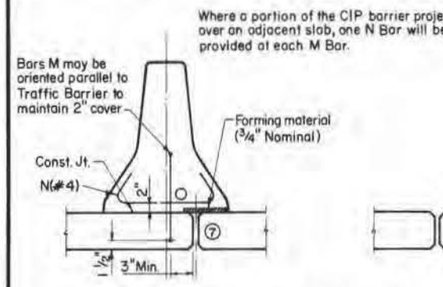


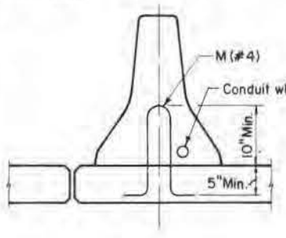
ELEVATION AT LIGHT POLE

③ Two Bars M may be used in lieu of each Anchor Bolt

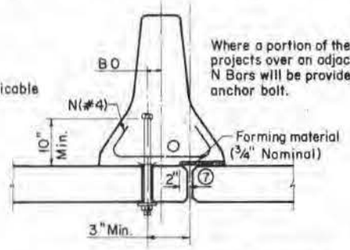


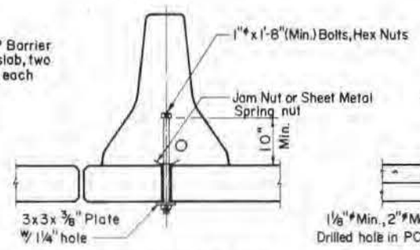
PLAN AT SLAB OPEN JOINTS



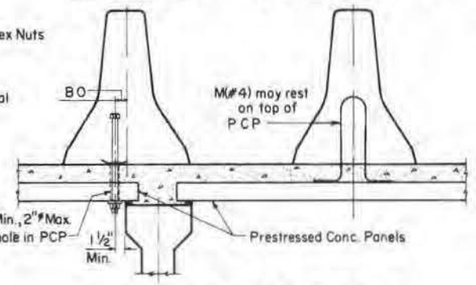


CAST-IN-PLACE ON NEW SLABS

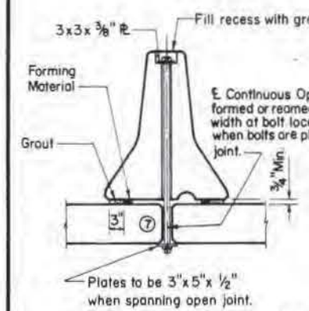


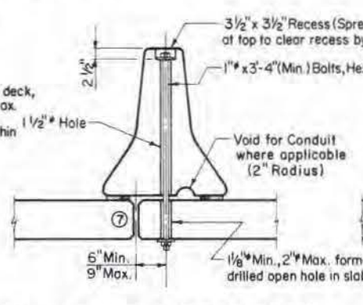


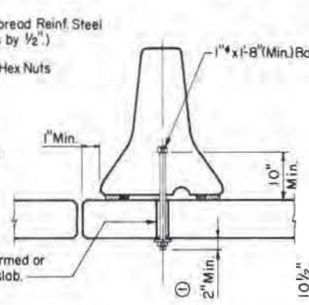
CAST-IN-PLACE ON NEW OR EXISTING SLABS



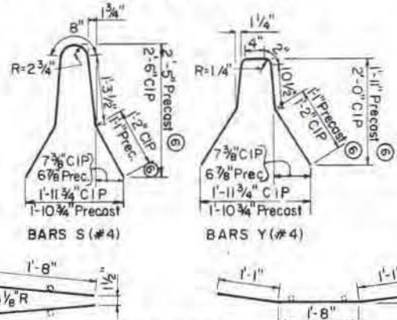
CAST-IN-PLACE WITH PCP SLABS

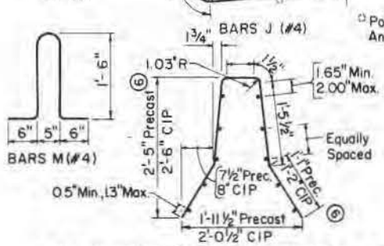


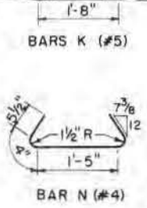




PRECAST ON NEW OR EXISTING SLABS





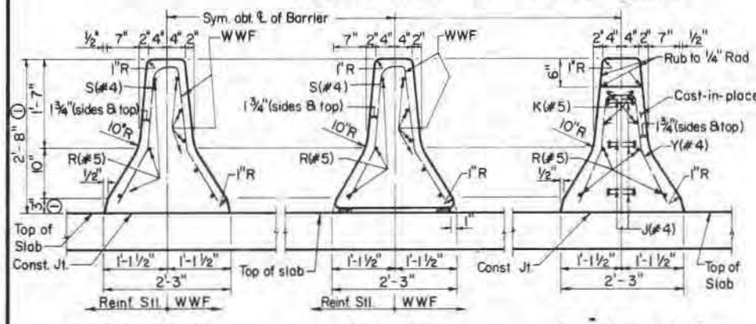


Detail shown is for D 12.4 longitudinal wires and D or W 13.3 vertical wires. Combinations of Reinforcing Steel and Welded Wire Fabric or configurations of Welded Wire Fabric other than shown will be permitted when conditions below are satisfied and the dimension from end of section to first welded vertical wire does not exceed 3".

DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
1. Min. (Cumulative Total) Wire Area	1.24 Sq. In.	0.133 Sq. In. Per Ft. (End 6'-0" of all sections)
2. No. of Wires Minimum Maximum	6 14	7 @ 12" 19 @ 4"
3. Maximum Wire Size Differential	The smaller wire shall have an area of 40% or more of the larger wire.	

⑥ Dimensions shown are permissible for structures with overlays up to 2 inches. Adjust by height of overlays over 2 inches.

⑦ Some longer span structures with open median joints require separate T501 (MOD) bridge railing on both sides due to the potential differential deflections.



CAST-IN-PLACE PRECAST AT LIGHT POLE

TYPICAL SECTIONS

① Note: If bridge deck has Asphaltic Concrete Overlay, the height of cast-in-place and precast barriers and full height anchor bolts must be adjusted accordingly. See bridge layout sheet for overlay thickness.

Optional Slip Forming: Cast-in-place barrier may be slip formed. Additional reinforcement may be tack welded to the upper two-thirds of the reinforcing cage to provide bracing. Do not weld to M Bars or anchor bolts.

Bolt or Bar M Offset (B O)	No. of Bolts per Section	No. of M Bars per Section
0 to 2"	2	4
2" to 5" (Max.)	3	6

ESTIMATED QUANTITIES
(FOR INFORMATION ONLY)

	Conc	Reinf. Steel	Str Steel (Anchor Bolts)
	C.Y.	Lb.	Lb.
30'-0" Barrier Cast-in-place	3.5	228	17(b)
30'-0" Barrier (Precast)	3.4	160(a)	25(c)
10'-0" Light Pole Section	1.2	144	17(b)

(a) With W W F
(b) With 1'-8" Anchor Bolts
(c) With 3'-4" Anchor Bolts

GENERAL NOTES

All concrete, reinforcement, anchor bolts, blocking, grout, etc., as shown are considered as part of the barrier for payment.

A cast-in-place section of barrier shall be provided as shown if illumination poles are to be installed. See sheet CTBI(4) for the light pole, anchor bolt, and conduit details.

Concrete for barrier shall be Class A, C or H.

Welded wire fabric may be used as an option to the conventional reinforcement for precast or cast-in-place barrier. Only conventional reinforcement is to be used for the 10 ft. sections at any light poles. Welded wire fabric shall be made in accordance with ASTM A497.

Grout for precast barriers shall consist of two parts sand and one part cement. Latex adhesive may be added to the grout if directed by the Engineer. Wood or other material approved by the Engineer shall be used for blocking. Enough firm blocking must be used to properly align and grade the barrier sections. At other locations, any suitable material may be used to retain the grout.

Joints shall be located near ends of spans, at ends of light pole sections, and at intervals in between as necessary to maintain 30 ft. maximum and 15 ft. minimum section lengths. When barrier is cast-in-place, a joint shall be placed at interior supports of continuous units. Joint openings shall be ½ inch minimum and 1 inch maximum or ½ inch wider than adjacent open slab joints. Material used in forming joints may be left in place if it is compressible and light in color. Where portions of barriers project over adjacent spans, similar materials may also be used to provide ¾ inch nominal clearance.

Anchor bolts and associated nuts, washers, and plates for the barrier to slab attachment shall be galvanized. Bolts shall conform to ASTM A307 (or A36 threaded rod with tack welded nut). Threaded rods may be 0.906 inch minimum diameter with rolled threads. Nuts shall conform to A307 requirements and shall be tapped or chased after galvanizing. Bolts and nuts shall have Class 2A and 2B fit tolerances.

The centerline axis of the barrier shall be vertical except where the slab is superelevated in which case it shall be normal to the cross slope unless otherwise shown in the plans or directed by the Engineer.

The maximum offset from the center of the barrier to the true circular centerline shall be one inch for precast segments installed on horizontal curves. If this would require segment lengths of less than 15 feet, then the barrier shall be cast-in-place to the correct radius.

Shop drawings are not required for this barrier.

Anchorage systems equal to or stronger than those shown may be used provided the details of such systems are submitted to and approved by the Engineer prior to placement.

FOR CONTRACTOR INFORMATION ONLY

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

CONCRETE TRAFFIC BARRIER TYPE 1

PRECAST OR CAST-IN-PLACE (BRIDGE)

CTBI(1)-85

ORIGINAL DRAWING DATE: OCTOBER 1985	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT #	SHEET
DR.- MPM				
REVISIONS	12	6	F 514 (85)	147
CK.- JJP				
DR.- EDS	COUNTY	CONTROL	SECTION	JOB #	HIGHWAY
CK.- MPM	HARRIS	27	13	125	US 59

SITE DESCRIPTION

PROJECT LIMITS: IH 45 (CROSSTIMBERS ST TO FALLBROOK DR)
IH 69 (MURPHY RD TO WESTPARK DR)

PROJECT DESCRIPTION: PEDESTRIAN BARRIER MOUNTED ON CTB

MAJOR SOIL DISTURBING ACTIVITIES: NONE

TOTAL PROJECT AREA: 152.98 AC

TOTAL AREA TO BE DISTURBED: N/A

WEIGHTED RUNOFF COEFFICIENT:
(AFTER CONSTRUCTION): 0.90

EXISTING CONDITION OF SOIL & VEGETATIVE
COVER AND % OF EXISTING VEGETATIVE COVER: CLAY LOAM, 0% VEGETATIVE COVER

NAME OF RECEIVING WATERS: WHITEOAK BAYOU-BUFFALO BAYOU
GREENS BAYOU
BRAYS BAYOU

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

____ TEMPORARY SEEDING
____ PERMANENT PLANTING, SODDING, OR SEEDING
____ MULCHING
____ SOIL RETENTION BLANKET
____ BUFFER ZONES
____ PRESERVATION OF NATURAL RESOURCES

OTHER: ____

STRUCTURAL PRACTICES:

__X__ SILT FENCES
____ HAY BALES
____ ROCK BERMS
____ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
____ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
____ DIVERSION DIKE AND SWALE COMBINATIONS
____ PIPE SLOPE DRAINS
____ PAVED FLUMES
____ ROCK BEDDING AT CONSTRUCTION EXIT
____ TIMBER MATTING AT CONSTRUCTION EXIT
____ CHANNEL LINERS
____ SEDIMENT TRAPS
____ SEDIMENT BASINS
____ STORM INLET SEDIMENT TRAP
____ STONE OUTLET STRUCTURES
____ CURBS AND GUTTERS
____ STORM SEWERS
____ VELOCITY CONTROL DEVICES
__X__ EROSION CONTROL LOGS

OTHER: ____

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES: ____

1. PLACE NECESSARY SWP3 DEVICES AND CONSTRUCTION SIGNS PROVIDED FOR BY TCP PLAN SHEETS
2. COMPLETE PROPOSED CONSTRUCTION WHILE ENSURING THAT DISTURBED AREAS ARE CONTAINED BY SWP3 DEVICES.
3. REMOVE SWP3 DEVICES AFTER CONSTRUCTION IS COMPLETE AND ENSURE ALL DISTURBED SOIL AREAS ARE STABILIZED

STORM WATER MANAGEMENT: INSTALL SILT FENCE OR EROSION CONTROL LOGS AS REQUIRED BY TXDOT PROJECT MANAGER AS STANDARD.

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE: All erosion and sediment controls will be maintained in good working order. If a repair is necessary it will be done at the earliest date possible, but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. The area adjacent to creeks and drainageways shall have priority followed by devices protecting storm sewer inlets.

INSPECTION: All inspections will be performed by a TxDOT inspector per one of the options below as directed by the Area Engineer
1. At least every 7 calendar days
2. At least every 14 days or after 0.5 inches or more of rainfall
An inspection and maintenance report should be made for each inspection. Based on the inspection results, the controls shall be revised according to the inspection report.

WASTE MATERIALS: The dumpster used to store all waste material will meet all state and local city solid waste management regulations. All trash and construction debris will be deposited in the dumpster. The dumpster will be emptied as necessary or as required by local regulation and the trash will be hauled to a local dump. No construction waste material will be buried on site.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): In the event of a spill which may be considered hazardous, the Houston District Safety Office shall be contacted immediately at 713-802-5962.

SANITARY WASTE: All Sanitary Waste will be collected from the portable units as necessary or as required by local regulations by a licensed sanitary waste management contractor.

OFFSITE VEHICLE TRACKING:

____ HAUL ROADS DAMPENED FOR DUST CONTROL
____ LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
____ EXCESS DIRT ON ROAD REMOVED DAILY
____ STABILIZED CONSTRUCTION ENTRANCE

OTHER: ____

REMARKS: Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the sediment that may enter receiving waterways. Disposal areas shall not be located in any waterway, waterbody or streambed. Construction staging areas and vehicle maintenance areas shall be constructed by the contractor in a manner which minimizes the runoff of all pollutants. All waterways shall be cleared as soon as practical of temporary embankments, temporary bridges, matting, falsework, piling, debris, and other obstructions placed during construction operations that are not part of the finished work.

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED
PROFESSIONAL ENGINEER

2/8/2021

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

Texas Department of Transportation
Houston District

TxDOT STORM WATER POLLUTION PREVENTION PLAN

SWP3

FILE: STDG1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
©TxDOT JANUARY 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6		147
9/2010 INSPECTION NOTE	COUNTY		CONTROL	SECT	JOB	HIGHWAY
9/2013 INSPECTION NOTE	HARRIS		0912	72	610	VARIOUS
11/2013 SW3P TO SWP3						
05/2015 2014 SPECS						

STD G-1

I. STORMWATER POLLUTION PREVENTION

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit is required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506. Refer to Storm Water Pollution Prevention Plan (SWP3) Houston District standard plan.

No Additional Comments

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS

United States Army Corps of Engineers (USACE) Permit is required for filling, dredging, excavating or other work in water bodies, rivers, creeks, streams, wetlands or wet areas. The Contractor must adhere to all of the terms and general conditions associated with the following permit(s). If additional work not represented in the plans is required, contact the Engineer immediately.

☒ No United States Army Corps (USACE) Permit Required

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) without a Pre-Construction Notification (PCN). Project specific permit was not issued by USACE, therefore is not in the plan set. The USACE general conditions are in the “General Notes."

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) with a Pre-Construction Notification (PCN). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set. The USACE general conditions are in the “General Notes."

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Individual Permit (IP). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set.

☐ Work would be authorized by the United States Army Corps of Engineers (USACE) permit. The project specific permit issued by the USACE will be provided to the contractor.

United States Coast Guard (USCG) Permit is required for projects that involve the construction or modification (including changes to lighting) of a bridge or causeway across a water body determined to be navigable by the United States Coast Guard (USCG) under Section 9 of the Rivers and Harbors Act. If additional work not represented in the plans is required, contact the Engineer immediately.

☐ No United States Coast Guard (USCG) Coordination Required

☐ United States Coast Guard (USCG) Permit

☐ United States Coast Guard (USCG) Exemption

No Additional Comments

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the area and contact the Engineer immediately.

No Additional Comments

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.

No Additional Comments

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS

If any of the listed species below are observed, cease work in the area, do not disturb species or habitat and contact the Engineer immediately.

The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to October 1). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document “Avoiding Migratory Birds and Handling Potential Violations” found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)

No Additional Comments

Field Biologist, Ornithologist – a field biologist is defined as an individual qualified to perform field investigations, presence/absence surveys and habitat surveys for protected avian species or species of concern. A mandatory bachelor’s degree in biology or a related science is required. At a minimum, the Field Biologist, Ornithologist, shall have completed and reported a minimum of three presence/absence and habitat surveys for protected avian species in the past five years. A minimum of three projects must have been conducted in Texas. Surveys shall have been performed for documentation of species in accordance with a protocol approved by USFWS or TPWD, or following generally accepted methodologies.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.

No Additional Comments

VII. OTHER ENVIRONMENTAL ISSUES

Comments:

DATE: Sep 15, 2020
FILE:

Version 2.1

Texas Department of Transportation

TxDOT Houston District

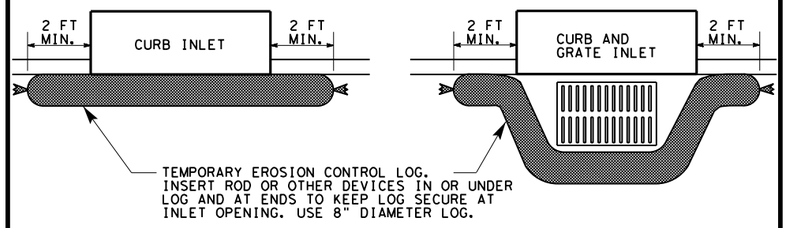
ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	72	610	IH 45/IH 69
UPDATED section V. text and added definition (10/17) ADDED USCG and USACE notes in Section VII (04/18)	DIST	COUNTY		SHEET NO.
	Hou	Harris		148

CURB INLETS
8" DIAMETER LOGS

ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8")



MATERIAL REQUIREMENTS

FILL:

Use 100% shredded mulch or other non-compost biodegradable material as fill for logs. No compost or fines.

DO NOT USE MATERIAL WHICH PROHIBITS WATER INFILTRATION.

LOG MESH:
Use mesh with 1/4" openings or larger. Mesh must allow water infiltration but also hold fill material in place.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

A sediment trap (erosion control log) may be used to filter sediment out of runoff draining from an unstabilized area.

Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Sediment traps should be placed in the following locations:
1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way

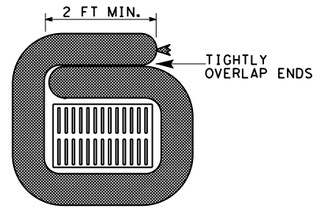
The trap should be cleaned when the capacity has been reduced by 1/2 or the sediment has accumulated to a depth of 1', whichever is less.

REQUIRED ITEMS:

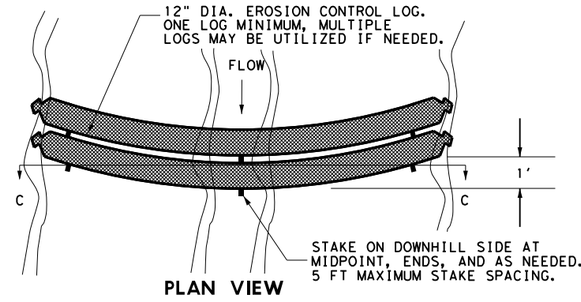
- ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8") LF
- ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL) (12") LF
- ITEM 506-6043 BIODEG EROSN CONT LOGS (REMOVE) LF

DROP INLETS AND OTHER LOCATIONS
12" DIAMETER LOGS

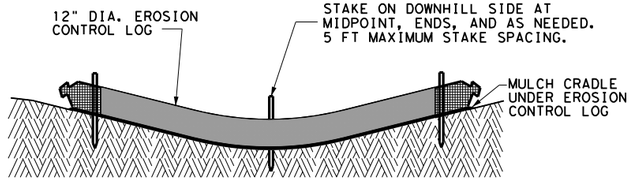
ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL)(12")



DROP INLETS

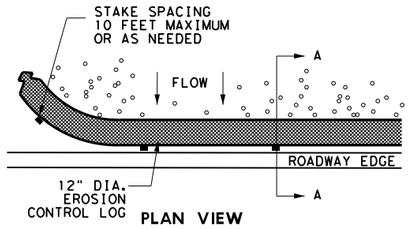


PLAN VIEW

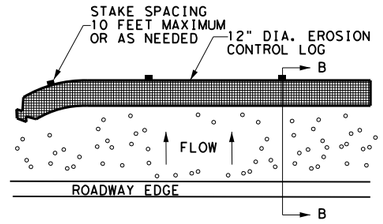


SECTION C-C

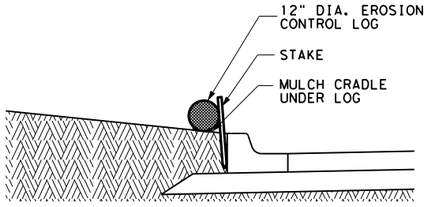
DRAINAGE SWALE OR DITCH



PLAN VIEW

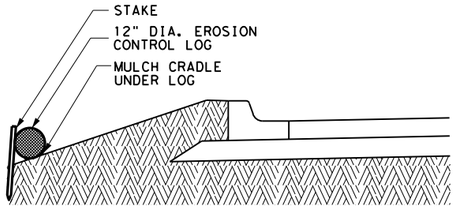


PLAN VIEW



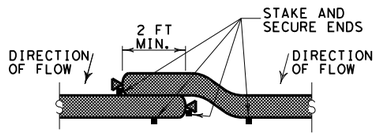
SECTION A-A

SLOPE TO ROADWAY EDGE

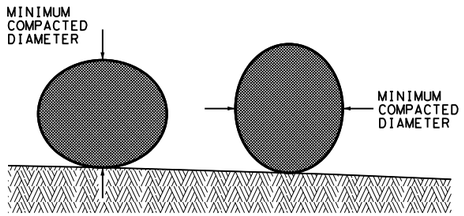


SECTION B-B

SLOPE AWAY FROM ROADWAY EDGE



END OF LOG OVERLAP



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation
Houston District

EROSION CONTROL LOG

ECL-12

FILE: STDG4a.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
©TxDOT 2014	DISTRICT	FED REG	PROJECT NUMBER	SHEET
REVISIONS 3/15 MINOR CORRECTIONS	HOU	6		149
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0912	72	610	VARIOUS

STD G-4A