Texas Department of Transportation
Book 2 - Technical Provisions

North Tarrant Express Project
Segments 3A and 3B Facility

Attachment 11-2
Approved Design Exceptions

September 30, 2012

Texas Department of Transportation

MEMORANDUM

TO: Dieter Billek, P.E.
Strategic Project Division

DATE: August 10, 2012

FROM: Maria G. Burke, P.E. Maria G. Burke, P.E.

SUBJECT: Revised Schematic, IAJR and Design Exceptions

County: Tarrant
Control: 0014-16-179, etc.
Highway: **IH 35W – South Segment**
Limits: From IH 820 to IH 30

Attached is a copy of the Federal Highway Administration letter dated August 9, 2012, providing comments and discussion on the revised schematic, design exceptions and the Interstate Access Justification Report (IAJR) for the subject project.

We forwarded you the Traffic Operations Division's review comment on July 9, 2012 and our responses to district response were submitted to you on May 2, 2012. We suggest that you provide responses addressing all comments using a comment / response form. If you have any questions, please feel free to contact me at 512.416.2703 or Ray Thomasian at 512.416.2718.

cc: Curtis Hanan, P.E. - FTW
John Tillinghast, P.E. – FTW
Loyl Bussell, P.E. – FTW
Anita Wilson - FHWA
MAM file copy
File Copy

U.S. Department of Transportation
Federal Highway Administration

Texas Division

300 E 8th Street
Austin, Texas 78705
Phone: 512-536-5950
Fax: 512-536-5990
www.fhwa.dot.gov/txdiv

August 9, 2012

In Reply Refer To:
HA-TX

Revised Schematics, Interstate Access Justification Report and Design Exceptions
Interstate Highway (IH) 35W: From IH 820 to IH 30
Tarrant County
CSJ: 0014-16-179 & 0014-16-931

Ms. Maria G. Burke, P.E.
Director, Field Coordination Section A
TxDOT - Design Division
125 E. 11th Street
Austin, Texas 78701

Dear Ms. Burke:

Reference is made to your letters dated April 11, 2012 and June 28, 2012, transmitting the schematic, design exceptions (DEs) and Interstate Access Justification Report (IAJR) for the subject project. The DE #1 is required at five ramp/direct connector locations to the managed lanes where the standard width for a ramp or connector would be constructed but would accommodate two lanes to separate high occupancy vehicles (HOVs) from the rest and allow them to "declare" themselves as such and receive a fifty percent discount of the toll amount during established hours of the day. In addition the project is proposed to be developed in phases and at the locations of existing loop ramps, the ramps would require some reconstruction for the first phase of the project but will still maintain existing geometric conditions that are not in accordance with the TxDOT Roadway Design Manual (RDM) for minimum radius and design speed.

In the same line as the IH35W North discussions occurred in an attempt to address concerns regarding adequate signage, markings, and information in advance of the declaration zones. The TxDOT Fort Worth District later indicated that the region may go to another method of declaration that would not require the declaration zones currently proposed in the schematics. The commitment to move forward with alternate declaration is not solidified therefore we conditionally concur with the DE #1 and schematics pending FHWA acceptance of operational analysis and a complete signing (including small advance signing which are not in the schematics and would be developed as part of the requirements set forth in the agreement with the developer) and striping plan that effectively deals with concerns identified with the declaration area concept. It is understood that the design exception will no longer be needed if

new technology enables other methods besides physical lane declaration for toll or HOV use, such as a toll tag registration system. An approach that does not require a design exception alternative would be preferred if it becomes available.

An Environmental Assessment (EA) for this project is currently being conducted and is anticipated to be completed in August 2012. Final approval of the DEs, the IAJR and the schematic are contingent upon completion of the environmental process and a Finding of No Significant Impact (FONSI) is determined for the build alternative.

Should you have any questions, please contact Anita Wilson at 512-536-5951.

Sincerely,

Salvador Deocampo
District Engineer

Texas Department of Transportation

DEWITT C. GREER STATE HIGHWAY BLDG. • 125 E. 11TH STREET • AUSTIN, TEXAS 78701-2483 • (512) 463-8585

July 6, 2011

Tarrant and Denton Counties
Control: 0014-16-252, 0014-16-255
0081-12-041 & 0081-13-904
Highway: IH 35W
Limits: From: IH 820 to SH 114

Ms. Janice Brown
Texas Division Administrator
Federal Highway Administration
Austin, Texas 78701

Dear Ms. Brown:

Attached for your review are one (1) copy of the proposed design schematic and two (2) copies of the Interstate Access Justification Report along with a request for design exception for reduced shoulder widths along the high occupancy vehicle declaration lanes for the above captioned project.

The proposed project will reconstruct the existing four lane freeway to six/eight general purpose lanes and four/six tolled managed lanes. In addition, the construction of the interchanges with SH 170 and US 81/US 287 are also included as part of this project. Please note that Design and Traffic Operations Divisions are currently reviewing the design schematic and we will forward you our review comments shortly.

Also for your information, enclosed is a copy of the Form 1002, page 3 of 5. If you need additional information, please contact me at (512) 416-2703 or Ray Thomasian, at (512) 416-2718.

Sincerely,

Maria G. Burke, P.E.
Director of Field Coordination Section A

Attachments

cc: FTW– Loyl Bussell, P.E.
TTA- Dieter Billek, P.E.
MAM Read File
File Copy

Texas Department of Transportation

MEMORANDUM

TO: Dieter Billek, P.E.
Texas Turnpike Authority Division

DATE: June 24, 2011

FROM: Curtis W. Hanan, P.E.

Originating Office
Fort Worth District
TPD

SUBJECT: Preliminary Geometric Layout
IH 35W: From IH 820 to SH 114
CSJ: 0014-16-252, 0014-16-255
0081-12-041 & 0081-13-904
Tarrant and Denton Counties

Attached for your review and further handling are three copies of the preliminary geometric layout and Interstate Access Justification report for the above referenced project. The proposed project will reconstruct the existing four lane freeway to six/eight general purpose lanes and four/six tolled managed lanes. Interchanges with SH 170 and US 81/US 287 are also proposed to be reconstructed.

The original Page 3 of 5 of the corresponding Form 1002 that describes the proposed basic design criteria is also enclosed. Included is a design exception for reduced shoulder widths along high occupancy vehicle declaration lanes.

If you have questions, please contact Mr. John Tillinghast, P.E. at (817) 370-6594 or me at (817) 370-6535.

Curtis W Hanan P.E.
District Advanced Transportation Planning Director

Attachments

PROPOSED BASIC DESIGN DATA

Control: See Attached Sheet Highway: IH 35W County: Tarrant
Limits: From IH 820 to Eagle Parkway

Work Program Title(s):

Work Type (Layman's Description):
Eagle Pkwy to US 81/US 287 Reconstruct from 4 lanes to 6 General Purpose lanes and 4 Managed Toll lanes
US 81/US 287 to IH 820 Reconstruct from 4 lanes to 8 General Purpose lanes and 4/6 Managed Toll lanes

Proposed Design Standards (Structures):
Proposed Design Standards (Roadway): Roadway Design Manual (May 2010), Chpt 2, Chpt 3, Section 6
Proposed Design Standards (Traffic): 2006 Texas MUTCD Revision 1
Design Speed (Applicable): See Attch mph Terrain: Level
Traffic: Existing See Attached Sheet Projected: See Attached Sheet
Highway functional Class (Urban): Freeway (Rural):

Design Criteria Recommended for Approval (District):
Date: 6/21/2011
Signed: [signature], PE
Title: District Design Engineer

Design Criteria Approval (Division):
Date:
Signed:
Title:

Exceptions Requested
(List and indicate occurrence, i.e., over total project, at 3 locations, at 1 structure, etc.)

1. Shldrs for 6 Managed Lane Ramp Declaration Areas
2.
3.

Waivers Requested

1.
2.
3.

Design Exception Recommended for Approval (District):
Date:
Signed:
Title:

Waiver Recommended for Approval (District):
Date:
Signed:
Title:

EXCEPTION COMMITTEE
(To be filled out in Austin)

_____ Bridge Design
_____ Roadway Design
_____ Bicycle Lanes
_____ Traffic

Recommended Action:

☒ Approval ☐ Non-Approval

Reasons:

Date: 6/29/11
Signed: [signature]
Director, ~~Design Division~~ District Engineer

WAIVER COMMITTEE
(To be filled out in District Office)

_____ Bridge Design
_____ Roadway Design
_____ Bicycle Lanes
_____ Traffic

Recommended Action:

☐ Approval ☐ Non-Approval

Reasons:

Date:
Signed:
(Title)

IH 35W
From IH 820 to Eagle Parkway
CSJ's:0014-16-252, & 255
0081-12-041 & 0081-13-904

Design Speeds:

IH 35W General Purpose and Managed Lanes:	70 MPH
US 81/US 287 General Purpose Lanes:	70 MPH
Direct Connectors:	50 MPH *
Ramps/Managed Lane Ramps:	50 MPH
Frontage Roads:	40 MPH
Collector/Distributors:	50 MPH
City Streets:	30 MPH

* 50 MPH except where noted on schematic

Traffic:

Existing: 174,900 ADT (2010) SH 121 to US 81/US 287
115,100 ADT (2010) US 81/US 287 to Westport Parkway
92,300 ADT (2010) Westport Parkway to SH 114

Projected:269,800 ADT (2030) SH 121 to US 81/US 287
178,800 ADT (2010) US 81/US 287 to Westport Parkway
141,000 ADT (2030) Westport Parkway to SH 114

Project:	IH 35W North Segment
County:	Tarrant
Control/Limits:	0014-16-252 IH 820 to US 81/ US 287
	0014-16-255 IH 820 to US 81/ US 287
	0081-12-041 US 81/US 287 to Tarrant/Denton County Line
	0081-13-904 Tarrant/Denton County Line to Eagle Parkway

Introduction

The purpose of this Request for Design Exception No. 1 is to provide the flexibility to design, construct, finance, operate and maintain a Project that leverages minimal State resources while bringing congestion relief and roadway improvements estimated in excess of $440 million to Tarrant County.

The Request for Design Exception is needed for five entrance ramps to the IH 35W Managed HOV Lane system and one Managed Lane direct connector ramp where the shoulder widths, at the Declaration Areas only, do not meet the standard recommended guidelines for shoulder widths as specified in the contract documents.

Physical as well as financial constraints sometimes preclude the ability to provide a consistent design in accordance with Good Engineering Practice. Shoulder widths are often squeezed to less than desirable to accommodate bridge and sign columns just as elements of a project's design are often optimized to provide a consistent overall design in relation to adjacent structures and roadways. For example, TxDOT recently submitted a Request for Design Exception for the IH-635 Project for FHWA approval because the minimum values on the ramps could not be attained. The request which was submitted for similar reasons to those described above has been subsequently approved by FHWA.

In addition, the following likely changes will eliminate the need for Declaration Areas: (1) air quality goals are attained, (2) change in regional policy/law, (3) technological advances that allow the toll gantry system to distinguish HOV users from SOV users reliably in the same lane, (4) declaration is achieved through a registration program or (5) transponder technology advances to where declaration occurs at the device level. Because one or more conditions listed above are likely occurrence(s) and will negate the need for the Declaration Areas, the design exception is sought for the interim condition only with a view to reducing the size of the "bubble" at the Declaration Area.

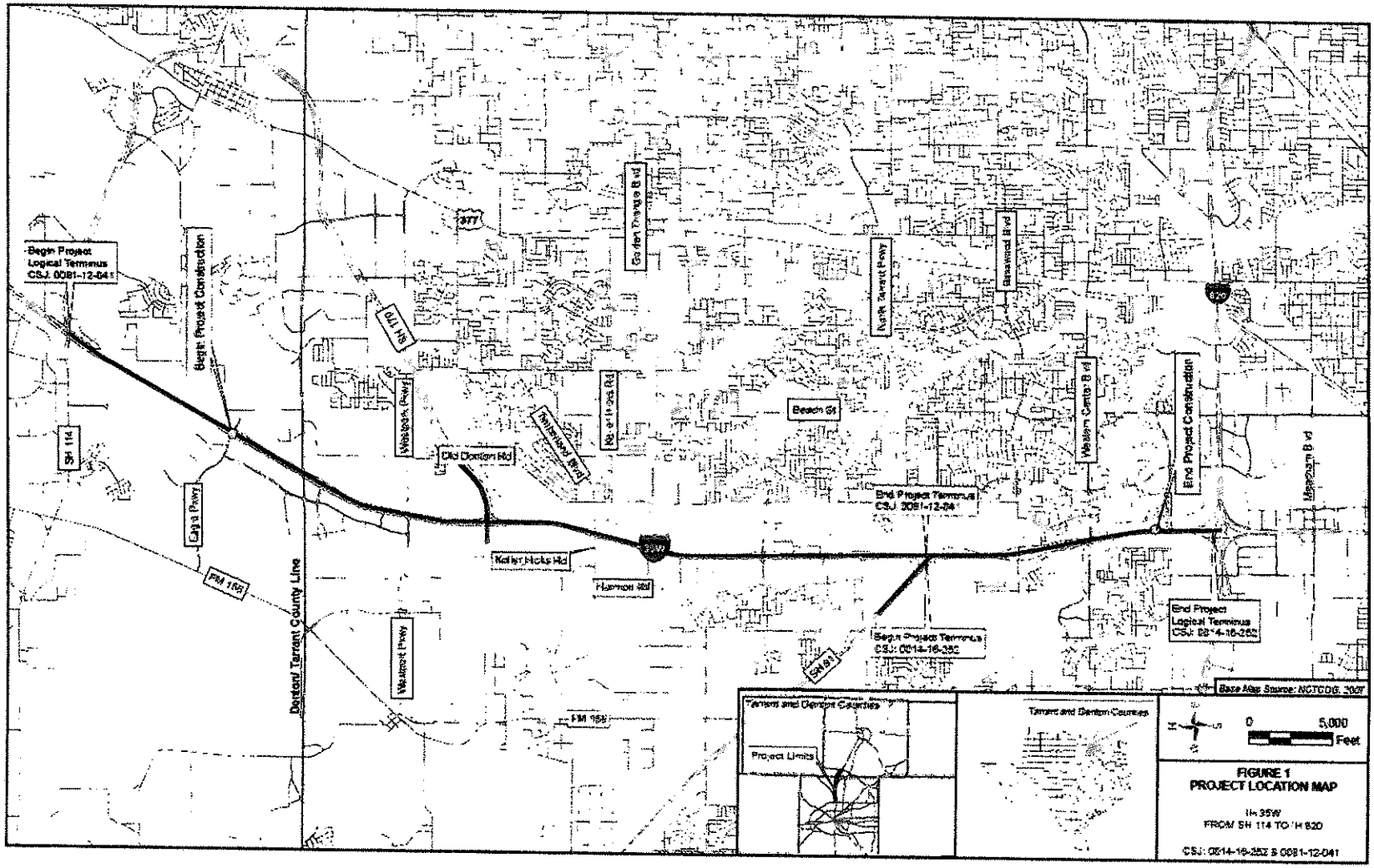
Project Description

TxDOT Fort Worth District proposes to improve a 10.5-mile section of IH 35W in Tarrant and Denton Counties, Texas. The proposed project extends from Eagle Parkway in southern Denton County to IH 820 in north-central Tarrant County, as shown in **Figure 1**.

IH 35W from SH 114 to IH 820 is a four-lane divided freeway with controlled access entrances and exits with discontinuous frontage roads.

IH-35W within the project limits is currently not a tolled facility.

Figure 1: Project Location Map



The proposed improvements include the reconstruction and widening of the existing freeway:

- From IH 820 to Basswood Boulevard, the proposed project would consist of reconstructing and widening the roadway to a 14-lane facility consisting of four General Purpose Lanes in each direction and a barrier-separated six-lane concurrent Managed Lane facility (three lanes in each direction). The Managed Lane facility would be centered between the General Purpose Lanes.
- From Basswood Boulevard to US 81/287, the proposed project would consist of reconstructing and widening the roadway to a 12-lane facility consisting of four General Purpose Lanes in each direction and a barrier-separated four-lane concurrent Managed Lane facility (two lanes in each direction). The Managed Lane facility would be centered between the General Purpose Lanes. Direct connector ramps between US 81/US 287 and the IH 35W Managed Lanes would be constructed.
- From US 81/287 to Eagle Parkway, the proposed project would consist of reconstructing and widening the roadway to a 10-lane facility consisting of three General Purpose Lanes in each direction and a barrier-separated four-lane concurrent Managed Lane facility (two lanes in each direction). The Managed Lane facility would be centered between the General Purpose Lanes. Direct connector ramps between IH 35W and SH 170 would also be constructed.

Managed HOV Lane Policy and Project Application

The proposed Managed Lanes will be managed using a pricing methodology in accordance with the policies developed by the North Central Texas Council of Governments (NCTCOG) and included by the Federal Highway Administration under the Express Lane Demonstration Program (Section 1604(b) Safe Accountable, Flexible and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU).

The NCTCOG's Managed Lane policy includes the following key provisions (The full policy is located in the NCTCOG's Mobility 2030: 2009 Amendment- page 279 at http://www.nctcog.org/trans/mtp/2030/17.Roadway.pdf):

- Transit vehicles will not be charged a toll.
- Single Occupancy Vehicles (SOV) will pay the full rate.
- HOVs of two or more occupants will receive a 50 percent discount during the peak period. This discount will phase out after the air quality attainment maintenance period.
- Regional Transportation Council sponsored public vanpools are permitted to add peak-period toll as eligible expenses.

Current NCTCOG's policy Managed Lane Policy specifies that HOV (Managed Lane) users will receive a 50% discount during the peak period, the electronic toll collection system needs to distinguish between SOV and HOV users through the use of Declaration Areas. A Declaration Area will be provided at each of the following entrance ramps and direct connectors into the IH-35W Managed Lanes:

A. Southbound (SB) ramp from Frontage Road just south of Basswood Blvd.
B. SB direct connector ramp from Eastbound (EB) US 287
C. SB interim ramp from General Purpose Lanes just south of North Tarrant Pkwy
D. SB ramp from Frontage Road just south of Heritage Trace Pkwy

E. SB ramp from General Purpose Lanes just south of Keller Hicks Road
F. SB ramp from General Purpose Lanes just south of Alliance Blvd.

Declaration Area "C" would be on an interim ramp constructed to begin the SB Managed Lanes for the portion of the North Segment Facility extending from US 81/ US 287 to IH 820. This ramp would then be removed when the Managed Lanes are extended north to Eagle Parkway.

Table 1 lists the proposed Declaration Areas and **Exhibit 1** shows the general locations.

Table 1: Proposed Declaration Areas

No.	Location	Road	Direction	Station	Inside Shldr (ft)	Outside Shldr (ft)
A	FR On-Ramp	IH 35W	SB	1510+00	4	4
B	US 287 Connector	IH 35W	SB	1452+00	4	4
C	Transition Ramp	IH 35W	SB	1410+00	4	4
D	FR On-Ramp	IH 35W	SB	1360+00	1	1
E	GPL On-Ramp	IH 35W	SB	1258+00	1	1
F	GPL On-Ramp	IH 35W	SB	1068+00	1	1

Functionally, the ramps and connectors requiring design exceptions will operate as single lane ramps except that the users will be required to shift horizontally to a transitional section to register the vehicle as a HOV vehicle for a pricing discount during peak periods. The ramps are transitioned at 50 to 1 from both sides in order to transition from a single 14-ft wide lane to 2-12-ft wide lanes, which include a 200-ft long Declaration Area. Within the transition section, the HOV and SOV users will shift to the right and left, respectively, which will allow them to self-declare occupancy. Within the Declaration Area, the electronic toll collection equipment will record self-declared HOV users and SOV users in order to identify all HOV user transactions. Typical sections for the ramps and direct connectors at the Declaration Areas are provided in **Exhibit 2.** After the Declaration Area, the 2-12ft lanes transition back to a single 14-ft lane before drivers enters the Managed HOV Lanes. Plan view and typical sections for the ramps and connectors requiring design exceptions are provided in **Exhibits 3.1 through 3.6.**

The Managed HOV Lanes are included in the proposed Dallas-Fort Worth Metropolitan Transportation Mobility 2030 plan as a measure to reach air quality attainment status. NCTCOG policy allows the discount for HOV users to phase out after the air quality attainment maintenance period. In the future, the following likely changes will eliminate the need for these Declaration Areas (1) air quality goals are attained, (2) change in regional policy/law, (3) technological advances that allow the toll gantry system to distinguish HOV users from SOV users reliably in the same lane, (4) declaration is achieved through a registration program or (5) transponder technology advances to where declaration occurs at the device level. The likely occurrence of one or more of the conditions listed above will negate the need for the Declaration Areas.

1. **What are the minimum design values that can not be obtained?**

   The minimum inside shoulder width of 4 feet and the outside shoulder widths of 6 feet and 8 feet required for ramps and direct connectors, respectively, cannot be obtained within the Declaration Areas for the following entrance ramps and direct connectors into the Managed HOV Lanes:

   A. SB ramp from FR just south of Basswood Blvd (Exhibit 3.1).
   B. SB direct connector ramp from EB US 287 (Exhibit 3.2)
   C. SB interim ramp from GPL just south of North Tarrant Pkwy (Exhibit 3.3)
   D. SB ramp from FR just south of Heritage Trace Pkwy (Exhibit 3.4)
   E. SB ramp from GPL just south of Keller Hicks Road (Exhibit 3.5)
   F. SB ramp from GPL just south of Alliance Blvd. (Exhibit 3.6)

2. **Why the minimum design values can not be attained?**

   The minimum values on the ramps cannot be attained because of construction cost and right-of-way limitations along IH 35W. Priority was given to attaining design values on the General Purpose Lanes, the Managed HOV Lanes, free ramps, and frontage roads because these are considered permanent features of the facility.

   Providing the minimum values for the Declaration Areas at the entrance and direct connector ramps would require widening retained fill sections and bridges resulting in wider roadway sections at the Declaration Areas than for the remainder of the ramp lengths. The wider sections would also result in realignments of the adjacent roadways thereby creating areas of potential sideswipe accidents as inattentive drivers may not shift and remain on a linear path as the lane lines are transitioned to accommodate the minimum shoulders. The realignments could result in the need for additional right-of-way.

3. **What are the values that can be attained by the proposed design?**

   The inside and outside shoulder widths that can be attained at the proposed Declaration Areas are shown in **Table 1.**

4. **Summary and analysis of the accident history at this location.**

   The proposed Managed Lanes and Managed Lane ramps are new construction. Accident data relative to this exception for IH 35W was taken from the data obtained on the General Purpose Lanes for the years 2006, 2007 and 2008. The crash rates were provided by Control-Section/Milepoint in North Segment in two sections – Section 1 - from IH 820 to US 287/US 81, and Section 2 from US 287/ US 81 to Eagle Parkway.

   To analyze the safety impacts of construction along the IH 35W corridor, crash data between 2006 and 2008 along IH 35W corridor within the project limits were collected and reviewed for crash patterns. A total of 542 crashes were reported in these sections of IH 35W. **Table 2** provides a summary of the crashes by facility and severity.

Table 2: Crash Type and Severity Summary

IH 35W Facility	Year	Crash Severity			
		Fatality	Injury*	Non-Injury	No Information
IH 820 to US 287	2006		30	44	
(Section 1)	2007		39	59	1
	2008	1	35	80	
US 287 to Eagle Pkwy	2006		36	43	3
(Section 2)	2007	3	43	48	2
	2008		28	47	
Total		**4**	**211**	**321**	**6**

* *Injury includes incapacitating crashes, non-incapacitating crashes, and possible injury cases*

The crash rate on the General Purpose Lanes was compared with statewide average data for urban interstate facilities to obtain a safety ratio for the past three years. The results are summarized in **Table 3.**

Table 3: Crash Rate Analysis Summary

IH 35W General Purpose Lanes	2006		2007		2008	
Section	1	2	1	2	1	2
Actual Crashes	74	82	99	96	116	75
Actual Crash Rate (per 100 million vehicle miles)	64.17	61.96	85.85	72.54	100.59	56.67
Statewide Average Crash Rate (per 100 million vehicle miles)	107.23		111.32		101.32	
Safety Ratio	0.6	0.6	0.8	0.7	1.0	0.6

The review of the crash data indicates that a number of crashes are caused by sideswipes and rear-end collisions. Based on the mile point information for Sections 1 and 2, the crashes highlight the need for the project due to increasing number of crashes caused by the increased congestion along IH 35W. Construction of the new interchanges and widening of the mainlanes cross-section will distribute traffic

more evenly, reducing congestion on the mainlanes and potentially reducing these types of crashes.

The Texas Transportation Institute (TTI) field tested the proposed declaration area designs on IH 30, which will have similar operational characteristics to the IH 35W declaration areas. These field tests were conducted on October 17, 2007 in College Station, TX and were based on a higher speed mainlane declaration design. Based on observations by several Research and Operational personnel during testing the Declaration Areas functioned properly. **Appendix A** contains the summary of results of the field tests.

The operation of the declaration areas may be compared to the Dallas North Tollway (DNT) entrance and exit ramps at Royal Lane and Northwest Highway. From 2005 to 2006, the number of accidents is as follows:

- 5 at the SB DNT exit ramp at Royal Lane
- Zero at the NB DNT entrance ramp at Royal Lane
- 2 at the NB DNT entrance ramp at Northwest Highway
- 2 the SB DNT exit ramp at Northwest Highway

These ramps have 50 to 1 transitions to 10-ft wide lanes with a 6" curb on both sides and 11" of clearance to the toll booths, but the accident history does not show a pattern or problem. They require drivers to make quick choices between the cash lane and the toll tag lane, which are narrower than the cross section that these design exceptions provide. Occupancy declaration will require less complicated decisions; so, it is highly unlikely that the implementation of the requested design exceptions will negatively impact the causes of accidents.

5. **Brief description of alternatives considered and the reasons for eliminating each alternative.**

Several redesign alternatives were considered. In general, the ramps and connectors could be widened to meet the minimum design values but the redesign options were eliminated from consideration due to the additional construction cost and potential right-of-way costs to the project. The redesign options that were considered in order to provide the required minimum shoulder requirement are described below:

A. Declaration Area "A" is located on both a retained fill section and structure through the Declaration Area. The proposed redesign solution would be to widen the Declaration Area and redesign the alignment 2' to the east.

B. Declaration Area "B" is located on both a retained fill section and structure through the Declaration Area. The connector currently has 4-foot inside and 4-foot outside shoulders. The proposed redesign solution would include widening the connector ramp 4' to the west to provide 4' inside and 8' outside shoulders. Since the area required for the retained fill section between the SB ML and ultimate configuration of the SB GPL at the Declaration Area does not permit the required widening, the SB GPL alignment would need to be realigned to the west resulting in the redesign of the SB GPL and the exit ramp to Basswood Blvd. The direct connector ramp may

also need to be realigned to provide a more cost effective bent arrangement as a result of the redesign.

C. Declaration Area "C" is located on an interim at-grade ramp. The proposed alignment would need to be redesigned 2' to the west through the Declaration Area towards the SB GPL.

D. Declaration Area "D" is located on a retained fill section through the Declaration Area. The proposed design solution would include widening the Declaration Area and redesigning the ramp and frontage road alignment 10' to the west. This redesign would require 4400 square feet of additional right-of-way.

E. Declaration Area "E" is on a retained fill section through the Declaration Area. The proposed design solution would be to widen the Declaration Area and redesign the ramp and frontage road alignment 10' to the west. This redesign would require approximately 4150 square feet of additional right-of-way.

F. Declaration Area "F" is at-grade and would require widening the pavement and redesigning the ramp alignment 12' to the west through the Declaration Area towards the SB GPL.

The redesign alternatives were eliminated from consideration because the Enforcement Zone and Declaration Areas are an interim condition only and only operational during the peak periods. When the HOV discount is phased out after the air quality attainment maintenance period, the currently proposed pavement for the Enforcement Zone and Declaration Areas will be striped off to provide the required shoulder areas. The minimum shoulder width is already included within these areas. The additional unused pavement associated with the redesign solutions will create maintenance issues with trash and windblown debris collecting in these areas.

6. **What is the percentage and total dollar difference between the proposed cost and the cost of construction necessary to obtain minimum values?**

The current estimate of construction costs for IH 35W is $440 Million. The costs associated with widening each of the ramps listed in Question 5 to provide the minimum required inside and outside shoulder widths are:

No.	Location	Additional Construction Cost	Percent Increase in Cost
A	FR On-Ramp	$18,000	<1%
B	US 287 Connector	$178,000	<1%
C	Transition Ramp	$21,000	<1%
D	FR On-Ramp	$89,000	<1%
E	GPL On-Ramp	$87,000	<1%
F	GPL On-Ramp	$95,000	<1%

Estimate of Additional Costs: **$488,000**

7. **Does this design conform to adjacent roadway sections?**

The adjacent roadway sections of IH 820 and SH 183 (Segments 1 and 2) being developed as part of the North Tarrant Express Comprehensive Development Agreement will have shoulders that meet minimum design requirements. Smooth and uniform shoulder width transitions will be used to ensure that drivers have time to recognize the change in shoulder widths.

These width transitions keep the design exception areas in conformity with adjacent sections as drivers will not be caught off guard by sudden changes in the shoulder widths. Moreover, since passing would not be allowed within the Declaration Area, the ramps would continue to function as a single lane ramp.

8. **What would be the project delay and consequences as a result of meeting the minimum values?**

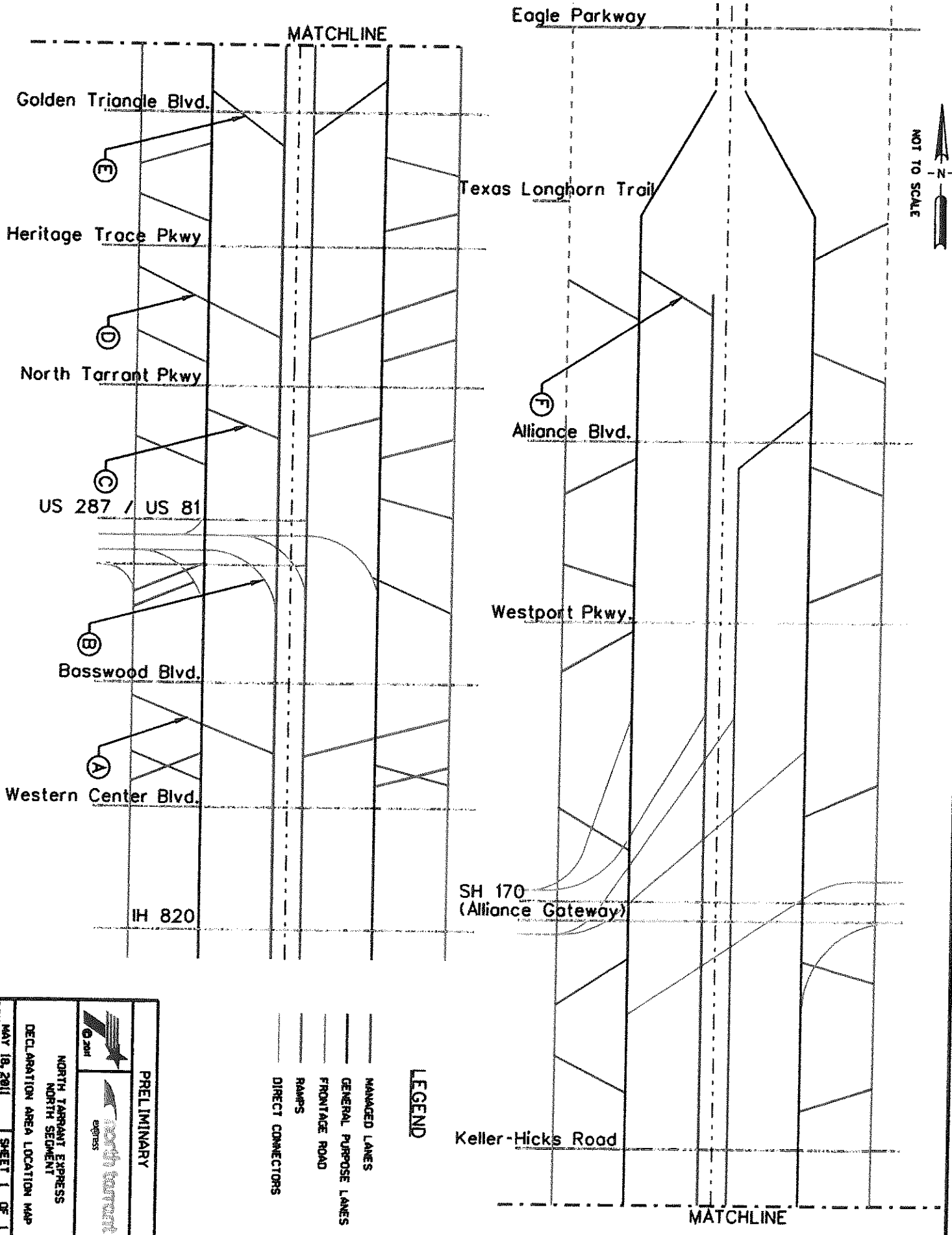
Project delay would be both at the design level and during construction due to the additional right-of-way that would be required to implement the minimum value at all locations. Obtaining minimum values on the IH 35W ramps would require the purchase of additional right-of-way and maintenance costs, which could cause project delay of possible one year. Delaying the project will adversely impact expected mobility improvements, congestion relief in the area and final costs of the project.

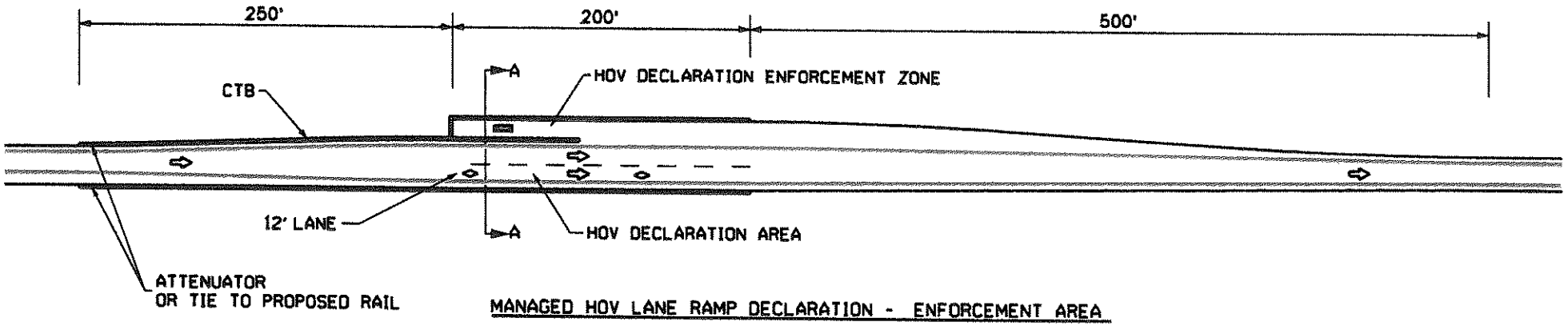
9. **Short narrative of why you feel this design exception should be approved.**

The Enforcement Zone and Declaration Areas are an interim condition only and only operational during the peak periods. When the HOV discount is phased out after the air quality attainment maintenance period, the pavement for the Enforcement Zone and Declaration Area will become functionally shoulders and the minimum shoulder width is already included within these areas. Areas of additional unused pavement will create maintenance issues with trash and windblown debris collecting in these areas.

This design exception should be approved because the reduced shoulder widths are limited to the Declaration Areas. Regulatory traffic signs, "Do Not Pass" are anticipated to be located in advance of the Declaration Areas. Only one vehicle at a time will be entering the Declaration Area and the ramps and connectors will operate as one lane ramps. Within this area and the transition sections, the total pavement width is greater than the desirable pavement width for a one lane ramp, which will allow sufficient width for vehicles to pass in the event of an accident in the Declaration Area. A consistent design approach was applied for all of these ramps to develop consistent driver expectations. The configuration is the least disruptive to adjacent property owners and avoids maintenance impacts of the additional pavement.

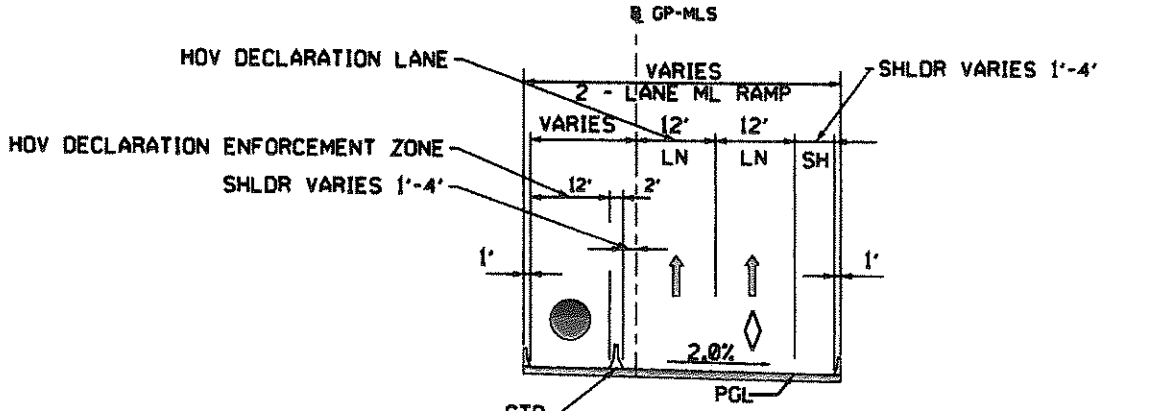
Finally, the need for the design exception is only for the interim condition and will not be required when the region incorporates emerging technologies that will remove the need for the Declaration Areas (potentially before facility opening) or the HOV requirement and/or air quality goals are attained.


MATCHLINE
Golden Triangle Blvd.
E
Heritage Trace Pkwy
D
North Tarrant Pkwy
C
US 287 / US 81
B
Basswood Blvd.
A
Western Center Blvd.
IH 820
Eagle Parkway
Texas Longhorn Trail
F
Alliance Blvd.
Westport Pkwy.
SH 170
(Alliance Gateway)
Keller-Hicks Road
MATCHLINE
N
NOT TO SCALE
LEGEND
MANAGED LANES
GENERAL PURPOSE LANES
FRONTAGE ROAD
RAMPS
DIRECT CONNECTORS
PRELIMINARY
NORTH TARRANT EXPRESS
NORTH SEGMENT
DECLARATION AREA LOCATION MAP
MAY 18, 2011
SHEET 1 OF 1
EXHIBIT 1



MANAGED HOV LANE RAMP DECLARATION - ENFORCEMENT AREA

N.T.S.



A-A TYPICAL

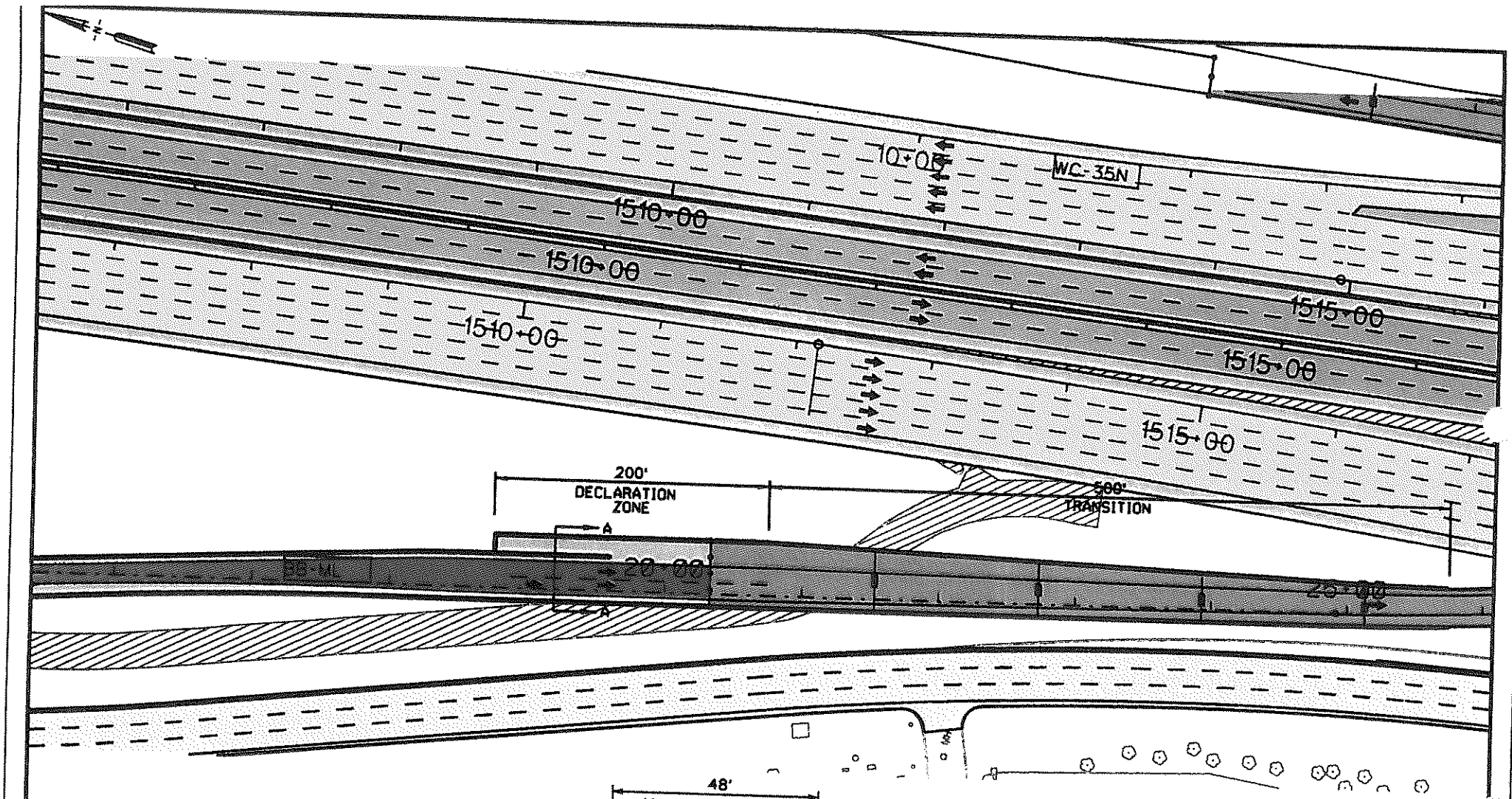
PRELIMINARY

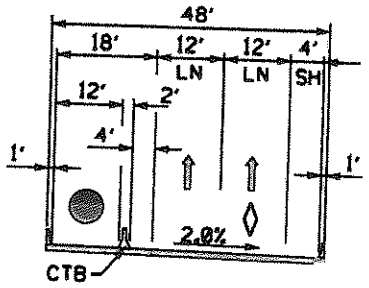
NORTH TARRANT EXPRESSWAY
NORTH SEGMENT

PROPOSED MANAGED HOV LANE RAMP
DECLARATION AREA DETAIL

MAY 18, 2011 | SHEET 1 OF 1

EXHIBIT 2





● ENFORCEMENT VEHICLE
◊ HOV LANE

SECTION A-A
DECLARATION AREA "A"
N.T.S.

SCALE
0 50 100 200

PRELIMINARY

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NORTH SEGMENT

PROPOSED DECLARATION AREA "A"
SB RAMP FROM BASSWOOD BLVD

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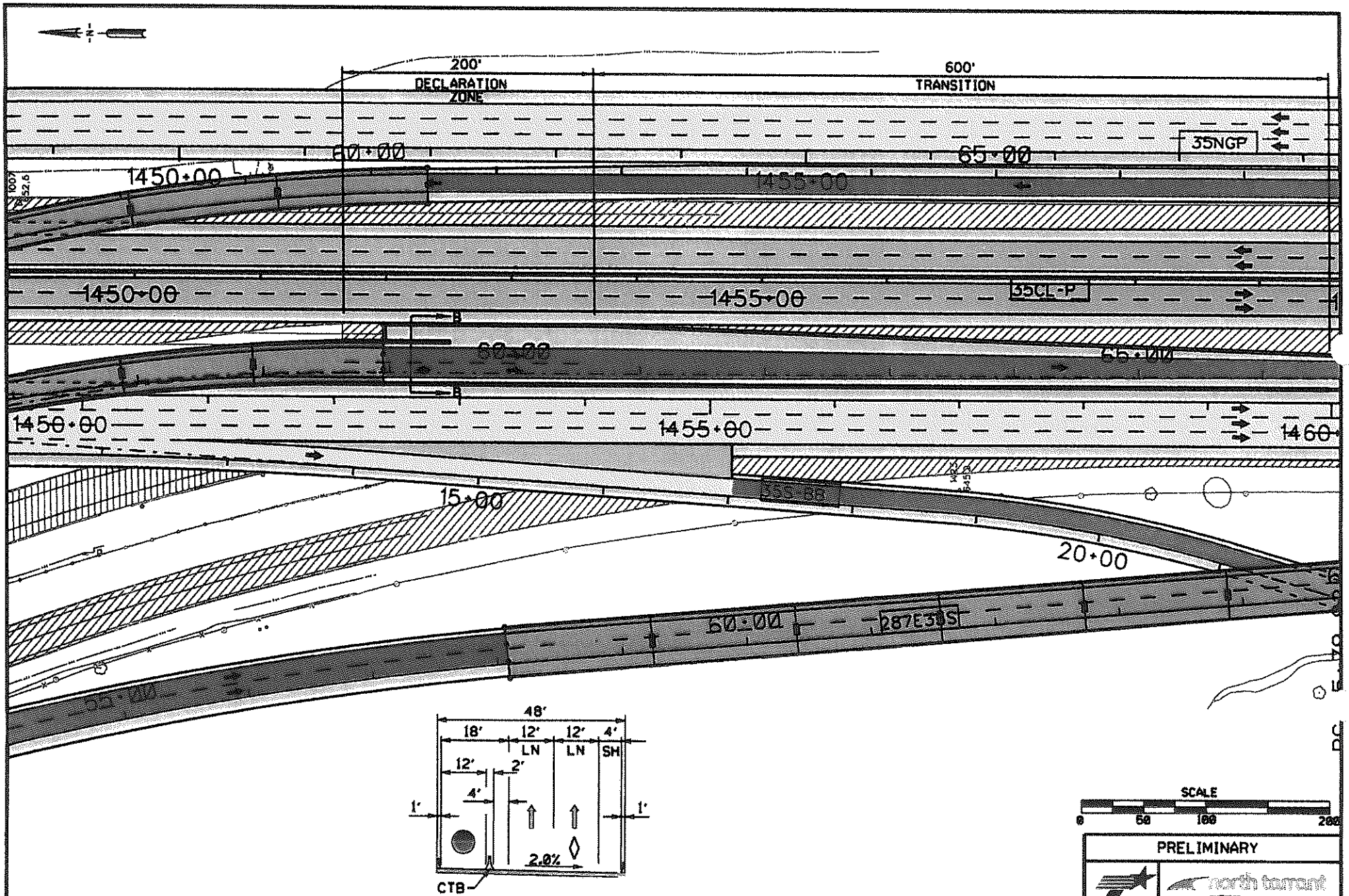
EXHIBIT 3.1



ENFORCEMENT VEHICLE
HOV LANE

SECTION B-B
DECLARATION AREA "B"
N.T.S.

SCALE
0 50 100 200

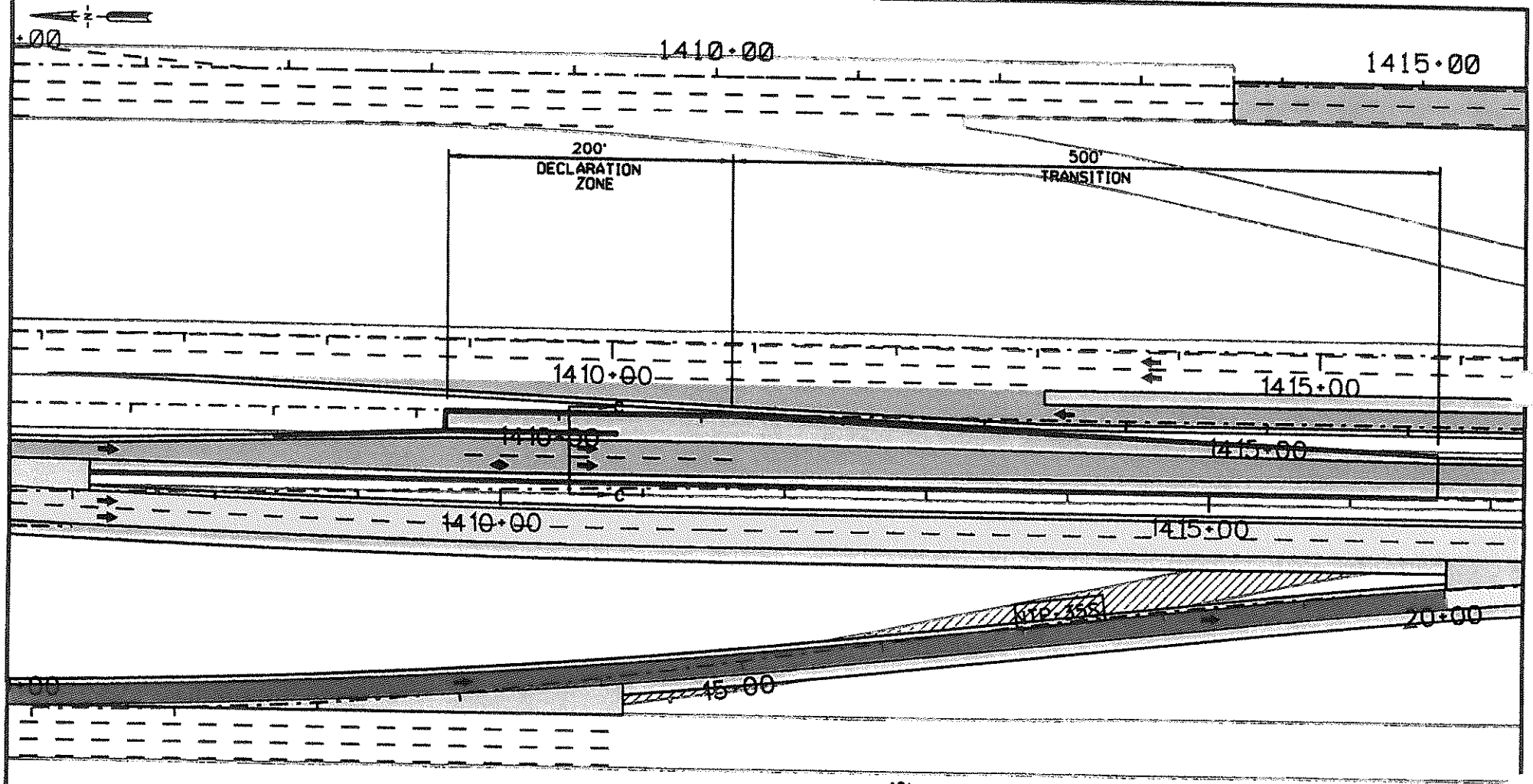
PRELIMINARY

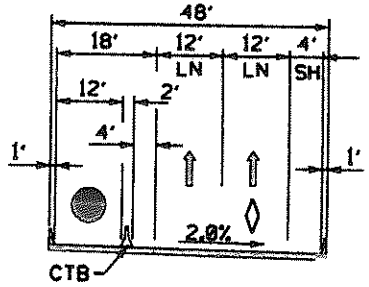
NORTH TARRANT EXPRESSWAY
NORTH SEGMENT

PROPOSED DECLARATION AREA "B"
SB CONNECTOR RAMP FROM US287 GPL

MAY 18, 2011 | SHEET 2 OF 6

EXHIBIT 3.2





◉ ENFORCEMENT VEHICLE
◊ HOV LANE

SECTION C-C
DECLARATION AREA "C"
N.T.S.

SCALE
0 50 100 200

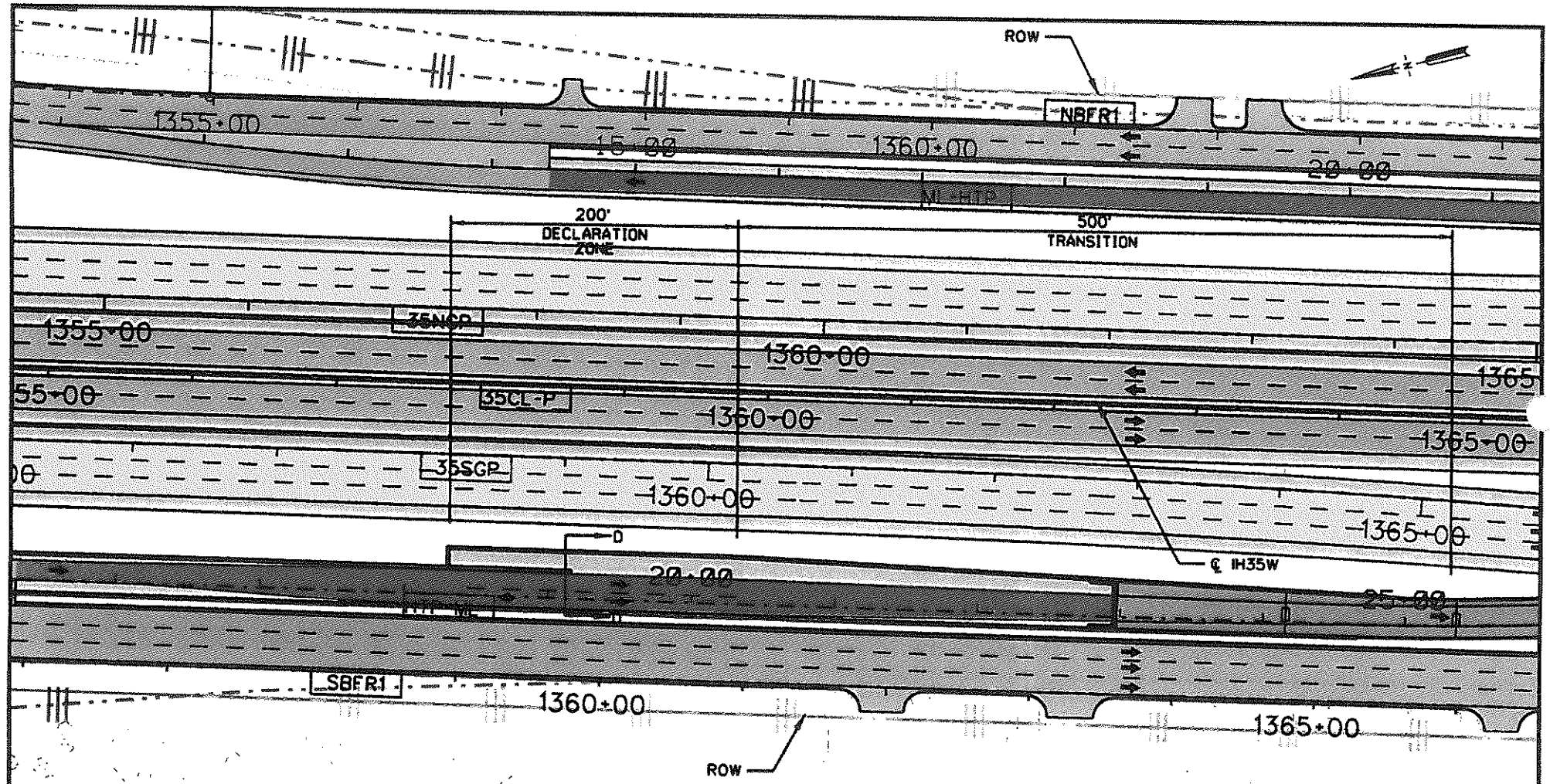
PRELIMINARY

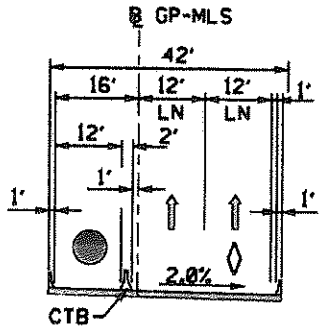
NORTH TARRANT EXPRESSWAY
NORTH SEGMENT

PROPOSED DECLARATION AREA "C"
INTERIM SB ML RAMP FROM IH35W GPL

MAY 18, 2011 | SHEET 3 OF 6

EXHIBIT 3.3





● ENFORCEMENT VEHICLE
◊ HOV LANE

SECTION D-D
DECLARATION AREA "D"
N.T.S.

SCALE
0 50 100 200

PRELIMINARY

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NORTH SEGMENT

PROPOSED DECLARATION AREA "D"
SB RAMP FROM SB FR

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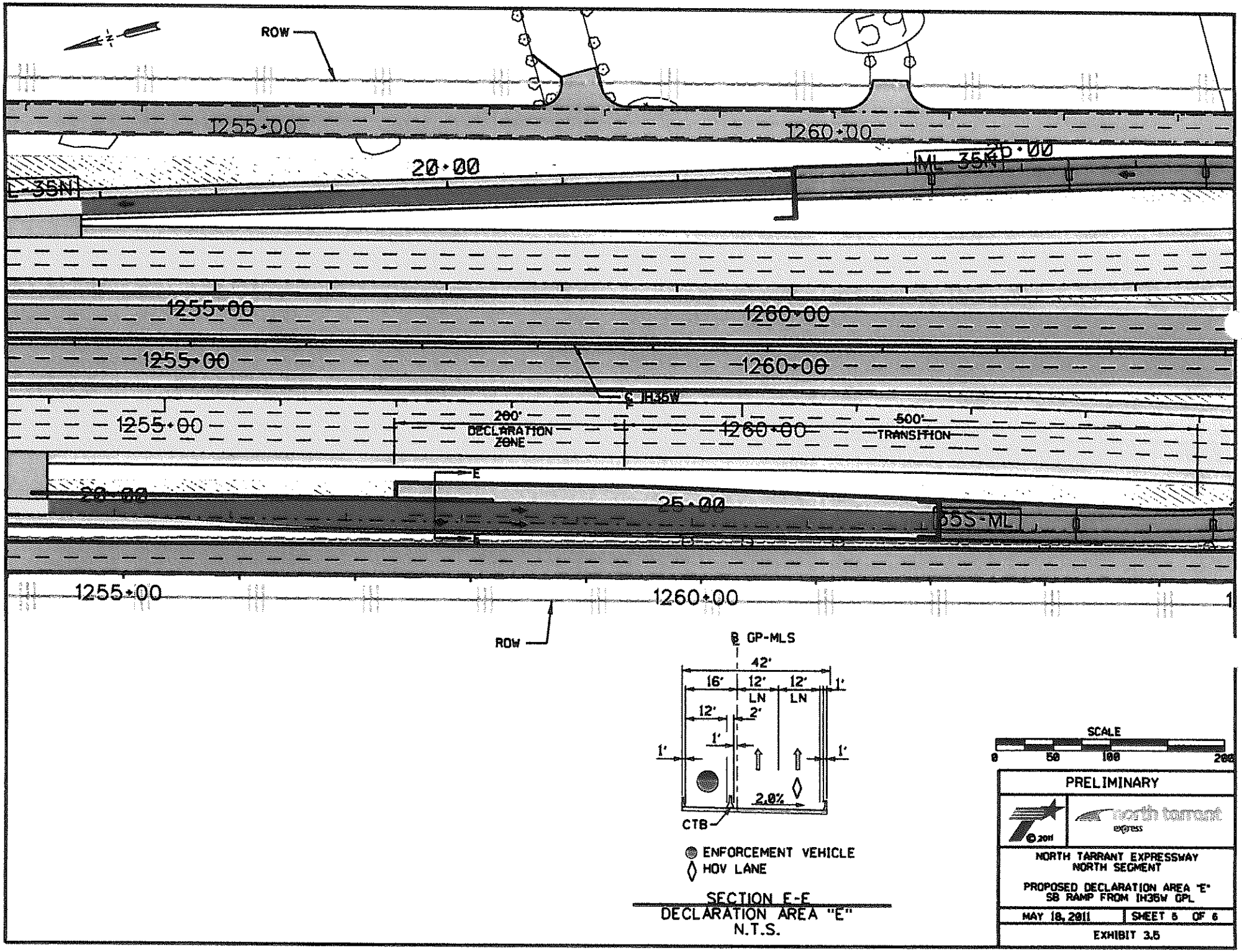
EXHIBIT 3.4


ROW
59
1255+00
1260+00
20+00
L 35N
ML 35N
20+00
1255+00
1260+00
1255+00
1260+00
℄ IH35W
200'
DECLARATION ZONE
1255+00
1260+00
500'
TRANSITION
E
20+00
25+00
35S-ML
1255+00
1260+00
ROW
℄ GP-MLS
42'
16'
12'
12'
1'
LN
LN
12'
2'
1'
1'
1'
2.0%
CTB
ENFORCEMENT VEHICLE
HOV LANE
SECTION E-E
DECLARATION AREA "E"
N.T.S.
SCALE
0
50
100
200
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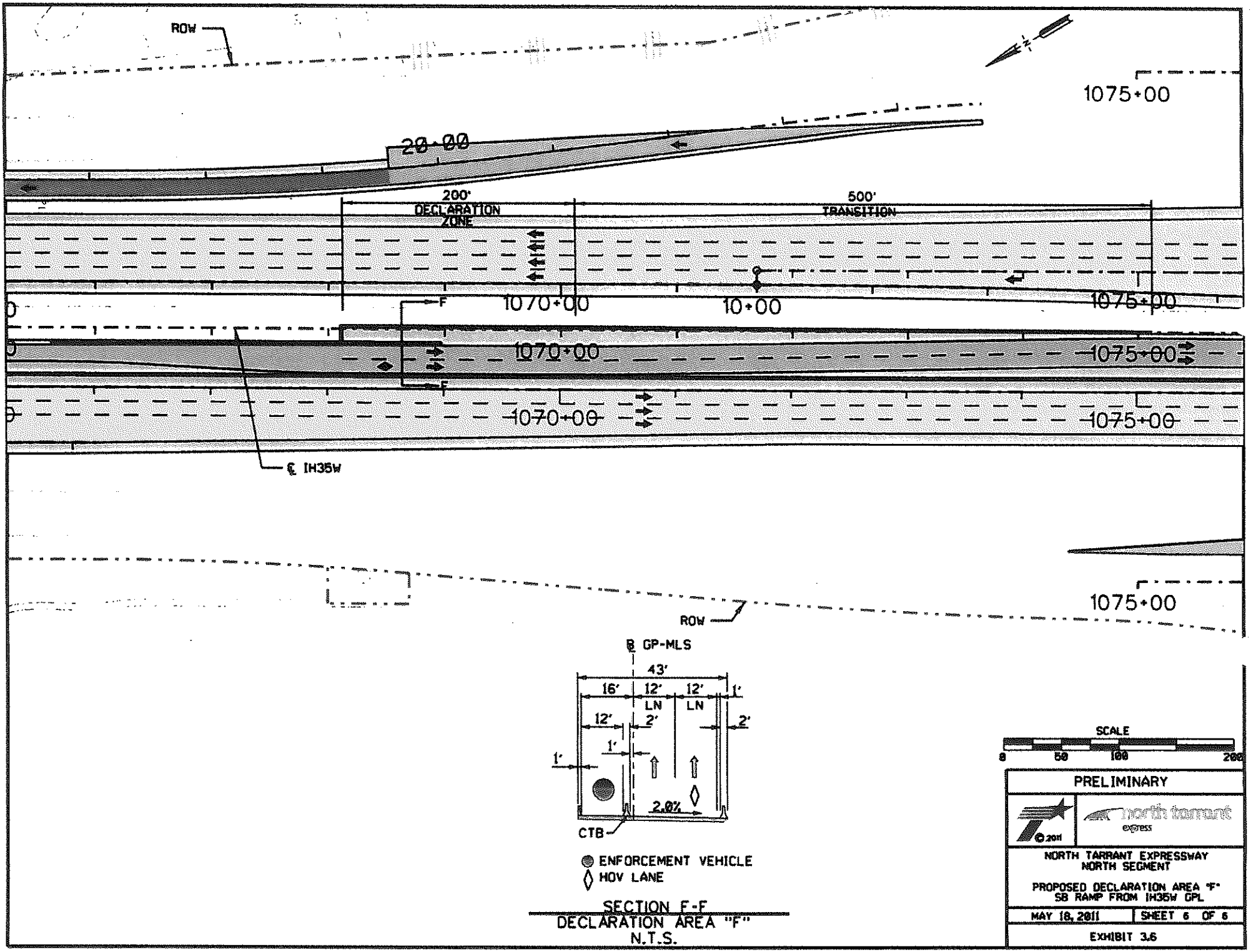
NORTH TARRANT EXPRESSWAY
NORTH SEGMENT
PROPOSED DECLARATION AREA "E"
SB RAMP FROM IH35W GPL
MAY 18, 2011
SHEET 5 OF 6
EXHIBIT 3.5



SECTION F-F
DECLARATION AREA "F"
N.T.S.

PRELIMINARY

NORTH TARRANT EXPRESSWAY
NORTH SEGMENT

PROPOSED DECLARATION AREA "F"
SB RAMP FROM IH35W GPL

MAY 18, 2011 | SHEET 6 OF 6

EXHIBIT 3.6

APPENDIX A

TTI Field Test Results

Design and Operation of the I-30 Tom Landry Managed Lane Value Pricing Project in Dallas, Texas

Christopher Poe, Ph.D, P.E., Assistant Agency Director, Texas Transportation Institute (cpoe@tamu.edu)

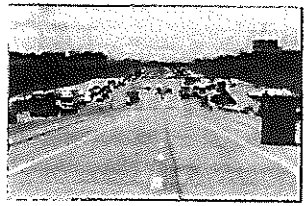
Matt MacGregor, P.E., CDA/Tollway Director, Texas Department of Transportation (mmacgre@dot.state.tx.us)

OVERVIEW

Project Overview

The I-30 West Managed Lane is the first value pricing project in the Dallas area along I-30 Tom Landry Freeway corridor. This corridor is a general purpose freeway with a managed HOV lane in the median. The facility opened in 2007 with its initial phase as an HOV lane. In general, the western section is concurrent flow operation on the inside median, the center section is 2-lane reversible, and the eastern section is 1-lane reversible.

The Dallas region has an aggressive managed lane policy to test various operational and pricing strategies. The I-30 corridor serves as the region's value pricing test bed where strategies can be tested before being applied in other corridors. A key element of the managed HOV lane is a tolling gantry design that allows carpools and single-occupant vehicles to be tolled at variable rates based on occupancy while maintaining the free-flow operation of the lane.



KEY REGIONAL MANAGED LANE POLICY

Fixed Schedule Pricing Policy

- A fixed-fee schedule will be applied during the first six months of operation; dynamic pricing will be applied thereafter.
- The toll rate will be set up to $0.75 per mile cap during the fixed-schedule phase.
- Toll rates will be updated monthly during the fixed-schedule phase.
- Single-occupant vehicles will pay the full rate.
- High-occupancy vehicles of two or more occupant and vanpools will pay the full rate in the off-peak period.

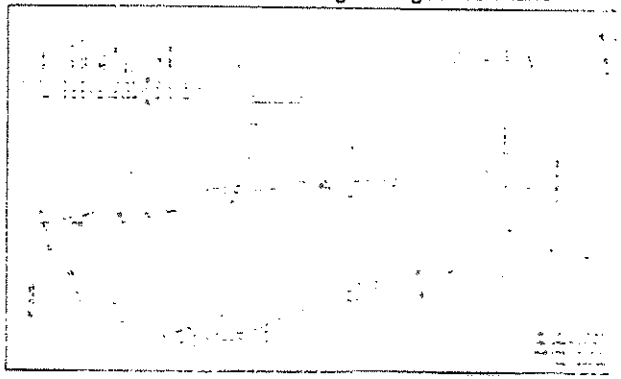
Dynamic Pricing Policy

- Market-based tolls will be applied during the dynamic-pricing phase.
- The toll rate will be established to maintain a minimum average corridor speed of 50 miles per hour. An escalating operating cap will be applied to minimize toll exposure.
- High-occupancy vehicles of two or more occupants will receive a 50 percent discount during the peak period (6:30 a.m. – 9:00 a.m. and 3:00 p.m. – 6:30 p.m.).
- During the dynamic-pricing phase, tolls will be rebated if the average speed drops below 35 mph. Rebates will not apply if speed reduction is out of the control of the operator.

PHASES OF DESIGN

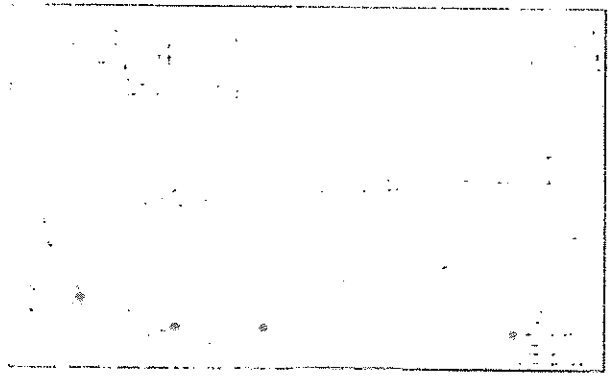
Phase 1.5 – Interim Tolling

Reversible managed HOV lane with varying lengths. Add toll collection to the existing managed HOV lane



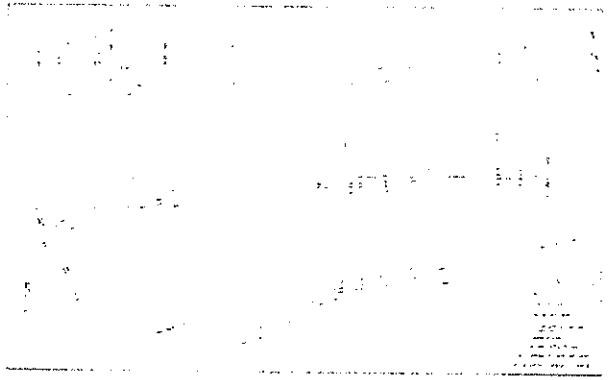
Phases 2 & 3 – Lane Extension

Extend 2-lane reversible managed HOV section and widen general purpose lanes over Trinity River Bridge



Phase 4 – Improved Access

Add wishbone ramps and direct connections at the Loop 12 interchange for NB to EB and SB to WB



Research sponsored by:

US Department of Transportation
Texas Department of Transportation

Research conducted by:

Texas Transportation Institute

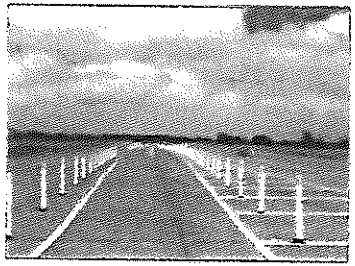
TOLL GANTRY DESIGN FIELD TEST

Description of Field Test

- Full scale mock-up of the toll gantry design with temporary pavement markings and pylons
- Conducted at the TTI Riverside Facility in College Station, TX
- Project team and staff from participating agencies able to drive the through the design at highway speed
- Unable to simulate vertical curvature or overhead signing

Question to be Answered by Field Test

- How does the lane shift at the gantry work?
- Does the design encourage/discourage passing?
- What is the comfort at high speed?
- What is the comfort with a vehicle platoon?
- How is visibility behind a large vehicle?
- Do the pylons assist the design?
- Do we agree with HOV being in the right lane?



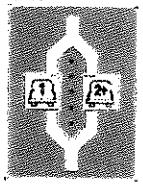
Field Test Findings

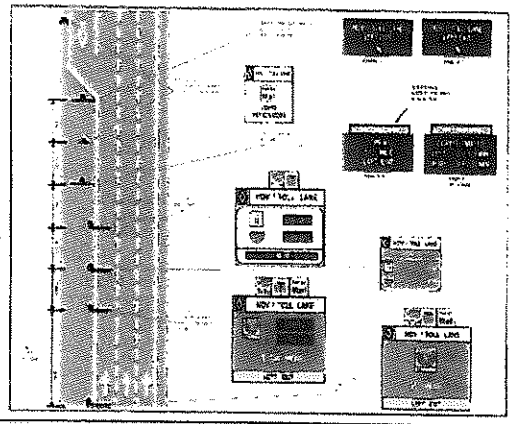
- Lane shift design was comfortable at highway speeds
- Design may discourage passing maneuvers
- Pylons effective traffic control
- Visibility of the gantry when following a platoon of vehicles was a concern
- Design Revisions = adjust gore taper and include more emphasis on the overhead sign design

SIGNING CHALLENGES

Signing Information

1) Managed lane is ahead
2) Distance to the managed lane entrance
3) Managed lane is open or closed
4) Managed lane entrance is a left exit
5) Distance to Managed Lane destinations/exits
6) Location of the actual managed lane entrance
7) Means of payment





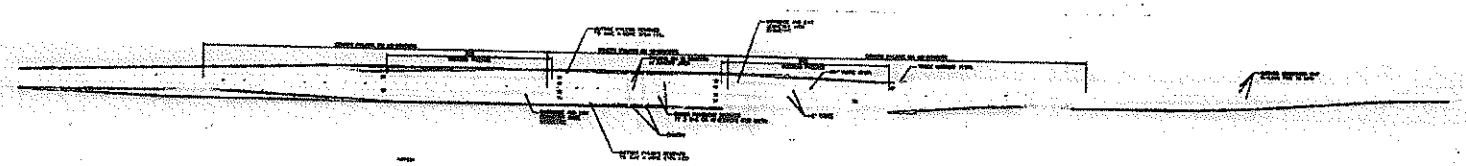
ACKNOWLEDGEMENTS

Participating Agencies

- Texas Department of Transportation (TxDOT)
- Dallas Area Rapid Transit (DART)
- North Texas Tollway Authority (NTTA)
- North Central Texas Council of Governments (NCTCOG)
- Texas Transportation Institute (TTI)

Key Project Team Members

- Stephen Endres, P.E., Project Manager, TxDOT
- Matthew MacGregor, P.E., CDA/Tollway Director, TxDOT
- Koorosh Olyai, P.E., Assistant Vice President, DART
- Dan Lamers, P.E., North Central Texas Council of Governments
- Christopher Poe, P.E., Assistant Agency Director, TTI
- Stephen Ranft, Assistant Research Specialist, TTI
- Jim Langston, P.E., Bridgefarmer Associates



Proposed HOV Declaration Lane Evaluation

Description of Field Test

- Full scale mock-up of the proposed lane configuration, geometry, pavement markings and pylons
- Project team and staff from participating agencies able to test drive the mock-up ramp at highway speeds and with back round traffic.
- Test conducted at TTI Riverside Facility in College Station, TX.

Questions to be answered by Field Test

- How does the Lane shift at the gantry works
- Does the design encourage/discourage passing?
- What is the comfort at high speeds?
- What is the comfort with a vehicle platoon?
- How is the visibility behind a large vehicle?
- Do the Pylons assist the design?
- Do we agree with HOV being in the right lane?

Field Test Findings

- **Lane shift design was comfortable at highway speeds**
- **Design may discourage passing maneuvers**
- **Pylons effective traffic control**
- **Visibility of the gantry when following a platoon of vehicles was a concern**

Other recommendations of this review are:

- Design Revisions; adjust gore taper
- Overhead sign design

What was not tested?

- Gantry Design
- Vertical and horizontal curvature
- Signing

Simulations

- Model assumptions and development
- Aerial view
- Driver's view
- Enforcement view
- Link to view simulation

Example of similar design in operation and Accident history

- DNT Entrance/exit ramps at Royal Lane and Northwest Highway in Dallas

Field Test

Tolling Gantry