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16. Abstract This report describes research activities regarding the comprehension of the signs and pavement markings for toll roads and managed lanes. Texas Transportation Institute researchers conducted seven focus groups, which explored driver understanding of toll road route markers, open road tolling payment options, pavement marking symbols, and preferential lane pavement markings in four Texas cities. Researchers also reviewed the ongoing development of revisions to the toll road chapter for the <i>Texas Manual of Uniform Traffic Control Devices</i> .					
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DRIVER COMPREHENSION OF SIGNING AND MARKINGS FOR TOLL FACILITIES

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DISCLAIMER

This research was performed in cooperation with the Texas Department of Transportation (TxDOT) and the Federal Highway Administration (FHWA). The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the FHWA or TxDOT. This report does not constitute a standard, specification, or regulation.

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CHAPTER 1: BACKGROUND

Since 2006, the Texas Manual on Uniform Traffic Control Devices (TMUTCD) has contained a chapter governing signs for toll facilities (1). The standards and guidelines it contains apply to new and existing toll facilities in the state of Texas, including conventional toll roads with cash plazas, open road tolling facilities that accept electronic payment only, and managed lanes with a tolling component. As new toll facility operations and design continue to evolve in Texas, new traffic control devices are needed to convey information to drivers. In the past year, new operations have come to bear on toll roads in Texas. The most important of these is video tolling, which allows drivers to use an electronic toll collection (ETC) facility, even if they don't possess a toll tag. When a non-tag vehicle passes through a toll gantry, the system photographs the license plate of the vehicle. The tolling agency sends the registered vehicle owner a bill by mail for the toll plus a small handling fee. Many of the signs in the current TMUTCD Chapter 2J contain the phrase "TxTAG Only," which was originally intended to be used for ETC facilities. With the advent of video tolling, adjustments to these signs, or additional supplementary signs, will be needed.

The current federal Manual on Uniform Traffic Control Devices (MUTCD) contains no information directly related to toll facilities, but it does have some preferential lane guidance that can be applied to managed lanes (2). A recent Federal Highway Administration (FHWA) project summarized the best practices for toll plaza design, including traffic control devices (3). Additional research sponsored by FHWA focused on symbols used for electronic payments at toll plazas and on open road tolling facilities (4). These efforts led to a FHWA policy memorandum concerning toll plaza design and signing (5). An upcoming Notice of Proposed Amendment to the MUTCD, expected in the autumn of 2007, promises to address more fully issues relating to signs, signals, and markings for toll roads and managed lanes.

The first year of this project identified current practices in other states and countries concerning driver information on toll facilities (6). Most states and toll operators have tried to apply the principles of guide sign design and sign sequencing to their roadways. For the most part, toll road signing is identical to freeway signing. The places where it most differs are in directional signing from adjoining non-toll facilities and in toll plaza signing. The first year of this project also included focus groups in three Texas cities (Austin, Arlington, and San Angelo) to assess driver comprehension of toll route numbering, frontage road entrance ramp signing,

guide sign banners, cash pull-out lanes for open road tolling, and pricing signs for managed lanes. During the first year, the researchers also developed example typical layout drawings and a detailed outline of a field book that will be the final product of this project.

This report summarizes research activities in the second year of a three-year effort to assess driver comprehension of toll facility operations and traffic control devices. The research during this year consisted of driver comprehension assessment of specific signs and markings. A parallel research and design effort was undertaken to develop principles of traffic control device design and placement that could be applied to new and existing roadways. A series of typical layout drawings is under development, as well, which eventually could form the basis for a revision to Chapter 2J of the TMTUCD.

CHAPTER 2: FOCUS GROUP RESEARCH OF DRIVER COMPREHENSION

In order to assess driver understanding of the new sign designs included in Chapter 2J of the TMUTCD, Texas Transportation Institute (TTI) researchers conducted focus groups. In addition to the signs in the TMUTCD, TTI researchers developed new candidate signs and pavement markings with the assistance of the project monitoring panel and the Texas Department of Transportation (TxDOT) Traffic Operations Division. These new candidates were designed to address specific toll facility operations that are not currently addressed in the manual. The focus group discussions then were primarily evaluations of specific sign and pavement marking designs, but they also allowed assessment of comprehension of the traffic operations associated with new types of toll facilities. These included parallel managed lanes with a toll component, toll roads with continuous parallel frontage roads, open road tolling plazas with cash pull-out lanes, and route marker design.

This chapter provides a description of the materials for the focus group, found in [Appendix A](#), and a short summary of the discussion. Readers are encouraged to read the full transcripts of the focus groups, found in [Appendix B](#), to gain the full flavor of the drivers' reactions.

PARTICIPANTS

A total of 55 Texas drivers participated in the focus groups: 21 men and 32 women. They ranged in age from 19 to 76. Researchers conducted the focus groups in TTI offices in Dallas, College Station, El Paso, and San Antonio. [Table 1](#) shows a complete breakdown of the demographics of the drivers. [Figure 1](#) shows that each focus group consisted of 8-12 people. At the beginning of the session, the facilitator asked participants to indicate the frequency with which they used toll facilities in Texas and in other areas of the country, and whether or not they owned a toll tag. Participants received \$50 for their attendance at the two hour session.

Table 1. Demographics of Focus Group Participants (Focus Group Sessions Shown in Order).

City	Month Conducted	Total Number	Number of Men	Number of Women	Age Range	Number who had a toll tag
Dallas (evening)	May	7	3	4	22-59	2
Dallas (daytime)	May	7	2	5	19-60	1
College Station (evening)	June	10	5	5	19-76	0
El Paso (evening)	July	8	4	4	25-64	0
El Paso (daytime)	July	7	3	4	19-62	0
San Antonio (evening)	August	10	4	6	21-56	0
San Antonio (daytime)	August	6	2	4	25-69	0
Totals		55	21	32	19-76	3



Figure 1. Example Focus Group Session.

DISCUSSION TOPICS AND COMMENT SUMMARY

The focus group relied on a PowerPoint® presentation that consisted of sign drawings, typical layouts, and photographs that had been digitally edited to include new sign designs. The facilitator worked from the same script for each group. As the focus groups progressed over several months, researchers added certain topics to the script, so that not all of the groups saw identical material, though the majority of it was identical. They added some material to provide better illustrations of content, and other material represented new topics that had just been identified by the project monitoring committee. This section of the report presents each group of slides on a particular topic, along with a summary of the comments on that topic. Appendix B presents the full transcripts of the focus groups.

Discussions with members of the project advisory team identified discussion topics for the focus groups. Researchers selected specific sign and roadway designs after reviewing preliminary plans for toll facilities throughout the state. The majority of these preliminary plans were prepared by consulting engineers and were then submitted to TxDOT district or Traffic Operations staff for review. By examining these plans, the researchers could identify specific areas of inconsistency that would benefit from new standards. The plans reviewed included:

- Dallas District: S.H. 121, I-635, I-30 Managed Lanes
- San Antonio District: Loop 1604
- Austin District: Loop 1 North, R.M. 620, U.S. 290 East, U.S. 183 East, U.S. 290 West, S.H. 130, Mopac Express Lanes
- Houston District: I-10 West Katy Tollway
- Tyler District: Loop 49

The focus group facilitator presented images of signs and roadways to the groups to prompt discussion on particular operational issues and sign design components. An LCD projector displayed the images via computer on a screen in the conference rooms where the focus groups took place. Researchers created the images by a variety of means. In some cases, they took a drawing of a sign directly from a preliminary schematic sheet; and they copied some pages from the TMUTCD Chapter 2J directly from the manual. In many cases, researchers

digitally edited photographs or sign images in order to present signs in a roadway context and to present different versions of the same sign.

The topics and slides are presented below. The first four slides showed welcome messages and procedural details.

Route Marker Signs for Toll Roads

The focus group began with a discussion of route markers that can be found on guide signs. [Figure 2](#) shows a non-toll road U.S., interstate highway, and Texas state shield. (Note: the Texas state shield was not added until the El Paso daytime and San Antonio focus groups.)



Figure 2. Illustration of Route Markers for Discussion.

The researcher asked the focus groups what type of roadway was going to each destination; and although most participants recognized the interstate shield, few knew the U.S. highway shield, and many identified it as a state shield. The researcher then asked if toll facilities should have a unique marker. Nearly everyone believed there should be separate route markers for toll roads, although a few participants noted that if they didn't already know what the different markers meant, then a unique shield wouldn't matter.

The next slide continued the discussion on route shields by introducing toll route markers with blue backgrounds and white backgrounds. The 2006 TMUTCD shows the route shield for a

state toll road as having blue numerals on a white background. Earlier versions of that document had shown the reverse image, and some early toll road plans had implemented that version. The project monitoring committee felt that the blue background sign may stand out better next to a white background conventional state route marker. [Figure 3](#) illustrates independent route assemblies for toll routes and parallel frontage roads for a state route. These are photographs of actual installations in the Austin area just prior to the roads opening in 2006.



Figure 3. Toll Road Route Markers with Blue or White Backgrounds.

The researcher explained the structures in the pictures in [Figure 3](#) as being some proposals for the route markers for toll shields and showed each image separately. When shown the white background sign on the left, participants commented that they thought that the sign was clear, the flag was eye-catching, and that the word “TOLL” distinguishes the sign. There was some concern about the white background sign not standing out against the sky. Referring to the sign structure on the right in [Figure 3](#), there was some confusion on the difference between the Loop 1 and Toll 1 signs. Participants made suggestions to add “LOOP” to the toll road sign for better understanding. When asked to directly compare the blue and white background versions of the toll route marker, the participants seemed to be split on their preference of the white or

blue backgrounds, with a slight majority favoring the blue. Subsequent slides showed these two markers in applications other than independent route assemblies.

Many plans for expansion of existing freeway facilities call for a change of those roads to tolled and the frontage roads functioning as non-toll alternatives to the numbered toll route. The initial discussion in this topic area focused on drivers' understanding of those operations. Most people understood, however, that Loop 1 would be a slower route than Toll 1. Several commented that there would likely be businesses and traffic signals on Loop 1, while Toll 1 would be an expressway. A few people expressed confusion on whether the two routes ended up at the same place, or if they followed the same path. After open discussion on this topic, the facilitator explained the actual operation and began discussion of specific sign designs.

The researchers edited [Figure 4](#) to include representative signs from the TMUTCD to illustrate this particular situation, but the photograph on the right shows a white on blue toll road marker, while the left shows a blue on white. With this slide, more and more of the participants began to prefer the blue background to the white version of the toll marker. Comments included concern for the legibility of the blue numbers at night, liking the contrast of a blue sign next to a white sign – making it obvious it's a different road – and the contrast of the blue background to white background portion within the toll sign. Suggestions for improvement included printing the word “TOLL” larger, taking away the flag, and moving the word “TOLL” to the top of the sign.

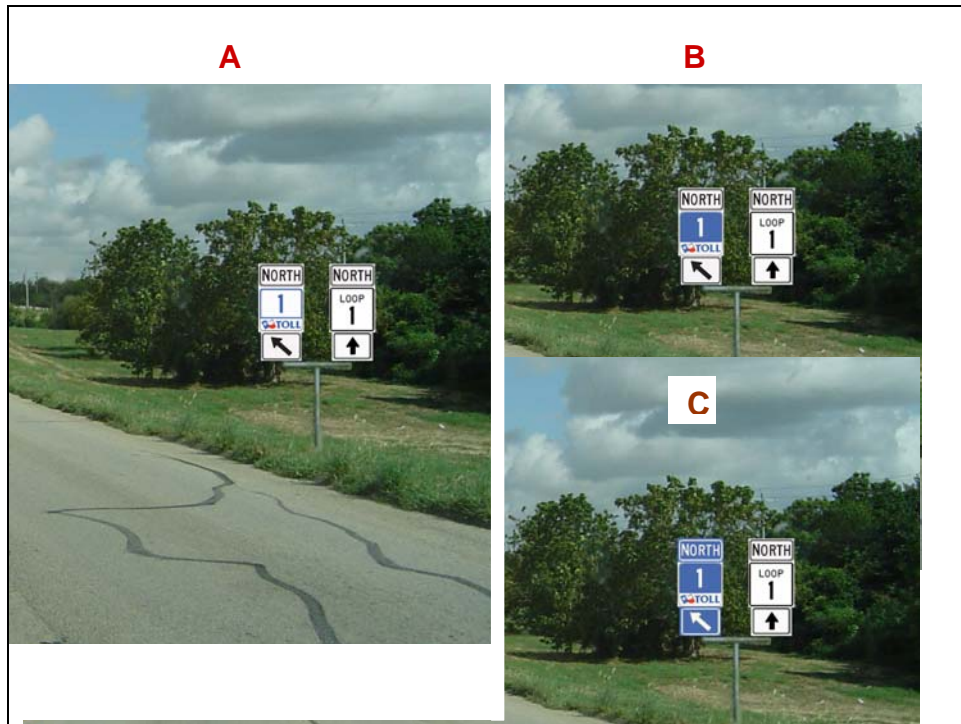


Figure 4. Toll Road Entrance Ramp from a Non-Toll Frontage Road (Version C was added in San Antonio Groups).

The San Antonio focus groups saw an edited version of the previous slide that showed an example of the blue route marker with blue background for the cardinal direction word (NORTH) and arrow (See [Figure 4](#), Version C). Most of the participants in these groups preferred the new added version (Version C). The only criticism was that there was too much blue, and it reminded someone of an Interstate shield.

[Figure 5](#) again shows a scenario where a toll road is running adjacent to a non-toll frontage road. The 2006 focus groups were also shown this slide. Researchers removed the flag icon from the bottom of a blue on white toll route marker and added a new plaque to the marker. The added plaque displays the text “TxTAG ONLY,” similar to the banners considered for the large overhead guide signs.

When asked their opinion on the altered toll sign in [Figure 5](#), participants generally liked the changes, although some believed the top portion was too small. Many liked the increase in the size of “TOLL,” accomplished by removing the small flag under the numerals. Others reported liking the original design with the small flag because it drew their attention to that portion of the sign where it said “TOLL.”



Figure 5. Modified Route Marker for a Toll Road Entrance Ramp from a Non-Toll Frontage Road.

Referring to the “TxTAG ONLY” portion of the sign, one interesting comment that participants brought up in several of the focus groups was that they thought the sign meant only drivers with Texas license plates were allowed on that roadway (due to the common use of the word “tag” to mean license plate). When asked what forms of payment would be allowed on the road shown in the photo, participants were mixed on whether it meant one could pay cash on the roadway or one had to have an electronic tag. The tendency was to assume “TOLL” always means there is an opportunity to pay a toll with cash while on the roadway. This issue would be brought up repeatedly in the groups. Most participants, even those from the Dallas area, where toll tags are common, believed that the word “TOLL” automatically implied cash payments would be accepted.

Researchers added [Figure 6](#) to see what the participants thought about the blue and white backgrounds for a toll route marker when placed next to a blue interstate shield. Many participants still preferred the blue background sign, feeling that the word “TOLL” stood out in its white field below the blue section. Others were concerned it would now be confused with the interstate sign or thought it no longer stood out as much as when it was next to a white background state route marker. Several mentioned using a new color other than blue or white for

the background. One subject in Dallas suggested giving the toll route marker, like the interstate shield, its own unique shape. One of the San Antonio focus groups liked the idea of switching the background color of the toll route marker to always be the opposite of the route marker to which it was adjacent.



Figure 6. Toll Route Markers Compared to Interstate Route Markers.

Route markers need to function when placed on large green guide signs leading drivers to exits from the toll road. [Figure 7](#) shows two existing sets of green guide signs. The top photo is from the Dallas area, while the bottom photo is from the Austin area. In both cases, the photo was cropped to display an adjacent interstate route marker as a point of comparison. When asked their preference of the blue vs. white background for toll markers on a green guide sign, the participants almost all said the white background stood out more. The San Antonio daytime and Dallas evening focus groups brought back the discussion of removing the flag from the toll shield, saying it was too small to see. Many proponents of the blue background sign in the previous scenarios expressed the belief that a single color should be used consistently, although admitting that in this case the white background stood out more against the green guide sign.



Figure 7. Comparison of Toll Route Marker Background Color for Applications on Green Guide Signs.

Researchers added [Figure 8](#) and [Figure 9](#) for the San Antonio focus groups to compare similar changes in the background color for route markers for toll roads on US highways and interstates. When comparing the options, the San Antonio participants were fairly split, although they did lean toward the top row of signs, where the direction and arrow plaques had blue backgrounds, as opposed to options N, O, and P. One subject specified that he did not like the center choices (R and O) because the color of the shield he was used to seeing had been changed, and he might confuse it with a business route.

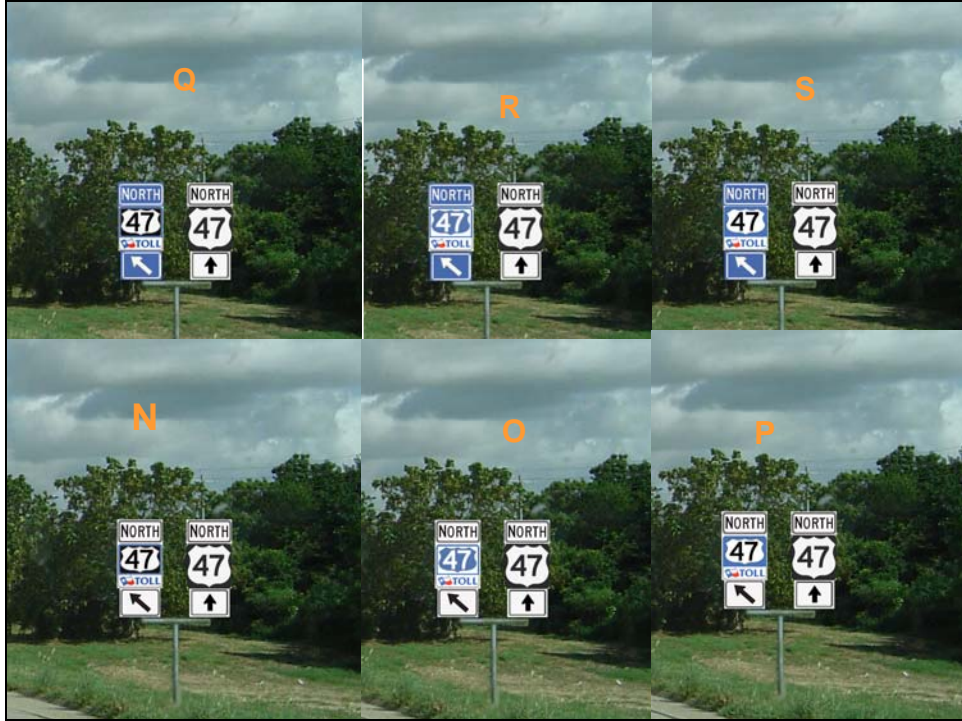


Figure 8. San Antonio Focus Group Slide Showing Examples of Signage for a Toll Road Entrance Ramp from a Free Frontage Road for US Highways.



Figure 9. Toll Route Markers for an Interstate Toll Road Entrance Ramp Next to a Trailblazer Sign for an Adjacent Interstate.

When showing [Figure 9](#), the researcher explained that this was not a situation where the non-toll route of the same number operated as a frontage road to the tolled route. It was just a situation where one could enter a tolled interstate facility or continue straight to a non-tolled interstate of a different number. Both San Antonio groups preferred the first column, where the red band remained on the tolled interstate shield. One of the groups decided they preferred option W, with the blue background for the direction and arrow plaques for consistency. It should be noted that Texas has no plans to toll existing interstate highways. Researchers included this slide to carry the principle of reversing colors for toll route markers through to all potential applications.

All seven focus groups were shown [Figure 10](#), which shows color variations to the three different types of toll road route shields. The slide was a summary slide to re-cap all of the discussion up to this point. The general consensus was slightly in favor of B (blue background) for state routes, an even split between N and P for U.S. routes, and an overwhelming majority in favor of X for interstate routes.

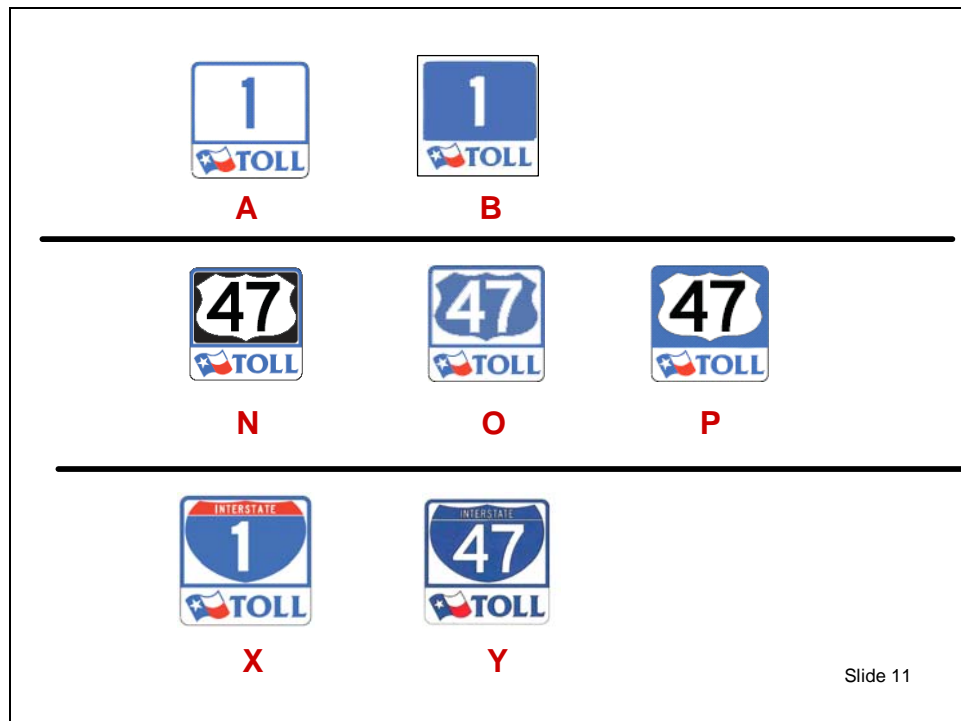


Figure 10. Summary of the Different Types of Toll Road Route Markers Discussed.

Pavement Markings

The next section focused on horizontal and longitudinal pavement markings that can be used to help designate direct connect ramps to toll facilities. Figure 11 shows three versions of horizontal markings that could be used on a lane drop exit to a toll road. Figure 12 shows a fourth version; and Figure 13, added for the two San Antonio groups, shows a fifth. The groups viewed these versions in quick succession to focus the discussion on a comparison among them. Overall, the focus groups had positive responses to the pavement markings. Some participants expressed some concern with the marking placement and visibility in high traffic situations. Many participants stated that the markings should supplement rather than replace information on the overhead guide signs.

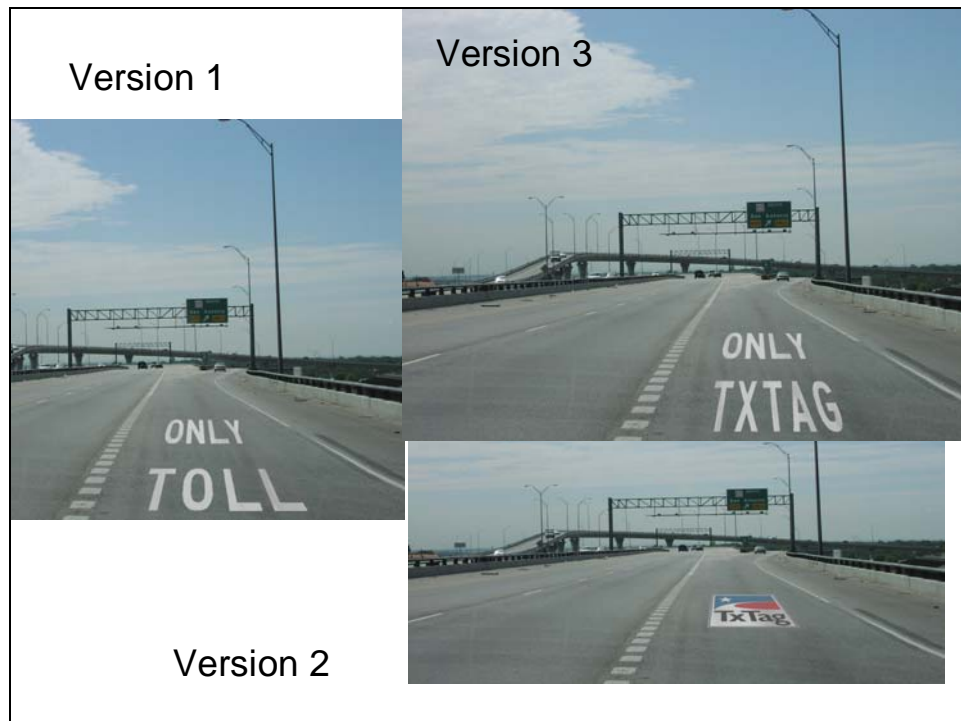


Figure 11. Horizontal Signing Options for Direct Connect Ramps to Toll Facilities.

Version 4



Slide 13

Figure 12. Horizontal Signing Using Toll Route Marker (White Background) for Direct Connect Ramp to Toll Facility.

Version 5



Slide 23

Figure 13. Horizontal Signing Using Toll Route Marker (Blue Background) for Direct Connect Ramp to Toll Facility.

Many like the color in Version 2 of [Figure 11](#) because they thought it would stand out. Others said that “TxTAG ONLY” better described who would be allowed in the facility, and that Version 2 did not provide enough information. Most people felt that “TOLL ONLY” left the driver to wonder if he or she could pay cash if he or she exited. One participant in Dallas suggested combining the TxTAG symbol with the word “ONLY,” and another suggestion in College Station was to have text saying “TxTAG ONLY NO CASH.”

When shown the route marker in [Figure 12](#), participants liked the color of the symbol, but some were concerned that the route marker on the pavement did not provide any information about what type of payment was expected on the road, in fact, the El Paso evening group assumed the word “TOLL” on the marker meant a driver would be allowed to pay cash. The College Station participants thought it was more important to have “TxTAG ONLY” on the marker than to have the route number on the marker. The blue background toll route marker (Version 5, [Figure 13](#)) was added and accepted favorably by the San Antonio groups.

[Figure 14](#) showed horizontal pavement markings on the approach to a toll booth to indicate the type of payment designated for that lane. When asked if these types of markings were needed or helpful, all of the focus groups agreed that they are important. No one noticed or commented on the purple lane lines, and the facilitator did not point these out to the groups because the focus of the discussion was on the text.



Figure 14. Horizontal Signing and Lane Markings on the Approach to a Toll Booth.

The next pavement marking topic concerned markings for weaving areas for buffer-separated managed lanes. The slides showed a managed lane on the far left side of a freeway facility with various lane line and horizontal signing treatments digitally edited. [Figure 15](#) begins with the managed lane separated from the mainlanes by two solid lines, indicating that no vehicles are to enter or exit the managed lane at this point. When showing the first slide, the researcher would ask, “Where am I?” The vast majority of the responses were either the HOV lane or the carpool lane. For each of these slides showing longitudinal markings, the facilitator asked the groups if the drivers in the special lane could exit, and if the drivers in the mainlanes of the freeway could enter the lane. For [Figure 15](#), the groups recognized double white lines as uncrossable, but some drivers admitted they would cross between the lanes anyway.

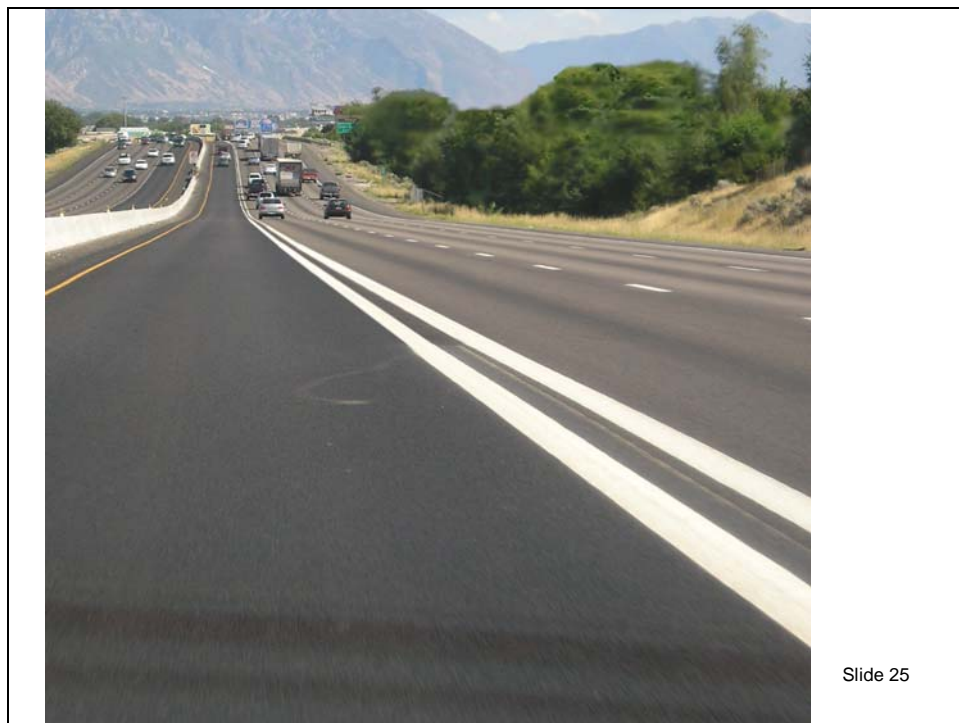


Figure 15. Managed Lane Separated from the Mainlanes by Double Solid White Lines.

[Figure 16](#) shows an access area indicated by a single white skip line to indicate where lane changes are permitted. This is the current standard for buffer-separated HOV lanes. Researchers asked the participants the same questions about who could enter and exit the lane, and participants said that movement was allowed back and forth between the lanes at this point, although there was some confusion in the Dallas evening group.

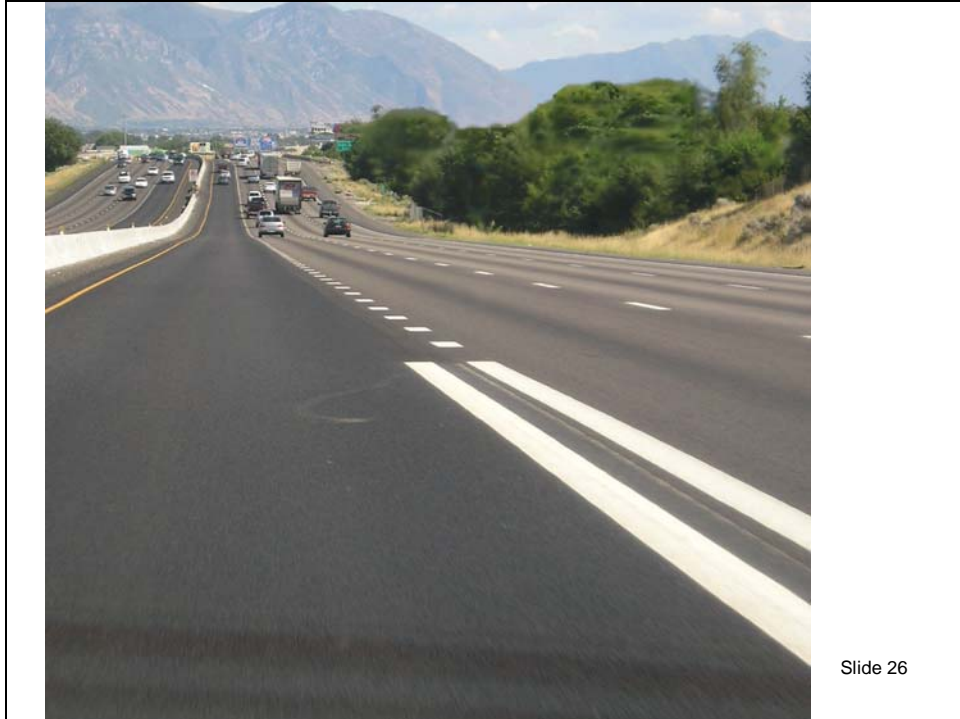


Figure 16. Managed Lane Access Area Separated from the Mainlanes by Single Dashed Line.

Some managed lane operations may require limited access or express lane operations where vehicles may enter the lane, but exiting the lane to the general purpose lanes is prohibited in order to reduce the amount of weaving. [Figure 17](#) shows one possible treatment to convey this message; along with transition of the longitudinal markings horizontal markings of the word “ONLY” and an arrow have been added. When asked the same questions about entering and exiting the lane, participants were still confused about the intended message of the markings. Participants believed the words (meaning “stay in lane”) contradicted the dashed lines on the pavement (meaning “lane changes permitted”) and did not reply favorably to this option.



Figure 17. Managed Lane Ingress Only Area Using Text and Arrow with Conventional Lane Line Treatments.

Figure 18 introduces another option of horizontal markings at the transition point that read “NO EXIT” while driving over them. With this figure, all of the participants recognized that a driver could not exit the lane, but some were still unsure if drivers from the mainlanes could enter. Some participants were still concerned about the dashed lines and text providing conflicting messages. Figure 19 shows the same markings, but changes the longitudinal lines to show a solid white line next to a broken white line to divide the managed and mainlanes. A participant in the first Dallas group suggested this treatment using no passing zone markings. All of the groups preferred this version, thinking it more clearly showed that the special lane could not exit the lane, but the mainlanes could still enter. The El Paso daytime group even believed that the lines alone were sufficient to convey this message, and the text was not needed. Several participants mentioned that there still would be violators who would exit the lane if they wanted.



Figure 18. Managed Lane Ingress Only Area Using Text with Conventional Lane Line Treatments.



Figure 19. Managed Lane Ingress Only Area Using Text with No Passing Zone Lane Line Treatments.

Cash Pull-Out Lanes on Open Road Tolling Facilities

At most modern toll plazas, electronic tag holders do not have to slow down and go through a toll booth. Prior to the payment area, those vehicles paying cash are separated from the mainlanes, go through conventional toll booths, and re-enter the toll road. Tag holders never slow down and just proceed straight and pass under a toll gantry. The next section of the focus group evaluated proposed signing in the TMUTCD Chapter 2J. Focus group participants also addressed, with mixed results, this topic in the first year of the project. Researchers left out this discussion section of the San Antonio AM focus group in the interest of time.

To begin the discussion, [Figure 20](#) was shown to explain how the road would be configured for tolling. The participants had an easy time understanding and were in favor of the general concept.

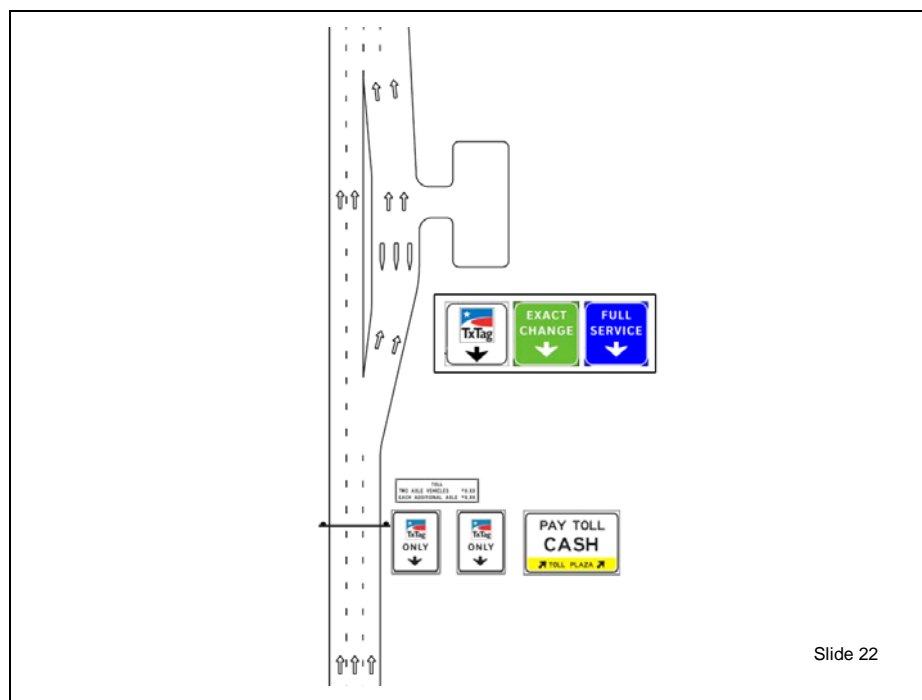


Figure 20. Details of Cash Pull-Out Lane to Explain Operation.

The TMUTCD contains two versions of Figure 2J-8 that show different advance sign sequences for cash pull-out lanes. The next portion of the discussion compared these two drawings side by side. After an overview slide was shown ([Figure 21](#)), each sign was discussed in detail.

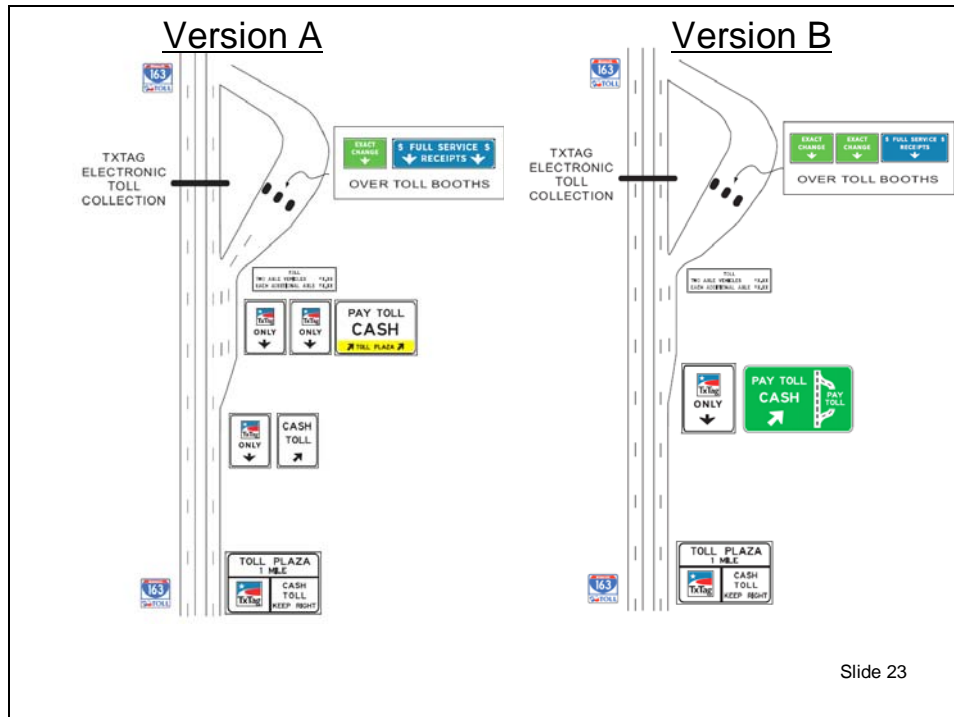


Figure 21. Slide Showing TMUTCD Figures 2J-8 A and B.

The 1 Mile advance sign was discussed first (see [Figure 22](#)). This sign is identical for both versions shown in the TMUTCD. For the most part, participants saw this sign as helpful, but they made the following suggestions: use the term “TOLL BOOTH” instead of “TOLL PLAZA,” add “KEEP LEFT” under the TxTAG symbol, and use arrows pointing to the lanes on the signs.

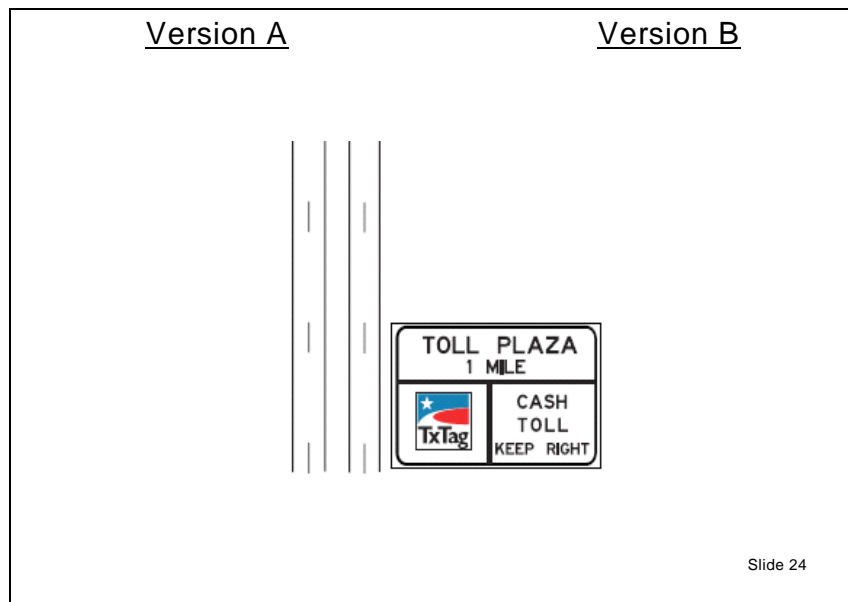


Figure 22. Close-up of 1 Mile Advance Sign for Cash Pull-Out.

The group discussed the second advance signs next. Version A contains regulatory signs only, while Version B contains a diagrammatic guide sign illustrating the return lane configuration (see [Figure 23](#)). The sign in Version B is similar to those in use in Oklahoma and Colorado. The groups were split between the two versions, with slightly more participants preferring Version A. Many participants liked the green colored sign in Version B, often relating the color to money, but not everyone thought a map was necessary, and some thought it was too much information. Several were concerned that a driver may think they're being forced to exit the tollway to pay in Version A, and they may not realize it's just a pullout. When asked if there was any other information they'd like to see at this point, several of the focus groups mentioned that they'd like to know the price of the toll.

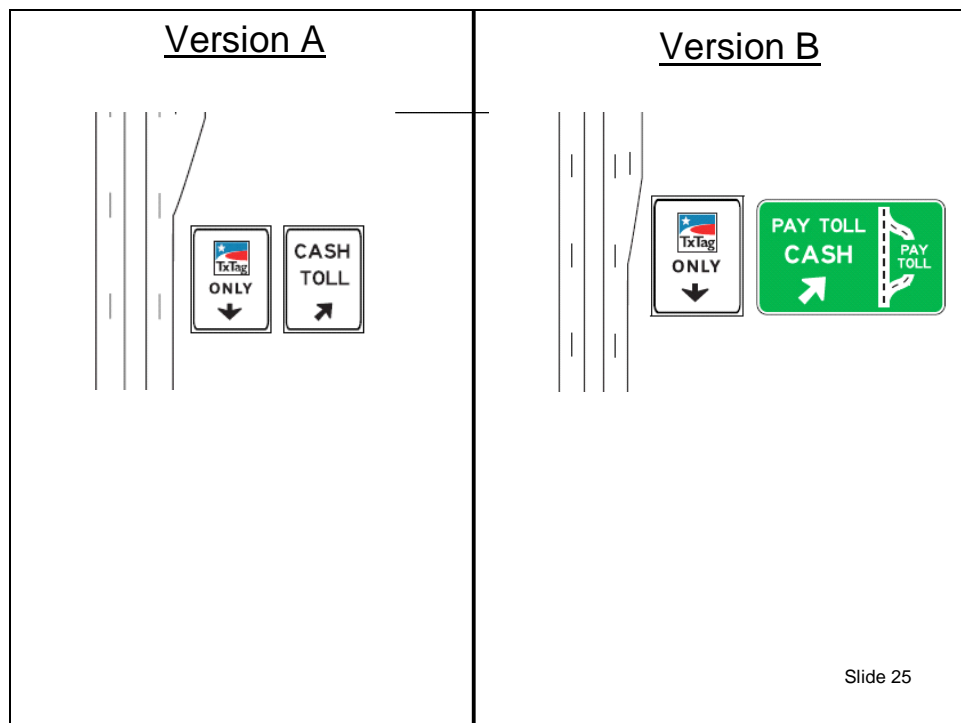


Figure 23. Close-up of Exit Direction Signs for Cash Pull-Out Lanes.

The groups discussed exit direction signs next. Version A in [Figure 24](#) contains lane assignment signs to be displayed overhead at the gore, while Version B has no additional signs at this point. Most of the groups believed the added signs in Version A would be helpful; suggestions for improvement included changing “TOLL PLAZA” to “TOLL BOOTH,” making the right sign green, and adding the price of the toll to the sign. Participants showed some concern that these signs are too close to the plaza for a price sign, and a few participants believed

the signs should be kept as simple as possible and that perhaps some of these signs were not necessary.

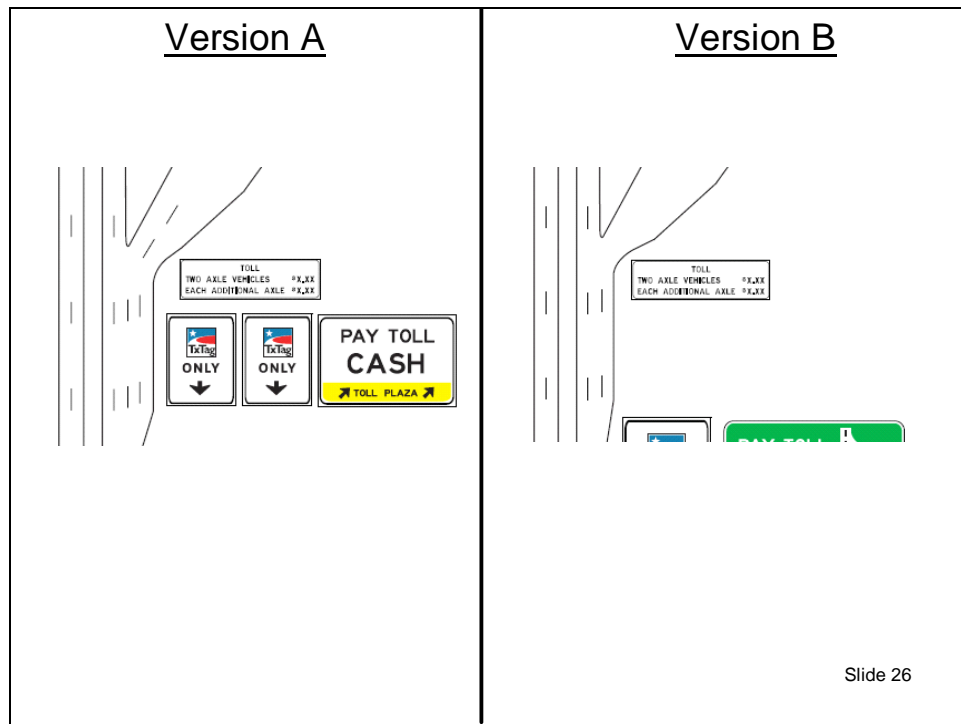


Figure 24. Close-up of Lane Assignment Signs at the Gore for Cash Pull-Outs.

Guide Sign Design

The next discussion topic concerned freeway advance signs on ETC-only facilities (see [Figure 25](#)). Some other agencies (e.g., Maryland Transportation Authority) have designs that call for both a positive message (Tag Only) and prohibitive message (No Cash). The TMUTCD does not currently include the prohibitive message. The two versions of the guide sign shown in [Figure 25](#) present alternate ways of conveying the exclusive message. When just viewing Version 1, most participants believed it was clear that a vehicle had to have a tag to ride in that facility; however there was some confusion on what a “TxTAG” was and if other agency tags, such as an EZ tag, would be allowed in the lane. A few people from San Antonio said they would still go in the lane, expecting to pay cash if they didn’t have a tag, or they would avoid the lane if they didn’t have Texas license plates. A suggestion in San Antonio was to call the tag “TxPass” to avoid confusion with vehicle registration tags. When asked, most participants liked Version 2, with the added “NO CASH” plaque, because it would help drivers who are unfamiliar

with the TxTAG to know who would be allowed in the lane. A few participants believed this added plaque made the sign “busy.”

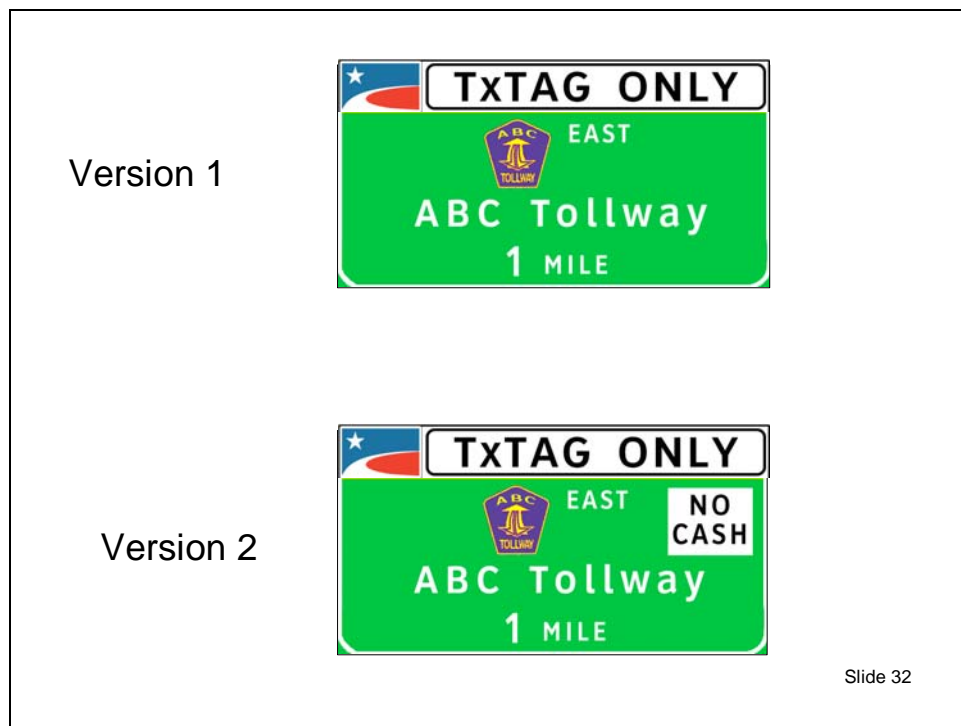


Figure 25. Direct Connect Ramp Signing for Toll Facilities.

The previous figure introduced the concept of a banner at the top of a toll road guide sign. [Figure 26](#) continues with this idea by offering several variations and asking the participants if they have any suggestions for what should be written in that banner.

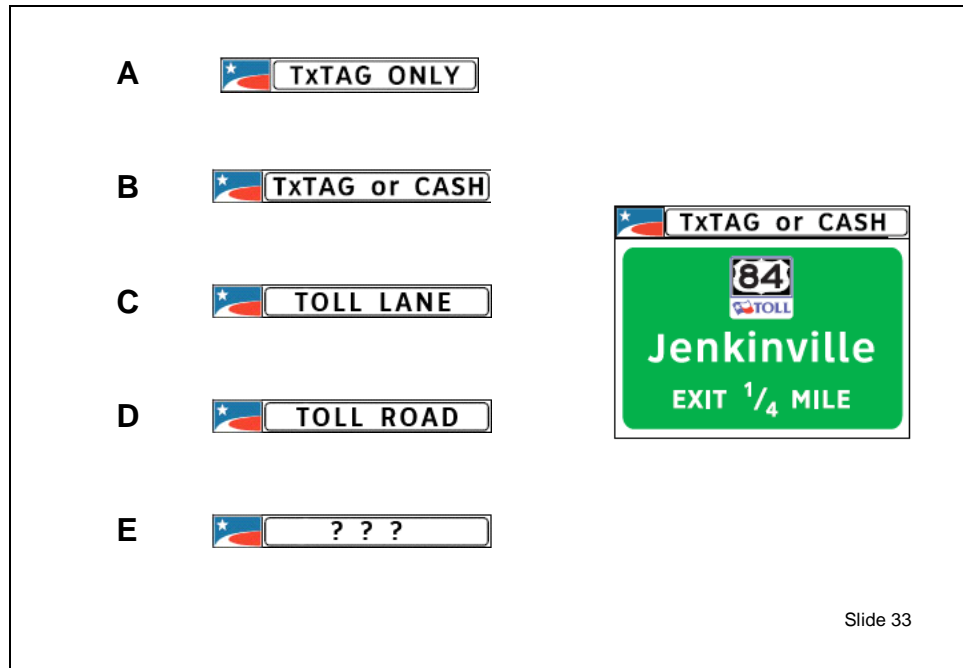


Figure 26. Alternative Guide Sign Banners.

All of the focus groups were in favor of a toll road specific banner at the top of the guide signs. Most preferred one that was very specific in indicating who was allowed in the lane, such as A or B, although some participants in the San Antonio evening and the College Station groups preferred version D as a more generic option.. The focus groups were also concerned with unfamiliar drivers from different states and whether they would be able to enter the roadway.

CHAPTER 3: DEVELOPMENT ACTIVITIES TOWARD A FIELDBOOK FOR SIGNING AND MARKINGS FOR TOLL FACILITIES

The final report on this project, to be completed in 2008, will include as products a complete set of typical layout drawings for a wide variety of roadway configurations. Below is a draft outline of the toll road section of this fieldbook. This draft outline is organized in a similar fashion to chapters of the TMUTCD and could form the basis for future revisions of this manual. The authors presented this draft outline to inform the reader of the scope of the final guidelines and to invite comments for other topics. Readers may contact the TxDOT Traffic Operations Division for any interim layout drawings that may be available as this project continues.

2J.01 SCOPE OF TOLL GUIDE SIGN STANDARDS

2J.02 TOLL ROAD SIGNING PRINCIPLES

2J.03 GENERAL

2J.04 TOLL ROAD ROUTE SHIELDS AND AUXILIARIES

Figure 2J-1: Existing Basic Signs in 2006 TMUTCD.

Figure 2J-2: New Additions to Basic Signs.

Figure 2J-3: Guide Sign Routing Plaques for Use with Toll Banner.

Figure 2J-4: Guide Sign Routing Plaques for Use with Free Exit Banner.

2J.05 TOLL ROADWAY WITHOUT FRONTAGE ROADS – EXITS

Figure 2J-5. 1: Minor Exit from a Toll Roadway without Frontage Roads.

Figure 2J-5. 2: Minor Exit from a Toll Roadway without Frontage Roads (Lane Drop Scenario).

Figure 2J-5. 3: Major Exit from a Toll Roadway without Frontage Roads.

2J.06 TOLL ROADWAY WITHOUT FRONTAGE ROADS – ENTRANCES

Figure 2J-6. 1: Entrance to a Toll Roadway without Frontage Roads.

Figure 2J-6. 2: Entrance to a Toll Roadway without Frontage Roads (Direct Connect Ramp Scenario).

Figure 2J-6. 3: Entrance to a Toll Roadway without Frontage Roads (Multiple Exits Scenario).

2J.07 TOLL ROADWAY WITHOUT FRONTAGE ROADS – TOLL PLAZA

Figure 2J-7. 1: Toll/Cash Plaza for a Toll Roadway without Frontage Roads.

Figure 2J-7. 2: Toll/Cash Plaza for a Toll Roadway without Frontage Roads (Leading to a Cross Street).

2J.08 TOLL ROADWAY WITH FRONTAGE ROADS – EXITS

Figure 2J-8. 1: Exit from a Toll Roadway with Frontage Road.

Figure 2J-8. 2: Exit from a Toll Roadway with Frontage Road (Lane Drop Scenario).

Figure 2J-8. 3: Exit from a Toll Roadway with Frontage Road with Cross Street.

Figure 2J-8. 4: Exit to a Toll Roadway with Frontage Road (Direct Connect Ramp before Free Exit).

Figure 2J-8. 5: Exit to a Toll Roadway with Frontage Road (Direct Connect Ramp after Free Exit).

Figure 2J-8. 6: Details of an Intersection Leading to a Toll Roadway with Frontage Road.

2J.09 TOLL ROADWAY WITH FRONTAGE ROADS – ENTRANCE

Figure 2J-9. 1: Entrance to a Toll Roadway with Frontage Road with a Cross Street.

Figure 2J-9. 2: Entrance to a Toll Roadway with a Frontage Road.

Figure 2J-9. 3: Entrance to a Toll Roadway with a Frontage Road (Lane Drop Scenario).

Figure 2J-9. 4: Entrance to a Toll Roadway with a Frontage Road with a U-Turn Lane.

2J.10 NON-TOLL ROADWAY CONVERTS TO A TOLL ROADWAY

Figure 2J-10. 1: Non-Toll Roadway Converts into a Toll Roadway with Frontage Road.

Figure 2J-10. 2: Non-Toll Roadway Converts into a Toll Roadway with a Frontage Road and Cross Street.

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1. Texas Department of Transportation. *2006 Manual on Uniform Traffic Control Devices*. Texas Department of Transportation, 2006.
2. U.S. Department of Transportation. *Manual on Uniform Traffic Control Devices for Streets and Highways, 2003 Edition*. Federal Highway Administration, Washington, D.C.
3. Smith, R. *State of the Practice and Traffic Control Strategies for Toll Plazas: Best Practices*. Report to the Office of Operations, Federal Highway Administration, Washington D.C., July 28, 2006, <http://mutcd/fhwa.dot.gov/rpt/tcstoll/index.htm>.
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6. Chrysler, S.T., A.A. Williams, and K. Fitzpatrick. *Preliminary Guidelines for Signing on Toll Roads*. Report No. 5446-1, Texas Transportation Institute, College Station, Texas, 2007.

APPENDIX A
FOCUS GROUP PAPERWORK

INFORMED CONSENT

You have been invited to participate in a focus group discussion concerning toll road signing. This session is taking place in the offices of the Texas Transportation Institute. You are being selected as a possible participant because you are aged 18 and older, you possess a valid driver's license, and you have no apparent limitations impeding your ability to drive. You have been instructed to read this form and ask any questions you may have before agreeing to participate in the study. You will be compensated \$50 for completing the session. If you choose to discontinue participation before the session is completed or you do not wish to be audiotaped, you will be paid \$10 for your trouble.

Background Information: The purpose of this study is to understand what drivers think about signs on toll roads.

Procedures: If you agree to be in this study, you will be asked to participate in a brief introductory session and engage in a discussion about toll lanes. You will also be asked to complete a brief questionnaire about your driving habits. This session will take no longer than 2 hours. It is your right to stop the study at any time for any reason without any repercussion. If you ask to leave early, you will be paid adjusted to the portion of the scheduled 2 hours in which you participated.

Confidentiality: This session will be audiotaped so that all comments can be captured. There may also be note-takers present. The records of this study will be kept private. In any sort of report that might be published, no information will be included which may make it possible to identify you. The research records will be kept in a locked file, accessible only to the investigator. These records will be destroyed after three years. You will be asked to sign a form acknowledging payment for your participation. These forms are kept separate from this signed consent form and any other data that would identify you by name.

Voluntary Nature of the Study: Your decision whether or not to participate will not affect your current or future relations with the Texas Transportation Institute, Texas A&M University, or the Texas Department of Transportation. If you decide to participate, you are free to withdraw at any time without affecting those relationships. A copy of this form will be given to you prior to your proceeding with the experiment if you request it.

Contacts and Questions: The researcher conducting this study is Dr. Susan Chrysler of the Texas Transportation Institute. She can be reached at 979-862-3928 or s-chrysler@tamu.edu. The Texas Department of Transportation is funding this project.

This research has been reviewed and approved by the Institutional Review Board - Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, the Institutional Review Board may be contacted through Ms. Angelia Raines, Director of Research Compliance, Office of the Vice President for Research, at (979) 458-4067 (araines@vprmail.tamu.edu).

Statement of Consent: *Please be sure you have read the above information, asked questions, and received answers to your satisfaction. You will be given a copy of the consent form for your records. By signing this document, you consent to participate in the study.*

Signature of Research Participant

Date

Signature of Principal Investigator

Date

QUESTIONNAIRE TO BE COMPLETED BEFORE THE STUDY

Please circle the appropriate response.

DEMOGRAPHICS

Sex: Male Female

Birthdate: _____ (Month, Day, Year)

City of Residence: _____

Race / Ethnic Background: White African-American Asian or Pacific Islander
Hispanic Other

Current Employment: Full Time Part Time Retired
Student
Homemaker Other

Highest Level of Education: Some High School High School Graduate
Some College or Vocational School College Graduate
Some graduate school Graduate degree

DRIVING HISTORY

How often do you drive a motor-vehicle?
A few times a year A few times a month
A few times a week Once a day Several times a day

How often do you drive on a toll road ?
A few times a year A few times a month
A few times a week Once a day Several times a day

Do you have an electronic tag in your vehicle to pay tolls ? Yes No

If you answered "Yes", please list the type of tag _____
(for example: TxTAG, North Texas Toll Authority (NTTA), Harris County EZ TAG)

Does your occupation involve transportation ? Yes No

If you answered "Yes", please list your occupation: _____
(for example: bus driver, law enforcement, traffic engineer)

APPENDIX B
FOCUS GROUP TRANSCRIPTS

This Appendix contains the transcripts of the seven focus groups conducted for this project:

1. April 23, 2007, Dallas, Texas, evening
2. April 24, 2007, Dallas, Texas, daytime
3. May 31, 2007, College Station, Texas, evening
4. July 31, 2007, El Paso, Texas, evening
5. August 1, 2007, El Paso, Texas, daytime
6. August 22, 2007, San Antonio, Texas, evening
7. August 23, 2007, San Antonio, Texas, daytime

The PowerPoint® slides used as aids in the focus groups can be found in the body of the report and also within the transcripts themselves.

Dallas, Texas
April 23, 2007 (evening)

Introductions:

1. Lives on Preston Rd, near Campbell. Drives downtown to Love Field to work. Sometimes takes toll roads from Keller Springs to Royal Lane. In the morning it's fast but coming home it's not worth it. Has toll tag.
2. Drives on highways, not toll roads.
3. Lives in Grand Prairie, doesn't usually drive on tollway. Only been on very few times.
4. Lives in Grand Prairie. Takes short toll bridge sometimes. If it's rush hour, will not drive on it.
5. Lives in Duncanville off of Clark Road. Drives to downtown every morning. Does not have toll tag.
6. Lives in Plano. Has tag, but doesn't drive on Toll Road too often.
7. Drives toll road constantly, lives in Plano. Has tag.

Route Markers

Slide 5



What kind of road is represented on Durham sign?

6. State Highway
7. No Clue
3. I see them but have always wondered why they have different shapes

How about the sign on the right, going to Dallas?

6. Interstate – the sign is labeled
1. 2. 3. 4. 5. 6. Agree

Given that you all don't seem to know that each type of sign has special meaning, should there be special markers for toll roads?

7. Yes, diamond would help with Tollway written out, might realize that is a toll road, The way interstate was written on the other sign
6. \$ sign might help
2. 3. 4. 5. 6. 7. Think yes there should be special markers

Slide 6



Sign images: This is the sign for a new State Highway 45 as a toll road. Has anyone ever seen a sign similar to that?

-No one had ever seen them.

Slide 7



Feeder vs. Toll: This is an example of what you would see if you are at an intersection on a frontage road, and this will tell you where to turn to get to that road. Here is an example of an entrance to Toll Route 1. The roads are going to the same place but one is a toll. Do you think one color combination is better than the other?

-Everyone likes white on blue

6. Can distinguish better

7. Obvious that there is a difference between two roads

Slide 8



There might be a situation where now you have a blue interstate shield next to it. In that kind of situation, do you think the blue still helps?

7. The white one is still a noticeable difference
 5. Make words "TOLL" larger and above "North" to stand out more. Thinks TOLL is the first thing he should see to know if he needs to pay
 3. Goes ok with other sign, does have more white for the TOLL background and arrow background, if it were to be totally blue that would be more confusing. Looks good the way it is.
 6. Toll sign should be larger. Two together that are blue are not as distinguishable as having the contrast between the blue interstate and white background for TOLL. Should put TOLL on the top. Color does help. Matter of people training eyes to see what they are looking for
- Can't think of any other signs that have blue/white combination in Texas

Slide 9



Green background, overhead signs: white 121 or blue 45?

6. Likes the white. Tells something is different because signs aren't the same.
7. Different shape, as with interstate, why not do the same with toll way too?
6. Maybe make it a circular sign
6. It would be very hard to distinguish the signs as one from another, 45 looks like a speed limit.

- Everyone agrees.
- Everyone would still like to see TOLL in larger letters

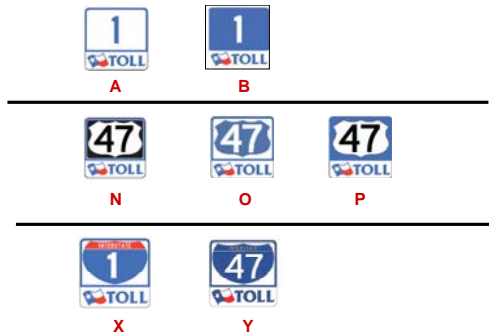
Do you think the flag on the toll sign means anything?

1. No flag – takes up too much room. Doesn't mean anything.
3. Doesn't mean anything - there for decoration
6. Maybe toll indicator-too hard to figure out, some people would never connect that

Slide 10



Slide 11



A & B: Illustrate versions of Texas route marker for a toll road.

In general, it seems like you guys like the blue sign better when it is next to a white sign, but up on the green overhead it was kind of blending in, and think the flag is eye catching but doesn't really mean anything.

6. White number 1 will stand out better at night because of color.

X, Y, and Z: Let people know they are still on the same US highway, but it is now a toll.

2. Likes Z, stands out more, it is different from the other ones, still wants to see TOLL on top of the sign
4. Y stands out at night
6. Y: Numbers are in black, "TOLL" should be in black too.
1. Likes X because if it was black on white it would look like a speed limit sign.

Does anything get taken away from the shield symbol by putting it in a box?

- 6. Shield is a distinct shape. Message that it's a secondary road can still be conveyed.
- 5. Colors catch eye more than shape, maybe red signs to warn that you are about to have to pay
- 1. Circle sign with the same information
- 6. Could do an oval shape

Pavement Markings

Slide 13



This is another way we can distinguish toll roads from other roads. This is an example on a freeway where the exit ramp is taking you to a toll road.

Version 1:

- All have seen pavement markings before
- 6. Clearly marked on road.

*Version 2: **Has anyone ever seen this symbol before?***

- Do not know this sign
- Better have a toll tag; do not think you could pay cash
- 5. Should say tag only
- Assume Tag only
- Assume only TX tags would work, since it says Texas
- 6. Any time you use color, it's going to attract better
- Helpful to let drivers know that they're getting on a toll road
- Like number, like having the word "toll", color will stand out,
- 6. Use reflective paint for night.

Version 3:

- Symbol and "only"
- Color always helpful more than white marking on pavement

- All think that pavement mark is better.
- Would get out of lane

Slide 14

Version 4



Version 4:

- 6. Likes these if you are not familiar with the road
(All nod)
- 6. Reflective paint so that at night it shows even more
- 3 & 4 good for out of town people
- 3. This is not enough, signs are also needed
- All think \$ too
- 6. Assume bill by reading the license plate or cash, would not think truly trapped if did not have a toll tag

Slide 15

At the toll booths?



What do you think about markings on the pavement approaching toll booths?

- 6. Good to have
(All nod)
- 3. Two lines for tags and the slow for cash, tell me where to go. If you have a toll tag that should be something on the top of the booth where you are going through

Slide 16



Lane on Freeway: This shows a special lane on the inside of a freeway. Has anyone ever seen anything like this?

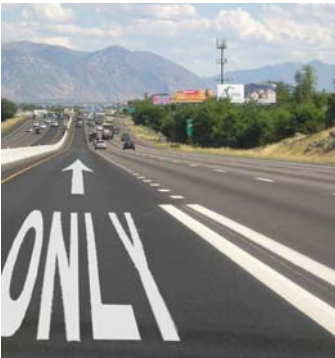
- All say HOV
- All think you can not change lines
- 6. Everyone should know that you can't cross double white line

Slide 17



- All confused
- Like HOV
- 6. People can get in but I can't leave because the dotted line and pavement markings (All nod, like 19 better)

Slide 18



3. Confusing, used to a dotted line and a solid line letting her know when she can and cannot enter a lane
7. Don't like
1. Don't like, words do not agree with the dashed lines

Slide 19



- 6 & 2 driver education would be needed for the pavement markings alone to be effective, in other places though lanes change with a traffic pattern and that is much more confusing than this, this sign clearly says NO EXIT
3. Would be confusing, why dotted lines if you couldn't exit?
 7. Red Dots, having a different color

Slide 20



1. Would help to make more sense, road striping, similar to passing/no passing lanes on a two lane road with a solid stripe and a dotted line
4. Like the passing lane idea

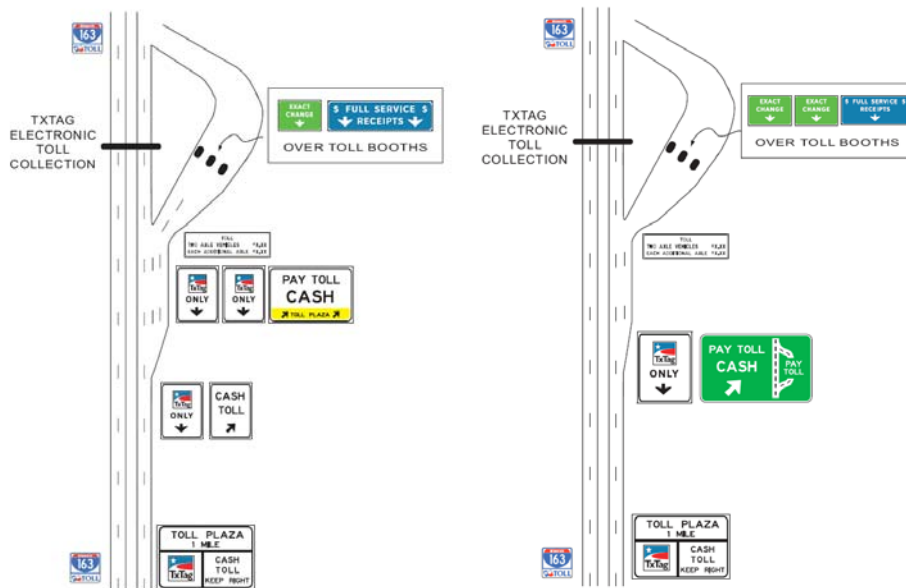
Which Lane Is for Me?

Slide 22



There are situations like this where if you have a tag, you just stay left and go on through, and if you want to pay cash, you have to exit to the right. We are going to talk about the configuration where if you want to pay cash, you have to go through a toll booth area, and if you have a tag, you just keep going.

Slide 23



Both versions have a sign like this where we are telling you there is a toll plaza a mile ahead. Is sign preparing for splitting up of lanes ahead?

-Yes

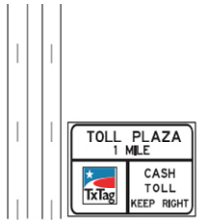
Why is it a white background rather than another color?

-informational sign

What do you think about the word Plaza?

6. More than just a tollbooth, if you don't have a toll tag you have to go around somewhere else, need to explain that it is more than just a booth

Slide 24



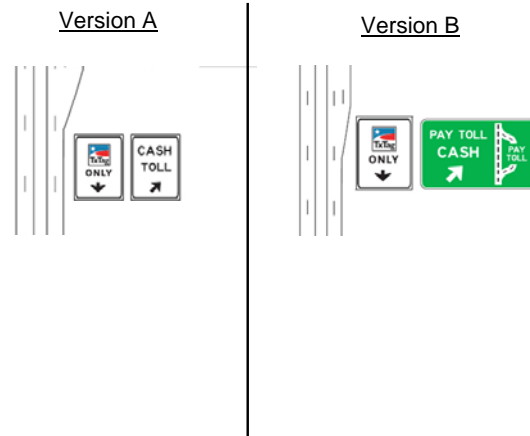
Let's look at the lower right; the "cash toll". Is there any other words we could use? We are about a half mile, quarter mile until you need to start changing lanes. Which one do you think does a better job of telling you that you are slowing down to pay, then getting back on the same road (drive through).

- 4. Rather see just "cash only" than "toll plaza"
- 6. B gives better idea of what to expect when you get to the plaza, shows that you just make a bend, so you wouldn't think that you're getting forced off and having to actually exit
- Everybody thinks B is better

Do you think that in version B, where one sign is green and the other is white, is that trying to tell you something?

- 4. Difference in color is good, one telling you, you can go through with tag, the other explaining you need to pay
- 7. Green for cash

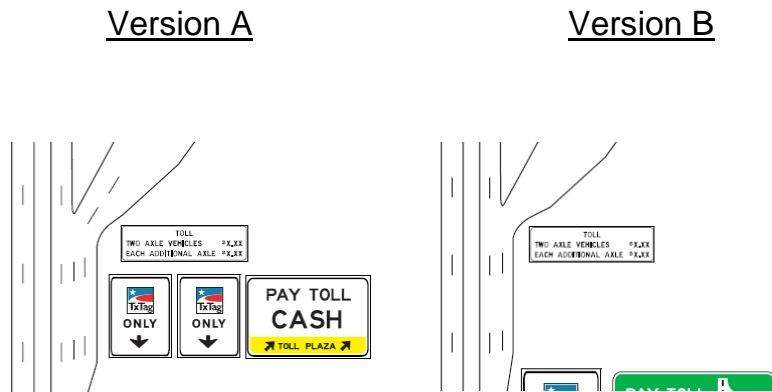
Slide 25



Is there any other information you would like to see at the point when you need to start changing lanes?

- 5. Wants to know how much, the price of the toll

Slide 26



Version A has an additional set of signs. Do you think the additional set of signs is necessary? Or did the first two signs tell you everything?

- 6. Thinks need to give people as much information as you can; people tend to not pay attention as they are driving
- 7. Doesn't agree. Last thing he wants is to look over at sign when someone stops in front to pull out change, accident waiting to happen
- 6. That's why you have a place that tells you where to split for tag and cash then signs telling what money or other information you need, I think all the warning you can give them is better

“Pay toll Cash” sign

3. Doesn't understand why there are 2 signs for tag only. Understand now that signs will be over the lane, arrow over lane OK. The more help you give them, the better.

Saying that maybe we don't need "toll" twice on one side. Is this doing a good enough job saying if you don't have a tag, you must exit?

2. Yes. Likes Green, thinks sign with map is too busy, by the time you get to the toll booth you are just glancing at the signs, if you have arrows and see the road up ahead, that should be enough
6. Likes green "pay toll cash" sign and map explaining that you are moving to the right to pay at the tollbooth

How Do I Pay?

Slide 32

Version 1



Version 2



Here is another type of sign. You are on a free road right now and you are going to exit and get off on a toll road.

All nod for version 2

2. I would expect it


1. They must, they have to let you on

-Should be sign telling us either way

Slide 33

A 

B 

C 

D 

E 



1. Name of toll road not important
6. It's the whole road

Dallas, Texas
April 24, 2007 (daytime)

Introductions:

1. Lives in Plano. Has several toll tags, and uses tollway all the time.
2. Lives in Grand Prairie. Occasionally uses toll bridge. No tag.
3. Lives in Irving. Uses toll road 4-5 times a month. Prefers getting billed, no tag.
4. Lives in Garland. No tag, but uses them when she has to (several times a week).
5. Lives in Valley Ranch area. Rarely uses toll roads. Finds another route if can.
6. Lives in Fort Worth.
7. Lives in Fort Worth. Drives on toll road all the time. Work vehicle has tag.

Route Marker Signs for Toll Roads

Slide 5



We are going to talk about different ways of marking different kinds of roads. Route markers help us to find which roads to go on. Different classes or types of roads have different colors and shapes associated with their markers. What kind of road is shown on left?

5 & 1: State highway

Do you think that toll roads should have a separate, unique marker for them?

-No

Slide 6



This is an example of a farm and market road route marker, and this is a type of marker for a toll road that is being considered.

1. Sign is clear, for people that don't want to get on the toll
4. Flag directs your eye to sign and the fact that it is a TOLL
3. Eye catching because you are looking for the number.

Blue background vs. white background

5. Likes blue, shows that it is the toll.
3. Likes white because it is eye-catching, it grabs your attention to the fact that it is a toll road
4. Agrees

Slide 7



We might have a case where signs are next to each other. What do you think is happening here?

- 1 & 3. Both roads are loop one, but if you get on the highway, it's a toll
4. I would think that it meant north 1 get on the highway, and it's a toll, then there is a frontage road that is coming back, or you could do whatever you needed to do
5. Likes the blue because it stands out more and actually separates the TOLL part from the actual highway number
4. The blue with the contrast does make it easier to understand that if you enter the highway you will be getting on a toll

If all toll signs had a blue background, should there still be the word "toll"??

All agree, yes. It would be confusing just to go by the color

Slide 8



We had a couple people comment last night that they wished the word **TOLL** was bigger, compared to when the word was smaller and had the flag. I know some of you liked the flag.

- 1 & 3. Like it bigger because sometimes you just miss seeing the sign and need that largeness to notice
4. blends in with the numbers, when I look at it I see the word toll, but I like having the flag beside it emphasizing that you are about to get on a toll road

Based on sign, if you got on this road, would there be tollbooths where you could pay cash?

2. Depends on time of day, because if it is the middle of night and you don't have a tag you are kind of stuck because you have no way to pay and no one is there working
1. Changes mind. People would assume they could pay cash if they saw the word "toll"
4. If it is the kind of road where it only takes tag you should not even say the word toll

Slide 9



Here is a situation where you might end up with an interstate shield next to a toll route marker.

5. It blends in with the interstate marker.

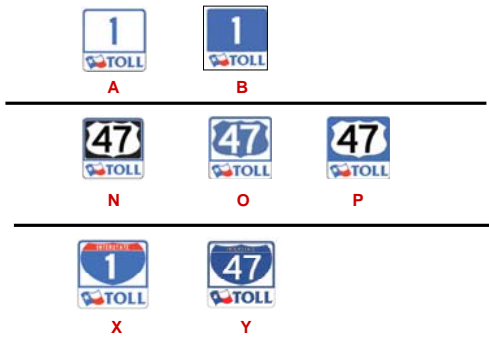
Slide 10



-Most believe white stands out more on the green sign

6. Likes the white background when it is on the green sign, but likes the blue when it is stand alone

Slide 11



Do you like white or blue? (A vs. B)

2. White stands out against blue

1. Agrees

5. Likes the white better now that he has seen how the blue would look on the green overhead sign

-Most like white. (A)

X, Y, and Z

1. Z-easier on the eye

2. Z still has the blue on it and is letting you know its not just another highway road

4. Z with the blue

6. Z

7. Y stands out more and is easier to see

Pavement Markings

Slide 13



This is a situation when you are on the highway but are going to take the exit on to the toll road. Have you seen markings like this on road? Do you think it is something that is helpful?

-Yes

1. Likes pavement markings because sometimes if you are behind a big truck you cannot see the overhead signs but can see what is on the road
4. Good idea, helps with bottle necking, if you start informing people far enough back, they could begin getting over much more in advance

If you saw this would you think you could you pay cash?

- 1, 3. Think it could be either way.

What do you think this would mean (the TX Tag symbol)?

-Would assume you'd have to have a tag

2. I wouldn't because it does not say only, with that just says you are getting on a toll road, not that you have to have a tag

Have you seen TX Tag symbol?

5- No

2- Yes

1. Assumed that her north Texas tag would work, since it is Texas too
6. I would question but I think I would be ok with just my Dallas tag

Symbol or text better?

7. Likes symbol, with “only” needs to be further back from the exit, that way when someone is right up on it and it says “only” it wont be a huge deal to change lanes
- Needs to be more simple

Slide 14

Version 4



Here is one where we can take one of our route markers, whatever design we decide, and put that on the road. Does this emblem imply that you must have a TX Tag?

2. No. it's just telling me it's a toll, whether you have a tag or pay in cash
3. Stripes, close together dots mean exit only

Slide 15

At the toll booths?



Here are symbols where they would actually be at the toll booths where some lanes are for cash and some lanes are for the tag. Are there any markings like this around Dallas at tollbooths?

-Yes

1. Have it at 190, they have the different pavement markings at the large span of toll booth

Is this a good thing?

-All think yes

6. Thinks it would be a good thing to have on the road

Slide 16



When you see markings like this, where you have regular striping here then double white striping, if you were in this lane, could you change lanes?

-No

What do you think this lane is?

-Carpooling, HOV

Can people come in?

-No. Cannot cross at all

3. Most people know that but many do not obey

1. If you are talking about drivers from other countries, they do not have any idea what this is.

Do you think pavement markings do as well as the signs by themselves? Should there be signs?

3. Yes, pavement markings work but people don't follow. Need signs.

Slide 17



Can you cross the line now?

- Yes, after the double white lines end
- 2. That is when you can get into and out of the HOV lane, people can go both directions

Slide 18



If you saw something like that, what do you think you could do?

- 2. It means you must stay in that lane, you cannot cross over
- 7. You cannot get out but you can probably get in

Slide 19



Could you change lanes now?

- 1. Must stay in lane.
- 3. I would think that people could come in, they just cannot exit; what if they had a solid line on one side then a dotted on the other?
- 7. Can get on but not off, finds having the broken lines conflicting with the "no exit"

Slide 20



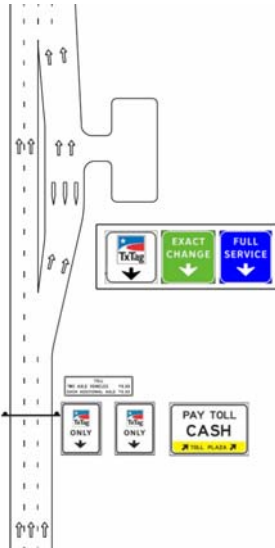
-All confusing

-Like this, it makes much more sense, defines exactly what people can and cannot do

2. Think people would still ignore
3. But for people that do follow the rules this would be best
4. Put up a sign that says traffic signs doubled

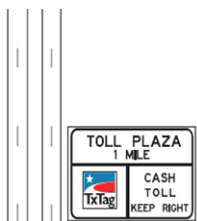
Which Lane Is for Me?

Slide 22



Looking at the signs leading up to where you are actually going to pay...

Slide 24



This is the first sign drivers would see. What do you think of this sign?

1. It's very clear

Does it prepare drivers for configuration up ahead?

-It's helpful.

Why do you think it has a white background? Does it mean anything special?

-It's clear. Information

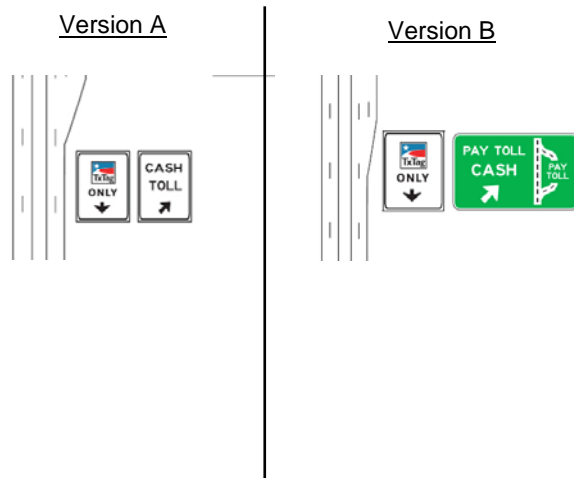
Phrase "toll plaza" What does that mean?

3. Toll booth
7. Doesn't know what "plaza" part means, thinks toll booth would be better
6. Plaza means "shopping to them."

Phrase "cash toll" Is that good?

7. You have to have cash only, "cash only" would be better than cash toll, I guess as long as it says cash

Slide 25



This would be about half a mile back from the plaza; signs are overhead, where the lanes start to widen out. We have two different versions of this. Which one do you like overall?

- version A
3. Version B is too much info.
5. Likes color of B but doesn't like diagram.

- The diagram on B is confusing, with version A might think she was exiting, and didn't know if she could get back on
- If you use the toll road all the time you are going to know that in version A that does not mean you are exiting, but people that don't use the toll road might not

In Version B does it bother you that one is white and one is green?

- 2-Money = green, there it means cash. Having it written out makes it clearer.
- 1-Green is saying what to do twice. Version A is clear & simple, I wouldn't think that meant to exit just that you keep to the right

What else would you need to know?

3. Would like to know how much it was before you got there, that way you don't have to dig for money when you get there
- How much \$ on lanes would be helpful
7. Type of payment posted, credit card or check

Violation enforcement - What warning should be shown?

4. Maybe if you need to slow down, but if people have no money to pay they are stuck
3. Scare people that have no change

Slide 26

Version A

Version B



Are additional signs necessary?

1. No, one set is fine.
- Word "plaza" isn't necessary
7. Thinks price sign should be farther back
- The simpler you keep the signs, the easier they are to read. Keep in mind that they are driving.
7. Simple & clear.

Slide 32

Version 1



Version 2



Here is an example of the sign that tells you up ahead there is an exit for the ABC toll road or a numbered route. Can you pay cash on ABC tollway?

-No because it says “TX tag only”

Would you think there’s an automatic billing system?

3. Yes, sign doing a good job explaining if you don’t have a tag do not get on this road

-Wouldn’t necessarily assume that everywhere has automatic billing

Is “no cash” necessary?

7. “TX tag only” sign speaks for itself, people might think maybe it takes credit card or something; TX tag only says there are no exceptions

Slide 33

A



B



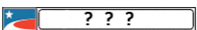
C



D



E



Are banners on top a good idea?

1. Yes, especially if traveling from out of town.

3. Say something such as toll tag because people from out of town not necessarily sure what TX tag means

- 2 & 7. Need to be more specific, some people not sure what TX Tag means
1. Can't use tag in OK
 7. TX toll tag or cash, if from out of town and have a toll tag they might think that they can use their tag here
 2. In the state of Texas if you are paying for a tag I would think I could use it anywhere in the state
 3. If you are paying for a TX tag you should be able to use it in Texas and I would think I could use it there

Would you like to be able to drive in OK with toll tag?

-Yes. And would like to be able to drive in airport with it.

College Station, Texas
May 31, 2007 (evening)

Introductions:

1. Lives in College Station, does not typically drive on toll roads but has driven on the Sam Houston Toll Road a few times, does not have a toll tag
2. Lives in Bryan, occasionally drives on toll roads in Houston, has driven on many toll roads in Florida and the Northeast
3. Lives in Bryan, lived in Chicago and Miami and drove on many toll roads there
4. Lives in College Station, does not have a toll tag, has driven mainly on the Houston toll road
5. Lives in Snook, been on toll road in Houston, usually will avoid them if he can, does not have a toll tag
6. Lives in Bryan, does not have a toll tag, has driven on toll roads in the Northeast, truck driver so been in many different areas
7. Lives in College Station, driven on toll roads in Houston and Florida, does not have a toll tag
8. Lives in Bryan, been on toll roads but not driven on them herself
9. Lives in Bryan, driven on toll road in Houston, does not have a toll tag
10. Lives in College Station, occasionally drives on toll roads in Houston, does not have a toll tag

There are no toll roads in Bryan/College Station which is why we want to talk to you. Toll roads are somewhat new to Texas. There are some issues about how to make traffic signs and roadways better for small town people that visit larger towns. We want information from non-urban people.

Route Marker Signs for Toll Roads

Slide 5



You may recognize signs like this. Road markers help us to find what roads we want to go on. Different types of roads might have different colors and shapes associated with them to make it easier to spot the type of road you are on. Can anybody tell me what kind of road is going to Durham? What designation is that?

2. 6. US Highway
4. 7. 8. 9. State Highway

What kind of road is going to Dallas?

-Everyone answers interstate

State Highway signs are square white signs that say Texas on the top. Do you think that we need special route markers for toll roads? How many people even know what the markers mean?

9. Obviously not since we couldn't determine what the first signs meant
7. So you are talking about every tollway have the same sign?

Each toll road would have a specific sign, and you would know due to the color and shape.

4. Signs need shape and color for people to remember them, white background with black lettering doesn't mean a lot, and it is the special color and special shape, like the interstate sign.

Slide 6



So this is a farm and market road marker on the left, and this is an example of a possible route marker for a toll road. What do you think about that?

5. Kind of plain
8. Plain and concerned about the background, the sky washes it out
1. Glad it says TOLL and that is the main thing that distinguishes
9. 10. Agree on TOLL wording
2. Wonders if they will be consistent with highways that have NSEW identification

Here's another photo that shows another type of toll marker with a white number on a blue background. This is what would happen near an entrance ramp to a toll road with a frontage road running next to it and lots of signs together.

1. Likes the white number on the blue background better, makes toll road sign stand out

- 8. Agrees because the blue background differentiates and is easier to see
- 10. If that's on a highway it's too much to read. Come up on an intersection and the lights green, all that is a lot to try and take in
- 5. Driving, you might get halfway then realize you have already passed it
- 6. 8. Agree with 5, 10

Why do you think there is the same number one on the two signs?

- 9. One is going north, and one is going south
- 5. 6. One is the highway, and one is the feeder road

Given that this may be at the stop light where you are going down the feeder then there might be a ramp for toll road, does that influence what you think in having a light background versus a blue background?

- 4. 6. The blue background more noticeable and stands out, want bold to make sure you are going the right way
- 5. Does not influence

Slide 7



Now say you have turned the corner and are going down the frontage road, and here is the ramp that goes on to the toll road. This is an example situation in how signs would be used.

- 2. Believes that sign is very understandable
- 1. Thinks it would be better if the sign was on the ramp side, if you are going to have to pay you need to know that you are getting on a toll road—10 agrees
- 5. Reverse color with the blue with the white number would really make it stand out, the white background very similar to other signs, see the blue background and know it's a toll road—6, 7, 8, 9, 10 agree
- 8. That looks like it is very close to ramp and would have to make a quick decision to get over—2 agrees
- 4. The number becomes a lot more visible with the white on blue background, for people who have vision issues just looking here at TOLL the word still doesn't

stand out, if you knew what your color scheme meant you would know what it is—**6, 8, 9, 10** agree

8. Wonder if maybe they put TOLL on top, make it bigger letters

1. Like TOLL on bottom and wants indication that you are about to get on the ramp that leads to a toll road

5. Thought about TOLL on top but wants to be consistent with other signs—**9, 10** agree

Slide 8



I did a couple things on this version. One thing is I made it bigger.

6. Additional sign right before you get on really indicates you are entering a toll road—**5, 8** agree

Do you think that over time that the little flag at the bottom is going to come to mean anything?

5. 7. 8. Flag has no meaning

10. Maybe that could be where a symbol comes in, if there is a symbol for the toll road

The other thing they mention is that this sign has a “TX Tag Only” written at the top. Has anyone every heard of TX Tag?

7. 8. 10. Never heard of TX Tag

3. That means no coin

2. Has heard of TX Tag, you can only go on toll road if you have a tag, disagrees with concept

8. What happens if you get on the toll road by accident? Is there a way to get off?

In general, you will get your picture taken and get a ticket for violation.

2. Don't like having the number on the sign, should only say that you are entering a toll road, distance away almost looks like both go same direction

1. Agrees, should just have big sign that says you are about to get on a toll road

Slide 9



Sometimes the interstate is white numbers on a blue background. We are worried that if we choose to use white/blue toll combination that you all like, is that going to look weird when next to interstate sign?

6. Use red or some other different color
 7. Very different with the white as compared to that
 8. The shape is obviously different
- Everyone still likes the blue background

Slide 10



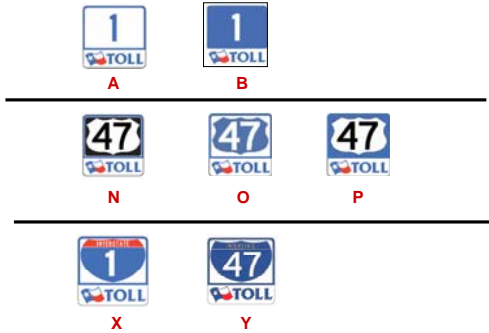
We are taking the sign we all like and placing it on a green sign overhead.

6. The toll sign needs to be just as big as the other signs and there would not be a problem
1. 4. 8. 9. 10. All agree that it needs to be bigger
1. 5. Especially the tollway part of the sign

Even against the green, it is still better than the white background?

- Everyone still likes the blue background better
2. It looks as good as the interstate sign

Slide 11



Here is summing up all the different things we looked at. Here are the different versions of the Texas highway road marker. All still like the blue?

-Yes, everyone likes the blue background sign

If we have a toll road that is an interstate or a US highway, how would we imply that same idea to those symbols? We have a couple different versions.

1. 6. Like version O
2. The same thing when US 290 and HWY 6 are the same road, why have a US seal, it is a toll road first and last, should be marked as either a toll road or US highway
5. Likes version O but would like to make the white outer border background red or black
10. Likes P keeping the same color, just cut the shield out so when you see that you think HWY, if you change colors might confuse people. Like the black lettering on white shield—1, 6, 9 agree and think it's easier to read
6. P could throw you off at night, you might not be able to see it, color doesn't matter at night, shape is more important—1 agrees
4. Reflection off that cut out would be striking, blue would be slightly reflected—9 agrees
2. 4. Should they have completely different designation for toll road?
4. If don't know the area, needs the highway designation and what road you are on or becomes confusing

That brings us down to the interstate sign. We could do the same idea - we could make the whole thing blue background to differentiate it from the free interstate. US highway sounds like we are split between O and P. Some are concerned about the readability at night.

4. 5. 9. As long as TOLL is visible
4. O seems to wash out because of the color, the blue will get lost on a bright sunny day—7 agrees

1. 4. Like Y on the interstate markers because of thicker font and color stands out more

Pavement Markings

Slide 13



In addition, but not as a replacement to signage, pavement markings could be used on the roadway to distinguish tollways. Do you find pavement markings useful?

7. Helpful

10. Nice to know that when you are in that lane you know what road you are on, the only problem is that when you are on a highway and in a small town and they don't keep up with pavement markings, then it becomes an issue of what does it say, as long as they keep up with the markings they are helpful

4. 7. Agree

5. Problem when in bumper to bumper traffic and moving slow, cant read it, by the time the person in front of you gets off it you are on top of it—8, 9, 10 agree

2. Half mile back have sign that says "right lane exit toll road only" so you know and can get over when necessary—1, 4, 5, 8, 9, 10 agree

Pavement markings will always be in addition to signs, not replacing them.

6. Pavement markings helpful but tend to always look at the signs up above

What other different versions of pavement markings could we do? We could just do something like put that TX Tag symbol on it.

2. No TX Tag

1. 6. 4. 10. Marking should say TX Tag only if cannot pay with cash

1. This marking requires people to be educated since many people do not know what the TX Tag symbol means

- 4. Needs to say TX Tag only, no cash—1, 10 agree, people need to know for sure they can only use a tag
- 3. Whole new concept, confusing to people
- 2. 4. Infrequent visitors confused
 - Everyone agrees having just the symbol would be confusing
- 5. 6. Need to write the words out
- 4. 7. 8. 10. Require more maintenance because of summer heat

Slide 14

Version 4



We could put the route number on the pavement marker.

- Everyone thinks it is more important to have TX Tag only on the marker than to have the number
- 5. If they are taking his cash he wants to know about it quickly, in 80mph traffic

When you see this and it just says “toll”, would you expect to be able to pay cash?

- Everyone absolutely expects to be able to pay cash when the sign only has the route number and TOLL

Slide 15

At the toll booths?



Sounds like you want to see TX Tag in writing and want to see the word “only.” Think about now coming up to a toll booth where you have some lanes where you can pay with cash, some pay with coins, and some with your tag. Do you think pavement markings showing what you can do in each lane is a good idea?

-Yes pavement markings would be a good idea

10. Also have signs a ways back that explain which lane has what, sitting in a long line need to make decisions earlier

1. Sam Houston tollway has signs differentiating lanes, likes that idea

2. Signs that say “EZ tag” and other lane designations—everyone agrees these are important

3. Need to show exact change lanes and tell how much you need

Slide 16



This is special lane on inside of freeway. Have any of you ever seen a lane like this?

2. 4. Yes have seen lanes like that, they designate HOV lanes

10. But it is not separated by a median

Dallas tends to have more HOV lanes with paint.

1. Sometimes they close it off with a gate so you can't get on

6. They really need a sign that says HOV lane closed

2. The one in Houston sometimes has an interesting ending, you are driving along the HOV lane and all of a sudden you are at a red light where you need to turn right or left and you don't have any idea where you are

Do you think if you were in the HOV lane right now and you wanted to change lanes over into the center lane, would you be allowed to change lanes right now?

1. 10. Double line means you cannot cross the line

2. You are not supposed to

Do you think people do?

-Everyone agrees that yes, people change lanes

Slide 17



Do you think you are allowed to change lanes now? (*Lane separation is a dotted line*)

-Everyone agrees yes, you can change lanes

Do you think you can come in and out of the center lane?

- 10. Now not double lined, makes it another lane on highway
- 6. Looks like you can exit
- 2. Slightly different from other markings on highway

Do you think the road pavement markings are enough here, or should there be a sign?

-Everyone agrees that there should be a sign

- 5. Sign to let you know what you can and cannot do
- 8. Sign on a pole with lettering that says HOV
- 1. Agrees need HOV signs periodically so people know that they are on the HOV
- 9. People won't remember what the pavement marking (double lines) means
- 5. Pavement marking that says HOV only that goes thought area—8, 9 agree

Slide 18



Could you come in to this lane? (*Has pavement marking “only” with an arrow in addition to dotted lane separation*)

1. 2. 4. 5. 6. Yes, you can come into the lane

If I am in the HOV lane can I exit?

2. 3. 7. 9. 10. No, you cannot exit the lane

1. 3. 5. 6. Yes, you can leave the lane

4. Unless there is a concrete barrier there, I can go out

Slide 19



How many people think you can change lanes now? (*Has pavement marking “no exit” in addition to dotted lane separation*)

-Everyone agrees that now you cannot exit

4. Seems like you have a stop and yield sign put together

Slide 20



Now can I change lanes? (*Has pavement marking “no exit” with a solid inner line and an outer dotted lane separation*)

Everyone believes this marking is clearer

4. Now it definitely means in only and you can't go out

5. Why don't you just say enter only?

Because people in other lanes cannot see.

Which lane is for me?

Slide 22

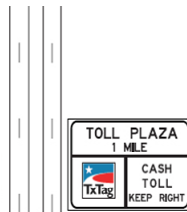


Another configuration. This slide explains how road would be configured for tolling where if you have a tag you don't have to slow down, just go through the left lanes, if you don't have a tag, pull over, slow down, and pay cash, and then get back on.

4. Instead of EZ tag say TX Tag

-Everyone agrees that the configuration is easy to understand

Slide 24



We are going to talk about the signs that lead up to the toll booth. There are a couple different versions. We have a sign a mile back, then a sign maybe half a mile back, then right at the booth. They are going to be a little different. This one will be a mile back.

10. I like it

5. I think if you put a "Keep Left" underneath the TX Tag

1. Have arrows over the lanes pointing to left—10 agrees

Why do you believe this sign has a white background rather than another color?

- 8. There are a lot of words there
- 1. 9. It's just information
- 7. There are 2 lanes and the sign explains where you need to be
- 4. You have not changed what road you are on, it is not urgent information

They are trying to prepare you for a mile from now. If you are paying with cash you need to be on the right side. If you have a TX Tag you need to be on the left side.

- 3. Would rather see TX Tag used the same everywhere, if you want a flag on it, use the flag everywhere—1, 2 agree

What about the phrase “Cash Toll?” is that good enough or are there other terms you can use?

- 10. Likes the phrase “cash only”
- 1. As long as it says cash
- 2 As long as it says TOLL

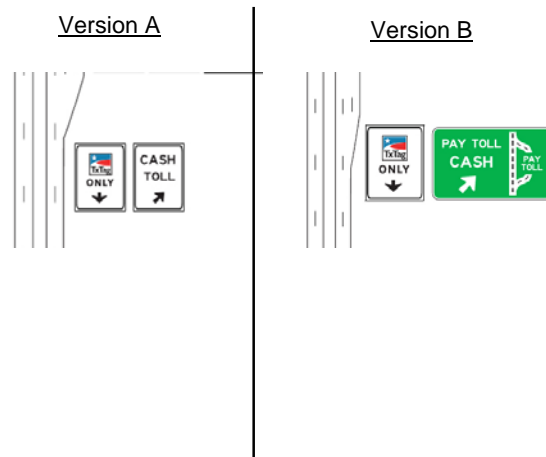
Does the word TOLL to you mean cash?

- Everyone agrees that when they hear TOLL they know they have to pay
- 2. If you have TX Tag you can only use the tag, if you have TOLL then you can use the tag or go through without one
- 5. If you go to the right you have to pay cash
- 4. It is not saying right lane only, it is saying KEEP RIGHT, it's like move in that direction, not you've got to be there
- 2. If it says cash, I don't see how a TX Tag could go through without paying cash

Do you think it would be better to say “no tag?”

- 1. If you have a TX Tag you are probably familiar with the area—8, 9, 10 agree
- 2. Although if it is Texas, it may be different in Houston than it is in Dallas or Austin

Slide 25



Further down the road, this is two versions of the same. This is right before the ramp to go to the cash lane.

- 10. Either one of those is fine but if you use version A have the cash toll sign colored
- 8. 9. Green stands out more and cash is green
- 10. Some people might think green as normal highway, you could highlight in yellow but every bright color we have another sign for, and so it is just something people would have to get used to

Do you think one version does a better job than the other of explaining that you are not exiting, you are just going through the booth then coming back on?

- 6. This one basically tells you that you have to pay, Version B
- 4. I feel over informed on B, I think I would rather see version A
- Everyone likes version A better

If you saw version A, do you think some people might think they are exiting?

- 2. I do have a problem with A, the arrow looks upside down
- 1. Needs to show arrow that you are exiting, otherwise people might just keep going strait
- 5. Treat it like a deceleration lane because you have to slow down and go through the toll—8, 9, 10, agree
- 1. If there was another down arrow people might think I am supposed to stay on and the toll booth is going to show up on the highway

Do you think there is any other information that needs to be posted on this location?

- Everyone agrees on having how much money you need to have ready
- 1. The amount of the toll could be something they put on that first sign a mile back—10. agrees

Slide 26

Version A

Version B



Now we are right at the ramp. On A we have an additional set of signs, on B we don't, so after the lane widens out you have a slow down lane. These would be overhead. Do you think its good to have an additional set of signs?

4. Then you are indicating actual number of lanes
-Everyone agrees that additional signs are helpful

Do you recognize where else in the sign system we would see a sign with yellow at the bottom like that and the black arrows?

- No one recognizes where a sign like that would be used

That is often used where it would say Exit Only. Do you like having the words "Toll Plaza" right there, or can you think of something else we could use?

5. "Toll booth"-1, 10 agree
4. I think it is a little wordy, I have understood it all the way through, and I don't need that, just say "Pay Here"
3. Toll and cash are kind of redundant, put the exact amount, which would be better

Do you think we need those toll rate signs? I heard a lot of you say you wish you would have had that a mile back.

4. By then it's too late, I'm just going to pull up and have them talk to me

Part of the reason we were putting the sign here is because it's only for the people that are going to pay cash. The tag people do not need this information.

5. Yeah, they don't care
8. I still think we need it farther back; the tag people aren't going to be looking at that—2, 4, 5, 7 agree
5. Even if you did it down at the bottom where it says TOLL PLAZA, if you had \$1 or \$2, just so those people using cash have some kind of window
7. If it is farther back you have time to get the money ready

How Do I Pay?

Slide 32

Version 1



Version 2



Here is a sign you would see on a ramp leading up to the toll. We put this thing across the top that says TX Tag only. If you were from an area that had this system where we were going to take your picture, would you expect to be able to get on without a tag?

7. 8. 9. No

5. Concept of having an actual toll gate when you get on where it reads your TX Tag and if you don't have it, the gate doesn't go up

9. But then they couldn't give out tickets

4. They don't want to lose money that way

7. Why is the symbol there, for that city that is their symbol?

4. Is this going to be state mandated, if I see TX Tag only in College Station that could mean we are going to let you get billed by mail, but in some other place, it could mean something different

That is what we are trying to keep from happening. Say I have an EZ tag that I got in Houston; can I go on that road?

-None think you can get on with an EZ Tag when it says TX Tag only

2. It says you cannot

4. TX Tag only, you might have to have 20 tags across your windshield

Here is another version of that. Do you like the NO CASH?

-Everyone likes the NO CASH sign, makes it more understandable

4. Gets to the point

Slide 33

A 

B 

C 

D 

E 



Here are a couple other things we could put across the top.

1. Use A where it is “TX Tag only” and use B where you can use TX Tag or pay with cash
9. B you are going to have booths and A you are not
2. With B there is going to be some way to pay

If it is just a regular full service toll like Sam Houston, which sign would you rather see?

1. 2. 3. 5. 6. 7. 8. 9. 10. Want B with “TX Tag or Cash”
2. Toll roads says anything is legal
4. But if you get used to seeing TX Tag, stick to A or B, don’t go to something else completely with “toll road”
5. Someone from another state comes through how are they going to know it’s a toll road without specifying “toll road”
1. If it says TX Tag only and you are from another state, you know you don’t have TX Tag so you know you don’t need to be on that road

Let’s talk about C. If you saw something that said “Toll Lane” what would you think?

10. Individual lane
 - Everyone would change lanes
 - 1. People crossing the lines all the time
 - 4. For someone who does it all the time and is there all the time and knows what it is about
 - 1. Don’t like individual lane being a toll
 - 2. Have the toll lane sign up at the booth—4, 10 agree

El Paso, Texas
July 31, 2007 (evening)

Introductions:

Do you drive on any toll roads in the area? Do you have a toll tag?

1. Yes, no
2. Yes, no
3. Yes, no
4. Yes, no
5. Yes, no
6. No, no
7. No, no
8. No, no

Route Markers

Slide 5



Does anybody know what kind of highway would be number 56? What about number 20? These are called route markers. By the size, shape, and color, they help identify what category of road it is.

1. 2. 3. 7. 56 is a state road, I-20 is an interstate

Slide 6



This is an example of a farm and market route marker. This is one proposal that we have for a route marker for a toll road. What do you think about that? Do toll roads

need to have their own special symbol? This might be on a frontage road with a white number on a blue background.

-Yes, toll roads need their own shield

3. The blue numbers might be good during the day, but I think at night the white would be better

1. 4. Likes blue on white, not many other signs with that contrast, it would catch your eye more than having the dark on the outside

There is a road called Loop 1 in Austin. Now you see these signs that say Loop 1 and Toll 1. What do you think the difference is?

3. Toll 1 goes through the city, Loop 1 goes around the city

1. I think they end up at the same place but the toll would be faster, like a shortcut

Slide 7



Here are some signs that you might see on a frontage road. If you saw that and looked down the street you would see there is a ramp there that goes on to the highway, and this is a frontage road. Seeing how these signs are arranged, what do you think the difference is between Loop 1 and Toll 1?

8. If you enter toll road, once you get on there are no exits, through way

2. 7. Toll 1 would be shorter or faster with less traffic, the roads are running next to each other

3. The toll you have to pay to use, the other one you don't. They may go to the same place but one you have to pay for the other you don't. So when you get on the toll road you pay; very few exits and limited options

1. In Dallas it was the same highway and you could either pay the toll or right next to it with the same highway I did not have to go through it, I didn't understand, I just didn't use the toll road

Let us talk about the color. This is what we saw on the number 45 sign with the blue letters, and this is the same picture with reverse. The idea of what is happening here is the frontage road would be a free alternative, but it might be slower with more

traffic and stop lights. It will run parallel to the highway. Given that, which toll sign would you like to see?

3. 4. 5. 6. 7. 8. Prefer white on blue background. There is more of a difference between the toll sign and loop sign. The contrast helps you understand there are two different options. The signs on the right with the white background are too similar.

Slide 8



Here is another example that we might have. Some roads in Texas already do not have toll booths. You get an electric tag in your car, and that is how you pay the toll. It is a window sticker that allows you to drive through still going 70 mph. Given how it works, do you think we need TxTag ONLY that explains how you would pay it?

- 1.3.4. If you go through the toll booth without a tag, believe will have to pay a fine
- 1. Yes, you need TxTag only, need to be clear
- 3. Toll to me means you need to pay. With TxTag ONLY, assumed you can use cash for tolls
- 8. Toll to me means when you come to the end of the road, you are going to pay
- 3. Sign is confusing, too much info
- 3. 7. 8. Preferred TxTag below route shields

Slide 9



We decided on the Loop 1 that we like the blue background because it was different than the white state route. But sometimes they might be next to a blue interstate sign. Now do you still like the blue, or does the white one look better?

- 2. 3. 4. 7. Liked white on blue
- 2. 7. The blue background would be better at night, it contrasts better and is easier to see, it stands out
- 4. This sign is easier for me to understand, without the TxTag ONLY
- 8. Liked blue on white and simpler sign, does not want the TxTag only, she is concentrating on the road information. Believes paying for it is secondary information

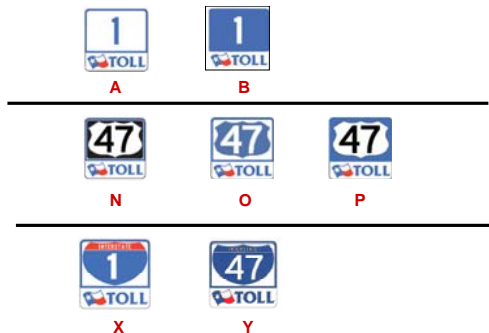
Slide 10



So here is how this same sign would appear on a green sign overhead on the highway. What do you think about the blue versus the white background up on the green sign?

- 1. 2. 3. 4. 6. 8. Blue numbers on white background, also like how it is larger

Slide 11



We could also have a US highway that has a toll or even an interstate.

- 3. Need to keep the sign the same throughout the states, keep the colors consistent so as not to confuse out-of-state drivers

1. 3. 8. Keep flag on all route shields that say “Toll,” it keeps things uniform and familiar
1. 2. 6. Yes, colors should be reversed. We have dark on a white background for our Texas state highways, now we are talking about trying to flip it to distinguish as a toll road. Think should do the same for the other categories of roads to keep it consistent
4. Likes P, really likes the different colors

Pavement Markings

Slide 16



You are on a free road and you, are going to exit on to a toll road. Do you like having written things on the ground? These will always be in addition to signs.

3. 7. Advantage pavement markers are larger, reinforces
 - All. Like pavement markers, it helps, does not detract.
 - All. Believe with version 1- pay either with the TAG, or CASH
1. Version 2, with the symbol not enough information. Does that mean I have to pay with a tag or is cash accepted too?
 - All. Version 3 – for TxTag only
 - Prefer the words only over the TxTag symbol, more explanatory and clear if you have to have a tag

Slide 18

Version 4



We could also put the route marker and put the whole sign on the ground.

1. Likes this the best, this tells you that you can also pay with cash
-All. Assume you can pay cash since it just says TOLL

Slide 19

At the toll booths?



Sometimes there are toll booths. and we put pavement markers in different lanes to explain what you can use for payment. Do you like that idea?

- Yes, like having that additional information. Think it works and is understandable.

Slide 20



What kind of lane is this? If I wanted to get out of the lane to exit, could I?

- 3. 7. HOV lane
- 5. 6. No, you can't cross
- 4. No, you cannot exit this lane because of the double white lines
- All. People cannot enter the carpool lane from the other lanes

Slide 21



How about now?

- All. Cross both ways. You can enter or exit the lane

Slide 22, 23



- 8. If you cannot exit, why would you have the dashes? That would confuse me; I would think I could cross the lane
- 1. 4. Can't exit, but can go in because of the broken lines
- All. Does not do a very good job of explaining you can only enter, not exit

Slide 24

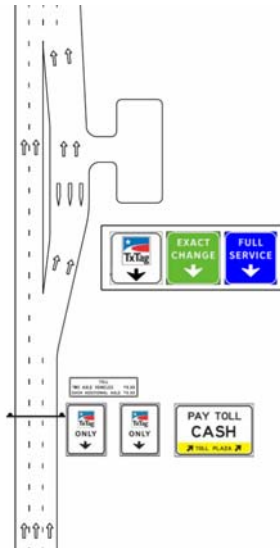


Is this better?

- 4. If you can come in, why can't you get out?
-All. Makes sense, like this one the best

Which Lane Is for Me?

Slide 26

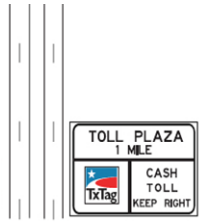


Starting at the bottom, these might be a mile or half a mile from the toll booths. Do you understand what is going to happen up ahead? These are all going to be up ahead over the lanes.

- 9. What is full service? I think of a gas station when I think of that.

Full service means you can pay in cash but can get change if you do not have the exact amount.

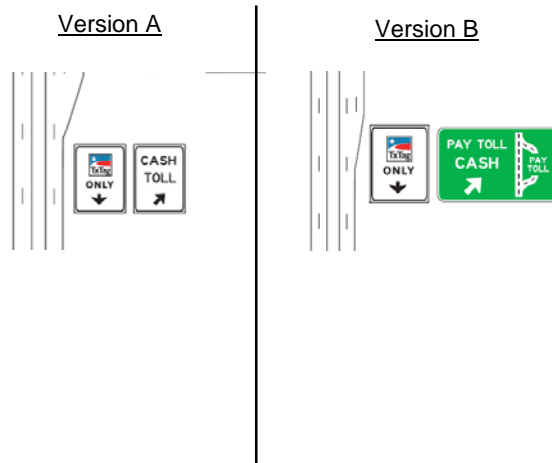
Slide 28



This is the first sign you would see a mile back. What do you think of TOLL PLAZA?

2. 3. TOLL BOOTH preferred

Slide 29



These are two versions of the signs that would be right before the ramp that goes off to the right for those paying with cash.

1. 2. 3. 4. 5. 6. 7. Version B better, it is clearer without having to read so much. I like the picture.
8. Pay toll? That means I have to get out of the way and then get back on.
3. It is possible that some people might think they have to exit to pay with cash, it is also possible they might miss the sign all together

Slide 30

Version A

Version B



In one version, we have an extra set of signs now. As it widens out, these would be directly over the lanes. Do you think we need this extra set?

1. 3. Yes, skies the limit. They would be helpful, why not have them.

How Do I Pay?

Slide 36

Version 1



Version 2



You have to have a tag; it is the only way you can pay. Do you think we need to reinforce with NO CASH?

1. 4. 7. Liked NO CASH on sign for people who do not know what TxTag is

Slide 37

A

B

C

D

E



There are many different things we could put in the top banner. Do you like the idea of putting it on the top?

- All. Like the forms of payment across the top.
- 1. 2. Like more specific, like Version A over Version D, want to know how they can pay
- Good for out of towners

El Paso, Texas
August 1, 2007 (daytime)

Introductions:

Do you drive on toll roads, and do you have a toll tag?

1. No, no
2. No, no
3. No, no
4. No, no
5. No, no
6. No, no
7. No, no
8. No, no

Route Marker Signs

First, we're going to talk about certain symbols that are on roads.

Slide 5



Looking at these things with numbers in them, what kind of highway do these represent? Or what category of road?

5. 8. 4. US 56 is a US Highway

If you were going to come up to a toll road, would you want to see that it has a unique symbol; something that says it is a toll road? If there was a Texas state highway that was a toll road, should we use this kind of sign or one that says it's a toll road?

- All. Would like unique symbol for toll roads

Slide 6



This is an idea we have for a fake highway; it is different from the Texas marker because it is blue.

2. Misleading, some people might think it is a speed limit sign
1. 4. Like blue letters on white background

Slide 7



Here is a type of sign and how we might use it on a frontage road. So you could stay on the frontage road or get on the highway. What do you think is happening here? Are the two roads going in the same place?

1. 3. 8. Same place, you just have to pay for toll road, and the frontage road is free. You also go faster on the toll road.
3. If someone has more time and does not want to spend money, they can use the frontage road without getting on the toll
- All. Like white on blue sign better
3. Add LOOP 1 TOLL, so that it specifies we are going to the same place. Helps people to better understand

Slide 8



If you saw this sign, what would you be expecting? Would you expect to see toll booths?

8. In Baltimore, they have an EZ Pass, it's a sticker on your windshield and you can just go right through the booth

Here is a different sign they might put up. What do you think "TxTag" only means?

2. TxTAG special tag needed, that you can use and not have to pay cash
 6. 3. Believe it means you cannot use cash
 1. 4. 8. No Cash accepted
 1. Confusing sign, might be too much on it
- All believe there should be a sign further back explaining that you are about to get on the toll. People need more time to make the decision, instead of the sign just at the on ramp.

Slide 9



So we all liked the blue background sign before. However, sometimes it will be next to another sign with a blue background. So you like the blue still?

1. 7. 3. 6. 8. Like blue lettering on white background signs, the contrast is better.
2. Blue background could make people confused. They might think it is just a freeway sign

3. You don't have to go with blue, you could just go with any different color to distinguish a toll road

Do you think toll signs should all be the same? Should whatever color we pick go on all the signs?

3. Yes

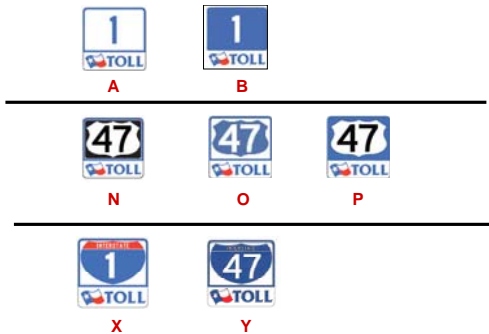
Slide 10



Sometimes we take these route markers and have to put them up on the green signs that are on the highway. In this context, which background do you think is better?

- 3. 4. 7. Like the blue lettering on a white background
- 4. Like the white background, on the green sign it stands out more

Slide 11



These are what we were talking about for state routes or loop roads, but what I hear you saying is you would like to have something with "Texas" in the signs. It would help distinguish it from a speed limit sign. So we could do the same type of thing for interstates or US highways, and use the color to make them look like toll roads, too. Looking at the rest of these, which ones do you like?

- 8. N because it is the regular sign simply with TOLL added underneath
- 4. X again using the regular sign and just adding TOLL

1. P, very similar to the normal sign, just with blue to better distinguish as a toll road
2. I think use the signs that you have been using for years to help people better understand. If you just add "TOLL" they know they have to pay. If you start changing the colors, people may be confused and not know what type of road it is.

Pavement Markings

Slide 19



Now let's talk about other things you can do in addition to signs. We will always have signs, but we can convey extra information with postings on the ground. So this might be an exit ramp that goes over to this road that is a toll road. So this is paint, and, of course, you are reading from the bottom up as you are driving toward it. What do you think about that?

1. Like it, especially for night
1. 3. 4. Like the colorful symbol, believe it is more self explanatory. Would not go on that road if were out of town and did not know what TxTag was.
1. The written words would be cheaper and are just as clear
4. 7. Like version 2 with the colors

Slide 20

Version 4



We could actually put the route number right on there. This would be if we just took a sign and put it on the ground.

This sign does not tell you that a tag is needed to drive on the toll. People would think they could hand cash to someone.

Slide 21

At the toll booths?



Now you could have a regular toll booth where some lanes are for cash and some lanes need a toll tag. Do you like that idea that a toll plaza would have pavement markings?

6. Yes because it separates which lanes can be used for what.
2. That way people don't have to slow down to figure out what lane they need to be in, they know in advance.

Slide 22



What do you think this lane is? If you wanted to get out of the special lane and go into the other lanes, could you?

- 3. Carpool? But there is no diamond symbol.
- 1. 2. 4. 6. No, can't change lanes.
- 4. I would think legally you are not supposed to change lanes because of the double lines.

Slide 23



Slide 24



If you are in the special lane, can you go out? If you are in the regular lanes, can you come in?

-Can go out and get in?

Slide 25



If you are in the special lane, can you go out? If you are in the other lanes, can you enter?

-You cannot leave the special lane.

1. You can get in.

Slide 26



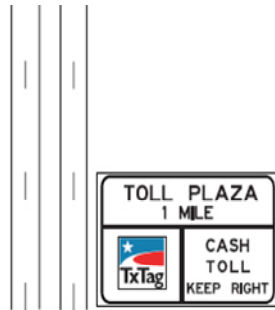
-All. Like this version better, it explains things more. Think the lines are enough, should not need the words "NO EXIT."

Which Lane Is for Me?

Now I want to talk about where you pay. First, I am going to explain how this works; then we are going to look at some signs that lead up to the toll booths. Now that we have tags, we can make the freeways where people who have tags can keep driving as fast and never have to slow down. But if you are going to pay cash, you

need to pull out in kind of like an inspection station, go through the booth, then go right back on the freeway.

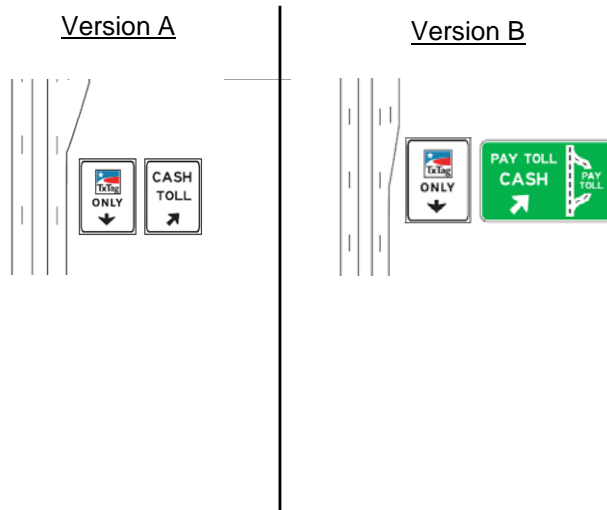
Slide 30



This is the first sign you would see a mile before you get to that area. Do you think that is explaining that there is going to be a split?

All. Understand sign and what it is trying to convey.

Slide 31



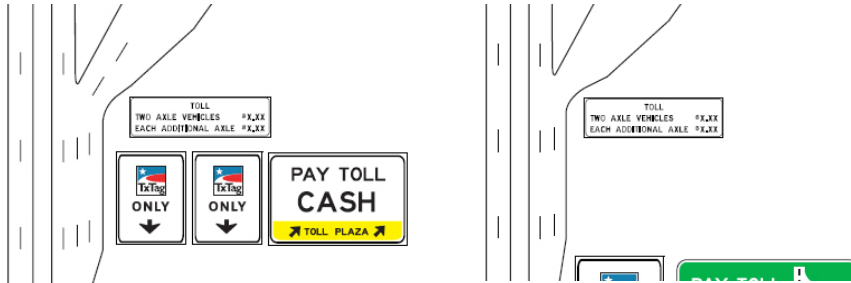
This might be right where the ramp widens for people to start pulling out. These will all be over the road. Do you like one version better than the other?

1. 2. 3. 4. 6. Version A. The map is not needed. The simpler the better. People would not think they are exiting.
1. 2. 4. Like green sign without the map.
2. The green sign stands out and makes you pay attention. Don't really need the word "PAY."
4. Green means money.

Slide 32

Version A

Version B



This would be signs right over the lanes at the toll booth. These are reinforcing the same information.

- 1.
 - 2.
 - 3.
 - 4.
 - 6.
- Like additional signs. Still would like the “pay toll cash” sign to be green.

How Do I Pay?

Slide 38

Version 1



Version 2



This is if you are on a free road, then up here there is going to be a highway where you can go to ABC Tollway. Do you think that putting “TxTag ONLY” is enough, or should we also put “NO CASH”?

- All. Place NO CASH on the sign in addition to TxTag only for people who do not know what TxTag is.

Slide 39

A 

B 

C 

D 

E 



Here are some other things we could put at the top of the sign. Do you like putting how you can pay up on the sign some place?

-All. Like Version A and B.

San Antonio, Texas
August 22, 2007 (evening)

Introductions:

Have you ever driven on toll roads? Do you have a toll tag?

1. No, No
2. Dallas, Houston, No
3. Houston, New York, Atlanta, No
4. Houston, No
5. No, No
6. Rarely, No
7. No, No
8. Virginia, No
9. Last summer Oklahoma, No
10. Last summer Oklahoma, No

Route Marker Signs for Toll Roads

Slide 5



Route markers help us find which road to go on. Different types of roads may have different colors or shapes associated with them to make it easier to spot that type of road. What type of route marker is Highway 56?

- State highway
- County, route 56

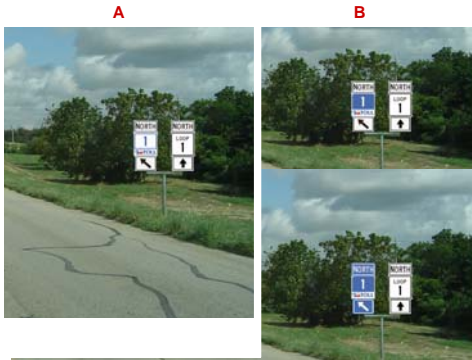
What type of route marker is going to Dallas?

- All. Interstate

What kind of road goes to Marion? Do you think we need special markers for toll roads?

- All. Yes.

Slide 6



-I like that.

Explains frontage road/toll road concept. What do you think is happening here?

-One road goes straight, one to the left.

6. One is a toll road, one is not

Are both roads going to the same place?

-Yes, straight shot

Does a shield like this (A) stand out enough?

-Many like C

Do you like the blue background?

-All. Yes.

Does the word "Toll" stand out?

-All. Yes.

4. Have everything blue

2. To me the left and right side on C look totally different

5. Likes B, just does not like all that blue

1. Agrees, C makes me think interstate, a lot of blue

Slide 7



On this one, we removed the flag from TOLL at the bottom of the sign and added TxTAG ONLY to the top. Are these good changes?

- 8. Good change; the sign stands out more
- 7. Little bit, not a lot, go with the other

What do you think the plaque on top means? (TxTAG only)

- 7. You have to have a chip in your car
- 3. Tag means you have to pay

If do not have a tag, can you get on?

-All. No.

Do we need something to say that?

-All. Yes.

Slide 8



What if you have a blue interstate shield that is not for a toll road next to a blue background shield for a toll road? Is it better to have blue next to blue?

- 2. Still like blue and toll sign
- 5. Like the left (toll marker) blue, with white plaques
- 4. Can you use another color?
- 2. Yellow for caution, getting on toll road
- 10. Like the one on right (white toll sign), cannot miss it next to Interstate sign, stands out, I like the white next to the big blue interstate shield

Can we switch around which color we use based off of what color the shield next to it is?

- Most. Yes.
- 4. I do not think so

Slide 9



Sometimes we will put a toll sign up on a green sign. Which toll shield do you like best?

5. White background pops out more
7. Agrees, distracted by Interstate (on the bottom sign)
1. Use the white on green signs, blue when not

We've only really been talking about state markers. What about US highways?

Slide 10-N Only



1. Black border on left 47 should be blue
2. Tells you it is a toll road but runs a longer distance?

O and P

- O - about 4 like
- P - about 4 like
- 8. What about if you go to green sign, so like O
- 4. Reverse it? Blue number on white

S, Q, and R

5. P and Q
2. R and O, 3 agrees
3. If I am driving...blue catches my eye

- 5. Everything pops out
- 2. I like S
- 10. Do colors really matter? "TOLL" all I need to see
- 7. "TOLL" is never jumping out at me
- 2. But the two different colors make me say "hey"
- 10. I just see the word "TOLL," all are the same
- 8. Flag helps
- 4. Wishes "TOLL" was on top
- 10. Agrees

How do you think you will pay the toll?

- 5. Quarters
- 3. Some of them are a dollar
- 10. Depends on amount of gates

Do you think Toll means "cash?"

- Most. Yes.
- 4. If only electronic, I would be surprised

Slide 11



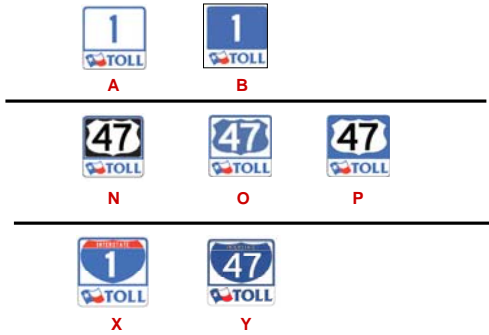
These signs would be for an Interstate toll road entrance to the left, but you continue straight for a separate non-toll Interstate.

- 3. Red pops it out (red on X and W's toll shields)
- Others agree

Are you not recognizing it (Z, Y) is an interstate shield for the toll road?

- No's

Slide 12



To summarize I believe you like X for the interstate, you're split on O and P, and A and B depend on what color the sign next to it is?

-Yes

Slide 13



Version 1

What does this banner mean?

- 4. No Cash
- Others-"TAGS ONLY"

Would you expect to see toll booths on this road?

- 3. No, then there has to be something
- 10. Yes

If you do not have a tag, can you enter onto this road?

- Mixed
- 4. No
- 10. Depends on gates
- 5. Cash lane
- 10. Cash lane, express lane
- 3. "TAGS ONLY"
- 8. Cash and tags only lane
- 9. Registration tags
- 8. I would go if I didn't have a tag

Who would go?

5. I would go for it

Version 2

5. "NO CASH"

3. Would you have to have little coins?

All Cash

10. Think that is a waste

Researcher explains new types of toll roads (Westpark). So you want to be able to pay cash? Or maybe buy a day pass?

6. Like cell phone, buy it and throw it away when you're done

Do you like Version 2?

-Yes's

Slide 14

A 

B 

C 

D 



E 

What type of banner would you like to see on top of the sign?

10. D

1. "TxTag, NO CASH"

What if you without tags were billed with service fee, not given a violation?

9. People throw in trash anyway

7. What if you are not in your own car?

How can we tell people that they can ride on the road and receive a bill later in the mail?

2. No tag, picture

8. Camera flash, sensor

What about "Pay by mail"?

1. "You are being watched"

2. When receive bill and see admin charge, that will be upsetting

What banner would you chose for a generic toll road?

10. D

If you see “Toll” will you think you can pay cash?

- 10. I know they are getting away from it
- 1. I think you can pay cash
- 4. Confusing either way, but once you do it one way people will learn

What if the toll part is just a couple lanes?

- 1. High capacity?
- 2. Divider
- 1. People go wherever they want

What about “Toll Lane” (C)?

- 1. Not if the roads are separate
- 2. People cut over

You think the idea of a banner or plaque is good?

- All. Yes
- Need banner

Pavement Markings

Slide 22

Version 1



Version 3



Version 2



Researcher explains pavement markings. Which one do you like?

- 2. They're not placed far enough back in San Antonio
- Most-Version 2
- 3. How would you see that?

Do you think these help? Are they necessary?

Slide 23

Version 4



-Most like

Slide 24

Version 5



-Blue really sticks out
-Really like

Slide 25

At the toll booths?



Slide 26



Where am I?

8. HOV lane
- Others agree.
7. Shoulder
5. There's a double white line though

Are you allowed to get out of this lane?

6. Not in Texas
7. If there is no barrier I could
4. I would
1. Not supposed to
5. But if you need to exit...

Slide 27



Can you get out of this lane?

- All. Yes.

Can you get in from the mainlanes?

- Yes's

Slide 28



Can you get out?

Yes's

1. Should have double lines

Can the main lanes come in?

-Yes's

Slide 29



-For how long?

Can people come in?

-Yes.

2. Then have to have arrows

Researcher explains that the mainlanes could come in, but the managed lane can not. Would you still change lanes?

4.7. Change lanes regardless

2. What are the consequences?

Slide 30



Is this better?

6. Looks like they can get in but not out

Do you need text?

-Beneficial.

Which Lane is for me?

Slide 33

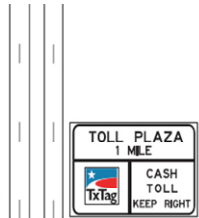


Slide 33

Researcher explains pullout lanes.

10. Likes

Slide 35



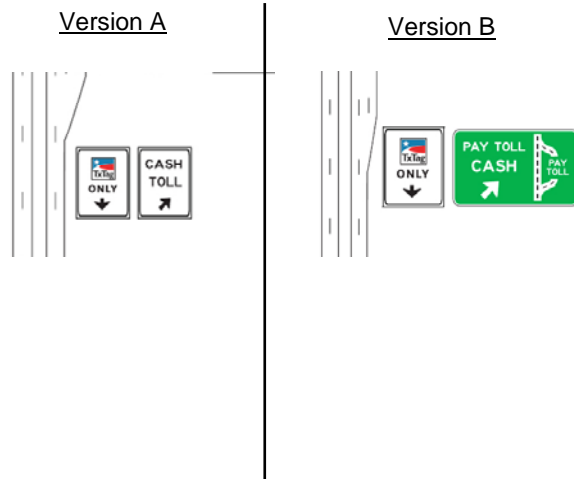
This is the one mile back sign. What do you think?

-Good's

What do you think of the "Toll plaza" phrasing?

-Ok.

Slide 36



7. I like Version A, you do not need map
-Others agree.

Would people think they were exiting?

-No.

Slide 37

Version A

Version B



Do you need another set of signs like A?

-Yes.

7. I think it would help

San Antonio, Texas
August 23, 2007 (daytime)

Introductions:

Have you ever driven on toll roads? Do you have a toll tag?

2. No, No
3. Puerto Rico, No
4. No, No
7. Houston, when I lived in Houston
8. No, No
9. Yes, not anymore, was on husband's car

2. What is a Toll tag?

Researcher explains.

Route Marker Signs for Toll Roads

Slide 5



Route markers help us find which road to go on. Different types of roads may have different colors or shapes associated with them. What kind of road goes to Durham?

9. State
- Federal
3. State

What kind of road goes to Marion?

2. Country
- State

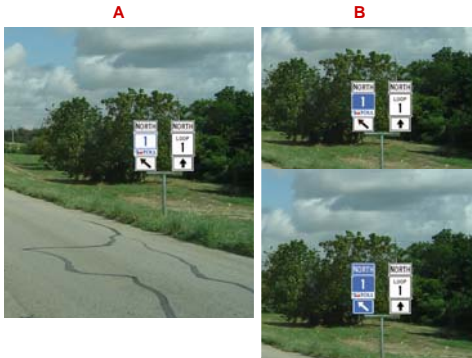
What kind of road goes to Dallas?

- National

Do you think we need a unique marker for toll roads?

4. Yes
9. I think you should, what if you're traveling and have no quarters

Slide 6



What is the difference between the two roads?

- 4. Main road goes to left
- 7. Does not indicate toll is a loop

Do these roads go to the same place?

- 8. No
- 4. Loop is something different
- 7. If toll road is a loop, it should say that
- 9. Agrees

Researcher explains the type of roadway in the picture. Which version do you like best?

- All. C
- 9. You can tell
- 4. Toll should be larger print, take away flag
- 7. Put "TOLL" above North, bright color
- 8. Agrees

You like the blue background?

- All. Yes

Slide 7



- 7. Still like to see loop on there

You prefer the Blue?

-Yes.

7. Do not know about night, but yes

What do you think about the top banner? (TxTAG only)

4. Only people with Texas plates allowed on that road

3. It's very small

8. Hard to see at night, too small

Do others think it could mean you need to have Texas plates?

-Others agree

9. Once you know, then it is ok

7. What is a TxTag?

9. Does it work in other states?

Slide 8



What if you have a blue interstate shield that is not for a toll road next to a blue background shield for a toll road?

7.8. Still like blue

7. Sign could be white

4. Everyone knows interstate symbol

2. I kind of like white next to that, but understand

Slide 9



Sometimes toll road signs are put overhead on green signs.

4. Get rid of Texas flag

- 8. Makes it look smaller
- 7. Do not think that is appropriate place for it (TX flag)
- 9. So small, not going slow (flag)
- 2. Hard to know a flag is there
- 7. Could make bottom with red background

Slide 10- Version N



- 4. Toll should be bigger, or yellow
- Others agree

Versions O and P

- Several like P
- 7. Make arrow background blue

Version S

- Several like

Versions R and Q

- 4. Between S and Q, if you change color of background, may think I am on a different road, like business

Why do you like S? Do you like blue route marker, make consistent with the state shields?

- All. Yes

How would you pay?

- 7. What do you do if you do not have money if you get on a toll?

What is your idea of what a toll road is?

- 8. Pay toll while you are on it, a man in a booth
- 2. Like in the movies
- 9. One state gave you a ticket that read when you entered and then you would pay when you exited

What about in Puerto Rico? Do they time stamp? Or do you need exact change?

8. I think exact change

If you have sticker?

-All. Yes

Slide 11



9. I cannot figure it out

Researcher explains the two interstate roadways.

4. Should not take the red out of the interstate shield

8. Agrees

Is version X better?

2. Blue background with black arrow

7. Like W, stay with it

Slide 12



A



B



N



O



P



X



Y

So most of you like Version B?

-Yes.

And Version X for the interstates?

-Yes

And split between P and N?

Slide 13

Version 1



Version 2



Version 1

What does the banner at the top mean?

9. Have to have a tag
2. Now there are two flags on the sign

You think TxTag is your license?

-Yes's

Researcher explains TxTag

You don't have a TxTag, and you're in Houston. Would you go on this road?

-Several-No

4. I would think my TX plates would let me go
3. Called AutoExpress in Puerto Rico, most lanes for AutoExpress, two for cash

Could you pay cash on this road?

8. No

2. I would think it was my tags, but would not go because it says "TOLL" and I do not have cash

Version 2

9. Very busy

-Others agree.

2. Think should always have 2 lanes that accept cash


4. Call it TxPass instead of Tag

-Others agree

Slide 14

A 

B 

C 

D 

E 



7. Where is one without icon? (version without the flag)

Researcher explains how the same flag icon will be on the toll tag sticker.

4. That would work

7. But if you do not have a tag, it would not make a difference

Think there should be one generic symbol for tags?

-Yes.

Think you need a banner?

9. Yes

7. Blue would look like a rest area

2. Should be there

You think on a generic toll road, you can pay cash?

-All. Yes.

What do you think a toll lane is?

8. Single lane

9. Agrees

Think banner should have a blue background?

7. Shows better like that, make "TOLL" bigger

Pavement Markings

Slide 22

Version 1



Version 3



Version 2

- 7. If bumper to bumper you cannot see
- 9. But on a rainy night...Houston loves them

Slide 23

Version 4



Do we need the words?

- 9. Like the color, others agree
- 7. Like 4
- 4. Agrees

Slide 25

At the toll booths?



3. (In Puerto Rico)Writes on ground, AutoExpress

Slide 26



Where am I?

- 9. HOV lane
- 8. There's no symbol
- 9. Cannot cross the line, double white, others agree

Slide 27



-Now you can cross

Slide 28



- 4. Contradicting
- 7. Should not exit

People can come in?

-Confusion

- 4. There are broken white lines, you can go in and out

Slide 29



4. Still contradicting

7. Better

- 4. Broken lines tell me I can go back and forth

Slide 30



-All like.

Still need the words?

- 4. Yes