Texas Department of Transportation

TECHNICAL PROVISIONS

STATE HIGHWAY 71 TOLL LANES

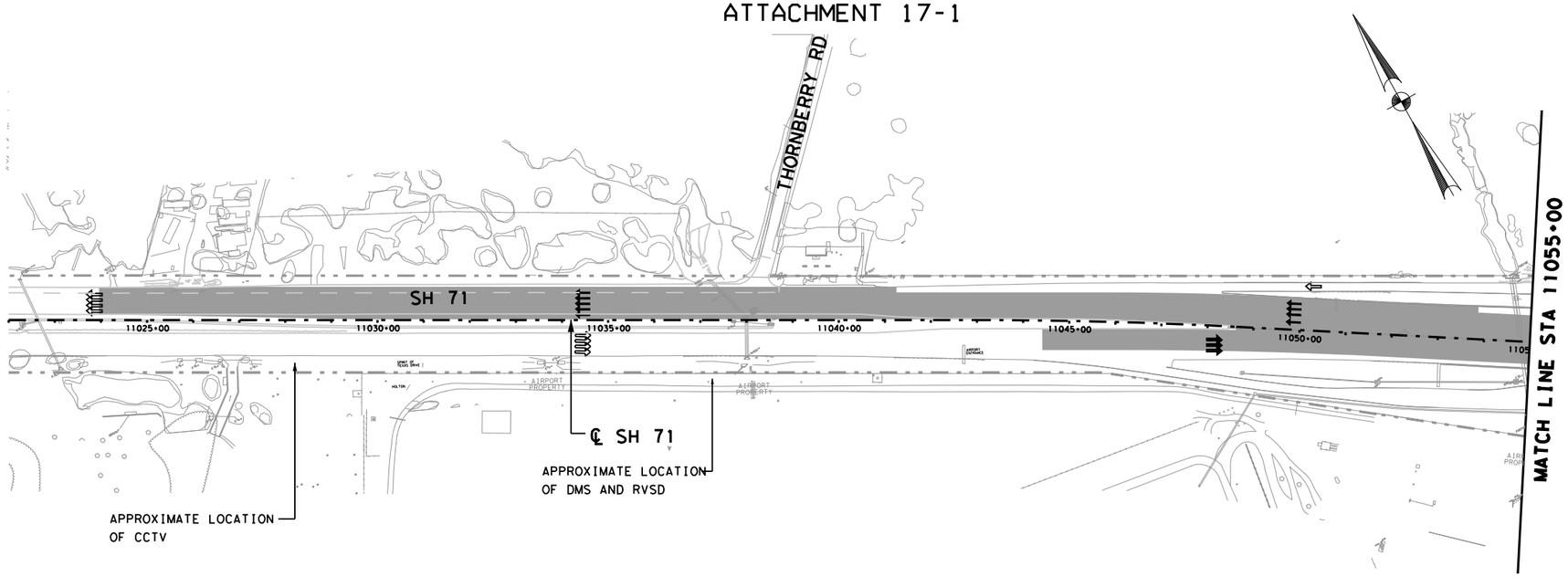
Attachment 17-1

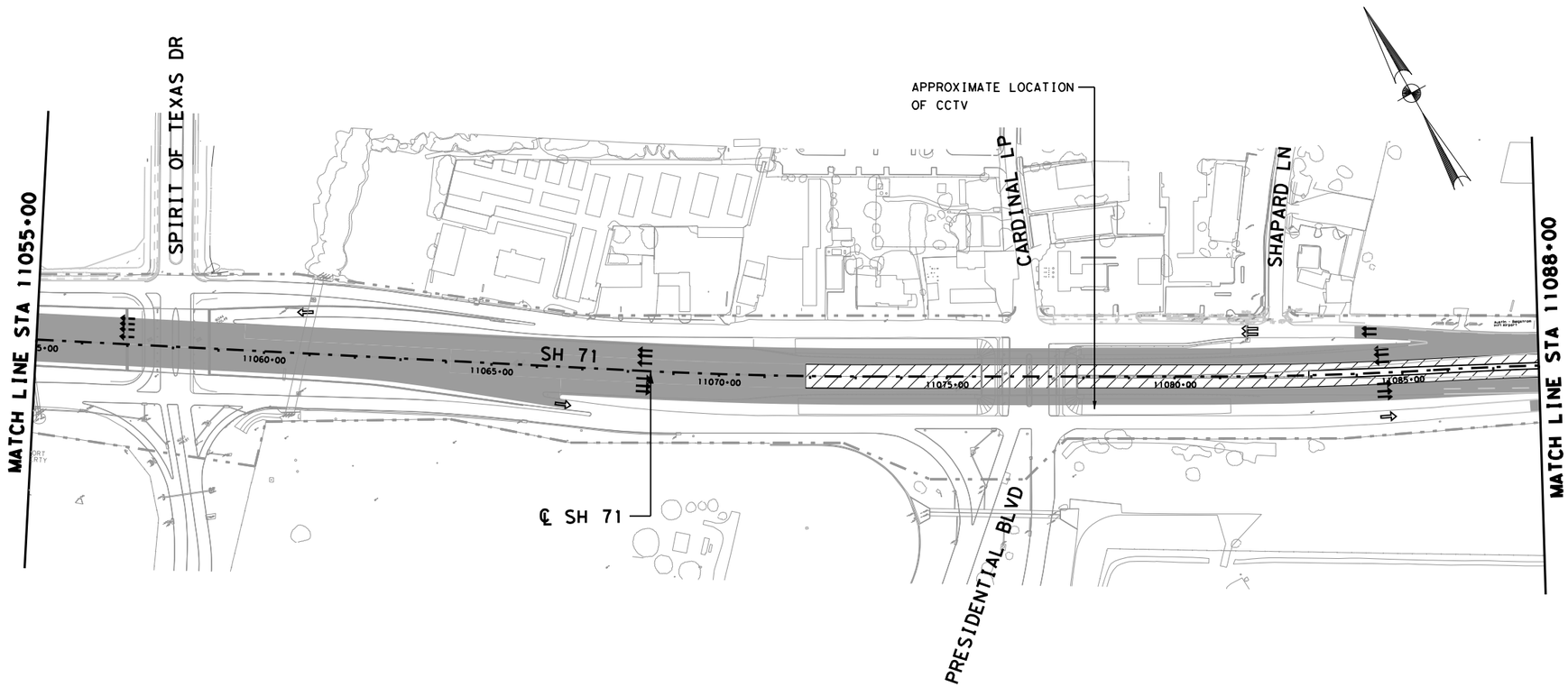
Conceptual ITS Layout

STATE HIGHWAY 71
CONCEPTUAL ITS LAYOUT
ATTACHMENT 17-1

LEGEND

- PROPOSED TOLL
- PROPOSED NON-TOLL (SH 71 MAINLANES)
- PROPOSED NON-TOLL (FM 973)





Texas Department of Transportation

STATE HIGHWAY 71
CONCEPTUAL ITS LAYOUT
ATTACHMENT 17-1

SCALE: 1"=300'

SHEET 1 OF 3

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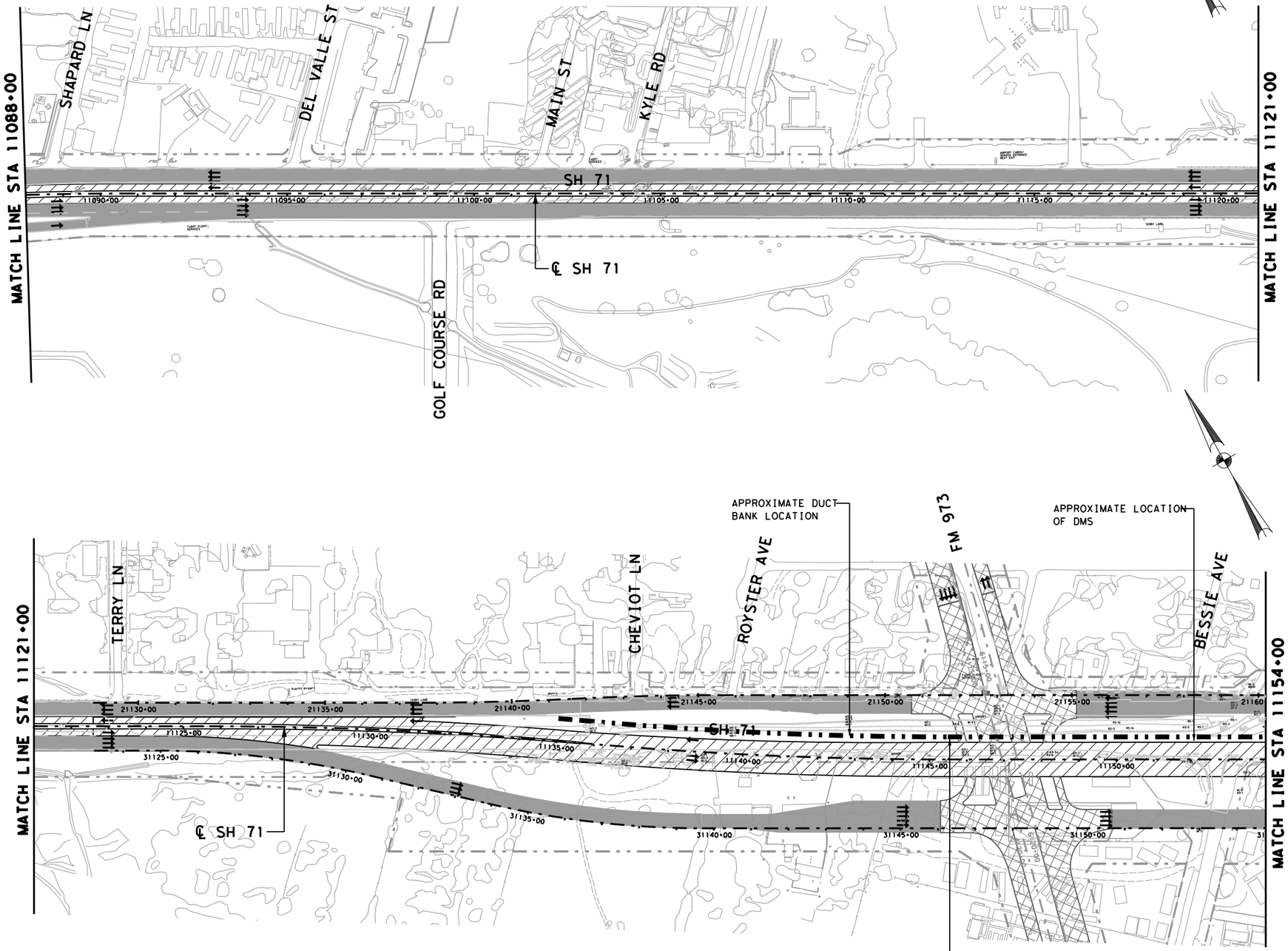
LEGEND

- PROPOSED TOLL
- PROPOSED NON-TOLL (SH 71 MAINLANES)
- PROPOSED NON-TOLL (FM 973)



Texas Department of Transportation

STATE HIGHWAY 71

CONCEPTUAL ITS LAYOUT ATTACHMENT 17-1

SCALE: 1"=300'

SHEET 2 OF 3

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LEGEND

- PROPOSED TOLL
- PROPOSED NON-TOLL (SH 71 MAINLANES)
- PROPOSED NON-TOLL (FM 973)

APPROXIMATE DUCT BANK LOCATION

℄ SH 71

SH 71

MATCH LINE STA 11154+00

MATCH LINE STA 11194+00

APPROXIMATE LOCATION OF CCTV

APPROXIMATE DUCT BANK LOCATION

SH 130

MATCH LINE STA 11194+00

℄ SH 71

SH 71

ONION CREEK

APPROXIMATE LOCATION OF DMS

Texas Department of Transportation

STATE HIGHWAY 71

CONCEPTUAL ITS LAYOUT
ATTACHMENT 17-1

SCALE: 1"=300'

SHEET 3 OF 3

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Texas Department of Transportation

TECHNICAL PROVISIONS

SH 71 TOLL LANES

Attachment 19-1

Performance and Measurement Table Baseline

Table 19-1: Performance and Measurement Table

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1	Cat 1	Cat 2			
				Hazard Mitigation	Permanent Remedy	Permanent Repair			
1) ROADWAY									
							Unless stated otherwise, measurements shall be conducted using procedures, techniques, and measuring equipment consistent with TxDOT's *Pavement Management Information System Rater's Manual.*		
	1.1	Obstructions and debris	Roadway and clear zone free from obstructions and debris	2 hrs	N/A	N/A	Visual Inspection	Number of obstructions and debris	Nil
	1.2	Pavement	All roadways have a smooth surface course (including bridge decks, covers, gratings, frames and boxes) and free from Defects.	24 hrs	28 days	6 months	**a) Ruts – Mainlanes, shoulders & ramps**		
							10ft straight edge used to measure rut depth for localized areas.	Depth of rut at any location greater than 0.5"	Nil
							b) Failures Instances of failures exceeding the failure criteria set forth in the TxDOT PMIS Rater's Manual, including potholes, base failures, punchouts and jointed concrete pavement failures	Occurrence of any failure	Nil
							c) Edge drop-offs Physical measurement of edge drop-off level compared to adjacent surface	Instances of edge drop-off greater than 2" (Number)	Nil
	1.3	Crossovers and other paved areas	Crossovers and other paved areas are free of Defects	24 hrs	28 days	6 months	**a) Potholes** Visual Inspection	Potholes of low severity or higher (Number)	Nil

Table 19-1: Performance and Measurement Table

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1	Cat 1	Cat 2			
				Hazard Mitigation	Permanent Remedy	Permanent Repair			
	1.3 con't.						**b) Base failures**	Base failures of low severity or higher (Number)	Nil
	1.4	Joints in concrete	Joints in concrete paving are sealed and watertight	24 hrs	28 days	6 months	Visual inspection of joints	Length unsealed joints greater than ¼"	Nil
			Longitudinal joint separation				Measurement of joint width and level difference of two sides of joints	Joint width more than 1" or faulting more than ¼"	Nil
	1.5	Curbs	Curbs are free of defects	24 hrs	28 days	6 months	Visual inspection	Length out of alignment	Nil
2) DRAINAGE									
	2.1	Travel Way	The travel way is free from water to the extent that such water would represent a hazard by virtue of its position and depth.	24 hrs	28 days	6 months	Visual inspection of water on surface	Instances of hazardous water build-up	Nil
3) STRUCTURES									
	3.1	Structures having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or springlines of arches or extreme ends of openings or multiple boxes	Substructures and superstructures are free of: • graffiti • undesirable vegetation • debris and bird droppings • blocked drains, weep pipes manholes and chambers • blocked drainage holes in structural components • defects in joint sealants • defects in pedestrian protection measure	24 hrs	28 days	6 months	Visual inspection.	Instances of defect.	Nil 100%

Table 19-1: Performance and Measurement Table

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1	Cat 1	Cat 2			
				Hazard Mitigation	Permanent Remedy	Permanent Repair			
	3.1 con't.		• scour damage • corrosion of rebar • paint system failures • impact damage						
	3.2	Structure components	i) Expansion joints are free of: • dirt debris and vegetation • defects in drainage systems • loose nuts and bolts • defects in gaskets ii) The deck drainage system is free of all and operates as intended. iii) Parapets are free of: • loose nuts or bolts • blockages of hollow section drain holes • graffiti • vegetation • accident damage iv) Bearings and bearing shelves are clean. v) Sliding and roller surfaces are clean and greased to ensure satisfactory performance. Additional advice contained in bearing manufacturers' instructions in the Structure Maintenance Manual is followed.	24 hrs	28 days	6 months	Visual inspection	Instances of defect.	Nil 100%

Table 19-1: Performance and Measurement Table

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1	Cat 1	Cat 2			
				Hazard Mitigation	Permanent Remedy	Permanent Repair			
	3.2 con't.	Structure components	vi) Special finishes are clean and perform to the appropriate standards. vii) All non-structural items such as hoists and electrical fixings, operate correctly, are clean and lubricated as appropriate, in accordance with the manufacturer's recommendations and certification of lifting devices is maintained.	24 hrs	28 days	6 months	Visual inspection	Instances of defect.	Nil 100%
	3.3	Non-bridge class culverts	Non-bridge-class culverts are free of: • defects in sealant to movement joints	24 hrs	28 days	6 months	Visual inspection	Number with defects in sealant and movement joints	Nil
4) PAVEMENT MARKINGS, OBJECT MARKERS, BARRIER MARKERS AND DELINEATORS									
	4.1	Pavement markings	Pavement markings are: • clean and visible during the day and at night • whole and complete and of the correct color, type, width and length • placed to meet the TMUTCD and TxDOT's Pavement Marking Standard Sheets	24 hrs	28 days	6 months	a) Markings - Visual inspection	Length found defective.	100%
							Physical measurement	Length with more than 5% loss of area of material at any point	Nil
								Length with spread more than 10% of specified dimensions.	Nil
							b) Profile Markings Visual inspection	Length performing its intended function and compliant with relevant	100%

Table 19-1: Performance and Measurement Table

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1	Cat 1	Cat 2			
				Hazard Mitigation	Permanent Remedy	Permanent Repair			
	4.1 con't							regulations	
	4.2	Raised reflective markers Raised reflective markers	Raised reflective pavement markers, object markers and delineators are: • Clean and clearly visible • Of the correct color and type • Reflective or retroreflective as TxDOT standard • Correctly located, aligned and at the correct level • Are firmly fixed • Are in a condition that will ensure that they remain at the correct level.	24hrs	28 days	6 months	Visual inspection	Number of markers associated with road markings that are ineffective in any 10 consecutive markers. (Ineffective includes missing, damaged, settled or sunk.) A minimum of four markers should be visible at 80' spacing when viewed under under low beam headlights. Uniformity (replacement rpms having equivalent physical and performance characteristics to adjacent markers).	Nil 100%
	4.3	Delineators & Markers	Object markers, mail box markers and delineators are: • clean and visible • of the correct color and type • legible and reflective • Straight and Vertical	24 hrs	28 days	6 months	Visual inspection	Number of object markers or delineators defective or missing	Nil

Table 19-1: Performance and Measurement Table

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1	Cat 1	Cat 2			
				Hazard Mitigation	Permanent Remedy	Permanent Repair			
5) GUARDRAILS, SAFETY BARRIERS AND IMPACT ATTENUATORS									
	5.1	Guard rails and safety barriers	All guardrails, safety barriers, concrete barriers, etc. are maintained free of Defects. They are appropriately placed and correctly installed at the correct height and distance from roadway or obstacles. Installation and repairs shall be carried out in accordance with the requirements of NCHRP 350 standards.	24 hrs	28 days	6 months	Visual inspection	Length of road restraint systems correctly installed Length free from defects Length at correct height Length at correct distance from roadway and obstacle	100% 100% 100% 100%
	5.2	Impact attenuators	All impact attenuators are appropriately placed and correctly installed	24 hrs	7 days	6 months	Visual inspection	Number correctly placed and installed	100%
6) TRAFFIC SIGNS									
	6.1	General – All Signs	i) Signs are clean, correctly located, clearly visible, legible, reflective, at the correct height and free from structural and electrical defects	24 hrs	28 days	6 months	**a) Retroreflectivity** Coefficient of retro reflectivity	Number of signs with reflectivity below the requirements of TxDOT's TMUTCD	Nil
			ii) Identification markers are provided, correctly located, visible, clean and legible				**b) Face damage** Visual inspection	Number of signs with face damage greater than 5% of area	Nil
			iii) Sign mounting posts are vertical, structurally sound and rust free				**c) Placement** Visual inspection	Signs are placed in accordance with TxDOT's Sign Crew Field Book including not twisted or leaning	100%

Table 19-1: Performance and Measurement Table

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1	Cat 1	Cat 2			
				Hazard Mitigation	Permanent Remedy	Permanent Repair			
	6.1 con't		iv) All break-away sign mounts are clear of silt or other debris that could impede break-away features and shall have correct stub heights v) Obsolete and redundant signs are removed or replaced as appropriate vi) Visibility distances meet the stated requirements vii) Sign information is of the correct size, location, type and wording to meet its intended purpose and any statutory requirements viii) All structures and elements of the signing system are kept clean and free from debris and have clear access provided. ix) All replacement and repair materials and equipment are in accordance with the				**d) Obsolete signs** Visual inspection	Number of obsolete signs	Nil
							e) Sign Information Visual inspection	Sign information is of the correct size, location, type and wording to meet its intended purpose	100%
							f) Dynamic Message Signs Visual inspection	Dynamic message signs are fully functioning	100%
	6.2	General - Safety critical signs	i) Requirements of the TMUTCD ii) Dynamic message signs are in an operational condition	2hrs	1 week	6 months	Visual inspection	Number of damaged Safety critical signs	Nil
7) ROADSIDE MANAGEMENT									

Table 19-1: Performance and Measurement Table

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1	Cat 1	Cat 2			
				Hazard Mitigation	Permanent Remedy	Permanent Repair			
	7.1	Vegetated Areas – Except landscaped areas – General	Vegetation is maintained so that: i) Height of grass and weeds is kept within the limits described for urban and rural areas. Mowing begins before vegetation reaches the maximum height. ii) Spot mowing at intersections, ramps or other areas maintains visibility of appurtenances and sight distance. iii) Grass or vegetation does not encroach into or on paved shoulders, main lanes, sidewalks, islands, riprap, traffic barrier or curbs. iv) A herbicide program is undertaken in accordance with the TxDOT Herbicide Manual to control noxious weeds and to eliminate grass in pavement or concrete. v) A full width mowing cycle is completed after the first frost. vi) Wildflowers are preserved utilizing the guidelines in the mowing specifications	24 hrs	7 days	28 days	**a) Urban areas** Physical measurement of height of grass and weeds	Individual measurement areas to have 95% of height of grass and weeds between 5 in. and 18 in	100%
							b) Rural areas Physical measurement of height of grass and weeds	Individual measurement areas to have 95% of height of grass and weeds between 5 in. and 30 in	100%
							c) Encroachment Visual inspection of instances of encroachment of vegetation	Occurrences of vegetation encroachment in each auditable section	Nil
							d) Wildflowers Visual Inspection with audit of process.	Adherence to vegetation management manuals	100%
							e) Sight lines Visual inspection	Instances of impairment of sight lines or sight distance to signs	Nil

Table 19-1: Performance and Measurement Table

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1	Cat 1	Cat 2			
				Hazard Mitigation	Permanent Remedy	Permanent Repair			
	7.1 con't.	Vegetated Areas – Except landscaped areas – General	and TXDOT *Roadside Vegetation Manual*.	24 hrs	7 days	28 days			
8) EARTHWORKS, EMBANKMENTS AND CUTTINGS									
	8.1	Slope Failure	All structural or natural failures of the embankment and cut slopes of the Facility are repaired	24 hrs	28 days	6 months	Visual inspection by geotechnical specialist and further tests as recommended by the specialist	Recorded instances of slope failure	Nil
	8.2	Slopes - General	Slopes are maintained in general conformance to the original graded cross-sections, the replacement of landscaping materials, reseeding and re-vegetation for erosion control purposes and removal and disposal of all eroded materials from the roadway and shoulders	24 hrs	28 days	6 months		Inspection records showing compliance	100%
9) AMENITY									
	9.1	Graffiti	Graffiti is removed in a manner and using materials that restore the surface to a like appearance similar to adjoining surfaces	24 hrs	28 days	6 months	All graffiti is considered a Category 1 defect	Inspection records showing compliance	100%
10) SWEEPING AND CLEANING									
	10.1	Sweeping	**i)** Keep all channels, hard shoulders, gore areas, ramps, intersections, islands and frontage roads swept clean.	24 hrs	28 days	6 months	Buildup of dirt, ice rock, debris, etc. on roadways and bridges not to accumulate greater than 24" wide or 1/2" deep	Inspection records showing compliance	100%

Table 19-1: Performance and Measurement Table

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1	Cat 1	Cat 2			
				Hazard Mitigation	Permanent Remedy	Permanent Repair			
	10.1 con't.	Sweeping	ii) Clear and remove debris from traffic lanes, hard shoulders, verges and central reservations. footways and cycle ways iii) Remove all sweepings without stockpiling in the right of way and dispose of at approved tip.	24 hrs	28 days	6 months			
	10.2	Litter	i) Keep the right of way in a neat condition, remove litter regularly. ii) Pick up large litter items before mowing operations. iii) Dispose of all litter and debris collected at an approved solid waste site.	24 hrs	28 days	6 months	No more than 20 pieces of litter per roadside mile shall be visible when traveling at highway speed.	Inspection records showing compliance	100%

Texas Department of Transportation

TECHNICAL PROVISIONS

STATE HIGHWAY 71 TOLL LANES

Attachment 20-1

TTI Pedestrian and Bicycle Study

State Highway 71 – Del Valle Area

Pedestrian and Bicycle Study
State Highway 71 – Del Valle Area

EXISTING CONDITIONS AND RECOMMENDATIONS - FINAL

To: **Ed Collins, Austin District**
Texas Department of Transportation

From: **Joan G. Hudson, P.E., Associate Research Engineer**
Texas Transportation Institute

Date: **June 15, 2011**

The Texas Department of Transportation (TxDOT) is in the process of designing a "superstreet" along SH 71 to reduce congestion. A superstreet is a new type of intersection design which is intended to reduce the delay for motorists. The project increases the number of vehicles through the signalized intersections by eliminating left turn movements. Those left turning motorists would be required to turn right and then make a U-turn to effectively complete the left turn maneuver. See Figure 1.

Figure 1. Proposed Layout of Superstreet
(ftp://ftp.dot.state.tx.us/pub/txdot-info/library/projects/austin/SH 71e/schematic_102510.pdf)

One concern with the superstreet concept is the safety and accommodation of pedestrians and bicyclists. Crosswalks, pedestrian signals, and pedestrian push buttons will be available at the FM 973 (south leg)/Falwell Lane intersection. No accommodations for pedestrians will be provided at the FM 973 (north leg) intersection with SH 71. As such, the Austin District requested that the Texas Transportation Institute (TTI) conduct a study of SH 71 and FM 973 near the planned superstreet. Two main tasks of the project include:

1. Develop, administer, and analyze a survey of people who attend the Open House meeting held on November 16, 2010, and
2. Collect pedestrian and bicyclist volume and movement data along SH 71 near FM 973 and on FM 973 just south of SH 71.
3. Contact stakeholders to discuss potential walking and bicycling concerns related to the project.

This technical memorandum summarizes the findings of the study and includes recommendations for the District to consider in their planning of the superstreet.

Survey

The survey, developed in English and Spanish, included questions about typical walking or biking routes, trip purposes, and time-of-day for these walking or biking trips focused specifically on the state-maintained roadways in the area. The superstreet area was expanded to include US 183. Researchers asked whether participants felt safe walking or biking on these routes. In addition to the survey, an aerial photo of SH 71 between Riverside Drive and Ross Road was printed and available at the open house meeting for people to draw typical walking and biking routes.

There were 22 participants in the survey, 19 of which indicated that they live in the East Austin/Del Valle area. The questions and results are shown in Appendix A. Of the 19 residents, 18 said they live in neighborhoods and 17 identified the neighborhood or street of their residence. The map in Appendix B shows these neighborhoods. It is important to note that none of the residents in the area immediately adjacent to the proposed superstreet answered the survey. The lack of input from residents living near the project is unfortunate. However, insight was gained through discussions with representatives from several agencies and organizations including:

- Capital Metropolitan Transportation Authority (CapMetro)
- Austin Transitional Housing Center
- Del Valle Community Coalition
- Travis County Correctional Facility
- South Rural Community Center
- Children's Wellness Center

<u>Survey Results</u>

Six of the survey participants walk or bike to the grocery or convenience store, three walk to the bus stop, three to community center, and two walk to work or school. Five people said that they walk or bike to a neighborhood park or public library. Only three of the respondents indicated that they walk or bike along or across the state facilities and none of those three indicated feeling safe doing so.

When speaking of feeling safe walking or biking along or across these roadways, all of the comments provided by respondents focused on reasons why they feel unsafe. Too much traffic, going too fast, too many crashes and the lack of sidewalks top the list of concerns. To address safety, options including crosswalks, sidewalks, pedestrian "walk/do not walk" signals and curb ramps were selected as needed for adults and children alike. Other ideas for improving the safety of children include the addition of crossing guards, police officers, a wall or barrier to protect children from high speed traffic, and hike and bike trails. One person said, "It would not be safe (for children) with any of these measures."

From the aerial photo of the roadway section which was on display at the November 16th Open House, seven people mentioned specific safety concerns or marked their walking/biking routes. SH 71 at Ross Road, east of SH 130, was mentioned a couple of times by people who would like to walk or bike from the Berdoll Farms neighborhood south of SH 71 to Southeast Metro Park on the north side of SH 71. Other people mentioned the high speed of motorists on SH 71 and the occurrence of crashes at the median west of Ross Road as deterrents to walking or bicycling. A pedestrian overpass was suggested.

The Dollar General store located on Ross Road near Del Valle High School was mentioned as a popular destination for the students by two open house attendees. Students walk across Ross Road to reach the store and create a safety concern as they interact with motorists. These attendees were given contact information of Travis County Transportation and Natural Resources staff since Ross Road is not under TxDOT's jurisdiction.

The desire for sidewalks on FM 973 north of SH 71 from Eva Street to businesses like Tolivers (north of Eva Street and south of the Colorado River) was mentioned by a person who used to live in the area and wanted to bike to these businesses. That person said, "There's no space on the roadway for bicycles."

Along SH 71 west of the proposed superstreet, there is a bus stop (Bus Stop Number 1851) on the south side and businesses, a post office, and a residential area on the north side (Austin Pecan Park). Instead of staying on the bus until the turnaround at the correctional facility and getting off on the north side near the destination, parents with children disembark and cross SH 71 midblock, according to the bus driver who attended the open house meeting.

Another person mentioned the post office as needing sidewalks leading to it.

Other people who marked the aerial photo focused on the intersections of SH 71 at US 183 and SH 71 at Riverside Drive as problem locations in terms of crashes and pedestrian accessibility, respectively.

Therefore, the comments received on the survey, at the open house, and written on the aerial photo are generally for sections of SH 71 outside of the superstreet section. Therefore, special attention should be given to the comments made by the various agencies and organizations listed above.

Data Collection

Walking and biking volume and origin/destination data was gathered on Thursday, November 18, 2010 from 6:00am to 6:00pm with two 1-hour breaks in the day from 10-11am and 3-4pm. Daylight hours limited the view prior to 6:30am. Almost 300 pedestrian crossings and six bicyclists were counted crossing and/or traveling along the roadway over the course of the 10-hour period. These were mostly adults and a few teenagers. Data were collected in three parts as shown circled in Figure 2: SH 71 West, SH 71 East and FM 973 (south leg). The highest hourly volume crossing SH 71 was 23 pedestrians, 19 of whom crossed midblock at uncontrolled locations in the western section of SH 71. In the eastern section, many more pedestrians were seen crossing at the signalized intersections of FM 973. There were seven (7) pedestrians who crossed midblock between 5-6pm and six (6) pedestrians who crossed midblock between 2-3pm. Over 100 pedestrians were counted

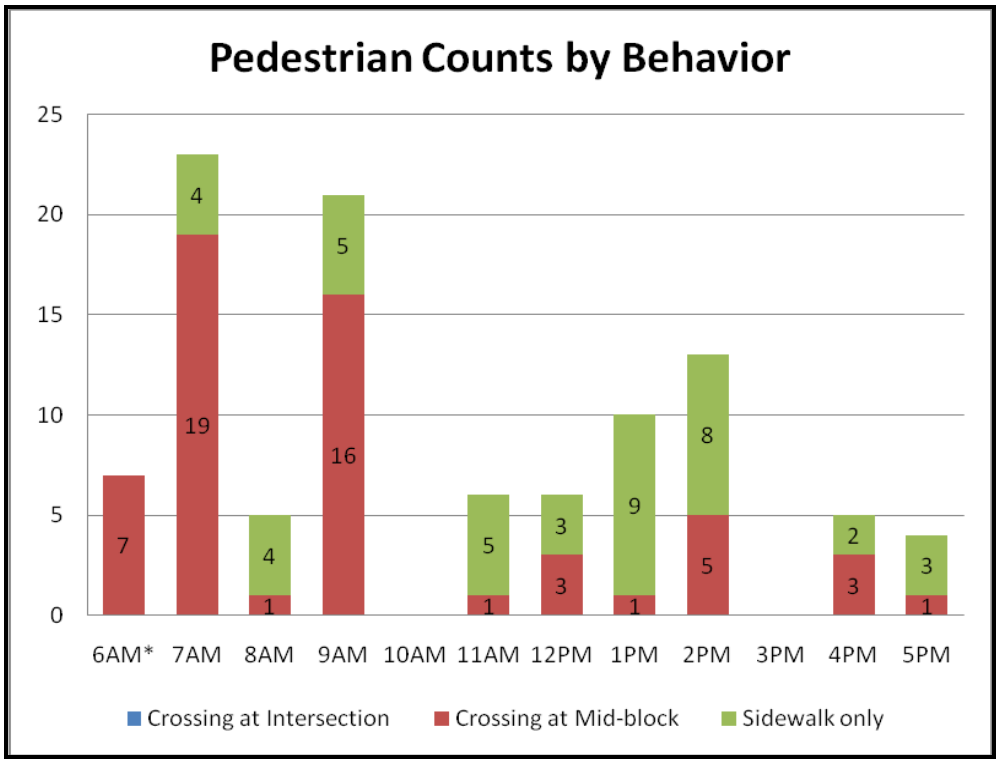
Figure 2. Pedestrian Crossing Midblock on SH 71

over the course of the ten hour period in each of the two sections of SH 71. A total of 84 pedestrians were counted crossing or walking along FM 973.

Other items to note are listed below:

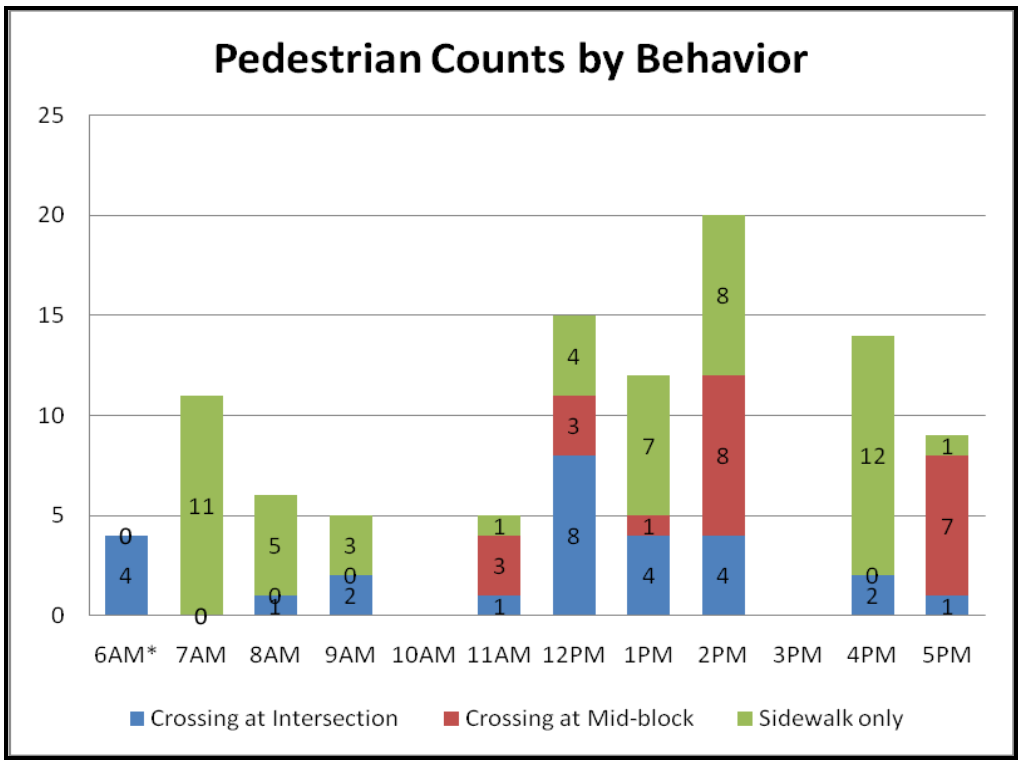
1. SH 71 was divided into two parts and covered by two observers (Figure 3). Some of the pedestrians may have been counted twice since their activities may extend to two observers' range. This issue doesn't exist in the figures since every activity has its own trajectory.
2. Pedestrians were noted as crossing midblock (uncontrolled location), crossing at the intersection, or walking on the edge of the roadway (sidewalk area) only.
3. Crossing at the intersection was defined as crossing the SH 71 at FM 973 signalized intersections (north leg and south leg).
4. The counts were based on activity, not on pedestrian. For example, one person walking into the convenient store and later walking out was counted as two activities.
5. Starting at about 10:00 AM there were people standing at the intersections asking for money from the motorists. They were only counted twice in the data set (showing up and leaving).
6. Figures 4, 5, and 6 chart the pedestrian and bicycle count data by behavior.

Figure 3. SH 71 West, SH 71 East, and South leg of FM 973



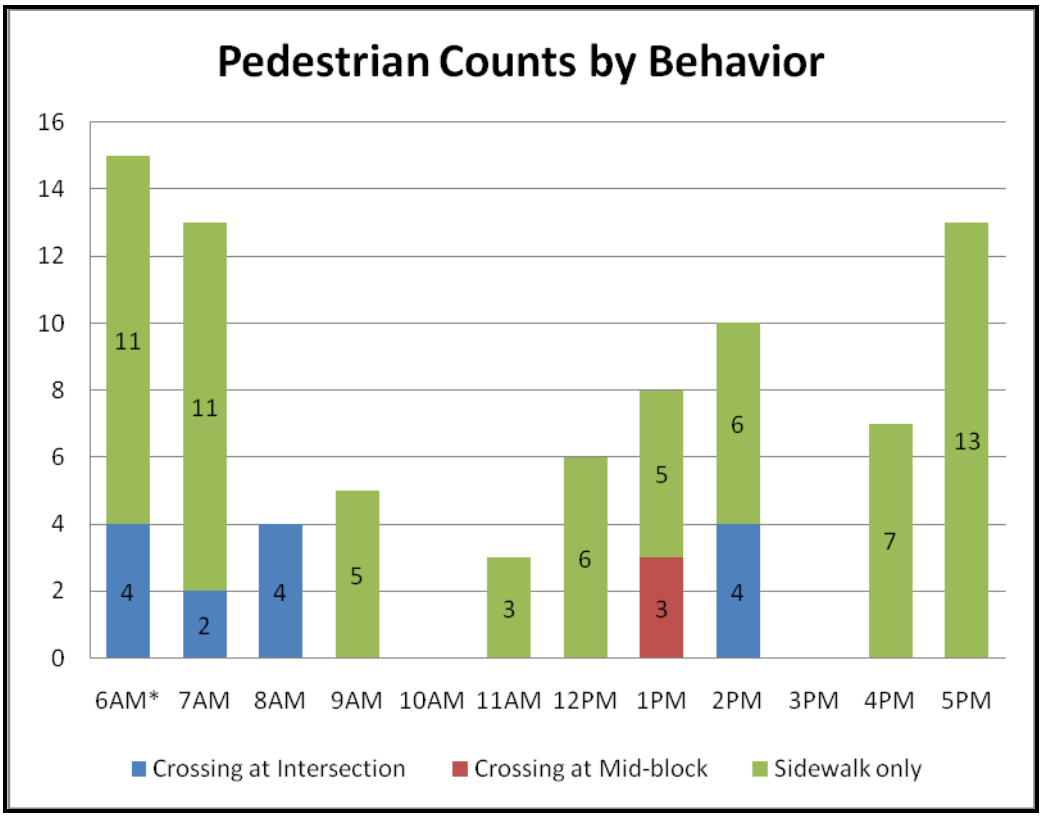
Note: No data was collected from 10-11am and 3-4pm

Figure 4. SH 71 West Pedestrian Counts by Behavior



Note: No data was collected from 10-11am and 3-4pm

Figure 5. SH 71 East Pedestrian Counts by Behavior



Note: No data was collected from 10-11am and 3-4pm

Figure 6. FM 973 South Leg Pedestrian Counts by Behavior

There are no signalized intersections in the western section of SH 71 while the eastern section of SH71 has two signalized intersections (both legs of FM 973). Even so, a similar number of pedestrians were counted crossing the highway in each of these two sections. Clearly defined worn trails exist along both roadways indicating pedestrian use (see photos in Figure 7). This evidence of pedestrian use is confirmed in all three charts showing pedestrians walking along the roadway.

Figure 7. Worn paths on (a) the south side of SH 71 and (b) the west side of FM 973

Charts showing approximate age of the pedestrian by time of day are available in Appendix C. As seen in Figures 4-6 above, there were 10 or more pedestrians per hour in each of these sections. The maximum hour for SH 71 pedestrian activity occurred from 7:00 to 8:00 AM when 23 people were counted walking

along or across the west section and 11 people were seen walking along or across the east section. The maximum hour for FM 973 occurred from 6:00 to 7:00 AM (even though visibility was limited by darkness) when 15 pedestrians walked along or across the roadway. On average, 10 pedestrians per hour were counted on SH 71. Over half of the pedestrians seen on the west leg of SH 71 were crossing midblock. Just under a third of the pedestrians counted in the eastern section crossed midblock SH 71. Almost all of the pedestrians counted on FM 973 were walking along the roadway. Table 1 summarizes the pedestrian totals for each section.

Table 1. Pedestrian Volume on SH 71

Hour	Crossing Midblock SH 71 West	Walking Along SH 71 West	Total Peds/Hr SH 71 West	Crossing SH 71 East at FM 973	Crossing Midblock SH 71 East	Walking Along SH 71 East	Total Peds/Hr SH 71 East
6-7am*	7	0	7	4	0	0	4
7-8am	19	4	23	0	0	11	11
8-9am	1	4	5	1	0	5	6
9-10am	16	5	21	2	0	3	5
11-12noon	1	5	6	1	3	1	5
12-1pm	3	3	6	8	3	4	15
1-2pm	1	9	10	4	1	7	12
2-3pm	5	8	13	4	8	8	20
4-5pm	3	2	5	2	0	12	14
5-6pm	1	3	4	1	7	1	9
10-hr Total	57	43	100	27	22	52	101

* Darkness limited sight of pedestrians before 6:30am.

Table 2. Pedestrian Volume on FM 973

Hour	Crossing FM 973 at SH 71	Crossing Midblock FM 973	Walking Along FM 973	Total Peds/Hr FM 973
6-7am*	4	0	11	15
7-8am	2	0	11	13
8-9am	4	0	0	4
9-10am	0	0	5	5
11-12noon	0	0	3	3
12-1pm	0	0	6	6
1-2pm	0	3	5	8
2-3pm	4	0	6	10
4-5pm	0	0	7	7
5-6pm	0	0	13	13
10-hr Total	14	3	67	84

* Darkness limited sight of pedestrians before 6:30am.

Lines were drawn on a satellite image of the study area and extended beyond the roadway to better indicate the pedestrian's origin and destination. These lines are shown in Figures 8-10 where each pedestrian is represented by a line. The pedestrians who crossed the roadway are not counted as walking along even though they might have walked adjacent to the roadway for some part of their walking trip. A closer view of each of the primary crossing points showing arrows for the direction of travel is included in Appendix D.

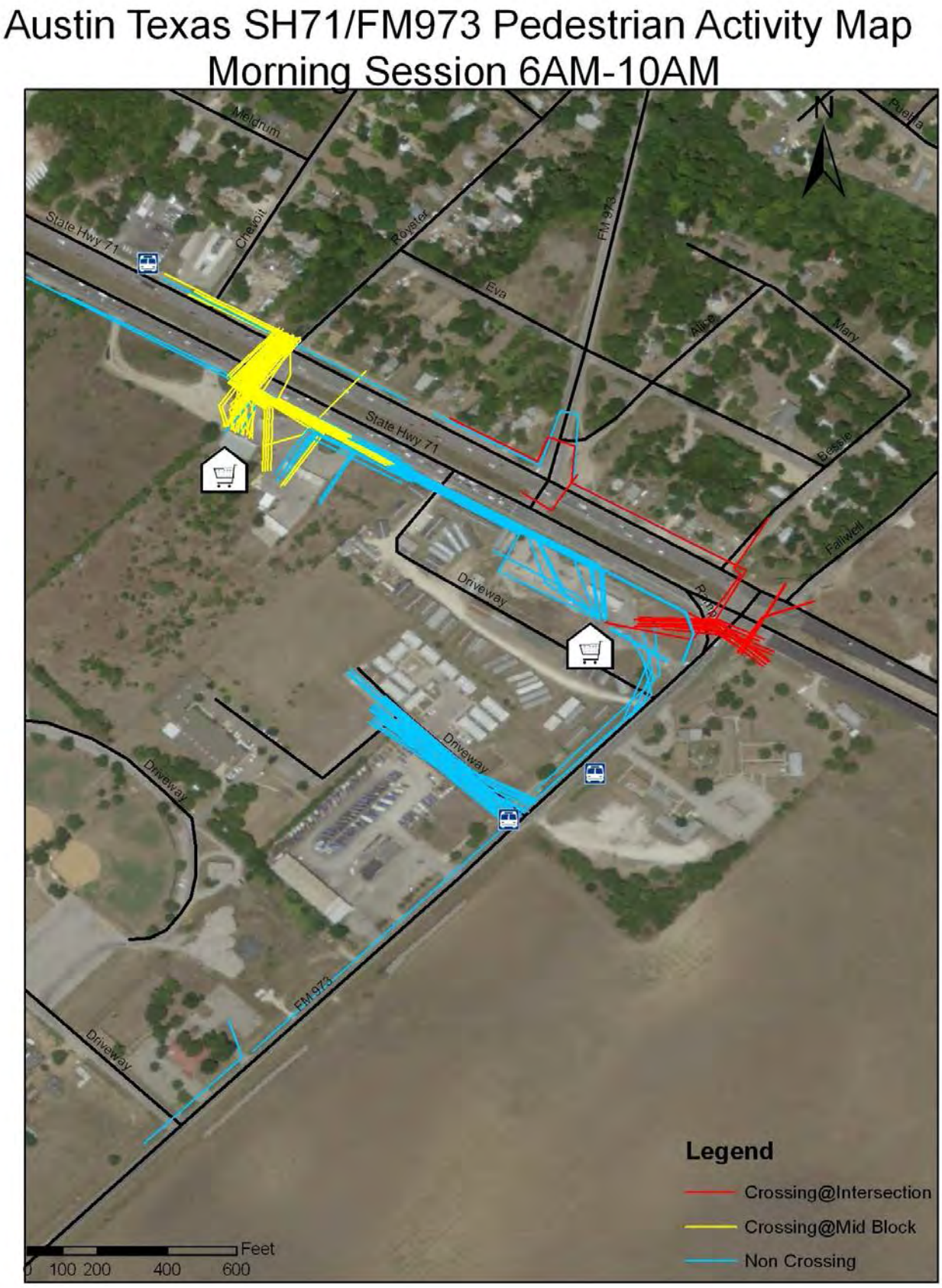


Figure 8. Morning Pedestrian Travel

Figure 9. Noon-time Pedestrian Travel

Figure 10. Afternoon Pedestrian Travel

Stakeholder Discussions

The pedestrian data collection results indicate that many pedestrians are crossing SH 71 near Royster Avenue to reach the bus stop located near the Sonic Drive-In at Cheviot Lane (see Figure 11). This is especially true in the morning hours. Since Capital Metropolitan Transportation Authority (CapMetro) handles the placement and construction of bus stops, researchers were asked to contact them to discuss concerns. In addition to CapMetro, several other agencies were contacted to understand the needs of the community including: Travis County Correctional Facility, Austin Transitional Housing Center, the Del Valle Community Coalition, South Rural Community Center, and the Children's Wellness Center.

Figure 11. Westbound Bus Stop at Cheviot Lane

<u>Capital Metro</u>

From the discussions, it is clear that CapMetro would like to have an improved and accessible westbound bus stop. Any modifications to this stop would necessitate upgrading the stop to meet current standards. They have funding available to support this work. When asked if they would move this westbound bus stop to the east, CapMetro staff indicated that they would be willing to shift the bus stop to the east as long as it remains west of FM 973 (south leg). Moving to the east of FM 973 (south leg) is not preferred.

CapMetro would also like to install an eastbound bus stop on the south side of SH 71. They are willing to pay for the bus stop and the sidewalks leading to it if TxDOT gives the approval. They point to the FM 969/Martin Luther King Jr. Boulevard east of Airport Boulevard project where TxDOT had limited right-of-way and drainage ditches on either side and still managed to install sidewalks and accessible bus stops on both sides of the roadway.

Bus pull-outs are also needed on SH 71 so that the bus driver can move the bus off of the main lanes to load and unload. CapMetro staff said that ideally the pull-out would be similar to the one on Loop 1/MoPac East Frontage Road north of RM 2244. Photos of sidewalks and pullouts on FM 969 and Loop 1/MoPac north of RM2244 are available in Appendix E.

A meeting of TxDOT and CapMetro was held on April 14, 2011 to discuss these issues.

<u>Austin Transitional Housing Center</u>

The Austin Transitional Housing Center is located behind the convenience stores with a driveway connecting to SH 71. This center houses almost 350 people most of whom are transit dependent. Release times begin at 5:30am when residents leave for jobs. Between 6:30 and 7:00am, others are released to search for jobs. The residents are encouraged to use the bus stop located on the Travis County Correctional Facility by the baseball fields. A section of fence was removed to enable access to the stop. However, it appears that many of the residents choose not to use that stop and instead cross SH 71 to reach the westbound stop near Cheviot Lane.

To compound matters, the administrators of the correctional facility recently decided to remove the bus stop due to damage caused to the pavement structure and problems during weekends when motor vehicle

parking around the fields constrains bus travel. Administrators have been in discussion with CapMetro about this bus stop removal.

Travis County Correctional Facility

Many people travel to and from the correctional facility by bus, according to the facility director. They come to visit relatives, to assist people who are being released, or are themselves being released. The director indicated that people who are released often choose to walk. He requests that a sidewalk be installed as part of this superstreet project along the west side of FM 973 in front of their facility leading to SH 71. He also suggests a bus stop on eastbound SH 71 near the driveway to the transitional center so that residents are less tempted to cross the highway. However, he has no funding to support such a project.

South Rural Community Center

Research staff also contacted the South Rural Community Center staff who indicated that many people come to their facility which houses a clinic and support services for families. The clients reportedly walk, bus, bike, and drive to the facility. Adults are sometimes seen with children in tow.

What has resulted from people walking to and from the facilities mentioned above is a hard-packed trail on the western side of FM 973.

Del Valle Community Coalition and Children's Wellness Center

The Del Valle Community Coalition staff person recommended researchers speak with the director of the Children's Wellness Center on Ross Road. Although the center is on Ross Road which is located east of the superstreet project, the director indicated that she has heard from people who regularly walk the section of SH 71 where the superstreet is planned. Researchers provided questions and the director called several people who live in the area. The questions and answers are as follows:

- Do you walk along or across the FM 973 and SH 71?

  Along and across 973 and 71. Some of us ride bikes too but it is not safe and our children cannot attend ACC, even though they have been accepted because it is not safe for them to ride their bikes to the bus stop.

- If you cross, do you cross at a traffic signal?

  Yes, but there are no crosswalks.

- How do you feel when walking in the area?

  Very unsafe. Please check the wrecks on this strip on 973 and around 71 along Del Valle proper. The numbers grow each year. The main problem is the truck (drivers) who speed and pass lanes, even at the top of the hill. Many of us actually have to dodge the trucks.

- Have there been times when you have to run to get across the street for fear of being hit?

  Yes and I have had to run away from the road to avoid being hit.

- What obstacles do you face when walking along or across the roadways?

  Flying rocks/dirt. No room to walk side by side with my children, too dark in the morning to get to work, no bike lane, trucks, trucks and more trucks who never seem to get stopped for dangerous driving.

- Do you ride the bus and get on or off at the bus stops in the area?

  Yes.

- Where are you typically walking to/from? In other words, are you walking from home or the bus stop to destinations in the area?

  Further down south on 973, off Pierce Lane, Elroy Road, Jacobson Road

- What improvements would you most like to see on these roadways?

  A flyway or walking bridge from Ross Rd to the Metropolitan Park across from 71 so that the children and families can safely cross to the park. Bike lanes/walking lane. Signs that enforce speed limits and driving laws. Cross walks with traffic lights that help people cross. Bus stops that have a shelter for rain and sun.

- Anything else you'd like to add?

  A longer side lane to turn into Ross Rd from 71, a wider 973 road from 71 to MLK near Hornsby. A pass for the toll roads so that those who have the quality of life lowered by the toll way can actually afford to use the road.

Recommendations

Based on the data collection results as well as input from the stakeholders in the SH 71/FM 973 area, many pedestrians walk along and across the roadways. To increase the safety and provide accommodations for pedestrians in this area, the following recommendations are made:

1. Relocate the westbound bus stop on the north side of SH 71 near Cheviot Lane to the section of SH 71 between the two legs of FM 973. By relocating the stop, current accessibility standards must be met. People are more likely to cross SH 71 at the FM 973 (south leg) signalized intersection since it will be closer to the bus stop and pedestrians will continue to be accommodated with crosswalks, pedestrian signals, curb ramps, and pedestrian push buttons.
2. Install sidewalks along both sides of SH 71 between Cheviot Lane and FM 973 (south leg).
3. Install a sidewalk along the west side of FM 973 between SH 71 and the Travis County Correctional Facility southernmost driveway.
4. Improve the southbound bus stop on FM 973 to current accessibility standards.
5. Install a bus stop on the south side of eastbound SH 71 near the Austin Transitional Center driveway.
6. Re-evaluate pedestrian travel after the superstreet is installed to see if pedestrians continue to cross SH 71 at uncontrolled locations.

Appendix A: Survey Results

Survey for Walking and Bicycling in the Area of SH 71, US 183, and FM 973
Austin District
16-Nov-10

There were 22 survey responses received at the Open House Meeting on November 16, 2010. The following answers were received.

1. Where do you live?

East Austin/Del Valle area	19	
Other	2	
	1	Owns property in East Austin/Del Valle

2. If you live in the East Austin/Del Valle area, do you live in?

ð A neighborhood. Name of neighborhood or street_____	18	Colorado Crossing and Berdoll Farms listed most. See Google Map for neighborhood information.
ð Rural area	1	
ð Not applicable	1	

3. Do you work in the East Austin/Del Valle area?

□ Yes	10	
□ No	12	

4. Do you bike or walk to the following? (check all that apply)

□ Grocery/convenience store	6	
□ Bus stop – where do you or your children usually catch the bus?	3	
□ Work or school	2	
□ Community center	3	
□ Doctor or other medical appointments	0	
□ Other _____	5	neighborhood park (2), weekend recreation, on my street, to public library
□ No. I do not walk or bike. Go to Question 7.	10	

5. Do you walk or bike along or across SH 71, US 183 or FM 973?

□	Yes	3
□	No	12

If yes, do you feel safe walking or biking along or across these roadways?

□	Yes	0
□	No	3
□	Explain_____	Although this was for people who said that they do walk on the roadway mentioned, several took the time to indicate that they do not feel safe and several listed reasons shown below.

Comments: 1) Try to avoid, others in the neighborhood do travel on these busy roads. Too much traffic. 2) There is too much traffic and daily accidents. 3) Not right now. Too dangerous. No sidewalks or bike lanes. 4) Too dangerous. 5) We need pedestrian crosswalks with stop bars. Please support more pedestrian and bike routes. 6) Need sidewalks near commercial areas. 7) Cars go too fast.

6. What time do you typically walk or bike across or along SH 71, US 183 or FM 973? (check all that apply)

□	Peak periods (weekdays from 6:30-9:30 AM or 4-7 PM)	2
□	Mid-day (non-peak periods)	1
□	Nights	0
□	Weekends	4

7. What needs to be present for children to walk or bicycle across or along SH 71, US 183 and FM 973? (check all that apply)

ð	Crosswalks at the signalized intersections	12
ð	"Walk/Do Not Walk" lights at the traffic signals	9
ð	Sidewalks	12
ð	Sidewalk ramps for wheelchair accessibility	8
ð	Other_____	safety monitors; bright lighting/signals and signage announcing crosswalks/bicycle routes/lanes; it would not be safe with any of these measures; police; recreation (a reason to walk, somewhere to go); any and everything cause we don't have anything; some kind of wall or barrier to protect children and adults from high speed traffic; hike/bike trails.

8. Would you cross SH 71, US 183, and FM 973 at the signalized intersections if the following amenities existed? (check all that apply)

☐ Crosswalks	11
☐ "Walk/Do Not Walk" lights	9
☐ Sidewalks	10
☐ Sidewalk ramps for wheelchair accessibility	6
☐ Other _____	No; Signage; It would not be safe with any of these measures; Over the street bridge; Need these in the future when more businesses are established, example Dollar General on Ross Road.

9. Please feel free to share other transportation safety concerns.

This is an accident (fatality) waiting to happen especially for children.
Need weekend bus service. Need to anticipate commerce and development and provide for peds.
Thanks for your openness to feedback and public input.
Traffic on FM969.
There is no way I would ever bike or walk along either the way it is.
71 should be three lanes until Ross Road
Need more walking safety features on busy highways.
Bike riders do not feel safe sharing the road with cars.

10. What is your age group?

☐ 18-19 (you must be 18 or older to participate in this survey)	0
☐ 20-24	0
☐ 25-44	10
☐ 45-64	9
☐ 65 and over	1

Appendix B: Neighborhood of Survey Participants

Includes respondents who listed their neighborhood/street (includes 17 out of 19 people). Neighborhood is indicated with a blue balloon in aerial photo.

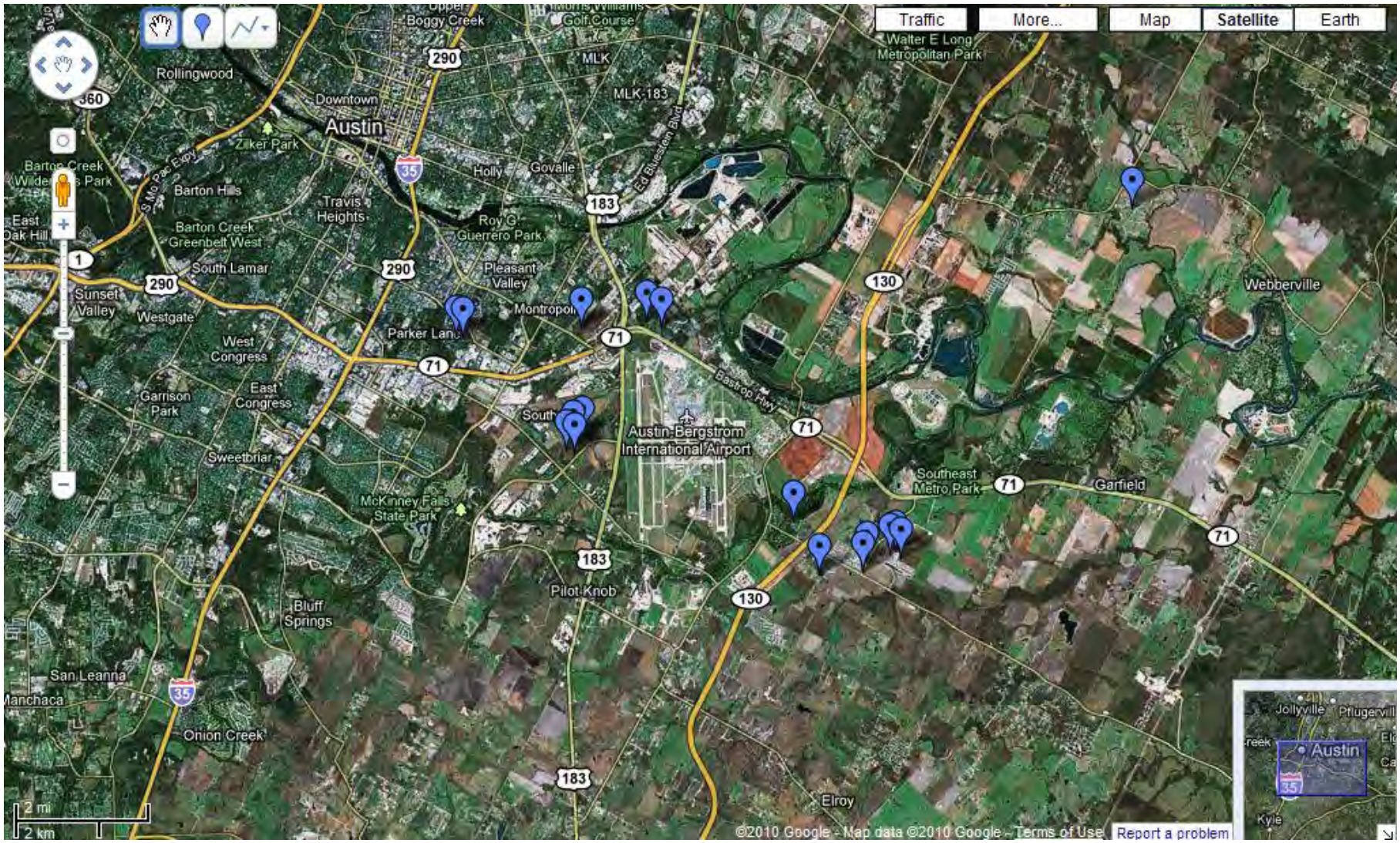


Figure 12. Residential Areas of Survey Respondents

Appendix C: Pedestrian Counts by Age

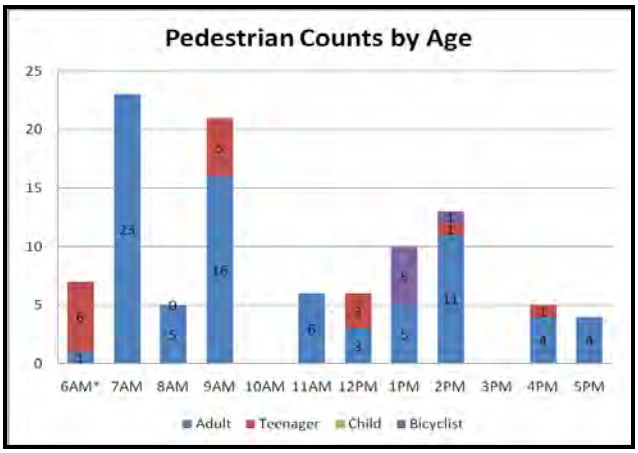


Figure 13. SH 71 West Pedestrian Volume by Age

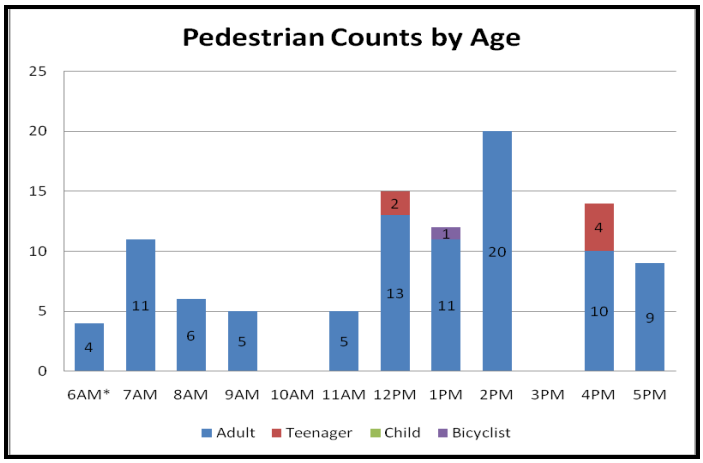


Figure 14. SH 71 East Pedestrian Volume by Age

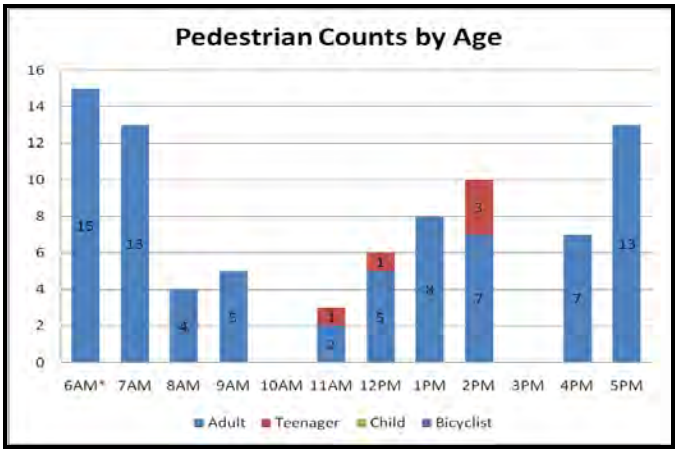


Figure 15. FM 973 (south leg) Pedestrian Volume by Age

Appendix D: Close Up Views

Figure 16. SH 71 at FM 973 South Leg

Morning Period - 6-10AM

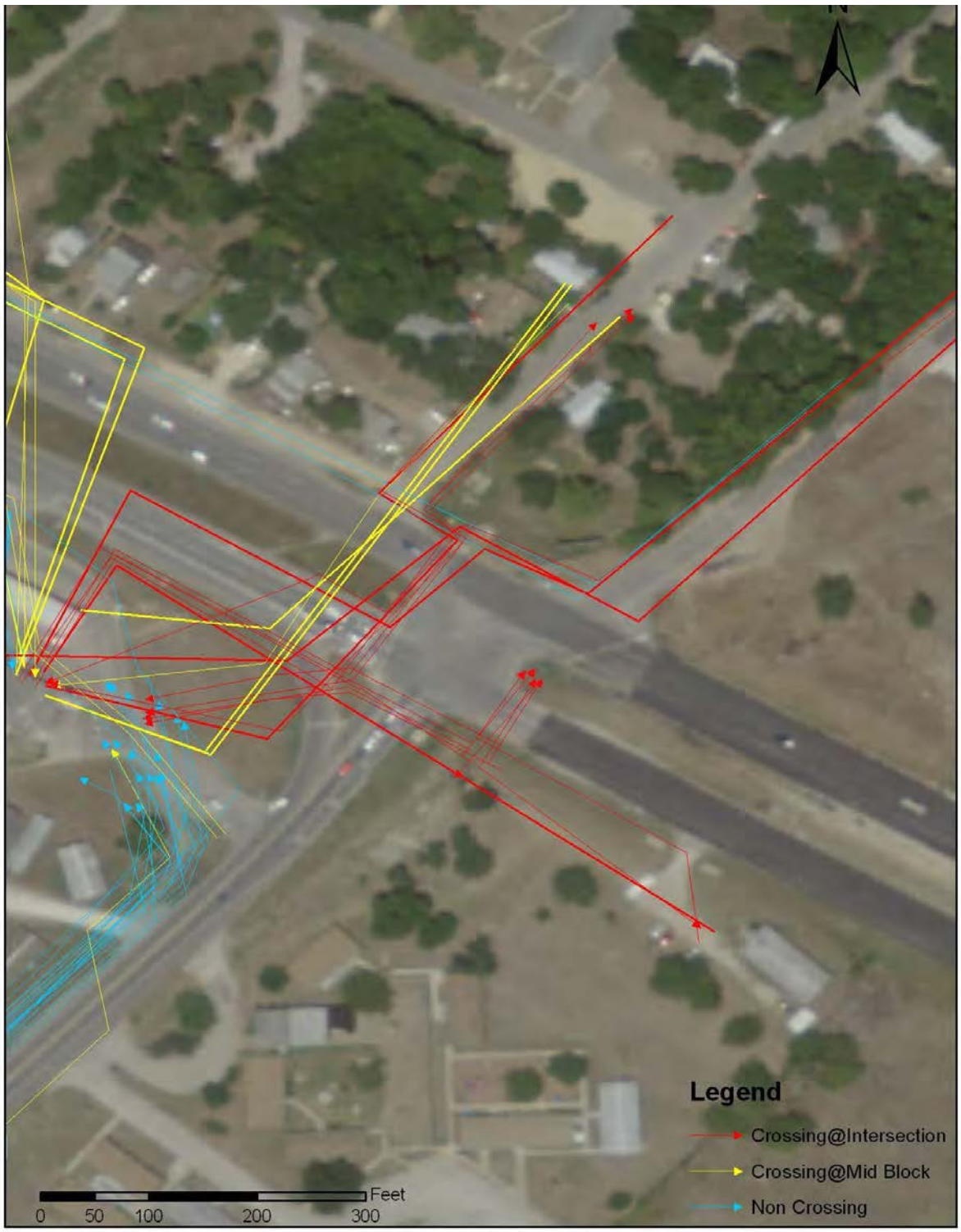


Figure 17. SH 71 at FM 973 South Leg

Noon Period - 11-3PM

Figure 18. SH 71 at FM 973 South Leg

Afternoon Period – 4-6PM

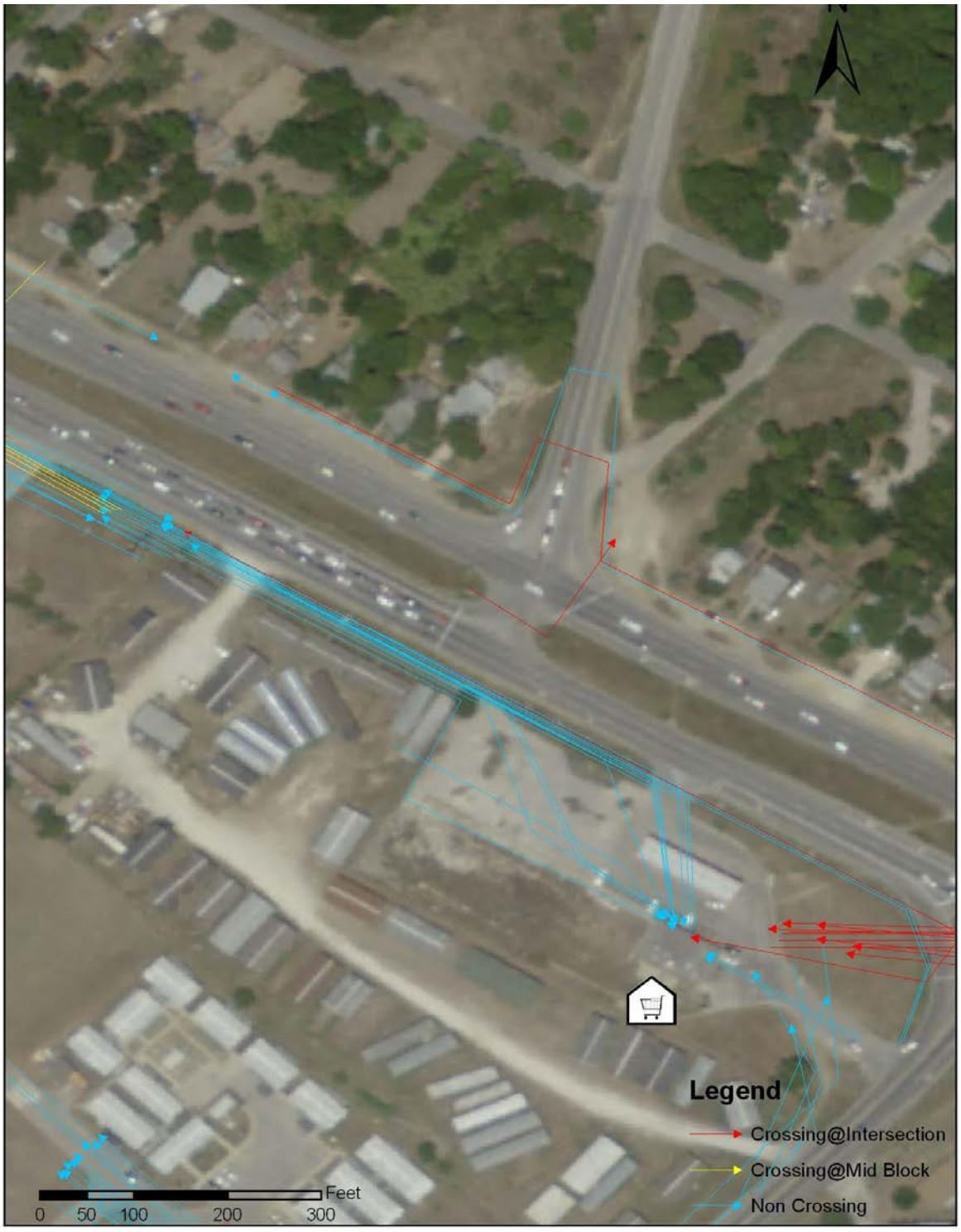


Figure 19. SH 71 at FM 973 North Leg

Morning Period - 6-10AM

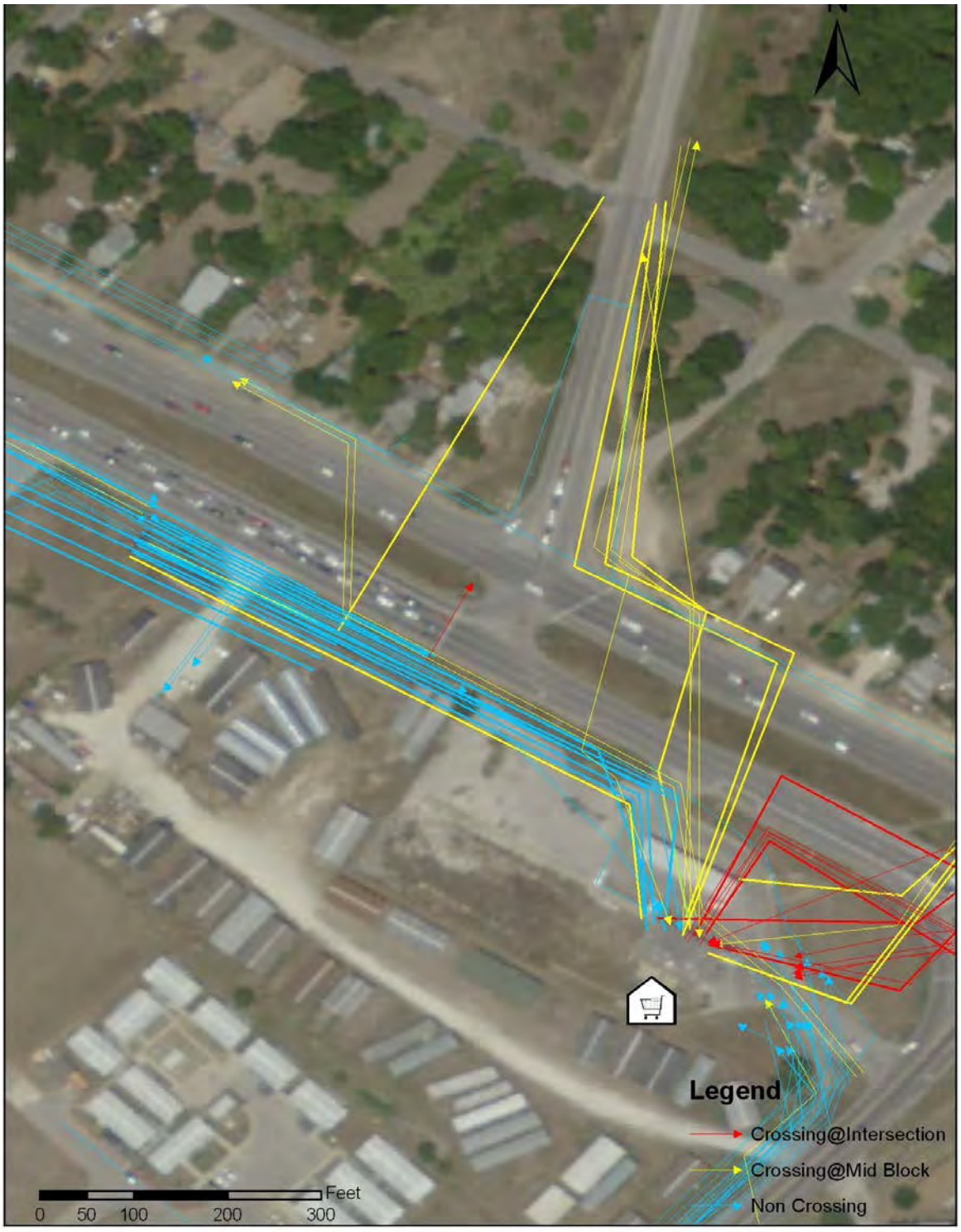


Figure 20. SH 71 at FM 973 North Leg

Noon Period – 11-3PM

Figure 21. SH 71 East Section at FM 973 North Leg

Afternoon Period – 4-6PM

Figure 22. SH 71 at Royster Avenue

Morning Period - 6-10AM

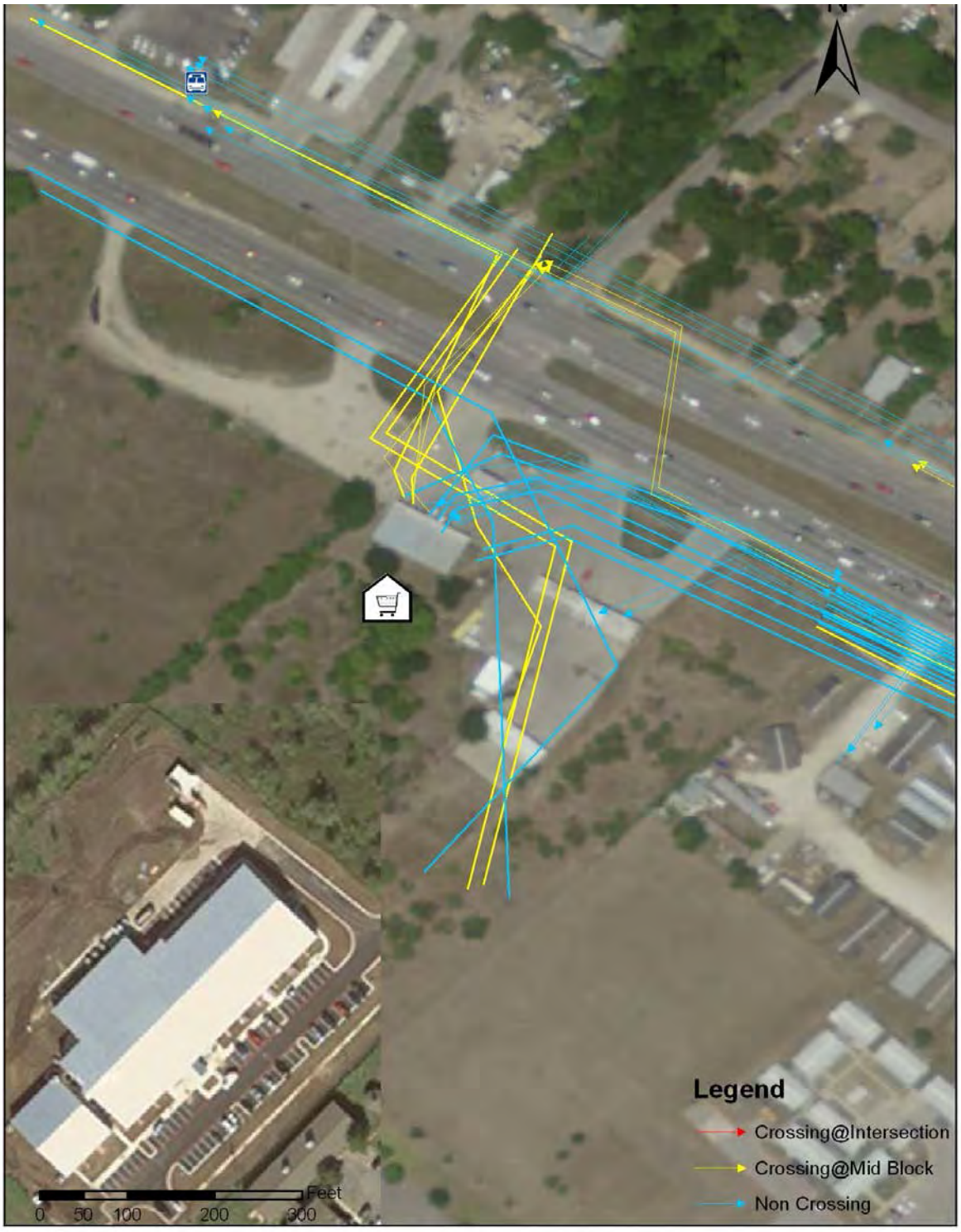


Figure 23. SH 71 at Royster Avenue

Noon Period – 11-3PM

Figure 24. SH 71 at Royster Avenue

Afternoon Period – 4-6PM

Appendix E: Photos of Example Sidewalks and Bus Stops

Figure 25. Bus Pull-Out on FM 969

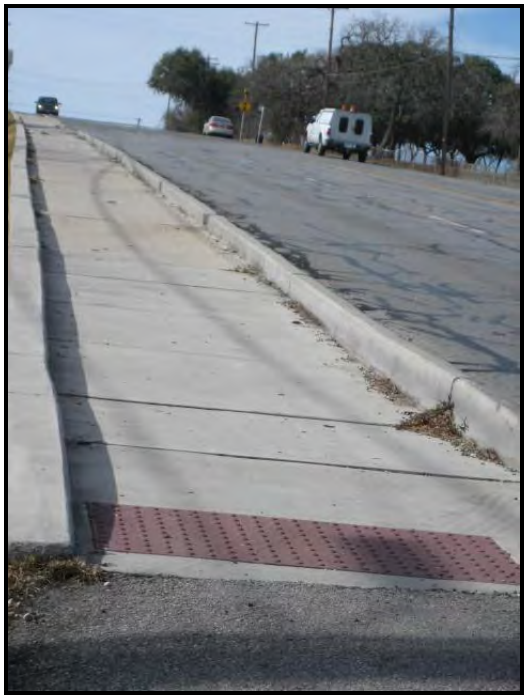


Figure 26. Sidewalk on FM 969 Eastbound

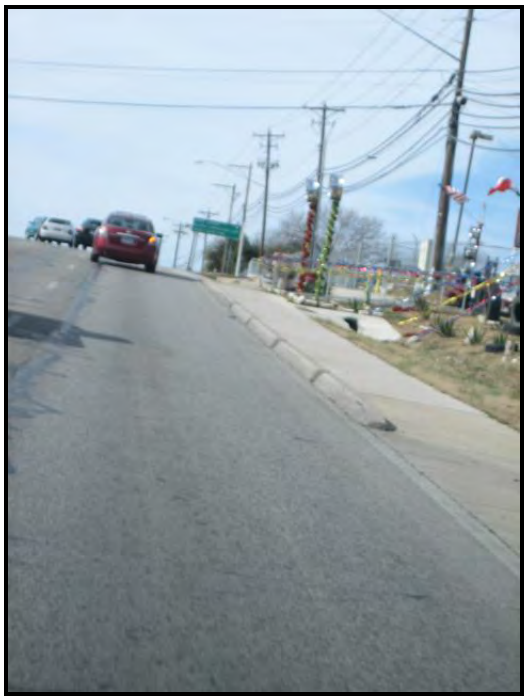


Figure 27. FM 969 Westbound (note sidewalk and drainage)

Figure 28. Loop 1 EFR north of RM 2244 (good example)

Texas Department of Transportation

TECHNICAL PROVISIONS

STATE HIGHWAY 71 TOLL LANES

Attachment 21-1

Toll Facility Responsibility Matrix

TOLL FACILITY RESPONSIBILITY MATRIX

Responsibility Assignment Legend			
Primary Responsibility: P	**Support Responsibility: S**	**Coordination Responsibility Only: C**	**No Responsibility: N**

Element/Task/Component/ Sub-system	DB Contractor (DB)			Systems Integrator (SI)			Comments Other Responsibility/Information
	Design	Procure	Install/ Construct	Design	Procure	Install / Construct	
GENERAL REQUIREMENTS							
Schedule	**P**	**P**	**P**	S	C	S	DB must accommodate and incorporate the SI scheduled activities into the DB schedule. All schedule changes or updates which impact the SI tasks must be agreed to by the SI prior to submittal to the Mobility Authority. A weekly schedule must be distributed and incorporate any SI updates or changes.
Request for Early Opening	**P**	**P**	**P**	S	S	S	SI must be able to match schedule request for early opening to conform to requirements in RFDP.
Design Package – Installation and Electrical Design and Plans	**P**	**P**	**P**	C	N	C	DB to incorporate all SI requirements and specifications into Structural and Electrical Design Packages. SI to provide approval prior to issuance of Released For Construction (RFC) plans.
Grading	**P**	**P**	**P**	C	N	C	
Drainage	**P**	**P**	**P**	C	N	C	No culverts or pipes under tolling zones.
Utilities/Electrical Services	**P**	**P**	**P**	S	C	C	SI to provide specific power requirements for the Toll System. DB to incorporate into toll facilities design and construct power utilities interface, and all power infrastructure.
Traffic Control/Safe work zone	**P**	**P**	**P**	S	N	C	SI to provide DB detailed lane closure requirements and schedule for installation and testing.
Signing	**P**	**P**	**P**	C	N	N	All toll signing must be coordinated with and approved by the Mobility Authority. If toll price signs utilize changeable electronic signs, the DB will provide the static sign and the SI will provide the electronic insert.
Striping	**P**	**P**	**P**	S	N	C	SI to coordinate striping with pavement loop locations.
Lighting	**P**	**P**	**P**	S	C	S	Roadway and toll location lighting provided by DB. SI to provide lighting requirements in vicinity of toll locations and locations of other Toll System equipment. DB to confirm that lighting does not obstruct toll related signing or impede the Toll System.

TOLL FACILITY RESPONSIBILITY MATRIX
SH 71 Project

Responsibility Assignment Legend			
Primary Responsibility: P	**Support Responsibility: S**	**Coordination Responsibility Only: C**	**No Responsibility: N**

Element/Task/Component/ Sub-system	DB Contractor (DB)			Systems Integrator (SI)			Comments Other Responsibility/Information
	Design	Procure	Install/ Construct	Design	Procure	Install / Construct	
Landscaping	**P**	**P**	**P**	C	N	N	
Fencing/Guardrail/Bollards/Concrete Barrier	**P**	**P**	**P**	S	C	C	SI to provide requirements for specific equipment clearances for Toll System. DB to incorporate into roadway design. SI to confirm that design plans meet requirements.
TOLL SYSTEM: LOCATIONS, LAYOUTS, STRUCTURES, MOUNTS/BRACKETS							
Locations and Layouts	**P**	**P**	**P**	S	C	C	SI to provide specific locations for the Toll System, SI to provide requirements for specific lane and facility layouts. DB to incorporate into Design Packages. SI to review and approve.
Gantries/Foundation/Trusses/Junction boxes/Conduits/Grounding	**P**	**P**	**P**	S	C	S	SI to provide requirements for conduits (for SI installed power and communications cables, including specific requirement for below ground conduits for the loops), junction boxes, and power needs for the Toll System. DB to incorporate into structural design, including electrical grounding, bonding. DB to provide and install junction boxes and conduit pull strings and bell ends for all conduits up to one foot above pole and gantry foundation. The DB will require SI to sign off on below-ground conduits for the loops prior to installation of special pavement structure.
Gantries/Foundation/Trusses/Junction boxes/Conduits/Grounding	S	C	S	**P**	**P**	**P**	SI to install conduits from one foot above grade to all Toll System components.
Equipment Mounts on Brackets/Frames	S	N	C	**P**	**P**	**P**	SI to procure and install all Toll System equipment, and related cable & wiring, including communications from roadside cabinets to the equipment mounted on the gantries. SI to provide requirements for all brackets and frames needed to attach SI procured equipment to DB provided truss.
Equipment Brackets/Frames on Gantries	**P**	**P**	**P**	S	N	C	DB to provide and install all frames needed to attach all SI procured equipment. SI to provide locations for installation to the DB. SI to provide and install all mounting brackets required for tolling equipment.

TOLL FACILITY RESPONSIBILITY MATRIX
SH 71 Project

Responsibility Assignment Legend			
Primary Responsibility: P	**Support Responsibility: S**	**Coordination Responsibility Only: C**	**No Responsibility: N**

Element/Task/Component/ Sub-system	DB Contractor (DB)			Systems Integrator (SI)			Comments Other Responsibility/Information
	Design	Procure	Install/ Construct	Design	Procure	Install / Construct	
Pavement structure, including special nonferrous zones and conduit stub-outs for in-pavement sensors/loops	**P**	**P**	**P**	S	N	C	SI to provide requirements for special pavement structure at toll gantry areas. SI shall coordinate joint spacing to avoid conflicts with loop placement and sign off on riser locations before concrete pour. DB to assure ferrous objects (i.e. rebar, grates, pipes, etc.) are not in toll revenue collection detection system(s) zone of influence. DB to locate loop risers after pavement is poured.
EQUIPMENT CABINETS							
Toll Equipment Cabinets	C	N	S	**P**	**P**	**P**	SI to provide size and number of cabinets needed for Toll System. DB shall incorporate location into site grading and drainage. SI to procure and install environmentally controlled cabinets. The environmentally controlled enclosures provided by SI must comply with the America Society of Heating, Refrigeration, and Air Conditioning Engineers: Thermal Guidelines for Data Processing Environments. DB to provide traffic control devices and safe working conditions for SI during installation of all toll equipment.
Toll Equipment Cabinet Site (TEC) and Roadside Equipment Cabinet Base Slabs	**P**	**P**	**P**	S	N	C	SI to provide requirements for specific equipment weight and anchorages for cabinets to the DB. DB to incorporate into Roadway Design. DB to install slabs with conduit plumbing.
Facility Security and Security Communications at Toll System locations	C	N	C	**P**	**P**	**P**	SI to provide security communications for all toll system equipment. DB to incorporate into the Roadway Design.
TOLL SUB-SYSTEMS							
Automatic Vehicle Identification (AVI) Antennas and Readers	N	N	S	**P**	**P**	**P**	SI to provide AVI System Mounts, Wiring and Cables. SI will perform all AVI system installation and terminations, and to make the connections to the electronics in the cabinets.
Automatic Vehicle Classification and Detection (AVC) and (AVD)	N	N	S	**P**	**P**	**P**	SI to install, connect and terminate AVC and/or AVD System mounted on the gantries and/or

Responsibility Assignment Legend			
Primary Responsibility: P	**Support Responsibility: S**	**Coordination Responsibility Only: C**	**No Responsibility: N**

Element/Task/Component/ Sub-system	**DB Contractor (DB)**			**Systems Integrator (SI)**			**Comments Other Responsibility/Information**
	Design	**Procure**	**Install/ Construct**	**Design**	**Procure**	**Install / Construct**	
							installed in the pavement to the electronics in the cabinets.
In-Pavement Sensors/Loops	N	N	S	**P**	**P**	**P**	SI to saw cut pavement, procure, install, and seal pavement sensors with approved sealant. DB to assure ferrous objects (i.e. rebar, grates, etc.) are not in toll revenue collection detection system(s) zone of influence.
Video Capture Sub-System (VCS/VES) Cameras, Illumination, Sensors and Servers	N	N	S	**P**	**P**	**P**	SI to provide, install, terminate all Video Capture Sub-System (VCS/VES) equipment.
In-Lane Processing Servers and Electronics	N	N	N	**P**	**P**	**P**	SI to provide, install, connect, and terminate all electronics in the cabinet and assures proper communications to the devices on the gantry and/or in the pavement.
POWER DISTRIBUTION SUB-SYSTEM							
Metered power service at each location:	**P**	**P**	**P**	C	N	C	SI to provide power requirements and special requirements for construction of utilities near each Toll System. DB to provide and install necessary conduit & junction/pull boxes.
Metered power service at each toll location:	C	N	C	**P**	**P**	**P**	The SI shall provide and install all other wiring, switches, surge protection/suppression, etc. for power from the meter for the Toll System equipment. SI will terminate all power wiring from ATS at Toll System.
Generators & Automatic Transfer Switches (ATS)	S	N	C	**P**	**P**	**P**	SI to provide generators, ATS, generator cabinets, wiring, connect and terminate all power at the Toll System sites.
Generator Power Source is Natural Gas (if applicable)	**P**	**P**	**P**	S	N	C	If natural gas is available, the DB shall provide, install and incorporate the gas lines into the roadway design. SI to coordinate and provide generator requirements including location for gas feed.
Generator Power Source is propane or diesel	S	N	C	**P**	**P**	**P**	The SI shall provide, and install the propane/diesel tank for the generator if natural gas is not a viable option for the project. The Mobility Authority will

Responsibility Assignment Legend			
Primary Responsibility: P	**Support Responsibility: S**	**Coordination Responsibility Only: C**	**No Responsibility: N**

Element/Task/Component/ Sub-system	**DB Contractor (DB)**			**Systems Integrator (SI)**			**Comments Other Responsibility/Information**
	Design	**Procure**	**Install/ Construct**	**Design**	**Procure**	**Install / Construct**	
							decide if propane or diesel will be used.
Uninterruptible Power Supplies (UPS)	S	N	C	**P**	**P**	**P**	SI to provide and install Uninterruptible Power Supply Systems (UPS) in the cabinets. UPS will be required for the Toll System.
Lightning Protection & Grounding	**P**	**P**	**P**	S	C	C	SI to provide specific requirements for equipment lightning protection and grounding. DB to furnish and install required lightning protection and grounding.
COMMUNICATIONS SUB-SYSTEMS							
Conduits/Ducts & Junction/Pull Boxes/Outlets	**P**	**P**	**P**	S	C	S	SI to provide specific Communications design requirements including location of long-radius sweep conduit bends. DB to incorporate into the roadway design and install including conduits, junction boxes, bell ends with pull strings. The DB Contractor shall verify that all duct banks and conduits are clear and have pull strings prior to the beginning of the Toll System installation.
Fiber Optic cabling in conduits for Toll System	S	S	S	**P**	**P**	**P**	SI to provide fiber requirements for Toll System. DB to incorporate into design of backbone and laterals. SI to furnish and install along the corridor from communication hub to cabinets.
Toll Hardware in Cabinets	C	N	C	**P**	**P**	**P**	SI to provide and install all toll hardware within the cabinets. Equipment must be installed in a clean and organized manner and must not be affected by the environmental controls. The SI must provide and install the redundant environmental controls.
Routers	C	N	C	**P**	**P**	**P**	SI to provide, install and configure the routers for connection from hub locations to the Mobility Authority's Traffic Management Center (TMC).
Hubs	N	N	C	**P**	**P**	**P**	If applicable.
Switches	N	N	C	**P**	**P**	**P**	SI to provide, install and configure the switches for connection from tolling to hub locations.
Firewalls	N	N	C	**P**	**P**	**P**	SI to provide, install and configure the necessary firewall for the toll system.
Patch/Distribution Panels	N	N	C	**P**	**P**	**P**	SI to provide and install all the necessary patch and distribution panels to provide Fault Tolerant Single

TOLL FACILITY RESPONSIBILITY MATRIX
SH 71 Project

Responsibility Assignment Legend			
Primary Responsibility: P	**Support Responsibility: S**	**Coordination Responsibility Only: C**	**No Responsibility: N**

Element/Task/Component/ Sub-system	DB Contractor (DB)			Systems Integrator (SI)			Comments Other Responsibility/Information
	Design	Procure	Install/ Construct	Design	Procure	Install / Construct	
							Mode Fiber Optic IP-Based Communication System.
Corridor Communications System	S	N	C	**P**	**P**	**P**	SI to provide Fault Tolerant Single Mode Fiber Optic IP-Based Communication System for Toll Revenue Collection Systems.
Corridor Communications Conduits	**P**	**P**	**P**	C	N	S	DB to provide branch conduit to the TxDOT ductbank system, including conduit, ground boxes, and terminations
Corridor to Traffic Management Center (TMC)	N	N	N	**P**	**P**	**P**	SI to provide Fault Tolerant IP-Based Communication System to the TMC for Toll Revenue Collection Systems.
Data/Communications Service to each Tolling Location	N	N	N	**P**	**P**	**P**	SI to provide system design plans indicating power and communications/data requirements. SI to install up to the Toll System locations at demark panel.
SYSTEMS SERVERS AND SPACE							
Toll Collection Systems Computer(s)	N	N	N	**P**	**P**	**P**	
Support Equipment at CTRMA Offices	N	N	N	**P**	**P**	**P**	SI to provide data and power wiring schematics, equipment rack/cabinet requirement, and elevations, layouts, floor plans, air flow diagrams, and environmental controls load calculations, electrical power distribution, including grounding, bonding, lightning protection, panel boards, TVSS, circuit breakers conduit, conductors, j-boxes, receptacles.
Systems Servers & Workstations	N	N	C	**P**	**P**	**P**	SI to provide, install and configure all system servers and workstations required at the TMC to support the operations and management of the Project.

TOLL FACILITY RESPONSIBILITY MATRIX
SH 71 Project

Responsibility Assignment Legend			
Primary Responsibility: P	**Support Responsibility: S**	**Coordination Responsibility Only: C**	**No Responsibility: N**

Element/Task/Component/ Sub-system	DB Contractor (DB)			Systems Integrator (SI)			Comments Other Responsibility/Information
	Design	Procure	Install/ Construct	Design	Procure	Install / Construct	
Federal Communication Commission License Preparation and Submission	C	N	N	**P**	**P**	**P**	SI to provide all information necessary to acquire FCC Licensing to the Mobility Authority.
DUCT BANK & INTELLIGENT TRANSPORTATION SYSTEMS (ITS) – TXDOT OWNED							
Duct Bank Adjustment & ITS relocations design	**P**	**P**	**P**	N	N	N	DB is responsible for the design of any necessary ITS relocations, including, foundations, conduits, electrical services, grounding circuits, and support structures. DB responsible for adjusting any existing duct bank manholes and providing new junction/boxes and manholes if in conflict with the project. Coordination with TxDOT will be required.
Duct Bank Adjustments/new connections	**P**	**P**	**P**	S	N	C	DB is responsible for all manhole adjustments and new manhole ties.
Fiber optic cables	**P**	**P**	**P**	N	N	N	Any adjustments to existing cables are DB responsibility.
Relocation of existing CCTV & DMS foundations, conduits, grounding, camera poles, and electrical services	**P**	**P**	**P**	N	N	N	DB is responsible for relocating any existing CCTV and DMS structures and services impacted by the Project Design, including communications and power. Damaged or inoperable equipment shall be moved but not repaired.
Existing and new vehicle detector foundations, conduits, loops, grounding, vehicle detector support structures, and electrical services	**P**	**P**	**P**	N	N	N	DB to coordinate with TxDOT regarding any existing vehicle detector/ loops within the pavement to determine if they need to be replaced/ relocated. The DB will replace/relocate any detectors/loops unless TxDOT prefers to do the work. Any damaged detectors/loops that are to remain must be replaced by the DB.
Vehicle detectors, communications, and equipment enclosures	**P**	**P**	**P**	N	N	N	