

**3-year Analysis of Texas Department of Transportation (TxDOT)
Roadway Improvement Projects in the San Antonio District
(2004 – 2006)**

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ABSTRACT

Cost of roadway improvements and their relative significance to improving driving conditions is a key relationship in the decision process of transportation officials regarding which roadways to spend public dollars on for construction projects. Using ArcGIS tools the purpose of this study was to generate maps for each year in the study to show which state owned roadways were being identified for roadway improvements and determine if decisions to spend public dollars on roadway construction was unduly weighted against one part of Bexar County over another. TxDOT's San Antonio District is made of 12 counties with Bexar County being the hub of the district. The study area was restricted to Bexar County and state owned roadways within the county. The county contains the city of San Antonio and it is the county that received the greatest share of roadway improvement dollars within the overall district boundary. GIS analysis of the data set provided by district staff revealed that roadway improvement dollars were generally being allocated across varied roadway classifications, like interstate highways and farm-to-market roadways without bias towards any one particular classification of roadway or location within Bexar County.

INTRODUCTION

TxDOT's San Antonio District spent approximately \$675 million dollars for roadway improvement projects in Bexar County from January 2004 to December 2006. Prudent and justified expenditures of public money to make roadway improvements can generate much public favor and support for future allocation of roadway improvement expenditures. Generally all proposed roadway improvement projects must go through a public involvement process which usually means taking preliminary drawings and making public presentations before an audience of local constituents where the roadway improvement is to occur.

If the public perception is positive, because of past roadway improvements to areas where the local constituents live and work which improved driving conditions; then proposed improvements can be well received. The perception becomes one that TxDOT is an agency

developing projects across the district based on need, versus some hidden agenda benefiting one neighborhood or constituency over another. On the other side of the coin, if public perception is negative because of poorly planned or poorly managed construction projects, the proposed roadway improvements may be challenged as to the purpose and need for the improvement resulting in a public outcry as to differential treatment being given to one segment of the local populace or area over another group or neighborhood.

Clearly the goal of the district is to carefully analyze all roadways within in its jurisdiction and oversight; subsequently, selecting projects based on criteria such as annual average daily traffic counts, existing roadway conditions, or for safety considerations of the traveling public using state owned public roadways. Justified and prudent spending of public dollars for a vast roadway network without careful consideration can lead to wasteful and unnecessary roadway construction projects. With Texas' growing population, and in particular with San Antonio's recent explosive growth and local community development having a well managed and maintained roadway network is critical for the safe efficient movement of goods and services across the city as well as Bexar County.

DATA

Project data used for the analysis came from the San Antonio District staff working in the Transportation and Planning Section. Data was formatted in an Excel spreadsheet which contained 306 records of roadway improvements occurring over a 4 year period from January 2004 to March 2008. The spreadsheet contained the following information for each project:

- CSJ – Control Section Job related to internal project identifier
- Roadway identifiers
 - IH – Interstate highway
 - US – US Highway
 - SH – State Highway
 - SL – State loop
 - FM – Farm-to-Market
 - LP – Loop
 - SP – Spur
- Project length in miles
- Cost of the proposed improvement
- Project classification of roadway improvement like “widen non-freeway”

- Limits of the project given the from-to or terminal points of the roadway improvement
- Description in narrative form of proposed improvements

	A	C	E	J	K	L	M	
	CSJ	HWY	LEN MI	Cost	Project Class	Limits From	To	Description
1	0253-04-122	SP 537	0.5	\$190,868	LSE	ON SAN PEDRO @ RAMSEY	TANGO DRIVE	LANDSCAPE
2	0521-04-189	IH 410	0.805	\$35,176,360	WF	BLANCO RD	MC CULLOUGH AVE	UPGRADE TO 10 LANE
3	0521-04-259	IH 410	0.963	\$1,415,061	UTL	BLANCO ROAD	MCCULLOUGH AVE	RIGHT OF WAY UTILI
4	0073-08-143	IH 37	3.722	\$2,925,262	OV	PECAN VALLEY OVERPASS	SALADO CREEK BRIDGE	ACP OVERLAY & PAV
5	0521-05-126	IH 410	2.273	\$4,803	ROW	U P R R	SH 16	UTILITIES
6	0915-12-180	CS	2.908	\$2,408,264	UGN	IN SCHERTZ ON LOWER SE	FROM LP 1604 TO FM 151	REHABILITATE AND I
7	0915-12-268	CS	0.698	\$1,491,458	WNF	ON KITTY HAWK DR FROM	CONVERSE CITY LIMITS	RECONSTRUCT & EXP
8	0915-12-295	CS	0.756	\$2,624,114	WNF	ON CRESTWAY FROM MIL	NEW WORLD	RECONSTRUCT & EXP
9	0915-12-366	CS	1.266	\$2,634,833	WNF	ON MILLER RD /CRESTWA	TO 0.4 MI S OF KITTY HA	REHAB & WIDEN NAF
10	0915-12-404	CS	2.066	\$9,061,632	WNF	ON ZARZAMORA FROM W	IH 410	RECONSTRUCT & EXP
11	0915-12-410	CS	1.985	\$6,711,005	WNF	ON APPLEWHITE RD FROM	ZARZAMORA RD	RECONSTRUCT & EXP
12	0024-08-111	US 90	2.077	\$1,286,295	OV	CUPPLES RD	S. FLORES	ACP OVERLAY & PAV
13	0025-02-166	IH 10	0.632	\$705,158	OV	LP 353 BRIDGE	S. FLORES BRIDGE	ACP OVERLAY & PAV
14	0915-12-162	CS	0.239	\$1,794,299	WNF	ON WURBACH RD FROM H	IRONSIDE RD	WIDEN EXIST STREET
15	0915-12-196	CS	0.064	\$109,591	WNF	IN SAN ANTONIO ON IRON	AT WURZBACH	WIDEN NB APPROACH
16	0521-05-127	IH 410	3.477	\$1,091,430	OV	SH 16 SOUTH	IH 35 SOUTH	PAVEMENT REPAIR, S
17	0521-06-122	IH 410	-	\$889,151	OV	SALADO CREEK (FRONTA	FM 1346	OVERLAY, MBGF & IN
18	0613-01-052	SH 16	5.369	\$1,736,005	OV	LOOP 1604	1.0 MI NORTH OF APPL	PAVEMENT REPAIR, C
19	0915-00-085	VA	0.001	\$199,932	MSC	DISTRICTWIDE		THERMOPLASTIC RE

Figure 1. Snapshot of S.A. District Project Data

In order to show a geospatial relationship with the data shown above, several maps were obtained from the TxDOT geospatial enterprise database maintained by staff personnel in the Austin HQs of the highway department. All the data sets within the TARHE enterprise database have a geographic coordinate system (GCS) defined as NAD 83. No additional projections were required to link required data sets to each other.

Two feature classes from the TARHE data base were used to create base layers for analysis. One of the feature classes is the Bexar County shape file. The second feature class required to conduct a geospatial analysis was the state roadway network system, which was clipped to the Bexar County shape file.

METHODS

Data sets required to create a visual presentation/analysis of the district construction projects for the 3-year timeframe under investigation had to be converted from an *.xls format to an *.mdb file format. Digitized line and point features of projects selected for construction for each year was produced using ArcMAP editor. Lastly map files selected from the TARHE enterprise database were required to enable digitizing of the line and point features.

Prior to converting the excel spreadsheet data set, a thorough screening of each record was necessary to exclude records which had limits described as ‘various’ or which had designations that did not readily lend themselves to depiction as line or point features. Exclusion of these projects did not significantly alter the overall picture of the proposed analysis.

Projects matching the description as ‘various’ were usually small in scope and their estimated cost was less than fifty thousand dollars for the proposed work per project. The number of

records excluded from the analysis based on a descriptor as 'various' for any one year from 2004 to 2006 was less than five projects.

Analyzing the project data required digitizing all projects remaining in the *.mdb data file. 2004 contained nine point locations usually related to either railroad crossing improvements or general roadside feature improvements like safety end treatments to exposed culvert openings. There were also forty-four line features of roadway improvements ranging from maintenance related work like surface treatments called 'seal coats' or 'overlays' to major improvements like the funding of the US 281 @ IH 410 interchange.

2005 contained 76 roadway improvement projects, with sixteen identified point features similar to 2004 proposed roadway improvements, but it also included some additional point projects called out as traffic signal type projects. Sixty roadway improvements were digitized as line features equating to construction projects ranging again from maintenance type work to full reconstruction of interstate freeway segments, classified as IH.

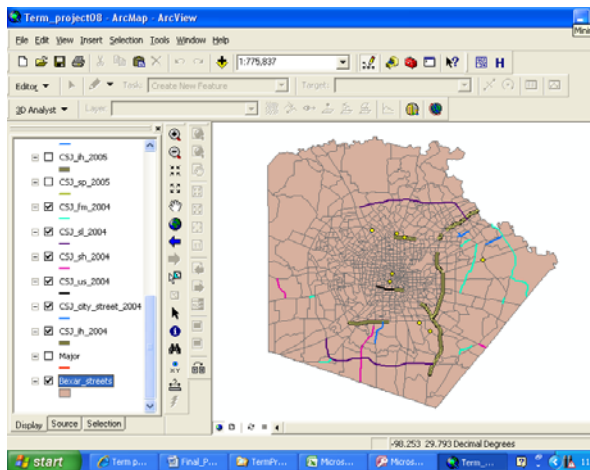


Figure 2. 2004 Digitized Roadway Improvements

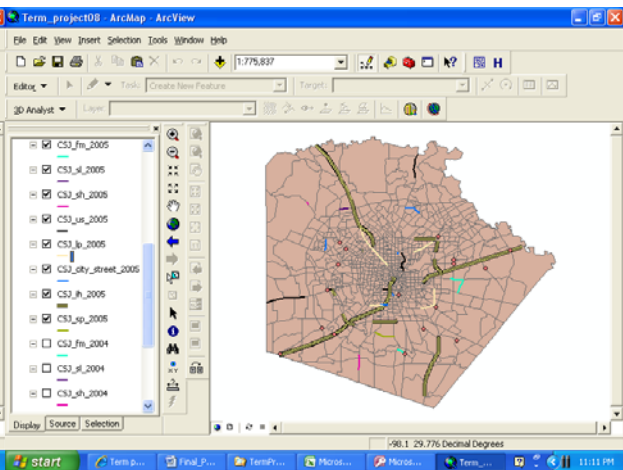


Figure 3. 2005 Digitized Roadway Improvements

The third year of the study area and corresponding roadway improvements included twenty point feature type projects and thirty-four line feature type construction projects. The results of the digitized data sets are shown in Figure 2, Figure 3 and Figure 4 for each year from 2004 to 2006, respectively.

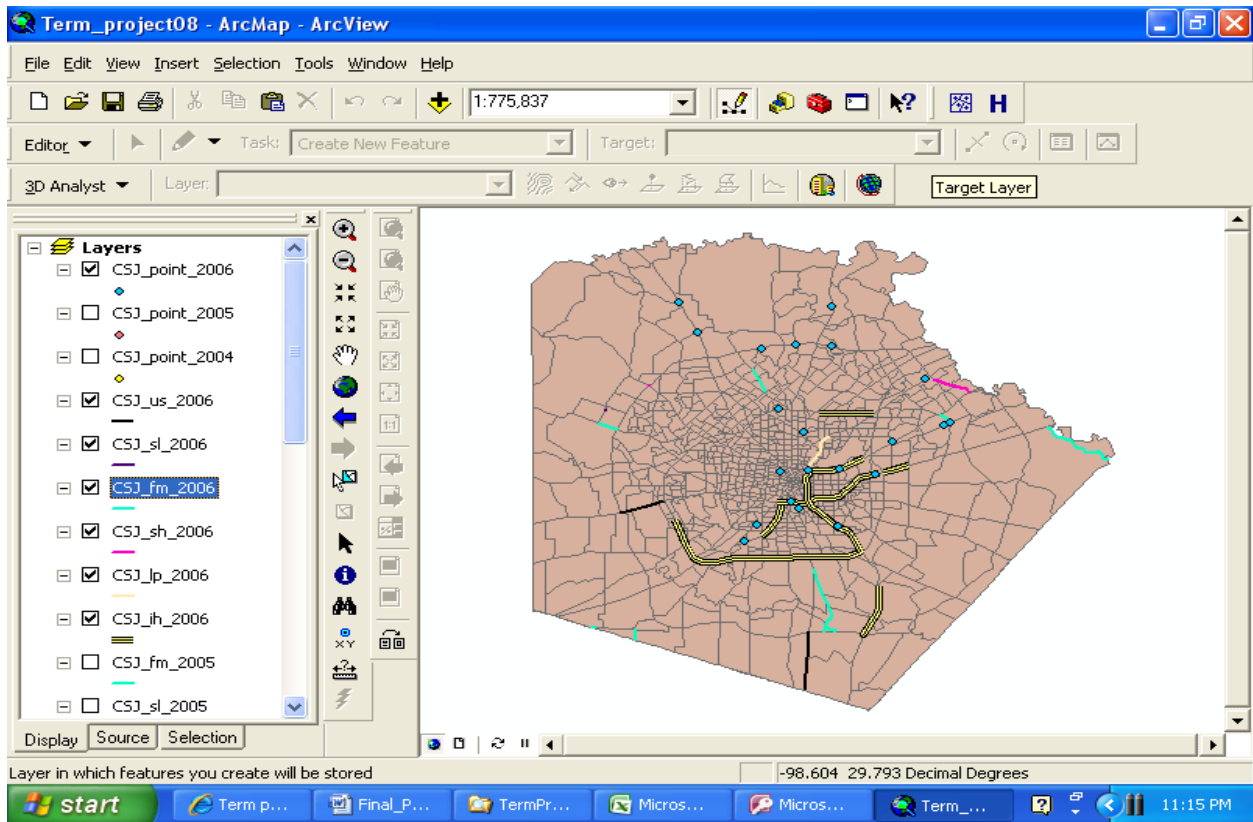


Figure 4. 2006 Roadway Improvement Projects

The digitization of the feature classes required an additional data field in the personal geodatabase to enable the newly created point and line roadway improvements feature classes over the 3-year period from 2004 to 2006 to be linked with the converted data set obtained from the district planning staff. The name of the primary key used to link the geodatabase and the TxDOT data set was 'CSJ'. An example of the linked attribute table is shown below for 2004:

SHAPE *	CSJ_point_2004.CSJ	TxDOT_2.CSJ *	TxDOT_2.HWY	TxDOT_2.CNTY	TxDOT_2.LEN_MI	TxDOT_2.F
Point	0253-04-122	0253-04-122	SP 537	BEXAR	0.5	BMET
Point	0915-12-162	0915-12-162	CS	BEXAR	0.239	CCMO
Point	0915-12-420	0915-12-420	CS	BEXAR	0.1	TRAF
Point	0915-12-421	0915-12-421	CS	BEXAR	0.1	TRAF
Point	0915-12-422	0915-12-422	CS	BEXAR	0.1	TRAF
Point	0915-12-423	0915-12-423	CS	BEXAR	0.1	TRAF
Point	0025-02-174	0025-02-174	IH 10	BEXAR	0.5	CCMO
Point	0521-04-263	0521-04-263	IH 410	BEXAR	2.1	BMET

Figure 5. 2004 Point Feature Attribute Table

ANALYSIS

For 2004 point features listed in Figure 5, four of the roadway improvements were classified as railroad crossings; one project was a roadway widening project on a city street; one project was a landscape project; one project was a utility adjustment; and one project was related to miscellaneous operational improvements of an affected intersection.

Projects identified as 2004 point features were widely dispersed throughout San Antonio and Bexar County indicating need was the driving force in selecting these projects for funding using 2004 federal dollars. Three of the projects are in north San Antonio, two projects are near downtown, one project was located in far eastern Bexar County, and lastly two projects were identified in southwestern Bexar County.

Analysis of digitized line features for 2004 followed the same trend as the point features discussed above. Of the five state roadway classifications identified for funding in 2004, the breakdown of each type of roadway classification is listed below:

- IH = 15 projects
- US = 1 project
- SH = 4 projects
- SL = 7 projects
- FM = 8 projects

Additionally, the state also funded eight projects through the Metropolitan Planning Organization using federal dollars for roadway improvements on San Antonio city streets. Overall the projects selected for 2004 funding were mainly for road work in the eastern half of Bexar County. Several projects of particular interest in southern Bexar County were in response to Project Starbrite. Project Starbrite was the initiative to bring the Toyota manufacturing plant to San Antonio.

Another highlighted project selected for funding in 2004 was the pavement overlay of "Loop 1604" between IH 10 West and IH 35, classified as an SL. Dollars allocated for this project related to maintaining the existing roadbed to prevent serious degradation to riding pavement surface. Pavement condition is directly related to annual average daily traffic that passes along the corridor, among other criteria also.

For 2005 TxDOT allocated \$141 million dollars for 76 projects. There was a 49 percent funding decrease in dollars available for roadway improvement projects most probably due to constricting state and federal budgets related to highway dollars. Regardless, district staff increased the number of projects submitted for construction from 53 projects in 2004 to 76 projects in 2005. A summary of the 2005 projects is given below:

- IH = 32 projects
- US = 7 projects
- SH = 2 projects
- SL = 1 project
- FM = 3 projects
- LP = 5 projects
- SP = 2 projects

In addition to projects described above there were eighteen type point projects funded in 2005. The projects included improvements to railroad crossings, traffic signal upgrades, bridge widening, and utility adjustments. Also in 2005, through the MPO seven city street projects were funded at a cost of \$25 million dollars.

2006 was a banner year for the San Antonio District resulting in a significant increase in dollars spent for construction. \$260 million dollars were allocated over 54 projects in Bexar County. The breakdown of the roadway functional classification and corresponding number of projects funded is listed below:

- IH = 12 projects
- US = 3 projects
- SH = 2 projects
- SL = 1 project
- LP = 1 project
- FM = 10 projects

Of particular note during the 2006 funding cycle was the increased budget allocated to the interstate highway system. One project, in particular, was the widening of IH 410 from Broadway to Beitel Creek which received 62.5 percent of the federal money spent on interstate highway improvements in Bexar County for 2006.

Amongst the remaining projects funded in 2006, sixteen farm-to-market roads identified for funding received dollars earmarked for safety improvements. Nine projects were identified as traffic operational improvements to include work related to traffic upgrades. Five projects were classified as railroad safety improvements.

The projects were spread out across Bexar County generally indicating no bias towards any one sector or segment of the local area. A compilation of three years worth of projects is shown in Figure 6.

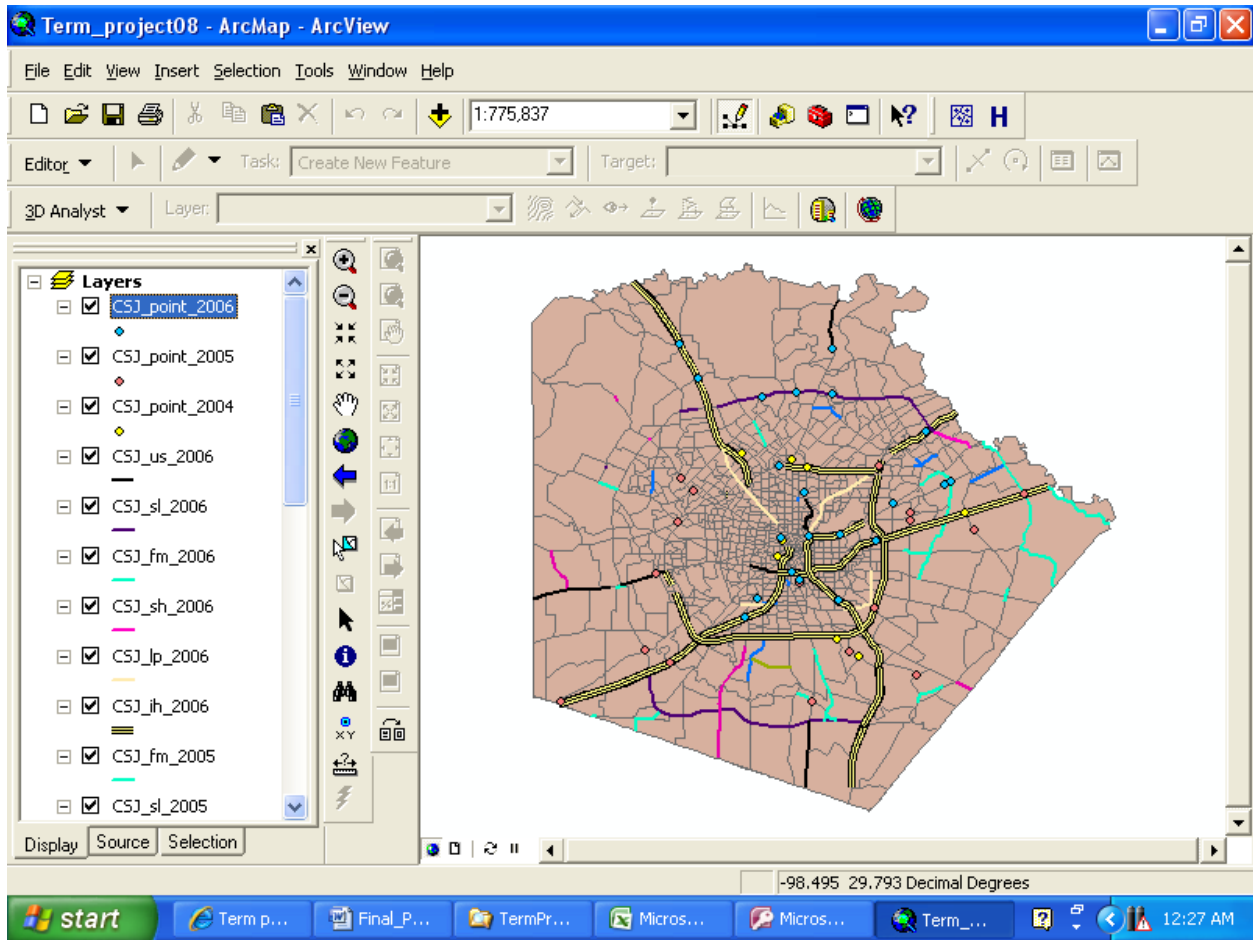


Figure 6. 2004 to 2006 Roadway Improvement Map

Shown below is an example using the Statistics tool to look at estimated project costs for 2006 projects. The analysis shows the sum total of all projects funded in 2006. Of particular note in this analysis is the max value is well more than half of the sum value. A query of the database would reveal which project it is, as well as where it is.

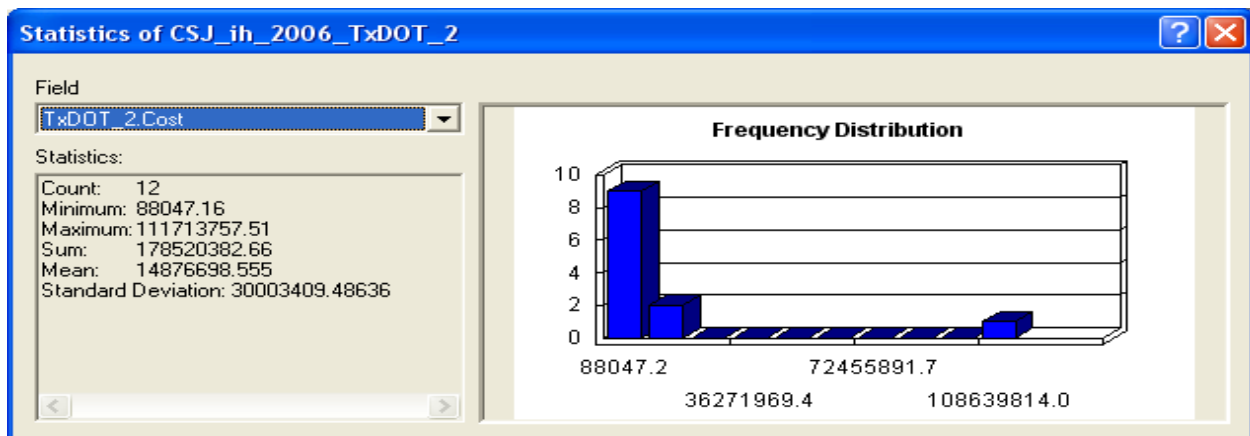


Figure 7. Statistics analysis of 2006 estimated project costs

CONCLUSION

After reviewing the compiled geospatial data, it appears San Antonio district staff was carefully weighing need of roadway improvements while trying to maintain the integrity of the state owned roadway network in Bexar County. All areas of the county, generally received federal and state highway dollars translated as related roadway improvements, but not necessarily in proportionate amounts. District staff focused on spending available federal and state dollars according to the designation of the money as it was related to projects matching the funding designation for Bexar County projects according to need and not any bias towards one sector of the populace.

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REFERENCES

TxDOT, San Antonio District, Transportation and Planning Section

TxDOT, San Antonio District, Information Resources Section