1. January of 1999, I was a Traffic Signal Engineer after having spent almost 4 years in Roadway Illumination. A usual slow January at TxDOT, Christmas and New Year’s being over, the start of the calendar year although the fiscal year was well underway
2. Until this came out!

A policemen and a co-worker saw her lying and ran to assist. When the co-worker touched Betty Jean, she was electrically shocked and pulled back. Betty Jean Sanchez seems to have been killed instantly by a full 480 volts when she touched this metal ground box lid.

1. This is the corner today, the SW corner of the University of Texas campus in San Antonio, or UTSA, west of downtown. Only, Durango Street is now W. Cesar Chavez. Notice the “wrong way” sign post.
2. This is what the corner looked like in May of 1999. Notice two ground box lids,
3. And here is a close up. The metal lid by the sign post is the one that had 480 volts applied to it. The other lid is reinforced polymer concrete, the newer TxDOT standard. They are strong, non-conducting, and non-metalic.

To understand what happened, let’s back up a bit.

1. Here’s the area including the corner today. Here are the two high mast illumination poles.
2. High mast poles are 150-feet tall, and then had 12 400W High Pressure Sodium lamps operating at 480V.
3. Here is the plansheet from the project. In 1985, TxDOT let a contract to improve I-35 (\*) including the building of the elevated lanes and the off ramp right here. (\*) The two high mast poles were installed for TxDOT by Loyd Electric in preparation for the work, (\*) fed from two electrical services over here. The subject corner with the ground box is right here.
4. The electrical service was 2 type B enclosures, each with 4 circuits; you can see the circuit numbers on the covers. Until about 10 years ago, TxDOT used a two wire, 480 volt system for roadway illumination which we called type “B”. I don’t know where it came from, the utilities or TxDOT, but it was used extensively until we replaced it with a 3 wire system that is usually 240/480, but sometimes 120/240.

Each circuit was protected by a 600 volt, single pole circuit breaker and controlled by a photo cell operated contactor.

1. Here you can see the two wire system in detail, the hot conductor going to the top of the disconnect, through the fuse, and out, and the grounded conductor. Notice that it’s bonded to the enclosure here. This switch is actually mounted on the pole; the ground only goes up to the light ring at the top of the pole. That’s because the design practice at that time was to use rigid metal conduit instead of PVC as nowadays. The conduit was the grounding conductor, and a very effective grounding conductor.
2. Grounding bushings and grounding jumpers were to be installed at every ground box to bond all the conduits and even the lid as shown here. TxDOT’s standard then and now is copper conductors with type XHHW insulation. Loyd Electric was bought out by Mica who completed the contract, passed inspection, and turned the illumination system over to TxDOT.
3. And as is usual in large cities, TxDOT had signed a Lighting Agreement with San Antonio (and Central Power Supply) to operate and maintain the illumination system back in May of 1976. This new work was simply added to the old agreement. CPS now maintained the system.
4. An MOU in July of that year included the stipulation, “It is recognized that the State is to be relieved of any maintenance responsibilities whatsoever.” This left CPS totally responsible for all maintenance.
5. Meanwhile, the I-35 improvement was completed in a series of projects, and in 1997 UTSA construction was also completed, including a fancy new sidewalk. Spaw-Glass, Inc. was the General Contractor for the project; M&M Paving was the sidewalk contractor. Part of the project was to slope the sidewalk down for wheelchair access at the corner.
6. Here is the original ground box is place after the I-35 illumination construction. TxDOT standard was and is 6 to 9 inches from the bottom of the lid to the top of the conduits. \* And this indicates the new grade, which means the conduits would need to be lowered.
7. But that wasn’t done. CPS should have lowered the conduit for the project but didn’t. M&M “said” they didn’t install this box; we’re not sure who did. Spaw-Glass had no record. \* Of course, the conductors were pinched against the conduit creating a ground fault if not a dead short. However, neither the breaker tripped (which we will discuss in a minute) nor was anyone else electrocuted, even mildly. Why? Because the circuit was controlled by a photocell at the service enclosure, thus turned off at first light. But, on January 7, 1999, sunrise in San Antonio was at 0729, which means it didn’t get light until about 0700 normally. Betty Jean was walking to work to start a 0700 shift. By the time most people arrived in January, \* it was already first light and the circuit was turned off. Also, this was not an area where folks walked at night.

What happened to the ground path?

1. The sidewalk work had been delayed, so Spaw-Glass pushed M&M to hurry! \* M&M started here where they were surprised by the conduits between the electrical services and the first ground box. Being a responsible contractor, M&M immediately notified Spaw-Glass; Spaw-Glass, in turn, contracted CPS to repair the conduits since CPS was in charge of maintenance for roadway illumination.
2. In keeping with the new standards, CPS installed PVC conduit, as you can see here. Other than that, CPS replicated what was there before.
3. Each circuit had one black and one white conductor. What’s missing here?

CPS never pulled a grounding conductor in the PVC although a grounding conductor i is the new TxDOT standard! The conduits from each service went to the same ground box. The CPS worker labeled the circuit hot conductors but not the whites. Apparently, he simply scooped up 4 whites in each hand and fed them into one of the two conduits.

1. As a result, the white for this circuit wound up in this enclosure. By the way, notice the ½ inch PVC for the grounding electrode conductors to the ground rods? They aren’t bonded either! So, there was no effective ground path. That’s why the breaker didn’t trip even though the conductors were ground faulted and possibly shorted.

Another problem with the 480 to ground system was that breakers didn’t always trip even in a short circuit situation. Houston District had a short in a circuit under a driveway. They knew they had a problem because the roadway lights were not coming on. They discovered where the short was when the heat from the arc caused the asphalt driveway to melt and bubble over the short. The circuit breaker never tripped.

1. . M&M claims that they didn’t touch this box, it was already in place. And, TxDOT pointed out that it wasn’t a TxDOT standard box; the lid and box are completely different. But someone lowered both of these boxes without adjusting the conduits; the lid was resting on the conduits, pinching the conductors between them.
2. Some of these details came out from a joint TxDOT-CPS inspection of ALL the electrical groundboxes, signal poles, junction boxes, and services in the 5-block area in front of UTSA. We got started on May 18, as I remember, at Commerce Street and worked south.
3. We know that some of the system was installed correctly, such as this box and lid, by Loyd Electric – we know that because Loyd put its name on the bottom of the lids.
4. We found some hinky stuff like this where they’d turned the conduit sideways to fit in the lowered box, but nothing *real* bad.
5. Then we got to the 1st box from the service, the one with all 8 circuits in it.
6. The lumps are actually cooked insulation! Notice the hole in this conductor, too.
7. We wrapped the damaged conductors in voltage blankets and put them back to bed.
8. When we opened the 2nd box, it got worse! If the conductors and splices look a bit fuzzy and burned ...
9. It’s because they are! These are 3M’s 600v weatherproof epoxy bag splices. They should not be burned!
10. Again.
11. CPS again wrapped each one before putting them back.
12. In this box, we found where someone had tried to lower the conduit, so ...
13. ... Notice also the plastic bushing. This is not a grounding bushing! Notice also the black and white conductors. XHHW insulation, which TxDOT required, came in grey only! This is THHN. I believe either CPS was here after Loyd Electric or Mica did it.
14. And then we found this at high mast pole 31. The conduits were bonded, but the metal lid wasn’t!
15. And, at pole 32, the 1-inch conduit still has the plastic thread protector on it. This is the conduit that goes from the ground box into the pole foundation! This looks like a construction blunder, not a maintenance issue. So, my job was to look through the construction documents to assure what was done.
16. I only found “Electric installed.” I never found any confirmation that anything had been actually looked at or documented. Is this surprising? Not to me. Our inspectors have historically been excellent in earth work, concrete, steel, and asphalt. But electricity was a strange animal to them. Then, to compound this, our Contractors have a history of (\*) intimidating TxDOT inspectors into accepting the work. The Contractors hated me because as a Master Electrician with Union training, I knew what a bad or incorrect installation was, and I couldn’t be intimidated into believing their crap was good.
17. Let’s account where we are:
18. So, then the lawsuits hit. And everyone who was involved at all was included in the suit. But that list was winnowed down to these lucky finalists: TxDOT, Mica, CPS, Spaw-Glass, and M&M. (\*) CPS settled out of court for $2.5M. I suspect that CPS took one look at what we were finding on our inspection and threw in the towel. (\*) TxDOT was offered out with a settlement of $8K. As the Assistant AG said, “That’s chump change in a case like this.”

But, the rest went to court to fight it out. Where did Mica Come from? Mica Corporation had purchased Loyd Electric from John Loyd in the late 80’s during the I-35 project, so Mica inherited Loyd’s liability in the case. Mica also did the electric work on the subsequent projects on I-35.

The jury awarded Betty Jean Sanchez’s estate $6.4 M, apportioned thusly (\*) which left Mica owing $3.2 M (\*), Spaw-Glass zero (\*), and M&M $1.9M (\*). It’s fortunate for all the others that CPS settled out for so much because according to this formula, CPS only owed less than $1M. But why did Mica get hit so hard when it was obvious that others had done the damage? Mica, and therefore TxDOT, was blamed for sloppy work.

1. From an observation after the trail, the burden fell on Mica because LC Tubb, President Of Mica, testified that Mica probably did (\*) move the ground box involved during subsequent projects, proof that Mica was at fault.
2. But, one needs also to understand how lawyers work. Pay particular attention to #5.
3. More observations after the trial, “According to Spaw-Glass attorney Ric Reyna, the jurors he polled stated that TXDOT could and should have caught the lack of lid bonding and grounding even though it was the City's and CPSB's job to catch it too. So, not having heard all the evidence and our take on key facts, the jury apparently concluded that Mica (Lloyd) installed an unbonded, ungrounded lid during Project 1 A and that (\*) TXDOT, City and CPSB did not detect it then or when the punchlist was done at the end of project 1C.” Folks, what punchlist?!?
4. As for this ground box, we have no idea who replaced it, but it’s not the original lid and probably not the box, either. It could have been damaged and replaced by some contractor during any other construction, including the building of UTSA, by a truck, crane, or other equipment. It might have been changed during the sidewalk construction. And, Mica (Loyd) might have been the one to do the work. But, without a punch list (\*) or other documentation (\*) to prove their innocence, Mica was left holding the bag (\*)!
5. One question I had was, after crossing the Street,
6. How did she wind up lying on this box, her stomach on the lid, and next to this pole? The shock should have thrown her back away from the box lid, not on it.
7. I found the clue in the policeman’s testimony. She was about 5’5”, 180 lbs, middle aged Hispanic. Besides the fact that January is flue season, diabetes and hypertension are common among heavy Hispanic women. She could have been suffering a heart attack or the onset of a stroke, or the flu, but I believe she felt herself fading and was aiming at the pole for support. I don’t believe she stepped on the box lid; I think she collapsed onto it. It is entirely possible that she was dead before she was shocked.

That however does not relieve the parties of fault and responsibility!