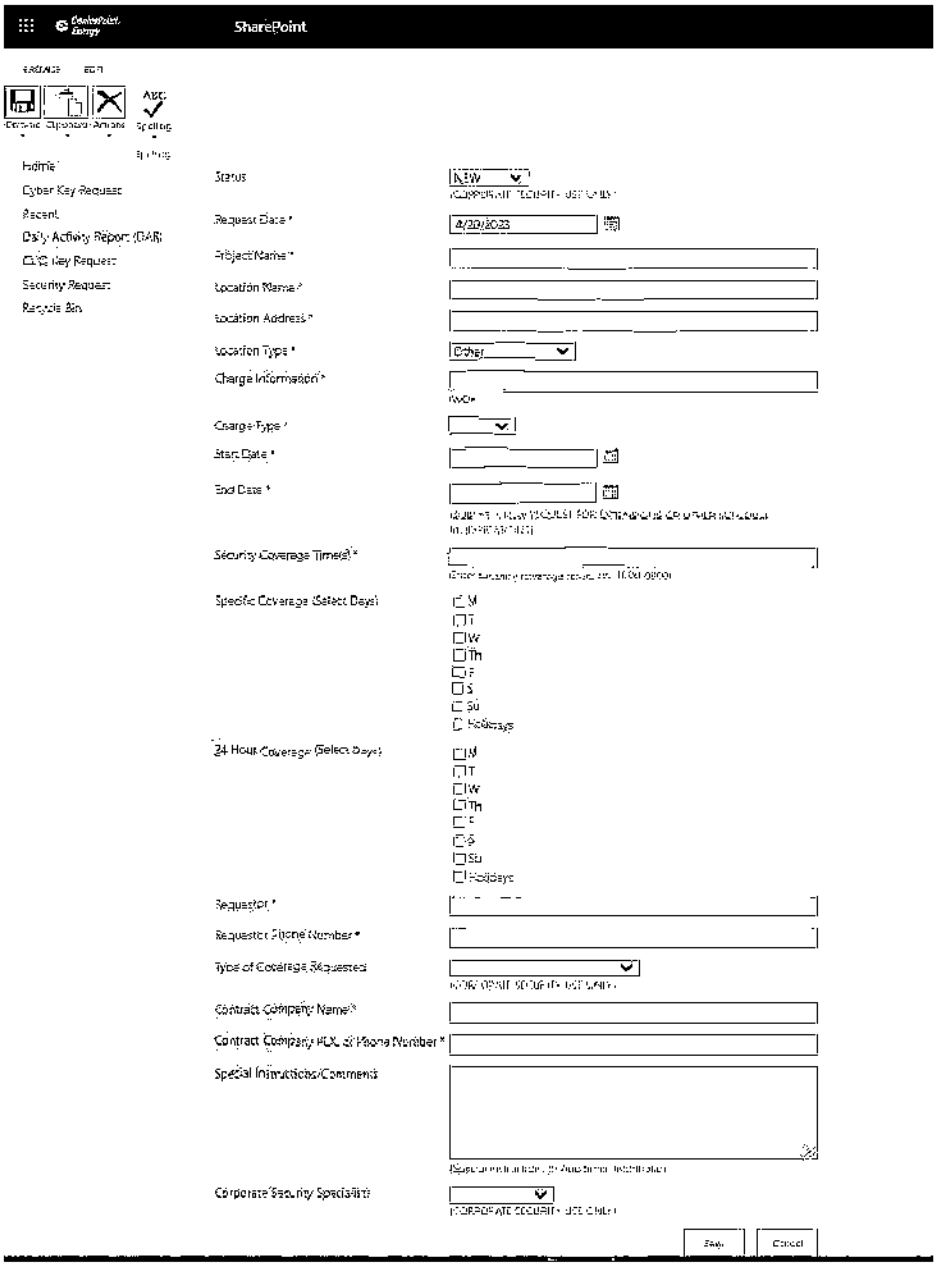
CenterPoint. Energy	Department:	Tiger Team
Title: **Mobile Generation Load Shed, Load Restoration, and Mutual Assistance Process**	Date:	04/27/2023

Sample Form:



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8 General Installation Guidelines

The Engineering Generation team, in coordination with Real Time Operations (RTO), Governmental Relations, Substation Projects, and Distribution Planning, is critical to identifying the best feeders at substations to maximize the benefits on the distribution system (i.e. identifying the best locations the generator can be utilized to maximize customer benefit). This concept is to allow feeder rotations during an Electric Reliability Council of Texas (ERCOT) load shed event.

For mobile generator installations at conventional substations, the ideal interconnection position is on either end of the conventional bus. This gives Major Underground (MUG) the necessary room to safely work on the cable terminations. The below image is an example of an installation at one end of a conventional bus structure.

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If the structure has the truss for a section breaker installation, the switch mounting channel, the 2000 amp disconnect switches, and the cable support c-channel are the only materials necessary for installation to support the interconnection of the mobile generator. If the structure does not have this truss, the material will need to be fabricated and installed to support the switch mounting channel, the 2000 amp disconnect switches, and the cable.

For mobile generator installations within a Low-Profile substation, the ideal interconnection location is on the nonexpanding side of the "T" structures. If this cannot be done, the opposite end can be used, however, caution will need to be taken. If substation expansion occurs, these installed materials would need to be moved. Thought regarding this should be taken prior to initial installation for ease of movement in the future. If installed at the nonexpanding end and the materials are not present, the disconnect switches and insulators would also need to be installed. If installing at the expanding end, verify the existing switches on both sides of the "T" structure are present and in good operating condition. For both scenarios, MUG will need to install an "L" bracket for cable support.

For both Conventional and Low-Profile substations, MUG will supply enough cable to make necessary terminations at both the generator and the substation disconnect switches. During this installation, MUG also ensures the swap of the A & C phase at the generator bus lugs (matching CNP's C-B-A counterclockwise rotation) due to the generator's A-B-C clockwise phase rotation.

After installation of the generators, CNP Sub Ops and CNP Major Underground will need to verify phase rotation between the generator and the distribution system. This ensures that during a deployment CNP does not reverse the phasing and potentially damaging customer equipment.

The following procedure should be followed to ensure correct phase rotation for a 30MW generator:

- With the disconnect switches open on the CNP substation side (visually check for open) and the 52G breaker racked in (visually check breaker is racked in and in the open position), CNP gives authorization to begin the fire up process of the generator.
- Once generator has come up to speed and temp and generator operator give the okay, CNP authorizes the generator operator to close in the 52G breaker to an open disconnect switch to test the MUG cable (keep in this state for a 5-minute test verification period).
- After the 5-minute test verification period, CNP authorizes the generator operator to open the 52G breaker. The generator operator will open the excitation of the generator and rack-out the breaker (generator operator will need to shut down the generator and open the breaker then re-fire the generator).
- Once the 52G breaker is in the racked-out position (visually verify) CNP will close the disconnect switches and energize the MUG cable to a racked out 52G breaker.
- MUG crews will attach a rotation meter on the Gen side PT's and check rotation (ABC clockwise), then move the rotation meter to the load side of the 52G breaker and verify the same rotation (CNP should have already rolled the A&C phases on the generator lugs to match our CBA rotation). After all checks

have been completed, the generator is powered down and the disconnects are opened at the substation bus. The lock-out tag-out procedure of the generator operator is followed and a CNP WB lock is applied to the 52G breaker cabinet once verified it is in the open and drawn-out position.

For a 5MW generator the above procedure will not be able to be leveraged as the PT's are not accessible with the generator energized. Thus, the following procedure will need to be used. If the site has a single unit for installation in a low-profile substation the best installation spot is at the no expanding side of the substation. New insulators and a 1200Amp switch will need to be installed. Then MUG will need to install one set of 1000 MCM AL cables with Lug terminators on the substation side and 600Amp "T" body terminators on the generator side.

9 Connection Procedure

9.1 Procedures for generators connected to multiple feeders (~30MW)

- Verify that the designated feeders planned to be connected to generators are not field tied to any other substation or adjacent feeders
- For low-profile substation, roll designated feeders from the bus to which the generator is connected to the adjacent transformers.
- For conventional substation, contact Distribution Control Operations to field switch the designated feeders on the bus connected to generator to the adjacent feeders not designated as feeder planned to be connected to generators.
- Note down the voltage at the bus where the generator will be connected. Generator voltage should be adjusted to match this voltage.
- Note down feeder load on each feeder planned to be connected to generators.
- Measure the phase rotation at the bus. Phase rotation will be measured again after energizing the bus using generator to verify.
- De-energize and isolate substation transformers. For low-profile substations, lift jumpers from low-side bushing on the transformers.
- Disable transformer differential protection on the isolated transformers.
- Place a block on all breakers connected to the feeders planned to be connected to generator.
- Place a block on B breakers and section breakers to prevent rolling feeders from a transformer connected bus to generator connected bus.
- Disable substation sectionalizing schemes if needed (if block on breakers is not enough).
- After a greenlight is given by RTO, Tiger Team will instruct LCP to startup units.
- Wait for generator to be ready to accept load.
- Close generators disconnect switches for substations where these are installed.
- Energize the bus through the generator once the frequency and voltage are stabilized. Frequency must be 60Hz.
- Verify the voltage and frequency as well as phase rotation at the bus.
- Voltage must closely match the observed voltage before switching.
- Phase rotation must match the measure phase rotation before switching.

- Initiate transfer trip to trip large DERs on the feeder if any.
- For low-profile substation, energize feeders from adjacent transformers as needed by first disconnecting the feeder from the transformer and connecting to generator in open transition.
- For conventional sub, contact Distribution Control to revert field switching to trip the feeder and close feeder breaker to energize feeder in open transition.
- Refer to the feeder load prior to switching to ensure total load on the generator does not exceed winter capacity to allow for load fluctuations.
- Continue to monitor voltage, frequency, and total load on the bus.

9.2 Procedures for generators connected to single feeder (~5MW)

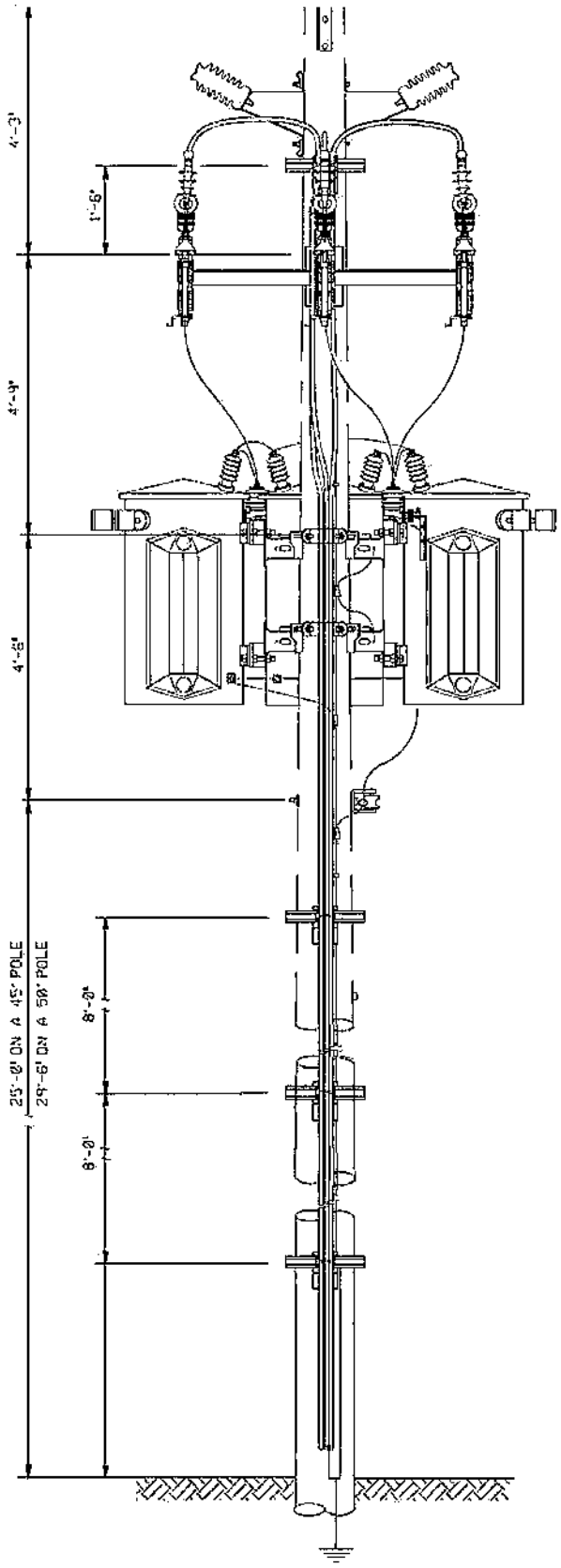
- Verify circuits to be connected to generators are not field tied to any other substation or adjacent feeders.
- Verify that load on the designated feeder is less than 5MW.
- Contact Distribution Control Operations to perform switching to reduce load below 5MW if needed.
- Wait for generator to be ready to accept load. Generator breaker should already be open and have a hold.
- Trip and place a block on the A and B breakers connected to the designated feeder that will be connected to the generator.
- Energize the feeder by closing the generator breaker. Refer to site specific procedures for more details.
- Open A breaker and Close B breaker on adjacent feeder to add more load as generator capacity allows.
- Continue to monitor voltage, frequency, and total load on the feeder.

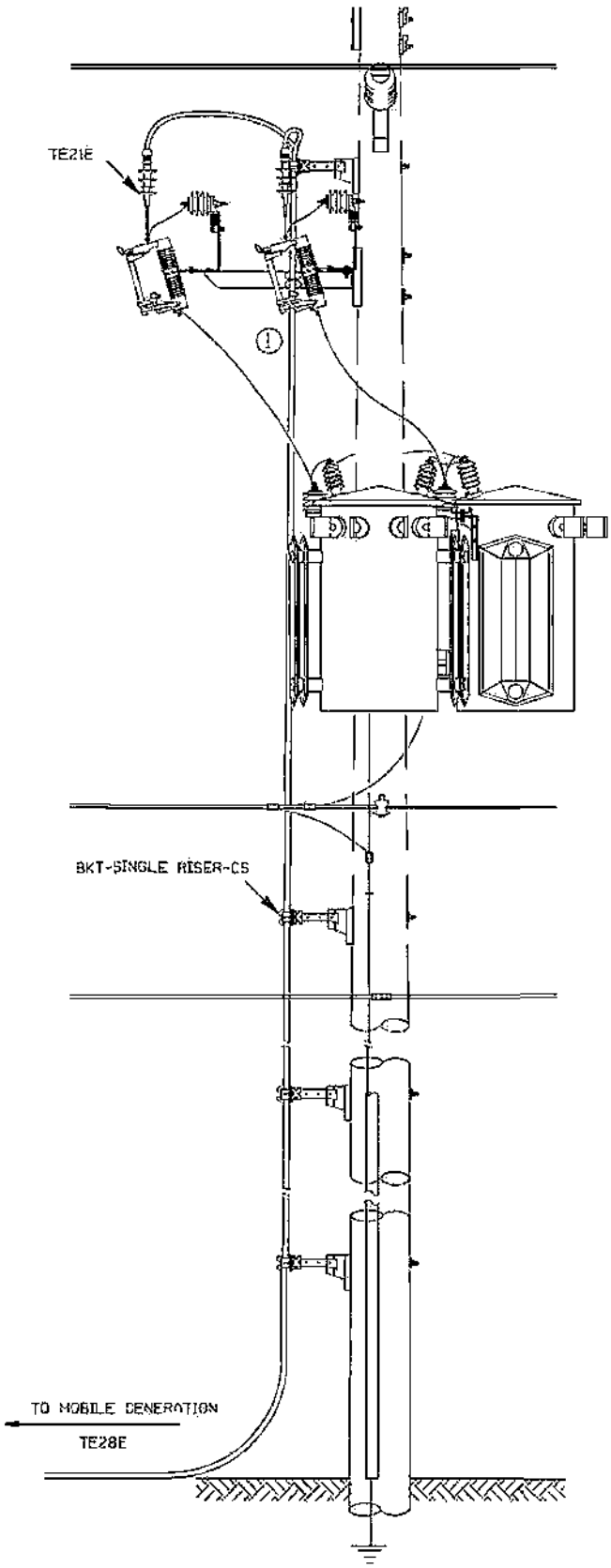
9.3 Procedures for generators connected to inspection bus (~5MW)

- Verify circuits to be connected to generators are not field tied to any other substation or adjacent feeders.
- Verify that load on the designated feeder is less than 5MW.
- Contact Distribution Control to perform switching to reduce load below 5MW if needed.
- Wait for generator to be ready to accept load. Generator breaker should already be open and have a hold.
- Verify that generator frequency is 60Hz and that the voltage closely matches low-side bus voltage where the feeder was connected.
- Trip feeder breaker and place a hold.
- Perform necessary switching to connect the de-energized feeder to the de-energized inspection bus.
- Close any switches to connect the generator to the inspection bus.
- Close generator breaker to energize the inspection bus and feeder.
- Continue to monitor voltage, frequency, and total load on the feeder.

9.4 Types of connections

9.4.1 Single Customer connection

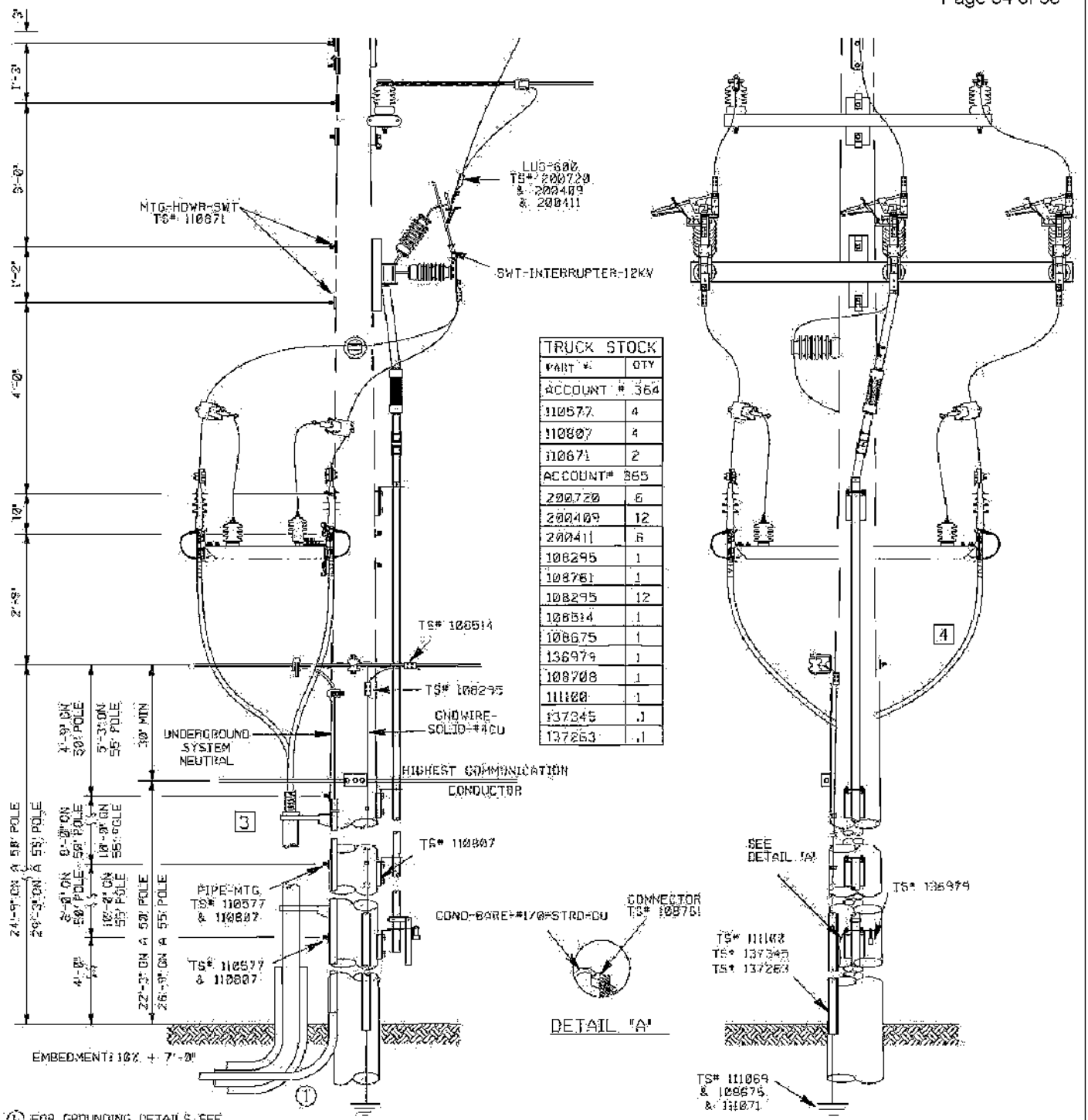




(1) BRACKET ARM TO BE COVER TO PROTECT CABLE.

SKETCH FOR
MOBILE GENERATION

SHEET 1 OF 2 SHEETS



TRUCK STOCK	
PART #	QTY
ACCOUNT # 364	
110577	4
110807	4
110671	2
ACCOUNT# 365	
200720	6
200409	12
200411	6
108295	1
108761	1
108295	12
108514	1
108675	1
136979	1
108708	1
111100	1
137345	1
137263	1

1. FOR GROUNDING DETAILS SEE OH DISTRIBUTION STANDARD 15-100.
2. THE SYSTEM NEUTRAL MUST BE LOWERED FROM THE STANDARD POSITION TO ASSURE PROPER INSTALLATION OF UNDERGROUND EQUIPMENT.
3. DIMENSIONS REFER TO THE TOP MOUNTING BOLT OF SWITCH PIPE GUIDES OR SWITCH HANDLE
4. MATERIAL INDICATED WITH "T.S.#" (TRUCK STOCK) WILL NOT BE ORDERED IN STANDARD UNIT OF OVERHEAD CONSTRUCTION.
5. FOR FEEDER INSTALLATION A 5' TALLER POLE IS REQUIRED & EMBEDMENT WILL BE 10% + 7'.

TABLE "A" QTY 1 PER CONNECTION ACCOUNT#365		CONNECTORS PART # RUN				
		#4AAAC	#2AAAC	#1/0AAAC	#4/0AAAC	600 KCMIL AAC
TAP	#4AAAC	108641	108293	108293	*	*
	#2AAAC	*	108293	108293	*	*
	1/0AAAC	*	*	108309	108508	*
	4/0AAAC	*	*	*	108522	231075*
	600 KCMIL AAC	*	*	*	*	231071*

*WEJTAP CONNECTORS REQUIRES 1 BOOSTER PER CONNECTOR
#231076 FOR INSTALLATION OR
#231077 FOR REMOVAL

NO.	DATE	REVISION	BY	CH	APP.
3	6-18-2020	REPLACE POTHEAD BRACKET W/LARGE T-ARM BRACKET; & REVISED NOTE 4	SEM	JCD	MC
2	03-18-14	REPLACED SWITCH (22091 W/258393); ADD NOTE #3	SCM	JCD	MWS

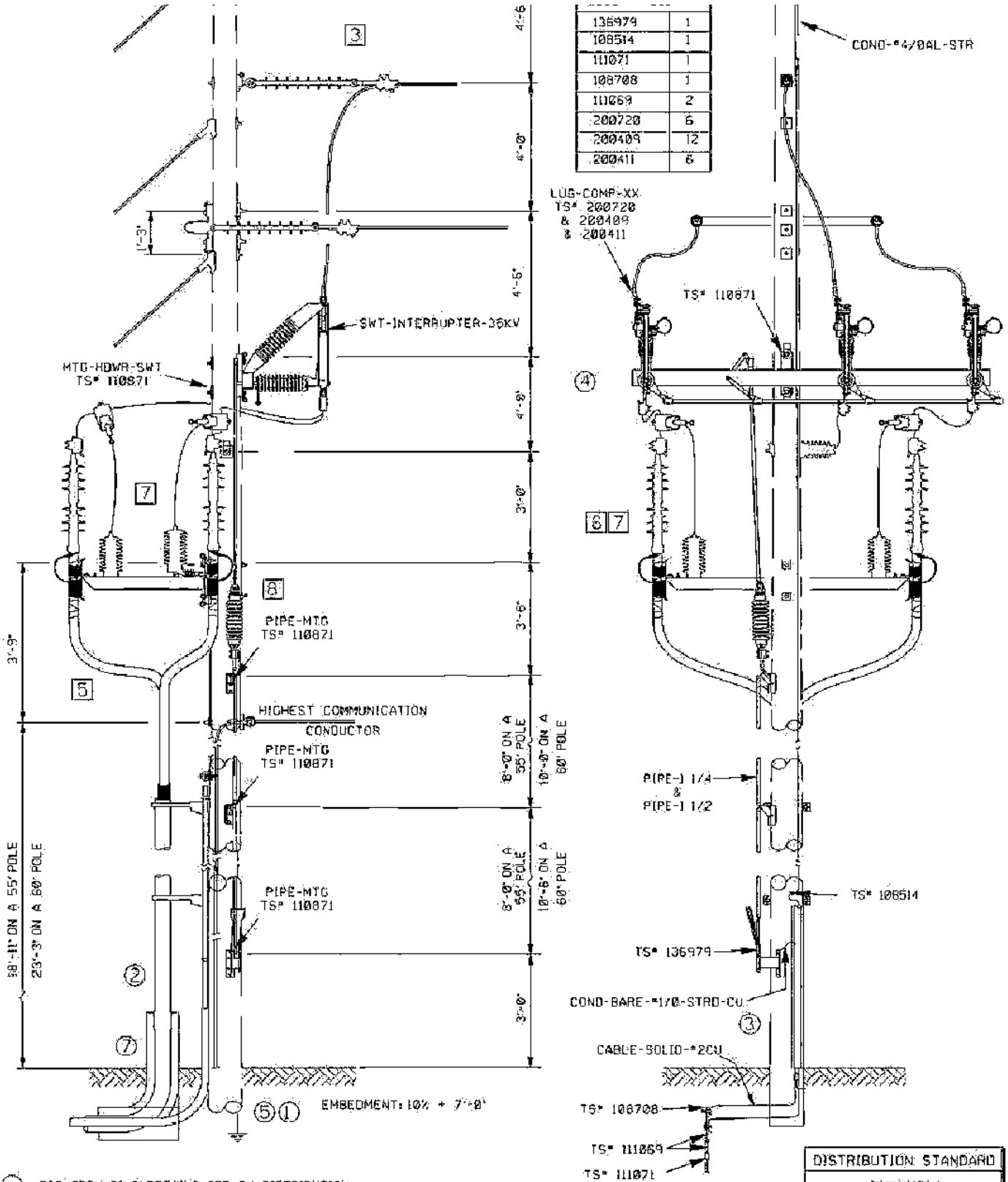
SLACK DEADEND
(3PST SWITCH)

DISTRIBUTION STANDARD
TP29

12KV TERMINAL POLE
INTERRUPTER SWITCH ASSEMBLY
(600KCMIL EPR TERMINAL POLE 3PST)

CenterPoint Energy
HOUSTON, TEXAS

DRAWN	05-25-04	L.A. MCCOY	SECTION SW 34-48T10W TP2
CHECKED	05-28-04	JAMES C. DAVIS	SHEET 6 OF 11 SHEETS
APPROVED	06-01-04	LEO H. HAAS	DRAWING NUMBER 435 178 20



1. FOR GROUNDING DETAILS SEE OH DISTRIBUTION STANDARDS 16-100.
2. USE MIN. CLASS 2 POLE FOR ALL TERMINAL POLE INSTALLATIONS.
3. GROUND OPERATING HANDLE TO POLE BOND USING A PARALLEL GROOVE CONNECTOR. (CUT HOLE IN MOULDING TO MAKE CONNECTION).
4. DO NOT CONNECT STEEL BACKBONE TO GROUND WIRE AND MAINTAIN 3" CLEARANCE BETWEEN METAL PARTS OF SWITCH AND DOWNLEAD WIRE.
5. ADDITIONAL GROUND RODS MAY BE NEEDED FOR
6. USE A 4/0 COVERED AL. CONDUCTOR FOR THE POLE BOND. TO EXTEND FROM TOP OF POLE TO AL/CU TRANSITION POINT.
7. FOR FEEDER INSTALLATION A 5' TALLER POLE IS REQUIRED & EMBEDMENT WILL BE 10% + 7'.

DISTRIBUTION STANDARD
TP37C

TERMINAL POLE FUSE AND SWITCH ASSEMBLY, 35KV
(1250KCMIL, 3PST SWITCH)

CenterPoint Energy
HOUSTON, TEXAS

10 Governmental Relations Documentation

City of Houston (COH) Code of ordinance on Noise and Sound Level Regulation section 30-16 outlines "defenses" where "emergency work" is considered a defense. COH defines emergency work as:

Emergency work means any work performed for the purpose of (i) preventing or alleviating the physical trauma or property damage threatened or caused by an emergency, (ii) restoring property to a safe condition following a fire, accident, or natural disaster, (iii) protecting persons or property from exposure to danger, or (iv) restoring public utilities

Section 30-16 ordinance is listed as:

Sec. 30-16. - Defenses.

The following defenses shall apply to any offense established in this chapter:

1. The emission of any sound was for the purpose of alerting persons to the existence of an emergency, danger, or attempted crime.
2. The sound was produced by an authorized emergency vehicle.
3. The sound was produced by emergency work.
4. The sound was generated:
    a. At a lawfully scheduled stadium event;
    b. By a parade and spectators and participants on the parade route during a lawful parade;
    c. By spectators and participants at lawfully scheduled amphitheater event;
    d. By patrons and participants using cannons and gunfire during historical battle re-enactments for which a pyrotechnic permit was obtained and the explosives were inspected by the fire marshal;
    e. By a pyrotechnic display that was inspected and approved by the fire marshal; or
    f. By spectators and participants of any outdoor event, fun run, race, festival, fiesta, or concert that was sponsored or cosponsored by the city and is in full compliance with a permit issued by the city.
5. The sound was produced by the erection, excavation, construction, or demolition of any building or structure, including the use of any necessary tools or equipment, conducted between the hours of 7 a.m. and 8 p.m., which activity did not produce a sound exceeding 85 dB(A) when measured from the property line of the residential property where the sound is being received.
6. The sound was produced by aircraft in flight or in operation at an airport, or railroad equipment in operation on railroad rights-of-way operated in compliance with all applicable federal laws.
7. The sound was produced by operating or permitting the operation of any mechanically powered saw, drill, sander, router, grinder, lawn or garden tool, lawnmower, or any other similar device used between the hours of 7 a.m. and 8 p.m., provided the device did not produce a sound exceeding 85 dB(A) when measured from the property line of the nearest residential property where the sound is being received and was used for the maintenance or upkeep of the property on which it was operated.
8. The sound was generated as authorized under the terms of a permit issued under sections 30-8 and 30-9 of this Code.
9. The sound was produced by the operation of any air conditioning unit that did not produce a sound exceeding 65 dB(A) on residential property or 75 dB(A) on nonresidential property, when measured from the property line of the non-residential or residential property where the sound is received to the source of the sound.
10. The sound was produced as part of a religious observance or service during daytime hours, provided the sound did not cumulatively exceed five minutes duration in any one hour period.
11. The sound was produced during daytime hours by activities conducted on public parks, public playgrounds, and public or private school grounds, including, but not limited to, school athletic and school entertainment events.

Potential restoration locations:

City	Facility	Address	Zip Code

Sugarland	[redacted]	[redacted]	
Fulshear			
Rosenberg			
Missouri City			
Pearland			
Galveston			
Deer Park			77536
			77536
Pasadena			
Baytown			77521
			77521
			77521
			77521
			77521
La Porte			77571
			77571
Lake Jackson			
Manvel			

	[redacted]	[redacted]		
Iowa Colony				
Arcola				
Houston				

Version	Author	Date	Section	Description
00	Tiger Team	XX-XX-2023	All	New