Control Number: 49827

Item Number: 69

Addendum StartPage: 0

GDS Associates, Inc.
ENGINEERS & CONSULTANTS

POWER LINE SAFETY BILL
HB 4150

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AGENDA

- History of HB 4150
- Training Requirements
  - Hazard Recognition
  - NESC
- Five Year Reporting
- Annual Reporting of Non-Compliant Transmission Lines
- Annual Report of Fatalities or Injuries
- Inspection of Distribution and Transmission Lake Crossings
- Cost Recovery

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HISTORY

- August 5, 2017, three Boy Scouts were electrocuted when the topmast of their sailboat struck a low power line strung across Lake O' the Pines.
- HB 4150 passed on a vote of 143-0.
- State Rep. Chris Paddie

  "Ultimate goal is to ensure that no family has to experience what they experienced."

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PURPOSE OF THE HB 4150

- Power Line Safety Act
  - Requires all utilities that own or operate transmission line to train employees to recognize safety problems.
  - Resulted in new rules passed by the Texas Public Utility Commission
- Supported by industry groups

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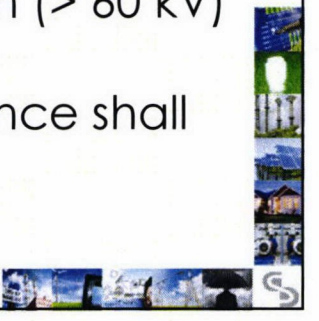
POWER LINE SAFETY BILL

- Cost allocation
- T&D lines must be in compliance with the NESC
- Report on training
- Report on inspection of transmission (> 60 kV)
- Report on non-compliance
- T&D lines over lakes not in compliance shall be corrected by December 2021
- Reports due by May 2020



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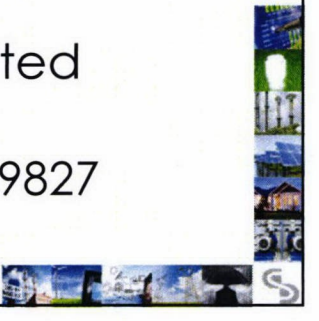
TEXAS PUBLIC UTILITY COMMISSION

- Developed rules for implementation of the HB 4150
- Public Utility Regulatory Act (PURA) §38.102
- Order adopting the new rule dated February 14, 2020
  - see Texas PUC website Project 49827



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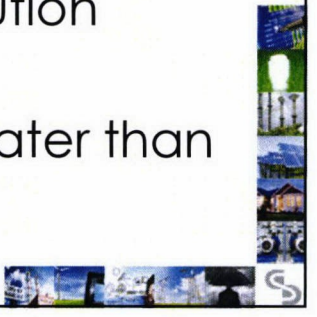
TRAINING REQUIREMENTS

- §38.102 Applies to electric utility, municipally owned utility, and electric cooperative that owns or operates overhead transmission or distribution assets
- Transmission means facilities greater than 60 kV



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TRAINING REQUIREMENTS

§38.102 Submit report to PUC with a summary description of

1. Hazard recognition training to its employees related to overhead transmission and distribution facilities
2. Training programs to employees related to NESC for construction of T&D lines

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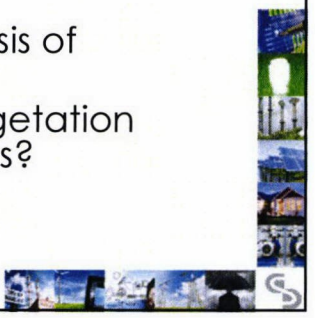
TRAINING REQUIREMENTS

- "to employees"
- NESC for the construction of T&D lines
  - Line personnel and engineers
- Hazard recognition training
  - Not well defined as which employees
  - Line personnel and engineers have a basis of understanding
  - How about other employees such as vegetation management and substation technicians?
  - Office personnel?



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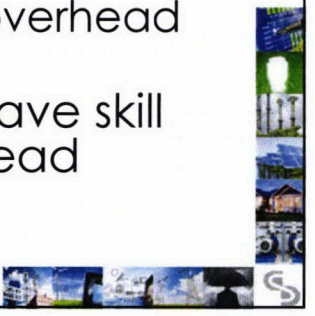
HAZARD RECOGNITION TRAINING

- Underlying goal is to report problems so corrections can be made.
- Personnel need to be able to recognize that there is a problem
  - Requires basic knowledge of the overhead system
- Consider training personnel who have skill sets to report problems with overhead power lines



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HAZARD RECOGNITION TRAINING

- One of the root causes of workplace injuries and incidents is failure to identify or recognize the hazard.
  - Critical element is ability to identify and assess the hazard.
- OSHA 1926.21(b)(2)
  - Employers shall instruct each employee in the recognition and avoidance of unsafe conditions

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HAZARD RECOGNITION TRAINING

- The goal of Power Line Safety Act is prevent power line clearance issues
  - Public Safety
  - Public is not expected to know safe distances
- Hazard Recognition training focuses on power line clearance issues
  - Identify and assess unsafe conditions
  - Non-compliance with NESC
  - Watch for strength issues and danger trees

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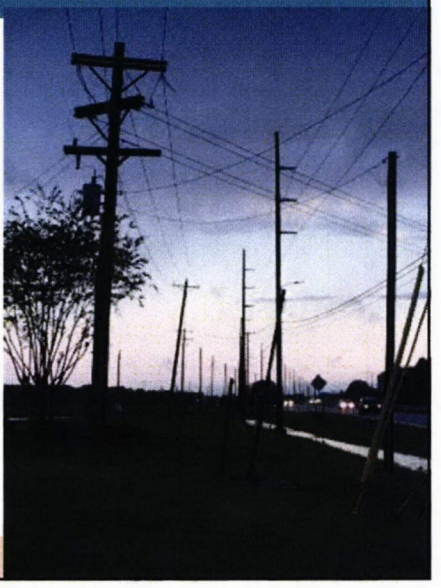
Hazard Recognition Training

- Training is not OSHA 1926(b)(2) requirement for employees related hazards at the worksite
- Unique training related to inspection and observation of lines when driving by or working nearby.



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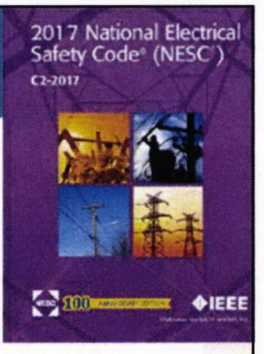
NESC Training

- Training programs to employees related to NESC for construction of T&D lines.
- The bill used the word "construction" and not "clearances".
  - PUC declined to limit the scope of training to be only vertical clearances (49827-36)
- Clearly the goal is public safety
  - NESC Rule 010 – these rules are necessary for safeguarding the public



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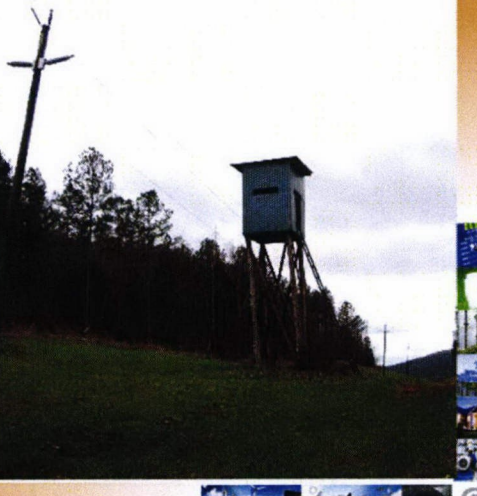
NESC Training

- Focus on clearances (vertical and horizontal)
- Need to include adders for transmission clearances
  - Voltages exceeding 22kV (phase to ground)
  - 0.4 inches per kV over 22kV
  - Adjustments for elevation and maximum operating voltages



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Transmission Adjustments

- Can the transmission trip for single-line to ground faults?
- Voltage adder
  - 69kV requires 19.2 feet above a road
    - Add 5% for voltage range
    - 72.45kV (69*1.05) requires 19.9 feet
  - 115kV requires 20.0 feet above a road
    - Add 5% for voltage range
    - 115kV X 1.05 requires 20.2 feet above a road

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TRANSMISSION ADDERS

- Add for elevations over 3,000 feet above sea level

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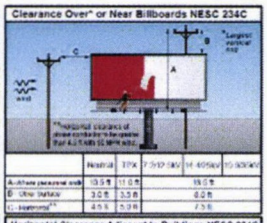
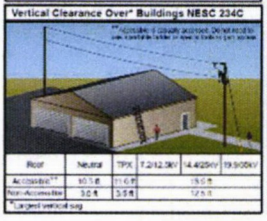
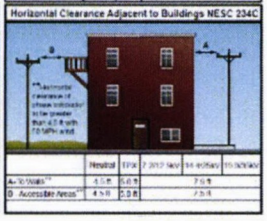
NESC TRAINING







- Roads
- Lakes
- Buildings
- Other structures
- Grain bins/pools

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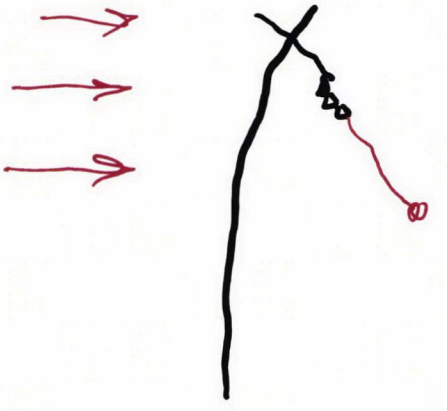
TRANSMISSION STRUCTURES

- Rule 234B
- Wind displacement with 50 MPH wind at 60F.
- Include deflection of suspension insulators
- Include deflection of a flexible structure if the cable is attached 60 ft or more above grade



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NESC TRAINING

- Other topics that could be covered
  - Grounding, and missing neutrals
  - Pole and guy strength
  - Clearance between conductors
  - Substation security

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TRAINING DOCUMENTATION

- File summary of training with PUC
- If and when an incident occurs .....
- How to show your employees have been trained?
  - Sign-in sheets
  - Testing – provides confirmation of understanding
  - On-line testing for record retention

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TRANSMISSION LINE SAFETY

- §38.102(c) May 1, 2020 each electric utility, municipally owned utility and electric cooperative that owns or operates transmission facilities greater than 60 kV shall submit to the PUC a report
  - Percent of transmission line inspected for vertical clearance in the last 5 years
  - Percent of transmission line to be inspected for vertical clearance in the next five years

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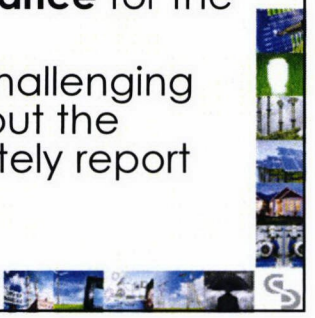
TRANSMISSION LINE INSPECTION

- §38.102(c) May 2020 Filing, filing once every 5 years
  - Miles of transmission line owned or operated
  - Percentage of transmission line inspected for compliance with NESC **Vertical Clearance** for the years 2015-2019
  - PUC noted some utilities may find it challenging to provide the required information, but the utilities should make efforts to accurately report the information.



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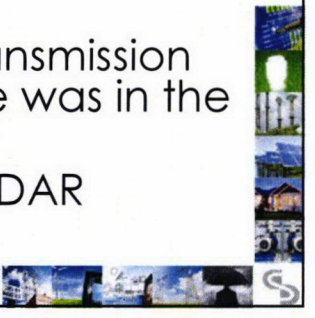
TRANSMISSION LINE INSPECTION

- Inspections for 2015-2019
- Note "patrol" inspection based on right-of-way cycle
  - Observation without measurements
  - From a truck or on foot
- Note "pole inspections" based on transmission pole inspections, if vertical clearance was in the scope of the inspectors
- Note any other inspections such as LiDAR



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TRANSMISSION LINE INSPECTION

- §38.102(c)(2)

May 2020 Filing, once every five years

  - Percentage of transmission lines inspected compliance with NESC **Vertical Clearance** for the years 2020-2024

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TRANSMISSION LINE INSPECTION

- Cycle for inspection not specified
  - 5 year cycle implied but not required
- Method for inspection not provided to determine compliance with NESC vertical clearance
- Rating of the conductor
  - 75°C or 167°F
  - Actual tension
- LiDAR inspection
- Ground observation
- Survey methods

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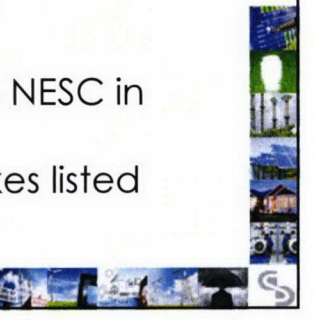
ANNUAL REPORT REQUIREMENTS

- §38.102(d) No later than May 1 every five years
- Submit a report for the preceding year
  - Number of identified occurrences of noncompliance with PURA §38.004
    - Compliance with clearances set forth in NESC in effect at the time of construction.
    - Includes crossings over the 173 Texas lakes listed



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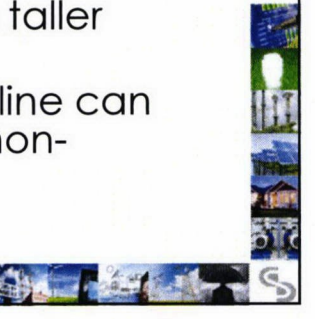
ANNUAL REPORT REQUIREMENTS

- §38.102(c)(1) Report if the utility has actual knowledge of any portion of the transmission facilities not in compliance with vertical clearance requirements of the NESC.
  - Did you learn of any low clearances last year?
  - Did you replace transmission poles with taller poles?
  - Distribution under-build on transmission line can cause the transmission structure to be non-compliant.



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Annual Report Requirements

- §38.102(c)(3) Report for last year, if the utility has actual knowledge of any violations of easement agreements with the Corps of Engineers regarding vertical clearance of transmission line as required by the NESC.
  - Corps of Engineers often has vertical clearances greater than NESC.
  - Find your existing permits

US Army Corps of Engineers®

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Lake Crossing

- Footnote 17
- Designed high water level
- Non-controlled water such as rivers
  - 10-year flood level

ft

Table 232-1— *(continued)*
Vertical clearance of wires, conductors, and cables above ground, roadway, rail, or water surfaces

(Voltages are phase to ground for effectively grounded circuits and those other circuits where all ground faults are cleared by promptly de-energizing the faulted section, both initially and following subsequent breaker operations. See the definitions section for voltages of other systems.
See Rules 232A, 232B1, 232C1a, and 232D4.)

Nature of surface underneath wires, conductors, or cables	Insulated communication conductors and cable; messengers; overhead shield/ surge-protection wires; effectively grounded guys; ungrounded portions of guys meeting Rules 215C2 and 279A1 exposed to 0 to 300 V; neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1 (ft)	Noninsulated communication conductors; supply cables of 0 to 750 V meeting Rule 230C2 or 230C3 (ft)	Supply cables over 750 V meeting Rule 230C2 or 230C3; open supply conductors, 0 to 750 V; ungrounded portions of guys meeting Rules 215C2 and 279A1 exposed to over 300 V to 750 V (ft)	Open supply conductors, over 750 V to 22 kV; ungrounded portions of guys meeting Rules 215C2 and 279A1 exposed to 750 V to 22 kV (ft)	Trolley and electrified railroad contact conductors and associated span or messenger wires	
					0 to 750 V to ground (ft)	Over 750 V to 22 kV to ground (ft)
7. Water areas suitable for sailboating including lakes, ponds, reservoirs, tidal waters, rivers, streams, and canals with an unobstructed surface area of						
a. Less than 20 acres	17.5	18.0	18.5	20.5	—	—
b. Over 20 to 200 acres	25.5	26.0	26.5	28.5	—	—
c. Over 200 to 2000 acres	31.5	32.0	32.5	34.5	—	—
d. Over 2000 acres	37.5	38.0	38.5	40.5	—	—
8. Established boat ramps and associated rigging areas; areas posted with sign(s) for rigging or launching sail boats	Clearance aboveground shall be 5 ft greater than in 7 above, for the type of water areas served by the launching site					

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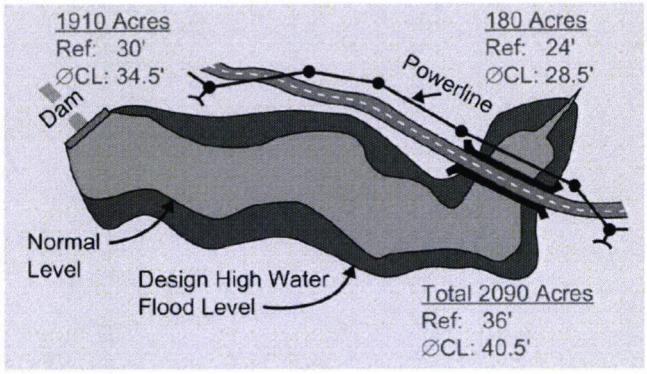
Lake Crossing

- Footnote 20
- Bridge limitations on water area



Power line on small lake side of bridge

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Corp of Engineers

- Reference Pool Elevation
  - 249.5' for Lake of the Pines
  - Reference pool elevation is the elevation of the spillway crest.

	751V-22kV	23kV-87KV	88kV-115kV	116kV-161kV
COE in Ft	**56.5**	**58.7**	**59.6**	**61.1**
NESC for 2,000 Acre Lake in Feet	**40.5**	**41.5**	**42.1**	**43**

Check with COE!!

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ANNUAL REPORT REQUIREMENTS

- §38.102(e) Each year by May 1, utility must report for the prior year,
- For transmission and distribution facilities
  - Distribution being defined as greater than 1 kV
- Number of fatalities or injuries other than employee, contractors or other persons qualified to work in proximity of head high voltage lines
- Report of these injuries is limited only to those facilities that are found noncompliant with the NESC.

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ANNUAL REPORT REQUIREMENTS

- Reporting on public contact with lines that are not compliant.
- Contact with lines that are compliant is not required.

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Annual Report Requirements

- For reported injuries and fatalities prior description of corrective action taken to prevent reoccurrence.
- PURA §38.102 states that reports made are not admissible in a civil or criminal proceeding against the electric utility.

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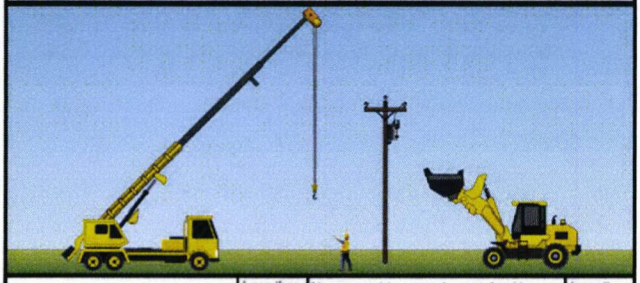
Annual Filing Requirements

- Violations from a national disaster, weather event, or man-made act or force outside of affected utility's control are not required to be reported
- Crane contacting power line that is compliant need not be reported
  - Check with legal counsel

Crane / Derrick Transmission Cleare



Crane / Derrick	Less than 50kV	Heavy machinery equipment (backhoes, front-end loaders, bulldozer, dump trucks)	Less than 50kV
Must Contact Electric Utility if maximum working radius in the work zone. *See OSHA 1926.1408 (a) (2)*	20 feet	Horizontal Minimum Clearance from. *See OSHA 1926.600 (a) (6)*	10 feet
Minimum Approach Distance, ONLY if Specific Controls in Place. *See OSHA 1926.1408 (a) (2) (iii)*	10 feet	Vertical Minimum Clearance from. *See OSHA 1926.600 (a) (6)*	10 feet

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ANNUAL FILINGS

- The commission will make all reports publicly available by September 1 of each year.

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HB 4150 CLEARANCE OVER LAKES

- Electric utilities, municipally owned utilities, and electric cooperatives with a transmission or distribution line over one of the 178 Texas lakes listed in HB4150

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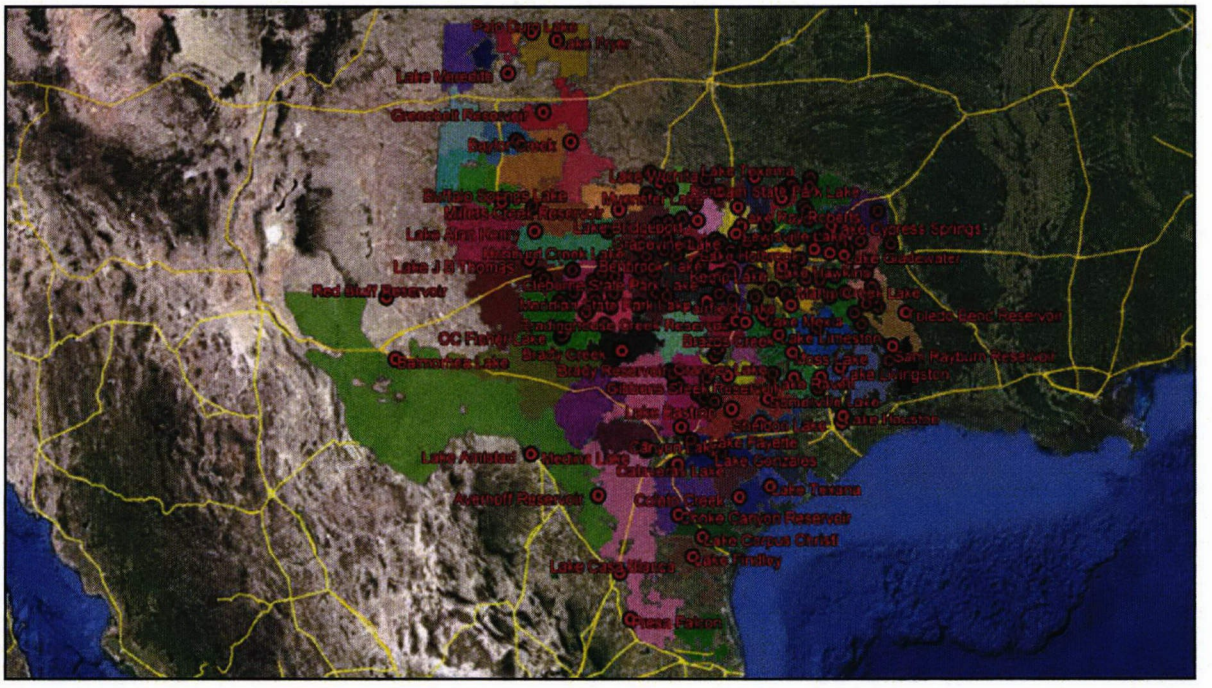

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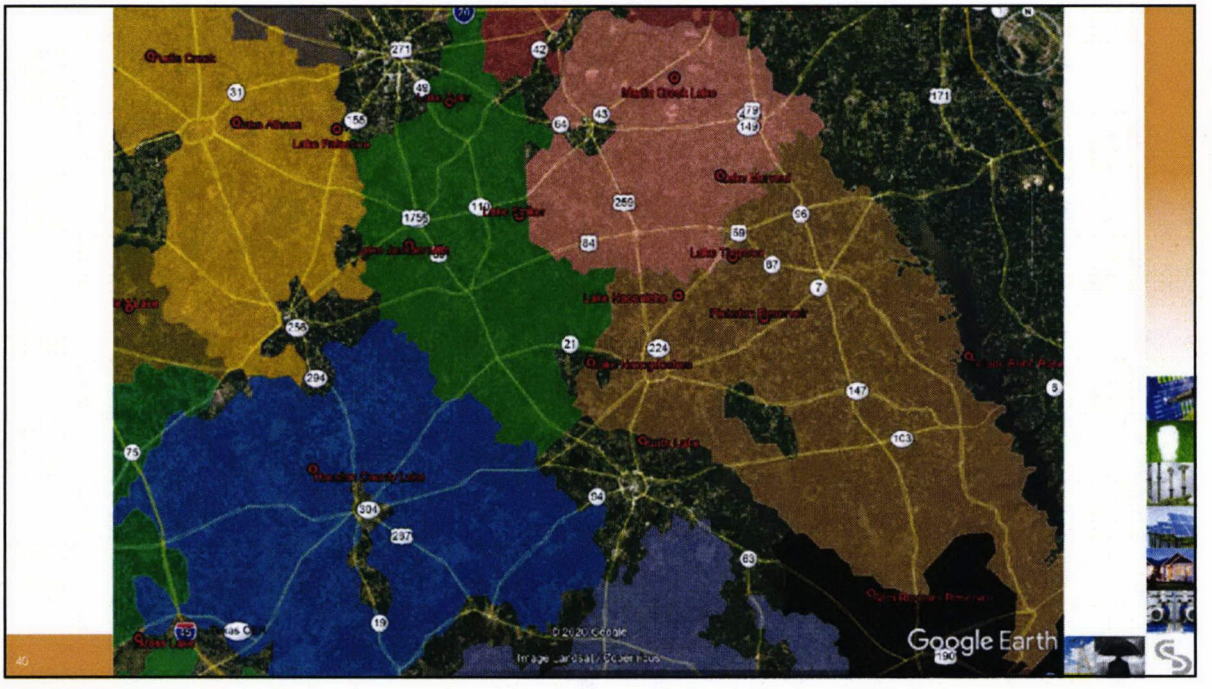

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HB 4150

- Any electric utility who owns a transmission or distribution line over a lake listed in Section 38.004(b),
  - And that line is not in compliance with the clearance standards of NESC Rule 232 in effect at the time the line was constructed
  - Shall bring the line into compliance not later than December 31, 2021.
- Per HB 4150 any lines rebuilt, must be compliant with the current NESC (no grandfathering)
- Beware that the NESC and COE have different requirements for clearances over the lake. COE is the controlling entity.

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LAKE CROSSINGS

- Inspection lake crossing in 2020
- Plan to correct by end of 2021
  - Update COE permits may slow the process
- New NESC requires Grade B strength
- Date of correction is not contained in PUC requirements

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Lake Crossings

- Many different ways to attack the problem
- LiDAR
- Survey

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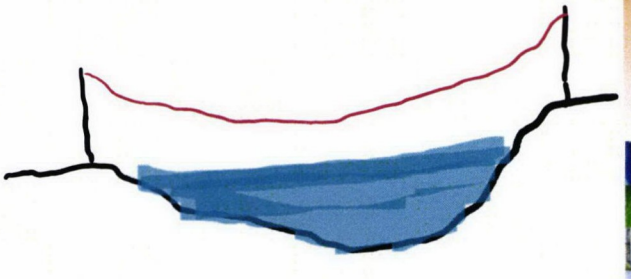
Lake Crossing

- Obtain benchmark/ elevation of full pool
- Elevation of base of the pole on each side
- Horizontal distance
- Determine attachment height



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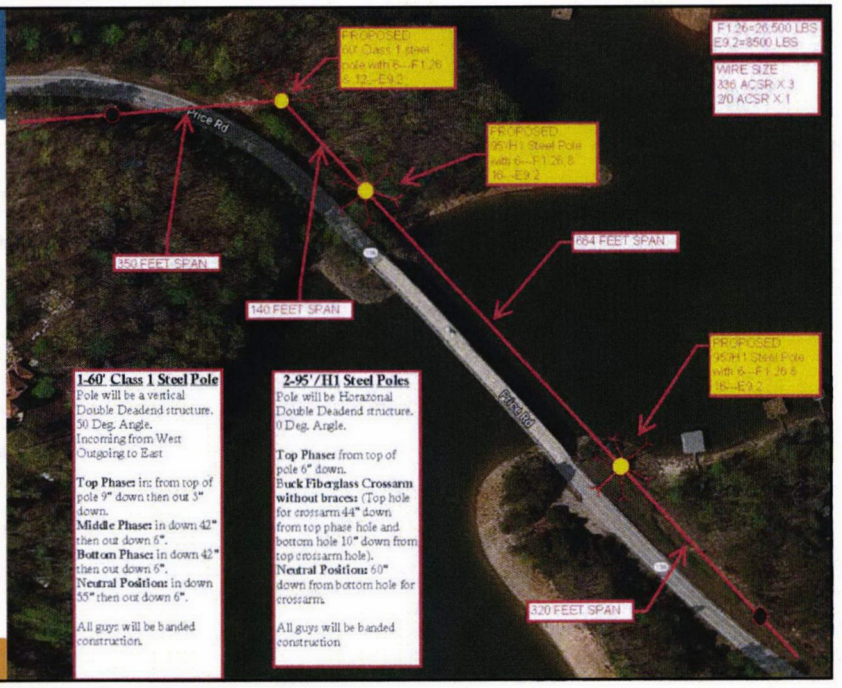
- Example Problem
- 664 ft span
- 336 ACSR with marker balls



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Lake Crossing

Conductor: 336.4 Kcmil 18/ 1 Stranding ACSR "MERLIN"

Area = 0.2789 Sq. in Diameter = 0.684 in Weight = 0.365 lb/ft RTS = 8680 lb
Data from Chart No. 1-844
English Units
Limits and Outputs in Average Tensions.

Span = 664.0 Feet Special Load Zone
Creep IS a Factor Rolled Rod

Design Points					Final		Initial	
Temp °F	Ice in	Wind psf	K lb/ft	Weight lb/ft	Sag Ft	Tension lb	Sag Ft	Tension lb
15.0	0.25	4.00	0.20	0.965	13.73	3880	13.11	4062
32.0	0.25	0.00	0.00	0.655	12.67	2855	11.17	3237
0.0	0.00	0.00	0.00	0.365	8.39	2399	6.67	3016
15.0	0.00	0.00	0.00	0.365	9.28	2170*	7.25	2776
30.0	0.00	0.00	0.00	0.365	10.19	1976	7.90	2547
60.0	0.00	0.00	0.00	0.365	12.02	1675	9.40	2142
90.0	0.00	0.00	0.00	0.365	13.80	1460	11.07	1819
120.0	0.00	0.00	0.00	0.365	15.49	1302	12.79	1575
167.0	0.00	0.00	0.00	0.365	17.93	1125	15.41	1309

* Design Condition

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- With Marker balls
- 120°F

Lake Crossing
Neutral without Marker Balls

Conductor: #2/0 AWG 6/ 1 Stranding ACSR "QUAIL"

Area = 0.1221 Sq. in Diameter = 0.447 in Weight = 0.183 lb/ft RTS = 5310 lb
Data from Chart No. 1-938
English Units
Limits and Outputs in Average Tensions.

Span = 664.0 Feet Special Load Zone
Creep is NOT a Factor Rolled Rod

Design Points					Final		Initial	
Temp °F	Ice in	Wind psf	K lb/ft	Weight lb/ft	Sag Ft	Tension lb	Sag Ft	Tension lb
0.0	0.00	0.00	0.00	0.183			8.87	1137
15.0	0.00	0.00	0.00	0.183			9.53	1059
30.0	0.00	0.00	0.00	0.183			10.22	987
60.0	0.00	0.00	0.00	0.183			11.66	866
90.0	0.00	0.00	0.00	0.183			13.11	771
120.0	0.00	0.00	0.00	0.183			14.54	695

Above: Initial Data Prior to Marker Ball Installation

Below: 3 Marker Balls in 664Feet, Dia= 36.0 in , Wt= 17.0 lb + 0.0 lb

15.0	0.25	4.00	0.20	0.935	19.47	2655	19.47	2655*
32.0	0.25	0.00	0.00	0.630	17.97	1939	16.95	2054
0.0	0.00	0.00	0.00	0.260	12.95	1107	10.63	1348
15.0	0.00	0.00	0.00	0.260	13.67	1049	11.22	1278
30.0	0.00	0.00	0.00	0.260	14.38	997	11.83	1212
60.0	0.00	0.00	0.00	0.260	15.77	910	13.08	1096
90.0	0.00	0.00	0.00	0.260	17.11	839	14.35	1000
120.0	0.00	0.00	0.00	0.260	18.39	781	15.62	919

* Design Condition

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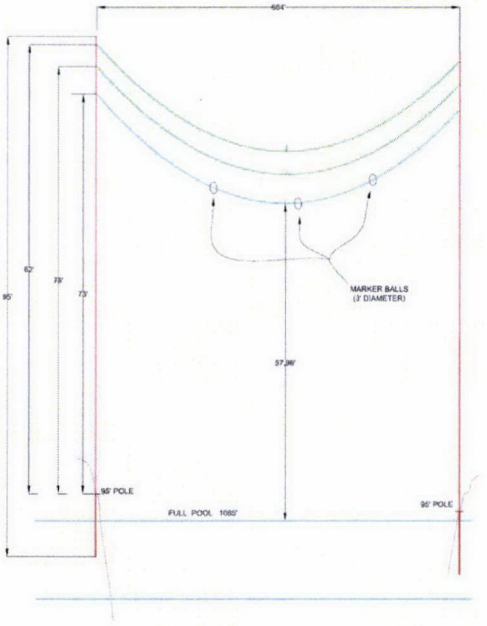
- Requires 95 foot pole
  - Only 55 foot in place
- Difficult to determine existing tension
  - Return wave difficult
  - Model actual pole and clearance at 60°F
  - Existing ground clearance per the model



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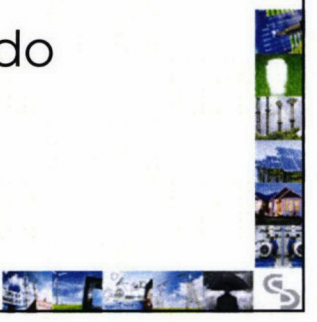
LiDAR

- Fly over with Drone
- Provides actual tensions
- Faster verification of clearance
- Mobilization expensive need to do several at a time



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Initial Screening

- Use Google Earth
  - Rough elevations
  - Pole heights
  - Sag tables for the specific span

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ASSIGNMENT OF COSTS

- "Costs incurred by a municipally owned utility or electric cooperative to comply with Section 38.102 [i.e., new reporting requirements] shall be recorded as a regulatory asset for timely recovery in wholesale transmission rates established by the commission."

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Assignment of Costs

- "recovery in wholesale transmission rates established by the commission"
- These costs will ERCOT wholesale transmission charges through Transmission Cost of Service rate filing
- Commenters on the new rule asked for clarification regarding items eligible for expense recovery and which rate mechanisms are the appropriate vehicle to request recovery.
  - Commission declined to address cost recovery in this rulemaking

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Assignment of Costs

- Upgrade costs will be capital expenditures
- Record the following costs
  - Mandated training
  - Mandated inspection
  - Mandated reporting
- There may be future rule making or the first utility in for TCOS reveal PUCT acceptance of costs.

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WHAT NOW?

- 5 Year Reporting
  - Vertical inspection of transmission for 2015-2019
  - Future inspection – what is your plan?
- Annual Reporting
  - Known non-compliant T-lines and corrective actions
- Annual Reporting of fatalities or injuries
- Training program descriptions
  - Training is required but not before May 2020
- Review lake crossings in 2020 and fix in 2021

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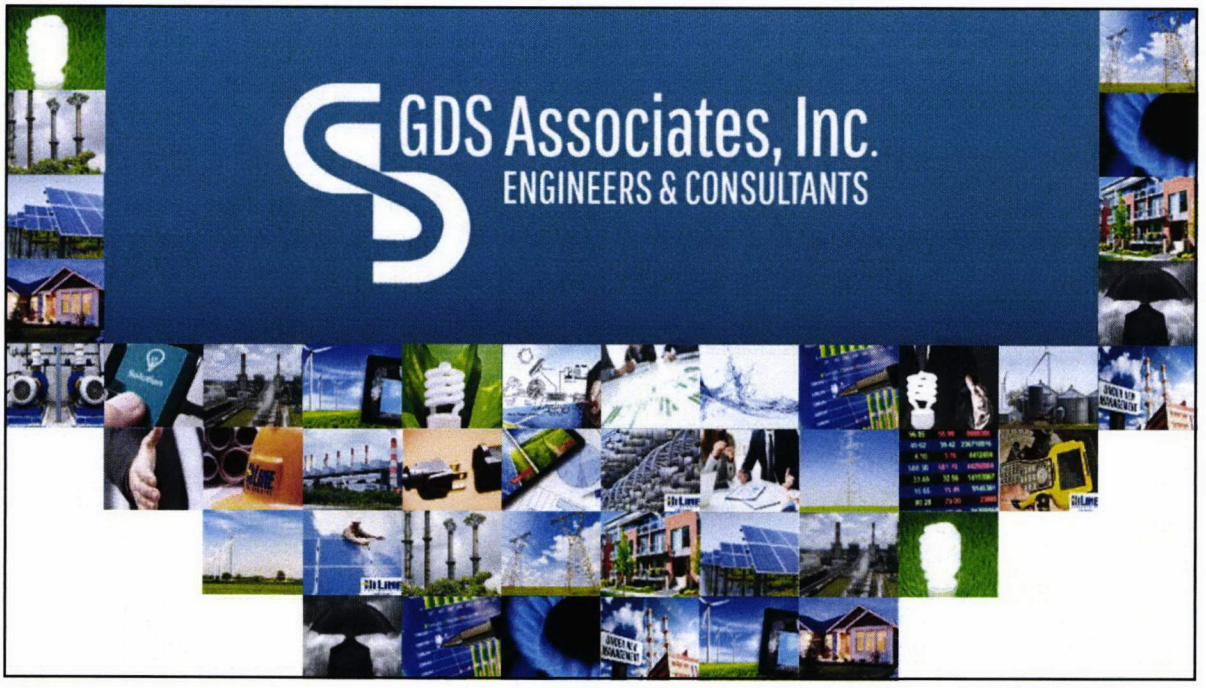

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