Advances in XML Reporting

PLS ATUG June 2017

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PLS-CADD Integration at SDG&E

- All Transmission Projects Modeled in PLS-CADD
  - The Best available solution for large scale system modeling
- Build Cost Savings
  - Accuracy of SAPS FE Engine provides more efficient designs, reducing material costs
- Design Time Savings – Process Integration
  - PLS-CADD Design Specification
  - Custom Excel Calculators
  - **Custom Applications**

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Project Drivers

- Greater CPUC Oversight
  - General Order 95 (CA Version of NESC)
- 2008 Electric Safety OIR
  - Focused on clearances, veg. management, visual inspections, intrusive pole inspection, joint-use and **pole loading**
- 2012 & 2014 GO 95 Modified Rules – Reports Available Upon Request
- 2016 CPUC implemented Safety Citation Program
- Increased Auditing
  - CPUC and Internal Stakeholders

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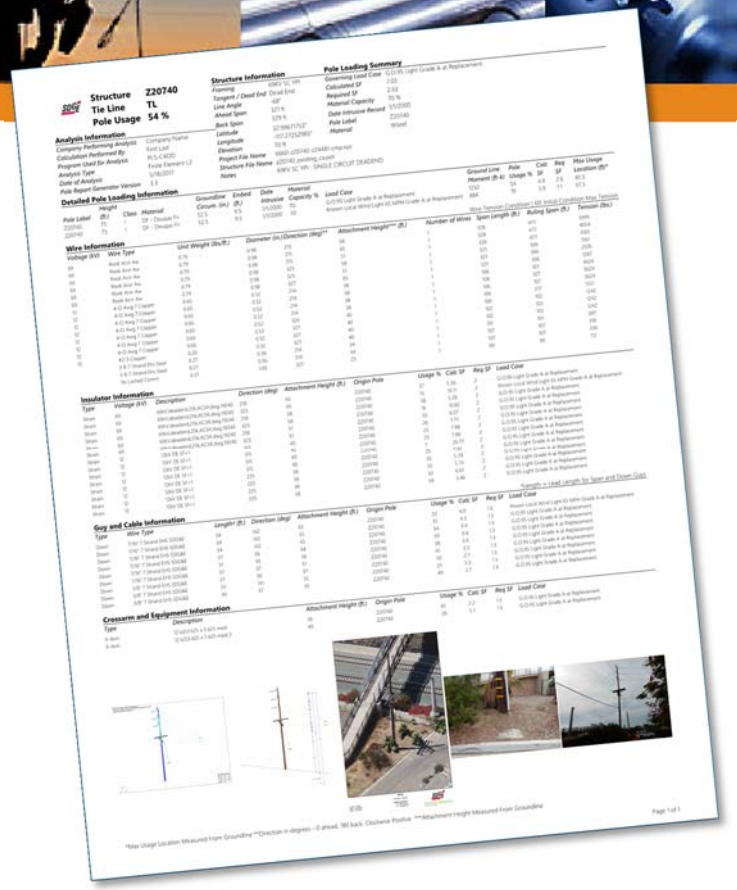
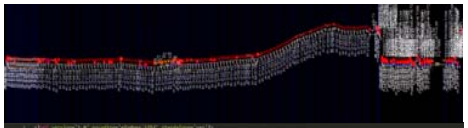
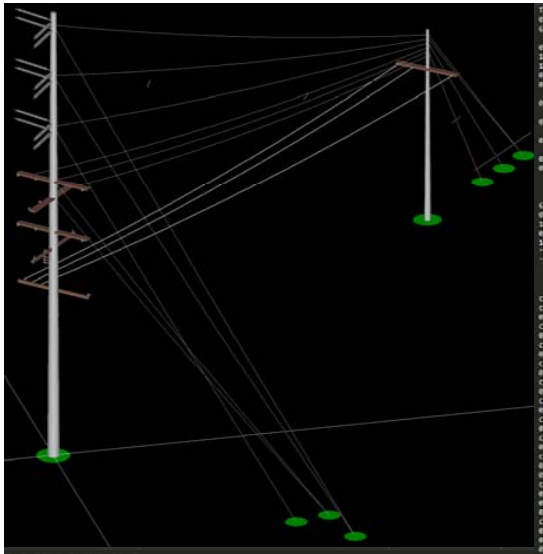
SDG&E Requirements



- Applicable to T&D
- Easy to Read & Duplicate
- Single Output Page Summarizing
  - Structure Information
  - Attachment Information
  - Loading Cases
  - Structure Photos
  - Structure Usage and Safety Factors
- Bulk Output Sheet
  - Imported into database (PIDS – Pole Information Data System)
- Easily Created from PLS-CADD Models

PLS Data Source: 2015





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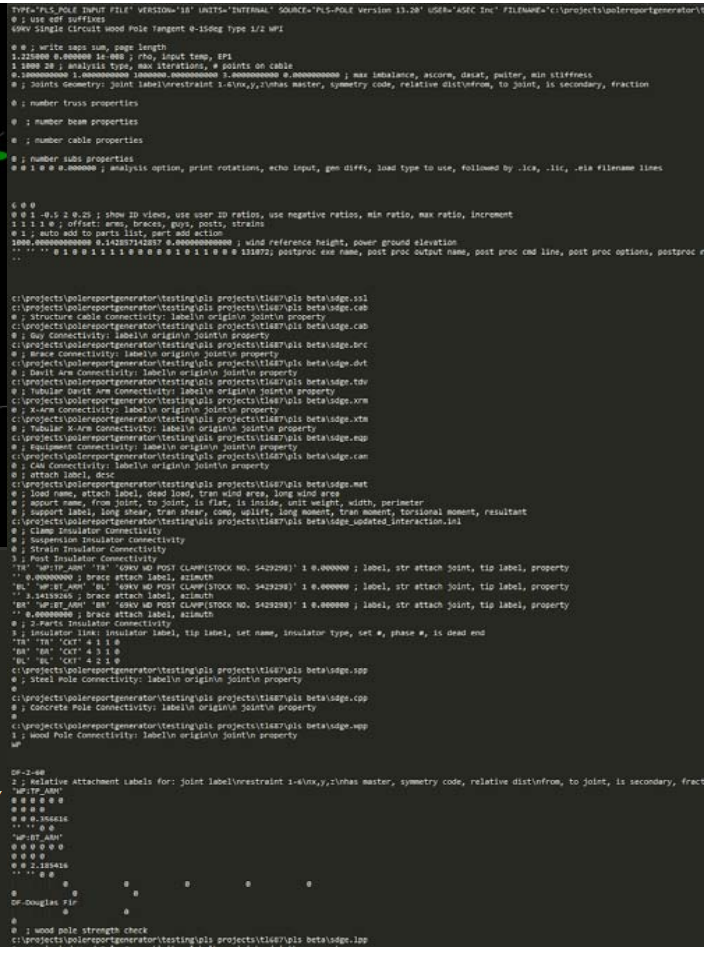
PLS_POLE INPUT FILE
    9 ; Structure Cable Connectivity: label\n origin\n joint\n property
    9 ; Guy Connectivity: label\n origin\n joint\n property
    0 ; Brace Connectivity: label\n origin\n joint\n property
    0 ; Davit Arm Connectivity: label\n origin\n joint\n property
    0 ; Tubular Davit Arm Connectivity: label\n origin\n joint\n property
    6 ; X-Arm Connectivity: label\n origin\n joint\n property
    0 ; Tubular X-Arm Connectivity: label\n origin\n joint\n property
    0 ; Equipment Connectivity: label\n origin\n joint\n property
    0 ; CAN Connectivity: label\n origin\n joint\n property
    9 ; Clamp Insulator Connectivity
    0 ; Suspension Insulator Connectivity
   25 ; Strain Insulator Connectivity
    3 ; Post Insulator Connectivity
    0 ; 2-Parts Insulator Connectivity
    2 ; Steel Pole Connectivity: label\n origin\n joint\n property
    0 ; Concrete Pole Connectivity: label\n origin\n joint\n property
    0 ; Wood Pole Connectivity: label\n origin\n joint\n property
    0 ; Laminated Wood Pole Connectivity: label\n origin\n joint\n property
    0 ; FRP Pole Connectivity: label\n origin\n joint\n property
    0 ; Mast Connectivity: label\n origin\n joint\n property
    0 ; Vang Connectivity: label\n origin\n joint\n property
    0 ; Framing Connectivity: label\n origin\n joint\n property

DXF ATTACHMENTS
BMP ATTACHMENTS
SAPS CABLE PROPERTIES FILE
XARM PROPERTIES FILE
Insulator Library
STEEL POLE PROPERTIES FILE
```



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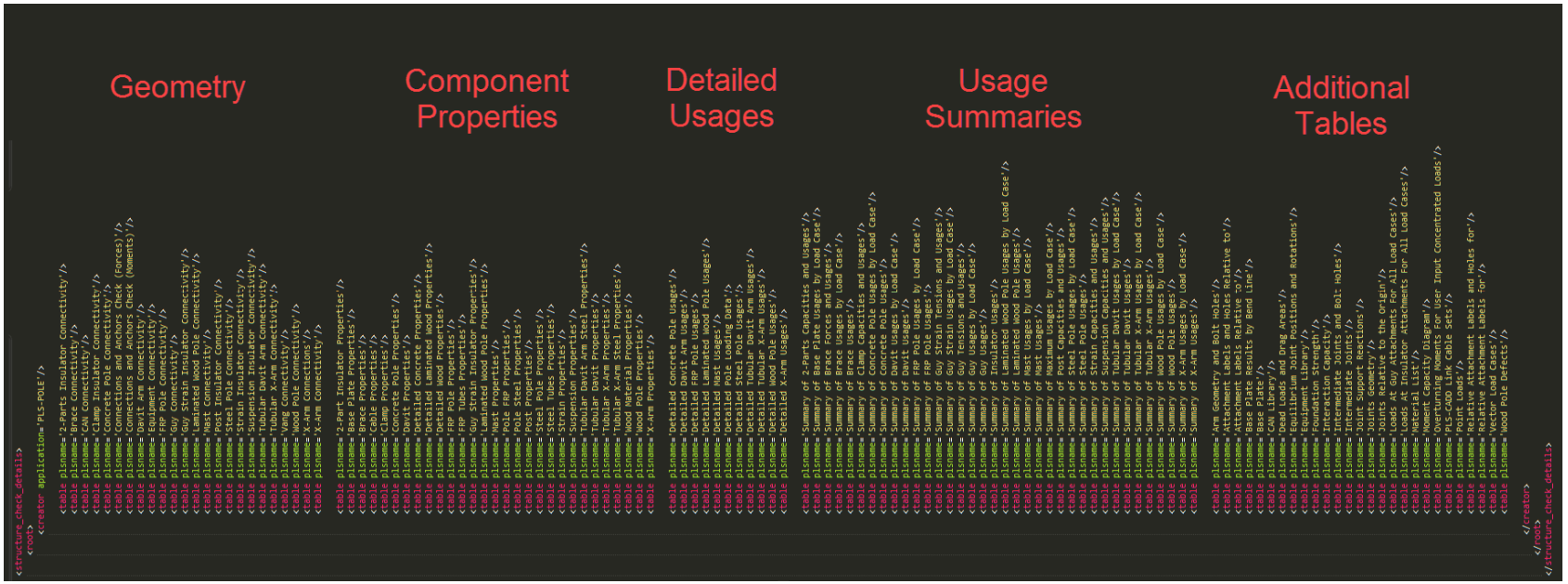
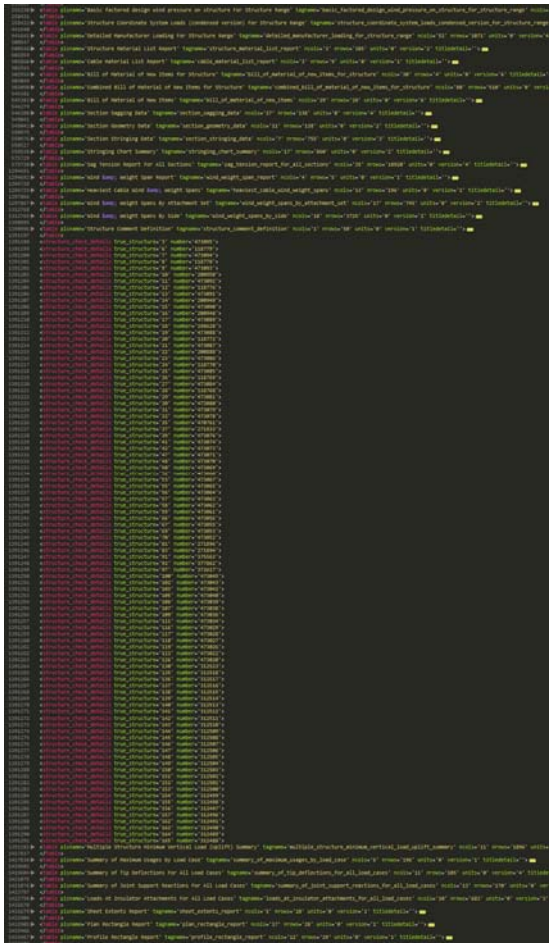
PLS Data Source: 2017

- PLS-CADD Version 14.4
  - Structure Check Details Tag
    - Properties, Geometry, Loading and More!



The Full Picture



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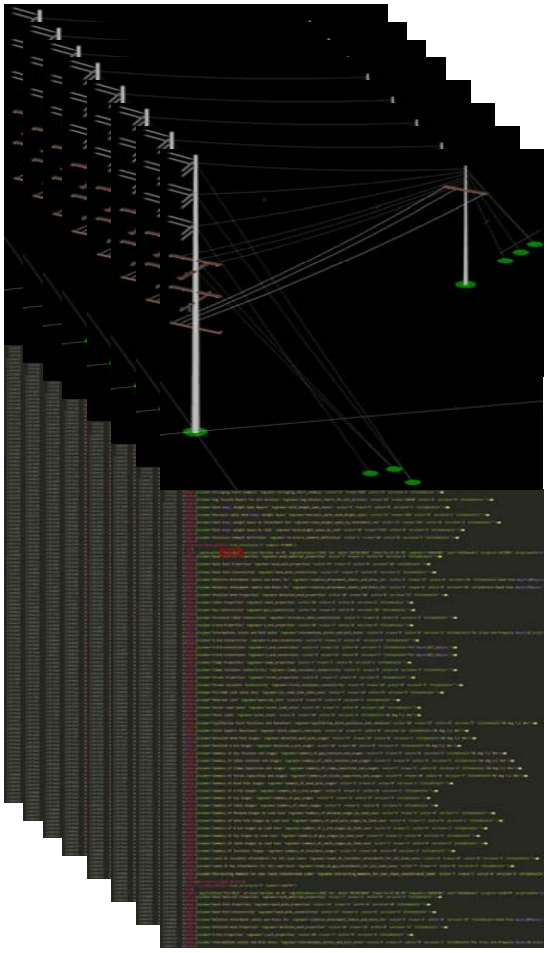

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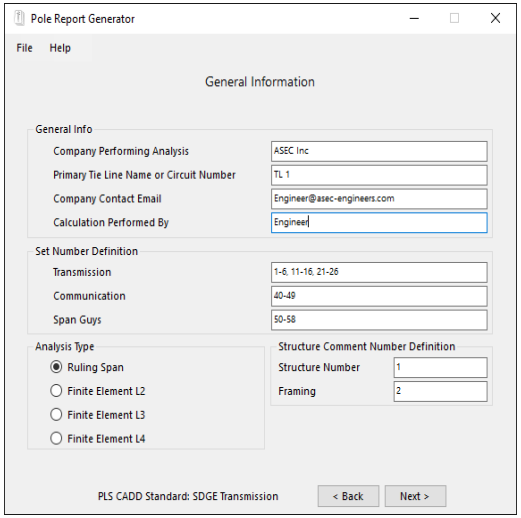
PRG Updates

2015

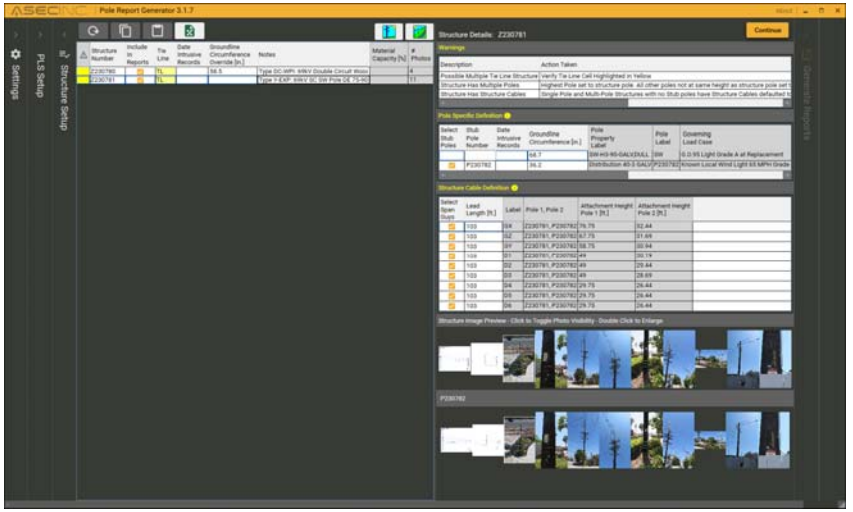
- Windows Forms
- Complex Wizard
- Standalone User Manual
- Manual Updating



< 5 Users

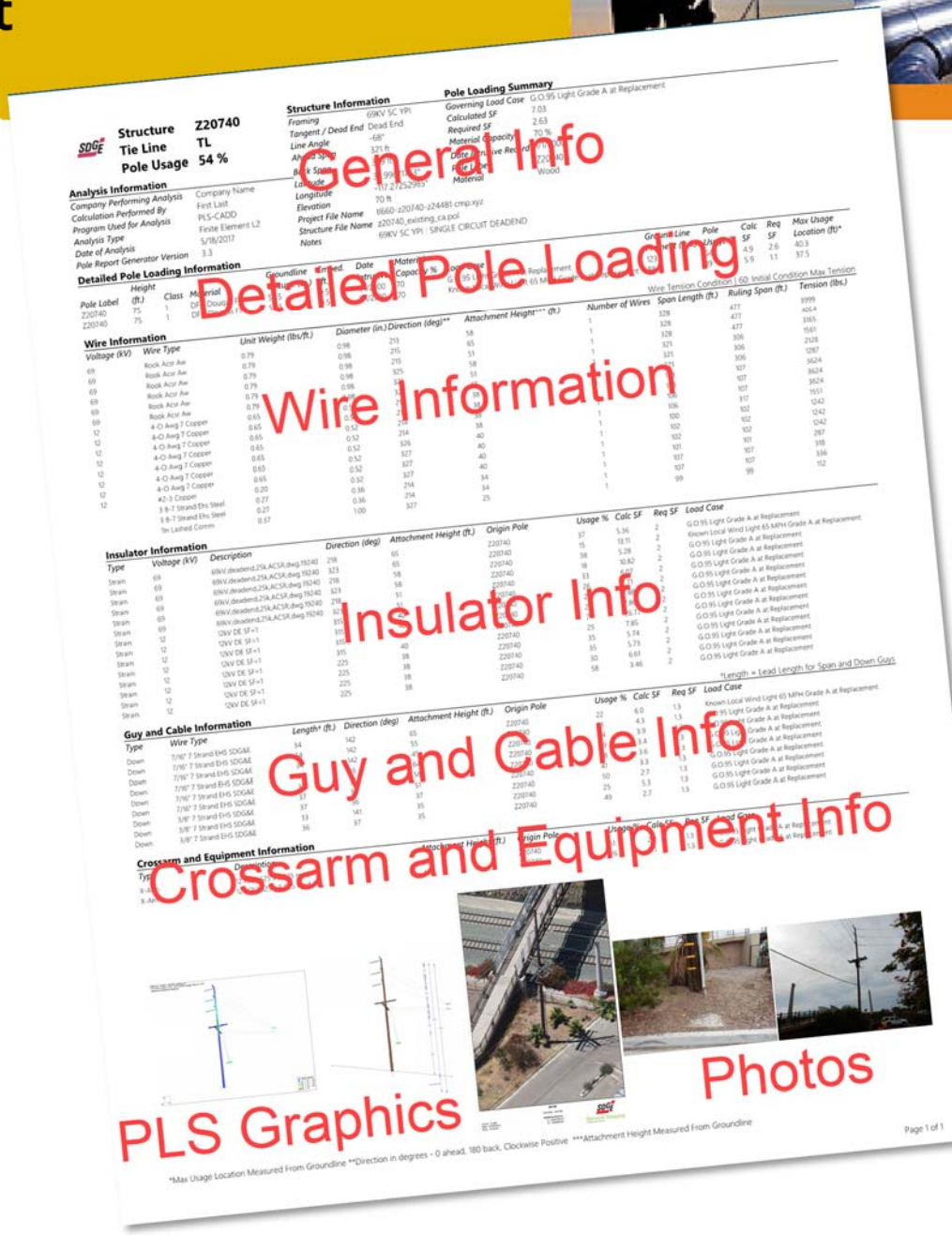
2017

- WPF
- Single Page Application
- Integrated Help / Instructions
- Automatic Updating



~40 Users

PRG Report


General Info
Detailed Pole Loading
Wire Information
Insulator Info
Guy and Cable Info
Crossarm and Equipment Info
PLS Graphics
Photos

General Info

Structure	**Z20740**
Tie Line	**TL**
Pole Usage	**54 %**

Analysis Information

Company Performing Analysis	Company Name
Calculation Performed By	First Last
Program Used for Analysis	PLS-CADD
Analysis Type	Finite Element L2
Date of Analysis	5/18/2017
Pole Report Generator Version	3.2

Structure Information

Framing	69KV SC YPI
Tangent / Dead End	Dead End
Line Angle	-68°
Ahead Span	321 ft
Back Span	329 ft
Latitude	32.99671753°
Longitude	-117.27252985°
Elevation	70 ft
Project File Name	tl660-z20740-z24481 cmp.xyz
Structure File Name	z20740_existing_ca.pol
Notes	69KV SC YPI : SINGLE CIRCUIT DEADEND

Pole Loading Summary

Governing Load Case	G.O.95 Light Grade A at Replacement
Calculated SF	7.03
Required SF	2.63
Material Capacity	70 %
Date Intrusive Record	1/1/2010
Pole Label	Z20740
Material	Wood

Detailed Pole Loading

Detailed Pole Loading Information

Pole Label	Height (ft.)	Class	Material	Groundline Circum. (in.)	Embed. (ft.)	Date Intrusive	Material Capacity %	Load Case	Ground Line Moment (ft-k)	Pole Usage %	Calc SF	Req SF	Max Usage Location (ft)*
Z20740	75	1	DF - Douglas Fir	52.5	9.5	1/1/2017	70	G.O.95 Light Grade A at Replacement	1232	54	4.9	2.6	40.3
Z20740	75	1	DF - Douglas Fir	52.5	9.5	1/1/2017	70	Known Local Wind Light 65 MPH Grade A at Replacement	884	19	5.9	1.1	37.5

Wires

Wire Information

Wire Tension Condition | 60: Initial Condition Max Tension

Voltage (kV)	*Wire Type*	*Unit Weight (lbs/ft.)*	*Diameter (in.)*	*Direction (deg)***	*Attachment Height*** (ft.)*	*Number of Wires*	*Span Length (ft.)*	*Ruling Span (ft.)*	*Tension (lbs.)*
69	Rook Acsr Aw	0.79	0.98	125	65	1	328	477	4054
69	Rook Acsr Aw	0.79	0.98	123	58	1	328	477	3999
69	Rook Acsr Aw	0.79	0.98	125	51	1	328	477	3165
12	4-O Awg 7 Copper	0.65	0.52	124	38	1	108	107	3624
12	4-O Awg 7 Copper	0.65	0.52	124	38	1	108	107	3624
12	4-O Awg 7 Copper	0.65	0.52	124	38	1	106	107	3624
12	4-O Awg 7 Copper	0.65	0.52	124	38	1	106	317	1551
12	4-O Awg 7 Copper	0.65	0.52	237	40	1	102	102	1242
12	4-O Awg 7 Copper	0.65	0.52	237	40	1	102	102	1242
12	4-O Awg 7 Copper	0.65	0.52	236	40	1	100	102	1242
12	#2-3 Copper	0.20	0.32	237	40	1	101	101	287
69	Rook Acsr Aw	0.79	0.98	235	58	1	321	306	1561
69	Rook Acsr Aw	0.79	0.98	237	65	1	321	306	1287
69	Rook Acsr Aw	0.79	0.98	235	51	1	321	306	2128
	1In Lashed Comm	0.37	1.00	237	25	1	99	99	112
	3 8-7 Strand Ehs Steel	0.27	0.36	124	34	1	107	107	318
	3 8-7 Strand Ehs Steel	0.27	0.36	124	34	1	107	107	336

Insulators

Insulator Information

Type	*Voltage (kV)*	*Description*	*Direction (deg)*	*Attachment Height (ft.)*	*Origin Pole*	*Usage %*	*Calc SF*	*Req SF*	*Load Case*
Strain	69	69kV,deadend,25k,ACSR,dwg.19240	218	65	Z20740	37	5.36	2	G.O.95 Light Grade A at Replacement
Strain	69	69kV,deadend,25k,ACSR,dwg.19240	323	65	Z20740	15	13.11	2	Known Local Wind Light 65 MPH Grade A at Replacement
Strain	69	69kV,deadend,25k,ACSR,dwg.19240	218	58	Z20740	38	5.28	2	G.O.95 Light Grade A at Replacement
Strain	69	69kV,deadend,25k,ACSR,dwg.19240	323	58	Z20740	18	10.82	2	G.O.95 Light Grade A at Replacement
Strain	69	69kV,deadend,25k,ACSR,dwg.19240	218	51	Z20740	33	6.07	2	G.O.95 Light Grade A at Replacement
Strain	69	69kV,deadend,25k,ACSR,dwg.19240	323	51	Z20740	26	7.71	2	G.O.95 Light Grade A at Replacement
Strain	12	12kV DE SF=1	315	40	Z20740	25	7.88	2	G.O.95 Light Grade A at Replacement
Strain	12	12kV DE SF=1	315	40	Z20740	25	7.86	2	G.O.95 Light Grade A at Replacement
Strain	12	12kV DE SF=1	315	40	Z20740	7	26.77	2	G.O.95 Light Grade A at Replacement
Strain	12	12kV DE SF=1	315	40	Z20740	25	7.85	2	G.O.95 Light Grade A at Replacement
Strain	12	12kV DE SF=1	225	38	Z20740	35	5.74	2	G.O.95 Light Grade A at Replacement
Strain	12	12kV DE SF=1	225	38	Z20740	35	5.73	2	G.O.95 Light Grade A at Replacement
Strain	12	12kV DE SF=1	225	38	Z20740	30	6.61	2	G.O.95 Light Grade A at Replacement
Strain	12	12kV DE SF=1	225	38	Z20740	58	3.46	2	G.O.95 Light Grade A at Replacement

Guys and Cables

Guy and Cable Information

†Length = Lead Length for Span and Down Guys

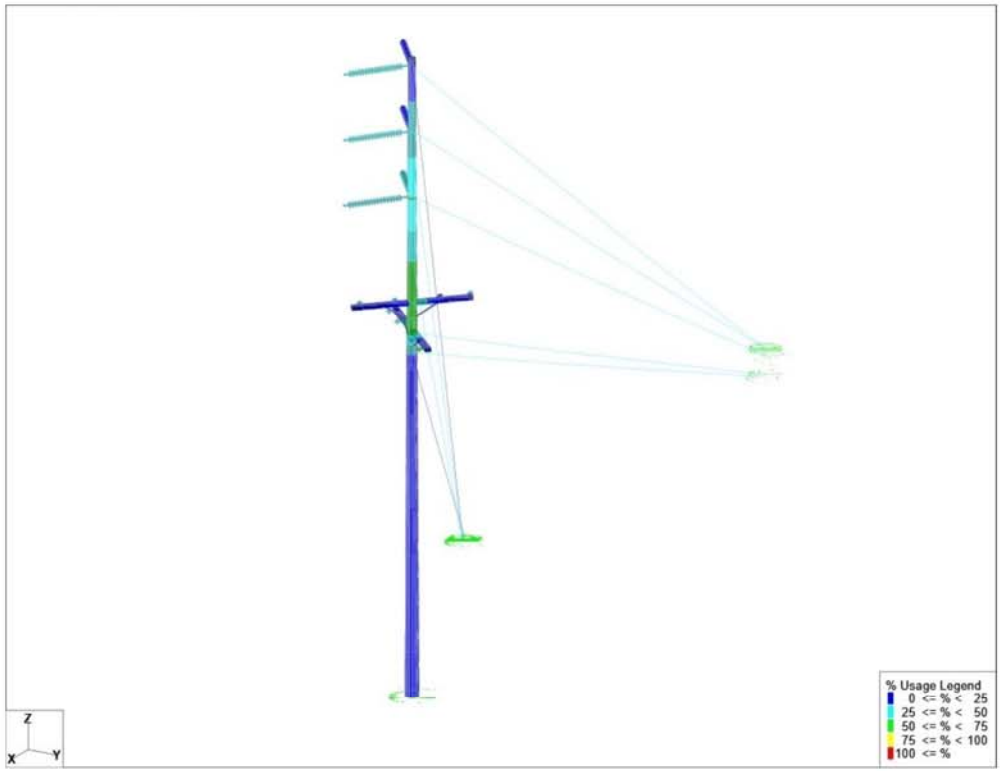
Type	*Wire Type*	*Length† (ft.)*	*Direction (deg)*	*Attachment Height (ft.)*	*Origin Pole*	*Usage %*	*Calc SF*	*Req SF*	*Load Case*
Down	7/16" 7 Strand EHS SDG&E	34	142	65	Z20740	22	6.0	1.3	Known Local Wind Light 65 MPH Grade A at Replacement
Down	7/16" 7 Strand EHS SDG&E	34	142	55	Z20740	31	4.3	1.3	G.O.95 Light Grade A at Replacement
Down	7/16" 7 Strand EHS SDG&E	34	142	45	Z20740	34	3.9	1.3	G.O.95 Light Grade A at Replacement
Down	7/16" 7 Strand EHS SDG&E	37	36	64	Z20740	39	3.4	1.3	G.O.95 Light Grade A at Replacement
Down	7/16" 7 Strand EHS SDG&E	37	36	58	Z20740	38	3.6	1.3	G.O.95 Light Grade A at Replacement
Down	7/16" 7 Strand EHS SDG&E	37	37	51	Z20740	41	3.3	1.3	G.O.95 Light Grade A at Replacement
Down	3/8" 7 Strand EHS SDG&E	37	36	37	Z20740	50	2.7	1.3	G.O.95 Light Grade A at Replacement
Down	3/8" 7 Strand EHS SDG&E	33	141	35	Z20740	25	5.3	1.3	G.O.95 Light Grade A at Replacement
Down	3/8" 7 Strand EHS SDG&E	36	37	35	Z20740	49	2.7	1.3	G.O.95 Light Grade A at Replacement

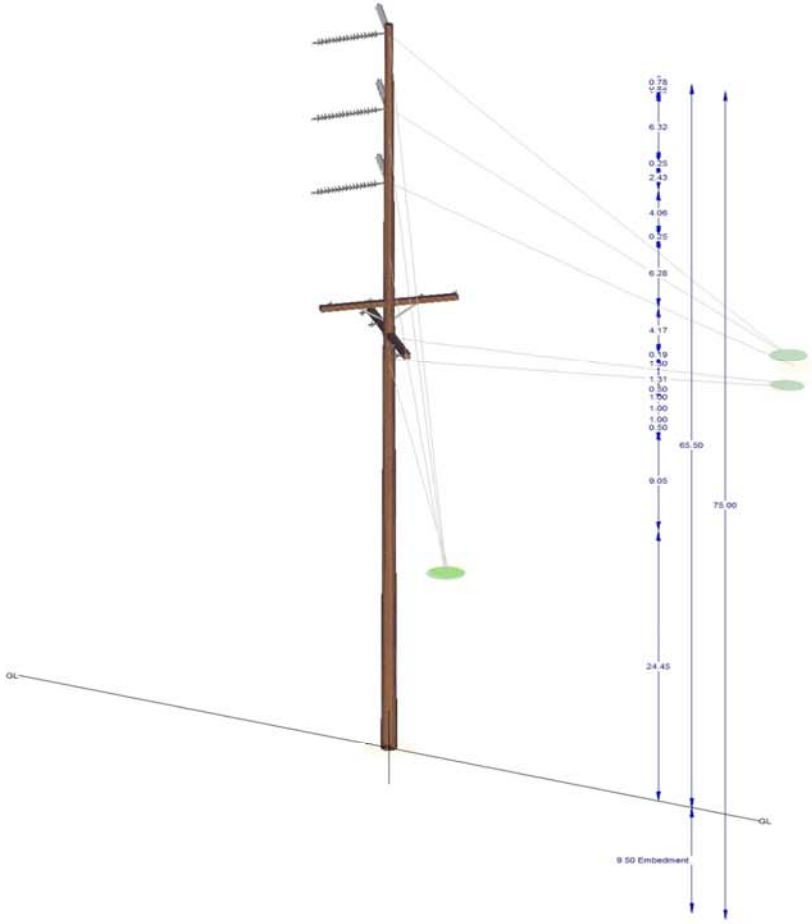
Crossarms and Equipment

Crossarm and Equipment Information

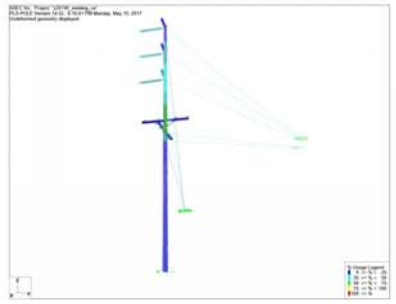
Type	*Description*	*Attachment Height (ft.)*	*Origin Pole*	*Usage %*	*Calc SF*	*Req SF*	*Load Case*
X-Arm	12`x(2)3.625 x 5.625 mod	38	Z20740	61	2.2	1.3	G.O.95 Light Grade A at Replacement
X-Arm	12`x(2)3.625 x 5.625 mod 2	40	Z20740	26	5.1	1.3	G.O.95 Light Grade A at Replacement

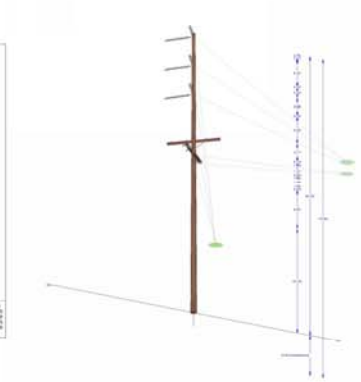
PLS Graphics



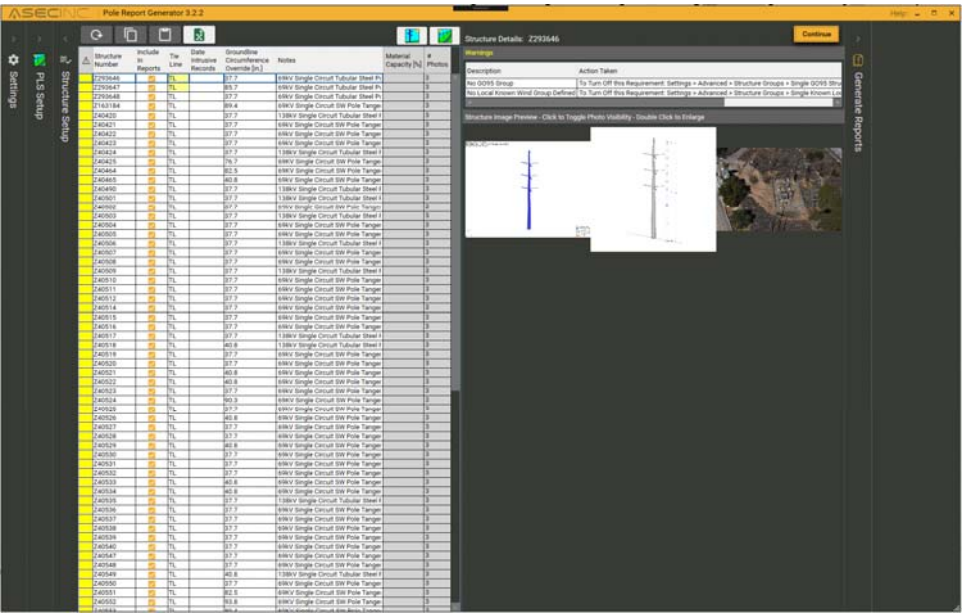


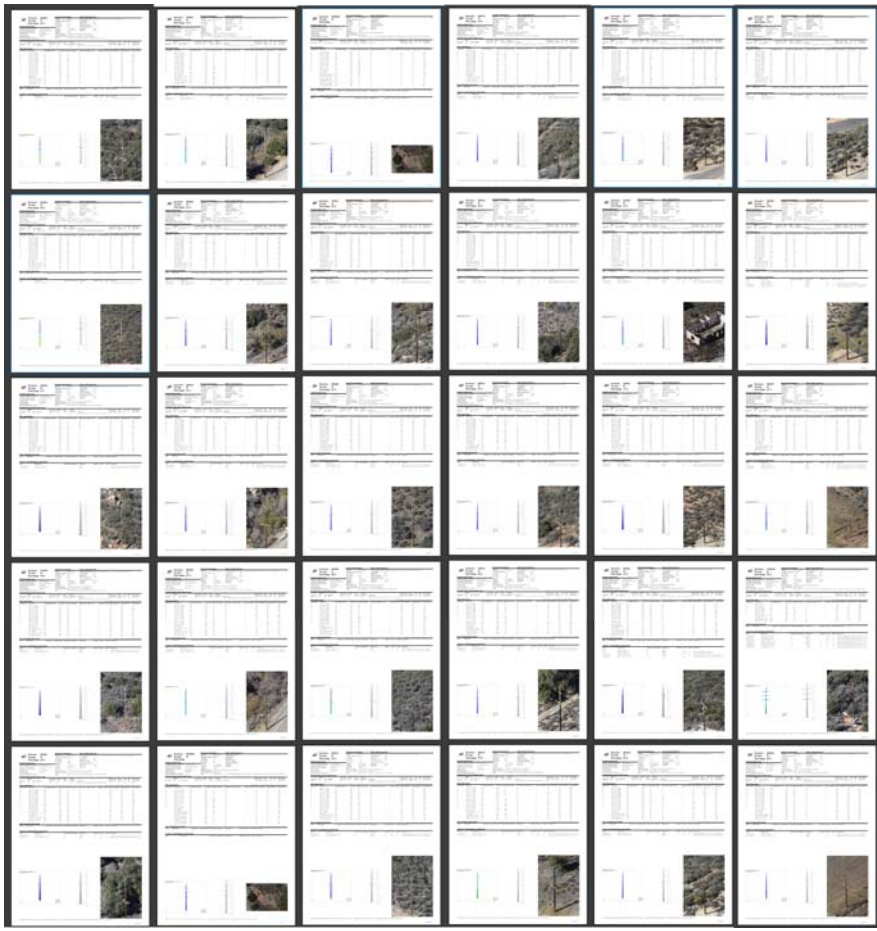
Graphics + Photos



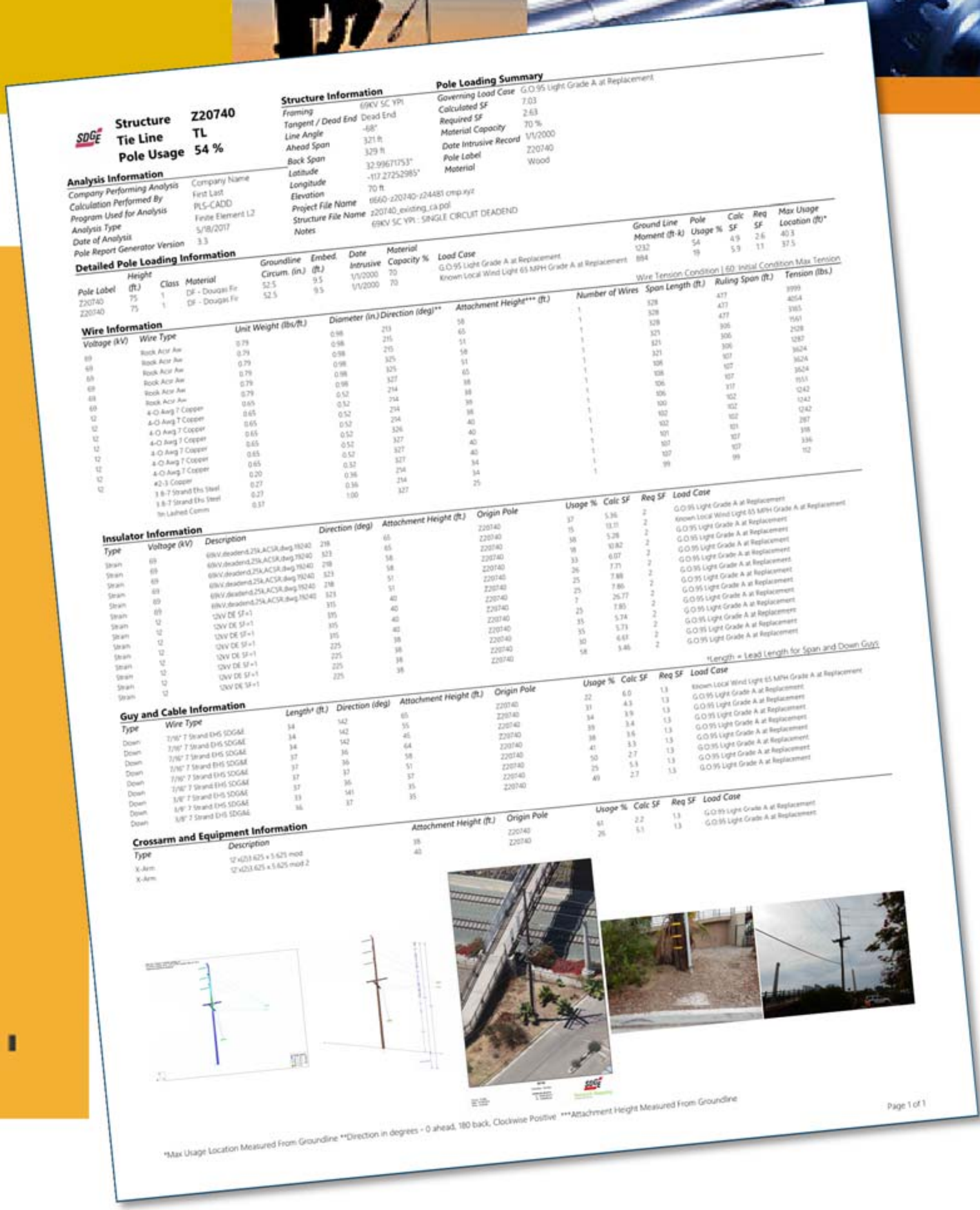


Bulk Reporting





Demo



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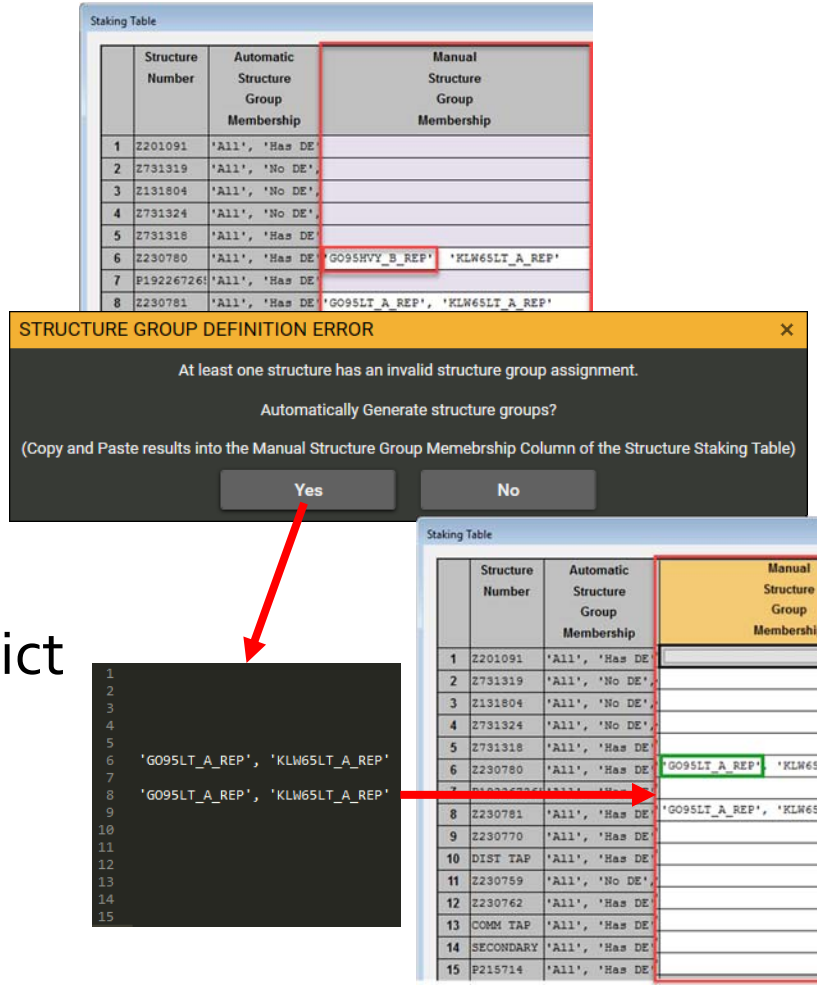
Additional Benefits

- Provides QA/QC
  - Modeling Set Up:
    - Schema File
    - Set & Phase Numbering
    - Criteria File
  - Load Cases
    - GO95 Loading District
    - Known Local Wind District



Process Integration

- Pole Reporting Integration
  - 60% Design - PRG Report and PLS-CADD Long Report
  - 90% Design - PRG Report and PLS-CADD Long Report
  - Final Design - PE Stamped PRG Report Only
- PIDS Database
  - Additional spreadsheet and file renaming to prepare for database upload

Questions

Single Page Report

Integrated QA / QC

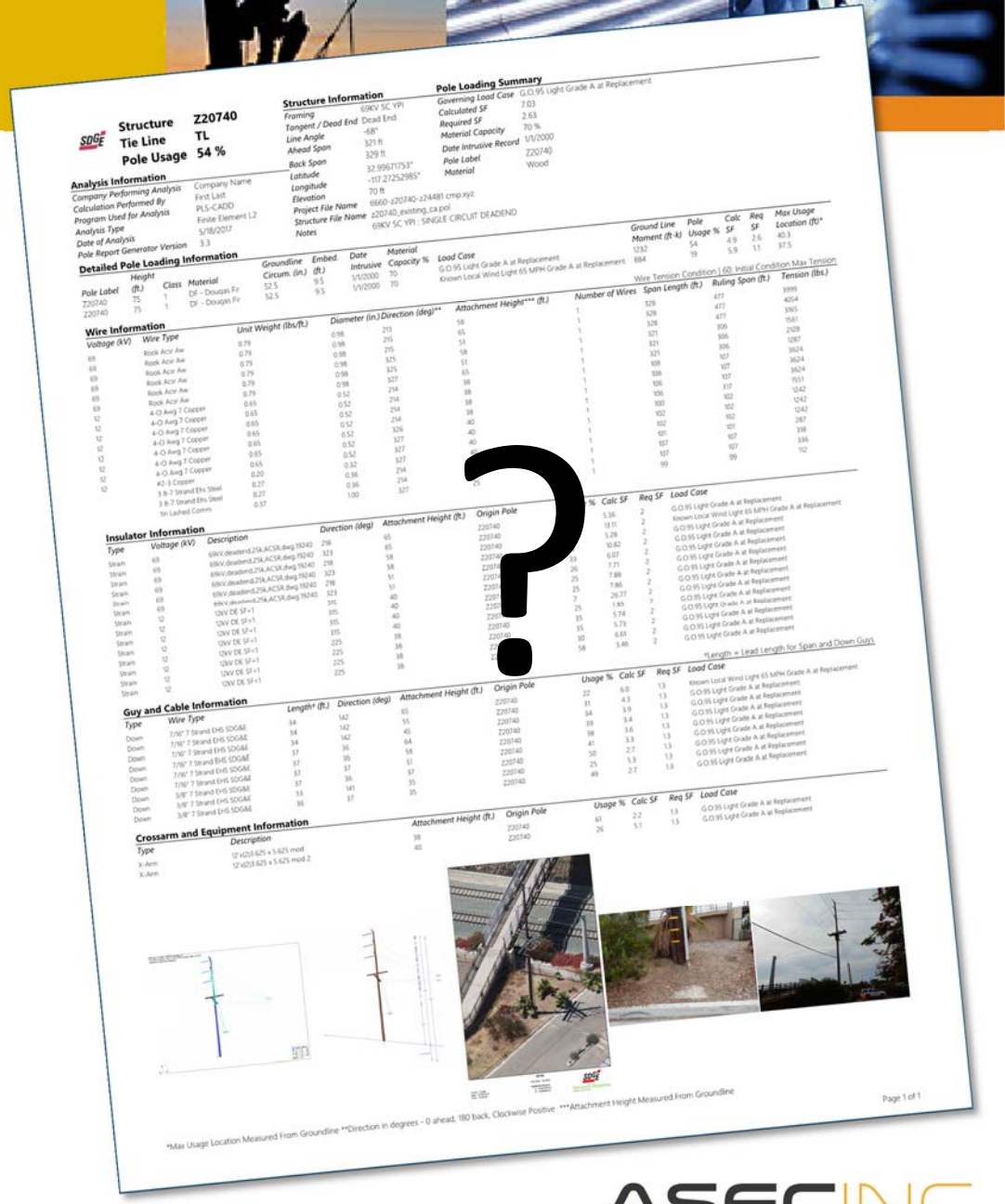
Transmission & Distribution

Bulk Output sheet

Compatible with PLS 14.4 and later

Intuitive User Experience

Automatic Updating



Thank You!

For more information, please visit
www.polereportgenerator.com

Thank you for your attention,

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