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# *Electric Energy Distribution Network Analysis Program ( PADEE )*

Author: Ing. Jorge Matheus

[www.matmor.com/padeeing.html](http://www.matmor.com/padeeing.html)

Edificio Valencia I, Piso 1 - Ofic. 2 –Ave. Fco Miranda - Los Dos Caminos, Caracas 1071, Venezuela

Tlf: 235.76.40, (0416)621-91-14 - Fax: 235.76.40 - E-mail: [jorgematheus@gmail.com](mailto:jorgematheus@gmail.com)

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## **WHO IS MATMOR?**

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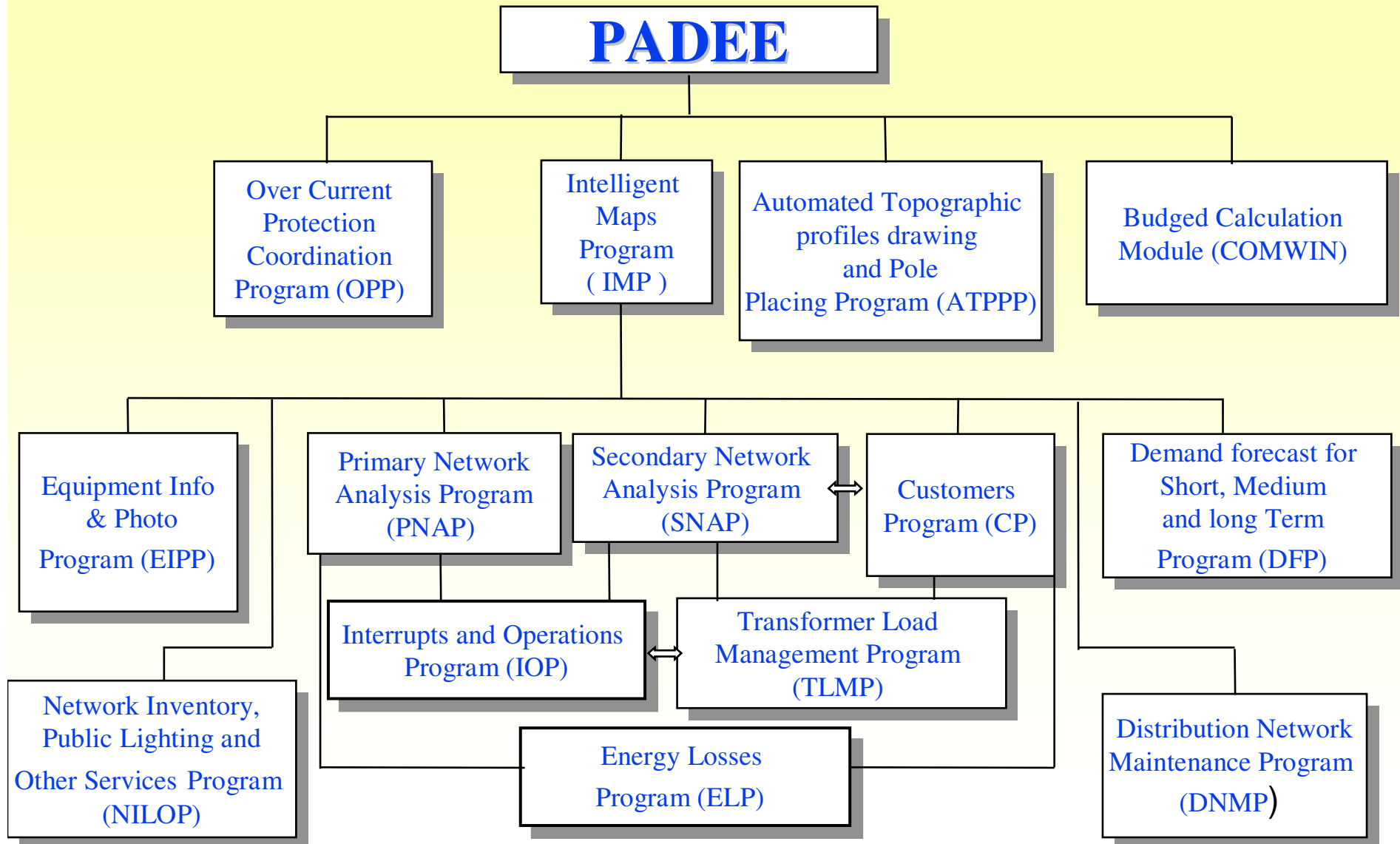
**Ingenieria y Construcción MATMOR is form in 1998 but engineering staff has more than 30 years experience in Electric Energy Distribution Projects, Transmission and Substations, using all these experience in developing PADEE software**

**MATMOR, also do electric Works inspection and minor construction projects.**

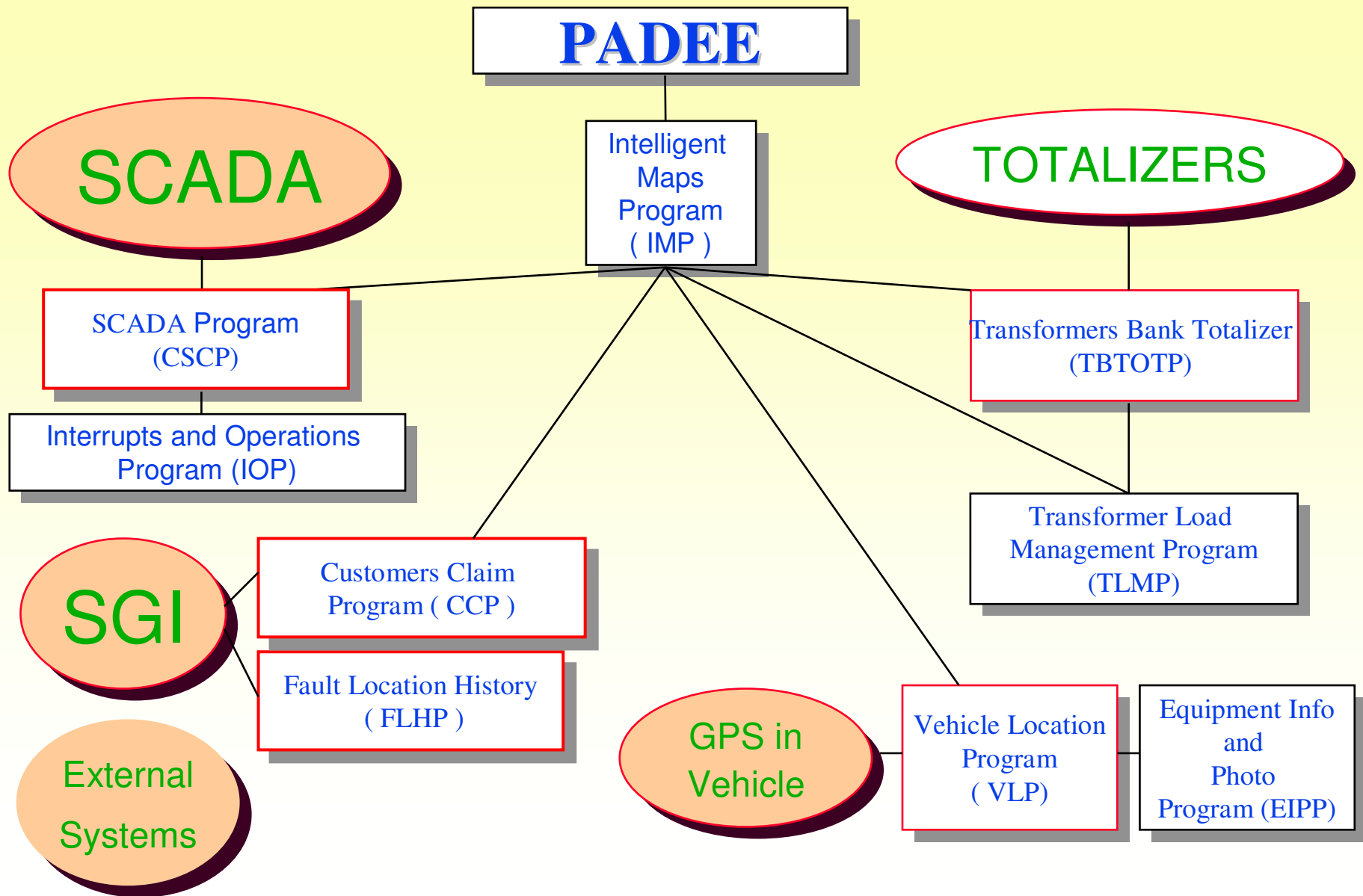
**It also helps clients budgeting, buying and reception electric power equipments and computer hardware and software.**



# Electric Energy Distribution Network Analysis Program (PADEE) modules



# Electric Energy Distribution Network Analysis Program (PADEE) modules



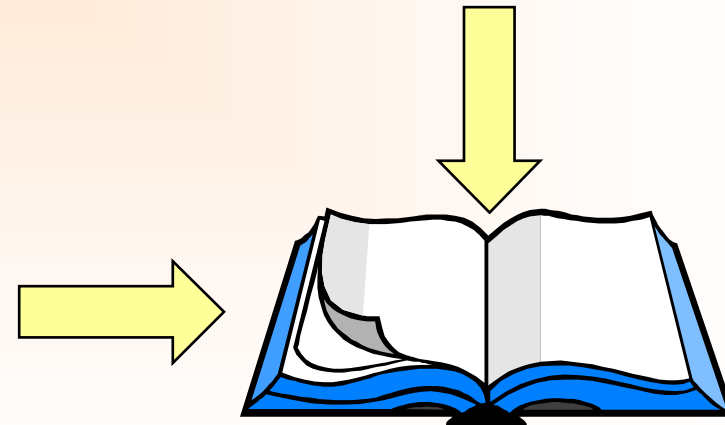
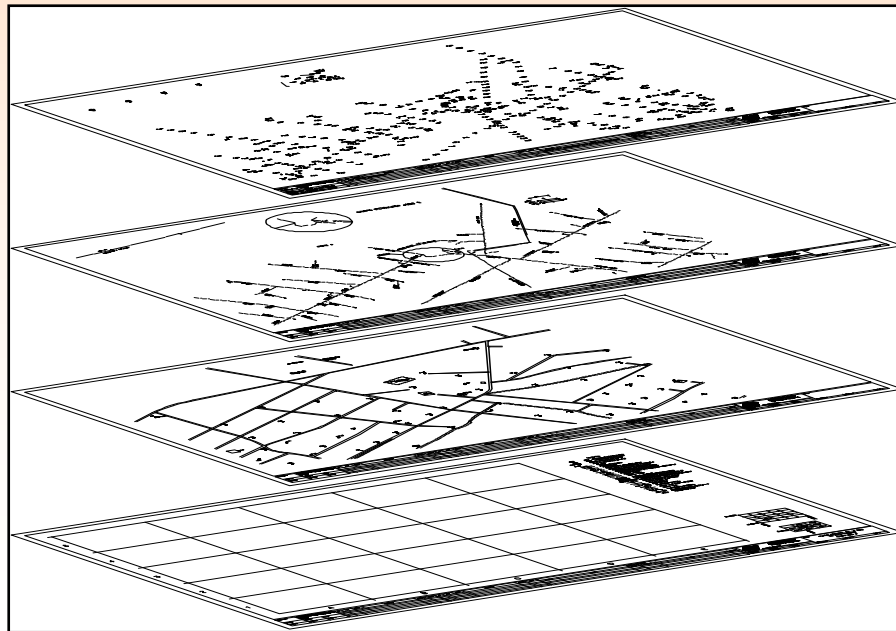
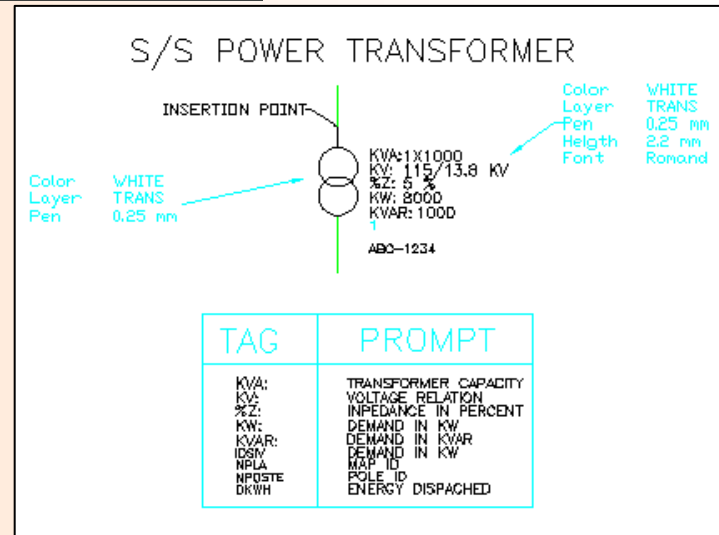
# PADEE Highlights

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- **Covers and integrates Planning, Operation, Projects, Commercial and Maintenance areas with a unique and coherent database easy to visualize**
- **Use simple methodologies.**
- **Low Computer Hardware requirement.**
- **Quick Learning curve**
- **More than 500 seats in use**
- **Easy to buy for consulting companies and public utilities companies due to Flex Licenses opportunities**

# Intelligent Map Design Program (IMP)

Use Autocad drawing engine to make network maps easily. Assuring perfect drawings, sharing and maintenance with a very fast learning curve. It take advantage of AutoCAD's layers and symbols



# Intelligent Maps Program (IMP)

• The information needed to make all kind of analysis is available at the networks maps, and these maps are already inside a computer (Autocad drawing), PADEE take advantage of this fact and use the computer to extract the distance, loads, capacities and other data available in the map and transfer into the analysis programs automatically and transparently to Users.

## •Maps Type

- Streets and parcels
- Electric Network
- Equipment Locations
- One Line Diagrams and schematics drawings

•This programs use the same visual symbols we had use for many years but it may be customized to local drawing standards

•Use layers and Blocks to makes maps

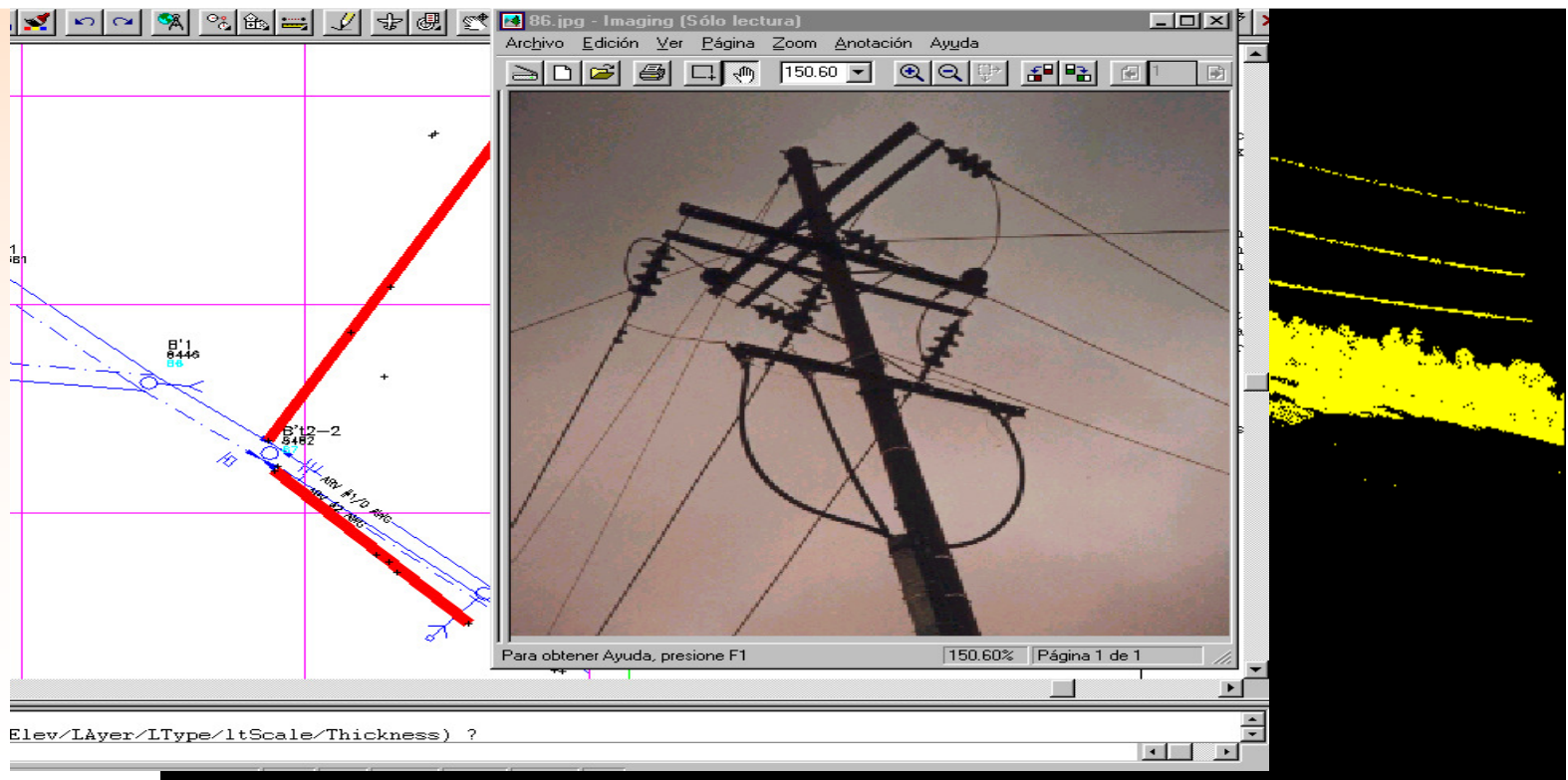
•Show drawing Procedures to make intelligent maps

- Distances, Conductor Sizes, R y X
- Transformers Capacities, switches, cut-outs and other equipments



# Equipment Information and Photo ( EIPP )

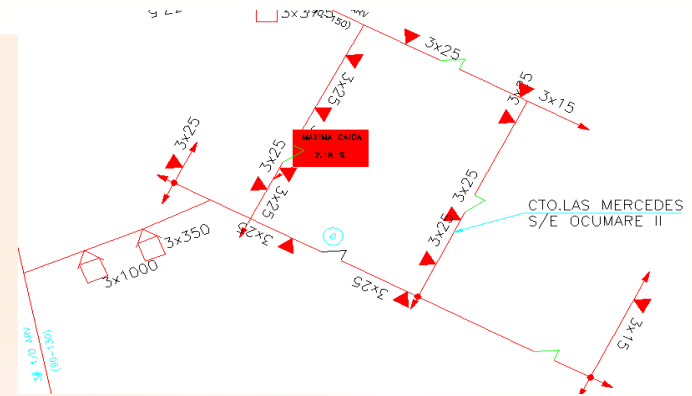
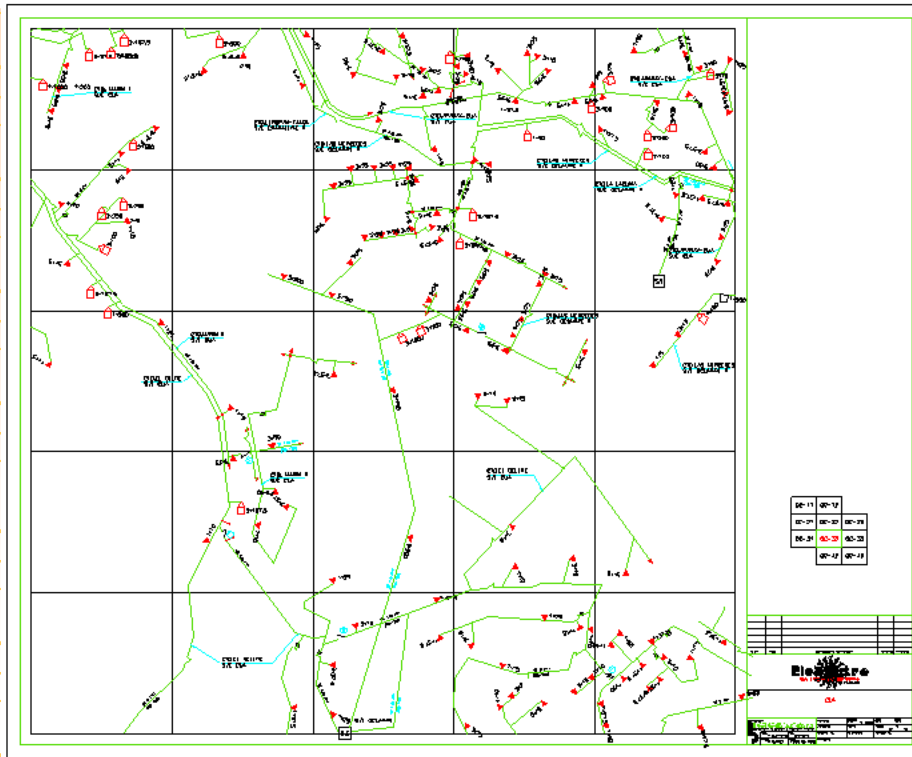
- Equipments in maps are linked to image, Excel Data, movie, or any other kind of multimedia documents. As example, pole may be photograph and linked to the network map.
- With this program you may click the symbol in map and it will deploy the information



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# Primary Network Analysis Programs (PNAP)

- All analysis are inside the maps. PNAP results are graphics. It use “Flags” or colors to highlight problems at points or sections. Tabular results is just for detailing results and are similar to older programs.



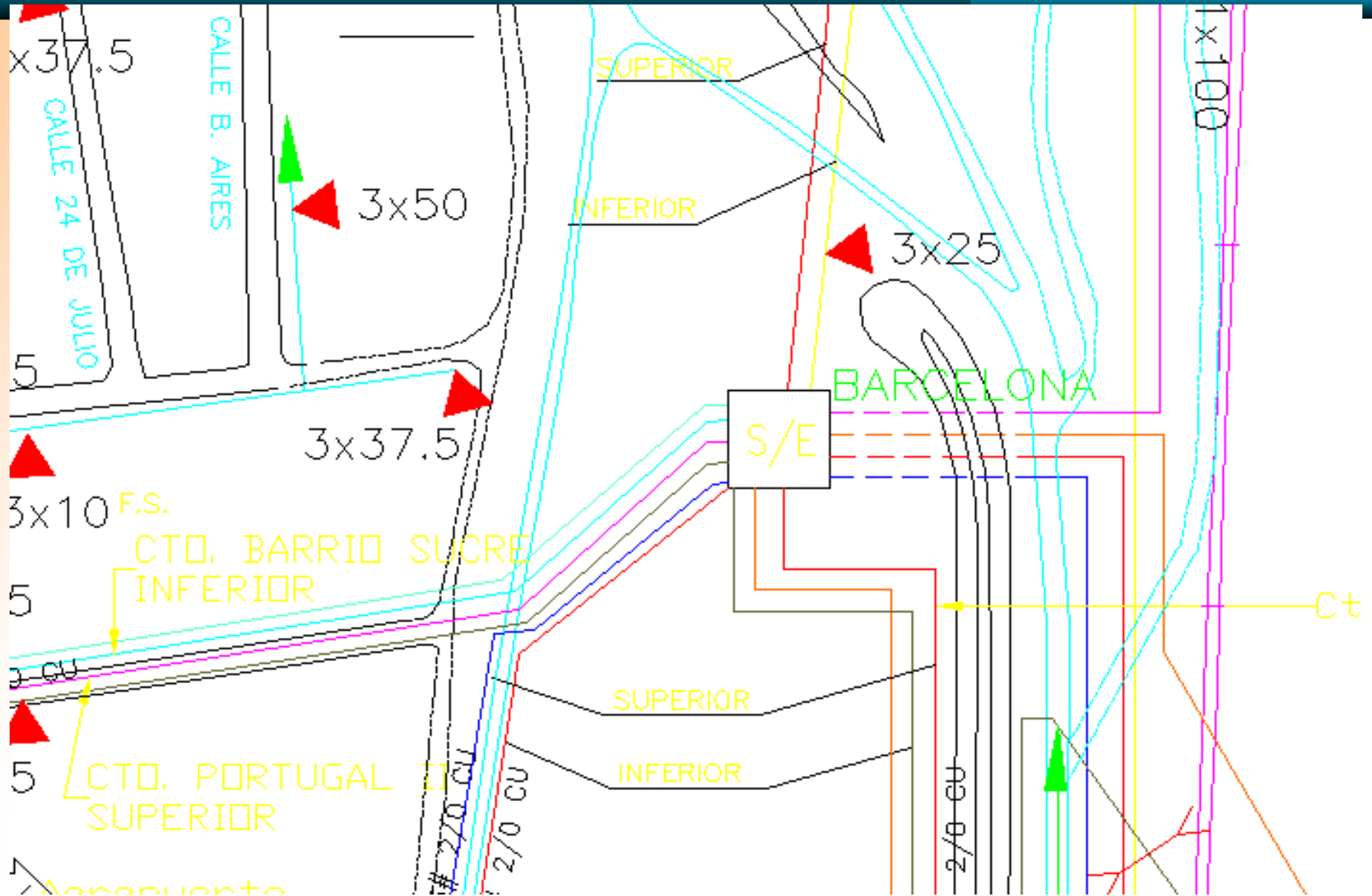
CIUDAD : OCUMARE AÑO : 1997 ALTERNATIVA : 1 FECHA : 29-JUL-97  
HORA : 15:12

PROGRAMA DE LOCALIZACION DE CARGAS

ALIMENTADOR NO. 3 CTO # 3 OCUMARE III S/E OCUMARE  
VOLTAJE LIMBA LIMBA 23.80 KV  
FACTORES DE POTENCIA 80.00 %  
TENSION EN LA BARRA 105 %  
AMPERIOS POR FASE 195. 195. 195. AMP

NODOS	CARGAS		DEMANDAS LOCALIZADAS		CARGAS FICTICIAS		DEMANDAS ESPECIALES	
	KVA	KVAR	KVA	KVAR	KVA	KVAR	KVA	KVAR
11	.00	.00	.00	.00	.00	.00	.00	.00
17	75.00	.00	49.52	39.70	29.62	.00	.00	.00
4	.00	.00	.00	.00	.00	.00	.00	.00
12	1500.00	.00	890.45	794.00	890.45	.00	.00	.00
10	.00	.00	.00	.00	.00	.00	.00	.00
13	450.00	.00	297.19	238.20	177.72	.00	.00	.00
7	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	.00	.00
18	.00	.00	.00	.00	.00	.00	.00	.00
22	75.00	.00	49.52	39.70	29.62	.00	.00	.00
20	.00	.00	.00	.00	.00	.00	.00	.00
19	.00	.00	.00	.00	.00	.00	.00	.00
15	.00	.00	.00	.00	.00	.00	.00	.00
21	75.00	.00	49.52	39.70	29.62	.00	.00	.00
8	.00	.00	.00	.00	.00	.00	.00	.00
7	2000.00	.00	623.42	525.00	414.68	.00	.00	.00
14	1000.00	.00	1941.30	1688.01	1344.81	.00	.00	.00
6	.00	.00	.00	.00	.00	.00	.00	.00
5	450.00	.00	297.19	238.20	177.72	.00	.00	.00
1	.00	.00	.00	.00	.00	.00	.00	.00
9	600.00	.00	334.26	317.60	234.36	.00	.00	.00
TOTALES	7275.00	.00	4804.64	3950.91	2873.16	.00	.00	.00

# Primary Network Analysis Programs (PNAP) – Automatically Feeder COLORED





# Primary Network Analysis Programs ( PNAP )

The following analysis may be performed:

- Load Flow and profiles graphics results ( voltage, loads, losses in each feeder sections and summaries)
- Capacitor Locations by minimum loss or minimum voltage drop criteria.
- Short Circuit calculation, three phase, two phases, two phase to ground and single phase to ground.
- Substation placing by load center criteria.

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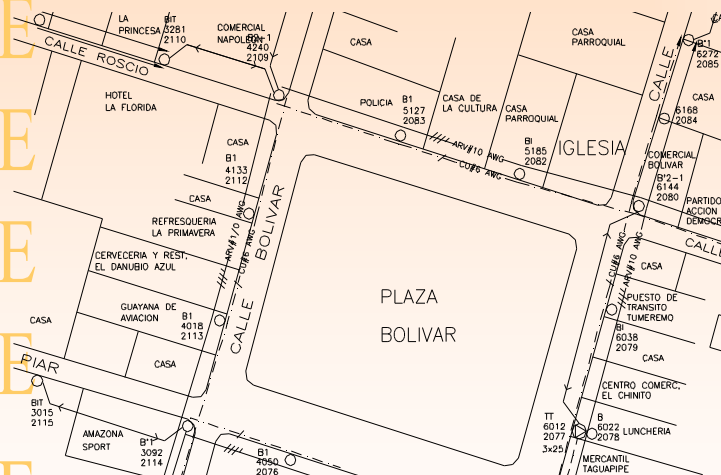
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# Secondary Network Analysis Program (SNAP)

Calculates operation conditions of secondary network base on customers loads linked to poles and taking data directly form maps. Perform load flow calculation for low voltage network

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LOW VOLTAGE NETWORK ANALYSIS										
SECTOR CODE: AAA706704			CITY: GAIGARA			MAP: AAA				
NOMINAL V.: 208/120			P.F.: 0.80			BANK CAP.: 3x15				
Ing. y Const. MATMOR, C.A.										
NODE No.	LOAD KVA	VOLTAGE ( Vpn )	% V	SECTION INI-END	CONDUCTOR	LONG. ( M )	AMP ( A )	LOAD ( KVA )	LOSS ( W )	
1	0.00	119.76	0.27	1- 2	4# 1/0 ARV	23.20	18.96	6.83	4.94	
2	0.00	119.48	0.52	2- 3	4# 1/0 ARV	45.80	18.96	6.83	9.72	
3	0.92	118.88	1.01	3- 4	4# 1/0 ARV	40.40	16.40	5.91	6.45	
4	5.91	118.43	1.38	5- 6	4# 1/0 ARV	15.70	0.00	0.00	0.00	
5	6.01	119.72	0.30	0- 1	4# 1/0 ARV	25.80	18.96	6.83	5.50	
6	0.00	119.72	0.30	0- 5	4# 1/0 ARV	32.40	16.66	6.01	5.35	
TOTAL LOSSES ( W )									31.96	
TOTAL LOAD WITHOUT S.L. (KVA)						12.84 + 0.00 = 12.84		CARGA = 28.53 %		
MAXIMUM VOLTAGE DROP ( % )						1.38				
MAXIMUM %V DROP NODE						4				
MAX CURRENT ( A )						18.96		MAX LOAD IN SECTION 8.43 %		
BETWEEN NODES						1- 2		1		

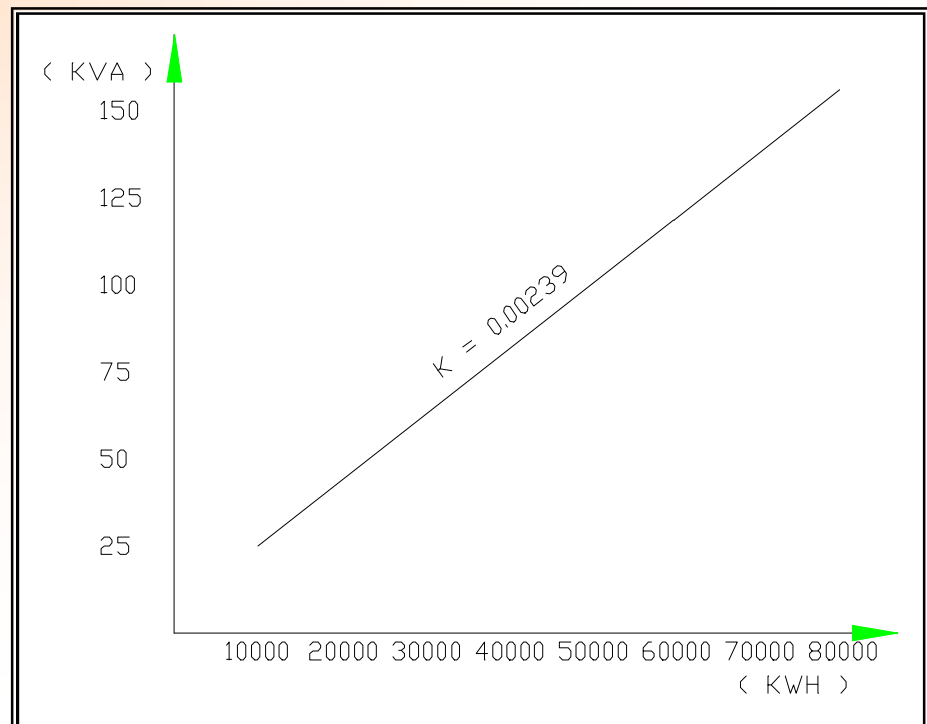
PA Results are output with a simple diagram as shown on right side figure.  
PA Highlights results are presented directly on map.



# Transformer Load Management Program (TLMP)

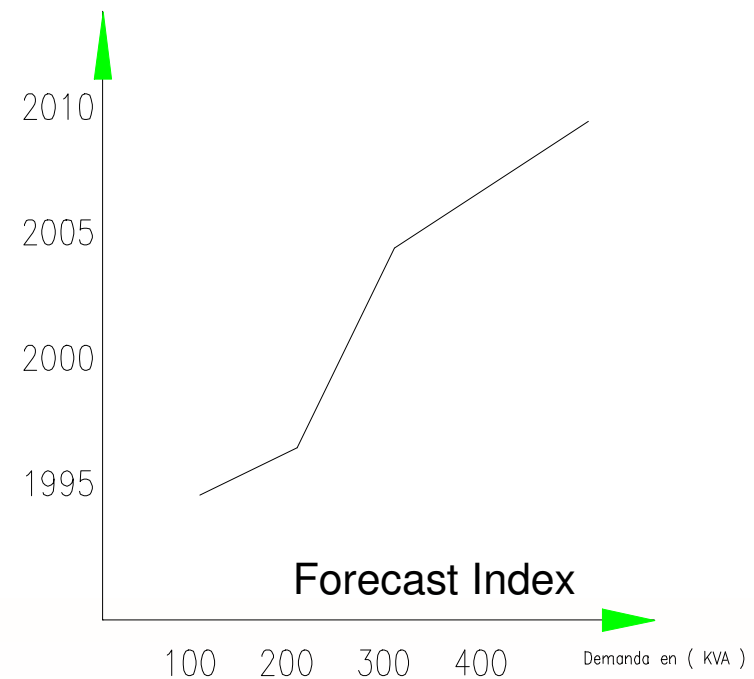
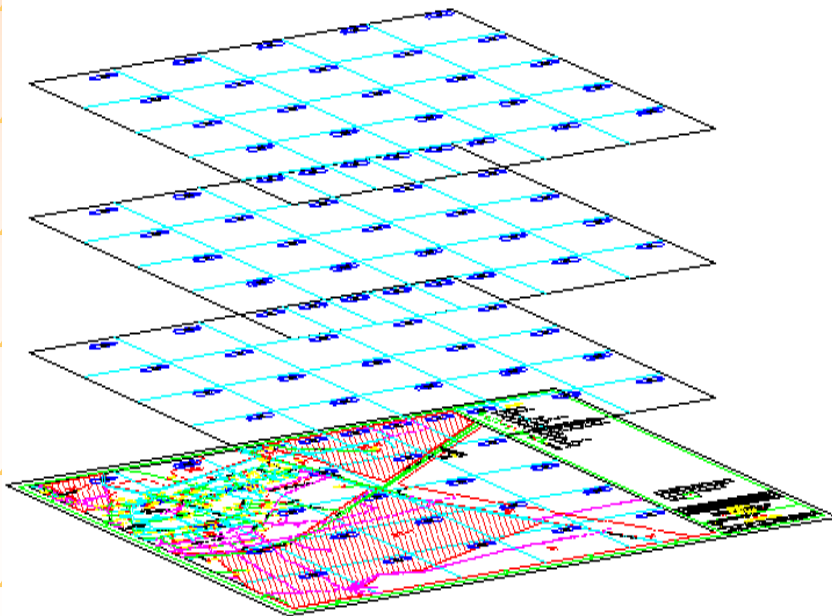
TLMP obtain transformer loads from low voltage networks, it use the relation made by SNAP and CP to get energy use by consumers. It sum all the energy use by consumers and use factor “K” to get transformer bank total demand. It may reverse the analysis with a instant measure to get estimate energy dispatch by transformer bank, and estimated non technical losses

Trafo Nº. Pole Nº	Capacity (KVA)	Total Energy Montly	Load Total (KVA)	% Load (KVA)	Notes
AA-2405	3x25	54500	81.75	109	Overloaded
AA-2507	3x37.5	67890	101.83	90.51	
AA-2609	3x15	43203	64.8	144.01	Overloaded
AA-3610	3x25	50134	75.2	100.26	
AA-4555	3x75	60233	90.34	40.15	
AA-5523	3x15	32304	48.45	107.66	Overloaded
AA-1233	2x10	12330	18.49	92.47	
AA-2345	3x25	67002	100.5	134	Overloaded
BA-2344	3x25	60453	90.67	120.9	Overloaded
BA-1223	3x25	32435	48.65	64.87	
BA-2344	3x15	54623	81.93	182.07	Overloaded
BA-6734	3x50	32478	47.71	32.48	Underloaded
BA-2345	3x25	57567	86.35	191.89	Overloaded



# Demand Forecast Program ( DFC )

DFC make easy the hard work needed to input the land use data. It also help to correlate present demand with estimated demands in small areas. May produce small area demand history. Forecast result are transferred back to network for further analysis.



# Programas de Coordinación de Protecciones (PCP)

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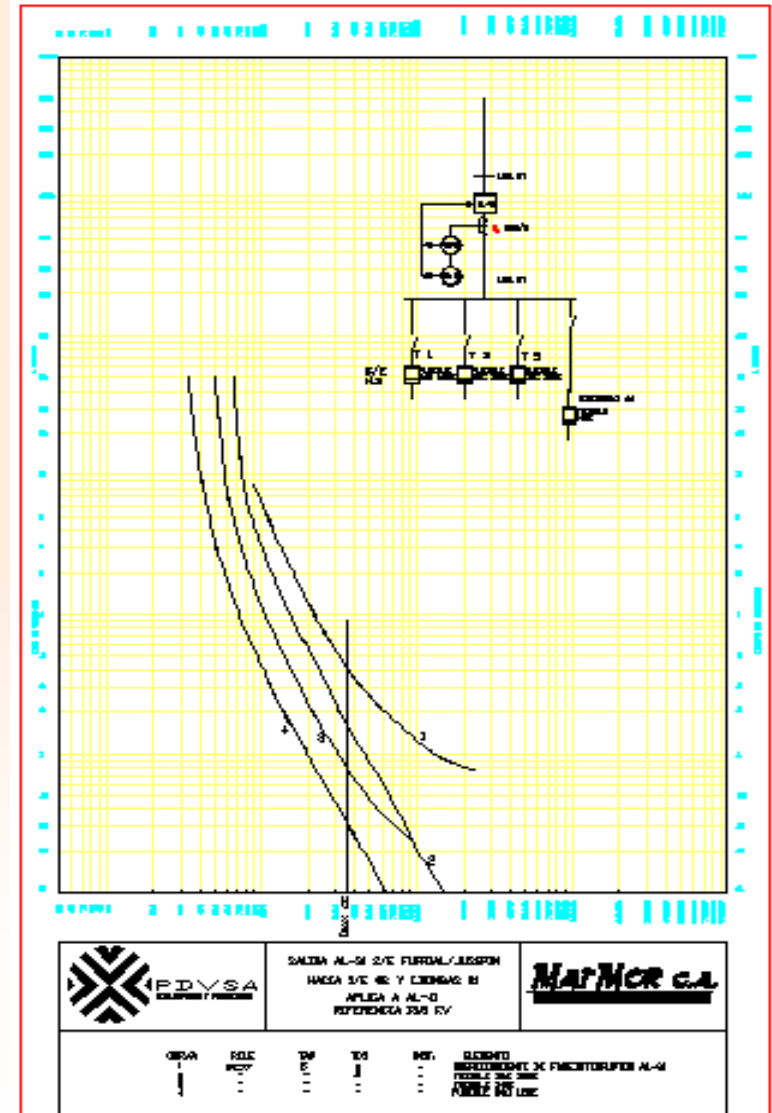
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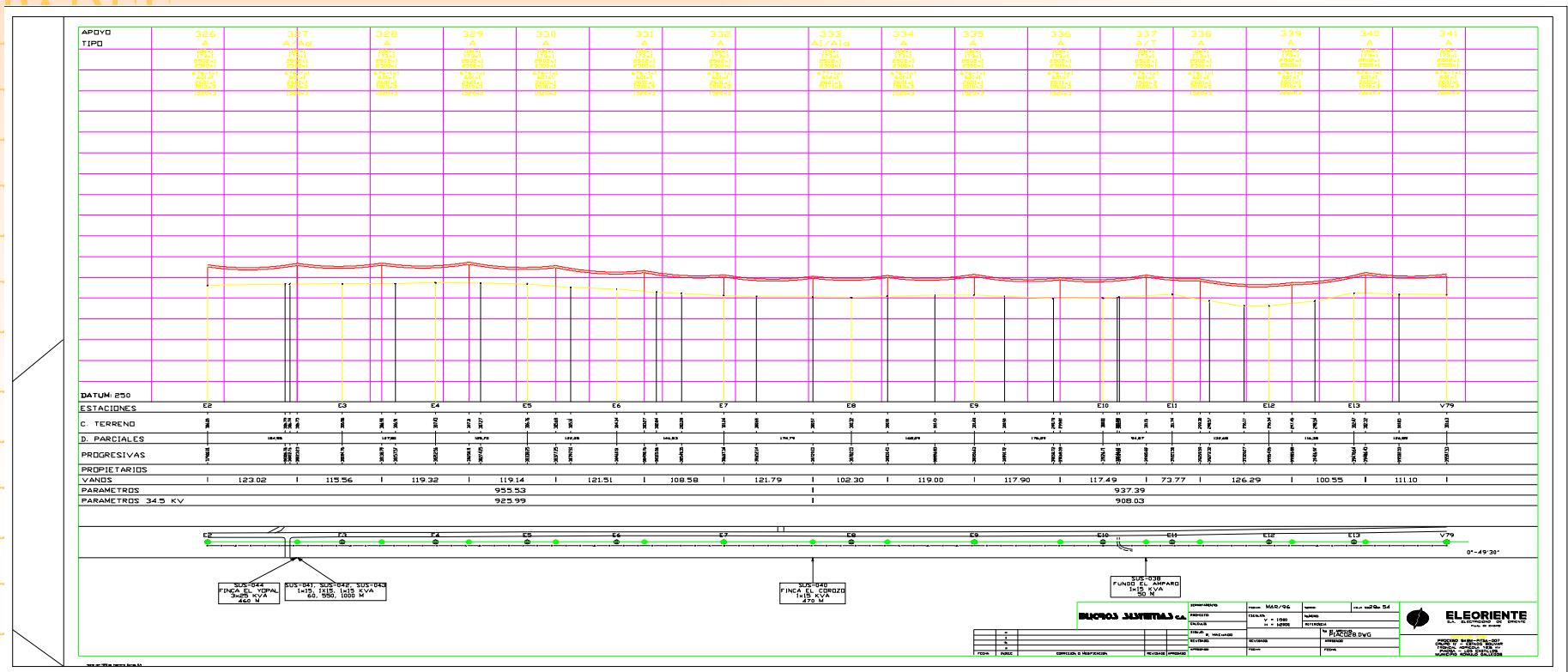
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- Has more than 150 relay type and fuse curves
- Symbols Library to aid one-line diagrams
- Curve, CT Dial and TAPS Data Automatic Identification

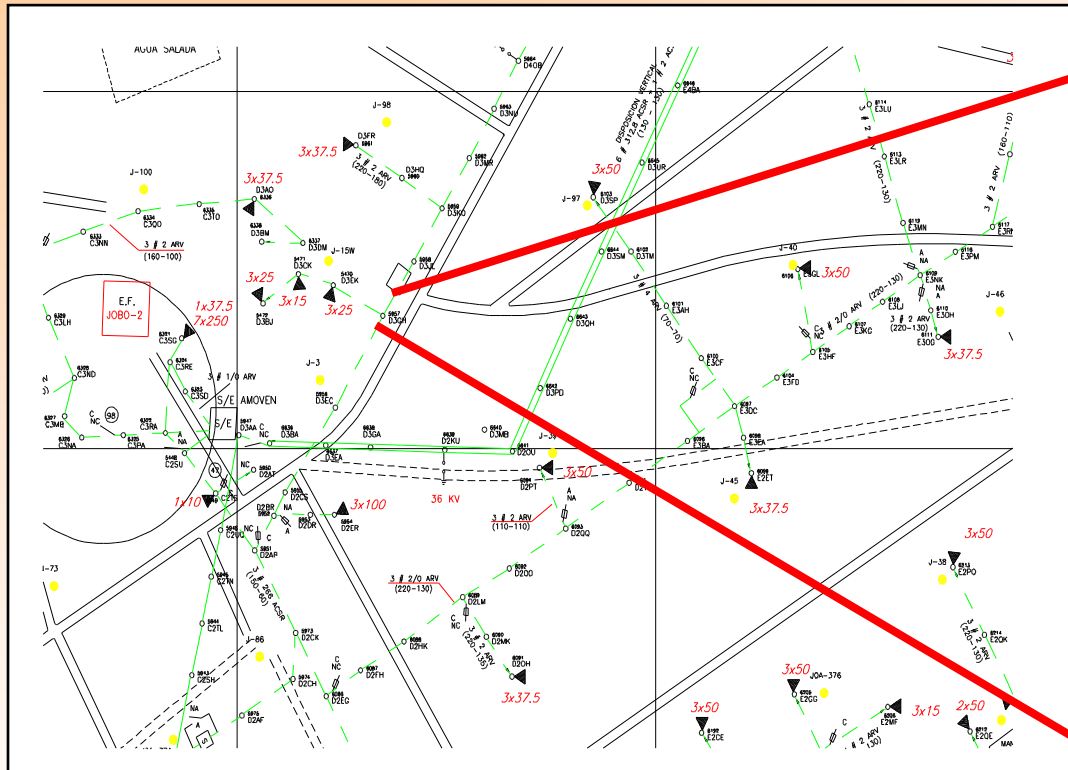


# Programas de Perfiles Topográficos y Diseño de Líneas ( PPTDL )

- Take data directly form Topographic Survey Notebook
- Do the mathematics calculations.
- Draw the topographic profile
- It has the tools with catenaries curves to manual pole placing.
- Calculates the exact catenary's conductors curve with the placed supporting structures or poles. Calculates medium span. Weight spam and real parameter, and other.



# COMWIN PROGRAM (B.O.M. - WORK BUDGED)



ELECCIDENTE  
UNIDAD DE DESARROLLO  
FILIAL DE CADAFE

PAGINA # 1  
FECHA : 05/04/94

PUNTO: 1300 ETAPA: 0  
DESCRIPCION: 21-0430

COD. OBRA: TUMEREM OBRA: REMODELACION DE LAS REDES AEREAS DE DISTRIBUCION DE TUMEREMO. ESTADO BOLIVAR.

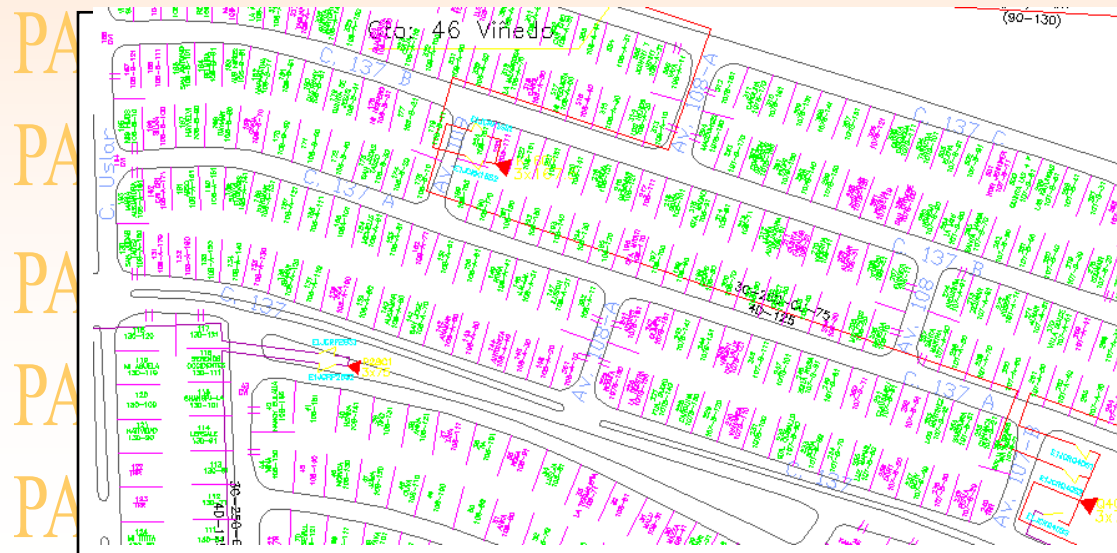
COD	DESCRIPCION	CAN	PRECIOS UNITARIOS		TOTAL	TOTAL GENERAL
			MATER	M. OBRA		
101	POSTE TUBULAR DE ACERO DE 8.23 MTS (27') DE LONGITUD S.E. 150 KG	1.00	9951.00	703.00	10654.00	10654.00
150	FUNDACION PARA POSTE DE 8.23 MTS , EN ALINEACION PARA CUALQUIER TIPO DE SUELO	1.00	2303.70	370.42	2674.12	2674.12
2501	PIRATURA DE POSTE DE BAJA TENSION CON SUS ACCESORIOS.	1.00	83.51	222.00	305.51	305.51
2500	CODIFICACION DE POSTE	1.00	0.00	0.00	0.00	0.00
418	PERCHA DE CUATRO AISLADORES PARA ALINEACION MONTADA EN POSTE DE SECCION 8.89 CH ( 3 1/2") DE DIAMETRO.	1.00	1283.00	411.00	1694.00	1694.00
301	BRAZO DE A.P. DE 3/4" X 1.20 MTS ABRAZ. 3-3 1/2" (7.62 - 8.89 CH) DE DMT. CON SU CONEXION AL POSTE LUMINARIA H-520.	1.00	1965.00	267.00	2232.00	2232.00
2401	ADAPTADORES PARA CONEXION DE ACOMETIDA EN BAJA TENSION RED MONOFASICA.	1.00	378.00	203.00	581.00	581.00
MONTO ACUMULADO (Bs) :			MATERIALES .....	15964.21		
			MANO DE OBRA .....	2176.42		
			TOTAL GENERAL .....		18140.63	

- Produce the Bill of Materials
- Work construction units
- Work Budged and other reports
- Can run stand alone o work with autocad maps.

# Energy Losses Program

## No technical Losses (ELP)

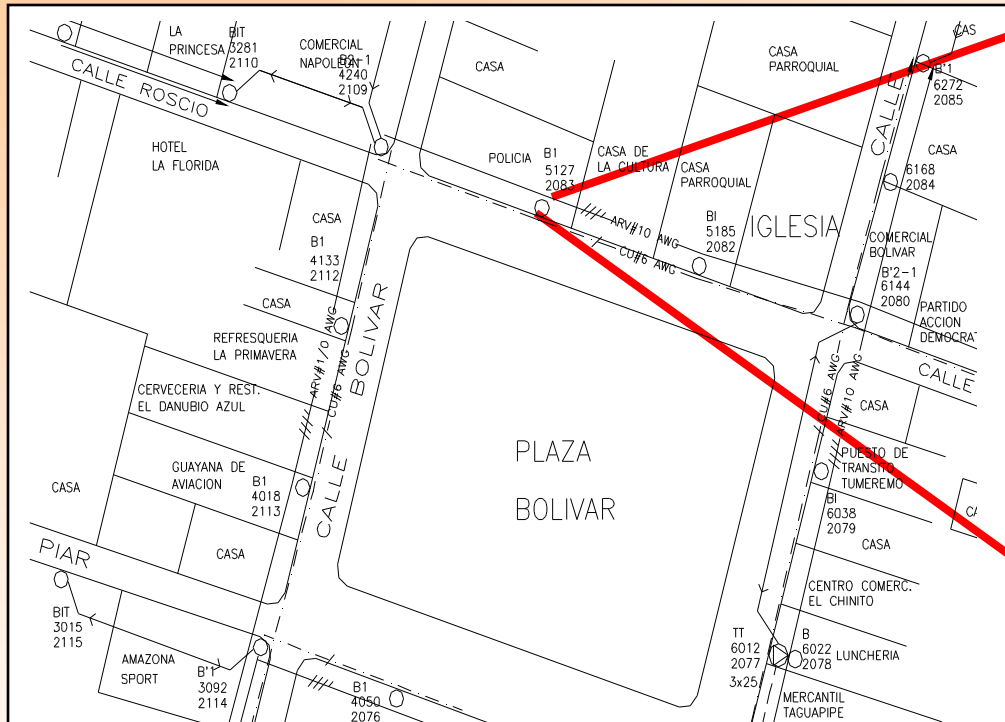
- **Distribute dispatched energy proportional to transformer bank demand**
- **Compare Dispatched Energy Vs Billed Energy**
  - By small area ( square area)
  - By Feeder
  - By distribution transformer
  - By Large areas
- **Permit visual comparison of energy consumption between houses with similar characteristics**



- Green Parcels are consumers with more than 500 kWh monthly, the rest are billing less energy with unknown and unexplained reason. These may have metering problems.

# Inventory, Street Light and other service Program (NILOP)

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INGENIERIA Y CONSTRUCCION  
**PADEE**



**PRESENTACION INVENTARIO**

POLE GEO. ID: 11A4515 POLE CON. ID: 73

TYPE: POSTE MATERIAL: HIERRO USE: E STATUS: BUENO SIZE: USE:

**CROSS ARMS**      **TRANSF.**

NUMERO	TIPO	TAMAÑO	USO	ESTADO	NUM.	KVA	SERIAL
0					0		

**INSULATORS**      **CUT-OUTS**

CANT.	ESPIGA	EST. ESPIGA	EST. PALILLO	CANT. SUSPENS.	EST. SUSPENSION	NUM.	AMP	FUSIBLE
0			0	0		0		

**PERCH**      **WIRE & ANCHORS**      **EQUIPMENT**

NUM. PERCHA	EST. PERCHA	Num. AISLADORES	NUMERO	TIPO	NUMERO	TIPO
0			0		0	

**SERVICE DROP**      **EARTHIG**      **ARRESTERS**

NUMERO	TIPO	NUMERO	NUM. BAJANTES	EST. CDNEX. A POSTE	NUM.	TIPO	ESTADO
0		0	0		0		

**STREET LIGHT**      **COUNTY/CITY**

VOLTAJE	TIPO	ESTADO	EST. CAJA CONT.	VATIOS	LOCALIDAD
120	Plana	Buena		100	CARDENA

Observacion: [ ]

[START] [END] [NEXT] [BACK] [EDIT] [ADD] [ELIM] [EXIT]

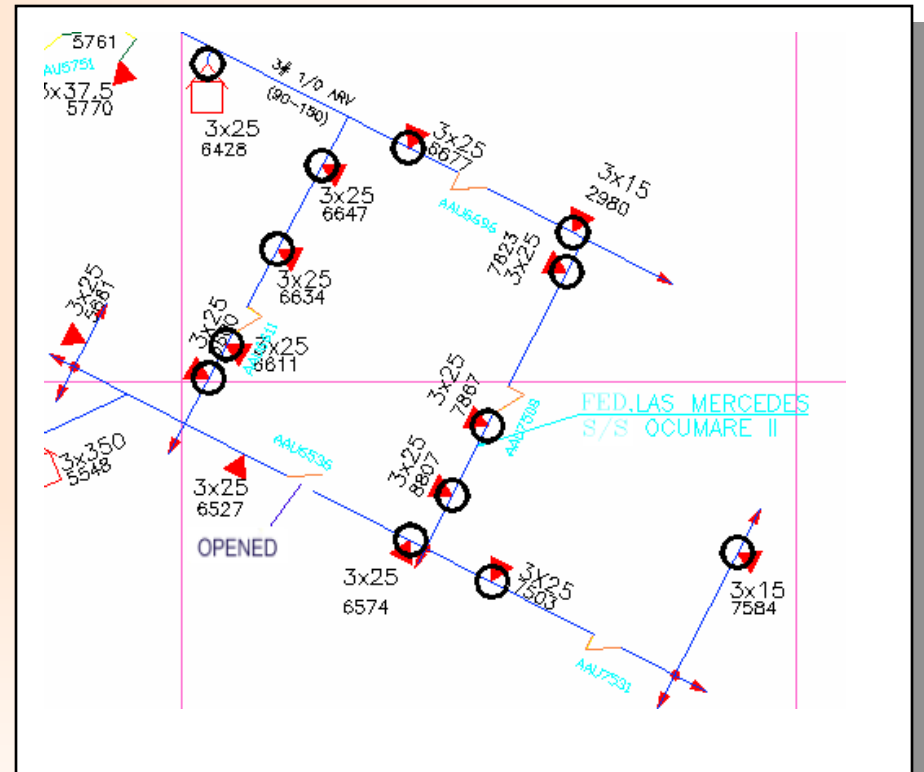
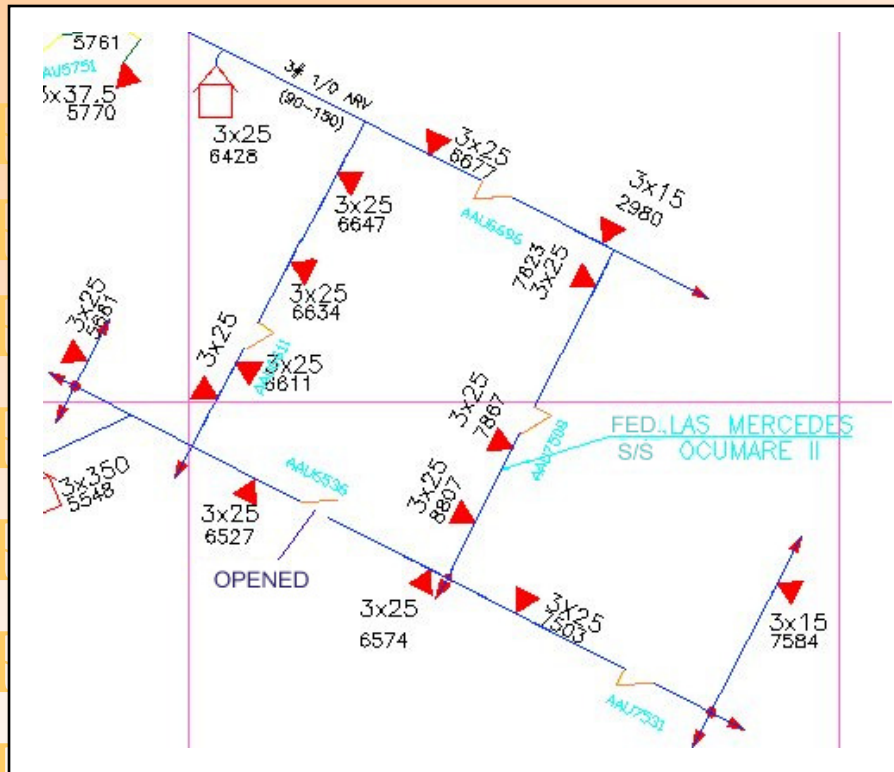


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- Directly form autocad map or stand alone
- Pole by Pole inventory and auditing
- Materials and equipment in bad shape
- Street Light auditing
- Pole rent to support other public service like, phone, Cable TV, and others

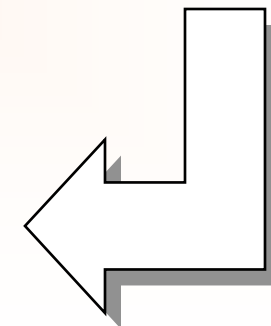


# Interruptions and Operations Programs (IOP)



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AFFECTED CUSTOMERS				
ACCOUNT	NAME / ADDRESS	ENERGY	POLE ID	METER/SATUS
60300120	CARMEN N. MENDOZA DE MARTINEZ C. SUCRE No. 35	93.00	66	805137 M
		9.00		
		9.00		
		0.00		
		37.00		
20135180	GOMEZ L. SERAPIO C CARABOBO N 37	186.00	66	161
		243.00		
		230.00		
		0.00		
		219.67		
60300090	PRIETO DOMINGO C. SUCRE No. 40	408.00	67	2734547 B
		111.00		
		1902.00		
		0.00		
		807.00		

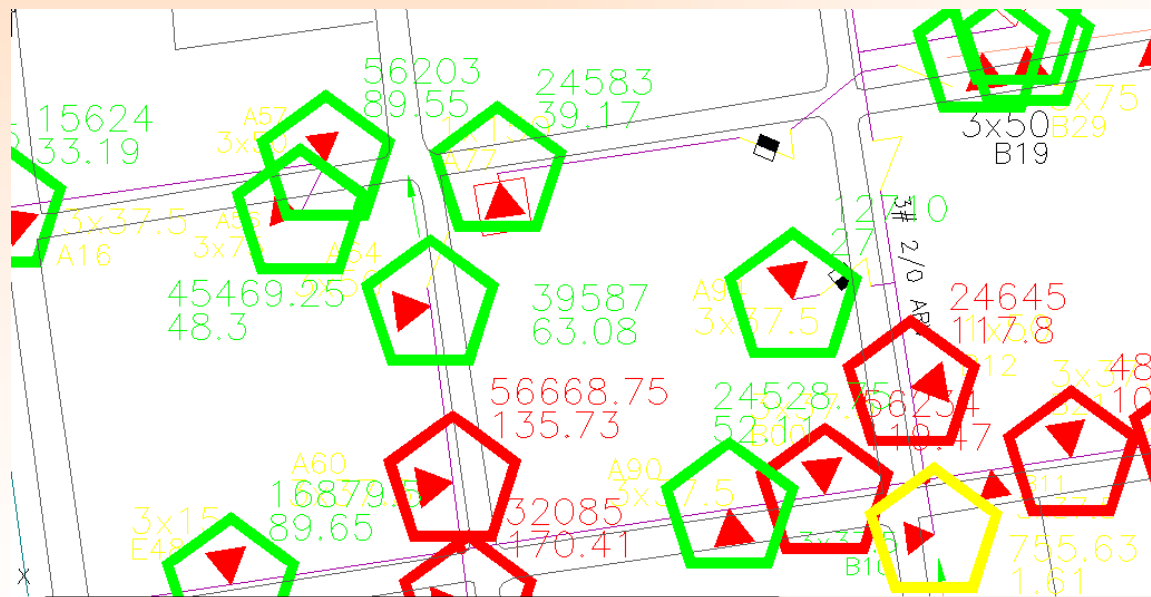




# Transformer Bank Totalize Program (TBTOTP)

**Produce a graphic visualization of transformer banks demand readings and colors “marks” depending of transformer utilization factors**

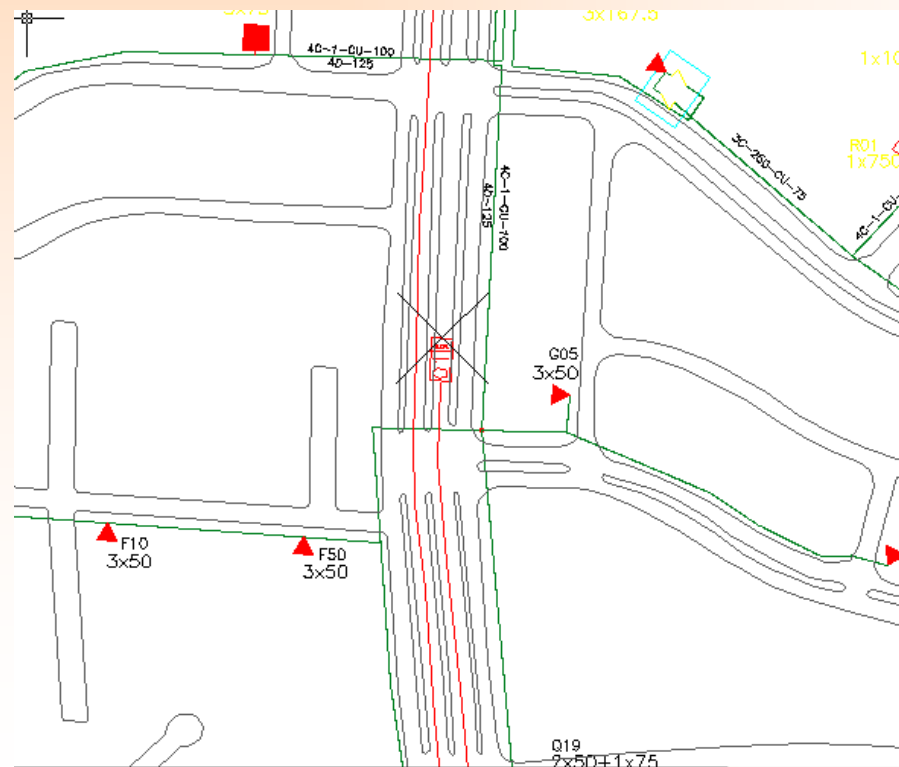
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# VEHICLE LOCALIZATION PROGRAM (VEHLOCP)

**Show vehicle position on top of distribution network map  
in order to improve operation and reduce outages time  
and maintenances.**

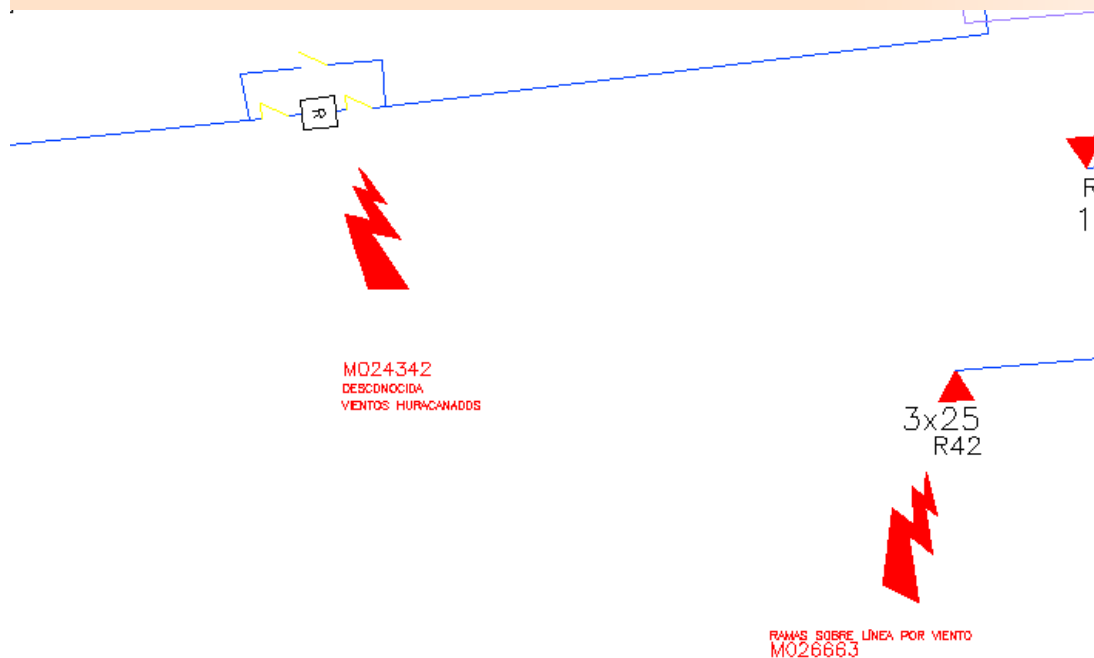
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# Fault History Location Program (PUBFAL)

Locate over the network map historic faults by it's cause,  
in order to make maintenance plans

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FAIRLURES FOLLO UP

EVENT DATE	25/04/2006	TIME	16:16:09
REPOSITION DATE	25/04/2006	TIME	09:54:17

CAUSES

EVENT DESCRIPTION  
BURNED TRANSFORMERS FUSES

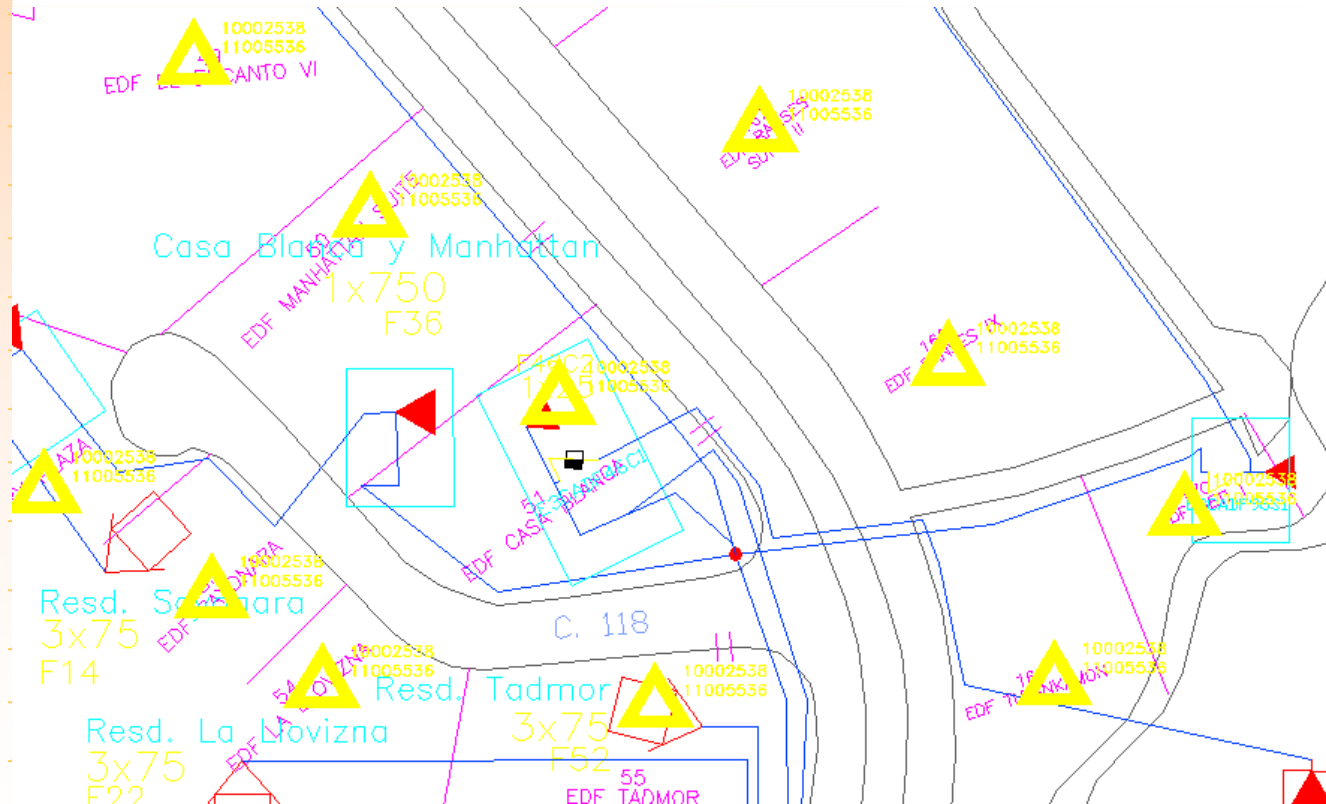
AFFECTED POWER  FAIRLURE TIME  AFFECTED CUSTOMERS

NOTES  
65 AMP BURNED FUSES. TRANSFORMER WHERE TESTED ON IDLE  
PUT BACK IN SERVICE

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# Claim Location Program (CLAP)

**Locate over the network map pending claims, in order to locate branches faults or fault origin. Help a lot in massive events**



**In figure shows an example of possible fault origin**

## Main Characteristic

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- Stand alone, Multiple Licenses or corporative licenses were no limitation off number of users.
- First version are operating since 25 years ago.
- PADEE had help optimized network planning in rural areas, urban areas, agricultural areas, tourist areas, industrial areas and petroleum areas.
- Use AUTOCAD as drawing platform. Which is the best seller cad software in the world. ( Shortly will run over a less expensive platform)
- It may work with online diagram where not maps are available
- Link High and Low Voltages network, and customer analysis in one software.

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- **Keep distribution network information reliable, updated and Centralized.**
- **Produce, updates and make coherent information**
  - Intelligent, digital and automated Network maps
  - Locate clients or customers geographically and link then to the electric network
  - Keep a geographic reference historic load demand
- **Reduce Man hours required for projects, studies and works management**
- **Well planed distribution network reduce maintenance and operations cost and optimize resources.**

# Benefits

- **Electric Distribution network detailed knowledge**
  - Primary, Transformer bank, and secondary network and substations
  - Map customers locations
  - Customer linked to distributions network poles
- **Quick and easy**
  - Geographic location of elements by it's attributes or characteristics
  - Off-line emergency conditions simulation
  - Speedy and secure network map update
- **Distribution systems data base**
  - Unified
  - Centralized
  - Reliable

# Benefits

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- Engineer Applications to evaluate and planning the distribution network
- Man Hour Labor reduction in:
  - Updating distribution network Projects
  - Distribution line projects.
  - Operation planning projects
  - Budget, bill of material
  - Network Inventory ( Network Market Value )
- Improve activities of:
  - Maintenance
  - Operations
  - Design
  - Billing

# Medium and Long Term Benefits

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- Increase **productivity**
- Save **in project efforts**
- Recover **clients and Improve billing performance**
- Reduce **Energy losses, investments and operations spends**

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# Example of Fault Events Flow Diagrams

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**Fault events  
Flow diagram  
solving  
procedure**

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