GIS Electric Data Model - Service Point

Draft V-1.0

10/7/2014

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ARCFM ELECTRIC DATA MODEL

This document will provide instructions how to identify a distribution transformer-unit based on one or more service-meter records. To best way to understand the ArcFM customer service data model table relationship is to demonstrate the procedure how to locate selected records using ArcFM electric trace tool. The electric trace tool is a powerful rule-based function that allows you to check how electric current is flowing through a network of connected devices. If you specify phase configurations when tracing upstream or downstream, you can analysis what protective devices are electrically connected throughout the network. This search method uses a geometric network (topology) algorithm to identify one or more Service Point features located at endpoints of the secondary distribution feeder where energy is supplied to a customer. Once these records have been identified, they will support a drill-down approach to find Service Meter records and the distribution Transformer they are connected to.

- Perform a secondary **circuit trace** anywhere in the distribution network
  - Perform a spatial search to identify **Service Point** features
    - Use the Service Point features to find **Service Addresses** for each location
      - Use the Service Addresses to find **Customer Information** (AccountID / **PremiseID**)
        - Use the Customer Information to find **Service Meters**
          - Use the Service Meters to find **Transformer Unit**(s) for each transformer
            - Use the Transformer Unit to find **Transformer Bank** (Facility ID)

Circuit Tracing criteria is available for the Primary and Secondary overhead and underground network using the electric trace tool options. Users may access electric circuit tracing tools from ArcFM desktop and ArcFM Viewer products. First, the User must select the Geometric Network – ***ElectricDataSet_Net*** created for electric tracing in the Utility Network Analyst toolbar's 'Network' field. Geometric networks offer a way to model common networks and infrastructures found in the real world. A geometric network is a set of connected edges (lines) and junctions (nodes), along with connectivity rules that are used to represent and model the behavior of a common network infrastructure in the Geodatabase.

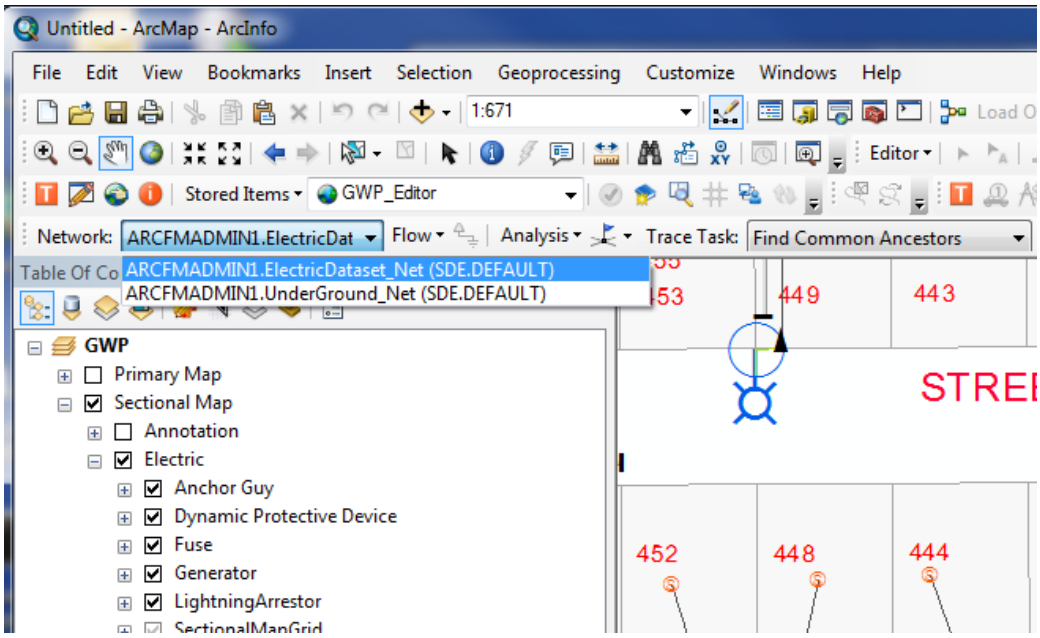


Figure-1: Electric Geometric Network – ElectricDataSet_Net

ARCFM CONFIGURATION: FEEDER MANAGER:

Electric Tracing depends on the electric trace weight that **Feeder Manager** maintains through the initialize Electric Trace Weights function**.** Trace weights must be initialized correctly, otherwise electric tracing options will not work properly. The GWP Electric GIS database (Geodatabase) is configured using *Feeder Manager* Default setting. ArcFM Feeder Manager allows GWP utility managers to determine which circuit a given piece of electrical equipment belongs, which source(s) supply it with power, and which of its electrical phases are energized on the primary side. Feeder Manager writes Feeder-ID and energized phase information to the ArcFM database in the attribute fields of individual electrical devices. It assigns the same Feeder-ID to all electric features in an ArcFM database considered to belong to a particular electric distribution circuit. Feeder Manager maintains information that indicates which electrical phases can reach the feature from the source of power. Once the circuit-ID and energized phase information is assigned to ArcFM features, Feeder Manager uses this information to update circuit association or energized phases when changes are made to the network.

ARCFM CONFIGURATION: ELECTRIC TRACE OPTIONS

Use the Electric Tracing Options to determine how results are displayed and how the trace searches for phases and sources.

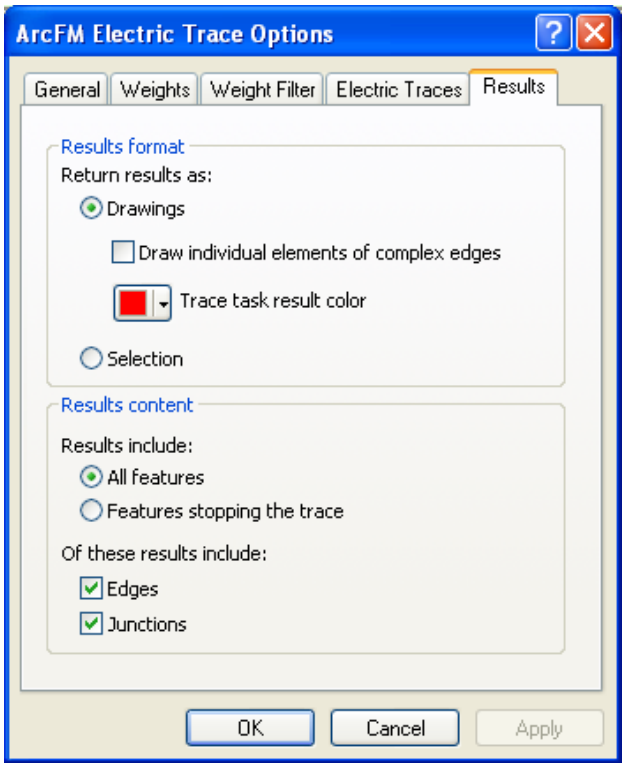
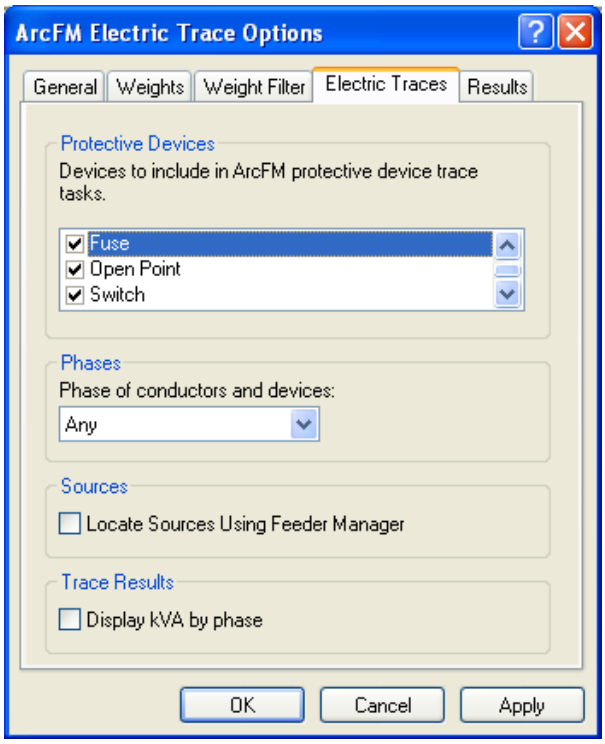


Figure-2: Electric Trace Options

Results Content: Use this field to indicate the features that should be included in the trace. These settings are used by only the Electric Distribution Downstream traces. All other traces ignore these settings.

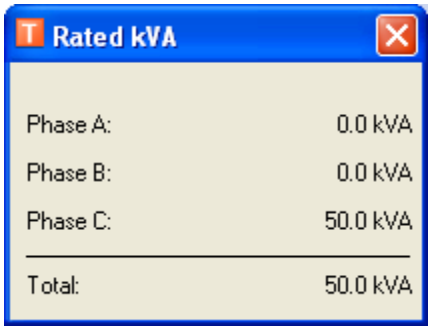


Protective Devices: Select the checkbox(es) of the device(s) to be included in a protective device trace (upstream or downstream).

Phases: Choose a phase to be traced (for example, At least C) from the dropdown menu at the Phases field. The default value is Any.

Sources: GWP Users must select the “Locate Sources Using Feeder Manager” checkbox to identify sources as features that are related to CIRCUITSOURCE objects.

Trace Results (optional): Select the “Display kVA by phase" checkbox to display a message box that shows the sum of the rated kVA (by phase) for all transformers returned by the trace. If incorrectly configured, the kVA on all phases will be displayed as 0.0.



ENABLE / DISABLE FEATURES (TRACE OPTIONS):

Users can prevent features from participating in trace results by changing the value of the Enabled field to False. The Enabled field (flag attribute) is an ESRI network analysis concept. It is automatically created when the geometric network is created.

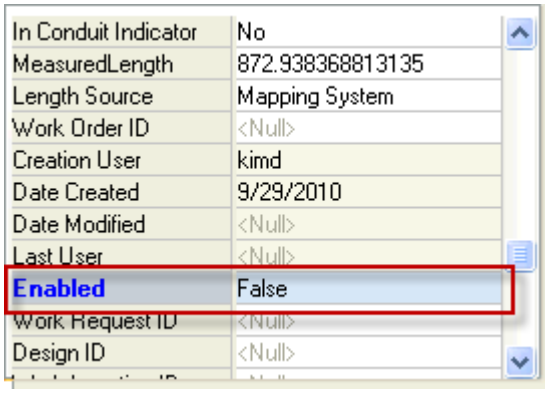


Figure-3: Network Enable / Disable Trace Attribute

ELECTRIC TRACE TASK:

There are several methods to locate a position on the map. You can search by *electric Pole-no, Meter-no, Transformer Facility-ID, or Street Address*. I will use the Street Address to find a location to perform an electric trace: In the example below, the street address is ***425 Wilson Ave***.

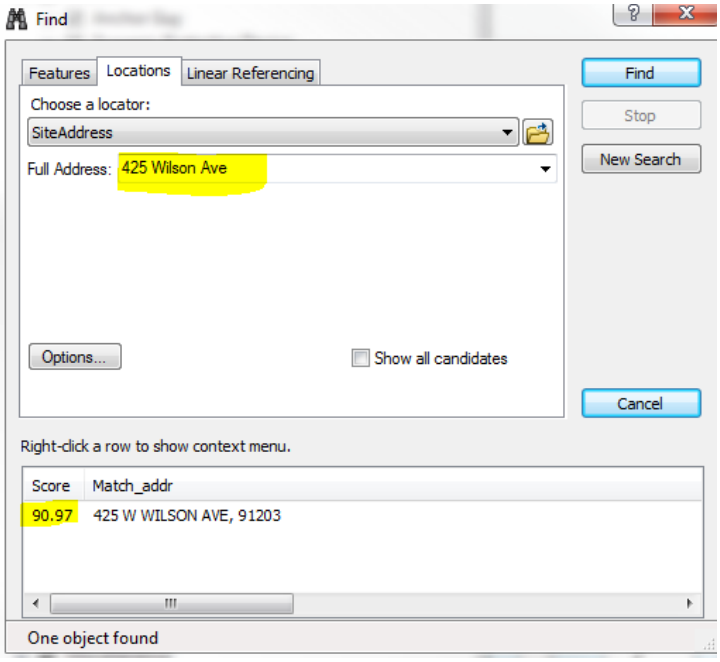
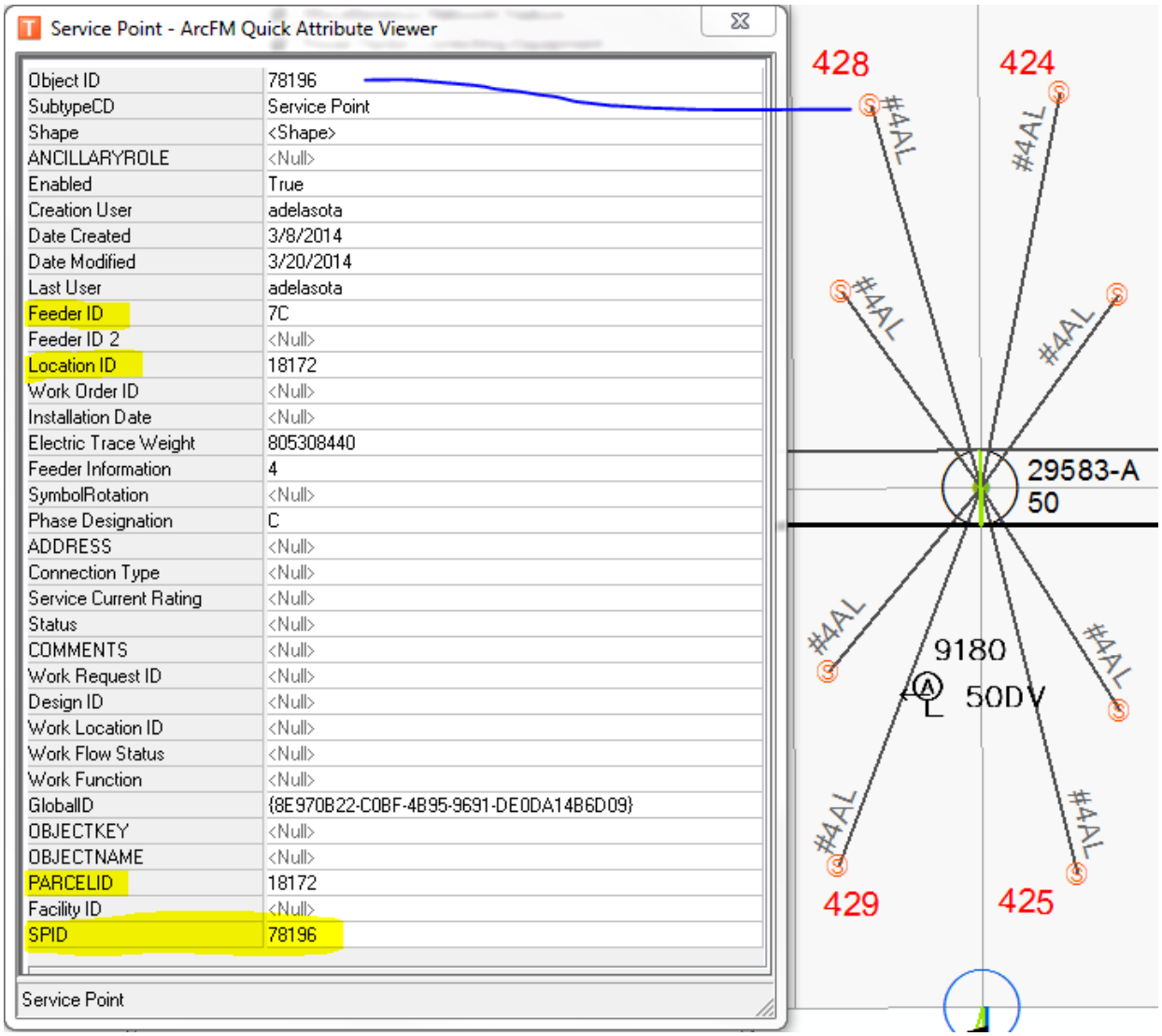


Figure-4: Address Geocoding search lookup tool

Electric trace tasks allow you to check how current is flowing through a network of connected features. You can place Edge flags anywhere on the map to define where the trace begins and enable or disable features. You can define the upstream or downstream protective devices you want to find and indicate phase configurations for tracing electric distribution throughout the network. With these options, you can perform a search condition to identify all Service Point features or service drop connections. The GIS basemap Property Owner (Parcel) record is joined to the Service Point by ***TAXPARCELS.PARCELID = SERVICEPOINT.PARCELID***. When creating a SERVICEPOINT it is automatically assigned a uniqueID in the ***SPID*** (Service Point ID) field.



ELECTRIC TRACE TOOLBAR:

The ArcFM Electric Traces toolbar allows you select the trace you wish to perform and set the trace options before performing a trace.

1. On the ArcFM toolbar, select the **DownStream** trace button
2. Click the feeder or conductor at the location where the trace should begin. The cursor snaps a trace start flag to the nearest junction within the snapping tolerance. If no junction is found, the cursor snaps to the nearest edge within the snapping tolerance. Once the flag is placed, the trace is automatically initiated.
3. You will receive a warning message if there are more than 2,000 features to be buffered.
4. You may clear the flags, results, and the buffer using the Clear button on the Electric Traces toolbar.

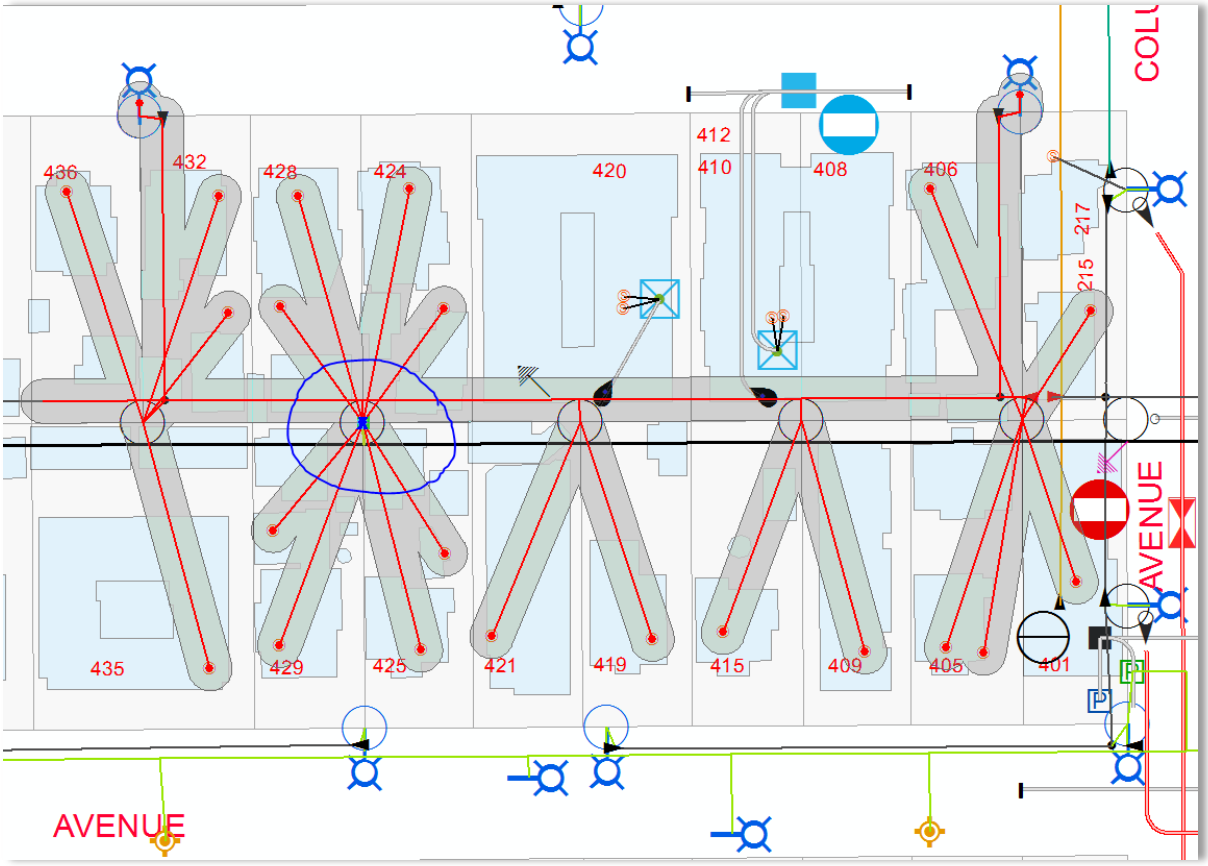


Figure 5, Electric trace tool selecting a point location on the Secondary Circuit.

In the example above, the results from the electric trace search query returned ***21 Service Point*** features associated with the 'Secondary Overhead Electric Line Segments'. Service Point records are used to find SERVICEADDRESS records by joining the two tables using ***SERVICEPOINT.LOCATIONID = SERVICADDRESS.LOCATIONID*** field.

Table

Service Point

Object ID *	ANCILLARYROLE	Enabled	Creation User	Date Created	Date Modified	Last User	SubtypeCD	Feeder ID *	Feeder ID 2	Location ID *
95290	<Null>	True	adelasota	3/8/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18167
88883	<Null>	True	adelasota	3/8/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18168
79475	<Null>	True	adelasota	3/8/2014	5/30/2014	adelasota	Service Point	7C	<Null>	18171
88508	<Null>	True	adelasota	3/8/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18171
78185	<Null>	True	adelasota	3/8/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18172
78196	<Null>	True	adelasota	3/8/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18172
72445	<Null>	True	adelasota	3/7/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18173
72450	<Null>	True	adelasota	3/7/2014	4/25/2014	adelasota	Service Point	7C	<Null>	18173
101395	<Null>	True	adelasota	3/8/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18174
72443	<Null>	True	adelasota	3/7/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18188
76592	<Null>	True	adelasota	3/8/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18188
94518	<Null>	True	adelasota	3/8/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18189
100005	<Null>	True	adelasota	3/8/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18189
88877	<Null>	True	adelasota	3/8/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18190
78191	<Null>	True	adelasota	3/8/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18191
94514	<Null>	True	adelasota	3/8/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18192
73612	<Null>	True	adelasota	3/8/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18193
75408	<Null>	True	adelasota	3/8/2014	8/15/2014	adelasota	Service Point	7C	<Null>	18193
73483	<Null>	True	adelasota	3/8/2014	3/20/2014	adelasota	Service Point	7C	<Null>	18194
78584	<Null>	True	adelasota	3/8/2014	5/30/2014	adelasota	Service Point	7C	<Null>	18195
76590	<Null>	True	adelasota	3/8/2014	4/25/2014	adelasota	Service Point	7C	<Null>	18198

(21 out of *2000 Selected)

Figure 6, A list of Service Point Locations where energy is supplied to a Customer based on the electric trace.

Table

ARCFMADMIN1.SERVICEADDRESS

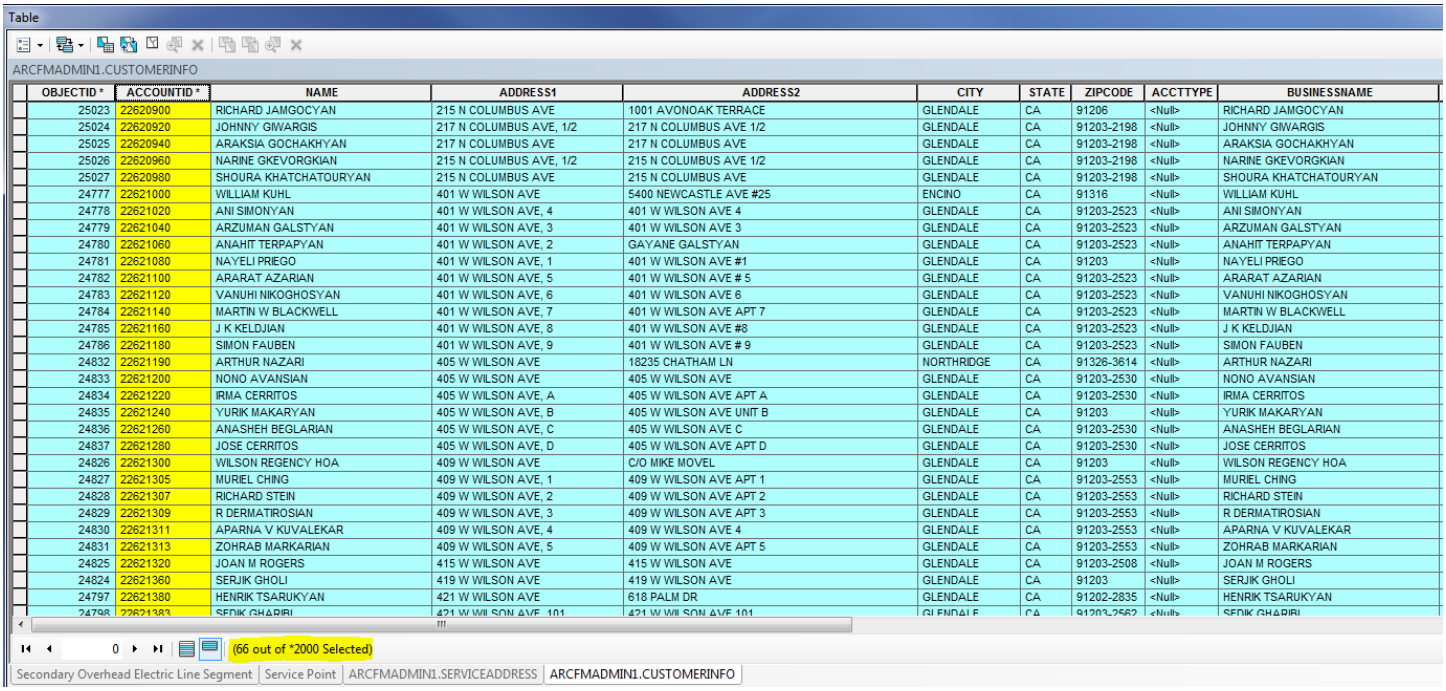
OBJECTID *	LOCATIONID *	ACCOUNTID *	ADDRESS1	ADDRESS2	CITY	STATE	ZIPCODE	ACCTTYPE	LOCCITY	STREETNO	STREETDIR	STREETNAME	STREETSUF	SITUS
25008	18167	22620900	215 N COLUMBUS AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	215	N	COLUMBUS	AVE	215 N COLUMBUS AVE
25009	18167	22620920	217 N COLUMBUS AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	217	N	COLUMBUS	AVE	215 N COLUMBUS AVE
25010	18167	22620940	217 N COLUMBUS AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	217	N	COLUMBUS	AVE	215 N COLUMBUS AVE
25011	18167	22620960	215 N COLUMBUS AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	215	N	COLUMBUS	AVE	215 N COLUMBUS AVE
25012	18167	22620980	215 N COLUMBUS AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	215	N	COLUMBUS	AVE	215 N COLUMBUS AVE
24846	18194	22621000	401 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	401	W	WILSON	AVE	401 W WILSON AVE
24847	18194	22621020	401 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	401	W	WILSON	AVE	401 W WILSON AVE
24848	18194	22621040	401 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	401	W	WILSON	AVE	401 W WILSON AVE
24849	18194	22621060	401 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	401	W	WILSON	AVE	401 W WILSON AVE
24850	18194	22621080	401 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	401	W	WILSON	AVE	401 W WILSON AVE
24851	18194	22621100	401 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	401	W	WILSON	AVE	401 W WILSON AVE
24852	18194	22621120	401 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	401	W	WILSON	AVE	401 W WILSON AVE
24853	18194	22621140	401 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	401	W	WILSON	AVE	401 W WILSON AVE
24854	18194	22621160	401 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	401	W	WILSON	AVE	401 W WILSON AVE
24855	18194	22621180	401 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	401	W	WILSON	AVE	401 W WILSON AVE
24817	18193	22621190	405 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	405	W	WILSON	AVE	405 W WILSON AVE
24818	18193	22621200	405 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	405	W	WILSON	AVE	405 W WILSON AVE
24819	18193	22621220	405 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	405	W	WILSON	AVE	405 W WILSON AVE
24820	18193	22621240	405 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	405	W	WILSON	AVE	405 W WILSON AVE
24821	18193	22621260	405 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	405	W	WILSON	AVE	405 W WILSON AVE
24822	18193	22621280	405 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	405	W	WILSON	AVE	405 W WILSON AVE
24811	18198	22621300	409 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	409	W	WILSON	AVE	409 W WILSON AVE
24812	18198	22621305	409 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	409	W	WILSON	AVE	409 W WILSON AVE
24813	18198	22621307	409 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	409	W	WILSON	AVE	409 W WILSON AVE
24814	18198	22621309	409 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	409	W	WILSON	AVE	409 W WILSON AVE
24815	18198	22621311	409 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	409	W	WILSON	AVE	409 W WILSON AVE
24816	18198	22621313	409 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	409	W	WILSON	AVE	409 W WILSON AVE
24810	18192	22621320	415 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	415	W	WILSON	AVE	415 W WILSON AVE
24809	18191	22621360	419 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	419	W	WILSON	AVE	419 W WILSON AVE
24782	18190	22621380	421 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	421	W	WILSON	AVE	421 W WILSON AVE
24783	18190	22621383	421 W WILSON AVE	<Null>	GLENDALE	<Null>	91203	<Null>	GLENDALE	421	W	WILSON	AVE	421 W WILSON AVE

(66 out of *2000 Selected)

Secondary Overhead Electric Line Segment | Service Point | ARCFMADMIN1.SERVICEADDRESS

Figure 7, A list of Service Address Locations for the electric trace.

The query returned in ***66 Service Address*** records. The results from the Service Address table query is used to find CUSTOMERINFO (Harris Electric Utility Billing Accounts) by joining the two tables using ***SERVICEADDRESS.ACCOUNTID = CUSTOMERINFO.ACCOUNTID***.



Table

ARCFMADMIN1.CUSTOMERINFO

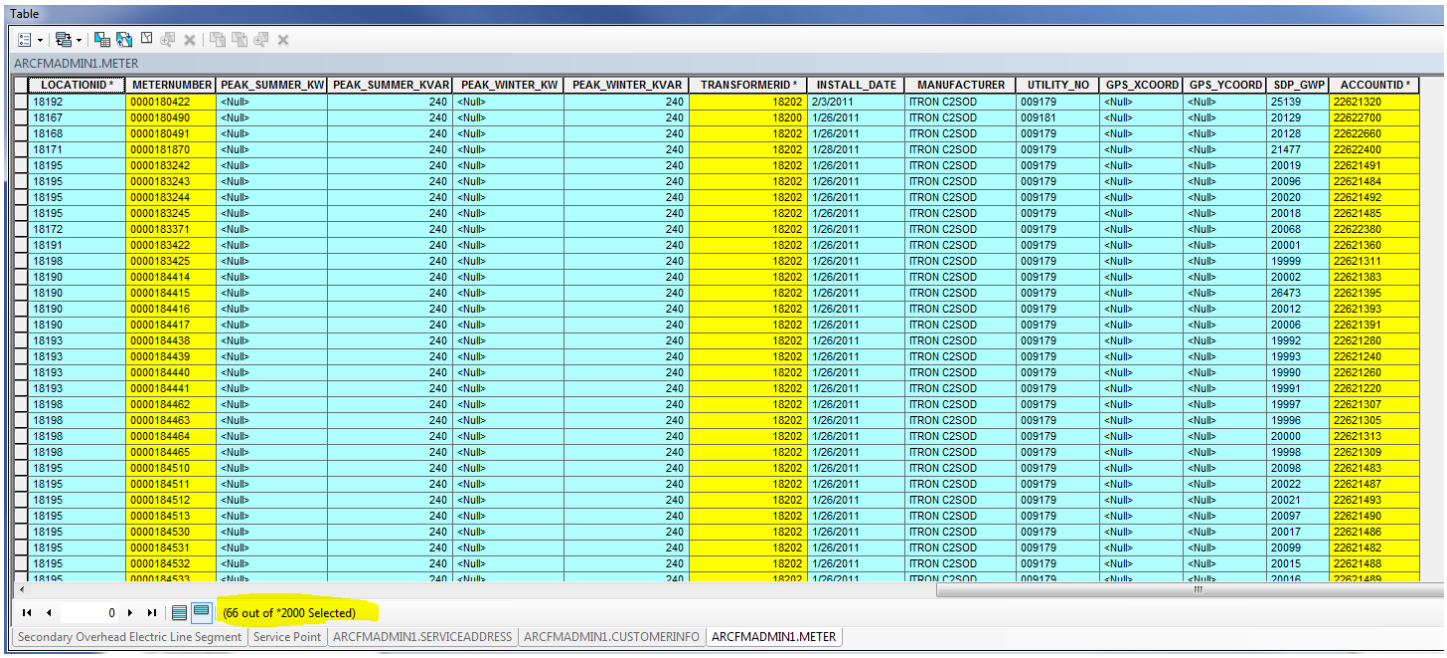
OBJECTID *	ACCOUNTID *	NAME	ADDRESS1	ADDRESS2	CITY	STATE	ZIPCODE	ACCTTYPE	BUSINESSNAME
25023	22620900	RICHARD JAMGOCYAN	215 N COLUMBUS AVE	1001 AVONOAK TERRACE	GLENDALE	CA	91206	<Null>	RICHARD JAMGOCYAN
25024	22620920	JOHNNY GIWARGIS	217 N COLUMBUS AVE, 1/2	217 N COLUMBUS AVE 1/2	GLENDALE	CA	91203-2198	<Null>	JOHNNY GIWARGIS
25025	22620940	ARAKSIA GOCHAKHYAN	217 N COLUMBUS AVE	217 N COLUMBUS AVE	GLENDALE	CA	91203-2198	<Null>	ARAKSIA GOCHAKHYAN
25026	22620960	NARINE GKEVORGKIAN	215 N COLUMBUS AVE, 1/2	215 N COLUMBUS AVE 1/2	GLENDALE	CA	91203-2198	<Null>	NARINE GKEVORGKIAN
25027	22620980	SHOURA KHATCHATOURYAN	215 N COLUMBUS AVE	215 N COLUMBUS AVE	GLENDALE	CA	91203-2198	<Null>	SHOURA KHATCHATOURYAN
24777	22621000	WILLIAM KUHL	401 W WILSON AVE	5400 NEWCASTLE AVE #25	ENCINO	CA	91316	<Null>	WILLIAM KUHL
24778	22621020	ANI SIMONYAN	401 W WILSON AVE, 4	401 W WILSON AVE 4	GLENDALE	CA	91203-2523	<Null>	ANI SIMONYAN
24779	22621040	ARZUMAN GALSTYAN	401 W WILSON AVE, 3	401 W WILSON AVE 3	GLENDALE	CA	91203-2523	<Null>	ARZUMAN GALSTYAN
24780	22621060	ANAHIT TERPAPYAN	401 W WILSON AVE, 2	GAYANE GALSTYAN	GLENDALE	CA	91203-2523	<Null>	ANAHIT TERPAPYAN
24781	22621080	NAYELI PRIEGO	401 W WILSON AVE, 1	401 W WILSON AVE #1	GLENDALE	CA	91203	<Null>	NAYELI PRIEGO
24782	22621100	ARARAT AZARIAN	401 W WILSON AVE, 5	401 W WILSON AVE # 5	GLENDALE	CA	91203-2523	<Null>	ARARAT AZARIAN
24783	22621120	VANUHI NIKOGHOSYAN	401 W WILSON AVE, 6	401 W WILSON AVE 6	GLENDALE	CA	91203-2523	<Null>	VANUHI NIKOGHOSYAN
24784	22621140	MARTIN W BLACKWELL	401 W WILSON AVE, 7	401 W WILSON AVE APT 7	GLENDALE	CA	91203-2523	<Null>	MARTIN W BLACKWELL
24785	22621160	J K KELDJIAN	401 W WILSON AVE, 8	401 W WILSON AVE #8	GLENDALE	CA	91203-2523	<Null>	J K KELDJIAN
24786	22621180	SIMON FAUBEN	401 W WILSON AVE, 9	401 W WILSON AVE # 9	GLENDALE	CA	91203-2523	<Null>	SIMON FAUBEN
24832	22621190	ARTHUR NAZARI	405 W WILSON AVE	18235 CHATHAM LN	NORTHRIDGE	CA	91326-3614	<Null>	ARTHUR NAZARI
24833	22621200	NONO AVANSIAN	405 W WILSON AVE	405 W WILSON AVE	GLENDALE	CA	91203-2530	<Null>	NONO AVANSIAN
24834	22621220	IRMA CERRITOS	405 W WILSON AVE, A	405 W WILSON AVE APT A	GLENDALE	CA	91203-2530	<Null>	IRMA CERRITOS
24835	22621240	YURIK MAKARYAN	405 W WILSON AVE, B	405 W WILSON AVE UNIT B	GLENDALE	CA	91203	<Null>	YURIK MAKARYAN
24836	22621260	ANASHEH BEGLARIAN	405 W WILSON AVE, C	405 W WILSON AVE C	GLENDALE	CA	91203-2530	<Null>	ANASHEH BEGLARIAN
24837	22621280	JOSE CERRITOS	405 W WILSON AVE, D	405 W WILSON AVE APT D	GLENDALE	CA	91203-2530	<Null>	JOSE CERRITOS
24826	22621300	WILSON REGENCY HOA	409 W WILSON AVE	C/O MIKE MOVEL	GLENDALE	CA	91203	<Null>	WILSON REGENCY HOA
24827	22621305	MURIEL CHING	409 W WILSON AVE, 1	409 W WILSON AVE APT 1	GLENDALE	CA	91203-2553	<Null>	MURIEL CHING
24828	22621307	RICHARD STEIN	409 W WILSON AVE, 2	409 W WILSON AVE APT 2	GLENDALE	CA	91203-2553	<Null>	RICHARD STEIN
24829	22621309	R DERMATIROSIAN	409 W WILSON AVE, 3	409 W WILSON AVE APT 3	GLENDALE	CA	91203-2553	<Null>	R DERMATIROSIAN
24830	22621311	APARNA V KUVALEKAR	409 W WILSON AVE, 4	409 W WILSON AVE 4	GLENDALE	CA	91203-2553	<Null>	APARNA V KUVALEKAR
24831	22621313	ZOHRAB MARKARIAN	409 W WILSON AVE, 5	409 W WILSON AVE APT 5	GLENDALE	CA	91203-2553	<Null>	ZOHRAB MARKARIAN
24825	22621320	JOAN M ROGERS	415 W WILSON AVE	415 W WILSON AVE	GLENDALE	CA	91203-2508	<Null>	JOAN M ROGERS
24824	22621360	SERJIK GHOLI	419 W WILSON AVE	419 W WILSON AVE	GLENDALE	CA	91203	<Null>	SERJIK GHOLI
24797	22621380	HENRIK TSARUKYAN	421 W WILSON AVE	618 PALM DR	GLENDALE	CA	91202-2835	<Null>	HENRIK TSARUKYAN
24798	22621383	SEDIK GHARIBI	421 W WILSON AVE, 101	421 W WILSON AVE 101	GLENDALE	CA	91203-2562	<Null>	SEDIK GHARIBI

(66 out of *2000 Selected)

Secondary Overhead Electric Line Segment | Service Point | ARCFMADMIN1.SERVICEADDRESS | ARCFMADMIN1.CUSTOMERINFO

Figure8, A list of Harris Customer Service Accounts(ie; PREMISEID) for the electric trace .

The query returned in ***66 Customer Info*** records. The results from the Customer Info table query is used to find electric METER records by joining the two tables using ***CUSTOMERINFO.ACCOUNTID = METER.ACCOUNTID***. *Note*, the CUSTOMERINFO table AccountID field is also known as the ***PREMISEID*** defined as the first 8-digits of the Harris Customer Account Number. ***ACCOUNTID*** is a primary key field in the CUSTOMERINFO table and should not contain duplicate records for each Customer. The AccountID number can have one-to-many (1..n) meters joined to a single ***PREMISEID***.



LOCATIONID *	METERNUMBER	PEAK_SUMMER_KW	PEAK_SUMMER_KVAR	PEAK_WINTER_KW	PEAK_WINTER_KVAR	TRANSFORMERID *	INSTALL_DATE	MANUFACTURER	UTILITY_NO	GPS_XCOORD	GPS_YCOORD	SDP_GWP	ACCOUNTID *
18192	0000180422	<Null>	240	<Null>	240	18202	2/3/2011	ITRON C2SOD	009179	<Null>	<Null>	25139	22621320
18167	0000180490	<Null>	240	<Null>	240	18200	1/26/2011	ITRON C2SOD	009181	<Null>	<Null>	20129	22622700
18168	0000180491	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20128	22622660
18171	0000181870	<Null>	240	<Null>	240	18202	1/28/2011	ITRON C2SOD	009179	<Null>	<Null>	21477	22622400
18195	0000183242	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20019	22621491
18195	0000183243	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20096	22621484
18195	0000183244	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20020	22621492
18195	0000183245	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20018	22621485
18172	0000183371	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20068	22622380
18191	0000183422	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20001	22621360
18198	0000183425	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	19999	22621311
18190	0000184414	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20002	22621383
18190	0000184415	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	26473	22621395
18190	0000184416	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20012	22621393
18190	0000184417	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20006	22621391
18193	0000184438	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	19992	22621280
18193	0000184439	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	19993	22621240
18193	0000184440	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	19990	22621260
18193	0000184441	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	19991	22621220
18198	0000184462	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	19997	22621307
18198	0000184463	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	19996	22621305
18198	0000184464	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20000	22621313
18198	0000184465	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	19998	22621309
18195	0000184510	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20098	22621483
18195	0000184511	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20022	22621487
18195	0000184512	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20021	22621493
18195	0000184513	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20097	22621490
18195	0000184530	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20017	22621486
18195	0000184531	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20099	22621482
18195	0000184532	<Null>	240	<Null>	240	18202	1/26/2011	ITRON C2SOD	009179	<Null>	<Null>	20015	22621488

Figure 9, A list of Service Meters for the electric trace.

The query resulted in ***66 Meter*** records. The METER table contains important attributes that can be joined to parent table records for search, query, & reporting purposes. The Meter table is used to find the TRANSFORMER_UNIT records by joining the two tables using ***METER.TRANSFORMERID = TRANSFORMER_UNIT.OBJECTID***. Important METER attributes:

- METERNUMBER = 0000180422 — Varchar2(50)
- **TRANSFORMERID = 18202** — **Long Integer (this is the FK to TransformerUNIT)**
- ACCOUNTID = 22621320 — Varchar2(20)
- LOCATIONID = 18192 — Varchar2(20)
- SERIALNUMBER = 0301357267 — Varchar2(50)
- SDP_GWP = 18202 — Long Integer (Source is Harris CIS)
- FACILITYID (alias UTILITY_NO) = 009179 — Varchar2(20) (Transformer FacilityID)

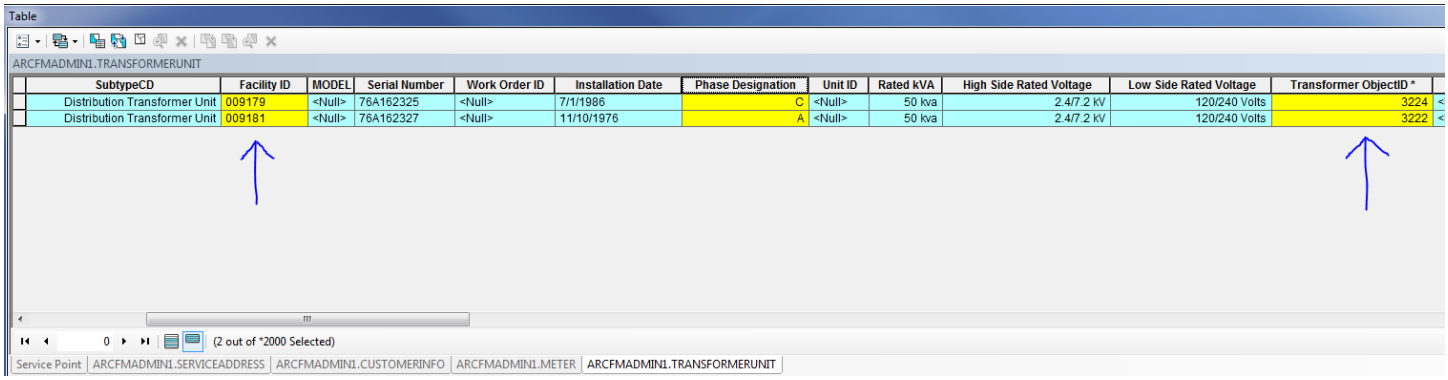


Figure 10, A list of Transformer_UNIT records for the electric trace.

The query of the ***Transformer-Unit*** table returned 2 records because it is a Phase Designation. The TRANSFORMER_UNIT table can be joined with the TRANSFORMER_BANK table by **TRANSFORMER_UNIT.*TRANSFORMEROBJECTID = TRANSFORMER_BANK.OBJECTID*** to find the JUNCTION point location (node) used in the ArcFM electrical distribution system.

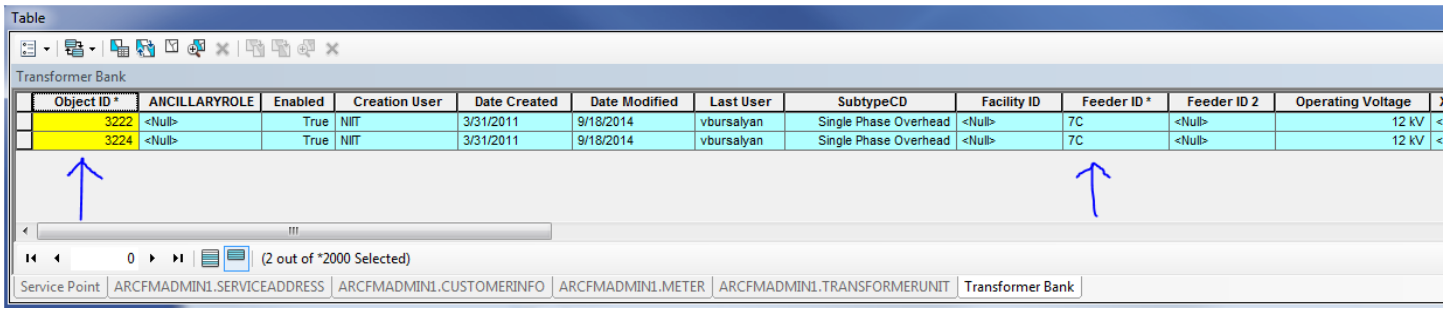
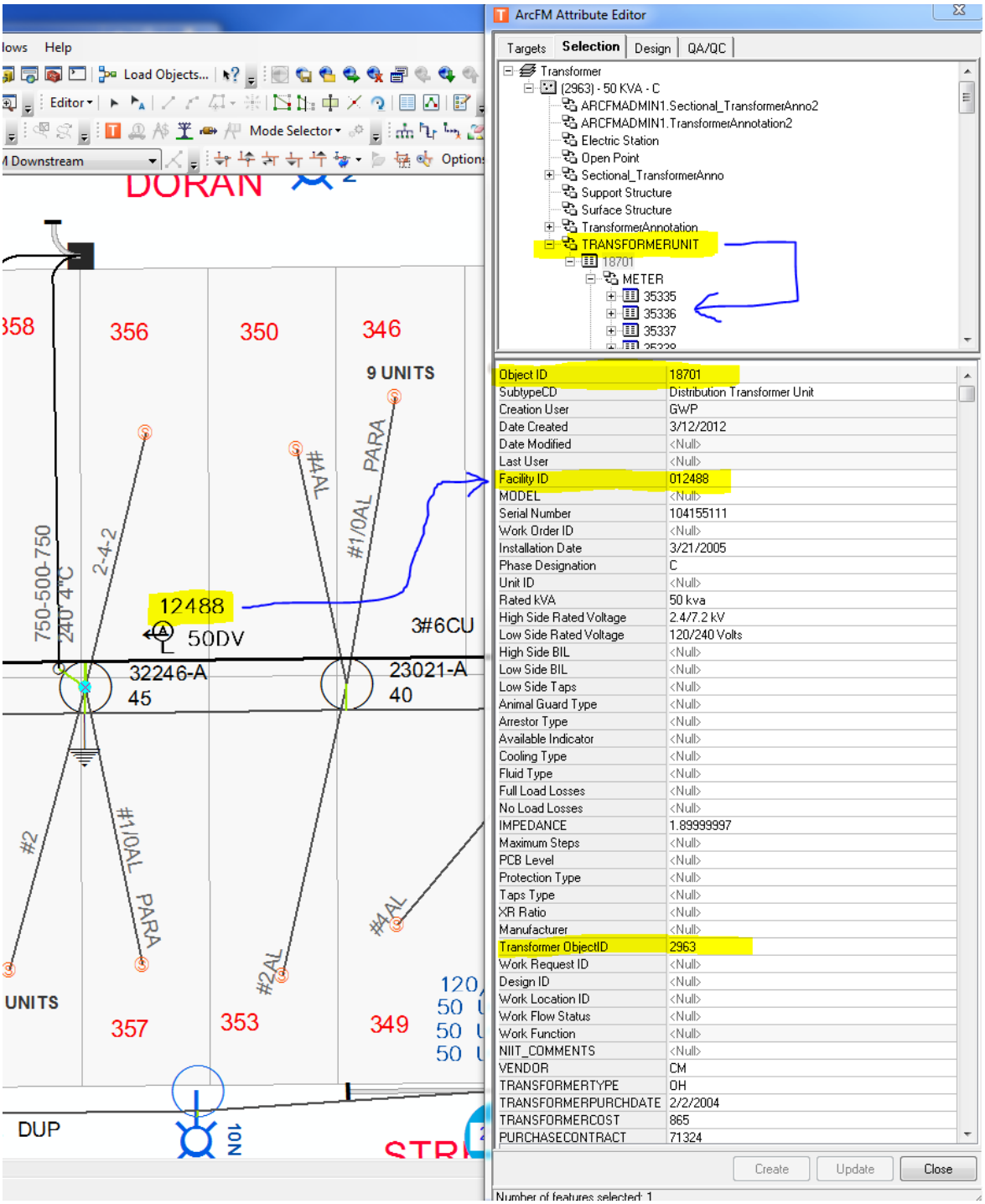


Figure 11, A list of Transformer BANK records for the electric trace.

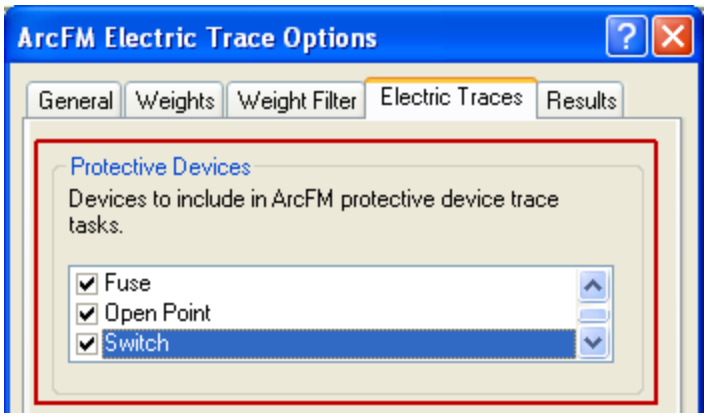
A list of Service Meter records can be identified by joining the TRANSFORMER_UNIT record (FacilityID=012488) to the METER table using ***TRANSFORMER_UNIT.OBJECTID(2963) = METER.TRANSFORMERID(2963)***



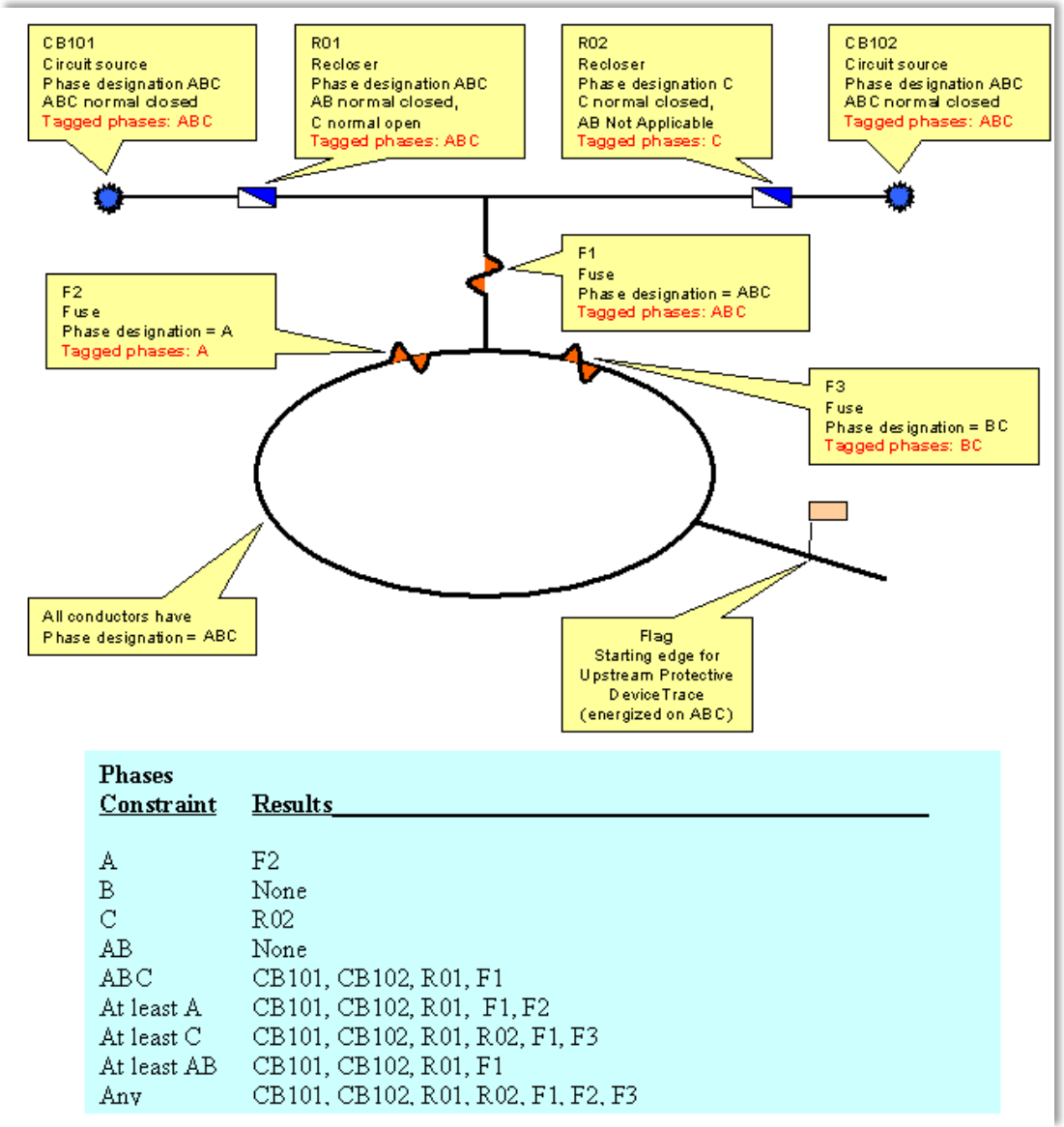
APPENDIX

A) PROTECTIVE DEVICE TRACES AND PHASE:

Upstream Protective Device Trace and Downstream Protective Device Trace. The Upstream Protective Device and the Downstream Protective Device traces are similar to the Upstream Trace and the Downstream Trace tasks, respectively. The primary difference is that the Protective Device traces include only protective device features in their trace results. The traces define protective devices according to the selected feature classes in the ArcFM Electric Trace Options.



It can be difficult to interpret the “Phase of conductors and devices" option for the Upstream Protective Device trace in the presence of unusual or complex circuit configurations. The basic rule governing the Upstream Protective Device trace logic is: each protective device lying on a path from a circuit source to the flagged edge is tagged with the phases that (1) reach the device’s junction, and (2) are supported according to the device’s phase designation. The “Phase of conductors and devices" option filters out any devices whose tagged phases do not match the setting. Although the following example is unrealistic because of the unusual phase-routing, it should help illustrate how the “Phase of conductors and devices" option is applied in unusual circumstances.



Phases

Constraint	Results
A	F2
B	None
C	R02
AB	None
ABC	CB101, CB102, R01, F1
At least A	CB101, CB102, R01, F1, F2
At least C	CB101, CB102, R01, R02, F1, F3
At least AB	CB101, CB102, R01, F1
Any	CB101, CB102, R01, R02, F1, F2, F3

Figure 12 - Unusual circuit configurations may require close examination to understand the effect of various Phases choices upon Upstream Protective Device Trace results.

Each protective device is tagged with the phases that (1) reach its junction *and* (2) are supported, according to its phase designation.

B) ELECTRIC TRACE TOOLBAR:

The ArcFM Electric Traces toolbar allows you select the trace you wish to perform and set the trace options before performing a trace.

Tool	Description
Downstream Protective Device Trace	A Downstream Protective Device trace finds all protective devices downstream of the flag, by phase. The trace stops at an open switch. Select specific features to be traced in the ArcFM Electric Trace Options (Electric Traces tab). The trace operation executes as follows: 1. The ArcFM Downstream Protective Device trace searches for circuit sources in all directions from each end of the flagged edge. If no sources are found the trace returns nothing. 2. The trace is launched from the end that failed to reach any sources. This trace returns only protective device features as specified in the ArcFM Electric Trace Options. 3. The trace filters the results according to the value selected in the "Phase of conductors and devices" setting in the ArcFM Electric Trace Options. The Protective Traces and Phase page offers more information about this setting. The resulting features in addition to the flagged edge are returned as the trace results.
Upstream Protective Device Trace	An Upstream Protective Device trace finds all protective devices upstream of the flag, by phase. The trace stops at the circuit source. Select specific features to be traced in the ArcFM Electric Trace Options (Electric Traces tab). The trace operation executes as follows: 1. The ArcFM Upstream Protective Device trace searches in all directions from each end of the flagged edge for circuit sources that can reach the edge. If no sources are found, the trace returns nothing. 2. If one or more sources are located, a trace is performed to locate all connected features between the flagged edge and each source. This trace returns only protective device features as specified in the ArcFM Electric Trace Options. 3. The trace filters the results according to the value selected in the "Phase of conductors and devices" setting in the ArcFM Electric Trace Options. The Protective Traces and Phase page offers more information about this setting. The resulting features in addition

	to the flagged edge are returned as the trace results. **Note:** This trace is **Phase Sensitive**. This means that an edge will be included in the trace results if it is a necessary component of any path that brings the specified phases (e.g., "At least AB" which means at least A and B) from a source to the flagged feature and the edge itself carries all of the specified phases. Multiple feeds and loops will impact the results of this trace.
Electric Distribution Trace	The Electric Distribution trace finds all features connected to the same feeder system, by phase. If you change the status of a switch or breaker, an Electric Distribution trace will return all features affected by the status change. The trace operation executes as follows: 1. Find all circuit sources that can reach the flagged edge on one or more phases. If no sources are located, the trace returns nothing. 2. If one or more sources are located, ArcFM traces from both ends of the flagged edge to each source. 3. The trace filters the results according to the value selected in the "Phase of conductors and devices" setting in the ArcFM Electric Trace Options. The resulting features in addition to the flagged edge are returned as the trace results.
Downstream Trace	A Downstream Trace finds all features (lines and devices) in a feeder system by phase that are downstream of the trace flag. The trace operation executes as follows: 1. The ArcFM Downstream trace searches for circuit sources in all directions from each end of the flagged edge. If no sources are found the trace returns nothing. 2. If one or more sources are found from one end of the edge but not the other, the downstream sense is clear. 3. The trace is launched from the end that failed to reach any sources. 4. The trace filters the results according to the value selected in the "Phase of conductors and devices" setting in the ArcFM Electric Trace Options. The resulting features in addition to the flagged edge are returned as the trace results.
Upstream Trace	An Upstream Trace finds all features (lines and devices) in a feeder system by phase that are upstream of the trace flag. This trace requires Feeder Manager be configured. If you have configured Electric Tracing without Feeder Manager, this trace will not work. The trace operation executes as follows: 1. The ArcFM Upstream trace searches in all directions from each

	end of the flagged edge for circuit sources that can reach the edge. If no sources are found, the trace returns nothing. 2. If one or more sources are located, a trace is performed to locate all connected features between the flagged edge and each source. 3. The trace filters the results according to the value selected in the "Phase of conductors and devices" setting in the ArcFM Electric Trace Options. The resulting features in addition to the flagged edge are returned as the trace results. **Note:** This trace is **Phase Sensitive**. This means that an edge will be included in the trace results if it is a necessary component of any path that brings the specified phases (e.g., "At least AB" which means at least A and B) from a source to the flagged feature and the edge itself carries all of the specified phases. Multiple feeds and loops will impact the results of this trace.
Next Upstream Protective Device Trace	The Next Upstream Protective Device Trace finds the immediate protective device upstream of the flag. When you place a second flag, this trace marks the previously found protective device in gray. Use the ArcFM Electric Trace Options (Electric Traces tab) to specify which features are considered protective devices. The trace operation executes as follows: 1. The ArcFM Next Upstream Protective Device Trace searches in all directions from each end of the flagged edge for circuit sources that can reach the edge. 2. If one or more sources are located, the trace locates the immediate upstream protective device feature. If you placed the flag at a point for which there are multiple sources, the trace will locate each immediately upstream protective device. If no sources are found, the trace returns nothing. 3. The trace displays different symbols based on the state of the protective device. View the symbol descriptions on the Protective Device Traces and Phase page. **Note:** This trace is **Phase Sensitive**, but it does not respect the Phases options in the ArcFM Electric Trace Options window (Electric Traces tab). It traces all phases present on the flagged feature.
Isolation Protective Device Trace	The Isolation Protective Device trace identifies every device you must open in order to truly isolate a particular location on your map. When you place a flag, the trace operation executes as follows: 1. The ArcFM Isolation Protective Device Trace searches in all directions from each end of the flagged edge for circuit sources

	that can reach the edge. If no sources are found, the trace returns the immediate protective devices in any direction, but without any indication of whether they lie upstream or downstream. 2. If one or more sources are located, the trace locates the immediate upstream protective device. 3. It then traces downstream from that device to identify downstream protective device features. 4. The trace displays different symbols based on the state of the protective device. View the symbol descriptions on the Protective Device Traces and Phase page. When you place a second flag, this trace marks the previously found protective devices in gray. Use the ArcFM Electric Trace Options (Electric Traces tab) to specify which features are considered protective devices. **Note:** This trace is **Phase Sensitive**, but it does not respect the Phases options in the ArcFM Electric Trace Options window (Electric Traces tab). It traces all phases present on the flagged feature.
Clear Flags, Barriers, and Results	This button removes all flags and barriers from the map. It also clears the results if you have selected the Results as Drawings option. You may also use this tool to clear the trace buffer if it exists. If you choose to view your results as a selected set, the Selection tab of the Attribute Editor will NOT be cleared.
Results As Selection	Use this toggle button to determine how the trace results are displayed. When the button is depressed (or toggled on), the resulting features are selected on the map and displayed on the Selection tab. When it is toggled off, the resulting features are highlighted on the map in red (you may change the default color using the Options button).
Zoom To Results	Use this toggle button to elect whether to zoom to the trace results. When this button is depressed (or toggled on), the map view will zoom to the trace results.
Options... **Trace Options**	Click this button to set various options for your electric trace.

C) ELECTRIC TRACING JUNCTIONS (node or vertex location):

The bits of the ***MMElectricTraceWeight*** field have different interpretations for junction features than for edge features. The bit settings on this page apply only to feature classes that have one of the following class model names assigned: Switch, OpenPoint, Fuse, DynamicProtectiveDevice, Transformer, PrimaryMeter, FdrMgrProtective, or FdrMgrLoadpoint. for junction feature classes (with one of the above class model names assigned), the bits of the field with the model name ***MMELECTRICTRACEWEIGHT*** in the GWP Electric database are interpreted as follows:

Bit 31 is reserved for future use by Telvent.

Bits 30-28 — (These bits are currently the only bits used by ArcFM electric trace tasks.) The status bits specify the normal position of each phase present on switchable devices (e.g., switch, recloser) and depends on three field model names: NORMALPOSITION_A, NORMALPOSITION_B, and NORMALPOSITION_C. The value of 0 means that the device is closed; 1 means that the device is open.

For nonswitchable devices representing customer load points on a primary circuit (e.g., distribution transformers, primary meters), the bit setting depends on the PHASEDESIGNATION field model name. An unset bit (0) indicates that the device is operational on the phase. A set bit (1) indicates the device is not operational on the phase.

For remaining nonswitchable devices, the Status bits 28-30 have no significance.

Bits 27-17 are reserved for future use by Telvent.

Bit 16 — This bit specifies whether a junction serves as a subsidiary source. A set bit (1) indicates that it is a subsidiary source; an unset bit (0) indicates that it is not. This bit is used by Extended Feeder Manager.

Bit 15 — This bit specifies whether a device is gang operated. The value of Y means that it is; any other value (e.g., N, 0) means that it is not. This bit is used only by Responder (NOT Feeder Manager).

Bit 14 — This bit specifies if a device is a transformer and depends on the class model name TRANSFORMER. The value 1 means that it is; 0 means that it is not.

Bit 13 — This bit specifes that a device serves as the power source (or ultimate source) for a circuit because it is related to the object class with the class model name CIRCUITSOURCE. The value 1 means that it is; 0 means that it is not.

Bit 12 — This bit indicates a device that can prevent the flow of power between two lines and depends on the class model names FDRMGRPROTECTIVE and SWITCH. Any device with one of these model names will have the switch flag bit set to 1.

Bit 11 — This bit indicates a device that represents a point of power delivery and depends on the class model name FDRMGRLOADPOINT.

Bits 10-8 — These bits indicate whether a device has overcurrent protection on any phase and depends on the class model name FDRMGRPROTECTIVE and field model name PHASEDESIGNATION. A set bit indicates overcurrent protection is present on the phase.

Bits 7-6 are reserved for future use by Telvent.

Bits 5-3 — These bits indicate whether a device is operational on each phase and depend on the field model name PHASEDESIGNATION. A value of 0 means that the device is operational on the phase. A value of 1 indicates the device is not operational on the phase. A single phase fuse on phase A would have a value of 110 for these bits.

Bits 2-0 are reserved for future use by Telvent.

Byte 3 (MSB)							
bit 31	bit 30	bit 29	bit 28	bit 27	bit 26	bit 25	bit 24
reserved	**Normal Status Phase C**	**Normal Status Phase B**	**Normal Status Phase A**	**reserved**			

Byte 2							
bit 23	bit 22	bit 21	bit 20	bit 19	bit 18	bit 17	bit 16
reserved							**Subsidiary Source**

Byte 1							
bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8
Flag:	Flag:	Flag:	Flag:	Flag:	Flag	Flag	Flag

Gang Operated	Transformer	Circuit Source	Switch	Load Point	Phase C Protective Device	Phase B Protective Device	Phase A Protective Device

Byte 0 (LSB)							
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
reserved	**reserved**	Phase C Exists	Phase B Exists	Phase A Exists	**reserved**		

D) ELECTRIC TRACING EDGES (line features):

For any edge feature class that belongs to the electrical network, the bits of the MMElectricTraceWeight field are interpreted as follows in the GWP electric Geodatabase:

Bit 31 is reserved for future use by Telvent.

Bits 30-28 — These bits indicate the presence or absence of a conductor for each phase and depend on the field model name PhaseDesignation. For any traceable features (see bit 12 below), Feeder Manager then uses the value in the field with field model name PHASEDESIGNATION to set these bits. The value of 1 indicates the presence of a conductor on a phase; a 0 indicates the absence of a conductor on the phase.

Bits 27-13 are reserved for future use by Telvent.

Bit 12 — This bit specifies a line (edge) that should not be traced and depends on the class model name FDRMGRNONTRACEABLE and the field model name FDRMGRNONTRACEABLE. If Feeder Manager finds the class model name FDRMGRNONTRACEABLE, then no features in this feature class are traced. If Feeder Manager finds the field model name FDRMGRNONTRACEABLE, then only those features with a code of 0 are traced. The BusBar, for example, may contain some features that should not be traced such as those found in substations.

Bit 11 is reserved for future use by Telvent.

Bits 10-4 — These bits are set to indicate the operating voltage of the edge feature and depend on the OPERATINGVOLTAGE field model name and the Feeder Manager FDRMGRVOLTAGECODE domain.

Bits 3-0 are reserved for future use by Telvent.

Byte 3 (most significant bit (MSB)							
bit 31	bit 30	bit 29	bit 28	bit	bit	bit	bit

				27	26	25	24
reserved	**Phase C Conductor Present**	**Phase B Conductor Present**	**Phase A Conductor Present**	**reserved**			

Byte 2
bits 23 - 16
reserved

Byte 1			
bits 15 - 13	bit 12	bit 11	bits 10 - 8
reserved	Flag: Non-Feeder	**reserved**	Voltage Code (most significant three bits)

Byte 0 — least significant bit (LSB)				
bits 7 - 4	bit 3	bit 2	bit 1	bit 0
Voltage Code (least significant four bits)	**reserved**			