

Autodesk Topobase Electric Technical Overview

Autodesk® Topobase™ software brings engineering design data and geospatial data together in a centralized database environment so organizations can share and use spatial information more easily. By integrating previously disparate islands of CAD and GIS data into a common, centralized framework, Topobase enables organizations to improve the efficiency of business processes and reduce the redundancy of information. Organizations no longer have to “throw data over the wall” between departments and re create data because of incompatible formats. With Topobase, data is available, accurate, and synchronized across the organization.

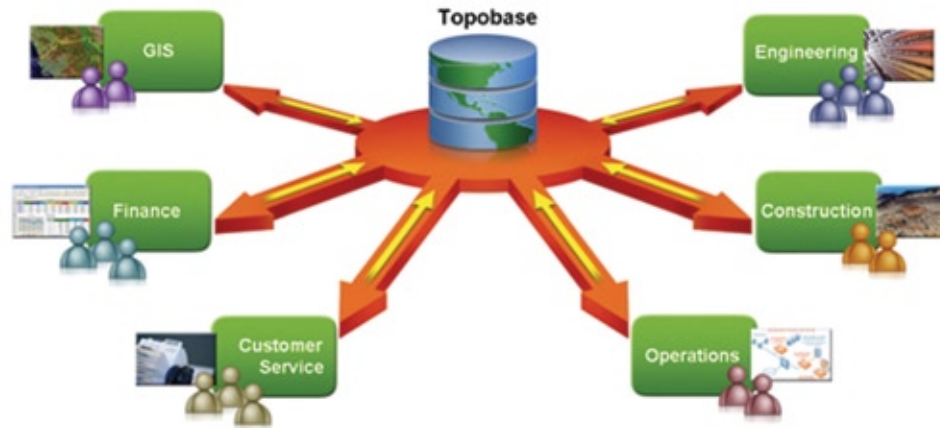


Figure 1: Autodesk Topobase is an infrastructure design and management solution that provides integrated, organization-wide access to spatial information for engineering, GIS, operations, and business processes.

The Benefits of Topobase

Using Topobase, organizations gain a comprehensive view of their infrastructure assets and geospatially enable all asset management processes, which helps to improve decision making. Organizations enhance efficiency and data quality by using the same applications to create and manage spatial information across departments. When all departments can use a single set of business rules to access and analyze data, the organization reduces manual and duplicate data entry and minimizes the need for data conversion. Topobase also streamlines data editing and creation, while making those processes more efficient through automation and rule-based data creation. Perhaps most important, Topobase enables organizations to securely share spatial information with employees, such as field staff and business decision makers, who have traditionally lacked access to this information.

The Topobase Architecture

The Topobase application stores spatial data in a central database and integrates with other business systems. Topobase is built on AutoCAD® Map 3D and Autodesk MapGuide® Enterprise software applications. AutoCAD Map 3D is a leading platform for creating and editing spatial data. It combines the familiar functionality of AutoCAD® software-based design applications with GIS functionality.

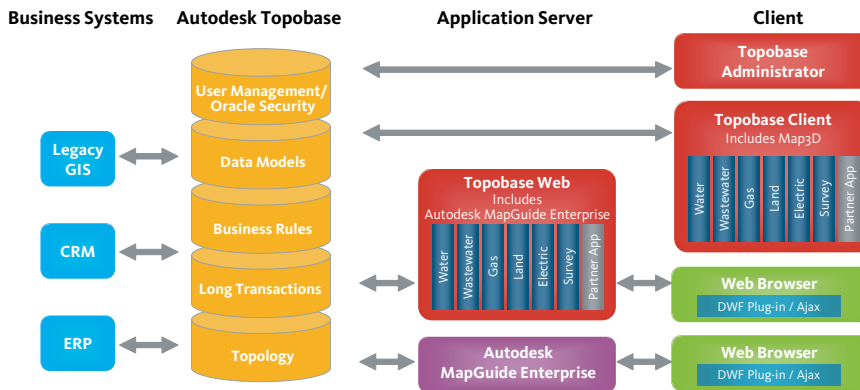


Figure 2: The Autodesk Topobase architecture delivers data integration, sharing, creation, and management capabilities along with superior database performance.

Autodesk MapGuide Enterprise enables organizations to publish map and design information internally or over the web. Using industry-leading development tools, organizations can create online applications that blend spatial and alphanumeric information from business systems on user-friendly maps. This capability makes sharing valuable infrastructure data with non-CAD and GIS users seamless and cost-effective.

Topobase uses Oracle® Spatial, the world's leading spatial database, to store spatial data. Based on open standards, Oracle Spatial provides vendor-neutral GIS capabilities that allow organizations to use preferred applications to carry out geospatial analysis. It takes full advantage of the native GIS capabilities in Oracle Spatial for storing spatial data and performing spatial tasks, and it includes the proven Oracle database management and tuning features that help ensure superior database performance over time. Organizations can use standard IT tools along with SQL to access information and the connectivity models in Topobase for upstream and downstream tracing, reporting, or to integrate with business and IT systems (such as customer relationship management and enterprise resource planning) or legacy GIS systems from other vendors.

Extending the value and capabilities of AutoCAD Map 3D, Autodesk MapGuide Enterprise, and Oracle Spatial, each Topobase implementation includes a set of standard components:

- Topobase Client—A desktop application that streamlines the integration of design data using a familiar interface and automatically stores asset data in the Oracle Spatial database.
- Topobase Web—An application that uses Autodesk MapGuide Enterprise to share asset information over the web.
- Topobase Administrator—A tool that enables organizations to change or extend data structures in the Oracle Spatial database, create business rules, design user forms and reports, and regulate access to the Spatial database.
- Industry-specific applications—Modules designed for managing specific types of infrastructure, such as electric, water, wastewater, gas, sewer, and land assets.

These components, a flexible architecture, and advanced technical features make Topobase a powerful infrastructure asset management solution for organizations that manage dynamic infrastructure networks. For more

detailed information about how to create, edit, share, and manage data using the Topobase Client, Topobase Web, and Topobase Administrator applications, see the Autodesk Topobase White Paper.

An Overview of Autodesk Topobase Electric

An industry-specific application within Topobase, Autodesk® Topobase™ Electric software delivers best-in-class CAD and GIS functionality using an Oracle enterprise database that has been specifically tailored for use by the electric utilities industry. This software enables electric utilities to use CAD tools to create assets and manage electric utility transmission and distribution networks and infrastructure.

Electric utilities can use Topobase Electric to create rich information that contains attribute data associated with their assets, both structural (such as poles, towers, segments, and ducts) and electrical (such as fuses, transformers, conductors, and switches). Engineering asset information is GIS-ready, incorporating a dynamic utility model that enables on-the-fly topology and analysis, including network traces to identify open assets, find circuit and phase configuration, and determine load calculation. Electric utilities can then maintain their infrastructure data in Topobase Electric, which can be accessed across the organization and used by business teams in ongoing network and asset management.

Topobase Electric comes with an electric-specific data model that contains the most common data schemas, object relationships and associations, business rules, and workflows requested and used in the electric industry today, including robust connectivity models. Furthermore, organizations can define and customize each element of the model to fit extended or specific requirements. For example, the data model on the database contains industry-specific business rules to help protect the integrity of spatial information, thereby improving the quality of data.

Topobase Electric workflows are designed to be comprehensive and to streamline common activities related to creating, configuring, and maintaining electric utility networks. In fact, many users rely on the extensive library of workflows to perform their daily tasks, with no need to understand the entire data model.

With the display model style templates included in Topobase Electric, each group of users (executives, customer service agents, field crews, and other employees) can view the utility's spatial data in a format that corresponds to their specific work functions. These preconfigured layer styles enable users to focus on and work with the subset of the enterprise database they need to efficiently complete their job tasks. For example, a network engineer might want access to network data or to view underground information, as-built infrastructure, and network conditions for asset-creation work. Meanwhile, an operations manager might want to see assets color-coded according to maintenance schedules.

Along with infrastructure asset data management tools, Topobase Electric features, including advanced CAD and GIS functions, enable departmental domain experts to accelerate workflows and increase the integrity of infrastructure data.

The following sections of this white paper explore the basic components of Autodesk Topobase Electric: asset assemblies, cross sections, topology, Electric Explorer, workflows and business rules, the database model, and display models.

Topobase Electric enables electric utilities and networks to:

- Gain a more complete view of all network infrastructure and assets.
- Make vital asset information accessible across the organization.
- Reduce data redundancy and duplicate systems and improve data quality by enforcing business rules and using workflows to meet data-quality standards.
- Minimize time-consuming data conversion processes when moving data between departments and job functions.
- Maintain engineering design accuracy throughout the project lifecycle, from the conceptual design to as-built final.
- Share information internally and externally more securely, easily, and cost-effectively.

A Closer Look: The Technical Features of Topobase Electric

The Autodesk Topobase Electric application delivers the advanced spatial data creation, sharing, and management capabilities electric utilities require to document, maintain, and present their electric network information. The Topobase Electric application contains asset assemblies, cross sections, circuit management, electric network topology, workflows and business rules, robust electric-specific data models, and customizable display model–style templates for graphical data representation. Combined, these features support optimal database performance, facilitate efficient asset creation and data management, and enhance the integrity of network data.

Smart Asset Assemblies

Electrical asset assemblies, or templates, are used to efficiently create common arrangements of features that are related to the network, such as a transformer bank, compatible unit, substation, or cross section. An assembly consists of several features with predefined attributes, geometry, labels, and internal connectivity. Also, a user can define assemblies for different types of equipment that vary in their attribute values (reference records). Templates can be used to create either simple or complex features.

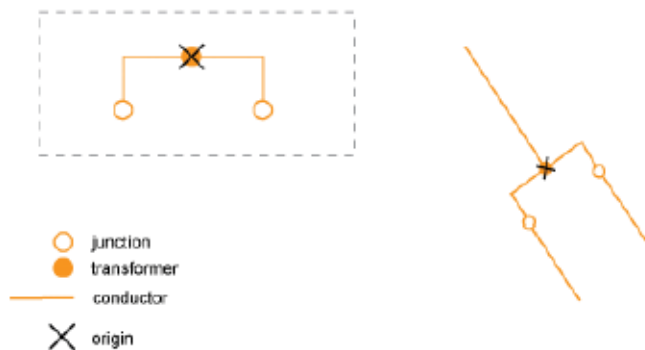


Figure 3: Example of a smart asset assembly.

Figure 3 shows an example of a smart asset assembly for a feature arrangement consisting of a transformer, two junctions, and two conductors. Using this assembly, a user can create and connect the five objects with a single mouse-click. In addition, feature attributes and connectivity are applied by the asset assembly. If the template features are grouped, the user can easily move or rotate the feature arrangement as a whole. After placing and moving the assembly, the user can continue to digitize the conductors.

Cross Sections

A cross section represents a schematic view of the segments of an electrical network and shows the ducts and conductors that lie in the segment. A cross section can also show the contents of a structural node, such as poles or towers. Also, users can use a cross section to edit electric objects; for example, a user can place or remove ducts in the segment and place or remove conductors in a duct. Cross sections simplify management of the relations between segments, ducts, and conductors and the data acquisition.

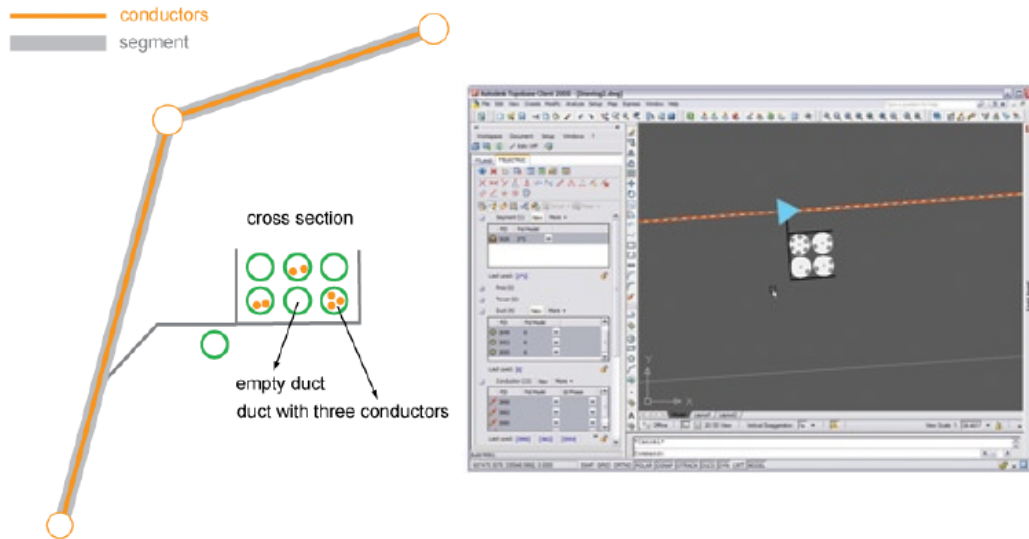


Figure 4: Typical cross section.

While segments and conductors are stored with geometry, the ducts are attribute feature classes without geometry. Using cross sections, a user can present all elements in the map, as illustrated in Figure 4.

Circuit Management

Electric devices and conductors can be grouped as circuits, meaning that each device or conductor optionally stores the relation to a circuit in the associated attribute. Circuits are managed by feature rules and topology.

Electric Network Topology

Topobase Electric supports both structural and electrical networks; that is, a user can administer structural and electrical networks separately. Topologies control the consistency of both networks, for example, to maintain circuit and phase integrity.

The electric data model contains two topologies:

- Electrical topology stores the connectivity of electrical elements such as conductors and devices.
- Structural topology stores the connectivity of structures and facilities such as segments, substations, banks, poles, and other structural features.

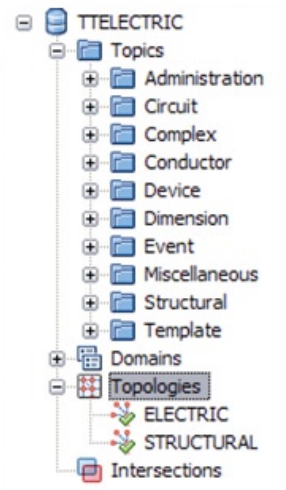


Figure 5: The electric data model contains two network topologies: electric and structural.

The topologies are implemented as an element-to-element model, which means that the elements are connected in a logical topology. Logical connectivity means that electric features can be connected without having a spatial relationship. The logical topologies have been defined in the Data Model Administrator. The user can view the settings, including tracing templates, with the Data Model Administrator.

Electrical Topology

The electric topology describes the connectivity between electrical conductors and devices.

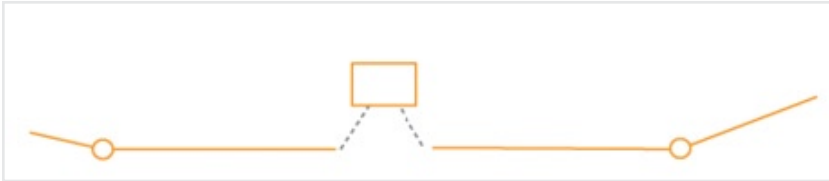


Figure 6: Example of electric topology.

For example, a device does not need to be connected spatially to the conductors to create a clear representation in the drawing. The logical topology automatically enables tracing and manages the connection between the features.

The electric network connects devices and conductors. An example is the conductor-fuse-conductor series. Conductors can be connected only to devices and must be connected to two devices. Optionally, the user can connect devices to devices, such as fuse-switch-transformer.

Structural Topology

The structural topology describes the connectivity between segments and structural elements, such as a transformer or pole. A structural network connects segments and all other structural objects. A segment cannot be connected to a segment and must be connected to a structural point, such as a manhole.

Electric Explorer

Use the Electric Explorer to view, build, and maintain electric networks. The Electric Explorer provides access to many features at once and can display the relationships between features. Each set of features is displayed in a separate “container” that enables the user to select multiple features and edit them at the same time.

The Electric Explorer displays segments, ducts, conductors, devices, and other electric elements and provides functions and workflows to manage network features. The user can specify which containers are available in the Electric Explorer and include only those containers that are needed. The user can edit attributes directly in the Electric Explorer, specifying which attributes to make available.

Electric Explorer makes it easy for users to:

- Create a new circuit for use in an electric network.
- Create a new underground network that automatically manages relationships between structural elements and electric devices.
- Create an overhead network using conductors: there are no segments or ducts; poles and towers are for information only and are not part of the overhead network.
- Populate the Electric Explorer by selecting and loading features in the map.

- Add ducts and conductors to segments by clicking snap points in the segment cross section.
- View related features by using Select Inferior and Select Superior to view, locate, and select associated network features. For example, select a segment and use Select Inferior to view all the features in that segment. Alternatively, the user can select a device or conductor and use Select Superior to view the ducts and segments that contain that device or conductor.
- Customize the Electric Explorer by setting document options. For example, specify which feature-class containers are visible.

Topobase Electric business rules and workflows allow electric utilities to:

- Improve productivity, quality of data, and efficiency by combining multiple steps into a single workflow.
- Check, validate, and maintain data quality at all points within the organization, across all levels of users.

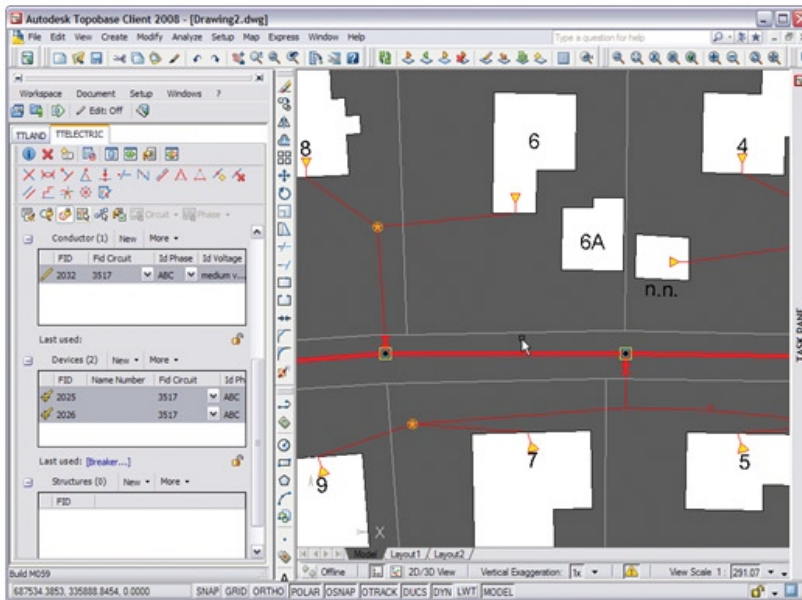


Figure 7: The Electric Explorer.

Workflows and Business Rules

One of the most important features of Topobase Electric is that it enables users to establish a comprehensive set of workflows to streamline business processes based on the electric utility's particular way of doing business. These workflows help guide users through common tasks and govern the way information is entered into the database. Workflows—and related business rules working behind the scenes—also prevent users from leaving out required elements, choosing incorrect materials, or including incorrect material sizes, thereby reducing errors during asset creation and data updates.

Workflows within Topobase Electric consist of a sequence of procedures or steps that the user is required to follow while performing a routine task. Business rules are actions executed automatically when a change is made to the database. Business rules speed the data creation process and keep data consistent. For example, the Validate Electric Topology business rule checks the phase, voltage, and state values when a connection is added or modified. If inconsistencies are detected, the voltage fields are highlighted in orange, and a tooltip displaying a message is available.

Business rules automatically flag or correct data according to predefined algorithms and perform complex consistency and dependency checks. Once business rules are established, dialog boxes in the Topobase Client include only valid elements for the user to select, streamlining the process and increasing accuracy. For example, when the load transfer workflow is running, the user is automatically prompted if it is not possible to connect the open and closed switches topologically. If during the tracing, a feature is reached twice—

assuming it is not a closing feature—then the workflow terminates without storing any information. A dialog box appears with the message “The load transfer didn’t succeed,” and no information is stored until the user attempts a second load transfer.

Workflows, business rules, and Electric Explorer tasks help users save time by combining several steps into one and automatically checking for errors, thus helping ensure that all relevant information is entered into the database. Users can easily create custom workflows or use one of the Topobase Electric workflows described here.

Electric Explorer tasks

- Find a feature in the map—select a feature on the map and identify related assets. For example, if the user selects a duct, the user is able to pick the containing segment as well as the conductors contained by the duct.
- Find connected features—use the Topobase network-tracing functions to find connected features, for example, all electric devices and conductors that are connected to an asset.
- Connect network elements—use the Topobase logical connector to define a part of an electric network. Using the logical connector, users can connect features that are not spatially connected.
- Create a segment—use the Electric Explorer to create a segment that contains a duct and a conductor.
- Other asset placement tasks: The Topobase Electric Explorer enables users to place network features, such as stations, service points, and conductors that run from the station to the service point.

Analysis workflows

- Find connected features—find all features that are topologically connected to a selected start feature. The network tracing begins from the selected start feature and is completed at the optional stop features.
- Find open devices—find open devices in an electric network. Open devices are switchable devices or conductors for which the state attribute is set to open or inactive.
- Compute load—compute the load of devices that consume power, such as a light, meter, motor, service point, or transformer.

Maintenance workflows

- Reconfigure circuit and flow—identify new features as part of the circuit when a user adds them to a network, and correct any flow errors, as well.
- Reconfigure phase—enables a user to correct the phase setting on a specific feature and issues an alert if a phase setting for a feature is incompatible with the associated feature.
- Transfer load—transfer the load from one circuit to another by feeding the network from another breaker.

Report workflows

- Report generation—print predefined and user-defined reports and export them as ASCII text, Crystal Reports®, or HTML files.

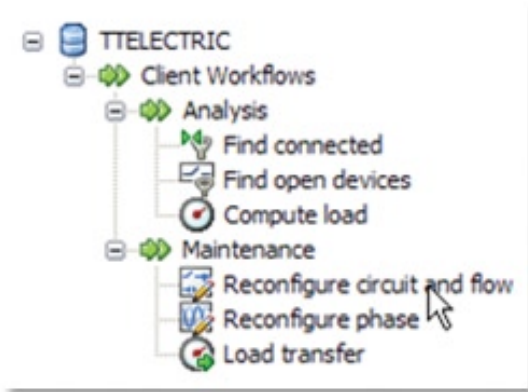


Figure 8: Workflows in Autodesk Topobase Electric.

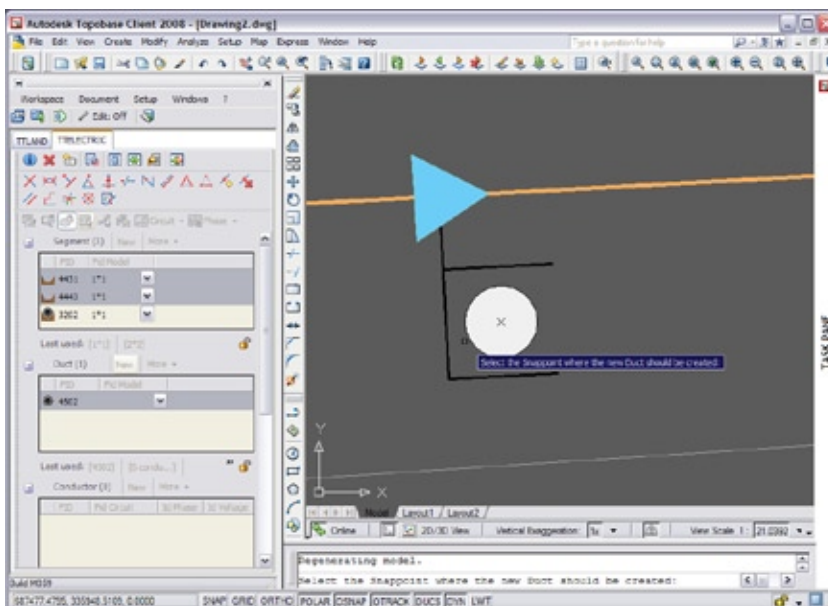


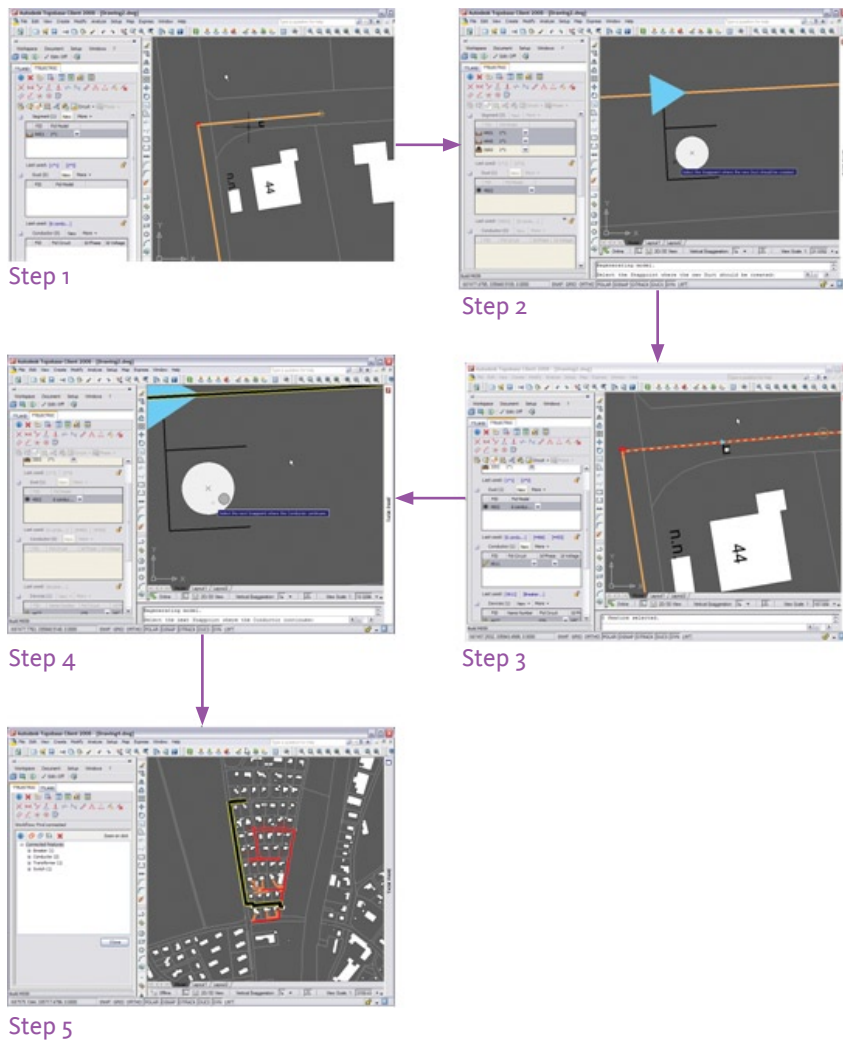
Figure 9: Workflows help to streamline the creation of underground networks.

Example Workflow: Create an Underground Network

Let's take a closer look at a typical Topobase Electric workflow: creating an electric network. Using this workflow, the user can create either an underground or overhead network. An underground network might consist of segments, ducts, devices, and conductors.

To create an underground network

1. In Topobase Client, open the Electric Explorer.
2. Digitize the devices; for example, an electric network normally starts with a circuit breaker. Then digitize a transformer and a service point.
3. Digitize the segments between the devices.
4. Assign the segment model. The cross sections are then placed automatically.
5. Create the ducts. Use the cross section snap points to place the ducts in the segment.
6. Assign the duct model. Use the duct snap points to place the conductors in the segment.



The built-in data model in Topobase Electric—which includes electric-specific database schemas, workflows, and business rules—helps utilities reduce deployment time and realize greater returns on their investment.

Figure 10: Example of using a workflow to create an underground network.

Topobase Electric Data Model

Topobase Electric comes preconfigured with an Oracle data model that is designed to capture the exact data needed by the electric utilities industry. It is configured to manage attribute information appropriate to assets common in the industry, such as connectors, fuses, meters, regulators, transformers, and switches. In addition, the data model is designed to capture all the underlying attributes relevant to each feature, such as voltage, current, age, condition, and circuit connection. The data model also maintains the relationships between features. This means, for example, that every conductor is associated to a circuit based on the connectivity.

The electric data model can be further customized with the Topobase Administrator to meet the exact data requirements of individual electric utility networks. And because the electric data model is preconfigured to meet the most common needs of the industry, these customizations typically can be completed rapidly—helping organizations realize the return on their Topobase Electric investment sooner.

The Topobase Electric data model is composed of 10 types of elements and their associated functions. Each of these is referred to as a topic. The 10 primary topic areas are as follows:

- Administration—Stores and manages contacts, customers, locations, and manufacturer information.
- Circuit—Stores and manages information on a group of connected electric devices and conductors (otherwise known as circuits).

- Complex—Stores the geometry components that are used to display cross sections in the map.
- Conductor—Stores information on conductors, used to carry electrical energy from point to point.
- Device—Stores information about devices that make up the electric network.
- Dimension—Stores dimension lines, labels, and points.
- Event—Stores information on events, related observations, and maintenance related to a feature.
- Miscellaneous—Stores information about physical markers, such as a sign or concrete monument that is installed either directly above or immediately adjacent to underground lines, bends, or fittings to indicate the presence of electricity.
- Structural—Stores information on the structural network.
- Template—Stores template definitions.

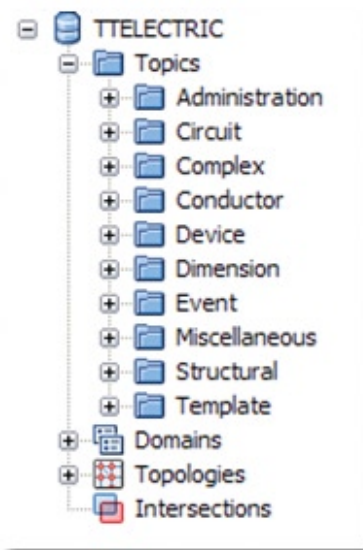


Figure 11: The electric data model supports the streamlined management of conductors, circuits, fuses, meters, switches, transformers, and other features specific to electric utility networks.

Let's take a closer look at the individual components of the electric data model.

Administration

The Administration topic contains attribute feature classes that manage information about contacts, customers, dimensions, locations, manufacturers, and item numbers related to network assets. In addition, the Administration topic includes feature classes for the creation of meter areas, pressure zones, protection zones, and supply zones. Captured data includes geometry, area, creation date, name, narrative, and user flag. The Administration topic includes the following feature classes:

- Administrative Area—Manages administrative areas such as cities, counties, or districts.
- Contact—Captures relevant contact information, such as owner, concessionaires, installer, operator, or maintenance person.
- Contract—Manages contract information related to an electric feature, for example, a joint-use agreement for a structure, such as a pole, that is shared by different utility companies.
- Customer Information—Manages customer information associated with a service point or meter.

- Location—Stores location information, such as street name, for electrical features.
- Manufacturer—Captures manufacturer data for all materials and assemblies.

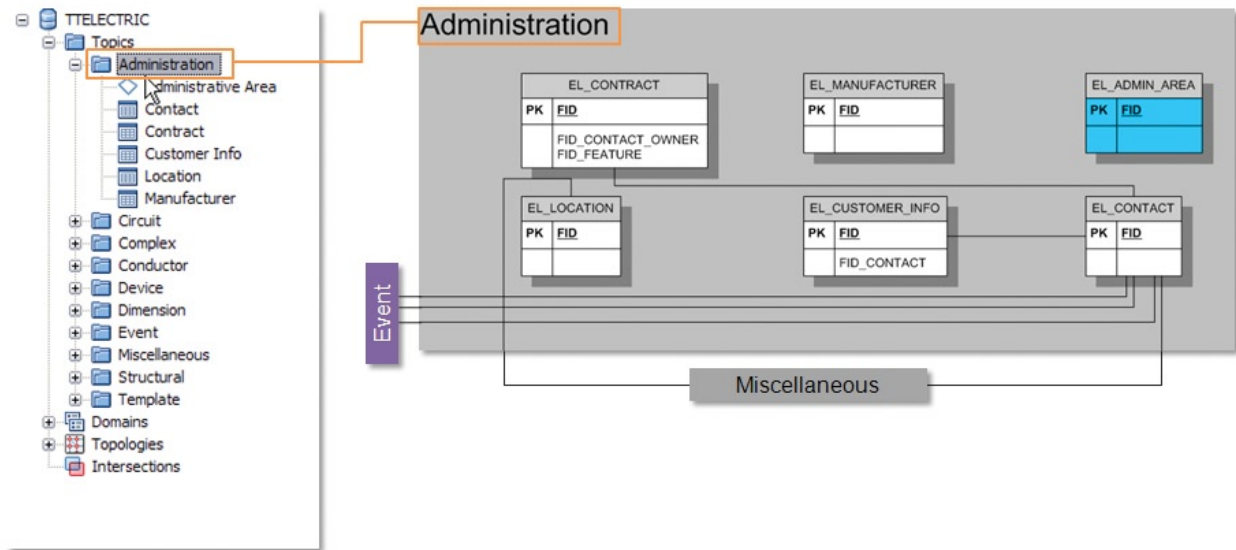


Figure 12: Topobase Electric Administration topic.

Circuit

The Circuit topic contains information about a group of connected electric devices and conductors—otherwise known as circuits. All device and conductor feature classes are related to a circuit. A circuit starts at an origin device such as a circuit breaker.

The Circuit topic consists of only one feature class, Circuit, which stores and manages information about the circuit.

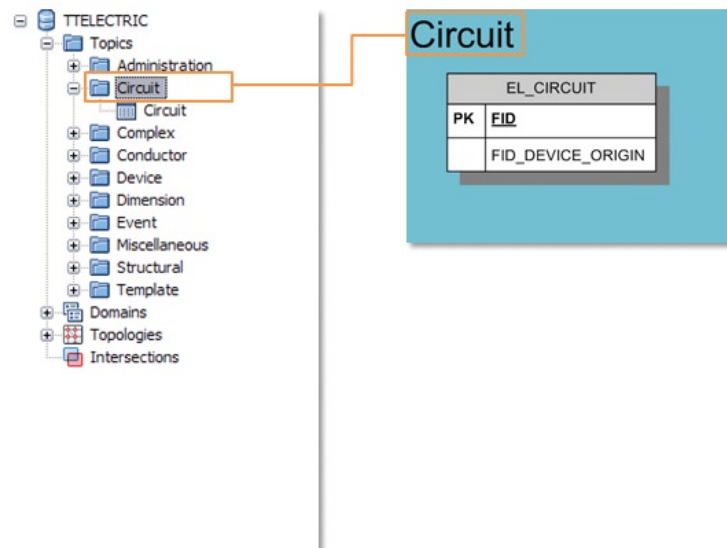


Figure 13: Topobase Electric Circuit topic.

Complex

The Complex topic contains the feature classes for cross sections and stores the geometry components that are used to display cross sections in the map. It contains five feature classes:

- Conductor—Stores the points that represent the conductors in a cross section.
- Decoration—Stores style information for the cross section, for example, a border line. The cross section decoration is related to the cross section.
- Duct—Represents the duct in a cross section.
- Origin—Indicates the insertion point of the geometry on the map.
- Snap Point—Shows a point on the map that elements can be snapped to during the asset creation process.

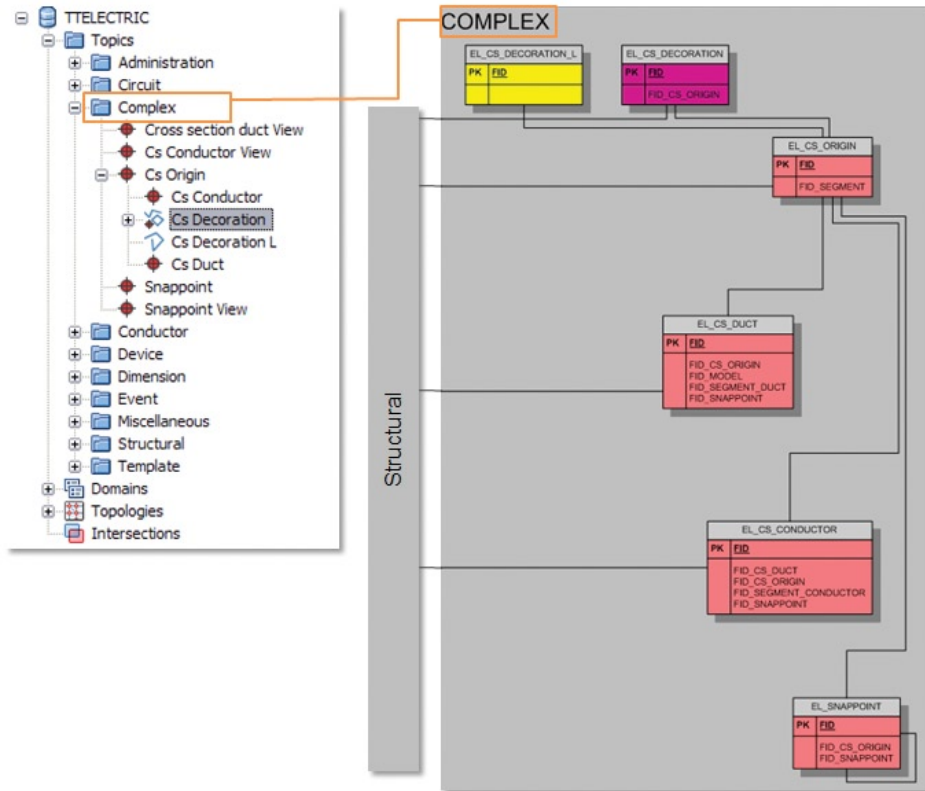


Figure 14: Topobase Electric Complex topic.

Conductor

The Conductor topic contains the conductor feature classes. A conductor is used to carry electric energy from point to point. This topic contains the following feature classes:

- Conductor—The conductor is related to a circuit and a structure, such as tower, pole, or manhole.
- Conductor Model—Stores information about the conductor model, such as manufacturer and material.
- Fiber—Manages telecommunication fibers if they are included with electric assets. A fiber is a very thin, flexible glass or plastic strand along which large quantities of information can be transmitted in the form of light pulses. A conductor can contain several fibers. Fibers are not part of the electric network.

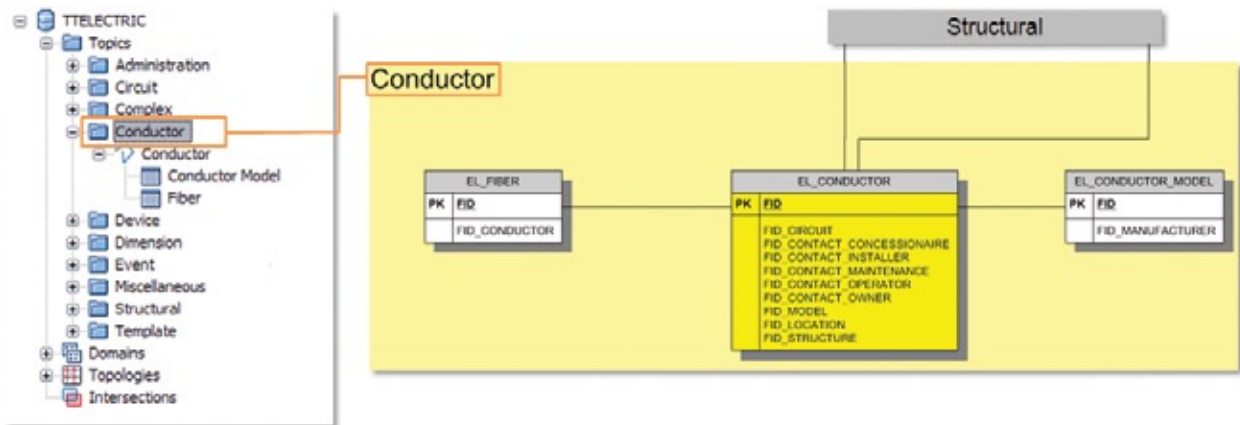


Figure 15: Topobase Electric Conductor topic.

Device

The Device topic contains the device feature classes that make up the electric network. This topic stores flow and connectivity information for the logical topology.

The Device topic contains the following feature classes, most of which also have predefined label and model feature classes:

- Breaker—A protection device that opens in an overcurrent condition to protect the circuit. A breaker is usually installed in substations at the start of a circuit.
- Bus Bar—A heavy conductor used to collect, carry, and distribute electric currents.
- Capacitor—An electric circuit element used to store charge temporarily.
- Current Regulator—A device that maintains the current on the network to within a given tolerance.
- Elbow—A terminator for a conductor before it connects to a device.
- Fault Thrower—A ground switch that is closed by local protection equipment on an energized circuit under fault conditions, remotely tripping the circuit breaker(s) controlling the circuit.
- Fuse—A protection device that opens to protect the upstream circuit sections from faults occurring downstream from the fuse. The fuse opens when the operating current exceeds the cutout current.
- Generator—A device that converts mechanical energy into electrical energy.
- Ground—An item that grounds electrical equipment.
- Head Bolt Outlet—A device that supplies electric current for vehicle heating in cold weather climates.
- Isolator—A device that separates a component, circuit, or system from a source of electricity.
- Junction—A device that links two or more conductors.
- Light—A streetlight.
- Lightning Arrester—A device that protects the electric network from lightning.
- Load Tap Changer—On-load tap-changing mechanism for power transformers.
- Meter—A device that measures the quantity and rate of electricity through a section of line.
- Motor—A device that converts electrical energy into mechanical energy.
- Recloser—A protection device that detects downstream faults and interrupts the faulted section.

- Regulator—A device that maintains the current on the network within a given tolerance.
- Riser—The connection between underground and overhead networks.
- Sectionalizer—A protective device that automatically isolates faulty sections of a circuit. Because it does not have fault-interrupting capability, it is used with a backup device such as a breaker or a recloser.
- Service Point—The boundary between the network and the customer. A service point may have many customers associated with it. The symbology of the service point reflects the type of customers fed by the network at that point.
- Sleeve—A device that repairs or connects cable.
- Switch—A device that opens or closes to change the load distribution or the configuration of the network.
- Termination—The termination of a loose end of a conductor.
- Transformer—A device that converts the generator's low-voltage electricity to higher voltage levels for transmission to the load center, such as a city or factory.
- Way—A switchable point within low-voltage switch gear.

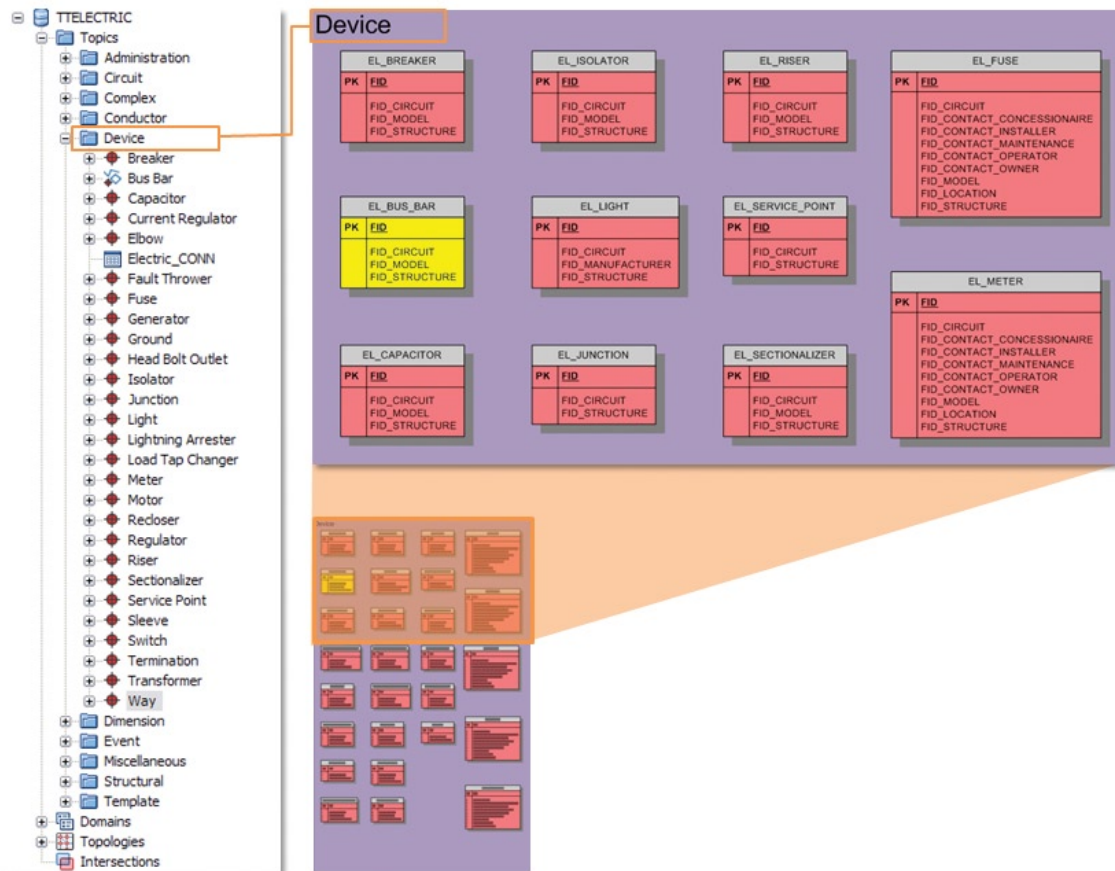


Figure 16: Topobase Electric Device topic.

Dimension

The Dimension topic enables users constructing and editing the electric network to store transient data on asset dimensions. Use it to create user-defined markups and label measurements, for example, to measure and label the distance between two points on the network.

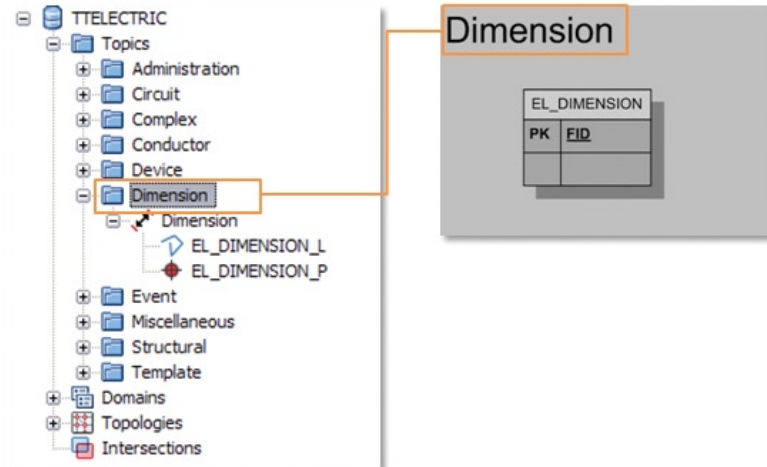


Figure 17: Topobase Electric Administrator view of Dimension topic.

Event

The Event topic contains the feature classes for events, observations, and maintenance related to a feature:

- Event—Stores events such as inspections, including event type and contact information. An event can be related to several observations, and an observation can be related to several maintenance activities. For example, for a damage event, the observation might be inspection information and the maintenance might be repair information.
- Maintenance—Stores maintenance work such as washing, inspection, or function checking. Maintenance can be related to an observation.
- Observation—Stores observation activities that apply to a feature, for example, meter reading. Observations can be related to an event. Use a point, line, or polygon to indicate a location in the map.

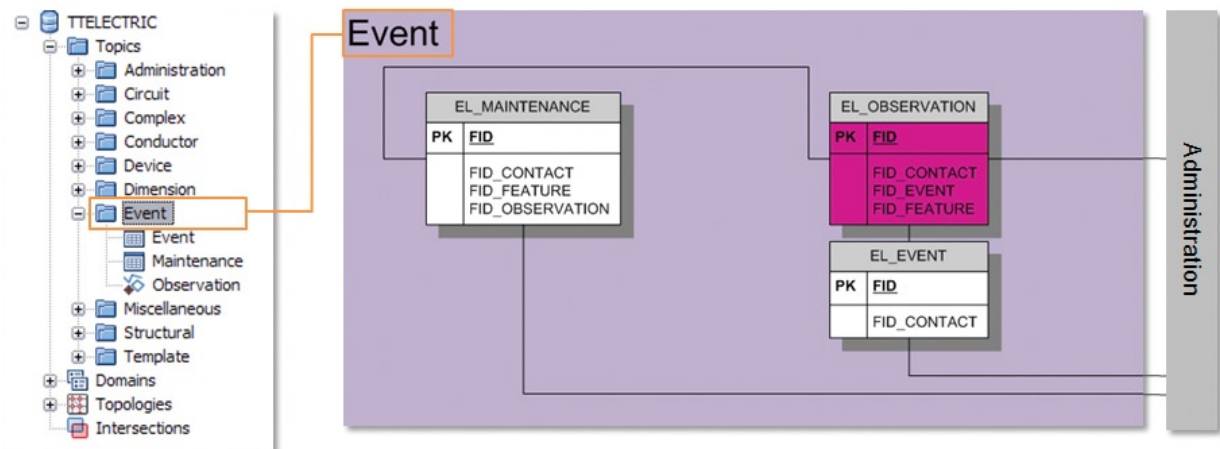


Figure 18: Topobase Electric Event topic.

Miscellaneous

The Miscellaneous topic stores information about physical markers. A marker is a sign or a concrete monument installed either directly above or immediately adjacent to underground lines, bends, or fittings to indicate the presence of electricity.

Markers are not part of the electric network.

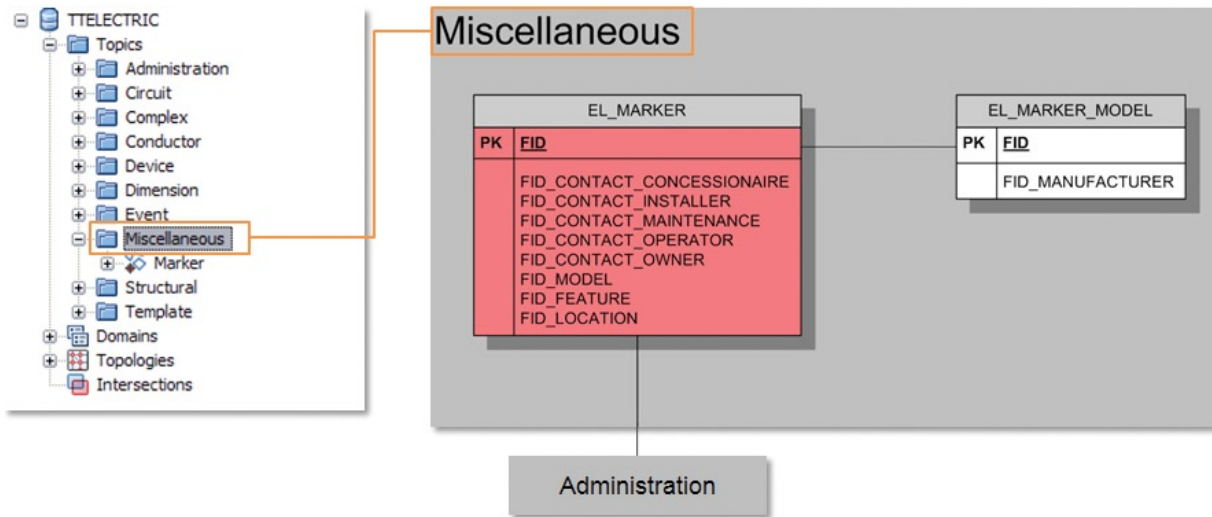


Figure 19: Topobase Electric Miscellaneous topic.

Structural

The Structural topic contains the structural feature classes that make up the structural network plus some additional structural feature classes. The topic stores flow and connectivity information for the logical topology. Most structural features classes have an associated model table.

The following are a few of the Structural feature classes. The full list is available in the data model appendix.

- Access Point—A structure that provides access to electric facilities.
- Anchor—An anchor associated with a structure. This feature class includes a predefined label feature class and is not included in the structural network.
- Antenna—An anchor associated with a structure.
- Arrestor—An anchor associated with a structure.
- Capacitor Bank—A set of individual capacitors grouped together.
- Feeder Pillar—A metal cabinet with opening doors.
- Handhole—A small underground access point.
- Link Box—A sunken box with a concrete lid at ground level.
- LV Board—LV distribution busbar mounted on the substation wall.
- Manhole—An underground access point.
- Pad—A structure that is made of poured concrete, laid over a gravel base, upon which electric facilities (most commonly transformers) are placed.
- Pathway—A feature class that stores information about the electric network: segments, ducts, and conductors.
- Pole—A structure that supports overhead devices in the electrical system.
- Substation—A walled structure where voltage transformation takes place. The substation itself is not connected to the electric network. It is part of the structural network.

- Switch Board—A mechanical device for shifting an electric current to another circuit.
- Switchgear—Switching equipment used in an electric power station.
- Tower—A special type of pole structure, characterized by its size and construction type. It usually supports high-voltage conductors.
- Vault—A walled structure that houses electric devices. It may be underground or may sit on a slab.
- Warning Light—A warning light associated with a structure.

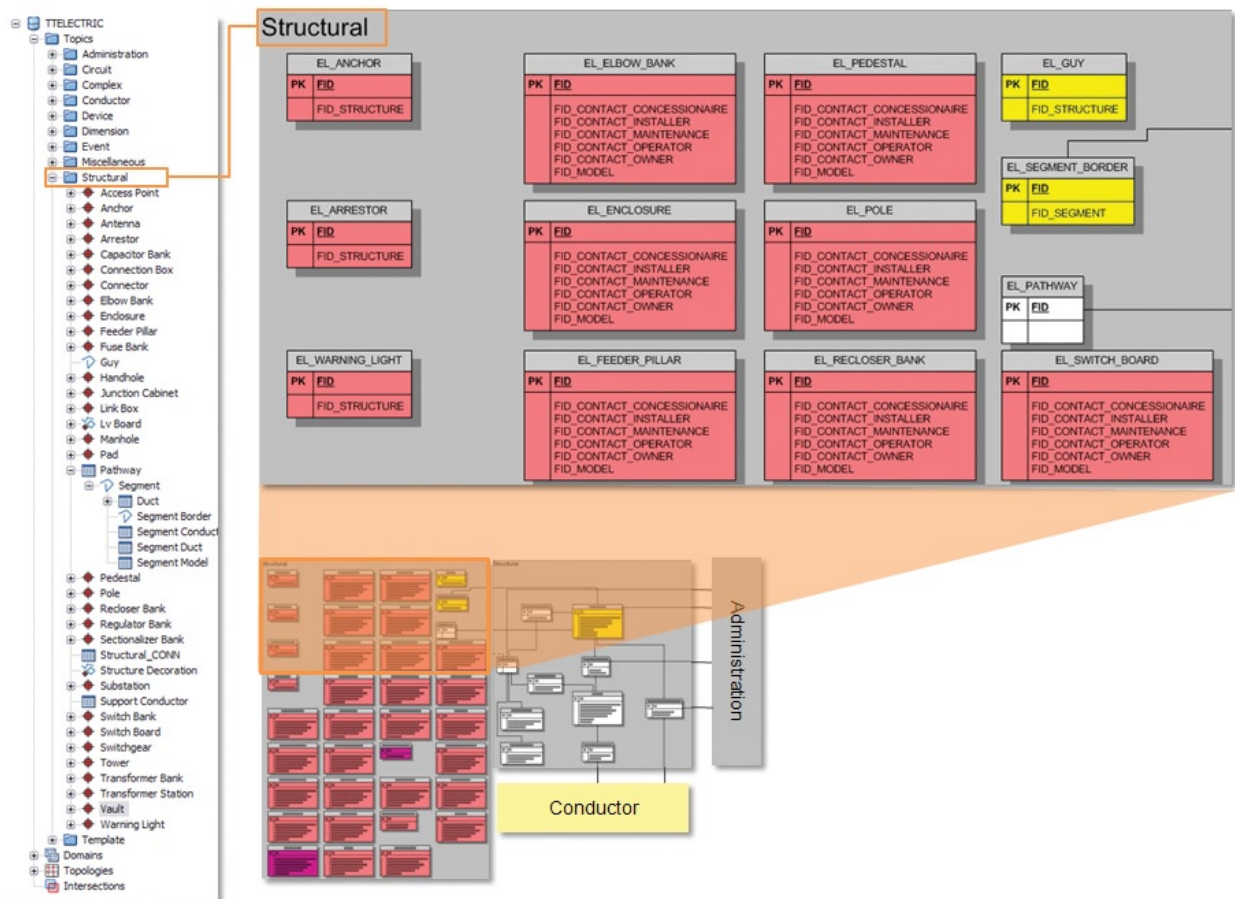


Figure 20: Topobase Electric Structure topic.

Template

The Template topic contains attribute tables that store the template definitions:

- Feature Group—Stores the grouping of the template features when the template is created.
- Feature Group Feature—Stores the relationship between the feature group and the feature classes.
- Template—Stores the template metadata, such as the name. A foreign key connects a template to a model, such as segment model or duct model.
- Template Explorer—Specifies the feature classes in the document explorer from which a template is available.
- Template Feature—Stores the template geometry in the local coordinate system.
- Template Relation—Stores the relation between the features in the template and the created features.

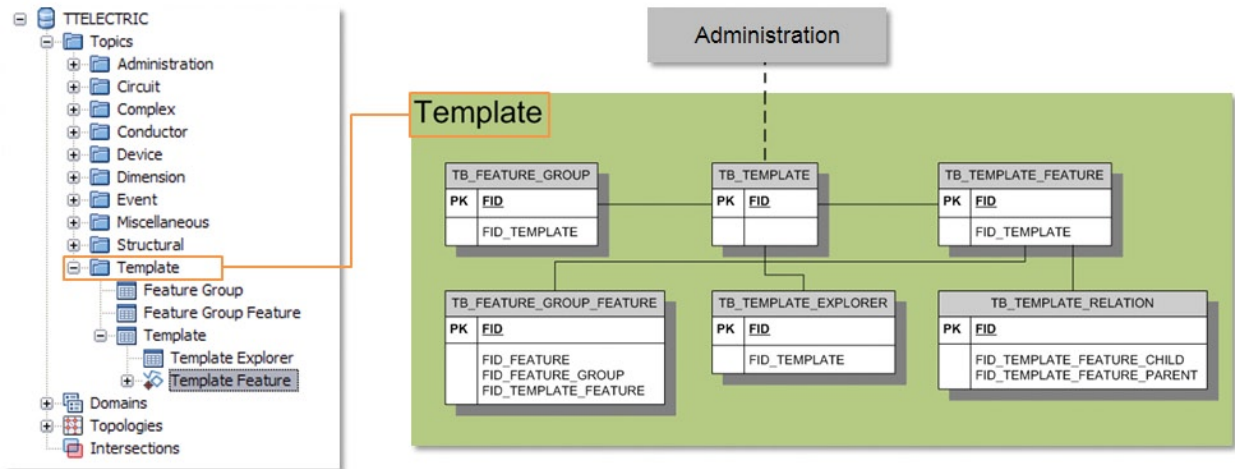


Figure 21: Topobase Electric Template topic.

Display Style Templates

With the preconfigured layer styles in Topobase Electric, many different users—or groups of users, such as executives, customer service agents, or field crews—can access and view the facility data they need in a customized view designed to meet their unique work functions. These style templates enable users to view information using the scale, symbols, and formatting most relevant to their jobs so that they can complete job-related tasks efficiently. For example, electric utility network engineers want to know where the existing conductors are below the street, but maintenance and operations personnel might be interested in viewing the same data represented according to physical state, load, and maintenance schedules.

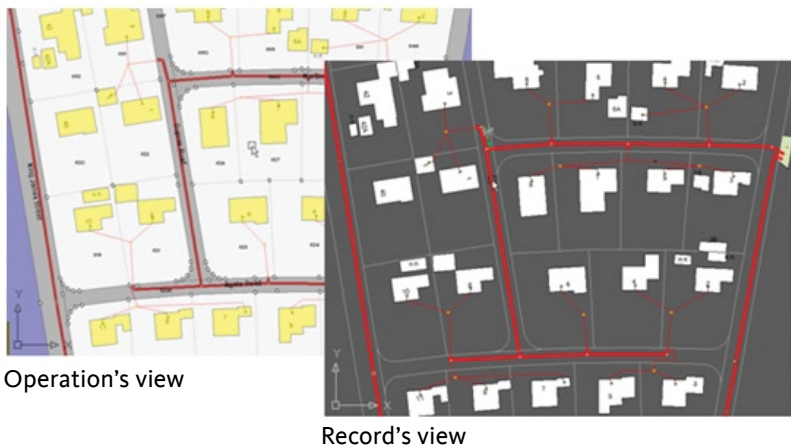


Figure 22: Display style templates show different graphical representations depending on the job function.

Conclusion: Autodesk Topobase Electric Delivers Results

Infrastructure design and management greatly affects the success and accuracy of electric networks and utilities. For too long, utilities have carried out data creation, as-built, and management processes using disparate applications that generate data in proprietary formats and store data in independent, siloed databases. This lack of integrated asset management results in duplicated work, increased risk of errors, limited visibility into assets as a whole, and a myriad of time-consuming workarounds such as data conversions. Autodesk Topobase Electric software gives electric utilities the architecture, electric-specific components, and technology features they need to overcome these challenges.

By providing centralized access to spatial data and enhanced processes, Autodesk Topobase Electric improves the way workers complete vital tasks throughout electric utility organizations. Employees in every department can save time, boost productivity, and work more independently. Predefined data models, workflows, and business rules help accelerate processes within the organization and help ensure that electric-related data is easily—and accurately—shared among departments.

With Topobase Electric, organizations are able to:

- Gain a big-picture view of electric network and related assets.
- Streamline common processes and tasks using automated workflows.
- Improve data quality and accuracy using embedded business rules.
- Minimize data conversions.
- Share asset data with less effort.
- Quickly and cost-effectively implement productivity gains.

Find out more about the benefits of Autodesk Topobase Electric by visiting www.autodesk.com/topobase today.

Appendix

