Detailed Feature Specification (DFS)

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| --- | --- | --- | --- |
| Version # | Author | Date | Revision Description |
| 0.1 | Rich Adase | 1/10/2017 | Initial draft |
| 0.2 | Rich Adase | 1/20/2017 | * Added section on Feature State Lifecycle * Expanded Features section to capture assumptions and class-specific decisions |
| 0.3 | Rich Adase | 1/30/2017 | * Added some BRs related to boundary feature classes and functionality * Added section to describe shared components and their attributes; started with description of attributes related to geographic data collection |
| 0.4 | Rich Adase | 2/15/2017 | * Updated list of documents included in the DFS * Added Appendix A for open issue tracking |
| 0.5 | Rama Ankam | 2/22/2017 | * Added preliminary review notes to Appendix A * Updated some issues that can be accommodated for March core GIS delivery |
| 0.6 | Rich Adase  Joel Dizon | 3/30/2017 | * Relocated Feature State Lifecycle to Job Management DDD * Elaborated Fiber Relationships |
| 1.2 | Rich Adase | 5/15/2017 | * Elaborated on feature sections – Duct Point, Miscellaneous Structure, Primary/Secondary Conductor Node * Added section under Shared Attribution describing logic for Device ID attributes |
| 1.6 | Rich Adase | 6/16/2017 | * Added section under Shared Attribution describing CU/Ancillary CU component behavior * Relocated BRs from Business Rules DDD regarding GIS Connectivity requirements |
| 1.8 | Rich Adase | 7/10/2017 | * Relocated BR from Business Rules DDD regarding service point validation * Added Open Point as a type of Secondary Conductor Node |
| 1.9 | Rich Adase | 7/19/2017 | * Reorganized section on virtual points * Updated Legends section to directly address more BRs * Responded to outstanding review comments |
| 2.0 | Rich Adase | 8/14/2017 | * Clarified mapping of virtual point feature classes during migration to OMS * Specified use of 4-way footprint for Special type Manholes |
| 2.1 | Rich Adase | 3/30/2018 | * Described placement of Duct Bank, Formation, and Duct * Reorganized BRs to specifically address COTS functionality * Added section 7 to describe switch gear assemblies * Responded to comments and open issues |

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# Overview

## Purpose of Document

The Detailed Feature Specification (DFS) is primarily intended to document the feature classes comprised by the GIS model, describing for each feature class the components and attributes involved, and the core metadata describing the behavior of that feature class.

This includes the following related documents:

* This document, providing information at a system level, such as feature state lifecycle, display legends, etc.
* A set of accompanying spreadsheets:
  + ***DFS Features*** – Contains the structured information about each feature class. There are three spreadsheets that follow this format:
    - ***DFS Features – Electric.xlsx*** – Contains feature classes related to electric distribution assets.
    - ***DFS Features – Landbase.xlsx*** – Contains feature classes related to landbase and boundaries.
    - ***DFS Features – Fiber.xlsx*** – Contains feature classes related to Fiber Optic Works.
  + ***DFS Relationships.xlsx*** – Describes the relationships between feature classes, such as connectivity and ownership.
  + ***DFS Legends*** – Describes the various legends available to users, including presentation and default behaviors of all legend entries.
  + ***DFS Value Lists.xlsx*** – Describes value lists referenced by the feature model for displaying picklists in the user interface, performing value lookups, and validating data domain constraints.

## Business Requirements

### Ad Valorem

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| BR # | Requirement | Section # |
| 5.1.2.F5 | The tax boundary subtypes defined in requirement 5.1.2.F4 can have their visibility toggled on and off, as defined in the Boundaries DRD functional requirement 5.1.1.F16. | 2.9 |

### Boundaries

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| BR # | | Requirement | Section # |
| 5.1.1.F1 | | The system will allow users to view boundaries their roles have access to. | 5.1.3 |
| 5.1.1.F2 | | The system will retain a user’s session selected boundaries to be used in future. | 5.1.1 |
| 5.1.1.F16 | | The system will allow the visibility of different boundaries to be toggled on and off. | 5.1.1 |
| 5.1.1.F17 | | The system will allow each boundary to be uniquely visually identified. Example: color, shading, or fill pattern. | 5.1.2 |
| 5.1.1.F30 | The Telecom Boundaries will contain the following attributes:  - Antenna Height  - Antenna Location (GPS latitude/longitude)  - Antenna Type  - Coverage  - EIRP (Effective Isotropic Radiated Power)  - Frequency  - Signal Strength (decibels - dbm) o The Signal Strength will be grouped into three bands:  o -75 dbm  o -85 dbm  o -95 dbm | | DFS Features - Landbase |
| 5.1.1.F37 | | This boundary subtype [Meter Tech Boundaries] will contain the following attributes:  - ESZ Type  - G3E-FNO (Feature Number)  - G3E-FID ID (ID of Feature Identified, i.e. Feeder, Substation, etc.)  - G3E-FID Polygon (ID of Polygon)  - ESZ ID  - ESZ Name (5-digit Substation Code + 4-digit Feeder ID)  - Substation Code  - Service Center (3-digit Code)  - District/Agency Name  - The population of this field will be reviewed during the design |  |
| 5.1.1.F40 | | The Joint Use Permit Boundaries will show the TRC route map associated with the permit and will contain the following attributes:  - Company Name  - Permit Number  - Status  \*Permit number is associated with poles as defined in the GIS Model and Business Rules DRD | 2.5 |
| 5.1.1.F51 | | The Cartographic Boundaries will be comprised of the following boundary subtypes:  - Zip Code | DFS Features – Landbase (Zip Code Boundary) |
| 5.1.1.F54 | | The Political Boundaries will be comprised of the following boundary subtypes:  - Congressional District  - Precinct  - State Senate District  - State House District | DFS Features – Landbase, DFS Value Lists (Political Boundary Type) |

### Decommissioning

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| BR # | Requirement | Section # |
| 9.2.5.F1 | The system will allow the users to automatically filter the GIS map view so that only the fuses and reclosers are displayed along a designated feeder. The system will display a different color for spans based on the number of upstream protective devices. See Appendix Section XVI.A | **5.2.3** |
| 9.2.10.F1 | The system will allow a Streetlight Administrator to add a Traffic Lens Account with the following information: [...] | DFS Features – Electric |
| 9.2.10.F2 | The system will allow a Streetlight Administrator to view the Traffic Lens Account information. | DFS Features – Electric |

### Fiber

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| BR # | Requirement | Section # |
| 17.1.2.F7 | The new Graphical Design System/GIS will support representing the splice by a graphical icon within the route of the fiber cable. | DFS Legends - Fiber |
| 17.1.2.F8 | The new Graphical Design System/GIS will support representing station fence boundary and control house by graphical icons. | DFS Legends - Fiber |

### GIS Connectivity

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| BR # | Requirement | Section # |
| 0.1.9.F1 | The new GIS system must support the creation and configuration of a connectivity model per Oncor’s needs. The Oncor connectivity needs can be found below and at the following SharePoint link and in the Appendix section of this document. | **4.1** |
| 0.1.10.F6 | The GIS application should have the ability to toggle views to display Completed and Incomplete map correction/found asset tags. | **2.1** |
| 0.1.10.F10 | The new GIS application should distinguish energized features from de-energized features using different colors. |  |
| 0.1.14.F3 | Each Transformer must have Primary and Secondary nodes. This will avoid the “OMS Integration –One Node Transformer Error” | **2.10** |
| 0.1.14.F13 | Single phase features that are connected to multiple phase line will have the ability to preserve connectivity to accommodate Bypass/Tap | **2.9.4** |
| 0.1.14.F27 | All Fuses and Switches within a Switchgear should have a common Node. This will avoid the “Switchgear – Common Node Error”. | **2.7** |
| 0.1.14.F31 | A two node device requires at least one node to be connected. A warning must be displayed to the user in case of rule violation. | **DFS Relationships** |

### GIS Model & Business Rules

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| BR # | Requirement | Section # |
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| 0.1.3.F1 | Symbology between Network assets and Non-Network assets must be different and easily distinguishable. | **5.2.1, 5.2.2** |
| 0.1.3.F4 | The new Graphical Design System/GIS must allow the capability to automatically change the symbology (color, line weight, shape etc.) based on the attributes (Status, Type, Material etc.) of the feature | **5.1.2** |
| 0.1.3.F5 | The Symbology must be consistent across multiple GIS applications (Desktop, Web and Mobile). | **5.1.5** |
| 0.1.3.F6 | The Symbology must be distinguishable for different background colors (white, dark, Ariel photograph, satellite imagery etc.) | **5.1.2** |
| 0.1.3.F7 | The Symbology must support accessibility for color blind users. | **5.1.2** |
| 0.1.3.F8 | The new GIS must allow customizing Symbology on an on-demand basis for specific needs (Presentation for City authorities or Executives etc.). | **1.3.1** |
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| 0.1.8.F1 | All assets/features that are stored in the GIS should be tied back to their CU related record. | **3.2** |
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### Joint Use Management

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| BR # | Requirement | Section # |
| 7.3.1.F9 | The system will allow a Joint Use Administrator to edit attributes to include the Company ID (Company Name) for multiple selected attachments at the same time. | **1.3.5** |

### Landbase

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| BR # | Requirement | Section # |
| 9.1.1.F4 | The user must have the ability to turn on and off the selected base map. | **5.1.4** |
| 9.1.1.F5 | Base maps should be easily accessible to the end user. | **5.1.4** |
| 9.1.2.F2 | Utilize out-of-the box vendor symbols and labels and offer customization for layers in the new Graphical Design System/GIS. | DFS Legends - Landbase |
| 9.1.3.T2 | The system will allow users to edit features without feature locking and allow for data conflict resolution.  For example, when one user begins updating a feature, the system should not lock the feature. The system should allow for resolution of conflicts during data edits when multiple users edit the same feature. | 1.3.4 |
| 9.1.3.T3 | The system shall allow the user to turn on and off visibility for manual features. | **5.1.1** |

### Project Design

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| BR # | Requirement | Section # |
| 1.3.2.F21 | The user will be able to toggle the Design Polygon layer on and off. | **5.1.1** |
| 1.3.2.T5 | By default, features should appear in a different color on the map based on the current state of the feature. PPI/PPR, ABI/ABR, INI/OSR features should appear as three separate colors. | **5.2.1.c** |
| 1.3.3.F1 | The system will be able to display a master map representing all of Oncor’s features on a single, continuous map without the need for segments. | **1.3.1** |
| 1.3.3.F2 | The system will allow the user to toggle any feature layer (land base and facilities) on or off. | **5.1.1** |
| 1.3.3.F5 | Allow users to zoom in and out on the map in the following ways:   * Mouse wheel * Zoom buttons * Entering a zoom level | **1.3.1** |
| 1.3.3.F6 | The user will be able to view the attributes of a feature. | **1.3.3** |
| 1.3.3.F8 | The user will be able to view the ancillaries attached to a feature. | **1.3.3** |
| 1.3.3.F9 | The user will be able to view the attributes of an ancillary. | **1.3.3** |
|  |  |  |
| 1.3.3.F12 | The user will be able to view a list of documents that have been attached to a WR. | **3.3** |
| 1.3.3.F14 | The user will be able to view a list of documents that have been attached to feature. | **3.3** |
|  |  |  |
| 1.3.4.F8 | When a feature is added, the user will be prompted to enter required attributes, if any. | **1.3.4** |
| 1.3.4.F9 | The user will be able to edit attributes of a feature that a user is allowed to edit. | **1.3.4** |
| 1.3.4.F12 | The user will be able to connect a feature to another feature. Electrical connectivity is defined in section XI of the GIS Connectivity DRD Appendix. | **4.1** |
| 1.3.4.F16 | The user will be able to move and re-own a feature to a structure. | **1.3.4** |
| 1.3.4.F34 | The system will be able to apply rules governing the creation, size, positioning, and content of labels when adding features. | **1.3.2** |
| 1.3.4.F35 | The user will be able to add a permanent note to the master map. If a permanent note is added under a WR, the note will not be visible on the master map until WR approval. This note will remain on the map beyond closing of the WR. | **2.4** |
| 1.3.4.F36 | The user will be able to remove a permanent note from the master map while in a WR. The note will be removed from the master map upon WR approval. Users will be restricted from removing permanent notes from the master map outside of a WR. | **2.4** |
| 1.3.5.F3 | The user will be able select whether permits will be visible on the GIS map or not. | **5.1.1** |
| 1.3.5.F6 | The user will be able select whether easements will be visible on the GIS map or not. | **5.1.1** |
| 1.3.6.F3 | The system will automatically display a template for the Detail Design drawings of the two-way, and three-way, and four-way Manhole features when placed in the GIS. This Detail Design drawing will allow the user standard free-form drawing capabilities such as the ability to create lines, shapes, and labels. This Detail Design will be attached to the feature. See XII.F in the appendix for manhole screenshot reference. | **6.1** |
| 1.3.6.F4 | The user will be able to connect a feeder on the GIS map to cable drawn in the manhole Detail Designs. | **6** |
| 1.3.6.F5 | The system will be able to connect a feature drawn in the Detail Design to a graphical feature on the GIS map. | **6** |
| 1.3.6.F6 | The system will be able to visually demonstrate that a feature in the Detail Design is connected to a graphical feature on the GIS map. | **6** |
| 1.3.7.F3 | Upon adding a voucher to a feature, the user will be prompted to enter any required voucher attributes. The user will be prevented from submitting the voucher if any required fields are unfilled. | **1.3.4** |
| 1.3.7.F17 | The user will be required to enter the Vegetation Management estimate before they can mark the design for approval. | **DFS Features – Electric (Voucher Attributes / Estimated Amount)** |
| 1.3.7.F24 | The user will be able to view a list of vouchers attached to a Workpoint. | **1.3.3** |
| 7.1.1.F9 | The user will be able to filter the master map so that only poles with a state of LIP are shown. | **5.1.1** |

### Service Line Connectivity

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| BR # | Requirement | Section # |
| 4.1.1.F6 | There will be a distinct symbol in the GIS for each Service Line Feature: [...] | **DFS Legends – Electric** |
| 4.1.1.F11 | Service Lines in Proposed Install status will be visually displayed differently from assets that are in Installed In Service or Closed status. | **DFS Legends – Electric** |
| 4.1.6.F8 | Service Points will have a symbol based on the type of location it is serving. Such as: [...] | **DFS Legends – Electric** |
| 4.1.6.T6 | Validation rules will exist on Service Point data entry to ensure required fields are properly entered. | **1.3.5** |

### Street Light Maintenance

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| BR # | Requirement | Section # |
| 8.2.3.F1 | The system will graphically display all Streetlights with a known geographic location. |  |
| 8.2.3.F4 | The system will allow the Streetlight Administrator to filter the GIS display of Streetlights by multiple attributes, including the following but not limited to:   * FLN * GLN * WR Install number * WR Edit number * Operations Workset Number * Vintage Year * Owner code * Location Description * Account number * Schedule * Rate code * Lamp Type * Wattage * Luminaire Style * Luminaire Quantity * Light Status * Connection Date * Disconnect Date * Billing Status * Billing Start Date * Billing End Date * Municipality | **5.1.1** |
| 8.2.3.F6 | Streetlights will have their own feature layer that can be toggled on/off within the system. | **5.1.1** |
| 8.2.3.F7 | The system will allow the Streetlight Administrator to select multiple Streetlights through the mapping interface and modify the attributes of this group of Streetlights. | **1.3.5** |
| 8.2.4.F7 | The system will allow the Streetlight Administrator to select and modify the attributes of a group of Streetlights. | **1.3.5** |

### System Administration

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| BR # | Requirement | Section # |
| 14.1.1.F13 | The GIS will allow an Administrator to identify a set of features or components and perform a bulk modification of their attributes. | **1.3.4** |
| 14.1.1.F41 | The GIS will provide the functionality through a UI for an Administrator to set up and manage pick lists. | **1.3.4** |
| 14.1.3.F9 | The system will allow the user to place a DIS Corrections Tag at the same location of an existing feature. | **1.3.4** |



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| BR # | Requirement |



## Standard Product Functionality

Each item listed below is included in the standard G/Technology desktop product, and is assumed to address one or more business requirements.

### Map Display and Navigation

FRAMME divided the service territory into segments, with separate database servers and master graphic repositories for each one. G/Technology, by contrast, uses a single database to contain graphic and non-graphic data for the entire territory, with published cache files to support rapid display of data across that territory. Therefore, the new GIS map will be continuous. ***(BR 1.3.3.F1)***

Map windows may be navigated in the following ways, among others ***(BR 1.3.3.F5)***:

* Mouse wheel (when the Select Tool or Pan command is active)
* Zoom commands, accessed either from the View menu or toolbar buttons
  + Zoom In
  + Zoom Out
  + Zoom To Scale

Feature symbology is driven by metadata, and may not typically be altered by users. Some flexibility is offered via the Symbology button on the Display Control toolbar, which allows users to change the color, line style, symbol font, point size, and line weight of query or trace results; this can be manipulated to appear as if features have different style rules applied. Generation of complex or heavily tailored plots that depend on changes in symbology are better produced using GeoMedia. ***(BR 0.1.3.F8)***

### Feature Definition

G/Technology maintains definitions of the composition, attribution, and graphical appearance of features as metadata stored in the Oracle database.

When a new feature instance is placed, metadata rules are applied to determine how graphic components are drawn on the map, including considerations such as symbol, linestyle, size, relative positioning, etc. For label components, rules also govern the text content of each label based on attributes of the feature. ***(BR 1.3.4.F34)***

### Reviewing Features

G/Technology provides standard capability to review attributes of any feature defined in the model, via the Feature Explorer panel. Attributes are organized within Feature Explorer into dialog tabs, which may be configured to show a single record in a vertical column or multiple repeating instances (e.g.- Ancillary CUs, Vouchers on a Work Point) in a horizontal grid. Refer to the *DFS Features* spreadsheets for configuration of attribute inclusion and behavior on dialog tabs. ***(BRs 1.3.3.F6, 1.3.3.F8, 1.3.3.F9, 1.3.7.F24)***

### Placing features

When placing features, graphic components may be placed at the same location as an existing component using the vector snap tools on the SmartSketch toolbar. ***(BR 14.1.3.F9)***

### Editing Features

G/Technology employs optimistic locking when editing features, which means that users in multiple jobs may edit the same feature component concurrently. This is in contrast to FRAMME, which employed pessimistic locking to prevent concurrent edits. Users have access to conflict detection and resolution tools to reconcile concurrent edits on a given feature component. ***(BR 9.1.3.T2)***

G/Technology includes a standard command called Reestablish Relationships to manage relationships between features. This applies to all defined relationships, such as connectivity and ownership. ***(BR 1.3.4.F16)***

G/Technology supports configuration of required attributes, but enforces requirement during feature validation prior to posting, not during feature placement. However, the names of required attributes will be displayed in Feature Explorer using a bold font to communicate to users that they are required. ***(BR 1.3.4.F8, 1.3.7.F3, 4.1.6.T6)***

Attributes are edited via dialog tabs in Feature Explorer. Configuration of those dialog tabs determines which attributes may be edited. Access to individual attributes may be configured to be restricted to users with specific roles; if a user does not have the role designated for a given attribute, then the attribute will be neither visible nor editable for any feature to which it applies. Refer to the *DFS Features* spreadsheets for configuration of attribute inclusion and behavior on dialog tabs, and *System Access DDD* for more information about roles. ***(BR 1.3.4.F9)***

G/Technology provides a standard command called Edit Common Attribute that allows users to select multiple features and edit any attributes they have in common as a single action. ***(BR 14.1.1.F13, 7.3.1.F9, 8.2.3.F7, 8.2.4.F7)***Attribute picklists in G/Technology are governed by metadata, including the picklist definitions describing the table and columns from which to retrieve data, and the association of those picklists with individual attributes. This metadata may be modified using the Metadata Explorer panel in G/Technology, which is only available when an Administrator license is in use. ***(BR 14.1.1.F41)***

# Features

All feature definitions comprising the G/Technology feature model are specified in the related spreadsheets:

* ***DFS Features - Electric.xlsx*** describes the main electric feature model.
* ***DFS Features - Fiber.xlsx*** describes features that are part of the Fiber Optic Works add-on module, and is referenced by the Fiber Management DDD
* ***DFS Features - Landbase.xlsx*** describes landbase and boundary features, and is referenced by the Landbase & Boundaries DDD

The intention of this section is to put those definitions in context, and communicate any additional design details that are better served with a narrative description rather than the structured format of the spreadsheet.

Note that the following subsections address only those feature classes for which special assumptions or logic have been specified. As a result, this section should not be viewed as a complete list of feature classes.

This section also includes discussion of specialized feature placement logic, where applicable. If placement logic is not included here for a given feature class, then it is assumed that feature is placed using standard G/Technology configured placement logic.

## Correction Tags

Correction Tag features are designated as being in one of the following statuses:

* Pending
* In Progress
* Closed

Legends that include this feature are pre-filtered so that users may turn features in each status on and off independently.

## Ducts & Conduits

### Feature Classes

#### Duct Bank

The Duct Bank feature class represents concrete-encased ducts, at the highest level. This feature includes the linear graphic that shows the location of the duct path. Duct Banks participate in the ductivity relationship, which provides a means of tracing along ducts that connect underground structures.

When placing a Duct Bank, the user draws the linear component between two structures related by ductivity. A label may be optionally placed, which consists of a line containing the configuration for each owned Formation feature.

#### Formation

Formations are owned by Duct Banks, each representing a collection of individual Ducts. CUs selected by designers correspond to Formations – for example, the CU code “DB2X3” corresponds to a Formation of six 6” electrical Ducts, arranged in a 2 x 3 grid. More than one Formation may be owned by the same Duct Bank.

When placing a Formation feature, the selected CU will automatically set the Configuration attribute, which is assumed to be of the format “***x***X***y***”, where ***x*** represents the horizontal number of Ducts and ***y*** represents the vertical number of Ducts. For example, the Configuration “2X3” represents a grid of Ducts two across and three down. When the new Formation feature is saved, custom code automatically creates the proper number of Ducts, with attributes indicating the location of each one within the configured grid. Ducts are automatically numbered starting with 1 in the upper left corner, then incrementally across the first row, then continuing from left to right across each row downward.

#### Duct

Duct features are owned by Formations. They participate in the containment relationship, which allows underground conductors to be associated with the ducts that they pass through.

Ducts are not placed individually, but always as part of a Formation, in order to maintain the proper CUs.

#### Inner Duct

Inner Ducts are owned by Ducts and may be placed to separate fiber cables from electrical cables passing through the same duct.

#### Conduit

Conduits features represent direct-buried conduits (as opposed to concrete-encased Ducts). They do not participate in the ductivity and containment relationships that Duct Banks and Ducts do. Each instance of a Conduit represents a single tube and is drawn on the map as a separate line.

#### Junction Point

Junction Points behave something like a virtual manhole. They may be connected to Duct Banks via ductivity, and also may own Conduits at one end.

One usage scenario is road crossings, where the material of a Duct Bank changes as it passes through the bore under the road; a JunctionPoint at either side of the road would allow the Duct Bank to be estimated in three separate pieces.

Another scenario involves Formations that start from one Manhole but split along the way and end at separate Manholes; in this case a JunctionPoint at the split would allow for estimation up to the point where the Formations share a common trench, and then separate Duct Banks beyond that point to the destination Manholes.

A JunctionPoint may have an associated detail, but it is optional, and should not be created automatically.

### Metadata

**G/Technology** requires that the Duct feature include attributes to describe the row and column positions for both ends of the duct, with respect to the Formation.

If a user creates or repositions a duct using the Duct Configuration control, the appropriate geometry is marked as [stale](javascript:toggleBlock('266304')" \o "stale graphics flag" \t "_self). This assists in the incremental placement of the duct, because only stale ducts need to be placed and/or replaced. Therefore G/Technology also requires that the Duct and Formation features include stale flag attributes corresponding to both ends of the duct (designated as “from” and “to”).

The following information is stored G/Technology metadata tables to support Duct Configuration functionality:

|  |  |  |
| --- | --- | --- |
| Table | Column | Value |
| G3E\_DUCT | G3E\_ASSIGNMENTANO | Duct Attributes / Logical Assignment |
| G3E\_DUCT | G3E\_FROMROWPOSANO | Duct Attributes / From Horizontal Position |
| G3E\_DUCT | G3E\_FROMCOLPOSANO | Duct Attributes / From Vertical Position |
| G3E\_DUCT | G3E\_TOROWPOSANO | Duct Attributes / To Horizontal Position |
| G3E\_DUCT | G3E\_TOCOLPOSANO | Duct Attributes / To Vertical Position |
| G3E\_DUCT | G3E\_FROMGEOMSTALEANO | Duct Attributes / From Stale Flag |
| G3E\_DUCT | G3E\_TOGEOMSTALEANO | Duct Attributes / To Stale Flag |
| G3E\_FORMATION | G3E\_FROMGEOMSTALEANO | Formation Attributes / From Stale Flag |
| G3E\_FORMATION | G3E\_TOGEOMSTALEANO | Formation Attributes / To Stale Flag |

Note that the actual metadata values described above are stored as the attribute IDs (G3E\_ANO) of the specified attributes.

## Miscellaneous Structure

Miscellaneous Structures are present in the system primarily to enforce ownership in places where the owning structure is not a typical feature. They may have the following types:

* **Bridge** – Most commonly used for Street Lights.
* **Mid-span Tap** – Represents a virtual structure to own the point where overhead conductors are tapped.
* **Other** – Other types of unspecified structures.

## Permanent Note

The user will be able to place a feature called Permanent Note to display text annotation on the map that is unrelated to any specific feature. If a Permanent Note is added in the context of a WR, it will not be posted until approval of that WR, and not visible to other users until that occurs. The note will remain on the map beyond closing of the WR.

Permanent Notes may be deleted from the master map, but only within the context of a WR. Removed notes are deleted from the master map upon WR approval.

## Plotting Boundary

The Plotting Boundary feature class is used to specify areas of the map from which plots may be generated, including construction prints for specified WRs and automatically generated feeder maps.

For more information about Plotting Boundary placement, refer to *Map Printing DDD*.

## Pole

The definition of the Pole feature class includes several synthesized components that bear further explanation.

* ***Pole Height Label*** – Some Poles require their height to be displayed along with the symbol. Rather than create multiple symbols that include the height text, a synthesized label component is used to draw the text at a fixed offset from the symbol, and only displayed for those cases where the symbology rules require height to be denoted.
* ***Pole Active Permit Symbol*** – When a Pole has an active Joint Use permit associated with it, this component appears as a filled orange hexagon, drawn under the Pole as a backdrop. (Note that this was designed as an alternative to creating a Joint Use Permit Boundary feature; instead of drawing a boundary around all Poles included on a permit, users may run a query to select all Poles on that permit, fit those Poles to the map window, and use these permit symbols to visualize which poles are affected.)
* ***Proposed Symbol*** – See section 3.4 below.

## Primary/Secondary Conductor Node

Primary and Secondary Conductor Nodes are virtual features, meaning they do not represent a physical asset, and are not managed as part of WMIS estimation. Each is modeled with a single connectivity node. Primary and Secondary are split into two separate feature classes in order to prevent primary features from being connected directly to secondary features.

Primary and Secondary Conductor Nodes may be one of the following types:

* **Dead End** – Placed by the user at the end of a conductor to denote an intentional end of the line, as distinguished from accidentally or improperly unconnected conductors. Also helps distinguish unconnected conductors ending at the same structure.
* **Conductor Change** – Indicatestwo Primary Conductors directly connected with different sizes.
* **Jump-over** – Helps clarify when multiple circuits cross in different directions at a common structure; depicted as a small inline half-circle.
* **Open Point** – An Open Point may be placed between two Secondary Conductors that are fed by different transformers. The feature’s connectivity status is always open, and the symbol denotes the fact that two conductors at the same structure are not truly connected.

## Service Point

A Service Point represents a location where electrical service is provided and is an endpoint of the connectivity model. Each Service Point may include one or more Premises, which are modeled as repeating non-graphic components. The graphic symbol for the Service Point represents the type of Premise or Premises. A single label shows partial address information; the new system no longer uses multiple labels to denote individual Premises.

Premise components of the Service Point feature include an attribute to store the ESI Location. These values are managed by CC&B and provided to designers via email upon request. This attribute is not configured as required, but users may encounter custom validation errors if Service Points in certain scenarios have one or more Premises that are missing an ESI Location; for more detail, refer to *Business Rules DDD* for the custom functional interface *ESI Location Premise*.

## Switch Gear

Primary Switch Gear may be placed on a Pad or in a Vault. When placed on a Pad, graphic components are drawn in the geo view only. When placed in a Vault, the graphic components are drawn in the Vault detail view only.

Secondary Switch Gear may only be placed in a Vault, and the graphic components are drawn in the Vault detail view only.

From a modeling perspective, switch gear features themselves represent just the equipment enclosure. The contents of the switch gear are modeled as if they were individual features, using Primary Fuse, Primary Switch, and Secondary Breaker features. Switch Gear Bus features are used to show how these features are wired inside the enclosure.

The combinations of features that make up a switch gear are managed in the GIS as assemblies in an equipment catalog. When placing a switch gear, designers first draw a polygon representing the enclosure, and then select a preconfigured assembly from a list of switch gear types. The GIS then uses the selected assembly to create individual features within the polygon. The assembly dictates both the relative graphic layout of the involved features, as well as connectivity between them. All features in the assembly are defined as being owned by the switch gear feature.

Connections between devices owned by the Switch Gear are shown using the Switch Gear Bus features. These linear features are defined as having a single node, which allows graphic depiction of the connections while maintaining a common connectivity node between all devices connected to a given bus.

The following features may be configured as part of switch gear assemblies:

* Primary Switch Gear
  + Primary Fuse
  + Primary Switch
  + Primary Switch Gear Bus
  + Remote Terminal Unit
* Secondary Switch Gear
  + Remote Terminal Unit
  + Secondary Breaker
  + Secondary Switch Gear Bus
  + Secondary Switch Gear Enclosure

For further details about switch gear assemblies and equipment catalogs, refer to Section 7, Assemblies.

## Tax Jurisdiction Boundary

Tax Jurisdiction Boundaries are designated as one of the following types:

* County
* City
* School District
* Special District

Legends that include this feature are pre-filtered so that users may turn types on and off independently.

## Transformers & Autotransformers

There are several features representing distribution transformers:

* Transformer – OH
* Transformer – OH Network
* Transformer – UG
* Transformer – UG Network

For all distribution transformer feature classes, connectivity node 1 is assumed by convention to represent the primary side, while connectivity node 2 represents the secondary side.

There is also a separate feature class to represent Autotransformers. For these, both connectivity nodes are primary.

## Virtual Points

Virtual points do not represent physical assets, but instead are virtual devices added to the feature model to facilitate switching operations. There are multiple feature classes defined to represent these points, each tailored for different use cases and manipulated by OMS according to different rules.

Some virtual points may be designated as either permanent or temporary:

* Permanent points are typically placed as part of a placement configuration for features that should always have a particular set of virtual points present.
* Temporary points may be placed to facilitate OMS connectivity as the feature state lifecycle progresses. They are removed when a feature is transitioned to INI, and connectivity is automatically modified to close the gaps.

### Bypass Point

Some feature classes, such as Recloser, require the ability to bypass the device for maintenance purposes. This is modeled by placing three Bypass Points in association with the device:

* Two normally closed Bypass Points are placed in series with the bypassed device, one at each connectivity node.
* One normally open Bypass Point is placed in parallel with the set including the bypassed device and both of the other Bypass Points.

To bypass the device, OMS users can open the two Bypass Points connected in series and close the one connected in parallel.

Permanent Bypass Points are placed automatically with their associated device using placement configurations for those devices. Bypass Points may also be placed independently, either as permanent or temporary.

Bypass Points are symbolized as a small circle – red and filled when closed, or green and unfilled when open. When temporary, a small square is used instead. The symbol for the parallel point should be placed on the source side of the bypassed feature but offset slightly from the being in-line with the connected conductor.

In OMS, Bypass Points are modeled as switches, and therefore are not predicted during outage analysis.

### Elbow

Some features, such as loop-fed UG Transformers, require Elbow features to be present. For accounting purposes, the Elbows are recorded as ancillary compatible units of the associated feature, and the Elbow features themselves are only present to allow for switching.

Elbows are typically placed automatically with the feature they are connected to but may also be placed independently if necessary. They are always permanent.

Elbows are symbolized as a small hexagon – red and filled when closed, or green and unfilled when open.

OMS maintains a separate feature definition for Elbows, and this feature will be mapped to that during migration.

### Isolation Point

Some feature classes, such as radial Transformers, require the ability to be temporarily isolated from the feeder. This is modeled by placing an Isolation Point upstream. In the case of Transformer, this represents the fuse built into the device, which is not modeled separately.

Permanent Isolation Points are placed automatically with their associated device using placement configurations for those devices. Isolation Points may also be placed independently, either as permanent or temporary.

Isolation Points are symbolized as a small circle – red and filled when closed, or green and unfilled when open. When temporary, a small square is used instead.

In OMS, Isolation Points are modeled as fuses, and therefore are predictable during outage analysis.

### Phase Connector

When a single-phase device is connected in-line with a multiple phase conductor, it can interfere with phase tracing; for example, when three single phase Voltage Regulators are installed on three successive poles. To carry the additional phases, a Phase Connector is placed in parallel with each device such that the total set of phases between the two connectivity nodes of the device match the phases to which it is connected.

Phase Connectors are placed manually when needed and are always designated as permanent.

Phase Connectors are symbolized as a small circle – red and filled when closed, or green and unfilled when open.OMS maintains a separate feature definition for Phase Connectors, and this feature will be mapped to that during migration.

# Shared Components

## Common Attributes

### Data Collection

The following attributes are included to track information about geographic data collection methods. They will only be populated by external processes; values will be null for newly placed features. It is expected that the attributes will only be made visible to users with a certain role (refer to System Access DDD).

* The ***Level of Confidence*** grade is assigned to features based on the method by which their geographic location was determined:

|  |  |
| --- | --- |
| Level of Confidence Grade | Description |
| 5 | Highest level of confidence; collected via LiDAR |
| 4 | Location has been confirmed using GPS collection techniques |
| 3 | Based on imagery with ~50cm accuracy, otherwise points that are shifted based on the shift vectors created by the conflation process for a given area |
| 2 | Based on less accurate imagery, or converted data |
| 1 | Lowest level of confidence; located based on proximity to landbase features |

* ***Collection Method*** is a text description of how GPS coordinates are verified (i.e. – GPS grade 3, GPS grade 2, GPS grade 1, Smart Phone – Type/Model) to help determine the positional accuracy of the data collection results.
* ***Collection Date*** tracks when data was collected, e.g.- the time stamp collected from the GPS receiver.

### Design Responsibility

Design Responsibility may be set to one of the following values:

* + - Distribution
    - Downtown
    - Airport

This is used as a means of restricting access to structures in the downtown network and airport areas. For more detail, refer to the System Access DDD.

## CU Attributes & Ancillary CU Attributes

Any feature class that represents one or more assets managed by CUs is configured to include the shared CU Attributes component. For aggregate features, the system creates one instance of this component for each repeating non-graphic component (i.e.- device unit or conductor wire); for simple features only one instance is created. The CU Code attribute in this component provides a reference to retrieve other information such as standard attributes. For more detail, refer to the *Job Management DDD* and *WMIS IDD*.

All instances of the CU Attributes component are retained after WR closure, to serve as a record of material installed.

Instances of the Ancillary CU Attributes component are deleted at WR closure unless they meet certain criteria for retention (e.g.- they represent property.Refer to *WMIS IDD* for more information about deletion of CUs at WR closure.

## Hyperlink Attributes & Job Hyperlink Attributes

Most features are defined with an optional repeating Hyperlink Attributes component, which allows documents and web locations to be associated with that feature. For more detailed information about specialized usage of this component, refer to the *Document Management IDD*.

The Design Area feature has a similar component called Job Hyperlink Attributes. These hyperlinks are interpreted to be associated with the WR to which the Design Area is related and is used for linking to documents that apply to the WR rather than individual features.

For each of these component types, users may view the list of instances via dialog tabs configured for display in Feature Explorer.

## Proposed Symbol

## For certain structure classes (Pole, Street Light Standard, Transmission Tower), the Proposed Symbol graphic component is displayed as a circle around the main symbol for the feature. This is implemented as a synthesized component, which means that it is drawn based on the same geometry as another graphic component – in this case, centered on the same coordinates as the primary graphic symbol. Legends are configured to filter this component so that it only appears while the feature is in the PPI state.SCADA Attributes

### SCADA Capable

A feature that is flagged as SCADA Capable is equipped to be controlled remotely, although it might not be configured to allow remote control. This flag is assumed to be set automatically based on CU selection but may also be overwritten by the designer if an existing device is subsequently equipped for SCADA in the field.

### SCADA Enabled

If a SCADA Capable feature is actually configured to allow remote control, it is considered SCADA Enabled. In the GIS, this flag is implied by the value of the Device ID, since the master data source for SCADA enabled features is a spreadsheet maintained by Planning, and not available directly for GIS processing. For rules about inferring the SCADA Enabled flag based on Device ID, refer to *Business Rules DDD*.

### Device ID

Features representing certain types of equipment – such as Fuses, Switches, and Reclosers, among others – carry an attribute “Device ID”. The data in this field is expected to fall into one of the following categories:

* + - ***4-digits*** – These are legacy data, converted from FRAMME where the ID was generated by taking the last four digits of the feature ID.
    - ***5-characters*** – These are SCADA devices, whose Device ID values are managed by the DOCs. These values are expected to be keyed in by designers when they are assigned. Note that new values are expected to allow alphanumeric characters to accommodate more unique values within the space of five characters.
    - ***6-digits*** – For new non-SCADA devices, the Device ID is assigned based on the next value in a database sequence, which will start at 100001 when the new system is put into production. These values will increase by one each time a device is assigned a value. They are expected to be unique across all features that are assigned Device IDs.

### Device Function

Device Function indicates the software configuration for a SCADA Capable device. It is only valid for this attribute to be set for the following features; in all other cases it should be null:

* + - Primary Switch
    - Recloser
    - Remote Terminal Unit

# Relationships

Feature classes can be defined to participate in relationships. Each section below describes a relationship configured for use in Oncor’s GIS; for details about which feature classes participate in each relationship, refer to the accompanying spreadsheet ***DFS Relationships.xlsx***.

## Connectivity

G/Technology uses node-edge connectivity to model the interconnectivity of devices in an electrical network. The node-edge connectivity model uses the concept of a *node* to represent a connection point in the network. Features that connect nodes are considered *edges* in this model.

The node is a virtual entity with no correlation to a device or feature in the real world; it is simply the point at which two or more devices connect. Nodes have no feature or component representation in the model. Rather, a node is signified by a unique number that is shared by all of the features that connect at that shared node. Each feature in the connecting model may have one or two nodes, depending on how the feature is to be modeled.

On the Connectivity tab in the DFS Relationships spreadsheet, check marks in the grid indicate features that are candidates for connectivity when a given feature is placed. During placement, candidates are highlighted on the map as the user moves the primary graphic component nearby, and connectivity is established if the user places the symbol while a candidate is highlighted.

Note that there may be situations in which connectivity is established indirectly, such as automatic placement of virtual points as part of a placement configuration, or when a feature is connected to a node that already connects multiple existing features. It should be acceptable if some of these relationships do not specifically appear as checked in the DFS; the documented relationships are more for guiding placement rather than validating all possible combinations of feature classes.

## Ownership

Ownership is a relational model that describes a one-to-many association among features. In general, a parent can have many children, but children have only one parent, except in the case of linear features. Linear features (such as conductors and conduits) can have two parents, one per end.

## Ductivity

Ductivity is a shortened name for “duct connectivity” and represents a node-edge connectivity model between features in a duct network – i.e.- underground structures and the ducts that run between them. This relationship is maintained separately from electrical connectivity, and involves different feature classes, but is modeled in a similar fashion.

## Containment

Containment is a many-to-many ownership relationship. In contrast to typical parent/child ownership containment can accommodate the fact that a single duct can contain more than one cable, and a single cable can be contained by more than one duct.

## Fiber Connectivity

The fiber features participate in node-ordered, ownership, node-edge, and containment relationships with each other and possibly other existing features, depending on the data model into which they are being inserted. The fiber features all use a common component for each type of relationship in which they participate.

## Fiber Node Ordered Output

Node-ordered connectivity (NOC) is a one-to-many relational model that determines direction in a connected network of features. Node-ordered connectivity describes connectivity between features, and uses actual facilities, such as splices and terminals, as connect points. In node-ordered connectivity, direction is maintained, for example, an optical cable connects to splice.

## Fiber Ownership

Fiber Ownership is a relational model that describes a one-to-many association among features. In general, a parent can have many children, but children have only one parent, except in the case of linear features. Linear features (such as conductors and conduits) can have two parents, one per end. For instance, a fiber rack encloses a fiber shelf which encloses the fiber cards in the model. There is not a maximum depth to this ownership relationship. This fiber interface feature owns one or more racks, with each rack owning shelves and each shelf owning cards, which adds another level to the ownership hierarchy.

## Fiber Containment

The fiber conductors and the linear fiber infrastructure features participate in containment relationships. When the fiber features are added to a communications model, these fiber features also participate in containment relationships with the traditional communications infrastructure features. Containment is a many-to-many ownership relationship.

# Legends

A legend is a list of the graphic components you want to display in a map window. It consists of an ordered group of legend entries and may contain some or all of the components of the features in the model. Different legend definitions can emphasize different features in the utility model, so that the view is tailored to different users and job functions.

## Legend Configuration & Behavior

### Legend Entries

Legends are composed of legend entries for each graphic component of features that are intended to be displayed in a given legend. This includes electrical features, fiber features, landbase features, and additional workflow related features (such as Design Area). A legend entry is the association of a component view and a style rule (and label rule for text components). A legend entry defines the following:

* + - How the component view is named in the Display Control
    - How the component view is drawn, for example, color, translucency, symbol, or size
    - How the text is displayed, i.e.- the content of the label

A legend entry can be used on several different legends. Legend display characteristics further describe a legend entry as it will appear on a specific legend. The display characteristics control entry priority, On/Off mode, scale minimum/maximum, whether the entry is locatable, and the map scale indicator. Display settings are preserved when a user saves their workspace and are restored the next time that workspace is used in a G/Technology session.

The inclusion of a legend entry in a legend allows users to toggle the display of all instances of the graphic component it represents. This includes:

* + - Design Area (BR 1.3.2.F21)
    - Street Light (BR 8.2.3.F6)
    - All boundary feature classes (BR 5.1.1.F16)
    - All feature classes (BR 1.3.3.F2)

Legend entries may include predefined filters to create multiple subsets of data. The user may also apply ad hoc filters to limit the display of a given component across an entire map window by any attribute published in component views, which includes at least all attributes referenced in existing style or label rules, and may include more. For example, a user could apply an ad hoc filter to achieve the following results:

* + - Display only Poles in feature state LIP (BR 7.1.1.F9)
    - Display only Street Lights with specified values for any attribute (BR 8.2.3.F4)

### Style & Label Rules

Effort has been made to ensure readability of feature colors against different backgrounds. Consideration was also given to accommodating colorblind users, partly through tooltips that can provide information textually rather than implied by color schemes.

For a reference list of color guidelines, refer to the *DFS Legends* spreadsheet, on the Color Table tab. The upper portion of that tab lists commonly used colors and how they are generally applied (by feature state, voltage, normal status, grouping of feature classes, etc.).

### Access

Each legend may have an associated role that determines whether a given user may attach that legend. Similarly, legend entries may also be displayed or hidden based on an associated role. For more information, refer to the *System Access DDD*.

### Web Services

Legends may also include entries for controlling the display of web source data, such a Web Map Service (WMS) or Web Feature Service (WFS). This includes base map data provided by vendors such as Google or Bing. For more specific detail about planned use within the current project scope, refer to *Landbase & Boundaries DDD*, although the functionality is available to add data sources at any time.

### Multiple Platforms

Web and mobile solutions provided by Hexagon for display of G/Technology data are designed to share legend metadata to ensure that features are displayed consistently between applications. Refer to the *Web Access* and *Mobile* DDDs for further information.

## Defined Legends

### Distribution Design Legend

#### Purpose

This is the default legend, which is most similar to the display rules found in DIS.

Network features are visible using this legend but displayed as gray to distinguish from distribution features.

#### Content

As a rule, all feature classes should be included in this legend, even if they are turned off by default.

#### Symbology Guidelines

In addition to distinguishing features in proposed states by color, some states may also be generally distinguished by line width or text weight (as a guideline only):

* PPI, PPR, PPA, ABI, ABR = heavy/bold
* INI, OSR = medium
* CLS = light

### Network Design Legend

#### Purpose

Network designers need a view of the model that makes it easy to distinguish grids and feeders in geographically dense areas. To meet that need, Primary and Secondary Conductors in this legend are organized by Network ID, while the rest of the features are organized in functional groupings as in the Distribution Design Legend.

Distribution features are visible using this legend, but displayed as gray to distinguish from network features.

#### Content

The base assumption for this legend is that all feature classes should be included in this legend, even if they are turned off by default. However, there may be individual cases where certain features are specifically not wanted when performing network design activities. Refer to ***DFS Legends.xslx*** for details.

#### Color Coding

Colorization for Primary Conductors in this legend is based on network ID, in contrast with the Distribution Design legend which sets conductor color based on operating voltage.

Within each network, feeders are assigned a unique color. Feeders across all networks that end with the same number should have the same color – for example, feeders 501, 601, and 701 are the same; 502, 602, and 702 are the same, etc. The following color scheme is used:



Note that the 300 and 400 networks are not in use at the time of writing, but they are included in the legend definition for future expansion. Also note that if the network designation scheme should change in the future, this legend will need to be adjusted accordingly.

For further detail, refer to the *DFS Legends* spreadsheet, on the Color Table tab.



### Protective Device Legend

#### Purpose

This legend displays a simplified view of facility data color coded by the number of protective devices occurring between a given feature and its feeder breaker.

This legend is provided as a replacement for the DIS Feature Maintenance Tool’s Protective Device Mode, as a means of identifying missing or incorrectly connected devices in the GIS.

#### Content

The following features are included in this legend:

* Primary Conductor
* Primary Fuse
* Recloser

#### Color Coding

Color coding of features depends on the presence of an attribute on the Connectivity component called “Upstream Protection Count”, which indicates the number of upstream protective devices. This attribute is populated by the standard feeder trace & update that also sets the immediate protective device ID and propagates substation and feeder IDs to the entire feeder. For further details about that trace, refer to the Analysis DDD.

Style rules for all connected features in this legend will handle color according to the following logic, where x = Upstream Protection Count:

* If x = 0, display in GREEN.
* If (x – 1) modulo 4 = 0, display in RED.
* If (x – 1) modulo 4 = 1, display in CYAN.
* If (x – 1) modulo 4 = 2, display in MAGENTA.
* If (x – 1) modulo 4 = 3, display in YELLOW.

The effect of this calculation is to show features immediately downstream of a Substation Breaker in green, and then cycle through the four remaining colors each time a protective device is encountered.

# Details

G/Technology displays feature graphics primarily in two types of map window:

* Geographic, which uses real world coordinates
* Detail, which is a quasi-schematic view of a set of features, typically related by a common owner

All graphic components are defined as either geographic or detail, corresponding to one of these window types. A given feature may be displayed in both geographic and detail views, but it must include an instance of each type of component for this to happen. Some features have only geographic components, some have only detail components, and some have both types.

Note that these separate graphic components are still part of the same feature, and therefore are both included in the same relationships with other features. For example, a Primary Conductor may be connected between a geographic-only feature and a detail-only feature. Reviewing or tracing the conductor while both windows are open will visibly indicate to the user that connectivity spans both representations.

Only designated feature classes may have an associated detail. Each of the following subsections describes the classes so designated in Oncor’s GIS, with more information about behaviors specific to each class.

## Junction Point

Junction Point details are optional and may be added any time after placement of a Junction Point feature. They are provided as a means of depicting duct banks at that location. There is no intention of depicting connected features in these details.

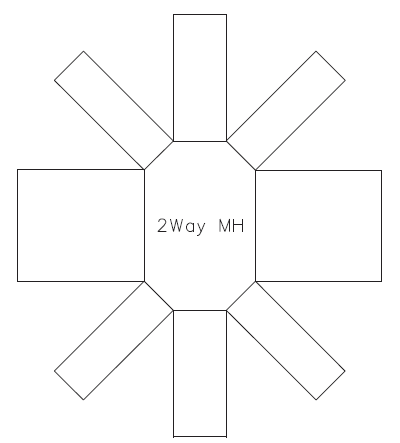
## Manhole

Manhole details are optional and may be added any time after placement of a Manhole feature.

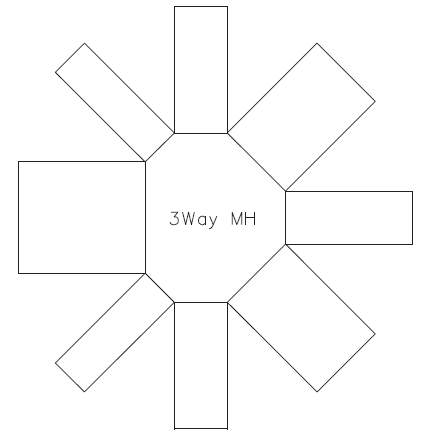
When a detail is created for a Manhole, the detail graphic components representing the footprint of the Manhole are automatically generated based on the Manhole’s Type attribute. Each layout is built out of repeating polygon components, which may be modified by the user after initial placement if necessary.

The following types are anticipated:

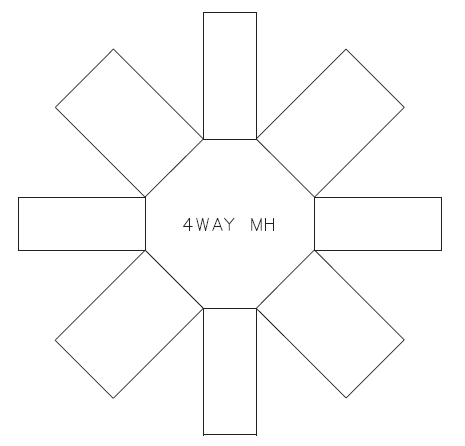
### 2-way



### 3-way



### 4-way



### Special

For Special type Manholes, it is assumed that the designer will use the graphic edit tools in the detail window to modify the initial footprint layout as needed. The initial layout will be the same as the one used for 4-way Manholes. Designers will also be able to place additional repeating polygon components if necessary to depict the layout of the Manhole.

## Pad

Pad details are optional, and may be added any time after placement of a Pad feature. They are provided as a means of depicting duct banks at that location. There is no intention of depicting connected features in these details, including the devices that make up Primary Switch Gear.

When a detail is created for a Pad, a detail graphic component representing the footprint of the Pad is automatically placed as a 7’ by 10’ rectangle. Designers may then place additional instances of the footprint polygon to represent windows in the Pad, as needed.

## Vault

Vault details are optional, and may be added any time after placement of a Vault feature. Multiple Vaults may share the same detail if necessary, typically indicating that they are connected.

When a Primary Switch Gear or Secondary Switch Gear is placed in a Vault, the graphic components are generated in the Vault detail window.

# Assemblies

An [equipment assembly](mk:@MSITStore:C:\\Program%20Files%20(x86)\\Intergraph\\GTechnology\\Program\\Resdlls\\0009\\GTechAdmin.chm::/generating_the_equipment_catalog_entries.htm" \o "Generating the Equipment Catalog Entries" \t "_self) is a standard but expandable piece of equipment. Engineers use [predefined assemblies](mk:@MSITStore:C:\\Program%20Files%20(x86)\\Intergraph\\GTechnology\\Program\\Resdlls\\0009\\GTechAdmin.chm::/assembliesDesi.htm" \o "Assemblies" \t "_self) to avoid having to build new ones for each installation. For example, a switch gear is an enclosure that contains various electrical devices like fuses, switches, and busses. An assembly lets you place a switch gear as a single facility, which is more efficient, less tedious, and less error prone than placing individual electrical devices.

G/Technology enables storage of predefined assemblies in the database as an [equipment catalog](mk:@MSITStore:C:\\Program%20Files%20(x86)\\Intergraph\\GTechnology\\Program\\Resdlls\\0009\\GTechAdmin.chm::/settingupanassemblymodel.htm" \o "Setting Up the Assembly Model and Equipment Catalog" \t "_self). At placement, attributes are replicated to each facility, based on what is stored in the equipment catalog. When these features are stored in the catalog, the user can place them using specialized assembly placement techniques.

Each of the following subsections describes a feature class that makes use of an equipment catalog for placement.

## Primary Switch Gear

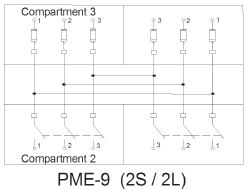
### Included Features

Entries in the equipment catalog may include features from the following classes:

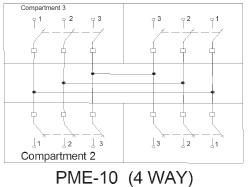
* + Primary Fuse – UG
  + Primary Fuse – UG Network
  + Primary Switch – UG
  + Primary Switch – UG Network
  + Primary Switch Gear Bus
  + Remote Terminal Unit

### Catalog Entries

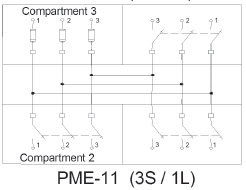
#### Deadfront PME-9 (2S/2L)



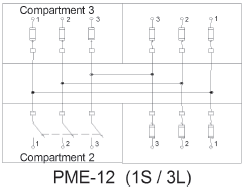
#### Deadfront PME-10 (4 Way)



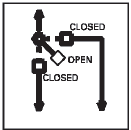
#### Deadfront PME-11 (3S/1L)



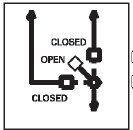
#### Deadfront PME-12 (1S/3L)



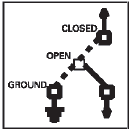
#### Vault 1



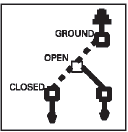
#### Vault 2



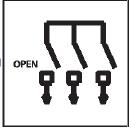
#### Vault 3



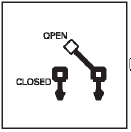
#### Vault 4



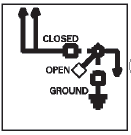
#### Vault 5



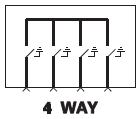
#### Vault 6



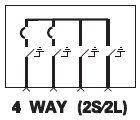
#### Vault 7



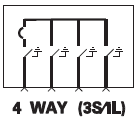
#### Vista 4 Way



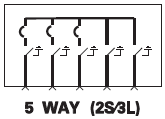
#### Vista 4 Way (2S/2L)



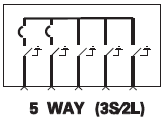
#### Vista 4 Way (3S/1L)



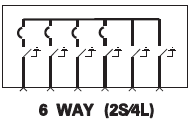
#### Vista 5 Way (2S/3L)



#### Vista 5 Way (3S/2L)



#### Vista 6 Way (2S/4L)



## Secondary Switch Gear

### Included Features

Entries in the equipment catalog may include features from the following classes:

* + Remote Terminal Unit
  + Secondary Breaker
  + Secondary Breaker – Network
  + Secondary Switch Gear Bus
  + Secondary Switch Gear Enclosure

### Catalog Entries

1. Open Issues

|  |  |  |  |
| --- | --- | --- | --- |
| # | Section | Issue description | Status |
| 1 | BR 0.1.10.F10 | Need to determine what to do with this BR since partial energization is in the process of being removed from scope. | Open 2/15/2017 |
| 2 | BR 0.1.3.F5 | Need to determine the best place to address consistency of symbology across desktop, web, and mobile environments.  See section 5.1.5. | Open 2/15/2017  Resolved 7/19/2017 |
| 3 | BR 1.3.4.F15 | Need to review approach for transferring features.  BR moved to Job Management DDD. | Open 2/15/2017  Resolved 7/19/2017 |
| 4 | 4.1 | Need to add descriptions of other types of data stored in the Common Attributes component.  No additional needs at this time; will add more information as needed. | Open 2/15/2017  Resolved 7/19/2017 |
| 5 | 4.1.1 | What values should be populated in the Level of Confidence attribute for features placed by designers after the system is in production?  Expanded description to clarify that attributes will be null on placement. Additional processing would require scope review. | Open 2/15/2017  Resolved 7/19/2017 |
| 6 | 4.2 | Elaborate on the intended use of the Property Accounting Attributes component.  Component is no longer part of the design. | Open 2/15/2017  Resolved 7/19/2017 |
| 7 | 5.5, 5.6, 5.7, 5.8 | Elaborate on fiber-related relationships.  Added descriptions. | Open 2/15/2017  Resolved 7/19/2017 |
| 8 | 6.1.3 | Need to propose and review a general color and weight scheme for feature states.  Added for Distribution legend, in addition to previous description of Network legend. Adjustments can be addressed individually from now on. | Open 2/15/2017  Resolved 7/19/2017 |
| 9 | 6.1.4 | Review proposed symbology guidelines for Distribution Design legend.  Will review with SMEs during week of 7/31. | Open 2/15/2017  Resolved 7/19/2017 |
| 10 | 6.2.3 | Review proposed color scheme for Network Design legend.  Reviewed previously during network follow-up meetings, and will review again with SMEs during week of 7/31. | Open 2/15/2017  Resolved 7/19/2017 |
| 11 | 6.3.3 | Determine if a different color can replace yellow in the Protective Device legend, to avoid confusion with standard G/Technology behavior that uses yellow to indicate problems with style rules. | Open 2/15/2017 |
| 12 | 1 | Elaborate on the design of Asset History.  Relocated to Job Management DDD. | Open 2/15/2017  Resolved 7/19/2017 |
| 13 | 7.1 | Need to obtain drawings of Manhole Detail footprints so that they can be included in this document.  Received and incorporated. | Open 2/15/2017  Resolved 7/19/2017 |
| 14 |  | DFS Features – Electric   * Many electrical features were not reviewed by SMEs as part of DFS review * Shared components need to be reviewed with SMEs * Dialogues need to be refined for placement, edit, and review functions and reviewed by SMEs * Data types need to be validated for all attributes * Placement Techniques have not been validated * All attributes need remarks defining how these attributes will be populated and maintained. These remarks should indicate whether the attribute is populated by the system, by CU selection, by the user, etc. The remarks for many attributes are currently blank. * Certain attributes that are populated by CUs are connected to value lists while others are not. Need explanation from Hexagon as to why this is the case and which way is correct. * New feature needed for Network – Crab. Used to connect multiple conductors in a manhole.   Need to determine what Load Data attributes are required and on what features will this data be stored  Now tracked in issue tracker, should be removed from this document. | Open 2/20/2017  Resolved 7/19/2017 |
| 15 |  | DFS Features – Landbase   * Landbase features have not been reviewed by SMEs * Sample data needs to be provided for all commercial landbase features * Need information on how attributes will be populated * Will there be special placement configurations and tooltips for the features? * Labels need to be determined – both content and on which features * Need to review dialogs and preferred order with SMEs * Do the following boundaries from Land Base DRD 9.1.1.F3 need features or will they be a part of another boundary? (source in parentheses)   + City Hall (TomTom Institution)   + Clinic/Nursing Home (TomTom Institution)   + Communications (In house – DOC Notes)   + Fire Station (TomTom Large Area Land Mark)   + Hospital (TomTom Institution)   + Military (TomTom Large Area Land Mark)   + Natural Gas Station (In house – DOC Notes)   + Police Department (TomTom Large Area Land Mark)   + School/University (TomTom Institution)   + Sewer (In house – DOC Notes)   + Street Network Data (TomTom or Corelogic)   Transit (TomTom Transportation Terminal)  Now tracked in issue tracker; should be removed from this document. | Open 2/20/2017  Resolved 7/19/2017 |
| 16 |  | DFS Fiber   * All fiber features and their attributes not been reviewed with the SMEs * Value list for fiber features are missing from the Values List DFS * Missing legend for a features covered in the Fiber DFS   Fiber connectivity and ownership has not been reviewed by SMEs  Now tracked in issue tracker; should be removed from this document. | Open 2/20/2017  Resolved 7/19/2017 |
| 17 |  | DFS Legends - Electric   * Distribution design legend needs to be reviewed * After Distribution legend is finished, need to work with other groups to see if additional legends will be needed * Network design legend needs to be reviewed with Network SMEs * Protective device legend needs review by SMEs * Distribution symbology, text, labels needs review * Placement Selection tab needs to be reviewed * ABI/ABR states are not reflected in symbology style rules * Line tab – No “Stroke Name” defined. Unclear if used to determine line type such as hashed marked lines. This impacts all Linear Features. * After initial GTech build with Oncor’s features and symbology, will need additional review to define more detailed items like font sizes, zoom levels, line thickness, scale dependence, etc. These items need to be demoed to the SMEs so that they can observe how these settings appear on the map in the application itself rather than on a spreadsheet. * Whenever Structure ID appears in a label, numbers before dash should appear above the dash and numbers that come after the dash. Ex:   XXXXXXX  -XXXXXXXX | Open 2/20/2017 |
| 18 |  | DFS Legends – Landbase   * Need landbase symbology * Entire document needs to be reviewed with SMEs * Label Tab is empty   Need to discuss how Network features will be visually distinct from non-network | Open 2/20/2017 |
| 19 |  | DFS Relationships   * Connectivity needs to be reevaluated in light of confusion regarding isolation points. * Ownership has not been reviewed and appears incorrect in many instances * The following have not been reviewed or discussed   + Ductivity   + Containment   + Fiber tabs   Currently, Fiber is documented as completely separate from Electric features but Fiber may be owned to certain Distribution structures | Open 2/20/2017 |
| 20 |  | DFS Value Lists   * Many of these are incomplete or incorrect and need to be filled in * The “Value List” Column in the DFS Features spreadsheets lists the common name for the value list. However, the DFS Value Lists spreadsheet tabs use the table names for the value lists. This is confusing especially given the similar names of many of the value lists. Needs to be consistent. Either use common name or table name in both spreadsheets. * Value Lists Not populated that affect multiple features (other value blank or missing value lists are documented below on the relevant feature):   + Wire Size – Primary Conductor OH/UG, Secondary Conductor : CU Driven   + Wire Type - Primary Conductor OH/UG : CU Driven   + Insulation Material - Primary Conductor UG   + Node Type – Primary & Secondary Conductor Node   + Secondary Bundle Code – Secondary Conductor, Service Line : Should be CU driven   + Wire Material – Secondary Conductor : CU Driven   + Fuse Rating – Network Protector, Recloser | Open 2/20/2017 |
| Electric Features | | | |
| 21 |  | **shared components**   * Ancillary Compatible Unit Attributes   + To be discussed in Job Management   + Activity Code value list is empty * Common Attributes   + Decision needs to be made as to whether Address will be broken into separate fields as in FRAMME or one field as it will be in CC&B. Are there Addresses for features other than Premises?   + Should Structure\_ID X, Structure\_ID Y also be stored for systems that still require FLNX, FLNY to be separated? Need to evaluate during integration design.   + Level of confidence grade missing Value List   + Construction Complete date is mapped to ABANDON\_D. This is incorrect. There should be a separate Abandoned Date attribute that maps to this.   + Job Place date – Should be Job Place**d** Date *(HXGN-Updated DFS)*   + Owner Type – needs to be populated by CU for some(all?) features   + Missing “Shared Use” flag to allow for non-network assets to be owned to network vaults, conduits, and manholes. * Communications Attachment   + Needs to be reviewed with Joint Use   + Need to validate all possible features to which this component can be added   + If combined with Equipment attachment, need to add Weight attribute   + Attachment Agreement Value List empty   + Attachment Maintainer Value List empty   + Attachment Type Value list missing * Compatible Unit Attributes   + Activity Code Value list empty * Condition Attributes * Connectivity Attributes   + SCADA Enabled in connectivity attributes? Should this be in common? Same for Automated. * Distribution Planning   + Spreadsheet lists that these will be fed from spreadsheet. There are currently no requirements or functionality documented regarding this. * Equipment attachment – discussion required whether this component should remain separate or be combined with Communications Attachment   Load Analysis Attributes – Need to reviewed and updated as part of Data Store IDD effort | Open 2/20/2017 |
| 22 |  | **shared dialogs**  Needs to be reviewed by SMEs | Open 2/20/2017 |
| 23 |  | **AMS Collector**  Needs to be reviewed by Telecom SMEs   * DFS Legends   + No notes on whether there needs to be a label or not * DFS Relationships   In workshop notes, only have AMS Collector being owned to a Pole, Transmission Tower and a Miscellaneous Structure *(HXGN-Updated Relationship spreadsheet per Capco’s notes)*. | Open 2/20/2017 |
| 24 |  | **AMS Router**  Needs to be reviewed by Telecom SMEs   * DFS Features   + Tooltip should have LAN ID - *(HXGN-Updated per Capco’s notes)*.   + Workshop notes say label component is not needed since there is a symbol (Also in DFS Legends) - *(HXGN-Updated per Capco’s notes)*.   + Mention of radio being a part of the router – is this covered in the collector or does this need to be a part of the router as well? * DFS Relationships   In notes, only owned to Pole, Transmission Tower, Miscellaneous Structure and Street Light Standard - *(HXGN-Updated per Capco’s notes)*. | Open 2/20/2017 |
| 25 |  | **Arrestor**  Features DFS   * Remove Quantity – wkshp 3 notes - *(HXGN-Is this confirmed with SMEs? There were two quantity columns and we decided to delete one)*.   Values List:   * Arrestor Voltage blank : Driven by CU * Arrestor Class blank : Driven by CU   Relationship  Arrestor not owned to UG conductors – DFS Review session - *(HXGN-Updated per Capco’s notes)*. | Open 2/20/2017 |
| 26 |  | **Autotransformer**   * DFS Features   + Configuration – Will be populated by Designer if placed by user. Will come from DEIS as well.   + Phase Quantity – Populated by CU   + Need Placement Configuration for isolation points   + Tooltip is missing   TSN – Populated by DEIS interface | Open 2/20/2017 |
| 27 |  | **Capacitor**   * DFS Features   + Per DFS Review Notes, Control Type and Switch Type attributes should be required and will be driven by CU- *(HXGN-Updated per Capco’s notes)*.   + Per DFS Review Notes, Bank Function Code should be required - *(HXGN-Updated per Capco’s notes)*.   + Per DFS Review Notes, Neutral Sensor should not be required- *(HXGN-Updated per Capco’s notes)*.   + Tooltip is empty * DFS Legends   + Has different colored symbols for driving primary operating voltages on capacitors but this symbology should be on the Conductor feature not on the Capacitor feature; same on the text tab for the label * DFS Relationships   In workshop notes, only have ownership to pole, miscellaneous structure, vault and pad | Open 2/20/2017 |
| 28 |  | **CES Battery**  Needs to be reviewed by Telecom SMEs   * DFS Relationships   + Needs Secondary Connectivity – follow up with Telecom   Ownership – follow up with Telecom | Open 2/20/2017 |
| 29 |  | **Corrections Tag**  Has not been discussed or reviewed with SMEs. | Open 2/20/2017 |
| 30 |  | **DA Fiber Modem**  Needs to be reviewed by DA SMEs   * DFS Features   + DA Fiber Modem Attributes’ Table Name is REPEATER\_N as well as the symbol and detail symbol – does this need to change? - *(HXGN-Updated per Capco’s notes)*.     - In DFS Legends the symbol is V\_DAFIBERMDM\_S, maybe already changed but needs to be reflected in DFS Features sheet?   + Needs follow up on if tooltip and label are wanted   + Should there be a value list for Manufacturer? * DFS Legends   + Has a Feature Name of DA Radio and a Component name of DA Fiber Modem in Design Legend – should reflect what’s in DFS Features “DA Fiber Modem” for Feature Name and “DA Fiber Modem Symbol” for Component Name - *(HXGN-Updated per Capco’s notes)*. * DFS Relationships   Need to confirm Connectivity and Ownership with DA SMEs | Open 2/20/2017 |
| 31 |  | **DA Radio**  Needs to be reviewed with Telecom SMEs   * DFS Features   + How will Type, ID, Power Type and Antenna Type be populated? * DFS Value Lists   + VL\_DA\_ANTENNA\_TYPE is empty * DFS Relationships   Can a DA Radio own a DA Fiber Modem? | Open 2/20/2017 |
| 32 |  | **Design Area**  Has not been discussed or reviewed with SMEs. | Open 2/20/2017 |
| 33 |  | **Duct**  During design workshop, there was confusion regarding terminology difference between GTech and Oncor. As a result, attribution may be on the wrong features. Ducts, Duct Banks, and Formations require follow-up discussion. |  |
| 34 |  | **Duct Bank**  During design workshop, there was confusion regarding terminology difference between GTech and Oncor. As a result, attribution may be on the wrong features. **Oncor terminology has Ducts containing Formations which contain Conduits.** The decision to use this terminology was made in Workshop 1. Ducts, Duct Banks, and Formations require follow-up discussion.  DFS Features:   * In Oncor terminology, Conduits are the tubes that hold the wires inside the ducts. Conduit attribution does not make sense on the Duct Bank. * Duct Bank is listed as a two node device. Is this for Ductivity? Other structures that have Ductivity do not have nodes. * Network Usage appears in common attributes. Why is it duplicated here? * Conduit Use code implies a value list   Value Lists:   * Conduit Material list blank * Conduit Size list blank   Relationships:  Ductivity and Containment tabs still use GTech terminology rather than Oncor’s. Oncor terminology has Ducts containing Formations which contain Conduits. | Open 2/20/2017 |
| 35 |  | **Fault Indicator**   * Not reviewed by SMEs   Feature DFS   * Remark (equipment ID is last 4 of FLN) * Trip Current Rating values: 400/600/800/…)   Relationship DFS   * Ownership should be to connected conductor – WKSP 1 notes   Legend   * Fault Indicators in a proposed status should have a heavier weight than those inservice – wkshp 3 notes * Fault Indicators with SCADA should have their own symbol – wkshp 3 notes, nothing designated   Label for Fault Indicator – if not SCADA, show device id; if SCADA have info in label | Open 2/20/2017 |
| 36 |  | **Field Check**  Not SME Reviewed  Feature DFS  3/30/2018 – Field Check feature is no longer part of the design. | Pending Closure |
| 37 |  | **Foreign Cable**  Not SME Reviewed  Feature DFS   * Notes from wkshp 1 state to have a follow up on the feature. Electric and Communication maybe models as one feature.   Value List   * Missing Foreign Cable Type and Cable Position   Legend   * Will need to review how these should look   Relationship  Foreign Cable missing in this DFS | Open 2/20/2017 |
| 38 |  | **Formation**  During workshop, there was confusion regarding terminology difference between GTech and Oncor. As a result, attribution may be on the wrong features. Ducts, Duct Banks, and Formations needs follow-up discussion.  3/30/2018 – Terminology has been rectified with respect to DIS. Duct Banks retain their same name, and may own Formations, which may own Ducts, which may own Inner Ducts. Conduits retain their same name, representing direct buried conduits. | Pending Closure |
| 39 |  | **Guy**  Not reviewed by SMEs  Feature DFS   * Placement routine needed to place anchor when a guy is placed – wkshp 3 * Anchor will need a symbol – wkshp 3 * Anchor type attribute is CU driven   Value List   * Guy Type is blank   Legend   * Guy Linear needs to be defined   Will need Anchor symbol | Open 2/20/2017 |
| 40 |  | **Isolation Point**  DFS Features:   * Type needs value list?   Legends:   * Symbols for closed elbow and closed elbow detail are missing   Relationships:  Connectivity needs to be reviewed after Hexagon has investigated how isolation points will affect connectivity validation. | Open 2/20/2017 |
| 41 |  | **Manhole**  Needs discussion with Network and airport  DFS Features   * Manhole Type code requires value list? * Location Type references same value list as Vaults. Does this make sense? Can a manhole be on a Roof?   Value lists   * Manhole Modification Type blank * Manhole Stacking blank   Legends:   * The same symbol is used for all types of manholes. These should have different Symbology.   For Network Manholes, may want to use Manhole ID for the label. | Open 2/20/2017 |
| 42 |  | **Miscellaneous Structure**  Needs to be reviewed with SMEs   * DFS Value Lists   + VL\_MISC\_STRUCTURE\_TYPE has TT – TU Transmission Tower as a value. Does this need to be removed since Transmission Tower is now a separate feature? * DFS Relationships   + Ownership needs to be reviewed with SMEs * DFS Legends   Special symbols for different states? | Open 2/20/2017 |
| 43 |  | **Network Protector**   * Not reviewed by SMEs   Value List   * Network Protector Mode list not populated * Network Protector Relay MFGs Code list not populated (most likely CU Driven) * Network Protector Fuse Link list not populated   Feature DFS  Protector Mode | Open 2/20/2017 |
| 44 |  | **Network Splice**   * Not reviewed by SMEs * No notes on Network Splice   Relationship DFS   * Connectivity to Primary UG Conductor needs to be validated * Splice should be own to the conductor(s) (type) that was spliced   Need to validate that network splice can be owned to a vault | Open 2/20/2017 |
| 45 |  | **OMS Event**  Not reviewed by SMEs  No longer a feature due to not receiving information from OMS  3/30/2018 – OMS Event feature is no longer part of the design. | Pending Closure |
| 46 |  | **Pad**  Feature DFS   * Add Owner Code – Customer (Value = CU) and Oncor with Oncor (value = TU) as default -wkshp 3 notes * Review if type is needed to address pre cast or poured in place – wkshp 3   Value List  Pad Size & Material list are both blank : CU driven | Open 2/20/2017 |
| 47 |  | **Plotting Boundary**  Has not been discussed or reviewed with SMEs  3/30/2018 – Recommend addressing within context of Map Printing DDD instead of DFS. We did add a section to this document | Pending Closure |
| 48 |  | **Pole**   * DFS Features   + Class, Height and Material are CU driven   + Could Owning Company be handled by Owned By attribute in common?   + Tooltip – Need Crossarm Quantity to be added * DFS Value Lists   + VL\_POLE\_CLASS is empty   + VL\_POLE\_HEIGHT is empty   + VL\_POLE\_MATERIAL is empty   + VL\_POLE\_OWNER only has one value in it – what are other possible values * DFS Legends   + Pole Symbols need to be reviewed with SMEs   + Special behavior of symbols when states change? Workshop notes talk about extra circle around pole in PPI and thicker weight, INI – double circle with thick weight, etc. * DFS Relationships   Ownership needs to be reviewed with SMEs | Open 2/20/2017 |
| 49 |  | **Premise**  Modeling of premise needs to be discussed as part of Service Line Workshop.  3/30/2018 – This has long since been discussed as we changed to a Service Point feature with repeating Premise non-graphic components. | Pending Closure |
| 50 |  | **Primary Conductor – OH**  Feature DFS   * Primary Conductor Construction Type value list not populated – Noted as Action item   Value List   * Feeder Position value list – add “Field” and “Road” to Phase position VL if list are the same according to remark   Legend   * Legend: missing Neutral Line from WKSHP 3 – Thin blue line * Legend: Missing voltage based color filter.   + Need a different color for a 13.2 voltage (metroplex – Dallas)   + 5 primary voltages (single phase/three phase)     - 7.2/12.5 – orange     - 7.6/13.2 – light orange     - 14.4/24.9 – green     - 21.6/12.5/21.6 – light green   <7.2 kv – brown | Open 2/20/2017 |
| 51 |  | **Primary Conductor – UG**  Feature DFS   * Cable Rehabilitated – Remark: “Required, Y/N”. Default “Yes” if used in Downtown Network   Legend   * Legend missing Neutral Line from WKSHP 3 – Thin blue line * Legend: Missing voltage based color filter.   + Need a different color for a 13.2 voltage (metroplex – Dallas)   + 5 primary voltages (single phase/three phase)     - 7.2/12.5 – orange     - 7.6/13.2 – light orange     - 14.4/24.9 – green     - 21.6/12.5/21.6 – light green   <7.2 kv – brown | Open 2/20/2017 |
| 52 |  | **Primary Conductor Node**   * Explanation of different types of Primary Conductor Nodes needed in DFS Word Doc * Not reviewed by SMEs   Legend:   * Need confirmation the following symbol is used in FRAMME   + 1   + WKSP 3 states use what is in FRAMME   Relationship DFS:   * Primary Node should connect with Primary UG/OH conductors   Feature DFS:  Unknown if specialized nodes such as Termination/Dead End Nodes needs to have attributes defined here | Open 2/20/2017 |
| 53 |  | **Primary Enclosure**  Not reviewed by SMEs  Feature DFS   * Placement configuration – should have two elbows from wkshp 3 notes * Mark for follow up from wkshp 3 notes   Legend   * No symbol defined   Relationship  Need to review all connectivity and ownership relationships | Open 2/20/2017 |
| 54 |  | **Primary Fuse**  DFS Features:   * Device ID – 6 digit number to be generated by the system * Use – populated by CU * Bay Number – Will need to be added as part of Switch gear assembly configuration * Position Number – same as above * Normal Status and Phase both have the same attribute mapping – *(HXGN – Updated DFS)* * Normal Status should be required – *(HXGN – Updated DFS)* * Interrupt rating – populated by CU – *(HXGN – Updated DFS)* * Missing from tooltip - Device ID, Fuse Link Size   Value List:   * Fuse Holder type blank * Fuse Interrupt Rating blank   Legends  Should be green hollow circle or red solid circle with F in it. | Open 2/20/2017 |
| 55 |  | **Primary Point of Delivery**  Not SME Reviewed  Legend DFS   * Should be Red for PME (primary)   Blue for SME (secondary) | Open 2/20/2017 |
| 56 |  | **Primary Pull Box**  Not SME Reviewed  Value List   * Pull Box Material is blank * **Pull** Box Size is blank   Legend  If Pull box type = SS or ST use semi circle, currently mapped to PB | Open 2/20/2017 |
| 57 |  | **Primary Switch**  Features DFS   * Device Id will be populated by the system but editable by the user * Device Function – CU driven – *(HXGN – Updated DFS)* * Switch Type – CU driven – *(HXGN – Updated DFS)* * Switch Use – CU driven – *(HXGN – Updated DFS)* * Load Break – CU Driven – *(HXGN – Updated DFS)* * Continuous Current Rating – CU driven – *(HXGN – Updated DFS)*   Value lists   * Switch Type is blank   Legends   * Missing symbology for Intelliruptors (circle IR), Vista gears (circle VG) , DSC (Triangle), and Vacuum (square) * Also missing TO symbol for switches in ATO   Switches should follow standard red/green open/close color scheme | Open 2/20/2017 |
| 58 |  | **Primary Switch Gear**  DFS Features:   * Continuous Current Rating – CU driven * Interrupt medium – CU driven * Switch Control Type – needs to be driven by CU in future   Legends:  Primary Switch gear symbology missing | Open 2/20/2017 |
| 59 |  | **Primary Switch Gear Bus**  Relationships:   * Bus has two nodes in DFS but one node on Connectivity tab * Should not connect to primary enclosure * Switch Gear Bus needs to be removed from ownership. There is already a Primary Switch Gear Bus.   Legends:  Should not appear in Distribution Design legend as it will only be in Switch Gear details | Open 2/20/2017 |
| 60 |  | **Rack**  Not reviewed by SMEs  Features DFS   * Weight Class attribute most likely CU driven   Value List   * Rack Material blank : will probably be CU driven * Need to confirm 2P, 3P, 4P values for Rack Type (no notes)   Legend   * Will need to confirm after network follow up if this will remain a linear feature   Relationship   * Racks may be owned by vaults – depends on follow up with Oncor on network modeling | Open 2/20/2017 |
| 61 |  | **Recloser**   * DFS Features   + SCADA attributes need to be reviewed by Chris Darby – general consensus seems to be that IP Addresses should not be in the GIS; this data would have to come from another system   + Note from workshop: Talk about Ground Trip Plug, Ground Trip Relay, Ground Trip Currrent, Interrupt Medium, Phase Trip Current, Phase Trip Plug, Recloser Interval, Recloser Max Operations, Recloser Reset, Recloser Time Sequence, TC Delay Ground, TC Delay, with Planning – still need a final answer   + Recloser Type will be populated from the CU   + Tooltip should be Amperage Rating, Recloser Type and Device ID   + Why is there a Label Text Attribute on a Recloser Bank, would this not be covered by Recloser Label above?   + Where are isolation point rules kept? Different for each type * DFS Relationships   + If a recloser has an isolation point should it be able to have connectivity to anything else?   + Ownership needs to be reviewed – in workshop notes only have it owned to pole structures and transmissions towers   + What if the recloser is type fuse saver or trip saver, is two node required connectivity still true? * DFS Value Lists   + VL\_RECLOSER\_TYPE is empty   + These values come from the workshop, need to ask for full list: 2H, 4H, 6H, W, WE, WB, RVE, etc.   + Or would this be Recloser, Fuse Saver or Trip Saver?   + Need to clarify what the attribute is for the above values. * DFS Legends   + Don’t have Large Recloser Symbol on Symbol tab   + Colors need to be reviewed   + On Text tab, Recloser and Recloser Label Large are the same size   + In workshop notes, small label should be Amperage Rating, Recloser Type and Device ID   In workshop notes, large label should just be Device ID | Open 2/20/2017 |
| 62 |  | **Remote Terminal Unit**  Needs to be reviewed with DA SMEs   * DFS Features   + Should there be a value list for control type?   + Label?   + Tooltip is empty   + Will an RTU have any nodes? * DFS Legends   + In Distribution Design Legend and Network Design Legend a Legend Entry of V\_DAFIBERMDM\_S, a Feature Name of DA Radio, and a component name of DA Fiber Modem – should reflect what is in the DFS Features spreadsheet and name of Feature * DFS Relationships   + Will an RTU have connectivity?   + Ownership needs to be reviewed * DFS Legends   + Symbol should have RTU in it   Color needs to be discussed | Open 2/20/2017 |
| 63 |  | **Riser**  Not reviewed by SME  Feature DFS   * Riser Conduit Size & Material are CU Driven   Relationship  Riser should be able to be owned to a pole – wkshp 1 notes | Open 2/20/2017 |
| 64 |  | **Secondary Box**  Not reviewed by SME  Feature DFS   * Conflicting notes on removing Secondary Box Material wkshp 1 notes (both sets)   Value List   * Secondary Box Size is blank * Secondary Box Use - Restore Use Code attribute – Determines above grade (DA, SA) or below grade (DB, SB) -wkshp 3   Relationship   * Secondary box has Ductivity, shouldn’t that generate an entry on the Ductivity tab? | Open 2/20/2017 |
| 65 |  | **Secondary Breaker**  Needs to be reviewed with SMEs   * DFS Features   + Should there be a value list for Continuous Current Rating? * DFS Legends   + Symbol information copied and pasted from Secondary Box – needs to be defined for Secondary Breaker – *(HXGN – Updated DFS)*   + Need to confirm Label * DFS Relationships   Connectivity and Ownership needs to be reviewed with SMEs | Open 2/20/2017 |
| 66 |  | **Secondary Bus Duct**  Needs to be reviewed by SMEs  Relationships:   * Remove Service Line from connectivity.   Also connects to Secondary conductor? | Open 2/20/2017 |
| 67 |  | **Secondary Conductor**  Feature DFS   * Secondary Conductor type: Value List changed to CU Driven based on DFS review session notes – *(HXGN – Updated DFS)*   Relationship DFS  Secondary Conductor should NOT connected to a AMS Router or DA Radio | Open 2/20/2017 |
| 68 |  | **Secondary Conductor Node**   * Not SME Reviewed   Feature DFS   * Notes have Secondary Enclosures as a secondary node type but the DFS has the enclosure as a feature type   Relationship DFS  Secondary Connectivity node should connect with Secondary Conductor | Open 2/20/2017 |
| 69 |  | **Secondary Enclosure**   * Not SME Reviewed   Feature DFS  Notes have Secondary Enclosures as a secondary node type but the DFS has the enclosure as a feature type | Open 2/20/2017 |
| 70 |  | **Secondary Fuse**  Feature DFS   * Device ID – 6 digit number to be generated by the system * Only appear in detail view of vaults * Attributes appear to have been copied from primary fuse. Other attributes need to be reviewed to determine if they apply to Secondary Fuse   Value Lists   * Fuse Type blank – Should be KRPC or z-link   Relationships   * Connectivity   + Needs connectivity to Network protector * Ownership   + Secondary fuse is missing. Should be owned to a vault   Legends – *(HXGN – Updated DFS)*   * Secondary Fuse will only appear in vault details – geo symbology should be removed.   Should follow standard fuse color guidelines – hollow green for open, solid red for closed | Open 2/20/2017 |
| 71 |  | **Secondary Switch Gear**  Secondary Switch Gear appears to be a copy of Primary Switch Gear. Needs to be reviewed with airport and network SMEs. | Open 2/20/2017 |
| 72 |  | **Secondary Switch Gear Bus**  Nothing in notes indicate that this feature was requested. Need to determine whether this is needed when Secondary Switch Gear configurations are generated. | Open 2/20/2017 |
| 73 |  | **Secondary Switch Gear Enclosure**  Part of Main-Tie-Main detail. Needs to be reviewed as part of configuration of secondary switchgears. | Open 2/20/2017 |
| 74 |  | **Service Line**  Needs additional discussion as part of Service Line workshop  DFS Features:   * Attribution has not been discussed or reviewed with SMEs * Size – Should be CU driven * Requirements call for 3 different types of service lines. (graphic material, graphic nonmaterial, nongraphic). Need attribute related to this?   Value List:   * Secondary Bundle list is blank * Service Type needs definitions   Relationships:   * Would connectivity be to the premise or to the service point? Both? Needs to be discussed along with discussion on how service points and premises will be modeled.   Legends:  Requirements call for 3 different linears for the 3 different types of service lines. | Open 2/20/2017 |
| 75 |  | **Service Point**  Modeling of Service Points needs to be discussed as part of Service Line workshop | Open 2/20/2017 |
| 76 |  | **Street Light**   * DFS Features   + City Owned streetlights will not be electrically connected. Connectivity component should be required for Oncor owned lights but optional for Customer owned. Enforcement is shown as optional in DFS Relationships spreadsheet.   + Attributes have been reviewed in the context of when the type is Street Light but not for when type is Area, Guard, or Traffic.   + Need to assess whether Street Light feature should contain all four types as a single feature or if these should be separated into different features.   + Lamp Type – populated by CU   + Wattage – populated by CU   + Account Number – Selected by user in the Street Light Account Selection interface defined in the Street Light Management DDD. Needs to be required for Streetlights. Premise #s should also be required for Guard Lights but make it an overrideable validation or make it able to accept some type of “unknown” value.   + Remarks for Account Description have this field being populated based on Account Number. During workshop this was discussed as a reference to the Account Table rather than as an attribute to avoid conflicting data if the Account Description is updated in the Account Table.   + Rate Code – Same as above.   + Rate Schedule – Same as above   + Ballast Type – Decision in Workshop 3 was to remove this attribute. However, this decision was questioned during the Streetlights workshop. Follow-up needed to determine whether this attribute is still needed.   + Bracket Length – same as above   + Connect Date – In streetlights workshop, discussed that this currently represents the date at which the light was placed in graphics. Can be removed as long as this is the meaning of “Job Placed Date” in the common attributes. If not, another attribute should be added to the common attributes to represent this.   + Disconnect Date – Can only be modified by users with SLA role. Should be auto populated when Connection Status is changed to “disconnected”. Should be cleared when connection status is changed to Connected again.   + Missing Reconnect Date attribute – Only editable by the SLA. Should automatically reconnect light upon this date.   + Mapped – no longer needed as all lights will have a location   + Agreement Number – Should be part of MSLA table or removed entirely   + Agreement Date – Should be part of MSLA table   + Supplement Number – Removed as per Workshop 3 decision   + Supplement Date – Same as above   + Traffic Lens Quantity – Should only apply to Traffic Lights and not appear for the other feature types.   + Placement Configurations – Different placement configurations needed for each different type of light (except traffic) if all remain as one feature. May also need a separate configuration for Oncor vs city owned lights to account for connectivity difference. * DFS Value lists   + Street Light Lamp Type value list is blank   + Street Light Wattage value list is blank   + Street Light Rate Code value list is missing rate C. Need to validate if P and R are correct. Where did these values come from? Also need rate E for network. Also need Z.   + Street light Ballast Type is blank * DFS Relationships   + Ownership     - Streetlights cannot own a premise     - Missing Transmission Tower   + Connectivity     - Streetlights should not be directly connected to an UG transformer * DFS Legends   + Missing symbology rules for Customer owned lights “Sunburst”.   + Missing color difference for Customer owned lights. Today these are cyan.   Want the rate schedule to appear with the symbol. Either as part of the symbol itself or with a label placed over the symbol. | Open 2/20/2017 |
| 77 |  | **Street Light Control**   * DFS Features   + In workshop 1, it was decided that these should be 2 node devices   + Wattage – populated by CU * DFS Values List   + Street Light Wattage value list is blank * DFS Relationships   + Connectivity     - Street Light Control should have 2 nodes     - Need to connect to Streetlights?   + Ownership   Based on workshop 1 notes, ownership should only be to pad, pole, Secondary box | Open 2/20/2017 |
| 78 |  | **Street Light Standard**   * DFS features   + Type – Populated from CU   + Material - Populated from CU   + Foundation Type - Populated from CU   + Height - Populated from CU   + All 4 should be required attributes * DFS Legends   During the workshop, it was suggested that the symbology should change based on the type of Streetlight Standard. Currently there is only one symbol listed in the spreadsheet. | Open 2/20/2017 |
| 79 |  | **Substation**  DFS Features:  Substation Type Code should be changed to “Substation Type”. – *(HXGN – Updated DFS)*  Should have value list with options of D and T (need to define). Should have a default value of D. | Open 2/20/2017 |
| 80 |  | **Substation Breaker**  Needs to be reviewed by SMEs   * DFS Features   + Tooltip in workshop notes: Breaker Number and Feeder Number   + Need to confirm planning attributes and if they will be in the GIS coming from another system or not   + Any Value Lists needed? * DFS Relationships   + Have connectivity to Substation Transformer in workshop notes   Ownership needs to be reviewed | Open 2/20/2017 |
| 81 |  | **Substation Bus**  Not reviewed by SMEs  Relationships:  Notes have conflicting ownership. At one point was said that everything is owned to the substation. This is most likely correct but other notes imply it can be owned to other features. Need to confirm. | Open 2/20/2017 |
| 82 |  | **Substation Transformer**   * DFS Value List   Substation Transformer type is blank – should be permanent or mobile | Open 2/20/2017 |
| 83 |  | **Transformer – OH**   * DFS Features   + Transformer Bank Type – Populated by CU – *(HXGN – Updated DFS)*   + KVA Size – Populated by CU – *(HXGN – Updated DFS)*   + Primary/Secondary configuration – populated by user if placed in design. Also will be populated by DEIS interface   + Primary Voltage – populated by CU – *(HXGN – Updated DFS)*   + Secondary Voltage – populated by CU – *(HXGN – Updated DFS)*   + TSN – Comes from DEIS interface   + Placement configuration needed for isolation points * DFS Relationships   + Transformer needs to broken into OH/UG on child part of ownership tab * DFS Legends   + Network symbology missing   + Network label missing   Workshop 3 notes indicate that all Transformer symbols should be grey | Open 2/20/2017 |
| 84 |  | **Transformer – UG**   * DFS Features   + Transformer Bank Type – Populated by CU – *(HXGN – Updated DFS)*   + KVA Size – Populated by CU – *(HXGN – Updated DFS)*   + Primary/Secondary configuration – populated by user if placed in design. Also will be populated by DEIS interface   + Primary Voltage – populated by CU – *(HXGN – Updated DFS)*   + Secondary Voltage – populated by CU – *(HXGN – Updated DFS)* * DFS Legends   + Network symbology missing   + Network label missing   Workshop 3 notes indicate that all Transformer symbols should be grey | Open 2/20/2017 |
| 85 |  | **Transmission Tower**  DFS Features:   * Listed as a single node device. Should be N/A.   Legends  Has a color change for PPI state. Do Transmission Towers even need feature states given they are not being constructed in distribution GIS? | Open 2/20/2017 |
| 86 |  | **Tree-trimming Polygon**  Has not been discussed or reviewed with SMEs. | Open 2/20/2017 |
| 87 |  | **Vault**  Vaults need further discussion with Network and Airport  Value Lists:   * Vault Voltage list is blank   Vault Entrance Type is blank | Open 2/20/2017 |
| 88 |  | **Vault Equipment**  Value Lists:   * Follow-up needed to define all the different types   Symbology   * Should have different symbols for all the different types   Current alarm symbol for vault protection appears to be flipped with fan symbol for Vault Equipment. | Open 2/20/2017 |
| 89 |  | **Vault Protection**  Value Lists:   * Follow-up needed to define all the different types   Symbology  Current alarm symbol for vault protection appears to be flipped with fan symbol for Vault Equipment. | Open 2/20/2017 |
| 90 |  | **Voltage Regulator**  DFS Features:   * All Planning related attributes can be removed as there is no process for keeping them up updated. * KVA – CU driven * Missing Primary Configuration   Relationships:  In workshop 1, said ownership would only be to a pole. Need to verify the other features on the ownership tab. | Open 2/20/2017 |
| 91 |  | **Work Point**  Modeling of Work Point needs to be discussed as part of the Job Management workshop. | Open 2/20/2017 |
| Fiber Features | | | |
| 93 |  | **Boundary**  Notes say that it is unknown if this feature will be used in distribution, no requirements listed | Open 2/20/2017 |
| 94 |  | **Building**  Value list are missing | Open 2/20/2017 |
| 95 |  | **Fiber Branch Enclosure**  No notes or requirements on Branch Enclosure | Open 2/20/2017 |
| 96 |  | **Fiber Cable**  Fiber DFS   * Fiber Strand attributes not populated, these would be covered by 17.1.1.F2 in the Fiber DRD   Relationship DFS  Fiber Connectivity - Fiber Cables should be “owned” to Buildings not connected | Open 2/20/2017 |
| 97 |  | **Fiber Patch Panel**   * Missing Patch Panel Port Attributes found in 17.1.3.F2   Action item: map port-specific attributes to S\_CONNECT table | Open 2/20/2017 |
| 98 |  | **Fiber Rack**   * Missing the following attributes from workshop notes   + Enclosure Number   + Number of terminations   Keep Manufacturer and Model | Open 2/20/2017 |
| 99 |  | **Fiber Splice Enclosure**  Attributes missing, found in 17.1.2.F1 + demarcation (from workshop) | Open 2/20/2017 |
| 100 |  | **Fiber Tray**  Attributes missing, no requirements or notes regarding Fiber Tray | Open 2/20/2017 |
| 101 |  | **Floor**  Attributes missing | Open 2/20/2017 |
| 102 |  | **Room**   * Missing attributes from workshop notes   + Room Type   + Room Number   + Height   Alias | Open 2/20/2017 |
| 103 |  | **Splice**   * Missing attributes, found in 17.1.2.F2   Mention of a maintenance splice as a repeating component in workshop notes | Open 2/20/2017 |
| Landbase Features | | | |
| 105 |  | **shared components**   * Landbase Audit Attributes   + Will Created Date also have the time?   + Will Last Edited Date also have the time?   + Need attribute for Source   + Nothing in notes about Source Version attribute   + In workshop notes, Status attribute was changed to Stage and has the following possible values:     - Accepted     - Under review     - Suppress     - Archived * Miscellaneous Label (blank) * Building Area (blank) * Parcel Area (blank) * Parcel Centroid (blank)   + Have remove Parcel Centroid in notes * Parcel label (blank) * Pipeline Label (blank) * Pipeline Linear (blank) * Street Centerline Label (blank)   Street Centerline Label (blank) | Open 2/20/2017 |
| 106 |  | **shared dialogs**   * Dialog list does not match with shared component list   Why is Right-of-Way Attributes Dialog here? | Open 2/20/2017 |
| 107 |  | **Airport**  Does this need a label? | Open 2/20/2017 |
| 108 |  | **Building Detail – Commercial**   * Missing attributes identified in workshop   + Building Name   + Date Loaded   Label? | Open 2/20/2017 |
| 109 |  | **Building Detail – Manual**   * Has Building Detail Area Component but Commercial Building Detail does not, is this needed on both? * Missing Attributes   Label? | Open 2/20/2017 |
| 110 |  | **Cadastral Edge**  Empty | Open 2/20/2017 |
| 111 |  | **Cadastral Node**  Empty | Open 2/20/2017 |
| 112 |  | **Census Boundary**   * State FIPS is spelled Sate FIPS * Type attribute should have a value list with options of:   + Census Tract   Block Group | Open 2/20/2017 |
| 113 |  | **Certification Boundary**   * Label? * Where did the attributes come from? * Certification Type attribute   + Are the remarks supposed to be in a value list?   “Single, Dual” | Open 2/20/2017 |
| 114 |  | **County Boundary**   * Label?   State FIPS is spelled “Sate FIPS” | Open 2/20/2017 |
| 115 |  | **Digital Elevation Model**  Label? | Open 2/20/2017 |
| 116 |  | **DOC Note**   * Where does the text attribute for the label belong? * Discussion in workshop that this could possibly be text only without a symbol – what was the resolution?   Need to review Value List for DOC Note Type | Open 2/20/2017 |
| 117 |  | **Easement – Manual**   * Is Status attribute the same as the one in Landbase Audit component? Only have Active and Abandoned as possible values in notes.   Need to complete possible values in DFS Value Lists for VL\_EASEMENT\_TYPE | Open 2/20/2017 |
| 118 |  | **HOA Boundary**   * Created Date, Version of Source, and possibly State attribute already covered by Landbase Audit Attributes Component   Will there be any special attributes based on the streetlight/MSLA List discussion in Workshop 2? | Open 2/20/2017 |
| 119 |  | **Hydrology**   * Label?   Would there be a value list for Type attribute? | Open 2/20/2017 |
| 120 |  | **Manmade Feature**  Attributes empty – no attributes needed for this feature | Open 2/20/2017 |
| 121 |  | **Meter Tech Boundary**  Needs further discussion? | Open 2/20/2017 |
| 122 |  | **Municipality Boundary**   * Not discussed in workshop   What is this boundary? | Open 2/20/2017 |
| 123 |  | **Operational Boundary**   * Operational Boundary Type Value List does not line up between DFS Value Lists and DFS Features – Landbase * Tooltip empty but in label line says tooltip should have Name attribute * Need Code and Name attributes for Feeder, District, Service Center, Crew Headquarters, Operational Group   Where do these belong? | Open 2/20/2017 |
| 124 |  | **Parcel – Commercial**   * SUB\_NAME name is Addition Name   How were attributes determined to be required or not? | Open 2/20/2017 |
| 125 |  | **Parcel – Manual**   * Abstract not required on parcel, may be located on another dataset per Zach Arrington * Parcel Area attribute added in Workshop notes   DFS Value Lists  VL\_PARCEL\_TYPE is empty | Open 2/20/2017 |
| 126 |  | **Permanent Note**  Where does the text attribute belong on the label? | Open 2/20/2017 |
| 127 |  | **Permit**  Where did the Permit Type Value List come from? | Open 2/20/2017 |
| 128 |  | **Pipeline Commercial**  Are Hyperlink Attributes needed here? | Open 2/20/2017 |
| 129 |  | **Pipeline Manual**   * Are Hyperlink Attributes needed here? * Should there be a value list for any of the attributes?   Owner, Type, Material? | Open 2/20/2017 |
| 130 |  | **Political Boundary**   * Type should have a value list with the following values:   + Congressional District   + State Senate District   + State House District   + Judicial District   Need to look into specific attributes for each type of political boundary | Open 2/20/2017 |
| 131 |  | **Railroad**  Label? | Open 2/20/2017 |
| 132 |  | **Restricted Area**  Further discussion needed on the restricted boundary solution | Open 2/20/2017 |
| 133 |  | **School District**   * Label?   Need to look into attribution more | Open 2/20/2017 |
| 134 |  | **Special Use**   * Label?   Are there mores attributes needed on this boundary for each type? | Open 2/20/2017 |
| 135 |  | **Street Centerline – Commercial**   * Should not have the following attributes:   + Not Necessary   + N/A   Do any of the attributes need a value list? Like type, | Open 2/20/2017 |
| 136 |  | **Street Centerline – Manual**  Attributes need to be reviewed with SMEs | Open 2/20/2017 |
| 137 |  | **Street Right-of-Way Line**   * Two Right-of-Way Attributes dialogs in Dialogs section, attributes should be listed in order to be seen   DFS Value Lists   * VL\_RIGHTWAY\_TYPE is empty, needs the following values:   + Major   + Minor   + Private   Alley | Open 2/20/2017 |
| 138 |  | **Tax Jurisdiction Boundary**   * Should have the following attributes according to the DRD:   + Jurisdiction Code   + Status   + Description   + Jurisdiction Type with a value list of:     - County     - City     - School   Special | Open 2/20/2017 |
| 139 |  | **Telecom Boundary**  Does Antenna Type or any other attributes need a value list? | Open 2/20/2017 |
| 140 |  | **Texas Section**  Need to review and confirm attributes | Open 2/20/2017 |
| 141 |  | **Texas State** | Open 2/20/2017 |
| 142 |  | **Third-Party Service Area**   * Further discussion needed on who will maintain this   Does Type attribute need a value list? | Open 2/20/2017 |
| 143 |  | **Zip Code Boundary**  Have in notes that there are sub boundaries of a zip code boundary: Zip and Zip+4 – do we need a type attribute with a value list? | Open 2/20/2017 |
| 144 | 2.7 | Reconcile Dead End and Open Point as types of Primary/Secondary Conductor Nodes. | Open  3/30/2018 |
| 145 | 5.1.2 | To address BRs, we added verbiage that states colors should be readable against the background and suitable for colorblind users. Since styles are expected to be under continued review and adjustment, these statements put us at risk of not getting acceptance of the DFS. Hexagon is trying to adjust working to make the design acceptable even though the implementation might require continued adjustments. | Open  3/30/2018 |
| 146 | 7 | Created a new section to document assembly behavior and equipment catalogs for switch gear features, but the content still needs to be completed. | Open  3/30/2018 |