Stepping into the Future, Implementing AutoCAD Utility Design 2016

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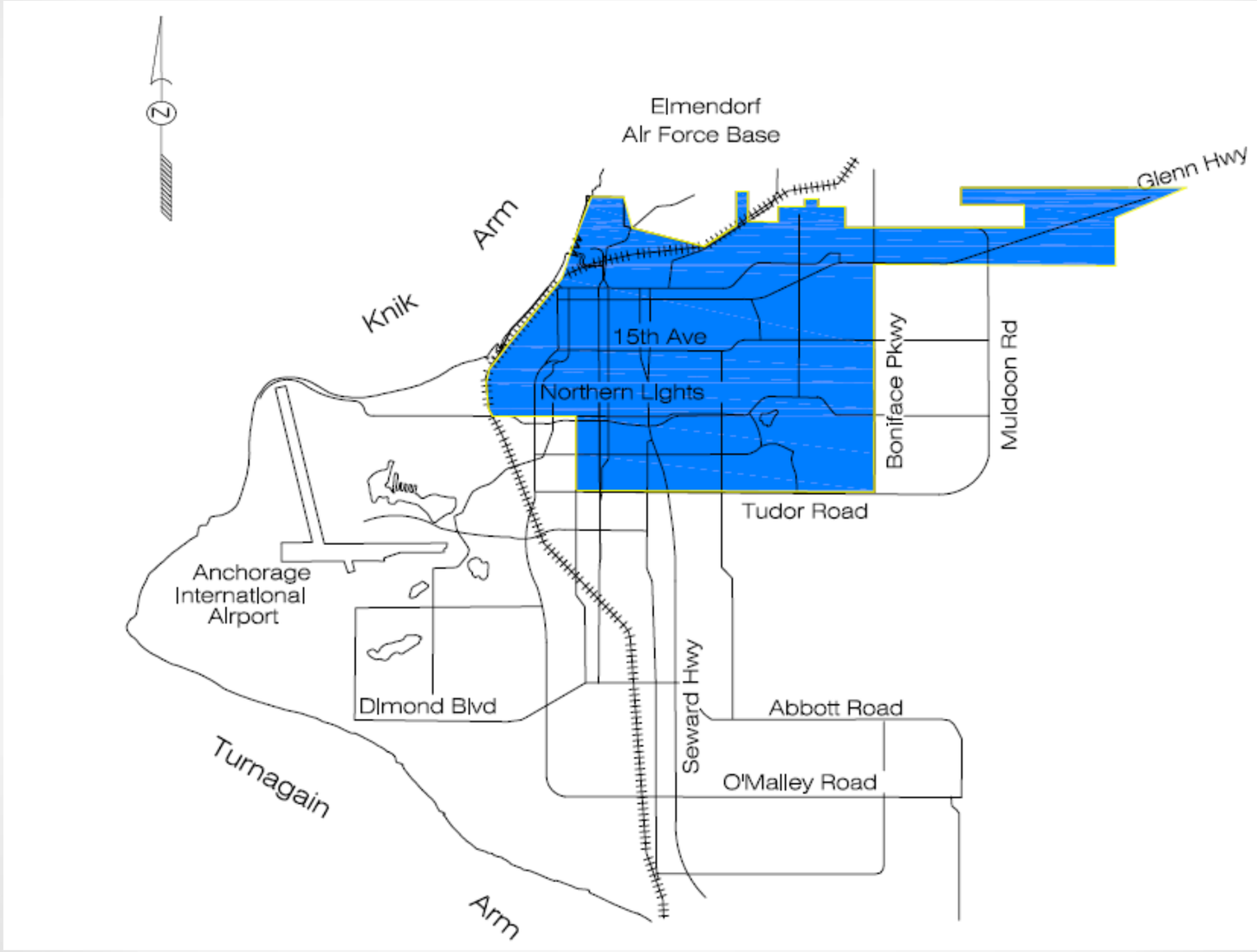
ALASKA

Anchorage Municipal Light and Power (AML&P)

AML&P Service Area, ~20 square miles



About Anchorage Municipal Light and Power

- AML&P serves over 30,000 residential and commercial customers and 2 military bases
- Total Gen. Capacity, 379 MW
- Vertically aligned utility, own our gas
- 9c/KWH to 15c/KWH, lowest rates in Alaska
- 147 miles of overhead (Transmission and Distribution)
- 252 miles of underground
- Engineering: Line Design, Customer Engineering, Substation, Engineering Support

Key learning objectives

At the end of this class, you will be able to:

- Develop project goals for implementing AutoCAD Utility Design 2016
- Discover ML&P's proposed AutoCAD Utility Design 2016 integrated solution
- Discover the AutoCAD Utility Design 2016 Industry Model and how it drives engineering design and AutoCAD Map 3D (GIS)
- Discover the future of 3D design with AutoCAD Utility Design and ReCap

Class Summary

- Current AUD 2009 Solution
- AUD 2016 Project Goals
- Proposed AUD 2016 Architecture
- Core AUD 2016 and Map3D Integration
- AUD 2016 Industry Model Issues
  - Case Studies (4)
- Intelligent Design, Rules
- Material Catalog Relationship
- Lessons Learned/Considerations
- 3D Design with AUD 2016, Recap, and Infraworks

Chapter 1: Current AUD 2009 Solution

- **Current AUD 2009 Solution**
- AUD 2016 Project Goals
- Proposed AUD 2016 Architecture
- Core AUD 2016 and Map3D Integration
- AUD 2016 Industry Model Issues
  - Case Studies (4)
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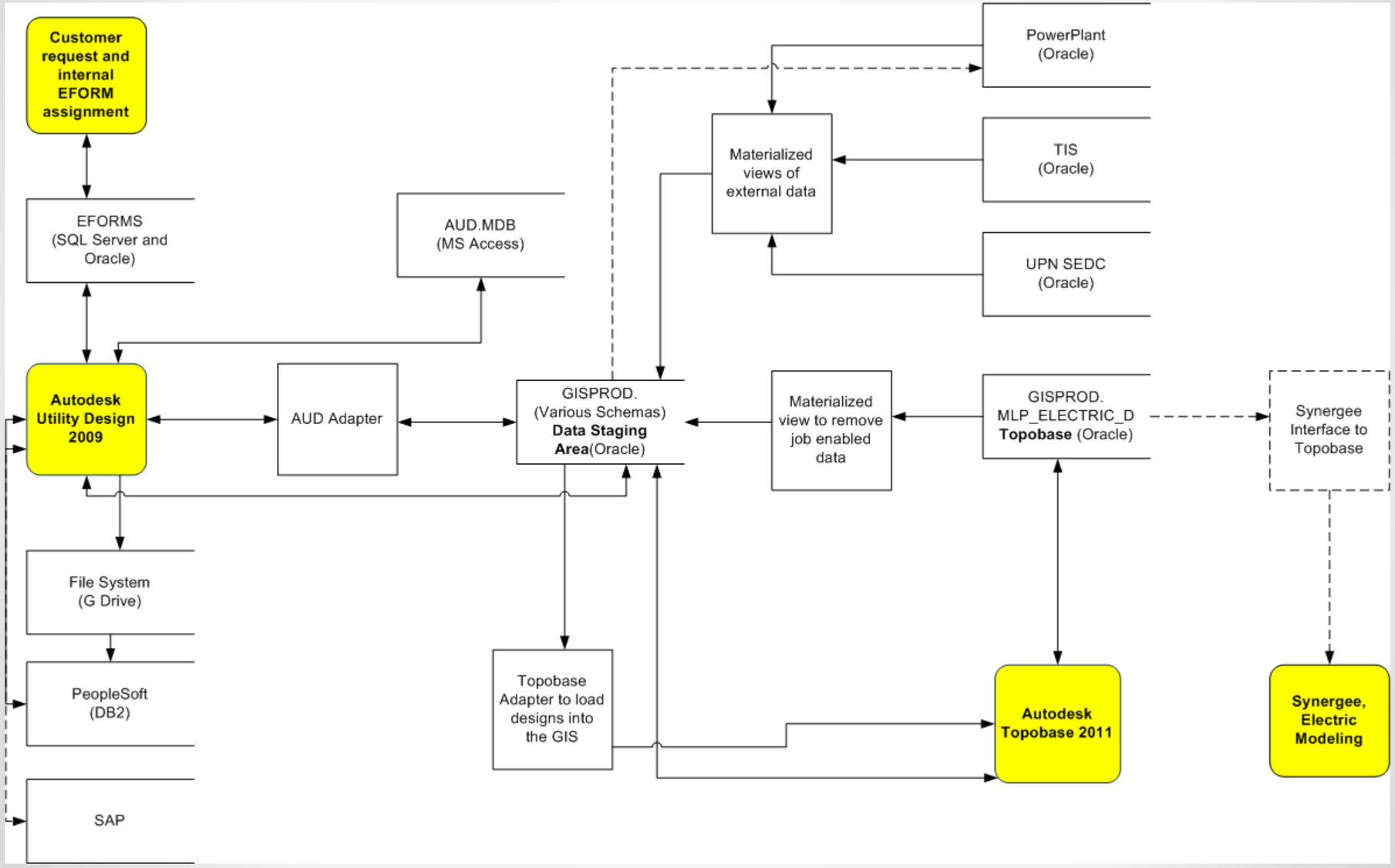
- 3D Design with AUD 2016, Recap, and Infraworks

AUD 2009, Topobase 2011, Powerplant/PeopleSoft



Chapter 2: AUD 2016 Project Goals

- Current AUD 2009 Solution
- **AUD 2016 Project Goals**
- Proposed AUD 2016 Architecture
- Core AUD 2016 and Map3D Integration
- AUD 2016 Industry Model Issues
  - Case Studies (4)
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- 3D Design with AUD 2016, Recap, and Infraworks

AutoCAD Utility Design 2016 Project Goals

- Improved Engineering Design Process with the Autodesk Industry Model
- Update and Streamline Utility Construction Standards
- Integrating AUD Design with Utility Asset Management
- Increase Data Quality and Reduce Costs

Chapter 3: Proposed AUD 2016 Architecture

- Current AUD 2009 Solution
- AUD 2016 Project Goals
- **Proposed AUD 2016 Architecture**
- Core AUD 2016 and Map3D Integration
- AUD 2016 Industry Model Issues
  - Case Studies (4)
- Intelligent Design, Rules
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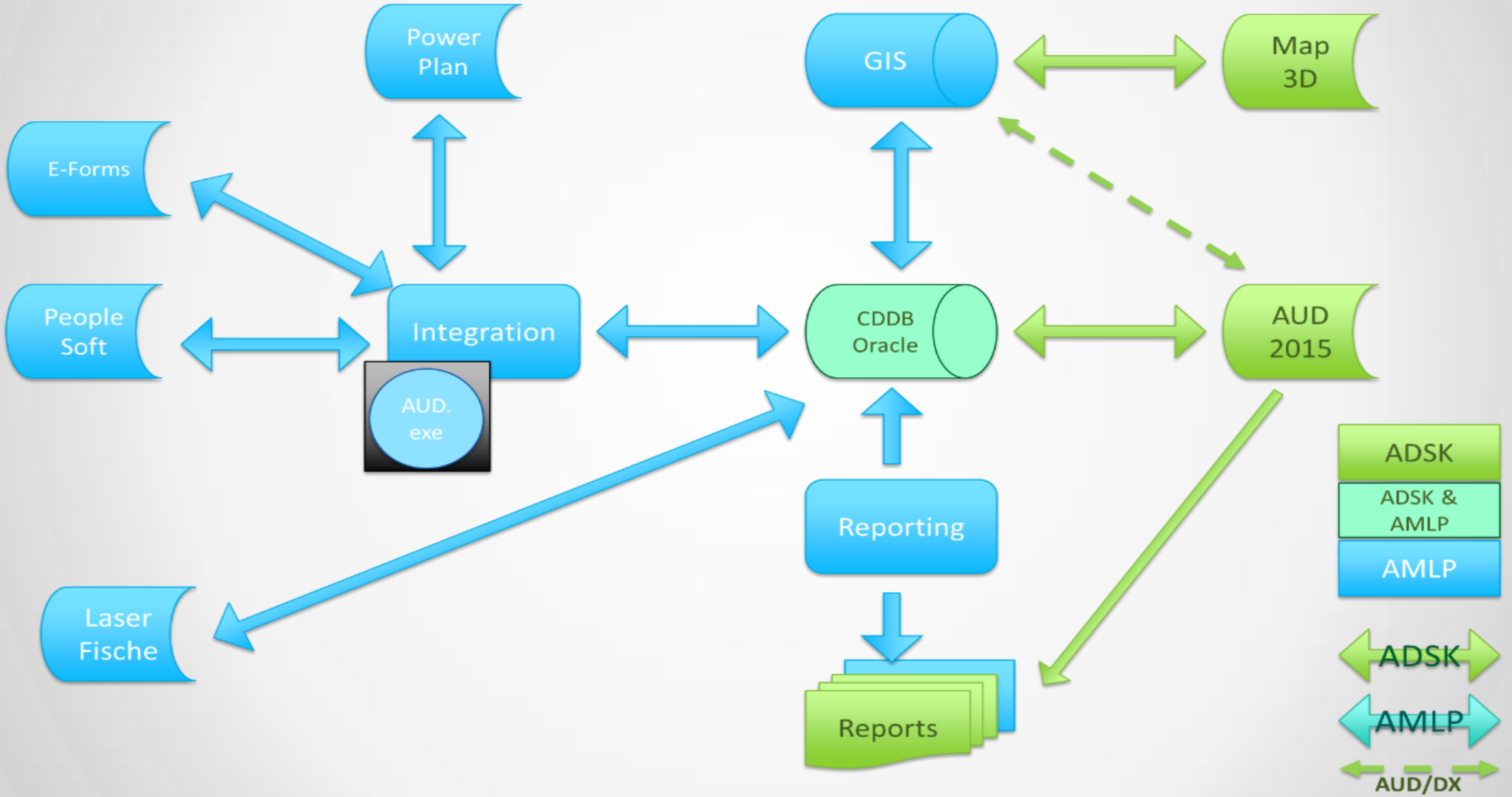
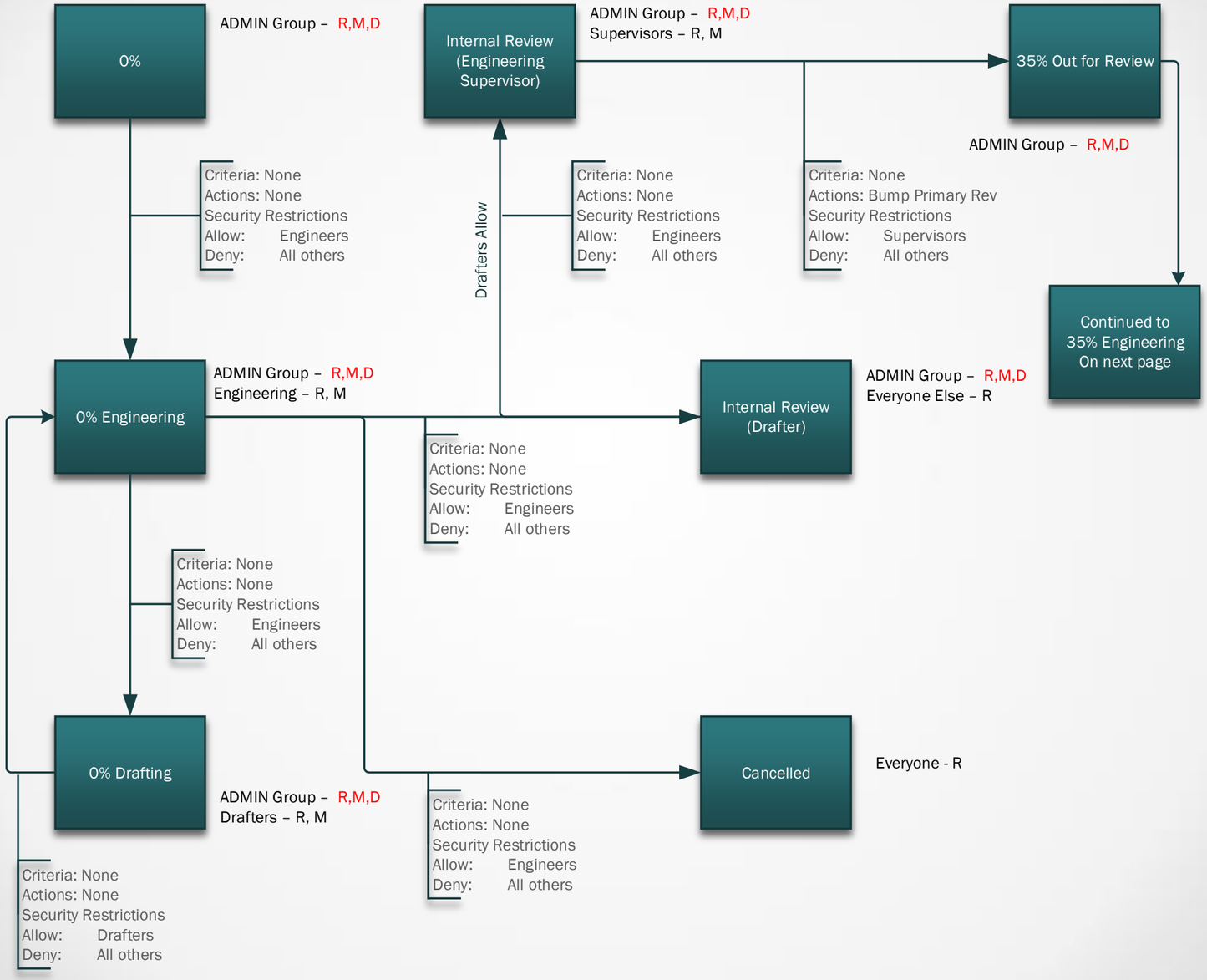
- 3D Design with AUD 2016, Recap, and Infraworks

Proposed AUD 2016 Architecture, Tasking



Proposed Vault Implementation with AUD 2016



Chapter 4: Core AUD 2016 and Map3D Integration

- Current AUD 2009 Solution
- AUD 2016 Project Goals
- Proposed AUD 2016 Architecture
- **Core AUD 2016 and Map3D Integration**
- AUD 2016 Industry Model Issues
  - Case Studies (4)
- Intelligent Design, Rules
- Material Catalog Relationship
- Lessons Learned/Considerations
- 3D Design with AUD 2016, Recap, and Infraworks

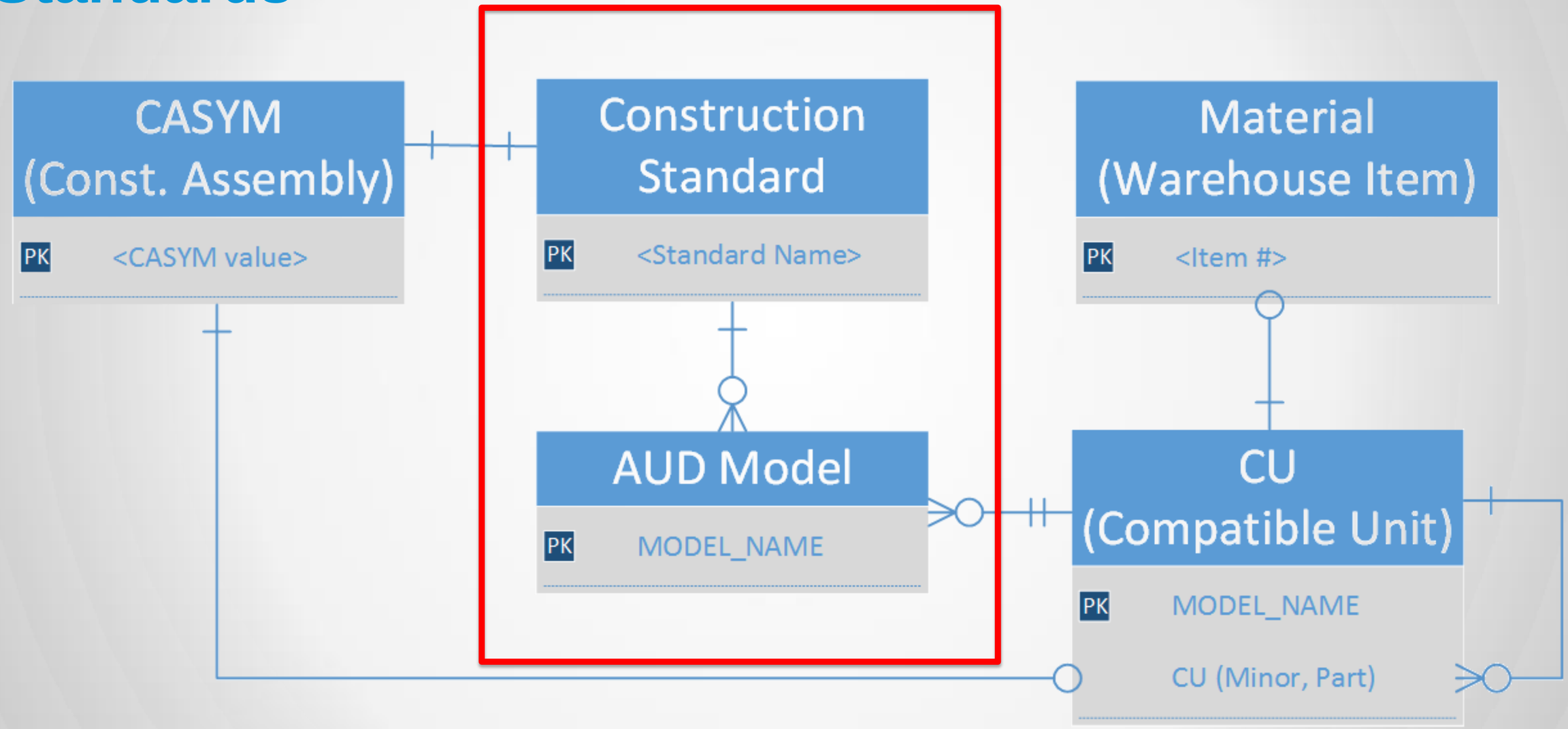
Topobase 2011 vs. AUD 2016 Industry Model

- Data differences, unit records in the GIS
- Engineered design requirements significantly upgraded
  - Junctions and dummy conductors
  - Elbows, ducts, cross sections, etc.
  - Paper/print ready vs. data/GIS ready

Chapter 5: AUD 2016 Industry Model Issues

- Current AUD 2009 Solution
- AUD 2016 Project Goals
- Proposed AUD 2016 Architecture
- Core AUD 2016 and Map3D Integration
- **AUD 2016 Industry Model Issues**
  - **Case Studies (4)**
- Intelligent Design, Rules
- Material Catalog Relationship
- Lessons Learned/Considerations
- 3D Design with AUD 2016, Recap, and Infraworks

AUD 2016 Industry Model and Old Construction Standards



Case Study 1: Pads (Const. Std.)

BASE	WIDTH (INCHES)	LENGTH (INCHES)	DEPTH (INCHES)	BACKFILL (YARDS³)*
UBMC15-CMP	44	40	24	2.9
UBMC15-1	48	48	24	3.4
UBMC15-2	72	72	24	5.8
UBMC15-3	94	80	24	7.5
UBMC17-1	84	60	36	6.7
UBMC17-2	96	72	36	8.3
UBMU19	71	63	36	6.3
UBPMX-3	140	72	36	11.0
UPBMX-4	180	72	36	13.5
UPBMX-5	220	72	36	16.0

*MINIMUM (EXCLUDES CONDUIT VOLUMES)

MUNICIPALITY OF ANCHORAGE, ALASKA

DIMENSIONS & NOTES FOR EQUIPMENT BASES

MUNICIPAL LIGHT & POWER

Sheet 4 OF 4

CONSTRUCTION STANDARD

UBASE

Case Study 1: Pads (AUD Industry Models)

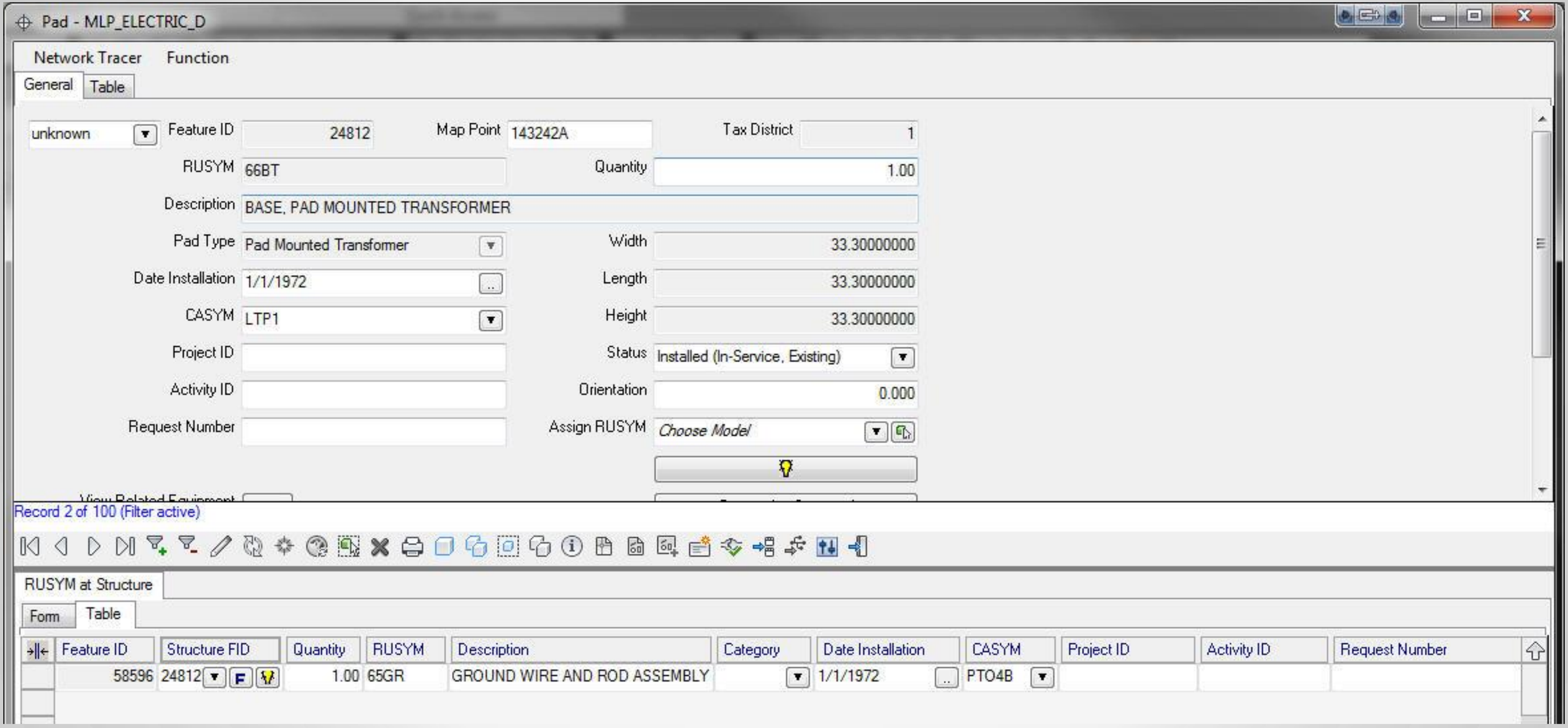
Models | Attributes | Styles | Details | Callouts

Pad data:

Model Name	Description	Model Group	Pad Type	Structure Type	Add Length (ft)
UBMC15-1	48"x48"x24" EQUIPMENT BASE, MC-15 TYPE I	Concrete	concrete	above ground	16
UBMC15-2	72"x72"x24" EQUIPMENT BASE, MC-15 TYPE II	Concrete	concrete	above ground	24
UBMC15-3	94"x80"x24" EQUIPMENT BASE, MC-15 TYPE III	Concrete	concrete	above ground	29
UBMC17-1	84"x60"x36" EQUIPMENT BASE, MC-17 TYPE I	Concrete	concrete	above ground	24
UBMC17-2	96"x72"x36" EQUIPMENT BASE, MC-17 TYPE II	Concrete	concrete	above ground	28
UBMU19	71"x63"x36" EQUIPMENT BASE, MU-19	Concrete	concrete	above ground	22.33333333
UBPMX-3	140"x72"x24" EQUIPMENT BASE, PMX, 3 MODULE	Concrete	concrete	above ground	35.33333334
UBPMX-4	180"x72"x24" EQUIPMENT BASE, PMX, 4 MODULE	Concrete	concrete	above ground	42
UBPMX-5	220"x72"x24" EQUIPMENT BASE, PMX, 5 MODULE	Concrete	concrete		
UBMC15-CMP	44"x40"x24" EQUIPMENT BASE, COMPOSITE	Non-Concrete	unknown		

Dimension 1 (ft)	Dimension 2 (ft)	Dimension 3 (ft)	Manufacturer	Material	FID	CU	RUSYM	Do Not Order	CASYM	Hyperlink
4	4	2		concrete	398	UBMC15-1	66UBMC15_1	<null>	<null>	<null>
6	6	2		concrete	399	UBMC15-2	66UBMC15_2	<null>	<null>	<null>
7.833333333	6.666666667	2		concrete	400	UBMC15-3	66UBMC15_3	<null>	<null>	<null>
7	5	3		concrete	401	UBMC17-1	66UBMC17_1	<null>	<null>	<null>
8	6	3		concrete	402	UBMC17-2	66UBMC17_2	<null>	<null>	<null>
5.916666667	5.25	3		concrete	403	UBMU19	66UBMU19	<null>	<null>	<null>
11.66666667	6	2		concrete	404	UBPMX-3	66UBPMX3	<null>	<null>	<null>
15	6	2		concrete	405	UBPMX-4	66UBPMX4	<null>	<null>	<null>
18.33333333	6	2		concrete	406	UBPMX-5	66UBPMX5	<null>	<null>	<null>
3.333333333	4	2		Composolite	407	UBMC15-CMP	66UBMC15_CMP	<null>	<null>	<null>

Case Study 1: Pads (GIS Data)



Case Study 2: Transformers (TIS Data)

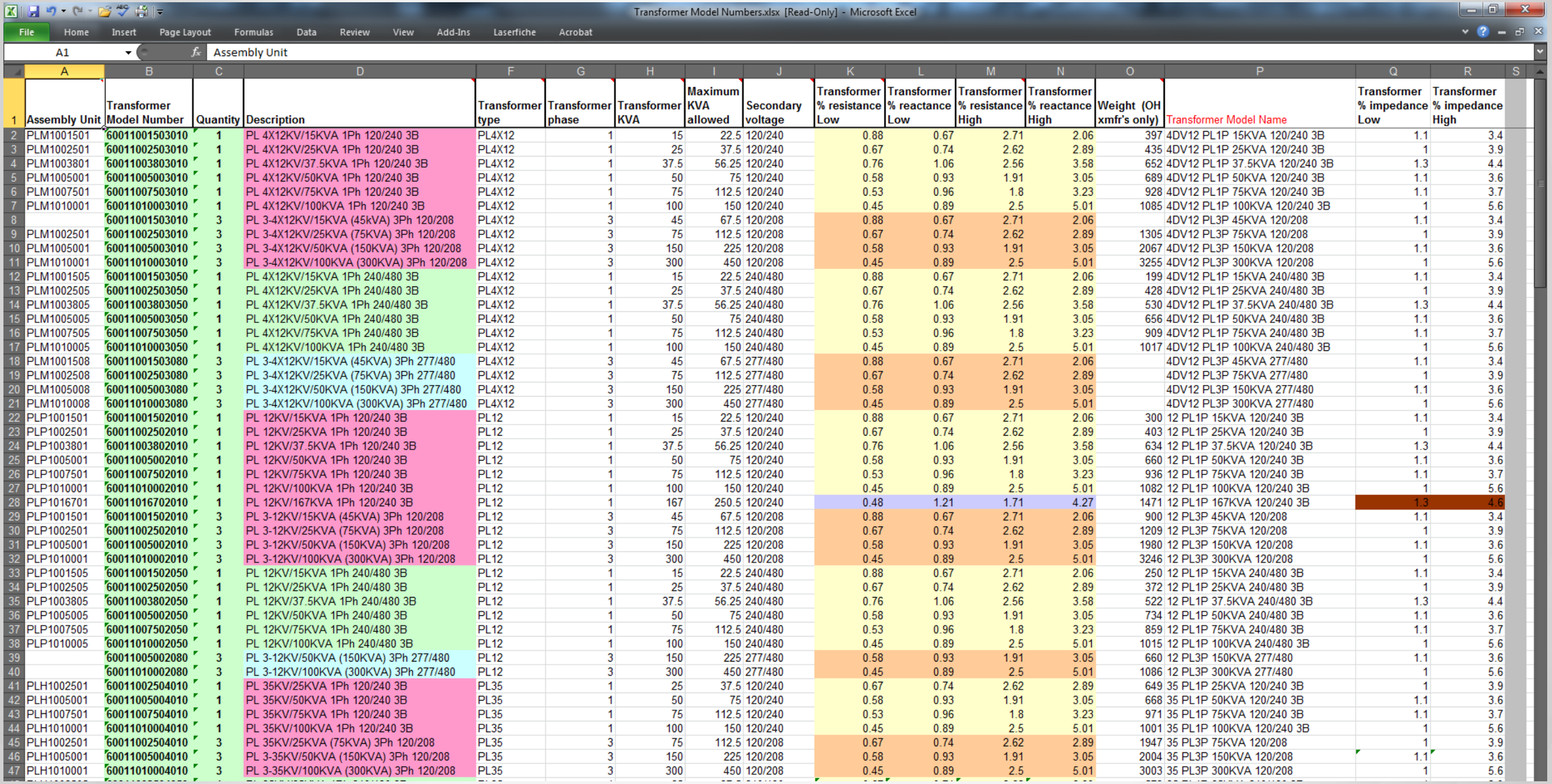
deleted fields:
PO_NBR, IMPEDANCE_LOSS, IMPEDANCE_CALC, all (6) TAPS fields, MOST fields to the right of TAPS
deleted records: STATUS =V, X

Status: Valid Status Codes:
S - In Stock
I - Installed
T - Installed (mpt not verified)

Status: Valid Status Codes:
P - Pending (returned & in row TY150)
L - Leased
U - Unusable
B - Borrowed
V - Sold
X - Junked/Retired

SEQ	XFMR_NBR	STOCK_NBR	kVA	TYPE	PHASE	MAKE	V-Prim	V-Sec	IMPED.	WT	D	W	H	GALL	MAP POINT	STATUS	ENTERED_DATE	PRIMARY_SWITCH	POLARITY
6	1002	60011002501010	25	PL	1	ALLIS CHALMERS	2400/4160Y	120/240	2.70	0	0	0	0	16	123152A	I	03/14/1986 00:00:00	NO	A
10	1008	60011002501010	25	PL	1	ALLIS CHALMERS	2400/4160Y	120/240	2.70	0	0	0	0	16	123152A	I	11/13/1986 00:00:00	NO	A
23	1020	60011002502010	25	PL	1	LINE MATERIAL	7200/12470Y	120/240	2.40	0	0	0	0	16	163348B	I	03/14/1986 00:00:00	NO	A
73	1073	60011002502010	25	PL	1	LINE MATERIAL	7200/12470Y	120/240	2.30	0	0	0	0	16	163347C	I	03/24/1986 00:00:00	NO	A
140	115	60011007502010	75	PL	1	WESTINGHOUSE	7200/12470Y	120/240	1.50	0	0	0	0	34	143176A	I	03/26/1986 00:00:00	NO	A
151	1165	60011005002010	50	PL	1	ALLIS CHALMERS	7200/12470Y	120/240	1.60	0	0	0	0	26	123478A	I	03/26/1986 00:00:00	NO	A
153	1167	60011005002010	50	PL	1	ALLIS CHALMERS	7200/12470Y	120/240	1.60	0	0	0	0	26	133042B	I	03/26/1986 00:00:00	NO	A
156	117	60011001501010	15	PL	1	WESTINGHOUSE	2400/4160Y	120/240	2.30	0	0	0	0	10	123162B	I	03/26/1986 00:00:00	NO	A
157	1172	60011005001010	50	PL	1	ALLIS CHALMERS	2400/4160Y	120/240	1.50	0	0	0	0	24	123025A	I	03/26/1986 00:00:00	NO	A
165	118	60011001001010	10	PL	1	WESTINGHOUSE	2400/4160Y	120/240	2.30	0	0	0	0	10	123162B	I	03/26/1986 00:00:00	NO	A
166	1180	60011005002010	50	PL	1	WESTINGHOUSE	7200/12470Y	120/240	1.50	670	0	0	0	28	123247J	I	01/16/1986 00:00:00	NO	A
171	1187	60011002502010	25	PL	1	LINE MATERIAL	7200/12470Y	120/240	2.30	0	0	0	0	16	153422D	I	03/26/1986 00:00:00	NO	A
188	1207	60011001502010	15	PL	1	WAGNER	7200/12470Y	120/240	2.50	0	0	0	0	11	133715A	I	03/26/1986 00:00:00	NO	A
205	1224	60011001502010	15	PL	1	LINE MATERIAL	7200/12470Y	120/240	1.70	325	17	19	39	12	123769B	I	12/21/1995 00:00:00	NO	A
239	1264	60011007501010	75	PL	1	LINE MATERIAL	2400/4160Y	120/240	1.40	910	0	0	0	40	123032M	I	09/06/1995 00:00:00	NO	A
247	1278	60011003702010	38	PL	1	WESTINGHOUSE	7200/12470Y	120/240	2.50	0	0	0	0	24	153413C	I	03/28/1986 00:00:00	NO	A
303	1346	60021005002011	50	PM	1	ALLIS CHALMERS	12470GRDY/7200	240/120	1.60	1,400	0	0	0	68	133665D	I	03/28/1986 00:00:00	NO	A
317	1362	60011007502010	75	PL	1	WESTINGHOUSE	7200/12470Y	120/240	1.50	975	0	0	0	34	113632D	I	03/28/1986 00:00:00	NO	A
318	1363	60011002502050	25	PL	1	WESTINGHOUSE	7200/12470Y	240/480	1.60	0	0	0	0	21	123739A	I	03/28/1986 00:00:00	NO	A
340	1397	60011002502050	25	PL	1	WESTINGHOUSE	7200/12470Y	240/480	1.60	0	0	0	0	21	142962Z	I	03/28/1986 00:00:00	NO	A
369	1436	60011002501010	25	PL	1	WAGNER	2400/4160Y	120/240	2.20	0	0	0	0	15	123152B	I	03/28/1986 00:00:00	NO	A

Case Study 2: Transformers (Convert to Models)



Transformer Model Numbers.xlsx [Read-Only] - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Add-Ins Laserfiche Acrobat

A1 Assembly Unit

	A	B	C	D	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Assembly Unit	Transformer Model Number	Quantity	Description	Transformer type	Transformer phase	Transformer KVA	Maximum KVA allowed	Secondary voltage	Transformer % resistance Low	Transformer % reactance Low	Transformer % resistance High	Transformer % reactance High	Weight (OH xmfr's only)	Transformer Model Name	Transformer % impedance Low	Transformer % impedance High
2	PLM1001501	60011001503010	1	PL 4X12KV/15KVA 1Ph 120/240 3B	PL4X12	1	15	22.5	120/240	0.88	0.67	2.71	2.06	397	4DV12 PL1P 15KVA 120/240 3B	1.1	3.4
3	PLM1002501	60011002503010	1	PL 4X12KV/25KVA 1Ph 120/240 3B	PL4X12	1	25	37.5	120/240	0.67	0.74	2.62	2.89	435	4DV12 PL1P 25KVA 120/240 3B	1	3.9
4	PLM1003801	60011003803010	1	PL 4X12KV/37.5KVA 1Ph 120/240 3B	PL4X12	1	37.5	56.25	120/240	0.76	1.06	2.56	3.58	652	4DV12 PL1P 37.5KVA 120/240 3B	1.3	4.4
5	PLM1005001	60011005003010	1	PL 4X12KV/50KVA 1Ph 120/240 3B	PL4X12	1	50	75	120/240	0.58	0.93	1.91	3.05	689	4DV12 PL1P 50KVA 120/240 3B	1.1	3.6
6	PLM1007501	60011007503010	1	PL 4X12KV/75KVA 1Ph 120/240 3B	PL4X12	1	75	112.5	120/240	0.53	0.96	1.8	3.23	928	4DV12 PL1P 75KVA 120/240 3B	1.1	3.7
7	PLM1010001	60011010003010	1	PL 4X12KV/100KVA 1Ph 120/240 3B	PL4X12	1	100	150	120/240	0.45	0.89	2.5	5.01	1085	4DV12 PL1P 100KVA 120/240 3B	1	5.6
8		60011001503010	3	PL 3-4X12KV/15KVA (45kVA) 3Ph 120/208	PL4X12	3	45	67.5	120/208	0.88	0.67	2.71	2.06		4DV12 PL3P 45KVA 120/208	1.1	3.4
9	PLM1002501	60011002503010	3	PL 3-4X12KV/25KVA (75KVA) 3Ph 120/208	PL4X12	3	75	112.5	120/208	0.67	0.74	2.62	2.89	1305	4DV12 PL3P 75KVA 120/208	1	3.9
10	PLM1005001	60011005003010	3	PL 3-4X12KV/50KVA (150KVA) 3Ph 120/208	PL4X12	3	150	225	120/208	0.58	0.93	1.91	3.05	2067	4DV12 PL3P 150KVA 120/208	1.1	3.6
11	PLM1010001	60011010003010	3	PL 3-4X12KV/100KVA (300KVA) 3Ph 120/208	PL4X12	3	300	450	120/208	0.45	0.89	2.5	5.01	3255	4DV12 PL3P 300KVA 120/208	1	5.6
12	PLM1001505	60011001503050	1	PL 4X12KV/15KVA 1Ph 240/480 3B	PL4X12	1	15	22.5	240/480	0.88	0.67	2.71	2.06	199	4DV12 PL1P 15KVA 240/480 3B	1.1	3.4
13	PLM1002505	60011002503050	1	PL 4X12KV/25KVA 1Ph 240/480 3B	PL4X12	1	25	37.5	240/480	0.67	0.74	2.62	2.89	428	4DV12 PL1P 25KVA 240/480 3B	1	3.9
14	PLM1003805	60011003803050	1	PL 4X12KV/37.5KVA 1Ph 240/480 3B	PL4X12	1	37.5	56.25	240/480	0.76	1.06	2.56	3.58	530	4DV12 PL1P 37.5KVA 240/480 3B	1.3	4.4
15	PLM1005005	60011005003050	1	PL 4X12KV/50KVA 1Ph 240/480 3B	PL4X12	1	50	75	240/480	0.58	0.93	1.91	3.05	656	4DV12 PL1P 50KVA 240/480 3B	1.1	3.6
16	PLM1007505	60011007503050	1	PL 4X12KV/75KVA 1Ph 240/480 3B	PL4X12	1	75	112.5	240/480	0.53	0.96	1.8	3.23	909	4DV12 PL1P 75KVA 240/480 3B	1.1	3.7
17	PLM1010005	60011010003050	1	PL 4X12KV/100KVA 1Ph 240/480 3B	PL4X12	1	100	150	240/480	0.45	0.89	2.5	5.01	1017	4DV12 PL1P 100KVA 240/480 3B	1	5.6
18	PLM1001508	60011001503080	3	PL 3-4X12KV/15KVA (45KVA) 3Ph 277/480	PL4X12	3	45	67.5	277/480	0.88	0.67	2.71	2.06		4DV12 PL3P 45KVA 277/480	1.1	3.4
19	PLM1002508	60011002503080	3	PL 3-4X12KV/25KVA (75KVA) 3Ph 277/480	PL4X12	3	75	112.5	277/480	0.67	0.74	2.62	2.89		4DV12 PL3P 75KVA 277/480	1	3.9
20	PLM1005008	60011005003080	3	PL 3-4X12KV/50KVA (150KVA) 3Ph 277/480	PL4X12	3	150	225	277/480	0.58	0.93	1.91	3.05		4DV12 PL3P 150KVA 277/480	1.1	3.6
21	PLM1010008	60011010003080	3	PL 3-4X12KV/100KVA (300KVA) 3Ph 277/480	PL4X12	3	300	450	277/480	0.45	0.89	2.5	5.01		4DV12 PL3P 300KVA 277/480	1	5.6
22	PLP1001501	60011001502010	1	PL 12KV/15KVA 1Ph 120/240 3B	PL12	1	15	22.5	120/240	0.88	0.67	2.71	2.06	300	12 PL1P 15KVA 120/240 3B	1.1	3.4
23	PLP1002501	60011002502010	1	PL 12KV/25KVA 1Ph 120/240 3B	PL12	1	25	37.5	120/240	0.67	0.74	2.62	2.89	403	12 PL1P 25KVA 120/240 3B	1	3.9
24	PLP1003801	60011003802010	1	PL 12KV/37.5KVA 1Ph 120/240 3B	PL12	1	37.5	56.25	120/240	0.76	1.06	2.56	3.58	634	12 PL1P 37.5KVA 120/240 3B	1.3	4.4
25	PLP1005001	60011005002010	1	PL 12KV/50KVA 1Ph 120/240 3B	PL12	1	50	75	120/240	0.58	0.93	1.91	3.05	660	12 PL1P 50KVA 120/240 3B	1.1	3.6
26	PLP1007501	60011007502010	1	PL 12KV/75KVA 1Ph 120/240 3B	PL12	1	75	112.5	120/240	0.53	0.96	1.8	3.23	936	12 PL1P 75KVA 120/240 3B	1.1	3.7
27	PLP1010001	60011010002010	1	PL 12KV/100KVA 1Ph 120/240 3B	PL12	1	100	150	120/240	0.45	0.89	2.5	5.01	1082	12 PL1P 100KVA 120/240 3B	1	5.6
28	PLP1016701	60011016702010	1	PL 12KV/167KVA 1Ph 120/240 3B	PL12	1	167	250.5	120/240	0.48	1.21	1.71	4.27	1471	12 PL1P 167KVA 120/240 3B	1.3	4.6
29	PLP1001501	60011001502010	3	PL 3-12KV/15KVA (45KVA) 3Ph 120/208	PL12	3	45	67.5	120/208	0.88	0.67	2.71	2.06	900	12 PL3P 45KVA 120/208	1.1	3.4
30	PLP1002501	60011002502010	3	PL 3-12KV/25KVA (75KVA) 3Ph 120/208	PL12	3	75	112.5	120/208	0.67	0.74	2.62	2.89	1209	12 PL3P 75KVA 120/208	1	3.9
31	PLP1005001	60011005002010	3	PL 3-12KV/50KVA (150KVA) 3Ph 120/208	PL12	3	150	225	120/208	0.58	0.93	1.91	3.05	1980	12 PL3P 150KVA 120/208	1.1	3.6
32	PLP1010001	60011010002010	3	PL 3-12KV/100KVA (300KVA) 3Ph 120/208	PL12	3	300	450	120/208	0.45	0.89	2.5	5.01	3246	12 PL3P 300KVA 120/208	1	5.6
33	PLP1001505	60011001502050	1	PL 12KV/15KVA 1Ph 240/480 3B	PL12	1	15	22.5	240/480	0.88	0.67	2.71	2.06	250	12 PL1P 15KVA 240/480 3B	1.1	3.4
34	PLP1002505	60011002502050	1	PL 12KV/25KVA 1Ph 240/480 3B	PL12	1	25	37.5	240/480	0.67	0.74	2.62	2.89	372	12 PL1P 25KVA 240/480 3B	1	3.9
35	PLP1003805	60011003802050	1	PL 12KV/37.5KVA 1Ph 240/480 3B	PL12	1	37.5	56.25	240/480	0.76	1.06	2.56	3.58	522	12 PL1P 37.5KVA 240/480 3B	1.3	4.4
36	PLP1005005	60011005002050	1	PL 12KV/50KVA 1Ph 240/480 3B	PL12	1	50	75	240/480	0.58	0.93	1.91	3.05	734	12 PL1P 50KVA 240/480 3B	1.1	3.6
37	PLP1007505	60011007502050	1	PL 12KV/75KVA 1Ph 240/480 3B	PL12	1	75	112.5	240/480	0.53	0.96	1.8	3.23	859	12 PL1P 75KVA 240/480 3B	1.1	3.7
38	PLP1010005	60011010002050	1	PL 12KV/100KVA 1Ph 240/480 3B	PL12	1	100	150	240/480	0.45	0.89	2.5	5.01	1015	12 PL1P 100KVA 240/480 3B	1	5.6
39		60011005002080	3	PL 3-12KV/50KVA (150KVA) 3Ph 277/480	PL12	3	150	225	277/480	0.58	0.93	1.91	3.05	660	12 PL3P 150KVA 277/480	1.1	3.6
40		60011010002080	3	PL 3-12KV/100KVA (300KVA) 3Ph 277/480	PL12	3	300	450	277/480	0.45	0.89	2.5	5.01	1086	12 PL3P 300KVA 277/480	1	5.6
41	PLH1002501	60011002504010	1	PL 35KV/25KVA 1Ph 120/240 3B	PL35	1	25	37.5	120/240	0.67	0.74	2.62	2.89	649	35 PL1P 25KVA 120/240 3B	1	3.9
42	PLH1005001	60011005004010	1	PL 35KV/50KVA 1Ph 120/240 3B	PL35	1	50	75	120/240	0.58	0.93	1.91	3.05	668	35 PL1P 50KVA 120/240 3B	1.1	3.6
43	PLH1007501	60011007504010	1	PL 35KV/75KVA 1Ph 120/240 3B	PL35	1	75	112.5	120/240	0.53	0.96	1.8	3.23	971	35 PL1P 75KVA 120/240 3B	1.1	3.7
44	PLH1010001	60011010004010	1	PL 35KV/100KVA 1Ph 120/240 3B	PL35	1	100	150	120/240	0.45	0.89	2.5	5.01	1001	35 PL1P 100KVA 120/240 3B	1	5.6
45	PLH1002501	60011002504010	3	PL 35KV/25KVA (75KVA) 3Ph 120/208	PL35	3	75	112.5	120/208	0.67	0.74	2.62	2.89	1947	35 PL3P 75KVA 120/208	1	3.9
46	PLH1005001	60011005004010	3	PL 3-35KV/50KVA (150KVA) 3Ph 120/208	PL35	3	150	225	120/208	0.58	0.93	1.91	3.05	2004	35 PL3P 150KVA 120/208	1.1	3.6
47	PLH1010001	60011010004010	3	PL 3-35KV/100KVA (300KVA) 3Ph 120/208	PL35	3	300	450	120/208	0.45	0.89	2.5	5.01	3003	35 PL3P 300KVA 120/208	1	5.6

Case Study 2: Transformers (AUD Industry Models)

Models | Attributes | Styles | Details | Callouts

Transformer data:

Model Name	Description	Model Grou	Structure Type	Transformer Type	Phase Count	Kva (kVA)	Max Kva (kVA)	Voltage	Voltage 2	Percent Resistance Low	Percent Reactance Low	Weight (lb)
12_PL1P_75KVA_240/480_3B	PL 12KV/75KVA 1Ph 240/480 3B	PL12-1P	overhead	Pole Mount	1	75	112.5	240/480 V	<null>	0.53	0.96	859
12_PL3P_150KVA_120/208	PL 3-12KV/50KVA (150KVA) 3Ph 120/208	PL12-3P	overhead	Pole Mount	3	150	225	120/208Y V	<null>	0.58	0.93	1,980
12_PL3P_150KVA_277/480	PL 3-12KV/50KVA (150KVA) 3Ph 277/480	PL12-3P	overhead	Pole Mount	3	150	225	277/480Y V	<null>	0.58	0.93	660
12_PL3P_300KVA_120/208	PL 3-12KV/100KVA (300KVA) 3Ph 120/208	PL12-3P	overhead	Pole Mount	3	300	450	120/208Y V	<null>	0.45	0.89	3,246
12_PL3P_300KVA_277/480	PL 3-12KV/100KVA (300KVA) 3Ph 277/480	PL12-3P	overhead	Pole Mount	3	300	450	277/480Y V	<null>	0.45	0.89	1,086
12_PL3P_45KVA_120/208	PL 3-12KV/15KVA (45KVA) 3Ph 120/208	PL12-3P	overhead	Pole Mount	3	45	67.5	120/208Y V	<null>	0.88	0.67	900
12_PL3P_75KVA_120/208	PL 3-12KV/25KVA (75KVA) 3Ph 120/208	PL12-3P	overhead	Pole Mount	3	75	112.5	120/208Y V	<null>	0.67	0.74	1,209
12_PM1P_100KVA_120/240_3B	PM 12KV/100KVA 1Ph 120/240 3B	PM12-1P	above ground	Pad Mount	1	100	125	120/240 V	<null>	0.58	1.16	0
12_PM1P_100KVA_120/240_4B	PM 12KV/100KVA 1Ph 120/240 4B	PM12-1P	above ground	Pad Mount	1	100	125	120/240 V	<null>	0.58	1.16	0
12_PM1P_167KVA_120/240_3B	PM 12KV/167KVA 1Ph 120/240 3B	PM12-1P	above ground	Pad Mount	1	167	208.75	120/240 V	<null>	0.45	1.11	0
12_PM1P_167KVA_120/240_4B	PM 12KV/167KVA 1Ph 120/240 4B	PM12-1P	above ground	Pad Mount	1	167	208.75	120/240 V	<null>	0.45	1.11	0

Case Study 2: Transformers (GIS Data, Parent/Child)

Transformer - MLP_ELECTRIC_D

Network Tracer Function

General | Table

unknown Feature ID: 130570 Structure: 32716

Transformer Type: Pole Mount Orientation: 0.000

State: active Circuit:

Primary Voltage: 12 KV

Secondary Voltage: Unknown Voltage

Phase: ABC

Total kVA: 75.00

Status: Installed (In-Service, Existing)

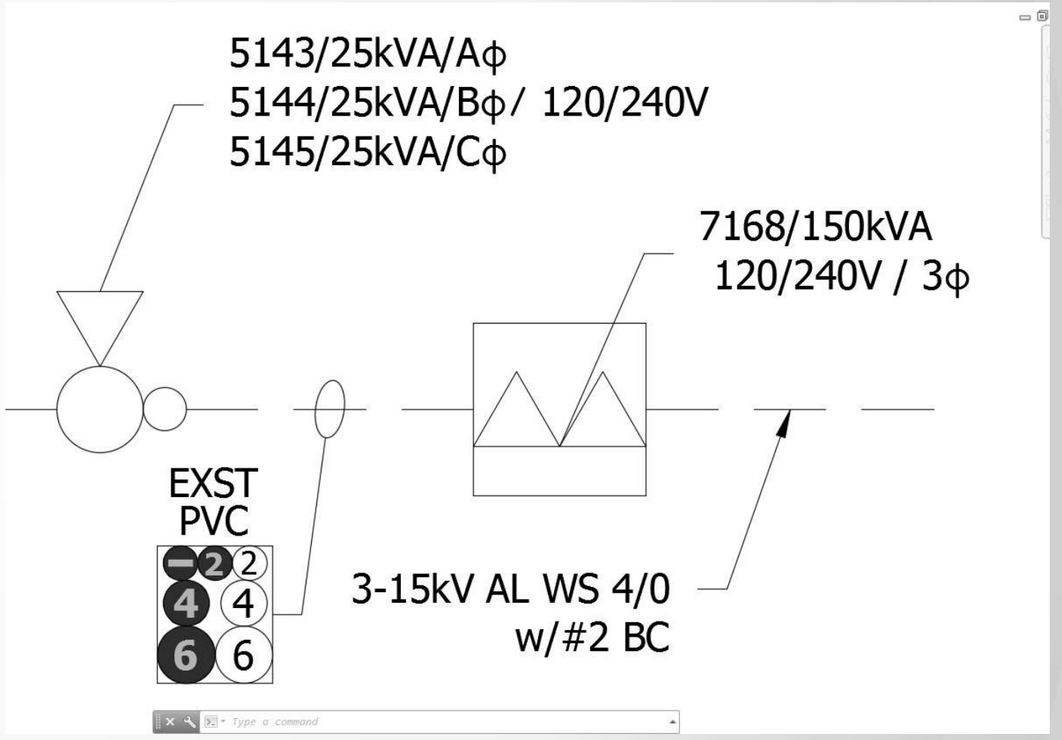
Connection Electric

Record 2 of 1419 (Filter active)

Transformer Unit

Form | Table

Vi	Feature ID	Parent Tran	Description	Transformer Typ	Transf	Date Install	Project ID	Activity ID
...	134366	130570	POLE MOUNT TR	Pole Mount	4429	1/1/2000		
	134367	130570	POLE MOUNT	Pole Mount	4431	1/1/2000		
	134368	130570	POLE MOUNT	Pole Mount	4430	1/1/2000		



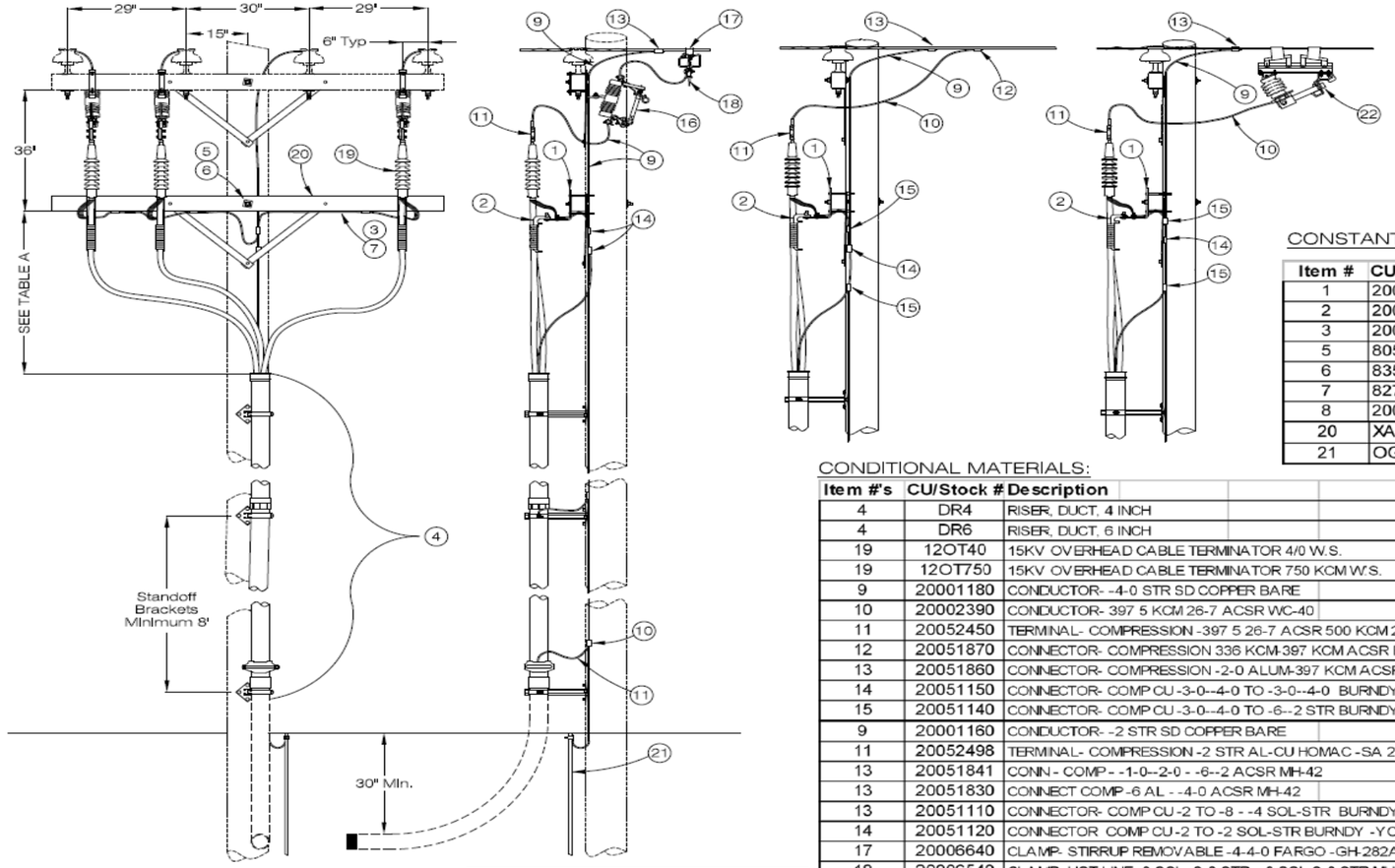
Case Study 3: Riser (Construction Standard)

REVISION: 2	DATE: 5/12/2015
REVISED BY:	
DRAWN BY:	

(#) = Material Item #

SECTION SUPVR:	
OPS. MGR:	
CHIEF ENGR:	

ADD NOTES HERE:



CONSTANT MATERIALS:

Item #	CU/Stock #	Description	Qty
1	20035505	BRACKET- CROSSARM TERMINATION MOUNTING 3M -MB-1	3
2	20035500	SUPPORT, CABLE 75" - 2" ALUMIFORM #CS-820	3
3	20001160	CONDUCTOR- -2 STR SD COPPER BARE	15
5	805514	BOLT, MACHINE 5/8 X 14	1
6	835022	WASHER, 2 1/4" SQUARE 5/8"	2
7	827001	STAPLE, GROUND WIRE	10
8	20051120	CONNECTOR, COMPRESSION CU #2 TO #2 SOL/STR BURNDY #YC2C2	1
20	XA10L	CROSSARM, WOOD, 10 FT LIGHT	1
21	OGR1	GROUND WIRE AND ROD ASSEMBLY, OHD	1

CONDITIONAL MATERIALS:

Item #'s	CU/Stock #	Description	Qty	Rule
4	DR4	RISER, DUCT, 4 INCH	1	IF CONNECTING TO 4 IN CONDUIT
4	DR6	RISER, DUCT, 6 INCH	1	IF CONNECTING TO 6 IN CONDUIT
19	12OT40	15KV OVERHEAD CABLE TERMINATOR 4/0 W.S.	1	IF UNDERGROUND CABLE IS 4/0
19	12OT750	15KV OVERHEAD CABLE TERMINATOR 750 KCM W.S.	1	IF UNDERGROUND CABLE IS 750
9	20001180	CONDUCTOR- -4-0 STR SD COPPER BARE	50	IF OHD WIRE IS 336 OR 397
10	20002390	CONDUCTOR- 397 5 KCM 26-7 ACSR WC-40	25	IF OHD WIRE IS 336 OR 397
11	20052450	TERMINAL- COMPRESSION -397 5 26-7 ACSR 500 KCM 2 HOLE MH-47	3	IF OHD WIRE IS 336 OR 397
12	20051870	CONNECTOR- COMPRESSION 336 KCM-397 KCM ACSR BLK WR 885 MH-42	3	IF OHD WIRE IS 336 OR 397
13	20051860	CONNECTOR- COMPRESSION -2-0 ALUM-397 KCM ACSR WR 835 MH-42	1	IF OHD WIRE IS 336 OR 397
14	20051150	CONNECTOR- COMP CU -3-0--4-0 TO -3-0--4-0 BURNDY -YC28C28	1	IF OHD WIRE IS 336 OR 397 and UG CABLE NEUTRAL IS 4/0
15	20051140	CONNECTOR- COMP CU -3-0--4-0 TO -6--2 STR BURNDY -YC28C2	4	IF OHD WIRE IS 336 OR 397 and UG CABLE NEUTRAL IS 4/0
9	20001160	CONDUCTOR- -2 STR SD COPPER BARE	75	IF OHD WIRE IS LESS THAN 336
11	20052498	TERMINAL- COMPRESSION -2 STR AL-CU HOMAC -SA 2NTN	3	IF OHD WIRE IS LESS THAN 336
13	20051841	CONN - COMP - -1-0--2-0 - -6--2 ACSR MH-42	1	IF OHD WIRE IS LESS THAN 4/0
13	20051830	CONNECT COMP -6 AL - -4-0 ACSR MH-42	1	IF OHD WIRE IS 4/0
13	20051110	CONNECTOR- COMP CU -2 TO -8 - -4 SOL-STR BURNDY YC2C4	1	IF OHD WIRE IS #6 or #4 Cu
14	20051120	CONNECTOR COMP CU -2 TO -2 SOL-STR BURNDY -YC2C2	2	IF OHD WIRE IS LESS THAN 336 AND UG CABLE NEUTRAL IS #2
17	20006640	CLAMP- STIRRUP REMOVABLE -4-4-0 FARGO -GH-282AL	3	IF OHD WIRE IS LESS THAN 336
18	20006540	CLAMP- HOT LINE -8 SOL- 2-0 STR- -8 SOL-2-0 STR MH-19	3	IF OHD WIRE IS LESS THAN 336

TABLE A	
750 kCM	60 INCHES
4/0	48 INCHES

OPTIONAL MATERIALS:

16	12_CUTOUT_200A	CUTOUT, 15KV 200A UNIV. FUSE TUBE MH-28	3	IF FUSED CUTOUTS ARE REQUIRED
22	12_SW_LINE_600A	SWITCH, 12KV 600A 1 PHASE, LINE TAP MS-25	3	IF 600A DISCONNECT SWITCH IS CALLED FOR

MUNICIPALITY OF ANCHORAGE, ALASKA — MUNICIPAL LIGHT & POWER

15kV 3-PHASE RISER

SHEET 1 OF 1
CONSTRUCTION STANDARD
12_RISER_3PH

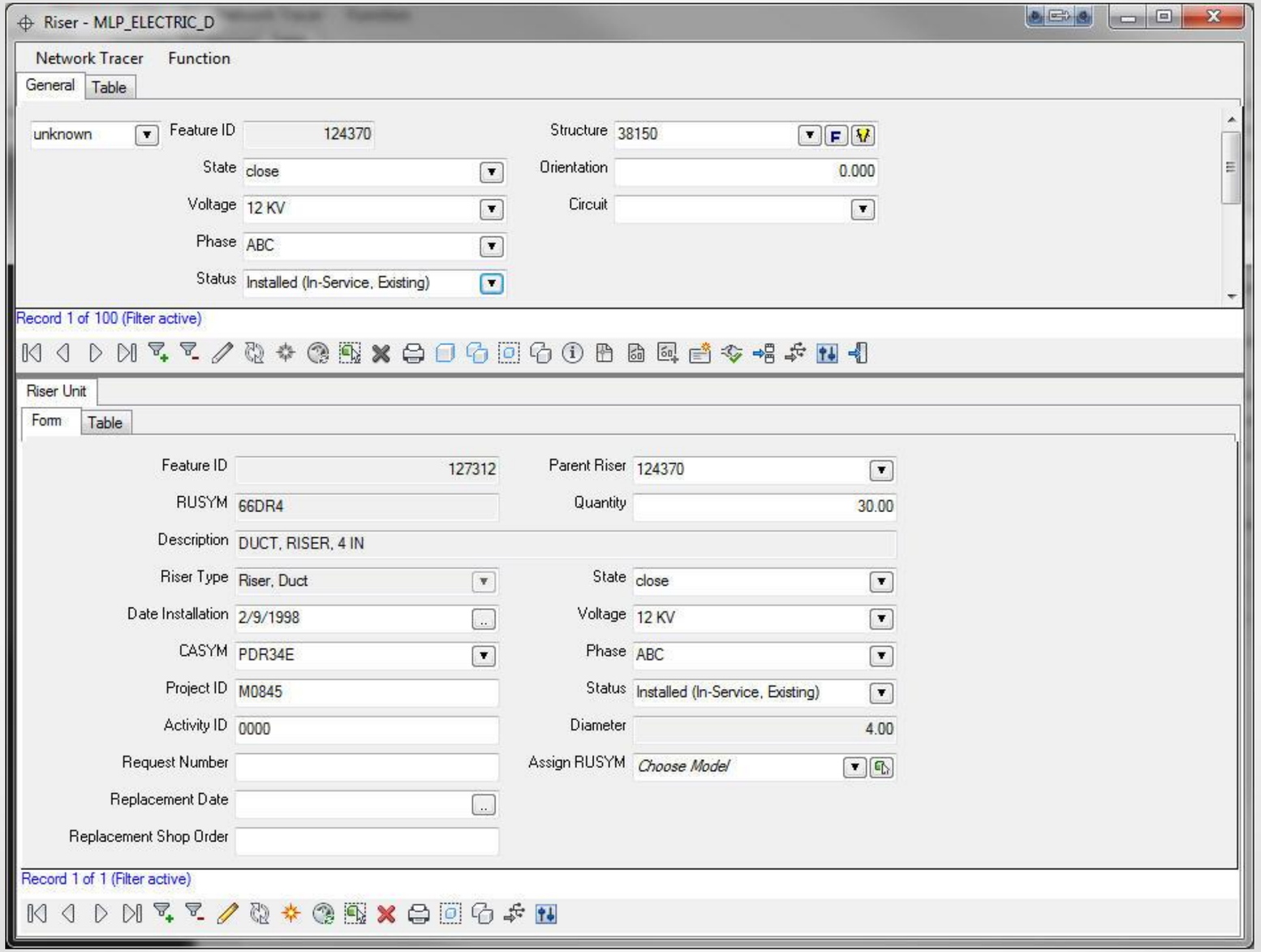
Case Study 3: Riser (AUD Industry Models)

Models | Attributes | Styles | Details | Callouts

Riser data:

Model Name	Description	CU	Model Grou	Riser Type	Riser Attachment	Phase Coun	Nominal Voltage	CASYM	RUSYM
12RISER3PH_A_4	12KV Riser, 4 Inch, 3 Phase Hard Connection	12RISER3PH_A	primary	primary	crossarm	3	12 KV	12RISER3PH_A	67-12RISER3PH_A
12RISER3PH_A_6	12KV Riser, 6 Inch, 3 Phase Hard Connection	12RISER3PH_A	primary	primary	crossarm	3	12 KV	12RISER3PH_A	67-12RISER3PH_A
12RISER3PH_B_4	12KV Riser, 4 Inch, 3 Phase Bridge Switch	12RISER3PH_B	primary	primary	crossarm	3	12 KV	12RISER3PH_B	67-12RISER3PH_B
12RISER3PH_B_6	12KV Riser, 6 Inch, 3 Phase Bridge Switch	12RISER3PH_B	primary	primary	crossarm	3	12 KV	12RISER3PH_B	67-12RISER3PH_B
12RISER3PH_C_4	12KV Riser, 4 Inch, 3 Phase With Cutout	12RISER3PH_C	primary	primary	crossarm	3	12 KV	12RISER3PH_C	67-12RISER3PH_C
12RISER3PH_C_6	12KV Riser, 6 Inch, 3 Phase With Cutout	12RISER3PH_C	primary	primary	crossarm	3	12 KV	12RISER3PH_C	67-12RISER3PH_C

Case Study 3: Riser (GIS Data)



Case Study 4: Conductors (AUD Industry Models)

Models | Attributes | Styles | Details | Callouts

Conductor data:

Model Name	Description	Model Group	Phase Count	Neutral Model Name	Outer Diar	Ampacity (A)	Resistanc	Reactance	Min Bend Rad	Max Eyepull (lbf)	Max Grippull (lbf)	RUSYM
397.5_ACSR_IBIS_TRAN	Wire, 397.5 ACSR "IBIS", 3ph Transmission	transmission	3	<null>	0.783	590	0.0525	0.0835	9	3,180	1,000	56-397.5_ACSR_IBIS_TRAN
795_ACSR_DRAKE_TRAN	Wire, 795 ACSR "DRAKE", 3ph Transmission	transmission	3	<null>	1.108	907	0.0263	0.0756	13	6,360	1,000	56-795_ACSR_DRAKE_TRAN
1_0_ACSR_RAVEN_1ph_DIST	Wire, 1/0 ACSR "RAVEN", 1ph	primary	2	1_0_ACSR_RAVEN_N	0.398	230	0.2161	0.1163	5	845	845	65-1_0_ACSR_RAVEN_1ph_DIST
1_0_ACSR_RAVEN_3ph_DIST	Wire, 1/0 ACSR "RAVEN", 3ph	primary	3	1_0_ACSR_RAVEN_N	0.398	230	0.2161	0.1163	5	845	845	65-1_0_ACSR_RAVEN_3ph_DIST
1_0_ACSR_RAVEN_N	Wire, 1/0 ACSR "RAVEN", Neutral	neutral	0	<null>	0.398	230	0.2161	0.1163	5	845	845	65-1_0_ACSR_RAVEN_N
397.5_ACSR_IBIS_DIST	Wire, 397.5 ACSR "IBIS", 3ph Distribution	primary	3	397.5_ACSR_IBIS_N	0.783	590	0.0525	0.0835	9	3,180	1,000	65-397.5_ACSR_IBIS_DIST
397.5_ACSR_IBIS_N	Wire, 397.5 ACSR "IBIS", Neutral	neutral	0	<null>	0.783	590	0.0525	0.0835	9	3,180	1,000	65-397.5_ACSR_IBIS_N
600_10_AL_QUAD_OH_DIST	Wire, 1/0 QUAD "COSTENA", Distribution Secondary	secondary	3	<null>	1.33	215	0.22	0.031	16	2,534	1,000	<null>
600_10_AL_TPX_OH_DIST	Wire, 1/0 TPX "RANELLA", Distribution Secondary	secondary	3	<null>	1	235	0.105	0.029	12	1,690	1,000	<null>
600_2_AL_QUAD_OH_DIST	Wire, #2 QUAD "PALOMINO", Distribution Secondary	secondary	3	<null>	1.03	155	0.336	0.032	12	1,593	1,000	<null>
600_2_AL_TPX_OH_DIST	Wire, #2 TPX "COCKLE", Distribution Secondary	secondary	3	<null>	0.77	170	0.336	0.032	9	1,062	1,000	<null>

Case Study 4: Conductors (GIS Data, Parent/Child)

Conductor - MLP_ELECTRIC_D

Network Tracer | Function

General | Table

unknown | Feature ID: 230448 | Circuit: S20F6

Voltage: 12 KV | Actual Length (CAD): 244.4523759

Phase: ABC | Measured Length: 244.0000000

Status: Installed (In-Service, Existing) | Wire Type: CABLE, UG

Conductor Type: Primary Conductor

Set as Start-Feature for Find Feeders

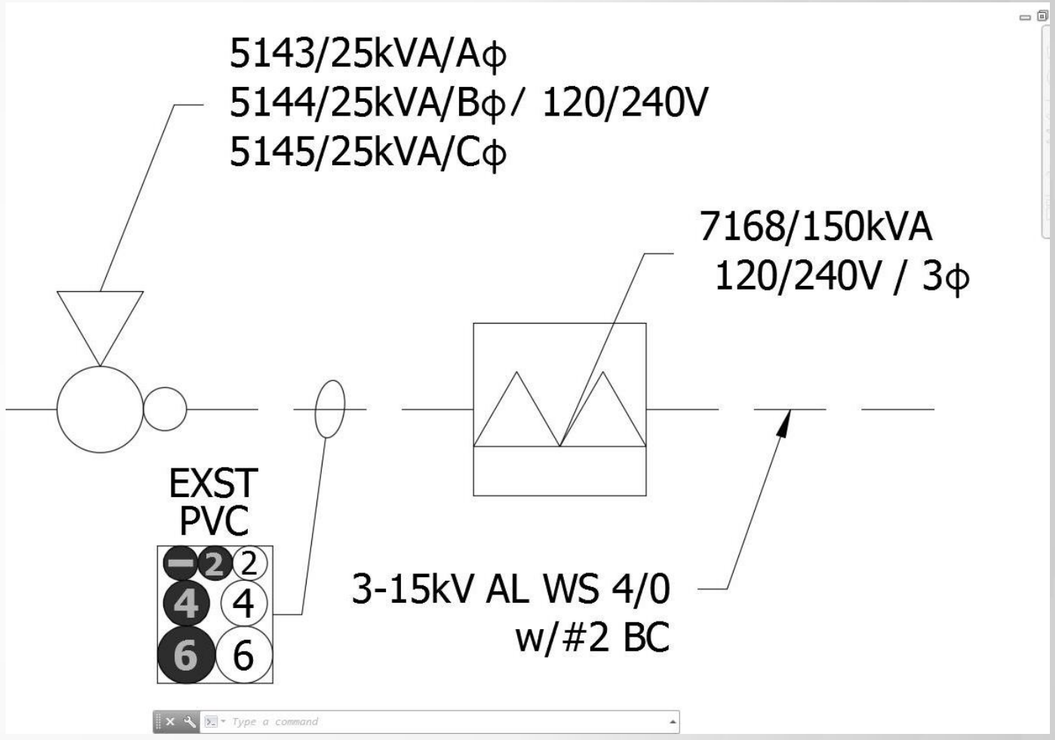
Record 1 of 100 (Filter active)

Conductor Unit

Form | Table

Feature	CASYM	Parent Con	RUSYM	Description	Quantity	State	Volta
290812	PCA750	230448	67CAP750	CABLE, UG, AL, 15 KV, 750 KCM	729.50	close	12 KV
290813	PCCN40	230448	67WCB40	WIRE, UG, CU, X-VOLTAGE, #4/0	243.20	close	12 KV

Record 1 of 2 (Filter active)



Chapter 6: Intelligent Design, Rules

- Current AUD 2009 Solution
- AUD 2016 Project Goals
- Proposed AUD 2016 Architecture
- Core AUD 2016 and Map3D Integration
- AUD 2016 Industry Model Issues
  - Case Studies (4)
- **Intelligent Design, Rules**
- Material Catalog Relationship
- Lessons Learned/Considerations
- 3D Design with AUD 2016, Recap, and Infraworks

“Intelligent Design” Pad Rules

- If no equipment on pad, order steel plate
- Number of incoming ports cannot exceed what pad allows
- If “Is Stacked” = true, set Z value to (-1)* height of pad
- If 1-Phase 25-250kVA Transformer or 15kV 1 1-Phase Switch cabinet, optional composite pad not recommended

“Intelligent Design” Transformer Rules

- Voltage must match connected conductors
- Transformer must be contained by a structure
- If transformer contained by “existing” vault less than length 14ft and width 8ft, raise a notice
- If dimensions of vault not available raise a notice

“Intelligent Design” Riser Rules

- If a non-primary riser (secondary, lighting, comm) is connected to a switch or cutout, raise an alert
- For primary conductor in the riser, order termination quantity times primary conductor phase count
- Match riser conduit to connecting conduit size
- If connecting conduit is 2 inches or less, use 2 inch riser

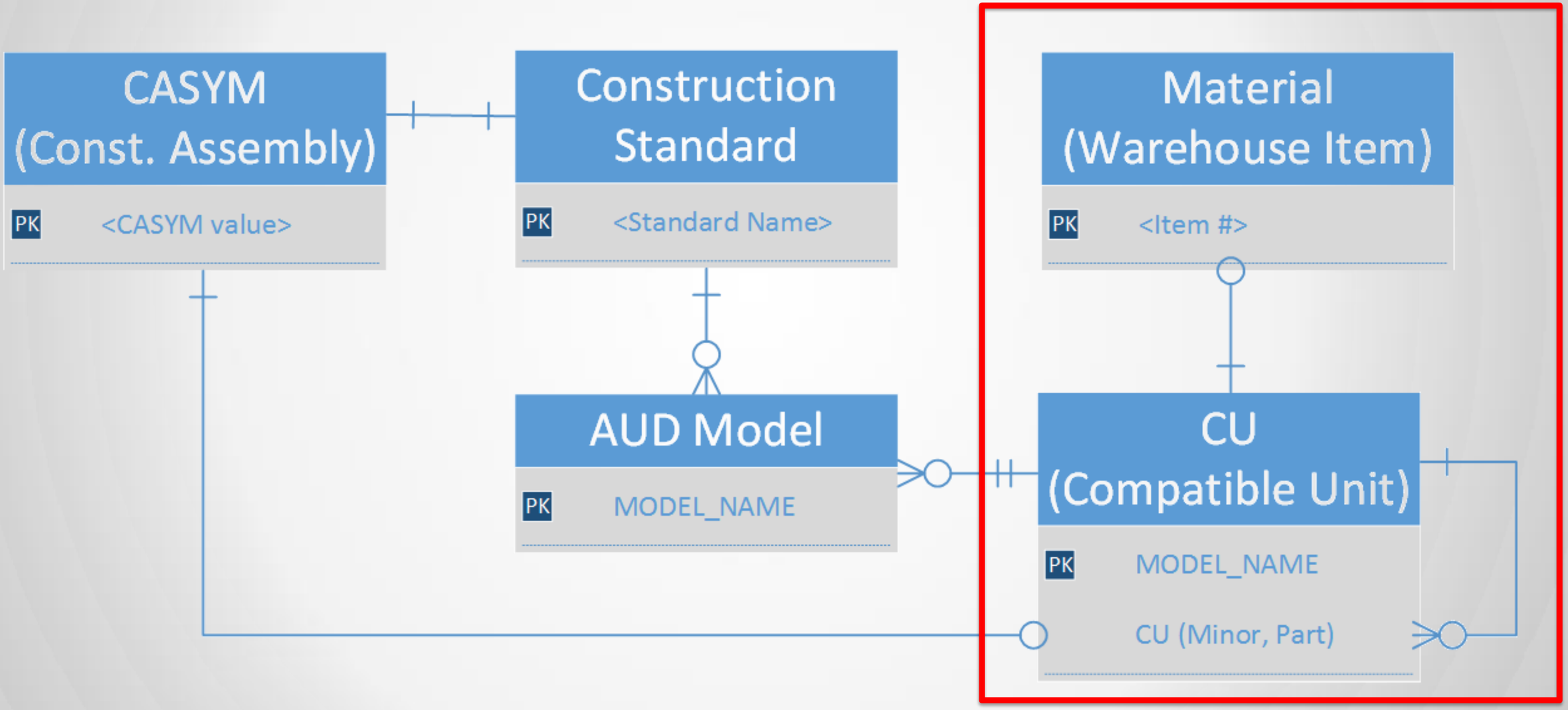
“Intelligent Design” Conductor Rules

- Apply cable pulling tension and voltage drop rules
- Validate that the voltage of conductor matches voltage of connected device for primary voltages only
- Order appropriate elbows and terminations (see table)
- Sizing per voltage drop rules

Chapter 7: Material Catalog Relationship

- Current AUD 2009 Solution
- AUD 2016 Project Goals
- Proposed AUD 2016 Architecture
- Core AUD 2016 and Map3D Integration
- AUD 2016 Industry Model Issues
  - Case Studies (4)
- Intelligent Design, Rules
- **Material Catalog Relationship**
- Lessons Learned/Considerations
- 3D Design with AUD 2016, Recap, and Infraworks

AUD 2016 Material Catalog Relationship



Material Catalog, Major CU, Minor CU, Part CU

Major CU — Assigned to: Cluff

Assembly	VAULT6X10_2HOLE	Description	VAULT, UG, 6 W X 10 L X 7 H FT, 2-MANHOLE					
Uom	EA	Category	Vault					
Labor Hrs:	USL	28	DIF	35	HOT	35	Cost	

Constant Materials:

	Item #	Stock #	Description	Qty
	3	20042235	VAULT- 6 X 10 X 7 FT 2 MANHOLE MV-2	1
	4	20042510	RACK-CABLE NON-METALLIC H DUTY U	10
	5	20042520	ARM-SUPPORT NON-METALLIC 14IN U	10

Item #	RUSYM	Description	Qty
1	66VAULT6X10_2HOLE	VAULT, UG, 6 W X 10 L X 7 H FT, 2-MANHO	1

Minor CU

	CASYM	Description	Qty
1	VAULTMANHOLE	Vault Manhole Assembly	1
2	VAULTGROUND	Vault Ground Loop Assembly	1

Conditional Materials:

	Minor CU	Stock #	Description	Qty	Rule
(Selected by Rules	VAULTMANHOLE		Vault Manhole Assembly	1	IF Equipment Base not on Vault
		20036640	TAPE- ARC AND FIREPROOF 3 IN X 20 FT SC	10	IF Primary Voltage 750 MCM OR 1000MCM 3 Phase Circuit In Vault (per circuit)
		20036640	TAPE- ARC AND FIREPROOF 3 IN X 20 FT SC	6	IF Primary Voltage 4/0 OR 1/0 3 Phase Circuit In Vault (per circuit)
		20036650	TAPE-ARC AND FIREPROOF 1 1-2IN X 20 FT	5	IF Primary Voltage 4/0 OR 1/0 1 Phase Circuit In Vault (per circuit)

Optional Materials:

Stock #	Description	Qty	Rule
20042340	Ring. 42 In I.D. X 4 In Manhole Extension U.V. #4204	0	
20042345	Ring. 42 In I.D. X 6 In Manhole Extension U.V. #4206	0	
20042350	Ring. 42 In I.D. X 12 In Manhole Extension	0	
20042355	Ring. 42 In I.D. X 24 In Manhole Extension	0	

Chapter 8: Lessons Learned

- Current AUD 2009 Solution
- AUD 2016 Project Goals
- Proposed AUD 2016 Architecture
- Core AUD 2016 and Map3D Integration
- AUD 2016 Industry Model Issues
  - Case Studies (4)
- Intelligent Design, Rules
- Material Catalog Relationship
- **Lessons Learned/Considerations**
- 3D Design with AUD 2016, Recap, and Infraworks

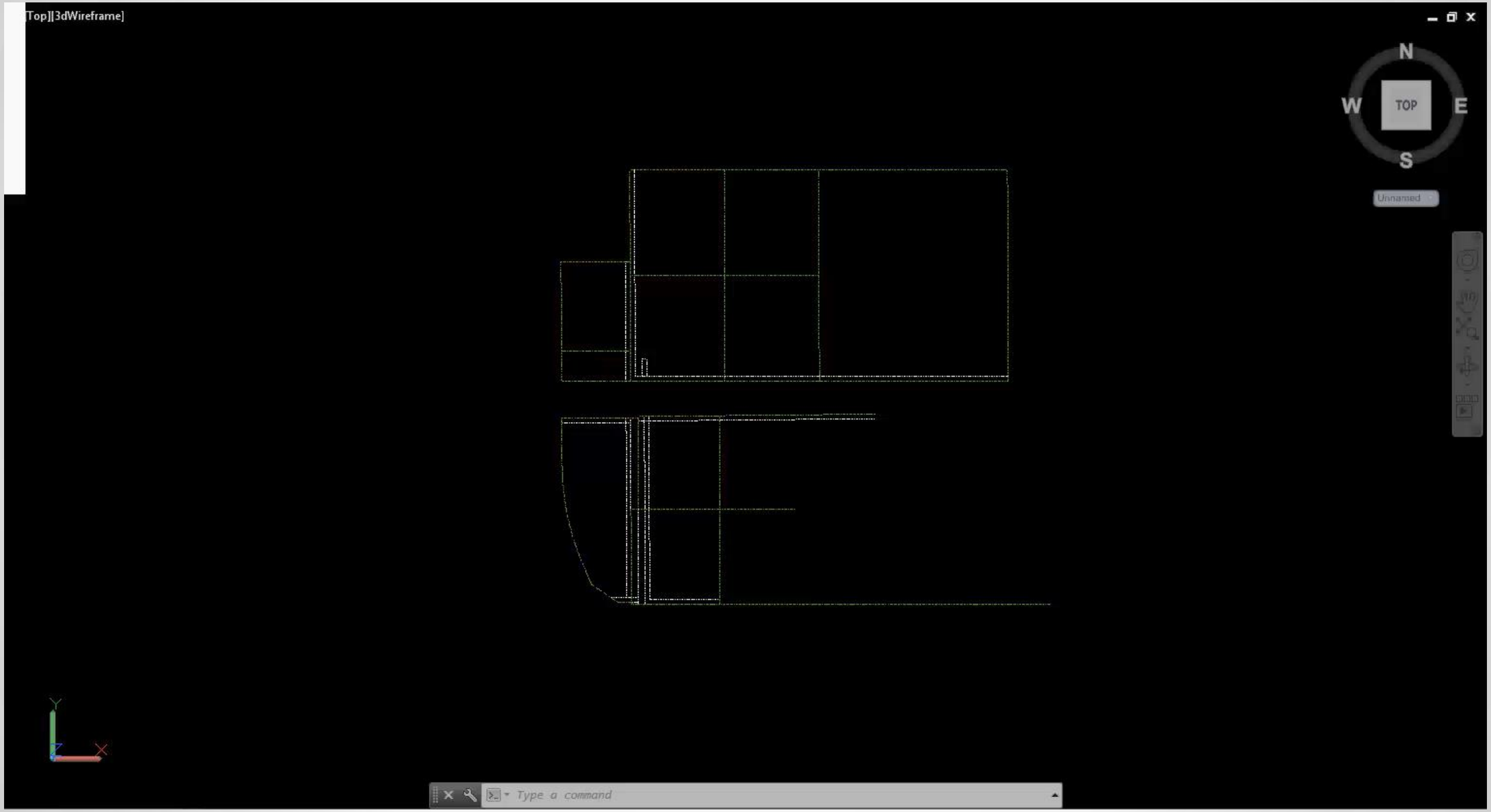
AUD 2016 Lessons Learned/Considerations

- Do not try to complete Industry Models early
- Iterative approach to completing AUD 2016 models
- Recommend re-creating construction standards
- Recommend modeling in AUD to match GIS, integration and DX implications
- Resource planning, significant internal project resources
- Excellent time to consider how and why you do things

Chapter 9: 3D Design with AUD 2016, Recap and Infraworks

- Current AUD 2009 Solution
- AUD 2016 Project Goals
- Proposed AUD 2016 Architecture
- Core AUD 2016 and Map3D Integration
- AUD 2016 Industry Model Issues
  - Case Studies (4)
- Intelligent Design, Rules
- Material Catalog Relationship
- Lessons Learned/Considerations
- **3D Design with AUD 2016, Recap, and Infraworks**

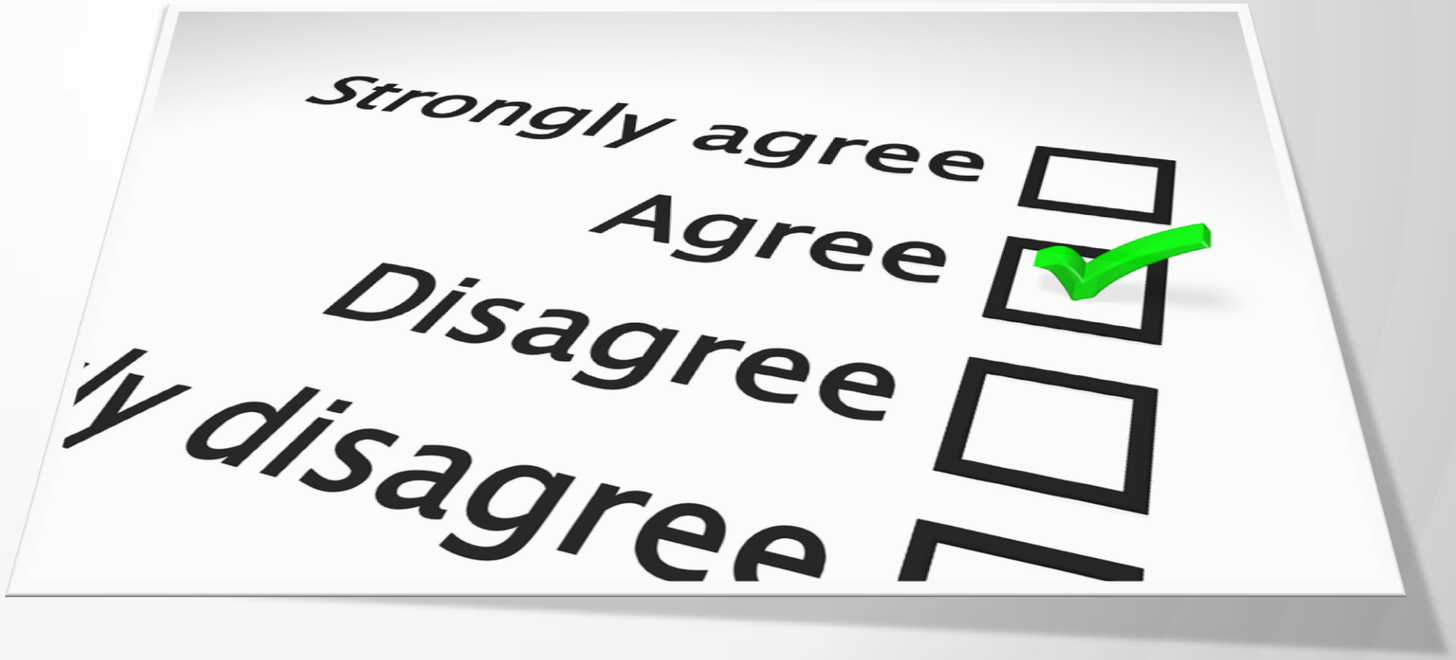
AUD 2016 and Recap Design



Infraworks with Recap 3D Models

Be heard! Provide AU session feedback.

- Via the Survey Stations, email or mobile device.
- AU 2016 passes awarded daily!
- Give your feedback after each session.
- Give instructors feedback in real-time.



Questions?

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