COLDNet Pole Design

Table of Contents

1.0	Instal	lation	6
1.1	Ins	talling COLDNet Pole	6
2.0	Starti	ng COLDNet Pole	9
2.1	Ор	ening COLDNet Pole	9
2.2	Ор	ening and Registering COLDNet Pole	9
2.3	Openir	ng a COLDNet Pole File 1	0
2.3	Cre	eating a COLDNet Pole File 1	1
3.0	Settin	ng up Libraries1	2
3.1	Со	nductors1	13
3.2	Vo	ltages1	13
3.3	Pol	es1	4
3.4	Pol	e Bases	15
3.5	Cro	ossarms1	15
3.6	Soi	I Туре 1	6
3.7	Sta	ys1	17
3.8	Pol	e Plant	8
4.0	Paran	neter File and Design Criteria1	9
5.0	Settin	ngs 2	20
5.1	Cal	culation Methods	20
ļ	5.1.1	Tension Calculation Method2	20
ļ	5.1.2	Pole Allowable Tipload Calculation Method2	20
ļ	5.1.3	Pole Tipload Bending Above Stay Calculation Method2	20
ļ	5.1.4	Foundation Calculation Method2	20
5.2	Cal	culation Options	20
5.3	Blo	wout Conditions	20
5.4	De	fault Properties	20
6.0 Po	ole Desi	gn2	22
6.1	Ge	neral Design Information	22
(5.1.1	Selecting Pole	22
(5.1.2	Pole Angle	22
(5.1.3	Foundations2	22
(5.1.4	Job Description2	24
7.0	Surve	y Data2	25

7.	1 (reating and Editing a Profile	25
7.	2 E	ntering Field Data	25
	7.2.1	Relative Horizontal Distance & Height	25
	7.2.2	Absolute Distance & Elevation	26
8.0 F	oint L	bads	27
8.	1 Simp	le Point Loads	27
8.	2 Com	plex Point Loads	28
7.0	Des	ign Information	29
7.	1 (onductors	29
7.	2 (rossarms	30
7.	4 Pole	Plant	32
7.	5 Stays		33
	7.5.1	Creating Stays	33
	7.5.2	Stay Orientation	33
	7.5.3	Stay Details	33
8.0	Res	ults	35
9.0	Pro	files	36
9.	1 S	tringing Conductor through Remote Points	36
9. 9.	1 S 2 Clea	tringing Conductor through Remote Points	36 37
9. 9. 9.	1 S 2 Cleai 3 Cate	tringing Conductor through Remote Points ance to Ground nary Curves	36 37 37
9. 9. 9. 10.0	1 S 2 Clear 3 Cate Repor	tringing Conductor through Remote Points ance to Ground nary Curves ts	36 37 37 38
9. 9. 9. 10.0 10	1 S 2 Clear 3 Cate Repor 0.1 F	tringing Conductor through Remote Points ance to Ground nary Curves ts ole Information & Loads Report	36 37 37 38 38
9. 9. 10.0 10 10	1 S 2 Cleai 3 Cate Repor 0.1 F 0.2 C	tringing Conductor through Remote Points ance to Ground nary Curves ts ole Information & Loads Report alculation Report	36 37 37 38 38 38
9. 9. 10.0 10 10	1 S 2 Clear 3 Cate Repor 0.1 F 0.2 C 0.3 Ter	tringing Conductor through Remote Points ance to Ground nary Curves ts ole Information & Loads Report alculation Report rain Data Report	36 37 37 38 38 38
9. 9. 10.0 10 10 10 10	1 S 2 Clear 3 Cate Repor 0.1 F 0.2 C 0.3 Ter 0.4 Sag	tringing Conductor through Remote Points rance to Ground nary Curves ts ole Information & Loads Report ralculation Report rain Data Report	36 37 37 38 38 38 38
9. 9. 10.0 10 10 10 10 10 11.0	1 S 2 Clear 3 Cate Repor 0.1 F 0.2 C 0.3 Ter 0.4 Sag Stre	tringing Conductor through Remote Points rance to Ground nary Curves ts ole Information & Loads Report ralculation Report rain Data Report /Tension Report	36 37 37 38 38 38 38 38 38
9. 9. 10.0 10 10 10 10 11.0 12.0	1 S 2 Clear 3 Cate Repor 0.1 F 0.2 C 0.3 Ter 0.4 Sag Stre Exp	tringing Conductor through Remote Points rance to Ground hary Curves ts ole Information & Loads Report raiculation Report rain Data Report /Tension Report ength Factors ort to DXF	36 37 37 38 38 38 38 38 42 43
9. 9. 10.0 10 10 10 10 11.0 12.0 13.0	1 S 2 Clear 3 Cate Repor 0.1 F 0.2 C 0.3 Ter 0.4 Sag Stre Exp 3D	tringing Conductor through Remote Points ance to Ground hary Curves	36 37 37 38 38 38 38 38 42 43 44
9. 9. 10.0 10 10 10 10 11.0 12.0 13.0 14.0	1 S 2 Clear 3 Cate Repor 0.1 F 0.2 C 0.3 Ter 0.4 Sag Stre Exp 3D Dis	tringing Conductor through Remote Points	36 37 37 38 38 38 38 38 42 43 44 45
9. 9. 10.0 10 10 10 10 11.0 12.0 13.0 14.0 11	1 S 2 Clear 3 Cate Repor 0.1 F 0.2 C 0.3 Ter 0.4 Sag Stre Exp 3D Dis L.1 Dis	tringing Conductor through Remote Points	36 37 37 38 38 38 38 38 42 43 44 45
9. 9. 10.0 10 10 10 10 11.0 12.0 13.0 14.0 11	1 S 2 Clear 3 Cate Repor 0.1 F 0.2 C 0.3 Ter 0.4 Sag Stre Exp 3D Dis 11.1.1	tringing Conductor through Remote Points	36 37 37 38 38 38 38 38 38 42 43 45 45
9. 9. 10.0 10 10 10 10 11.0 12.0 13.0 14.0 11	1 S 2 Clear 3 Cate Repor 0.1 F 0.2 C 0.3 Ter 0.4 Sag Stre Exp 3D Dis 11.1.1 11.1.2	tringing Conductor through Remote Points	36 37 37 38 38 38 38 38 38 38 42 45 45 45
9. 9. 10.0 10 10 10 11.0 12.0 13.0 14.0 11	1 S 2 Clear 3 Cate Repor 0.1 F 0.2 C 0.3 Ter 0.4 Sag Stre Exp 3D Dis 11.1.1 11.1.2 11.1.3	tringing Conductor through Remote Points	36 37 37 38 38 38 38 38 38 38 38 42 45 45 45 45

11.1	L.5	Point Numbers	-5
11.1	L.6	Comments	-5
11.1	L.7	Span Length4	5
11.1	L.8	Show Blowout4	15
11.1	L.9	Show Wires4	6
11.1	L.10	Full View4	6
11.2	Drav	v Options4	6
11.3	Mea	sure Distance and Bearing4	17
11.4	Cros	s-Sections	17

Figure 1: Opening COLDNet Pole from File Explorer	6
Figure 2: Install Wizard	6
Figure 3: Folder Selection for Installation	7
Figure 4: Confirmation Screen	7
Figure 5: Finish Installation	8
Figure 6: COLDNet Pole Main Screen	9
Figure 7: COLDNet Pole Licence Details	9
Figure 8: Entering Registration Code	10
Figure 9: Selecting a Parameter File	11
Figure 10: Parameter File & Component Libraries	12
Figure 11: Selected Libraries	12
Figure 12: Conductor Library	13
Figure 13: Voltage Library	14
Figure 14: Pole Library	14
Figure 15: Pole Base Library	15
Figure 16: Crossarm Library	16
Figure 17: Soil Library	16
Figure 18: Stay Library	17
Figure 19: Pole Plant Library	18
Figure 20: Parameter File	19
Figure 21: COLDNet Pole Settings	21
Figure 22: COLDNet Pole Design Information	24
Figure 23: COLDNet Pole Data Input – Relative Horizontal Distance & Height	26
Figure 24: COLDNet Pole Data Input - Profile 2	26
Figure 25: COLDNet Simple Point Load Information for the Design	27
Figure 26: COLDNet Complex Point Load Information for the Design	28
Figure 27: COLDNet Conductor Information for the Design	29
Figure 28: COLDNet Crossarm Information for the Design	31
Figure 29: COLDNet Pole Plant Information for the Design	32
Figure 30: COLDNet Stay Information for the Design	34
Figure 31: COLDNet Pole Results Grid	35
Figure 32: Stringing Conductor through Remote Points	36
Figure 33: Adding a Ground Clearance Line to a Profile	37
Figure 34: Adding and Modifying Clearance Curves	37
Figure 35: Pole Information & Loads Report	39
Figure 36: Calculation Results Report	40
Figure 37: Terrain Data Report	40
Figure 38: Sag/Tension Report	41
Figure 39: Modifying Strength Factors	42
Figure 40: Exported DXF File Example	43
Figure 41: 3D View of Design	44
Figure 42: Draw Options	46
Figure 43: Measuring Distance and Bearing between Two Points	47
Figure 44: Cross Sectional Views	48

COLDNet Pole Design

1.0 Installation

1.1 Installing COLDNet Pole

Figure 1 below shows the COLDNet Pole installation files, double click Setup.exe to begin.



Figure 1: Opening COLDNet Pole from File Explorer

The following screen will then appear as shown in Figure 2 below. Click Next to continue.



Figure 2: Install Wizard

After clicking **Next**, the following window will appear as shown in Figure 3 below. If you wish to change the location of your install, click the **Browse** button and select the folder you wish to install in. Click **Next** to continue.

🛃 COLDNetPole		_		×
Select Installation Folde	r			
The installer will install COLDNetPole to t	he following folder.			
To install in this folder, click "Next". To in	istall to a different folder, enter it be	elow or	r click ''Bro	wse".
<u>F</u> older: C:\Program Files (x86)\CATAN\COLD	NetPole\		Browse.	
			Disk Cos	t
Install COLDNetPole for yourself, or for	anyone who uses this computer:			
O Everyone				
Just me				
	Cancel < Back		Ne	xt >

Figure 3: Folder Selection for Installation

The following window will then appear as shown in Figure 4 below, click **Next** to continue.

最 COLDNetPole	-		×
Confirm Installation			
The installer is ready to install COLDNetPole on your computer.			
Click "Next" to start the installation.			
Cancel	Back	Ne	ext >

Figure 4: Confirmation Screen

The installation is now complete, click **Close** to finish (Refer Figure 5).



Figure 5: Finish Installation

2.0 Starting COLDNet Pole

2.1 Opening COLDNet Pole

COLDNet Pole can either be opened through the desktop shortcut created from the install or through the Windows Start Menu.

2.2 Opening and Registering COLDNet Pole

Figure 6 below shows the initial window from COLDNet Pole after opening the file.

G COLDNet Pole						- 0 ×
File Designs Configuration Reports Strength	Factors Export to DXF 3D View Job	History Print Settings Information	on	Display Options + Draw Options Measure +	Sag Conductor Clearance to Ground Catenaries Cro	ass-Sections + Print
Current Design:	Foundation		Job Description:	Plan Profile		
Pole Details	Soil Type:		^			
Asset No:	Soil Passive	Use Non-Standard				
Group:	Resistance (kPa/m):	- SOI				
Length:	Setting Depth (m):	 Use Non-Standard Setting Depth 				
Strength:	Stabilised Backfill:					
Neasured Strength	Ground (mm):					
(icN):	Pole Bases & Logs	Offset (m) Direction (*)				
	Pole Base:					
Change Pole Angle -	Upper Log:					
Add Profile	Lower Log:					
Survey Data Simple Point Loads Complex Point Load	s Results Images					
Profile Data	· · · · · · · · · · · · · · · · · · ·					
News	O Away From Pole	lify Bearing				
Name:	Towards Pole	Data Ty	pe:			
Data Points	Date1 Date2 Baseled	(4)	Community			
			×			
			COUNTRY AND A REPORT OF A REPORT OF A REPORT OF			
			COLDNet Pole does not appear to be registered. Exit code = 3 You will be taken to the registration form			
			ОК			
				XYLocation TODOTEXT		
Conductors Crossarms Pole Plant Stays						
Add New Conductor Remove S	Selected Conductor					
Conductor Group Conductor	Voltage No. of Max (°C)	Temp Min Temp (°C)				

Figure 6: COLDNet Pole Main Screen

For first time registration an 'Exit Code 3' will appear when the program is open. Select **OK**. The following Licencing window will appear, as seen in Figure 7.

🖳 COLDNet Profile L	icence Details —	×
Close		
Company	ERDS Error Code 3	
Licence Type	Licenced	
User Type	Single User	
No. of Users	1	
Start Date	25/05/2019	
End Date	No end date	
Registration Code	9A9DA69B9CBFCB6EAAC6BABF9793AC9BA19A9E9D9CA397A89799C3BCC0BFC56EA2B8C2BDBFBBBBC58EAD888FB2A5A19B9D7F8A8A82928F93	
-	Is Registered	
-	Generate Registration Email Generate Text File with Registration Details Enter Validation Code	.4

Figure 7: COLDNet Pole Licence Details

If Microsoft Outlook is installed on the computer, select **Generate Registration Email**. A **Name** and **Phone Number** will be required to **Generate Registration Email**. An automatic email will be generated to send to COLDNet Support. Click **Send** and the support team will email you back a registration code. If Microsoft Outlook is not installed on the machine select the **Generate Text File with Registration Details** and follow the previous instructions. This text file will need to be saved and then emailed to <u>support@coldnet.com.au</u> to acquire the registration code.

Once a registration code has been sent from COLDNet Support select **Enter Validation Code** on the licensing form. Simple cut and paste the code provided to you before selecting **OK** and exiting the licensing form (Refer Figure 8).

🔛 Complete Registration	_		\times
Cut & Paste Registration Code provided to you into the box below			
A89E8AA7B7BA79A2B5C5B7869EA48AAC928DA89492A2A086A4BBABCBB7B4799AA7CDB5AEC6B3B499A5779AAA94AC93	3C8A82	2798D8A	7E9E
Cancel		ОК	

Figure 8: Entering Registration Code

2.3 Opening a COLDNet Pole File

There are two options for opening a COLDNet Pole file: the first option is to click **File>Open** and select a COLDNet Pole file from the selected folder, and the second option is only available if the user has used COLDNet Pole before, by selecting a file from the recent files list which is located below the **Quit** button in the **File** menu.

2.3 Creating a COLDNet Pole File

The user can also create a new COLDNet Pole file by selecting **File>New.** After selecting this option, the file will require a name to be created and a directory selected for it to be stored. The following screen below will appear as shown in Figure 9. Select **Parameter File Locations>Add Directory** to navigate to the location where the Design Parameters/Libraries have been stored locally on the machine. Once selected **Close** Manage Directories window and double click on the desired parameter file from the list. In this example the Design Parameter file called NZ has been selected.



Figure 9: Selecting a Parameter File

3.0 Setting up Libraries

Select **Configuration** from the main COLDNet Pole form from the top tool-bar menu. The following window shown in Figure 10 will appear.

	- Foundatio					103	Description			Fier Re-	- Cia	
Dotals		Sol Type:								-	North	Wile?
Parameter File & Componen	Churin											
Cancel Changes Save	Charges											
Component Libraries I Com	derters Millione Bries	Onio Rosson /	Second Sec	Terror Str	an Brin Ma	4						
Change Parameter Die	Save As New Parameter I	in .										
											Calculation Mathema	
						the Design are D					Territor Calculation Mathem	Budaudana u
Ubrane	•										Pole Alternable Tiploa Calculation Method	PoleStrongth v
Conductor Ubran	A C://Iners//Geren Hetc/	men/Document	si/COLOWEILibn	eries/WZDel		nductors				Change Rie	Pole Tipland Banding above Ste	
Voltage Ubrar	VI CIVUSers/VGoren Hoto	.nan/Document	SPCOLD/VerUSA	HesWizbe	Iset.COLDVG	tagoData				Change frie	Calculation Rethod	PoleStrongth V
Pole Ulivar	n C://leers//Generi Hatci	man/Document	21C0.01et(Lon	necViZ0e	teut.COLDPol	eGroups				U Change File	Foundation Calculation Hethod	Embedment each
Pole base Librar	/ Crybersyderen Heto	nanpocuneit	avcouovar, pav	nesytzba	ISBC/DOLDVG	ubusu				Change me		
Crossern Ubrer	A Chosershueren Hetch	nanuocument	SCOLD WE Day	neswizoe	Succounts	ntre l				Change Pre	Celculation Options	Revert Configure
Ser type Librar	 Contractivitation Hallo Contractivitation Hallo 	manypocument	SUCCEDIMENTAL INFO	PREVEZ DE		IDABA				Change Hie	Celculate Tiplicada 🗹	Research on (Mills Lat
and dealer have	Cilleral Garage Hate	The second se	and a state of the state		inch col par	in the state of th				O Change File	Celculate foundations M	maniference (-c.). In
Pole Hark owner	n Conseis prefer tiers									 Change Hie 	Calculate Hid-Span separation M	Wind Pressure (Pa): 1200
											Calculate Optic B	Default Properties
											Calculate Constants Ed	
											Conduct Containing ED	Desire Shi iyac
												Mid-Span 'K' factor: 0.40
Tipload Cases		Badal	Dennik	-			-			in fan	Opint Load Cases	
Ter Ter	Wed Wed	Thickness	of Ice A	5	C D	Live Load	. Lord		Reduction	Reduction	Name (*C)	(14)
	(*C) (Pa)	Seev	Snow (Wh)	(Ga)	(Gc) (H)	Vertical (4)	(N)		Winds	Downdraft	 Upit 0 980 	
		6464	0.00	0.00	1.25 1.25	0.00	0.00	0.00		11	•	
New Word	10 1531	0						0.00	-			
Max Wed Evendey	10 1531	0	0 1.0	2 0.00	0.00 1.10	9,00 1						
Max Wed twenydey	10 1531 10 382	0	0 1.0	0 0.00	0.00 1.10	0.00	1.00					
Max Wed Evenyday	10 1531	0	0 1.0	0.00	0.00 1.10	0.00						
 Max Wed Everyday 	10 1531	0	0 1.0	0 0.00	0.00 1.10	9.00		0.00				
 Max Wed Everyday 	10 1531	0	0 1.0	0 0.00	6.00 1.10	0.00		0.04				
 Max Web Everyday 	10 1531	0 0	0 1.0	0 0.00	0.00 1.10	0.00						
 Max Wee Everyday 	10 1533	0	0 1.0	0 0.00	0.00 1.10	8.00						
Yex Wed Evenyday	10 1533		0 1.0	0 0.00	0.00 1.10	8.80)						
 Max widd Zveryday 	10 153	. 0	0 1.0	0 0.00	6.00 1.10	8.80						
Max Web The second se	10 153	0	0 1.0	0 8.00	6.00 1.16	0.00 /						
 Max Aved Exercise 	10 153 10 382	0	0 10	0 0.00	8.00 1.10	0.00						
Max Wind Zonnydey	10 153 10 363	0	0 1.0	0 0.00	6.00 1.16	0.00		U.S.P				
 United at the second sec	20 1533 10 363	0	0 1.0	0 8.00	6.00 1.10	0.00		U.S.W				
 Starting Decider Encoder 	161 01 382 01 382	0	0 1.0	0 8.00	8.00 1.10	0.00		U.SU				
• Use with the workey	30 153 70 385		0 1.0	0 0.00	8.00 1.10	0.00		vov				

Figure 10: Parameter File & Component Libraries

Before continuing using COLDNet Pole, the Libraries must be set up. To do this, click the **Change File** button next to each library type, locate the library file you wish to use for that data set, and select it. Alternatively, if all the Libraries are stored in the same folder, they can be loaded together using the **Change Location where Libraries are Stored**. This will open a dropdown menu and allow the user to select the folder in which the Libraries are stored. If there is more than one library for each library type, it will load the first library of that type by default. If this is the wrong library then it will be required to be changed manually be selecting **Change File** next the required library and selecting the correct file. The selected data will be able to be viewed in the tabs shown after a file is selected. Once all the libraries have been selected the form should look like Figure 11 below.

jn:	- Foundation						1ob Description:			Hen a	verile.			
els .		Sol Type:										North (¥Ĵ0*	_
erneter File & Component Lit	baries													
ncel Changes Save Ch	enges													
ponent Librarias Condu	ctory Voltages Poles	Fole Secent O	cossecute 1	of Types	tava Pole	Pinot								
hange Parameter File Si	ave As New Parameter Fil													
											- Calculation Methods			
				Change	Location wit	ere the libraries an	e Stored				Tension	Celculation Hethod:	RufruSpan v	
Libraries												le d'handide Salard		
Conductor Library	C/User/Vieren Hetchr	ani CANA Pta	unicoupy	et - Decume	nta Mierrente	COLONet Pole Test	Changes/Conver	adCATA/ILibrarias/0	NZDefect COLDCord	 Change File 		Coloriation Method:	Pelestrength v	
Vokana Library)	C/Users/Kieren Hatchr	an/CATIN Pty	INTICOLON	et - Docume		COLONIS Pole Test			AZDefack COLDWRM	Change file	Pole Tiplead	Bending above Stay	PoieEtrength	
Pole Ubrary:	C:/Users/Kieren Hetchr	an/CATAN Ptg	undycoupy	et - Docume	nts//Geneta	COLONet Pole Text	Changes/Conver	adCATANLibrarian's	NZDefecturocuppoled	change File		Cardena and Phatematic		
Pole Date Library)	C//Users//Geren Hatchr	ar//CRTAN Pty	LINICOLDN	st - Docume	nts\General	COLDNet Pole Test	Changes/Conver	tedCATA/NUbranics/V	NZDefault/COLOPcial	Change file	Foundation	Colculation Hethod:	Embedmentlangth v	
Crosserm Library:	C:/Users/Kieren Hetchr	un/CATAN Pty	undycou pre	it - Docume	nts\/General	COLONet Pole Text	Changes/Conver	adCATANLibraries/	NZDefailt.COLDXerr	Change File	Calculation Options			
Soil Type Lineary:	C//Users//Seren Hatchr	or//CATAN Pty	LINGCOLDN	st - Docume	nts/General	COLDNet Pole Test	Changes//Conver	todCATA/NLIbrarios/V	WZDefault.COLDSeTD	Change file	Calcula	te Tiploeds 🕢 🗍	Siewost Conditions	
Stay Librarys	Critikeren Hetche	sen)(CRTAN Pty	INFOCUTION OF	et - Docume	ntel/General	COLONet Pole Test	Changes/Conver	tedCATANLiteraries/)	AZDefack.COLDStay	Change File	Calculate F	condations 🖂	Temperature (*C): 15	
Pole Plant Library:	C//Users//Seren Hatchr	GIVCATAN Pty	LIDICOLDN	st - Docume	nts\Genera	COLDNet Pole Test	Changes/Conver	tedCATA/ILloraries/i	NZDefault.COLDPole	lo Change file	Calculate Mid-Span	separation 🗹	third Pressers (Na): \$200	
											Cali	alata Uplift 🖂	Auto M Automatica	
												And a state of the second	Ceracit: Meperoes	
											Calc	unic stays 🔄		
											Calculate	Grossama 🗹	Celeuit Sail Type:	
											Coloulate	Crossorma 🗹	Default Sol Type: Not-Span 'K' factor:0.40	2
ipload Cases	Wind	Redial 1	Density				tive		Use Spen	User Span	Coloriate Uplitt Load Cases Name Term	Grossama Z	Default Sal Type:	
lipload Cases	Wind Pressure (C) (Pa)	Redial Thickness of loc or Snow	Density of Ice of Snew		G()	D Live Loud P3) Vertical (4)	E Live E Hard Harz	6	Une Span Rodusten Factor Syncptic	law Spen Reduction Reduction Description	Uplitt Load Cases	Crossams 2 Crossams 2 PC 0 900	Default Sal Type: Hid-Span K factor: (8.40	
lipitoad Cases	Wind Pressure (Pa)	Redial Thickness of ice or Snow (new)	Density of loc of Snaw (lug(er)	Ân) (Ôs)	(Gc)	D Live Loud Pi) Vertical (4)	E Live Hard (4)	6	Une Span Roduction Factor Synoptic Winds	Une Span Reduction Retor Demotran Winda	Uplift Load Cases	And Sorry () Crossoms () PC) 900	Default Skill Type: Nid-Span 'K' factor: (0.40 Pressane No	
Nome Tump Nome Tump Parates	Virature Inc] Pressure (Piss) 10 1533	Redial Thickness of los or Snow (mm) 1 0	Density of loc of Show (log(in?)	An) (Ga)	(Gc) 1.25	D Live Load P() Vertical (N) L25 0.1	E Live E Laud Harz. (4) 00.000 0.00	6	Une Span Rudusten Rotor Groups Unds	User Sporn Reduction Fostor Deenstrash Winda	Colourate	Ander Boorps (2) Crossamma (2) PC (1) 900	Defeuit Sui Type: Niel-Span K factori (0.40 Pressere No	
None Turp None Turp His Stel	No.4614 Pressure (Class) 10 15551 20 265	Redial Thékness of loe or Snow (sem) 0 0	Density of loc Snaw (lag(snr)) 0	Ån) (Ös) 1.00 0.00 1.00 0.00	C (94) 1.25 0.00	D Live Local (R) Vertical (N) L25 0.1 L10 0.1	E Live E Level Herz, (1) 0 0.00 0.0	6 0 0.00	Une Span Rodo-Siren Rotor Spropic Unds	Une Sport Reduction Descortes Winds	Colourado	Annature Stired P Produce Stired P PC 00	Defeuit Sal Type: Nel-Span 'K' factor: Nesaere No	
Nome Turnya Rome Turnya P Nos Died Everyday	Nindur v *C) (Met) 10 1551 20 203	Redial Thickness of loe or Snow (een) 0 0	Density of loc Of Show (haginr) 0	An (Ga) 5.00 0.00	(9c) 1.25 0.00	D Live Load (N) Vertical (N) L25 0.1 L10 0.1	E Live E Herz, (4) 50 0.00 0.0	6 0 0.00 0 0.00	Une Span Roduction Rodor Symposic Under	Une Span Reduction Plantocht Winda 	Uplift Load Cases	arature Tind a	Cefeut Sal Type: Mel-Span K factori (8.40 Pressna N)	
Iglead Cases Nome Turner P Han third Everyday	Product v Product v 10 1333 10 305	Redial Thickness of loc or Snow (een) 0 0	Density of loc Snaw (bagier) 0 0	A (Gg) 2.00 0.00	(Qc) 1.25 0.09	D Live Lood (N) Verical (N) L25 0.4	E Live E Herz, (4) 50 0.90 0.0	6 0 0.00	Lies Speen Rod-Lucien Rod-Lucien Brade Unde	Une Spen Reduction Pottor Winds 	Uplitt Load Cases	And Skyle Skyle S Grossenne 2 Produce 1 900 900	Defeut Sal Type: No Span K factor: (5.40 Pressen No)	
Figlead Cases Nome Turner Name Cond Everyday	Wind Pessare (P) 10 10 30 305	Redial Thickness of loc or Snow (ann) 0 0	Demailty of loc Of Secure (log(or))	A (Ge)	C (0d) 1.25 0.09	D Live Lood (N) Verical (N) L25 0.4	E Live E Level Herz, 00.000 0.0	6 0 0.00	Jan Span Roduktion Pactor Sprophic UI nds	Une Spen Redotten Potton Winds	Uplitt Load Cases	And Skyle Skyle S Grossenne 2 Produce 1 900 900	Defe, ir Sal Type Wei Sgan Yr Todor: (8-4) Normen	
Fiplead Cases Name Iumpe P Kus Sout Corryday *	анайана ЧСП Резсият 10 1353 10 363	Redial Thickness of loc or Snow (ann) 0 0	Demaity of loc Sceau (lag(er/) 0	A (Ge)	C (0d 1.25 0.09	0 Una Lond R) Version (N) L25 0.1 L10 0.4	E Live E Level Harz, (1) 00 0.90 0.0	6 0 0.00 0 0.00	Jan Saan Rudukulen Factor Synophic Unds	Une Spen Reduction Fector Demonstrative Winds	Upilit Load Cases	and boys (2) Groupering (2) another (2) (2) (3) (3) (3) (3) (3) (3) (3) (3) (3) (3	fræfik fiskt fyser Ned Span Yr fostor (ka)	
Figlead Cases None Imme Man Draf Everydry *	Mind Pressure 10 1353 10 305 10 305	Redial Thickness of loc or Snaw (mm) 0 0	Density of loc Or (lag(nr) 0	Am) (Ga) 1.00 0.00 1.00 0.00	C (0c) 1.25 0.09	D Live tood R) Verscal (4) 1.25 0.1 1.10 0.4	E Line Land (4) 00 0.00 0.0	6 0 0.00 0 0.00	Line Sipan Rode Sipan Rode Sign Inde	Uni Stein Nettor Detor Desotati Winds	Colours	And Skyle Skyle S Grouperman S Annature Stind n 70 00	Defect & Sal Types	
None lump None lump No correl Curryday	wukuru Possije (P) 20 (94) 20 2555 20 265	Radial Thedropy C Show (sen) 0	Density of loc Secure (lag(sr)) 0	Am) (Ga) 3.60 0.00 1.00 0.00	C (0d) 1.23 0.09	D Live Load R) Version (4) 1.23 0.5 1.10 0.4	E Live E Herz (4) 00 0.90 0.0	6 0 0.00 0 0.00	Jan Soan Rubucien Robert Binds Binds	Une Speri Reduction Footower Winde	Cav Column Updit Lood Cases Name Term Provide Cases	And Borry (2) Groupering (2) Another (2) (2) (2) (2) (2) (2) (2) (2) (2) (2)	fraffusit Sal Type. Ned Seen 'K' factorn (5.40 Preserve Ng)	
Iglead Cases None Iump P Head Sould Everyday	workiwu Penge KC 2000 100 12555 100 3805	Radial Thoknoss of loc or (sen) 0 0	Demaity of loc Sceaw (lag(er)) 0	An) (Gu)	(0c) 1.28 0.09	D Live Lood (R) Vertical (N) L25 0.4	5 Live 5 Hard 197 20 0.00 00 0.00 00 0.00	6 0 0.00 0 6.00	Jan Sann Rodulon Rodu Synoptic Winds	Une Sman Reduction Reduction University 	Cave Calevine UpIM Lead Cases Area from a state	Crossense 2 Crossense 2 PC 0 PC 0 PC	Cethuit Sai Type.	
Tyload Cases Isane Turner Han Seat Everyddy	www.ww Pessare (#4) 29 20 30 30 30 30	medial Thiskness of loc or Stope (enrol) 0	Demity of loc Seraw (big(int)) 0	An) (Gu)	C (0d) 1.25 0.09	2 Uny Lond 72) Vertical (0) 1.23 0.4 1.10 0.4	E Line Head Head 1992 10 0 0.00 0 0.00 0 0.00	6 0 0.00 0 0.00	Jas Span Bučkućen Pače Sertopic E no 	Dies Spein Reference Preuroden Windle	Upfill Calculation	Crossense 2 anatum Tiel P PC 20	Centruit Sai Type Ned Geen YC factor (3.40 Prevent	
Tablead Cases Rome Vorte Non York Controllery	Wind CC Passing 10 1535 10 385	medial Triskness of loc or Snow (mm) 0 0	Derwity of loc Stream (log(nr) 0	A) (B) 2.00 0.00	C (0c) 1.28 0.09	2 Live Load 72 Versal (0) 1.23 0.0 1.10 0.4	5 Line 8 Line 900 (0.00) 0 (0.00) 0 (0.00) 0 (0.00)	6 8 8.00 8 0.00	Jas Saan Rock Strophic Brinds	Bute Secon Petco Protoco IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Uptill Cald Case	Crossense Store St	Gerlauf Sai Types Medisely Y fractorn (6-0 Newsyn)	
Yaptead Cases Name Turning Yaptead Cases Name Control of Control o	Notice Wind Pressure 1940 10 21555 10 21555 10 21555	Redial Thykness of ice or (cent) 0 0	Deraity of loc Scear (lag(nr) 0	Am) (Ös) 2.60 0.00	6 (9d) 1.28 0.09	C Uni Lund P Verstaal (V) 1.23 0.4 1.10 0.4	E Line Harz, 1972, 30 0.00 0.00 0 0.00 0.00	6 0 0.00 0 0.00	Uns Span Reduction Brods In Ros In Ros	Bag Spen Not Monte Prevokst Unda	Upfill Cade Cade	nedure bird of the set	Refut Sal Type	
None Very None Very Hex Stati Everyday	ассани <mark>Жінд</mark> 28 (1555) 29 (1555) 29 (1555)	testial Trackes of locar Stream (mm) 1 0	Demilty of Joe Secure (Jag(un)) 0	An) (Gu)	C (9d 1.28 0.09	2 Line Load 72 Versal (%) 1.23 0.4 1.10 0.4	E Live E Land 1962 20 0.80 0.00	6 0 0.00 0 0.00	John Stater Reducing Reducing Ull reduce Ull reduce Interpreter In	New Steer Redoctor Postor Postor 	Uptill Cadd Ceset	Adde Saviry 2 Crasserers 2 PC2 PC2 PC2 PC2 PC2	Carlad Da Type Rediger Y frazon (L-0 neuron 2)	
Figlead Cases home lump Heat and Convolution	wystary Prospie Prospie 19 3333 19 780	Radid Thickney Show (sm) 0	Demility of 20 Sector Diagtory 0	An) (Ga) 2.00 0.00 2.00 0.00	Cc) 1.23 0.09	2 Uny Soul 70 Versal (0) 1.22 0.0 1.10 0.4	E Line Begg (1) 30 0.00 00 0.00 0.00 0.00	6 0 0.00	Law Span Rodolist Were Colored	Des Sper Fisicación Processar Virial	Upill Load Cares	nyature Dini f	ranka ku toja Mađgan Vingan Indegan Vingan Indegan Vingan Inde	

Figure 11: Selected Libraries

3.1 Conductors

To access the Conductor Library select the **Conductors** tab in the Libraries Form. From this tab the user can select a Conductor Group from the dropdown menu and edit any of the conductors populated in the Conductor Table (Refer Figure 12).

Conductor groups can be added and edited by selecting **Add/Edit Group Name**. A new window will open in which groups can be added or edited. Click **Save & Close to** commit any changes made.

Click the **Change File**, before locating and loading the library file to be used for the data set.

Click **Save Changes** to commit any changes made to the Conductor Library or **Save As** to create new Conductor Library.

A Design:								Job Description:				Plen Profile				
ole Detail:	5			Soil Type:											North (Y) 0°	
As Paran	neter File & Compone	int Libraries														
Can	cal Chapper Sav	e Changer														
Con	cerenaryes bar	e changes														
Comp	ponent Libraries	onductors Voltag	pes Poles P	ole Bases C	ossarms Soil Ty	pes Stays Pole	s Plant									
St Cond	ductor Group Stand	dard - Add	/Edit Group Na	imes Import	CATAN Conducto	r Library New Lit	orary Change Fil	e Save Save As								
1 S			Area	Self	Diameter	Initial Modulus of	Final Modulus of	Temperature Allowance for	Coefficient	Calculated Breaking	Allowable	Everyday	Everyday	Dreg	Barris Marrison	^
	Name	Description	(mm3)	(N/m)	(mm)	Elasticity (MPa)	Elasticity (*C)	in-elastic stretch (PC)	Expansion	Load (kN) (CBL)	load (as %	% CBL)	(*C)	Coefficient	Part Number	
	Chlorine	7/2.50 Chlori	34.40	0.93	7.50	59.00	59.00	0.00	23.00	8.52	70.00	10.00	10.00	1.00	NA NA	
	Fluorine	7/3.00 Fluorin	49.50	1.32	9.00	59.00	59.00	0.00	23.00	12.28	70.00	10.00	10.00	1.00	NA	
	Iodine	7/4.75 Iodine	124.00	3.33	14.30	59.00	59.00	0.00	23.00	28.20	70.00	10.00	10.00	1.00	NA NA	
	Neon	19/3.75 Neon	210.00	5.65	18.80	59.00	59.00	0.00	23.00	49.73	70.00	10.00	10.00	1.00	NA NA	
rte:	Namu	7/2.11 Namu	24.48	0.66	6.33	60.70	60.70	0.00	23.04	4.35	70.00	10.00	10.00	1.00	NA.	
54	Poko	7/2.36 Poko	30.62	0.82	7.08	60.67	60.67	0.00	23.04	5.48	70.00	10.00	10.00	1.00	NA.	
	Kutu	7/3.00 Kubu	49.50	1.32	9.00	60.67	60.67	0.00	23.04	8.57	70.00	10.00	10.00	1.00	NA.	
	Fly	7/3.40 Fly A	63.69	1.71	10.50	60.70	60.70	0.00	23.04	10.71	70.00	10.00	10.00	1.00	NA	
n	Rango	7/3.66 Rango	73.65	1.98	10.98	60.70	60.70	0.00	23.04	11.59	70.00	10.00	10.00	1.00	NA NA	
-	Wasp	7/4.39 Wasp	106.20	2.84	13.20	60.67	60.67	0.00	23.04	17.13	70.00	10.00	10.00	1.00	NA.	
	Weke	7/4.72 Weke	122.48	3.29	14.20	60.67	60.67	0.00	23.04	19.63	70.00	10.00	10.00	1.00	NA NA	
	Weta	19/3.35 Weta	167.47	4.51	16.80	58.60	58.60	0.00	23.04	27.84	70.00	10.00	10.00	1.00	NA NA	
	Cockroach	19/4.22 Cock	265.75	7.17	21.10	58.60	58.60	0.00	23.04	42.03	70.00	10.00	10.00	1.00	NA NA	
	Butterfly	19/4.65 Butte	322.70	8.71	23.30	58.60	58,60	0.00	23.04	51.09	70.00	10.00	10.00	1.00	NA NA	
	A.A. ABC CABLE	95 SQ MM	380.00	13.24	38.40	58.60	58.60	0.00	23.04	55.36	40.00	10.00	10.00	1.00	NA NA	
	Namu PVC	7/2.11 Nemu	24.48	1.15	8.73	60.67	60.67	0.00	23.00	4.35	70.00	10.00	10.00	1.00	NA	
	Poko PVC	7/2.36 Poko	30.62	1.41	9.68	60.67	60.67	0.00	23.04	5.48	70.00	10.00	10.00	1.00) NA	
	Rutu PVC	7/3.00 Kuta	49.40	2.09	11.60	60.67	60.67	0.00	23.00	0.23	70.00	10.00	10.00	1.00	NA NA	
	Margo PVC	7/3.66 Kango	106.00	4.31	15.56	60.67	60.67	0.00	23.04	16.65	70.00	10.00	10.00	1.00	NA NA	
	Beetle RVC	19/2 67 Reat	106.40	4.12	16.35	59.60	59.60	0.00	23.00	19.03	70.00	10.00	10.00	1.00	NA NA	
	Weike EVC	7/4.72 Weke	122.48	4.84	17.36	60.67	60.67	0.00	23.00	20.25	70.00	10.00	10.00	1.00	NA NA	
	Cricket PVC	7/5.36 Cricke	157.94	6.04	19.28	60.67	60.67	8.00	23.04	25.51	70.00	10.00	10.00	1.00	NA	
	Weta PVC	19/3.35 Weta	167.47	6.14	19.75	58.60	58,60	0.00	23.04	27.84	70.00	10.00	10.00	1.00	NA	
Ac	Cockroach	19/4.22 Cock	265.74	9.48	24.40	58.60	58.60	0.00	23.04	4.20	70.00	10.00	10.00	1.00	NA	
~	ALUMENUM	95SQMM ABC	380.00	1.32	38.40	560.00	560.00	0.00	23.00	55.36	40.00	10.00	10.00	1.00	NA NA	
	Thrush	6+1/1.89 Thr	19.58	0.67	5.66	79.29	79.29	0.00	18.36	6.53	70.00	10.00	10.00	1.00	NA.	
	Squirrel	6+1/2.11 Squ	24.43	0.83	6.33	79.29	79.29	0.00	18.36	7.79	70.00	10.00	10.00	1.00	NA	
	Gopher	6+1/2.36 Gop	29.20	1.04	7.08	79.29	79.29	0.00	18.36	9.69	70.00	10.00	10.00	1.00	NA	
	Flounder	6/2.31+1/3.7	32.38	1.43	6.70	100.20	100.20	0.00	16.40	17.07	70.00	10.00	10.00	1.00	NA NA	
	Ferret	6+1/3.00 Ferr	49.39	1.68	9.00	79.29	79.29	0.00	18.36	15.50	70.00	10.00	10.00	1.00	NA NA	
	Rabbit	6+1/3.35 Rab	61.80	2.10	10.05	79.29	79.29	0.00	18.36	18.97	70.00	10.00	10.00	1.00	NA.	
	Mink	6+1/3.66 Min	73.55	2.50	11.00	79.29	79.29	0.00	18.36	22.43	70.00	10.00	10.00	1.00	NA.	
	Recoon	6+1/4.09 Rac	91.94	3.13	12.30	79.29	79.29	0.00	18.36	28.16	70.00	10.00	10.00	1.00	NA	
	Dog	6/4.72+7/1.5	118.80	3.88	14.20	76.00	76.00	0.00	18.79	34.23	70.00	10.00	10.00	1.00	NA.	
	Dinno	18+1/3.35 Di	167,80	4.95	16.80	66.00	66.00	0.00	21.24	36.83	70.00	10.00	10.00	1.00	1 NA	v

Figure 12: Conductor Library

3.2 Voltages

To access the Voltage Library select the **Voltage** tab in the Libraries Form. From this tab the user can edit any of the voltages populated in the Voltage Table (Refer Figure 13).

Click the **Change File**, before locating and loading the library file to be used for the data set.

Click **Save Changes** to commit any changes made to the Voltage Library or **Save As** to create a new Voltage Library.

Design:	- Foundation	Job Description:	Stan perfix	
e Details	Sol Tures		A PIONE	Really (VI /
Recomptor File & Component	libraries			
Cancel Changes Save C	hannes			
Cancer Changes - Save C				
Component Libraries Con	luctors Voltages Poles Pole Bases Crossarms Soil Types St	rys Pole Plant		
s moun count strage ou	where the state of the state state of the st			
s Voltage Description	Velue (kV) Teg			
 LV3 	0.4			
11kV	11			
3.9eV	33			
00KV	00			
10/1	0.23			
SL	0.23			
SWER	11			
n				
-				
4				

Figure 13: Voltage Library

3.3 Poles

To access the Pole Library select the **Poles** tab in the Libraries Form. From this tab the user can select a Pole Group from the dropdown menu and edit any of the pole details populated in both the Pole Lengths and Pole Strengths Table (Refer Figure 14).

Pole groups can be added and edited by selecting **Add/Edit Group Name**. A new window will open in which groups can be added or edited. Click **Save & Close** to commit any changes made.

Click the **Change File**, before locating and loading the library file to be used for the data set.

Click **Save Changes** to commit any changes made to the Pole Library or **Save As** to create a new Pole Library.



Figure 14: Pole Library

3.4 Pole Bases

To access the Pole Base Library select the **Pole Bases** tab in the Libraries Form. From this tab the user can select a Pole Base Group from the dropdown menu and edit any of the pole bases populated in both the Pole Bases and Pole Logs Table (Refer Figure 15).

Pole Base groups can be added and edited by selecting **Add/Edit Group Name**. A new window will open in which groups can be added or edited. Click **Save & Close** to commit any changes made.

The up and down arrow keys located on the right side above the Pole Logs table can be used to transfer pole base data between the two grids.

Click the **Change File**, before locating and loading the library file to be used for the data set.

Click **Save Changes** to commit any changes made to the Pole Base Library or **Save As** to create a new Pole Base Library.





3.5 Crossarms

To access the Crossarm Library select the **Crossarm** tab in the Libraries Form. From this tab the user can select a Crossarm Group from the dropdown menu and edit any of the crossarm details populated in both the Crossarm and Crossarm Details Table (Refer Figure 16).

Crossarm groups can be added and edited by selecting **Add/Edit Group Name**. A new window will open in which groups can be added or edited. Click **Save & Close** to commit any changes made.

Click the **Change File**, before locating and loading the library file to be used for the data set.

Click **Save Changes** to commit any changes made to the Crossarm Library or **Save As** to create a new Crossarm Library.

£				- Foundation						Job Description	0				Elen.	Paulie					
					I Type:											Hom			North (V) 0		
	erFile & Comp	net	t Libraries																		
i	Changes 1	ave l	Changes																		
	and thereins	~~~	ad atom 10 lan	an Dalas Dala	Danas Crosser			and Tale Seat													
	m Group Bu	ick C	Concrete ·	Ace/Ecit Group N	arres Import (LATAN Cross	Arm d	ata New Library	Change Fil	e Save Save	As										
	imi																				
	Attachment Ty	90 F	lber			Voltage Filb	×											Nu	mber of wires (Iter	
	No Fiter	~				No Filter	v											[4	Ý		
	Attachment Type		Description		Part No.	Voltage		Distance from Pole Top to Crosserm Attachment	Maximum Deviation Angle Constraint	Neximum Deviation Angle (*)	Hinimum Deviation Angle Constraint	Hinimum Deviation Angle (*)	Longth (mm)	Dept) (mm)	Heig (mir	ghc n)	Drag Coefficient	Strength (HPa)	Number of wires	Vertical Capacity (RN)	Acrossine Capecity (kH)
	Strain	v 2	2H D. Arm S. To	nn LH 307	A2^2/T	11kV	~	-0.080	E					0	0	0	1.2	0.00		3	0
	Strain	× 2	2H D.Arm D. Ter	m RH 3W	A2^2/T2	11k9		-0.080						0	0	0	1.2	0.00		3	0
	Strain	× 2	2H D. Arm D. To	rm DH 3W	A2^2/T2	21869		-0.050	E				_	0	0	0	1.2	0.00		3	0
	Pn	× 3	DH S PEN RH		A3/P	1069	~	-0.030	8	5.00				0	0		1.2	0.00		3	0
	Pin Dia	H?	IN G FON UT		A202002	2189	Y	-0.050	E	5.00				0	0	0	1.2	0.00			
	Fin		IN D FIN LH		A302/PZ	atky	v	-0.000	E.					0	0		1.2	0.00		3	0
	Strain	× 3	BM D STRAIN S.	RH	A3^2/T	11ky	~	-0.800	0					0	0	0	1.2	0.00		3	0
	Strain	× 3	D STRAIN S	ы	A3^2/T	11k9		0.800	E					0	0	0	1.2	0.00		3	0
	Strain	~ 3	BH D STRAIN D	RE	A3^2/T2	1189		-0.800						0	0	0	1.2	0.00		3	0
	Strein	~ >	D STRAIN D	UK .	A012/T2	1189		-0.000					_	0	0	0	1.2	0.00		0	0
	Pn	~ 2	tm S. Pin RH 3W	(52/P	11k9	~	-0.030	R	5.00			_	0	0	0	1.2	0.00		3	0
	Pin		ten Sy Pin LH 318		12/2	11kv	~	+0.030	M	5.00				0	0	0	1.7	0.00		3	a v
	rm Octail Be	sck	Concrete 2N E	Arm S. Term	LH SW						Since	ngth Factors									
	Transverse Offset (m)		Vertical Offset (m)	Suspension Arm Length (m)	Allowabie Uplif (kH)						•	Load Case Max Wind	Street	oth Rector		1					
	-0.	93	0.03	0.03	a							Everyday				1					
	-0.	30	0.00	0.03	0																
	0.	50	0.03	0.03	0																
į		-																			
		_					_														



3.6 Soil Type

To access the Soil Library select the **Soil Type** tab in the Libraries Form. From this tab the user can edit any of the soil data populated in the Soil Types Table (Refer Figure 17).

Click the **Change File**, before locating and loading the library file to be used for the data set.

Click **Save Changes** to commit any changes made to the Soil Type Library or **Save As** to create a new Soil Library.



Figure 17: Soil Library

3.7 Stays

To access the Stays Library select the **Stays** tab in the Libraries Form. From this tab the user can select a Stay Group from the dropdown menu and edit any of the stay details populated in the Stay Table (Refer Figure 18).

Stay groups can be added and edited by selecting **Add/Edit Group Name**. A new window will open in which groups can be added or edited. Click **Save & Close** to commit any changes made.

Click the **Change File**, before locating and loading the library file to be used for the data set.

Click **Save Changes** to commit any changes made to the Stays Library or **Save As** to create a new Stay Library.

texts texts <tt< th=""><th>Image Image <th< th=""><th></th><th></th><th>Details</th><th></th><th></th><th></th><th>Job Description:</th><th></th><th>Plan Profile</th><th></th></th<></th></tt<>	Image Image <th< th=""><th></th><th></th><th>Details</th><th></th><th></th><th></th><th>Job Description:</th><th></th><th>Plan Profile</th><th></th></th<>			Details				Job Description:		Plan Profile	
Parenter like 12 Ching like 12 See Change See Change <t< th=""><th>Parameter la de la</th><th>Normal Libration Normal Libration<</th><th></th><th></th><th></th><th>Soil Type:</th><th></th><th></th><th>^</th><th>North (Y) 0*</th><th></th></t<>	Parameter la de la	Normal Libration Normal Libration<				Soil Type:			^	North (Y) 0*	
Carde Charges Enter Unitaries Carded in Unitar	Circle Changes Stand Electronamical Solutional Voltages (Instances Solutiona Voltages (Instances Solutiona Voltages	Cardonge Stee Charges Using in the Stee Charges Stee Stee Stee Stee Stee Stee Stee Stee	Carded Darget Size Darget Direct Darkster Direct Darkster <thdirect darkster<="" th=""> Direct Darkster<!--</th--><th>Parameter File & Component Li</th><th>braries</th><th></th><th></th><th></th><th></th><th></th><th></th></thdirect>	Parameter File & Component Li	braries						
Component lidentitie Ontdocker Vehages Percent lidentitie Addred Group hann Instruct CADA Struct data. Neu Library Ounger ife. Struct. Stare A.B. Struct Name Percent Library Ounger ife. Stare. Stare A.B. Stare Stare Stare Stare Stare Stare Stare Stare Stare Stare Stare Stare Stare Stare A.B. 1 Name Percent Library Made Neu Library Ounger ife. Stare Stare A.B. Stare A.G. Stare A	Component Libraries Ontdativer Waters New Libraries Add/ddt Group Name Tend CATAN Strat data tene Library Change Tene Strat Strat <td>Component Librarie Valuation Valuation</td> <td>Construct Undard Vadded Kondeturu Vaddeturu Vaddetur</td> <td>Cancel Changes Save Ch</td> <td>anges</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Component Librarie Valuation	Construct Undard Vadded Kondeturu Vaddeturu Vaddetur	Cancel Changes Save Ch	anges						
Universitie de la	Object AddBd Cookering Description Second Cookering	Note: Note: <th< td=""><td></td><td>Comment Librarian Cont</td><td>stern Malkanes Delos D</td><td>ala Basana Com</td><td>na Call Turan A</td><td>Stave Data Plant</td><td></td><td></td><td></td></th<>		Comment Librarian Cont	stern Malkanes Delos D	ala Basana Com	na Call Turan A	Stave Data Plant			
Bree Part of the late Description of the late Description of the late Image: Imag	Bree Bree Description Descrip	Bree Part of the late Part of the late Part of the late Image Part of the late	By and an analysis By and analysis By and analysis By anal	Stav Group, Wood	Add/Edit Group Name	es Import Catan	Stav data New I	ibrary Channa File Save Save &			
Name Price Winder (http:// (http:// http:// (Nume Print Windle (http://htt	Nume Prime Windle (http://htt	Neme Part (A) Ultrade (A) Dancer (A) <td>Stays</td> <td></td> <td></td> <td></td> <td></td> <td>Stay Strength F</td> <td>Factors</td> <td></td>	Stays					Stay Strength F	Factors	
Nome Nome Case of Case of Cas	Nome Nome Case of Case of Cas	Nome Nome Careford Vera Configure Nome	Nme Nme/her Cardity Ominity Drag Coefficient Note N		214	Ultimate	Country.		Load Cas	ses Strength Factors	
dol at da (NO)	Object Object<	Object Object<	Object Object<	Name	Number	Capacity	(mm)	Drag Coefficient	Max Wind	1	
Dia Model Model/Model Alada Come Alada	Distance NOR-VA NACA NACA NACA NACA OSB NG NOR-VA NACA NOR-VA NACA NOR-VA NACA OSB NG NOR-VA NACA NACA NACA NACA NACA OSB NG NOR-VA NACA NACA NACA NACA NACA OSB NG NOROVA NACA NACA NACA NACA NACA OSB NG NOROVA NACA NACA NACA NACA NACA ASA NACA NACA NACA NACA NACA NACA ASA NACA NACA NACA NACA NACA NACA SSB NACA NACA NACA NACA NACA NACA V NACA NACA NACA NACA NACA NACA	Distance Widewide Hank Han	Dia Mode Mode/Mode Alead Common Alead Alead Common Alead A	C01 -1 45	W/201/45	(KN) 26.25	0.00		Everyday	Y 1	
021 # 45 W10521/45 9.2.0 0.00 1 051 # 45 W10521/40 9.2.0 0.00 1 053 # 45 W10521/40 9.2.0 0.00 1 053 # 45 W10521/40 9.0.0 1 1 053 # 45 W10521/40 6.0.0 1 1 053 # 45 W10521/40 6.0.0 1 1 053 # 45 W10521/40 0.00 1 1 A31 WA31 3.14 0.00 1 A32 WA32 45.10 0.00 1 952 W1952 5.00 0.00 1 952 W1952 5.00 0.00 1 + - - - - -	021 + 45 W10521/45 12.06 0.00 1 051 + 45 W10521/45 12.06 0.00 1 053 + 45 W10521/45 0.00 1 1 A51 W1A51 12.06 0.00 1 A52 W1A53 45.10 0.00 1 952 W1532 4.00 0.00 1 952 W1532 4.00 0.00 1 953 W1532 4.00 0.00 1 • - - - - -	CBL # 6 WOSL/6 S2.0 0.00 1 GS1 # 6 WOSL/69 S2.0 0.00 1 AS1 WAS1 S2.0 0.00 1 AS2 WAS2 45.10 0.00 1 SS2 WS2 45.0 0.00 1 SS2 WS2 45.0 0.00 1 SS2 WS2 4.00 0.00 1 V VS2 VS3 0.00 1	08 # 45 W059245 92.00 0.00 1 05 # 45 W059245 92.00 0.00 1 05 # 45 W05945 92.00 0.00 1 05 # 45 W05945 92.00 0.00 1 05 # 45 W05945 92.00 0.00 1 05 # 45 W0595 92.00 0.00 1 05 # 50 W059 92.00 0.00 1 A27 W059 92.00 0.00 1 353 W059 14.00 0.00 1 553 W0593 14.00 0.00 1 * * * * *	GS1 at 60	W/GS1/43	36.25	0.00		1		
024 00 0021/00 92.28 0.00 1 024 00 0021/00 93.90 1 1 024 00 00251/00 92.90 0.00 1 A1 00251/00 92.90 0.00 1 A51 0045 0.00 1 1 A52 0.40 0.00 1 1 A51 0.45 0.00 1 1 A52 0.40 0.00 1 1 551 0.50 0.00 1 1 553 0.955 1.400 0.00 1 1 * * * * * * *	024 00 0021/00 92.28 0.00 1 024 00 0021/00 93.90 1 1 024 00 0025 100 0.00 1 1 A1 0025 100 0.00 1 1 A51 0045 0.00 1 1 A52 0.405 0.00 1 1 A51 0.457 0.00 1 1 A51 0.457 0.00 1 1 A51 0.457 0.00 1 1 S51 0.957 0.00 1 1 S53 0.957 1.400 0.00 1 V V V V V V	Bit # W0321/40 92.28 0.00 1 G12 # 40 W0321/40 P30 0 1 G12 # 41 W051/50 P20 0.00 1 A1 WA5 P20 0.00 1 A51 WA51 P20 0.00 1 A51 WA52 9.00 1 1 A51 WA53 9.47 0.00 1 S51 W353 9.47 0.00 1 S53 W353 14.00 0.00 1 S53 W353 14.00 0.00 1 V V V V 0.00 1	02 84 40 W03290 92.00 0.00 0 05 84 40 W052940 49.50 0 0 05 84 50 W052940 42.50 0.00 0 0 A5 W1517 42.50 0.00 0 0 0 A5 W152 45.10 0.00 0 0 0 55 W152 6.00 0 0 0 0 55 W153 14.30 0.00 0 0 0 55 W153 14.30 0.00 0 0 0	GS2 at 45	W/GS2/45	52.09	0.00				
050 # 61 W0551/40 99.99 0.00 1 650 # 62 W0551/40 91.40 0.00 1 451 WA51 91.40 0.00 1 452 W1620 45.10 0.00 1 453 W1630 64.41 0.00 1 552 W1530 64.40 0.00 1 553 W1530 14.40 0.00 1 553 W1530 14.40 0.00 1 553 W1530 14.40 0.00 1 • • • • • •	050 # 61 W0551/40 99.99 0.00 1 650 # 62 W0551/50 92.59 0.00 1 451 WA52 45.10 0.00 1 452 WA52 45.10 0.00 1 453 WA52 45.10 0.00 1 553 W1532 5.00 0.00 1 553 W1532 1.400 0.00 1 • - - - - -	C50 # 45 W053/44 99.99 0.00 1 C50 # 60 W055/90 92.90 0.00 1 A51 WA52 91.40 0.00 1 A52 WA52 45.10 0.00 1 A53 WA52 45.10 0.00 1 A53 WA52 45.10 0.00 1 A53 WA52 45.00 0.00 1 S53 W353 1.400 0.00 1 • - - - - -	03 # 43 W03 A45 PP.99 0.00 1 05 # 40 W05 390 82.50 0.00 1 A1 W04 1 31.40 0.00 1 A52 W05 2 43.0 0.00 1 A52 W05 2 43.0 0.00 1 A52 W32 3 45.47 0.00 1 553 W05 2 14.00 0.00 1 553 W05 3 14.00 0.00 1 * * * * * *	GS2 at 60	W/G52/60	52.08	0.00	1	1		
050 40 W053M0 82.50 0.00 1 A51 WA51 31.40 0.00 1 A52 WA52 45.10 0.00 1 A52 WA52 45.00 1 A53 WA52 45.47 0.00 1 A53 W353 45.47 0.00 1 552 W952 9.00 0.00 1 553 W953 14.00 0.00 1 57 W953 14.00 0.00 1 58 W953 14.00 0.00 1 60 W953 14.00 0.00 1 7 W953 14.00 0.00 1	0504 00 W053/M0 82.30 0.00 3 A51 WA51 31.40 0.00 3 A52 WA52 45.10 0.00 3 A52 WA52 45.10 0.00 3 A52 WA52 45.40 0.00 3 A52 W752 9.00 0.00 3 552 W752 9.00 0.00 1 553 W752 14.00 0.00 1 57 W752 14.00 0.00 1 583 W752 14.00 0.00 1 * * * * * *	0504 00 W053/M0 82.30 0.00 1 A51 WA51 31.40 0.00 3 A52 WA52 45.10 0.00 3 A52 WA52 45.00 3 A53 WA52 45.00 3 A53 WA52 9.00 0.00 3 S52 W952 9.00 0.00 1 S53 W953 14.00 0.00 1 V V V953 14.00 0.00 1 S53 W953 14.00 0.00 1 1 V V V953 14.00 0.00 1 S53 W953 14.00 0.00 1 1 V V V953 14.00 0.00 1 V V V V V V V V V V V V	R R WGS349 R Q <td>GS3 at 45</td> <td>W/GS3/45</td> <td>89.99</td> <td>0.00</td> <td></td> <td>1</td> <td></td> <td></td>	GS3 at 45	W/GS3/45	89.99	0.00		1		
A51 WA51 31.40 0.00 1 A52 WA52 45.00 0.01 1 A53 WA53 65.47 0.00 1 552 W552 9.00 0 1 553 W553 14.00 0.00 1 • - - - -	A51 WA51 31.40 0.00 1 A52 WA52 45.00 3 A53 WA52 65.00 3 523 W252 9.00 3 553 W253 14.00 0.00 1 • • • • • •	A51 WA51 31.40 0.00 1 A52 WA52 45.40 0.00 1 A53 WA53 65.47 0.00 1 S53 W553 14.00 0.00 1 * * * * * *	M31 WA31 31.40 0.00 1 A23 WA32 45.47 0.00 1 53 W32 45.47 0.00 1 53 W32 45.40 0.00 1	GS3 at 60	W/GS3/60	82.50	0.00		1		
AS2 W/S2 45.10 0.00 1 AS3 W/S3 M/S4 0.00 1 55.0 W/S3 14.00 0.00 1 * * * * * *	AS2 W/S2 45.10 0.00 1 AS3 W/S2 M/S0 0.00 1 55.0 W/S2 9.00 0.00 1 47.0 W/S3 14.00 0.00 1 * * * * * *	AS3 W/A2 45.10 0.00 1 AS3 W/S3 45.40 0.00 1 55.0 W/S3 14.00 0.00 1 * * * * * *	A73 W/42 45.10 0.00 1 A53 W/32 M/30 0.00 1 S53 W/933 14.00 0.00 1 * * * * * *	AS1	W/AS1	31.40	0.00		1		
AS W/AS 65.47 0.00 1 52 W/2S 14.00 0.00 1 53 W/2S 14.00 0.00 1	AS W/AS 65.47 0.00 1 53 W/SS 14.40 0.00 1 * * * * *	AS W/AS 65.47 0.00 1 53 W/SS 14.40 0.00 1 * * * * *	ASQ WASQ 66.47 C.00 523 W353 14.00 C.00 1 * * * * *	AS2	W/AS2	45.10	0.00		1		
853 W/82 9.00 0.00 1 953 W/853 14.00 0.00 1	653 W/553 0.00 1 653 W/553 1.400 0.00 1	553 W1532 0.00 0.1 653 W1533 1.400 0.00 1	553 W/52 9.00 0.00 1 553 W/53 4.00 0.00 1	AS3	W/AS3	85.47	0.00		1		
353 W133 1430 0.00 1	353 W353 14.00 0.00 1	Image: Spide of the spide o		552	W/SS2	9.00	0.00	1	1		
				553	W/SS3	14.00	0.00		1		

Figure 18: Stay Library

3.8 Pole Plant

To access the Pole Plant Library select the **Pole Plant** tab in the Libraries Form. From this tab the user can select a Pole Plant Group from the dropdown menu and edit any of the pole plant details populated in the Pole Plant Table (Refer Figure 19).

Pole Plant groups can be added and edited by selecting **Add/Edit Group Name**. A new window will open in which groups can be added or edited. Click **Save & Close** to commit any changes made.

Click the **Change File**, before locating and loading the library file to be used for the data set.

Click **Save Changes** to commit any changes made to the Pole Plant Library or **Save As** to create a new Pole Plant Library.

						Job (escription:			Plan	Profile			
econs.			oil Type:								Prome		North (Y) 01	
	eter File & Component Librarie	e1												
Cana	cel Changer Save Change													
	con changes - Save change				Data Diant									
Comp	ionent Libraries Conductors	Voltages Poles Pole	Bases Crossa	/ms Soil Types 5	Jays Pole Plant	ale Equipment Lib	more New Library	Change Elle C	ma Caus As					
OIE P	hant Group ETEL Transform	hers on 11m Busck	• A00/	Edit Group Names	Import CALAR PE	ne Equipment Lo	rary inew ubrary	Change rile is	Distance					
	Name	Part Number	Is Circular	Height (m)	Width/Diameter (m)	Depth (m) (Downline)	Mass (kg)	Point (from top of plant) (m)	from Top of Pole to Mounting Point (m)	from pole to inside face or plant (m)	Drag Coefficient	Wind Area Across Line (m ²) (Height x Length)	Wind Area Downline (m ²) (Height x Depth)	
۱.	ETEL 3PH 100 kVA	Pole Mt 100-1		1.48	1.25	0.92	950.00	-0.40	2.24	0.10	1.50	0.00		0.
	ETEL 1PH 15 kVA	Pole Mt 15-11-1		0.79	0.52	0.65	172.00	-0.40	2.24	0.10	1.50	0.00		0.
	ETEL 1PH 30 kVA	Pole Mt 30-11-1		1.03	0.52	0.65	236.00	-0.40	2.24	0.10	1.50	0.00		0.
	ETEL 3PH 30 kVA	Pole Mt 30-11-3		0.87	0.99	0.70	348.00	-0.40	2.24	0.10	1.50	0.00		0.
	ETEL 3PH 50kVA	Pole Mt 50-11-3		0.96	0.99	0.70	451.00	-0.40	2.24	0.10	1.50	0.00		0.
	ETEL 3PH 150 kVA	Pole Mt 150-1		1.20	1.22	1.00	955.00	-0.40	2.24	0.10	1.50	0.00		0.
	ETEL 3PH 200 KVA	Pole Mt 200-1		1.17	1.20	1.04	1,048.00	-0.40	2.24	0.10	1.50	0.00		0.
<u> </u>														_

Figure 19: Pole Plant Library

4.0 Parameter File and Design Criteria

The loadcase design criteria established by the user can be created and viewed under **Configuration** on the top tool-bar menu. Once opening the form the user will be able to view and edit the different loadcases located underneath the library section from the **Component Libraries** Tab.

To create a new Parameter File or edit any of the existing Parameter File (by loading one at the start of a new job or loading in an old file), simply double click into the cell and type in the new value. If a new Parameter File has been created it will need to be saved using the **Save File As New Parameter File** button. If editing an existing file click the **Save Changes** button to save the changes made.

An existing Parameter File can also be imported through this form using the **Change File** feature. An example Parameter File that was loaded at the start of a new job can be seen in Figure 20 below.

Т	ipload	Cases															 Upli	ft Load Ca	ises		
		Name	Temperature	Wind	Radial Thickness of Ice or	Density of Ice or	A	B	c	D	Live Load	E	Live Load	G	Use Span Reduction	Use Span Reduction Factor		Name	Temperature (°C)	Wind Pressure (Pa)	
			(*C)	(Pa)	Snow (mm)	Snow (kg/m ³)	(wn)	(GS)	(GC)	(PE)	vertical (N)		(N)		Winds	Downdraft Winds	P.	Uplift	0	900	
		Max Wind	10	1531	0	0	1.00	0.00	1.25	1.25	0.00	0.00	0.00	0.00			l in				
		Everyday	10	383	0	0	1.00	0.00	0.00	1.10	0.00	0.00	0.00	0.00							
	•																				
	_						_	_	_	_		_									

Figure 20: Parameter File

5.0 Settings

To view and edit the COLDNet Pole settings, select **Configuration** from the top tool bar menu in the main COLDNet Pole window. The Parameter File & Component Libraries form will then open in a new window (Refer Figure 21). Located on the right-hand side of the form under the **Component Libraries** Tab are the settings (**Calculation Methods, Calculation Options, Blowout Conditions & Default Properties)**.

5.1 Calculation Methods

5.1.1 Tension Calculation Method

There are two different methods for calculating the tension of the conductors, which include: Ruling Span & Inclined Ruling Span.

5.1.2 Pole Allowable Tipload Calculation Method

There are two different methods for calculating the allowable pole tipload, which include: Pole Strength & Bending Strength

5.1.3 Pole Tipload Bending Above Stay Calculation Method

There are two different methods for calculating the allowable tipload above stay attachment, which include: Pole Strength & Bending Strength.

5.1.4 Foundation Calculation Method

There are two different methods for calculating the foundations, which include: Modified Broms & Embedment Length.

5.2 Calculation Options

Under **Calculation Options** are a list of options available to the user to be considered in the calculations. All of the calculations are selected by default but can be turned off and on as required by selecting the check box next to each of the options (Refer Figure 21).

5.3 Blowout Conditions

Blowout Conditions for the design can be entered in the fields provided under **Temperature** and **Wind Pressure** (Refer Figure 22).

5.4 Default Properties

Default Properties for the **Soil Type** and **Mid-Span 'K' Factor** that will be used in the relevant calculations can be entered in the fields provided (Refer Figure 21).

Calculation Methods	
Tension Calculation Metho	od: RulingSpan 🗸
Pole Allowable Tiplo	ad PoleStrength V
Calculation Herite	
Pole Tipload Bending above St	ay PoleStrength
Calculation Metho	d: Tolestichgan
Foundation Coloulation Mathe	
Foundation Calculation Metho	a: EmbedmentLength V
Calculation Options	Plawaut Canditiana
Calculate Tiploads 🗹	Blowout Conditions
Calculate Foundations 🗸	Temperature (°C): 15
Calculate Mid-Span separation	
Calculate Mid-Spall Separation	Wind Pressure (Pa): 800
Calculate Uplift 🗹	
Calculate Stays 🗹	Default Properties
Calculate Crossarms 🗸	Default Soil Type: Very Firm
	Voly Hill
	Mid-Span 'K' factor: 0.40

Figure 21: COLDNet Pole Settings

6.0 Pole Design

After the Libraries and Parameter Files have been set up, the user can begin assigning the **Pole Details** in the required fields (Refer Figure 22). Any new design changes or edits to existing data will need to be saved (**File>Save**) to commit changes. Quit (**File>Quit**) can be used to remove any changes made during the editing session on the job.

6.1 General Design Information

The **General Information** required for the single pole analysis can be selected from the dropdown menus available or entered where provided (Refer Figure 22).

6.1.1 Selecting Pole

The **Pole Group** must first be selected from the dropdown menu provided. The options in the dropdown are populated from the user Pole Library.

A **Pole Length** must then be selected from the dropdown menu provided. The options in the dropdown are populated from the pole lengths that are available for the **Pole Group** that was previously selected. This data is also generated from the Pole Library.

Once a **Pole Length** has been selected, the **Pole Strength** will then need to be to be allocated from the dropdown provided. The options in the dropdown are populated from the pole strengths that are available for the **Pole Length** that was previously selected. Once again, this data will be generated from the Pole Library.

If a **Measure Strength** is available and required to use for the design it can be entered in the field provided. These values will be used as the allowable tipload strength of the pole if entered.

An **Asset No.** can also be entered into the field provided if required.

6.1.2 Pole Angle

The pole angle is only visual and edited if the pole structure is rectangular. Circular poles will not have the angle displayed or editable.

To change the pole angle, either enter in the specific value in **Pole Angle** textbox provided or by selecting one of the default options available under **Change Pole Angle**. The **Change Pole Angle** dropdown options will only become available once a profile has been entered. Any changes made to the pole angle can be visually seen in the main plan view. Note that the pole angle is displayed and entered in decimal degrees.

6.1.3 Foundations

The **Soil Type** can then be selected from the dropdown menu. The options in the dropdown are populated from the user Soil Library.

From the **Soil Type** selected, the **Soil** Strength value is populated for the Soil Library. If the user wishes to change this value, they can do so by selecting **Non-Standard Soil Strength** and entering the desired value in the textbox provided. From the pole selected, the standard setting depth is populated for the pole (which is generated from the Pole Library). If the user wishes to change this value, they can do so by selecting **Non-Standard Setting Depth** and entering the desired value in metres in the textbox provided.

If applicable a **Stabilised Backfill** is available for both circular and rectangular poles. To add stabilised backfill, select **Stabilised Backfill** and enter in the desired **Width below Ground** in millimetres. If the **Stabilised Backfill** is checked the **Width below Ground** will be automatically populated with the widest base width of the pole selected. The diameter of the stabilised backfill that is entered must be equal too, or greater than this value.

7.1.3.1Pole Bases

Pole bases can be added or removed to any rectangular pole. There are three different types of pole bases: donuts, upper logs and lower logs that are generated from the Pole Base Library. Bases can be removed by selecting 'None' from any of the dropdown menus and all changes can be visible in both the elevation and plan views.

A donut can be added to a pole by selecting an available one from the first dropdown menu. The **Offset Distance** of a donut will automatically be defaulted to 0m and can only be changed so that the donut sits underneath the pole (i.e. the offset distance can only be 0m or the '-' the depth of the donut). The **Orientation** cannot be edited for donuts.

An upper log can be added in conjunction with either a lower log or donut, or by itself if required. Simply select the desired **Upper Log** from the dropdown menu. This will automatically populate the **Offset Distance** as a vertical distance from the ground line to the bottom of the pole, specified for the log in the Pole Base Library. This value can be changed if required, however the offset distance must be positive and no greater than the setting depth of the pole. The upper log must be placed on a face of the pole and will automatically be placed on the inside face of the pole. The **Orientation** can also be changed manually in the space provided.

A lower log can be added in conjunction only with an upper log, or by itself if required. Simply select the desired **Lower Log** from the dropdown menu. This will automatically populate the **Offset Distance** as a vertical distance from the bottom of the pole to the ground line, specified for the log in the Pole Base Library. This value can be changed if required, however the offset distance must be positive and no greater than the setting depth of the pole or the upper log offset if current. The lower log must be placed on a face of the pole and will automatically be placed on the outer face of the pole. The **Orientation** can also be changed manually in the space provided.

6.1.4 Job Description

A **Job Description** can be entered into the field provided if desired by the user.

G COLDNet Pole: C:\U	Jsers\Kieren Hatchman\Desktop\Kierer	Hatchman\CATAN\COLDNet Pole\Example Jobs\Walkthrough.COLDPole
File Designs C	onfiguration Reports Strength	actors Export to DXF 3D View Job History Print Settings Information
Current Design:	Design1	Foundation Job Description:
Pole Details		Soil Type: Very Firm V Walk-through
Asset No:	1234	Soil Strength (kPa):
Group:	Busck Concrete V	Liso Soil
Length:	B11 ~	Setting Depth (m): 1.80 Use Non-Standard Setting Depth
Strength:	Single 22kN v	Stabilised Backfill:
Measured Strength Strong/Weak (kN):		Ground (mm):
Pole Apole (°):	0	Pole Bases & Logs Offset (m) Direction (*)
role Angle ().		Pole base: Pole base: Donut 2 V
		Upper Log: <none> 0</none>
	Add Profile	Lower Log: <none> V 0</none>

Figure 22: COLDNet Pole Design Information

7.0 Survey Data

After the Pole and Foundation details have been set up, the user can begin by entering in the required field data in the **Survey Data** tab underneath the pole information on the main form (Refer Figure 23). Any new data or edits to existing data will need to be saved (**File>Save**) to commit changes. Quit (**File>Quit**) can be used to remove any changes made during the editing session on the job.

7.1 Creating and Editing a Profile

Before the user can enter in the field data, they must first add a **New Profile**. A profile can be entered by typing in the required direction in the field provided, followed by OK or selecting the Enter key. The bearing of the new profile must be between 0 - 360 degrees. Once a bearing has been added, the data field grid will become available.

The tabs that are displayed under **Survey Data** displays the current bearing that is being worked on. To change bearings, select from the tabs across the top of the **Data Points** table.

To modify an existing bearing select **Modify Bearing** and enter in the desired change.

To remove a bearing from the job completely, select **Delete Bearing**.

By default, the Bearing **Name** will be empty, however this can be changed by entering in a new description in the **Name** field provided.

Before entering the field data the user should first specify the **Date Type** that was used during the survey. The two options available are: **Relative Horizontal Distance & Height & Absolute Distance and Elevation**. The user should then specify which orientation the data was collected in and therefore be recorded in. The two options available are: **Away from Pole** and **Towards Pole**. **Away from Pole** specifies that the data was collected from the pole of interest (origin) to an outer direction. **Towards Pole** specifies that the data was collect from an outer reference in an inward direction towards to pole of analysis. By default **Away Pole** using **Relative Horizontal Distance & Height** are selected. If the survey data has been entered wrong at any stage it can be corrected by selected the correct option for both of these fields.

7.2 Entering Field Data

The way in which the data is required to be entered into the data grid is specific to the **Data Type** that was selected when creating the job. All data is to be entered on a per bearing basis (i.e. a new profile will need to be created every time a data enter falls off the centreline from the previous entry). As outlined, there are two **Data Type** options available to choose from including: **Relative Horizontal Distance & Height, Absolute Distance & Elevation**. The example shown will be entered using **Relative Horizontal Distance & Height**.

7.2.1 Relative Horizontal Distance & Height

For this data entry type, the user will enter the **Horizontal Distance** and **Vertical Distance** (in metres) for each data point. This is the change in horizontal and vertical distance between the current data point and the previous point. The user will then need to specify what **Point Type** is applicable from the dropdown provided. **Comments** can be added if required. A profile will only be created if an **"End Span Pole"** has been added for the current Working Bearing (maximum of one End Span

Pole per bearing) (Example shown in Figures 23 & 24). The data points entered will be visually represented in the main plane view screen.

7.2.2 Absolute Distance & Elevation

For this data entry type, the user will enter the **Absolute Distance** and **Elevation** for each data point. This is the absolute distance and elevation from the pole (or first data point if data was collected towards the pole) to the current data point. The user will then need to specify what **Point Type** is applicable from the dropdown provided. **Comments** can be added if required. A profile will only be created if an "**End Span Pole**" has been added for the current Working Bearing (maximum of one End Span Pole per bearing). The data points entered will be visually represented in the main plan view screen.

120°	Data Simple Point Loa	ids Complex Point I	Loads Results I	mages					
Nam	ne:		Away	From Pole	Modify B	Bearing	Data Type:	Relative Horizontal Distance & Height	~
Data	Points		O Towa	rds Pole	Delete	Profile			_
	Point Type	Point Number	Horizontal Distance (m)	Vertical Distance (m)	Bearing (°)			Comments	
	Study Pole	1	0.00	0.00					
	Ground Point	2	20	0.1					
	Ground Point	3	10	0		Drive way			
	Ground Point	4	20	0.4					
	Offline Point	5	3	6	60	Shed Roof			
	Remote Point	6		6		LV			
	Ground Point	7	20	-0.3					
1	End Span Pole	8	20	0		Pole Asset No	0.5678		

Figure 23: COLDNet Pole Data Input – Relative Horizontal Distance & Height

Survey	/ Data Simple Point Load	ls Complex Point I	Loads Results I	mages					
120°	310°								
Nam	ie:		Away	From Pole	Modify E	earing		Data Type:	Relative Horizontal Distance & Height
Data	Points		🔘 Towa	rds Pole	Delete I	Profile			
	Point Type	Point Number	Horizontal Distance (m)	Vertical Distance (m)	Bearing (°)				Comments
	Study Pole	1	0.00	0.00					
	Ground Point	9	20	-0.5					
	Ground Point	10	20	-0.5					
•	Ground Point	11	20	-0.2]			
	End Span Pole	12	20	-0.1		Pole Asset No	0.7744		

Figure 24: COLDNet Pole Data Input - Profile 2

8.0 Point Loads

Point Loads can be added at any stage of the design process once the Pole Design Information has been established. The user can add any additional point loads that are required for the design through the **Simple Point Loads** and **Complex Point Loads** tabs respectively (located next to the Survey Data Tab). The loadcase factors are applied to all point load calculations. Any new design changes or edits to existing data will need to be saved (**File>Save**) to commit changes. Quit (**File>Quit**) can be used to remove any changes made during the editing session on the job.

8.1 Simple Point Loads

To add a new simple point load to the design click **Add New Point Load**, a new row in the simple loads grid will appear.

First, an optional **Description** can be entered into the first cell in the grid, followed by the **Bearing** for the simple load which will need to be entered in the field provided in decimal degrees.

Next, the **POA** (Point of Attachment) will need to be entered manually as a height above the ground in metres, in the field provided.

The **Horizontal Load** that is required for the point load can be entered in kilo-Newtons in the field provided. This is the horizontal load per wire, not the overall load from the point load.

Finally, the **No. of Wires** will need to be entered in the space provided. The number of wires will get multiplied with the horizontal load to obtain the total load from the point load. Refer Figure 25 for an example

If a simple point load is no longer required for the design it can be removed by selecting **Remove Selected Point Load**. The simple load will be removed from the simple loads grid.

Survey Data Simple Point Loads	Complex Point Loads	Results Images				
					Add New Point Load	Remove Selected Point Load
Description	Bearing (°)	POA (m)	Horizontal Load (kN) / Wire	No. of Wires		
Point Load 1	30	7	2	3		

Figure 25: COLDNet Simple Point Load Information for the Design

8.2 Complex Point Loads

To add a new complex point load to the design click **Add New Point Load**, a new row in the complex loads grid will appear.

First, an optional **Description** can be entered into the firs cell in the grid, followed by the **Bearing** for the complex load which will need to be entered in the field provided in decimal degrees.

Next, the **POA** (Point of Attachment) and **POA End** will need to be entered manually as a height above the ground in metres, in the fields provided.

The **Conductor Group** must then be selected from the dropdown menu provided. The options in the dropdown are populated from the user Conductor Library.

A **Conductor** must then be selected from the dropdown menu provided. The options in the dropdown are populated from the conductors that are available for the **Conductor Group** that was previously selected. This data is also generated from the Conductor Library.

The **Everyday Load** needs to be entered as a percentage of the conductor breaking load in the field provided.

The **No. of Wires** will need to be entered in the space provided. The number of wires will get multiplied by the calculated tension load to obtain the total load from the point load.

Either the **Span Length** or the **Ruling Span** must finally be entered in the fields provided. If there is no **Ruling Span** provided the **Span Length** value will be used in the complex load calculation. However, if a **Ruling Span** has been provided this will be used regardless of whether a **Span Length** has been entered or not.

If a complex point load is no longer required for the design it can be removed by selecting **Remove Selected Point Load**. The complex load will be removed from the complex loads grid.

Survey Data Simple Point Loads	Complex Point Lo	ads Results In	mages							
						Add N	lew Point Load		Remove Selecte	d Point Load
Description	Bearing (°)	POA (m)	POA End (m)	Conductor Group	Conductor	Everyday Load (%CBL)	No. of Wires	Span Length (m)	Ruling Span (m)	
Service	200	7	8	Standard	Chlorine	8	1	30	30	

Figure 26: COLDNet Complex Point Load Information for the Design

7.0 Design Information

After the Survey Data has been entered and the Profiles have been created, the user can begin assigning the **Design Information** in the required tabs. Any new design changes or edits to existing data will need to be saved (**File>Save**) to commit changes. Quit (**File>Quit**) can be used to remove any changes made during the editing session on the job.

7.1 Conductors

After the Profiles have been generated, the user can create a list of conductors that are required for the design in the **Conductor** tab at the bottom of the main screen (Refer Figure 27). Any new design changes or edits to existing data will need to be saved (**File>Save**) to commit changes. Quit (**File>Quit**) can be used to remove any changes made during the editing session on the job.

To add a new conductor to the design click **Add New Conductor**, a new row in the conductor grid will appear.

The **Conductor Group** must first be selected from the dropdown menu provided. The options in the dropdown are populated from the user Conductor Library.

A **Conductor** must then be selected from the dropdown menu provided. The options in the dropdown are populated from the conductors that are available for the **Conductor Group** that was previously selected. This data is also generated from the Conductor Library.

Next, the **Voltage** must be selected from the dropdown menu provided. The options in the dropdown are populated from the user Voltage Library.

The **No. of Wires**, **Max Temp** and **Min Temp** need to be entered in the fields provided. If the voltage and number of wires selected for a conductor doesn't match any of the entries in the Crossarm Library a message box will appear.

If a conductor is no longer required for the design it can be removed by selecting **Remove Selected Conductor**.

Conductors Crossarms Pole Pla	int Stays				
Add New Conductor	Remove Selected Cond	uctor			
Conductor Group	Conductor	Voltage	No. of Wires	Max Temp (°C)	Min Temp (°C)
Standard	Iodine	11kV	3	40	-15
Standard	19/2.75 SC/GZ	LV3	4	40	-15

Figure 27: COLDNet Conductor Information for the Design

7.2 Crossarms

After the Conductors have been added to the design, the user can begin to create the profiles and add circuits to the design. To add the crossarms and circuits to the design, select the **Crossarm** tab at the bottom of the main screen and select the bearing tab that is required to be designed (Refer Figure 28). Any new design changes or edits to existing data will need to be saved (**File>Save**) to commit changes. Quit (**File>Quit**) can be used to remove any changes made during the editing session on the job.

To add a new circuit to the design click **Add New Circuit**, a new row in the pole crossarm grid and end crossarm grid will appear. First enter in all the required information in the pole crossarm grid before moving onto the end crossarm grid.

It must first be determined if the circuit is connected to a different circuit on another bearing. Connected circuit simply means that the two circuits share the same crossarm at the attachment. Only one crossarm will be present at that attachment and will share the same parameters between the two circuits. If the circuit is not connected there will be a crossarm present at the attachment of each circuit. To connect a circuit, select **Connected Circuit** from the dropdown menu and choose which circuit to connect too. In order to connect a circuit there first bust be at least one complete circuit on two or more profiles. Circuits can only be joined if all the required information has been entered.

Next, select the **Attachment Type** for the crossarm from the dropdown provided. Either a **Pin** or **Strain** crossarm must be selected.

A **Conductor** must then be selected from the dropdown menu provided. The options in the dropdown are populated from the list of conductors that have been added to the design in the Conductors Tab.

The **Everyday Load** needs to be entered as a percentage of the conductor breaking load in the field provided.

The **Crossarm Group** must first be selected from the dropdown menu provided. The options in the dropdown are populated from the user Crossarm Library.

A **Crosssarm** must then be selected from the dropdown menu provided. The options in the dropdown are populated from the crossarms available for the **Crossarm Group** that was previously selected. Only crossarms that match the **Conductor** parameters will be listed in the dropdown menu (i.e. crossarms that match the attachment type, number of wires and voltage in the Crossarm Library).

The **POA** (Point of Attachment) will automatically be generated from the Crossarm Library for the top circuit based on the **Crossarm** selected. If the circuit is not the top circuit it will need to be entered in manually as a height above the ground in metres, in the field provided. Select the **Locked POA** function to fix this this height above ground.

The **Crossarm Angle** will automatically be populated so that it is positioned on the closest face across the line of the circuit. If required this value can be changed by entering into the field provided in decimal degrees.

The **Span Length** will be automatically populated as the distance between the two poles. This value cannot be edited. **Ruling Span** will also be automatically calculated and populated in the field provided. This value can be changed if required.

If a circuit is no longer required for the design it can be removed by selecting **Remove Selected Circuit**. The circuit will be removed from both the pole crossarm grid and the end crossarm grid.

There is an option available to **Show Kingbolt Height** instead of the **POA**. To do this simply select the option from the top right-hand corner of the **Crossarms Tab**.

There is also options available to **Show Wire Detail** and **Show Height of Wires** above ground. To show any of these two options select them from the top right-hand corner of the **Crossarm Tab**.

Conduct	ors Crossarms Pole Plant Stays											
120°	310°											
Pole	Crossarms Add New	Circuit	Remove Selected Circuit						156	ow Kingbolt Heig	1 Show	w Wire Detail Show Height of Wires
Circu	t Common Crossarm	Attachment Type	Conductor	Everyday Load (%CBL)	Crossarm Group	Crossarm	Locked POA	POA (m)	Crossarm Angle (*)	Span Length (m)	Ruling Span (m)	
	1 310° Circuit: 1 11kV	Strain	11kV Iodine x 3	12.00	Busck Concrete	2M D.Arm S. Term RH 3W		9.120	215	90.00	90.00	
	2 «None»	Strain	LV3 19/2.75 SC/GZ x 4	8.00	Busck Concrete	3M LV D TERM S		8.120	210	90.00	90.00	
End	Crossarms											
Circu	t	Attachment Type			Group	Crossarm		POA (m)	Crossarm Angle (*)			
	1	Strain			Busck Concrete	2M D. Arm S. Term LH 3W		10.000	210			
	2	Strain			Busck Concrete	3M LV D TERM S		9.000	210			

Condu	ctors Crossarms Pole Plant Stays												
120*	310°												
Po	Add New	/ Circuit	Remove Selected Circuit						🗌 sh	ow Kingbolt Heig	ht 🗌 Sho	w Wire Detail Show Height of Wires	
Cir	cuit Common Crossarm	Attachment Type	Conductor	Everyday Load (%CBL)	Crossarm Group	Crossarm	Locked POA	POA (m)	Crossarm Angle (*)	Span Length (m)	Ruling Span (m)		
	1 120° Circuit: 1 11kV	Strain	11kV Iodine x 3	12.00	Busck Concrete	2M D.Arm S. Term RH 3W		9.120	215	80.00	80.00		
En	d Crossarms												
Cir	cuit	Attachment Type			Group	Crossarm		POA (m)	Crossarm Angle (*)				
	1	Pin			Busck Concrete	3M S PIN RH		9.000	220				

Figure 28: COLDNet Crossarm Information for the Design

7.4 Pole Plant

After the Circuits and Crossarms have been added to the design, the user can add Pole Plant equipment if required. To add the equipment to the design, select the **Pole Plant** tab at the bottom left-hand corner of the main screen (Refer Figure 29). Any new design changes or edits to existing will need to be saved (**File> Save**) to commit changes. Quit (**File>Quit**) can be used to remove any changes made during the editing session on the job.

To add a new pole plant to the design click **Add New Pole Plant**, a new row in the pole plant grid will appear.

The **Pole Plant Group** must first be selected from the dropdown menu provided. The options in the dropdown are populated from the user Pole Plant Library.

A **Pole Plant** must then be selected from the dropdown menu provided. The options in the dropdown are populated from the pole plants that are available for the **Pole Plant Group** that was previously selected. This data is also generated from the Pole Plant Library.

The **Distance from Pole Top (m)** and **Offset Distance from Pole** will be automatically generated after the **Pole Plant** has been selected based on the information in the user Pole Plant Library. This information can also be changed manually in the fields provided if required.

The **Direction** will automatically be populated so that the plant is placed across the line and behind the line for terminations. This value can be changed by entering it into the field provided in decimal degrees.

Pole plant **Comments** can be added in the field provided if required.

If a pole plant is no longer required for the design it can be removed by selecting **Remove Selected Pole Plant**.

Conductors Crossarms Pole Plant Stay	s					
Add New Pole Plant	Remove Selected Pole Plant					
Pole Plant Group	Pole Plant	Distance from Pole Top (m)	Offset Distance from Pole (m)	Direction (°)	Exclude from Calculations	Comment
ETEL Transformers on 11m Busck	ETEL 3PH 100 kVA V	2.24	0.10	300		

Figure 29: COLDNet Pole Plant Information for the Design

7.5 Stays

Details of the stays can be viewed in the **Stays** tab at the bottom left-hand corner of the main screen (Refer Figure 30). Any new design changes or edits to existing will need to be saved (**File> Save**) to commit changes. Quit (**File>Quit**) can be used to remove any changes made during the editing session on the job.

7.5.1 Creating Stays

To add a new stay to a pole select **Add New Stay**. This will add a new entry into the Stay Table and populate a stay onto the selected pole. The **Stay Orientation**, and other details can then be entered.

Once all the required stay information has been added, select **Check Stays** to run the calculations for the pole configuration. The new results will be displayed in the results grid under the **Results** tab.

If a stay is required to be deleted, select **Remove Selected Stay**. This will remove the selected stay in the table and will automatically rerun the calculations for the new stay configuration.

7.5.2 Stay Orientation

There are three options available to the user to default the stay angle for new or existing stays including: **Resultant Angle of Maximum Load, Bisect Angle & Inline Stays**. These options can be selected from the left-hand menu bottoms and will automatically change the **Direction** in the results grid and update the Elevation and Plan View drawings accordingly. The **Stay Results Grid** will be updated automatically upon selection.

Resultant Angle of Maximum Load can only be used for a single or multiple stays. It will place all the stays that have been added to the stay grid in the direction opposing the angle of maximum load on the pole.

Bisect Angle can only be used when one or more stays are present and will place all the stays that have been added to the stay grid on the bisect angle. To calculate the bisect angle, there must be two or less spans on the pole.

Inline Stays can be used with a single or multiple stays up to the number of spans. The stays will automatically be placed in-line and behind each of the spans. **Offset Inline Stays** can be used when two inline stays have been placed on the job. To use this, select the check box and enter the **Distance to Offset** value required in the text box provided followed by the Enter key. This will automatically update the two **Directions** of the inline stays with the correct offset.

7.5.3 Stay Details

Specific details regarding the stays can be found in the Stay Table provided.

As well as the default stay orientation options, the user can also change the direction of the stay manually in the Stay Table, under **Direction**. The angle must be between

0-360 degrees. Any changes made will be displayed visually in the Elevation and Plan Views. Select **Check Stays** to view the new results.

The **Locked Data Column** is available to fix a specific stay configuration. Any changes made to the stay details won't affect the results in the selected locked column field. The user can select from: Stay Spread, Height on Pole and Angle with Ground. By default, **Stay Spread** will be locked and will be unable to be edited until a new locked column is selected. The locked data columns will be shaded grey for clarification.

Distance from Top of Pole is the vertical distance from the top of the pole to the point of attachment of the stay and is measured in metres. The **Distance from Top of Pole** can be changed if this data column is not locked. Following any changes made the remaining stay fields will be updated automatically accordingly.

Height at Pole is the vertical distance from the ground level to the point of attachment of the stay and is measured in metres. The **Height at Pole** can be changed if this data column is not locked. Following any changes made the remaining stay fields will be updated automatically accordingly.

Angle with Ground is the elevation angle from the ground line to the point of attachment of the stay and is measured in degrees. The **Angle with Ground** can be changed if this data column is not locked. Following any changes made the remaining stay fields will be updated automatically accordingly.

Stay Spread is the horizontal distance from the base of the stay to the point of attachment the stay makes with the ground and is measured in metres. The **Stay Spread** can be changed if this data column is not locked. Following any changes made the remaining stay fields will be updated automatically accordingly.

The stay can be changed by selecting a **Stay Group** and **Stay** from the provided dropdown menus. The options in the dropdown are populated from the user Stay Library.

Part Number can also be changed via the text box provided.

Stay Comments are comments can be added or removed as required by the user via the text box provided.

Conductors Crossarms Pole Plant Stays													
Add New Stay Rem	ove Selected Sta	у										Check Stays	
Stay Orientation	Direction (°)	Locked Data Column		Distance from Top of Pole (m)	Height at Pole (m)	Angle With Ground (°)		Stay Spread (m)	Stay Group	Stay	Part Number	Comments	
Resultant Angle of Maximum Load	215.00	Stay Spread	\sim	0.20	9	4	5	9.00	Stays	7/12 SC/GZ	S2		
Bisect Angle													
Inline Stays													
Offset Inline Stays:													
Distance to Offset (m):													

Figure 30: COLDNet Stay Information for the Design

8.0 Results

At any stage during the design process a list of results and defects is available to the user through the **Results** tab in the middle of the main screen. Underneath this tab is a table of results that are current to the design (Refer Figure 31). If any defects are present the pole on the main plan view screen will be highlighted red. The list is automatically updated after any changes are made to the design.

For each of the calculation results listed in the table there will be a calculation type which outlines the type of calculation present, the **Loadcase** for which this occurs and the description of the **Component** that is being calculated. Each result populates the calculated value, as well as the allowable value and utilisation if applicable.

The desired results can be turned off and on by selecting and un-selecting each of the calculation types list above the results table. There is also an option available to **Show All** and **Hide All** if required.

										_
Survey Data Simple	e Point Loads	Complex Point Lo	ads Results Images							
Show Results	Show Al	Hide All								
🗹 Tiploads 🗹	Foundations	Uplift 🗹 Ho	oriz. Midspan 🗹 Vert. Midpsan 🗹	Tensions 🗹 Stay Ca	Ilcs. 🗹 Simple I	Point Loads 🗹 Comple:	< Point Loads 🔽	Crossarm Calcs.		
Stay Wire Results	LoadCase	Stay	Stay Direction	Stay Horiz.Capacity (kN)	Stay Horiz. Calculated Load (kN)	Stay Utilisation (%)				^
	Max Wind	7/12 SC/GZ @ 45	215	27.72	129.33	466.57				
	Everyday	7/12 SC/GZ @ 45	215	27.72	76.57	276.22				
Pole Bending Above Stay	Loadcase	Allowable Pole Tip Load Strong (kN)	Calculated Pole Tip Load Strong (kN)	Utilisation Strong (%)	Allowable Pole Tip Load Weak (kN)	Calculated Pole Tip Load Weak (kN)	Utilisation Weak (%)			
	Max Wind	22.00	5.71	25.94	8.00	1.93	24.08			
	Everyday	22.00	2.07	9.41	8.00	0.51	6.37			
Pole Tip & Foundation Checks Transverse to Stay	Loadcase	Allowable Load Strong (kN)	Calculated Load Strong (kN)	Utilisation Strong (%)	Allowable Load Weak (kN)	Calculated Load Weak (kN)	Utilisation Weak (%)	Required Embedment Length Strong (m)	Require Embedm Length Wea	
1		22.00kN	9.59kN	43.57%	8.00kN	109.56kN	1369.51%	3.14		~
•										_

Figure 31: COLDNet Pole Results Grid

9.0 Profiles

After the data and design information has been entered, profiles will be created radially around the pole of interest in the design. The elevation views of each of these profiles can be viewed by selecting them from the **Profile** tabs generated at the top of the main screen next to the **Plan View** tab. A **Profile** tab will be generated for every bearing that consists of a Study Pole and an End Span Pole. From the **Profile** tab the user has the ability to sag the conductors through conductor points that have been entered for that particular bearing of interest. From these screens Ground Clearances and Conductor Curves can also be added.

9.1 Stringing Conductor through Remote Points

If Remote Points have been entered in the data input table for the selected profile, they will appear in the Conductor Everyday Stringing grid which can be accessed by navigating to the Profile of interest and selecting **Sag Conductor**. The **Chainage** and **Height** columns are read only and are calculated from the Data Input grid. **Point Comments** can be added from the grid which will be reflected back into the **Comments** field in the Data Input grid.

To begin the conductor stringing, the user must first select which circuit requires stringing by selecting it from the dropdown menu provided under **Select Circuit**. The number of circuits in the dropdown list will be equal to those that have been added when filling out the crossarm grids under the **Crossarms** tab.

Next, select the Remote Points from the table that will be used to sag the conductor. To do this, simply select the check box in the end column called **Sag Point** for the points required.

Once all the **Remote Points** have been selected, a **Conductor Temperature** is required to be entered. This is the temperature of the conductor at the time the conductor data points were taken. The temperature needs to be entered in degrees Celsius.

Select **Calculate Stringing** to see the new **Everyday Load** and **Everyday Tension** (Refer Figure 32). Click **Update Stringing** to commit the changes to the design. This will update the elevation view as well as the **Everyday Load** value for the circuit in the **Crossarm** tab.

Calculate Everyda	ay Strin	ng for pro	file 120				×
Sel	ect Ci	rcuit	Circuit 1	l: 11kV Iodine x3		\sim	
Chainage (m)		Height (m)	Point Comment		Sag Point	t
50	0.00		6.00	LV			
Conductor Terr	nperat	ure (°C)	:	20	Calc	ulate Stringing	
Conductor Tem Everyday	nperat r Load	:ure (°C) (%CBL)	:: [20	Calc	ulate Stringing Jate Stringing	

Figure 32: Stringing Conductor through Remote Points

9.2 Clearance to Ground

A ground clearance line (as an offset from the groundline) can also be added by selecting **Clearance to Ground**. Select **Add Clearance** and enter in the desired clearances (Refer Figure 33). Select **Remove Clearance** to remove. Select **Save** to commit changes. This will now be displayed on the Profile Drawing.



Figure 33: Adding a Ground Clearance Line to a Profile

9.3 Catenary Curves

Catenary Curves can be edited and added by selecting **Catenaries** from the tool strip menu for each of the profiles. Upon selection a new window will open and by default, have a Maximum Temperature and a Minimum Temperature curve displayed for each of the circuits on the profile (Refer Figure 34).

These curves are generated from the Maximum and Minimum Operating temperatures that were selected for that conductor. These values along with the **Radial Thickness** and **Density Ice / Snow** can be edited by entering in the desired values into the grid. There are check boxes available to **Show Minimum Clearance in Span**, **Show Curve** and **Show Clearance Curve**. When **Show Minimum Clearance in Span** is turned on a red arrow will also appear at the location of lowest clearance in the profile. The value for the lowest clearance and the position in which it occurs along the span can be seen in the Profile Drawing. If a **Clearance Curve** is selected, a **Clearance** value will need to be entered into the adjacent column. The colours that are displayed in the Profile Drawings for these curves can be changed under the **Colour** and **Clearance Colour** column in the grid. Additional curves for each circuit can be added and removed by selecting **Add Curve** and **Remove Curve** respectively. To change circuits select from the list of tabs that have been automatically generated.

120° N	Nodify Catenary Display									
Add	Curve Remove Curve									Close
Circui	t 11kV Iodine Circuit LV3 19/2.75 SC/G2	Z								
	Description	Temperature (°C)	Radial Thickness Ice/Snow (mm)	Density Ice/Snow (kg/m³)	Colour	Clearance Colour	Show Minimum Clearance in Span	Show Curve	Show Clearance Curve	Clearance (m)
۲.	Max. Temperature	40	0	0						
	Min. Temperature	-15	0	0						

Figure 34: Adding and Modifying Clearance Curves

10.0 Reports

There are four predefined reports available to the client to assist with analysing the conditioning of the pole and its assets. These three reports include: **Pole Information & Loads, Calculation Results, Terrain Data & Sag/Tension Report**. They are standard summary reports that show the basic information and calculation results for the pole of interest. To access any of these reports simply select the report tab of interest under **Reports** in the top tool bar menu of the main form. Once selected the report form will open in a new window. From there the client can view the reports as well as export them to a CSV or Microsoft Excel format if required.

To export any of the reports select either **Export to CSV** or **Export to Excel** from the top tool bar menu and select **Export Current**. After selecting either of these options a new window will appear with the exported data. Create a name for the file and save after complete. Use **Export All** to export all of the report to a single document and repeat the previous process.

The reports can be printed in a similar manner by selecting **Print** from the top tool bar. Once again, select **Print Current** to print the current report tab or **Print All** to combine the reports into one document. **Print Settings** are also available if required from the top menu bar.

Click **Close** to exit the form and return to the main screen.

10.1 Pole Information & Loads Report

The component information available in the **Pole Information** report include: Poles, soil type, conductors, crossarms, pole plants and stays. Any simple or complex point loads on the design will also be displayed in the table. This report gives the user a detailed understanding of the critical information and components used in the design (Refer Figure 35).

10.2 Calculation Report

The standard calculations in the **Calculation Report** provided include: Tiploads, Foundations, Horizontal Mid-Span Separation, Vertical Mid-Span Separation, Uplift, Conductor Tensions, Crossarm Loads, Stay Tensions, Stay Bending Loads, Stay Transverse Loads & Stay Foundations. Each calculation will show the calculated result, allowable result and utilisation (if applicable) for each loadcase (Refer Figure 36). The desired results can be turned off and on by selecting and un-selecting each of the calculation types list above the results table. There is also an option available to **Show All** and **Hide All** if required.

10.3 Terrain Data Report

The **Terrain Data** report has information regarding all the data points entered in the design (Refer Figure 37). The report shows a list of bearings and the survey data contained within each of them (Refer Figure 37).

10.4 Sag/Tension Report

A **Sag/Tension** Report can be generated for each of the circuits oh the job. First the user must select whether to use Initial or final modulus of elasticity for each conductor. This can be done be selecting the checkbox under the column **Use Initial Modulus of Elasticity**. If the final modulus of Elasticity is used instead, an option is available to enter a **Temperature Allowance for Inelastic Stretch**. This can be entered in the column provided or a default value of 0°C will

be used. An Exclude from Report option is available for each circuit. The Initial Modulus of Elasticity and Final Modulus of Elasticity will be automatically generated from the conductor properties that have been entered in the Conductor Library. The report will calculated four different results including: Sag, Horizontal Tension, Axial Tension and Time for 3 Return Waves. Each of these options can be turned off and on by selecting the checkboxes provided under Report Options. A Start Temperature & End Temperature need to be entered into the fields provided following be a Temperature Increment. A calculation will be done for each temperature between the start value and end value increasing by the temperature increment. Select Generate Report to populate (Refer Figure 38).

G Reports																- 0
Export to CSV Export to Excel	Print Print Settin	ngs Close														
Pole Information & Loads Calcula	ation Results Terrain	Data Sag/Tensio	on Report													
Asset Number	Pole Group	Length Description	Pole Length (m)	Strength Description	Nominal Pole Strength (kN)	Measured Pole Strength (kN)	Pole Bearing(°)	Pole Comments								
1234	Busck Concrete	B11	11.00	Single 22kN	S: 22.00 W: 8.00		210									
Soil Type	Strength (kPa)	Setting Depth (m)	Non Standard Setting Depth	Stabilised Backfill	Width Below Ground (mm)	Pole Base	Base Offset (m)	Base Direction (°)								
Very Firm	150	1.80			Donut 2	0	0									
Conductor Group	Conductor	Voltage	No. of Wires	Max Temp (°C)	Min Temp (°C)											
Standard	Iodine	11kV	3	40	-15											
Standard	19/2.75 SC/GZ	LV3	4	40	-15											
Circuit No.	Common Crossarm	Attachment Type	Conductor	Everyday Load (%CBL)	Crossarm Group	Crossarm	Locked POA	POA (m)	Crossarm Angle (*)	Span Length (m)	Ruling Span (m)	End Crossarm Attachment Type	End Crossarm Group	End Crossarm	End Crossarm POA (m)	End Crossarm Angle (°)
Profile: 120*																
1	310° Circuit: 1 11kV	Strain	3x Iodine @11kV	12.00	Busck Concrete	2M D.Arm S. Term RH 3W		9.120	215	90.00	90.00	Strain	Busck Concrete	2M D. Arm S. Term LH 3W	10.000	210
2	<none></none>	Strain	4x 19/2.75 SC/GZ @LV3	8.00	Busck Concrete	3M LV D TERM S		8.120	210	90.00	90.00	Strain	Busck Concrete	3M LV D TERM S	9.000	210
Profile: 310*																
1	120º Circuit: 1 11kV	Strain	3x Iodine @11kV	12.00	Busck Concrete	2M D.Arm S. Term RH 3W		9.120	215	80.00	80.00	Pin	Busck Concrete	3M S PIN RH	9.000	220
Direction (°)	Height at Pole (m)	Distance from Top of Pole (m)	Angle with Ground (°)	Stay Spread (m)	Stay Group	Stay	Comments									
215	9	0.2	45	9	Stays	7/12 SC/GZ										
Plant Group	Plant Name	Distance from Top of Pole (m)	Offset Distance from Pole (m)	Direction (*)	Exclude from Calculations	Comments										
ETEL Transformers on 11m Busck	ETEL 3PH 100 kVA	2.24	0.10	300												
Simple Point Load Bearing (*)	POA (m)	Horizontal Load (kN)/ Wire	No.of Wires													
30	7.00	2.00	3													
Complex Point Load Bearing (*)	POA (m)	POA End (m)	Conductor Group	Conductor	Everyday Load (%CBL)	No.of Wires	Span Length (m)	Ruling Span (m)								
200	7.00	8.00	Standard	Chlorine	8.00	1	30.00	30.00								

Figure 35: Pole Information & Loads Report

G Reports										
Export to CSV	Export to Excel	Print Print S	ettings Close							
Dela Information	Calcul	ation Results : Tax	citings Close	naion Depart						
- Show Results	Ta Loads - Colour	inter interesting inter	rain Data Say/ it	sision Report						
chen recours	Show	All Hide All	1							
Tiploads	Foundations	Uplift 🖂 Hor	iz. Midspan 🖂 V	/ert. Midosan 🔽	Tensions 🖂 Sta	av Calcs. 🖂 Sim	ple Point Loads	Complex Point	Loads 🖓 Crossa	rm Calcs.
				Stav	Stav Horiz.	-				
Stay Wire Results	LoadCase	Stay	Stay Direction	Horiz.Capacity (kN)	Calculated Load (kN)	Stay Utilisation (%)				
	Max Wind	7/12 SC/GZ	215	27.72	129.33	466.57				
	Everyday	7/12 SC/GZ	215	27.72	76.57	276.22				
Pole Bending Above Stay	Loadcase	Allowable Pole Tip Load Strong (kN)	Calculated Pole Tip Load Strong (kN)	Utilisation Strong (%)	Allowable Pole Tip Load Weak (kN)	Calculated Pole Tip Load Weak (kN)	Utilisation Weak (%)			
	Max Wind	22.00	5.71	25.94	8.00	1.93	24.08			
	Everyday	22.00	2.07	9.41	8.00	0.51	6.37			
Pole Tip & Foundation Checks	Loadcase	Allowable Load Strong (kN)	Calculated Load Strong (kN)	Utilisation Strong (%)	Allowable Load Weak (kN)	Calculated Load Weak (kN)	Utilisation Weak (%)	Required Embedment Length Strong	Required Embedment Length Weak	Actual Embedment Length (m)
		22.00kN	9.59kN	43.57%	8.00kN	109.56kN	1369.51%	3.14	11.76	1.80
		22.00kN	5.75kN	26.13%	8.00kN	65.70kN	821.30%	2.36	8.38	1.80
Uplift (+ve means uplift)	Loadcase	Profile	Crossarm	Common Crossarm	Allowable Uplift (kN)	Calculated Uplift (kN)	Calculated Uplift (kg)			
	Uplift	120°	Circuit 1: 2M	310° Circuit:	0.00	-0.279	-28.49			
			Circuit 2: 3M		0.00	-0.141	-14.41			
		310°	Circuit 1: 2M	120° Circuit:	0.00	-0.047	-4.74			
Mid-span Separation Same Circuit	Profile	Circuit	Actual Value (m)	Required Value (m)						
	120°	Circuit 1	0.90	0.58						
		Circuit 2	0.80	0.38						
	310°	Circuit 1	0.80	0.54						
Mid-span Separation Between	Profile	Top Circuit	Lower Circuit	Actual Value (m)	Required Value (m)					
	120°	1	2	1.24	0.27					
Conductor Tensions per Wire	Profile	Circuit	Conductor	Calculated Breaking Load (kN) (CBL)	Allowable Tension (kN)	Case	Calculated Tension (kN)	Utilisation (% Allowable)		
	120°	Circuit 1	11kV Iodine	28.20	19.740	Everyday	3.384			
						Maximum Te	2.106	10.7		
						Minimum Tem	5.972	30.3		

Figure 36: Calculation Results Report

G Repor	ts											
Export	to CSV Export to Ex	cel Print Print	Settings Close									
Pole Inf	ormation & Loads Cal	culation Results Te	rrain Data Sag/	Tension Repo	ort							
Name	Direction of Measurements	Absolute or Relative Data										
120°	Away from Pole	Relative	Point Type	Point Number	Horizontal Distance (m)	Vertical Distance (m)	Bearing (°)	Chainage (m)	Elevation (m)	Comment	East (m)	North (m)
			Study Pole	1	0.000	0.000		0.000	0.000		0.000	0.000
			Ground Point	2	20.000	0.100		20.000	0.100		17.321	-10.000
			Ground Point	3	10.000	0.000		30.000	0.100	Drive way	25.981	-15.000
			Ground Point	4	20.000	0.400		50.000	0.500		43.301	-25.000
			Offline Point	5	3.000	6.000	60.000		6.500	Shed Roof	45.899	-23.500
			Remote Point	6		6.000		50.000	6.500	LV	43.301	-25.000
			Ground Point	7	20.000	-0.300		70.000	0.200		60.622	-35.000
			End Span Pole	8	20.000	0.000		90.000	0.200	Pole Asset No.5678	77.942	-45.000
Name	Direction of Measurements	Absolute or Relative Data										
310°	Away from Pole	Relative	Point Type	Point Number	Horizontal Distance (m)	Vertical Distance (m)	Bearing (°)	Chainage (m)	Elevation (m)	Comment	East (m)	North (m)
			Study Pole	1	0.000	0.000		0.000	0.000		0.000	0.000
			Ground Point	9	20.000	-0.500		20.000	-0.500		-15.321	12.856
			Ground Point	10	20.000	-0.500		40.000	-1.000		-30.642	25.712
			Ground Point	11	20.000	-0.200		60.000	-1.200		-45.963	38.567
			End Span Pole	12	20.000	-0.100		80.000	-1.300	Pole Asset No.7744	-61.284	51.423

Figure 37: Terrain Data Report

G Reports									- o ×
Export to CSV	Export to Exi	el Print Prin	t Settings Close						
Pole Information	n & Loads Calo	ulation Results 7	Ferrain Data Sag/Ter	ion Report					
Profile	Circuit	Cond	Initial uctor of El (N	lodulus Use sticty Modu 'a) Elas	nitial Final M us of of Ela icity (Mi	odulus ticity (the value entered is subtracted)	Exclude from Report	Report Options	Start Temperature (*C) 10 End Temperature (*C) 20
120°	Circuit 1	11kV Iodine	D 12% 59	0	59	0			Temperature Increment (°C) 5
120°	Circuit 2	LV3 19/2.75 5	SC/GZ @ 8% 184	0	184	0		Horizontal Tensions	
310°	Circuit 1	11kV Iodine (\$ 12% 59	0] 59	0		Axial Tensions	
								Wave Sagging (3 return waves)	Generate Report
Prof	file	Circuit	Conductor	Initial or F Modulus Elasticit	nal Modulus of Elasticity (M	f Temperature Pa) Allowance (*C)			
120°		Circuit 1	11kV Iodine @ 12%	Final	59	0			
Temper	rature	10 °C	15 °C	20 *C					
Sag	(m)	0.99		1.10	1.20				
Horizontal Te	ension (kN)	3.38		3.06	2.80	_			
Axial Tens	sion (kN)	3.38		3.06	2.80				
Time for 3 retur	m Waves (sec)	5.40		5.68	5.94	_			
120*		Circuit 2	LV3 19/2.75 SC/GZ	8% Final	184	0			
Temper	rature	10 °C	15 °C	20 °C					
Sag	(m)	0.56		0.61	0.66	_			
Horizontal Te	ension (kN)	15.73		4.56 1	3.48	_			
Axial Tens	sion (kN)	15.73		4.56 1	3.48	_			
Time for 3 retur	m Waves (sec)	4.07		4.23	4.40	_			
310*		Circuit 1	11kV Iodine @ 12%	Final	59	0			
Temper	rature	10 °C	15 °C	20 °C					
Sag	(m)	0.79		1.88	1.98				
Horizontal Te	ension (KN)	3.38		3.02	2.72	_			
Time for 3 retur	m Waves (sec)	4.80		5.08	5.35				

Figure 38: Sag/Tension Report

11.0 Strength Factors

The strength factors for both the Pole and Soil can be modified by selecting **Strength Factors** from the top tool strip menu on the main screen (Refer Figure 39). The strength factors can be modified for each of the loadcases that are present in the Parameter File. To change the values simply enter in the desired factor in the field provided followed by the **Save** button. Upon exiting the form, the calculations will automatically be reprocessed to replicate these strength factor altercations.

Modif	y Strength Factors		
Cano	cel		Save
	Loadcase	Pole Strength Factor	Soil Strength Factor
•	Max Wind	1.00	1.00
	Everyday	1.00	1.00

Figure 39: Modifying Strength Factors

12.0 Export to DXF

The design can be exported to a DXF format by selecting **Export to DXF** and selecting from one of the three options: **Plan View**, **Profile Views & Export All**. The DXF files will automatically be generated with a default name and saved into the same location that the COLDNet Pole job file had been elected to save to. Upon selection an option will appear to open the folder in which the location has been saved to. To open the DXF file simple double click on the created file (Refer Figure 40). A DXF viewer will need to be installed on the user's computer to be able to view the file.



Figure 40: Exported DXF File Example

13.0 3D View

To view the design in 3D select the **3D View Option** from the top tool strip menu. A new window will open where the 3D model can be viewed. To toggle the view hold and move down the left-mouse key. To orbit the model hold down and move the right mouse key. Use the mouse scroll wheel to zoom into the cursor location. To rest the drawing back to the original view select **Redraw**.

There is a check box available **Show Terrain** which can be turned off and on to allow the user to view any pole bases that are positioned below ground level.



Figure 41: 3D View of Design

14.0 Display Options

There are several different methods that the user can view and highlight their data which can be accessed from the main window screen of COLDNet Pole.

11.1 Display Options

Display Options are available for the user to turn off and on, to create a customised view for the user. The display options selected by the user will be saved, and appear whenever they start the program. Individual or multiple display options can be selected at a given time.

11.1.1 Remote Points

The remote points can be displayed in the main plan view and profile screens via **Display Options>Remote Points.** By default, the remote points will be displayed by a blue cross. This can be changed through the **Draw Options** panel.

11.1.2 Ground Points

The ground points can be displayed in the main plan view and profile screens via **Display Options>Ground Points**. By default, the ground points will be displayed by a white cross. This can be changed through the **Draw Options** panel.

11.1.3 Offline Points

The offline points can be displayed in the main plan view and profile screens via **Display Options>Offline Points**. By default, the offline points will be displayed by a white circle. This can be changed through the **Draw Options** panel.

11.1.4 Point Coordinates

The point coordinates (X, Y, Z) can be displayed in the main plan view and profile screens via **Display Options>Point Coordinates**. The point coordinates will be displayed in text next to the point.

11.1.5 Point Numbers

The point numbers can be displayed in the main plan view and profile screens via **Point Numbers>Point Coordinates**. The point numbers will be displayed in text next to the point.

11.1.6 Comments

Data points that have user comments can be highlighted via **Display Options>Comments**. The comment will be displayed in text next to the point.

11.1.7 Span Length

For bearings that contain a profile (i.e. a pole point is in the data set) the span length is available via **Display Options> Span Length**. The span length will be displayed as a dimension in metres above or below the profile.

11.1.8 Show Blowout

For bearings that contain a profile (i.e. a pole point is in the data set) the blowout curve is available via **Display Option> Show Blowout**. The blowout curve will be generated based on the blowout conditions that have been entered for the design. If

no blowout conditions have been entered you will be taken to the settings form where these can be entered. The blowout curve is drawn based on the location of the blowout from the outer most wires and is shown via a violet line in the plan view drawing.

11.1.9 Show Wires

For bearings that contain a profile (i.e. a pole point is in the data set) the wire configuration can be seen in the plan view screen via **Display Option> Show Wires**.

11.1.10 Full View

To reset the plan view drawing back to fit-to-page select full view via **Display Options>Full View** or alternatively using **Ctrl + F**.

11.2 Draw Options

Each of the **Display Options** outlined in section 11.1 above can be customised for the user comfort. Under the **Draw Options** menu (on the top tool strip menu) each highlighting options have three settings: Colour, Width and Shape. These three options can be edited by the user (Refer Figure 42).

Colours can be changed by selecting ... button, located next to Draw Colour.

The width of the highlight can be changed via **Draw Width** by selecting the up and down arrow keys.

The shape of the highlight can be changed by selecting the desired shape from the list under **Draw Shape**.

Reset reverts any changes made back to their original state, or **Reset All** to revert all display options changes back to their original state. Changes can be applied via **Apply Changes**.

The background colour of the plan view can also be changed from the Draw options form by selecting ... button next to the **Background Colour** setting.

G Draw Options							- 0	\times
Background Color	ur: .	. Apply	Changes	Add 1 to All Widths	Reset All Close			
Pole			Reset	Ground Poin	nts		Reset	
Draw Colour:				Draw Colour:				
				Draw Width:	2	-	×	
				Draw Shape:	x	\sim		
Pole Points			Reset	Offline Point	ts		Reset	
Draw Colour:				Draw Colour:				
Draw Width:	4		0	Draw Width:	2	-	o	
Draw Shape:	Circle ~			Draw Shape:	Circle	\sim		
Remote Point	s		Reset	Profile			Reset	
Draw Colour:				Draw Colour:				
Draw Width:	2			Draw Width:	2	-		
Draw Shape:	x ~							

Figure 42: Draw Options

11.3 Measure Distance and Bearing

The user can measure the distance and bearing between two points by selecting **Measure>Between Two Points** from the top tool strip menu on the main plan view screen. After selecting the option, a small form will appear at the top right-hand corner of the screen. From there, select the two points of interest by clicking on them individually from the plan view screen. The bearing will be calculated from the first point of selection to the second point of selection (Refer Figure 43). Use the **Reset** function to repeat the process for another two points. Once finish select **Close** to continue with the design. There is also a similar tool available for measuring the distance and bearing between two mouse clicks by selecting **Measure>Between Mouse Click Points** and repeating the process above.



Figure 43: Measuring Distance and Bearing between Two Points

11.4 Cross-Sections

A cross-sectional view of the line can be created by selecting **Cross-Sections>Create Cross-Section**. The cross-sectional view can be used to measure horizontal and vertical clearances to the conductor. A blowout curve will also be displayed to show the geometry of the conductor swing under blowout conditions. The user will first be required to select the Offline Point to incorporate into the cross-section. The Offline Point will usually be in reference to a building or object that has been captured during the survey to verify it meets the required clearance values. After selecting the offline point, a span will need to be selected. Once selected, a new window will automatically be generated with the cross-sectional view (Refer Figure 44). More than one cross-sectional view can be created. They can be viewed under **Cross-Sections>Uiew Cross-Sections** and deleted via **Cross-Sections>Delete Cross-Sections**.

Once the form is open, the **Temperature** and **Wind Pressure** can be changed and **Recalculated** to produce a new cross-sectional view.

and Daint Daint Catting											<u> </u>
ose Print Print Setting	gs										58
Cross Section Name:	Section A-A	Tem	nperature:	15 Wind	Pressure (Pa): 8	00	•	Recalculate			
Profile: 120		Point C	comment:	Shed Roof							
Circuit	Case	Temperature (°C)	Wind (Pa)	Straight Line Distance (m)	Horizontal Distance (m)	Vertical Distance (m)	Horizontal Clearance (m)	Vertical Clearance (m)	Description	Т	
kV Iodine @12.0%	Maximum Temperature	40	0	2.375	1.687	1.672					
	Minimum Temperature	-15	0	3.172	1.687	2.686					
	Blowout	15	800	2.775	0.090	2.774					
3 19/2.75 SC/GZ @8.0%	Maximum Temperature	40	0	1.824	1.198	1.375					
	Minimum Temperature	-15	0	2.206	1.198	1.852					
	Blowout	15	800	1.830	0.570	1.739					
19/2.75 SC/GZ	Closest			1.830	0.571	1.739					
					(T15,W800)) (T-15, WC (T15, WC	22				
					(T15,W800)	(T-15, ψc (T15, ψc) (T15, ψc) (T15, ψc) (T40, ψc) (T40, ψc)	2)				
					(T15,W800) (T15,1	(T-15, W (T15, W0) (T-15, W3) (T40, W0) (T40, W0)	9)				
					(T15,W800) (T15,	(T-15, ₩ (T15, ₩0) (T15, ₩0) (T40, ₩0) (T40, ₩0)) 1				
					(T15, W800) (T15, Shed Roof) (T-15, W (T-15, W) (T-15, W) (T-15, W) (T-15, W) (T-15, W) (T-15, W) (T-15, W) (T-15, W) (T-15, W)	9 1				
					(T15, W900) (T15, Stred Reof) (T-15, W (T-15, W (T-15, W) (T-15, W) (T-16, 479), W (T-16, 479), W (T-10, W)	9				
					(T15, W900) (T15, Shed Roof	(T15,W0) (T15,W0) (T15,W0) (T15,W0) (T15,W0) (T15,W0) (T15,W0)	2)				
					(TIS, W800) (TIS) Shed Roof) (T-15, w) (T-15, w) (T-15, w) (T-15, w) (T-15, w) (T-15, w) (T-15, w) (T-15, w)	9				
					(TIS, W800 (TIS)) (T-15, W (T-15, W) (T-15, W) (T-15, W) (T-15, W) (T-15, W) (T-15, W)	2				
					(TIS,W800 (TIS) Shed Roof	(7-15, W))))))))))))))))))))	2				
					(T15, VR00) (T15) Sked Roof	(7-15, wo	9				
					(T15, W800) (T15) Shed Roof) (T-15, w (T-15, w) (T-15, w) (T-15, w) (T-15, w) (T-15, w) (T-15, w) (T-15, w) (T-15, w) (T-15, w) (T-15, w) (T-15, w) (T-15	9				
					(TIS WRRD) (TIS) Shed Reof) (T-15, W0 (T-15, W0) (T-15, W0) (T-15, W0) (T-15, W0) (T-15, W0)	20				
					(TIS,W800 (TIS) Sted Roof	(T-15, W (T-15, W (T-15, W)	2				
					(T15,W800) (T15) Sked Roof	(T-15, w0)	2				
					(T15, W800) (T15, Shed Roof) (T-15, w((T-15, w()) (T-15, w()) (T-15, w()) (T-15, w()) (T-15, w())	2)				
					(TIS W800 (TIS) Shed Reof) (T-15, WD) (T-15, WD) (T-	20				

Figure 44: Cross-Sectional Views