

# Distribution Construction Standard Handbook

**High Voltage Overhead** 

Part 04 (H)



### **General Notes**

Clearances of conductors from ground, other structures and other conductors shall be undertaken in accordance with AS/NZS 7000:2010, Standard for Overhead Line Design – Detailed Procedures, and the following Western Power references:

- Distribution Overhead Line Design Manual
- High Voltage Aerial Bundled Cable Manual
- High Voltage Hendrix Manual

HV Insulated Taps are to be used where wildlife protection against contact with earth or another phase is required, using either LVABC or bare conductor, refer to DCSH R8-1 series drawings.

Pole strength and height selections for poles <u>without</u> pole top plant shall be determined as per Poles 'n' Wires assessments, unless stated otherwise under the specific DCSH reference.

In general, the following rules apply when selecting pole strengths <u>with</u> pole top plant, unless stated otherwise under the specific DCSH references:

- For 315kVA Pole Top Transformers: use 8kN poles
- For single phase Pole Top Transformers: use 4kN poles as minimum
- For all other pole top plant and pole top switches: use 6kN poles as a minimum

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## **Drawing Register**

Number	Revision	DESCRIPTION							
H01-1	I	3 PHASE INTERMEDIATE WITH RUNNING EARTH							
H01-3	L	3 PHASE INTERMEDIATE ANTI-SWAN CROSSARM GUIDE							
H01-4	В	3 PHASE INTERMEDIATE DOUBLE CROSS-ARM							
H02-1	E	3 PH INTERMEDIATE 1 PH TEE-OFF WITH/WITHOUT DOF							
H02-2	A	3 PH INTERMEDIATE 1 PH TEE-OFF WITH/WITHOUT DOF ALT. MAIN RE							
H03	F	4 WAY INTERMEDIATE							
H04-1	I	HORIZONTAL TERMINATION							
H04-2	В	HORIZONTAL TERMINATION - ANTI-SWAN CROSS-ARM							
H03 F H04-1 I	В	DOUBLE TERMINATION AND 1 PH T-OFF WITH DOF							
H05-1	E	STRAIN ANGLE WITH OR WITHOUT DROPOUT FUSE							
H05-2	С	STRAIN ANGLE UPTO 30° DEVIATION - DOUBLE ANTI-SWAN CROSS-ARM							
H05-3	В	STRAIN ANGLE ANTI SWAN CROSS-ARM - LONG BAY							
H05-4	A	$3\Phi$ x 3 POLE LONG BAY SOLUTION FOR ANGLE DEVIATION UPTO $45^{\circ}$							
H05-5	A	3Φ IN-LINE STRAIN WITH TEE OFF							
H06	L	RUNNING DISC ANGLE OR VERTICAL TERMINATION (900mm SPACING)							
H07	Н	RUNNING DISC ANGLE OR VERTICAL TERMINATION (1200mm SPACING)							
H08-1	C	INTERMEDIATE CABLE WITH DROPOUT FUSES							
H08-2	D	INTERMEDIATE CABLE WITH DROPOUT FUSES (ALTERNATE CROSSARM)							
H08-3	A	INTERMEDIATE CABLE WITHOUT DROPOUT FUSES							
H09-1	G	TERMINATION CABLE WITH DROPOUT FUSES UPSTREAM							
H09-2	E	TERMINATION & CABLE WITH DROPOUT FUSES							
H09-3	С	3 PHASE TERMINATION & CABLE WITH FUSED SINGLE-PHASE TEE-OFF							
H09-4	A	Termination Cable Single Phase Tx. And DOF							
H10-1	K	INTERMEDIATE TRANSFORMER HV TO OPEN AERIAL							
H10-2	M	INTERMEDIATE TRANSFORMER HV TO ABC							
H11-1	J	IN-LINE TERMINATION TRANSFORMER							
H11-2	Н	SIDE MOUNTED TERMINATION TRANSFORMER WITH DROPOUT FUSES							
H11-3	C	REMOTE DATA ACQUISITION FOR TX TERMINATION TRANSFORMER STOCK NO.							
H12	E	POLE TOP SWITCH INCLUDING EARTH							
H13-1	E	TEE-OFF WITH DROPOUT FUSES							
H13-2	В	TEE-OFF WITHOUT DROPOUT FUSES							
H14-1	C	COMBINATION SWITCH & FUSE WITH RAISER (11KV & 22KV) (FLY-OVER SWITCH)							
H14-2	В	COMBINATION SWITCH & FUSE							
H14-3	D	PTS & FUSES/ISOLATORS LAYOUT FOR 2 CABLES							
H17-4	C	TRANSFORMER CABLE SUPPLIED							
H18	E	TERMINATION POLE TOP SWITCH WITH CABLE AND DROPOUT FUSE							
H19	E	TERMINATION POLE TOP SWITCH WITH CABLE ARRANGEMENT							
H20-1	E	ISOLATION TRANSFORMER							
H20-2	E	ISOLATION TRANSFORMER 3PH TERMINATION 1PH IN-LINE WITHOUT 1PH DROPOUT FUSE							
H20-3	С	ISOLATION TRANSFORMER 3PH TERMINATION 1PH IN-LINE WITH DROPOUT FUSE							



		Part 4 – High Voltage Overhead
Number	Revision	DESCRIPTION
H20-4	D	ISOLATION TRANSFORMER 3PH TERMINATION 1PH IN-LINE WITH/WITHOUT DROPOUT FUSE
H20-5	F	ISOLATION TRANSFORMER 3PH CABLE/1PH TEE-OFF WITH/WITHOUT DROPOUT FUSE
H20-6	D	ISOLATION TRANSFORMER 3PH IN-LINE/1PH TEE-OFF WITHOUT DROPOUT FUSE
H20-7	D	ISOLATION TRANSFORMER 3PH TERMINATION/1PH CABLE WITH DROP OUT FUSE
H20-8	A	TERMINATION TRANSFORMER 2 PHASE LINE/ 1 PHASE SPUR
H21	D	METERING TRANSFORMER
H22	C	INTERMEDIATE WISHBONE WITH OVERHEAD EARTHWIRE
H23	C	INTERMEDIATE FLAT CONSTRUCTION WITH OVERHEAD EARTHWIRE
H24	C	TERMINATION TRANSFORMER WITH OVERHEAD EARTHWIRE
H25	В	INTERMEDIATE TRANSFORMER WISHBONE CONSTRUCTION
H26-1	C	VERTICAL STRAIN
H26-2	A	INLINE STRAIN WITH OVER HEAD EARTH WIRE
H27	В	WISHBONE CONSTRUCTION WITH TEE-OFF
H28	В	VERTICAL STRAIN ANGLE WITH OVERHEAD EARTHWIRE
H29-1	В	FAULT INDICATOR LV AERIAL SUPPLY ARRANGEMENT
H30	С	SURGE ARRESTOR STANDARD LINE INSTALLATION
H31	F	22kV CAPACITOR BANK WITH 10 kVA TRANSFORMER (SINGLE/DOUBLE BUSHING)
H32	Н	33kV CAP BANK WITH SWITCH AND 10kVA OR 25kVA TRANSFORMER (SINGLE/TWO BUSHING) CONNECTION DETAILS
H33-1	C	INLINE LAYOUT TYPE GE VR-1 50A-100A DETAILS
H33-2	C	INLINE DETAIL TYPE GE VR-1 50A-100A CONSTRUCTION DETAIL
H33-3	A	OFFSET DETAIL TYPE GE VR-1 50A-100A ARRANGEMENT
H33-3A	A	OFFSET DETAIL TYPE GE VR-1 50A-100A DETAILS
H33-4	A	OFFSET DETAIL TYPE GE VR-1 50A-100A CONSTRUCTION DETAIL
H34	A	SHUNT REACTOR
H40-1	F	INTERMEDIATE
H40-2	E	1 PHASE ANTI CLASH / ANTI GALAH INTERMEDIATE
H41-1	В	RUNNING DISC OR TERMINATION WITH / WITHOUT TERMINATION
H41-2	D	SINGLE PHASE STRAIN ANGLE
H41-3	A	1 PHASE ANTI CLASH / ANTI GALAH TERMINATION
H41-4	A	SINGLE PHASE ANTI CLASH / ANTI GALAH STRAIN
H42-1	С	SINGLE PHASE TEE-OFF TO STRAIN WITH OR WITHOUT DROPOUT FUSE
H42-2	A	INTERMEDIATE WITH CABLE TERMINATION
H43	D	TEE OFF WITHOUT DROPOUT FUSE
H44-1	E	DOUBLE TERMINATION
H44-2	В	TRIPLE TERMINATION
H46-1	Н	INTERMEDIATE TRANSFORMER WITH OR WITHOUT DROPOUT FUSE
H46-2	A	2Ph IN-LINE 2Ph TRANSFORMER WITH DROPOUT FUSE
H47-1	F	TERMINATION TRANSFORMER WITH OR WITHOUT DROPOUT FUSE
H47-2	F	3 PH INLINE/1 PH TRANSFORMER WITH DROPOUT FUSE
H47-3	C	DOUBLE TERMINATION TRANSFORMER WITHOUT DROPOUT FUSE
H47-4	A	1Ph CABLE TERMINATION TRANSFORMER WITH/WITHOUT DROPOUT FUSE
H48-1	G	TWIN MOUNTED TRANSFORMER (1 PHASE) EACH SIDE OF POLE



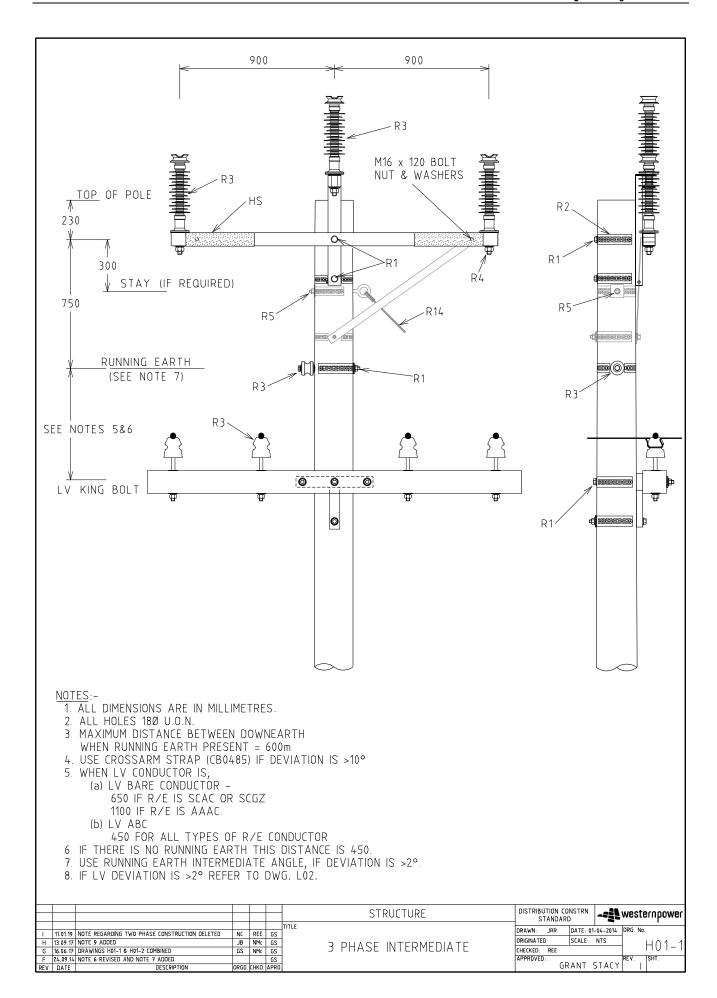
Number	Revision	DESCRIPTION
H48-2	В	VERTICAL MOUNTED TRANSFORMER SINGLE PHASE 2 BUSHING
H49	C	EARTH & LV PHASE CONNECTIONS
H50	С	EARTH & LV PHASE CONNECTIONS THREE & FOUR TRANSFORMERS SETUP
H52-1	В	STANDARD DOWN EARTH - RUNNING EARTH
H52-2	A	EXTENDED OR REMOTE DOWN EARTH - RUNNING EARTH
H53	В	1 PHASE IN-LINE STRAIN WITH SECTIONALISER & BYPASS FUSE
H60-4	A	3 PH. RECLOSER / LOAD BREAK SWITCH HV BARE - HV ABC/HENDRIX WITH LV ARIAL SUPPLY
H61-1	F	POLE MOUNTED 3 PH RECLOSER / LOAD BREAK SWITCH WITH BY-PASS SWITCH
H61-2	F	POLE MOUNTED 3 PH RECLOSER / LOAD BREAK SWITCH WITH BY-PASS SWITCH (ARIEL LV SUPPLY)
H63-2	D	1 PHASE RECLOSER / LOAD BREAK SWITCH BY-PASS ISOLATORS/STRAIN TERMINATION WITH SINGLE PHASE TX SUPPLY

	Drawings	HV HENDRIX
H100	E	INTERMEDIATE POLE 0 - 2 DEGREES
H101	D	INTERMEDIATE ANGLE POLE 2 – 30 DEGREES
H102	С	INTERMEDIATE ANGLE POLE 31 – 60 DEGREES
H103	D	DOUBLE TERMINATION 61 - 90 DEGREES
H104	В	TERMINATION POLE FOR CABLE CONNECTION
H105	С	INTERMEDIATE TEE-OFF FROM EXISTING COVERED CONDUCTOR WITH DOF DRILLING DETAILS
H106	D	INTERMEDIATE TEE-OFF FROM EXISTING BARE CONDUCTOR WITH D.O.F DRILLING DETAILS
H107	D	INTERMEDIATE POLE CROSSING DRILLING DETAILS
H108-1	В	OPEN AERIAL TO COVERED CONDUCTOR WITH SURGE ARRESTERS
H108-2	C	IN-LINE (0-6°) STRAIN COVERED CONDUCTOR WITH SURGE ARRESTERS
H109	D	PTS COVERED CONDUCTOR TERMINATED MESSENGER WIRE
H110	D	PTS COVERED CONDUCTOR TO OPEN AERIAL
H111	F	INTERMEDIATE TRANSFORMER COVERED CONDUCTOR DRILLING DETAILS
H112	F	TERMINATION TRANSFORMER WITH DROP OUT FUSE DRILLING DETAILS

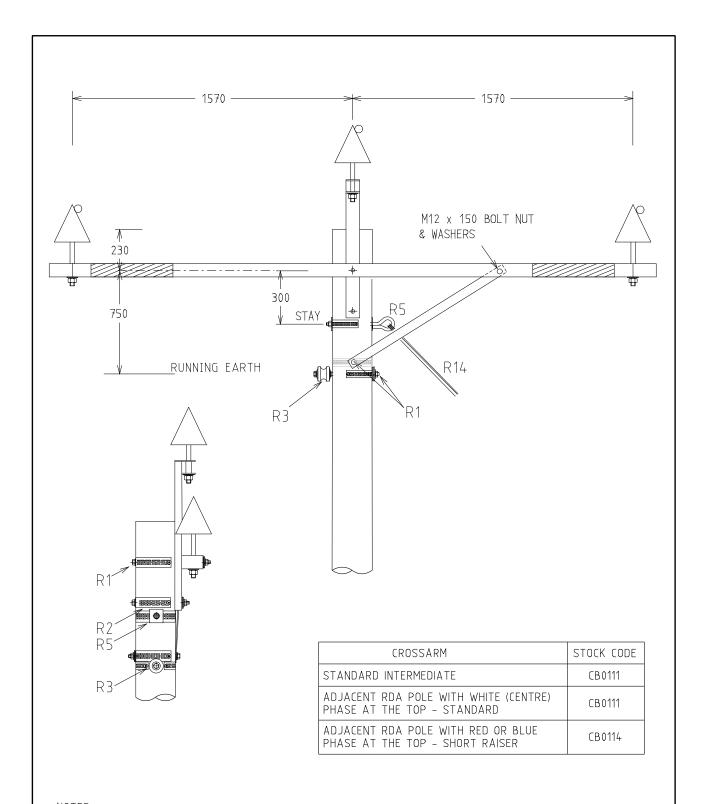


# **HV BARE**





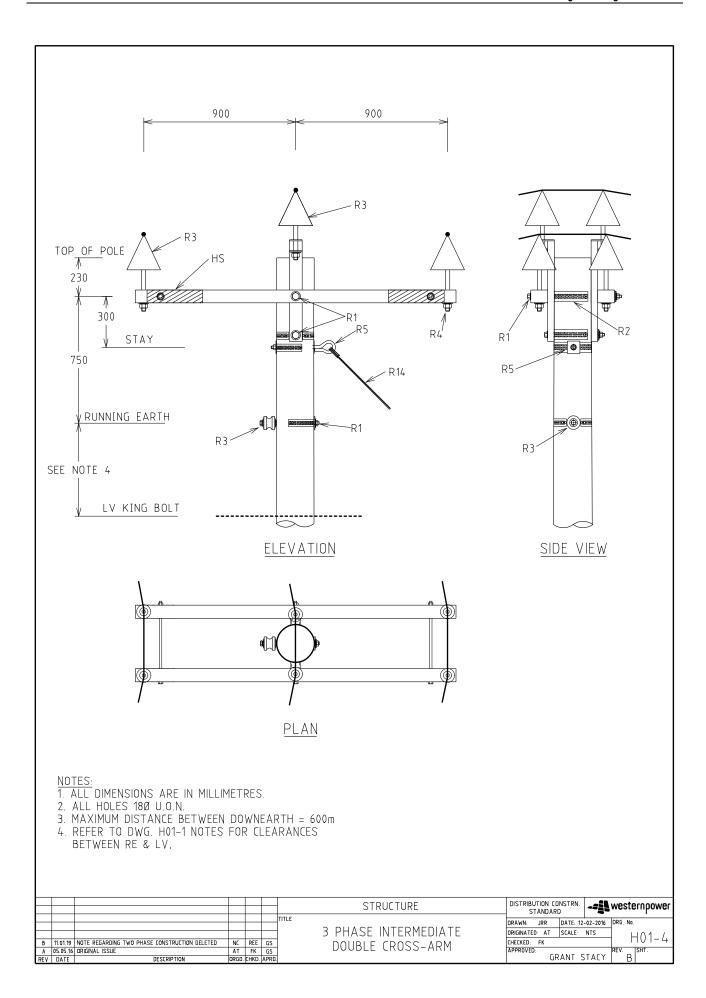




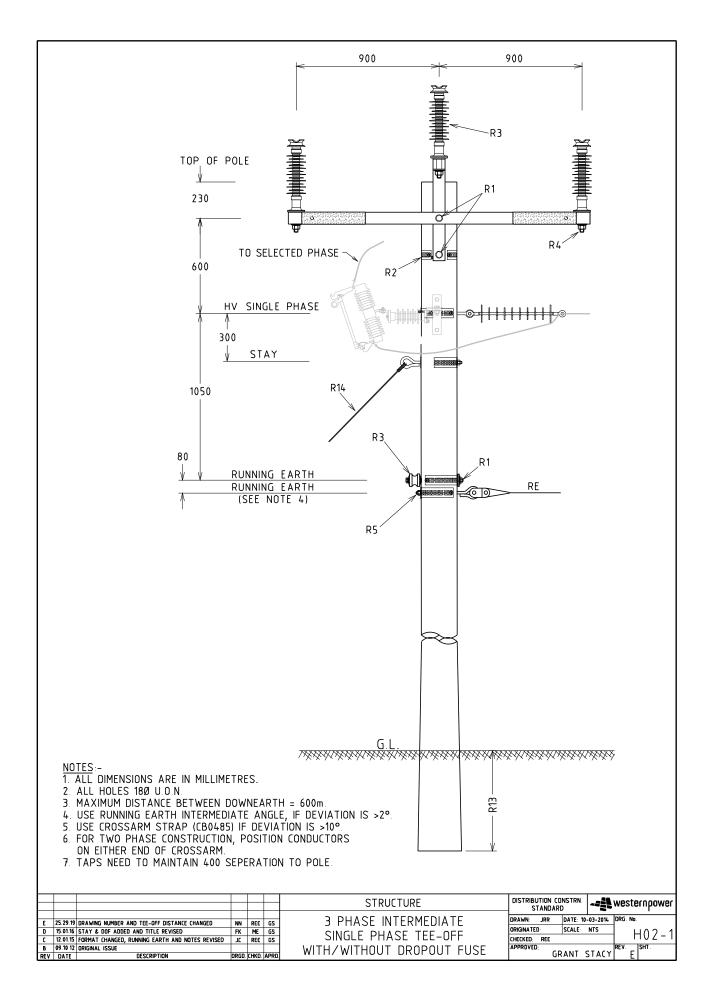
- 1. ALL DIMENSIONS ARE IN MILLIMETRES.
- 2. ALL HOLES 18Ø U.O.N. 3. MAXIMUM DISTANCE BETWEEN DOWNEARTH = 600m.
- 4. USE CROSSARM STRAP (CB0485) IF DEVIATION IS >10°.

						STRUCTURE	DISTRIBUTION CONSTRN. STANDARD westernpower
L	11.01.19	NOTE REGARDING TWO PHASE CONSTRUCTION DELETED	NC	REE	GS	TITLE	
K	09.01.18	CROSSARM USE TABLE ADDED	CO	NMc	GS	2 DILACE INTERMEDIATE	DRAWN: JRR DATE: 01-04-2014 DRG. No.
J	24.09.14	NOTE 4 ADDED			GS	3 PHASE INTERMEDIATE	ORIGINATED SCALE NTS H \( \) 1 \( \)
Н	14.08.14	DISPERSION PLATE FOR CROSSARM STRAP ADDED			GS	ANTI-SWAN CROSSARM GUIDE	CHECKED: REE
G	07 07.14	DRAWING NUMBER CHANGED			GS	ANTI-SWAN CKOSSAKII DOIDL	APPROVED: REV. SHT.
REV	DATE	DESCRIPTION	ORGO.	CHKD.	APRD		GRANT STACY   L

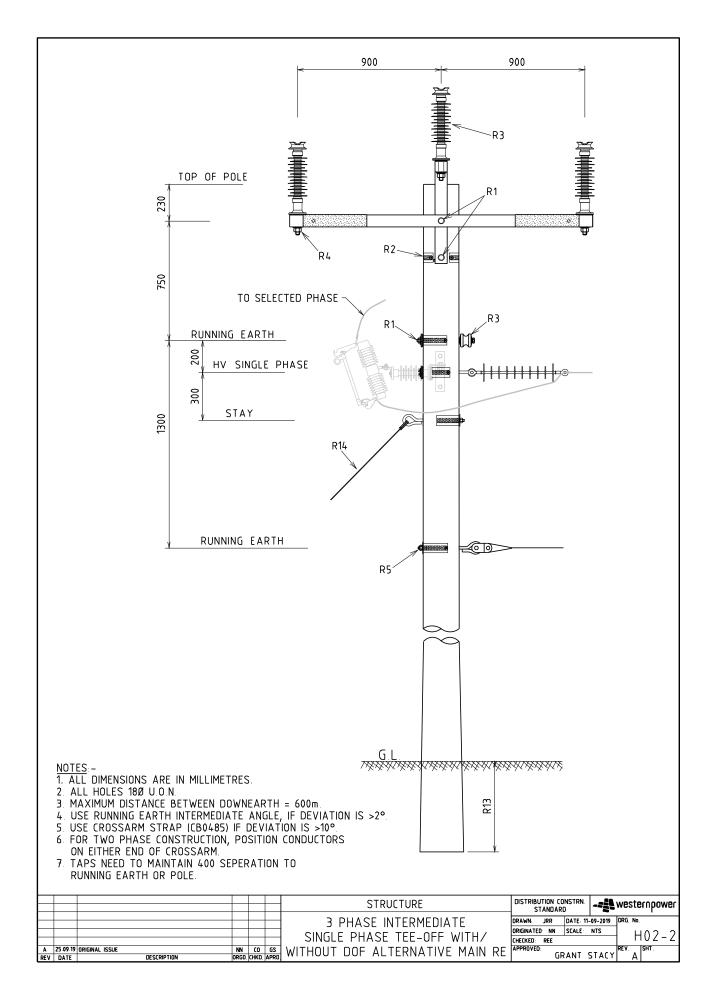




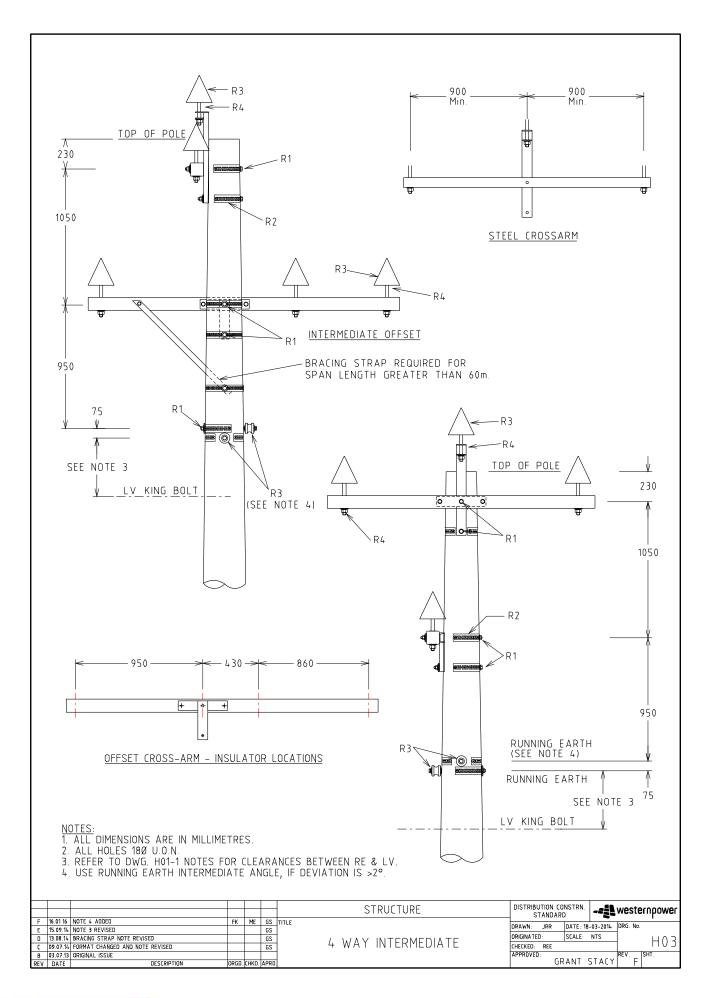




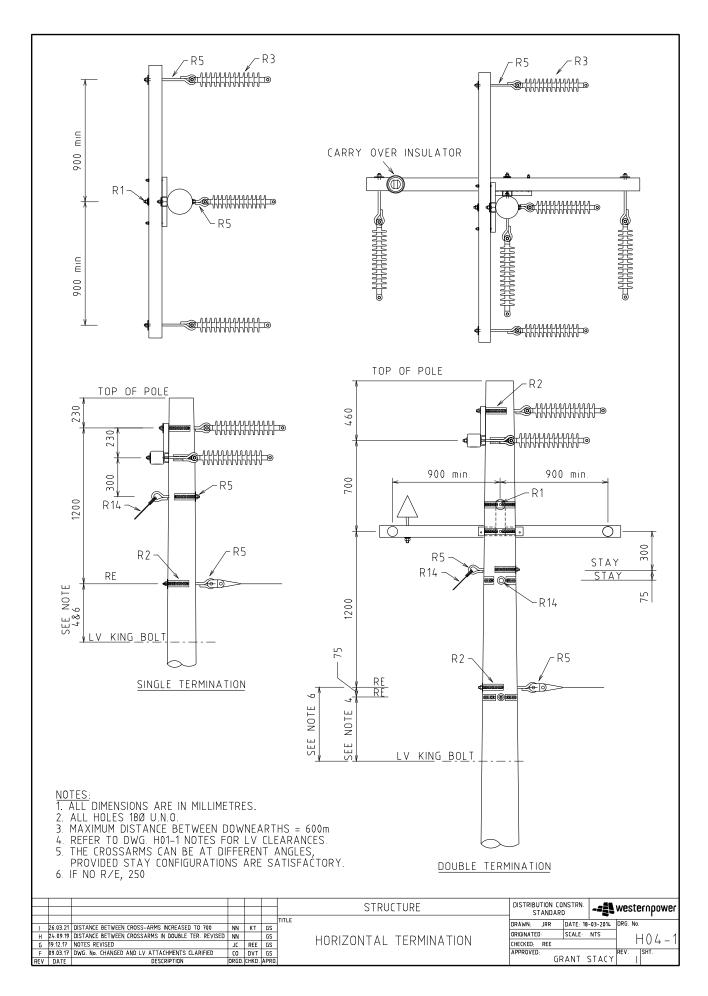




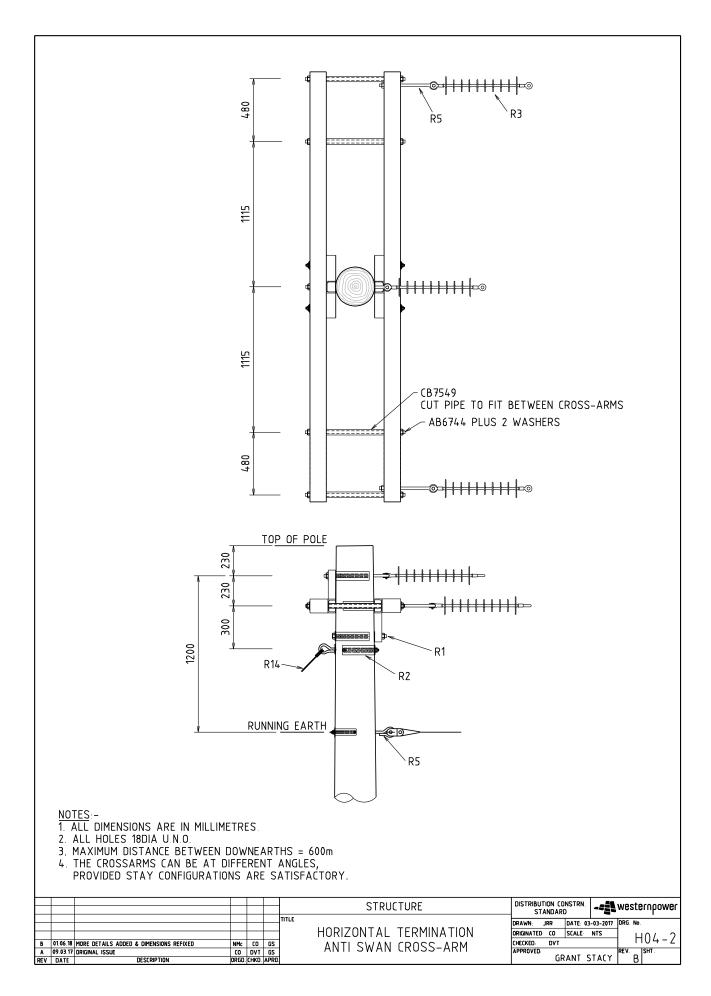




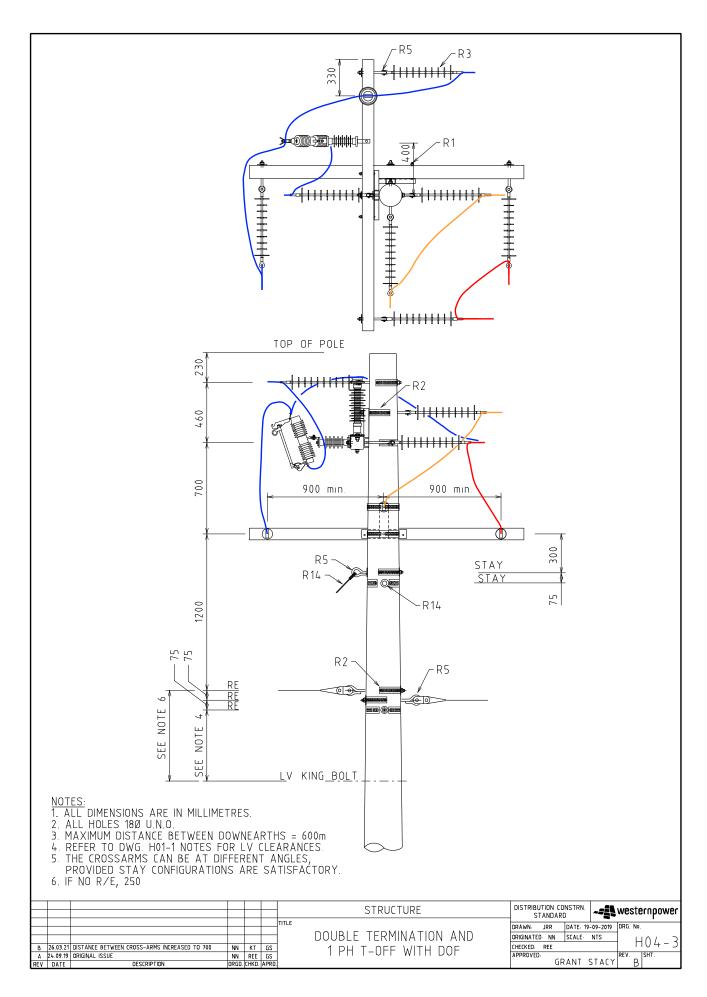




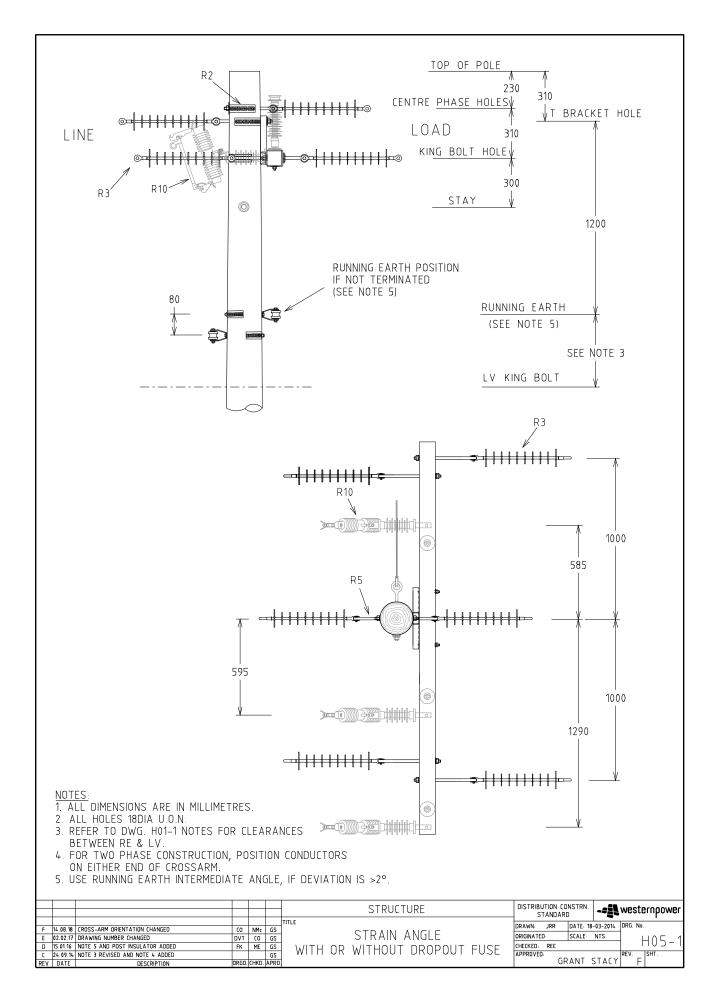




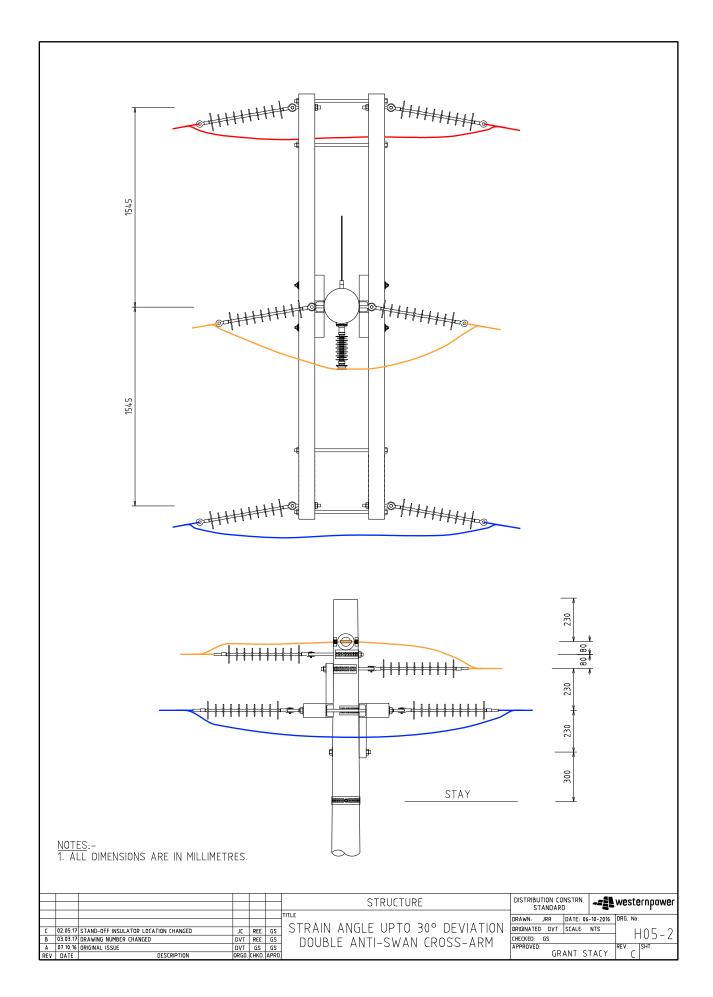




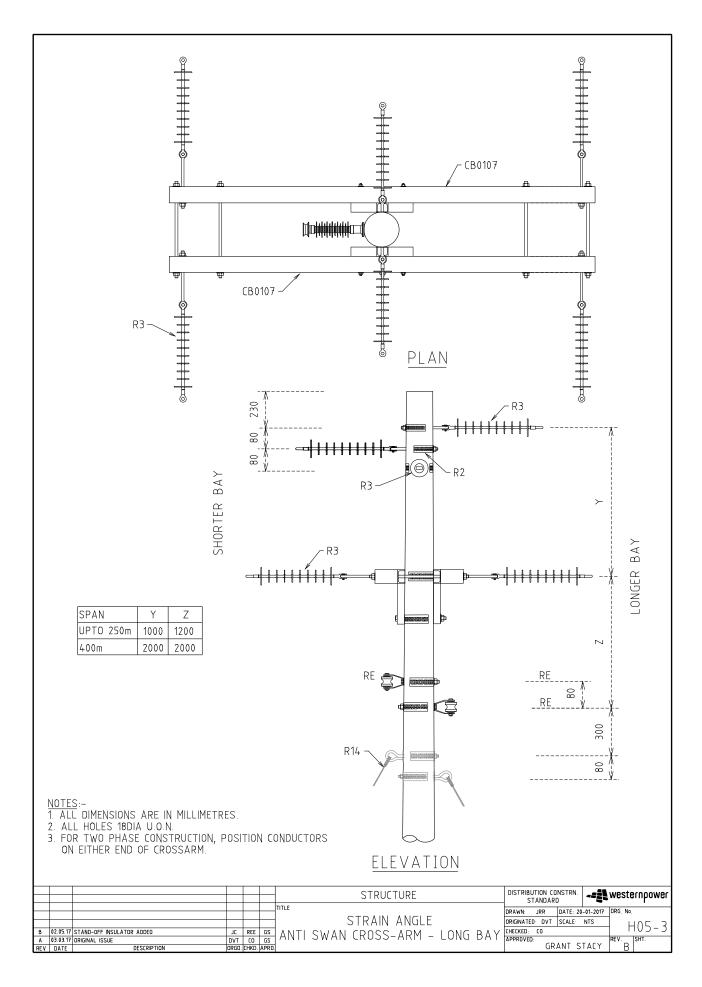




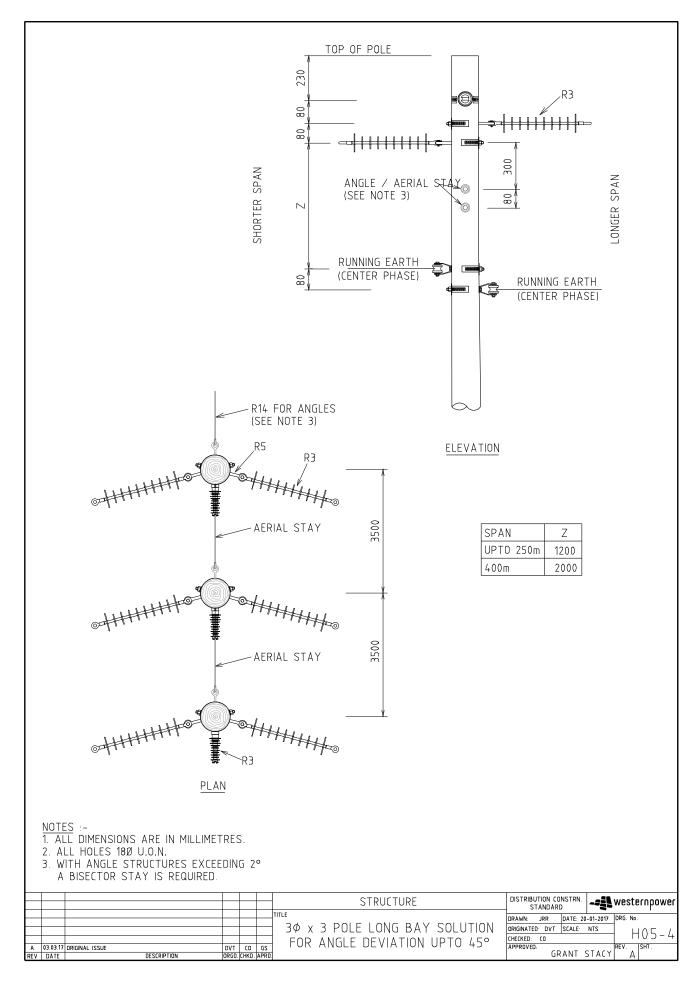




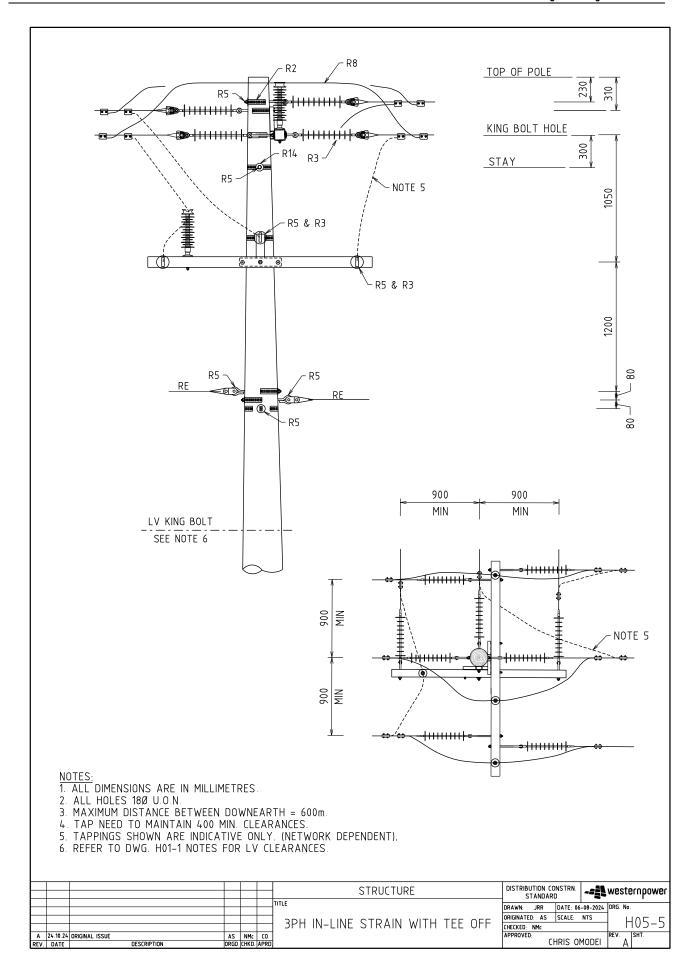




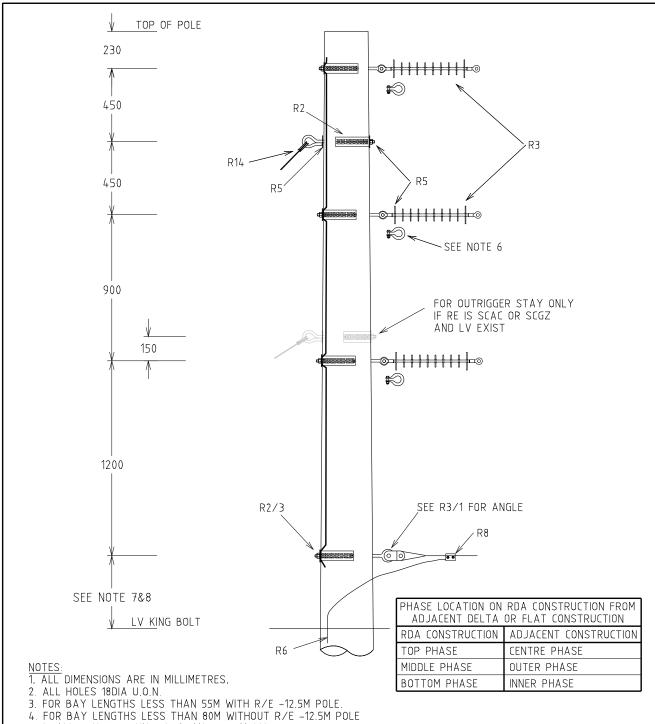








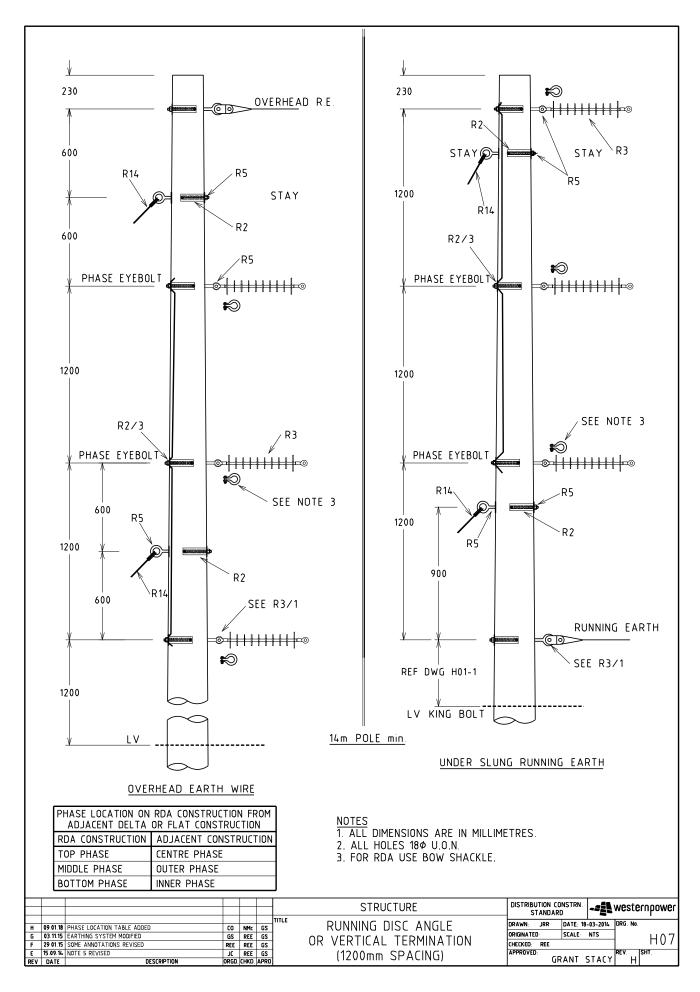




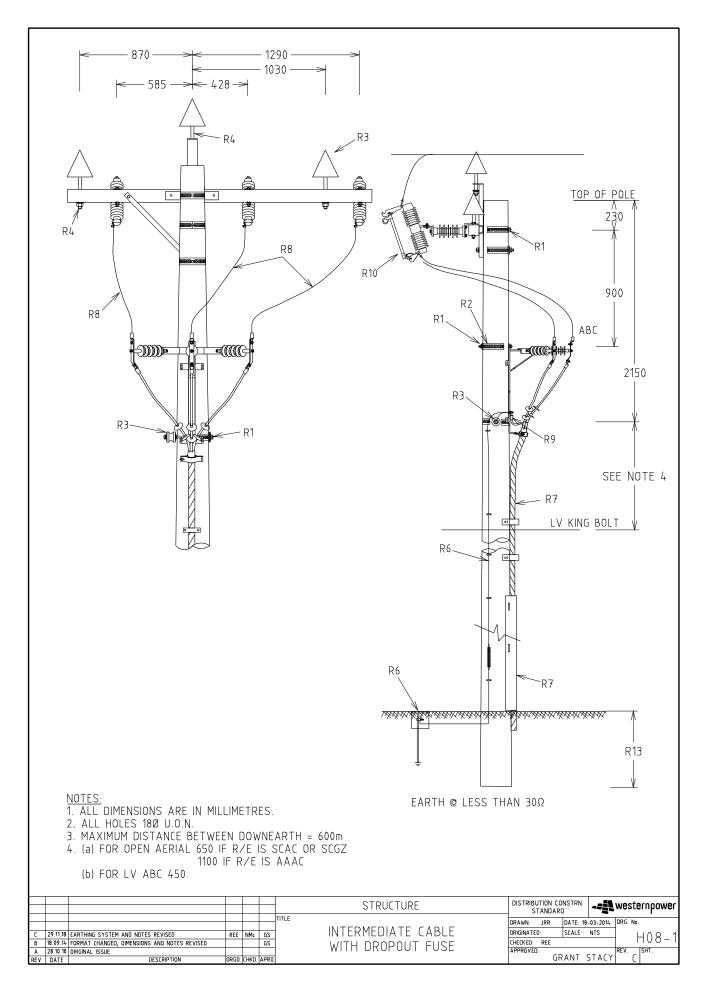
- IF ALL OTHER GROUND CLEARANCES COMPLY
- 5. FOR BAY LENGTHS GREATER THAN 80M ON A 12.5m POLE H7 CONDUCTOR SPACING APPLY AND ALL OTHER GROUND CLEARANCES COMPLY.
- 6. FOR RDA USE BOW SHACKLE OS0055 7. WHEN LV CONDUCTOR IS;
- - (a) LV BARE CONDUCTOR -
    - 650 IF R/E IS SCAC OR SCGZ 1100 IF R/E IS AAAC.
  - (b) LV ABC
    - 450 FOR ALL TYPES OF R/E CONDUCTOR
- 8. IF THERE IS NO RUNNING EARTH INSTALL LV AT R/E POSITION.

						STRUCTURE	DISTRIBUTION CONSTRN. STANDARD	-= <u>{</u> }	westernpower
						TITLE DUNING DICC ANGLE	DRAWN: JRR DATE: 18	03 201/	DDG No
L	09 01.18	PHASE LOCATION TABLE ADDED	co	NMc	GS	KOMMING DISC ANGLE			DICO. NO.
K	06.07.17	NOTES REVISED	NMc	JC	GS	OR VERTICAL TERMINATION	ORIGINATED SCALE	NTS	HOA
J	20.04.16	OUTRIGGER STAY ADDED	AT	DVT	GS	OR VERTICAL TERMINATION	CHECKED: REE		1100
Н	03.11.15	EARTHING SYSTEM MODIFIED	GS	REE	GS	(900mm SPACING)	APPROVED:		REV. SHT.
RFV	DATE	DESCRIPTION	ORGO	CHKD	APRO	(700IIIII SI ACING)	GRANT S	STACY	

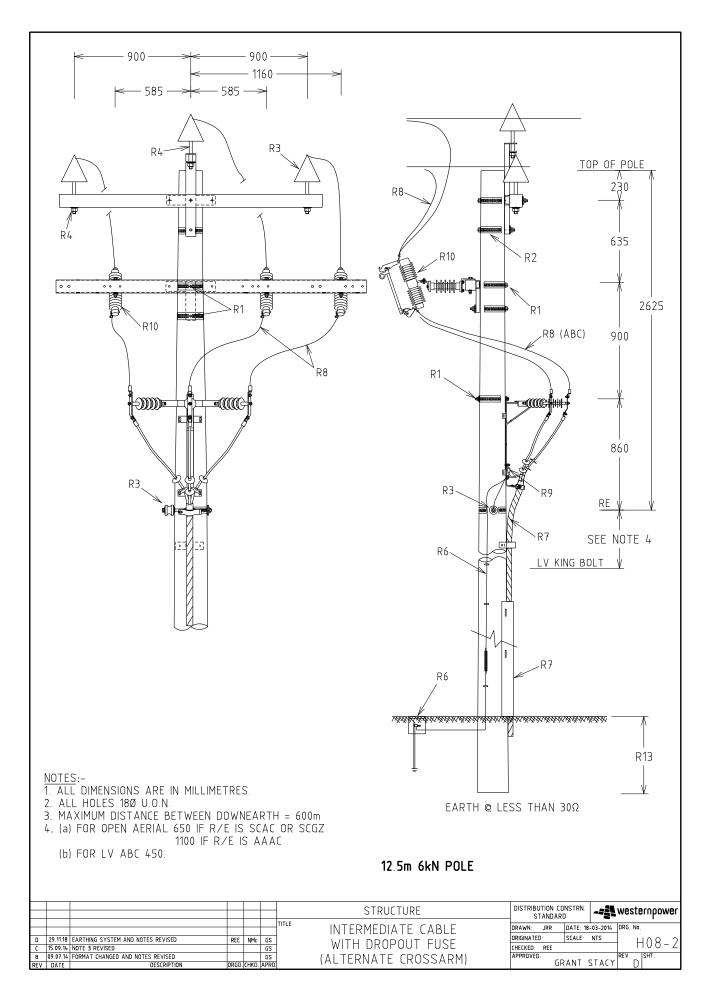




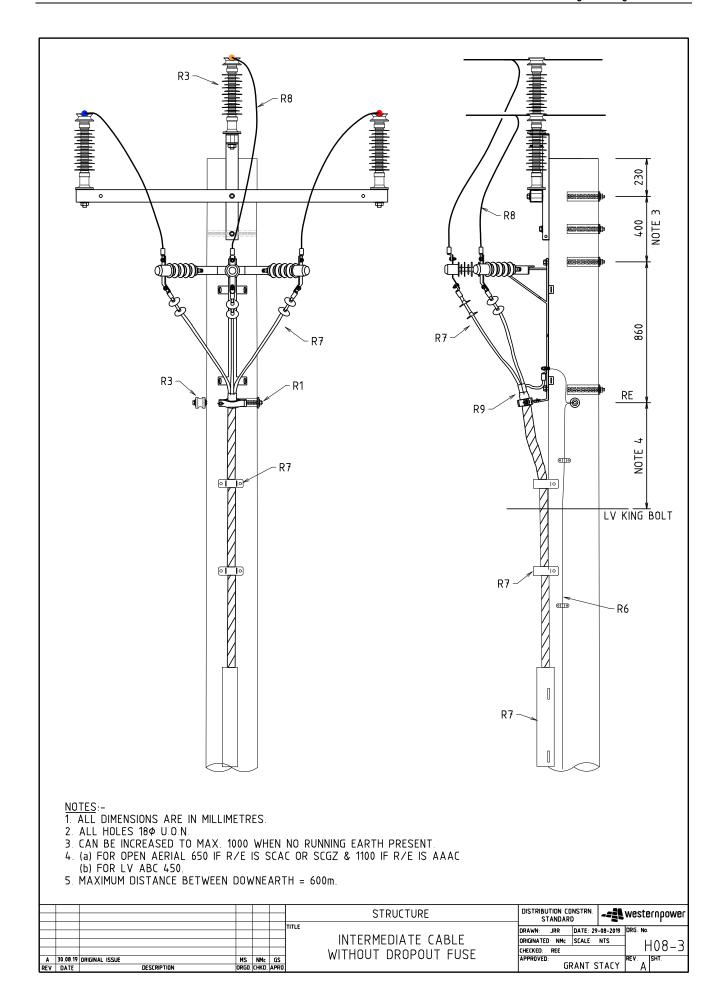




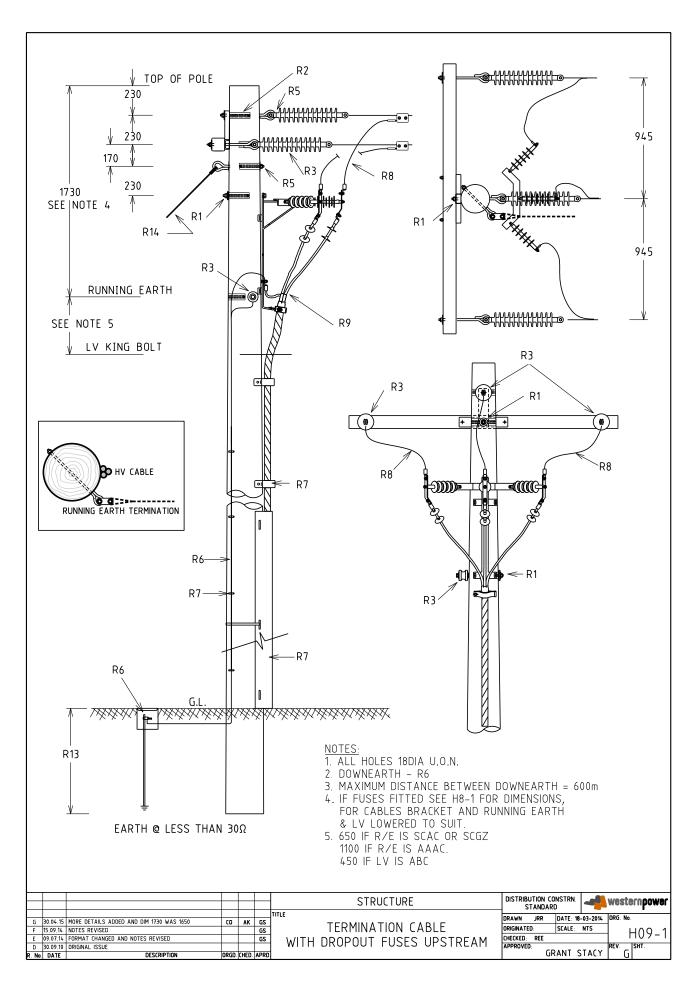




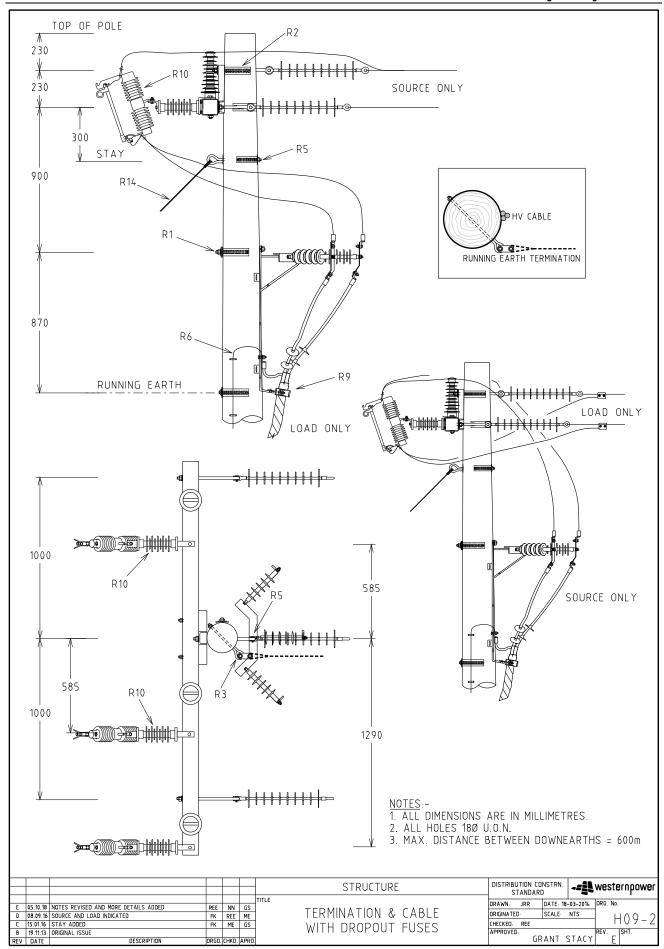




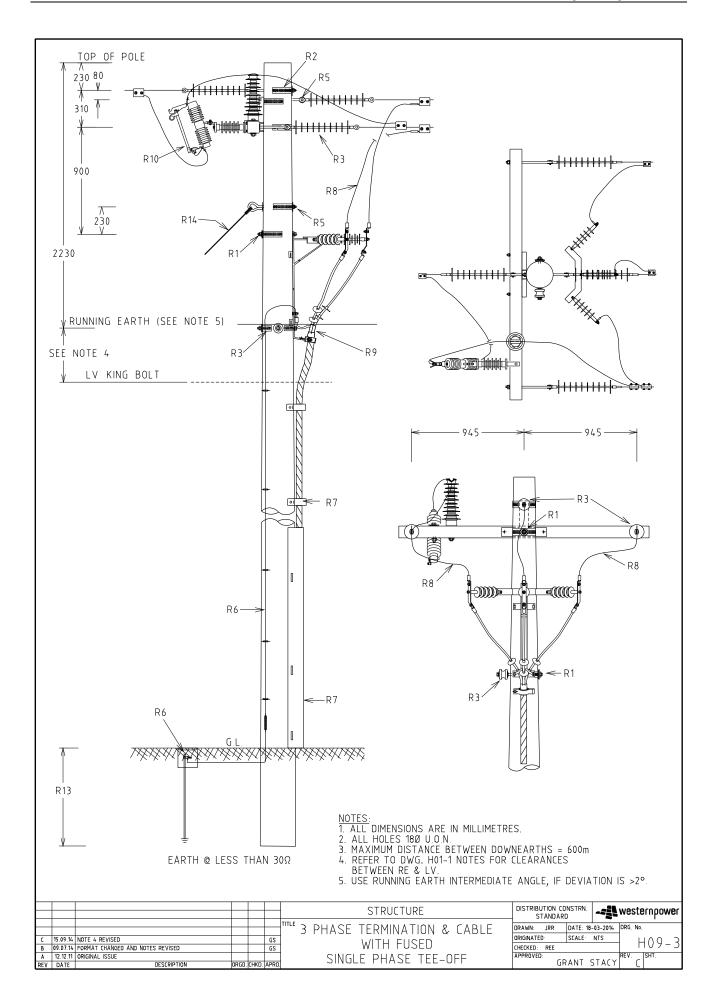




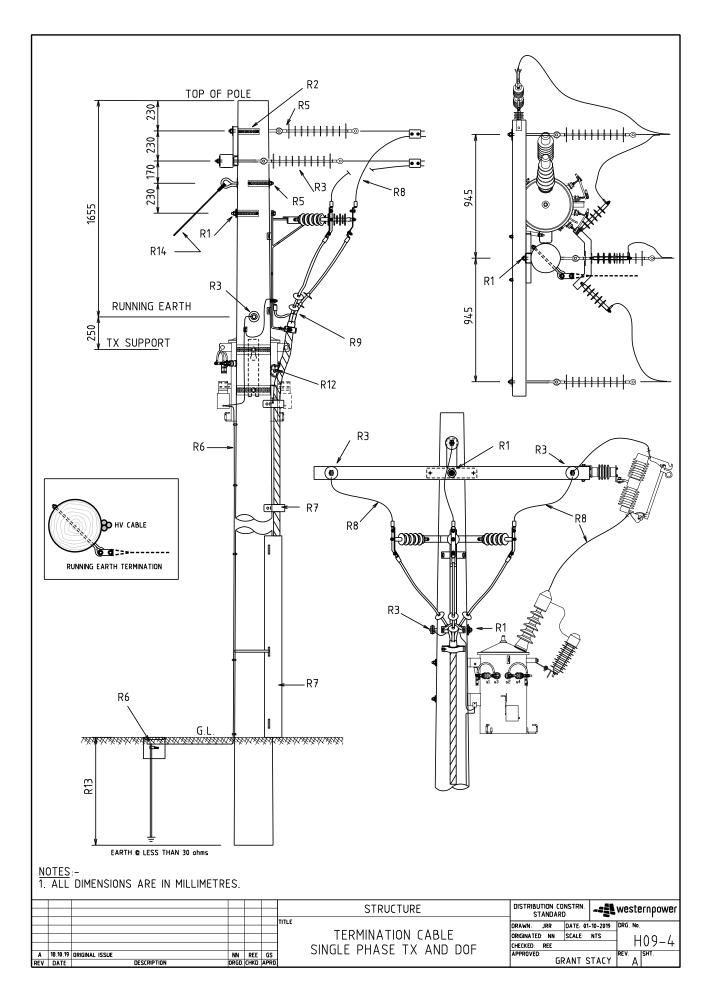




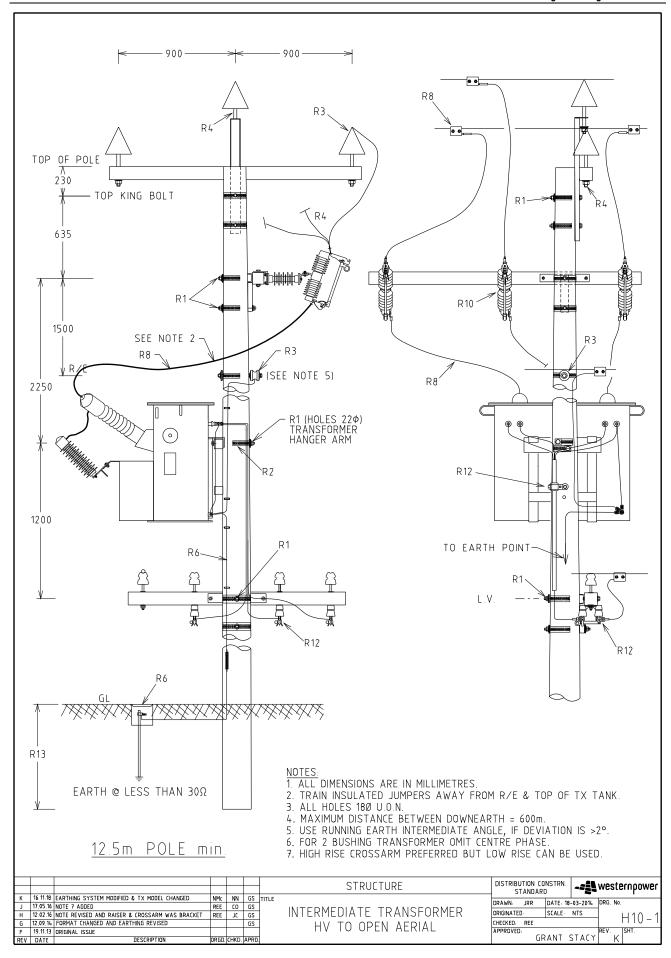




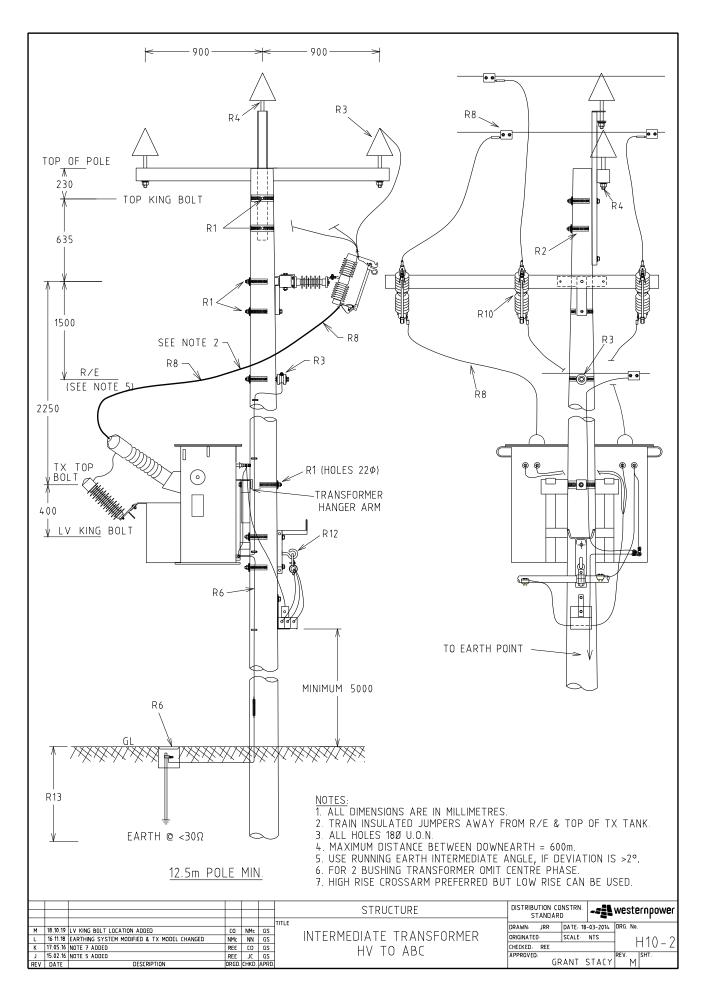




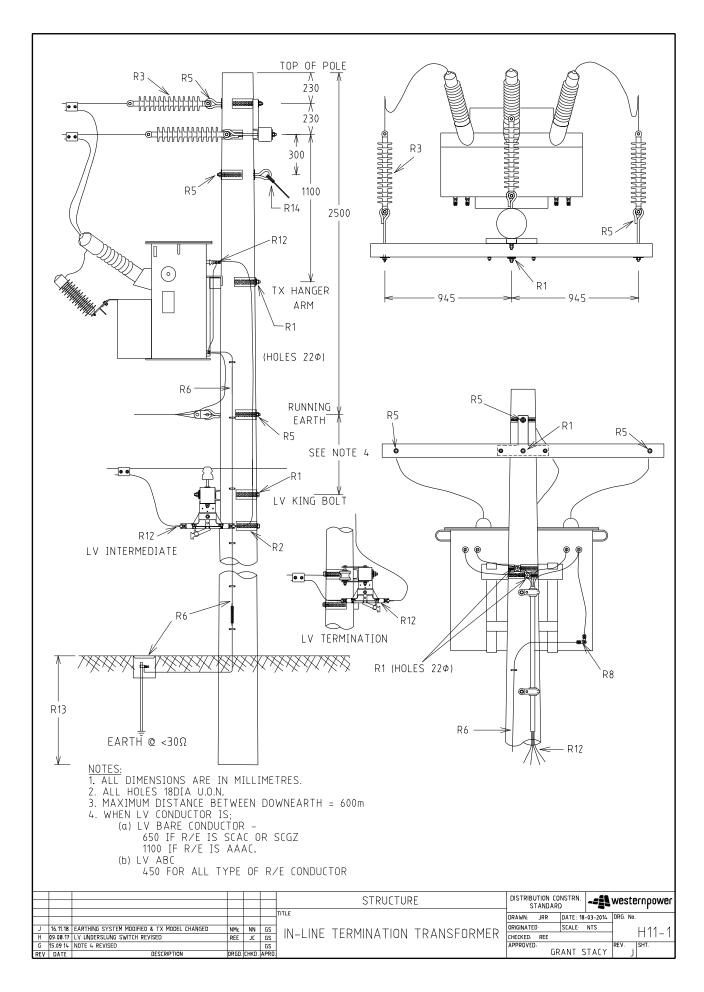




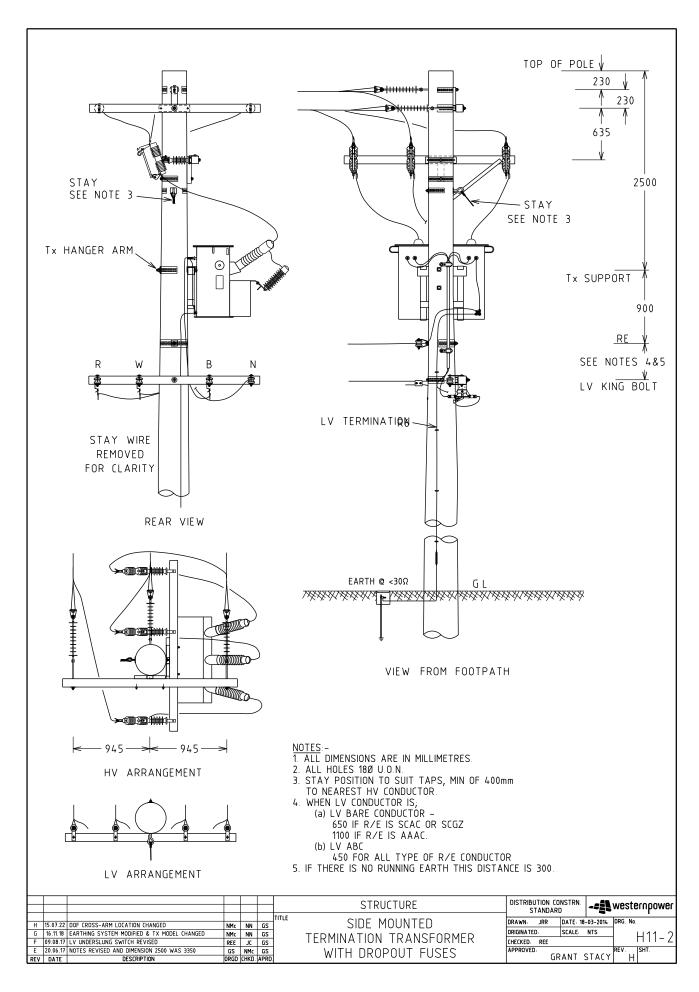




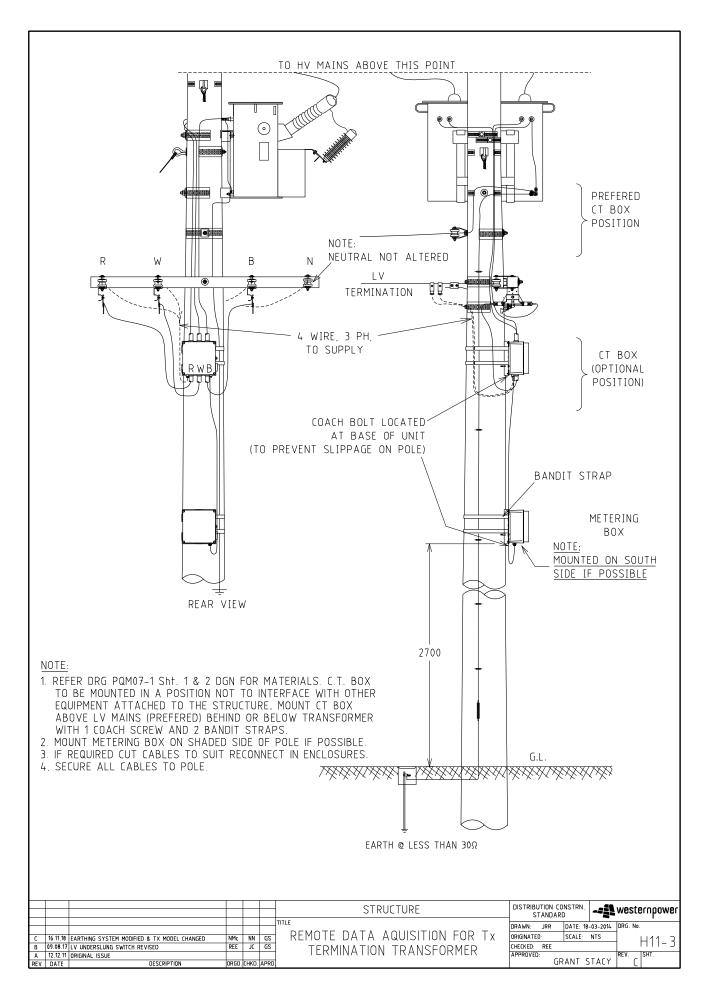




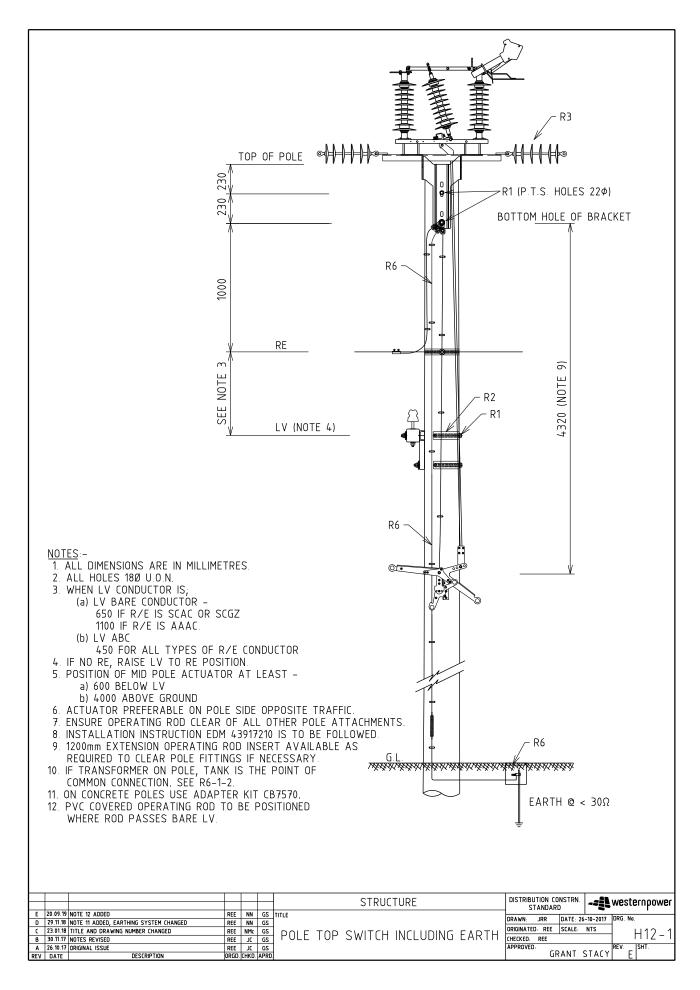




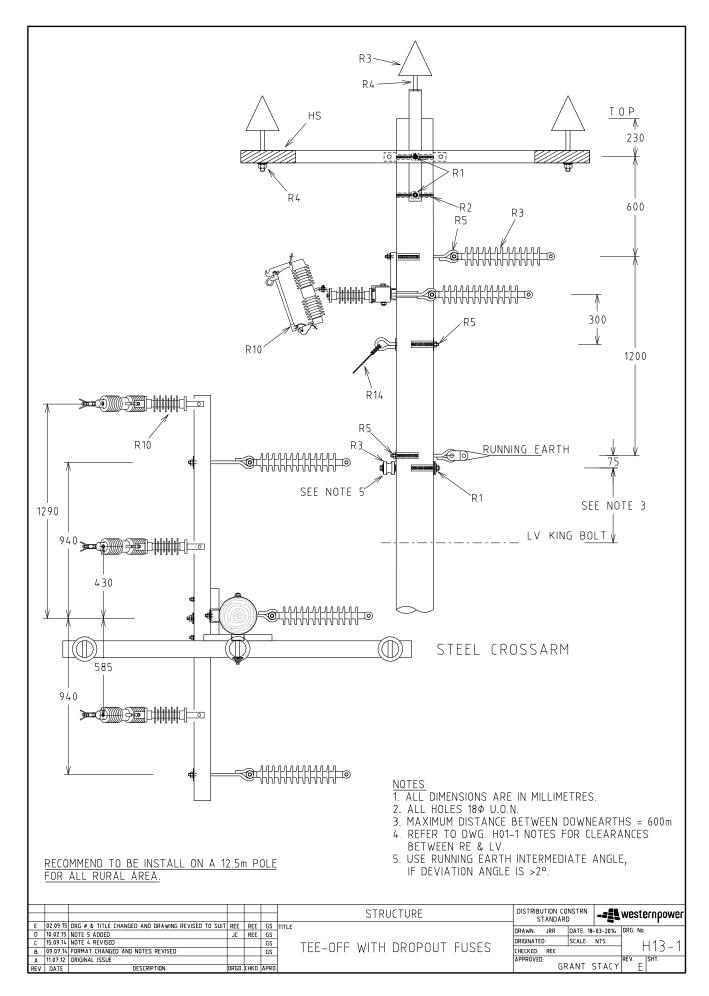




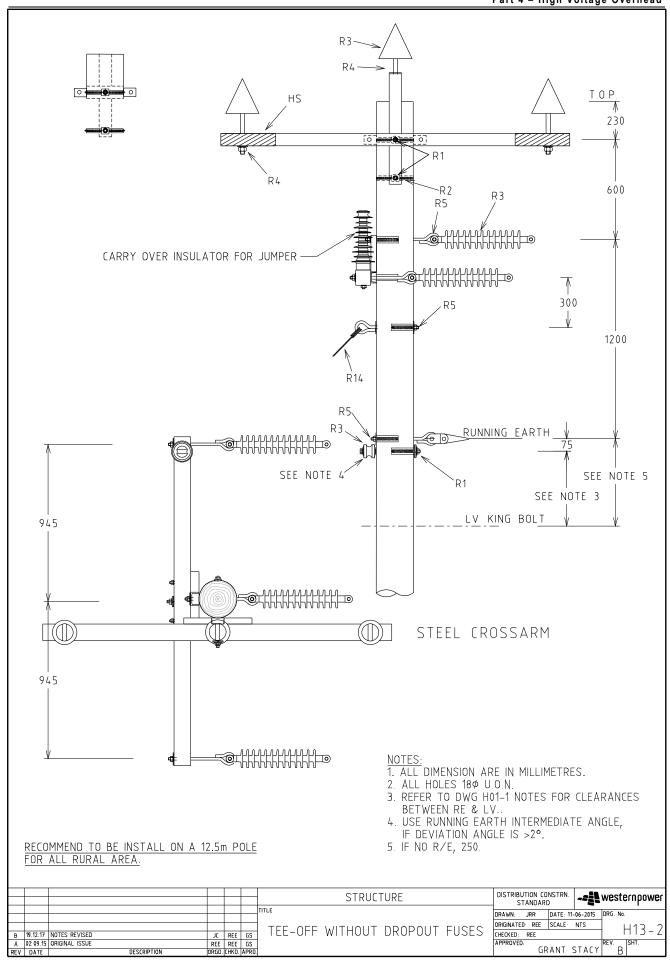




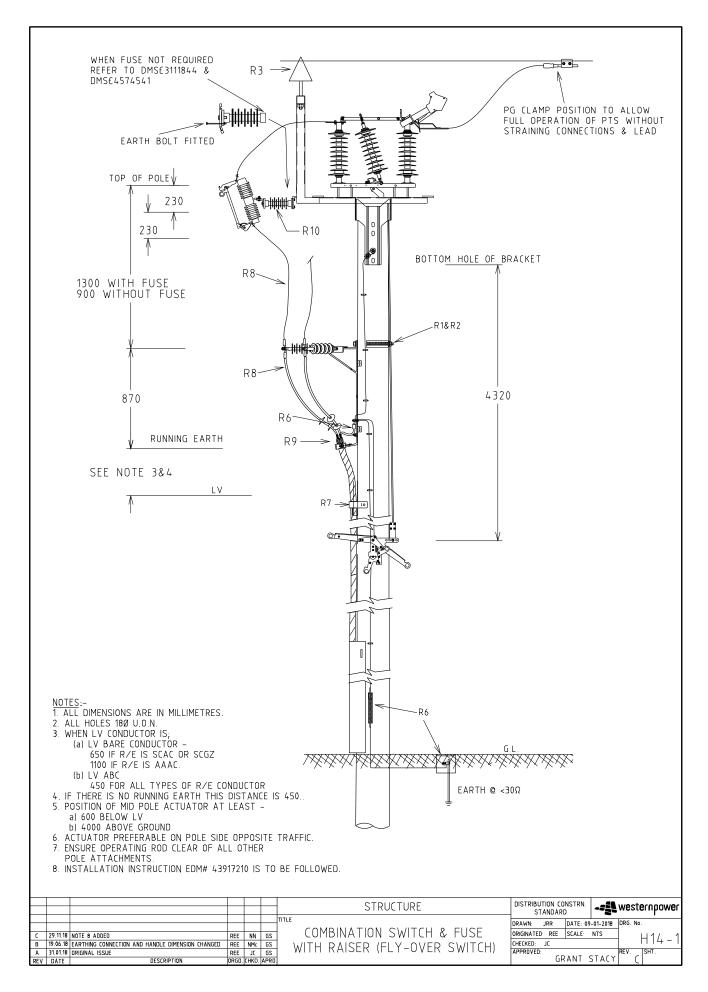




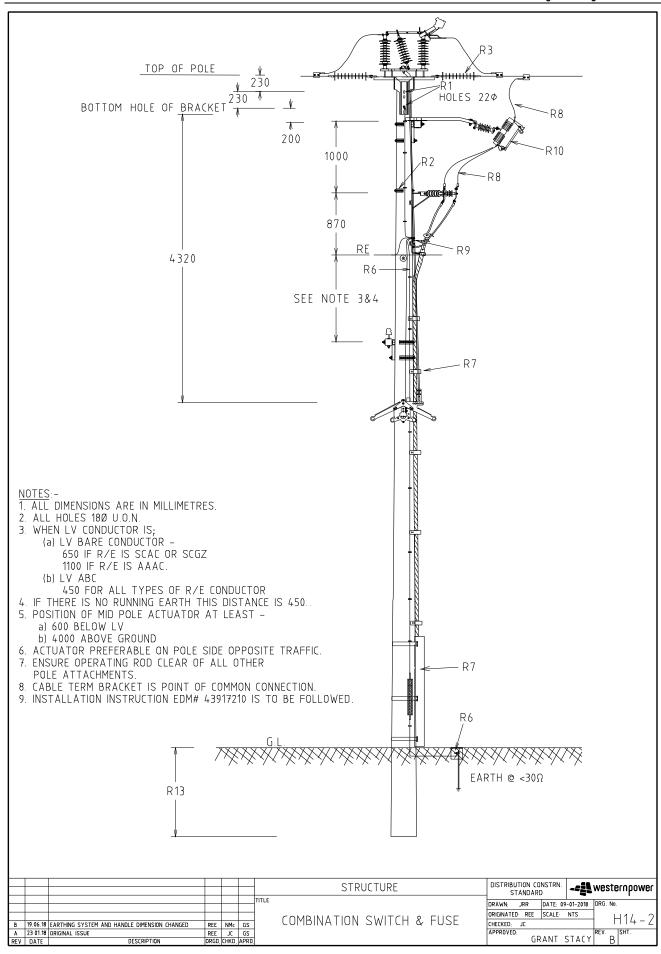




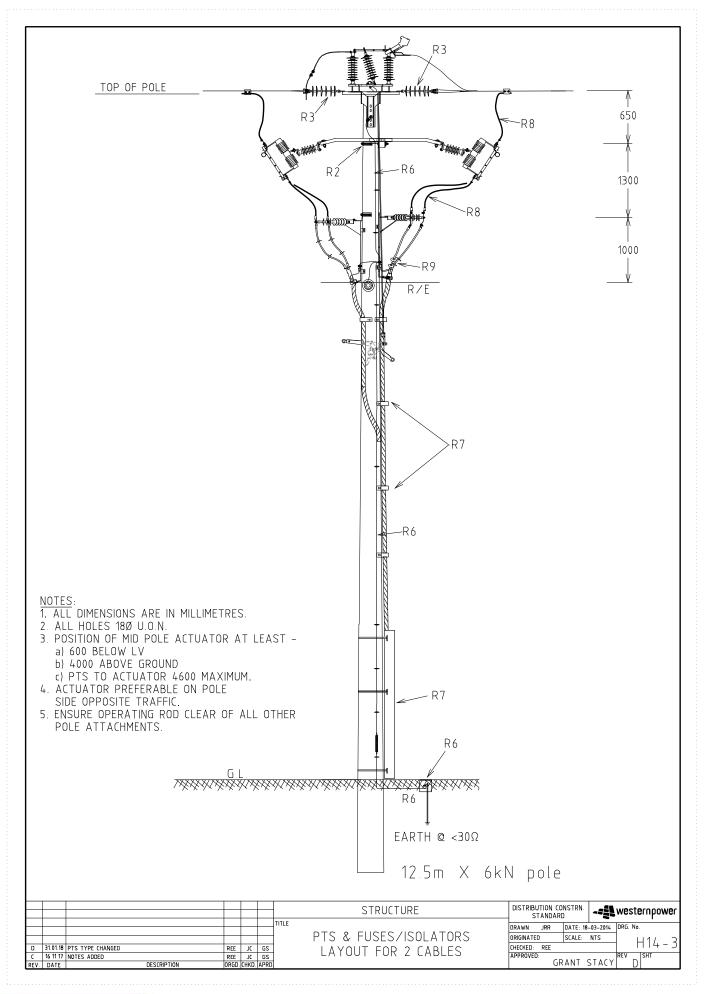




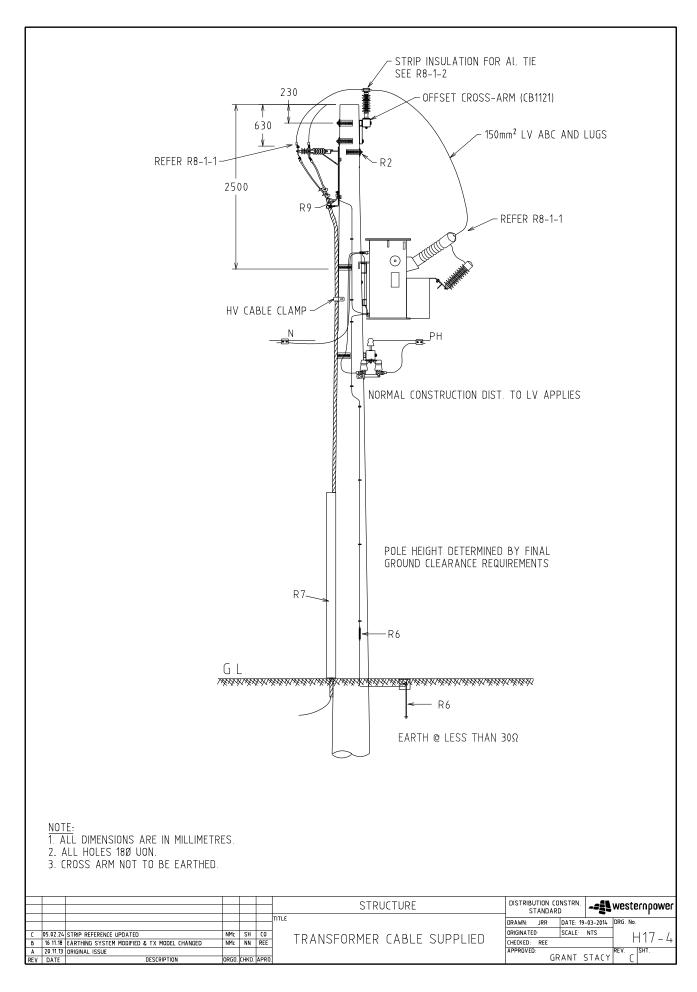




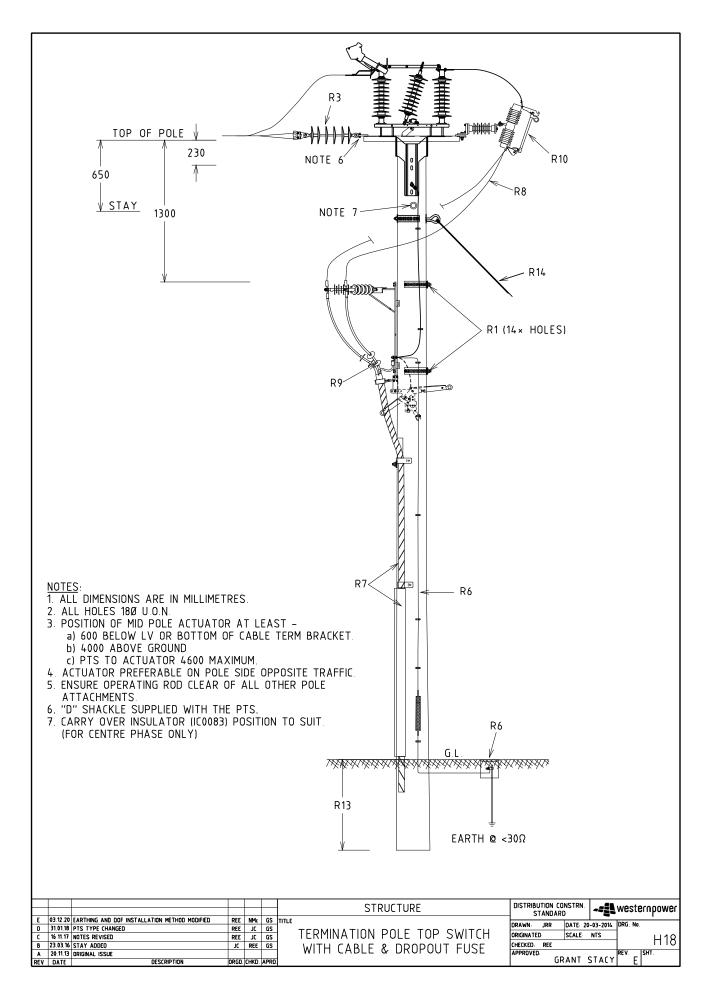




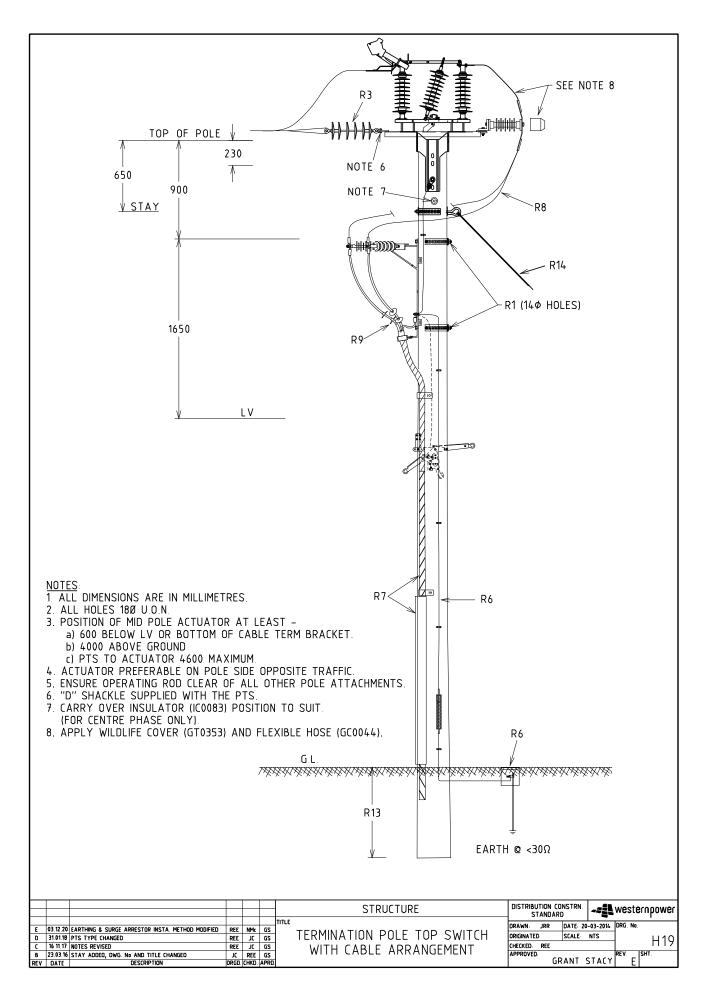




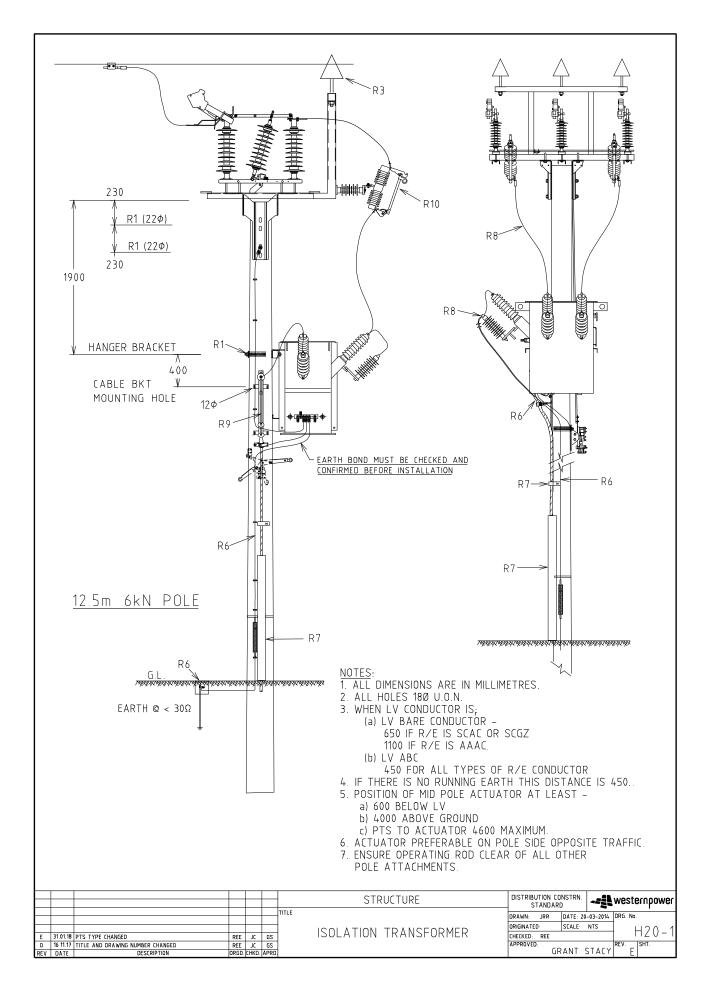




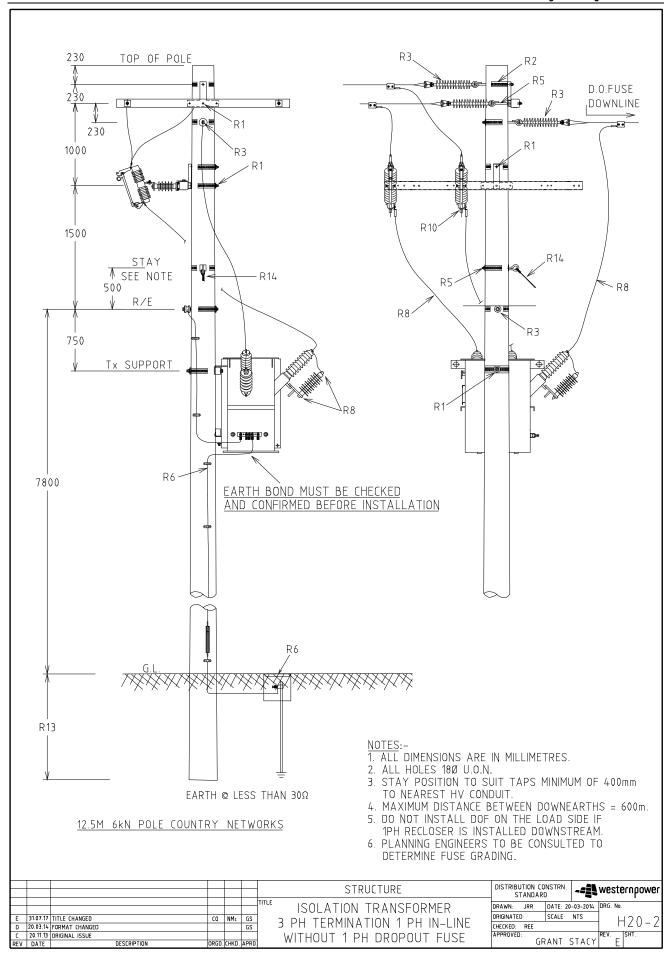




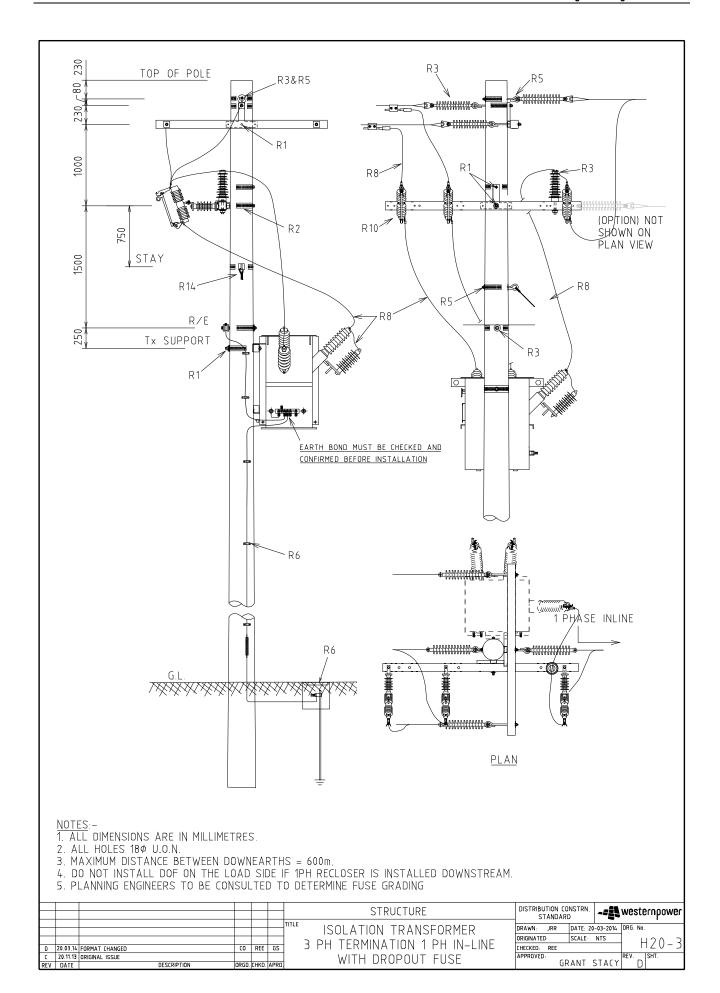




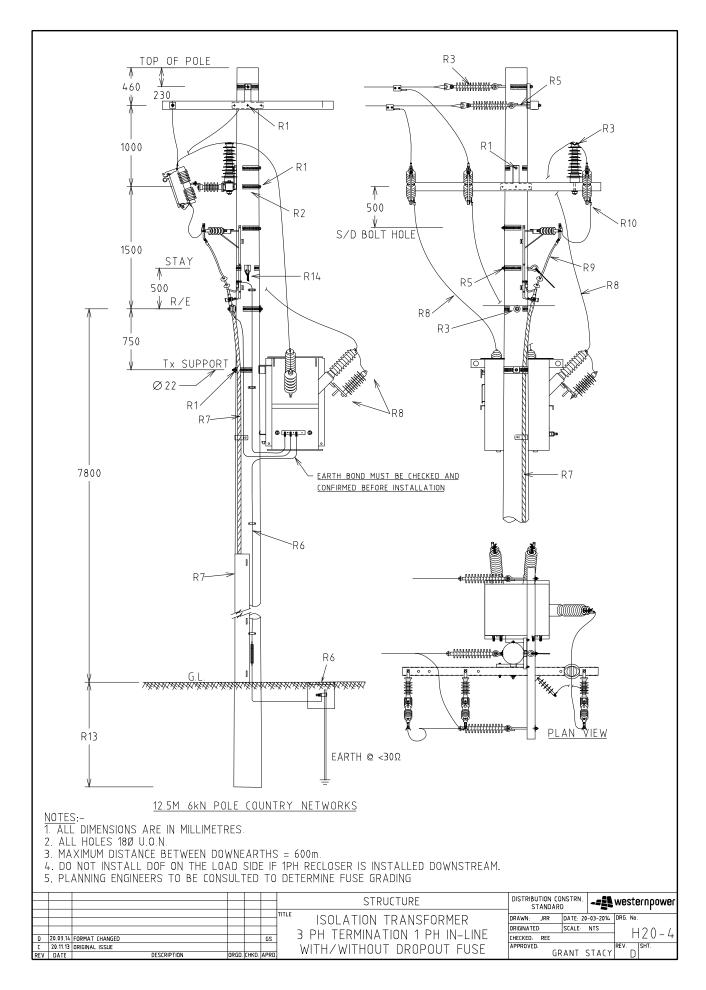




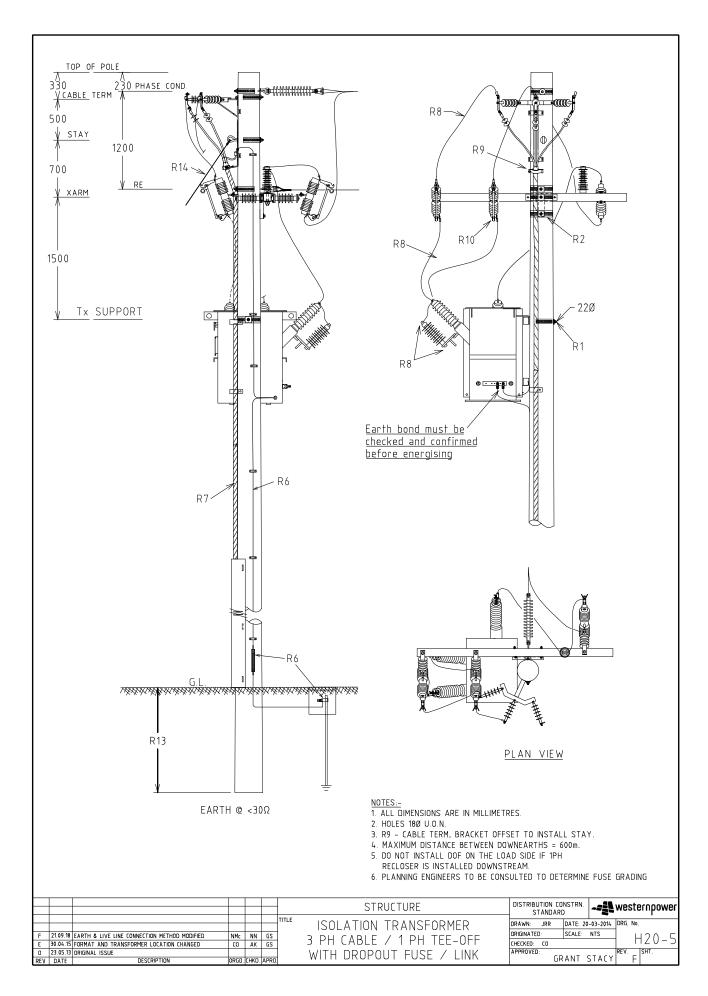




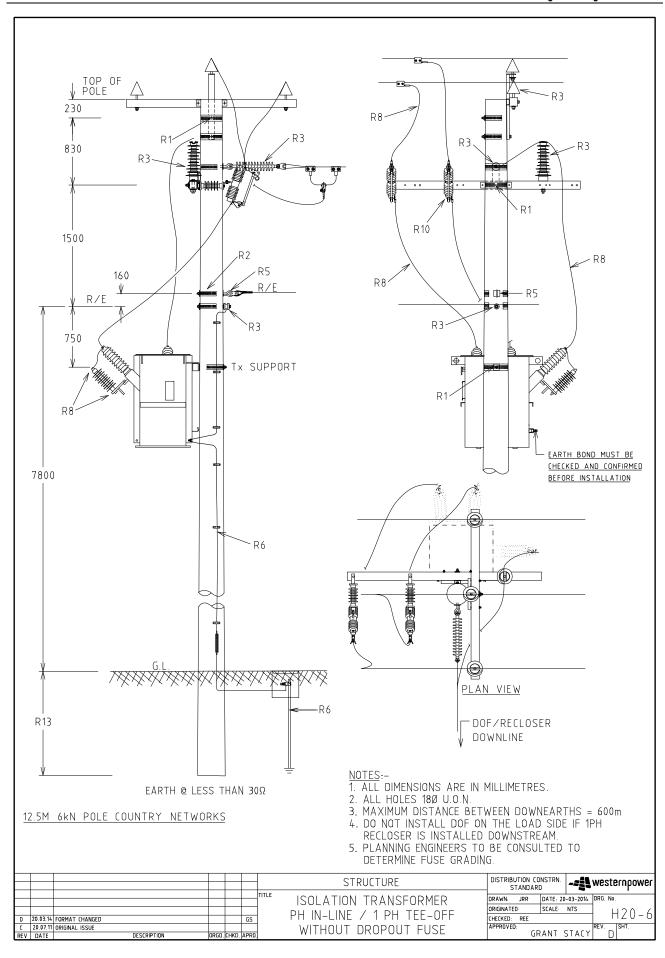




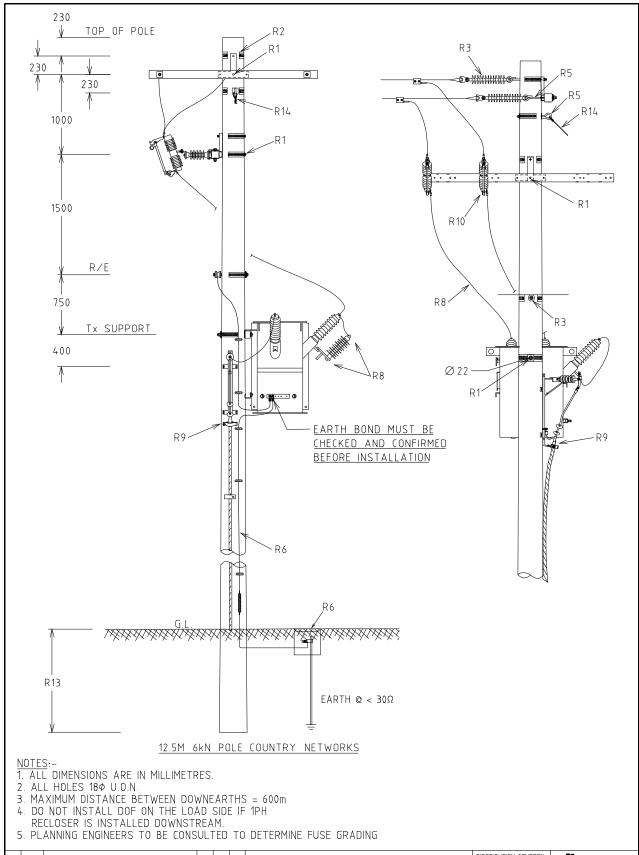






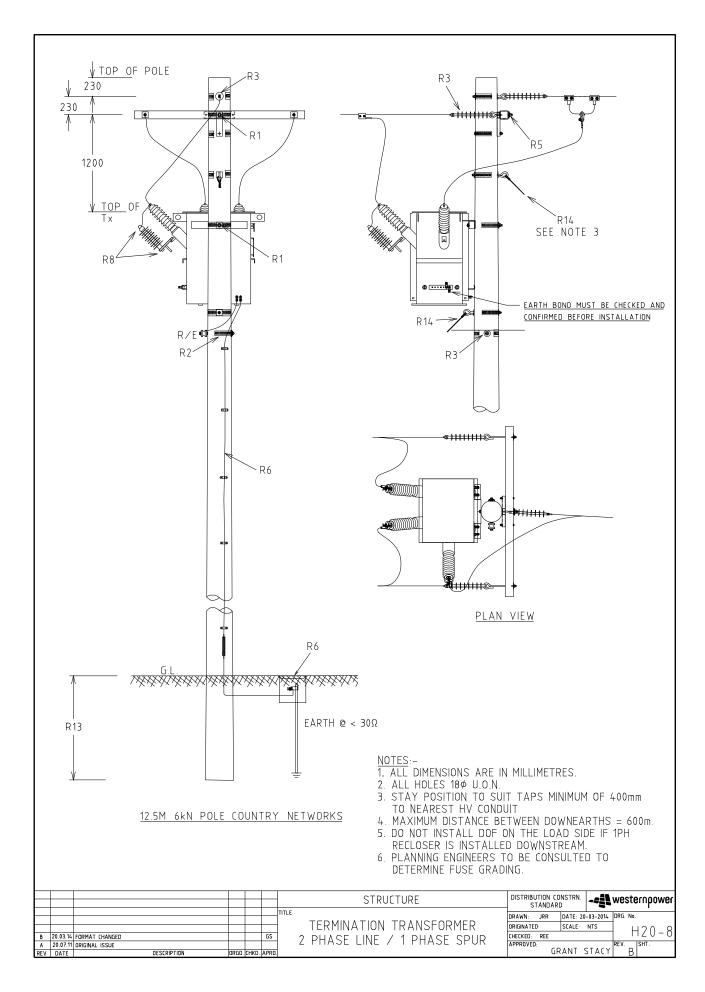




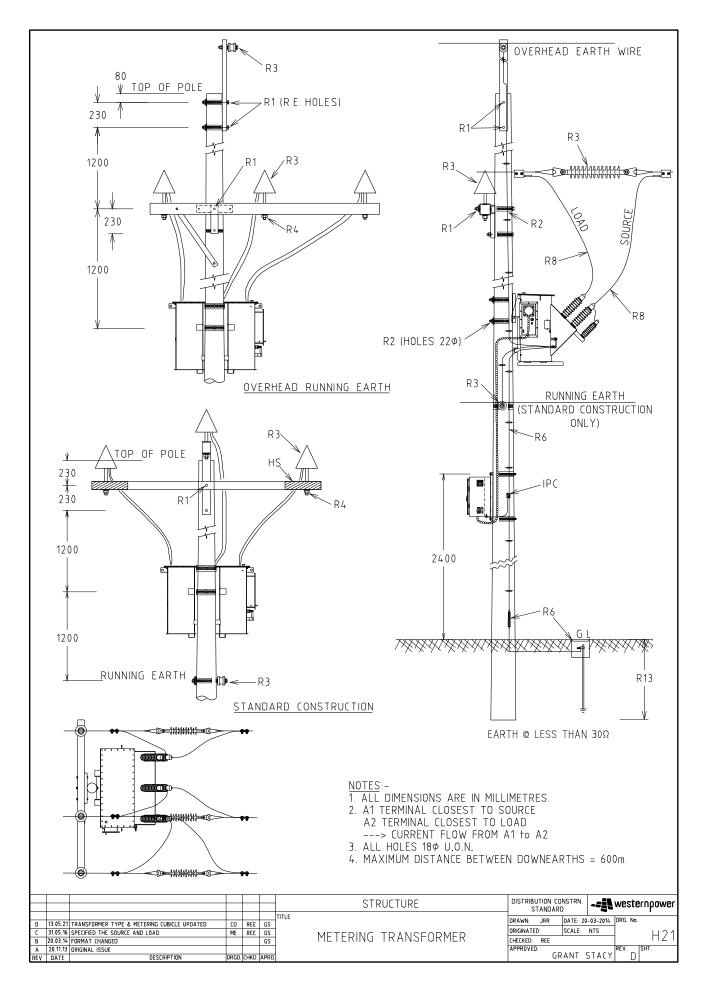




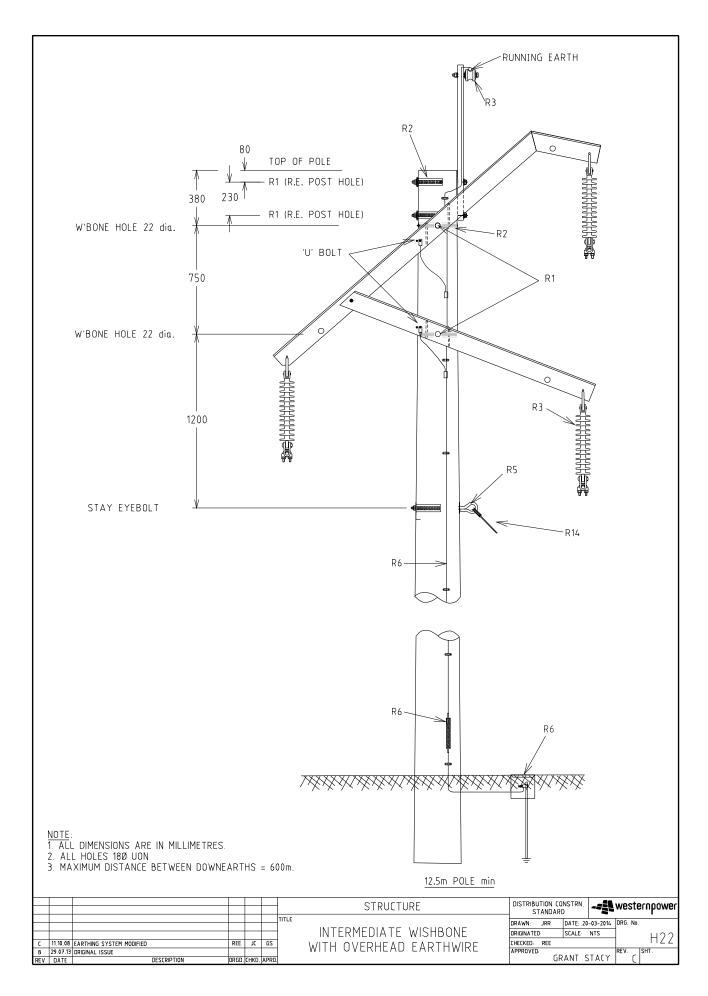




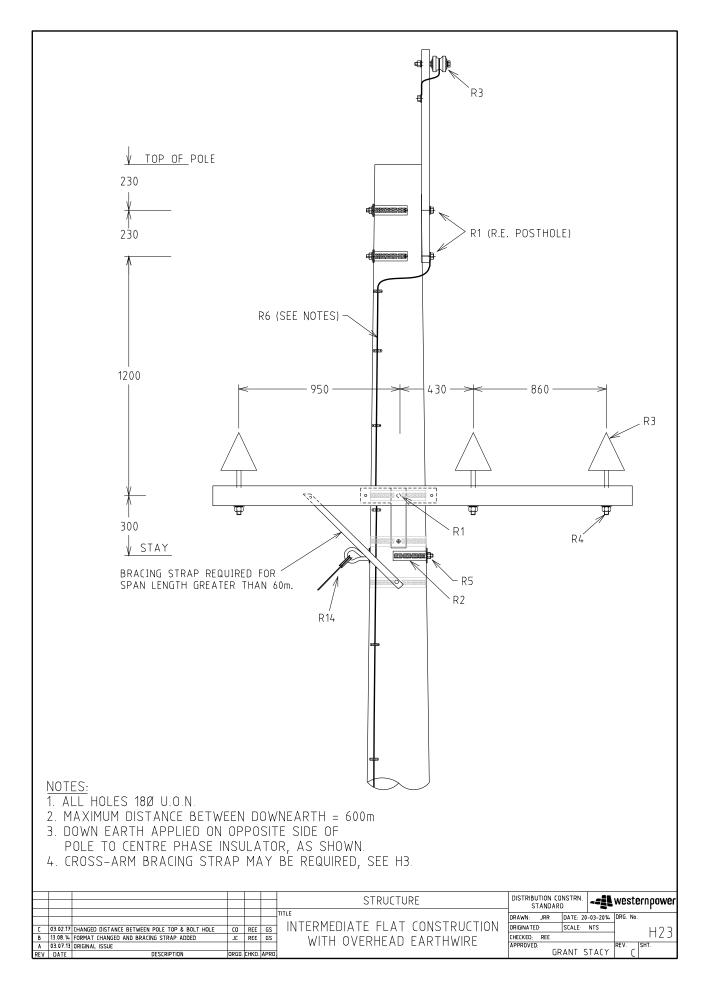




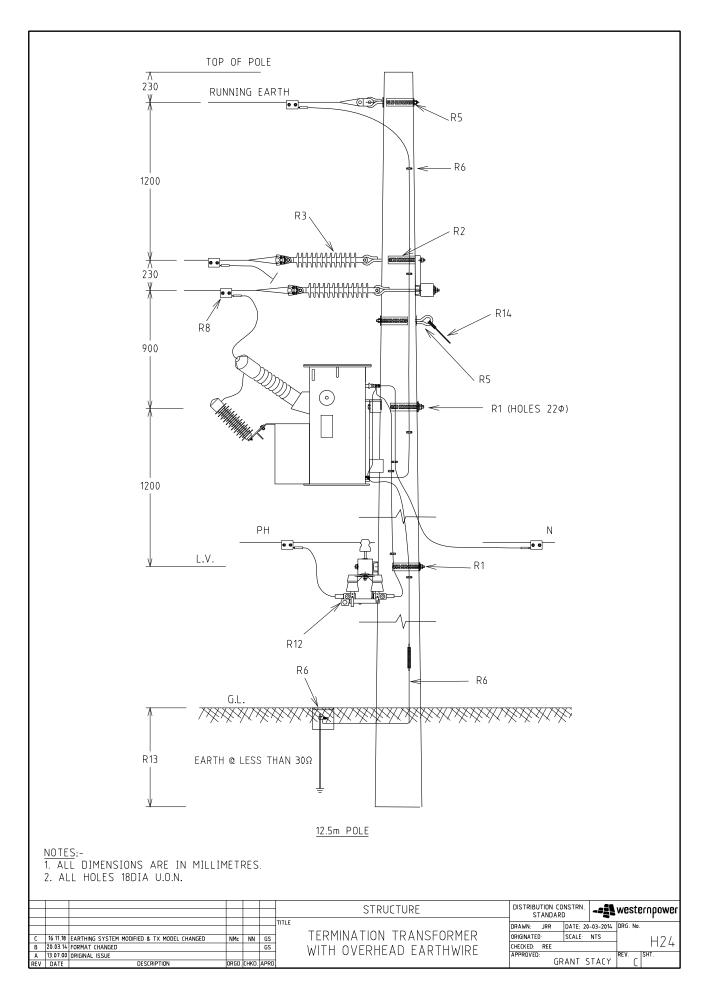




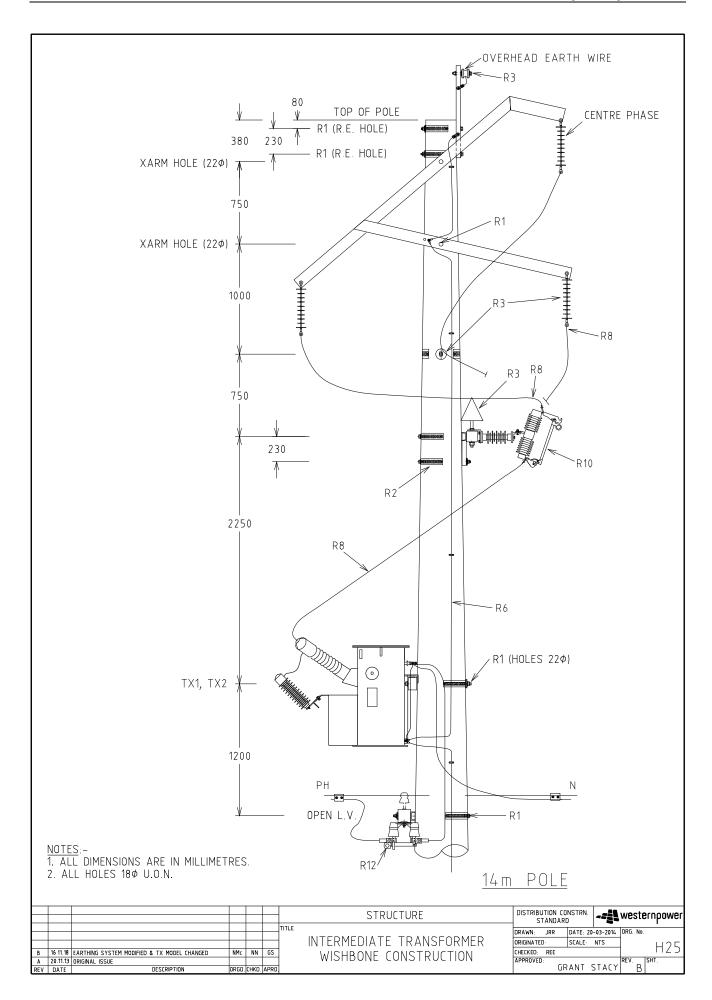




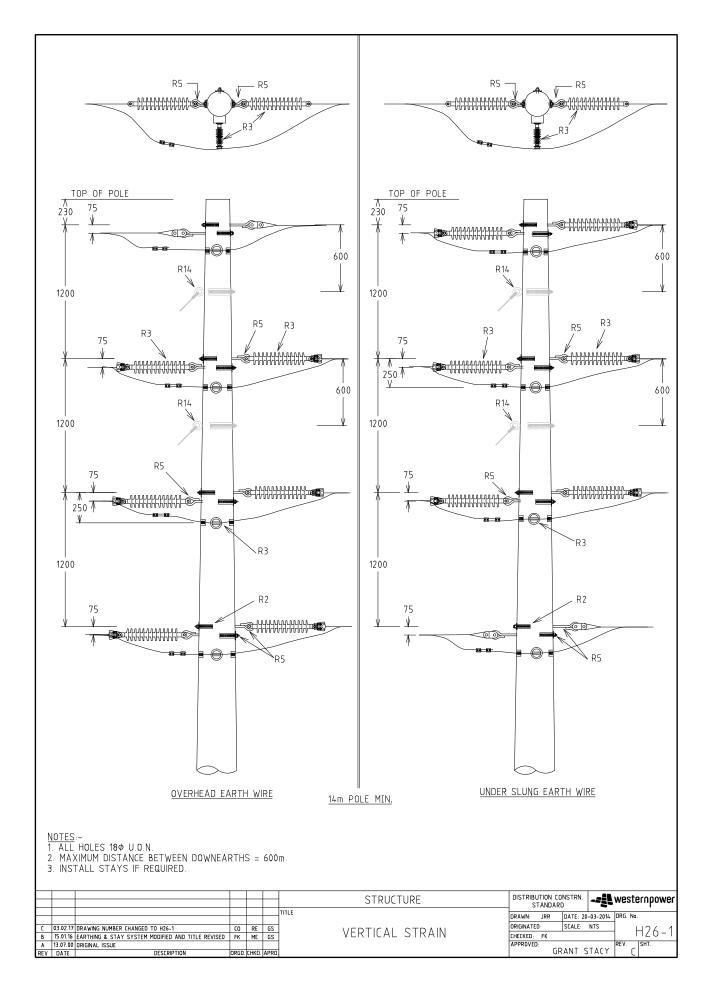




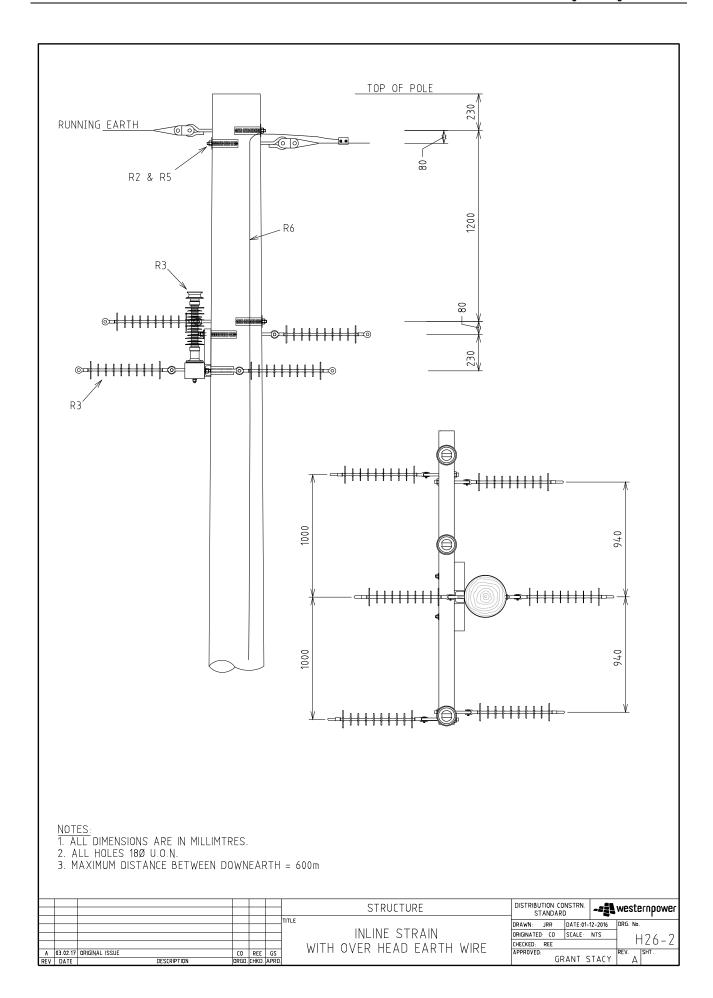




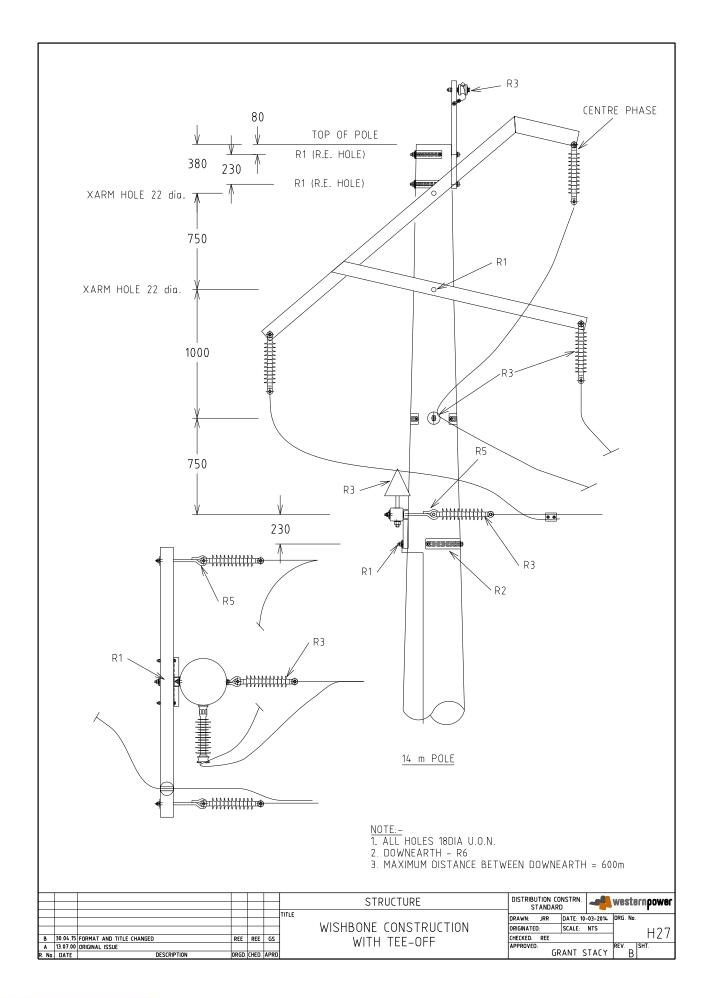




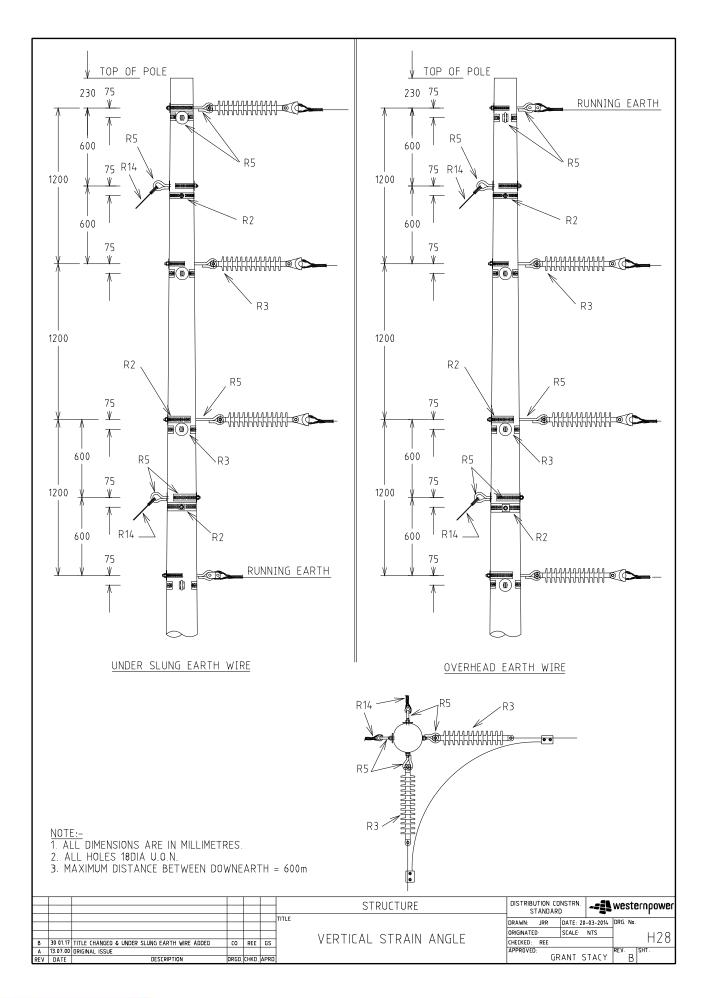




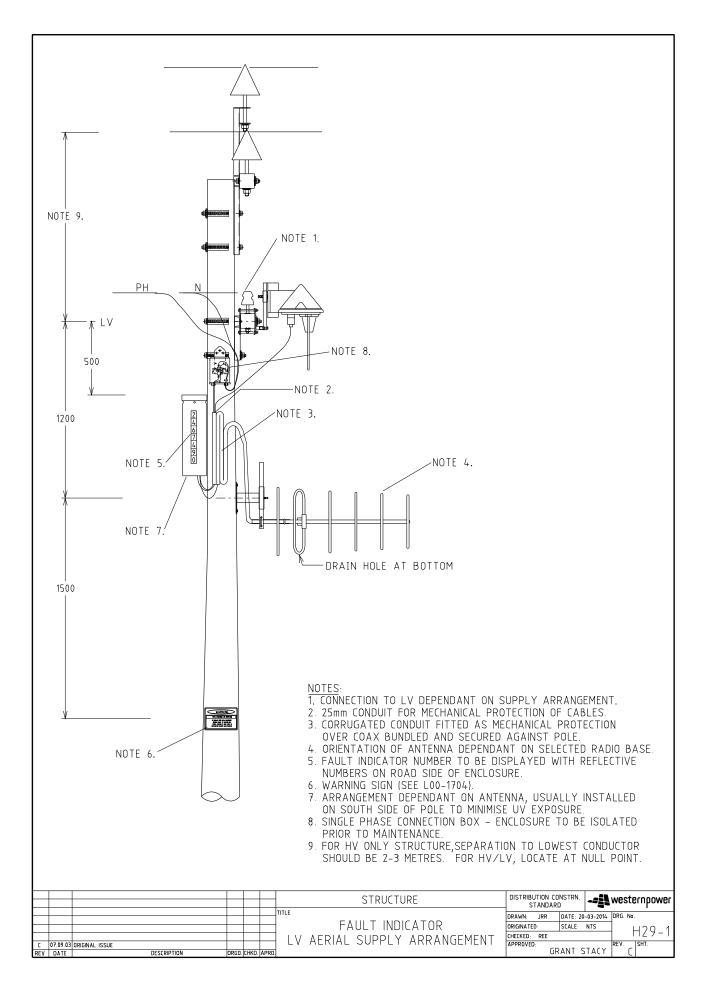




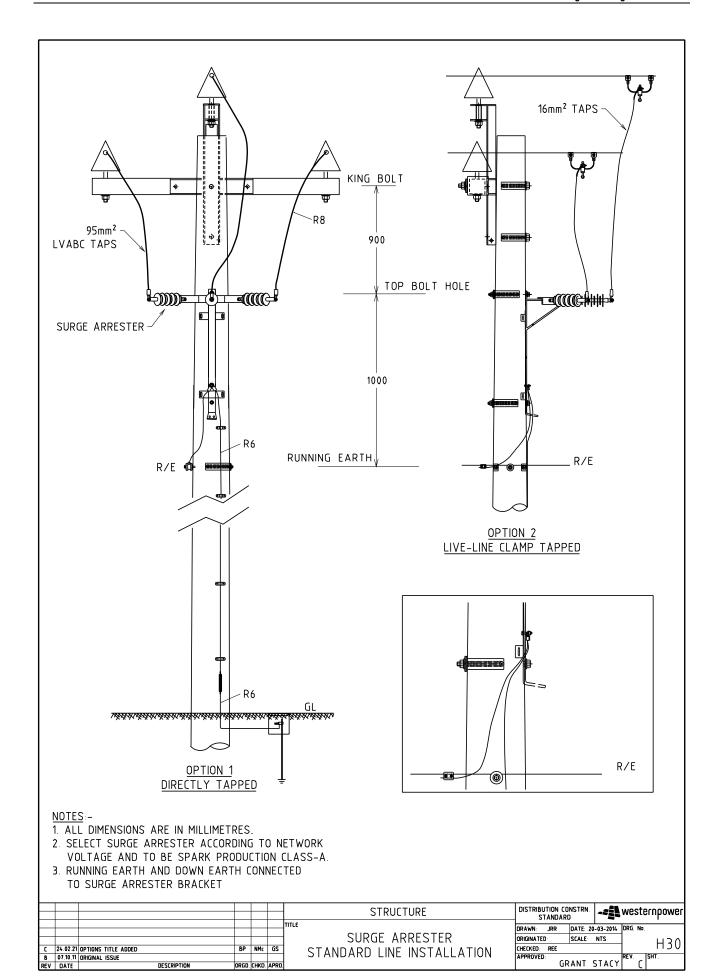




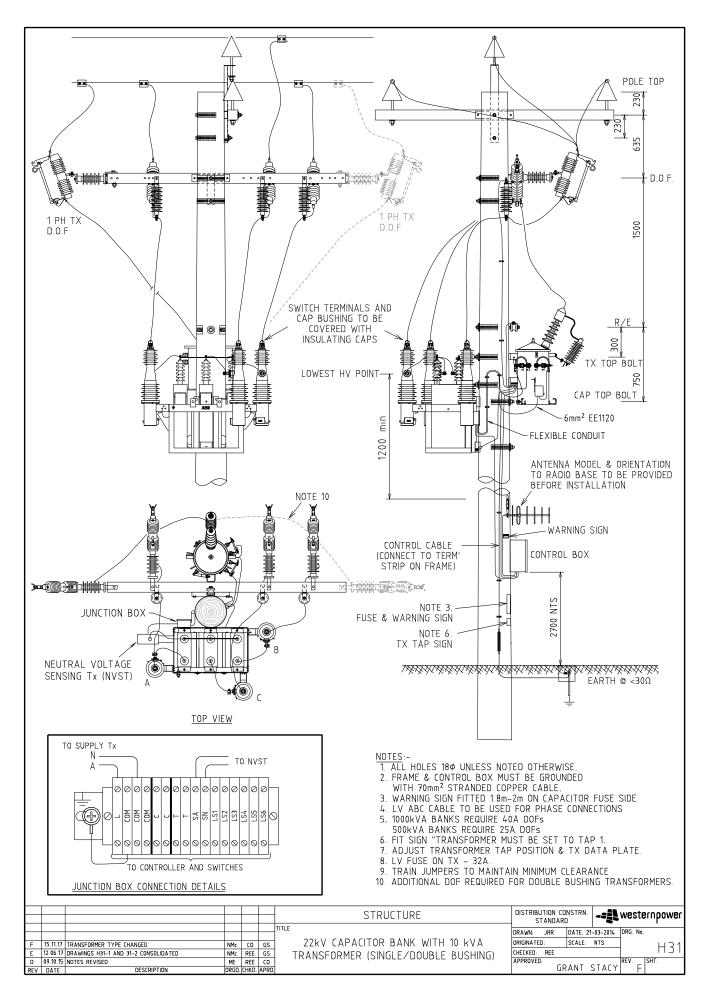




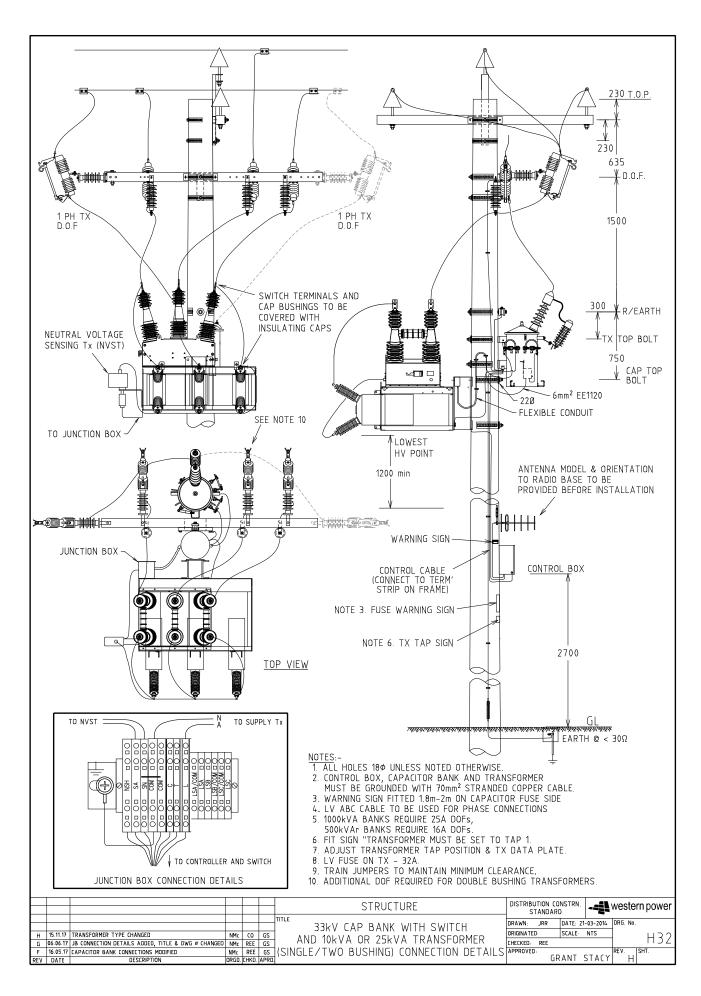




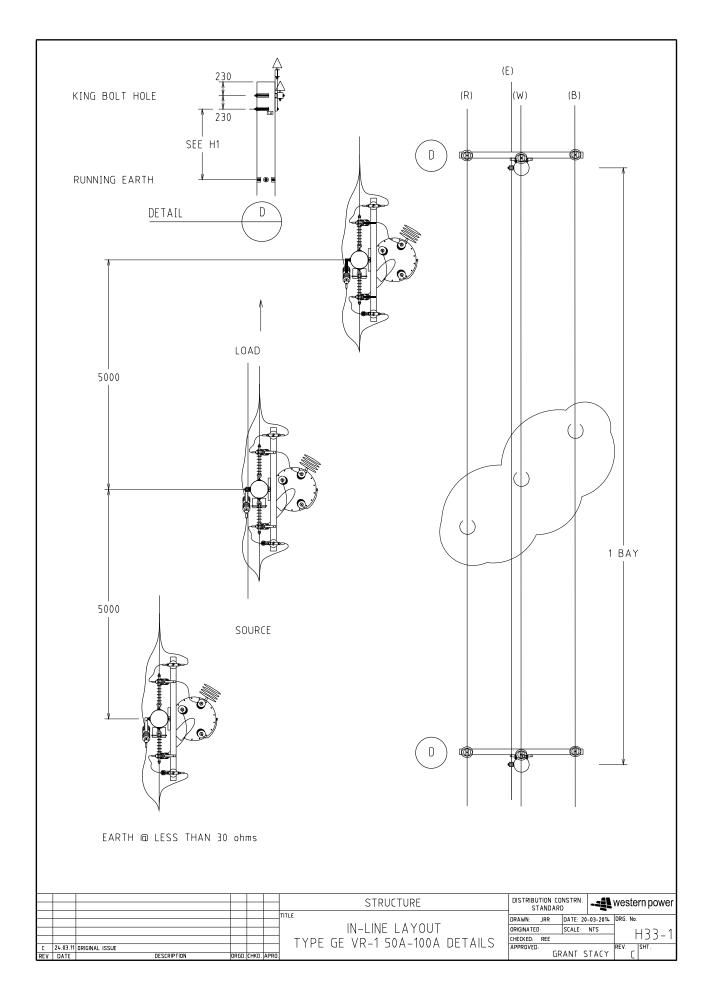




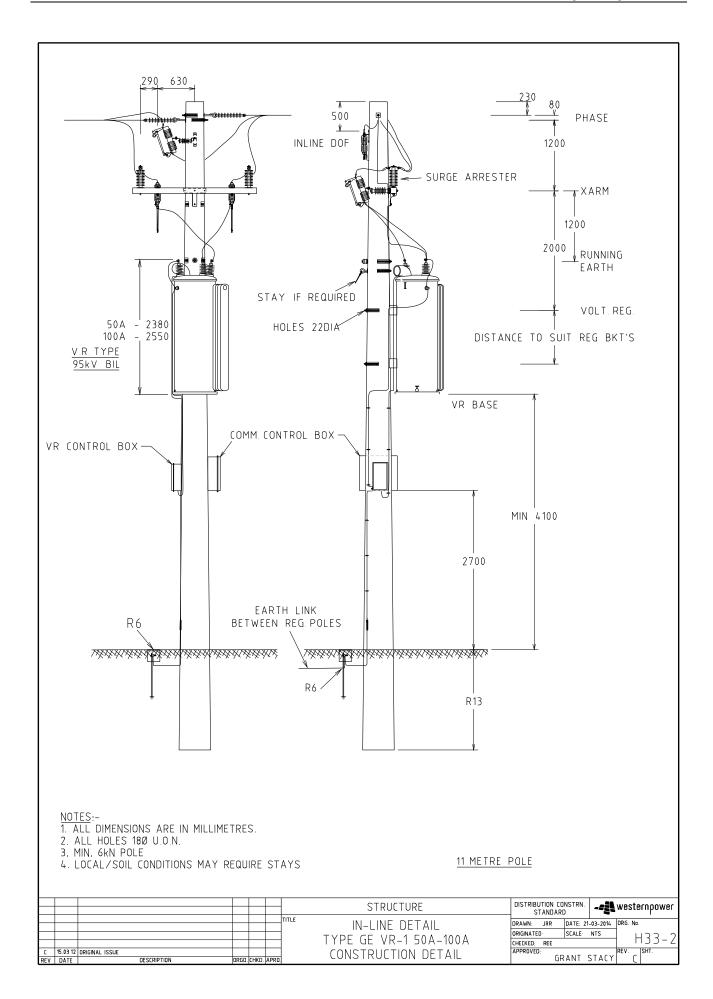




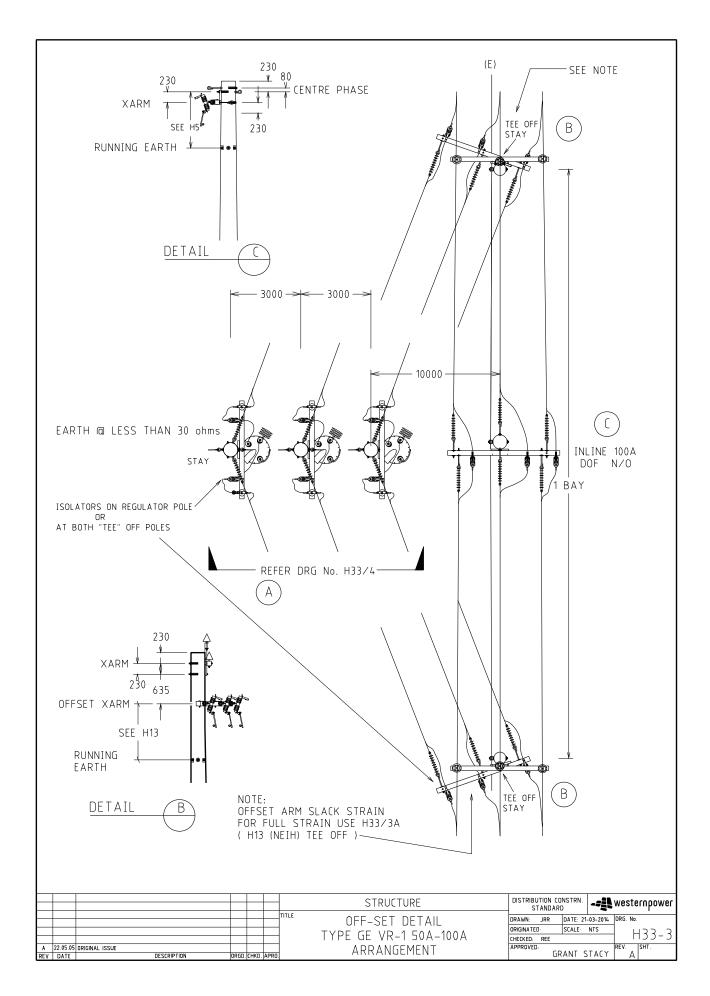




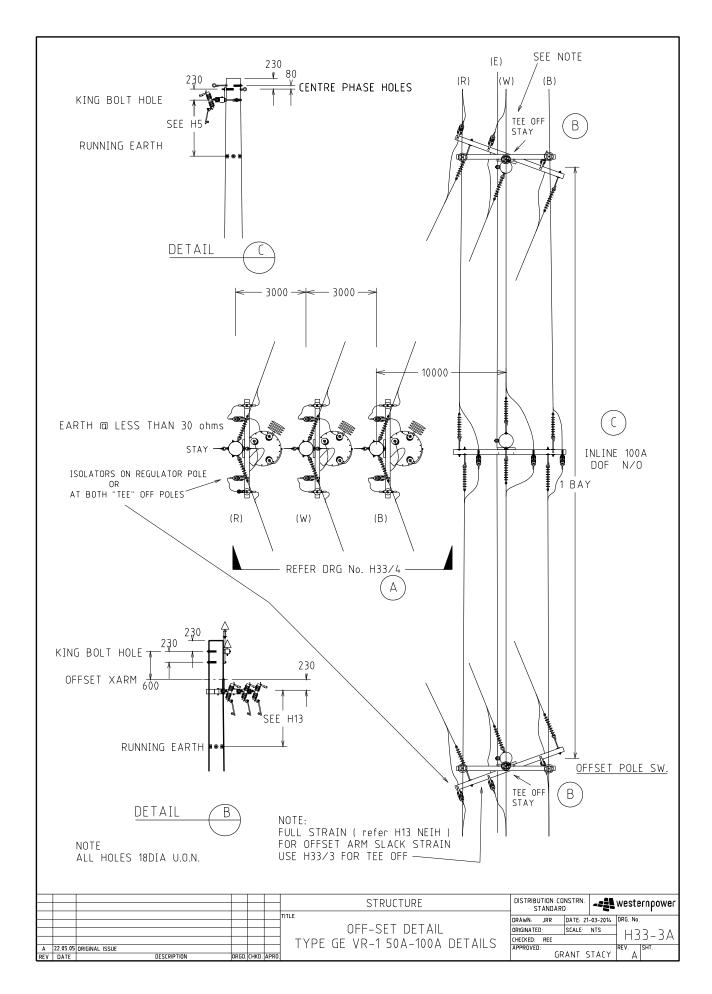




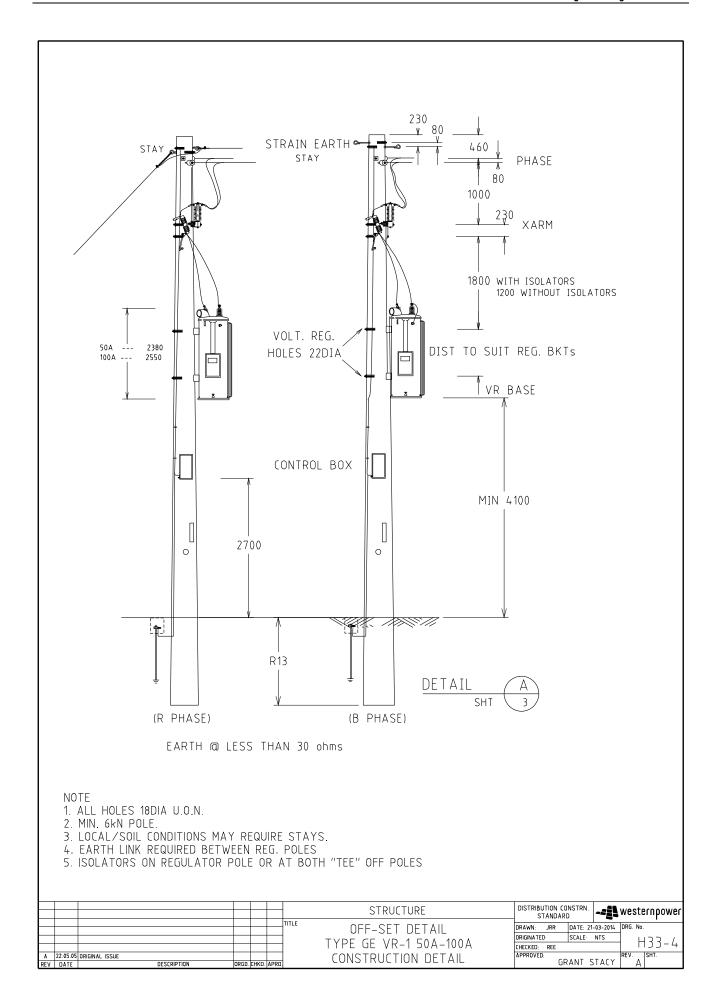




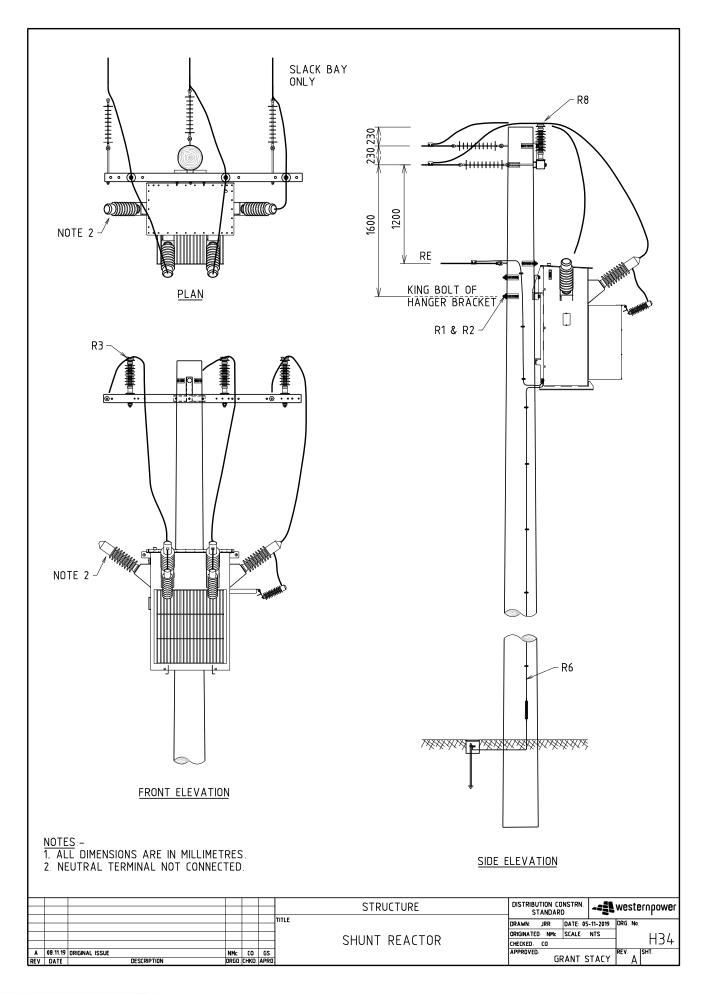




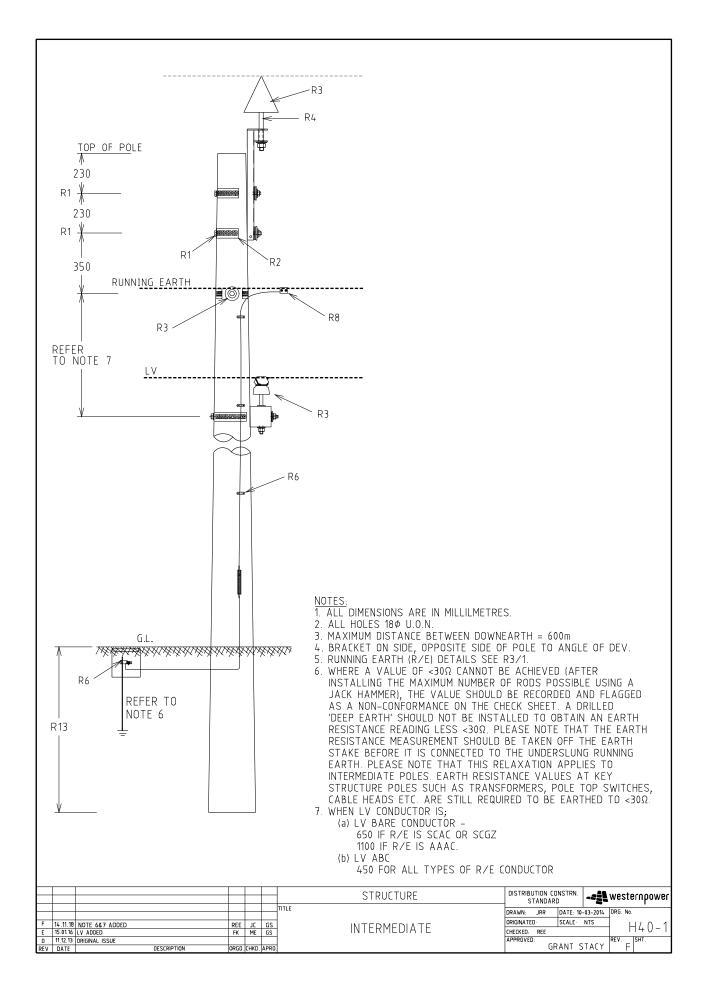




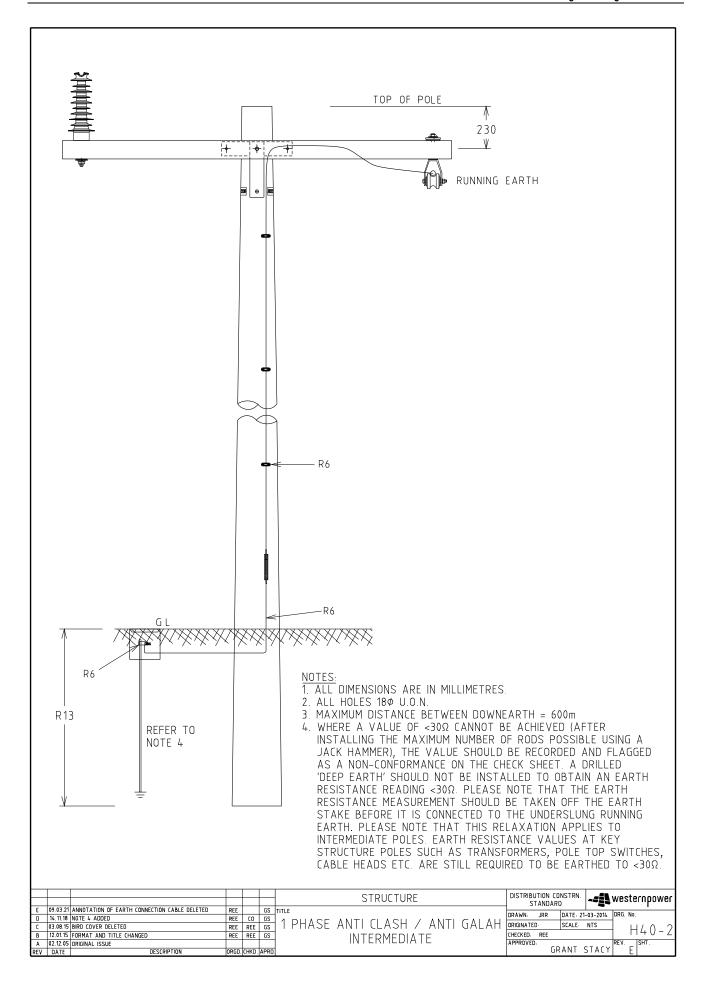




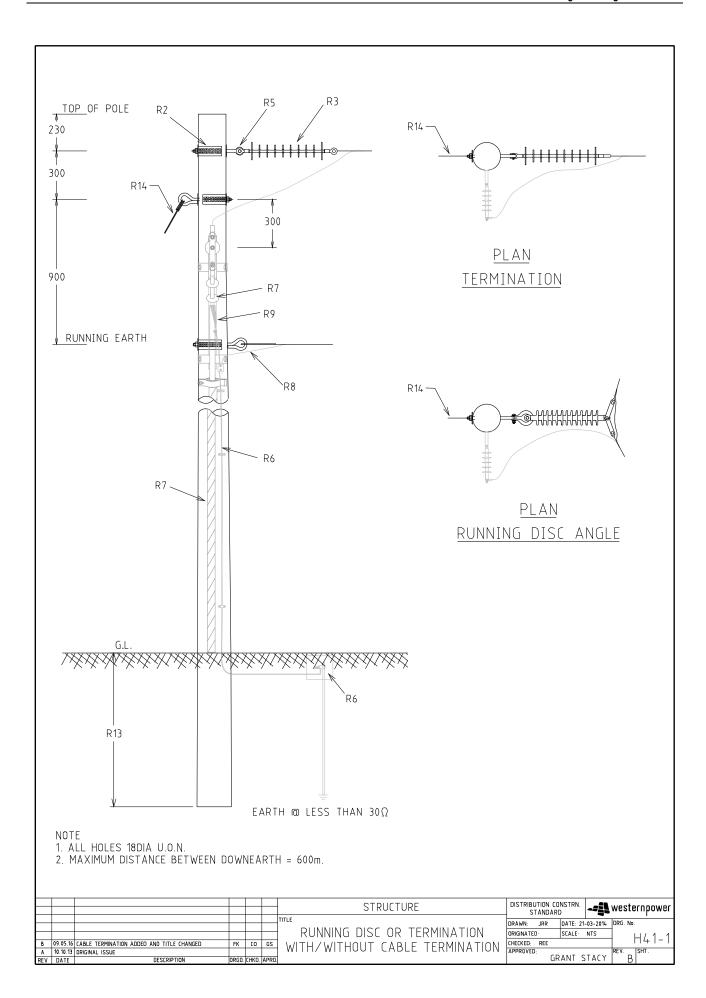




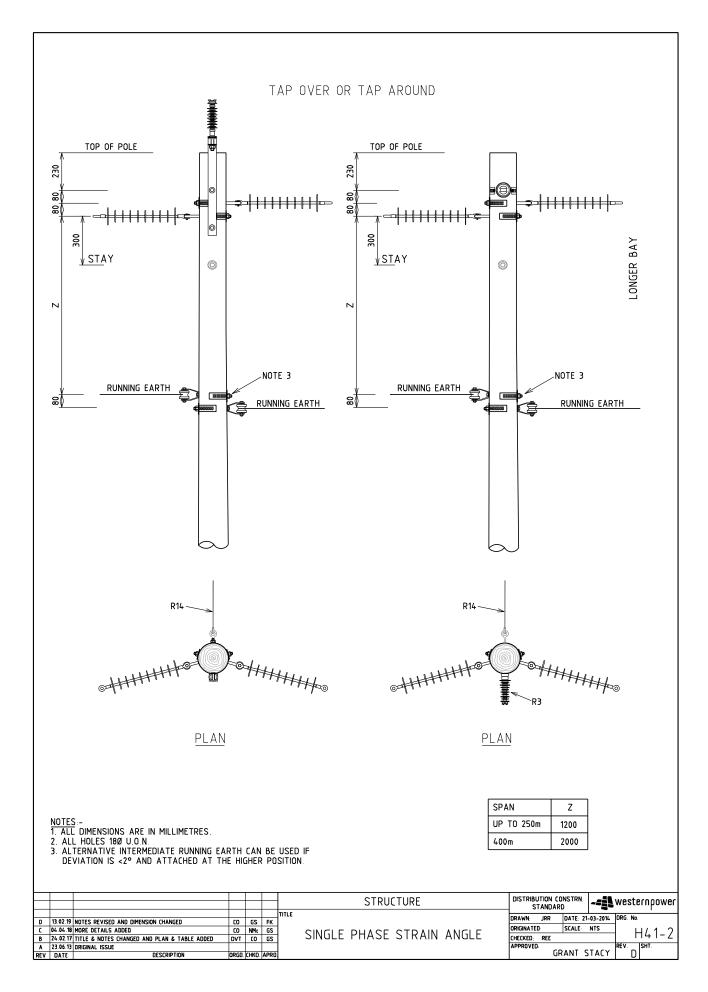




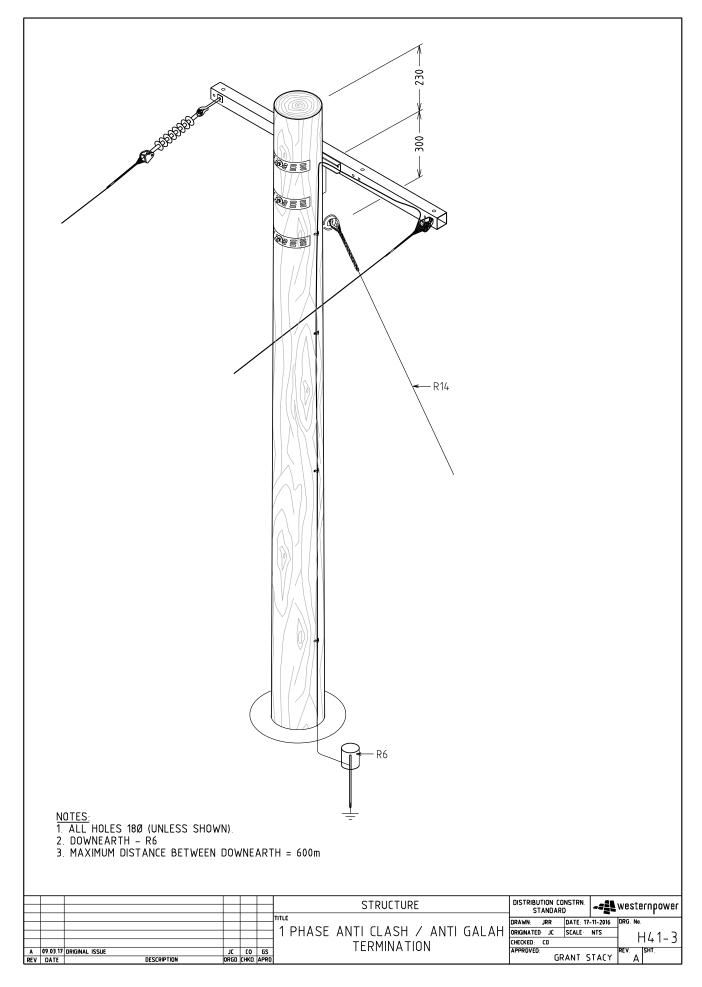




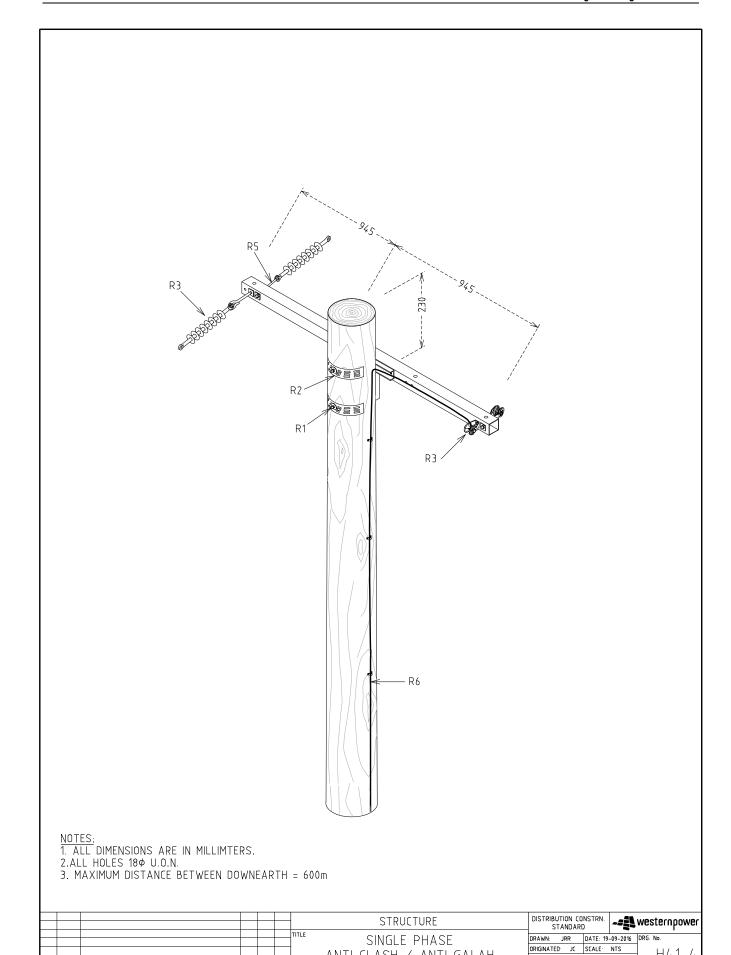














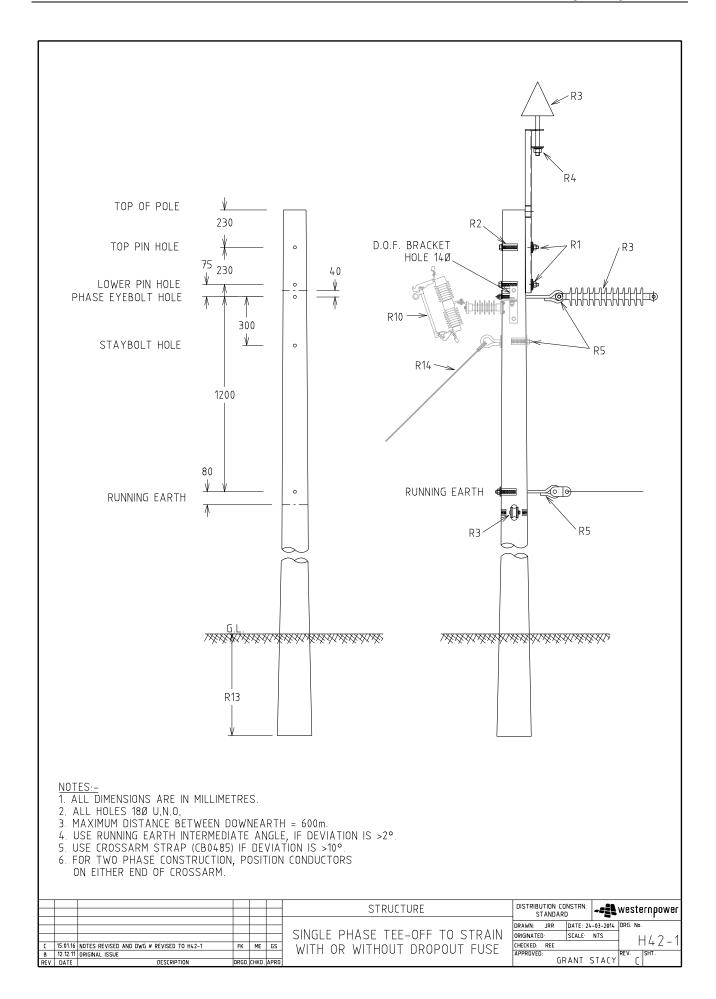
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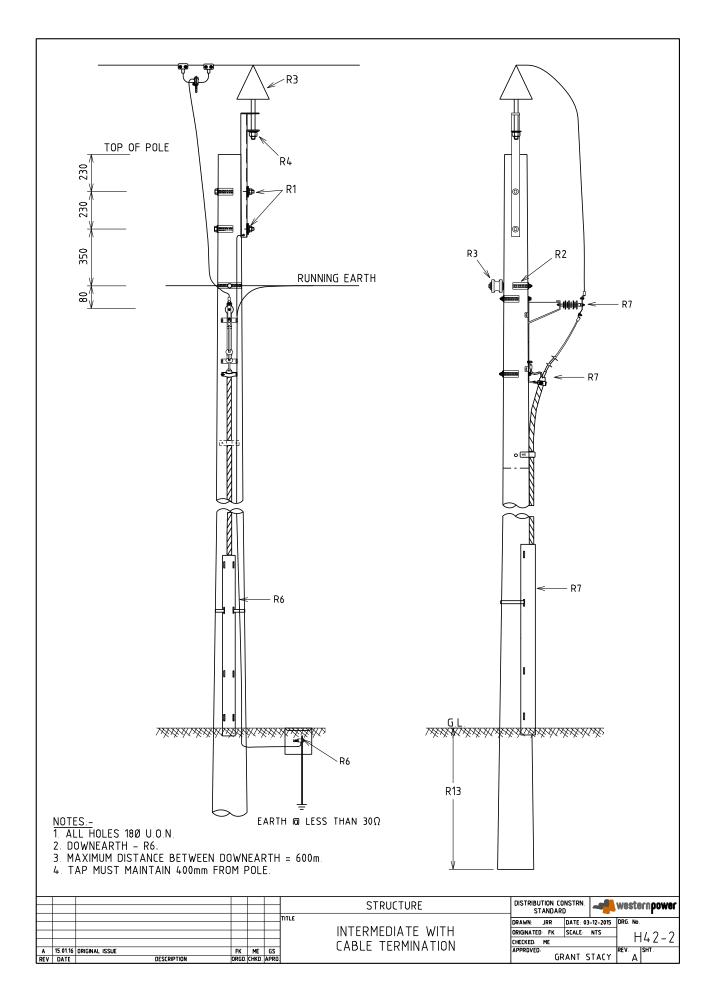
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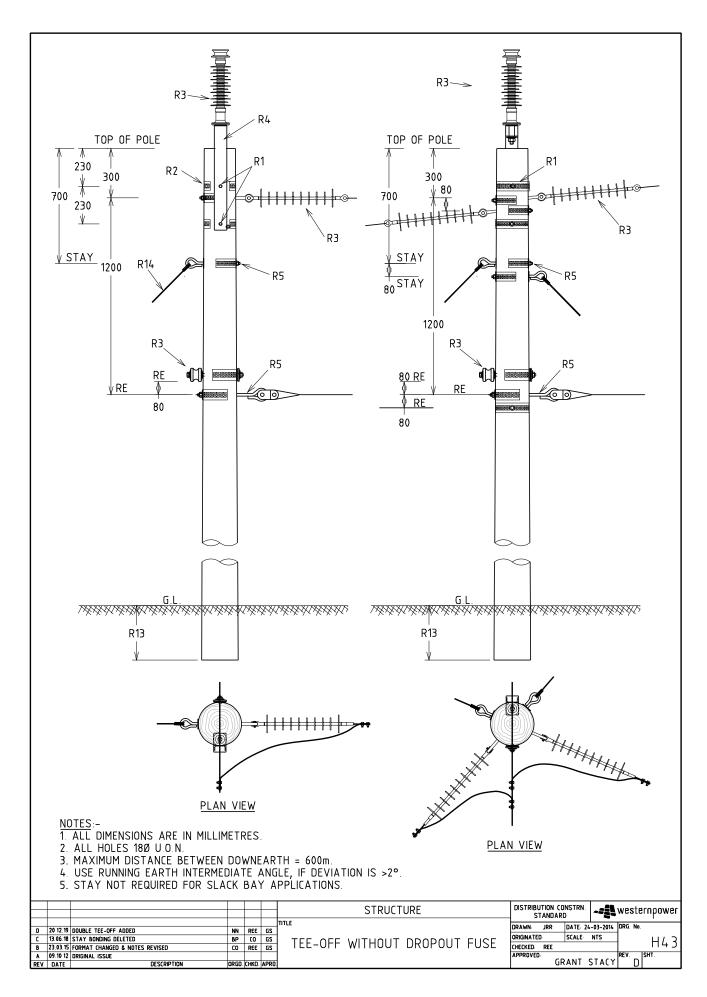
H41-4



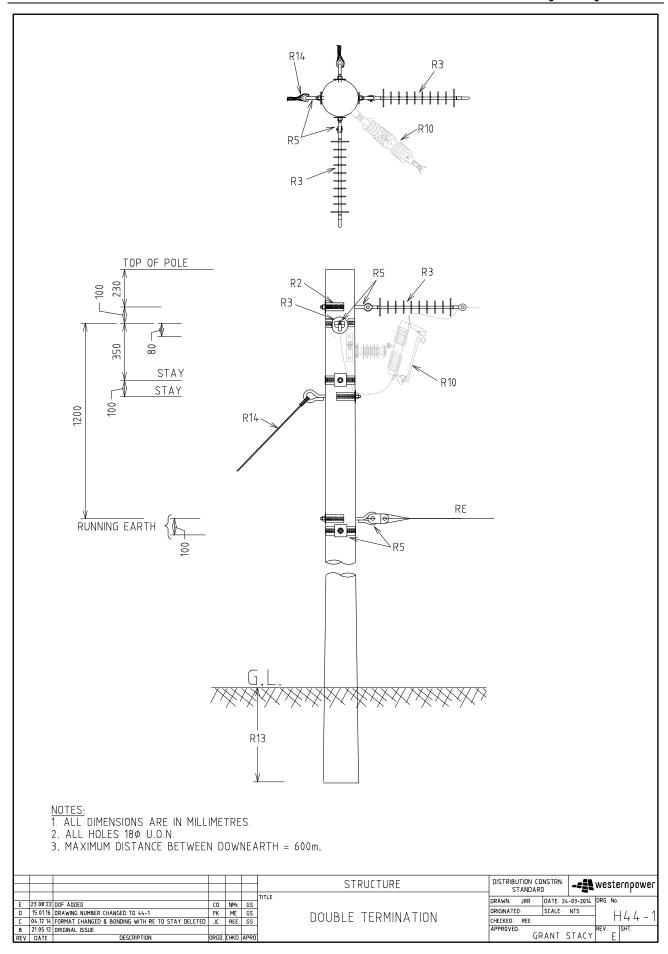




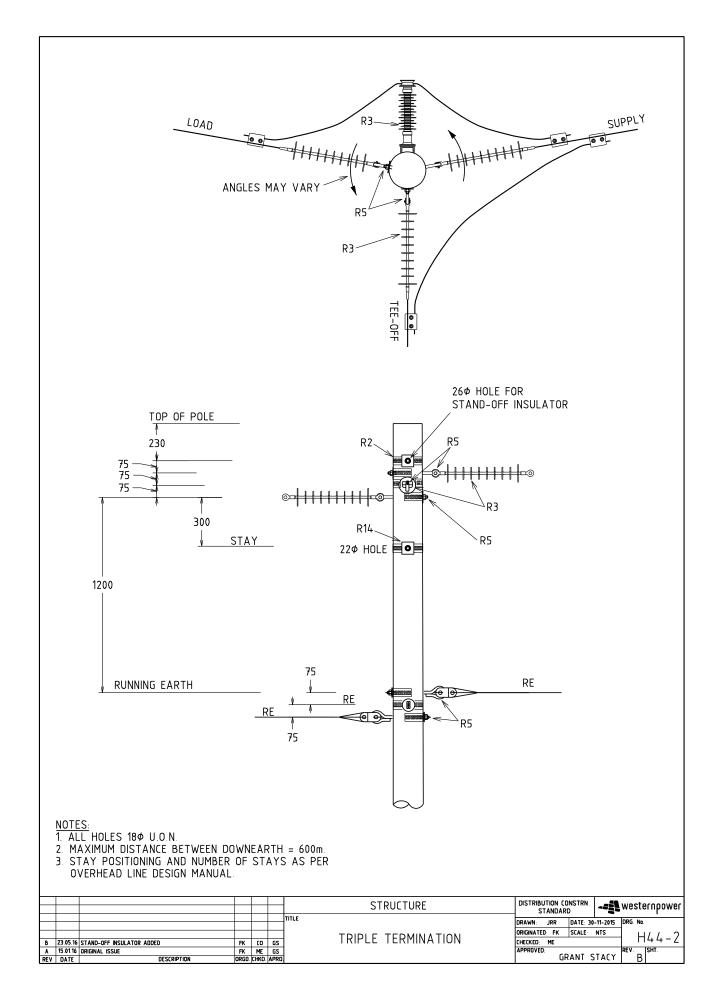




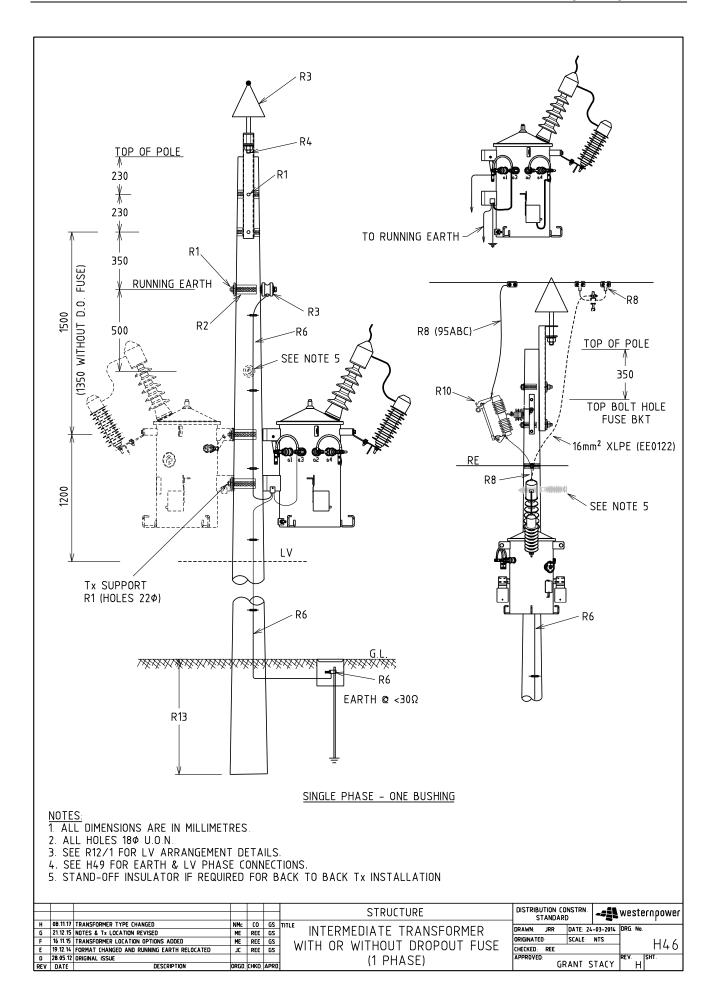




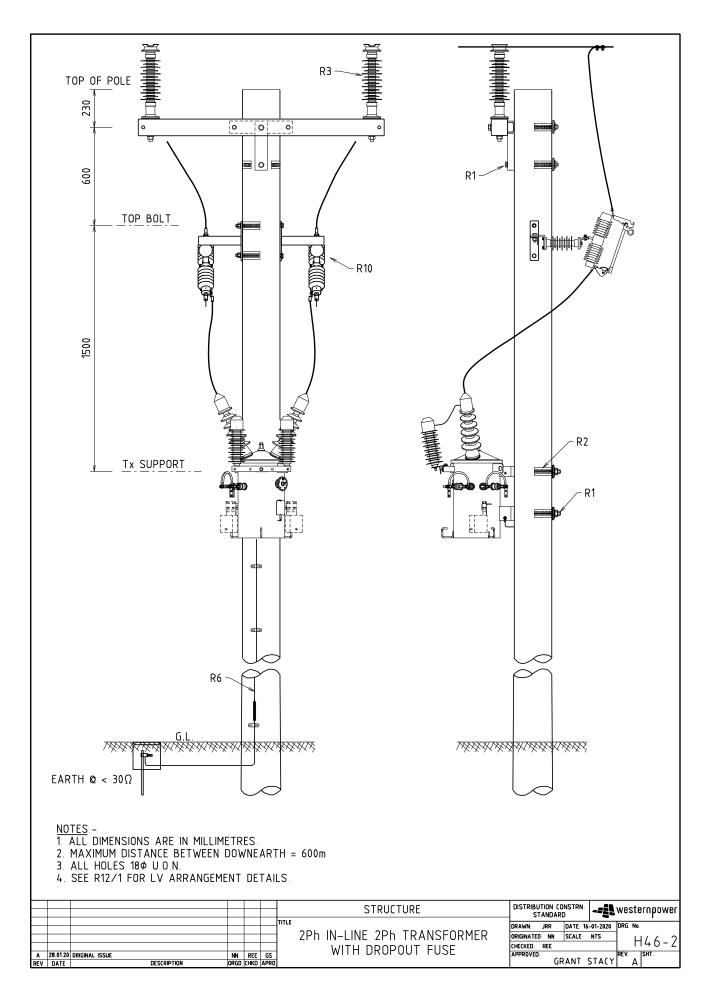




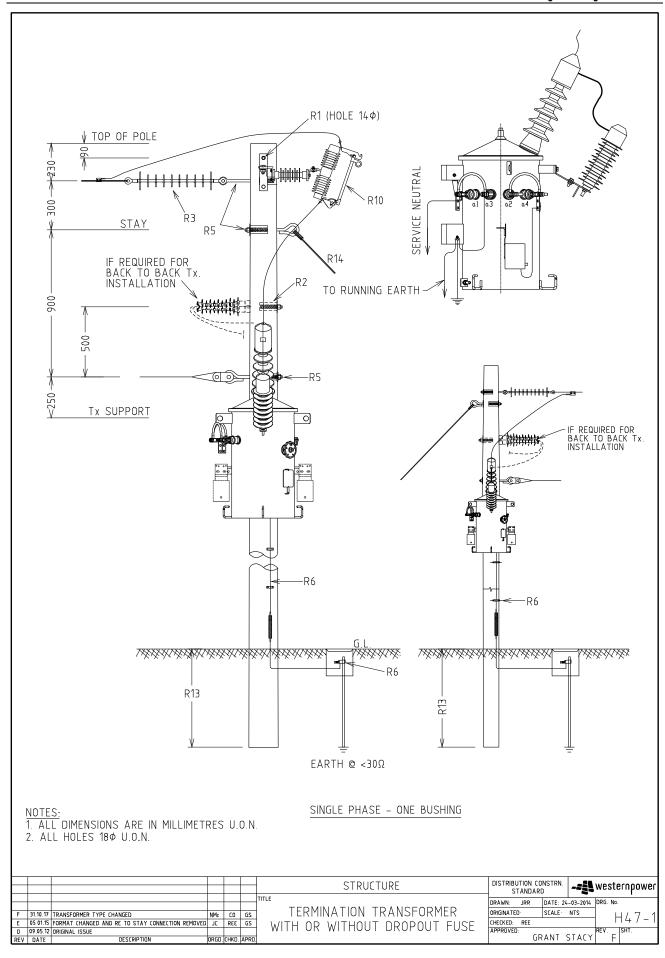




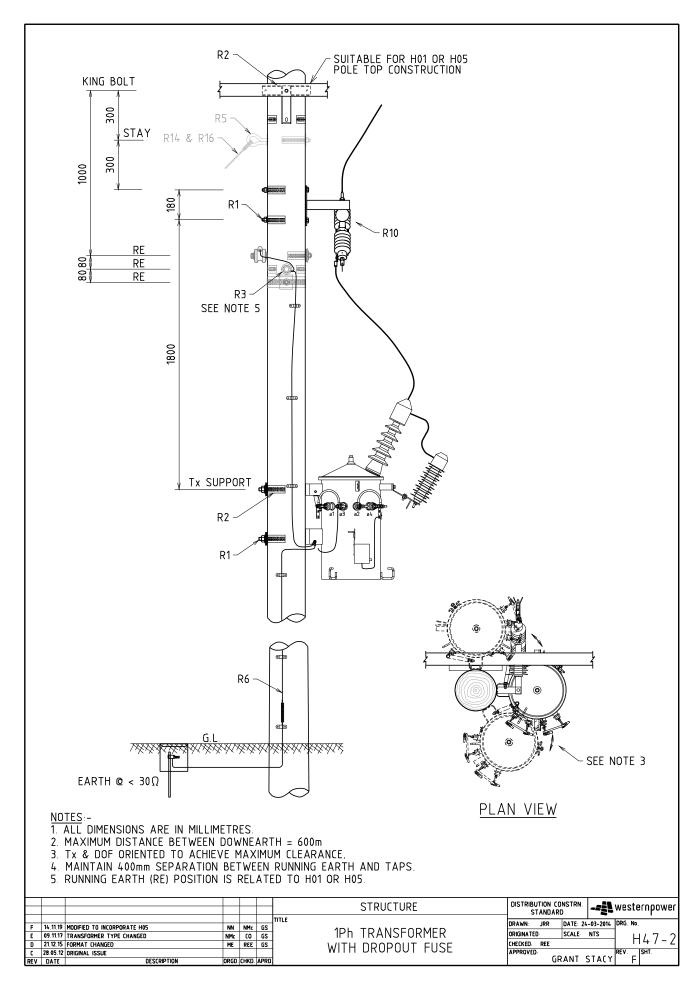




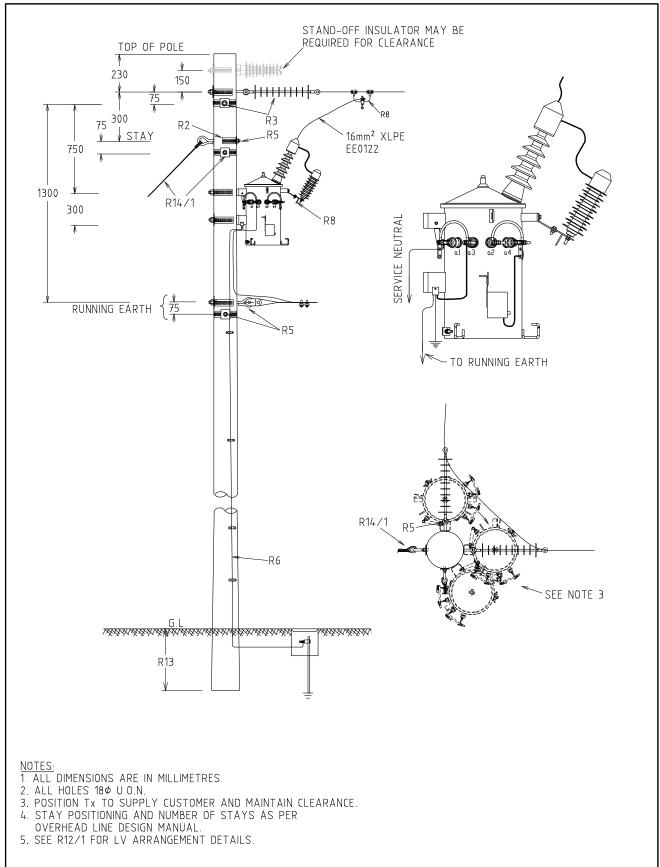






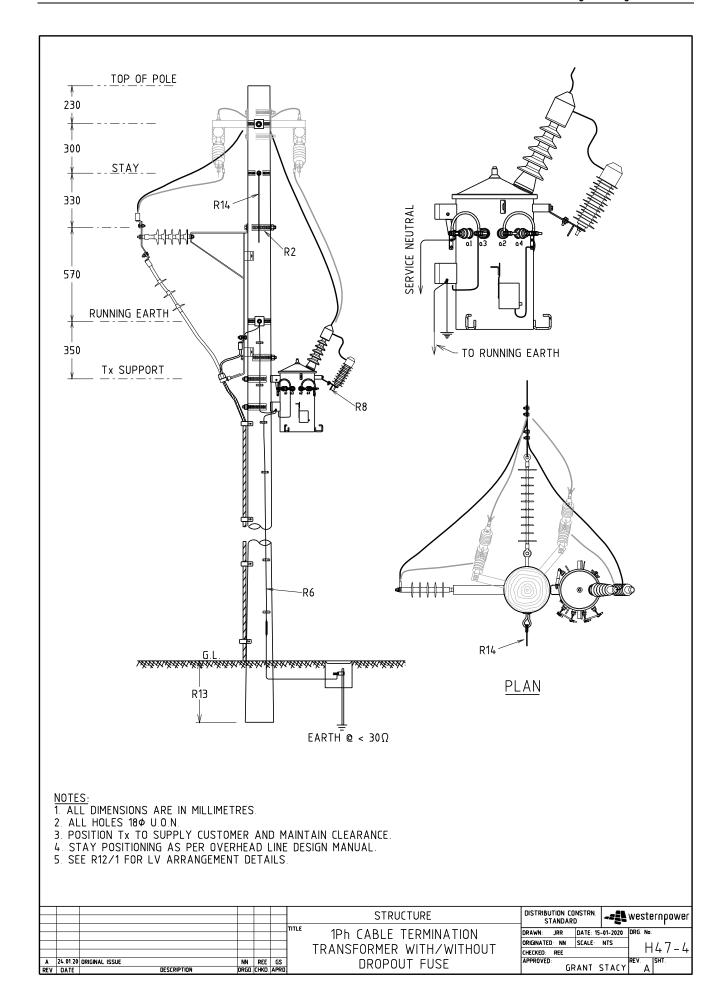




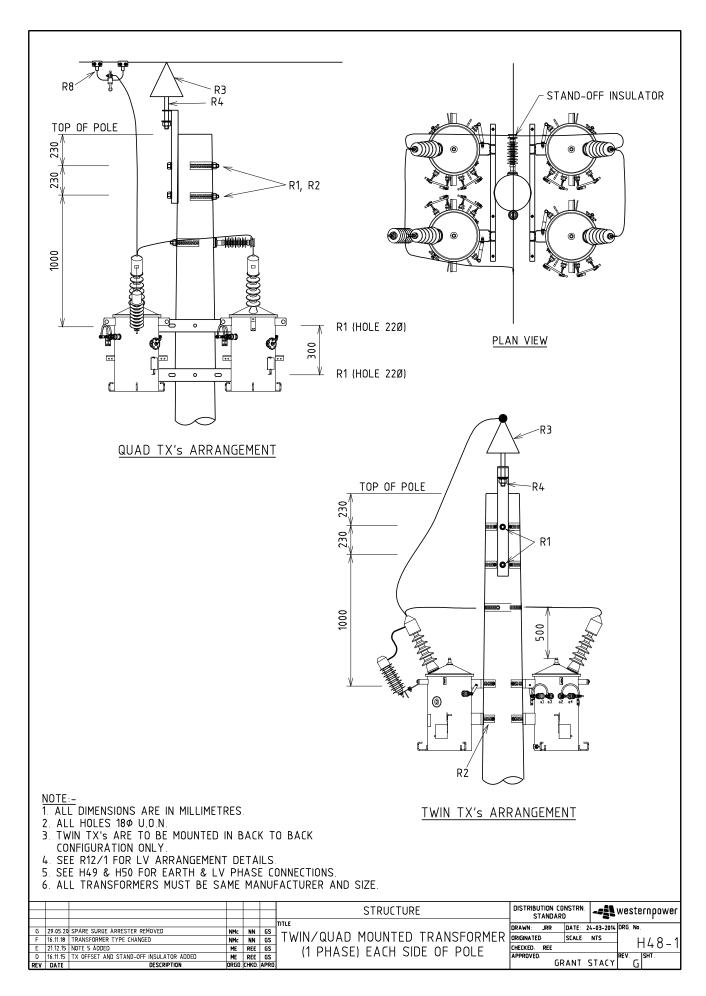


l										
							STRUCTURE	DISTRIBUTION CONSTRN.		
							STRUCTURE	STANDARD	<b>-≥</b> westernpower	
						TITLE	1DL DOLIDLE TEDMINIATION	DRAWN: JRR DATE: 18-06-2015 DRG. No.	_	
ı							1Ph DOUBLE TERMINATION			
С	09.11.17	TRANSFORMER TYPE CHANGED	NMc	CO	GS	1	TRANSFORMER WITHOUT	ORIGINATED CO SCALE NTS 1/7	2	
В	21.12.15	NOTE 6 ADDED	REE	ME	GS	1	TRANSFURMER WITHOUT	CHECKED: REE	ا ر -	
Α	16 11.15	ORIGINAL ISSUE	ME	REE	GS	1	DROPOUT FUSE	APPROVED: REV. SHT.		
RFV	DATE	DESCRIPTION	ORGO.	CHKD.	APRO	1	DIVOLOGI LOGE	GRANT STACY   (		

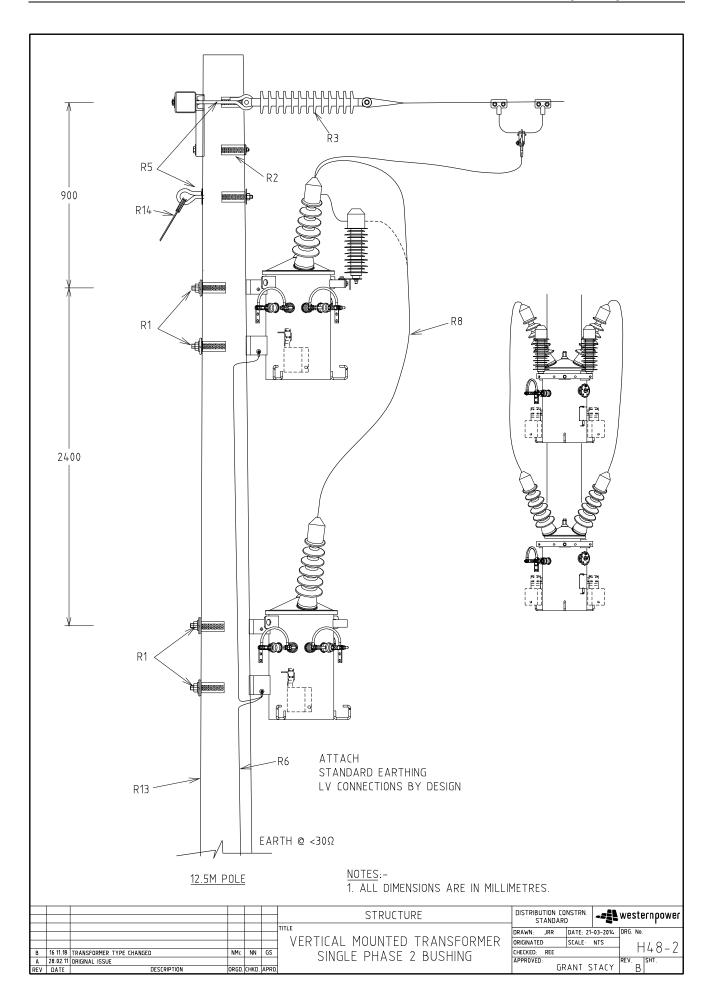




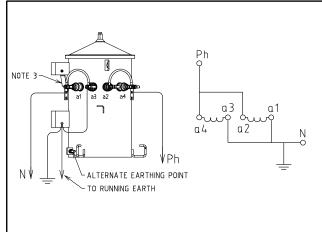


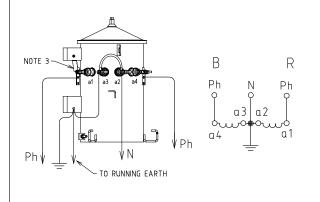






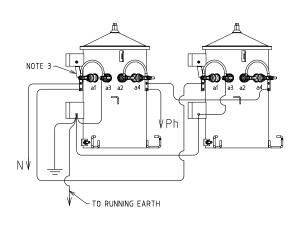


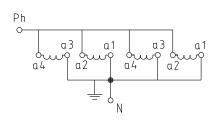




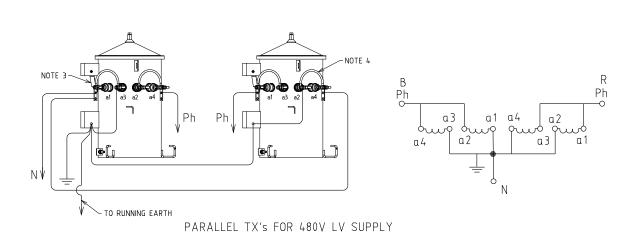
CONNECTION FOR 240V LV SUPPLY







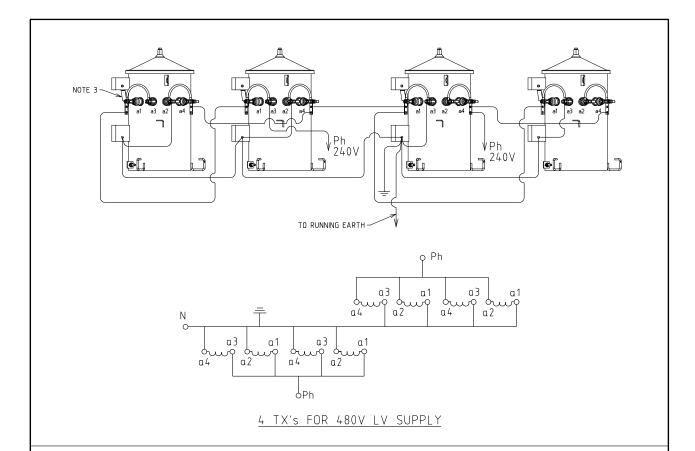
PARALLEL TX's FOR 240V LV SUPPLY

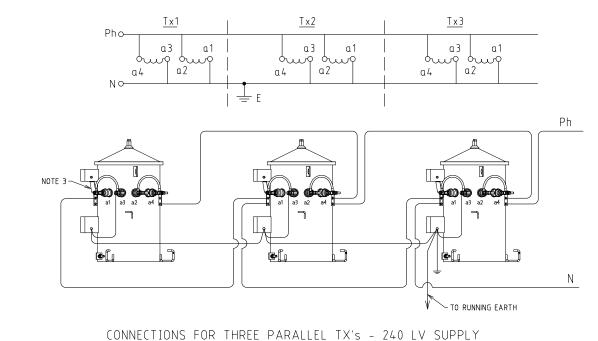


- 1. SEE R12/1 FOR LV ARRANGEMENT DETAILS.
  2. HV BUSHINGS NOT SHOWN.
  3. ENSURE ER (EARTH RETURN) LINK TO THE TANK IN PLACE SEE R12-1.
  4. BUSHING WITH LV LINKS CAN BE USED INTERCHANGABLY.

						STRUCTURE	DISTRIBUTION CONSTRN	<b>∡≥</b> westernpower				
						STRUCTURE	STANDARD	-=== Megrei IIhnmei				
						TITLE		lene .				
						,···	DRAWN: JRR DATE: 2	24-03-2014 DRG. No.				
H-			NMc	CO			ORIGINATED SCALE	NTS LLC				
	31.10.17	TRANSFORMER TYPE CHANGED	INPIC	LU	GS	T EVDID & LV DDVGF LUNNEL HUNG		H/. U				
В	13.10.14	FORMAT CHANGED AND NOTE ADDED	FK	REE	GS		CHECKED: REE	1147				
Α	13.07.00	ORIGINAL ISSUE		_			APPROVED	REV. SHT.				
REV	DATE	DESCRIPTION	ORGO.	CHKD.	APRD		GRANT S	STALY [				



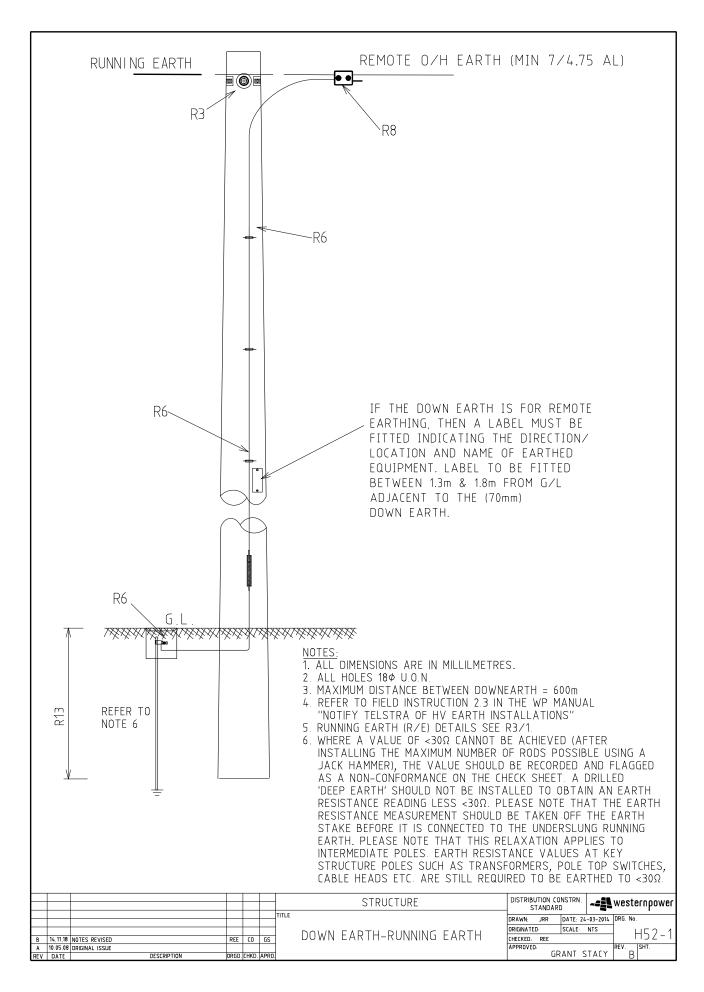




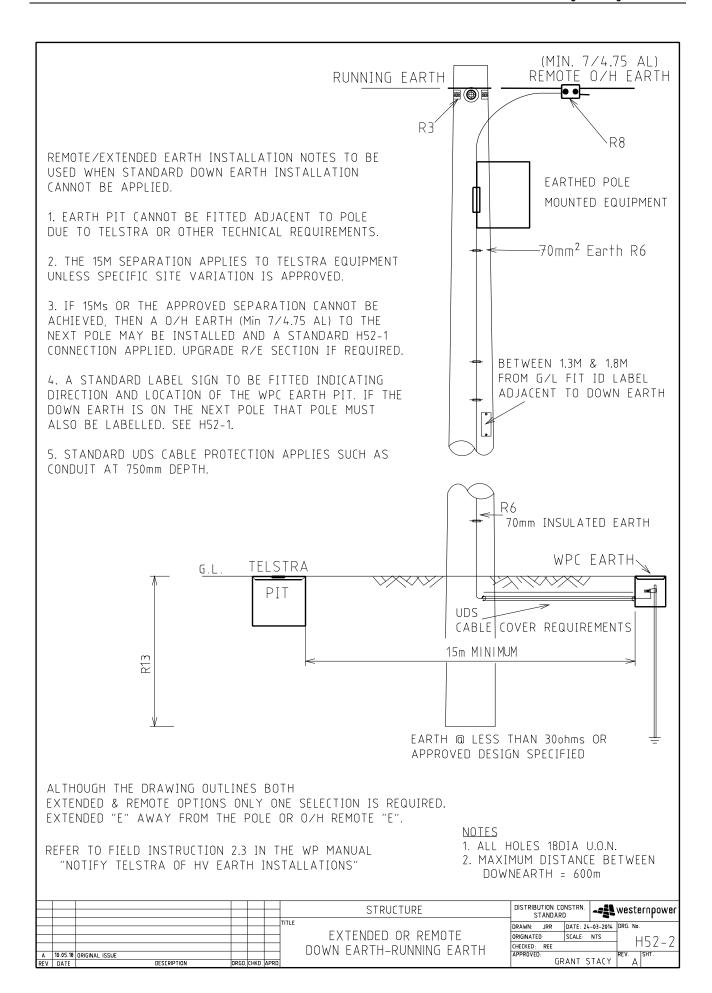
- 1. SEE R12/1 FOR LV ARRANGEMENT DETAILS. 2. HV BUSHINGS NOT SHOWN.
- 3. ENSURE ER (EARTH RETURN) LINK TO THE TANK IN PLACE SEE R12-1. 4. BUSHING WITH LV LINKS CAN BE USED INTERCHANGABLY.

						STRUCTURE			DISTRIBUTION CONSTRN. STANDARD		-41	westernpower
						TITLE			DRAWN: JRR	DATE: 2	4-03-2014	DRG. No.
С	30 10 17	TRANSFORMER TYPE CHANGED	NMc	03	GS	EARTH	& LV PHASE CONNE	CTIONS	ORIGINA TED:	SCALE	NTS	HEN
В	13.10.14	FORMAT CHANGED AND NOTE ADDED	FK	REE	GS	THREE &	FOUR TRANSFORMER	OC CETIID	CHECKED: REE			000
Α	13.07.00	ORIGINAL ISSUE				]	TOOK TRANSFORTE	(3 3L 101	APPROVED:	DANT C		REV. SHT.
REV	DATE	DESCRIPTION	ORGO.	CHKD.	APRO	]			l	irant s	STACY	L

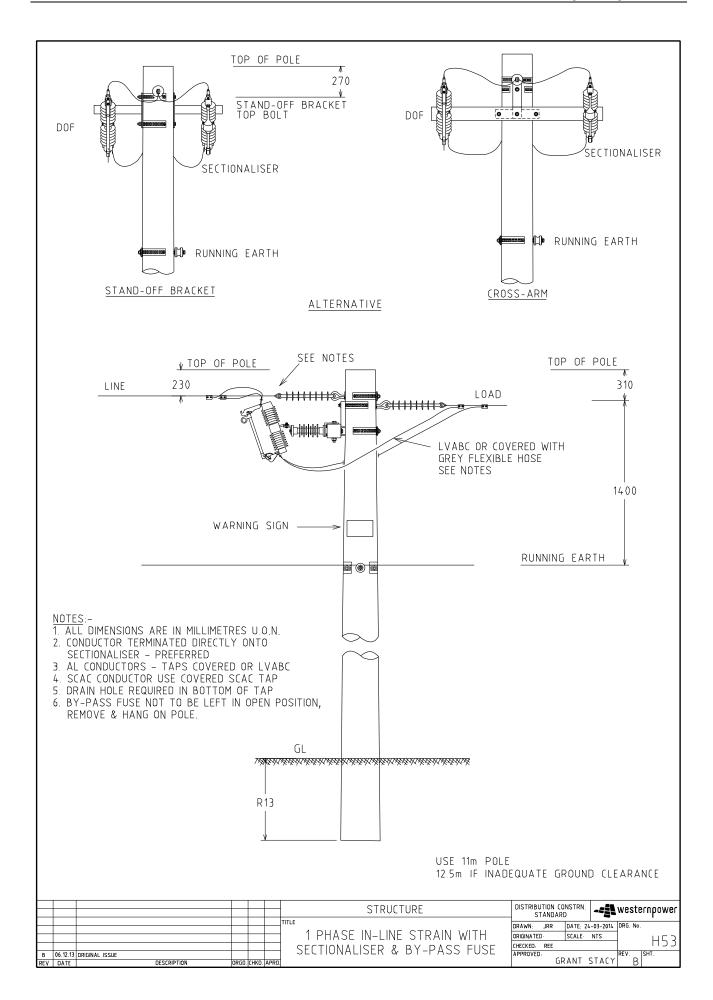




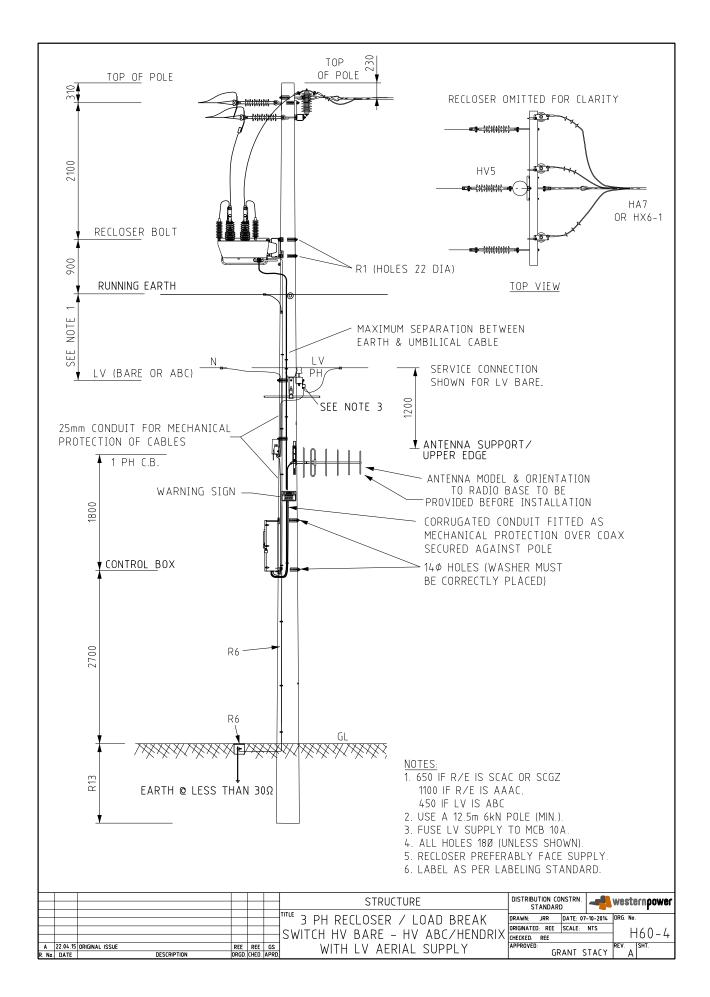




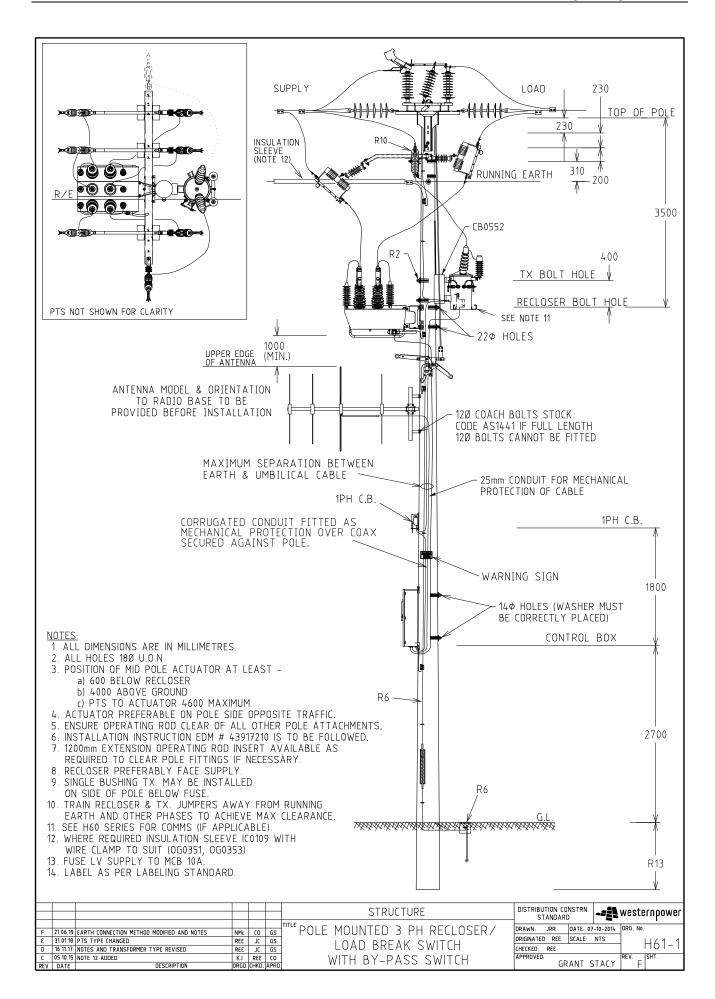




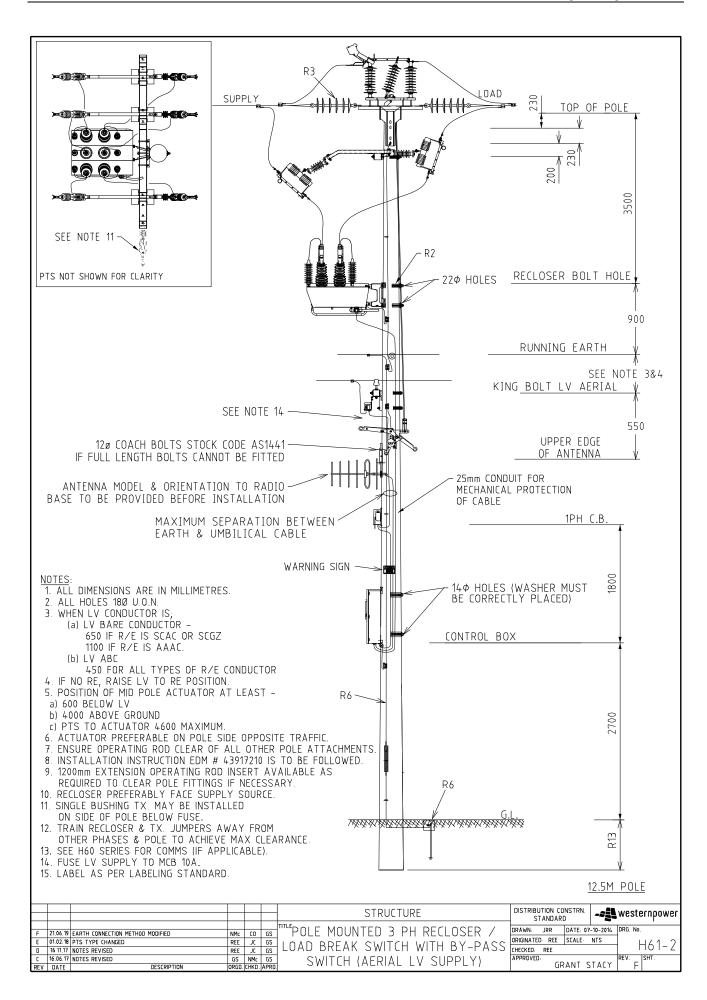




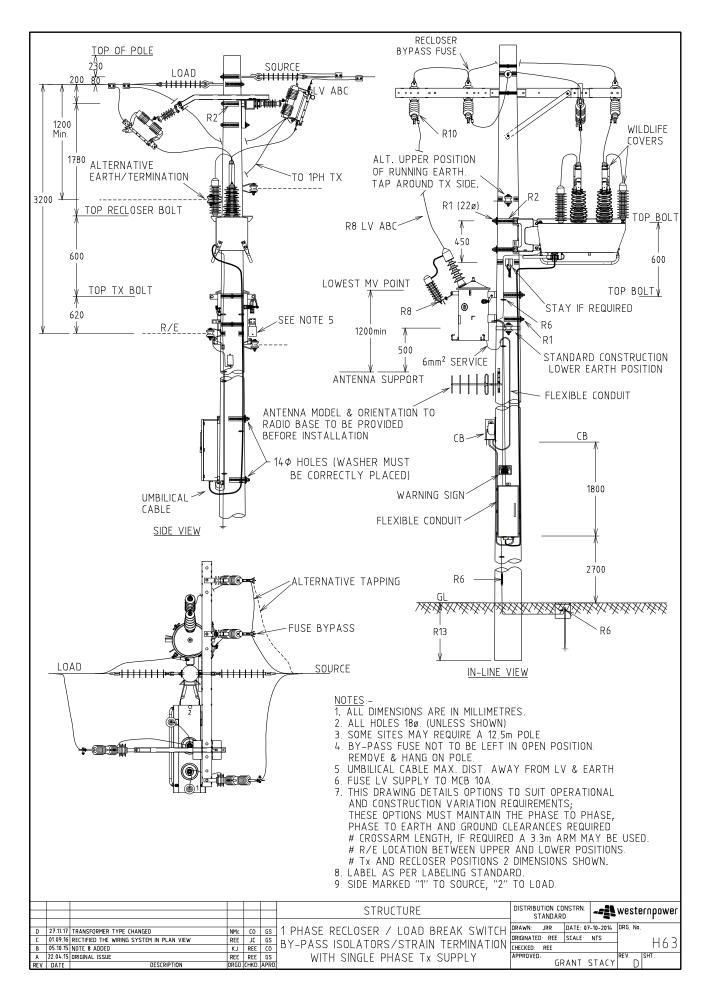








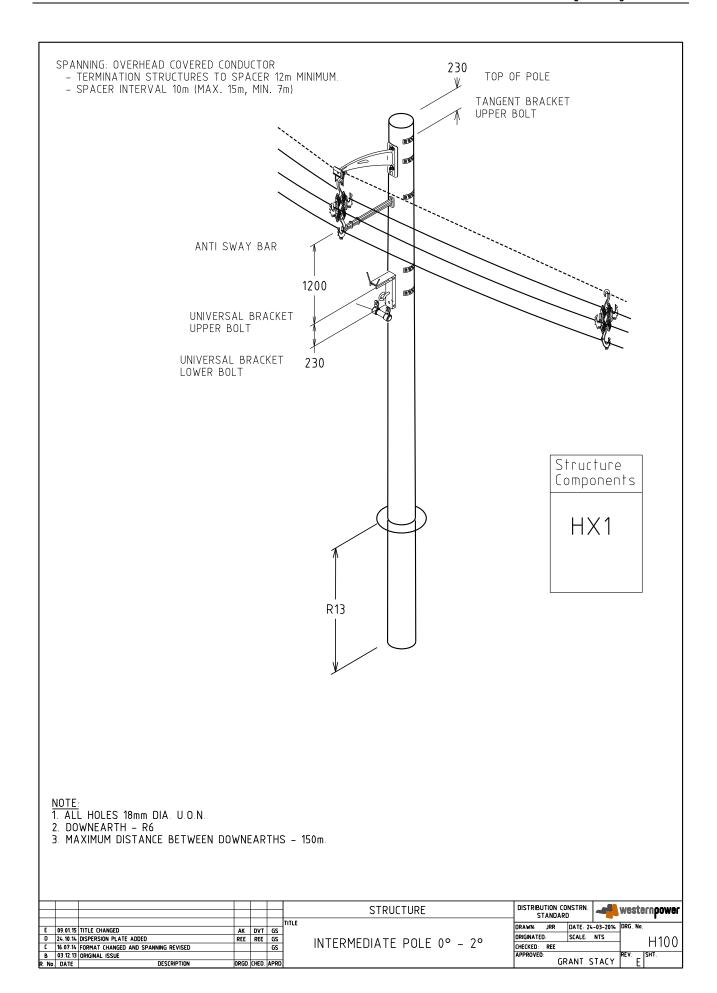




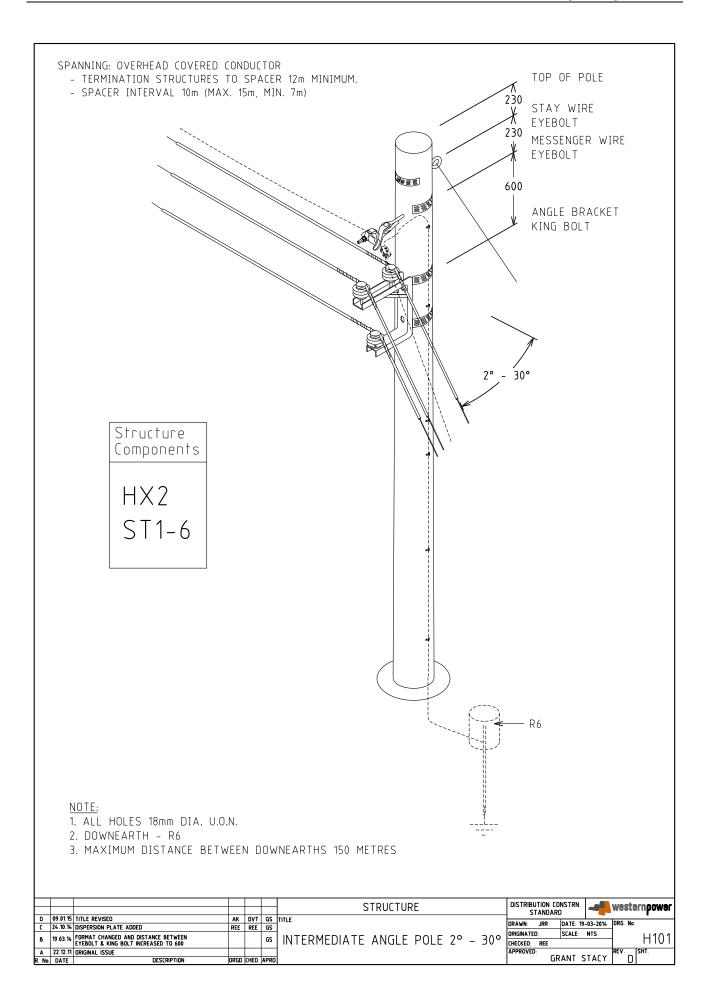


## **HV HENDRIX**

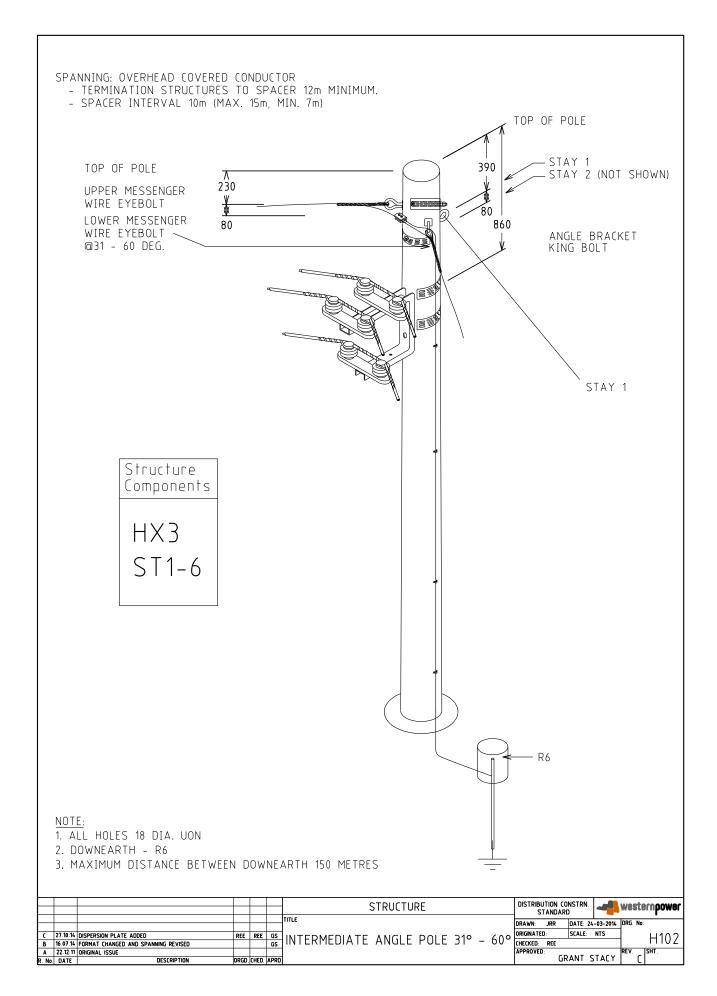




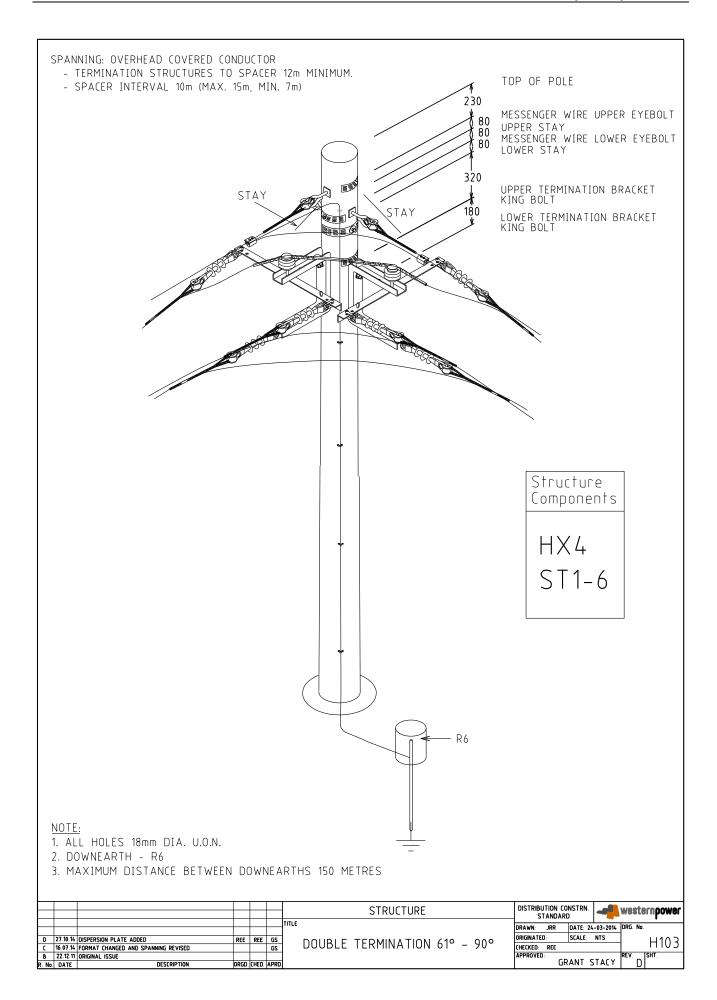




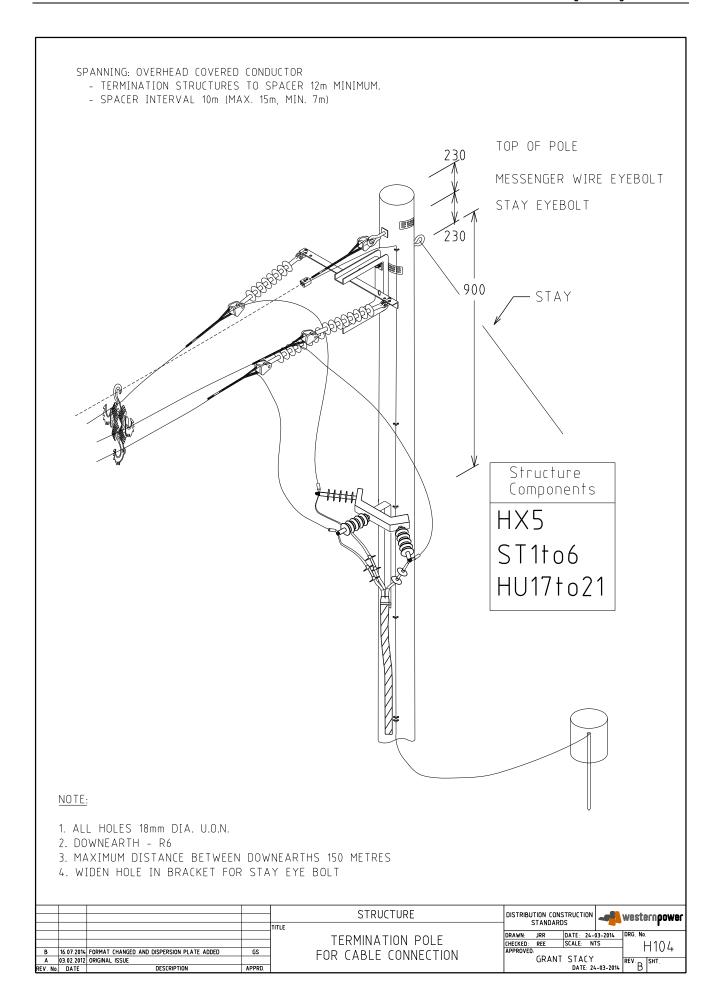




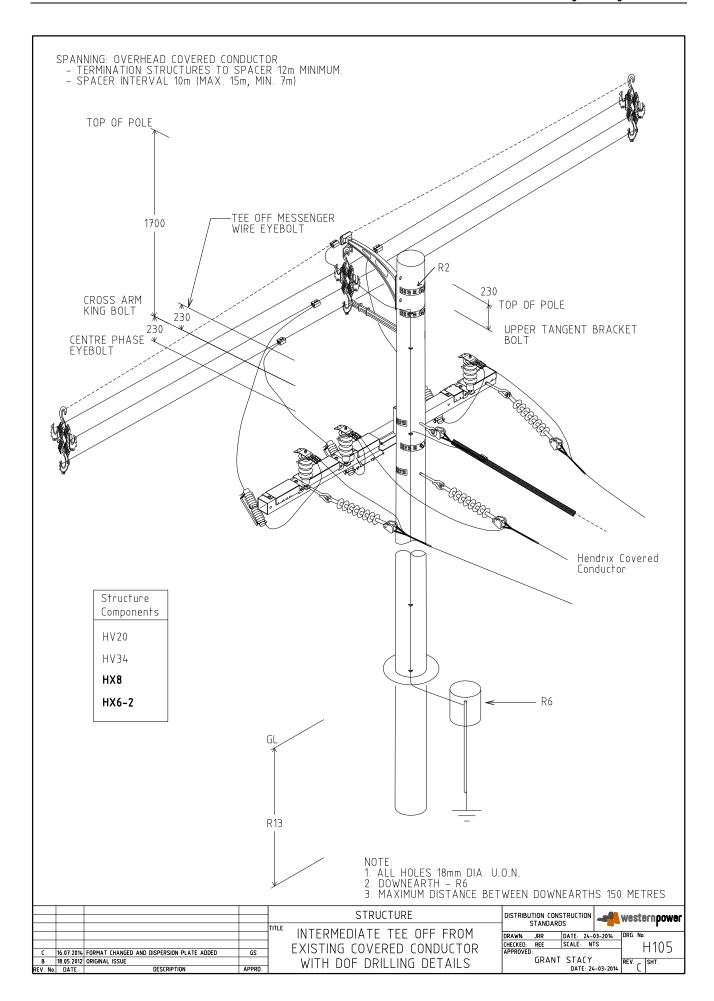




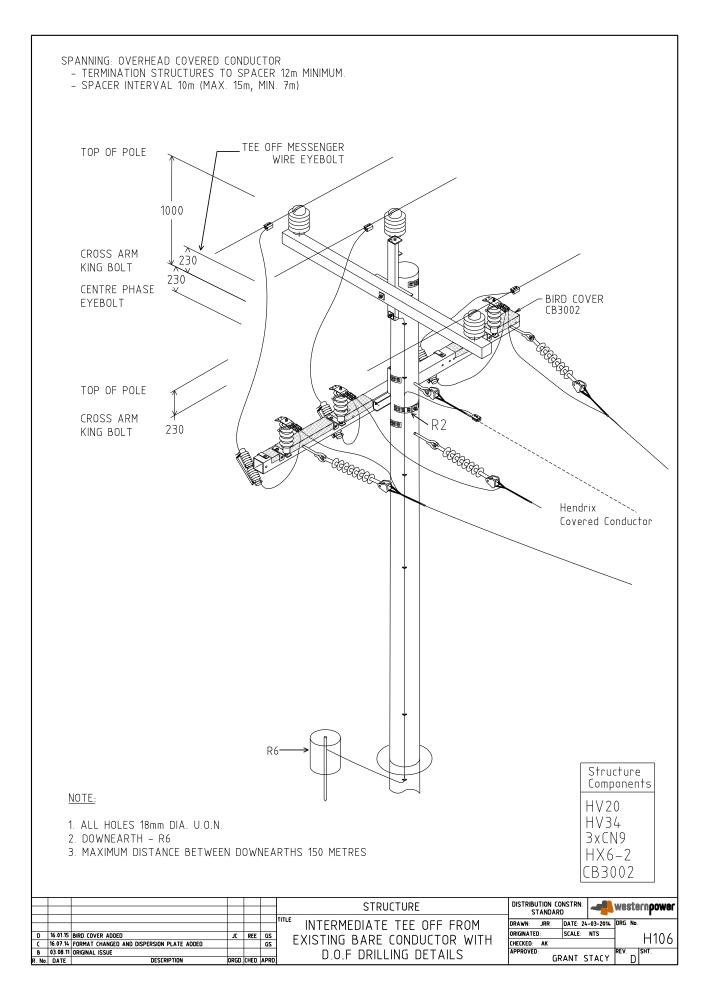




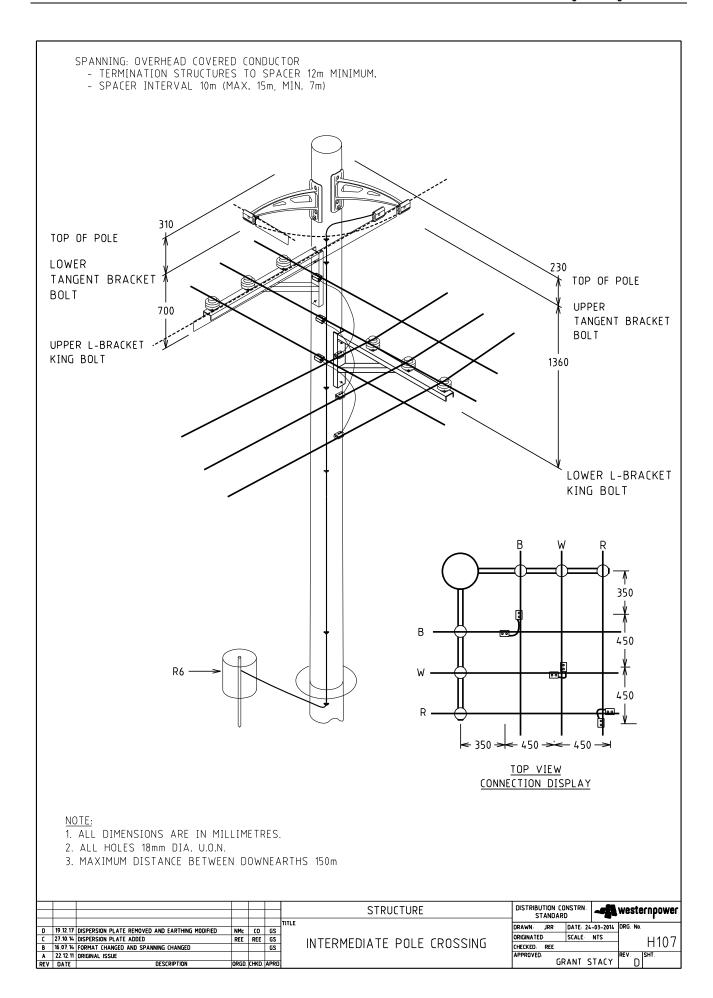




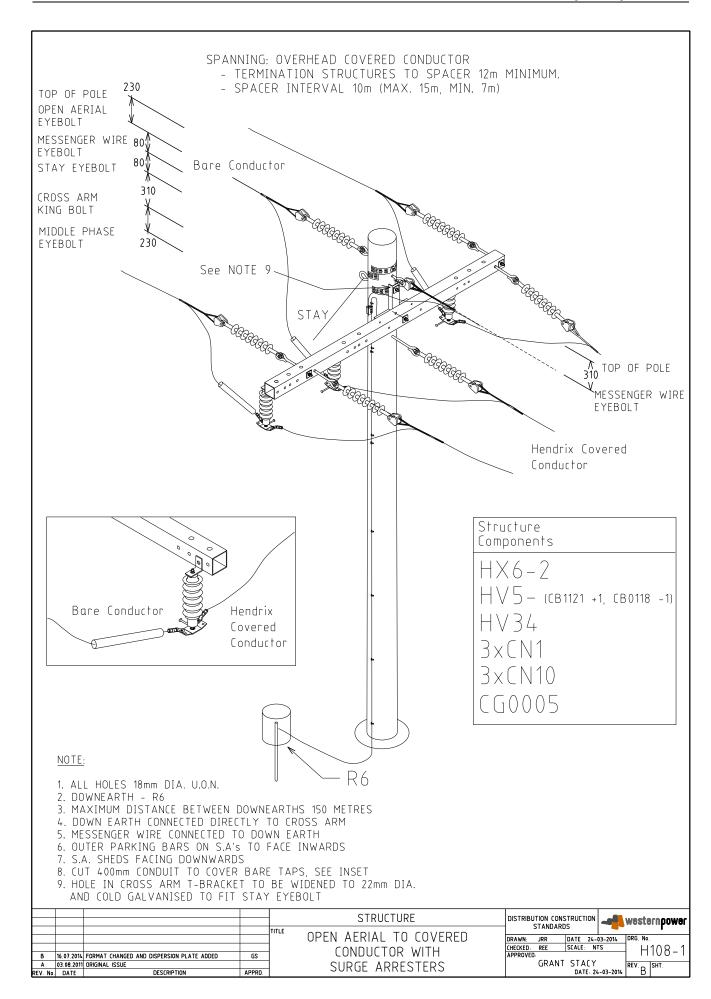




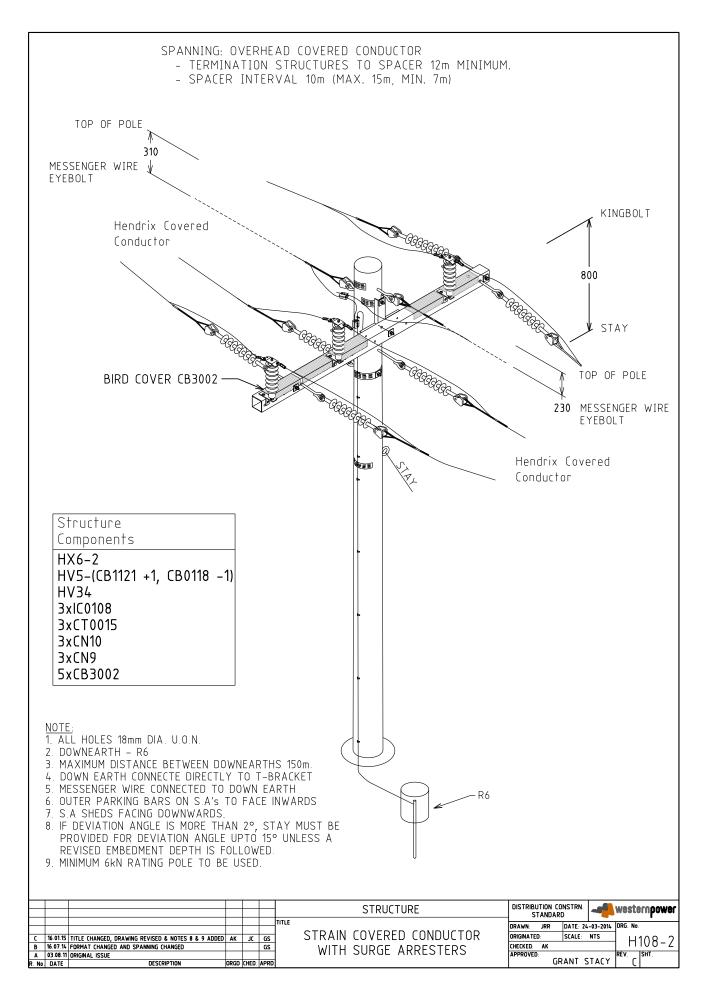




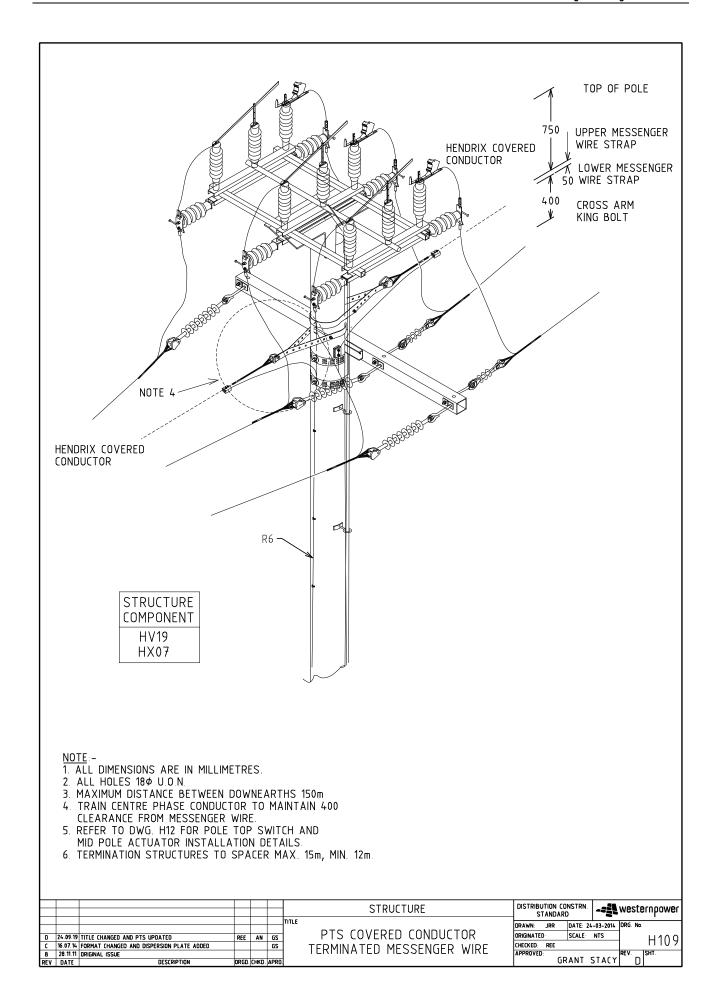




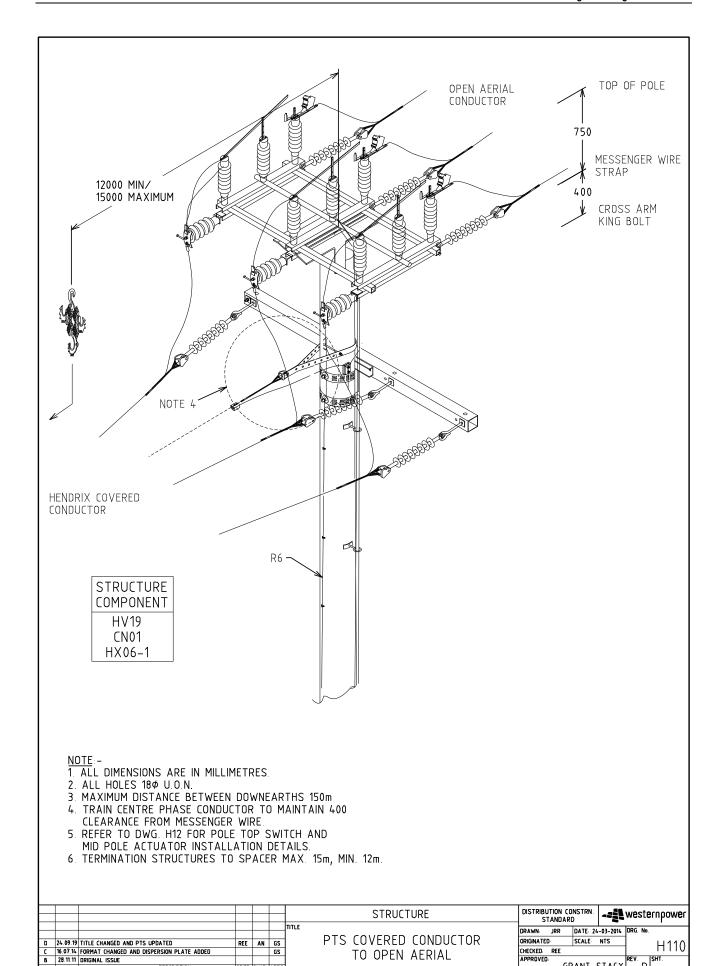














REV DATE

DESCRIPTION

GRANT STACY

