Table C ***MAXIMUM WIND PRESSURES – WALL CLADDING – CLASS A***

MAXIMUM WIND PRESSURES – WALL CLADDING – LOADING CO-EFFICIENTS

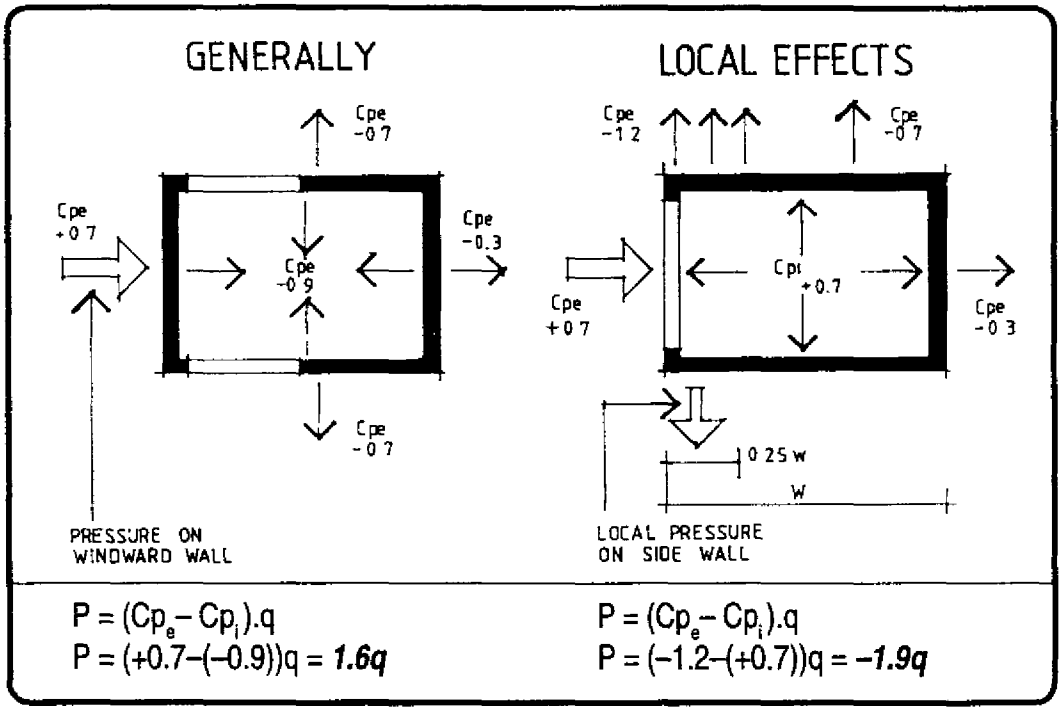
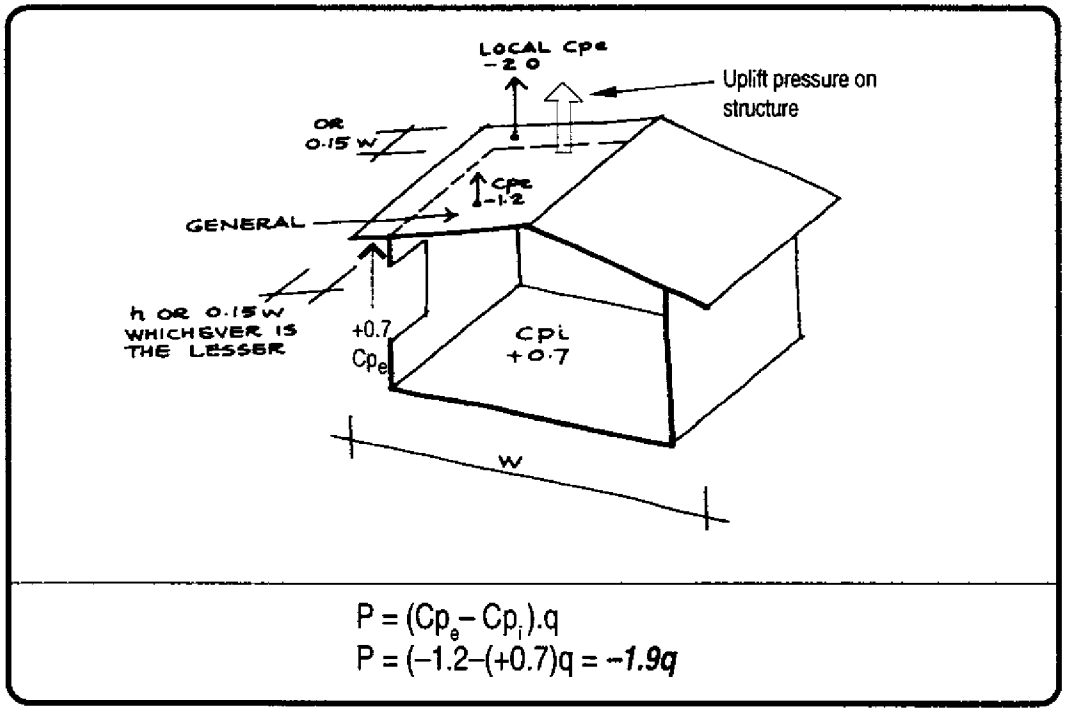


TABLE 13
MAXIMUM WIND PRESSURES - WALL CLADDING CLASS A

GROUND ROUGHNESS CATEGORY	*HEIGHT*	*DYNAMIC PRESSURE*		*(W) GENERALLY*		*(W/4) LOCAL EFFECTS*	
		q		*p = 1.6 q*		*p = 1.9 q*	
		kPa	*psf*	*kPa*	*psf*	*kPa*	*psf*
1	15	1.63	34.0	2.60	54.33	3 09	64.52
1	10	1.53	32 0	2.45	51.21	2.91	60.81
1	5	1.19	24.8	1.90	39.66	2.25	47.09
1	3	1.06	22.0	1.69	35.28	2.01	41.89
2	15	1.53	32.0	2.45	51.21	2 91	60 81
2	10	1 33	27 7	2.12	44 29	2.52	52.60
2	5	0 96	20.0	1.53	31 96	1.82	37.95
2	3	0.79	16.6	1.27	26.55	1.51	31 53
3	15	1.19	24.8	1.90	39.66	2.25	47.09
3	10	0.93	19.5	1.49	31.16	1.77	37.00
3	5	0 75	15.7	1.20	25.09	1.43	29.80
3	3	0.63	13.1	1.00	20.98	1.19	24 91
4	15	0.84	17.5	1.34	28.04	1.59	33.30
4	10	0 69	14.4	1 10	22.99	1.31	27.30
4	5	0 55	11.5	0.88	18.44	1.05	21.89
4	3	0.48	10.0	0.77	16.06	0.91	19.07

Table D ***MAXIMUM WIND PRESSURES – ROOF STRUCTURE – CLASS B***

MAXIMUM WIND PRESSURES – ROOF STRUCTURE – LOADING CO-EFFICIENTS



$$P = (Cp_e - Cp_i).q$$
$$P = (-1.2-(+0.7)q = \mathbf{-1.9q}$$

TABLE 14
MAXIMUM WIND PRESSURES - ROOF STRUCTURE CLASS B

GROUND ROUGHNESS CATEGORY	*HEIGHT*	*DYNAMIC PRESSURE*		*GENERAL WIND PRESSURE*	
		q		*P = 1.9 q*	
		kPa	*psf*	*kPa*	*psf*
1	15	1.50	31.4	2.85	59.60
1	10	1.38	28.9	2.63	54 88
1	5	1.06	22.0	2.01	41 89
1	3	0.93	19.5	1.77	37.00
2	15	1.38	28.9	2.63	54.88
2	10	1.19	24.8	2.25	47 09
2	5	0.84	17 5	1.59	33 30
2	3	0.69	14.4	1.31	27.30
3	15	1.06	22.0	2.01	41.89
3	10	0 84	17.5	1.59	33.30
3	5	0.65	13.5	1.23	25.69
3	3	0.55	11.5	1.05	21.89
4	15	0.73	15.2	1.39	28.95
4	10	0.59	12.3	1.12	23.38
4	5	0.46	9.7	0.88	18 40
4	3	0.41	8.7	0.79	16.44

Table E ***MAXIMUM WIND PRESSURES – ROOF CLADDING – CLASS A***

MAXIMUM WIND PRESSURES – ROOF CLADDING – LOADING CO-EFFICIENTS

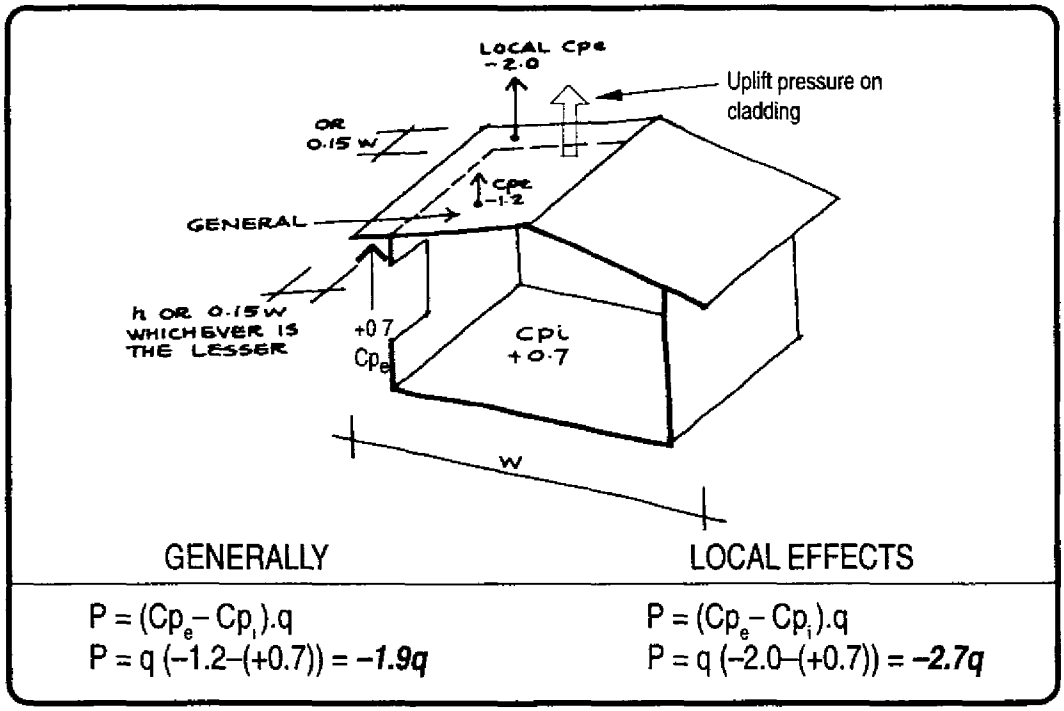
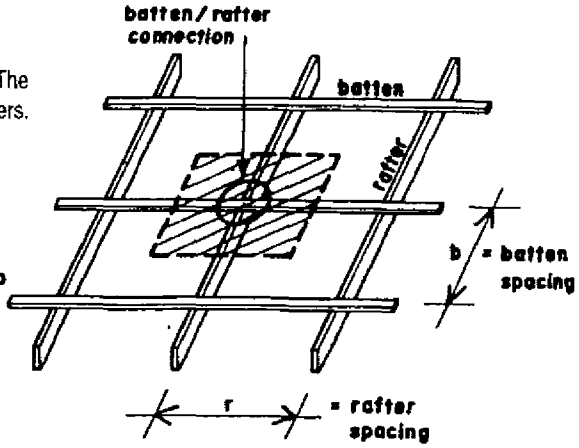


TABLE 15
MAXIMUM WIND PRESSURES - ROOF CLADDING CLASS A

GROUND ROUGHNESS CATEGORY	*HEIGHT*	*DYNAMIC PRESSURE*		*WIND PRESSURE*			
		q		*GENERAL p = 1.9 q*		*LOCAL p = 2.7 q*	
		kPa	*psf*	*kPa*	*psf*	*kPa*	*psf*
1	15	1.63	34 0	3.09	64.5	4.39	91 7
1	10	1.53	32.0	2.91	60.8	4.14	86.4
1	5	1.19	24.8	2.25	47.1	3.20	66.9
1	3	1.06	22.0	2.01	41.9	2.85	59.5
2	15	1 53	32 0	2.91	60 8	4.14	86.4
2	10	1.33	27.7	2.52	52.6	3 58	74.7
2	5	0.96	20.0	1 82	38.0	2.58	53.9
2	3	0.79	16.6	1.51	31.5	2.15	44 8
3	15	1.19	24.8	2.25	47.1	3 20	66.9
3	10	0.93	19.5	1.77	37.0	2.52	52.6
3	5	0 75	15.7	1 43	29.8	2.03	42.3
3	3	0.63	13.1	1.19	24.9	1 69	35.4
4	15	0.84	17.5	1.59	33 3	2.27	47.3
4	10	0.69	14.4	1 31	27.3	1.86	38.8
4	5	0 55	11 5	1.05	21.9	1.49	31.1
4	3	0.48	10.0	0.91	19 1	1 30	27.1

5.14 LOAD AREAS

Load area is the area of wall or roof accepting loads. The whole of which are transferred to the supporting members.



UPLIFT FORCES OF ROOFS

(1) connection between batten and rafter

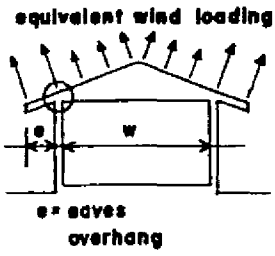
contributing loaded area = r x b

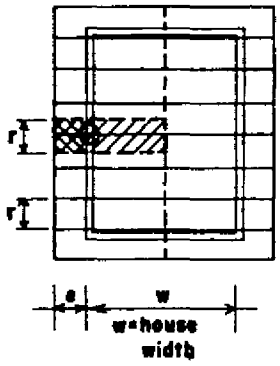
force = loading X r x b

(kN) = (kPa) X (m^2)

A. LOAD AREA – BATTEN (ROOF BATTEN LOAD AREA TRANSFER TO PURLIN OR RAFTER).

(2) connection of truss to wall





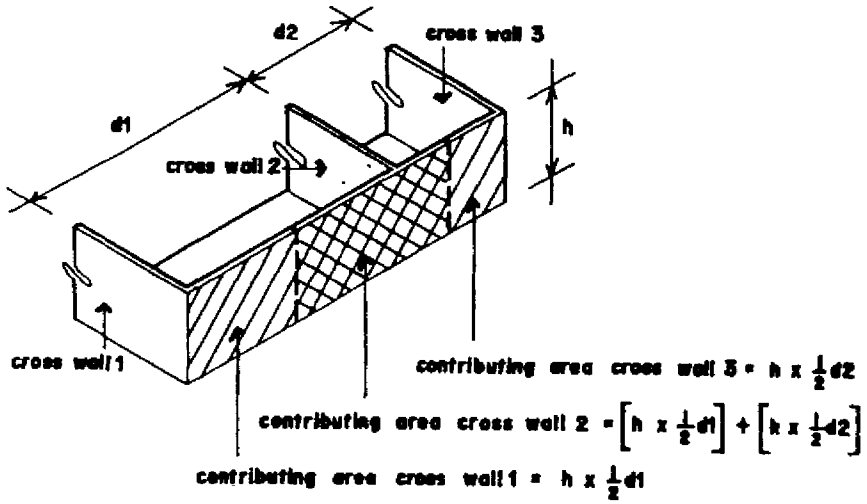
contributing area of overhanging eave = r x e

contributing area of general roof = r x $\frac{1}{2}$w

$$\text{Force} = \left[\begin{matrix}\text{general}\\\text{loading}\end{matrix} \times r \times \tfrac{1}{2}w\right] + \left[\begin{matrix}\text{eaves}\\\text{loading}\end{matrix} \times r \times e\right]$$

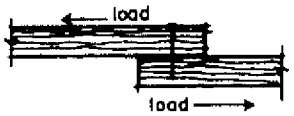
$$(kN) = \left[(kPa) \times (m^2)\right] + \left[(kPa) \times (m^2)\right]$$

B. LOAD AREA – ROOF RAFTER (RAFTER LOAD AREA TRANSFER TO TOP PLATE).



B. LOAD AREA – WALL PANEL (WALL LOAD AREA TRANSFER TO CROSS-WALL).

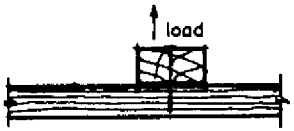
NAILS - LATERAL LOADS.



- PLAIN SHANK STEEL WIRE NAILS
- GROUP STRENGTH J3 GREEN TIMBER
- INCLUDES 100% OVERLOAD FOR CYCLONIC GUST CONDITIONS
- NOT TO BE USED FOR NORMAL LOAD CONDITIONS
- NAIL INTO SIDE GRAIN
- 50 % PENETRATION INTO SECOND TIMBER

METRIC			IMPERIAL		
NAIL SIZE	LOAD PER NAIL		NAIL SIZE		LOAD / NAIL
(millimetres)	(kilograms)	(Newtons)	gauge (S.W.G)	diam. (inch)	(pounds)
2·5 mm	46 kg	460 N	12 g	0·10	101 lb
2·8 mm	53 kg	530 N	11 g	0·12	117 lb.
3·15mm	66 kg	660 N	10 g	0·13	145 lb
3·75mm	90 kg	900 N	9 g	0·14	203 lb
4·5 mm	121 kg	1210 N	7 g	0·18	267 lb

NAILS - WITHDRAWAL LOADS.

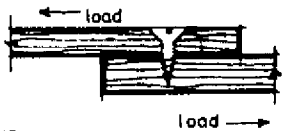


- PLAIN SHANK STEEL WIRE NAILS
- GROUP STRENGTH J3 TIMBER - GREEN OR DRY
- AVOID NAILING INTO END GRAIN
- NO CAPACITY FOR OVERLOAD DUE TO GUST.
- THIS FIXING METHOD PREFERABLY AVOIDED
- LOADS ARE GIVEN PER UNIT LENGTH OF PENETRATION

METRIC			IMPERIAL		
NAIL SIZE	LOAD / NAIL / MILLIMETER		LOAD PER NAIL / INCH		LOAD / NAIL
(millimetres)	(kilograms)	(Newtons)	gauge (S.W.G)	diam (inch)	(pounds)
2·5 mm	0·65 kg	6·5 N	12 g	0·10	36 lb
2·8 mm	0·79 kg	7·9 N	11 g	0·12	44 lb
3·15 mm	0·81 kg	8·1 N	10 g	0·13	45 lb
3·75 mm	0·96 kg	9·6 N	9 g	0·14	54 lb.
4·5 mm	1·15 kg	11·5 N	7 g	0·18	64 lb

Resistance Loads adapted from Standards Association of Australia (1988): **AS 1720.1**

WOOD SCREWS - LATERAL LOADS.

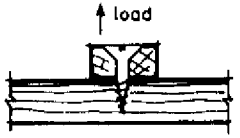


- GROUP STRENGTH J3 DRY TIMBER
- SCREW INTO SIDE GRAIN
- PENETRATION 7 TIMES SHANK DIAMETER
- INCLUDES 100 % OVERLOAD FOR CYCLONIC GUST CONDITIONS
- NOT TO BE USED FOR NORMAL LOAD CONDITIONS

	METRIC			IMPERIAL	
SCREW SIZE	SHANK DIAM.	LOAD		SHANK DIAM	LOAD
NO	(millimetres)	(kilograms)	(Newtons)	(inches)	(pounds)
4	2·74mm	4·8 kg	480 N	0·108	108 lb
6	3·45mm	7·6 kg	760 N	0·136	171 lb
8	4·17mm	10·6 kg	1060 N	0·164	238 lb
10	4·88mm	14·8 kg	1480 N	0·192	333 lb
12	5·59mm	19·6 kg	1960 N	0·220	441 lb
14	6·30mm	24·8 kg	2480 N	0·248	558 lb
18	7·72mm	37 4 kg	3740 N	0 304	842 lb

NOTE FOR END GRAIN FIXING ALLOW $^{2}/_{3}$ OF ABOVE LOADS

WOOD SCREWS - WITHDRAWAL LOADS.

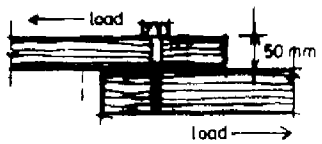


- SIDE GRAIN OF GROUP J3 DRY TIMBERS
- INCLUDES 100 % OVERLOAD FOR CYCLONIC GUST CONDITIONS
- NOT TO BE USED FOR NORMAL LOAD CONDITIONS
- LOADS GIVEN PER UNIT OF PENETRATION

	METRIC				IMPERIAL		
SIZE	SHANK DIAM	LOAD/mm PENETRATION		MAX LOAD	SHANK DIAM	LOAD/INCH	MAX LOAD
NO	(millimetres)	(kilograms)	(Newtons)	PER SCREW	(inches)	(pounds)	PER SCREW
4	2·74mm	3·3kg	33 N	730 N	0·108	164 lb	164 lb
6	3·45mm	4·2kg	42 N	1110 N	0·136	235 lb	250 lb
8	4·17mm	5·1kg	51 N	1650 N	0·164	286 lb	370 lb
10	4·88mm	6·0kg	60 N	2270 N	0·192	336 lb	510 lb
12	5·59mm	6·8kg	68 N	2960 N	0·220	381 lb	665 lb
14	6·30mm	7·7kg	77 N	3780 N	0·248	432 lb	835 lb
18	7·72mm	9·5kg	95 N	5600 N	0·304	532 lb	1260 lb

NOTE FOR END GRAIN FIXING ALLOW $^{2}/_{3}$ OF ABOVE LOADS

COACH SCREWS - LATERAL LOADS.

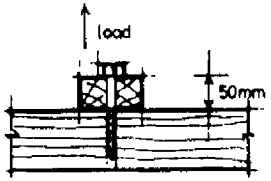


- GROUP STRENGTH J3 - GREEN TIMBER,
- PENETRATION INTO THE THICKER MEMBER TO BE 8 TIMES THE SHANK DIAMETER
- INCLUDES 100% OVERLOAD FOR CYCLONIC GUST CONDITIONS
- NOT TO BE USED FOR NORMAL LOAD CONDITIONS
- SUBJECT TO CONDITIONS 4 5 1 IN A S 1720 – 1975

METRIC					
DIAM-ETER	PENE-TRATN	LOAD - PARALLEL TO GRAIN		LOAD - PERPENDIC TO GRAIN	
(mm)	(mm)	(kilogram)	(Newtons)	(kilogram)	(Newtons)
6	50	151	1512	99	990
10	75	420	4200	165	1650
12	100	604	6040	198	1980
16	125	840	8400	264	2640
20	150	1050	10500	330	3300

IMPERIAL			
DIAM-ETER	PENE-TRATN	LOAD (POUNDS)	
		PARALLEL TO GRAIN	PERPEND TO GRAIN
(inches)	(inches)		
0·25	2	340	223
0·38	3	945	371
0·5	4	1360	446
0·63	5	1890	594
0·75	6	2360	743

COACH SCREWS - WITHDRAWAL LOADS.



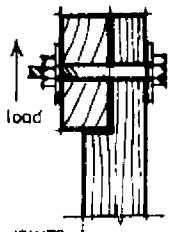
- GROUP STRENGTH J3 - GREEN TIMBER
- INCLUDES 100 % OVERLOAD FOR CYCLONIC GUST CONDITIONS
- NOT TO BE USED FOR NORMAL LOAD CONDITIONS
- LOADS ARE GIVEN PER UNIT OF PENETRATION

METRIC		
DIAMETER	LOAD PER MILLIMETRE OF PENETRATION	
(millimetres)	(kilograms)	(Newtons)
6 mm	6·6 kg	66 N
10 mm	9·0 kg	90 N
12 mm	9·8 kg	98 N
16 mm	11·4 kg	114 N
20mm	13·0 kg	130 N

IMPERIAL	
DIAMETER	LOAD PER INCH OF PENETRATION
(inches)	(pounds)
0·25	370 lb
0·375	500 lb
0·5	550 lb
0·625	640 lb
0·75	730 lb

NOTE FOR END GRAIN FIXING ALLOW $^{2}/_{3}$ OF ABOVE LOADS

BOLTED JOINTS - LATERAL LOADS.

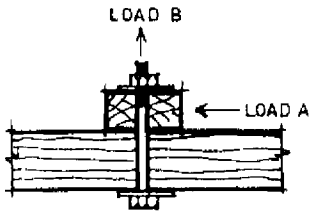


- GROUP STRENGTH J3 – GREEN TIMBER
- INCLUDES 100 % OVERLOAD FOR CYCLONIC GUST CONDITIONS
- NOT TO BE USED FOR NORMAL LOAD CONDITIONS
- ALSO VALID FOR TIMBER TO STEEL JOINT
- STEEL WASHERS REQUIRED. HOLE DIAM = BOLT DIAM. $^{+1}_{0}$ mm
- ONE BOLT IN SINGLE SHEAR. NOT TO BE USED FOR MULTIPLE BOLT JOINTS

METRIC					
DIAM-ETER	WASHR SIZE	LOAD - PARALLEL TO GRAIN		LOAD - PERPENDIC TO GRAIN	
(mm)	(mm)	(kilogram)	(Newtons)	(kilogram)	(Newtons)
6	28ϕ×1·6	151	1512	99	990
10	56ϕ×3	420	4200	165	1650
12	56ϕ×3	604	6040	198	1980
16	73ϕ×5	840	8400	264	2640
20	73ϕ×5	1050	10500	330	3300

IMPERIAL			
DIAM-ETER	WASHR SIZE	LOAD (POUNDS)	
		PARALLEL TO GRAIN	PERPEND TO GRAIN
(inches)	(inches)		
0·25	1¼ϕ 16g	340	223
0·375	2 2ϕ10g	945	371
0·5	2 2ϕ10g	1360	446
0·625	2 9ϕ6g	1890	594
0·75	2 9ϕ6g	2350	743

BOLTS - BASIC WORKING LOADS



- ORDINARY STEEL BOLTS
- NO ALLOWANCE FOR CYCLONIC OVERLOAD
- LOAD GIVEN IS CAPACITY OF ONE BOLT
- LOAD A = BOLT IN SHEAR
- LOAD B= BOLT IN TENSION

METRIC				
DIAM	LOAD A		LOAD B	
(mm)	(kilogram)	(Newtons)	(kilograms)	(Newtons)
12	900 kg	9,000 N	1,210 kg	12,100 N
16	1,610 kg	16,100 N	2,260 kg	22,600N
20	2,510 kg	25,100 N	3,530kg	35, 300N

IMPERIAL		
DIAM.	LOAD (LBS)	
(inches)	LOAD A	LOAD B
0·5	2025 lb	2720 lb
0 625	3620 lb	5085 lb
0·75	5650 lb	7945 lb

Resistance Loads adapted from Standards Association of Australia (1988). **AS 1720.1**

CAPACITY OF FIXINGS

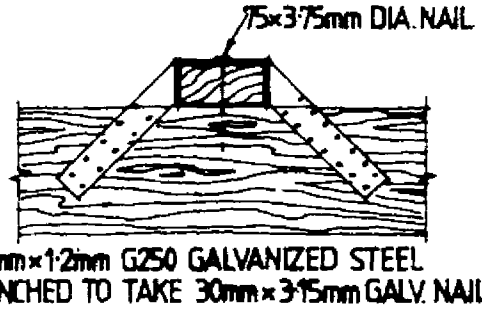
Adopted from Manufacturer's Catalogs

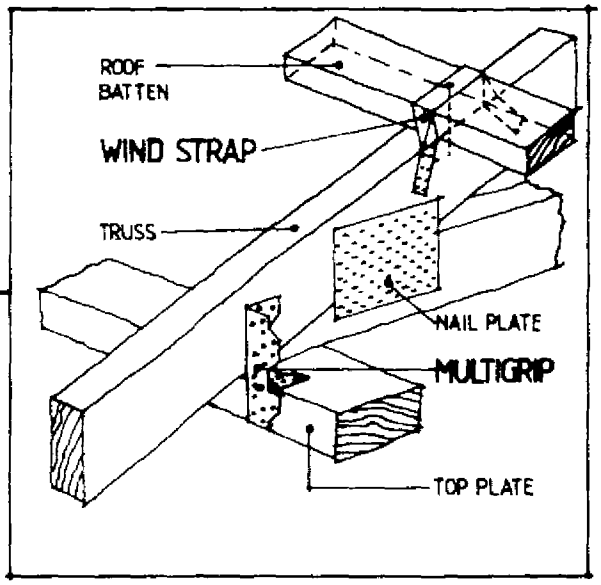
'PRYDA' WIND STRAP

STEEL ALLOWABLE TENSION	=	7·9kN
MINIMUM YIELD	=	14·0kN
CAPACITY	=	16·5kN

NUMBER OF NAILS IN EACH LEG	TOTAL BASIC NAIL LOAD	DEAD + WIND ALLOWABLE DESIGN	DEAD + WIND CAPACITY
4	3·4kN	6·3kN	16·5kN*
5	4·2kN	7·9kN	16·5kN*
6	5·0kN	9·5kN	16·5kN*

* Limited by steel strength





'PRYDA' MULTIGRIP

EACH MULTIGRIP MUST BE FIXED WITH TWELVE 30×3·15mm NAILS OR THREE NAILS PER TAB, EG. NINE NAILS IN FIG 1.

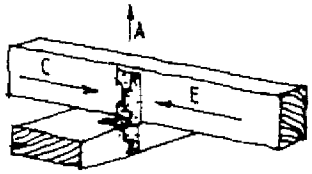


Fig 1

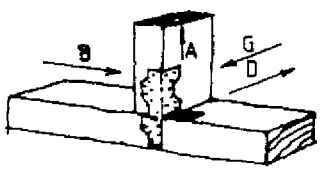


Fig 2

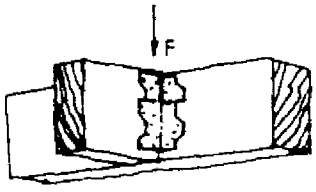


Fig 3

RECOMMENDED WORKING VALUES	VALUES ARE GIVEN FOR ONE MULTIGRIP IN KILONEWTONS						
DIRECTION OF LOAD	A	B	C	D	E	F	G
ALLOWABLE DEAD + LIVE	1·3	1·1	0·5	0·8	0·5	1·9	0·6
ALLOWABLE DEAD + WIND	1·8	1·7	0·7	1·2	0·7	2·6	0·8

CAPACITY OF FIXINGS

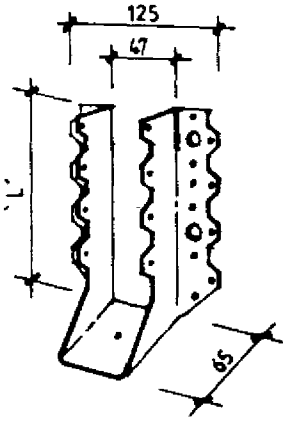
Adopted from Manufacturer's Catalogs

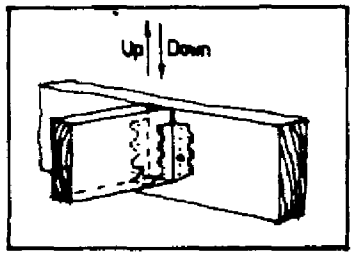
'PRYDA' FRAMING BRACKET

The 'L' values for each bracket Type are as follows
TYPE G = 65mm TYPE D = 134mm
TYPE B = 86mm TYPE F = 182mm

Bracket type	Design criteria	Load direction	Total Basic Nail Load	Number of nails	Allowable design	Capacity
	DEAD + LIVE LOADS					
G	Displace.	Down	330N	8	4·4kN	12·4kN
B	"	"	"	10	5·5kN	15·6kN
D	"	"	"	16	8·8kN	24·9kN
F	"	"	"	22	12·1kN	34·3kN
	DEAD + WIND LOADS					
G	Ultimate	Up	420N	4	3·1kN	9·3kN
B	"	"	"	5	4·0kN	11·6kN
D	"	"	"	8	6·3kN	18·6kN
F	"	"	"	11	8·7kN	25·5kN

IN ORDER TO ACHIEVE THE ABOVE LOADS, ALL NAIL HOLES IN EACH BRACKET MUST BE FILLED WITH 30mm x 3·15mm DIA. GALV NAILS.



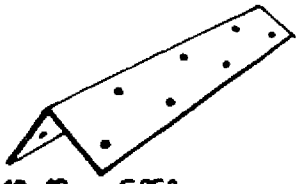


RAFTER TO WALL PLATE, RAFTER TO VERANDAH LINTLE BEAM, FLOOR JOIST TO BEARER

'PRYDA' ANGLE BRACING

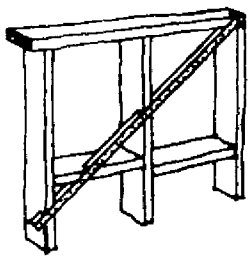
ALLOWABLE TENSION - NAILS IN ONE LEG ONLY		
NUMBER OF NAILS EACH END	TOTAL BASIC NAIL LOAD	DEAD + WIND
3	890N	1·7kN
4	1200N	2·2kN

COMPRESSIVE LOAD		
	STUDS AT 600 CRS. BRACE AT 45°	BRACE AT 55°
Clear brace length	780mm	980mm
Ultimate buckling load	4·6kN	3·1kN
Allowable compressive load (with FS = 2)	2·3kN	1·6kN



19×19mm G250 GALVANISED STEEL.

NOTE. THIS BRACE OFTEN ACTS IN CONJUNCTION WITH WALL CLADDING MATERIALS ONCE CONSTRUCTION IS COMPLETE.

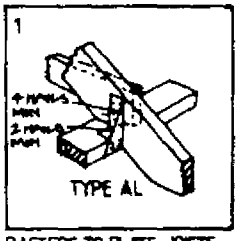


BRACING TO WALL FRAMING

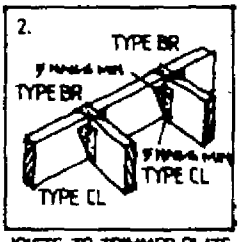
CAPACITY OF FIXINGS

Adopted from Manufacturer's Catalogs

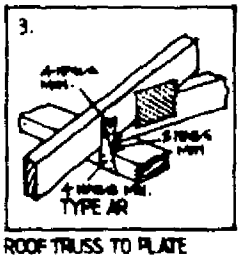
'TECO' TRIP-L-GRIP FRAMING ANCHOR



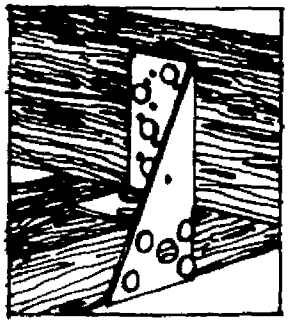
RAFTERS TO PLATE, JOISTS TO PLATE



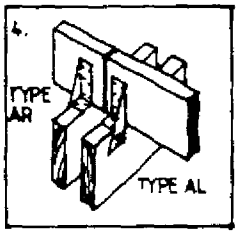
JOISTS TO TRIMMER, PLATE OR FASCIA



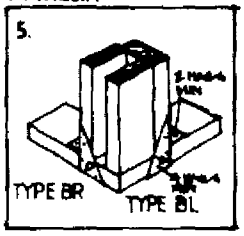
ROOF TRUSS TO PLATE



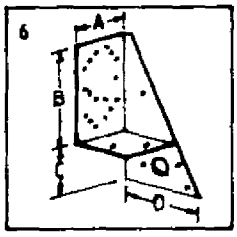
MANUFACTURED FROM 1·2mm GALVABOND STEEL & PUNCHED TO TAKE 2·8mm × 30mm GALVANISED NAILS



PURLINS TO HANGERS – HANGERS TO CEILING JOISTS



CORNER STUDS



A	38mm - 1½ in.
B	73mm - 2⅞in.
C	42mm - 1⅝in.
D	63mm - 2½in.

EACH TRIP-L-GRIP MUST BE FIXED WITH TEN (10) TECO NAILS FOR MAXIMUM BENEFIT! NAILING PATTERNS FOR TYPICAL TRIP-L-GRIP APPLICATIONS ARE SHOWN ABOVE.

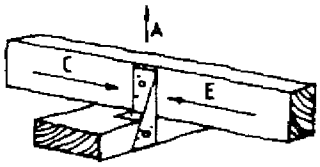


Fig 1

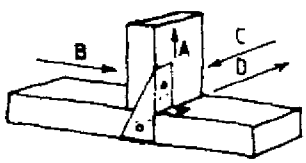


Fig 2

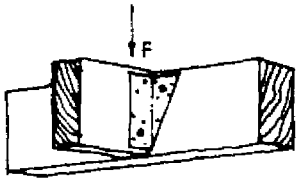


Fig 3

RECOMMENDED WORKING VALUES (METRIC)	VALUES ARE GIVEN FOR ONE ANCHOR IN NEWTONS					
Direction of Load	A	B	C	D	E	F
Long Term Loading	1335	2360	1290	890	1335	2000
Long Term & Maintenance (Live) Loads	1670	2950	1610	1110	1670	2500
Short Term Load	2000	3540	1935	1335	2000	3000

RECOMMENDED WORKING VALUES (IMPERIAL)	VALUES ARE GIVEN FOR ONE ANCHOR IN POUNDS					
Direction of Load	A	B	C	D	E	F
Long Term Loading	300	530	290	200	300	450
Long Term & Maintenance (Live) Loads	375	663	362	250	375	562
Short Term Load	450	790	435	300	450	675

NOTE THE ABOVE LOADS ARE BASED ON BASIC VALUES PUBLISHED IN THE 'TIMBER ENGINEERING DESIGN HANDBOOK' WITH MODIFICATION FACTORS FOR LOAD DURATION AS RECOMMENDED IN THAT DOCUMENT.

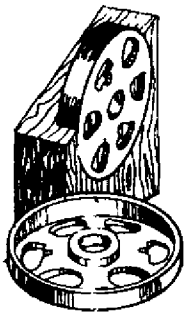
CAPACITY OF FIXINGS

Adopted from Manufacturer's Catalogs

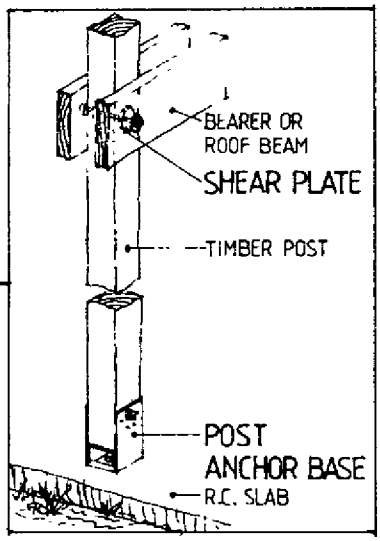
TECO' SHEAR PLATE

SHEAR PLATES ARE MALLEABLE CAST PLATE DESIGNED FOR BOTH WOOD TO STEEL & WOOD TO WOOD APPLICATIONS AND ARE AVAILABLE IN 65mm & 100mm DIAMETERS

THE BEARING AREA OF THE TIMBER IS INCREASED WHICH INCREASES THE LOAD CAPACITY OF THE BOLT.



65mm & 100mm DIA.



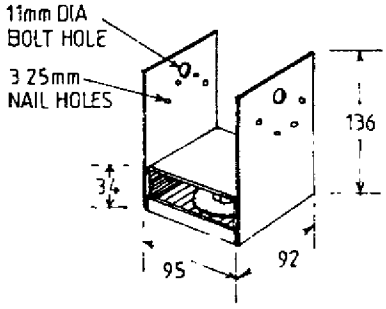
'TECO' POST ANCHOR BASE

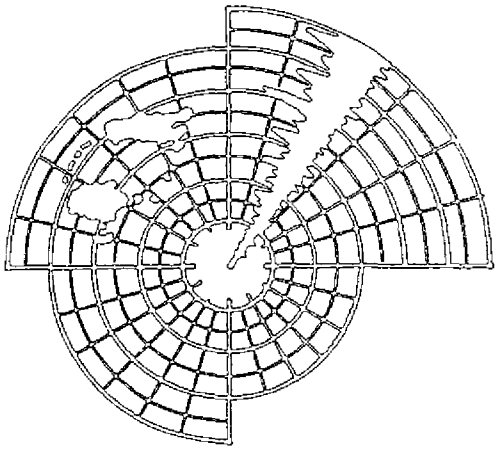
BASE MANUFACTURED FROM 2mm GALV STEEL & RAISED SUPPORT FROM 3mm GALV. STEEL.

POST TO BASE CONNECTION WITH 1/M10 GALV. BOLT OR 8/3·15 FLAT HEAD GALV. NAILS.

BASE TO CONC. CONNECTION WITH 1/M12 EXPAND MASONRY ANCHOR DESIGNED TO ADEQUATLY CARRY LOADS TABLED BELOW OR A PRE-SET ANCHOR BOLT 75mm MIN INTO CONC

LOAD TYPE	ALLOWABLE LOAD
WIND UPLIFT (TENSION)	6kN
DEAD & LIVE LOAD (COMPRESSION)	20kN





6 PROCEDURES AFTER DISASTER

CONTENTS

6.1 EVALUATION

Post Disaster Activity is primarily concerned with saving lives, evacuating homeless people, attending to the injured and providing food and comfort to the affected population.

Emergency work may be needed to attend to damaged and dangerous structures where quick decisions have often to be made to offer protection or to avoid further calamities.

Once this period is over it is important for those responsible for the construction industry to organise inspections and evaluations of the buildings in the areas affected by the disaster and to report to government and industry on their findings

The extent of work should be kept in scale with the disaster event and designed to mitigate damages in future disasters as well as to identify technical solutions to the damaged building stock.

6.1.1 Introduction

Buildings already existing require a system of examination or investigation to establish whether they require upgrading to make them secure against wind loads.

6.1.2 Inspection Teams & Equipment

A leading group or groups should be established and set up in a base headquarter with adequate facilities, including offices, communication systems, transport, office staff, accommodation and the necessary authorities to operate and gain access.

The investigative teams to inspect building damages should be carefully selected from personnel experienced in the building industry and should include architects, engineers, builders, supervisors, inspectors and master tradesmen. Several teams of 3-4 people who can move about freely and quickly can inspect a large number of properties each day

Teams should arrange adequate equipment.

6.1.3 Recording

Teams should properly record and photograph the key components of the constructions inspected to give a picture of the condition of the roofs, walls, floors and other elements and to comment on their status

Evaluation forms should be designed to suit the local construction methods typical for the country concerned

They should be pre-printed and readily available

A sample set of survey forms and questionnaires for inspectors is enclosed on the following pages.

6.1.4 Reporting

Reporting should be carried out in an organised way and there should be some commonality in the systems and methods adopted so that second stage reporting and evaluation is made easier.

Reporting on damages and construction failures can include suggestions for improvements to construction techniques.

6 1.5 Fixings & Fasteners

Newly erected buildings, even those that are cyclone secure need to be inspected on a regular basis to check the integrity of the important and critical·

a	ANCHORAGE	of components to the foundation.
b	BRACING	of wall and roof plane surfaces
c	CONTINUITY	for fixings, fastenings and tie down systems

These elements can deteriorate over time, where exposed to rust, salt attack and where building movement and shrinkage occur, all of which can affect the basic integrity of the buildings. They also may lack basic structural integrity.

Reports should be completed that pinpoint where weakness exists and detail alternative optional solutions to bring the building(s) up to date.

A set of sample 'before' and 'after' details and photographs could be assembled as a broad approach to the problem.

6 1 6 Innovation and Imagination

The designer should be encouraged to use some imagination in seeking solutions It is relatively easy, in most cases to find innovative and imaginative solutions to problems once the designer has developed a broad understanding of:

i. The wind loads,

ii. Tables of resistance of fastenings, and,

iii Design and construction techniques.

Solutions may need to take account of the fact that the building may be used or occupied during reinstatement as the cost of relocation of the users may add heavily to the cost of the repair

6.2 SUMMARY

The details from the inspection team reports should be passed through to the central management headquarters where the overall evaluations are examined and assessed.

Subsequent reports should consolidate the reporting and make detailed observations and recommendations and establish broad budgets for repair and / or reconstruction or demolition.

Headquarters team should report their recommendations to relevant government authorities for action and funding.

NOTE: this paper does not purport to investigate and report on disaster management procedures in detail

Comments made above are a preamble to lead into the technical material covered hereafter to help educate communities to mitigate the damages by improvement of design and construction techniques.

6.3 MAINTENANCE OF EXISTING BUILDING

The maintenance of existing buildings covers two areas:

a. General maintenance from year to year to prevent the building from falling into a state of disrepair Budgets for this work will vary depending on the nature and quality of the construction materials

   However, annual budgets for general maintenance should be set in the order of from 0 5% to 1.5% to 2.0% of the current replacement value of the building

b. Specific maintenance of a building also should include any upgrading or renovation required to maintain the building to a state where it is up to date, not only for its specific use from time to time but also to enable the building to meet adequate codes or standards of construction as they are developed and especially to enable the building to resist disaster events such as cyclones, earthquakes, fires and floods

Upgrading of buildings is not always a major cost compared to the budgets required to replace them, a decision which is often taken when adequate knowledge and experience in upgrading is not available. An old building in reasonable structural condition can be recycled to serve a new function and upgraded to current regulations for from 25% to 50% of the cost of replacement.

The cost of upgrading buildings, in reasonable condition, to resist cyclones or high winds can be done for values of from 5% to 15% of the value of the building. The initial inspection should be made by experienced personnel, preferably an architect or engineer Proper details and drawings or illustrations of the existing building are essential. These should be examined prior to final decisions on possible solutions.

It is often possible to find solutions that are able to be carried out without vacating the building Even where a basic structural integrity is not present it may be possible to superficially implant a structural system of load transferring elements into the building to give it sufficient security Each case should be examined individually as it is often possible to find an innovative solution to the problem.

Upgrading of buildings damaged in cyclones requires an examination and assessment by experienced personnel to determine whether it is economical to rehabilitate the building or to demolish the damaged structure.

The size and design of the original building and its classrooms should be assessed as well as the need to change room sizes when investigations of foundations may also be required.

6.3.1 Maintenance Inspection Reporting

The scope of a maintenance inspection report should include, but not necessarily be limited to, investigation of the site and surroundings, wall framing and cladding, roof framing and cladding, windows and doors and the cyclone 'tie-down' system.

The format of a Maintenance Inspection Report should be designed to promote the active participation of building inspectors in the process of upgrading and / or maintaining the level of cyclone resistance in buildings.

The proceeding draft 'Maintenance Inspection Report' has been designed to encourage this participation by the use of 'YES / NO' questions and 'GOOD / SATISFACTORY / POOR' qualitative assessment of the structure of an existing building. At the end of each section of questions is a paragraph of 'Remedial Action' that may be necessary to update construction to the required standard.

It is suggested that such forms, reviewed and extended as required, could be carbonized and copies circulated to the client, architect and contractor

6.4 MAINTENANCE INSPECTION SURVEY FORM

PROJECT STATISTICS

SCHOOL BUILDING(S) . ... TYPE ....

FLOORS ... . AREA .....

LOCATION .... TOWN .....

INSPECTOR . ... DATE ....

PART A THE SITE

A.1 Observe surround terrain and re-establish 'ground roughness'

Ground Roughness Category 1 e g airport .... ❑

Ground Roughness Category 2 e g rural . ... ❑

Ground Roughness Category 3 e.g urban .. .. ❑

Ground Roughness Category 4 e.g. town centre .... ❑

If ground roughness has changed from that under which the school was built, what structural updating required to comply with new ground roughness category

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		YES	NO
A.2	Observe structural condition of neighbouring buildings and surrounds Could these buildings break-up and become flying debris during a cyclone? (i.e , loose roofing, broken windows, etc...)	❑	❑
A.3	Observe condition and proximity of nearby trees.	❑	❑
	Could trees fall or lose limbs during a cyclone? (i e., dead trees, brittle branches, etc.)		
A 4	Observe condition of school grounds. Is there any loose material or rubbish littered about?	❑	❑

A 5 Note remedial action required to repair or remove.
a. dilapidated neighbouring buildings;
b. dangerous trees, or;
c. loose material on school grounds

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PART B THE ROOF

A thorough maintenance inspection will require an investigation of both the exterior roof surface and roof structure from beneath (i e., in the ceiling space)

Type of Roof

❑ Gable ❑ Hip ❑ Skillion ❑ Other

Roof Construction

❑ Concrete Slab ❑ Steel Trusses ❑ Timber Trusses
❑ Post & Beam ❑ Beam & Framing ❑ Other

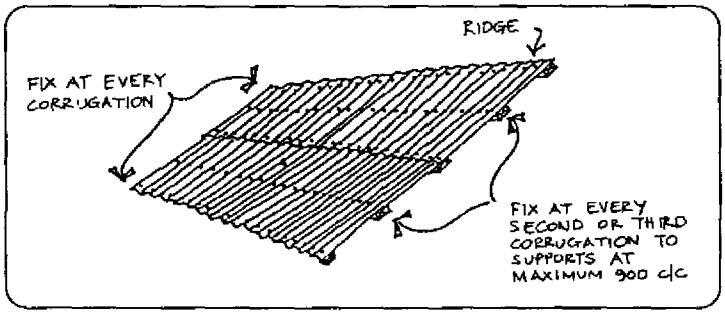
Roof Cladding

❑ Concrete ❑ Tiles ❑ Iron Sheeting
❑ Fibre Cement ❑ Shingles ❑ Thatch
❑ Other

B.1 ***Exterior Roof Surface***

B.1.1 Observe and note condition of the following roof elements:

		GOOD	ADEQUATE	POOR
a.	Roof cladding (i.e. rusting, holes or debris)	❑	❑	❑
b.	Roof fixings and fasteners (i.e , correct type, spacing of screws, none loose).	❑	❑	❑



c.	Gutters and downpipes.	❑	❑	❑
d.	Flashing and ridge capping (i.e., adequately fixed and sealed).	❑	❑	❑
e.	Roof Ventilators (i e , clear of nests or vegetable matter - is it adequately fixed?)	❑	❑	❑
f	Exposed timber work (i.e., split or rotten boards or eaves timber)	❑	❑	❑

B 1 2 Note remedial action, required to upgrade exterior roof surface

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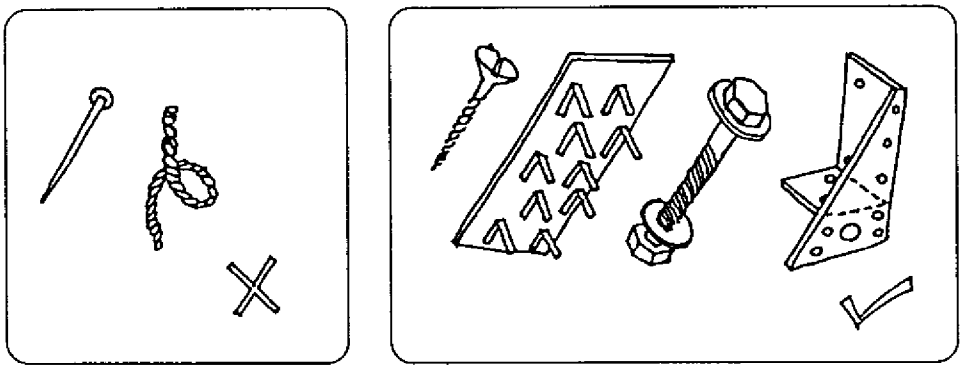
B.2 ***Roof Structure***

B.2.1 Inspect and note condition of the following roof structural members (i.e., damp rot, insect infestation, cracking, etc and their fixings to their supporting member).

		GOOD	ADEQUATE	POOR
a	Purlins and battens	❑	❑	❑
b.	Rafters	❑	❑	❑
c.	Trusses	❑	❑	❑
d.	Fixing methods (i.e., correct type, location of fasteners).	❑	❑	❑



FIXING ELEMENTS & CONNECTORS

B.2.2 Observe and note condition of the underside of roof cladding (i.e., rusting, denting from debris, etc...).

GOOD	ADEQUATE	POOR
❑	❑	❑

B.2.3 Note remedial action required to upgrade roof structure

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PART C WALLS

Walls should be inspected to check their integrity and ability to accept and transfer disaster loads

- Examine tie down systems of roof and wall construction.
- Is there a bond beam or ring-beam at the top of the walls?
- Is it tied down to foundations and at what centres?
- What is material and method of tie down systems?
- What is length of unsupported walls?
- What lateral bracing is available? Are corners braced?
- Note extent and height of gable walls and support of same.

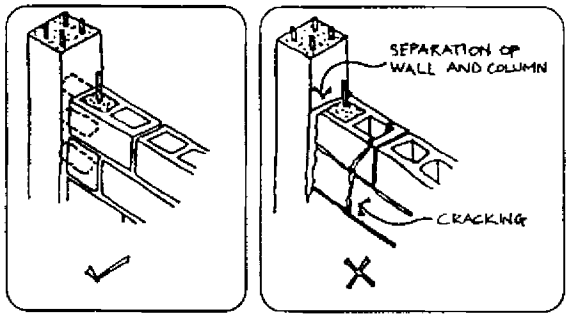
Type of Wall

❑ Concrete	❑ Concrete Block	❑ Solid Brick
❑ Cavity Brick	❑ Timber Frame	❑ Concrete Frame
❑ Steel Frame	❑ Other	

C.1 *Block or Brick Walls*

C 1 1 Inspect and note general condition of brick or block walls

		YES	NO
a	Are there any settlement or movement cracks through bricks or mortar joints?	❑	❑
b	Has water penetrated into any cracks and rusted reinforcing steel? (i.e., rust stains)	❑	❑
c.	Is there any cracking or separation between any 'insitu-cast' concrete columns and brick / block walls?	❑	❑



CONNECTION – BLOCK WALL TO COLUMN

C.1.2 Inspect wall top plate or bond beam:

		YES	NO
a.	Is timber top plate and / or bond beam in satisfactory condition? (i.e., no cracking, rust in steel or rot in timber).	❑	❑
b.	Are all 'tie-down' bolts / cast-in rods correct type and spacing?	❑	❑
c	Are 'tie-down' bolts / cast-in rods rust free and securely fastened?	❑	❑

C.1.3 Check that core filling has been carried out satisfactorily. ❑ ❑

C.1.4 Note remedial action required to repair brick / walls

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C.2 Timber Frame Walls

		GOOD	ADEQUATE	POOR
C.2 1	During ceiling inspection of roof structure, check and note condition of top plate (i.e., wood rot, insect infestation, splitting, etc..)	❑	❑	❑
C.2.2	Are the correct type and spacing of 'tie-down bolts / rods passing through the top plate provided	❑	❑	❑
C.2.3	Are 'tie-down' bolts / rods securely tightened and corrosion free?	❑	❑	❑
C.2.4	If building elevated on stumps or posts, inspect and note condition of bottom plate connection to floor substructure			
	a. Are the 'tie-down' rods securely fixed to floor substructure and securely tightened?	❑	❑	❑
	b. Is there adequate cross bracing between stumps or posts?	❑	❑	❑

C.2.5 Note remedial action required to repair timber wall framing

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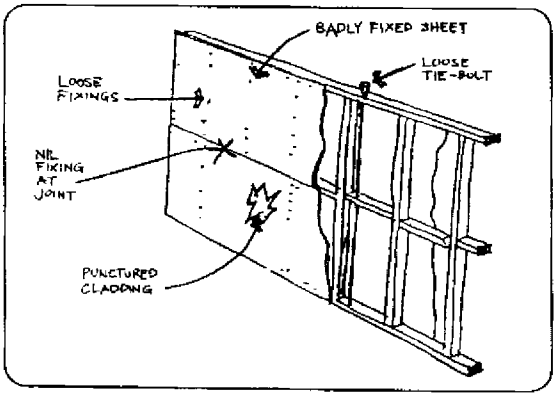
C.3 Wall Cladding

		GOOD	ADEQUATE	POOR
C.3 1	Inspect and note condition of cladding (i e rotten chamfer boards, debris damage, moisture penetration at joints, etc).	❑	❑	❑

C.3.2 Inspect fixings and fastening method of securing cladding to timber wall framework

		YES	NO
a.	Are fixings the correct type, number and spacings?	❑	❑
b	Is cladding securely fixed to timber framework? (i.e., no loose or rusty screws or nails).	❑	❑



C.3 3 Note remedial work required to repair cladding

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PART D WINDOWS, DOORS & SHUTTERS

Inspect these elements internally and externally and check their operation.

❑ Timber ❑ Aluminium ❑ Steel ❑ Other

Check type and record details of:

- Framing to door and window openings.
- Glazing, thickness, size. Method of fixing.
- Reinforcement around openings
- Size of openings.
- Types of beams or lintels over opening
- Describe generally, including fixing details.

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D.1 Windows and Window Frames

D 1.1 Inspect windows and window frames and note general condition:

		YES	NO
a.	Are there any broken louvres or window panes?	❑	❑
b.	Are frames secure and fixed firmly into wall opening?	❑	❑
c.	Are fixings of correct type and number to adequately secure frame against cyclonic winds?	❑	❑

D.1.2 Note remedial work is required to repair windows and window frames

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D.2 Doors and Door Frames

D.2.1 Inspect doors and door frames and note general condition

		YES	NO
a	Are door surfaces intact and free from punctures or indentation?	❑	❑
b.	Are door frames secure and firmly secured into wall opening?	❑	❑
c.	Are door stops and door hinges adequate to secure door and frame against cyclonic winds? (i.e., ensure screws are in all hinge holes).	❑	❑

D 2 2 Note remedial action required to repair doors and door frames

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D.3 Cyclone Shutters

D 3 1 Inspect and note condition of cyclone shutters:

		YES	NO
a.	Are the shutters free of wood rot and hinges free of rust?	❑	❑
b.	Do shutters open easily and close securely?	❑	❑
c	Are shutter hinges (or tracks if sliding) securely fixed to wall?	❑	❑

D.3.2 If shutters not permanently attached to exterior walls

		YES	NO
a	Are they adequately stored?	❑	❑
b.	Are they in good state of repair?	❑	❑

PART E FLOOR SYSTEMS & FOUNDATIONS

Check the nature and type of floor systems and the material and stability of the natural foundations in addition to the condition of the artificial foundation.

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E.1 *Floor Systems*

Upper Floors

❑ Concrete ❑ Steel Beam & Joists ❑ Timber Joists ❑ Other

Lower Floors

❑ Concrete Slab on Ground Fill ❑ Suspended Slab ❑ Timber Bearers and Joists

❑ Timber Floor Boards ❑ Plywood Flooring ❑ Other Systems

Describe in general, including fixing details.

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E.2 *Foundations*

Type

❑ Concrete ❑ Stone ❑ Brick ❑ Timber Post ❑ Other

Bearing Material

❑ Rock ❑ Gravel ❑ Good Ground ❑ Clay ❑ Silt

Comment on stability

(Describe in general - include comment on damp proof courses and moisture movement).

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PART F GENERAL COMMENTS

The following additional matters will assist in the overall evaluation of damages and in the assessment and evaluation.

F.1 *Costing*

- Establish overall building area.
- Assess current replacement cost pre-cyclone.
- Establish unit rates for reconstruction (per m^2)
- Add margin for reconstruction in post disaster period.
- Establish extent of damages and values of same
- Assess approximate cost to make good where possible.

F.2 *Debris Damage*

Examine and evaluate extent of debris and damages caused by flying debris:

❑ 10% ❑ 30% ❑ 50% ❑ 70% ❑ 90%

F.3 *Infrastructure & Services*

Identify and comment on primary problems common in the regions affected by the disaster, e.g.:

- wind damage
- debris damage
- wave surges
- flooding
- poor access to site
- power lines blown down
- ....
- ....
- ....
- power services
- sewerage services
- water supply services
- telephone services
- transport to region
- tree debris
- ....
- ....
- ....