CWT Partnership
Structural Engineering Consultants

49 Back Lane
Rochford Essex SS4 1AY
Tel No: 01702 540146 Fax No: 01702 40193

Contract: 10 CHURCHEND FOULNESS.

Job No: 4426.

Sheet No: 1

Section:

By: Checked:

Date: JAN 08

SCOPE OF WORK

1. CHECK EXISTING JOISTS TO FRONT BEDROOM FLOOR.

   DESIGN ADDITIONAL JOISTS TO STRENGTHEN FLOOR

DESIGN DATA

1. BS 6399
2. BS 5268
3. SITE SURVEY DATA

LOADING

FLOOR DL = 0.5
LL = 1.5 } 2.0 KN/M².

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EXISTING JOISTS 44 x 147. @ 400 c/c

SPAN = 3.0 M.

LOAD / JOIST = 2 x 0.4 x 3.0 = 2.4 KN.

M_T = 2.4 x 3 x 0.125 = 0.9 KN M

$Z_{reqd.}$ = 0.9 x 10^3 / 4.1 x 1.1 = 199.5

$Z_{provided.}$ 44 x 147 = 158.

$$f = \frac{5 \times 2.4 \times 3^3 \times 10^6}{384 \times 6800 \times 11.6} = 10.69 > 9.0$$

PLUS 32 NOTCH AT TOP ADJACENT TO SUPPORT

CHECK SHEAR — EFFECTIVE AREA 115 x 44 = 5060 mm^2.

SHEAR $\frac{3 \times 1200}{2 \times (5060)}$ = 0.355 < 0.6 N/mm^2.

EXISTING JOISTS
INADEQUATE

CONSIDER OPTIONS
FOR STRENGTHENING
FLOOR.

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Section:

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CONSIDER INTERMEDIATE JOISTS.

OPTIONS

A) EITHER TEMPORARY REMOVAL OF HEATING PIPES AND USE JOISTS 147 DEEP.

B) CONSIDER 50 X 122 JOISTS + INFILL TO ½ BOARDING

C) CONSIDER 50 x 122 JOISTS BOLTED TO EXISTING JOISTS

D) NEW JOISTS THROUGHOUT.

A) TRY 50 x 147 JOISTS BETWEEN OR ADJACENT TO EXISTING

LOAD / JOIST = $2 \times 0.2 \times 3 = 1.2$ KN'

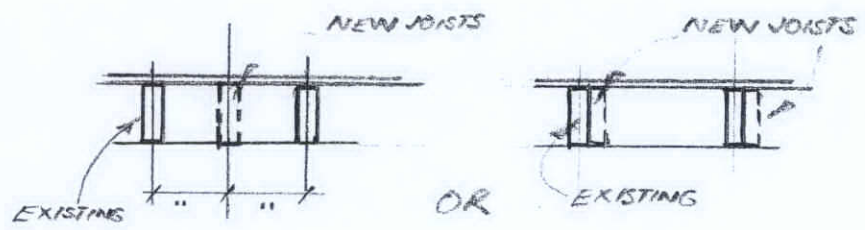
$M_t = 1.2 \times 3 \times 0.125$

$= 0.45$ KNM

$Z_{reqd} = 0.45 \times 10^3 / 5.3 \times 1.1 = 77.18$

$Z_{provided} = 180$.

$$\delta = \frac{5 \times 1.2 \times 3^3 \times 10^6}{384 \times 8800 \times 13.2} = 3.63$$



A)

PROVIDE

50 x 147 JOISTS

(STRENGTH CLASS C16)

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B) TRY 50 x 100 JOISTS BETWEEN OR ADJACENT TO EXISTING.

z provided = 78.4

z reqd = 77.18

$$f = \frac{5 \times 1.2 \times 3^3 \times 10^6}{384 \times 8800 \times 3.8} = 12.61 > 9.0$$

162/12.84

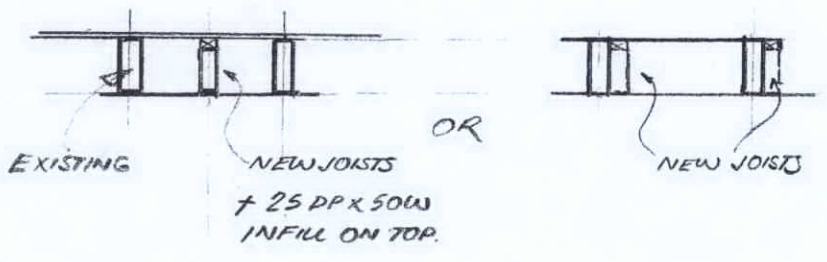
TRY C24 162/15.75 = 10.28 > 9.0

TRY 50 x 122 JOISTS + SMALL NOTCH FOR PIPES

z provided = 124.

$$f = 162 \times 10^6 / 384 \times 8800 \times 7.57 = 6.33 < 9.0.$$

25.58



B)

PROVIDE

50 x 122 JOISTS

(STRENGTH CLASS C16)

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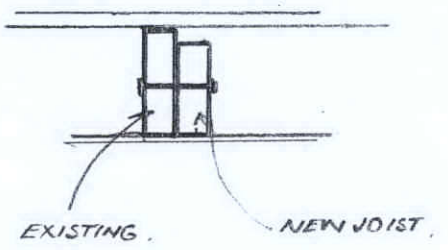
c) BOLT 50x122 JOISTS TO EXISTING

c) PROVIDE

50 x 122 JOISTS BOLTED TO EXISTING M8 BOLTS @ 400 c/c

NEW JOISTS TO HAVE MIN OF 50mm BEARING AT SUPPORTS.



D) NEW JOISTS

Z REQD = $0.9 \times 10^3 / 5.3 \times 1.1$ = 154.0

(C16)

C24 " / 7.5×1.1 = 109.0

C16 $\delta = 324 \times 10^6 / 384 \times 8800 \times 13.2$ = 7.26 < 9.0

44.6

C24 = 5.91

PROVIDE

50 x 147 JOISTS 350 c/c (STRENGTH CLASS C24)

TO LIMIT DEFLECTION

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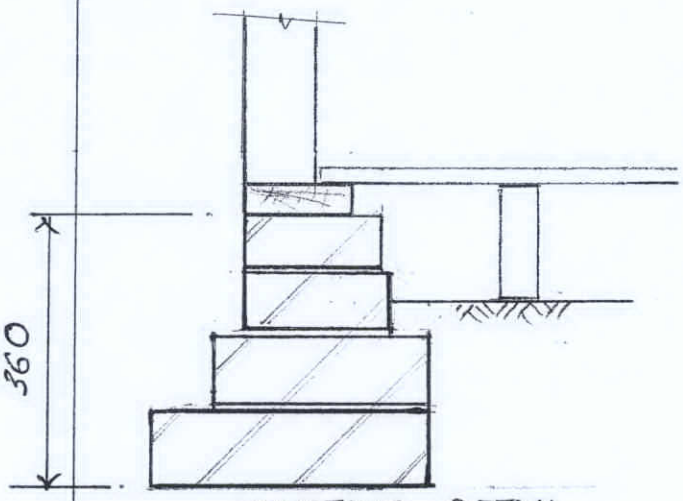
Section:

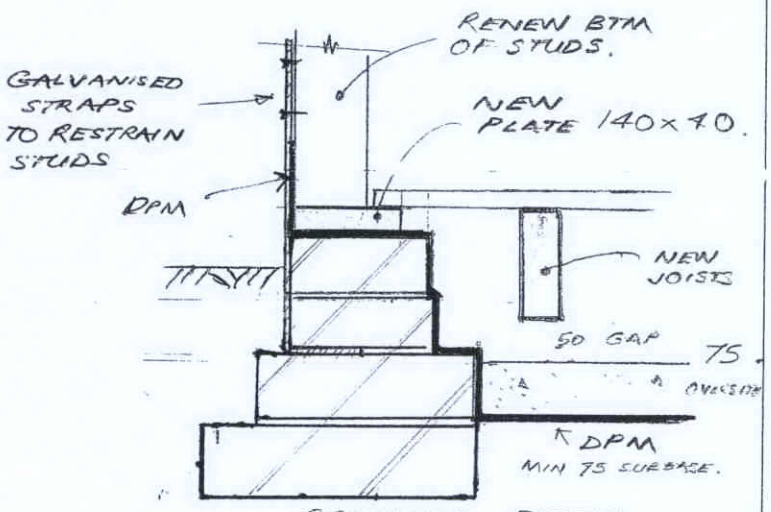
By: Checked:

Date: APRIL 08.

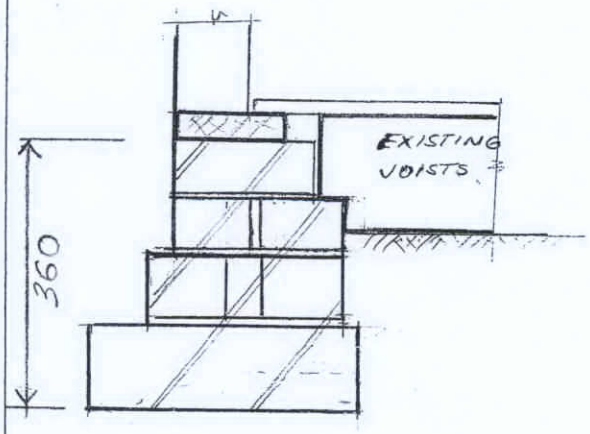
SUBSTRUCTURE DETAILS.



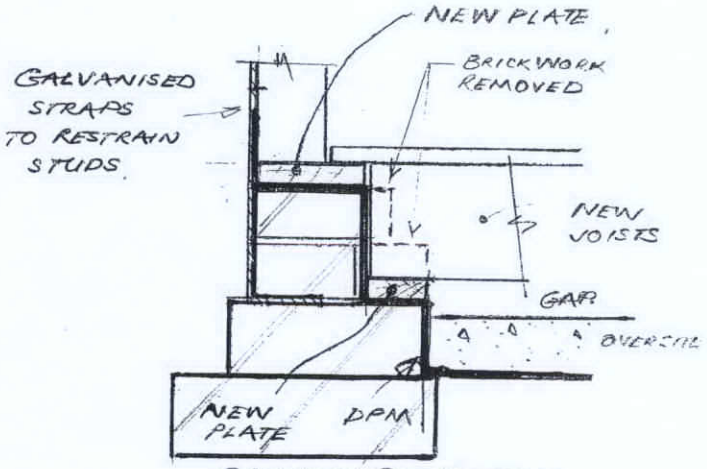
EXISTING DETAIL ON SIDE ELEVATION.



PROPOSED DETAIL ON SIDE ELEVATION.



EXISTING DETAIL ON FRONT ELEVATION.



PROPOSED DETAIL ON FRONT

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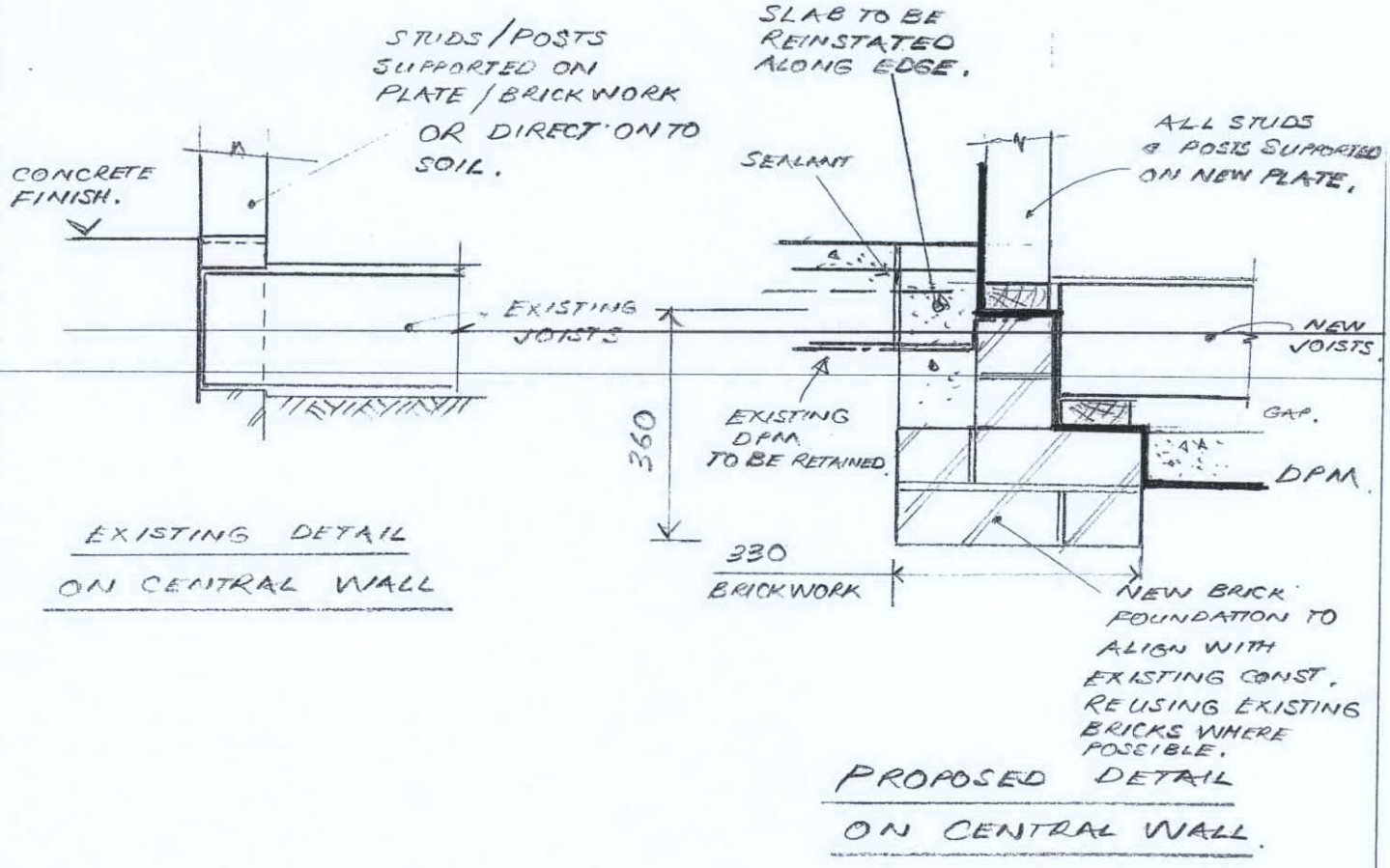
SUBSTRUCTURE DETAILS



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Section:

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Date: APRIL 08.

REPLACEMENT GROUND FLOOR JOISTS TO LOUNGE.

TRY 47×147 @ 400 c/c.

LOADING = $2 \times 0.4 \times 3.0 = 2.4$ KN
(DL+LL)

$M+ = 2.4 \times 3 \times 0.125 = 0.9$ KNM.

z reqd $= 0.9 \times 10^3 / 5.3 \times 1.1 = 154.37$

z $47 \times 147 = 169 \times 10^3$ mm^3.

$\delta = \dfrac{5 \times 2.4 \times 3^3 \times 10^6}{384 \times 8800 \times 12.4} = 7.73 < 9.0$

PROVIDE

47×147 JOISTS
@ 400 c/c

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LOADING TO STUDS.

1. GABLE WALL

STUD = 0.75 x 6.0 = 4.50

ROOF/CEILING. 4.7 x 1.2 x 2.3 / 6.5 = 2.00

6.50

STUDS @ 400 c/c LOAD/STUD = 2.60 KN.

2. FRONT WALL.

STUD = 0.75 x 5.0 = 3.75

ROOF = 3.125 x 1.2 = 3.75

7.5 KN/M.

ALLOWING FOR FLOOR @ 1ST FLOOR CEILING TO BE PROPPED

STUDS @ 400 c/c LOAD/STUD = 3.0 KN

3. CENTRAL STUD WALL

STUD = 0.65 x 5.0 = 3.25

ROOF = 3.75

7.00 KN/M

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Section:

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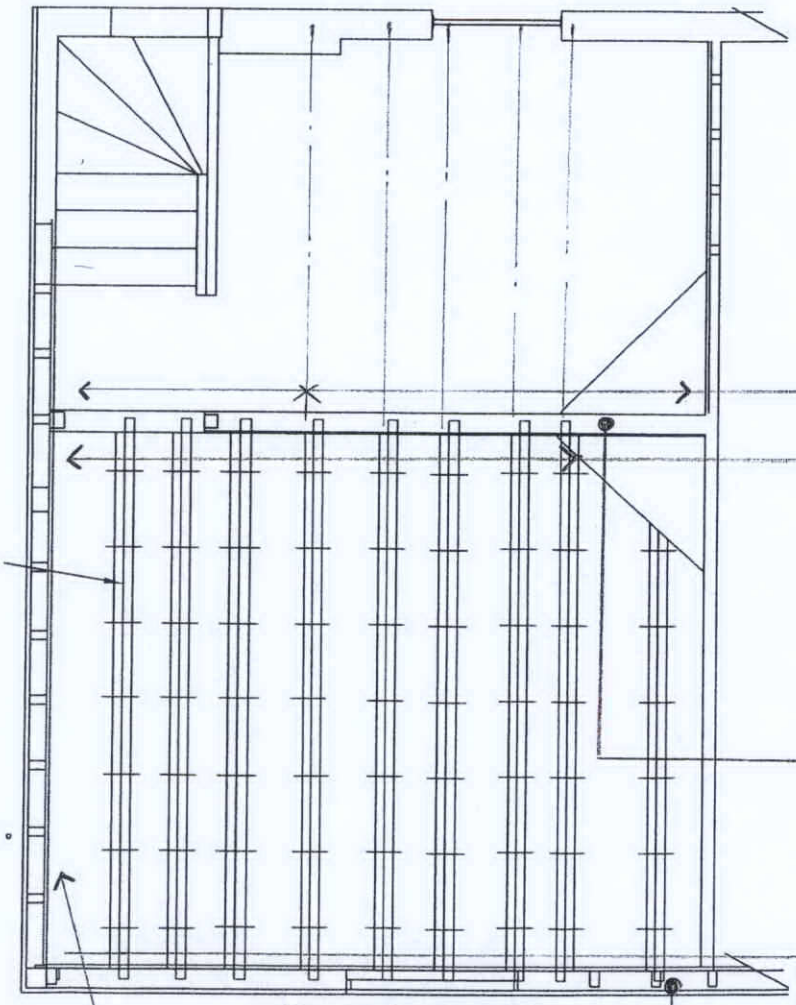
Date: APRIL 08

TEMPORARY WORKS NECESSARY TO SUPPORT THE STRUCTURE PRIOR TO REPAIRS ON THE SUBSTRUCTURE



Proposed - First Floor

LOADING TO ENDS OF FLOOR JOISTS 1.0 KN/M.

LOADING TO ENDS OF FLOOR JOISTS = 1.5 KN/M

LOADING TO CENTRAL STUD WALL AT GROUND LEVEL = 7.0 KN/M (ALLOWING FOR ROOF STRUTS)

LOADING TO ENDS OF FLOOR JOISTS = 1.5 KN/M.

LOADING TO FRONT STUD WALL AT GROUND LEVEL = 7.5 KN/M.

LOADING TO SIDE STUD WALL AT GROUND LEVEL 6.5 KN/M.

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Section:

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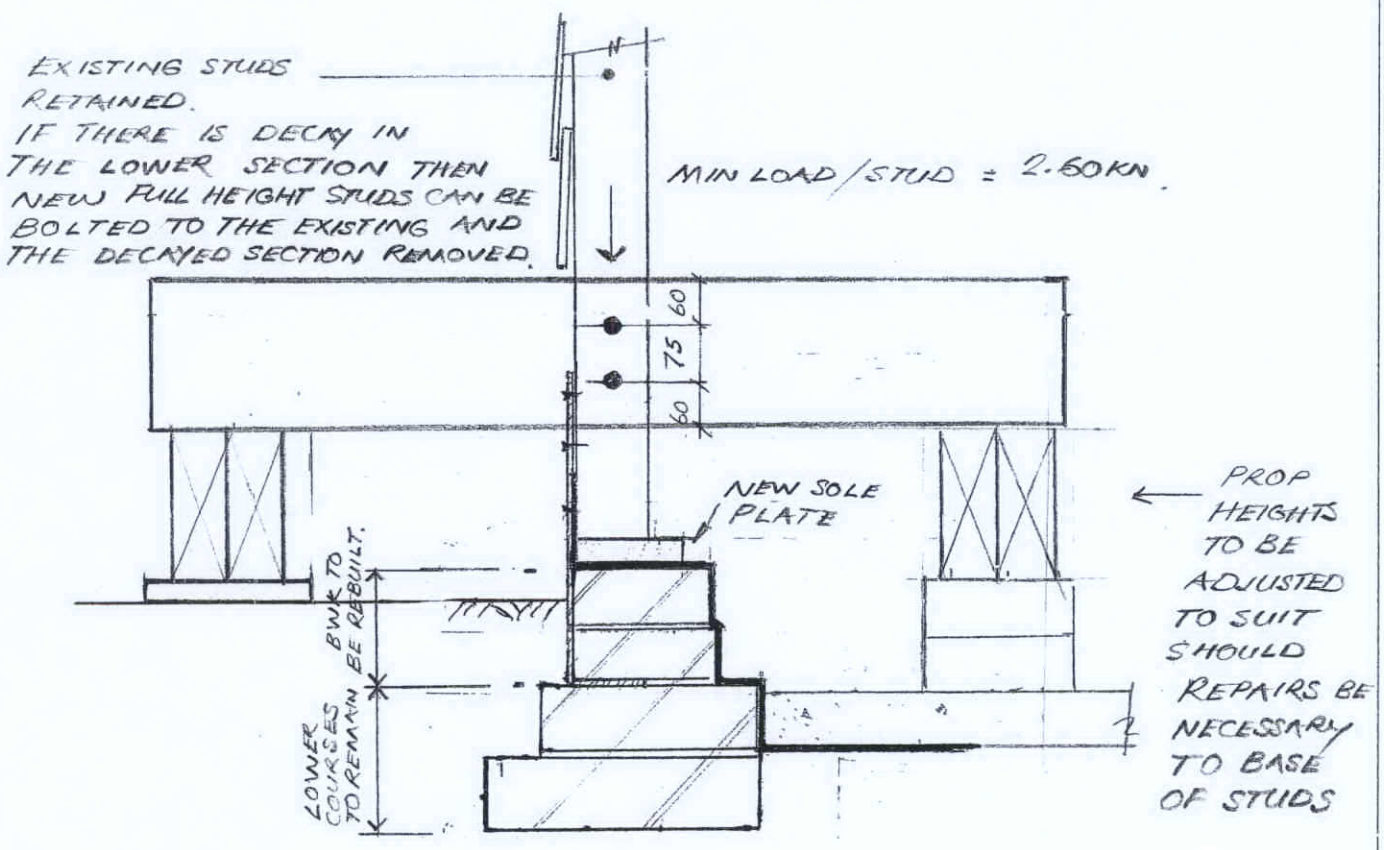
Date: MAY 08.

PROPOSED PROPS TO SUPPORT STUDS ON SIDE ELEVATION.



STUDS 40 x 90 — BOLT CAPACITY M12 = 1.50 KN

∴ 2 N° BOLTS = 3.0 KN > 2.6

PROP — CHECK 50 x 195 C24 TIMBER.

TRY MAX SPAN = 1.2 M $M_T = 2.6 \times 1.2 \times 0.25 = 0.78$ KNM

$Z = 0.78 \times 10^3 / 7.5 = 104$ Z 50 x 195 = 317

SHEAR = 1.3 KN $\frac{3V}{2A} = \frac{3 \times 1.3 \times 10^3}{2 \times 50 \times 195}$

$= 0.2 N/mm^2 < 0.71$

$\delta = 0.42 < 3.6$

PROVIDE 50 x 195 PROPS BOLTED TO STUDS USING 2/12Ø BOLTS

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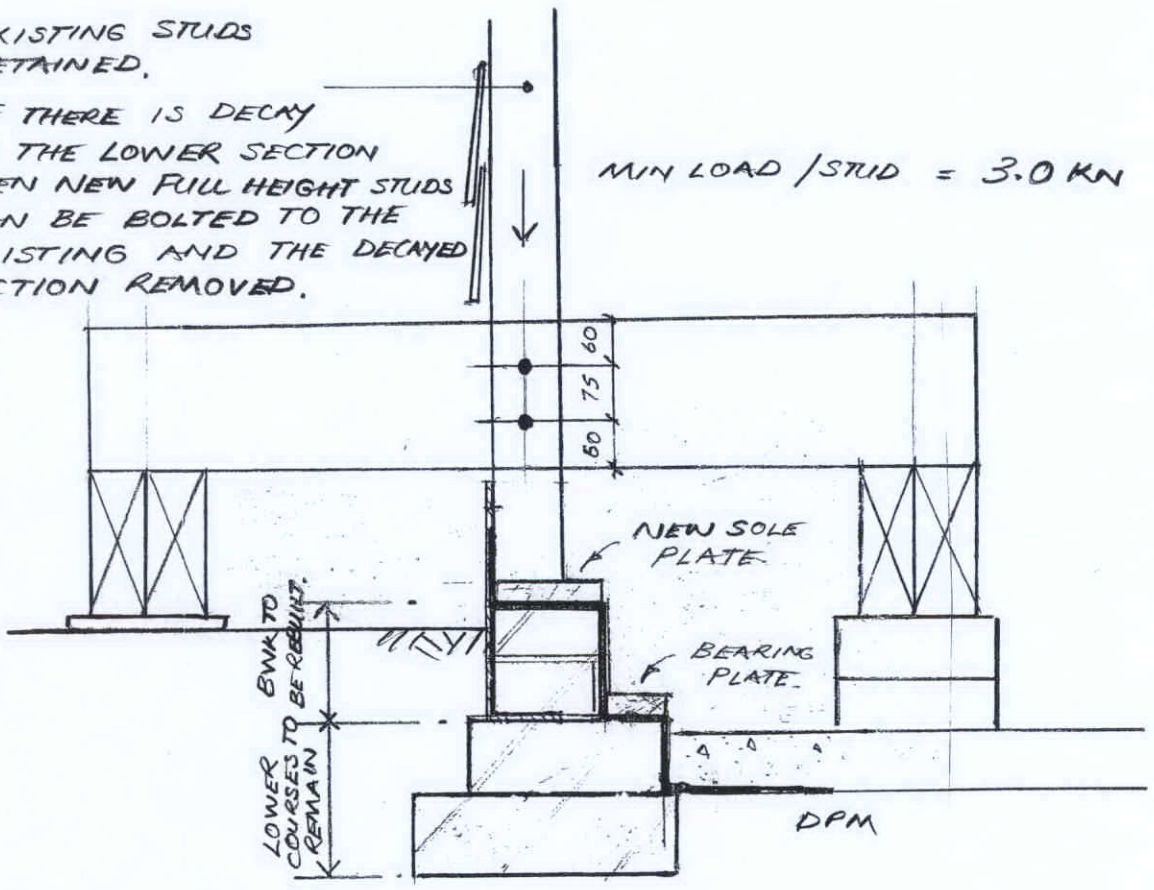
PROPOSED PROPS TO SUPPORT STUDS ON FRONT ELEVATION.

EXISTING STUDS RETAINED.

IF THERE IS DECAY IN THE LOWER SECTION THEN NEW FULL HEIGHT STUDS CAN BE BOLTED TO THE EXISTING AND THE DECAYED SECTION REMOVED.

MIN LOAD / STUD = 3.0 KN



STUDS 40 X 90 — BOLT CAPACITY = 1.50 KN
M12

2 N° BOLTS = 3.0 KN.

PROPS — CHECK 50 X 195 C24 TIMBER

MAX SPAN = 1.2M $M+ = 3 \times 1.2 \times 0.25 = 0.9$ KNM.

$Z = 0.9 \times 10^3 / 7.5 = 120$ Z 50 X 195 = 317

SHEAR = 1.5 SHEAR STRESS = $0.23 N/mm^2$ < 0.71

$f = 0.78 < 3.6$

PROVIDE

50 X 195 PROPS BOLTED TO STUDS USING 2/12ø BOLTS

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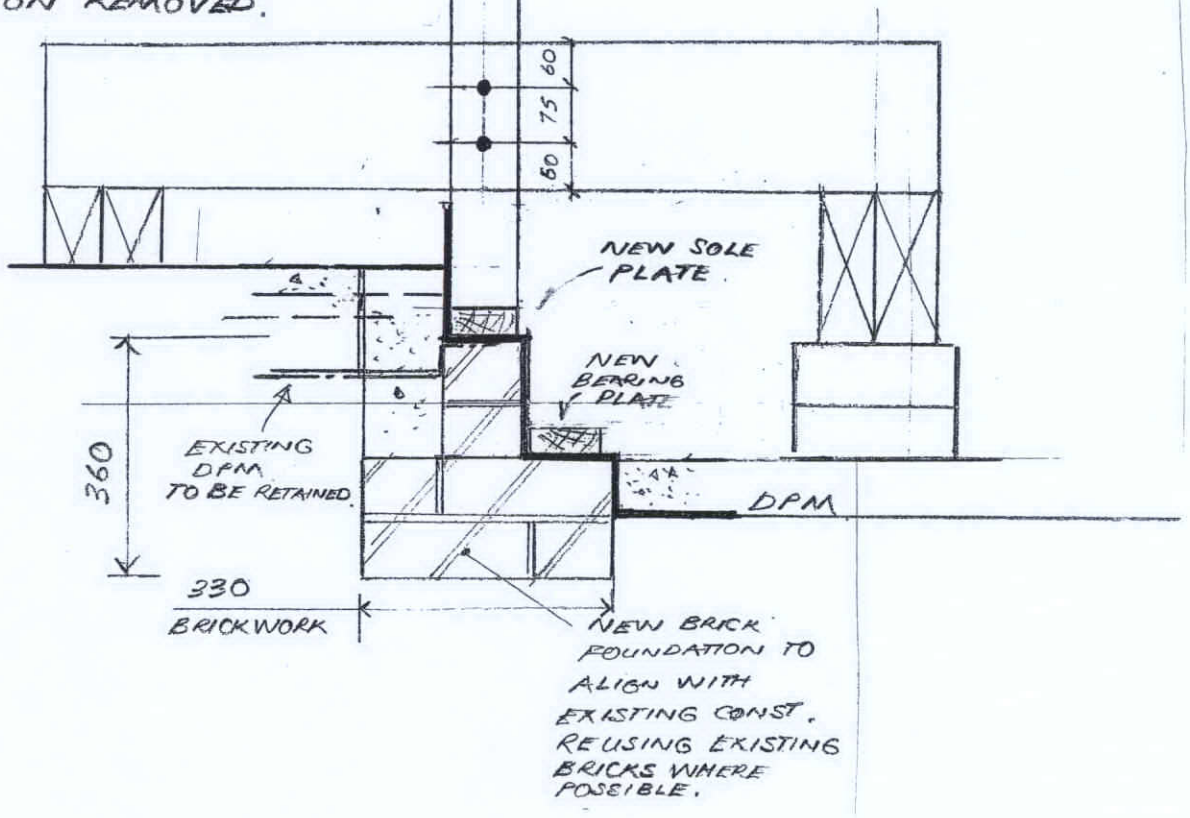
PROPOSED PROPS TO SUPPORT STUDS ON CENTRAL PARTITION

EXISTING STUDS RETAINED.

IF THERE IS DECAY IN THE LOWER SECTION THEN NEW FULL HEIGHT STUDS CAN BE BOLTED TO THE EXISTING AND THE DECAYED SECTION REMOVED.

MIN LOAD / STUD = 3.0 KN



LOADING AS FOR FRONT WALL

PROVIDE

50 x 195 PROPS BOLTED TO STUDS USING 2/12 Ø BOLTS.

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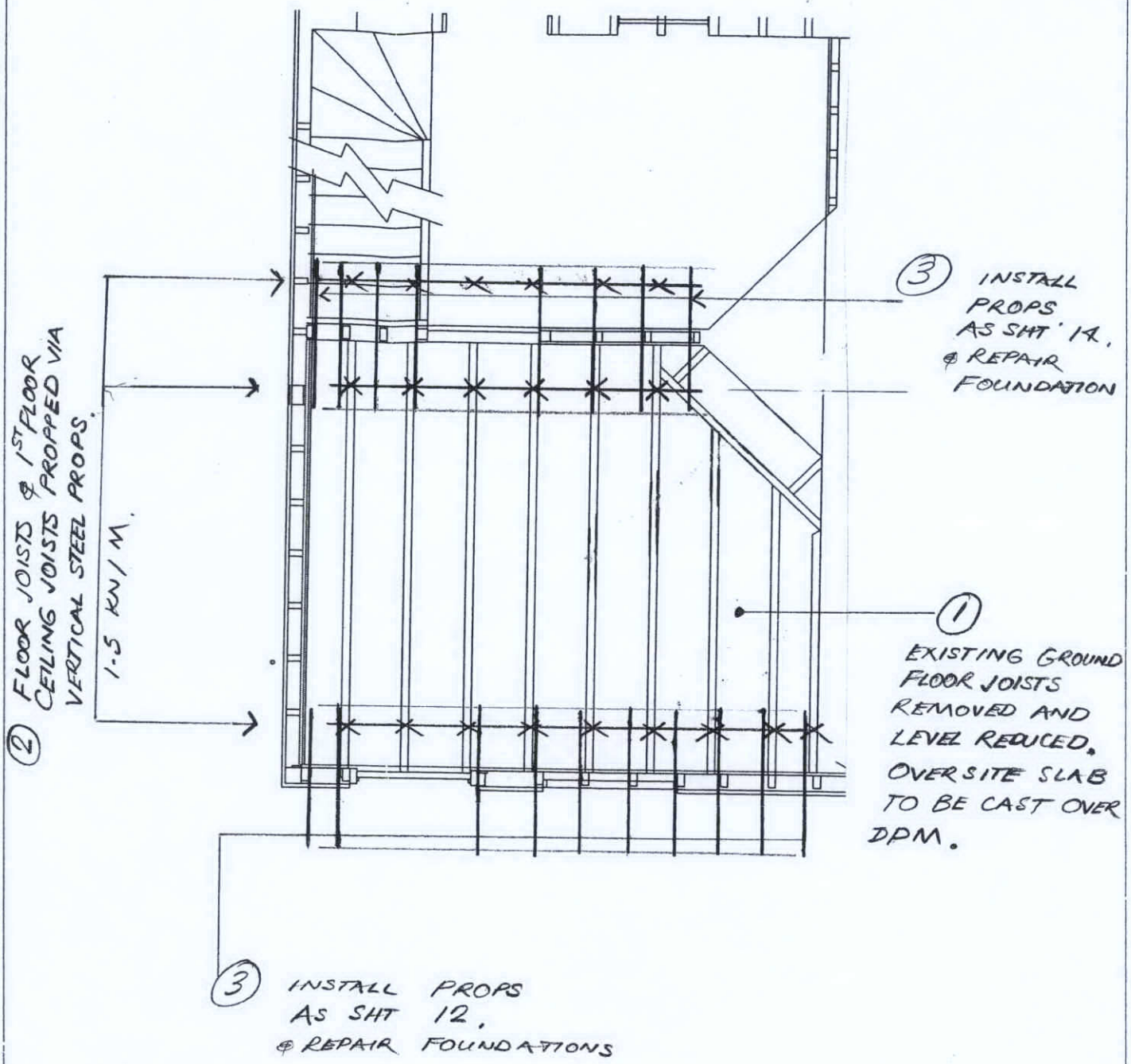
PHASE (1) PROPPING STRUCTURE & REPAIR TO SUBSTRUCTURE



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PHASE (2) PROPPING STRUCTURE & REPAIR TO SUBSTRUCTURE