คำนวณรอยต่อ - STRUCTURAL STEEL HAUNCHES

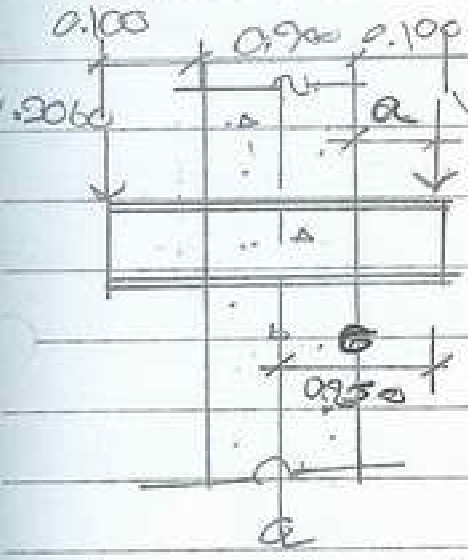
SHEARING B6 VB6 = 9,570 กก. (MOMENT CONNECTING)

B7 VB7 = 3060 กก. (SHEAR CONNECTION)

fc' = 240 ksc, fy = 3000 ksc, FOR REBAR

fy = 2500 ksc FOR STEEL STRUCTURE. ขนาดคาน 0.20x0.500.

ขนาดเสา 0.30x0.300 เมตร.



เลือก WF 150x100x6x9x21.10 kg/m.

V=3060 kg ตรวจสอบกำลังของ ร. โดยสมมติภาวะเฉือน

กรณี PURE SHEAR

Vsum = 3060x2 = 6120 kg.

พื้นที่รับแรงเฉือนของคอนกรีต

Bcp = 0.7x1.0x30x0.85x240 = 6,200 kg) มากกว่า

ความสามารถรับแรงเฉือนของเหล็ก

15x6x0.40x2500 = 9000 > 3060 kg OK.

คำนวณหาค่า Vc

$V_c = 0.85 f_c' b l_e / (1+3.6e/l_e)$

~~Vc = 0.85x240x0.10x30/(1+3.60x25/30)~~

Vc = 0.85x3400x4x12/(1+3.60x6/12)

= 86,863.20 lb.

เหล็กเสริม DB12 Fy = 3000 ksc, คำนวณหา Vh

จากตาราง 6.20.2 ได้ = 11 KIPS.

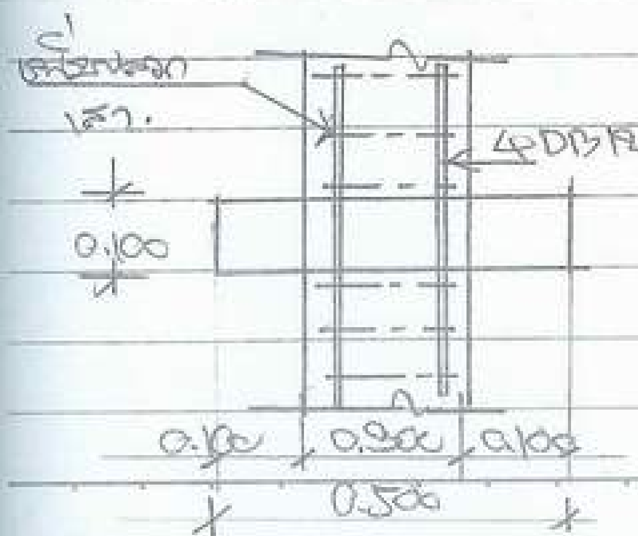
∴ ค่ากำลังรับแรงเฉือนของ HAUNCHES

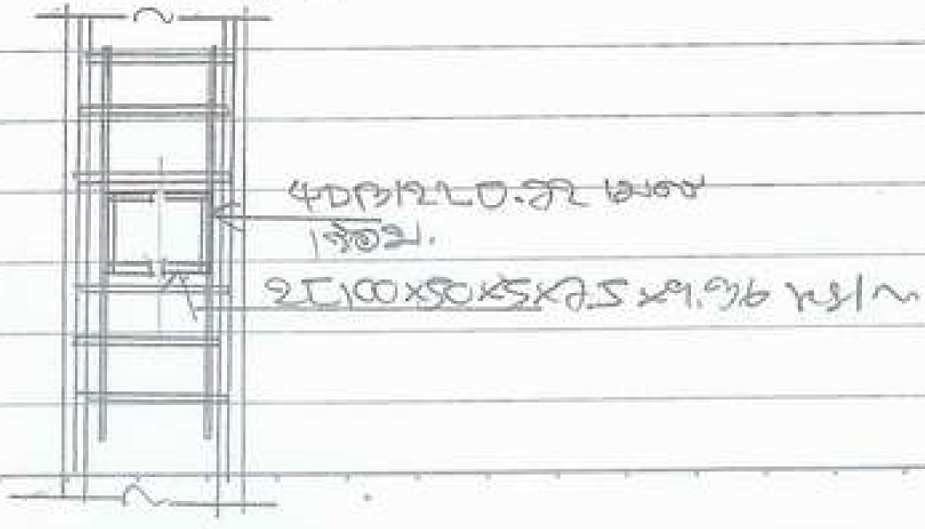
V_u = 0.85x(86,863.20+11 KIP)

V_u = 83 KIP = 37,810 kg.

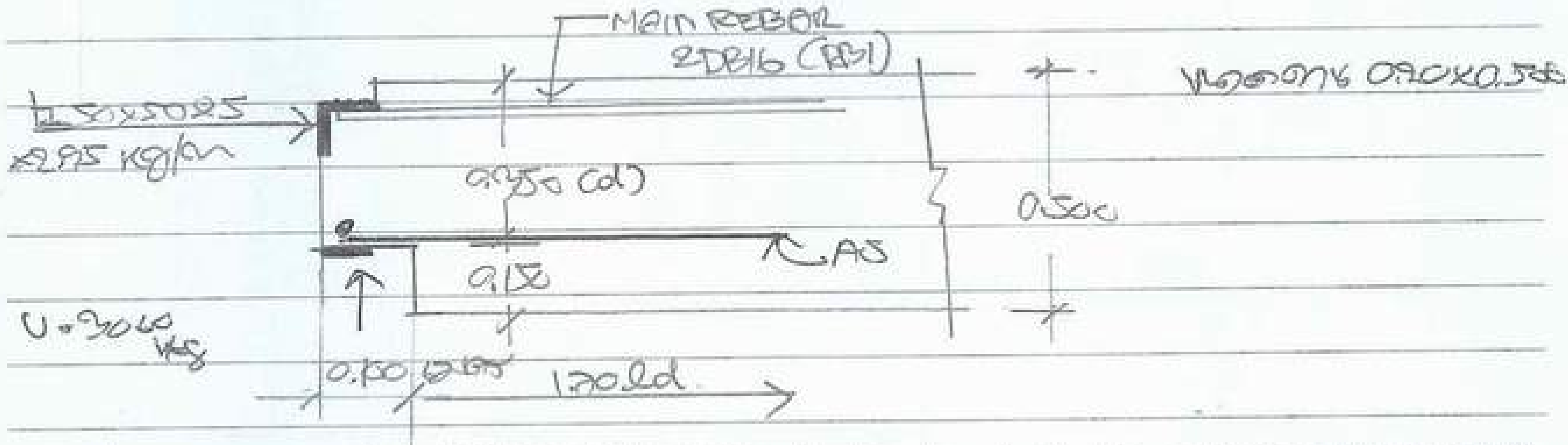
สรุปใช้ WF 150x100x6x9x21.10 kg, REBAR 4DB12 L 0.80 เมตร.

OR. [100x50x5x7.5x9.36 kg, 4 DB12 L 0.80 เมตร





ตัวอย่างการออกแบบบ่าปลายคาน DAPPED - END.



คำนวณหา As (FLEXURE & AXIAL TENSION IN THE EXTENDED END

$A_s = A_f + A_n$.

$= \frac{1/0.85 \times [3000(\times 10/35)]}{0.85 \times 3000} = 0.399$ ซม.^{2} ใช้ 2RB9 SR24.

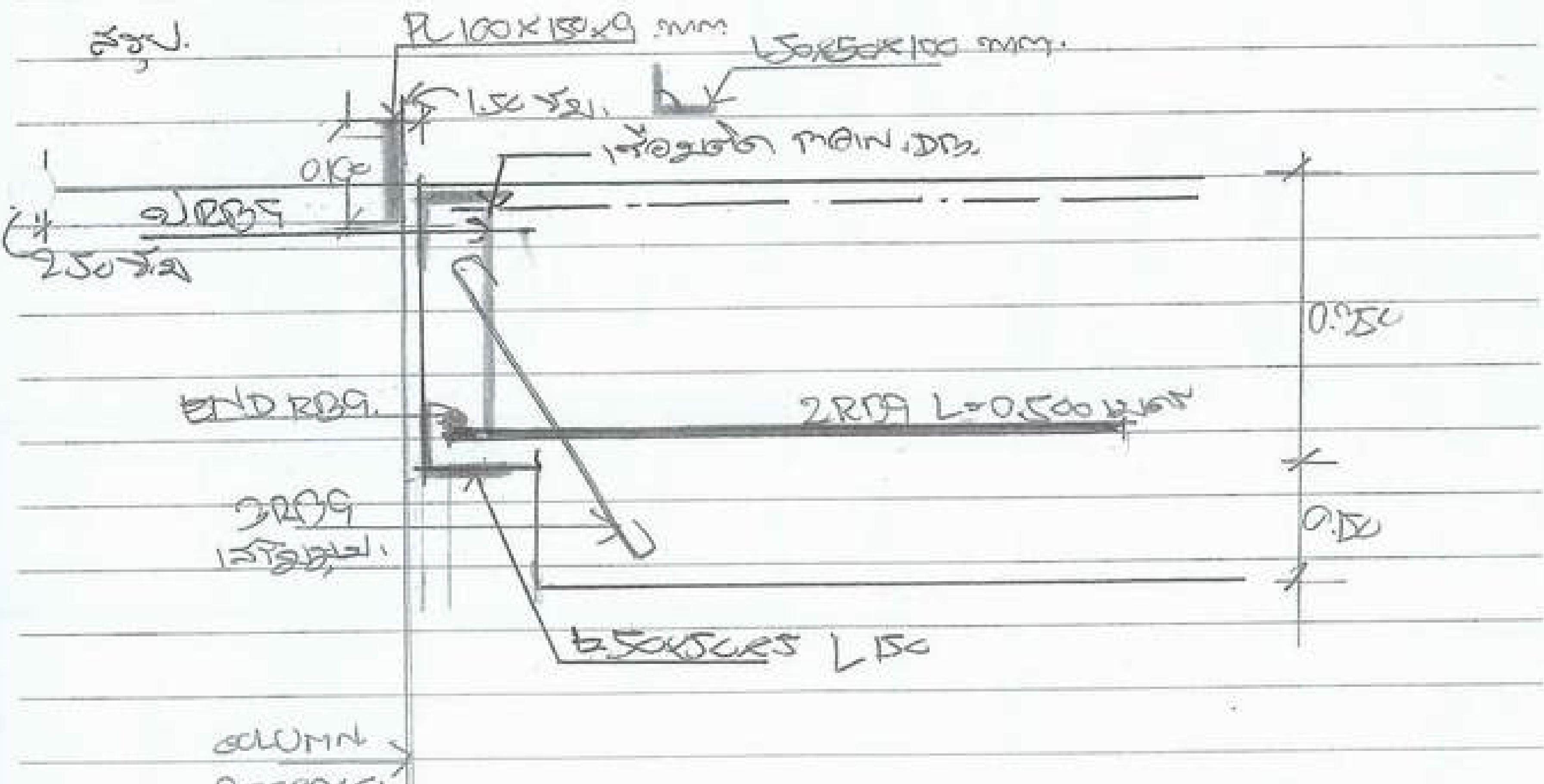
กำลังต้านทานแรงเฉือน 1.5 เท่าเฉือนของคอนกรีต

$V_c = 0.20 \times 240 \times 25 \times 20 = 24{,}000$ kg. > 3,000 ok

REENTRANT CORNER.

$A_{sh} = \frac{V_u}{\phi f_y} = \frac{3000}{0.85 \times 3000} = 1.17$ หรือ 1.57 FOR RB.
USE 3RB9 (1.908)

สรุป.



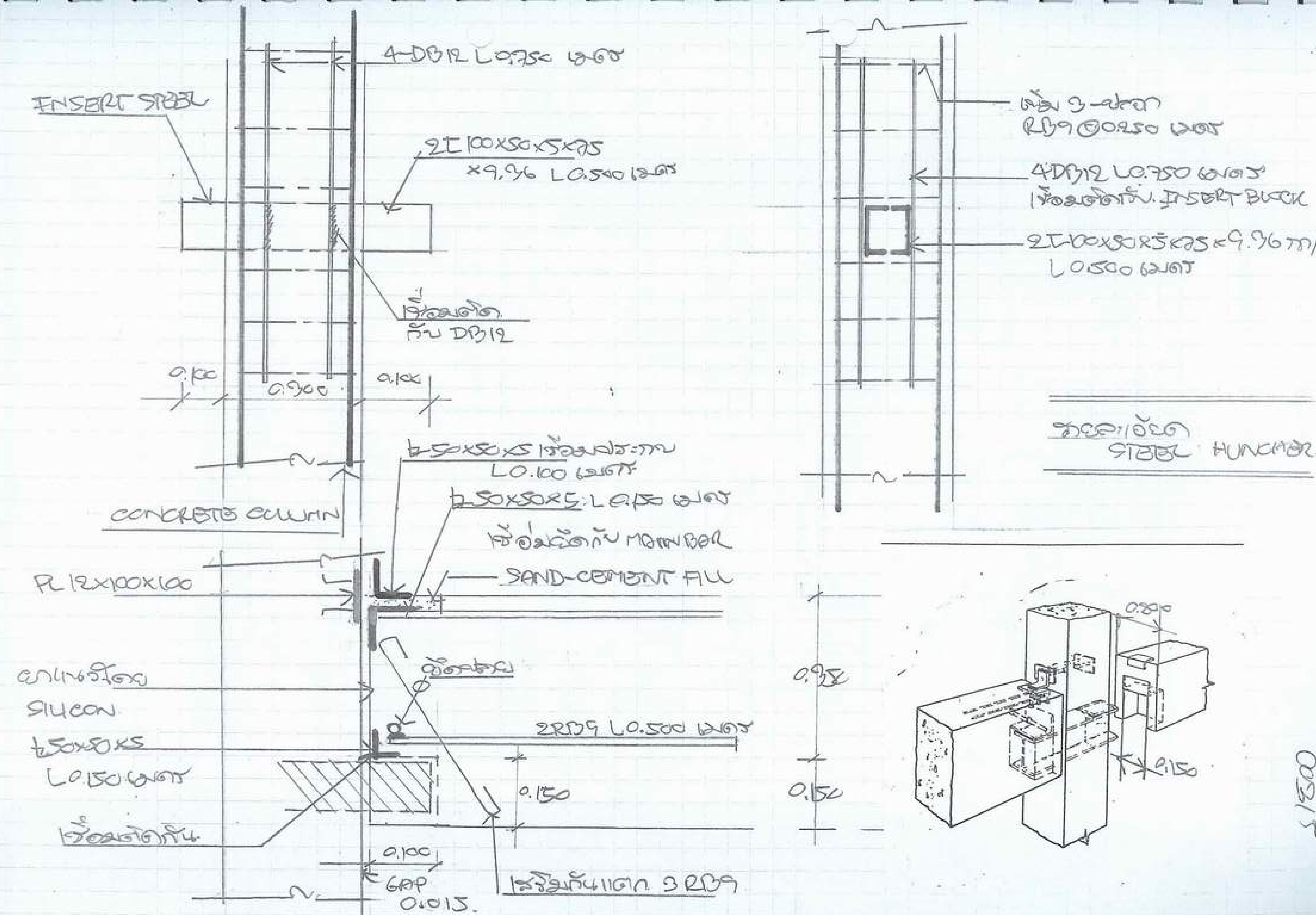

4-DB12 L0.750 เมตร
INSERT STEEL
2[100x50x5x7.5
x9.36 L0.500 เมตร
เชื่อมติด
กับ DB12
0.100
0.900
0.100
CONCRETE COLUMN
L50x50x5 เชื่อมประกบ
L0.100 เมตร
L50x50x5 L0.150 เมตร
เชื่อมติดกับ MEMBER
SAND-CEMENT FILL
PL 12x100x100
SILICON
L50x50x5
L0.150 เมตร
2RB9 L0.500 เมตร
0.150
0.100
GAP
0.015
0.950
0.150
4DB12 L0.750 เมตร
เชื่อมติดกับ INSERT BLOCK
2[100x50x5x7.5 x9.36 กก./ม.
L0.500 เมตร
RB9 @0.250 เมตร
STEEL HUNGER
0.800
0.150

Fig. 6.12.1 Structural steel haunches

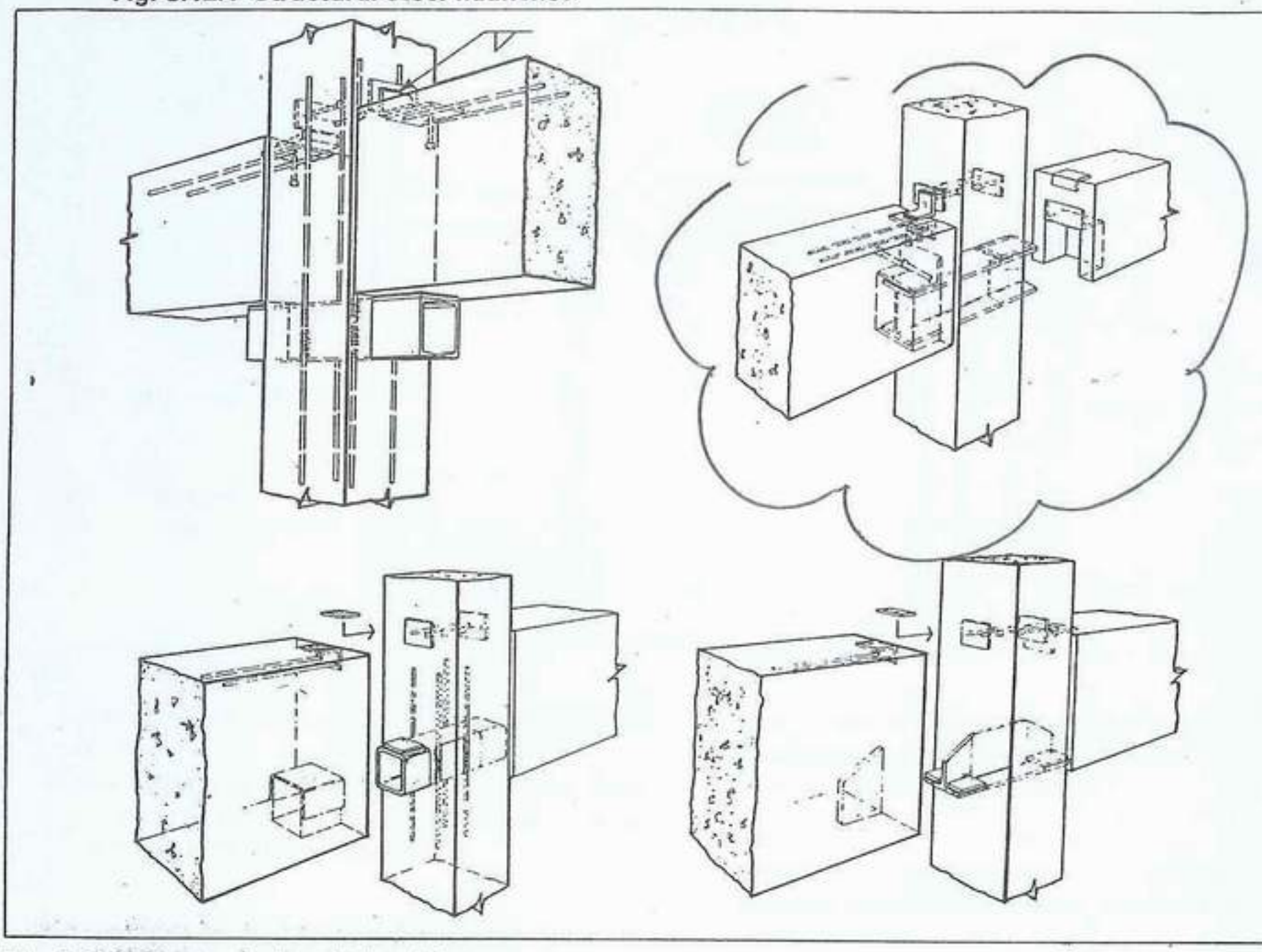


Fig. 6.12.2 Stress-strain relationships

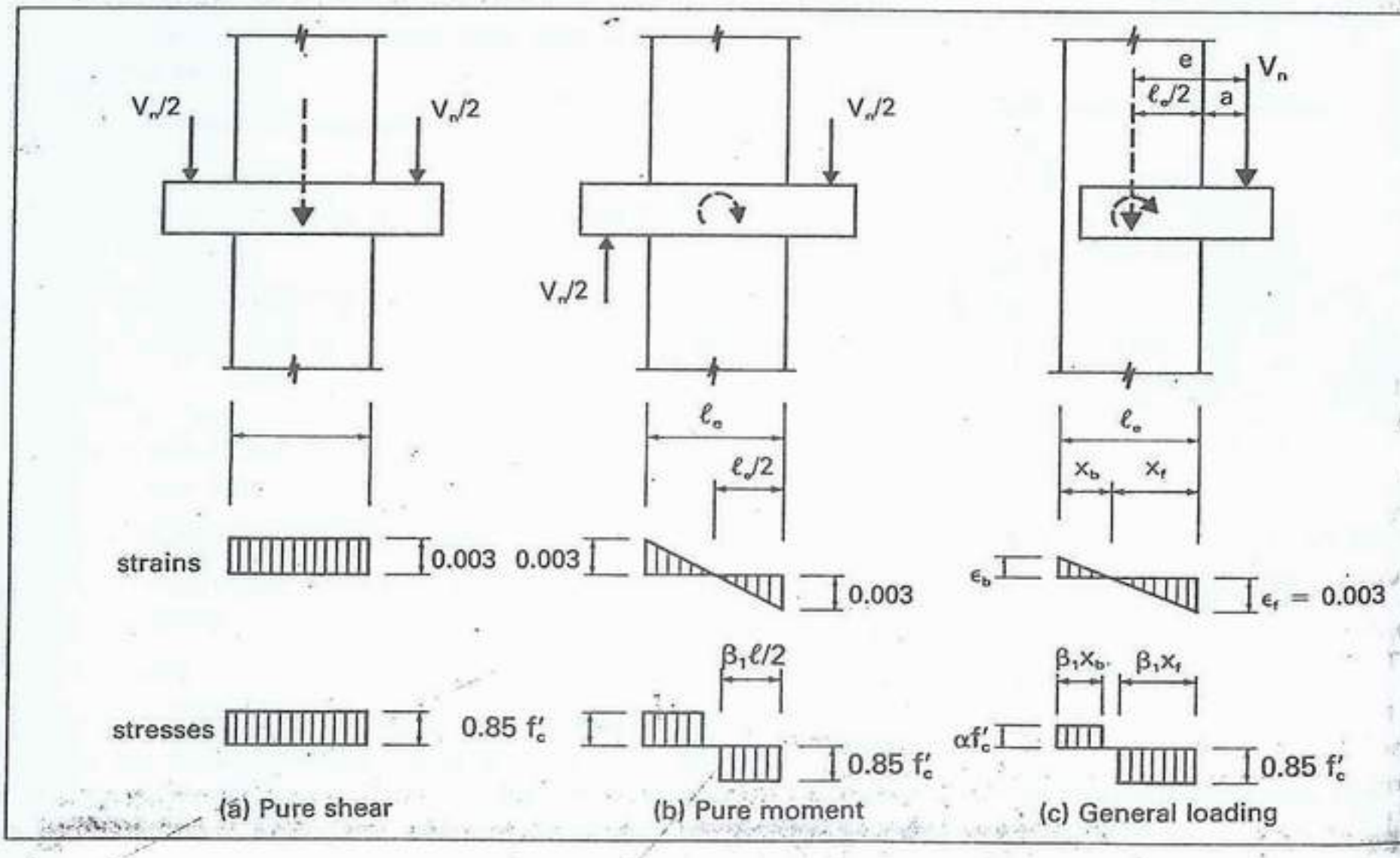
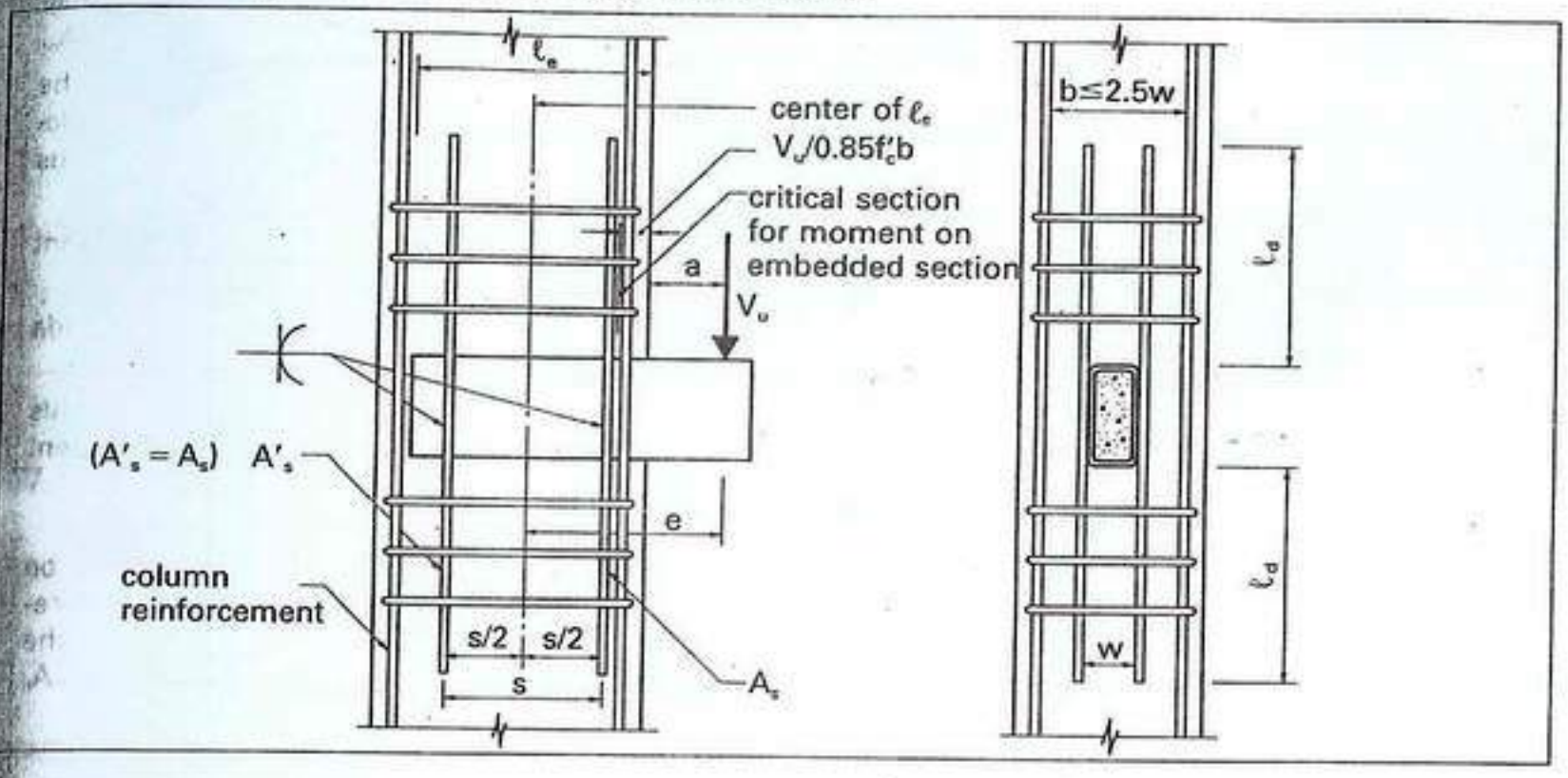


Fig. 6.12.3 Assumptions and notation–steel haunch design



members, as in Fig. 6.12.3, it can be counted twice.

4. The critical section for bending of the steel member is located a distance $V_u/(0.85\ f'_c\ b)$ in from the face of the column.

If the steel section projects from both sides, as in Fig. 6.12.2(a), a minimum eccentricity of $e/\ell_e = 0.5$ is recommended in Eq. 6.12.1.

The design strength of the steel section can be determined by:

Flexural design strength:

$$\phi V_n = \frac{\phi Z_s f_y}{a + V_u/(0.85f'_c b)} \qquad \text{(Eq. 6.12.3)}$$

Shear design strength:

$$\phi V_n = \phi(0.55 f_y\ h\ t) \qquad \text{(Eq. 6.12.4)}$$

where

Z_s = plastic section modulus of the steel section (see Table 6.20.16)

f_y = yield strength of the steel

h,t = depth and thickness of steel web, respectively

$\phi = 0.90$

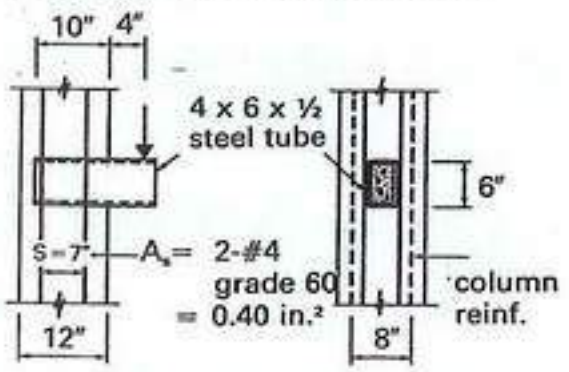
(Note: Plastic design criteria for structural steel does not require the use of ϕ-factor. However, the load factors used are 1.7(D + L). Therefore, when using steel plastic design with concrete load factors (1.4D + 1.7L), the use of $\phi = 0.90$ is recommended in order to provide approximately the same overall factor of safety.)

Horizontal forces, N_u, are resisted by bond on the perimeter of the section. If the bond stress resulting from factored loads exceeds 250 psi, headed studs or reinforcing bars can be welded to the section.

Example 6.12.1 Design of structural steel haunch

Given:

The structural steel haunch shown.



f'_c = 5000 psi

f_y (reinforcement) = 60,000 psi (weldable)

f_y (structural steel) = 36,000 psi

Problem:

Find the design strength.

Solution:

Effective width, b = confined area (8 in.) or 2.5w = 2.5(4) = 10 in.