**تصميم السلم (Design of Stair)**



* **Data and Assumptions : "البيانات المفترضة"**

Fc=21Mpa افترض ان مقاومة الخرسانة:

Fy=280MPa افترض ان اجهاد الخضوع للحديد:

-Finishing load =2.2kN/m2 افترض ان مجموع الاحمال الانهائية:

-Live load = 4kN/m2افترض ان الحمل الحي على الدرج:

-Assume rise = 18cm افترض ان ارتفاع الدرجه الواحده "القائم":

 Run = 30cmافترض ان عرض الدرجه الواحده "النائم":



* ***Thickness:*** حساب السماكة للبلاطة السفلية التي تكون تحت الدرج

The thickness of slab to resist the deflection

$$simply supported\rightarrow h=\frac{L}{20}=\frac{3700}{20}=185mm\rightarrow ACI 05.table(9.5.a) $$

Use h=200 mm

* ***Dead load:***
* **Flight:**

own weight of slab=$\left(0.18×0.3×25×0.5\right)+\left(0.2×1×25\right)$

$$=5.675kN/m$$

Total Dead load =1.2(5.675+2.2) =9.45kN/m

Wu=D.L+L .L=9.45+1.6×4=15.85kN/m

* **Landing:**

Dead load=1.2×(0.2×25+2.2)=8.64kN/m

Total load on the landing =1.6×4+8.64=15.04kN/m

Wu=15.04KN/m

 Wu on flight = 15.85 KN/m

* **Design of stair (1):**

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$$M\_{u}=27.7 KN.m$$

$$d=h-20-\frac{16}{2}=172mm$$

$$Ru=\left[\frac{Mu×10^{6}}{b×d^{2}}\right]=0.936mpa$$

$ρ =0.00383 <ρ \_{min}$ $Use ρ \_{min}=0.005$

$As=ρ×b×d=0.005×1000×172=860mm^{2}$

$∴Use 6∅14mm/m$

Space between bars (S):



 Use 160 mm C/C

* **Secondary reinforcement:**

$As'=ρ×b×d=0.002×1000×172=344mm^{2}$

$$∴Use 5∅10mm/m$$

* **Design of stair (2):**

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$$M\_{u}=21.6 KN.m$$

$$d=h-20-\frac{16}{2}=172mm$$

$$Ru=\left[\frac{Mu×10^{6}}{b×d^{2}}\right]=0.73mpa$$

$ρ =0.0029 <ρ \_{min}$$Use ρ \_{min}=0.005$

$As=ρ×b×d=0.005×1000×172=860mm^{2}$

$∴Use 6∅14mm/m$

Space between bars (S):



 Use 160 mm C/C

* **Secondary reinforcement:**

$As'=ρ×b×d=0.002×1000×172=344mm^{2}$

$∴Use 5∅10mm/m$