Analysis of Failure of Isolated Foundation of A Steel Bridge

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Abstract- *Foundations of engineering constructions are systems that act like interface elements to transmit the loads from superstructure to, and into, the underlying soil or rock over a wider area at reduced pressure. Broadly foundations are classified as shallow foundation and deep foundation. A proper design of foundation system requires the following as in [1] (i) purpose of engineering structures, probable service life loadings, types of framing, soil profile, construction methods, construction costs, and client/owner's needs, (ii) design without affecting environment and enough margin of safety with respect to unforeseen events and uncertainty in determination of engineering properties of soil and acceptable tolerable risk level to all the parties, i.e., public at large, the owner, and the engineer.*

Keywords- Foundation, Superstructure ,Underlying soil

I. INTRODUCTION

1. **Structure an Isolated (spread/cushion) Footing with STAAD Foundation Advanced**.: This is the second post to present and clarify a progression of instructional exercises made to show distinctive highlights of STAAD Foundation Advanced. In a previous blog entry, the STAAD Foundation Advanced Tutorial: Series 1 – The Basics showed clients how to set up proposed establishments and about the significance of worldwide information. Coming up next is the forerunner of the video identified with disengaged balance plan.

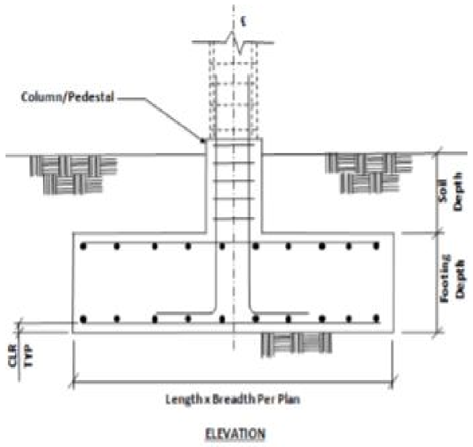
$$q = \frac{P}{A} \pm \frac{Mx}{Sx} \pm \frac{Mz}{Sz}$$

2. Failure of Existing Foundation Of a Steel Bridge: The examination demonstrates that overwhelming floods in this little waterway caused scour which broadened bit by bit over years beneath establishing level. The scaffold did not crumple amid high flood but rather on retreating floods when a substantial tanker disregarded the extension. Dock p-3 which settled and gone way.

3. LOAD TRANSFER FAILURE: The target of establishment is to exchange the heap on superstructure to the establishment soil on a more extensive zone. It functions as an interface between superstructure (over the ground) and substructure (under the ground). The span of the balance is chosen so that it circulates the weight on the subsoil and it is normal that the connected weight never surpasses the allowable furthest reaches of the subsoil. A factor of security in geotechnical configuration is embraced to deal with various wellsprings of vulnerability associated with geotechnical plan and practice. These vulnerabilities incorporate [3,4]. viz., (a) the characteristic heterogeneity or inalienable changeability (the physical marvel adding to the fluctuation), (b) estimation mistake (because of hardware, procedural-administrator, and arbitrary testing blunders), and (c) display change vulnerability (because of guess present in observational, semi-experimental or hypothetical models to relate estimated amounts to structure parameters).

II. PROBLEM FORMULATION

DESIGN REQUIRMENTS	DETAILS
Pile size	1m x 2m
Size of pile column	75mm × 175 mm
Depth of pile cap	2m
Grade of Concrete and steel	M25 and Fe 500
Support condition	Fixed
Seismic zones	II
Soil conditions	Medium



III. METHODOLOGY

- Design Parameters

Concrete and Rebar Properties
Soil Properties
Sliding and Overturning
Global Settings
Pedestal Shape : N/A
Pedestal Height (Ph) : N/A
Pedestal Length - X (Pl) : N/A
Pedestal Width - Z (Pw) : N/A
Unit Weight of Concrete : 25.000kN/m3
Strength of Concrete : 25.000N/mm2
Yield Strength of Steel : 500.000N/mm2
Minimum Bar Size : Ø12
Maximum Bar Size : Ø25
Pedestal Minimum Bar Size : Ø12
Pedestal Maximum Bar Size : Ø32
Minimum Bar Spacing : 50.000mm
Maximum Bar Spacing : 450.000mm
Pedestal Clear Cover (P, CL) : 50.000mm
Footing Clear Cover (F, CL) : 50.000mm
Soil Type : Drained
Unit Weight : 22.000kN/m3
Soil Bearing Capacity : 200.000kN/m2
Soil Bearing Capacity Type: Gross Bearing Capacity
Soil Surcharge : 2.000kN/m2
Depth of Soil above Footing : 0.000mm
Cohesion : 0.000kN/m2
Min Percentage of Slab in Contact: 0.000
Footing Size
Initial Length (Lo) = 1.000m Initial Width (Wo) = 1.000m
Uplift force due to buoyancy = 0.000kN Effect due to adhesion = 0.000kN
Area from initial length and width, Ao = Lo X Wo = 1.000m2
Min. area required from bearing pressure, Amin = P / qmax = 0.409m2
Note: Amin is an initial estimation. P = Critical Factored Axial Load(without self weight/buoyancy/soil). qmax = Respective Factored Bearing Capacity.

IV. RESULT

- Moment Calculation

Check Trial Depth against moment (w.r.t. Z Axis)
Critical Load Case = #4
Effective Depth = = 0.249m Governing moment (Mu) = 124.278kNm
As Per IS 456 2000 ANNEX G G-1.1C
Limiting Factor1 (Kumax) =
= 0.456026
Limiting Factor2 (Rumax) =
= 3318.146612kN/m2
Limit Moment Of Resistance (Mumax) = = 884.615973kNm
Mu <= Mumax hence, safe
Check Trial Depth against moment (w.r.t. X Axis)
Critical Load Case = #4
Effective Depth = = 0.249m Governing moment (Mu) = 226.663kNm
As Per IS 456 2000 ANNEX G G-1.1C
Limiting Factor1 (Kumax) =
= 0.456026
Limiting Factor2 (Rumax) =
= 3318.146612kN/m2
Limit Moment Of Resistance (Mumax) = = 884.615973kNm
Mu <= Mumax hence, safe

- Shear Calculation

Check Trial Depth for one way shear (Along X Axis) (Shear Plane Parallel to X Axis)
Page 7 of 38Isolated Footing Design
Critical Load Case = # 4 DX = 1.863m
Shear Force(S) = 175.238kN Shear Stress(Tv) = 163.666580kN/m2 Percentage Of Steel(Pt) = 0.1470
As Per IS 456 2000 Clause 40 Table 19 Shear Strength Of Concrete(Tc) = 288.318kN/m2 Tv< Tc hence, safe

V. CONCLUSION

- The Isolated Foundation is also design for Hard soil.
- The Isolated Foundation replace by Pile Foundation.

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