SEISMIC PERFORMANCE OF IRREGULAR STRUCTURE WITH BUCKLING RESTRAINED BRACE

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Abstract - *The seismic performance of irregular structure can be significantly improved using buckling restrained brace.pushover analysis is done on the irregular t shaped structure.two different type of BRB are used for the analysis.BRB is placed in exterior and interior frames.The irregular structure is compared with structure without braces.*

***Key Words*: Buckling restrained brace(BRB), Push over analysis**

1.INTRODUCTION

A buckling-restrained brace **(**BRB**)** is a structural brace in a building, designed to allow the building to withstand cyclical lateral loadings, typically earthquake-induced loading. It consists of a slender steel core, a concrete casing designed to continuously support the core and prevent buckling under axial compression, and an interface region that prevents undesired interactions between the two. Braced frames that use BRBs – known as buckling- restrained braced frames, or BRBFs – have significant advantages over typical braced frames. Three major components of a BRB can be distinguished are its steel core, its bond-preventing layer, and its casing. The steel core is designed to resist the full axial force developed in the bracing. Its cross-sectional area can be significantly lower than that of regular braces, since its performance is not limited by buckling. The core consists of a middle length that is designed to yield inelastically in the event of a design-level earthquake and rigid, non-yielding lengths on both ends. Increased cross-sectional area of the non-yielding section ensures that it remains elastic, and thus plasticity is concentrated in the middle part of the steel core. Such configuration provides high confidence in prediction of the element behavior and failure.

2. MODELLING

Modeling is done in sap2000.pushover analysis is conducted in modelled irregular t shaped structure.

2.1 Frame details

15 storey irregular T shaped structure is created.each storey height is 3m.total storey height is 45m.column is tube type section of grade fe 250.beam is double web I section of grade fe250 and bracing is tube type of grade fe345.

Table -1: Sectional Details of building.

Column(mm)	550x15 (storey 1-3) 500x12 (storey 4-6) 450x12 (storey 7-9) 350x12 (storey 10-12) 300x10 (storey 13-15)
Beam(mm)	170x360x15x10 (storey 1-3) 160x340x12x10 (storey 4-6) 150x320x12x8 (storey 7-9) 120x260x10x8 (storey 10-12) 100x220x10x6 (storey 13-15)
Brace(mm)	160x14 (storey 1-3) 140x12 (storey4-6) 120x12 (storey 7-9) 100x10 (storey 10-12) 80x8 (storey 13-15)

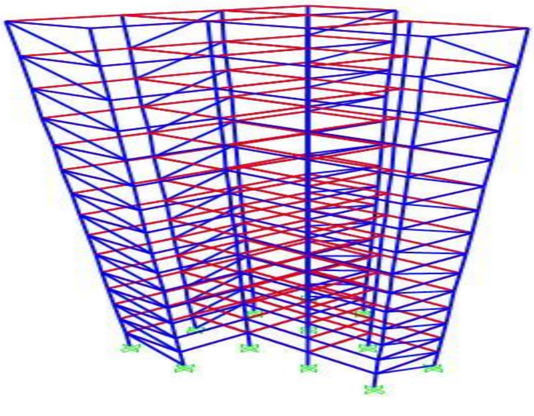

Fig 2.1 T shape (BRB exterior)

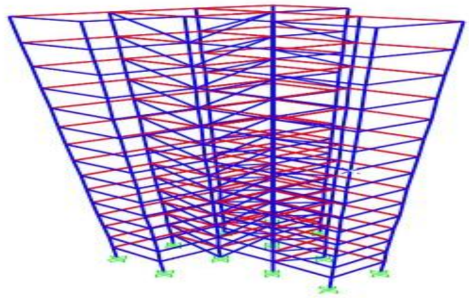

Fig 2.2 T shape (BRB interior)

2.2 Pushover analysis

Pushover analysis is conducted over this irregular T shape structures.loads that are taken into consideration are dead and live load.live load is 4.5 kN/m^2 and at roof level it is 1.5 kN/m2.BRB is provided in exterior and interior frames.

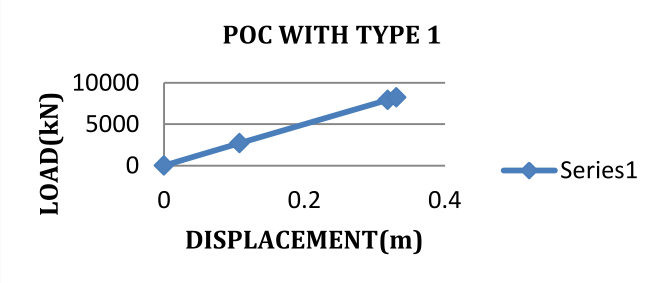

Fig 2.3 push curve of BRB exterior model (type 1 BRB)

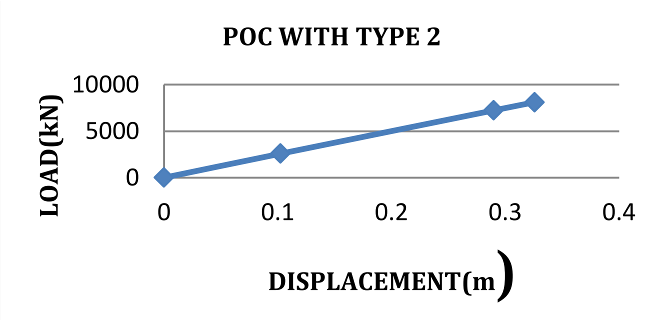

Fig 2.4 push curve of BRB exterior model (type 2 BRB)

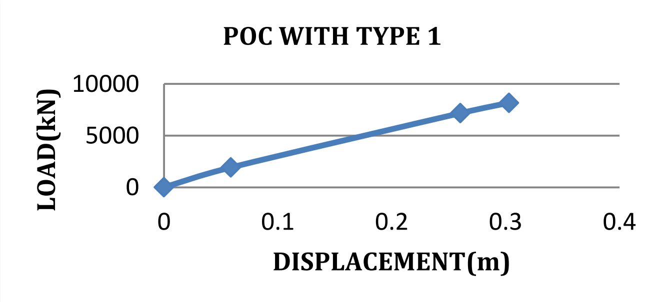

Fig 2.5 push curve of BRB Interior model (type 1 BRB)

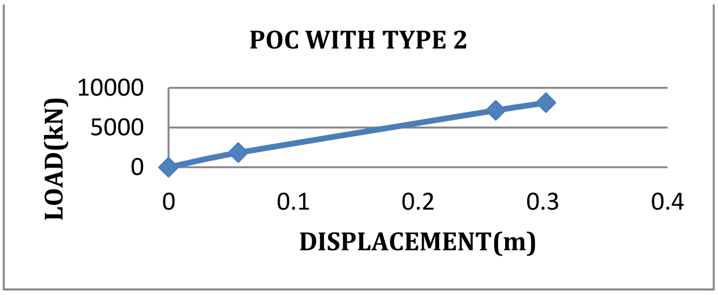

Fig 2.6 push curve of BRB Interior model (type 2 BRB)

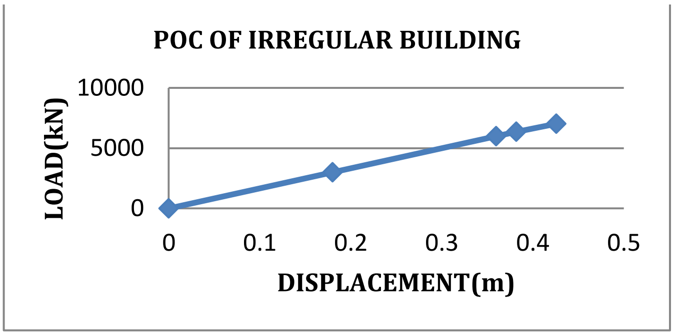

Fig 2.7 push curve without braces

Table 2.1 comparison for exterior model

	Load(kN)	Displacement(m)	Ductility factor
Type 1 BRB	8245.57	0.331	1.555
Type 2 BRB	8112.52	0.325	1.664
Irregular building	7025.83	0.425	1.136

Table 2.2 comparison for interior model

	Load(kN)	Displacement(m)	Ductility factor
Type 1 BRB	8177.28	0.303	2.467
Type 2 BRB	8115.26	0.302	2.689
Irregular building	7025.83	0.425	1.136

3. CONCLUSIONS

Buckling restrained brace helps to dessipate the seismic energy.T shaped irregular structure is analysed with two type of BRB.this braces are placed in i9nterior and exterior frames.The following conclusions are

1) Load carrying capacity for exterior model is 0.82% more than interior model.

2) BRB which is placed interior has less displacement when compared to BRB which is placed exterior.

3) Ductility for interior model are 2.467 and 2.689 which is higher than exterior model

4) When exterior and interior models were compared with the irregular structure without braces,irregular has low load carrying capacity,ductility factor and high displacements.

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