# PENGARUH PENEMPATAN BAK AIR PADA LANTAI TERATAS STRUKTUR GEDUNG OLEH BEBAN LATERAL DINAMIK

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## ABSTRAK

Kolam renang pada bangunan hotel merupakan salah satu daya tarik yang dapat memikat pengunjung. Selain itu, adanya kolam renang pada bangunan hotel dapat berpengaruh terhadap respon struktur bangunan ketika dibebani beban dinamik. Kolam renang merupakan salah satu bentuk dari perwujudan bak air. Ketika struktur diberikan beban dinamik maka air yang berada pada bak air akan mengalami gerakan hidrodinamik yang dapat mereduksi respon struktur. Hal tersebut yang menjadikan alasan dalam perencanaan dan analisis bangunan hotel dengan bak pada lantai teratasnya. Perencanaan struktur mengacu pada SNI 2847-2019, SNI 1727-2020, dan SNI 1726-2019. Adapun analisis beban hidrodinamik pada bak air mengacu pada ACI 350.3. 20. Perencanaan dan analisis struktur menggunakan *software* aplikasi SAP 2000. Adapun beban yang dianalisis meliputi beban mati, hidup, air hujan, hidrostatik, hidrodinamik, spektrum respon, dinamik sinusoidal dan dinamik gempa *time history* dengan mutu beton f'c 30 MPa dan mutu baja 420 MPa. Pemodelan air sebagai beban hidrodinamik mengacu pada *spring mass system.* Berdasarkan hasil perencanaan elemen struktur digunakan dimensi balok 600 mm x 300 mm, 500 mm x 250 mm dan 650 mm x 350 mm, dimensi kolom 400 mm x 400 mm, 500 mm x 500 mm dan 400 mm x 400 mm, tebal pelat lantai 120 mm, tebal pelat dan dinding bak air 250 mm, dimensi *pile cap* 2 m x 2 m x 0,65 m dan 2 m x 1,9 m x 0,6 m, tiang pancang yang digunakan sebanyak 3 buah dan 4 buah dengan panjang tiang pancang 24 m. Berdasarkan hasil pembebanan dinamik sinusoidal diperoleh data simpangan mengalami pengurangan maksimum 61,279%, gaya geser dasar mengalami pengurangan maksimum 59%, percepatan *joint* teratas mengalami pengurangan maksimum 63,7%. Berdasarkan hasil pembebanan dinamik gempa *time history* diperoleh data simpangan mengalami pengurangan maksimum 31,608%, gaya geser dasar mengalami pengurangan maksimum 33%, percepatan *joint* teratas mengalami pengurangan maksimum 27,067%.

**Kata Kunci:** Bak Air, Hidrodinamik, Hidrostatik, *Spring Mass System*

# *THE INFLUENCE OF WATER TANK PLACEMENT ON THE TOP FLOOR OF A BUILDING STRUCTURE DUE TO DYNAMIC LATERAL LOADS*

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## *ABSTRACT*

*The swimming pool in a hotel building is one of the attractions that can captivate visitors. Additionally, the presence of a swimming pool can influence the structural response of the building when subjected to dynamic loads. The swimming pool serves as a form of a water tank. When the structure is subjected to dynamic loads, the water in the tank will experience hydrodynamic motion, which can reduce the structural response. This is the reason for the designing and analysis of hotel buildings with pools on the top floor. Structural designing refers to SNI 2847-2019, SNI 1727-2020, and SNI 1726-2019. The analysis of hydrodynamic loads on the water tank is based on ACI 350.3-20. The designing and structural analysis are conducted using the software SAP 2000. The loads analyzed include dead loads, live loads, rain loads, hydrostatic loads, hydrodynamic loads, response spectrum, sinusoidal dynamics, and time-history earthquake dynamics, with concrete quality f'c 30 MPa and steel quality 420 MPa. The modelling of water as a hydrodynamic load refers to the spring-mass system. Based on the designing results, the dimensions of the structural elements used are as follows, beams dimension 600 mm x 300 mm, 500 mm x 250 mm, and 650 mm x 350 mm, columns dimension 400 mm x 400 mm, 500 mm x 500 mm, and 400 mm x 400 mm, a floor slab thickness of 120 mm, the thickness of the pool walls and slab is 250 mm, pile cap dimensions are 2 m x 2 m x 0.65 m and 2 m x 1.9 m x 0.6 m and it uses of 3 and 4 piles with a length of 24 m. Based on the results of sinusoidal dynamic loading, the data shows that the displacement experiences a maximum reduction of 61.279%, the base shear experiences a maximum reduction of 59%, and the acceleration at the top joint experiences a maximum reduction of 63.7%. From the results of time-history earthquake loading, it is found that the displacement experiences a maximum reduction of 31.608%, the base shear experiences a maximum reduction of 33%, and the acceleration at the top joint experiences a maximum reduction of 27.067%.*

***Keywords:*** *Hydrodynamic, Hydrostatic, Spring Mass System, Water Tank*