ABSTRACT
Liquefied natural gas (LNG) is considered as the green energy in Korea because of its low carbon emission compared with other fossil fuels. As the demand of natural gas is increasing, the more capacity of storing and re-gasifying facilities are required. Technical development of large LNG storage tank is positively necessary for cost reduction and site efficiency. For this reason, Korea Gas Corp (KOGAS) is now challenging the design and construction of the world’s largest tanks with a capacity of 270,000m³.As of 2016, three LNG tanks of 270,000 m³ are under construction in Samcheok LNG terminal in Korea, which will be the largest LNG storage tank in the world when constructed. In this study, an optimum dimension and section of the tank were decided and the stability and economical efficiency were also investigated by comparing the amount of construction materials.

KEY WORDS: LNG; LNG storage tank, parametric study, optimum size.

INTRODUCTION
Since the introduction of LNG in 1986, the demand of LNG is growing very fast compared to other energy sources. To meet the growing demand of LNG, KOGAS had to build a lot of LNG storage tanks around the nation since Korea is depended most of natural gas on import from foreign countries. As the demand of natural gas is increasing, the more capacity of storing and re-gasifying facilities are required. LNG storage tank is given a great deal of weight on the construction of LNG terminal. Therefore cutting down expenses of construction is a big issue in the LNG field. Technical development of large LNG storage tank is positively necessary for cost reduction and site efficiency. For this reason, the R&D Division of KOGAS is developing a super large LNG storage tank. Through the design and construction of LNG storage tanks, KOGAS and R & D Center accumulated a lot of experiences and technologies related with LNG. Based on the design experience and the test result obtained from the pilot LNG tank, KOGAS designed commercial LNG storage tanks in 2002. KOGAS had constructed the 140,000 m³ and 200,000 m³ storage tanks and have been operating them. Currently, most of the LNG tanks under construction in KOGAS have a capacity of 200,000 m³. R & D Center of KOGAS is now developing the design and construction of the world’s largest tanks with a capacity of 270,000 m³.

THE TREND OF SUPER LNG TANK IN KOREA
It was in 1986 when LNG(liquefied natural gas) was in commercial service throughout the Korea. Since then, LNG industry in Korea grew up rapidly. LNG demands for domestic and power plant were also increased. Since most of natural gas was imported from foreign countries, KOGAS had to build a lot of LNG storage tanks around the nation. KOGAS currently have 3 LNG receiving terminal in operation and one more terminal in construction. LNG storage tank is given a great deal of weight on the construction of LNG terminal. Therefore cutting down expenses of construction is a big issue in the LNG field. Technical development of large LNG storage tank is positively necessary for cost reduction and site efficiency. For this reason, the R&D Division of KOGAS is developing a super large LNG storage tank. Through the design and construction of LNG storage tanks, KOGAS and R & D Center accumulated a lot of experiences and technologies related with LNG. Based on the design experience and the test result obtained from the pilot LNG tank, KOGAS designed commercial LNG storage tanks in 2002. KOGAS had constructed the 140,000 m³ and 200,000 m³ storage tanks and have been operating them. Currently, most of the LNG tanks under construction in KOGAS have a capacity of 200,000 m³. R & D Center of KOGAS is now developing the design and construction of the world’s largest tanks with a capacity of 270,000 m³.

MOTIVATION FOR DEVELOPMENT OF SUPER LARGE LNG STORAGE TANK
When we compare the economical efficiency of 200,000 m³ and 270,000 m³ storage tanks, it was estimated that the cost of construction for 270,000 m³ tank is 14.4% higher than that of 200,000 m³ tank including the material cost, labor cost, construction equipment cost, etc, whereas the size of the tank increased 35%. If the efficiency is considered form the point of the use of construction site, about 6,300 m² more land spaces are needed in construction of 270,000 m³ tank comparing to the 200,000 m³ one. At this point, it must be considered the net volume for comparing the usage of LNG. Consequently, 270,000 m³ storage tank costs less per unit volume than 200,000 m³ tank. In addition, LNG storage tanks with larger size will be better to hold LNG of big LNG carriers having more than 200,000 m³ storage capacities.