CHAPTER V

CONCLUSION

5.1 Conclusion

According to the calculations done in this research and as well as data analysis, this writing concludes that:

1. Castellated beam that is acted as a tee section on the opening is controlled by the Vierendeel moment. On the web post of the beam, the castellated beam is acted as an I-beam and is controlled by shear buckling and flexural buckling.
2. The cost efficiency of the usage of castellated beam in this project is 8.43%. While as for the volume efficiency of the usage of castellated beam in this project is 17.58%.
3. The strength ratio of castellated beam B2 and B3 are 0.345 and 0.907 respectively. While as for conventional beam the strength ratio of B2 and B3 are 0.933 and 0.768 respectively. The design of castellated beam on B2 is much stronger than conventional beam, but the design of conventional beam on B3 is much stronger than castellated beam.
4. Due to the cost efficiency of the usage of castellated beam in this project is 8.43%, it is unlikely to be implemented by owners since it has less impact on the decrease of budget. But castellated beam can be implemented for the installation of MEP works through the opening of the castellated beam since pipes for MEP works cannot penetrate through conventional beam with the respect of structural strength.
5. The positive effect of using castellated beam is that the moment of inertia of the beam, plastic section modulus, and elastic section modulus of the profile as well as rigidity of the structure and flexural strength of the profile is increased without increasing its weight. The usage of castellated beam may decrease the load transported from beams to columns and from columns to foundation of the structure, hence the

structure of the columns and foundation can be decreased. Asides from that, the usage of castellated beam enhances the variation of interior of the structure, and also to install mechanical and electrical works without any demolition of steel. The negative effect of using castellated beam is that it is not effective on withholding shear forces. It is needed to have a research focuses on its shear capabilities.

5.2 Suggestions for Next Research

Suggestions for the next research concluded by the writer from his point of view of this report are:

1. The usage of structural analysis program such as *STAAD.Pro* for the calculation of castellated beams.
2. Using not only hexagonal openings, but a variety of openings such as circular, sinusoidal, ellipsis, or square openings for future researches.
3. With cost analysis and volume analysis of the steel used, it is well suggested to do a detailed research on the cost analysis between castellated beam and conventional beam in respect to the market that sells the beams in typical span. The volume may be different significantly, hence affects the cost. So, future detailed research is much needed.