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COMPARISON STUDY OF LOADING AND STYLE IN PRATEGNED PC-T (Prestressed Concrete-T) BEAM USING SNI-1725-2016 AND RSNI T-02-2005

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ABSTRACT

Comparison of loading and force in the PC-T beam (prestressed concrete-T) girder using SNI-1725-2016 and RSNI T-02-2005 standards. This study aims to make a PC-T (prestressed concrete-T) girder modeling using the CSI BBridge application for structural planning, after which it can analyze the internal forces and deflection of the PC-T (prestressed concrete-T) girder using the CSI Bridge application, then compare by using SNI-1725-2016 and RSNI T-02-2005. The method of this final project is carried out in several stages, namely collecting the required data, calculating the load, modeling the structure, and comparing the structures using SNI-1725-2016 and RSNI T-02-2005. The load planning consists of self-dead load (MS), additional dead load (MA), traffic load (TD), brake force (TB), wind load (EW), temperature influence (ET), and earthquake load (EQ). . The result of the comparison of the load states that the value of SNI-1725-2016 tends to be smaller than that of RSNI T-02-2005.

Keyword: PCT Girder, CSI Bridge, flexural, pre-stress.

BACKGROUND

Many structural systems are chosen in building a bridge, one of which is prestressed concrete. The presence of prestressed concrete is a solution to these problems. In prestressed concrete building construction has advantages over ordinary reinforced concrete. One example, the construction of a bridge building for reinforced concrete is usually limited to a certain span length. By using a bridge girder from prestressed concrete it can be used on long span bridges. In this study, the capacity of the beam girder will be reviewed using the reference standard of the Loading Standards for the SNI-1725-2016 and RSNI T-02-2005 Bridges. The analysis in this study will compare the use of SNI-1725-2016 and RSNI T-02-2005 on the flexural behavior of the T Girder PC (Prestress Concrete) bridge.

PROBLEM IDENTIFICATIONS

Based on the problems that have been described in the background section, a problem formula can be taken that will be used as a reference. The formulation of the problem in this study is how to load the superstructure on the T prestressed concrete bridge with SNI-1725-2016 and RSNI T-02-2005.

OBJECTIVES

Tujuan dari penelitian PC *(Prestress Concrete)* T *Girger* ini adalah membuat pemodelan, menganalisa gaya dalam dan lendutan menggunakan software CSI brigde. Penelitian ini juga membandingkan pembebanan dengan menggunakan SNI-1725-2016 dan RSNI T-02-2005.

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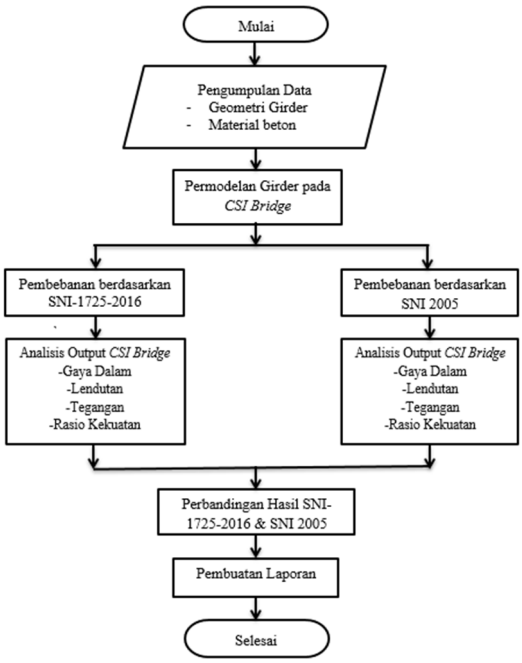
THEORYTICAL

Prestressed concrete is a type of concrete in which steel reinforcement is pulled and is tensioned against the concrete. The pulling results in an equilibrium system for internal stresses (tensile on steel and compression on concrete) which will increase the ability of the concrete to withstand external loads. Prestressed concrete undergoes several stages of loading that must be analyzed. At each loading stage, a check must be made for the condition of the stressed part and the part that is attracted to each section. At this stage different permit voltages apply. The two stages of loading on the prestressed concrete are the transfer stage and the service stage. The application of the prestressing force of the concrete will provide a compressive stress to the sections. This voltage provides resistance to external loads that work. If the pre-stress force acts not at the center of the section, but with the eccentricity, there is an additional stress due to the eccentricity. Loss of prestress is the reduced force acting on the tendon during the loading stage. In a prestressed concrete structure system there is always a loss of prestress, either due to the stress system or due to the influence of time. Direct stress losses are caused by elastic shortening of the concrete, friction along the tendon curvature in the post-pull structure and slippage of the anchors. Meanwhile, the loss of prestress due to the influence of time is caused by shortening of the concrete at the steel level due to creeping and shrinkage of the concrete and relaxation of the steel.

METHODOLOGY

The main discussion in this research is the planning of T-profile girder beams on prestressed bridges. The research steps are presented in Figure 2.



The bridge design structure data are as follows

a. Span : 40,6 m
b. Distance : 7,6 m
c. Ways : 2 jalur
d. Co,pressive Strenght : K-400

RESULT AND DISCUSSION

The results of the calculation of the combined load of shear force for the yayan and ultimate conditions can be seen in the table below:

Tabel 1 Shear Force Combination

Load Type	Load	RSNI T-02-2005	SNI 1725-2016
		kN	kN
MS + MA + TD + TB + PR	COMB 1	6280.882	6144.553
MS + MA + TD + TB + ET + PR	COMB 2	6253.86	6123.256
MS + MA + EQ + PR	COMB 3	6000.358	6091.077
MS + MA + TD + TB + EW +PR	COMB 4	5973.336	6064.061
MS + MA + TD + TB + ET + EW + PR	COMB 5	6271.085	6213.737
MAX	COMB 6	**5891.173**	**6022.784**

Table 2 Ultimit Shear Force Condition

Load Type	Load	RSNI T-02-2005	SNI 1725-2016
		kN	kN
MS + MA + TD + TB + PR	COMB 1	5944.402	5886.124
MS + MA + TD + TB + ET + PR	COMB 2	5911.976	5853.705
MS + MA + EQ + PR	COMB 3	5911.976	5815.091
MS + MA + TD + TB + EW + PR	COMB 4	5575.346	5782.671
MS + MA + TD + TB + ET + EW + PR	COMB 5	5992.496	6033.383
MAX	COMB 6	**5493.183**	**5741.395**

The results of the calculation of the load for the combined moment can be seen in the table below :

Tabel 3 Moment Combinations

Load Type	Load	RSNI T-02-2005	SNI 1725-2016
		kN	kN
MS + MA + TD + TB + PR	COMB 1	-79335.9318	-78231.1602
MS + MA + TD + TB + ET + PR	COMB 2	-79048.2999	-78004.4621
MS + MA + EQ + PR	COMB 3	-76349.9197	-77661.9442
MS + MA + TD + TB + EW + PR	COMB 4	-76062.2877	-77374.3716
MS + MA + TD + TB + ET + EW + PR	COMB 5	-79231.6408	-78967.5834
MAX	COMB 6	**-75187.7111**	**-76935.008**

Table 4 Moment Ultimit Combinantions

Load Type	Load	RSNI T-02-2005	SNI 1725-2016
		kN/m	kN/m
MS + MA + TD + TB + PR	COMB 1	-76100.6729	-75480.3449
MS + MA + TD + TB + ET + PR	COMB 2	-75755.5146	-75135.2577
MS + MA + EQ + PR	COMB 3	-75755.5146	-74724.2364
MS + MA + TD + TB + EW + PR	COMB 4	-72172.300	-74379.1492
MS + MA + TD + TB + ET + EW + PR	COMB 5	-76612.6104	-77047.8234
MAX	COMB 6	**-71297.7233**	**-73939.7856**

The results of calculating the combined load of deflection can be seen in tables below:

Tabel 5 Deflection Combinantion

Load Type	Load	RSNI T-02-2005	SNI 1725-2016
		m	m
MS + MA + TD + TB + PR	COMB 1	0.068996	0.079629
MS + MA + TD + TB + ET + PR	COMB 2	0.071913	0.081929
MS + MA + EQ + PR	COMB 3	0.070054	0.07216
MS + MA + TD + TB + EW + PR	COMB 4	0.099281	0.085402
MS + MA + TD + TB + ET + EW + PR	COMB 5	0.102198	0.088319
MAX	COMB 6	**0.111068**	**0.092775**

Table 6 Deflection Ultimit Combinations

Load Type	Load	RSNI T-02-2005	SNI 1725-2016
		kN	kN
MS + MA + TD + TB + PR	COMB 1	0.101237	0.107529
MS + MA + TD + TB + ET + PR	COMB 2	0.104738	0.111029
MS + MA + EQ + PR	COMB 3	0.096045	0.091631
MS + MA + TD + TB + EW + PR	COMB 4	0.104738	0.115198
MS + MA + TD + TB + ET + EW + PR	COMB 5	0.14108	0.118698
MAX	COMB 6	**0.149951**	**-0.776741**

CONCLUSIONS

Based on the CSI Bridge modeling, the shear force value of SNI-1725-2016 at service and ultimate conditions tends to be smaller than RSNI T-02-2005. Based on the CSI Bridge modeling, the SNI-1725-2016 moment value on service and ultimate conditions tends to be smaller than RSNI T-02-2005. Based on the CSI Bridge modeling, the deflection value of SNI-1725-2016 at service and ultimate conditions tends to be smaller than that of RSNI T-02-2005.

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