



DESIGN AND ANALYSIS OF COLUMN AND DECK SLAB OF HYDERABAD METRO RAIL

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ABSTRACT

The report compiles the results from the METRO-project. The different parts of the project; design fires, evacuation, integrated fire control, smoke control, extraordinary strain on constructions and fire-and rescue operations are presented separately. The bridge is structure which includes too many structural components visible as well as below the ground, they may look simple but the analysis and the structural design of all those components, even the simplest bridge type can be a fairly laborious and cumbersome job especially with respect to the various elements of the bridge superstructure and substructure.

For bridges located on major perennial rivers or non-perennial river will have to be made support on deep foundations like wells or pile foundations, the design of which involves lengthy computational effort. The bridge engineer should be equipped with a handy computational tool with the help of which he can quickly and reliably determine the suitability of various layouts and configuration of the sub-structure before finalizing the most optimum design of the substructure. In this thesis attempt has been made to analysis and design the substructure for bridges with simply-supported spans with the help of various structural engineering software available. The computer programs like Autodesk Infra Works, STAAD Pro.

I. INTRODUCTION

Bridges have been the maximum seen testimony to the contribution of engineers.

Bridges have usually figured prominently in human records. They decorate the vitalities of the cities and beneficial aid the social, cultural and economic improvements of the places around them. Bridge is a structure supplying passage over an impediment without ultimate the way under. The required passage can be for a road, a railway, pedestrians, a canal or a pipeline and the impediment to be crossed can be a river, a street, railways or a valley. The part of the bridge shape under the extent of the bearing and above the founding degree is typically referred to as the substructure. The design of bridge substructure is an vital part of the overall format for a bridge and impacts to a big quantity the aesthetics, the safety and the financial machine of the bridge. Bridge substructure is a totally important part of a bridge because it thoroughly transfers the hundreds. Underground metro rail systems are complicated infrastructures of sizable significance for their communities and users. They create a state of affairs in which many customers share a exceedingly restrained place on the same time. This creates large dangers, with the tunnel fires which have took place in recent years displaying in reality that a fire can also have every primary and lethal effects. The mass delivery gadget ought to be constructed so that people feel that they'll be safe and relaxed while touring. A loss of self-assurance within the system is devastating for both society and mass transport companies. STAAD.

Pro is structural analysis layout utility software program. It includes a state of the

artwork purchaser interface, visualization gear and international format codes. It is used for 3-d version era, evaluation and multi-fabric format. The commercial version of STAAD.Pro supports numerous metal, concrete and wood layout codes. It is one of the software application packages created to help structural engineers to automate their responsibilities and to remove the tedious and lengthy approaches of the guide methods.

II. METHODS OF CREATING THE MODEL

There are two strategies of creating the structure facts:

- a. Using the command file
- b. Using the graphical model era mode, or graphical user interface (GUI) as it's also noted.

The Command File is a text report which incorporates the information for the shape being modeled. This file consists of simple English language like commands. This command record can be created right now the usage of the editor built into this system, or for that depend, any editor which saves facts in textual content form, including Notepad or WordPad to be had in Microsoft Windows. This command report is also automatically created behind the curtain while the shape is generated using the Graphical User Interface.

The graphical model generation mode and the command document are seamlessly incorporated. So, at any time, you can quickly go out the graphical version generation mode and get entry to the command file. You will find that it displays all records entered via the graphical version generation mode. Further, at the same time as you are making modifications to the command document and shop it, the GUI immediately shows the modifications made to the structure thru the command report. Both techniques of creating our model are defined on this educational.

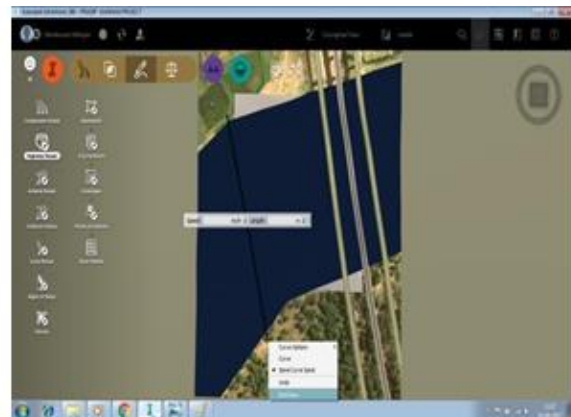


Fig 1: command file model

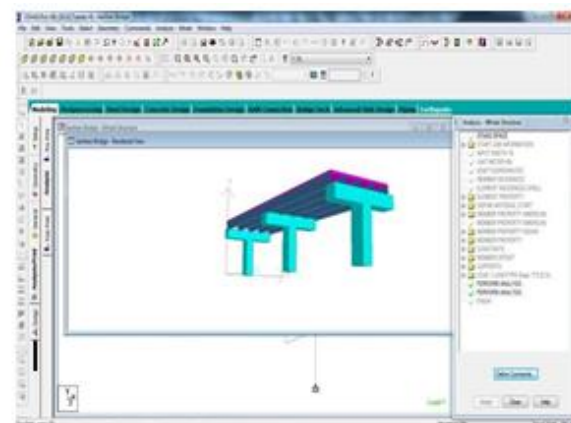




Fig 2: GUI based model

III. Analysis of Bridge span between 3rd, 4th and 5th piers in STA

First create the beams in grid. Then Translational Repeat applied and span among pier three,4& 5 is created Slab is created the usage of Surface meshing. Then Section and Material is implemented to piers, Beam caps, Girders and Plates using General (Properties). Provide regular resource to column. Beam offset feature is used to location girder under slab & girders on beams exactly. At final beam cap is positioned over column well. Proper placement

Analyze it. In subsequent steps, on Bridge Mode, Deck is created with roadways and the use of IRC loadings Class AA+R & Influence Surface. Generator is activated. Now you ready to generate loading Using "Run Load Generator" Here you may need to Provide Information like-1. Which deck? 2. IRC loading financial ruin three, 3. Maximum displacement and on which, 4. Last step, you want to add most aid reactions node and path with effect. Now use command "Create Loading in Staad Model" and Load technology is completed. Go to Staad pro and now you may see IRC load instances are brought in Load Cases Details. Finally, examine for the final lime. After evaluation following consequences are obtained.

X	Y	Z	Resultant
(mm)	(mm)	(mm)	(mm)
2.033	-16.021	-0.374	16.154
-3.709	-20.138	0.264	20.479
-2.456	2.553	-0.497	3.577
0.000	-53.067	0.428	53.068
0.162	-0.540	3.237	3.286
0.162	-0.540	-3.234	3.283
0.000	-53.067	0.428	53.068

Apply loading (Self-weight as Dead load and



Fig 3: proper placement vie



Type	L / C	NAME
Primary	1	
Primary	2	IRC: SLS Class 70R+A Loading N26: Disp Y -ve
Primary	3	IRC: SLS Class 70R+A Loading N6: React FY +ve
Primary	4	IRC: SLS Class 70R+A Loading N12: React FY +ve
Primary	5	IRC: SLS Class 70R+A Loading N18: React FY -ve

Pro	Node A	Node B	Node C	Node D	Material
p	(cm)	(cm)	(cm)	(cm)	1
3	30.000	30.000	30.000	30.000	CONCRETE

MATERIAL

Material	Name	E (N/mm ²)	Density (kg/m ³)	Temperature (°C)
3	STEEL	205.000	0.30	7.81E-1
4	STAINLESS TEEL	197.890	0.30	7.81E-1
5	ALUMINUM	68.948	0.33	2.71E-1
6	CONCRETE	21.718	0.17	2.4E-3

Input Details:

Included in this printout are results for load cases:

Properties

Properties	Section	Area (cm ²)	I _{xx} (cm ⁴)	I _{yy} (cm ⁴)	J (cm ⁴)	Material
1	Rect 2.00x3.00	60E 3	450	200	470	CONCRETE
2	Rect 2.00x2.50	50E 3	260	167	342	CONCRETE
4	I160016CS 0040	895.00	105	4.63	3.65	CONCR. ETE

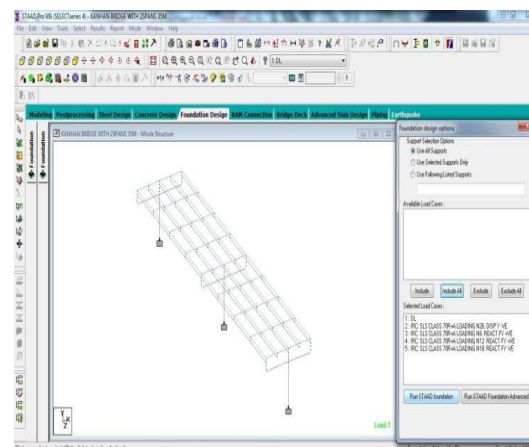
Plate Thickness

PILE FOUNDATION

We will use Staad Foundation platform for Pile Foundation Design.

STEPS: -

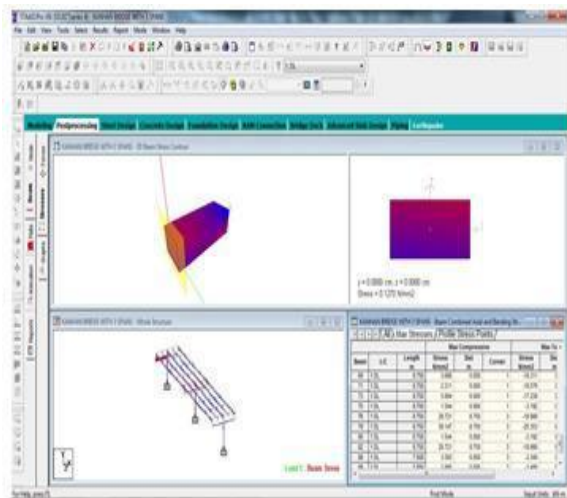
1. The Bridge model is exported to Staad Foundation under mode "Foundation Design"



2. You can see the Geometry of Support as well Node numbers on graphic screen of



Staad Foundation and Loads in Load description



IV. BACKGROUND

The METRO Mission is a research assignment about infrastructure protection in mass-delivery underground rail and metro systems. The reputation changed into on tunnels and subway/ metro stations, and both fire and explosion risks have been studied. It is a multidisciplinary task in which researchers and PhD college students from nine one of a kind disciplines cooperate with practitioners with the common cause to make underground rail mass delivery structures more secure inside the future. The METRO task (www.Metroproject.Se) changed into a three year undertaking, running from December 2009 to the December of 2012. The important aim of METRO emerge as to create a more secure environment for passengers, employees and primary responders in the event of fire or terror assault in underground mass delivery systems.

V. CONCLUSION

This paper discussed the metro column and analysis of column subjected to Indian Standard code. The study focused on the column and analysis of column's foundation using STAAD Pro. In project we create the super structure data required for foundation design. For that we used

Autodesk Infra works in which, we create the whole column and analyze it. After analysis the results' details taken for designing pile foundation in STAAD Pro. In this for 3rd, 4th and 5th span we design foundation. We can create/built bridge using Autodesk Infra works software without using survey data. STAAD PRO has the capability to calculate the reinforcement needed for any concrete section. It is possible to analyze and design the bridge substructure with the help of software and time can be saved by avoiding lengthy calculations required for analysis and design of bridge substructure. For more convenience in analysis and design of bridge substructure little software can be developed performing all the calculation on one platform instead of using many software. This will help the structural designer to save his effort and time in case of more complicated design of sub structure for bridge

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