How & Why to Make Your New Bridge Major Maintenance Free and Save at least 43% Project Cost

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Abstract— Are you surprised to read the title? You must be thinking what is “Major Maintenance Free”. ‘Maintenance’ means regular cleaning, repainting and so on, whereas ‘Major Maintenance’ involves rehabilitation to your bridge after it has severely deteriorated. Thus the aim of this tech-doc is to introduce you to a rehabilitation free bridge. With this clarified, let us dive in.

Index Terms— rehabilitation ,regular ,cleaning ,Major ,Maintenance, surprised,clarified,
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1 INTRODUCTION

You know how bridges can suddenly collapse prematurely due to deterioration. In fact, after the Gokhale bridge incident at Andheri railway station in 2018, I was involved in a project with Central Railways for the rapid vulnerability assessment of rail bridges. I saw the pain of the officeholders and engineers very closely in this project; travelling to far offff places from home, returning home very late, no time to spend with family, pressure from superiors and ministers, etc. I know how painful it feels being an offiffifficer/engineer caught in such a situation. Leaving aside the fear of its collapse, the cost of collapse and that of reconstruction, there is also an economic loss associated with degraded bridges still in use. Study by experts have found that on a rail bridge with a speed restriction of 20 kmph, there is an average loss in revenue of Rs 12,41,208/- per day and a delay in arrival time of train by 12 min and for a road bridge trafficked block an average loss in revenue of Rs 4,52,945/- per hour is estimated [6].

As authority engineers, when you are constructing new bridges you will want to save lives of people, save bridges from collapsing and save cost of rehabilitation and avoid economic losses.

What if I tell you, that I can create for you

CORROSION IN BRIDGE PROJECTS

Survey has found that in 70% to 90% cases of premature deterioration of RC structures, corrosion of the reinforcement steel was the dominant degradation mechanism [1]. Let me give you three (3) perfect examples. The Tiwai Point Bridge, in New Zealand was put out of use in 39 years, because of severe corrosion due to sea spray [8]. The Varsova bridge near Mumbai underwent its fifirst repair after 19 years of construction then the second repair in 32 years and full replacement in 43 years of life [4, 3]. The Ullasundet Bridge built in Norway had to be completely demolished after a service period of just 25 years. During this time of 25 years, a total repair cost, comparable to its construction cost, was spent [5]. Just imagine, if you want to keep this bridge for 100 years you will lose a total cost equal to four (4) times of the original project.

III. Major Maintenance Free Strategy

This technology aims to get rid of all major rehabilitation on the bridges due to deterioration. This strategy is founded in reverse engineering the deterioration the bridge is expected to undergo during its life-time. The technology blends with the structural design to deliver a deterioration resistant infrastructure.

This technology is a ti-level project implementation module: Pr-Construction, During-Construction and the Post-Construction. In the first step we quantify the numerical magnitude of deterioration load. For eg. in sea bridges, the amount of surface chloride load. For an under-sea tunnel the surface chloride concentration on the external lining and carbonation potential of interior lining. Moreover, as the bridge has to live for 100 years the extent of global warming is Qualified over its life-cycle. This is important because rise in temperature reduces the chloride resisting property of concrete. The deterioration analysis isactivated for 100 years using the software known as MFL100+ which provides the required specification. The second Step (during-construction), essentially verified if the properties specified for a deterioration resistance are satisfied by the contractor or not. Decision are taken in this phase, whether improvement are required if the contractor fails to comply with the requirement. Provision are also made, if required, for long term Structural Health Monitoring which will provide real time Remaining Life of the bridge. In the final stage, tests are conducted on the as built infra and the input properties of analysis are Bayesian updated with the as-built information and a Remaining-life Analysis is performed to check if it Satisfied a 100 year life or not. In case of non compliance, enhancements to satisfy the balance life are put in place.

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VIII. Conclusion

FOR YOUR NEW BRIDGE, AS THE CURRENT design may not be a Major Maintenance Free strategy, in the inevitable event of major rehabilitation for the project, you will spend an expected cost of at least 50% On the other hand after you adopt the Maintenance Free Strategy you need to spent merely 7% of the project, and you upfront save a massive 43% (= 50% % 7%) during the project life-cycle. With the money you save you can break-even earlier than expected and rest of the amount is just pure profit for you. Whats more, you need not put speed limit or block your bridges and so you save your economic losses too.Adopting the Major Maintenance Free Life (MFL) strategy for your project is about care and honesty, which can provide you with confidence, peace of mind and a good nights sleep. You make our Nation a super power by avoiding its enormous losses from infrastructure failures.

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