

REF # HRS/PKHA-18

Date: 05th April 2023

**METHODOLOGY FOR REPLACEMENT OF
BEARING PADS
AT
DERYA KHAN BRIDGE DI KHAN PROJECT**



1. Introduction

1.1 About Us:

Supabizz has been trading in imported Bridge Bearing pads and Expansion Joints, since the year 2009. With time, we have successfully supplied, installed, and replaced Bridge bearing pads and Expansion Joints in more than 150+ bridge projects across Pakistan.

1.1.1 Expansion Joints

Our Vendors are experts in their respective manufacturing types for Expansion Joints and Bearing Pads. They have provided quality, while being Economical, for the budget constraint Bridge construction sector of Pakistan. The names of our esteemed vendors are as below.

1. Interbuna SL Spain
2. ETIC/Aevia France
3. Arsan Kaucuk Turkey
4. Wabo Germany (manufactured by Wanbao in China)



1.1.2 Elastomeric Bridge Bearing pads:

Although Bridge bearing pads are of many types, we will only be discussing Elastomeric Bearing Pads. As they are used in the majority of Bridge Projects all across Pakistan. The reason is, that the following bearing pads require less maintenance when compared to other types of Bridge Bearing pads. Also, the fact that Elastomeric Bearing pads are highly adaptable, to various conditions in Pakistan.

When understanding the primary functions of bearing pads. It is understood that Bearing pads, form a connection between the super-structure and the sub-structure of the Bridge. The connection is made to control the loading and movements between parts of the structure (the super-structure and the sub-structure).



2. Situation Of Bridge:

The survey was conducted on 01st April 2023 to attain better understanding and clarity. For the Successful Execution of the Bearing pad replacement procedure. The following factors were noticed.

- I. There are Bearing pad Present that is not exposed in the following Bridge. Due to the accumulation of Debris.
- II. Water is running below the bridge.
- III. The wind and Climatic changes in the area are unpredictable. Making it inconvenient for the Execution team.
- IV. The structure is old and worn out. Requiring delicacy and strong (mentally and physically) workmanship. The following alignment runs within the major cities. Stopping traffic movement can cause a nuisance for travelers and locals commuting in the area



3. Foreseen Problems During Execution, With Their Expected Remedies:

	Foreseen Problems	Expected Remedies
1.	There are Bearing pad Present. But there is too much Debris between Girder and Pier cap, and no Bearing pad is exposed.	The Process of Bearing Pad Replacement. So, we will have to clear all the debris before the placement of the jacks to lift the bridge.
2.	Water is running below the bridges.	This can prove to be problematic. During the fixation of scaffolding pipes or Shuttering. For the Labor team to stand and perform their desired tasks. And even during Execution works. Depending entirely on the space available to set up the platform.
3.	The wind and Climatic changes in the area are unpredictable. Making it inconvenient for the Execution team.	During heavy winds and Rain. It is advised to the Execution team. To Step down from their ladders and Scaffolding and resume work after the climate has settled.
4.	The structure is old and worn out. Requiring delicacy and strong (mentally and physically) workmanship.	The working conditions are not ideal and the Execution team will require precision and accuracy. This can be attained by labor to get work done checked by Supabizz Site Engineer and confirmed.
5.	The following alignment runs within the major cities. Stopping traffic movement can cause a nuisance for travelers and locals commuting in the area.	For this, it is recommended that the majority of works be executed at night and be performed till Sunrise.



4. Methodology:

Concerning bridge design experts, our previous bearing pad replacement and keeping in account the condition of the bridge of Derya Khan. The following methodology is advised.

4.1 Diversions And Road Blockage

To adopt safety measures following steps should be taken while replacing the Bearing pads under the bridge by placing jacks directly under girder ends on top of transom/abutments to install new bearing pads.

- I. To complete this job on either side South bond or the North bond, we need to do it by the closing of the said portion, or it's recommended to avoid heavy traffic and light traffic may pass at the speed of 20 km/hour. **But no traffic should pass during the lifting of the superstructure.**



- II. No movement on the bridge would be allowed during the bearing pad replacement process. Whereas in a few conditions, slow traffic movement can be allowed. It is recommended while lifting suitable diversion on the said part may be applied with through a person having a flag in hand with a safety jacket to guide the traffic.

4.2 Shuttering And Scaffolding

Access ladders are used along with Shuttered platforms around transoms wherever necessary. Here the labor team will stand for breaking diaphragm and jacks placement. Shuttered platforms are dismantled and fixed again when moving toward the next piers for lifting.



4.3 Cutting Of Diaphragm

Hydraulic jacks will have to be placed both right and left in the diaphragm side by side with the girder. For placing hydraulics jacks as seen in the picture below the diaphragm has to be cut special care is done while cutting the concrete blocks in the diaphragm to avoid any impact on girders which can result in destruction.



4.4 Load Capacity And Type Of Hydraulic Jacks Used

Our company carries a large stock of fully tested hydraulic jacks (hydra-jacks) available for service and sale at competitive rates.

Hydraulic pumps and control systems range from basic setups to the more complicated electronic control and structural monitoring systems used for controlled hydraulic movement. We offer a complete service from start to finish for a wide range of applications. Areas where our expertise has been proved valuable include:

-) Lifting Heavy Weights
-) Lifting Bridges for replacing the bearing pad



4.4.1 Hydraulic jack lifting mechanism:

Hydraulic jacks are used as the means of lifting bridges so that defective or frozen bearing pads can be removed.

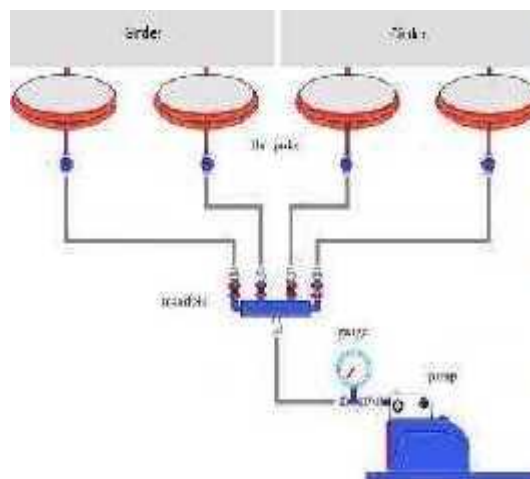
Jack used in the above-mentioned projects bare a load capacity of **50-Tons** and the height of the piston, Piston diameter is **160mm** & stroke is **30mm**

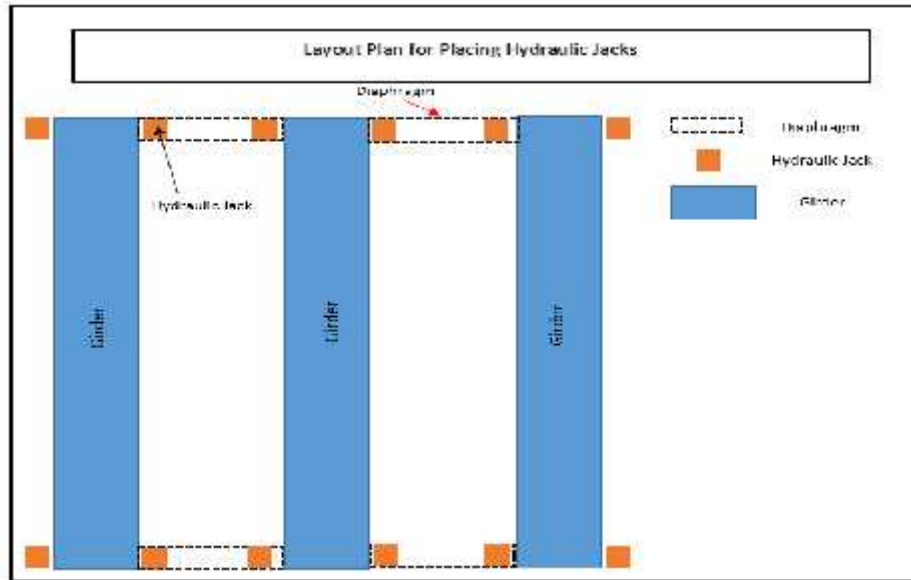


For the above process, 50-Tons hydraulic jacks will be placed left and right to the girders, to assure an equal lifting of the span. The jacks will lift the girder a total of 120mm

4.5 Placement of Hydraulic Jacks

Hydraulic jacks will be installed on the bottom of the diaphragm horizontal to the girder as shown in the Layout. One or two hydraulic pumps are enough with the help of manifold lines, to lift several hydraulic jacks. The hydraulic pump is activated through the three-phase generator. After that, all the jacks will be fixed by applying the required pressure, to touch the bottom of the diaphragm. A packing of steel plates is used on which the jack is placed so the jack touches the bottom of the diaphragm. This step is performed on all jacks, one by one to assure that the top plate of the jacks can bare the load of one complete span of the bridge.





4.6 Lifting Of Superstructure

Dial gauges will be used to check the level of exact pressure for the lifting of the Superstructure. The hydraulic pump gives pressure to all the jacks at once and the lifting procedure is initiated. All fixed jacks will act simultaneously. After lifting of girder approximately 120mm, bearing pads will be installed. Acknowledging the required application of leveling epoxy.



4.7 Cleaning The Debris And Application Of Leveling Epoxy

On the top of the Transom/abutment debris nearby, the bearing plinth would be removed and the surface would be cleaned properly before starting the replacement procedure. After cleaning the debris leveling epoxy will be applied on the pier cap under the girder, on the contact surface of the girder, and on the upper-bottom layer of the bearing pad. After which bearing will be placed



4.8 Placement Of Bearing Pads

The new bearing pad will be placed at the correct line and level. Lastly, the deck will be lowered on the new bearing pad.



4.9 Lowering Hydraulics Jacks

After placing the bearing pad and applying leveling epoxy, we will release the pressure of the hydraulics pump, so the piston of the hydraulic jack lowers down. As a result, the girder will be placed on the bearing pad and will transfer the load to columns through the newly installed bearing pad.



4.10 Application Of Sbr And High Strength Concrete Within Block Cut Of Diaphragm

After lowering the girder, SBR is applied in the block cut where previously the jack was placed. SBR assures a strong bond between the old concrete and the new concrete that will be poured in block cut afterward. High-strength concrete of 5000psi is recommended

4.11 Repeat The Same Process

The above-stated process will be executed, span by the span of the bridge. This will be repeatedly done on all spans of all bridges

4.12 Requirements

4.12.1 From Hajji Raees Khan and Sons (contractor)

From our contractor we will require the following:

-) Concrete and steel at the site.
-) Road Blockage during work execution.
-) Security along with a translator.
-) Timely Payment of all due and upcoming bills from SupaBizz.
-) Machinery such as cranes etc. As per the requirement at the site.

4.12.2 From PKHA and Nespak (client and consultant) :

From our Consultant we will require the following:

-) Immediate approval of methodology, to mobilize a team.
-) Timely Supervision at the site.
-) Feedback and Support during Execution.

4.13 Conclusion:

The following methodology will be applied for the first time due to no bearing pads being present in the bridge previously. We hope and assure professionalism and quality of work. To carry out the following process. Lastly, cooperation and assistance will be required from the consultant and contractor to execute the task at hand.

Thank you.

Made By:	Approved By:	Checked By:
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