

**FEASIBILITY STUDY FOR REMODELLING OF BRBD LINK
CANAL TO MEET THE SHORTAGE OF CANAL SUPPLY FOR
LAHORE AND KASUR DIVISIONS**

SCOPE OF SERVICES

HIGH-TECH CONDITION SURVEY OF RAVI SYPHON

DECEMBER 2021

NESPAK-BARQAAB-MMP JOINT VENTURE CONSULTANTS

NESPAK House Lahore

**FEASIBILITY STUDY FOR REMODELLING OF BRBD LINK CANAL TO MEET
THE SHORTAGE OF CANAL SUPPLY FOR LAHORE AND KASUR DIVISIONS
HIGH-TECH CONDITION SURVEY OF RAVI SYPHON
Scope of Services**

Table of Contents

	<u>Page</u>
1. INTRODUCTION	1
2. EARLIER INSPECTION OF RAVI SYPHON	2
3. DESIGN DATA OF RAVI SYPHON	2
3.1 Location	2
3.2 Hydraulic Data	2
4. SCOPE OF WORK	6
4.1 Dry Inspection.....	6
4.2 Underwater Inspection	6
4.3 Technical Requirements	6
4.4 Time Period for the Inspection	7
4.5 Payment Schedule.....	7
4.6 Insurances	7
5. BIDDING REQUIREMENTS	7
5.1 Bidding Procedure	7
5.2 Qualification Criteria.....	8
5.3 Bid Submission and Opening.....	8

HIGH-TECH CONDITION SURVEY OF RAVI SYPHON Scope of Services

1. INTRODUCTION

The Ravi syphon conveys the flow of the BRBD canal under Ravi River. BRBD Canal crosses Ravi River through a syphon between RD 282+760 to RD 284+623. The structure was built in 1952-53 comprises five 10'-3" square reinforced concrete barrels 1759 ft (536 m) long with total design discharge of 4,853 cusecs (138 cumecs). The discharge capacity is reported to have reduced because of increasing hydraulic roughness and downstream water levels in the canal being higher than design. The Ravi Syphon has been operated for 4,000-4,200 cusecs. The conveyance capacity of the syphon is a constraint to agricultural development in the downstream command areas of Central Bari Doab Canal (CBDC) and the Upper Dipalpur.

Punjab Irrigation Department intends to rehabilitate the existing Ravi Syphon for its continued serviceability. Rehabilitation of the syphon will involve repair of syphon barrels through shotcreting/guniting at the top and sides of the barrels with reinforced concrete at the base.

Punjab Irrigation Department (The Client) has initiated a study "Remodeling of BRBD canal! Water shortages for Lahore and Kasur Division", which includes rehabilitation of Ravi Syphon and allied structures. NESPAK-BARAAB-MMP Joint Venture being the Consultants, intend to inspect Ravi syphon to identify structural conditions of the structure before finalizing various components of rehabilitation.

No repair or rehabilitation have so far been reported on the syphon since its inauguration. The general layout plan of Ravi syphon with respect to salient ground features is shown in the Figure-1.



Figure- 1: Location of Ravi Syphon

2. EARLIER INSPECTION OF RAVI SYPHON

NESPAK (2007) carried out an underwater inspection of the syphon with the help of divers. About 33% of the overall length could only be examined due to oxygen supply limitations. The results of underwater inspection were:

- i. The concrete face has been eroded at the syphon inlet leaving coarse aggregate exposed and in some places reinforcement steel bars are exposed.
- ii. Many of the barrel joints were found to be leaking.
- iii. A small gully has developed on the right bank of the Ravi River over the upstream sloping section of the barrels.
- iv. The gates of the syphon require extensive rehabilitation.
- v. Traverse joints in all five barrels were found to be in poor condition.
- vi. Cracks in the concrete in four of the five barrels were observed.
- vii. Two large holes were found in one of the barrels.
- viii. Water stops are exposed at many places.

3. DESIGN DATA OF RAVI SYPHON

3.1 Location

Ravi Syphon is located where BRBD canal crosses River Ravi, approximately 2 kilometers downstream from Pakistan-India border. The Ravi syphon conveys the flow of BRBD canal under Ravi River starting from canal RD 282+760 to RD 284+623. The coordinates of start and end of Ravi Syphon in UTM meters. 43 N are stated in the following table:

Table-I: Coordinates of Start and End of Ravi Syphon

Location	Latitude	Longitude
Start of Syphon	31°43'21.71"N	74°28'12.46"E
End of Syphon	31°43'04.19"N	74°28'12.39"E

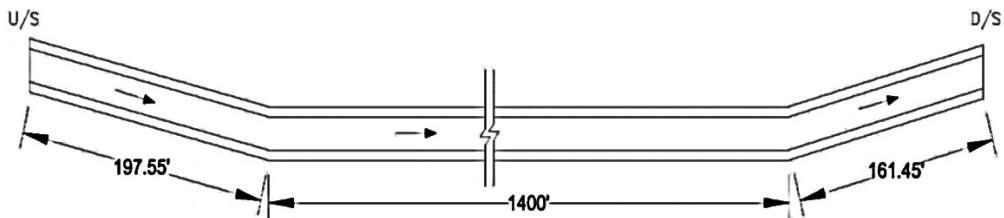
3.2 Hydraulic Data

The Ravi Syphon comprises five 10'-3" square reinforced concrete barrels with fillets at the interior corners, Plan and Section are shown as Figure-2, Figure-3 and Figure-4.

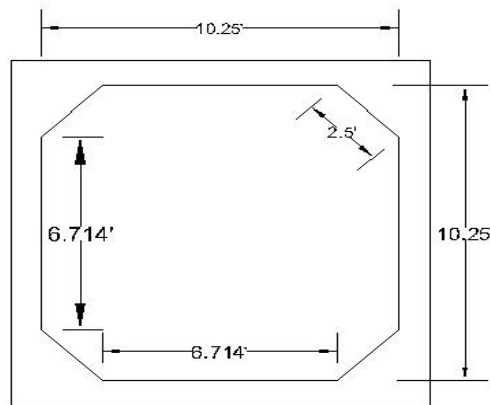
Table-2: Hydraulic Data of Ravi Syphon RD 282+760 BRBD Link Canal

Year of Construction	1949 – 1952
No of Barrels	5
Length of each Barrel (ft.)	1759
Size of Barrels (ft.) (External)	10.25 ft. each
Slope of Barrel (ft.)	0.30
Top RL of Barrels (ft.)	688.00
Highest Water Level U/S of Barrels (ft.)	731.50
Highest Water Level D/S of Barrels (ft.)	726.00
Max. Head Loss of W.L on U/S & D/S (ft.)	4.08
Discharge of each Barrel. (cusec)	972
Total Design Capacity of Barrels (cusec)	4853

Velocity (ft./s)	10.50
Max. Discharge Capacity of River at Syphon (cusec)	426,000
Highest Flood Level of river at Syphon (ft.)	722.00
Maximum Silted Bed Level of River at Syphon	703.00
Minimum Silted Bed Level of River at Syphon	688.00
Average Silted Bed Level of River at Syphon	696.00
Designed top after Sand cover of 8.30 ft.	696.30



Longitudinal profile of Ravi Syphon
Total Length = 1759 ft



Section A-A'

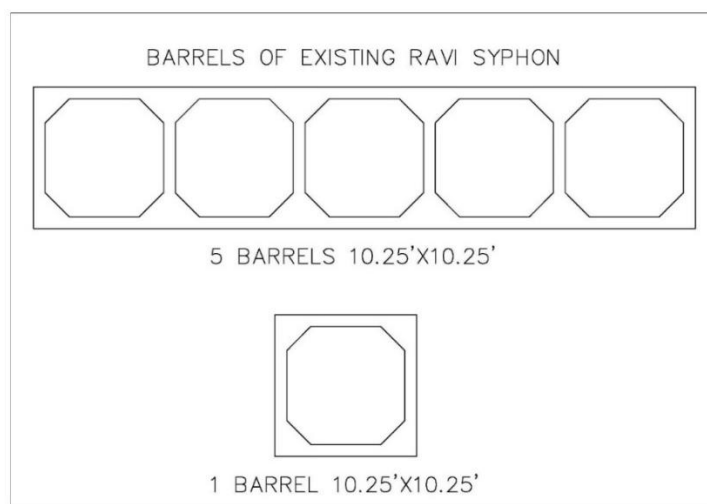


Figure-2: Longitudinal Profile and Section A-A of Ravi Syphon

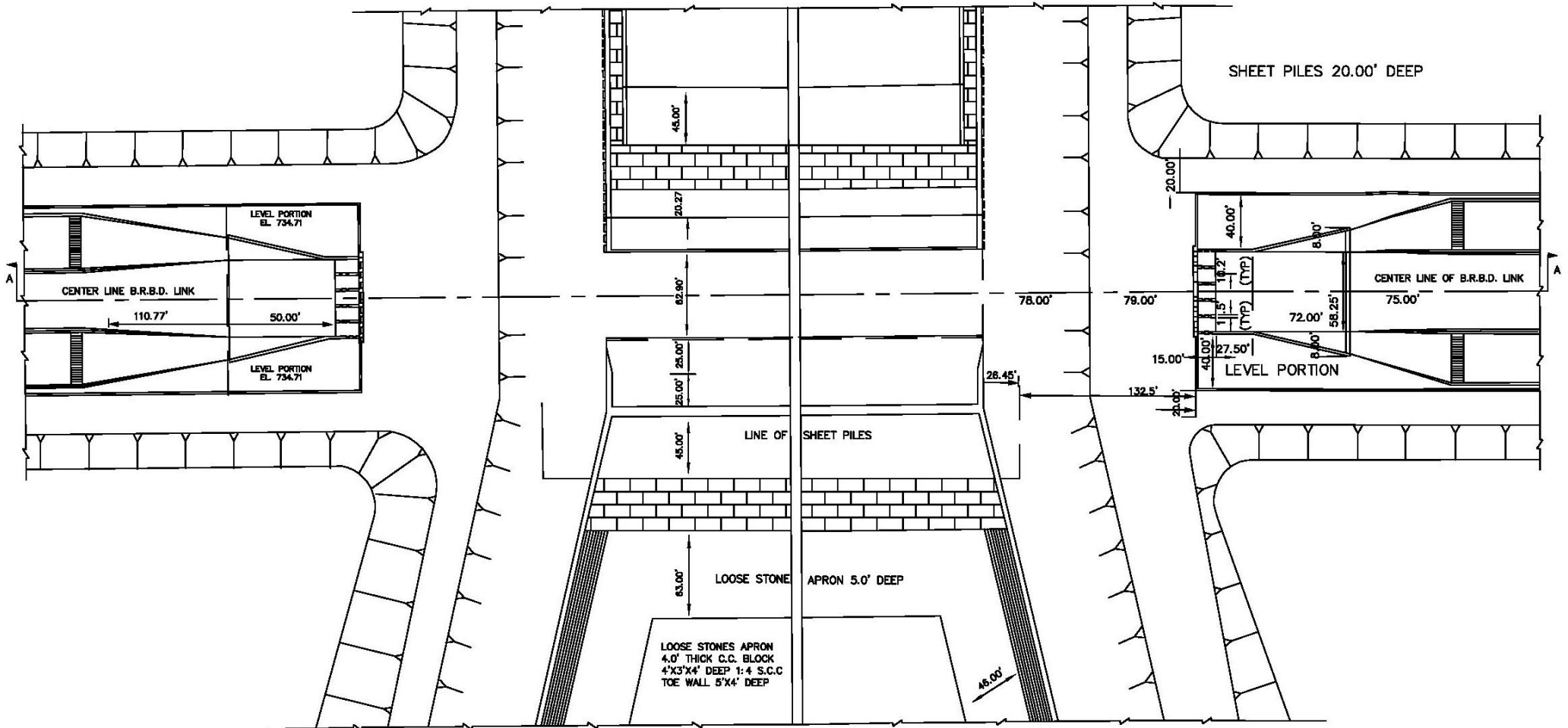


Figure-3: Ravi Syphon Plan

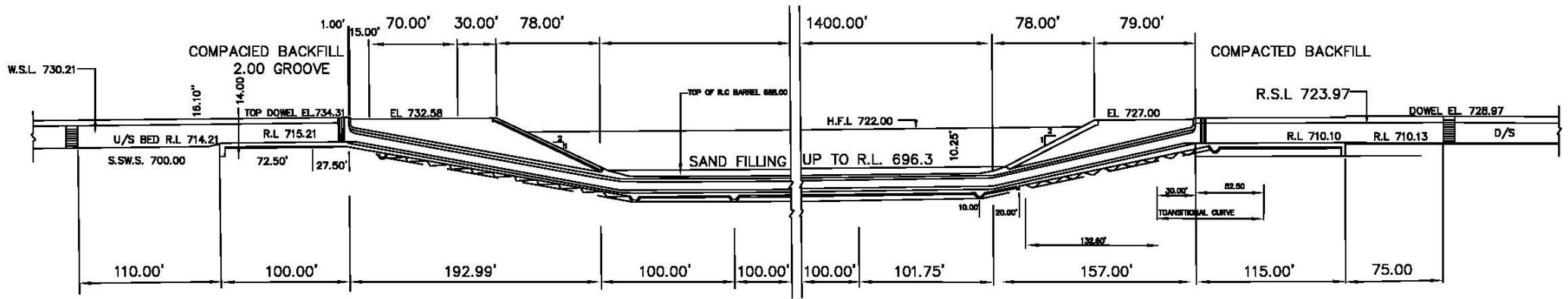


Figure-4: Section A-A of Ravi Syphon Plan

4. SCOPE OF WORK

The scope of inspection includes:

4.1 Dry Inspection

In order to propose rehabilitation measures to strengthen existing structure, it is required to inspect the structure thoroughly in all aspects related to its structural integrity. For dry inspections, water is required to be pumped out from syphon so that the dry condition inside the structure may be achieved in order to carry out the inspection of the present condition of structure. Followings noting/observations are required to be made:

- i. Concrete deformation, damage, and weathering
- ii. Reinforcement exposure (if any)
- iii. Water stop condition
- iv. Cracks
- v. Settlements along the barrels
- vi. Leakages

All of the above factors are to be studied for each barrel and shall be reported in terms of high-resolution images and videos with respect to chainage and location.

4.2 Underwater Inspection

If dry inspection could not be possible inside the structure, then underwater inspection shall be carried out representing the above listed factors satisfactorily.

4.3 Technical Requirements

- i. Inspection shall be carried out for the complete length of the barrels
- ii. Resolution of the videos and photography, acceptable to the Consultants, shall be high so that findings of the inspection can be translated in terms of technical findings of the existing Ravi Syphon
- iii. Close Circuit Television (CCTV) footage shall be available for the complete length of the barrels; minimum of 80% length shall be acceptable in case of any limitation arises during inspection
- iv. The diver shall also be taking high resolution pictures as per requirement of the Consultants
- v. The diver shall be guided by the expert(s) through live CCTV footage for detailed picturing/video for any area requiring focus.
- vi. Video as well as photographs shall be available for the complete length of the barrels
- vii. Digital copy of the images/videos, compatible with Microsoft platform, shall be provided in a DVD

4.4 Time Period for the Inspection

Time period available for the dry/wet inspection shall be ten days (10-days) between December 26, 2021 to January 12, 2022; the canal closure period of Upper Chenab Canal (UCC) and BRBD.

4.5 Payment Schedule

The payment schedule against the services shall be as follows.

Sr. No.	Description	Payment
1	Advance Payment against Bank Guarantee	Up to 25%
2	On completion of inspections and providing digital files of videos/photographs ¹	50% ²
3	Upon submission of the final report	25%

Note: all applicable taxes shall be deducted at source from all the payments.

4.6 Insurances

The insurance of the equipment and diver(s) shall be the service provider's responsibility who may arrange appropriate coverage. The Client shall not be responsible for any loss (equipment and/or life) during the inspection. No claim in this regard shall be entertained.

5. BIDDING REQUIREMENTS

5.1 Bidding Procedure

Single-stage two envelop bidding procedure shall be followed for procurement of services. The bidders are required to submit their sealed original technical and financial bids inside a sealed envelope marked 'TECHNICAL BID' and FINANCIAL BID'.

The Technical Bid shall not contain any financial information otherwise the bid may be considered non-responsive and marked zero.

First, the technical bid of the bidders shall be evaluated against the given technical criteria. The financial bid of only the technical evaluated bidders shall be opened for further evaluation and remaining financial bids shall be returned 'unopened'.

The lowest evaluated bidder shall be considered for award of the contract.

¹ Within 10 days subsequent to completion of inspections

² Plus remaining of advance payment (if any)

5.2 Qualification Criteria

The bidder shall submit the required documents in support of the following criteria to be followed for evaluating the technical bid of the bidders.

1. The bidder(s) must have at least one completed or in-hand assignment of underwater inspection of canal or barrages.
2. The bidder(s) must have relevant qualified/certified divers to fulfill the requirement of the assignment.
3. The bidder(s) must have completed at least three underwater (sea/canal) inspections/repairs in the Public/Private sector.
4. The bidder(s) must demonstrate the availability of the required oxygen supply for underwater inspection of at least 300 m length of the barrel.
5. The bidder(s) must demonstrate the availability of CCTV for underwater inspection of at least 200 m length of the barrel.
6. The bidder(s) must submit National Tax No., Sales Tax No. Certificates & Income Tax clearance certificate and the last income Tax return.
7. The bidder(s) must submit financial soundness certificate with an annual turnover of 10 million or more from any scheduled Bank of Pakistan, showing his financial soundness for this particular bid.
8. Current commitments and previously completed similar tasks within 3 years
9. No litigation certificate.

5.3 Bid Submission and Opening

The Bid must be submitted on or before December 30, 2021 (1600 hrs) at the following address.

Team Leader
NESPAK-BARQAAB-MMP Consultants
NESPAK House,
1-C Block N Model Town Extension
Lahore
Phone No. +92-42-99231943

The technical bid opening shall be on December 30, 2021 (1630 hrs) at the same address, as above.