

SHAH TECHNICAL
CONSULTANTS PVT LTD
in association with



TANDON URBAN SOLUTIONS PVT. LTD.
&
CONSULTING ENGINEERS GROUP LTD.

Project Development and Management Consultant (PDMC) for
Atal Mission for Rejuvenation and Urban Transformation (AMRUT) in Punjab
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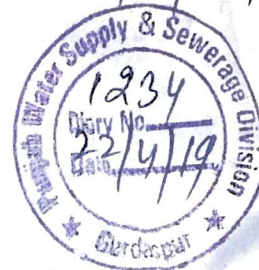
Email: pdmcanrut.punjab@stc.co.in

Ref: STC/PB/PDMC/2019/ 1466

Date: 16/04/2019

To

✓ Executive Engineer
Punjab Water Supply & Sewerage Division
Gurdaspur



✓
22/4/19
22/4/19

Subject: Copy of DPR for Sewerage Scheme at Pathankot under AMRUT.

Dear Sir,

Please find enclosed herewith a copy of the DPR along with drawings for Extension & Augmentation for Sewerage System at Pathankot (Estimated Cost Rs.8177.58 Lakh) is enclosed for record and reference.

Yours faithfully

Team Leader
PDMC-AMRUT
Chandigarh

CC:

1. Engineer-In-Chief, PWSSB, Chandigarh along with copy of DPR.
2. Assistant Construction Manager, PDMC, Amritsar along with copy of DPR.

Team Leader
M/s Shah Technical Consultant Pvt Ltd
Chandigarh

Memo No: ATPB/ 64 /PMIDC/SEW

Dated 23 Jan 18

Subject: DPR FOR AUGMENTATION AND EXTENSION OF SEWERAGE
SCHEME AT PATHANKOT (ESTIMATED COST Rs 9229.79 LAKH)

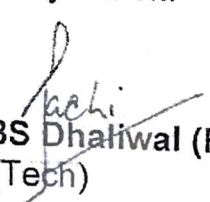
- 1 Refer to the following Memo/ION Nos:-
 - (a) This Office ION No ATPB/22/PMIDC/SEW dated 05 Aug 17
 - (b) This Office ION No ATPB/43/PMIDC/SEW dated 24 Oct 17
 - (c) Your Office Memo No STC/PB/PDMC/2017/640 dated 14 Nov 17
 - (d) This Office ION No ATPB/48/PMIDC/SEW dated 15 Nov 17
 - (e) This Office ION No ATPB/52/PMIDC/SEW dated 15 Nov 17
 - (f) This Office ION No ATPB/54/PMIDC/SEW dated 15 Nov 17
 - (g) Your Office Memo No STC/PB/PDMC/2017/666 dated 28 Nov 17
 - (h) E-in-C-cum Technical Advisor, PWSSB, Memo No PWSSB/2017/D-II/26995, dated 12 Dec 17
 - (j) This Office ION No ATPB/58/PMIDC/SEW dated 22 Dec 17
 - (k) Your Office Memo No STC/PB/PDMC/2017/709 dated 21 Dec 17
 - (l) This Office ION No ATPB/60/PMIDC/SEW dated 28 Dec 17
 - (m) E-in-C-cum Technical Advisor, PWSSB, Memo No PWSSB/2018/D-II/447, dated 08 Jan 18
 - (n) This Office ION No ATPB/62/PMIDC/SEW dated 16 Jan 18
 - (o) Your Office Memo No STC/PB/PDMC/2018/758 dated 17 Jan 18
 - (p) Your Office Memo No STC/PB/PDMC/2018/766 dated 20 Jan 18
- 2 The subject cited DPR was received in this Office vide your Office Memo No mentioned at Para-1(c) above 'by hand' through Rep of the Consultant on 15 Nov 17 for Rs 9229.79 lakh. The major observations were pointed out to the Rep of the Consultant and Officers of PWSSB vide this Office ION mentioned at Para-1(e) above.
- 3 Field check of the DPR was conducted by a joint team of Rep of the Consultant, Officers of PWSSB (HQ) & field staff and a technical Officer from this Office on 05 & 06 Jan 18. The observations were raised by the Joint Team and the same has been corrected in the DPR by the Consultant and PWSSB. After making the corrections, the amount of the DPR has reduced from Rs 9229.79 lakh to Rs 8177.58 lakh.

4 The following major corrections which were made in the re-submitted DPR after the site checks are appended below (refer **Appendix** attached for details):-

- (a) **Dismantling of Roads.** Quantity of road cut has been reduced from 112114 Rmt to 99531 Rmt. due to correction of alignment. Initially DPR was framed with SW pipes, which has now been replaced with uPVC Pipes (up to 315mm o/d).
- (b) **Lateral and Main Sewer.** Length of sewer line has been reduced from 146289 rmt to 141836 rmt by adopting shortest routes.
- (c) **Brick Manholes.** Numbers of brick Manhole Chambers have been increased based on the site condition
- (d) **House Connection and ICs.** After field check, numbers of House Connections & ICs have increased from 13763 Nos to 21832 Nos.
- (e) **Trenchless Crossing.** The original length of trenchless crossing has increased from 160 rmt to 362 rmt. This length of the trenchless crossing has increased as the STPs have reduced from 05 Nos to 02 Nos.
- (f) **STP.** After the field check, the proposed 05 Nos STP have been reduced to 02 Nos as per site conditions.
- (g) **Railway Crossing.** As against 04 railway crossings, now 05 railway crossings are required (including 1.5 km sewer line in the railway land). The cost of one additional railway crossing and the cost of sewer line has accordingly been added in the DPR.
- (h) **MPS/IPS.** After field check, the provision of 05 Nos MPS/IPS has been reduced to 03 Nos.
- (i) **Restoration of Road Crust.** After field check, the length of restoration of road crust has reduced from 112144 rmt to 99531 rmt.

5 The DPR received in this Office for Rs 9229.79 lakh is technically vetted for **Rs 8177.58 lakh** excluding departmental charges.

6 The DPR (in original) is returned for further necessary action.


Lt Gen BS Dhaliwal (Retd)
Advisor (Tech)

Copy to

CEO-cum-Secretary to Govt of Punjab
Local Govt

General Manager (Projects)
PMiDC

Commissioner,
Municipal Corporation, Patiala

- For information please

**AMMENDMENTS MADE IN THE REVISED DPR OF SEWERAGE SCHEME
PATHANKOT (AMRUT SCHEME)**

Ser No	Items	Quantity		Change in Costing (+) (Rs in lakh)
		included in DPR	Actually required at site	
1	Sub Head- 1 Dismantling of Roads	112144 Rmt	99531 Rmt	-13.08
2	Sub Head- 2 Lateral And Main Sewar	146289 Rmt	141836 Rmt	79.74
3	Sub Head- 3 Brick Manholes	5496 Nos	5550 Nos	312.15
4	Sub Head- 4 House Connections and IC	13763 Nos	21832 Nos	-200.05
5	Sub Head- 5 Trenchless Crossing of NH	160 Rmt	320 Rmt +42 Rmt	79.39
6	Sub Head- 6 Rising Main 450 MM dia K7 (for MPS)		198 Rmt	Nil
7	Sub Head- 7 STP	5	2	-1228.09
8	Sub Head- 8 Railway Crossing including 1.5 km length of sewer line in railway land	4	5	+212.50
9	Sub Head-9 MPS/IPS	5	3	-177.73
10	Sub Head- 10 Restoration of Crust of Streets/ Lanes	112144	99531	-117.04
	Total Financial Effect			-1052.21

Note:

Item listed at Ser No 8 should only be utilized for Railway crossing.

Alvraj Singh

NARINDER SINGH

B.S. Mehta
DCLAS

(f) **PROCUREMENT OF WORKS**

All tenders are being invited on-line on web site of e-tender of GoP and also tender notice is being published in newspapers for wide circulation. The e-tendering document is a "STANDARD BIDDING DOCUMENT" for procurement of works approved by GoP. The Technical Bids and Financial Bids are being opened by the tender inviting authorities and are being decided in SLTC after getting examined in Technical Sub-Committee headed by E-in-C PWSSB and also being examined by head of department of PWSSB/DWSS/Municipal Corporations.

(g) **QUALITY ASSURANCE**

All machines, equipment and works are being inspected by third party to assure quality of material and works

(h) **Scope of Proposed Work**

- Lateral Sewer : 128.147 Km
- Main Sewer : 18.249 Km
- Manhole : 2204 Nos.
- House Service Connection : 19063 Nos.

S.NO	Description	Quantity	Unit
1.	UPVC Pipe SN-8		
	Lateral Sewer		
i	160mm outer Dia	29046	Mtr
ii	200mm outer Dia	85566	Mtr
iii	250 mm outer Dia	4573	Mtr
iv	315 mm outer Dia	9075	Mtr
	Total	128260	Mtr
2.	P/L of RCC-NP3 HDPE Lining Pipe		
	Main Sewer		
i	400mm diameter	7045	Mtr
ii	600 mm diameter	6531	Mtr
	Total	13576	Mtr
3.	Construction of Manhole		
i	Size 90x150 cm & Size 120x180 cm	5550	No
4.	House Service Connection		
i	110 mm o/d Pipe	109160	Mtr
ii	Inspection Chamber (450 x 450x 600) New	21832	No

E	PWSSB Requirement 9.92% on Part 1& 2 (A) : Contingencies Charges @ 1% + Culture Cess 1% + Departmental Charges @ 6% + Heritage Cess @ 1% + Third Party Inspection Charges @ 0.92%		559.48
2	Part - 2 Sewerage Treatment Plant, MPS, Rising Main With Electrical Works		
i	Sub Head- 9 : Const. of STPs 2 Nos of different Zones Including NP-2 RCC Pipe For Gravity Line	2 Nos	461.91
ii	Sub Head- 10 : Const. of MPSs 2 Nos & 1 IPS of different Zones Incl Rising Main	3 Nos	207.19
	Sub-Total for GOI Share Part 2 (A)		669.10
	Grand Total (Part 1 & 2)		8177.58
	Grand Total		8737.06
E	5 Years Operation and Maintenance cost of Sewerage Treatment Plant (Borne by ULBs)		
i	For 1.2 MLD Sewerage Treatment Plant		67.39
iii	For 2.0 MLD Sewerage Treatment Plant		102.80
F	5 Years Operation and Maintenance cost of Existing & Proposed Sewerage Network System (Borne by ULBs)		734.34
	Financial Share Pattern :		
i	Share of GOI as (50%) on (C+Part 2 (A)) (Rs. In Lac)		4088.79
ii	Share of ULB as (20%) on (C+Part 2 (A)) (Rs. In Lac)		1635.52
iii	Share of State Govt. as (30%) on (C+Part 2 (A)) & + Cost of D (Rs. In Lac)		3012.75

(b) O & M

The provision of O & M is mandatory for at least 5 Years. Cost is to be borne by ULBs. GOI funding will not be there. The O & M Cost comes to Rs **904.53 Lac**.

1.7 Population of the town

Decadal population history of the town has been collected and population of the town has been projected for the years 2015, 2030 and 2045 by various methods of population projections like Arithmetic, Geometrical, Incremental Increase and Graphical methods.

The details of Population projection are given in Annexure 1 of this report. As per the analysis of decadal population history of the town, the growth of population of the town can be best illustrated by Geometrical Increase method. The projected total population of the town adopted in the design of Water supply & Sewerage system is given in the following table.

1.8 Projected population of the town adopted in the design

Year	Projected population by Geometric Increase method (33 wards)	Villages & outgrowth	Total
2011 (Census)	148937 ✓	83033	231970
2015	163012	89909	252921
2030	241057	111422	352479
2045	361707	126627	488334 ✓

The projected population of the town is worked out by the average of AI, GI, II methods and the same growth factor from (2030 to 2045) to the newly added area to the municipal limit has been adopted.

1.9 Projected population for 16 peripheral villages

Population details (Census 2011) and population projections of Villages newly added during the formation of Pathankot Municipal Corporation :

Sl No.	Villages	Area proposed within Corporation limit in ha*	Village population contributing to MC (Year 2011)	Village population projected - Domestic		
				Year 2015 (8.28 % over 2011 Population)	Year 2030 (34.19 % over 2011 Population)	Year 2045 (52.50 % over 2011 Population)
1	Khanpur	58.95	3952	4279	5303	6027
2	Lamini	80	3417	3700	4585	5211
3	Mamun	798.74	32689	35396	43865	49851
4	Bharoli Kalan	52.22	3768	4080	5056	5746
5	Bharoli Khurd	66.12	1426	1544	1914	2175

A) Extension of sewerage system to the uncovered areas of the town

Analysis of Topographical base map and Sewerage Zoning

On analysis of the survey base map, drainage pattern of the terrain is identified. Based on the terrain nature zoning for various sewerage catchments have been marked with one or more villages in each of the zones. The 16 villages have been covered in Five Sewerage zones; namely Zone 1, Zone 2, Zone 3, Zone 4, Zone 5.

Area is divided into zones and total length of the particular zone is calculated along with the projected population of 2030 and 2045 of that zone is calculated. Per meter person is calculated on the same basis.

$$\text{Total population 2045} / \text{Total Length} = \text{Person/Meter}$$

Same Factor is used for all the hydraulic Designs of all zones

Zone 1

The area laying to the western side of National Highway (NH 54) is generally sloping towards South-West and is named as Zone 1. Zone 1 comprises of villages Malikpur, Behelolpur, Sarna.

As the area is on the other side of UBDC Canal which is to be crossed to tap to existing STP via IPS which will be non feasible to cross canal, Therefore Sewage from Malikpur, Behelolpur and Sarna areas can be collected near Adarsh nagar and treated there itself by constructing STP of 1.2 MLD and can be disposed to a drain adjacent to STP via NP2 pipe calculation attached in design statement.

Zone 2

Zone 2 consist of villages starting from Bharoli kalan and Bharoli khurd and along the NH and tapping sewerage network from Bhadur ladi village at node no 78 and continuing to tap the network of Dushyant colony, Buddha nagar and then crossing NH at covering areas of jamalpur and kila jamalpur to the STP site at Kothe Pandita di. Another trunk line covering village Dherawal and reaching to STP site at Kothe Pandita di. Another separate STP of 2 MLD is proposed as the gradient does not allow to tap the sewer into the existing network. Disposal of treated water from STP will be disposed to the drain

Zone 3

Zone 3 consist of 2 areas Mamoon and Adhunik vihar and is separated by railway line. To avoid railway and NH Crossing North part of Mamoon area is collected and tapped to the existing sewer at Dalhousie road of 400mm.

The details of proposed STPs like Capacity, population served, areas/zones covered are given in the following table.

Zone	Population	Capacity Required for STP in MLD	Proposed Capacity in MLD
Zone 1	10125	1.16	1.2
Zone 2	16546	1.90	2

2.3 Details of STPs

Land for construction of Sewage Treatment Plant are available at five locations in each zone. The land identified in the Adarsh nagar village can be utilised for the construction of STP for treating the sewage flows of Zone 1.

The land identified in Kothi pandita di village can be utilised for the construction of STP for treating the sewage flows from Zone 2.

The details of area of land required for the construction of Proposed Sewage Treatment Plants (STPs) in Pathankot are given in the following table. It is ensured to provide land for the construction of STPs at different locations by Municipal Corporation Pathankot vide letter no 1279 Dated 03.08.2017.

S. No	Zone	STP Capacity	Land Required	Land Available
1	Zone1	1.2 MLD	2	4 Acre Khasra No 92/2R93
2	Zone2	2 MLD	1	1.25 Acre Khasra No 12R 25/1 25/2

Genral Points During Sewerage Network Construction:

- At some initial reaches actual velocity is less than 0.3 m/s at peak discharge as population at those points is less
- All sewerage system which is to be tapped in the existing network are physically verified at site, However before lying of sewer system existing IL should be considered.
- Before execution GL IL shown in the maps shall be cross checked with hydraulic design statement
- In item no 29.4 note 14 for uPVC pipes CC block was proposed in CSR originally In place of that brick is proposed at 2m interval.
- Wherever fall is provided in any stretch it is divided equally in each manhole in that stretch.

2.4 House service connections:

At present, there are 19063 nos. Sewer connection exists in the town and 21832 nos. sewer connections provision made in this project.

3. DESIGN PARAMETERS

3.0 Sewerage Design and Sewer Construction

The Manual of Sewerage and Sewage Treatment (Third Edition), Ministry of Urban Development, 2013 is an excellent publication which comprehensively deals with all aspects of sewerage systems from initial planning through design and construction, including management and legal aspects, and then on to the subsequent operation and maintenance of the systems. The design criteria are adopted from the CPHEEO, which are modified suitably to account for the project area.

3.1 Design Basis

The sewerage system is designed for the expected wastewater flows in the design year based on the projected population. Wastewater generated is calculated assuming 135 lpcd water supply rate and waste generated is assumed to be 85 % of the water supplied.

3.2 Design Period

- Initial Stage : 2015
- Intermittent Stage : 2030
- Ultimate Stage : 2045

Hence the ultimate design year to be considered for the Project is 2045.

3.3 Design Flows

Design flows are essentially peak dry weather flows. Peak dry weather flows would comprise peak domestic wastewater flow plus Infiltration.

Since the flow in sewers varies considerably from hour to hour as such peak flows with the following peak function have been adopted for arriving at design flow as per guide lines provided in the Manual.

Contributory Population	Peak Factor
up to 20,000	3.00
Above 20,001 to 50,000	2.50
Above 50,001 to 7,50,000	2.25
above 7,50,001	2.00

Peak factor of 2.25 is considered for the design of Sewerage system.

3.4 Design Formula

The manning's formula is used to calculate the hydraulic gradient in sewers, as given below:

$$V = 1/n R^{2/3} S^{1/2}$$

Manholes provide access to sewers for inspection and cleaning. Manholes are located at every change of alignment, grade or diameter, at the head of all sewers and branches and at every junction of two or more sewers. Spacing of manholes depends upon type of sewer cleaning equipment's viz., manually operated or by mechanical devices. On sewers, which are to be cleaned manually, which cannot be entered for cleaning or inspection, the maximum distance between manholes should be 30 m. This is adopted in designs.

3.9.2 Shape of Manholes:

It was decided that there would be problems for operating the jet suck machines for cleaning the sewer if the RCC precast circular manhole chambers are constructed during operation and maintenance and suggested the construction of rectangular manhole chambers with suitable dimensions.

In lieu of Circular manholes, rectangular manholes have been included as per CSR item No.29.84 to 29.88.

3.9.3 Manhole Covers and Frames

The size of the manhole covers should be such that there should be clear opening of not less than 560 mm diameter for manholes exceeding 0.90 m depth. Provision of manhole covers has been in accordance to IS 1726. The cover frame is proposed to be embedded in plain concrete on top of masonry to correct alignment and level with suitable lifting arrangement. DI manhole frame and cover has also been considered in high vehicular roads.

3.9.4 Inspection Chamber

The property connections of sewage would be provided through Inspection Chamber(I.C.), one I.C. outside the property. These specifications may vary according to the site conditions.

The proposed dimensions of Inspection Chambers are given below:

- 450x450x600mm with 230mm thick walls outside the properties along the roads.

Ventilation Shafts:

In modern, well designed sewerage system, there is no need to provide ventilation on such elaborate scale considered necessary in the past, especially with the present day policy to not intercepting traps in house connections. The ventilating columns are not necessary where intercepting traps are not provided. It is necessary however, to make provision for the escape of air to take care of the exigencies of full flow and also to keep the sewage as fresh as possible especially in outfall sewers.

The RCC ventilating shafts of 9.0m high have been proposed along the main sewers with a distance of 1000m between two ventilating shafts as per drawing.

- ii) Buddha Nagar
- iii) Adarsh nagar ✓
- iv) Simbal Chowk ✓

2. Railway Crossings at following places.

- i) Near Buddha Nagar
- ii) Near Mohalla Piplan wala(Under Unused track)
- iii) Near Bharoli kalan ✓
- iv) Near Qila Village. ✓
- v) Galla Mandi (X)

NHAI → 1) NH 154 near Simbal chowk
 2) NH 44 near SKR Hospital
 3) NH 54 near Adarsh Nagar
 4) near Judicial Court complex
 5) Faridkot Nagar Mala near Deriwal

Letter appd
 for NOC
 NHAI

Railway crossing → 1) Near Bedi Bajri colony
 2) Near Bharoli kalan
 3) Near Qila village
 4) near Buddha Nagar
 5) Galla Mandi

Layout
 map