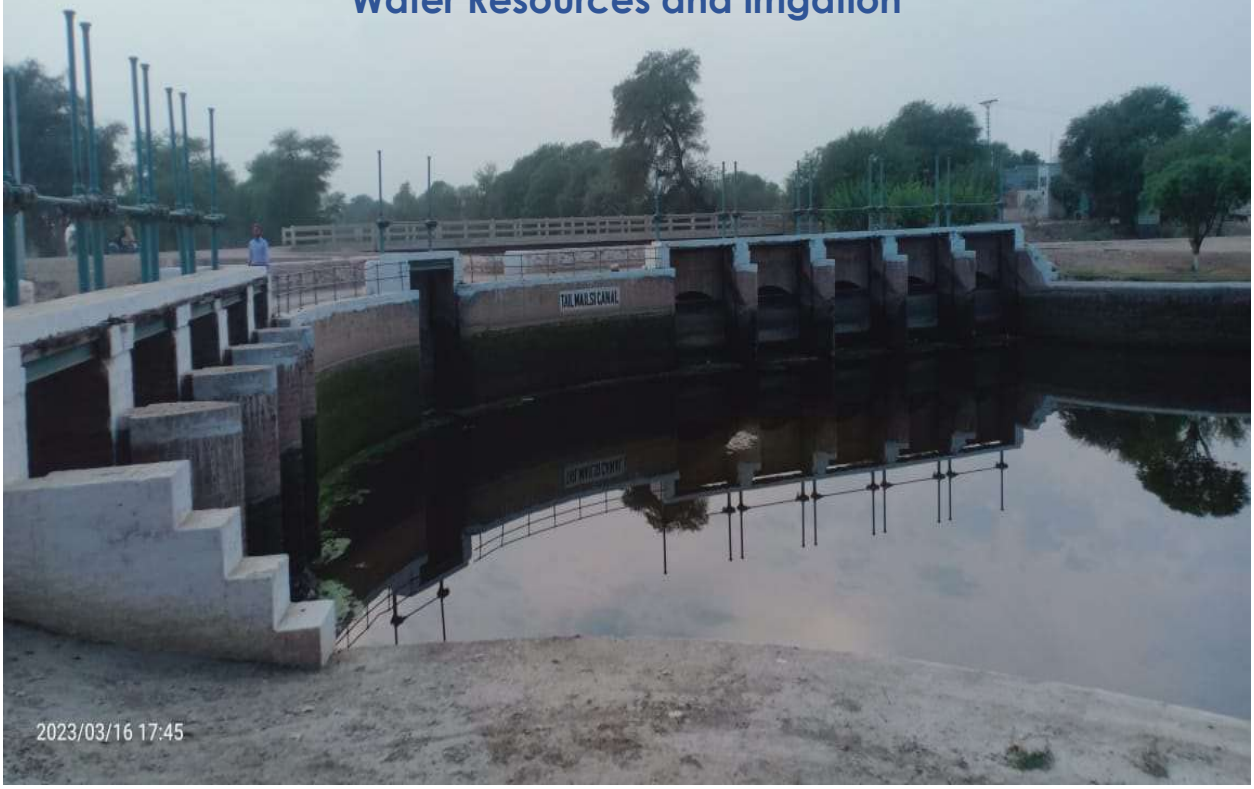
MULTAN REGIONAL MASTER PLAN

Water Resources and Irrigation



Introduction

Multan City is the 3rd largest in the Province, and is located on National Highway (N5) leading to Bahawalpur and Muzaffargarh / Dera Ghazi Khan enroute to Karachi, passing through core of the City. The City lies east of Chenab River, more or less in the geographic center of the Country, at a distance of about 966 km from Karachi. Multan is known as the 'City of Sufi Saints (Pirs) and Shrines'. The City has many superbly designed mosques, shrines and tombs. A network of rails, highways and air flights connect Multan to the rest of the Country. The city offers trading facilities to the entire region for vegetables, grains and agro-based products.

Multan is the financial hub of southern Punjab. Multan is a versatile city with economy base ranging from rich heritage artifacts to modern day industry. Multan's vast economy is based on industry which includes Sugar & flour mills, foundries, fertilizer factories, Textile & weaving & dyeing industry, & most importantly agriculture.

Multan plain is made of alluvial soil sloping gently from North East to South-West with a slight slope also from North-West to South-East. The formation is of very recent origin formed by the ever-changing course of Chenab and Ravi. It is clear from the fact that one will find sand below a few feet of clay. Ravi had in the past changed different courses. In the time of Aurangzeb, Ravi flowed along the Eastern fringe of the walled city or along the Fort between the shrines of Hazrat Baha-ud-Din Zakariya Multani and Shah Shams Sabzwari and in fact a revenue Mohalla is still named as Taraf Ravi where Ravi flowed previously. Eastern part is irrigated by the Multan Branch of Siddhnai Canal fed by Ravi. Nullah Wall Muhammad dug in 1750 A.D. under the orders of Nawab All Muhammad Khan, the then ruler of Multan, irrigates the North-Western area. The portion of the nullah within the habited area has now been converted to urban functions like roads, offices and residences. Second important Canal is Sikandari Canal, an offshoot of Shujabad Canal dug by Nijabat Khan, a landlord in 1777 A.D.

Water Resources of Multan

The Chenab River is flowing in northeast to southwest direction along the western periphery of the Multan City and has a great impact to the recharge and quality of groundwater of the Project area.

Multan city is underlain by a vast aquifer, which is the extension of Punjab Plain & is the main source of public water supply, industrial use and irrigation in the Project area. The aquifer underlying the Multan city comprises unconfined alluvium with a thickness of more than 750 ft. It is part of the large inter fluvial deposit of Lower

Bari Doab, bounded by the Chenab River in northwest and the Sutlej River to the southeast and forms the part of vast alluvial plain of the lower Indus Plain in Punjab Province.

The depth of the water table in the Project area ranges from 30 ft. to 60 ft. It is shallow in north and north west towards the river side and deep in the center of city due to over extraction of groundwater and high elevation of the city. Although, water table in the center of city has declined to 60 feet indicating some stress on aquifer, however, the situation is not very alarming. In case, water table declines more in future due to increase in groundwater extraction in the city, the recharge from surroundings will also increase due to increase in hydraulic gradient.

Irrigation and Water Resources

Surface-water resources in Pakistan are based on the flows of the Indus River and its tributaries (Jhelum, Chenab, Ravi, Sutlej, and Beas to the east and the Kabul River to the west). The Indus River has a total length of 2900 km and a drainage area of ~966,000 km^2. The inflow to these rivers is mainly derived from snow and glacial melt and rainfall in the catchment areas. Outside the Indus Basin, most of the rivers are ephemeral streams, which only flow during the rainy season and thus do not meet the water needs of the Indus system inside the basin as do the other rivers. The irrigation network is shown in figure 1 below.

The Indus river basin in Pakistan is being divided into two plains i.e. upper and lower Indus plain. The upper Indus plain comprises of Himalayan piedmont, the doabs, and the Suleiman piedmont. The area between two rivers forms a Doab. The Indus river Basin consists of following four doabs.

1. Thal Doab (Area between Indus and Jhelum Rivers)
2. Chaj Doab (Area between Jhelum and Chenab Rivers)
3. Rachna Doab (Area between Chenab and Ravi Rivers)
4. Bari Doab (Area between Chenab / Ravi and Sutlej Rivers)

The Punjab Irrigation consist of eight (08) irrigation field administrative zones as listed below.

I. Lahore Zone
II. Sargodha Zone
III. Faisalabad Zone
IV. Sahiwal Zone
V. Multan Zone
VI. Bahawalpur Zone
VII. Dera Ghazi (D.G.) Khan Zone

VIII. Potohar Zone.

The salient feature of irrigation zones is shown in table 1.

Table 1: Salient Features of Punjab Irrigation Zones

Descriptions	Lahore Zone	Sargodha Zone	Faisalabad Zone	Sahiwal Zone	Multan Zone	Bahawalpur Zone	D.G. Khan Zone	Potohar Zone
No of Channel	549	576	350	262	331	706	423	-
Length of main, branch, and link canals (Miles)	725	657.75	544.00	454.00	344.65	519.60	453.00	-
Outlets (No.)	12,499	9,046	8,380	6,709	6,100	7,812	8,197	-
Gross Command Area (M. Acres)	4.50	4.69	3.44	3.76	1.83	3.50	2.33	-
Culturable Command Area (M. Acres)	4.00	4.11	3.22	3.03	1.66	3.25	2.11	-
Design flow (Cusec)	29,767	23,225	21,294	15,528	9,292	3,593	20,088	-
Length of Drains (Miles)	527	1835.27	1500	1552.29	425	498.18	412	-
No of Small Dams	-	-	-	-	-	-	-	57

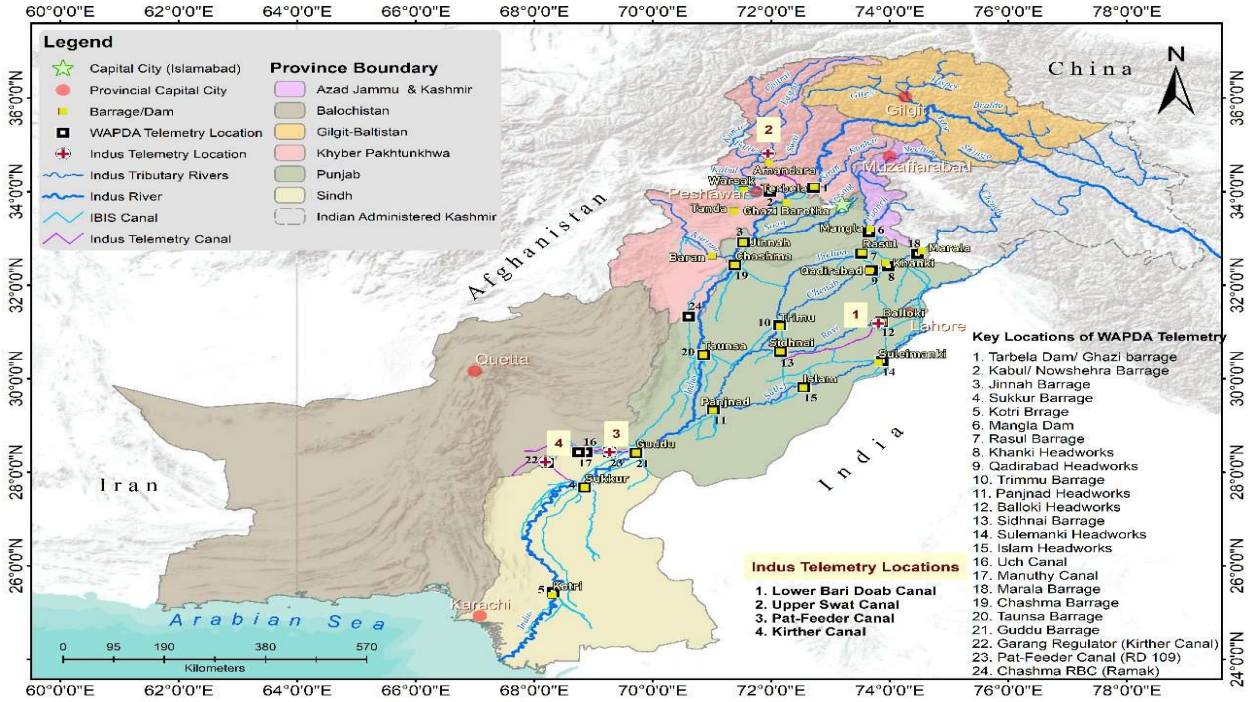


Figure 1: Irrigation Network of Indus Basin in Pakistan

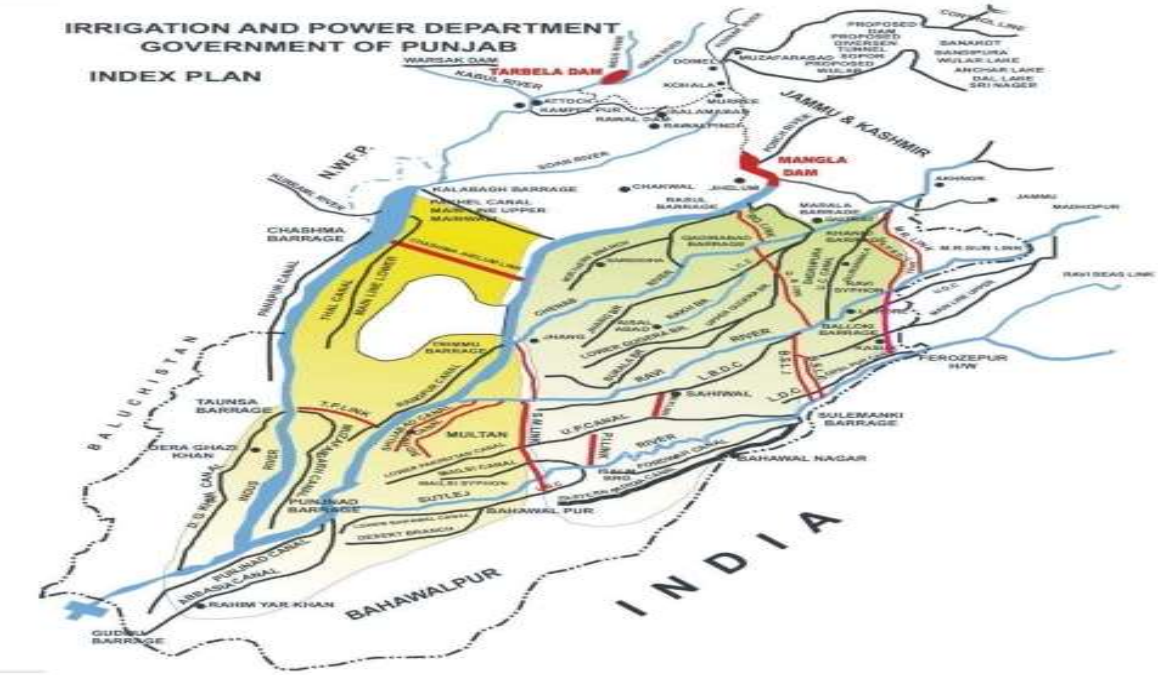


Figure 2: Punjab Irrigation Network Index Plan

There are following main salient features of Punjab Irrigation department.

Headworks / Barrages	13
Main Canals	25
Length of main canals and branches (Miles)	3,993
Length of distributaries and minors (Miles)	19,191
Length of inter river Link canals (Miles)	528
Main canals offtake discharge (Cusec)	120,000
Link canals offtake discharge (Cusec)	110,000
Total Outlets	58,000
Gross command area (million Acres)	23.35
Culturable command area (million Acres)	20.78
Perennial culturable command area (million Acres)	12.94
Non-Perennial culturable command area (million Acres)	7.84
Overall designed annual Intensity (%)	67
Actual intensity (%)	120-130
SCARP Tubewells	1,060
Private Tubewells	110,000
Length of flood embankments (Miles)	1,600
Length of surface drains (Miles)	4,800
Small Dams	57

Climatology of Multan:

District Multan lies in warm composite zone, where the climate is dry hot in summer and cold in winter. The hottest months are May, June, July and August. The heat and dust of Multan are proverbial. Day temperature in the summer months between May and September is high but the nights are comparatively cool. The highest day temperature is recorded in the months of May, and June. The winter is pleasant. The coldest months are the later half of December and January. The maximum and minimum mean temperatures in summer are 42 and 29 degree centigrade whereas in winter it is 21.0 and 7 degree centigrade respectively. The average monthly maximum, mean, and minimum temperatures in Multan are shown in figure 3.

Multan is classified as arid zone where annual rainfall is low. The average annual rainfall of Multan is 280 millimeters during last fifty-three (53) years from 1979-2022. The most of which falls during monsoons from June to August. Winter rain is rare. The most wet year due to heaviest rainfall is 1992 with rainfall intensity of 509 mm and driest year is 2021 with rainfall intensity of 101 mm, respectively. The total annual rainfall of Multan is shown in figure 4.

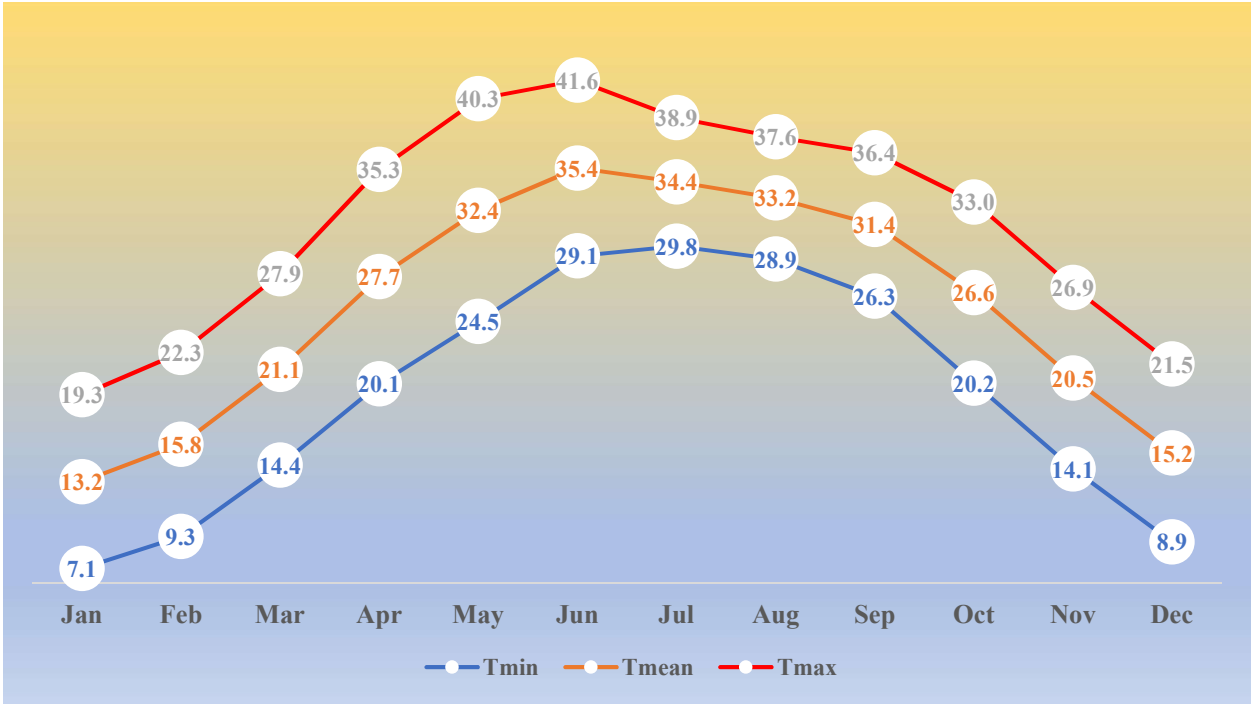


Figure 3: Mean maximum, average, and minimum temperature of Multan region (1979-2022)

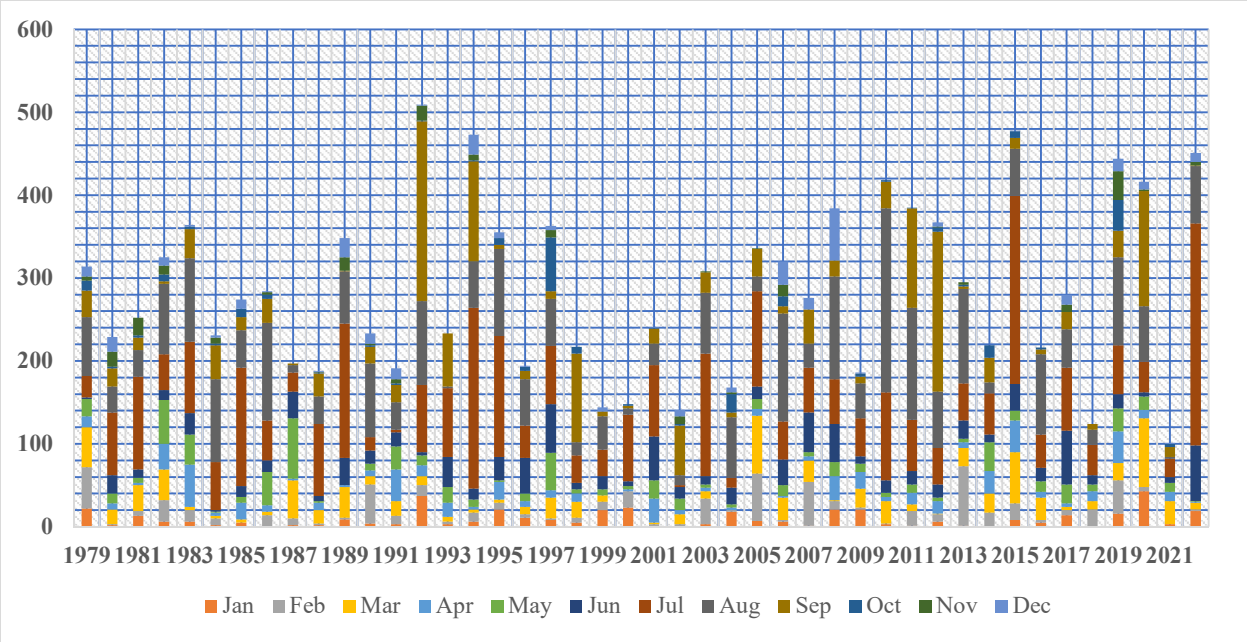


Figure 4: Annual Rainfall in Multan (1979-2022)

The overall climatic condition hot and low humid. Wind storms have been one of the chief characteristics of Multan in olden days. In recent time, the frequency of the windstorms has considerably decreased because of the extensive agricultural development in and around the district. The monthly average relative humidity of Multan division varies from 25% to 51%. The relative humidity trend from 1979-2022 is shown in figure 5.

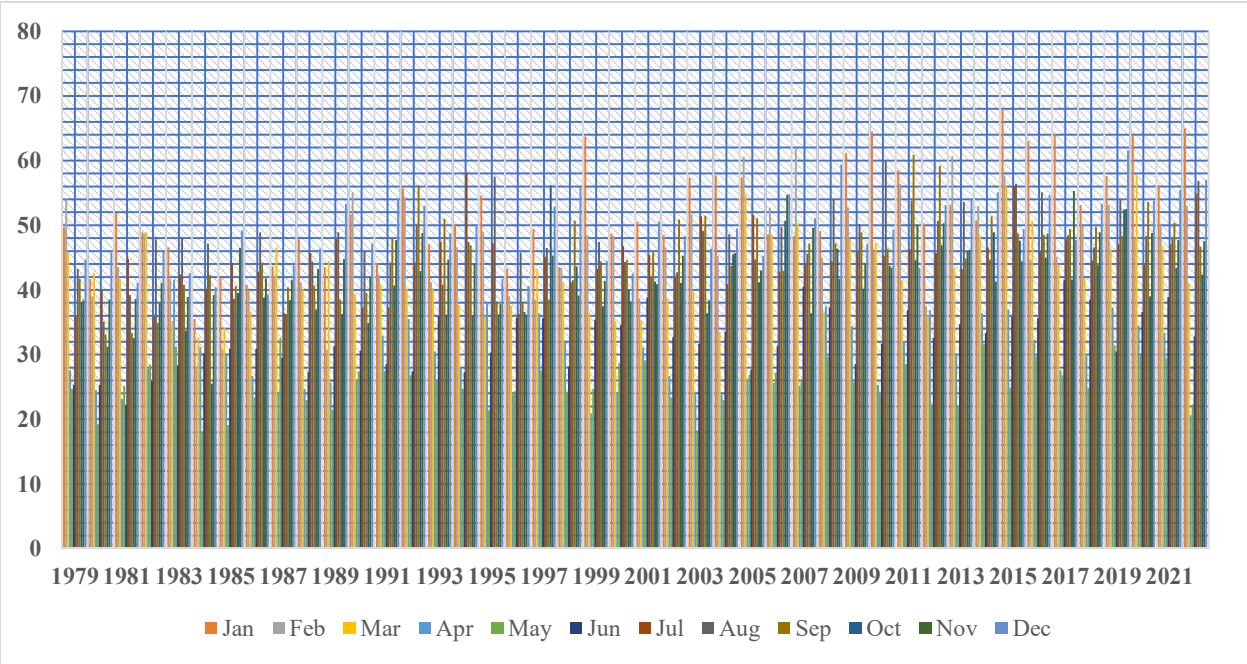


Figure 5: Monthly Relative Humidity of Multan (1979-2022)

Agriculture of Multan:

The District is roughly linear in shape along north-south axis. Various canals from River Sutlej & River Chenab pass through Multan & its adjoining districts making this area heaven of fertile land for agriculture. Adding to it in summer, the extreme hot weather can reach above 50°C which are the ideal conditions for mango, citrus and cotton productions. Along with these many other crops are ideal for these areas.

Agriculture is thus unquestionably important major factor in Multan's economy. While main crops remain mangoes, citrus, sugarcane, cotton, and wheat others include rice, maize, tobacco, vetch, lentils and oil seeds. A large number of fruit farms also grow fruit crops, which include dates, pears, bananas and guavas. Potatoes, Onion and Cauliflower are the main vegetables grown in the district

Water Resources and Irrigation of Multan:

Multan region stretched within mainly Multan irrigation zone boundary and a little part of Sahiwal irrigation zone boundary as shown in figure 6.

Figure 6: Multan Zone Irrigation Network and Boundary

Water Resources and Irrigation Assessment of Multan Region:

There are following main canal circle are under jurisdictions of Multan irrigation zone.

1) Multan canal circle
2) Haveli canal circle
3) Shujabad canal circle
4) Lodhran canal circle.
5) Mailsi canal circle.
6) Upper and Lower Western Bar canal circle
7) Mailsi-Syphon canal circle.
8) Trimmu canal circle.
9) Trimmu Barrage
10) Sidhnai Barrage

The Trimmu barrage and canal circles are not included in Multan region. The tail reach of Lower Bari Doab canal circle of Sahiwal zone in Khanewal is also part of Multan region which included for field assessments to develop water resources and irrigation plan for Multan regional plan.

The existing structural and situational survey was conducted for improving and facilitation of water resources and irrigation intervention to enhance agricultural and non-agricultural water availability in Multan region. The following key areas of interventions are considered to improve water resources and irrigation resources in regional plan.

- Rehabilitation/Upgradation of Headwork / Barrage.
- Construction of new head and/or cross regulator.
- Rehabilitation/Upgradation of existing head and/or cross regulator.
- Rehabilitation/Upgradation of official residencies (Rest-house, SDO residency, Sub-engineer residency, Support Staff residencies), Roads, Boundary walls, recreational parks, sewerage, and water supply.
- Rehabilitation/Upgradation of canal/distributary/minor lining
- Constructions of crossing bridge or flood embankment bunds.
- Installation of telemetry, and solarization system.
- Installation of artificial groundwater recharge galleries.
- Rehabilitation/upgradation of canal hydraulic structures.

There are following residencies, and infrastructures can be included in rest house;

1. Sub-Division Officer–SDO Residency (SDO/R).
2. Sub Engineer Residency Quarter (SE.Q.)
3. Support Staff Residency / Mineral Quarters (MQ)

4. Gauge Reader Huts (GH).
5. Roads (R)
6. Boundary Wall (BW).
7. Water Supply and Sanitation (WSS).

Multan and Shujabad Canal Circles of Multan Region:

Multan and Shujabad canal circle are main stretched over Multan and Shujabad cities and their surrounding premises. Shujabad Canal Division covers the area of Tehsil Shujabad, part of Tehsil Jalalpur Pirwala, Tehsil Multan of District Multan and Tehsil Kabirwala of District Khanewal. Also, a Minor part of Muzaffargarh Tehsil of Muzaffargarh District, lies within the jurisdiction of this Division. These areas lie on the left bank of River Chenab D/S of its confluence with River Ravi in a narrow belt to confluence point of Sutlej and Chenab River within a width varying from two to ten miles and covering a length of about 90 miles as shown in figure 7.

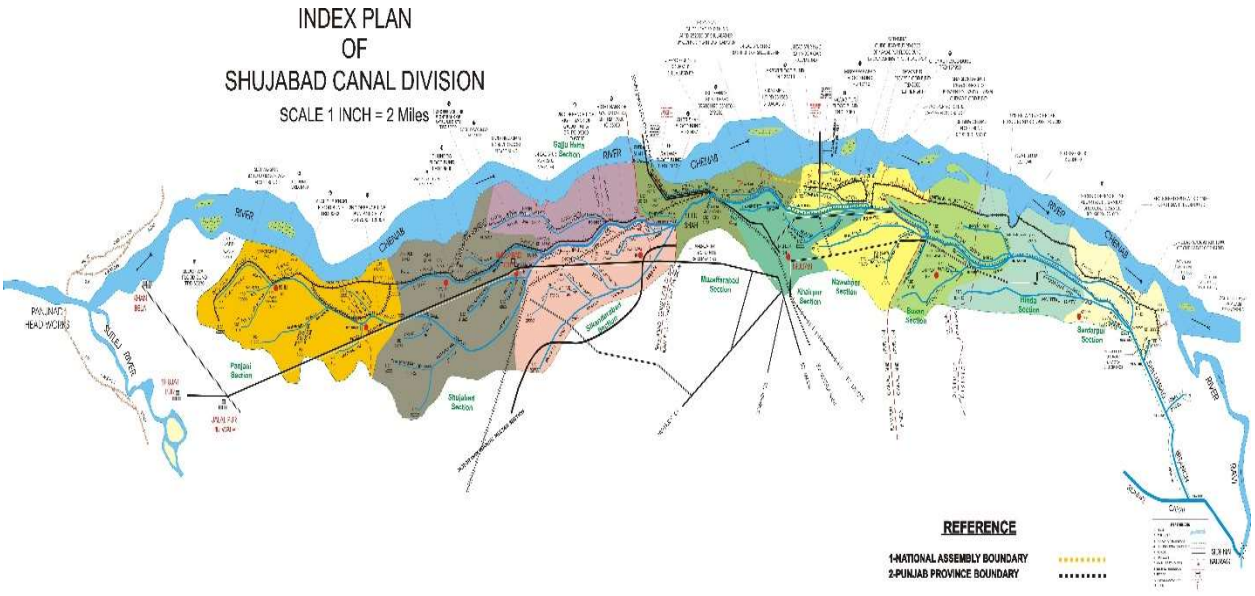


Figure 7: Shujabad canal circle Irrigation Network and Boundary

The major issues faced by Multan and Shujabad canal circles were cross regulators at canal/distributary offtakes & flood escape channel, sewerage/waste disposals in canal system, flood protection works, canal linings, official residencies (Rest-house, SDO residency, Sub-engineer residency, Support Staff residencies), Roads, Boundary walls, recreational parks, sewerage, and water supply etc. The existing conditions of these features are discussed below along with short descriptions.

A flood escape channel offtake from Nawabpur head regulator at RD 197+775 over Shujabad branch canal. The purpose of this escape channel is to disposal of

flood water flow from head regulator into Chenab River during flood season. But it affecting adversely on head regulator due to back flood water damages during high flood situation in Chenab River. Therefore, there is need of installation of cross-regulator at tail RD of flood escape channel to protect Nawabpur head regulator structure. The current condition of flood escape channel is shown in figure 8.

Figure 8: Flood Escape Bund at Nawabpur Rest Area of Shujabad canal circle.

The Nawabpur rest-house located at Nawabpur head regulator on Shujabad branch canal. The official residencies, and water supplies conditions are shown in figure 09. There is need to construct official residencies (Rest-house, SDO residency, Sub-engineer residency, Support Staff residencies), Gauge reader hut, Roads, Boundary walls, mosque, sewerage, and water supply at rest house.

Figure 9: Nawabpur Rest-house on Shujabad branch canal.

The Shershah distributary offtakes from Shujabad branch canal at RD 279+000. There is need to install cross-regulator at head of Shershah distributary as shown in figure 10.

Figure 10: Shershah Distributary at RD 279+000 on Shujabad branch canal

The Shujabad branch canal flow around Multan, Jalalpur Pirwala, and Shujabad along Chenab River. The urban waste water, sewerage and industrial sewerage is disposed at different location without any treatment as shown in figure 11. So, there is need to installation of waste water treatment plants to protect canal water from damages due to waste water. Moreover, there is need of sludge carrier installation along canal to reduce water quality in canal as well as

groundwater. These waste water treatments plants will be addressed in water supply and sanitation section in details.

Figure 11: Waste water disposals at different location in Shujabad branch canal

Upper & Lower Western Bar and Mailsi–Syphon Canal Circles of Multan Region:

The command areas of Lower western bar, tail reach part of upper western bar, and Mailsi-Syphon canal circles are irrigating Multan region. These canals command areas stretched over Vehari, Khanewal, Lodhran districts. The Sindhnai-Mailsi-Bahawal (SMB) Link canal is upper reach boundary of Multan zone. The Thingi, Shergardh, and Mailsi canal division are located in these canal circles. The Index plan of these canal circles are shown in figure 12.

The major issues faced by Lower & Upper Western Bar and Mailsi-Syphon canal circles were cross regulators at canal/distributary offtakes, sewerage/waste disposals of urban areas into canal system, canal linings, official residencies (Rest-house, SDO residency, Sub-engineer residency, Support Staff residencies), rest-houses infrastructures (Roads, Boundary walls, recreational parks, sewerage, and water supply etc.). The existing conditions assessments of these features are discussed below along with short descriptions.

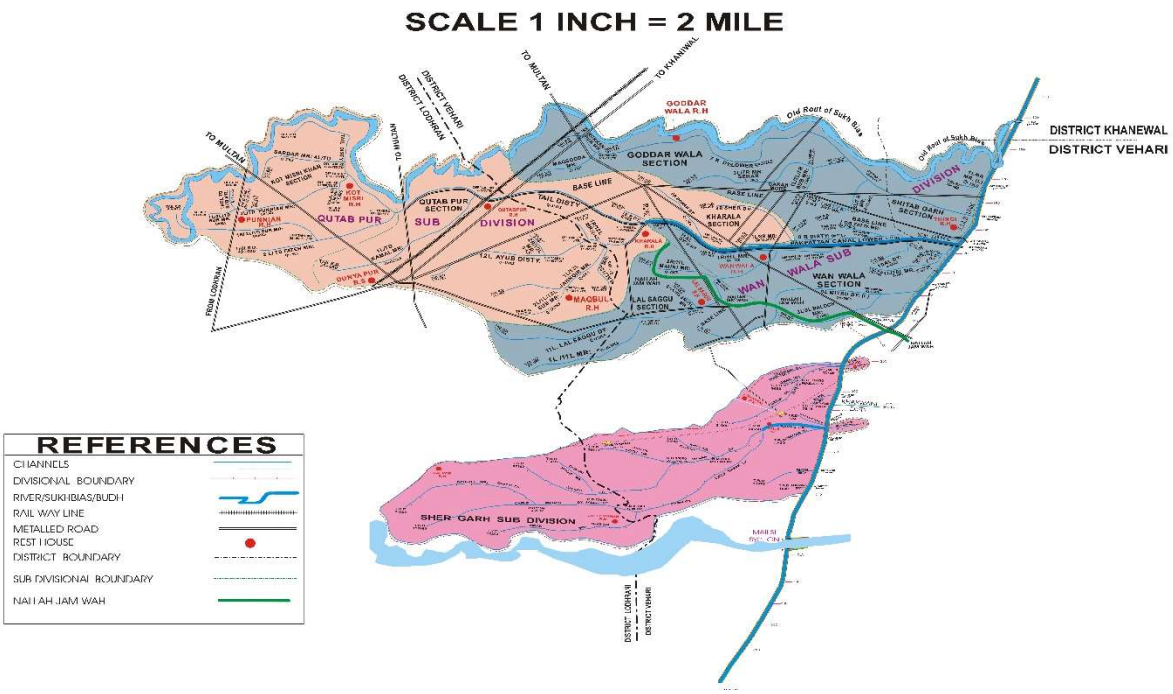


Figure 12: Upper & Lower Western Bar and Mailsi-Syphon canal circle Index Plan

The Thingi rest house located at Thingi town on left bank of SMB Link Canals. This rest house comprises on official premises of Upper & Lower western bar and Mailsi-Syphon executive engineers (XENs), their residencies including support staff's residencies, government offices (Agriculture, Police, Revenue and Education), Schools, gym & sport complex and recreational park for families. The most of places are abandon due to deterioration as shown in figure 13. The water supply & sewerage system, access road and electricity facilities are also in poor condition which are required to upgraded and modifications.

Figure 12: Thingi Rest-house at Thingi Adda on SMB Link Canal division.

The three canals namely Dhamaki distributary, Mailsi canal, and Mailsi distributary are under jurisdictions of Shergardh sub-division of lower western bar. The Shergardh and Mailsi Rest houses are located in this sub-division. The rest house, official staff residencies, and staff offices assessed and shown in figure 13. The Shergardh rest house was part Sahiwal division but now its part of Multan division in latest canal division formation. So, it was assessed that construction location of official staff residencies (SDO, Sub-engineer, and support residencies) will be more appropriate at Mailsi rest-house instead of Shergardh rest house. The Mailsi rest house and areas available for construction of official residencies are also shown in figure 13. The Mailsi-Syphon located across River Sutlej where SMB link canal crosses below bed of River Sutlej and supplies water into Bahawal canal in Bahawalpur Irrigation zone. The location of Mailsi Syphon is also shown in figure 13.

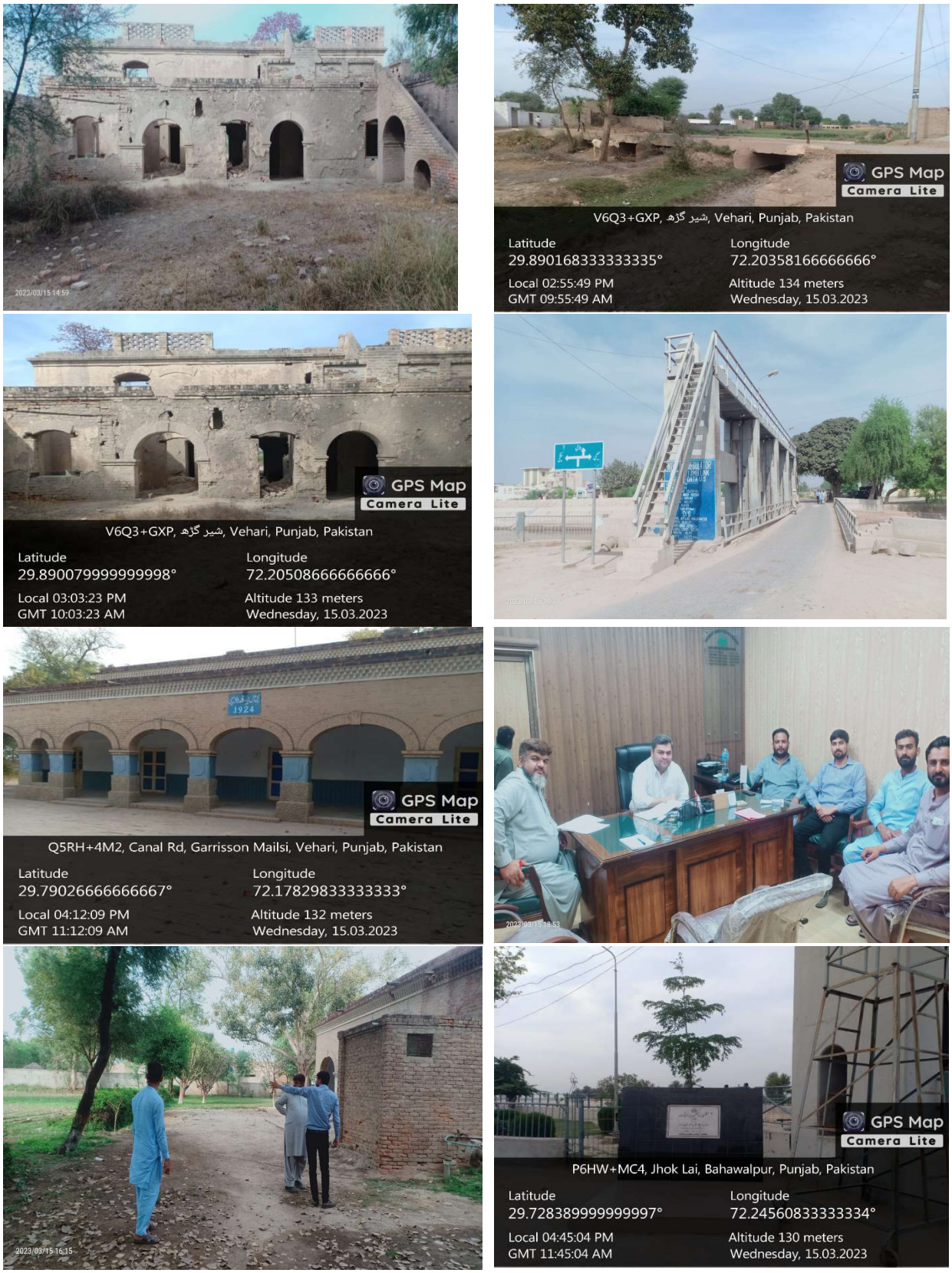


Figure 13: Shergardh & Mailsi Rest-house, and Mailsi-Syphon

The Urban waste water disposal in irrigation canal are major issues which is faced by irrigation department. These problem cause deteriorations of canal structure as well as canal water quality. The similar issues arise with Mailsi distributary when its flow along Mailsi city from its RD 16+000 to its tail RD. The effluent disposals and canal condition assessment shown in figure 14. It is recommended to lining of Mailsi distributary from RD 16+000 to tail RD along with disposal of waste water into public health waste water disposal plant located near Mailsi city.

Figure 14: Condition Assessment of Mailsi Canal along Mailsi City

Lodhran Canal Circle of Multan Region:

The Lodhran canal circle located in district Lodhran. The Lodhran index plan is shown in figure 15. The Lodhran canal division comprises over Mailsi canal off-taking from Shergardh headwork and its distribution system. The distribution of Mailsi distribution consist of Chit Dain (CD) distributary, Mahmood, Lodhran branch, Bahisht distributary, Shanel distributary, and Gopal distributary canals and their irrigation network.

The major issues faced by Lodhran canal circles were cross regulators at canal/distributary offtakes, sewerage/waste disposals of urban areas into canal system, canal linings, official residencies (Rest-house, SDO residency, Sub-engineer residency, Support Staff residencies), rest-houses infrastructures (Roads,

Boundary walls, recreational parks, sewerage, and water supply etc.). The existing conditions assessments of these features are discussed below along with short descriptions.

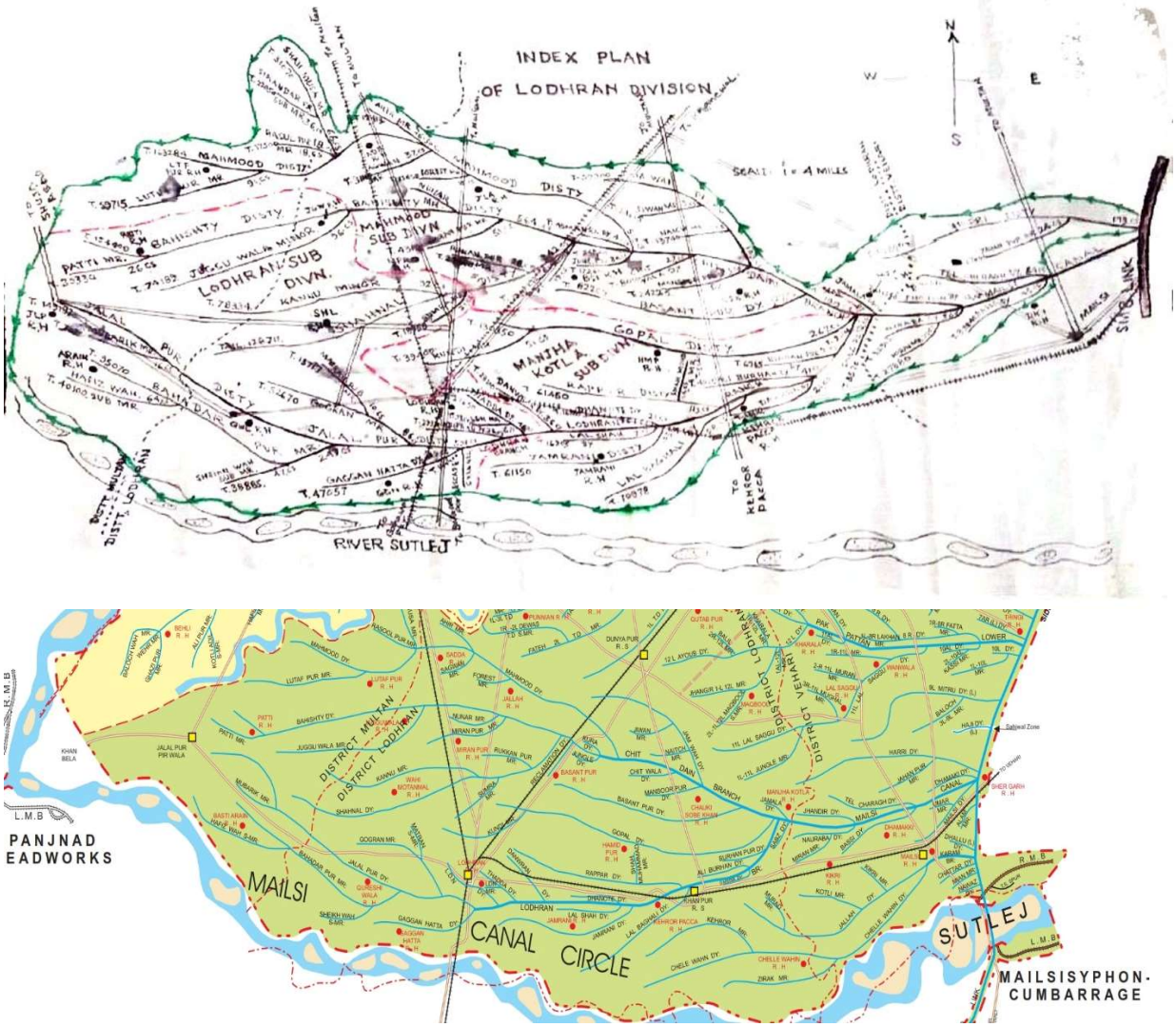


Figure 15: Lodhran Canal Index Plan

The cross regulators at canal/distributary offtakes and their lining are one of main issues which is required to address. The canal condition assessments are shown in figure 16. There are number of locations where rehabilitation of cross regulators and lining of main, distributary, and minor canals as listed below:

I. Rehabilitation of Cross Regulator.
   i. Hafiz wah minor off-taking from Bahadur minor canal.
   ii. Sheikh wah minor off-taking from Lodhran branch canal.
   iii. Cross regulator at RD 60+000, 80+000, 98+000, and 105+000 at Lodhran branch canal

II. Lining of distributary / minor canals.

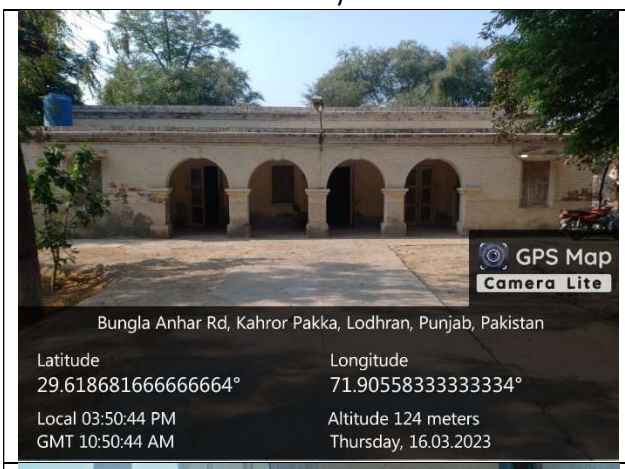
i. Hafiz wah minor from RD 0 to tail RD (40+000)
ii. Sheikh wah minor from RD 0 to tail RD (38+885)
iii. Mahmood distributary minor from RD 130+000 to tail RD (163+000)
iv. Jaggu wala minor from RD 28+000 to tail RD (74+180)
v. Shanel distributary from RD 90+500 to tail RD (128+711)
vi. Basantpur distributary from RD 48+000 to tail RD (84+000).

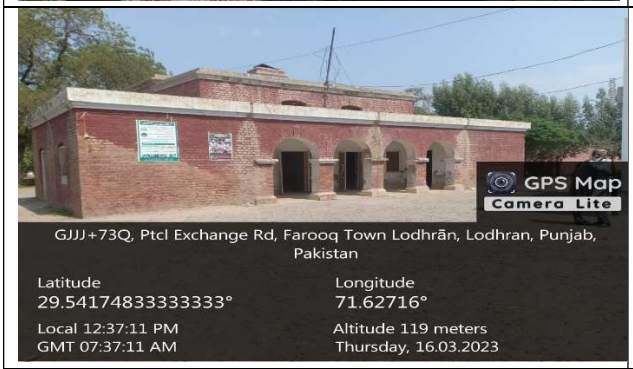
Figure 16: Infrastructure Assessment of Lodhran Canal Circle.

The official residencies in rest house, gauge reader huts, rest house civil infrastructures (roads, boundary wall, mosque, and parks) are deteriorated in most of rest houses in Lodhran canal circles. The rest-houses condition assessments are shown in figure 17. The following rest-houses assessed and evaluated to recommend appropriate suggestion for Rehabilitation or upgradation.

A. Lodhran Rest House (SDO/R, 2 SE.Q, 4 MQ, R, WSS, and Solarization recommended)
B. Krodh Pakka Rest House (1 SE.Q, 3 MQ, R, WSS, BW, and Solarization recommended)
C. Manjha Kotla Rest House (1SE.Q, 2 MQ, BW, and Solarization recommended)
D. Dhamaki Rest House (1SE.Q, 2 MQ, BW, and Solarization recommended)
E. Jaggu Wala Rest House (1SE.Q, 2 MQ, BW, and Solarization recommended)
F. Choki Sobay Khan Rest House (1SE.Q, 2 MQ, BW, and Solarization recommended)

G. Lutufpur Rest House (1SE.Q, 2 MQ, BW, and Solarization recommended)
H. Basantpur Rest House (1SE.Q, 2 MQ, 1GH, BW, and Solarization recommended)





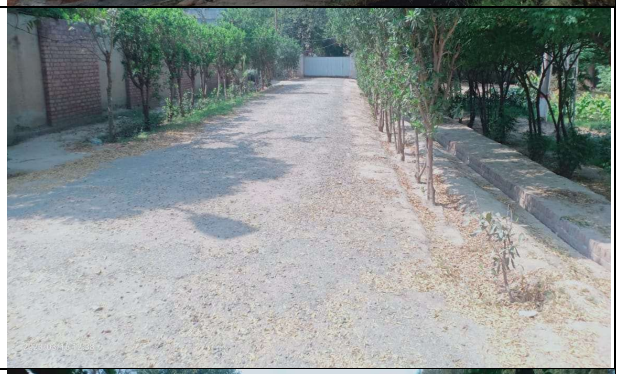


Figure 17: Shujabad canal circle Irrigation Network and Boundary

Water Resources and Irrigation Assessment of Multan Region:

Pakistan's economy is largely based on its agricultural produce. Water is therefore a critical resource for its sustained economic development. In order to fully utilize the river water resources, the IBIS has emerged as the largest contiguous irrigation system in the world. The Indus Basin Irrigation System (IBIS) comprises of three large dams, eighty-five small dams, nineteen barrages, twelve inter-river link canals, forty-five canal commands and 0.7 million tube wells in monetary terms, this network is the biggest infrastructure enterprise of Pakistan accounting for approximately US$ 300 billion of investment.

During the British colonial period, the irrigation system was expanded and modernized. The British built large dams and canals to increase the amount of water available for irrigation. The construction of the Sukkur and Taunsa Barrage in the 1930s was a major achievement during this period. After the independence of Pakistan in 1947, the government continued to invest in the irrigation system. The construction of the Terbela Dam in the 1970s and the Mangla Dam in the 1960s were major milestones in the expansion of the irrigation system.

The most of irrigation network and its infrastructure has been developed mostly before the independence of Pakistan. Therefore, field administrative setups such as rest-houses, barrages/ headworks, canals head/cross regulators, official residencies, and their offices reflect historical infrastructures were assessed on basis of following existing observations.

Rating	Asset Condition	Description
A	**Excellent**	No noticeable defects. Some aging or wear may be visible
B	**Good**	Only minor deterioration or defects are evident

C	**Fair**	Some deterioration or defects are evident, but function is not significantly affected
D	**Poor**	Serious deterioration in at least some portion of the structure. Function is inadequate
F	**Failing**	No longer functional. General failure or complete failure of a major structural component

The following assessments conducted on basis of site visit and information collected during filed visit from March 13 to 18, 2023.

a) Rehabilitation / Upgradation required in most of rest-houses premises which includes official residencies & offices, roads, water supply & sanitation, sewerage, recreational parks, boundary wall, and renewable energy.
b) Rehabilitation / Upgradation required in most of Head work premises which includes telemetry, gauge reader huts, and head work infrastructure.
c) Rehabilitation or construction of head / cross regulators, flood protection bunds, and bridges over main, distributary, and minor canals.
d) Rehabilitation / upgradation of canal hydraulics (canal linings, and falls).
e) Enhance groundwater resources options through artificial recharge.

Water Resources and Irrigation Plans of Multan Region:

The water resources and irrigation development plans were prepared for three planning cycles i.e.

a) Short Term Plans (02 Years Plans, 2023-2025).
b) Medium Term Plans (05 Years Plans, 2023-2028)
c) Long Term Plans (10 Years Plans, 2023-2033)

These plans developed after conducting conditions and requirement assessments of existing infrastructures. These water resources and irrigation short, medium, and long-term plans are as followed. The detailed costing and budget have been prepared and attached as volume of bill of estimates separately.

Proposed Schemes	Scope
1. Constructions of Head / Cross Regulators ❑ Construction of cross regulator on Shershah Distributary off-taking from Shujabad Canal at RD 279+000, Multan.	❑ Construction of head/cross regulator to regulate flow.

❑ Construction of cross regulator on tail RD 9+400 of flood escape channel off-taking from Nawabpur head regulator on Shujabad Canal to protect Nawabpur head regulator during flood season, Multan.	❑ Conservation of head regulator from back flood water during flood season.
2. Rehabilitation and Construction of Official residencies ❑ Construction of residency for SDO (01 No.), Sub-Engineer (01 No.), Mineral Quarters (03 Nos.) at Nawabpur Rest House Multan. ❑ Construction of recreational park, swimming pool, sport court, roads, drainage network, and repair of rest house building at Thingi rest house Vehari. ❑ Construction of residency for Sub-Engineer (01 No.), Mineral Quarters (03 Nos.), and repair of rest house building at Shergardh rest House Vehari. ❑ Construction of roads, drainage network, and repair of rest house building at Lodhran rest house Lodhran	❑ Repair of existing infrastructures ❑ Government official residencies for sustainable and effective utilization of resources in public interest ❑ Re-creational park to attract public and generate revenue for Irrigation Department

Medium Term Plans

Proposed Schemes	Scope
1. Rehabilitation and Construction of Official residencies ❑ Construction of residency for SDO (01 No.), Sub-Engineer (01 No.), Mineral Quarters (03 Nos.) at Mailsi Rest House Mailsi. ❑ Construction of residency for Sub-Engineer (01 No.), Mineral Quarters (03 Nos.), and repair of rest house building at Manjha Kotla rest House Mailsi. ❑ Construction of residency for Sub-Engineer (01 No.), Mineral Quarters (03 Nos.), and repair of rest house building at Jaggu-wala rest House Lodhran.	❑ Repair of existing infrastructures ❑ Government official residencies for sustainable and effective utilization of resources in public interest ❑ Re-creational park to attract public and generate revenue for

❑ Construction of residency for Sub-Engineer (01 No.), Mineral Quarters (03 Nos.), and repair of rest house building at Choki Sobay Khan rest House Lodhran. ❑ Construction of residency for Sub-Engineer (01 No.), Mineral Quarters (03 Nos.), and repair of rest house building at Krodh Pakka rest House Krodh Pakka. ❑ Construction of residency for Sub-Engineer (01 No.), Mineral Quarters (03 Nos.), and repair of rest house building at Dhamaki rest House Mailsi ❑ Construction of residency for Sub-Engineer (01 No.), Mineral Quarters (03 Nos.), and repair of rest house building at Basantpur rest House Lodhran.	Irrigation Department
2. Canal Linings ❑ Canal Lining of Mailsi Distributary from RD 16+000 to Tail RD 64+400. ❑ Canal Lining of Jaggu wala disty from RD 28+000 to Tail RD 74+180. ❑ Canal Lining of Shenal Dsity off takes Chit dam branch from RD 90+500 to tail RD (128+711). ❑ Canal Lining of Mahmood disty from RD 130+000 to Tail RD 163+000	❑ Repair of existing infrastructures ❑ Government official residencies for sustainable and effective utilization of resources in public interest
3. Constructions of Head / Cross Regulators ❑ Construction of cross regulator on Sheikh wah minor off-take Lodhran Branch canal Lodhran. ❑ 13.Construction of cross regulator on Hafiz wah off-takes Bahadur distributary Lodhran.	❑ Construction of head/cross regulator to regulate flow. ❑ Conservation of head regulator from back flood water during flood season.

Long-Term Plans

Proposed Schemes	Scope
1. Flood Protection Works ❑ Construction of flood protection bund along Chenab River from Shahpur to Shujatpur in	❑ Conservation of head regulator from back

Shujabad Canal Circle to protect Jalalpur Pirwala	flood water during flood season. ❑ Protect Urban and Rural settlements from flood /high flow threats.
2. Development of Groundwater Recharge Galleries in all rest houses of Multan Irrigation Zone ❑ Construction of artificial recharge wells in all rest house of irrigation department to harvest rainwater, flood water, and residential cleaning water for revival of groundwater in area	❑ Revival of depleting groundwater resources in Multan Irrigation Zone

Irrigation Department Approved Residencies and Hydraulic Structures:

The Irrigation has developed sample design / layouts for construction of civil infrastructures such as head regulator, cross regulators, and official residencies within rest-houses and are recommended as standard of construction in all over in Punjab. These standard design layouts are shown below.

Head / Cross Regulators:

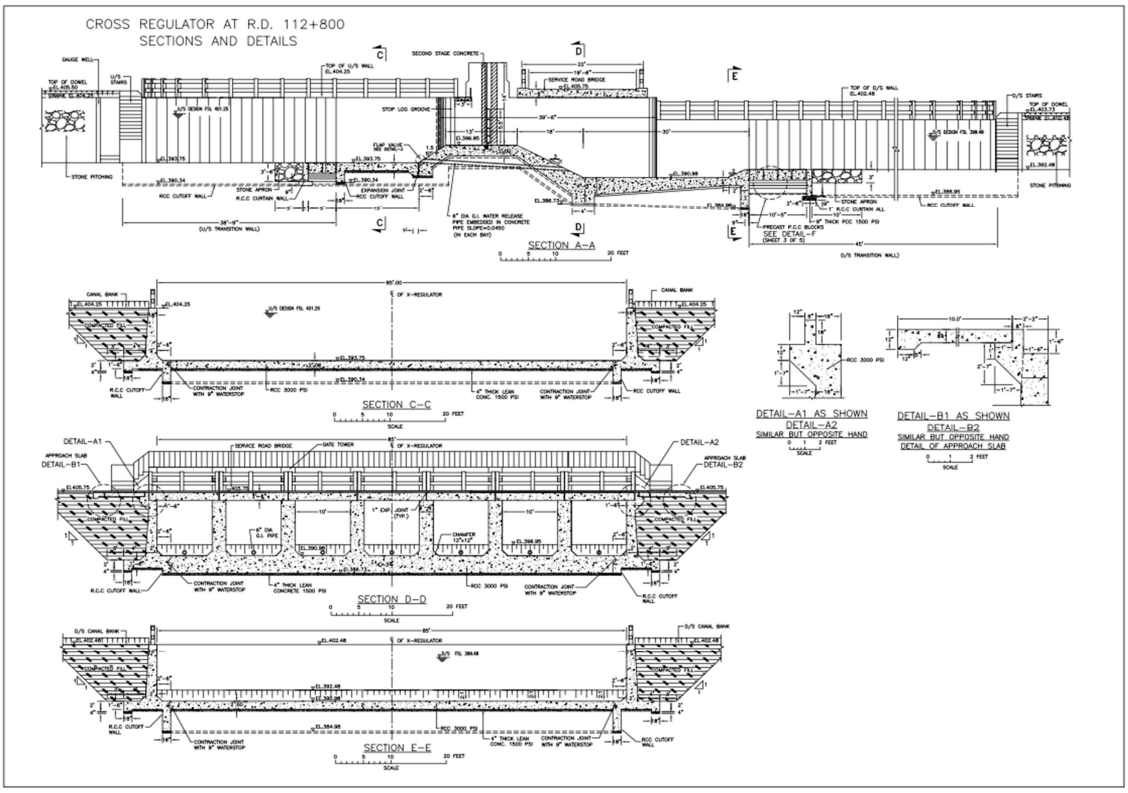


Figure 18: Head / Cross Regulator Standard 1

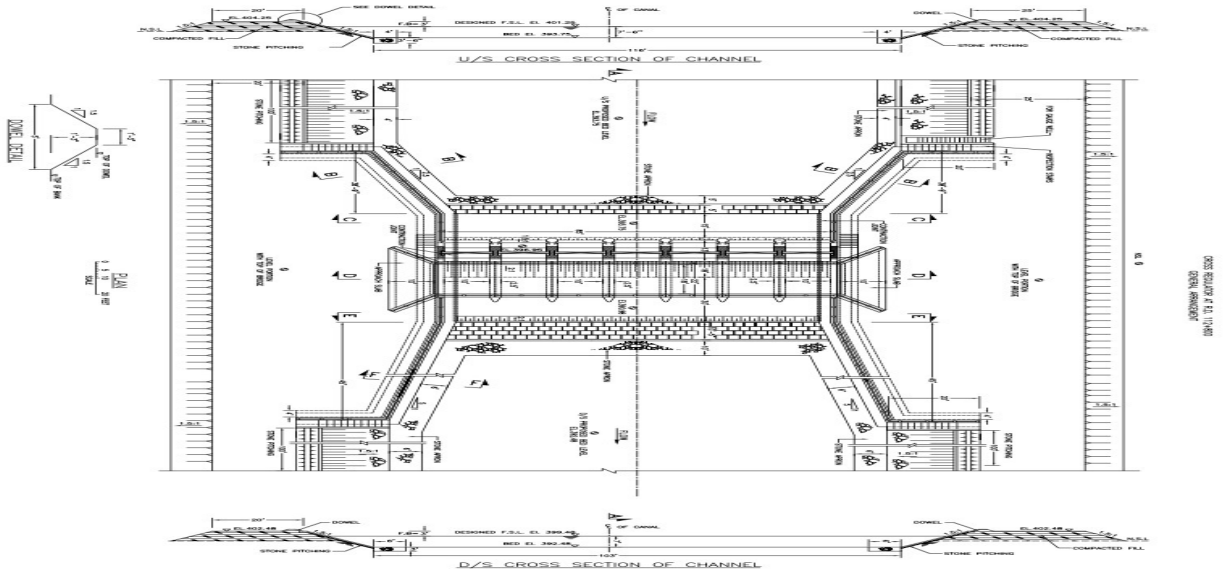


Figure 19: Head / Cross Regulator Standard 2

Residencies of Rest House:

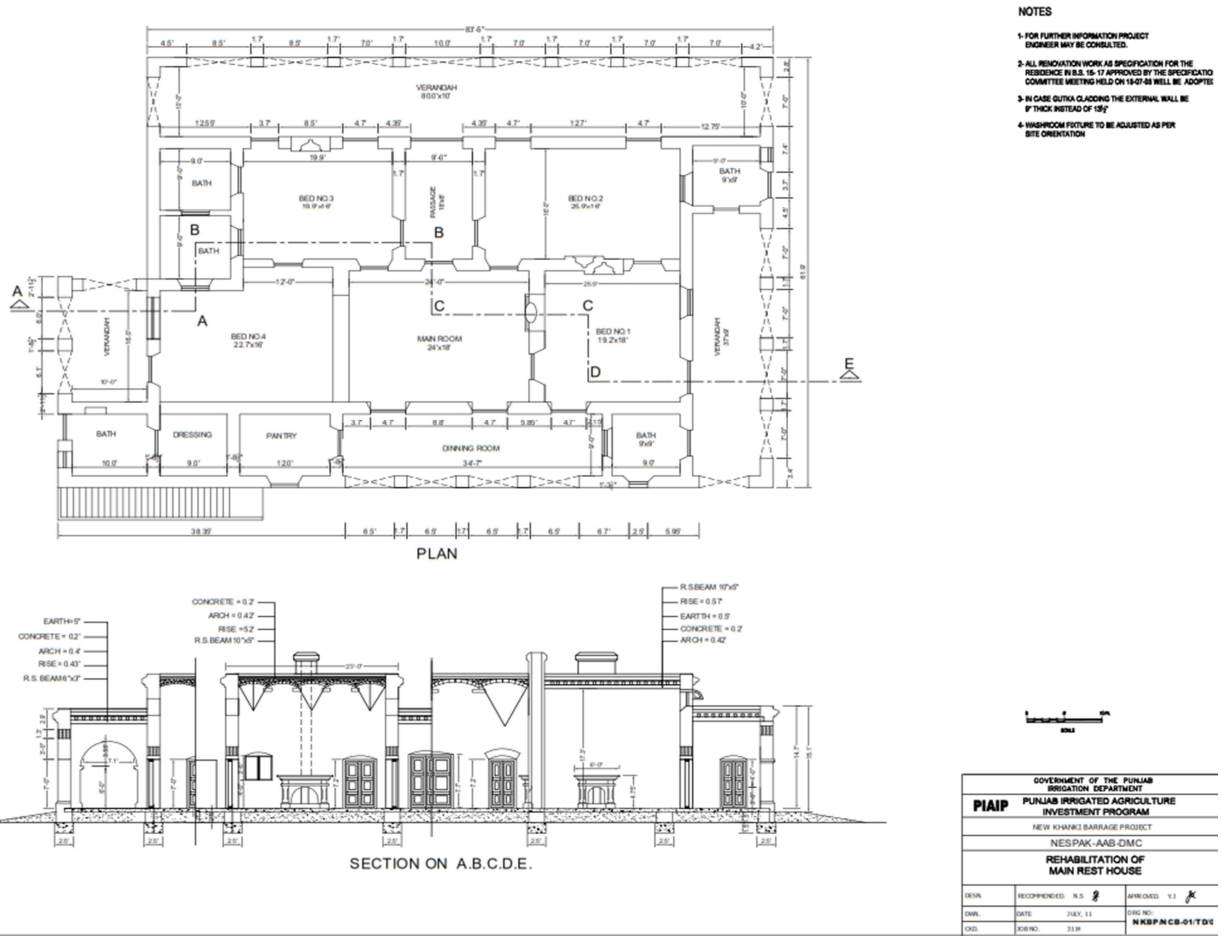


Figure 20: Rest House Design

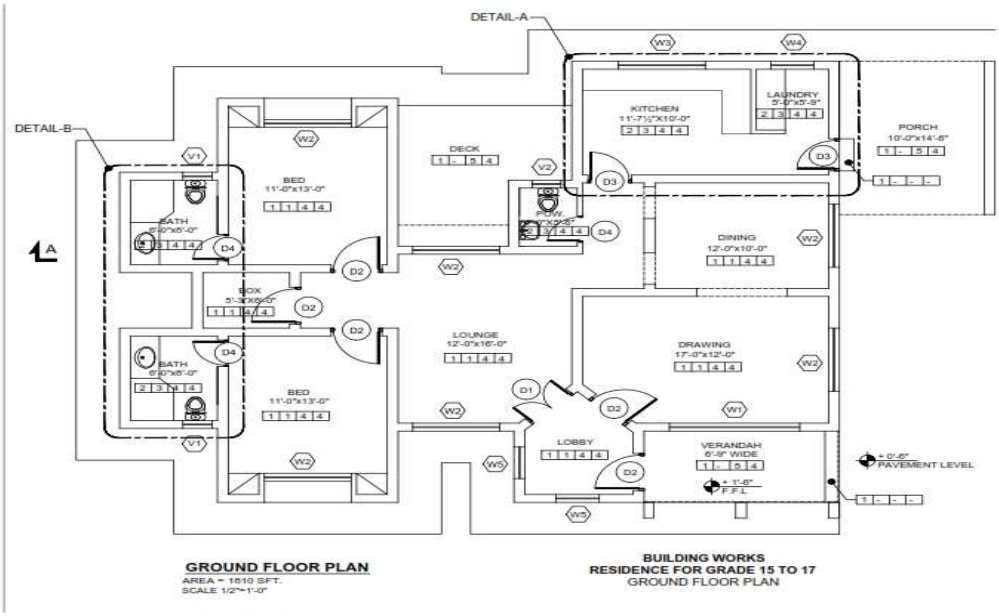


Figure 21: Sub Division Office Residency Design

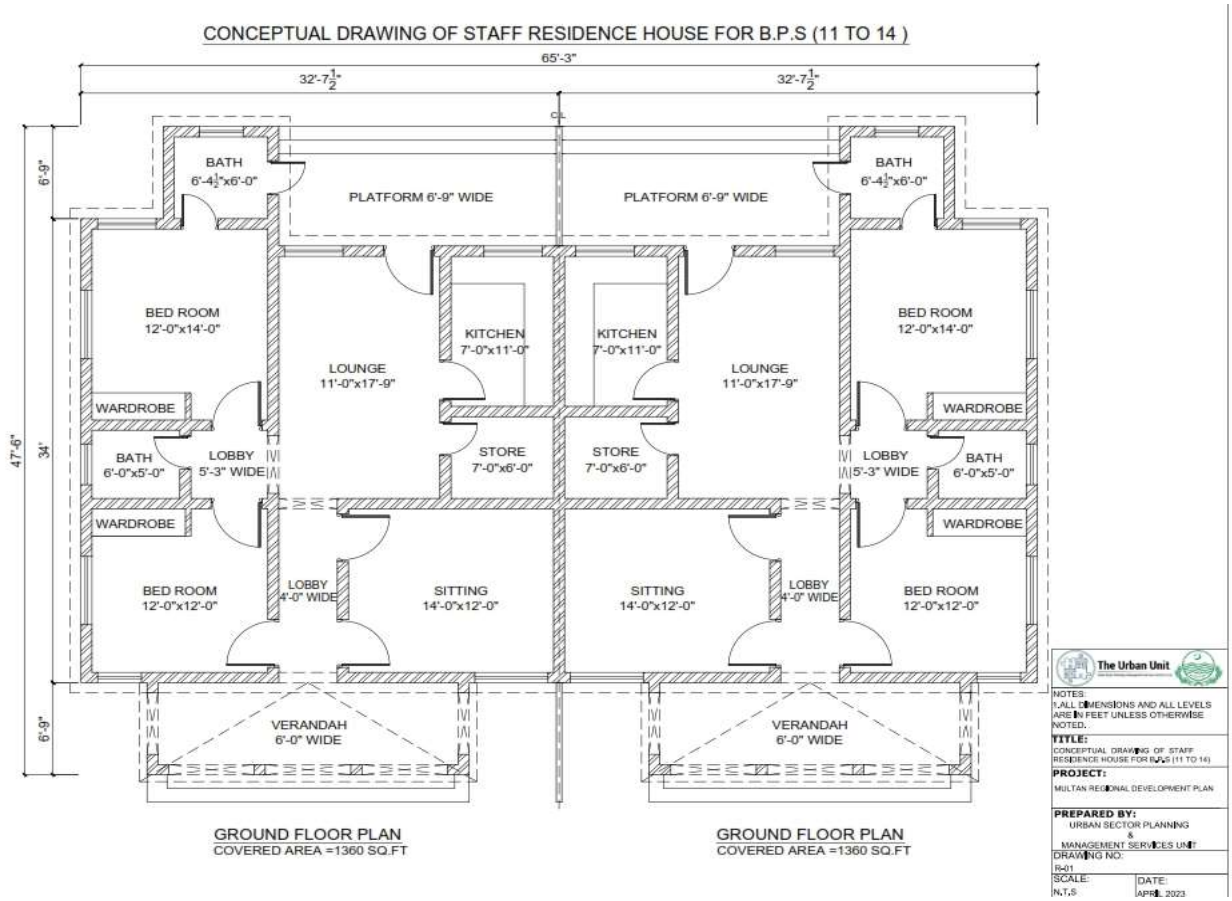


Figure 22: Sub Engineer Residency Design

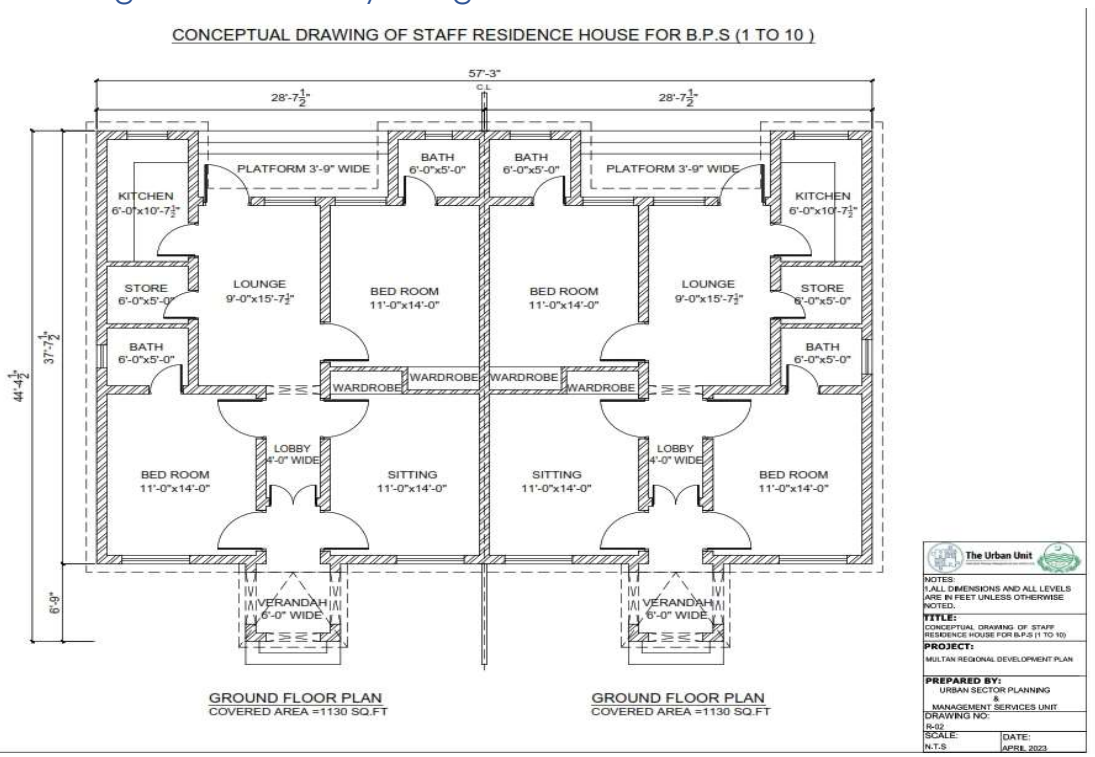


Figure 23: Gauge Reader Hut / Mineral Quarters Residency Design