

SECRETTERRAIN STUDYRAVI CHENAB CORRIDORPREFACE

1. Ravi Chenab Corridor comprises of 190 Kms of WB and 181 Kms of Intl Border. A total of 371 Kms of area assumes imp in the op strat of Pakistan Army and it is believed that it is a corridor of constraints and opportunities. Since the corridor has obtained a central place in our thought process, therefore threadbare analysis and eval of the terrain are of vital imp. It will not be naïve to mention that the dynamics of this corridor also offer an academic understanding of many notions of op strat. This study is being compiled in two vols. Vol - I entail significant aspects of terrain to incl mil aspects. Relevant anxs att give addl info. Vol-II mainly incl data on various aspects to populate our maps for objective mirco/marco planning process. It is hoped that op, int and log staff will make best use of all types of anxs for planning.



2. This edition of Terrain Study has been revised after three yrs. Being seized with another ph of escalation with India, the envt demanded objectively and op orientated comds on gr helped in myriad forms to analyse the terrain from critical angles. An effort has been made to making the study helpful for all arms and svcs. For this purposes various sources beides air and gr recce have been used. Analysis of en water reg cap, its effs and other aspects of terrain have been taken from aval maps, air photos, int reports, gr recce and data provided by MI Dte, Fmns, Irrigation / Highway, Rly, Met Depts and a lot of images have been taken from Google Earth. It is hoped that these images and photos will help the users to infer various details in broader context.

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SECRET**TERRAIN STUDY****RAVI CHENAB CORRIDOR****AIM & SCOPE OF STUDY**

Maps: West Pakistan, Jammu and Kashmir 1:250,000 sheets 43-L, P and M West Pakistan Jammu and Kashmir 1:50,000 sheets 43 H/11, 12, 15, 16, 43, K/16, 43L /1-16, 43 o/3, 4, 8, 12, 15, 16, 43 P/1, 2, 3, 5, 6, 7, 9, 10, 11, 13, 14, 15, 44, I/1-16, 44 M/1, 5, 9, 45, P/2, 3, 4, 6, 7, 8, 10, 11, 52, C/4, 8, 52, D/1.

3. **Aim.** To carryout terrain study of RCC within given bdrys with a view to record and update terrain configurations both along cisfrontier and transfrontier for op analysis.

4. **Limits of Study.** Limits of area under study is bounded by fol:-

a. **Cisfrontier**

- (1) **North.** Marala HWs
- (2) **East.** Working bdry upto Masrur – Abial Dogran
- (3) **South.** Intl border upto Syphon.
- (4) **West.** GT Rd Shahdra – Wazirabad.

b. **Transfrontier**

- (1) **North.** Line of River Chenab.
- (2) **North – East.** Paramandal Range
- (3) **South – East.** Line Pathankot-Batala Amristar.
- (4) **South.** Syphon.
- (5) **West.** Indo – Pak Bborder.

5. **Scope.** This Terrain Study focuses to provide composite info to all arms and ech of comd to plan and conduct ops according to their tasks. Therefore, main coverage is given to gen topo info, comm infrastructure, obs sys (natural / manmade). Since behaviour of River Ravi is undergoing a maj change due to const of various hydraulic structures/reservoir by India. Therefore, a spec attn has been given to “River Front” by incorporating concls of spec study conducted by Engrs 30 Corps. Mil aspects of terrain and analysis have been added to invite further analysis.

CHAPTER - I**TERRAIN STUDY - CISFRONTIER**

6. **Gen Description.** RCC is bounded by River Chenab in the north and Ravi in the south. The grain of the ground is generally from NE to SW. Numerous nullahs take-off from Parmandal Range in same direction and divide the corridor into different compartments. Degh Nadi runs almost in the middle of the corridor and divides it into two halves. Since grain of gr slopes from NE to SW, therefore all nullahs and rivers flow in same dir. The area is plain, irrigated, thickly populated and comm infrastructure is well dev rt up to the WB / Intl border. The lopsided alignment of WB / Intl Border forms numerous salients, however, Pukhlia and Shakargarh Salient are prominent thus jetting out into en territory, whereas Arnia Salient give en similar advantage comparable with own Shakargarh Salient. Besides, three enclaves across River Ravi i.e. **Jassar enclave** in Shakargarh Sec, **Sherpur and Bhago Kamo enclaves in Maqboolpur Sec** are imp pivot of mnvr. Strat objs in the area are Marala HWs, Sialkot, MRL, BRBL, UCC, **Sialkot International Airport** and GT Rd. The area is broadly divided into three secs i.e. Sialkot, Shakargarh and Maqboolpur Secs.5



7. **Met Conditions.** Details are given in **Vol II Anx A.**

a. **Seasons.** Various seasons fall as under: -

- | | | | |
|-----|--------|---|-----------|
| (1) | Winter | - | Oct – Feb |
| (2) | Spring | - | Mar – Apr |
| (3) | Summer | - | May – Aug |

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(4) Autumn - Sep – Oct

- b. **Rains.** The rainy seasons are well defined i.e, the summer monsoons during Jul-Aug and winter rains from Dec-Jan. The monsoon rains are characterized by violent thunderstorms, hy showers, drop in temp and inc in humidity. Rivers and nullahs swell and gen overflow their banks. X cty mov becomes very difficult. Winter rains are in the form of lt showers and these do not pose maj X cty mov problem. The mean monthly rainfall is 212 to 466 mm during monsoons. The average annual rainfall is approx 975 mm. During winter, only lt showers are recorded. The month of Nov, Dec, Jan and Feb are gen dry, which have avg monthly rainfall of 25 mm. Main rainy months are as under:-

(1) Winter - Dec – Feb

(2) Summer - Jun – Sep

- c. **Vis.** The fog obstructs Vis during the early mornings of the winters. Dust storms are common during summer, which also restricts vis.
- d. **Wind.** The winds gen blow from north to south. Dusty winds of 5-7 knots blow from Apr-Jun and adversely eff the vis. Gentle breeze is experienced during day, blowing from east to west and in the opposite dir during ni due to eff of rivers and maj canals in the vicinity.
- e. **Temp.** The area has moderately hot summers and cold winters. May, Jun, Jul and Aug are the hottest months.

Season	Temp	
	Min	Max
Summer	35	48
Winters	1	22

Topo

8. **Rel.** The area is gen flat, open and well cultivated. Chenab, Ravi and Jammu Tawi are main rivers in the area. MRL, UCC and BRBL are the maj canals in the area with a no of distys. The entire area is studded with vills and towns. Sialkot is a maj industrial city loc in close proximity of the border. Other imp towns are Shakargarh, Narowal, Sambrial, Jamke, Dhamtal, Badiana, Chawinda, Daska, Pasrur and Qila **Ahmed Abad**. The entire area is well served with rds/trs. Sialkot is linked with

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Wazirabad, Chawinda and Pasrur by broad gauge rly line. Vills are loc on high gr. Small mounds and OP tower/bunds in the area provide good obsn. The cross cty going for all types of vehs is possible in the entire area during dry weather. Pukhlian Salient becomes almost inaccessible during monsoon season. During floods, area in close proximity of all maj rivers and nullahs gets flooded and no cross cty mov is possible.

9. **Drainage.** Gen slope of the area is from NE to SW. It is well drained by water channels in the area. The area South and SW of Marala-Chaprar Bund does not have any noticeable drainage sys and going becomes difficult during rainy season. Approx 1-2 m water remains stagnant between Marala, Chaprar and SE of it, thereby making going from both these dir difficult. The area between Aik and Degh Nadi is suitable for all types of mov during dry season due to good drainage sys. However, during monsoon season nullahs over flow their banks and surrounding area is flooded, thus affecting X cty mov of all types of vehs. Since almost all towns/vills are loc on high gr, therefore these do not pose any drainage problem.

10. **Vegetation**

- a. **Crops.** This area is well-cultivated yielding two crops a year. Wheat, rice and sugarcane are the maj crops grown in the canal irrigated area. Except for the paddy fds, all other crops provide adequate cover for inf from gr and air obsn. The paddy fds become eff obs for veh mov from Jul to Sep. Scattered clumps, orchards are aval, and these provide ltd cover.



- b. **Forests/Orchards.** Vol-I - **Anx S.** Scattered clumps, trees and orchards are aval and provide ltd cover. Groves of trees are normally found near towns, vills and along rivers/canals. A few vills have adequate vegetation, spec around Eminabad. These plantations mainly

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comprise of eucalyptus trees and these are planted by the locals for commercial purposes.

- c. **Elephant Grass.** It is found in low lying areas where water often remains stagnant. This provides cover from gr obsn and it can be used as improvised rd expedient. Main stretches of land bearing elephant grass or sarkanda are:-

- (1) Areas along River Chenab.
- (2) Astride Degh Nadi covering an area of about 100 m either side.
- (3) Astride Bhed Nullah at few places 50 to 75 m in width.

11. **Soil Analysis**

- a. **Soil Conditions.** The soil in the area is predominantly clayey and gen saline. During rains, areas of rice cultivation turn into slush and these reduce traction of vehs and going becomes very difficult.

- (1) Area near MRL Canal and UCC have sandy clayey soil.
- (2) **Banks of Degh Nadi have sandy soils with claye top layer making the X Cty move difficult during rainy season.**
- (3) **Fields on home bank of river Ravi have alluvial soils with adequate sand contents. Move of B vehs is difficult in rainy season due to clay content, however, creation of bog through inundation esp for tr vehs is also difficult due to sandy nature of the soil.**
- (4) The area near River Chenab has alluvial type soil of grey or brown colour.
- (5) Beds of canals/distys, nullahs/drains have a mixture of sand and clay.
- (6) The land is extremely fertile and well cultivated but area north of Marala- Chaprar bund and area west and east of Marala HWs is marshy / boggy, especially during rainy season.

- b. **Water Table.** Water table varies from 5-15 m. In rainy season water table rises as high as 2-4 m. Various soil conditions of the area can be summarized as under:-

- (1) Area 1-2 kms along River Tawi, east and west of Marala.

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(2) Both sides of MRL, UCC, BRBL and Degh Nadi have higher water table ranging from 1-3 m.

- c. **Tfc.** Gen the gr being firm, permits good tk going during dry weather except in marshy/boggy/higher water table areas. X cty mov of all types of vehs is possible during dry weather, however, the mov of B vehs is obstructed by bunds, fds and small irrigation channels. During the pd from Jul to Sep the going is affected by cultivation of rice in maj portion of the area. All rivers / nullahs, in the area over flow during monsoons and become impassable and turn the adjacent areas into slush which adversely hinders the mov.

Misc Aspects

12. **Obsn and F of Fs.** The bunds, vills, escarpment and high grs provide good obsn and F of Fs. However, in winter vis is reduced during early hrs due to fog, rain and haze. Clumps, elephant grass and standing crops eff the F of Fs of flat trajectory wpns.

13. **Cover and Clt.** The flat nature of the terrain does not provide much cover from view / fire except for the bunds and water channels. Bunds, scattered clumps, res forests (Rakhs) and standing crops provide cover from fire and obsn. The various rakhs in the area provide adequate cover to a bde size force.

14. **Mov.** During dry season/winter, x cty mov of all type of vehs is good except through some of the boggy patches near all rivers/canals. During summer, particularly during the monsoons x cty mov is extremely difficult.

Engr Aspects of the Terrain

a. **Const Sites.** Being flat with firm soil, the area poses no problem in dev/const of new rds and trs. Similarly const of airstrips is also possible.

Const Material

(1) **Timber.** Sheesham and other trees, suitable for temp const are aval in abundance.

(2) **Sand.** Beds of canals, rivers and nullahs can provide adequate qty of sand.

(3) **Bricks.** A large no of bricks kilns are present in the area that can sup large qty of bricks.

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(4) **Gravel and Rock**. It is not aval and therefore these have to be tpt form other areas.

c. **Water Sup**. The area has large no of tube wells op by both elec and diesel. Water storage tks exist at Sialkot, Marala, Pasrur, Chawinda and Daska. Water is adequate both for human/animal consumption and for const.

16. **Log Aspects**. The area has a wide spread cottage industry of surgical instruments, leather/rubber and sports goods while the factories are conc around Sialkot and Daska. None of these industries is engaged in def production. However, network of small and med workshops can help in generating local procurement of mechanical and electronic items of mil use.

Sec wise Terrain Analysis

17. **Sialkot Sec**. This sec can be divided into two sub secs i.e North and South of Sialkot:-

a. **North of Sialkot - Pukhlian Sub-Sec**. This sub sec is formed by two

rivers originating from Jammu, essentially washed by the Parmandal Range. River Jammu Tawi and River Tawi are joined by numerous nullahs before joining River Chenab. Munawar Tawi also joins River Chenab close to MHWs after flowing from NE to SW. Terrain in this sub sec is gen flat and open with firm soil. The gr slopes from NE to SW and it is interspersed by numerous nullahs. The



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entire area is thickly populated and extensively cultivated. The vills are loc at reg intervals and provide good obsn and their incorporation will provide str to def. Tr / Rd Akhnur-Khairi-Kachi Mand-Pukhlial-Sidhra and rd/tr Jammu-Gajansu-Chumbian-Sidra are the maj penetrants in this sub sec. Going in this sub sec is poor. The channels do not pose any difficulty to the vehicular mov in dry season. Pukhlial salient almost becomes impassable for 24 hours after the rains. During floods going across Tawi too is very difficult and it would entail maj engr effort. There are no of orchards and res forests. Three imp res forests are loc along the northern side of River Tawi, and these can accommodate up to a Bde plus size force. The sub sec has both tac and op significance. A cl 30 Al rd connects the base of the salient with the tip. A RCC br on River Tawi has been const which is the only Xing for civ tfc into Pukhlial sub sec. The salient is protruding into Indian territory posing **dir threat to Akhnur** which is **barely 6.5 km from its northern tip**. The salient is approx **14 Kms at the base and narrows down towards the north forming two narrow necks**. The lower neck is 2.7 Kms wide and upper neck is 2.4 Km wide.

- b. **North of Sialkot - Tawi-Palkhu Sub Sec.** This sub sec is flanked by

River Tawi in the North and Palkhu Nullah in the South. The area has a fairly well dev comm infrastructure.

MHWs an obj of both psy - mil and psy - eco imp, lies in the NW of this compartment. Marakiwal Forest loc imed North of



Sialkot can accommodate upto a bde minus size force. **Kotli Arian Res Forest (3x2 kms)** lies SE of twin canals, about 3 Kms South of MHWs.

- c. **South of Sialkot – Pulkhu - Degh Sub Sec.** This sub sec is bounded by **Palkhu Nullah in the North and Degh Nadi in the SE**. Terrain in

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this sub sec is flat, open and firm and provides good going in dry weather. There is **no natural obs in this area except Palkhu, Aik and Hasri Nullahs, which are partial obs.** Two main canals MRL and UCC run west of this sec and these are complete obs when flowing. All towns and vills are linked with rds / trs. The whole area is densely populated and extensively cultivated. The **famous penetrants of Ranbir Singpura – Nandpur – Jura, Jammu – Ranbir Singpura – Suchet garh – Sialkot** are loc in this sub sec. During paddy growing season, X-cty mov is gen difficult. Entire area is well served with rds/trs and is studded with villages. Bunds, villages, mounds loc on higher gr assume significant tac imp. Area immediately south of Rd Sialkot – Zafarwal is low lying and it is affected by the monsoon rains. Cover is aval in the shape of **Gunna Bit Rakh (Bde minus size force), Rakh Baba Bure Shah (Bde size force)** and other seasonal crops. **Other Res forests existing in the area are:-**

- (1) **Talwandi Res Forest.** (Bde size Force)
- (2) **Chanoki Res Forest.** (Bde size Force)
- (3) **Seowal Res Forest.** (Bde size Force)

18. **Shakargarh Sec**

- a. **Zafarwal Sub Sec.** The area is bounded by Degh Nadi in the NW, working bdry in the north, River Bein in the East and rd Qila **Ahmedabad**– Sankhatra – Nurkot in the south. The area north of line Sakror – Darman – Maryal is gen broken and undulating whereas in the south it is flat and open. The lay of the gr is from north to south. The area is densely populated with numerous vills and small towns. The vills are mostly loc on high gr. Def bund provides good obsn and F of Fs. Cover is aval in the form of clumps / orchards. The imp towns / vills are Zafarwal, Darman, **Tarapur** Chak Amru, Laiser Kalan and Azizpur. There are no of small nullahs which run from north to south. Basantar, Karir nadi, Cho and Hodla Nullah are the main obs in the area during the monsoon. During monsoons, the nullahs become unfordable. Nullah beds are soft and sandy and req some engr effort to negotiate. The

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metalled rds in the aea are rd Chawinda – Zafarwal – Shakargarh, rd Zafarwal - Narowal and rd Zafarwal – Darman – Laiser Kalan – Shakargarh.

- b. **Shakargarh Sub Sec.** River Bein bound this area in the west and WB/IB on other three sides, thus making it a triangular shaped salient. River Bein forms the broad base of the triangle and measures about 48 kms. The grain of the gr is from NE to SW and soil is firm and clayey. River Bein is not fordable during monsoons. There are no of small nullahs running from NE to SW. The area south of Rd Shakargarh – Ikhlaspur is gen flat and open. X cty mov is good except in rainy season. Going, however is restd near River Ravi. Area north of Rd Shakargarh – Ikhlaspur is broken and undulating and makes an escarpment. The area is thickly populated. Ikhlaspur, **Nurkot** and Kot Naina are significant towns/vills. A large no of def/flood bunds exist in the area, which provide good obsn and F of Fs. The cover is aval in the form of orchards, nullahs and vills. Kukar is a significant enclave in the area. The area opposite Kukar enclave is boggy due to stagnate water. Some imp rds in the area are Rd Shakargarh – Kot Naina, Rd Shakargarh – Ikhlaspur and Rd Shakargarh-Masrur Bara Bhai. Shakargarh – Chak Amru and Shakargarh – Narowal are broad guage rly lines.
- c. **Narowal Sub Sec.** Degh Nadi and MRL Canal in the west, Rd Qila **Ahmadabad** – Sankhtara – Nurkot in the north, River Bein in the east, River Ravi and intl border in the south bound the area. The soil is clayey with compact patches of sand near River Ravi. During dry weather X cty mov is possible however, mov will be restd to rds during wet weather. The vills, rly embankment and bunds provide good obsn F of Fs and def lines. River Ravi has obs value (**Impact of water con by Indians has reduced its obs value considerably. For details ref Chapter – II**) and it changes its course

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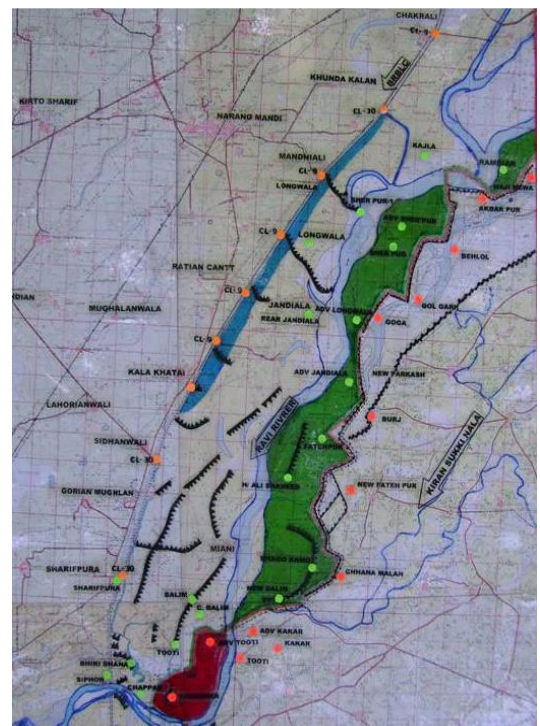
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frequently, thereby, creating enclaves on its either side. Dharam and Jassar are the maj enclaves. Most of the area is either barani or irrigated by tube wells except in close proximity of MRL Canal. BUAs and clumps provide cover. Narowal, Raya, Baddomalhi, Qila **Ahmadabad** and Sankhatra are the significant towns in the area. The broad gauge lines from Shakargarh to Narowal and Sialkot to Narowal make a junc at Narowal.

19. **Magboolpur Sec**

- a. **Narang Sub-Sec.** MRL/BRBL Sub Link bound it in north, BRBL upto link (6272) in the east and intl border / River Ravi in the south/SE. This sec is comparatively more populated, fertile and plain and gr slopes from NE to SW with a gentle gradient. The comm infrastructure is fairly dev besides few med and large sized vills link various trs in the south. X cty mov is good for all types of vehs during dry season while in rainy season mov of veh is restd only to existing trs. The distys of MRL and BRBL spread over in the area and these provide good irrigational network. Sub Link canal links MRL with BRBL. Maj obs are Sub Link (6873), Escape Channel (6565), MRL Canal (6871), Shahdra disty and Jajo Gill Minor (6770). Moreover, a broad guage single line rly tr is also aval in the sec which runs from Shahdra to Narang and onwards to Narowal / Shakargarh.

- b. **Syphon Sub-Sec.** This sub sec is bounded by BRBL canal in the west, Kala Khatai (5758) in the north, intl border in the east and River Ravi in the south. The gr is gen sloping from NE to SW and all streams/nullahs flow in the same dir. Area is undulating,

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crisscrossed by small water channels comprising nullahs and distys/minors of BRBL. Marshy / high water table areas astrides River Ravi and BRBL canal in the south/SE and comparatively firm, flat and fertile area in the north and SW are main characteristics of the area. Permanent pondage astride BRBL canal poses little hinderance for X cty in dry weather, however mov of all types of vehs, during monsoon season becomes unfordable temporarily, depending upon the duration of rains. During wet season mov across these obs is confined only to aval crossing places. Bed of the Shahdra disty is soft and sandy which req some engr effort for Xing by wh vehs. The area is comparatively thinly populated with vills consisting of mixed kacha/masonry hutments and these are gen loc on high grs, facilitating good obsn and F of Fs. Maj BUAs in the sub sec are Kala Khatai (5758), Dhode (5653) and Maqboolpur / Miani (5952). The area is gen devoid of dev comm network barring few trs, linking vills and leading to BOPs.

Manmade Features**20. Comcens**

- a. Gujranwala.
- b. Daska.
- c. Sialkot.
- d. Marala.
- e. Chawinda.
- f. Zafarwal.
- g. Shakargarh.
- h. Narowal.
- j. Pasrur.
- k. Satrah.

Sec Wise Description - Imp Comcens**21. Sialkot Sec**

- a. **Sialkot**. A Dist HQ, industrial city and very imp comcen is

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sandwiched between two maj nullahs i.e. Palkhu Nullah which passes from North and Aik nullah passes from the south of Sialkot. Surrounding area is flat, plain and well cultivated. It is well connected with the surrounding areas by rds and rly i.e. Zafarwal, Pasrur, Wazirabad, Daska, Gujranwala and Eminabad. City and Cantt combined, have a BUA of about 25 sq km. The psycho - social value and conurbation eff of city give it imp place in op strat. It is loc at a dist of 7-8 km from intl border. A flexible pavement airstrip exists in the north of Sialkot city and is suitable for Lt ac only. **Sialkot International airport has been recently completed near Sambrial.**

- b. **Zafarwal**. It is a small town spread over **6-8** sq km. The area is fertile and well cultivated. It is well connected with Shakargarh, Narowal, Sialkot, Daska, Pasrur and other small towns in the area by means of rds/trs. A hospital, TG and post office exist in this town. **Recently it has been given status of a Teh HQ.**

- c. **Chawinda**. A med size town, spread over **6-8** sq km and it is loc on rly line Sialkot-Pasrur. It is well linked with Zafarwal, Sialkot, Pasrur by rds/trs. Area is fertile, well cultivated and has population over **45000**. It has facility of Rural Health Centre and 150 lines tel exch.



- d. **Pasrur**. A Teh HQ and very imp comcen that provides depth to Zafarwal, Chawinda, Shakargarh and Narowal. It spreads over 6-8 sq km. It is well

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connected with main towns/cities in the area by means of rds and with Sialkot and Narowal by rly line also. An **ammo dump** and air fd is also loc in SE of the town. It has the facility of hospital, TG, Grid Sta and PO. A TV booster is also instl in the town.

- e. **Daska**. A Teh HQ loc on rd Gujranwala - Sialkot. Covering an area of 8-10 sq km. The town is linked with Sambrial and Pasrur. BRBL passes through the town. The area is fertile and well cultivated. A hospital, TG, Grid Sta and PO exist in the town.

- f. **Wazirabad**. It is loc NW of Gujranwala on the bank of Pulkhu Nullah and 3.2 km from River Chennab. Both National Highway and Pakistan rly connect it with Lahore and Rawalpindi. It is spread over an area of 10-12 sq km. It is also linked with Sialkot by rly/rd .It is an imp rly junc which connects it with Lahore, Rawalpindi, Sialkot and Faisalabad. It is a Teh HQ and has small industries of stainless steel goods, cutlery, rubber factory and rly wksp.



22. **Shakargarh Sec**

- a. **Shakargarh**. A Teh HQ and it is spread over an area of about **8-10 sq** km. It is an imp comcen, loc on the home bank of River Bein and it is well connected with towns loc in the surrounding area by means of rds and rly i.e. Zafarwal, Pasrur, Narowal and Muridke etc. It is also hub of Shakargarh salient.



Rd Shakargarh-Kot Naina (2502) leads towards intl border. Area is

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fertile and is well cultivated. A Hospital TG/PO, ammo/mine dump and fwd mil garr (Antowali) exist in the area.

- b. **Baddomalhi.** It is a med size town, loc 7 km away from the border. It is imp comcen close to the border. MRL passes west of the town. It is well linked with Lahore –Narowal by rly line and with other towns by means of rds/trs. River Ravi passes east of Baddomalhi. It is spread over 3-4 sq km. A basic health unit, college, Tel exch and PO exist in the town.
- c. **Miangri/Nurkot.** It is a small town with a population of approx 7000. The area is fertile and is connected with maj towns in the area by means of rds/trs. It is well connected with Shakargarh, Pasrur and Narowal by rly line. It is about 13 km from the border. It has facilities of basic health unit and tel exch. It has a fwd garrison and an air strip for It acs.
- d. **Narowal.** A Dist HQ and imp comcen in the area. It is spread over 8-12 sq km. It is well connected with the main towns in the area by means of rds/trs to incl Shakargarh, Narang, Shahdra, Lahore, Pasrur, Chawinda and Sialkot. It is loc at a distance of 5 km from the border opposite



Dharman enclave. It has a facility of hospital, TG and PO. A wing HQ of Chenab Rangers is also loc at Narowal.

- e. **Aliabad.** A small town loc 2 km from the intl border and Basantar nullah. It is spread over an area of 1-2 sq km with population of approx 7000. It is well cultivated. It is linked with maj towns by

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rds/trs, through Jassar.

23. **Magboolpur Sec**

- a. **Narang.** A town, loc 9 km away from the intl border and it is spread over an area of 4-6 sq km. It is linked with Lahore and Narowal by rly and with other towns by means of rds/trs. It is an imp comcen close to the border. The area is fertile and well cultivated. It has a facility of college, basic Health Unit, tel exch and PO.
- b. **Shahdara.** This town is loc on the home bank of River Ravi close to Lahore. It is spread over 10-12 sq km. It is imp business/ industrial area and prominent communities are Jat and Kashmiri. It is well linked with surrounding towns by rds and rly. It is linked with Narowal and Shakargarh by a broad gauge rly line. The town has chemical, ceramic, automobile, steel work and precast concrete industries. There are plans to give dist status to this town.
- c. **Kamoke.** It is a fairly big town spread over 6-7 km along both sides of GT Rd. The town is connected with the surrounding vills through a good network of rds and trs. It has all the basic amenities like hospital, rly sta, tg and PO.
- d. **Muridke.** It is fairly big town spread over 6-8 sq km along both sides of GT Rd. It has generated carbo hydro eff because of main industrial area in this sec. It is loc on the National highway and on main rly line. It is also connected with Narang and Narowal by rd. A TG and PO exist in the town.



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- e. **Eminabad.** It is a small town, spread over 3-4 km. It is an imp comcen. It is well linked with other imp towns/cities like Sialkot, Kamoke and Muridke etc.

24. **Main Rds.** Details of main rds in the area are as under, however other rds are given at **Anx Q** and **Vol II Anx B:-**

- | | | |
|----|----------------------------|--|
| a. | Grand Trunk Road | 70A2 |
| b. | Muridke – Narowal | 50A1 |
| c. | Gujranwala – Pasrur | 70A1 |
| d. | Gujranwala – Sialkot | 70A2 |
| e. | Wazirabad – Sialkot | 70A2(<u>Dual Carriageway</u>) |
| f. | Sialkot – Pasrur – Narowal | <u>70A2</u> |
| g. | Sialkot – Zafarwal | <u>50A2 uptill Degh and then 50A1</u> |
| h. | Sialkot – Suchetgarh | 30A1 |
| j. | Zafarwal - Shakargarh | <u>70A2</u> |
| k. | Narowal - Shakargarh | 70A2 |

25. **Rlys**

- a. Summary of main Rly Trs in RCC incl fol:-

- | | | |
|-----|--|--------------------|
| (1) | Lahore – Narowal – Sialkot – Wazirabad | Broad, Single line |
| (2) | Narowal - Jassar – Chak Amru | Broad, Single line |
| (3) | Lahore–Kamoki-Gujranwala-Wazirabad | Broad, Single line |

- b. **Lahore – Rawalpindi.** A broad gauge single line rly comm which connects Lahore, Gujranwala, Wazirabad, Gujrat, Jhelum, Rawalpindi.

- c. **Wazirabad – Sialkot – Chawinda - Pasrur.** It is broad gauge single line which is 110 kms in length. It connects Wazirabad-Sialkot- Qila Sobha Singh (Renamed Qila Ahmadabad) and Narowal.



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- d. **Shahdara – Narowal – Shakargarh – Chak Amru.** It is broad gauge single line tr except from Narowal to Chak Amru which is narrow gauge. Its length is 76.85 km.
- e. **Sialkot - Dallowali.** It is broad gauge single line tr which is 4 Km in length.
- f. **Rly Stas.** Imp rly stas on tr Wazirabad – Narowal and Shahdara – Chak Amru are as under:-

Ser	Rly Sta	Sidings	Sidings	Remarks
(1)	Wazirabad	1	1	
(2)	Sambrial	-	-	
(3)	Uggoki	-	-	
(4)	Dallowali	1	-	
(5)	Sialkot City	2	1	
(6)	Gunna Kalan	-	-	
(7)	Alhar	-	-	
(8)	Chawainda	1	-	
(9)	Pasrur	1	1	
(10)	Qila <u>Ahmedabad</u>	1	1	
(11)	Narowal	3	2	
(12)	Jassar	1	1	
(13)	Nurkot	1	1	
(14)	Shakargarh	1	-	
(15)	Chak Amru	1	-	
(16)	Gujranwala Cantt	2	1	
(17)	Gujranwala City	4	2	
(18)	Shahdara Bagh	1	1	
(19)	Kala Khatai	1	1	
(20)	Narang	1	1	
(21)	Pejowali	1	1	
(22)	Baddomalhi	2	1	
(23)	Raya Khas	1	-	
(24)	Bostan Afghanan	1*	-	*Repairable
(25)	Darbar Sahib - Kartarpur	1*	-	
(26)	<u>Daud RS</u>	<u>1</u>	-	

- g. **Lvl Crossings.** Ref to Vol II Anx C.

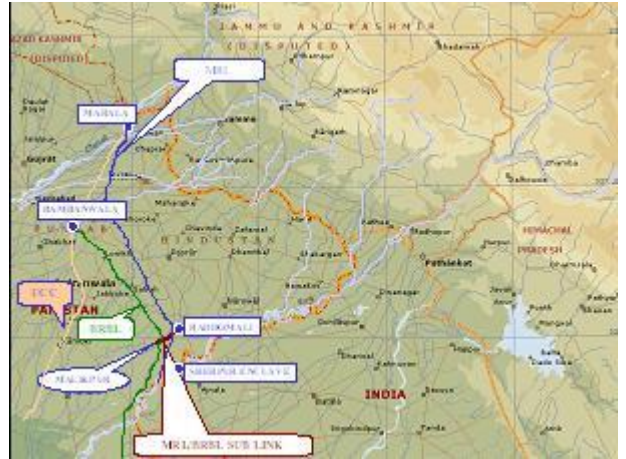
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- h. **Air Fds/LGs.** Ref to **Anx S** and **Vol II Anx D.**

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26. **Obs System.** Ref to sketch at **Anx R.**a. **Marala Ravi Link (MRL)**

Canal. It originates from River Chenab at MHWs and terminates near Sherpur. It is 96 kms long, 110 to 130 ms wide, 4-6 ms deep with a capacity of 22000 cusecs.

b. **Upper Chenab Canal**

(UCC). It originates from River Chenab at MHWs. It is 85 kms long, 45-50 m wide, 3-5 m deep with a capacity of 20000 cusecs.

c. **Bambanwala Ravi Bedian**

(BRBL) Link Canal. It originates from UCC at Bambanwala and terminates at Bedian i.e. in 4 Corps area. Its length is 132 kms, it is 40 – 75 ms wide. The depth varies from 3-7 ms with a total capacity of 8000 cusecs.

d. **MRL / BRBL Sub Link.** It

originates from MRL south of Badomalhi and joins BRBL near Malikpur. It is 5 kms long, 60-70 ms wide and 3-4 ms deep and has a design capacity of 5000 cusecs.

e. **Brs.** Ref to **Vol II Anx E.**

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27. **Bunds/Ditches.** (For details, ref to **Vol II Anx F**). The layout of DCBs is given as under:-

- a. **Sialkot Sec.** **A total of 348 Kms of DCBs, 3 Kms of Kidney Bunds and 23 Kms of Flood Protection Bunds exist in AOR thus making a total of 374 Kms of DCBs and Bunds exist in this sec.** Broad layout is placed opposite.



- b. **Shakargarh / Magboolpur Sec.** A total of **73.8 Kms of DCB, 106.84 Kms of Def Bund and 74.2 Kms of Flood Protection Bund thus making a total of 254.84 Kms of DCBs and Bunds exist in this sec. Broad layout is placed opposite.**



28. **OP Towers.** Ref to **Vol II Anx G.**

Natural Features

29. **River Chenab.** It originates from Great Himalayan and flows through the hills of Himachal Pardesh. It flows in western direction upto Kishtwar and then changes its direction to southwest. It splits into several channels at Akhnur and runs along the western border of Pukhlian salient. It enters own area opposite Gangwal (6358). Two of its main



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tributaries, Manawar Tawi and Jammu Tawi join upstream of MHWs. It is a maj obs even during dry season with a wet gap of 190-200 m, depth of 2 to 5 m and a velocity of 1-6 knots in the main stream.

30. **River Tawi**. This river enters own area opposite Ikramabad 6652, flows east to west and isolates Pukhlial Salient from the south. As the catchments area is close to pt of entry therefore its current is very fast. It is a maj obs having a sandy bed. Tawi has changed its course and after washing away Rangala 6653 and Chak Salarian 6653 it has temporarily stabilized its flow. Average wet span is 250-350 m but reduces to 50 m in winter.

31. **River Ravi**. It originates from Pirpanjal hills and flows in gen dir NE to SW. It enters Pakistan few kms east of Shakargarh near Kot Naina and flows along Indo-pak border until Ravi Syphon. The river with its wide course is fordable at many places in dry season. However, where the course is narrow fording is difficult. During monsoons pd, various channels join the river to form a wide stream to making it fairly formidable obs.



The main channels cont changing its course during monsoons. **This highlights the need for River Analysis to ascertain latest course every yr. The water can be reg by India through Madhopur HW, and Thein Dam**. Due to const of Hir Bund, the water has been diverted to the old bed of River Ravi flowing into Indian territory. **Essential data and study of River Front is given in the Chapter II**. However, essential data is as under:-

- a. **Tech Data**. **The flow of the river is reg through Madhopur HWs. The essential tech data of river is as under:-**

(1) **Width/Gap**



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- (a) **Dry Weather.** 110-155m.
- (b) **Wet Weather.** 200 - 600m.
- (c) **Width Bank to Bank.** 270 - 800 m.
- (d) **Depth.** 1 to 3 m.
- (e) **Current (Dry).** 0.3 to 0.6 m per second.
- (f) **Curent (Wet).** 2 to 3 m per second.
- (g) **Bed Condition.** Compact and sandy.
- (h) **Disch (Dry Weather).** 450 to 1400 cusecs.
- (j) **Disch (Wet Weather).** 1,50,000 cusecs.

32. **River Bein.** It originates from Parmandal hills. It flows from north to south, entering Pakistan near Sukho Chak. Tech data incl fol:-

- a. **Width 100 - 700 m**
- b. **Wet Span - 70 -500 m**
- c. **Depth of water - 0.5 – 2 m**



33. **River Devak.** A seasonal river originating from the Parmandal hills, it flows from northeast to southwest and join river Basanter in Indian Held Kashmir. Tech data incl fol:-

- a. Average Span - 600 – 1200 m
- b. It is seasonal river, therefore it has no water in dry season.

34. **River Basantar (Degh Nadi).** Being a seasonal river, it originates from Parmandal hills. River Devak joins this river flowing along Indo Pak border. On entering Pakistan, it is called Degh Nadi. Tech data incl fol:-

- a. Average Span - 900 – 2400 meters
- b. **Depth of Water**
 - (1) Dry Season - 0.3 – 0.6 meters
 - (2) Wet Season - 1 to 3 meters

35. **River Ujh.** It is formed by interlinking of numerous channels and joins River Ravi. It carries about 200 – 500 cusecs of water.



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36. **Escarpment.** A significant, escarpment runs in the North and NE from Sukhu Chak upto Ikhlaspur for approx 21 kms, with ht varying from 3 to 15 ms. A length of 9 Kms is across WB from Manihari Post to Abial Dogran and 12 Kms from Abial Dogra to Ikhlaspur is along cisfrontier.

37. **Seasonal Nullahs.** **Anx R.** Imp seasonal nullahs in the area are Ghag, Palkhu, Aik, Degh, Bein and Basantar. During rainy season they usually produce flash floods, overflow their banks, inundate adjacent areas and they become maj obs however, during dry season these normally remain dry.

- a. **Ghag Nullah.** Enters Pakistan south of Khairi (8461), during winter its main channel reduces to 9 - 14 m with a water lvl of 0.50-1 m but during unusual floods the nullah is a menace for the people of Pukhlian. Its water is used for irrigation purposes but no permanent arng can be made because of the devastating char of the nullah during monsoons. The nullah bed is sandy which can take lt vehs. The banks are sandy and sloping with ht varying from 0.25-1 m.
- b. **Palkhu Nullah.** Crosses the WB opposite Jhulki, during winter its main channel reduces to 5-8 m with the water depth varying from 0.5 – 1m. Like Ghag Nullah its' behavior during monsoons is alarming and floods a maj portion of the area of Sambrial and area north of Sialkot Cantt. It is an eff obs for the vehs during the monsoons but during dry season it can be crossed w/o much effort. The bed of the nullah comprises of clayey soil which could pose some problems, thereby entailing recce. Due to its behavior in monsoon season no perm arng can be made for utilizing its' water. Absence of a br/culvert on this nullah near the border impedes lateral mov and can pose serious difficulty with regard to shifting of tps by the defenders. However, in sq 6440, 6338 and 6337 Xing places are aval.
- c. **Aik Nullah.** This nullah originates from the hills around Jammu in IHK, flows west and enters Pakistan north of vill Umranwali. It then flows SW, passing along the southern limits of Sialkot city, eventually joining

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Palkhu Nullah NE of Wazirabad. The nullah is broader in IHK and becomes narrower as it flows in the vicinity of Sialkot. East of Sialkot it meanders and its banks on the inner curve are steep. Gen upto SE of vill Gangianwali the banks are steep with the ht varying from 2.5 -7 m. Width of this nullah varies from 15-30 m and it has 3-5 m running water in rainy season. The bed is clayey east of Sialkot and gen sandy near Wazirabad. Aik Nullah is a partial tk obs and affords Xing places with detailed recce.

- d. **Hasri Nullah.** Hasri Nullah east (running along vills Charwa, Chawinda and Nawan Sohawa) and west (running along vills Kakanwali -Badiana and Nawan Sohawa) flows gen north to south. It has little water, sandy beds and can be crossed by all types of vehs at places, after a little recce. Gen the banks are steep and high.
- e. **Nikki Degh.** Flows gen parallel to west of Degh Nadi, in the dir of NE to SW. It is not an obs in dry season but a complete obs for whs and partial obs for trs during rainy season. However, numerous Xing places can be found after a little recce during rainy season. It has been converted into an eff obs by making a DCB.

f. **Degh Nadi**

- (1) A seasonal nullah, which remains dry for maj portion of the yr. It is approx 300 -1000 m wide with 0.25-4 m steep



banks and fast flowing water of approx 1-2 m depth during monsoons. Mov across is restd during dry season due to sandy/soft nature of its bed, while during wet season it is an eff obs. Prior recce and cfm is essential before a Xing is attempted.

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Joins River Ravi 20 kms south of Lahore. Brs exist on rd Chawinda-Zafarwal, Slk-Zafarwal and Pasrur-Narowal. The various Xing places aval are given below:-

(a) **Site A**

- (1) Bijapur 8822 – Bhudial 9021.
- (2) **Loc.** GR-884222 – GR-900215.

(b) **Site B**

- (1) Khalilpur 9023 – Tehra 9222.
- (2) **Loc.** GR-904235 – GR-925226.

(c) **Site C**

- (1) Pedhiari 9025 – Jhandiala 9425.
- (2) **Loc.** GR-915253 – GR-924249.

(d) **Site D**

- (1) Sakrori 9329 – Deoli 9425.
- (2) **Loc.** GR-944260 – GR-941277.

- (2) Obs value of Degh Nadi **dec** during dry weather and as such it does not remain maj obs. The svys and trials have been carried out during Escalation 2008 / 09. The water table one km astride Nadi is b/w 6-15 fts. During Winters of 2008/09 svy was carried out to ascertain the depth and span of 2 x water courses and result is as under:-

Ser	Channel/ Water Course	Loc	Width of Wet Span	Depth
(a)	Western	Point - 964304	10 m wide	6 “
(b)	“	Point - 975304	30 m wide	10 “
(c)	“	Point - 965287	30 m wide	9 “
(d)	Eastern	Point - 972299	15 m wide	6 “
(e)	“	Point - 969294	5 m wide	8 “
(f)	“	Point– 958287	5 m wide	11 “
(g)	Dry span b/w two water courses	Point-950299	Dry span 400 m	

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- (3) Various svys and trials have been carried out during Escalation 2008 / 09 and it has been ascertained that it can take 10-25 tk passes at sel places with TFC CI III. The results of svy and trials incl fol:-

Sheet No/ GR	Soil Type	Water Table	Test Sec TFC Reading					TFC CI			TFC CI		Tank Passes
			3"	9"	15"	21"	27"	FCI	RI	RCI	Dry	Wet	
43L/15 948294	Sandy Lome	3'	220	120	160	220	220	211	-	-	-	III	10-25
			220	220	220	220	210		-	-	-		
			220	220	220	220	220		-	-	-		
43L/15 951294	Silty Clay Lome	4'	180	180	180	180	200	211	-	-	-	III	10-25
			220	220	230	220	220		-	-	-		
			220	230	230	240	220		-	-	-		
43L/15 950296	Sandy Lome	4'	220	180	220	180	200	214	-	-	-	III	10-25
			220	200	220	230	210		-	-	-		
			220	230	230	240	220		-	-	-		
43L/15 946291	Sandy Lome	3'	230	220	220	210	200	217	-	-	-	III	10-25
			225	220	220	220	200		-	-	-		
			230	220	220	220	200		-	-	-		
43L/15 950290	Sandy Lome	3'	210	220	220	220	200	216	-	-	-	III	10-25
			220	220	220	220	200		-	-	-		
			220	220	220	220	220		-	-	-		
43L/15 952293	Sandy Lome	3'	220	220	230	220	200	219	-	-	-	III	10-25
			220	220	225	220	220		-	-	-		
			220	220	220	220	220		-	-	-		
43L/15 954285	Sandy Lome	1-1/2'	200	210	220	210	200	209	-	-	-	IV	3-10
			200	220	220	210	200		-	-	-		
			200	220	220	210	200		-	-	-		
43L/15 950287	Sandy Lome	3'	230	220	220	220	200	221	-	-	-	III	10-25
			230	220	220	220	220		-	-	-		
			230	220	200	220	230		-	-	-		
43L/15 945290	Sandy Lome	2-1/2'	230	220	200	200	200	216	-	-	-	III	10-25
			230	220	200	220	200		-	-	-		
			230	220	200	220	200		-	-	-		

- g. **Basantar Nullah.** It originates from foothills of Parmandal Range and out strike Dharman from the west, passes east of Bara Pind and joins river Ravi near Jassar. It is a partial obs during dry weather and eff obs during rainy season.



- h. **Bein Nullah**
- (1) It enters Pakistan near Sukmal 1827, runs from north to south and joins river Ravi near Dera Afghan 0792, Its width is 90 to 750 m, depth is 0.5 to 1.5 m with 1-4 m high banks. Its wet

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gap is 72 m and during rainy seasons extends upto 575 m. Its current is 0.63 m to 3 m per sec. Depth of water is 0.63 m to 2 m.

(2) It is a partial obs for tk during dry weather and eff obs during monsoon. Xing places are aval at most of the places.

j. **Karir Nullah.** Can be crossed by all types of vehs by improving the banks during dry season. During rainy season it is an eff obs. It joins Basantar nullah in the south. A cl 50 br exists on rd Zafarwal – Shakargarh.

k. **Cho Nullah.** It is not an obs during dry weather but becomes eff obs during flood season. Has a sandy bed with 40 m to 100 m span. Difficult portions are:-

(1) The western bank of nullah from south of Kohliyan Khurd (113229) to east of Sarjal (123202), is a complete obs for wh as well as tr vehs, as the banks are 4.5 m high with steep slope.



(2) From Bajar (107120) to Hansowala (099102) the western bank is 3 m high with steep slope banks. The mov is also restd by the forest in this area.

l. **Bhed Nullah.** It has a depth of 0.2 -3 m in wet weather. Banks are 0.5 – 2.5 m high, width varies from 14 – 26 m. It is an obs only in wet weather.

m. **Khot Nullah.** Water depth varies from 0.50 – 3m, banks are 0.6 – 4m high. It is an obs only in wet season.

n. **Sankai Nullah.** A wet nullah with small qty of water starting from Kohliyan (104276), running south passing by vill Ghurgal (109217), Vill Chamariya (103192) and joins the Cho Nullah near vill Bahlolpur Bala (111181). Is a complete obs for tks having a width of 3.7 m with 2 to 3 m

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of steep banks. Engr effort is req for crossing this nullah however, few Xing sites are also aval.

- o. **Dry Nullah.** It is a seasonal nullah. Remains dry mostly, except for rainy season. Originates SE of Gaddo pindi (109203) runs south till it joins Sankai Nullah at Bahlolpur Bala. Is a complete obs for A vehs with steep aval on the tr leading from Chamariyal (1019) to Hallan (1219). Engr effort is req for crossing this nullah.

CHAPTER - II

RAVI CHENAB CORRIDOR

RIVER FRONT (RIVER RAVI)

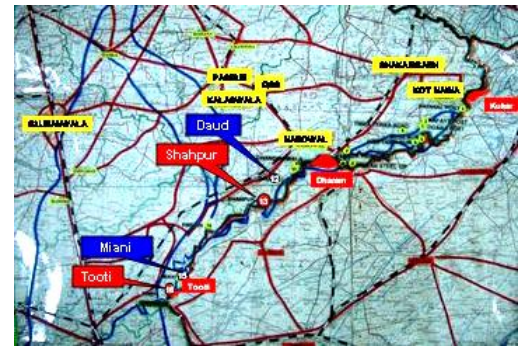
38. **Gen.** River Front has traditionally been perceived to be flank protected by impregnable river obs. However, study (2009) has been carried out to ident its obs value and impact on future ops, particularly after total con of its water by Indians.



39. Crossing Over River

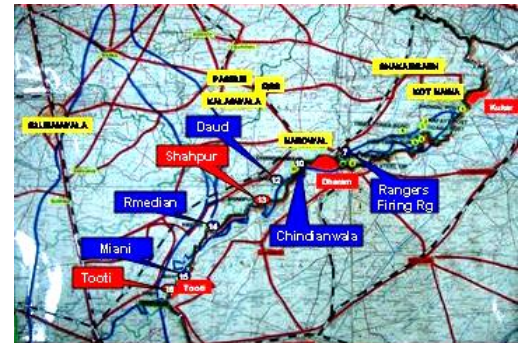
- a. Out of entire front fol xings have tac/op value:-

- (1) Daud.
- (2) Shahpur.
- (3) Miani.
- (4) Tooti.



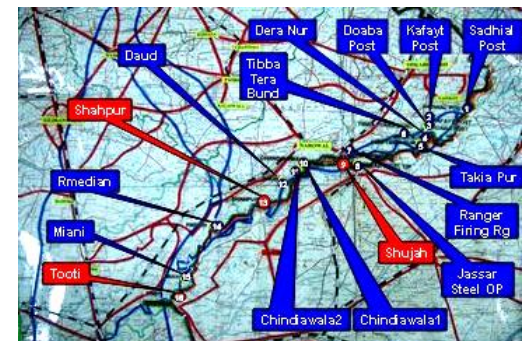
- b. The above xings can further be expanded from tac pt of view into fol xings:-

- (1) Rangers Firing Rg.
- (2) Chindiawala.
- (3) Daud.
- (4) Shahpur.
- (5) Rmedian.
- (6) Miani.
- (7) Tooti.

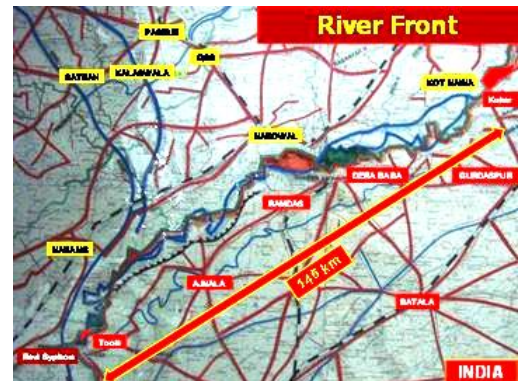


- c. Further div of seven xings from tac
pt of view will appear as under:-

- (1) Sadhial Post.
- (2) Kafayat Post.
- (3) Doaba Post.



- (4) Dera Nur.
- (5) Takiapur.
- (6) Tibba Tera Bund.
- (7) Ranger Firing Rg.
- (8) Jassar Steel OP .
- (9) Shujah.
- (10) Chindiawala 1.
- (11) Chindiawala 2.
- (12) Daud.
- (13) Shahpur.
- (14) Rmedian.
- (15) Miani.
- (16) Tooti.



40. Going Through Likely Xing Sites

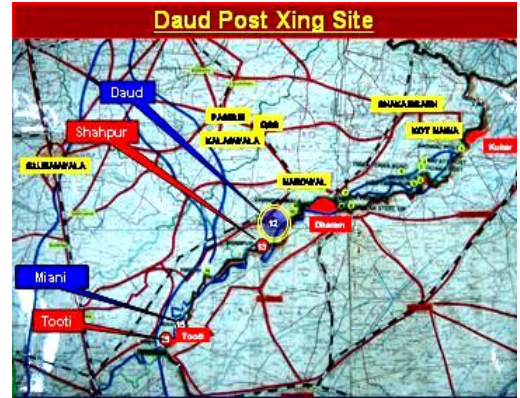
a. Area B/W Daud & Shahpur Posts

- (1) Area b/w Daud & Shahpur posts is wide open and allows armr mnvr.
- (2) Ltd depth of river allows wading through without br effort.
- (3) Mech aslt is possible.
- (4) Raya FPB lies in depth.
- (5) Prep of apchs & exits req min plant effort.
- (6) Area provides good tfc for tr and wh vehs.



b. **Daud Post Xing Site**

- (1) Raya FPB lies in depth.
- (2) Area is wide open and allows armr mnvr.
- (3) Prep of apchs & exits req min plant effort.
- (4) Area provides good tfc for A and B vehs.
- (5) Ltd depth allows wading through or use of trestle brs.



(6) **En Effort Across Daud Xing**

Gap Details		Br Effort	Expeds Req	Tech Viability
Wet Span	Dry Span			
300'	362'	6xsets TMM-3 Br	150'	Yes

Capacity - A BG comprising 2-3 x inf bdes sp by an armr bde.

c. **Shahpur Post Xing Site**

- (1) Site loc inside En territory.
- (2) Raya FPB lies in depth.
- (3) Area is wide open and allows armr mnvr.
- (4) Prep of apchs & exits req min plant effort.
- (5) Area provides good tfc for A and B vehs.



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Gap Details		Br Effort	Expeds Req	Tech Viability
Wet Span	Dry Span			
350'	212'	6xsets TMM-3 Br	200'	Yes

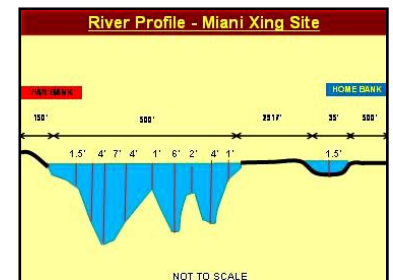
Capacity - A BG comprising 2-3 x inf bdes sp by an armr bde.

d. Miani Xing Site

- (1) Area is wide open and allows armr mnvr.
- (2) Sandy patch b/w off shoots req expeds for wh / br vehs.
- (3) Prep of apchs & exits req min plant effort.
- (4) Area provides good tfc for tr and wh vehs.
- (5) Ltd depth allows wading through or use of trestle brs.

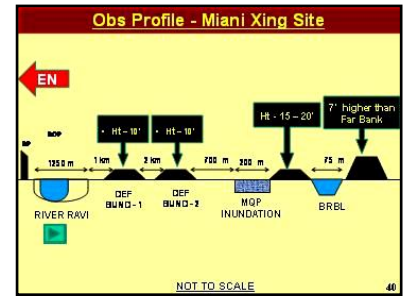


- (6) River Profile - Miani Xing Site is placed opposite.



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- (7) Obs Profile - Miani Xing Site.



- (8) **En Effort Across Miani Xing**

Gap Details		Br Effort	Expeds Req	Tech Viability
Wet Span	Dry Span			
500'	2915'	16.5 sets TMM-3 Br	200'	Yes

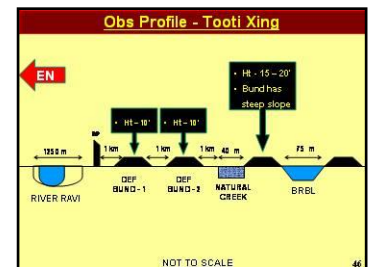
Capacity - A BG comprising 1 x inf bde sp by an armr regt.

- e. **Tooti Xing Site**

- (1) Site loc inside En territory.
- (2) Prep of apchs & exits req min plant effort.
- (3) Area provides good tfc for tr and wh vehs.



- (4) Obs Profile - Tooti Xing is placed opposite.



- (5) **En Effort Across Tooti Xing**

Gap Details		Br Effort	Expeds Req	Tech Viability
Wet Span	Dry Span			
500'	NA	1 x set PMP Br & 4 x sets TMM-3 Br	-	Yes

Capacity - A BG comprising 1 x inf bde sp by an Armr regt.

41. **Maj Concls**

a. **Tech Aspects**

(1) The essential data is placed opposite.

(2) Aval xing sites provide good tfc.

(3) Ltd plant effort req for prep of apchs / exits for all sites.

<u>Xing Site</u>	<u>Wet Span</u>	<u>Br Effort</u>	<u>Expeds Req</u>	<u>Capacity</u>	<u>Tech Viability</u>
Daud	300'	6 x Sets TMM-3 Br	150'	2-3 x Inf Bdes sp by an Armr Bde	Yes
Shahpur	350'	6 x Sets TMM-3 Br	200'	2-3 x Inf Bdes sp by an Armr Bde	Yes
Miani	500'	16 ½ x Sets TMM-3 Br	200'	Inf Bdes sp by an Armr Regt	Yes But Difficult for En
Tooti	500'	1 x Set PMP Br & 4 x Sets TMM-3 Br	-	Inf Bdes sp by an Armr Regt	Yes

(4) Firm bed condns prevail.

(5) **Obs value of River Ravi has been reduced.** Launching of floating brs may not be possible and instead use of trestle brs is envisaged for river xing op.

(6) En can negotiate water based obs sys with aval trestle brs (6 x TMM-3 Sets – 252 m) at all sites less Miani that will req rft.

(7) En can inc water disch from Madhopur HWs to facilitate use of floating brs.

b. **Op Aspects.** The area b/w Daud Post and Shahpur Post offers offn options to en due to openness of the area. It provides excellent going and permits large scale armr mnvr. The fordability of the river permits mech aslt. Growth in area affords undetected mov and achieving tac surprise.

42. **Recommendations**

a. In view of the prevailing evmt, threat in Daud – Shahpur area may be re-eval and def works may be planned accordingly.

b. Layout of existing def works may be revisited and it may be dovetailed in def plans. Apropos, pri be accorded for const of def bund b/w Tooti and Bikidana posts. There is also a need to enhance ctr mob measures.

c. Govt of Punjab be apch for fol:-

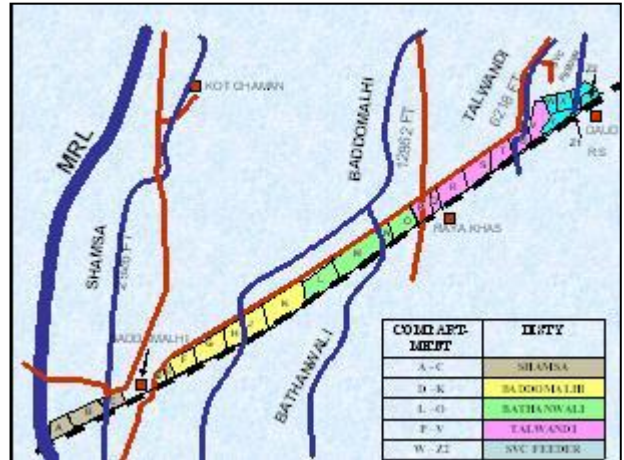
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- (1) Operationalization of Sub Link to optimum disch capacity (i.e. 3500 cusecs).
 - (2) Const of perm outlets in BRBL Canal for urgent charging of MQP Inundation Scheme.
- d. Study of River Front may be carried out twice in a yr i.e dry and wet weather.

SECRETCHAPTER - IIITERRAIN STUDY – CISFRONTIERINUNDATION SCHEMES

43. Raya Inundation Scheme. To enhance terrain friction along Raya –
Ajnala, a feasibility study was carried out in 1967 and the scheme was approved

by GHQ in 1969. The const
commenced in Apr 69. The soil test
were carried out in Oct / Nov 84
through E – in – C Branch and Soil
Svy of Pakistan. E – in – C Branch cl
the soil as clay and clay silt having lrd
value for inundation. The Soil Svy of
Pakistan cl the soil as sand / sandy
clay loam and dec it as border case.



According to NESPAK, the soil is not ideal for inundation and it is not
completely unsuitable either. Since
1969 a large no of TWs have been
instl in the area which have resulted
in lowering of water table in the area
and consequent reduction in eff of the
Inundation Scheme. However, as per
the Army policy the scheme is to be
reg maint in the present shape even
though it may not be fully eff. Mines
will also be planted to inc the obs value of this scheme. Various aspects of this
scheme are as under:-



- a. Design. The inundation belt is 12-13 kms long and 600 ft wide
commencing from Sq-
8183 (about 160 m short
of Daud Rly Sta and

• Length	-	9 Miles
• Width	-	600 ft
• No of Compartments	-	27
• Water	-	159 Cusecs
• Tps	-	One Plt Pl
• Time	-	14 Days

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running upto MRL in the West). In the South, rly line Narowal – Lahore is used as a dyke. The compartments of the belt runs parallel to the rly line. The scheme has 27 compartments and these are fed through feeders, which emanates from Talwandi, Shamsa and Badhomalhi distys. The scheme was designed to be eff in 21 days which incl time for filling up to the compartments and pondage of water for obtaining the req bog. The lay of the gr is from east to west and the water flow in the same dir in the compartments.

- b. Req and Aval of Water. The scheme req a total of 159 cusecs of water at tail of all distys for 10.5 days to fill the compartments. However, 14 days are req for the scheme to create an eff bog. Talwandi, Badhomalhi and Shamsa distys taking off from MRL provide 92 cusecs, 45 cusecs and 22 cusecs respectively.
- c. Tubewells as Source of Water. SCARP IV has instl 73 TWs along Talwandi, Badhomalhi and Shamsa distys. At present very few are functional. Reportedly, Irrigation Dept is planning to tfr these TWs to pvt sec.
- d. Present State of Scheme. The scheme has been considerably damaged by floods / rain water and civ population. Most of the dykes, bund and other protective / hydraulic works have been damaged by locals and due to erosion by hy floodwater and rains. Const of bldgs / houses by civs in the compartment has also come up. Other aspects req attn are as under:-
 - (1) Four compartments i.e. C.D.E and F are almost out of use because of bldgs and massive const. These involve fighting in BUAs.
 - (2) Svc Feeder is completely washed away and at places loose earth has been takenaway by locals. Only demarcation of feeder line is visible on gr. The dykes and bunds especially in compartments W, X, Y, Z-1 are badly damaged. Only the

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outlets can be seen on gr in compartments X, Y & Z. If the scheme is to be reactivated, the svc feeder would req re-const to its entire length of fill.

- (3) The banks of the three disty namely Talwandi, Baddomalhi and Shamsa disty of MRL are damaged / breached at many places and these req maj repair by Irrigation Dept before the scheme is made effective. The bed of the distys are almost lvl with the surrounding gr. At places, it is lower than surroundings.

Maqboolpur Inundation Scheme

44. **Historical Backgr.** The idea of Maqboolpur Inundation Scheme was originally conceived during emergency in January 1987 to inc the terrain friction. The area of inundation is bounded by reg / canal escape, loc at BRBL, RD 204 in the north, reg (Sidhanwali) RD 254.5 in the south while the length is running rt along the eastern (lt) bank of the BRBL itself. During const of BRBL (which is in fill) and the spurs, the soil had been excavated from nearby vicinity, which resulted in forming up of low lying areas close to the BRBL. The perpendicular alignment of spurs in relation to BRBL is helpful for retaining water after nec engr eff. In these areas, water gets accumulated during rainy season and it is dried up during dry pd. The cultivation is mostly dependant on TWs, Old Shahdra Disty and New Shahdra Disty. The nature of gr and close proximity of water sources give rise to creation of an inundation belt. To give this idea a prac shape, a detailed study of the area was carried out alongwith a feasibility survey to eval the potentials of the area for inundation. The studies consisted of :-

- a. **Soil Svy.** This was conducted by the Soil Svy of Pakistan and Military College of Engineering. The soil was dec moderately suitable for inundation. The soil was gp into two cats : -
 - (1) **Gp I.** It covers 40% of the area and it was considered more suitable for inundation. A bog is likely to be caused within 5 days in such type of soils.

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(2) **Gp II.** It covers 60% of the area of proposed inundation belt and these are less suitable for inundation. This type of soil can take 11 days or more to saturate.

- b. **Contouring.** A detailed gr svy was carried out to assess feasibility of flow of water within the inundation compartments. Contouring at a one ft interval was done and it was estb that the water would flow from north to south. Basing on this fact the compartments were designed.
- c. **Aval of Water.** A study was also carried out which ident the max amount of water that could possibly be drawn and used for the Scheme. The max cap of BRBL is 4800 cusecs in Maqboolpur Sec whereas 4000 cusecs is the min req, downstream of Ravi Syphon for the 4 Corps defs. A max of 200 cusecs was felt enough for the inundation scheme which was surely aval.

45. **Salient Features of Scheme.** **Anx P.** The total length of the scheme is 24.3 km which is divided in two portions. The first area is from Reg / Canal Escape to Sidhanwali, which is 15.1 km in length which is artificially inundated whereas the remaining portion i.e. the sec portion downstream of Sidhanwali is naturally inundated due to old river channel and remains ponded throughout the yr. The main features are:-

- | | | | |
|----|----------------------------|---|---------------------------|
| a. | Depth | - | 60 to 200 yds |
| b. | No of compartments | - | 22 |
| c. | No of cross dykes | - | 15 |
| d. | No of weirs in cross dykes | - | 11(Brick masonry outlets) |
| e. | No of culverts in spurs | - | 02 |

46. **Filling Timings.** In order to make the scheme op, the time req for different activities is :-

Action	Eff	Time (Days)	Remarks
Construction / repair of dykes			If dykes are not washed away by the floods, this activity may require one day for repair, however, the work will depend upon the extent of damage.
Filling of compartments	15x outlets	9	
Average pd of saturation		5	
Total		14 days	

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47. **Effectiveness.** Three trials have already been carried out on the Scheme so far. The salient eff of trial can be summarized as under:-:-

- a. The first two tests were conducted in 1990 and in Jun 1992 respectively. During the trials, the Scheme did not prove to be eff against tk, however, wh veh could not negotiate the area, not because of bogging down but due to loss of traction caused by slipping.
- b. During, third trial conducted in Dec 92 scheme gave promising results.

CHAPTER - IV**TERRAIN STUDY - TRANSFRONTIER**

48. **Gen Description.** Transfrontier portion opposite RCC comprises of SE end of IHK comprising district of Jammu with adjoining others districts of Jammu, Udhampur, Riasi, Kathua and Samba. Besides, districts of Indian Punjab to incl Pathankot, Gurdaspur and Amritsar also bordering the corridor. The area is made up of foothills of Himalayas and it is washed by Paramandal Range more prominently close to Jammu thus forming a network of rivers and streams of various sizes and shapes. The area slopes from North to South and the gr is firm and flat except at Paramandal Hills where it varies in ht from 625 to 1250 ms. The broad features of the area incl fol:-



- a. A high ridge runs from NW to SE along Parmandal - Ramkot - Aglidar and lies in the north of Madhopur - Jammu highway running parallel to it. Ht of this ridge varies from 600 to 1200 M. This ridgeline dominates the entire area south of it. The area north of Madhopur - Jammu highway is gen mtn and well forested with hts

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of the features ranging from 600 M on the SW to 950 M on the NE. Area south of the highway is fertile, well dev and thickly populated.

- b. A narrow belt of approx 1.5 to 3 km adjacent to the eastern face of Pukhlian Salient becomes marshy in wet season and has thick growth of wild grass. Beyond this belt upto Jammu it is fairly open and firm. Area b/w River Tawi and Basantar upto Miran Sahib is open and cultivated

and beyond it gr starts gradually accending towards north upto the foothills of Jammu. Beyond Jammu, there is sharp and sudden rise in elevation, where gr become extremely hilly and dry. These foothills are



covered with 'Kikar' forests. The area b/w rivers Basantar and Ravi starts gradually rising from Pakistan / IHK border till it reaches the foothills have steep elevation and these are covered with forests. Gr is undulating with steep banks of nullahs.

- c. The gr gen rises from South to North. Hts of few pts in this area are:-
- (1) Pt south of Panji Pass (NZ 9519) 4950 m. This is the highest pt in the area of study.
 - (2) Kishtwar - 4024 m
 - (3) Udhampur - 645 "
 - (4) Akhnur - 330 "
 - (5) Jammu - 309 "
 - (6) Samba - 375 "
 - (7) Kathua - 315 "
 - (8) Madhopur - 360 "
- d. Rivers and nullahs being seasonal gen remain dry or have little water in winter, presenting little difficulty in crossing during the monsoons. Beds of these streams are covered with coarse sand, pebbles and in the

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foothills with boulders. Rivers Chenab, Tawi, Ujh and Ravi flow throughout the yr and the depth of water and current velocity render these as obs for vehs. The area also has a well dev canal sys.

- e. The area b/w Rivers Tawi and Basantar extn upto Jammu city is fertile, well dev and populated. B/w River Basantar and Ravi the terrain is undulating, dry and hilly, Chenab, Jammu Tawi, Ujh and Ravi are the maj rivers in the area and flow throughout the yr.
- f. The maj nullahs in the area are Ghag, Palkhu, Aik, Hasri, Devik, Basantar, Bein and Tarnah. Ranbir canal, Ujh canal and Kashmir canal are the maj canals in the area, Ranbir canal has 18 distys.
- g. A well dev comm infrastructure exists in this corridor. Indians are planning to extend the broad gauge rly line from Jammu to Srinagar. Reportedly, upto Udhampur it has been connected with Jammu. The entire comm network is def oriented. Indians have also const a large no of new obs and improved the old ones particularly along the border.
- h. Jammu is a maj city loc in close proximity of the border. Other imp towns are Akhnur, Nawanshahr, Mirah Sahib, Ghandinagar, Samba, Kuta, Hiraanagar and Kathua. The area is well served with rds/trs. Jammu is well linked with Akhnur, Nagrota, Udhampur, Samba, Madhopur and Pathankot and Basoli by rds/trs and rly. Jammu is also linked with Pathankot by broad gauge rly line. Vills on high gr, mounds and OP towers/bunds in the area provide obsn.
- j. Plain areas are extensively cultivated with wheat, grain, maize, rice, sugarcane and mustard. In the hilly regions with low elevation, terraces are used for cultivation along the slopes. Due to hilly terrain and hard nature of the soil, large scale cultivation is not possible. There are two seasons for cultivation in this area. The summer cultivation "Kharif" comprises of maize spiked millet, jawar, rice, cotton and sugarcane as its main products. The winter cultivation "Rabi" comprises of wheat and gram. Sowing starts in May – Jun and the crops are harvested in Oct to Dec.

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- k. Foothills of Parmandal Range and the area north of this line is well forested. North - eastern area has a large no of State Forest. The area south of the foothills has scattered growth of forests and orchards which are found gen near the BUA.

49. **Climatic Conditions.** The climate of the area is gen akin to that prevailing in the adjacent area of Pakistan except in the hilly areas where it is much cooler. Temp is extreme in the southern portion of Parmandal Range. The winter months ie October to March are best suited for mil ops because of favourable weather. For details, ref to **Vol II Anx H.**

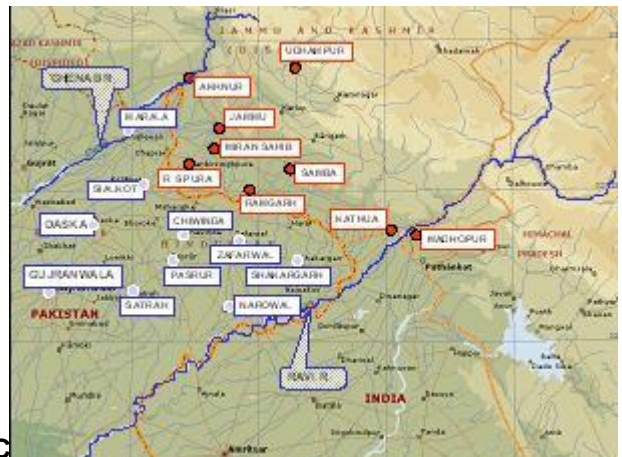
50. **Soil Analysis**

- a. **Soil Condition.** The soil in this area is gen sandy silt. However, except for the area irrigated by Ranbir, Tawi and Ujh the remaining area is "Barani". Gr is firm and it is capable of taking all types of mil t/c in fair weather.
- b. **Water Table.** Area has a low water table and is almost free from water logging as the gr slopes towards Pakistan. Marshy patches exist on the eastern side of Pukhlian Salient where the water table is high. Water table rises appreciably after the monsoons.
- c. **T/c.** Gen the gr being mtn, going is restd to the rds/trs. However, area south of the main highway permits x-cty mov of vehs, but in the monsoons in the close proximity of river/nullahs, going becomes difficult for all types of vehs. The nullahs in the area over flow during rains, which becomes impassable and turns the adjacent areas into slush which hinders mov.

Comm Infrastructure

51. **Maj Comcens**

- a. **Jammu Sec**
- (1) Udhampur.
 - (2) Akhnur.
 - (3) Jammu.
 - (4) Miran Sahib.



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(5) Ranbhirsinghpura.

(6) Ramgarh.

(7) Madhopur.

b. **Samba Sec**

(1) Samba.

(2) Kathua.

52. **Imp Penetrants**

Rd	CI	Length (Kms)	Brs/Choke Pts		
			Type	CI	Loc
<u>Jammu Sec</u>					
Jammu – Gajansu	9A1	15	-	-	-
Jammu-Chazipur- R.S.Pura Suchetgarh	40A1	25	RCC RCC RCC	70 70 70	Over Balwal N Over Palkhu N Ranbhir Canal
B.D. Bari – Bishna-Salher- Rathana-Mule Chak	9A1	23 -	- -	- 9	“ Guror Nullah
Channi – Saror Ratnal – Siblu Chak – Deoli Chak	9A1	16	RCC	20	Aik Nullah Ranbhir Canal
Tirthi – Ladwa – Shopalpur – Dostpur			RCC	9	River Tawi Complex
Diydia-Mahesna-Panser	30A1	12	RCC	30	Ravi-Tawi Complex
Kathua – Makhsuspur- Fatehpur-Kanshi	9A1	20	-	-	Singhar N
Barwan – Akhanpur	-	-	-	-	-
<u>Samba Sec</u>					
Samba – Mawa-Ragal	9A1	12	RCC	9	Ujh Canal
Samtore-Londi	9A1	8	RCC	9	“
Kamala – Khaur – Deoli Chak	9A1	14	RCC “ “	9 9 9	Ujh Canal Irrigation disty Aik Nullah
Bajpur – Ramgarh – Chak Jasu	9A1	15	RCC	9	Ujh Canal

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Rd	CI	Length (Kms)	Brs/Choke Pts		
			Type	CI	Loc
Ramkot-Dinga- Diydla Hiranagar Murli Bhatti-Mehru	9A1	30	RCC	70	Tarnah Nullah
			RCC	9	-
			RCC	9	Ravi Tawi Complex
Dharamkot-Panj	9A1	39	RCC	9	Over Ujh river
			"	30	Over Ujh river
			"	30	"
Madhopur-Sherpur- Bahadurpur-Kukar Enclave	9A1	36	RCC	9	MBL
			"	9	UBDC
			"	9	Salampur feeder
			-	-	River Ravi

53. **Imp Laterals**

Ser	Rds	CI	Length (Kms)	Brs/Choke Pts		
				Type	CI	Loc
a.	Chamba-Basoli- Thein-Madhopur-Samba- Jammu-Akhnur	70A2	167	RCC	70	Basanter
				RCC	70	River
				-	70	"
				RCC	70	Bein River
				RCC	70	Tarnah N
				RCC	70	Chenab R
				RCC	70	Ranbhir C
				RCC	70	"
b.	Basoli-Ramk Kishanpur- Udhampur	70A2	90	RCC	70	Aik Nullah
				RCC	70	-
				RCC	70	Bhini River
				RCC	70	"
				RCC	70	Satar Khad

Description of Rd Network54. **Highways**a. **Jammu Sec**

- (1) **Madhopur- Samba-Jammu-Akhnur.** It is part of Indian national highway No 1A (IHK-1A). This is a maj land route from Indian

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main land into IHK which forms the main L of C in this area. It is cl 70, all weather, two way metalled rd and a very imp lateral in the area.

- (2) **Jammu-Udhampur-Srinagar**. A cl 70, all weather, two way, metalled rd. The 15 kms long bypass takes off near Randowali Rakh (8653 43 L/14) on the Jammu-Pathankot rd about 6 kms from Jammu and joins the Jammu-Srinagar highway 4 kms short of Nagrota 8968.

b. **Samba Sec**

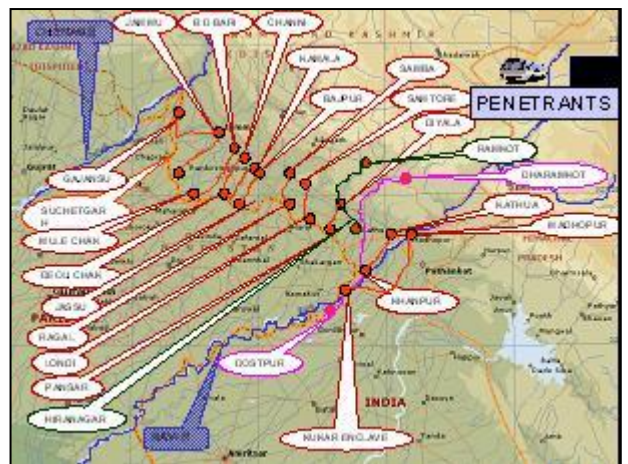
- (1) **Basoli-Ramkot-Udhampur**. A cl 70, all weather, two way metalled rd upto Kishanpur and thereafter 70 A1. It is an imp lateral highway in depth and provides an altn L of C in the area. It is linked with Madhopur - Samba - Jammu highway through fol rds :-

- (a) Ramkot 2953 – Hiranagar 2532 cl 40 A1.
- (b) Ramkot – 2953 Channi 1357 cl 50 A1.
- (c) Dharam Kot 4850 - Raj Bagh cl 30 A1.

55. **Penetrants**. Imp penetrants are give below. Details of other penetrants are given at Vol II Anx J.

a. **Jammu Sec**

- (1) **Akhnur – Malpur – Nursing Pura**. It is cl 40, fair weather, one way metalled rd.
- (2) **Kane Chak 7169 – Misrialia**. It is a cl 70, all weather, one-way metalled rd. It joins the main highway Akhnur – Jammu at 7568.
- (3) **Gajansu – Jammu**. It is cl 70, all weather, one way metalled rd.



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- (4) **Kukarhan 6957 – Kaho 7359 – Jammu.** From Kukarhan to Kaho it is a cl 9, fair weather, one way unmetalled rd. From Kaho to Jammu it is a cl 9, all weather, one way metalled rd.
- (5) **Chandu Chak 6746 – Badihal Brahmanan 7350 – Kotli Shahdaula 7647.** From Chandu Chak to Badihal Brahmanan it is a cl 9, fair weather, one way unmetalled rd. From Badihal Brahmanan to Kotli Shahdaula it is a cl 9, all weather, one way gravel rd.
- (6) **Karotona Khurd 6743 – Agre Chak – Ghazipur.** It is a cl 9, all weather, one way metalled rd. It joins main rd Suchetgarh – Jammu near Ghazipur.
- (7) **Suchetgarh – Jammu.** It is cl 40, all weather, one way metalled rd.
- (8) **Chakroi – Nawansher.** It is cl 9, all weather, one way metalled rd.
- (9) **Devigarh (7533) to Chakroi 7339.** It is cl 9, all weather, two way metalled rd.
- (10) **Chakroi – Chak Muhammad Yar 7644 – Dhinde Kalan 7849.** It is cl 9, all weather, one way metalled rd.
- (11) **Mule Chak (7535) – Deblehar – Kotli Miyar – Fatia (8249) B.D Bari (9051).** It is cl 24, all weather one way metalled rd.
- (12) **Kot Kubbah (7932) – Arnica (8036).** It is cl 9, all weather, one way metalled rd. From Arnica, following penetrates are available:-
 - (a) **Arnica – Deblehar (7843).** It is cl 30, all weather one way metalled rd.
 - (b) **Arnica – Rethana (7940) – Salehr 8241 –B.D.Bari.** It is cl 30, all weather, one way metalled rd.
 - (c) **Arnica – Sibbu Chak (8739).** It is cl 9, all weather one way metalled rd.
- (13) **Partabgarh – Sibbu Chak – Ratnal – Chhani.** It is cl 30, all weather one way metalled rd.

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- (14) **Deoli Chak (8834) – Khaur (8937).** It is cl 9, fair weather one way, unmetalled rd. From Khaur the fol penetrants are aval:-
- (a) **Khaur – Chimna Chak (9039) – Tr Junn (8946).** It is cl 9, all weather one way metalled rd.
- (b) **Khaur – Chimna Chak – Jakh (9546) – Rahiya (9849) – Parmandal (0458) – Baral (0662).** It is cl 9, all weather, one way metalled rd.
- (c) **Khaur – Kamala (9843).** It is a cl 9, all weather, one way metalled rd.
- (d) **Khaur (8937) – Rd Junc (8945).** It is a cl 9, all weather, one way metalled rd.
- (e) **Khaur - Chak Hasil (8643).** It is a cl 9, all weather, one way metalled rd.
- (15) **Ramgarh (9636) – Samdu Manhasplur 0343.** It is a cl 9, all weather, one way metalled rd.
- (16) **Uchak Jasu (9132) – Ramgarh – Bajplur (0143).** It is a cl 40, all weather, one way metalled rd.

b. **Samba Sec**

- (1) **Nanga 06421 – Ramgarh to Gadwal.** From Nanga to Ramgarh to Gadwal It is a cl 9, all weather, one way, metalled rd. At Gadwal two rd links are aval which contact with main highway Pathankot-Jammu at Bajplur and Kamala.
- (2) **Nanga – Sapwal – (0542).** It is a cl 9, fair weather, unmetalled rd.
- (3) **Galar (0535) – Samba.** It is a cl 9, all weather, one way metalled rd.
- (4) **Baral (1457) – Samba – Nawa – Ragal (1132).** From Ragal to Nawa it is a cl 9, fair weather, one way unmetalled rd. From Nawa to Baral it is a cl 9, all weather, one way metalled rd.
- (5) **Ragal (1132) – Nawa - Samba.** It is a cl 9, all weather, one way metalled rd.

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- (6) **Rd from Bobiya (2026) to Matheropur (2429).** It is a cl 9, all weather, one way metalled rd.
- (7) **Londi (2028) – Kuta (2238).** It is a cl 9, all weather, one way metalled rd.
- (8) **Bhati Mehra (2127) – Hiranagar (2532) Dinga Amb (3343) – Ramkot (3053).** It is a cl 9, all weather, one way metalled rd.
- (9) **Hiranagar – Bhaiya (2638).** It is a cl 30, all weather, one way metalled rd.
- (10) **Maharajpur – Diyala Chak.** It is a cl 9, all weather, one way metalled rd.
- (11) **Chardal (3037) – Chak Hariya (3425) – Kotle Javahir (3318).** It is a cl 30, all weather, one way metalled rd.
- (12) **Bhopalpur – Parol – Kathua (5042 43 P/11).** It is a cl 9, all weather, one way metalled rd.
- (13) **Bamial – Janial – Parol.** It is cl 9, all weather, one way metalled rd.
- (14) **Kanshi Barwan – Bahadarpur – Sherpur (5215) Sajampur (5819).** Kanshi Barwan to Bahadarpur is a cl 9, all weather, one way metalled rd. Bahadarpur to Sajampur is cl 9, fair weather rd.
- (15) **Bahadarpur – Narot – Kathua.** It is cl 9, all weather, one way metalled rd.
- (16) **Rd from Chak Charhum (4529 43 P/7) to Barwa (4533 43 P/7).** It is cl 9, all weather, one way metalled rd.
- (17) **Panji Bilaur (5552 43 P/10) – Trithi (4547 43 P/6) to Jasrota (3833 43 P/7).** It is cl 9, all weather, one way metalled rd.
- (18) **Manihari (2624) – Diaya Chak.** It is cl 9, all weather, one way metalled rd.

56. **Laterals.** Imp laterals are given below. Details of other laterals are given at Vol II Anx J.

- a. **Jammu Sec**

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- (1) **Akhnur (7178 43 L/9) – Gajansus (7062 43 L/9).** It is cl 9, all weather, one way metalled rd.
- (2) **Gajansu – Kukerhan (6957 43 L/10).** It is cl 9, all weather, one way metalled rd.
- (3) **Akhnur – Churota (7676 43 L/13) – Jammu (8561 43 L/14).** It is cl 70, all weather, one way metalled rd.
- (4) **Agra Chak (7247 43 L/10) – Ranbir Singhpora (7346 43L/10)- Nawan Shahr.** It is a cl 9, fair weather, one way unmetalled rd.
- (5) **Mule Chak (7535 43 L/10) – Kot Kubbah (7932 43 L/15) – Partabgarh (8735 43 L/14) – Nanga (95531).** It is a cl 9, fair weather, one way unmetalled rd.
- (6) **Mule Chak – Chhanni.** It is a cl 9, fair weather, one way metalled rd.
- (7) **Arnia (8036 43 L/14) – Sibbu Chak (8739) – Khaur (8937) – Ramgarh (9636).** It is a cl 9, fair weather, one way metalled rd.
- (8) **Galar (0535) – Ragal (1132) – Mangu Chak (1529) – Londi (2028).** It is a cl 9, fair weather, one way unmetalled rd.
- (9) **Jhaijar (9379 43 L/13) – Jindrah (0571 43 P/1) – Kishanpur (1067).** It is a cl 9, fair weather, one way metalled rd.
- (10) **Dhansuti (0670) – Maneh (1167) – Kishanpur (1067).** It is a cl 9, fair weather, one way metalled rd.

b. **Samba Sec**

- (1) **Kamala (9843) – Gadwal (0041) – Mawa (1135) – Kathua (5024).** It is a cl 9, fair weather, one way metalled rd.
- (2) **Murli Chak (2429) – Maharajpur (3520).** It is a cl 9, fair weather, one way unmetalled rd.
- (3) **Bamial (3614 43 P/7) - Kanshi Barwan (3813) – Makhanpur (3806 43 P/8).** It is a cl 9, fair weather, one way metalled rd.
- (4) **Khyanpur (8766 43 L/13) – Surauinsar (0166 43 P/1) Mansar (1159) – Ramkot (3053 43 P/6).** It is a cl 9, all weather, one way metalled rd. Near Tutan Khui (9564, Map Sheet 43 L/13) this rd is

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linked with Jammu – Udampur main highway. At Mansa this rd is linked with rd Ramkot – Kishanpur – Batala (1262, Map Sheet 43 P/2).

- (5) **Udhampur (1083) – Bassan (3168) – Ramnagar (2671) – Makwal (4054).** It is a cl 70 A1 b/w Udampur and Ramnagar.
- (6) **Udhampur (1083) – Kishanpur (4649) – Basoli (7641).** It is a cl 9, fair weather, one way metalled rd.
- (7) **Kathua (5024) – Mawa (1153) – Gadwal (0041).** It is a cl 9, fair weather, one way metalled rd.

57. **Rds in Depth**

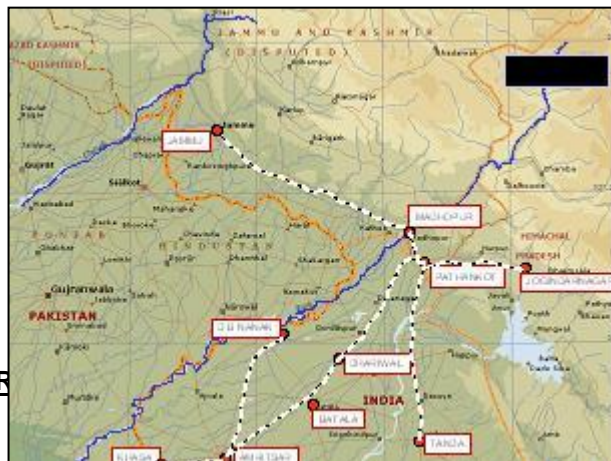
- a. **Jammu Sec.** Udampur – Ramban – Anantnag (Islamabad). It is a cl 70, all weather, two way, metalled rd.
- b. **Samba Sec**
- (1) **Basoli – Bhaderwah – Kishtwar – Anantnag (Islamabad).** It is a cl 9, fair weather, one way metalled rd.
- (2) **Basoli – Chamba.** It is a cl 9, fair weather, one way metalled rd.
- (3) **Badarwah – Chamba.** It is a cl 9, fair weather, one way metalled rd.

58. **Main Rly Comm**

a.	Pathankot -Madhopur – Jammu	Broad, Single line
b.	Amritsar Khalsa	Broad, Single line
c.	Amritsar – D.B Nanak	Broad, Single line
d.	Amritsar – Batala – Dhariwal	Broad, Dual line
e.	Dhariwal – Pathankot	Broad, Single line
f.	Pathankot – Tanda	Broad, Single line
g.	Pathankot – Jogindarnagar	Single Meter line

59. **Description of Rly Network**

- a. **Madhopur – Jammu.** Data on the rly line is as fol:-
- (1) **Length.** 60 kms approx.
- (2) **Gauge.** Broad.

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(3) **Line.** Single.

(4) **Imp Rly Stas.** Ref to **Vol II Anx M.**

(a)	Kathua	-	5024
(b)	Bhudi	-	4233
(c)	Hiranagar	-	2532
(d)	Gugwal	-	1938
(e)	Samba	-	1043
(f)	Bajpur	-	0143
(g)	Brahman Di Bari	-	9051
(h)	Jammu	-	8561

(5) **Br/Culverts.** There are total 216 brs / culverts enroute. The largest br is over River Ujh, which is 650 m long with 27 spans.

b. **Jammu-Udhampur-**

Srinagar. Work on Jammu-Udhampur rly link is complete. It involves total 53.2 km tr, passing through 12 tunnels and over 161 brs. Svy work upto Srinagar has been done and other modalities are in hand at present.

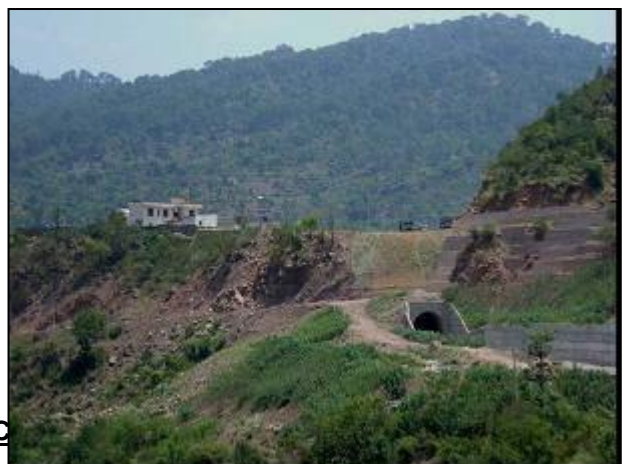


c. **Udhampur - Baramula.** The rly line is approved with cost of Rs 15 billions.

d. **RS / Ramps.** Ref to Vol II **Anx M.**

e. **Rly Brs.** Ref to **Vol II Anx N.**

f. **Tunnels.** There is a Nandani tunnel about NE of Jammu on rd Jammu-Udhampur. The details are as fol:-



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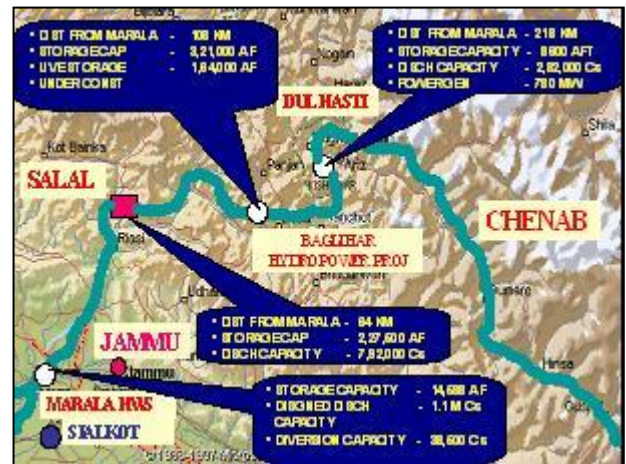
- (1) **Loc.** 9275
- (2) **Length.** 128 m
- (3) **Base Width.** 5 m
- (4) **Ht.** 6 m approx.
- (5) **Security.** Elec lts are aval in the tunnel and it is gd on both sides by armed pers.

Obs System

60. **River Chenab.** There are numerous rivers, nullahs and canals on both sides of the WB. River Chenab originates from Great Himalyan and flows through the hills of Himachal Pardaesh. It flows in western dir upto Kishtwar and then changes its course to SW.

- a. **Hydraulic Structures / Reservoirs** (Ref to Vol II
Anx AA & CC)

- (1) Dul Hasti Dam.
- (2) Baghlihar Dam.
- (3) Salal Dam.
- (4) Akhnur Reg.
- (5) Marala HWs.



- b. **Avg Wet Span**

- (1) At Akhnur - 195 m
- (2) South of Akhnur - 120 -200 m

- c. **Depth of Water**

- (1) Dry Season - 2 - 3 m
- (2) Wet Season - 5 m

- d. **River Tawi.** It originates from Parmandal hills on the NE. Many nullahs and streams join River Tawi at different places. Near Jammu, it divides into two main channels namely Tawi River and Jammu Tawi.

- (1) **Avg Wet Span**

- (a) Near Jammu - 250 - 300 m
- (b) South of Jammu - 90 - 150 m

SECRET(2) **Depth of Water**

- (a) Dry Season - 1 - 2 m
- (b) Wet Season - 2 - 4 m

e. **River Devak**. A seasonal river originating from the Parmandal hills, it flows from NE to SW and join river Basanter in IHK.

f. **River Basanter (Degh Nadi)**. A seasonal river originating from Parmandal hills. River Devak joins this river flowing along Indo- Pak border. On entering Pakistan it is known as Degh Nadi.

- (1) Avg Span - 900 – 2400 m

(2) **Depth of Water**

- (a) Dry Season - 0.3 – 0.6 m
- (b) Wet Season - 1 - 3 m

61. **River Ravi**. It originates from Pirpanjal hills and flows in general direction NE to SW. It enters Pakistan few Kms north of Gurdaspur and gen flows along the Indo Pak border till Ravi Syphon. The river with its wide course is fordable at many places in dry season.



a. **Hydraulic Structures / Reservoirs** (Ref to Vol II

Anx AA & CC)

- (1) Chamera Hydropower Project.
- (2) Ranjit Saghar Dam (Thein).
- (3) Shahpur Kundi Dam.
- (4) Madhopur HWS.

b. **Imp Data**

- (1) Wet Gap - 90 – 160 m
- (2) Depth - 1 - 3 m

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(3) Width - 250-600 m

62. **Canals** (Ref to Vol II Anx BB)

a. **Jammu Sec**

- (1) **Partab Canal**. It originates from Chenab River with max disch of 350 cusecs near Devipur and terminates in gen area Hamirpur Sidhan. It is about 7.3 m wide and 1.5 m deep.
- (2) **Akhnur Canal**. It originates from River Chenab at 8276 near Akhnur. There is an under gr reg at its origin. It terminates near Sabamwan 5564. It is about 28 - 36 m wide and 2.50 m deep. It is a better obs than Partab Canal.

- (3) **Ranbir Canal**. The canal originates from River Chenab at 7179, north of Akhnur br. A reg cum br with five bays exists on eastern bank of the river to reg water



into the canal. The canal runs roughly in SE dir until north of Charwa and then runs westwards roughly parallel to the border and tails off near Indo - Pak border, north of Bajragarhi. Data of the canal is as under:-

(a) **Width and Depth**

- i. Near the reg it is 18 to 20 m wide and 3 m deep.
- ii. Width and depth gradually dec towards the tail end.

(b) **Areas Irrigated**. SE of Akhnur and southern areas of Jammu dist.

(c) **Svc Rd**. A cl 70, all weather, two way, metalled rd, runs on the western side of the canal from Akhnur to Jammu.

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From Jammu to the tail end of the canal it is a cl 9, fair weather, one way, unmetalled rd.

- (4) **Old Kashmir (Basantpur) Canal.** The old Kashmir (Basantpur) canal which takes off from River Ravi near Basantpur 5726 with a capacity of 120 cusecs has been remodeled beyond Madhopur. The remodeled canal below Madhopur is known as new Kashmir (Basantpur) canal. The upper reach of the old canal still exists and acts as an indep inundation canal for irrigation of a small area.

- (5) **New Kashmir (Basantpur) Canal.** The canal takes off from a reg

on River Ravi just above Madhopur HWs. From the reg it fol the alignment of the old canal which has been remodeled for the inc cap. At RD 17252 the canal



bifurcates into two branches, namely the Kathua Canal and Chak Andher Feeder.

- (6) **Irrigation Channel East of Pukhlial Salient.** It is old bed of River Chenab. Indian have con the flow of water in the old bed of River Chenab by const a small reg in area 8664. It is connected by a bund which runs parallel to that of River Chenab running from NE to SW. The reg has three spans about 3 m each.

- (7) **Samka Lift Irrigation Scheme.** It is loc opposite Chaprar. Main channel runs from Tibba Kalali 7550 to Chandu Chak 6746. It is connected with Nikki Tawi 7551.

b. **Samba Sec**

- (1) **Ujh Canal.** The canal originates from River Ujh near Jassrota 3833. It flows in NW dir upto Karariyan 12239 and then flow

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towards south tailing off near Ragal 1132. Data of canal is as under :-

- (a) **Capacity.** It has full disch of 200 cusecs at head reg.
- (b) **Width and Depth**
 - i. Near the head it is 8 to 9 m wide and 2 to 3 m deep.
 - ii. Width and depth gradually dec towards the tail end.
- (2) **Basanter Lift Irrigation Scheme.** Basanter Lift Canal is a very small canal having 20 cusecs capacity. Taking off from River Basanter it tails off near river Devak. It has three distys running towards south.
- (3) **Kathua Canal.** Kathua Canal is 8 m wide, 2 m deep and suitable as A tk obs.
- (4) **Chak Andher Feeder.** This canal is 7 m wide, 2 m deep and suitable as A tk obs.
- (5) **Ravi Canal.** A lined canal is proposed from rt bank of Ravi to carry water from Ravi to Chenab at Shahpur Kundi Barrage. Tech clearance has been given. It will be 15 m wide, 3 to 6 m deep and lined.

63. **Airfds.** Ref to **Anx V & Vol II Anx O.**

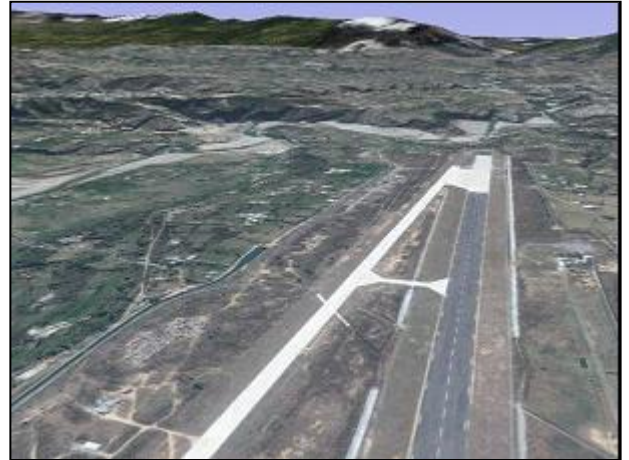
- a. **Jammu.** An all weather non jet type air fd (fit for hy ac) is loc about 3 km south of Satwari rd junc 8356. Imp data incl fol:-

- (1) **Runway**
 - (a) **No of runway.** One.
 - (b) **Length.** 2000 m.
 - (c) **Width.** 45 m.
- (2) **Gr Def.** 1x BSF coy for the protection of radar unit.



b. **Udhampur Airfd**

- (1) **Loc.** 3254N - 7509E.
- (2) **Runway.** Single.
 - (a) Length - 2743 m
 - (b) Width - 45 m
- (3) **Gr Def.** 1x BSF
Coy, 1x TA Bn and 1x
DSC PI.



- c. **Pathankot Airfd.** Indian air force fighter/bomber base, loc about 1 km from Pathankot on rd Pathankot-Jallundhur.

- (1) **Runway**
 - (a) Length - 2700 m.
 - (b) Width - 45 m.



- d. **Kishtwar Airfd.** It is a fair weather non jet type airfd fit for lt acs. It is loc 75.40 E.

- e. **Kargil Airfd.** Airport already exists, which now is being widened to make it capable of jet landing.

- f. **Landing Grs.** In addn to a/m airfds, fol landing grs are also aval:-

- (1) Gajansu 7062 (43 L/9)
- (2) Phulorha 6743 (43 L/10)
- (3) Rangpur Trewa 7834 (43 L/14)
- (4) Brahman Di Bari 9051 (43 L/14)
- (5) Chardal 3033 (43 P/7)
- (6) Kathua 5024 (43 P/11)

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64. **Fencing Sys.** (Ref to **Anx T** and **Vol II Anx OO**). Indians have const four types of fence i.e. type A, B, C and D along the Indo - Pak border near zero line. This fence is being shifted close to WB/IB. Ptl are emp at ni, whereas link ptl and Border Security Force tps (on horse back) are emp during the day for surv. New towers having ht of 9 to 10.5 m have been const along the fence at approx two to three km interval for cont obsn during day. Searchlights have been instl for ni svy.



65. **Bunds/Ditches.** (Ref to **Anx V** and **Vol II Anx DD**).

Ser	Name/Loc	Length
<u>Jammu Sec</u>		
a.	Kane Chak – Gajansu-Badihal – Brahamanan	22000 ms
b.	Samal camp – Samka	8000 ms
c.	Chandu Chak – Chakroi-Arnia	18000 ms
d.	Arnia – Khaur	9000 ms
e.	Mokhe Ditch	2200 ms
f.	Ranbhirsinghpura (Nawan Shehr)	2000 ms
g.	Miran Sahib Ditch	9000 ms
h.	Chakroi Ditch	4200 ms
<u>Samba Sec</u>		
j.	Khaur – Ramgarh	8000 ms
k.	Bajpur – Ramgarh	10000 ms
l.	Nagna-Ramgarh-Bajpur	13000 ms
m.	Samba – Galar – Mawa	9000 ms
n.	Ragal – Landhi	12000 ms
o.	Chandwan-Pansar	6700 ms
p.	Tarnah N-Lachhmipur	11300 ms

66. **Bunds/Ditches** (Ref to **Anx V** and **Vol II Anx DD**)

a. **Jammu Sec**

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- (1) **Malpur - Pargoal - Sidarwan Bund.** This bund originates from Malpur and terminates near vill Sidarwan. Basically, it is flood protection bund, no bunkers have been reported on the bund. However, it can be used for def purposes. Due to const of this bund flow of water from River Chenab to old bed of River Chenab has been permanently stopped. A cl 9 F1 tr exist along the bund for mov of vehs. Tech data of the bund is as under:-

- (a) Ht - 4 - 6 m
(b) Top Width - 3 - 4 m

- (2) **Kane Chak Bund/Ditch.** It originates from Malpur 7073 and terminates near vill Chakrali. It runs parallel to the WB as def bund, concrete RR/MG bunkers exist in the bund. It is main def posn of the en. The ditch is fed by no 1 off shoot of Ranbir Canal near Kane Chak and it remains filled through out the yr. On eastern side this bund is served with cl 9 A1 metalled rd which links Akhnur, Kane Chak 7370 and Gajansu 7062. Tech data of the bund/ditch and layout of the def are as under:-

(a) **Bund**

- i. Ht - 2 m
ii. Top Width - 3.5-4 m
iii. Base Width - 5-6 m

(b) **Ditch**

Ser		Akhnur Kane Chak	Kane Chak Chakrali
(a)	Top Width	25-27 m	9-11 m
(b)	Base Width	25-27 m	3 – 4.5 m
(c)	Depth	4 m	2 – 3 m
(d)	Water Lvl	3 m	2 – 2.5 m

- (3) **Double Ditch.** There is double ditch from Taunkanwali to Abdullian 6645. The two ditches are approx 100 m apart from each other. The sec ditch is approx 6 kms in length, 3.5 m wide and 2.5 deep. This is an abandoned ditch and it is not being maint since long.

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- (4) **Sati 7151 - Suchetgarh.** It originates from Sati and runs almost parallel to the border and terminates near Suchetgarh. Concrete RR/MG bunkers has been const in the bund. It is def bund and forms en main def posn. Ditch can be charged with disty no 10 of Ranbir Canal. Tech data is as under:-

(a) **Bund**

i.	Ht	-	6 m
ii.	Top Width	-	4.5 m
iii.	Base Width	-	10.5 m
iv.	Dist b/w bund and ditch	-	9 m

(b) **Ditch**

i.	Depth	-	3.5 m
ii.	Top width	-	9-10
iii.	Base width	-	4-5.5 m
iv.	Water lvl	-	2.5 m

- (5) **Chakroi 7339 – Arnia 8136.** It originates near Satowali 7043, runs 2-4 kms parallel to Indo-Pak border. Passes through Aik Nullah, Arnia, Ala and ends near Kathar 8636. It is a def bund and has concrete RR/MG bunkers. It is main def posn of the en. It can be charged by Chakroi minor near vill Chakroi and Karyal minor near Ala 8336. Tech data is as under:-

(a) **Bund**

i.	Ht	-	6 m
ii.	Top width	-	4.5 m
iii.	Base width	-	10.5 m

(b) **Ditch**

i.	Depth	-	3.5 m
ii.	Top width	-	20-23 m
iii.	Bottom width	-	18-21 m

- (6) **Nawanshahr Bund/Ditch.** It is horse shoe shaped ditch around Nawanshahr. It protects the town from almost all sides except

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the rear. It covers rd Sialkot-Jammu and provides depth to main def posn. Tech data is as fol:-

(a) **Bund**

- | | | | |
|------|------------|---|-----------|
| i. | Ht | - | 2 m |
| ii. | Top width | - | 3-3.5 m |
| iii. | Base width | - | 4.5-5.5 m |

(b) **Ditch**

- | | | | |
|------|------------|---|---------|
| i. | Depth | - | 2.5 m |
| ii. | Top width | - | 4-6 m |
| iii. | Base width | - | 10-12 m |

- (7) **Miran Sahib Bund/Ditch.** It is loc south of Miran Sahib and has been designed primarily for the def of Jammu. There is another smaller ditch behind the main ditch which provides depth. It covers rd Sialkot-Jammu and provides depth by two distys (10 and 11 of Ranbir Canal) which can be used for filling the ditch with water. The water can also be drained into Guror nullah when the ditch is req to be dried. Tech data is as under:-

(a) **Bund**

- | | | | |
|------|------------|---|------------|
| i. | Ht | - | 2 m |
| ii. | Top width | - | 3 to 3.5 m |
| iii. | Base width | - | 4 to 5 m |

(b) **Ditch**

- | | | | |
|------|------------|---|----------|
| i. | Depth | - | 2.5 m |
| ii. | Top width | - | 7-9 m |
| iii. | Base width | - | 4 to 6 m |

b. **Samba Sec**

- (1) **Ramgarh Bund/Ditch.** It runs from Kamor to Nandpur, nearly parallel and at dist of 3 to 7 km from Indo-Pak border. A 3-5 m wide kacha tr has also been const on northern side of bund for veh tfc. Toward west, the ditch is connected with disty no 9 of Ranbir canal from which water can be filled into it, making it a formidable A/tk obs. On the eastern side it is connected with Degh Nadi, thus providing the facility for draining the water from ditch into Nadi when req. Basically it is a def bund. Concrete RR/MG bunkers have been const. It is the main def posn of the en. Tech data is as fol:-

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SECRET(a) **Bund**

- i. Ht - 3 to 3.5 m
- ii. Top width - 3 to 3.5 m

(b) **Ditch**

- i. Depth - 2-5 m
- ii. Top width - 5-5.5 m
- iii. Base width - 4-4.5 m

(c) **Banks**. Northern bank is sloping at angle of about 60 degrees but southern bank has steeper slopes. The banks are brick lined.

(2) **Galar 0535 – Lundi 2028 – Pansar 2923.** It originates from Galar and terminates near vill Dhindah and runs parallel and close to the border. It is basically def bund. Concrete RR / MG bunkers have been const. It is main def posn of the en. It can be charged with Ujh canal near vill Ragal 1132 as Ujh canal crosses bund and ditch at this pt. Tech data is as under :-

(a) **Bund**

- i. Ht - 2.5 m
- ii. Top width - 3-4 m
- iii. Base width - 6-8 m

(b) **Ditch**

- i. Width - 12 m
- ii. Depth - 2.5 m

67. **Details of Bunkers.** Ref to **Vol II Anx EE.**

68. **Op Towers.** Ref to **Vol II Anx FF.**

69. **BOPs.** Ref to **Vol II Anx GG.**

70. **Str Pts.** Ref to **Vol II Anx HH.**

71. **Log Instls.** Ref to **Vol II Anx KK.**

72. **Firing Ranges.** Ref to **Vol II Anx LL.**

73. **Helipads.** Ref to **Vol II Anx MM.**

74. **Tel Exchs.** Ref to **Vol II Anx NN.**

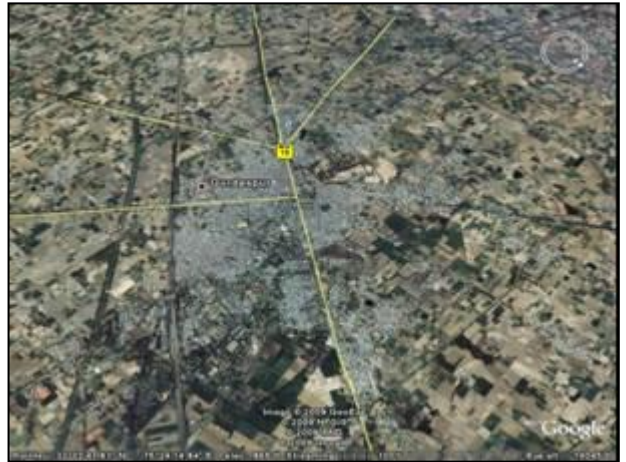
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SECRET**CHAPTER - V****TERRAIN STUDY - TRANSFRONTIER****RELEVANT DETAILS (RAVI – BEAS CORRIDOR)****Gen Description of the Area**

75. **Terrain.** The area under study is the NW portion of the province of East Punjab and it comprises of the dists of Amritsar and Gurdaspur. It covers a total area of about 7770 sq kms and it shares a common border with Pakistan for about 290 kms. Rivers, nullahs and distys in this sec flow in the gen dir NE to SW. The area is gen fertile, dev and thickly populated. Gr in this area is plain and dry, criss crossed with rivers, canals and distys. Broad char incl fol:-



- a. The area is well served with a reliable network of rlys, rds and trs mostly fit for use in all weathers. The area b/w River Ravi and Beas is termed as 'Bari Doab', which is interspersed with natural and man made obs sys.
- b. Gen entire area lies on a low elev with exception of small portions in the NE corner i.e. Kathua-Pathankot essentially loc at the foothills of Piranjial Range. Hts of some pts in this area are :-

(1)	Harike	-	223 m
(2)	Taran	-	225 m
(3)	Ajnala	-	225 m
(4)	Fatehgarh Churian	-	240 m
(5)	East of Narot	-	287 m
- c. **Soil Analysis**
 - (1) **Soil Condition.** The soil in this area is of alluviat type of grey or brown colour with contents of salts that it is brought by the flow

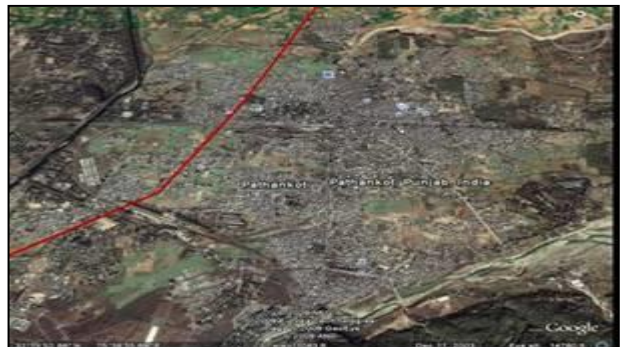
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of the rivers and their tributaries. The area is well irrigated by rivers, canals and drains and at places by tube wells.

- (2) **Water Table.** Gr water table rises in over 60% of the area from 5 to 6 m to less than 1.5 m at the end of monsoon season.
- (3) **Tfc.** Gen the gr being firm, permits good going during dry weather. During dry weather it offers good tk going except in low lying areas in the vicinity of rivers / nullahs / distys where the gr is boggy due to seepage of water and high water table. X cty mov of all types of veh is possible during dry weather, however mov is facilitated by thick network of rds / trs and rly line.

Comm Infrastructure76. **BUAs and Comcens**a. **Gurdaspur Sec**

- (1) **Madhopur.** It is a very vital comcen and the gateway to IHK. On the southern side, Upper Bari Doab Canal takes off with a capacity of 20,000 cusecs. From this canal originate the Salampur Feeder and Madhopur – Beas link at a distance of 1 km and 5 kms from the head reg respectively. On the northern side Kashmir Basantpur canal takes off with a capacity of 800 cusecs.
- (2) **Pathankot.** It is tehsil HQ and an imp rly junc. An imp mil airfd is loc 6.5

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kms south of the town. Two strat highways, Amritsar – Pathankot and Jullundur originate from here.

- (3) **Gurdaspur**. Dist HQ and an imp rly and rd comcen. INH-15 passes through the town. Reportedly, a Cantt is planned to be under const on rd Gurdaspur – Pathankot over 1295 hectares of land.
- (4) **Dera Nanak**. An imp comcen close to the border. The city is connected by rly with Amritsar. BUA is about 3.5 sq kms. Bypass rd to Gurdaspur is aval towards south. It is also a Sikh religious centre.

- (5) **Batala**. A Teh HQ and imp rail and rd comcen. Built up area of 10 sq kms can be bypassed from the west.



b. **Ajnala Sec**

- (1) **Ajnala**. A Teh HQ and an imp rd comcen loc 18 kms from the border.
- (2) **Amritsar**. Dist HQ, Provincial Capital and the largest town in this sec which is sacred to Sikhs because of Golden Temple. It is centrally loc and is well connected with rest of the area by rds, rlys and air. Civ and mil airfd is loc at north of the city. A bypass rd is aval in the north. The city is protected in the north by Gumtala Nala (20 m wide and

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2 m deep) and in the south and SE by UBDC Main Branch (width 45 m).

77. **Rds / Trs**

a. **Highways.** Fol are cl 70A2 highways falling within the limits of study:-

- (1) **Madhopur – Gurdaspur – Batala – Amritsar – Taran – Harike – Zira (INH-15).** An imp lateral rd of cl 70 A2 in the middle of the sec, linking imp comcen and focal pts. It is pertinent to mention that this highway links Jammu with Kathua and terminates at Samakheil.
- (2) **Madhopur – Pathankot – Mukerian – Jullundur.** A maj lateral which runs NS. Two maj brs are aval over river Beas near Mirthal. While the old br is a rail cum rd br, the new one is a cl 70, RCC rd br only.
- (3) **Atari – Amritsar – Jullundur (INH-1).** INH-1 is a maj rd which links Dehli with Amritsar and Lahore. It was earlier known as the GT Rd. It bisects the sec almost in half and along its entire length a double gauge rly line runs almost parallel to it. At Amritsar there is a bypass. The bypass originates from km stone 6 at sq 9936 44 1/14 (Amritsar-Jullundhur Rd) and runs to the north and along Gumtiala Drain on the northern side of Amristar city and cantt. The bypass rd again joins with the main rd at km stone 29 sq 8837 44 1/14.

b. **Penetrants**

(1) **Gurdaspur Sec**

- (a) **Pathankot-Narot.** It is cl 9, all weather, one way metalled rd.
- (b) **Jhakilehir – Bhariial Lehri – Rattan Garh.** It is cl 9, all weather, one way metalled rd.
- (c) **Dinanagar – Wazirpur Jattan.** It is cl 30, all weather, one way metalled rd.
- (d) **Dinanagar – Galri Dostpur – Kalanaur.** It is cl 9, all weather, one way metalled rd.

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- (e) **Gurdaspur – Wazirpur Jattan.** It is cl 30, all weather, one way metalled rd.
- (f) **Kalanaur – Khadar Pakhiwan.** It is cl 9, all weather, one way metalled rd.
- (g) **Mukerian – Gurdaspur – Bakshiwal – Kalanaur – Dera Baba Nank.** It is cl 30, all weather, one way metalled rd.
- (h) **Bakshiwal-Santokhra-Dhariwal-Qadian-Kohlwan.** It is cl 40, all weather, one way metalled rd. From Bakhshiwal to Dahriwal is cl 9, all weather, one way metalled rd.
- (j) **Shahpur-Othian Dhariwal-Haresh Chinna.** It is cl 9, all weather, one way metalled rd.

(2) **Ajnala Sec**

- (a) **Srigobindpur-Batala-Kotli Surat Wali-Dera Baba Nanak.** It is cl 40, all weather, one way metalled rd upto Batala. Batala to Dera Baba Nanak is cl 40, all weather, two way metalled rd.
- (b) **Amritsar-Fatehgarh-Dera Baba Nanak.** It is cl 40, all weather, two way metalled rd.
- (c) **Chemiar-Gaggomohal-Ghalib.** It is cl 9, all weather, one way metalled rd.
- (d) **Amritsar-Ajnala-Bal.** It is cl 70, all weather, one way metalled rd upto Ajnala. Ajnala to Bal it is cl 40 all weather, one way metalled rd.
- (e) **Bhet-Batala-Fatehgarh Churian-Ajnala.** It is cl 70, all weather, one way metalled rd.
- (f) **Ajnala-Tulwandi-Fatehwal Sarangdes-Barhalwal.** It is cl 9, all weather, one way metalled rd.
- (g) **Ajnala – Punja – Awan Basu – Bhindi Aulakh – Saiyidpur.** It is cl 30, all weather, one way metalled rd.

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- (h) **Ajnala-Kamirpur.** It is cl 9, all weather, one way metalled rd.
- (j) **Isapur-Jasraur-Ghoga.** It is cl 9, all weather, one way metalled rd.
- (k) **Ramtrith-Bhitewadh-Mananwala-Surian – Bhindi Saiydan-Bhindi Aulakh-Bhindi Nain.** It is cl 40, all weather, one way metalled rd.
- (l) **Bhindi Saiydan Buri.** It is cl 9, all weather, one way metalled rd.
- (m) **Srigobindpur – Amritsar – Ramtrith – Chuganwan – RasulpurKakkar – Rani.** It is cl 40, all weather, one way metalled rd.
- (n) **Khiala-Kohala-Cheleke-Bachiwud.** It is cl 9, all weather, one way metalled rd.
- (o) **Bhullar-Pindori – Kakkar.** It is cl 9, all weather, one way metalled rd.
- (p) **Bhittewadh-Champur-Khiala-Kauiwala – Nurpur – Charenda.** It is cl 9, all weather, one way metalled rd.

c. **Laterals**(1) **Gurdaspur Sec**

- (a) **Dinanagar – Kathlaur.** It is cl 9, all weather, one way metalled rd.
- (b) **Srigobindpur – Gurdaspur.** It is cl 40, all weather, one way metalled rd.
- (c) **Gurdaspur 4087 – Dera Baba Nanak.** It is cl 30, all weather, one way metalled rd.
- (d) **Batala 2460 – Dera Baba Nanak.** It is cl 40, all weather, one way metalled rd.

(2) **Ajnala Sec**

- (a) **Dera – Nanak –Ramdas-Ajnala-Chuganwan – Atari.** It is cl 40, all weather, one way metalled rd.

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- (b) Kalanaur – Kakampur-Kotli – Surat Malli – Kala Afghanan. It is cl 9, all weather, one way metalled rd.
- (c) Amritsar-Majitha – Fatehgarh Churian. It is cl 40, all weather, one way metalled rd.
- (d) Chuganwan – Bhakna – Kalan – Dhand – Tarn Taran. It is cl 40, all weather, one way metalled rd.
- (e) Bachiwud – Atari. It is cl 9, all weather, one way metalled rd.
- (f) MS 292 (Lahore Amritsar Rd) Kiran Garh – Sarangra Kakkar. It is cl 9, all weather, one way metalled rd.
- (g) Ajnala – Atari 6934. It is cl 18, all weather, one way metalled rd.
- (h) Amritsar 9240 – Dera Baba Nanak. It is cl 40, all weather, one way metalled rd.
- (j) Ajnala – Gil 8070. It is cl 40, all weather, one way metalled rd.
- (k) Ajnala – Punja 7463 – Awan Basau 7162 – Bhindi Aulakh 6658 – Saiyad Pur 6452. It is cl 30, all weather, one way metalled rd.
- (l) Batala – Chahal 2656 – Saidelal 1543 – Jandiala Guru 0932. It is cl 40, all weather, one way metalled rd.
- (m) Jandiala Guru – Tarn Taran 0019. It is cl 50, all weather, one way metalled rd.
- (n) Ajnala – Chaganwan 7346. It is cl 18, all weather, one way metalled rd.

73. Rlys. A fairly well dev sys of broad gauge rly exists in this area. The main lines are as fol (For details, ref to **Vol II Anx L**) :-

- a. Pathankot-Madhopur-Jullundur. Single line.
- b. Pathankot – Amritsar. Single line.
- c. Dera Nanak – Amritsar. Single line.
- d. Datala – Qadian. Single line.

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- e. **Atari – Amritsar – Jullundur.** Double line.

74. **Airfds / Landing Strips**

a. **Pathankot**

(1) **Loc**

- (a) Map - 43 P/12

(b) **Description.**

Indian Air Force fighting / bomber base, loc about seven kms from Pathankot on rd Pathankot-Jullunder.



(2) **Runway**

- (a) Length - 2743 m
 (b) Width - 45 m
 (c) Type of Concrete, for all types of jet ac.

- (3) **Radar.** High lvl radar coverage is provided by a PSM-33 each at Jammu and Amritsar. Low level coverage is provided by the integral radars of the SA-3 sqn loc at Pathankot.

b. **Raja Sansi (Amritsar)**

(1) **Loc**

- (a) Map - 44 1/14
 (b) **Description.** Civ / mil airfd loc about 13 kms from Amritsar – Ajnala near Raja Sansi town.

(2) **Runway**

- (a) Length - 2745 m – Main runway
 (b) Width - 45 m
 (c) Type Concrete, fit for all types of jet ac.

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- c. **Mirthal/Mukerian**. It has also been reported that fair weather landing strips for It ac, also exist in area Mirhal and Mukerian.
- d. **Jullundur**. Civ airfd south of Jullundur city is reported to be under const:-
- (1) Type Non jet all weather
 - (2) Loc 3117N – 7535E

75. **River Beas**. It originates from Pirpanjal Range (Kangra and flows in gen dir NE to SW till it join river Sutlej at Harike HWs. Low lying flood plains of this river are subj to annual floods and are thinly populated. Gen char of the river are the same as of River Ravi. Pandoh Dam, Pong Dam and Beas – Sutlej link hydroelectric proj on this river have been const by Indians to harness this river completely. In very wet yrs, however, some water is expected to pass below Harike. Width of the river at Mirthal is 518 m and at Dhilwan it is about 570 m.



76. **Canals**. Imp canals and drains are discussed below :-

- a. **Upper Bari Doab Canal**.

This canal with total capacity of 21,000 cusecs takes off from Madhopur HWs. Out of this 10,000



cusecs are passed into River Beas through Madhopur – Beas Link. Near Baba Haji it is divided into upper Bari Doab Canal Main Branch (55 m wide, 1-2 m deep) and upper Bari Doab Canal. Lahore Branch takes off from Main Branch at Aliwal, and Upper Bari Doab Canal is further divided into Kasur branch and Sobraon Branch. All these channels flow

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in gen dir NE to SW. Average dist b/w canals is about 19 Kms forming well defined corridors in this sec. Dimensions of these canals are :-

Ser	Branch	Width (M)	Depth (M)
(1)	UBC Lahore Branch	22.5	1-2
(2)	UBDC Main Branch	43-45	2-3
(3)	UBDC Kasur Branch	30	1-2
(4)	UBDC Sobraon Branch	24	1-1.5

- b. **Kalanaur Disty.** It is the shortest canal, which originates from Galri HWs over Naumuni Nullah and runs parallel to the Dhussi Bund through out its length. It irrigates the areas of Kalanaur and Ramdas. There is a kacha rd on the bund which exists on home side of the canal. The rd can take all type of vehs in fair weather and is mainly used by mil vehs. Its tech dats is as under :-

- (1) Width - 18.28 m
- (2) Depth - 2.42 m
- (3) Ht of bank - 3.34-4.57 m
- (4) Width of bank- 3.34-6.08 m

- c. **Madhopur Beas Link Canal.** The canal takes off from Upper Bari

Doab Canal transferring 10000 cusecs of water from River Ravi to River Beas. It also falls into Chakki Khad which is a rt bank tributary of river Beas near will Simbi Gujran. It is an obs for tks. Its top width is 36.4 m and depth is 2.5 m.



- d. **Shampur Disty.** It originates from sq 9877 as an extn of Kiran Rajban inundation canal and it terminates near Sayidpur 6452 into Kiran Sakki nullah 6449. This distry runs in b/w and parallel to Dhussi bund and rd Dera Nanak-Ajnala. It crosses the rd Dera Baba Nanak-Ajnala from south of vill shampur 9678. It is 7 – 10 m wide, 1-2 m deep and has

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1-2.5 m high bund on both sides. Svc tr runs over eastern bund. It has fol mil implications :-

- (1) It can inundate area Kiran Sakki nullah and Dhussi bund.
- (2) It serves as intmed-depth posn for the fwd tps as the eastern bank has ht of 1 to 1.5 m.

e. **Galri Canal.** It originates from Galri HW at Galir and fol almost the same alignment as of Kalanaur Disty upto Churra from where onwards it runs parallel to Kiran Sakki nullah upto Gill. Its' top width varies from 9.4 to 12.6 m and depth is b/w 1.9 to 2.5 m.

77. **Brs.** Ref to **Vol II Anx K.**

78. **Cantts.** Ref to **Vol II Anx JJ.**

79. **Bund / Ditches.**

a. **Dhussi Bund.** A flood protection bund runs along river Ravi from Akrota 4908 opposite Ikhlaspur to Chhannan Mallah 6364 opposite Maqboolpur. It also serve the purpose of main def posn and has concrete RR / MG bunkers. Known data of the bund is given below :-



- (1) Length - 83 km
- (2) Ht - 6 m
- (3) Top Width - 4.5 m
- (4) Bottom width - 12-15 m
- (5) Banks - Steep vertical

b. **Ramdas Bund / Ditch.** It originates from Kiran Sakki nullah near vill Shahpur Jajan, out skirt Ramdas and ultimately joins Dhussi bund near vill Gaggar 9079. It can be fed by Galri Canal as it crosses the ditch near vill Singhapura 9778. It is an eff obs for tk vehs. It covers the apch ldg to Ramdas-Fatehgarh-Amritsar and Ramdas-Ajnala-Amritsar. It also provides depth to main def posn. Tech dats is as under :-

- (1) **Bund**
 - (a) Ht - 3.5 m

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(b) Top width - 3-4 m

(c) Base width - 6-8 m

(2) **Ditch**

(a) Depth - 3.4 m

(b) Top Width - 3.5

(c) Base width - 1.5 m

80. **Nullahs**

- a. **Kiran Sukki Nullah.** A tributary of river Ravi, it rises in the Bahrapur marshes Gurdaspur, 5 kms NE of Bahrapur and joins Ravi 2 kms south of vill Maqboolpur. It runs parallel to Dhussi Bund at a distance of 1 to 6.5 kms east and forms an effective tank obs. Thus it is an altn tank obs after River Ravi. From originating pt to Kalanaur it is called Kiran



Nullah and after that to the pt of falling into river Ravi, it is known as Sukki Nullah. Another nullah called Doga nullah originates 2.5 kms north of Gurdaspur and joins kiran Nullah near vill Lale Nangal. The nullah has been improved at six existing crossing places b/w kalanaur and Ajnala to make it an effective obs. The total improved length is 21 kms.

Tech data of Kiran /Sukki Nullah is as under :-

(1) Width varies from 25 to 95 m.

(2) Depth 4.5 m.

(3) **Bund**

(a) Ht - 3-4.5 m

(b) Top Width - 3 m

(c) Base width - 6 m

(4) **Xing Places**

(a) Rd Gurdaspur – Dera Nank.

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- (b) Rd Batala – Dera Nanak.
- (c) Rd Fatehgarh Churian – Dera Nanak
- (d) Rd Fatehgarh Churian – Ramdas
- (e) Rd Chamari – Gago Mahal
- (f) Rd Ajnala – Dera Nanak

- b. **Rohi Nullah.** This is the main drainage sys which drains the southern portion of the sec. It is the longest natural water channel in the sec, other than the rivers. It originates from gen area Marar and running NE to SW passes through Batala, east of Fatehpur, north of Taran, south of Bhikkiwind, north of Mastagarh and enters Pakistan NE of Kasur.



SECRETCHAPTER - VITERRAIN STUDY – MIL ASPECTS OF TERRAINSialkot Sec

81. Apchs. Broadly there are four maj apchs leading into Sialkot Sec as under:-

a. Gajansu - Kachimand -

Khoje Chak - Sidra /

MHWs. It can take an Inf

Bde (+) and an Armd Regt.

b. R.S.Pura - Chaprar/BM -

Marala HWs. An Inf Div

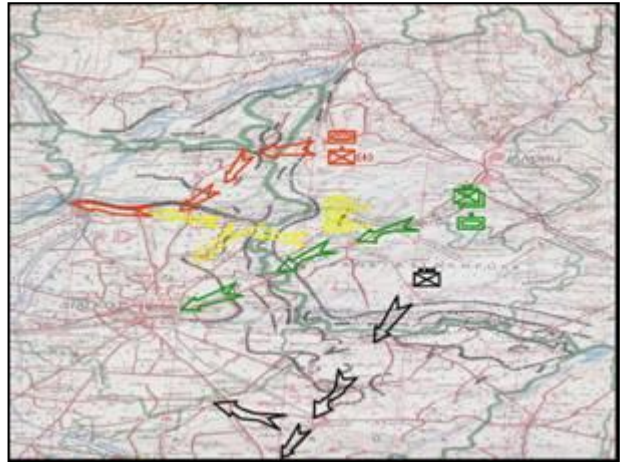
plus and an Armd Bde (-).

The op will be mostly inf dominated till line Saidpur –

Marakiwal.

c. Miran Sahib - Sucheet Garh – Sialkot. It can take upto Inf Div and Armd Regt. Approx 13 vills dominates this apch. Besides, Palkhu and Aik N will have canalizing eff.

d. Arnia – Mahrajke/Khaur – Badiana/Chawinda on to Pasrur. It can sp a Corps size force. Armr can be eff utilized beyond line Wirk – Chak Ali and Kingra.



82. Detailed Description of Apchs

a. North of Sialkot

(1) Akhnur - Khairi - Pukhlian – Sidhra. This apch is served by a cl 9 F1 tr/12 A1 rd. Initially this apch can take about a bde minus because of the BUA upto line Kachhi Mand – Mala 6560 and later on the capacity inc to a bde plus. There is no maj obs enroute. RCC br at Sidhra over Jammu Tawi has tac imp. After having crossed Jammu Tawi en has a choice to either threaten Marala HWs from the eastern dir or mov Southwards to invest Sialkot.

(2) Jammu – 8560 Gajansu 7062 – Pukhlian – Chumbian – 6951-Sidhra 5951. It can take a bde plus and armr regt minus initially

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and can be later built up with an inf div and an armr regt. The obj of this force would be to sever Pukhlian Salient at the neck and if possible to eff a crossing of Tawi and capture Marala HWs or at least threaten it.

- (3) **Rambir Singh Pura - Nandpur – Zahura.** This apch will be used in conjunc with the main apch (Rambir Singh Pura - Suchetgarh - Sialkot). It can take a div minus sp by armd regt. En after reaching Zahura will have an option either to go for Marala HWs or to invest Sialkot from the north.
- (4) **Jammu – Rambir Singh Pura - Suchetgarh – Sialkot.** It is served by a cl 50 A1 rd. It can take an inf div plus sp by an armr regt. It is the shortest apch to Sialkot.

b. **South of Sialkot**

- (1) **Arnia – Maharajke - Bajragarhi - Badiana – Pasrur.** It can take upto corps sp by two armd bdes. En has good comm infrastructure on her side. The apch threatens most frequented route Rd Sialkot – Mahrajke – Zafarwal. After estb of lodgement, no worthwhile natural obs is encountered by en till MRL Canal. Area is open and fit for ops by armr on a large scale.
- (2) **Khaur - Charwa- Chobara-Chawinda- Pasrur.** The apch threatens most frequented route Rd Sialkot – Mahrajke – Zafarwal. It can take upto corps sp by two armd bdes.
- (3) **Ramgarh - Bhagiari - Dugri Cross – Pasrur.** It can take an inf div minus with an armd regt. Degh Nadi protects its lt flk. It is sp by apch of Khaur - Chobara - Chawinda – Pasrur. It is served by a cl 30 A1 rd from Kingra to Dugri cross. En will have the option of going towards Chawinda or Pasrur after

83. **Eff of Cen Assy.** En has Superior Strat Orientation in Sialkot Sec, essentially balancing the advantage that we enjoy in Shakargarh Salient. En while op on interior lines has the advantage of central assy to generate multiple thrust lines. Sialkot, MHW and most frequented route along Rd Sialkot – Zafarwal have immense psycho – social / eco imp. Sialkot and Rd Sialkot – Zafarwal lie perilously close to the

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WB and these are prone to easy interdiction. The own op on Exterior Lines eff largely on the emp options of Tac Res to incl its stretching and div.

84. **Strat Posture**

- a. **En.** Offn - def Strat with comb of fwd and rearward def posture.
- b. **Own.** Def - offn Strat with an exaggerated fwd def posture.

85. **Critical Spaces**

- a. **North of Sialkot.** Space bounded by Gondal – Saidpur – Zahura – Marakiwal, is essential to prevent dev of threat to Marala HWs, Sialkot and Twin Canals. This space assumes imp for retention of a suitable launch pad for ARN.
- b. **South of Sialkot.** Bhagowal – Phillourah – Chawinda and Badiana is critical to 15 Div's def mnvr as loss of this critical space will open multiple op possibilities to en to incl threatening strat objs in depth.

86. **Impact of Conurbation / BUAs.** The pronounced eff of conurbation of Sialkot and expansion of various population cens close to WB not only constraint the psycho – social dimensions on one hand but on other their incorporation into def inc the potency of own def mnvr. Therefore, incorporation of BUAs into def is compulsion. The cumulative eff of extensive BUAs, DCBs and conurbation eff is likely to be char by slow inf dominated ops with inc anvil of fire and use of 3rd dimensional forces. However, compartmenting and canalizing effs created by obs, BUAs, DCBs is likely to deny en generating full cbt power and bold emp of armr mnvrs during the initial stages of battle.



87. **Vuln of Phuklian Salient.** Pukhlian Salient protruding into Indian territory threatens Akhnur and Indian L of C (Madhopur – Samba – Jammu), therefore it is likely to remain a high pri tgt for early reduction by the en. Pragoal Enclave provides launching pad for reduction of Pukhlian Salient from the West. Possibility of reduction of Phuklian salient from multiple dirs coupled with our compulsion to hold it for Army's

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offn mnvr dictate its def in str and early reduction of Pargol Enclave. Psycho – Social imp of MHW also merits holding it against possible en's gr and heliborne ops rt from the outset.

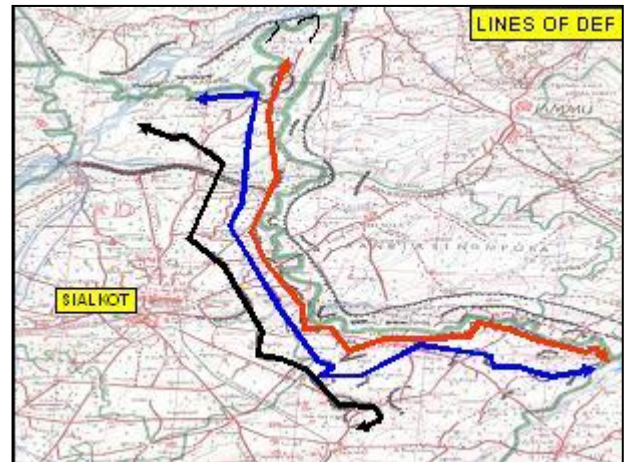
88. **Lines of Def.** Def can be configured around fol lines of def:-

a. **Along WB DCB.** 75 km DCB all along WB has recently been completed.

b. **Line - I.** Along line of DCBs named as Kachimand – Chaprar – Mahinderwal – Bajragarhi – Maharajke – Charwa.

c. **Line - II.** Ghazipur – Najowal – Saliha - Karlup – Wirk -Mastpur Bund.

d. **Line - III.** Along line of DCBs i.e Zahoor – Patesar – Bhagowal – Philourah – Gadgor – Kingra.



89. **Space for Assy.** Ltd spaces for assy suggests fairly predictable lines of op under dense envmts. Fol is the data:-

a. **Cisfrontier**

(1)	Total space	-	4162 sq
(2)	BUA	-	315 sq
(3)	Water channels	-	317
(4)	Space aval	-	3530 sq

b. **Transfrontier**

(1)	Total space	-	1585 sq
(2)	BUA	-	44 sq
(3)	Water channels	-	347
(4)	Space aval	-	1194 sq

90. **Strat Surprise.** Aval of one entry pt at Madhupur, condensed space due to proximity of Parmandal Range and predictable assy spaces constraints achieving surprise at op and tac lvl.

Shakargarh / Magboolpur Sec

91. **Apchs.** Broad description of main avenues is given as under:-

- a. **Degh – Ravi Sec.** This sec is served by three penetrants i.e. Samba – Zafarwal, Kuta – Shakargarh and Chak Sakta – Shakargarh, which ultimately all lead to strat objs of twin canals and GT rd.

- (1) It can take a Corps/Corps plus with an Armd Div.
- (2) En offn through this avenue of attk adds depth to her vuln line of comm.



- b. **Across River Front.** Across River front fol pentrants sp this apch:-

- (1) Dera Baba Nanak – Narowal – Pasrur
- (2) Gurdaspur – Kuker – Kotnaina – Shakargarh.
- (3) Ajnala – Badomalhi – Raya – Pasrur.
- (4) **Ajnala – Shahpur / Daud – QSS**



(Renamed as Qila Ahmadabad) - Pasrur.

- (5) **Capacity.** It can take a Corps sp by armr div.

Detailed Descriptions of Apchs

92. **Shakargarh Sec**

- a. **Samba – Darman – Azizpur – Zafarwal – Qila Sobha Singh.** It originates from Samba passes through Darman, Azizpur, Zafarwal and terminates at Chawinda / Qila Sobha Singh. It is served by only, one cl-

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9 all weather rd from Tarapur to Darman. This apch can take div sp by an armd bde.

- b. **Kuta – Chak Nahra – Chak Amru – Shakargarh.** It originates from Kuta, passes through Chak Nahra, Chak Amru, Maryal and terminates at Shakargarh. It is served by cl 30 A1 rd from Chak Amru to Shakargarh. This apch is criss crossed with no of nullahs across the border. This apch can take a div sp by an armd bde minus.
- c. **Kathua – Masrur – Ikhlaspur – Shakargarh.** It originates from border passes through Masrur, Ikhlaspur and Shakargarh. The apch is served by cl 30 A1 rd both from Masrur to Shakargarh and Ikhlaspur to Shakargarh. This apch has a capacity of taking a div plus. Emp of armr is restd because of the escarpment near Pansar and Masrur, however, after Masrur there is no problem for armr. There is a good network of rds both towards own sides and across the border.
- d. **Gurdaspur – Kukar Enclave – Kot Naina – Shakargarh.** It originates from Guradaspur passes through Kukar Enclave / Kot Naina – Kanwal Afghani and terminates at Shakargarh. The area is gen flat and open. It can take a div sp by an armd bde. Maj engr effort is req in crossing River Ravi after which the area will pose no problem. It is served by cl 30 A1 rd from Kot Naina to Shakargarh.
- e. **Kalanur – Maddoke – Nurkot – Shakargarh – Qila Sobha Singh (Renamed as Qila Ahmadabad).** It originates from Kalanur passes through Maddoke, Nurkot, Sankhatra and terminates at Qila Sobha Singh (Renamed as Qila Ahmadabad). It is served with no of rds on both sides of the border in the shape of penetrants and laterals. It req maj engr br efforts to cross River Ravi. This apch can take a div plus sp by an armd bde.
- f. **Ramdas – Dera Baba Nanak – Jassar – Narowal – Tapiala.** It originates from Ramdas passes through Dera Baba Nanak, Jassar, Narowal and terminates at Tapiala / Qila Sobha Singh (Renamed as Qila Ahmadabad). It is served by no of rds on both sides of the border in the shape of penetrants and laterals. It is an apch which leads directly

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to Narowal. Narowal – Shakargarh and Narowal – Pasrur are cl 70 A1 rds and will facilitate en action towards any side. This apch can take a div plus sp by an armd bde. It also involves maj engr br effort for Xing of River Ravi.

- g. **Ajnala – Shahpur – Raya Khas – Narowal / MRL.** It originates from Ajnala passes through Shahpur, Raya Khas and terminates at Narowal / MRL. It is served by no of rds on both sides of the border in the shape of penetrants and laterals. This apch leads dir to Baddomalhi / Narowal. Raya Inundation Scheme if re-activated in time would pose maj problems for en advancing tps / columns. The obs value of River Ravi has reduced considerably and as such no maj engr effort is req to sustain op. This apch can take a div sp by an armd bde (+).

93. **Magboolpur Sec**

- a. **Ajnala – Ghoga – Mandhali – Narang.** This apch can sustain ops of a mtn / inf div sp by an armd regt upto BRBL but it would req substantial engr effort to cross River Ravi and BRBL. Across BRBL going is very good. A cl 70A2 rd is aval which can facilitate maj mnvr comprising corps size force sp by two armd bdes.
- b. **Chuganwan – Rasulpur – Magboolpur.** This apch can take an inf/mtn div upto BRBL. Extensive engr effort will be req in Xing River Ravi and BRBL having boggy area and stagnant water ponds. Across BRBL it affords multiple options of heading for Muridke or turning to Shahdara.
- c. **Chuganwan – Tooti – Sheikhpura – Siphon GT Rd.** This apch affords an imp jump off pt (unopposed crossing) across River Ravi to threaten Siphon/GT Rd. Terrain friction enhances due to eff of creeks, BRBL and their eff of seepage. Being loc on extreme limb of 30 Corps, preliminary op of bde/bde(+) can be launched to capture Siphon. Therefore, extensive engr sp is req to induct Div sp by Armd Regt. Tac op against Siphon can generate op effs besides impacting def mnvr of 4 Corps and agro based eco of central Punjab.

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94. **Superior Strat Orientation.** Pak enjoys superior strat orientation, because of vuln of Indian strat L of C to IHK and strat obj of Madhopur HWs. The peculiar alignment of the border upon undertaking offn can create a sit of front to flank for en's offn mnvr.
95. **Strat Posture**
- a. **En.** Proactive strat with an exaggerated fwd def posture.
 - b. **Own.** Offn - def Strat with comb of fwd and rearward def posture.
96. **Critical Space.** A space bounded by **Dhamtal – Zafarwal – Shakargarh – Narowal** and **Narowal – Pasrur – Raya.**
97. **Pivots of Mnvr.** Darman, Dehlra, Laiser Kalan, Maryal, are important pivots of mnvr. Pivots of mnvr Zafarwal, Shakargarh and Narowal would be req for subsequent ops.
98. **Effs of Parmandal.** Restd space b/w WB and Parmandal Range, gradual induction through choke pt of Mahdopur HWs forces the en a graduated assy thus subjecting them to effective interdiction. The aval req space both along, East and West of Degh is approx 550 map squares whereas 255 (145 West of Degh and 110 East of Degh) map squares are aval for depl which are barely sufficient for 2 x inf div and 1x IABG.
99. **Jump Off Pts Across River Ravi.** Dharam, Kukar Enclaves and Shahpur provide jump off pts across River Ravi. Any success along this dir can create battle of reverse front.
100. **Imp of Brs Over Twin Canals and Degh.** Brs on MRL/ BRBL and Degh Nadi assume strat importance and entail gr and air protection, apart from having sufficient res br/ altn crossing means.
101. **Threat of Double Envelopment.** Shakargarh Salient is vuln to double envelopment.
102. **Op Across River Front.** Op across River front in early stage of the battle or application of strat forces subsequently can induce a serious imbal in def mnvr of 30 Corps. Therefore, gd of river front in str is must.