



September, 2019

**Integrated Development of No Frill Airstrip &
Provision of Airline Connectivity at Shivamogga on
Design, Finance, Build, Operate and Transfer
(DFBOT) Framework**



Project Information Memorandum



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Part I: Project Background



1. Shivamogga – A Brief Overview:

1.1 Introduction:

Shivamogga district is located at central part of Karnataka, having Shimogga city as its district head quarter. Shivamogga, is known for its scenic beauty, forests, and cool climate is situated in the Malnad region bounded by Sahyadri Ghats at a mean elevation of 640 average mean sea level (AMSL) in the western part of Karnataka. Shivamogga lies 274 kilometers from the State capital Bangalore.

As per traditional derivations, the name pertains to Lord Shiva ('Shiva – Mukha' – Face of Shiva, 'Shivana – Mogu' – Nose of Shiva, 'Shivana – Mogge' – Buds of flowers meant for Shiva). According to the legends, the place had the ashram of the famous sage 'Durvasa' who was noted for his sharpness of temper. He used to keep on the oven a pot boiling with sweet herbs. Once, some cowherds, who chanced upon it, tasted the beverage out of curiosity and called the place "Sihi – Moge' (Sweet Pot). The name Shimoga has its own Legend. A Saint who took water in his bowl of River Tunga exclaimed that it's very sweet so the name Simi meaning sweet and mugged meaning bowl became the name of this City.

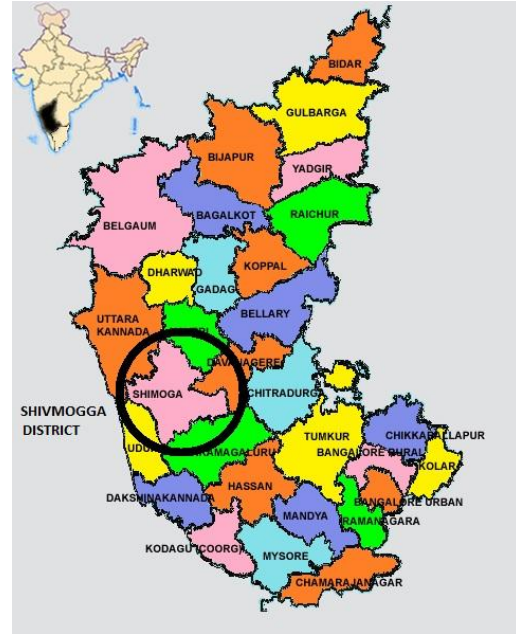


Figure 1: Shivmogga District Location

Shivamogga is an ancient land, which was earlier called as Mandela. Legend has that Saint Parashuram of Krutha Yuga performed his ritual and cleaned his weapon (Kodli) at Parashurama Thirtha in River Tunga at Thirthahalli. Ramayana also has the reference of Maricha relative of Ravana got killed in the disguise of deer by Rama at Mrugavadhe in Thirthahalli.

Historically the first known Kingdom of Karnataka was created by Mayuravarma of Kadambas at Talagunda, The queen Shanthala wife of the great King Vishnuvardhana was Born and brought up at Balligavi in Shikaripura Taluk. Nayakas of Keladhi and Ikkeri ruled over this land. Shivappa Nayaka was the



great king who infamous for his Tax. Tippu Sultan has captured the kingdom for some time. Budhi Basappa rebelled against British and carved his own kingdom at Nagar and built the Fort. Ensor the famous village of Shikaripura taluk has carved its niche in the history of freedom movement of our country. It is the first village in India, which declared its Independence, which was later crushed by, the imperial army by killing four elders of the village. Many got imprisoned. Thus Shivmogga has a special place in the annals of history of Karnataka.

Today, Shimoga is more than just a tourist destination. Its rich tradition in education, fine arts and culture remain deeply etched in its people and place. The enchanting natural scenery of hills, hillocks and green dates, rivers and streams, dense forests, flora and fauna, forts, temples and historical places, sandalwood and spices, add to this mouth-watering cuisine and touching hospitality and you know you've got – HEAVEN ON EARTH.

1.2 Location & Geography:

Shimoga district is a part of the Malnad region of Karnataka and is also known as the Gateway to Malnad or Malenaada Hebbagilu in Kannada. The district is landlocked and bounded by Haveri , Davanagere , Chikmagalur , Udupi and Uttara Kannada Districts. The district ranks 9th in terms of the total area among the districts of Karnataka. The district is spread over an area of 8465 square kms, which constitute 4.41 % area of the State. Shivmogga district is divided into 2 sub-divisions and 7 Taluks.



Figure 2: Taluk Map of Shivmogga District

The Shivoga Sub-division comprises the taluks of Shivoga, Bhadravathi and Thirthahalli. The Sagar sub-division comprises Sagar, Shikaripura, Sorab and Hosanagara. The Shivoga district administration is headed by the Deputy Commissioner with additional role of a district Magistrate. Assistant Commissioners, Tahsildars, Shirastedars, Revenue inspectors and Village Accountants help the Deputy Commissioner in the administration of the district. The district headquarters is Shivmogga



Shivmogga lies between the latitudes 13°27' and 14°39' N and between the longitudes 74°38' and 76°04' E at a mean altitude of 640 metres above sea level. The peak Kodachadri hill at an altitude of 1343 metres above sea level is the highest point in this district. Rivers Kali, Gangavathi, Sharavathi and Tadadi originate in this district. The two major rivers that flow through this district are Tunga and Bhadra which meet at Koodli near Shimoga city to gain the name of Tungabhadra, which later joins Krishna. Taluk wise hoblies and villages, of Shivammoga district is listed below.

| Taluk | No. of Hoblies | No. of Villages |
|--------------|----------------|-----------------|
| Bhadravati | 3 | 145 |
| Hosanagara | 4 | 204 |
| Sagara | 6 | 238 |
| Shikaripura | 5 | 176 |
| Shivamogga | 9 | 214 |
| Soraba | 5 | 306 |
| Thirthahalli | 5 | 247 |

1.3 Topography:

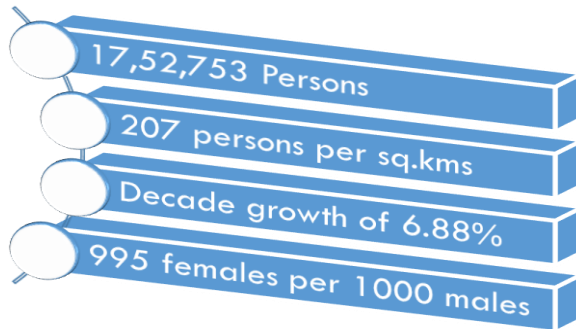
Shivmogga, a place known for its scenic beauty, flush green lush forests, eye-catching waterfalls, cool climate is situated in the Malnad region bounded by Sahyadri ghats at a mean elevation of 640 AMSL in the western part of Karnataka. The district is spread over an area of 8477 Sq.Kms with a forest area of 2.27 Lakh Hectares. The eastern part of district comes under the semi-malnad zone with plain topography and occasional chains of hills covered with semi-deciduous vegetation.

Shivmogga district serves as origin for rivers Kali, Gangavathi, Sharavathi and Tadadi. The other major rivers which flow through the district are Tunga, Bhadra and Varada. The rivers Tunga and Bhadra meets at a place called Koodalgi in Shimoga district. Agumbe, a small place, known for its highest rainfall (8000 mm/annum) in southern India hails from this district.

Shimoga district is rich in flora and fauna, the dense forest and green shrub jungles are main producers of sandalwood, rosewood, teak and other exotic timber. Mango, Jackfruit, Tamarind, etc are the other important trees found around the district with rich yields. The dense forests of the district are home for wild animals like Elephant, Tiger, Lion, Leopard, Wild bear, Bear, Antelope, Bison, Porcupine, Monkeys, wolves and many other animals. Birds migrate from all over the world



and travel down to Shimoga for a honeymoon. Birds of 94 different species are found flying higher and higher in the blue skies.



1.4 Demography:

As per the Census in the year 2011, the population of the district was 17,52,753. The district has a population density of 207 persons per sq.kms. Its population growth was 6.88%. Shivmogga has a

rate over the decade 2001-2011

sex ratio of 995 females per 1000 males and a literacy rate of 80.5%

1.5 Economic Profile:

The estimated total Gross District Domestic Product (GDDP) of the district was Rs. 7585 crores and the per capita annual income of the district was Rs. 61,271. The contribution of Shivammogga district to the GSDP of Karnataka is indicated in the below.

| Description | INR Crore | Contribution (%) |
|---|-----------|------------------|
| Total District GDP | 7,585 | 2.54 |
| Agriculture and Allied (Agriculture, Animal husbandry, Forestry, Fishing) | 1,682 | 4 |
| Industry (Manufacturing, Construction, Mining) | 2,028 | 2.4 |
| Services (Real estate, hotels, restaurants, banking and legal services) | 3,875 | 2.2 |

1.6 Industrial Scenario:

Shivamogga district has more than 10,000 of industrial units, established with an investment of Rs.11,715.90 lakhs, employing 41,000 persons. Agro based, Automobile and Engineering based industries are the prominent in the district. Notable industries in Shivamogga district is indicated in figure below.



| | |
|---------------------------------|---|
| Visvesvaraya Iron & Steel Ltd | <ul style="list-style-type: none"> • Investment of Rs. 26,838 Lakhs • Employment of 2,735 people |
| Mysore Paper Mills Ltd | <ul style="list-style-type: none"> • Investment of Rs. 23,602.29 Lakhs • Employment of 4,010 people |
| Paper Packaging Ltd. | <ul style="list-style-type: none"> • Investment of Rs. 319 Lakhs • Employment of 126 people |
| Bhadra Packedes (P) Ltd | <ul style="list-style-type: none"> • Investment of Rs. 169.89 Lakhs • Employment of 49 people |
| The Southern Gas Ltd. | <ul style="list-style-type: none"> • Investment of Rs. 95.80 Lakhs • Employment of 20 people |
| Pearlite Liners (P) Ltd. | <ul style="list-style-type: none"> • Investment of Rs. 75 Lakhs • Employment of 160 people |
| Karnataka Soaps & Detergent Ltd | <ul style="list-style-type: none"> • Investment of Rs. 63.50 Lakhs • Employment of 147 people |
| Government Milk Dairy | <ul style="list-style-type: none"> • Investment of Rs. 44.15 Lakhs • Employment of 147 people |

Source: www.Shivamogga.nic.in

1.7 Rail Network:

Shivamogga district is well connected by broad-gauge rail line to important cities like Bengaluru, Mysuru and Hubballi and Hyderabad. In total Shivamogga district has 125.8 Kms length of rail lines. The rail network in Shivamogga district can be divided among two distinct railway lines that are present in it:

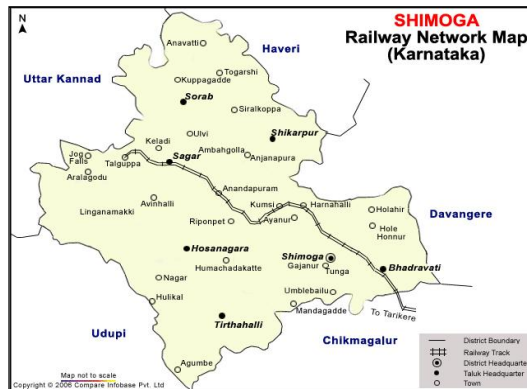


Figure 3 Shivamogga District Rail Network

Source: Maps of India

- Broad Gauge Line:** The Broad Gauge line starts from the district's border with Chikkamagaluru and runs through the Bhadravathi station to end at Shivamogga station.
- Narrow Gauge Line:** This line runs from Shivamogga Station; passes through the town of Sagar and ends at Talguppa. The train that runs now on this track has a heritage background associated with it. It consists of only 2 bogies and is in the form of a railbus. There is a proposal to convert this line into Broad Gauge and further connecting it to the Konkan Railway.



1.8 Road Network:

Shivamogga has a total road length of 6631 km of which 222 km's belongs to the National Highways and 402 km's belongs to State Highways, which are listed as follows.

(a) National Highways:

- (I) NH-13 (Sholapur - Mangalore): Starting

from the district's border with Davangere, this road passes through the cities of Shivamogga and Thirthahalli on to the Chikkamagaluru border.

- (II) NH-206 (Bangalore - Honnavar): Starting from the district's border with Chikkamagaluru, this road passes through the cities of Bhadravathi, Shivamogga and Sagar on to the district's border with Uttara Kannada.

(b) State Highways:

- (I) SH-1 (Padubidri - Maharashtra border): Starting from the district's border with Udupi, this road passes through the towns of Agumbe, Thirthahalli, and Shikaripura in Shivamogga district on to the district's border with Haveri.

- (II) SH-26 (Halageri - Hulikal): Starting from the district's border with Haveri, this road passes through the towns of Ayanur, Arasalu and ends at Hulikal which is a town near the district's border with Udupi.

- (III) SH-48: (Kumta - Andhra Pradesh border): Starting from the district's border with Uttara Kannada, this road passes through the towns of Sorab and Shikaripura on to the district's border with Davangere.



Figure 4: Shivmogga District Road Map

Source: Maps of India

1.9 Tourism:

Shivamogga has some of the most handfult tourist locations in Southern India attracting both domestic and international tourist in the region. The notable tourist locations are listed below:



(a) **Waterfalls:**

- **Jog Falls** is the highest waterfall in India and second highest in Asia. The river Sharavathi falls into the gorge in four distinct flows which are termed Raja, Rani, Rover, and Rocket. Jog falls lies in Sagar taluk and is 30 km. from the city of Sagar.
- **Kunchikal Falls** is the 11th highest waterfall in India and 313th highest in World with a height of 455 meters and ranks 116 in the list of highest waterfalls in the world. This waterfall is near Mastikatte and is formed by the Varahi River.
- **Barkana Falls** is near Agumbe and 80 km from Thirthahalli town. Barkana Falls is the 10th highest waterfall in India and ranks 308 in the world.
- **Achakanya Falls** is located near a village called Aralsuruli, 10 km from Thirthahalli on the way to Hosanagara. The falls is formed by the Sharavathi river.
- **Vanake-Abbey Falls** is in the heart of Malnad forests, 4 km from Agumbe.
- **Hidlamane Falls** is near Nittur in Hosanagara Taluk.
- **Dabbe Falls**, Sagara is located near Hosagadde in Sagar taluk. On the road from Sagar to Bhatkal, Hosagadde lies about 20 km from the town of Kargal. From Hosagadde a walk of 6–8 km into the forest leads to Dabbe Falls.



Figure 6: Jog Falls



Figure 7: Bhadra river project dam



Figure 5: Talagunda rock pillar

**(b) Dams:**

- **Linganamakki dam** is built across the Sharavathi river in Sagar taluk and is 6 km from Jog Falls. It is the main feeder reservoir for the Mahatma Gandhi hydro-electric project. It has two power generating units of 27.5 MW.
- **Bhadra river dam** is built across Bhadra river at Lakkavalli at distance of 20 km from Bhadravathi city. The dam was constructed by Sir. M. Vishweshwaraiah, the then chief engineer of Karnataka state. The dam mainly serves the purpose of irrigation in and around Bhadravathi taluk and Tarikere taluk of Chikkamagaluru district.
- **Gajanur dam** is built across the river Tunga in a village called Gajanur 12 km from Shimoga city.

(c) Hill Stations:

- **Agumbe** is 90 km west of Shimoga city. It is known as the Cherrapunji of South India. Agumbe is 830 meters above sea level. The place is famous for its sunset view.
- **Kavaledurga** is a fort on a hill 5,056 feet (1,541 m) above sea level.
- **Kodachadri hills** are 115 km from Shimoga city. The hills are 1343 m above sea level.
- **Kundadri** is a hill near Thirthahalli. It is famous for its rock formations.

(d) Cultural Heritage:

- **Shivappa Nayaka palace and museum** is in the city of Shimoga. The palace was built by Shivappa Nayaka during the 17th century CE. Kote Seetharamanjaneya temple is beside it.
- **Sacred Heart church**, built in the 1990s and second largest church of Asia, is in the city of Shimoga. It has features of Roman and Gothic styles of architecture.
- **Lakshminarasimha temple** is located in the Bhadravathi city. It has been built in the Hoysala style called 'trikutachala'.
- **Chandragutti fort** is near Balligavi which was built by Banavasi Kadambas. The Renukamba temple is in this village.
- **Humcha** is a Jain pilgrimage place with a Panchakuta basadi which was built during 10th and 11th century CE.
- **Kedareshvara temple** is located in Kubetoor. It has been built in the Chalukyan style.
- **Nagara**, which was earlier called Bidarur, was the last capital of the



Keladi kings and later taken by Hyder Ali during 1763. The Hyder Ali tank, Neelakanteshwara temple and Venkataramana temple are located in this city.

- **Keladi and Ikkeri** were the capitals of Keladi Nayakas. The places are near Sagar.
- **Talagunda** is a village in the Shikaripura taluk. The Talagunda inscription on a stone pillar is in Prakrit language. The author of the inscription was Kubja, court poet of Shantivarman.

(e) Wild Life:

- **Gudavi Bird Sanctuary** is in Sorab Taluk. The sanctuary is spread over an area of 0.74 sq.km.
- **Sharavathi Valley Wildlife Sanctuary** is in Sagar Taluk. It has evergreen and semi-evergreen forests with its eastern portion adjoining the Linganamakki reservoir.
- **Shettihalli Wildlife Sanctuary** lies adjacent to Shimoga town and has forests ranging from dry deciduous to semi-evergreen and is spread over an area of 395.6 Sq.km.
- **Bhadra Wildlife Sanctuary** was started in 1951 as Jagara valley game sanctuary covering an area of about 252 Sq.km.
- **Mandagadde Bird Sanctuary** is a 1.14-acre (0.46 ha) sanctuary 30 kilometres (19 mi) from Shimoga town on the way to Thirthahalli.
- **Sakrebailu Elephant Camp** lies 14 km. from Shimoga town on the way to Thirthahalli.
- **Tyavarekoppa Lion and Tiger Safari** lies about 10 km (6.2 mi) from Shimoga town on the way to Sagar.

1.10 Growth Opportunities:

- a. The district has abundant non-cultivable and fallow land available which can be effectively used for starting industries. The district has 3 Hydro-Electric Power projects.
- b. Handicraft artisans producing sandalwood and rosewood articles are producing certain precious articles, which have great demand in the country as well as abroad.
- c. The foundry and automobile sectors have excelled by way of its quality and innovativeness. This factor needs to be utilized for further development.



- d. Teak, sandalwood, Rosewood, etc. available in the forests, have very good potential for value added products, horticultural crops & plantation in the district indicate a promising future for many new industries.
- e. In view of the rapid tourism related developments in Karnataka and the proximity to key tourism destinations in South India, Shivamogga is well poised to act as the gateway for both domestic and international tourists.

1.11 Conclusion:

GoK has been attracting investments ranging from automobile companies to service industries, to set up their manufacturing units at Shivamogga. Growing industrial development coupled with religious, leisure and domestic tourist destinations in and around Shivamogga has augmented the stern need for an airport.



Part II: Shivamogga Airport Project



2. Development Concept:

2.1 Current Status:

The nearest airport near Shivamogga city is the Mangalore Airport which is at a distance of 200 Kms from Shivamogga city. Rail connectivity is minimal, only a single express train plies between Shivamogga and Bangalore. Road connectivity is fair with connection of major cities in the vicinity of Shivamogga. The existing means of transport have limited connectivity and these constraints obstruct development of Shivamogga city compared to the surrounding region.

2.2 Location:

The proposed site for the Shivamogga Airport is at Sogane village, situated at a distance of 12 Kms from Shivamogga city. The land to the extent of 653 acres (2.643 sq. km) is under possession of the Authority, for the purpose of the project.

However, for the purpose of developing the no frill airport, area admeasuring 449 acres has been earmarked for Aero Activities and area of 49 acres has been earmarked for Non Aero activities. Obstacle Limitation Surface (OLS) Survey has already been conducted for the subject site location and the survey report is attached as Annexure 1. The topographic survey and geo-tech survey of the above said land has been attached as Annexure 2. The location of the existing airstrip is shown in the below picture. compiled



Figure 8: Airstrip Aerial view

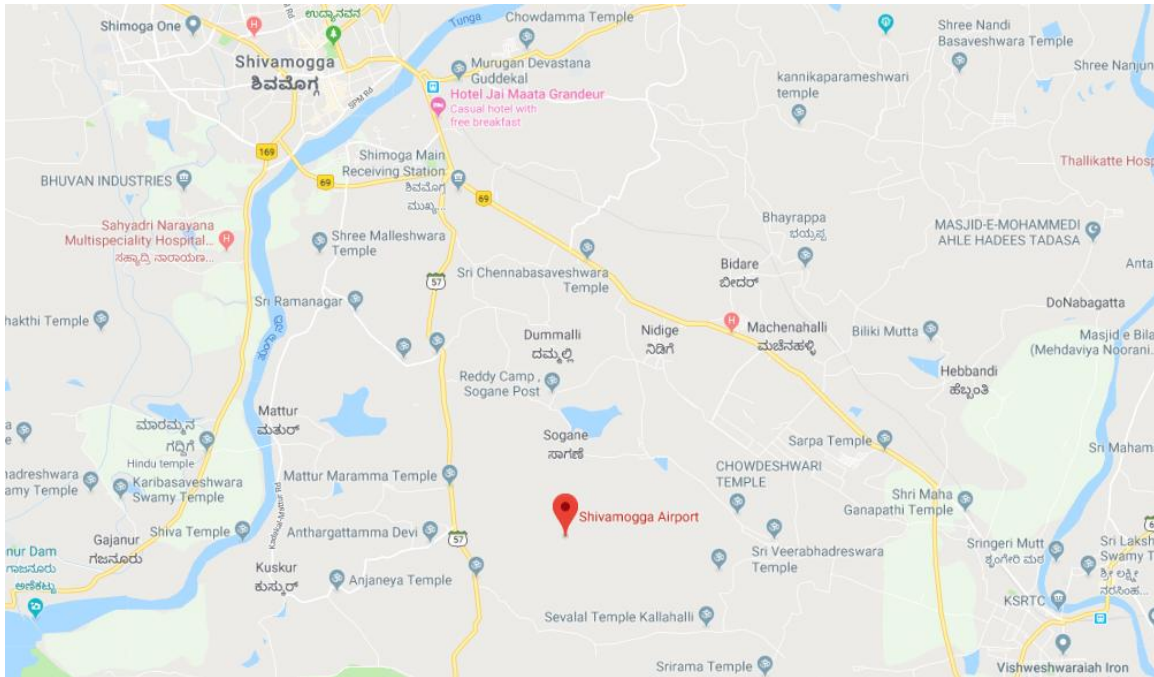


Figure 9: Airstrip Location

2.3 Nearby Airports:

The Airports nearby to Shivamogga airport is indicated in the figure below and the shortest air distance between the Shivamogga airport and the nearby airports is specified in the table below.

| Sr. No. | Airport | Approx. air distance in km. |
|---------|-----------|-----------------------------|
| 1. | Bangalore | 238 |
| 2. | Mysore | 213 |
| 3. | Mangalore | 128 |
| 4. | Bellari | 199 |
| 5. | Hubli | 177 |
| 6. | Belgaum | 248 |
| 7. | Bijapur | 333 |
| 8. | Goa | 256 |
| 9. | Hyderabad | 483 |



Figure 10 Nearby Airports



2.4 Support Infrastructure

(a) Roads

There are three approaches to the project site. The main approach road is N.R Pura State highway of a length 14 kms connecting Shivamogga city and the project site and the other two being the village roads.

(b) Power

At present the electricity supply to the villages in the vicinity of airport land and the industrial area adjacent to it, is from a 110 KVA substation at Machenahalli village adjacent to the project site.

(c) Water

The water supply is upto Mellakoppa village adjacent to project site. The water supply in the airport land is from borewells. The ground water level is about 150 – 200 ft.

3. PROPOSED FACILITIES:

3.1 Aeronautical Facilities:

At an early stage KSIIDC has proposed to develop Airstrip with basic facilities that are necessary for an airline operator to provide services. The following are some of the basic facilities proposed to be developed in initial stage of operations

- i. Runway
- ii. Taxi way
- iii. Terminal Building cum control room
- iv. Parking facility
- v. Fencing / Boundary wall
- vi. Approach Road
- vii. CC Drain
- viii. Apron
- ix. other facilities as per the requirements of DGCA

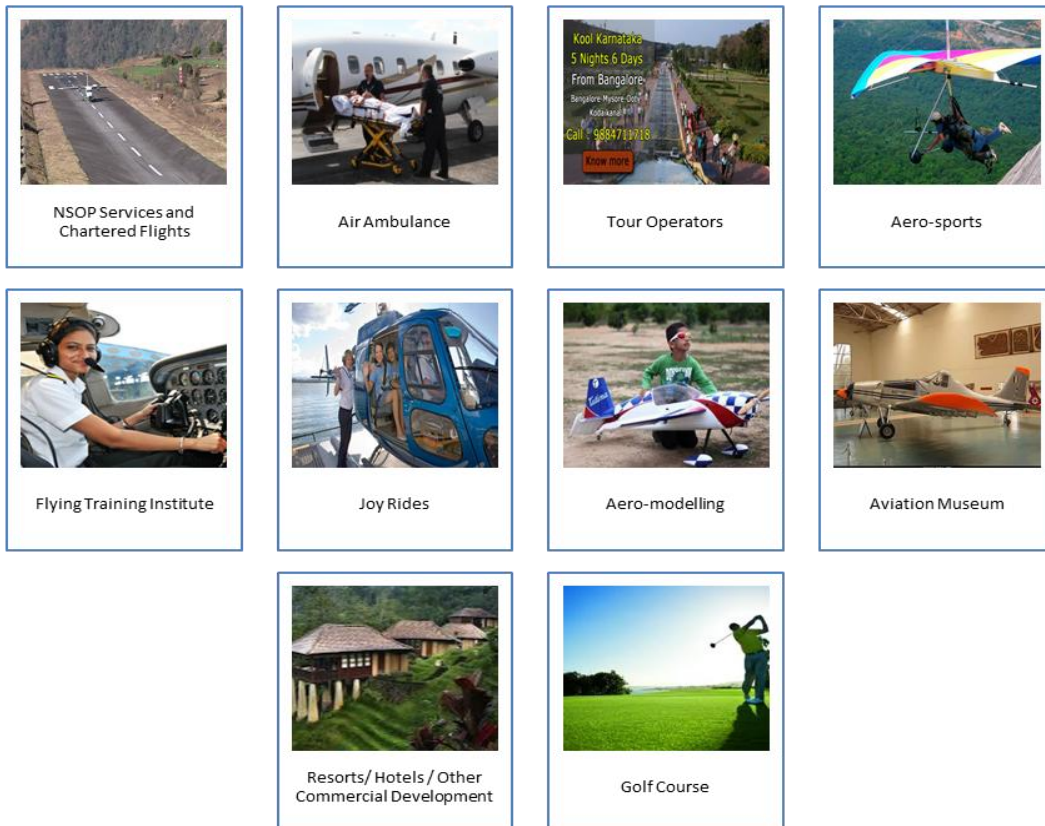
Note: The guideline for development of No Frills Airport by Airport Authority of India is annexed for additional reference.



3.2 Non-Aeronautical Facilities:

Further, to enhance the project viability, the developer is allowed to undertake non-aeronautical developments. The Concessionaire may develop any Non-Airport Activities as per their requirement in compliance with the all Applicable Laws including rules and regulations of DGCA, Government of Karnataka and the local authorities. Non-Airport Activities include, but not limited to the following services, facilities, amenities and equipment:

- i. Airport transport services
- ii. Hotels, restaurants, convention/conference centre
- iii. Exhibition/trade centres
- iv. Theme/entertainment parks, sports facilities
- v. Retail
- vi. Commercial Complexes, banks
- vii. Golf Course
- viii. Food Courts
- ix. Drone operations
- x. Flight Training Schools/ Flying Clubs





4. DRONES or UNMANNED AERIAL VEHICLES (UAV):

The proposed airstrip can be utilized for the testing and certification of Drones or unmanned aerial vehicles. Further, the SPV can utilize the land allotted for non-aeronautical activities for development of drones.

5. ESTIMATION OF PROJECT COST:

The initial capital investment in the project is estimated to be Rs. 31.17 Crore (Approx.) as provided in the table below:

| Sl. No. | Item | Description of work | Amount (in Rs. Cr) |
|---------|--|--|--------------------|
| 1 | Runway of flexible pavement | 1200.00 m x 23.00m width & 3.50m shoulders | 19.00 |
| 2 | 7.5m WIDTH TAXI WAY with flexible pavement AND 1.5 m shoulder on either side of runway | 150 m x 7.5m WIDTH TAXI WAY with flexible pavement AND 1.5 m shoulder on either side of runway | 0.67 |
| 3 | Terminal Building | capacity 40 Pax (900 Sqm) | 1.80 |
| 4 | Approach road | 7 m width carriage way and 1.50 m Shoulder (including drainage 1.4km) | 2.00 |
| 5 | Perimeter Road | 3.75 m width carriage way, 3.50 km | 2.10 |
| 6 | Car Parking | 30 Vehicles | 0.13 |
| 7 | Fencing | length 12.20km | 1.30 |
| 8 | CC drain | 700.00 m | 0.47 |
| 9 | Apron | Apron 75 m x35 m (parking for 2 aircrafts) | 2.13 |
| 10 | Isolation Bay | 35 m x 35 m with Taxiway (150 m) | 0.95 |
| 11 | Security equipment | DFMD, HHMD, X-BIS | 1.00 |
| 12 | Electricals, Lighting for terminal and street lights & UPS | Electricals | 1.00 |
| 13 | ARFF Building (Airport Fire Station) | Fire vehicles | 2.00 |
| 14 | CCTV | CCTV Eqpt. | 0.10 |



| | | | |
|--|--|--|--------------|
| 15 | ATC | ATC Eqpt. | 0.10 |
| 16 | Barrier at entrance- mobile/ motorized/ automatic | Barrier at entrance- mobile/ motorized/ automatic | 0.03 |
| 17 | Furniture | chairs, check-in counters, security frisking booth, airline counters, etc. | 0.10 |
| 18 | Vehicles for patrolling | Security Jeep | 0.12 |
| 19 | Sewerage system | Septic tank & others | 0.75 |
| 20 | Water Supply | Water tank, sump & supply system | 0.75 |
| Sub Total | | | 36.50 |
| Misc., Price variation, etc. (5%) | | | 1.82 |
| Grand Total | | | 38.32 |

GoK intends to develop the Airstrip on DFBOT framework and accordingly issued the RFP & Project Development Agreement to appoint a developer who can construct, operate and maintain the Airstrip along with providing airline connectivity. The Concessionaire shall be eligible for a concession period of 20 years extendable by 10 years, as per the provisions under the Project Development Agreement.

ಶ್ರೀಮಂತರ ಮಹಾನಗರ ಪಾಲಿಕೆ - ಪುನರ್ವಿಂಗಡನೆಯ ವಿವರಣೆ

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 ೩. ಮುಖ್ಯವಾಗಿ ಗಾಂಧಿವರದ ಕೆ. ೩ ಮತ್ತು ೪ನೇ ವಲಯದ ಮಹಾನಗರ ಪಾಲಿಕೆಯ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ



SURVEY REPORT FOR PROPOSED AIR PORT PROJECT AT SHIMOGA.

1. INTRODUCTION

Topographic Survey for Preparation of Topographic Map for Proposed Airport at Sogane Village Shimoga District. The Project site Located at 8KM from Shimoga.

2. TOPOGRAPHIC SURVEYS

For detailed Master Plan layout design purposes it was necessary to carry out the topographical survey so as to:

- Establish control system both horizontally and vertically, to which the construction plans can be related;
- Establish a Digital Terrain Model containing the existing highway, rivers, streams and other topographical features to form the basis for the new designs;
- Prepare base plan containing all the natural and man made features like buildings, fences, walls, utilities, temples and other religious structures etc. which would govern the finalisation of horizontal alignment.
- Utilise the same Digital Terrain Model to form the basis for the estimation of engineering construction materials.

3. SCOPE OF SURVEY

The survey was carried out as per the scope of work in following stages

Block Level survey of the area using latest Technology will be taken up and a contour map shall be prepared showing contours at an interval of 0.5 meters and Block level interval at every 15 meter, it shall also indicate land use and all the prominent existing features such as Roads, Railway tracks, colonies, independent houses, water bodies, farms, gardens, fields, fences etc. Cardinal points shall be marked with reference stones on the ground and marked on the survey map.

4. SURVEY OPERATION

I. Total Station Traverse

A closed traverse will be run along the Boundary line. While traversing, station will be established 100 to 250mts apart. These points would be further used for detailed survey. The minimum accuracy of this survey would be 1:10,000. All computation will be comply with the following:

Traverse adjustment by Bowditch method

II Leveling

A closed circuit leveling line will be run along the entire area. The levels will be within respect to TBM-1 R.L 100.00 established at plinth of Katte on Shimoga-NR Pura Road. All traverse stations will be connected. The accuracy of leveling will be within a limit of $12\sqrt{k}$ mm where k is the loop length in Kilometer. Precision auto levels will be used for this purpose.

III. Detailed Survey

Using the horizontal and vertical control points established accurate data in the digital format in terms of Northing (Y). Easting (X) and Elevation (Z) co-ordinates for all breaks in terrain .All natural and man made features such as buildings, irrigation channels, drainage structures, temples, mosques, trees and utility installations etc, shall be captured during the survey. Spot level on the taken at 15 m interval. Trees with girth wise shall be captured with areas of plantation. Wherever there are groups of trees/plantations, they shall be picked with the areas of plantation. Boundaries of Agricultural Land area shall be surveyed to demarcate the cultivation land limit.

All DTM data is collected with total station as per the survey specifications of IRC and to meet Airport Authority of India standards.

NAME OF PROJECT:-SHIMOGA AIR PORT

TBM POINTS DETAILS

| TBM No | RL | REMARKS |
|--------|---------|--|
| TBM1 | 100.00 | MARKED ON TOP OF THE KATTE PLINTH NEAR BOUNDARY POINT B1 |
| TBM2 | 115.545 | MARKED ON TOP OF THE ROCK |
| TBM3 | 116.942 | MARKED ON PLINTH OF PUMP HOUSE |
| TBM4 | 107.696 | MARKED ON RIGHT SIDE ROAD EDGE (VIINAYAKA NAGAR ROAD) |
| TBM5 | 116.129 | MARKED ON LEFT SIDE ROAD EDGE (VIINAYAKA NAGAR ROAD) |
| TBM6 | 118.236 | MARKED ON TOP OF CULVERT (SOGANE ROAD) |
| TBM7 | 122.498 | MARKED ON NEAR FIELD BUND |
| TBM8 | 109.335 | MARKED ON LEFT SIDE ROAD EDGE (VIINAYAKA NAGAR ROAD) |
| TBM9 | 111.260 | MARKED ON TANK BUND EDGE |
| TBM10 | 128.724 | MARKED ON NEAR FIELD BUND |

NAME OF PROJECT:- SHIMOGA AIR PORT

TRAVERSE FROM ST-1 TO ST-28

| S. No | Station | Easting | Northing | Distance | Cu. Di | Delta E | Delta N | Final E | Final N | Remarks |
|-------|--------------|-----------|-----------|-----------------|-----------------|---------|---------|-----------|-----------|---------|
| 1 | ST1 | 15000.000 | 10000.000 | 0.000 | 0.000 | 0.000 | 0.000 | 15000.000 | 10000.000 | |
| 2 | ST2 | 14811.545 | 9989.146 | 188.767 | 188.767 | 0.000 | 0.017 | 14811.545 | 9989.163 | |
| 3 | ST3 | 14527.378 | 10112.233 | 309.679 | 498.447 | -0.001 | 0.044 | 14527.377 | 10112.278 | |
| 4 | ST4 | 14416.053 | 10091.719 | 113.200 | 611.646 | -0.001 | 0.054 | 14416.051 | 10091.773 | |
| 5 | ST5 | 13907.789 | 10025.120 | 512.609 | 1124.255 | -0.003 | 0.100 | 13907.786 | 10025.219 | |
| 6 | ST6 | 13745.377 | 9791.765 | 284.309 | 1408.564 | -0.003 | 0.125 | 13745.374 | 9791.891 | |
| 7 | ST7 | 13440.157 | 10010.338 | 375.411 | 1783.975 | -0.004 | 0.159 | 13440.153 | 10010.497 | |
| 8 | ST8 | 13215.143 | 10230.080 | 314.512 | 2098.487 | -0.005 | 0.187 | 13215.138 | 10230.267 | |
| 9 | ST9 | 12703.536 | 10252.249 | 512.087 | 2610.574 | -0.006 | 0.232 | 12703.530 | 10252.482 | |
| 10 | ST10 | 12578.624 | 10293.888 | 131.670 | 2742.244 | -0.006 | 0.244 | 12578.617 | 10294.131 | |
| 11 | ST11 | 12158.946 | 10255.215 | 421.456 | 3163.700 | -0.007 | 0.281 | 12158.939 | 10255.497 | |
| 12 | ST12 | 12000.566 | 10150.051 | 190.115 | 3353.815 | -0.008 | 0.298 | 12000.558 | 10150.349 | |
| 13 | ST13 | 11881.769 | 10108.708 | 125.785 | 3479.600 | -0.008 | 0.309 | 11881.761 | 10109.017 | |
| 14 | ST14 | 11480.953 | 10041.324 | 406.442 | 3886.042 | -0.009 | 0.345 | 11480.943 | 10041.669 | |
| 15 | ST15 | 11480.956 | 10041.313 | 0.012 | 3886.054 | -0.009 | 0.345 | 11480.947 | 10041.658 | |
| 16 | ST16 | 11674.428 | 10387.177 | 396.300 | 4282.353 | -0.010 | 0.381 | 11674.418 | 10387.557 | |
| 17 | ST17 | 11758.609 | 10486.720 | 130.366 | 4412.719 | -0.010 | 0.392 | 11758.598 | 10487.112 | |
| 18 | ST18 | 12200.364 | 10666.635 | 476.988 | 4889.707 | -0.012 | 0.435 | 12200.352 | 10667.070 | |
| 19 | ST19 | 12309.031 | 10745.609 | 134.334 | 5024.040 | -0.012 | 0.447 | 12309.020 | 10746.055 | |
| 20 | ST20 | 12691.843 | 10744.247 | 382.814 | 5406.854 | -0.013 | 0.481 | 12691.830 | 10744.728 | |
| 21 | ST21 | 13056.766 | 10897.473 | 395.787 | 5802.641 | -0.014 | 0.516 | 13056.752 | 10897.989 | |
| 22 | ST22 | 13325.714 | 11030.324 | 299.971 | 6102.611 | -0.014 | 0.543 | 13325.700 | 11030.867 | |
| 23 | ST23 | 13795.729 | 11111.325 | 476.944 | 6579.555 | -0.016 | 0.585 | 13795.714 | 11111.910 | |
| 24 | ST24 | 14182.673 | 10921.277 | 431.096 | 7010.651 | -0.017 | 0.623 | 14182.656 | 10921.900 | |
| 25 | ST25 | 14321.047 | 10859.526 | 151.528 | 7162.179 | -0.017 | 0.637 | 14321.030 | 10860.163 | |
| 26 | ST26 | 14486.735 | 10687.955 | 238.514 | 7400.693 | -0.017 | 0.658 | 14486.718 | 10688.613 | |
| 27 | ST27 | 14795.135 | 10425.665 | 404.854 | 7805.547 | -0.018 | 0.694 | 14795.116 | 10426.359 | |
| 28 | ST28 | 14976.322 | 10236.289 | 262.091 | 8067.638 | -0.019 | 0.717 | 14976.303 | 10237.006 | |
| 29 | ST1 | 15000.020 | 9999.262 | 238.209 | 8305.847 | -0.020 | 0.738 | 15000.000 | 10000.000 | |
| | FINAL | 15000.000 | 10000.000 | | | | | | | |
| | | -0.020 | 0.738 | Distance | 8305.847 | | 0.739 | Accuracy | 11239 | |

NAME OF PROJECT:- SHIMOGA AIR PORT

TRAVERSE STATION FINAL CO-ORDINATE

| SL NO | STATION POINT | EASTING | NORTHING | FINAL R.L |
|--------------|----------------------|----------------|-----------------|------------------|
| 1 | ST1 | 15000.000 | 10000.000 | 99.881 |
| 2 | ST2 | 14811.561 | 9990.201 | 96.053 |
| 3 | ST3 | 14527.354 | 10113.184 | 90.150 |
| 4 | ST4 | 14416.034 | 10092.619 | 91.059 |
| 5 | ST5 | 13907.790 | 10025.840 | 95.149 |
| 6 | ST6 | 13745.454 | 9792.420 | 103.822 |
| 7 | ST7 | 13440.160 | 10010.882 | 105.903 |
| 8 | ST8 | 13215.075 | 10230.540 | 109.357 |
| 9 | ST9 | 12703.458 | 10252.529 | 117.228 |
| 10 | ST10 | 12578.532 | 10294.114 | 119.139 |
| 11 | ST11 | 12158.865 | 10255.293 | 104.045 |
| 12 | ST12 | 12000.518 | 10150.064 | 111.181 |
| 13 | ST13 | 11881.735 | 10108.668 | 112.519 |
| 14 | ST14 | 11480.941 | 10041.116 | 114.790 |
| 15 | ST15 | 11491.005 | 10366.599 | 114.794 |
| 16 | ST16 | 11566.960 | 10416.264 | 124.149 |
| 17 | ST17 | 11758.446 | 10486.591 | 114.801 |
| 18 | ST18 | 12200.149 | 10666.626 | 114.634 |
| 19 | ST19 | 12308.785 | 10745.623 | 119.038 |
| 20 | ST20 | 12691.596 | 10744.372 | 124.685 |
| 21 | ST21 | 13056.467 | 10897.701 | 111.694 |
| 22 | ST22 | 13325.372 | 11030.624 | 116.931 |
| 23 | ST23 | 13795.359 | 11111.765 | 107.615 |
| 24 | ST24 | 14182.363 | 10921.824 | 105.089 |
| 25 | ST25 | 14320.757 | 10860.103 | 104.732 |
| 26 | ST26 | 14486.498 | 10688.570 | 102.482 |
| 27 | ST27 | 14794.981 | 10426.365 | 98.974 |
| 28 | ST28 | 14976.228 | 10237.034 | 100.340 |

NAME OF PROJECT:-SHIMOGA AIR PORT

AREA STATEMENT DETAILS

AREA STATEMENT

| AREA | AREA IN SQ.MT | AREA IN SQ.FT | AREA IN ACRES/GUNTAS |
|-----------|---------------|---------------|-----------------------|
| B1 TO B21 | 2590128.02 | 27879904.94 | 640 Acres 0.82 Guntas |

NAME OF PROJECT:-SHIMOGA AIR PORT

BOUNDARY CO-ORDINATE

| Point No | Distance | Easting | Northing |
|----------|----------|-----------|-----------|
| B1 | | 14988.821 | 10000.818 |
| B2 | 1166.758 | 13825.490 | 9911.454 |
| B3 | 36.591 | 13793.157 | 9894.323 |
| B4 | 74.409 | 13719.506 | 9883.727 |
| B5 | 34.770 | 13706.402 | 9915.933 |
| B6 | 44.957 | 13661.599 | 9912.214 |
| B7 | 23.277 | 13652.767 | 9933.750 |
| B8 | 19.893 | 13633.154 | 9930.425 |
| B9 | 140.634 | 13499.374 | 9973.793 |
| B10 | 130.554 | 13443.068 | 10091.581 |
| B11 | 43.994 | 13401.661 | 10106.446 |
| B12 | 407.136 | 13305.809 | 10502.138 |
| B13 | 2058.284 | 11333.901 | 9912.127 |
| B14 | 507.535 | 11288.102 | 10417.592 |
| B15 | 3006.844 | 14174.270 | 11260.884 |
| B16 | 817.577 | 14569.493 | 10545.181 |
| B17 | 307.060 | 14851.807 | 10424.414 |
| B18 | 77.060 | 14885.168 | 10354.950 |
| B19 | 40.834 | 14924.355 | 10366.432 |
| B20 | 90.588 | 14949.826 | 10279.498 |
| B21 | 10.110 | 14959.746 | 10281.452 |
| B1 | 282.136 | 14988.821 | 10000.818 |



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E-Mail : kthblr@vsnl.net Web Site : www.karnatakatesthouse.com

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REPORT ON THE SOIL INVESTIGATION CONDUCTED FOR THE PROPOSED AIRPORT PROJECT AT SHIMOGA.

INTRODUCTION

M/s. Infrastructure Development Corporation (Karnataka) Limited, Infra House, #39, 5th Cross, 8th Main, RMV Extension, Sadashivanagar, Bangalore, has proposed **Airport** at the above site.

In order to get necessary data for designing the structure, the client has proposed soil investigation at the above site, and a vide reference No.071/ENG/E/KTH/LoA/01 dtd 13.06.2007 to carry out the investigation was made to us. Accordingly, necessary field investigation and laboratory tests were conducted and the results with recommendation are furnished herein.

OBJECT AND SCOPE OF WORK

This includes the following:

1. General Survey.
2. Sinking post-auger bore holes up to 6.0m or refusal which ever is earlier ($N_{\geq 50}$)
3. Collection of disturbed and undisturbed soil samples for laboratory investigation.
4. Report and recommendation for safe bearing capacity and suitable type of foundation.

RECONNAISSANCE

The sub soil essentially consists of yellowish brown / yellowish white sandy silt. Sketch No.1 indicates the location of bore holes and CBR samples collected as fixed by the engineers concerned.



FIELD INVESTIGATION

Soil sampling has been conducted as per relevant I.S.1892-1979.

This consists of the following:

1. Physical observation and general survey.
2. Sinking of **five** boreholes up to 6.0m or refusal strata ($N \geq 50$).
3. Conducting standard penetration tests at relevant depths as per IS:2131 – 1981.
4. Collection of undisturbed soil samples at specified depths for determination of cohesion (C) and friction factor (ϕ) as per IS : 2720 – 1986
5. Collection of disturbed soil sample at specified depths for conducting grain size analysis, determination of proctor density, water content, liquid limit and plastic limit.
6. Collection of disturbed soil sample at **0.50m depth** from the existing ground level for determination of **CBR value**

LABORATORY INVESTIGATIONS

This includes the following.

1. Conducting liquid & plastic limit tests on disturbed soil for classification as per IS : 2720 – part 5 – 1985.
2. Grain size distribution by wet sieve analysis as per IS: 2720 – part 4 – 1985.
3. Determination of natural moisture content and in-situ density.
4. Conducting proctor density and optimum moisture content.
5. Conducting shear tests on undisturbed soil sample and determination of C and (ϕ).
6. Conducting CBR value as per IS : 2720-Part 16

The tests are conducted as per the methods and guidelines given in relevant Indian Standard Codes and Specifications. The test results are given in table 1 & 2. Graph of grain size analysis is shown in sketch No.2. No Water table was encountered during the field investigations.



RECOMMENDATION

Borehole No.1

For the location covered under bore hole No.1, the bore logs indicate that the sub soils are yellowish white dense non plastic sandy silts with 26% sands, 69% silt and clay and 5% gravel, with N values is grater than 50 (71 at 2.0m and 98 at 4.0m). The liquid limit varies from 26% to 28 % and the soil is non plastic with relative density varies from 84% to 90% and indicates layer is dense in nature.

The safe bearing capacity at different depths below the existing ground level are recommended here below.

| Depth below the existing ground level | S.B.C in T/M² |
|--|---------------------------------|
| 1.50m | 21.00 |
| 3.00m | 23.00 |

Borehole No.2

For the location covered under bore hole No.2, the bore logs indicate that the sub soils are greyish white dense non plastic sandy silts with 30% sands and 70% silt and clay, with N values is 39 at 2.0m and rebound observed at 3.65m. The liquid limit varies from 21% to 26 % and the soil is non plastic with relative density varies from 75% to 76% and indicates layer is dense in nature.

The safe bearing capacity at different depths below the existing ground level are recommended here below.

| Depth below the existing ground level | S.B.C in T/M² |
|--|---------------------------------|
| 1.50m | 16.00 |
| 3.00m | 19.00 |



Borehole No.3

For the location covered under bore hole No.3, the bore logs indicate that the sub soils are yellowish brown dense non plastic silty sands with 60% sands and 40% silt and clay, with N values is 27 at 2.0m and grater than 50 at 4.0m. The liquid limit varies from 27% to 28 % and the soil is non plastic with relative density varies from 69% to 87% and indicates layer is dense in nature.

The safe bearing capacity at different depths below the existing ground level are recommended here below.

| Depth below the existing ground level | S.B.C in T/M² |
|--|---------------------------------|
| 1.50m | 18.00 |
| 3.00m | 20.00 |

Borehole No.4

For the location covered under bore hole No.4, the bore logs indicate that the sub soils are greyish brown dense silty sands with 60% sands and 40% silt and clay, with N values is 22 at 2.0m and rebound observed at 3.80m. The liquid limit varies from 27% to 32 % and the soil is non plastic at 2.0m and plasticity 7 at 3.50m with relative density varies from 69% to 81% and indicates layer is dense in nature.

The safe bearing capacity at different depths below the existing ground level are recommended here below.

| Depth below the existing ground level | S.B.C in T/M² |
|--|---------------------------------|
| 1.50m | 18.00 |
| 3.00m | 20.00 |

Borehole No.5

For the location covered under bore hole No.5, the bore logs indicate that the sub soils are yellowish brown dense silty sands with 70% sands and 30% silt and clay,



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with N values is greater than 50 at 2.0m and rebound observed at 3.65m. The liquid limit varies from 19% to 23 % and the soil is non plastic with relative density is 91% and indicates layer is dense in nature.

The safe bearing capacity at different depths below the existing ground level are recommended here below.

| Depth below the existing ground level | S.B.C in T/M ² |
|---------------------------------------|---------------------------|
| 1.50m | 22.00 |
| 3.00m | 25.00 |

Any change in soil strata if found during execution shall be brought to the notice of the Engineer-in-charge.

The safe bearing capacity is calculated using C, ϕ , N and R_d values. A typical calculation is shown in Appendix. The recommendations are restricted to the locations around the investigation points only.

CBR tests were conducted at location 1 & 2 as indicated in Sketch No.1. The Soaked CBR is 7.5% at location 1 and 5.25% for location 2 with OMC is 12%, MDD is 1.98 g/cc for location 1 and 1.93 g/cc for location 2.

For **KARNATAKA TEST HOUSE PVT.LTD.**

SREENIVASA.C B.E. (Civil),
TECHNICAL MANAGER.

A.NARAYANA, B.E. MIE., MIGS.,
Superintending Engineer (Retd.), KPWD
CHAIRMAN & MANAGING DIRECTOR

Dr. R. SATHYAMURTHY,
B.E., M.Sc., (Engg.), Ph.D., MIE., MIGS.,
CHIEF TECHNICAL CONSULTANT



APPENDIX

From Shear Failure Criteria:

For Bore Hole No.3 at 1.50m.

$$q_{\text{Net safe}} = \frac{1.3C' N'_C + \gamma D_f (N'_q)Rw_1 + 0.4 B_f \gamma N'_\gamma Rw_2 - \gamma D_f}{FS}$$

$$q_{\text{Safe}} = \frac{1.3C' N'_C + \gamma D_f (N'_q - 1)Rw_1 + 0.4 B_f \gamma N'_\gamma Rw_2}{FS} + \gamma D_f$$

q_{Safe} = Safe Bearing Capacity in T/m^2 ,

FS = Factor of Safety - 2.50

B_f = Width of Foundation - 1.50m,

D_f = Depth of Foundation - 1.50m,

C = 1.20 T/m^2 , C' = 0.80 T/m^2 , ϕ = 30°, ϕ' = 21°, γ = 1.71 T/m^3 ,

N'_C = 16.008, N'_q = 7.252, N'_γ = 6.488 $Rw_1 = 1.0$ $Rw_2 = 1.0$

$$q_{\text{Safe}} = \frac{1.3 \times 0.80 \times 16.008 + 1.71 \times 1.50 (7.252 - 1) + 0.40 \times 1.50 \times 1.71 \times 6.488}{2.50} + 1.71 \times 1.50$$

$$q_{\text{Safe}} = 18.33T/m^2 \approx \mathbf{18 T/m^2}$$

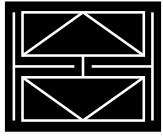
From Settlement criteria

$$q_a = 54.40 (N - 3) \left(\frac{B + 0.30}{2B} \right)^2 \times Rw_2 \times R_d$$

$$N = 27 \quad N' = 23 \quad N'' = 19$$

$$q_a = 54.40 (19 - 3) \left(\frac{1.50 + 0.30}{2 \times 1.50} \right)^2 \times 1.00$$

$$q_a = 31.33T/m^2$$



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Project No.KTTH/SI/1669/2007-08

Table – 1

| Sl. No. | BH. No. | Depth in mts. | Field Moisture Content % | Density g/cc | | Loose density g/cc | Maximum Proctor density g/cc | Optimum Moisture content % | Relative density % | C T/m ² | φ ⁰ |
|---------|---------|---------------|--------------------------|----------------|----------------|--------------------|------------------------------|----------------------------|--------------------|--------------------|----------------|
| | | | | γ _b | γ _d | | | | | | |
| 1. | 1 | 1.50 | 7.60 | 2.10 | 1.95 | 1.43 | 2.03 | 10 | 90 | 1.00 | 32 |
| 2. | 1 | 3.00 | 9.32 | 2.14 | 1.96 | 1.48 | 2.09 | 10 | 84 | 0.70 | 34 |
| 3. | 2 | 1.50 | 14.18 | 2.05 | 1.79 | 1.39 | 1.98 | 10 | 75 | 1.10 | 27 |
| 4. | 2 | 3.00 | 11.28 | 2.07 | 1.86 | 1.43 | 2.06 | 12 | 76 | 0.80 | 32 |
| 5. | 3 | 1.50 | 20.36 | 2.06 | 1.71 | 1.36 | 1.93 | 10 | 69 | 1.20 | 30 |
| 6. | 3 | 3.00 | 12.98 | 2.20 | 1.95 | 1.40 | 2.07 | 12 | 87 | 0.90 | 32 |
| 7. | 4 | 1.50 | 15.39 | 2.13 | 1.85 | 1.43 | 1.99 | 12 | 81 | 0.90 | 30 |
| 8. | 4 | 3.00 | 20.80 | 2.12 | 1.75 | 1.41 | 1.96 | 10 | 69 | 0.80 | 33 |
| 9. | 5 | 1.50 | 8.12 | 2.13 | 1.97 | 1.43 | 2.05 | 12 | 91 | 0.30 | 35 |

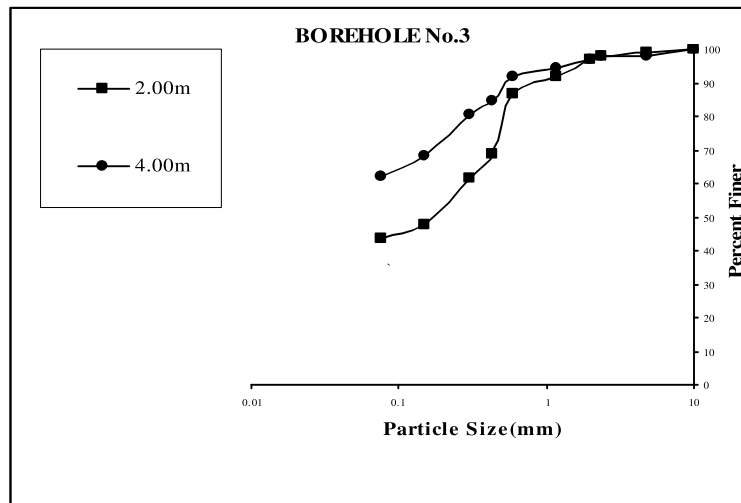
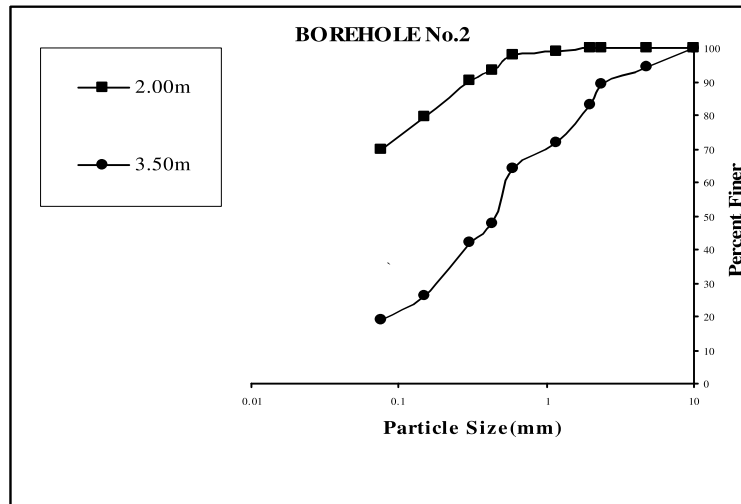
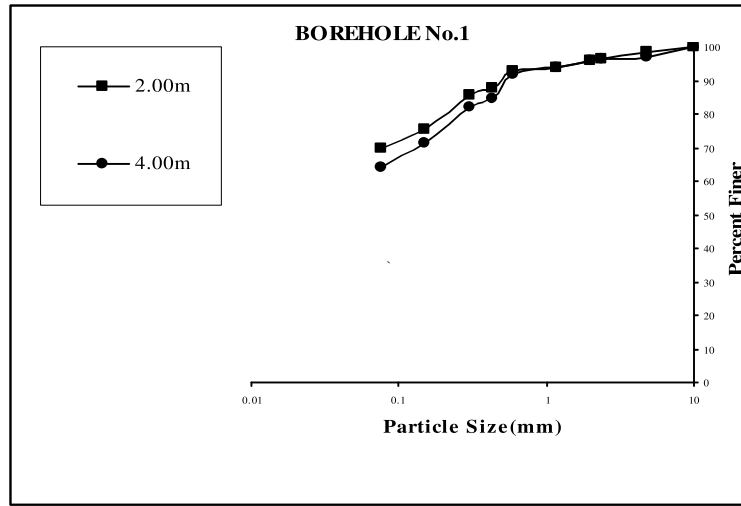
Table – 2

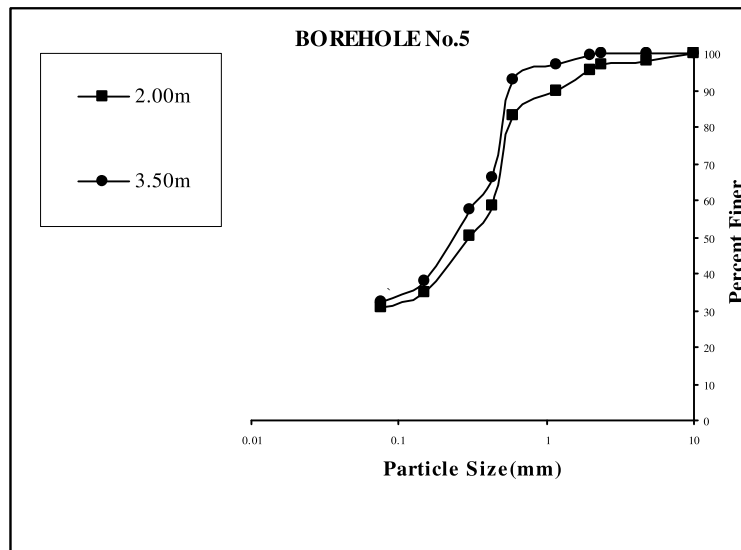
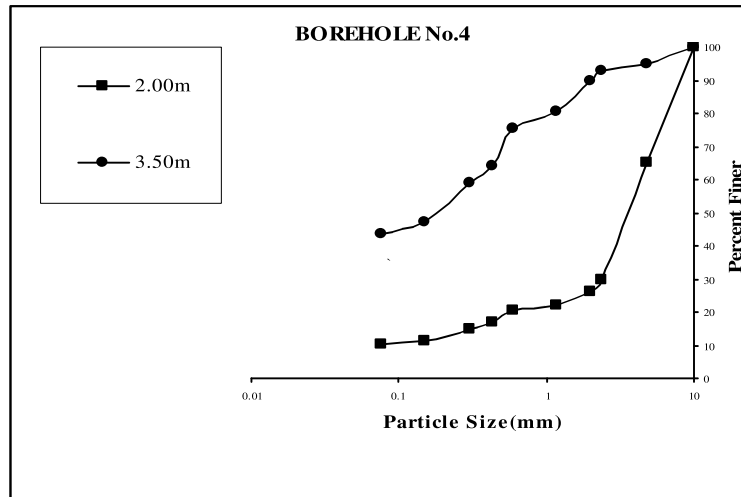
| Sl. No. | BH No. | Depth in Mts. | Gravel % | Grain Size Analysis | | | | | Liquid Limit % | Plastic Limit % | Plasticity Index | Soil Classification as per IS : 1498 – 1970 |
|---------|--------|---------------|----------|---------------------|------|------|---------------|--------|----------------|-----------------|------------------|---|
| | | | | Sand % | | | Silt & Clay % | | | | | |
| | | | | Coarse | Med. | Fine | Silt % | Clay % | | | | |
| 1. | 1 | 1.50 | 2 | 3 | 8 | 18 | 69 | NP | - | SM : Sandy silt | | |
| 2. | 1 | 3.50 | 3 | 1 | 11 | 21 | 64 | NP | - | “ | | |
| 3. | 2 | 1.50 | - | - | 6 | 24 | 70 | NP | - | “ | | |
| 4. | 2 | 3.50 | 6 | 11 | 35 | 29 | 19 | NP | - | SM : Silty sand | | |
| 5. | 3 | 1.50 | 1 | 2 | 28 | 25 | 44 | NP | - | “ | | |
| 6. | 3 | 3.50 | 2 | 1 | 13 | 22 | 62 | NP | - | SM : Sandy silt | | |
| 7. | 4 | 1.50 | 35 | 39 | 9 | 7 | 10 | NP | - | SM : Silty sand | | |
| 8. | 4 | 3.50 | 5 | 5 | 26 | 21 | 43 | 20 | 7 | SC : Silty sand | | |
| 9. | 5 | 1.50 | 2 | 3 | 37 | 28 | 30 | NP | - | SM : Silty sand | | |
| 10. | 5 | 3.50 | - | 1 | 33 | 34 | 32 | NP | - | “ | | |



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SK-2





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BORE LOG

Project No/KTH/1669/2007-08

CUSTOMER : M/s. Infrastructure Development Corporation (Karnataka) Limited.
Infra House, #39, 5th Cross, 8th Main,
Rmv Extension, Sadashivanagar,
Bangalore – 560 080.

PROJECT : Proposed Airport Project at Shimoga.

Type of Drilling : Manual Auguring

BH NO : 1

GWL : Not encountered

| Depth below GL (M) | Soil Description | Thick ness of Strata (m) | Legend | Details of Sampling | | Standard Penetration Test Data | | |
|--------------------|-----------------------------|--------------------------|--------|---------------------|------|--------------------------------|-----------|-----------------------------|
| | | | | Depth (m) | Type | Depth (m) | “N” Value | Rel. density or consistency |
| 0 | | | | | | | | |
| 1 | | | | | | | | |
| 2 | Yellowish white Sandy silt. | 4.00 | | 1.50 | UDS | | | |
| 3 | | | | SPT | 2.00 | 10/26/45 N > 50 | | |
| 4 | Soft disintegrated rock. | | | 3.00 | UDS | | | |
| 5 | | | | SPT | 3.50 | 25/38/60 N > 50 | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |

Bore hole is terminated at 4.00m from the existing ground level.

GL : Ground level

UDS - Undisturbed sample

SPT - Standard Penetration Test

DS - Disturbed sample

Remarks:

* - Sample not Retrieved.



KARNATAKA TEST HOUSE PVT. LTD.

NABL Accredited Laboratory as per ISO/IEC 17025

BORE LOG

Project No/KTH/1669/2007-08

CUSTOMER : M/s. Infrastructure Development Corporation (Karnataka) Limited.
Infra House, #39, 5th Cross, 8th Main,
Rmv Extension, Sadashivanagar,
Bangalore – 560 080.

PROJECT : Proposed Airport Project at Shimoga.

Type of Drilling : Manual Auguring

BH NO : 2

GWL : Not encountered

| Depth below GL (M) | Soil Description | Thick ness of Strata (m) | Legend | Details of Sampling | | Standard Penetration Test Data | | |
|--------------------|---------------------------|--------------------------|--------|---------------------|------|--------------------------------|----------------------|-----------------------------|
| | | | | Depth (m) | Type | Depth (m) | “N” Value | Rel. density or consistency |
| 0 | | | | | | | | |
| 1 | | | | 1.50 | UDS | | | |
| 2 | greyish white Sandy silt. | 4.00 | | | SPT | 2.00 | 12/12/27 N = 39 | |
| 3 | | | | 3.00 | UDS | | | |
| | | | | | SPT | 3.50 | 60/Rebound N > 50 | |
| 4 | Soft disintegrated rock. | | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |

Bore hole is terminated at 3.65m from the existing ground level.

GL : Ground level

UDS - Undisturbed sample

SPT - Standard Penetration Test

DS - Disturbed sample

Remarks:

* - Sample not Retrieved.



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BORE LOG

Project No/KTH/1669/2007-08

CUSTOMER : M/s. Infrastructure Development Corporation (Karnataka) Limited.
Infra House, #39, 5th Cross, 8th Main,
Rmv Extension, Sadashivanagar,
Bangalore – 560 080.

PROJECT : Proposed Airport Project at Shimoga.

Type of Drilling : Manual Auguring

BH NO : 3

GWL : Not encountered

| Depth below GL (M) | Soil Description | Thick ness of Strata (m) | Legend | Details of Sampling | | Standard Penetration Test Data | | | |
|--------------------|-----------------------------|--------------------------|--------|---------------------|------|--------------------------------|--------------------|-----------------------------|--|
| | | | | Depth (m) | Type | Depth (m) | “N” Value | Rel. density or consistency | |
| 0 | | | | | | | | | |
| 1 | | | | | | | | | |
| 2 | Yellowish brown Silty Sand. | 4.00 | | 1.50 | UDS | | | | |
| 3 | | | | | | | | | |
| 4 | Soft disintegrated rock. | | | | | 2.00 | 9/10/17 N = 27 | | |
| 5 | | | | | | | | | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |
| 8 | | | | | | | | | |
| 9 | | | | | | | | | |
| 10 | | | | | | | | | |
| | | | | | | 3.50 | 26/46/70 N > 50 | | |

Bore hole is terminated at 4.00m from the existing ground level.

GL : Ground level

UDS - Undisturbed sample

SPT - Standard Penetration Test

DS - Disturbed sample

Remarks:

* - Sample not Retrieved.



KARNATAKA TEST HOUSE PVT. LTD.

NABL Accredited Laboratory as per ISO/IEC 17025

BORE LOG

Project No/KTH/1669/2007-08

CUSTOMER : M/s. Infrastructure Development Corporation (Karnataka) Limited.
Infra House, #39, 5th Cross, 8th Main,
Rmv Extension, Sadashivanagar,
Bangalore – 560 080.

PROJECT : Proposed Airport Project at Shimoga.

Type of Drilling : Manual Auguring

BH NO : 4

GWL : Not encountered

| Depth below GL (M) | Soil Description | Thick ness of Strata (m) | Legend | Details of Sampling | | Standard Penetration Test Data | | |
|--------------------|---------------------------|--------------------------|--------|---------------------|------|--------------------------------|-------------------------|-----------------------------|
| | | | | Depth (m) | Type | Depth (m) | “N” Value | Rel. density or consistency |
| 0 | | | | | | | | |
| 1 | | | | | | | | |
| 2 | greyish brown Silty Sand. | 4.00 | | 1.50 | UDS | | | |
| 3 | | | | | SPT | 2.00 | 12/10/12 N = 22 | |
| 4 | Soft disintegrated rock. | | | 3.00 | UDS | | | |
| 5 | | | | | SPT | 3.50 | 20/34/Rebound N > 50 | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |

Bore hole is terminated at 3.80m from the existing ground level.

GL : Ground level

UDS - Undisturbed sample

SPT - Standard Penetration Test

DS - Disturbed sample

Remarks:

* - Sample not Retrieved.



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BORE LOG

Project No/KTH/1669/2007-08

CUSTOMER : M/s. Infrastructure Development Corporation (Karnataka) Limited.
Infra House, #39, 5th Cross, 8th Main,
Rmv Extension, Sadashivanagar,
Bangalore – 560 080.

PROJECT : Proposed Airport Project at Shimoga.

Type of Drilling : Manual Auguring

BH NO : 5

GWL : Not encountered

| Depth below GL (M) | Soil Description | Thick ness of Strata (m) | Legend | Details of Sampling | | Standard Penetration Test Data | | |
|--------------------|-----------------------------|--------------------------|--------|---------------------|------|--------------------------------|-------------------------|-----------------------------|
| | | | | Depth (m) | Type | Depth (m) | “N” Value | Rel. density or consistency |
| 0 | | | | | | | | |
| 1 | | | | | | | | |
| 2 | Yellowish brown Silty Sand. | 4.00 | | 1.50 | UDS | | | |
| 3 | | | | | | | | |
| 4 | Soft disintegrated rock. | | | | | 2.00 | 39/60/Refusal N > 50 | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |

Bore hole is terminated at 3.65m from the existing ground level.

GL : Ground level

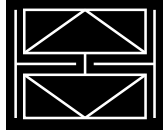
UDS - Undisturbed sample

SPT - Standard Penetration Test

DS - Disturbed sample

Remarks:

* - Sample not Retrieved.



KARNATAKA TEST HOUSE PVT. LTD.

No.778/44, 8th Cross, Triveni Road, Gokul 1st Stage, 2nd Phase, Bangalore – 560 054.
Tele Fax : 23378383 / 23375326.

E-Mail : kthblr@vsnl.net Web Site : www.karnatakatesthouse.com

NABL Accredited Laboratory as per ISO/IEC 17025



NABL Accredited
Certificate No. T-0901

Ref: KTH/CBR/1669/2007-2008

Date : 30.06.2007

CBR TEST REPORT ON SOIL SAMPLES

Name of the Customer : **M/s. Infrastructure Development Corporation (Karnataka) Limited.**

Infra House, #39, 5th Cross, 8th Main,
RMV Extension, Sadashivanagar,
Bangalore – 560 080.

The following are the test results of the soil samples collected by Karnataka Test House Pvt Ltd.

Name of the Project : Proposed Airport Project at Shimoga.

Clients Reference : Letter No.071/ENG/E/KTH/LoA/01 dtd 13.06.2007

Period of test : 25.06.2007 to 30.06.2007.

Technical Reference : IS : 2720 (Part – 4) 1985 Reaffirmed 2001, IS : 2720 (Part – 5) 1985 Reaffirmed 2001, IS : 2720 (Part – 16) 1987 Reaffirmed 2002.

| Identification | Soil Classification | Grain Size Analysis | | | | | Liquid Limit % | Plastic Limit % | Plasticity Index | Modified Proctor Density | | CBR Value | |
|----------------|---------------------|---------------------|--------|----|----|---------------|----------------|-----------------|------------------|--------------------------|---------|-----------|--------|
| | | Gravel % | Sand % | | | Silt & Clay % | | | | M.D.D g/cc | O.M.C % | Unsoaked | Soaked |
| Coarse | Med. | | Fine | | | | | | | | | | |
| CBR 1. | SM : Sandy silt | 6 | 5 | 15 | 38 | 36 | 18 | NP | - | 1.92 | 12 | 12.15 | 7.50 |

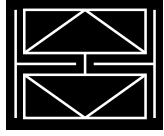
*As furnished by the customer.

For **KARNATAKA TEST HOUSE PVT. LTD.**

SREENIVASA.C
TECHNICAL MANAGER

Note : 1) This report is not to be reproduced except in full without our prior permission in writing.

2) The results listed refer only to the tested samples and applicable parameters.



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NABL Accredited
Certificate No.T-0901

Ref: KTH/CBR/1669/2007-2008

Date : 30.06.2007

CBR TEST REPORT ON SOIL SAMPLES

Name of the Customer : **M/s. Infrastructure Development Corporation (Karnataka) Limited.**
Infra House, #39, 5th Cross, 8th Main,
RMV Extension, Sadashivanagar,
Bangalore – 560 080.

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Name of the Project : Proposed Airport Project at Shimoga.
Clients Reference : Letter No.071/ENG/E/KTH/LoA/01 dtd 13.06.2007
Period of test : 25.06.2007 to 30.06.2007.

Technical Reference : IS : 2720 (Part – 4) 1985 Reaffirmed 2001, IS : 2720 (Part – 5) 1985 Reaffirmed 2001, IS : 2720 (Part – 16) 1987 Reaffirmed 2002.

| Identification | Soil Classification | Grain Size Analysis | | | | | Liquid Limit % | Plastic Limit % | Plasticity Index | Modified Proctor Density | | CBR Value | |
|----------------|---------------------|---------------------|--------|---|----|---------------|----------------|-----------------|------------------|--------------------------|---------|-----------|--------|
| | | Gravel % | Sand % | | | Silt & Clay % | | | | M.D.D g/cc | O.M.C % | Unsoaked | Soaked |
| Coarse | Med. | | Fine | | | | | | | | | | |
| CBR 2. | SC : Sandy silt | 4 | 3 | 7 | 29 | 57 | 25 | 16 | 09 | 1.90 | 12 | 8.10 | 5.25 |

*As furnished by the customer.

For **KARNATAKA TEST HOUSE PVT. LTD.**

SREENIVASA.C
TECHNICAL MANAGER

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AV-13011/9/2017-DT Pt(2)(RCS)
Government of India
Ministry of Civil Aviation

'B' Block, Rajiv Gandhi Bhavan
New Delhi, dated 31.07.2018

To,

1. Shri G.K. Chaukiyal, ED (RCS), AAI.
2. Shri Ayush Mani Tiwari, DDG, BCAS.
3. Shri Y. Sreenivasappa, DGM (IPD), KSIIDC, Govt. of Karnataka.
4. Shri A.K. Pathak, ED (Plg.), AAI.
5. Shri S. Biswas, ED (Arch.), AAI.
6. Shri A.K. Joshi, GM (Plg.), AAI.
7. Capt. RK Mallik, GM (Security), AAI.
8. Shri Arun Mehan, Jt. GM (Ops.), AAI.
9. Shri J.C. Wadhwa, DGM (AL), AAI.
10. Shri M.K. Garg, Dy. Director, DGCA

Sub.: Minutes of the Meeting held on 05/07/2018 under the Chairpersonship of Ms. Usha Padhee, Joint Secretary, Ministry of Civil Aviation to discuss Guidelines for Use and Operation of "No Frill Airports".

The undersigned is directed to forward herewith the Minutes of the Meeting held on 05th July, 2018 under the Chairpersonship of Ms. Usha Padhee, Joint Secretary, Ministry of Civil Aviation for information and further necessary action.



(U K Bhardwaj)

Under Secretary to the Govt. of India
Tele. 24610359

Copy to for internal distribution:

1. PS to JS(UP)
2. PS to JS(RA)
3. PA to US(UK)
4. Shri S N Dwivedi, Consultant, RCS Cell, MoCA.

~~Draft~~ Minutes of the Meeting held on 05.07.2018 at 1100 Hours under the Chairmanship of Joint Secretary (UP), Conference Hall, II Floor, B Wing, Rajiv Gandhi Bhawan, New Delhi to discuss Guidelines for Use and Operation of "No Frill Airports".

The list of participants is given at Annexure-A.

The meeting started with a brief introduction by all the participants. Thereafter, Ms. Usha Padhee, JS, welcomed all the participants for the meeting and explained about various issues related to Use and Operation of "No Frill Airports" which could be very relevant for UDAN Scheme. She also explained that the Govt. of Karnataka has forwarded a proposal for utilization of their existing Air Strips for operating flights through smaller aircraft and helicopters for intra-state air connectivity and promote tourism. It was emphasized about the necessity for detailed guidelines for use and operation of existing Air Strips in various states which could be utilised to provide better air connectivity for domestic network under UDAN Scheme and also for NSOPs. This domestic network could also be utilized during natural calamities, medical emergencies and tourism etc. The following issues were discussed and suggestions were listed out for further discussion with various stake holders and Govt. of Karnataka.

- 1. Initial Runway Width of 23 meters and widened subsequently for operation of bigger aircraft:** The matter was discussed in detail. Thereafter, it was agreed that an existing Runway with width of 23 meters could be utilized for smaller aircraft. However, as and when there is need to operate bigger aircraft at the said airfield, it would be required to be widened as per the DGCA Regulations. It was advised that the State Government should keep sufficient vacant areas around the periphery of airports to prevent obstructions caused due to building construction, growth of trees etc. keeping the future requirements in view.
- 2. Room on top of the Terminal Building for ATC Tower:** It was explained by officials of AAI that Modular ATC Tower uses similar concept where a Room on Top of the Building at an airfield could be used as ATC Tower. However, such location is required to have 360 degree view of entire area including both ends of runway for safety of aircraft operations.
- 3. Chain link fencing instead of compound wall:** RCS Cell informed that in a meeting held under the Chairmanship of Secretary, Civil Aviation, it was recommended for alternative compliance initially with Barbed Wire / Mesh Fencing to ensure perimeter security and avoid wild life hazard. However, watch tower is required due to security reasons and compound wall would be required to be built in due course of time when operation gets stabilized. Procedures adopted by RCS Airports can be adopted by the States.
- 4. Modular Terminal Building with sufficient space to accommodate passengers:** It was explained by expert members from AAI that initially at the RCS Airports, we are only required to have a porta cabin with sufficient space

to accommodate passengers and the space required is 250 Square Metres. Such arrangements have been made at Defence Airfields like Adampur, where RCS Flights are already operating.

5. Perimeter Road Lighting: This issue was also discussed in detail. However, keeping security scenario and threat perception for our airports, it was agreed that Perimeter Road Lighting is necessary and it should be provided. However, technology and scale of investment has to be airport specific. It is also recommended that solar energy lighting could be installed to reduce recurring cost.

6. Visit to Bangalore and Chikmagalur: At the end of the meeting, JS (UP) requested Member (operations), AAI to constitute a team of AAI, DGCA and BCAS Officers to visit the site in Karnataka as per the mutual convenience of AAI and Govt. of Karnataka to provide necessary guidance to the officials of Govt. of Karnataka.

7. The meeting ended with Thanks to all participants.

x-x-x-x-x

Appendix "A"

List of participants:

- | | |
|--|---------------------|
| 1. Ms. Usha Padhee, Joint Secretary, MoCA, | Chairperson. |
| 2. Shri V.R. Hegde, Director, MoCA. | |
| 3. Shri G.K. Chaukiyal, ED (RCS), AAI. | |
| 4. Shri Ayush Mani Tiwari, DDG, BCAS. | |
| 5. Shri Y. Sreenivasappa, DGM (IPD), KSIIDC, Govt. of Karnataka. | |
| 6. Shri S.N. Dwivedi, Consultant, RCS Cell, MoCA. | |
| 7. Shri A.K. Pathak, ED (Plg.), AAI. | |
| 8. Shri S. Biswas, ED (Arch.), AAI. | |
| 9. Shri A.K. Joshi, GM (Plg.), AAI. | |
| 10. Capt. RK Mallik, GM (Security), AAI. | |
| 11. Shri Arun Mehan, Jt. GM (Ops.), AAI. | |
| 12. Shri J.C. Wadhwa, DGM (AL), AAI. | |
| 13. Shri M.K. Garg, Dy. Director, DGCA. | |

x-x-x-x-x

Ref.: AAI/38/37/2018-ARII(P)/ 647

Date: 07.02.2018

270
270/02/14

To,
The Under Secretary,
Infrastructure Development Department
Govt. of Karnataka,
Karnataka Government Secretariat,
Vikasa Soudha, Bengaluru

Sir,

Sub.: Development of No Frills Airports – reg.

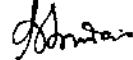
Reference may please be made to your letter no. IDD 186 DIA 2015 dated 20.11.2017 regarding the subject mentioned above.

The draft model design for no-frills airports/ airstrips proposed by you enclosing with the above mentioned letter has been examined and the observations are as follows:

1. The typical Terminal Building drawing, as submitted by you vide above mentioned letter is not appropriate. AAI has developed standard drawings for Terminal Building with pre-engineering, pre-fab buildings which can be constructed within a short period of time at minimal cost. A copy of the same is enclosed for ready reference please.
2. The ATC operations can be conducted from a small porta cabin wherever the frequency of flight is low as temporary office for ATS persons. However, a set of standard drawings for ATC Tower cum Technical Block cum Fire Station suitable for no-frills airport operations is also enclosed for ready reference.
3. The typical sketch indicating plan for airstrip as submitted by you vide above mentioned letter is not appropriate for all type of aircraft. The Runway length, airside facilities and Master Plan of the no-frill airstrip would be governed by critical aircraft to be operated, the location, scale of operation and availability of land pockets etc. complying DGCA CAR.
4. Comments of AAI on the other facilities and infrastructure to be developed for various types of no-frill airports is also enclosed for your perusal.
5. Drawings and tabulated comments of AAI are enclosed for ready reference.

GoK may identify and accordingly develop the proposed airstrips under RCS and joint survey to be undertaken with BCAS and DGCA officials.

Yours faithfully,


(S. Biswas)
ED(Arch.)

14/2/18
14/2/18
14/2/18

Encl: As Above.

P. Jais
ADC
19/2/18

NO FRILL AIRPORTS

| SL. NO. | FACILITIES | AAI | GoK | Remarks |
|---------------------------|---|---|---|---|
| 1 | Runway | 1100 x 30 | 1000 x 23 | Length of Runway will be determined w.r.t critical aircraft to be operated after elevation, temperature and slope correction of Aerodrome Reference Field Length (ARFL) of aircraft. |
| | | 1400 x 45 | 1500 x 30 | |
| | | 1800 x 45 | 1800 x 45 | |
| | Runway shoulder width | Not recommended | 7.5m x 2 (Type III) | As per DGCA CAR for aircraft under Code 3C (ATR-42), shoulders are not required. |
| Runway Drainage system | | As per standard | Proper slope to be maintained to avoid water accumulation and open drain may be provided beyond the basic strip as per DGCA CAR provision. | |
| 2 | RESA | 30 x 60 | 30M | Width has to be double the width of runway as per DGCA CAR. |
| | | 30 x 90 | 30M | |
| | | 90 X 90 | 90M | |
| 3 | Basic Strip (VFR Operation) | 80m | | To be provided as per DGCA CAR |
| | | 150m | | |
| | | 150m | | |
| 4 | Isolation Bay | Turning pad of Runway to be used as Isolation Bay | 30 x 30 50 x 50 70 x 70 | May be avoided as agreed by BCAS to use turning pad for Isolation Bay in the event of any unforeseen circumstances. |
| | | | | |
| | | | | |
| 5 | Apron | 2 Nos. 25 seater | 60 X 40 | Acceptable |
| | | 2 Nos. ATR-42 | 100 X 80 | |
| | | 2 Nos. ATR-72 / Q-400 | 100 X 80 | |
| 6 | Operational Boundary wall | As per BCAS Requirement | Chain link fencing | No exemption has been given by BCAS. State Govt. may obtain approval from BCAS regarding provision of chain link fencing. To start with RCS Flight, chain link facing may be provided. Subsequently perimeter wall as per BCAS requirement may be provided. |
| | | | Chain link fencing | |
| | | | Chain link fencing pre-cast low cost material | |
| | CCTV Surveillance | | 1 4 6 | CCTV in operational area to be decided after joint inspection with BCAS. |
| Security post at Boundary | | 2 nos. for Type 3 | Patrolling in operational area to be done as per BCAS norms. However, considering the visibility along the full length of wall, no. of security posts / posts may be reduced / avoided. To be finalised after joint inspection with BCAS. | |
| 7 | Perimeter Road in operational area | All weather motorable road with minimum perimeter lighting | 3.75m wide unpaved road | Unpaved road may be provided but properly compacted for all weather vehicular movement. |
| | | | 3.75m wide unpaved road | |
| | | | 3.75m wide unpaved road | |
| Steel fabricated gates | 1 entry gate on approach road to airport from city, 1 No. Near Terminal Building for entry exist to operational area and 1 no. crash gate at both ends of runway. | 1 no. at entrance only for type I & II. As per requirement for type II | Minimal Perimeter lighting may be provided for security and safety of the airport premises. As proposed by AAI. | |

| | | | |
|--|--|---|--|
| Approach road & Parking | To be provided by State Govt. Distance between car parking and Terminal Building to be reduced to 20m instead of | Parking 40m x 40m Parking 40m x 40m Parking 50m x 80m | BCAS has permitted to reduce distance between terminal building facade and car parking to 20m in case of land constraint. Size of car parking depends on number of parking to be provided. |
| Security post at entry to Airport premises with communication | | Proposed with inter-com/ walkie-talkie | Acceptable |
| Barrier at entrance- mobile/ motorised/ automatic | | Manual | Entry gate would be sufficient, no further barrier is required. |
| Lighting of approach road and parking | | High Mast proposed in car parking for Type III | Normal lamp post and high mast both acceptable. |
| Terminal Building | 1250 sqm (A50 + D50) 2500 sqm (A100 + D100) 3505 sqm (A150 + D150) | A10 + D10 A30 + D30 A60 + D60 | Standard module of pre-engineered and pre-fabricated building prepared by AAI may be adopted. However, SG may reduce considering availability of funds and scale of operations. |
| Terminal security personnel | | 2 nos. for Type I & II and 14 no. for Type III | No. of security personnel to be decided after joint inspection with BCAS which may vary as per scale of operation and time schedule. |
| No. of chairs for general use, check-in counters, security frisking booth, airline counters, gents/ ladies toilet etc. | | 30 nos. chairs for Type I and 40 nos. for Type II & III. Check-in counter 1 no. for Type I & II and 2 no. for Type III. Security frisking- 2 no. for Type I & II and 4 nos. for Type III. | To be provided as per terminal building capacity. |
| CCTV | As per BCAS Requirement | 1 no. for Type I & 4 no. for Type II & III | To be finalised after joint inspection with BCAS. |
| As staff communication system | | Intercom/ 2 no. hand held VHF set | Acceptable |
| Cargo Handling facility | Will be handled by airlines. | One agent proposed for Type III | Since the aircrafts would be smaller in size and the scale of operation would be minimal, only little belly cargo may be handled by airlines. |
| ATC Tower & Fire Station | Pre-engineered building with total area 730 sqm | Required Required Required | To be provided as per AAI standard design. (Drawing enclosed) |
| DVOR/ Nav. Aids | | NDB/ VOR | Initially for VFR operations, communication link with ATC to be provided. Augmentation to be considered subject to increase in frequency of operation. However, if SG wants to provided NDB/ VOR by paying the cost to AAI will help the aircraft navigation. |
| DME | | Not required for Type I & II and for Type III as per requirement | No frill airports are being developed for VFR operations. However, if SG wants to provided DME by paying the cost to AAI will help the aircraft navigation. |
| ILS | | 1 system proposed for Type III | VFR operations do not require ILS |

166 sq.m.

FLOOR PLAN

| | | | | |
|----|--------------------------------------|----------------|---|--|
| 14 | PAPI | To be provided | Not required in Type I & II and 1 system proposed for Type III | As per DGCA insistence, PAPI to be provided. |
| 15 | Simple approach lighting system | | Not required in Type I & II and 1 system proposed for Type III | No frill airports are being developed for VFR operations. However, if SG wants to provided SAPL by paying the cost to AAI will help the aircraft navigation. |
| 16 | Full body scan metal detector | | 2 nos. proposed for Type II & III | Not required. |
| 17 | Security personnel | | 2 nos. for Type I, 8 nos. for Type II and 14 nos. for Type III | No. of security personnel to be decided after joint inspection with BCAS which may vary as per scale of operation and time schedule. |
| 18 | X-BIS | 2 no. | Not required in Type I & II and 1 no. for Type III | Necessary for safety & security of operations. |
| 19 | Fire Tender & Ambulance | | For Type I & II, to be provided by local admin. And 1 each for Type III | To be provided/ arranged by SG. |
| 20 | Medical doctor for emergency | | May be arranged from local hospital | |
| 21 | Fire extinguishers | | 6 nos. for Type I, II & III | Number to be decided as per local fire regulations. |
| 22 | Perimeter intrusion detection system | | 1 no. for Type III | The system is not mandatory, however, if SG wants to provide, it will enhance security scenario. |
| 23 | Surveillance system at land side | | 2 nos. CCTV camera for Type III | |
| 24 | Security control/ aerodrome | | 1 each in Terminal building | Only 1 room can be provided in TB. |
| 25 | DFMD | 4 no. | 2 no. | Depends on scale of operation |
| | HHMD | 5 no. | 2, 6, 10 nos. type-wise | Number to be decided after joint inspection with BCAS which may vary as per scale of operation and time schedule. |
| 26 | Aerodrome light beacon | | As required | Required for VFR operation. |
| 27 | ATS Briefing office | | 1 no. | Standard drawing of ATC tower cum fire station is enclosed. |
| 28 | ATS reporting office | | 1 no. | |
| 29 | Fueling | | 1 agency | 30m x 30m paved area for parking oil bousers to be provided on air side. |
| 30 | Marking at Runway/ Taxiway / Apron | | As per ICAO standards | As per ICAO standards/ DGCA CAR |
| 31 | Hangar | | 1 no. for Type III | To be considered only on the specific request by airlines. |
| 32 | Helicopter operations | | Can land on runway and hower & park at apron | Acceptable |
| 33 | Authorized persons/ group | | 1 no. in Type I, 2 no. in Type II & as per standards in Type III | No. of personnel would be derived from the scale of operation. |
| 34 | Metrological and others | | wind indicator, landing T and signal square | To be provided as per DGCA CAR for VFR operations. |

36 sq.m.

1st FLOOR PLAN

The Master Plan for new/ intended airstrips to be operationalised under RCS of SG should obtain DGCA approval.