

vii) In other cases 0.15 M bed encasement with 1:4:8 (1 cement : 4 fine sand : 8 graded stone agg. 40 mm nominal size) cement concrete upto haunches of pipes shall be provided the stone ballast shall be of 40 mm nominal size for bed concrete and 20 mm nominal size for around encasement of pipe. Where cushion is less than 0.90 M, around encasement of pipe with same mix will be done.

viii) Where the invert level of the manhole is 1.22 m or more below the sub soil water level 0.115 m thick core of 1:2:4 cement concrete (1 cement : 2 coarse sand : 4 graded stone ballast 20 mm nominal size) shall be provided in the walls of the manhole upto 0.61 mtr. above sub soil water level in order to prevent in filtration of sub soil water level from the sides of the manhole shall be provided with 15 cm thick 1:2:4 (1 cement : 2 coarse sand : 4 stone agg. 20 mm nominal size) RCC slab monolithically with the core of the wall of the manhole lean concrete of 1:5:10 (1 cement : 5 fine sand : 10 graded stone agg. 40 mm nominal size) of 0.075 m thick shall be provided under the slab.

10. **Tests :** The sewer line laid will be subject to following three tests.

- a) Smoke test : to check the air tightness of joints.
- b) Mirror test : to check straight alignment of pipes.
- c) Disc test : The disc test will be conducted to see that lines are free of dead/set concrete/mortar/other blockages and lines laid are in straight line from manhole to manhole.

11. Any other tests, if required during course of execution will be decided by Engineer-in-Charge and will be binding on the contractor.

**Note:** Nothing extra is to be paid to the contractor for testing of pipes etc.

12. The contractor will submit to Engineer-in-Charge 5 sets of completion plan of sewerage system laid showing position of manholes, with it centre to centre distance dia of lines, gradients, location of drop connections, connecting point, with ground levels and invert levels at each point with in 10 days of completion of the sewerage work. The service plan (in original) approved by local body/D.J.B. along with their for warding letter be also submitted to the Engineer-in-Charge.

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13. The following slopes shall be maintained while laying the pipes :

S.No.	Dia of Pipe	Slope
1.	250 mm	1 in 190
2.	300 mm	1 in 245
3.	350 mm	1 in 300
4.	400 mm	1 in 360
5.	450 mm	1 in 510
6.	500 mm	1 in 590

14. During execution the work may be inspected by officials of MCD/DJB/DVB also.
15. Crossing over nallahs shall be done by CI pipe with necessary support.
16. The conditions mentioned in the approved scheme of DJB shall be followed strictly.

**C. SPECIFICATIONS FOR STORM WATER DRAINAGE**

Laying of underground pipe storm water drainage shall include excavating in all types of soils providing and laying of RCC NP-2 class, S&S pipes, jointed with rubber rings and cement mortar 1:2 including testing and refilling, constructing brick manholes, chambers, providing S.F.R.C. covers & frames, and SFRC grating as per approval of MCD/DJB completing the job to the satisfaction of the Engineer-in-Charge.

Following specifications will be used for providing underground pipe drainage in the complex :

1. The work will be executed as per the design and layout approved by the MCD/DJB.
2. RCC NP-2/NP-3 pipe ISI marked S&S Pipe shall be used.
3. Minimum diameter of the pipe used will be as per approved scheme by MCD/DJB.
4. The size of road gully chamber will be 50 x 45 x 60 cm base concrete will be in C.C. 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate 40 mm nominal size). Brick work 23 cm thick with bricks of class designation 75 will be in CM 1:5 (1 cement : 5 fine sand) inside plastering 12 mm thick with 1:3 (1 cement : 3 coarse sand) with a floating coat of neat cement SFRC grating with frame will be of size 500 x 450 mm as per standard design in CPWD specification Vol. VI 1996.

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5. The chamber shall be provided at the starting point, junctions and turns to the alignment as well as at every 20 mtr. interval.
6. In case the pipes are laid under sub soil water level, full encasement shall be done with 1:3:6 cement concrete (1 cement : 3 coarse sand : 6 graded stone agg. 40 mm nominal size).
7. In all other cases, 0.15 M bed and encasement with 1:4:8 (1 cement : 4 fine sand : 8 graded stone agg. 40 mm nominal size) cement concrete upto haunches of pipes shall be provided. The ballast shall be of 40 mm nominal size for bed concrete and 20 mm nominal size for other encasement of pipe. Where available cushion is less than 90 cm or 1.2 M under roads around encasement of pipe will be done with above mix.
8. RCC pipe drains shall be provided on both sides of roads for easy collection of storm water. As per approval accorded by MCD/DJB.
9. For collection of storm water, the covers of manhole shall be of SFRC. Gully chambers shall be provided on both sides of roads at suitable intervals and connected to the main pipe drain with RCC NP-2 pipes, S.F.R.C. heavy duty covers & frames shall be provided to the manholes which shall be embossed S.W. drains, D.D.A. & its year of manufacture as per instructions of Engineer-in-Charge.
10. The manhole shall be constructed in brick masonry as per the drawing mentioning in sewer sub head in the alignment of main line at spacing not exceeding 20 meters.
11. Size of manholes w.r.t depth of the pipe drain will be as follows :

	<u>For depth of manhole between</u>	<u>Bottom diameter of manhole</u>
i)	0.914 m to 1.68 m	0.91 m
ii)	1.68 m to 2.28 m	1.20 m
iii)	Beyond 2.28 m	1.52 m

Start manholes shall be minimum 0.914 M deep The depth of the manhole shall be taken as vertical distance between top level of SFRC cover and invert level of channel in the manhole.

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12. Where invert level of the manhole is 1.22 mtr. or more below the subsoil water level, 0.115 mtr. thick core of 1:2:4 (1 cement : 2 coarse sand : 4 stone ballast 20 mm nominal size) shall be provided in the walls of the manhole upto 0.61 mtr. above subsoil water level in order to prevent infiltration of subsoil water from the sides of the manholes as per MCD/DJB norms. The bottom of the manhole shall be provided with 0.15 mtr. thick 1:2:4 (1 cement : 2 coarse sand : 4 graded stone agg. 20 mm nominal size) RCC slab laid monolithically with the core of the wall of the manhole. Lean concrete of 1:5:10 (1 cement : 5 fine sand : 10 graded stone 40 mm nominal size) of 0.075 mtr. thickness shall be provided under the slab.
13. Where branch drain meets the main drains & drop is more than 0.61 m a drop connection as per CPWD specifications 96 Vol. VI, shall be provided.
14. The construction of the manhole shall be done as per approved drawing and sub-head of specifications.
15. During execution the work may be inspected by officials of MCD/DJB also.
16. The contractor will submit to Engineer-in-Charge 5 sets of completion plants of drainage work showing gradient; position of chambers, manhole, with centre to centre distance location of drop connections, dia of lines within 10 days of completion of drainage work. The service plan (in original) approved by legal body/MCD along with its forwarding letter shall be submitted to the Engineer-in-Charge by the Co.
17. Any other details, if required during course of execution will be decided by Engineer-in-Charge will be binding on the contractor.
18. The slope in various diameter of pipe, would be as mentioned in subhead sewerage specifications.

**D. SPECIFICATION FOR ROAD PARKINGS AND PATHS**

1. Construction of internal approach roads and parkings will be done as per layout plan and standard laid down by MCD. The contractor will ensure that roads are developed to the full right of way as per MCD norms. The required metalled width will be provided to the exact crust thickness as per norms. The contractor will ensure that nowhere the

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right of way of roads reduces. The roads will be laid to camber longitudinal as well as cross-section wise. The job of construction of roads consists of preparation of sub-grade, consolidation of the same, filling & compacting the earth work in embankment under optimum moisture conditions to give at least 95% of the maximum dry density (protector density), supplying Delhi Quartzite Stone and screening of blue texture of the required lying of base and sub-base coarses, using binding material and necessary rolling as per specification brick on edge and pre-mixing etc. the surface dressing of the berms of roads will be done in such a fashion so as to discharge the rain water to the open areas to the storm water pipe drainage roads of all rights of ways to be constructed as per latest MCD norms showing right of way of each road/path and their respective cross section within 10 days of completion of roads/path work.

2. Surface dressing of the berms with slope towards drainage system.
3. C.C. 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) pre-cast Kerb stone fair face finish in uniform colour of 0.30 m long and 0.20 M x 0.20 M section as per CPWD specifications/ directions of Engineer-in-Charge jointed with Mix 1:2 (1 cement : 2 fine sand) to be provided as per Architectural Drawings.
4. Toe walls in brick masonry with bricks of class designation 75

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**MINIMUM ACCEPTABLE SPECIFICATIONS FOR LIG/MIG FLATS (CIVIL WORK)**

S.No.	Item of Work	Decision
1.	<u>Foundation and Plinth</u>	As per structural drawings to be approved later on.
1.1.	<u>Foundation Concrete for Walls</u>	a) Lean concrete shall be with stone aggregate of 1:5:10 mix. b) The type of mix, thickness and width shall depend on approved structural design.
1.2.	<u>Damp proof course</u>	DPC shall be 40 mm thick of CC 1:2:4 for all houses with bitumen coating of 1.7 kg/sq.meter according to CPWD specifications, 1996 having the projection of 25 mm on outer walls.
1.3.	<u>Plinth filling</u> a) Sand filling b) Concrete under floor	Jamuna sand 100mm 75 mm layer of CC 1:5:10 with brick aggregate.
1.4.	<u>Brick work in Foundation &amp; plinth</u>	Cement mortar 1:4 & 1:6 shall be provided for masonry in foundation and plinth subject to the provisions of the approved structural drawings.
2.	<u>Super Structural Brick Work</u>	
2.1	<u>Brick work in super structure</u>	All brick work in super structure shall be with coarse sand in CM 1:4 or 1:6.
2.2	<u>Half Brick Work</u>	With bricks of specified class, in cement mortar 1:4 with or without hoop iron.
2.3	<u>Brick work under Kitchen Shelves etc.</u>	a) 7.5 cm thick brick laid flat in CM 1:3. b) Shelves may be reinforced cement concrete as per approved design.
3.	<u>R.C.C. Work</u>	
3.1	<u>R.C.C in column beams and slabs</u>	The detailed dimensions & mix of RCC to be adopted shall be as per approved structural design.

S.No.	Item of Work	Decision
3.2	<u>Lintels</u>	Precast or cast in situ as per approved design & drawing.
3.4	<u>Lintels band</u>	As per approved structural design and B.I.S./CPWD specification
3.5	<u>Triangular portion of steps in staircase.</u>	With bricks of class designation 75 in CM 1:3 (in coarse sand) as per structural drawings.
3.6	<u>Railing in Staircase &amp; Balcony</u>	<p>a) 0.9 M high MS railing in all the houses in staircase of approved pattern with hand railing 40 mm MS (approximate wt. 14 kg/meter (medium class pipe) and vertical bars embedded in waist slab. The height of railing shall be 0.9 m from finished level of step.</p> <p>b) 0.9 M high MS railing in balconies of approved pattern with hand railing of 40 mm MS pipe with (approx.) wt. of 14 kg/m (medium class pipe) above floor.</p> <p>c) Parapet on the terrace shall be 900 mm above the finished terrace level. Top of parapets shall be provided with brick on edge. No coping shall be provided. Plastering shall be done at top of parapet with slope inside.</p>
4.	<u>Wood work</u>	All doors except kitchen door.
4.1	<u>Door Shutters</u>	<p>Shall be of 35 mm thick laminated veneer lumber door shutters confirming to TADS-IS-1995 manufactured in factory by approved manufacturers including Black enameled M.S. Butt hinges with necessary screws as per directions of Engineer-in-Charge and paneling with panels of.</p> <p>a) 12 mm thick plain grade-I, Medium density flat pressed three layers &amp; graded particle, board (FPT-1) confirming to IS:3087 bonded with BWP type synthetic resin adhesive as per IS:1848.</p>

S.No.	Item of Work	Decision
4.2	<u>Door Fittings</u>	<p>b) 35 mm thick shutters. Kitchen Door : 35 mm thick LVL-Partly wire gauged &amp; partly paneled as provided for other door shutters.</p> <p>c) Anodised aluminium fittings e.g. Tower bolts, handles, door stopper etc. will be provided.</p> <p>d) Anodised aluminium sliding door bolts will be provided only at the entrance doors. All other doors will be provided with nickel plated MS pull lock bolts.</p>
5.	<u>STEEL WORK</u>	
5.1.	<u>Door Frame</u>	<p>a) T-iron frames.</p> <p>40 x 40 x 5 mm shall be provided according to the thickness of door shutters.</p>
5.2.	<u>Windows</u>	<p>Steel windows with standard steel section as per specification will be provided as per approved drawing.</p>
5.3.	<u>Windows Fittings</u>	<p>Oxidised MS fittings for all houses and with glazing as per CPWD specification 1996 Vol. I to VI.</p>
6.	<u>FLOORING</u>	
6.1	<u>Flooring</u>	<p>40 mm CC 1:2:4 in all rooms except bath, WC and kitchen where 40 mm mosaic flooring in ordinary cement shall be provided.</p> <p>Scooter Garage : 40 mm cc 1:2:4 without neat cement finish.</p>
6.2	<u>Skirting</u>	<p>18/21 mm skirting to match the floor finish 100 mm high.</p>
7.	<u>ROOFING</u>	
7.1	<u>Roof Treatment</u>	<p>Bitumen painting 1.7 kg/sqm with mud phuska treatment laid by proper slope topped with brick tiles of classed designation 100 and jointed with CM 1:3 and Khurra &amp; Gola 12 mm bed of CM 1:3 and grouted with CM 1:3.</p>
7.2	<u>Treatment on sloping roof slabs (like mummy slab)</u>	<p>Bitumen painting 1.7 kg/sqm followed by brick tiles of class designation 100, over 12mm bed of CM 1:3 and grouted with CM 1:3.</p>



S.No.	Item of Work	Decision
7.3	<u>Rain Water Pipes</u>	AC rain water pipe except the bottom length of about 2 M which shall be of S.C.I. pipe.
8.	<u>FINISHING</u>	
8.1.	<u>Plastering on walls (internal)</u>	12/15 mm cement plaster 1:6 for all houses.
8.2.	<u>Dado</u>	
8.3.	<u>Kitchen Platform Top</u>	White glazed tile dado upto window sill level in WC and upto lintel level in bath and kitchen.
8.4.	<u>Finishing Bottom of R.C.C slab</u>	25 mm Kota stone slab with maximum two pieces over working shelves.
8.5.	<u>Internal Finish on Walls</u>	6 mm rendering in CM 1:3.
8.6.	<u>External Finish on Walls</u>	White wash for all houses.
8.7.	<u>Primer</u>	Colour wash over cement plaster 1:6
8.8.	<u>Painting on wood work and steel work</u>	As per specification 1996 for wood work and steel work. Superior quality ready mixed paint, ISI mark for all wood & steel work except outer faces which shall be treated with synthetic enamel paint ISI mark.
9.	<u>Miscellaneous</u>	
9.1	<u>Plinth Protection</u>	50 mm cc 1:3:6 over 75 mm bed of dry brick aggregate with brick edging laid lengthwise to half brick depth.
9.2	<u>Pavement</u>	75 mm cc 1:2:4 over 75 mm cc 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate 40 mm nominal size).
10.	<u>INTERNAL SANITARY/WATER SUPPLY INSTALLATIONS</u>	
10.1.	<u>W.C. Pan</u>	One number white vitreous China, 580 mm Orissa pattern pan with 10 ltr. low level PVC flushing cistern of approved quality.

140

S.No.	Item of Work	Decision
10.2.	<u>Wash Basin</u>	One No. White vitreous China flat back wash basin 550 x 450 with one CP brass pillar tap.
10.3.	<u>Mirror</u>	Bevelled edges mirrors 600 x 450 mm.
10.4.	<u>Sink</u>	
10.5.	<u>Towel Rail</u>	Aluminium towel rail 600 x 20 mm
10.6.	<u>Soil &amp; Waste Pipes</u>	Single stack system 100/75 mm SCI pipes i/c all SCI fittings as per approved plumbing design.
10.7.	<u>Internal Manhole</u>	Brick masonry with brick of class designation 75 size 90 x 80 x 45 cm with S.F.R.C. light duty cover.
10.8.	<u>Pipe between house manhole and service manhole</u>	SW pipe 150 mm dia
10.9.	<u>Pipes Internal</u>	15/20 mm dia GI pipe medium quality 'B' class as per approved plumbing drawing.
10.10.	<u>Pipes external</u>	15/20 mm dia GI pipe medium quality 'B' class as per approved plumbing drawing with 15mm nominal bore brass ferule & meter chamber with CI box of thickness 6mm wall of size 38 x 38 x 11.5 cm.
10.11.	<u>Painting of G.I. pipes/SCI pipes</u> a) Internal b) External	Ready mixed paint Anticorrosive bitumastic paints.
10.12.	<u>Fittings</u>	ISI marked brass bibcocks and stop cocks - 15mm/20mm.
10.13.	<u>Overhead Tank</u>	HDPE water storage tank of 300 ltr. two in number capacity to be approved from F.D.A. & tested by CBRI, Roorkee & Public Health Engineering Department for each flat.
11.	<u>INTERNAL DEVELOPMENT (WATER SUPPLY)</u>	

S.No.	Item of Work	Decision
11.1.	<u>Pipe</u>	S&S Centrifugally cast (spum) iron pipes (class L.A.) 100mm/150mm.
11.2.	<u>Fittings</u>	S&S C.I. Standard fittings (Heavy class)
11.3.	<u>Pig lead</u>	Pig lead of approved quality.
11.4.	<u>Sluice Valve</u>	C.I. sluice valve (with cap) complete with bolts & nuts, rubber insertion etc. 100mm / 150mm as per specification.
11.5.	<u>Chambers for:</u> a) Sluice Valve b) Fire Hydrant	Brick masonry chambers 60 x 60 x 75 with bricks of designation 75 in cement mortar 1:5 (1 cement : 5 fine sand) with C.I. surface box complete as per specification.
11.6.	<u>Thrust Blocks</u>	CC 1:2:4 as per specification.
11.7.	<u>Dis-infection</u>	Dis-infection to be done using bleaching powder @ 0.5 gm/litre of water & cleaned with fresh water with minimum 3 times operation as per DJB conditions.
11.8.	<u>U.G.R./Pump House</u>	R.C.C. UGR of required capacity with boosting arrangement including necessary installation for supply of water as per DJB norms including standby D.G. set. This is to be provided as per approved scheme, which is to be got approved by the agency.
12.	<u>INTERNAL SEWERAGE</u>	
12.1.	<u>Pipe</u>	S&S NP-2/NP-3 RCC pipe with rubber ring joints & filling the joint with cement mortar 1:2 (1 cement : 2 fine sand) of required diameter including testing of joints as per approved design of DJB.

142

S.No.	Item of Work	Decision
12.2.	<u>Concrete</u>	<p>a) Concrete of mix 1:4:8 shall be used at bottom &amp; sides, alround of pipes for normal conditions for depth less than 0.910 m &amp; more than 4.57 m. For depth more than 0.910 m and less than 4.57 m concrete shall be upto haunches, all as per DJB norms and its approved.</p> <p>b) Under subsoil water level where invert level of manhole is 1.22 m or more below sub soil water level, 0.115 thick core wall of 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) to be provided with 15 cm thick RCC slab 1:2:4 casted monolithically with the core of the wall manhole complete as per the approved design.</p>
12.3.	<u>Manholes</u>	<p>Manholes of required diameter as per depth with brick wall in cement mortar 1:4 with foundation concrete 1:3:6 with stone aggregate inside cement plaster 1:4 with floating coat of neat cement, outside cement plaster 1:4 with SFRC cover (heavy duty) all complete as per approved design.</p> <p>In sub-soil or adverse soil, conditions manholes &amp; encasing of pipes shall be as per approved cradle &amp; structural design to avoid sinking &amp; settlement of lines/manholes.</p>
12.4.	<u>Foot Rest</u>	<p>Orange colour safety foot rest of minimum 6 mm thick plastic in capsulated complete as per IS-10910.</p>
12.5.	<u>Drop Connection</u>	<p>For drop more than 0.610 m drop connection as per CPWD specification to be provided.</p>
13.	<u>INTERNAL S.W. DRAIN</u>	
13.1.	<u>Pipe</u>	<p>S&amp;S, NP-2/NP-3 RCC pipe with rubber joints &amp; cement mortar joint 1:2 (1 cement : 2 fine sand) of required diameter as per approved MCD norms and after its approved</p>

143

S.No.	Item of Work	Decision
13.2.	<u>Concrete</u>	a) Same as Sewerage 12.2 (a) b) Same as Sewerage 12.2 (b)
13.3.	<u>Manhole</u>	Same as 12.3
13.4.	<u>Foot Rest</u>	Same as 12.4
13.5.	<u>Drop Connection</u>	Same as 12.5
13.6.	<u>Road Gully Chamber</u>	50 x 45 x 60 cm size with base concrete CC 1:5:10 as per approved thickness, brick wall in cement mortar 1:5 (1 cement : 5 fine sand) including 500 x 450 mm SFRC horizontal grating with frame complete as per standard design.
14.	<u>INTERNAL ROADS, PARKING &amp; PATHS</u>	
14.1.	<u>Sub Grade</u>	Subgrade to be prepared by excavating earth to an average depth of 22.5 cm, dressing of complete & consolidating with road roller 8-10 tonne as per specification.
14.2.	<u>Road</u>	Laying water bound macadam with specified stone aggregate, stone screening and binding material including screening, sorting, spreading & complete and consolidating with road roller 8 to 10 tonne capacity all complete as per MCD norms.
14.3.	<u>Surfacing</u>	2.5 cm/2cm premix carpet surfacing with stone chipping & paving asphalt 80/100 with tack coat all complete as per specification.
14.4.	<u>Kerb Stones</u>	C.C. 1:2:4 precast Kerb stone 0.30 m long & 0.20 m x 0.20 m section complete as per CPWD specification as per direction of Engineer-in-Charge.
14.5.	<u>Toe Wall</u>	Brick wall 1:4 (1 cement : 4 coarse sand) with brick designation 75.
14.6.	<u>Paths</u>	75 mm thick CC 1:2:4 over 75 mm thick CC 1:5:10.

144

S.No.	Item of Work	Decision
15.	<u>BOUNDARY WALL</u>	
15.1	<u>Boundary Wall with Gates</u>	Random rubbal stone masonry CM 1:4 (1 cement : 4 coarse sand) with MS Grill of approved pattern and coping of CC 1:2:4 (1 cement : 2 coarse sand : 4 graded stone agg.) on the top of wall with pointing as per approved drawing.
16.	<u>NUMBERING OF FLATS</u>	
16.1	<u>Numbering of flats</u>	The number of size 100 mm in height shall be printed on glazed tiles above the entrance door and in front verandah & balcony scooter garages and block ends showing the houses in each row blocks.
16.2	<u>Numbering on overhead tank, watermeter box, etc.</u>	Numbering of size 75mm in height shall also be done on overhead tank, water meter box.
17.	<u>SIGNAGES</u>	
17.1	<u>Information Sign Board/Guide Map</u>	Guide Maps: Made up of angle-iron/C.I. Pipe as per the direction of Engineer-in-Charge and Board is to provided at every Entry point with size 240 x 185 cms (overall excluding underground tank). Other shall direction/information/sign board will be provided on every street/road etc. as per locations approved by the Engineer-in-Charge. This board of suitable size be made up of M.S. angle and sheet etc.
17.2	<u>Direction Boards</u>	

**NOTE :**

- 1) Brick work shall be executed with bricks of class designation 75 or 100 as per approved structural design.
- 2) The height, width and length shall be adopted as per approved architectural design.

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- 3) All the items mentioned in the schedule shall be executed as per CPWD specifications, 1996, Volume I to VI with up-to-date correction slips. If any item is not available in the specifications it should be as per latest IS codes. Any other item not based on above should be supported by technical viability to be approved by competent authority.
- 4) Latest IS codes, development control norms & by-laws of MCD, DJB, DVB shall be considered while submission/approval of drawing & design for this work.
- 5) Jamuna sand, Fine sand & Coarse sand should as per specifications.
- 6) All fittings shall be ISI marked if not available then fittings as per ISI shall be used.
- 7) The detailed specifications for electrical/horticatures also separately attached.
- 8) The above specifications are for the complete job related with the project for full functional utility. However, if for functional utility any other item not covered above, if required, all be executed by agency and nothing extra shall be paid.

**NUMBERING OF FLATS :**

1. The numbering of flats shall be done with glazed tiles 5 mm thick fixed with cement mortar 1:3 on entrance door, front verandah scooter garages and balconies.

The tile shall have printed numbering of size 100mm in height. The numbering shall also be done on block ends also indicating houses in particular row/block all complete as per direction of Engineer-in-Charge.

2. **Numbering at other places**

The number of size 75mm in height shall be written with ISI marked enamel paint on overhead tanks, water meter box, etc. complete as per direction of Engineer-in-charge.

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### INFORMATORY SIGN BOARDS/GUIDE MAPS

1. The boards shall be fabricated with MS sheet 16 gauge with frame of angle iron 40 x 40 x 5 mm size and diagonal bracing of angle iron welded. This Board shall be supported on G.I. pipe 50 mm (Medium Class) with cross footing of angle iron size 40 x 40 x 5 mm shall be embedded 75 cm below ground level in cement concrete block 1:3:6 of size 30 x 30 x 75 cm. The board surface including angles, sheet & pipes shall be properly primed and painted with synthetic enamel paint. After repairing the surface with metal putty including lettering & preparing the guide map complete as per direction of Engineer-in-Charge.
2. The direction boards shall be made of angle iron 35 x 35 x 5 mm with MS sheet of 16 gauge duly welded. The angle iron legs shall be embedded in CC 1:3:6 of block size 20 x 20 x 45 cm below formation level. The surface shall be prepared with metal putty, primed and painted with synthetic enamel paint and writing letters as per the requirement complete as per direction of Engineer-in-Charge.

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**SCHEDULE OF WORK DONE STAGewise**

		<u>Individual</u>	<u>Cumulative</u>
1.	Submission and approval of all architectural drawings, layout, building plans containing all details, Specifications required for execution of work including development plans.	0.24%	0.24%
2.	Submission and approval of foundation designs and complete structural drawings for superstructure, U/G tank complete and other works to be executed at site for its completion.	0.45%	0.69%
3.	Submission and approval of all services plans from MCD/DJB/DVB/DFS etc.	0.24%	0.93%
4.	Completion of structure upto DPC level.	5.45%	6.38%
5.	Completion of structure upto lintel level of ground floor including door frames and window with shutters frame.	2.58%	8.96%
6.	Completion of structure upto floor 2 level including conduiting and fixing of boxes for fans.	2.76%	11.72%
7.	Completion of structure upto lintel level of 1st floor including door frames and windows with shutters.	2.12%	13.84%
8.	Completion of structure upto floor 3 level including conduiting and fixing of boxes for fans.	2.25%	16.09%
9.	Completion of structure upto lintel level of second floor including door frames and windows with shutters.	2.10%	18.19%
10.	Completion of structure upto floor 4 level including conduiting & fixing of boxes for fans.	2.60%	20.79%
11.	Completion of structure upto lintel level of 3 <sup>rd</sup> floor including door frames and windows with shutters.	1.44%	22.23%

12.	Completion of structures of		
	(i) Floor 5 level	3.03%	25.26%
	(ii) 4 <sup>th</sup> Floor lintel level	3.22%	28.48%
	(iii) Floor 6 level with mumty Parapet wall i/c conduiting & fixing of boxes for fans.	3.52%	32.00%
13	Internal electrification (walls conduiting & fixing boxes for switches etc. including drawings of Fish Wire in conduits).		
	i) Ground Floor	0.3229%	32.3229%
	ii) Ist floor	0.3312%	32.6541%
	iii) Second Floor	0.3248%	32.9789%
	iv) Third Floor	0.3231%	33.3020%
	v) Fourth Floor	0.2876%	33.5896%
14.	Providing/Fixing Door shutters.		
	i) Ground Floor	Nil	33.5896%
	ii) Ist Floor	Nil	33.5896%
	iii) Second Floor	Nil	33.5896%
	iv) Third Floor	Nil	33.5896%
	v) Fourth Floor Including Mumty.	Nil	33.5896%
15.	P/F Balcony railing, S/C railing window grills and other steel work	0.63%	34.2196%
16.	Internal Plaster		
	i) Ground Floor	0.71%	34.9296%
	ii) Ist Floor	0.90%	35.8296%
	iii) Second Floor	0.85%	36.6796%
	iv) Third Floor	0.75%	37.4296%
	v) Fourth Floor	0.98%	38.4096%

17.	Internal Flooring i/c skirting		
	i) Ground Floor	0.30%	38.7096%
	ii) Ist Floor	0.48%	39.1896%
	iii) Second Floor	0.43%	39.6196%
	iv) Third Floor	0.40%	40.0196%
	v) Fourth Floor	0.39%	40.4096%
18.	P/fixing glazed tiles and kota Stone.	0.45%	40.8596%
19.	Mud Phaska all complete with A/C pipe & fittings i/c gola and khurras and placing of H.D.P. tanks	1.21%	42.0696%
20.	External plaster	1.09%	43.1596%
21.	Internal Sanitary work	0.89%	44.0496%
22.	Internal GI work	0.47%	44.5196%
23.	Providing fixing W.C. Seats, Wash basin etc.	0.02%	44.5396%
24.	Internal finishing, white washing, painting etc. external finishing, final grinding.	Nil	44.5396%
25.	P/F fittings and fixtures i/c glass panes	Nil	44.5396%
26.	Internal electrification		
	i) Meter boards, telephone boxes and earthing etc.	0.3455%	44.8851%
	ii) Wiring, fixing of sheets, switches & MCB's	Nil	44.8851%
	iii) Testing, commissioning and handing over.	Nil	44.8851%
27.	Water supply i/c UGR pump house, boosters and accessories etc. complete as required	Nil	44.8851%
28.	S.W. Drain	Nil	44.8851%
29.	Sewerage	0.51%	45.3951%

30.	Boundary wall with necessary gola etc.	1.07%	46.4651%
31.	C.C. Path	Nil	44.4651%
32.	Roads	Nil	46.4651%
33.	Parks i/c earth filling etc. i/c plantation and land scaping.	Nil	46.4651%
34.	Horticulture work i/c unfiltered water supply, tubewell, pump house and pumps etc. complete.	Nil	46.4651%
35.	External electrification		
	i)Cost of sub-station bldg. & laying of H.T. Feed	0.1767%	46.6418%
	ii)Providing and installation of sub-station equipments	Nil	46.6418%
	iii) Providing LT Net work	Nil	46.6418%
	iv)Providing service cable & street lighting system.	Nil	46.6418%
	v) Testing, commissioning and handing over of complete system.	Nil	46.6418%
36.	Handing over of flats defect free in all respects and testing of all services to the satisfaction of Engineer-in-charge.	Nil	46.6418%
	Total		46.6418%

Note : Certified that the work has been executed %age wise stage wise as above i.e. 46.6418%.

**SCHEDULE OF PAYMENT STAGewise (BALANCE WORK)**

		<u>Individual</u>	<u>Cumulative</u>
1.	Submission and approval of balance architectural drawings, containing all details, Specifications required for execution of work including development plans, if any.	0.02%	0.02%
2.	Submission and approval of foundation designs and complete structural drawings for superstructure, U/G tank complete and other works to be executed at site for its completion.	0.09%	0.11%
3.	Submission and approval of all services plans from MCD/DJB/DVB/DFS etc.	0.02%	0.13%
4.	Completion of structure upto DPC level	0.09%	0.22%
5.	Completion of structure upto lintel level of ground floor i/c door frames and window with shutters frame.	0.79%	1.01%
6.	Completion of structure upto floor 2 level including conduiting and fixing of boxes for fans.	0.07%	1.08%
7.	Completion of structure upto lintel level of 1st floor including door frames and windows with shutters.	0.71%	1.79%
8.	Completion of structure upto floor 3 level including conduiting and fixing of boxes for fans.	0.09%	1.88%
9.	Completion of structure upto lintel level of second floor including door frames and windows with shutters.	0.75%	2.63%
10.	Completion of structure upto floor 4 level including conduiting & fixing of boxes for fans.	0.37%	3.00%
11.	Completion of structure upto lintel level of 3 <sup>rd</sup> floor including door frames and windows with shutters	1.05%	4.05%

12.	Completion of structures of			
	(i) Floor 5 level	0.51%]		
	(ii) 4 <sup>th</sup> Floor lintel level	1.46%]		
	(iii) Floor 6 level with mumty Parapet wall i/c conduiting & fixing of boxes for fans.	1.46%]	3.43%	7.48%
13	Internal electrification (walls conducting & fixing boxes for switches etc. including drawings of Fish Wire in conduits).			
	i) Ground Floor	0.14%}		
	ii) Ist floor	0.13%}		
	iii) Second Floor	0.14%}		
	iv) Third Floor	0.14%}		
	v) Fourth Floor	0.21%}	0.76%	8.24%
14.	Providing/Fixing Door shutters.			
	i) Ground Floor	0.84%}		
	ii) Ist Floor	0.94%}		
	iii) Second Floor	1.12%}		
	iv) Third Floor	1.12%}		
	v) Fourth Floor Including Mumty.	1.12%}	5.14%	13.38%
15.	P/F Balcony railing, S/C railing window grills and other steel work		2.57%	15.95%
16.	Internal Plaster			
	i) Ground Floor	1.48%}		
	ii) Ist Floor	1.12%}		
	iii) Second Floor	1.22%}		
	iv) Third Floor	1.41%}		
	v) Fourth Floor	1.91% }	7.14%	23.09%

17.	Internal Flooring i/c skirting		
	i) Ground Floor	1.31%}	
	ii) 1st Floor	0.97%}	
	iii) Second Floor	1.07%}	
	iv) Third Floor	1.12%}	
	v) Fourth Floor	1.14%}	5.61% 28.70%
18.	P/fixing glazed tiles and kota Stone.	1.03%	29.73%
19.	Mud Phaska all complete with A/C pipe & fittings i/c gola and khurras and placing of H.D.P. tanks	2.42%	32.15%
20.	External plaster	3.58%	35.73%
21.	Internal Sanitary work	3.95%	39.68%
22.	Internal GI work	2.87%	42.55%
23.	Providing fixing W.C. Seats, Washbasin etc.	1.84%	44.39%
24.	Internal finishing, white washing, painting etc. external finishing, final grinding.	3.75%	48.14%
25.	P/F fittings and fixtures i/c glass panes	3.75%	51.89%
26.	Internal electrification		
	i) Meter boards, telephone boxes and earthing etc.	0.29%}	
	ii) Wiring, fixing of sheets, switches & MCB's	2.81%}	
	iii) Testing, commissioning and handing over.	1.87%}	4.97% 56.86%
27.	Water supply i/c UGR pump houses, boosters and accessories etc. complete as required	3.75%	60.61%
28.	S.W. Drain	3.75%	64.36%
29.	Sewerage	2.79%	67.15%
30.	Boundary wall with necessary gola etc.	1.27%	68.42%
31.	C.C. Path	3.75%	72.17%
32.	Roads	3.75%	75.92%

33.	Parks i/c earth filling etc. i/c plantation and land scaping	1.87%	77.79%
34.	Horticulture work i/c unfiltered water supply, tubewell, pump house and pumps etc. complete	1.87%	79.66%
35.	External electrification		
	i)Cost of sub-station bldg. & laying of H.T. Feed	1.17%}	
		}	
	ii)Providing and installation of sub-station equipments	3.75%}	
		}	
	iii) Providing LT Net work	2.25%}	
		}	
	iv)Providing service cable & street lighting system.	3.75%}	
		}	
	v) Testing, commissioning and 100.00% handing over of complete system	3.75%}	14.67% 94.33%
36.	Handing over of flats defect free in all respects and testing of all services to the satisfaction of engineer-in-charge.	5.67%	100%
<b>NOTE :</b>		<b>Total</b>	<b>100%</b>

1. The work will proceed broadly as per the stages indicated above. However for work between two consecutive stages, the payment will be released for the lower stage. If some work is not executed as per the above sequence and later sequence is executed first, then the payment for that stage will be released at the discretion of the engineer-in-charge and his decision in this regard will be final and binding.
2. Certified that the balance work which is to be executed stagewise %age is given as above.



155

**ANNEX 'A'**

**MATERIALS TO BE ISSUED BY DEPARTMENT (RECOVERABLE)  
(FOR INTERNAL ELECTRIFICATION)**

S. NO.	DESCRIPTION OF ITEMS	MAKE	QTY.	UNIT	ISSUE RATE (Rs.)
1.	5/6 A Piano type switch	Precision	12500 Nos	Each	11=34
2.	5/6 A Bell Push (Piano Type)	Precision	760 Nos.	Each	12=55
3.	6 A 3 Pin socket outlet	Precision	2400 Nos.	Each	16=20
4.	16 A Switch (Piano Type)	Precision	1650 Nos.	Each	34=00
5.	16 A Socket Outlet	Precision	1650 Nos.	Each	34=00
6.	T.V. Socket Outlet	Precision	760 Nos.	Each	16=20
7.	2 Pin Telephone socket	Precision	760 Nos.	Each	15=40
8.	3.5 x 150 Sqmm L.T. Cable 1.1 KV	Gloster	1484 Mtr.	Mtr.	522=00
9.	1 x 630 Sqmm LT Cable 1.1 KV	Gloster	330 Mtr.	Mtr.	505=00
10.	3 x 300 Sqmm HT Cable 11 KV	R. P. G.	560 Mtr.	Mtr.	1603=00
11.	32 Amp DPMCB (INDKOPP)	Indokopp	760 Nos.	Each	175=00
12.	16 A SPMCB	Indokopp	2280 Nos.	Each	74=00
13.	6 A SPMCB	Indokopp	1520 Nos.	Each	74=00
14.	16A DPMCB	Indokopp	760 Nos.	Each	175=00

Note: - The Materials will be issued as is where basis. Any discrepancies in the material shall have to be set right by the successful tenderer.

**ANNEX 'B'****MATERIALS TO BE ISSUED BY DEPARTMENT (RECOVERABLE)**  
**(FOR EXTERNAL ELECTRIFICATION)**

S. No.	DESCRIPTION OF ITEMS	MAKE	QTY.	UNIT	ISSUE RATE (Rs.)
1.	2 x 25 sqmm LT Cable	Gloster	1705 Mtr.	Mtr.	97=00
2.	3.5 x 300 Sqmm LT Cable	Gloster	980 Mtr.	Mtr.	1038=00
3.	3 x 150 sqmm HT Cable	Gloster	150 Mtr.	Mtr.	972=00
4.	400KVA Transformer	Crompton Greaves	4 Nos.	Each	337908=00
5.	630 KVA Transformer	Crompton Greaves	2 Nos.	Each	423076.00
6.	HT Panel 11KV 350 MVA, 400A 4 Panel O.C.B.	MEI	2 Sets	Set	368994=00

Note: - The Materials will be issued as is where basis. Any discrepancies in the material shall have to be set right by the successful tenderer.

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**ADDITIONAL CONDITIONS**

The successful tenderer shall inspect the site before quoting the rates. It will be the responsibility of the successful tenderer to complete the work in continuation of the work left by the other agency. In case any deficiency/discrepancy is observed, the same shall have to be made good within the quoted rates.

**NOTE:-** The above said condition shall be added in N.I.T. for balance work alongwith original condition of the Agreement.

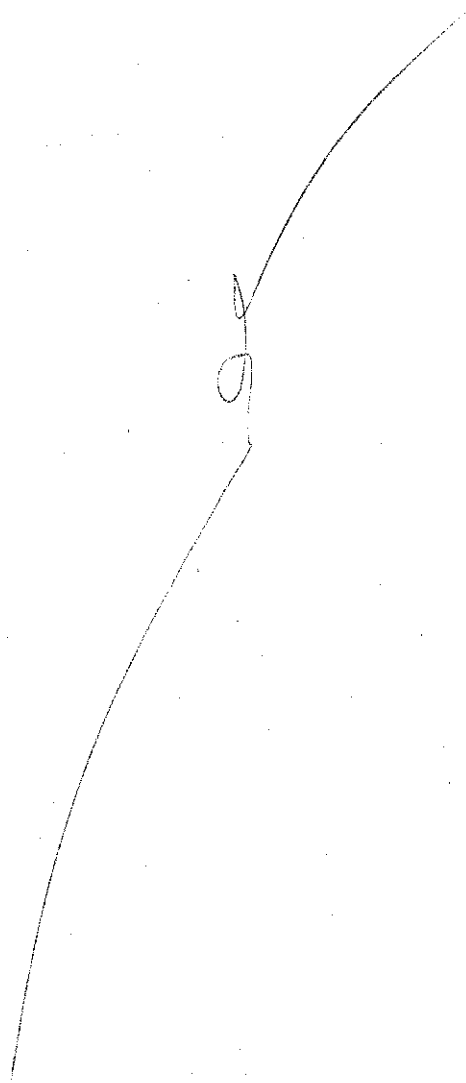
SCHEDULE - "B"

Name of work : Construction of LIG Houses on Turnkey Basis at Sector-14, Dwarka Phase-II (2.40 Hect.)  
(Rate to be filled in by the Agency).

S.No.	Description of Item	Qty.	Unit	Rate	Amount
1.	2. Deduct for not casting RCC roofs slabs at third floor including reinforcement, centring and shuttering, conduits etc. complete as per approved drawing & design. Deduct for not providing and fixing steel glazed Windows at all floors & height as per approved drawing. a) For over all portion treated as fixed.	3. 8 Nos.	4. Each LIG Unit	5.	6
	b) Extra for side-hung portion (Windows)	2320.99 Sq.m.	Sqm.		
		1557.92 Sq.m.	Sqm.		
3.	Add for demolishing RCC work including stacking of steel bars and disposal of serviceable/unserviceable material within 50 metres lead.	55.00 Cum.	Cum.		
4.	Add for dismantling doors, windows and clerestory windows (steel or wood) shutter including chowkhats, architrave, holdfasts etc. complete and stacking within 50 metres lead. a) Of area 3 sqm. and below.	2460 Nos.	Each		

NOTE : Col. No.5 & 6 not to be Published.

Executive Engineer  
South Western Division No. 6  
D.D.A., New Delhi



**LIST OF APPROVED DRAWINGS**

**LIST OF STRUCTURAL DRAWINGS**

<u>S.No.</u>	<u>Drawing No.</u>	<u>Details of Drawings.</u>
1.	SG/167/02/ST/A-01	Foundation Plan Block –A.
2.	SG/167/02/ST/B-01	Foundation Plan Block –B.
3.	SG/167/02/ST/C-01	Foundation Plan Block –C.
4.	SG/167/02/ST/C-02	Foundation Detail Block –C.
5.	SG/167/02/ST/C-03	Column Schedule Block –C.
6.	SG/167/02/ST/C-04	Plinth Beam details.
7.	SG/167/02/ST/C-05	First Floor Slab reinforcement Details Block-C.
8.	SG/167/02/ST/C-06	L-Section Beam Detail Block-C.
9.	SG/167/02/ST-GEN-07	Foundation Detail for Brick & Stone Wall.
10.	SG/167/02/ST/C-08	Structural Detail for Stair case.
11.	SG/167/02/ST/G-09	Typical Column plan for Upper Floor (3,4 & 5 for all Blocks A,B & C).
12.	SG/167/02/ST-G-10	Typical Column plan for Floor Two of all Blocks A,B & C.
13.	SG/167/02/ST-G-13	Foundation Details of Block A & B.
14.	SG/167/02/ST-G-14	First Floor slab Reinforcement Detail Blocks A & B.
15.	SG/167/02/ST-G-15	L-Section Beam Detail for Block A & B.
16.	SG/167/02/ST-G-16	Column Schedule for Block A & B.
17.	SG/167/02/ST-G-17	Typical Slab & Beam Reinforcement Details for Floor 2 to 5 and Block – A,B & C.
18.	SG/167/02/ST-G-18	Typical L-Section of Beam for Upper floor 2,3,4 & 5 of all Block A,B & C.
19.	SG/167/02/ST-G-19	Column Schedule for Upper floors Block-A,B&C
20.	SG/167/02/ST-G-20	Roof slab Reinforcement Details for Block A, B & C.
21.	SG/167/02/ST-G-21	L-Section Roof level Beam Details for all Blocks A, B & C.
22.	SG/167/02/ST-G-22	Structural Detail of Slab & Beams for Block-A, B & C.

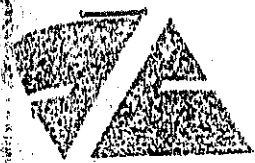
23.	SG/167/02/ST-CC-01	Foundation Details & Column Schedule of Community Centre.
24.	SG/167/02/ST-CC-01-A	Plinth Beam Details of Community Centre.
25.	SG/167/02/ST-CC-02	Ground floor Roof Slab & Beam of Community Centre.
26.	SG/167/02/ST-CC-04	Roof Slab & Beam at Roof Level of Community Centre.
27.	SG/167/02/ST-SH-01	Foundation Detail for Shopping Centre.
28.	SG/167/02/ST-CC-03	Structural Details of Stair case Community Centre

**LIST OF ARCHITECTURAL DRAWINGS.**

29.	SG/167/00/SB-01	Site layout
30.	SG/167/02/AR-CC-01	Community Centre Detail Floor Plan.
31.	SG/167/00/SB-02	Unit Calculation and Detail Plan.
32.	SG/167/00/SB-03	Detail Plans.
33.	SG/167/00/SB-04	Elevation & Sections.
34.	SG/167/00/SB-06	Boundary Wall Details.
35.	SG/167/02/AR-D-08	Toilet & Kitchen Details.
36.	SG/167/02/AR-G-09	Typical Terrace Plan for all Blocks.
37.	SG/167/02/AR-D-10	Door Window Details.
38.	SG/167/02/AR-G-10	Railing Details.
39.	SG/167/02/AR-01	Ground Floor Plan for Block-C.
40.	SG/167/02/AR-03	First/Typical Floor Plan for Block-C.
41.	SG/167/02/AR-04	Typical floor Plan Typical Cluster.
42.	SG/167/02/AR-W-A-01	Ground floor Plan for Block-A.
43.	SG/167/02/AR-B-01	Ground Floor Plan for Block-B.
44.	SG/167/02/AR-CC-02	Community Centre Details Section & Elevations.
45.	SG/167/02/AR-SH-01	Shopping Centre Details.
46.	SG/167/02/AR-C-02	Ground Floor Plan Typical Cluster.
47.	SG/167/02/AR-CC-3	Toilet and Kitchen Details of Community Centre.

**NOTE : The Electrical works Drawings may be seen in the office of EE(Elect.-5)/DWK.**





# FOUNDTEK CONSULTANTS

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161

PROJECT : REPORT ON SOIL INVESTIGATION WORK FOR PROPOSED  
CONSTRUCTION OF LIG HOUSES AT SECTOR 14 ,  
DWARKA PHASE II , NEW DELHI.

CLIENT : THE EXECUTIVE ENGINEER ,  
SOUTH WESTERN DIVISION NO. 9  
D.D.A. ,  
DELHI.

ARCHITECT : DEPARTMENTAL

REPORT NO. : 1089

DATE :



# FOUNDTEK CONSULTANTS

SOIL INVESTIGATION REPORT

JOB NO.

PAGE

1089

## REPORT ON SOIL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF LIG HOUSES AT SECTOR 14 DWARKA PHASE II, NEW DELHI.

### C O N T E N T S

	PAGE NO.
1. INTRODUCTION	1
1.1 PROJECT	1
1.2 AIM OF SOIL INVESTIGATION	1
1.3 AUTHORISATION	2
1.4 SCOPE OF WORK	2
2. INVESTIGATIONS CONDUCTED	3
2.1 INSITU TESTS	3
2.1.1 BOREHOLES	3
2.1.2 DYNAMIC CONE PENETRATION TESTS	4
2.2 LABORATORY TESTS AND RESULTS	4
3. OBSERVATIONS	5
4. DISCUSSIONS AND ANALYSIS	5-9
5. RECOMMENDATIONS	10
SOIL PROFILE TABLES	11-25
FIGURES	

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# FOUNDTEK CONSULTANTS

SOIL INVESTIGATION REPORT

JOB NO.

PAGE

1089

1

## REPORT ON SOIL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF LIG HOUSES AT SECTOR 14 , DWARKA PHASE II , NEW DELHI .

### 1. INTRODUCTION

#### 1.1 PROJECT

This soil investigation work , whose results are being presented herewith, has been conducted for the five - storeyed LIG houses being proposed to be constructed by the Office of The Executive Engineer, South Western Division no. 9 , D.D.A., New Delhi. This investigation work is of preliminary nature .

The site is situated at Sector 14 , Dwarka Phase -II , New Delhi.

A lay out plan of the site is being enclosed.

#### 1.2 AIM OF SOIL INVESTIGATION

Soil investigation has been conducted at the site in order to evaluate the parameters required for design of foundations. These parameters are :

- (a) Type of foundation on which the proposed super structure will be supported.
- (b) Depth of foundation , and



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## SOIL INVESTIGATION REPORT

JOB NO.

PAGE

1089

2

- (c) Allowable bearing pressure at the founding level.

To evaluate these parameters, following engineering properties of the sub-soil have been studied:

- (a) Sub - soil. penetration resistance characteristics which have been determined insitu.
- (b) Properties like particle size distribution, atterberg limits, bulk density, moisture content, dry density and shear strength parameters; which have been determined in the laboratory by conducting testing of both disturbed as well as undisturbed samples.

### 1.3 AUTHORISATION

Authority to carry out this investigation work has been provided by The Executive Engineer, South Western Division no. 9, D.D.A., New Delhi.

### 1.4 SCOPE OF WORK

The stipulated scope of work comprised of following:

1. Mobilisation of equipment and personnel to the site and back.
2. Sinking boreholes ( 5 nos.) in the subsoil down to 12 m depths or refusal whichever is encountered earlier, observing ground water table levels if encountered down to the termination depth, conducting



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## SOIL INVESTIGATION REPORT

JOB NO.

PAGE

1089

3

required field and laboratory tests and their analysis.

3. Conducting dynamic cone penetration tests down to 12 m depth or refusal whichever is encountered earlier below the existing ground level at 5 locations.
4. Preparation and submission of technical report in triplicate.

### 2. INVESTIGATIONS CONDUCTED

#### 2.1 INSITU TESTS

Exact locations of field testing points have been marked at the site as per directions of project engineers. These locations have been designated as BH 1 to BH 5 and DC 1 to DC 5 in this report.

##### 2.1.1 BOREHOLES

Following operations have been carried out during the progress of boreholes :

- (a) Augering with the help of shell and auger technique down to termination depth.
- (b) Standard penetration tests at regular intervals.
- (c) Collection of disturbed and undisturbed soil samples from various levels of the sub-soil strata.

The five boreholes have been terminated at 12 m depth below existing ground level.

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## SOIL INVESTIGATION REPORT

JOB NO.

PAGE

1089

4

Field observations during the progress of boreholes i.e. water table depths, filled up depths and standard penetration tests' results are being presented in form of compiled soil profile tables.

### 2.1.2 DYNAMIC CONE PENETRATION TESTS

In this test, a metal cone of apex angle 60 degrees was continuously driven into the sub-soil strata with the help of a falling hammer. Number of blows required for every 30cms penetration were noted down. Thus a continuous record of penetration resistance of the sub-soil strata was maintained.

The 5 no. tests have been terminated at 12 m depth below existing ground level.

Results of the tests have been plotted in the form of no. of blows/depth in m. curves.

### 2.2 LABORATORY TESTS AND RESULTS

Following tests have been conducted on various soil samples in the laboratory :

- (a) Particle size Distribution.
- (b) Liquid and plastic limits.
- (c) Natural Moisture Content.
- (d) Bulk and Dry Density.
- (e) Triaxial Shear Tests.
- (f) Specific Gravity.

Results are being presented in form of compiled soil profile tables.



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## SOIL INVESTIGATION REPORT

JOB NO.

PAGE

1089

5

### OBSERVATIONS

Following points are observed from results obtained so far :

- (a) Grain size distribution curves plotted from sieve and hydrometer analysis indicate that the sub-soil strata in this site can be broadly classified into following layers:

DEPTH RANGE (M) BELOW G.L.	TYPE OF SUB SOIL
0.0 - 2.0	Sandy silt
2.0 - 7.0	Sandy silt with gravels
7.0 - 10.0	Silty sand

- (b) Bulk density values vary from 1.71 to 1.84 gms./cc. whereas dry density values vary from 1.63 to 1.68 gms./cc. in the five boreholes.

- (c) Standard penetration test results and dynamic cone penetration tests operations are in agreement with each other and indicate medium nature of the sub-soil strata.

### 4. DISCUSSIONS AND ANALYSIS

For designing the foundation system, the following parameters are required :

- (a) Suitable type of foundation on which the proposed super-structure can be supported.
- (b) Depth of these foundations, and



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## SOIL INVESTIGATION REPORT

JOB NO.

PAGE

1089

6

- (c) Allowable bearing pressure at the founding level corresponding to various footing sizes.

### 4.1 TYPE OF FOUNDATION

Type of foundation to be adopted for a particular structure depends upon the loading intensity at the foundation level and the configuration of loading points.

Considering the anticipated loads, proposed project buildings can be supported over spread foundations.

### 4.2 DEPTH OF FOUNDATION

Foundations for proposed five storeyed LIG structures will be placed at a depth of 120 cms. below existing ground level.

Above recommended depth is safe against shear failure.

### 4.3 ALLOWABLE BEARING PRESSURE

Following criteria have been adopted for evaluation of allowable bearing pressure values :

1. Settlement criterion based upon standard penetration test results
2. Shear strength criterion

Intermediate shear failure condition as per I.S. 6403 has been considered for deducing shear strength value.

Allowable settlement value of 50 mm has been considered for allowable bearing pressure computation.





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## SOIL INVESTIGATION REPORT

JOB NO.

PAGE

1089

7

Bearing capacity values have been deduced considering worst conditions of water table i.e. a correction factor of 0.5 has been adopted.

Detailed calculations are being furnished as follows :

### 4.1.1 SETTLEMENT CRITERION

Standard penetration tests' results as observed in the field have been corrected for overburden and dilatancy as per I.S.-2131.

Corrected 'N' values in the 5 boreholes upto the zone of influence below recommended founding level are being presented in the tabular form as follows:

#### OBSERVED AND CORRECTED 'N' VALUES

DEPTH(m)	BH 1	BH 2	BH 3	BH 4	BH 5
1.2	15/22.5	13/19.5	13/19.5	12/18.0	11/16.5
2.7	12/14.8	14/17.3	13/16.1	14/17.3	12/14.8
4.2	11/11.8	10/10.8	12/12.9	12/12.9	12/12.9
5.7	8/ 8.0	10/10.0	8/ 8.0	9/ 9.0	8/ 8.0

Based upon the above corrected 'N' values, weighted average 'N' values have been calculated boreholewise, corresponding to different widths of foundations at 1.2 m depth :



# FOUNDTEK CONSULTANTS

## SOIL INVESTIGATION REPORT

JOB NO.

PAGE

1089

8

### WEIGHTED AVERAGE 'N' VALUES

BOREHOLE NO.	WIDTH OF FOUNDATION ( cms. )		
	100	150	225
1	19.9	18.1	16.6
2	18.7	17.3	16.1
3	18.3	16.1	16.0
4	17.7	17.3	15.8
5	15.9	15.3	14.4

Minimum average 'N' values have been considered.

FOUNDATION WIDTH ( CMS.)	WEIGHTED AVERAGE "N" VALUE ( MINIMUM)	NET S.B.C. ( KG./SQ.CM.)
100	15.9	1.73
150	15.3	1.42
225	14.4	1.25

#### 4.1.2 SHEAR FAILURE CRITERION

Cohesion,  $c = 0.040 \text{ Kg / sq.cm.}$   
Angle of shearing resistance,  $\phi = 26 \text{ degree}$   
Overburden density,  $\gamma = 1.70 \text{ gms./cc.}$   
Overburden Pressure,  $q = 0.204 \text{ kg/sq.cm.}$   
Average void ratio  $e = 0.60,$



# FOUNDTEK CONSULTANTS

## SOIL INVESTIGATION REPORT

JOB NO.

PAGE

1089

9

Interpolated bearing capacity factors :

$$N_c = 20.29, \quad N_q = 10.23, \quad N_r = 10.96$$

Shear strength ( Q ) is calculated from ,

$$Q = 0.4 \left( \frac{2}{3} c N_c + q ( N_q - 1 ) + 0.25 r B N_r \right)$$

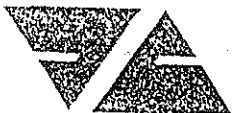
Width, B ( cms. )	Q ( kg./sq.cm. )
100	1.15
150	1.25
240	1.41

### 4.1.3 RESULTS

Based upon above analysis , following results are obtained :

FOUNDATION WIDTH (cms.)	ALLOWABLE NET BEARING PRESSURE ( Kg. / Sq. cm. )		
	Settlement Criterion	Shear Failure Criterion	Recommended Bearing Capacity
100	1.73	1.15	1.15
150	1.42	1.25	1.25
225	1.25	1.41	1.25

Based upon the above , the recommendations are being provided as follows :



# FOUNDTEK CONSULTANTS

## SOIL INVESTIGATION REPORT

JOB NO.

PAGE

1089

10

### 5. RECOMMENDATIONS

- I. Type of foundation : Spread
- II. Depth of foundation : 120 cms. below the existing G.L.
- III. Allowable Bearing Pressure

Following net allowable bearing pressure values can be adopted corresponding to various foundation widths at above recommended depths:

Width of foundation (cms.) 100 150 & above

Allowable Bearing Pressure  
( kg./ sq. cm.) 1.15 1.25

#### NOTE :

In case of filling operations above existing G.L., effective net bearing capacity will be deduced by subtracting from the net bearing capacity the weight of earthfill which has been calculated considering unit soil weight of 1.80 tonnes / cub.m..

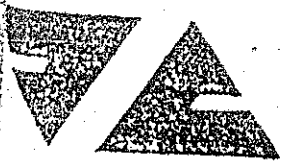
for FOUNDTEK CONSULTANTS

*(Signature)*  
(RAJESH GUPTA)  
CONSULTING ENGINEER

173

GEOTECHNICAL  
INVESTIGATION  
REPORT

COMPILED SOIL PROFILE TABLES



FOUNDTEK CONSULTANTS



# FOUNDTEK CONSULTANTS

## SOIL INVESTIGATION REPORT

JOB NO.

1089

PAGE

11

### SOIL PROFILE TABLE

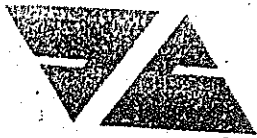
BOREHOLE NO.: 1

TERMINATION DEPTH : 12.0 M WATER TABLE DEPTH : 7.0 M

N	DEPTH (M)	I.S. CLASS	GRAIN SIZE Gr	Gr	Si	Cl	LL (%)	PL (%)	Rt	w	Rd	c	O	G	e
15	1.2	SM-ML	0	28	72	0	26	13	1.74	5.4	1.65	0.05	25	2.63	.59
12	2.0	SM-ML	4	36	60	0			1.75	5.8	1.65	0.04	26	2.64	.61
11	3.5	SM-ML	7	32	61	0			1.77	6.6	1.66				
8	4.2	SM-ML	8	38	54	0			1.84	9.8	1.67				
15	5.0	SM	0	75	25	0									
16	5.7	SM	0	84	16	0									
24	6.5	SW	0	87	13	0									
28	7.2	SW	0	90	10	0									
	8.7														
	10.2														
	11.7														

### Symbols :

N : SPT value, LL : Liquid limit, PL : Plastic limit, Rt = Bulk density  
( gms./cc. ) , Rd : Dry density ( gms./cc. ) , w : Moisture content (%)  
c = Cohesion ( kg. / sq.cm. ) , O = Angle of shearing resistance  
G = Specific Gravity, Gr / Sa / Si / Cl : Gravel / Sand / Silt / Clay  
N.P. = Nonplastic , e = Void Ratio



# FOUNDTEK CONSULTANTS

## SOIL INVESTIGATION REPORT

JOB NO.

PAGE

1089

12

### SOIL PROFILE TABLE

TERMINATION DEPTH : 12.0 M

BOREHOLE NO.: 2

WATER TABLE DEPTH : 7.0 M

N	DEPTH (M)	I.S. CLASS	GRAIN SIZE %AGE			LL (%)	PL (%)	Rt	w	Rd	c	O	G	e
			Gr	Sa	Si / Cl									
13	1.2	SM-ML 0	33	67	0	24	12							
14	2.0	SM-ML 3	39	58	0			1.73	6.0	1.63	0.04	26	2.62	.60
10	3.5	SM-ML 5	35	60	0			1.73	6.1	1.63	0.04	27	2.63	.61
10	5.0	SM-ML 5	41	54	0			1.75	6.4	1.64				
14	5.5	SM	0	81	19	0	N.P.							
16	7.2	SM	0	80	20	0		1.79	8.1	1.65				
21	8.7	SM	0	85	15	0								
25	11.7	SW	0	99	11	0								

#### Symbols :

N : SPT value, LL : Liquid limit, PL : Plastic limit, Rt = Bulk density  
(gms./cc.), Rd : Dry density (gms./cc.), w : Moisture content(%)  
C = Cohesion (kg. / sq.cm.), O = Angle of shearing resistance  
G = Specific Gravity, Gr / Sa / Si / Cl : Gravel / Sand / Silt / Clay  
N.P. = Nonplastic, e = Void Ratio



# FOUNDTEK CONSULTANTS

JOB NO.

PAGE

1089

13

## SOIL INVESTIGATION REPORT

### SOIL PROFILE TABLE

TERMINATION DEPTH : 12.0 M BOREHOLE NO. : 3  
WATER TABLE DEPTH : 7.0 M

N	DEPTH (M)	I.S. CLASS	GRAIN SIZE %AGE			LL (%)	PL (%)	W	Rd	C	O	G	e
			Gr	Sa	Si	Cl							
13	1.2	SM-ML	0	36	64	0	24	12					
13	2.0								1.71	4.6	1.63	0.04	26
13	2.7	SM-ML	7	30	63	0						2.62	.60
12	3.5								1.74	5.6	1.64		2.63
12	4.2	SM-ML	5	35	60	0							.60
8	5.0								1.77	5.9	1.67	0.04	27
	5.7	SM-ML	4	41	55	0							
	6.5								1.82	8.3	1.68		
13	7.2	SM	0	56	44	0	N.P.						
20	8.7	SM	0	85	15	0							
20	10.2	SW	0	90	10	0							
27	11.7	SW	0	88	12	0							

#### Symbols :

N : SPT value, LL : Liquid limit, PL : Plastic limit, Rt = Bulk density  
( gms./cc. ), Rd : Dry-density ( gms./cc. ), w : Moisture content (%)  
c = Cohesion ( kg. / sq.cm. ), O = Angle of shearing resistance  
G = Specific Gravity, Gr / Sa / Si / Cl : Gravel / Sand / Silt / Clay  
N.P. = Nonplastic, e = Void Ratio





# FOUNDTEK CONSULTANTS

## SOIL INVESTIGATION REPORT

JOB NO.

1089

PAGE

14

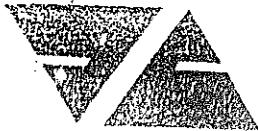
### SOIL PROFILE TABLE

TERMINATION DEPTH : 12.0 M  
BOREHOLE NO. : 4  
WATER TABLE DEPTH : 7.5 M

N	DEPTH (M)	I.S. CLASS	GRAIN SIZE %AGE				LL (%)	PL (%)	Rc	w	Rd	c	O	G	e
			Gr	Sa	Si	Cl									
12	1.2	SM-ML	0	39	61	0	23	12	1.71	4.3	1.63	0.05	25	2.63	.61
14	2.7	SM-ML	6	42	52	0			1.75	5.9	1.65	0.03	26	2.64	.60
12	4.2	SM-ML	9	32	59	0			1.76	6.0	1.66				
9	5.7	SM-ML	6	44	50	0			1.78	7.9	1.65				
11	7.2	SM	0	73	27	0	N.P.								
14	8.7	SM	0	83	17	0									
17	10.2	SM	0	83	17	0									
20	11.7	SW	0	91	9	0									

#### Symbols :

N : SPT value, LL : Liquid limit, PL : Plastic limit, Rt = Bulk density ( gms./cc. ) , Rd : Dry density ( gms./cc. ) , w : Moisture content (%)  
c = Cohesion ( kg. / sq.cm. ) , O = Angle of shearing resistance  
G = Specific Gravity, Gr / Sa / Si / Cl : Gravel / Sand / Silt / Clay  
N.P. = Nonplastic , e = Void Ratio



# FOUNDTEK CONSULTANTS

## SOIL INVESTIGATION REPORT

JOB NO.

PAGE

1089

15

### SOIL PROFILE TABLE

BOREHOLE NO.: 5

TERMINATION DEPTH : 12.0 M

WATER TABLE DEPTH : 7.2 M

N	DEPTH (M)	I.S. CLASS	GRAIN SIZE %AGE				LL (%)	PL (%)	Rt	w	Rd	c	O	G	e
			Gr	Sa	Si	Cl									
11	1.2	SM-ML	0	34	66	0	24	12							
	2.0								1.73	5.1	1.64	0.04	25	2.62	.59
12	2.7	SM-ML	3	39	58	0									
	3.5								1.75	6.3	1.64	0.03	27	2.63	.60
12	4.2	SM-ML	7	35	58	0									
	5.0								1.77	5.9	1.67				
8	5.7	SM-ML	5	41	54	0									
	6.5								1.81	8.2	1.67				
10	7.2	SM	0	75	25	0	N.P.								
16	8.7	SM	0	85	15	0									
21	10.2	SW	0	87	13	0									
23	11.7	SW	0	88	12	0									

#### Symbols :

N : SPT value, LL : Liquid limit, PL : Plastic limit, Rt = Bulk density (gms./cc.), Rd : Dry density (gms./cc.), w : Moisture content(%)  
c = Cohesion (kg. / sq.cm.), O = Angle of shearing resistance,  
G = Specific Gravity, Gr / Sa / Si / Cl : Gravel / Sand / Silt / Clay  
N.P. = Nonplastic, e = Void ratio

# FIGURES



FOUNDTEK REPORT





# FOUNDTEK CONSULTANTS

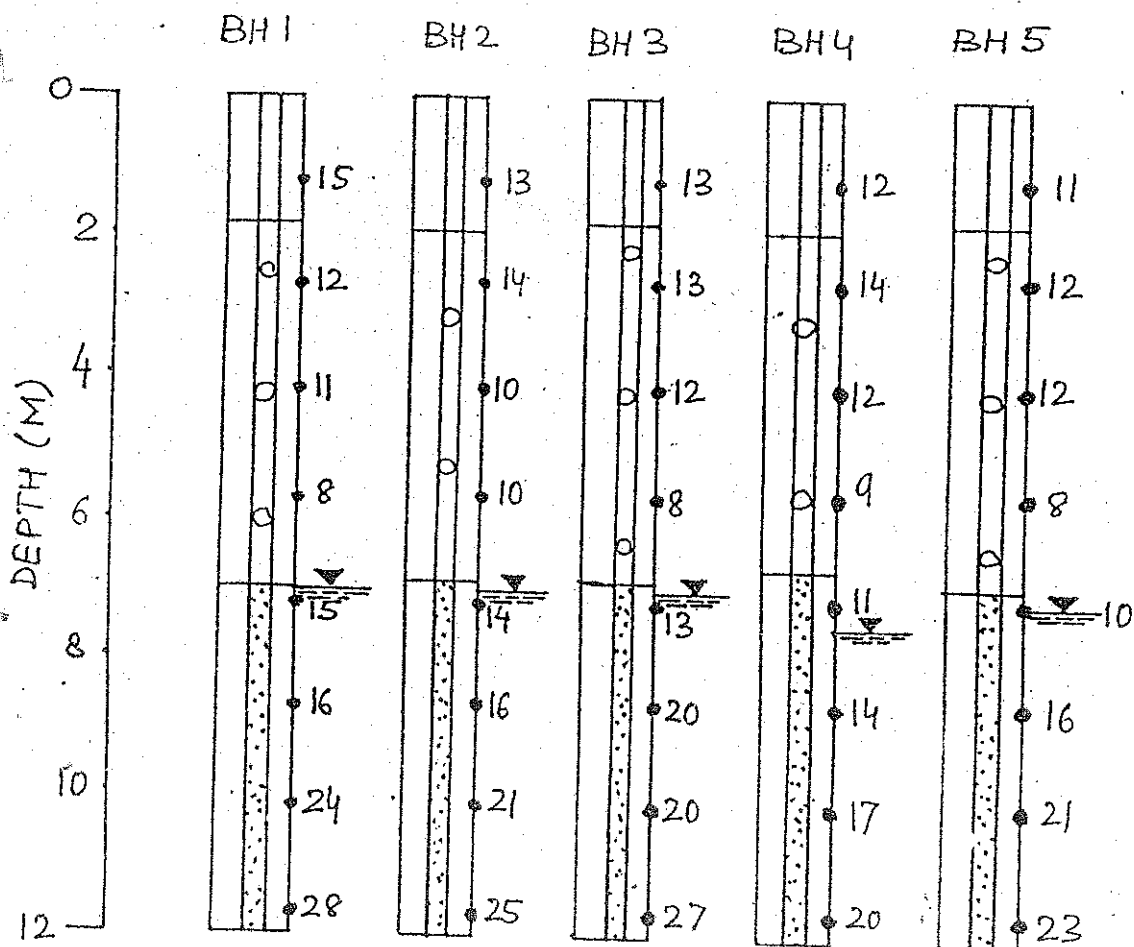
SOIL INVESTIGATION REPORT

JOB NO.

1089

PAGE

17



## LEGEND



SANDY SILT



SANDY SILT WITH GRAVELS



SILTY SAND



WATER TABLE



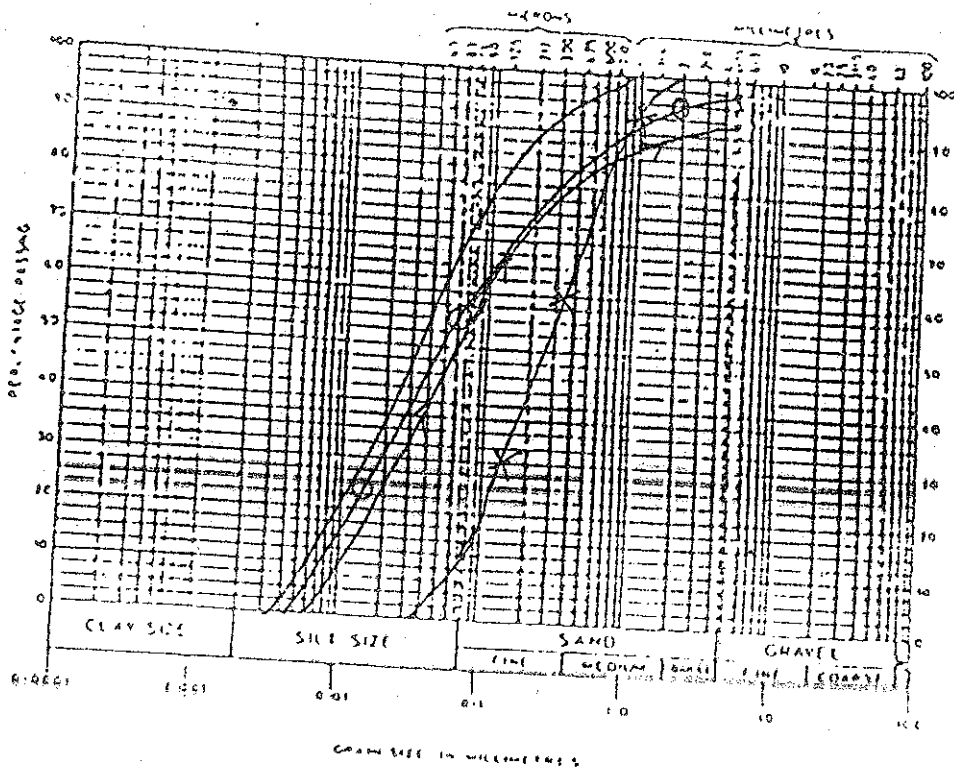
S.P.T. RESULTS

## COMPILED BOREHOLES' PROFILE



# FOUNDTEK CONSULTANTS FOUNDATION TECHNICAL CONSULTANTS

JOB NO. 1089  
PAGE 18



		GRAIN SIZE DISTRIBUTION (%)			
BH NO./DEPTH	CODE	GRAVEL	SAND	SILT	CLAY
1/1.2	—	0	28	72	0
1/5.7	→→	8	38	54	0
1/10.2	→→→	0	87	13	0
2/2.7	○-○	3	39	58	0

GRAIN SIZE ANALYSIS



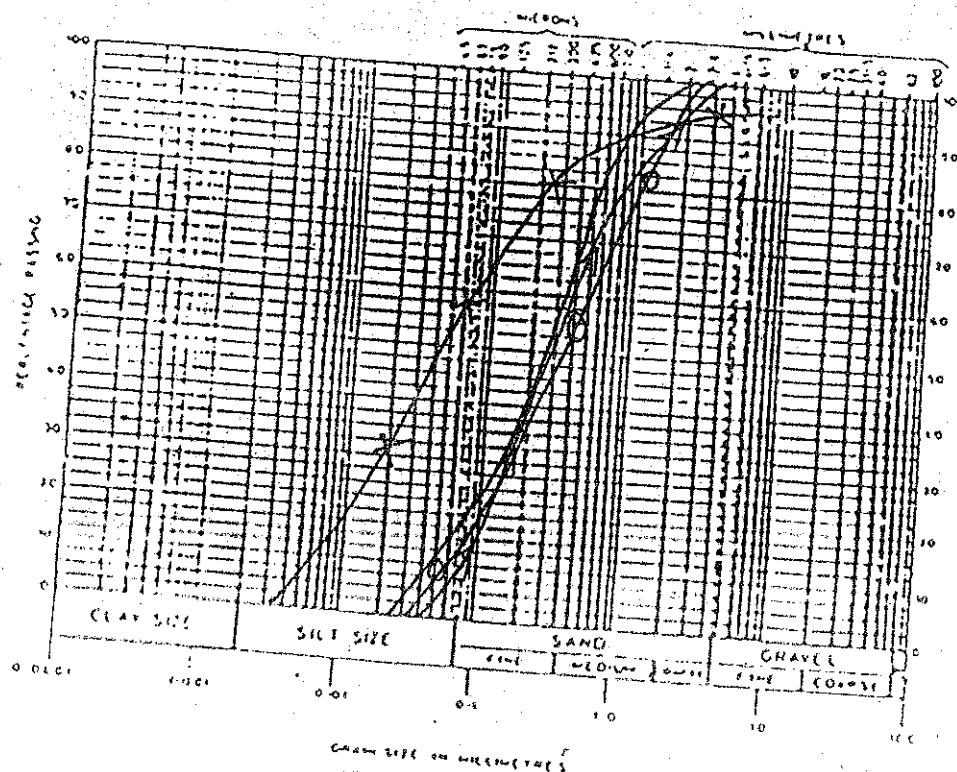
# FOUNDTEK CONSULTANTS FOUNDATION TECHNICAL CONSULTANTS

JOB NO.

PAGE

1089

19



BH NO/DEPTH	CODE	GRAIN SIZE DISTRIBUTION (%)			
		GRAVEL	SAND	SILT	CLAY
2/7.2	—	0	81	19	0
2/11.7	→→	0	89	11	0
3/4.2	←←	5	35	60	0
3/8.7	○○	0	85	15	0

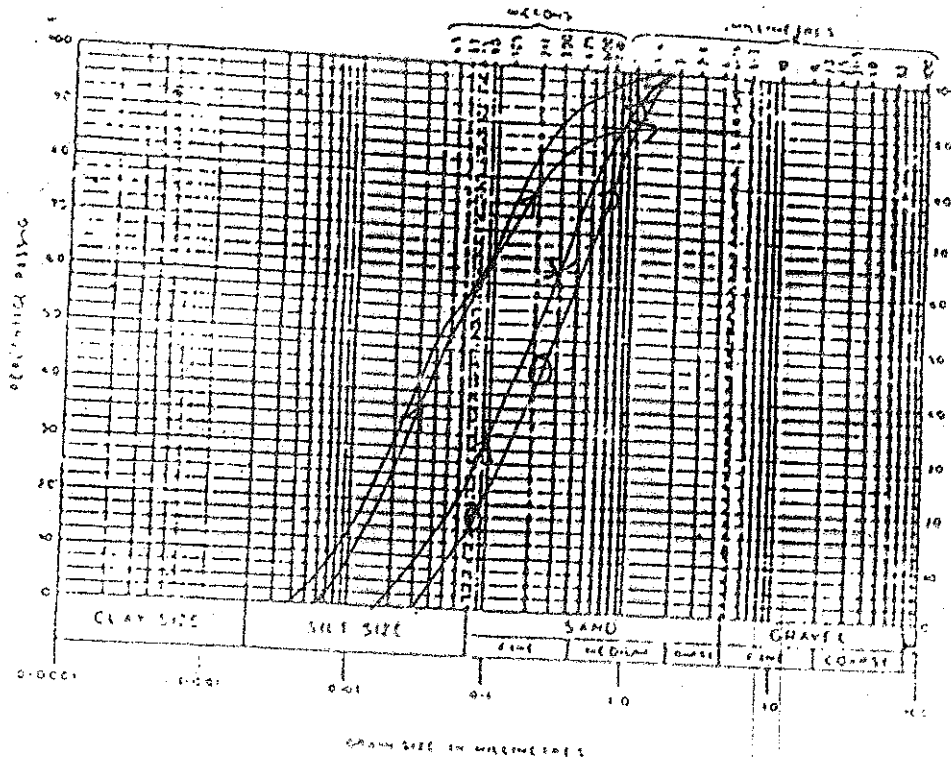
GRAIN SIZE ANALYSIS



# FOUNDTEK CONSULTANTS

FOUNDATION TECHNICAL CONSULTANTS

JOB No. 1089 PAGE 20



GRAIN SIZE DISTRIBUTION (%)					
BH NO/DEPTH	CODE	GRAVEL	SAND	SILT	CLAY
4/1.2	—	0	39	61	0
4/4.2	→→	9	32	59	0
4/7.2	→→	0	73	27	0
4/10.2	→→	0	83	17	0

GRAIN SIZE ANALYSIS

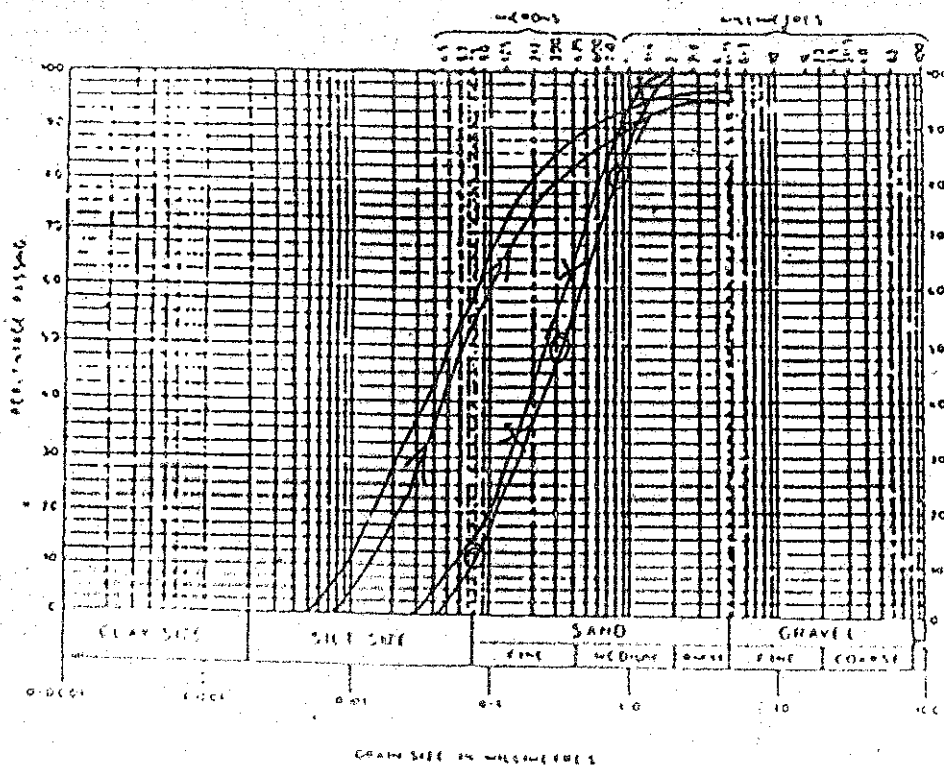




# FOUNDTEK CONSULTANTS

## FOUNDATION TECHNICAL CONSULTANTS

JOB No. 1089  
PAGE 21



GRAIN SIZE DISTRIBUTION (%)					
BH No./DEPTH	CODE	GRAVEL	SAND	SILT	CLAY
5/2.7	—	3	39	58	0
5/5.7	→→	5	41	54	0
5/8.7	→→→	0	85	15	0
5/11.7	→→→→	0	88	12	0

GRAIN SIZE ANALYSIS



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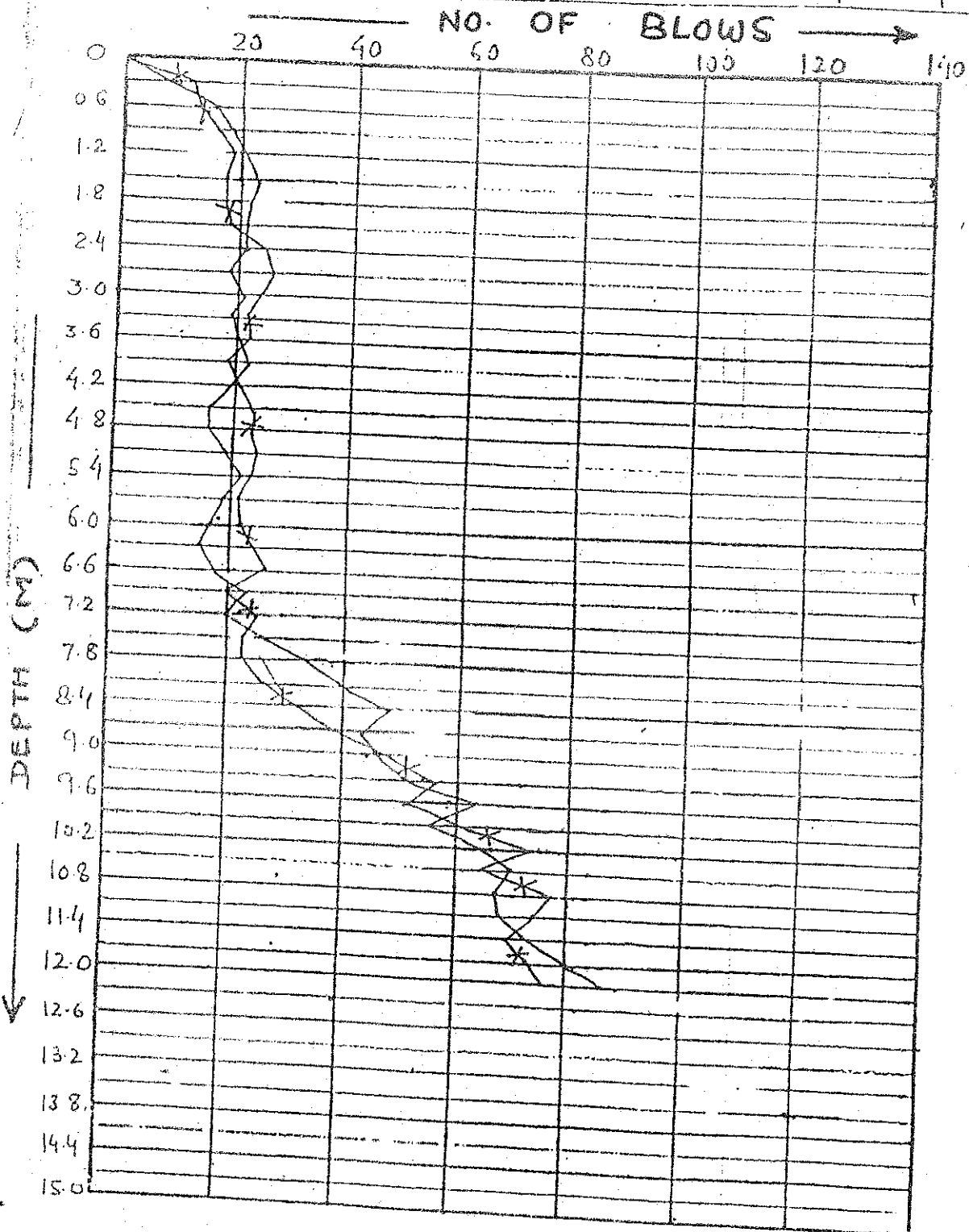
SOIL INVESTIGATION REPORT

JOB NO.

PAGE

1089


22

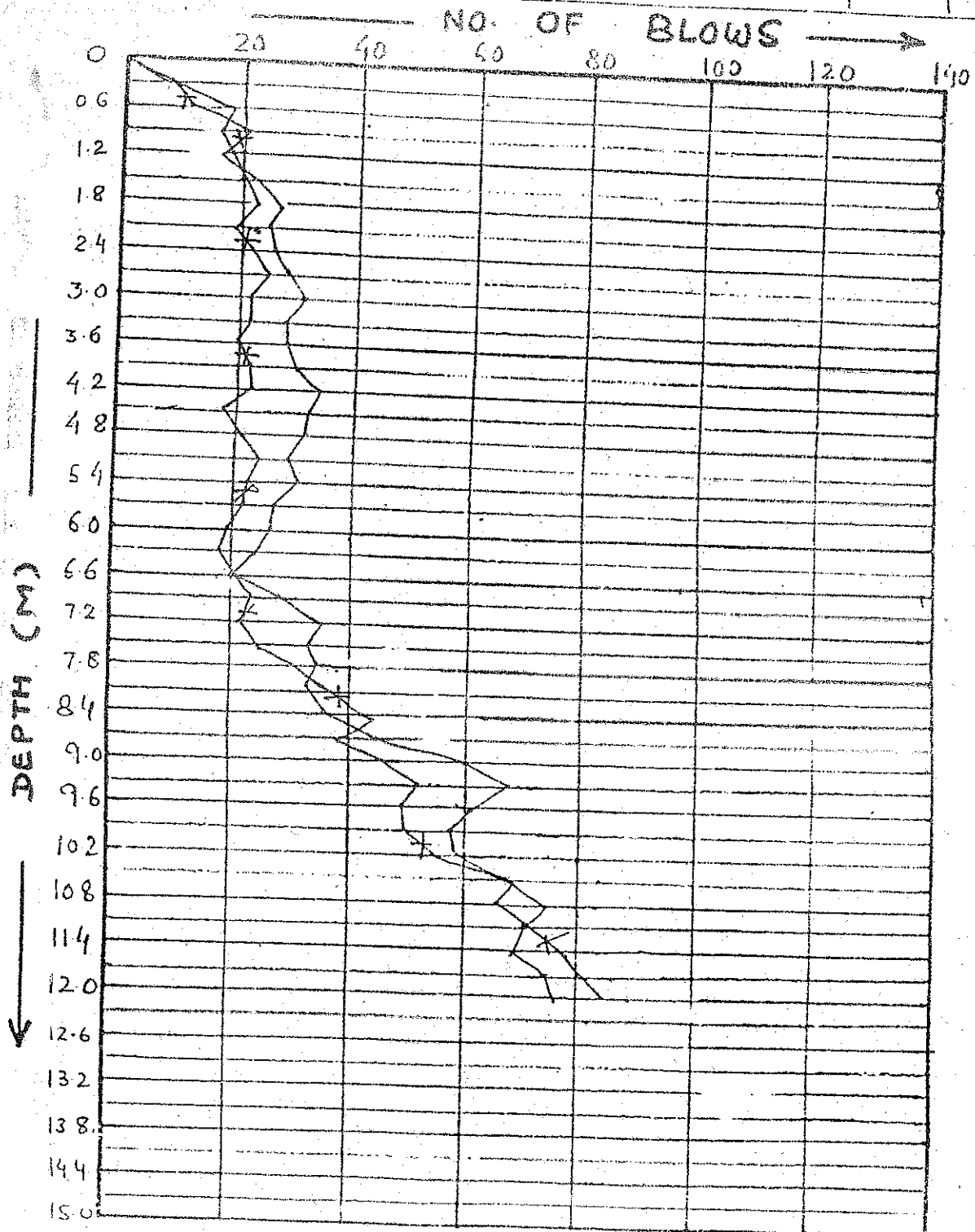


— DC 1  
— x — DC 2

DYNAMIC CONE PENETRATION TEST CURVES

187

	<b>FOUNDTEK CONSULTANTS</b>	JOB NO.	PAGE
	SOIL INVESTIGATION REPORT	1089	23



— DC 3  
—x—x— DC 4

DYNAMIC CONE PENETRATION TEST CURVES

188



FOUNDTEK CONSULTANTS

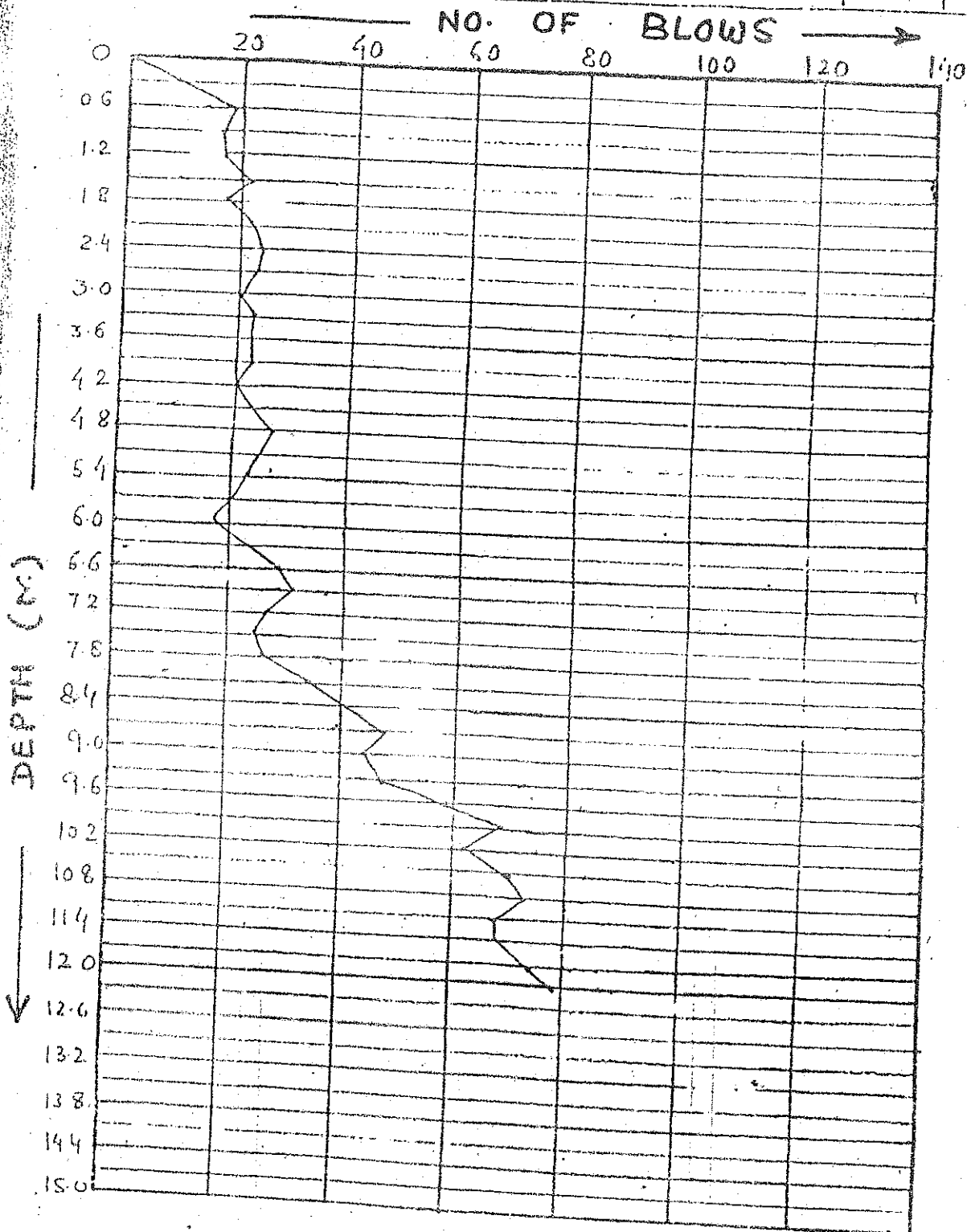
SOIL INVESTIGATION REPORT

JOB NO.

PAGE

1089

24



DC 5

DYNAMIC CONE PENETRATION TEST CURVES

13334

# PLAN LAYOUT

1234

123456789

**CLARIFICATION/CORRECTION/ADDITIONAL INFORMATION IN R/O  
VARIOUS CLAUSES/CONDITIONS OF THE NIT FOR BALANCE WORK**

**1. In NIT at page 39 regarding conditions in PWD-6:**

The Sl. No. of condition No. 18 may be read as 19.  
The Sl. No. of condition No. 19 may be read as 20.  
The Sl. No. of condition No. 20 may be read as 21.  
The Sl. No. of condition No. 21 may be read as 22.

**2. In NIT Page 7 for Sl.No.4.5:-**

The plinth area may be read as 42.09 Sqm. for each flat instead of 42 Sqm. In case the number of units/plinth area decreases due to unavoidable reasons, the cost shall be proportionately reduced from the awarded rates.

**3. In NIT Clause 39 at Page 71(Para i)**

The reimbursement of increase in cost of material, labour etc. will be applicable from the date of submission of financial bid instead of the date of award and the base date for working out such escalation will be the date of submission of tender.

**4. In NIT page 2 & 39:-**

The validity period may be read as 120 days instead of 90 days as mentioned at Page No.2 of NIT and the period of validity starts from the date of opening of financial bid which is called as the date of opening of the tender, as mentioned in the Clause No.20 at page 39.

**5. In NIT page 94:-**

The CPM /PERT CHART will be submitted 28 days after the date of award and not to be submitted alongwith the tender as mentioned at Sl.No.1 of page 94.

**6. Additional condition to be added in the N.I.T.**

**Re-imbursement of statutory variation of taxes or imposition of any New Taxes:-**

Tendered rates are inclusive of all taxes and levies payable under the respective statutes. However, pursuant to the constitution act. 1982, of any further tax or levy is imposed by statue after date of receipt of tenders and the contractors there upon necessarily and properly pays such taxes/levies the contractor shall be reimbursed the amount so paid, provided such payment, if any, is not, in the opinion of Superintending Engineer(whose decision shall be final and binding) attributable to delay in execution of work within the control of the contractor.

ii) The contractor shall keep necessary books of account and other documents for the purpose of this condition as may be necessary and shall allow inspections of the same by a duly authorised representative of Govt. and further shall furnish such other information/documents as the Engineer-in-Charge may require.

iii) The contractor shall, within a period of 30 days of imposition of any further tax or levy, the pursuant to the constitution Act. 1982 give a written notice thereof to the Engineer-in-charge that the same is given pursuant to this condition together with all necessary information relating thereto.

7. In N.I.T. page 12 Sl.No.01:-

The specification mentioned in the tender form is for RCC framed structures & necessary provisions required with respect of IS-Codes for making it earthquake resistant have to be followed.

8. In N.I.T. At page 9 Sl.No.18:-

The estimate based on the approved drawings shall be submitted (4 sets) within four months from the date of start instead of six months as mentioned in the NIT.

9. In N.I.T. page 9 Sl.No.17:-

In continuation to this para the total area of the office for DDA staff will be around 160 Sqm. Besides conference hall, Laboratory and contractor's office. This will be provided with normal furniture, almirha alongwith provision of drinking water, electricity including electrical fittings like lights, fans etc. etc.

10. Additional condition to be added in the N.I.T.

For materials of approved Makes:- :-

ISI marked materials subject to testing will be used. In case where articles of different makes & design bearing ISI mark are available in the market, the decision of the Engineer-in-Charge about a particular make & design to be used in the work shall be final & binding.

11. In N.I.T. page 9 for Sl.No.14 – Setting up lab.

Setting up of a testing laboratory at site equipped with the apparatus needed for spot testing during construction & "After wards" here means, till the houses are completed in all respect and are ready for handing over. The laboratory shall be removed only after the written permission of Engineer-in-Charge.

12. Additional condition to be added in the N.I.T.

For Electrical Works:-

D) The electrical fixtures like fans, tube lights, exhaust fans etc. inside the dwelling units are not to be included in the scope of work. However, provision



for bulk head fitting and batten holders (without lamps) inside the Dwelling Unit shall be provided. The electrical fitting like the fluorescent tube fittings and H.P.S.V. lamp fittings on the street lighting poles is included in the scope of work.

II). The power point of geyser in the bath room shall be provided under the scope of work.

III). The D.V.B. norms for finalizing the number of sub-stations shall be obtained from them. However, the main features are given below for information.

- a) The demand factor is 40% of the connected load.
- b) The connected load is 12 KW per 100 Sq. Mtr. which includes common services like staircase lighting, pumping load etc.
- c) The loading factor for the transformer is 60%.
- d) The maximum sub-station capacity is 2 x 630 KVA transformer.

IV) The back up of D.G. Supply is only required for water supply. The rating of the D.G. set shall be of the capacity of the water supply booster pumping sets as per D.J.B. norms.

V) The conduit of individual dwelling units for the telephone / T.V. shall be terminated in the telephone box/ splitter box in the staircase. From here the underground pipe shall be laid in the staircase leading upto the kuccha portion for taking the telephone / T.V. cable. However telephone / T.V. cable outside the dwelling units is not included in the scope of work.

VI) The work of providing conduit and wiring for the telephone/ T.V. outlet inside the dwelling unit is included in the scope of work. The tag block for the telephone and splitter box for the T.V. is also included in the work.

13. **Testing of Material :-**  
read as under:-

The para at Sl.No.9 of page 98 of N.I.T. may be

When required by the Engineer-in-Charge the contractor shall supply for the purpose of testing, samples of all materials proposed to be used in the works. Samples submitted either to govern bulk supplies or required for testing before use shall be in suitable packages to contain them shall be provided free of charge by the contractor. Testing charges, if any shall be borne by the contractor from approved laboratories outside the DDA jurisdiction. All expenditure required to be incurred for taking the samples, conveyance, packing, testing etc. shall be borne by contractor himself. All mandatory test as per specification shall be carried out at Laboratory as directed by Engineer-in-charge.

14. In N.I.T. Page 10 Sl.No.6(Parking

The full form of ECS is "Equivalent Car Space" and the norms to be adopted as 1.80 ECS per 100 Sqm. instead of 1.33 ECS per 100 Sqm.

15. Additional condition to be added in the N.I.T.

Mobilisation Advance

Mobilization advance for a maximum amount of Rs.1.00 crore (One crore) can be given at a simple interest of 18% Per Annum from the date of release of 1st installment. This advance shall be given in two installments of Rs.50 lakh (Rs. Fifty lakh) maximum each. 2<sup>nd</sup> installment would be given only after the contractor provide the utility certificate/document to the satisfaction of Engineer-in-charge. The advance shall only be given after the contractor provide irrevokable bank guarantee from a scheduled bank for an amount of Rs.1.18 crore (one crore eighteen lakh). The Mobilisation advance alongwith its interest shall be recovered in eight monthly installments starting from 2<sup>nd</sup> R/A bill and the full amount shall be recovered before 50% of the work is completed or the 75% period of the stipulated time of the contract, which ever is earlier.

16. Additional condition to be added in the N.I.T.

Secured Advance:-

The contractor on signing an indenture in the form to be specified by the Engineer-in-charge shall be entitled to be paid during the progress of the execution of the work upto 75% of estimated value of any materials which are in opinion of the Engineer-in-charge, non perishable and are in accordance with the contract and which have been brought on the site in connection there with and are adequately stored and protected against damage by weather or other causes but which have not at the time of advance been incorporated in the works. When materials on account of which and advance has been under this sub clause are incorporated in the work the amount of such advance shall be deducted from the next payment made under any of the clause or clauses of this contract.

17. In continuation to para at Sl. No. 4 at page 135 of NIT:

Sl. No.4. Toe wall in brick masonry with bricks of class designation 75 in cement mortar 1:4 for pavements/footpaths wherever necessary.

Sl.No.5. RCC NP-2 S&S pipe joints in rubber rings & cement mortar 1:2 (one cement : 2 fine sand for cross drainage with gully chambers of size 500 x 450 mm wherever necessary as per decision of the Engineer-in-charge.

Sl.No.6. Any other details that crop up depending upon site conditions will be decided by the Engineer-in-Charge and will be binding on the contractor.

Sl.No.7. The specification of C.C. pavement/footpath shall be as under:-

a) 100 mm thick C.C. 1:5:10 ( 1 cement : 5 fine sand : 10 graded stone aggregate 20 mm nominal size).

b) 100 mm thick C.C. 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) over an under layer of C.C. 1:5:10 as per para 'a'.

c) Toe walls – brick masonry with bricks of class designation 75 in cement mortar 1:4 (1 cement : 4 coarse sand) to retain the edges of the paving.

Sl.No.8. The work will be done as per CPWD specification 1996 Vol. 1 to VI with upto date correction slips where ever applicable and as per MCD norms.

Any other width of road as per approved development plan shall be as per prevailing MCD norms.

Sl.No.9. The contractor will submit to Engineer-in-Charge 5 sets of completion plans for road paths after its completion showing right of way of each road/path and their respective cross section within 10 days of completion of Roads/path work

**18. At page 136 of the NIT against Sl. No. 1.4(Brick work in foundation & plinth)**

In continuation of above para :

- i) Cement plaster 1:3 with neat coat on bottom and sides with bitumen painting @ 1.70 kg./sq.m.
- ii) Encasing joints of pipes and traps with C.C. 1:2:4 of size 30 x 30 x 30 cm.
- iii) G.I. spout into shaft.
- iv) The filling shall be with C.C. 1:5:10 with stone aggregate.
- v) The pipes shall be embossed ISI mark and to be tested fully.
- vi) Discharge from trap falling into another trap to be avoided.
- vii) Standard drawing for plumbing shall be as per approved drawing (subsequently to be approved by DDA).

**19. At page 138 of NIT against Sl. No. 4.2:**  
Sub sections c & d may be read as a & b.

**20. At page 140 of NIT for SLNo.10.4 of Sink**

The kitchen sink of stainless steel as per IS: 13983 with CI brackets & stainless steel plugs 40mm is to be provided. The size of sink will be 610x510x200mm.

