TELANGANA POWER GENERATION CORPORATION LIMITED

(A Govt. of Telangana Undertaking)

Petition of Additional Capital Cost for Raising of Additional Ash Pond bunds at KTPS- V &VI Stages

Volume-1 of 2

September, 2025

TELANGANA POWER GENERATION CORPORATION LIMITED

(A Govt. of Telangana Undertaking)

Petition of Additional Capital Cost for Raising of Additional Ash Pond bunds at KTPS- V &VI Stages

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(Form I)

BEFORE THE HONOURABLE

TELANGANA ELECTRICITY REGULATORY COMMISSION

Vidyut Niyantran Bhavan, G.T.S. Colony, Kalyan Nagar, Hyderabad 500 045

(Case No 75 of 2025)

IN THE MATTER OF:

Filing of the petition for additional capital cost towards Raising of Additional Ash Pond bunds at KTPS V&VI Stages under section 62/64 and 86 (1)(a) of the Electricity Act, 2003 read with Telangana Electricity Regulatory Commission (Multi Year Tariff) Regulation No. 2 of 2023.

AND IN THE MATTER OF:

Telangana Power Generation Corporation Limited,

Vidyut Soudha, Hyderabad – 500082. ... Applicant/Petitioner

AND

1. **Southern Power Distribution Company of Telangana Ltd. (TGSPDCL),** #6-1-50, Corporate office, Mint Compound, Hyderabad – 500 063.
2. **Northern Power Distribution Company of Telangana Ltd. (TGNPDCL),** H.No.2-5-31/2, Corporate Office, Vidyut Bhavan, Nakkalagutta, Hanmakonda, Warangal – 506001.

..... Respondents

Filing of the petition for additional capital cost towards Raising of Additional Ash Pond bunds at KTPS V&VI Stages under section 62/64 and 86 (1)(a) of the Electricity Act, 2003 read with Telangana Electricity Regulatory Commission (Multi Year Tariff) Regulation No. 2 of 2023.

1. Telangana Power Generation Corporation Limited (hereinafter referred to as "TGGENCO" or as the "Applicant") was established as a company registered under the Companies Act 2013, on 19th May 2014 upon coming into force of the Andhra Pradesh Reorganization Act, 2014 with effect from 2nd June 2014.

2. Hon'ble Commission vide notification dated 30.12.2023 has issued TGERC Regulation No. 2 of 2023 viz., Telangana Electricity Regulatory Commission (Multi Year Tariff) Regulation, 2023 (hereinafter referred to as "TGERC Regulation No. 2 of 2023").
3. It is to submit that, TGGENCO has proposed Raising of Additional Ash Pond bunds at KTPS V&VI Stages in Multiyear Tariff petition filed before Hon'ble TGERC for the 5th Control Period (FY: 2024-25 to FY: 2028-29).
4. The Hon'ble Commission in the Order, Dated.29.12.2023 stated that the proposed work was not supported by documentary evidence and in the light of the limited information available to the Commission, it considered the additional capitalization as approved in the Capital Investment Plan and Business Plan for FY: 2024-25 to FY: 2028-29 of Order, Dt. 29.12.2023 and the Additional Capital cost towards subject work was not approved.
5. Now, the DPR has been prepared by independent agency M/s V.S. Raju Consultants, Hyderabad and the proposal of Raising of Additional Ash Pond bunds at KTPS V&VI Stages along with cost benefit analysis is here with submitted along with supporting documents.

6. Details of Proposal

The brief details of the proposed work are as below.

6.1 Raising of Additional Ash Pond Bunds at KTPS-V&VI Stages

a. In accordance with the Clause No. 22.3 of TGERC Regulation 2 of 2023, the capital expenditure, in respect of existing generating Station incurred or projected to be incurred on the following count beyond the original scope, may be admitted by the Commission, subject to prudence check: "Deferred works relating to ash pond or ash handling system in addition to the original scope of work, on case -to case- basis".

b. Brief Description of work:

Raising of Additional Ash Pond bunds from Ch: 0M to 3200M and Suraram bund from Ch:4400M to Ch:5450M from EL(+) 115.50M to EL(+) 120.50M including raising of Wells and Spillway at Paloncha,

Bhadradri-Kothagudem Dist. The expenditure for the work proposed is of Rs. 50.65 crore.

c. Justification for the work:

I. The KTPS V & VI Stages is having '3' Nos. Ash Ponds [consists of AB Ash Pond-350 Acres, Additional Ash Pond-336 Acres & C Ash Pond-150 Acres] for disposal of ash generated from the Unit Nos.9 &10 (KTPS –V Stage (2x250MW)) and Unit No.11 (KTPS-VI Stage (1x500MW)).

II. Out of '3' Nos. Ash Ponds (AB Ash Pond, Additional Ash Pond, and C Ash Pond), currently, the AB Ash Pond is being used to deposit the ash generated from Unit Nos. 9 & 10 (KTPS-V Stage) and Unit No. 11 (KTPS-VI Stage). The current ash level in AB Ash Pond is at an elevation (EL) of +118.30 meters against the maximum level of EL (+) 120.50M. The other '2' Nos. Ash Ponds (Additional Ash Pond & 'C' Ash Pond) were got filled up with ash up to their maximum level of EL (+) 115.50M & EL (+) 110.00M respectively.

III. The 'C' Ash Pond was abandoned during the year 2010 due to heavy seepages and slips on the bunds. Further, 'Kanuga' plantation has been taken up in above Ash Pond area to prevent fugitive ash pollution during heavy winds/gales.

IV. By considering the current rate of ash disposal, the AB Ash Pond will meet the ash disposal requirement up to March 2026 only. Therefore, it is very much essential to raise the 'Additional Ash Pond' bunds from the existing EL (+) 115.50M to EL (+)120.50M (for a height of 5.0M), to keep it ready for ash disposal from KTPS-V Stage (2x250 MW) and KTPS-VI Stage (1x500MW) by the time the ash deposit level reaches to ultimate level in the AB Pond (EL (+)120.50M).

V. The proposed raising of Additional Ash Pond bund will be with Ash core, Earth cover, Sand filters as per the drawings and report (dt.14.08.2024) submitted by the third party consultant (Prof. V.S. Raju Consultants, Hyderabad) on 'Raising of Additional Ash Pond Bund (Stage-III)'.

VI. The estimate for the proposed work was prepared based on the drawings furnished by the consultant for an amount Rs.50,65,00,000.00 (Rupees Fifty Crore Sixty Five Lakh only) including all provisions. The expected life of 'Additional Ash Pond' with the proposed raise of '5.0M' (EL(+)115.50M to EL(+)120.50M) is about '4' years '6' months. The calculation details of expected life of Additional Ash Pond after proposed bund raising is as follows:

Expected life of Additional Ash pond after bund raising up to EL (+)120.50M	
Existing level	EL(+) 115.50M
Proposed level to be raised	EL(+) 120.50M
Total area of pond	334.00 Acres
Less area of bunds	34.00Acres
Net Area available	300.00 Acres
Height of bund proposed to be raised	5M
Capacity of the pond in Cum (300 Acres x4048x5 M)	60,72,000.00
Qty of Ash deposition from KTPS-V Stage (2x250MW) & KTPS VI Stage (1x500 MW)	3,700 Cum/ Day
Expected life of AB Pond after raising (60,72,000 Cum /3700 Cum)	1641 days (4 Years & 6 Months)

VII. The consultant, Prof. V.S. Raju Consultants, Hyderabad has furnished the Detailed Project Report (DPR) on techno-commercial aspects including cost benefit analysis of proposed work vide document No. VSRC/TGGENCO/KTPS/ AAP/ DPR/01, Dt.04.06.2025). The consultant has recommended to take up the subject work duly stating as follows:

a) The detailed analysis confirms that raising the height of the bund is technically feasible.

b) The total cost for raising the proposed height of bund is estimated at about Rs.55.00 crores, including all provisions.

c) The estimated life of the Ash Pond after raising the bunds is 4 Years 6 Months for storage of ash generated from KTPS –V Stage (2x250MW) KTPS-VI Stage (1x500MW).

d) The 1000 MW power production from KTPS-V & VI Stages is dependent on the operation of this ash pond. In addition to the benefits derived from utilizing this power, there are significant advantages associated with it. Given the rising domestic and industrial power demands, a reduction of 1000 MW in daily power generation would result in a severe power shortage in the state.

e) The stoppage of 1000 MW power production from KTPS V &VI Stages will result in a loss of annual fixed charges amounting to Rs. 4050 Crores over a period of 4 years and 6 months. In addition to the loss of fixed charges, there may also be additional losses incurred due to annual variable charges.

f) Therefore, raising of Additional Ash Pond bund for 5.0M height (Stage-III from El (+) 115.50M to El (+) 120.50M) is highly essential.

VIII. The Detailed Project Report (DPR) furnished by Prof. V.S. Raju Consultants, Hyderabad on the subject proposal is enclosed as Annexure.

IX. .Administrative approval was accorded to take up the above work vide T.G.O.O. No.57/CE/C/Thermal/2025, Dt:10.07.2025.

7. Prayer

For the above reasons and for such other and/or further reasons and grounds as may be urged at the time of hearing, the Applicant prays that the Hon'ble Commission may be pleased to:

a. Accept and take on record the Petition for Raising Additional Ash Pond bunds at KTPS-V&VI Stages under section 62/64 and 86 (1) (a) of the Electricity Act, 2003 read with Clause No. 22.3 of Telangana Electricity Regulatory Commission (Multi Year Tariff) Regulation No. 2 of 2023;

b. Approve the Additional Capital Cost of Rs.50.65 crore proposed to be incurred towards Raising Additional Ash Ponds at KTPS-V&VI Stage;

c. To grant suitable opportunity to TGGENCO within reasonable time frame to file additional material information, if required;

d. Condone any error/ omission and give opportunity to rectify the same;

e. To pass such order, as the Hon'ble Commission may deem fit and proper in the facts and circumstances of the case.

TELANGANA POWER GENERATION CORPORATION LIMITED

(APPLICANT)

22/9/25

Through

Signature of the applicant

Chief Engineer
Coal & Commercial
TGGENCO, V.S. Hyderabad-82.

Hyderabad,

Dated: 22 -09-2025.

(Form II)

BEFORE THE HONOURABLE

TELANGANA ELECTRICITY REGULATORY COMMISSION

At Its Office at Vidyut Niyantran Bhavan, G.T.S. Colony, Kalyan Nagar, Hyderabad 500 045

Filing No. ___/2025

Case No. ___/2025

IN THE MATTER OF:

Filing of the petition for additional capital cost towards Raising of Additional Ash Pond bunds at KTPS-V&VI Stages under section 62/64 and 86(1)(a) of the Electricity Act, 2003 read with Telangana Electricity Regulatory Commission (Multi Year Tariff) Regulation No. 2 of 2023.

AND IN THE MATTER OF:

Telangana Power Generation Corporation Limited,

Vidyut Soudha, Hyderabad – 500082. ... Applicant/Petitioner

AND

1. **Southern Power Distribution Company of Telangana Ltd. (TGSPDCL),** #6-1-50, Corporate office, Mint Compound, Hyderabad – 500 063.
2. **Northern Power Distribution Company of Telangana Ltd. (TGNPDCL),** H.No.2-5-31/2, Corporate Office, Vidyut Bhavan, Nakkalagutta, Hanmakonda, Warangal – 506001

..... Respondents.

Affidavit verifying the Petition

Filing of the petition for additional capital cost towards Raising of Additional Ash Pond bunds under section 62/64 and 86 (1)(a) of the Electricity Act, 2003 read with Telangana Electricity Regulatory Commission (Multi Year Tariff) Regulation No. 2 of 2023.

I, Chalicheemala Jeeva Kumar, son of Sri C. Venugopal Naidu, aged about 60 years working at Telangana Power Generation Corporation Ltd., do solemnly affirm and say as follows:

a) I am working as the Chief Engineer, Coal & Commercial in Telangana Power Generation Corporation Ltd., being a company in the business of generating electricity in state of Telangana. I am competent and duly authorized by Telangana Power Generation Corporation Ltd., to affirm, swear, execute and file this affidavit in the present proceedings.

b) I have read and understood the contents of the accompanying the petition for additional capital cost towards Raising of Additional Ash Pond bunds at KTPS-V&VI Stages under section 62/64 and 86 (1) (a) of the Electricity Act, 2003 read with Telangana Electricity Regulatory Commission (Multi Year Tariff) Regulation No. 2 of 2023.

c) Statements made in paragraphs of the petition accompanying affidavit now shown to me true to the best of my knowledge derived from the official records made available to me and are based on information and advice received which I believe to be true and correct.

22/9/25

Deponent

Chief Engineer
Coal & Commercial
TGGENCO, V.S. Hyderabad-82.

VERIFICATION:

I, the above-named Deponent solemnly affirm at Hyderabad on this 22nd Day of September, 2025 that the contents of the above affidavit are true to my knowledge, no part of it is false and nothing material has been concealed there from.

22/9/25

Deponent

Chief Engineer
Coal & Commercial
TGGENCO, V.S. Hyderabad-82.

Solemnly affirmed and signed before me at Hyderabad
On this 22nd September, 2025

ATTESTED

G.P.R. HRUDAYA
Company Secretary
TGGENCO, Vidyut Soudha,
HYDERABAD - 500 082

Telangana Power Generation Corporation Limited
Kothagudem Thermal Power Station- V (2X250MW)&VI Stages (1x500 MW)
Form 3: Summary of Capital Expenditure and Capitalisation

(Rs. in Crore)

S. No.	Particulars	FY 2025-26	FY 2026-27	Remarks
1	Opening Capital Works in Progress	0	5.00	
2	Capital Expenditure during the year	5.00	45.65	
3	Capitalisation during the year	0.00	50.65	
4	Closing Capital Works in Progress	5.00	---	

Note: The expenditure proposed to be incurred shall be shared between KTPS-V Stage (2x250 MW) & KTPS-VI Stage (1x500MW) in the ratio of 50:50 as common ash pond is existing for the above plants.

Telangana Power Generation Corporation Limited

Kothagudem Thermal Power Station- V (2X250MW)&VI Stages (1x500 MW)

Form 3.1: Statement of Additional Capitalisation after COD

S.No.	FY	Name of Package (BTG, BoP, Civil works etc.,)	Name of the work	Total Estimate cost (Rs. Crore)	Capital expenditure during the year (Rs. Crore)	Capitalisation during the year (Rs. Crore)	Asset group under which the capitalisation has been accounted (Land, Buildings, Etc.)	Scope of work	Relevant clause of the TGERC MYT Regulation, 2023 under which the capitalisation has been claimed	Justification
1	2025-26	Civil Works	KTPS Stage-V&VI- Raising of Additional Ash Pond bunds from Ch: 0M to 3200M and Suraram bund from Ch:4400M to Ch:5450M from EL(+) 115.50M to EL(+) 120.50M including raising of Wells and Spillway at Paloncha, Bhadradri-Kothagudem Dist	50.65	20	0	Ash Pond	Raising of Additional Ash Pond bunds from EL(+) 115.50M to EL(+) 120.50M for deposition of ash generated from KTPS-V Stage (2x250 MW) & KTPS-VI Stage (1x500MW)	Clause No.22.3	1. The KTPS V & VI Stages (1000 MW) are having '3' Ash Ponds (AB Ash Pond: 350Acres, Additional Ash Pond: 336Acres, C Ash Pond: 150 Acres) for disposal of ash generated from the Unit Nos.9 & 10 (2x250MW) and Unit No.11 (1x500MW). Out of above '3' Ash Ponds, at present, the AB Ash Pond has been serving for disposal of ash generated from the Unit Nos.9 to 11 of KTPS V & VI Stages. Other '2'Ash Ponds i.e., Additional Ash Pond & Ash Pond-'C' were got filled up with ash up to its maximum level of EL (+)115.50M & EL (+) 110.00M respectively. The Ash Pond-'C' was abandoned during the year-2010 due to heavy seepages and slips occurred on the bunds and 'Kanuga' plantation has been taken up in the above Ash Pond area to prevent flying of ash during heavy wind/gale. 2. Further, certain quantity of ash generated from KTPS-VII Stage (1x800 MW) is being deposited in to the AB Ash pond of KTPS V & VI Stages, due to delay in completion of ongoing bund raising work of Northern Ash Pond-II. By considering the present Ash disposal from KTPS V Stage (2x250 MW), KTPS VI Stage (1x500 MW) and KTPS VII Stage (1x800MW), the AB Ash Pond will cater the Ash disposal requirement up to March-2026. Hence, it is very much essential to raise the bunds of Additional Ash Pond for deposition of ash generated from KTPS-V Stage (2x250 MW) & KTPS-VI Stage (1x500 MW) from April-2026 onwards. 3. Admiinistrative approval was accorded to take up the above work vide T.G.O.O. No.57/CE/C/Thermal/2025, Dt:10.07.2025.
2	2026-27				30.65	50.65				
	Total			50.65	50.65	50.65				

Telangana Power Generation Corporation Limited

Kothagudem Thermal Power Station- V (2X250MW)&VI Stages (1x500 MW)

Form 3.2: Financing of Additional Capitalisation

(Rs. Crore)

S.No.	Particulars	FY 2025-26	FY 2026-27
1	**Additional capitalisation**		50.65
2	Financing Details	---	---
	Total Loan	---	---
3	Equity	0.00	0.00
4	Internal Resources	0.00	50.65
5	Others (Please Specify)	---	---
	Total (2+3+4+5)	0.00	50.65

JUSTIFICATION FOR RAISING OF ADDITIONAL ASH POND BUNDS FROM EL(+)115.50M TO EL(+)120.50M AT KTPS –V&VI STAGES, PALONCHA

KTPS Stage-V&VI - Raising of Additional Ash Pond bunds from Ch: 0M to 3200M and Suraram bund from Ch:4400M to Ch:5450M from EL(+) 115.50M to EL(+) 120.50M including raising of Wells and Spillway at Paloncha, Bhadradri-Kothagudem Dist.

****

1) The KTPS V & VI Stages is having '3' Nos. Ash Ponds [consists of AB Ash Pond-350 Acres, Additional Ash Pond-336 Acres & C Ash Pond-150 Acres] for disposal of ash generated from the Unit Nos.9 &10 (KTPS –V Stage (2x250MW)) and Unit No.11 (KTPS-VI Stage (1x500MW)).

2) Out of '3' Nos. Ash Ponds (AB Ash Pond, Additional Ash Pond, and C Ash Pond), currently, the **AB Ash Pond** is being used to deposit the ash generated from **Unit Nos. 9 & 10** (KTPS-V Stage) and **Unit No. 11** (KTPS-VI Stage). The current ash level in **AB Ash Pond** is at an elevation (EL) of **+118.30 meters** against the maximum level of EL (+) **120.50M**. The other '2' Nos. Ash Ponds (Additional Ash Pond & 'C' Ash Pond) were got filled up with ash up to their maximum level of EL (+) 115.50M & EL (+) 110.00M respectively.

3) The 'C' Ash Pond was abandoned during the year 2010 due to heavy seepages and slips on the bunds. Further, 'Kanuga' plantation has been taken up in above Ash Pond area to prevent fugitive ash pollution during heavy winds/gales.

4) By considering the current rate of ash disposal, the AB Ash Pond will meet the ash disposal requirement up to **March 2026** only. Therefore, it is very much essential to raise the 'Additional Ash Pond' bunds from the existing EL (+) 115.50M to EL (+)120.50M (for a height of 5.0M), to keep it ready for ash disposal from KTPS-V Stage (2x250 MW) and KTPS-VI Stage (1x500MW) by the time the ash deposit level reaches to ultimate level in the AB Pond (EL (+)120.50M).

5) The proposed raising of Additional Ash Pond bund will be with Ash core, Earth cover, Sand filters as per the drawings and report (dt.14.08.2024) submitted by

the third party consultant (Prof. V.S. Raju Consultants, Hyderabad) on 'Raising of Additional Ash Pond Bund (Stage-III)'.

6) The estimate for the proposed work was prepared based on the drawings furnished by the consultant for an amount **Rs.50,65,00,000.00** (Rupees Fifty Crore Sixty Five Lakh only) including all provisions. The expected life of 'Additional Ash Pond' with the proposed raise of '5.0M' (EL(+)115.50M to EL(+)120.50M) is about '**4**' years '**6**' months. The calculation details of expected life of Additional Ash Pond after proposed bund raising is as follows:

Expected life of Additional Ash pond after bund raising up to EL (+)120.50M	
➢ Existing level	EL(+) 115.50M
➢ Proposed level to be raised	EL(+) 120.50M
➢ Total area of pond	334.00 Acres
➢ Less area of bunds	34.00Acres
➢ Net Area available	300.00 Acres
➢ Height of bund proposed to be raised	5M
➢ Capacity of the pond in Cum (300 Acres x4048x5 M)	60,72,000.00
➢ Qty of Ash deposition from KTPS-V Stage (2x250MW) & KTPS VI Stage (1x500 MW)	3,700 Cum/ Day
➢ Expected life of AB Pond after raising (60,72,000 Cum /3700 Cum)	1641 days **(4 Years & 6 Months)**

7) The consultant, Prof. V.S. Raju Consultants, Hyderabad has furnished the Detailed Project Report (DPR) on techno-commercial aspects including cost benefit analysis of proposed work vide document no. VSRC/TGGENCO/KTPS/ AAP/ DPR/01, Dt.04.06.2025). The consultant has recommended to take up the subject work duly stating as follows:

i) The detailed analysis confirms that raising the height of the bund is technically feasible.

ii) The total cost for raising the proposed height of bund is estimated at about Rs.55.00 crores, including all provisions.

iii) The estimated life of the Ash Pond after raising the bunds is 4 Years 6 Months for storage of ash generated from KTPS –V Stage (2x250MW) KTPS-VI Stage (1x500MW).

iv) The 1000 MW power production from KTPS-V & VI Stages is dependent on the operation of this ash pond. In addition to the benefits derived from utilizing this power, there are significant advantages associated with it. Given the rising domestic and industrial power demands, a reduction of 1000 MW in daily power generation would result in a severe power shortage in the state.

v) The stoppage of 1000 MW power production from KTPS V &VI Stages will result in a loss of annual fixed charges amounting to Rs. 4050 Crores over a period of 4 years and 6 months. In addition to the loss of fixed charges, there may also be additional losses incurred due to annual variable charges.

vi) Therefore, raising of Additional Ash Pond for 5.0M height (Stage-III from EI (+) 115.50M to EI (+) 120.50M) is highly essential.

8) The Detailed Project Report (DPR) furnished by Prof. V.S. Raju Consultants, Hyderabad on the subject proposal is enclosed as Annexure.

TELANGANA POWER GENERATION CORPORATION LIMITED
VIDYUT SOUDHA :: HYDERABAD-500082
CIN:U40102TG2014SGC094070, Phone No:040-23499407
Website:www.tggenco.com Email Id:ce.cth@tggenco.com

ABSTRACT

KTPS Stage-V&VI- Raising of Additional Ash Pond bunds from Ch: 0M to 3200M and Suraram bund from Ch:4400M to Ch:5450M from EL(+) 115.50M to EL(+) 120.50M including raising of Wells and Spillway at Paloncha, Bhadradri-Kothagudem Dist.- Administrative Approval–for an amount of Rs.50,65,00,000.00 – Accorded.

T.G.O.O. No.57/CE/C/Thermal/2025 **Dt:10.07.2025.**

Read the following:-

Ref:
1. Lr.No.CE/O&M/SE/Civil/KTPS-V&VI.Stages/F.02/D.No.459/2024-25, Dt:13.11.2024.
2. Lr.No.CE/Civil/Thermal/SE.TCD-I/EE3/F.E458/D.No.33/2025-26, Dt.01.05.2025.
3. Lr.No.CE/O&M/SE/Civil/KTPS V&VI Stages/F.Dkt/D.No.305/2025-26, Dt:24.05.2025.

***

ORDER:

1. The KTPS V & VI Stages (1000 MW) are having '3' Ash Ponds (AB Ash Pond: 350Acres, Additional Ash Pond: 336Acres, C Ash Pond: 150 Acres) for disposal of ash generated from the Unit Nos.9 & 10 (2x250MW) and Unit No.11 (1x500MW). Out of above '3' Ash Ponds, at present, the AB Ash Pond has been serving for disposal of ash generated from the Unit Nos.9 to 11 of KTPS V & VI Stages. Other '2'Ash Ponds i.e., Additional Ash Pond & Ash Pond- 'C' were got filled up with ash up to maximum level of EL (+)115.50M & EL (+) 110.00M respectively. The Ash Pond-'C' was abandoned during the year-2010 due to heavy seepages and slips occurred on the bunds and 'Kanuga' plantation has been taken up in the above Ash Pond area to prevent flying of ash during heavy wind/gale.

2. Further, certain quantity of ash generated from KTPS-VII Stage (1x800 MW) is being deposited in to the **AB Ash pond** of KTPS V & VI Stages, due to delay in completion of ongoing bund raising work of **Northern Ash Pond-II.** By considering the present Ash disposal from KTPS V Stage (2x250 MW), KTPS VI Stage (1x500 MW) and KTPS VII Stage (1x800MW), the **AB Ash Pond** will cater the Ash disposal requirement up to March-**2026.** Hence, it is proposed to raise the 'Additional Ash Pond' bunds from existing EL (+) 115.50M to EL (+)120.50M to enable to deposit the ash generated from KTPS V Stage (2x250 MW) and KTPS-VI Stage (1x500MW) from April-2026 onwards.

Contd....P2

3. The Chief Engineer/O&M/KTPS-V&VI Stages has furnished the estimate for the subject work for an amount of **Rs.50,65,00,000.00** including all provisions and **Rs.40,09,42,853.00** excluding all provisions. The expected life of 'Additional Ash Pond' with proposed bund raising of 5M (from EL(+) 115.50M to EL +120.50M) is about '**4**' years '**6**' months. The subject proposal was submitted to TGERC under MYT in Capital Investment Plan for the 5th control period FY 2024-25 to FY 2028-29.

4. The proposal for according administrative approval for taking up the subject work for an amount of **Rs.50,65,00,000.00** including all provisions & **Rs.40,09,42,853.00** excluding all provisions & to call open tenders through e-procurement by meeting the expenditure from capital budget of KTPS V & VI Stages under '**additional capitalization**' was circulated to the Stores Purchase Committee of TGGENCO.

5. After careful consideration of the proposals mentioned in para-(4) above, the Stores Purchase Committee of TGGENCO has accorded approval for the following:

   a) Administrative approval to take up the work of **"KTPS Stage-V&VI - Raising of Additional Ash Pond bunds from Ch: 0M to 3200M and Suraram bund from Ch:4400M to Ch:5450M from EL(+) 115.50M to EL(+) 120.50M including raising of Wells and Spillway at Paloncha, Bhadradri Kothagudem Dist."** for an amount **Rs.50,65,00,000.00** (Rupees Fifty Crore Sixty Five Lakh only) including all provisions and to meet the expenditure from capital budget of KTPS V & VI Stages under additional capitalization.

   b) To call for open tenders through e-procurement in double packet system for the subject work for an Estimated Contract Value of **Rs.40,09,42,853.00** (Rupees Forty Crore Nine Lakh Forty Two Thousand Eight Hundred Fifty Three only) excluding all provisions.

6. This order is issued with concurrence of the Chairman and Managing Director/TGGENCO vide Reg.No.913, Dt.17.062025.

(BY ORDER AND IN THE NAME OF TGGENCO)

CHIEF ENGINEER/CIVIL/THERMAL

To
Chief Engineer/O&M,
KTPS-V & VI Stages,
Paloncha-507115,
Bhadradri-Kothagudem Dist.

Copy communicated to the:

1. P.S. to Chairman & Managing Director/TGGENCO/V.S./Hyderabad.
2. AEE/Techl. to Director (Civil)/TGGENCO/V.S./Hyderabad
3. P.O. to Director (Finance & Commercial)/ TGGENCO/V.S./Hyderabad.
4. A.S. to Director (Coal & Logistics)/ TGGENCO/V.S./Hyderabad.
5. D.E/Techl. to Director (Thermal & Projects/ TGGENCO/V.S./Hyderabad.
6. D.E./Techl. to Director (Hydel)/ TGGENCO/V.S./Hyderabad.
7. D.E./Techl. to Director (H.R.& IR)/ TGGENCO/V.S./Hyderabad.
8. P.A to Chief General Manager (Admn.)/TGGENCO/Vidyut Soudha/Hyderabad
9. Chief Engineer/Coal & Commercial/Vidyut Soudha/Hyderabad
10. FA&CCA (Resources) TGGENCO/Vidyut Soudha/Hyderabad-82
11. FA&CCA (Audit) & CFO/TGGENCO/Vidyut Soudha/Hyderabad-82
12. FA&CCA (Accounts)/TGGENCO/Vidyut Soudha/Hyderabad-82
13. Superintending Engineer/Civil/KTPS V & VI stages/ Paloncha – 507 115
14. Dy.CCA/ KTPS-V & VI stages/ Paloncha-507 115
15. Stock file

TELANGANA POWER GENERATION CORPORATION LIMITED

(A Govt. of Telangana Undertaking)

Petition of Additional Capital Cost for Raising of Additional Ash Pond bunds at KTPS- V &VI Stages

Volume-2 of 2

(Detailed Project Report)

September, 2025

TELANGANA POWER GENERATION CORPORATION LIMITED

(A Govt. of Telangana Undertaking)

Petition of Additional Capital Cost for Raising of Additional Ash Pond bunds at KTPS- V &VI Stages

INDEX

Volume 2 of 2

Sl. No.	Details	No.s
1	Detailed Project Report (DPR) on Raising of Additional Ash Pond bunds at KTPS-V & VI stages	Booklet

VSR CONSULTANTS VALUE ENGINEERING	**Prof. V.S. RAJU CONSULTANTS (Geotechnical and Structural) Gachibowli, Hyderabad – 500 032**

Document No. VSRC/TGGENCO/KTPS/AAP/DPR/01 **DATED: 04.06.2025**

DETAILED PROJECT REPORT (DPR) ON BENEFITS BY RAISING OF STAGE III BUND OF ADDITIONAL ASH POND

Project

Kothagudem Thermal Power Station, Kothagudem

Client

Telangana Power Generation Corporation Limited

		A Chenna Reddy	C.R Balaji	
04.06.2025	R0	A.CHENNA REDDY	C.R. BALAJI	PROF. V. S. RAJU
DATE	REVISION	PREPARED BY	REVIEWED BY	REVIEWED & APPROVED BY

The Team:

Prof. V.S. Raju
(Formerly: Director, IIT Delhi;
Professor & Dean, IIT Madras)

Mr. C. R. Balaji, Principal Engineer, B.E, MASCE, MIEI, FIGS

Senior Geotechnical Engineers:

Dr. K. Venkata Vydehi, PhD

Mr. A. Chenna Reddy, M.Tech

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Enclosure 1: Letter from TGGENCO dated 21.03.2025

Enclosure 2: Detailed Estimation of life of Additional Ash pond (Stage III)

Enclosure 3: Estimation of quantities for construction of Additional Ash pond bund (Stage III)

Enclosure 4: Annual Fixed Charges as approved by TGERC

Enclosure 5: Letter from TGGENCO dated 12.05.2025

Annexure 1: Copy of report on “Raising of Additional Ashpond bund (Stage III)” at Kothagudem Thermal Power Station by Prof. V.S. Raju Consultants dated 14-08-2024

DETAILED PROJECT REPORT (DPR) ON BENEFITS BY RAISING OF STAGE III BUND OF ADDITIONAL ASH POND, KTPS

04.06.2025

1. Preamble:

Telangana Power Generation Corporation (TGGENCO) is planning to increase the height of additional ash pond bund by 5 m (EL +115.5 m to EL +120.5 m). In line with the above, report titled “Raising of Additional Ash pond bund (Stage III) at Kothagudem Thermal Power Station” by the undersigned was communicated vide email dated 14.08.2024 (See Annexure 1 for complete report). The report gives the analysis and design of raising of ash pond bund by 5 m (EL +115.5 m to EL + 120.5 m).

TGGENCO has requested the undersigned to prepare a Detailed Project Report (DPR) for the raising of Additional ash pond bund from Ch: 0 m to 3200 m and Suraram bund from Ch: 4400 m to Ch: 5450 m from EL + 115.5 m to EL + 120.5 m including raising of decanting wells and Spillway. Layout of ash pond is given in figure 1 below.

This report gives

i. Service life of the pond with Stage III bund
ii. Cost estimate for construction of Stage III bund.
iii. Annual Fixed Charges as approved by Telangana Electricity Regulatory Commission (TGERC)

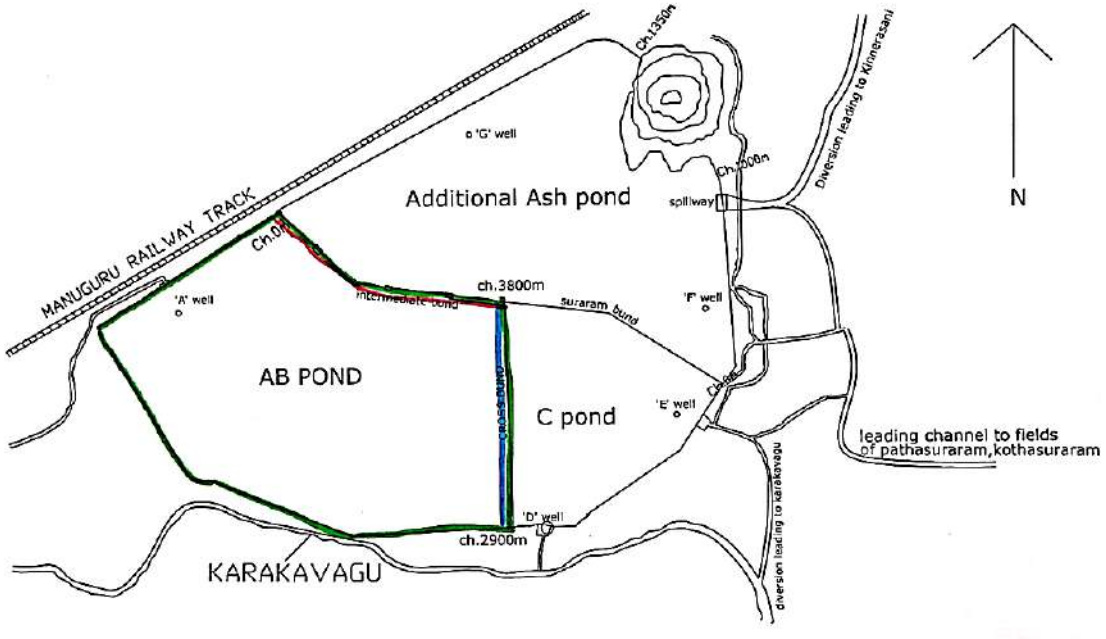

Figure 1. Layout of ash pond

2. Details of Additional ash pond Bund:

TGGENCO vide letter Lr. No. SF/Civil/KTPS-V&VI Stages/F.Dkt/D.No.1961/2024-25, Dt. 21.03.2025 (see Enclosure 1) provided the following information:

- Area after construction of Stage III bund is 300 Acres
- Perimeter of the bund at EL + 115.5 m is 5300 m.

Additional Information:

- Total production of power dependent on Additional Ash pond is 1000 MW.
- Quantity of Ash generated per day is 4200 tons for generation of 1000 MW.

The above information is used for the estimation of expected life of pond after completion of stage III bund.

Typical cross section of ash pond bund along with stage III bund is given in Fig. 2a. The cross section of rock toe and toe drain are given in Fig. 2b.

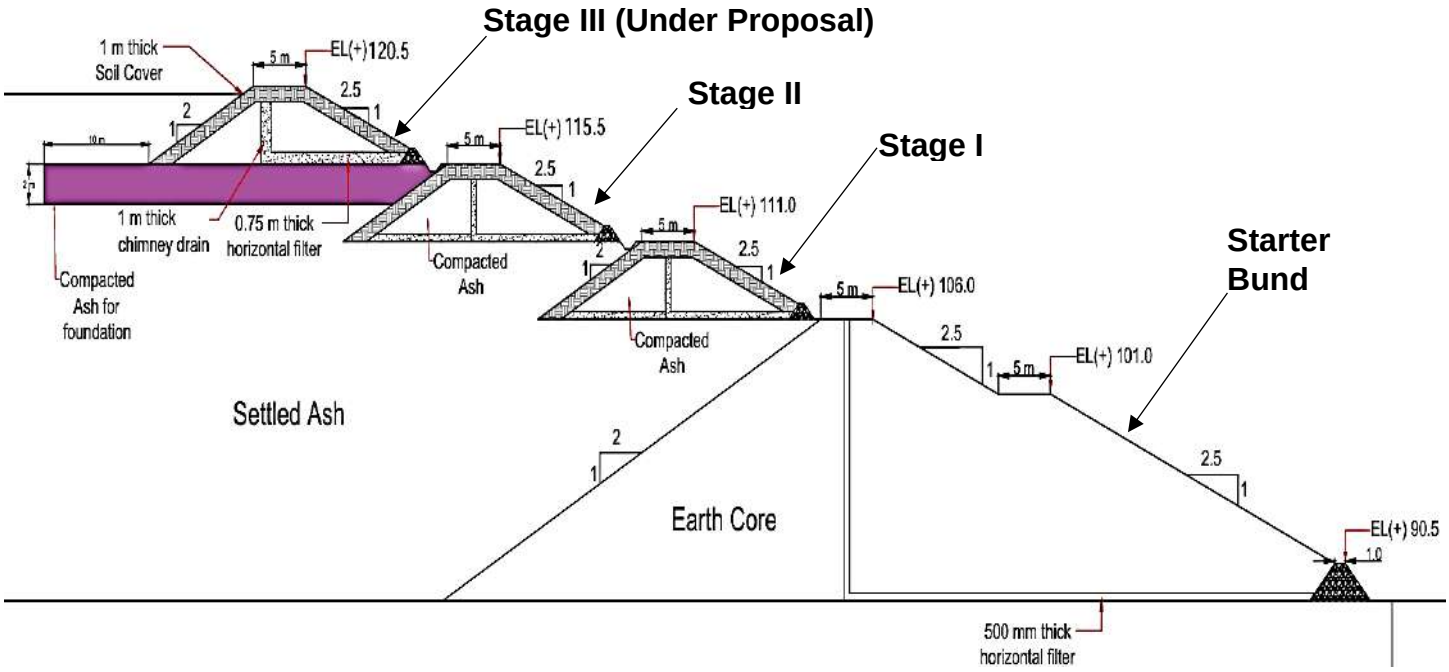

Fig. 2a Cross section of Additional Ashpond bund

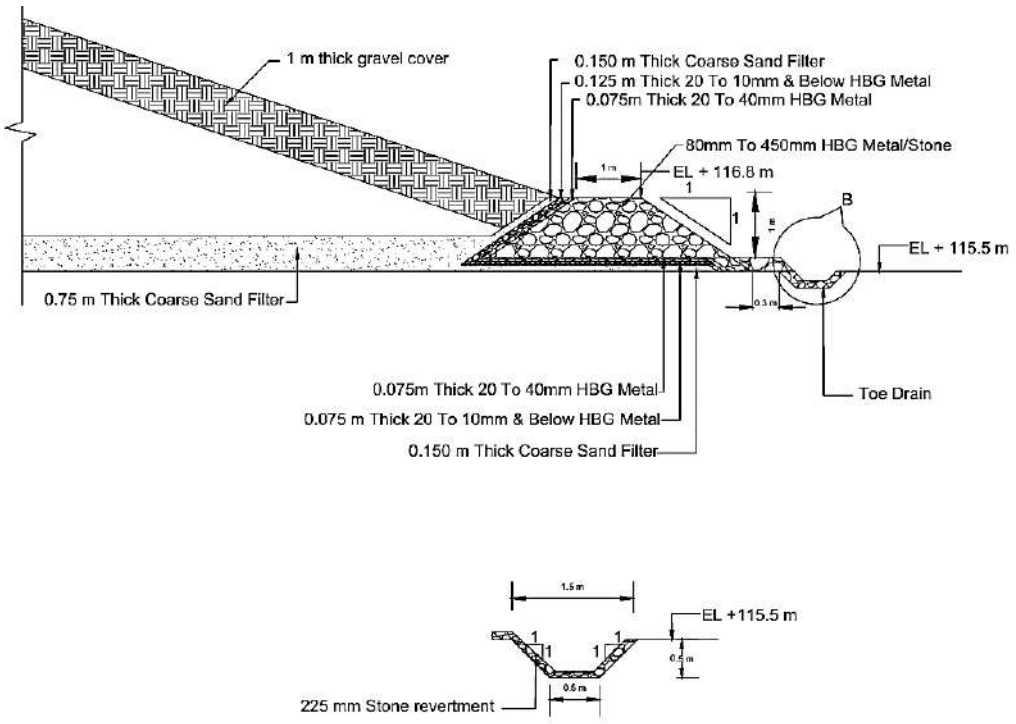

Fig. 2b Cross section of Rock toe and toe drain

3. Capacity and Expected life of Additional Ash pond:

As per the details provided by the TGGENCO, the expected life of Additional Ash pond after raising of bund from EL + 115.5 m to EL + 120.5 m is estimated.

Quantity of Ash produced per day for 1000 MW	=	**4200 tons**
Volume of Ash produced per day	=	**3700 m^3**
Capacity of pond after completion of stage III bund		
{Area 300 acres (1214058 m^2) x Height 5 m}	=	**6070300 m^3**
Expected life of Ashpond with stage III bund		
(6070300/ 3700)	=	**4 years 6 Months.**

See Enclosure 2 for detailed calculations on estimation of lifespan of Additional Ash pond.

4. Cost estimate:

The cost estimate includes the Cost of construction for raising the ash pond bund (stage III).

4.1 Cost of Construction of Stage III bund:

The following items are considered for cost estimate.

- Jungle clearance for main bund, suraram bund, cross bund, along the slopes.
- Excavation of settled ash for a depth of 2 m and compacting the same in layers of 200 mm to form the base for raising the bund.
- Construction of rock toe (with graded filter HGB 80 to 450 mm, 20 to 40 mm and 10 to 20 mm) for all the bunds stated in '1' (including the filter sand layer at base).
- Construction of horizontal and vertical sand filters.
- Construction of toe drain.
- Raising the bund with compacted ash to the required density.
- Laying of 1 m thick Gravel cover.
- Raising of decantation wells (Concrete and Steel).
- Raising of spillway (Concrete and Steel).

Total cost of above mentioned items works out to be **Rs.43.7 crores** and **Rs.55 crores** including all provisions (EPF, ESI and seigniorage charges) and GST. See Enclosure 3 for detailed estimate.

5. Loss of generation capacity and Revenue in the absence of additional capacity of ash pond:

The proposed Stage III bund will create an additional capacity for discharging 60,70,000 m^3 of ash. This much volume will enable 1000 MW per day over a period of 4 years and 6 months. In the absence of this capacity, the implications are as follows:

5.1 Annual Fixed Charges (AFC) as approved by TGERC:

Telangana Electricity Regulatory Commission vide "Order on True up for FY 2022 – 23 and Multi Year Tariff (MYT) for FY 2024 – 25 to 2028 – 29 dated 28.10.2024 has approved the Annual Fixed Charges as per Table 1 given below (See Enclosure 4 for relevant pages of the order).

Table 1: AFC as per TGERC Order

S. No	Stages	Financial Year	Approved AFC (crores)
1	KTPS V	2026 – 2027	392.37
	KTPS VI		454.53
2	KTPS V	2027 – 2028	404.70
	KTPS VI		467.40
3	KTPS V	2028 – 2029	417.98
	KTPS VI		480.99
4	KTPS V	2029 – 2030***	430.51
	KTPS VI		495.41
5	KTPS V	2030 – 2031***	443.43
	KTPS VI		510.28

*** TGERC has passed the order with regard to AFC till FY 2028 – 29. An annual increment of 3% (as given by TGGENCO) has been considered for the FY 2029 – 30 and FY 2030 – 31.

The estimated life of additional ash pond is 4 years and 6 months. TGGENCO informed the undersigned that the AB ash pond will cater the ash disposal requirement upto June 2026. Therefore, the approved AFC is considered from July 2026 to Dec 2030.

Referring to letter no. CE/Civil/Thermal/SE.TCD-I/EE3/F.E-458/D.No.44/2025-26, dt 12.05.2025 (See Enclosure 5), the details of annual fixed charges during the life of additional ash pond are given in Table 2 below:

Table 2: AFC during life of additional ash pond

S. No	Stages	Financial Year	Approved AFC (crores)
1	KTPS V KTPS VI	2026 – 2027 (July 26 – Mar 27, 9 months)	635.17
2	KTPS V KTPS VI	2027 – 2028 (Apr 27 – Mar 28)	872.19
3	KTPS V KTPS VI	2028 – 2029 (Apr 28 – Mar 29)	898.97
4	KTPS V KTPS VI	2029 – 2030*** (Apr 29 – Mar 30)	925.92
5	KTPS V KTPS VI	2030 – 2031*** (Apr 29 – Dec 30, 9 months)	715.28
Total			**4047**

Anticipated Revenue Loss if the additional ash pond is not built

(See Table 2 above) = Rs. 4047 Cr

Say 4050 Cr

6. Summary and Conclusions:

- Telangana Power Generation Corporation (TGGENCO) is planning to increase the height of additional ash pond bund by 5 m (Stage III from EL +115.5 m to EL + 120.5 m). Based on our detailed analysis, it is technically feasible to increase the height of the bund.

- Total cost for increasing the height works out to be about **Rs.43.7 crores** and **Rs.55 crores** including all provisions (EPF, ESI and seigniorage charges) and GST.

- The estimated life of ash pond is **4 years 6 months for storing of ash for generating 1000 MW of power per day**.

- 1000 MW of power production per day depends on this ash pond. There are huge advantages in-addition to the benefits generated by using this power. With increasing domestic and industrial power demands, reduction in 1000 MW of power generation per day will lead to acute power shortage in the state.

- As per information given by Chief Engineer, Civil / Thermal, TGGENCO, the annual fixed charges from TGERC over the 4 years 6 months is estimated as Rs 4050 Cr.

- In addition to loss due to annual fixed charges, there may be additional losses due to annual variable charges.

- Therefore, in our view **raising of additional ash pond (Stage III from EL +115.5 m to EL + 120.5 m) is a must.**

Prepared by	Reviewed by	Reviewed and Approved by
A. CHENNA REDDY	**C.R. BALAJI**	**PROF. V S RAJU**
(Geotechnical Engineer)	**(Principal Engineer)**	**(Formerly: Director, IIT Delhi; Prof & Dean, IIT Madras)**

ENCLOSURE 1

LETTER FROM TGGENCO DATED 21.03.2025

TELANGANA POWER GENERATION CORPORATION LIMITED
KTPS-V&VI STAGES:PALONCHA
(formerly Telangana state power generation corporation limited)
(AN ISO 900L:2008 accredited plant)
Website: www.tggenco.co.in , Email.Id: ce.ktps5@tggenco.co.in

From
The Superintending Engineer/Civil,
KTPS-V&VI Stages,
Paloncha – 507115.

To
Prof. V.S.Raju,
(Foundation and Geotechnical Consultant),
Plot no.9, 102, Nova Jyot, Telecom Nagar,
Gachibowli, Hyderabad-500032

Lr.No.SE/Civil/KTPS-V&VI Stages/F.Dkt/D.No. 1961 /2024-25, Dt: 21 .03.2025.

Sir,

Sub: KTPS-V&VI Stages –Raising of Additional ash pond bunds from Ch:- 0M to 3200M and Suraram bund from Ch:- 4400m to Ch:- 5450 from EL(+) 115.50M to EL(+) 120.50M including raising of wells and spillway at Paloncha, Bhadradri Kothagudem Dist- **Preparation of Detailed Project Report - Details furnished** - Regarding.

Ref: 1) Your mail Dt: 13.03.2025
2) Endt No.EE/Civil/O&M-II/KTPS-V&VI Stages/F.Ash pond/D.No.661/2024-25; Dt:18.03.2025

*****

In the reference 1st cited, certain information sought in respect of AB Pond, D Pond and other general information for preparing the Detailed Project Report for the subject work.

With reference to the endorsement lertter 2nd cited, the following details in respect of AB Pond, D Pond (Additional ash pond) and other general information are herewith furnished for taking further action please.

1) **In respect of AB Pond :**
   i) Total area of the AB pond after construction of starter bund is 350 Acres.
   ii) Area of the AB pond after construction of the bunds from EL+121.00M to EL+126.00M is approximately 243 Acres.
   iii) Perimeter of the bund at EL+121.00M is 4630 meters.

2) **In respect of D Pond (Additional ash pond) :**
   i) Total area of the Additional ash pond after construction of starter bund is 336 Acres.
   ii) Area of the Additional ash pond after construction of the bunds from EL+115.50M to EL+120.50M is approximately 300 Acres.
   iii) Perimeter of the bund at EL+115.50M is 5300 meters.

3) **Other details :**

AEE
24/03/25

EE III
24/03/25
SE C/TCD-I

Chief Engineer/Civil/Thermal
TGGENCO
Inward No: 8257
22 MAR 2025
SE/C/TCD-I SE/C/TCD-II
AEE/Tech. CE/Civil/Thermal

i) Quantity of ash generated per day is 2000 MT from V Stage, 2200 MT from VI Stage & 1000 MT from VII Stage.

ii) Total production of power in MW dependent on these 2 ash ponds is 1000MW.

iii) Revenue generated per MW : Rs.4.42/KWH

iv) Cost per cubic meter of the following (As per the estimate):

Sand for filters	: Rs.1419.00
Gravel	: Rs. 693.00
HBG metal / Stone	: Rs. 1504.00 per Cum for 10mm - 20mm
	: Rs. 1491.00 per Cum for 20mm – 40mm
	: Rs. 1041.00 per Cum for 80mm – 450mm

Yours faithfully

Superintending Engineer/Civil
KTPS-V & VI Stages

Copy Submitted to the Chief Engineer/O&M/KTPS-V&VI Stages for favour of information please.
Copy Submitted to the Chief Engineer/Civil Thermal/TGGENCO/Vidyut Soudha/Hyderabad for favour of information please.
Copy to the Executive Engineer/Civil/O&M-II/KTPS-V&VI Stages.

ENCLOSURE 2

DETAILED ESTIMATION OF LIFE OF ADDITIONAL ASH POND (STAGE III)

Project: DPR on benefits by raising of Stage III bund, Additional Ash Pond

Estimation of Life of Additional Ash pond (Stage III)

Area of Ash Pond available (After Stage III Bund)	=	300	Acres	**Given by TGGENCO**
	=	1214058	m^2	
Height of bund (Stage III)	=	5	m	
Volume of Ash Pond available for filling (1214058 x 5)	=	6070290	m^3	
Quantity of Ash produced per day for 1000 MW	=	4200	tons	**Given by TGGENCO**
Unit weight of Ash	=	1.135	t/m^3	
Volume of ash produced per day (4200/1.135)	=	3700	m^3	
Number of days to fill Ashpond (6070290/3700)	=	1640	days	
		54.7	Months	
		4 Years	**6 Months**	

ENCLOSURE 3

ESTIMATION OF QUANTITIES FOR CONSTRUCTION OF ADDITIONAL ASH POND BUND (STAGE III)

Project: DPR on benefits by raising of Stage III bund, Additional Ash Pond

Estimation of Quantities for Additional Ashpond (Stage III)

Perimeter of the Bund: 5300 m

S.No	Description of Item	Quantity	Unit	Cost per unit Vol (Rupees)	Amount (Rupees)
1	Jungle Clearance	442500	Sqm	3.2	₹ 14,16,000
2	Excavation of Settled Ash upto required depth	395600	Cum	214	₹ 8,46,58,400
3	Compaction of ash to required depth	153000	Cum	5.8	₹ 8,87,400
4	HBG Metal (10-20 mm)	1900	Cum	1560	₹ 29,64,000
5	HBG Metal (20-40 mm)	1650	Cum	1491	₹ 24,60,150
6	HBG Metal (80-450 mm)	11100	Cum	1041	₹ 1,15,55,100
7	Horizontal and Vertical sand filter	71200	Cum	1876	₹ 13,35,71,200
8	Stone pitching for Toe drain (225 mm thick)	2400	Cum	651	₹ 15,62,400
9	Embankment with Pond Ash	217500	Cum	227	₹ 4,93,72,500
10	Gravel Cover (1m thick)	133500	Cum	693	₹ 9,25,15,500
11	Concrete for Decanting wells	40	Cum	10010	₹ 4,00,400
12	Steel for Decanting well	0.5	tons	58978	₹ 29,489
13	Concrete for Spillway	180	Cum	10010	₹ 18,01,800
14	Steel for Spillway	15	tons	58978	₹ 8,84,670

Total = ₹ 38,40,80,000

Other miscellaneous items including Gravel base for inspection roads, Excavation for VSF, toe drains and Chute drains, Labour for steel works (RCC), PVC pipes, RR and Brick masonary works = ₹ 2,50,00,000

Total = ₹ 40,90,80,000

Considering 7% increase to the rates (SSR 2025)	=	**₹ 43,77,15,500**
Provision towards EPF @ 13.00% on Labour	=	₹ 44,82,000
Provision towards ESI @ 3.25% on Labour	=	₹ 11,21,000
Provision towards Seigniorage charges (LS)	=	₹ 1,81,00,000
Total amount	=	₹ 46,14,18,500
GST (18%)	=	₹ 8,30,55,330
Total amount including GST	=	**₹ 54,44,73,830**
	say	**₹ 54,45,00,000**

ENCLOSURE 4

ANNUAL FIXED CHARGES AS APPROVED BY TGERC

also allowed the additional interest on pension bonds as a separate item independent of Annual Fixed Charges (AFC). Considering the fact that the actual additional pension liability is not pertaining to TGGENCO employees but is a liability transferred to TGGENCO, the Commission allows the same as claimed by TGGENCO subject to true-up at actuals based on prudence check. In regards to water charges as a part of additional information the Commission asked the TGGenco to submit the basis along with the computation for claiming water charges of Rs 33.47 crore for FY 2024-25. TGGenco has submitted in its response that the water charges in respect of Thermal station and Hydel stations were claimed based on the actual usage of water for Thermal Generation and Hydel generation. TGGenco has submitted that during the FY 2022-23 poor rainfalls resulted in less Hydel Generation consequently less water charges claimed for the FY 2024 against the already approved Rs 68.32 crore for the FY 2023-24 in MTR Order dated 23.03.2023. The Commission at this stage has approved the water charges as claimed by the Petitioner subject to true-up at actuals based on prudence check.

5.1.73 The additional pension liabilities and water charges as claimed and approved by the Commission is given in Table below:

Table 5-16: Additional Pension Liabilities and Water Charges approved by the Commission for FY 2024-25 to FY 2028-29

Rs.in crore

Particular	Claimed					Approved				
	2024-25	2025-26	2026-27	2027-28	2028-29	2024-25	2025-26	2026-27	2027-28	2028-29
Additional Pension Liabilities	1367.73	1489.46	1617.06	1785.01	1946.20	1367.73	1489.46	1617.06	1785.01	1946.20
Water Charges	33.47	33.65	33.84	34.04	34.25	33.47	33.65	33.84	34.04	34.25

65. Annual Fixed Charges (AFC)

5.1.74 Based on the above, the Annual Fixed Charges (AFC) claimed by TGGenco and as approved by the Commission is as shown in the Tables below:

Table 5-17: Annual Fixed Charges as claimed and approved for the period FY 2024-25 to FY 2028-29

Rs.in crore

Station	Depreciation		O&M Expenses		Return on Equity		Interest on Loan		IoWC		NTI		Fixed Charges	
	As filed	Approved	As filed	Approved	As filed	Approved	As filed	Approved	As filed	Approved	As filed	Approved	As filed	Approved
AFC approved for FY 2024-25														
Thermal														
KTPS-V	35.53	1.44	270.25	206.99	85.13	104.80	-	0.23	35.48	33.74	15.22	15.22	**411.17**	**331.98**
KTPS-VI	22.30	45.25	269.11	206.97	153.76	114.02	-	0.00	34.60	32.96	8.53	8.53	**471.24**	**390.67**
KTPS-VII	174.38	186.42	568.91	483.04	322.34	243.82	232.68	242.01	63.87	61.34	10.83	10.83	**1351.35**	**1205.80**
RTS-B	9.86	1.18	109.87	17.48	4.67	1.03	-	-	5.41	0.20	1.49	0.26	**128.32**	**19.84**
KTPP-I	17.50	88.68	209.15	180.28	158.75	117.51	-	0.00	30.99	30.45	28.00	28.00	**388.39**	**388.92**

Station	Depreciation		O&M Expenses		Return on Equity		Interest on Loan		IoWC		NTI		Fixed Charges	
	As filed	Approved	As filed	Approved	As filed	Approved	As filed	Approved	As filed	Approved	As filed	Approved	As filed	Approved
KTPP-II	113.02	127.75	252.96	204.77	234.34	174.77	114.55	96.93	39.54	37.36	29.90	29.90	**724.51**	**611.68**
BTPS	242.05	274.31	442.02	189.59	503.83	377.86	458.47	387.89	77.12	70.14	11.62	11.62	**1711.87**	**1288.17**
Hydel														
Nagarjuna Complex	56.36	87.97	153.51	117.51	130.38	73.07	7.27	0.00	7.70	6.50	1.00	1.00	**354.22**	**284.05**
Srisailam LB	60.26	86.43	147.45	100.18	230.00	128.07	49.93	24.01	10.93	8.58	2.81	2.81	**495.76**	**344.47**
Small Hydel	1.14	4.04	48.98	42.20	8.86	4.57	0.65	0.00	1.30	1.13	0.26	0.26	**60.67**	**51.68**
Mini Hydel	0.37	0.90	10.43	7.27	2.29	1.57	0.60	0.00	0.30	0.22	0.09	0.09	**13.90**	**9.87**
Pochampad II	0.58	0.72	7.77	6.99	2.46	1.12	1.44	0.65	0.25	0.21	0.03	0.03	**12.47**	**9.66**
Priyadarshini Jurala	11.16	20.11	43.73	33.54	43.30	23.83	16.26	11.10	2.54	2.12	0.29	0.29	**116.70**	**90.41**
Lower Jurala	26.61	51.31	44.27	33.68	102.48	61.95	53.07	46.89	4.93	4.44	0.17	0.17	**231.19**	**198.10**
Pulichintala	8.62	10.22	41.69	38.55	30.07	16.99	22.20	19.21	2.11	1.86	0.50	0.50	**104.19**	**86.32**
Total	**779.74**	**986.74**	**2,620.10**	**1869.03**	**2,012.64**	**1444.97**	**957.13**	**828.93**	**317.06**	**291.23**	**110.76**	**109.51**	6575.95	5311.39
AFC approved for FY 2025-26														
Thermal														
KTPS-V	44.13	1.44	284.42	218.71	85.70	141.46	-	0.38	36.44	34.46	15.83	15.83	**435.47**	**380.62**
KTPS-VI	22.50	45.25	282.75	218.59	153.83	153.68	-	0.00	35.39	33.70	8.87	8.87	**485.94**	**442.36**
KTPS-VII	182.21	186.42	600.53	510.66	347.47	328.62	243.70	223.03	65.98	62.76	11.27	11.27	**1429.06**	**1300.22**
RTS-B	-	0.00	-	-	-	-	-	0.00	-	-	-	-	**0.00**	**0.00**
KTPP-I	18.52	88.68	219.54	190.43	159.16	158.38	-	0.00	31.66	31.17	29.13	29.13	**400.88**	**439.53**
KTPP-II	113.21	127.75	265.31	216.29	234.47	235.56	103.06	83.78	40.15	38.19	31.09	31.09	**726.30**	**670.48**
BTPS	296.28	280.09	473.92	200.86	582.32	518.27	522.75	372.99	82.55	72.39	12.09	12.09	**1946.20**	**1432.50**
Hydro														
Nagarjuna Complex	68.58	87.97	162.21	124.54	134.40	97.82	5.24	0.00	8.16	7.03	1.04	1.04	**377.59**	**316.33**
Srisailam LB	68.32	86.43	155.70	106.14	235.33	171.02	49.13	15.88	11.43	9.25	2.92	2.92	**517.10**	**385.80**
Small Hydel	2.64	1.20	52.04	44.62	9.75	6.03	1.28	0.00	1.43	1.16	0.27	0.27	**66.88**	**52.74**
Mini Hydel	0.89	0.90	11.19	7.69	3.04	2.07	1.59	0.00	0.35	0.23	0.10	0.10	**16.97**	**10.79**
Pochampad II	1.13	0.58	8.32	7.39	3.48	1.47	2.44	0.58	0.31	0.22	0.04	0.04	**15.65**	**10.20**
Priyadarshini Jurala	11.40	14.08	46.06	35.46	43.52	32.12	15.37	8.69	2.59	2.15	0.30	0.30	**118.65**	**92.20**
Lower Jurala	27.38	51.47	46.66	35.61	103.62	81.97	51.62	42.03	5.01	4.68	0.18	0.18	**234.12**	**215.59**
Pulichintala	9.37	10.22	44.11	40.79	31.41	22.74	22.75	18.45	2.22	1.99	0.52	0.52	**109.36**	**93.67**
Total	**866.56**	**982.48**	**2,652.75**	**1,957.79**	**2,127.50**	**1951.22**	**1,018.93**	**765.80**	**323.68**	**299.38**	**113.64**	**113.65**	6875.78	5843.02

Station	Depreciation		O&M Expenses		Return on Equity		Interest on Loan		IoWC		NTI		Fixed Charges	
	As filed	Approved	As filed	Approved	As filed	Approved	As filed	Approved	As filed	Approved	As filed	Approved	As filed	Approved
AFC approved for FY 2026-27														
Thermal														
KTPS-V	55.68	1.44	299.37	230.98	84.27	141.46	-	0.24	37.46	34.71	16.46	16.46	**460.32**	**392.37**
KTPS-VI	22.50	45.25	297.14	230.86	153.83	153.68	-	0.00	36.18	33.96	9.23	9.23	**500.42**	**454.53**
KTPS-VII	216.73	186.42	637.31	539.87	374.67	328.62	254.73	203.81	69.14	63.13	11.72	11.72	**1540.86**	**1310.13**
RTS-B	-	0.00	-	-	-	-	-	0.00	-	-	-	-	**0.00**	**0.00**
KTPP-I	18.71	88.68	230.41	201.15	159.72	158.38	-	0.00	32.35	31.38	30.29	30.29	**410.90**	**449.30**
KTPP-II	113.28	127.75	278.34	228.47	235.46	235.56	92.54	70.62	40.82	38.27	32.33	32.33	**728.11**	**668.34**
BTPS	347.74	280.09	506.22	212.30	619.63	518.27	532.95	343.91	86.66	72.26	12.57	12.57	**2080.63**	**1414.26**
Hydro														
Nagarjuna Complex	72.56	87.97	170.98	131.58	135.93	97.82	1.34	0.00	8.39	7.18	1.08	1.08	**388.12**	**323.47**
Srisailam LB	68.32	86.43	163.55	112.12	235.33	171.02	42.19	0.00	11.51	9.17	3.04	3.04	**517.86**	**375.70**
Small Hydel	2.84	1.14	54.97	47.18	9.86	6.03	1.07	0.00	1.50	1.21	0.28	0.28	**69.96**	**55.29**
Mini Hydel	1.56	0.90	12.02	8.13	3.45	2.07	2.01	0.00	0.40	0.24	0.10	0.10	**19.34**	**11.24**
Pochampad II	1.71	0.58	8.90	7.81	4.00	1.47	2.85	0.51	0.36	0.23	0.04	0.04	**17.78**	**10.56**
Priyadarshini Jurala	11.40	11.16	48.49	37.48	43.52	32.12	14.20	6.28	2.63	2.13	0.31	0.31	**119.93**	**88.85**
Lower Jurala	27.68	51.47	49.13	37.63	103.93	81.97	49.17	36.79	5.05	4.66	0.19	0.19	**234.77**	**212.33**
Pulichintala	9.74	10.22	46.55	43.14	31.84	22.74	22.22	16.82	2.29	2.01	0.54	0.54	**112.10**	**94.39**
Total	**970.44**	**979.50**	**2,803.39**	**2,068.71**	**2,195.42**	**1951.22**	**1,015.29**	**678.96**	**334.74**	**300.54**	**118.19**	**118.18**	7201.10	5860.75
AFC approved for FY 2027-28														
KTPS-V	69.18	1.44	315.03	243.94	78.01	141.46	-	0.10	38.50	34.97	17.12	17.12	**483.60**	**404.79**
KTPS-VI	22.50	45.25	312.36	243.82	153.83	153.68	-	0.00	37.06	34.23	9.59	9.59	**516.16**	**467.40**
KTPS-VII	229.30	186.42	673.00	574.29	382.55	328.62	240.89	184.59	71.04	63.61	12.19	12.19	**1584.59**	**1325.35**
RTS-B	-	0.00	-		-		-	0.00	-		-	-	**0.00**	**0.00**
KTPP-I	20.50	88.68	242.08	212.47	160.21	158.38	-	0.00	33.14	31.60	31.50	31.50	**424.43**	**459.64**
KTPP-II	115.25	127.75	292.42	241.34	236.41	235.56	81.88	57.46	41.59	38.36	33.63	33.63	**733.92**	**666.83**
BTPS	347.74	280.09	531.29	224.40	619.63	518.27	496.85	314.84	87.74	72.14	13.07	13.07	**2070.18**	**1396.67**
Hydro														
Nagarjuna Complex	76.11	87.97	180.20	139.02	136.60	97.82	-	0.10	8.65	7.34	1.12	1.12	**400.44**	**331.03**
Srisailam LB	68.32	86.43	171.85	118.43	235.33	171.02	35.26	0.00	11.60	9.31	3.16	3.16	**519.20**	**382.02**
Small Hydel	2.84	2.64	58.03	49.89	9.86	6.03	0.72	0.00	1.56	1.29	0.29	0.29	**72.72**	**59.56**

Mini Hydel	1.56	0.90	12.66	8.60	3.45	2.07	1.82	0.00	0.41	0.25	0.11	0.11	**19.79**	**11.71**
Pochampad II	1.71	1.13	9.39	8.26	4.00	1.47	2.67	0.44	0.37	0.24	0.04	0.04	**18.10**	**11.50**
Priyadarshini Jurala	11.40	11.40	51.05	39.62	43.52	32.12	13.04	3.87	2.67	2.15	0.33	0.33	**121.35**	**88.82**
Lower Jurala	27.68	51.47	51.73	39.77	103.93	81.97	46.35	31.54	5.07	4.64	0.20	0.20	**234.56**	**209.18**
Pulichintala	9.74	10.22	49.02	45.62	31.84	22.74	21.20	15.19	2.33	2.05	0.56	0.56	**113.57**	**95.26**
Total	**1,003.83**	**981.79**	**2,950.11**	**2,189.47**	**2,199.17**	**1951.22**	**940.68**	**608.11**	**341.72**	**302.18**	**122.91**	**122.91**	**7312.61**	**5909.76**
AFC approved for FY 2028-29														
KTPS-V	69.18	1.44	331.13	257.63	63.70	141.46	-	0.00	39.17	35.25	17.80	17.80	**485.38**	**417.98**
KTPS-VI	22.50	45.25	328.46	257.52	154.19	153.68	-	0.00	37.86	34.52	9.98	9.98	**533.03**	**480.99**
KTPS-VII	231.11	186.42	709.30	603.39	383.48	328.62	218.24	165.37	72.32	63.98	12.67	12.67	**1601.78**	**1335.11**
RTS-B	-	0.00	-		-		-	0.00	-		-	-	**0.00**	**0.00**
KTPP-I	20.50	88.68	254.21	224.44	160.57	158.38	-	0.00	33.83	31.84	32.76	32.76	**436.35**	**470.59**
KTPP-II	115.25	127.75	306.98	254.93	236.41	235.56	70.01	44.30	42.22	38.46	34.97	34.97	**735.90**	**666.03**
BTPS	347.74	280.09	557.81	237.19	619.63	518.27	461.20	286.04	88.71	72.04	13.60	13.60	**2061.49**	**1380.02**
Hydro														
Nagarjuna Complex	76.25	87.97	189.84	146.88	137.37	97.82	-	0.00	8.86	7.50	1.17	1.17	**411.15**	**339.00**
Srisailam LB	68.32	86.43	180.63	125.10	235.33	171.02	28.33	0.00	11.70	9.45	3.29	3.29	**521.02**	**388.70**
Small Hydel	2.84	2.84	61.26	52.75	9.86	6.03	0.36	0.00	1.62	1.35	0.30	0.30	**75.64**	**62.68**
Mini Hydel	1.56	0.90	13.33	9.09	3.45	2.07	1.62	0.00	0.42	0.26	0.11	0.11	**20.27**	**12.21**
PochampadII	1.71	1.71	9.90	8.73	4.00	1.47	2.50	0.36	0.38	0.26	0.04	0.04	**18.45**	**12.50**
Priyadarshini Jurala	11.40	11.40	53.76	41.88	43.52	32.12	11.88	1.46	2.71	2.16	0.34	0.34	**122.93**	**88.68**
Lower Jurala	27.68	51.47	54.47	42.03	103.93	81.97	43.53	26.29	5.10	4.62	0.20	0.20	**234.51**	**206.17**
Pulichintala	9.74	10.22	51.63	48.25	31.84	22.74	20.17	13.56	2.37	2.08	0.59	0.59	**115.16**	**96.26**
Total	**1,005.77**	**982.57**	**3,102.72**	**2,309.80**	**2,187.28**	**1951.22**	**857.83**	**537.38**	**347.26**	**303.78**	**127.83**	**127.82**	**7373.06**	**5956.92**

66. **Operational Parameters**

Petitioner's Claim

5.1.75 TGGenco has submitted the station wise operational parameter for the each of the thermal generating stations for the control period of the FY 2024-25 to FY 2028-29. In addition to above, TGGENCO requested the Commission to revise the normative auxiliary consumption for BTPS generating stations from 8.50% to 8.792%.

Commission's View

5.1.76 Clause 44 of (Multi Year Tariff) Regulation 2 of 2023 specifies the operational parameters. The relevant extract of the Regulation is as follows:

> ***"44 Operational Norms for Generating Stations***
>
> *44.1 Recovery of capacity charge, energy charge and any incentive by the generating station shall be based on the achievement of operational norms specified in this Regulation.*
>
> *44.2 The Normative Annual Plant Availability Factor (NAPAF) for Thermal Generating Stations for full recovery of Annual Fixed Charges shall be 85 per cent.*
>
> *44.3 Normative Annual Plant Load Factor (NAPLF) for incentive for thermal Generating Stations/Units shall be 85 per cent.*
>
> *44.7 Auxiliary Energy Consumption for all coal-based thermal Generating Stations shall be as given in the Table below:*

ENCLOSURE 5

LETTER FROM TGGENCO DATED 12.05.2025

TELANGANA POWER GENERATION CORPORATION LIMITED
VIDYUT SOUDHA :: HYDERABAD-500082
CIN:U40102TG2014SGC094070, Phone No:040-23499407
Website:www.tggenco.com Email ID:ce.cth@tggenco.com

From:
The Chief Engineer/Civil/Thermal,
TGGENCO, Vidyut Soudha,
Hyderabad-500082

To:
Prof. Vegesna Satyanarayana Raju,
Daffodil, 105,
LnT Serene County,
Telecom Nagar, Gachibowli,
Hyderabad 500032

Lr.No.CE/Civil/Thermal/SE.TCD-I/EE3/F.E-458/D.No.44/2025-26, Dt.12.05.2025.

Sir,

Sub: KTPS V&VI Stages- Preparation of Detailed Project Report for Raising of Additional Ash Pond bunds from Ch: 0M to 3200M and Suraram bund from Ch:4400M to Ch:5450M from EL(+) 115.50M to EL(+) 120.50M including raising of Wells and Spillway at Paloncha, Bhadradri-Kothagudem Dist.– Anticipated Revenue- Details-Furnished-Reg

Ref:
1. P.O.No.CC-17/CE/C/Th/SE/C/TCD-I/EE/C/Dvn-III/KTPS-V&VI/F.E-427/ D.No.210/ 23-24,Dt.28.08.2023.
2. Your e-mail Dt:24.04.2025
3. Lr.No.CE / O&M / SE / Civil / KTPS-V & VI Stages / F.Dkt / D.No.200 / 2025-26, Dt.08.05.2025.

****

With reference to email 2nd cited, the details of anticipated revenue from the Power generation of KTPS V Stage (2x250 MW) & KTPS-VI Stage (1x500MW) during life period of additional ash pond of with proposed bund raising from EL (+) 115.50M to EL (+) 120.50M, as received from the Chief Engineer/O&M/KTPS V&VI Stages vide reference 3rd cited is enclosed herewith, for taking further necessary action for preparation of Detailed Project Report.

Encl: As above

Yours faithfully,

12/05/25

CHIEF ENGINEER/CIVIL/THERMAL

Copy to the:
1. Chief Engineer/O&M/ KTPS-V & VI Stages/ Paloncha-507115/ Bhadradri-Kothagudem Dist.
2. Superintending Engineer/ Civil/ KTPS- V & VI Stages/ Paloncha-507115/ Bhadradri-Kothagudem Dist.
3. AEE (T) to Director/Civil/TGGENCO/VidyutSoudha/Hyderabad-82.

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TELANGANA POWER GENERATION CORPORATION LIMITED
KTPS-V&VI STAGES:PALONCHA
(AN ISO 900L:2008 accredited plant)
Website: www.tsgenco.co.in , Email.Id: ce.ktps5@tsgenco.co.in

From
The Chief Engineer/O&M,
KTPS-V&VI Stages,
New Paloncha.

To
The Chief Engineer/Civil/ Thermal
TGGENCO, Vidyut Soudha
Hyderabad-500082

Lr.No.CE/ O&M/SE/Civil/KTPS- V&VI Stages /F.Dkt/D.No.200 /2025-26, Dt. 8 .05.2025

Sir,

Sub: KTPS-V&VI Stages –Raising of Additional ash pond bunds from Ch:- 0M to 3200M and Suraram bund from Ch:- 4400m to Ch:- 5450 from EL(+) 115.50M to EL(+) 120.50M including raising of wells and spillway at Paloncha, Bhadradri Kothagudem Dist - Preparation of Detailed Project Report – **Certain Details furnished** - Regarding.

Ref: 1) Lr.No.CE/Civil/Thermal/SE.TCD-I/EE3/F.E458/D.No.26/25-26,Dt. 28.04.2025
2) Lr.No.DE/E&P/KTPS-V&VI/E&P-VI/F.No.03/D.No.27/25-26, Dt. 06.05.2025

*****

With reference to the above, the following data for preparation of DPR as requested by the consultant i.e; revenue to be generated from power generation of KTPS-V&VI stages during the life of the ash pond i.e; 4 years 6 months is furnished below for taking further action please.

FY/period	Fixed Charges (Rs. Crore)		Variable Charges (Rs. Crore)	
	KTPS-V	KTPS-VI	KTPS-V	KTPS-VI
2025-26	380.62	442.36	1213.92	1030.19
2026-27	392.37	454.53	1238.32	1131.51
2027-28	404.79	467.40	1266.48	992.00
2028-29	417.98	480.99	1163.03	1093.31
6 months in 2029-30	215.26	247.71	658.82	516.11
Total (Rs. Crore)	**1811.02**	**2092.99**	**5540.57**	**4763.11**

Note:-
Fixed charges and energy charge rate as per the clause 65 & 67 of TGERC MYT for 2024-25 to 2028-29 for TGGenco dated 28.10.2024 respectively.

Assumptions:-

- *Ex-Bus Availability of > 85% shall be achieved.i.e; full fixed charges shall be claimed.*
- *KTPS-V: 72% PLF for every FY except that with COH (65% for 2028-29).*
- *KTPS-VI: 70% for FY with no overhaul, 65% for FY with AOH, 60% for FY with COH (2027-28) & 65% for 2028-29 and 60% for 2029-30 in view of operation at 40% TML from August'2028.*
- *ECR for 2029-30 is arrived by 2% hike on that for FY 2028-29 for both V&VI stages.*
- *Fixed charges for 2029-30 are arrived by 3% hike on that for FY 2028-29 for both V&VI stages.*
- *APC for KTPS-V:10% & KTPS-VI:5.25%.*

Hence, the total anticipated Revenue for the above period is Rs.14207.69 crore.

Yours faithfully

08/05/2025

Chief Engineer/O&M
KTPS-V&VI Stages, Paloncha.

Copy to the Executive Engineer/Civil/O&M-II/KTPS-V&&VI Stages for information.

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ANNEXURE 1

COPY OF REPORT ON “RAISING OF ADDITIONAL ASHPOND BUND (STAGE III)” AT KTPS BY PROF. V. S. RAJU CONSULTANTS DATED 14-08-2024

VSR CONSULTANTS VALUE ENGINEERING	**Prof. V.S. RAJU CONSULTANTS (Geotechnical and Structural) Gachibowli, Hyderabad – 500 032**

Document No. VSRC/TGGENCO/KTPS/AAD/SIII/DCPT/01 **DATED: 14-08-2024**

Addendum 1 to "Report on Raising of Additional Ash Pond bund (Stage III)"

Project

Kothagudem Thermal Power Station,

Kothagudem

Client

Telangana Power Generation Corporation Limited

		A. Chenna Reddy	C.R. Balaji	
14.08.2024	**R0**	**A. CHENNA REDDY**	**C.R. BALAJI**	**PROF. V. S. RAJU**
DATE	**REVISION**	**PREPARED BY**	**REVIEWED BY**	**REVIEWED AND APPROVED BY**

The Team:

Prof. V.S. Raju

(Formerly: Director, IIT Delhi;
Prof & Dean, IIT Madras)

Mr. C. R. Balaji, Principal Engineer, B.E, MASCE, MIEI, MIGS

Geotechnical Engineer:

Mr. A. Chenna Reddy, M Tech

Table of Contents

S No	Description	Page No
1.	Preamble	1
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ENCLOSURES:

Enclosure 1	Test locations and termination depths of DCPTs
Enclosure 2	Correlation used for obtaining Standard Penetration Test Resistance SPT N value from DCPT Resistance (N_{cbr})
Enclosure 3	Correlation between corrected SPT N and Angle of Internal Friction as per Fig: 1 of IS 6403 -1981 (Reaffirmed 2021)
Enclosure 4	Detailed Procedure to calculate the Angle of Internal Friction of Soil from DCPT
Enclosure 5	Critical slip circles for proposed stage III bund

ANNEXURES:

Annexure 1	Copy of Report on raising of Additional Ash Pond bund (Stage III) dated 15.11.2023
Annexure 2	Copy of DCPT report by Annoor Test Labs and Engineering Services Pvt. Ltd., May 2024

Addendum 1 to "Report on Raising of Additional Ash Pond bund (Stage III)" at KTPS

14.08.2024

1. Preamble:

A "Report on raising of Additional Ash Pond bund (Stage III)" at Kothagudem Thermal Power Station (KTPS) (Report No. VSRC/TSGENCO/KTPS/AD/SIII/01 dated 15.11.2023) was communicated vide email dated 15.11.2023 (See Annexure 1). The report dealt with the slope stability analysis for the proposed cross-section of the ash pond bund for final stage.

The soil parameters (cohesion, angle of internal friction and bulk unit weight) for starter bund and the foundation soil were considered from the report titled "Augmentation of Ash bund at Kothagudem Thermal Power Plant (KTPS)" given by Department of Ocean Engineering, IIT Madras dated December 2002).

To confirm the shear parameters of the bund material and ash considered in the slope stability analysis of ash ponds, geotechnical investigations ((Dynamic Cone Penetration Tests (DCPT) and Short Boreholes) were recommended for Additional Ash Pond (D Pond) vide email dated 02nd November 2023. Accordingly, investigations were carried out and "Report for Dynamic Cone Penetration Test & Auger Boring at Additional Ash Pond" was communicated by TGGENCO on 02.08.2024.

This addendum gives the slope stability analysis of the proposed cross section of the ash pond bund for final stage with shear parameters for the bund material and ash obtained from DCPT & Hand auger boring test results.

2. Ash Dyke Details:

The total height of the dyke at chainage 1600 m is 28 m (from EL + 88 m to EL + 116 m). Typical cross-sections of existing dyke and proposed stage III bund are shown in figures 1 & 2 below:

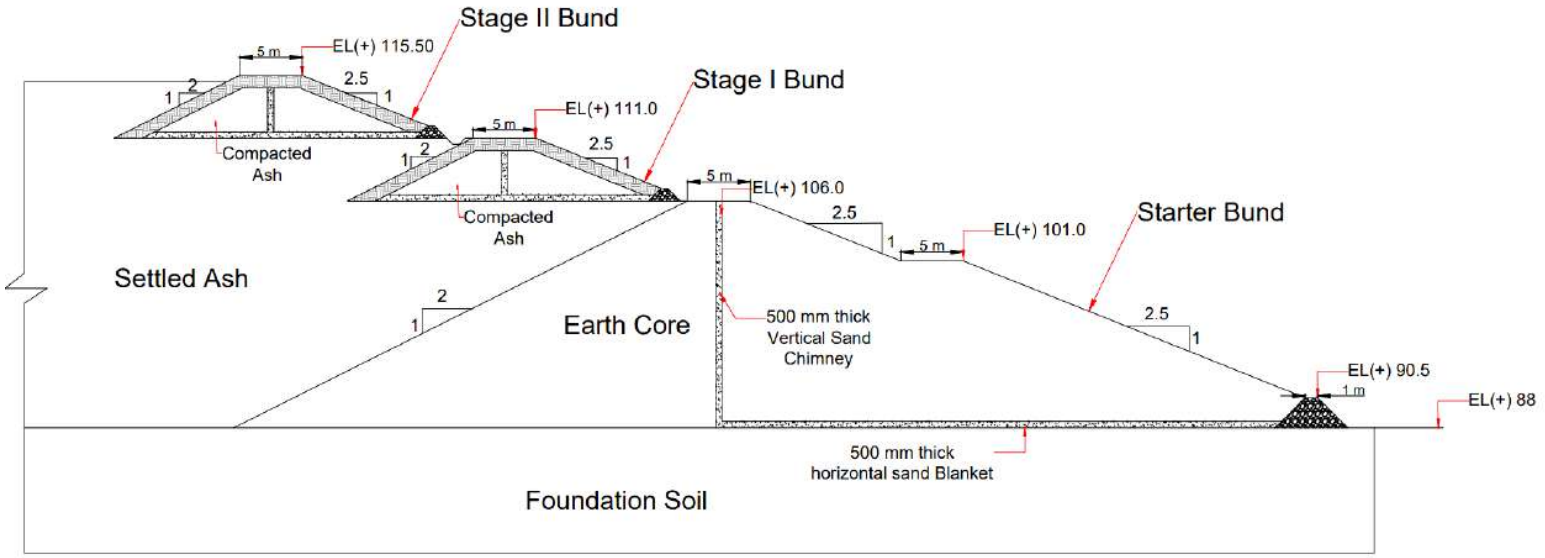


Fig 1: Typical cross section (Existing - Upto Stage II)

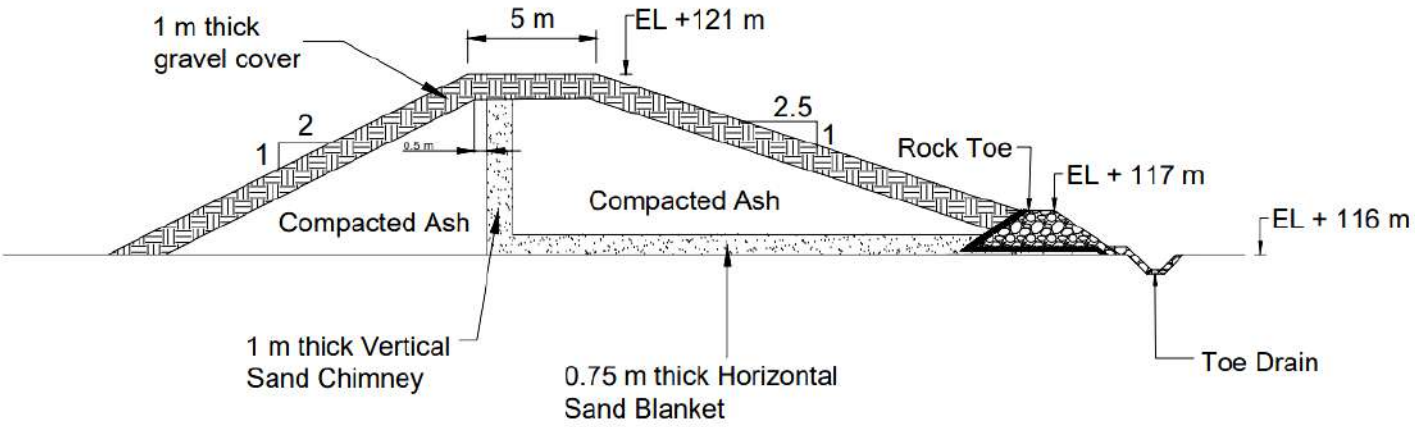


Fig 2: Typical cross section of Proposed Stage III bund

3. Details of Geotechnical Investigations carried out:

Annoor Test Labs and Engineering Services Pvt. carried out the DCPTs in May 2024. See Annexure 2 for copy of the report.

DCPTs have been carried out along the length of the Ashpond bund (approximately 4.2 km). A total of 63 DCPTs were carried out along the length of ash pond bund. Out of which, 44 were carried out at EL + 115 m at a distance of 10 m and 20 m from upstream edge of the bund. 15 DCPTs were carried out at EL + 106 m and the remaining 4 were carried out at EL + 111 m of the embankment. The maximum depth of penetration is about 10 m from the top of the settled ash.

Hand auger borings were carried at 14 locations. Out of which, 10 were carried out at EL + 106 m and the remaining 4 were carried out at EL + 111 m of the embankment. Maximum depth of auger bores conducted is only 4.5 m from respective elevations.

For test locations and termination depths of all the DCPTs and hand auger borings, see Enclosure 1.

4. Soil Parameters for Analysis:

Dynamic cone penetration tests were conducted as per IS 4968 (Part 1) –1976 (Reaffirmed 2007). The penetration resistance to drive a 60 mm diameter cone for every 100 mm has been recorded. The number of blows required to penetrate the cone for every 300 mm into the soil is denoted as N_{cbr}. The correlation used for obtaining Standard Penetration Test resistance SPT N value from N_{cbr} (as per Cl. 0.2.1 of IS 4968 Part 1 is given below (see Enclosure 2 for the extract from IS code).

(N_{cbr} / 1.5) = N up to depth of 4 m.

N_{cbr} / 1.75) = N for depths from 4 m to 9 m.

The angle of internal friction is obtained from correlation between corrected SPT N and angle of internal friction as per Fig: 1 of IS 6403 -1981 (Reaffirmed 2021). See Enclosure 3. The detailed procedure to calculate the angle of internal friction of soil from DCPT is given in Enclosure 4. Table 1 below shows the material properties adopted for the analysis (It is to be noted that only the angle of internal friction values considered for the starter bund and the foundation soil need to be modified based on DCPT results. The Ø values of 33^0 are to be used instead of 35^0):

Table 1: Material properties adopted for the Analysis.

Components	Unit weight (kN/m^3)	Cohesion (c) kPa	Angle of internal friction (Ø)
Starter Bund	18.5	-	33°
Gravel Cover of bunds of stages I, II & III	20	-	35°
Sand Filter	18	-	32°
Rock Toe	20	-	40°
Settled Ash below bunds of stages I, II & III	12	-	15°
Compacted Ash (inner core of bunds of Stages I & II)	12	-	25°
Compacted Ash (inner core of bund of Stage III)	12	-	27°
Compacted Ash (below bunds of stages I & II)	12	-	17°
Compacted Ash (below bund of stage III)	12	-	25°
Foundation Soil below starter bund	18.5	-	33°

5. Slope stability Analysis:

Slope stability analysis has been carried out using soil and ash properties obtained from DCPT results. The slope stability analyses are carried out by using GeoStudio software.

6. Results of Slope Stability Analysis:

The downstream slope is analyzed for the ash pond full condition for the proposed raising. The summary of factor of safeties obtained are given in Table 2:

Table 2: Summary of Factor of safeties (FoS)

For bunds at Different levels	Critical FoS (Analysis based on DCPT results)
From EL + 121 m to EL + 116 m (Stage III bund alone)	1.5
From EL + 121 m to EL +111 m (Stage III and II bunds)	1.4
From EL + 121 m to EL + 106 m (Stage III, II and I bunds)	1.3
From EL + 121 m to Starter Bund	1.5

As can be seen from the above table, Factor of Safeties (FoS) are greater than minimum required FoS of 1.3 as per “clause 5.1.1 of IS: 7894 - 1975 (Reaffirmed 2021) – Code of practice for stability analysis of earth dams”. Enclosure 5 shows the critical slip circles for all the above cases.

7. Summary and Recommendations:

- ✓ The analysis has been carried out based on the shear parameters from Dynamic Cone Penetration Tests.

- ✓ The proposed Stage III bund has enough factor of safety (See Table 2) and the same can be executed.

- ✓ **Important**: The top 2 m of settled ash below the base of the proposed stage III bund and 10 m beyond the upstream edge is to be removed by open excavation. The same is to be backfilled and compacted in layers. Refer to para 3 "Improvement of Settled Ash below Stage III bund" of our report dated 15.11.2023.

ANALYSIS & REPORT BY	REVIEWED BY	REVIEWED & APPROVED BY
(A. CHENNA REDDY)	(C.R. BALAJI)	(Prof. V.S. RAJU)

8. References:

- IS: 7894-1975 (Reaffirmed 2021) - Code of practice for stability analysis of earth dams
- Stability modelling with Slope/w by GEO-slope International Limited.
- IRC:78-2014 Standard Specifications and Code of Practice for Road Bridges

ENCLOSURE 1

TEST LOCATIONS AND TERMINATION DEPTHS OF DCPTS

A) The List of DCPT tests conducted in the Additional ash pond over the existing top layers of ash surface at a distance of 10m and 20 m at each location at an El (+) 115.0m (AGREEMENT ITEM NO 3)

The List of DCPT tests conducted are from BH 1 to BH 45 (Total 45 Tests)

The List of DCPT tests conducted are from BH 1 to BH 45 as mentioned in the below table

Sl. No.	Bore hole No.	Bore Hole ID	Chainage (m)	Cross chainage (m)	Elevation	Depth of Investigation (m)
1.	BH 1	AAP-0-10-115	0	10	(+)115	10.00
2.	BH 2	AAP-0-20-115	0	20	(+)115	10.00
3.	BH 3	AAP-200-10-115	200	10	(+)115	3.50
4.	BH 4	AAP-200-20-115	200	20	(+)115	10.00
5.	BH 5	AAP-400-10-115	400	10	(+)115	4.50
6.	BH 6	AAP-400-20-115	400	20	(+)115	10.00
7.	BH 7	AAP-600-10-115	600	10	(+)115	4.00
8.	BH 8	AAP-600-20-115	600	20	(+)115	10.00
9.	BH 9	AAP-800-10-115	800	10	(+)115	4.50
10.	BH 10	AAP-800-20-115	800	20	(+)115	10.00
11.	BH 11	AAP-1000-10-115	1000	10	(+)115	4.50
12.	BH 12	AAP-1000-20-115	100 1000	20	(+)115	6.00
13.	BH 13	AAP-1200-10-115	1200	10	(+)115	3.00
14.	BH 14	AAP-1200-20-115	1200	20	(+)115	4.00
15.	BH 15	AAP-1400-10-115	1400	10	(+)115	4.50
16.	BH 16	AAP-1400-20-115	1400	20	(+)115	4.50
17.	BH 17	AAP-1600-10-115	1600	10	(+)115	4.50
18.	BH 18	AAP-1600-20-115	1600	20	(+)115	10.00
19.	BH 19	AAP-1800-10-115	1800	10	(+)115	4.50
20.	BH 20	AAP-1800-20-115	1800	20	(+)115	10.00
21.	BH 21	AAP-2000-20-115	2000	20 10	(+)115	10.00
22.	BH 22	AAP-2000-10-115	2000	10 20	(+)115	4.50
23.	BH 23	AAP-2200-20-115	2200	20 10	(+)115	10.00
24.	BH 24	AAP-2200-10-115	2200	10 20	(+)115	10.00
25.	BH 25	AAP-2400-20-115	2400	20 10		10.00

Sl. No.	Bore hole No.	Bore Hole ID	Chainage	Cross chainage	Elevation	Depth of Investigation (m)
26.	BH 26	AAP-2400-10-115	2400	10 20	(+)115	4.50
27.	BH 27	AAP-2600-20-115	2600	20 10	(+)115	10.00
28.	BH 28	AAP-2600-10-115	2600	10 20	(+)115	6.00
29.	BH 29	AAP-2800-20-115	2800	20 10	(+)115	10.00
30.	BH 30	AAP-2800-10-115	2800	10 20	(+)115	10.00
31.	BH 31	AAP-3000-20-115	3000	20 10	(+)115	10.00
32.	BH 32	AAP-3000-10-115	3000	10 20	(+)115	10.00
33.	BH 33	AAP-3200-20-115	3200	20 10	(+)115	10.00
34.	BH 34	AAP-3200-10-115	3200	10 20	(+)115	6.00
35.	BH 35	AAP-5200-20-115	5200	20 10	(+)115	10.00
36.	BH 36	AAP-5200-10-115	5200	10 20	(+)115	6.00
37.	BH 37	AAP-5000-10-115	5000	10	(+)115	6.00
38.	BH 38	AAP-5000-20-115	5000	20	(+)115	10.00
39.	BH 39	AAP-4800-10-115	4800	10	(+)115	4.50
40.	BH 40	AAP-4800-20-115	4800	20	(+)115	10.00
41.	BH 41	AAP-4600-20-115	4600	20 10	(+)115	10.00
42.	BH 42	AAP-4600-10-115	4600	10 20	(+)115	4.50
43.	BH 43	AAP-4400-20-115	4400	20 10	(+)115	4.50
44.	BH 44	AAP-4400-10-115	4400	10 20	(+)115	4.50
45.	BH 45	AAP-SB-5400-111	5400	--	(+)106	4.50

Note: - BH – Bore Hole, AAP – Additional Ash Pond, SB – Suraram Bund

Ex. AAP-0-10-115 means DCP Test conducted in the Additional Ash Pond at Chainage 0 at Cross Chainage 10.0m at an Elevation 115.0 m

SKETCH SHOWING THE DCPT TESTS CONDUCTED IN THE ADDITIONAL ASH POND OVER THE EXISTING ASH SURFACE @EI 115
FROM BH-1 TO BH-45
Ch 1400
Ch 3200
Ch 4400
Ch 0M
Spillway
Additional Ash pond
AB pond
'F' well
BUND

B) List of DCPT tests conducted in the Additional ash pond over the existing earth surface along the axis and toe of bund at an El (+) 106.0m and at an EI (+) 111.0m

(AGREEMENT ITEM NO 2)

The list of DCPT tests conducted are from BH 46 to BH 60 at an EI (+) 106.0m as mentioned in the below table

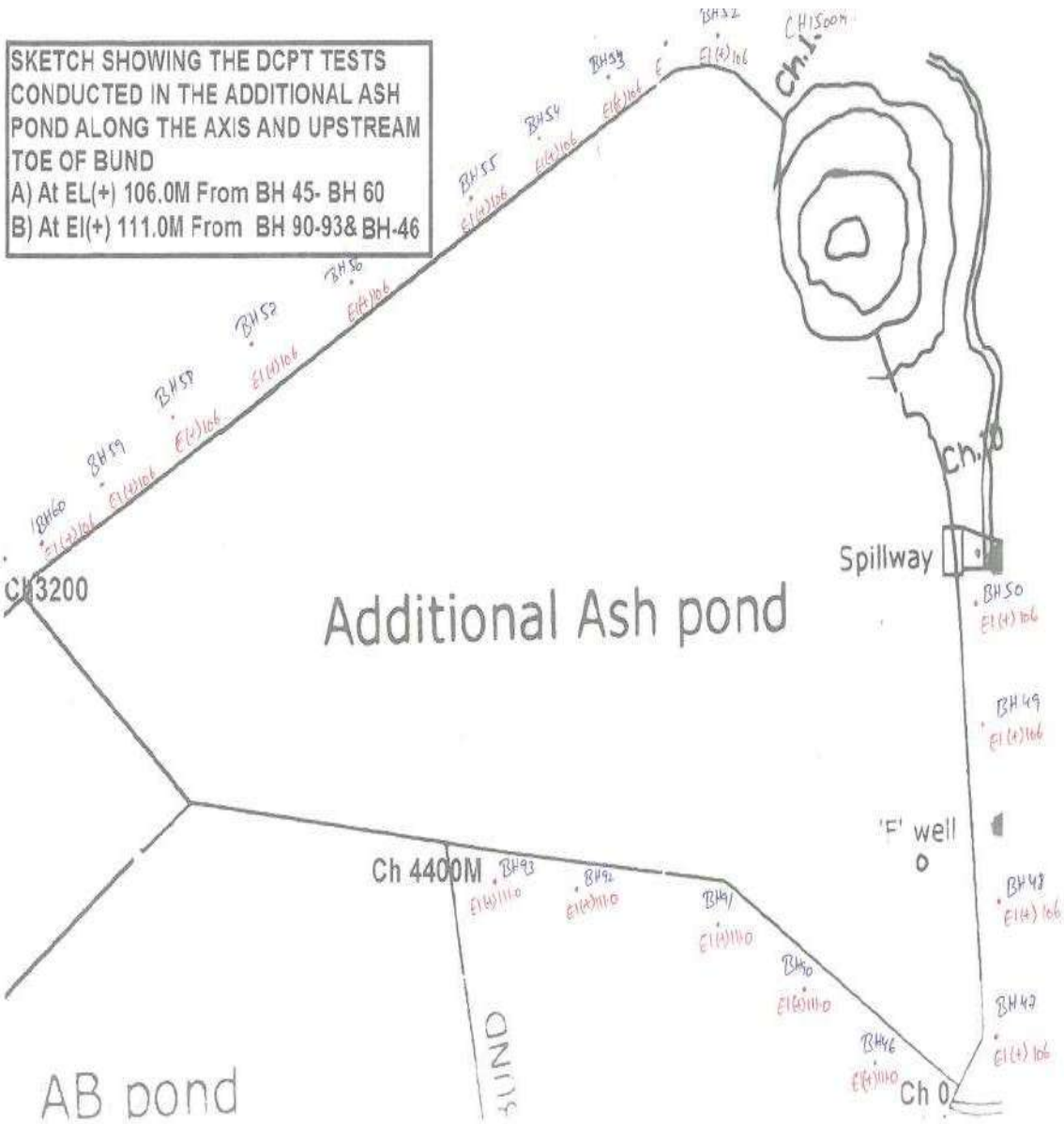
The list of DCPT tests conducted are from BH 90 to BH 93 at an EI (+) 111.0m as mentioned in the below table

S. No	Bore hole No.	Bore Hole ID	Chainage	Cross chainage	Elevation	Depth of Investigation (m)
46.	BH 46	AAP-SB-5200-111	5200	--	(+)106	4.50
47.	BH 47	AAP-0-E-106	0	--	(+)106	2.30
48.	BH 48	AAP-200-E-106	200	--	(+)106	3.00
49.	BH 49	AAP-400-E-106	400	--	(+)106	2.70
50.	BH 50	AAP-E-700-106	700	--	(+)106	2.00
51.	BH 51	AAP-1500-E-106	1500	--	(+)106	1.50
52.	BH 52	AAP-1600-E-106	1600	--	(+)106	2.00
53.	BH 53	AAP-1800-E-106	1800	--	(+)106	2.20
54.	BH 54	AAP-2000-E-106	2000	--	(+)106	1.60
55.	BH 55	AAP-2200-E-106	2200	--	(+)106	2.50
56.	BH 56	AAP-2400-E-106	240 2400	--	(+)106	1.90
57.	BH 57	AAP-2600-E-106	2600	--	(+)106	1.50
58.	BH 58	AAP-2800-E-106	2800	--	(+)106	2.00
59.	BH 59	AAP-3000-E-106	3000	--	(+)106	2.00
60.	BH 60	AAP-3200-E-106	3200	--	(+)106	2.00
61.	BH 90	AAP-SB-5000-111	5000	--	(+)111	3.50
62.	BH 91	AAP-SB-4800-111	4800	--	(+)111	3.50
63.	BH 92	AAP-SB-4600-E-111	4600	--	(+)111	3.50
64.	BH 93	AAP-SB-4400-111	4400	--	(+)111	3.50

Note: - BH – Bore Hole, AAP – Additional Ash Pond, SB – Suraram Bund

Ex. AAP-0-E-106 means DCP Test conducted in the Additional Ash Pond at Chainage 0 at an Elevation 106.0 m

Note: In between BH 50 to BH 51 hillock portion is available. Hence no DCPT tests are carried out in between BH 50 to BH 51.


SKETCH SHOWING THE DCPT TESTS CONDUCTED IN THE ADDITIONAL ASH POND ALONG THE AXIS AND UPSTREAM TOE OF BUND
A) At EL(+) 106.0M From BH 45- BH 60
B) At El(+) 111.0M From BH 90-93& BH-46
Ch 3200
Additional Ash pond
Spillway
'F' well
Ch 4400M
Ch 0
AB pond
BUND

ENCLOSURE 2

CORRELATION USED FOR OBTAINING

SPT N VALUE FROM DCPT RESISTANCE (Ncbr)

Indian Standard

METHOD FOR SUBSURFACE SOUNDING FOR SOILS

PART I DYNAMIC METHOD USING 50 mm CONE WITHOUT BENTONITE SLURRY

(First Revision)

0. FOREWORD

0.1 This Indian Standard (Part I) (First Revision) was adopted by the Indian Standards Institution on 22 December 1976, after the draft finalized by the Soil Engineering Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 The resistance N_{cd} (*see* Note) to penetration of the cone in terms of number of blows per 300 mm of penetration may be correlated with the bearing capacity of cohesionless soils and also possibly with the load carrying capacity of piles. The correlations are qualitative rather than quantitative in nature and are influenced by the character of the soils, such as grain-size distribution, surcharge pressure, permeability, and degree of saturation. The extra work required to determine the penetration resistance is small compared to the value of the data obtained, but these data only provide a rough indication of the consistency or relative density of the soil.

NOTE — The resistance to penetration in the standard penetration test (IS : 2131-1963*) shall be designated as N, that to a 50 mm cone as N_{cd} and that to a 62·5 mm cone using bentonite slurry as N_{cbr} [IS : 4968 (Part II)-1976†].

0.2.1 Correlation between cone penetration values (N_{cd}) and penetration values obtained by other methods may be developed for a given site by conducting the latter tests adjacent (about 3 to 5 m) to the location of the cone test (*see* Note).

NOTE — However for the 62·5 mm cone driven dry up to a depth of 9 m (without bentonite slurry) [*see* IS : 4968 (Part II)-1976†], for medium to fine sands, the following relationships have been developed by the Central Building Research Institute, Roorkee. These relationships, when utilized, shall be used with caution.

$N_{cbr} = 1{\cdot}5\ N$ up to a depth of 4 m

$N_{cbr} = 1{\cdot}75\ N$ for depths of 4 to 9 m.

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*Method for standard penetration test for soils.

†Method for subsurface sounding for soils: Part II Dynamic method using cone and bentonite slurry (*first revision*).

ENCLOSURE 3

CORRELATION BETWEEN CORRECTED SPT N AND ANGLE OF INTERNAL FRICTION AS PER FIG: 1 OF IS 6403 -1981 (REAFFIRMED 2021)

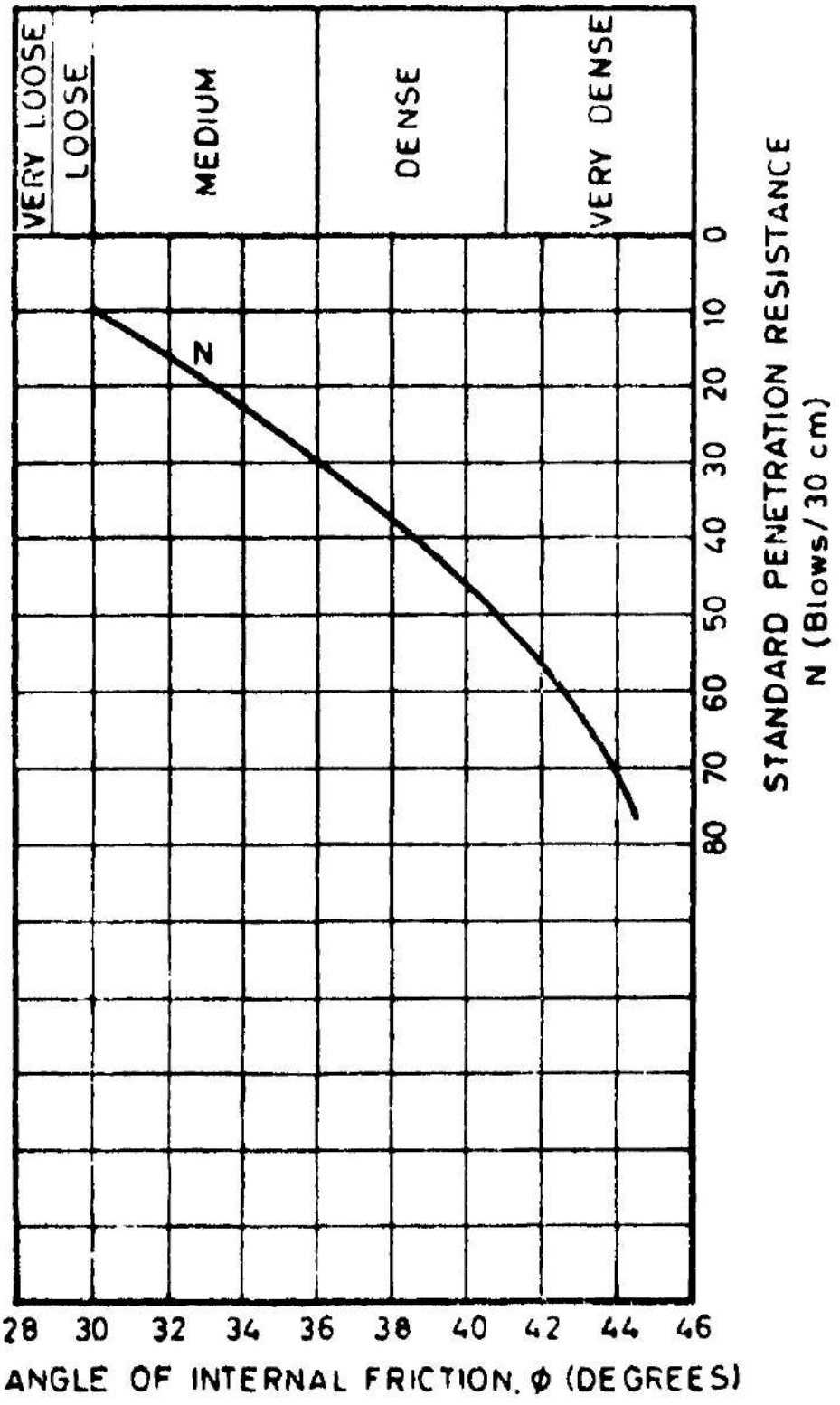


FIG. 1 RELATIONSHIP BETWEEN ϕ AND N

ENCLOSURE 4

DETAILED PROCEDURE TO CALCULATE THE ANGLE OF INTERNAL FRICTION OF SOIL FROM DCPT

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 01, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	9	1.50	6
4.2	5.7	3	1.75	2
5.7	7.2	13	1.75	7
7.2	8.7	8	1.75	5
8.7	10	9	1.75	5

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	6	7	28
4.2	18	76	2	2	26
5.7	18	0	7	12	31
7.2	18	0	5	7	28
10	18	0	5	8	29

Note:
Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')
Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 02, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	7	1.50	5
4.2	5.7	6	1.75	3
5.7	7.2	5	1.75	3
7.2	8.7	8	1.75	5
8.7	10	9	1.75	5

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	5	6	28
4.2	18	76	3	4	27
5.7	18	103	3	4	27
7.2	18	130	5	6	28
10	18	180	5	7	28

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND,

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 03, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	4	1.50	3
2.7	3.2	8	1.50	5
3.2	3.5	105	1.50	70

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	3	4	27
2.7	18	49	5	7	28
3.5	18	63	70	81	44

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 04, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	5	1.50	3
4.2	5.7	3	1.75	2
5.7	7.2	7	1.75	4
7.2	8.7	8	1.75	5
8.7	10	12	1.75	7

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	4	27
4.2	18	76	2	2	26
5.7	18	103	4	4	27
7.2	18	130	5	4	27
10	18	180	7	6	28

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 05, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	6	1.50	4
4.2	4.5	105	1.75	60

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	4	5	27
4.5	18	81	60	64	43

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 06, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	5	1.50	3
4.2	5.7	7	1.75	4
5.7	7.2	5	1.75	3
7.2	8.7	7	1.75	4
8.7	10	9	1.75	5

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	4	27
4.2	18	76	4	4	27
5.7	18	103	3	3	26
7.2	18	130	4	4	27
10	18	180	5	4	27

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND, EL + 115 m, Cross Chainage 10 m

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 07, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	3.7	5	1.50	3
3.7	4	105	1.50	70

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	4	27
4	18	72	70	78	44

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 08, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	6	1.50	4
4.2	5.7	7	1.75	4
5.7	7.2	9	1.75	5
7.2	8.7	4	1.75	2
8.7	10	3	1.75	2

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	4	5	27
4.2	18	76	4	4	27
5.7	18	103	5	5	27
7.2	18	130	2	2	26
10	18	180	2	1	26

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 09, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	4	1.50	3
4.2	4.5	105	1.75	60

GWT	not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	3	26
4.5	18	81	60	64	43

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 10, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	3	1.50	2
4.2	5.7	4	1.75	2
5.7	7.2	6	1.75	3
7.2	8.7	3	1.75	2
8.7	10	4	1.75	2

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	2	2	26
4.2	18	76	2	3	26
5.7	18	103	3	3	26
7.2	18	130	2	2	26
10	18	180	2	2	26

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 11, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	4	1.50	3
4.2	4.5	105	1.75	60

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	3	26
4.5	18	81	60	64	43

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 12, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	4	1.50	3
4.2	5.7	8	1.75	5
5.7	6	105	1.75	60

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	3	26
4.2	18	76	5	5	27
6	18	108	60	59	42

Note:
Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')
Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 13, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	5	1.50	3
2.7	3	105	1.50	70

GWT	not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	3	5	27
3	18	54	70	85	44

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 14, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	4	1.50	3
2.7	3.7	6	1.50	4
3.7	4	46	1.50	31

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	3	4	27
2.7	18	49	4	5	27
4	18	72	31	34	37

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 15, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	8	1.50	5
4.2	4.5	105	1.75	60

GWT	**not met**		**Submerged unit weight (γ')**	**10**	**kN/m^3**
			Bulk unit weight (γ)	**18**	**kN/m^3**

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	5	7	28
4.5	18	81	60	64	43

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 16, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	4	1.50	3
2.7	4.2	5	1.50	3
4.2	4.5	105	1.75	60

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	3	4	27
2.7	18	49	3	4	27
4.5	18	81	60	64	43

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 17, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	4	1.50	3
2.7	4.2	5	1.50	3
4.2	4.5	108	1.75	62

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	3	4	27
2.7	18	49	3	4	27
4.5	18	81	62	66	43

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 18, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	4	1.50	3
4.2	5.7	6	1.75	3
5.7	7.2	8	1.75	5
7.2	8.7	7	1.75	4
8.7	10	8	1.75	5

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	3	26
4.2	18	76	3	4	27
5.7	18	103	5	5	27
7.2	18	130	4	4	27
10	18	180	5	4	27

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 19, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	5	1.50	3
2.7	4.2	6	1.50	4
4.2	4.5	84	1.75	48

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	3	5	27
2.7	18	49	4	5	27
4.5	18	81	48	51	41

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 20, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	5	1.50	3
4.2	5.7	9	1.75	5
5.7	7.2	7	1.75	4
7.2	8.7	8	1.75	5
8.7	10	6	1.75	3

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	4	27
4.2	18	76	5	6	28
5.7	18	103	4	4	27
7.2	18	130	5	4	27
10	18	180	3	3	26

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 21, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	4	1.50	3
4.2	5.7	3	1.75	2
5.7	7.2	5	1.75	3
7.2	8.7	6	1.75	3
8.7	10	6	1.75	3

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	3	26
4.2	18	76	2	2	26
5.7	18	103	3	3	26
7.2	18	130	3	3	26
10	18	180	3	3	26

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 22, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	4	1.50	3
2.7	4.2	6	1.50	4
4.2	4.5	105	1.75	60

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	3	4	27
2.7	18	49	4	5	27
4.5	18	81	60	64	43

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 23, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	6	1.50	4
4.2	5.7	5	1.75	3
5.7	7.2	7	1.75	4
7.2	8.7	8	1.75	5
8.7	10	9	1.75	5

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	4	5	27
4.2	18	76	3	3	26
5.7	18	103	4	4	27
7.2	18	130	5	4	27
10	18	180	5	4	27

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 24, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	3	1.50	2
4.2	5.7	4	1.75	2
5.7	7.2	4	1.75	2
7.2	8.7	5	1.75	3
8.7	10	6	1.75	3

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	2	2	26
4.2	18	76	2	3	26
5.7	18	103	2	2	26
7.2	18	130	3	3	26
10	18	180	3	3	26

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 25, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	4	1.50	3
4.2	5.7	5	1.75	3
5.7	7.2	6	1.75	3
7.2	8.7	7	1.75	4
8.7	10	6	1.75	3

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	3	26
4.2	18	76	3	3	26
5.7	18	103	3	3	26
7.2	18	130	4	4	27
10	18	180	3	3	26

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 26, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	5	1.50	3
2.7	4.2	6	1.50	4
4.2	4.5	105	1.75	60

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	3	5	27
2.7	18	49	4	5	27
4.5	18	81	60	64	43

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 27, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	4	1.50	3
4.2	5.7	5	1.75	3
5.7	7.2	6	1.75	3
7.2	8.7	7	1.75	4
8.7	10	6	1.75	3

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	3	26
4.2	18	76	3	3	26
5.7	18	103	3	3	26
7.2	18	130	4	4	27
10	18	180	3	3	26

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 28, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	7	1.50	5
4.2	5.7	9	1.75	5
5.7	6	108	1.75	62

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	5	6	28
4.2	18	76	5	6	28
6	18	108	62	60	43

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 29, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	4	1.50	3
4.2	5.7	6	1.75	3
5.7	7.2	5	1.75	3
7.2	8.7	6	1.75	3
8.7	10	7	1.75	4

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	3	26
4.2	18	76	3	4	27
5.7	18	103	3	3	26
7.2	18	130	3	3	26
10	18	180	4	3	26

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 30, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	5	1.50	3
4.2	5.7	7	1.75	4
5.7	7.2	8	1.75	5
7.2	8.7	8	1.75	5
8.7	10	9	1.75	5

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	4	27
4.2	18	76	4	4	27
5.7	18	103	5	5	27
7.2	18	130	5	4	27
10	18	180	5	4	27

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 31, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	5	1.50	3
4.2	5.7	6	1.75	3
5.7	7.2	8	1.75	5
7.2	8.7	8	1.75	5
8.7	10	11	1.75	6

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	4	27
4.2	18	76	3	4	27
5.7	18	103	5	5	27
7.2	18	130	5	4	27
10	18	180	6	5	27

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 32, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	6	1.50	4
4.2	5.7	6	1.75	3
5.7	7.2	7	1.75	4
7.2	8.7	9	1.75	5
8.7	10	10	1.75	6

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	4	5	27
4.2	18	76	3	4	27
5.7	18	103	4	4	27
7.2	18	130	5	5	27
10	18	180	6	5	27

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 33, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	5	1.50	3
4.2	5.7	6	1.75	3
5.7	7.2	7	1.75	4
7.2	8.7	8	1.75	5
8.7	10	9	1.75	5

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	4	27
4.2	18	76	3	4	27
5.7	18	103	4	4	27
7.2	18	130	5	4	27
10	18	180	5	4	27

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 34, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	5	1.50	3
2.7	4.2	8	1.50	5
4.2	5.7	11	1.75	6
5.7	6	108	1.75	62

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	3	5	27
2.7	18	49	5	7	28
4.2	18	76	6	7	28
6	18	108	62	60	43

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 35, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	5	1.50	3
4.2	5.7	6	1.75	3
5.7	7.2	7	1.75	4
7.2	8.7	8	1.75	5
8.7	10	9	1.75	5

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	4	27
4.2	18	76	3	4	27
5.7	18	103	4	4	27
7.2	18	130	5	4	27
10	18	180	5	4	27

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 36, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	6	1.50	4
4.2	5.7	8	1.75	5
5.7	6	108	1.75	62

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	4	5	27
4.2	18	76	5	5	27
6	18	108	62	60	43

Note:
Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')
Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 37, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	5	1.50	3
2.7	4.2	8	1.50	5
4.2	5.7	9	1.75	5
5.7	6	108	1.75	62

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	3	5	27
2.7	18	49	5	7	28
4.2	18	76	5	6	28
6	18	108	62	60	43

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 38, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	6	1.50	4
2.7	4.2	8	1.50	5
4.2	5.7	11	1.75	6
5.7	7.2	15	1.75	9
7.2	8.7	22	1.75	13
8.7	10	36	1.75	21

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	4	6	28
2.7	18	49	5	7	28
4.2	18	76	6	7	28
5.7	18	103	9	9	29
7.2	18	130	13	12	31
10	18	180	21	17	32

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 39, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	5	1.50	3
2.7	4.2	8	1.50	5
4.2	4.5	108	1.75	62

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	3	5	27
2.7	18	49	5	7	28
4.5	18	81	62	66	43

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 40, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	5	1.50	3
2.7	4.2	6	1.50	4
4.2	5.7	7	1.75	4
5.7	7.2	7	1.75	4
7.2	8.7	8	1.75	5
8.7	10	9	1.75	5

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	3	5	27
2.7	18	49	4	5	27
4.2	18	76	4	4	27
5.7	18	103	4	4	27
7.2	18	130	5	4	27
10	18	180	5	4	27

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 41, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	5	1.50	3
4.2	5.7	8	1.75	5
5.7	7.2	9	1.75	5
7.2	8.7	10	1.75	6
8.7	10	10	1.75	6

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	3	4	27
4.2	18	76	5	5	27
5.7	18	103	5	5	27
7.2	18	130	6	5	27
10	18	180	6	5	27

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 42, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	5	1.50	3
2.7	4.2	8	1.50	5
4.2	4.5	108	1.75	62

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	3	5	27
2.7	18	49	5	7	28
4.5	18	81	62	66	43

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 43, EL +115 m, Cross chainage 10 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	3	1.50	2
2.7	4.2	10	1.50	7
4.2	4.5	108	1.75	62

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.7	18	49	7	8	29
4.5	18	81	62	66	43

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 44, EL +115 m, Cross Chainage 20 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	6	1.50	4
2.7	4.2	11	1.50	7
4.2	4.5	108	1.75	62

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	4	6	28
2.7	18	49	7	9	29
4.5	18	81	62	66	43

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 46, EL +106 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.7	7	1.50	5
2.7	4.2	9	1.50	6
4.2	4.5	108	1.75	62

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.5	18	27	5	7	28
2.7	18	49	6	7	28
4.5	18	81	62	66	43

Note:
Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')
Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND, EL + 106 m

Subject: Conversion of DCPT (Ncbr) to Standard Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 47, EL +106 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	1.7	14	1.50	9
1.7	2	21	1.50	14
2	2.3	64	1.50	43

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.5	18	27	9	13	31
2.7	18	49	14	17	32
4.5	18	81	43	46	40

Note:
Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')
Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standard Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 48, EL +106 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.2	13	1.50	9
2.2	2.5	23	1.50	15
2.5	3	51	1.50	34

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	9	13	31
2.5	18	45	15	19	33
3	18	54	34	41	39

Note:
Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')
Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT(Ncbr) to Standard Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 49, EL +106 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.1	27	1.50	18
2.1	2.7	108	1.50	72

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
0.7	18	13	18	31	36
2.7	18	49	72	90	44

Note:
Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')
Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standard Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 50, EL +106 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	1.6	48	1.50	32
1.6	2	108	1.50	72

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
0.7	18	13	32	54	42
2	18	36	72	97	44

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standard Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 51, EL +106m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	1.5	108	1.50	72

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.5	18	27	72	104	45

Note:
Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')
Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standard Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 52, EL + 106 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	1.7	69	1.50	46
1.7	2	108	1.50	72

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	46	70	44
2	18	36	72	97	44

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standard Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 53, EL + 106 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.2	38	1.50	25

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
2.2	18	40	25	33	33

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standard Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 54, EL + 106 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	1.6	108	1.50	72

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.6	18	29	72	102	45

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standard Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 55, EL +106 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.2	13	1.50	9
2.2	2.5	108	1.50	72

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.6	18	29	9	12	31
2.5	18	45	72	91	44

Note:
Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')
Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standard Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 56, EL + 106 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	1.9	108	1.50	72

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.9	18	34	72	98	45

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standard Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 57, EL + 106 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	1.5	108	1.50	72

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.5	18	27	72	104	45

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 58, EL + 106 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	1.7	21	1.50	14
1.7	2	108	1.50	72

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.6	18	29	14	20	33
2.5	18	45	72	91	44

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standard Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 59, EL + 106 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	1.8	108	1.50	72
1.8	2	108	1.50	72

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	72	109	45
2	18	36	72	97	44

Note:
Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')
Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)

Ncbr = 1.5 N (Upto 4 m depth)

Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 60, EL +106 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	1.7	108	1.50	72
1.7	2	108	1.50	72

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	72	109	45
2	18	36	72	97	44

Note:

Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')

Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 90, EL +111 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.9	3	1.50	2
2.9	3.2	4	1.50	3
3.2	3.5	4	1.50	3

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.9	18	52	3	3	26
3.5	18	63	3	3	26

Note:
Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')
Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 91, EL +111 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.9	3	1.50	2
2.9	3.2	3	1.50	2
3.2	3.5	5	1.50	3

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.9	18	52	2	2	26
3.5	18	63	3	4	27

Note:
Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')
Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 92, EL +111 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.9	3	1.50	2
2.9	3.2	3	1.50	2
3.2	3.5	4	1.50	3

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.9	18	52	2	2	26
3.5	18	63	3	3	26

Note:
Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')
Where, P' is Overburden Pressure in kN/m^2

Project: KTPS - D POND

Subject: Conversion of DCPT (Ncbr) to Standrad Penetration Test (SPT N)

As per IS 4968 part I (1976)
Ncbr = 1.5 N (Upto 4 m depth)
Ncbr = 1.75 N (4 m - 9 m depth)

DCPT 93, EL +111 m				
Depth (m)		DCPT (N_{cbr})	Conversion factor	SPT N
From	To			
0	2.9	3	1.50	2
2.9	3.2	5	1.50	3
3.2	3.5	5	1.50	3

GWT	Not met		Submerged unit weight (γ')	10	kN/m^3
			Bulk unit weight (γ)	18	kN/m^3

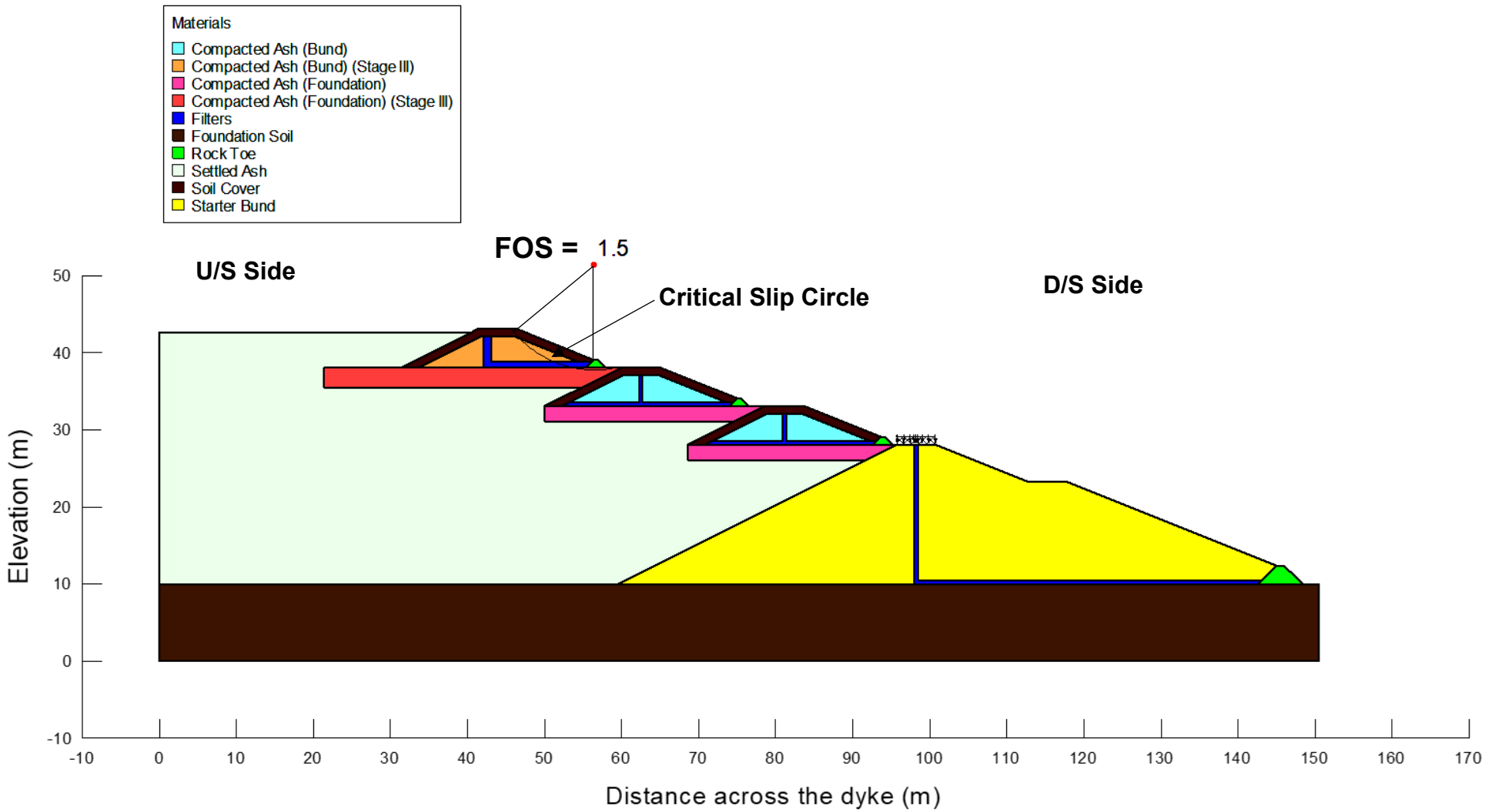
Depth (m)	Unit weight (kN/m^3)	Overburden Pressure (P')	SPT N	SPT N' (Overburden Correction)	Angle of internal friction (ϕ)
1.2	18	22	2	3	26
2.9	18	52	3	4	27
3.5	18	63	3	4	27

Note:
Correction Factor for Overburden Cn = 0.77*LOG10(2000/P')
Where, P' is Overburden Pressure in kN/m^2

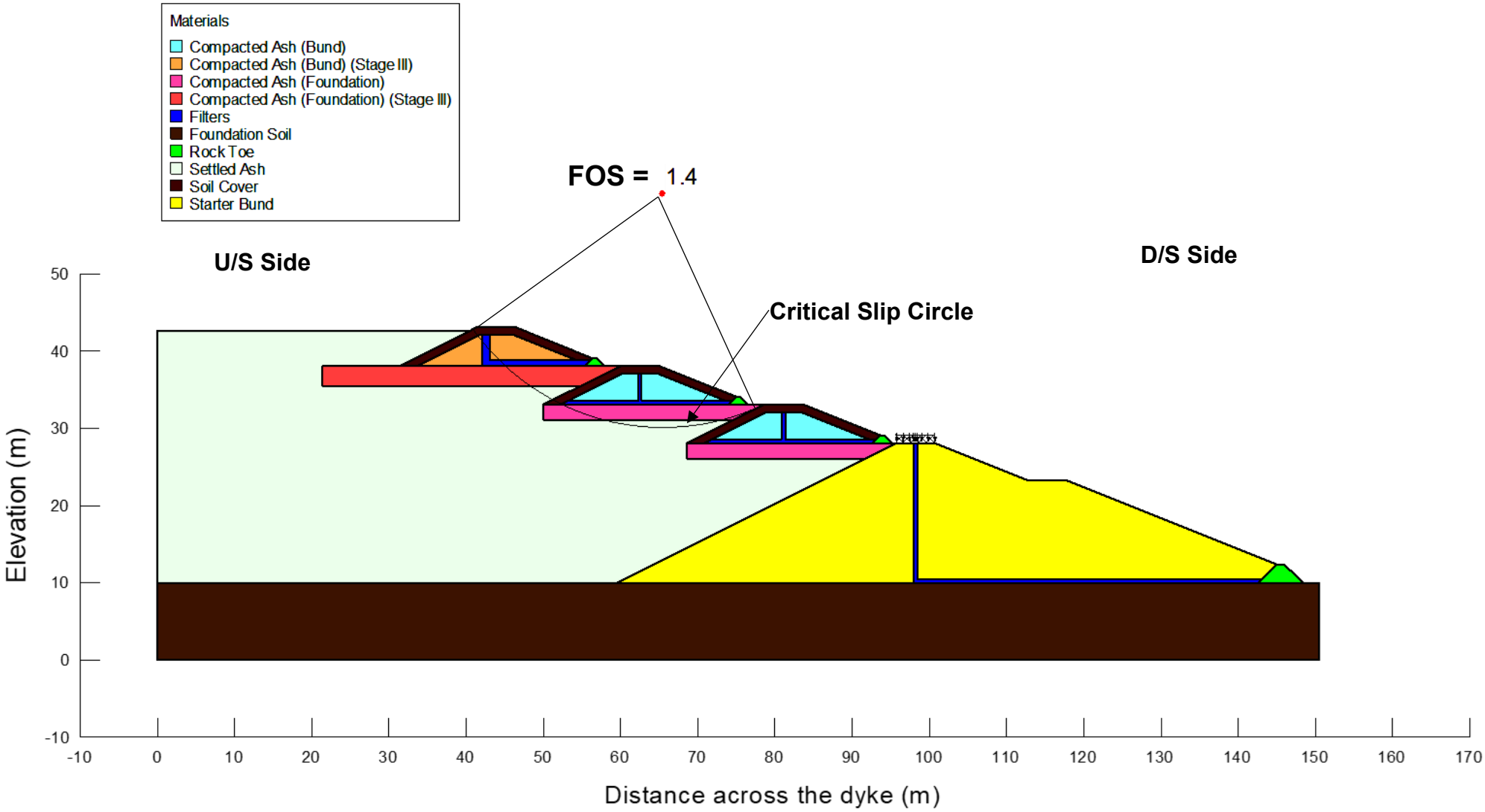
ENCLOSURE 5

CRITICAL SLIP CIRCLES FOR PROPOSED STAGE III BUND

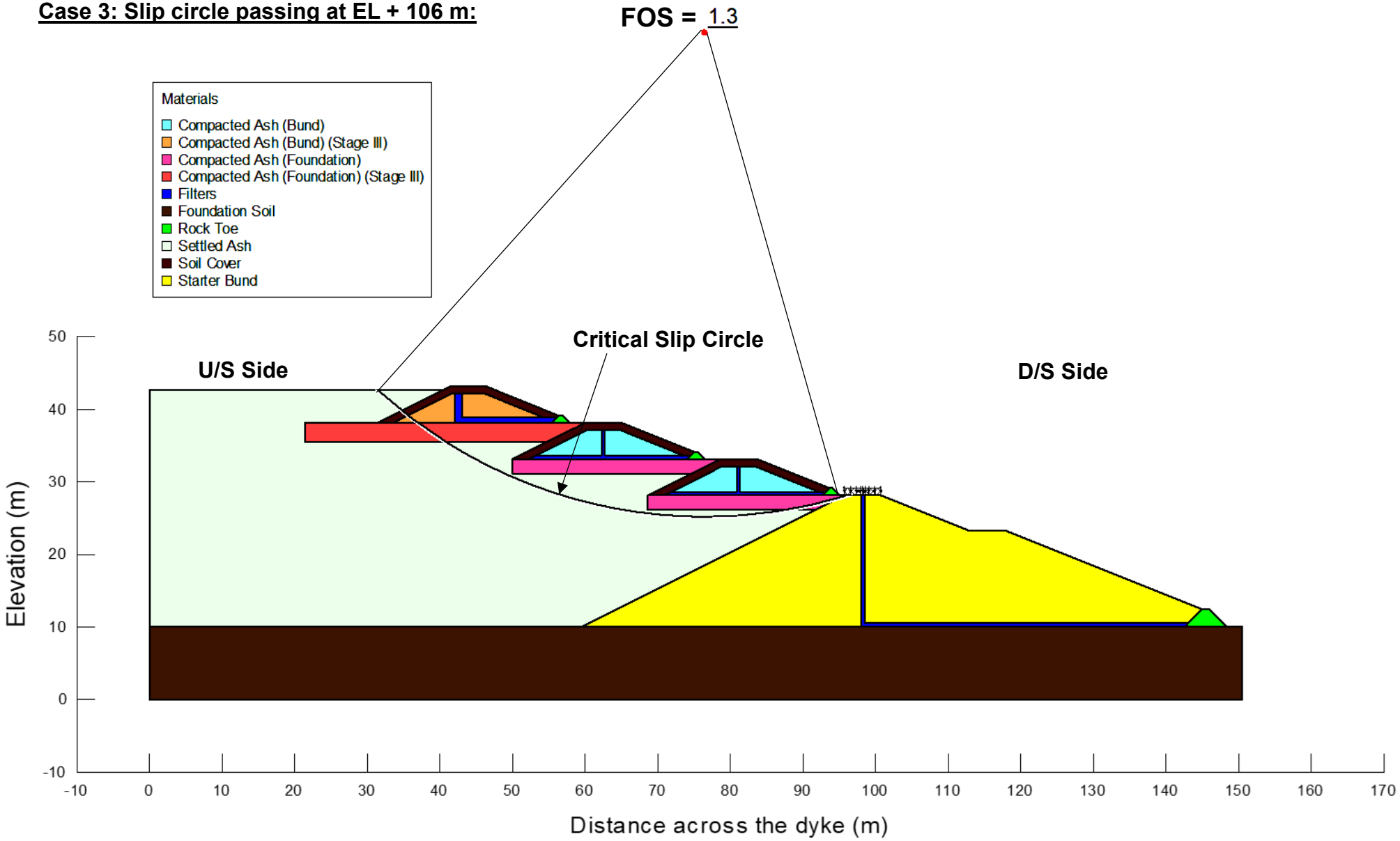
Case 1: Slip circle passing at EL + 116 m:



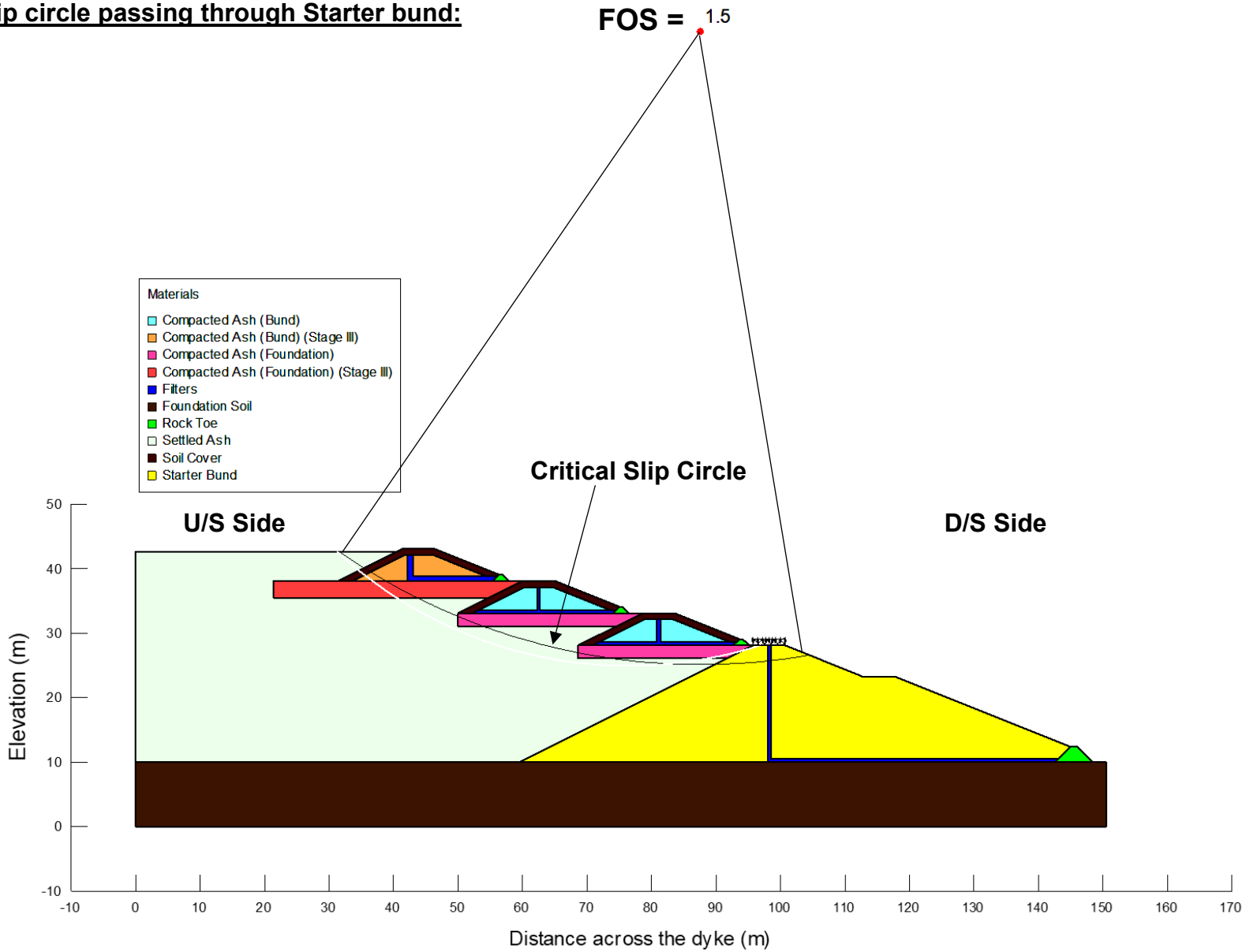
Case 2: Slip circle passing at EL + 111 m:



Case 3: Slip circle passing at EL + 106 m:



Case 4: Slip circle passing through Starter bund:



ANNEXURE 1

COPY OF REPORT ON RAISING OF ADDITIONAL

ASH POND BUND (STAGE III) DATED 15.11.2023

VSR CONSULTANTS VALUE ENGINEERING	**Prof. V.S. RAJU CONSULTANTS (Geotechnical and Structural) Gachibowli, Hyderabad – 500 032**

Document No. VSRC/TSGENCO/KTPS/AD/SIII/01 **DATED: 15-11-2023**

Report on Raising of Additional Ash Pond bund (Stage III)

Project

Kothagudem Thermal Power Station, Kothagudem

Client

Telangana State Power Generation Corporation Limited

		A Chenna Reddy	C.R Balaji	
15.11.2023	**R0**	**A. CHENNA REDDY**	**C.R. BALAJI**	**PROF. V. S. RAJU**
DATE	**REVISION**	**PREPARED BY**	**REVIEWED BY**	**REVIEWED AND APPROVED BY**

The Team:

Prof. V.S. Raju

(Formerly: Director, IIT Delhi &

Prof & Dean, IIT Madras)

Mr. C. R. Balaji, Principal Engineer, B.E, MASCE, MIEI, MIGS

Geotechnical Engineer:

Mr. A. Chenna Reddy, M Tech

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1.	Preamble	1
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3.	Improvement of Settled Ash below stage III bund	2
4.	Software used for Slope Stability Analysis	4
5.	Slope Stability Analysis – Stage III bund	4
6.	Results of Slope Stability Analysis	6
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ENCLOSURES:

Enclosure 1	Typical cross-section of proposed stage III bund
Enclosure 2	Typical cross-section of final stage bund
Enclosure 3	Slope stability analysis results showing the critical slip circles for proposed stage III bund
Enclosure 4	Latest Email regarding recommendations on Geotechnical Investigations dated 02-11-2023

Report on "Raising of Additional Ash Pond bund (Stage III) at Kothagudem Thermal Power Station"

15.11.2023

1. Preamble:

Telangana State Power Generation Corporation (TSGENCO) proposes to increase the Additional ash pond bund height by 5 m from present level of EL +116 m to EL +121 m. TSGENCO requested the undersigned to check the feasibility of the same.

The total height of Additional ash pond bund at chainage 1600 m is 28 m (from EL + 88 m to EL + 116 m). Typical cross-section is shown in figure 1 below. This report gives the design for raising of ash pond bund for Additional ash pond.

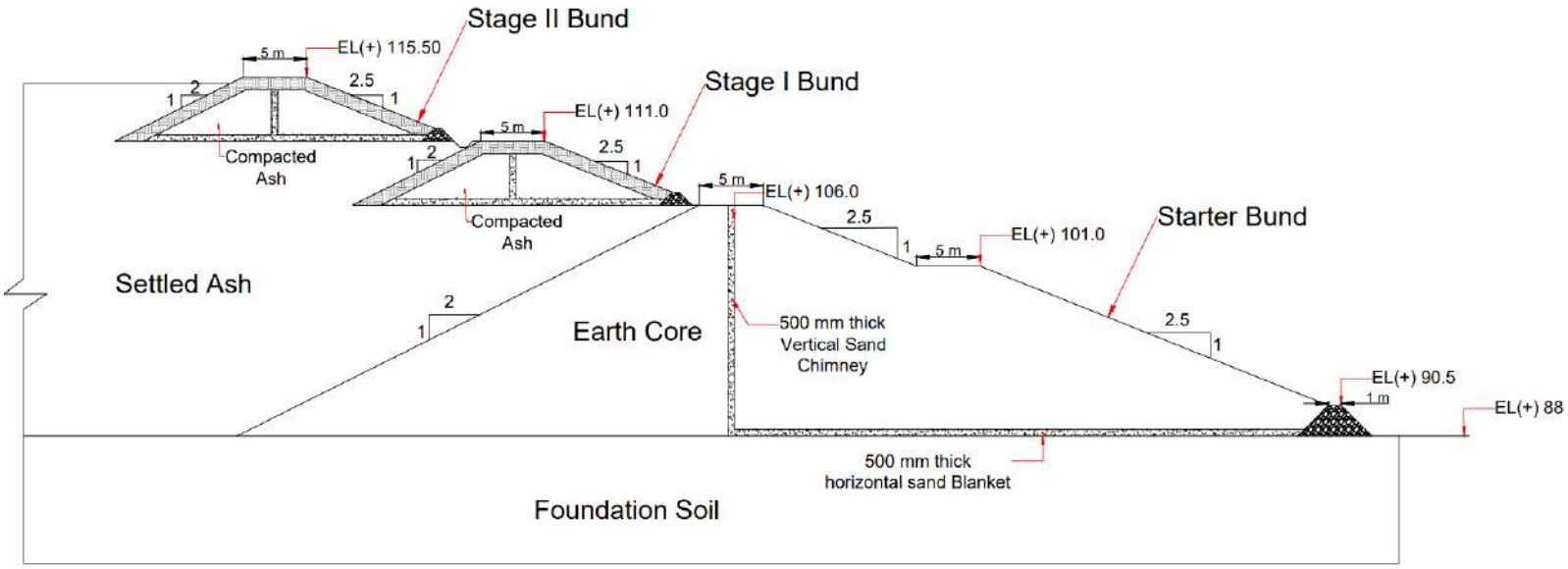


Fig 1: Typical cross section of Additional Pond bund

2. Design Concept:

The stage III bund is to be built of ash from ash pond. The ash to be used as inner core for construction of bund shall be laid in layers and compacted. A gravel layer of 1 m thick is to be provided on both upstream and downstream faces. This is to protect the bund from erosion due to rain water. The bund is provided with a vertical sand chimney so that the seepage water is drained through the vertical sand chimney into the bottom horizontal sand blanket and rock toe, thereby keeping the downstream slope completely free from seeping water. Seepage water collected, if any, will run into the toe drain. A typical cross section is shown in figure 2 below (Same is given in Enclosure 1).

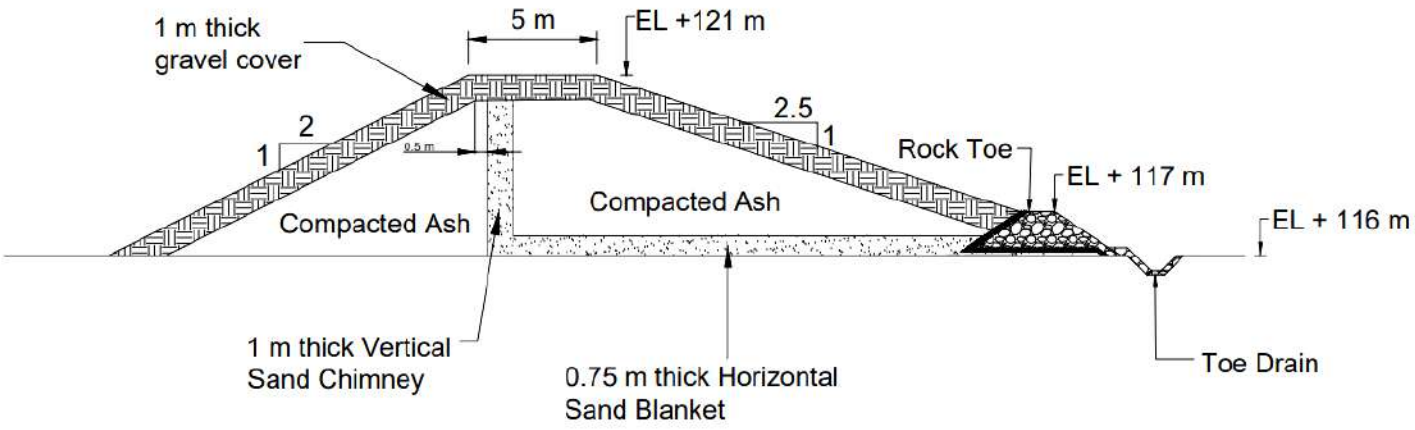


Fig 2: Typical cross section of Stage III bund

3. Improvement of Settled Ash below Stage III bund:

The settled ash will be in loose condition. It is not appropriate to build the stage III bund on such loose ash which will result in instability and excessive settlements. Hence, before construction of the stage III bund, the foundation ash has to be improved.

It is proposed to improve the foundation ash by removing 2 m of settled ash by open excavation, backfilling and compacting in layers.

3.1 Removing 2 m of settled ash by open excavation, backfilling and compacting in layers:

Below the footprint area of the proposed bund, settled ash upto a depth of 2 m is to be removed. Compaction is to be done at a depth of 2 m with heavy duty vibratory roller. This will also help in compacting the ash layers below. The extent of excavation and backfilling is to be extended 10 m beyond the upstream edge of the Stage III bund.

Later, the ash shall be laid in layers of thickness 275 mm. The compacted thickness shall be 200 mm. The same is to be adopted for backfilling the entire 2 m depth.

Trial compaction of the material shall be carried out and the number of passes required for achieving either 98% of Proctor density or 95% of modified Proctor density shall be determined and adopted. The sectional details of stage III bund with improved ground is given below in Fig 3 (See Enclosure 2 for sketch showing the final stage).

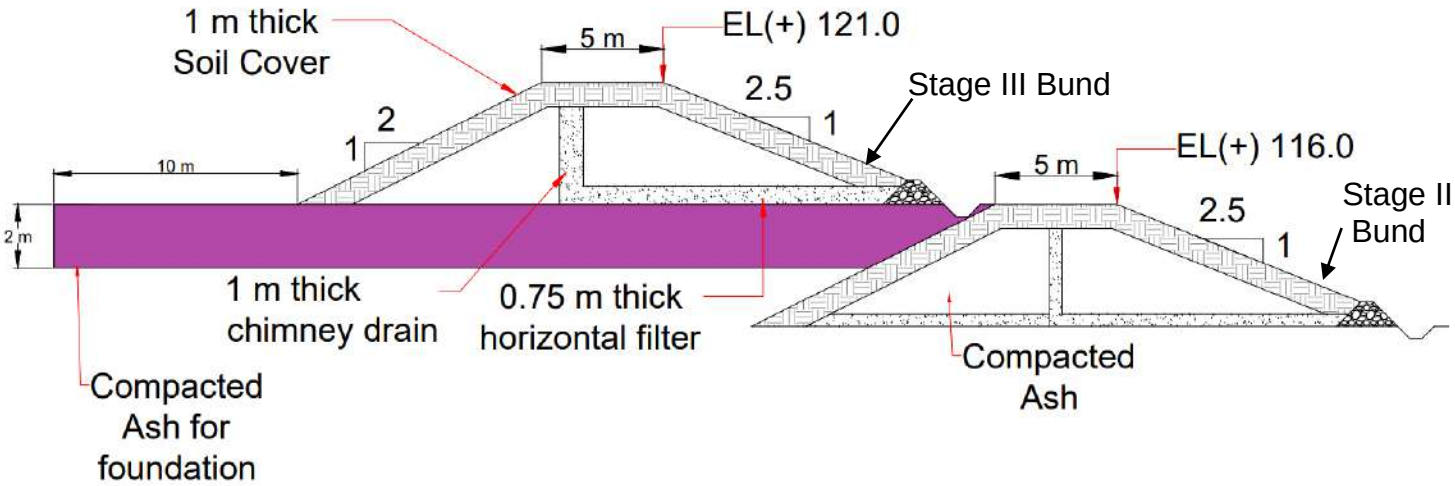


Fig 3: Section of proposed Stage III bund with Compaction below the base

4. Software used for slope stability analysis:

Geo Studio software has been used to check the slope stability of the new bund. Slope software offer variety of well-established methods for calculating the Factor of Safety (FoS). This software helps to find the critical slip circle for circular slip surfaces. Circular slip surfaces can be analyzed using Swedish slip circle analysis and Bishop method of analysis. The location of circular surface is defined using a rectangular grid of centers and then, and a number of different radii, a common point trough which all circles must pass or a tangential surface which the circle almost touches.

The ground section is built up by specifying each layer of material, from the surface downwards, as a series of X and Y co-ordinates. In our analysis, Bishop's simplified method is used, as this method considers the overall moment equilibrium as well as moment equilibrium of individual slices.

5. Slope stability Analysis – Stage III bund

The stage III bund is 5 m high. The cross – sectional details are as follows:

a) Top width is 5 m
b) Downstream side slope of bund is 1 V: 2.5 H
c) Upstream side slope of the bund is 1 V: 2 H
d) 1 m thick gravel cover
e) 1 m thick vertical sand chimney
f) 0.75 m thick horizontal sand blanket
g) Rock toe
h) Toe drain

The purpose of providing the rock toe is to collect the surface rain water / seepage water. In addition, it will add to the stability of the bund. After excavating for the toe drain, the bottom and side slopes are provided with stone pitching / revetment of 225 mm thick.

5.1 Material Properties used:

Starter bund (from EL + 88 m to EL + 106 m) material - unit weight (Y) = 20 kN/m^3, Angle of internal friction (phi) = 35^0, Cohesion (C) = 0 kN/m^2 (Properties are considered from the report titled “Augmentation of Ash bund at Kothagudem Thermal Power Plant (KTPS)” given by Department of Ocean Engineering, IIT Madras in December 2002). Table 1 below shows the material properties adopted for the analysis.

Table 1: Material properties adopted for the analysis.

Component	Unit weight (kN/m^3)	Cohesion (C) kPa	Angle of internal friction (Ø)
Starter Bund	20	-	35°
Gravel Cover	20	-	35°
Sand Filter	18	-	32°
Rock Toe	20	-	40°
Settled Ash	12	-	15°
Compacted Ash (Bunds of stage I, II)	12	-	25°
Compacted Ash (Stage III)	12	-	27°
Compacted Ash (Foundation of stage I, II)	12	-	17°
Compacted Ash (Foundation of stage III)	12	-	25°
Foundation Soil	20	-	35°

6. Results of Slope Stability Analysis:

The downstream slope is analyzed for the ash pond full condition for the proposed raising. The summary of factor of safeties obtained are given in Table 2:

Table 2: Summary of Factor of safeties (FOS)

For bunds at Different levels	Critical FOS
From EL + 121 m to EL + 116 m (Stage III bund alone)	1.5
From EL + 121 m to EL +111 m (Stage III and II bunds)	1.4
From EL + 121 m to EL + 106 m (Stage III, II and I bunds)	1.3
From EL + 121 m to Starter Bund	2.0

As can be seen from the above table, Factor of Safeties (FoS) are greater than or equal to minimum required FoS of 1.3 as per “clause 5.1.1 of IS: 7894 - 1975 (Reaffirmed 2021) – Code of practice for stability analysis of earth dams”. Enclosure 3 shows the critical slip circles for all the above cases.

7. Recommendations for Geotechnical Investigations:

Based on the site visit, the geotechnical investigations that needs to be carried out for additional ash pond was finalized. Dynamic Cone Penetration Tests (at EL + 106 m and EL + 116 m) and short boreholes at EL +106 m have been recommended. The same was communicated vide email dated 02nd November 2023 (See Enclosure 4).

It is recommended to carry out these investigations at the earliest to confirm the shear parameters considered in the analysis.

8. Summary and Recommendations:

- ✓ TSGENCO is proposing to add stage III bund on “Additional Ash Pond” from EL + 116 m to EL + 121 m.

- ✓ It is feasible to add stage III bund of 5 m high on additional ash pond. The requirements of factor of safety as per IS: 7894 - 1975 (Reaffirmed 2021) is satisfied (See Table 2).

- ✓ It is important to remove 2 m of settled ash by open excavation below the base of the proposed bund and 10 m beyond the upstream edge. The same is to be backfilled and compacted in layers. (See para 3 of this report)

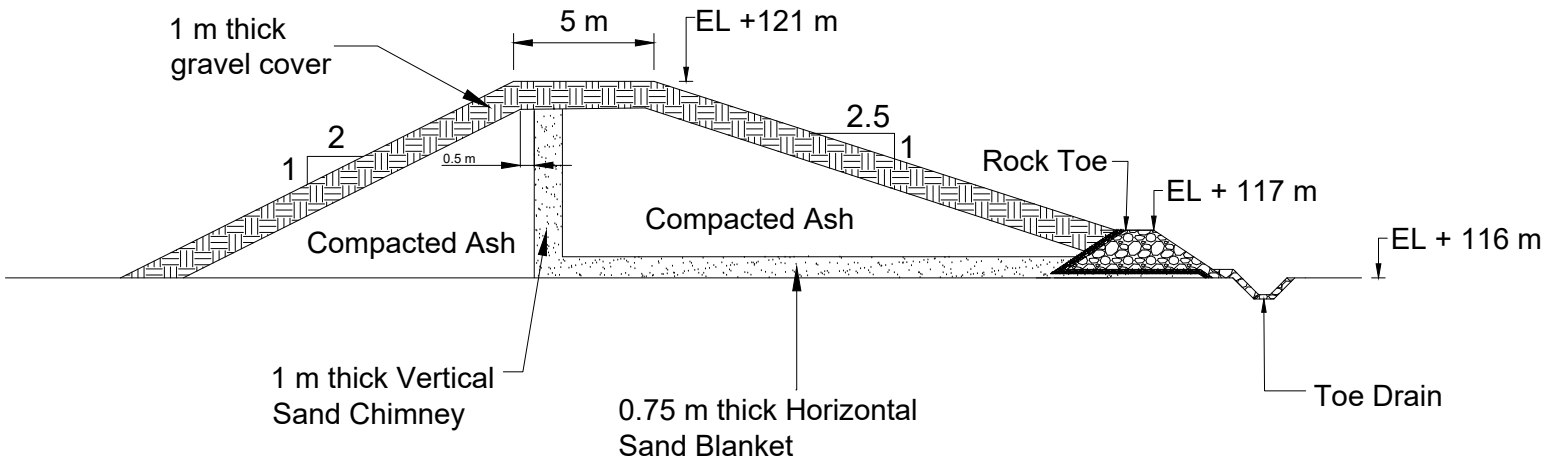
ANALYSIS & REPORT BY	REVIEWED BY	APPROVED BY
(A. CHENNA REDDY)	(C.R. BALAJI)	(Prof. V.S. RAJU)

9. References:

- IS: 7894-1975 (Reaffirmed 2021) - Code of practice for stability analysis of earth dams
- Stability modelling with Slope/w by GEO-slope International Limited.
- IRC:78-2014 Standard Specifications and Code of Practice for Road Bridges

ENCLOSURE 1

TYPICAL CROSS SECTION OF PROPOSED STAGE III BUND



TYPICAL CROSS-SECTION OF STAGE III BUND

NOTES:

1. DO NOT SCALE THIS DRAWING.
2. ALL DIMENSION ARE IN METERS.
3. THE HEIGHT OF ROCK TOE SHALL BE 1.0 m
4. THE MINIMUM TOP WIDTH OF ROCK TOE SHALL BE 1.0 m
5. WELL GRADED CLEAN COARSE SAND IS TO USED FOR VERTICAL SAND CHIMNEY AND HORIZONTAL SAND BLANKET.
6. ASH TO BE USED AS INNER CORE IS TO BE COMPACTED IN LAYERS. THICKNESS OF COMPACTED LAYER SHALL BE 200 mm.

S.NO	DATE	DESCRIPTION	CHECKED BY	REFERENCE

Client :
TSGENCO

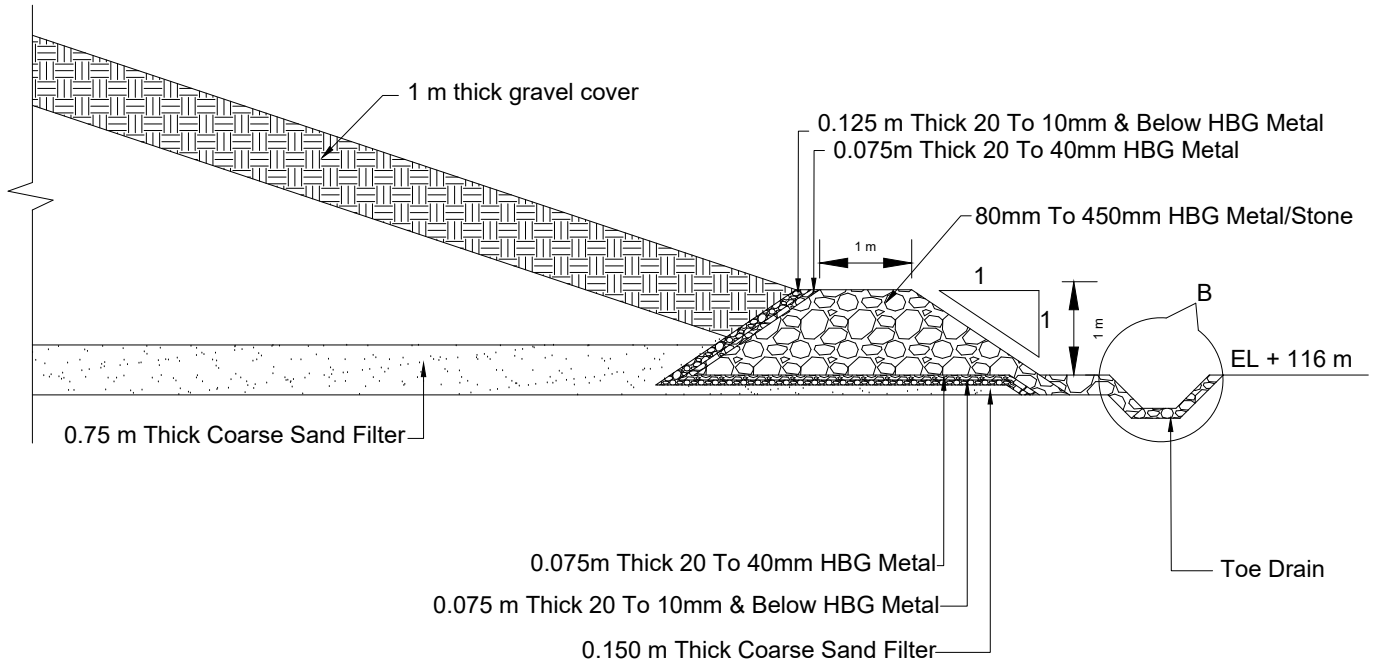
Project :
ASH POND AT KOTHAGUDEM THERMAL POWER STATION

Title :
TYPICAL CROSS - SECTION OF PROPOSED BUND

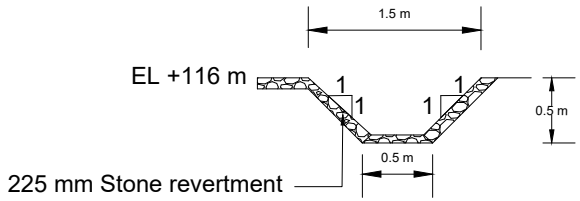
Consultants :
Prof.V.S.RAJU CONSULTANTS
(GEOTECHNICAL & STRUCTURAL)
HYDERABAD

DATE	SCALE	DRAWN BY
15/11/2023	NOT TO SCALE	A. CHENNA REDDY
DESIGNED BY C. R. BALAJI	CHECKED BY C. R. BALAJI	APPROVED BY Prof.V.S.RAJU

DRG. NO: VSRC/KTPS/TS/TCS/SIII/02 | REV. 0



TYPICAL CROSS-SECTION OF ROCK TOE



DETAIL AT B
TYPICAL CROSS-SECTION OF TOE DRAIN

NOTES:

1. DO NOT SCALE THIS DRAWING.
2. ALL DIMENSION ARE IN METERS.
3. THE HEIGHT OF ROCK TOE SHALL BE 1.0 m
4. THE MINIMUM TOP WIDTH OF ROCK TOE SHALL BE 1.0 m

S.NO	DATE	DESCRIPTION	CHECKED BY	REFERENCE

Client :
TSGENCO

Project :
ASH POND AT KOTHAGUDEM THERMAL POWER STATION

Title :
TYPICAL CROSS - SECTION OF ROCK TOE AND TOE DRAIN

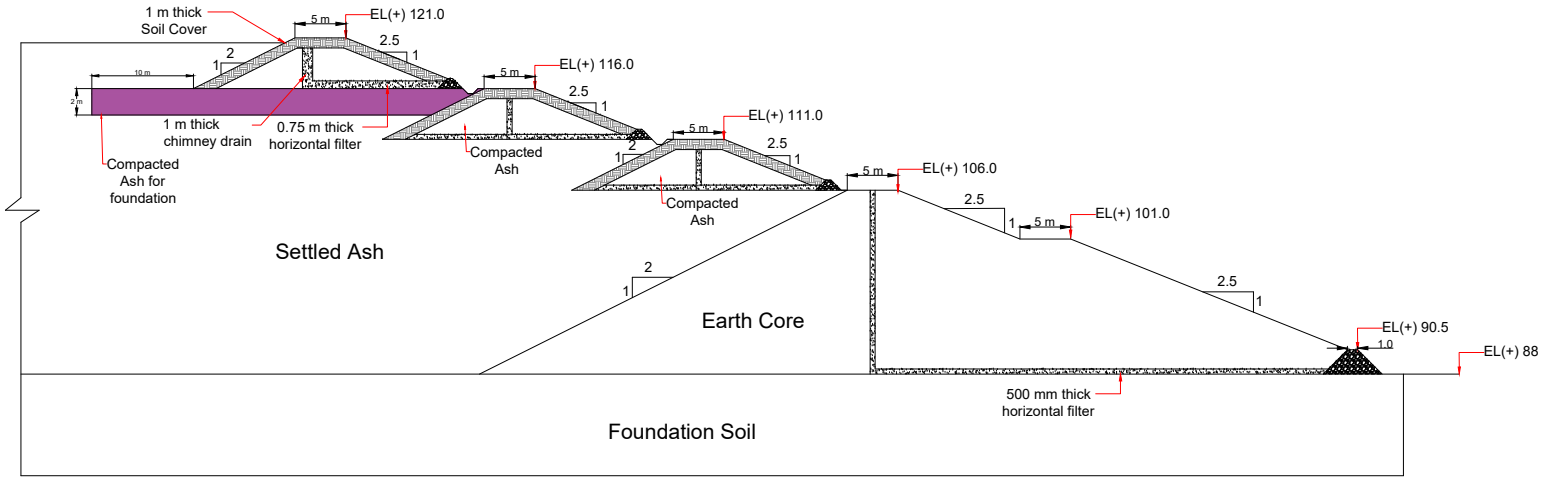
Consultants :
Prof.V.S.RAJU CONSULTANTS
(GEOTECHNICAL & STRUCTURAL)
HYDERABAD

DATE	SCALE	DRAWN BY
15/11/2023	NOT TO SCALE	A. CHENNA REDDY
DESIGNED BY C. R. BALAJI	CHECKED BY C. R. BALAJI	APPROVED BY Prof.V.S.RAJU

DRG. NO: VSRC/KTPS/TS/TCS/RTTD/03 REV. 0

ENCLOSURE 2

TYPICAL CROSS SECTION OF FINAL STAGE BUND



TYPICAL CROSS-SECTION OF PROPOSED FINAL STAGE BUND

NOTES:

1. DO NOT SCALE THIS DRAWING.
2. ALL DIMENSION ARE IN METERS.
3. THE HEIGHT OF ROCK TOE SHALL BE 1.0 m
4. THE MINIMUM TOP WIDTH OF ROCK TOE SHALL BE 1.0 m
5. WELL GRADED CLEAN COARSE SAND IS TO USED FOR VERTICAL SAND CHIMNEY AND HORIZONTAL SAND BLANKET.
6. ASH TO BE USED AS INNER CORE IS TO BE COMPACTED IN LAYERS. THICKNESS OF COMPACTED LAYER SHALL BE 200 mm.

S.NO	DATE	DESCRIPTION	CHECKED BY	REFERENCE

Client :
TSGENCO

Project :
ASH POND AT KOTHAGUDEM THERMAL POWER STATION

Title :
TYPICAL CROSS - SECTION OF PROPOSED BUND FINAL STAGE

Consultants :
Prof.V.S.RAJU CONSULTANTS
(GEOTECHNICAL & STRUCTURAL)
HYDERABAD

DATE	SCALE	DRAWN BY
15/11/2023	NOT TO SCALE	A. CHENNA REDDY
DESIGNED BY	CHECKED BY	APPROVED BY
C. R. BALAJI	C. R. BALAJI	Prof.V.S.RAJU

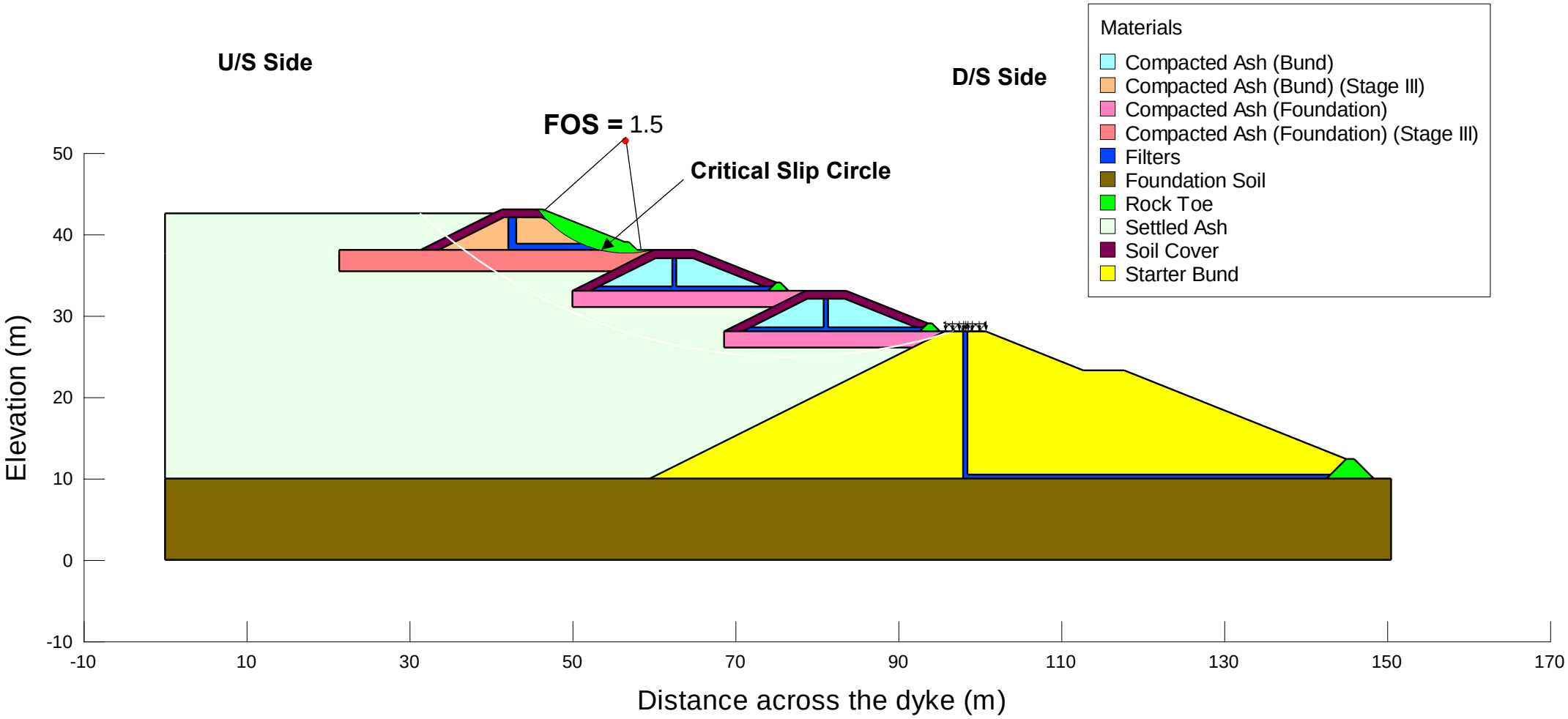
DRG. NO: VSRC/KTPS/TS/TCS/FS/01 | REV. 0

ENCLOSURE 3

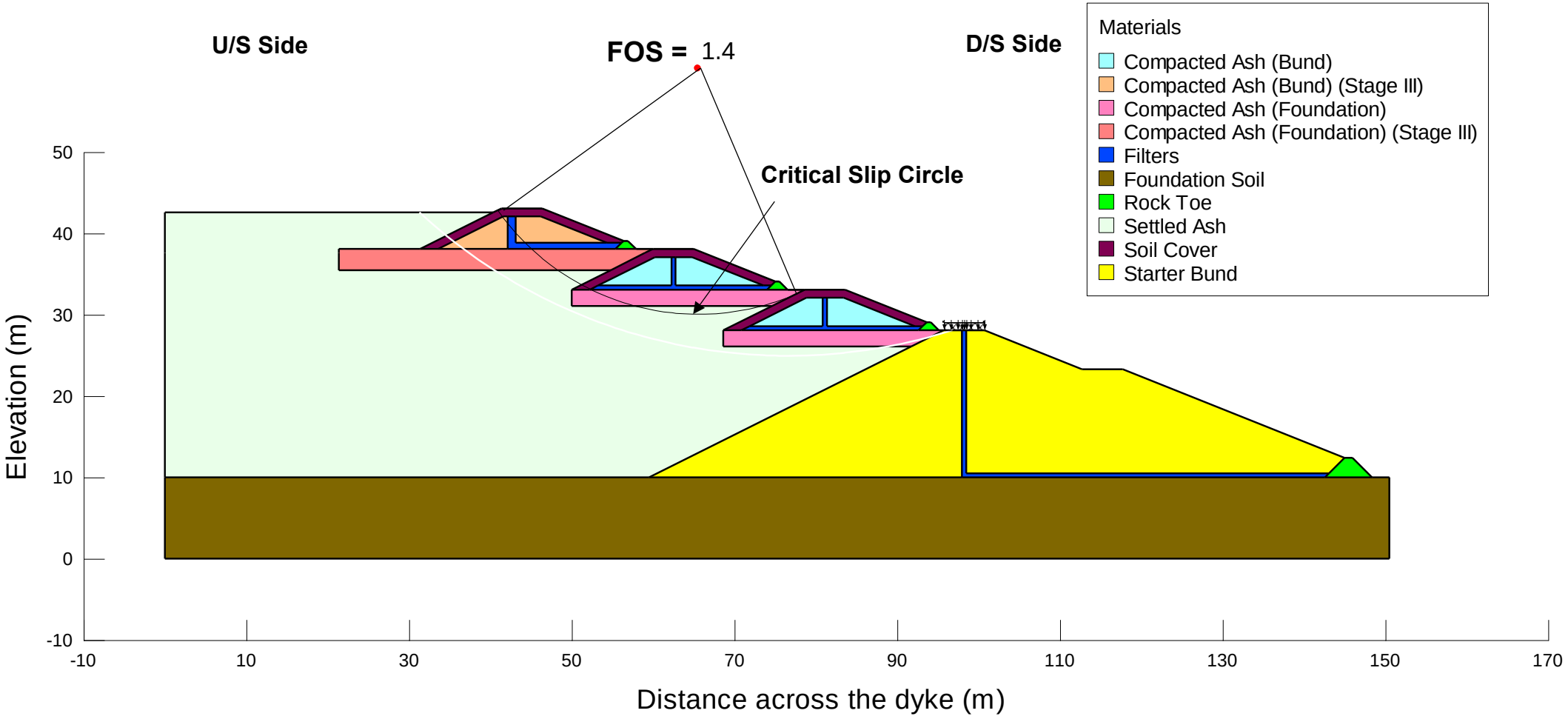
CRITICAL SLIP CIRCLES FOR PROPOSED STAGE III

CROSS SECTION

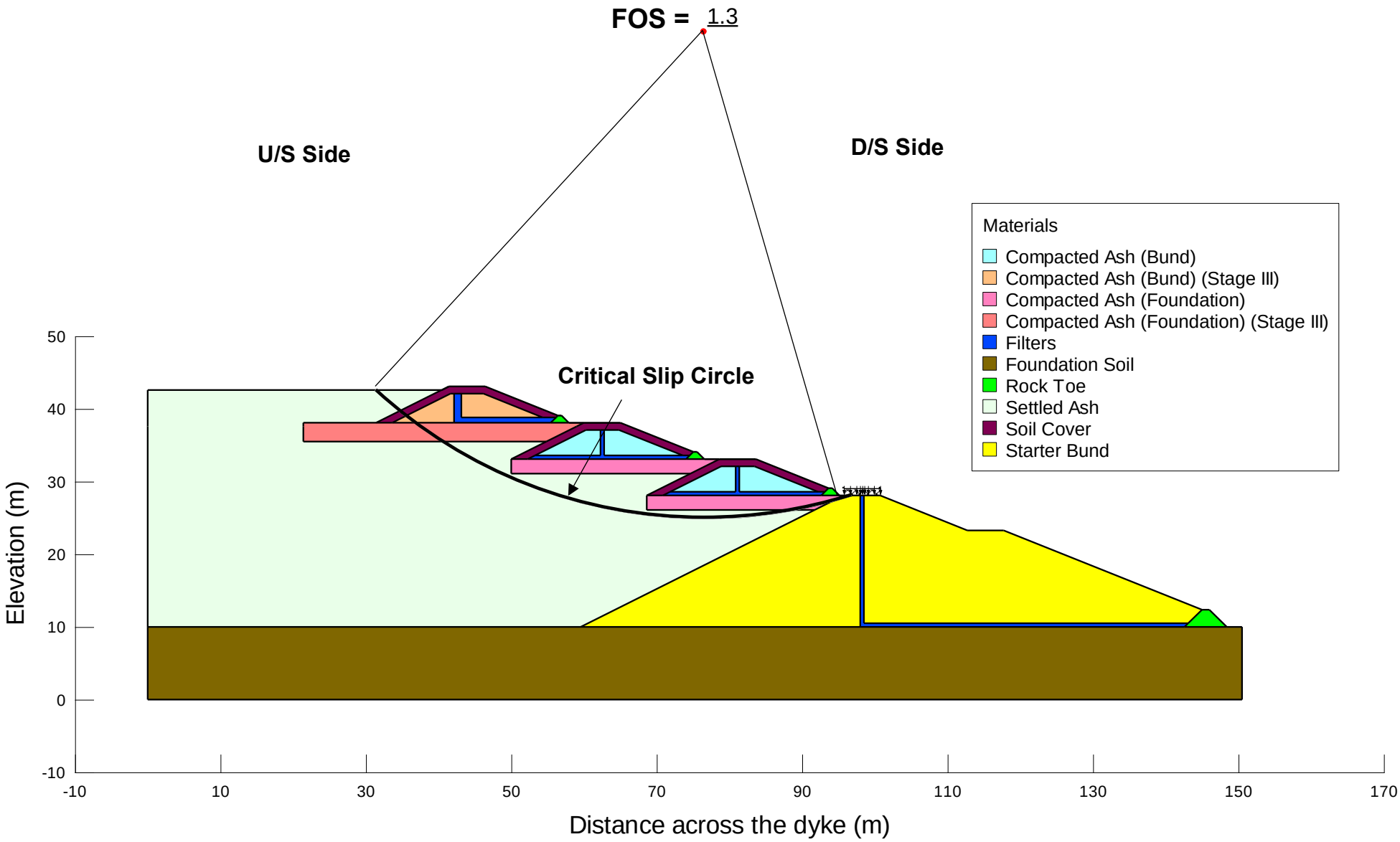
Case 1: Slip circle passing at EL + 116 m:



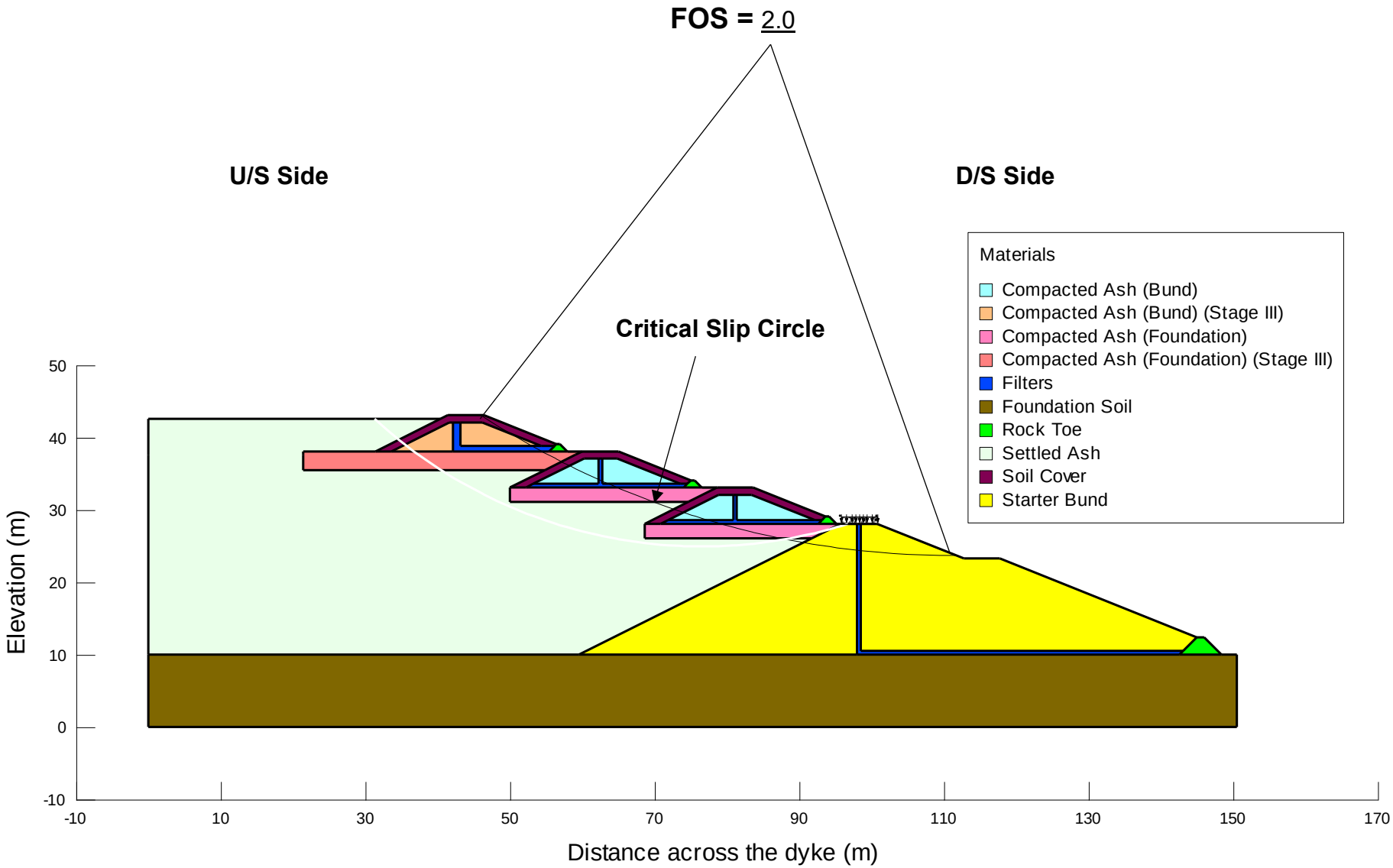
Case 2: Slip circle passing at EL + 111 m:



Case 3: Slip circle passing at EL + 106 m:



Case 4: Slip circle passing through Starter bund:



ENCLOSURE 4

LATEST EMAIL REGARDING RECOMMENDATIONS ON GEOTECHNICAL INVESTIGATIONS DATED 02-11-2023

From: raju vegesna <rajuvs_b@yahoo.com>
To: vsraju40@gmail.com <vsraju40@gmail.com>; ktps5.secivil <ktps5.secivil@tsgenco.co.in>
Cc: ce.cth <ce.cth@tsgenco.co.in>; ce.ktps5 <ce.ktps5@tsgenco.co.in>; ktps6.ee2 <ktps6.ee2@tsgenco.co.in>
Sent: Thursday, 2 November, 2023 at 03:19:15 pm IST
Subject: Re: KTPS-V&VI Stages – DCPT test to be conducted for AB pond and Additional Ash Pond – Reg

Dear Mokshaveer,

Thank you for your mail.

AB Ash Pond:

(i) DCPT at EL +102.5 m for a depth of 3.5 m at 200 m c/c all along the length of the bund

(ii) DCPT at EL +100 m at 200 m c/c all along the length of the bund; Termination level will be 3 m into NGL or refusal, whichever is earlier

(iii) Short boreholes at EL +102.5 m for a depth of 2.5 m at 200 m c/c all along the length of the bund using hand augers. Diameter of the borehole shall be 100 mm. Samples need to be collected continuously from the auger and tested for its shear parameters.

D Ash Pond:

(i) DCPT at EL +106 m at 200 m c/c all along the length of the bund; Termination level will be 3 m into NGL or refusal, whichever is earlier

(ii) DCPT on the upstream side of bund top at EL +116 m at a distance of 10 m and 20 m at 200 m c/c. Termination level will be 10 m or refusal, whichever is earlier.

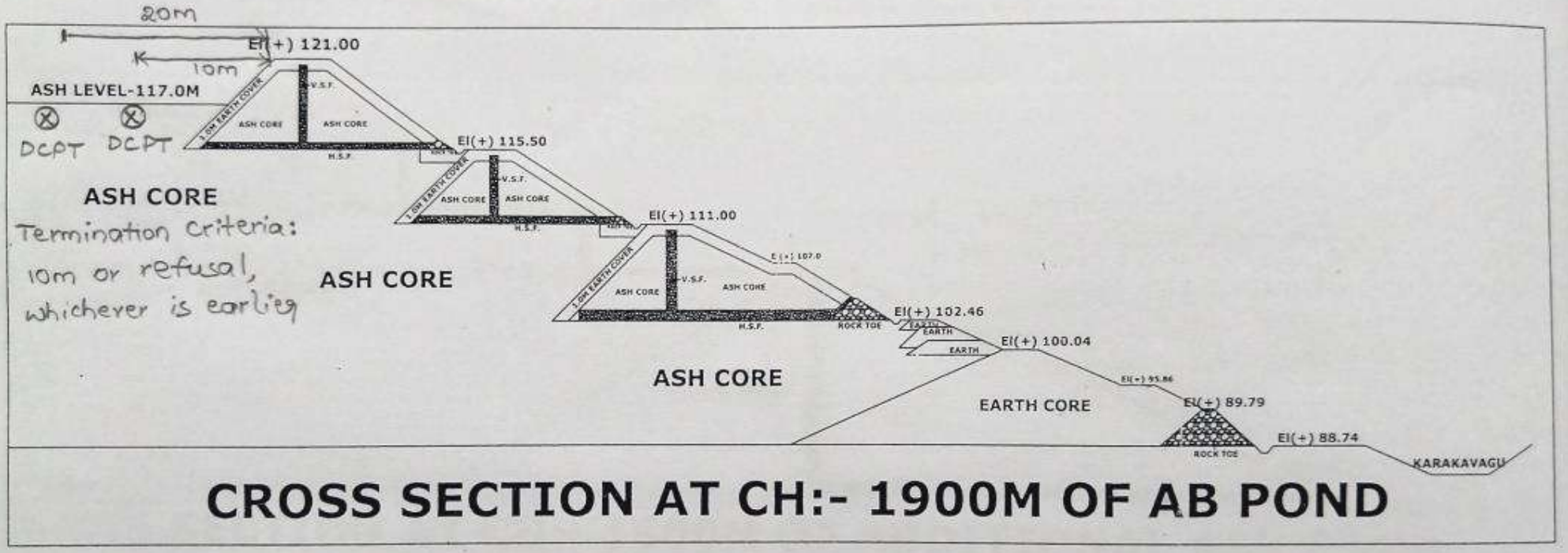
(iii) Short boreholes at EL +106 m at 400 m c/c all along the length of the bund. Diameter of the borehole shall be 100 mm. Samples need to be collected and tested for its shear parameters. Termination level shall be 2 m into NGL or refusal, whichever is earlier.

The remedial measures can be executed based on our recommendations for the Ch 800 m to Ch 2300 m. However, it is recommended to do the investigations as suggested above for the entire perimeter of the ash pond.

These investigations are absolute must for carrying out the stability analysis for the existing bund as well for exploring the possibility of raising the bunds of AB and D ponds.

Best Wishes

V.S. Raju

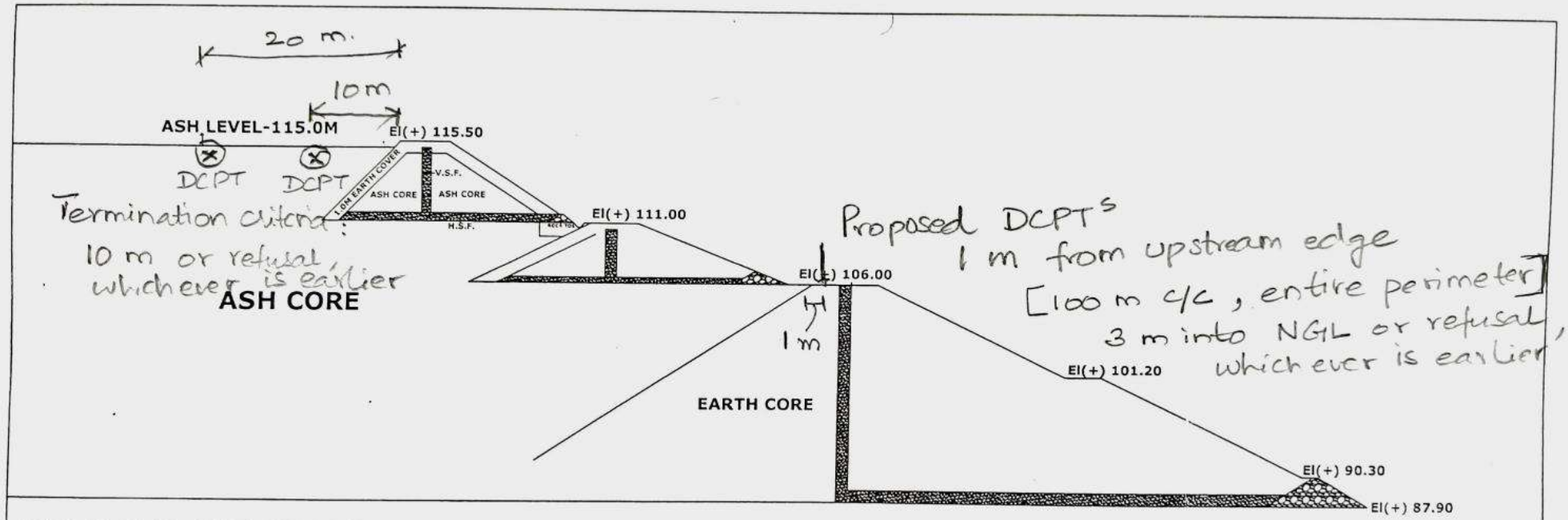


CROSS SECTION AT CH:- 1900M OF AB POND

Ash Pond Sub-Divn. O&M-I

19/9/23

Executive Engineer/Civil (LA)
O&M-II/KTPS V & VI Stages
PALONCHA



CROSS SECTION AT CH:- 1600M OF ADDITIONAL ASH POND

19/09/23

FAL
19/9/23
Executive Engineer
Ash Pond Sub-Div II
KTPS V/S10 PALONCHA

19/9/23
Executive Engineer/Civil (LAC)
O&M-II/KTPS V & VI Stages
PALONCHA

ANNEXURE 2

COPY OF DCPT REPORT BY ANNOOR TEST LABS AND ENGINEERING SERVICES PVT. LTD., MAY 2024

REPORT FOR DYNAMIC CONE PENETRATION TEST AND AUGER BORING AT ADDITIONAL ASH POND AS PER IS 4968: (PART-2)-1976.

CLIENT

TELANGANA STATE POWER GENERATION CORPORATION LIMITED.
Chief Engineer / O&M,
KTPS - V& VI Stages,
Palvancha.

In the Presence of
B. Mokshaveer (S.E/Civil/KTPS V&VI),
R. Mariniyya (E.E Civil),
A. Babu Rao (A.E.E Civil).

PROJECT

KTPS -V&VI Stages-Ash Ponds- DCPT Test from Ch. 0M to Ch. 3030M of AB Pond at an EI(+) 100.00M and EI(+) 102.50M, from CH. 0M to 3200M and from Ch. 4400M to Ch. 5450M of Additional Ash pond at an EI(+) 115.0M. – Reg.

TESTING AGENCY:

Reg. Office:- **Annoor Test Labs and Engineering Services Pvt Ltd.**
#2/90, Venus Bazar, Srinagar Colony, Gannavaram, Krishna Dist.
Ph: 08676256700, 9908056677,7093910033.
Mail ID:- services@annoorlabs.com; info@annoorlabs.com

TC-8831

For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager – Mechanical

1.0 INTRODUCTION

Telangana State Power Generation Corporation Limited has proposal for Dynamic Cone Penetration Test at KTPS -V&VI Stages-Ash Ponds- DCPT Test from Ch. 0M to Ch. 3030M of AB Pond at an EI(+) 100.00M and EI(+) 102.50M, from CH. 0M to 3200M and from Ch. 4400M to Ch. 5450M of Additional Ash pond at an EI(+) 115.0M. It is required to find the resistance value of the cone against the soil that helps us to determine different mechanical properties of soil such as strength. The work of above said project was entrusted to **M/s. Annoor Test Labs & Engg. Services Pvt. Ltd.**

You're Reference	**: PLOI NO:SE/Civil/KTPS.V&VI Stages/F.Dkt/D.No.133/2024-25 Dated 02-05-2024.**
Location of Sample Collection	**:** Additional Ash Pond of KTPS V&VI Stages
Date of Sample Collection	**:** 18-05-2024 to 17-06-2024
Collected By	**:** Mr. Sk. Subhani (ATLES, Pvt, Ltd)
Witnessed By	: **A. Babu Rao (In Charge A.E.E)** **: V. Ravinder (A.E)**
Climatic Condition	**:** Clear.
Date of Report Issued	**:** 28-06-2024

The report presented herein deals with the analysis of field and laboratory test results, type and depth of foundation and recommendations based on the type of soil and its safe bearing capacity of soil.

Dynamic Cone Penetration Test (DCPT)

The Dynamic Cone Penetration Test is a test carried out to find the resistance value of the cone against the soil that helps us to determine different mechanical properties of soil such as strength, bearing capacity, and so on.

All these tests measure the resistance of the soil strata to penetration by a penetrometer.

SPT is carried out in a hole while SCPT and DCPT are carried out without a hole.

Scope of the Work

Dynamic Cone penetration Test (DCPT) in the Additional ash pond and Additional ash pond all along the bund in accordance with IS specification using 60^0 conical tip with base area 10 cm^2. The DCPT test along the axis and upstream toe of the bund up to a depth of 10.00m or refusal which ever s earlier (as per work order).

For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager – Mechanical

Laboratory Test Parameters:

Natural moisture content: Natural moisture content of the soil samples is determined as per IS 2720 (Part 21) from the collected soil samples using oven-drying method.

Direct shear/ Tri-axial shear test: Shear Test is conducted as per IS: 2720 (Part 11 / 13).

Apparatus required for DCP Test:

The requirements to conduct DCPT are:

1. A Type Cone – 62.5 mm Size & 60° Angel Cone.
2. Drop Hammer weighing 65.0 Kg
3. Driving Stand with Hole
4. Driving head with Scale.

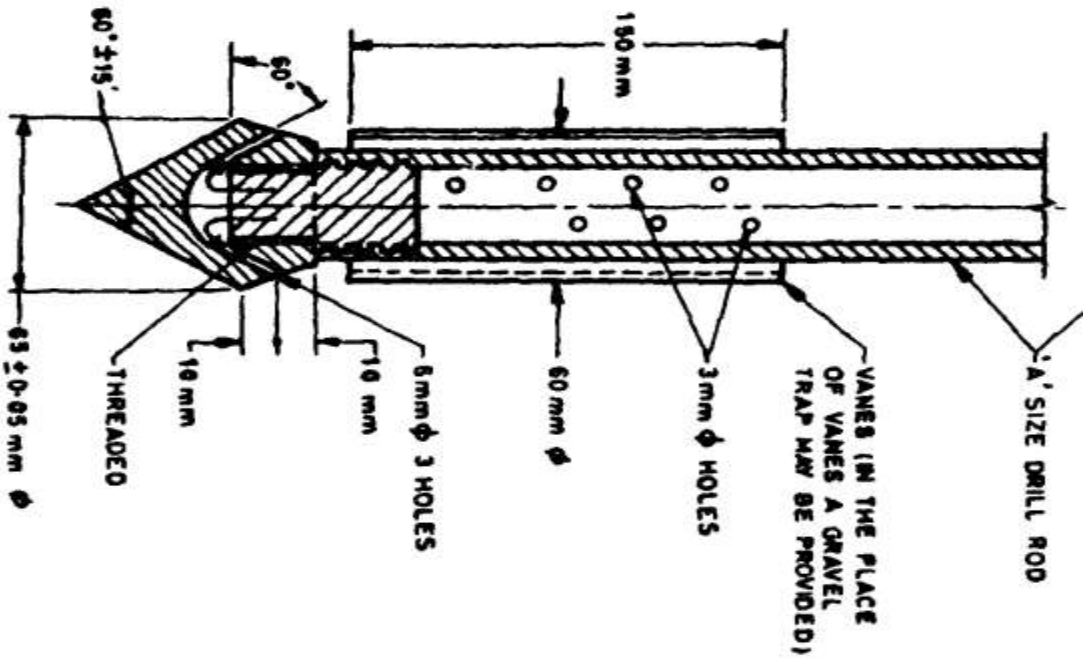


Fig. 1 CONE ASSEMBLY

For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager – Mechanical

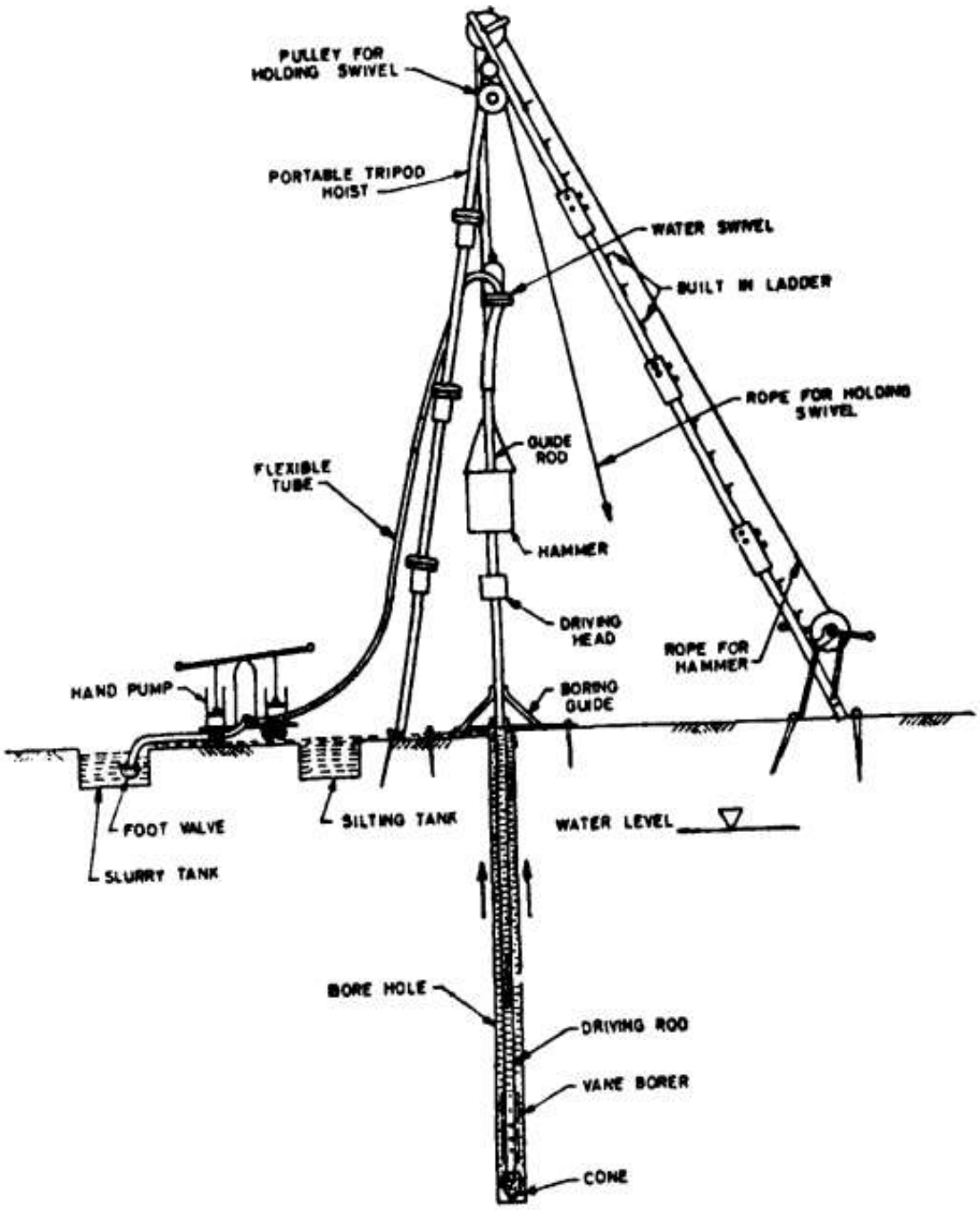


Fig. 2 A TYPICAL SET UP FOR DYNAMIC CONE PENETRATION TEST

For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager – Mechanical

Procedure for Dynamic Cone Penetration Test

Dynamic cone penetrometer is a method for estimating soil parameters and infiltration plays an important role in in-situ identification of soils and in many cases, it is used for studying layers of soil, especially when the desired depth is not too large. The Dynamic Cone Penetrometer used as per the IS 4968 Part 2 consists of cone with a 20 mm base diameter and 60-degree cone angle. The device is driven into the soil without using Bentonite by successive blows of the 60 kg hammer, falling from the height of 750 mm. The initial reading on the dynamic cone penetrometer is recorded. Then, the dynamic cone penetrometer is kept with the cone resting vertically on the ground where the test is to be carried out. Now, the cone is driven into the soil by the free fall of hammer of 750 mm each time. Then the number of blows of every 100mm penetration is recorded. This process is repeated until reached or refusal which every is earlier.

Conducting of Dynamic Cone Penetration Test at Various Chainages to know the:

- Identification of the type of Soil
- Shear Strength of soils

ABBREVIATIONS:

BH	**Borehole**
AAP	**Additional Ash Pond**
AB	**AB Pond**
SB	**Suraram Bund**
Ncbr	**Cone Penetration Value**
N	**Standard Penetration Value**
DCPT	**Dynamic Cone Penetration Test**
SPT	**Standard Penetration Test**
DS	**Disturbed Sample**
Φ	**Angle Of Friction**

For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager – Mechanical

A) The List of DCPT tests conducted in the Additional ash pond over the existing top layers of ash surface at a distance of 10m and 20 m at each location at an El (+) 115.0m (AGREEMENT ITEM NO 3)

The List of DCPT tests conducted are from BH 1 to BH 45 (Total 45 Tests)

The List of DCPT tests conducted are from BH 1 to BH 45 as mentioned in the below table

Sl. No.	Bore hole No.	Bore Hole ID	Chainage (m)	Cross chainage (m)	Elevation	Depth of Investigation (m)
1.	BH 1	AAP-0-10-115	0	10	(+)115	10.00
2.	BH 2	AAP-0-20-115	0	20	(+)115	10.00
3.	BH 3	AAP-200-10-115	200	10	(+)115	3.50
4.	BH 4	AAP-200-20-115	200	20	(+)115	10.00
5.	BH 5	AAP-400-10-115	400	10	(+)115	4.50
6.	BH 6	AAP-400-20-115	400	20	(+)115	10.00
7.	BH 7	AAP-600-10-115	600	10	(+)115	4.00
8.	BH 8	AAP-600-20-115	600	20	(+)115	10.00
9.	BH 9	AAP-800-10-115	800	10	(+)115	4.50
10.	BH 10	AAP-800-20-115	800	20	(+)115	10.00
11.	BH 11	AAP-1000-10-115	1000	10	(+)115	4.50
12.	BH 12	AAP-1000-20-115	100 1000	20	(+)115	6.00
13.	BH 13	AAP-1200-10-115	1200	10	(+)115	3.00
14.	BH 14	AAP-1200-20-115	1200	20	(+)115	4.00
15.	BH 15	AAP-1400-10-115	1400	10	(+)115	4.50
16.	BH 16	AAP-1400-20-115	1400	20	(+)115	4.50
17.	BH 17	AAP-1600-10-115	1600	10	(+)115	4.50
18.	BH 18	AAP-1600-20-115	1600	20	(+)115	10.00
19.	BH 19	AAP-1800-10-115	1800	10	(+)115	4.50
20.	BH 20	AAP-1800-20-115	1800	20	(+)115	10.00
21.	BH 21	AAP-2000-20-115	2000	20 10	(+)115	10.00
22.	BH 22	AAP-2000-10-115	2000	10 20	(+)115	4.50
23.	BH 23	AAP-2200-20-115	2200	20 10	(+)115	10.00
24.	BH 24	AAP-2200-10-115	2200	10 20	(+)115	10.00
25.	BH 25	AAP-2400-20-115	2400	20 10	(+)115	10.00

For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager – Mechanical

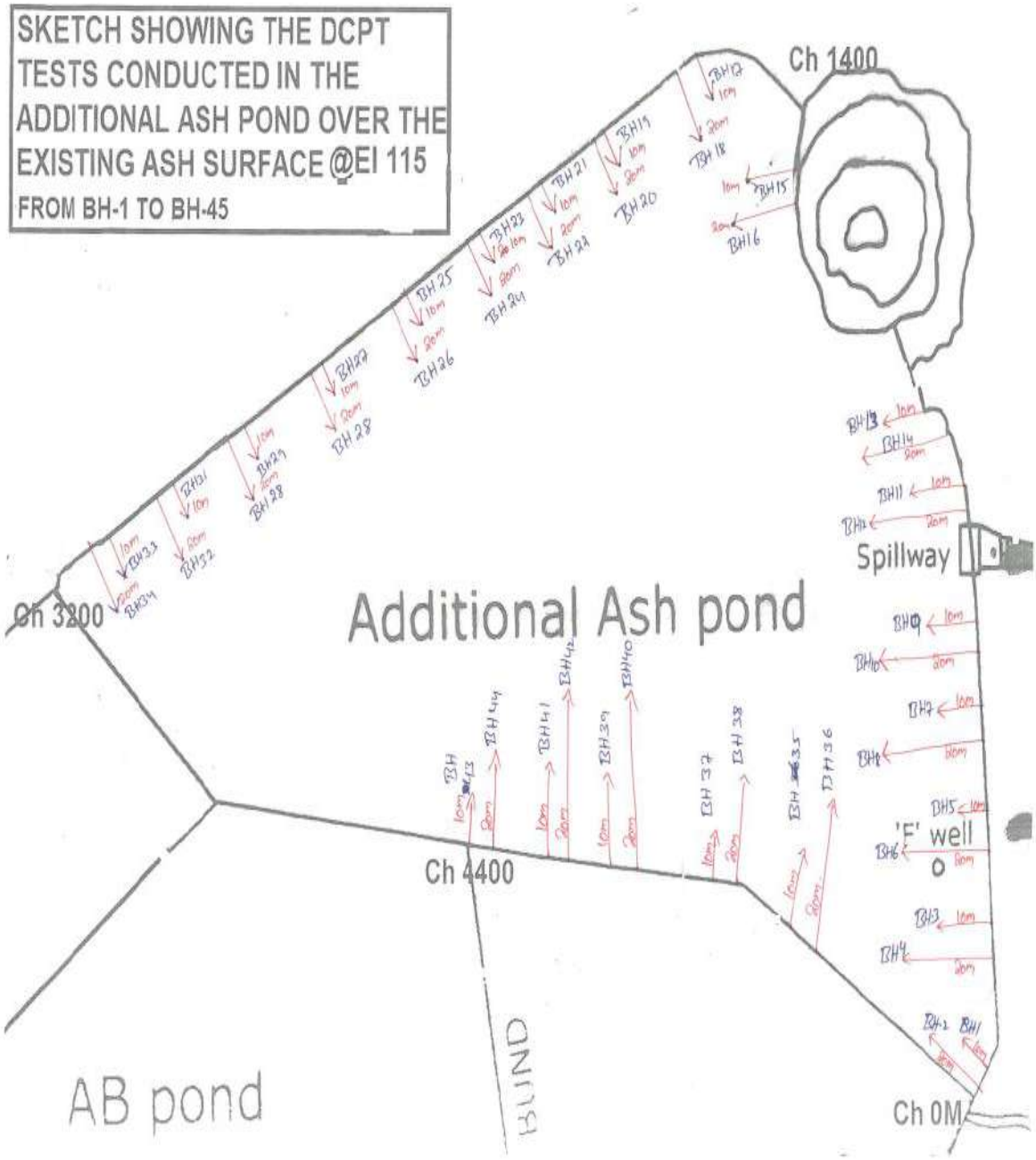
Sl. No.	Bore hole No.	Bore Hole ID	Chainage	Cross chainage	Elevation	Depth of Investigation (m)
26.	BH 26	AAP-2400-10-115	2400	10 20	(+)115	4.50
27.	BH 27	AAP-2600-20-115	2600	20 10	(+)115	10.00
28.	BH 28	AAP-2600-10-115	2600	10 20	(+)115	6.00
29.	BH 29	AAP-2800-20-115	2800	20 10	(+)115	10.00
30.	BH 30	AAP-2800-10-115	2800	10 20	(+)115	10.00
31.	BH 31	AAP-3000-20-115	3000	20 10	(+)115	10.00
32.	BH 32	AAP-3000-10-115	3000	10 20	(+)115	10.00
33.	BH 33	AAP-3200-20-115	3200	20 10	(+)115	10.00
34.	BH 34	AAP-3200-10-115	3200	10 20	(+)115	6.00
35.	BH 35	AAP-5200-20-115	5200	20 10	(+)115	10.00
36.	BH 36	AAP-5200-10-115	5200	10 20	(+)115	6.00
37.	BH 37	AAP-5000-10-115	5000	10	(+)115	6.00
38.	BH 38	AAP-5000-20-115	5000	20	(+)115	10.00
39.	BH 39	AAP-4800-10-115	4800	10	(+)115	4.50
40.	BH 40	AAP-4800-20-115	4800	20	(+)115	10.00
41.	BH 41	AAP-4600-20-115	4600	20 10	(+)115	10.00
42.	BH 42	AAP-4600-10-115	4600	10 20	(+)115	4.50
43.	BH 43	AAP-4400-20-115	4400	20 10	(+)115	4.50
44.	BH 44	AAP-4400-10-115	4400	10 20	(+)115	4.50
45.	BH 45	AAP-SB-5400-111	5400	--	(+)106	4.50

Note: - BH – Bore Hole, AAP – Additional Ash Pond, SB – Suraram Bund

Ex. AAP-0-10-115 means DCP Test conducted in the Additional Ash Pond at Chainage 0 at Cross Chainage 10.0m at an Elevation 115.0 m

For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager – Mechanical



For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager – Mechanical

B) List of DCPT tests conducted in the Additional ash pond over the existing earth surface along the axis and toe of bund at an El (+) 106.0m and at an EI (+) 111.0m

(AGREEMENT ITEM NO 2)

The list of DCPT tests conducted are from BH 46 to BH 60 at an EI (+) 106.0m as mentioned in the below table

The list of DCPT tests conducted are from BH 90 to BH 93 at an EI (+) 111.0m as mentioned in the below table

S. No	Bore hole No.	Bore Hole ID	Chainage	Cross chainage	Elevation	Depth of Investigation (m)
46.	BH 46	AAP-SB-5200-111	5200	--	(+)106	4.50
47.	BH 47	AAP-0-E-106	0	--	(+)106	2.30
48.	BH 48	AAP-200-E-106	200	--	(+)106	3.00
49.	BH 49	AAP-400-E-106	400	--	(+)106	2.70
50.	BH 50	AAP-E-700-106	700	--	(+)106	2.00
51.	BH 51	AAP-1500-E-106	1500	--	(+)106	1.50
52.	BH 52	AAP-1600-E-106	1600	--	(+)106	2.00
53.	BH 53	AAP-1800-E-106	1800	--	(+)106	2.20
54.	BH 54	AAP-2000-E-106	2000	--	(+)106	1.60
55.	BH 55	AAP-2200-E-106	2200	--	(+)106	2.50
56.	BH 56	AAP-2400-E-106	240 2400	--	(+)106	1.90
57.	BH 57	AAP-2600-E-106	2600	--	(+)106	1.50
58.	BH 58	AAP-2800-E-106	2800	--	(+)106	2.00
59.	BH 59	AAP-3000-E-106	3000	--	(+)106	2.00
60.	BH 60	AAP-3200-E-106	3200	--	(+)106	2.00
61.	BH 90	AAP-SB-5000-111	5000	--	(+)111	3.50
62.	BH 91	AAP-SB-4800-111	4800	--	(+)111	3.50
63.	BH 92	AAP-SB-4600-E-111	4600	--	(+)111	3.50
64.	BH 93	AAP-SB-4400-111	4400	--	(+)111	3.50

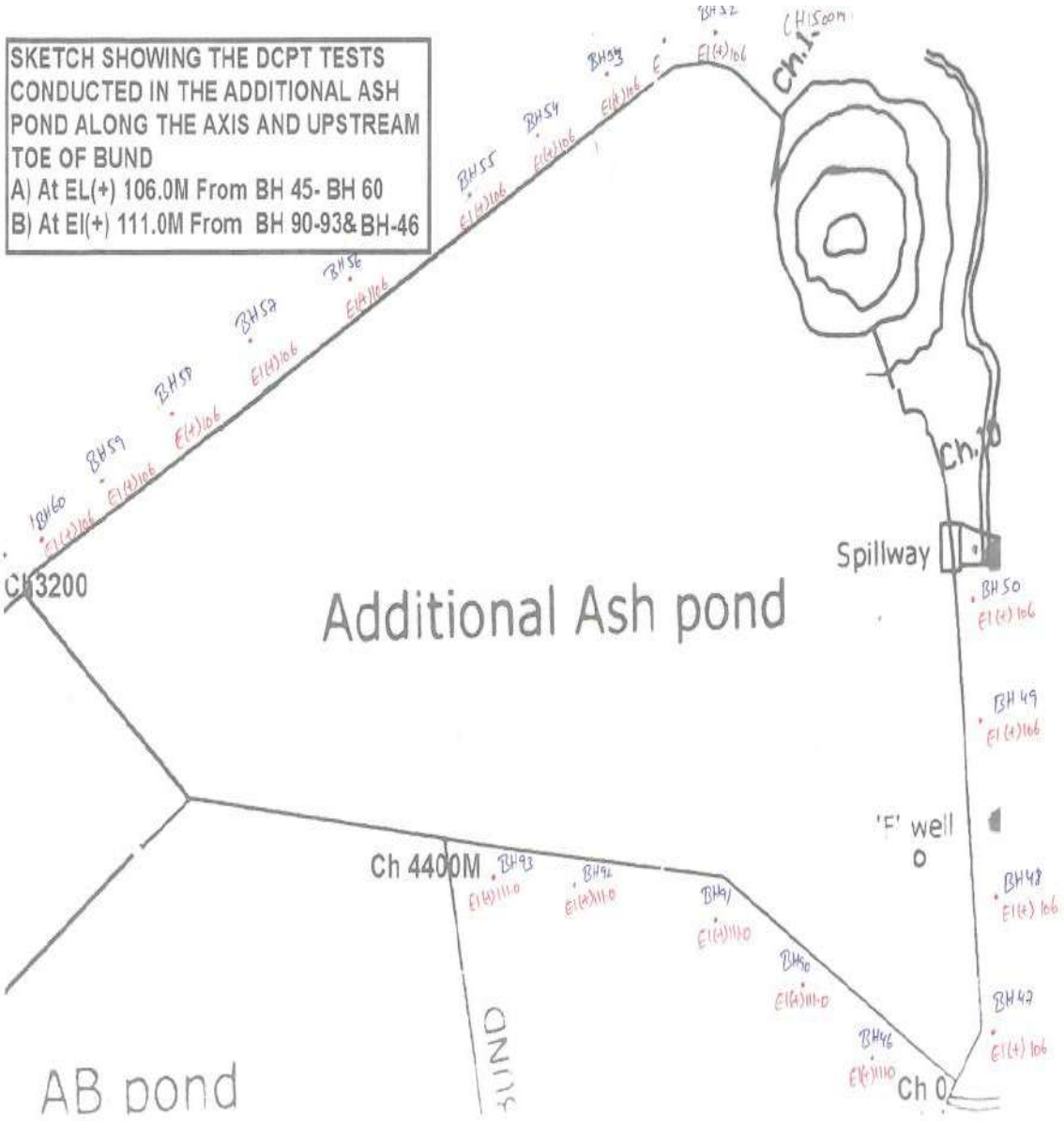
Note: - BH – Bore Hole, AAP – Additional Ash Pond, SB – Suraram Bund

Ex. AAP-0-E-106 means DCP Test conducted in the Additional Ash Pond at Chainage 0 at an Elevation 106.0 m

Note: In between BH 50 to BH 51 hillock portion is available. Hence no DCPT tests are carried out in between BH 50 to BH 51.

For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager – Mechanical

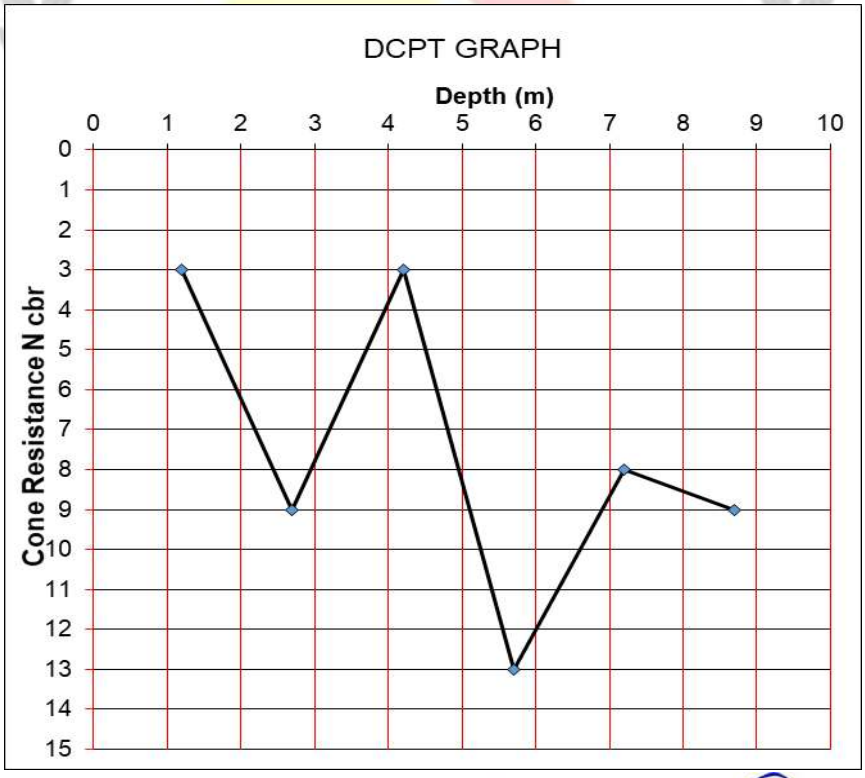


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager – Mechanical

BH-1

BH ID: AAP-0-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-0-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	3	4	9	6
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	1	1	1	3	2
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	5	4	4	13	7
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	3	2	3	8	5
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	3	3	3	9	5
13.0		DS	9.00 - 10.00					

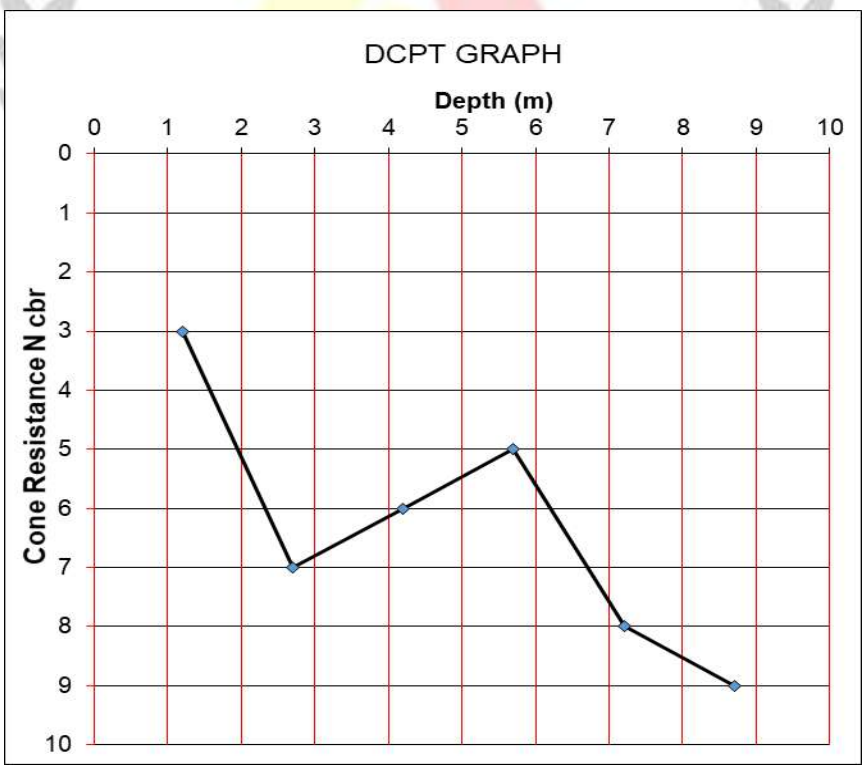


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-2

BH ID: AAP-0-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-0-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	3	7	5
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	1	3	6	3
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	2	2	1	5	3
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	2	4	2	8	5
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	2	3	4	9	5
13.0		DS	9.00 - 10.00					

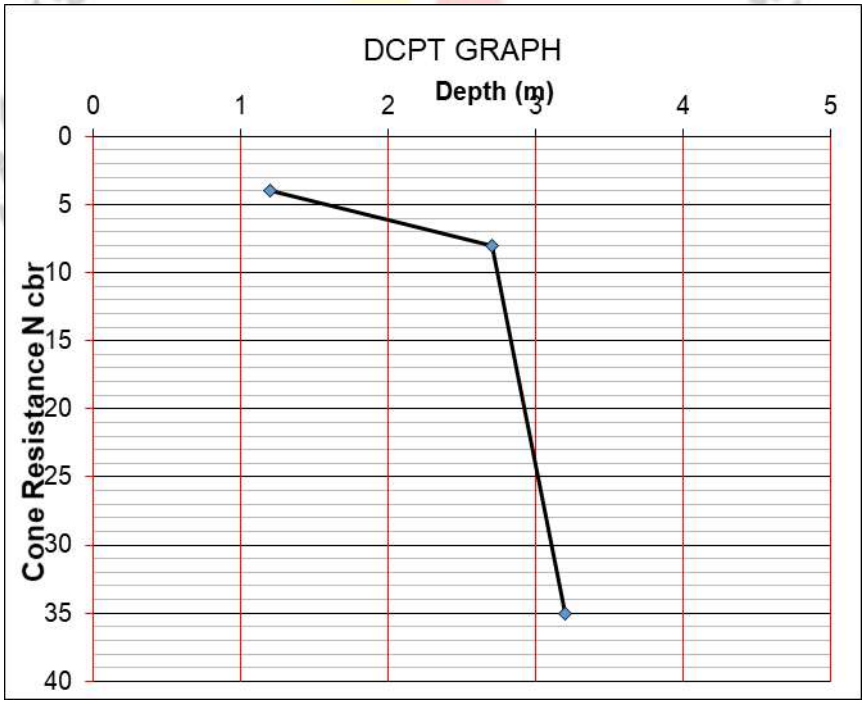


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-3

BH ID: AAP-200-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-200-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	2	4	3
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	4	8	5
5.0		DS	3.00 - 3.20					
6.0		DCPT	3.20 - 3.50	>35	--	--	35	20

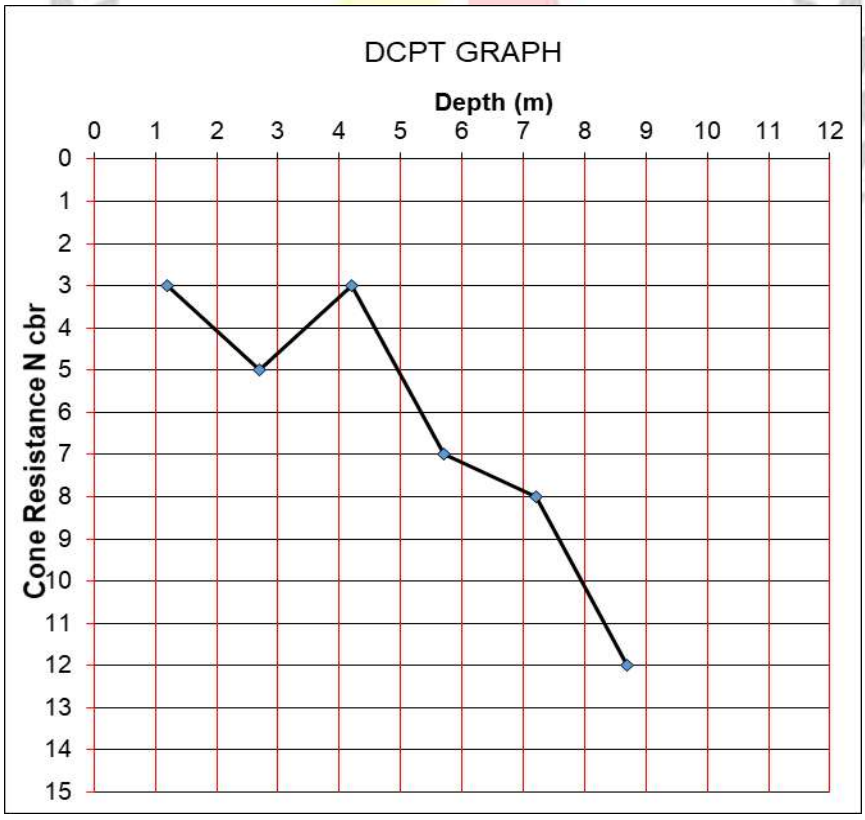


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-4

BH ID: AAP-200-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-200-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	1	2	5	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	1	1	1	3	2
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	2	2	3	7	4
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	2	3	3	8	5
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	3	4	5	12	7
13.0		DS	9.00 - 10.00					

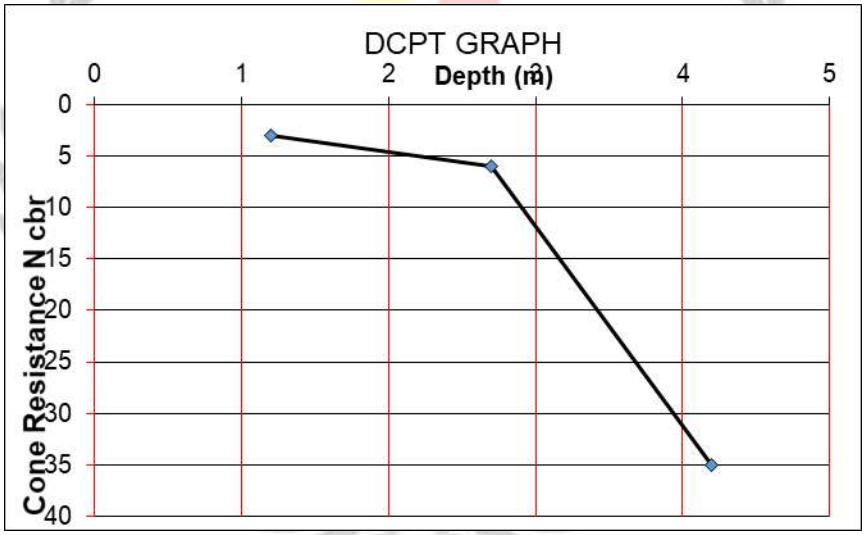


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-5

BH ID: AAP-400-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-400-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	2	6	4
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	35	--	--	35	20

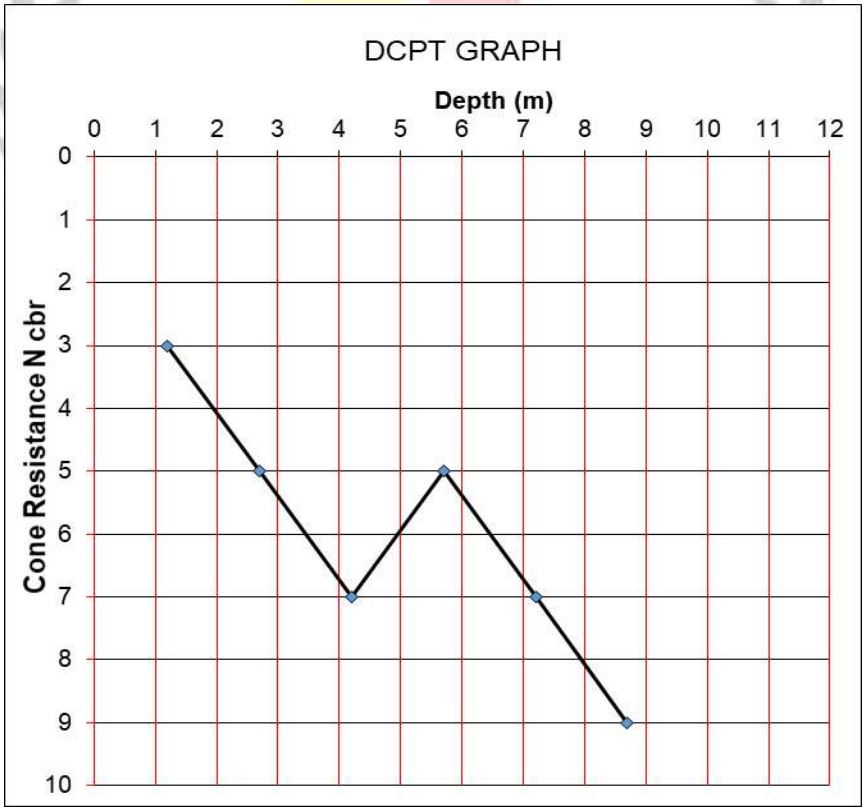


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-6

BH ID: AAP-400-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-400-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	1	2	5	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	2	3	7	4
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	1	2	2	5	3
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	2	2	3	7	4
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	3	3	3	9	5
13.0		DS	9.00 - 10.00					

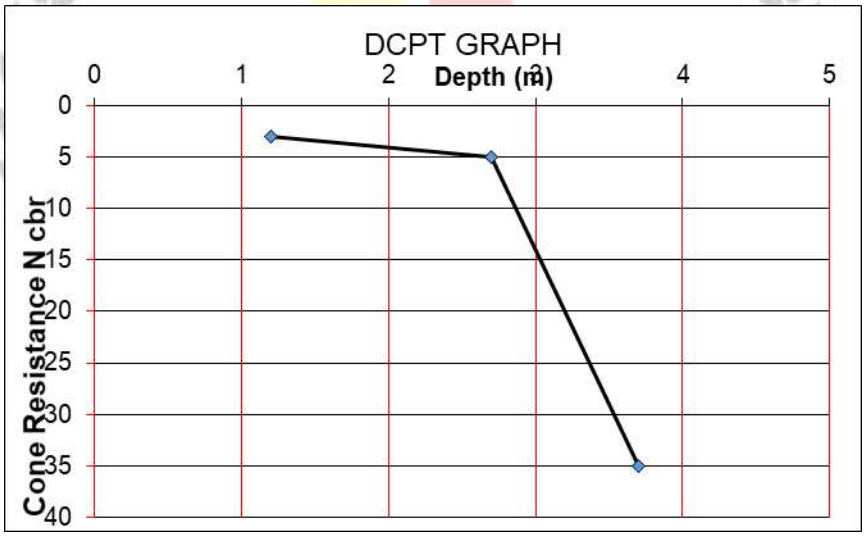


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-7

BH ID: AAP-600-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-600-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	1	2	5	3
5.0		DS	3.00 - 3.70					
6.0		DCPT	3.70 - 4.00	35	--	--	35	23

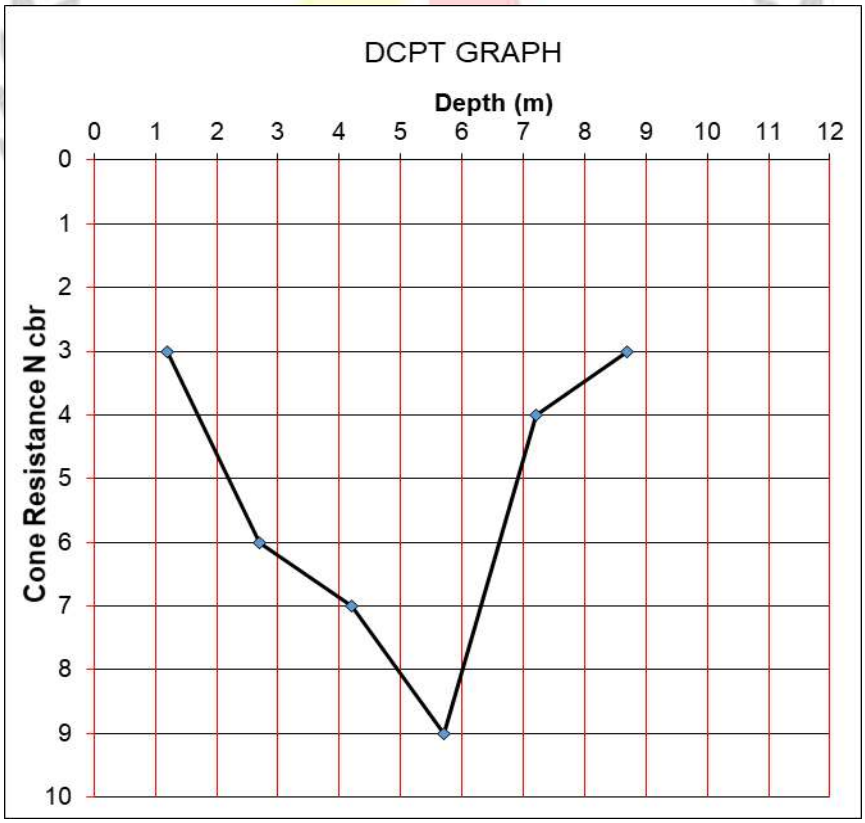


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-8

BH ID: AAP-600-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-600-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	2	6	4
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	2	3	7	4
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	3	3	3	9	5
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	1	2	1	4	2
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	1	1	1	3	2
13.0		DS	9.00 - 10.00					

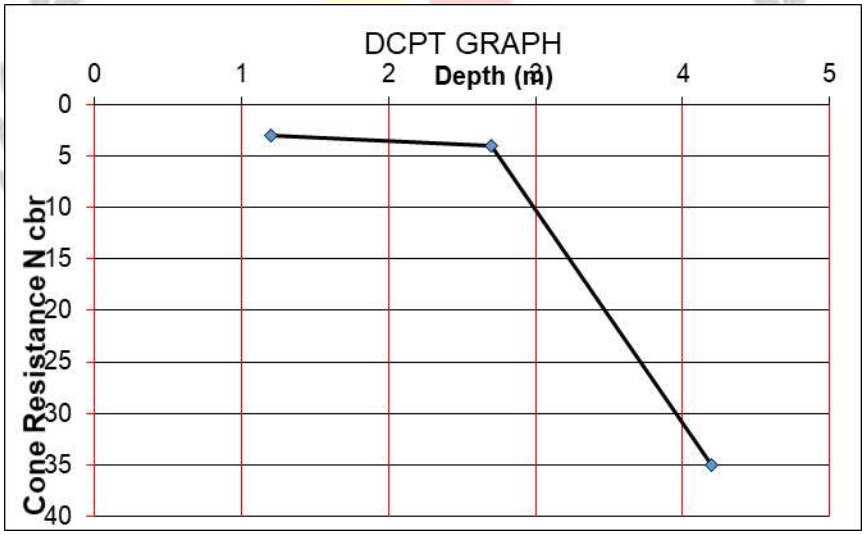


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-9

BH ID: AAP-800-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-800-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	1	1	2	4	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	35	--	--	35	20

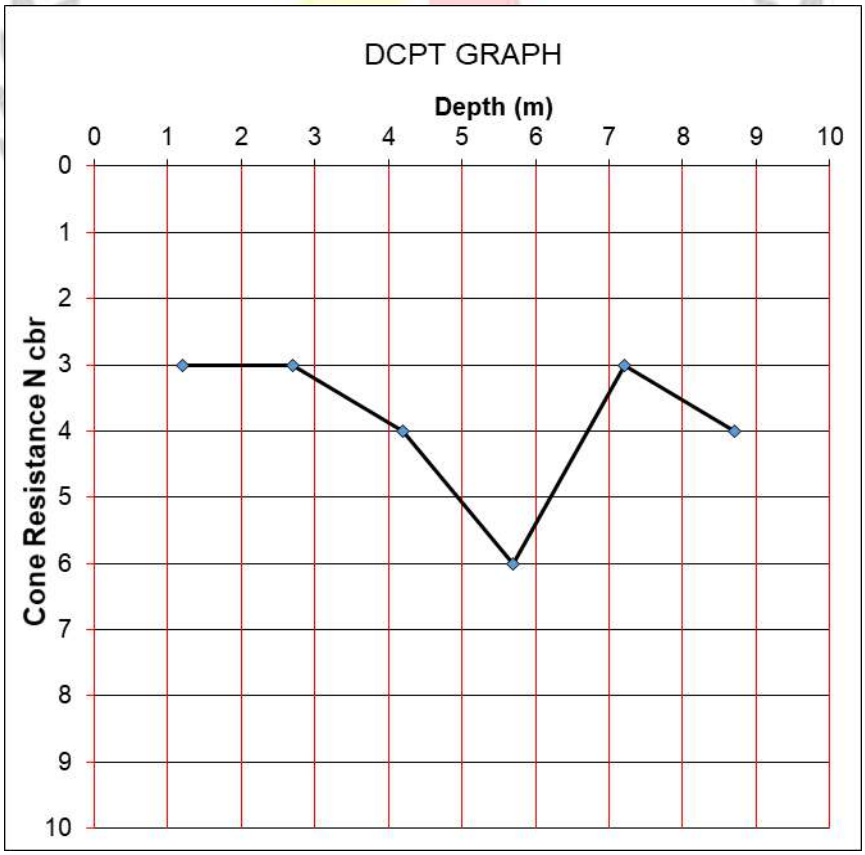


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-10

BH ID: AAP-800-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-800-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	1	1	1	3	2
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	1	2	1	4	2
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	2	2	2	6	3
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	1	1	1	3	2
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	2	1	1	4	2
13.0		DS	9.00 - 10.00					

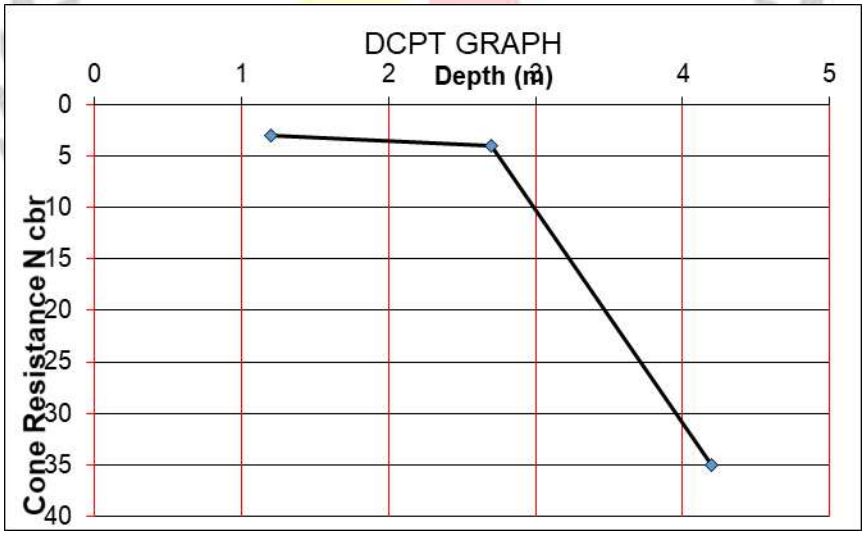


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-11

BH ID: AAP-1000-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-1000-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	1	2	1	4	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	35	--	--	35	20

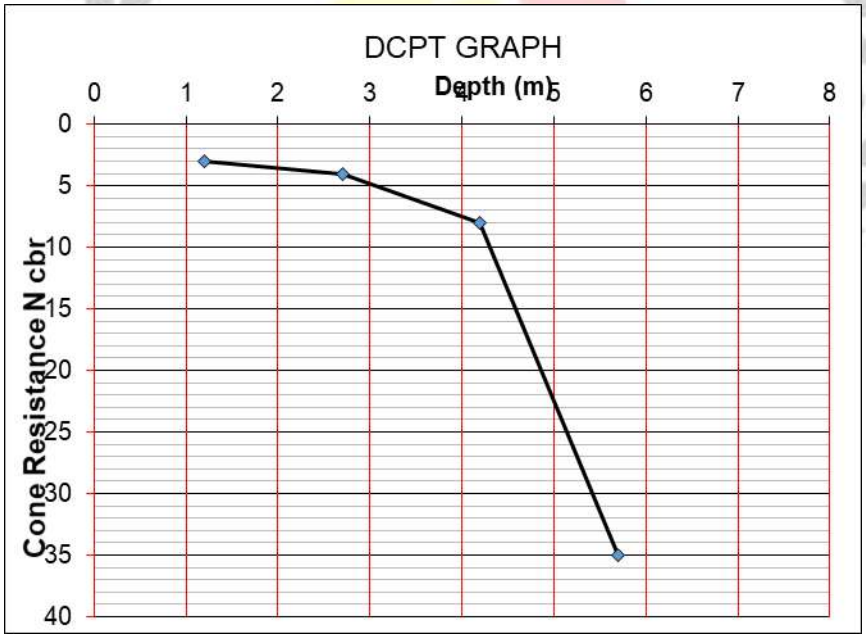


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-12

BH ID: AAP-1000-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-1000-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	1	1	4	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	3	3	8	5
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	35	--	--	35	20

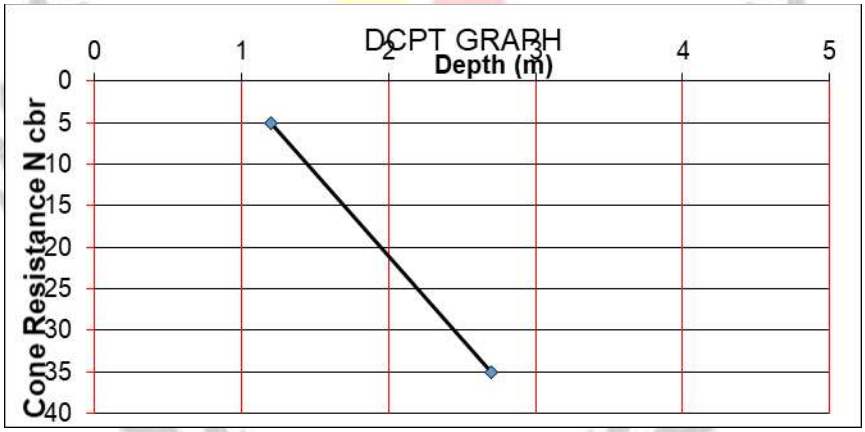


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-13

BH ID: AAP-1200-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-1200-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	2	1	2	5	3
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	35	--	--	35	23

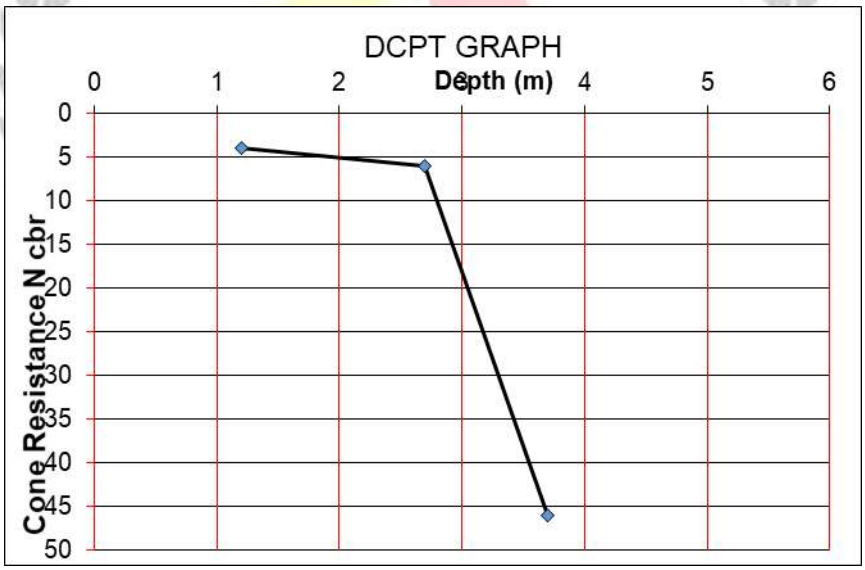


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-14

BH ID: AAP-1200-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-1200-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	2	1	1	4	3
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	1	3	6	4
5.0		DS	3.00 - 3.70					
6.0		DCPT	3.70 - 4.00	5	5	36	46	31

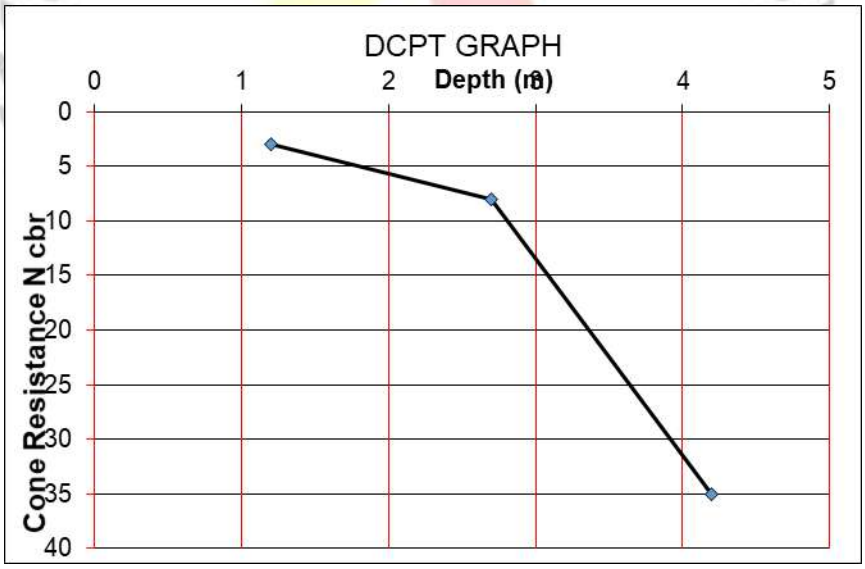


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-15

BH ID: APP-1400-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-1400-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	3	3	8	5
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	35	--	--	35	20

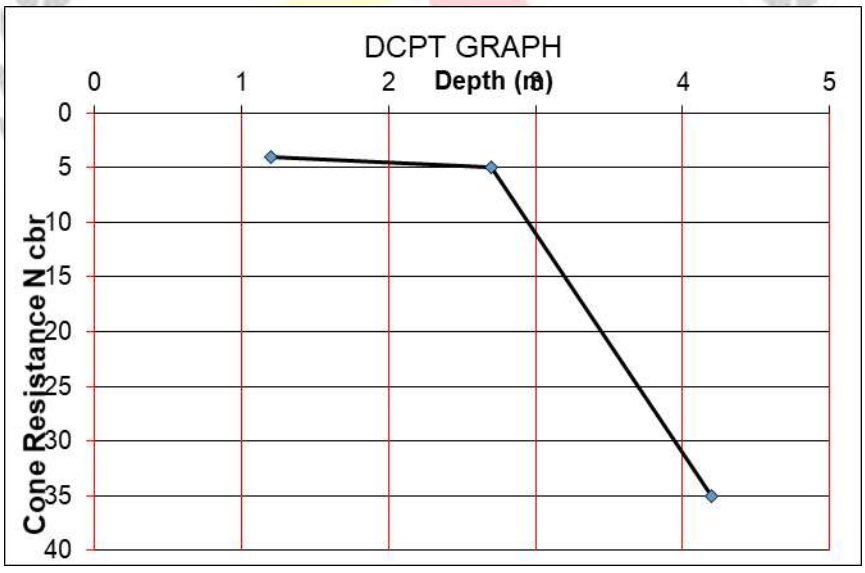


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-16

BH ID: APP-1400-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-1400-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	2	1	1	4	3
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	1	5	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	35	--	--	35	20

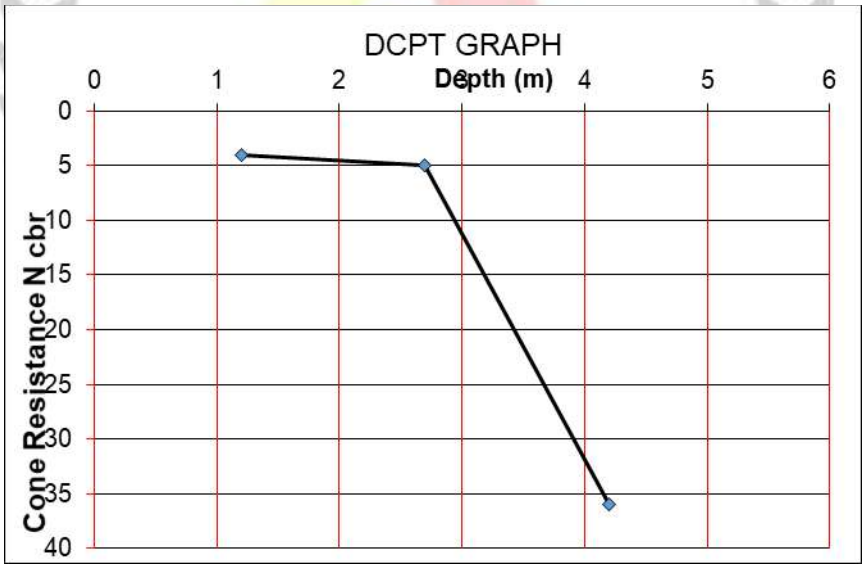


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-17

BH ID: AAP-1600-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value, (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-1600-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	2	4	3
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	1	2	5	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	36	--	--	36	21

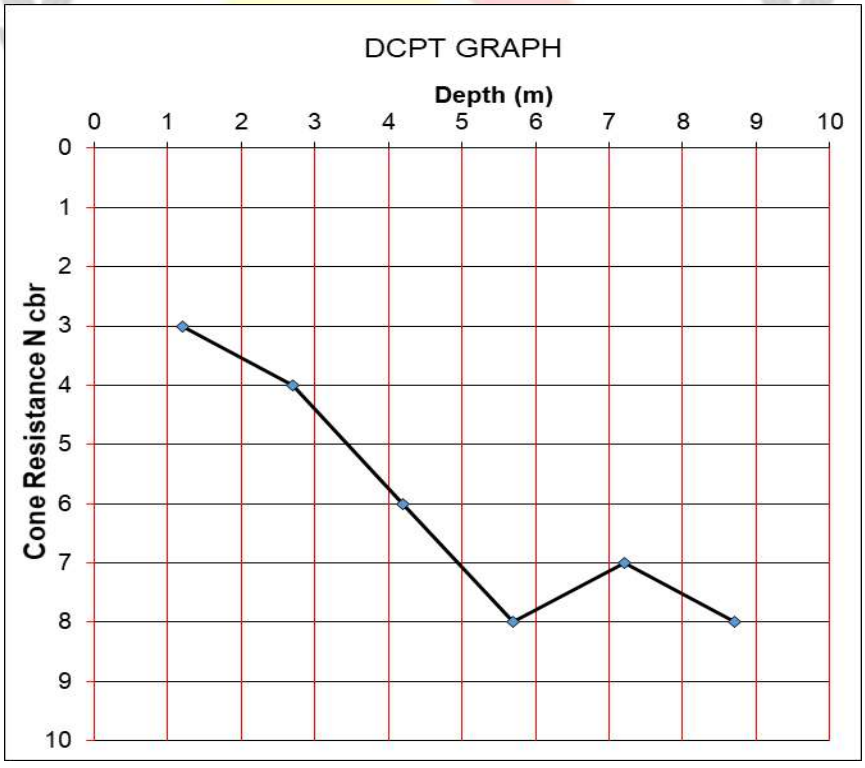


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-18

BH ID: AAP-1600-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-1600-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	1	2	1	4	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	2	2	6	3
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	2	3	3	8	5
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	2	3	2	7	4
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	2	3	3	8	5
13.0		DS	9.00 - 10.00					



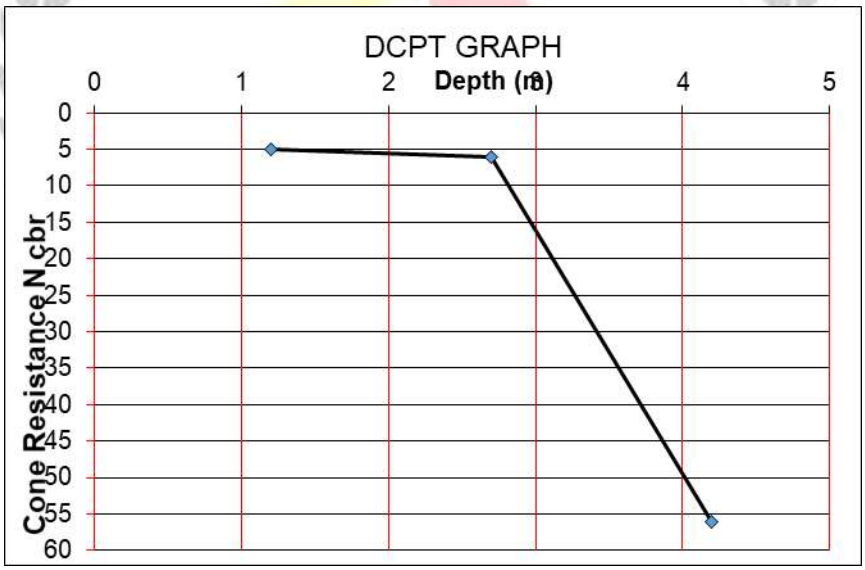
For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-19

BH ID: APP-1800-10-115

S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-1800-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	2	1	2	5	3
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	2	6	4
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	21	35	--	56	32

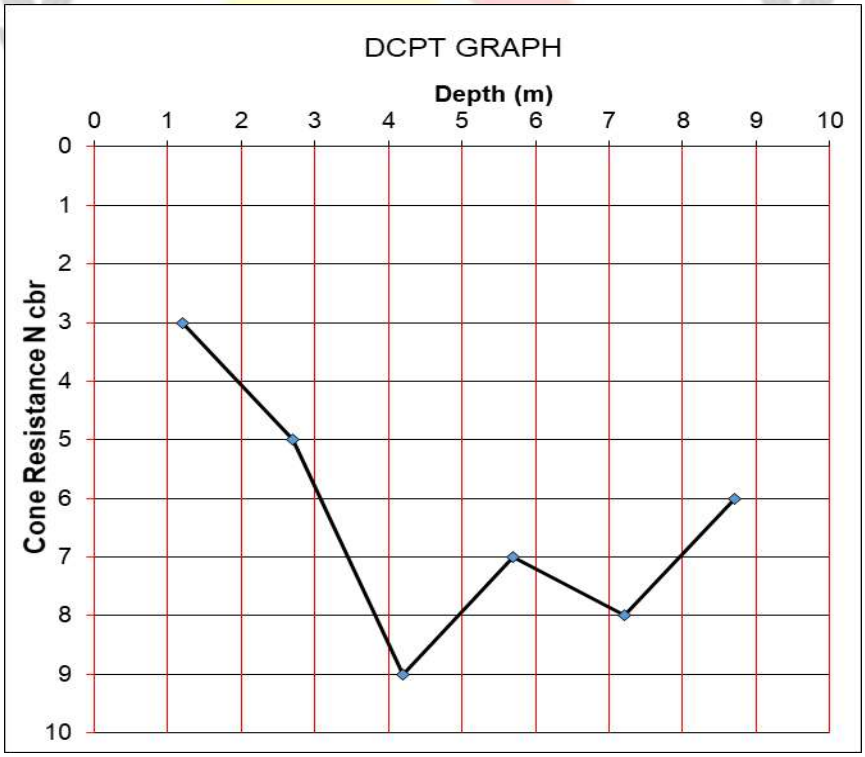


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-20

BH ID: AAP-1800-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-1800-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	1	5	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	3	3	3	9	5
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	3	2	2	7	4
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	3	3	2	8	5
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	2	2	2	6	3
13.0		DS	9.00 - 10.00					

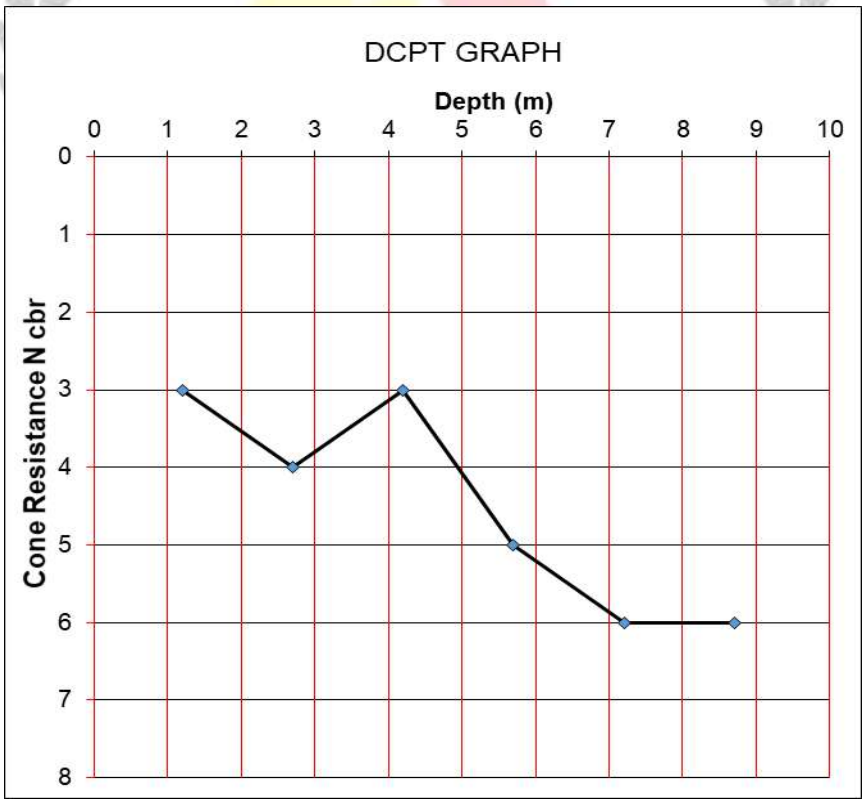


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-21

BH ID: AAP-2000-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-2000-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	1	1	2	4	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	1	1	1	3	2
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	2	2	1	5	3
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	2	2	2	6	3
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	2	2	2	6	3
13.0		DS	9.00 - 10.00					

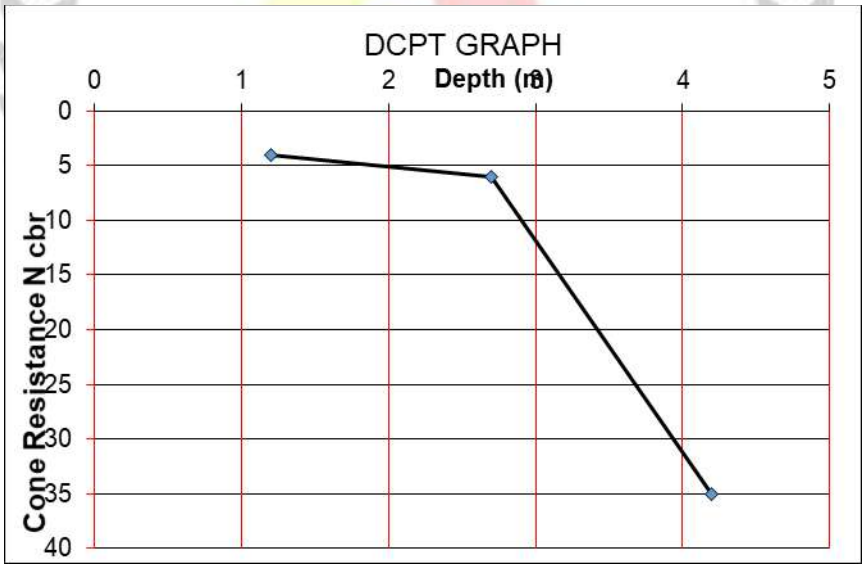


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-22

BH ID: APP-2000-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-2000-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	2	4	3
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	2	6	4
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	35	--	--	35	20

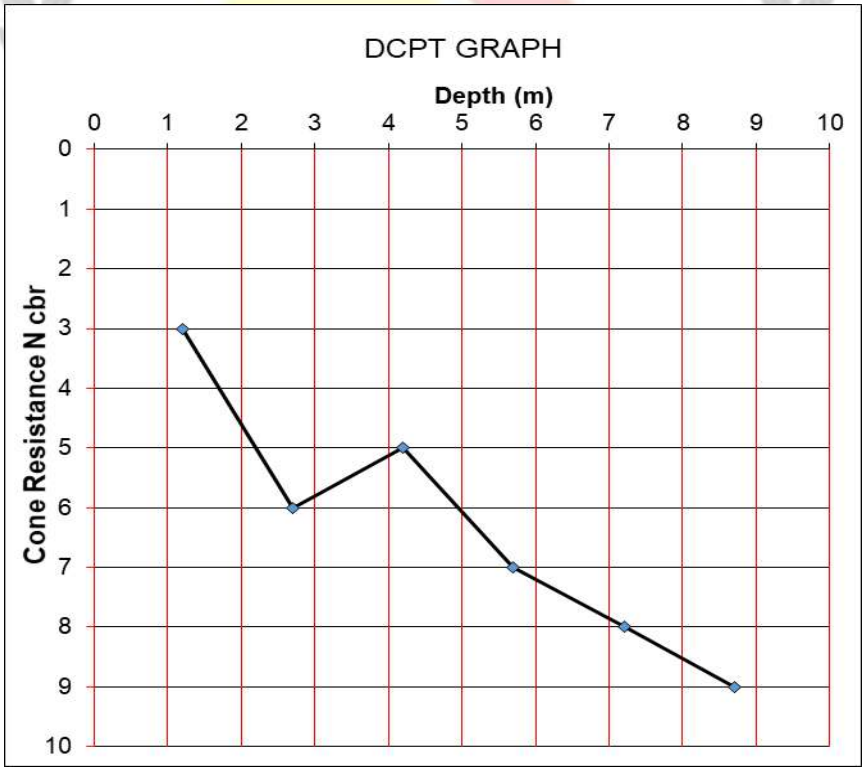


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-23

BH ID: AAP-2200-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-2200-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	2	6	4
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	2	1	5	3
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	2	2	3	7	4
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	2	3	3	8	5
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	3	3	3	9	5
13.0		DS	9.00 - 10.00					



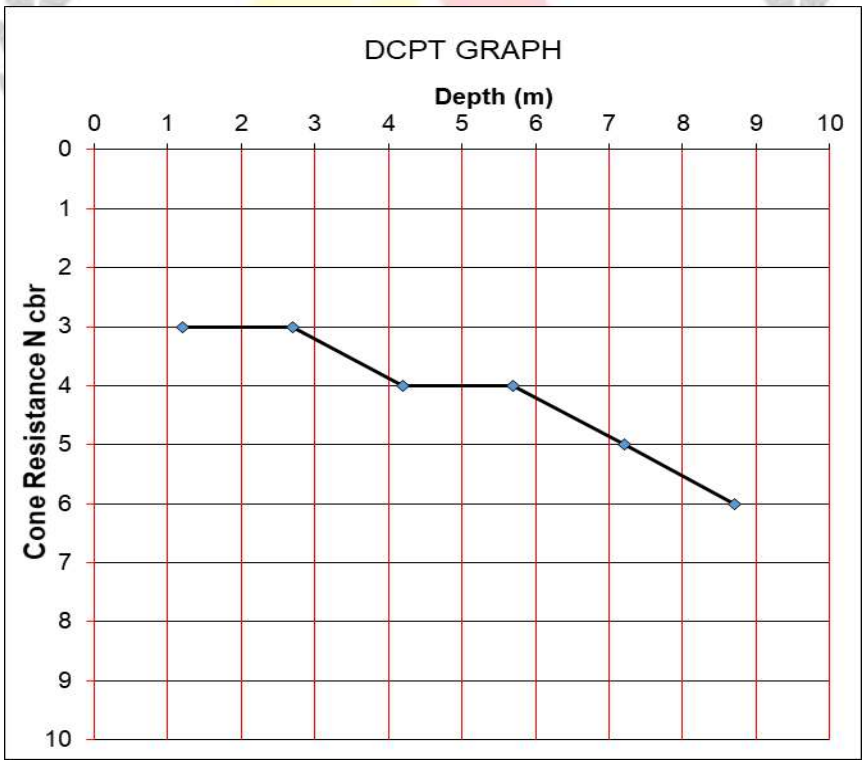
For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-24

BH ID: AAP-2200-10-115

S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-2200-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	1	1	1	3	2
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	1	1	2	4	2
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	2	1	1	4	2
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	2	2	1	5	3
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	2	2	2	6	3
13.0		DS	9.00 - 10.00					

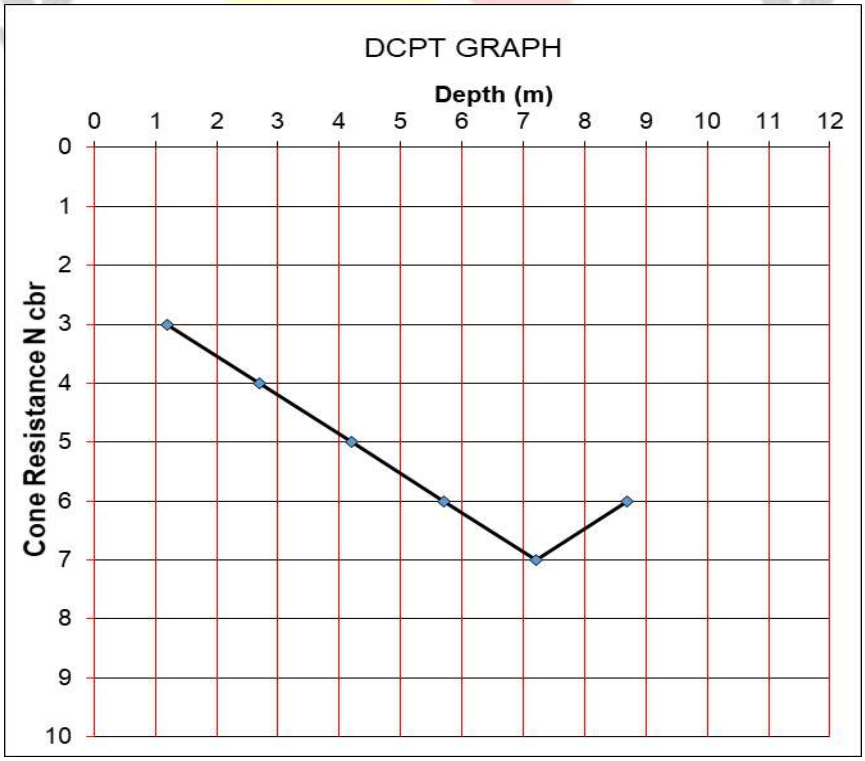


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-25

BH ID: AAP-2400-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-2400-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	1	1	2	4	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	2	1	5	3
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	2	2	2	6	3
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	2	2	3	7	4
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	2	2	2	6	3
13.0		DS	9.00 - 10.00					

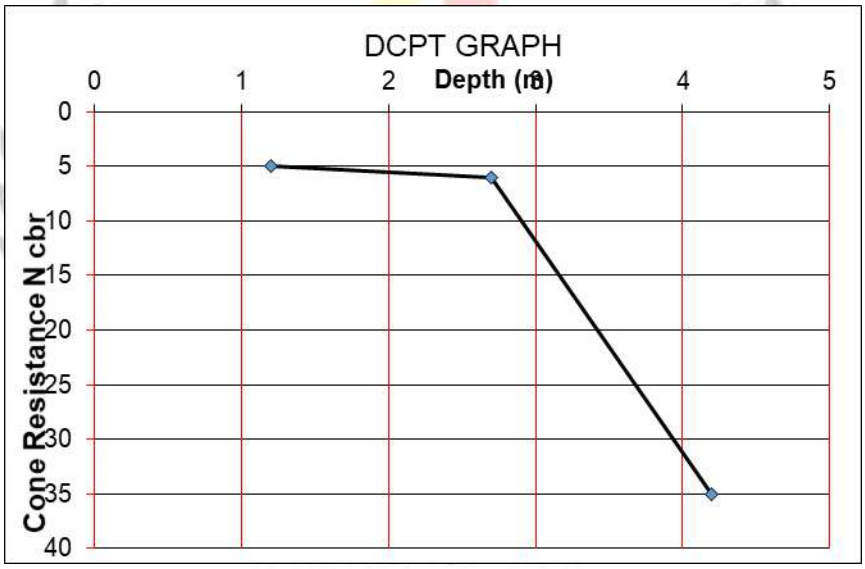


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-26

BH ID: APP-2400-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-2400-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	2	2	5	3
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	2	6	4
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	35	--	--	35	20

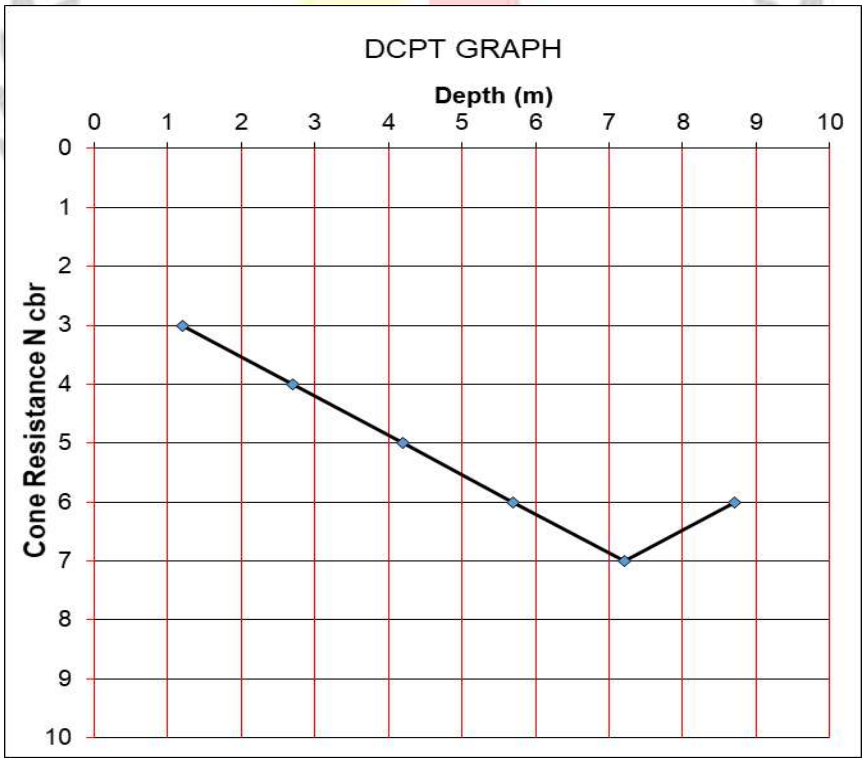


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-27

BH ID: AAP-2600-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-2600-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	1	1	2	4	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	1	2	5	3
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	2	2	2	6	3
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	2	3	2	7	4
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	2	2	2	6	3
13.0		DS	9.00 - 10.00					

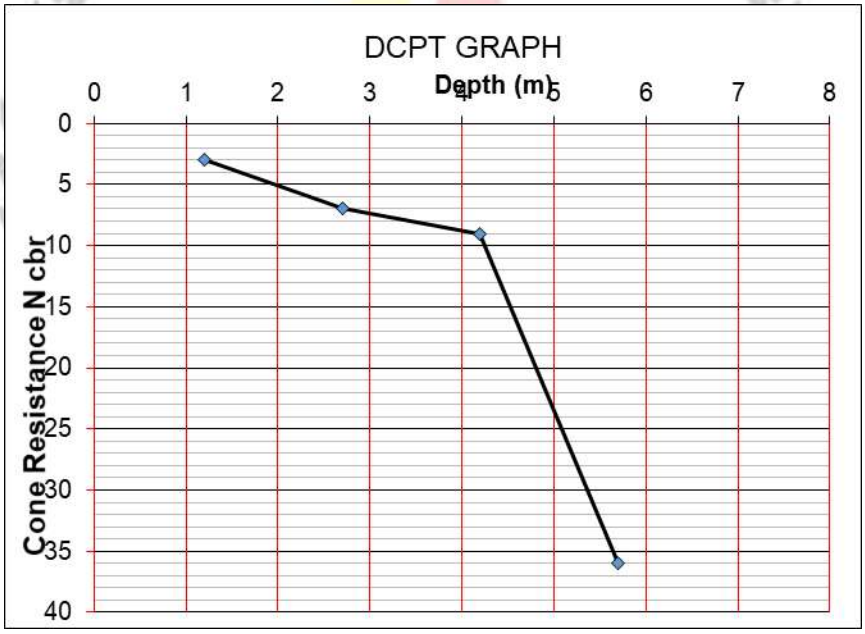


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-28

BH ID: AAP-2600-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-2600-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	3	7	5
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	3	3	3	9	5
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	36	--	--	36	21

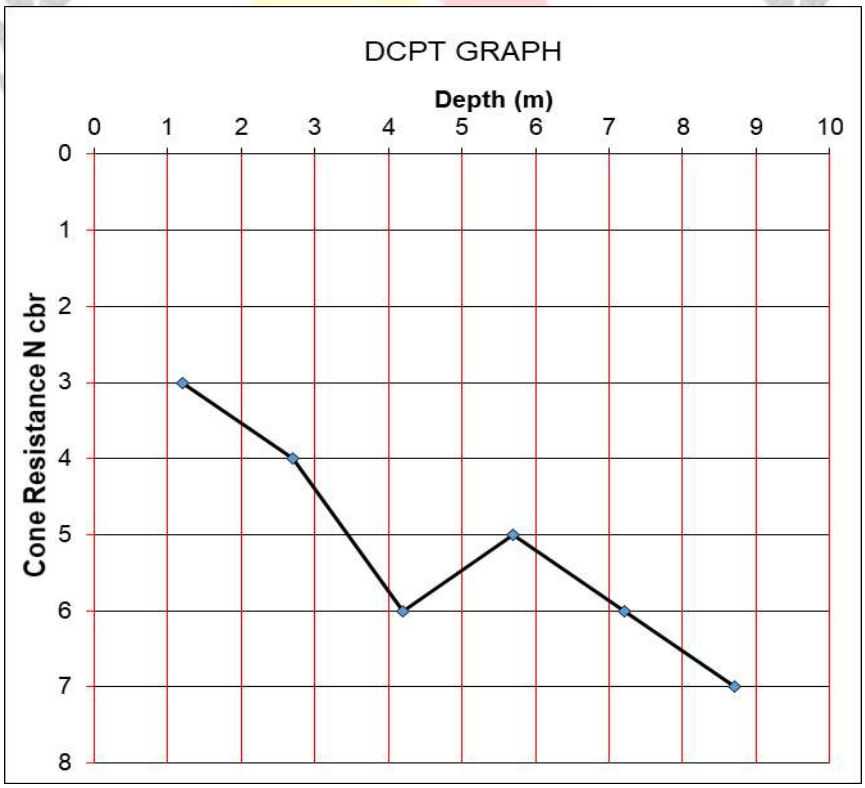


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-29

BH ID: AAP-2800-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-2800-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	1	1	2	4	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	2	2	6	3
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	2	2	1	5	3
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	2	2	2	6	3
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	2	2	3	7	4
13.0		DS	9.00 - 10.00					

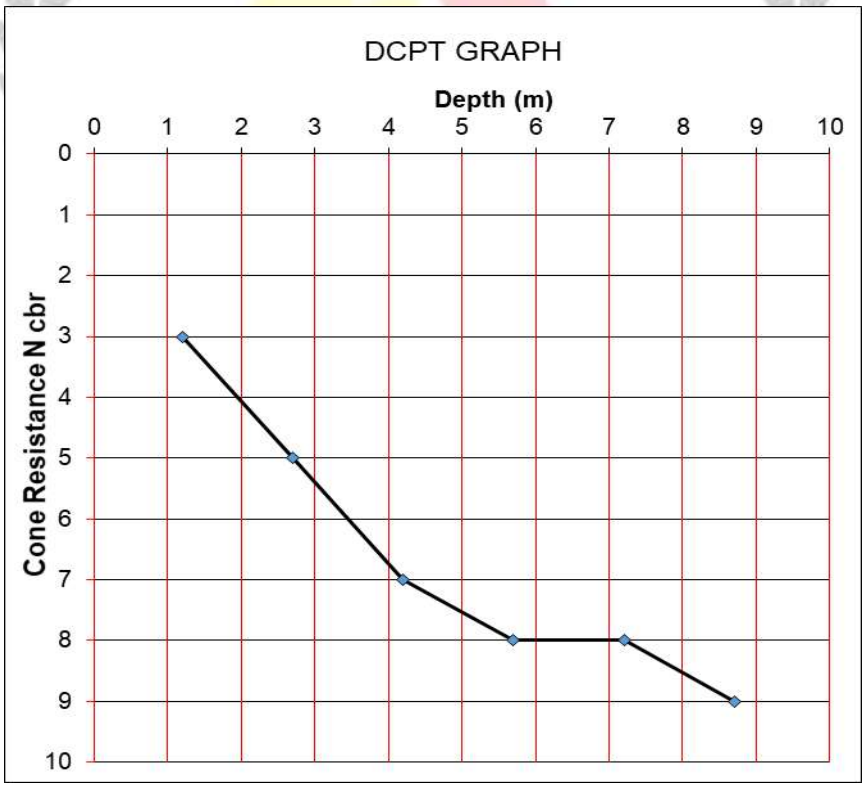


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-30

BH ID: AAP-2800-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-2800-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	1	2	5	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	2	3	7	4
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	2	3	3	8	5
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	3	2	3	8	5
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	3	3	3	9	5
13.0		DS	9.00 - 10.00					

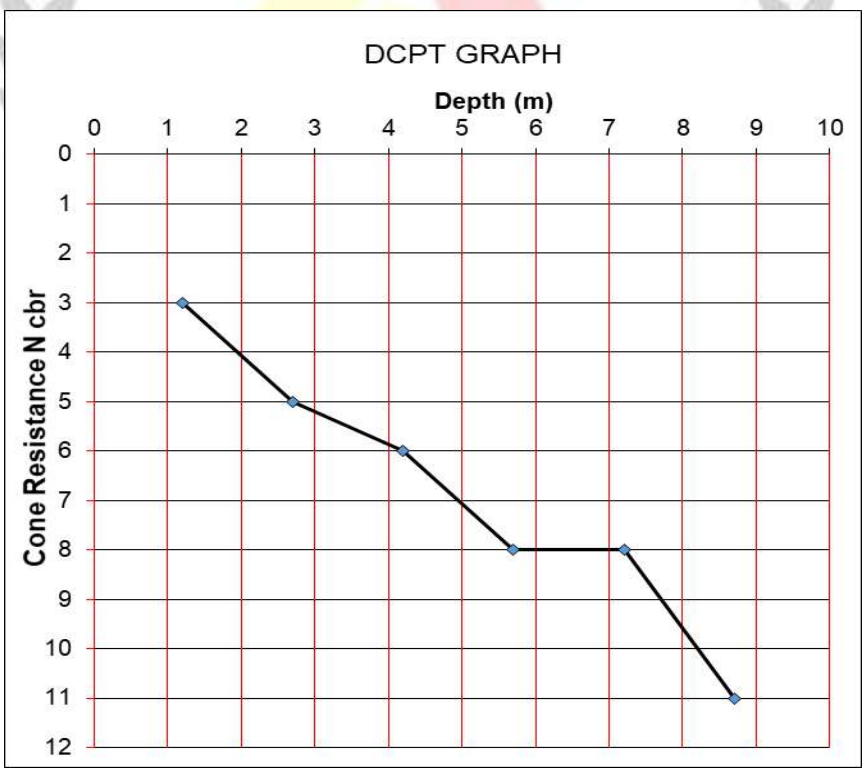


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-31

BH ID: AAP-3000-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-3000-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	1	5	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	2	2	6	3
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	3	2	3	8	5
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	2	3	3	8	5
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	5	3	3	11	6
13.0		DS	9.00 - 10.00					

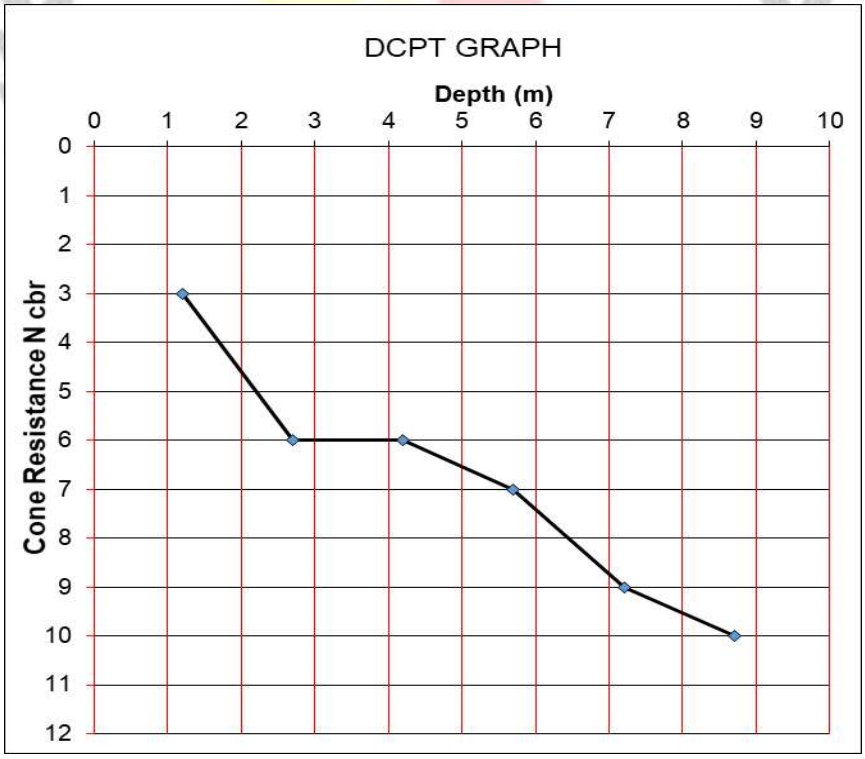


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-32

BH ID: AAP-3000-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-3000-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	2	6	4
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	2	2	6	3
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	2	2	3	7	4
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	3	3	3	9	5
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	4	3	3	10	6
13.0		DS	9.00 - 10.00					

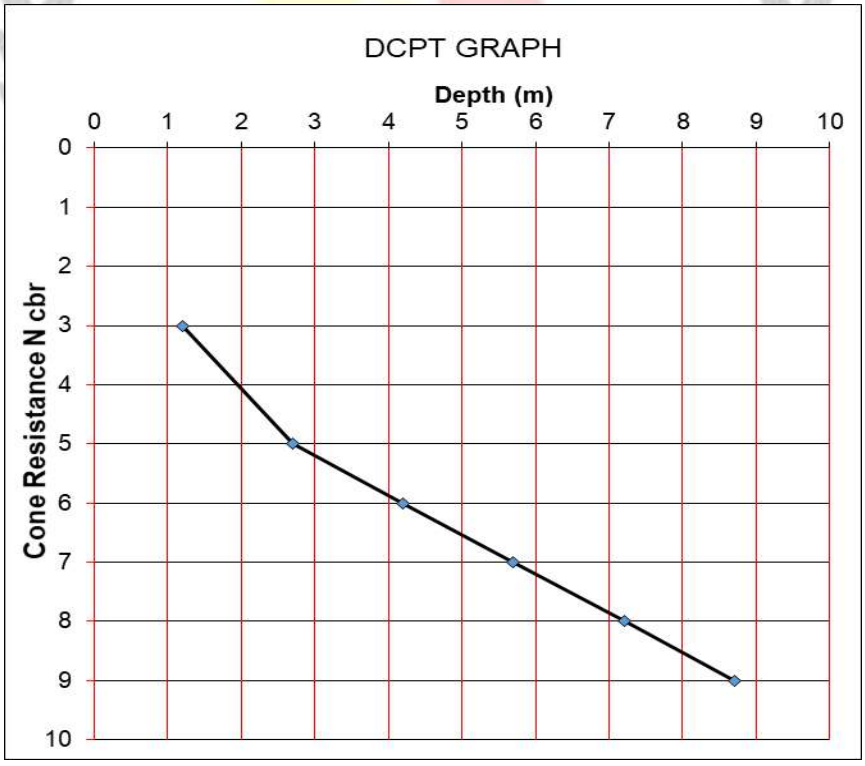


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-33

BH ID: AAP-3200-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-3200-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	1	5	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	2	2	6	3
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	2	3	2	7	4
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	2	3	3	8	5
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	3	3	3	9	5
13.0		DS	9.00 - 10.00					

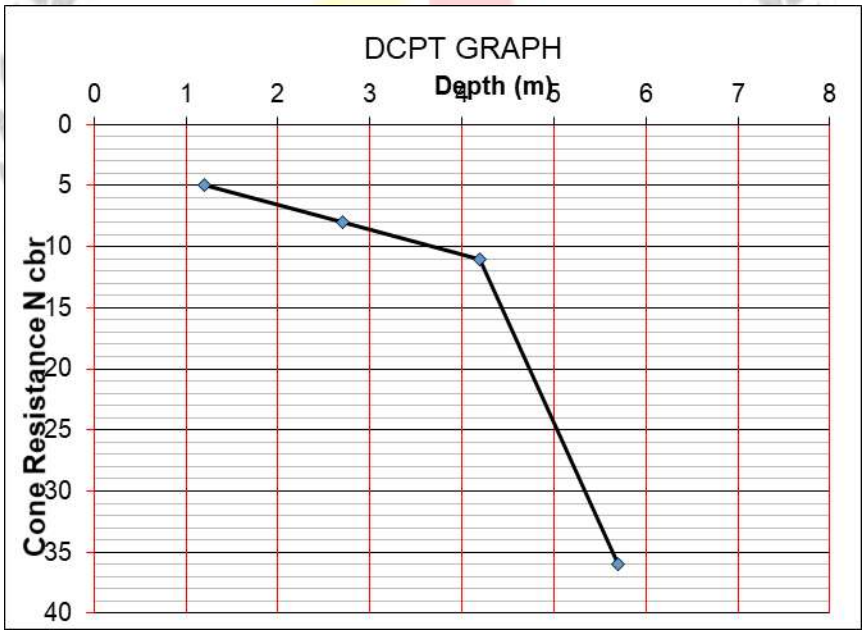


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-34

BH ID: AAP-3200-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-3200-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	2	2	5	3
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	3	3	8	5
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	3	4	4	11	6
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	36	--	--	36	21

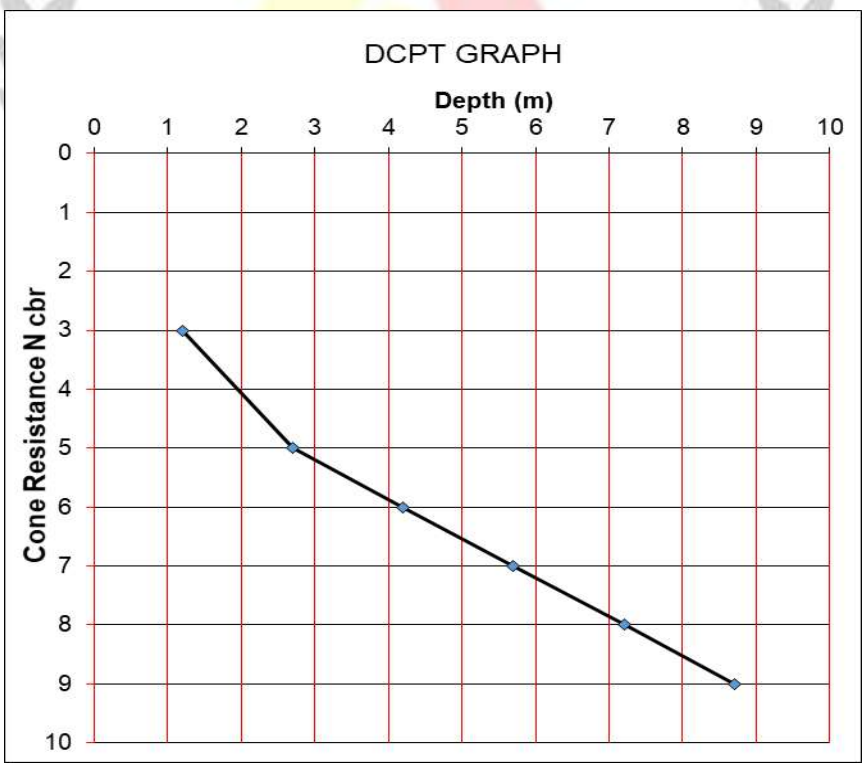


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-35

BH ID: AAP-5200-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-5200-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	1	2	5	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	2	2	6	3
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	2	2	3	7	4
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	3	2	3	8	5
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	3	3	3	9	5
13.0		DS	9.00 - 10.00					

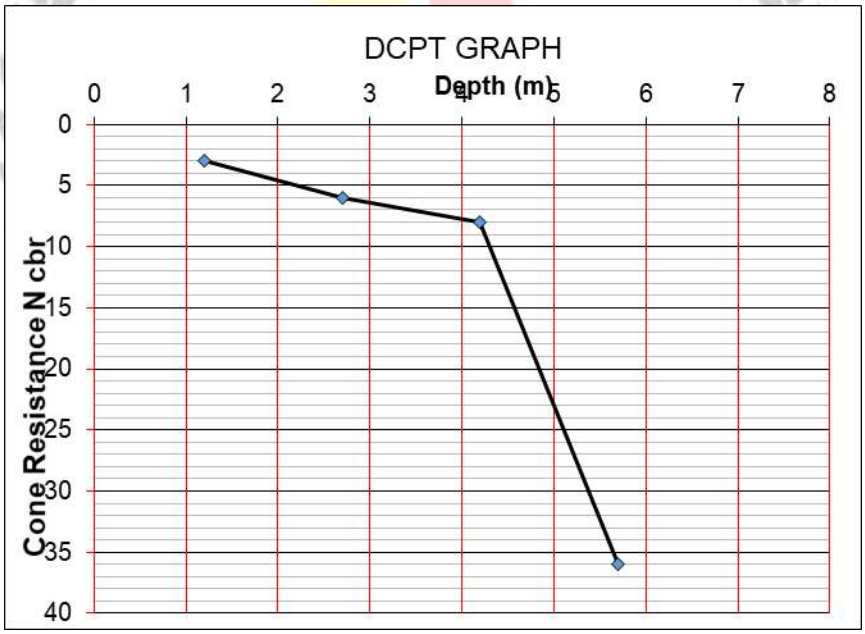


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-36

BH ID: AAP-5200-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-5200-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	2	6	4
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	3	3	8	5
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	36	--	--	36	21

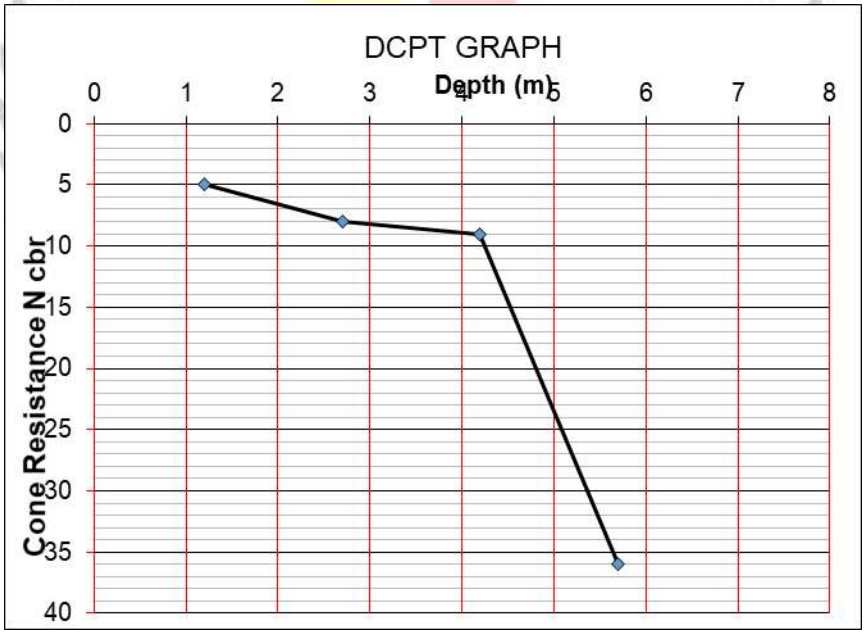


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-37

BH ID: AAP-5000-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-5000-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	2	2	5	3
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	3	3	8	5
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	3	3	3	9	5
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	36	--	--	36	21

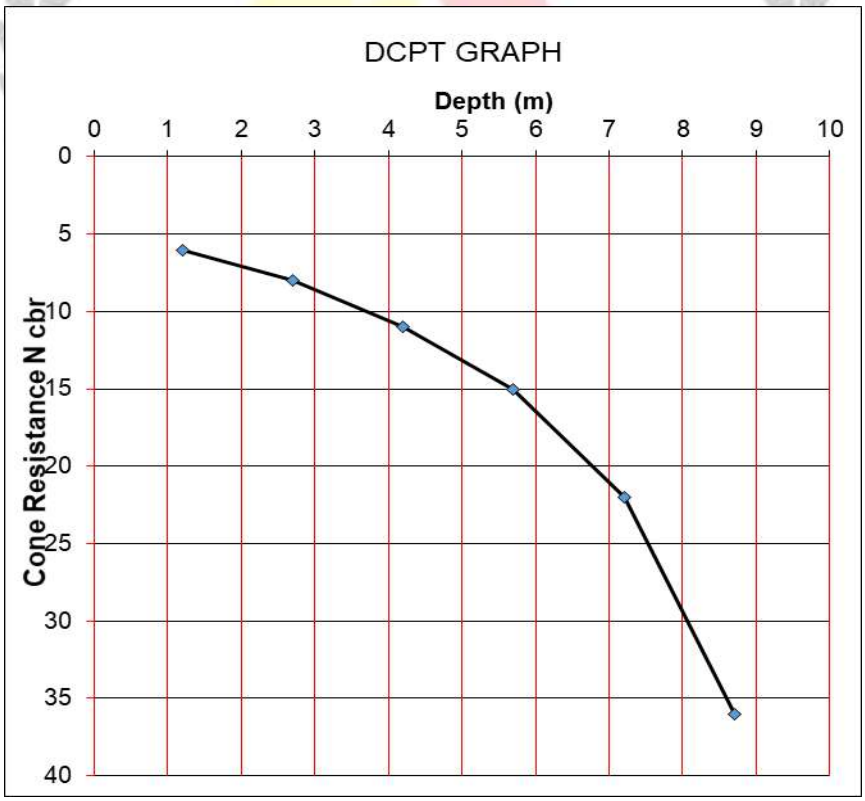


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-38

BH ID: AAP-5000-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-5000-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	2	2	2	6	4
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	3	3	8	5
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	3	4	4	11	6
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	4	5	6	15	9
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	6	7	9	22	13
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	10	12	14	36	21
13.0		DS	9.00 - 10.00					

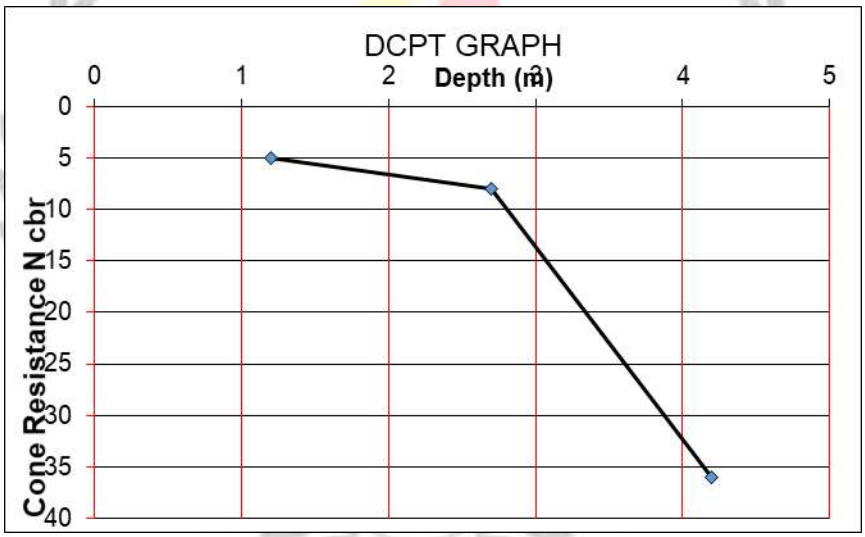


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-39

BH ID: AAP-4800-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-4800-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	2	2	5	3
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	3	3	8	5
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	36	--	--	36	21

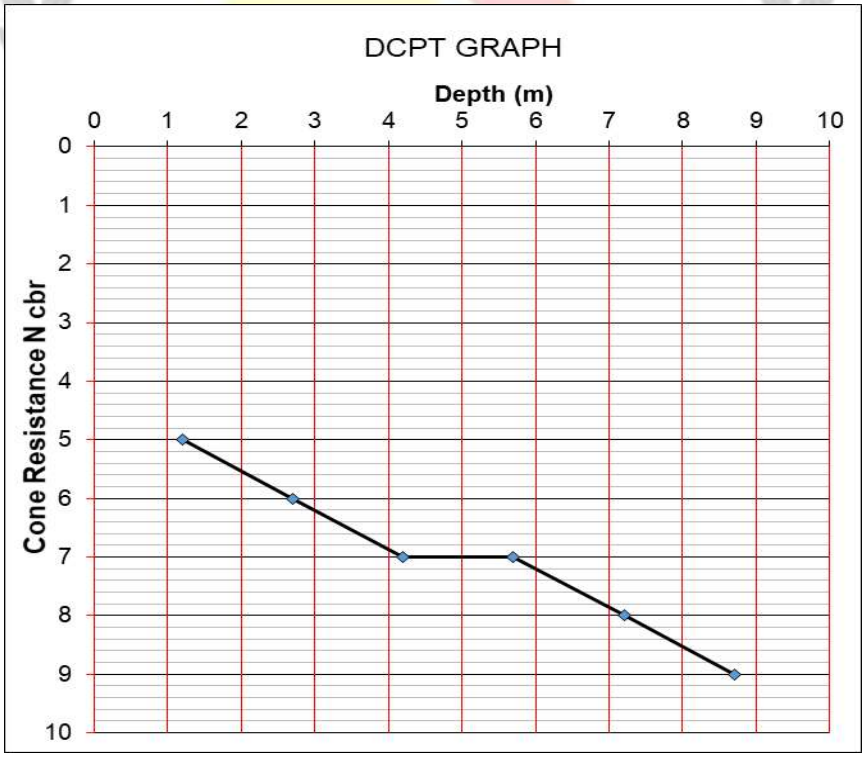


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-40

BH ID: AAP-4800-20-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-4800-10-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	2	2	5	3
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	2	2	6	4
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	3	2	7	4
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	2	2	3	7	4
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	2	3	3	8	5
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	3	3	3	9	5
13.0		DS	9.00 - 10.00					

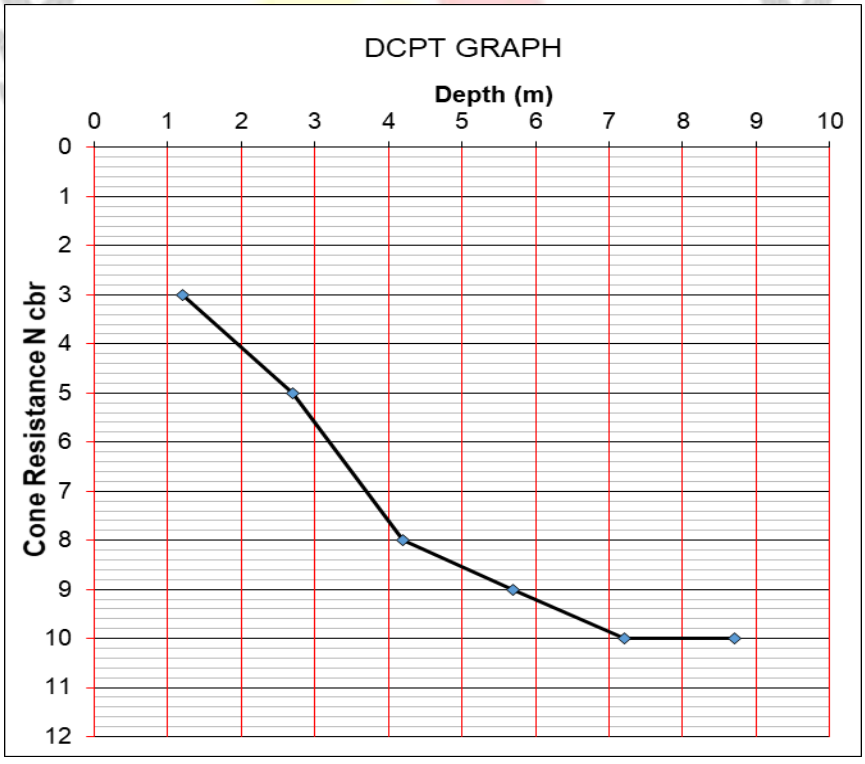


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-41

BH ID: AAP-4600-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-4600-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	1	2	2	5	3
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	2	3	3	8	5
7.0		DS	4.50 - 5.70					
8.0		DCPT	5.70 - 6.00	3	3	3	9	5
9.0		DS	6.00 - 7.20					
10.0		DCPT	7.20 - 7.50	3	5	2	10	6
11.0		DS	7.50 - 8.70					
12.0		DCPT	8.70 - 9.00	4	3	3	10	6
13.0		DS	9.00 - 10.00					

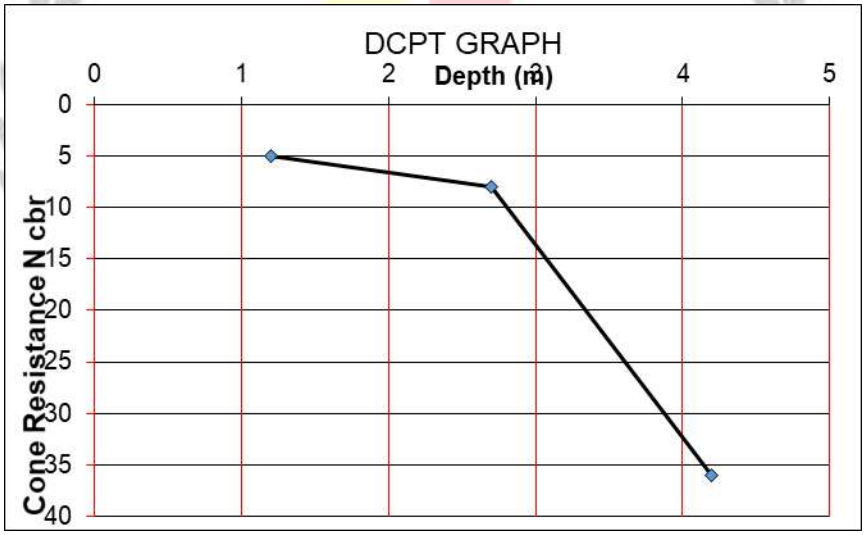


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-42

BH ID: AAP-4600-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-4600-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	2	2	5	3
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	3	3	2	8	5
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	36	--	--	36	21

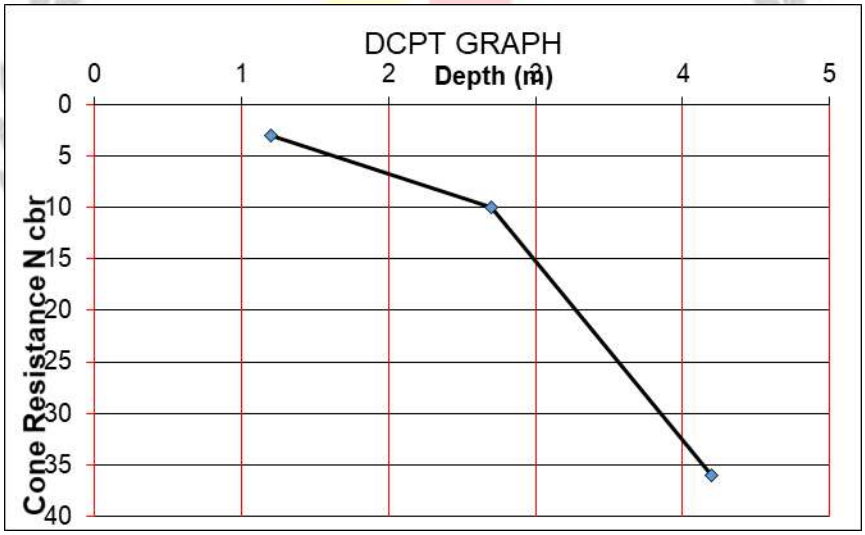


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-43

BH ID: AAP-4400-20-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-4400-20-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	3	4	3	10	7
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	36	--	--	36	21

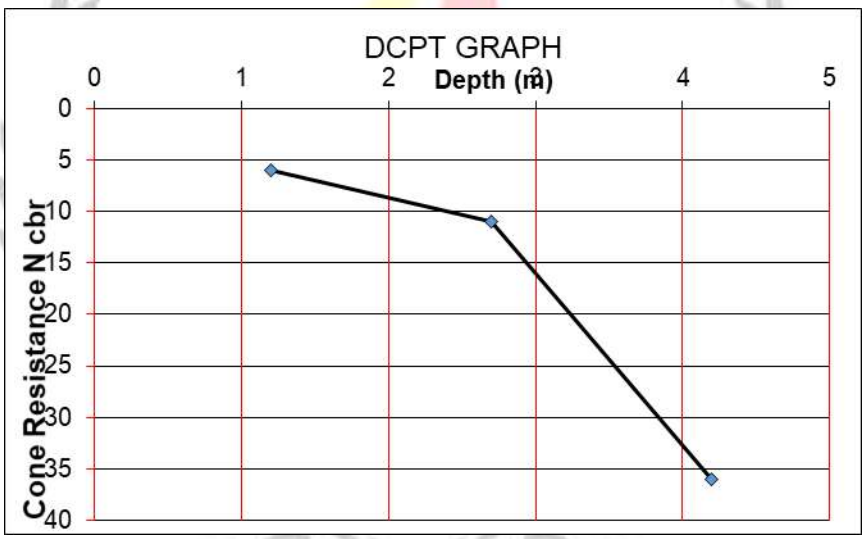


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-44

BH ID: AAP-4400-10-115								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-4400-10-115	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	2	2	2	6	4
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	4	3	4	11	7
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	36	--	--	36	21

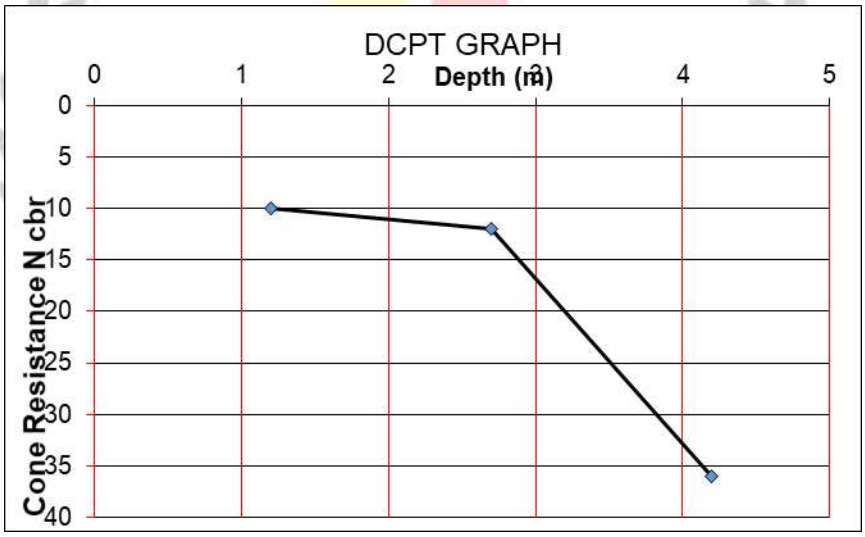


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-45

BH ID: AAP-5400-111								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-5400-111	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	3	3	4	10	7
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	2	4	6	12	8
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	36	--	--	36	21

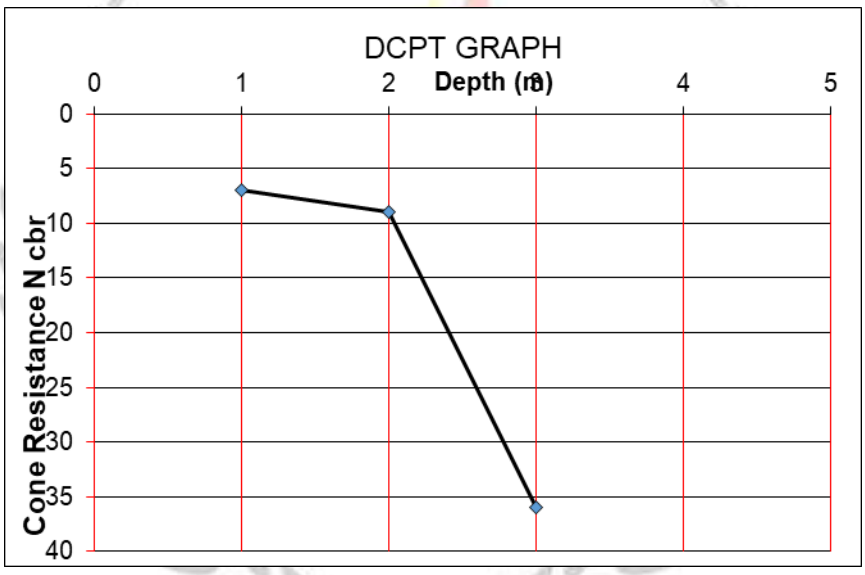


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-46

BH ID: AAP-SB-5200-111								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-SB-5200-111	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	2	2	3	7	5
3.0		DS	1.50 - 2.70					
4.0		DCPT	2.70 - 3.00	3	3	3	9	6
5.0		DS	3.00 - 4.20					
6.0		DCPT	4.20 - 4.50	36	--	--	36	21

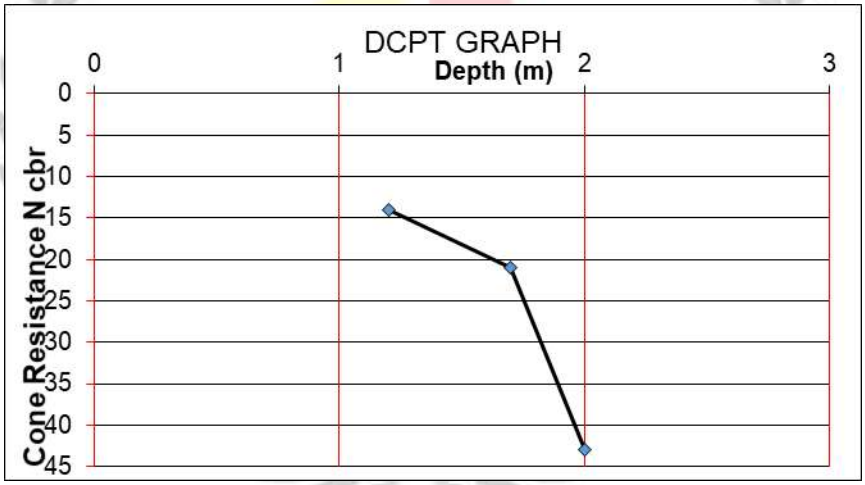


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-47

BH ID: AAP-0-E-106								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-0-E-106	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	5	4	5	14	9
3.0		DS	1.50 - 1.70					
4.0		DCPT	1.70 - 2.00	7	8	6	21	14
5.0		DCPT	2.00 - 2.30	7	36	--	43	29

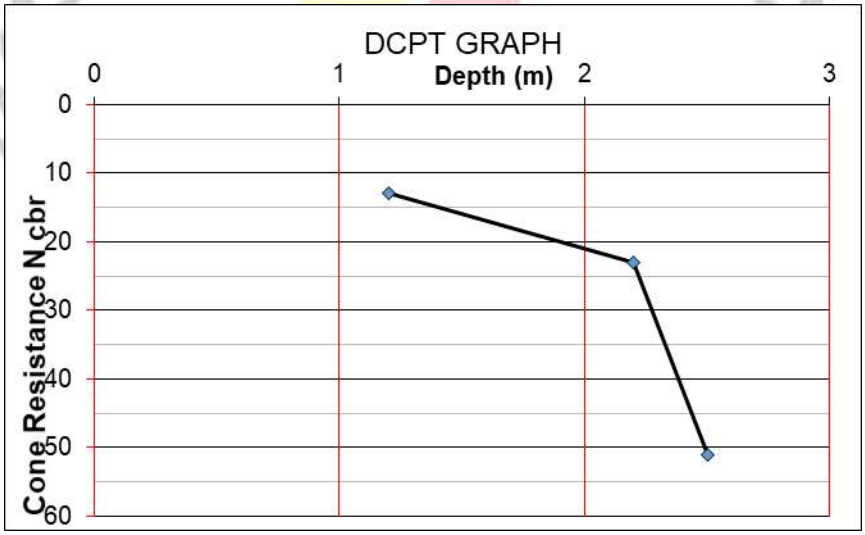


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-48

BH ID: AAP-200-E-106								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-200-E-106	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	3	5	5	13	9
3.0		DS	1.50 - 2.20					
4.0		DCPT	2.20 - 2.50	8	7	8	23	15
5.0		DCPT	2.50 - 2.80	7	8	36	51	34
6.0		DS	2.80 - 3.00					

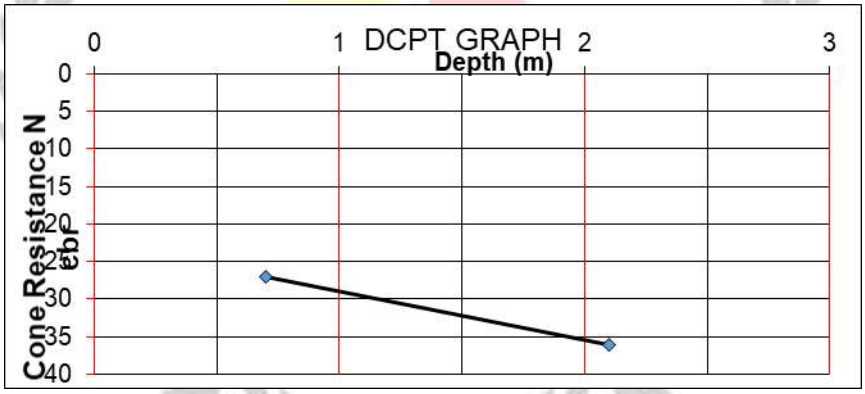


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-49

BH ID: 400-E-106								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-400-E-106	DS	0.00 - 0.70					
2.0		DCPT	0.70 - 1.00	10	8	9	27	18
3.0		DS	1.00 - 2.10					
4.0		DCPT	2.10 - 2.40	36	--	--	36	24
5.0		DS	2.40 - 2.70					

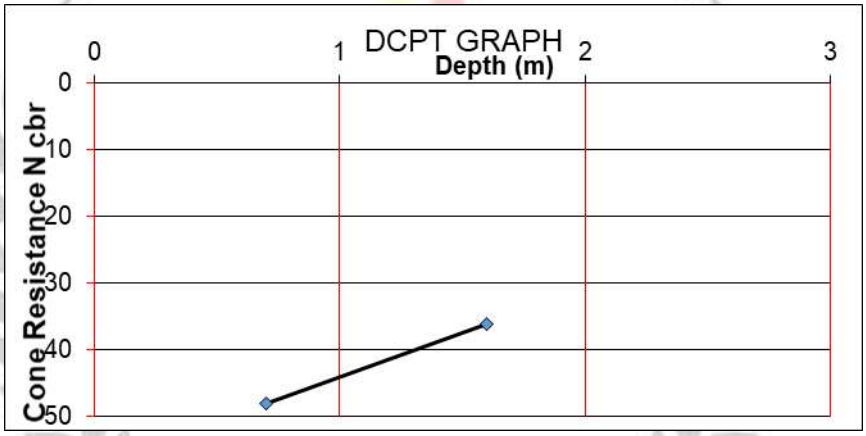


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-50

BH ID: AAP-E-700-106								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-E-700-106	DS	0.00 - 0.70					
2.0		DCPT	0.70 - 1.00	21	21	6	48	32
3.0		DS	1.00 - 1.60					
4.0		DCPT	1.60 - 2.00	36	--	--	36	24



For Annoor Test Labs & Engg. Services Pvt. Ltd.

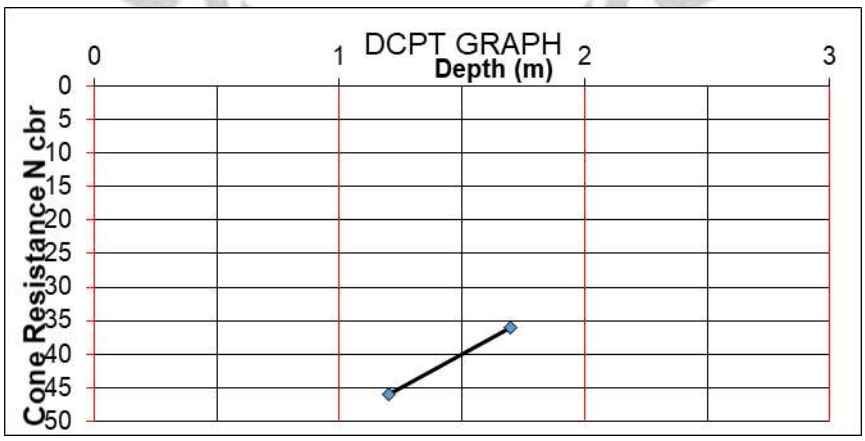
S K. Peeru Babu
Technical Manager – Mechanical

BH-51

BH ID:AAP- 1500-E-106								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-1500-E-106	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	36	-	-	36	24

BH-52

BH ID: 1600-E-106								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-1600-Earth-106	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	10	36	-	46	31
3.0		DS	1.50 - 1.70					
4.0		DCPT	1.70 - 2.00	36	--	--	36	24



For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-53

BH ID: 1800-E-106								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-1800-Earth-106	DS	0.00 - 1.70					
2.0		DCPT	1.70 - 2.00	10	17	11	38	25
3.0		DS	2.00 - 2.20					

BH-54

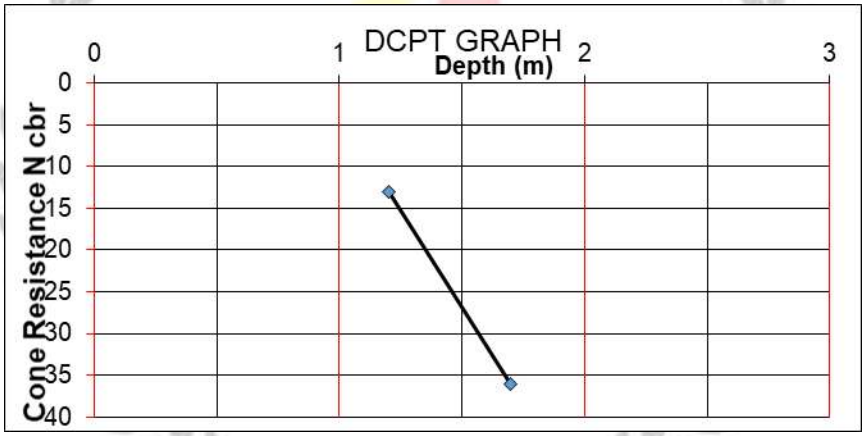
BH ID:AAP- 2000-E-106								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-2000-E-106	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.60	36	-	-	36	24

For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-55

BH ID: 2200-E-106								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-2200-Earth-106	DS	0.00 - 1.60					
2.0		DCPT	1.60 - 1.90	4	4	5	13	9
3.0		DS	1.90 - 2.20					
4.0		DCPT	2.20 - 2.50	36	--	--	36	24



For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-56

BH ID:AAP- 2400-E-106								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-2400-E-106	DS	0.00 - 1.60					
2.0		DCPT	1.60 - 1.90	36	-	-	36	24

BH-57

BH ID:AAP- 2600-E-106								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-2600-E-106	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	36	-	-	36	24

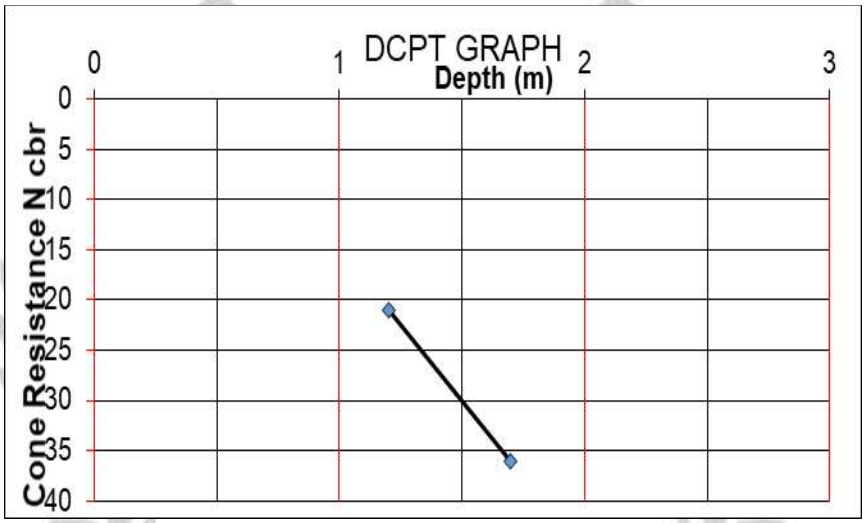
ATLES

For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-58

BH ID: AAP-2800-E-106								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-2800-E-106	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	4	7	10	21	14
3.0		DS	1.50 - 1.70					
4.0		DCPT	1.70 - 2.00	36	--	--	36	24

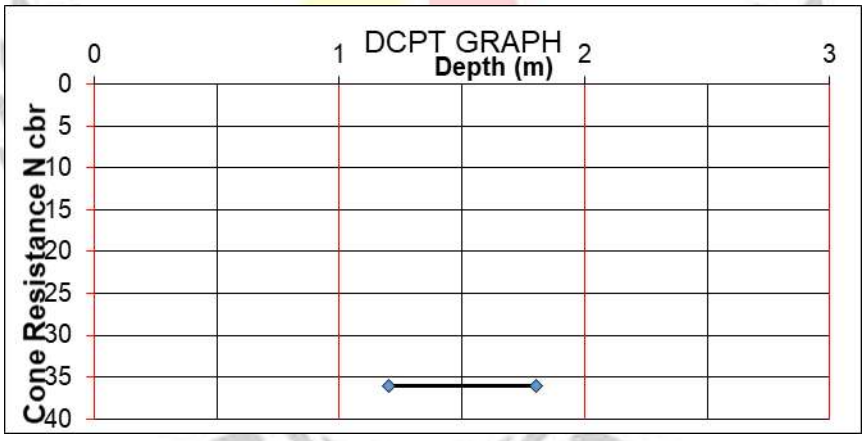


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-59

BH ID: AAP-3000--E-106								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-3000-E-106	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	36	--	--	36	24
3.0		DS	1.50 - 1.80					
4.0		DCPT	1.80 - 2.00	36	--	--	36	24

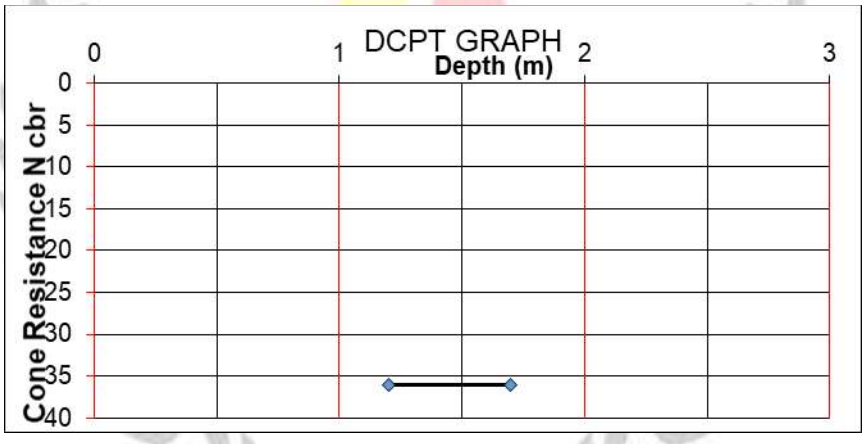


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-60

BH ID: AAP-3200-E-106								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-3200-E-106	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	36	--	--	36	24
3.0		DS	1.50 - 1.70					
4.0		DCPT	1.70 - 2.00	36	--	--	36	24

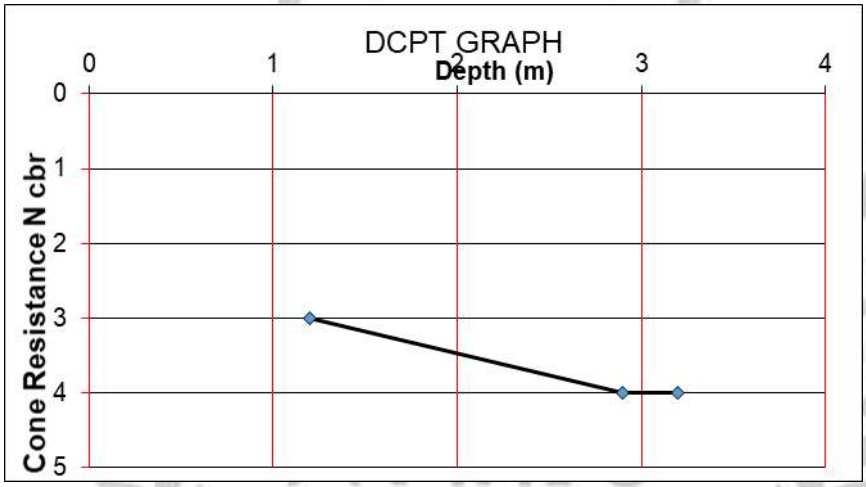


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-90

BH ID: AAP-SB-5000-111								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-SB-5000-111	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.90					
4.0		DCPT	2.90 - 3.20	1	1	2	4	3
5.0		DCPT	3.20 - 3.50	1	1	2	4	3

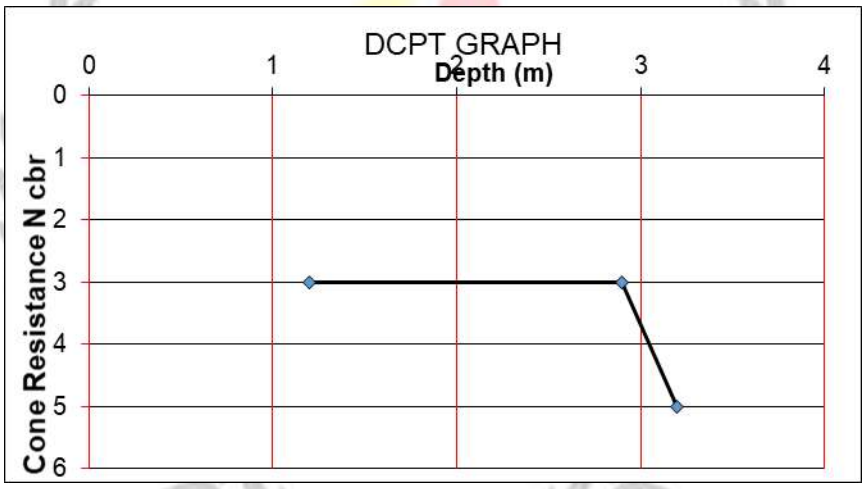


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-91

BH ID: AAP-SB-4800-111								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-SB-4800-111	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.90					
4.0		DCPT	2.90 - 3.20	1	1	1	3	2
5.0		DCPT	3.20 - 3.50	1	2	2	5	3

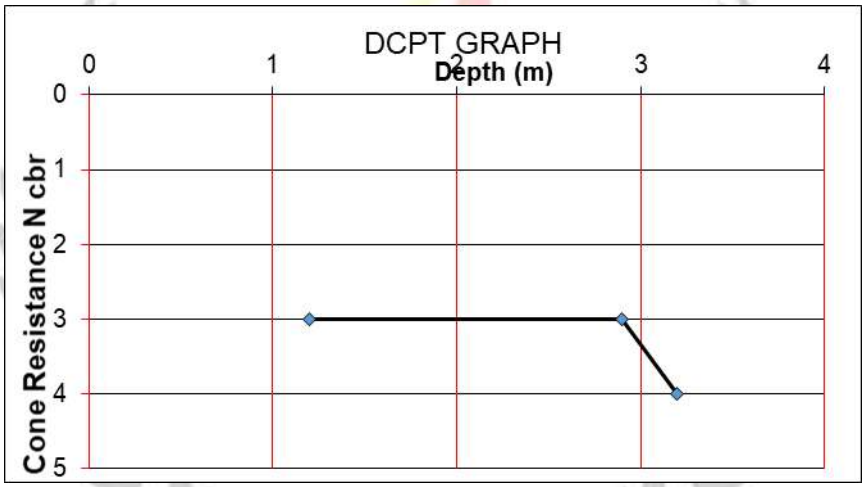


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-92

BH ID: AAP-SB-4600-E-111								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-SB-4600-E-111	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.90					
4.0		DCPT	2.90 - 3.20	1	1	1	3	2
5.0		DCPT	3.20 - 3.50	1	2	1	4	3

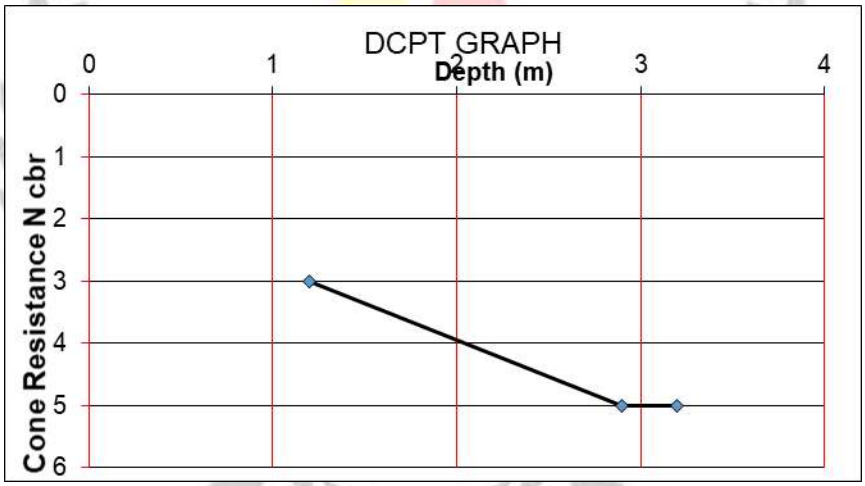


For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

BH-93

BH ID: AAP-SB-4400-111								
S.No	Description / ID	Sample Type (DS - Distrubed Sample, DCPT - Dynamic Cone Penetration)	Sample Depth (m)	Dynamic Cone Penetration (DCPT) No.of Blows			Cone Resistance Value. (Ncbr)	Standard Penetration Test Value (N)
				(0 - 10) cm	(10 - 20) cm	(20 - 30) cm	(a+b+c) = (Ncbr)	(i) If Depth is 0 - 4m (N) = Ncbr/1.5
				a	b	c		(ii) If Depth is 4 - 9m (N) = Ncbr/1.75
1.0	AAP-SB-4400-111	DS	0.00 - 1.20					
2.0		DCPT	1.20 - 1.50	1	1	1	3	2
3.0		DS	1.50 - 2.90					
4.0		DCPT	2.90 - 3.20	1	2	2	5	3
5.0		DCPT	3.20 - 3.50	2	2	1	5	3



For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager - Mechanical

C) Test results of hand auger boring in Additional ash pond.

The hand auger bores are conducted at below points at 14 locations for at every 400m Chainage.

BH no 45,47,49,50,51,52,54,56,58,60,90,91,92,93 (Agreement item no 5)

S. No.	Depth (m)	Bulk Density (g/cc)	Moisture Content (%)	Dry Density (g/cc)	Shear Parameters	
					Cohesion (kN/m^2) (C)	Angle of Friction (Ø)
Test Method		IS 2720 (Part -29)			IS 2720 (P – 10/13)	
BH-45 (AAP-SB-5400-106)						
1.	0.00 – 1.50	1.623	20.15	1.350	0	33
2.	1.50 – 3.00	1.621	21.24	1.337	0	31
3.	3.00 – 4.50	1.634	22.63	1.332	0	30
BH-47 (AAP-0-E-106)						
4.	0.00 – 1.50	1.921	10.72	1.735	0	30
5.	1.50 – 2.00	1.923	12.1	1.715	0	31
6.	2.00 – 2.30	1.925	11.56	1.725	0	32
BH-49 (AAP-400-E-106)						
7.	0.00 - 1.00	1.925	9.54	1.610	0	33
8.	1.00 - 2.40	1.931	11.05	1.738	0	35
BH-50 (AAP-E-700-106)						
9.	0.00 – 1.00	1.922	10.32	1.742	0	33
10.	1.00 – 2.00	1.932	8.94	1.773	0	34
BH-51 (AAP-1500-E-106)						
11.	0.00 – 1.50	1.924	12.72	1.512	20	33
BH-52 (AAP-1600-E-106)						
12.	0.00 – 1.50	1.927	8.19	1.781	17	29
13.	1.50 – 2.00	1.933	11.26	1.737	22	31
BH-54 (AAP-2000-E-106)						
14.	0.00 – 1.60	1.929	10.84	1.740	16	33
BH-56 (AAP-2400-E-106)						
15.	0.00 – 1.90	1.929	10.16	1.751	16	34
BH-58 (AAP-2800-E-106)						
16.	0.00 – 1.50	1.932	7.86	1.639	0	33

For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager – Mechanical

17.	1.50 – 2.00	1.925	10.25	1.746	0	34
BH-60 (AAP-3200-E-106)						
18.	0.00 – 1.50	1.922	8.35	1.773	0	34
19.	1.50 – 2.00	1.932	10.25	1.752	0	35
BH-90 (AAP-SB-5000-111)						
20.	0.00 – 1.50	1.624	23.15	1.318	0	32
21.	1.50 – 3.20	1.642	25.02	1.313	0	34
22.	3.20 – 3.50	1.629	24.64	1.306	0	33
BH-91 (AAP-SB-4800-111)						
23.	0.00 – 1.50	1.621	20.15	1.349	0	33
24.	1.50 – 3.20	1.625	21.69	1.335	0	34
25.	3.20 – 3.50	1.638	23.48	1.326	0	30
BH–92 (AAP-SB-E-4600-111)						
26.	0.00 – 1.50	1.613	23.32	1.307	0	32
27.	1.50 – 3.20	1.606	24.15	1.293	0	30
28.	3.20 – 3.50	1.611	22.61	1.430	0	29
BH–93 (AAP-SB-4400-111)						
29.	0.00 – 1.50	1.623	23.57	1.313	0	33
30.	1.50 – 3.20	1.628	22.42	1.329	0	31
31.	3.20 – 3.50	1.633	23.48	1.322	0	29

For Annoor Test Labs & Engg. Services Pvt. Ltd.

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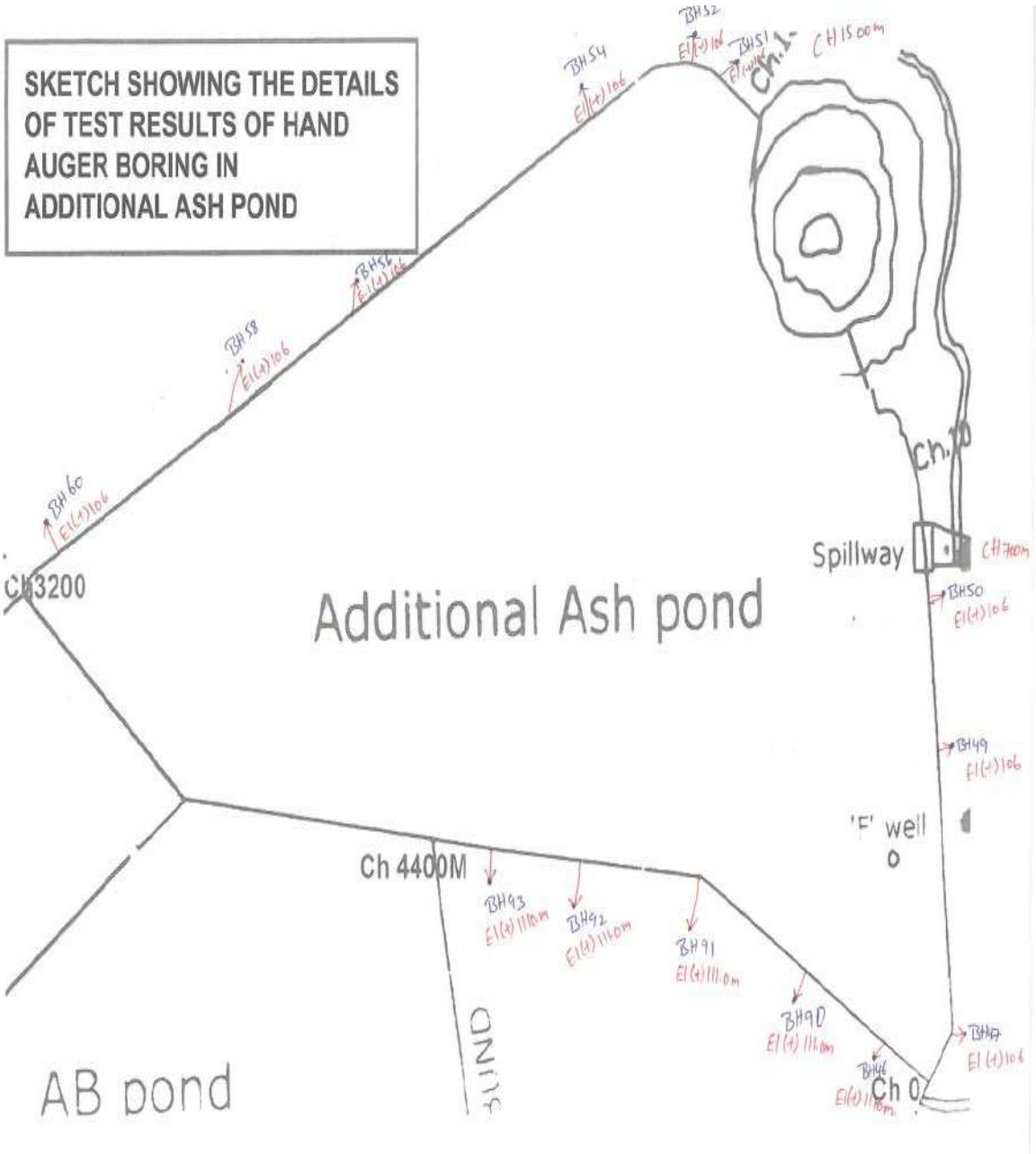
Technical Manager – Mechanical



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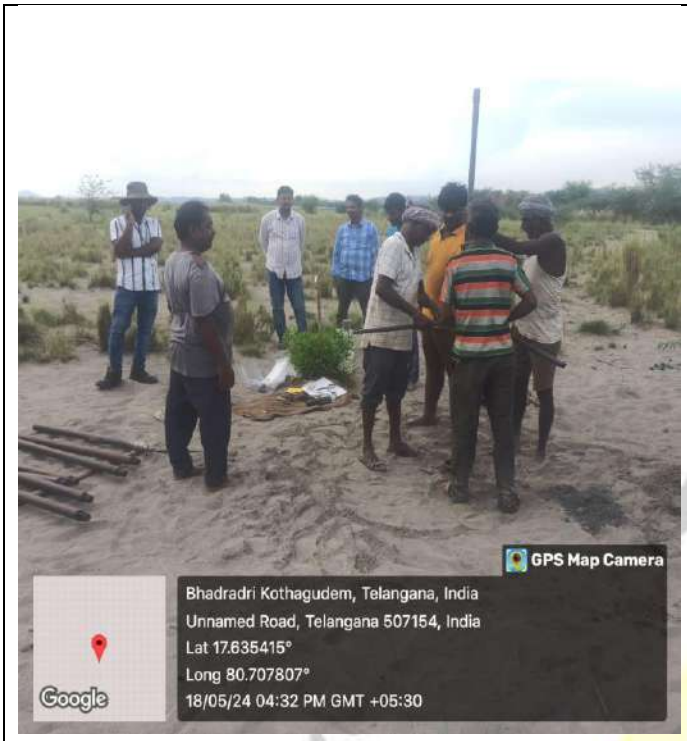
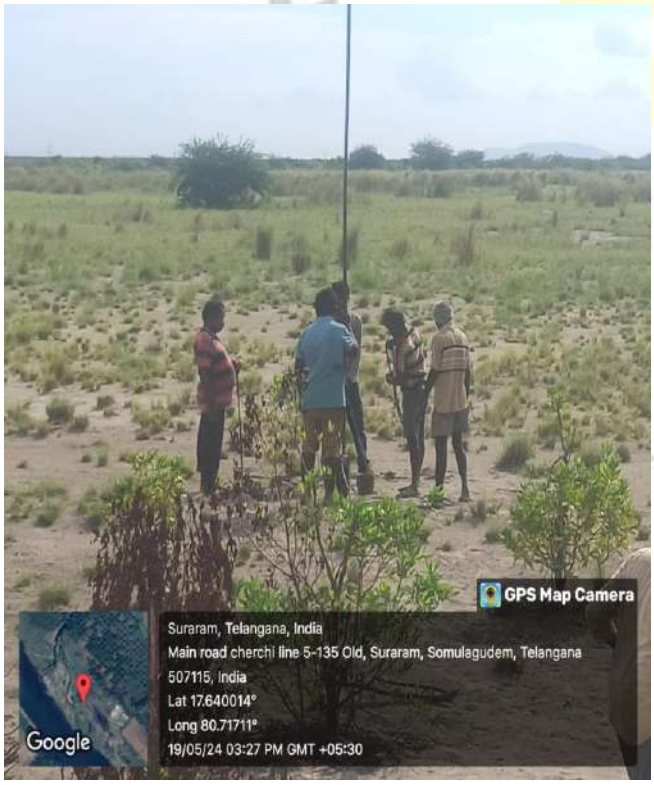
S K. Peeru Babu
Technical Manager – Mechanical

SITE PHOTO GRAPHS

For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager – Mechanical





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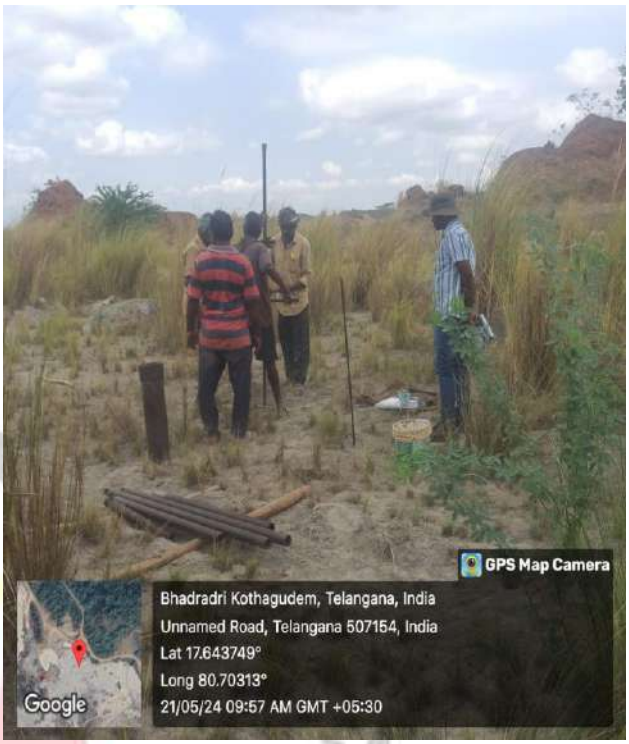
S K. Peeru Babu
Technical Manager – Mechanical



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S K. Peeru Babu
Technical Manager – Mechanical

ATLES

For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager – Mechanical

**** END OF THE REPORT ****

For Annoor Test Labs & Engg. Services Pvt. Ltd.

S K. Peeru Babu
Technical Manager – Mechanical

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