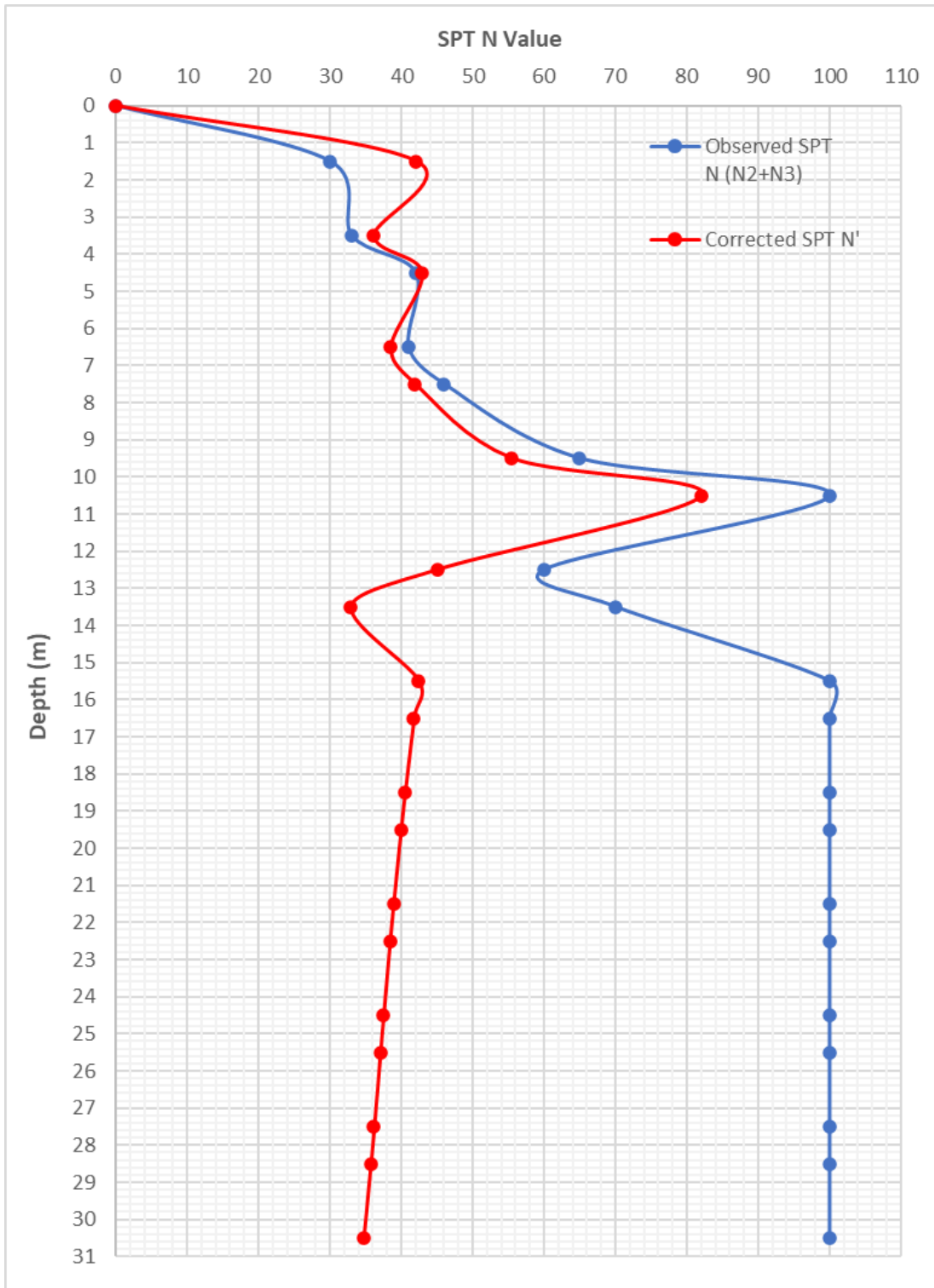


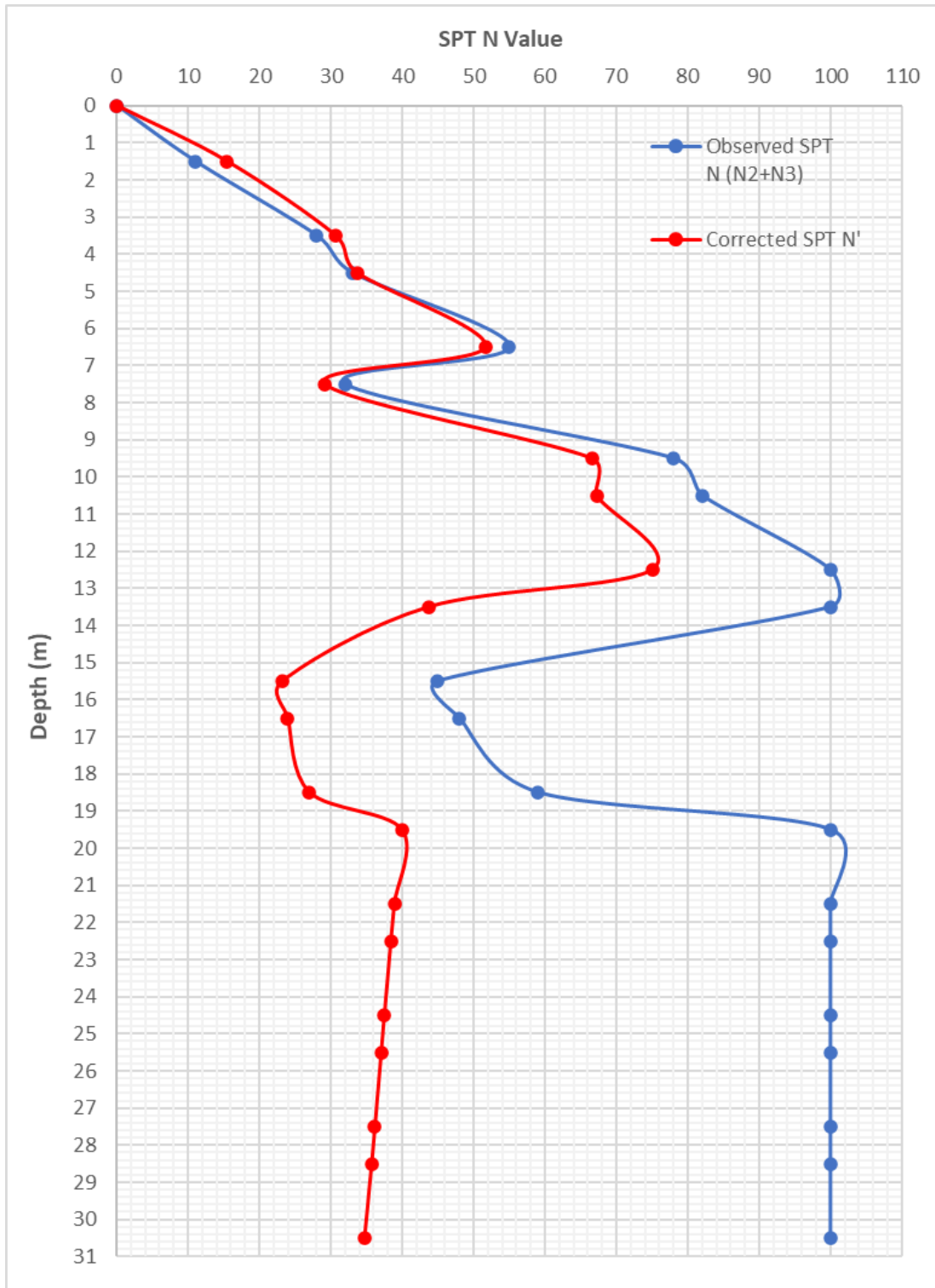


BH-23B



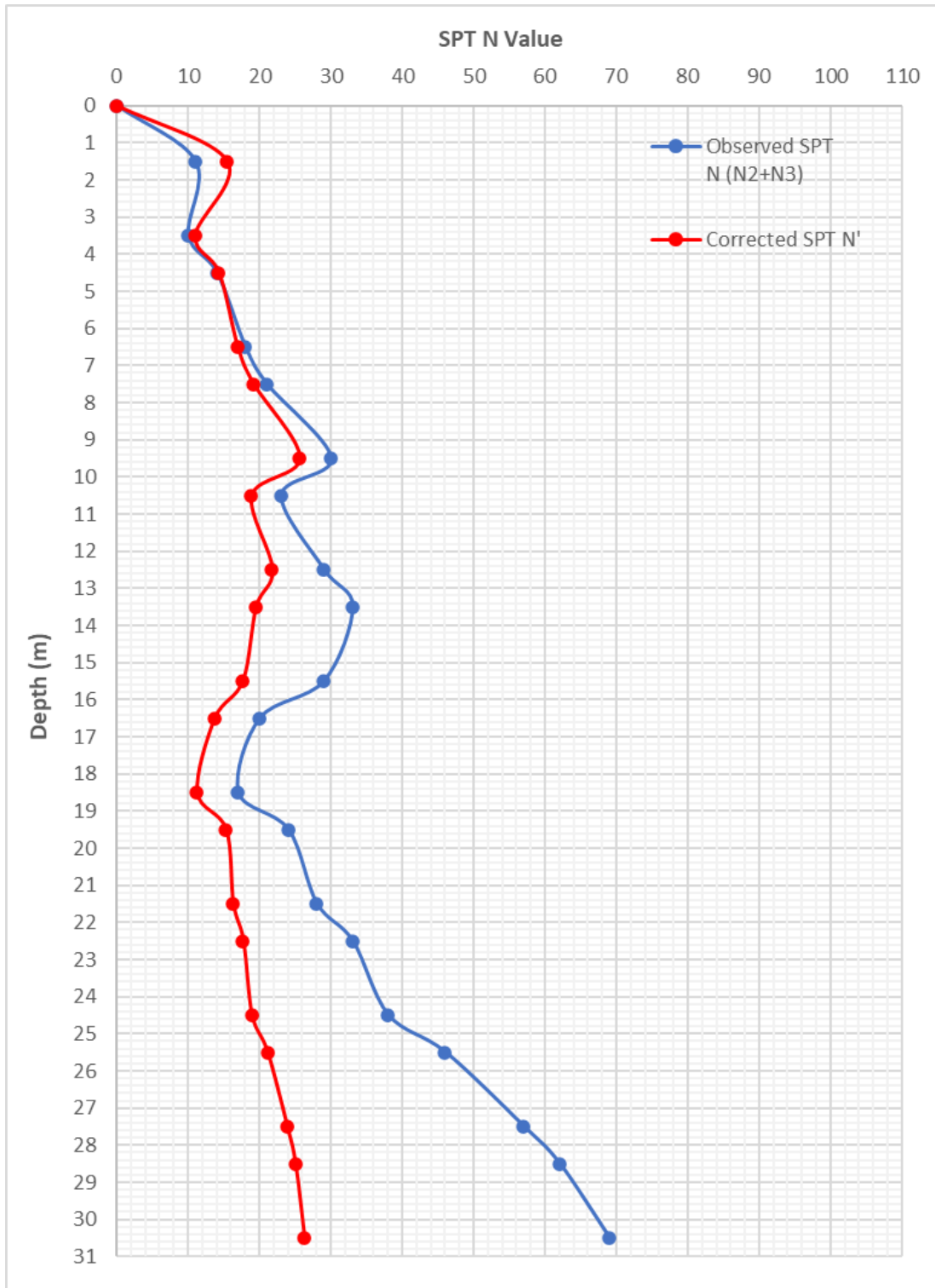


BH-24



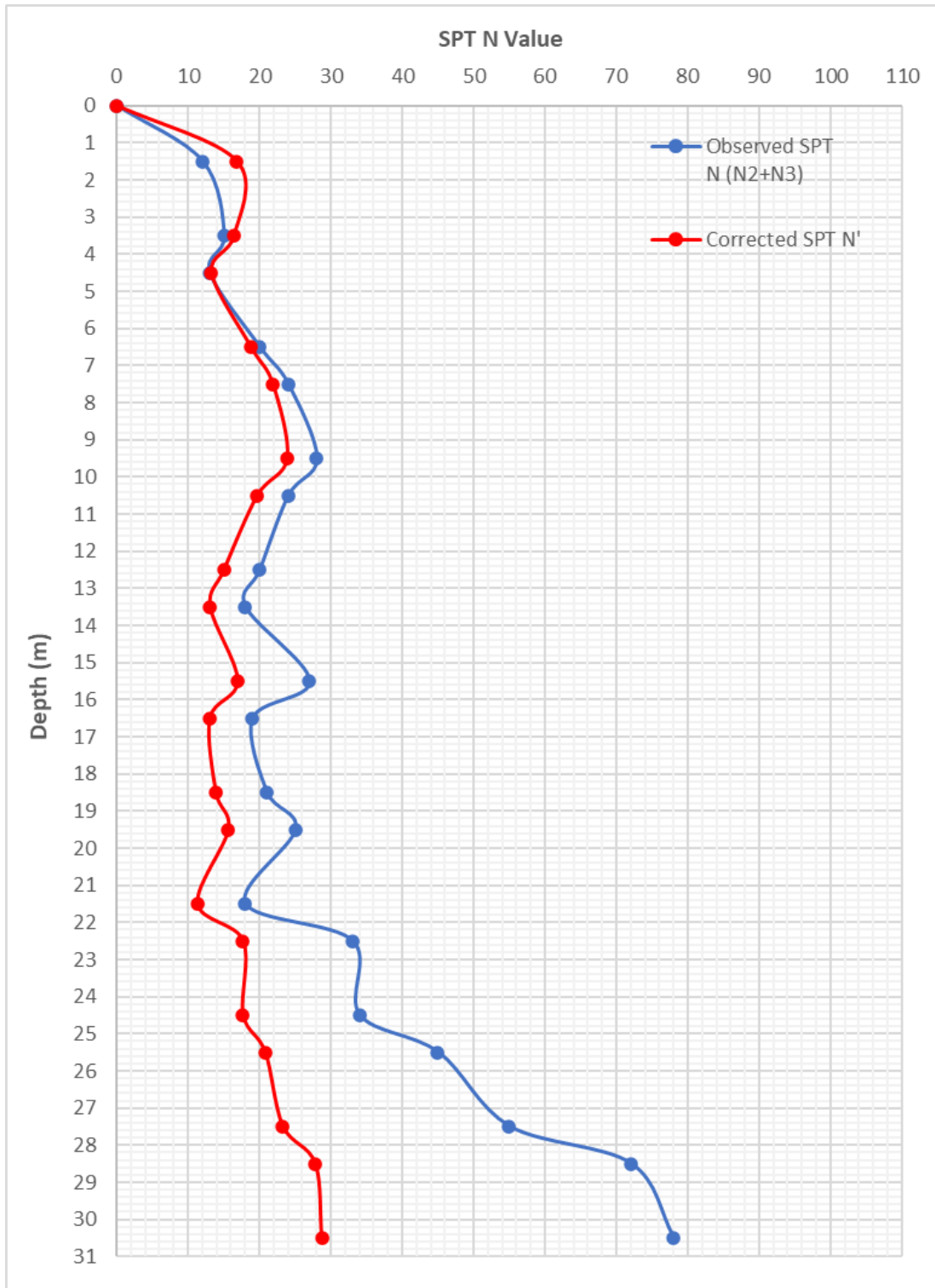


BH-25



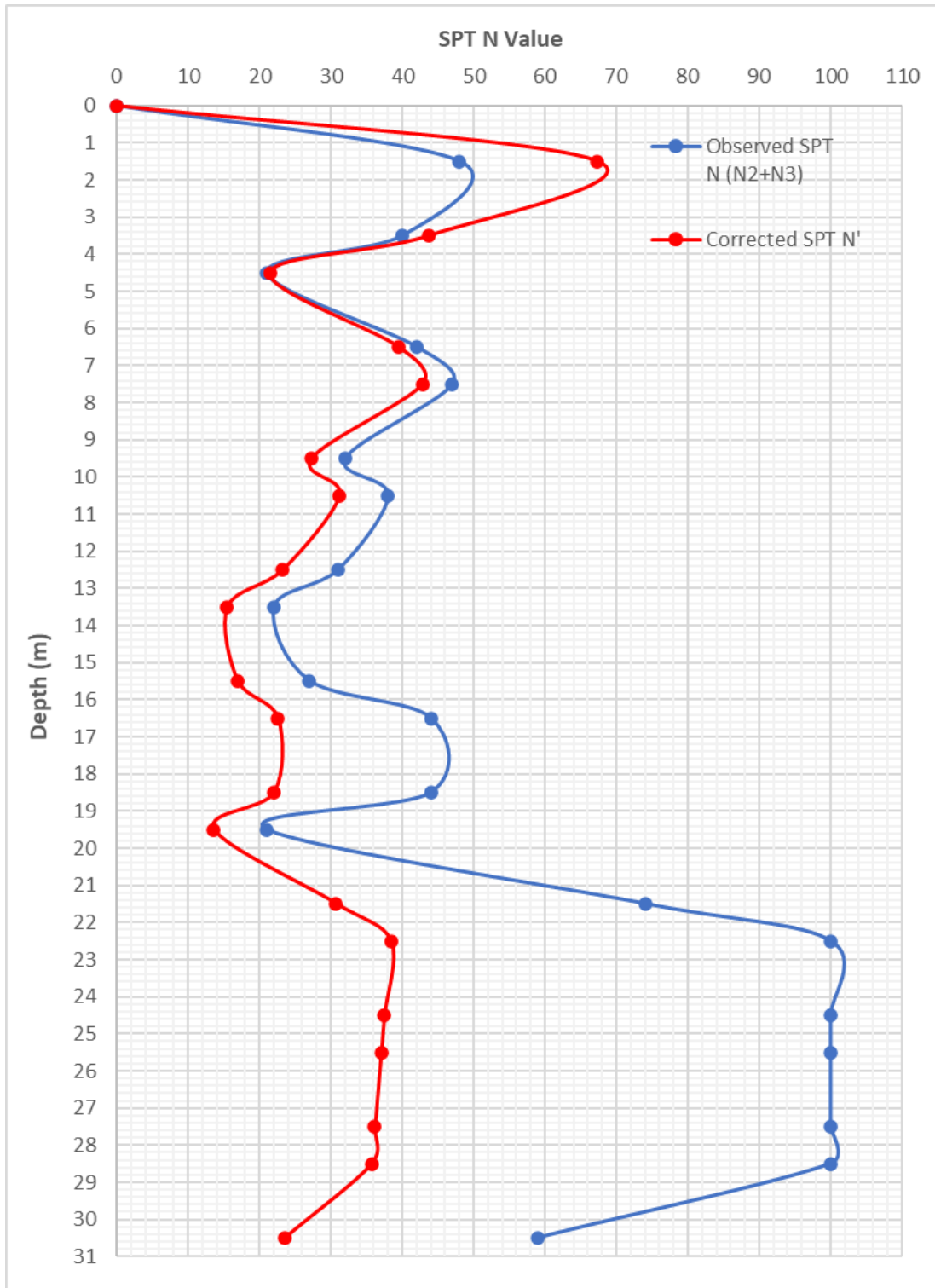


BH-26





BH-27





Appendix E Field Permeability Test Results



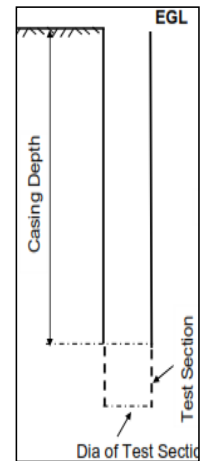
E.1 Zone 1: CH: 0+000 km to 1+004 km (BH-01 to BH-11)

Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-01
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	0+031
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	17.00

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	31.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	19.00
H₁/H₀:	0.947	t₂ [min]:	33.50
H₂/H₀:	0.907		
H₁/H₂:	1.045		

Coefficient of Permeability (K_t)		3.20E-03	[cm/min]
η_t	7.83	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		2.9349E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	1.00	199.00	0.995	-
3	1.00	3.00	197.00	0.985	-
4	2.00	5.00	195.00	0.975	-
5	5.00	7.00	193.00	0.965	-
6	10.00	12.00	188.00	0.940	-
7	15.00	16.00	184.00	0.920	-
8	30.00	26.00	174.00	0.870	-
9	60.00	41.00	159.00	0.795	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times (\log_e \frac{L}{R}) \frac{\log_e h_1/h_2}{t_2 - t_1}$$

K = Coefficient of Permeability;
d = Diameter of Intake Pipe (stand pipe);
L = length of Test Section;
h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

η_t = Viscosity of Water at the Field Temperature, t;
K_t = Coefficient of Permeability at the Field Temperature,
η₂₇ = Viscosity of Water at 27°C.

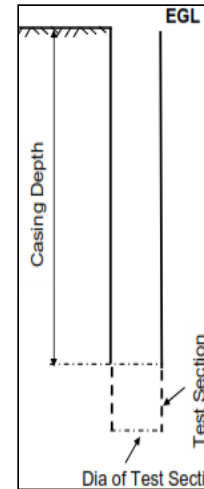


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-02
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	0+124
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	17.50

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	27.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	12.00
H₁/H₀:	0.975	t₂ [min]:	26.00
H₂/H₀:	0.947		
H₁/H₂:	1.030		

Coefficient of Permeability (K_t)		2.28E-03	[cm/min]
η_t	8.55	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		2.2764E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	2.00	198.00	0.990	-
3	1.00	3.00	197.00	0.985	-
4	2.00	4.00	196.00	0.980	-
5	5.00	6.00	194.00	0.970	-
6	10.00	9.00	191.00	0.955	-
7	15.00	13.00	187.00	0.935	-
8	30.00	23.00	177.00	0.885	-
9	60.00	34.00	166.00	0.830	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times (\log_e \frac{L}{R}) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

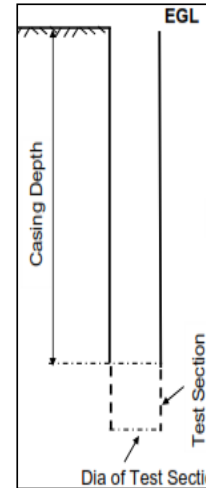


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-03
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	0+202
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	17.50

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	24.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	15.00
H₁/H₀:	0.951	t₂ [min]:	30.00
H₂/H₀:	0.903		
H₁/H₂:	1.054		

Coefficient of Permeability (K_t)		3.74E-03	[cm/min]
η_t	9.16	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		4.010E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	2.00	198.00	0.990	-
3	1.00	5.00	195.00	0.975	-
4	2.00	9.00	191.00	0.955	-
5	5.00	13.00	187.00	0.935	-
6	10.00	17.00	183.00	0.915	-
7	15.00	24.00	176.00	0.880	-
8	30.00	31.00	169.00	0.845	-
9	60.00	48.00	152.00	0.760	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times (\log_e \frac{L}{R}) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

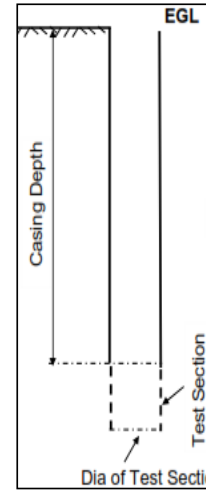


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-04
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	0+291
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	17.50

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	29.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	12.00
H₁/H₀:	0.964	t₂ [min]:	19.00
H₂/H₀:	0.942		
H₁/H₂:	1.023		

Coefficient of Permeability (K_t)		3.40E-03	[cm/min]
η_t	9.16	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		3.639E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	2.00	198.00	0.990	-
3	1.00	3.00	197.00	0.985	-
4	2.00	5.00	195.00	0.975	-
5	5.00	8.00	192.00	0.960	-
6	10.00	11.00	189.00	0.945	-
7	15.00	15.00	185.00	0.925	-
8	30.00	27.00	173.00	0.865	-
9	60.00	43.00	157.00	0.785	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times (\log_e \frac{L}{R}) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

K = Coefficient of Permeability;
d = Diameter of Intake Pipe (stand pipe);
L = length of Test Section;
h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

η_t = Viscosity of Water at the Field Temperature, t;
K_t = Coefficient of Permeability at the Field Temperature,
η₂₇ = Viscosity of Water at 27°C.

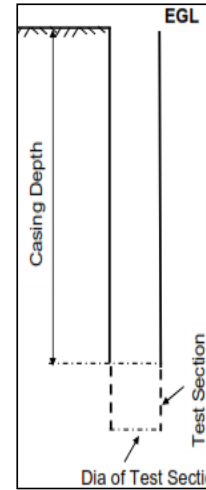


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-05
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	0+410
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	14.60

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	21.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	19.00
H₁/H₀:	0.929	t₂ [min]:	30.00
H₂/H₀:	0.888		
H₁/H₂:	1.046		

Coefficient of Permeability (K_t)		4.39E-03	[cm/min]
η_t	9.84	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		5.047E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	2.00	198.00	0.990	-
3	1.00	4.00	196.00	0.980	-
4	2.00	7.00	193.00	0.965	-
5	5.00	10.00	190.00	0.950	-
6	10.00	14.00	186.00	0.930	-
7	15.00	26.00	174.00	0.870	-
8	30.00	38.00	162.00	0.810	-
9	60.00	57.00	143.00	0.715	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times (\log_e \frac{L}{R}) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

K = Coefficient of Permeability;
d = Diameter of Intake Pipe (stand pipe);
L = length of Test Section;
h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

η_t = Viscosity of Water at the Field Temperature, t;
K_t = Coefficient of Permeability at the Field Temperature,
η₂₇ = Viscosity of Water at 27°C.

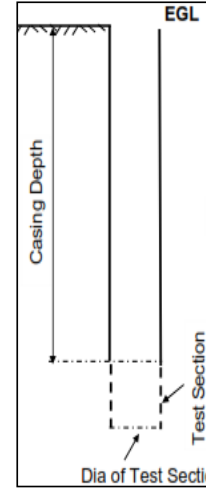


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-06
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	0+501
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	14.60

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	21.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	18.00
H₁/H₀:	0.933	t₂ [min]:	27.00
H₂/H₀:	0.899		
H₁/H₂:	1.037		

Coefficient of Permeability (K_t)		4.35E-03	[cm/min]
η_t	9.84	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		5.006E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	3.00	197.00	0.985	-
3	1.00	6.00	194.00	0.970	-
4	2.00	8.00	192.00	0.960	-
5	5.00	12.00	188.00	0.940	-
6	10.00	18.00	182.00	0.910	-
7	15.00	29.00	171.00	0.855	-
8	30.00	41.00	159.00	0.795	-
9	60.00	60.00	140.00	0.700	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times (\log_e \frac{L}{R}) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

K = Coefficient of Permeability;
d = Diameter of Intake Pipe (stand pipe);
L = length of Test Section;
h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

η_t = Viscosity of Water at the Field Temperature, t;
K_t = Coefficient of Permeability at the Field Temperature,
η₂₇ = Viscosity of Water at 27°C.

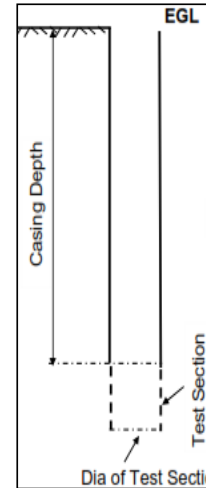


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-07
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	0+622
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.40

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	21.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	19.00
H₁/H₀:	0.902	t₂ [min]:	32.00
H₂/H₀:	0.835		
H₁/H₂:	1.080		

Coefficient of Permeability (K_t)		6.35E-03	[cm/min]
η_t	9.84	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		7.312E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	5.00	195.00	0.975	-
3	1.00	11.00	189.00	0.945	-
4	2.00	16.00	184.00	0.920	-
5	5.00	30.00	170.00	0.850	-
6	10.00	47.00	153.00	0.765	-
7	15.00	62.00	138.00	0.690	-
8	30.00	83.00	117.00	0.585	-
9	60.00	94.00	106.00	0.530	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times (\log_e \frac{L}{R}) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

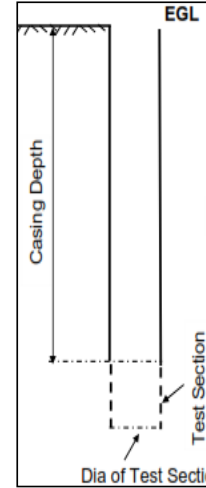


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-08
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	0+701
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	14.30

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	21.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	15.00
H₁/H₀:	0.915	t₂ [min]:	30.00
H₂/H₀:	0.830		
H₁/H₂:	1.102		

Coefficient of Permeability (K_t)		6.94E-03	[cm/min]
η_t	9.84	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		7.983E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	6.00	194.00	0.970	-
3	1.00	13.00	187.00	0.935	-
4	2.00	24.00	176.00	0.880	-
5	5.00	45.00	155.00	0.775	-
6	10.00	52.00	148.00	0.740	-
7	15.00	71.00	129.00	0.645	-
8	30.00	93.00	107.00	0.535	-
9	60.00	110.00	90.00	0.450	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times (\log_e \frac{L}{R}) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

K = Coefficient of Permeability;
d = Diameter of Intake Pipe (stand pipe);
L = length of Test Section;
h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

η_t = Viscosity of Water at the Field Temperature, t;
K_t = Coefficient of Permeability at the Field Temperature,
η₂₇ = Viscosity of Water at 27°C.

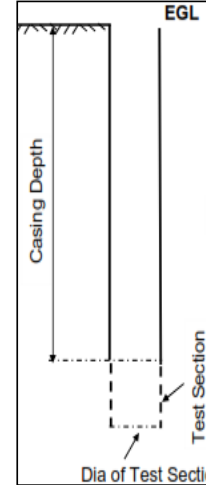


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-08A
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	0+734
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	14.30

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	18.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	19.00
H₁/H₀:	0.910	t₂ [min]:	32.00
H₂/H₀:	0.848		
H₁/H₂:	1.073		

Coefficient of Permeability (K_t)		5.77E-03	[cm/min]
η_t	10.6	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		7.153E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	2.00	198.00	0.990	-
3	1.00	3.00	197.00	0.985	-
4	2.00	4.00	196.00	0.980	-
5	5.00	10.00	190.00	0.950	-
6	10.00	18.00	182.00	0.910	-
7	15.00	24.00	176.00	0.880	-
8	30.00	42.00	158.00	0.790	-
9	60.00	66.00	134.00	0.670	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times (\log_e \frac{L}{R}) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

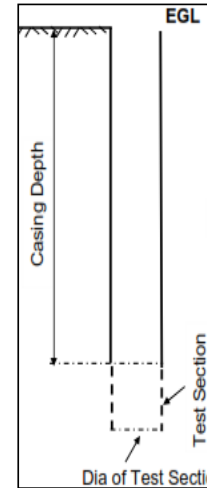


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-08B
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	0+847
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	14.50

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	18.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	19.00
H₁/H₀:	0.834	t₂ [min]:	32.00
H₂/H₀:	0.720		
H₁/H₂:	1.158		

Coefficient of Permeability (K_t)		1.20E-02	[cm/min]
η_t	10.6	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		1.493E-02	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	3.00	197.00	0.985	-
3	1.00	5.00	195.00	0.975	-
4	2.00	6.00	194.00	0.970	-
5	5.00	9.00	191.00	0.955	-
6	10.00	14.00	186.00	0.930	-
7	15.00	19.00	181.00	0.905	-
8	30.00	31.00	169.00	0.845	-
9	60.00	105.00	95.00	0.475	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times (\log_e \frac{L}{R}) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

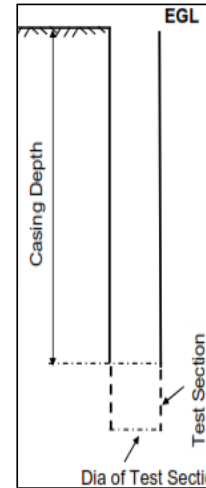


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-09
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	0+802
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.77

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	22.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	19.00
H₁/H₀:	0.786	t₂ [min]:	33.00
H₂/H₀:	0.629		
H₁/H₂:	1.250		

Coefficient of Permeability (K_t)		1.70E-02	[cm/min]
η_t	9.61	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		1.915E-02	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	4.00	196.00	0.980	-
3	1.00	13.00	187.00	0.935	-
4	2.00	29.00	171.00	0.855	-
5	5.00	56.00	144.00	0.720	-
6	10.00	74.00	126.00	0.630	-
7	15.00	93.00	107.00	0.535	-
8	30.00	105.00	95.00	0.475	-
9	60.00	146.00	54.00	0.270	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times (\log_e \frac{L}{R}) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

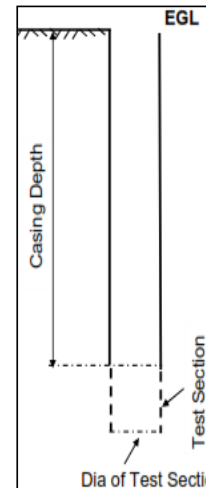


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-10
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	0+907
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.50

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	26.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	15.00
H₁/H₀:	0.925	t₂ [min]:	25.00
H₂/H₀:	0.875		
H₁/H₂:	1.057		

Coefficient of Permeability (K_t)		5.93E-03	[cm/min]
η_t	8.75	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		6.069E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	11.00	189.00	0.945	-
3	1.00	19.00	181.00	0.905	-
4	2.00	30.00	170.00	0.850	-
5	5.00	54.00	146.00	0.730	-
6	10.00	81.00	119.00	0.595	-
7	15.00	92.00	108.00	0.540	-
8	30.00	107.00	93.00	0.465	-
9	60.00	114.00	86.00	0.430	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times (\log_e \frac{L}{R}) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

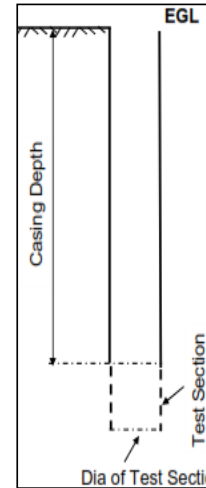


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-11
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	1+004
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	14.70

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	24.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	18.00
H₁/H₀:	0.918	t₂ [min]:	30.00
H₂/H₀:	0.864		
H₁/H₂:	1.063		

Coefficient of Permeability (K_t)		5.43E-03	[cm/min]
η_t	8.55	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		5.430E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	5.00	195.00	0.975	-
3	1.00	12.00	188.00	0.940	-
4	2.00	21.00	179.00	0.895	-
5	5.00	43.00	157.00	0.785	-
6	10.00	59.00	141.00	0.705	-
7	15.00	72.00	128.00	0.640	-
8	30.00	87.00	113.00	0.565	-
9	60.00	102.00	98.00	0.490	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times (\log_e \frac{L}{R}) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.



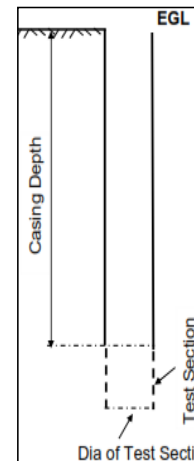
E.2 Zone 2: CH: 1+004 km to 1+925 km (BH-12 to BH-21)

Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-12
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	1+092
Project Code:	158_R2_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	14.00

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°C]:	21.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	19.00
H₁/H₀:	0.930	t₂ [min]:	33.50
H₂/H₀:	0.877		
H₁/H₂:	1.061		

Coefficient of Permeability (K_t)	4.33E-03		[cm/min]
η_t	9.84	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)	4.9842E-03		[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	4.00	196.00	0.980	-
3	1.00	8.00	192.00	0.960	-
4	2.00	10.00	190.00	0.950	-
5	5.00	22.00	178.00	0.890	-
6	10.00	36.00	164.00	0.820	-
7	15.00	44.00	156.00	0.780	-
8	30.00	61.00	139.00	0.695	-
9	60.00	77.00	123.00	0.615	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times \left(\log_e \frac{L}{R} \right) \frac{\log_e h_1/h_2}{t_2 - t_1}$$

K = Coefficient of Permeability;
d = Diameter of Intake Pipe (stand pipe);
L = length of Test Section;
h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

η_t = Viscosity of Water at the Field Temperature, t;
K_t = Coefficient of Permeability at the Field Temperature,
η₂₇ = Viscosity of Water at 27°C.

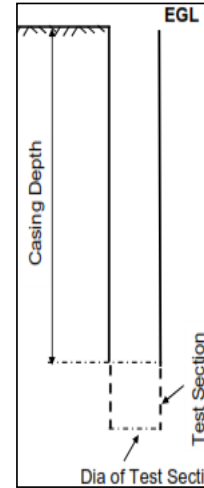


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-13
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	1+214
Project Code:	158_R2_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.40

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	20.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	14.00
H₁/H₀:	0.971	t₂ [min]:	28.00
H₂/H₀:	0.942		
H₁/H₂:	1.031		

Coefficient of Permeability (K_t)		2.33E-03	[cm/min]
η_t	10.09	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		2.7439E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	4.00	196.00	0.980	-
3	1.00	6.00	194.00	0.970	-
4	2.00	8.00	192.00	0.960	-
5	5.00	15.00	185.00	0.925	-
6	10.00	23.00	177.00	0.885	-
7	15.00	30.00	170.00	0.850	-
8	30.00	42.00	158.00	0.790	-
9	60.00	56.00	144.00	0.720	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times \left(\log_e \frac{L}{R} \right) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

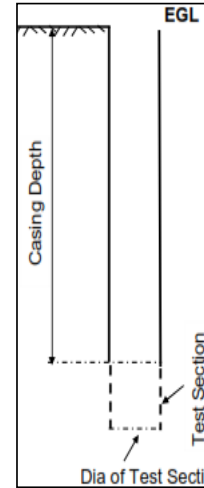


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-14
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	1+293
Project Code:	158_R2_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.40

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	16.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	15.00
H₁/H₀:	0.953	t₂ [min]:	30.00
H₂/H₀:	0.905		
H₁/H₂:	1.052		

Coefficient of Permeability (K_t)		3.64E-03	[cm/min]
η_t	11.16	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		4.750E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	5.00	195.00	0.975	-
3	1.00	7.00	193.00	0.965	-
4	2.00	9.00	191.00	0.955	-
5	5.00	13.00	187.00	0.935	-
6	10.00	15.00	185.00	0.925	-
7	15.00	20.00	180.00	0.900	-
8	30.00	22.00	178.00	0.890	-
9	60.00	40.00	160.00	0.800	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times \left(\log_e \frac{L}{R} \right) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

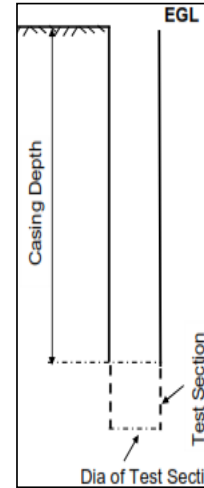


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-15
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	1+392
Project Code:	158_R2_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.80

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	18.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00		
r [cm]:	7.50	d [cm]:	15.00
H₁/H₀:	0.991	t₁ [min]:	12.00
H₂/H₀:	0.986	t₂ [min]:	19.00
H₁/H₂:	1.005		

Coefficient of Permeability (K_t)		7.92E-04	[cm/min]
η_t	10.6	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		9.814E-04	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	2.00	198.00	0.990	-
3	1.00	3.00	197.00	0.985	-
4	2.00	4.00	196.00	0.980	-
5	5.00	5.00	195.00	0.975	-
6	10.00	6.00	194.00	0.970	-
7	15.00	7.00	193.00	0.965	-
8	30.00	8.00	192.00	0.960	-
9	60.00	10.00	190.00	0.950	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times \left(\log_e \frac{L}{R} \right) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

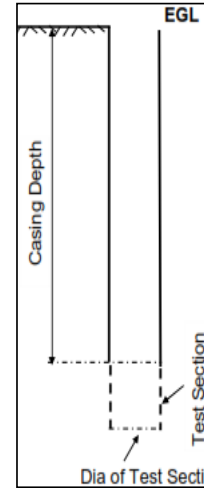


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-16
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	1+487
Project Code:	158_R2_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.00

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	20.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00		
r [cm]:	7.50	d [cm]:	15.00
H₁/H₀:	0.922	t₁ [min]:	21.00
H₂/H₀:	0.881	t₂ [min]:	32.00
H₁/H₂:	1.047		

Coefficient of Permeability (K_t)		4.42E-03	[cm/min]
η_t	10.09	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		5.219E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	8.00	192.00	0.960	-
3	1.00	12.00	188.00	0.940	-
4	2.00	14.00	186.00	0.930	-
5	5.00	18.00	182.00	0.910	-
6	10.00	25.00	175.00	0.875	-
7	15.00	29.00	171.00	0.855	-
8	30.00	40.00	160.00	0.800	-
9	60.00	59.00	141.00	0.705	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times \left(\log_e \frac{L}{R} \right) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

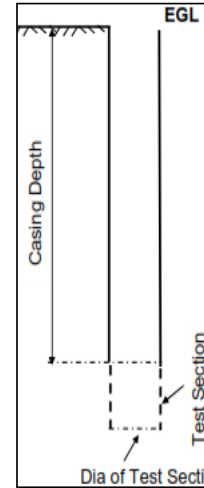


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-17
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	1+587
Project Code:	158_R2_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.00

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	20.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	18.00
H₁/H₀:	0.983	t₂ [min]:	27.00
H₂/H₀:	0.974		
H₁/H₂:	1.009		

Coefficient of Permeability (K_t)		1.04E-03	[cm/min]
η_t	10.09	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		1.223E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	1.00	199.00	0.995	-
3	1.00	2.00	198.00	0.990	-
4	2.00	4.00	196.00	0.980	-
5	5.00	5.00	195.00	0.975	-
6	10.00	6.00	194.00	0.970	-
7	15.00	7.00	193.00	0.965	-
8	30.00	10.00	190.00	0.950	-
9	60.00	12.00	188.00	0.940	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times \left(\log_e \frac{L}{R} \right) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

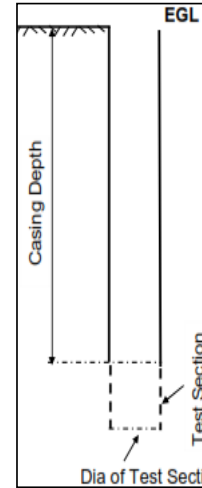


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-20
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	1+869
Project Code:	158_R2_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.00

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	20.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	19.00
H₁/H₀:	0.972	t₂ [min]:	32.00
H₂/H₀:	0.954		
H₁/H₂:	1.020		

Coefficient of Permeability (K_t)		1.61E-03	[cm/min]
η_t	10.09	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		1.896E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	1.00	199.00	0.995	-
3	1.00	3.00	197.00	0.985	-
4	2.00	3.00	197.00	0.985	-
5	5.00	4.00	196.00	0.980	-
6	10.00	7.00	193.00	0.965	-
7	15.00	10.00	190.00	0.950	-
8	30.00	15.00	185.00	0.925	-
9	60.00	22.00	178.00	0.890	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times \left(\log_e \frac{L}{R} \right) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

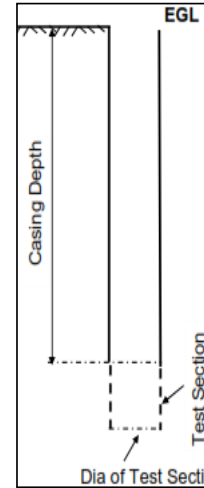


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-21
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	1+925
Project Code:	158_R2_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.00

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	21.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	15.00
H₁/H₀:	0.973	t₂ [min]:	30.00
H₂/H₀:	0.945		
H₁/H₂:	1.029		

Coefficient of Permeability (K_t)		2.04E-03	[cm/min]
η_t	9.84	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		2.349E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	1.00	199.00	0.995	-
3	1.00	3.00	197.00	0.985	-
4	2.00	4.00	196.00	0.980	-
5	5.00	7.00	193.00	0.965	-
6	10.00	10.00	190.00	0.950	-
7	15.00	14.00	186.00	0.930	-
8	30.00	19.00	181.00	0.905	-
9	60.00	29.00	171.00	0.855	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times \left(\log_e \frac{L}{R} \right) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.



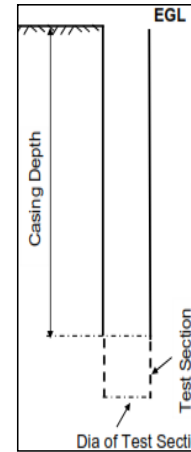
E.3 Zone 3: CH: 1+925 km to 2+586 km (BH-22 to BH-27)

Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-22
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	2+036
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.50

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°C]:	21.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	15.00
H₁/H₀:	0.975	t₂ [min]:	30.00
H₂/H₀:	0.950		
H₁/H₂:	1.026		

Coefficient of Permeability (K_t)		1.85E-03	[cm/min]
η_t	9.38	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		2.027E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	1.00	199.00	0.995	-
3	1.00	3.00	197.00	0.985	-
4	2.00	4.00	196.00	0.980	-
5	5.00	5.00	195.00	0.975	-
6	10.00	7.00	193.00	0.965	-
7	15.00	11.00	189.00	0.945	-
8	30.00	14.00	186.00	0.930	-
9	60.00	20.00	180.00	0.900	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times (\log_e \frac{L}{R}) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

K = Coefficient of Permeability;

d = Diameter of Intake Pipe (stand pipe);

L = length of Test Section;

h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;

h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;

R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

η_t = Viscosity of Water at the Field Temperature, t;

K_t = Coefficient of Permeability at the Field Temperature,

η₂₇ = Viscosity of Water at 27°C.

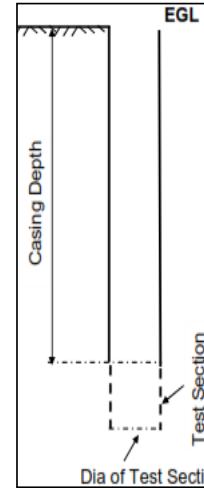


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-23
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	2+116
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.00

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	21.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	19.00
H₁/H₀:	0.946	t₂ [min]:	33.50
H₂/H₀:	0.905		
H₁/H₂:	1.045		

Coefficient of Permeability (K_t)		3.27E-03	[cm/min]
η_t	10.09	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		3.855E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	1.00	199.00	0.995	-
3	1.00	1.00	199.00	0.995	-
4	2.00	2.00	198.00	0.990	-
5	5.00	8.00	192.00	0.960	-
6	10.00	13.00	187.00	0.935	-
7	15.00	19.00	181.00	0.905	-
8	30.00	30.00	170.00	0.850	-
9	60.00	45.00	155.00	0.775	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times \left(\log_e \frac{L}{R} \right) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

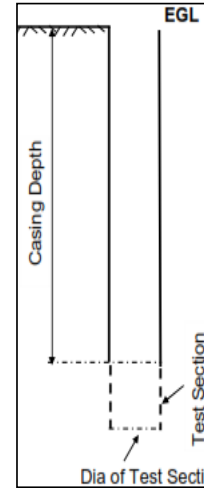


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-23A
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	2+257
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	14.20

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	21.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	19.00
H₁/H₀:	0.782	t₂ [min]:	33.50
H₂/H₀:	0.615		
H₁/H₂:	1.271		

Coefficient of Permeability (K_t)		1.77E-02	[cm/min]
η_t	10.6	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		2.190E-02	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	5.00	195.00	0.975	-
3	1.00	8.00	192.00	0.960	-
4	2.00	12.00	188.00	0.940	-
5	5.00	36.00	164.00	0.820	-
6	10.00	65.00	135.00	0.675	-
7	15.00	102.00	98.00	0.490	-
8	30.00	130.00	70.00	0.350	-
9	60.00	160.00	40.00	0.200	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times \left(\log_e \frac{L}{R} \right) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

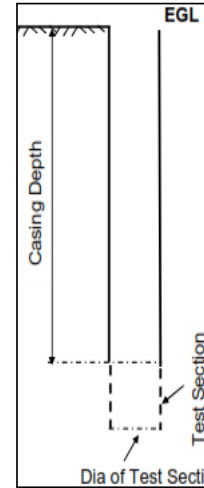


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-23B
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	2+190
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.00

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	21.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	19.00
H₁/H₀:	0.934	t₂ [min]:	33.50
H₂/H₀:	0.883		
H₁/H₂:	1.057		

Coefficient of Permeability (K_t)		4.09E-03	[cm/min]
η_t	9.84	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		4.710E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	1.00	199.00	0.995	-
3	1.00	2.00	198.00	0.990	-
4	2.00	4.00	196.00	0.980	-
5	5.00	9.00	191.00	0.955	-
6	10.00	15.00	185.00	0.925	-
7	15.00	21.00	179.00	0.895	-
8	30.00	32.00	168.00	0.840	-
9	60.00	51.00	149.00	0.745	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times \left(\log_e \frac{L}{R} \right) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

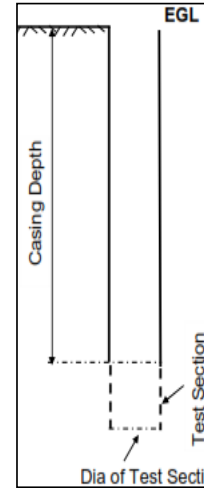


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-24
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	2+338
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.60

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	21.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	19.00
H₁/H₀:	0.918	t₂ [min]:	33.50
H₂/H₀:	0.855		
H₁/H₂:	1.074		

Coefficient of Permeability (K_t)		5.22E-03	[cm/min]
η_t	10.6	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		6.471E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	4.00	196.00	0.980	-
3	1.00	6.00	194.00	0.970	-
4	2.00	8.00	192.00	0.960	-
5	5.00	10.00	190.00	0.950	-
6	10.00	15.00	185.00	0.925	-
7	15.00	20.00	180.00	0.900	-
8	30.00	33.00	167.00	0.835	-
9	60.00	110.00	90.00	0.450	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times \left(\log_e \frac{L}{R} \right) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

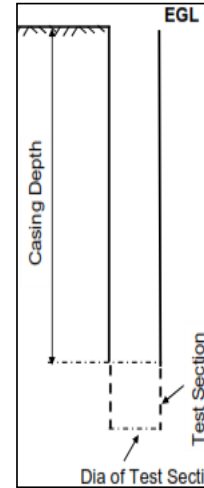


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-25
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	2+404
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	14.20

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	21.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	19.00
H₁/H₀:	0.981	t₂ [min]:	33.50
H₂/H₀:	0.967		
H₁/H₂:	1.015		

Coefficient of Permeability (K_t)		1.10E-03	[cm/min]
η_t	10.34	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		1.325E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	1.00	199.00	0.995	-
3	1.00	2.00	198.00	0.990	-
4	2.00	2.00	198.00	0.990	-
5	5.00	3.00	197.00	0.985	-
6	10.00	4.00	196.00	0.980	-
7	15.00	6.00	194.00	0.970	-
8	30.00	9.00	191.00	0.955	-
9	60.00	12.00	188.00	0.940	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times \left(\log_e \frac{L}{R} \right) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

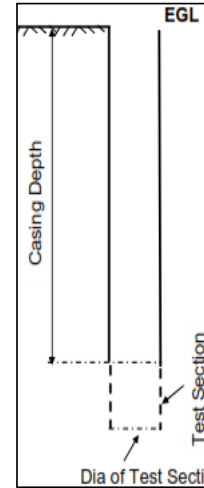


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-26
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	2+532
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.00

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	21.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	19.00
H₁/H₀:	0.972	t₂ [min]:	33.50
H₂/H₀:	0.950		
H₁/H₂:	1.023		

Coefficient of Permeability (K_t)		1.67E-03	[cm/min]
η_t	10.88	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		2.120E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	1.00	199.00	0.995	-
3	1.00	2.00	198.00	0.990	-
4	2.00	4.00	196.00	0.980	-
5	5.00	6.00	194.00	0.970	-
6	10.00	8.00	192.00	0.960	-
7	15.00	11.00	189.00	0.945	-
8	30.00	15.00	185.00	0.925	-
9	60.00	18.00	182.00	0.910	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times \left(\log_e \frac{L}{R} \right) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.

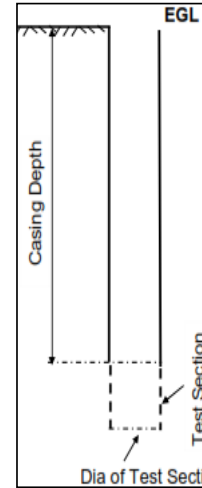


Name of Work:	Geotechnical Investigation work for Proposed Extension Metro corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km).		
Client:	Noida Metro Rail Corporation (NMRC) Limited	BH ID:	BH-27
Stretch:	Depot Station to Boraki MMTH	Chainage [km]:	2+586
Project Code:	158_R0_DEST TO BOMM_0+000 km TO 2+600 km	Water table Level [m]:	13.00

Falling Head Method

Depth of borehole [m]:	2.00
Temperature [°c]:	21.00
Radius of Hole (r) [cm]:	7.50
Depth of Casing Pipe [m]:	1.50
Length of test Section (l) [cm]:	50.00
L/R Ratio:	6.67

From 1.50m to 2.00m



L [cm]:	50.00	d [cm]:	15.00
r [cm]:	7.50	t₁ [min]:	19.00
H₁/H₀:	0.974	t₂ [min]:	33.50
H₂/H₀:	0.954		
H₁/H₂:	1.021		

Coefficient of Permeability (K_t)		1.53E-03	[cm/min]
η_t	10.88	milipoise	η₂₇ 8.55 milipoise
Coefficient of Permeability (K₂₇)		1.949E-03	[cm/min]

Sr No.	Time in Minutes [t]	Water Level from top of the Intake Pipe [cm]	Height (H) of water level at time (t) [cm]	H _t /H ₀	Remarks
1	0.00	0.00	200.00	1.000	-
2	0.30	1.00	199.00	0.995	-
3	1.00	2.00	198.00	0.990	-
4	2.00	3.00	197.00	0.985	-
5	5.00	4.00	196.00	0.980	-
6	10.00	5.00	195.00	0.975	-
7	15.00	9.00	191.00	0.955	-
8	30.00	14.00	186.00	0.930	-
9	60.00	17.00	183.00	0.915	-

Permeability by Falling head method is computed by the following relations:

$$K_t = \frac{d^2}{8L} \times \left(\log_e \frac{L}{R} \right) \frac{\log_e \frac{h_1}{h_2}}{t_2 - t_1}$$

- K = Coefficient of Permeability;
- d = Diameter of Intake Pipe (stand pipe);
- L = length of Test Section;
- h₁ = Head of Water in the Stand Pipe at time t₁, above Piezometric Surface;
- h₂ = Head of Water in the Stand Pipe at the time t₂, above Piezometric Surface;
- R = Radius of Borehole.

Coefficient of Permeability K₂₇, at 27°C is calculated by the following formula

$$K_{27} = \frac{\eta_t K_t}{\eta_{27}}$$

- η_t = Viscosity of Water at the Field Temperature, t;
- K_t = Coefficient of Permeability at the Field Temperature,
- η₂₇ = Viscosity of Water at 27°C.



Appendix F Site Investigation Photographs





F.1 Zone 1: CH: 0+000 km to 1+004 km (BH-01 to BH-11)

BH-01



BH-02



BH-03



BH-04





BH-05



BH-06



BH-07



BH-08





BH-08A



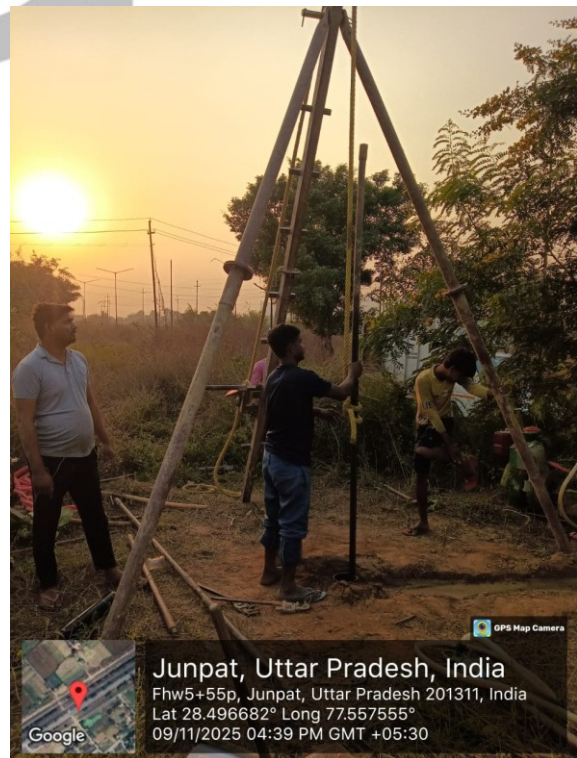
BH-8B



BH-09



BH-10





BH-11





F.2 Zone 2: CH: 1+004 km to 1+925 km (BH-12 to BH-21)

BH-12



BH-13



BH-14



BH-15





BH-16



BH-17



BH-20



BH-21



F.3 Zone 3: CH: 1+925 km to 2+586 km (BH-22 to BH-27)

BH-22

BH-23



BH-23A

BH-23B

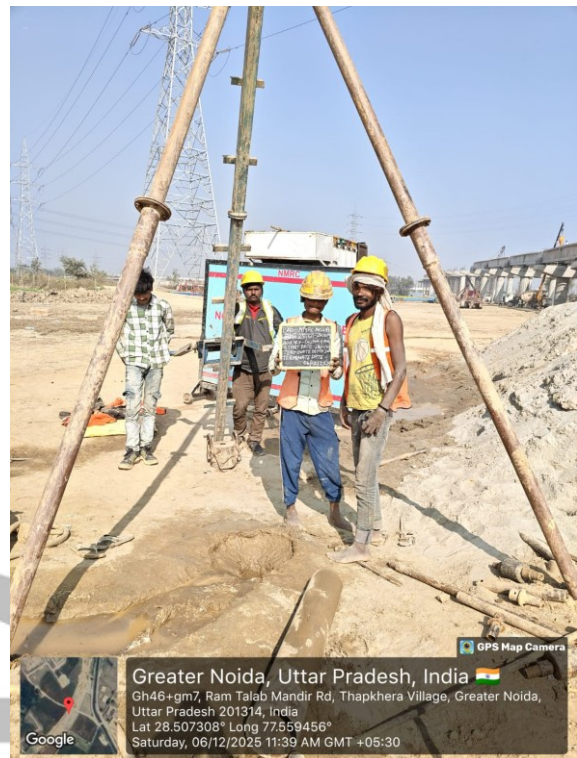




BH-24



BH-25



BH-26



BH-27

