

## السيد المهندس / رئيس قطاع التنفيذ والمناطق

تحية طيبة وبعد ،،،،،

نتشرف أن نرفق لسيادتك عدد ١ مقايضة معدلة ٢ لمشروع أعمال إنشاء الجسر الترابي للقطار الكهربائي السريع ٦ أكتوبر  
أبوسمبل (القطاع الخامس) من الكم ٦٤٠.٥٧٩ حتى الكم ٦٤١.٢٣٦ على أن تراجع الأسعار بمعرفة الإدارة بالقاهرة .  
اعداد المكتب الاستشاري سبكتروم للاستشارات الهندسية وعلي مسئوليته .

تنفيذ شركة الذهبي للمقاولات

برجاء التكرم بالعلم والتوجيه باللازم

وتفضلوا بقبول وافر التحية والإحترام ،،،،،



رئيس الإدارة المركزية

مهندس / عماد حسين  
عماد حسين



تحريرا في ٢٠٢٣/١٢/٢٦

المرفقات / عدد ( ١ ) مقايضة



الهيئة العامة للطرق والكباري

وزارة النقل

مقايمة معدلة 2 ( جزيرة لنور لأعمال )

مشروع : الجسر الترابي للطريق المربع ( أكتوبر / أبو سمبل )

القطاع الخامس من الكم 629 + 110.13 إلى الكم 715 + 824.53 بطول 86.52 كم

من إحداثي E 489929.6671 و N 2874215.5671

إلى إحداثي E 440168.6522 و N 2817778.3175

إستشاري القطاع سبكتروم للإستشارات الهندسية د. م. / عماد الدين شبل

تنفيذ الشركة : الذهبى للمقاولات فئة : الرابعة بقيمة : مليون

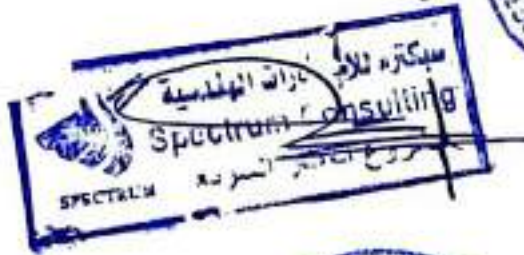
من الكم 640 + 579 إلى الكم 641 + 236 بطول 657 م

19,959,325 مليون



المقاول /

الإستشاري /



لمع

المنطقة الثامنة بقنا /





من محطة 110.13 629 حالي محطة 624.63 715 بطول 86.5145 كم  
التي تقسمها إلى المقاطعات الخمسة من محطة 640.579 إلى 641.236 بطول  
بين الأضلاع

الأجمالي

CamScanner

| مشروع القطار الكهربائي السريع القطاع الخامس            |             |          |                      |             |
|--------------------------------------------------------|-------------|----------|----------------------|-------------|
| تنفيذ شركة الذهبى للمقاولات                            |             |          |                      |             |
| من الكم 637+952 الى 643+863                            |             |          |                      |             |
| بيان اعمال توضيحي لمستخلص جاري (4) عقد (2024/2023/306) |             |          |                      |             |
| العقد                                                  | قيمة العقد  | المستخلص | كميات حفر ثرية عادية | كميات الردم |
| (2024/2023/306)                                        | عشرون مليون | جاري 1   | -                    | 23100.00    |
|                                                        |             | جاري 2   | 10000.00             | 121500.00   |
|                                                        |             | جاري 3   | -                    | 34400.00    |
|                                                        |             | جاري 4   | -                    | 30000.00    |
| كميات تم حصرها                                         |             |          | -                    | 24219.30    |
|                                                        |             |          | 14051.66             | 128231.31   |
|                                                        |             |          |                      | 33745.88    |
|                                                        |             |          | -                    | 30262.98    |
| اجمالي كميات تم حصرها                                  |             |          | 14051.66             | 216459.47   |
| كميات تم صرفها                                         |             |          | -                    | 23100.00    |
|                                                        |             |          | 10000.00             | 121500.00   |
|                                                        |             |          | -                    | 34400.00    |
|                                                        |             |          | -                    | 30000.00    |
| اجمالي كميات تم صرفها                                  |             |          | 10000.00             | 209000.00   |
| المتبقى من القيمة                                      |             |          | 4051.66              | 7459.47     |



**SECTION**  
Ministry of Transportation  
Regional Authority for Transport

**Project Name**  
BILTING (KUTUB) TRANSPORTATION  
PROJECT (KUTUB) TRANSPORTATION  
PROJECT (KUTUB) TRANSPORTATION  
PROJECT (KUTUB) TRANSPORTATION

**Scale**  
1:1000

**Sheet No**  
1/1



**SECTION (KUTUB) TRANSPORTATION**  
BILTING (KUTUB) TRANSPORTATION  
PROJECT (KUTUB) TRANSPORTATION  
PROJECT (KUTUB) TRANSPORTATION

**Scale**  
1:1000

**Sheet No**  
1/1

**SECTION (KUTUB) TRANSPORTATION**  
BILTING (KUTUB) TRANSPORTATION  
PROJECT (KUTUB) TRANSPORTATION  
PROJECT (KUTUB) TRANSPORTATION

**Scale**  
1:1000

**Sheet No**  
1/1

**SECTION (KUTUB) TRANSPORTATION**  
BILTING (KUTUB) TRANSPORTATION  
PROJECT (KUTUB) TRANSPORTATION  
PROJECT (KUTUB) TRANSPORTATION

**Scale**  
1:1000

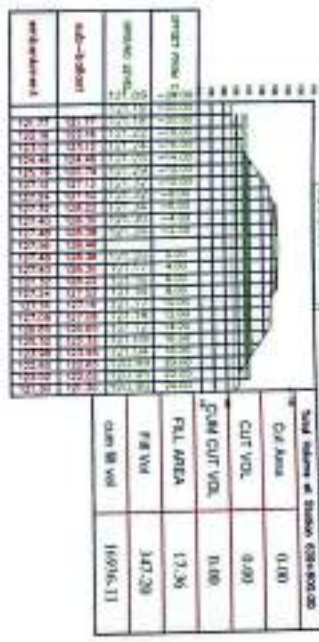
**Sheet No**  
1/1

**SECTION (KUTUB) TRANSPORTATION**  
BILTING (KUTUB) TRANSPORTATION  
PROJECT (KUTUB) TRANSPORTATION  
PROJECT (KUTUB) TRANSPORTATION

**Scale**  
1:1000

**Sheet No**  
1/1

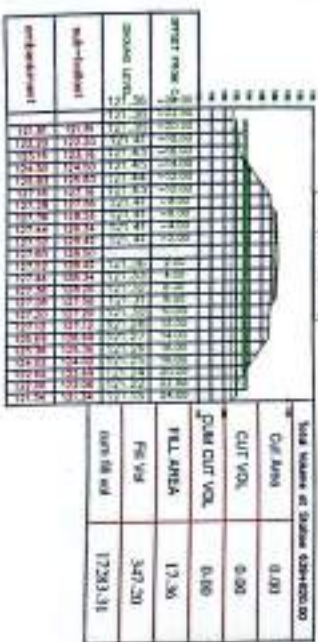
EXPRESS TRAIL  
SEC 1029+800 TO 1030



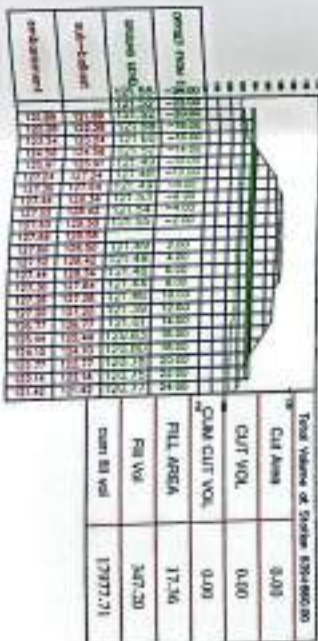
EXPRESS TRAIL  
SEC 1030+800 TO 1031



EXPRESS TRAIL  
SEC 1031+800 TO 1032



EXPRESS TRAIL  
SEC 1032+800 TO 1033



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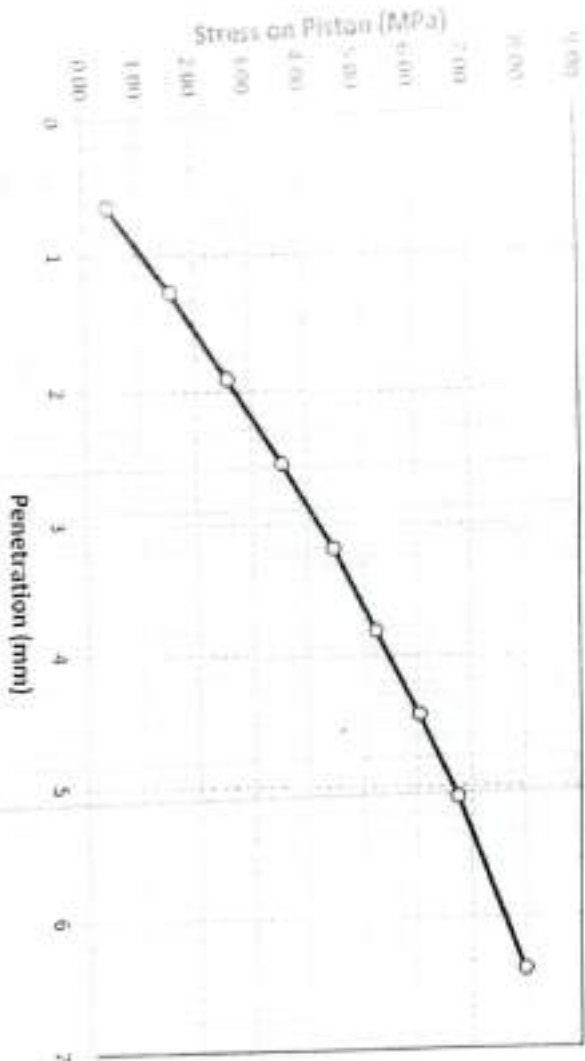


Consulting Engineering Bureau & Laboratories  
مكتب استشارات الهندسة والبحوث

Company Name : شركة الخلقي  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST:641+400 E=492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

### Load Penetration Curve of CBR Test

ASTM D-1883



Signature /

  
**CEL**  
مكتب استشارات الهندسة والبحوث  
مقر ومكتب : الخرطوم - السودان  
الهاتف : 219 9981 437  
الفاكس : 219 9981 437  
البريد الإلكتروني : info@cel.sd

IAS

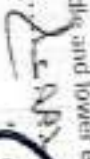
Company Name : شركة المكي  
Project : Electric Express Train - HSR from Qous To Arman  
Location : ST:641+400 E=492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

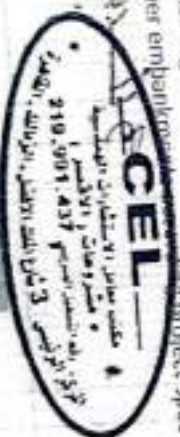
Test Results of California Bearing Ratio on Base Materials  
ASTM D 1883

| penetration                     |       | stress on piston (Mpa) |                |
|---------------------------------|-------|------------------------|----------------|
| mm                              | Inch  |                        |                |
| 0.64                            | 0.025 | 0.46                   |                |
|                                 | 0.050 | 1.58                   |                |
| 1.27                            | 0.075 | 2.58                   |                |
| 1.91                            | 0.100 | 3.55                   |                |
| 2.54                            | 0.125 | 4.47                   |                |
| 3.18                            | 0.150 | 5.23                   |                |
| 3.81                            | 0.175 | 6.03                   |                |
| 4.45                            | 0.200 | 6.74                   |                |
| 5.08                            | 0.250 | 7.97                   |                |
| 6.35                            |       |                        |                |
| CBR Result                      |       | Stress (Mpa)           |                |
| At 1 inch (2.54 mm) penetration |       | St. Value              | Sample results |
|                                 |       | 6.90                   | 3.55           |
|                                 |       |                        | CBR 100 %      |
|                                 |       |                        | 51.5 %         |

Notes:  
1. Attached graph shows penetration resistance versus penetration magnitude.  
2. The sample was compacted to dry density of  $\approx 2.22 \text{ (gm/cm}^3\text{)}$

At = 6.4 % optimum water content.  
3. Sample size 4.50 Kg.

CBR = 10 for middle and lower embankment. See project spec page No 36.  
Signature / 



( الشركة ) : شركة الكهرباء  
 Project : Electric Express Train – HSR From Qous To Armanat  
 Location : ST:641+400 E= 492410,088 N=2862759,57  
 Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
 Delivery Date : 08/01/2024  
 Reporting Date : 11/1/2024  
 Reporting No. : 10-19

Moisture – Density relation of soil  
Test result (Modified proctor test)  
ASTM D-1557



- Max dry density ( $\text{gm/cm}^3$ ) : 2.22
- Optimum moisture content % : 6.4 %

Signature / *[Signature]*





Consulting Engineering Bureau & Laboratories  
بureau d'ingénierie et de laboratoires

Company Name : شركة النخعي

Project : Electric Express Train - HSR From Qous To Arman

Location : ST:641+400 E= 492410,088 N=2862759,57

Type of sample : Soil Embankment ( Upper Embankment 0.0 M )

Delivery Date : 08/01/2024

Reporting Date : 11/1/2024

Reporting No. : 10-19

### Soil Classification

| TEST                 | Results<br>(%) | Limits according<br>Projects Specs |          |          |
|----------------------|----------------|------------------------------------|----------|----------|
|                      |                | (A-1-a)                            | (A-1-b)  | (A-2-4)  |
| Group Classification | (A-1-a)        | (A-1-a)                            | (A-1-b)  | (A-2-4)  |
| 2.00 mm (No.10)      | 27.5           | Max 50 %                           | -----    | -----    |
| 4.75 mm (No. 40)     | 15.6           | Max 30 %                           | Max 50 % | -----    |
| 4.75 mm (No. 200)    | 9.1            | Max 15 %                           | Max 15 % | Max 15 % |
| Liquid Limit         | -----          | -----                              | -----    | -----    |
| Plasticity Index     | 0              | Max 6 %                            | Max 6 %  | Max 10 % |

The test results are ( ☒ Comply - ☐ Not Comply ) with specifications limits

Signature

  
**CEL**  
بureau d'ingénierie et de laboratoires  
215 991 437  
بureau d'ingénierie et de laboratoires



# CEL

Consulting Engineering Bureau & Laboration  
مكتب استشارات ومختبرات الهندسة

Company Name : شركة الانجي  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

## Results of liquid limit and plasticity index of soils according to ASTM D-4318

| Test             | Results<br>(%) |
|------------------|----------------|
| Liquid Limit     | 0              |
| Plastic Limit    | 0              |
| Plasticity Index | 0              |

Signature / ...



44, 42400 P.O. Box 10, Sharjah  
Tel: 06 520 1000  
Fax: 06 520 1000



Company Name : شركة الأهلي  
Project : Electric Express Train - IISR From Qous To Arman  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

Materials finer than 75  $\mu$ m (no.200) sieve  
By washing ASTM D-1140.

| Test                                                             | Results (%) |
|------------------------------------------------------------------|-------------|
| Percentage of material finer than Sieve Size 75 $\mu$ m (No.200) | 9.1         |

Signature / ..... *Handwritten Signature*



Thank you for  
your cooperation  
0111 1010 901 407



Company Name : شركة المظني  
 Project : Electric Express Train - HSR From Qous To Armat  
 Location : ST:641+400 E= 492410,088 N=2862759,57  
 Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
 Delivery Date : 08/01/2024  
 Reporting Date : 11/1/2024  
 Reporting No. : 10-19

RESULTS OF SIEVE ANALYSIS According to ASTM D-422.

| Sieve Size<br>(mm) | Sieve Size<br>(IN) | Passing % |
|--------------------|--------------------|-----------|
| 50                 | 2                  | 95.1      |
| 37.5               | 1.5                | 91.9      |
| 25                 | 1                  | 80.7      |
| 19                 | $\frac{3}{4}$      | 72.2      |
| 12.50              | $\frac{1}{2}$      | 64.1      |
| 9.50               | $\frac{3}{8}$      | 45.8      |
| 4.75               | 4                  | 34.6      |
| 2.00               | 10                 | 27.5      |
| 0.425              | 40                 | 15.6      |

Signature / .....

*[Handwritten Signature]*



Company Name : شركة الأقيس  
Project : Electric Express Train – HSR From Qous To Arman  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 03/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

Dear Gentleman,

Attached here with the delivered on 08 / 01 / 2024

This sample is representative for 5.000 M<sup>3</sup>

Materials test

1. Sieve analysis according to ASTM D-422.
2. Material finer than sieve No. 200 according to ASTM D-1140.
3. Liquid limits and plasticity index of soil according to ASTM D-4318.
4. Soil classification according to Project Specs.
5. Proctor Test according to ASTM D-1557
6. CBR according to ASTM D-1883

Signature / 

Consultant Eng : Abderrahman Ahmed

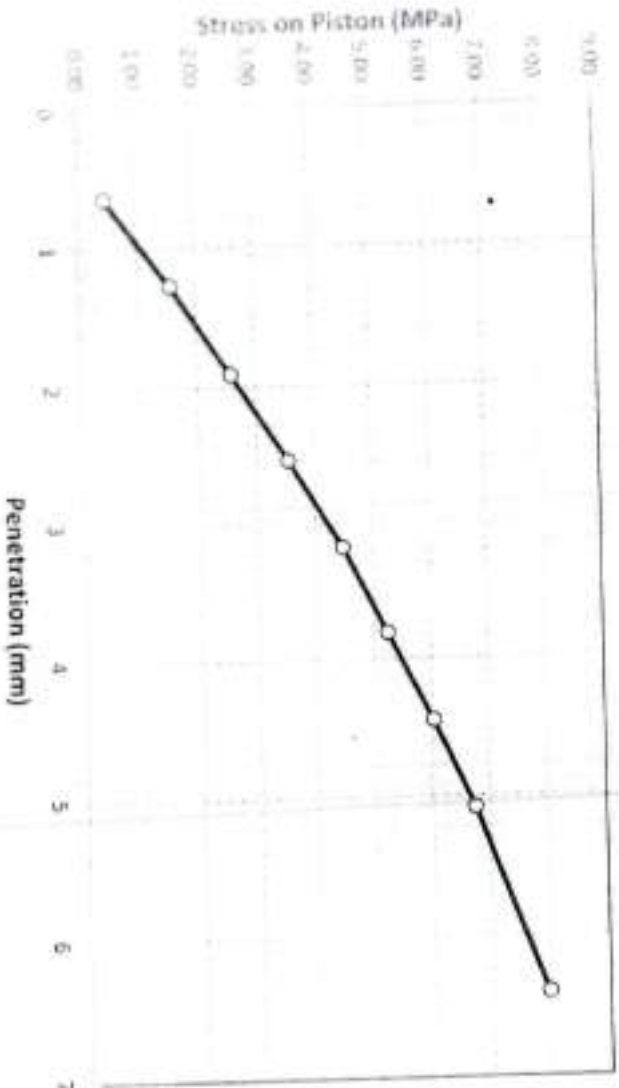


# CEL

Consulting Engineering Bureau & Laboratories  
مكتب مهندسي استشارات ومختبرات

Company Name : شركة الخبي  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

## Load Penetration Curve of CBR Test ASTM D-1883



Signature /



IAS  
REGISTERED

Company Name : شركة (الذبي)  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

Test Results of California Bearing Ratio on Base Materials  
**ASTM D 1883**

| penetration |       | stress on piston (Mpa) |  |
|-------------|-------|------------------------|--|
| mm          | Inch  |                        |  |
| 0.64        | 0.025 | 0.46                   |  |
| 1.27        | 0.050 | 1.58                   |  |
| 1.91        | 0.075 | 2.58                   |  |
| 2.54        | 0.100 | 3.55                   |  |
| 3.18        | 0.125 | 4.47                   |  |
| 3.81        | 0.150 | 5.23                   |  |
| 4.45        | 0.175 | 6.03                   |  |
| 5.08        | 0.200 | 6.74                   |  |
| 6.35        | 0.250 | 7.97                   |  |

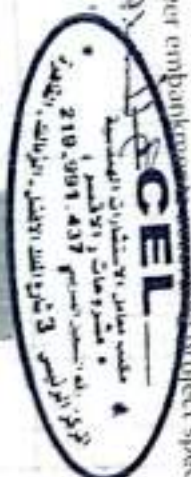
  

| CBR Result                        |           | Stress (Mpa)   |  | CBR 100 % |
|-----------------------------------|-----------|----------------|--|-----------|
| At 0.1 inch (2.54 mm) penetration | St. Value | Sample results |  |           |
|                                   | 6.90      | 3.55           |  | 51.5 %    |

Notes:

- 1- Attached graph shows penetration resistance versus penetration magnitude.
- 2- The sample was compacted to dry density of 2.22 (gm/cm<sup>3</sup>)  
At = 6.4 % optimum water content.
- 3- Surcharge load 4.50 Kg.

CBR = 10 for middle and lower embankment.  
Signature /  Project spec page No 36.



**IAS**

Company Name : شركة الخبي  
Project : Electric Express Train - HSR From Qous To Armani  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

Moisture - Density relation of soil  
Test result (Modified proctor test)  
ASTM D-1557



- Max dry density (gm/cm³) : 2.22
- Optimum moisture content % : 6.4 %

Signature / *[Signature]*



Company Name : شركة الجي  
 Project : Electric Express Train - HSR From Qous To Arman  
 Location : ST:641+400 E= 492410,088 N=2862759,57  
 Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
 Delivery Date : 08/01/2024  
 Reporting Date : 11/1/2024  
 Reporting No. : 10-19

Soil Classification

| TEST                 | Results<br>(%) | Limits according<br>Projects Specs |          |          |
|----------------------|----------------|------------------------------------|----------|----------|
|                      |                | (A-1-a)                            | (A-1-b)  | (A-2-4)  |
| Group Classification | (A-1-a)        | (A-1-a)                            | (A-1-b)  | (A-2-4)  |
| 2.00 mm (No.10)      | 27.5           | Max 50 %                           | -----    | -----    |
| 0.425 mm (No. 40)    | 15.6           | Max 30 %                           | Max 50 % | -----    |
| 0.075 mm (No. 200)   | 9.1            | Max 15 %                           | Max 15 % | Max 15 % |
| Liquid Limit         | -----          | -----                              | -----    | -----    |
| Plasticity Index     | 0              | Max 6 %                            | Max 6 %  | Max 10 % |

The test results are ( ☒ Comply - ☐ Not Comply ) with specifications limits

Signature :

  
 219 531 437  
 Amman, Jordan

**CEL**

Construction Engineering Services & Laboratories  
Abu Dhabi, United Arab Emirates

Company Name : شركة الخبي  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST:641+400 E=492410.088 N=2862759.57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Report No. : 10-19

**Results of liquid limit and plasticity index  
of soils according to ASTM D-4318**

| Test             | Results<br>(%) |
|------------------|----------------|
| Liquid Limit     | 0              |
| Plastic Limit    | 0              |
| Plasticity Index | 0              |

Signature /



**IAS**  
ARCHITECT

**CEL**

Company of Engineering, Research & Development  
Kuala Lumpur, Malaysia

Company Name: CEL  
Product: Electric Tension Test - 1000 Tonn (Type 1000)  
Model: CEL-1000 (Type 1000) No. 2000-1000  
Type of sample: Steel Reinforcement / Upper Reinforcement 1000 T  
Sample Size: 1000 (1000)  
Accounting Date: 10/1/2024  
Drawing No.: 10-10

Electric Tension Test - 1000 Tonn (Type 1000)  
By visiting (SSTV) 10-10

| Item                               | Details (No) |
|------------------------------------|--------------|
| Percentage of material (Type 1000) | 1000         |



# CEL

Consulting Engineering Bureau & Laboratories  
مكتب استشارات الهندسة ومختبرات

Company Name : عقبات 45 ج5  
Project : Electric Express Train - HSR From Qous To Armani  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

## RESULTS OF SIEVE ANALYSIS According to ASTM D-422.

| Sieve Size<br>(mm) | Sieve Size<br>(IN) | Passing % |
|--------------------|--------------------|-----------|
| 50                 | 2                  | 95.1      |
| 37.5               | 1.5                | 91.9      |
| 25                 | 1                  | 80.7      |
| 19                 | $\frac{3}{4}$      | 72.2      |
| 12.50              | $\frac{1}{2}$      | 64.1      |
| 9.50               | $\frac{3}{8}$      | 45.8      |
| 4.75               | 4                  | 34.6      |
| 2.00               | 10                 | 27.5      |
| 0.425              | 40                 | 15.6      |

Signature /



11564 T. 891, 437  
219, 891, 437  
شارع الملك فيصل - الرياض 11564



# CEL

Consulting Engineering Bureau & Laboratories  
مكتب استشارات الهندسة ومختبرات

Company Name : شركة النقي  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 03/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

Dear Gentleman,

Attached here with the delivered on 08 / 01 / 2024

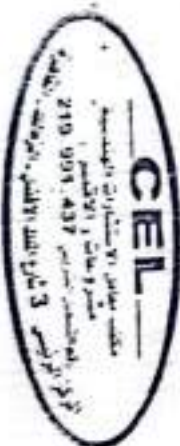
This sample is representative for 5.000 M<sup>3</sup>

### Materials Test

1. Sieve analysis according to ASTM D-422.
2. Material finer than sieve No. 200 according to ASTM D-1140.
3. Liquid limits and plasticity index of soil according to ASTM D-4318.
4. Soil classification according to Project Specs.
5. Proctor Test according to ASTM D-1557
6. CBR according to ASTM D-1883

Signature / *Abderrahman Ahmed*

Consultant Eng : Abderrahman Ahmed



# CEL

Geotechnical Engineering Laboratory  
 1. Stationing: 641+820 to 641+880  
 2. Project: Embankment

Company Name: 1. 641+820 to 641+880  
 Project: 2. Embankment  
 Testing Date: 1. 27 / 1 / 2024  
 Soil Type: 2. Upper Embankment  
 Location: 1. NE From 641+780 to 641+880  
 Level: 1. 0.50 M  
 Report No: 1. 140

## Compaction test by using Sand - Cone Test Method ASTM D-1556

| Test # | Station | Test Hole<br>Volume cm <sup>3</sup> | Moist Density<br>gm/cm <sup>3</sup> | Moisture<br>Content % | Dry Density<br>(gm/cm <sup>3</sup> ) | Degree of<br>Compaction (%) | Acceptance |
|--------|---------|-------------------------------------|-------------------------------------|-----------------------|--------------------------------------|-----------------------------|------------|
| 1      | 641+820 | 1504.2                              | 2.25                                | 5.3                   | 2.14                                 | 96.4%                       | Comply     |
| 2      | 641+840 | 1519.4                              | 2.28                                | 5.0                   | 2.16                                 | 97.1%                       | Comply     |
| 3      | 641+860 | 1527.1                              | 2.23                                | 5                     | 2.13                                 | 95.9%                       | Comply     |
| 4      | 641+876 | 1520.8                              | 2.30                                | 0.4                   | 2.16                                 | 97.6%                       | Comply     |

Degree of compaction based on proctor test dated At

Max. dry density = 2.22 gm/cm<sup>3</sup>

At optimum moisture content = 8.4 %

Signature /

*[Signature]*  
**CEL**  
 Geotechnical Engineering Laboratory  
 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391, 393, 395, 397, 399, 401, 403, 405, 407, 409, 411, 413, 415, 417, 419, 421, 423, 425, 427, 429, 431, 433, 435, 437, 439, 441, 443, 445, 447, 449, 451, 453, 455, 457, 459, 461, 463, 465, 467, 469, 471, 473, 475, 477, 479, 481, 483, 485, 487, 489, 491, 493, 495, 497, 499, 501, 503, 505, 507, 509, 511, 513, 515, 517, 519, 521, 523, 525, 527, 529, 531, 533, 535, 537, 539, 541, 543, 545, 547, 549, 551, 553, 555, 557, 559, 561, 563, 565, 567, 569, 571, 573, 575, 577, 579, 581, 583, 585, 587, 589, 591, 593, 595, 597, 599, 601, 603, 605, 607, 609, 611, 613, 615, 617, 619, 621, 623, 625, 627, 629, 631, 633, 635, 637, 639, 641, 643, 645, 647, 649, 651, 653, 655, 657, 659, 661, 663, 665, 667, 669, 671, 673, 675, 677, 679, 681, 683, 685, 687, 689, 691, 693, 695, 697, 699, 701, 703, 705, 707, 709, 711, 713, 715, 717, 719, 721, 723, 725, 727, 729, 731, 733, 735, 737, 739, 741, 743, 745, 747, 749, 751, 753, 755, 757, 759, 761, 763, 765, 767, 769, 771, 773, 775, 777, 779, 781, 783, 785, 787, 789, 791, 793, 795, 797, 799, 801, 803, 805, 807, 809, 811, 813, 815, 817, 819, 821, 823, 825, 827, 829, 831, 833, 835, 837, 839, 841, 843, 845, 847, 849, 851, 853, 855, 857, 859, 861, 863, 865, 867, 869, 871, 873, 875, 877, 879, 881, 883, 885, 887, 889, 891, 893, 895, 897, 899, 901, 903, 905, 907, 909, 911, 913, 915, 917, 919, 921, 923, 925, 927, 929, 931, 933, 935, 937, 939, 941, 943, 945, 947, 949, 951, 953, 955, 957, 959, 961, 963, 965, 967, 969, 971, 973, 975, 977, 979, 981, 983, 985, 987, 989, 991, 993, 995, 997, 999, 1001, 1003, 1005, 1007, 1009, 1011, 1013, 1015, 1017, 1019, 1021, 1023, 1025, 1027, 1029, 1031, 1033, 1035, 1037, 1039, 1041, 1043, 1045, 1047, 1049, 1051, 1053, 1055, 1057, 1059, 1061, 1063, 1065, 1067, 1069, 1071, 1073, 1075, 1077, 1079, 1081, 1083, 1085, 1087, 1089, 1091, 1093, 1095, 1097, 1099, 1101, 1103, 1105, 1107, 1109, 1111, 1113, 1115, 1117, 1119, 1121, 1123, 1125, 1127, 1129, 1131, 1133, 1135, 1137, 1139, 1141, 1143, 1145, 1147, 1149, 1151, 1153, 1155, 1157, 1159, 1161, 1163, 1165, 1167, 1169, 1171, 1173, 1175, 1177, 1179, 1181, 1183, 1185, 1187, 1189, 1191, 1193, 1195, 1197, 1199, 1201, 1203, 1205, 1207, 1209, 1211, 1213, 1215, 1217, 1219, 1221, 1223, 1225, 1227, 1229, 1231, 1233, 1235, 1237, 1239, 1241, 1243, 1245, 1247, 1249, 1251, 1253, 1255, 1257, 1259, 1261, 1263, 1265, 1267, 1269, 1271, 1273, 1275, 1277, 1279, 1281, 1283, 1285, 1287, 1289, 1291, 1293, 1295, 1297, 1299, 1301, 1303, 1305, 1307, 1309, 1311, 1313, 1315, 1317, 1319, 1321, 1323, 1325, 1327, 1329, 1331, 1333, 1335, 1337, 1339, 1341, 1343, 1345, 1347, 1349, 1351, 1353, 1355, 1357, 1359, 1361, 1363, 1365, 1367, 1369, 1371, 1373, 1375, 1377, 1379, 1381, 1383, 1385, 1387, 1389, 1391, 1393, 1395, 1397, 1399, 1401, 1403, 1405, 1407, 1409, 1411, 1413, 1415, 1417, 1419, 1421, 1423, 1425, 1427, 1429, 1431, 1433, 1435, 1437, 1439, 1441, 1443, 1445, 1447, 1449, 1451, 1453, 1455, 1457, 1459, 1461, 1463, 1465, 1467, 1469, 1471, 1473, 1475, 1477, 1479, 1481, 1483, 1485, 1487, 1489, 1491, 1493, 1495, 1497, 1499, 1501, 1503, 1505, 1507, 1509, 1511, 1513, 1515, 1517, 1519, 1521, 1523, 1525, 1527, 1529, 1531, 1533, 1535, 1537, 1539, 1541, 1543, 1545, 1547, 1549, 1551, 1553, 1555, 1557, 1559, 1561, 1563, 1565, 1567, 1569, 1571, 1573, 1575, 1577, 1579, 1581, 1583, 1585, 1587, 1589, 1591, 1593, 1595, 1597, 1599, 1601, 1603, 1605, 1607, 1609, 1611, 1613, 1615, 1617, 1619, 1621, 1623, 1625, 1627, 1629, 1631, 1633, 1635, 1637, 1639, 1641, 1643, 1645, 1647, 1649, 1651, 1653, 1655, 1657, 1659, 1661, 1663, 1665, 1667, 1669, 1671, 1673, 1675, 1677, 1679, 1681, 1683, 1685, 1687, 1689, 1691, 1693, 1695, 1697, 1699, 1701, 1703, 1705, 1707, 1709, 1711, 1713, 1715, 1717, 1719, 1721, 1723, 1725, 1727, 1729, 1731, 1733, 1735, 1737, 1739, 1741, 1743, 1745, 1747, 1749, 1751, 1753, 1755, 1757, 1759, 1761, 1763, 1765, 1767, 1769, 1771, 1773, 1775, 1777, 1779, 1781, 1783, 1785, 1787, 1789, 1791, 1793, 1795, 1797, 1799, 1801, 1803, 1805, 1807, 1809, 1811, 1813, 1815, 1817, 1819, 1821, 1823, 1825, 1827, 1829, 1831, 1833, 1835, 1837, 1839, 1841, 1843, 1845, 1847, 1849, 1851, 1853, 1855, 1857, 1859, 1861, 1863, 1865, 1867, 1869, 1871, 1873, 1875, 1877, 1879, 1881, 1883, 1885, 1887, 1889, 1891, 1893, 1895, 1897, 1899, 1901, 1903, 1905, 1907, 1909, 1911, 1913, 1915, 1917, 1919, 1921, 1923, 1925, 1927, 1929, 1931, 1933, 1935, 1937, 1939, 1941, 1943, 1945, 1947, 1949, 1951, 1953, 1955, 1957, 1959, 1961, 1963, 1965, 1967, 1969, 1971, 1973, 1975, 1977, 1979, 1981, 1983, 1985, 1987, 1989, 1991, 1993, 1995, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013, 2015, 2017, 2019, 2021, 2023, 2025, 2027, 2029, 2031, 2033, 2035, 2037, 2039, 2041, 2043, 2045, 2047, 2049, 2051, 2053, 2055, 2057, 2059, 2061, 2063, 2065, 2067, 2069, 2071, 2073, 2075, 2077, 2079, 2081, 2083, 2085, 2087, 2089, 2091, 2093, 2095, 2097, 2099, 2101, 2103, 2105, 2107, 2109, 2111, 2113, 2115, 2117, 2119, 2121, 2123, 2125, 2127, 2129, 2131, 2133, 2135, 2137, 2139, 2141, 2143, 2145, 2147, 2149, 2151, 2153, 2155, 2157, 2159, 2161, 2163, 2165, 2167, 2169, 2171, 2173, 2175, 2177, 2179, 2181, 2183, 2185, 2187, 2189, 2191, 2193, 2195, 2197, 2199, 2201, 2203, 2205, 2207, 2209, 2211, 2213, 2215, 2217, 2219, 2221, 2223, 2225, 2227, 2229, 2231, 2233, 2235, 2237, 2239, 2241, 2243, 2245, 2247, 2249, 2251, 2253, 2255, 2257, 2259, 2261, 2263, 2265, 2267, 2269, 2271, 2273, 2275, 2277, 2279, 2281, 2283, 2285, 2287, 2289, 2291, 2293, 2295, 2297, 2299, 2301, 2303, 2305, 2307, 2309, 2311, 2313, 2315, 2317, 2319, 2321, 2323, 2325, 2327, 2329, 2331, 2333, 2335, 2337, 2339, 2341, 2343, 2345, 2347, 2349, 2351, 2353, 2355, 2357, 2359, 2361, 2363, 2365, 2367, 2369, 2371, 2373, 2375, 2377, 2379, 2381, 2383, 2385, 2387, 2389, 2391, 2393, 2395, 2397, 2399, 2401, 2403, 2405, 2407, 2409, 2411, 2413, 2415, 2417, 2419, 2421, 2423, 2425, 2427, 2429, 2431, 2433, 2435, 2437, 2439, 2441, 2443, 2445, 2447, 2449, 2451, 2453, 2455, 2457, 2459, 2461, 2463, 2465, 2467, 2469, 2471, 2473, 2475, 2477, 2479, 2481, 2483, 2485, 2487, 2489, 2491, 2493, 2495, 2497, 2499, 2501, 2503, 2505, 2507, 2509, 2511, 2513, 2515, 2517, 2519, 2521, 2523, 2525, 2527, 2529, 2531, 2533, 2535, 2537, 2539, 2541, 2543, 2545, 2547, 2549, 2551, 2553, 2555, 2557, 2559, 2561, 2563, 2565, 2567, 2569, 2571, 2573, 2575, 2577, 2579, 2581, 2583, 2585, 2587, 2589, 2591, 2593, 2595, 2597, 2599, 2601, 2603, 2605, 2607, 2609, 2611, 2613, 2615, 2617, 2619, 2621, 2623, 2625, 2627, 2629, 2631, 2633, 2635, 2637, 2639, 2641, 2643, 2645, 2647, 2649, 2651, 2653, 2655, 2657, 2659, 2661, 2663, 2665, 2667, 2669, 2671, 2673, 2675, 2677, 2679, 2681, 2683, 2685, 2687, 2689, 2691, 2693, 2695, 2697, 2699, 2701, 2703, 2705, 2707, 2709, 2711, 2713, 2715, 2717, 2719, 2721, 2723, 2725, 2727, 2729, 2731, 2733, 2735, 2737, 2739, 2741, 2743, 2745, 2747, 2749, 2751, 2753, 2755, 2757, 2759, 2761, 2763, 2765, 2767, 2769, 2771, 2773, 2775, 2777, 2779, 2781, 2783, 2785, 2787, 2789, 2791, 2793, 2795, 2797, 2799, 2801, 2803, 2805, 2807, 2809, 2811, 2813, 2815, 2817, 2819, 2821, 2823, 2825, 2827, 2829, 2831, 2833, 2835, 2837, 2839, 2841, 2843, 2845, 2847, 2849, 2851, 2853, 2855, 2857, 2859, 2861, 2863, 2865, 2867, 2869, 2871, 2873, 2875, 2877, 2879, 2881, 2883, 2885, 2887, 2889, 2891, 2893, 2895, 2897, 2899, 2901, 2903, 2905, 2907, 2909, 2911, 2913, 2915, 2917, 2919, 2921, 2923, 2925, 2927, 2929, 2931, 2933, 2935, 2937, 2939, 2941, 2943, 2945, 2947, 2949, 2951, 2953, 2955, 2957, 2959, 2961, 2963, 2965, 2967, 2969, 2971, 2973, 2975, 2977, 2979, 2981, 2983, 2985, 2987, 2989, 2991, 2993, 2995, 2997, 2999, 3001, 3003, 3005, 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3339, 3341, 3343, 3345, 3347, 3349, 3351, 3353, 3355, 3357, 3359, 3361, 3363, 3365, 3367, 3369, 3371, 3373, 3375, 3377, 3379, 3381, 3383, 3385, 3387, 3389, 3391, 3393, 3395, 3397, 3399, 3401, 3403, 3405, 3407, 3409, 3411, 3413, 3415, 3417, 3419, 3421, 3423, 3425, 3427, 3429, 3431, 3433, 3435, 3437, 3439, 3441, 3443, 3445, 3447, 3449, 3451, 3453, 3455, 3457, 3459, 3461, 3463, 3465, 3467, 3469, 3471, 3473, 3475, 3477, 3479, 3481, 3483, 3485, 3487, 3489, 3491, 3493, 3495, 3497, 3499, 3501, 3503, 3505, 3507, 3509, 3511, 3513, 3515, 3517, 3519, 3521, 3523, 3525, 3527, 3529, 3531, 3533, 3535, 3537, 3539, 3541, 3543, 3545, 3547, 3549, 3551, 3553, 3555, 3557, 3559, 3561, 3563, 3565, 3567, 3569, 3571, 3573, 3575, 3577, 3579, 3581, 3583, 3585, 3587, 3589, 3591, 3593, 3595, 3597, 3599, 3601, 3603, 3605, 3607, 3609, 3611, 3613, 3615, 3617, 3619, 3621, 3623, 3625, 3627, 3629, 3631, 3633, 3635, 3637, 3639, 3641, 3643, 3645, 3647, 3649, 3651, 3653, 3655, 3657, 3659, 3661, 3663, 3665, 3667, 3669, 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4003, 4005, 4007, 4009, 4011, 4013, 4015, 4017, 4019, 4021, 4023, 4025, 4027, 4029, 4031, 4033, 4035, 4037, 4039, 4041, 4043, 4045, 4047, 4049, 4051, 4053, 4055, 4057, 4059, 4061, 4063, 4065, 4067, 4069, 4071, 4073, 4075, 4077, 4079, 4081, 4083, 4085, 4087, 4089, 4091, 4093, 4095, 4097, 4099, 4101, 4103, 4105, 4107, 4109, 4111, 4113, 4115, 4117, 4119, 4121, 4123, 4125, 4127, 4129, 4

**CEL**

Consulting Engineering Bureau & Laboratories  
مكتب استشارات الهندسة ومختبرات

Company Name : شركة الخديجي

Project : Electric Express Train - HSR From Qous To Arman

Location : ST:641+400 E= 492410,088 N=2862759,57

Type of sample : Soil Embankment ( Upper Embankment 0.0 M )

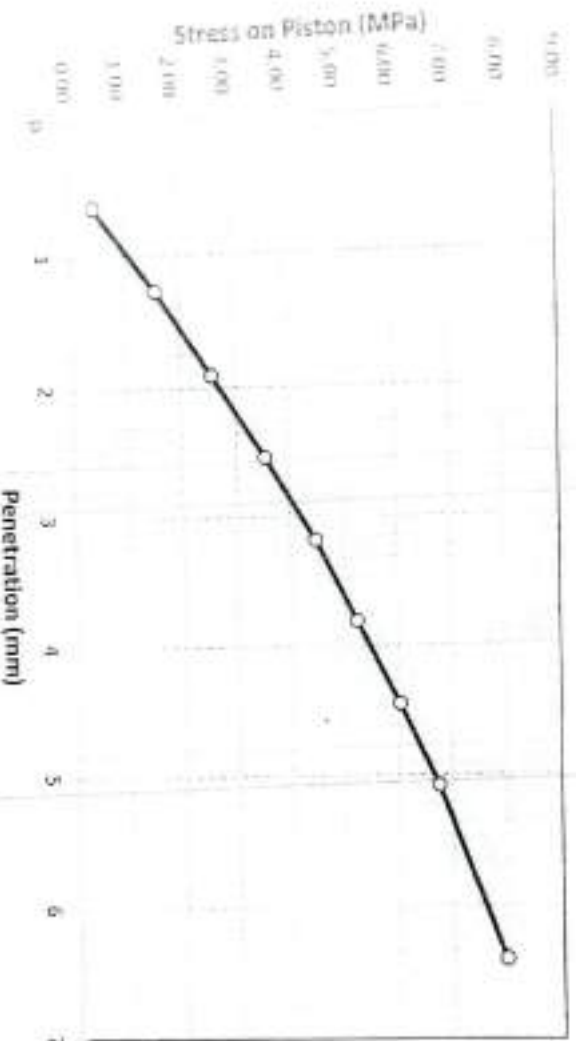
Delivery Date : 08/01/2024

Reporting Date : 11/1/2024

Reporting No. : 10-19

### Load Penetration Curve of CBR Test

ASTM D-1883



Signature /



**IAS**

REGISTERED

Company

Engineering  
Office

00 AM

Station 5

PHI MM

BOF-3  
Type of Activity

Test at (-0.5)

QC

QC

Test at  
Load

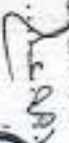
Company Name : شركة الأبي  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST:641+400 E= 492410.088 N=2862759.57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

Test Results of California Bearing Ratio on Base Materials  
ASTM D 1883

| penetration                      |       | stress on piston (Mpa) |                |
|----------------------------------|-------|------------------------|----------------|
| mm                               | Inch  |                        |                |
| 0.64                             | 0.025 | 0.46                   |                |
| 1.27                             | 0.050 | 1.58                   |                |
| 1.91                             | 0.075 | 2.58                   |                |
| 2.54                             | 0.100 | 3.55                   |                |
| 3.18                             | 0.125 | 4.47                   |                |
| 3.81                             | 0.150 | 5.23                   |                |
| 4.45                             | 0.175 | 6.03                   |                |
| 5.08                             | 0.200 | 6.74                   |                |
| 6.35                             | 0.250 | 7.97                   |                |
| CBR Result                       |       | Stress (Mpa)           |                |
| At 6.1 inch (154 mm) penetration |       | St. Value              | Sample results |
|                                  |       | 6.90                   | 3.55           |
|                                  |       | CBR 100 %              |                |
|                                  |       | 51.5 %                 |                |

Notes:

- 1- Attached graph shows penetration resistance versus penetration magnitude.
- 2- The sample was compacted to dry density of = 2.22 (gm/cm<sup>3</sup>)  
At = 6.4 % optimum water content.
- 3- Surcharge load 4.50 K/B.

+ CBR > 10 for middle and lower embankment. See project spec page No 36.  
Signature / 



# CEL

Geotechnical Engineering Bureau & Laboratories  
مكتب ومختبر الجيوتقنيك والهندسة المدنية

Company Name : شركة الألفي  
Project : Electric Express Train - HSR From Qous To Armanat  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

## Moisture - Density relation of soil Test result (Modified proctor test) ASTM D-1557



- Max dry density (g/cm³) : 2.12
- Optimum moisture content % : 6.4 %

Signature / *[Signature]*



Company Name : شركة الأحمدي  
 Project : Electric Express Train - HSR From Qous To Arman  
 Location : ST:641+400 E= 492410,088 N=2862759,57  
 Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
 Delivery Date : 08/01/2024  
 Reporting Date : 11/1/2024  
 Reporting No. : 10-19

Soil Classification

| Soil Classification  |             |                                 |          |          |
|----------------------|-------------|---------------------------------|----------|----------|
| TEST                 | Results (%) | Limits according Projects Specs |          |          |
|                      |             | (A-1-a)                         | (A-1-b)  | (A-2-4)  |
| Group Classification | (A-1-a)     | (A-1-a)                         | (A-1-b)  | (A-2-4)  |
| 2.00 mm (No.10).     | 27.5        | Max 50 %                        | -----    | -----    |
| 0.425 mm (No. 40).   | 15.6        | Max 30 %                        | Max 50 % | -----    |
| 0.075 mm (No. 200).  | 9.1         | Max 15 %                        | Max 15 % | Max 15 % |
| Liquid Limit         | -----       | -----                           | -----    | -----    |
| Plasticity index     | 0           | Max 6 %                         | Max 6 %  | Max 10 % |

The test results are ( ☐ Comply - ☐ Not Comply ) with specifications limits

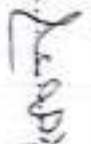
Signature /



Company Name : شركة الانجي  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

**Results of liquid limit and plasticity index  
of soils according to ASTM D-4318**

| Test             | Results (%) |
|------------------|-------------|
| Liquid Limit     | 0           |
| Plastic Limit    | 0           |
| Plasticity Index | 0           |

Signature /   


شركة الانجي  
مقر الشركة: 219 991 407  
مقر العمل: 219 991 407  
مقر المشروع: 3 شارع الملك فيصل، الرياض

# CEL

Consulting Engineering Bureau & Laboratories  
مكتب استشارات ومختبرات الهندسة

Company Name : شركة الخافي  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

Materials finer than 75  $\mu$ m (no.200) sieve  
By washing ASTM D-1140.

| Test                                                             | Results (%) |
|------------------------------------------------------------------|-------------|
| Percentage of material finer than Sieve Size 75 $\mu$ m (No.200) | 9.1         |

Signature / ..... *K. A. D. M.*



Company Name : شركة الخفجي  
 Project : Electric Express Train - HSR From Qous To Armanat  
 Location : ST:641+400 E= 492410,088 N=2862759,57  
 Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
 Delivery Date : 08/01/2024  
 Reporting Date : 11/1/2024  
 Reporting No. : 10-19

**RESULTS OF SIEVE ANALYSIS According to ASTM D-422.**

| Sieve Size<br>(mm) | Sieve Size<br>(IN) | Passing % |
|--------------------|--------------------|-----------|
| 50                 | 2                  | 95.1      |
| 37.5               | 1.5                | 91.9      |
| 25                 | 1                  | 80.7      |
| 19                 | $\frac{3}{4}$      | 72.2      |
| 12.50              | $\frac{1}{2}$      | 64.1      |
| 9.50               | $\frac{3}{8}$      | 45.8      |
| 4.75               | 4                  | 34.6      |
| 2.00               | 10                 | 27.5      |
| 0.425              | 40                 | 15.6      |

Signature /.....



Project : Electric Express 11 and 12  
 : 407410.088 N=2862759,57

Type of sample : Soil Embankment

Delivery Date : 03/01/2024

Reporting Date : 11/1/2024

Reporting No. : 10-19

Attached here with the delivered on 08 / 01 / 2024

This sample is representative for 5.000 M<sup>3</sup>

### Materials test

1. Sieve analysis according to ASTM D-422.
2. Material finer than sieve No. 200 according to ASTM D-1140.
3. Liquid limits and plasticity index of soil according to ASTM D-4318.
4. Soil classification according to Project Specs.
5. Proctor Test according to ASTM D-1557
6. CBR according to ASTM D-1883

Signature / *Lead II*

**Consultant Eng : Abderrahman Ahmed**



Company Name : شركة الجبيل  
 Project : Electric Express Train - ESSR From Ques To Azzamat  
 Testing Date : 23 / 1 / 2024  
 Soil type : Upper Embankment  
 Location : ST From 6+0-780 To 6+0-800  
 Level : ± 0.75 M  
 Report No. : L38-2

Compaction test by using Sand - Cone Test Method  
 ASTM D 1556

| Test # | Station | Test mass<br>Volume cm <sup>3</sup> | Bulk Density<br>g/cm <sup>3</sup> | Moisture<br>Content % | Dry Density<br>(g/cm <sup>3</sup> ) | Degree of<br>Compaction % | Acceptance |
|--------|---------|-------------------------------------|-----------------------------------|-----------------------|-------------------------------------|---------------------------|------------|
| 1      | 6+1-795 | 1543.1                              | 2.27                              | 6.4                   | 2.13                                | 96.0%                     | Comply     |
| 2      | 6+1-820 | 1488.2                              | 2.28                              | 6.4                   | 2.15                                | 96.7%                     | Comply     |
| 3      | 6+1-845 | 1481.3                              | 2.26                              | 6.4                   | 2.13                                | 95.9%                     | Comply     |
| 4      | 6+1-855 | 1507.6                              | 2.29                              | 6.4                   | 2.15                                | 97.0%                     | Comply     |

Degree of compaction based on proctor test stage A:

Max. dry density = 2.22 g/cm<sup>3</sup>

Az optimum moisture content = 6.4 %

Signature:

  
**CEL**  
 278 808 433  
 278 808 433

# CEL

Consulting Engineering Bureau & Laboratories  
شركة استشارات ومختبرات الهندسة المدنية

Company Name : شركة الطائي

Project : Electric Express Train - HSR From Qous To Armanat

Location : ST:641+400 E= 492410,088 N=2862759,57

Type of sample : Soil Embankment ( Upper Embankment 0.0 M )

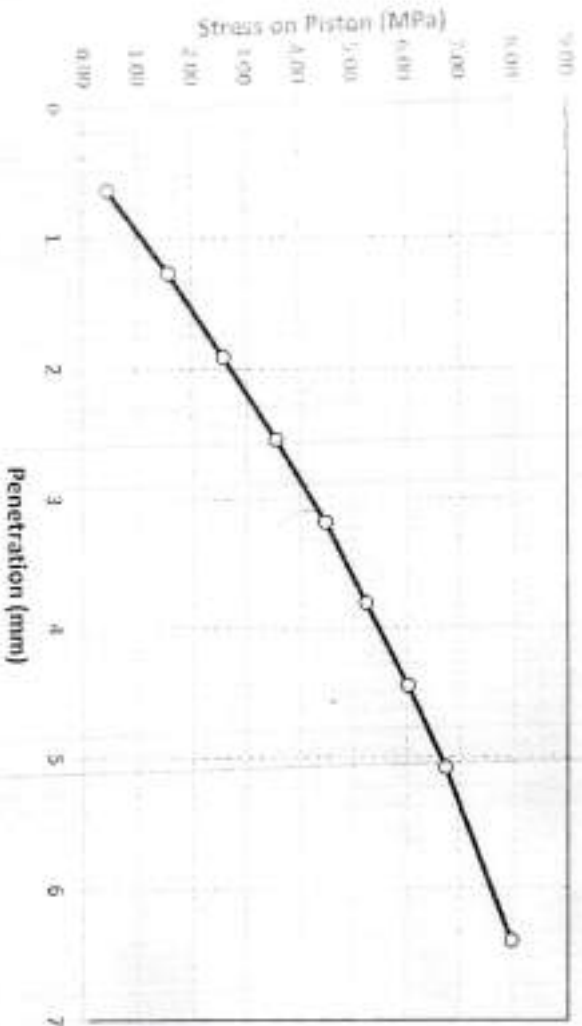
Delivery Date : 08/01/2024

Reporting Date : 11/1/2024

Reporting No. : 10-19

## Load Penetration Curve of CBR Test

ASTM D-1883



Signature /

  
**CEL**  
شركة الطائي  
مختبرات ومختبرات الهندسة المدنية  
رقم التسجيل: 219, 991, 437  
الرياض - المملكة العربية السعودية

**IAS**  
ACCREDITED

Company Name : شركة الأهلي  
Project : Electric Express Train – HSR From Qous To Arman  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

## Test Results of California Bearing Ratio on Base Materials

ASTM D 1883

| penetration |       | stress on piston (Mpa) |  |
|-------------|-------|------------------------|--|
| mm          | Inch  |                        |  |
| 0.64        | 0.025 | 0.46                   |  |
| 1.27        | 0.050 | 1.58                   |  |
| 1.91        | 0.075 | 2.58                   |  |
| 2.54        | 0.100 | 3.55                   |  |
| 3.18        | 0.125 | 4.47                   |  |
| 3.81        | 0.150 | 5.23                   |  |
| 4.45        | 0.175 | 6.03                   |  |
| 5.08        | 0.200 | 6.74                   |  |
| 6.35        | 0.250 | 7.97                   |  |

| CBR Result                        | Stress (Mpa) |                | CBR 100 % |
|-----------------------------------|--------------|----------------|-----------|
|                                   | St. Value    | Sample results |           |
| At 0.1 inch (2.54 mm) penetration | 6.90         | 3.55           | 51.5 %    |

Notes: 1. Attached graph shows penetration resistance versus penetration magnitude.

2. The sample was compacted to dry density of  $\approx 2.22 \text{ (gm /cm}^3\text{)}$   
At = 6.4 % optimum water content.

3. Surcharge load 4.50 Kgf.

4. CBR = 10 for middle and lower embankment. See project spec page No 36.

Signature /



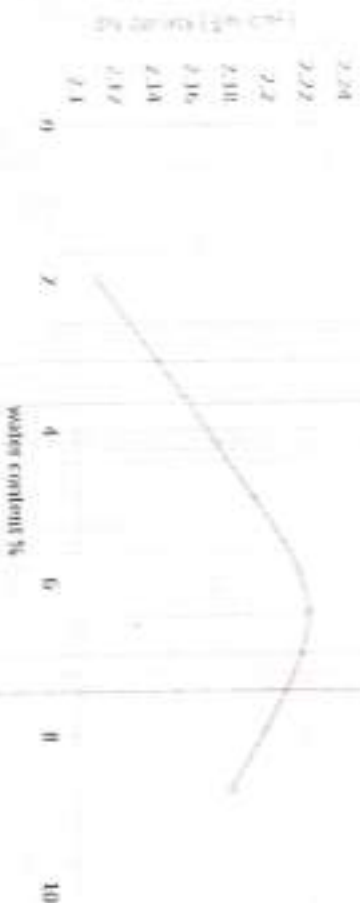
# CEL

Consulting Engineering Bureau & Laboratories  
مكتب استشارات ومختبرات الهندسة

Company Name : شركة الخبي  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

## Moisture - Density relation of soil Test result (Modified proctor test)

ASTM D-1557



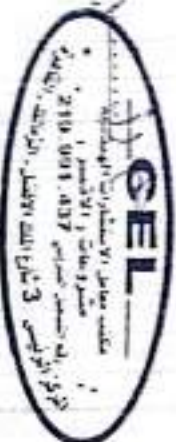
• Max dry density (gm/cm<sup>3</sup>)

1.2.22

• Optimum moisture content %

6.4 %

Signature /



IAS

Company Name : شركة الخبي  
Project : Electric Express Train – HSR From Qous To Armani  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

### Soil Classification

| TEST                   | Results (%) | Limits according Projects Specs |          |          |  |
|------------------------|-------------|---------------------------------|----------|----------|--|
| • Group Classification | (A-1-a)     | (A-1-a)                         | (A-1-b)  | (A-2-4)  |  |
| 2.00 mm (No.10).       | 27.5        | Max 50 %                        | -----    | -----    |  |
| 0.425 mm (No. 40).     | 15.6        | Max 30 %                        | Max 50 % | -----    |  |
| 0.075 mm (No. 200).    | 9.1         | Max 15 %                        | Max 15 % | Max 15 % |  |
| Liquid Limit           | -----       | -----                           | -----    | -----    |  |
| Plasticity index       | 0           | Max 6 %                         | Max 6 %  | Max 10 % |  |

The test results are ( ☐ Comply - ☐ Not Comply ) with specifications limits

Signature /



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Consulting Engineering Bureau & Laboratories  
مكتب هندسة واستشارات ومختبرات

Company Name : شركة الأهلي  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

## Results of liquid limit and plasticity index of soils according to ASTM D-4318

| Test             | Results<br>(%) |
|------------------|----------------|
| Liquid Limit     | 0              |
| Plastic Limit    | 0              |
| Plasticity Index | 0              |

Signature / .....

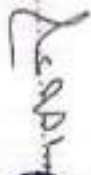


MAC

Company Name : شركة الطائي  
Project : Electric Express Train - HSR From Qous To Armanit  
Location : ST:641+400 E= 492410.088 N=2862759.57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

Materials finer than 75  $\mu$ m (no.200) sieve  
By washing ASTM D-1140.

| Test                                                             | Results (%) |
|------------------------------------------------------------------|-------------|
| Percentage of material finer than Sieve Size 75 $\mu$ m (No.200) | 9.1         |

Signature :   
  
مكتب استشارات الهندسة ومختبرات الطائي  
تحت إشراف وزارة البترول والثروة المعدنية  
رقم الترخيص: 319-901-437  
مقر العمل: 3 شارع الملك فيصل - الرياض

Company Name : شركة النخعي  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST 641+400 L= 492419.088 N=2862759.57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

RESULTS OF SIEVE ANALYSIS According to ASTM D-422.

| Sieve Size<br>(mm) | Sieve Size<br>(IN) | Passing % |
|--------------------|--------------------|-----------|
| 50                 | 2                  | 95.1      |
| 37.5               | 1.5                | 91.9      |
| 25                 | 1                  | 80.7      |
| 19                 | 3/4                | 72.2      |
| 12.50              | 1/2                | 64.1      |
| 9.50               | 3/8                | 45.8      |
| 4.75               | 4                  | 34.6      |
| 2.00               | 10                 | 27.5      |
| 0.425              | 40                 | 15.6      |

Signature / ..... *Dr. Abdullah*



# CEL

Consulting Engineering Bureau & Laboratories  
مكتب استشارات الهندسة ومختبرات

Company Name : شركة 55 جوا  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST-641+400 E = 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 03/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

Dear Gentleman,

Attached here with the delivered on 08 / 01 / 2024

This sample is representative for 5.000 M<sup>3</sup>

### Materials Test

1. Sieve analysis according to ASTM D-422.
2. Material finer than sieve No. 200 according to ASTM D-1140.
3. Liquid limits and plasticity index of soil according to ASTM D-4318.
4. Soil classification according to Project Specs.
5. Proctor Test according to ASTM D-1557
6. CBR according to ASTM D-1883

Signature : 

Consultant Eng : Abderrahman Ahmed



Company Name : شركة الطي  
Project : Electric Express Train - HSR From Qous To Armani  
Testing Date : 21 / 1 / 2024  
Soil type : Upper Embankment  
Location : ST From 641+400 To 641+780  
Level : - 0.25 M  
Report No. : 138

**Compaction test by using Sand - Cone Test Method**  
ASTM D-1556

| Test # | Station | Test Hole Volume cm <sup>3</sup> | Bulk Density gr/ cm <sup>3</sup> | Moisture Content % | Dry Density (gr/ cm <sup>3</sup> ) | Degree of Compaction (%) | Acceptance |
|--------|---------|----------------------------------|----------------------------------|--------------------|------------------------------------|--------------------------|------------|
| 1      | 641+425 | 1473.6                           | 2.27                             | 5.3                | 2.16                               | 97.1%                    | Comply     |
| 2      | 641+450 | 1553.5                           | 2.27                             | 6.4                | 2.13                               | 96.0%                    | Comply     |
| 3      | 641+475 | 1763.2                           | 2.26                             | 5.8                | 2.13                               | 96.1%                    | Comply     |
| 4      | 641+500 | 1281.3                           | 2.29                             | 5.8                | 2.17                               | 97.5%                    | Comply     |
| 5      | 641+525 | 1634.0                           | 2.26                             | 6.4                | 2.13                               | 95.8%                    | Comply     |
| 6      | 641+550 | 1404.2                           | 2.31                             | 5.8                | 2.19                               | 98.5%                    | Comply     |
| 7      | 641+575 | 1319.4                           | 2.26                             | 5.8                | 2.14                               | 96.4%                    | Comply     |
| 8      | 641+600 | 1450.7                           | 2.25                             | 5.8                | 2.13                               | 95.8%                    | Comply     |
| 9      | 641+625 | 1539.6                           | 2.24                             | 5.3                | 2.13                               | 96.0%                    | Comply     |
| 10     | 641+650 | 1548.6                           | 2.29                             | 5.3                | 2.17                               | 97.9%                    | Comply     |
| 11     | 641+675 | 1323.6                           | 2.24                             | 5.8                | 2.12                               | 95.4%                    | Comply     |
| 12     | 641+700 | 1512.5                           | 2.28                             | 6.4                | 2.15                               | 96.7%                    | Comply     |
| 13     | 641+720 | 1460.4                           | 2.30                             | 6.4                | 2.16                               | 97.3%                    | Comply     |
| 14     | 641+740 | 1472.9                           | 2.35                             | 6.4                | 2.21                               | 99.3%                    | Comply     |
| 15     | 641+760 | 1521.5                           | 2.28                             | 6.4                | 2.14                               | 96.4%                    | Comply     |
| 16     | 641+776 | 1412.5                           | 2.30                             | 6.4                | 2.16                               | 97.2%                    | Comply     |

Degree of compaction based on proctor test listed At

Max. dry density = 2.22 gm/cm<sup>3</sup>

At optimum moisture content = 6.4 %

Signature

**CEL**  
مكتب استشارات الهندسة والاختبارات  
219, 941, 437  
3 شارع الملك فيصل - الرياض

TEL: 011 2736221, 2736222  
FAX: 011 2736223

**IAS**  
ACCREDITED

**CEL**

Consulting Engineering Bureau & Laboratories  
مكتب محاسن والاستشارات الهندسية

Company Name : شركة الدقي

Project : Electric Express Train - HSR From Qous To Arment

Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"

Type of sample : Soil Embankment ( Upper Embankment 0.0 M )

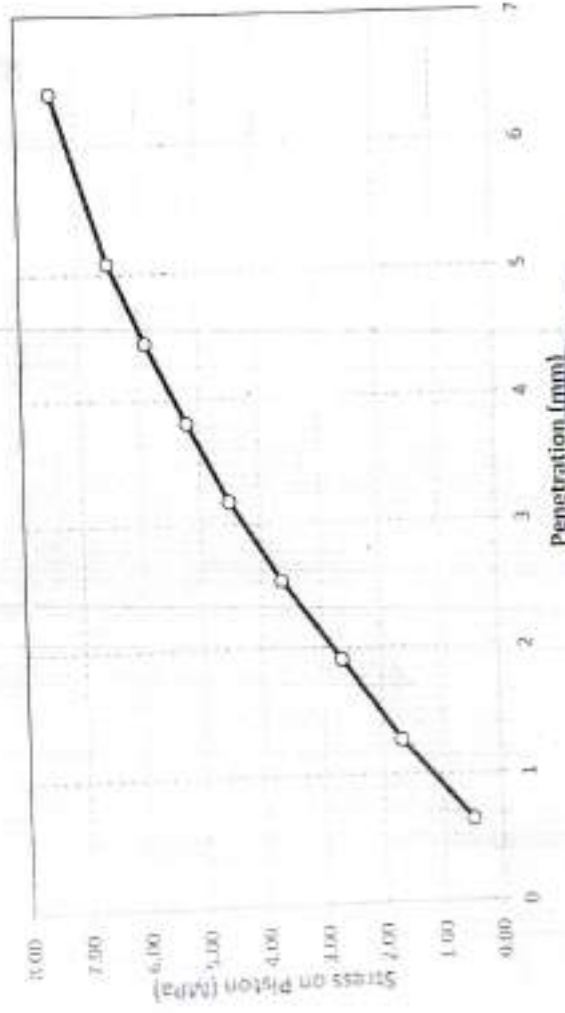
Delivery Date : 08/11/2023

Reporting Date : 12/11/2023

Reporting No. : 08-15

### Load Penetration Curve of CBR Test

ASTM D-1883



Penetration (mm)

**CEL**

مكتب محاسن والاستشارات الهندسية

مقر وحالت : القاهرة - مصر  
10 999 437 - 19 999 437

الطريق رقم 3 شارع الملك فيصل - الهرم - الجيزة

Signature /

Dr. Mohamed Elmaghrabi  
Director - Cairo  
12/11/2023

**IAS**  
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ISO 9001:2015

Company Name : شركة الهندسة  
Project : Electric Express Train - HSE from Qassim To Ar-Ramth  
Location : ST: 639-0000 L=12.5475.6° N=25.5579.1°  
Type of sample : Soil Embankment (Upper Embankment (0.0 M)  
Delivery Date : 06.11.2023  
Reporting Date : 12.11.2023  
Reporting No. : 06-15

Test Results of California Bearing Ratio on Base Materials  
ASTM D 1553

| mm                              | penetration |                | stress on piston (Mpa) |
|---------------------------------|-------------|----------------|------------------------|
|                                 | inch        |                |                        |
| 0.54                            | 0.025       |                |                        |
| 1.27                            | 0.050       |                |                        |
| 1.91                            | 0.075       |                |                        |
| 2.54                            | 0.100       |                |                        |
| 3.18                            | 0.125       |                |                        |
| 3.81                            | 0.150       |                |                        |
| 4.45                            | 0.175       |                |                        |
| 5.08                            | 0.200       |                |                        |
| 6.35                            | 0.250       |                |                        |
| CBR Result                      |             | Stress (Mpa)   | CBR, 100 %             |
| 4.11 inch (2.54 mm) penetration |             | Sample results | 52.8%                  |
|                                 |             | Stress value   | 1.05                   |
|                                 |             | 4.00           |                        |

Note:

- 1- Attached graph shows Penetration resistance versus Penetration magnitude
- 2- The sample was compared to 40% standard value (2.5 mm) per 1
- 3- At = 6.4 % optimum water content
- 4- Surcharge load 4.5 kg

4- CBR = 10 for middle and lower stress levels

Signature : 



Engineer  
Civil Eng.  
Date: 12/11/2023

**CEL**

Consulting Engineering Bureau & Laboratories  
مكتب استشارات الهندسة ومختبرات

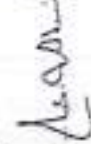
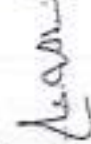
Company Name : شركة القبي  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

Moisture - Density relation of soil  
Test result (Modified proctor test)  
ASTM D-1557



• Max dry density (gm/cm³) : 2.22

• Optimum moisture content % : 6.4 %

Signature /  **CEL**  
مهندس /   
مختبر استشارات الهندسة ومختبرات  
مقر العمل: القاهرة - مصر 11511 437  
رقم الترخيص: 301

**IAS**  
ACCREDITED

Company Name : شركة النخيل  
 Project : Electric Express Train - HSR From Qous To Arment  
 Location : ST : 639+000 E=32°54'25.6" N=25°53'59.1"  
 Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
 Delivery Date : 08/11/2023  
 Reporting Date : 12/11/2023  
 Reporting No. : 08-15

Soil Classification

| TEST                 | Results<br>(%) | Limits according<br>Projects Specs |          |          |          |
|----------------------|----------------|------------------------------------|----------|----------|----------|
|                      |                | (A-1-a)                            | (A-1-b)  | (A-1-c)  | (A-2-4)  |
| Group Classification | (A-1-a)        |                                    |          |          |          |
| 2,000 mm (No. 10)    | 47.7           | Max 50 %                           | Max 50 % | Max 50 % | Max 15 % |
| 75 µm (No. 200)      | 28.8           | Max 30 %                           | Max 15 % | Max 15 % | Max 15 % |
| 4.75 mm (No. 40)     | 10.0           | Max 15 %                           | Max 15 % | Max 15 % | Max 15 % |
| 0.075 mm (No. 200)   |                |                                    |          |          |          |
| Liquid Limit         | ...            | .....                              | .....    | .....    | .....    |
| Plasticity Index     | 0              | Max 6 %                            | Max 6 %  | Max 6 %  | Max 10 % |

The test results are ( ☐ Comply - ☐ Not Comply ) with specifications limits

Signature /  **CEL**  
 مكتب استشارات الهندسة والبحوث  
 مقره: شارع 3، حي النخيل، الرياض 11564  
 رقم الترخيص: 219-801-437  
 رقم التسجيل: 3

# CEL

Consulting Engineering Bureau & Laboratories  
مكتب محاميل للاستشارات والهندسة

Company Name : شركة الذهي

Project

: Electric Express Train - HSR From Qous To Armant

Location

: ST: 639+000 E=32°54'25.6" N=25°53'59.1"

Type of sample

: Soil Embankment ( Upper Embankment 0.0 M )

Delivery Date

: 08/11/2023

Reporting Date

: 12/11/2023

Reporting No.

: 08-15

## Results of liquid limit and plasticity index of soils according to ASTM D-4318

| Test             | Results (%) |
|------------------|-------------|
| Liquid Limit     | 0           |
| Plastic Limit    | 0           |
| Plasticity Index | 0           |

Signature / 



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مكتب محاميل للاستشارات والهندسة

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BY IAS

# CEL

Consulting Engineering Division & Laboratories  
شركة الاستشارات الهندسية والمخبرية

Company Name : شركة الدقي

Project : Electric Express Train - HSR From Qous To Armant

Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"

Type of sample : Soil Embankment ( Upper Embankment 0.0 M )

Delivery Date : 08/11/2023

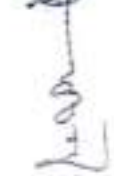
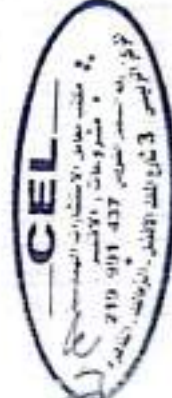
Reporting Date : 12/11/2023

Reporting No. : 08-15

Materials finer than 75  $\mu$ m (no.200) sieve

By washing ASTM D-1140.

| Test                                                                | Results (%) |
|---------------------------------------------------------------------|-------------|
| Percentage of material finer than<br>Sieve Size 75 $\mu$ m (No.200) | 10.0        |

Signature /  

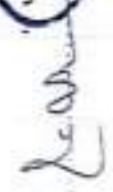
1001 1001 1001 1001  
1001 1001 1001 1001  
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IAS  
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Company Name : شركة الدبي  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

RESULTS OF SIEVE ANALYSIS According to ASTM D-422.

| Sieve Size (mm) | Sieve Size (IN) | Passing % |
|-----------------|-----------------|-----------|
| 50              | 2               | 97.5      |
| 37.5            | 1.5             | 92.7      |
| 25              | 1               | 84.2      |
| 19              | ¾               | 82.8      |
| 12.50           | ½               | 71.3      |
| 9.50            | 3/8             | 62.6      |
| 4.75            | 4               | 47.9      |
| 2.00            | 10              | 47.7      |
| 0.425           | 40              | 28.8      |

Signature /   

  
 مكتب محاسن الاستشارات والهندسة  
 مشروع : قطارات كهربائية  
 رقم الملف : 08-15-23  
 التاريخ : 12/11/2023

# CEL

Consulting Engineering Bureau & Laboratories  
مكتب استشارات ومختبرات الهندسة

Company Name : شركة المكي  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

Dear Gentleman,

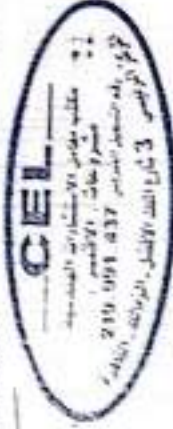
Attached here with the delivered on 8 / 11 / 2023

This sample is representative for 5.000 M<sup>3</sup>

## Materials test

1. Sieve analysis according to ASTM D-422.
2. Material finer than sieve No. 200 according to ASTM D-1140.
3. Liquid limits and plasticity index of soil according to ASTM D-4318.
4. Soil classification according to Project Specs.
5. Proctor Test according to ASTM D-1557
6. CBR according to ASTM D-1883

Signature / .....  Consultant Eng : Abderrahman Ahmed



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شركة تالعى للبحوث والدراسات الهندسية  
: Elctric Express Train - Sector (S) - Giza (G) Amend.  
: 13/04/2024  
: 16/01/2024  
: 02/01/2020  
: 01

Company Name  
Project  
Test Date  
Report Date  
Author  
Test No.

## Nonresistive Static Plate Load Tests of Soils DIN 18134



| Unloading (%)   | 1    | 2    | 3     | 4    |
|-----------------|------|------|-------|------|
| Stress (kg/cm²) | 3253 | 1766 | 884   | 31   |
| Stress (kg/cm²) | 5.00 | 2.50 | 1.250 | 0.10 |
| Settlement (mm) | 0.96 | 0.91 | 0.89  | 0.23 |

$$E_{vd} = 1 = 1.13$$

| Load (t)        | 0    | 1    | 2      | 3      | 4      | 5      | 6      |
|-----------------|------|------|--------|--------|--------|--------|--------|
| Stress (kg)     | 0    | 988  | 1172.8 | 1768.3 | 2352.5 | 2946.1 | 3532.5 |
| Stress (kg/cm²) | 0.00 | 0.83 | 1.06   | 2.02   | 3.35   | 4.17   | 5.00   |
| Settlement (mm) | 0.00 | 0.13 | 0.36   | 0.53   | 0.66   | 0.87   | 0.98   |

|                         |             |
|-------------------------|-------------|
| D (mm) =                | 320         |
| E <sub>vd</sub> (MPa) = | 0.75/0.0015 |
| E <sub>vd</sub> (MPa) = | 115.7       |

| Load (t)        | 0    | 1       | 2      | 3      | 4      | 5      |
|-----------------|------|---------|--------|--------|--------|--------|
| Stress (kg)     | 0    | 988.295 | 1172.8 | 1768.3 | 2352.5 | 2946.1 |
| Stress (kg/cm²) | 0.00 | 0.83    | 1.06   | 2.02   | 3.35   | 4.17   |
| Settlement (mm) | 0.21 | 0.31    | 0.47   | 0.63   | 0.74   | 0.86   |

|                         |       |
|-------------------------|-------|
| D (mm) =                | 320   |
| E <sub>vd</sub> (MPa) = | 0.42  |
| E <sub>vd</sub> (MPa) = | 138.3 |

E<sub>vd</sub> = Modulus of deformation during the loading stage.  
E<sub>vd</sub> = Modulus of deformation during the unloading stage.  
D = Plate diameter (mm)  
D<sub>1</sub> = The difference between 0.3 and 0.7 from the maximum loading (mm)  
D<sub>2</sub> = Difference in settlements corresponding to 0.3 and 0.7 from the maximum loading (mm)



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تليفون : فاكس : ٢٧٣٦٧٢٣١ - ٢٧٣٦٣٠٩٣  
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Company Name : شركة طهني للميكانيك و التوريدات المعمية :  
 Project : Electric Business Train - Sector 5 - Giza to Asmat  
 Test Date : 13/01/2024  
 report date : 15/01/2024  
 Station : 539+620  
 Test No. : 01

**Nonrepetitive Static Plate Load Tests of Soils**  
**DIN 18134**

| Loading Stage (1) |                              |        |      | Settlement |      | Average |
|-------------------|------------------------------|--------|------|------------|------|---------|
| Loading           | Stress<br>Kg/cm <sup>2</sup> | Dial 1 | mm   | Dial 2     | mm   |         |
| 0                 | 0.00                         | 20.00  | 0.00 | 19.70      | 0.30 | 0.35    |
| 1                 | 0.83                         | 19.96  | 0.05 | 19.50      | 0.50 | 0.73    |
| 2                 | 1.66                         | 19.70  | 0.30 | 19.30      | 0.40 | 0.35    |
| 3                 | 2.50                         | 19.46  | 0.54 | 19.08      | 0.51 | 0.53    |
| 4                 | 3.33                         | 19.30  | 0.70 | 18.98      | 0.82 | 0.96    |
| 5                 | 4.17                         | 19.11  | 0.89 | 18.75      | 0.64 | 0.87    |
| 6                 | 5.00                         | 19.00  | 1.00 | 18.54      | 0.96 | 0.95    |

| Unloading Stage (1) |                              |        |      | Settlement |      | Average |
|---------------------|------------------------------|--------|------|------------|------|---------|
| Loading             | Stress<br>Kg/cm <sup>2</sup> | Dial 1 | mm   | Dial 2     | mm   |         |
| 1                   | 2.50                         | 19.10  | 0.90 | 18.08      | 0.82 | 0.91    |
| 2                   | 1.25                         | 19.37  | 0.63 | 19.25      | 0.75 | 0.59    |
| 3                   | 0.100                        | 19.50  | 0.20 | 19.78      | 0.22 | 0.41    |

| Loading Stage (2)  |                              |        |      | Settlement |      | Average |
|--------------------|------------------------------|--------|------|------------|------|---------|
| Loading            | Stress<br>Kg/cm <sup>2</sup> | Dial 1 | mm   | Dial 2     | mm   |         |
| 0                  | 0.83                         | 19.59  | 0.31 | 19.70      | 0.50 | 0.31    |
| 1                  | 1.66                         | 19.48  | 0.52 | 19.59      | 0.41 | 0.47    |
| stress is reached. |                              |        |      |            |      |         |
| 2                  | 2.50                         | 19.36  | 0.54 | 19.38      | 0.62 | 0.53    |
| 3                  | 3.33                         | 19.25  | 0.75 | 19.27      | 0.73 | 0.74    |
| 4                  | 4.17                         | 19.14  | 0.86 | 19.18      | 0.82 | 0.54    |



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## Report

1. Evaluation and representation of results.
2. Load Settlement curve.
3. The test report content the following:-
  - location of test site - Dimension of loading plate.
  - Measuring device used - Type of soil.
  - Type of Bedding material below the plate -Weathering condition.
  - Time and date of measurements - Unusual observation made during test .
  - Dial gauge reading and corresponding normal stress - Loading-settlement curve.
  - Description of the soil condition below the plate after testing.

## Report

- Type of soil : Lower Embankment
- Job requiremer : Ev2 > 30 MPa

| Item                                                             |  | Description    |
|------------------------------------------------------------------|--|----------------|
| Type of bedding material below the plate                         |  | Natural Soil   |
| Plate Diameter (mm)                                              |  | 300            |
| Date of measurement                                              |  | : 13/01/2024   |
| Unusual observation made during test                             |  | NO             |
| Description of the soil conditions below the plate after testing |  | No deformation |

## Evaluation and representation of results

| Test No. | Station |         | Location | Level<br>( m ) | First Cycle      | Second<br>Cycle  | $E_{v2}/E_{v1}$<br>Ratio |
|----------|---------|---------|----------|----------------|------------------|------------------|--------------------------|
|          | From    | To      |          |                | $E_{v1}$ ( MPa ) | $E_{v2}$ ( MPa ) |                          |
| 1        | 639+580 | 639+680 | 639+620  | -5.5           | 111.7            | 135.3            | 1.21                     |

Signature /    
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Company : شركة لماسي للدراسات والتوريدات المعمارية

Project : Electric Express Train - Sector (5) - Qasr to Arment.  
Subject : Determine the deformation and strength characteristics of soil by the plate loading test according specifications EN 18134/2012-04 and project requirements  
Test Location : Station 039+303 to 839+050  
Station : 039+020  
Level : -5.5  
Test Date : 13/05/2024  
Report Date : 15/01/2024  
Type of soil : Lower Embankment  
Report No. : 01

Dear Gentleman,

According to the above mentioned subject the test performed as follows:-

## Apparatus

1. Loading plates consists of two plates with 303 mm and 303 mm diameter
2. The thickness of plates 30 mm
3. Dial gauges with accuracy 0.01 mm to measuring the settlement
4. Steel struts/gauges with magnetic supports to load the dial gauges
5. Hydraulic jack with pump to transfer reactive loads to the loading plates
6. Dial indicator measuring device with scale capacity 700 Bar (Enferbar)
7. Reaction loading system by roller comparator with weight approximately 15 ton.
8. Calibration certificates are attached.

## Test Procedure

1. Clean the ground on test area to the required level with undisturbed soil
2. Install loading plates 303 mm and 303 mm diameter, hydraulic jack and 3 dial gauges
3. Prior to starting the test applied preloading about 20 seconds
4. The strain gauge and the dial gauge shall be set to zero
5. For a 300 mm loading plate, the first values are 2.0 kg/cm<sup>2</sup>
6. The load shall be applied in six stages, in approximately equal increments, until the required maximum normal stress is reached.
7. Each change in load (from stage to stage) shall be completed within one minute
8. The load shall be released in 3 stages, to 60 %, 20 %, and approximately 2 % of the maximum load.
9. Following unloading, a further (2<sup>nd</sup>) loading cycle shall be carried out, in which, however, the load is to be increased only to the penultimate stage of the first cycle (so that the full load is not reached).
10. At each stage the load shall be maintained until the rate of settlement of the plate becomes less than 0.02 mm/min.
11. Remove the loads



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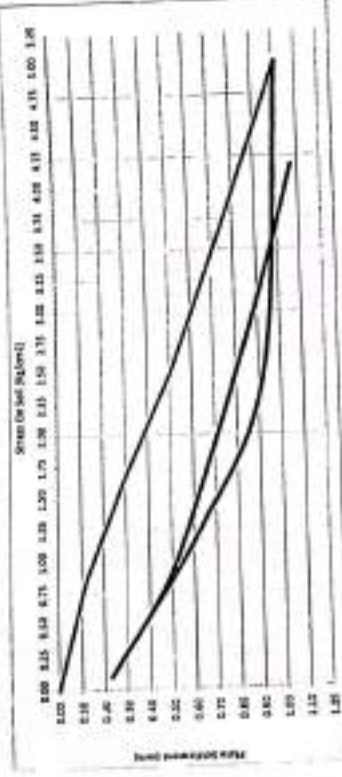
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Company Name  
Project  
Test Date  
Report Date  
Material  
Test No.

شركة المعاملات والدراسات الهندسية  
: Electronic Business Train - Sector (S) - Ques to Khamet  
: 13/01/2024  
: 15/01/2024  
: 6.581100  
: 101

### Nondestructive Static Plate Load Tests of Soils QIN 18134



| Loading (t)     | 0    | 1    | 2      | 3      | 4      | 5      | k      |
|-----------------|------|------|--------|--------|--------|--------|--------|
| Stage (Kg)      | 0    | 500  | 1172.8 | 1766.3 | 2359.8 | 2953.3 | 3546.8 |
| Stress (Kg/cm²) | 0.00 | 0.83 | 1.66   | 2.50   | 3.33   | 4.17   | 5.00   |
| Settlement (mm) | 0.00 | 0.12 | 0.30   | 0.51   | 0.68   | 0.84   | 1.01   |

|                         |       |
|-------------------------|-------|
| D (mm) =                | 300   |
| E <sub>vd</sub> (MPa) = | 61.74 |
| E <sub>vd</sub> (MPa) = | 61.74 |

| Loading (t)     | 0    | 1    | 2      | 3      | 4      | 5      |
|-----------------|------|------|--------|--------|--------|--------|
| Stage (Kg)      | 0    | 500  | 1172.8 | 1766.3 | 2359.8 | 2953.3 |
| Stress (Kg/cm²) | 0.00 | 0.83 | 1.66   | 2.50   | 3.33   | 4.17   |
| Settlement (mm) | 0.00 | 0.12 | 0.30   | 0.51   | 0.68   | 0.84   |

|                         |       |
|-------------------------|-------|
| D (mm) =                | 300   |
| E <sub>vd</sub> (MPa) = | 61.74 |
| E <sub>vd</sub> (MPa) = | 61.74 |

E<sub>vd</sub> = Modulus of deformation during the loading stage.  
E<sub>vd</sub> = Modulus of deformation during the unloading stage.  
D = Plate diameter (mm).  
Es = The difference between S3 and S4 has the maximum loading (mm) (kg/cm²).  
DS = Difference in settlements (mm) (kg/cm²).



| Unloading (t)   | 1    | 2    | 3     | 4    |
|-----------------|------|------|-------|------|
| Stage (Kg)      | 2553 | 1766 | 884   | 71   |
| Stress (Kg/cm²) | 5.00 | 2.50 | 1.250 | 0.10 |
| Settlement (mm) | 1.01 | 0.92 | 0.83  | 0.23 |

E<sub>vd</sub> (MPa) = 1.37

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## Report

1. Evaluation and representation of results.
2. 1 read Settlement curve
3. The test report content the following:-
  - location of test site - Dimension of loading plate.
  - Measuring device used - Type of soil.
  - Type of Bedding material below the plate -Weathering condition.
  - Time and date of measurements - Unusual observation made during test .
  - Dial gauge reading and corresponding normal stress - Loading-settlement curve.
  - Description of the soil condition below the plate after testing.

## Report

- Type of soil : Lower Embankment
- Job requirement :  $E_v > 30 \text{ MPa}$

| Item                                                             |  | Description    |
|------------------------------------------------------------------|--|----------------|
| Type of bedding material below the plate                         |  | Natural Soil   |
| Plate Diameter (mm)                                              |  | 300            |
| Date of measurement                                              |  | 13/01/2024     |
| Unusual observation made during test                             |  | NO             |
| Description of the soil conditions below the plate after testing |  | No deformation |

## Evaluation and representation of results

| Test No. | Station |         | Location | Level ( m ) | First Cycle   |               | Second Cycle | $E_v / E_v$ Ratio |
|----------|---------|---------|----------|-------------|---------------|---------------|--------------|-------------------|
|          | From    | To      |          |             | $E_v$ ( MPa ) | $E_v$ ( MPa ) |              |                   |
| 1        | 639+860 | 639+760 | 639+700  | -5.5        | 60.3          | 126.4         |              | 1.27              |

Signature /    
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والمختبرات

مركز استشارات الهندسة والمختبرات

1. The following information is required for the design of the structure:  
a. The structure is a reinforced concrete frame structure.  
b. The structure is subjected to the following loads:  
i. Dead load (DL) = 10 kN/m<sup>2</sup>  
ii. Live load (LL) = 5 kN/m<sup>2</sup>  
iii. Wind load (WL) = 15 kN/m<sup>2</sup>  
iv. Seismic load (SL) = 10 kN/m<sup>2</sup>  
c. The structure is located in a seismic zone of moderate intensity.  
d. The structure is to be designed for a service life of 50 years.  
e. The structure is to be designed for a design temperature of 20°C.

2. The following information is required for the design of the structure:

a. The structure is a reinforced concrete frame structure.

b. The structure is subjected to the following loads:

i. Dead load (DL) = 10 kN/m<sup>2</sup>

ii. Live load (LL) = 5 kN/m<sup>2</sup>

iii. Wind load (WL) = 15 kN/m<sup>2</sup>

iv. Seismic load (SL) = 10 kN/m<sup>2</sup>

c. The structure is located in a seismic zone of moderate intensity.

d. The structure is to be designed for a service life of 50 years.

e. The structure is to be designed for a design temperature of 20°C.

f. The structure is to be designed for a design wind speed of 15 m/s.

g. The structure is to be designed for a design seismic intensity of 10.

h. The structure is to be designed for a design temperature of 20°C.

i. The structure is to be designed for a design wind speed of 15 m/s.

j. The structure is to be designed for a design seismic intensity of 10.

k. The structure is to be designed for a design temperature of 20°C.

l. The structure is to be designed for a design wind speed of 15 m/s.

m. The structure is to be designed for a design seismic intensity of 10.

n. The structure is to be designed for a design temperature of 20°C.

o. The structure is to be designed for a design wind speed of 15 m/s.

p. The structure is to be designed for a design seismic intensity of 10.

q. The structure is to be designed for a design temperature of 20°C.

r. The structure is to be designed for a design wind speed of 15 m/s.

s. The structure is to be designed for a design seismic intensity of 10.

t. The structure is to be designed for a design temperature of 20°C.

u. The structure is to be designed for a design wind speed of 15 m/s.

v. The structure is to be designed for a design seismic intensity of 10.

w. The structure is to be designed for a design temperature of 20°C.

x. The structure is to be designed for a design wind speed of 15 m/s.

y. The structure is to be designed for a design seismic intensity of 10.

3. The following information is required for the design of the structure:

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مركز استشارات الهندسة والمختبرات

Company Name : شركة الأهلي  
Project : Electric Express Train – HSR From Qous To Armant  
Testing Date : 13 / 1 / 2024  
Soil type : Lower Embankment  
Location : ST From 639+580 To 639+760  
Level : - 5.5 M  
Report No. : 131

Compaction test by using Sand – Cone Test Method  
ASTM D- 1556

| Test # | Station | Test Hole Volume<br>cm <sup>3</sup> | Bulk Density gm/<br>cm <sup>3</sup> | Moisture Content % | Dry Density (gm/ cm <sup>3</sup> ) | Degree of Compaction (%) | Acceptance |
|--------|---------|-------------------------------------|-------------------------------------|--------------------|------------------------------------|--------------------------|------------|
| 1      | 639+610 | 1550.0                              | 2.27                                | 5.8                | 2.15                               | 97.7%                    | Comply     |
| 2      | 639+675 | 1441.7                              | 2.25                                | 5.8                | 2.12                               | 96.5%                    | Comply     |
| 3      | 639+710 | 1387.5                              | 2.27                                | 5.3                | 2.16                               | 98.2%                    | Comply     |
| 4      | 639+755 | 1325.7                              | 2.27                                | 6                  | 2.14                               | 97.4%                    | Comply     |

Degree of compaction based on proctor test dated At

Max. dry density = 2.22 gm/cm<sup>3</sup>

At optimum moisture content = 6.4 %

Signature / ...



Mr. Mervat El-Shaw  
Quality Control  
Date: 13/1/2024



 CamScanner

Company Name : شركة الأهلي  
Project : Electric Express Train - HSR From Qous To Armant  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

**Test Results of California Bearing Ratio on Base Materials**  
ASTM D 1883

| penetration                        |              | stress on piston (Mpa) |
|------------------------------------|--------------|------------------------|
| mm                                 | Inch         |                        |
| 0.64                               | 0.025        |                        |
| 1.27                               | 0.050        |                        |
| 1.91                               | 0.075        |                        |
| 2.54                               | 0.100        |                        |
| 3.18                               | 0.125        |                        |
| 3.81                               | 0.150        |                        |
| 4.45                               | 0.175        |                        |
| 5.08                               | 0.200        |                        |
| 6.35                               | 0.250        |                        |
| CBR Result                         | Stress (Mpa) |                        |
| At 0.5 inch (12.54 mm) penetration | St. Value    | Sample results         |
|                                    | 6.90         | 3.65                   |
|                                    |              | CBR 100 %              |
|                                    |              | 52.8%                  |

Notes:

- 1- Attached graph shows penetration resistance versus penetration magnitude.
- 2- The sample was compacted to dry density of 2.22(gm/cm<sup>3</sup>)
- 3- At = 6.4 % optimum water content.
- 4- Surcharge load 4.50 Kg.

1- CBR > 10 for middle and lower embankments and upper embankments page No 36.

Signature / توقيع المهندس 3 شارع الكهانة، القاهرة



Company Name : شركة النخعي  
 Project : Electric Express Train - HSR From Qous To Armanat  
 Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
 Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
 Delivery Date : 08/11/2023  
 Reporting Date : 12/11/2023  
 Reporting No. : 08-15

Moisture - Density relation of soil  
Test result (Modified proctor test)  
ASTM D-1557



• Max dry density (g/cm³) : 2.22

• Optimum moisture content % : 6.4 %

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 رقم الترخيص : 3 شارع الملك فيصل، الرياض



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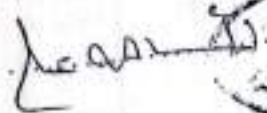
Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Armant  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

## Soil Classification

| TEST                 | Results<br>(%) | Limits according<br>Projects Specs |          |          |
|----------------------|----------------|------------------------------------|----------|----------|
|                      |                | (A-1-a)                            | (A-1-b)  | (A-2-4)  |
| Group Classification | (A-1-a)        | Max 50 %                           | -----    | -----    |
| 2.00 mm (No.10).     | 47.7           | Max 30 %                           | Max 50 % | -----    |
| 0.425 mm (No. 40).   | 28.8           | Max 15 %                           | Max 15 % | Max 15 % |
| 0.075 mm (No. 200).  | 10.0           |                                    |          |          |
| Liquid Limit         | ---            | -----                              | -----    | -----    |
| Plasticity index     | 0              | Max 6 %                            | Max 6 %  | Max 10 % |

The test results are ( ☐ Comply - ☐ Not Comply ) with specifications limits

Signature /





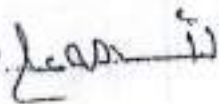
# CEL

Consulting Engineering Bureau & Laboratories  
مكتب معامل الاستشارات الهندسية

Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Armant  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

**Results of liquid limit and plasticity index  
of soils according to ASTM D-4318**

| Test             | Results (%) |
|------------------|-------------|
| Liquid Limit     | 0           |
| Plastic Limit    | 0           |
| Plasticity Index | 0           |

Signature / 



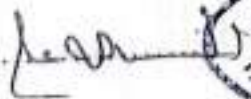
# CEL

Consulting Engineering Bureau & Laboratories  
مكتب معامل الاستشارات الهندسية

Company Name : شركة الذهبى  
Project : Electric Express Train – HSR From Qous To Armant  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

Materials finer than 75  $\mu$ m (no.200) sieve  
By washing ASTM D-1140.

| Test                                                             | Results (%) |
|------------------------------------------------------------------|-------------|
| Percentage of material finer than Sieve Size 75 $\mu$ m (No.200) | 10.0        |

Signature / 



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مكتب معامل الاستشارات الهندسية

Company Name : شركة الذهبى  
Project : Electric Express Train – HSR From Qous To Armant  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

## RESULTS OF SIEVE ANALYSIS According to ASTM D-422.

| Sieve Size (mm) | Sieve Size (IN) | Passing % |
|-----------------|-----------------|-----------|
| 50              | 2               | 97.5      |
| 37.5            | 1.5             | 92.7      |
| 25              | 1               | 84.2      |
| 19              | 3/4             | 82.8      |
| 12.50           | 1/2             | 71.3      |
| 9.50            | 3/8             | 62.6      |
| 4.75            | 4               | 47.9      |
| 2.00            | 10              | 47.7      |
| 0.425           | 40              | 28.8      |

Signature / .....



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مكتب معامل الاستشارات الهندسية

Company Name : شركة الذهبى  
Project : Electric Express Train – HSR From Qous To Armant  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

Dear Gentleman,

Attached here with the delivered on 8 / 11 / 2023

This sample is representative for 5.000 M<sup>3</sup>

### Materials test

1. Sieve analysis according to ASTM D-422.
2. Material finer than sieve No. 200 according to ASTM D-1140.
3. Liquid limits and plasticity index of soil according to ASTM D-4318.
4. Soil classification according to Project Specs.
5. Proctor Test according to ASTM D-1557
6. CBR according to ASTM D-1883

Signature /...

Consultant Eng : Abderrahman Ahmed



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مكتب معامل الاستشارات الهندسية

Company Name : شركة الذهبى  
Project : Electric Express Train – HSR From Qous To Armant  
Testing Date : 30 / 1 / 2024  
Soil type : Middli Embankment  
Location : ST From 638+740 To 639+100  
Level : - 2 M  
Report No. : 144

Compaction test by using Sand – Cone Test Method

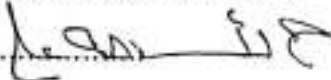
ASTM D- 1556

| Test # | Station | Test Hole Volume cm <sup>3</sup> | Bulk Density gm/ cm <sup>3</sup> | Moisture Content % | Dry Density (gm/ cm <sup>3</sup> ) | Degree of Compaction (%) | Acceptance |
|--------|---------|----------------------------------|----------------------------------|--------------------|------------------------------------|--------------------------|------------|
| 1      | 638+762 | 1398.6                           | 2.30                             | 5.8                | 2.17                               | 97.8%                    | Comply     |
| 2      | 638+795 | 1348.6                           | 2.29                             | 5.3                | 2.17                               | 98.0%                    | Comply     |
| 3      | 638+830 | 1436.8                           | 2.23                             | 5.3                | 2.12                               | 95.6%                    | Comply     |
| 4      | 638+885 | 1486.8                           | 2.25                             | 5.8                | 2.13                               | 95.8%                    | Comply     |
| 5      | 638+930 | 1506.9                           | 2.28                             | 5.3                | 2.16                               | 97.4%                    | Comply     |
| 6      | 638+991 | 1534.0                           | 2.27                             | 5.8                | 2.14                               | 96.5%                    | Comply     |
| 7      | 639+045 | 1452.1                           | 2.23                             | 5                  | 2.13                               | 95.8%                    | Comply     |
| 8      | 639+085 | 1511.8                           | 2.25                             | 6.4                | 2.11                               | 95.2%                    | Comply     |

Degree of compaction based on proctor test dated At

Max. dry density = 2.22 gm/cm<sup>3</sup>

At optimum moisture content = 6.4 %

Signature / ..... 

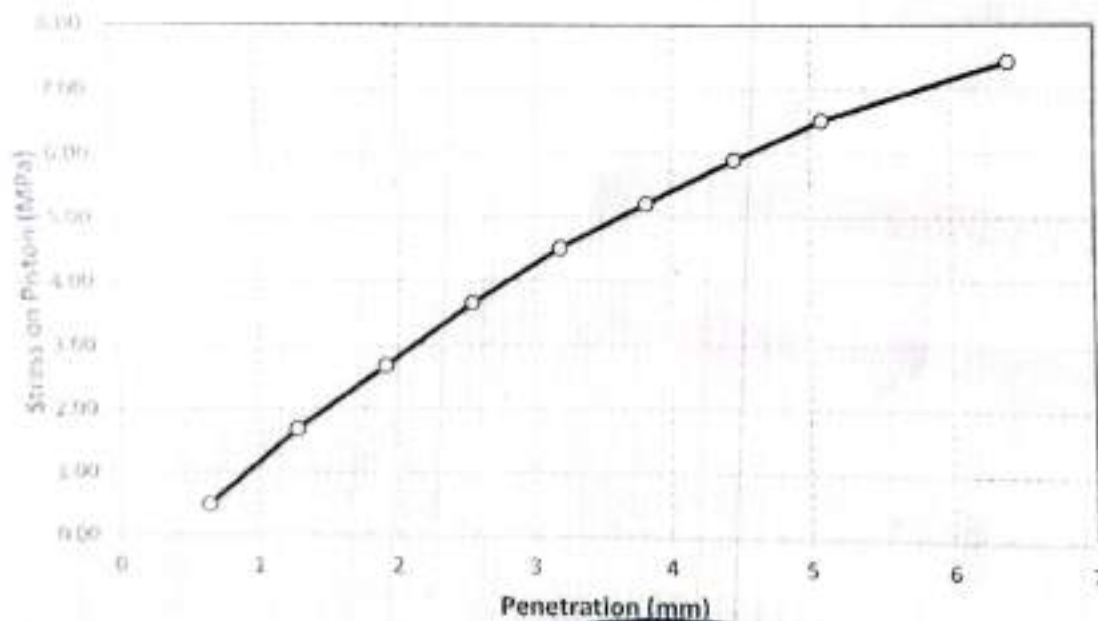


3 E Malek E Afdal Street  
Zamalek, Cairo  
Tel & Fax : 2736723 - 27363060



Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

**Load Penetration Curve of CBR Test**  
**ASTM D-1883**



Signature /



Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Arman  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

## Test Results of California Bearing Ratio on Base Materials ASTM D 1883

| penetration |       | stress on piston (Mpa) |
|-------------|-------|------------------------|
| mm          | Inch  |                        |
| 0.64        | 0.025 |                        |
| 1.27        | 0.050 |                        |
| 1.91        | 0.075 |                        |
| 2.54        | 0.100 |                        |
| 3.18        | 0.125 |                        |
| 3.81        | 0.150 |                        |
| 4.45        | 0.175 |                        |
| 5.08        | 0.200 |                        |
| 6.35        | 0.250 |                        |

| CBR Result                        | Stress (Mpa) |                | CBR 100 % |
|-----------------------------------|--------------|----------------|-----------|
|                                   | St. Value    | Sample results |           |
| At 0.1 inch (2.54 mm) penetration | 6.90         | 3.65           | 52.8%     |

### Notes:

- Attached graph shows penetration resistance versus penetration magnitude.
- The sample was compacted to dry density of 2.22(gm/cm<sup>3</sup>)
- AI = 6.4 % optimum water content.
- Surcharge load 4.50 Kg.

Signature /

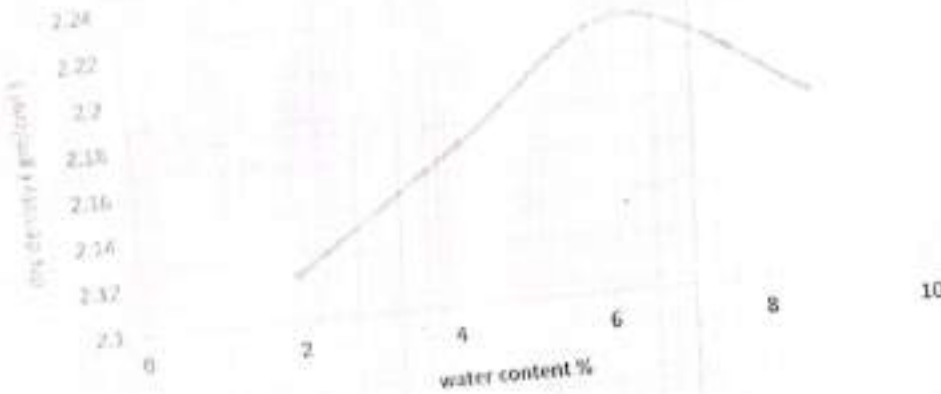


# CEL

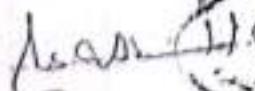
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مكتب محاميل الاستشارات الهندسية

Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Armant  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

Moisture - Density relation of soil  
Test result (Modified proctor test)  
ASTM D-1557



- Max dry density (gm/cm³) : 2.22
- Optimum moisture content % : 6.4 %

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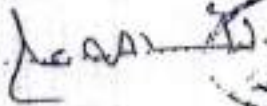
Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Arment  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

## Soil Classification

| TEST                   | Results<br>(%) | Limits according<br>Projects Specs |          |          |
|------------------------|----------------|------------------------------------|----------|----------|
|                        |                | (A-1-a)                            | (A-1-b)  | (A-2-4)  |
| • Group Classification | (A-1-a)        |                                    |          |          |
| 2.00 mm (No.10).       | 47.7           | Max 50 %                           | -----    | -----    |
| 0.425 mm (No. 40).     | 28.8           | Max 30 %                           | Max 50 % | -----    |
| 0.075 mm (No. 200).    | 10.0           | Max 15 %                           | Max 15 % | Max 15 % |
| Liquid Limit           | ---            | -----                              | -----    | -----    |
| Plasticity index       | 0              | Max 6 %                            | Max 6 %  | Max 10 % |

The test results are ( ☐ Comply - ☐ Not Comply ) with specifications limits

Signature /





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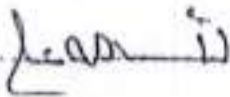
Consulting Engineering Bureau & Laboratories  
مكتب معامل الاستشارات الهندسية

Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Armant  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

**Results of liquid limit and plasticity index  
of soils according to ASTM D-4318**

| Test             | Results<br>(%) |
|------------------|----------------|
| Liquid Limit     | 0              |
| Plastic Limit    | 0              |
| Plasticity Index | 0              |

Signature /





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Geotechnical Engineering Services & Laboratories  
P.O. Box 111, Jeddah 21511, Saudi Arabia

Company Name: ج.م.ع.ل  
Project: Electric Express Train - HSR From Qassim To Al-Madina  
Location: ST: 639+000 E=32°54'25.6" N=25°51'50.1"  
Type of sample: Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date: 08/11/2023  
Reporting Date: 12/11/2023  
Reporting No.: 08-15

Materials finer than 75  $\mu$ m (No.200) sieve  
By washing ASTM D-1140

| Test                                                                | Results (%) |
|---------------------------------------------------------------------|-------------|
| Percentage of material finer than<br>Sieve Size 75 $\mu$ m (No.200) | 0.2         |

Signature: [Signature]

**CEL**  
Geotechnical Engineering Services & Laboratories  
P.O. Box 111, Jeddah 21511, Saudi Arabia  
Tel: 011-800-1234567 Fax: 011-800-1234567  
Email: info@cel.com.sa

**IAS**

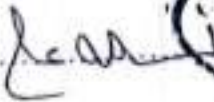
# CEL

Consulting Engineering Bureau & Laboratories  
مكتب معامل الاستشارات الهندسية

Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Armant  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

## RESULTS OF SIEVE ANALYSIS According to ASTM D-422.

| Sieve Size (mm) | Sieve Size (IN) | Passing % |
|-----------------|-----------------|-----------|
| 50              | 2               | 97.5      |
| 37.5            | 1.5             | 92.7      |
| 25              | 1               | 84.2      |
| 19              | 3/4             | 82.8      |
| 12.50           | 1/2             | 71.3      |
| 9.50            | 3/8             | 62.6      |
| 4.75            | 4               | 47.9      |
| 2.00            | 10              | 47.7      |
| 0.425           | 40              | 28.8      |

Signature /  

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مكتب معامل الاستشارات الهندسية

Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Armant  
Location : ST: 639+000 E=32°54'25.6" N=25°53'59.1"  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/11/2023  
Reporting Date : 12/11/2023  
Reporting No. : 08-15

Dear Gentleman ,

Attached here with the delivered on 8 / 11 / 2023

This sample is representative for 5.000 M<sup>3</sup>

### Materials test

1. Sieve analysis according to ASTM D-422.
2. Material finer than sieve No. 200 according to ASTM D-1140.
3. Liquid limits and plasticity index of soil according to ASTM D-4318.
4. Soil classification according to Project Specs.
5. Proctor Test according to ASTM D-1557
6. CBR according to ASTM D-1883

Signature /...

Consultant Eng : Abderrahman Ahmed



15/11/2023  
12/11/2023  
12/11/2023



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Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Arment  
Testing Date : 15 / 1 / 2024  
Soil type : Middle Embankment  
Location : ST From 638+940 To 638+980  
Level : - 4.5 M  
Report No. : 134-2

## Compaction test by using Sand - Cone Test Method ASTM D- 1556

| Test # | Station | Test Hole Volume<br>cm <sup>3</sup> | Bulk Density gm/<br>cm <sup>3</sup> | Moisture Content % | Dry Density (gm/ cm <sup>3</sup> ) | Degree of Compaction (%) | Acceptance |
|--------|---------|-------------------------------------|-------------------------------------|--------------------|------------------------------------|--------------------------|------------|
| 1      | 638+955 | 1545.8                              | 2.26                                | 6.4                | 2.13                               | 95.9%                    | Comply     |
| 2      | 638+976 | 1568.1                              | 2.30                                | 6                  | 2.17                               | 97.8%                    | Comply     |

Degree of compaction based on proctor test dated At

Max. dry density = 2.22 gm/cm<sup>3</sup>

At optimum moisture content = 6.4 %

Signature /



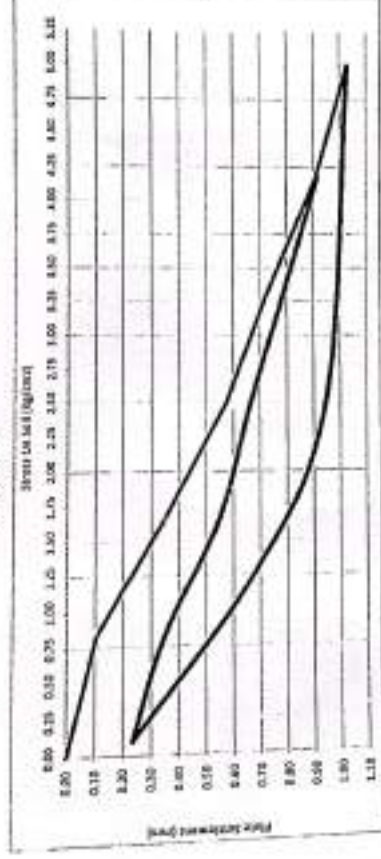
1 E. Mark E. Abdel Street  
Zandeh, Cairo  
Tel: 27367201 - 27367201



| Company Name | Project | Test Date | report date | Station | Test No. |
|--------------|---------|-----------|-------------|---------|----------|
|--------------|---------|-----------|-------------|---------|----------|

شركة القصب للطاقات والتوريدات الصناعية :  
: Electric Express Train - Sector (S) - Coys to Arrant.  
- 23/01/2024  
: 25/01/2024  
: 641+188  
: 01

**Noncompetitive Static Plate Load Tests of Soils**  
DIN 18134



| Loading (t)                  | 0    | 1    | 2      | 3      | 4      | 5      | 6      |
|------------------------------|------|------|--------|--------|--------|--------|--------|
| Stage (kg)                   | 0    | 486  | 1172.8 | 1766.3 | 2252.6 | 2846.1 | 3532.8 |
| Stress (kg/cm <sup>2</sup> ) | 0.00 | 0.63 | 1.60   | 2.40   | 3.23   | 4.17   | 5.00   |
| Settlement (mm)              | 0.00 | 0.11 | 0.35   | 0.57   | 0.73   | 0.91   | 1.03   |

|          |     |              |      |              |      |              |      |
|----------|-----|--------------|------|--------------|------|--------------|------|
| D (mm) = | 360 | 51 (average) | 0.20 | 62 (average) | 4.77 | $\Delta S =$ | 0.41 |
|----------|-----|--------------|------|--------------|------|--------------|------|

| Leading (%)                  | 0    | 1    | 2    | 3    | 4    | 5    |      |
|------------------------------|------|------|------|------|------|------|------|
| Stage(Kp)                    | 0    | 86.6 | 28.5 | 17.2 | 17.6 | 3    | 29.6 |
| Stress (Kg/cm <sup>2</sup> ) | 0.10 | 0.83 | 1.65 | 2.52 | 3.33 | 4.17 |      |
| Settlement (mm)              | 0.23 | 0.35 | 0.55 | 0.87 | 1.70 | 0.91 |      |

|                         |                             |      |      |      |      |
|-------------------------|-----------------------------|------|------|------|------|
| D (mm) =                | 3.00                        | 2.51 | 2.87 | ΔS = | 0.18 |
| E <sub>0</sub> (nmol) = | 6.31 × 10 <sup>-3</sup> mol |      |      |      |      |

Set = modulus of deformation during the loading stage.

Ex2 e modulus of deformation during the 1st loading stage.

Q = Plate displacement (mm)

**It's a /** has different meanings between CT and ST even the machines have a / symbol [Nelson's  
CT vs PLATO Comparison (part 6)]

is a large difference between 0.1 and 0.7 in the relative loading (Fig. 6). For a difference in settlement of 1 and 0.7 mm the load was halved (and not a difference in settlement of 0.1 and 0.7 mm).

Received: 1999/05/10; Accepted: 1999/06/07; Published: 1999/06/07

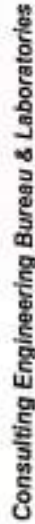


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مكتب معامل الاستشارات الهندسية  
مشروعات محافظات الوجه القبلي

|              |  |
|--------------|--|
| Company Name |  |
| Project      |  |
| Test Date    |  |
| report data  |  |
| Station      |  |
| Test No.     |  |

شركة 24 هس للقطارات و التوريات الجوية :  
 : Electric Express Train - 8 sector (B) - Door to Airport.  
 : 23/01/2024  
 : 25/01/2024  
 : 641+180  
 01

Nonrepetitive Static Plate Load Tests of Soils  
DIN 18134

| Loading Stage (1) |                              |        |         |
|-------------------|------------------------------|--------|---------|
| Loading           | Stress<br>Kg/cm <sup>2</sup> | Dial 1 | Dial 2  |
|                   |                              | mm     | mm      |
| 0                 | 0.00                         | 30.50  | 30.50   |
|                   |                              | 0.05   | 0.50    |
| 1                 | 0.83                         | 31.84  | 31.25   |
|                   |                              | 0.16   | 0.35    |
| 2                 | 1.66                         | 33.50  | 33.10   |
|                   |                              | 0.40   | 0.57    |
| 3                 | 2.50                         | 35.19  | 35.06   |
|                   |                              | 0.61   | 0.73    |
| 4                 | 3.33                         | 36.24  | 36.30   |
|                   |                              | 0.78   | 0.81    |
| 5                 | 4.17                         | 37.67  | 37.33   |
|                   |                              | 0.93   | 0.86    |
| 6                 | 5.00                         | 38.94  | 39.00   |
|                   |                              | 1.03   | 1.09    |
|                   |                              |        | Average |
|                   |                              |        | 0.80    |

| Unloading Stage (t) |                              |            |        |         |
|---------------------|------------------------------|------------|--------|---------|
| Loading             | Stress<br>Kg/cm <sup>2</sup> | Settlement |        | Average |
|                     |                              | Dial 1     | Dial 2 |         |
|                     |                              | mm         | mm     |         |
| 1                   | 2.50                         | 18.52      | 15.09  | 0.85    |
| 2                   | 1.25                         | 19.30      | 15.55  | 0.87    |
| 3                   | 0.100                        | 19.15      | 15.80  | 0.23    |

| Loading Stage (2)  |                              |        |            |        |         |
|--------------------|------------------------------|--------|------------|--------|---------|
| Loading            | Stress<br>Kg/cm <sup>2</sup> | Dial 1 | Settlement |        | Average |
|                    |                              |        | mm         | Dial 2 |         |
| 0                  | 0.83                         | 19.63  | 0.39       | 19.63  | 0.35    |
| increased 432      | 1.66                         | 19.42  | 0.58       | 19.48  | 0.55    |
| stress is reached. |                              |        |            |        |         |
| 2                  | 2.50                         | 19.31  | 0.69       | 19.35  | 0.67    |
| 3                  | 3.33                         | 19.19  | 0.81       | 19.33  | 0.79    |
| 4                  | 4.17                         | 19.07  | 0.93       | 19.10  | 0.91    |



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Consulting Engineering Bureau & Laboratories

مكتب معامل الاستشارات الهندسية

مشروعات محافظات الوجه القبلي

## Report

1. Evaluation and representation of results.
2. Load Settlement curve.

3. The test report content the following:-

- location of test site - Dimension of loading plate.
- Measuring device used - Type of soil.
- Type of Bedding material below the plate -Weathering condition.
- Time and date of measurements - Unusual observation made during test.
- Dial gauge reading and corresponding normal stress - Loading-settlement curve.
- Description of the soil condition below the plate after testing.

## Report

- Type of soil : Upper Embankment
- Job requirement :  $E_v2 > 60 \text{ MPa}$

| Item                                                             |  | Description    |
|------------------------------------------------------------------|--|----------------|
| Type of bedding material below the plate.                        |  | Natural Soil   |
| Plate diameter (mm)                                              |  | 300            |
| Date of measurement                                              |  | : 23/01/2004   |
| Unusual observation made during test                             |  | NO             |
| Description of the soil conditions below the plate after testing |  | No reformation |

## Evaluation and representation of results

| Test No. | Station |         | Location  | Level (m) | First Cycle    |  | Second Cycle   | $E_v/E_{vs}$ Ratio |      |
|----------|---------|---------|-----------|-----------|----------------|--|----------------|--------------------|------|
|          | From    | To      |           |           | $E_{v1}$ (MPa) |  | $E_{v2}$ (MPa) |                    |      |
| 1        | 641+150 | 641+200 | : 641+180 | : 0.0     | 95.2           |  | 145.2          |                    | 1.53 |

Signature /



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مكتب معمل الإستشارات الهندسية  
مشروعات محافظات الوجه القبلى

## Consent:

شركة الخفي للدراسات والبحوث المعمية :

## Project:

Electric Express Train - Sector (B) - Gous to Armout.

## Subject:

Determine the deformation and strength characteristics of soil by the

plate loading test according specifications UEN 181.04.2014-04 and project requirements

## Test Location:

Station : 641+100 to 641+200

## Station:

641+100

## Level:

8.0

## Test Date:

23/01/2024

## Report Date:

25/01/2024

## Type of soil:

Upper Embankment

## Report No.:

Q1

Dear Gentlemen,

According to the above mentioned subject the test performed as follows:

## Apparatus:

1. Loading plates consists of two plates with 300 mm and 300 mm diameter
2. The thickness of plates 30 mm
3. Dial gauges with accuracy 0.01 mm to measuring the settlement
4. Steel straightedges with magnetic supports to fixed the dial gauges
5. Hydraulic jack with pump to transfer reaction loads to the loading plates
6. Dial indicator measuring device with scale capacity 700 Bar (flexible)
7. Reaction loading system by roller compactor with weight approximately 15 ton.
8. Calibration certificates are attached.

## Test Procedure:

1. Clean the ground on test area to the required load with uniform soil
2. Install loading plates 300 mm and 300 mm diameter, hydraulic jack and 3 dial gauges
3. Prior to starting the test applied preloading about 30 seconds
4. The strain gauge and the dial gauge shall be set to zero
5. For 6 300 mm loading plate, the test values are 5.0 kg/cm<sup>2</sup>
6. The load shall be applied in six stages, in approximately equal increments, until the required maximum normal stress is reached
7. Each change in load (from stage to stage) shall be completed within one minute
8. The load shall be released in 3 stages, to 50 %, 25 %, and approximately 5 % of the maximum load
9. Following unloading, a further (3<sup>rd</sup>) loading cycle shall be carried out, in which, however, the load is to be increased only to the penultimate stage of the first cycle (so that the full load is not reached)
10. At each stage the load shall be maintained until the rate of settlement of the plate becomes less than 0.02 mm/min
11. Remove the loads



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مشروعات محافظات الوجه القبلي

Company Name : شركة فاضي للتجارب والتركيبات المعمية :  
Project : Badr El Ezzine Train - Sector (B) - Doha to Almerut  
Test Date : 23/01/2024  
report date : 25/01/2024  
Station : 541+120  
Test No. : 01

**Nonrepetitive Static Plate Load Tests of Soils**  
**DIN 18134**

| Loading Stage (1) |                              |        |      | Settlement |      | Average |
|-------------------|------------------------------|--------|------|------------|------|---------|
| Loading           | Stress<br>Kg/cm <sup>2</sup> | Dial 1 | mm   | Dial 2     | mm   |         |
| 0                 | 0.00                         | 10.00  | 0.00 | 10.00      | 0.00 | 0.00    |
| 1                 | 0.83                         | 10.83  | 0.20 | 10.91      | 0.59 | 0.15    |
| 2                 | 1.66                         | 10.01  | 0.39 | 10.74      | 0.33 | 0.33    |
| 3                 | 2.50                         | 10.43  | 0.57 | 10.55      | 0.45 | 0.51    |
| 4                 | 3.33                         | 10.15  | 0.75 | 10.30      | 0.61 | 0.68    |
| 5                 | 4.17                         | 10.10  | 0.90 | 10.25      | 0.77 | 0.83    |
| 6                 | 5.00                         | 10.08  | 1.02 | 10.20      | 0.93 | 0.98    |

| Unloading Stage (1) |                              |        |      | Settlement |      | Average |
|---------------------|------------------------------|--------|------|------------|------|---------|
| Unloading           | Stress<br>Kg/cm <sup>2</sup> | Dial 1 | mm   | Dial 2     | mm   |         |
| 1                   | 2.50                         | 10.05  | 0.94 | 10.14      | 0.86 | 0.90    |
| 2                   | 1.25                         | 10.30  | 0.70 | 10.38      | 0.42 | 0.60    |
| 3                   | 0.100                        | 10.13  | 0.27 | 10.83      | 0.20 | 0.23    |

| Loading Stage (2) |                              |        |      | Settlement |      | Average |
|-------------------|------------------------------|--------|------|------------|------|---------|
| Loading           | Stress<br>Kg/cm <sup>2</sup> | Dial 1 | mm   | Dial 2     | mm   |         |
| 0                 | 0.83                         | 10.64  | 0.38 | 10.03      | 0.31 | 0.33    |
| 1                 | 1.66                         | 10.40  | 0.64 | 10.53      | 0.47 | 0.50    |
| 2                 | 2.50                         | 10.30  | 0.70 | 10.37      | 0.83 | 0.86    |
| 3                 | 3.33                         | 10.33  | 0.85 | 10.21      | 0.79 | 0.82    |
| 4                 | 4.17                         | 10.01  | 0.99 | 10.05      | 0.84 | 0.97    |



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## Report

### 1. Evaluation and representation of results.

### 2. Load Settlement curve.

### 3. The test report content the following:-

- location of test site - Dimension of loading plate.
- Measuring device used - Type of soil.
- Type of Bedding material below the plate -Weathering condition.
- Time and date of measurements - Unusual observation made during test .
- Dial gauge reading and corresponding normal stress - Loading-settlement curve.
- Description of the soil condition below the plate after testing.

## Report

- Type of soil : Upper Embankment
- Job requiremer :  $E_v > 60 \text{ MPa}$

| Item                                                             |  | Descriptions   |
|------------------------------------------------------------------|--|----------------|
| Type of bedding material below the plate                         |  | Natural Soil   |
| plate Diameter (mm)                                              |  | 300            |
| date of measurement                                              |  | 12/3/01/2024   |
| Unusual observation made during test                             |  | NO             |
| Description of the soil conditions below the plate after testing |  | No deformation |

## Evaluation and representation of results

| Test No. | Station |         | Location | Level<br>(m) | First Cycle    |             | Second<br>Cycle | $E_v / E_{v1}$<br>Ratio |
|----------|---------|---------|----------|--------------|----------------|-------------|-----------------|-------------------------|
|          | From    | To      |          |              | $E_{v1}$ (MPa) | $E_v$ (MPa) |                 |                         |
| 1        | 641+100 | 641+150 | 641+120  | 0.0          | 104.8          | 117.0       |                 | 1.12                    |

Signature /



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مكتب معام الإستشارات الهندسية

مشروعات محافظات الوجه القبلي

## CONTENTS

شركة خلاص للخدمات الهندسية :

Project : Electric Express Trials - Sector (S) - Qous to Arment  
Subject : Determining the deformation and strength characteristics of soil by the plate loading test according specifications UH 18/24/21/2-104 and project requirements  
Test Location : Station : 641+100 to 641+150  
Station : 641+120  
Level : B.O  
Test Date : 23/01/2024  
Report Date : 25/01/2024  
Type of soil : Upper Embankment  
Report No. : 01

Dear Gentleman,

According to the above mentioned subject the test performed as follows:-

## Apparatus

1. Loading plates consists of two plates with 300 mm and 300 mm diameter
2. The thickness of plates 30 mm
3. Dial gauges with accuracy 0.01 mm to measuring the settlement
4. Steel straightedges with magnetic supports to fixed the dial gauges
5. Hydraulic jack with pump to transfer reactive loads to the loading plates
6. Dial indicator measuring device with scale capacity 700 Bar (Enwetac)
7. Reaction loading system by roller computer with weight approximately 15 ton.
8. Calibration certificates are attached.

## Test Procedure

1. Clean the ground on test area to the required level with undisturbed soil
2. Install loading plates 300 mm and 300 mm diameter, hydraulic jack and 3 dial gauges
3. Prior to starting the test applied preloading about 30 seconds.
4. The strain gauge and the dial gauge shall be set to zero
5. For a 300 mm loading plate, the first values are 5.0 kg/cm<sup>2</sup>
6. The load shall be applied in six stages, in approximately equal increments, until the required maximum normal stress is reached.
7. Each change in load (from stage to stage) shall be completed within one minute
8. The load shall be released in 3 stages, to 60 %, 20 %, and approximately 2 % of the stress in load
9. Following unloading, a further (2<sup>nd</sup>) loading cycle shall be carried out, in which, however, the load is to be increased only to the penultimate stage of the first cycle (so that the full load is not reached).
10. At each stage the load shall be maintained until the rate of settlement of the plate becomes less than 0.02 mm/min.
11. Remove the loads



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Company : شركة نذفي للمحولات والتوريدات المعمورة :

Project : Electric Express Train - Sector (5) - Qous to Arment  
Subject : Determine the deformation and strength characteristics of soil by the  
plate loading test according specifications DIN 18 134:2012-04 and project requirements  
Test Location : Station 641+100 to 641+150  
Station : 641+120  
Level : 0.0  
Test Date : 23/01/2024  
Report Date : 25/01/2024  
Type of soil : Upper Embankment  
Report No. : 01

Dear Gentleman,

According to the above mentioned subject the test performed as follows:-

#### Apparatus

1. Loading plates consists of two plates with 300 mm and 300 mm diameter
2. The thickness of plates 30 mm
3. Dial gauges with accuracy 0.01 mm to measuring the settlement
4. Steel straightedges with magnetic supports to fixed the dial gauges
5. Hydraulic jack with pump to transfer reactive loads to the loading plates
6. Dial indicator measuring device with scale capacity 700 Bar (Enerpac)
7. Reaction loading system by roller compactor with weight approximately 15 ton.
8. Calibration certificates are attached.

#### Test Procedure:

1. Clean the ground on test area to the required level with undisturbed soil
2. Install loading plates 300 mm and 300 mm diameter, hydraulic jack and 3 dial gauges
3. Prior to starting the test applied preloading about 30 seconds.
4. The strain gauge and the dial gauge shall be set to zero.
5. For a 300 mm loading plate, the limit values are 5.0 kg/cm<sup>2</sup>
6. The load shall be applied in six stages, in approximately equal increments, until the required maximum normal stress is reached.
7. Each change in load (from stage to stage) shall be completed within one minute
8. The load shall be released in 3 stages, to 50 % , 25 % , and approximately 2 % of the maximum load.
9. Following unloading, a further (2<sup>nd</sup>) loading cycle shall be carried out, in which, however, the load is to be increased only to the penultimate stage of the first cycle (so that the full load is not reached).
10. At each stage the load shall be maintained until the rate of settlement of the plate becomes less than 0.02 mm/min.
11. Remove the loads



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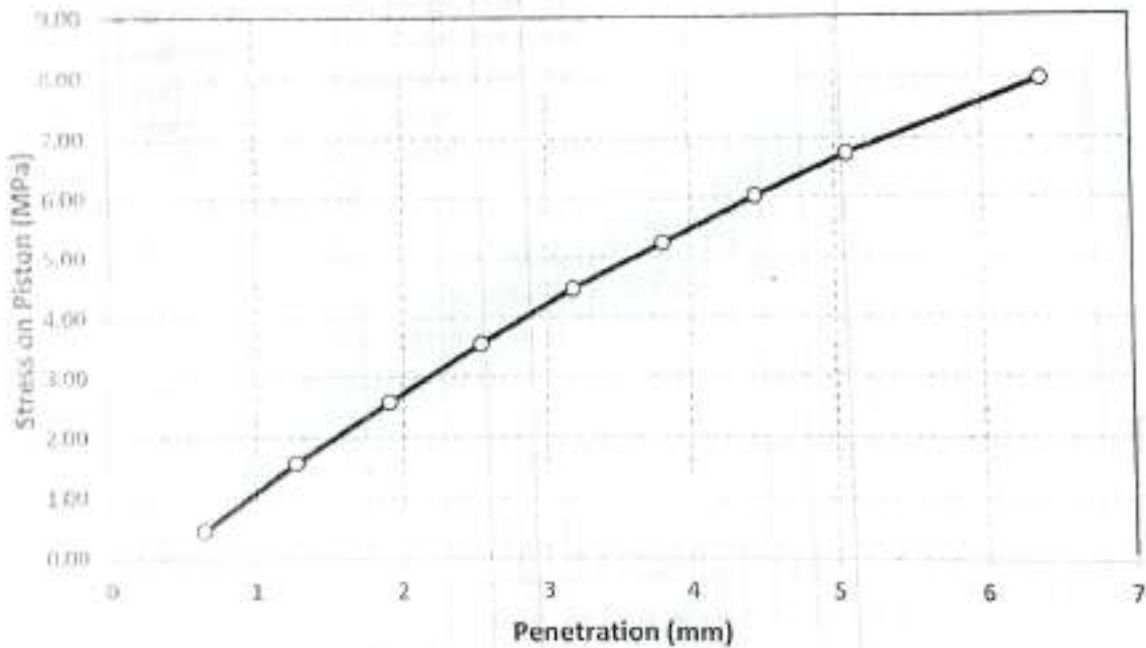
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مكتب معامل الاستشارات الهندسية

Company Name : شركة الذهبى  
Project : Electric Express Train – HSR From Qous To Armant  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

## Load Penetration Curve of CBR Test

ASTM D-1883



Signature / ..



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Project : Electric Express Train - HSR From Qous To Armant  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

**Test Results of California Bearing Ratio on Base Materials**  
**ASTM D 1883**

| penetration |       | stress on piston (Mpa) |
|-------------|-------|------------------------|
| mm          | Inch  |                        |
| 0.64        | 0.025 | 0.46                   |
| 1.27        | 0.050 | 1.58                   |
| 1.91        | 0.075 | 2.58                   |
| 2.54        | 0.100 | 3.55                   |
| 3.18        | 0.125 | 4.47                   |
| 3.81        | 0.150 | 5.23                   |
| 4.45        | 0.175 | 6.03                   |
| 5.08        | 0.200 | 6.74                   |
| 6.35        | 0.250 | 7.97                   |

| CBR Result                        | Stress (Mpa) |                | CBR 100 % |
|-----------------------------------|--------------|----------------|-----------|
| At 0.1 inch (2.54 mm) penetration | St. Value    | Sample results | 51.5 %    |
|                                   | 6.90         | 3.55           |           |

**Notes:**

- 1- Attached graph shows penetration resistance versus penetration magnitude.
- 2- The sample was compacted to dry density of  $\rho = 2.22 \text{ (gm/cm}^3\text{)}$   
At = 6.4 % optimum water content.
- 3- Surcharge load 4.50 Kg.
- 4- CBR > 10 for middle and lower embankments according project spec page No 36.

Signature / ...

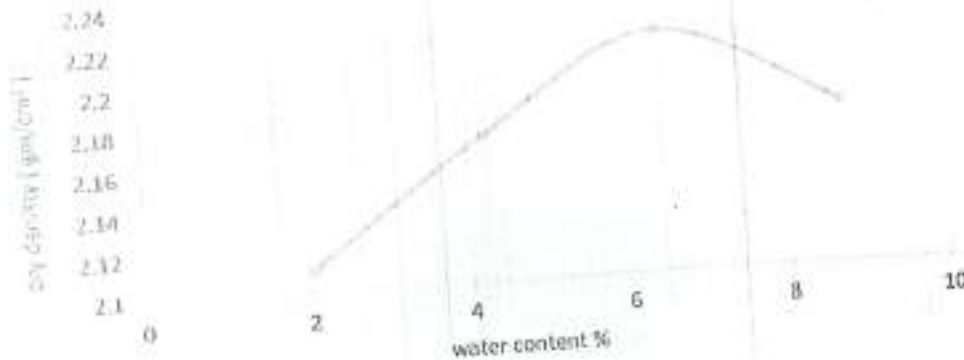


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Company Name : شركة الذهبي  
Project : Electric Express Train - HSR From Qous To Arment  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

Moisture - Density relation of soil  
Test result (Modified proctor test)  
ASTM D-1557



- Max dry density (gm/cm³) : 2.22
- Optimum moisture content % : 6.4 %

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Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Arment  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

Soil Classification

| TEST                 | Results<br>(%) | Limits according<br>Projects Specs |          |          |
|----------------------|----------------|------------------------------------|----------|----------|
|                      |                | (A-1-a)                            | (A-1-b)  | (A-2-4)  |
| Group Classification | (A-1-a)        | (A-1-a)                            | (A-1-b)  | (A-2-4)  |
| 2.00 mm (No.10).     | 27.5           | Max 50 %                           | -----    | -----    |
| 0.425 mm (No. 40).   | 15.6           | Max 30 %                           | Max 50 % | -----    |
| 0.075 mm (No. 200).  | 9.1            | Max 15 %                           | Max 15 % | Max 15 % |
| Liquid Limit         | -----          | -----                              | -----    | -----    |
| Plasticity index     | 0              | Max 6 %                            | Max 6 %  | Max 10 % |

The test results are ( ☐ Comply - ☐ Not Comply ) with specifications limits

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REFERENCE: INT-0001  
January, 2024  
Tel: 219.991.437



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Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Armant  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

## Results of liquid limit and plasticity index of soils according to ASTM D-4318

| Test             | Results (%) |
|------------------|-------------|
| Liquid Limit     | 0           |
| Plastic Limit    | 0           |
| Plasticity Index | 0           |

Signature / ...



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Company Name : شركة الذهبي  
Project : Electric Express Train – HSR From Qous To Armant  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

Materials finer than 75  $\mu$ m (no.200) sieve  
By washing ASTM D-1140.

| Test                                                             | Results (%) |
|------------------------------------------------------------------|-------------|
| Percentage of material finer than Sieve Size 75 $\mu$ M (No.200) | 9.1         |

Signature / ...



El Mansour Abdelhakim  
Engineer  
011594 276053 - 01159490



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Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Armant  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

## RESULTS OF SIEVE ANALYSIS According to ASTM D-422.

| Sieve Size (mm) | Sieve Size (IN) | Passing % |
|-----------------|-----------------|-----------|
| 50              | 2               | 95.1      |
| 37.5            | 1.5             | 91.9      |
| 25              | 1               | 80.7      |
| 19              | 3/4             | 72.2      |
| 12.50           | 1/2             | 64.1      |
| 9.50            | 3/8             | 45.8      |
| 4.75            | 4               | 34.6      |
| 2.00            | 10              | 27.5      |
| 0.425           | 40              | 15.6      |

Signature /.....



El Mostafa El Attia Salem  
Director / مدير  
44 El Mostafa El Attia Salem



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Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Armant  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 03/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

Dear Gentleman,

Attached here with the delivered on 08 / 01 / 2024

This sample is representative for 5.000 M<sup>3</sup>

### Materials test

1. Sieve analysis according to ASTM D-422.
2. Material finer than sieve No. 200 according to ASTM D-1140.
3. Liquid limits and plasticity index of soil according to ASTM D-4318.
4. Soil classification according to Project Specs.
5. Proctor Test according to ASTM D-1557
6. CBR according to ASTM D-1883

Signature / .....

Consultant Eng : Abderrahman Ahmed



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### Compaction test by using Sand – Cone Test Method

| Test # | Station | Test Hole<br>Volume cm <sup>3</sup> | Bulk Density<br>gm/ cm <sup>3</sup> | Moisture<br>Content % | Dry Density<br>(gm/ cm <sup>3</sup> ) | Degree of<br>Compaction (%) | Acceptance |
|--------|---------|-------------------------------------|-------------------------------------|-----------------------|---------------------------------------|-----------------------------|------------|
| 1      | 641+225 | 1513.2                              | 2.31                                | 6                     | 2.18                                  | 98.3%                       | Comply     |
| 2      | 641+250 | 1558.3                              | 2.24                                | 5.3                   | 2.13                                  | 95.7%                       | Comply     |
| 3      | 641+275 | 1535.4                              | 2.26                                | 5.8                   | 2.14                                  | 96.4%                       | Comply     |
| 4      | 641+300 | 1566.0                              | 2.25                                | 5.8                   | 2.12                                  | 95.7%                       | Comply     |
| 5      | 641+325 | 1484.7                              | 2.33                                | 5.8                   | 2.21                                  | 99.4%                       | Comply     |
| 6      | 641+350 | 1513.9                              | 2.30                                | 5.8                   | 2.18                                  | 98.1%                       | Comply     |
| 7      | 641+375 | 1511.1                              | 2.25                                | 5.8                   | 2.13                                  | 95.8%                       | Comply     |
| 8      | 641+395 | 1431.3                              | 2.28                                | 5.8                   | 2.16                                  | 97.3%                       | Comply     |

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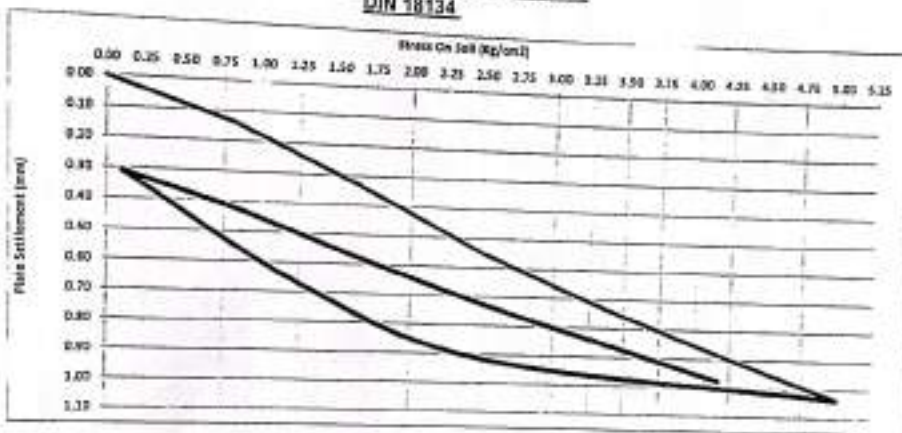
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Company Name  
Project  
Test Date  
report date  
Station  
Test No.

شركة القابض للتقنيات والكهرباء  
: Electric Express Train - Sector (5) - Quss to Amment.  
: 23/01/2024  
: 26/01/2024  
: 641+020  
: 01

## Nonrepetitive Static Plate Load Tests of Soils DIN 18134



| Loading (1)     | 0    | 1    | 2      | 3      | 4      | 5      | 6      |
|-----------------|------|------|--------|--------|--------|--------|--------|
| Stage(Kg)       | 0    | 588  | 1172.8 | 1756.3 | 2340.8 | 2925.3 | 3509.8 |
| Stress (Kg/cm²) | 0.00 | 0.83 | 1.66   | 2.50   | 3.33   | 4.17   | 5.00   |
| Settlement (mm) | 0.00 | 0.14 | 0.33   | 0.55   | 0.73   | 0.89   | 1.04   |

| UnLoading (1)   | 1    | 2    | 3     | 4    |
|-----------------|------|------|-------|------|
| Stage(Kg)       | 3533 | 1766 | 884   | 71   |
| Stress (Kg/cm²) | 5.00 | 2.50 | 1.250 | 0.10 |
| Settlement (mm) | 1.04 | 0.82 | 0.67  | 0.31 |

|                         |                      |           |      |           |      |      |      |
|-------------------------|----------------------|-----------|------|-----------|------|------|------|
| D (mm) =                | 300                  | S1 (mm) = | 0.33 | S2 (mm) = | 0.76 | ΔS = | 0.46 |
| E <sub>v1</sub> (MPa) = | (0.75 * D * ΔS) / ΔS |           |      |           |      |      |      |

$$E_{v2}/E_{v1} = 1.40$$

| Loading (2)     | 0    | 1       | 2      | 3      | 4      | 5      |
|-----------------|------|---------|--------|--------|--------|--------|
| Stage(Kg)       | 0    | 588.395 | 1172.8 | 1756.3 | 2340.8 | 2925.3 |
| Stress (Kg/cm²) | 0.10 | 0.83    | 1.66   | 2.50   | 3.33   | 4.17   |
| Settlement (mm) | 0.31 | 0.42    | 0.53   | 0.73   | 0.89   | 0.98   |

|                         |                      |           |      |           |      |      |      |
|-------------------------|----------------------|-----------|------|-----------|------|------|------|
| D (mm) =                | 300                  | S1 (mm) = | 0.55 | S2 (mm) = | 0.89 | ΔS = | 0.33 |
| E <sub>v2</sub> (MPa) = | (0.75 * D * ΔS) / ΔS |           |      |           |      |      |      |

E<sub>v1</sub> = Modulus of deformation during the loading stage.  
E<sub>v2</sub> = Modulus of deformation during the Reloading stage.  
D = Plate diameter (mm)  
ΔS = The difference between 0.3 and 0.7 from the maximum loading (mm) (kg/cm²)  
ΔS = Difference in settlements corresponding to 0.3 and 0.7 from the maximum loading (mm)



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تليفون + فاكس : ٢٧٣٦٧٢٣١ - ٢٧٣٦٣٠٩٣

Company Name : شركة الذهبى للمقاولات و التوريدات العمومية  
Project : Electric Express Train - Sector (5) - Qous to Asment.  
Test Date : 23/01/2024  
report date : 25/01/2024  
Station : 641+020  
Test No. : 01

**Nonrepetitive Static Plate Load Tests of Soils**  
**DIN 18134**

**Loading Stage (1)**

| Loading | Stress<br>Kg/cm2 | Dial 1 | Settlement<br>mm | Dial 2 | Settlement<br>mm | Average |
|---------|------------------|--------|------------------|--------|------------------|---------|
| 0       | 0.00             | 20.00  | 0.00             | 20.00  | 0.00             | 0.00    |
| 1       | 0.83             | 19.83  | 0.17             | 19.89  | 0.11             | 0.14    |
| 2       | 1.66             | 19.64  | 0.36             | 19.69  | 0.31             | 0.33    |
| 3       | 2.50             | 19.43  | 0.57             | 19.47  | 0.53             | 0.55    |
| 4       | 3.33             | 19.25  | 0.75             | 19.30  | 0.70             | 0.73    |
| 5       | 4.17             | 19.09  | 0.91             | 19.14  | 0.86             | 0.89    |
| 6       | 5.00             | 18.94  | 1.06             | 18.99  | 1.01             | 1.04    |

**Unloading Stage (1)**

| Loading | Stress<br>Kg/cm2 | Dial 1 | Settlement<br>mm | Dial 2 | Settlement<br>mm | Average |
|---------|------------------|--------|------------------|--------|------------------|---------|
| 1       | 2.50             | 19.06  | 0.94             | 19.11  | 0.89             | 0.92    |
| 2       | 1.25             | 19.31  | 0.69             | 19.35  | 0.65             | 0.67    |
| 3       | 0.100            | 19.67  | 0.33             | 19.71  | 0.29             | 0.31    |

**Loading Stage (2)**

| Loading             | Stress<br>Kg/cm2 | Dial 1 | Settlement<br>mm | Dial 2 | Settlement<br>mm | Average |
|---------------------|------------------|--------|------------------|--------|------------------|---------|
| 0                   | 0.83             | 19.60  | 0.40             | 19.55  | 0.45             | 0.42    |
| approximately equal | 1.66             | 19.44  | 0.56             | 19.40  | 0.60             | 0.58    |
| stress is reached.  |                  |        |                  |        |                  |         |
| 2                   | 2.50             | 19.29  | 0.71             | 19.26  | 0.74             | 0.73    |
| 3                   | 3.33             | 19.17  | 0.83             | 19.13  | 0.87             | 0.85    |
| 4                   | 4.17             | 19.04  | 0.96             | 19.01  | 0.99             | 0.98    |



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## Report

1. Evaluation and representation of results.
2. Load Settlement curve.
3. The test report content the following:-
  - location of test site - Dimension of loading plate,
  - Measuring device used - Type of soil,
  - Type of Bedding material below the plate -Weathering condition,
  - Time and date of measurements - Unusual observation made during test ,
  - Dial gauge reading and corresponding normal stress - Loading-settlement curve,
  - Description of the soil condition below the plate after testing.

## Report

- Type of soil : Upper Embankment
- Job requiremer :  $E_{v2} > 60 \text{ MPa}$

| Item                                                             | Descriptions   |
|------------------------------------------------------------------|----------------|
| Type of bedding material below the plate                         | Natural Soil   |
| Plate Diameter (mm)                                              | 300            |
| date of measurement                                              | : 23/01/2024   |
| Unusual observation made during test                             | NO             |
| Description of the soil conditions below the plate after testing | No deformation |

## Evaluation and representation of results

| Test No. | Station |         | Location  | Level<br>( m ) | First Cycle              | Second<br>Cycle          | $E_{v2} / E_{v1}$<br>Ratio |
|----------|---------|---------|-----------|----------------|--------------------------|--------------------------|----------------------------|
|          | From    | To      |           |                | $E_{v1} \text{ ( MPa )}$ | $E_{v2} \text{ ( MPa )}$ |                            |
| 1        | 641+000 | 641+050 | : 641+020 | : 0.0          | 95.8                     | 135.7                    | 1.41                       |

Signature /



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Company : شركة الذهبى للمطاولات والتوريدات المعمارية  
Project : Electric Express Train - Sector (5) - Qous to Arment.  
Subject : Determine the deformation and strength characteristics of soil by the plate loading test according specifications DIN 18134:2012-04 and project requirements  
Test Location : Station 641+000 to 641+030  
Station : 641+020  
Level : 0.0  
Test Date : 23/01/2024  
Report Date : 25/01/2024  
Type of soil : Upper Embankment  
Report No. : 01

Dear Gentleman,

According to the above mentioned subject the test performed as follows:-

#### Apparatus

1. Loading plates consists of two plates with 300 mm and 300 mm diameter
2. The thickness of plates 30 mm
3. Dial gauges with accuracy 0.01 mm to measuring the settlement
4. Steel straightedges with magnetic supports to fixed the dial gauges
5. Hydraulic jack with pump to transfer reactive loads to the loading plates
6. Dial Indicator measuring device with scale capacity 700 Bar (Enerbac)
7. Reaction loading system by roller compactor with weight approximately 15 tons
8. Calibration certificates are attached.

#### Test Procedure:

1. Clean the ground on test area to the required level with undisturbed soil
2. Install loading plates 300 mm and 300 mm diameter, hydraulic jack and 3 dial gauges
3. Prior to starting the test applied preloading about 30 seconds
4. The strain gauge and the dial gauge shall be set to zero
5. For a 300 mm loading plate, the limit values are 5.0 kg/cm<sup>2</sup>
6. The load shall be applied in six stages, in approximately equal increments, until the required maximum normal stress is reached.
7. Each change in load (from stage to stage) shall be completed within one minute
8. The load shall be released in 3 stages, to 60 %, 25 %, and approximately 2 % of the maximum load.
9. Following unloading, a further (2<sup>nd</sup>) loading cycle shall be carried out, in which, however, the load is to be increased only to the penultimate stage of the first cycle (so that the full load is not reached).
10. At each stage the load shall be maintained until the rate of settlement of the plate becomes less than 0.02 mm/min.
11. Remove the loads



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مكتب معامل الإستشارات الهندسية  
مشروعات محافظات الوجه القبلى

Company Name : شركة الأهلي للمقاولات والتوريدات العمومية  
Project : Electric Express Train - Sector (S) - Gous to Arment.  
Test Date : 23/01/2024  
report date : 25/01/2024  
Station : 641+080  
Test No. : 01

## Nonrepetitive Static Plate Load Tests of Soils DIN 18134

### Loading Stage (1)

| Loading | Stress<br>Kg/cm2 | Dial 1 | Settlement<br>mm | Dial 2 | Settlement<br>mm | Average |
|---------|------------------|--------|------------------|--------|------------------|---------|
| 0       | 0.00             | 20.00  | 0.00             | 20.00  | 0.00             | 0.00    |
| 1       | 0.83             | 19.87  | 0.13             | 19.79  | 0.21             | 0.17    |
| 2       | 1.66             | 19.66  | 0.34             | 19.62  | 0.38             | 0.36    |
| 3       | 2.50             | 19.45  | 0.55             | 19.41  | 0.59             | 0.57    |
| 4       | 3.33             | 19.27  | 0.73             | 19.23  | 0.77             | 0.75    |
| 5       | 4.17             | 19.08  | 0.92             | 19.05  | 0.95             | 0.94    |
| 6       | 5.00             | 18.94  | 1.06             | 18.90  | 1.10             | 1.08    |

### Unloading Stage (1)

| Loading | Stress<br>Kg/cm2 | Dial 1 | Settlement<br>mm | Dial 2 | Settlement<br>mm | Average |
|---------|------------------|--------|------------------|--------|------------------|---------|
| 1       | 2.50             | 19.04  | 0.98             | 18.99  | 1.01             | 0.99    |
| 2       | 1.25             | 19.26  | 0.74             | 19.22  | 0.78             | 0.76    |
| 3       | 0.100            | 19.63  | 0.37             | 19.59  | 0.41             | 0.39    |

### Loading Stage (2)

| Loading             | Stress<br>Kg/cm2 | Dial 1 | Settlement<br>mm | Dial 2 | Settlement<br>mm | Average |
|---------------------|------------------|--------|------------------|--------|------------------|---------|
| 0                   | 0.83             | 19.47  | 0.53             | 19.43  | 0.57             | 0.55    |
| approximately equal | 1.66             | 19.32  | 0.68             | 19.28  | 0.72             | 0.70    |
| stress is reached.  |                  |        |                  |        |                  |         |
| 2                   | 2.50             | 19.18  | 0.82             | 19.13  | 0.87             | 0.85    |
| 3                   | 3.33             | 19.03  | 0.97             | 19.00  | 1.00             | 0.98    |
| 4                   | 4.17             | 18.91  | 1.09             | 18.88  | 1.12             | 1.11    |



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## Report

1. Evaluation and representation of results.
2. Load Settlement curve.
3. The test report content the following:-
  - location of test site - Dimension of loading plate.
  - Measuring device used - Type of soil.
  - Type of Bedding material below the plate - Weathering condition.
  - Time and date of measurements - Unusual observation made during test .
  - Dial gauge reading and corresponding normal stress - Loading-settlement curve.
  - Description of the soil condition below the plate after testing.

## Report

- Type of soil : Upper Embankment
- Job requiremer :  $E_{v2} > 60 \text{ MPa}$

| Item                                                             | Descriptions   |
|------------------------------------------------------------------|----------------|
| Type of bedding material below the plate                         | Natural Soil   |
| Plate Diameter (mm)                                              | 300            |
| date of measurement                                              | : 23/01/2024   |
| Unusual observation made during test                             | NO             |
| Description of the soil conditions below the plate after testing | No deformation |

## Evaluation and representation of results

| Test No. | Station |         | Location  | Level<br>( m ) | First Cycle              | Second<br>Cycle          | $E_{v2} / E_{v1}$<br>Ratio |
|----------|---------|---------|-----------|----------------|--------------------------|--------------------------|----------------------------|
|          | From    | To      |           |                | $E_{v1} \text{ ( MPa )}$ | $E_{v2} \text{ ( MPa )}$ |                            |
| 1        | 641+050 | 641+100 | : 641+080 | : 0.0          | 95.1                     | 130.4                    | 1.37                       |

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Company : شركة الذهب للمقاولات والتوريدات الموسمية

Project : Electric Express Train - Sector (B) - Qous to Arment.  
Subject : Determine the deformation and strength characteristics of soil by the  
plate loading test according specifications DIN 18134:2012-04 and project requirements  
Test Location : Station 641+050 to 641+100  
Station : 641+080  
Level : 0.0  
Test Date : 23/01/2024  
Report Date : 26/01/2024  
Type of soil : Upper Embankment  
Report No. : 01

Dear Gentleman,

According to the above mentioned subject the test performed as follows:-

#### Apparatus

1. Loading plates consists of two plates with 300 mm and 300 mm diameter
2. The thickness of plates 30 mm
3. Dial gauges with accuracy 0.01 mm to measuring the settlement
4. Steel straightedges with magnetic supports to fixed the dial gauges
5. Hydraulic jack with pump to transfer reactive loads to the loading plates
6. Dial indicator measuring device with scale capacity 700 Bar (Enerbac)
7. Reaction loading system by roller compactor with weight approximately 15 ton.
8. Calibration certificates are attached.

#### Test Procedure:

1. Clean the ground on test area to the required level with undisturbed soil
2. Install loading plates 300 mm and 300 mm diameter, hydraulic jack and 3 dial gauges
3. Prior to starting the test applied preloading about 30 seconds.
4. The strain gauge and the dial gauge shall be set to zero
5. For a 300 mm loading plate, the limit values are 5.0 kg/cm<sup>2</sup>
6. The load shall be applied in six stages, in approximately equal increments, until the required maximum normal stress is reached.
7. Each change in load (from stage to stage) shall be completed within one minute
8. The load shall be released in 3 stages, to 50 % , 25 % , and approximately 2 % of the maximum load.
9. Following unloading, a further (2<sup>nd</sup>) loading cycle shall be carried out, in which, however, the load is to be increased only to the penultimate stage of the first cycle (so that the full load is not reached).
10. At each stage the load shall be maintained until the rate of settlement of the plate becomes less than 0.02 mm/min.
11. Remove the loads



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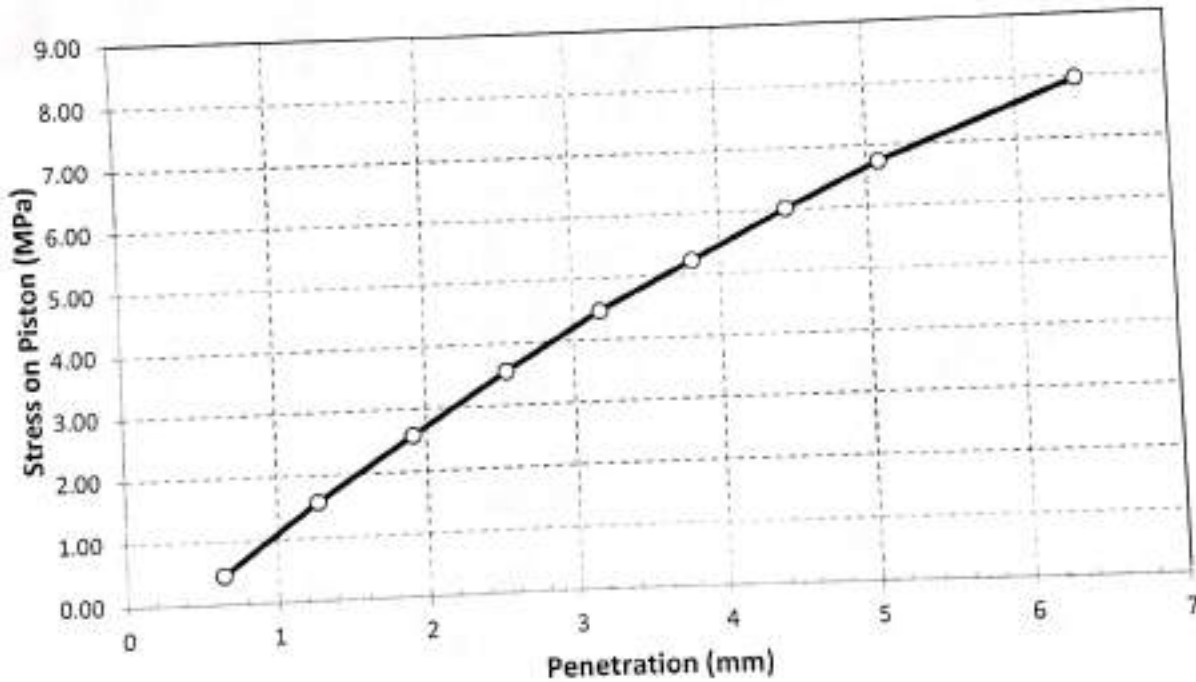
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مكتب معامل الاستشارات الهندسية

Company Name : شركة الذهبى  
Project : Electric Express Train – HSR From Qous To Armant  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

## Load Penetration Curve of CBR Test ASTM D-1883



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Company Name : شركة الذهبي  
Project : Electric Express Train – HSR From Qous To Armant  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

**Test Results of California Bearing Ratio on Base Materials**  
**ASTM D 1883**

| penetration |       | stress on piston (Mpa) |
|-------------|-------|------------------------|
| mm          | Inch  |                        |
| 0.64        | 0.025 | 0.46                   |
| 1.27        | 0.050 | 1.58                   |
| 1.91        | 0.075 | 2.58                   |
| 2.54        | 0.100 | 3.55                   |
| 3.18        | 0.125 | 4.47                   |
| 3.81        | 0.150 | 5.23                   |
| 4.45        | 0.175 | 6.03                   |
| 5.08        | 0.200 | 6.74                   |
| 6.35        | 0.250 | 7.97                   |

| CBR Result                        | Stress (Mpa) |                | CBR 100 % |
|-----------------------------------|--------------|----------------|-----------|
|                                   | St. Value    | Sample results |           |
| At 0.1 inch (2.54 mm) penetration | 6.90         | 3.55           | 51.5 %    |

**Notes:**

- 1- Attached graph shows penetration resistance versus penetration magnitude.
- 2- The sample was compacted to dry density of  $= 2.22 \text{ (gm/cm}^3\text{)}$   
At = 6.4 % optimum water content.
- 3- Surcharge load 4.50 Kg.
- 4- CBR > 10 for middle and lower embankments according project spec page No 36.

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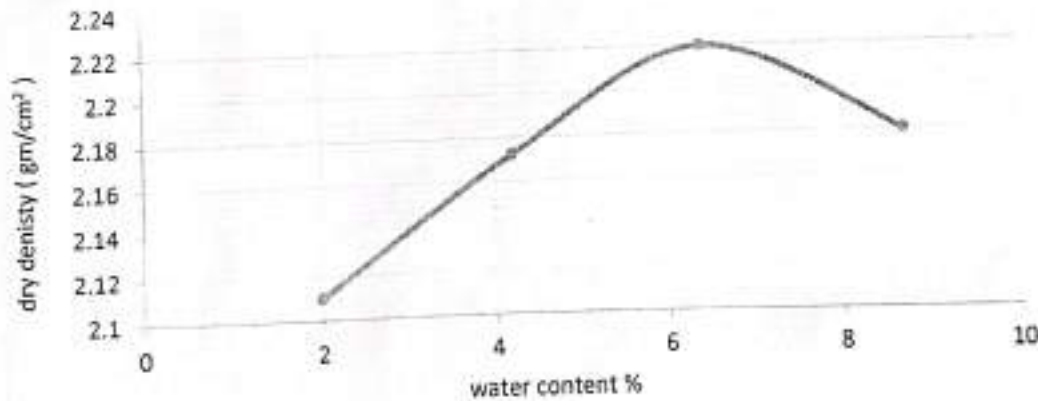
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Company Name : شركة الذهبي  
Project : Electric Express Train – HSR From Qous To Armant  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

**Moisture – Density relation of soil**  
**Test result (Modified proctor test)**  
**ASTM D-1557**



- Max dry density (gm/cm³) : 2.22
- Optimum moisture content % : 6.4 %

Signature /

*[Handwritten Signature]*



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Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Armant  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

## Soil Classification

| TEST                   | Results<br>(%) | Limits according<br>Projects Specs |          |          |
|------------------------|----------------|------------------------------------|----------|----------|
|                        |                | (A-1-a)                            | (A-1-b)  | (A-2-4)  |
| • Group Classification | (A-1-a)        | (A-1-a)                            | (A-1-b)  | (A-2-4)  |
| 2.00 mm (No.10).       | 27.5           | Max 50 %                           | -----    | -----    |
| 0.425 mm (No. 40).     | 15.6           | Max 30 %                           | Max 50 % | -----    |
| 0.075 mm (No. 200).    | 9.1            | Max 15 %                           | Max 15 % | Max 15 % |
| Liquid Limit           | -----          | -----                              | -----    | -----    |
| Plasticity index       | 0              | Max 6 %                            | Max 6 %  | Max 10 % |

The test results are ( ☐ Comply - ☐ Not Comply ) with specifications limits

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Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Armant  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

**Results of liquid limit and plasticity index  
of soils according to ASTM D-4318**

| Test             | Results<br>(%) |
|------------------|----------------|
| Liquid Limit     | 0              |
| Plastic Limit    | 0              |
| Plasticity Index | 0              |

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Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Armant  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 08/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

Materials finer than 75  $\mu$ m (no.200) sieve  
By washing ASTM D-1140.

| Test                                                             | Results (%) |
|------------------------------------------------------------------|-------------|
| Percentage of material finer than Sieve Size 75 $\mu$ M (No.200) | 9.1         |

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مركز أبحاث الهندسة  
المعالم الهندسية  
القاهرة - مصر

Company Name : شركة الذهبى  
 Project : Electric Express Train – HSR From Qous To Armant  
 Location : ST:641+400 E= 492410,088 N=2862759,57  
 Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
 Delivery Date : 08/01/2024  
 Reporting Date : 11/1/2024  
 Reporting No. : 10-19

RESULTS OF SIEVE ANALYSIS According to ASTM D-422.

| Sieve Size (mm) | Sieve Size (IN) | Passing % |
|-----------------|-----------------|-----------|
| 50              | 2               | 95.1      |
| 37.5            | 1.5             | 91.9      |
| 25              | 1               | 80.7      |
| 19              | $\frac{3}{4}$   | 72.2      |
| 12.50           | $\frac{1}{2}$   | 64.1      |
| 9.50            | $\frac{3}{8}$   | 45.8      |
| 4.75            | 4               | 34.6      |
| 2.00            | 10              | 27.5      |
| 0.425           | 40              | 15.6      |

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Company Name : شركة الذهبى  
Project : Electric Express Train – HSR From Qous To Armant  
Location : ST:641+400 E= 492410,088 N=2862759,57  
Type of sample : Soil Embankment ( Upper Embankment 0.0 M )  
Delivery Date : 03/01/2024  
Reporting Date : 11/1/2024  
Reporting No. : 10-19

Dear Gentleman ,

Attached here with the delivered on 08 / 01 / 2024

This sample is representative for 5.000 M<sup>3</sup>

## Materials test

1. Sieve analysis according to ASTM D-422.
2. Material finer than sieve No. 200 according to ASTM D-1140.
3. Liquid limits and plasticity index of soil according to ASTM D-4318.
4. Soil classification according to Project Specs.
5. Proctor Test according to ASTM D-1557
6. CBR according to ASTM D-1883

Signature / .....

Consultant Eng : Abderrahman Ahmed



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إبراهيم عبد الرحمن  
المقر الرئيسي  
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# CEL

Consulting Engineering Bureau & Laboratories  
مكتب معامل الاستشارات الهندسية

Company Name : شركة الذهبى  
Project : Electric Express Train - HSR From Qous To Armant  
Testing Date : 23 / 1 / 2024  
Soil type : Upper Embankment  
Location : ST From 641+000 To 641+200  
Level : - 0.0 M  
Report No. : 139

Compaction test by using Sand - Cone Test Method  
ASTM D- 1556

| Test # | Station | Test Hole Volume cm <sup>3</sup> | Bulk Density gm/ cm <sup>3</sup> | Moisture Content % | Dry Density (gm/ cm <sup>3</sup> ) | Degree of Compaction (%) | Acceptance |
|--------|---------|----------------------------------|----------------------------------|--------------------|------------------------------------|--------------------------|------------|
| 1      | 641+025 | 1465.3                           | 2.27                             | 5.3                | 2.15                               | 97.0%                    | Comply     |
| 2      | 641+050 | 1527.8                           | 2.25                             | 5                  | 2.14                               | 96.4%                    | Comply     |
| 3      | 641+075 | 1575.0                           | 2.29                             | 5.3                | 2.18                               | 98.1%                    | Comply     |
| 4      | 641+100 | 1660.4                           | 2.26                             | 5.8                | 2.13                               | 96.0%                    | Comply     |
| 5      | 641+125 | 1575.0                           | 2.29                             | 5.8                | 2.16                               | 97.3%                    | Comply     |
| 6      | 641+150 | 1667.4                           | 2.22                             | 5.3                | 2.11                               | 94.9%                    | Comply     |
| 7      | 641+175 | 1552.8                           | 2.26                             | 5.3                | 2.15                               | 96.7%                    | Comply     |
| 8      | 641+198 | 1515.3                           | 2.28                             | 5.8                | 2.16                               | 97.1%                    | Comply     |

Degree of compaction based on proctor test dated At

Max. dry density = 2.22 gm/cm<sup>3</sup>

At optimum moisture content = 6.4 %

Signature /



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