الهيئة العامة
للطرق و الكباري
(GARB)

قائمة الكميات الواردة بالمستخلص جاري (1)

أعمال الجسر الترابي للخط الأول للقطار الكهربائي السريع قطاع (برج العرب/العلمين) المسافة من الكم 371+000 إلى الكم 371+500 بطول 0.5 كم

رقم البند و بيانه : (3-1) بالمتر المكعب اعمال توريد وتشغيل اتربة صالحة للردم و مطابقة للمواصفات

تـنـفـيـذ : شركة الشاه للمقاولات العامة

مقدار العمل السابق : 0.0 م3

بيان الاعمال بالمقايسة	رقم الطلب	الموقع الكيلومتري		الابعاد (متر)		الكمية
		من	الى	طول	مساحة المقطع	
اعمال تحميل وتوريد تربة مطابقة للمواصفات والتشغيل باستخدام الات التسوية بسمك لا يزيد عن 30 سم حتى منسوب -2 متر وبسمك لا يزيد عن 25 سم لاستكمال المنسوب التصميمي لتشكيل الجسم والاكتاف (تربة تحمل كاليفورنيا لا تقل عن 15%) ورشها بالمياه للوصول الى نسبة الرطوبة المطلوبة والدك الجيد بالهراسات للوصول الى اقصى كثافة جافة (95% من الكثافة الجافة القصوى) ويتم التنفيذ طبقا للمناسيب التصميمية والقطاعات العرضية والطولية والرسومات التفصيلية المعتمدة [illegible] ومواصفات الهيئة العامة للطرق والكباري وتعليمات المهندس المشرف. في حالة طلب جهاز الإشراف زيادة نسبة الدمك عن 95% [illegible] مسافة النقل حتى 2 كم [illegible] - السعر يشمل [illegible] ونقل الى موقع العمل حتى مسافة 2 كم - السعر يشمل قيمة المادة المحجورة.	IR- F.1	371+000	371+100	100	5.1	510
	IR- F.2	371+000	371+100	100	5	500
	IR- F.3	371+000	371+100	100	4.9	490
	IR- F.4	371+000	371+100	100	4.83	483
	IR- F.5	371+000	371+100	100	4.8	480
اجمالي الكميات خلال فترة المستخلص الحالية (م3)						2463.00
الاجمالي الكلي (م3)						2463.00

مهندس الشركة
م / محمود شعبان

مهندس الاستشاري
مكتب XYZ
م / محمد خليل

مهندس الاستشاري
مكتب [illegible]
م / عبد العزيز مصطفى

مدير مشروع الهيئة
م/ مارجريت مجدي

SPECTRUM CONSULTING

مشروع القطار السريع غرب النيل

شركة الشاه للمقاولات العامة

الهيئة العامة
للطرق و الكباري
(GARB)
وزارة النقل

قائمة الكميات الواردة بالمستخلص جاري (1)

أعمال الجسر الترابي للخط الأول للقطار الكهربائي السريع قطاع (برج العرب/العلمين) المسافة من الكم 371+000 إلى الكم 371+500 بطول 0.5 كم

رقم البند و بيانه : (3-1) بالمتر المكعب اعمال توريد وتشغيل اتربة صالحة للردم و مطابقة للمواصفات
(علاوة تحصيل رسوم الكارتات و الموازين طبقا للائحه الشركه الوطنيه)

تنفيذ : شركة انشاء للمقاولات العامة

مقدار العمل السابق : 0.0 م3

بيان الأعمال بالمقايسة	رقم الطلب	الموقع الكيلومتري		الأبعاد (متر)		الكمية
		من	إلى	طول	مساحة المقطع	
اعمال تحميل وتوريد اتربة مطابقة للمواصفات وتشغيلها باستخدام الالات المسوية بسمك لا يزيد من 30 سم حتى منسوب -1 متر وبسمك لا يزيد عن 25 سم لاستكمال المنسوب التصميمي لتشكيل الجسر والاكتاف بنسبة تحمل كاليفورنيا لا تقل عن 15% وريها والمياه اللازمة الى نسبة الرطوبة المطلوبة والدمك الجيد بالهراسات للوصول الى اقصى كثافة جافة (95% من الكثافة الجافة القصوى) ويتم التنفيذ طبقا للمناسيب التصميمية و القطاعات العرضية النموذجية والرسومات التفصيلية المعتمدة والبند يشمل جميع مشتملاته طبقا لاصول الصناعة ومواصفات الهيئة العامة للطرق والكباري وتعليمات المهندس المشرف. -في حالة طلب جهاز الاشراف زيادة نسبة الدمك عن 95% يحتسب زيادة 1 جنيه على زيادة نسبة الدمك لكل 1%. -مسافة النقل حتى 2 كم ويتم احتساب علاوة 1.4 جنيه للكم زيادة او النقصان. -السعر يشمل عمل تشوينات وتقليب واختبارات ونقل لمواقع العمل حتى مسافة 2 كم -السعر يشمل [illegible] المصرية.	IR- F.1	371+000	371+100	100	5.1	510
	IR- F.2	371+000	371+100	100	5	500
	IR- F.3	371+000	371+100	100	4.9	490
	IR- F.4	371+000	371+100	100	4.83	483
	IR- F.5	371+000	371+100	100	4.8	480
اجمالي الكميات خلال فترة المستخلص الحالية (م3)						2463.00
الاجمالي الكلي (م3)						2463.00

مهندس الشركة	مهندس الاستشاري	مهندس الاستشاري	مدير مشروع الهيئة
	مكتب XYZ	مكتب د/ عماد نبيل	
م / محمود شعبان	م / محمد خليل	م / عبد الخالق مصطفى	م/ مارجريت مجدي

SPECTRUM CONSULTING

مشروع القطار السريع غرب النيل

شركة انشاء للمقاولات العامة

الهيئة العامة
للطرق و الكباري
(GARB)

قائمة الكميات الواردة بالمستخلص جاري (1)

أعمال الجسر الترابي للخط الأول للقطار الكهربائي السريع قطاع (برج العرب/العلمين) المسافة من الكم 371+000 إلى الكم 371+500 بطول 0.5 كم

رقم البند و بيانه : (1-3) بالمتر المكعب اعمال توريد وتشغيل اتربة صالحة للردم و مطابقة للمواصفات
(علاوة مسافة نقل الاتربة لمسافة 88 كم) (86*1.4=120.4)

تـنـفـيـذ : شركة انشاء للمقاولات العامة

مقدار العمل السابق : 0.0 م3

بيان الأعمال بالمقايسة	رقم الطلب	الموقع الكيلومتري		الأبعاد (متر)		نسبة العلاوة	الكمية
		من	الى	طول	مساحة المقطع		
العمل تحميل وتوريد اتربة مطابقة للمواصفات وتشغيلها باستخدام الات الهندسية بسمك لا يزيد عن 30 سم من منسوب 2 مم وبسمك لا يزيد عن 25 سم لاستكمال المنسوب التصميمي لتشكيل الجسر والاكتفاء بنسبة تحميل كاليفورنيا لا تقل عن 8% [illegible] [illegible] والتعامل الجيد [illegible] للوصول الى القمم كثافة جافة (95% من الكثافة الجافة القصوى) ويتم التنفيذ طبقا [illegible] والقطاعات [illegible] والرسومات [illegible] وطبقا لجميع [illegible] الاصول الفنية ومواصفات الهيئة العامة للطرق و الكباري وتعليمات المهندس المشرف في حالة طلب جهاز الاشراف زيادة نسبة الدمك عن 95% يحتسب زيادة 1 جنيه على زيادة نسبة الدمك [illegible] مسافة النقل حتى 2 كم ويتم احتساب علاوة 1.4 جنيه للكم بالزيادة او النقصان السعر يشمل عمل تسويات وتخطيط واختبارات ونقل المواقع العمل حتى مسافة 2 كم السعر يشمل [illegible]	IR- F.1	371+000	371+100	100	5.1	80%	408
	IR- F.2	371+000	371+100	100	5	80%	400
	IR- F.3	371+000	371+100	100	4.9	80%	392
	IR- F.4	371+000	371+100	100	4.83	80%	386.4
	IR- F.5	371+000	371+100	100	4.8	80%	384
اجمالي الكميات خلال فترة المستخلص الحالية (م^3)							1970.4
الاجمالي الكلي (م^3)							1970.4

مهندس الشركة	مهندس الاستشاري	مهندس الاستشاري	مدير مشروع الهيئة
م / محمود شعبان	مكتب XYZ	مكتب د/ عفاف نبيل	م/ مارجريت مجدي
	م / محمد خليل	أ.د / عبد العزيز مصطفى	

SPECTRUM CONSULTING

مشروع القطار السريع غرب النيل

شركة انشاء للمقاولات العامة
ايمن محمد محمود رضوان وشركاه

الهيئة العامة
الطرق و الكباري
(GARB)

قائمة الكميات الواردة بالمستخلص جاري (1)

أعمال الجسر الترابي للخط الأول للقطار الكهربائي السريع قطاع (برج العرب/العلمين) المسافة من الكم 371+000 إلى الكم 371+500 بطول 0.5 كم

رقم البند و بيانه : (3-1) بالمتر المكعب اعمال توريد وتشغيل اتربة صالحة للردم و مطابقة للمواصفات
[علاوة مسافة نقل الرمل لمسافة 68 كم] (66*1.4=92.4)

تـنفيــذ : شركة النشاء للمقاولات العامة

مقدار العمل السابق : 0.0 م3

الكمية	نسبة العلاوة	الأبعاد (متر)		الموقع الكيلومتري		رقم الطلب	بيان الأعمال والمقايسة
		مساحة المقطع	طول	إلى	من		
102	20%	5.1	100	371+100	371+000	IR- F.1	أعمال تحميل وتوريد تربة مطابقة للمواصفات وفردها وتشغيلها باستخدام آلات التسوية بسمك لا يزيد عن 30 سم حتى منسوب 2 متر وبسمك لا يزيد عن 25 سم لاستكمال المنسوب التصميمي لتشكيل الجسر [illegible] [illegible] ... والمواصفات الفنية للهيئة العامة للطرق والكباري وتعليمات المهندس المشرف [illegible]
100	20%	5	100	371+100	371+000	IR- F.2	
98	20%	4.9	100	371+100	371+000	IR- F.3	
96.6	20%	4.83	100	371+100	371+000	IR- F.4	
96	20%	4.8	100	371+100	371+000	IR- F.5	
492.6	اجمالي الكميات خلال فترة المستخلص الحالية (م3)						
492.6	الاجمالـي الكلي (م3)						

مهندس الشركة
م / محمود شعبان

مهندس الاستشاري
مكتب XYZ
م / محمد خليل

مهندس الاستشاري
مكتب د/ عماد نبيل
م/ عبد العزيز مصطفى

مدير مشروع الهيئة
م/ مارجريت مجدي

مشروع القطار السريع غرب النيل

شركة النشاء للمقاولات العامة

الهيئة العامة
للطرق و الكباري
(GARB)

قائمة الكميات الواردة بالمستخلص جاري (1)

أعمال الجسم الترابي للخط الأول للقطار الكهربائي السريع قطاع (برج العرب/العلمين) المسافة من الكم 371+000 إلى الكم 371+500 بطول 0.5 كم

رقم البند وبيانه : (4-1) بالمتر المكعب اعمال توريد وفرش طبقة الأساس (prepared subgrade) من الاحجار الصلبة المتدرجة ناتج تكسير الكسارات والمطابقة للمواصفات ......

تـنفيـذ : شركة إنشاء للمقاولات العامة

مقدار العمل السابق : 0.0 م3

بيان الأعمال بالمقايسة	رقم الطلب	الموقع الكيلومتري		الابعاد (متر)		الكمية
		من	الى	طول	مساحة المقطع	
بالمتر المكعب اعمال توريد وفرش طبقة تأسيس (prepared subgrade) من الاحجار الصلبة المتدرجة ناتج تكسير الكسارات والمطابقة للمواصفات [illegible] 100 سم [illegible] 12% [illegible] مسافة النقل [illegible] كم [illegible]	IR(PSG-1)	371+100	371+300	200	4.118	823.60
	IR(PSG-2)REV	371+300	371+500	200	3.919	783.80
	IR(PSG-3)REV	371+220	371+300	80	3.919	313.52
	IR(PSG-4)	371+100	371+220	120	3.919	470.28
	IR(PSG-5)	371+000	371+100	100	4.118	411.80
	IR(PSG-6)	371+000	371+100	100	3.919	391.90
اجمالي الكميات خلال فترة المستخلص الحالية (م3)						3194.90
الاجمالـي الكلـي (م3)						3194.90

مهندس الشركة	مهندس الاستشاري	مهندس الاستشاري	مدير مشروع الهيئة
	مكتب XYZ	مكتب د/ عماد نبيل	
م / محمود شعبان	م / محمد خليل	م/عبدالعزيز مصطفى	م / مارجريت مجدي زاخر

الهيئة العامة
للطرق و الكباري
(GARB)
وزارة النقل

قائمة الكميات الواردة بالمستخلص جاري (1)

اعمال الجسر الترابي للخط الأول للقطار الكهربائي السريع قطاع (برج العرب/العلمين) المسافة من الكم 371+000 إلى الكم 371+500 بطول 0.5 كم

رقم البند و بيانه : (4-1) بالمتر المكعب اعمال توريد وفرش طبقة الاساس (prepared subgrade) من الاحجار الصلبة المتدرجة ناتج تكسير الكسارات والمطابقة للمواصفات...(علاوة تحصيل رسوم الكارتات و الموازين طبقا للائحه الشركه الوطنيه)

تـنفيـذ : شركة إنشاء للمقاولات العامة

مقدار العمل السابق : 0.0 م3

بيان الاعمال بالمقايسة	رقم الطلب	الموقع الكيلومتري		الأبعاد (متر)		الكمية
		من	الى	طول	مساحة المقطع	
بالمتر المكعب اعمال توريد وفرش طبقة الاساس (prepared subgrade) من الاحجار الصلبة المتدرجة ناتج تكسير الكسارات والمطابقة للمواصفات والتمرير لمقاسات 100 مم ولا تزيد نسبة المار من منخل 200 عن 12% والتدرج طبقا للاشتراطات الخاصة بالمشروع لا تقل نسبة تحمل كاليفورنيا عن 25% ولا تزيد نسبة الفاقد بجهاز لوس انجلوس عن 35% و لا تزيد الامتصاص عن 15% ولا يقل معامل (Ev2) من تجربة لوح التحميل عن 80 ميجاباسكال [illegible] GPS [illegible] 25 سم [illegible] من 95% [illegible] المشروع [illegible] مسافة النقل 80 كم. يتم احتساب 2.2 طن/م [illegible]. السعر يشمل قيمة [illegible].	IR(PSG-1)	371+100	371+300	200	4.118	823.60
	IR(PSG-2)REV	371+300	371+500	200	3.919	783.80
	IR(PSG-3)REV	371+220	371+300	80	3.919	313.52
	IR(PSG-4)	371+100	371+220	120	3.919	470.28
	IR(PSG-5)	371+000	371+100	100	4.118	411.80
	IR(PSG-6)	371+000	371+100	100	3.919	391.90
اجمالي الكميات خلال فترة المستخلص الحالية ($م^3$)						3194.90
الاجمالـي الكلـي ($م^3$)						3194.90

مهندس الشركة	مهندس الاستشاري	مهندس الاستشاري	مدير مشروع الهيئة
	مكتب XYZ	مكتب د/عماد نبيل	
م / محمود شعبان	م / محمد خليل	م/عبدالعزيز مصطفى	م / مارجريت مجدي زاخر

الهيئة العامة
للطرق و الكباري
(GARB)

قائمة الكميات الواردة بالمستخلص جاري (1)

أعمال الجسر الترابي للخط الأول للقطار الكهربائي السريع قطاع (برج العرب/العلمين) المسافة من الكم 371+000 إلى الكم 371+500 بطول 0.5 كم

رقم البند و بيانه : (1-4) بالمتر المكعب اعمال توريد وفرش طبقة الاساس (prepared subgrade) من الاحجار الصلبة المتدرجة ناتج تكسير الكسارات والمطابقة للمواصفات ... (علاوة مسافة نقل السن 83كم)(63*1.2=75.6)

تـنفيـذ : شركة إنشاء للمقاولات العامة

مقدار العمل السابق : 0.0 م3

بيان الاعمال بالمقايسة	رقم الطلب	الموقع الكيلومتري		الابعاد (متر)		الكمية
		من	الى	طول	مساحة المقطع	
بالمتر المكعب اعمال توريد وفرش طبقة تأسيس (prepared subgrade) من الاحجار الصلبة المتدرجة ناتج تكسير الكسارات والمطابقة للمواصفات [illegible] مسافة النقل 83 كم. يتم احتساب 1.2 [illegible]	IR(PSG-1)	371+100	371+300	200	4.118	823.60
	IR(PSG-2)REV	371+300	371+500	200	3.919	783.80
	IR(PSG-3)REV	371+220	371+300	80	3.919	313.52
	IR(PSG-4)	371+100	371+220	120	3.919	470.28
	IR(PSG-5)	371+000	371+100	100	4.118	411.80
	IR(PSG-6)	371+000	371+100	100	3.919	391.90
اجمالي الكميات خلال فترة المستخلص الحالية ($م^3$)						3194.90
الاجمالــي الكلــي ($م^3$)						3194.90

مهندس الشركة	مهندس الاستشاري	مهندس الاستشاري	مدير مشروع الهيئة
	مكتب XYZ	مكتب د/عماد نبيل	
م / محمود شعبان	م / محمد خليل	م/عبدالعزيز مصطفى	م / مارجريت مجدي زاخر

SPECTRUM CONSULTING

الهيئة العامة للطرق والكباري (GARB)

قائمة الكميات الواردة بالمستخلص جاري (1)

أعمال الجسر الترابي للخط الأول للقطار الكهربائي السريع قطاع (برج العرب/العلمين)
المسافة من الكم 000+371 إلى الكم500+371 بطول0.5 كم

رقم البند و بيانه : (4-2) بالمتر المكعب اعمال توريد وفرش طبقة اساس من الاحجار الصلبة المتدرجة ناتج تكسير الكسارات والمطابقة للمواصفات.......

تنفيذ : شركة إنشاء للمقاولات العامة

مقدار العمل السابق : 0.0 م3

بيان الاعمال بالمقايسة	رقم الطلب	الموقع الكيلومتري		الأبعاد (متر)		الكمية
		من	الى	طول	مساحة المقطع	
بالمتر المكعب اعمال توريد وفرش طبقة اساس من الاحجار الصلبة المتدرجة ناتج تكسير الكسارات والمطابقة للمواصفات والتي حجم الحبيبات ما بين 31.5 مم الى 40 مم والا يزيد نسبة المار من منخل 200 عن 8% وتخضع لتوريد والاشتراطات العامة بالمشروع لا تقل نسبة تحمل كاليفورنيا عن 80% ولا يقل معامل المرونة (Ev2) من تجربة لوح التحميل عن 120 ميجاباسكال ولا يزيد نسبة الفاقد بجهاز لوس انجلوس عن 30% ولا يزيد الامتصاص عن 1.5% ويتم فردها على طبقتين باستخدام الات التسوية المختلفة على الا يزيد سمك الطبقة بعد تمام الدمك عن 20 سم ورشها بالمياه الاضافية للوصول الى نسبة الرطوبة المطلوبة بالمعدات اللازمة والهراسات للوصول الى اقصى كثافة جافة قصوى لا تقل عن 100% من الكثافة المعملية وكذلك تشمل اجراء التجارب المعملية والحقلية ويتم تنفيذ طبقا للاصول الفنية والرسومات التفصيلية المعتمدة وتبعا لجميع متطلبات المواصفات الفنية للمشروع وتوجيهات الاستشاري وتعليمات المهندس المشرف. مسافة النقل 20 كم. يتم احتساب 1.2 نقلة للكم بالزيادة او النقصان. السعر يشمل ضريبة القيمة المضافة المصرية.	IR(SB-1)	371+380	371+500	120	2.991	358.92
	IR(SB-2)	371+280	371+380	100	2.991	299.10
	IR(SB-3)	371+100	371+220	120	2.991	358.92
	IR(SB-4)REV	371+220	371+280	60	2.991	179.46
	IR(SB-5)	371+000	371+100	100	2.991	299.10
	IR(SB-6)	371+400	371+500	100	2.864	286.40
	IR(SB-7)REV	371+000	371+100	100	2.864	286.40
	IR(SB-8)REV	371+100	371+200	100	2.864	286.40
	IR(SB-9)	371+200	371+300	100	2.864	286.40
	IR(SB-10)	371+300	371+400	100	2.864	286.40
اجمالي الكميات خلال فترة المستخلص الحالية (م3)						2927.50
الاجمالي الكلي (م3)						2927.50

مهندس الشركة	مهندس الاستشاري	مهندس الاستشاري	مدير مشروع الهيئة
	مكتب XYZ	مكتب د/عماد نبيل	
م/محمود شعبان	م / محمد خليل	م/عبدالعزيز مصطفى	م / مارجريت مجدي زاخر

SPECTRUM CONSULTING

مشروع القطار السريع غرب النيل

الهيئة العامة
للطرق و الكباري
(GARB)

قائمة الكميات الواردة بالمستخلص جاري (1)

أعمال الجسر الترابي للخط الأول للقطار الكهربائي السريع قطاع (برج العرب/العلمين)
المسافة من الكم 000+371 إلى الكم500+371 بطول 0.5 كم

رقم البند وبيانه : (4-2) بالمتر المكعب اعمال توريد وفرش طبقة اساس من الاحجار الصلبة المتدرجة ناتج تكسير الكسارات والمطابقة للمواصفات........(علاوة تحصيل رسوم الكارتات و الموازين طبقا للائحه الشركه الوطنيه)

تـنـفـيـذ : شركة إنشاء للمقاولات العامة

مقدار العمل السابق : 0.0 م3

بيان الاعمال بالمقايسة	رقم الطلب	الموقع الكيلومتري		الأبعاد (متر)		الكمية
		من	الى	طول	مساحة المقطع	
بالمتر المكعب اعمال توريد وفرش طبقة اساس من الاحجار الصلبة المتدرجة ناتج تكسير الكسارات والمطابقة للمواصفات واقصى حجم للحبيبات ما بين 37.5 مم الى 40 مم ولا يزيد نسبة المار من منخل 200 عن 5% والمرفق الوارد بالاشتراطات الخاصة بالمشروع لا تقل نسبة تحمل كاليفورنيا عن 80% ولا يقل معامل التربة (2x2) من تجربة لوح التحميل عن 120 ميجاباسكال ولا يزيد نسبة الفاقد بجهاز لوس انجلوس عن 30% ولا تزيد الامتصاص عن 15% ويتم فردها على طبقتين باستخدام الات التسوية الحديثة على الا يزيد سمك الطبقة بعد تمام الدمك عن 20 سم ورشها بالمياه الاصولية للوصول الى نسبة الرطوبة المطلوبة واستخدام الهراسات للوصول الى اقصى كثافة جافة المعملي (لا يقل عن 100%) من الكثافة المعملية والفئة تشمل اجراء التجارب المعملية والحقلية ويتم تنفيذ طبقا لاصول الصناعة والرسومات التفصيلية المعتمدة وإيفاء بجميع مشتملاته طبقا للمواصفات الفنية للمشروع واوامر الاستشاري وتعليمات المهندس المشرف -مسافة النقل 20 كم. -يتم احتساب 1.2 جنيه لكل كم بالزيادة او النقصان. - السعر يشمل قيمة المادة المحجرية	IR(SB-1)	371+380	371+500	120	2.991	358.92
	IR(SB-2)	371+280	371+380	100	2.991	299.10
	IR(SB-3)	371+100	371+220	120	2.991	358.92
	IR(SB-4)REV	371+220	371+280	60	2.991	179.46
	IR(SB-5)	371+000	371+100	100	2.991	299.10
	IR(SB-6)	371+400	371+500	100	2.864	286.40
	IR(SB-7)REV	371+000	371+100	100	2.864	286.40
	IR(SB-8)REV	371+100	371+200	100	2.864	286.40
	IR(SB-9)	371+200	371+300	100	2.864	286.40
	IR(SB-10)	371+300	371+400	100	2.864	286.40
اجمالي الكميات خلال فترة المستخلص الحالية (م3)						2927.50
الاجمالـي الكلـي (م3)						2927.50

مهندس الشركة	مهندس الاستشاري	مهندس الاستشاري	مدير مشروع الهيئة
	مكتب XYZ	مكتب د/عماد نبيل	
م /محمود الشعبان	م / محمد خليل	م/عبد العزيز مصطفى	م / مارجريت مجدي زاخر

الهيئة العامة
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قائمة الكميات الواردة بالمستخلص جاري (1)

أعمال الجسر الترابي للخط الأول للقطار الكهربائي السريع قطاع (برج العرب/العلمين)
المسافة من الكم 000+371 إلى الكم500+371 بطول0.5 كم

رقم البند و بيانه : (2-4) بالمتر المكعب اعمال توريد وفرش طبقة اساس من الاحجار الصلبة المتدرجة ناتج تكسير الكسارات والمطابقة للمواصفات........(علاوة مسافة نقل السن83كم)(63*1.2=75.6)

تـنـفـيـذ : شركة إنشاء للمقاولات العامة

مقدار العمل السابق : 0.0 م3

بيان الاعمال بالمقايسة	رقم الطلب	الموقع الكيلومتري		الابعاد (متر)		الكمية
		من	الى	طول	مساحة المقطع	
بالمتر المكعب اعمال توريد وفرش طبقة اساس من الاحجار الصلبة المتدرجة ناتج تكسير الكسارات والمطابقة للمواصفات والتي حجم الحبيبات ما بين 31.5 مم الي 40 مم ولا يزيد نسبة المار من منخل 200 عن 5% بالجدول الوارد بالاشتراطات الخاصة بالمشروع لا تقل نسبة تحمل كاليفورنيا عن 80% ولا يقل معامل المرونة (Ev2) من تجربة لوح التحميل عن 120 ميجاباسكال ولا يزيد نسبة الفاقد بجهاز لوس انجلوس عن30% ولا يزيد الامتصاص عن 15% ويتم فردها علي طبقات باستخدام الات التسوية الحديثة علي الا يزيد سمك الطبقة بعد تمام الدمك عن 20 سم ورشها بالمياه الاحوالية الرجوع الي نسبة الرطوبة المطلوبة والدمك الجيد بالهراسات للوصول الي اقصي كثافة جافة قصوي (لا يقل عن 100%) من الكثافة المعملية والفئة تشمل اجراء التجارب المعملية والحقلية ويتم تنفيذ طبقا لاصول الصناعة والرسومات التفصيلية المعتمدة بالبند بجميع مشتملاته طبقا للمواصفات الفنية للمشروع والفريق الاستشاري وتعليمات المهندس المشرف. مسافة النقل 20 كم. يتم احتساب 1.2 جنية للكم بالزيادة او النقصان. السعر يشمل اتاوة المادة المحجرية	IR(SB-1)	371+380	371+500	120	2.991	358.92
	IR(SB-2)	371+280	371+380	100	2.991	299.10
	IR(SB-3)	371+100	371+220	120	2.991	358.92
	IR(SB-4)REV	371+220	371+280	60	2.991	179.46
	IR(SB-5)	371+000	371+100	100	2.991	299.10
	IR(SB-6)	371+400	371+500	100	2.864	286.40
	IR(SB-7)REV	371+000	371+100	100	2.864	286.40
	IR(SB-8)REV	371+100	371+200	100	2.864	286.40
	IR(SB-9)	371+200	371+300	100	2.864	286.40
	IR(SB-10)	371+300	371+400	100	2.864	286.40
اجمالي الكميات خلال فترة المستخلص الحالية (م3)						2927.50
الاجمالي الكلي (م3)						2927.50

مهندس الشركة	مهندس الاستشاري	مهندس الاستشاري	مدير مشروع الهيئة
	مكتب XYZ	مكتب د/عواد خليل	
م /محمود شعبان	م / محمد خليل	م/عبدالخالق مصطفى	م / مارجريت مجدي زاخر

SPECTRUM CONSULTING

مشروع القطار السريع غرب النيل

الهيئة العامة
للطرق و الكباري
(GARB)

محضر استلام موقع

مشروع: أعمال الجسر الترابي للخط الأول للقطار الكهربائي السريع قطاع (برج العرب - العلمين) في المسافة من الكم 000+371 إلى الكم 500+371 بطول 0.5 كم

تنفيذ: شركة إنشاء للمقاولات العامة .

إشراف : المنطقة الخامسة – منطقة غرب الدلتا

طبقاً للعقد رقم (2024/2023/814) بتاريخ 2023/12/04

إنه في يوم الاربعاء الموافق 2023/12/5 اجتمع كل من:-

1- السيد المهندس/محمد حسني فياض	مدير عام مشروعات - الهيئة العامة للطرق والكباري
2- السيدة المهندسة/مارجريت مجدي زاخر	مدير مشروع - الهيئة العامة للطرق والكباري
3- السيد المهندس/ محمود شعبان أحمد	مدير مشروع- شركة انشاء للمقاولات العامة

وذلك للمرور على مسار العملية المذكورة عاليه لاستلام الموقع :-
وقد تبين أن الموقع خالياً من العوائق الظاهرية ويسمح بالبدء في التنفيذ وبناء عليه يعتبر تاريخ 2023/12/5 هو تاريخ استلام الموقع وبدء الأعمال بالعملية

واقفل المحضر على ذلك ووقع الحضور

التوقيعات

3- محمود شعبان

2-

1-

رئيس الإدارة المركزية

منطقة غرب الدلتا

الاسكندرية – مرســـــى مطروح

عميد . مهندس /

"هاني محمد محمود طه"

محضـــــــر معاينـــــــة مسافـــــــة

أنه في يوم السبت 2023/12/2 وبحضور كلا من :-

1-- م/ مارجريت مجدي الهيئة العامة للطرق والكباري

2-- م/ عبدالعزيز مصطفى سبكترم للاستشارات الهندسية (مكتب د.عماد نبيل)

3-- م/ محمود شعبان احمد شركة إنشاء للمقاولات العامة

تم النزول والمعاينة وطبقا للتعليمات الواردة بالمقايسة بمسافات نقل التوريد للسن

(prepared subgrade & sub ballast)

من الكسارة حتى محور مسار الطريق وجد أنه :-

يتم النقل السن من الكسارة إلى محور مسار القطار السريع (الحمام – العلمين) لقطاع شركة إنشاء للمقاولات العامة من 000+371 الى 500+371 مسافة قدرها :-

(83 كم)

التوقيعات :-

3-- م/ محمود شعبان التوقيع/

2-- م/ عبدالعزيز مصطفى التوقيع/ 12/2/2023

1-- م/ مارجريت مجدي التوقيع/

شركة انشاء للمقاولات العامة

محضـــــــــر معاينـــــــة مسافـــــــــة

أنه فى يوم السبت 2023/12/2 وبحضور كلا من :-

1-- م / مارجريت مجدي — الهيئة العامة للطرق والكباري

2-- م/ عبدالعزيز مصطفى — سبكترم للاستشارات الهندسية (مكتب د.عماد نبيل)

3-- م/ محمود شعبان احمد — شركة إنشاء للمقاولات العامة

تم النزول والمعاينة وطبقا للتعليمات الواردة بالمقايسة بمسافات نقل التوريد للأتربة والرمال من المحجر حتى محور مسار الطريق وجد أنه :-

يتم النقل للأتربة والرمال من المحجر إلى محور مسار القطار السريع (الحمام – العلمين) لقطاع شركة إنشاء للمقاولات العامة من 000+371 الى 500+371 مسافة قدرها :-

1-- 88 كم للتراب

2-- 68 كم للرمل

التوقيعات :-

3-- م/محمود شعبان — التوقيع/

2-- م/ عبدالعزيز مصطفى — التوقيع/ 17/12/2023

1-- م/مارجريت مجدي — التوقيع /

شركة انشاء للمقاولات العامة
أيمن محمد محمود رضوان وشريكة

مشروع : القطار السريع [السخنة - العلمين - مطروح]

المقايسة التقديرية لبنود الاعمال تنفيذ شركة: إنشاء للمقاولات العامة (1)

القطاع من الكم 371+000 الي الكم 371+500 بطول 500 م

رقم البند	بيان الأعمال	الوحدة	الكمية	سعر الفئة	الإجمالي
3	اعمال الردم				
3-1	اعمال تحميل وتوريد التربة محافرة للمواصفات وتشليلها باستخدام الات التسوية بسمك لايزيد عن 50 سم حتى منسوب -3 متر وبسمك لايزيد عن 25 سم لاستكمال المنسوب التصميمي للشكل الجسر والاكتاف [نسبة تحمل كاليفورنيا لا تقل عن 15 %] ورشها بالمياة الاضافية الى نسبة الرطوبة المطلوبة والدمك الجيد بالمراسات الوصول الى قصى كثافة جافة [95% من الكثافة الجافة القصوى] ويتم التنفيذ طبقا للمناسيب التصميمية والقطاعات العرضية النموذجية والرسومات التفصيلية المعتمدة وقبند بجميع مقتضلاة طبقا لاصول الصناعة ومواصفات الهيئة العامة للطرق والكباري وتعليمات المهندس المشرف. -في حالة طلب جهاز الاشراف زيادة نسبة الدمك عن 95% يحسب زيادة 1 جنية على زيادة نسبة الدمك لكل 1%. مسافة النقل حتى 2 كم ويتم احتساب علاوة 1.4 جنية لكم بالزيادة او النقصان. السعر يشمل عمل تدويتات وتخليط واختبارات ونقل لموقع العمل حتى مسافة 2 كم السعر يشمل قيمة المادة المحجرية.	م³	3,500	85	297,500
	علاوة مسافة النقل 68 كم [التربة] [120.4 = 1.4 * 86]	م3	2,800	120.4	337,120
	علاوة مسافة النقل 68 كم [رمال طبيعية] [92.4 =1.4*66]	م3	700	92.4	64,680
	علاوة تحميل رسوم الكارتة والموازين طبقا للائحة الشركة الوطنية	م3	3,500	13	45,500
4	طبقات الاساس				
4-1	بالامر المكتب أعمال توريد وفرش طبقه تأسيس (Prepared subgrade) من الاحجار الصلبة المتدرجة ناتج تكسير الكسارات والمحافظة للمواصفات وقصي حجم للحبيبات 100 مم والا تزيد نسبة المار من منخل 200 عن 12% والفرق الوارد بالاشتراطات الخاصة بالمشروع لا تقل نسبة تحمل كاليفورنيا عن 25% والا تزيد نسبة الفاقد بجهاز لوس انجلوس عن 30% والا يزيد الامتصاص عن 2.5% والا يقل معامل المرونة [Ea] من تجربه لوح التحميل عن 80 ميجابسكال ويتم فردها علي طبقتين باستخدام الات التسوية الحديثة علي ان لا يزيد سمك الطبقة بعد تمام الدمك عن 25 سم ورشها بالمياة الاضافية الوصول في نسبة الرطوبة المعكوية والدمك الجيد بالمراسات للوصول الي قصي كثافة جافة (لا تقل عن 95% من الكثافة الجافة القصوى) والفته لتشمل اجراء التجارب المعملية والحقلية ويتم التنفيذ طبقا لاصول الصناعة والرسومات التفصيلية المعتمدة والبند يجميع مشتملاته طبقا للمواصفات الفنية للمشروع وتقرير الاستشاري وتعليمات المهندس المشرف. - مسافه النقل 192 كم . - يتم احتساب علاوه 1.2 جنيه لكل 1 كم بالزياده او النقصان . - السعر يشمل قيمة المواد المحجرية طبقا لاقرب المنطقة بهذا لجاج رقم (5) من الكم 325 الى الكم 392.5	م³	3,200	278	889,600
	علاوة مسافة النقل 83 كم [75.6 =1.2*63]	م3	3,200	75.60	241,920
	علاوة تحميل رسوم الكارتة والموازين طبقا للائحة الشركة الوطنية	م3	3,200	25.00	80,000

شركة إنشاء للمقاولات العامة
ايمن محمد محمود رضوان وشركه
ب.ض: ٥١٩/٠٢٦/٠٠٤ س.ت: ٢٥٥٧٢

شركة إنشاء للمقاولات العامة
ايمن محمد محمود رضوان وشركه
ب.ض: ٥١٩/٠٢٦/٠٠٤ س.ت: ٢٥٥٧٢

الهيئة العامة للطرق والكباري
الإدارة المركزية لشئون المالية والإدارية وإدارة البيئة

مشروع : القطار السريع (السخنة - العلمين - مطروح)
المقايسة التقديرية لبنود الاعمال تنفيذ شركة: إنشاء للمقاولات العامة (1)
القطاع من الكم 371+000 الي الكم 371+500 بطول 500 م

رقم البند	بيان الأعمال	الوحدة	الكمية	سعر الفئة	الاجمالى
4-2	بالحفر المكعب أعمال توريد وفرش طبقه أساس من الاحجار الصلبة المتدرجة ناتج تكسير الكسارات والمطابقة للمواصفات والمعي حجم التحويبات ما بين 31.5مم الى 40مم والا يزيد نسبة المار من منخل 200 عن 5% والتدرج الوارد بالاشتراطات الخاصة بالمشروع لا تقل نسبة تحمل كاليفورنيا عن 80%والا يقل معامل المرونة (Ev2) من تجربه لوح التحميل عن 120 ميجابسكال والا يزيد نسبة الفاقد بجهاز لوس انجلوس عن 30% والا يزيد الانضغاص عن 15% ويتم فردها علي طبقتين باستخدام الات التسوية الحديثة علي ان لا يزيد سمك الطبقة بعد تمام الدمك عن 20 سم ورشها بالمياة الاصولية للوصول الي نسبة الرطوبة المطلوبة وقدمك الجيد بالهراسات للوصول الي المعي كثافة جافة (لا تقل عن 100%) من الكثافة المعملية والفقه لشمل اجراء التجارب المعملية والحقلية ويتم التنفيذ طبقا لاصول الصناعة والرسومات التفصيلية المعتمدة والبند يجمع مشتملاته طبقا للمواصفات الفنية للمشروع وتقرير الاستشاري وتعليمات المهندس المشرف. - مسافه النقل لا تقل 20 كم . - يتم احتساب علاوه 1.2 جنيه لكل 1 كم زياده او النقصان . - السعر يشمل قيمة المواد المحجرية طبقا لافادة المنطقة بهذا قطاع رقم (5) من الكم 325 الى الكم 392.5	م³	2,975.16	298.00	886,597.08
	علاوة مسافة النقل83 كم [63*1.2 = 75.6]	م3	2,975.16	75.60	224,921.94
	علاوة تحصيل رسوم الكارتة والموازين طبقا للائحة الشركة الوطنية	م3	2,975.16	25.00	74,378.95
	الاجمالى				3,142,218

شركة إنشاء للمقاولات العامة
أيمن محمد محمود رضوان وشريكه
ب.ض: ٥١٩/٠٢٦/٠٠٤ س.ت: ٢٥٥٧٢

شركة إنشاء للمقاولات العامة
أيمن محمد محمود رضوان وشريكه
ب.ض: ٥١٩/٠٢٦/٠٠٤ س.ت: ٢٥٥٧٢

الهيئة العامة للطرق و الكباري
الإدارة المركزية لشئون المالية و الإدارية و الموارد البشرية

S5-B-IN

MATERIAL APPROVAL REQUEST

Inshaa

Contractor Company	INSHAA GENERAL OF CONSTRUCTION Company		Designer Company	(SPECTRUM) Engineering Consulting Office	
Issued by Contractor	Name: Eng. Mahmoud shaban	Sign: 3 Apr 2023	Date/Serial Number: 30-03-2023 (M.A.R.) (1.1)	Time: 1:30	
Received by GARB CONSULTANT	Eng. Mazen Essamy		MAR	C1: 371	C2: EW

C3	DD	MM	YY	DD	MM
CS	31		23		

CODE-1	S1 to S21 Station Reference	D1 to S3 Depot Reference	Kp XXX Note For Kilometer point only Start Km is used
CODE - 2		Work Activity	
CODE - 3		Sub Element of Activity	

Description of Materials	Fill Layer Total Quantity (5000 m3) Upper Embankment		
Location to be Used	From Station (371+000) to Station (371+500)		
Sample only	Yes	Materials Type	Fill layers
Supplier Name		Data Sheet provided	Yes attached INSHAA GENERAL OF CONSTRUCTION Company contracting ASTM D (1557)
Reference in BoQ		Specification	EARTHWORK SPECIFICATIONS & TESTING REPORT (CG21-41.2) VERSION 2 BY CIVECON GROUP
Prequalification reference		Test Samples Results	
Reference Photos	No/Yes	Other	

Comments by: Eng. Mazen Essamy (SPECTRUM)

1-Quality test Result By Third Party Lab is Approved.

2-This Sample Representive (5000 m3) only.

SPECTRUM CONSULTING

Comments by: Eng. Alaa Abd-Allatif (ER)

2-Results report attached and acceptable with the project specifications.

3-Final approval is subject to above mentioned comments

شركة انشاء للمقاولات العامة Inshaa General Contracting

Wait for Chemical analysis Result

Done 8-4-2023

APPROVAL STATUS

Organisation	Name	Sign	Date	A AWC-R
Contractor	Eng. Mahmoud shaban	3 Apr 2023	31-03-2033	A
QA/QC *	Eng. Mazen Essamy			
GARB**	Eng. Mohammed Fayad			A
Employers Representative	Eng. Alaa Abd-Allatif	for	8-4 2023	AWC

* Designer

** Alignment/Bridges: Culvert only

I- Introduction

General Consultant	:	SYSTRA
Consultant	:	SPECTRUM
Contractor	:	شركة انشاء للمقاولات
Sample	:	FERMA
Station	:	St(371+000) to St(371+500)
Date of Test	:	31/03/2023
QC	:	1359

II- Sample description:

Gravel and sand

III- Required tests and Results

Required Tests		Results
1- Grain size analysis and classification	Grain size analysis	As showed in appendix
	Classification	A-1-a
2- Modified compaction (Proctor test)	MDD	2.116
	OMC	6.3%
3- Liquid limit, plastic limit and plasticity index	LL	Non plastic
	PL	Non plastic
	PI	Non plastic
4- California bearing ratio (CBR)	CBR ratio	42%

IV- Notes

1- Samples were brought by : Client
2- Samples are responsible from the Person who brought it.
3- The results are applying only for the present report.

LAB DIRECTOR

Eng / Eman kandil

Geotechnical consultant

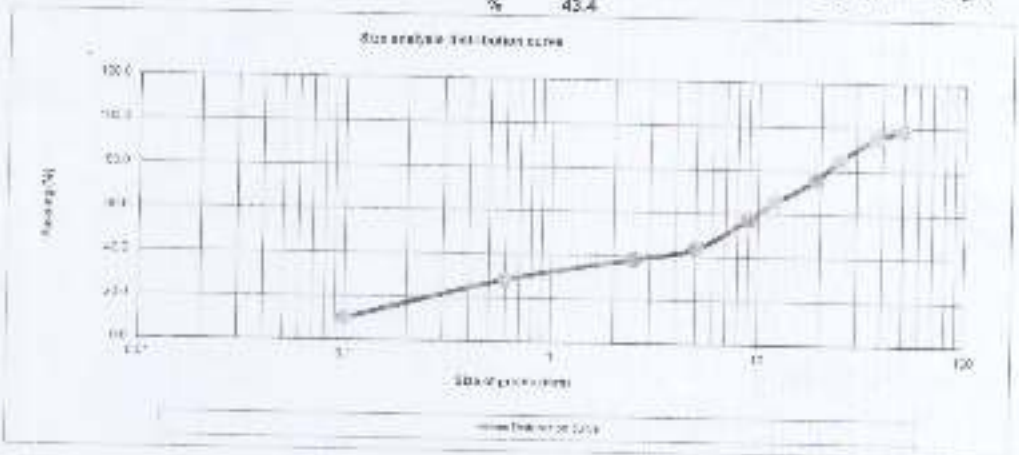
Dr. Mohamed Mostafa Badry

شركة انشاء للمقاولات العامة IGC insha general construction

PARTICLE SIZE DISTRIBUTION ANALYSIS ASTM C-136 / AASHTO T27

	WEIGHT RETAINED (gm)	CUMULATIVE WEIGHT RETAINED (gm)	CUMULATIVE PERCENTAGE RETAINED (%)	CUMULATIVE PERCENTAGE PASSING (%)	STANDURD SPECIFICATION LIMITS	
2	158.00	158.00	1.58	98.4		
1 1/2	358.00	516.00	5.16	94.8		
1	965.00	1481.00	14.81	85.2		
3/4	957.00	2438.00	24.38	75.6		
1/2	1050.00	3488.00	34.88	65.1		
3/8	785.00	4273.00	42.73	57.3		
No.4	1387.00	5660.00	56.60	43.4		
No.10	60.00	60.00	12.00	38.2		
No.40	174.00	174.00	34.80	28.3		
No.200	387.00	387.00	77.40	9.8		

Total sample weight = 10000.00 pass No.4= 4340.0 Total fine aggregates weight = 500 gm
% 43.4



Soil classification: A- 1- a (Non Plastic)

Modified Proctor Test Report
ASTM - D 1557

Mould Number :- 1
Volume of mould = 2120 cm³
Weight of mould = 5657 g
G.S = 2.6 g/cm3

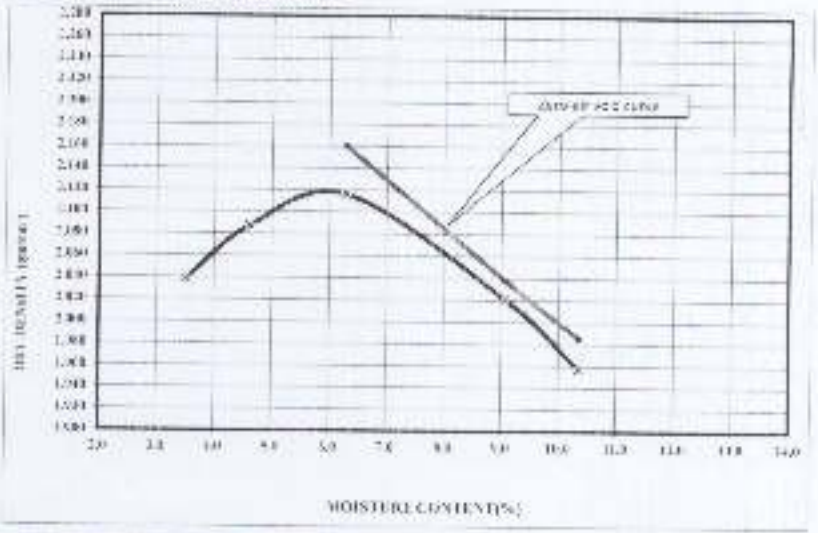
A- Density Calculations :-

	1	2	3	4	5
Weight of wet soil+mould (g)	10130	10285	10425	10330	10236
Weight of mould (g)	5657	5657	5657	5657	5657
Weight of wet soil (g)	4473	4628	4768	4673	4579
Volume of mould (cm^3)	2120	2120	2120	2120	2120
Wet density (g/cm^3)	2.110	2.183	2.249	2.204	2.160
Dry density (g/cm^3)	2.038	2.087	2.116	2.021	1.957
Zero-air Void curve			2.160	2.038	1.986

B- Moisture Calculations :-

Weight of wet soil+container (g)	250.0	250.0	250.0	250.0	250.0
Weight of dry soil+container (g)	244.3	242.5	240.0	236.2	234.8
Weight of container (g)	82.0	80.0	81.0	84.0	88.0
moisture content(%)	3.5	4.6	6.3	9.1	10.4

C- Dry density-Moisture relationship:-



M.D.D= 2.116 gm/cm³
O.M.C= 6.3 %

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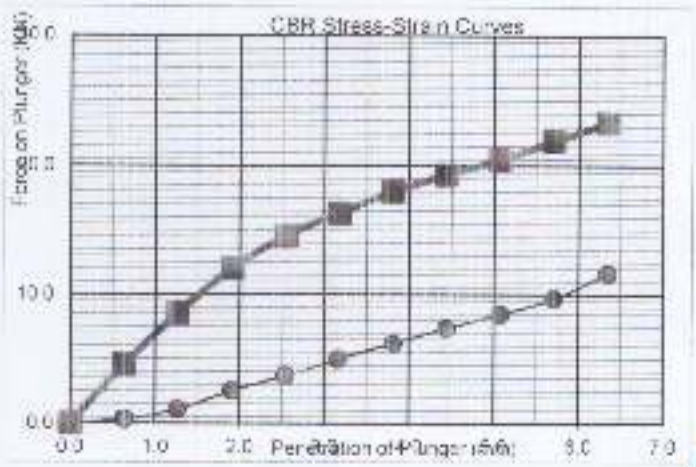
Internal inspection and laboratories sector
Accredited by : Egyption General Authority for Petroleum under No. 34/29-11-2011
Accredited by : Egyption Accreditation council (EGAC) under No. 031708/1A

Report Of CBR Test - ASTM - D 1883

NO OF BLOWS	56			Swell %			
MOULD NO	1				56		
WT OFMOULD+SOIL	11930			Start	0.00		
WT OF MOULD	7010			End	0.00		
WT OF SOIL	4920			Swell	0.00		
VOLUME OF MOULD	2198						
WET DENSITY	2.238						
	MC before soaking			Weight of Rammer			4.54Kg
TIN NO	1				MDD	Kg/m3	2.116
WT OF WET SOIL+TIN	250.00						
WT OF DRY SOIL+TIN	240.5				OMC	%	6.3
WT OF WATER	9.50						
WT OF TIN	92				PROVING RING		
WT OF DRY SOIL	148.5				Div/KN		0.0210
MOISTURE CONTENT	6.4						
DRY DENSITY	2.104				Capacity (KN)		50

Pen	Reading (Div)			Bearing (KN)			CBR		
mm	56			56			standar	56	
0.00	0			0.0			0.0		
0.64	32			0.3			4.5		
1.27	108			1.1			8.5		
1.91	256			2.5			12.0		
2.54	375			3.7			14.5	28	
3.17	505			5.0			16.3		
3.81	532			6.2			18.0		
4.45	753			7.4			19.3		
5.08	865			8.5			20.5	42	
5.71	987			9.7			21.9		
6.35	1186			11.6			23.3		



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Accredited by : Egyption Accreditation council (EGAC) under No. 031706/1A

Report	:	541 - 1 - Center
Date	:	08/06/2023

CHEMICAL ANALYSIS

General Consultant	:	SYSTRA
Consultant	:	SPECTRUM
Contractor	:	شركة انشاء للمقاولات
Project	:	Electric express train
Sample	:	FERMA
Station	:	ST (371 +0.00) : (371 + 500)
Date of Test	:	31-3-2023

Temperature : 25 °C Humidity : 40%

ANALYSIS	RESULTS	TEST METHOD
ORGANIG MATTER	NEGATIVE	ASTM D 2974

LAB DIRECTOR
CH/ Mostafa Asker
Por Amany Amin

SPECTRUM CONSULTING
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شركة انشاء للمقاولات العامة IGC
inshaa general construction

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S5-B-IN

MATERIAL APPROVAL REQUEST

Contractor Company	INSHAA GENERAL OF CONSTRUCTION Company			Designer Company		(SPECTRUM) Engineering Consulting Office			
Issued by Contractor	Name	Sign		Date/Serial Number		Time			
	Eng. Mohamed Hassan			07-04-2023 (M.A.R.) Rev (P.S.G.1)		1:30			
Received by GARB CONSULTANT	Eng. Mazen Essamy		MAR	C1	C2	C3	DD	MM	YY	HH	MM
				371	EW	CS	08	04	23	01	30

CODE-1	S1 to S21 Station Reference	D1 to S3 Depot Reference	Kp XXX Note For Kilometer point only Start Km is used
CODE - 2	Work Activity		
CODE - 3	Sub Element of Activity		

Description of Materials	Prepared Subgrade Total Quantity (5000 m3)		
Location to be Used	From Station (371+000) to Station (371+500)		
Sample only	Yes	Materials Type	Prepared Subgrade
Supplier Name		Data Sheet provided	Yes attached INSHAA GENERAL OF CONSTRUCTION Company contracting ASTM D (1557)
Reference in BoQ	(4-1)	Specification	EARTHWORK SPECIFICATIONS & TESTING REPORT (CG21-41.2) VERSION 2 BY CIVECON GROUP
Prequalification reference		Test Samples Results	
Reference Photos	No/Yes	Other	

Comments by: Eng. Mazen Essamy (SPECTRUM)	Comments by: Eng. Alaa Abd-Allatif (ER)
1-Quality test Result By Third Party Lab is Approved. 2-This Sample Representative (5000 m3) only.	1- All tests were carried-out by third Party lab (comibassal international) 2-Results report attached and acceptable with the project specifications. 3-Final approval is subject to above mentioned comments.

SPECTRUM CONSULTING

شركة انشاء للمقاولات العامة IGC inshaa general construction

APPROVAL STATUS				
Organisation	Name	Sign	Date	A-AWC-R
Contractor	Eng. Mohamed Hassan		08-04-2023	A
QA/QC *	Eng. Mazen Essamy			A
GARB**	Eng. Mohammed Fayad			
Employers Representative	Eng. Alaa Abd-Allatif		12-4-2023	Awc

* Designer
** Alignment/Bridges: Culvert only

I- Introduction

General Consultant	:	SYSTRA
Consultant	:	SPECTRUM
Contractor	:	شركة انشاء للمقاولات
Sample	:	Prepare Sub-Grade
Station	:	St(371+000) to st(371+500)
Date of Test	:	08/04/2023
QC	:	883-3

II- Sample description:

Crushed stone and sand

III- Required tests

1- Grain size analysis and classification
2- Modified compaction (Proctor test)
3- Liquid limit, plastic limit and plasticity index
4- California bearing ratio (CBR)
5- Specific gravity (SG)
6- Los Angeles test

شركة انشاء للمقاولات العامة IGC inshaa general construction

IV- Results

1- Grain size analysis and classification	Grain size analysis	As showed in appendix
	Classification	A-1-a
2- Modified compaction(Proctor test)	MDD	2.155
	OMC	6.30%
3- Liquid limit, plastic limit and plasticity index	LL	Non plastic
	PL	Non plastic
	PI	Non plastic
4- California bearing ratio (CB	CBR ratio	92%
5- Specific gravity (SG), absorption and degradation	S S D	2.569
	Absorption	1.2%
	Degradation	0.2%
6- Los Angeles test	Abrasion ratio	27.2%

LAB DIRECTOR
Eman
Eng / Eman kandil

COMIBASSAL INTERNATIONAL CONTROLLERS

Geotechnical consultant
For. Dr. M—
Dr. Mohamed Mostafa Badr

SPECTRUM CONSULTING

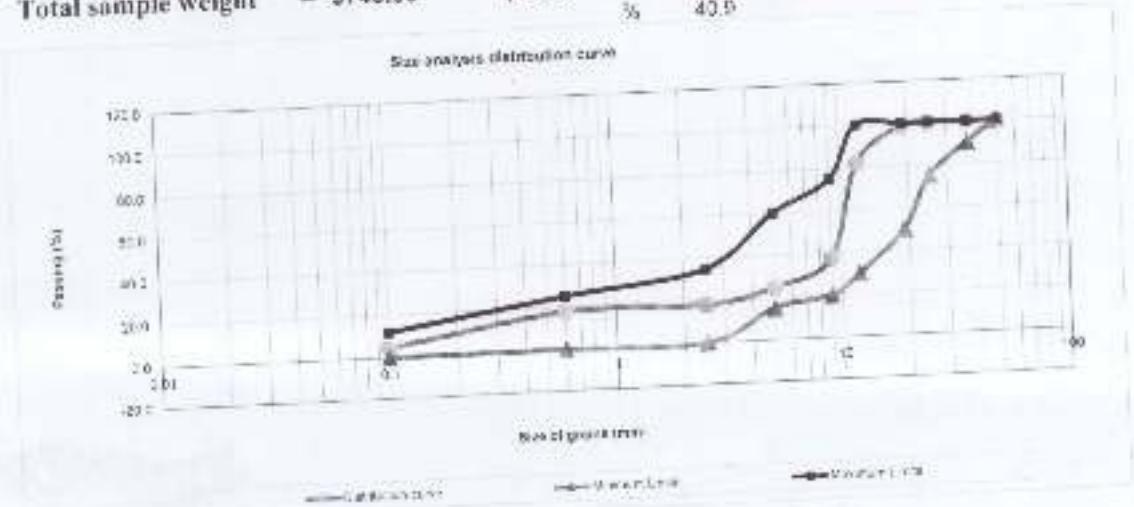
APPENDIX

COMIBASSAL International Controllers
Internal inspection and laboratories sector
Accredited by : Egyption General Authority for Petroleum under No. 34/29-11-2011
Accredited by : Egyption Accreditation council (EGAC) under No. 031706/1A

PARTICLE SIZE DISTRIBUTION ANALYSIS ASTM C-136 / AASHTO T27

	WEIGHT RETAINED (gm)	CUMULATIVE WEIGHT RETAINED (gm)	CUMULATIVE PERCENTAGE RETAINED (%)	CUMULATIVE PERCENTAGE PASSING (%)	STANDURD SPECIFICATION LIMITS	
5	0.00	0.00	0.00	100.0	100	100
4	0.00	0.00	0.00	100.0	95	100
3	0.00	0.00	0.00	100.0	75	100
1.5	150.00	150.00	1.54	98.5	50	100
3/4	4355.00	6083.00	62.45	37.5	25	75
3/8	1255.00	7338.00	75.34	24.7	15	50
No.10	138.00	138.00	27.60	17.9	0	35
No.200	405.00	405.00	81.00	4.7	3	12

Total sample weight = 9740.00 pass No.3/8= 3980.0 Total fine aggregates weight = 500 gm
3/8 40.9



Soil classification: A- 1- a (Non Plastic)

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Modified Proctor Test Report
ASTM - D 1557

Mould Number :-	1
Volume of mould =	2190 cm^3
Weight of mould =	7047 g
G.S =	2.56 g/cm3

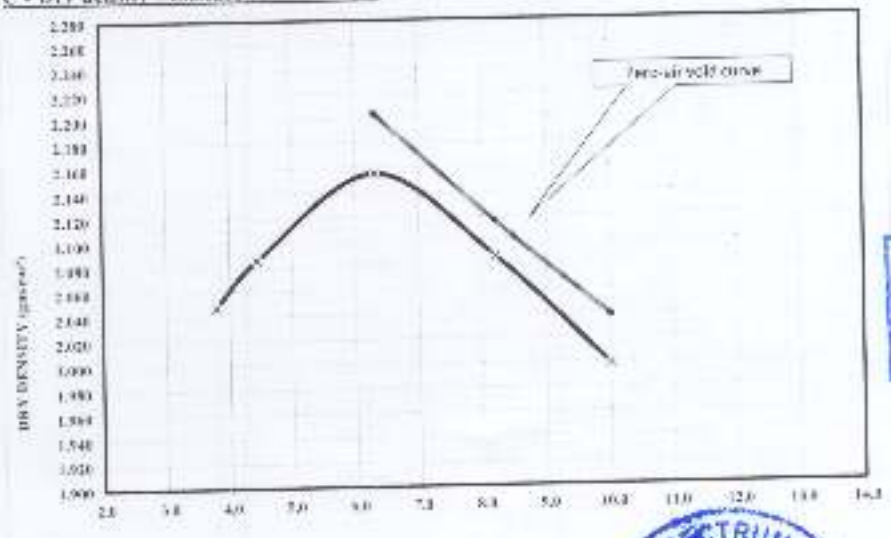
A- Density Calculations :-

	1	2	3	4	5
Weight.of wet soil+mould (g)	11700	11818	12065	11993	11860
Weight.of mould (g)	7047	7047	7047	7047	7047
Weight.of wet soil (g)	4653	4771	5018	4946	4813
Volume of mould (cm^3)	2190	2190	2190	2190	2190
Wet density (g/cm^3)	2.125	2.179	2.291	2.258	2.198
Dry density (g/cm^3)	2.047	2.086	2.155	2.087	1.998
Zero-air Void curve			2.204	2.116	2.038

B- Moisture Calculations :-

Weight.of wet soil+container (g)	250.0	250.0	250.0	250.0	250.0
Weight.of dry soil+container (g)	244.0	243.0	240.2	237.5	235.0
Weight.of container (g)	85.5	85.5	85.0	85.0	85.0
moisture content(%)	3.8	4.4	6.3	8.2	10.0

C - Dry density-Moisture relationship:-



M.D.D= 2.155 gm/cm³
O.M.C= 6.30 %

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Internal inspection and laboratories sector
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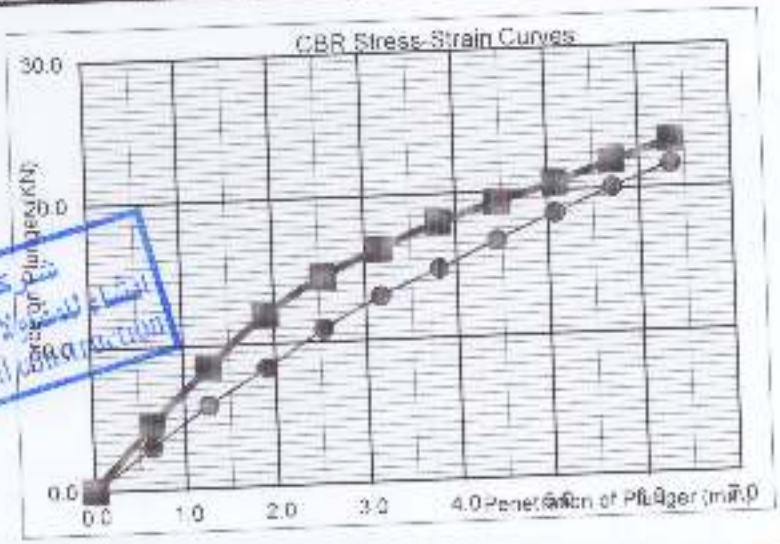
Accredited by : Egyption Accreditation council (EGAC) under No. 031708/1A

Report Of CBR Test - ASTM - D 1883

NO OF BLOWS	56			Swell %				
MOULD NO	1				56			
WT OFMOULD+SOIL	12120			Start	0.00			
WT OF MOULD	7047			End	0.00			
WT OF SOIL	5073			Swell	0.00			
VOLUME OF MOULD	2190							
WET DENSITY	2.316							
	MC before soaking			Weight of Rammer			4.54Kg	
					MDD	Kg/m3	2.171	
TIN NO	1							
WT OF WET SOIL+TIN	250.00				OMC	%	6.3	
WT OF DRY SOIL+TIN	240							
WT OF WATER	10.00				PROVING RING			
WT OF TIN	92				DIVKN			
WT OF DRY SOIL	148	2.125						
MOISTURE CONTENT	6.8				Capacity (KN)		50	
DRY DENSITY	2.170							

	97			Bearing (KN)			CBR		
Pen. m/m	56			56			standar	56	
0.00	0			FALSE			0.0		
0.64	302			3.0			4.5		
1.27	595			5.6			8.5		
1.91	850			8.3			12.3		
2.54	1110			10.9			14.5	92	
3.17	1330			13.0			16.3		
3.81	1510			14.8			18.0		
4.45	1700			16.7			19.3		
5.08	1880			18.4			20.5	92	
5.71	2050			20.1			21.9		
6.35	2210			21.7			23.3		



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Absorption & Specific Gravity for Aggregate
AASHTO T85 - ASTM C127

Weight of sample	2500
Weight of saturated - dry surface sample (B)	2525
Weight of saturated sample in water (C)	1542
Weight of dry sample aftre heating (A)	2495

Results:-

Saturation surface dry spicific gravity = B / (B-C)	2.569
Bulk spicific gravity = A / (B-C)	2.538
Apparent spicific gravity = A /(A-C)	2.618
Asorbtion of water = (B-A)/A*100	1.2
Degradation of aggregate = (2500-A)/ A*100	0.2

شركة انشاء للمقاولات العامة IGC insheo general construction

SPECTRUM CONSULTING

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ABRASION AND IMPACT " LOS ANGELES " TEST

(For coarse aggregate)

ASTM- C 131-96 / AASHTO-T-96

Speed	Rotate at 30 to 33 Rpm For 500 Revolution
Trial Grading	A
Intitial Weight (W1) gms	5000
Weight of tested sample (W2) gms Retained on sieve No.12	3640
% abrasion By Weight Passing from Sieve No.12	27.2%

شركة انشاء للمقاولات العامة
IGC inshaa general construction

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Report	:	379 - 6 - Center
Date	:	12/04/2023

CHEMICAL ANALYSIS

General Consultant	:	SYSTRA
Consultant	:	SPECTRUM
Contractor	:	شركة انشاء للمقاولات
Project	:	Electric express train
Sample	:	Prepard Sub Grade
Station	:	ST (373 +0.00) : (374 +0.00)
Date of Test	:	8-4-2023

Temperature : 20 °C

Humidity : 40%

ANALYSIS	RESULTS	TEST METHOD
CHLORIDE	0.0014%	ASTM D 2974
SULPHATE	0.0080%	
ORGANIG MATTER	NEGATIVE	

LAB DIRECTOR
CH/ Mostafa Asker

SPECTRUM CONSULTING

COMIBASSAL INTERNATIONAL CONTROLLERS

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S5-B-IW

MATERIAL APPROVAL REQUEST

Contractor Company	INSHAA GENERAL OF CONSTRUCTION Company			Designer Company			(SPECTRUM) Engineering Consulting Office		
	Name	Sign		Date/Serial Number			Time		
Issued by Contractor	Eng. Mahmoud shaban			28-04-2023 (M.A.R.) Rev (B.S.1)			1:30		
Received by GARB CONSULTANT	Eng. Mazen Essamy		MAR	C1	C2	C3	DD	MM	YY	HH	MM
				371	EW	CS	29	04	23	01	00

CODE-1	S1 to S21 Station Reference	D1 to S3 Depot Reference	Kp XXX Note For Kilometer point only Start Km is used
CODE - 2	Work Activity		
CODE - 3	Sub Element of Activity		

Description of Materials	Sub-Ballast Total Quantity (5000 m3)		
Location to be Used	From Station (371+000) to Station (371+500)		
Sample only	Yes	Materials Type	Prepared Subgrade
Supplier Name		Data Sheet provided	Yes attached INSHAA GENERAL OF CONSTRUCTION Company contracting ASTM D (1557)
Reference in BoQ	1.2)	Specification	EARTHWORK SPECIFICATIONS & TESTING REPORT (CE21-41.2) VERSION 2.0 BY CIVECON GROUP
Prequalification reference		Test Samples Results	
Reference Photos	No/Yes	Other	

Comments by: Eng. Mazen Essamy (SPECTRUM)

1-Quality test Result By Third Party Lab is Approved.

2-This Sample Representive (5000 m3) only.

SPECTRUM CONSULTING

Comments by: Eng. Alaa Abd-Allatif (ER)

1- All tests were carried out by third Party lab (combassal international)

2-Results report attached and acceptable with the project specifications.

3-Final approval is subject to above mentioned comments.

شركة انشاء للمقاولات العامة
inshaa general construction

APPROVAL STATUS

Organisation	Name	Sign	Date	A-AWC-R
Contractor	Eng. Mohamed Hassan		29-04-2023	A
QA/QC *	Eng. Mazen Essamy			A
GARB**	Eng. Mohammed Fayad			
Employers Representative	Eng. Alaa Abd-Allatif		6-5-2023	AWC

* Designer

** Alignment/Bridges. Culvert only

I- Introduction

General Consultant	:	SYSTRA
Consultant	:	SPECTRUM
Contractor	:	شركة إنشاء للمقاولات
Sample	:	Sub-Ballast
Station	:	St(371+0.00) to st(371+500)
Date of Test	:	29/04/2023
QC	:	1034-1

II- Sample description:

Crushed stone and sand

III- Required tests

1- Grain size analysis and classification
2- Modified compaction (Proctor test)
3- Liquid limit, plastic limit and plasticity index
4- California bearing ratio (CBR)
5- Specific gravity (SG)
6- Los Angeles test

شركة انشاء للمقاولات العامة IGC
Inshaa general construction

IV- Results

1- Grain size analysis and classification	Grain size analysis	As showed in appendix
	Classification	A-1-a
2- Modified compaction (Proctor test)	MDD	2.184
	OMC	7.5%
3- Liquid limit, plastic limit and plasticity index	LL	Non plastic
	PL	Non plastic
	PI	Non plastic
4- California bearing ratio (CBR)	CBR ratio	95%
5- Specific gravity (SG), absorption and degradation	S S D	2.579
	Absorption	1.3%
	Degradation	0.2%
6- Los Angeles test	Abrasion ratio	30%

LAB DIRECTOR
Eman
Eng / Eman kandil

COMIBASSAL INTERNATIONAL CONTROLLERS

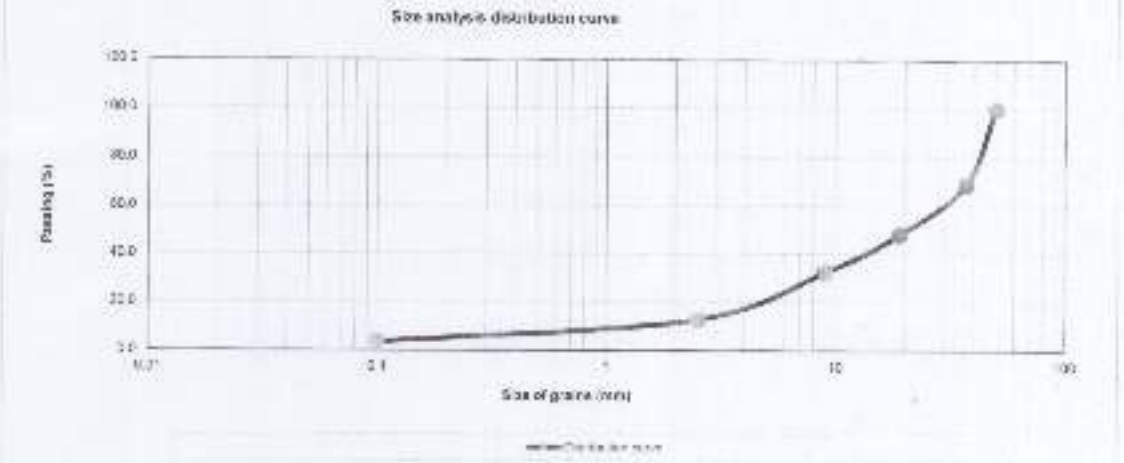
Geotechnical consultant
For. Dr. M
Dr. Mohamed Mostafa Badry

SPECTRUM CONSULTING

PARTICLE SIZE DISTRIBUTION ANALYSIS ASTM C-136 / AASHTO T27

	WEIGHT RETAINED (gm)	CUMULATIVE WEIGHT RETAINED (gm)	CUMULATIVE PERCENTAGE RETAINED (%)	CUMULATIVE PERCENTAGE PASSING (%)	STANDURD SPECIFICATION LIMITS	
2	0.00	0.00	0.00	100.0		
1 1/2	3103.00	3103.00	31.03	69.0		
1	1851.00	4954.00	49.54	50.5		
3/4	235.00	5189.00	51.89	48.1		
1/2	855.00	6044.00	60.44	39.6		
3/8	714.00	6758.00	67.58	32.4		
No.4	1110.00	7868.00	78.68	21.3		
No.10	200.00	200.00	40.00	12.8		
No.200	418.00	418.00	83.60	3.5		

total sample weight= 10000.00 pass No.4= **2132.0** Total fine aggregates weight – **500** gm
pass% 21.3



Soil classification: A - 1- a - sample is non plastic

شركة انشاء للمقاولات العامة IGC
inshaa general construction
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Modified Proctor Test Report
ASTM - D 1557

Mould Number :- 3
Volume of mould = 2199 cm^3
Weight of mould = 7046 g
G.S = 2.7 g/cm3

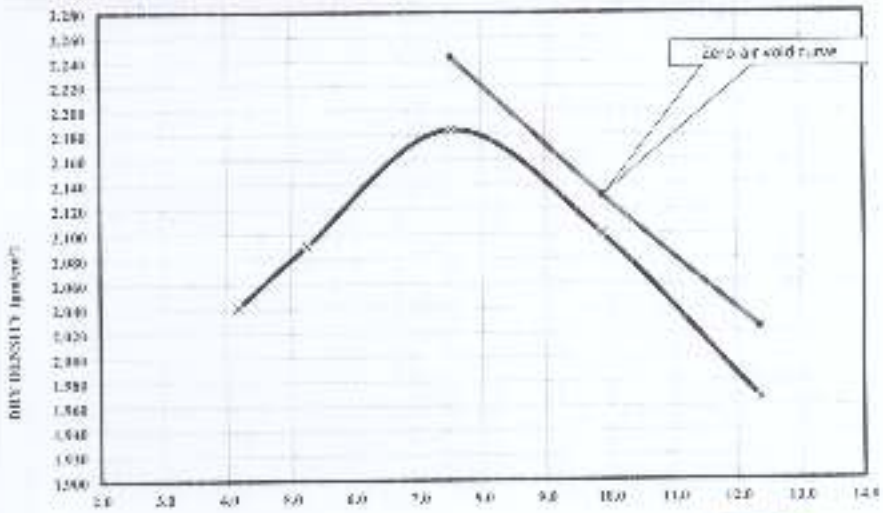
A- Density Calculations :-

	1	2	3	4	5
Weight.of wet soil + mould (g)	11721	11886	12211	12120	11905
Weight.of mould (g)	7046	7046	7046	7046	7046
Weight.of wet soil (g)	4675	4840	5165	5074	4859
Volume of mould (cm^3)	2199	2199	2199	2199	2199
Wet density (g/cm^3)	2.126	2.201	2.349	2.307	2.210
Dry density (g/cm^3)	2.041	2.091	2.184	2.100	1.967
Zero-air Void curve			2.244	2.131	2.024

B- Moisture Calculations :-

Weight.of wet soil (g)	100.0	100.0	100.0	100.0	100.0
Weight.of dry soil (g)	96.0	95.0	93.0	91.0	89.0
moisture content%	4.2	5.3	7.5	9.9	12.4

C - Dry density-Moisture relationship:-



M.D.D= 2.184 gm/cm³
O.M.C= 7.5 %

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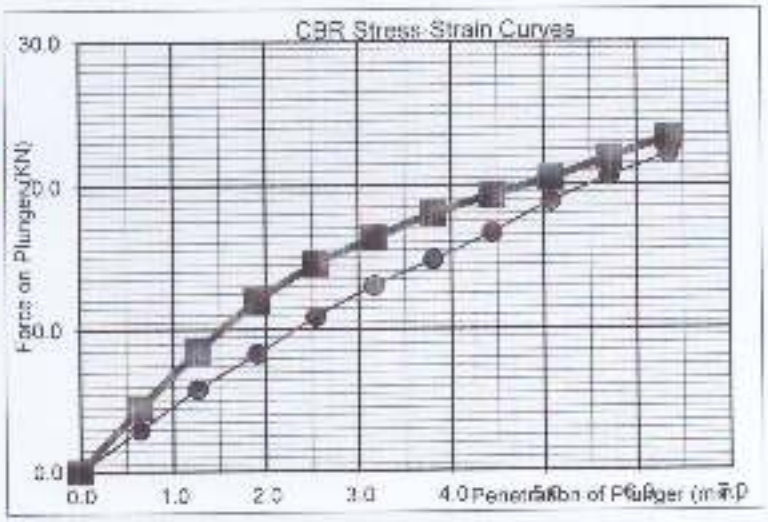
Accredited by : Egyption Accreditation council (EGAC) under No. 031706/1A

Report Of CBR Test - ASTM - D 1883

NO OF BLOWS	56			Swell %			
MOULD NO	1				56		
WT OF MOULD+SOIL	12150			Start	0.00		
WT OF MOULD	7047			End	0.00		
WT OF SOIL	5103			Swell	0.00		
VOLUME OF MOULD	2190						
WET DENSITY	2.330						
	MC before soaking			Weight of Rammer			4.54Kg
TIN NO	1				MDD	Kg/m3	2.184
WT OF WET SOIL+TIN	250.00						
WT OF DRY SOIL+TIN	240				OMC	%	7.5
WT OF WATER	10.00						
WT OF TIN	92				PROVING RING		
WT OF DRY SOIL	148	2.129			Dw/KN		
MOISTURE CONTENT	6.8						
DRY DENSITY	2.183				Capacity (KN)		50

Pen mm	97			Bearing (KN)			CBR		
	56			56			standar	56	
0.30	0			FALSE			0.0		
0.64	302			3.0			4.5		
1.27	595			5.8			8.5		
1.91	950			8.3			12.0		
2.54	1110			10.9			14.5	82	
3.17	1330			13.0			16.3		
3.81	1510			14.8			18.0		
4.45	1700			16.7			19.3		
5.08	1925			18.9			20.5	95	
5.71	2100			20.6			21.9		
6.35	2260			22.2			23.3		



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Absorption & Specific Gravity for Aggregate
AASHTO T85 - ASTM C127

Weight of sample	2500
Weight of saturated - dry surface sample (B)	2527
Weight of saturated sample in water (C)	1547
Weight of dry sample aftre heating (A)	2494

Results:-

Saturation surface dry spicific gravity = B / (B-C)	2.579
Bulk spicific gravity = A / (B-C)	2.545
Apparent spicific gravity = A /(A-C)	2.634
Asorbtion of water = (B-A)/A*100	1.3
Degradation of aggregate = (2500-A)/ A*100	0.2

شركة انشاء للمقاولات العامة IGC inshaa general construction

COMIBASSAL INTERNATIONAL CONTROLLERS

SPECTRUM CONSULTING

ABRASION AND IMPACT " LOS ANGELES " TEST

(For coarse aggregate)

ASTM- C 131-96 / AASHTO-T-96

Speed	Rotate at 30 to 33 Rpm For 500 Revolution
Trial Grading	A
Intitial Weight (W1) gms	5000
Weight of tested sample (W2) gms Retained on sieve No.12	3500
% abrasion By Weight Passing from Sieve No.12	30.0%

شركة انشاء للمقاولات العامة IGC inshaa general construction

SPECTRUM CONSULTING سبكترم للاستشارات الهندسية

Report	:	442 - 1 - Center
Date	:	06/05/2023

CHEMICAL ANALYSIS

General Consultant	:	SYSTRA
Consultant	:	SPECTRUM
Contractor	:	شركة انشاء للمقاولات
Project	:	Electric express train
Sample	:	Sub Ballast
Station	:	ST (371 + 0.00) : (371 – 500)
Date of Test	:	29-4-2023

Temperature : 21 °C Humidity : 55%

ANALYSIS	RESULTS	TEST METHOD
CHLORIDE	0.0053%	ASTM D 2974
SULPHATE	0.0190%	
ORGANIG MATTER	NEGATIVE	

SPECTRUM CONSULTING

COMIBASSAL

LAB DIRECTOR
CH/ Mostafa Asker

شركة انشاء للمقاولات العامة IGC
inshaa general construction

S5-B-IN

MATERIAL INSPECTION REQUEST

Contractor Company	INSHAA GENERAL OF CONSTRUCTION Company			Designer Company	(SPECTRUM) Engineering Consulting Office								
Issued by Contractor	Name	Sign		Date/ Serial Number	Time								
	Eng. Mahmoud shaban			09/04/2023 (P.L.T.1)	01:00 PM								
Received by GARB CONSULTANT	Eng. Mazen Essamy		PLT	C1	C2	C3	DD	MM	YY	HH	MM		
				371	rw	CS	10	04	2023	2	00		

CODE-1	S1 to S21 Station Reference	D1 to D3 Depot Reference	Xp XXX Note For Kilometer point only Start Km is used
CODE - 2		Work Activity	
CODE - 3		Sub Element of Activity	

Description of Materials	Prepared subgrade level 2		
Location to be Used	St. (371+350) To (373+500)		
MAR Approval No	M.A.R (P.S.G 1)	Date	08/04/2023
Supplier Name			
Test Requirement	P.L.T (DIN 18134)	Specification	EARTHWORK SPECIFICATIONS & TESTING REPORT (CG21-41.2) VERSION 2 BY OVECON GROUP
Reference Photos	Yes / No	Other	Ref UIR-P.S.G (2)

Item	Description	Unit	Quantity	Arrival Date	Note
1	PLATE LOAD TEST	NUMBER	6	10/04/2023	
2					
3					
4					

Comments by: Eng. Mazen Essamy (SPECTRUM)

1-The Plate Load Test Result P.L.T (DIN 18134) is Approved

SPECTRUM CONSULTING

Comments by: Eng. Alaa Abd-Allatif (ER)

1-Plate Load Test was carried- out by (F-just)
2-Results report attached and acceptable with project specifications.
3-Final approval is subject to above mentioned comments.

شركة انشاء للمقاولات العامة IGC inshaa general construction

APPROVAL STATUS

Organisation	Name	Sign	Date	A-AWC-R
Contractor	Eng. Mahmoud shaban		10-04-2023	A
QA/QC *	Eng. Mazen Essamy			A
GARB**	Eng. Margret magdy			
Employers Representative	Eng. Alaa Abd-Allatif		10-4-2023	AWC

* Designer
** Alignment / Bridges Culvert Only

Technical Report

Plate Loading Tests

KM 371+475, KM 371+450,
KM 371+425, KM 371+400,
KM 371+375, and KM 371+350

Project

Electric Express Train (Sokhna - New capital - 6th of October city - New Elalamein city)

Prepared for
Inshaa General Construction
3 Mobilka CC - Abu Youssef, Alexandria, Egypt

(April 10, 2023)

1. Introduction

The Civil Engineering Testing & Consulting Unit (CETCU) of the Egypt-Japan University of Science and Technology (EJUST) was retained by Inshaa General Construction to conduct 6 plate loading tests on the Prepared Subgrade 2.0 of the Electric Express Train project at 6 locations (KM 371+475, KM 371+450, KM 371+425, KM 371+400, KM 371+375, and KM 371+350) in accordance with the German Standard DIN18134. The mandate was communicated by Eng. Mahmoud Shaban of Inshaa General Construction. Field team members (Mr.Mohamed Mamdouh) from the working CETCU team visited the project site on April 10, 2023 and performed the required tests. This report summarizes the plate loading test procedure according to DIN18134, the test results and their interpretations, and the CETCU pertaining recommendations.

2. Test Set Up and Instrumentation

- The German standard DIN18134 was applied to define the test setup including the loading system, test conditions, and procedure for the plate loading tests.
- The tests were carried out to determine the Strain Moduli (Ev1 and Ev2) and their ratio (Ev2/Ev1) from a stress – deformation relationship of two consecutive loading from Loading-Unloading-Loading regime.
- The loading plate has a diameter of 600 mm and a thickness of 25 mm and it is provided with equally spaced stiffeners. The upper plate face is parallel to the bottom face of the plate to allow a 300-mm plate to be placed on the 600-mm plate top.
- The loading system consisted of a hydraulic pump connected to a hydraulic jack of 700 bar capacity, which can apply and release the load increments.
- The dial gauge used to measure the plate settlement has a resolution of 0.01 mm and the lever ratio was equal to 1.
- The temperature at the time of the test was 19± 1°C.
- The plate was carried out on a Prepared Subgrade 2.0 (according to the company) at 6 points. The test surface area was levelled, and the plate was bedded on this surface.
- The hydraulic jack was placed on the middle of, and normal to, the loading plate beneath the reaction loading system and secured against tilting.
- The reacting loading system was a heavy multi-purpose Loader CAT 966F.

3. Test Procedure and Results

The plate load test was conducted in accordance with the DIN18134. Loading, unloading, and reloading regimes were considered to estimate the resilient modulus of the tested soil. Prior to the test, the force transducer and dial gauge were reset to zero, and then a load corresponding to a stress of 0.01 MN/m2 was applied. The load was increased in the first loading cycle until a normal stress of 0.25 MN/m2 was reached, and the loading increment was 0.025 MN/m2. The load was gradually released in four stages. Following unloading, a second loading cycle was performed, but the load was only increased to the penultimate stage of the first cycle. 10 plate loading tests on the Prepared Subgrade 2.0 of the Electric Express Train project were conducted at 10 locations (KM 371+325, KM 371+300, KM 371+275, KM 371+250, KM 371+225, KM 371+200, KM 371+175, KM 371+150, KM 371+125, and KM 371+100) and the data collected at the 10 test points is included in Appendix A.

Table 1 presents the load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+325), while Table 2 shows the data obtained at the second loading stage.

Table 1: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+325)

Loading stage	Load (F)	Normal	Settleme
	kN	MN/m^2	mm
0	1.414	0.005	0.00
1	7.07	0.025	0.28
2	14.14	0.050	0.34
3	21.21	0.075	0.45
4	28.28	0.100	0.55
5	35.35	0.125	0.64
6	42.42	0.150	0.73
7	49.49	0.175	0.83
8	56.56	0.200	0.92
9	63.63	0.225	1.02
10	70.7	0.250	1.07
11	56.56	0.200	1.07
12	49.49	0.175	1.08
13	35.35	0.125	1.05
14	21.21	0.075	0.95
15	1.414	0.005	0.15

Table 2: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+325)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.15
1	7.07	0.025	0.38
2	14.14	0.050	0.46
3	21.21	0.075	0.55
4	28.28	0.100	0.65
5	35.35	0.125	0.76
6	42.42	0.150	0.83
7	49.49	0.175	0.89
8	56.56	0.200	0.94
9	63.63	0.225	1.00

The load-settlement data obtained in all loading and unloading stages for the test performed at the first location (KM 371+325) are shown in Figure 1. Table 3 shows the calculations of the resilient modulus of the tested soil according to DIN18134. The testing data corresponding to the second testing point (KM 371+300) is provided in Tables 4-6 and Figure 2. The testing data corresponding to the third testing point (KM 371+275) is provided in Tables 7-9 and Figure 3. The testing data corresponding to the fourth testing point (KM 371+250) is provided in Tables 10-12 and Figure 4. The testing data corresponding to the fifth testing point (KM 371+225) is provided in Tables 13-15 and Figure 5.

Table 3: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+325)

Parameters	1st loading cycle	2nd loading cycle
(s_0,max) MN/m^2	0.25	0.25
a_0 (mm)	0.16	0.17
a_1 (mm/(MN/m^2))	3.96	5.96
a_2 (mm/(MN2/m^4))	-1.03	-10.43
$Ev= 1.5 r/ (a_1+a_2 \cdot s_{0,max})$	121.65	134.10
Ev_2/Ev_1	1.10	

Table 17: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+350)

Loading stage	Load (F) kN	Normal stress (s_o) MN/m²	Settlement (S) mm
0	1.414	0.005	0.22
1	7.07	0.025	0.42
2	14.14	0.050	0.50
3	21.21	0.075	0.57
4	28.28	0.100	0.66
5	35.35	0.125	0.73
6	42.42	0.150	0.80
7	49.49	0.175	0.83
8	56.56	0.200	0.86
9	63.63	0.225	0.91

Table 18: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+350)

Parameters	1st loading cycle	2nd loading cycle
$[s_o]_{max}$ MN/m²	0.25	0.25
a_2 (mm)	0.09	0.24
a_1 (mm/(MN/m²))	3.11	5.31
a_2 (mm/(MN2/m⁴))	-0.55	-10.77
$Ev = 1.5 r / (a_1 + 2 a_2 s_{o,max})$	151.18	171.72
Ev_2/Ev_1	1.14	

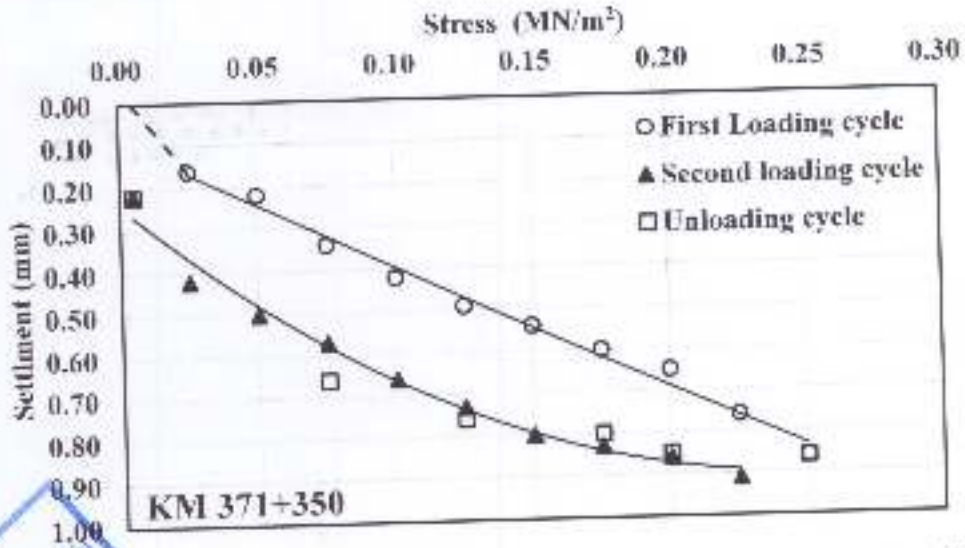

Figure 6: Load-settlement data: plate loading test performed at (KM 371+350)

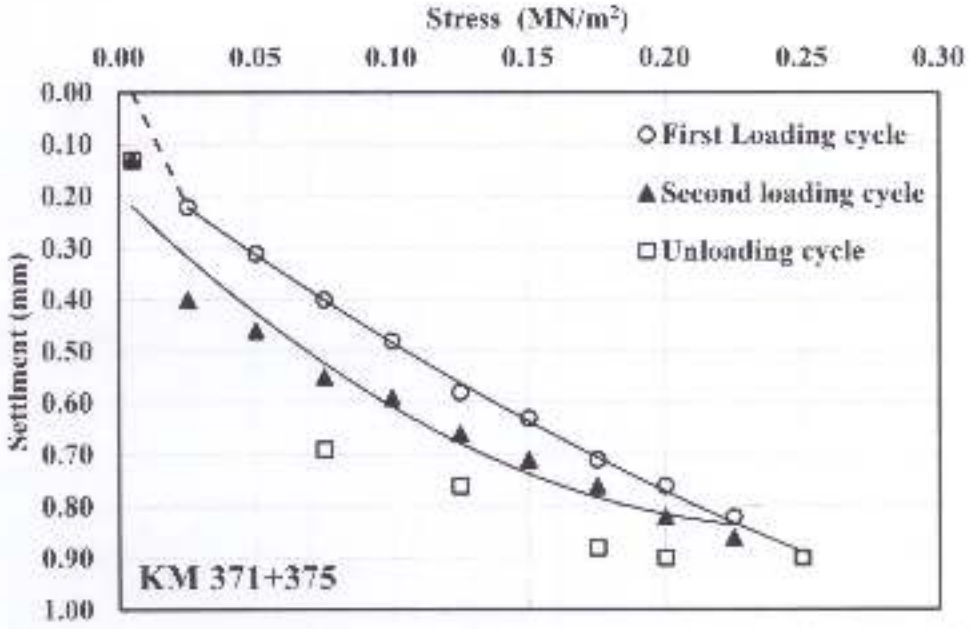

Figure 5: Load-settlement data: plate loading test performed at (KM 371+375)

Table 16: Load-settlement data obtained at the first loading and unloading stages of the

Loading stage	Load (F)	Normal stress (s_0)	Settlement (S)
	kN	MN/m^2	mm
0	1.414	0.005	0.00
1	7.07	0.025	0.16
2	14.14	0.050	0.22
3	21.21	0.075	0.34
4	28.28	0.100	0.42
5	35.35	0.125	0.49
6	42.42	0.150	0.54
7	49.49	0.175	0.60
8	56.56	0.200	0.65
9	63.63	0.225	0.76
10	70.7	0.250	0.86
11	56.56	0.200	0.85
12	49.49	0.175	0.80
13	35.35	0.125	0.76
14	21.21	0.075	0.66
15	1.414	0.005	0.22

Table 13: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+375)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.00
1	7.07	0.025	0.22
2	14.14	0.050	0.31
3	21.21	0.075	0.40
4	28.28	0.100	0.48
5	35.35	0.125	0.58
6	42.42	0.150	0.63
7	49.49	0.175	0.71
8	56.56	0.200	0.76
9	63.63	0.225	0.82
10	70.7	0.250	0.90
11	56.56	0.200	0.90
12	49.49	0.175	0.88
13	35.35	0.125	0.76
14	21.21	0.075	0.69
15	1.414	0.005	0.13

Table 14: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+375)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.13
1	7.07	0.025	0.40
2	14.14	0.050	0.46
3	21.21	0.075	0.55
4	28.28	0.100	0.59
5	35.35	0.175	0.66
6	42.42	0.150	0.71
7	49.49	0.175	0.76
8	56.56	0.200	0.82
9	63.63	0.225	0.86

Table 15: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+375)

Parameters	1st loading cycle	2nd loading cycle
(s_0, max) MN/m^2	0.25	0.25
a_0 (mm)	0.12	0.19
a_1 (mm/(MN/m^2))	3.95	5.16
a_2 (mm/(MN2/m^4))	-3.58	-10.27
Ev= 1.5 r/ (a_1 + a_2	[illegible]	173.31
Ev$_2$/Ev$_1$	1.18	

Table 11: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+400)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.24
1	7.07	0.025	0.45
2	14.14	0.050	0.57
3	21.21	0.075	0.59
4	28.28	0.100	0.63
5	35.35	0.125	0.68
6	42.42	0.150	0.73
7	49.49	0.175	0.82
8	56.56	0.200	0.87
9	63.63	0.225	0.91

Table 12: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+400)

Parameters	1st loading cycle	2nd loading cycle
($s_{s,max}$) MN/m^2	0.25	0.25
a_0 (mm)	0.16	0.29
a_1 (mm/(MN/m^2))	2.65	4.14
a_2 (mm/(MN2/m^4))	1.76	-6.43
Ev= 1.5 r/ (a_1+a_2· $s_{s,max}$)	145.57	177.88
Ev_2/Ev_1	1.22	

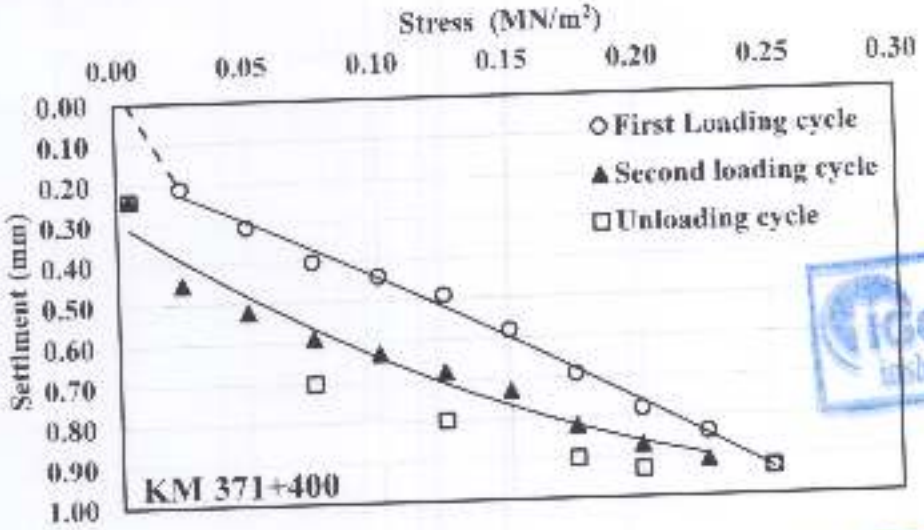

Figure 4: Load-settlement data: plate loading test performed at (KM 371+400)

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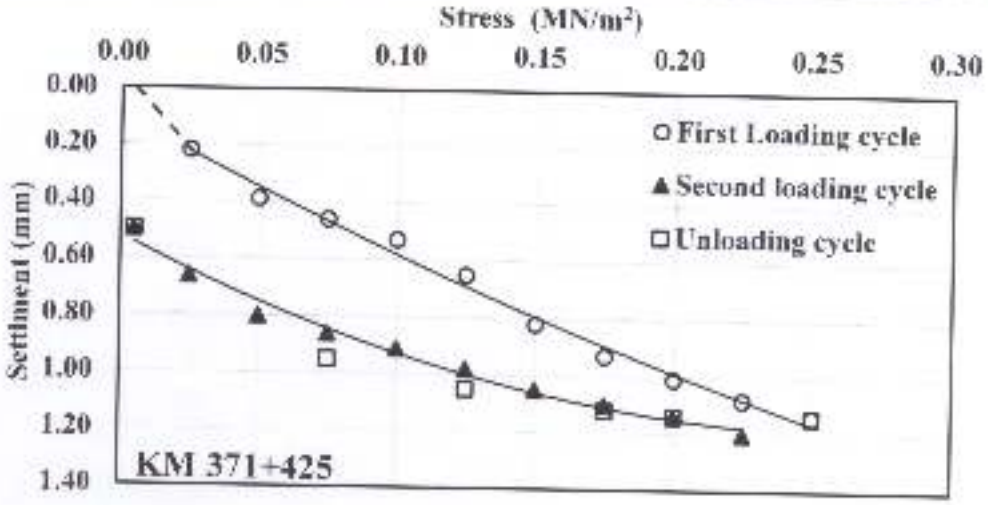

Figure 3: Load-settlement data: plate loading test performed at (KM 371+425)

Table 10: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+400)

Loading stage	Load (F) kN	Normal stress (s_o) MN/m²	Settlement (S) mm
0	1.414	0.005	0.00
1	7.07	0.025	0.21
2	14.14	0.050	0.31
3	21.21	0.075	0.40
4	28.28	0.100	0.44
5	35.35	0.125	0.49
6	42.42	0.150	0.58
7	49.49	0.175	0.69
8	56.56	0.200	0.78
9	63.63	0.225	0.84
10	70.7	0.250	0.93
11	56.56	0.200	0.93
12	49.49	0.175	0.90
13	35.35	0.125	0.80
14	21.21	0.075	0.70
15	1.414	0.005	0.24

Table 7: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+425)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.00
1	7.07	0.025	0.22
2	14.14	0.050	0.39
3	21.21	0.075	0.46
4	28.28	0.100	0.53
5	35.35	0.125	0.65
6	42.42	0.150	0.82
7	49.49	0.175	0.93
8	56.56	0.200	1.01
9	63.63	0.225	1.08
10	70.7	0.250	1.14
11	56.56	0.200	1.14
12	49.49	0.175	1.12
13	35.35	0.125	1.05
14	21.21	0.075	0.95
15	1.414	0.005	0.50

Table 8: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+425)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.50
1	7.07	0.025	0.66
2	14.14	0.050	0.80
3	21.21	0.075	0.86
4	28.28	0.100	0.91
5	35.35	0.125	0.98
6	42.42	0.150	1.05
7	49.49	0.175	1.10
8	56.56	0.200	1.14
9	63.63	0.225	1.20

Table 9: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+425)

Parameters	1st loading cycle	2nd loading cycle
(s_0,max) MN/m^2	0.25	0.25
a_0 (mm)	0.10	0.52
a_1 (mm/(MN/m^2))	5.23	4.95
a_2 (mm/(MN2/m^4))	-3.82	-9.07
Ev= 1.5 r/ (a_1+a_2. s_0,max)	105.31	167.89
Ev_2/Ev_1		1.59

Table 5: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+450)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (s) mm
0	1.414	0.005	0.47
1	7.07	0.025	0.73
2	14.14	0.050	0.83
3	21.21	0.075	0.89
4	28.28	0.100	0.95
5	35.35	0.125	1.05
6	42.42	0.150	1.10
7	49.49	0.175	1.20
8	56.56	0.200	1.24
9	63.63	0.225	1.29

Table 6: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+450)

Parameters	1st loading cycle	2nd loading cycle
(s_0,max) MN/m^2	0.25	0.25
a_0 (mm)	0.14	0.53
a_1 (mm/(MN/m^2))	3.81	5.50
a_2 (mm/(MN2/m^4))	2.61	-9.65
Ev= 1.5 r/ (a_1+a_2. $s_{0,max}$)	100.91	145.58
Ev_2/Ev_1	1.44	

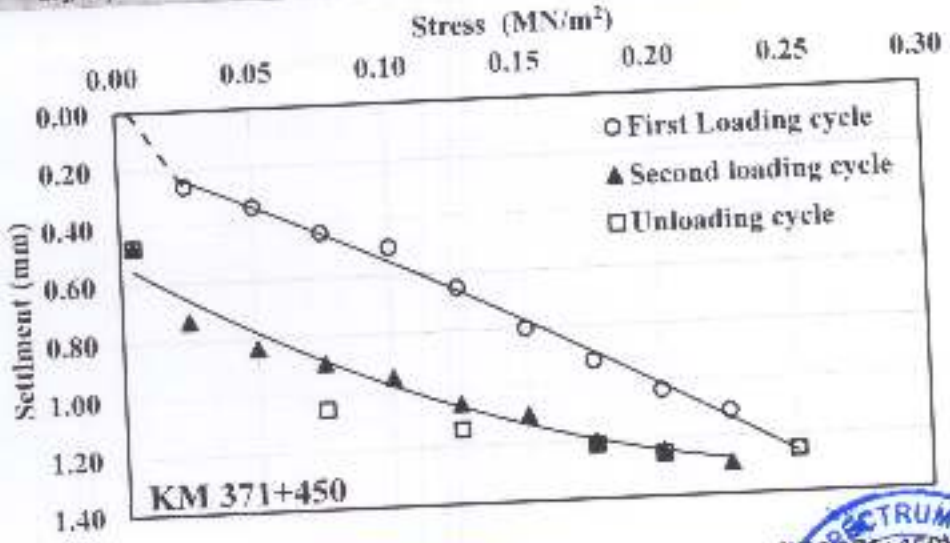

Figure 2: Load-settlement data, plate loading test performed at (KM 371+450)

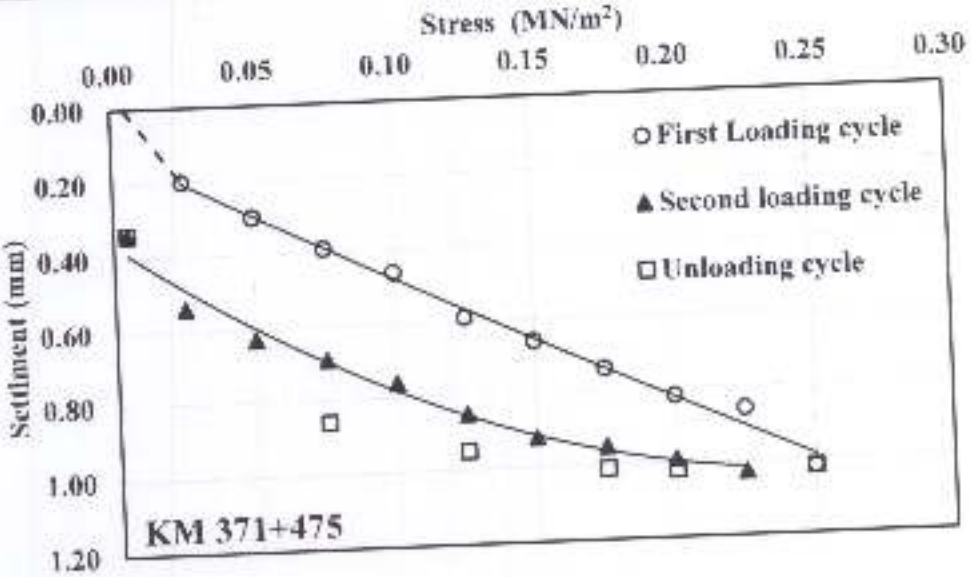

Figure 1: Load-settlement data: plate loading test performed at (KM 371+475)

Table 4: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+450)

Loading stage	Load (F) kN	Normal stress (σ_n) MN/m²	Settlement (S) mm
0	1.414	0.005	0.00
1	7.07	0.025	0.26
2	14.14	0.050	0.34
3	21.21	0.075	0.44
4	28.28	0.100	0.50
5	35.35	0.125	0.65
6	42.42	0.150	0.80
7	49.49	0.175	0.92
8	56.56	0.200	1.03
9	63.63	0.225	1.11
10	70.7	0.250	1.25
11	56.56	0.200	1.25
12	49.49	0.175	1.21
13	35.35	0.125	1.14
14	21.21	0.075	1.05
15	1.414	0.005	0.47

Table 2: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+475)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.34
1	7.07	0.025	0.54
2	14.14	0.050	0.63
3	21.21	0.075	0.69
4	28.28	0.100	0.76
5	35.35	0.125	0.85
6	42.42	0.150	0.92
7	49.49	0.175	0.95
8	56.56	0.200	0.99
9	63.63	0.225	1.03

The load-settlement data obtained in all loading and unloading stages for the test performed at the first location (KM 371+475) are shown in Figure 1. Table 3 shows the calculations of the resilient modulus of the tested soil according to DIN18134. The testing data corresponding to the second testing point (KM 371+450) is provided in Tables 4-6 and Figure 2. The testing data corresponding to the third testing point (KM 371+425) is provided in Tables 7-9 and Figure 3. The testing data corresponding to the fourth testing point (KM 371+400) is provided in Tables 10-12 and Figure 4. The testing data corresponding to the fifth testing point (KM 371+375) is provided in Tables 13-15 and Figure 5. The testing data corresponding to the sixth testing point (KM 371+350) is provided in Tables 16-18 and Figure 6.

Table 3: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+475)

Parameters	1st loading cycle	2nd loading cycle
(s_0,max) MN/m^2	0.25	0.25
a_0 (mm)	0.11	0.37
a_1 (mm/(MN/m^2))	3.77	5.19
a_2 (mm/(MN2/m^4))	-1.03	-10 18
$Ev=1.5\ r/\ (a_1+a_2.\ s_{0,MAX})$	**128.29**	**170.24**
Ev_2/Ev_1	**1.33**	

3. Test Procedure and Results

The plate load test was conducted in accordance with the DIN18134. Loading, unloading, and reloading regimes were considered to estimate the resilient modulus of the tested soil. Prior to the test, the force transducer and dial gauge were reset to zero, and then a load corresponding to a stress of 0.01 MN/m2 was applied. The load was increased in the first loading cycle until a normal stress of 0.25 MN/m2 was reached, and the loading increment was 0.025 MN/m2. The load was gradually released in four stages. Following unloading, a second loading cycle was performed, but the load was only increased to the penultimate stage of the first cycle. 6 plate loading tests on the Prepared Subgrade 2.0 of the Electric Express Train project were conducted at 6 locations (KM 371+475, KM 371+450, KM 371+425, KM 371+400, KM 371+375, and KM 371+350) and the data collected at the 6 test points is included in Appendix A.

Table 1 presents the load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+475), while Table 2 shows the data obtained at the second loading stage.

Table 1: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+475)

Loading stage	Load (F)	Normal	Settleme
	kN	MN/m^2	mm
0	1.414	0.005	0.00
1	7.07	0.025	0.20
2	14.14	0.050	0.30
3	21.21	0.075	0.39
4	28.28	0.100	0.46
5	35.35	0.125	0.59
6	42.42	0.150	0.66
7	49.49	0.175	0.74
8	56.56	0.200	0.82
9	63.63	0.225	0.86
10	70.7	0.250	1.02
11	56.56	0.200	1.02
12	49.49	0.175	1.01
13	35.35	0.125	0.95
14	21.21	0.075	0.86
15	1.414	0.005	0.34

4. Closure

Test results presented herein report the load-settlement data obtained from 6 plate loading tests conducted on the Prepared Subgrade 2.0 of the Electric Express train project at 6 locations (KM 371+475, KM 371+450, KM 371+425, KM 371+400, KM 371+375, and KM 371+350) in accordance with German Standard, DIN18134.

Location	E_{v1} MN/m2	E_{v2} MN/m2	E_{v2}/E_{v1} ratio
KM 371+475	128.29	170.24	1.33
KM 371+450	100.91	145.58	1.44
KM 371+425	105.31	167.69	1.59
KM 371+400	145.57	177.88	1.22
KM 371+375	147.31	173.53	1.18
KM 371+350	151.18	171.72	1.14

• Note: Before interpreting these test results for future applications, the Prepared Subgrade 2.0 in-situ variability between the testing locations should be considered.

Technical committee

Dr. Mahmoud Ahmed

Prof. Dr. Mohamed F. M. Fahmy

E-JUST CETC Unit

Lab Engineer

Mohamed A. Al-Najjar

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Appendix A

Location of test site:	KM 371+475		Field team	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction		Date:	10/4/2023
Diameter of loading plate	600		Time	9:02:00 AM
				9:28:00 AM
Lever ratio	1		Note: CAT 966F	
Type of Soil	Prepared Subgrade 2.0			
Bedding material	---			
Temperature	19°C			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	0	1.414	10.00	
	1	7.07	9.80	
	2	14.14	9.70	
	3	21.21	9.61	
	4	28.28	9.54	
	5	35.35	9.41	
	6	42.42	9.34	
	7	49.49	9.26	
	8	56.56	9.18	
	9	63.63	9.14	
	10	70.7	8.98	
Unloading Stage	11	56.56	8.98	
	12	49.49	8.99	
	13	35.35	9.05	
	14	21.21	9.14	
	15	1.414	9.66	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	0	1.414	9.66	
	1	7.07	9.46	
	2	14.14	9.37	
	3	21.21	9.31	
	4	28.28	9.24	
	5	35.35	9.15	
	6	42.42	9.08	
	7	49.49	9.05	
	8	56.56	9.01	
	9	63.63	8.98	

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Location of test site:	KM 371+450		Field team	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction		Date:	10/4/2023
Diameter of loading plate	600		Time	9:35:00 AM
				10:03:00 AM
Lever ratio	1		Note: CAT 966F	
Type of Soil	Prepared Subgrade 2.0			
Bedding material	0			
Temperature	19°C			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	0	1.414	10.00	
	1	7.07	9.74	
	2	14.14	9.66	
	3	21.21	9.56	
	4	28.28	9.50	
	5	35.35	9.35	
	6	42.42	9.20	
	7	49.49	9.08	
	8	56.56	8.97	
	9	63.63	8.89	
	10	70.7	8.75	
Unloading Stage	11	56.56	8.75	
	12	49.49	8.79	
	13	35.35	8.86	
	14	21.21	8.95	
	15	1.414	9.53	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	0	1.414	9.53	
	1	7.07	9.27	
	2	14.14	9.17	
	3	21.21	9.11	
	4	28.28	9.05	
	5	35.35	8.95	
	6	42.42	8.90	
	7	49.49	8.80	
	8	56.56	8.76	
	9	63.63	8.71	

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Location of test site:	KM 371+425	Field team	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction	Date:	10/4/2023
Diameter of loading plate	600	Time	10:10:00 AM
			10:38:00 AM
Lever ratio	1	Note: CAT 966F	
Type of Soil	Prepared Subgrade 2.0		
Bedding material	---		
Temperature	19°C		

Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)
Loading Stage	0	1.414	10.00
	1	7.07	9.78
	2	14.14	9.61
	3	21.21	9.54
	4	28.28	9.47
	5	35.35	9.35
	6	42.42	9.18
	7	49.49	9.07
	8	56.56	8.99
	9	63.63	8.92
	10	70.7	8.86
Unloading Stage	11	56.56	8.86
	12	49.49	8.88
	13	35.35	8.95
	14	21.21	9.05
	15	1.414	9.50
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)
Reloading Stage	0	1.414	9.50
	1	7.07	9.34
	2	14.14	9.20
	3	21.21	9.14
	4	28.28	9.09
	5	35.35	9.02
	6	42.42	8.95
	7	49.49	8.90
	8	56.56	8.86
	9	63.63	8.80

Location of test site:	KM 371+400	Field team	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction	Date:	10/4/2023
Diameter of loading plate	600	Time	10:45:00 AM
			11:13:00 AM
Lever ratio	1	Note: CAT 966F	
Type of Soil	Prepared Subgrade 2.0		
Bedding material	---		
Temperature	19°C		

Test regime	Loading Stage No.	Load (KN)	Dial Gauge Reading (mm)
Loading Stage	0	1.414	10.00
	1	7.07	9.79
	2	14.14	9.69
	3	21.21	9.60
	4	28.28	9.56
	5	35.35	9.51
	6	42.42	9.42
	7	49.49	9.31
	8	56.56	9.22
	9	63.63	9.16
	10	70.7	9.07
Unloading Stage	11	56.56	9.07
	12	49.49	9.10
	13	35.35	9.20
	14	21.21	9.30
	15	1.414	9.76
Test regime	Loading Stage No.	Load (KN)	Dial Gauge Reading (mm)
Reloading Stage	0	1.414	9.76
	1	7.07	9.55
	2	14.14	9.48
	3	21.21	9.41
	4	28.28	9.37
	5	35.35	9.32
	6	42.42	9.27
	7	49.49	9.18
	8	56.56	9.13
	9	63.63	9.09

Location of test site:	KM 371+375		Field team	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction		Date:	10/4/2023
Diameter of loading plate	600		Time	11:20:00 AM
				11:48:00 AM
Lever ratio	1		Note: CAT 966F	
Type of Soil	Prepared Subgrade 2.0			
Bedding material	---			
Temperature	19°C			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	0	1.414	10.00	
	1	7.07	9.78	
	2	14.14	9.69	
	3	21.21	9.60	
	4	28.28	9.52	
	5	35.35	9.42	
	6	42.42	9.37	
	7	49.49	9.29	
	8	56.56	9.24	
	9	63.63	9.18	
	10	70.7	9.10	
Unloading Stage	11	56.56	9.10	
	12	49.49	9.12	
	13	35.35	9.24	
	14	21.21	9.31	
	15	1.414	9.87	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	0	1.414	9.87	
	1	7.07	9.60	
	2	14.14	9.54	
	3	21.21	9.45	
	4	28.28	9.41	
	5	35.35	9.34	
	6	42.42	9.29	
	7	49.49	9.24	
	8	56.56	9.18	
	9	63.63	9.14	

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Location of test site:	KM 371+350		Field team	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction		Date:	10/4/2023
Diameter of loading plate	600		Time	11:55:00 AM
				12:23:00 PM
Lever ratio	1		Note: CAT 966F	
Type of Soil	Prepared Subgrade 2.0			
Bedding material	---			
Temperature	19°C			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	0	1.414	10.00	
	1	7.07	9.84	
	2	14.14	9.78	
	3	21.21	9.66	
	4	28.28	9.58	
	5	35.35	9.51	
	6	42.42	9.46	
	7	49.49	9.40	
	8	56.56	9.35	
	9	63.63	9.24	
	10	70.7	9.14	
Unloading Stage	11	56.56	9.15	
	12	49.49	9.20	
	13	35.35	9.24	
	14	21.21	9.34	
	15	1.414	9.78	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	0	1.414	9.78	
	1	7.07	9.58	
	2	14.14	9.50	
	3	21.21	9.43	
	4	28.28	9.34	
	5	35.35	9.27	
	6	42.42	9.20	
	7	49.49	9.17	
	8	56.56	9.14	
	9	63.63	9.09	

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E-JUST CETC Unit

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SPECTRUM CONSULTING

Location of test site:	KM 371+325		Field team	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction		Date:	11/4/2023
Diameter of loading plate	600		Time	9:02:00 AM
				9:28:00 AM
Lever ratio	1		Note: CAT 966F	
Type of Soil	Prepared Subgrade 2.0			
Bedding material	---			
Temperature	19°C			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	0	1.414	10.00	
	1	7.07	9.72	
	2	14.14	9.66	
	3	21.21	9.55	
	4	28.28	9.45	
	5	35.35	9.36	
	6	42.42	9.27	
	7	49.49	9.17	
	8	56.56	9.08	
	9	63.63	8.98	
	10	70.7	8.93	
Unloading Stage	11	56.56	8.93	
	12	49.49	8.94	
	13	35.35	8.95	
	14	21.21	9.05	
	15	1.414	9.85	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	0	1.414	9.85	
	1	7.07	9.62	
	2	14.14	9.54	
	3	21.21	9.45	
	4	28.28	9.35	
	5	35.35	9.24	
	6	42.42	9.17	
	7	49.49	9.11	
	8	56.56	9.06	
	9	63.63	9.00	

شركة انشاء للمقاولات العامة
inshaa general construction

SPECTRUM CONSULTANTS

E-JUST CETC Unit

S5-B-1N

MATERIAL INSPECTION REQUEST

Contractor Company	INSHAA GENERAL OF CONSTRUCTION Company			Designer Company	[SPECTRUM] Engineering Consulting Office						
Issued by Contractor	Name: Eng. Mahmoud shaban	Sign		Date/ Serial Number: 10/04/2023 (P.L.T. 2)	Time: 01:00 PM						
Received by GARB CONSULTANT	Eng. Mazen Essamy		P.L.T	C1: 371	C2: IW	C3: CS	D: 11	MM: 04	YY: 2023	HH: 2	MM: 00

CODE-1	St to S21 Station Reference	D1 to 53 Depot Reference	Kp XXX Note For Kilometer point only Start Km is used
CODE-2		Work Activity	
CODE-3		Sub Element of Activity	

Description of Materials	Prepared subgrade level 2		
Location to be Used	St. (371+100) To (373+350)	Date	08/04/2023
MAR Approval No	M.A.R (P.S.G 1)		
Supplier Name		Specification	EARTHWORK SPECIFICATIONS & TESTING REPORT (OG21-41.2) VERSION 2 BY OVECON GROUP
Test Requirement	P.L.T (DIN 18134)	Other	Ref UIR-P.S.G (3&4)
Reference Photos	Yes / No		

Item	Description	Unit	Quantity	Arrival Date	Note
1	PLATE LOAD TEST	NUMBER	10	11/04/2023	
2					
3					
4					

Comments by: Eng. Mazen Essamy (SPECTRUM)

1-The Plate Load Test Report P.L.T (DIN 18134) Is Approved

SPECTRUM CONSULTING

Comments by: Eng. Alaa Abd-Allatif (ER)

1-Plate Load Test was carried- out by (E-just)
2-Results report attaches and acceptable with project specifications.
3-Final approval is subject to above mentioned comments.

شركة انشاء للمقاولات العامة IGC inshaa general construction

APPROVAL STATUS

	Name	Sign	Date	A-AWC-R
Organisation				
Contractor	Eng. Mahmoud shaban		11-04-2023	A
QA/QC *	Eng. Mazen Essamy			A
GARB**	Eng. Margret magdy			
Employers Representative	Eng. Alaa Abd-Allatif		11-4-2023	AWC

* Designer
** Alignment / Bridges, Culvert Only

Technical Report

Plate Loading Tests

KM 371+325, KM 371+300, KM 371+275, KM 371+250, KM 371+225, KM 371+200, KM 371+175, KM 371+150, KM 371+125, and KM 371+100

Project

Electric Express Train (Sokhna - New capital - 6th of October city - New Elalamein city)

Prepared for

Inshaa General Construction

3 Mobilka CC - Abu Youssef, Alexandria, Egypt

(April 11, 2023)

1. Introduction

The Civil Engineering Testing & Consulting Unit (CETCU) of the Egypt-Japan University of Science and Technology (EJUST) was retained by Inshaa General Construction to conduct 10 plate loading tests on the Prepared Subgrade 2.0 of the Electric Express Train project at 10 locations (KM 371+325, KM 371+300, KM 371+275, KM 371+250, KM 371+225, KM 371+200, KM 371+175, KM 371+150, KM 371+125, and KM 371+100) in accordance with the German Standard DIN18134. The mandate was communicated by Eng. Mahmoud Shaban of Inshaa General Construction. Field team members (Mr.Mohamed Mamdouh) from the working CETCU team visited the project site on April 11, 2023 and performed the required tests. This report summarizes the plate loading test procedure according to DIN18134, the test results and their interpretations, and the CETCU pertaining recommendations.

2. Test Set Up and Instrumentation

- The German standard DIN18134 was applied to define the test setup including the loading system, test conditions, and procedure for the plate loading tests.
- The tests were carried out to determine the Strain Moduli (Ev1 and Ev2) and their ratio (Ev2/Ev1) from a stress – deformation relationship of two consecutive loading from Loading-Unloading-Loading regime.
- The loading plate has a diameter of 600 mm and a thickness of 25 mm and it is provided with equally spaced stiffeners. The upper plate face is parallel to the bottom face of the plate to allow a 300-mm plate to be placed on the 600-mm plate top.
- The loading system consisted of a hydraulic pump connected to a hydraulic jack of 700 bar capacity, which can apply and release the load increments.
- The dial gauge used to measure the plate settlement has a resolution of 0.01 mm and the lever ratio was equal to 1.
- The temperature at the time of the test was 19± 1°C.
- The plate was carried out on a Prepared Subgrade 2.0 (according to the company) at 10 points. The test surface area was levelled, and the plate was bedded on this surface.
- The hydraulic jack was placed on the middle of, and normal to, the loading plate beneath the reaction loading system and secured against tilting.
- The reaction loading system was a heavy multi-purpose Loader CAT 980

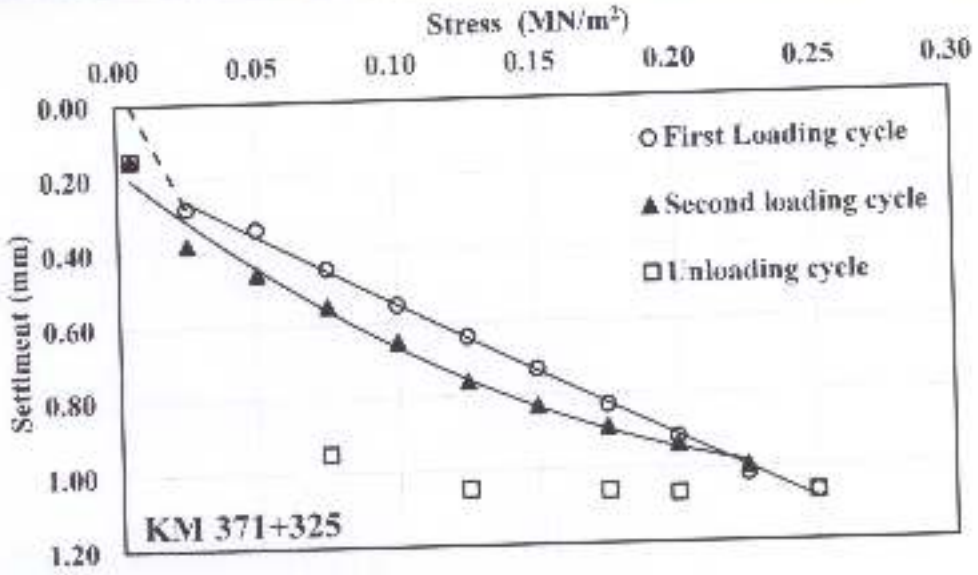

Figure 1: Load-settlement data: plate loading test performed at (KM 371+325)

Table 4: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+300)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m²	Settlement (S) mm
0	1.414	0.005	0.00
1	7.07	0.025	0.25
2	14.14	0.050	0.30
3	21.21	0.075	0.40
4	28.28	0.100	0.51
5	35.35	0.125	0.60
6	42.42	0.150	0.72
7	49.49	0.175	0.80
8	56.56	0.200	0.87
9	63.63	0.225	0.93
10	70.7	0.250	1.02
11	56.56	0.200	1.02
12	49.49	0.175	1.02
13	35.35	0.125	0.98
14	21.21	0.075	0.88
15	1.414	0.005	0.30

Table 5: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+300)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.30
1	7.07	0.025	0.46
2	14.14	0.050	0.53
3	21.21	0.075	0.59
4	28.28	0.100	0.69
5	35.35	0.125	0.77
6	42.42	0.150	0.85
7	49.49	0.175	0.92
8	56.56	0.200	0.95
9	63.63	0.225	1.00

Table 6: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+300)

Parameters	1st loading cycle	2nd loading cycle
(s_0,max) MN/m^2	0.25	0.25
a_0 (mm)	0.12	0.31
a_1 (mm/(MN/m^2))	4.23	4.59
a_2 (mm/(MN2/m^4))	-2.43	-6.68
Ev= 1.5 r/ (a_1+a_2. $s_{0,max}$)	124.31	154.08
Ev_2/Ev_1	1.24	

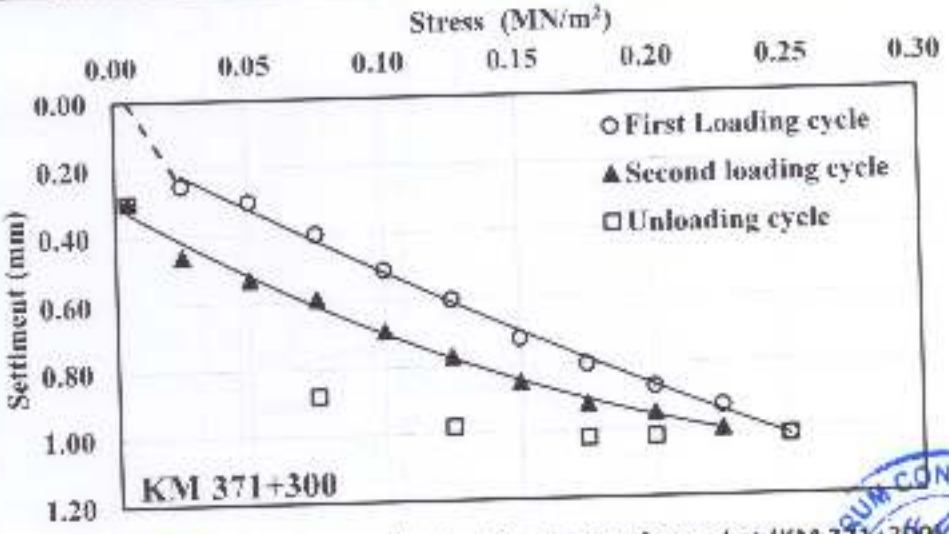

Figure 2: Load-settlement data: plate loading test performed at (KM 371+300)

Table 7: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+275)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.00
1	7.07	0.025	0.29
2	14.14	0.050	0.36
3	21.21	0.075	0.48
4	28.28	0.100	0.57
5	35.35	0.125	0.64
6	42.42	0.150	0.75
7	49.49	0.175	0.86
8	56.56	0.200	0.95
9	63.63	0.225	1.03
10	70.7	0.250	1.16
11	56.56	0.200	1.16
12	49.49	0.175	1.16
13	35.35	0.125	1.10
14	21.21	0.075	0.99
15	1.414	0.005	0.30

Table 8: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+275)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.30
1	7.07	0.025	0.55
2	14.14	0.050	0.67
3	21.21	0.075	0.75
4	28.28	0.100	0.81
5	35.35	0.125	0.90
6	42.42	0.150	0.93
7	49.49	0.175	1.00
8	56.56	0.200	1.05
9	63.63	0.225	1.10

Table 9: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+275)

Parameters	1st loading cycle	2nd loading cycle
(s_0,max) MN/m^2	0.25	0.25
a_0 (mm)	0.20	0.35
a_1 (mm/(MN/m^2))	3.51	6.01
a_2 (mm/(MN2/m^4))	1.21	12.49
$Ev_1 = 1.5\ r/(a_1 + a_2 \cdot s_{0,max})$	118.02	155.57
Ev_2/Ev_1	1.32	

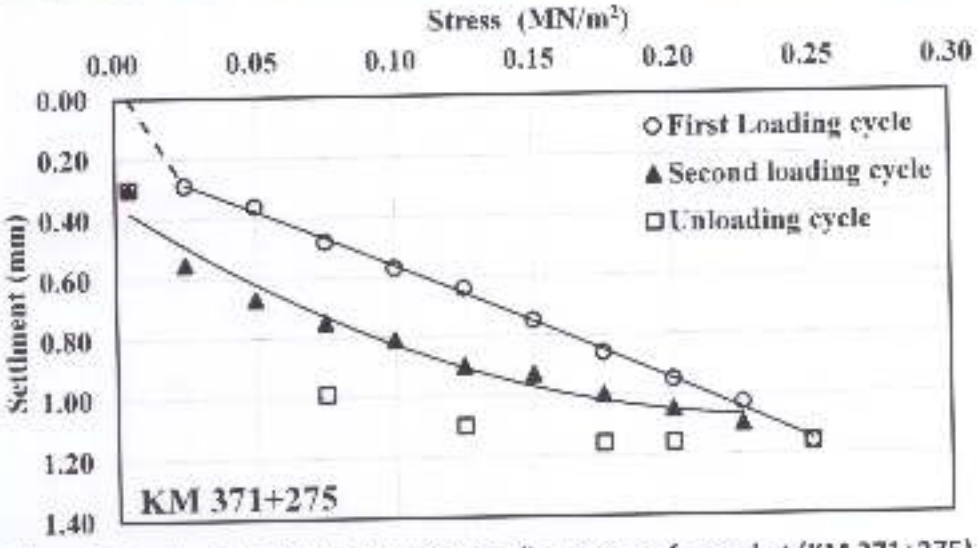

Figure 3: Load-settlement data: plate loading test performed at (KM 371+275)

Table 10: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+250)

Loading stage	Load (F) kN	Normal stress (s_n) MN/m²	Settlement (S) mm
0	1.414	0.005	0.00
1	7.07	0.025	0.31
2	14.14	0.050	0.38
3	21.21	0.075	0.45
4	28.28	0.100	0.53
5	35.35	0.125	0.61
6	42.42	0.150	0.72
7	49.49	0.175	0.80
8	56.56	0.200	0.86
9	63.63	0.225	0.95
10	70.7	0.250	1.05
11	56.56	0.200	1.05
12	49.49	0.175	1.04
13	35.35	0.125	0.95
14	21.21	0.075	0.86
15	1.414	0.005	0.26

Table 11: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+250)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.26
1	7.07	0.025	0.48
2	14.14	0.050	0.54
3	21.21	0.075	0.65
4	28.28	0.100	0.74
5	35.35	0.125	0.83
6	42.42	0.150	0.86
7	49.49	0.175	0.93
8	56.56	0.200	1.00
9	63.63	0.225	1.05

Table 12: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+250)

Parameters	1st loading cycle	2nd loading cycle
$(s_0)_{max}$ MN/m^2	0.25	0.25
a_0 (mm)	0.23	0.29
a_1 (mm/(MN/m^2))	2.97	5.45
a_2 (mm/($MN2/m^4$))	1.21	-9.54
$Ev= 1.5\ r/\ [a_1+a_2.\ s_{0\ MAX}]$	137.52	146.62
Ev_2/Ev_1	1.07	

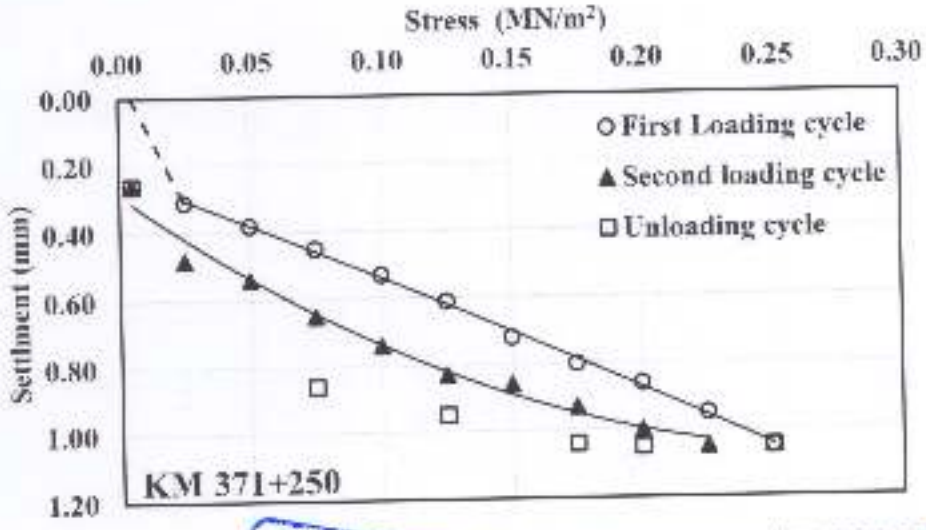

Figure 4: Load-settlement data- plate loading test performed at (KM 371+250)

Table 13: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+225)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.00
1	7.07	0.025	0.20
2	14.14	0.050	0.29
3	21.21	0.075	0.40
4	28.28	0.100	0.49
5	35.35	0.125	0.58
6	42.42	0.150	0.64
7	49.49	0.175	0.71
8	56.56	0.200	0.80
9	63.63	0.225	0.88
10	70.7	0.250	0.99
11	56.56	0.200	0.99
12	49.49	0.175	0.97
13	35.35	0.125	0.87
14	21.21	0.075	0.74
15	1.414	0.005	0.19

Table 14: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+225)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.19
1	7.07	0.025	0.38
2	14.14	0.050	0.45
3	21.21	0.075	0.53
4	28.28	0.100	0.61
5	35.35	0.125	0.69
6	42.42	0.150	0.79
7	49.49	0.175	0.85
8	56.56	0.200	0.90
9	63.63	0.225	0.96

Table 15: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+225)

Parameters	1st loading cycle	2nd loading cycle
(s_0,max) MN/m^2	0.25	0.25
a_0 (mm)	0.12	0.21
a_1 (mm/(MN/m^2))	3.72	4.81
a_2 (mm/(MN2/m^4))	-1.21	-6.69
Ev= 1.5 r/ (a_1+a_2. s_0,max)	131.76	103.45
Ev_2/Ev_1	1.09	

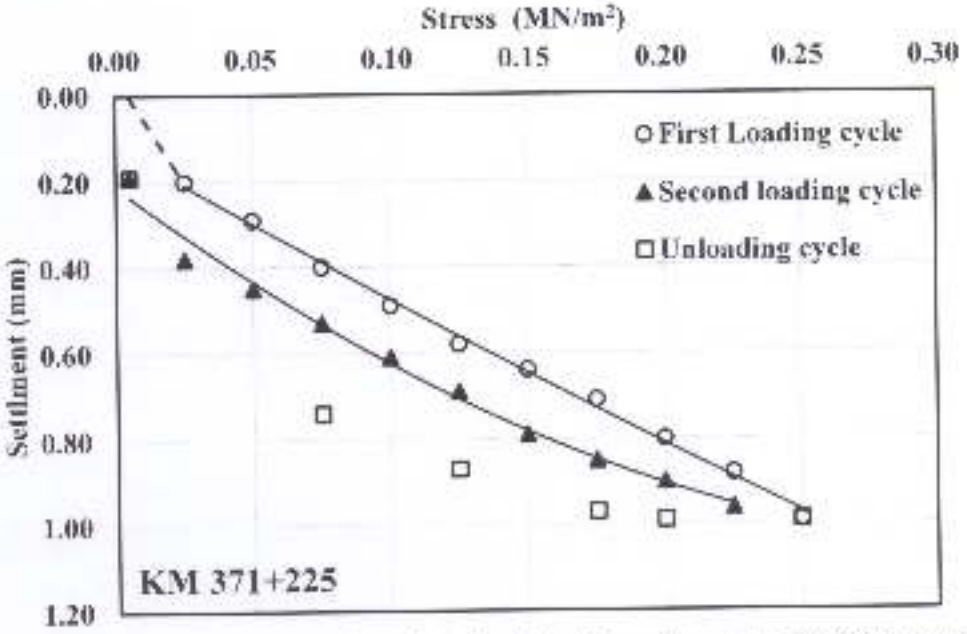

Figure 5: Load-settlement data: plate loading test performed at (KM 371+225)

The testing data corresponding to the sixth testing point (KM 371+200) is provided in Tables 16-18 and Figure 6. The testing data corresponding to the seventh testing point (KM 371+175) is provided in Tables 19-21 and Figure 7. The testing data corresponding to the eighth testing point (KM 371+150) is provided in Tables 22-24 and Figure 8. The testing data corresponding to the ninth testing point (KM 371+125) is provided in Tables 25-27 and Figure 9. The testing data corresponding to the tenth testing point (KM 371+100) is provided in Tables 28-30 and Figure 10.

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الجامعة المصرية اليابانية للعلوم و التكنولوجيا
وحدة اختبارات و استشارات الهندسة المدنية
E-JUST CETC Unit

Table 16: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+200)

Loading stage	Load (F)	Normal stress (s_0)	Settlement (S)
	kN	MN/m^2	mm
0	1.414	0.005	0.00
1	7.07	0.025	0.25
2	14.14	0.050	0.32
3	21.21	0.075	0.40
4	28.28	0.100	0.52
5	35.35	0.125	0.69
6	42.42	0.150	0.80
7	49.49	0.175	0.91
8	56.56	0.200	1.02
9	63.63	0.225	1.13
10	70.7	0.250	1.23
11	56.56	0.200	1.23
12	49.49	0.175	1.23
13	35.35	0.125	1.15
14	21.21	0.075	1.04
15	1.414	0.005	0.44

Table 17: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+200)

Loading stage	Load (F)	Normal stress (s_0)	Settlement (S)
	kN	MN/m^2	mm
0	1.414	0.005	0.44
1	7.07	0.025	0.61
2	14.14	0.050	0.67
3	21.21	0.075	0.78
4	28.28	0.100	0.86
5	35.35	0.125	0.93
6	42.42	0.150	1.00
7	49.49	0.175	1.08
8	56.56	0.200	1.14
9	63.63	0.225	1.23

Table 18: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+200)

Parameters	1st loading cycle	2nd loading cycle
$[s_0 max]$ MN/m^2	0.25	0.25
a_0 (mm)	0.11	0.46
a_1 (mm/(MN/m²))	4.39	4.47
a_2 (mm/(MN2/m⁴))	0.67	-5.02
Ev= 1.5 r/ [a_1+2 a_2 s_0 max]	98.71	139.89
Ev2/Ev1	1.42	

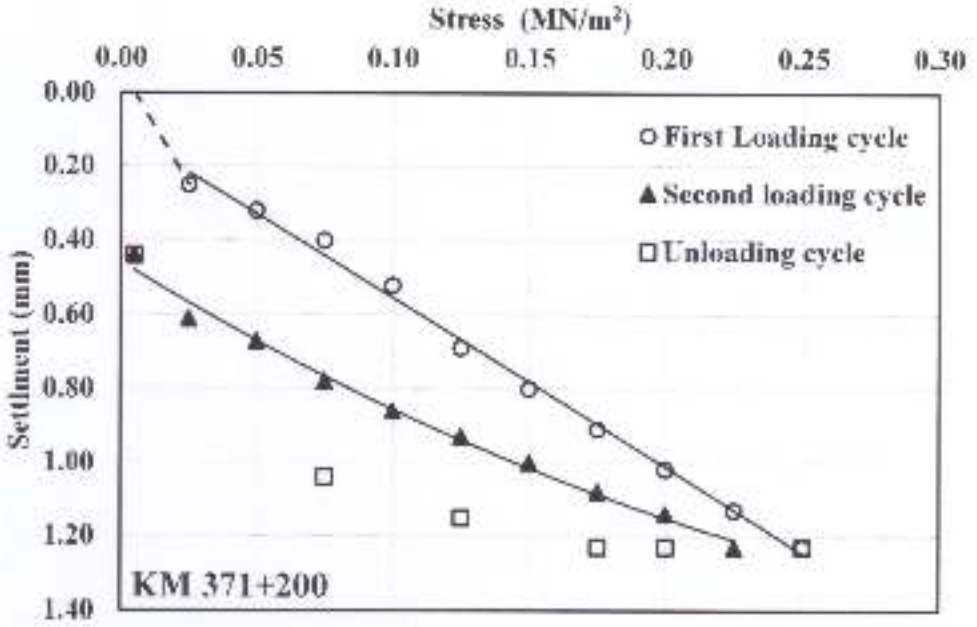

Figure 6: Load-settlement data: plate loading test performed at (KM 371+200)

Table 19: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+175)

Loading stage	Load (F) kN	Normal stress (s_n) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.00
1	7.07	0.025	0.26
2	14.14	0.050	0.35
3	21.21	0.075	0.46
4	28.28	0.100	0.56
5	35.35	0.125	0.68
6	42.42	0.150	0.77
7	49.49	0.175	0.93
8	56.56	0.200	1.03
9	63.63	0.225	1.13
10	70.7	0.250	1.30
11	56.56	0.200	1.30
12	49.49	0.175	1.28
13	35.35	0.125	1.27
14	21.21	0.075	1.2
15	1.414	0.005	1.15

Table 20: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+175)

Loading stage	Load (F)	Normal stress (s_0)	Settlement (S)
	kN	MN/m^2	mm
0	1.414	0.005	0.45
1	7.07	0.025	0.70
2	14.14	0.050	0.76
3	21.21	0.075	0.85
4	28.28	0.100	0.95
5	35.35	0.125	1.02
6	42.42	0.150	1.10
7	49.49	0.175	1.20
8	56.56	0.200	1.23
9	63.63	0.225	1.30

Table 21: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+175)

Parameters	1st loading cycle	2nd loading cycle
$(s_0 max)$ MN/m^2	0.25	0.25
a_0 (mm)	0.16	0.49
a_1 (mm/(MN/m^2))	3.64	5.50
a_2 (mm/(MNZ/m^2))	3.40	-8.70
$Ev= 1.5\ r/(a_1+a_2 s_{0\ max})$	100.21	135.45
Ev_2/Ev_1	1.35	

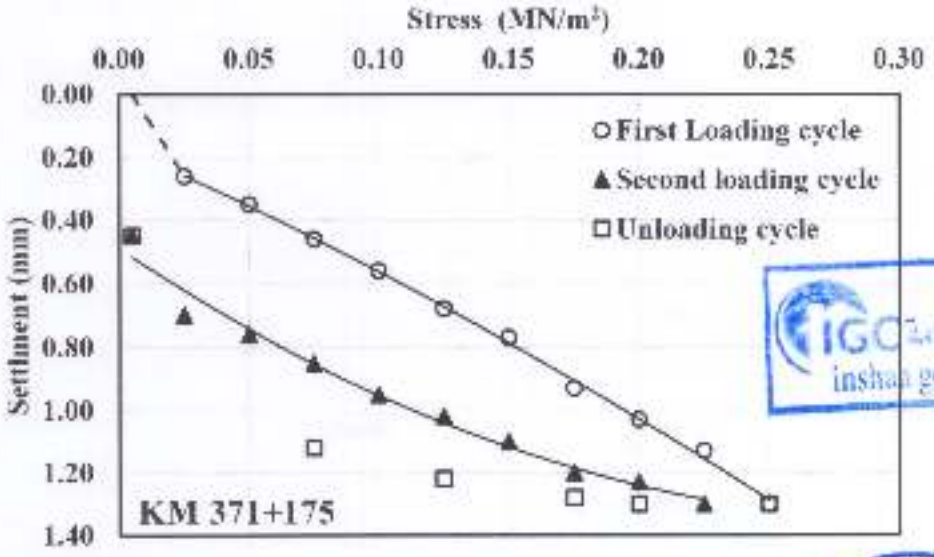

Figure 7: Load-settlement data: plate loading test performed at (KM 371+175)

Table 22: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+150)

Loading stage	Load (F)	Normal stress (s_o)	Settlement (S)
	kN	MN/m^2	mm
0	1.414	0.005	0.00
1	7.07	0.025	0.30
2	14.14	0.050	0.38
3	21.21	0.075	0.55
4	28.28	0.100	0.66
5	35.35	0.125	0.82
6	42.42	0.150	0.95
7	49.49	0.175	1.08
8	56.56	0.200	1.19
9	63.63	0.225	1.31
10	70.7	0.250	1.48
11	56.56	0.200	1.48
12	49.49	0.175	1.47
13	35.35	0.125	1.45
14	21.21	0.075	1.36
15	1.414	0.005	0.66

Table 23: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+150)

Loading stage	Load (F)	Normal stress (s_o)	Settlement (S)
	kN	MN/m^2	mm
0	1.414	0.005	0.66
1	7.07	0.025	0.88
2	14.14	0.050	0.96
3	21.21	0.075	1.09
4	28.28	0.100	1.19
5	35.35	0.125	1.30
6	42.42	0.150	1.38
7	49.49	0.175	1.47
8	56.56	0.200	1.53
9	63.63	0.225	1.57

Table 24: Calculations of the resilient modulus of the tested soil according to DIN 18134: (KM 371+150)

Parameters	1st loading cycle	2nd loading cycle
(s_o, max) MN/m^2	0.25	0.25
a_0 (mm)	0.15	0.67
a_1 (mm/(MN/m^2))	5.23	6.40
a_2 (mm/(MN2/m^4))	0.12	-10.64
$Ev=1.5\pi/(a_1+a_2 \cdot s_{o\,max})$	85.49	128.18
Ev_2/Ev_1	1.41	

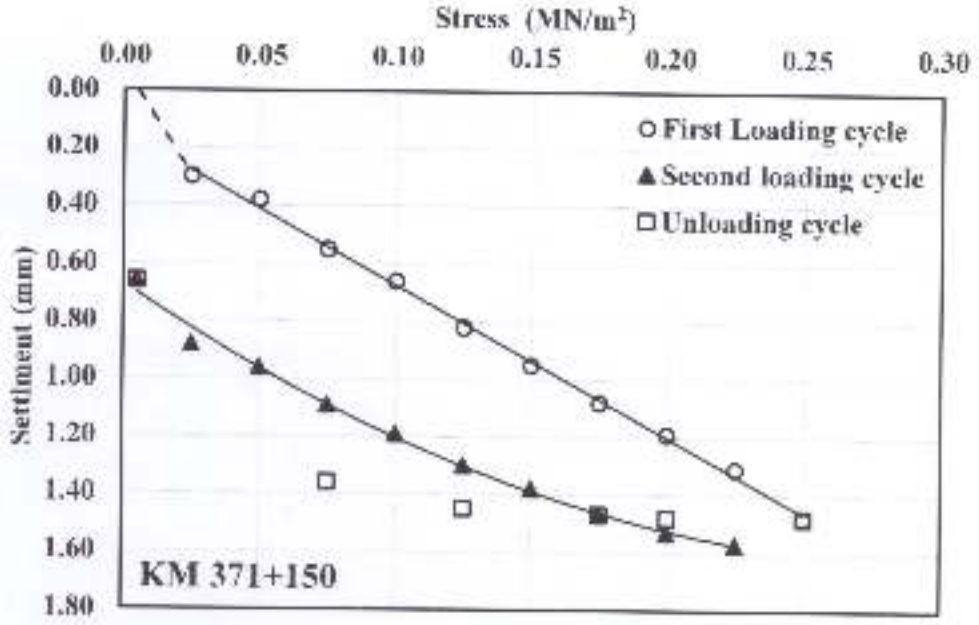

Figure 8: Load-settlement data: plate loading test performed at (KM 371+150)

Table 25: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+125)

Loading stage	Load (F) kN	Normal stress (s_o) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.00
1	7.07	0.025	0.26
2	14.14	0.050	0.30
3	21.21	0.075	0.43
4	28.28	0.100	0.53
5	35.35	0.125	0.67
6	42.42	0.150	0.79
7	49.49	0.175	0.86
8	56.56	0.200	0.96
9	63.63	0.225	1.07
10	70.7	0.250	1.15
11	56.56	0.200	1.19
12	49.49	0.175	1.18
13	35.35	0.125	1.12
14	21.21	0.075	1.01
15	1.414	0.005	0.40

Table 26: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+125)

Loading stage	Load (F)	Normal stress (s_n)	Settlement (S)
	kN	MN/m^2	mm
0	1.414	0.005	0.40
1	7.07	0.025	0.63
2	14.14	0.050	0.69
3	21.21	0.075	0.78
4	28.28	0.100	0.86
5	35.35	0.125	0.93
6	42.42	0.150	1.03
7	49.49	0.175	1.10
8	56.56	0.200	1.16
9	63.63	0.225	1.21

Table 27: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+125)

Parameters	1st loading cycle	2nd loading cycle
(s_n,max) MN/m^2	0.25	0.25
a_0 (mm)	0.13	0.44
a_1 (mm/[MN/m^2])	4.18	5.10
a_2 (mm/[$MN2/m^4$])	0.24	-7.50
$Ev= 1.5\ r/\ (a_1+a_2\cdot s_{n,MAX})$	106.08	139.54
Ev_2/Ev_1	1.32	

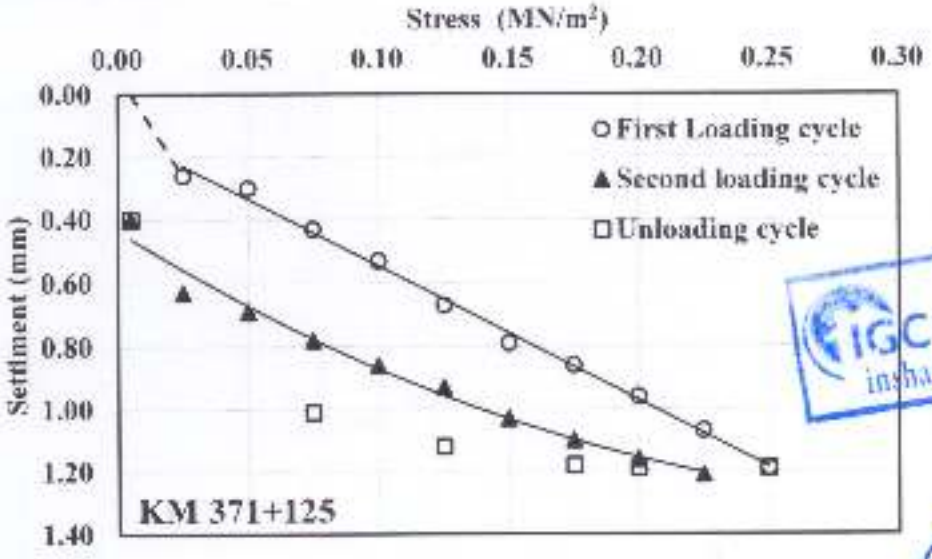

Figure 9: Load-settlement data: plate loading test performed at (KM 371+125)

Table 28: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+100)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.00
1	7.07	0.025	0.35
2	14.14	0.050	0.41
3	21.21	0.075	0.50
4	28.28	0.100	0.60
5	35.35	0.125	0.76
6	42.42	0.150	0.90
7	49.49	0.175	1.00
8	56.56	0.200	1.13
9	63.63	0.225	1.22
10	70.7	0.250	1.37
11	56.56	0.200	1.37
12	49.49	0.175	1.36
13	35.35	0.125	1.21
14	21.21	0.075	1.07
15	1.414	0.005	0.34

Table 29: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+100)

Loading stage	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.34
1	7.07	0.025	0.70
2	14.14	0.050	0.79
3	21.21	0.075	0.85
4	28.28	0.100	0.97
5	35.35	0.125	1.09
6	42.42	0.150	1.15
7	49.49	0.175	1.24
8	56.56	0.200	1.30
9	63.63	0.225	1.37

Table 30: Calculations of the resilient modulus of the tested soil according to DIN18134 (KM 371+100)

Parameters	1st loading cycle	2nd loading cycle
(s_0 max) MN/m^2	0.25	0.25
a_0 (mm)	0.22	0.42
a_1 (mm/(MN/m^2))	3.84	7.02
a_2 (mm/(MN2/m^2))	3.09	-12.86
Ev= 1.5 r/ (a_1+a_2· $s_{0,max}$)	97.57	118.34
$Ev_{2/1}$	1.21	

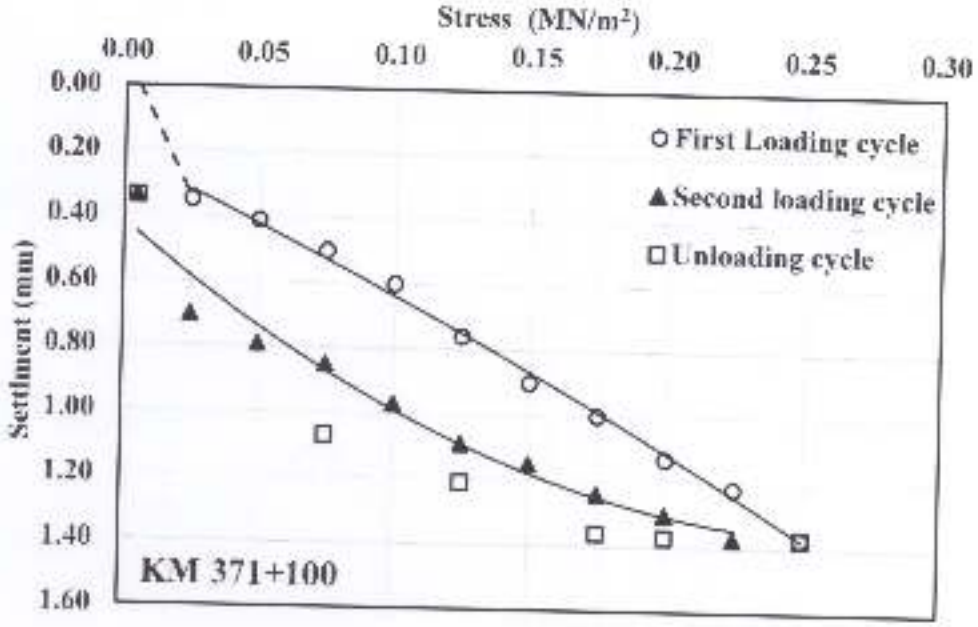

Figure 10: Load-settlement data: plate loading test performed at (KM 371+100)

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4. Closure

Test results presented herein report the load-settlement data obtained from 10 plate loading tests conducted on the Prepared Subgrade 2.0 of the Electric Express train project at 10 locations (KM 371+325, KM 371+300, KM 371+275, KM 371+250, KM 371+225, KM 371+200, KM 371+175, KM 371+150, KM 371+125, and KM 371+100) in accordance with German Standard, DIN18134.

Location	E_{v1} MN/m2	E_{v2} MN/m2	E_{v2}/E_{v1} ratio
KM 371+325	121.65	134.10	1.10
KM 371+300	124.31	154.08	1.24
KM 371+275	118.02	155.57	1.32
KM 371+250	137.52	146.62	1.07
KM 371+225	131.76	143.45	1.09
KM 371+200	98.71	139.89	1.42
KM 371+175	100.21	135.45	1.35
KM 371+150	85.49	120.18	1.41
KM 371+125	106.08	139.54	1.32
KM 371+100	97.57	118.34	1.21

- Note: Before interpreting these test results for future applications, the Prepared Subgrade 2.0 in-situ variability between the testing locations should be considered.

Technical committee

Dr. Mahmoud Ahmed

Prof. Dr. Mohamed T. El-Farra

E-JUST CETC Unit

Lab Engineer

Mohamed A. Al-Najjar

SPECTRUM CONSULTING

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Appendix A

Location of test site:	KM 371+300		Field team	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction		Date:	11/4/2023
Diameter of loading plate	600		Time	9:35:00 AM
				10:03:00 AM
Lever ratio	1		Note: CAT 966F	
Type of Soil	Prepared Subgrade 2.0			
Redding material	0			
Temperature	19°C			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	0	1.414	10.00	
	1	7.07	9.75	
	2	14.14	9.70	
	3	21.21	9.60	
	4	28.28	9.49	
	5	35.35	9.40	
	6	42.42	9.28	
	7	49.49	9.20	
	8	56.56	9.13	
	9	63.63	9.07	
	10	70.7	8.98	
Unloading Stage	11	56.56	8.98	
	12	49.49	8.98	
	13	35.35	9.02	
	14	21.21	9.12	
	15	1.414	9.70	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	0	1.414	9.70	
	1	7.07	9.54	
	2	14.14	9.47	
	3	21.21	9.41	
	4	28.28	9.31	
	5	35.35	9.23	
	6	42.42	9.15	
	7	49.49	9.08	
	8	56.56	9.05	
	9	63.63	9.00	

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Location of test site:	KM 371+275		Field team	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction		Date:	11/4/2023
Diameter of loading plate	600		Time	10:10:00 AM
				10:38:00 AM
Lever ratio	1		Note: CAT 966F	
Type of Soil	Prepared Subgrade 2.0			
Bedding material	---			
Temperature	19°C			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	0	1.414	10.00	
	1	7.07	9.71	
	2	14.14	9.64	
	3	21.21	9.52	
	4	28.28	9.43	
	5	35.35	9.36	
	6	42.42	9.25	
	7	49.49	9.14	
	8	56.56	9.05	
	9	63.63	8.97	
	10	70.7	8.84	
Unloading Stage	11	56.56	8.84	
	12	49.49	8.84	
	13	35.35	8.90	
	14	21.21	9.01	
	15	1.414	9.70	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	0	1.414	9.70	
	1	7.07	9.45	
	2	14.14	9.33	
	3	21.21	9.25	
	4	28.28	9.19	
	5	35.35	9.10	
	6	42.42	9.07	
	7	49.49	9.00	
	8	56.56	8.95	
	9	63.63	8.88	

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وحدة اختبارات و استشارات الهندسة المدنية - JUST CETC Unit

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Location of test site:	**KM 371+250**	**Field team**	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction	**Date:**	11/4/2023
Diameter of loading plate	600	**Time**	10:45:00 AM
			11:12:00 AM
Lever ratio	1	**Note:** CAT 966F	
Type of Soil	Prepared Subgrade 2.0		
Bedding material	---		
Temperature	19°C		

Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)
Loading Stage	0	1.414	10.00
	1	7.07	9.69
	2	14.14	9.62
	3	21.21	9.55
	4	28.28	9.47
	5	35.35	9.39
	6	42.42	9.28
	7	49.49	9.20
	8	56.56	9.14
	9	63.63	9.05
	10	70.7	8.95
Unloading Stage	11	56.56	8.95
	12	49.49	8.96
	13	35.35	9.05
	14	21.21	9.14
	15	1.414	9.74
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)
Reloading Stage	0	1.414	9.74
	1	7.07	9.52
	2	14.14	9.46
	3	21.21	9.35
	4	28.28	9.26
	5	35.35	9.17
	6	42.42	9.14
	7	49.49	9.07
	8	56.56	9.00
	9	63.63	8.95

شركة انشاء للمقاولات العامة IGC inshaa general construction

JUST CETC Unit

SPECTRUM CONSULTING

SMT.bOH@ejust.edu.eg
Mobile: +201565631725

Location of test site:	**KM 371+225**		**Field team**	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction		**Date:**	11/4/2023
Diameter of loading plate	600		**Time**	11:20:00 AM
				11:48:00 AM
Lever ratio	1		**Note:** CAT 966F	
Type of Soil	Prepared Subgrade 2.0			
Bedding material	---			
Temperature	19°C			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	**0**	**1.414**	**10.00**	
	1	**7.07**	**9.80**	
	2	**14.14**	**9.71**	
	3	**21.21**	**9.60**	
	4	**28.28**	**9.51**	
	5	**35.35**	**9.42**	
	6	**42.42**	**9.36**	
	7	**49.49**	**9.29**	
	8	**56.56**	**9.20**	
	9	**63.63**	**9.12**	
	10	**70.7**	**9.01**	
Unloading Stage	**11**	**56.56**	**9.01**	
	12	**49.49**	**9.03**	
	13	**35.35**	**9.13**	
	14	**21.21**	**9.26**	
	15	**1.414**	**9.81**	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	**0**	**1.414**	**9.81**	
	1	**7.07**	**9.62**	
	2	**14.14**	**9.55**	
	3	**21.21**	**9.47**	
	4	**28.28**	**9.39**	
	5	**35.35**	**9.31**	
	6	**42.42**	**9.21**	
	7	**49.49**	**9.15**	
	8	**56.56**	**9.10**	
		63.63	**9.04**	

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IGC inshaa general construction

وحدة اختبارات و استشارات الهندسة المدنية
E-JUST CETC Unit

SPECTRUM CONSULTING

Location of test site:	**KM 371+200**	**Field team**	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction	**Date:**	11/4/2023
Diameter of loading plate	600	**Time**	11:55:00 AM
			12:23:00 PM
Lever ratio	1	**Note:** CAT 966F	
Type of Soil	Prepared Subgrade 2.0		
Bedding material	---		
Temperature	19°C		

Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)
Loading Stage	0	1.414	10.00
	1	7.07	9.75
	2	14.14	9.68
	3	21.21	9.60
	4	28.28	9.48
	5	35.35	9.31
	6	42.42	9.20
	7	49.49	9.09
	8	56.56	8.98
	9	63.63	8.87
	10	70.7	8.77
Unloading Stage	11	56.56	8.77
	12	49.49	8.77
	13	35.35	8.85
	14	21.21	8.96
	15	1.414	9.56
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)
Reloading Stage	0	1.414	9.56
	1	7.07	9.39
	2	14.14	9.33
	3	21.21	9.22
	4	28.28	9.14
	5	35.35	9.07
	6	42.42	9.00
	7	49.49	8.92
	8	56.56	8.[illegible]
	9	63.63	8.77

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GC inshaa general construction

وحدة اختبارات و استشارات الهندسة المدنية
EJUST CETC Unit

SPECTRUM CONSULTING

Location of test site:	KM 371+175		Field team	Mr. Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction		Date:	11/4/2023
Diameter of loading plate	600		Time	12:30:00 PM
				12:58:00 PM
Lever ratio	1		Note: CAT 966F	
Type of Soil	Prepared Subgrade 2.0			
Bedding material	—			
Temperature	19°C			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	0	1.414	10.00	
	1	7.07	9.74	
	2	14.14	9.65	
	3	21.21	9.54	
	4	28.28	9.44	
	5	35.35	9.32	
	6	42.42	9.23	
	7	49.49	9.07	
	8	56.56	8.97	
	9	63.63	8.87	
	10	70.7	8.70	
Unloading Stage	11	56.56	8.70	
	12	49.49	8.72	
	13	35.35	8.78	
	14	21.21	8.88	
	15	1.414	9.55	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	0	1.414	9.55	
	1	7.07	9.30	
	2	14.14	9.24	
	3	21.21	9.15	
	4	28.28	9.05	
	5	35.35	8.98	
	6	42.42	8.90	
	7	49.49	8.80	
	8	56.56	8.7[illegible]	
	9	63.63	8.60	

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Location of test site:	KM 371+150		Field team	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction		Date:	11/4/2023
Diameter of loading plate	600		Time	1:07:00 PM
				1:35:00 PM
Lever ratio	1		Note: CAT 966F	
Type of Soil	Prepared Subgrade 2.0			
Bedding material	—			
Temperature	19°C			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	0	1.414	10.00	
	1	7.07	9.70	
	2	14.14	9.62	
	3	21.21	9.45	
	4	28.28	9.34	
	5	35.35	9.18	
	6	42.42	9.05	
	7	49.49	8.92	
	8	56.56	8.81	
	9	63.63	8.69	
	10	70.7	8.52	
Unloading Stage	11	56.56	8.52	
	12	49.49	8.53	
	13	35.35	8.55	
	14	21.21	8.64	
	15	1.414	9.34	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	0	1.414	9.34	
	1	7.07	9.12	
	2	14.14	9.04	
	3	21.21	8.91	
	4	28.28	8.81	
	5	35.35	8.70	
	6	42.42	8.62	
	7	49.49	8.53	
	8	56.56	8.47	
	9	63.63	8.43	

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Location of test site:	KM 371+125		Field team	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction		Date:	11/4/2023
Diameter of loading plate	600		Time	1:43:00 PM
				2:10:00 PM
Lever ratio	1		Note: CAT 966F	
Type of Soil	Prepared Subgrade 2.0			
Bedding material	---			
Temperature	19°C			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	0	1.414	10.00	
	1	7.07	9.74	
	2	14.14	9.70	
	3	21.21	9.57	
	4	28.28	9.47	
	5	35.35	9.33	
	6	42.42	9.21	
	7	49.49	9.14	
	8	56.56	9.04	
	9	63.63	8.93	
	10	70.7	8.81	
Unloading Stage	11	56.56	8.81	
	12	49.49	8.82	
	13	35.35	8.88	
	14	21.21	8.99	
	15	1.414	9.60	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	0	1.414	9.60	
	1	7.07	9.37	
	2	14.14	9.31	
	3	21.21	9.22	
	4	28.28	9.14	
	5	35.35	9.07	
	6	42.42	8.97	
	7	49.49	8.90	
	8	56.56	8.84	
	9	63.63	8.74	

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Location of test site:	KM 371+100		Field team	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction		Date:	11/4/2023
Diameter of loading plate	600		Time	2:18:00 PM
				2:48:00 PM
Lever ratio	1		Note: CAT 966F	
Type of Soil	Prepared Subgrade 2.0			
Bedding material	---			
Temperature	19°C			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	0	1.414	10.00	
	1	7.07	9.65	
	2	14.14	9.59	
	3	21.21	9.50	
	4	28.28	9.40	
	5	35.35	9.24	
	6	42.42	9.10	
	7	49.49	9.00	
	8	56.56	8.87	
	9	63.63	8.78	
	10	70.7	8.63	
Unloading Stage	11	56.56	8.63	
	12	49.49	8.64	
	13	35.35	8.79	
	14	21.21	8.93	
	15	1.414	9.66	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	0	1.414	9.66	
	1	7.07	9.30	
	2	14.14	9.21	
	3	21.21	9.15	
	4	28.28	9.03	
	5	35.35	8.91	
	6	42.42	8.85	
	7	49.49	8.76	
	8	56.56	8.70	
	9	63.63	8.63	

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IGC inshaa general construction

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S5-B-IN

MATERIAL INSPECTION REQUEST

Contractor Company	INSHAA GENERAL OF CONSTRUCTION Company		Designer Company	(SPECTRUM) Engineering Consulting Office	
Issued by Contractor	Name: Eng. Moahmed hassen elssyd	Sign: 5 EA 11 2023	Date/ Serial Number: 10-05-2023 (P.L.T.4)	Time: 01:00 PM	
Received by GARB CONSULTANT	Eng. Mazen Essamy		PLT		

C1	C2	C3	DD	MM	YY	HH	MM
371	EW	CS	11	05	2023	3	00

CODE-1	S1 to S21 Station Reference	D1 to S3 Depot Reference	Kp XXX Note For Kilometer point only Start Km is used
CODE-2		Work Activity	
CODE-3		Sub Element of Activity	

Description of Materials	Prepared sub grade level 2		
Location to be Used	St. (371+000) To (371+100)		
MAR Approval No	M.A.R. P.S.G.1	Date	08/04/2023
Supplier Name	ALFARDI		
Test Requirement	P.L.T (DIN 18134)	Specification	EARTHWORK SPECIFICATIONS & TESTING REPORT (CG21-41.2) VERSION 2 BY CIVILCON GROUP
Reference Photos	Yes / No	Other	Rev UIR- P.S.G.6

Item	Description	Unit	Quantity	Arrival Date	Note
1	PLATE LOAD TEST	NUMBER	4	11/05/2023	
2					
3					
4					

Comments by: Eng. Mazen Essamy (SPECTRUM)

1-The Plate Load Test Result P.L.T (DIN 18134) is Approved.

SPECTRUM CONSULTING

Comments by: Eng. Alaa Abd Allatif (ER)

1-Plate Load Test Was Carried-out By (E-just)
2-Results report attached and acceptable with project specifications.
3-Final approval is subject to above mentioned comments.

شركة انشاء للمقاولات العامة IGC inshaa general construction

APPROVAL STATUS

Organisation	Name	Sign	Date	A-AWC-R
Contractor	Eng. Mohamed Hassan	5 EA 11 2023	11-05-2023	A
QA/QC *	Eng. Mazen Essamy			A
GARB**	Eng. Mohammed Fayad			
Employers Representative	Eng. Alaa Abd-Allatif		12-5-2023	AWC

* Designer
** Alignment / Bridges: Culvert Only

Technical Report

Plate Loading Tests

KM 371+000 to 371+025, KM 371+025 to 371+050,
KM 371+050 to 371+075, and KM 371+075 to 371+100

Prepared Subgrade 2

Project

Electric Express Train (Sokhna - New capital - 6th of October city - New Elalamein city)

Prepared for

Inshaa General Construction

3 Mobilka CC - Abu Youssef, Alexandria, Egypt

(May 11, 2023)

يعتمد ،،،
أمين عام الجامعة
لواء مهندس / أسامة فتحي

E-JUST CETC Unit

1. Introduction

The Civil Engineering Testing & Consulting Unit (CETCU) of the Egypt-Japan University of Science and Technology (EJUST) was retained by Inshaa General Construction to conduct 4 plate loading tests on the Prepared Subgrade 2 of the Electric Express Train project at 4 locations (KM 371+000 to 371+025, KM 371+025 to 371+050, KM 371+050 to 371+075, and KM 371+075 to 371+100) in accordance with the German Standard DIN18134. The mandate was communicated by Eng. Mahmoud Shaban of Inshaa General Construction. Field team members (Mr.Mohamed Mamdouh) from the working CETCU team visited the project site on May 11, 2023 and performed the required tests. This report summarizes the plate loading test procedure according to DIN18134, the test results and their interpretations, and the CETCU pertaining recommendations.

2. Test Set Up and Instrumentation

- The German standard DIN18134 was applied to define the test setup including the loading system, test conditions, and procedure for the plate loading tests.
- The tests were carried out to determine the Strain Moduli (Ev1 and Ev2) and their ratio (Ev2/Ev1) from a stress – deformation relationship of two consecutive loading from Loading-Unloading-Loading regime.
- The loading plate has a diameter of 600 mm and a thickness of 25 mm and it is provided with equally spaced stiffeners. The upper plate face is parallel to the bottom face of the plate to allow a 300-mm plate to be placed on the 600-mm plate top.
- The loading system consisted of a hydraulic pump connected to a hydraulic jack of 700 bar capacity, which can apply and release the load increments.
- The dial gauge used to measure the plate settlement has a resolution of 0.01 mm and the lever ratio was equal to 1.
- The temperature at the time of the test was 24± 1°C.
- The plate was carried out on a Prepared Subgrade 2 (according to the company) at 4 points (KM 371+000 to 371+025, KM 371+025 to 371+050, KM 371+050 to 371+075 and KM 371+075 to 371+100). The test surface area was levelled, and the plate was bedded on this surface.
- The hydraulic jack was placed on the middle of, and normal to, the loading plate beneath the reaction loading system and secured against tilting.
- The reaction loading system was a heavy multipurpose Loader CAT 966F.

3. Test Procedure and Results

The plate load test was conducted in accordance with the DIN18134. Loading, unloading, and reloading regimes were considered to estimate the resilient modulus of the tested soil. Prior to the test, the force transducer and dial gauge were reset to zero, and then a load corresponding to a stress of 0.01 MN/m2 was applied. The load was increased in the first loading cycle until a normal stress of 0.25 MN/m2 was reached, and the loading increment was 0.025 MN/m2. The load was gradually released in four stages. Following unloading, a second loading cycle was performed, but the load was only increased to the penultimate stage of the first cycle. 4 plate loading tests on the Prepared Subgrade 2 of the Electric Express Train project were conducted at 4 locations (KM 371+000 to 371+025, KM 371+025 to 371+050, KM 371+050 to 371+075, and KM 371+075 to 371+100) and the data collected at the 4 test points is included in Appendix A.

Table 1 presents the load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+000 to 371+025), while Table 2 shows the data obtained at the second loading stage.

Table 1: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+000 to 371+025)

Loading stage	Load (F) kN	Normal MN/m^2	Settleme mm
0	1.414	0.005	0.00
1	7.07	0.025	0.20
2	14.14	0.050	0.28
3	21.21	0.075	0.35
4	28.28	0.100	0.51
5	35.35	0.125	0.71
6	42.42	0.150	0.84
7	49.49	0.175	1.00
8	56.56	0.200	1.14
9	63.63	0.225	1.23
10	70.7	0.250	1.36
11	56.56	0.200	1.36
12	49.49	0.175	1.34
13	35.35	0.125	1.32
14	21.21	0.075	1.24
15	1.414	0.005	0.69

Table 2: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+000 to 371+025)

Loading stage	Load (F)	Normal stress (σ_0)	Settlement (S)
	kN	MN/m^2	mm
0	1.414	0.005	0.69
1	7.07	0.025	0.85
2	14.14	0.050	0.95
3	21.21	0.075	1.00
4	28.28	0.100	1.07
5	35.35	0.125	1.15
6	42.42	0.150	1.20
7	49.49	0.175	1.28
8	56.56	0.200	1.33
9	63.63	0.225	1.40

The load-settlement data obtained in all loading and unloading stages for the test performed at the first location (KM 371+000 to 371+025) are shown in Figure 1. Table 3 shows the calculations of the resilient modulus of the tested soil according to DIN18134. The testing data corresponding to the second testing point (KM 371+025 to 371+050) is provided in Tables 4-6 and Figure 2. The testing data corresponding to the third testing point (KM 371+050 to 371+075) is provided in Tables 7-9 and Figure 3. The testing data corresponding to the fourth testing point (KM 371+075 to 371+100) is provided in Tables 10-12 and Figure 4.

Table 3: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+000 to 371+025)

Parameters	1st loading cycle	2nd loading cycle
(s_0,max) MN/m^2	0.25	0.25
a_0 (mm)	0.02	0.72
a_1 (mm/(MN/m^2))	5.22	4.19
a_2 (mm/(MN2/m^4))	0.97	-5.42
$Ev= 1.5 r/ (a_1+a_2 . s_{0,MAX})$	82.34	158.76
Ev_2/Ev_1	1.93	

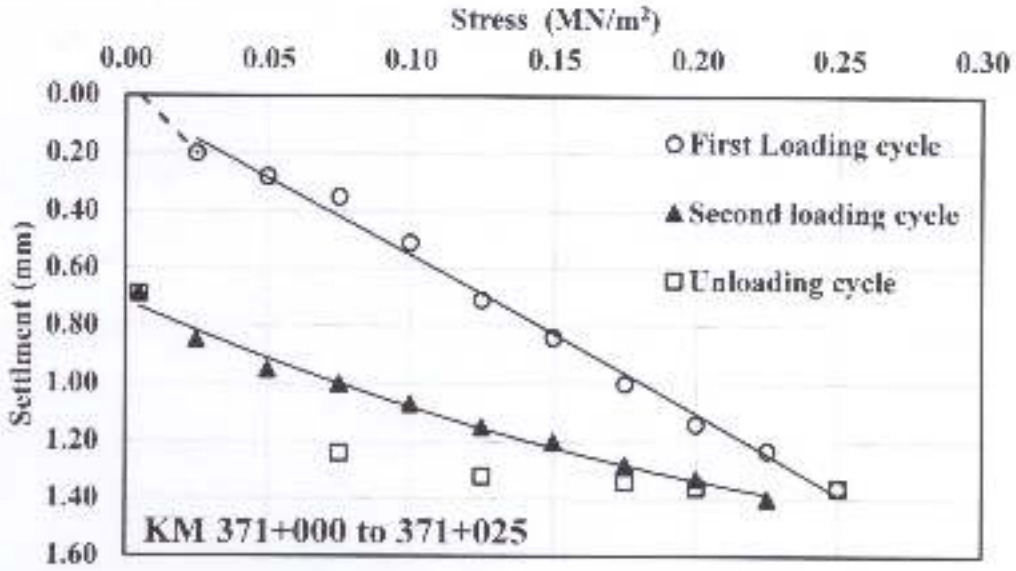

Figure 1: Load-settlement data: plate loading test performed at (KM 371+000 to 371+025)

Table 4: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+025 to 371+050)

Loading stage	Load (F)	Normal stress (σ_0)	Settlement (S)
	kN	MN/m^2	mm
0	1.414	0.005	0.00
1	7.07	0.025	0.35
2	14.14	0.050	0.40
3	21.21	0.075	0.45
4	28.28	0.100	0.54
5	35.35	0.125	0.65
6	42.42	0.150	0.73
7	49.49	0.175	0.81
8	56.56	0.200	0.90
9	63.63	0.225	1.00
10	70.7	0.250	1.08
11	56.56	0.200	1.08
12	49.49	0.175	1.07
13	35.35	0.125	1.0
14	21.21	0.075	0.9
15	1.414		0.3

Table 5: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+025 to 371+050)

Loading stage	Load (F) kN	Normal stress (σ_o) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.34
1	7.07	0.025	0.57
2	14.14	0.050	0.65
3	21.21	0.075	0.73
4	28.28	0.100	0.80
5	35.35	0.125	0.88
6	42.42	0.150	0.92
7	49.49	0.175	0.96
8	56.56	0.200	1.00
9	63.63	0.225	1.05

Table 6: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+025 to 371+050)

Parameters	1st loading cycle	2nd loading cycle
(s_o,max) MN/m^2	0.25	0.25
a_o (mm)	0.27	0.38
a_1 (mm/(MN/m^2))	2.61	5.46
a_2 (mm/(MN2/m^4))	2.79	-11.55
Ev= 1.5 r/ (a_1+a_2. $s_{o,MAX}$)	136.24	174.64
Ev_2/Ev_1	1.28	

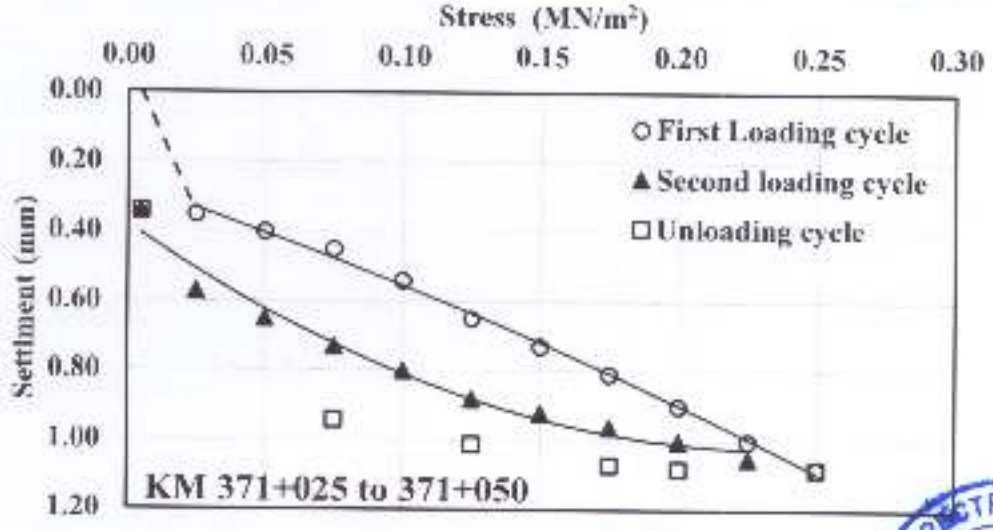

Figure 2: Load-settlement data: plate loading test performed at (KM 371+025 to 371+050)

Table 7: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+050 to 371+075)

Loading stage	Load (F) kN	Normal stress (σ_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.00
1	7.07	0.025	0.25
2	14.14	0.050	0.32
3	21.21	0.075	0.43
4	28.28	0.100	0.57
5	35.35	0.125	0.67
6	42.42	0.150	0.83
7	49.49	0.175	0.93
8	56.56	0.200	1.08
9	63.63	0.225	1.17
10	70.7	0.250	1.31
11	56.56	0.200	1.30
12	49.49	0.175	1.29
13	35.35	0.125	1.22
14	21.21	0.075	1.15
15	1.414	0.005	0.45

Table 8: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+050 to 371+075)

Loading stage	Load (F) kN	Normal stress (σ_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.45
1	7.07	0.025	0.63
2	14.14	0.050	0.75
3	21.21	0.075	0.88
4	28.28	0.100	0.94
5	35.35	0.125	1.00
6	42.42	0.150	1.07
7	49.49	0.175	1.13
8	56.56	0.200	1.19
9	63.63	0.225	1.25

Table 9: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+050 to 371+075)

Parameters	1st loading cycle	2nd loading cycle
(s_0,max) MN/m^2	0.25	0.25
a_0 (mm)	0.12	0.48
a_1 (mm/(MN/m^2))	4.28	8.80
a_2 (mm/(MN2/m^4))	2.00	10.81
$Ev= 1.5\ r'\ (a_1+a_2\cdot s_{0,max})^{-1}$	93.86	145.26
Ev_2/Ev_1	1.55	

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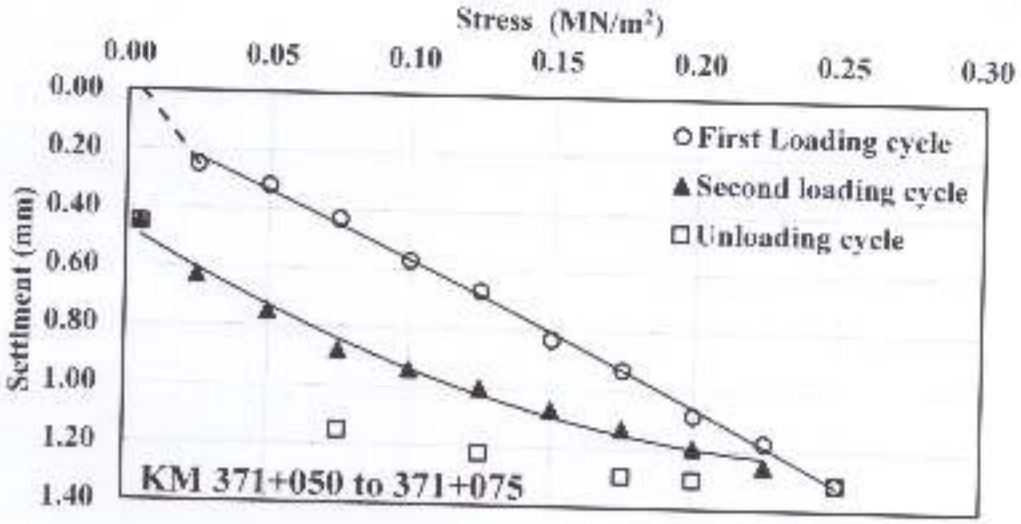

Figure 3: Load-settlement data: plate loading test performed at (KM 371+050 to 371+075)

Table 10: Load-settlement data obtained at the first loading and unloading stages of the plate loading test performed at the location (KM 371+075 to 371+100)

Loading stage	Load (F)	Normal stress (σ_n)	Settlement (S)
	kN	MN/m^2	mm
0	1.414	0.005	0.00
1	7.07	0.025	0.26
2	14.14	0.050	0.41
3	21.21	0.075	0.50
4	28.28	0.100	0.55
5	35.35	0.125	0.65
6	42.42	0.150	0.74
7	49.49	0.175	0.85
8	56.56	0.200	0.94
9	63.63	0.225	1.03
10	70.7	0.250	1.13
11	56.56	0.200	1.13
12	49.49	0.175	1.12
13	35.35	0.125	1.05
14	21.21	0.075	0.99
15	1.414	0.005	0.30

Table 11: Load-settlement data obtained at the second loading and unloading stages of the plate loading test performed at the location (KM 371+075 to 371+100)

Loading stage	Load (F) kN	Normal stress (σ_0) MN/m^2	Settlement (S) mm
0	1.414	0.005	0.30
1	7.07	0.025	0.53
2	14.14	0.050	0.67
3	21.21	0.075	0.79
4	28.28	0.100	0.88
5	35.35	0.125	0.96
6	42.42	0.150	1.01
7	49.49	0.175	1.09
8	56.56	0.200	1.15
9	63.63	0.225	1.22

Table 12: Calculations of the resilient modulus of the tested soil according to DIN18134: (KM 371+075 to 371+100)

Parameters	1st loading cycle	2nd loading cycle
$(s_0.max)\ MN/m^2$	0.25	0.25
a_0 (mm)	0.20	0.33
a_1 (mm/(MN/m^2))	3.69	6.80
a_2 (mm/(MN2/m^4))	0.12	13.26
$Ev = 1.5\ r/(a_1+a_2.s_{0,MAX})$	120.92	129.14
Ev_2/Ev_1	1.07	

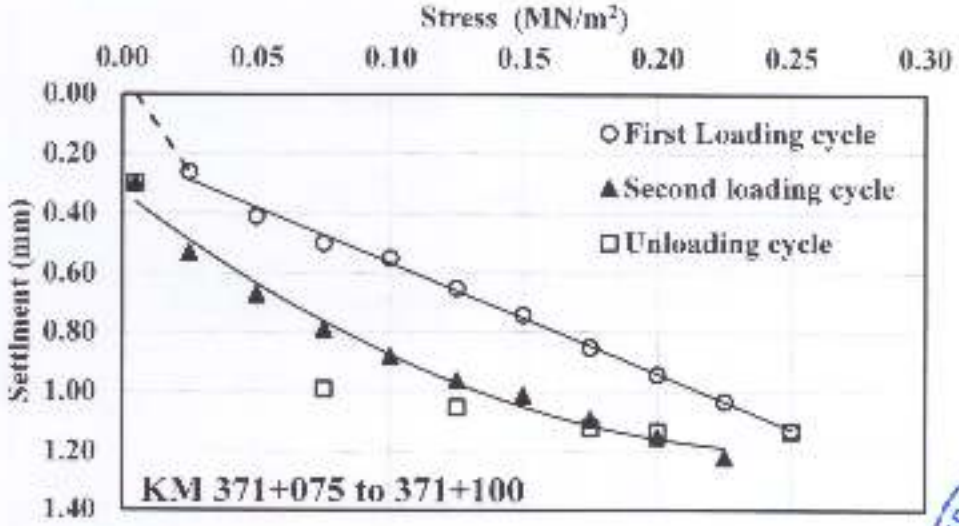

Figure 4: Load-settlement data: plate loading test performed at (KM 371+075 to 371+100)

4. Closure

Test results presented herein report the load-settlement data obtained from 4 plate loading tests conducted on the Prepared Subgrade 2 of the Electric Express train project at 4 locations (KM 371+000 to 371+025, KM 371+025 to 371+050, KM 371+050 to 371+075, and KM 371+075 to 371+100) in accordance with German Standard, DIN18134.

Location	E_{v1} MN/m2	E_{v2} MN/m2	E_{v2}/E_{v1} ratio
KM 371+000 to 371+025	82.34	158.76	1.93
KM 371+025 to 371+050	136.24	174.64	1.28
KM 371+050 to 371+075	93.86	145.26	1.55
KM 371+075 to 371+100	120.92	129.14	1.07

- Note: Before interpreting these test results for future applications, the Prepared Subgrade 2 in-situ variability between the testing locations should be considered.

Technical committee

Dr. Mahmoud Ahmed

Prof. Dr. Mohamed F. M. Fahmy

Lab Engineer

Mohamed A. Al-Najjar

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Appendix A

Location of test site:	KM 371+000 to 371+025		Field team	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction		Date:	11/5/2023
Diameter of loading plate	600		Time	10:30:00 am
				10:58:00 am
Lever ratio	1		Note: CAT 966F	
Type of Soil	Prepared Subgrade 2			
Bedding material	---			
Temperature	24°C			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	0	1.414	10.00	
	1	7.07	9.80	
	2	14.14	9.72	
	3	21.21	9.65	
	4	28.28	9.49	
	5	35.35	9.29	
	6	42.42	9.16	
	7	49.49	9.00	
	8	56.56	8.86	
	9	63.63	8.77	
	10	70.7	8.64	
Unloading Stage	11	56.56	8.64	
	12	49.49	8.66	
	13	35.35	8.68	
	14	21.21	8.76	
	15	1.414	9.31	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	0	1.414	9.31	
	1	7.07	9.15	
	2	14.14	9.05	
	3	21.21	9.00	
	4	28.28	8.93	
	5	35.35	8.85	
	6	42.42	8.80	
	7	49.49	8.72	
	8	56.56	8.65	
	9	63.63	8.60	

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Location of test site:	KM 371+025 to 371+050		Field team	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction		Date:	11/5/2023
Diameter of loading plate	600		Time	11:05:00 am
				11:33:00 am
Lever ratio	1		Note: CAT 966F	
Type of Soil	Prepared Subgrade 2			
Bedding material	—			
Temperature	24°C			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	0	1.414	10.00	
	1	7.07	9.65	
	2	14.14	9.60	
	3	21.21	9.55	
	4	28.28	9.46	
	5	35.35	9.35	
	6	42.42	9.27	
	7	49.49	9.19	
	8	56.56	9.10	
	9	63.63	9.00	
	10	70.7	8.92	
Unloading Stage	11	56.56	8.92	
	12	49.49	8.93	
	13	35.35	8.99	
	14	21.21	9.06	
	15	1.414	9.66	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	0	1.414	9.66	
	1	7.07	9.43	
	2	14.14	9.35	
	3	21.21	9.27	
	4	28.28	9.20	
	5	35.35	9.12	
	6	42.42	9.08	
	7	49.49	9.04	
	8	56.56	9.00	
	9	63.63	8.95	

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E-JUST CETC Unit

SPECTRUM CONSULTING

Location of test site:	KM 371+050 to 371+075		Field team	Mr.Mohamed Mamdouh
Project title:	Electric Express Train Project - Inshaa General Construction		Date:	11/5/2023
Diameter of loading plate	600		Time	11:40:00 am
				12:08:00 pm
Lever ratio	1		Note: CAT 966F	
Type of Soil	Prepared Subgrade 2			
Bedding material	—			
Temperature	24°C			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	0	1.414	10.00	
	1	7.07	9.75	
	2	14.14	9.68	
	3	21.21	9.57	
	4	28.28	9.43	
	5	35.35	9.33	
	6	42.42	9.17	
	7	49.49	9.07	
	8	56.56	8.92	
	9	63.63	8.83	
	10	70.7	8.69	
Unloading Stage	11	56.56	8.70	
	12	49.49	8.71	
	13	35.35	8.78	
	14	21.21	8.85	
	15	1.414	9.55	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	0	1.414	9.55	
	1	7.07	9.37	
	2	14.14	9.25	
	3	21.21	9.12	
	4	28.28	9.06	
	5	35.35	9.00	
	6	42.42	8.93	
	7	49.49	8.87	
	8	56.56	8.81	
	9	63.63	8.75	

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IGC inshaa general construction

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Location of test site:	**KM 371+075 to 371+100**		**Field team**	**Mr.Mohamed Mamdouh**
Project title:	**Electric Express Train Project - Inshaa General Construction**		**Date:**	**11/5/2023**
Diameter of loading plate	**600**		**Time**	**12:15:00 pm** **12:43:00 pm**
Lever ratio	**1**		**Note:**	
Type of Soil	**Prepared Subgrade 2**		**CAT 966F**	
Bedding material	**---**			
Temperature	**24°C**			
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Loading Stage	0	1.414	10.00	
	1	7.07	9.74	
	2	14.14	9.59	
	3	21.21	9.50	
	4	28.28	9.45	
	5	35.35	9.35	
	6	42.42	9.26	
	7	49.49	9.15	
	8	56.56	9.06	
	9	63.63	8.97	
	10	70.7	8.87	
Unloading Stage	11	56.56	8.87	
	12	49.49	8.88	
	13	35.35	8.95	
	14	21.21	9.01	
	15	1.414	9.70	
Test regime	Loading Stage No.	Load (kN)	Dial Gauge Reading (mm)	
Reloading Stage	0	1.414	9.70	
	1	7.07	9.47	
	2	14.14	9.33	
	3	21.21	9.21	
	4	28.28	9.12	
	5	35.35	9.04	
	6	42.42	8.99	
	7	49.49	8.91	
	8	56.56	8.85	
	9	63.63	8.78	

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inshaa general construction

E-JUST CETC Unit

SPECTRUM CONSULTING

S5-B-IN

MATERIAL INSPECTION REQUEST

Contractor Company	INSHAA GENERAL OF CONSTRUCTION Company			Designer Company			(SPECTRUM) Engineering Consulting Office		
Issued by Contractor	Name	Sign		Date/ Serial Number			Time		
	Eng. Mahmoud shaban			19/06/2023 (P.L.T.5)			02:00 PM		
Received by GARB CONSULTANT	Eng. Mazen Essamy		PLT	C1	C2	C3	C0	MM	YY	HH	MM
				371	PW	CS	20	06	2023	2	00

CODE-1	S1 to S21 Station Reference	D1 to S3 Depot Reference	Rp XXX Note For Kilometer point only Start Km is used
CODE-2	Work Activity		
CODE-3	Sub Element of Activity		

Description of Materials	Sub Ballast 2.		
Location to be Used	St. (371+000) To (371+100)		
MAR Approval No	M.A.R (B.S 1)	Date	29/04/2023
Supplier Name			
Test Requirement	P.L.T (DIN 18134)	Specification	EARTHWORK SPECIFICATIONS & TESTING REPORT (DG21-A1.2) VERSION 2 BY CIVILCON GROUP
Reference Photos	Yes / No	Other	Rev UIR-S.B-(7)

Item	Description	Unit	Quantity	Arrival Date	Note
1	PLATE LOAD TEST	NUMBER	4	20/06/2023	
2					
3					
4					

Comments by: Eng. Mazen Essamy (SPECTRUM)

1-The Plate Load Test Result P.L.T (DIN 18134) Is Approved

SPECTRUM CONSULTING

Comments by: Eng. Alaa Abd-Allatif (ER)

1-Plate Load Test was carried- out by (Combiassai)
2-Results report attached and acceptable with project specifications.
3-Final approval is subject to above mentioned comments.

شركة انشاء للمقاولات العامة
INSHAA GENERAL CONSTRUCTION

APPROVAL STATUS

Organisation	Name	Sign	Date	A-AWC-R
Contractor	Eng. Mahmoud shaban		20-06-2023	A
QA/QC *	Eng. Mazen Essamy			A
GARB**	Eng. Margret magdy			
Employers Representative	Eng. Alaa Abd-Allatif		21-6-2023	A+C

* Designer
** Alignment / Bridges: Culvert Only

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Technical report

of Plate Loading Test (DIN 18134)

General	:	SYSTRA
Consultant	:	SPECTRUM
Contractor	:	شركة إنشاء للمقاولات العامة
Project	:	ELECTRIC EXPRESS TRAIN
Sample	:	Sub-Ballast (2)
Station	:	ST(371+000) TO ST(371+100)
Date of Test	:	20/6/2023
QC	:	1453

شركة انشاء للمقاولات العامة IGC inshaa general construction

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Introduction:

The Plate Load test is designed to determine the vertical deformation and strength characteristics of soil by assessing the force and amount of penetration with time when a rigid plate is made to penetrate the soil.
The test to be carried out on the native soil according to German specifications DIN 18134.

Test methods :

1- The German standard DIN 18134 was applied to define the apparatus used, the loading system, test conditions, and procedure for plate load test.
2- Loading plates with a diamter of 600 mm have a thickness of 25mm and are provided with equally spaced stiffners with even upper faces parallel to the plate bottom face to allow 300 mm plate to be placed on top of it.
3- The loading system consisted of a hydrulic pump connected to a hydrulic jack of 700 bar capacity, which is capable of applying and releasing the load stages.
4- The dial gauge used to measure the plate settlement has a resolution of 0.01mm and the lever ratio was equal to 1.
5- The temperature at the time of the test was 25°.
6- The plate was carried out on a native soil (sand-gravel). The test surface area was level ed and the plate was bedded on this surface.
7- The hyrulic jack was placed on the middle of, and at normal to, the loading plate beneth the reaction loading system and secured against tilting.
8- The reaction loading system was a heavey multi-purpose excavator (more than 20 ton).

Description of exprement:

1- Loading, unloading and reloading regims were applied according to DIN 18134 for the plate load test to estimate the resilient modulus
2- Prior to the test, the force transeducer and dial guage were set to zero, after which a load was applied corressponding to a stress of 0.01 MN/m2.
3- In the first loading cycle, the load was increased until a normal stress of 0.25 MN/m2 was reached, and the loading increaement was 0.025 MN/m2. The load was released in four stages.
4- Following unloading, a further second loading cycle was carried out, in which, the load was increased only to the penultimate stage of the first cycle.

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St (371+000) to (371+025) km

600

Table 1: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (s_0) MN/m^2	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.07
2	14.14	0.050	0.14
3	21.21	0.075	0.21
4	28.28	0.100	0.26
5	35.35	0.125	0.32
6	42.42	0.150	0.38
7	49.49	0.175	0.44
8	56.56	0.200	0.50
9	63.63	0.225	0.55
10	70.7	0.250	0.60
11	56.56	0.200	0.59
12	49.49	0.175	0.58
13	35.35	0.125	0.47
14	21.21	0.075	0.35
15	1.414	0.005	0.17

Table 2: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (s0) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.17
16	7.07	0.025	0.25
17	14.14	0.050	0.29
18	21.21	0.075	0.35
19	28.28	0.100	0.41
20	35.35	0.125	0.46
21	42.42	0.150	0.52
22	49.49	0.175	0.58
23	56.56	0.200	0.63
24	63.63	0.225	0.65

Table 3: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
(σ_{3max}) MN/m^2	0.250	0.250
a_0 (mm)	0.008	0.164
a_1 (mm/(MN/m^2))	2.680	2.747
a_2 (mm/(MN^2/m^4))	1.152	-3.298
$E_{v2}=1.5\,r\,(a_1+2a_2\sigma_{3max})$	188.12	207.13
Ev2/Ev1	1.10	

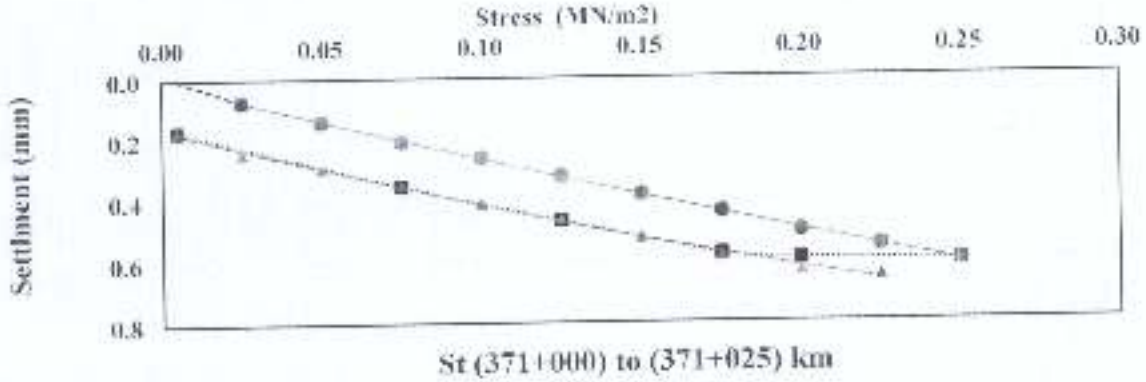

Fig. 1: Load-settlement curve, fitting curves according to Table 1 and Table 2 for the first and second loading cycles

- Measurment points from the first loading cycle
- Measurment points from the unloading cycle
- Measurment points from the second loading cycle

S Settlement in mm

σ_z Normal stress MN/m²

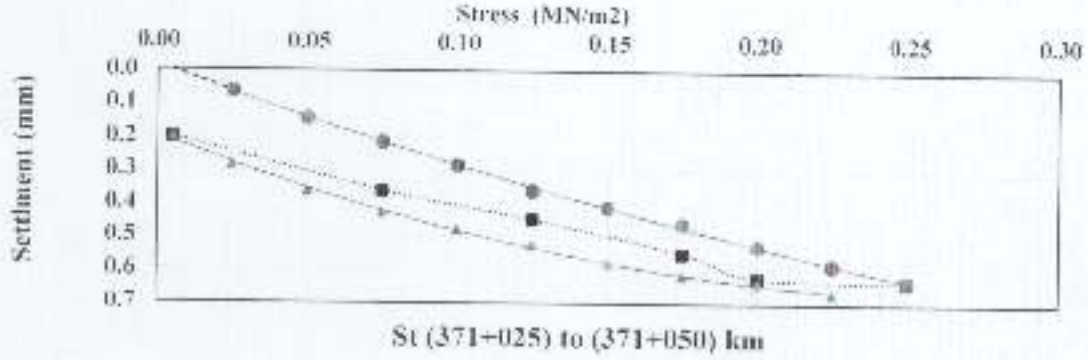

Fig. 2: Load-settlement curve, fitting curves according to Table 4 and Table 5 for the first and second loading cycles

- Measurment points from the first loading cycle
- Measurment points from the unloading cycle
- Measurment points from the second loading cycle

s Settlement in mm

σ_c Normal stress MN/m²

St (371+050) to (371+075) km

600

Table 7: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_N) MN/m^2	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.09
2	14.14	0.050	0.14
3	21.21	0.075	0.19
4	28.28	0.100	0.20
5	35.35	0.125	0.26
6	42.42	0.150	0.32
7	49.49	0.175	0.39
8	56.56	0.200	0.45
9	63.63	0.225	0.52
10	70.7	0.250	0.55
11	56.56	0.200	0.62
12	49.49	0.175	0.55
13	35.35	0.125	0.44
14	21.21	0.075	0.32
15	1.414	0.005	0.16

Table 8: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_N) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.16
16	7.07	0.025	0.20
17	14.14	0.050	0.25
18	21.21	0.075	0.31
19	28.28	0.100	0.36
20	35.35	0.125	0.42
21	42.42	0.150	0.47
22	49.49	0.175	0.52
23	56.56	0.200	0.57
24	63.63	0.225	0.62

Table 9: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
($\sigma_{N\,max}$) MN/m^2	0.250	0.250
a_0 (mm)	0.056	0.150
a_1 (mm/(MN/m^2))	1.407	2.165
a_2 (mm/(MN^2/m^4))	2.547	-0.288
	220.21	215.00
	0.98	

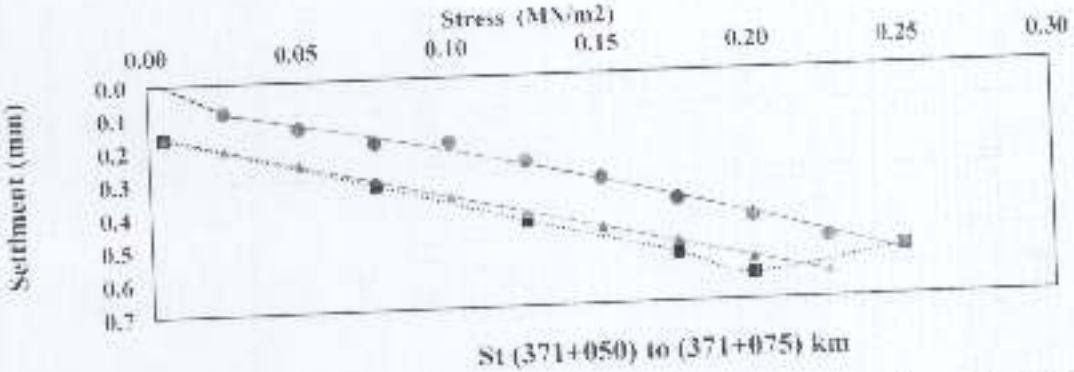

Fig. 3: Load-settlement curve, fitting curves according to Table 7 and Table 8 for the first and second loading cycles

- Measurment points from the first loading cycle
- Measurment points from the unloading cycle
- Measurment points from the second loading cycle

s Settlement in mm

σ_E Normal stress MN/m²

St (371+075) to (371+100) km

600

Table 10: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_n) MN/m^2	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.07
2	14.14	0.050	0.15
3	21.21	0.075	0.21
4	28.28	0.100	0.28
5	35.35	0.125	0.34
6	42.42	0.150	0.40
7	49.49	0.175	0.45
8	56.56	0.200	0.50
9	63.63	0.225	0.54
10	70.7	0.250	0.58
11	56.56	0.200	0.57
12	49.49	0.175	0.50
13	35.35	0.125	0.43
14	21.21	0.075	0.30
15	1.414	0.005	0.20

Table 11: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_n) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.20
16	7.07	0.025	0.28
17	14.14	0.050	0.32
18	21.21	0.075	0.38
19	28.28	0.100	0.43
20	35.35	0.125	0.48
21	42.42	0.150	0.52
22	49.49	0.175	0.57
23	56.56	0.200	0.59
24	62.63	0.225	0.63

Table 12: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
$(\sigma_{n\,max})$ MN/m^2	0.250	0.250
s_0 (mm)	-0.003	0.196
a_1 (mm/(MN/m^2))	2.197	2.698
a_2 (mm/(MN^2/m^4))	-3.456	3.515
Ev	192.44	247.34
	1.29	

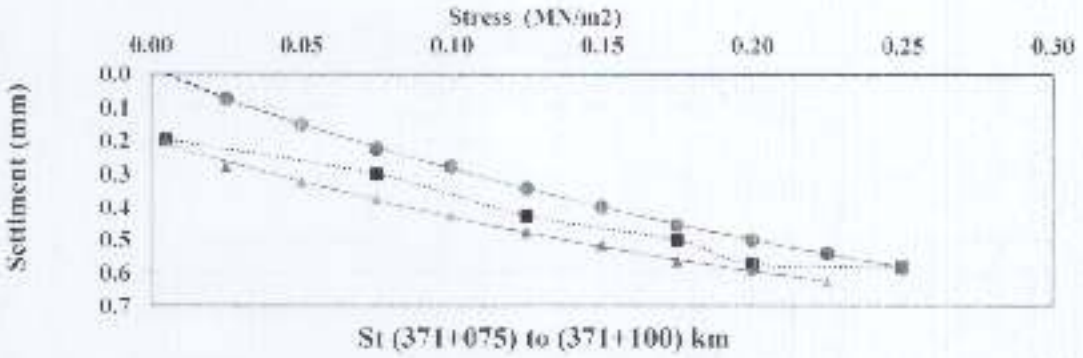

Fig. 4: Load-settlement curve, fitting curves according to Table 10 and Table 11 for the first and second loading cycles

- Measurment points from the first loading cycle
- Measurment points from the unloading cycle
- Measurment points from the second loading cycle

S: Settlement in mm

σ_0 Normal stress MN/m²

S5-B-IN

MATERIAL INSPECTION REQUEST

Contractor Company	INSHAA GENERAL OF CONSTRUCTION Company			Designer Company		[SPECTRUM] Engineering Consulting Office			
Issued by Contractor	Name: Eng. Mahmoud shaban	Sign		Date/ Serial Number: 20/06/2023 (P.L.T.6)		Time: 02:00 PM			
Received by GARB CONSULTANT	Eng. Mazen Essamy		PLT	C1	C2	C3	DD	MM	YY	HH	MM
				371	FW	CS	21	06	2023	2	00

CODE-1	S1 to S21 Station Reference	D1 to S3 Depot Reference	Kp XXX Note For Kilometer point only Start Km is used
CODE - 2	Work Activity		
CODE - 3	Sub Element of Activity		

Description of Materials	Sub Ballast 2.		
Location to be Used	St. (371+100) To (371+275)		
MAR Approval No	M.A.R (B.S 1)	Date	29/04/2023
Supplier Name			
Test Requirement	P.L.T (DIN 18134)	Specification	EARTHWORK SPECIFICATIONS & TESTING REPORT (CG21-41.2) VERSION 2 BY CIVICON GROUP
Reference Photos	Yes / No	Other	Rev UIR-S.B-(8)&(9)

Item	Description	Unit	Quantity	Arrival Date	Note
1	PLATE LOAD TEST	NUMBER	7	21/06/2023	
2					
3					
4					

Comments by: Eng. Mazen Essamy (SPECTRUM)

1-The Plate Load Test Result P.L.T (DIN 18134)

Approved

SPECTRUM CONSULTING

Comments by: Eng. Alaa Abd-Allatif (ER)

1-Plate load Test was carried out by (Comibasse)
2-Results report attached and acceptable with project specifications.
3-Final approval is subject to above mentioned comments.

شركة انشاء للمقاولات العامة
Inshaa general construction

APPROVAL STATUS

Organisation	Name	Sign	Date	A-AWC-R
Contractor	Eng. Mahmoud shaban		21-06-2023	A
QA/QC *	Eng. Mazen Essamy			A
GARB**	Eng. Margret magdy			
Employers Representative	Eng. Alaa Abd-Allatif		22-6-2023	A W C

* Designer
** Alignment / Bridges Culvert Only

Technical report

of Plate Loading Test (DIN 18134)

General	:	SYSTRA
Consultant	:	SPECTRUM
Contractor	:	شركة إنشاء للمقاولات العامة
Project	:	ELECTRIC EXPRESS TRAIN
Sample	:	Sub-Ballast (2)
Station	:	ST(371+100) TO ST(371+275)
Date of Test	:	21/6/2023
QC	:	1459

شركة انشاء للمقاولات العامة IGC
inshaa general construction

SPECTRUM CONSULTING
SPECTRUM CONSULTING

Introduction:

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The test to be carried out on the native soil according to German specifications DIN 18134.

Test methods :

1- The German standard DIN 18134 was applied to define the apparatus used, the loading system, test conditions, and procedure for plate load test.
2- Loading plates with a diamter of 600 mm have a thickness of 25mm and are provided with equaily spaced stiffners with even upper faces parallel to the plate bottom face to allow 300 mm plate to be placed on top of it.
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4- The dial gauge used to measure the plate settlement has a resolution of 0.01mm and the lever ratio was equal to 1.
5- The temperature at the time of the test was 25°.
6- The plate was carried out on a native soil (sand-gravel). The test surface area was levelled and the plate was bedded on this surface.
7- The hyrulic jack was placed on the middle of, and at normal to, the loading plate beneth the reaction loading system and secured against tilting.
8- The reaction loading system was a heavey multi-purpose excavator (more than 20 ton)

Description of exprement:

1- Loading, unloading and reloading regims were applied according to DIN 18134 for the plate load test to estimate the resilient modulus
2- Prior to the test, the force transeducer and dial guage were set to zero, after which a load was applied corressponding to a stress of 0.01 MN/m2.
3- In the first loading cycle, the load was increased until a normal stress of 0.25 MN/m2 was reached, and the loading increaement was 0.025 MN/m2. The load was released in four stages.
4- Following unloading, a further second loading cycle was carried out, in which, the load was increased only to the penultimate stage of the first cycle.

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St (371+100) to St (371+125) km

600

Table 1: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (s_0) MN/m²	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.07
2	14.14	0.050	0.12
3	21.21	0.075	0.17
4	28.28	0.100	0.22
5	35.35	0.125	0.28
6	42.42	0.150	0.34
7	49.49	0.175	0.40
8	56.56	0.200	0.46
9	63.63	0.225	0.52
10	70.7	0.250	0.58
11	56.56	0.200	0.57
12	49.49	0.175	0.55
13	35.35	0.125	0.44
14	21.21	0.075	0.31
15	1.414	0.005	0.13

Table 2: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress(s0) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.13
16	7.07	0.025	0.17
17	14.14	0.050	0.21
18	21.21	0.075	0.26
19	28.28	0.100	0.31
20	45.35	0.125	0.38
21	42.42	0.150	0.42
22	49.49	0.175	0.47
23	56.56	0.200	0.54
24	63.63	0.225	0.58

Table 3: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
($\sigma_{0,max}$) MN/m²	0.250	0.250
a_0 (mm)	0.016	0.121
a_1 (mm/(MN/m²))	1.917	1.875
a_2 (mm/(MN²/m⁴))	1.415	0.873
[illegible]	198.19	215.15
[illegible]	1.09	

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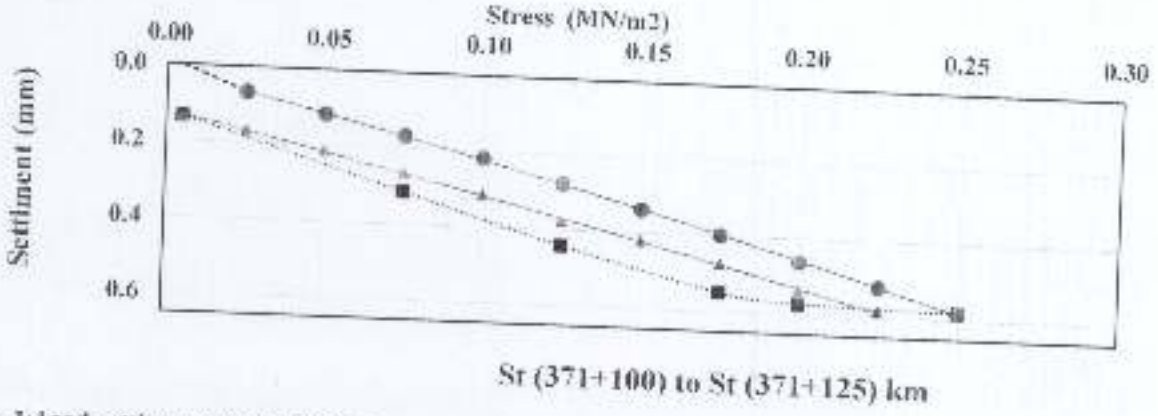

Fig. 1: Load-settlement curve, fitting curves according to Table 1 and Table 2 for the first and second loading cycles

- Measurment points from the first loading cycle
- Measurment points from the unloading cycle
- Measurment points from the second loading cycle

S Settlement in mm

σ_N Normal stress MN/m²

St (371+125) to St (371+150) km

600

Table 4: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_N) MN/m^2	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.07
2	14.14	0.050	0.12
3	21.21	0.075	0.16
4	28.28	0.100	0.21
5	35.35	0.125	0.27
6	42.42	0.150	0.32
7	49.49	0.175	0.38
8	56.56	0.200	0.44
9	63.63	0.225	0.50
10	70.7	0.250	0.57
11	56.56	0.200	0.56
12	49.49	0.175	0.54
13	35.35	0.125	0.42
14	21.21	0.075	0.33
15	1.414	0.005	0.11

Table 5: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_N) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.11
16	7.07	0.025	0.16
17	14.14	0.050	0.21
18	21.21	0.075	0.26
19	28.28	0.100	0.31
20	35.35	0.125	0.37
21	42.42	0.150	0.41
22	49.49	0.175	0.45
23	56.56	0.200	0.51
24	63.63	0.225	0.57

Table 6: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
(σ_{Range}) MN/m^2	0.250	0.250
s_0 (mm)	0.034	0.104
a_1 (mm/(MN/m^2))	1.556	2.077
a_2 (mm/(MN^2/m^4))	2.344	-0.211
$E_V = 1.5\ r\ (a_1 + 2\ s_0\ a_2)$	208.90	223.27
E(2/Ev)	1.06	

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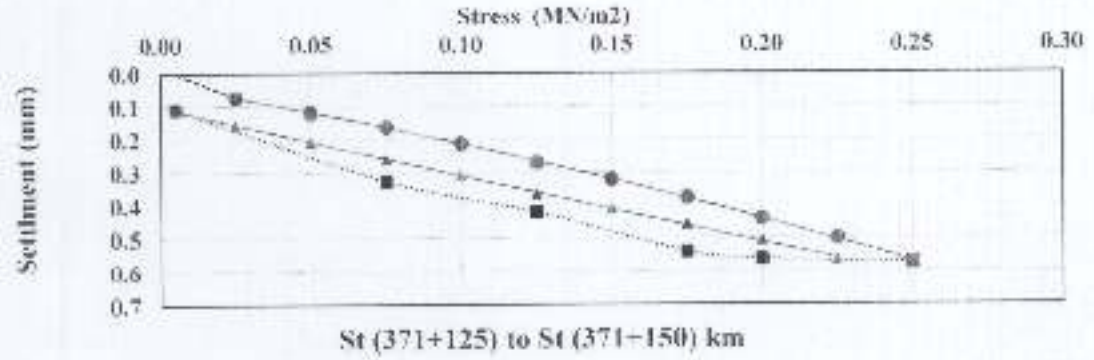

Fig. 2: Load-settlement curve, fitting curves according to Table 4 and Table 5 for the first and second loading cycles

- ● Measurment points from the first loading cycle
- ■ Measurment points from the unloading cycle
- ▲ Measurment points from the second loading cycle
- S Settlment in mm
- σ_u Normal stress MN/m²

St (371+150) to St (371+175) km

600

Table 7: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_z) MN/m^2	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.05
2	14.14	0.050	0.10
3	21.21	0.075	0.16
4	28.28	0.100	0.21
5	35.35	0.125	0.27
6	42.42	0.150	0.34
7	49.49	0.175	0.40
8	56.56	0.200	0.46
9	63.63	0.225	0.54
10	70.7	0.250	0.61
11	56.56	0.200	0.60
12	49.49	0.175	0.58
13	35.35	0.125	0.45
14	21.21	0.075	0.32
15	1.414	0.005	0.10

Table 8: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_z) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.20
16	7.07	0.025	0.14
17	14.14	0.050	0.15
18	21.21	0.075	0.24
19	28.28	0.100	0.29
20	35.35	0.125	0.35
21	42.42	0.150	0.41
22	49.49	0.175	0.46
23	56.56	0.200	0.53
24	63.63	0.225	0.58

Table 9: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
$[\sigma_{z,max}]$ MN/m^2	0.250	0.250
a_0 (mm)	-0.001	0.089
a_1 (mm/(MN/m^2))	1.945	1.931
a_2 (mm/(MN^2/m^4))	1.960	1.233
$E_V = 1.5\ r\,[a_1 + a_2\ \sigma_{z,max}]$	184.77	200.89
	1.09	

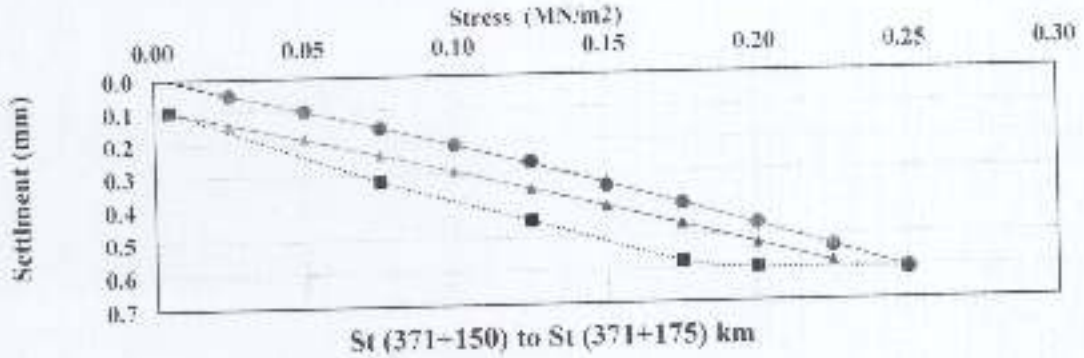

Fig. 3: Load-settlement curve, fitting curves according to Table 7 and Table 8 for the first and second loading cycles

- ● Measurment points from the first loading cycle
- ■ Measurment points from the unloading cycle
- ▲ Measurment points from the second loading cycle

S Settlement in mm

σ_z Normal stress MN/m²

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St (371+175) to St (371+200) km

600

Table 10: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_0) MN/m²	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.08
2	14.14	0.050	0.14
3	21.21	0.075	0.19
4	28.28	0.100	0.24
5	35.35	0.125	0.29
6	42.42	0.150	0.34
7	49.49	0.175	0.40
8	56.56	0.200	0.46
9	63.63	0.225	0.51
10	70.7	0.250	0.58
11	56.56	0.200	0.57
12	49.49	0.175	0.55
13	35.35	0.125	0.42
14	21.21	0.075	0.32
15	1.414	0.005	0.13

Table 11: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_0) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.12
16	7.07	0.025	0.17
17	14.14	0.050	0.22
18	21.21	0.075	0.28
19	28.28	0.100	0.32
20	35.35	0.125	0.38
21	42.42	0.150	0.43
22	49.49	0.175	0.47
23	56.56	0.200	0.52
24	63.63	0.225	0.58

Table 12: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
(σ_{0max}) MN/m²	0.250	0.250
a_0 (mm)	0.842	0.109
a_1 (mm/(MN/m²))	3.840	2.227
a_2 (mm/(MN²/m⁴))	1.192	0.731
Ev= 1.5 [illegible]	210.48	156.78
	0.59	

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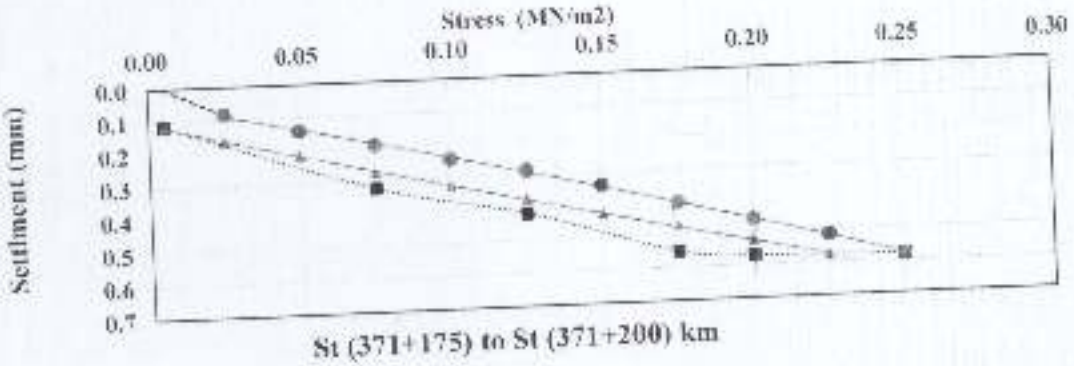

Fig. 4: Load-settlement curve, fitting curves according to Table 10 and Table 11 for the first and second loading cycles

- Measurment points from the first loading cycle
- Measurment points from the unloading cycle
- Measurment points from the second loading cycle

S Settlement in mm
σ_n Normal stress MN/m²

St (371+200) to St (371+225) km

600

Table 13: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_n) MN/m^2	Settlement of loading plate S (mm)
0	1.414	0.005	0.01
1	7.07	0.025	0.07
2	14.14	0.050	0.12
3	21.21	0.075	0.18
4	28.28	0.100	0.23
5	35.35	0.125	0.28
6	42.42	0.150	0.33
7	49.49	0.175	0.39
8	56.56	0.200	0.44
9	63.63	0.225	0.49
10	70.7	0.250	0.58
11	56.56	0.200	0.57
12	49.49	0.175	0.55
13	35.35	0.125	0.44
14	21.21	0.075	0.34
15	1.414	0.005	0.16

Table 14: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_n) MN/m2	Settlement of loading plate S (mm)
16	1.414	0.005	0.16
16	7.07	0.025	0.19
17	14.14	0.050	0.23
18	21.21	0.075	0.25
19	28.28	0.100	0.33
20	35.35	0.125	0.38
21	42.42	0.150	0.43
22	49.49	0.175	0.48
23	56.56	0.200	0.53
24	63.63	0.225	0.58

Table 15: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
($\sigma_{n max}$) MN/m^2	0.250	0.250
s_i (mm)	0.027	0.149
a (mm/(MN/m^2))	1.855	1.046
$K_{s min}$ (MN/m^3)	1.192	1.301
$K_{s rel}$	209.22	238.25
Ratio	1.09	

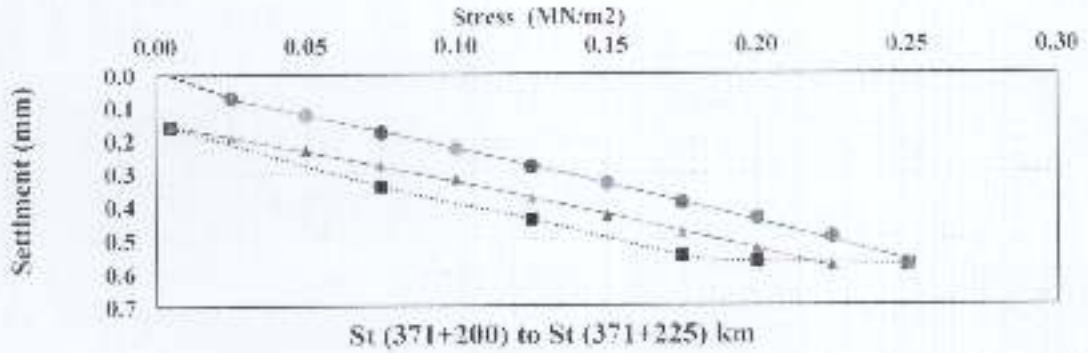

Fig. 5: Load-settlement curve, fitting curves according to Table 13 and Table 14 for the first and second loading cycles

- Measurment points from the first loading cycle
- Measurment points from the unlonding cycle
- Measurment points from the second loading cycle

S Settlement in mm

σ_z Normal stress MN/m^2

St (371+225) to St (371+250) km

600

Table 16: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_N) MN/m^2	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.08
2	14.14	0.050	0.12
3	21.21	0.075	0.17
4	28.28	0.100	0.22
5	35.35	0.125	0.28
6	42.42	0.150	0.32
7	49.49	0.175	0.38
8	56.56	0.200	0.47
9	63.63	0.225	0.58
10	70.7	0.250	0.61
11	56.56	0.200	0.60
12	49.49	0.175	0.55
13	35.35	0.125	0.41
14	21.21	0.075	0.32
15	1.414	0.005	0.14

Table 17: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_N) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.14
16	7.07	0.025	0.18
17	14.14	0.050	0.22
18	21.21	0.075	0.27
19	28.28	0.100	0.31
20	35.35	0.125	0.36
21	42.42	0.150	0.41
22	49.49	0.175	0.46
23	56.56	0.200	0.52
24	63.63	0.225	0.58

Table 18: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
($\sigma_{N,MAX}$) MN/m^2	0.250	0.250
a_0 (mm)	0.044	0.145
a_1 (mm/(MN·m^{-2}))	1.355	1.575
a_2 (mm/(MN^2·m^{-4}))	3.779	1.784
E_V = 1.5 [illegible]	95.69	222.63
[illegible]	1.14	

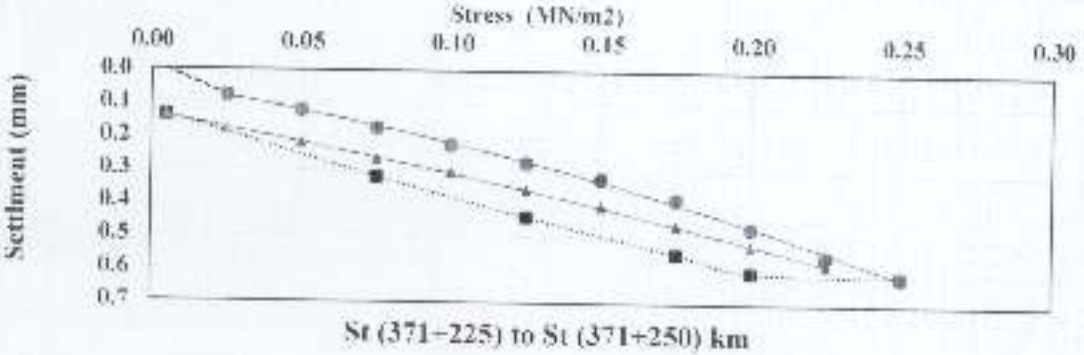

Fig. 6c Load-settlement curve, fitting curves according to Table 16 and Table 17 for the first and second loading cycles

- Measurment points from the first loading cycle
- Measurment points from the unloading cycle
- Measurment points from the second loading cycle

S Settlement in mm

σ_z Normal stress MN/m²

St (371+250) to St (371+275) km

600

Table 19: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_0) MN/m²	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.09
2	14.14	0.050	0.15
3	21.21	0.075	0.20
4	28.28	0.100	0.26
5	35.35	0.125	0.32
6	42.42	0.150	0.38
7	49.49	0.175	0.43
8	56.56	0.200	0.48
9	63.63	0.225	0.54
10	70.7	0.250	0.61
11	56.56	0.200	0.60
12	49.49	0.175	0.55
13	35.35	0.125	0.45
14	21.21	0.075	0.34
15	1.414	0.005	0.14

Table 20: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_0) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.14
16	7.07	0.025	0.18
17	14.14	0.050	0.22
18	21.21	0.075	0.27
19	28.28	0.100	0.31
20	35.35	0.125	0.37
21	42.42	0.150	0.42
22	49.49	0.175	0.47
23	56.56	0.200	0.54
24	63.63	0.225	0.60

Table 21: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
($\sigma_{0,max}$) MN/m²	0.250	0.250
a_0 (mm)	0.034	0.136
a_1 (mm/(MN/m²))	2.216	1.609
a_2 (mm/(MN/m²)²)	0.303	1.971
Ev (MN/m²)	196.41	214.55
E_{v2}/E_{v1}	1.09	

شركة
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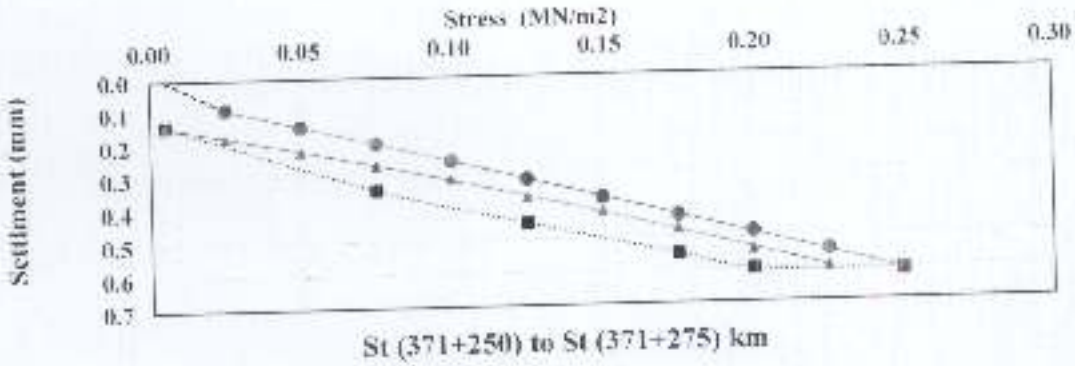


Fig. 7: Load-settlement curve, fitting curves according to Table 19 and Table 20 for the first and second loading cycles

- ● Measurment points from the first loading cycle
- ■ Measurment points from the unloading cycle
- ▲ Measurment points from the second loading cycle

S Settlement in mm

σ_z Normal stress MN/m²

Conclusions:

The present test results which obtained from the plate loading tests of the native soil on top of the sub-ballast layer of the electric express train project at location St (371+100) to St (371+275) km in accourdance to the German standard , DIN 18134 are illustrated in table 22 .

Table 22 :Test results

Location	Ev1(MN/m^2)	Ev2(MN/m^2)	Ev2/Ev1 ratio
St (371+100) : St (371+125) km	198.19	215.15	1.09
St (371+125) : St (371+150) km	209.90	222.27	1.06
St (371+150) : St (371+175) km	184.77	200.99	1.09
St (371+175) : St (371+200) km	210.48	186.78	0.89
St (371+200) : St (371+225) km	209.22	228.29	1.09
St (371+225) : St (371+250) km	195.69	222.63	1.14
St (371+250) : St (371+275) km	196.41	214.53	1.09

Lab Director
Eng / Eman Kandil

Geotechnical Consulant
For. Dr. M.
Dr / Mohamed Mostafa Badry

شركة انشاء للمقاولات العامة IGC inshaa general construction

S5-B-IN

MATERIAL INSPECTION REQUEST

Contractor Company	INSHAA GENERAL OF CONSTRUCTION Company			Designer Company		[SPECTRUM] Engineering Consulting Office			
Issued by Contractor	Name	Sign		Date/ Serial Number		Time			
	Eng. Mahmoud shaban			21/06/2023 (P.L.T.7)		02:00 PM			
Received by GARB CONSULTANT	Eng. Mazen Essamy		PLT	S1	S2	Q1	Q2	MM	YY	HH	MM
				371	EW	C5	22	06	2023	2	00

CODE-1	S1 to S21 Station Reference	D1 to D3 Depot Reference	Rp XXX Note For Kilometer point only Start Km is used
CODE - 2	Work Activity		
CODE - 3	Sub Element of Activity		

Description of Materials	Sub Ballast 2.		
Location to be Used	St. (371+275) To (371+500)		
MAR Approval No	M.A.R (B.S 1)	Date	29/04/2023
Supplier Name			
Test Requirement	P.L.T (DIN 18134)	Specification	EARTHWORK SPECIFICATIONS & TESTING REPORT (CG21-41.2) VERSION 2 BY CIVECON GROUP
Reference Photos	Yes / No	Other	Rev UIR-S.B-(6)&(9)&(10)

Item	Description	Unit	Quantity	Arrival Date	Note
1	PLATE LOAD TEST	NUMBER	9	22/06/2023	
2					
3					
4					

Comments by: Eng. Mazen Essamy (SPECTRUM)

1-The Plate Load Test Result P.L.T (DIN 18134) Is Approved

SPECTRUM CONSULTING

Comments by: Eng. Alaa Abd-Allatif (ER)

1- Plate Load Test was carried- out by (Comibassal)
2-Results report attached and acceptable with project specifications.
3-Final approval is subject to above mentioned comments.

شركة انشاء للمقاولات العامة IGC inshaa general construction

APPROVAL STATUS

Organisation	Name	Sign	Date	A-AWC-R
Contractor	Eng. Mahmoud shaban		22-06-2023	A
QA/QC *	Eng. Mazen Essamy			A
GARB**	Eng. Margret magdy			
Employers Representative	Eng. Alaa Abd-Allatif	for	23-6-2023	A w c

* Designer
** Alignment / Bridges: Culvert Only

Technical report

of Plate Loading Test (DIN 18134)

General	:	SYSTRA
Consultant	:	SPECTRUM
Contractor	:	شركة إنشاء للمقاولات العامة
Project	:	ELECTRIC EXPRESS TRAIN
Sample	:	Sub-Ballast (2)
Station	:	ST(371+275) TO ST(371+500)
Date of Test	:	22/6/2023
QC	:	1476

شركة انشاء للمقاولات العامة IGC inshaa general construction

SPECTRUM CONSULTING SPECTRUM CONSULTING

Introduction:

The Plate Load test is designed to determine the vertical deformation and strength characteristics of soil by assessing the force and amount of penetration with time when a rigid plate is made to penetrate the soil.
The test to be carried out on the native soil according to German specifications DIN 18134.

Test methods :

1- The German standard DIN 18134 was applied to define the apparatus used, the loading system, test conditions, and procedure for plate load test.
2- Loading plates with a diamter of 600 mm have a thickness of 25mm and are provided with equally spaced stiffners with even upper faces parallel to the plate bottom face to allow 300 mm plate to be placed on top of it.
3- The loading system consisted of a hydrulic pump connected to a hydrulic jack of 700 bar capacity, which is capable of applying and releasing the load stages.
4- The dial gauge used to measure the plate settlement has a resolution of 0.01mm and the lever ratio was equal to 1.
5- The temperature at the time of the test was 25°.
6- The plate was carried out on a native soil (sand-gravel). The test surface area was levelled and the plate was bedded on this surface.
7- The hyrulic jack was placed on the middle of, and at normal to, the loading plate beneth the reaction loading system and secured against tiilting.
8- The reaction loading system was a heavey multi-purpose excavator (more than 20 ton).

Description of exprement:

1- Loading, unloading and reloading regims were applied according to DIN 18134 for the plate load test to estimate the resilient modulus
2- Prior to the test, the force transeducer and dial guage were set to zero, after which a load was applied corressponding to a stress of 0.01 MN/m2.
3- In the first loading cycle, the load was increased until a normal stress of 0.25 MN/m2 was reached, and the loading increaement was 0.025 MN/m2. The load was released in four stages.
4- Following unloading, a further second loading cycle is carried out, in which, the load was increased only to the penultimate stage of the first cycle.

شركة انشاء للمقاولات العامة IGC inshaa general construction

SPECTRUM CONSULTING سبكترم للاستشارات الهندسية

St (371+275) to St (371+300) km

600

Table 1: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_0) MN/m^2	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.08
2	14.14	0.050	0.14
3	21.21	0.075	0.19
4	28.28	0.100	0.25
5	35.35	0.125	0.31
6	42.42	0.150	0.37
7	49.49	0.175	0.42
8	56.56	0.200	0.48
9	63.63	0.225	0.53
10	70.7	0.250	0.58
11	56.56	0.200	0.58
12	49.49	0.175	0.56
13	35.35	0.125	0.43
14	21.21	0.075	0.30
15	1.414	0.005	0.12

Table 2: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_0) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.12
16	7.07	0.025	0.16
17	14.14	0.050	0.20
18	21.21	0.075	0.25
19	28.28	0.100	0.30
20	35.35	0.125	0.35
21	42.42	0.150	0.40
22	49.49	0.175	0.46
23	56.56	0.200	0.52
24	63.63	0.225	0.54

Table 3: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
($\sigma_{0,max}$) MN/m^2	0.250	0.250
a_0 (mm)	0.022	0.107
a_1 (mm/MN/m^2)	2.345	1.991
a_2 (mm/MN/m^2)	-0.380	0.053
Ev= 1.5 r[illegible]	200.01	226.67
Ev2/Ev1	1.13	

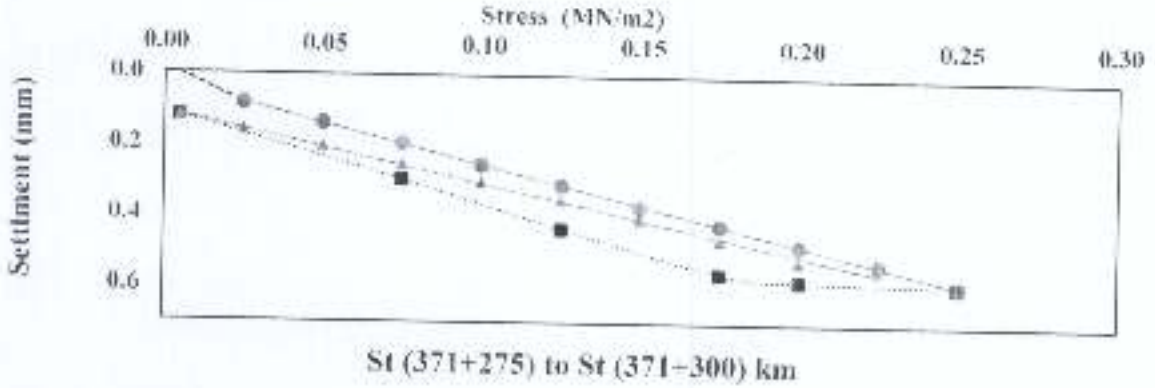


Fig. 1: Load-settlement curve, fitting curves according to Table 1 and Table 2 for the first and second loading cycles

- Measurment points from the first loading cycle
- Measurment points from the unloading cycle
- Measurment points from the second loading cycle

S Settlement in mm

σ_0 Normal stress MN/m²

St (371+300) to St (371+325) km

600

Table 4 Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_n) MN/m^2	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.09
2	14.14	0.050	0.13
3	21.21	0.075	0.19
4	28.28	0.100	0.25
5	35.35	0.125	0.30
6	42.42	0.150	0.35
7	49.49	0.175	0.41
8	56.56	0.200	0.46
9	63.63	0.225	0.52
10	70.7	0.250	0.56
11	56.56	0.200	0.55
12	49.49	0.175	0.54
13	35.35	0.125	0.41
14	21.21	0.075	0.30
15	1.414	0.005	0.14

Table 5: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (sd) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.14
16	7.07	0.025	0.19
17	14.14	0.050	0.23
18	21.21	0.075	0.29
19	28.28	0.100	0.33
20	35.35	0.125	0.39
21	42.42	0.150	0.44
22	49.49	0.175	0.48
23	56.56	0.200	0.53
24	63.63	0.225	0.56

Table 6: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
(σ_{max}) MN/m^2	0.250	0.250
a_1 (mm)	0.036	0.132
a_2 (mm/(MN/m^2))	2.234	2.161
a_3 (mm/(MN/m^2))	-0.303	-0.362
Ev= 1.5 r (a$_2$-a$_3$)	209.52	235.58
Ev2/Ev1	1.12	

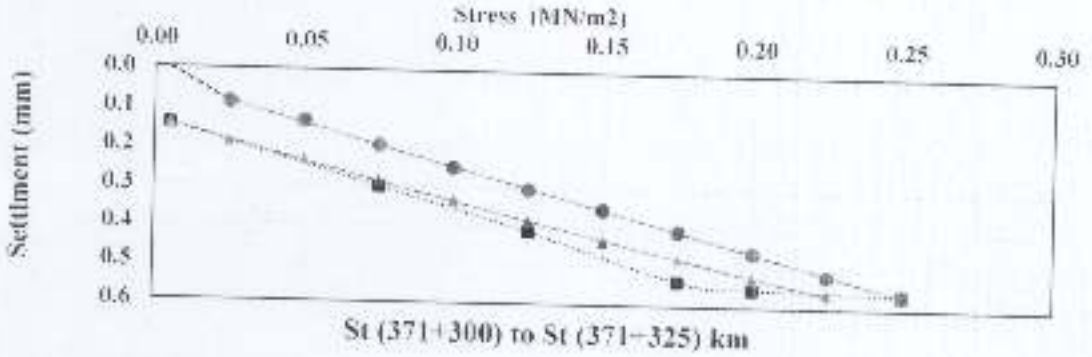


Fig. 2: Load-settlement curve, fitting curves according to Table 4 and Table 5 for the first and second loading cycles

- ● Measurment points from the first loading cycle
- ■ Measurment points from the unloading cycle
- △ Measurment points from the second loading cycle

S Settlement in mm

σ_n Normal stress MN/m²

St (371+325) to St (371+350) km

600

Table 7: Measured values for first loading cycle and unloading cycle

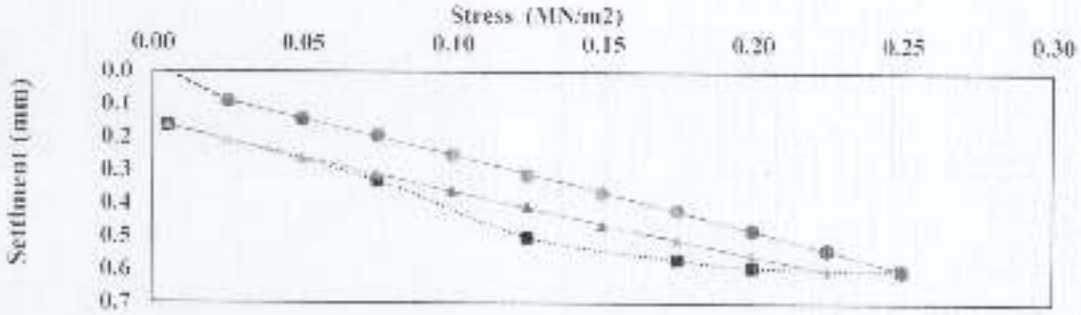
Loading stage no.	Load (F) kN	Normal stress (σ_n) MN/m^2	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.09
2	14.14	0.050	0.14
3	21.21	0.075	0.19
4	28.28	0.100	0.25
5	35.35	0.125	0.31
6	42.42	0.150	0.37
7	49.49	0.175	0.42
8	56.56	0.200	0.48
9	63.63	0.225	0.54
10	70.7	0.250	0.60
11	56.56	0.200	0.59
12	49.49	0.175	0.57
13	35.35	0.125	0.50
14	21.21	0.075	0.33
15	1.414	0.005	0.16

Table 8: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (σ) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.16
16	7.07	0.025	0.21
17	14.14	0.050	0.26
18	21.21	0.075	0.31
19	28.28	0.100	0.36
20	35.35	0.125	0.41
21	42.42	0.150	0.46
22	49.49	0.175	0.51
23	56.56	0.200	0.56
24	63.63	0.225	0.60

Table 9: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
($\sigma_{max.}$) MN/m^2	0.250	0.250
s_1 (mm)	0.037	0.154
a_1 (mm/(MN/m^2))	2.075	2.142
a_2 (mm/(MN/m^2))	0.667	0.686
$Ev=1.5\ a'(a_1+a_2\ \sigma_{max})$	200.75	228.32
Ev2/Ev1	1.14	



St (371+325) to St (371+350) km

Fig. 3: Load-settlement curve, fitting curves according to Table 7 and Table 8 for the first and second loading cycles

- Measurement points from the first loading cycle
- Measurement points from the unloading cycle
- Measurement points from the second loading cycle

S Settlement in mm

σ_z Normal stress MN/m²

St (371+350) to St (371+375) km

600

Table 10: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_0) MN/m^2	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.06
2	14.14	0.050	0.14
3	21.21	0.075	0.19
4	28.28	0.100	0.25
5	35.35	0.125	0.31
6	42.42	0.150	0.37
7	49.49	0.175	0.43
8	56.56	0.200	0.49
9	63.63	0.225	0.54
10	70.7	0.250	0.59
11	56.56	0.200	0.58
12	49.49	0.175	0.56
13	35.35	0.125	0.45
14	21.21	0.075	0.30
15	1.414	0.005	0.12

Table 11: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_0) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.12
16	7.07	0.025	0.17
17	14.14	0.050	0.21
18	21.21	0.075	0.26
19	28.28	0.100	0.31
20	35.35	0.125	0.36
21	42.42	0.150	0.41
22	49.49	0.175	0.46
23	56.56	0.200	0.52
24	63.63	0.225	0.58

Table 12: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
$(\sigma_{0\,max})$ MN/m^2	0.250	0.250
s_0 (mm)	0.004	0.113
a_1 (mm/MN/m^2)	2.575	1.870
a_2 (mm/MN/m^2)	-0.569	0.805
Ev= 2.5 r/a_1 (MN/m^2)	150.87	217.28
Ev2/Ev1	1.44	

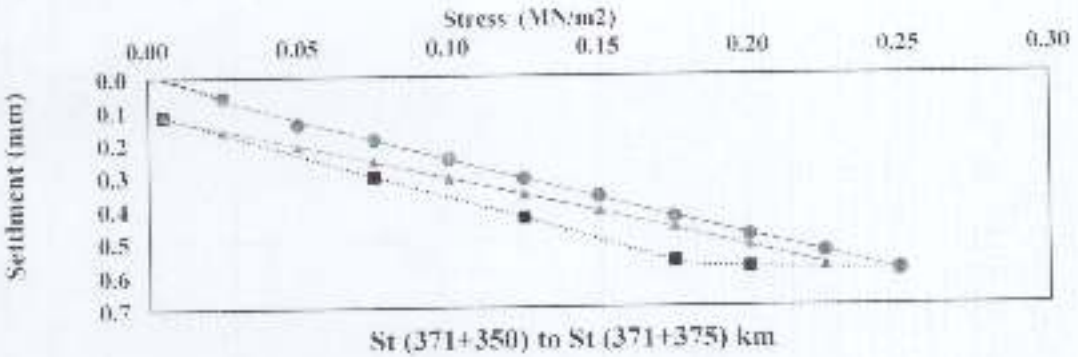


Fig. 4: Load settlement curve, fitting curves according to Table 10 and Table 11 for the first and second loading cycles

- Measurment points from the first loading cycle
- Measurment points from the unloading cycle
- Measurment points from the second loading cycle

S Settlement in mm

σ_z Normal stress MN/m²

St (371+375) to St (371+400) km

600

Table 13: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_n) MN/m^2	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.13
2	14.14	0.050	0.12
3	21.21	0.075	0.17
4	28.28	0.100	0.23
5	35.35	0.125	0.27
6	42.42	0.150	0.33
7	49.49	0.175	0.39
8	56.56	0.200	0.46
9	63.63	0.225	0.50
10	70.7	0.250	0.58
11	56.56	0.200	0.57
12	49.49	0.175	0.55
13	35.35	0.125	0.44
14	21.21	0.075	0.34
15	1.414	0.005	0.13

Table 14: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_0) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.13
16	7.07	0.025	0.17
17	14.14	0.050	0.22
18	21.21	0.075	0.26
19	28.28	0.100	0.30
20	35.35	0.125	0.36
21	42.42	0.150	0.41
22	49.49	0.175	0.46
23	56.56	0.200	0.51
24	63.63	0.225	0.55

Table 15: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
($\sigma_{1 \text{ to } 2}$) MN/m^2	0.250	0.250
s_1 (mm)	0.084	0.122
a_1 (mm/(MN/m^2))	0.997	1.790
b_1 (mm/(MN^2/m^2))	4.002	5.646
$Ev=2.5 \cdot r \cdot (a_1+b_1 \cdot \sigma_{1 \text{ to } 2})^{-1}$	225.29	230.58
Ev2/Ev1	1.02	

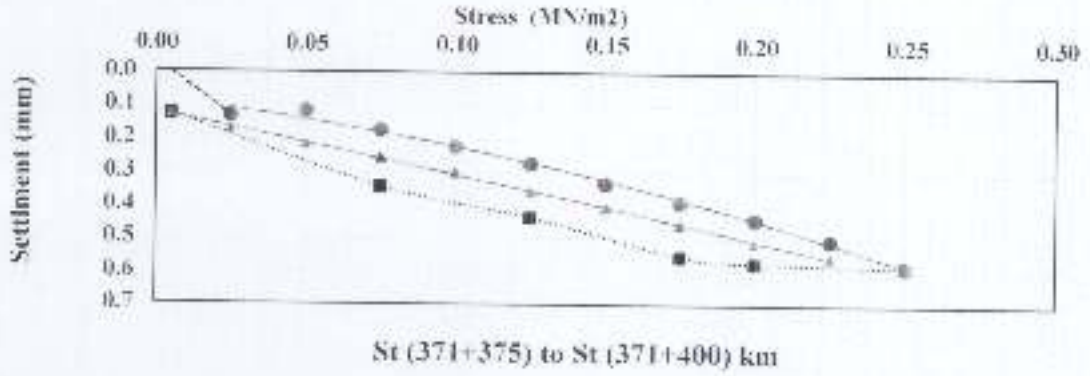


Fig. 5: Load-settlement curve, fitting curves according to Table 13 and Table 14 for the first and second loading cycles

- Measurment points from the first loading cycle
- Measurment points from the unloading cycle
- Measurment points from the second loading cycle

S Settlement in mm

σ_0 Normal stress MN/m²

St (371+400) to St (371+425) km

600

Table 16: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_0) MN/m^2	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.09
2	14.14	0.050	0.14
3	21.21	0.075	0.20
4	28.28	0.100	0.26
5	35.35	0.125	0.31
6	42.42	0.150	0.36
7	49.49	0.175	0.41
8	56.56	0.200	0.46
9	63.63	0.225	0.53
10	70.7	0.250	0.59
11	56.56	0.200	0.58
12	49.49	0.175	0.56
13	35.35	0.125	0.44
14	21.21	0.075	0.32
15	1.414	0.005	0.14

Table 17: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_0) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.14
16	7.07	0.025	0.15
17	14.14	0.050	0.23
18	21.21	0.075	0.27
19	28.28	0.100	0.32
20	35.35	0.125	0.36
21	42.42	0.150	0.41
22	49.49	0.175	0.46
23	56.56	0.200	0.52
24	63.63	0.225	0.58

Table 18: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
($\sigma_{0.250}$) MN/m^2	0.250	0.250
s_1 (mm)	0.039	0.131
a_1 (mm/MN/m^2)1	2.086	1.720
a_2 (mm/MN/m^2)1	0.404	1.012
$E_{v1}=1.5 r(m)*a_1$ (MN/m^2)	208.79	228.10
Ev2/Ev1	1.11	

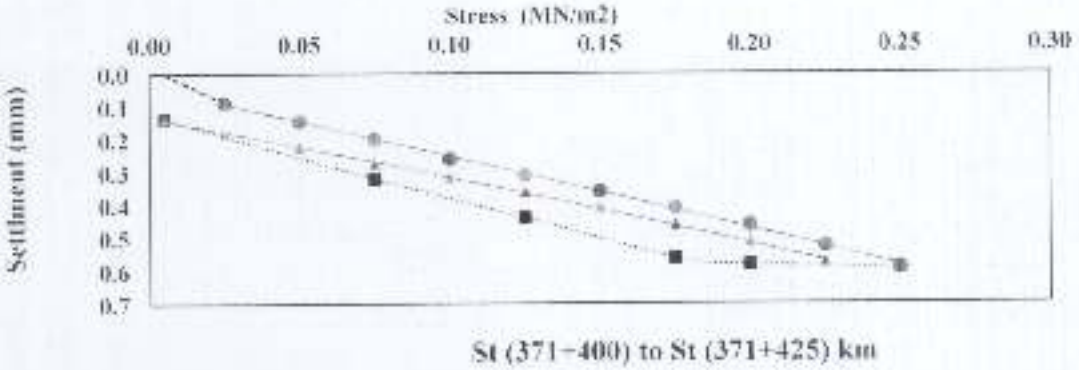


Fig. 6: Load-settlement curve, fitting curves according to Table 16 and Table 17 for the first and second loading cycles

- ● Measurment points from the first loading cycle
- ■ Measurment points from the unloading cycle
- △ Measurment points from the second loading cycle
- s Settlement in mm
- σ_0 Normal stress MN/m^2

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St (371+425) to St (371+450) km

600

Table 19: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (P) kN	Normal stress (σ_0) MN/m²	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.10
2	14.14	0.050	0.16
3	21.21	0.075	0.21
4	28.28	0.100	0.27
5	35.35	0.125	0.32
6	42.42	0.150	0.38
7	49.49	0.175	0.44
8	56.56	0.200	0.50
9	63.63	0.225	0.56
10	70.7	0.250	0.62
11	56.56	0.200	0.61
12	49.49	0.175	0.59
13	35.35	0.125	0.47
14	21.21	0.075	0.35
15	1.414	0.005	0.18

Table 20: Measured values for second loading cycle

Loading stage no.	Load (P) kN	Normal stress (σ_0) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.18
16	7.07	0.025	0.22
17	14.14	0.050	0.26
18	21.21	0.075	0.31
19	28.28	0.100	0.37
20	35.35	0.125	0.43
21	42.42	0.150	0.48
22	49.49	0.175	0.53
23	56.56	0.200	0.57
24	63.63	0.225	0.61

Table 21: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
($\sigma_{0,max}$) MN/m²	0.250	0.250
a_0 [mm]	[illegible]	0.161
a_1 [mm/(MN/m²)]	[illegible]	2.168
a_2 [mm/(MN/m²)²]	[illegible]	-0.582
$E_v = 1.5\,r/(a_1 + a_2\,\sigma_{0,max})$	[illegible]	122.54
E_{v2}/E_{v1}	1.14	

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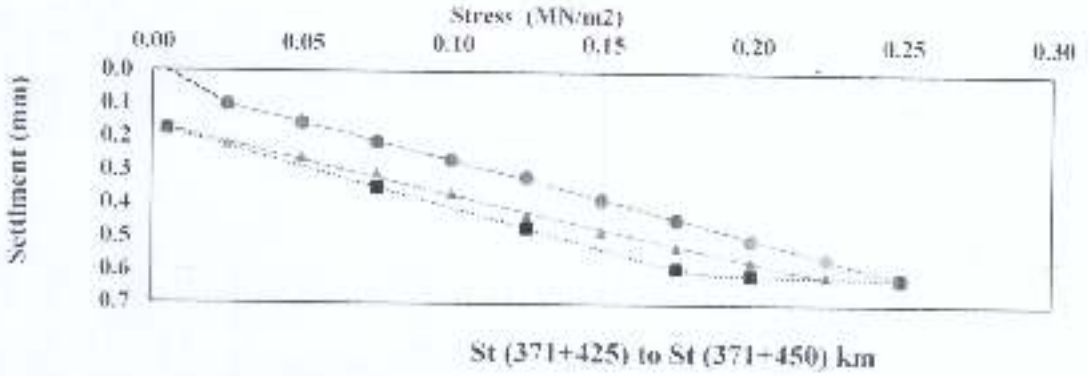


Fig. 7: Load-settlement curve, fitting curves according to Table 19 and Table 20 for the first and second loading cycles

- Measurment points from the first loading cycle
- Measurment points from the unloading cycle
- Measurment points from the second loading cycle

S Settlement in mm

σ_E Normal stress MN/m²

St (371+450) to St (371+475) km

600

Table 22: Measured values for first loading cycle and unloading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_n) MN/m^2	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.08
2	14.14	0.050	0.13
3	21.21	0.075	0.18
4	28.28	0.100	0.24
5	35.35	0.125	0.29
6	42.42	0.150	0.36
7	49.49	0.175	0.41
8	56.56	0.200	0.47
9	63.63	0.225	0.53
10	70.7	0.250	0.59
11	56.56	0.200	0.58
12	49.49	0.175	0.56
13	35.35	0.125	0.48
14	21.21	0.075	0.35
15	1.414	0.005	0.12

Table 23: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (σ_n) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.12
16	7.07	0.025	0.16
17	14.14	0.050	0.20
18	21.21	0.075	0.25
19	28.28	0.100	0.31
20	35.35	0.125	0.35
21	42.42	0.150	0.41
22	49.49	0.175	0.48
23	56.56	0.200	0.50
24	63.63	0.225	0.54

Table 24: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
($\sigma_{1,2,3}$) MN/m^2	0.250	0.250
s_1 (mm)	0.025	0.113
a_1 (mm/(MN/m^2))	1.976	1.920
a_2 (mm/(MN/m^2))	1.132	1.510
$E_V = 1.5 \cdot (a_1 - a_2) \cdot \sigma_{1,2,3}$	199.20	214.52
$I_V = E_{V2} / E_{V1}$	1.08	

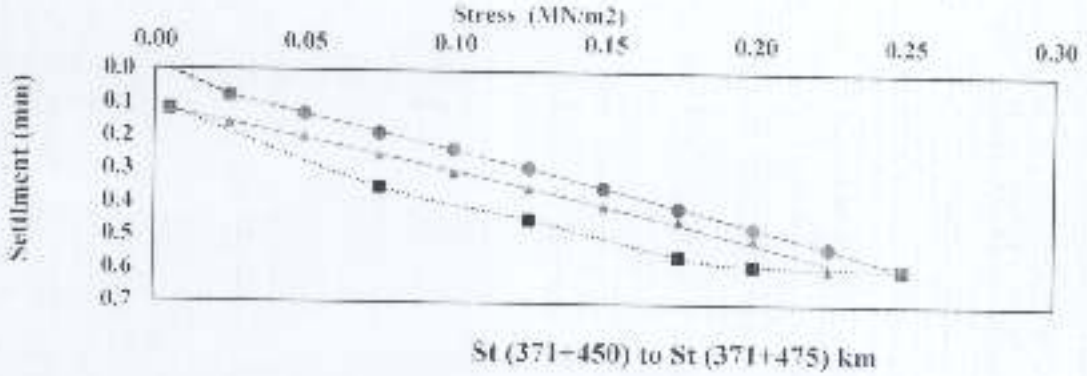


Fig. 8: Load-settlement curve, fitting curves according to Table 22 and Table 23 for the first and second loading cycles

- Measurment points from the first loading cycle
- Measurment points from the unloading cycle
- Measurment points from the second loading cycle

s Settlement in mm

σ_0 Normal stress MN/m²

St (371+475) to St (371+500) km

600

Table 25: Measured values for first loading cycle and unloading cycle

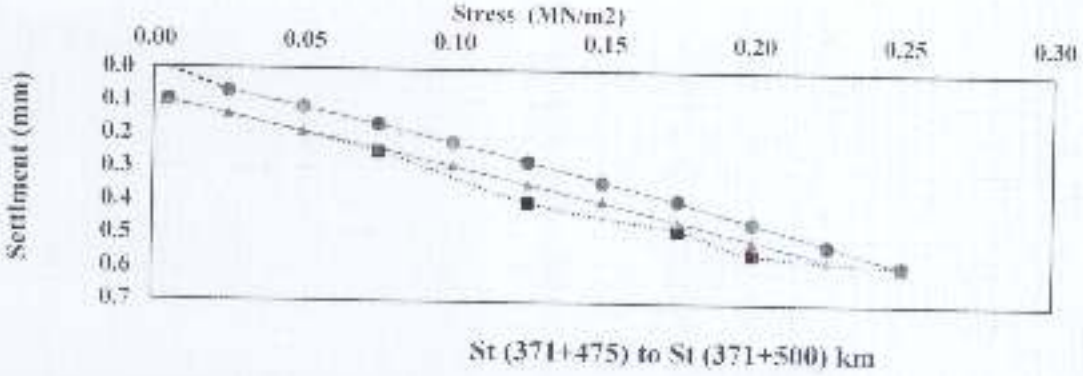
Loading stage no	Load (F) kN	Normal stress (σ) MN/m²	Settlement of loading plate S (mm)
0	1.414	0.005	0.00
1	7.07	0.025	0.07
2	14.14	0.050	0.12
3	21.21	0.075	0.17
4	28.28	0.100	0.22
5	35.35	0.125	0.28
6	42.42	0.150	0.34
7	49.49	0.175	0.39
8	56.56	0.200	0.46
9	63.63	0.225	0.52
10	70.7	0.250	0.58
11	56.56	0.200	0.55
12	49.49	0.175	0.48
13	35.35	0.125	0.40
14	21.21	0.075	0.25
15	1.414	0.005	0.10

Table 26: Measured values for second loading cycle

Loading stage no.	Load (F) kN	Normal stress (σ) MN/m2	Settlement of loading plate S (mm)
15	1.414	0.005	0.10
16	7.07	0.025	0.14
17	14.14	0.050	0.19
18	21.21	0.075	0.25
19	28.28	0.100	0.29
20	35.35	0.125	0.34
21	42.42	0.150	0.39
22	49.49	0.175	0.45
23	56.56	0.200	0.51
24	63.63	0.225	0.57

Table 27: Compilation of results

Parameters	1st loading cycle	2nd loading cycle
$(\sigma_{s,max})$ MN/m²	0.250	0.250
a_1 (mm)	0.022	0.090
a_1 (mm/(MN/m²))	3.831	1.939
a_2 (mm/(MN/m²))	3.779	0.775
$E_{v1} = 1.5 \sigma / (a_1 + a_2 \sigma_{s,max})$	199.48	210.58
Ev2/Ev1	1.06	



St (371+475) to St (371+500) km

Fig. 8: Load-settlement curve, fitting curves according to Table 25 and Table 26 for the first and second loading cycles

- Measurment points from the first loading cycle
- Measurment points from the unloading cycle
- Measurment points from the second loading cycle

S Settlement in mm

σ_z Normal stress MN/m²

Conclusions:

The present test results which obtained from the plate loading tests of the native soil on the sub-ballast layer of the electric express train project at location from St (371+275) to St (371+500) km in accourdance to the German standard , DIN 18134 are illustrated in table 28 .

Table 28 :Test results

Location	Ev1(MN/m^2)	Ev2(MN/m^2)	Ev2/Ev1 ratio
St (371+275) : St (371+300) km	200.01	226.67	1.13
St (371+300) : St (371+325) km	209.52	235.58	1.12
St (371+325) : St (371+350) km	200.75	228.32	1.14
St (371+350) : St (371+375) km	190.87	217.28	1.14
St (371+375) : St (371+400) km	225.29	230.58	1.02
St (371+400) : St (371+425) km	205.79	228.10	1.11
St (371+425) : St (371+450) km	195.70	222.54	1.14
St (371+450) : St (371+475) km	199.20	214.52	1.08
St (371+475) : St (371+500) km	199.48	210.98	1.06

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