

## Apéndice-5. Estimación del Costo a ser sufragado por el País Receptor

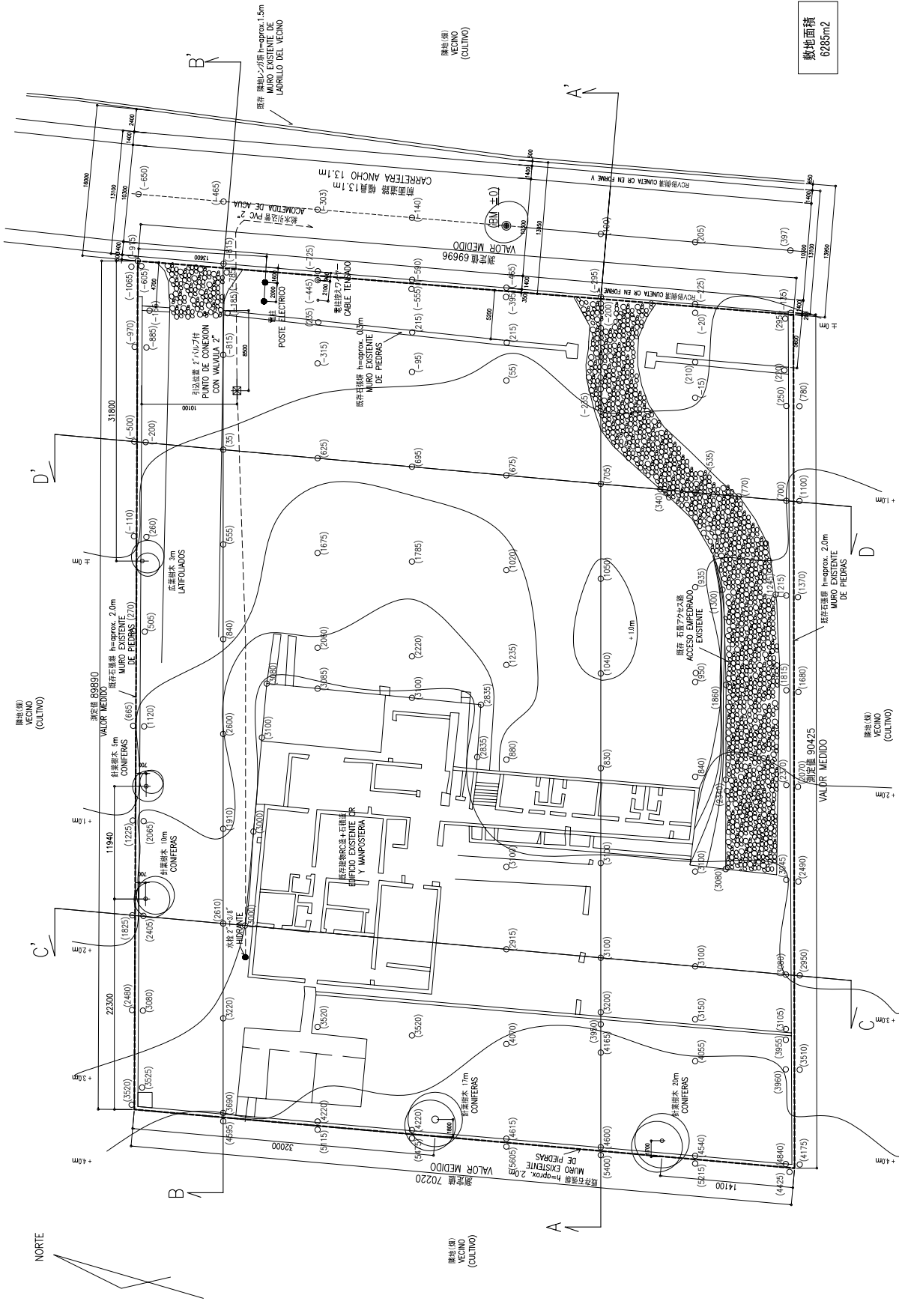
Items	Costo S/. sin IGV	Observaciones
<b>COSTO DE TRABAJOS A SER EJECUTADOS POR EL PAÍS RECEPTOR</b>		
Demolición /Remoción de las Facilidades Existentes	58,500	Fundación - piso de hormigón, Mampostería estructural + Techo de madera, una parte de 2 pisos. (incluye el cerco frontal, pavimento exterior), área de construcción 650m <sup>2</sup> x 90S/.
Limpieza del Sitio y Movimiento de tierra	7,238	Área registrada: 6031.74m <sup>2</sup> x 1.20S/.
Conexión de Electricidad	15,856	Costo de conexión básica de 22.9kV 3P 100kW
Extensión /Conección de Líneas Telefónicas	361	Cargo único de Instalación para Línea Clásica
Conexión de Agua Corriente	170	Costo de obra 20S/.+Costo de materiales 150S/.
Muebles, Tejidos y Equipos en General	50,500	Área del piso con excepción de la parte de exhibición (505m <sup>2</sup> ) x costo directo de obra /m <sup>2</sup> x 5% (100S/./m <sup>2</sup> )
Plantas y Jardinería	4,800	Cobertura de césped de la plaza + Plantación de arbustos en áreas de reforestación Área de reforestación 400m <sup>2</sup> x 12S/.
Equipos/Obras para Exhibición y Presentación	795,000	Obra de museografía del área de exhibición de 1,300m <sup>2</sup> (incluyendo almacén, estantes) 1,300m <sup>2</sup> x 600S/.
<b>SUB-TOTAL</b>	<b>932,426</b>	
<b>IGV 19%</b>	<b>177,161</b>	
<b>TOTAL</b>	<b>1,109,586</b>	<b>Aprox. US\$337,866</b>
<b>TARIFAS Y COMISIONES NECESARIAS A SER CUBIERTAS POR EL PAÍS RECEPTOR</b>		
Tarifas de arreglos bancarios, etc.	8,655	Monto del contrato x 0.1%
Tarifa por solicitud de permiso de construcción	33,268	
Inspección Ocular- Fuera del Casco Urbano	35	Reglamento de la Municipalidad Distrital de Chavín de Huántar
Constancia de seguridad por Revisión del	4,390	Idem Costo directo de la obra x 0.1%
Constancia de seguridad por Licencia	28,538	Idem Costo directo de la obra x 0.65%
Certificado de Habilidad Profesional del Colegio de Arquitectos	305	
<b>TOTAL</b>	<b>41,923</b>	<b>Approx. US\$12,765</b>
<b>OTROS</b>		
Carga de reembolso de impuestos al valor agregado (IGV)	998,637	Costo de la obra de la parte local x 19%

## **Apéndice-6. Otros Datos Relevantes**

**6-1. Mapa de Levantamiento Topográfico**

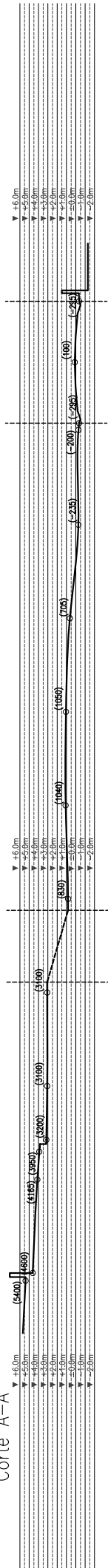
**6-2. Perfil Geotécnico**

# 6-1 Mapa de Levantamiento Topográfico



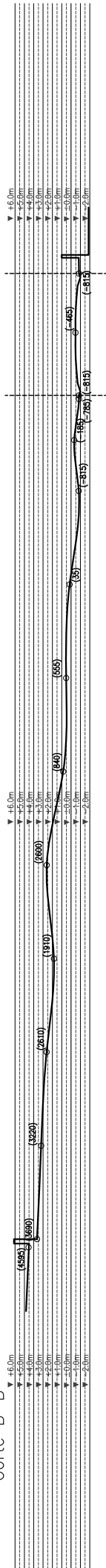
<p>MATSUDA CONSULTANTS INTERNATIONAL CO., LTD. 43-7-10968, 3-chome, Shibuya-ku, Tokyo, Japan 151-0063 Tel. 03(533)9581 Fax. 03(533)9777</p>	<p>PROJECT TITLE : チャペル・センター・ワンタム国立博物館建設計画 PROJECT PARA LA CONSTRUCCION DEL MUSEO NACIONAL CHAVIN</p>		<p>DRAWN BY: N. NISHIYA CHECKED BY: T. OSAWA APPROVED BY:</p>	<p>PROJECT NO.: DATE: 2005/10/14 SCALE: 1/400</p>	<p>DRAWING TITLE : 敷地測量図 PLANO DE LEVANTAMIENTO TOPOGRAFICO</p>	<p>SHEET NO.</p>
	<p>敷地面積 6235m<sup>2</sup></p>					

Corte A-A'



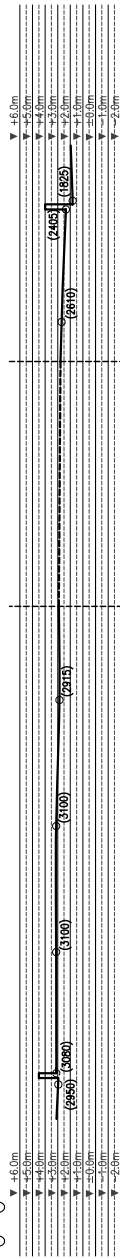
既存建築物+石積造  
EDIFICIO EXISTENTE CR  
Y MANPOSTERIA

Corte B-B'

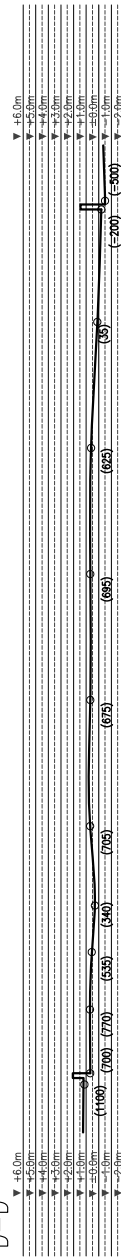


既存建築物+石積造  
EDIFICIO EXISTENTE CR  
Y MANPOSTERIA

Corte C-C'



Corte D-D'



 <p>MATSUDA CONSULTANTS INTERNATIONAL CO., LTD. 4-2-7, Onoda 1-chome, Onoda-shi, Yamaguchi-ken 751-0063 Tel. 083(53)9281 Fax 083(53)9777</p>	<p>PROJECT TITLE : チャペル・デ・オンダ国立博物館建設計画 PROJECT PARA LA CONSTRUCCION DEL MUSEO NACIONAL CHAVIN</p>	<p>DRAWN BY: N. NISHIYA CHECKED BY: T. OSAWA APPROVED BY:</p>	<p>PROJECT NO.: DATE: 2005/10/15 SCALE: 1/400</p>	<p>DRAWING TITLE : PLAN/ 敷地測量図 PLANO DE LEVANTAMIENTO TOPOGRAFICO</p>	<p>SHEET NO.</p>
	<p>EDIFICIO EXISTENTE CR Y MANPOSTERIA</p>				



**SOILS STUDY**  
**MUSEUM SITE - CHAVIN DE HUANTAR**  
**HUARI, ANCASH**

**Report No M2352**  
**Lima, November 2005**



**SOILS STUDY**  
**MUSEUM SITE - CHAVIN DE HUANTAR**  
**HUARI, ANCASH**

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M2352-11 Plate Load Test PC-1	Graphic Time versus Settlement Average for each Increase of Load
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**SOILS STUDY**  
**MUSEUM SITE - CHAVIN DE HUANTAR**  
**CHAVIN, ANCASH**

**Summary and Conclusions**

The present report includes the Soils Study required by MATSUDA CONSULTANTS INTERNATIONAL CO., LTD to determine the foundation conditions for the Chavín de Huantar Site Museum, located in Chavín de Huantar, province of Huari, department of Ancash.

The field exploration program carried out included the following works:

Two plate load tests at 1.5 and 1.7 m of depth with respect to the level of the present land surface, denominated PC-1 and PC-2. In order to carry out these tests it was necessary to excavate platforms with backhoe until the depths where the tests were required to be carried out, with the respective approach ramp for the truck that would be used as a counterweight.

Four test pits excavated manually down to depths of between 0.80 and 1.00 m, denominated C-1 to C-4.

Test pit C-1 was made in the same platform where plate load test PC-1 was executed, at 1.50 m of depth with respect to the level of the land surface.

Test pits C-2 and C-3 were made in the same platform where plate load test PC-2 was executed, at 1.70 m of depth with respect to the level of the land surface.

Test pit C-4 was executed adjacent to a foundation of the existing building, with the purpose of determining its foundation depth and the characteristics of the soil on which the foundation is supported.

Profiling the shear walls of the excavations for the platforms where the load tests were carried out. The sections profiled are denominated Slope T-1 and Slope T-2.

The soil profile in the South sector of the land, where plate load test PC-1 was carried out, is formed by an upper layer of organic soil 0.40-m thick, under which, down to the limit of the depth investigated (2.50 m with respect to the natural surface of the land) were found interlaced layers of:

- from 0.40 to 0.65 m silty clay, sandy, slightly gravelly, of low plasticity, stiff;
- from 0.65 to 1.20 m clayed silt, sandy, of middle plasticity, stiff;
- from 1.20 to 1.45 m fine to medium sand, slightly gravelly, clayed, silty, medium dense;
- from 1.34 to 1.55 m silty clay, sandy, of low plasticity, stiff; and
- from 1.55 to 2.50 m clayed silt, sandy, gravelly, of middle plasticity, very stiff.

The Northwest zone of the land, which presents a higher level, has a soil profile that is different and is formed by an upper layer of organic soil 0.50-m thick, followed by the



following layers:

from 0.50 to 1.65 m sub-angular	fill of slightly sandy gravel, loose, with stones and boulders of 12 inches maximum size;
from 1.50 to 2.70 m 32	stones, boulders and sub-angular rock fragments of up to 32 inches of maximum size, with matrix of silty clay, sandy, gravelly, of low plasticity, stiff, and sandy gravel, clayed, medium dense.

The water table was not detected within the depth investigated.

In principle, it is recommended considering a minimum foundation depth of 1.50 m with respect to the present land surface, verifying in all the area that it exceeds the upper layers of fill. In the event that, when excavating down to the depth indicated this requirement is not fulfilled, the excavation for the foundations will have to be deepened until fulfilling it and leaving the height of the over-excavation empty with a false foundation of poor cyclopean concrete.

The allowable pressure that must be used in the structural calculations is **qa = 1.50 Kg/cm<sup>2</sup>**. This value corresponds to the allowable pressure by shear stress determined considering a safety factor of 3, as specified in Technical Construction Standard E050: Soil and Foundations (2)\*. The settlement expected below footings of different widths that apply this load to the subsoil is, in all cases, less than 10 mm, that are the maximum tolerable value determined according to the recommendations in the Standard indicated (2).

According to Technical Construction Standard E030: Seismic-resistant Design (3), the soil profile that will be within the active foundation depth can be classified as Type S2, to which corresponds a Soil Factor S equal to 1.2 and a Tp Predominant Vibration Period of 0.6 sec.

In the areas where concrete floors and patios will be constructed it is recommended eliminating the upper layer of organic soil by a minimum thickness of 0.40 m and replacing it with a selected, placed and compacted granular material in layers of not more than 0.20-m thick to a minimum of 95% of the maximum dry density under the modified Proctor test.

In general, all the fill required to reach the project levels, either covering over existing excavations or in those sectors where the land surface speed is depressed, will have to be done with selected granular material, preferably sandy gravel, well or poorly-graded, clean or slightly silty or slightly clayed, placed by layers of not more than 0.20-m thick, compacted to 95% of the maximum dry density under the modified Proctor test.





These recommendations are made to avoid splitting in the concrete floor slabs. In addition, and as a precaution, it would be advisable to consider a minimum of reinforcement in these concrete slabs.

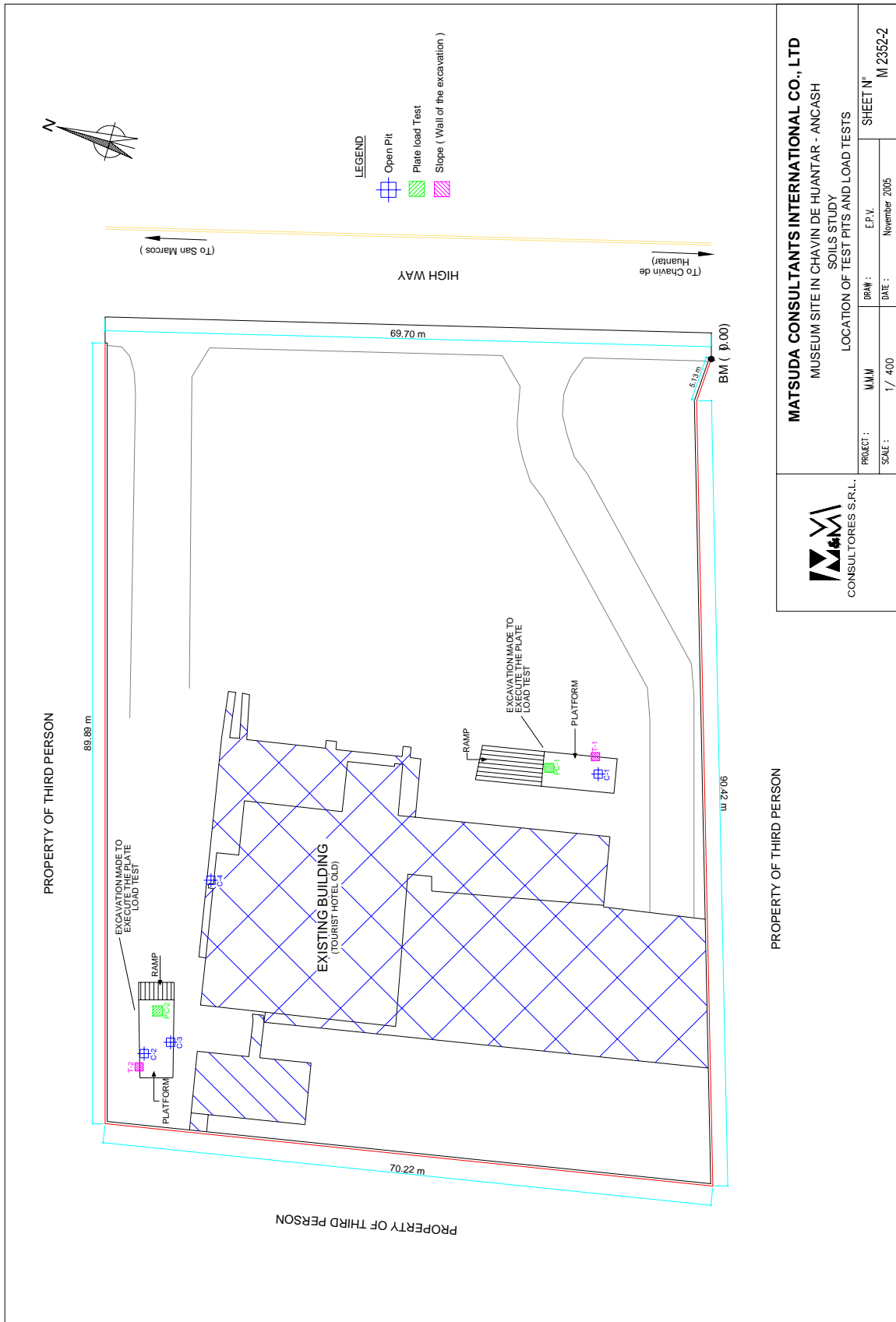
Lima, November 2005


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Eng. Maggie Martinelli de Mayer  
Reg. Col. Engs. CIP 26250

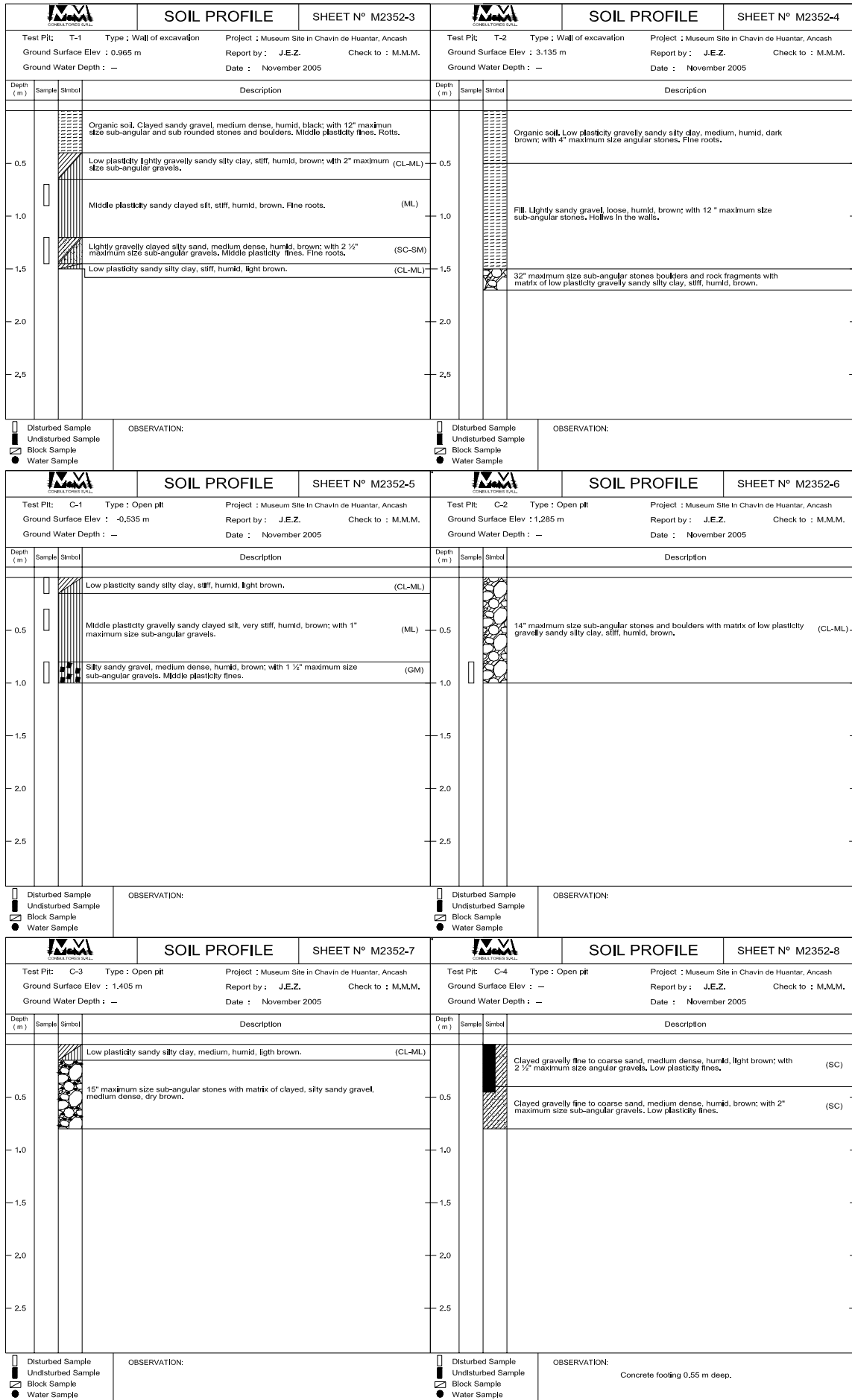
\* The numbers in parenthesis indicate references to the bibliography.

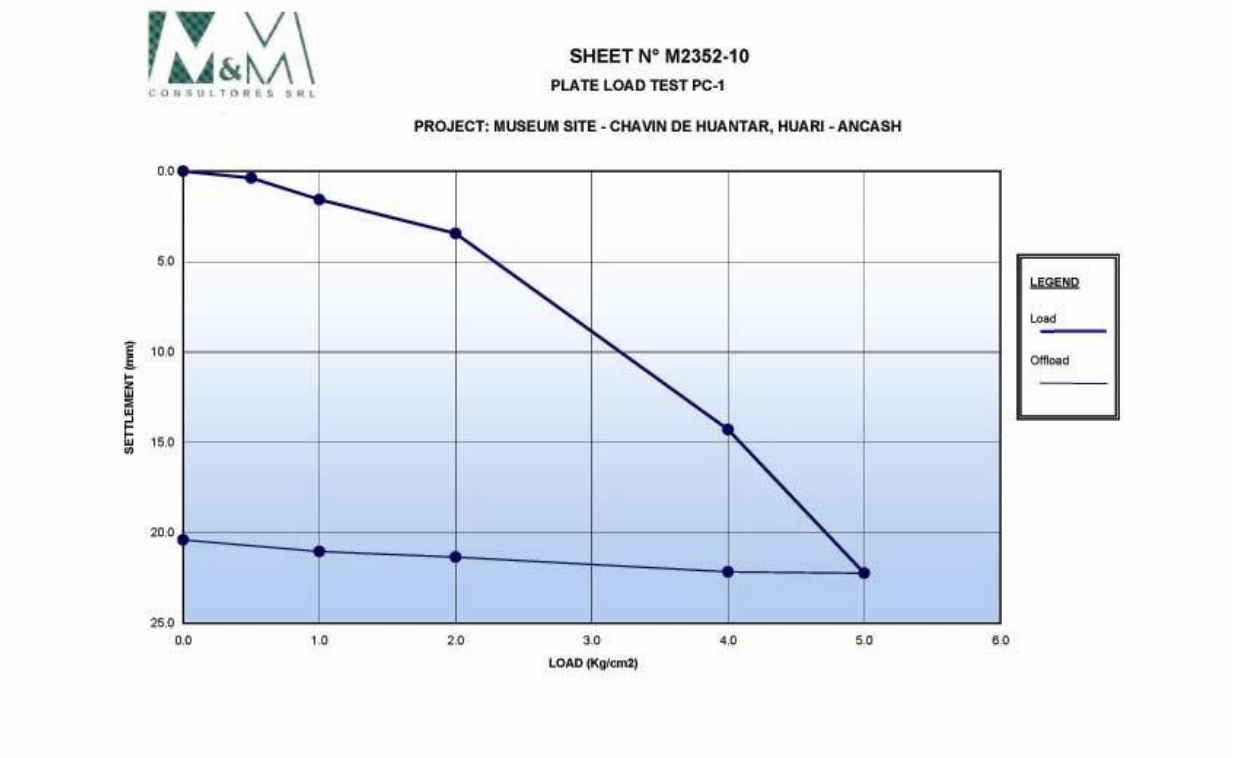
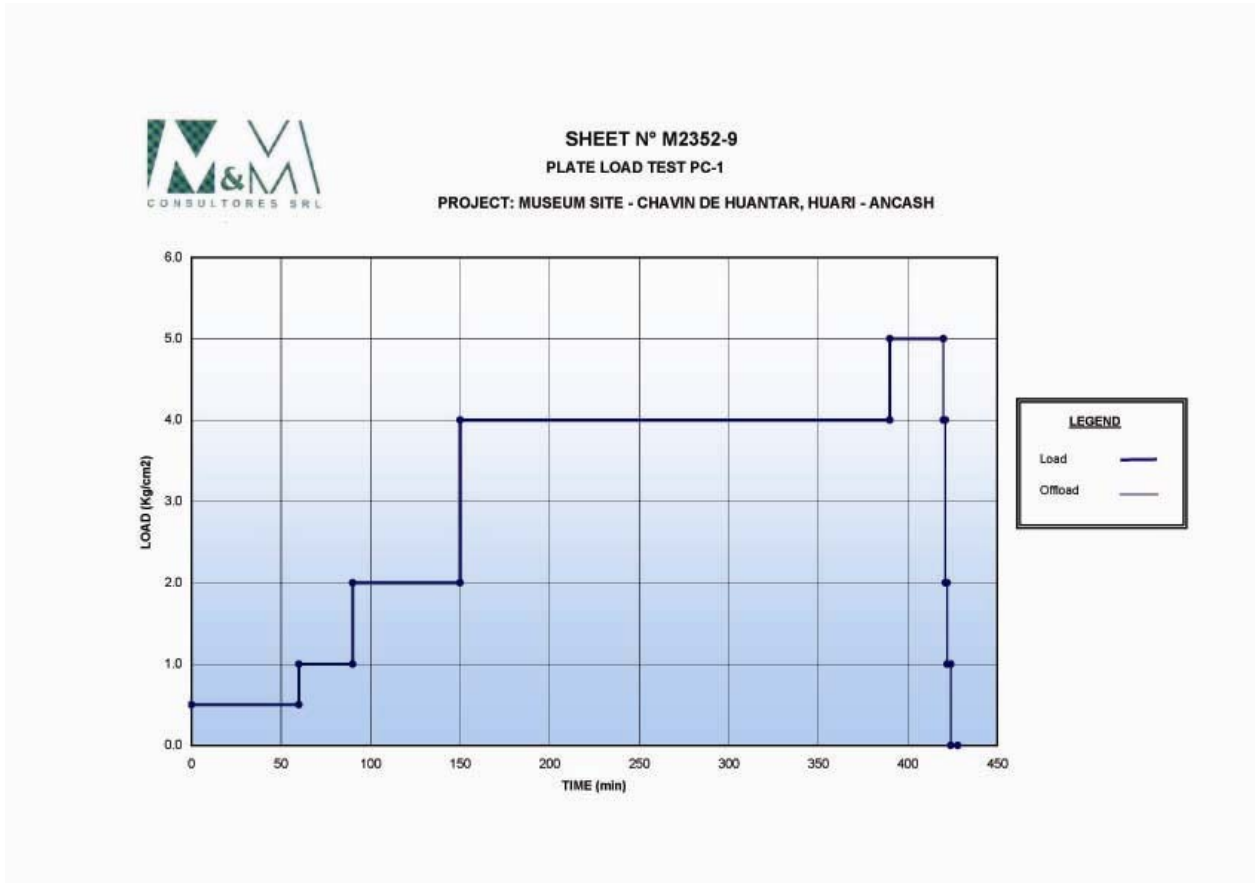
M2352-2 Location of Test Pits and Load Tests



 <p><b>MATSUDA CONSULTANTS INTERNATIONAL CO., LTD</b> MUSEUM SITE IN CHAVIN DE HUANTAR - ANCASH SOILS STUDY LOCATION OF TEST PITS AND LOAD TESTS</p>	<p>PROJECT : M.M</p>	<p>DRAWN : E.P.V</p>	<p>SHEET N°</p>
	<p>SCALE : 1/ 400</p>	<p>DATE : November 2005</p>	<p>M 2352-2</p>

• M2352-3 to M2352-8 Soil Profiles of the Slopes (shear walls) and Soil Profiles of the Test Pits



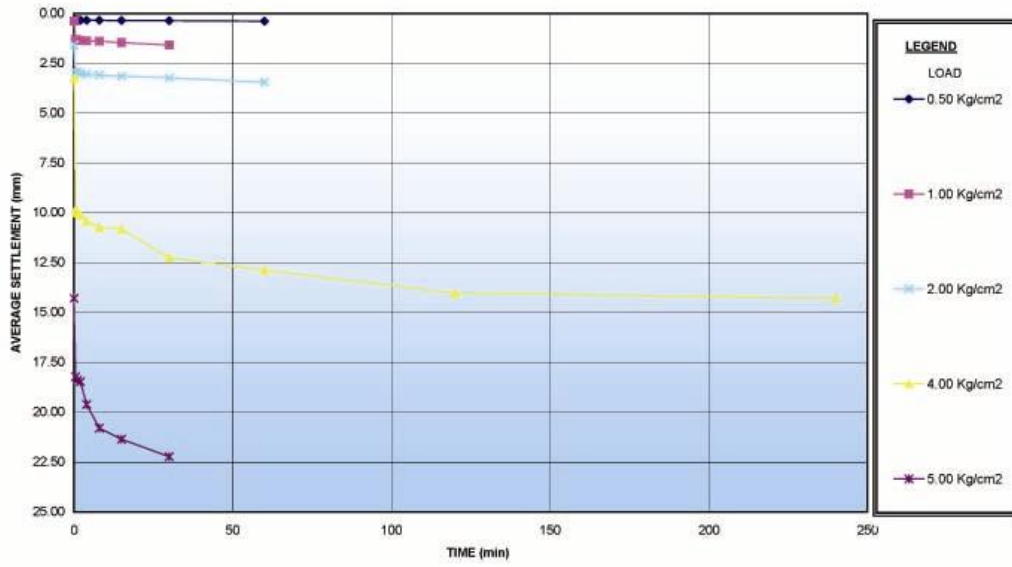


• M2352-11 Plate Load Test PC-1 Graphic Time versus Settlement Average for each Increase of Load



SHEET N° M2352-11  
PLATE LOAD TEST PC-1

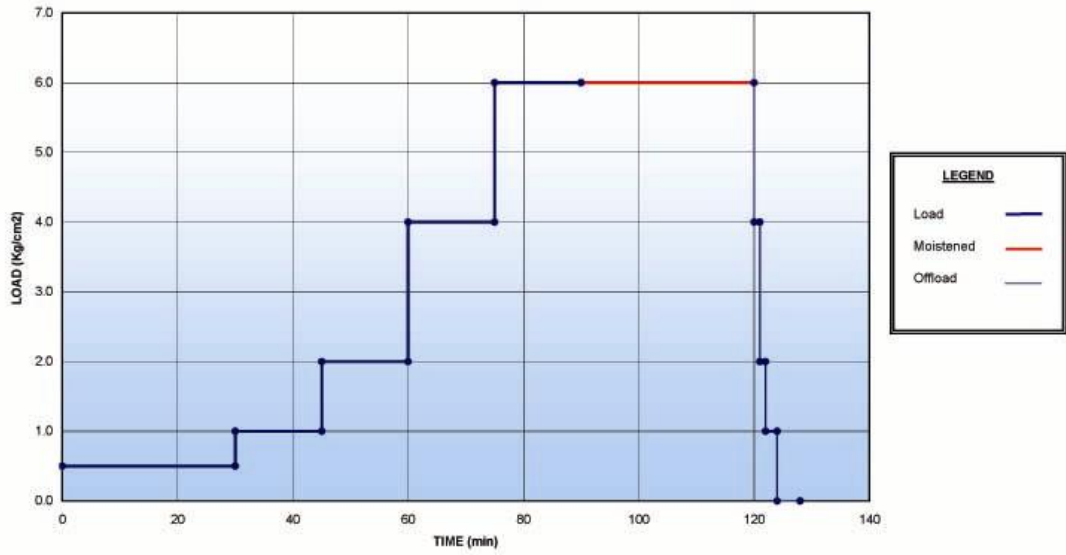
PROJECT: MUSEUM SITE - CHAVIN DE HUANTAR, HUARI - ANCASH





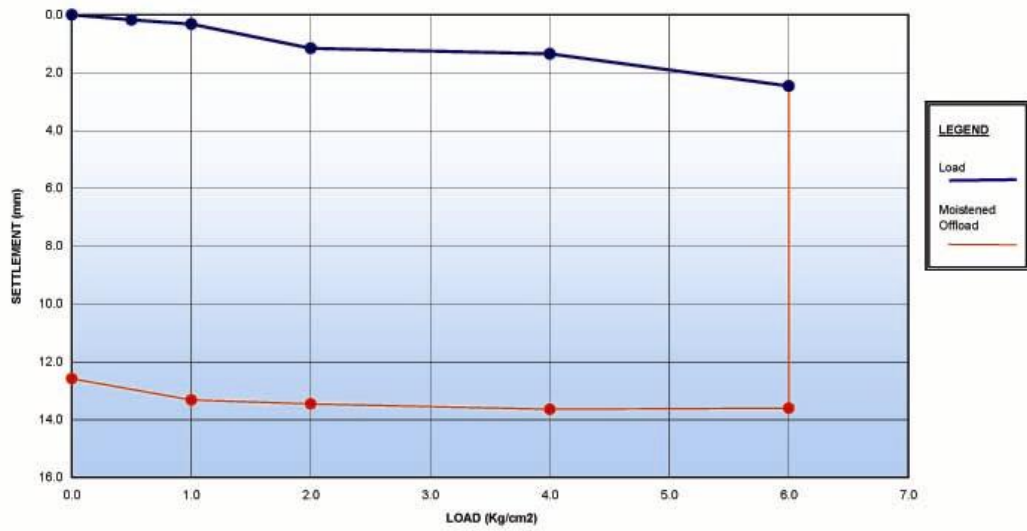
**SHEET N° M2352-12**  
**PLATE LOAD TEST PC-2**

**PROJECT: MUSEUM SITE - CHAVIN DE HUANTAR, HUARI - ANCASH**



**SHEET N° M2352-13**  
**PLATE LOAD TEST PC-2**

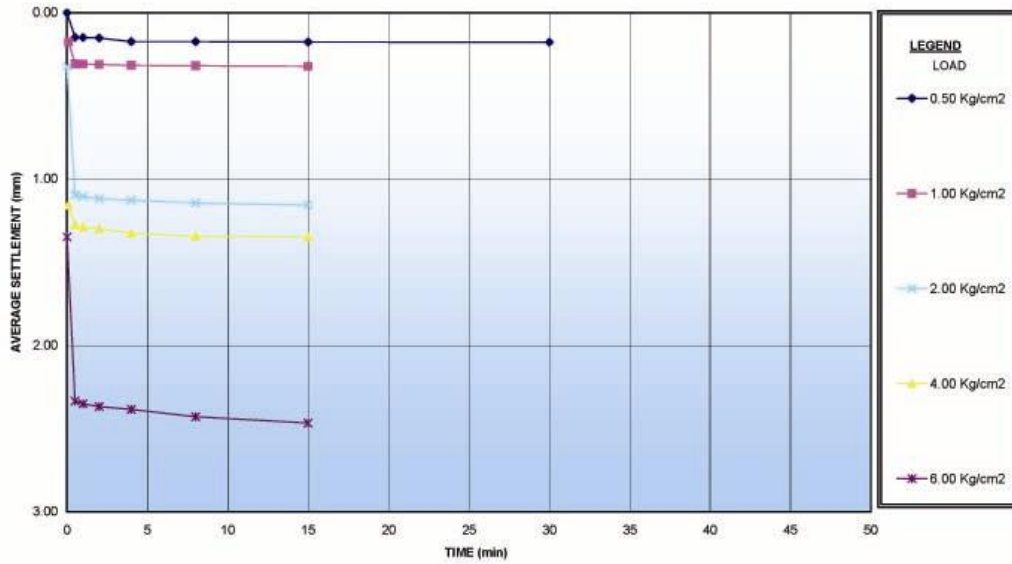
**PROJECT: MUSEUM SITE - CHAVIN DE HUANTAR, HUARI - ANCASH**



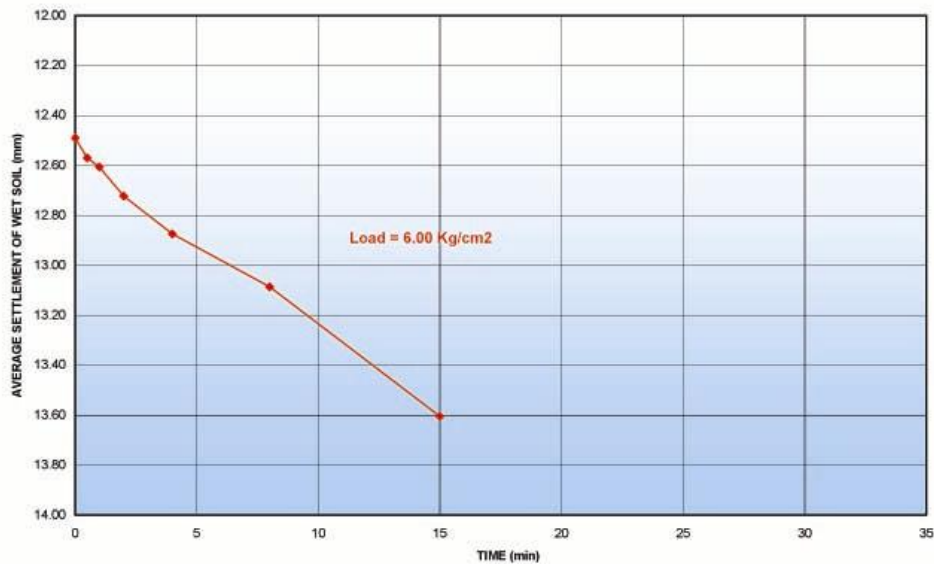
- M2352-14 to 14A Plate Load Test PC-2 Graphic Time versus Settlement Average for each Increase of Load, Graphic Time versus Settlement Average to Moistening the Soil with a Load of 6.00 Kg/cm<sup>2</sup>



**SHEET N° M2352-14**  
**PLATE LOAD TEST PC-2**  
**PROJECT: MUSEUM SITE - CHAVIN DE HUANTAR, HUARI - ANCASH**



**SHEET N° M2352-14A**  
**PLATE LOAD TEST PC-2**  
**PROJECT: MUSEUM SITE - CHAVIN DE HUANTAR, HUARI - ANCASH**



## Tables

### M2352-3 Gradation Analysis, Atterberg Limits and Unified Classification of Samples Tested

**TABLE NPM2352-3**

**MUSEUM SITE IN CHAVÍN DE HUANTAR, HUARI-ANCASH  
GRADATION ANALYSIS, ATTERBERG LIMITS AND UNIFIED CLASSIFICATION**

SAMPLE		GRADATION ANALYSIS FOR SIEVE														LIMITS ATTERBERG			UNIFIED CLASSIFICATION USCS		
Open Pit	Depth (m)	% OF PARTICLES UNDER THE ASTM SIEVE N°														LL	LP	I.P			
		4"	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	N#4	N#10	N#20	N#40	N#100	N#200	%	%		%	
T-1	0.70 - 0.90									100	99	93	90	82	74	70	31	17	4	ML	
T-1	1.20 - 1.45			100	97	95	95	95	94	94	92	86	80	72	60	50	19	14	5	SC-SM	
C-1	0.00 - 0.15											100	96	92	84	73	64	21	16	5	CL-ML
C-1	0.30 - 0.50					100	99	96	91	88	81	76	72	66	59	55	32	15	7	ML	
C-1	0.80 - 1.00					100	77	67	57	54	47	44	42	39	34	32	31	16	5	GM	
C-2	0.60 - 0.80	100	83	83	83	76	69	65	62	60	58	55	53	49	46	44	21	16	5	CL-ML	
C-3	0.20 - 0.40				100	99	95	83	66	60	49	44	42	38	33	31	29	15	14	GC	
C-4	0.20 - 0.40			100	95	93	90	87	83	78	69	60	54	45	37	33	22	14	8	SC	
C-4	0.50 - 0.70				100	96	93	89	88	84	72	64	59	52	45	41	29	16	13	SC	
PC-2	0.15 - 0.40			100	90	76	59	48	42	40	37	35	34	32	29	28	21	16	5	GC-GM	

### M2352-4 Settlement versus Loads Applied Ratio

**TABLE No M2352-5**

**SETTLEMENT VERSUS LOADS APPLIED RATIO**

PLATE LOAD TEST PC-1

Depth of test = 1.50 m

Load (Kg/cm <sup>2</sup> )	s (mm)	Settlement S (mm)		
		B = 1.00 m	B = 2.00 m	B = 3.00 m
0.50	0.3815	0.90	1.15	1.26
1.00	1.5728	3.72	4.76	5.20
2.00	3.4393	8.14	10.40	11.37
4.00	14.2833	33.81	43.20	47.22
5.00	22.2245	52.60	67.22	73.47

PLATE LOAD TEST PC-2

Depth of test = 1.70 m

Load (Kg/cm <sup>2</sup> )	s (mm)	Settlement S (mm)		
		B = 1.00 m	B = 2.00 m	B = 3.00 m
0.50	0.1763	0.42	0.53	0.58
1.00	0.3213	0.76	0.97	1.06
2.00	1.1555	2.73	3.49	3.82
4.00	1.3478	3.19	4.08	4.46
6.00	2.4653	5.84	7.46	8.15
6.00*	13.6045	32.20	41.15	44.97

\* Moist

s = Settlement of the load plate

s = Settlement of a footing of B width





**UNIVERSIDAD NACIONAL AGRARIA LA MOLINA**  
**FACULTAD DE INGENIERÍA AGRÍCOLA**  
 Departamento de Recursos de Agua y Tierra  
**LABORATORIO DE ANALISIS DE AGUA Y SUELO, MEDIO AMBIENTE**

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## ANALISIS DE SUELO SALES

TABLE N° M2352-5

SOLICITANTE : M y M CONSULTORES S R L  
 PROYECTO : Museo Chavin de Huanar  
 PROCEDENCIA : Huaraz  
 FECHA : La Molina, 17 de Noviembre del 2005

N° Lab.	N° Campo	SO <sup>4</sup> (ppm)
7727	C 1 Prof 0.80 - 1.00 m. (MAB)	290.88



LABORATORIO DE ANALISIS DE AGUA Y SUELOS  
  
**ING. ANTONIO DACOSTA GUTIERREZ**  
 JEFE DE LABORATORIO  
 DRAT

## **Apéndice-7. Referencia**

1. Lineamientos Generales del Plan Maestro de Chavín de Huántar, 7/2000, INC
2. Estudios Arqueológicos Realizados en Chavín de Huántar, INC
3. Programa de Recuperación de Monumentos MINCETUR-INC 2005, 2005, INC
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