APPENDIX VIII:

CONSOLIDATION TEST

1. INTRODUCTION. Consolidation is the process of gradual transfer of an applied load from the pore water to the soil structure as pore water is squeezed out of the voids. The amount of water that escapes depends on the size of the load and compressibility of the soil. The rate at which it escapes depends on the coefficient of permeability, thickness, and compressibility of the soil. The rate and amount of consolidation with load are usually determined in the laboratory by the one-dimensional consolidation test. In this test, a laterally confined soil is subjected to successively increased vertical pressure, allowing free drainage from the top and bottom surfaces.

2. APPARATUS. The apparatus should consist of the following:

a. Consolidometer shall consist of a rigid base, a consolidation ring, porous stones, a rigid loading plate, and a support for a dial indicator (Fig. 1). It may be either the fixed-ring or the floating -ring type both of which are shown in Figure 2.

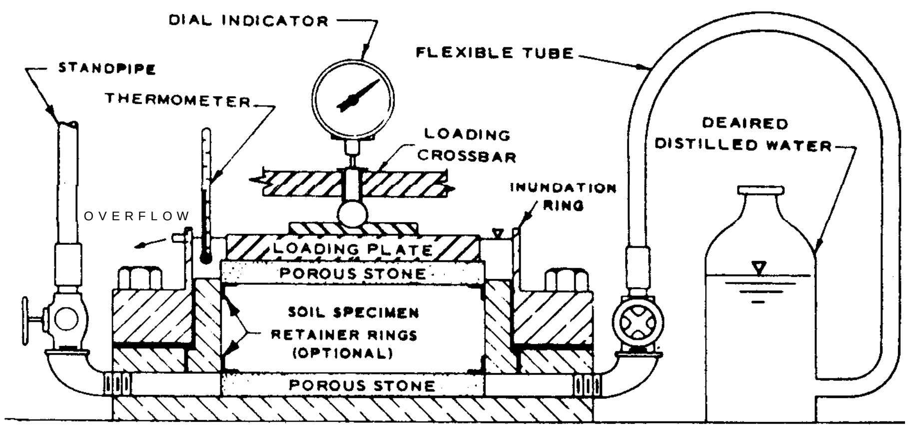


Figure 1. Typical consolidometer

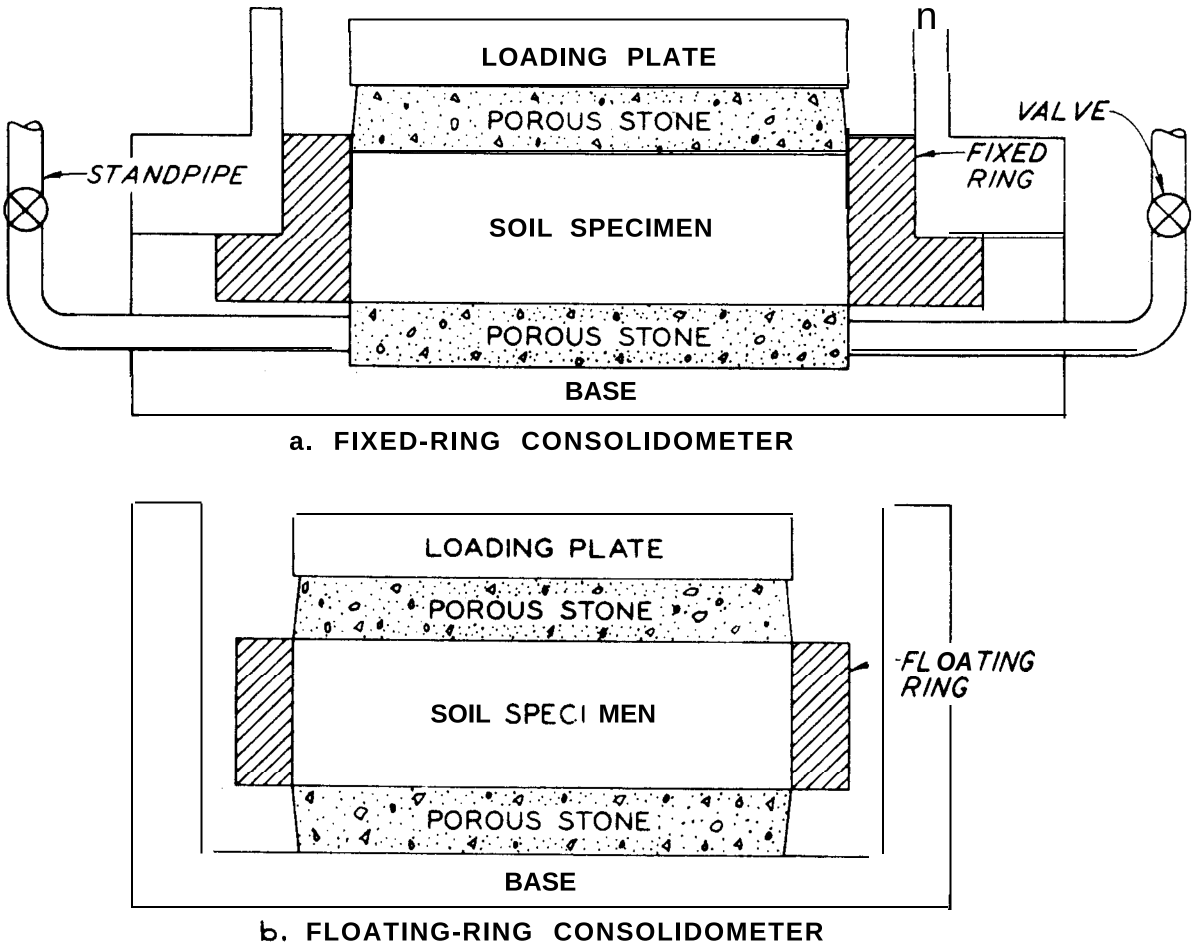


Figure 2. Schematic diagrams of fixed-ring and floating-ring consolidometers

The various metal parts of the consolidometer shall be of the same non-corrosive material. All-plastic or combination plastic and metal consolidometers may also be used to reduce electrochemical effects. The consolidometer shall conform to the following requirements.

(1) Fixed-ring consolidometer shall have a rigid base with a recess for supporting the bottom porous stone and for seating and attaching the consolidation ring. The upper surface of the'recess shall be grooved to permit drainage. The base shall also have (a) an inundation

ring to permit submergence of the specimen in water to prevent evaporation of water from the specimen during the test, and (b) suitable connections and a standpipe for making permeability tests.

(2) Floating-ring consolidometer† shall have a rigid base for supporting the bottom porous stone. The base shall be large enough to permit free vertical movement of the consolidation ring and shall have a chamber surrounding the ring for submergence of the specimen.

b. Consolidation ring shall completely and rigidly confine and support the specimen laterally. The inside diameter of the ring should not be less than 2-3/4 in. and preferably not less than 4 in.; use of larger rings for specimens of larger diameter, particularly with the fixed-ring consolidometer, will reduce the percentage of applied load carried by side friction and consequently will provide more accurate results. Normally, the ratio of the height of ring to inside diameter of ring should be between 1/4 and 1/6. The consolidation ring may be lined with a material such as Teflon to reduce the friction between the ring and a specimen of fine-grained soil. A stainless steel ring is preferable for specimens containing abrasive particles.

c. Porous stones more pervious than the specimen of soil should be used to permit effective drainage. For routine testing, stones of medium porosity are satisfactory. The diameter of the porous stones

† In the floating-ring consolidometer the friction between the inside of the ring and the specimen is less than that in the fixed-ring type. However, when very soft soils are tested with the floating-ring consolidometer, the side friction will not support the weight of the ring, and compression occurs toward the middle of the specimen from top and bottom. The floating-ring device is suitable only for comparatively stiff soils, and has the disadvantage that it cannot be used for permeability tests.

shall be such as to prevent the squeezing out of soil through the clearance spaces between the ring and stone and to permit free compression of the specimen without binding; to minimize the possibility of binding, the sides of the upper porous stone of the fixed-ring consolidometer should be slightly tapered away from the specimen, while both porous stones of the floating-ring consolidometer should be tapered. A clearance of about 0.010 to 0.015 in. around the stone generally will be adequate; however, if very soft soils are tested, a smaller clearance may be desirable or retainer rings may be used as shown in Figure 1. Details of a typical retainer ring are shown in Figure 3. The porous stones should be cleaned after every test, preferably in an ultrasonic cleaner or by boiling and flushing.

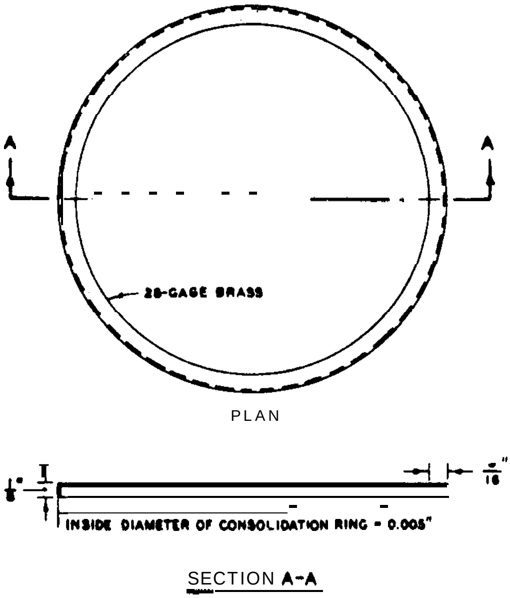


Figure 3. Typical retainer ring

d. Loading devices of various types may be used to apply load to the specimen. The most commonly used is the beam-and-weight mechanism. The loading device should be capable of transmitting axial load to the specimen quickly and gently. Also, the equipment should be capable of maintaining the load constant for at least 24 hr. The equipment should be calibrated to ensure that the loads indicated are those actually applied to the soil specimen.

e. Dial Indicator. A dial indicator reading counterclockwise, with a range of 0.50 in. and graduated to 0.0001 in., is recommended.

f. Equipment for Preparing Specimens. A trimming turntable operated as a vertical lathe is commonly used in preparing specimens (see Fig. 4). Suitable trimming knives notched to fit the thickness of the consolidation ring, a wire saw with 0.01 -in. -diameter wire, and a metal straightedge or screed are also required.

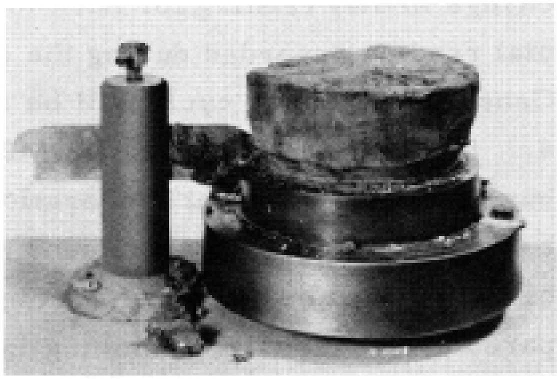


Figure 4. Cutting. specimen into specimen ring

g. Other items needed are:

(1) Balances, 'sensitive to 0.1 g and 0.01 g

(2) Timing device, a watch or clock with second hand

(3) Centigrade thermometer,, range 0 to 50 C, accurate to 0.1 c

(4) Distilled or demineralized water

(5) Filter papers and glass plates

(6) Apparatus necessary to determine water content and specific gravity (see Appendices I, WATER CONTENT - GENERAL, and IV, SPECIFIC GRAVITY)

3. CALIBRATION OF EQUIPMENT. In the consolidation test it is desired to measure only the volume change of the specimen; therefore, corrections must be applied for any significant deformation due to the compressibility of the apparatus itself. In sandy and stiff soils, an appreciable proportion of the total deformation may be caused by this factor. Therefore, a calibration curve should be prepared for each consolidometer when testing such soils. This is done by placing the consolidometer with submerged porous stones and filter papers in the loading device, applying the load increments to be used in the consolidation test, and reading the dial

indicator for each load. After the maximum load has been applied, the loads are decreased in the same order as that in which they were applied, and the dial indicator reading is again recorded. Since the deformations are almost instantaneous, the effect of time can be ignored. The total change in dial reading for each load is the correction to be applied to the dial reading recorded during the consolidation test under that same load. Generally, a single cycle will be sufficient for the calibration.

4. PREPARATION OF SPECIMENS. Specimens shall be prepared in a humid room to prevent evaporation of soil moisture. Extreme care shall be taken in preparing specimens of sensitive soils to prevent disturbance of their natural structure. Specimens of relatively soft soils may be prepared by progressive trimming in front of a calibrated, ring-shaped specimen cutter as shown in Figure 2 of Appendix II, UNIT WEIGHTS, VOID RATIO, POROSITY, AND DEGREE OF SATURATION. More commonly, specimens are prepared using the trimming turntable shown in Figure 4 herein; the procedure, based on the use of this equipment, shall be as described in the following subparagraphs. Preferably, specimens of compacted soil should be compacted to the desired density and water content directly into the consolidation ring, in thin (1/4 to 3/8 in.) layers, using a pressing or kneading action of a tamper having an area less than one-sixth the area of the specimen and thoroughly scarifying the surface of each layer before placing the next. Alternatively, specimens may be trimmed from samples compacted in a compaction mold by a similar kneading action.

a. Using a wire saw, knives, or other tools, trim the specimen into approximately cylindrical shape with a diameter about 1/2 in. greater than the inside diameter of the specimen ring. Care should be taken to disturb the specimen as little as possible during trimming. Chamfer the lower edge of the specimen until the bottom will fit exactly into the specimen ring.

b. Place the specimen ring on the rotating wheel and the specimen on the ring, starting the bottom into the ring as shown in Figure 4. Use a cutting tool to trim the specimen to accurate dimensions, place a glass plate on top of the specimen, and gently force the specimen down during the trimming operation. The specimen should fit snug in the consolidation ring.

c. Cut off the portion of the specimen remaining above the ring with a wire saw or knife (or other convenient tool for harder specimens). Extreme care must be taken for many soils, especially fissured clays, in cutting off this portion. Carefully true the surface flush with the specimen ring with a straightedge. If a pebble is encountered in the surface, remove it and fill the void with soil. Place a glass plate (previously weighed) over the ring and turn the specimen over.* Cut off the soil extending beyond the bottom of the ring in the same manner as that described for the surface portion. Place another glass plate on this surface, and again invert the specimen to an upright position, removing the metal disk if one was used.

5. PROCEDURE. The procedure shall consist of the following steps:

a. Record all identifying information for the specimen, such as project number, boring number, and other pertinent data, on the data sheet (Plate VIII-1 is a suggested form); note any difficulties encountered in preparation of the specimen. Measure and record the height and cross-sectional area of the specimen. Record weight of specimen ring and glass plates. After specimen is prepared, record the weight of the specimen plus tare (ring and glass plates), and from the soil trimmings obtain 200 g of material for specific gravity‡ and water content determinations. Record

---

* It may be found convenient after the top surface has been prepared to place over the specimen a circular metal plate, approximately 0.05 in. thick and of the same diameter as the specimen, and force it down until it is flush with the top of the ring. This provides a recess for the top porous stone and prevents the specimen from squeezing out of the consolidation ring.

‡ It is recommended that a specific gravity test be made on representative material from every consolidation test specimen.

the wet weight of the material used for the water content determination on the data sheet.

b. Fill the grooves in the base of the consolidometer with water. Fit the porous stone (previously saturated with water) into the base of the consolidometer. Add sufficient water so that the water level is at the top of the porous stone. Place a moist filter paper (Whatman No. 1 or equal) over the porous stone. (Be very careful to avoid entrapping any air during the assembly operations .) Place the ring with the specimen therein on top of the porous stone. If the fixed-ring consolidometer is used, secure the ring to the base by means of clamps and screws.

c. Place a moist filter paper on top of the specimen, and then place the previously saturated top porous stone and the loading plate in position.

d. Place the consolidometer containing the specimen in the loading device.

e. Attach the dial indicator support to the consolidometer, and adjust it so that the stem of the dial indicator is centered with respect to the specimen. Adjust the dial indicator to permit the approximate maximum travel of the gage but still allow measurement of any swelling.

f. Adjust the loading device until it just makes contact with the specimen. The seating load should not exceed about 0.01 ton per sq ft.

g. Read the dial indicator, and record the reading on a data sheet (Plate VIII-2 is a suggested form). This is the initial reading of the dial indicator.

h With the specimen assembled in the loading device, apply a load of 0.25 ton per sq ft to the specimen and immediately inundate the specimen by filling the volume within the inundation ring or the chamber surrounding the specimen with water. If a fixed-ring device is used, a low head of water should be applied to the base of the specimen and maintained during the test by means of the standpipe. Place a thermometer in the water, and record the temperature at 2-hr intervals.

To obtain reliable time-consolidation curves the temperature should not vary more than ± 2 C during the test. For most fine-grained soils a load of 0.25 ton per sq ft is usually enough to prevent swelling, but if swelling occurs apply additional load increments until swelling ceases. Were the specimen permitted to swell, the resulting void ratio-pressure curve would have a more gradual curvature and the preconsolidation pressure would not be well defined. Alternatively to applying a large initial load increment, swelling can be prevented by not inundating the specimen until the load on the specimen has reached such a level that consolidation is obviously occurring along the straight-line portion of the void ratio-pressure curve, During the stages before water is added, the humidity around the specimen should be maintained at 100 percent to prevent evaporation; a moist paper towel, cotton batting, or other cellular material wrapped around the specimen is usually adequate. This alternative procedure permits an initial load increment less than 0.25 ton per sq ft to be applied to the specimen.

1. Continue consolidation of the specimen by applying the next load increment. The following loading schedule is considered satisfactory for routine tests: 0.25, 0.5, 1.0, 2.0, 4.0, 8.0, and 16.0 tons per sq ft, the total load being doubled by each load increment. The maximum load should be great enough to establish the straight-line portion of the void ratio-pressure curve, subsequently described. The loading schedule may be modified by the designer to simulate the loading sequence anticipated in the field.

j. Observe and record on the data sheet (Plate VIII-2) the deformation as determined from dial indicator readings after various elapsed times. Readings at 0.1, 0.2, 0.5, 1.0, 2.0, 4.0, 8.0, 15.0, and 30.0 min, and 1, 2, 4, 8, and 24 hr for each load increment are usually satisfactory. A timing device should be located near the consolidometer to insure accurately timed measurements. Allow each load increment to remain on the specimen for a minimum of 24 hr until it is determined that the primary consolidation is completed. For most plastic, fine-grained soils a time interval of 24 hr will be sufficient. It is desirable that the duration of all load increments be the same. During the course of the test, plot the dial reading versus time data for each load increment on a semilogarithmic plot as shown in Plate VIII-3. P'lot the dial reading on an arithmetic scale (ordinate) and the corresponding elapsed time on a logarithmic scale (abscissa) as shown in Figure 5. For saturated fine -grained soils, the dial reading versus time curve will generally be similar to the curve shown in Figure 5 and can be converted into a time-consolidation curve using the theory of consolidation. The 100 percent consolidation or the completion of the primary consolidation is arbitrarily defined as the intersection of the tangent to the curve at the point of inflection, with the tangent to the straight-line portion representing the secondary time effect. The construction necessary for determination of the coordinates

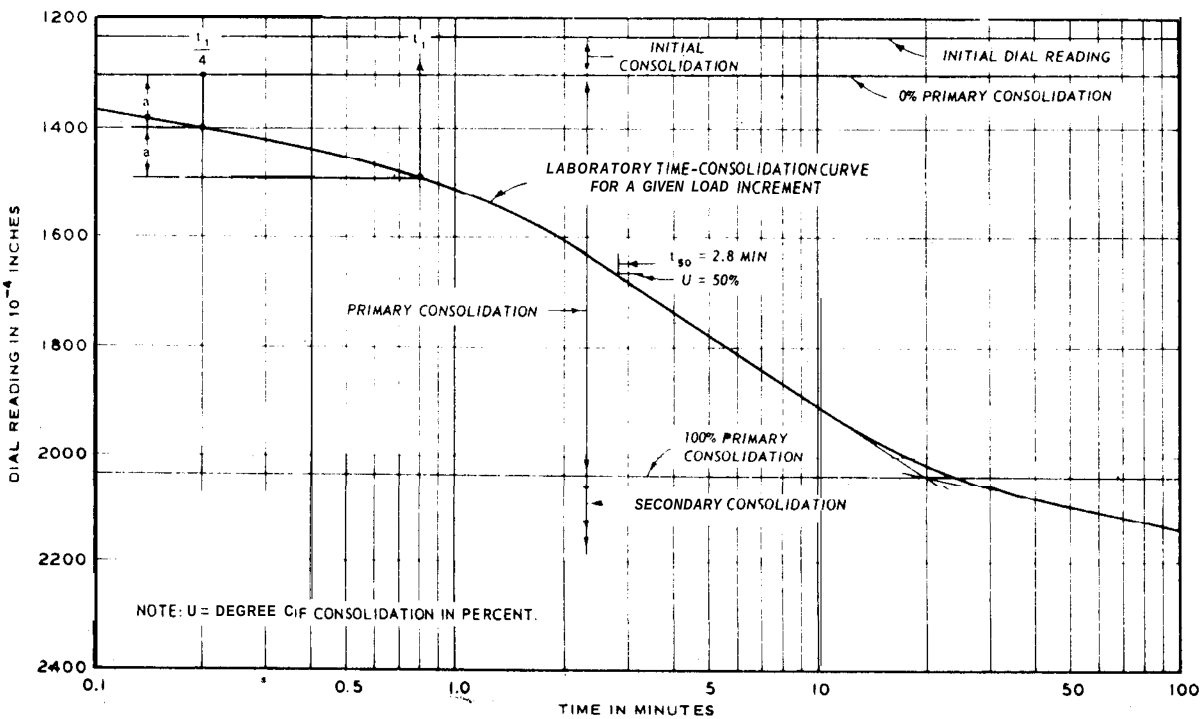


Figure 5. Time -consolidation curve

representing 100 percent consolidation and other degrees of consolidation is shown in Figure 5 (see also EM 1110-2-1904, Settlement Analysis).

k. Record on a data sheet (Plate VIII-4 is a suggested form) the dial reading for each load increment corresponding to a selected time (usually 24 hr) at which primary consolidation has been completed for all increments.

l. After the specimen has consolidated under the maximum load, remove the load in decrements, taking three-quarters of the load off successively for each of the first two decrements and as considered desirable thereafter. Take readings of the dial indicator as each decrement is removed to determine the rebound of the specimen. Observe, record, and plot the dial readings versus time; loads should not be removed until the dial readings are relatively constant with time or until the dial reading versus logarithm of time curve indicates completion of rebound. The final load at the end of the rebound cycle should be 0.1 ton per sq ft or less, and this load should be maintained for 24 hr in order to reduce to a tolerable amount the error in the final water content determination caused by swelling.

m. When the dial readings indicate no further significant rebound, remove the dial indicator and disassemble the apparatus. Carefully blot any excess water from the ring and surface of the specimen, eject the specimen into a dish of known weight, and weigh the dish and wet specimen; then oven-dry the wet specimen to constant weight (see Appendix I, WATER CONTENT - GENERAL).

6. COMPUTATIONS. The computations shall consist of the following:

a. From the recorded data compute and record on the data sheet, Plate VIII-l, the initial and final water contents (see Appendix I, WATER CONTENT - GENERAL). Compute also the height of solids, void ratio before and after test, initial and final degree of saturation, and dry density before test using the following formulas:†

Height of solids, $H_s = \frac{W_s}{A \times G_s \times \gamma_w} = \left[\frac{W_s}{A \times G_s \times 1 \times 2.54} \text{ in.}\right]$

Void ratio before test, $e_o = \frac{H - H_s}{H_s}$

Void ratio after test, $e_f = \frac{H_f - H_s}{H_s}$

Initial degree of saturation, percent, $S_o = \frac{H_{wo}}{H - H_s} \times 100$

Final degree of saturation, percent, $S_f = \frac{H_{wf}}{H_f - H_s} \times 100$

Dry density before test, $\gamma_d = \frac{W_s}{H \times A} = \left[\frac{W_s \times 62.4}{H \times A \times 2.54} \text{ lb per cu ft}\right]$

where

- W_s = weight of dry soil, g
- A = area of specimen, sq cm
- G_s = specific gravity of solids
- γ_w = unit weight of water, g per cc
- H = height of specimen, in.
- H_f = height of specimen at end of test = $H - \Delta H$, in., where ΔH is the net change in height of specimen

---

† Equations in brackets are based on units of measurements shown in explanation of symbols.

H_{wo} = original height of water = $\frac{W_{wo}}{A \times \gamma_w} = \left[\frac{W_{wo}}{A \times 1 \times 2.54} \text{ in.}\right]$ where

W_{wo} = weight of water in specimen before test, g

H_{wf} = final height of water = $\frac{W_{wf}}{A \times \gamma_w} = \left[\frac{W_{wf}}{A \times 1 \times 2.54} \text{ in.}\right]$ where

W_{wf} = weight of water in specimen after test, g

The purpose of computing the degree of saturation at the beginning and end of the test is to obtain a check on the accuracy of the data observed and recorded. An appreciable variation from 100 percent in the computed degree of saturation at the beginning of the test for specimens that are known to be completely saturated may indicate the presence of gas or air in the specimen, or an error in the data or computations.

b. From data sheet (Plate VIII-2) or from dial reading-time plots (Plate VIII-3), obtain the final dial reading for each load increment that corresponds to the selected time interval (usually 24 hr) and record these values on the data sheet (Plate VIII-4). On the same data sheet record the dial reading correction. The dial reading correction is the dial reading corresponding to the deformation of the apparatus for each load, and is obtained from a calibration curve for the apparatus as described in paragraph 3. The height of voids, H_v, corresponding to any given load is equal to the initial height of voids ($H - H_s$) minus the corrected dial reading (ΔH). The change in height of the specimen is equal to the accumulative change of the corrected dial readings. Compute the void ratios of the specimen corresponding to different load increments. The void ratio is numerically equal to the height of the voids divided by the height of solids.

7. PRESENTATION OF RESULTS. The results of the consolidation

tests shall be shown on the report forms, Plates VIII-3 and VIII-5. The data shall be shown graphically in terms of time-consolidation curves in the form shown as Plate VIII -3 and in terms of void ratio -pressure curves in the form shown as Plate VIII-5. To obtain the void ratio-pressure curve, the void ratio, e, is plotted on the arithmetic scale (ordinate) and the corresponding pressure, p, in tons per square foot on the logarithmic scale (abscissa) as shown in Figure 6. The overburden pressure, p_o, preconsolidation pressure, p_c, and compression index, C_c, shall be determined and shown on the report form (Plate VIII-5). The determinations of the preconsolidation and overburden pressures of a soil are normally made by design engineers; procedures are

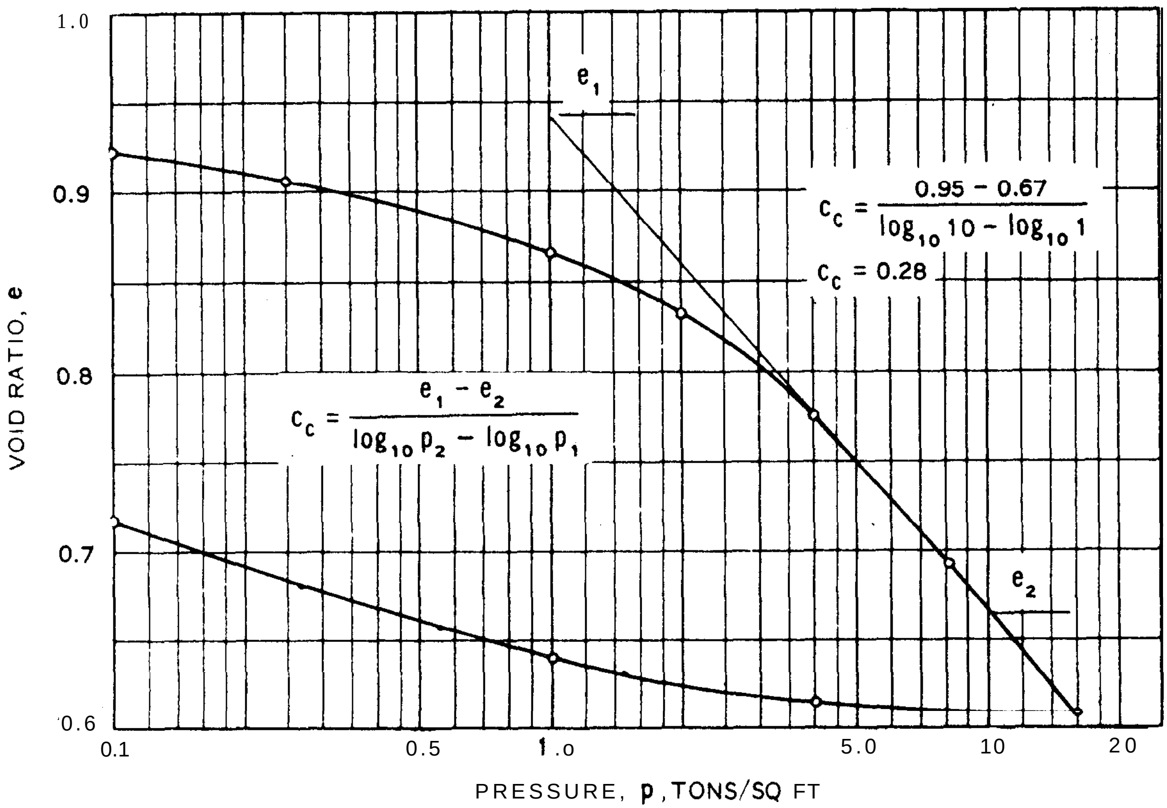


Figure 6. Void ratio-pressure curve

discussed in detail in EM 1110-2-1904, Settlement Analysis.

The slope of the straight-line portion of the pressure-void ratio curve on a semilogarithmic diagram is known as the compression index, C_c. The compression index is defined by the equation

$$C_c = \frac{e_1 - e_2}{\log_{10} p_2 - \log_{10} p_1}$$

where p_1 and p_2 are selected pressures from the straight-line portion of the curve, and e_1 and e_2 are the corresponding void ratios. The compression index is a measure of the compressibility of a soil. An example of the computation of C_c is shown in Figure 6. For simplification, p_2 is often chosen to be 10 times p_1, in which case the denominator becomes unity.

If permeability tests are performed in conjunction with the consolidation test (see Appendix VII, PERMEABILITY TESTS), the coefficient of permeability for each load increment shall also be plotted in the form shown as Plate VIII -5.

A brief description of undisturbed specimens should be given on the report form. The description should include color, approximate consistency, and any unusual features (such as stratification, fissures, shells, roots, sand pockets, etc.). For compacted specimens, give the method of compaction used and the relation to maximum density and optimum water content.

8. POSSIBLE ERRORS. Following are possible errors that would cause inaccurate determinations of consolidation characteristics:

a. Specimen disturbance during trimming. As in all laboratory determinations of the engineering properties of undisturbed soils, the largest errors are caused by changing the natural structure of the soil while preparing the test specimen; disturbance will affect the time-deformation relation and will obscure the preconsolidation pressure.

Trimming must be done in the humid room with every care taken to minimize the disturbance. Since the zone of disturbance caused by trimming a given soil is essentially constant in depth, the effect of this zone can be reduced by using a larger specimen.

b. Specimen not completely filling ring. The volume of the specimen must be exactly that of the consolidation ring, otherwise there will not be complete lateral confinement.

c. Galvanic action in consolidometer. To prevent changes in the consolidation characteristics of the specimen due to galvanic currents, all metal parts of the consolidometer should be of the same noncorrosive material; it is preferable that all such parts be made of plastic.

d. Permeability of porous stones too low. The measured rate of consolidation can be markedly affected by the permeability of the porous stones. The stones should be cleaned after every test to remove embedded soil particles.

e. Friction between specimen and consolidation ring. Tests have shown that over 20 percent of the load applied to a specimen can be lost by side friction in a fixed-ring consolidometer and about one-half this amount in a floating-ring consolidometer.† The effect of side friction can be reduced by (1) using a larger diameter specimen, (2) using a thinner specimen, and (3) lining the consolidation ring with Teflon.

f. Inappropriate load increment factor. Depending on the purpose of the test, a load increment factor of 2.0 (that is, of doubling the total load by each load increment) may not be satisfactory; for example, to sharply define the preconsolidation pressure, a factor of 1.50 or even 1.25 may be better.

g. Unsatisfactory height (or thickness) of specimen. The height of the specimen will determine how clearly can be detected the break in

† D. W. Taylor, Research on the Consolidation of Clays, Serial 82, Department of Civil and Sanitary Engineering, Massachusetts Institute of Technology (Cambridge, Mass., 1942).

the time-consolidation curve that represents completion of primary consolidation. Depending on the character of the soil, if the specimen is too thin, the time to 100 percent consolidation may be too rapid, while if too thick, the break in the curve may be obscured by secondary compression. Also, when a load increment factor smaller than 2.0 is used, the thickness of the specimen may have to be increased to cause enough deformation during primary consolidation to define the break in the curve.

CONSOLIDATION TEST
(Specimen Data)

Date ____________

Project ____

Boring No. ____________________ Sample No. ____________________

Classification

			Before Test				After Test	
			Specimen		Trimmings		Specimen	
Tare No.			Ring and plates					
Weight in grams	Tare plus wet soil							
	Tare plus dry soil							
	Water	W_w	W_{wo}				W_{wf}	
	Tare							
	Dry soil	W_s						
Water content		w	w_o	%	%		w_f	%

Consolidometer No.		Area of specimen, A, sq cm	
Weight of ring, g		Height of specimen, H, in.	
Weight of plates, g		Sp gr of solids, G_s	

Height of solids, $H_s = \frac{W_s}{A \times G_s \times \gamma_w} = \frac{\qquad}{\quad \times \quad \times 1 \times 2.54} =$ in.

Original height of water, $H_{wo} = \frac{W_{wo}}{A \times \gamma_w} = \frac{\qquad}{\quad \times 1 \times 2.54} =$ in.

Final height of water, $H_{wf} = \frac{W_{wf}}{A \times \gamma_w} = \frac{\qquad}{\quad \times 1 \times 2.54} =$ in.

Net change in height of specimen at end of test, $\Delta H =$ in.

Height of specimen at end of test, $H_f = H - \Delta H =$ in.

Void ratio before test, $e_o = \frac{H - H_s}{H_s} = \frac{\qquad}{\qquad} =$

Void ratio after test, $e_f = \frac{H_f - H_s}{H_s} = \frac{\qquad}{\qquad} =$

Degree of saturation before test, $S_o = \frac{H_{wo}}{H - H_s} = \frac{\qquad}{\qquad} =$ %

Degree of saturation after test, $S_f = \frac{H_{wf}}{H_f - H_s} = \frac{\qquad}{\qquad} =$ %

Dry density before test, $\gamma_d = \frac{W_s}{H \times A} = \frac{\quad \times 62.4}{\quad \times \quad \times 2.54} =$ lb/cu ft

Remarks ____

____

Technician ____________ Computed by ____________ Checked by ____________

ENG FORM 1 JUN 65 3847

PLATE VIII-1

CONSOLIDATION TEST

(Time-Consolidation Data)

Date ____________________

Project ____

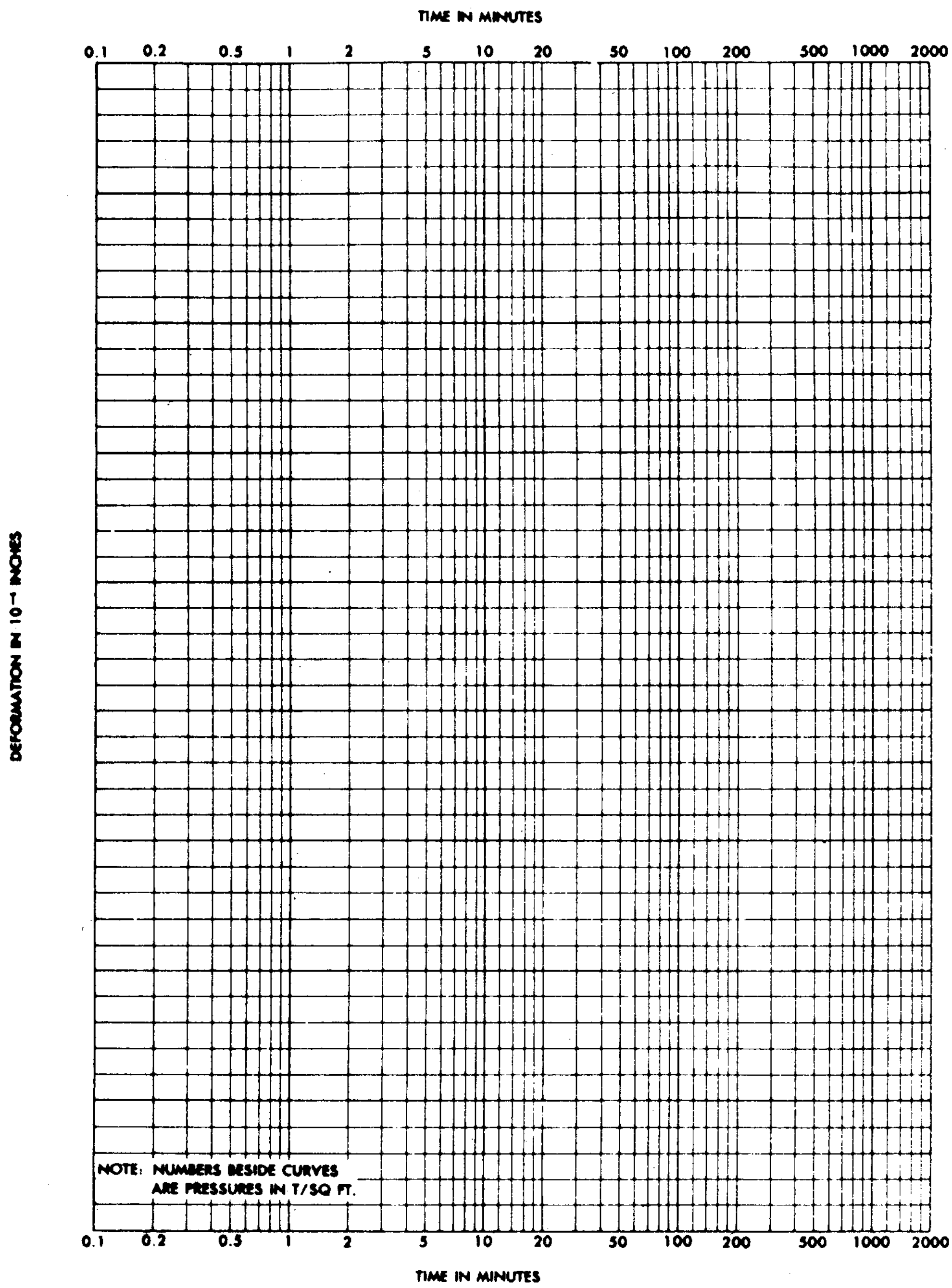
Boring No. ____________________ Sample No. ______________ Consol. No. ______________

Date and Pressure	Time	Elapsed Time, min	Dial Rdg. 10^{-4} in.	Temp. °C	Date and Pressure	Time	Elapsed Time, min	Dial Rdg. 10^{-4} in.	Temp. °C

Technician ____________________

ENG FORM 1 JUN 65 3848

PLATE VIII-2



PROJECT			
AREA			
BORING NO.	SAMPLE NO.	DEPTH EL	DATE

ENG FORM 2088 1 MAY 63 — PREVIOUS EDITIONS ARE OBSOLETE.

CONSOLIDATION TEST—TIME CURVES (TRANSLUCENT)

PLATE VIII-3

* GPO : 1964 OF—713-968

CONSOLIDATION TEST

(Computation of Void Ratios)

DATE ____________

PROJECT ____________

BORING NO. ____________ SAMPLE NO. ____________ CONSOLIDOMETER NO. ____________

Pressure, p T/sq ft	Date Increment Applied	Time in Min Increment Effective	Dial Reading 10^{-4} in.	Correction 10^{-4} in.	Change in Height, ΔH 10^{-4} in.	Height of Voids, H_v 10^{-4} in.	Void Ratio, e

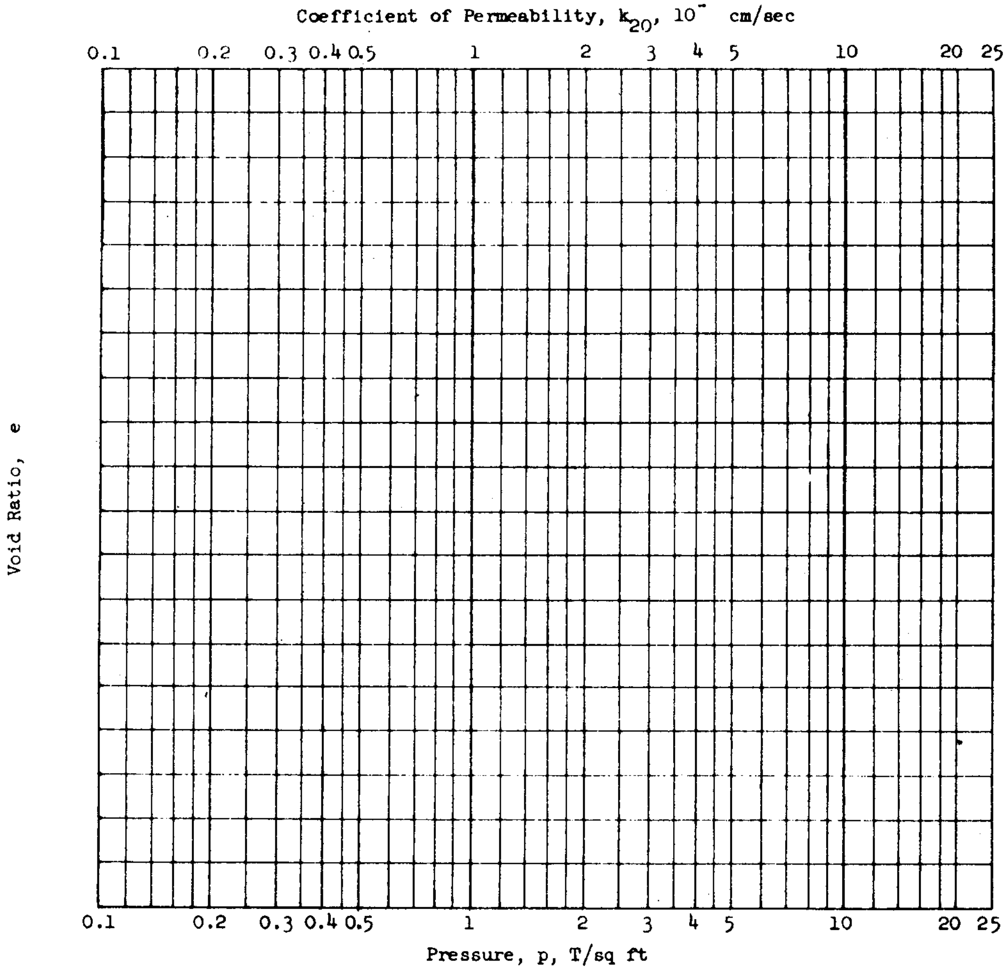
Note:

Height of voids, $H_v = (H - H_s) - \Delta H =$

Void ratio, $e = \frac{H_v}{H_s}$

TECHNICIAN ____________ COMPUTED BY ____________ CHECKED BY ____________

ENG FORM 1 JUN 65 3849



Type of Specimen		Before Test		After Test	
Diam in.	Ht in.	Water Content, w_o	%	w_f	%
Overburden Pressure, p_o T/sq ft		Void Ratio, e_o		e_f	
Preconsol. Pressure, p_c T/sq ft		Saturation, S_o	%	S_f	%
Compression Index, C_c		Dry Density, γ_d	lb/ft^3		
Classification		k_{20} at e_o = $\times 10^{-}$ cm/sec			
LL	G_s	Project			
PL	D_{10}				

Remarks	Area
	Boring No. / Sample No.
	Depth El / Date
	CONSOLIDATION TEST REPORT

ENG FORM 1 MAY 63 2090 PREVIOUS EDITIONS ARE OBSOLETE. *(TRANSLUCENT)*