Standards Buyers Guide

ASTM C 29

GW-135 Portable Bench Beam Balance, 131 lb
Or GW-34413 Electronic Bench Scale, 200 lb
C-353 Tamping Rod, 5/8" dia
G-29202 Scoop
G-170 Thermometer, General Purpose

Choose unit weight bucket based on aggregate size
C-601 Unit Weight Bucket, 1/10 cu ft
C-603 Unit Weight Bucket, 1/3 cu ft
C-605 Unit Weight Bucket, ½ cu ft
C-609 Unit Weight Bucket, 1 cu ft

Choose Strike Off Plate
C-61130 Strike Off Plate, 10 x 10 in
C-61150 Strike Off Plate, 12 x 12 in
C-61190 Strike Off Plate, 16 x 16 in, ½ in thick, acrylic

ASTM C 31

Making & Curing Concrete Test Specimens in the Field
Choose appropriate size molds
C-209 Lipped Concrete Mold, 6 x 12
C-20910 Plastic Lids for Lipped Molds, 6 x 12
C-210 Plastic Cylinder Molds for 6 x 12
C-212 Domed Lids for C-210
C-215 Plastic Cylinder Mold, 3 x 6
C-21510 Flat Lid for 3 x 6 Molds
C-218 Plastic Cylinder Mold, 2 x 4
C-21810 Flat Lids for 2 x4 Molds
C-220 Plastic Cylinder Mold, 4 x8
C-221 Domed Lids for 4 x 8 mold
(see ASTM C 470 for devices needed to verify molds)

Choose Beam Mold
C-231 Steel Beam Mold, 6x6x20
C-234 Plastic Beam Mold, 6x6x21
C-233 Beam Mold Field Cover
C-345 Concrete Vibrator
C-540 Pocket Tachometer

Choose Accessories
G-510 Rubber Mallet
C-352 Graduated Tamping Rod 5/8"
C-353 Tamping Rod, 5/8"
C-357 Tamping Rod (Puddling), 3/8" x 12"
G-161 Pocket Dial Thermometer
G-15910 Armored Case Concrete Thermometer
C-252 Field Curing Box
Economy Curing Box
Transport Rack
Thermostatically Controlled Heater
G-180 Max-Min thermometer
Or G-180E Electronic Max Min Thermometer, two channel
Also needed: wheel barrow, concrete trowel, and items to perform slump, and air content.

ASTM C 39

Compressive Strength of Cylindrical Concrete Specimens
Select load frame of appropriate load capacity
CM-200 300,000 lb capacity w/ single readout
CM-216 300,000 lb capacity w/ advanced readout
CM-400 500.000 lb capacity w/ single readout
CM-416 500,000 lb capacity w/ advanced readout
The above come with platens for 6 x 12 cylinders. Select appropriate Platen sets if other size cylinders are to be tested.
C-18040 Cube Platen Set, 2" specimens
C-18060 Platen set for 3x6 cylinders
C-18070 Platen Set for 4 x 8 cylinders
C-170 Flexural Beam Test Attachment
301110 Splitting Tensile Strength Bar
(Note: On site calibration of load frames required upon delivery and anytime load frame is moved.)

ASTM C 40 AASHTO T 21

Organic Impurities in Fine Aggregates for Concrete
C-404 Organic Impurities Test Set
Consist of:
C-405 16 oz Graduated Glass Test Bottle (6)
C-410 Color Standards Chart
C-415 Sodium Hydroxide Beads, 1 lb container

ASTM C 42

Obtaining and Testing Drilled Cores and Sawed Beams of Concrete Coring Drills
C-822 Trailer Mounted Coring Drill
C-752 Portable Electrical Core Drill
C-820 Portable Gasoline Core Drill

Concrete Core Bits
C-71042 4 1/4 OD x 4 ID Diamond Core bit, Closed Back
C-71062 6 1/4 OD x 4 ID Diamond Core bit, Closed Back
(note other sizes and open back bits available)

ASTM C 70

C-424 Chapman Specific Gravity Flask
GW-115 Triple Beam Balance, 2610 gram
Or GW-342 Dual Range Electronic Balance

ASTM C 78

Flexural Strength of Concrete
C-16001 Flexural Load Frame
Or CM-216 300,000 lb load Frame
And C-170 Flexural Beam Attachment
G-193 Dial Caliper, 0-12"

ASTM C 87

Effects of Organic Impurities in Fine Aggregate on Strength of Mortar

C-248 Flow Table, Manual, with mold
Or C-24810 Flow Table, Motorized, with mold
C-24805 Flow Calipers
C-235 Cube Mold, 2" square, 3 gang
C-238 Rubber Tamper
G-296 Trowel
Compression Machine with cube platens (see ASTM C 39)
G-250 Mortar Mixer

ASTM C 109

Compressive Strength of Hydraulic Cement Mortars using 2" Cube Specimens

C-235 Cube Mold, 2" Square, 3 Gang, Bronze
GW-115 Triple Beam Balance, 2610 gram x 0.1 gram
Or GW-342 Dual Range Electronic Balance
G-37125 Graduated Cylinder, Plastic, 250 ml
G-37150 Graduated Cylinder, Plastic, 500 ml
G-250 Mortar Mixer
C-238 Hard Rubber Tamper
G-296 Trowel, 2 ¾" x 5 ½" , Triangular
C-248 Flow Table, Manual, w/ Mold
Or C-24810 Flow Table, Motorized, with Mold
G-29201 Scoop, Small
C-401 Cube Test Sand, 50 lb bag

ASTM C 117

Materials Finer than # 200 Sieve in Mineral Aggregates by Washing

GW-115 Triple Beam Balance, 2610 gram x 0.1
Or GW-342 Dual Range Electronic Balance
PCF-80016 Brass Sieve, 8" dia, # 16 ss mesh
P-404 Wet Wash Sieve, 8" dia, by 4" deep
Or P-40410 Wet Wash Sieve, 8' dia x 4", with backup
G-30014 Pan, Stainless Steel, 13.5" dia x 5" deep
GO-220 Oven, Forced Draft, 7.0 cu ft
Or GO-216 Oven, Gravity Convection, 2.0 cu ft
P-620 Aggregate Wash Drum

ASTM C 127

Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate

GW-30315 Electronic Balance, 12,000 x 0.1 gram
With weight below capability
C-625 Density Wire Basket
A-532 Water Tank, 45 gallon
PCF-80004 Brass Sieve, 8" dia, # 4 ss mesh

ASTM C 128

Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregates

GW-115 Triple Beam Balance, 2610 gram
Or GW-342 Electronic Dual Range Balance
G-29151 Volumetric Flask, 500 ml
S-292 Specific Gravity and Absorption Set
Consist of:
S-29220 Pycnometer, 1 qt capacity
S-29250 Sand Absorption Cone
S-29290 Tamper
C-425 Le Chatelier Density Flask
G-170 General Purpose thermometer

ASTM C 131

Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

C-658 LA Abrasion Machine
Or C-660 Enclosed LA Abrasion Machine
C-66020 Abrasion Charges, set of 12
Ovens, Scales, sieves and handling pans also required.

ASTM C 136

Sieve Analysis of Fine and Coarse Aggregates

P-260/261/262 Screen Shaker
With appropriate size screen trays
P-220 Portable Sieve Shaker, 8"
Or P-231/240 Ro-Tap Sieve Shaker, 8" / 12"
Or P-200/210 Laboratory Sieve Shaker, 8"/12"
With appropriate size sieves
P-410/411/412/413 Sieve Brushes
Ovens, Scales, sample splitters, and handling pans also required

ASTM C 138

Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

GW-135 Platform Balance, 131 lbs x 0.01 lb
Or GW-34413 Electronic Bench Scale, 200 lb
C-352 Tamping Rod, Graduate, 5/8"
Or C-353 Tamping Rod, 5/8"

Choose unit weight bucket based on aggregate size
C-601 Unit Weight Bucket, 1/10 cu ft
C-603 Unit Weight Bucket, 1/3 cu ft
C-605 Unit Weight Bucket, ½ cu ft
C-609 Unit Weight Bucket, 1 cu ft

Choose Strike Off Plate
C-61130 Strike Off Plate, 10 x 10 inches
C-61150 Strike Off Plate, 12 x 12 inches
C-61190 Strike Off Plate, 16 x 16 in, ½ in thick, acrylic
G-510 Rubber Mallet
(Note: C-345 Vibrator required if slump is 1" or less)

ASTM C 143

Slump of Hydraulic-Cement Concrete

C-350 Slump Cone Test Set
Includes:
C-335 Slump Cone
C-351 Aluminum Base Plate
C-352 Graduated Tamping Rod
G-29202 Scoop
C-354 Funnel, Slump Cone
C-356 Plastic Slump Cone
(Note: Tape Measure or stiff ruler, wheel barrow or G-30009 Material Handling Pan also needed)

ASTM C 151

Autoclave Expansion of Portland Cement

C-254 Cement Mortar Autoclave
C-24520 Test Specimen Holder (holds 8)
C-24550 Length Comparator
C-24557 Contact Points
C-24541 Single Bar Mold, 1x1x10 in
C-24542 Dual Bar Mold, 1x1x10in
G-296 Triangular Trowel

ASTM C 173

Air Content of Freshly Mixed Concrete by the Volumetric Method

Select the Volume Meter:
C-440 Roll-A-Meter, Bonze
C-440A Light weight, Air Volume Meter, Aluminum
C-445 Air Volume Meter, Plastic
(accessories required for all three models of Volume Meters)
G-29202 Scoop
G-510 Rubber Mallet

ASTM C 231

Air Content of Freshly Mixed Concrete by the Pressure Method

Select the Air Meter
C-435 Press-UR-Meter w/ wood case
C-435A Air Meter with Plastic case
G-510 Rubber Mallet
G-29202 Scoop

Optional Equipment
C-44201 Calibration Vessel (canister), 5%

ASTM C 403

Time of Setting of Concrete Mixtures by Penetration Resistance

C-241 Mortar Penetrometer
G-170 General Purpose Thermometer
C-353 Tamping Rod, 5/8"
G-380 series Pipettes
Sample containers, and handling pans also required

ASTM C 490

Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete

C-24550 Length Comparator
C-24557 Contact Points
C-24541 Single Bar Mold, 1x1x10 in
C-24542 Dual Bar Mold, 1x1x10in

ASTM C 496

Splitting Tensile Strength of Cylindrical Concrete Specimens

301110 Splitting Bar, 12 x 12 x 3 in
G-191 Concrete Micrometer, 5.5 to 6.5 in.
Compression machine to meet ASTM C 39 required
Bearing strips of 1/8" plywood, 1" wide required

ASTM C 511

Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes

C-250 Humidifier
C-252 Curing Tank
C-255 Heater, Curing Tank
C-256 Submersible Circulating Pump
G-184/185 Temperature Recorder
C-252 Concrete Curing Box

ASTM C 535 AASHTO T 96

C-658 LA Abrasion Machine
Or C-660 Enclosed LA Abrasion Machine
C-66020 Abrasion Charges, set of 12
Ovens, Scales, sieves and handling pans also required.

ASTM C 597

Pulse Velocity Through Concrete

C-561 Ultrasonic Concrete Testing System
Related items:
C-561220 Handheld Terminal
C-56130 Coupling Grease

ASTM C-617

Capping Cylindrical Concrete Specimens

G-29105	Stainless Steel Capping Ladle
G-153	Thermometer

Select capping fixture of appropriate size

C-275	Vertical Cylinder Capping Fixture, 6”
C-27510	Vertical Cylinder Capping Fixture, 4”
C-27520	Vertical Cylinder Capping Fixture, 3”

Select Warming Pot of suitable capacity

GO-230	Warming Pot, 4 qt
GO-231	Warming Pot, 8 qt
GO-232	Warming Pot, 12 qt
GO-23220	Warming Pot, 20 qt

Select type of capping compound

C-280	Capping Compound, powder
C-282	Capping Compound, Hi Strength flakes

Cube molds to verify strength of capping compound

C-235	Cube mold, 2”, 3 gang
C-23510	Cover Plate, 3 hole, Cube Mold

ASTM C-803

Penetration Resistance of Hardened Concrete

C-510	Windsor Probe Test System
C-520	Silver Probe Kit, 3 probes / set
C-530	Gold Probe Kit, 3 probes / set

ASTM C-805

Rebound Number of Hardened Concrete

C-500	Concrete Test Hammer
	Includes: rubbing stone and carrying case
Or C-505	Digital Concrete Test Hammer

Accessories and replacement parts

C-50010	Rubbing Stone
C-50020	Calibration Test Anvil

ASTM C-1231 AASHTO T 22

Use of Unbonded Caps in Determination of Compressive Strength of Hardened Concrete Cylinders

C-289	6" Capping Pad Set
C-28904	4" Capping Pad Set
C-28903	3" Capping Pad Sets

(sets include 2 steel receivers and 2 pads, Durometer 60)

Replacement Items

C-288	6" Steel Receivers, set of 2
C-293	6" Capping Pads, pair, soft
C-294	6" Capping Pads, pair, medium
C-295	6" Capping Pads, pair, hard
C-28804	4" Steel Receivers, set of 2
C-28705	4" Capping Pads, pair, medium
C-28706	4" Capping Pads, pair, hard
C-28803	3" Steel Receivers, set of 2
C-28701	4" Capping Pads, pair, soft
C-28702	4" Capping Pads, pair, medium
C-28703	4" Capping Pads, pair, hard

ASTM D 421 AASHTO T 87, T 146

Dry preparation of soil samples for particle size analysis and determination of soil constants.

P-421	Soil Mortar
P-420	Soil Pestle, rubber tipped
PCF-80004	#4 Sieve, 8 in diameter
PCF-80010	#10 Sieve, 8 in diameter
PCF-80040	#40 Sieve, 8 in diameter
PB-180	Brass Pan
PB-185	Cover
GW-117	Dial O Gram Triple Beam Scale, 2610 g x 0.1 g
GW-11520	Stainless steel scoop and counterweight
Or GW-342	Electronic Balance, Dual Range
P-512	Sample Splitter, 1 in
G-30012	Mixing Pan, Stainless Steel

ASTM D 422 AASHTO T 88

Particle Size Analysis (hydrometer analysis).

GW-l10	Dial O Gram Balance, 310 g x 0.01 g
Or GW-342	Electronic Balance, Dual Range
GW-l17	Dial O Gram Triple Beam Scale, 2610 g x 0.1 g
GW-l1520	Stainless steel scoop and counterweight
S-30020	Stirring apparatus with paddle and cup
S-300	Hydrometer, 151 H
S-301	Hydrometer, 152 H
S 30010	Hydrometer Jar
G-18731	Thermometer, 2 to 80ºC x 0.2
PCF-83000	3 in Sieve, 8 in diameter
PCF-82000	2 in Sieve, 8 in diameter
PCF-81500	1 1/2 in Sieve, 8 in diameter
PCF-81000	1 in Sieve, 8 in diameter
PCF-80750	3/4 in Sieve, 8 in diameter
PCF-80380	3/8 in Sieve, 8 in diameter
PCF-80004	#4 Sieve, 8 in diameter
PCF-80008	#8 Sieve, 8 in diameter
PCF-80010	#10 Sieve, 8 in diameter
PCF-80016	#16 Sieve, 8 in diameter
PCF-80020	#20 Sieve, 8 in diameter
PCF-80030	#30 Sieve, 8 in diameter
PCF-80040	#40 Sieve, 8 in diameter
PCF-80050	#50 Sieve, 8 in diameter
PCF-80060	#60 Sieve, 8 in diameter
PCF-80100	#100 Sieve, 8 in diameter
PCF-80140	#140 Sieve, 8 in diameter
PCF-80200	#200 Sieve, 9 in diameter
PB-180	Brass Pan
PB-185	Cover
P-412	Wire Sieve Brush
P-220	Motorized Sieve Shaker
S-30050	Hydrometer Jar Bath
G-35125	Glass Beaker
G-190	Stop Watch
S-30060	Sodium Hexameta-phosphate, 1 lb
S-30060-5	Sodium Hexametaphosphate, 5 lb

ASTM D 427 AASHTO T 92

Shrinkage factor of soils.
Need: 6" straight edge, glass cup, glass plate, glass plate (see hard copy)

G-387	Evaporating Dish
G-29301	Spatula
S-29510	Monel Shrinkage Dish
G-29520	Crystallizing Dish
G-29530	Prong Plate
G-36025	Graduated Cylinder
S-29540	Mercury, I lb
GW -117	Dial O Grarn Triple Beam Scale, 2610 g x 0.1 g
Or GW-342	Electronic Balance, Dual Range
S-35710	Beveled Straight Edge
S-56028	Brass Plate

ASTM D 558 AASHTO T 134

Standard Method for Moisture-Density Relations of Soil-Cement Mixtures

S-320	4” Compaction Mold
Or S-322	4” Split Compaction Mold
S-310	Standard Proctor Hammer, 5.5 lbs
Or S-335	Mechanical Compaction Hammer
GW-342	Electronic Dual Range Balance
Or GW-115	Triple Beam Balance, 2610 x 0.1 gram
GW-135	Platform Balance, 131 lbs x 0.01 lb
Or GW-34417	Electronic Bench Scale, 50 lbs x 1 gram
S-35710	Straight Edge, beveled
P-47030	Screen Tray, 3” mesh
P-47008	Screen Tray, 3/8” mesh
P-47000	Screen Tray, #4 mesh
G-30014	Round Bowl, SS, 13” x 5”
G-29101	Sampling Spoon
G-296	Triangular Trowel
G-29402	Preparation Knife, large
GC-SC-74	Pan, 13” x 1.9”
GO-220	Oven, Forced Draft
G-316	Moisture Cans, Aluminum

ASTM D 559 AASHTO T 135

Test Methods for Wetting & Drying Compacted Soil Cement Mixtures

S-320	4" Compaction Mold
Or S-322	4" Split Compaction Mold
S-310	Standard Proctor Hammer, 5.5 lbs
Or S-335	Mechanical Compaction Hammer
GW-342	Electronic Dual Range Balance
Or GW-115	Triple Beam Balance, 2610 x 0.1 gram
GW-135	Platform Balance, 131 lbs x 0.01 lb
Or GW-34417	Electronic Bench Scale, 50 lbs x 1 gram
S-35710	Straight Edge, beveled
P-47030	Screen Tray, 3" mesh
P-47008	Screen Tray, 3/8" mesh
P-47000	Screen Tray, #4 mesh
G-30014	Round Bowl, SS, 13" x 5"
G-29101	Sampling Spoon
G-296	Triangular Trowel
G-29402	Preparation Knife, large
GC-SC-74	Pan, 13" x 1.9"
GO-220	Oven, Forced Draft
G-316	Moisture Cans, Aluminum
G-29003	Scratch Brush
G-192	Dial Caliper, 0-6"
G-37125	Glass Graduated Cylinder, 250 ml

Also need sample carriers, trays, moisture room and 6 prong ice pick.

ASTM D 698 AASHTO T 99

Moisture Density relations of soils and soil aggregate mixtures (5.5 lb hammer, 12 in drop)

S-310	Compaction Hammer, 5.5 lb
Or S-335	Mechanical Compaction Hammer
S-320	Compaction Mold, 4 in (Methods A & B)
S-326	Compaction Mold, 6 in (Method C)
S-35710	Beveled Straight Edge
S-329	Sample Ejector
GW-120	Solution Balance, 20 kg x 1 g
Or GW-34417	Electronic Balance, 50 lb x 1 g
GW-115	2610 gram Triple Beam Balance
Or GW-342	Electronic Balance Dual Range
GO-220	Forced Draft Lab Oven
S-35710	Straight Edge
P-47000	Screen Tray #4
P-47008	Screen Tray, ¾”
P-47004	Screen Tray, 3/8"
G-30010	Sample Prep Pan, 24 x 24
G-30015	Stainless Steel Mixing Pan
G-316	Aluminum Moisture Box
G-535	Laboratory Tongs
G-37220	Plastic Graduated Cylinder
G-296	Mixing Trowel
G-29101	Mixing Spoon
G-29202	Scoop
G-341	Water Bottle, 16 oz
G-510	Rubber Mallet
G-29303	Spatula

ASTM D 854 AASHTO T-100

Specific Gravity of Soils

Select Volumetric Flask of appropriate size

S-29111	100 ml Volumetric Flask, Unstoppered
S-29121	250 ml Volumetric Flask, Unstoppered
S-29151	500 ml Volumetric Flask, Unstoppered
S-29120	250 ml Volumetric Flask, Plain Stopper
S-29150	500 ml Volumetric Flask, Plain Stopper
S-29151	One hole rubber stopper for 250 & 500 ml flask

Other items

GW-30312	Electronic Balance, 2100 gram x 0.01 gram
GO-220	Oven, Forced Draft
G-169	Thermometer, -1 to 51 C x 0.1
S-293	Desiccator
G-430	Dessicant, color reactive
GO-235	Hot Plate, 6.26 x 6.25 inches
G-400	Vacuum Pump
GC-MA-194	Vacuum Aspirator

Cooler, Stryrofoam (purchase locally)

S-274	Buckner Funnel Assembly w/ Flask
PCF-80004	#4 Sieve, 8" diameter, Brass w/ss mesh
G-530	High Temperature Cotton Gloves, pair

ASTM D 1140

Amount of Material in Soils Finer than the # 200 Sieve

GW-342	Electronic Balance, Dual Range
P-40410	Wet Wash Sieve # 200 with B/U, 8" x 4" deep
P-40610	Wet Wash Sieve #200, 8" dia x 8" deep
PCF-80040	Brass Sieve, # 40 ss mesh, 8" diam

Other sieve sizes may be necessary based on soil particle size

S-30060	Sodium Hexametaphosphate, 1 lb

ASTM D 1556 ASSHTO T 191

Density of soil in place by the sand cone method.

S-120	Sand Cone Apparatus
S-121	Density Base Plate
S-125	Density Sand, 100 lb, w/ plastic bag
Or 2190-A	Density Sand, 100 lb, paper bag
GW-130	Field Scale, 36 lb x 0.01 lb
GW-115	Triple Beam Scale, 2610 g x 0.1 g
Or GW-50030	Electronic Balance, 15 Kg x 2 Grams
GW-50099	Carrying Case for GW-30030
G-500	Pick Hammer
G-515	Chisel
G-29101	Spoon
G-29001	Brush
G-510	Rubber Mallet
G-310	Field Can
GW-200	Forced Draft Oven
G-316	Aluminum Moisture Cans
G-535	Laboratory Tongs

Note: Field Moisture Contents can be performed by Model S-141 Speedy Moisture Tester, hot plate, or camp stove

ASTM D 1557 AASHTO T 180

Moisture Density relations of soils and soil. aggregate mixtures (10 lb hammer and 18 in drop).

S-311	Compaction Hammer, 10 lb
Or S-335	Mechanical Compactor
S-320	Compaction Mold, 4 in (Methods A & B)
S-326	Compaction Mold, 6 in (Method C)
S-35710	Beveled Straight Edge
S-329	Sample Ejector
GW-120	Solution Balance, 20 kg x 1 g
Or GW-34417	Electronic Balance, 50 lbs x 1 g
GW-115	2610 gram Triple Beam Balance
Or GW-342	Electronic Balance Dual Range
GO-220	Forced Draft Lab Oven
S-35710	Straight Edge
P-47000	Screen Tray #4
P-47008	Screen Tray, ¾"
P-47004	Screen Tray, 3/8"
G-30010	Sample Prep Pan, 24 x 24
G-30015	Stainless Steel Mixing Pan
G-316	Aluminum Moisture Box
G-535	Laboratory Tongs
G-37220	Plastic Graduated Cylinder
G 296	Mixing Trowel
G 29101	Mixing Spoon
G-29202	Scoop
G-341	Water Bottle, 16 oz
G-510	Rubber Mallet
G-29303	Spatula

ASTM D 1558

Moisture Content Penetration Resistance Relationships of Fine-Grained Soils

S-172	Proctor Penetrometer Set
GW-347	Electronic Bench Scale, 110 lbs x 0.05 lbs

Items to perform ASTM D 698 also needed.

Download datasheets, manuals, and technical notes from www.durhamgeo.com

ASTM D 1883 AASHTO T 193

CBR (California Bearing Ratio of laboratory compacted soils)

S-350 CBR Lab Set
Which Contains
S-327 (4) CBR Mold, 6" I.D.
S-32710 (1) CBR Spacer DisK, 2.416 thick
S-359 (1) CBR Filter Paper
S-352 (4) Filter Screens, #100 brass
S-353 (4) Swell Plates, 5 7/8" diameter
S-354 (1) Aluminum Tripod
E-814 (1) Dial Indicator
S-355A (4) Surcharge Weight, Circular
S-356A (4) Surcharge Weight, slotted
S-311 (1) Compaction Hammer
S-35710 (1) Straight Edge with Beveled Edge

Sample Preparation Equipment which is the same as equipment needed for ASTM D698 and D1557 listed above

S-329 Sample Ejector
GW-120 Solution Balance, 20 kg x 1 g
Or GW-34417 Electronic Balance, 50 lbs x 1 g
GW-115 2610 gram Triple Beam Balance
Or GW-342 Electronic Balance Dual Range
GO-220 Forced Draft Lab Oven
S-35710 Straight Edge
P-47000 Screen Tray #4
P-47008 Screen Tray, ¾"
P-47004 Screen Tray, 3/8"
G-30010 Sample Prep Pan, 24 x 24
G-30015 Stainless Steel Mixing Pan
G-316 Aluminum Moisture Box
G-535 Laboratory Tongs
G-37220 Plastic Graduated Cylinder
G-296 Mixing Trowel
G-29101 Mixing Spoon
G-29202 Scoop
G-341 Water Bottle, 16 oz
G-510 Rubber Mallet
G-29303 Spatula

Load Frame, Either Mechanical or Manual

S-360 Manual CBR load frame, w/ Penetration Piston
S-610 Mechanical Load Frame
And Either
S-61020 Mechanical CBR Accessory Set
Or S-61025 Electronic CBR Accessory Set

Note: The S-611 offers automated Load Frame, data collection and report preparation

ASTM D 2166

Unconfined compressive strength of soil.

S-611 &S-61130 Automated UCC Load Frame, Electronic Accessories, and software
Or S-610 Mechanical Load Frame
And either
S-61030 Mechanical Accessory Set
Or S-61035 Electronic Accessory Set
G-190 Stop Watch
GW-117 Dial-O-Gram Triple Beam Scale, 2610 g x 0. 1 g
Or GW-342 Dual Range Electronic Balance
G-192 Dial Caliper, 0-6"
Or G-194 Digital Caliper, 0-12"
S-240 Sample Extruder for Shelby Tubes, full length
Or S-329 & Sample Ejector
S-32922 Accessory Set for 3 in Shelby tubes
S-57428 Miter Box
S-57628 Trimming Device
G-29402 Large Preparation Knife
G-295 Open Wire Saw

Note: If remolded samples are needed then add
S-57729 Compaction Mold, 2.875 x 6"
S-57728 2.8" Gauge Block
S-577 Sliding Weight Hammer

Equipment to perform D 2216 Moisture Content of Soils is also needed

ASTM D 2167 AASHTO T 205

Density and unit weight of soil in place by the rubber balloon method.

Balloon Density Apparatus Choose either S 130, S 132, or S 133.

S-130 1/20 ft^3
S-132 1/13 ft^3
S-133 1/10 ft^3
GW-130 Field Scale, 36 lb x 0.01 lb
GW-115 Triple Beam Scale, 26 10 g x 0. 1 g
G-310 Field Can
G-500 Pick Hammer
G-515 Chisel
G-29101 Mixing Spoon, stainless
G-29001 Dusting Brush
G-510 Rubber Mallet
GW-200 Forced Draft Oven
G-316 Aluminum Moisture Cans
G-535 Laboratory Tongs

Note: Field moisture contents can be determined by Model S-141 Speedy Moisture Tester, hot plate, or camp stove

ASTM D 2168

Calibration of Laboratory Mechanical-Rammer Soil Compactor

S-33020 Calibration Kit
S-33050 Lead Calibration Cylinders, 100/ pk

ASTM D 2216 AASHTO

Water Moisture Content of Soil and Rock

GO-220	Forced Draft Oven, 7.0 ft^3 (recommended)
Or GO-216	Gravity Convection Oven, 2.0 ft^3
GW-342	Electronic Balance, Dual Range
Or GW-115	Triple Beam Balance, 2610 gram x 0.1
And GW -110	Dial-O-Gram Balance, 310 gram x 0.01
G-316	Aluminum Moisture containers, with lids
S-293	Dessicator
Or S-29350	Dessicator Cabinet
G-340	Desiccant, 5 lb container, color reactive
G-530	Gloves, High Temperature, Cotton
G-535	Laboratory tongs
G-29401	Knife, Sample Preparation
G-29302	Spatula, medium
LT-98	Quartering Canvas
P-512	Sample Splitter, Riffle type, 1" chutes

ASTM D 2434 ASHTOO T-215

Permeability of Granular Soils

S-488	Constant Head Tank and Wall Mounted Manometer

Select Cell Based on sample particle size

S-48625	Sand Gravel Permeameter, 2.5”
S-486	Sand Gravel Permeameter, 3.0” (most popular)
S-48645	Sand Gravel Permeameter, 4.5”
S-48660	Sand Gravel Permeameter, 6.0”
S-48090	Sand Gravel Permeameter, 9.0”
GC-MA-194	Vacuum Aspirator
Or G-400	Vacuum Pump
S-577	Sliding Weight Hammer
G-29201	Scoop, Small
G-170	Thermometer, General Purpose
G-36125	Glass Graduated Cylinder, 250 ml
Or G-37125	Plastic Graduated Cylinder, 250 ml
G-30015	Stainless Steel Bowl, 17” x 6”
G-190	Stop Watch
GW-115	Triple Beam Balance, 2610 x 0.l gram

ASTM D 2435 AASHTO T-216

One dimensional consolidation properties of soil.

Select either a Pneumatic Load Frame.

S 450	Terraload Consolidation Device
S 45040	Digital Transducer Readout matched with 150 psi Pres-sure Transducer
G-410	Laboratory Air Compressor
TR-738	Air Filter, Regulator Assembly

Or a Dead Weight Load Frame

S-449	Dead Weight Load Frame
S-44901	Weight set, 16 TSF

Other weight sets available, see catalog description

And Select either a Floating ring

S-453	Floating Ring Consolidometer

Or a Fixed Ring Consolidometer

S-455	Fixed Ring Consolidometer

Select a Measuring device, dial gauge or electronic

E-805	Dial Indicator, 0.4 in x 0.0001 in and flat tips
Or E-405	Smart Digital Transducer Readout with a
E-310	Linear displacement Transducer, 0.5 x 0.0001 in
E-344	LDT Mount Bracket or E-342

Displacement Transducer mounted to Dial Indicator

Other Items

S45599	Calibration Disk
G-29402	Preparation Knife
G-295	Wire Saw
S-359	Filter Paper, cut to size
GW-342	Electronic Dual Range Balance

Equipment to perform ASTM D 2216 also needed

ASTM D 2850 AASHTO T-296

Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils

S-600	Triaxial Load Frame
Or S-6100E	Load Frame, 0.005 to 0.200 speed range
E-212	Load cell, 2,000 lb capacity
E-405	Digital Readout calibrated to E-212
S-500	Panel, 3 burettes for one cell
S-502	Extension Panel, 6 burettes for 2 cells
S-505	Deairing Tank
Or S-530	Nold Deairing Apparatus
S-510	Triaxial Cell with 1.4 and 2.8” accessories
E-814	Dial Indicator, 1.0 inch x 0.001
S-54028	Membranes, 2.8”
S-57028	Membrane Stretcher, 2.8”
S-56128	Glass Fiber Filter Disc, 2.8”
G-5002G	High Vacuum Grease

ASTM D 2850 AASHTO T-296 (continued)

Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils

G-192	Dial Caliper, 0-6”
GW-342	Dual Range Electronic Balance
Or GW-115	Triple Beam Balance, 2610 x 0.1 gram
And GW-110	Dial-O-Gram, 310 x 0.01 gram
G-400	Vacuum Pump
G-410	Laboratory Air Compressor
TR-738	Filter Regulator Assembly
S-57428	Split Mitre Box, 2.8”
G-295	Wire Saw
G-29402	Large Sample Knife
S-35710	Straight Edge, Beveled

Equipment to perform ASTM D 2216 Moisture Content of Soils also needed

Items to extrude sample from Shelby Tube

S-240	Sample Extruder
And S-24030	Sample Tray for S-240 extruder
Or S-329	Sample Ejector
And S-32924	Adaptor Plate and Piston, 2.8”

Items to remold sample (technique will decide actual items)

S-57729	2.875 x 6” Compaction Mold
S-57730	Spacer Plug, 2.85 x 2”
S-57728	Gauge Block
G-510	Rubber Mallet
S-577	Sliding Weight Hammer
S-575	Pneumatic Kneading Compactor
S-57528	Split Compaction Mold
S-57228	Vacuum Split Mold

Optional and Suggested Spare Items

S-53028	O-rings, pack of 4, 2.8”
S-55028	Porous Stones, 2.8”,
S-57629	Soil Sample Trimmers, Lathe
And S-57606	2.8” cap for S-57629 Trimmer

ASTM D 2937

Density of Soil in Place by the Drive Cylinder Method

S-104	Density Drive Sampler
S-10230A	Density Drive Tubes, 4" Swaged end

Or Optional S-10230 Drive tubes, straight bevel end

S-35710	Straight Edge
GW-115	Triple Beam Balance, 2610 gram x 0.1
GW-11905	Plastic Carry Case for GW-115
GW-33040	Portable Balance 6000 x 1 gram
GW-33090	Hard Carrying Case for GW-33040

Note: Field moisture determination equipment is also needed. (Such as the S-141 Speed Moisture Tester or Hot plate.)

ASTM D-3385

Infiltration Rate of soils in Field using Double Ring Infiltrometer

S-475	Double Ring Infiltrometer Set
G-189	Digital Stop Watch
G-18731	Thermometer, -2 to 81°C by 0.2°C
G-510	Rubber Mallet
S-110	Hand Auger Set

Other items to be purchased locally including, level, steel tape measure, steel ruler, 2x4 or 4x4 wood, water container.

ASTM D 4318 AASHTO T 89

Liquid Limit, Plastic Limit and Plasticity index of soils.

S-271	Liquid Limit Device with counter
Or S-272	Motorized Liquid Limit Device with counter
S-27510	Plastic Grooving Tool, Set/12
S-275	Metal ASTM Tool with Measuring Block
S-275	AASHTO Wedge Grooving Tool
G-315	Small aluminum Moisture Cans w/ lids
GW-110	Dial-O-Gram Balance, 310 g x 0.01 gram
Or GW-342	Electronic Balance, dual range
Or G W-30312	Electronic Balance, 2100 gram x 0.01 gram
G-386	Evaporating Dish, 4 5/8" diameter
S 27710	Plastic Limit Plate
S-278	Plastic Limit Roller (optional)
S-27801	Adhesive paper for S-278
G 29301	Spatula
PCF-80040	#40 Brass Sieve, 8" dia, ss mesh
G 340	Plastic Dispensing Bottle
C 36110	Graduated Cylinder, 200 ml
G-36025	Graduated Cylinder, 25 ml
GO 200	Forced Draft Oven
G 30012	Stainless steel bowl, 9 in dia.

Equipment necessary to perform ASTM D 2216 also needed

Download datasheets, manuals, and technical notes from **www.durhamgeo.com**

ASTM D 4546

One Dimensional Swell or Settlement Potential of Cohesive Soils

Select either a Pneumatic Load Frame

S-450	Terraload Consolidation Device
S-45040	Digital Transducer Readout matched with 150 psi Pressure Transducer
G-410	Laboratory Air Compressor
TR-738	Air Filter, Regulator Assembly

Or a Dead Weight Load Frame

S-449	Dead Weight Load Frame
S-44901	Weight set, 16 TSF

Other weight sets available, see catalog description

And Select either a Floating Ring

S-453	Floating Ring Consolidometer

Or a Fixed Ring

S-455	Fixed Ring Consolidometer

Select a Measuring device, dial gauge or electronic

E-805	Dial Indicator, 0.4 in x 0.0001 in and flat tips
Or E-405	Smart Digital Transducer Readout with a
E-310	Linear displacement Transducer, 0.5 x 0.0001 in
E-344	LDT Mount Bracket or E-342 Displacement Transducer mounted to Dial Indicator

Other Items

S45599	Calibration Disk
G-29402	Preparation Knife
G-295	Wire Saw
S-359	Filter Paper, cut to size
GW-342	Electronic Dual Range Balance

Equipment to perform ASTM D 2216 also needed

ASTM D-4767 AASHTO T 297

Consolidated Undrained Triaxial Test for Cohesive Soils
See equipment for D-2850 and add

E-124	Pore Pressure Transducer
E-405	Digital Readout for E-124
S-56150	Filter Strips

ASTM D-4829

Expansion Index of Soils

S-441	Expansion Index Consolidometer
E-805	Dial Indicator
S-310	Standard Compaction Hammer
S-35710	Straight Edge, Beveled
PCF-80004	Brass Sieve, 8" dia, # 4 stainless steel mesh
G-29101	Sampling Spoon
G-30014	Stainless Steel Mixing Pan, 13.5 x 5
GO-216	Oven, Gravity Convection
Or GO-220	Oven, Forced Draft

ASTM D-5084

Measurement of Hydraulic Conductivity of Saturated Porous Materials using a Flexible Wall Permeameter

S-500	Panel, 3 burettes for one cell
S-502	Extension Panel, 6 burettes for 2 cells
S-480	Permeability Cell, 2.8"
S-505	Deairing Tank
Or S-530	Nold Deairing Apparatus
S-54028	Membranes, 2.8"
S-57028	Membrane Stretcher, 2.8"
S-56128	Glass Fiber Filter Disc, 2.8"
G-5002G	High Vacuum Grease
G-192	Dial Caliper, 0-6"
GW-342	Dual Range Electronic Balance
Or GW-115	Triple Beam Balance, 2610 x 0.1 gram
And GW-110	Dial-O-Gram, 310 x 0.01 gram
G-170	General Purpose Thermometer
S-57428	Split Mitre Box, 2.8"
G-295	Wire Saw
G-29402	Large Sample Knife
G-400	Vacuum Pump
G-410	Laboratory Air Compressor
TR-738	Filter Regulator Assembly
E-124	Pore Pressure Transducer, 150 psi
E-405	Digital Readout, Calibrated to E-124

Equipment to perform ASTM D 2216 Moisture Content of Soils also needed

Items to extrude sample from Shelby Tube

S-240	Sample Extruder
And S-24030	Sample Tray for S-240 extruder
Or S-329	Sample Ejector
And S-32924	Adaptor Plate and Piston, 2.8"

Items to remold sample (technique will decide actual items)

S-57729	2.875 x 6" Compaction Mold
S-57730	Spacer Plug, 2.85 x 2"
S-57728	Gauge Block
G-510	Rubber Mallet
S-577	Sliding Weight Hammer
S-575	Pneumatic Kneading Compactor
S-57528	Split Compaction Mold
S-57228	Vacuum Split Mold

Optional and Suggested Spare Items

S-53028	O-rings, pack of 4, 2.8"
S-55028	Porous Stones, 2.8",
S-470	Permeant Interface Device
S-57629	Soil Sample Trimmers
And S-57606	2.8" cap for S-57629 Trimmer