

Test Procedure for

SAMPLING AGGREGATE, FLEXIBLE BASE, AND STONE RIPRAP



TxDOT Designation: Tex-400-A

Effective Date: April 2021

1. SCOPE

- 1.1 Use this test procedure for sampling completed stockpiles of coarse and fine aggregate used to produce concrete and retaining wall select backfill, stockpiles of flexible base, and stone riprap. This procedure may also be used to sample concrete aggregate during production when stored in bays or stockpiles that are not accessible in three directions.
- 1.2 Use this test procedure to sample completed coarse or fine aggregate stockpiles and materials using a front-end loader or shovel. The preference for sampling is to use a front-end loader. Only use a shovel where a front-end loader is not available.

2. SAMPLE SIZE

- 2.1 Use Table 1 to determine the minimum sample size to perform the required tests listed in the applicable specification.
- 2.2 Obtain samples that show the true nature and condition of the materials that they represent. Do not combine materials that apparently differ in property or character to make a composite sample. Differences may be indicated by color or texture.
- 2.3 Use a sample splitter or quartering cloth to reduce the field sample to laboratory test size.

Nominal Maximum Size of Aggregate ¹	Minimum Weight of Field Samples ² (lbs.)
No. 8	25
No. 4	25
3/8 in.	25
1/2 in.	35
3/4 in.	55
1 in.	110
1-1/2 in.	165
2 in.	220
2-1/2 in.	275
3 in.	330
Nominal Maximum Size of Flexible Base ¹	Minimum Weight of Field Samples ² (lbs.)
1-3/4 in.	400

- 1. The maximum aggregate size is the largest sieve size listed in the applicable specification upon which any material can be retained.
- 2. The minimum sample mass depends upon the maximum aggregate size as well as the number and type of tests required.

3. SAMPLING PROCEDURES

- 3.1 *This test procedure does not claim to address the safety concerns associated with its use. It is the responsibility of the user of this test procedure to establish the appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*
- 3.2 *Sampling procedure for aggregate from completed stockpiles using a front-end loader.*
- 3.2.1 *Use this procedure to sample completed stockpiles of coarse or fine aggregate using a front-end loader.*
- 3.2.2 *Determine the minimum number of samples required for approval based on TxDOT's Guide Schedule frequency for concrete or retaining wall select backfill.*
- 3.2.3 *Identify the sampling locations by dividing the stockpile in approximately equal sectors based on the number of samples determined from Section 3.2.2. Aggregate must be sampled from a minimum of two sectors or locations for acceptance.*
- 3.2.4 *Clean and level the ground at the sampling location to prevent contamination of the sampling pile.*
- 3.2.5 *Cut approximately at the ground level to the top edge of the stockpile until a clean face is exposed. This represents the full height of the stockpile.*
Note 1-*The exposed vertical face should be perpendicular to the top edge of the stockpile, but this may not be possible with stockpiles of dry, coarse aggregates.*
- 3.2.6 *Discard the material cut away while exposing the clean face.*
- 3.2.7 *Build a sample pad by cutting into the vertical face at the ground level to the full height of the stockpile to obtain material.*
- 3.2.8 *Lower the bucket as close as possible to the ground to avoid segregation and empty the entire contents of the bucket in one motion onto the ground.*
- 3.2.9 *Using the loader bucket, strike and level the sample pad at mid-height in the direction the bucket was emptied to create a flat surface for sampling. Back-drag the sampling pad only once.*
- 3.2.10 *Divide the sample pad into four quadrants of similar size.*
- 3.2.11 *Place clean sample bags or containers near the center of the sampling pad and obtain the sample across the flat area staying more than 1 ft. away from the edges.*
- 3.2.12 *Sample equal amounts of aggregate evenly across each quadrant. Fully insert the shovel as near as vertical as possible and then slowly roll the shovel back and lift slowly to avoid coarse aggregate rolling off the sides of the shovel.*
Note 2-*Spade-tip shovels are not recommended for sampling. Square-tip shovels work well preventing aggregate from rolling from the side.*
- 3.2.13 *Obtain additional shovelfuls from different quadrants of the sampling pad, and in areas avoiding previous shovel holes.*
- 3.2.14 *Place the aggregate into the clean sample bags or containers.*
- 3.2.15 *Seal and label the sample bags or containers.*

- 3.2.16 Repeat Section 3.2.4 to 3.2.15 for each additional location as determined from Section 3.2.3.
- 3.3 *Sampling procedure for aggregate from completed stockpiles using a shovel.*
- 3.3.1 Use this procedure to sample completed stockpiles of coarse or fine aggregate using a shovel where a front-end loader is not available. The preference for sampling is to use a front-end loader.
- 3.3.2 Determine the minimum number of samples required for approval based on TxDOT's Guide Schedule frequency for concrete or retaining wall select backfill.
- 3.3.3 Identify the sampling locations by dividing the stockpile in approximately equal sectors based on the number of samples determined from Section 3.3.2. Aggregate must be sampled from a minimum of two sectors or locations for acceptance.
- 3.3.4 Identify locations within each sector from the top third, at the mid-point, and bottom third of the stockpile. Sampling must be performed in no less than these three increments.
- 3.3.5 Dig a small trench into the stockpile at each location approximately 1 ft. deep and 3 ft. in diameter.
Note 3-A board may be shoved vertically into the stockpile just above the point of sampling to prevent segregation from coarser aggregate rolling down during sampling.
- 3.3.6 Do not use the aggregate removed from the trenched area as a part of the sample.
- 3.3.7 Shovel aggregate from the stockpile into clean sample bags or containers from the innermost part of the trench. Minimize larger sized aggregate falling back into the trench.
Note 4-When sampling sands, sampling tubes of at least 1-1/4 in. diameter may be used where experience has indicated representative samples cannot be obtained otherwise.
- 3.3.8 Seal and label the sample bags or containers.
- 3.3.9 Repeat Section 3.3.4 to 3.3.8 for each additional location as determined from Section 3.3.3.
- 3.4 *Sampling procedure for aggregate when sampling during concrete production at mixing plant/site.*
- 3.4.1 Use this procedure to sample coarse or fine aggregate at concrete mixing plants/sites during production from bays or stockpiles that are not accessible in three directions and for Optimized Aggregate Gradation (OAG) concrete. The preference for sampling is to use a front-end loader. Only use a shovel when a front-end loader is not available.
- 3.4.2 Identify the center of the open face of the aggregate bay.
- 3.4.3 Sample at this location using a front-end loader according to Section 3.2.
- 3.4.4 Sample at this location using a shovel when a front-end loader is not available according to Sections 3.3.
- 3.4.5 Sample at additional locations when the face of the open bay or face of the stockpile is significantly wide. Chose a minimum of two locations approximately equal offset from the center.
- 3.5 *Sampling Procedure for Flexible Base Stockpiles.*
- 3.5.1 Identify **four** locations around the perimeter of the stockpile that represent the approximate quarter-points of the stockpile.

Note 5— When the locations cannot be obtained from around the entire perimeter due to limited space, use four equally spaced locations.

- 3.5.2 Clean and level the ground at these four locations to prevent contamination of the sampling pile.
- 3.5.3 Sample each quarter-point of the stockpile using a front-end loader to cut into each quarter-point.
- 3.5.4 Cut at the ground level to the top edge of the stockpile until a clean vertical face is exposed that is perpendicular to the top edge of the stockpile. This represents the full height of the stockpile.
- 3.5.5 Discard this material cut away while exposing the clean face.
- 3.5.6 Build a sample pad by cutting into the vertical face at the ground level of the full height of the stockpile to obtain material.
- 3.5.7 Lower the bucket as close as possible to the ground to avoid segregation and empty the entire contents of the bucket in one motion onto the ground in one motion.
- 3.5.8 Using the loader bucket, strike and level the sample pad at mid-height in the direction the bucket was emptied to create a flat surface for sampling. Back-drag the sampling pad only once.
- 3.5.9 If material is visually segregated, discard the material and repeat Sections 3.5.6 to 3.5.8.
- 3.5.10 Place clean sample bags or containers near the center of the sampling pad and obtain the sample across the flat area staying more than 1 ft. away from the edges.
- 3.5.11 Divide the sample pad into four quadrants and sample equal amounts of aggregate evenly across each quadrant.
- 3.5.12 Using a square-tip shovel, fully insert the shovel as near as vertical as possible and then slowly roll the shovel back and lift slowly to avoid coarse aggregate rolling off the sides of the shovel.
Note 6—Spade-tip shovels are not allowed for sampling flexible base stockpiles.
- 3.5.13 Obtain additional shovelfuls from different quadrants of the sampling pad, and in areas avoiding previous shovel holes. Remove material from each quadrant to fill one sample bag or container. Minimize loose material falling from the sides of the hole and loss of material from the shovel into the hole or adjacent ground while filling sample bags or containers.
- 3.5.14 Place the aggregate into the clean sample bags or containers.
- 3.5.15 Repeat Sections 3.5.13 to 3.5.15 until a minimum of 100 lbs. of material is sampled from each sample pad.
- 3.5.16 Seal and label the sample bags or containers, and properly secure for transportation to avoid any loss of material.
- 3.5.17 Repeat Sections 3.5.4 to 3.5.16 at each of the stockpile quarter-points to provide a minimum of 400 lbs. of sampled flexible base material.
Note 7—The minimum amount of 400 lbs. of material is representative of the entire stockpile sampled. This minimum amount of material is required for a testing laboratory to perform all the required test procedures for stockpile approval.
- 3.6 *Preparation of Sampled Flexible Base for Testing.*

- 3.6.1 Allow the material to air dry or oven dry at a maximum temperature of 140°F for a minimum of 4 hours until the material is sufficiently dry for handling.
- 3.6.2 Quarter the material by emptying each container or sample bag onto a clean floor or a clean tarp. Optionally, use a mechanical quartering device or sample splitter to quarter the material in accordance with ASTM C702, Method A. Proceed to Section 3.6.6.
- 3.6.3 Thoroughly mix the material using a shovel. When using a tarp, the ends of the tarp may also be used to also mix the material.
- 3.6.4 Spread the material into the shape of a circle of uniform thickness and homogenous with no segregation.
- 3.6.5 Using a shovel or straightedge, visibly trace lines on top of the material to outline four evenly sized quarters.
- 3.6.6 Use a quarter of the sample and proceed to [Tex-101-E](#), Part I to prepare and test the material for gradation ([Tex-110-E](#)); and the liquid limit ([Tex-104-E](#)) and plastic limit ([Tex-105-E](#)) tests to determine the plasticity index ([Tex-106-E](#)).
- 3.6.7 Combine the remaining three quarters with any remaining material from Section 3.4.15 and proceed to [Tex-101-E](#), Part II to prepare the material for Moisture-Density curve ([Tex-113-E](#)), wet ball mill ([Tex-116-E](#)), and compressive strength ([Tex-117-E](#)) testing.
- 3.7 *Sampling Procedure for Stone Riprap.*
- 3.7.1 Obtain six to eight pieces of the stone riprap that is representative of the size of the riprap.
- 3.7.2 Crush or break down the entire sample to a maximum particle size of 6 in.
- 3.7.3 Select approximately 275 lbs. of the riprap and place into sample bags or containers.
- 3.7.4 Seal and label the sample.
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4. ARCHIVED VERSIONS

- 4.1 Archived versions are available.