

# Agresource Applications and Specifications Manual

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**Agresource, Inc.** 800-313-3320

## INTRODUCTION

### What is AGRESOIL COMPOST?

AGRESOIL COMPOST is nutrient-rich, high quality compost made from thermophilic, aerobic decomposition of organic residues under controlled conditions. Different varieties of AGRESOIL COMPOST are made from particular feedstocks that produce certain properties and characteristics. The properties of each compost variety determine its best application.

The specifications in this manual outline ranges for key parameters compost must have to be acceptable for each type of application.

## **PRODUCTION PROCESS: What makes AGRESOIL COMPOST extremely consistent?**

By utilizing advanced composting systems, such as in-vessel agitated bed composting systems, windrow turners, and through advising operations personnel on proper composting procedures, AGRESOIL COMPOST has gained the reputation of being consistently high-quality compost. AGRESOIL COMPOST characteristics vary from one facility to the next, but matching a particular compost to each application is key and producing consistent quality is always important.

Both in-vessel agitated bed composting and use of windrow turners allow for increased control of the aerobic composting process. Skilled professionals are also key in monitoring the composting process and optimizing levels of temperature, moisture and oxygen. After the “active” phase of composting AGRESOIL COMPOST is cured and tested to meet state regulatory standards.

Each specialized process is designed to insure that the finished compost contains the nutrients, organic matter, and beneficial micro-organisms needed to improve plant material growth and health.

## **AVAILABILITY**

Agresource is the leading supplier of compost in the New England. AGRESOIL COMPOST is available in 50-70 cu yd loads and in smaller quantities through a network of distributors. Please call 800-313-3320 for a quote or delivery.

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## **APPLICATION RATES FOR AGRESOIL COMPOST**

### ***TURF ESTABLISHMENT / SOD INSTALLATION / SOIL RENOVATION:***

Incorporate 1 to 3 inches of AGRESOIL COMPOST into the top 4 to 6 inches of soil (3-9 cu yds/1000 sq.ft). Use higher rate for less fertile soil.

### ***TURF MAINTENANCE / TOPDRESSING:***

Broadcast 1/3 inch of AGRESOIL COMPOST (approximately 1 cu yd/1000sqft) on established turf and rake in. For best results aerate soil prior to topdressing.

### ***FLOWER BEDS / GROUND COVERS:***

Mix or rototill 1 to 3 inches of AGRESOIL COMPOST into the soil prior to planting.

### ***TREE AND SHRUB PLANTING:***

Uniformly mix AGRESOIL COMPOST with existing soil and use at a rate of 25% AGRESOIL COMPOST to 75% soil and use as backfill for trees and shrubs.

### ***SHRUB MAINTENANCE / MULCHING:***

Spread AGRESOIL COMPOST 2 to 3 inches thick over planting areas or individual plant pits.

### ***FIELD NURSERY PRODUCTION:***

Incorporate 2 to 3 inches of AGRESOIL COMPOST into the top 4 to 6 inches of soil. Test soil pH levels where ericaceous crops are grown.

### ***POTTING MEDIUMS / CONTAINER PLANTS:***

Custom blend AGRESOIL COMPOST (1/10 to 1/3 by volume) with traditional potting mediums. Water thoroughly after planting.

### ***GOLF COURSES:***

## ***Tee and Green Construction***

Blend 20% AGRESOIL COMPOST with 80% USGA specific sand, mix thoroughly, seed or sod. (Screen AGRESOIL COMPOST to 1/4 prior to blending)

### ***Topdressing***

Broadcast 1/4 inch of AGRESOIL COMPOST on fairway, green or tee and rake/sweep off any debris. Topdressing after core aeration is most effective.

The rates listed above are general recommendations for use. Existing soil should be tested and a horticultural professional or extension agent consulted for specific uses.

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## **SAND BASED ROOTZONES & COMPOST**

Sand based rootzone mixes have been common for years in USGA golf course greens. Today athletic field construction has also turned to these manufactured root zones to keep over-used fields in play through various climactic conditions. An organic component is needed to amend these sand based athletic field root zones to add water and nutrient retention. The most commonly utilized organic amendments are peat products and compost. The organic amendment, along with the sand source, must be selected carefully to develop a quality root zone mix.

Sand based root zone mixes are manufactured soils developed to provide all the properties necessary to sustain healthy growth of turfgrass, provide a playable surface in various climactic conditions and also resist compaction. Native soils may not provide all these unique qualities. Today's athletic surfaces are being utilized more than ever, players and spectators both have come to expect perfect turfgrass quality. Maintaining athletic surfaces without a quality root zone has become nearly impossible with today's increased play and demanding standards.

Quality compost has become a useful organic amendment for sand based root zone mixes. Traditionally peat was used as the only suitable organic amendment due to its high organic matter percentage, suitable particle size and consistency. Today biosolid compost has become a clear alternative to peat because of its many qualities and improved production processes. Quality biosolid compost provides enough organic matter, a suitable particle size and the consistency to be used in sand based root zone mixes. Compost has advantages peat products lack as an organic amendment. It provides the root zone with beneficial microbes that improve nutrient availability and have also shown the ability to aid in suppression of soil borne pathogens. Compost adds life to the root zone, as well as organic matter at a reasonable cost.

Compost has been used successfully on many athletic field surfaces. Agresoil bulk compost has been used on over forty sand based athletic surface projects. In each application, the use of a quality compost and sand was necessary to ensure a proper root zone blend, grow-in of the turfgrass and long term durability of the field.

An example of compost used in a sand based root zone mix is the reconstruction of the Great Lawn of Central Park. It was necessary to completely renovate the 15 acre field after the original soils were compacted and turfgrass covered less than half of New York City's most popular open space. The existing root zone was removed and a drainage system installed prior to the addition of the new root zone. The new root zone mix was developed by Dr. Norman Hummel of Hummel and Co. Inc. and was approximately 7 parts sand (with proper aggregate distribution), 2 parts compost (AGRESOIL COMPOST) and one part topsoil. This manufactured soil was designed to hold up to over 12,000 softball games on its six fields and many other events such as performances by the Metropolitan Opera, New York Philharmonic and many other daily guests. By designing a manufactured soil and monitoring its consistency during delivery, Dr. Hummel and the Central Park Conservancy staff developed an athletic field surface which is withstanding the demands of New York City's populace.

A quality root zone mix is developed by first selecting sand with a suitable particle size distribution and pH. The USGA recommendations are used many times as a guideline in choosing a sand source. These recommendations focus on the particle size distribution, most scrutinized is the percentage of silt and clay particles. A high percentage of silt and clay particles increases the risk of compaction and reduced infiltration rates. It is also important to limit the percentage of larger sand particles to aid in the stability of the root zone mix.

Standards for the compost as the organic amendment are currently incomplete in USGA recommendations, but reputable laboratories require the compost must be from a source that produces a consistent product with a proven track record. The compost is then tested for plant sensitive parameters such as pH, C:N ratio, soluble salts and stability. Organic matter percentage of the compost is many times the limiting factor. The percentage must be high, generally above 60%, to develop a balanced root zone mix; this excludes most leaf and yard waste composts.

USGA Recommendations                      Particle Size Analysis (ASTM F-1632)

Gravel	V. Course	Coarse	Medium	Fine	V. Fine	Silt	Clay
2mm	1 mm	0.5 mm	0.25mm	0.15 mm	.05mm		

≤ 3 % gravel	≥ 60%	≤ 20%	≤ 5%	≤ 5%	≤ 3%
≤ 10 % combined					

Sand based root zone mixes are generally amended with compost at a rate of approximately 10-25 percent. This is determined in the laboratory based on many factors such as final organic matter percentage, particle size distribution and infiltration rates. A well-balanced mix will allow play in wet conditions and resist compaction. These are two factors generally limiting the use of soil fields. As more and more children and adults are participating in athletic activities, it is important to keep athletic fields and golf courses in top playing condition as long as possible.

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## SPECIFICATION

### SPORTS FIELD SAND BASED ROOTZONE

#### 1. DESCRIPTION

This work shall consist of preparing a root zone mixture consisting of sand and compost. The root zone mix will be evaluated by using the ASTM test methods for putting green root zones. A sand sample and compost sample shall be submitted to testing agent for adherence to specifications.

#### 2. MATERIALS

**2.1 Processed Sand** – The sand shall meet the following criteria:

Constituent	Sieve Mesh	Diameter of Sieve (mm)	Allowable Range Percent Retained
Gravel	10	2.00	0-5%
Very coarse sand	18	1.00	0-20% combined with gravel
Coarse sand	35	0.50	at least 60%

Medium sand	60	0.25	in this range
Fine sand	100	0.15	10% maximum
Very fine sand	270	0.005	3% maximum
Silt		0.002	5% maximum
Clay		<0.002	3% maximum

In addition, there should be no more than 10% combined very fine sand, silt and clay.

**2.2 Compost**– Compost shall be derived from biosolids, clean ground wood, and/or sawdust that meet all State Environmental Agency requirements. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

Parameters	Range
pH	6.0 – 7.75
Moisture Content	35% – 55%
Soluble Salts	< 4.0 mmhos/(dS)
C:N Ratio	15 – 30:1
Particle Size	< 1/2"
Organic Matter Content	> 60%
Bulk Density	< 1000 lbs./cubic yard
Foreign Matter	< 1% (dry weight)

Compost generator shall also provide minimum available nitrogen and other macro and micro nutrients to determine fertilizer requirements. Generator shall supply documentation showing state approval.

**Product Information** – All parameters listed above can be met by **AGRESOIL COMPOST** as distributed by: Agresource, 100 Main Street, Amesbury, MA 01913, Telephone: 800-313-3320.

### 3.0 Root Zone Mixture Ratios and Performance Testing

Upon approval of the processed sand and compost components, the owners testing agents shall blend the components to determine the correct ratio of sand and compost to create the root zone mix. This ratio of sand and compost will be based on laboratory testing and performance guidelines established by these specifications.

*For bidding purposes, the mix ratio will contain approximately 75 to 85% sand and 25 to 15% compost by volume.*

The root zone mix developed by the owners testing agent will establish the required mix ratio and specifications for approval or rejections of all quality control submittals during construction. The construction contractor shall bear the cost of all testing.

**Performance Testing:** ASTM testing procedures for sand based athletic fields shall be used for performance testing. Water retention shall be done at a tension that corresponds to the depth of the root zone. (30 cm tension for 12-inch root zone, 25 cm for 10 inch). The tests shall comply with the following criteria on a core compacted at 14.3 ft-lbs/square inch.

Infiltration rate (inches per hour)	8 to 14
Bulk density (gm/cc)	1.3 to 1.65
Total porosity	35 – 55%
Saturation percentage	35 – 60%

The root zone mix shall have an organic matter content of 1.5 to 4.0% on a dry weight basis.

## SOIL BASED ROOTZONES & COMPOST

Today athletic field construction has turned to manufactured root zones to keep over-used fields in play through various climactic conditions. Fields are generally built with either soil based or sand based systems that are amended with an organic product. While sand based fields create a more durable field that can resist compaction they also require proper irrigation and are more costly to construct. Therefore, soil based rootzones are the most common type of athletic field root zone mix.

Soil based root zone mixes are manufactured soils developed to provide all the properties necessary to sustain healthy growth of turfgrass, provide a playable surface in various climatic conditions and also resist compaction. Generally native soils will not provide all these unique qualities. Soil based root zones are developed by blending a locally available soil and an organic amendment (compost) to improve water and nutrient retention as well as reduce compaction. The organic amendment, along with the soil source, must be selected carefully to develop a quality root zone mix.

Quality compost is an excellent organic amendment for soil based root zone mixes. Traditionally athletic fields were built utilizing locally available topsoil as the root zone. Today manufacturing a root zone with the use of biosolid compost is a clear improvement. Quality biosolid compost provides the root zone with beneficial microbes that improve nutrient availability and have also shown the ability to aid in suppression of soil borne pathogens. Biosolid compost adds life to the root zone, as well as organic matter at a reasonable cost.

A quality root zone mix is developed by first selecting a soil with a suitable particle size distribution and pH. A high percentage of silt and clay particles increases the risk of compaction and reduced infiltration rates. It is also important to limit the percentage of larger sand particles to aid in the stability of the root zone mix. The organic amendment (compost) must be tested for plant sensitive parameters such as pH, C:N ratio, soluble salts and stability. Organic matter percentage of the compost is many times the limiting factor. The percentage must be high, generally above 60%, to develop a balanced root zone mix.

Soil based root zone mixes are generally amended with compost at a rate of approximately 15-30 percent. This rate is generally determined by the final organic matter percentage of the root zone. A field that is irrigated requires a 4-5 percent organic matter level while a non-irrigated field should have 5-6 percent organic matter. A well-designed mix will provide safe playing conditions and superior turfgrass quality.

The chart below aids in estimating percentage of AGRESOIL COMPOST to blend with a soil to reach the target organic matter percentage. The left column is the percentage needed to boost the organic matter to your target value. The right column contains the percentage of AGRESOIL COMPOST needed to reach the target organic matter percentage. (i.e. to improve a soil from 2% to the target of 5% you would need to add 3% O.M., therefore you would amend the soil with approx. 22% AGRESOIL COMPOST)

AGRESOIL COMPOST inclusion

% to raise

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1%	8%	
2%	15%	All rates based on addition
3%	22%	of AGRESOIL COMPOST to a
4%	27%	typical soil weighing
5%	32%	2600lbs/cuyd.
6%	37%	

Today's athletic surfaces are being utilized more than ever; players and spectators both have come to expect perfect turfgrass quality. Maintaining athletic surfaces without a quality root zone has become nearly impossible with today's increased play and demanding standards.

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## SPECIFICATION

### MANUFACTURED SPORTS FIELD ROOT ZONE

#### 1. DESCRIPTION

This work shall consist of preparing a root zone manufactured from compost and other soil constituents for use in athletic field construction. This material can be either pre-blended and brought on-site or the compost can be blended with soils stockpiled at the construction site.

#### 2. MATERIALS

**2.1 Compost**– Compost shall be derived from organic wastes including sawdust, clean ground wood, leaf and yard residues, and biosolids that meet all State Environmental Agency requirements. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

Parameters	Range
pH	5.5 – 7.5
Moisture Content	35% – 55%
Soluble Salts	< 4.0 mmhos (dS)
C:N Ratio	15 – 30:1
Particle Size	< ½"
Organic Matter Content	< 40%
Bulk Density	< 1000 lbs./cubic yard
Foreign Matter	< 1% (dry weight)

Compost generator shall also provide minimum available nitrogen and other macro and micro nutrients to determine fertilizer requirements. Generator shall supply documentation showing state approval for intended use.

**Product Information** – All parameters listed above can be met by **AGRESOIL COMPOST** as distributed by: Agresource, 100 Main Street, Amesbury, MA 01913, Telephone: 800-313-3320.

**2.2 Soil Component** – Soil shall consist of loose, friable soil, free of ice, snow and rubbish with no admixture of refuse or material toxic to plant growth. Soil shall be reasonably free of stones, lumps, roots and weeds or similar objects larger than a half inch in diameter.

**A.** Soil shall meet additional parameters:

Parameters	Range
pH	6.0 – 7.5
Moisture Content	25% – 55%
Soluble Salts	<2.5 mmhos (dS)
Stone and Debris	< 1% (by weight)
Foreign Matter	<.05% (by weight)

**B.** Particle Size

- 100% by volume must pass a 1 inch screen.
- 95% by volume must pass a 1/2 inch screen.
- Not more than 70% of the soil by weight shall be less than .25 mm (fine sand) of which no more than 25% by weight shall consist of particles less than .002 mm (clay).

### **3. MANUFACTURED SPORTS FIELD ROOT ZONE**

Manufactured sports field root zone shall consist of soil as described in Section 2.2 amended with compost as described in Section 2.1. Compost manufactured topsoil shall be free of refuse, stones, lumps, roots and weeds or similar objects larger than one inch in diameter. Compost manufactured topsoil will be uniformly mixed to meet the final requirements listed below:

<b>A. Parameters</b>	<b>Range</b>
pH	6.0-7.5
Moisture Content	30% – 55%
Soluble Salts	< 2.0 mmhos (dS)
Organic Matter	5-6%
Foreign Matter	<0.5% (by weight)

**B.** Particle Size

- 100% (by volume) must pass through a 1 inch screen.
- 95% (by volume) must pass through a 1/2 inch screen.

Compost manufactured topsoil shall meet the following mechanical analysis:

Textural Class	% of Total Weight	Average %
Sand (0.05 – 2.0 mm dia. range)	45-75	60
Silt (0.002-0.05 mm dia. range)	15-35	25
Clay (less than 0.002 mm dia range)	5-20	15

#### **4. CONSTRUCTION REQUIREMENTS**

Manufactured athletic field root zone shall be spread evenly upon the previously prepared subgrade surface to the depth specified on the plans. The manufactured athletic field root zone shall be spread in such a manner as to establish a loose, friable seedbed.

#### **5. METHOD OF MEASUREMENT**

All compost manufactured topsoil, loam and compost will be measured by the cubic yard.

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### **COMPOST MANUFACTURED TOPSOIL**

Compost manufactured topsoil is a practical and necessary alternative to stripped topsoil. Topsoil has become increasingly scarce and expensive for use on landscape projects. The daily usage of inferior soils on many turfgrass and landscape projects can have dramatic effects on soil structure and plant material health.

Agresource has worked with both state agencies, landscape architects and engineers to promote the use of compost in topsoil manufacturing. Manufactured topsoil is produced by using ingredients that are readily available: low organic matter subsoils, sand and compost. By analyzing these ingredients you can create the correct admixture to produce a topsoil that has the structure, organic matter and nutrients available to produce lush vegetative growth.

Compost manufactured topsoil has many benefits, which include both economics and performance. Using manufactured topsoil can guarantee that the soil specification can meet many parameters due to the distinct qualities of the ingredients. Mixing together a sandy soil that has an aggregate distribution which will prevent compaction and compost which is high in organic matter will yield a soil which could be used for athletic field construction. These materials lack key properties individually, but mixed properly can create a superior topsoil.

Beneficial reuse of materials such as subsoils, sands and compost on projects will help eliminate the need to strip virgin soils. The unregulated use of stripped topsoil will eventually begin to deplete this natural resource. This trend has led many states agencies, landscape architects and engineers to begin developing specifications to utilize compost manufactured topsoil. The following pages contain model specifications for compost manufactured topsoil.

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### **SPECIFICATION**

### **COMPOST MANUFACTURED TOPSOIL**

## 1. DESCRIPTION

This work shall consist of preparing topsoil manufactured from compost and other soil constituents for use in turf or planting areas. This material can be either pre-blended and brought on-site or the compost can be blended with soils stockpiled at the construction site.

## 2. MATERIALS

**2.1 Compost**– Compost shall be derived from organic wastes including sawdust, clean ground wood, leaf and yard residues, and biosolids that meet all State Environmental Agency requirements. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

Parameters	Range
pH	5.5 – 8.0
Moisture Content	35% – 55%
Soluble Salts	< 4.0 mmhos (dS)
C:N Ratio	15 – 30:1
Particle Size	< ¾"
Organic Matter Content	> 20%
Bulk Density	< 1200 lbs./cubic yard
Foreign Matter	< 1% (dry weight)

Compost generator shall also provide minimum available nitrogen and other macro and micro nutrients to determine fertilizer requirements. Generator shall supply documentation showing state approval for intended use.

**Product Information** –All parameters listed above can be met by **AGRESOIL COMPOST®** as distributed by: Agresource, 100 Main Street, Amesbury, MA 01913 Telephone 800-313-3320.

**2.2 Soil Component** – Soil shall consist of loose, friable soil, free of ice, snow and rubbish with no admixture of refuse or material toxic to plant growth. Soil shall be reasonably free of stones, lumps, roots and weeds or similar objects larger than two inches in diameter.

A. Soil shall meet additional parameters:

Parameters	Range
pH	5.5 – 7.5
Moisture Content	25% – 55%
Soluble Salts	2.5 mmhos (dS)
Stone and Debris	< 5% (by weight)

Foreign Matter <.05% (by weight)

**B. Particle Size**

- 100% by volume must pass a 2 inch screen.
- 95% by volume must pass a 3/4 inch screen.
- Not more than 60% of the soil by weight shall be less than .05 mm (very fine sand) of which no more than 25% by weight shall consist of particles less than .002 mm (clay).

**3. COMPOST MANUFACTURED TOPSOIL**

Compost manufactured topsoil shall consist of soil as described in Section 2.2 amended with compost as described in Section 2.1. Compost manufactured topsoil shall be free of refuse, stones, lumps, roots and weeds or similar objects larger than two inches in diameter. Compost manufactured topsoil will be uniformly mixed to meet the final requirements listed below:

<b>A. Parameters</b>	<b>Range</b>
pH	5.5 – 8.0
Moisture Content	30% – 55%
Soluble Salts	2.0 mmhos (dS)
Organic Matter	>5%
Foreign Matter	<0.5% (by weight)

**B. Particle Size**

- 100% (by volume) must pass through a 2 inch screen.
- 95% (by volume) must pass through a 3/4 inch screen.

Compost manufactured topsoil shall meet the following mechanical analysis:

Textural Class	% of Total Weight	Average %
Sand (0.05 – 2.0 mm dia. range)	45-75	60
Silt (0.002-0.05 mm dia. range)	15-35	25
Clay (less than 0.002 mm dia range)	5-20	15

**4. CONSTRUCTION REQUIREMENTS**

**4.1 Turf**

Compost manufactured topsoil shall be spread evenly upon the previously prepared subgrade surface to the depth specified on the plans. The compost manufactured topsoil shall be spread in such a manner as to establish a loose, friable seed bed. Measures should be taken on steep grades to slow run-off.

**4.2 Plantings**

Compost manufactured topsoil shall be spread evenly upon the prepared subgrade surface to the depth specified in plans for all planting beds.

For all woody plant material, compost manufactured topsoil shall be placed around rootball to even the base of the plants main leader with the soil grade. All compost manufactured topsoil shall be firmly dressed into place to prevent settling and provide support.

Compost manufactured topsoil used for planting beds of herbaceous plants needs to be spread and remain loose and friable for installation of plant material.

## 5. METHOD OF MEASUREMENT

All compost manufactured topsoil, loam and compost will be measured by the cubic yard.

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## SPECIFICATION

### TURF ESTABLISHMENT WITH COMPOST

#### DESCRIPTION

The work shall consist of incorporating compost into the soil profile to improve soil quality and plant growth. This specification applies to all types of turf establishment methods including seeding, sodding and hydroseeding.

#### MATERIALS

Compost shall be derived from organic wastes including sawdust, clean ground wood, leaf and yard residues, and biosolids that meet all State Environmental Agency requirements. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

	Parameters	Range
pH	5.5 – 8.0	
Moisture content	35% – 55%	
	C:N ratio	15 – 30:1
Organic Matter	> 40%	
Particle Size	< 3/4 inch	
Soluble Salts	< 4.0 mmhos (dS)	
Bulk Density	< 1200 lbs/cuyd	
Foreign Matter	< 1% by weight	

The use of compost will reduce fertilizer requirements. The compost generator shall supply the specifier a nutrient analysis to determine these requirements. Generator shall supply documentation showing state approval for intended use.

## PRODUCT INFORMATION

This specification covers the properties of **AGRESOIL COMPOST®** as distributed by: Agresource, 100 Main Street, Amesbury, MA 01913, telephone 800-313-3320.

## **CONSTRUCTION REQUIREMENTS**

Incorporate uniformly one to three inches of compost within the top four to six inches of the soil profile (three to twelve cubic yards per 1000 square feet). Use a higher rate for upgrading marginal soils. Water thoroughly after seeding or sodding.

*Newly seeded areas can be topdressed with a fine compost (<3/8 inch), then water.*

## **METHOD OF MEASUREMENT**

Compost will be measured by the cubic yard.

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## **SPECIFICATION**

### **COMPOST AS LANDSCAPE BACKFILL MIX COMPONENT**

#### **DESCRIPTION**

This work shall consist of excavating a planting hole and blending compost with the excavated soil to improve soil quality and plant growth. This specification applies to all types of containerized, balled, and burlapped plant material.

#### **MATERIALS**

Compost shall be derived from organic wastes including sawdust, clean ground wood, leaf and yard residues, and biosolids that meet all State Environmental Agency requirements. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

Parameters	Range
pH	5.5 – 8.0
Moisture content	35% – 55%
C:N ratio	15 – 30:1
Organic Matter	> 40%
Particle Size	< 1 inch
Soluble Salts	< 4.0 mmhos (dS)
Bulk Density	< 1000 lbs/cuyd
Foreign Matter	< 1% by weight

The use of compost will reduce fertilizer requirements. The compost generator shall supply the specifier a nutrient analysis to determine these requirements. Backfill mix for ericaceous plants shall have a pH less than

7.0.

## PRODUCT INFORMATION

This specification covers the properties of **AGRESOIL COMPOST®** as distributed by: Agresource, 100 Main Street, Amesbury, MA 01913, telephone 800-313-3320.

## CONSTRUCTION REQUIREMENTS

Uniformly mix compost with the excavated soil of the planting hole at a 1:2 ratio. Backfill and firm the soil blend around the rootball within the planting hole. Water thoroughly after planting.

## METHOD OF MEASUREMENT

Compost will be measured by the cubic yard.

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## SPECIFICATION

### COMPOST AS A LANDSCAPE MULCH

#### DESCRIPTION

This work shall consist of applying compost to the soil surface immediately after planting to inhibit weed growth, conserve soil moisture and reduce erosion.

#### MATERIALS

Compost shall be derived from organic wastes including sawdust, clean ground wood, leaf and yard residues, and biosolids that meet all State Environmental Agency requirements. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

Parameters	Range
pH	5.5 – 8.0
Moisture content	35% – 55%
C:N ratio	15 – 30:1
Particle Size	< 3 inches
Soluble Salts	< 4.0 mmhos (dS)

Bulk Density < 1000 lbs/cuyd

Foreign Matter < 1% by weight

Compost generator shall supply documentation showing state approval for intended use.

When using compost for mulching, specific products may be more physically and visually preferable for any given mulching bed area. Since aesthetic preferences vary, it is recommended that a sample of compost be sent to the specifier prior to field use.

## PRODUCT INFORMATION

This specification covers the properties of **AGRESOIL COMPOST®** as distributed by: Agresource, 100 Main Street, Amesbury, MA 01913, telephone 800-313-3320.

## CONSTRUCTION REQUIREMENTS

Compost shall be uniformly applied to an average depth of 2-3 inches immediately after planting. Water thoroughly after application to stabilize the entire mulch layer. All foreign matter and debris larger than 2 inches shall be removed from the surface of the mulched area.

## METHOD OF MEASUREMENT

Compost will be measured by the cubic yard.

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## SPECIFICATION

### ESTABLISHMENT OF PLANTING BEDS WITH COMPOST

#### DESCRIPTION

This work shall consist of incorporating compost into the soil profile to improve soil quality and plant growth. This specification applies to all types of plantings, including vines, ground covers and flowering plant material.

#### MATERIALS

Compost shall be derived from organic wastes such as food and agricultural residues, animal manures, leaf and yard waste, and biosolids that meet all State Environmental Agency requirements. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

Parameters	Range
pH	5.5 – 8.0
Moisture content	35% – 55%
C:N ratio	15 – 30:1

Organic Matter	> 40%
Particle Size	< 1 inch
Soluble Salts	< 3.0 mmhos (dS)
Bulk Density	< 1000 lbs/cu yd
Foreign Matter	< 1% by weight

Compost generator shall supply documentation showing state approval for intended use.

The use of compost will reduce fertilizer requirements. The compost generator shall supply the specifier a nutrient analysis to determine these requirements. Planting bed compost and soil mix for ericaceous plants shall have a pH less than 7.0.

## PRODUCT INFORMATION

This specification covers the properties of **AGRESOIL COMPOST®** as distributed by: Agresource, 100 Main Street, Amesbury, MA 01913, telephone 800-313-3320.

## CONSTRUCTION REQUIREMENTS

Compost shall be applied over planting bed area at an average rate of 2 – 3 inches and uniformly incorporated within 6 – 8 inches of the soil profile. Use a higher rate for upgrading marginal soils.

## METHOD OF MEASUREMENT

Compost will be measured by the cubic yard.

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## SPECIFICATION

### COMPOST AS A SOIL MULCH FOR EROSION CONTROL

#### DESCRIPTION

This work shall consist of applying compost to a sloped soil surface to reduce erosion for long term stabilization.

#### MATERIALS

Compost shall be derived from organic wastes such as food and agricultural residues, animal manures, leaf and yard waste, and biosolids that meet all State Environmental Agency requirements. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

Parameters	Range
pH	5.5 – 8.0
Moisture Content	35% – 55%

C:N Ratio	15:1 – 30:1
Soluble Salts	< 4.0 mmhos (dS)

Compost shall contain a range of particle sizes that produce a stable mat. Very coarse (>3 inches) composts should be avoided if the slope is to be landscaped or seeded.

Compost generator shall supply documentation showing state approval for intended use.

## PRODUCT INFORMATION

This specification covers the properties of AGRESOIL COMPOST® as distributed by: Agresource, 100 Main Street, Amesbury, MA 01913, telephone 800-313-3320.

## CONSTRUCTION REQUIREMENTS

Compact (track) the existing slope then uniformly apply compost to a minimum depth of 3 inches to slopes of up to 1:2. Compact (track) the compost layer. On highly unstable soils, use compost with additional structural materials. Follow by seeding or planting if desired.

## METHOD OF MEASUREMENT

Compost will be measured by the cubic yard.

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## SPECIFICATION

### BIORETENTION SOIL

#### DESCRIPTION

Bioretention Soil shall consist of loose, friable soil, free of ice, snow and rubbish with no admixture of refuse or material toxic to plant growth. Soil shall be reasonably free of stones, lumps, roots and weeds or similar objects larger than two inches in diameter. Bioretention soil mixture shall be mixed 50% sand and 50% compost by volume.

The final Bioretention Soil mixture shall meet the following parameters:

Parameters	Range
pH	5.5 – 7.5
Moisture Content	25% – 55%
Organic Matter Content	4 – 7% (dry weight basis)
Stone and Debris	< 5% (by weight)
Soluble Salts	2.5 mmhos (dS)
Foreign Matter	<.05% (by weight)

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The bioretention soil mixture shall be a uniform mix, free of stones, stumps, roots or other similar objects larger than 2-in excluding mulch. No other materials or substances shall be mixed or dumped within the bioretention area that may be harmful to plant growth, or prove a hindrance to the planting or maintenance operations. The bioretention soil mixture shall be free of Knotweed, Phragmites, Purple Loosestrife, Bermuda grass, Quackgrass, Johnson grass, Mugwort, Nutsedge, Poison Ivy, Canadian Thistle, Teathumb, or other noxious weeds.

The bioretention soil mixture shall be tested and meet the following criteria:

Textural Class	% of Total Weight
Gravel (greater than 2 mm)	< 15%
Sand (0.05 – 2.0 mm diameter range)	> 85%
Silt (0.002-0.05 mm diameter range)	< 10%
Clay (less than 0.002 mm diameter range)	< 5%

**Processed Sand** – The sand shall meet the following criteria:

Sand shall be tested for particle size distribution (USGA) very coarse to very fine categories. Evenly graded sand with equal percentage of coarse, medium, and fine particle size should be avoided.

There shall be no more than 15% combined silt and clay.

There shall be no more than 30% fine sand.

There shall be no more that 10% very fine sand.

## **Bioretention Soil Mixture Ratios and Performance Testing**

Upon approval of the processed sand and compost components, the owners testing agents shall blend the components to determine the correct ratio of sand and compost to create the bioretention soil mix. This ratio of sand and compost will be based on laboratory testing and performance guidelines established by these specifications.

The bioretention mix developed by the owners testing agent will establish the required mix ratio and specifications for approval or rejections of all quality control submittals during construction. The construction contractor shall bear the cost of all testing.

## **Testing Methods**

ASTM F1632-B Standard Test Method for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis shall be used for measurement of particle size distribution and the coefficient of uniformity.

Performance Testing: ASTM F1815 Standard Test Method for Saturated Hydraulic Conductivity shall be used to determine infiltration rate.

Required Infiltration rate > 1.0 (inches per hour)

## **COMPOST**

Compost shall be derived from organic wastes such as leaf and yard waste residues and meet all State Environmental Agency requirements. The product shall be well composted, and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

Parameters	Range
ph	5.5 – 8.0
Moisture Content	35% – 55%
Soluble Salts	4.0 mmhos (dS)
C:N ratio	10 – 30:1
Particle Size	< 3/4"
Organic Matter Content	> 25%
Bulk Density	< 1400 lbs./cubic yard
Foreign Matter	< 1% (dry weight)

Compost generator shall also provide minimum available nitrogen and other macro and micro nutrients to determine fertilizer requirements.

Product Information – All parameters listed above can be met by **Agresoil Compost** and **Agresoil Bioretention Soil** or equal as distributed by: Agresource, 100 Main Street, Amesbury, MA 01913, Telephone 800-313-3320.

## **SPECIFICATION**

### **RAIN GARDEN SOIL**

#### **DESCRIPTION**

Rain garden soil shall consist of loose, friable soil, free of ice, snow and rubbish with no admixture of refuse or material toxic to plant growth. Soil shall be reasonably free of stones, lumps, roots and weeds or similar objects larger than two inches in diameter. Rain garden soil mixture shall be a mixture of soil and compost to meet the following parameters.

The final Rain Garden Soil mixture shall meet the following parameters:

Parameters	Range
pH	5.5 – 7.5
Moisture Content	25% – 55%
C:N Ratio	15:1 – 30:1
Organic Matter Content	4 – 7% (dry weight basis)
Soluble Salts	2.5 mmhos (dS )
Stone and Debris	< 5% (by weight)
Foreign Matter	<.05% (by weight)

The rain garden soil shall be a uniform mix, free of stones, stumps, roots or other similar objects larger than 2-in excluding mulch. No other materials or substances shall be mixed or dumped within the bioretention area that may be harmful to plant growth, or prove a hindrance to the planting or maintenance operations. The bioretention soil mixture shall be free of Knotweed, Phragmites, Purple Loosestrife, Bermuda grass, Quackgrass, Johnson grass, Mugwort, Nutsedge, Poison Ivy, Canadian Thistle, Teathumb, or other noxious weeds.

The rain garden soil mixture shall be tested and meet the following criteria:

Textural Class	% of Total Weight
Gravel (greater than 2 mm)	< 15%
Sand (0.05 – 2.0 mm diameter range)	> 70%
C:N Ratio	15:1 – 30:1
Silt (0.002-0.05 mm diameter range)	< 20%
Clay (less than 0.002 mm diameter range)	< 10%

**Processed Sand** – The sand shall meet the following criteria:

Sand shall be tested for particle size distribution (USGA) very coarse to very fine categories. Evenly graded sand with equal percentage of coarse, medium, and fine particle size should be avoided.

There shall be no more than 30% combined silt and clay.

There shall be no more than 30% fine sand.

There shall be no more that 10% very fine sand.

## Rain Garden Soil Ratios and Performance Testing

Upon approval of the processed sand and compost components, the owners testing agents shall blend the components to determine the correct ratio of sand and compost to create the bioretention soil mix. This ratio of sand and compost will be based on laboratory testing and performance guidelines established by these specifications.

The bioretention mix developed by the owners testing agent will establish the required mix ratio and specifications for approval or rejections of all quality control submittals during construction. The construction contractor shall bear the cost of all testing.

## Testing Methods

ASTM F1632-B Standard Test Method for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis shall be used for measurement of particle size distribution and the coefficient of uniformity.

**Performance Testing:** ASTM F1815 Standard Test Method for Saturated Hydraulic Conductivity shall be used to determine infiltration rate.

Required Infiltration rate > 1.0 (inches per hour)

## Compost

Compost shall be derived from organic wastes such as leaf and yard waste residues and meet all State Environmental Agency requirements. The product shall be well composted, and contain material of a generally

humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

Parameters	Range
pH	5.5 – 8.0
Moisture content	35% – 55%
C:N Ratio	15:1 – 30:1
Soluble Salts	6.0 mmhos (dS)
C:N ratio	10 – 30:1
Particle Size	< 3/4"
Organic Matter Content	> 25%
Bulk Density	< 1400 lbs./cubic yard
Foreign Matter	< 1% (dry weight)

Compost generator shall also provide minimum available nitrogen and other macro and micro nutrients to determine fertilizer requirements.

**Product Information** – All parameters listed above can be met by **Agresoil Compost** and **Agresoil Bioretention Soil** or equal as distributed by: Agresource, 100 Main Street, Amesbury, MA 01913, Telephone 800-313-3320.

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## SPECIFICATION

### MANUFACTURED WETLAND SOIL

#### DESCRIPTION

This work shall consist of preparing wetland soil that is manufactured from compost and other soil constituents for use in establishing wetland vegetation.

#### MATERIALS

Soil – Soil shall consist of loose, friable soil, free of ice, snow and rubbish with no admixture of refuse or material toxic to plant growth. Soil shall be reasonably free of seeds and roots of exotic invasive species, stones, lumps and or similar objects larger than two inches in diameter. Manufactured wetland soil will be uniformly mixed to meet the final requirements listed below:

Soil shall meet additional parameters :

Parameters	Range
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pH	5.5 – 7.5
Moisture Content	25% – 55%
Soluble Salts	2.5 mmhos (dS)
Organic Content	>20% (dry weight)
Organic Carbon Content	> 12% (dry weight)
Stone and Debris	< 5% (by weight)
Foreign Matter	<0.5% (by weight)

Particle Size:

- 100% by volume must pass a 1.5 inch screen.
- 85% by volume must pass a 3/4 inch screen.

**Compost** – Compost shall be leaf and yard waste compost. The product shall be well composted and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

Parameters	Range
pH	6.5 – 7.5
Moisture Content	35% – 55%
Soluble Salts	< 4.0 mmhos (dS)
C:N Ratio	< 25:1
Particle Size	< 1.5"
Organic Content	> 25% (dry weight)
Bulk Density	< 1300 lbs./cubic yard
Foreign Matter	< 1% (dry weight)

Compost generator shall also provide minimum available nitrogen and other macro and micronutrients.

**Product Information** -All parameters listed above can be met by **AGRESOIL COMPOST** as distributed by: Agresource, 100 Main Street, Amesbury, MA 01913 Telephone 800-313-3320.

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## SPECIFICATION

# LIGHT WEIGHT MEDIA – EXTENSIVE MIX

## DESCRIPTION

Growing media for a green roof system is designed to have saturated weight limits for a specific structure as well as sustain green roof plants. The extensive and intensive medias are mineral based medias with reduced organic content containing an aggregate that reduces the saturated weight without losing volume needed for specific species of plants. The light weight media extensive mix intended use is for the establishment of herbs, grasses, mosses, and plants such as succulents known for its tolerance for extreme conditions on roof tops. Growing depth of the media ranges from 2-4 inches and can be installed on roofs with little structural alterations. The mix shall consist of expanded shale, sand, and compost. For bidding purposes, the mix ratio will contain approximately 50-85% expanded shale, 0-25% sand, and 15-20% compost by volume to meet the following physical properties.

## MATERIALS

Light weight media extensive mix shall be uniformly mixed to meet the final requirements listed below:

Compost shall have the following properties:

Parameters	Range
pH	6.0 – 8.0
Moisture Content	30% – 55%
Soluble Salts	< 1.0 mmhos (dS)
Organic Matter	< 5.0%
Phosphorus	< 200 mg/L
Potassium	< 700 mg/L
Magnesium	< 200 mg/L
Nitrate + Ammonium	< 80 mg/L
Bulk Density (dry weight basis)	< 70 lbs/ft <sup>3</sup>
Bulk Density (max. water-holding capacity)	< 95 lbs/ft <sup>3</sup>
Total Pore Volume	
Maximum Water-Holding Capacity	20 – 65%
Air-Filled Porosity (at max. water-holding capacity)	> 8
Water Permeability	2.36 – 15.8 in/min

## Particle Size Distribution – Media Components Expanded Shale Mix

Sieve	Allowable Range
Mesh	Percent Passing

1/2"	98 – 100%
3/8"	75 – 100%
#4	5 – 45%
#8	5 – 20%
#16	0 – 10%
#30	0 – 2.8%
#50	0 – 2.2%
#100	0 – 1.9%
#200	0 – 1.3%

**Processed Sand** – The sand shall meet the following criteria:

Constituent	Sieve Mesh	Diameter of Sieve (mm)	Allowable Range Percent Retained
Gravel	10	2.00	0 – 5%
Very Coarse Sand	18	1.00	0 – 20% combined with gravel
Coarse Sand	35	0.50	at least 60%
Medium Sand	60	0.25	in this range
Fine Sand	100	0.15	20% maximum
Very Fine Sand	270	0.05	10% maximum
Silt		0.002	3% maximum
Clay		<0.002	3% maximum

**Compost**– Compost shall be derived from organic wastes such as food and agricultural residues, animal manures, leaf and yard waste, and biosolids that meet all State Environmental Agency requirements. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

Parameters	Range
pH	5.5 – 8.0
Moisture Content	35% – 55%
C:N Ratio	10 – 30:1
Organic Matter	< 35%
Particle Size	< 3/4 inch

Soluble Salts	< 4.0 mmhos (dS)
Bulk Density	< 1400 lbs/cuyd
Foreign Matter	< 1% by weight

**Particle Size Distribution** – The final media shall meet the following criteria:

Diameter – mm	% Sum of Particles
<12.5	100 – 98
9.5 – 12.5	98 – 93
6.3 – 9.5	80 – 70
3.2 – 6.3	45 – 25
2.0 – 3.2	30 – 10
1.0 – 2.0	20 – 5
.25 – 1.0	10 – 2
.05 – .25	5 – 0
.002 – .05	3 – 0
<.002	2 – 0

## Lightweight Media Mixture Performance Testing

Upon approval of the media components, the owners testing agents shall blend the components to determine the correct ratios to create the root zone mix. This ratio will be based on laboratory testing and performance guidelines established by these specifications.

The root zone mix developed by the owners testing agent will establish the required mix ratio and specifications for approval or rejection of all quality control submittals during construction. The construction contractor shall bear the cost of all testing.

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## SPECIFICATION

### LIGHT WEIGHT MEDIA – INTENSIVE MIX

#### DESCRIPTION

The light weight media intensive mix intended use is for the establishment of turfgrass, trees and shrubs, and perennials on roof tops where weight loads are critical. Larger plants require deeper growing media, from 8-inches

or more to support larger plants and trees from possible high wind shear and extreme weather which are typical on roofs. The media is denser and can contain higher organic matter than an extensive mix; therefore an increased structural load capacity of the roof is needed. The mix shall consist of expanded shale, sand, and compost. For bidding purposes, the mix ratio will contain approximately 50-60% expanded shale, 15-30% sand, and 15-25% compost by volume to meet the following physical properties.

## MATERIALS

Light weight media extensive mix shall be uniformly mixed to meet the final requirements listed below:

Parameters	Range
pH	6.0 – 8.0
Moisture Content	30% – 55%
Soluble Salts	< 1.0 mmhos (dS)
Orgnaic Matter	< 5.0%
Phosphorus	< 200 mg/L
Potassium	< 700 mg/L
Magnesium	< 200 mg/L
Nitrate + Ammonium	< 80 mg/L
Bulk Density (dry weight basis)	< 70 lbs/ft3
Bulk Density ( max. water holding capacity)	< 90 lbs/ft3
Total Pore Volume	
Maximum Water Holding Capacity	35 – 65%
Air-Filled Porosity (at max. water-holding cap.)	> 8/td>
Water Permeability (saturated hydraulic conductivity)	0.024 – 2.83 in/min

### Particle Size Distribution – Media Components Expanded Shale

Sieve Mesh	Allowable Range Percent Passing
1/2"	98 – 100%
3/8"	75 – 100% %
#4	5 – 45%
#8	5 – 20%
#16	0 – 10%
#30	0 – 2.8%
#50	0 – 2.2%
#100	0 – 1.9%

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#200	0 – 1.3%
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**Processed Sand** – The sand shall meet the following criteria:

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Constituent	Sieve Mesh	Diameter of Sieve (mm)	Allowable Range Percent Retained
Gravel	10	2.00	0 – 5%
Very Coarse Sand	18	1.00	0 – 20% combined with gravel
Coarse Sand	35	0.50	at least 60%
Medium Sand	60	0.25	in this range
Fine Sand	100	0.15	20% maximum
Very Fine Sand	270	0.05	10% maximum
Silt		0.002	3% maximum
Clay		<0.002	3% maximum

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**Compost** – Compost shall be derived from organic wastes such as food and agricultural residues, animal manures, leaf and yard waste, and biosolids that meet all State Environmental Agency requirements. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

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Parameters	Range
pH	5.5 – 8.0
Moisture Content	35% – 55%
C:N Ratio	10 – 30:1
Organic Matter	< 35%
Particle Size	< 3/4 inch
Soluble Salts	< 4.0 mmhos (dS)
Bulk Density	< 1400 lbs/cuyd
Foreign Matter	< 1% by weight

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**Particle Size Distribution** – The final media shall meet the following criteria:

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Diameter – mm	% Sum of Particles
<12.5	100

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9.5 – 12.5	100 – 99
6.3 – 9.5	99 – 95
3.2 – 6.3	90 – 80
2.0 – 3.2	60 -50
1.0 – 2.0	50 -33
.25 – 1.0	40 – 30
.05 – .25	15 – 5
.002 – .05	10 – 0
<.002	2 – 0

### Lightweight Media Mixture Performance Testing

Upon approval of the media components, the owners testing agents shall blend the components to determine the correct ratios to create the root zone mix. This ratios of will be based on laboratory testing and performance guidelines established by these specifications.

The root zone mix developed by the owners testing agent will establish the required mix ratio and specifications for approval or rejection of all quality control submittals during construction. The construction contractor shall bear the cost of all testing.

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### Reference Table

#### ***Raising Organic Matter Percentages:***

#### Compost Inclusion Rate

Percentage to Raise	
1%	8%
2%	15%
3%	22%
4%	27%
5%	32%
6%	37%
7%	41%
8%	44%
9%	47%

All rates based on addition of AGRESOIL COMPOST to typical soil weighing 2600lbs/cu yd.

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10%	50%
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**Coverage:**

Coverage per cu yd applied

Depth in inches	Cu yds needed to cover 10,000sqft	
1/4"	1296 sq ft	8 cu yds
1/2"	648	16
3/4"	486	21
1"	324	31
2"	162	62
3"	108	93
6"	54	186

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Quantity of AGRESOIL COMPOST required to cover 1 acre:

1" layer .....  
140 cuyds

2" layer .....  
280 cuyds

3" layer .....  
420 cuyds

6" layer .....  
840 cuyds

Above rates apply to Agresoil Compost with organic content over 40%. Please call to verify.  
All rates are approximate.

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**Agresource, Inc.**

www.agresourceinc.com

800-313-3320

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