

BOMANITE PERVIOUS CONCRETE SYSTEMS SUGGESTED MIX DESIGNS

This guide is to provide some basic information concerning the mix designs used in the construction of Grasscrete with Molded Pulp Formers. It is meant to assist in the development of an appropriate concrete mix design based on previous experience constructing Grasscrete pavements. The weights referenced are in pounds and the volume referenced is in OZ/CWT cementitious (ounces per 100 pounds).

Note that Grasscrete utilizes a top sized aggregate of no more than 1/2" nominal diameter. If the top sized aggregate is too coarse it will not pass between the reinforcing steel and the wall of the Grasscrete former resulting in voids or more likely, concrete with incorrectly distributed aggregate. Large aggregate also creates issues with ease of concrete placement and finishing. The use of a nominal 3/4" top sized aggregate is permissible in very low quantity if needed to meet specified concrete properties but is not recommended.

In addition to the materials listed below, all Grasscrete is constructed with a minimum 1.5 pound loading of synthetic fibers. This is to reduce shrinkage cracking that originates from the corners of the former voids and to improve the overall performance of the concrete slab. Propex Fibermesh 300 Fibrillated fibers are the basis of design when selecting the minimum fiber loading option. When reducing the reinforcing steel in Grasscrete, such as from 8" on center to 16" on center as determined by the Grasscrete Molded Pulp Loading Tables, a higher fiber loading and differing type is required. In this case, Propex Novomesh 950 blended fibers at a five (5) pound per yard loading are the basis of design. Be sure to verify fiber type and loading requirements in the Grasscrete Guideline Specifications.

Most correctly designed pervious driving or parking applications are constructed with as little slope or fall possible. Generally no more than one (1) percent slope is desired. For these applications the use of Self Consolidating Concrete (SCC) is recommended. SCC improves placement rates and surface finish while providing excellent consolidation around the reinforcing steel. In general a 26 - 28 inch spread works best for Grasscrete applications. Mix 1, in the table below is an example of this type of concrete.

Mix 1 - Relatively Level Applications < 3 percent grade

<u>MATERIAL DESCRIPTION</u>	<u>WEIGHT</u>	<u>VOLUME</u>
3/8" Pea Gravel - rounded	1526	
Concrete Sand - rounded	1526	
Portland Cement Type I/II	395	
Class F Flyash	263	
Water	255	
BASF Polyheed PS 1466 - HRWR Admixture		8 -12 ounces CWT
BASF Builders DelvoStabilizer - Hydration Control Admixture		4-6 ounces CWT
BASF Builders Rheomac 450 Viscosity Modifying Admixture		1-2 ounces CWT
Master Builders MB-AE 90 Air Entraining Admixture		1-2 ounces CWT
Water to cement ratio: .39		
Design Slump: 26 - 28 inch Spread - Self Consolidating		
Compressive Strength @ 28 days: 4000 psi		

When constructing Grasscrete on a slope such as residential drives, storm water retention or flow control applications as well as slope protection, a differing mix design needs to be employed. For these applications the use of concrete with greater body or mortar content is recommended. This type of mix will ensure adequate placement rates and surface finish while providing the required consolidation around the reinforcing steel. In general a 6-8 inch slump works best for Grasscrete applications. Mix 2, in the table below is an example of this type of concrete.

Mix 2 - Moderately Sloped Applications > 3 percent grade

<u>MATERIAL DESCRIPTION</u>	<u>WEIGHT</u>	<u>VOLUME</u>
3/8" crushed aggregate	1100	
Concrete Sand	1650	
Portland Cement Type I/II	565	
Class F Flyash	205	
Water	350	
Master Builders Polyheed 997 MRWR Admixture		5-10 ounces CWT
Master Builders MB-AE 90 Air Entraining Admixture		1-2 ounces CWT
Water to cement ratio: .45		
Design Slump: 6-8 inch		
Compressive Strength @ 28 days: 4000 psi		

These two examples of mix designs used in the construction of Grasscrete are for reference only and should not be utilized without correct lab development and proprieties testing based on the regional materials sourced. Once a mix design has been developed or proposed for any given application, a field constructed mockup of the application in question should be used to verify the appropriateness of the concrete, the workability or ease of placement of the concrete and the finished appearance of the Grasscrete.

Consult Bomanite Technical Services for additional information relevant to the construction of Grasscrete.