

# Appendix H

## **Beach Material & Sieve Analysis**

# INTRODUCTION

ESA collected three soil samples on the south beach of Lowman Beach Park to analyze the existing grain size distribution as part of the beach nourishment design. The samples were taking at three clear feature of the beach, the toe, the foreshore and the backshore. The South beach of the Lowman Beach Park is being using as a reference site to inform the design of the beach nourishment component of the project on the north side of the Park. And is used to understand the natural morphology of the beach along the shore at this particular site.

# SIEVE ANALYSIS

A sieve analysis following the standard test method for particle-size analysis of soils ASTM D422-63. The grain size distributions results are shown on Figure 1. The results shoe that the beach toe is composed of a mixture of cobble, gravel and coarse and sand, where cobble and coarse gravel are 40% of the material and sand and fine sand compose 30% of the material. The foreshore shows a mix of coarse gravel with about 50% of the material, 20% of gravel and 30% of coarse sand and sand. The backshore of the beach shows a very uniform material with no sands and 80% of fine and medium material and 20% of coarse gravel

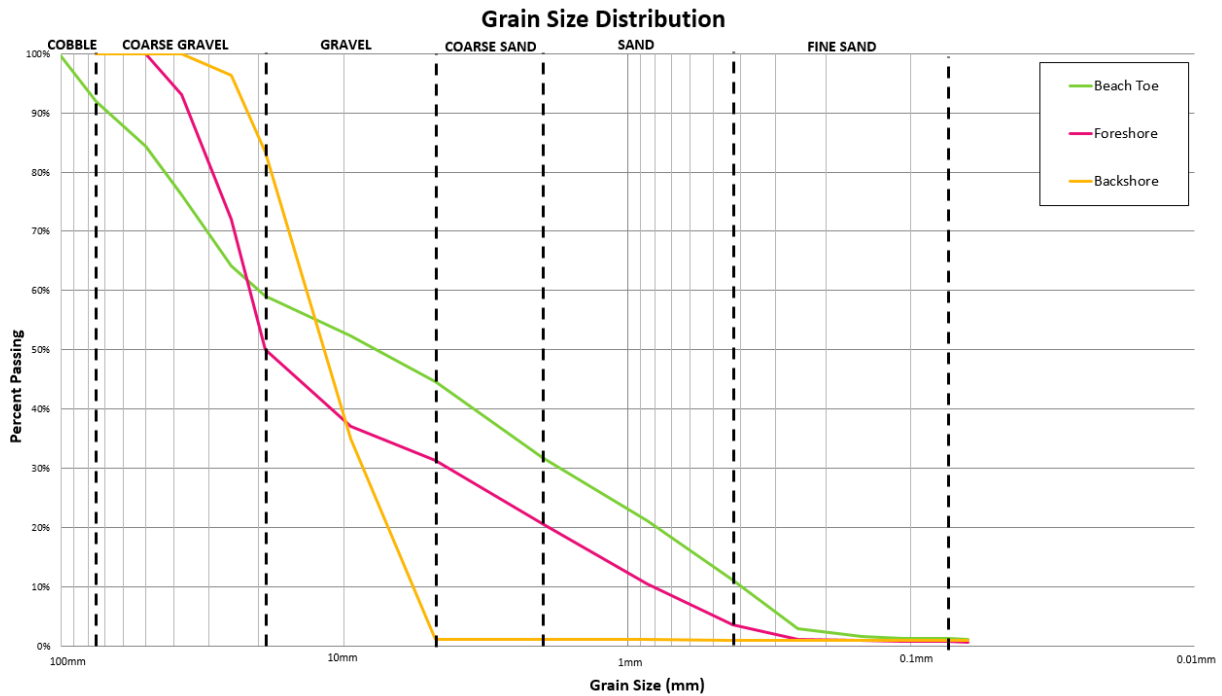
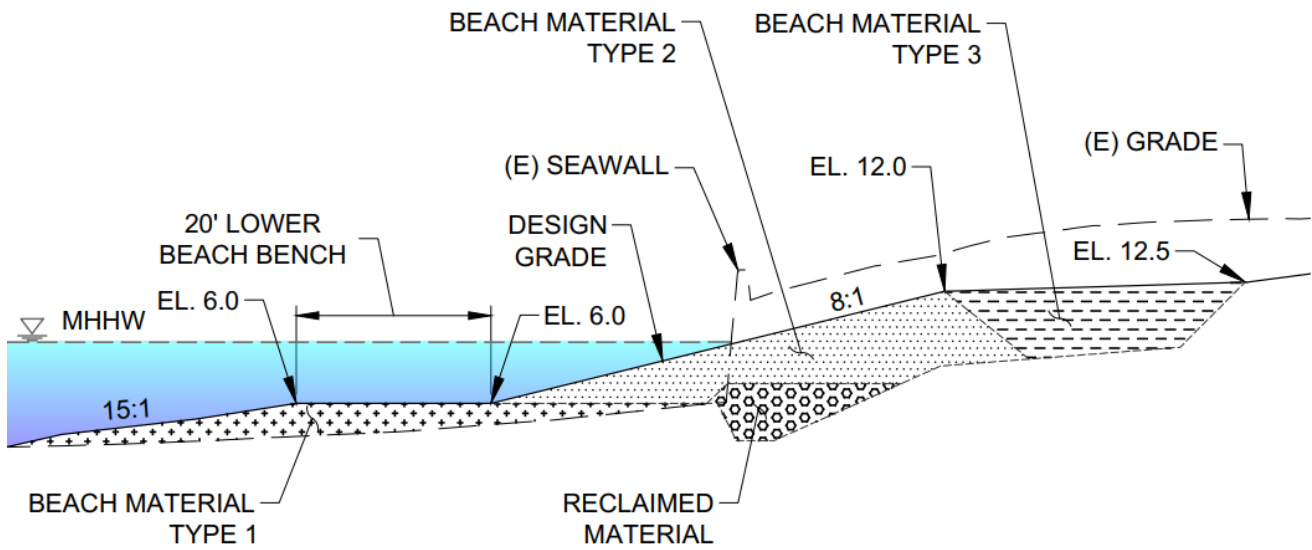


Figure 1. Grain Size Distribution at Lowman Beach

# BEACH MATERIAL PLACEMENT

The beach material type and placement is shown on Figure 2. The beach material at the toe is call type 1, the foreshore is type 2 and the backshore is type 3. It also includes the option of reclaimed material from the excavation of the site that could be used for the core of the beach. The reclaimed material will need to have similar characteristics than the beach material type 2 or 3.



**Figure 2.** Profile of Beach Material Placement

# PROPOSED BEACH MATERIAL

The proposed beach material would be a mixture of gravel, gravelly sand, and sand. The percentage of fine sand will be kept to less than 4% and finer sediment should be less than 2% or none. The recommended grain size distribution for material type 1, 2 and 3 are shown on table 1 through 3 respectively.

The toe of the beach (type 3 material) will be composed of a mixture of coarse sand gravel and cobble, with 45% to 55% of the material been a mix of gravel and cobble and 15 to 35% coarse sand. This mixture will mimic some of the properties to the toe beach south of the site and will make the toe of the beach more resistant to coastal erosion and the combination of cobble, gravel and coarse sand will make the toe less movable and less permeable as well.

**TABLE 1  
RECOMMENDED GRAIN SIZE DISTRIBUTION  
BEACH MATERIAL TYPE 1 - BEACH TOE**

	<b>Screen / Sieve</b>	<b>Percent Passing</b>
Cobbles	3 in	80 - 100%
Coarse Gravel	1 in	60 - 80%
Gravel	0.75 in	45 - 55%
Fine Gravel	#10 (2.0 mm)	35 - 45%
Coarse Sand	#20 (0.84 mm)	15 - 35%
Fine Sand	#100	0 - 4%
Very Fine Sand	#200	0 - 2%

The foreshore (type 2 material) would be composed of a combination of mix gravel and coarse sand, with 80-60% of gravel and 10-20% of coarse sand. The lower percentage of coarse sand on the foreshore will allow more permeability on the slope while also creating a natural look of the beach as seen south of the site.

**TABLE 2  
RECOMMENDED GRAIN SIZE DISTRIBUTION  
BEACH MATERIAL TYPE 2 - FORESHORE**

	<b>Screen / Sieve</b>	<b>Percent Passing</b>
Cobbles	3 in	--
Coarse Gravel	1 in	80-100%
Gravel	0.75 in	50-70%
Fine Gravel	#10 (2.0 mm)	20-40%
Coarse Sand	#20 (0.84 mm)	10-20%
Fine Sand	#100	0-4%
Very Fine Sand	#200	--

The backshore (type 3 material) would be composed of uniform gravel about 75%-85% of the material with a smaller percentage of coarse gravel of 10%. There will not be fine or sand materials, with no more than 15% to 25% of fine gravel. The backshore will be mucho more permeable (as seen south of the site) reducing the risk of formation of water puddles on the backshore and allowing the water seepage through the beach back to the Puget sound.

**TABLE 3  
RECOMMENDED GRAIN SIZE DISTRIBUTION  
BEACH MATERIAL TYPE 3 - FORESHORE**

	<b>Screen / Sieve</b>	<b>Percent Passing</b>
Cobbles	3 in	--
Coarse Gravel	1 in	90-100%
Gravel	0.75 in	75-85%
Fine Gravel	#10 (2.0 mm)	15-25%
Coarse Sand	#20 (0.84 mm)	--
Fine Sand	#100	--
Very Fine Sand	#200	--