

DACITE PUMICE – THE SUPERIOR LIGHTWEIGHT FILL

Garibaldi Pumice provides dacite (white) pumice lightweight fill (LWF), an extremely lightweight, naturally occurring aggregate for geotechnical applications. The compacted, dry density of dacite pumice is 40-46% lower than that of red vesicular basalt, an alternate LWF product (Table 1). Even after considering water absorption of the two products, and the finer gradation of our material (Figure 1), compacted dacite pumice remains 18-26% lighter (Table 1 - Saturated Surface-Dry densities). Finer gradation is often required to meet project specifications and results in less voids, better compaction, and reduced risk of settlement.

The compacted dry density of dacite pumice is 40-46% lower than that of coarser red vesicular basalt.

Are you an Engineer?

Use the lightest aggregate available and reduce the excavation required or enjoy an increased design safety factor.

An Owner or Contractor?

Use the lightest aggregate available and reduce your costs.

Lighter material translates into lower design volume requirements, reduced risk of compression of native soils and viable use at more sites. Dacite pumice has been used in areas with challenging soils where red vesicular basalt was determined to be too heavy (e.g. Fraser Highway).

Garibaldi pumice is quoted by volume (price/m³) rather than by weight (price/tonne); the same units engineers use to quantify LWF requirements and contractors use to bid. As all lightweight aggregates absorb water in the material's pores, the delivered density will vary with water content. If fill is purchased by the tonne, the volume received will vary. Therefore, the heavier the material, the less volume received per tonne.

Our product has excellent strength and durability, exceeding California Dept. of Transportation (Cal Trans) LWF quality specifications. It is on the **BC Ministry of Transportation and Infrastructure Recognized Product List** and has been used widely throughout the lower mainland, including the Highway 1 project. See www.garibaldipumice.com for additional information. Email info@garibaldipumice.com to obtain supporting test reports for CBR, Durability Index, R-value and Shear Strength results.

Garibaldi Pumice LWF is on the BC MOTI Recognized Products List and exceeds the Cal Trans R-value and Durability Index specs by a wide margin.

Example 1: 20,000 cubic metres of LWF is required

- If red vesicular basalt is used, 20,000 tonnes is required (assumes 1000 kg/m³ moist, compacted, in-place density). If dacite pumice is used, 16,000 tonnes is required (assumes 800 kg/m³ moist, compacted, in-place density).
- **Bottom Line using Dacite Pumice: 20% less loading on underlying materials resulting in an increased design safety factor.**

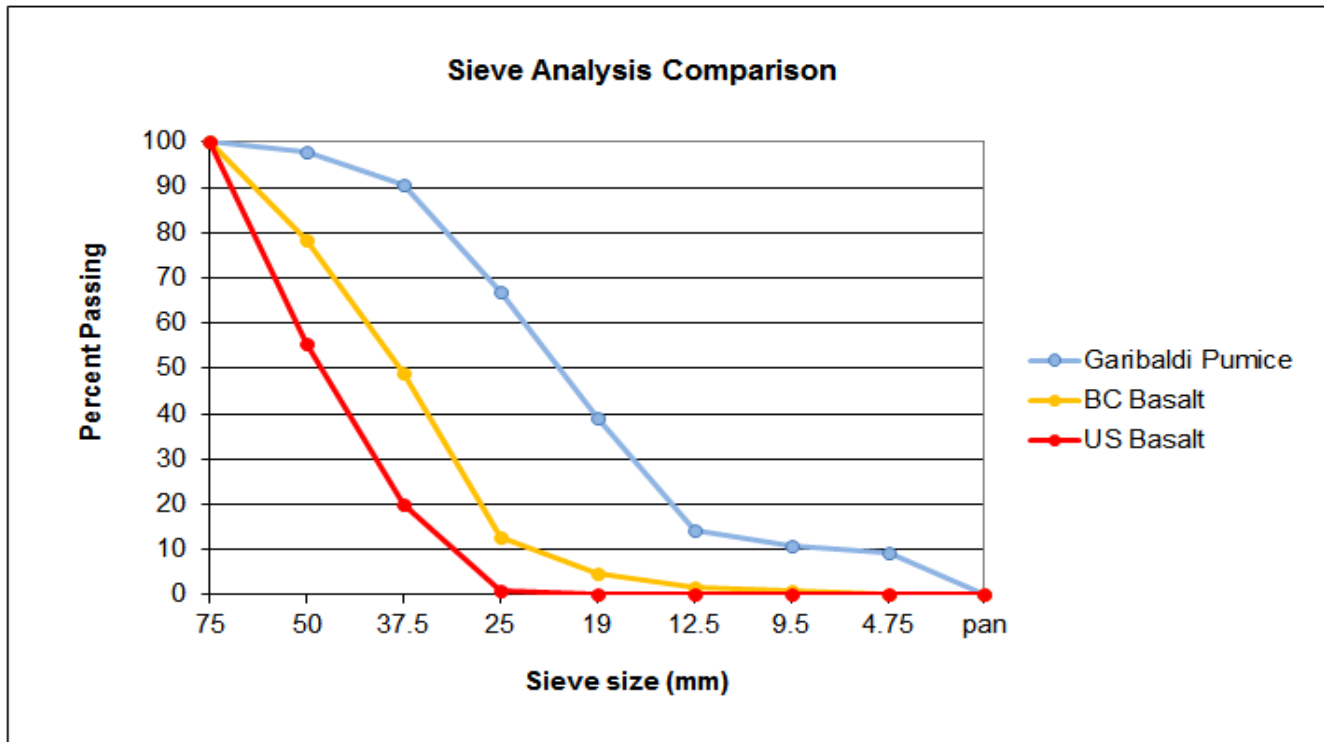
Example 2: A 10,000 tonne load compensation is required (assume native soil is 1800 kg/m³)

- If red vesicular basalt is used, 12,500 cubic metres is required however, if dacite pumice is used 10,000 cubic metres is required (assume moist, compacted, in-place densities as above). If the cost of both aggregates is equal (for example \$75 per cubic metre), the cost for the red vesicular basalt is \$937,500 whereas the cost of the dacite pumice is \$750,000.
- **Bottom Line using Dacite Pumice: \$187,500 cost savings on the material alone.**

**Table 1 - Density Comparison of
Garibaldi Dacite Pumice and Red Vesicular Basalt**

| | | Garibaldi Pumice 3 to ½ inch | BC Red Basalt 3 to ¾ inch | US Red Basalt 3 to 1 inch |
|---|---------------------|---|--------------------------------------|--------------------------------------|
| Dry Density (kg/m ³) ASTM C29 | Loose | 448.5 | 681.7 | 755.7 |
| | Compacted - Rodding | 473.3 | 794.3 | 870.6 |
| | Compacted - Jigging | 503.5 | 845.3 | 927.8 |
| Relative Density (Specific Gravity) Saturated Surface-Dry basis (g/cm ³) ASTM C127 | | 1.189 | 1.566 | 1.841 |
| Absorption (% of dry density) ASTM C127 | | 50.1 | 9.0 | 9.4 |
| Mass of Water Absorbed - Jigged Material (kg) | | 252 | 76 | 87 |
| Saturated Surface- Dry Density (kg/m ³) ASTM C127 | Loose | 673 | 743 | 827 |
| | Compacted – Rodding | 710 | 866 | 952 |
| | Compacted – Jigging | 756 | 921 | 1015 |
| % Compaction | | 5-11% | 14-19% | 13-19% |

Data from Density Comparison of Lightweight Aggregate – Dacite Pumice and Red Vesicular Basalt, Golder Associates, 2012. Supporting test reports available upon request - info@garibaldipumice.com.



**Figure 1 - Sieve Analysis Comparison of
Garibaldi Dacite Pumice and Red Vesicular Basalt**