On graphs with a small circuit spectrum

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We determine the simple connected edge-weighted graphs with cycles of just two different weights. This result is related to previous work on finding the graphs and matroids with a small range of cycle (circuit) sizes due to Cordovil, Edmonds, Lemos, Lewis, Maia, Murty, Neudauer, Putnam, Reid, Sheppardson Wu, Young and others. All sufficiently large graphs of this type are topological minors of a single family of graphs.