Many different models of random knotting have been used to study a wide variety of properties of knots and links. Random grid diagrams are one such model. In 2017, Harvey and O’Donnol defined graph grid diagrams, a generalization of knot and link grid diagrams, which represent transverse spatial graphs. We use computational methods to generate samples of random graph grid diagrams and investigate properties of the spatial graphs they represent. (Received September 15, 2020)