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In this paper we introduce a new discrete weak gradient operator and a new weak Galerkin (WG) finite element method for second order Poisson equations based on this new operator. This newly defined discrete weak gradient operator allows us to use a single stabilizer which is similar to the one used in the discontinuous Galerkin (DG) methods without having to worry about choosing a sufficiently large parameter. In addition, we'll establish the optimal convergence rates and validate the results with numerical examples. (Received September 17, 2013)