Transition metal oxides are an important research area due to their wide range of applications such as photovoltaics, catalysts, batteries, cancer therapeutics, etc. Materials used in these applications are highly tunable due to the oxidative properties of the transition metals influenced by their d orbital character. Much computational research has been focused on developing methods to better predict material properties which results in increasing the cost with improved chemical accuracy and system size. We seek a different strategy to materials design where we build off the cost-effective formalism of DFT which has been successful in predicting chemical design parameters for many systems along with using experimentally available crystal structures. A shortcoming of DFT is the tendency to overdelocalize d and f orbital electrons that are highly correlated causing the bandgap to shrink and possibly predict the incorrect electronic field splitting. To correct for the overdelocalization of electron density, a Hubbard U term can be applied to include on-site Coulomb repulsion while maintaining the cost-effectiveness of DFT. In literature, U is often treated as a tunable parameter to acquire the band gap expected from experiment or simply selected from another paper. U is pseudopotential dependent and currently no PSP database comes with suggested U values to use. Also, U must be determined a priori for systems that have yet to be synthesized. These are two impediments for this methodology. In this work we derive Hubbard U terms using the linear response method for the 3d, 4d, and 5d rows of transition metals using the GBRV ultrasoft pseudopotential set where we systematically vary the oxidation state of the transition metal, along with its chemical environment. From our results we discuss how U should track with periodic trends and how it can be applied for structures with more than one oxidation state or in complex metal oxides.