The right-turn Flashing Yellow Arrow (FYA) signal phasing is a new signal practice in the United States. The Manual on Uniform Traffic Control Devices (MUTCD 2009) allocates a signal phasing section for the right-turn FYA. The right-turn FYA signal phasing requires four-section head FYA signal. It supports multiple phases’ indications that guide the motorist through permissive, protected, and/or permissive/protected phases. This dissertation investigated three permissive right-turn FYA signal phases in various traffic conditions and signal timing circumstances. The first permissive right-turn FYA signal phase is a Right-turn on Impeding Through (RTOIT) taking place during the cross-street through traffic movement. The second permissive right-turn FYA signal phase occurs during the opposing left-turn approach movement so called Right-turn on Impeding Left (RTOIL). The third permissive right-turn phase is a right-turn on adjacent through green impeded only by the side street pedestrians called Right-turn on Adjacent Through (RTOAT). The research aimed to develop warrants lead to efficient implementation of permissive right-turn FYA signal phases based on microsimulation analysis. Multinomial logit models were developed to establish a decision support system that predicts the efficiency attributes of the permissive right-turn FYA signal phases.