In this report, we first review information on safety needs related to darkness and vehicle headlighting, and then present new software simulation results, from the CHESS model, for a set of hypothetical adaptive driving beam (ADB) systems. Studies of crash data indicate that the main elevation in risk attributable to darkness, rather than to other nighttime risk factors such as alcohol and fatigue, is for pedestrian crashes. The increase in risk for pedestrians in darkness is large; in terms of fatalities, about 2,334 pedestrian deaths per year in the U.S. can be attributed to the effects of darkness. CHESS simulations of the effects of ADB systems on driver vision indicate that these systems can be expected to provide large improvements in pedestrian visibility over current low-beam headlighting. Although specific safety benefits cannot be inferred directly from studies of visibility, ADB systems therefore may offer substantial improvements in safety. The potential safety benefits of ADB systems can be expected to apply primarily to pedestrian crashes. If ADB systems are able to control glare reasonably well, it may be advantageous to consider using base photometric levels that are even stronger than current high-beam headlighting.