TO: LFEV-ESCM Team  
FROM: John Augelli  
DATE: 28 November 2012  
SUBJECT: Tractive System Cable Choice  

ABSTRACT:  
This document describes the requirements and restrictions for the cable that will connect the battery packs and the motor controller. It also recommends a specific cable to use.

TECHNICAL FINDINGS:  
Motor simulations have required that the motor receive somewhere between 50-120 Amps over the length of an entire race. This wide range can be accounted for by the fact that the simulation is constantly changing and is still a work in progress. So in order to make sure that this range is covered completely, a gauge should be chosen that can sustain more than 120 Amps. In addition, the cable needs withstand an impulse discharge current of around 650 amps, for around 10 seconds. This estimate for current and time is very liberal, however it will ensure that the cable chosen is well-suited to fit the application.

RECOMMENDATIONS AND DECISIONS:  
With all of these requirements being taken into consideration the recommendation is to purchase 100 ft. of 2/0 AWG standard battery cable from McMaster-Carr. According to http://lugsdirect.com/WireCurrentAmpacitiesNEC-Table-301-16.htm this gauge wire is suited to handle 145 Amps with a max temperature of 60 degrees C. The specification in the hybrid vehicle rules states that the maximum temperature rise in cables is 40 degrees above the ambient. So the 60 degrees C rating for 145 Amps is within the requirement. Also, the attached thermal simulation shows that the 2/0 AWG can handle the specified impulse discharge current. In fact, there is no significant increase in temperature.

ATTACHED DOCUMENTS:  
The thermal simulation results of a 1 foot 2/0 AWG wire is attached.