



DARPA Urban Challenge

Event Guidelines

October 10, 2007

Document Change Summary

Section & Page Number	Description of Change	Date of Change
	Initial release	October 1, 2007
2. Team Photos (pg 7)	Team Photos	October 5, 2007
2. Media (pg 9)	Team Press at Military Robotics Session	October 5, 2007
4. Event Coverage (pg 12)	Removed deadline for 3D models	October 5, 2007
4. Event Start (pg 12)	Chute spacing & start roads	October 5, 2007
4. Speed Limits (pg 16)	Speed Limits	October 5, 2007
4. Zones (pg 16)	Zones	October 5, 2007
2. Practice Areas (pg 8)	Practice Area 1 note	October 8, 2007
4. Event Start (pg 12)	Start dimensions provided	October 8, 2007
4. Speed Limits (pg 16)	Speed limits clarified	October 8, 2007
4. Zones (pg 16)	Zone numbering reinstated	October 8, 2007
4. Overnight Operations (pg 16)	Overnight operations added	October 8, 2007
1. Applicability (pg 1)	CA Driver Handbook reference	October 10, 2007
1. Schedule (pg 2)	Minor schedule updates	October 10, 2007
4. Mission Finish & Final Mission Finish (pg 16,17)	Non-autonomous operation clarified	October 10, 2007
4. Prizes (pg 17)	Prizes language added	October 10, 2007

Table of Contents

1	Introduction	1
2	Operations	4
3	National Qualification Event (NQE).....	10
4	Urban Challenge Event (UCE)	12

1 Introduction

Applicability This document provides instructions for operations at the National Qualification Event (NQE) and Urban Challenge Event (UCE) which will take place at the Southern California Logistics Airport (SCLA) in Victorville, California from October 24 to November 4, 2007. The guidance in this document supersedes earlier guidance.

Semifinalist teams must adhere to the following:

- Team vehicles must arrive before 1600 on October 25.
- Team leaders must attend the Team Welcome Meeting at 1700 on October 25.
- Team leaders must participate in the NQE Opening Ceremony at 0700 on October 26.
- Vehicles must undergo inspection and E-stop testing on October 26. Vehicles must pass these tests to participate in NQE.
- Team leaders must participate in the Finalist Announcement Ceremony (time to be announced) on November 1.

Finalist teams must adhere to the following:

- Vehicles must be ready and participate in practice starts 0530-1400 on November 2.
- Team vehicles and team leaders must participate in the Opening Ceremony at 0630 on November 3.
- During the course of the final event, members of the team launch crew must be on hand to start the vehicle at the start of missions, and be available to go on the course as required.

DARPA may call additional meetings during the course of the event. Team leaders must monitor the bulletin board at the Information Tent and are reminded to keep their cell phones on and charged.

A link to the California Driver Handbook has been posted on the Urban Challenge website.

Schedule The following times are approximate and subject to change:

National Qualification Event

Wednesday, October 24

0700 Event site open to teams
0700-1700 Registration open

Thursday, October 25

0700-1700 Registration open
0730-1700 Practice areas open for vehicle calibration
1700-1800 Team Welcome Meeting

Friday, October 26

0700-1700 Registration open
0700-0730 NQE Opening Ceremony
0730-1200 Vehicle inspection and E-stop test
0800-0900 Block 1 practice area signup
1220-1700 Block 1 testing (practice areas open)
1500-1600 Block 2 practice area signup

Saturday, October 27 – Wednesday, October 31

0700-1700 Registration open
0730-1210 Block 2,4,6,8,10 testing
0900 Deadline for block 3,5,7,9 practice area signup
1230-1710 Block 3,5,7,9 testing
1600 Deadline for block 4,6,8,10 practice area signup

Thursday, November 1

0700-1700 Registration open
TBA Announcement of finalists

Urban Challenge Event**Friday, November 2**

0500-1700 Registration open
0530-1400 Practice starts
1300-1600 Military Robotics Session
1700-2000 Barbecue

Saturday, November 3

0400-1700 Registration open
0430-0800 Event Day Breakfast (Event Tent)
0530 Vehicles in start chutes
0545 MDF distribution
0630 Opening Ceremony
0700 First vehicle launched

Sunday, November 4

0800 Finalist Team Recognition
1000 Awards Ceremony
Event Rain Date

Note that these times reflect start times, and in some cases teams are expected to have vehicles ready 30 minutes early.

Pit areas are restricted to team members with appropriate credentials from 2000 to 0600 every night.

Area Layout

Figure 1 shows the driving route to the event site.

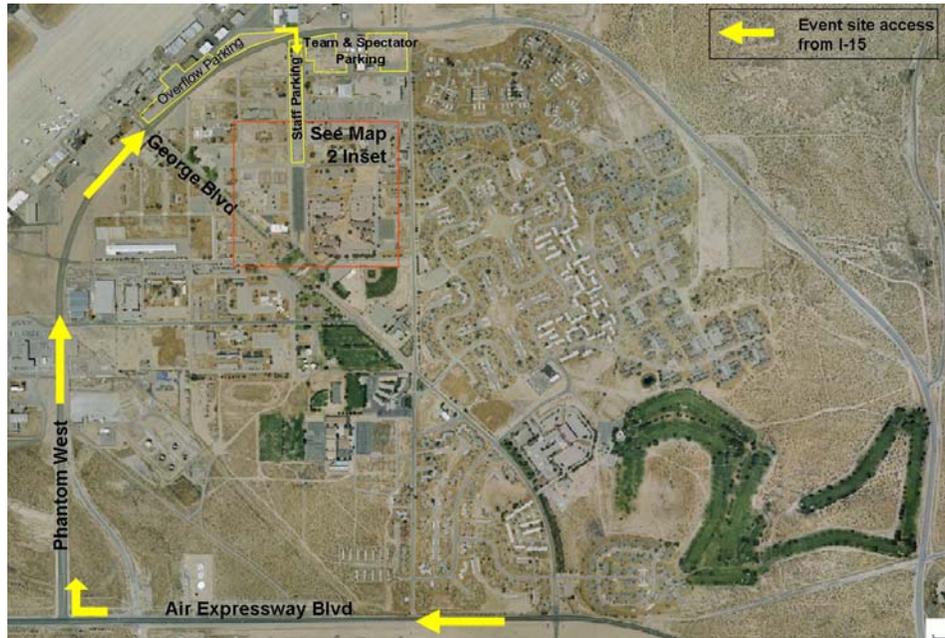


Figure 1. Driving map to site from I-15.

The inset in Figure 2 shows the team areas near the Urban Challenge start area.

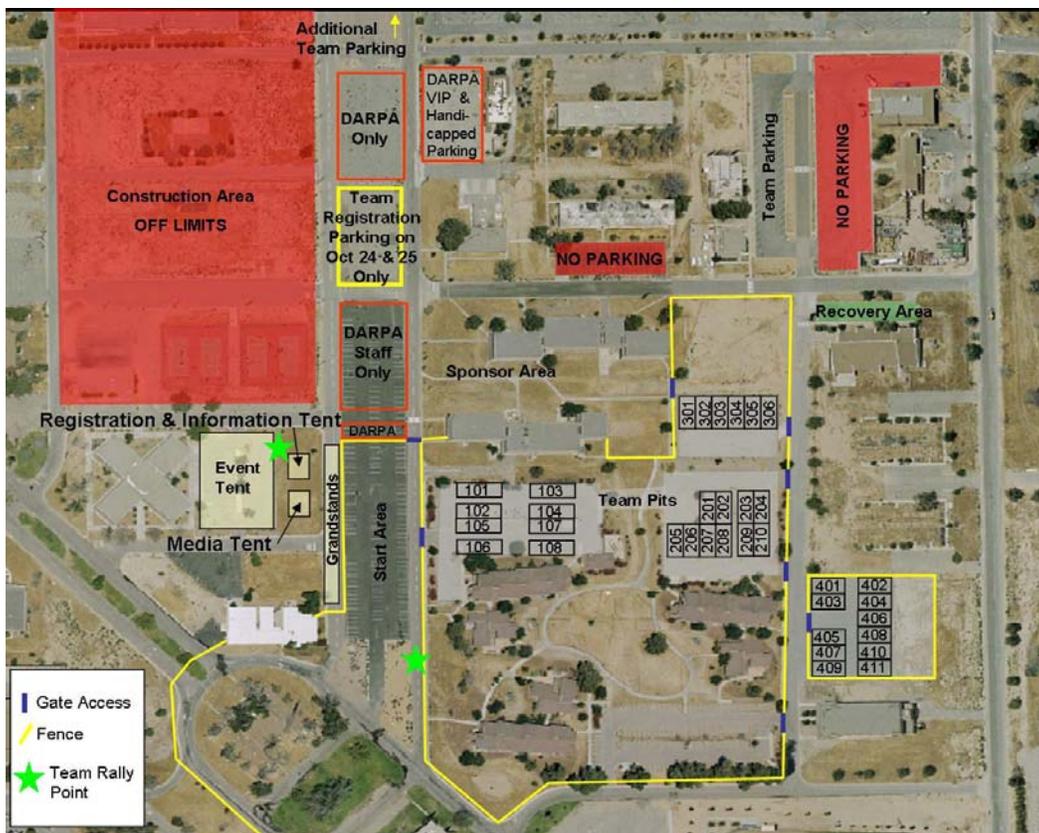


Figure 2. Start Area.

Much of the SCLA area is privately-owned or reserved for testing by DARPA. Figure 3 shows areas that are accessible to teams during the event. These include the pit area and the spectator areas. Team members are restricted from testing areas at all times. Teams may view NQE testing from designated viewing areas while testing is taking place, but may not venture onto the test areas at any time without DARPA permission and escort. Teams caught scouting the course will be disqualified.

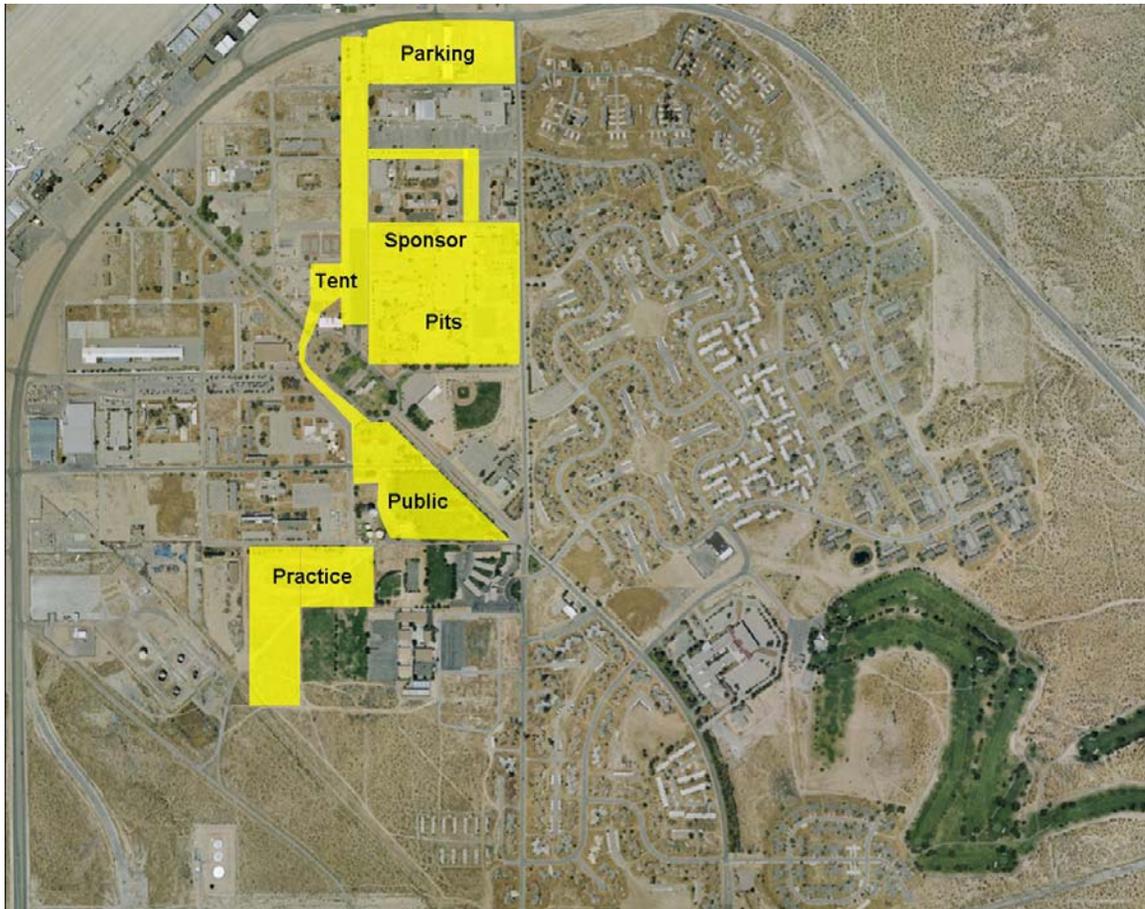


Figure 3. Team accessible areas at NQE.

2 Operations

Shipping To ship a vehicle directly to the site, teams should send a request to GrandChallenge@darpa.mil to ensure proper handling on-site. All shipments to the site should be addressed:

DARPA – *TEAM NAME*
Trailer across from:
18425 Starfighter St.
Victorville, CA 92394

Starting October 18, DARPA personnel will be on-site to accept shipments. Please be sure to include the team name on the shipping label to ensure efficient delivery of the package to the correct team. Teams may inquire about materials that have been sent at the Information Tent.

Registration All team members are required to pre-register. Up to 25 team members (team leader included) are allowed on the team roster and will receive credentials for pit access during restricted hours without an escort. Additions, deletions, and replacements to the team roster will be handled on-site at registration. Roster changes must be confirmed by the team leader.

Travel and lodging information is available at the registration website www.sainc.com/uc2007/teamreg.

Team Check-in Teams may arrive at the site between 0700 and 1700 on October 24-25. All team members should temporarily park vehicles in the team registration parking area (Figure 2) and check-in at the Information Tent to receive an information packet and photo badge. If possible, photos for the badge should be submitted in advance as described on the registration website. Tickets purchased on the registration website for the Barbecue on November 2 and Breakfast on November 3 will be distributed at check-in. Additional tickets will be available for purchase, although availability is limited.

E-stop transmitters will be collected from each team at registration, and a receipt will be returned indicating Government acceptance.

DARPA will provide teams with the RNDF and MDF for the E-stop test and the RNDF for the NQE course at check-in.

Teams will receive five safety vests for their launch crew.

Parking Teams may park as many vehicles within the pit area as their pit area will accommodate. Team vehicles may not remain in the sponsor areas and may not block the access roads. Additional team vehicles must be parked in other designated parking areas for the event.

Pits Each team will be assigned a pit area of at least 1600 square feet on paved surface. Teams with large trailers may allow these vehicles to protrude on the dirt area (if any) abutting their pit. Pit assignments are given in Table 1.

Team members with credentials may work in the pit area 24 hours. A team member without credentials or team guest may be escorted into the pit area during restricted hours by a credentialed team member who must stay with all guests in the pit area until they leave. Sleeping or camping on SCLA property, including pits and parking areas, is not allowed. Team members that abuse their privileges in any way are subject to loss of their pit credentials.

Teams should plan to provide their own shelter in the pits and should be aware that the area is subject to occasional strong winds. The entire pit area is enclosed by a perimeter fence, however fencing is not provided between the pits. Overhead lighting is provided in the pit area, but no electrical power, water, or other amenities is provided. Teams may use generators, but care in the handling of fuel including the use of spill mats and ready access to a fire extinguisher is required. Details of the fueling process will be provided at registration.

DARPA will provide roving security patrols 24 hours a day from 0700 on October 24 until 1200 on November 4. Teams are responsible for security of their vehicle and equipment, and should lock up tools and other valuables when unattended.

Teams are allowed to bring their vehicles off-site for fueling or repair by signing out at the Information Tent. Vehicle testing is not allowed on the public streets, including all areas of the base except those designated for this purpose by DARPA. Wireless internet access (802.11b) is available in the Event Tent with power strips for charging laptops.

Table 1: Team pit assignments

101	Team Caltech
102	Austin Robot Technology
103	Stanford Racing Team
104	Georgia Tech/SAIC Sting Racing
105	Team Cybernet
106	Team Case
107	Team Berlin
108	Team-LUX
201	Gator Nation
202	SciAutonics/Auburn Engineering
203	OdyEra
204	Avant Guardium
205	Team Gray
206	Team CajunBot
207	Axion Racing
208	University of Utah
209	Insight Racing
210	OSU-ACT
301	Team Osh Kosh Truck
302	Team Autonomous Solutions
303	Victor Tango
304	MIT
305	Ben Franklin Racing Team
306	Tartan Racing
401	Princeton University
402	Team UCF
403	Team Juggernaut
404	Honeywell
405	Team Urbanator
406	Team Cornell
407	Golem Group
408	Mojavaton
409	Team Jefferson
410	Team Annie Way
411	CarOLO

The following rules apply in the pits:

- Smoking is not allowed in the pit area. Open flames of any kind (propane stove, barbecue grill, etc) are not allowed in this area.
- Pets are not allowed in the team pit area or in the main spectator area. Pets are allowed in the satellite spectator areas (public areas in Figure 3). All local animal control laws must be obeyed.
- Alcohol consumed on-site during the event must be purchased from the licensed, on-site vendor. No alcoholic beverages may be brought onto the event site property.

- The pits are a work area. Loud music or activities that are disturbing to other teams are not allowed.

Team Welcome Meeting The Team Welcome Meeting will take place October 25 at 1700 in the Event Tent. Basic instructions and guidelines for the event will be presented at this meeting. Attendance is mandatory for team leaders and recommended for team members.

Opening Ceremony On October 26, all team leaders should be in the start area at 0630 to participate in the NQE opening ceremony. Vehicles should be pre-staged for E-stop testing.

NQE Team Photos On October 25, DARPA leaders will meet team members and pose with them for a team photo in the team pit area. Teams are encouraged to wear their team colors and have their vehicle available for the photo. Teams leaders can sign-up for a time slot by sending an email to GCLogistics@darpa.mil or during on-site registration. Teams in Pits 101-210 will be visited 0845-1200; teams in pits 301-411 1230-1630.

Scheduling will be arranged to avoid conflict with time in the practice area.

Safety Inspection and E-stop Test Vehicle safety inspection and E-stop testing will be conducted immediately following the NQE Opening Ceremony in the start area and in the two practice areas. The test location for each team is given in the list below:

Start Area	Practice Area 1	Practice Area 2
Austin Robot Technology	Princeton University	Team Gray
AvantGuardium	SciAutonics/Auburn Engineering	Team Jefferson
Axion Racing	Stanford Racing Team	Team Juggernaut
CarOLO	Tartan Racing	Team Oshkosh Truck
Gator Nation	Team AnnieWay	Team UCF
Georgia Tech / SAIC Sting Racing	Team Autonomous Solutions	Team Urbanator
Honeywell/IVS Team	Team Berlin	Team-LUX
Insight Racing	Team CajunBot	The Ben Franklin Racing Team
MIT	Team Caltech	The Golem Group
Mojavaton	Team Case	University of Utah
Ody-Era	Team Cornell	VictorTango
OSU - ACT	Team Cybernet	

Teams must stage their vehicles at 0600 in their assigned test areas before the NQE Opening Ceremony, and be sure that launch crews are available to conduct the test after the ceremony. The E-stop test will follow the format of the E-stop test that was conducted at site visits.

Each team must pass the safety inspection and E-stop test before being allowed to operate at NQE.

E-stops Teams must have a DARPA-supplied E-stop system integrated and tested on their vehicle before arriving at NQE. E-stop technical support is available on-site by inquiring at the Information Tent.

Teams not selected as finalists must turn in their E-stop systems on November 1 after the announcement, as directed by DARPA. Finalist teams must turn in their systems before 1200 on November 4.

Food and Beverage Teams are responsible for providing their own provisions throughout the event including water. Food and beverage concessions will be available on-site October 26 through November 3 from 0700 to 1500. Trash disposal and recycling containers will be available on-site.

Fueling Teams may fuel their vehicles using a UL-approved fuel container (maximum capacity 10 gallons) on the fuel mats in the pit area. One mat will be provided in each pit for team use. All containers must have a pouring spout and be sealed with threaded closures to ensure safe handling. The container must be clearly labeled with the team's name and number. Vehicles that are street-legal may be driven to local service stations for fuel. Details regarding the fueling procedure will be available at check-in.

Practice Areas Two graded dirt lots without signs or markings are available for use by teams for vehicle calibration and practice. These areas are enclosed by K-rail barriers and are provided with two traffic barrels and a DARPA-operated E-stop transmitter. Teams may create an RNDP for this area, test sensors, or use it in other ways to improve the performance of their vehicle. Teams may place obstacles in the practice area including team-provided vehicles, but no humans, either in or out of vehicles, may be present in the practice area during autonomous operation Practice Area 1 has a telephone pole (unpowered and disconnected) located at 34.577621, -117.371270 that teams should consider when creating RNDPs.

Practice areas will open on October 25 to allow each team 30 minutes for preliminary calibration of their vehicle according to the following fixed schedule:

Session	Practice Area 1	Practice Area 2
0730	CarOLO	Gator Nation
0800	Axion Racing	Team Autonomous Solutions
0830	Team Case	Team Cornell
0900	Team Gray	Team Jefferson
0930	Victor Tango	Team Juggernaut
1000	Ben Franklin Driving Team	Team Berlin
1030	Ody-Era	Team CajunBot
1100	Team Cybernet	MIT
1130	AvantGuardium	Sting Racing
1200	Insight Racing	Stanford Racing Team
1230	SciAutonics/Auburn Engineering	Mojavaton
1330	Intelligent Vehicle Systems	Princeton University
1400	Austin Robot Technology	Team Urbanator
1430	Team LUX	Tartan Racing
1500	Team UCF	The Golem Group
1530	University of Utah	Team AnnieWay
1600	Team Oshkosh	Team Caltech
1630	OSU-ACT	

Teams may arrange to trade spots with other teams should the need arise. Teams should plan to arrive at the designated practice area 30 minutes in advance of their time slot. Teams who do not intend to make use of this opportunity or who have traded spots with another team should inform DARPA at registration.

The practice area will be open during NQE test blocks 1-10. Practice slots will be 40 minutes. Teams may request a practice time slot for the morning or afternoon session at

the Information Tent. Requests for a morning time slot are due by 1600 the day prior to the requested session. Afternoon time slot requests are due by 0900 of the requested day. When more practice slots are requested than are available, an algorithm will be used to determine priority based on whether the team has had access to a practice area before, in addition to other criteria.

The driving route to the Practice Area leaves the pit area on Weasel Street, travels south on Nevada Street through a controlled intersection, turns right on George Boulevard, left on Mustang Street and left on Starfighter Street. Teams should stay off the narrow road between the park and the school. Parking at the practice areas is available along the dirt access road.

Media Registered members of the media are provided with credentials to permit access to DARPA media briefings and access to spots along the route that are limited to media. One press badge will be provided to the team leader at check in for use by the team press liaison who is also a registered team member. Team members with press badges are not allowed to attend a briefing held prior to the Military Robotics Session from 1230 - 1330.

DARPA will have extensive video coverage of the event including footage from a helicopter. Airspace at the site is controlled, and no other air vehicles are allowed at the site for the duration of the event below 5000 ft AGL.

Sponsor Area Allotments will be worked out with DARPA prior to arrival for teams that request space before the deadline. Sponsor representatives should check in at the Information Tent upon arrival. The Sponsor Area is next to the pit area, but is not within the security fence. No electrical power is provided in this area.

Military Robotics Session On the afternoon of November 2 from 1300-1600 Government officials attending the Military Robotics Session will be allowed to tour the team pit area. These individuals represent user communities, acquisition agents, and other Government organizations tracking progress in the field. Teams interested in this interaction should be in the pit area and prepared to discuss their team and its capabilities. Posters or other items may be used to aid in this process. All semifinalist and finalist teams are welcome to take part in this activity

Barbecue and Breakfast At 1700 on November 2, doors will open for the Urban Challenge Barbecue in the Event Tent. Tickets may be reserved on the registration website, or purchased on a first come first serve basis at the Information Tent. Tickets are \$25 for adults, \$5 for children under 12 and free for children under 5.

At 0430 on November 3, a hot breakfast will be available for purchase in the Event Tent. Tickets may be reserved on the registration website or purchased on a first come first serve basis at the Information Tent. Tickets are \$12 for adults, \$3 for children under 12 and free for children under 5.

Launch Crews Each team is provided with five safety vests at registration. Team members wearing these vests will be allowed to launch and recover their team's autonomous vehicles at the start and finish of test events, and at the UCE. Use of these vests in combination with the DARPA-supplied picture identification is mandatory before a team member will be allowed in the start area or on the course.

Departure Semifinalist teams that are not selected as finalists need not vacate their pit until the event is complete. Security will be provided in the pit area until 1200 (noon) on November 4. Teams must completely vacate their pit area, including turn-in of their E-stop unit and removal of all trash and other materials by 1200 (noon) on November 5. Fuel mats should be left in the team pit on departure.

3 National Qualification Event (NQE)

Scheduling Testing at NQE will take place in morning blocks (0730 – 1230) and afternoon blocks (1230 – 1730). DARPA will start testing by launching the first team on the list, and proceed through all teams in order. The exact start time of each team’s test slot within the block is not determined in advance, as the schedule may be advanced or delayed depending on the testing schedule. This schedule is preliminary, and DARPA may choose to rework this schedule to be sure all teams are afforded a fair assessment. Teams must be ready to run when their turn comes. Teams should not request practice areas during their test blocks.

Each team is scheduled for one attempt at each of the three test areas, during the first five test blocks. The preliminary block assignments and group schedule for the first five blocks is shown below. Scheduling for subsequent blocks will be announced at the event.

Teams scheduled for the end of a test block are not required to be present when their test block starts, but must be staged and ready to launch when their turn comes.

NQE AREA			
	A	B	C
Friday Block 1	Ben Franklin Racing Team Mojavaton Team - LUX MIT Team UCF Team Juggernaut Ody - Era	Team CajunBot Stanford RacingTeam Team Cybernet Team Jefferson Gator Nation Honeywell/IVS Team The Golem Group	Team Gray Tartan Racing Team Cornell Team Caltech Axion Racing Team Urbanator SciAutonics/Auburn Engineering
Saturday Block 2	VictorTango Team Case CarOLO Team AnnieWay Team Autonomous Solutions Team Berlin Insight Racing	Team Gray Tartan Racing Team Cornell Team Caltech Axion Racing Team Urbanator SciAutonics/Auburn Engineering	Avant Guardium Austin Robot Technology Team Oshkosh Truck Georgia Tech/SAIC Sting Racing OSU - ACT University of Utah Princeton University
Block 3	Avant Guardium Austin Robot Technology Team Oshkosh Truck Georgia Tech/SAIC Sting Racing OSU - ACT University of Utah Princeton University	Ben Franklin Racing Team Mojavaton Team - LUX MIT Team UCF Team Juggernaut Ody - Era	Team CajunBot Stanford RacingTeam Team Cybernet Team Jefferson Gator Nation Honeywell/IVS Team The Golem Group
Sunday Block 4	Team Gray Tartan Racing Team Cornell Team Caltech Axion Racing Team Urbanator	VictorTango Team Case CarOLO Team AnnieWay Team Autonomous Solutions Team Berlin	Ben Franklin Racing Team Mojavaton Team - LUX MIT Team UCF Team Juggernaut

	SciAutonics/Auburn Engineering	Insight Racing	Ody - Era
Block 5	Team CajunBot Stanford RacingTeam Team Cybernet Team Jefferson Gator Nation Honeywell/IVS Team The Golem Group	Avant Guardium Austin Robot Technology Team Oshkosh Truck Georgia Tech/SAIC Sting Racing OSU - ACT University of Utah Princeton University	VictorTango Team Case CarOLO Team AnnieWay Team Autonomous Solutions Team Berlin Insight Racing

Test Areas The locations of test areas A, B, and C are shown Figure 4 below. Pedestrian access is available to Area A, and spectators may watch from behind the fence. Only members of the launch crew with safety vests are allowed within the fenced area.

Vehicles in Area B will be launched and recovered from the start area in Starfighter Lot. Access and autonomous vehicle parking is available from behind the start chutes. Spectators may view vehicle starts and finishes from the bleachers and view the autonomous vehicles traversing Sabre Street from the area abutting the team pits. Team members are forbidden from activities on Nevada Street except traveling to and from the team pits and the Practice Area or Area C.

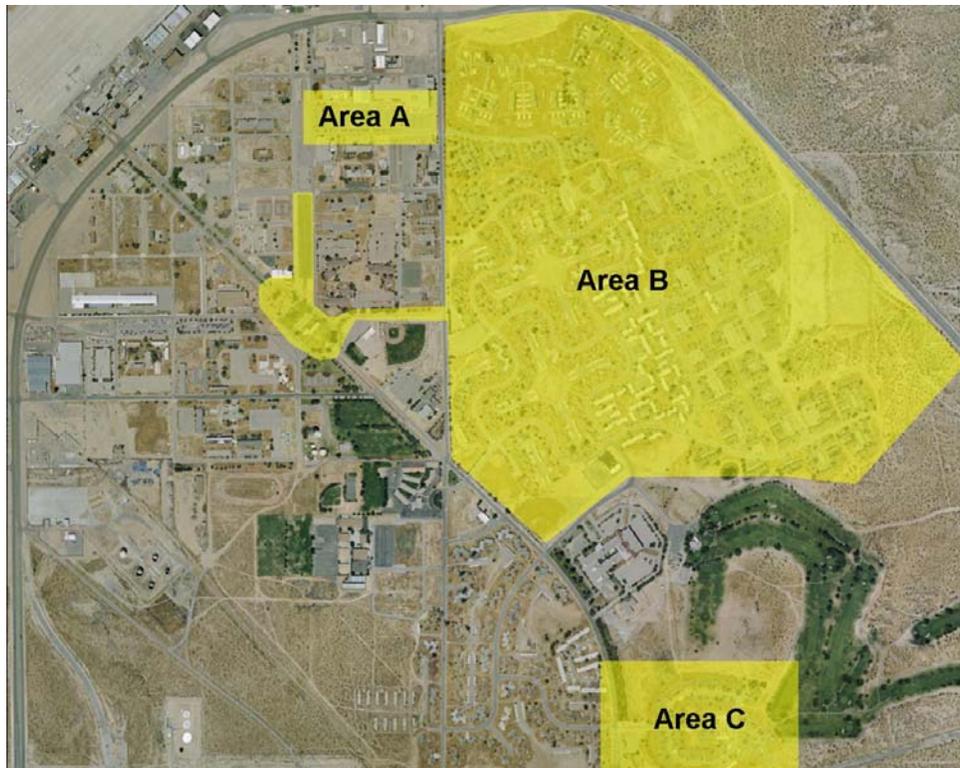


Figure 4: NQE test areas.

Testing Testing at NQE will use an RNDF provided upon registration which defines the road network at all three test areas. An MDF for each test will be provided onsite at least 5 minutes before the start of the test. Vehicles should be configured as for the UCE, and should be capable of exhibiting all required behaviors listed in the Technical Evaluation Criteria. Teams may not share MDFs or other information about the course with other teams, spectators, or members of the media until the completion of NQE. Vehicles must

be able to pull safely into moving traffic, avoid static and moving obstacles, and negotiate situations such as jammed intersections, obstacle zones, parking lots, and emergency stops. A number of different considerations will be used in judging performance, including safe operation, precision maneuver, regard for the rules, and speed. Teams should not assume that the maximum speed limit is necessarily safe or recommended, and should choose a safe speed based on conditions.

DARPA may choose to provide feedback to teams during the course of NQE, in which case this information will be available in the Information Tent.

Testing in Area B will make use of one or more of the start chutes for the UCE and will use a similar format making use of an RNDF zone.

Announcement of Finalists Finalists will be announced on November 1 at a time to be announced. Finalists will be provided with start chute assignments, the UCE RNDF, and the MDF for practice starts.

4 Urban Challenge Event (UCE)

Practice Starts On the morning of November 2, mandatory practice starts will take place in the start area. Teams must load the final event RNDF and move vehicles into place at 0530. At 0545, teams will have 5 minutes to load the MDF for the practice start mission. Team launch crews should wait near the mission finish area to recover their vehicle for replacement in the chute and reload of the MDF for the second practice start mission. Team launch crews should be prepared to continue this process as required until approximately 1400.

The RNDF for the UCE will be distributed at the finalist announcement on November 1 and the MDF for practice starts. Practice starts will make use of the UCE RNDF.

Event Coverage DARPA will produce a live video webcast of the UCE at a site linked to www.darpa.mil/grandchallenge. This site will also have tracking maps and a progress board to monitor each autonomous vehicle. A 3-D option may be available after the event that will allow individual vehicles to be tracked and viewed in a rendered landscape. A generic representation will be provided for each vehicle, or teams may optionally submit more realistic models including sponsor names and team name. (Note: teams are no longer required to submit their models by October 12.)

Event Start At 0530 on November 3, all vehicles must be ready to go in the assigned start chutes in the start area at Starfighter lot. The team's assigned start chute is used by the team at the start of the race, at the start of each mission, and to quarantine the vehicle after the course is finished.

Start chutes are aligned in a row with a center-to-center spacing of 14.5 ft (4.42 m), along the east edge of Starfighter lot. All chutes face the Start Zone (SZ), as shown in Figure 5. There is a stub road leading from each chute to the start chute zone. The stub road is nominally 10ft long, with the first waypoint 1 ft in front of the chute opening. An entry waypoint is located on the zone perimeter 5' directly in front of each stub road. The SZ has a single exit waypoint, which is located on the SZ perimeter. Only one vehicle will be in the start zone at a time.

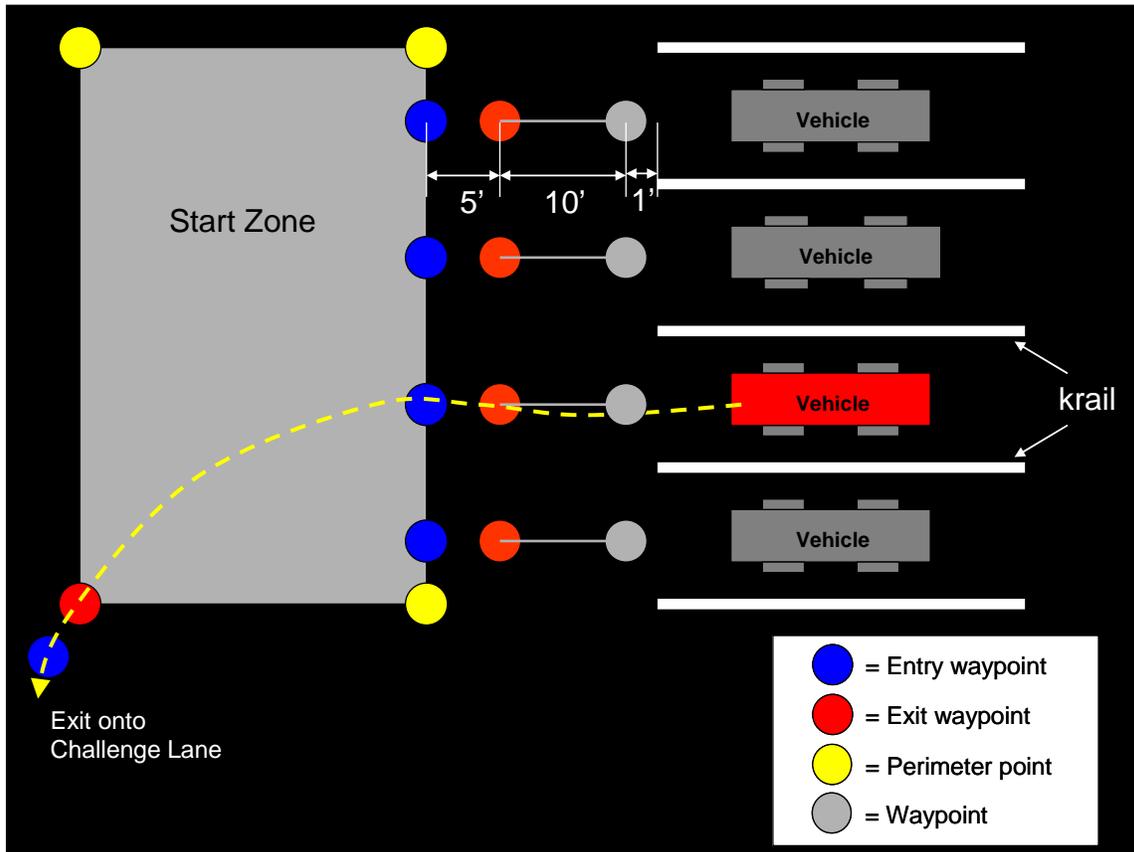


Figure 5. Start zone and 4 (of 20) start chutes.

Mission Restart Members of the team’s launch crew will return to the mission finish area between missions to recover and reposition their vehicle, load the MDF for the next mission, and re-launch the vehicle. The time that elapses in this process will not count against team’s run time provided the mission reload is accomplished in under 5 minutes. Load time in excess of 5 minutes will be added to the run time. Time to recover and reposition the vehicle will not count against the team. The team must have members of the launch crew in the finish area to recover their vehicle.

Team Information DARPA may request members of a team’s launch crew travel onto the course during stoppage of the event to restart a vehicle, reposition a vehicle, or remove a vehicle from the course. Should this take place, DARPA will use the public address system and call the team leader cell phone number. Team launch crew members should immediately proceed to one of two rally points (Figure 2) for transportation onto the course.

A Team Information Booth in the Main Tent will answer team inquiries about vehicles and vehicle recovery. Requests for team representatives to speak to the media or appear on the webcast will be forwarded to the Team Information Booth.

Vehicles that are towed off the course will be brought to the vehicle recovery area (Figure 2) and turned over to the team.

RNDF and MDF The RNDF for the UCE will be distributed at the Finalist Announcement Ceremony on November 1. MDFs for mission 1 will be issued at least 5 minutes in advance of the event start. With the E-stop in PAUSE, the team will load the MDF and configure the vehicle for autonomous operation. The team will then leave the start area and the vehicle will be launched. Subsequent MDFs will be provided to the team when the vehicle has been repositioned in the start chute after concluding the previous mission.

Traffic Circle Vehicles leaving the SZ will travel south on Challenge Lane to the traffic circle, shown in Figure 6. The traffic circle is configured as a single lane running counterclockwise. The RNDF will designate a solid white line separating the two one-way lanes of Segment M, meaning that once vehicles enter the southbound lanes via the entry waypoints, the vehicles must not cross the solid white line to enter a different lane.

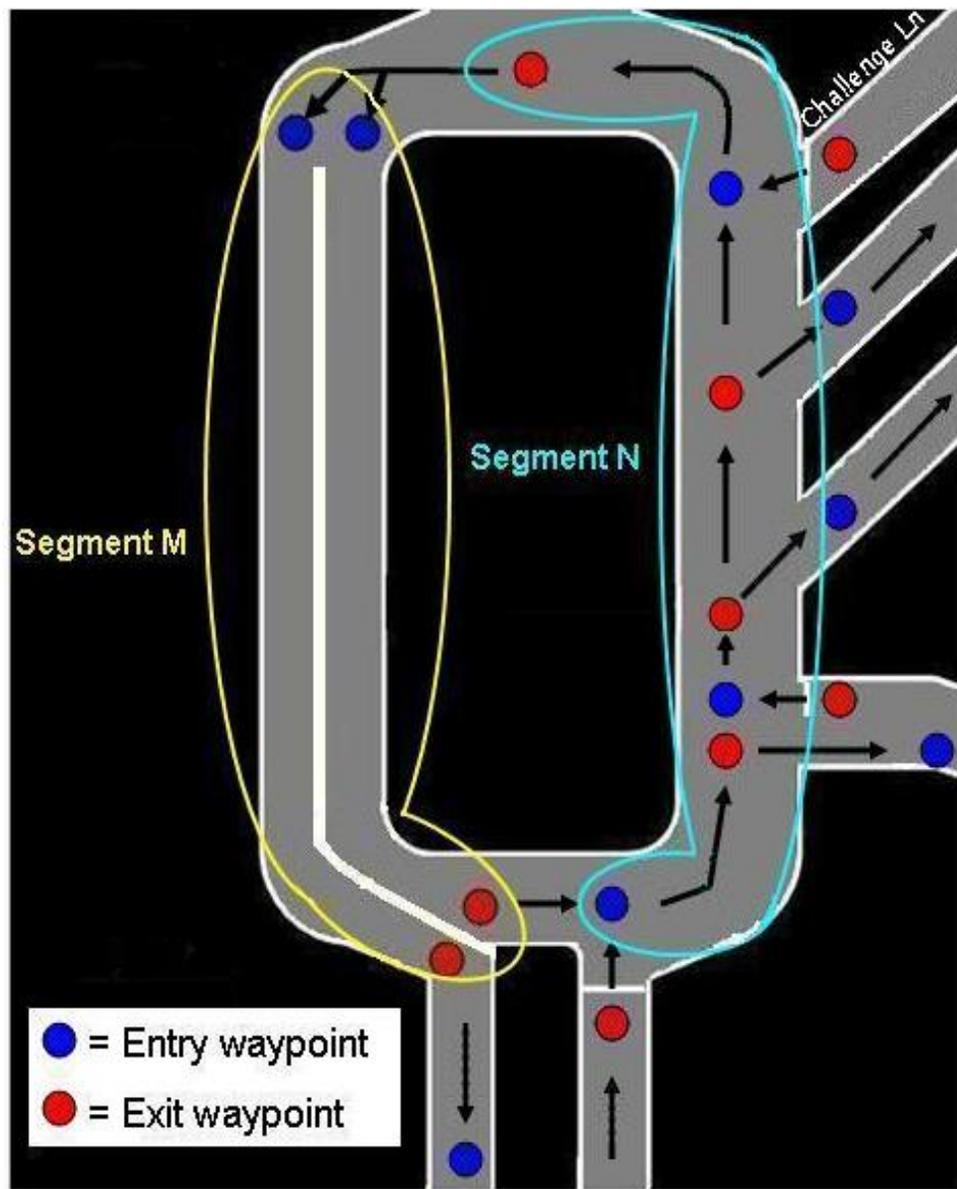


Figure 6. Traffic circle.

Lane Ending Within a single segment, one lane may end before the other lane due to construction or other hazards. Figure 7 shows an example in which traffic barrels have been used to indicate the blockage. The vehicle must detect that the lane has been blocked and merge safely with traffic in the other lane to achieve the next checkpoint.

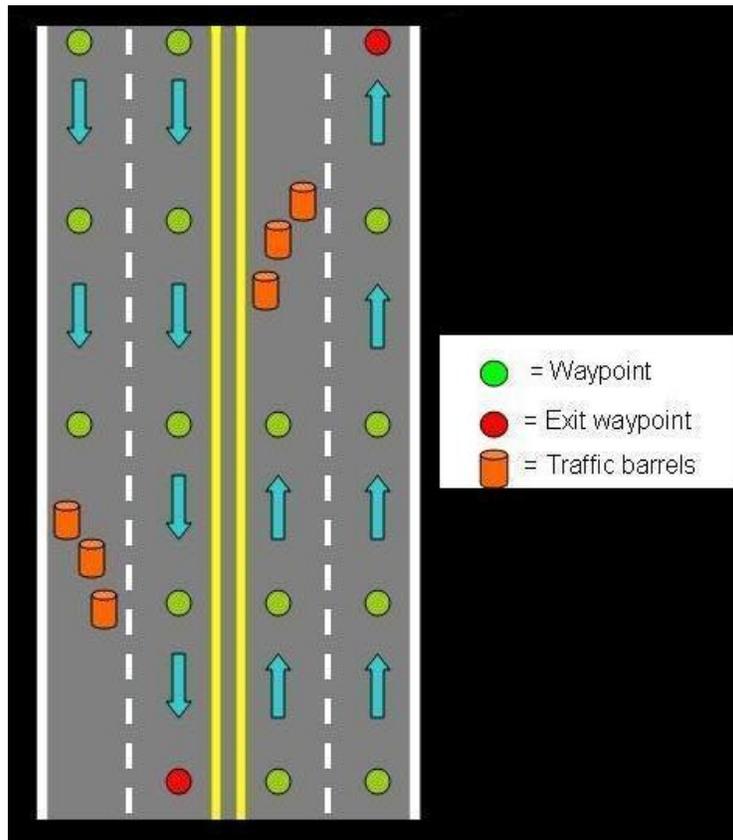


Figure 7. Traffic barrels marking the end of a lane.

Tee-stops Vehicles must safely negotiate intersections with two, three, or more stops, including situations such as that shown in Figure 8. In this case, two Tee-stops are offset from one another, forming a complex configuration.

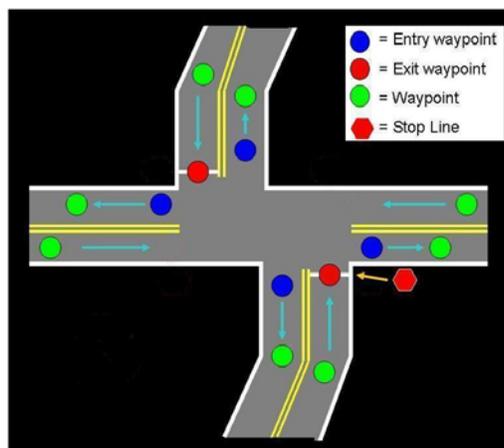


Figure 8. Offset intersection.

U-turns Vehicles may only make U-turns when encountering a blocked road or at a U-turn area designated in the RNDF. In some unusual situations in which a vehicle has left the route, a vehicle may make a U-turn in an attempt to return to the route. U-turns are allowed in zones.

Speed limits Maximum speeds in excess of 30 mph may be specified at various locations on the course. There is no requirement that a vehicle travel any faster than the minimum speed and no implication that the maximum speed limit is safe or recommended.

Off-road areas Vehicles are expected to navigate roads with unpaved surfaces in off-road areas. These roads are passable in a passenger vehicle, but are impassable off the road. These roads will not have marked centerlines or stop lines.

In some cases waypoints may be very sparse and vehicles must detect roadside berms or use some other means to stay on the road. These roads will be one-way.

Zones The RNDF **will not** contain gaps in the numbering of segments and zones. As stated in the RNDF specification, an RNDF will contain segments 1 thru M, followed by zones M+1 thru N.

Overnight Operations In case of inclement weather on the morning of November 3, the start may be delayed until November 4. If weather or other factors delay the event once it has started, it is possible that the event finish will be delayed. In this case, all vehicles will be stopped in place on the course before sundown and teams will be allowed to configure them to sit overnight, to be restarted in the morning. DARPA would work with each team to work out issues regarding the MDF.

Mission Finish The last checkpoint of all mission MDFs (except the final one) will coincide with the finish point on Pit Lane, as shown in Figure 9. The vehicle must come to a complete stop at the last checkpoint of the mission whereupon the vehicle will be placed in DISABLE mode by DARPA. A team representative must be present to take control of the vehicle when directed by DARPA officials. The vehicle must be driven in non-autonomous mode by a member of the team's launch crew to the team's assigned start chute, at which point the team will have 5 minutes to load a new MDF and prepare the vehicle for the next mission. When the vehicle is ready, the launch crew must signal DARPA and leave the start area before the vehicle can be launched.

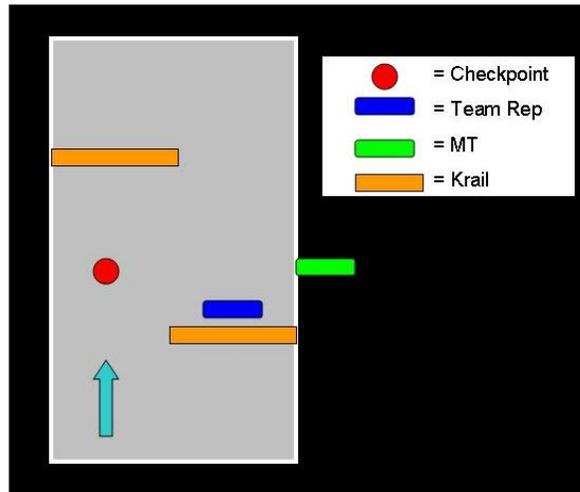


Figure 9. Mission finish area.

Final Mission Finish After completing the final mission, the vehicle will be paused at the finish line on Victory Lane before the final checkpoint. The last checkpoint will be located in the start chute zone where the vehicle must come to a complete stop before it is disabled. A team representative must be present to take control of the vehicle and move it in non-autonomous mode to the team’s start chute where it is quarantined until released by DARPA.

Determination of the Winner The Urban Challenge is constructed to determine the most capable vehicle, in terms of both vehicle speed and its ability to follow rules and demonstrate the capabilities described in the Technical Criteria. Vehicle speed is not the sole criteria. To qualify to win the event, a vehicle must complete the 60-mile course in less than 6 hours, avoid collisions, achieve all checkpoints, and obey the rules. Vehicles may finish the course in under 6-hours, but not qualify as winners. Vehicles that are impeding the smooth flow of traffic, driving dangerously, cause an accident, or are not making satisfactory progress may be pulled from the course at DARPA’s discretion.

A penalty table will not be published in advance of the event. Data collected during the race will be analyzed to give an overall picture of vehicle capability.

Finalist Team Recognition DARPA leaders will meet with team members to recognize their accomplishments prior to the Awards Ceremony on November 4. Team members should be in the start area with their autonomous vehicle no later than 0800.

Results will be announced at the Award Ceremony on November 4.

Prizes Cash prizes will be transferred by direct deposit. Each team leader should bring a deposit slip for the account into which the funds will be transferred.