National Automated Highway System Consortium
Technical Feasibility Demonstration Specification

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NAHSC 1997 Demonstration System Specification

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NAHSC 1997 Demonstration System Specification

04/07/97

The purpose of this Demonstration Specification is to capture high level requirements for all NAHSC 1997 Technical Feasibility Demonstration subsystems. Due to the nature of the Technical Feasibility Demonstration, those requirements are not what would be considered "classic" engineering requirements but do provide a "functional performance" baseline that can be used to certify the systems as "ready for Demonstration participation". Safety requirements provided in this specification are based on the Safety Plan but take precedence over the guidance provided in the plan. The specification will be used to document common requirements (which all scenarios must meet), scenario specific requirements, and safety requirements. Test procedures will be produced which focus on verifying the requirements as represented in the final version of this document. [2614,1, B]

1.0 GENERAL DEMONSTRATION REQUIREMENTS

1.1 Common Demonstration Vehicle Requirement

1.1.1 Vehicle Appearance

Vehicles in the Demonstration shall have a "production" appearance inside and outside (i.e. no bulky attachments should be mounted on the vehicle exterior or in the passenger compartment; vehicle controls for transitioning between manual and automated control should be standard switches or buttons). [2527,1, A]

1.1.2 Voice Communications

a. The Vehicle Developer shall provide in-vehicle voice communications compatible with the 1997 Demonstration voice communications system in all vehicles participating in the "live" demonstration. [2528,1, A]
b. Portable in-vehicle voice radio for team support/coordination shall be equipped with headset and have push-to-talk voice activated transmit capability. [2628,1, A]

1.1.3 Seat Belts

a. Passenger cars shall be equipped with seat belts and shoulder restraints. [2531,1, B]
b. Maintenance vans shall be equipped with seat belts and shoulder restraints. [2616,1, A]
c. Trucks shall be equipped with seat belts for driver, narrator and passengers. [2617,1, B]
d. Transit busses shall be equipped with seat belts for driver only. [2618,1, A]

1.1.4 Maintenance of Vehicle Log Book

Vehicle developers shall maintain a log book for each vehicle which serves as a permanent record of all changes/work that is performed on the vehicle after it has been pre-certified. The log book shall accompany the vehicle at all times. As a minimum, the following shall be recorded in the log book. [2533,1, A]

a. Component Replacement - When a component is replace due to failure or modification, record in the log book the reason for component replacement, old and new part and serial numbers, date work was done, name of who did the work, and the vehicle odometer reading. [2534,1, A]
b. Modification - When the vehicle configuration is modified, record in the Log Book, the reason for modification, reference the authority for the change (i.e. a Change Order or other authorizing document) and record the effected component(s) part and serial numbers, date work was done, name of who did the work, and the vehicle odometer reading. [2535,1, A]
c. Anomalous Operation - When ever the vehicle is operated, and an anomaly is observed, record a description of the problem, date observed, name of who observed it, and the vehicle odometer reading. [2536,1, A]
d. Maintenance - When ever routine maintenance is performed, record what was done, date, name of who did it, and the vehicle odometer reading. [2537,1, A]

1.1.5 Logo Display

Vehicles shall display the NAHSC logo provided by the Demonstration Team. [2556,1, A]

1.1.6 Vehicle Stability

All live demonstration vehicles shall be capable of staying in scenario scripted lane(s) with sufficient stability to prevent excessive weaving or surging, for the entire length of the Demonstration run. [2586,1, A]

1.1.7 Ride Comfort

All live demonstration vehicles shall provide passenger ride comfort similar to that of 1996 model year manually controlled vehicles. [2587,1, A]

1.1.8 Vehicle Handling Provisions

All live demonstration vehicles shall be equipped with anti-lock brakes and OEM or high performance tires in good condition. [2627,1, A]

1.1.9 Check-In

All live demonstration vehicles equipped with the VRC Transponder shall cause the check-in function changeable message sign to display an acceptance message when the vehicle passes the VRC reader. [2398,1, B]

1.2 Common Demonstration Scenario Requirements

1.2.1 Vehicle to DPC Telemetry

Demonstration vehicles equipped with vehicle-to-DPC communications shall transmit vehicle identification, speed and lane position telemetry data to the Demonstration Presentation Center during scenario execution updated at least once per second average over 5 minutes. [2620,1, B]

1.2.2 Scenario Execution Time and Maximum Speed

All scenarios shall enter the express lanes, execute their scenario, and exit the express lanes in a time not to exceed 15 minutes. Maximum speed during scenario execution is 65 miles per hour. [2554,1, B]

1.2.3 Time Under Automation

During their certification runs, vehicles shall navigate under automated control, at least 90% of the time that they are scheduled to operate under automated control. [2555,1, A]

1.2.4 Switching Between Manual and Automated Control

Automated vehicle control systems shall have no failures associated with switching between manual and automated control. [2544,1, A]

1.2.5 Operating Under Different Lighting Conditions

Demonstration vehicles shall execute planned scenarios under lighting conditions of cloudy or clear skies during the hours of 6 AM through 10 PM, Pacific time. [2621,1, A]

1.2.6 Operating Under Different Weather Conditions

Vehicle developers shall notify both the vehicle development lead and the vehicle production lead of all weather conditions under which the vehicles can operate. [2622,1, A]

1.2.7 Scenario Repeatability

Each Demonstration scenario shall be executable at least 10 consecutive times with no more than 2 scenario interruptions, total. [2623,1, A]

1.2.8 Vehicle Performance during the Scenario

During execution of the scenario, each of the live demonstration vehicles shall provide the capability to: [2588,1, A]

a. Accelerate to 65 mph (or the scenario top speed) with no uncomfortable or unsafe weaving. [2589,1, B]
b. Vary vehicle speed with no uncomfortable or unsafe weaving or jerking. [2590,1, B]
c. Come to a stop from 65 mph (or the scenario top speed) with no uncomfortable or unsafe weaving or jerking. [2593,1, B]
d. Perform all maneuvers smoothly with no uncomfortable or unsafe weaving or jerking. [2594,1, B]
e. Clear the lanes under either automated or manual control if the scenario is interrupted for any reason. [2598,1, B]
f. Permit drivers to safely and competently assume control in any threatening, unplanned event. [2597,1, A]

2.0 SAFETY REQUIREMENTS

2.1 Driver Notification

a. A trained/certified driver shall be present in the driver's seat during the demonstration scenario and be continuously vigilant and prepared to assume manual control of the vehicle, within 1 second, in the event of a malfunction/failure for any reason of automated control system(s). [2526,1, C]
b. All AHS vehicles shall be designed to provide an audible and visual warning to the driver within .25 second (TBR) if any automated control system fails to function normally or becomes non-operational for any reason. [2624,1, A]
c. All AHS vehicles shall have an alert system that is independent of the automated controls, such that a failure to the computer will not disable the warning system. [2625,1, A]

2.2 Return to Manual Control

Each vehicle shall be equipped with a "kill switch" to permit the driver to transition from automated to manual control in a failure or emergency condition. [2530,1, A]

2.3 Notification of Return to Manual Control

Each vehicle shall notify other vehicles in the scenario, when the "kill switch" is activated. [2524,1, A]

2.4 Automation Controls

Automation controls shall not be accessible by passengers. [2525,1, A]

2.5 Displays and Controls

The driver shall be able to see lighted displays and controls during normal automated operations. [2541,1, A]

2.6 Self Electromagnetic Compatibility

Vehicle hardware and software shall not exhibit any adverse electromagnetic compatibility effects due to onboard vehicle equipment or from other vehicles within a scenario. [2529,1, A]

2.7 Radiated Emissions

Vehicles shall not be adversely effected by radiated emissions encountered in a normal vehicle ambient environment, anticipated '97 Demonstration communications equipment or radars. [2543,1, A]

2.8 Vehicle Power Source

Failure of any vehicle power source shall not interfere with manual control or transition from automated to manual control. [2548,1, A]

2.9 Failure and Effects

The following requirements describe the complete chain of events that takes place, the effects (i.e. driver indication that there is a problem and driver response as well as how the vehicle is reacting and what is going in hardware and software) for a failure in each vehicle in the scenario. [2557,1, A]

a. A sensor used for lateral or longitudinal control fails. [2558,1, A]
b. A steering actuator controller fails. [2559,1, A]
c. A steering actuator assembly fails [2560,1, A]
d. A brake actuator controller fails. [2561,1, A]
e. A brake actuator assembly fails. [2562,1, A]
f. Throttle actuator fails. [2563,1, A]
g. Throttle actuator controller fails. [2564,1, A]
h. Vehicle to vehicle communications fails. [2565,1, A]
i. Vehicle lateral computer fails. [2566,1, A]
j. Vehicle longitudinal computer fails. [2567,1, A]
k. Software in either computer fails or stops running. [2568,1, A]

2.10 Steering (Lateral)

a. Under automated lateral control, a range limiter shall prevent the steering control system from producing a steering angle exceeding 4 degrees at the ground wheel when the vehicle is traveling at 65 mph (105 kph). [2538,1, C]
b. Under automated lateral control, a limiter shall prevent the steering control system from producing a lateral acceleration exceeding 2.5 meters/seconds square. [2540,1, C]
c. Under automated lateral control, a limiter shall prevent the steering control system from causing the vehicle to cross the lane boundary except during an intentional lane change. [2545,1, C]
d. The steering actuator shall be adjustable so that the driver can easily overpower it. [2578,1, A]

2.11 Speed (Longitudinal)

2.11.1 Speed Application Program (Watchdog)

The speed application program shall examine the speed command before it is sent to the vehicle controller and disable steering control and alert the driver if: [2579,1, A]
a. The absolute value of the acceleration (or deceleration) is greater than +5 to -5 m/s/s. [2580,1, A]

3.0 SCENARIO REQUIREMENTS

3.1 Multi-Platform Free Agent

3.1.1 Multi-Platform Free Agent vehicles shall transfer from manual operation on entrance ramp to automated operation on the driving lane. [2416,1, C]
3.1.2 Multi-Platform Free Agent Vehicles shall be capable of transferring from manual to fully automated control while driving at a speed of between 35 and 50 miles per hour. [2399,1, B]
3.1.3 Multi-Platform Free Agent vehicles shall be capable of maintaining a constant speed of 50 mph +/- 7 mph. [2400,1, C]
3.1.4 All Multi-Platform Free Agent vehicles shall provide automatic lateral vehicle control to maintain accurate lane keeping while maintaining a headway of 40 meters. [2401,1, B]
3.1.5 Selected Free Agent vehicles may provide automatic lateral vehicle control to maintain accurate lane keeping while maintaining a headway of 25 meters. [2402,1, B]
3.1.6 All Multi-Platform Free Agent vehicles may provide automatic lateral vehicle control to maintain accurate lane keeping while maintaining a spacing of 25 meters. [2402,2, B]
3.1.7 Multi-Platform Free Agent vehicles shall provide automatic lateral vehicle control to maneuver the vehicle between lanes for entry/exit, lane change, and obstacle avoidance. [2404,1, C]
3.1.8 Multi-Platform Free Agent vehicles shall provide automatic longitudinal vehicle control to maintain a spacing of 40 +/- 0.5 meters. [2405,1, D]

3.1.9 Multi-Platform Free Agent vehicles may provide automatic longitudinal vehicle control to maintain a spacing of 20 +/- 0.5 meters. [2406,1, D]

3.1.10 Multi-Platform Free Agent vehicles may provide automatic longitudinal vehicle control to maintain spacing in the presence of merging automated and non-automated vehicles. [2407,1, C]

3.1.11 Selected Multi-Platform Free Agent vehicles shall detect a single obstacle at a minimum distance of 100 meters. [2408,1, C]

3.1.12 Multi-Platform Free Agent vehicles shall avoid obstacles by stopping. [2411,1, C]

3.1.13 Multi-Platform Free Agent vehicles shall avoid an obstacle by executing a lane transition maneuver. [2412,1, D]

3.1.14 Selected Multi-Platform Free Agent vehicles may avoid an obstacle by using obstacle detection notification information from other automated vehicles. [2413,1, C]

3.1.15 A Multi-Platform Free Agent vehicle shall detect that it is closing on a slower vehicle and alert the driver. [2414,1, C]

3.1.16 Selected Multi-Platform Free Agent vehicles shall determine if it is safe to change lanes prior to executing a lane change maneuver. [2415,1, C]

3.1.17 Selected Multi-Platform Free Agent vehicles shall demonstrate roadway departure warning and countermeasure systems. [2403,1, B]

3.1.18 Information shall be displayed on the human-machine interface device which is consistent with the Multi-Platform Free Agent vehicles actions. [2626,1, A]

3.2 Platoon

3.2.1 Platoon vehicles shall provide automatic longitudinal vehicle control to increase the spacing up to 30 +/- 0.5 meters. [2423,1, C]

3.2.2 Platoon vehicles shall maintain spacing at 4.5 +/- 0.5 meters while moving at constant speed under automated control. [2424,1, C]

3.2.3 Platoon vehicles shall provide automatic longitudinal vehicle control to reduce the spacing between vehicles from 30 meters to less than 4.5 +/- 0.5 meters. [2425,1, C]

3.2.4 Platoon vehicles shall communicate vehicle status to adjacent vehicles. [2427,1, A]

3.2.5 Platoon vehicles shall safely and robustly merge at the end of a platoon. [2591,1, A]

3.2.6 Platoon vehicles shall safely and robustly split from the middle of the platoon. [2592,1, A]

3.2.7 Information shall be displayed on the human-machine interface device which is consistent with the Platoon vehicles actions. [2631,1, A]

3.3 Maintenance

3.3.1 The Infrastructure Diagnostics Vehicle shall provide automated lateral vehicle control at speeds up to 60 mph. [2428,1, A]

3.3.2 The Infrastructure Diagnostics Vehicle shall maintain a constant speed +/- 2 miles per hour using conventional cruise control. [2429,1, A]

3.3.3 The Infrastructure Diagnostics Vehicle shall provide near real time health and status communications of magnetic nails to the Demonstration Presentation Center. [2431,1, A]

3.3.4 The Infrastructure Diagnostics Vehicle shall automatically check in prior to initiation of automated vehicle control. [2465,1, A]

3.3.5 The Infrastructure Diagnostics Vehicle shall check the health and status of the AHS Check-In system. [2467,1, A]

3.3.6 The Infrastructure Diagnostics Vehicle shall provide voice communications for safety and operational control. [2468,1, A]

3.3.7 The Infrastructure Diagnostics Vehicle shall provide its vehicle speed to the Demonstration Presentation Center (DPC). [2469,1, A]

3.3.8 The Infrastructure Diagnostics Vehicle shall provide its vehicle position to the Demonstration Presentation Center (DPC). [2470,1, A]

3.3.9 The Infrastructure Diagnostics Vehicle shall provide its vehicle subsystem status to the Demonstration Presentation Center (DPC). [2472,1, A]

3.3.10 The Infrastructure Diagnostics Vehicle shall log detected problems and locations of detected problems into the ALTS GIS data base and communicate the problem and location to the Demonstration Presentation Center. [2432,1, A]

3.3.11 The Obstacle Removal Vehicle shall demonstrate the ability to pick up debris from the edge of the roadway. [2433,1, B]

3.3.12 All live demonstration vehicles shall provide voice communications for safety and operational control. [2473,1, B]

3.3.13 The Obstacle Removal Vehicle shall receive the location of debris from the Demonstration Presentation Center (DPC) via voice communications. [2474,1, B]

3.4 Control Transition

3.4.1 Control Transition vehicles shall transfer from manual to automated control while driving at a speed of at least 10 miles per hour. [2434,1, A]

3.4.2 Control Transition vehicles shall detect an obstacle in the roadway. [2435,1, A]

3.4.3 Control Transition vehicles shall execute an automated lane change maneuver. [2436,1,A]

3.4.4 Control Transition vehicles shall automatically reduce speed to follow a slower vehicle at a fixed headway. [2437,1, A]

3.4.5 Control Transition vehicles shall automatically transition from a vision based lateral control system to a magnetic nail based lateral control system while traveling at a speed of at least 30 mph. [2438,1, A]

3.4.6 Control Transition vehicles shall maintain a set speed within +/- 2 mph. [2439,1, A]

3.4.7 Selected Control Transition vehicles shall provide automatic longitudinal vehicle control to reduce spacing to 10 meters +/- .5 meters. [2440,1, B]

3.4.8 Control Transition vehicles shall maintain lateral control, in their lane, while using a vision based lateral control system. [2629,1, A]

3.4.9 Control Transition vehicles shall maintain lateral control, in their lane, while using a magnetic marker lateral control system. [2630,1, A]

3.5 Alternative Technology

3.5.1 Selected Alternative Technology vehicles shall transfer vehicle control from manual to automated control. [2441,1, A]
3.5.2 Selected Alternative Technology vehicles shall transition from vision based to radar reflective lateral control. [2442,1, A]
3.5.3 Selected Alternative Technology vehicles shall automatically reduce speed to follow a slower vehicle at a fixed spacing. [2443,1, B]
3.5.4 Selected Alternative Technology vehicles shall execute a double lane change maneuver to pass a vehicle in the right lane. [2444,1, A]

3.6 Evolutionary

3.6.1 Evolutionary vehicles shall change lanes while under manual control without activating either the steering actuator or warning devices. [2445,1, A]
3.6.2 Evolutionary vehicles shall warn the driver, and regain lateral control of the vehicle when the vehicle inadvertently violates the lane boundary. [2446,1, A]
3.6.3 Evolutionary vehicles shall maintain a spacing of approximately 50 meters +/- .5 meters behind a vehicle whose speed is 85 kph +/- 5 kph. [2447,1, B]
3.6.4 Evolutionary vehicles shall detect a vehicle traveling in the driver's blind spot and warn the driver. [2448,1, A]
3.6.5 Evolutionary vehicles shall maintain a spacing of 50 meters +/- .5 meters behind merging automated or non-automated vehicles. [2449,1, B]
3.6.6 Evolutionary vehicles shall maintain a constant spacing behind an automated or non-automated vehicle whose speed varies between 0 and 40 kph. [2450,1, B]
3.6.7 Evolutionary vehicles shall automatically maintain lateral control. [2451,1, A]
3.6.8 Selected Evolutionary vehicles shall detect an obstacle in the roadway. [2452,1, A]
3.6.9 Evolutionary vehicles shall communicate the detection of an obstacle in the roadway to adjacent vehicles. [2453,1, A]
3.6.10 Selected Evolutionary vehicles shall receive information about an obstacle in the roadway from other vehicles. [2454,1, A]
3.6.11 Evolutionary vehicles shall automatically change lanes to avoid an obstacle. [2455,1, A]
3.6.12 Evolutionary vehicles shall check for the presence and location of adjacent vehicles prior to executing a lane change maneuver. [2456,1, A]
3.6.13 Selected Evolutionary vehicles shall detect an obstacle in the driver's blind spot. [2460,1,A]
3.6.14 Selected Evolutionary vehicles shall delay a lane change maneuver until its blind spot is clear. [2461,1, A]
3.6.15 Selected Evolutionary vehicles shall maintain a constant spacing of 20 meters +/- .5 meters behind another vehicle. [2457,1, B]
3.6.16 Selected Evolutionary vehicles shall automatically follow a vehicle executing a lane change maneuver with a spacing of 20 meters +/- .5 meters in front of it. [2462,1, B]
3.6.17 Selected Evolutionary vehicles shall detect obstacles in two adjoining lanes. [2458,1, A]

3.6.18 Evolutionary vehicles shall come to an emergency stop to avoid an obstacle if both lanes are obstructed. [2459,1, A]

3.7 Truck

3.7.1 The Eaton VORAD Heavy Truck shall detect and provide a visual or audible alert to the driver when a vehicle cut-in-lane maneuver is present to the front of the truck at approximately of 50 meters. [2599,1, A]

3.7.2 The Eaton VORAD Heavy Truck shall provide slow vehicle cut-in collision warning. [2601,1, A]

3.7.3 The Eaton VORAD Heavy Truck shall detect and provide a visual or audible alert to the driver when slower moving vehicles are to the front of the truck, in the same lane, at a spacing of approximately 200 feet. [2602,1, B]

3.7.4 The Eaton VORAD Heavy Truck shall provide closing spacing collision warning. [2603,1, A]

3.7.5 The Eaton VORAD Heavy Truck shall detect and provide a visual or audible alert to the driver when a stopped vehicle is to the front of the truck, in the same lane of travel, at approximately 200 feet. [2604,1, A]

3.7.6 The Eaton VORAD Heavy Truck shall provide stopped vehicle approach collision warning. [2605,1, A]

3.7.7 The Eaton VORAD Heavy Truck shall provide automatic longitudinal vehicle control to maintain spacing in the presence of merging non-automated vehicles into truck's lane. [2600,1, A]

3.7.8 The Eaton VORAD Heavy Truck shall provide automatic engagement of "following mode" operation behind slower-moving vehicles in the same lane. [2606,1, A]

3.7.9 The Eaton VORAD Heavy Truck shall provide automatic disengagement of "following mode" operation when lead vehicles accelerate to speed beyond truck's cruise control set speed. [2607,1, A]

3.7.10 The Eaton VORAD Heavy Truck shall be capable of maintaining a constant speed of 50 mph. [2612,1, A]

3.7.11 The Eaton VORAD Heavy Truck shall provide automatic longitudinal vehicle control to maintain a driver selected headway of 2 or more seconds. [2613,1, A]

4.0 OTHER DEMONSTRATION REQUIREMENTS

4.1 Demonstration Presentation Center (DPC)

4.1.1 The Demonstration Presentation Center which includes the AHS Demonstration TMC will be the focal point of all '97 Demo exposition activities including providing public awareness/ education and advanced transportation research and development functions. [2215,1, A]

4.1.2 The AHS TMC will be compatible with the national ITS architecture to the greatest extent possible. [2216,1, A]

4.1.3 The AHS TMC will be built on principals of an "open systems architecture" including modular, standards based designs independent of vendor proprietary hardware and software to ensure future flexibility and growth potential. [2217,1, A]

4.1.4 The AHS TMC will be developed in a manner that provides the greatest benefits at the lowest possible life cycle cost. [2218,1, A]

4.1.5 The AHS TMC will be developed incrementally, within defined funding and scheduling constraints, such that those capabilities with the highest benefit/cost ratio are given the highest priority. [2219,1, A]

4.1.6 The AHS Demonstration TMC will simulate a region-wide system that integrates the traffic operations of many jurisdictions and agencies. [2220,1, A]

4.1.7 The AHS Demonstration TMC shall be capable of displaying current traffic status information for the area around and including the I-15 demonstration lanes. Current status estimates shall be in real-time based on actual and/or simulated data. [2221,1, A]

4.1.8 The Demonstration Presentation Center may provide the following information, via the internet, to allow the traveler to access the current conditions of the transportation system:
- Weather travel conditions,
- Traffic conditions,
- Incident information,
- Construction zones,
- Special event status, and
- Recommended diversion/alternate routing. [2222,1, A]

4.1.9 The Demonstration Presentation Center may utilize the Internet to act as a transportation clearinghouse for accurate and timely information to support real-time selection of the best departure time, transportation modes, and routes prior to a traveler's departure. [2223,1, A]

4.1.10 The Demonstration Presentation Center may provide exhibition participants with information needed to better plan participation in the exhibition and demonstration including:
- Schedule of demonstration events
- Schedule of exhibition events
- Special events associated with Expo/Demo
- San Diego commercial air information
- San Diego hotel and restaurant accommodations
- Attractions and events in the San Diego area [2225,1, A]

4.1.11 The AHS Demonstration TMC shall simulate the capabilities of a central incident management coordination center, capable of incident detection, verification, classification, response planning, response selection, response implementation, and recovery, to minimize the effect incidents have on traffic and public safety. [2226,1, A]

4.1.12 The AHS Demonstration TMC shall be able to receive, process and display information related to the detection and/or simulation of the following types of incidents:
- Traffic accidents or breakdowns on or near roadways
- Road hazards
- HAZMAT (fuel, chemicals, explosives) [2227,1, A]

4.1.13 The AHS Demonstration TMC shall be able to receive, process and display information related to the detection and/or simulation of incidents based on the following information sources: I-15 Demo Vehicles (cellular phones, ALTs, cellular data modems) [2228,1, A]

4.1.14 Upon detection, verification and classification of a simulated incident, the AHS TMC shall automatically recommend one or more incident/emergency response plans, derived from the circumstances of the incident. The AHS TMC operator shall have the option to:
- Concur with the automated recommendation,
- Choose another preplanned option,
- Modify an existing option, or
- Develop a new response plan. [2229,1, B]

4.1.15 The AHS Demonstration TMC shall be responsible for simulating the initiation and support of the selected response plan until the incident has been cleared and traffic operations have returned to normal. Actions to be simulated include:
- Notification of the affected agencies of the incident and the plan selected for implementation
- Dispatch applicable emergency and service vehicles [2230,1, B]

4.1.16 The AHS Demonstration TMC shall simulate notification of all affected agencies, media, and travelers that the incident has been cleared and operations are again normal. [2231,1,A]

4.1.17 The AHS TMC shall update the incident management data base with all relevant facts associated with the incident response. [2232,1, A]

4.1.18 The AHS Demonstration TMC may be able to simulate detection of the following types of incidents:
- Weather related (rain, snow, ice, fog, wind, hail, tornado)
- Natural disasters (flood, earthquake, avalanche, rock or mud slide)
- Unlawful acts (riots, high speed chase, stolen vehicle)
- Personal security or mayday calls
- Scheduled events (parades, funerals, sporting events, construction, oversize loads, preventive maintenance, etc.) [2233,1, A]

4.1.19 The AHS TMC may receive, process and display information related to the detection and/or simulation of incidents based on some of the following information sources:
- Traffic sensors (video cameras, etc.)
- Environmental sensors (weather, pollution)
- Field equipment diagnostics
- Transportation services providers (radio reports from police, maintenance, courtesy patrols, transit operations, commercial vehicle operators, or other public service agencies)
- Commercial broadcast reports (local television, radio, and traffic reporting organizations) [2234,1, B]

4.1.20 The AHS TMC may use simulated historical and real-time data to make near term predictions of the time and location of potential hazardous conditions. [2235,1, A]

4.1.21 The AHS Demonstration TMC shall be capable of receiving and displaying information regarding the health and status of magnets in the I-15 roadway [2236,1, A]

4.1.22 The AHS Demonstration TMC shall be capable of receiving and displaying information regarding the health and status of the check-in beacons. [2237,1, A]

4.1.23 The AHS TMC shall be capable of making predictions as to when the next scheduled maintenance activities will be required based on data received from the IDV. [2238,1, A]

4.1.24 The AHS TMC may be capable of scheduling routine maintenance operations based on reliability/malfunction trend information. [2239,1, A]

4.1.25 The AHS TMC will be integrated to allow outputs from various functions, running on different processors, to be displayed with common user interface characteristics. [2240,1,A]

4.1.26 The AHS TMC will be capable of switching terminal outputs to selected large overhead video screens at the push of a button. [2241,1, A]

4.1.27 The AHS TMC will be designed in such a manner as to allow the sharing of data across TMC platforms via a common database interface. [2242,1, A]

4.1.28 The AHS TMC will be capable of providing display of slide presentations and previously recorded video tape presentations. [2243,1, A]

4.1.29 The AHS Demonstration TMC shall receive data from an Infrastructure Beacon during Check-In scenarios to simulate monitoring of the check-in process for entry onto an automated highway. [2244,1, A]

4.1.30 The AHS Demonstration TMC shall provide the capability to display data indicating a simulated acceptance of the driver request for transfer to automated control. [2245,1, A]

4.1.31 The AHS TMC may simulate the capability to receive and respond to user's preferred exit requests. [2248,1, B]

4.1.32 The AHS TMC may simulate the capability to monitor the demerge of vehicles from automated lanes and the transfer of vehicle control from automated to manual (or safely park vehicle). [2249,1, A]

4.1.33 The AHS TMC shall be capable of receiving telemetry data from vehicles moving along the I-15 roadway and track the relative location of that vehicle on overhead display screens. [2251,1, A]

4.1.34 The AHS TMC shall receive data from the Infrastructure Diagnostics Vehicle (IDV) scenario in support of magnetic marker maintenance and roadway maintenance needs. It will receive data provided by the ALTS system and display that information on a user display. [2252,1, A]

4.1.35 The AHS TMC may simulate coordination of road maintenance activities (e.g., road closure, road maintenance, snow removal, etc.) with maintenance organizations of the jurisdictions responsible. [2253,1, A]

4.1.36 The AHS TMC may facilitate simulation of traffic control/diversion strategies (e.g., advisories, road closures, route guidance, signal timing updates, etc.) for road maintenance activities. This shall include issuing access permits for highway maintenance along highway rights-of-way. [2254,1, A]

4.1.37 The AHS TMC may maintain a log of planned road maintenance events for planning traffic control in the affected area and as information to be distributed to travelers [2255,1, A]

4.1.38 The AHS TMC may simulate coordination of construction activities (e.g., road closure, detour routing, etc.) on all roads within the TMC's boundaries. [2256,1, B]

4.1.39 The AHS TMC shall be capable of receiving, processing, displaying, recording and distributing incoming communications (data, voice, video). [2257,1, A]

4.1.40 The AHS TMC may be capable of transmitting video images of incidents and/or roadway obstacles to properly equipped vehicles. [2259,1, A]

4.1.41 The AHS TMC shall be capable of operating Variable Message Signs (VMS) in and around the exhibition center. [2260,1, A]

4.1.42 The AHS TMC shall be able to simulate traveler advisories to the public through Highway Advisory Radios (HAR). [2261,1, A]

4.1.43 The Demonstration Presentation Center shall be capable of sending selected data to Kiosks in and around the exhibition site for subsequent display. [2262,1, A]

4.1.44 The Demonstration Presentation Center shall be capable of making information available on the World Wide Web (via the '97 Demo Homepage) in near-real time. [2263,1, B]

4.1.45 The AHS TMC shall provide integrated data sharing between the LMC developed functions and the PBFI developed functions via common relational database access. [2264,1, A]

4.1.46 The AHS TMC may provide integrated and consolidated dispatching functions to facilitate inter-jurisdictional, multi-agency information sharing with participating agencies to improve efficiency, consistency and timeliness of incident response plans as well as day-to-day traffic management. Specifically, this includes participation and interaction with the San Diego Transportation Management Center (SDTMC). [2265,1, A]

4.1.47 The AHS TMC dispatch services may utilize, where feasible, the various public agency and private sector dispatch systems as an additional source of field data for incident detection and verification efforts. Public agency participation shall include the numerous city and county public work department vehicle fleets as well as the local police departments. [2266,1, A]

4.1.48 The AHS TMC shall simulate management of traffic speed, vehicle spacing, and lane usage. [2270,1, A]

4.1.49 The AHS TMC shall simulate regulation and optimization of traffic flow and access. [2269,1, A]

4.1.50 The AHS TMC shall be capable of simulating a variety of traffic management situations (TBD) based on scripted scenarios (to include computer aided dispatch). [2271,1, A]

4.1.51 The Demonstration Presentation Center shall be able to accomplish most of its marketing objectives via recorded video and simulations in the event of the loss of real time information. [2272,1, A]

4.2 Control Center Requirements

4.2.1 The Control Center for the Live Vehicle Demonstration shall have the capability to be in constant voice communication with all participants in the Live Vehicle Demonstration. [2504,1, A]

4.2.2 The Control Center for the Live Vehicle Demonstration shall have the capability to be in constant voice communication with the San Diego TMC. [2505,1, A]

4.2.3 The Control Center for the Live Vehicle Demonstration shall track the health and availability of all vehicles participating in the Live Vehicle Demonstration. [2506,1, A]

4.2.4 The Control Center for the Live Vehicle Demonstration shall track the schedule and status of the vehicle sequences. [2507,1, A]

4.2.5 The Control Center for the Live Vehicle Demonstration shall track the schedule and status of all scenarios before and during the time the scenarios are on the lanes. Scenarios include the placement and removal of obstacles. [2508,1, A]

4.2.6 The Control Center for the Live Vehicle Demonstration shall track the status and availability of the South Control Yard, North Staging Area, Outdoor Technology Presentation Facility, and Express lanes prior to, and during the Live Vehicle Demonstration. [2509,1, A]

4.2.7 The Control Center for the Live Vehicle Demonstration shall track the status and availability of the shuttle buses used to transport passengers between the Expo center, the North Staging Area, and the South Control Yard. [2510,1, A]

4.2.8 The Control Center for the Live Vehicle Demonstration shall track the location and availability of passengers from the time that they are in the queue to be picked up at the Expo center, until they are dropped off at the Expo center. [2511,1, A]

4.2.9 The Control Center for the Live Vehicle Demonstration shall track the status of the adjacent lanes prior to and during the Live Vehicle Demonstration. [2512,1, A]

4.2.10 The Control Center for the Live Vehicle Demonstration shall track the weather forecast for the morning of, and during the Live Vehicle Demonstration. [2513,1, A]

4.2.11 The Control Center for the Live Vehicle Demonstration shall have the capability to transmit electronically, all status information to the North Staging Area prior to and during the Live Vehicle Demonstration. [2514,1, A]

4.2.12 The Control Center for the Live Vehicle Demonstration shall have the capability to transmit electronically, all status information to the Demonstration Presentation Center prior to and during the Live Vehicle Demonstration. [2515,1, A]

4.2.13 The Control Center for the Live Vehicle Demonstration shall have the capability to transmit electronically, all status information to the sprung structure in the SCY prior to and during the Live Vehicle Demonstration. [2516,1, A]

4.2.14 The Control Center for the Live Vehicle Demonstration shall have the capability to dispatch obstacle placer vehicles during the Live Vehicle Demonstration. [2517,1, A]

4.2.15 The Control Center for the Live Vehicle Demonstration shall have the capability to dispatch tow trucks during the Live Vehicle Demonstration. [2518,1, A]

4.2.16 The Control Center for the Live Vehicle Demonstration shall have the capability to dispatch emergency vehicles during the Live Vehicle Demonstration. [2519,1, A]

4.2.17 The Control Center for the Live Vehicle Demonstration shall have the capability to receive video images from the lanes, NSA, and SCY during the Live Vehicle Demonstration. [2520,1, A]

4.2.18 The Control Center for the Live Vehicle Demonstration shall have the capability to be secured from intrusion during and after Live Vehicle Demonstration operations. [2521,1, A]

4.2.19 The Control Center for the Live Vehicle Demonstration shall contain at least three (3) desktop computers to support Demonstration operations. [2522,1, A]

4.2.20 The Control Center for the Live Vehicle Demonstration shall contain at least two (2) 4' by 6' white boards, to support Demonstration operations. [2523,1, A]

4.3 Communications

4.4 Status

4.5 Control

5.0 VERIFICATION AND VALIDATION

NAHSC Technical Feasibility Demonstration Verification Cross Reference Matrix

Demo Spec Para #	Topic	Rqt#	Procedure Step #	Validation Method
1.0	**GENERAL DEMONSTRATION REQUIREMENTS**			
1.1	***Common Demonstration Vehicle Requirement***			
1.1.1	**Vehicle Appearance**			
1.1.1	Vehicle Appearance	2527	1.2.1	I
1.1.1	Vehicle Appearance	2527	1.2.2	I
1.1.1	Vehicle Appearance	2527	1.2.3	I
1.1.1	Vehicle Appearance	2527	1.2.4	I
1.1.2	**Voice Communications**			
1.1.2.a.	Voice Communications	2528	1.8.1	I
1.1.2.a.	Voice Communications	2528	1.8.2	I
1.1.2.a.	Voice Communications	2528	1.8.3	D
1.1.2.a.	Voice Communications	2528	1.8.4	D
1.1.2.b.	Voice Communications	2628	1.8.5	I
1.1.3	**Seat Belts**			
1.1.3.a	Seat Belts - Passenger Cars	2531	1.5.1	I, D
1.1.3.b	Seat Belts - Maintenance Van	2616	1.5.2	I, D
1.1.3.c	Seat Belts - Trucks	2617	1.5.3	I, D
1.1.3.d	Seat Belts - Transit Buses	2618	1.5.4	I, D
1.1.4	**Maintenance of Vehicle Log Book**			
1.1.4	Maintenance of Vehicle Log Book	2533	1.6.1	I
1.1.4	Maintenance of Vehicle Log Book	2533	1.6.2	I
1.1.4.a	Component Replacement	2534	1.6.3	I
1.1.4.b	Modification	2535	1.6.3	I
1.1.4.c	Anomalous Operations	2536	1.6.4	I
1.1.4.d	Maintenance	2537	1.6.5	I
1.1.5	**Logo Display**			
1.1.5	Logo Display	2556	1.7.1	I
1.1.5	Logo Display	2556	1.7.2	I
1.1.6	**Vehicle Stability**			

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Demo Spec Para #	Topic	Rqt#	Procedure Step #	Validation Method
1.1.6	Vehicle Stability	2586	4.3	D
1.1.7	**Ride Comfort**			
1.1.7	Ride Comfort	2587	4.3	D
1.1.8	**Vehicle Handling Provisions**			
1.1.8	Vehicle Handling Provisions	2627	1.4.1	I
1.1.8	Vehicle Handling Provisions	2627	1.4.2	I
1.1.9	**Check-In**			
1.1.9	Check-In	2398	3.3	D
1.2	***Common Demonstration Scenario Requirements***			
1.2.1	**Vehicle to DPC Telemetry**			
1.2.1	Vehicle to DPC Telemetry	2620	1.9.1	D
1.2.1	Vehicle to DPC Telemetry	2620	1.9.2	T
1.2.2	**Scenario Execution Time and Maximum Speed**			
1.2.2	Scenario Execution Time and Maximum Speed	2554	3.2.1	T
1.2.2	Scenario Execution Time and Maximum Speed	2554	3.2.2	T
1.2.2	Scenario Execution Time and Maximum Speed	2554	3.2.3	A
1.2.2	Scenario Execution Time and Maximum Speed	2554	3.2.4	D
1.2.2	Scenario Execution Time and Maximum Speed	2554	4.3	D
1.2.3	**Time Under Automation**			
1.2.3	Time Under Automation	2555	4.3	D
1.2.4	**Switching Between Manual and Automated Control**			
1.2.4	Switching Between Manual Automated Control	2544	3.4	D
1.2.5	**Operating Under Different Lighting Conditions**			
1.2.5	Operating Under Different Lighting	2621	4.1.2	A
1.2.5	Operating Under Different Lighting	2621	4.1.6	A
1.2.5	Operating Under Different Lighting	2621	4.4.1 - 10	D

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1.2.6	**Operating Under Different Weather Conditions**			
1.2.6	Operating Under Different Weather Conditions	2622	4.1.1	A
1.2.6	Operating Under Different Weather Conditions	2622	4.1.3	A
1.2.6	Operating Under Different Weather Conditions	2622	4.1.4	A
1.2.6	Operating Under Different Weather Conditions	2622	4.1.5	A
1.2.6	Operating Under Different Weather Conditions	2622	4.4.1 - 10	D
1.2.7	**Scenario Repeatability**			
1.2.7	Scenario Repeatability	2623	4.3	D
1.2.8	**Vehicle Performance during the Scenario**			
1.2.8	Vehicle Performance During the Scenario	2588	3.5 - 3.8	D
1.2.8.a	Vehicle Performance During the Scenario	2589	3.5	D
1.2.8.b	Vehicle Performance During the Scenario	2590	3.6	D
1.2.8.c	Vehicle Performance During the Scenario	2593	3.7	D
1.2.8.d	Vehicle Performance During the Scenario	2594	3.1	D
1.2.8.d	Vehicle Performance During the Scenario	2594	3.7	D
1.2.8.e	Vehicle Performance During the Scenario	2598	3.8.3	D
1.2.8.f	Vehicle Performance During the Scenario	2597	3.8.3	D
2.0	**SAFETY REQUIREMENTS**			
2.1	***Driver Notification***			
2.1.a	Driver Notification	2526	1.1	I
2.1.a	Driver Notification	2526	3.8.1	D
2.1.a	Driver Notification	2526	3.9.3	D
2.1.a	Driver Notification	2526	3.9.5	D
2.1.a	Driver Notification	2526	3.10.2	D
2.1.b	Driver Notification	2624	3.8.2	D
2.1.b	Driver Notification	2624	3.9.3	D
2.1.b	Driver Notification	2624	3.9.5	D
2.1.b	Driver Notification	2624	3.10.2	D
2.1.c	Driver Notification	2625	3.9.3	D

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Demo Spec Para #	Topic	Rqt#	Procedure Step #	Validation Method
2.1.c	Driver Notification	2625	3.9.5	D
2.1.c	Driver Notification	2625	3.10.2	D
2.2	***Return to Manual Control***			
2.2	Return to Manual Control	2530	3.11.1	I
2.2	Return to Manual Control	2530	3.11.2	D
2.3	***Notification of Return to Manual Control***			
2.3	Notification of Return to Manual Control	2524	3.11.2	D
2.4	***Automation Controls***			
2.4	Automation Controls	2525	1.3.1	D
2.5	***Displays and Controls***			
2.5	Displays and Controls	2541	1.3.2	I
2.6	***Self Electromagnetic Compatibility***			
2.6	Self Electromagnetic Compatibility	2529	4.5	D
2.7	***Radiated Emissions***			
2.7	Radiated Emissions	2543	4.5	D
2.8	***Vehicle Power Source***			
2.8	Vehicle Power Source	2548	2.2	A
2.8	Vehicle Power Source	2548	2.3	A
2.8	Vehicle Power Source	2548	2.4	A
2.8	Vehicle Power Source	2548	2.5	A
2.8	Vehicle Power Source	2548	2.6	A
2.9	***Failure and Effects***			
2.9	Failure Effects (Fault Analysis)	2557	2.2	A
2.9	Failure Effects (Fault Analysis)	2557	2.3	A
2.9	Failure Effects (Fault Analysis)	2557	2.4	A
2.9	Failure Effects (Fault Analysis)	2557	2.5	A
2.9	Failure Effects (Fault Analysis)	2557	2.6	A
2.9.a	Failure Effects (Fault Analysis)	2558	2.2	A
2.9.a	Failure Effects (Fault Analysis)	2558	2.3	A
2.9.b	Failure Effects (Fault Analysis)	2559	2.3	A
2.9.c	Failure Effects (Fault Analysis)	2560	2.3	A
2.9.d	Failure Effects (Fault Analysis)	2561	2.2	A
2.9.e	Failure Effects (Fault Analysis)	2562	2.2	A
2.9.f	Failure Effects (Fault Analysis)	2563	2.2	A
2.9.g	Failure Effects (Fault Analysis)	2564	2.2	A

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2.9.h	Failure Effects (Fault Analysis)	2565	2.2	A
2.9.i	Failure Effects (Fault Analysis)	2566	2.2	A
2.9.i	Failure Effects (Fault Analysis)	2566	2.3	A
2.9.j	Failure Effects (Fault Analysis)	2567	2.2	A
2.9.k	Failure Effects (Fault Analysis)	2568	2.2	A
2.9.k	Failure Effects (Fault Analysis)	2568	2.3	A
2.10	**Steering (Lateral)**			
2.10.a.	Steering (Lateral)	2538	3.9.1	T
2.10.b	Steering (Lateral)	2540	3.9.4	T
2.10.c	Steering (Lateral)	2545	3.9.4	D
2.10.d	Steering (Lateral)	2578	3.9.2	D
2.10.d.	Steering (Lateral)	2578	3.9.5	D
2.10.d.	Steering (Lateral)	2578	3.10.2	D
2.11	**Speed (Longitudinal)**			
2.11.1	**Speed Application Program (Watchdog)**			
2.11.1	Speed Application Program (Watchdog)	2579	3.10.1	T
2.11.1.a	Speed Application Program (Watchdog)	2580	3.10.1	T
3.0	**SCENARIO REQUIREMENTS**			
3.1	***Multi-Platform Free Agent***			
3.1.1	Multi-Platform Free Agent	2416	2-6	D
3.1.2.	Multi-Platform Free Agent	2399	2-6	D
3.1.2.	Multi-Platform Free Agent	2399	2-7	D
3.1.2.	Multi-Platform Free Agent	2399	2-21	D
3.1.3.	Multi-Platform Free Agent	2400	2-2	D
3.1.4.	Multi-Platform Free Agent	2401	2-5	D
3.1.5.	Multi-Platform Free Agent	2402	2-4	D
3.1.6.	Multi-Platform Free Agent	2402	2-4	D
3.1.7.	Multi-Platform Free Agent	2404	2-8	D
3.1.8.	Multi-Platform Free Agent	2405	2-5	D
3.1.9.	Multi-Platform Free Agent	2406	2-3	D
3.1.10.	Multi-Platform Free Agent	2407	2-9	D
3.1.10.	Multi-Platform Free Agent	2407	2-10	D
3.1.11.	Multi-Platform Free Agent	2408	2-11	D
3.1.11.	Multi-Platform Free Agent	2408	2-12	D
3.1.12.	Multi-Platform Free Agent	2411	2-13	D

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3.1.13.	Multi-Platform Free Agent	2412	2-14	D
3.1.14.	Multi-Platform Free Agent	2413	2-15	D
3.1.14.	Multi-Platform Free Agent	2413	2-16	D
3.1.14.	Multi-Platform Free Agent	2413	2-17	D
3.1.15.	Multi-Platform Free Agent	2414	2-18	D
3.1.15.	Multi-Platform Free Agent	2414	2-19	D
3.1.16.	Multi-Platform Free Agent	2415	2-20	D
3.1.17.	Multi-Platform Free Agent	2403	2-1	D
3.1.18.	Multi-Platform Free Agent	2626	2-22	D
3.1.18.	Multi-Platform Free Agent	2626	2-23	D
3.2	***Platoon***			
3.2.1	Platoon	2423	1-2	D
3.2.1	Platoon	2423	1-3	D
3.2.2	Platoon	2424	1-1	D
3.2.3	Platoon	2425	1-4	D
3.2.3	Platoon	2425	1-5	D
3.2.4	Platoon	2427	1-6	D
3.2.4	Platoon	2427	1-7	D
3.2.5	Platoon	2591	1-4	D
3.2.6	Platoon	2592	1-2	D
3.2.6	Platoon	2592	1-8	D
3.2.7	Platoon	2631	1-9	D
3.3	***Maintenance***			
3.3.1	Maintenance	2428	3-1	D
3.3.2	Maintenance	2429	3-2	D
3.3.3	Maintenance	2431	3-4	D
3.3.4	Maintenance	2465	3-3	D
3.3.5	Maintenance	2467	3-5	D
3.3.6	Maintenance	2468	3-14	D
3.3.7	Maintenance	2469	3-6	D, T
3.3.8	Maintenance	2470	3-7	D, T
3.3.8	Maintenance	2470	3-8	D, T
3.3.8	Maintenance	2470	3-9	D, T
3.3.9	Maintenance	2472	3-10	D, T

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3.3.10	Maintenance	2432	3-11	D
3.3.10	Maintenance	2432	3-12	D
3.3.11	Maintenance	2433	3-13	D
3.3.12	Maintenance	2473	3-14	D
3.3.13	Maintenance	2474	3-14	D
3.3.13	Maintenance	2474	3-15	D
3.3.13	Maintenance	2474	3-16	D
3.4	***Control Transition***			
3.4.1	Control Transition	2434	5-13	D
3.4.2	Control Transition	2435	5-3	D
3.4.2	Control Transition	2435	5-4	
3.4.3	Control Transition	2436	5-5	D
3.4.4	Control Transition	2437	5-6	D
3.4.4	Control Transition	2437	5-7	D
3.4.4	Control Transition	2437	5-8	D
3.4.4	Control Transition	2437	5-9	D
3.4.5	Control Transition	2438	5-10	D
3.4.6	Control Transition	2439	5-11	D
3.4.7	Control Transition	2440	5-12	D
3.4.8	Control Transition	2629	5-1	D
3.4.9	Control Transition	2630	5-2	D
3.5	***Alternative Technology***			
3.5.1	Alternative Technology	2441	6-5	D
3.5.2	Alternative Technology	2442	6-6	D
3.5.3	Alternative Technology	2443	6-1	D
3.5.3	Alternative Technology	2443	6-2	D
3.5.3	Alternative Technology	2443	6-3	D
3.5.3	Alternative Technology	2443	6-4	D
3.5.4	Alternative Technology	2444	6-7	D
3.5.4	Alternative Technology	2444	6-8	D
3.5.4	Alternative Technology	2444	6-9	D
3.6	***Evolutionary***			
3.6.1	Evolutionary	2445	4-14	D
3.6.2	Evolutionary	2446	4-1	D
3.6.3	Evolutionary	2447	4-2	D

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Demo Spec Para #	Topic	Rqt#	Procedure Step #	Validation Method
3.6.3	Evolutionary	2447	4-3	D
3.6.3	Evolutionary	2447	4-4	D
3.6.3	Evolutionary	2447	4-5	D
3.6.4	Evolutionary	2448	4-6	D
3.6.4	Evolutionary	2448	4-7	D
3.6.5	Evolutionary	2449	4-3	D
3.6.5	Evolutionary	2449	4-8	D
3.6.6	Evolutionary	2450	4-9	D
3.6.7	Evolutionary	2451	4-1	D
3.6.8	Evolutionary	2452	4-10	D
3.6.8	Evolutionary	2452	4-11	D
3.6.9	Evolutionary	2453	4-12	D
3.6.10	Evolutionary	2454	4-13	D
3.6.11	Evolutionary	2455	4-14	D
3.6.12	Evolutionary	2456	4-15	D
3.6.13	Evolutionary	2460	4-16	D
3.6.14	Evolutionary	2461	4-17	D
3.6.15	Evolutionary	2457	4-18	D
3.6.16	Evolutionary	2462	4-19	D
3.6.16	Evolutionary	2462	4-20	D
3.6.17	Evolutionary	2458	4-21	D
3.6.18	Evolutionary	2459	4-22	D
3.7	***Truck***			
3.7.1	Truck	2599	7-1	D
3.7.2	Truck	2601	7-3	D
3.7.2	Truck	2601	7-4	D
3.7.2	Truck	2601	7-5	D
3.7.3	Truck	2602	7-6	D
3.7.4	Truck	2603	7-7	D
3.7.4	Truck	2603	7-8	D
3.7.4	Truck	2603	7-9	D
3.7.5	Truck	2604	7-10	D
3.7.6	Truck	2605	7-11	D
3.7.7	Truck	2600	7-2	D
3.7.8	Truck	2606	7-12	D

NAHSC Technical Feasibility Demonstration Verification Cross Reference Matrix

Demo Spec Para #	Topic	Rqt#	Procedure Step #	Validation Method
3.7.8	Truck	2606	7-13	D
3.7.9	Truck	2607	7-14	D
3.7.10	Truck	2612	7-15	D
3.7.11	Truck	2613	7-16	D
4.0	**OTHER DEMONSTRATION REQUIREMENTS**			
4.1	***Demonstration Presentation Center (DPC)***			
4.1.1	Demonstration Presentation Center (DPC)	2215		
4.1.2	Demonstration Presentation Center (DPC)	2216		
4.1.3	Demonstration Presentation Center (DPC)	2217		
4.1.4	Demonstration Presentation Center (DPC)	2218		
4.1.5	Demonstration Presentation Center (DPC)	2219		
4.1.6	Demonstration Presentation Center (DPC)	2220		
4.1.7	Demonstration Presentation Center (DPC)	2221		
4.1.8	Demonstration Presentation Center (DPC)	2222		
4.1.9	Demonstration Presentation Center (DPC)	2223		
4.1.10	Demonstration Presentation Center (DPC)	2225		
4.1.11	Demonstration Presentation Center (DPC)	2226		
4.1.12	Demonstration Presentation Center (DPC)	2227		
4.1.13	Demonstration Presentation Center (DPC)	2228		
4.1.14	Demonstration Presentation Center (DPC)	2229		
4.1.15	Demonstration Presentation Center (DPC)	2230		
4.1.16	Demonstration Presentation Center (DPC)	2231		
4.1.17	Demonstration Presentation Center (DPC)	2232		
4.1.18	Demonstration Presentation Center (DPC)	2233		
4.1.19	Demonstration Presentation Center (DPC)	2234		
4.1.20	Demonstration Presentation Center (DPC)	2235		
4.1.21	Demonstration Presentation Center (DPC)	2236		
4.1.22	Demonstration Presentation Center (DPC)	2237		
4.1.23	Demonstration Presentation Center (DPC)	2238		
4.1.24	Demonstration Presentation Center (DPC)	2239		
4.1.25	Demonstration Presentation Center (DPC)	2240		
4.1.26	Demonstration Presentation Center (DPC)	2241		
4.1.27	Demonstration Presentation Center (DPC)	2242		
4.1.28	Demonstration Presentation Center (DPC)	2243		

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Demo Spec Para #	Topic	Rqt#	Procedure Step #	Validation Method
4.1.29	Demonstration Presentation Center (DPC)	2244		
4.1.30	Demonstration Presentation Center (DPC)	2245		
4.1.31	Demonstration Presentation Center (DPC)	2248		
4.1.32	Demonstration Presentation Center (DPC)	2249		
4.1.33	Demonstration Presentation Center (DPC)	2251		
4.1.34	Demonstration Presentation Center (DPC)	2252		
4.1.35	Demonstration Presentation Center (DPC)	2253		
4.1.36	Demonstration Presentation Center (DPC)	2254		
4.1.37	Demonstration Presentation Center (DPC)	2255		
4.1.38	Demonstration Presentation Center (DPC)	2256		
4.1.39	Demonstration Presentation Center (DPC)	2257		
4.1.40	Demonstration Presentation Center (DPC)	2259		
4.1.41	Demonstration Presentation Center (DPC)	2260		
4.1.42	Demonstration Presentation Center (DPC)	2261		
4.1.43	Demonstration Presentation Center (DPC)	2262		
4.1.44	Demonstration Presentation Center (DPC)	2263		
4.1.45	Demonstration Presentation Center (DPC)	2264		
4.1.46	Demonstration Presentation Center (DPC)	2265		
4.1.47	Demonstration Presentation Center (DPC)	2266		
4.1.48	Demonstration Presentation Center (DPC)	2270		
4.1.49	Demonstration Presentation Center (DPC)	2269		
4.1.50	Demonstration Presentation Center (DPC)	2271		
4.1.51	Demonstration Presentation Center (DPC)	2272		
4.2	***Control Center Requirements***			
4.2.1	Control Center Requirements	2504		
4.2.2	Control Center Requirements	2505		
4.2.3	Control Center Requirements	2506		
4.2.4	Control Center Requirements	2507		
4.2.5	Control Center Requirements	2508		
4.2.6	Control Center Requirements	2509		
4.2.7	Control Center Requirements	2510		
4.2.8	Control Center Requirements	2511		
4.2.9	Control Center Requirements	2512		
4.2.10	Control Center Requirements	2513		
4.2.11	Control Center Requirements	2514		

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Demo Spec Para #	Topic	Rqt#	Procedure Step #	Validation Method
4.2.12	Control Center Requirements	2515		
4.2.13	Control Center Requirements	2516		
4.2.14	Control Center Requirements	2517		
4.2.15	Control Center Requirements	2518		
4.2.16	Control Center Requirements	2519		
4.2.17	Control Center Requirements	2520		
4.2.18	Control Center Requirements	2521		
4.2.19	Control Center Requirements	2522		
4.2.20	Control Center Requirements	2523		
4.3	***Communications***			
4.4	***Status***			
4.5	***Control***			