

# VOLVO

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Customer Contract Number C030588	Customer Contract Start/Finish Dates 21-Jan-2009 to 31-Dec-2011		

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## Acceptance Test Plan

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### C030588 CVII Task 5

**Task 5 builds on the base CVII infrastructure developed in Tasks 2, 3, and 4 providing a vehicle alert application for vehicle status data exchanged via vehicle-to-vehicle (V2V) communication.**

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<b>Responsible</b>	Tom Richter
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## 1 General Information

This document describes the acceptance test plan for Task 5 of the NYSDOT CVII Project.

### 1.1 Document Contacts

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### 1.2 Revision History

Issue	Date	Author	Changes
1.0	26 Apr 2011	Mike Brown	Initial

### 1.3 Reference Documents

- [1] Contract #C030588 – PIN: CC95.07.121  
Commercial Vehicle Infrastructure Integration  
New York State – Department of Transportation  
Astrid Glynn, Commissioner
- [2] 6980-02821-01-02 C030588 CVII Program Plan  
Volvo Technology – Tom Richter  
Issue 3.1 – 06 Nov 2009
- [3] 6980-02941-01-10 C030588 CVII Task 5 Concept of Operations  
SwRI – Mike Brown  
Issue 1.0 – 16 Nov 2010

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## 1.4 Abbreviations

CV	Commercial Vehicle
CVII	Commercial Vehicle to Infrastructure Integration
DOT	Department of Transportation
DMCU	5.9 GHz DSRC Mobile Communications Unit
DSRC	Dedicated Short-Range Communications
EVA	Emergency Vehicle Alert
IP	Internet Protocol
KTC	Kapsch TrafficCom Inc.
MV	Maintenance Vehicle
N/A	Not Applicable
NYS	New York State
NYS DOT	New York State Department of Transportation
SwRI	Southwest Research Institute
TGW	Telematics Gateway
V2V	Vehicle-to-Vehicle
VII	Vehicle to Infrastructure Integration
VTEC	Volvo Technology

## 1.5 Acceptance Criteria Identification

All acceptance criteria defined in this specification shall utilize the following notation:

*Criteria TASK5-nnn/i.i: <Criteria Title>*  
<Criteria Specification>

Where:

‘nnn’      Serial number: 000-999

‘i.i’      Issue of test plan in which the criteria was added or modified

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## 2 Acceptance Test Procedure

The acceptance test for Task 5 shall be accomplished by running the commercial test vehicle (CV) and a simulated maintenance vehicle (MV) through the procedures defined in this document which will verify that the requirements for the vehicle alert application have been met. There will not be an actual maintenance vehicle equipped and available for the acceptance test, so the maintenance vehicle shall be simulated with a test Jeep.

### 2.1 Test Procedure Log

During the execution of the test procedure, a Test Procedure Log shall be maintained as defined in the remainder of this paragraph.

#### 2.1.1 Pre-Test Data

Prior to running the test route, the following information shall be collected:

- Test hardware configuration:
  - System diagram showing:
    - Equipment
    - Connectivity (including IP addresses, etc.)
  - For each equipment item:
    - Manufacturer
    - Model
    - Serial Number

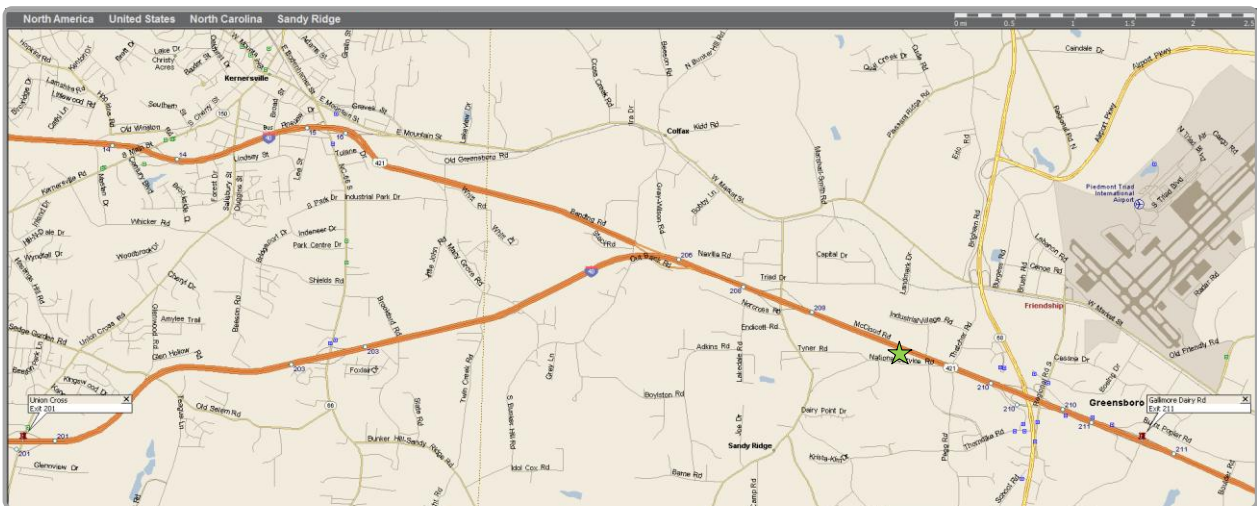
#### 2.1.2 Test Execution Data

During the execution of the test, the information defined in the test procedures below (i.e. “Log ...”) shall be collected.

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## 2.2 Acceptance Test Location

The acceptance test location for Task 5 will be performed on I-40 between Union Cross Road (Exit 201) and Gallimore Dairy Rd (Exit 211) around the Volvo campus in Greensboro, NC, as shown on the map below:



### 2.2.1 Vehicle Alert Application Test

The vehicles will setup in the configuration required for each test and will then execute the test as defined in the following sections.

### 2.2.2 Moving MV, Same Heading, Deactivate EVA before CV reaches MV

Both vehicles will be driving the same heading on the same road within communication range. The MV will drive ahead of the CV and will then slow down enough so that the CV will eventually catch up.

Procedure:

- Log the starting time of the test
- MV operator manually activates the EVA
- CV receives and displays the EVA
- Log the display
- CV updates the display as the vehicle gets closer

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- Log that the display is updating
- MV operator deactivates the EVA prior to the CV reaching the MV
- CV no longer receives or displays the EVA
- Log that the display was removed

### 2.2.3 Moving MV, Same Heading, Deactivate After Passing

Both vehicles will be driving the same heading on the same road within communication range. The MV will drive ahead of the CV and will then slow down enough so that the CV will eventually catch up.

Procedure:

- Log the starting time of the test
- MV operator manually activates the EVA
- CV receives and displays the EVA
- Log the display
- CV updates the display as the vehicle gets closer
- Log that the display is updating
- CV passes the MV
- Log that the display update text changes after passing the MV as the distance grows between the vehicles.
- MV operator deactivates the EVA prior to the CV leaving communication range.
- CV no longer receives or displays the EVA
- Log that the display was removed

### 2.2.4 Moving MV, Same Heading, No Deactivate

Both vehicles will be driving the same heading on the same road. The MV will drive ahead of the CV enough that it is out of communication range and will then slow down enough so that the CV will eventually catch up.

Procedure:

- Log the starting time of the test
- MV operator manually activates the EVA
- CV receives and displays the EVA once in range

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- Log the display
- CV updates the display as the vehicle gets closer
- Log that the display is updating
- CV passes the MV
- Log that the display update text changes after passing the MV as the distance grows between the vehicles.
- CV leaves communication range.
- CV no longer receives or displays the EVA
- Log that the display was removed

## 2.2.5 Moving MV, Opposite Heading, No Deactivate, EVA Heading is MV Heading Only

Both vehicles will be driving on the same road but in opposite headings initially out of communication range. The EVA will only be valid for the MV's heading.

Procedure:

- Log the starting time of the test
- MV operator manually activates the EVA
- CV receives the EVA once in range but does not display it
- Log that the message was not displayed
- CV continues and drives out of range of the MV
- Log that the CV no longer receives the EVA and never displayed it

## 2.2.6 Moving MV, Opposite Heading, No Deactivate, EVA Heading is All Headings

Both vehicles will be driving on the same road but in opposite headings initially out of communication range. The EVA will be valid for the all headings.

Procedure:

- Log the starting time of the test
- MV operator manually activates the EVA
- CV receives and displays the EVA once in range
- Log the display
- CV updates the display as the vehicle gets closer



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- Log that the display is updating
- CV passes the MV
- Log that the display update text changes after passing the MV as the distance grows between the vehicles.
- CV leaves communication range.
- CV no longer receives or displays the EVA
- Log that the display was removed

## 2.2.7 Moving MV, Same Heading, No Deactivate, Not Group Affected

Both vehicles will be driving the same heading on the same road. The MV will drive ahead of the CV enough that it is out of communication range and will then slow down enough so that the CV will eventually catch up.

Procedure:

- Log the starting time of the test
- MV operator manually activates the EVA
- CV receives the EVA once in range but does not display it
- Log that the message was not displayed
- CV continues and drives out of range of the MV
- Log that the CV no longer receives the EVA and never displayed it

## 2.2.8 Parked MV, Same Heading, No Deactivate

Both vehicles will be on the same heading on the same road. The MV will drive ahead of the CV enough that it is out of communication range and will then park on the shoulder.

Procedure:

- Log the starting time of the test
- MV operator manually activates the EVA
- CV receives and displays the EVA once in range
- Log the display
- CV updates the display as the vehicle gets closer
- Log that the display is updating
- CV passes the MV

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- Log that the display update text changes after passing the MV as the distance grows between the vehicles.
- CV leaves communication range.
- CV no longer receives or displays the EVA
- Log that the display was removed

## 2.2.9 MV Passes Parked CV, Same Heading, No Deactivate

Both vehicles will be on the same heading on the same road. The CV will drive ahead of the MV enough that it is out of communication range and will then park on the shoulder.

Procedure:

- Log the starting time of the test
- MV operator manually activates the EVA
- CV receives and displays the EVA once in range
- Log the display
- CV updates the display as the vehicle gets closer
- Log that the display is updating
- MV passes the CV
- Log that the display update text changes after the MV passes as the distance grows between the vehicles.
- MV leaves communication range.
- CV no longer receives or displays the EVA
- Log that the display was removed

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## 3 Acceptance Criteria

### 3.1 General

Each of the following criteria shall be evaluated by analyzing the data contained in the log files created by the KTC “COMM\_TEST” utility running on both DMCUs.

***Criteria TASK5-001/1.0: DSRC Range Statistics***

The usable DSRC range area for the successful transmission of DSRC data shall be a minimum distance of 300 meters between the two DMCUs.

***Criteria TASK5-002/1.0: RSE to DMCU Packet Loss Statistics***

The DMCU to DMCU packet loss within the DSRC range shall be a maximum of 10% in relation to the total DSRC packet transmission.

***Criteria TASK5-003/1.0: DMCU to RSE Packet Loss Statistics***

The DMCU to DMCU packet loss within the DSRC range shall be a maximum of 10% in relation to the total DSRC packet transmission.

***Criteria TASK5-004/1.0: Received Signal Strength***

The DSRC received signal strength shall be a minimum of 10 dBm at 300 meters.

### 3.2 Vehicle Alert Application

Each of the following criteria shall be evaluated by analyzing the data collected in the Test Procedure Log and the DMCU, and TGW transaction information.

***Criteria TASK5-005/1.0: Manual Activation / Deactivation***

The TGW and DMCU logs for the MV shall be analyzed for each test to ensure that the manual EVA activation / deactivation were successfully executed when performed.

***Criteria TASK5-006/1.0: Automatic Activation / Deactivation***

The TGW and DMCU logs for the MV shall be analyzed for each test to ensure that the automatic EVA activation / deactivation were successfully executed when performed.

***Criteria TASK5-007/1.0: EVA Display***

The logged display information shall be analyzed for each test to ensure that the EVA was correctly displayed and removed at the appropriate times and that the display was updating correctly. The information shall also be analyzed for each test to ensure that the EVA was not displayed if appropriate.

***Criteria TASK5-008/1.0: EVA Content***

The logged emergency vehicle alert content from each test shall be analyzed to ensure that it is consistent and accurate.

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