HLR-WEB System Specifications

1. Overview of the HLR-WEB system

In the SMART vehicle design process the PBS Bridge loading standard compliance plays an integral role. To this end the Department of Transport, Energy and Infrastructure in South Australia has developed this web-based assessment tool to assist in determining the loading effects on bridges in South Australia of proposed vehicles, rather than those of prescriptive vehicles.

The Bridge Assessment Tool aims to give SMART vehicle designers an indication of compliance under Tier 2 of the PBS Bridge Loading Standard. The tool assesses the vehicle design effects over the Draft South Australian PBS Networks for Level 1-4 (A&B). The check for compliance using this tool should provide some confidence to designers to proceed with their vehicle design.   (Note that the assessment tool is not a replacement for full assessment, nor can the results from this tool be used for permit allocation).

The web-based user interface enables the vehicle designer to enter relevant vehicle parameters, select one of the standard PBS Networks and perform the assessment. The results of the assessment are given in the form of a message indicating whether that vehicle may, or may not, create bridge effects that exceed acceptable limits. Depending on the outcome of the assessment, the user may then choose to save the assessment and exit the application, to modify the vehicle and re-run the assessment, or to select another PBS route and run the vehicle over it.

2. Operation and directory, folder and file specifications

The assessment process which the HLR-WEB tool uses is based on the HLR (Heavy Load Route) system developed by the DTEI Bridge Section. The system consists of a VB6-based executable file called **HLR6.EXE** that resides in the ..*HLR6* folder (on an internal DTEI server), together with a number of associated permanent and variable data files. The executable itself is a stripped-down version of **HLR5.EXE** currently used by the Bridge Assessment Group to perform detailed heavy load assessments.

Apart from the **hlr6.exe** processing module there are a number of data files that must be present in both the ..*HLR6* folder as well as an associated ..*HLR6\TempFiles* subfolder. The location of all files in the system is governed by the file called "*Defaults.txt*" located in the **HLR6.exe** start-up directory. A more detailed over-view of this file is given in Section 2.0 below.

When the user selects a PBS Network for assessment, the HLR-WEB GUI links that network to a corresponding PBS network file located in the main HLR5 database directory (the path for which is specified by the parameter *DataDirectory* in "*Defaults.txt*"). The GUI copies the list of bridge numbers from that file into a text file called "**hlp.txt**" and stores it in the ..*HLR6\TempFiles* subfolder (the subfolder path is specified by the parameter *TempDir* in "*Defaults.txt*"). Note that the database directory can be located on any server in the system. PBS network file names are:

> PBS-Network1A.txt, PBS-Network1B.txt, PBS-Network2A.txt, PBS-Network2B.txt
> PBS-Network3A.txt, PBS-Network3B.txt, PBS-Network4A.txt, PBS-Network4B.txt

All of these are simple text files that contain a list of structure numbers lying on that network. (The mapping system creates these files initially then updates them whenever a bridge is added to, or removed from, one of those networks). Each record in the *PBS-NetworkXY.txt* files corresponds to a single plan number.

During run-time the **hlr6.exe** processing module reads the list of bridges from "**hlp.txt**" and performs an analysis and assessment of each. As it does so, it writes relevant data to a **Log.dat** file (also in text form) while missing structures numbers are written to a file called "*List of structures not in database.txt*". (This issue is covered in more detail in Section 2.1 below). Finally, the program checks if any structure has had a restriction applied. The results of this check are written to another text file called "*Vehicle_Travel_Check.txt*". All of these files are saved to the current user's *TempFiles* folder.

As indicated above, the **hlr6.exe** analysis module requires all run-time data and temporary files to be located in the *TempFiles* folder. As a consequence, all users accessing this application on a network would be locked into the same directory path specification. This works fine if the temporary folder is located on a user's own PC (since the folder path specification can be configured identically on each PC) but it will create problems if the directory is located on a server and a number of users wish to run the application simultaneously.

A multi-user environment has been implemented using three identical HLR6 folders on the internal DTEI server. When a client attempts to run their assessment the GUI checks if any one of these three folders are free. If so, the assessment is processed. If not, a message is displayed informing the user that the system is busy and to try again in a minute or two.

The content, description and format of data within the various key files is described below.

2.0 Defaults.txt

Directory and folder specifications are given in the file called "*Defaults.txt*" located in the **HLR6.exe** start-up directory. This is a text file with (in part) the following <u>example</u> contents and format:

> *# HLR6 - Defaults File*
> *#*
> *# The structure or content of this file was last changed on 8/8/2010*
> *#*
> *# INSTRUCTIONS FOR CHANGING DEFAULT VALUES*
> *#*
> *# Each comment line must start with the hash (#) symbol*
> *# Default values are declared using the convention: Variable = Value*
> *# Do NOT change variable names or their spelling*
> *#*
> *# DIRECTORY STRUCTURE*
> *#*
> *# Directory for program files*
> *ProgramFiles=*
> *#*
> *# Directory for database files*
> *DataDirectory =C:\HLR5\Database*
> *#*
> *# Directory for help files*
> *HelpFiles=C:\HLR5\HelpFiles*
> *#*
> *# Directory for temporary files*
> *TempDir =C:\HLR6\TempFiles*
> *#*
> *# Directory for the Editor for editing & printing reports*
> *ReportEditor =C:\Program Files\Microsoft Office\Office\winword.exe*
> *#*
> *# DEFAULT PARAMETERS*
> *#*
> *DesignStandard=*
> *#*
> *...*

Note that if "*Directory for program files*" is blank (null) HLR6 will assume that the program files are in the **HLR6.EXE** start-up directory. Database files referenced during the analysis at run-time must be stored in the folder specified by *# Directory for database files*. Directory settings for help files, the *Editor* and the *Browser* are not referenced by HLR6 and can be ignored. All existing files within the *ProgramFiles* folder must be left as-is.

2.1 Log.dat

This file stores the output generated by the analysis routine. It is a text file containing the results for every structure analysed in the **hlp.txt** plan list (see also item 2.4 below). In order to determine whether the assessment has been successful (or not) the HLR6 post-processing routine searches for any one of the following key phrases in **log.dat**: *"Overloaded", "5 kph Centre", "10 kph Edge", "Absolute Restriction"*

As soon as the first phrase is found the search stops and the word "*FAIL*" is written to a text file called "*Vehicle_Travel_Check.txt*" in the *TempFiles* folder. Otherwise the assessment check continues and if no critical keywords are found the word "*PASS*" is written to the file. The following conditions are ignored in the scanning process: *"Bypass Analysis", "No Design Vehicle Data", "Not Analysed", "Structure not in database"*.

Note also that the above phrases are reproduced exactly as they appear in the log report (including quotes, spaces and capitalization). The quotes are included in the search criteria because identical text strings may be embedded in other parts of the record. The above phrases may occur anywhere within a given record. The log and "*Vehicle_Travel_Check.txt*" files can be deleted once the search has been completed.

Structure numbers <u>not</u> found in the HLP database are written to a text file called "*List of structures not in database.txt*" located in the current user's *TempFiles* folder.

2.2 hloa.txt (Analysis parameters)

This is a text file that stores various analysis parameters viz: *Dummy, Use default DFs, Travel direction (0=Forward), Travel direction (True=Forward), Dummy, Use reduced axle loads, Struct DF axle width, Struct DF axle numb tyres, Stop at restricted bridges, ULS factor, Working Overstress factor.* The contents of the file depend on the network level selected by the user. Therefore the file must be created and written by the HLR-WEB GUI to the ...*TempFiles* folder prior to runtime. It will take one of the following two forms:

EITHER:

"True","False","0","True","0","False","3","4","False","2","100"   (For a Level 1 network)

OR

"True","False","0","True","0","False","3","4","False","1.8","115"   (For network Levels 2-4)

NOTE: Although DTEI structures do not currently have specific DFs the *"Use default DFs"* parameter has been set to *"False"* to cater for any future changes to this situation.

2.3 hla1.txt (Job ID parameters)

This is a text file that stores general job ID run-time parameters (*HL number, Application number, Route description, Vehicle description, Vehicle reduction factor, Job date, Company name, Processed by*). It should **<u>not</u>** be changed or deleted.

NOTE: A *Vehicle Reduction Factor* of 0.9 is applied during the analysis (refer to the *Analysis* tab in HLR5).

2.4 hlp.txt (Plan list)

This is a text file that contains the list of structure (or plan) numbers of the bridges that are to be assessed. The contents of this list will depend on which of the standard network routes have been selected by the user and must be copied from an appropriate server prior to runtime. Each record (or line in the file) consists of a single, alpha-numeric, string value enclosed in double quotes e.g., *"3000", "6599A"* etc.

If the file is generated elsewhere it must be copied into the "**hlp.txt**" file in the *TempFiles* folder <u>before</u> the assessment begins. The file can be deleted once the search has been completed.

Structure numbers <u>not</u> found in the HLP database are written to a text file called "*List of structures not in database.txt*" located in the current user's *TempFiles* folder.

2.5 hlr1.txt (Route data)

This text file resides in the *TempFiles* folder and stores default route-based parameters (*Route number, Route name, Number of links, Extra roads at beginning of route, Extra roads at end of route*). It should ***not*** be changed or deleted.

2.6 hlr2.txt (Link data)

This text file resides in the *TempFiles* folder and stores default link-based parameters (*Link name, Sequential number of link within the full route, Link number, Source route name, Source route number, Section number, Whether the link lies on the route*). It should ***not*** be changed or deleted.

2.7 hlv2.txt (General vehicle data)

This is a text file that contains user-specified vehicle identification information and must be created prior to runtime by the HLR-WEB interface and written to the *TempFiles* folder. It consists of a single record and contains the following vehicle parameters:

> *Vehicle number (alphanumeric)*
> *Vehicle name (alphanumeric)*
> *Number of axles (integer value - maximum 99)*
> *Vehicle weight (enter "0" as shown)*
> *Vehicle weight (enter "0" as shown)*
> *Vehicle length (enter "0" as shown)*
> *Vehicle height (enter "0" as shown)*
> *Vehicle width (enter "0" as shown)*

EXAMPLE: *"HLM1600","M1600 Axle Loads Only","12","0","0","0","0","0"*

The most important parameter is the third, *Number of axles*. Note that ***all*** parameters must be enclosed in double quotes and be comma delimited. Although all parameters appear in the record as alphabetic strings they will be converted by HLR at run-time into numeric equivalents (where appropriate).

2.8 hlv3.txt (Vehicle axle data)

This is a text file that contains user-specified vehicle axle data and must be created prior to runtime by the HLR-WEB interface. It consists of multiple records, the total number of records being equal to the "*Number of axles*" specified in the ***hlv2.txt*** file above.   Each record contains the following parameters:

> *Vehicle number (alphanumeric – must be identical to that specified in **hlv2.txt**)*
> *Axle number (integer – a sequential number from 1 to the maximum number of axles)*
> *Axle load (numeric – must be given in tonnes)*
> *Axle spacing (numeric – must be given in metres)*
> *Axle width (numeric – insert "0")*
> *Reduced axle load (numeric – insert "0")*

EXAMPLE:

> *"HLM1600","1","12.24","0","0","0"*
> *"HLM1600","2","12.24","1.25","0","0"*
> *....*

Note that ***all*** parameters must be enclosed in double quotes and be comma delimited. Although all parameters appear in the record as alphabetic strings they will be converted by HLR at run-time into numeric equivalents (where appropriate).

Axle spacing: Note that this value represents the spacing *between* adjacent axles (i.e., from one to the next). The first axle is the reference axle so it's spacing must always be 0.

2.9 List of structures not in database.txt (Text file)

Structure numbers _not_ found in the HLP database are written to this text file located in the _TempFiles_ folder. This file will not be viewable by the client running the software – only those with access permission to the folder. This will be particularly useful during the network testing stage.

A check is made that relevant _HLPx.txt_ database files exist. If not, an appropriate message is written to the file "_List of structures not in database.txt_" (located in the current user's _TempFiles_ folder) and the assessment is terminated.

2.10 All other data files

A number of temporary files are created during the analysis process and saved to the _TempFiles_ folder. They have the extension "_.ENV_" and "_.OUT_" and can be deleted at the end of the assessment. Note that at runtime HLR6 deletes these files (left from the previous run) before performing the current analysis.