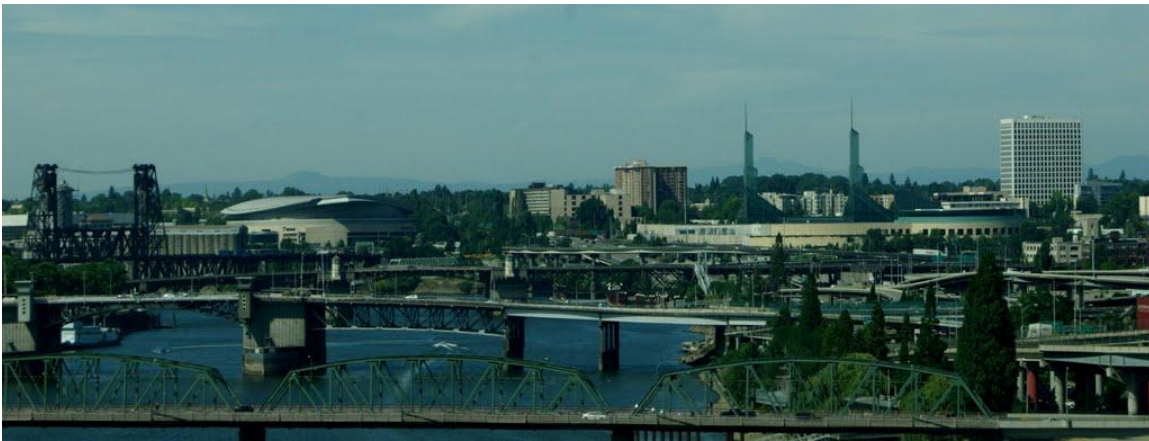


# ***Oregon Department of Transportation***

## **TransInfo Software Architecture Appendix VI**



## **OHMS HERS-ST Extract Specification**

***V 1.0***

***Exor Corporation Ltd 2009***

**Version Control**

<b><i>Date</i></b>	<b><i>Version</i></b>	<b><i>Changed by</i></b>	<b><i>Notes</i></b>
September 2009	0.1	RE	Initial revision
October 2009	0.2	RE	Changes to reflect using a modified HPMS 2010+ process of submitting the data to OHMS
November 2009	1.0	RE	Response to comments from 2 <sup>nd</sup> draft of the software architecture document.

**Note:**

- Version numbers < 1 indicate draft
- Whole numbers indicate a finalized edition
- Version numbers between whole numbers indicate error correction, minor changes altering the substance of the report
- Version numbers with 2 decimal points indicate draft to a minor or major revision.
- Draft changes prior to a major revision should be marked as "DRAFT"
- Version does not indicate acceptance by ODOT or Exor.

Cover Image: Portland Area, Vaughan, 2009.

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## 1. Introduction

The Oregon Department of Transportation (ODOT) is implementing an Exor Asset Management system to be called TransInfo. TransInfo will replace the existing ITIS and Features Inventory systems with a spatially enabled system that supports multiple LRS. It is based on COTS software from Exor Corporation and implementation is being carried out by a team consisting of staff from both Exor and ODOT. It is based on Exor version 4.0.5.0.

This report details the specification for a data extract from the TransInfo system to be supplied to the Oregon Highway Monitoring System (OHMS). OHMS is used to enable ODOT to do capacity and economic modeling using the State Version of the Highway Economic Requirements System (HERS-ST) software, developed by the Federal Highway Administration (FHWA). This file will be compiled from data in TransInfo from asset records and their location on the network. It will then be extracted and made available to ODOT to load into the OHMS system.

Where requirements are yet to be defined, the project will make these determinations in the Build/Design phase and record that in the design document, which will evolve from this specification.

## 2. Scope

Creation of the OHMS extract is considered in scope of the primary TransInfo project. Exor is responsible extracting the data required and making it available as a file.

Exor is not responsible for transporting the file to OHMS or loading the extract to the OHMS system. Exor will provide CSV files to a client PC running TransInfo.

### 2.1 High Level Requirements and Responsibilities

#### 2.1.1 Exor

- Produce CSV formatted files of the extract of the OHMS data in the format discussed below from Asset and Network data (as specified in the Core TransInfo requirements and mapped in the TransInfo data storage Design)

#### 2.1.2 ODOT

- Test the OHMS extract for completeness and accuracy
- Make any process changes required to load the file to the OHMS system
- Follow the work process to load the file into OHMS

## 3. Summary of OHMS Extract

OHMS is a system used to analyze highway data to aid in economic and capacity planning. It is closely associated with the HERS-ST program. From the FHWA web site:

*"HERS-ST is an engineering/economic analysis (EEA) tool that uses engineering standards to identify highway deficiencies, and then applies economic criteria to select the most cost-effective mix of improvements for system-wide implementation. HERS-ST*

*is designed to evaluate the implications of alternative programs and policies on the conditions, performance, and user cost levels associated with highway systems.”*

As part of the TransInfo project an extract to support OHMS will be generated. At the time of writing the impact of the HPMS 2010+ reassessment on the HERS-ST has not yet been fully determined but it is anticipated that HERS-ST data structure will change to reflect a format similar to the HPMS 2010+ format. This document assumes that the HERS-ST format will be a modified HPMS 2010+ format currently for the purposes of this project and the format and content are defined below.

## **4. Exporting Data for OHMS**

### **4.1 File Format**

The format to be used will be a CSV files. These are plain text files with data separated by commas and therefore commas are not allowed in the data fields.

No header row will be attached to the file.

### **4.2 Data Structure**

The OHMS process will extract two files. The data structure is documented by the FHWA in *HPMS Reassessment 2010+ Data Specifications*. This is available at <http://www.scag.ca.gov/hpms/pdfs/2009/HPMS-FHWAspec12a-3.pdf> Just two of the tables will be produced: SUBMIT\_SECTIONS and SUBMIT\_SAMPLES. All other HPMS tables that can be produced from TransInfo would be available from the HPMS extract being developed during the TransInfo implementation if they are required.

There is some uncertainty that the SUBMIT\_SAMPLES table is required as the entire dataset should represent samples. If this can be confirmed during design then this table will not be produced by TransInfo. The OHMS design documents will confirm this.

Refer to the FHWA reference guides for details of the file structures required.

For the purposes of OHMS the file format or structure will not change but the definition of the content will be altered. The main differences will be:

- Data not demanded by the HPMS 2010+ will be included
- 100% of the network will be included as samples
- The sample break points will be defined by assets specified by the OHMS administrator and documented below.

### **4.3 Source Data**

The OHMS system will use numerous data types from the TransInfo System to produce the HERS-ST file. A high level description of this is included below.

#### **4.3.1 SUBMIT\_SAMPLES**

The SUBMIT\_SAMPLES table may not be required but the specification has been retained until that is confirmed.

To produce a SUBMIT\_SAMPLES table, the road data needs to be segmented. Table 1 - SUBMIT\_SAMPLE\_SECTIONS Table Definition **Error! Reference source not found.** lists the TransInfo asset types and their relevant attributes that will be used to divide the road network up into sections that are homogeneous along their length for all of these attributes.

Constraint	Field Name	Data Type	Description
PK	Year_Record	Numeric(4)	Year for which the data apply
PK	State_Code	Numeric(2)	State FIPS code
PK	Route_ID	Character(32)	ID for the linear feature
PK	Begin_Point	Decimal(8,3)	Begin point
PK	End_Point	Decimal(8,3)	End point
	Section_Length	Decimal(8,3)	Section length
UK	Sample_ID	Char(12)	Sample Identifier

**Table 1 - SUBMIT\_SAMPLE\_SECTIONS Table Definition**

For the purposes of defining homogenous sections, the following HPMS items should define the extent of road sections. A change in any one of these items should trigger a new section.

IDENTIFICATION	
Item	Source in TransInfo
County Code	CNTY group
LRS Identification	HWY Route
Rural/Urban Designation	URBN Group
Functional System Code	FCC Asset
Number of Through lanes	<< TBD >>
Type of Facility	Asset FACL
AADT	Asset TRAF
Lane Width	PVMT asset lane XSP's
Shoulder Width	PVMT asset shoulder XSP's
Median Width	Asset MEDN
Speed	Asset SPZN
Terrain Type	Asset TERR
SCS	Asset SCS
Oregon Freight Route	Asset OFRG
Region/District	EA Group
PMS Section	<<TBD >>

**Table 2 - HERS-ST Splitting Agents**

Notes:

Only network contained within the Group 'Certified Mileage' is included in the HERS-ST extract.

Sample would normally be used to define the extent of the section but as this extract is to be used only for HERS-ST and not for HPMS, it will be excluded.

Number of through Lanes: The definition of the number of through lanes is not completely settled at time of writing but is likely to be derived from pavement information. This definition is not useful for ad hoc query or for reporting and the number of through lanes is used in many other reports so it is expected that an asset type will be derived from pavement to allow reporting of the number of through lanes.

*PMS Section:* This information is not currently contained within the TransInfo database. If required the PMS section will be created as an asset type in TransInfo.

### 4.3.2 SUBMIT\_SECTIONS

This table holds the bulk of the OHMS data. This data will be formatted as prescribed by the FHWA for HPMS and is detailed below in Table 3 - SUBMIT\_SECTIONS Table Definition.

Constraint	Field Name	Data Type	Description
PK	Year_Record	Numeric(4)	Year for which the data apply
PK	State_Code	Numeric(2)	State FIPS code
PK	Route_ID	Character(32)	ID for the linear feature
PK	Begin_Point	Decimal(8,3)	Begin point
PK	End_Point	Decimal(8,3)	End point
PK	Data_Item	Text	HPMS Data Items
	Section_Length	Decimal(8,3)	Section length
	Value_Numeric	Numeric	Numeric value for data item
	Value_Text	Varchar(50)	Text value for data item
	Value_Date	Date	Date_Value for data item
	Comment	Varchar(100)	Comment for State use

**Table 3 - SUBMIT\_SECTIONS Table Definition**

Below is a listing of all of the data items that will be included in the OHMS extract and what data type will be used to generate the values for the extract:

FHWA HPMS Reference	Data_Item	TransInfo Source
3.2.1.2.1	F_System	Asset FFC
3.2.1.2.2	Urban_Code	Group URB
3.2.1.2.3	Facility_Type	Asset FACL
3.2.1.2.4	Is_Structure	Asset STRC
3.2.1.2.6	Ownership	Always = 'STATE'
3.2.1.2.7	Through_Lanes	TBD, this asset type will be automatically derived from PVMT data.
3.2.1.2.8	HOV_Type	Asset HOV
3.2.1.2.9	HOV_Lanes	Asset HOV
3.2.1.2.10	Peak_Lanes	0.5 * Through_Lanes (rounded up)

FHWA HPMS Reference	Data_Item	TransInfo Source
		Peak_Lanes = Through_Lanes for One-Way segments.
3.2.1.2.11	Counter_Peak_lanes	Through_Lanes – Peak_Lanes  Counter_Peak_Lanes = Zero for One-Way segments.
3.2.1.2.12	Turn_Lanes_R	PVMT on Increasing highway only (count by XSP)
3.2.1.2.13	Turn_Lanes_L	PVMT on Increasing highway only (count by XSP)
3.2.1.2.14	Speed_Limit	Asset SPZN
3.2.1.2.17	Route_Number	ROUT group type
3.2.1.2.21	AADT	Asset TRAF
3.2.1.2.22	AADT_Single	Asset TRAF
3.2.1.2.23	Pct_Peak_Single	Asset TRAF
3.2.1.2.24	AADT_Combination	Asset TRAF
3.2.1.2.25	Pct_Peak_Combination	Asset TRAF
3.2.1.2.26	K_Factor	Asset TRAF
3.2.1.2.27	Dir_Factor	Asset TRAF
3.2.1.2.28	Future_AADT	Asset TRAF of previous year (year 19) that has the same ID.
3.2.1.2.31	Signals	Count intersections within the sample identified in SUBMIT_SAMPLE
3.2.1.2.32	Stop_Signs	Count intersections within the sample identified in SUBMIT_SAMPLE
3.2.1.2.33	At_Grade_Other	Count intersections within the sample identified in SUBMIT_SAMPLE
3.2.1.2.34	Lane_Width	Asset PVMT in XSP Lane 1
3.2.1.2.35	Median_Type	Asset MEDN
3.2.1.2.36	Median_Width	Asset MEDN
3.2.1.2.37	Shoulder_Type	Asset PVMT in XSP Shoulder
3.2.1.2.38	Shoulder_Width_R	Asset PVMT in XSP Right Shoulder
3.2.1.2.39	Shoulder_Width_L	Asset PVMT in XSP left Shoulder (even in divided highways)
3.2.1.2.40	Peak_Parking	Asset PARK or HPMS
3.2.1.2.43	Curves	Calculated from CURVE asset
3.2.1.2.44	Terrain_Type	Asset TERR
3.2.1.2.45	Grades	Calculated from GRADE asset
3.2.1.2.49	Surface_Type	Asset PVMT with XSP of Lane 1
3.2.1.2.56	Last_Overlay_Thickness	Asset PVMT with XSP of Lane 1



FHWA HPMS Reference	Data_Item	TransInfo Source
3.2.1.2.57	Thickness_Rigid	Asset PVMT with XSP of Lane 1
3.2.1.2.58	Thickness_Flexible	Asset PVMT with XSP of Lane 1
3.2.1.2.59	Base_Type	Asset PVMT with XSP of Lane 1 and material types of 'base'
3.2.1.2.60	Base_Thickness	Asset PVMT with XSP of Lane 1 and material types of 'base'
n/a	<i>Oregon Freight Route</i>	Asset OFRG
n/a	<i>Region/District</i>	EA Group
n/a	<i>PMS Section</i>	<<TBD >> This will be either appended from external information by OHMS externally to TransInfo (i.e. after the extract is downloaded from TransInfo) or extracted from a new asset type if it is created in TransInfo.

Table 4 - HERS-ST Data Definition

## 5. User Interface

User interface elements to be used for exporting data from TransInfo will consist of menu from which the files may be downloaded. The menu will be accessible from the main Launch Pad of the TransInfo application:

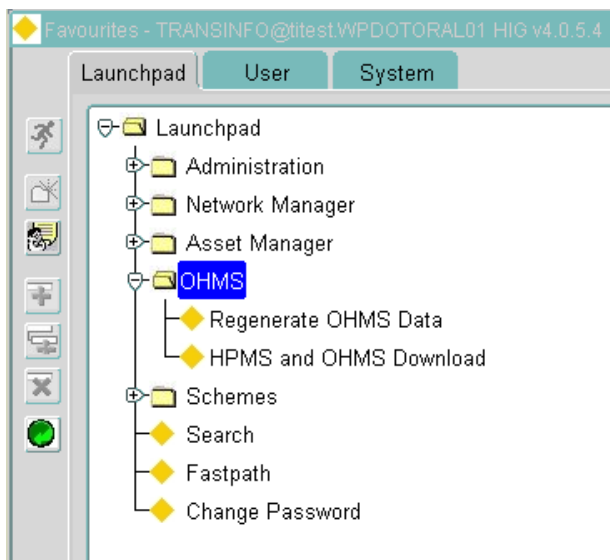


Figure 1 – Proposed OHMS Application Functions

The first menu will instigate a process to generate the HERS-ST format dataset within the TransInfo database. It is anticipated that this process will take significant processing time.

The second option will open a form to allow the user to download the HERS-ST extract.

The user will be prompted to download the HERS-ST extract to their client PC from which it can be loaded to the OHMS software by the user.

This has been divided into two processes so that the extract process can be started by one button press. This may take some time and may be started and left to process. The download button will allow the user to download and save the CSV file after it has been produced.

## 6. Security

The functions to create the extract and download it from TransInfo should only be accessible to applicable users. This could be only the persons responsible for loading the OHMS extract. To control this, the application function to produce the export should be restricted to those with an application role dedicated to controlling access to these functions. This role would be called TI\_APPROLE\_OHMS\_USER. This role can then be given to any users that should access the OHMS extract.

## 7. Components Required

This section is a list of development required and the objects that will be produced by the build process. As development progresses it should be updated to show the names of specific objects once confirmed.

### 7.1 Data Storage

No specific OHMS data is envisaged. The OHMS will consist of numerous datasets contained in the TransInfo database. The transformation of the data in TransInfo to the HERS-ST model will be determined during the design and build phase of the TransInfo project and will be driven by the methods used to produce pre 2010 HPMS+ data as per the HPMS manual. It is anticipated that in some cases data required will not be available in TransInfo and in these cases the field will be left blank.

### 7.2 Core User Interface

- Button on the core interface to create OHMS extract and store it in Database tables within TransInfo. This process will take some time.
- Button and forms to download the OHMS extract as CSV files to the client PC

### 7.3 Procedures and Views

- Procedure to create the extract <<XOR\_HERS\_ST\_EXTRACT.extract>>
- Procedure(s) to download the extract <<XOR\_HERS\_ST\_EXTRACT.download>>

### 7.4 Scripts

- Process to install all application functions
- Process to remove all application functions

### 7.5 Documentation

Documentation is required to:

- Install and uninstall the application function
- Maintain the application function
- Creating and downloading the OHMS Extract

For convenience these may be combined into one document.

## **8. Summary**

The OHMS extract will be produced as a modified HPMS 2010+ structured file from the TransInfo System. TransInfo will produce a CSV format file for the process and ODOT staff will load that into the OHMS system.

No significant changes to the scope of the OHMS extract have been suggested or are recommended by Exor.