Structures Asset Management Planning Toolkit
Using the toolkit in practice

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1 Introduction

In Hertfordshire we have been enthusiasts in Asset Management for many years, seeing the benefits of understanding the value of our assets, and managing them with a full understanding of the value of maintenance intervention, and of the depreciation of assets over time. We are keen to use the Structures Asset Management Planning Toolkit to help bring to our structural assets the same benefits we have already seen in highway asset management.

This note summarises our experience in collating the available data for use in the toolkit for the 2011/12 period, and more recently for the 2012/13 returns using the toolkit v1.02. We concentrate on using the data to establish Gross Replacement Cost (GRC) and Depreciated Replacement Cost (DRC) rather than for Asset Management Planning. We explain what was done and how in the hope that this might prove helpful to others when they come to do the same

2 Compiling the data

Hertfordshire County Council has been using the PBBI Confirm – Bridges Module as their bridge management system since April 2011. The bridge module stores the bridge inventory and condition data alongside the wider highways asset information stored by HCC.

We downloaded the Structures Asset Management Planning Toolkit in an MS Excel 2007 spreadsheet format, in two versions – the small and large versions, from the CIPFA website at www.cipfa.org/…

The spreadsheets are intended as a proof of concept model to demonstrate the principles of the tools which, it is hoped, will be incorporated into the various bridge management software applications available on the market in due course. However in the meantime it was necessary to populate the spreadsheet in order to get bridge DRC and GRC values for Whole of Government Accounts (WGA) returns.

3 Data collection

Hertfordshire are responsible for around 1700 structures, from culverts of 900mm diameter to a viaduct a little over 800m span. The structure and inspection data is held in Confirm which uses the SQL query syntax. The following outlines the process for data-mining and extraction of certain data fields from Confirm required by the toolkit spreadsheet.

We identified the discrete data sets that were required to populate each tab within the *Structures Asset Management Planning Toolkit*: Some of these were available from the Confirm database, but other data sets were taken from alternative sources

3.1 Structure Data

Basic data on each structure is held within the Confirm database and is required for the Structures Database tab in the spreadsheet. Other fields within this tab were not obtained through the Confirm

system. Alternative data sources were interrogated to extract the required information where available. Where data sets are not held or collated assumptions were made based on information available.

Data from Confirm

- Unique identifier
  - Structure Number, Reference/Name
- Structure type
  - As defined within the toolkit
- Dimensional information
  - Length, span/width, headroom and number of spans
- Route / Obstacle carried and crossed
  - As defined within the toolkit
- Additional factors
  - Heritage Status (listed structures)
  - Substandard structures
  - environmentally sensitive

Location

Rural or Urban sites. This data required GIS mapping. We overlaid settlements against structures and determined urban/rural based on the proximity to settlements.

Proximity to salting

GIS mapping was used to overlay known salting routes against structure locations.

Traffic levels of the route supported

No definite detail is available as traffic counts are not undertaken on all roads. However an assumption based upon the route supported road classification set bench marks for the level of predicted traffic flows across such structures.

3.2 Element Data

This tab breaks each structure into elements and sets know condition scores against each element. Confirm provided the bulk majority of the information for this tab and it is worth noting that elements reported within confirm relate to scored components and full detail is not provided. The additional data fields were populated through assumptions as our data bases either did not hold the relevant detail or was not sufficiently detailed to warrant extraction of such data sets.

Data from Confirm

- Element number set against structure reference – note that element number is set against a drop down choice menu which relates to the structure reference as detailed within the structures database tab.
- Condition. Direct input from Confirm – BCI score is extracted and directly inserted against the relevant data set.

Component material

Data held on materials is not extensive. We used the Primary and Secondary deck element data to determine materials for these elements. Substructure materials were completed using a lookup system in a separate spreadsheet – concrete and steel bridges were assumed to have concrete substructures. Older types of bridge were assumed to have brick substructures

Proximity to spray

No data is held on proximity of substructure elements to salt spray although we hope to collect this during future General Inspections. We used the method proposed in the Guidance Note to the 2012/13 toolkit, to average the results from a toolkit runs based on all elements being close to salt spray, or all elements being remote from salt spray

Strategy

The strategy is irrelevant as the software defaults to a pre-determined strategy when DRC is chosen as the analysing routine to be computed.

3.3 Data extraction from Confirm

The data from Confirm was obtained from the database using a custom Data Source in SQL and tailored to the unique nature of the Hertfordshire database.

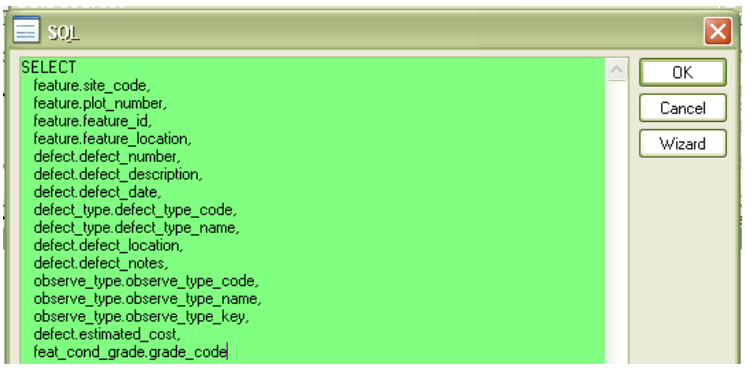


Fig 1: SQL code extract

The SQL code was stored as a data source, this allows the required information to be extracted as and when required in the future.

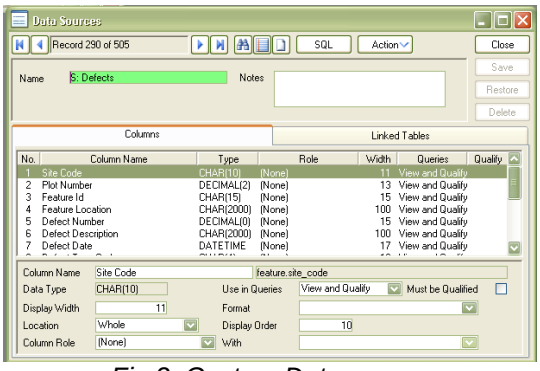
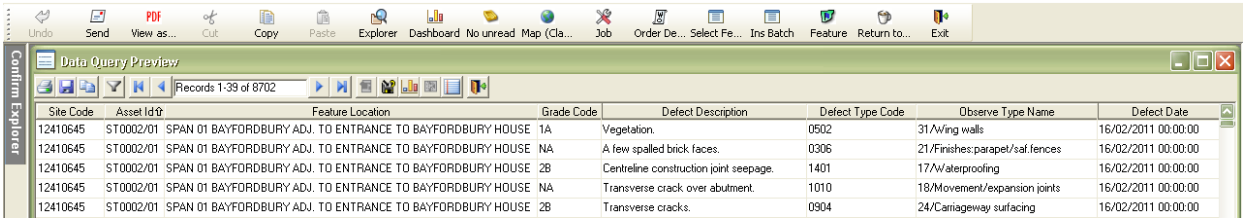


Fig 2: Custom Data source

The data source is run and a snapshot of the required inventory data is extracted.



Data Query Preview — Records 1-39 of 8702

Site Code	Asset Id	Feature Location	Grade Code	Defect Description	Defect Type Code	Observe Type Name	Defect Date
12410645	ST0002/01	SPAN 01 BAYFORDBURY ADJ. TO ENTRANCE TO BAYFORDBURY HOUSE	1A	Vegetation.	0502	31/Wing walls	16/02/2011 00:00:00
12410645	ST0002/01	SPAN 01 BAYFORDBURY ADJ. TO ENTRANCE TO BAYFORDBURY HOUSE	NA	A few spalled brick faces.	0306	21/Finishes:parapet/saf.fences	16/02/2011 00:00:00
12410645	ST0002/01	SPAN 01 BAYFORDBURY ADJ. TO ENTRANCE TO BAYFORDBURY HOUSE	2B	Centreline construction joint seepage.	1401	17/Waterproofing	16/02/2011 00:00:00
12410645	ST0002/01	SPAN 01 BAYFORDBURY ADJ. TO ENTRANCE TO BAYFORDBURY HOUSE	NA	Transverse crack over abutment.	1010	18/Movement/expansion joints	16/02/2011 00:00:00
12410645	ST0002/01	SPAN 01 BAYFORDBURY ADJ. TO ENTRANCE TO BAYFORDBURY HOUSE	2B	Transverse cracks.	0904	24/Carriageway surfacing	16/02/2011 00:00:00

Fig 3: Extracted Data (Sample)

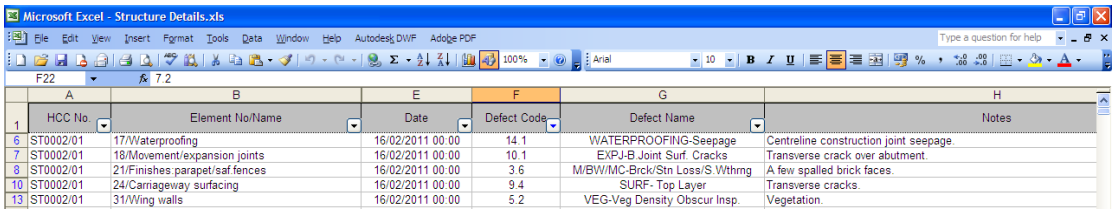
At this point the data can be checked and filtered to ensure only the latest data is extracted. For example in the example above, a filter was placed on the data obtained to restrict the information to the last two years of inspections.

3.4 Entering Data into the toolkit.

It is highly advisable to enter the data sets within the separate spreadsheet provided for this purpose. Once completed the data can be copied into the toolkit. This method assists in reducing the processing time needed to insert data into the toolkit. Note that both the data input spreadsheet and the toolkit validate the data for inconsistencies.

3.5 Data post-processing

The Confirm data was exported into Excel but some post-processing was required before it was used in the toolkit.



Microsoft Excel - Structure Details.xls

	A	B	E	F	G	H
1	HCC No.	Element No/Name	Date	Defect Code	Defect Name	Notes
6	ST0002/01	17/Waterproofing	16/02/2011 00:00	14.1	WATERPROOFING-Seepage	Centreline construction joint seepage.
7	ST0002/01	18/Movement/expansion joints	16/02/2011 00:00	10.1	EXPJ-B.Joint Surf. Cracks	Transverse crack over abutment.
8	ST0002/01	21/Finishes:parapet/saf.fences	16/02/2011 00:00	3.6	M/BW/MC-Brck/Stn Loss/S.Wthrng	A few spalled brick faces.
10	ST0002/01	24/Carriageway surfacing	16/02/2011 00:00	9.4	SURF- Top Layer	Transverse cracks.
13	ST0002/01	31/Wing walls	16/02/2011 00:00	5.2	VEG-Veg Density Obscur Insp.	Vegetation.

Figure 4: Extracted data in Excel format

Data cleansing

It is inevitable that errors are found in such a large data set. Time was spent reviewing the data to eliminate errors, and add missing data. For example, a few elements were noted as ‘unable to inspect’. These were given a condition score of 2B, any inaccuracy being small amongst such a large number of structures.

Span data

Our structures are inspected in accordance with the Code of Practice, and often have several inspection proformas completed for each structure, based on number of spans and forms of construction. A spreadsheet was used to collate this data into summary data per structure as required for the toolkit.

Removing element data

Certain elements, foundations for example, are not analysed by the toolkit and their inclusion will cause errors. These were removed using filters in the post-processing stage

4 Using the toolkit

We have explained above how the data was collected for the structure and element database tabs of the toolkit. Two other tabs – 'Updates, improvements and LCPs' and 'Routine maintenance, inspections and Assessments' – are not required for valuation purposes

Once the data is safely in the toolkit, check the data validation columns for any issues.

Once this check has been completed the user should select the 'Main Page' tab and click '*Show the main menu'*. '*Analyse new Scenario'* is to be chosen followed by '*Calculate DRC*', this will slowly produce an array of information.

We ran the full version of the spreadsheet on quad core computer. The latest version (as published for 2012/13 returns) ran in about five hours with 1600 structures, and 14000 elements.

Chart 8 and the 'Results Summary' tab provide the valuation information. GRC, accumulated depreciation and the DRC are reported and are to be used as required within the L Pack returns.

Annual Depreciation is not currently calculated by the toolkit but can be estimated by finding the difference between the DRC in the first period, and adding the amount spent on annual maintenance in the first year.

5 Conclusions

Significant effort was required to collect and process the data required for the toolkit, but the results are enlightening.

- Understanding of the considerable value of our structural assets puts us on an equal footing with other Council asset managers in discussing funding requirements
- Understanding Annual Depreciation gives a guide to maintenance funding requirements, with further detail provided by studying different maintenance strategies

Please note - we can't help you with your data or database; they will be specific to your authority and likely very different to ours but we hope this guide helps in general terms.

Hertfordshire
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This report was prepared by jointly by the Opus Arup and Hertfordshire teams working within the Whole Client Service for Hertfordshire County Council. It is based on a previous report prepared by Hertfordshire.