Format for Channel Survey Data (EACSD format)
Version 3.33 – 31th December 2018

List of changes from Version 3.2 to Version 3.3

1 Introduction last paragraph - deleted
2 File Header – references to NFCDD and SOS_Reach_Ref – removed, Maximum number of characters in section name reduced to 11.
3 User Notes General Notes – Note J added
3 User Notes Specific Notes 1 – revised
3 User Notes Specific Notes 8 – third paragraph revised concerning order of SB and HB records; paras 5 and 6 added
3 User Notes Specific Notes 10 – penultimate paragraph revised
8 Frequently asked questions – Q&A added concerning stepped long sections
9 References – National Survey Specifications revision number updated
10 Contact and Feedback – Contact details changed

List of changes from Version 3.3 to Version 3.3.1

1 Note 10, note concerning LC code revised. LC code only to be used for *irregular* bridge openings.
2 Note 8 revised so that eastings and northings of HB points are exactly the same as for the corresponding SB point. HB data to only appear between LB and RB markers. Only one LB and one RB marker to appear on each section. Bank top code is mandatory on all sections. HB level must be lower than its corresponding SB level.
3 Figure 3 revised to show clearly HB and SB cross-sections
4 Figures 1 and 2 revised to improve clarity
5 Note B revised to permit empty fields for CES data when it is excluded from the survey scope.
6 Note 14 For clarity, BT (bank top) has been changed to SN (section name), and in the record definitions. SN field has been **added** to the deepest bed definition.
7 Note 16 changed. No structure data to be shown in EACSD if the structure exception flag is set to 'Yes'. Modellers to refer to the drawings.
8 Note 12, last paragraph changed to show how to treat situations where there is more than one culvert
9 Cross section header. Section description is intended for free text description, two examples added
10 Group=Cross-section_alignment and been changed to Group=Cross-section_Alignment for consistency, but the validator does not check for this because it is anticipated that all text will be converted to upper case on import to modelling software.
11 Figures 2b and 4 added to provide clarity
12 Note 18 added, giving explanation for the 'size' of trash screen

List of changes from Version 3.3.1 to Version 3.3.2

1 User Specific Note 8 changed so that HB level can be equal to or lower than the previous SB level and explanation of HB records clarified.
2 User Specific Note 10 clarified concerning bed level profile at bridges

List of changes from Version 3.3.2 to Version 3.3.3

1 User notes 3 revised to clarify use of HC, HC1 HC2 codes for high chords.
2 Diagram 2c added to show definition of LC codes.
3 Specific note 10 revised to indicate order of points observed with LC code.
4 Figures 4a and 4b added to clarify definition of culverts. References added to Specific note 12.

Contents

1 Introduction

The EACSD data format is intended to be a universal transfer format which stores all the information required to supply input data to the common flood modelling packages including FLOOD MODELLER, HECRAS and MIKE11. It supersedes the EEBY format.

It is also anticipated that data stored in the format can be used to read into programs that run CFD analysis.

This data format should be read in conjunction with example data provided on www.eacsd.co.uk.

2 EACSD Format

File Header

Group=File_header
EACSD_V=3.3
Survey_Title=[alphanumeric]
Revision_Number=[integer]
Revision_Comment=[alphanumeric]
Date_of_File_Preparation=[ddmmmyyyy] (month as first three alpha char)
Time_of_File_Preparation=[hh:mm:ss] (hh as 24hr clock)
File_Produced_by=[alphanumeric]
Surveyor_Ref=[alphanumeric]
Client_Ref=[alphanumeric]
Watercourse_Name=[alphanumeric]

Watercourse centre-line string co-ordinates (digitised from vector maps)

* (line space for clarity)
Group=Centre-line_String
Centre-line_Derivation=[options: 1:10000_map, 1:2500_map, 1:1250_map, Survey][2]
E, N, C[3]
E, N, C
E, N, C
…
E, N, C

Cross-section header

* (line space for clarity)
Group=Cross-section_Header
Section_Name=[alphanumeric max 11 char]
Section_Description=[text] (e.g. 10m u/s bridge, or Hertford Rd Br or blank)
Section_Notes=[text][4]
Complex_Group=[option: Y, N][5]
Chainage=[numeric mask: #####.###][6]
Water_Level=[numeric] (leave blank if there is no water in the channel)
Section_Type=[option: Open or Structure]
Survey_Date=[ddmmmyyyy]
Survey_Time=[hh:mm:ss] 24 hour clock GMT
Survey_Method=[option: GNSSRTK, Level+tape, Total_station, Echo_sounder]

Start/End points of cross-section and turning points along section line

* (line space for clarity)
Group=Cross-section_Alignment
E, N[7]
E, N
…
E, N

Cross-section data points

* (line space for clarity)
Group=Cross-section_Data_Points
S, E, N, H, B, CES1, CES2, CES3, C[8]

Cross-section structure data (Bridge)

* (line space for clarity)
Group=Bridge-structure_Data_Points
Structure_Exception=[option: Y, N][16]
Structure_Skew_Angle=[numeric 2 digits between 0 and 90 degrees]
Structure_Length=[numeric]
Structure_Notes=[text]
S, E, N, H, CES2[9], C[10]

Cross-section structure data (Weir component)[11]

* (line space for clarity)
Group=Weir-structure_Data_Points
Structure_Type=[option: BROAD, SHARP, CRUMP, VNOTCH, LAB]
Structure_Exception=[option: Y, N][16]
Structure_Length=[numeric] [11]
Structure_Notes=[text]
S, E, N, H, CES2[9], C[11]

Cross-section structure data (Culvert)

*	(line space for clarity)
Group=Culvert-structure_Data_Points	
Structure_Exception=[option: Y, N][16]	
Trash_Screen_Size=[Numeric] (metres)[18]	
Trash_Screen_Bar_Spacing=[numeric] (metres)	
Trash_Screen_Bar_Diameter=[numeric] (metres	
Structure_Length=[numeric] (metres)	
Structure_Notes=[text]	
S, SH, E, N, H, X, IN, CES2[12]	(circular)
S, SH, E, N, H, X, Y, IN, CES2	(ellipse)
S, SH, E, N, H, X, Y, IN, CES2	(box)
S, SH, E, N, H, X, Y, IN, CES2	(arch)
S, SH, E, N, H, X, Y1, Y2, IN, CES2	(sprung arch)
S, SH, E, N, H, X, Y, IN, CES2	(ovoid)
S, SH, E, N, H, E1,N1,H1,En,Nn,Hn,….IN, CES2	(user defined)
S, E, N, H, CES2[9], C[10] (use for high chords(s), as necessary)	

Cross-section structure data (Other Structures)

*	(line space for clarity)
Group=Other_Structure[17]	
Structure_Exception=Y	
Structure_Notes=[text]	

Cross-section photos

*	(line space for clarity)
Group=Cross-section_photos	
E, N, B, F, D[13]	

Long-section data points

* (line space for clarity)
Group=Long-section_Left-bank_Data_Points
L, E, N, H, A, SN, C[14]

* (line space for clarity)
Group=Long-section_Right-bank_Data_Points
L, E, N, H, A, SN, C[14]

* (line space for clarity)
Group=Long-section_Deepest-bed_Data_Points
L, E, N, H, A, SN,C[14]

* (line space for clarity)
Group=Long-section_Defence-left_Data_Points
L, E, N, H, A, C[14]

* (line space for clarity)
Group=Long-section_Defence-right_Data_Points
L, E, N, H, A, C[14]

* (line space for clarity)
Group=Long-section_Other-feature_Data_Points
L, E, N, H, A, C[14]

General photographs

* (line space for clarity)
Group=General_Photographs
E, N, B, F, D[15]

3 User notes

General Notes

A **Except for weir structures and high chords**, all points must be moved in plan from observed position onto the cross-section line and shall fall within 0.1m of the cross-section line..

B CES = Conveyance Estimation System: option for computing channel and floodplain hydraulic roughness. In situations where the scope of work does not include collecting CES data, CES fields shall be empty.

C All sections to be 'viewed' as if looking downstream

D All units are in metres, unless otherwise stated

E Where a field is not used, two commas must be used next to each other i.e. to show that the field is blank

F Unfilled fields are to be left blank – Do not use ‘Null’

G Where options are listed, such as CES weir types, a selection must be made from the available types and typed correctly. The notes fields may be used to clarify or add information.

H For bridge and culvert structures, a high chord is required to show the spill line over which water would flow if it were to back up behind the structure. This could be a road centreline, back of kerb line or flood defence structure. Where a single high chord is used, code HC can be used. Code HC1, HC2 etc are to be used in situations where more than one HC is required, e.g. to show additional outlines of parapet walls, railings etc The modeller will decide how to model railings based upon the section photographs. See figure 1. High chord coordinates should be actual surveyed position – NOT snapped onto the section line.

J Coordinates and heights are to be shown to three decimal places.

Specific Notes

1 The naming and numbering system for channels and sections shall be as stated in the EA National Survey Specifications.

2 The largest scale of mapping available shall be used for digitising centre-lines. Centre-line is defined as the mid-point of the river between water lines. Points shall be determined at cross-section / structure locations and at a maximum interval of 50m. The digitised river centre-line shall not deviate by more than 2m or 1/10th of the width of the river from the location interpolated from the centre-line points. This guide is intended to ensure that surveyors digitise sufficient points around curves in the river. The digitised river centre-line will be the definitive centre-line of the river and will supersede previous roughly digitised centre-lines.

3 Comma-delimited, Easting, Northing, Code. Chainage runs up river from downstream end of survey. Code is ‘Zero_Chainage’ to indicate zero chainage zero point. The code field is blank for all other points. The sequence of points listed runs with the direction of flow so ‘zero chainage’ will be the last point in the list unless the centre-line is extended back to include negative chainages as may be necessary.

4 Available for revision comments or notes.

5 In some situations, the EACSD data format will not be able to fully represent the detail of the structure(s) being surveyed (e.g. compound weirs). The section group flag can be used when this situation is true. When the modeller, sees this flag in the EACSD data, they will know that a more in-depth review of the data is required, in order to represent the structure appropriately in the model.

6 Chainage to be reset to zero for each EACSD file. Negative chainages are permitted where sections are observed before the start of the survey.

7 Comma-delimited data from left bank to right bank. Most sections will only have start and end points which will be duplicates of the first and last points in the cross-section detail group. Where more than two points are shown, the section is a dogleg section normally of the flood plain as well as channel.

8 Comma-delimited data:

- S = String attribute, options:
  - SB = soft bed (top of silt)
  - HB = hard bed (bottom of silt)
  - HC = high cord
  - DL = Left Bank defence string
  - DR = Right Bank defence string
- E = Easting of point
- N = Northing of point
- H = Altitude of point
- B = Bank top
  - LB = left bank top
  - RB = right bank top
- Channel roughness, based on simplified Conveyance Estimation System data (optional) (see section 5 for codes to use):
  - CES1 = Vegetation at survey point
  - CES2 = Ground/bed type at survey point
  - CES3 = Irregularity (only required for floodplain survey)
- C = Point comment field (optional)

There may be more than one string SB, HB and D which may be followed by a digit e.g. HB1, HB2, D1, D2, D3 to indicate string number.

The channel roughness classification refers to the segment of the cross section following the surveyed point, going left to right across the section. It is not required for the last point in the string, as the previous point contains the classification for that segment.

Modelling is by default run on the state of the river bed at the time of survey (i.e. the soft bed cross-section). In order to have the default cross-section data with the same code for the whole cross-section, SB is also used for ground points on the cross-section line. See Open Cross-Section Coding diagram (Figure 3) below. All strings to be observed left to right.

Where required in the survey scope, the hard bed will be surveyed where silt is present by pushing the observing pole down through the silt. Silt is only significant if it is present within the watercourse, so HB records can only be present between the records indicating LB and RB points.

Modelling software will interpret a hard bed cross-section as consisting of SB points except where an SB record is followed immediately by an HB record with the same eastings and northings, in which case the HB level will be used instead of the SB level.

An HB record must immediately follow an SB record with the same eastings and northing, and the HB level must be equal to or lower than the SB level.

Bank top (LB and RB) are intended to indicate the extent of the flowing channel cross-section, as shown in Figure 3. On site they may be indicated by changes in vegetation as well as cross-section gradient and should be consistent with neighbouring sections. There shall be one LB and one RB marker on each section. Two parallel channels shall be surveyed as two channels, not combined as one.

DL and SB (and DR and SB) points at the start and end of a defence shall be co-located within 0.3m.

SB, HB, DL and DR points shall be located within 0.1m of the line defined by the Cross-section_alignment.

Note that HC (High cord) data should never be present on open channel sections.

9 Structure roughness based on simplified Conveyance Estimation System CES channel roughness for consistency with channel roughness. See section 5 for codes to use in the EACSD specification.

10 Comma-delimited data for bridge structures:

- S = String attribute, options:
  - SL = Spring point left (bridges)
  - SR = Spring point right (bridges)
  - SO = Soffit (bridges)
  - LC = Low chord (xyz point) – used for defining irregular structure shapes and observed left to right (Fig 2c). (LC coding is not to be used in situations where SL/SO/SR coding is applicable.)
  - HC = High chord (xyz point) – used for defining the shape of the top of the structure
- E = Easting of point
- N = Northing of point
- H = Altitude of point
- CES2 = Structure materials (see note 9)
- C = Comment field for point

There may be more than one string SL, SR, SO, LC, HC etc. which may be followed by a digit e.g. SL1, SO1, SR1 and SL2, SO2, SL2 to indicate string number. See Figures 1 and 2 below.

Cross-section points at bridge and culvert structures shall be observed along the face of the structure. This is to avoid the misalignment that results when offset open section points are snapped onto the line of a skewed section. Open channel sections are required up and downstream of bridge structures where they are representative of the reach. There will be occasions (e.g. track bridges or elevated footbridges, which are perpendicular to the channel centreline) where it is acceptable to reuse the cross-section data points used with the bridge structure section as open channel sections by copying them a few metres up and downstream of the structure.

Note that LC strings are not permitted when SL, SO, SR codes are used. The watercourse bed levels shall be representative of the channel at the bridge so that the combined structure and bed level data represent the aperture through which water can flow. If the bed is not representative of the open channel upstream of the bridge an additional section is to be observed a few metres upstream of the bridge to represent the open channel.

Note that points on the bed level cross-section located vertically beneath SL and SR points need not have exactly the same easting and northing coordinates but should be located close enough to ensure that a point interpolated on the bed level profile vertically below the SL / SR points will be representative of the actual bed level.

In some cases (e.g. viaducts) it is not necessary to observe high chords strings because they are high above the worst flood water level. Conversely, there may be other instances (particularly for culverts) when there is more than one high chord feature – for example a wall crossing the flood plain.

11 Comma-delimited data for weirs:

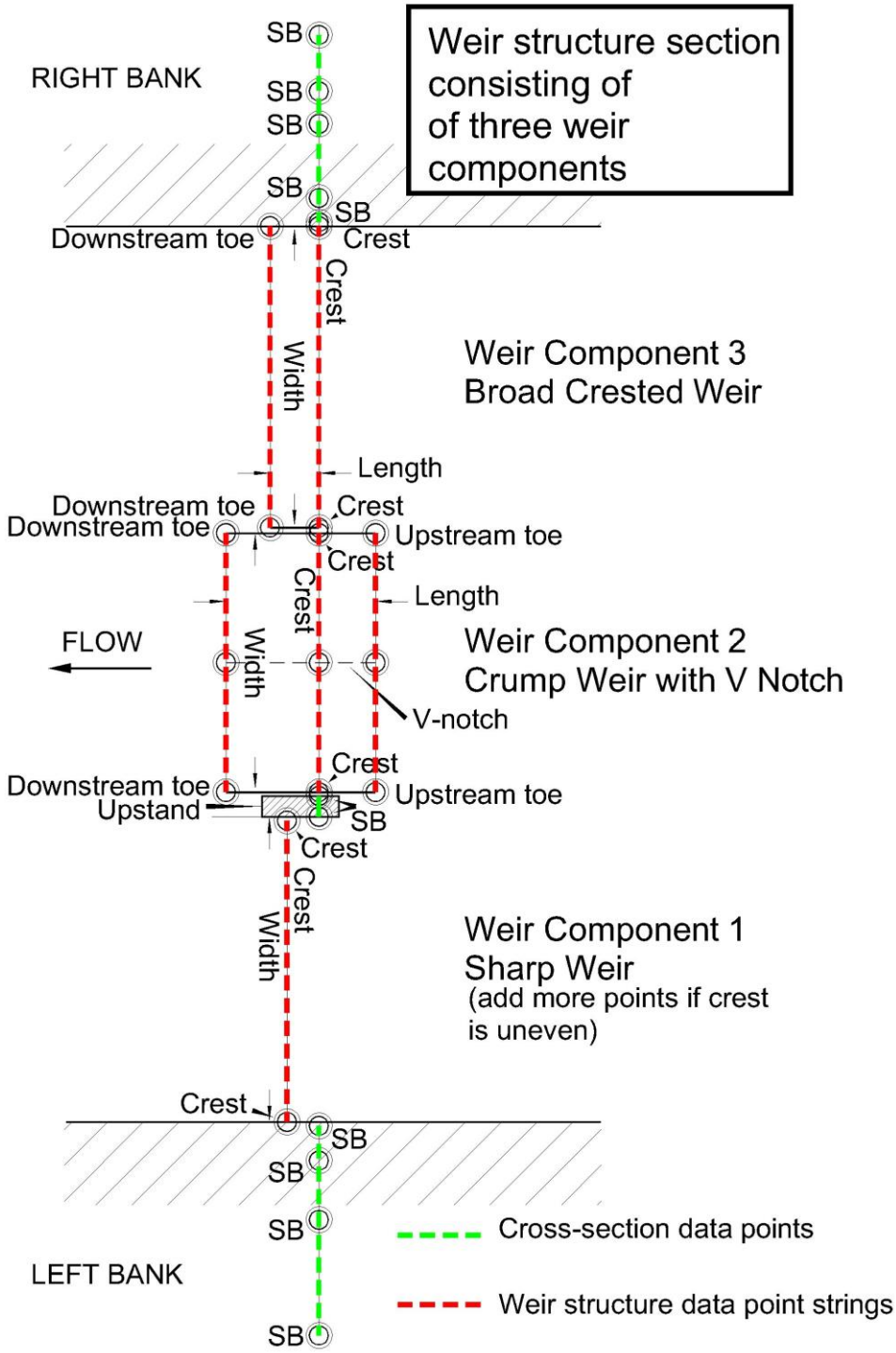
- E = Easting of point
- N = Northing of point
- H = Altitude of point
- CES2 = Structure materials (see note 9)
- S = “UT”, (upstream toe), “Crest” or “DT”, (downstream toe)
- C = Comment field for point

E, N coordinates presented in the weir structure data must not be snapped onto the overall section line.

This section covers cross-section data at weir structures. Open channel sections will generally also be required up and downstream of each weir where they should be representative of the channel cross-section.

The weir structure section will run along the crest of the weir, extending into the floodplain on the left and right banks. Ground points on the left and right banks are to be entered as “Cross-section data points” and observed from left to right as normal. Weir crest points should not be included as cross-section data points, however, if

there are upstands between weir components, the upstand components may be included as cross-section data points for the tops of the upstands.



Each weir component shall be entered using the Weir Structure Data Points template:

Group=Weir-structure_Data_Points
Structure_Type=[option: BROAD, SHARP, CRUMP, VNOTCH, LAB]
Structure_Exception=[option: Y, N][15]
Structure_Length=[numeric] [11]
Structure_Notes=[text]
S, E, N, H, CES2[9], C[11]

For a compound weir, the “Weir structure data points” group shall be used to describe each component of the weir in order from left to right bank. The data file will therefore have a “Cross-section data Points” group followed by one “Weir structure data points” group for each component of the compound weir.

If the overall cross-section includes an “Other Structure” (see note 17), this shall be included as a component of the weir.

The Weir structure data points group(s) shall be surveyed as strings running from left to right across the weir component.

The structure exception label should be used to indicate when a weir is too complicated to interpret using this data structure.

Structure length is the longitudinal length of the weir structure in metres.

Structure width is the channel width at the top of weir crest. For a standard perpendicular flat weir, the structure width will be the difference between the left and right most, easting and northing points. For irregular shaped weirs these data will not be the same and will be used by modellers in different ways.

For labyrinth weirs, surveyor will enter all the turning points on the weir crest. The weir width will be the distance along the crest, not the distance along the overall cross-section line. The same rule can be applied to horseshoe weirs, or Sharp weirs with other shapes.

12 Comma-delimited data for culverts:

- S = Inlet / Outlet, options:
  - Inlet
  - Outlet
  - HC = High chord (xyz point) – used for defining the shape of the top of the structure
- SH = Shape, options:
  - Circular
  - Ellipse
  - Box
  - Arch
  - Sprung Arch
  - Ovoid
  - User Defined
- E = Easting of point (soffit)
- N = Northing of point (soffit)
- H = Altitude of point (soffit)
- E1, En = Easting of point (User Defined, only)
- N1, Nn = Northing of point (User Defined, only)
- H1, Hn = Altitude of point (User Defined, only)
- X = Width (circular, ellipse, box, arch, sprung arch, ovoid culverts)

- Y = Height (ellipse, box, arch, ovoid culverts)
- Y1 = Height to springing (sprung arch culverts)
- Y2 = Height to crown (sprung arch culverts)
- IN = Culvert inlet type (section 6 / figure 5) (used only for S = inlet)
- CES2 = Structure materials (see note 9)

For any culvert longer than a road crossing (over about 15m), structure sections will be required at the inlet and the outlet structures.

For chamfered box culverts, the culvert dimensions should be taken to the face of the culvert, not the chamfer (see Fig 4a). As a general rule, if the chamfering occupies more than 5% of the culvert cross-section area, it should be treated as a user-defined culvert. If in doubt, this decision should be made in conjunction with the client. Chamfering should be visible on the section photographs.

User defined culverts should be entered in clockwise from the soffit (see Fig 4b). Points should be selected in order that the total area defined by the points is within 1% of the real area.
See Note H for explanation of High Chord.

Where there are two or more culvert openings and the culverts follow the same alignment, they are all to be shown in order left to right. If they follow different routes, the culvert carrying less flow shall be treated as a side channel.

13 Comma-delimited data for section photos:

- B = Bearing of photo (for standard photos)
- F = Filename of photo, 360 degree photo or video (local path)
- D = Photo Description

More than one photo may appear but note that some modelling packages accept only one photo, so the main photo should appear first in the data.

The photo file resolution should be limited 1600x1200 to reduce file sizes. 360 degree photos or video files can also be referenced in this section, if specified.

14 Comma-delimited data for long sections:

- L = Location attribute, options:
    - LB = Left Bank crest string
    - RB = Right Bank crest string
    - DB = Deepest Bed string
    - DL = Left Bank defence string
    - DR = Right Bank defence string
    - OF = Other notable features string
- E = Easting,
- N= Northing,
- H= Altitude of point
- A= Surface attribute, options:
    - GD=ground

    - SB=soft bed
    - HB=hard bed
    - PI=pipe invert and is followed by pipe diameter in mm (4 digits) eg PI0250 for a 250mm diameter pipe.
    - ST= structure point (e.g. side weir), In-flowing water courses will be represented by points in the LB or RB strings
- SN = Section Name (where point has been abstracted from cross-section data)
- C = Comment field

Long section strings are used to define the boundary between in-bank and out-of-bank models to identify where water will spill out of the channel. They are also used to modify interpolated sections which modellers insert between surveyed sections. Long section strings should include the points attributed as crest points in the cross-section data. DL, DR and OF strings are to be have numeric suffixes to identify them as separate strings. Where there is an upstanding obstruction, such as a wall or a solid fence, running parallel with the watercourse is to be surveyed, it shall be shown using a DL / DR string

15 General photos – use the same format as for section photos.

16 Structure exception is where the structure cannot be fully represented by the data format as it is a complicated shape. It is a flag which prompts the modeler to investigate other data supplied with the survey, such as drawn cross-sections and photographs. No structure data to be included in EACSD file when the exception flag is set to 'Y'.

17 Other structure is a means of recording the presence of structures not covered elsewhere in this format. "Other Structures" will include fish passes, orifices, sluices, mills, pumps and locks. The nature of the structure is to be recorded in the "Structure Notes" field, dimensional details are to be shown on the drawings and section photographs used to assist the description.

18 Trash screen is assumed to cover the full width of the structure. Size refers the length of the screen. Two examples are given below:

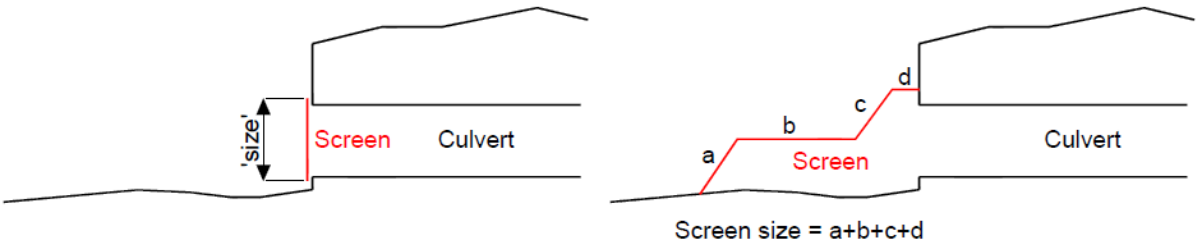


Figure 1 – Definition of structure openings, high and low chords for an arch bridge

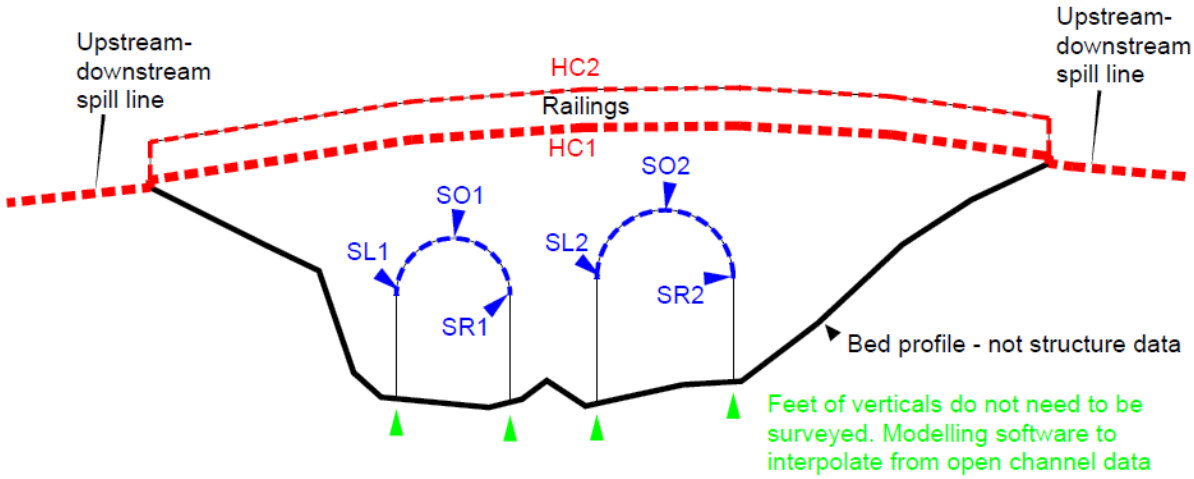


Figure 2a – Definition of structure openings and high chord for a flat-deck bridge

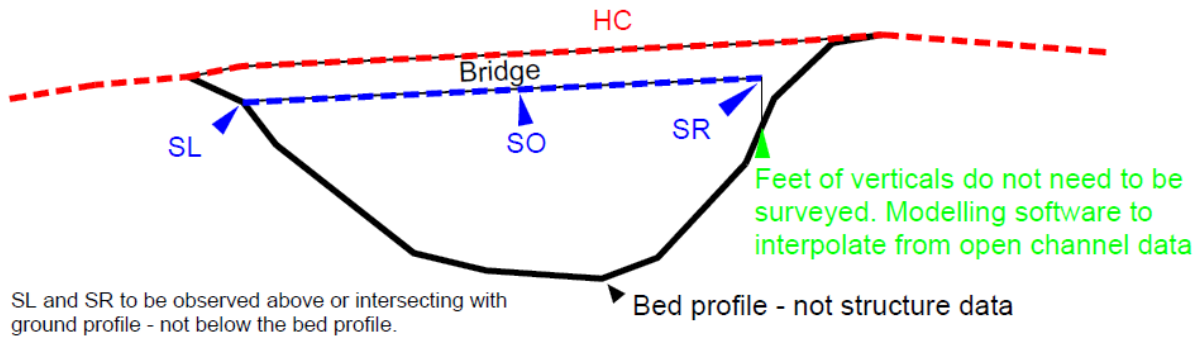


Figure 2b – Definition of structure openings and high chord for a flat-deck bridge

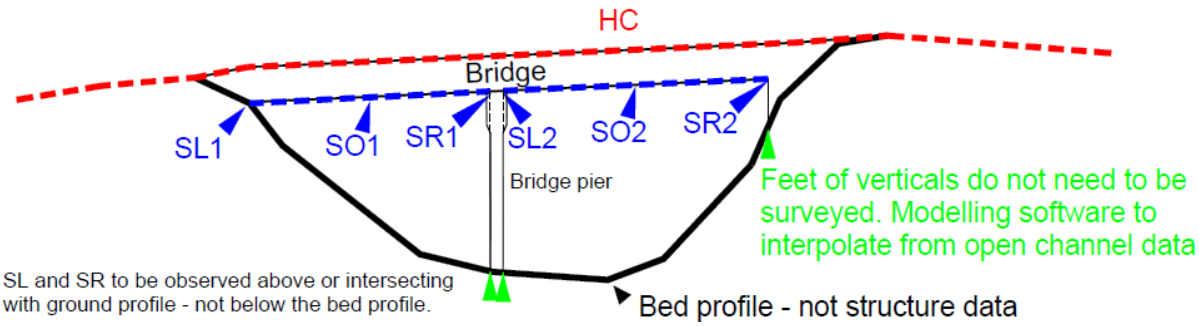


Figure 2c – Definition of bridge structure openings using LC code

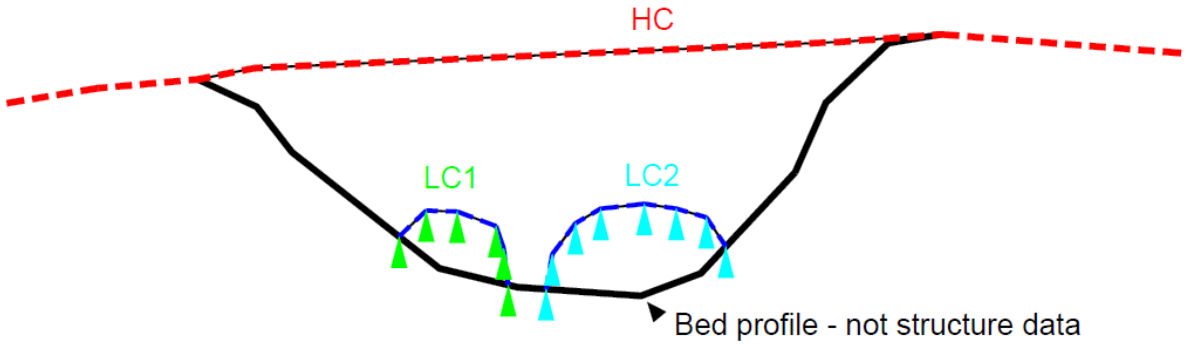


Figure 3 – Open cross section coding

Note that the coding is not the same as used for EEBY data, but more logical

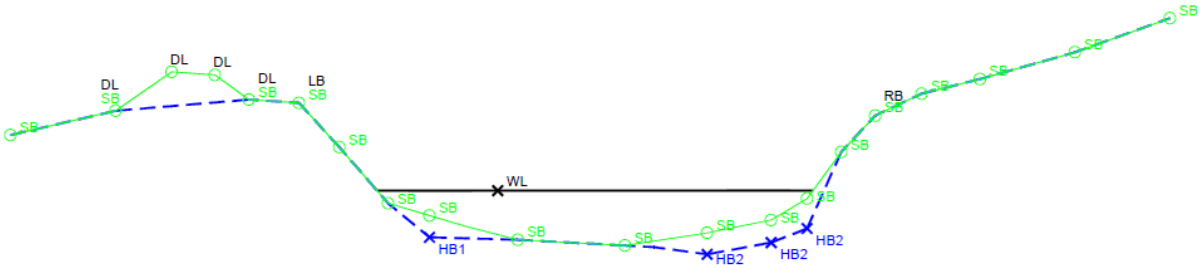


Figure 4 – Structure skew angle

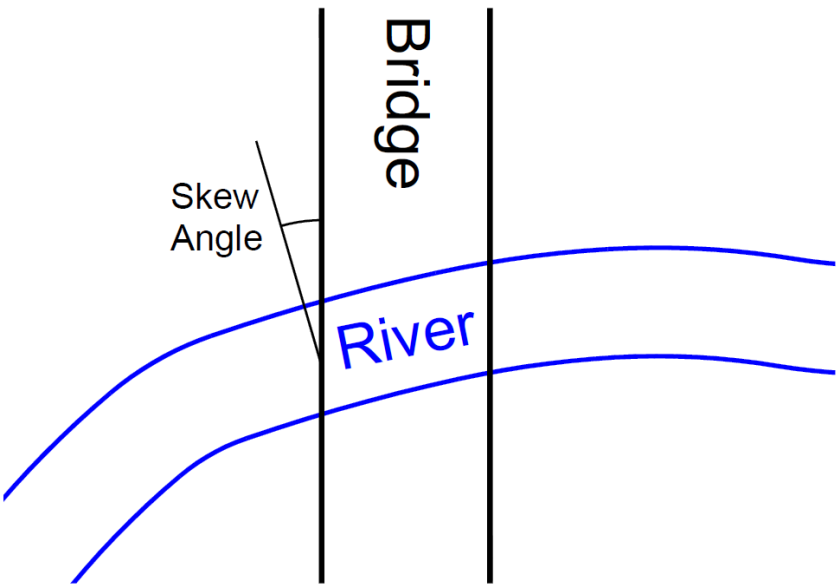


Figure 4a – Typical chamfered box culvert

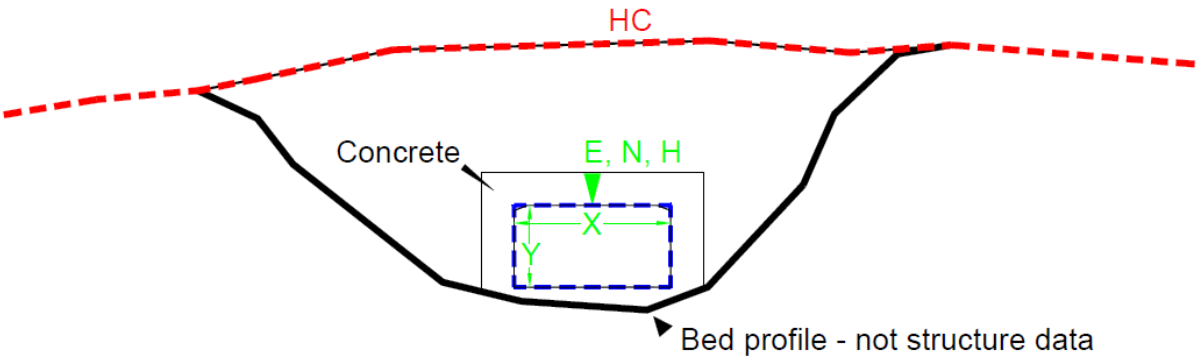
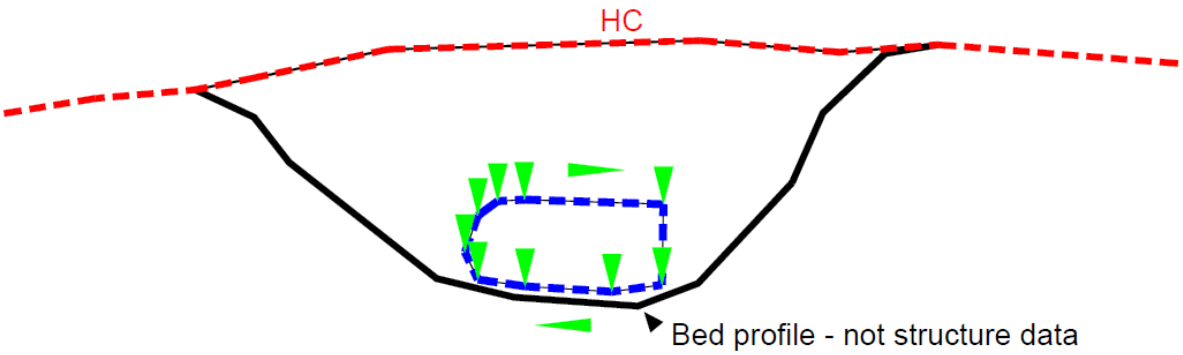


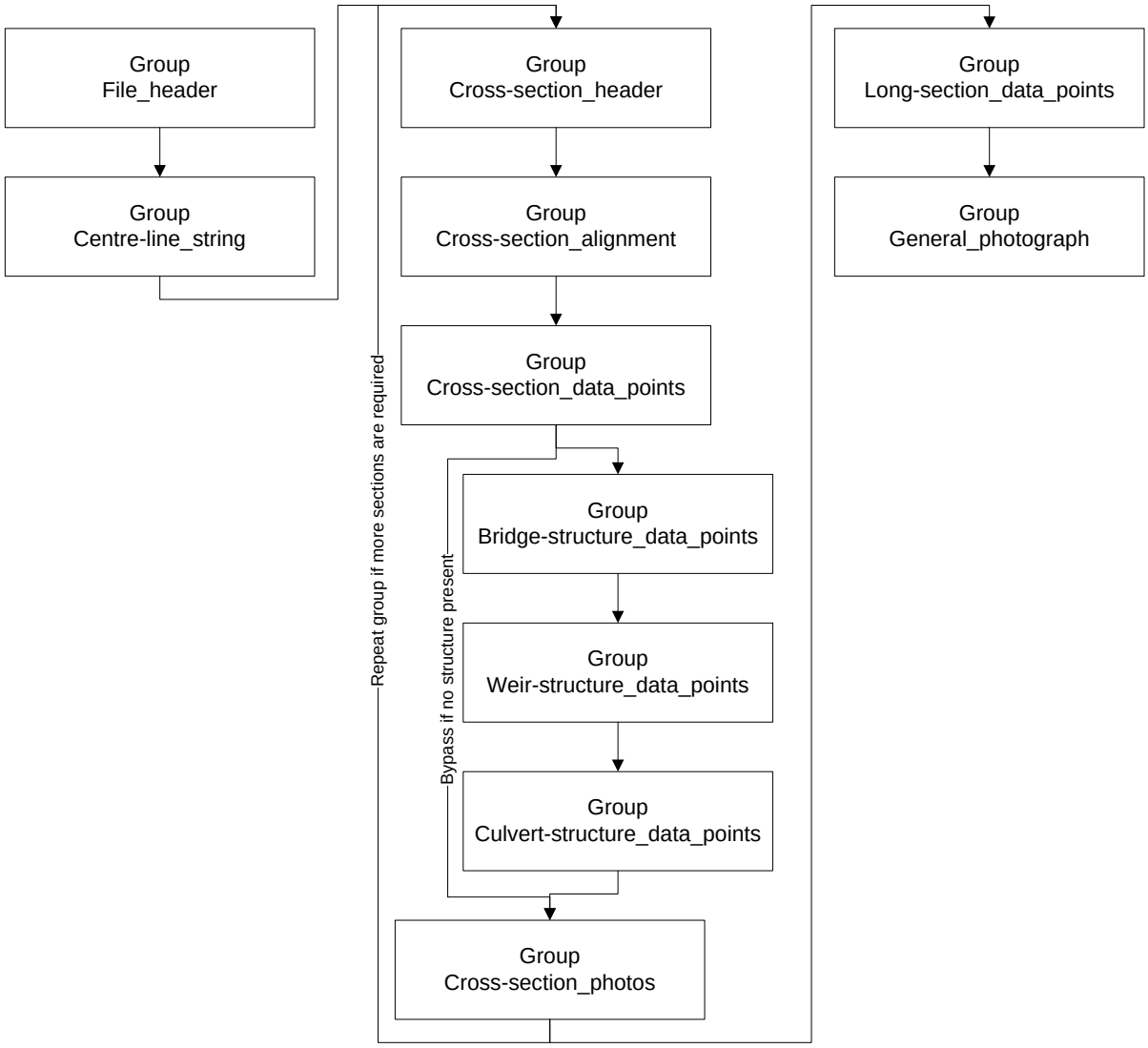
Figure 4b – Irregular culvert (observe clockwise closed polygon)



4 EACSD data file diagram

The structure of the EACSD data file is outlined in Figure 4 below.

Figure 4 – EACSD data file structure



Note that bridge, weirs, culverts and complex structures may require representative cross-sections upstream and downstream to fully describe the channel.

5 Channel and floodplain roughness

CES1 and CES2 are to be recorded for channel survey. CES1, CES2 and CES3 are to be recorded for floodplain survey. The codes to use in the EACSD data file are shown in brackets [].

5.1 Channel Survey

<u>CES1 – Vegetation at survey point</u>

Vegetation types for river banks

			
None [NONE]	Trailing bank-side plants [TBSPLNT]	Emergent reeds [REED]	Grass [GRASS]

Vegetation types for channel beds

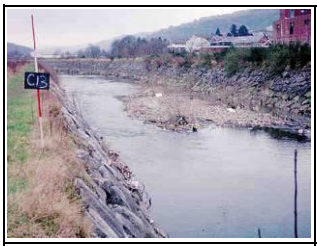
			
None [NONE]	Free floating plants [FFPLNT]	Moss [MOSS]	Trailing bank-side plants [TBSPLNT]
			
Reeds [REED]	Submerged plants [SUBPLNT]		

CES2 – Ground or material type at survey point

General types

			
Bedrock [BROCK]	Rubble (irregular sizes) [RUBBLE]	Cobbles (64-256mm) [COBBLE]	Gravel (2-64mm) [GRAVEL]
			
Soil (Sand, Silt, Clay, Peat) [SOIL]	Metal (iron, steel) [METAL]	Corrugated metal [CMETAL]	Wood [WOOD]
			
Concrete [CONC]	Brick [BRICK]	Asphalt [ASPH]	Plastic [PLASTIC]
			
Stone [STONE]			

Bank specific ground types

			
Rip-rap [RIPRAP]	Sheet pile [SPILE]	Wood pile [WPILE]	Plastic pile [PPILE]

			
Gabion [GABION]	Brick [BRICK]	Other [OTHER]	

5.2 Floodplain Survey

<u>CES1 – Vegetation at survey point</u>

Use CES1 vegetation types from section 5.2 and supplement with the additional vegetation types in this section.

			
Crops - Crops perpendicular to flow [PECROP]	Crops - Crops parallel to flow [PACROP]		
			
Grass - Short (< 0.75m) [GRASS]*	Grass - Medium (0.75-1m) [MGRASS] *	Grass - Tall (1-1.8m) [TGRASS] *	
			
Hedges – Open * (< 250m spacing) [CHDGECL]	Hedges - Open * (> 250m spacing) [CHDGEFA]	Hedges – Closed * (< 250m spacing) [DHDGECL]	Hedges - Closed * (> 250m spacing) [DHDGEFA]

			
Trees - Light brush [LBRUSH]	Trees - Medium brush [MBRUSH]	Trees - Dense brush [DBRUSH]	Trees - Cleared land (tree stumps) [CLEARED]
			
Trees - Heavy stand of trees [HSTREE]			

Notes

1. A closed hedge is a traditional hedge made to enclose an area of land stock proof. A closed hedge would therefore be uniformly thick all the way up, e.g. a laid or pletched hedge. A closed hedge could also be a hedge with a lot of debris in the bottom, for example corrugated iron infill. An open hedge typically would be a hedge in poor condition where the bottom has been allowed to thin out and all the vegetation is in the top of the hedge.
2. Hedge spacing is derived as hedges perpendicular to the direction of flow. I.e. across the floodplain. Hedges that are closer together have more impact than those further apart.
3. The conveyance estimation methods used only requires that grass be input within the three height categories.

<u>CES2 – Ground or material type at survey point</u>

Use CES2 vegetation types from section 5.2.

<u>CES3 – Irregularity</u>

			
None [NONE]	Ridges or ploughed fields [RIDGE]	Minor irregularities [MIRREG]	Appreciable irregularities [AIRREG]

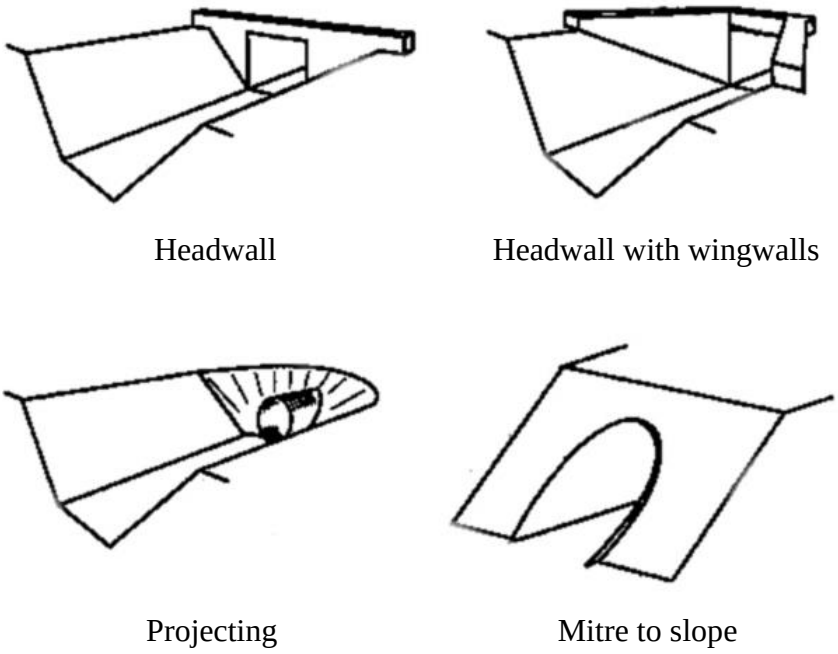
			
Minor obstructions [MOBST]	Appreciable obstructions [AOBST]	Dry Stone Wall [DRYSTONE]	

6 Culvert Inlet types

The culvert codes to use in EACSD data file are shown in brackets []. The file

- Headwall [HEADWAL]
- Headwall with wingwalls [HEADWWW]
- Projecting [PROJTNG]
- Mitre to slope [MITRESL]
- Other [OTHER]

Figure 5 – Culvert inlet types



7 Weir types

The weir codes to use in the EACSD data file are shown in brackets [].

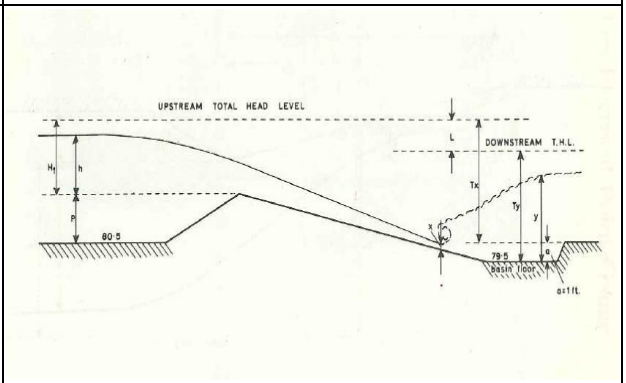
Sharp crested weir [SHARP]

Broad crested weir [BROAD]

Gated weir [GATED]

Labyrinth weir [LAB]

V-notch weir [VNOTCH]



Crump [CRUMP]

8 Frequently Asked Questions

Q What is a Culvert and what is a bridge?

A. The main difference between a culvert and a bridge is how the structure impacts on the flow. Culverts are generally long thin structures where friction is the main cause of energy loss whereas bridges obstruct water by the change in shape and are generally shorter in length. In situations where the opening has a small cross section area when compared with the channel cross-section, the structure should generally be treated as a culvert.

Q How do I need to record box Culvert corner chamfers?

A Box culvert champers can generally be ignored unless they remove more than 5% of the cross-sectional area.

Q What is the difference between an open and closed hedge?

A A closed hedge is a traditional hedge made to enclose an area of land stock proof. A closed hedge would therefore be uniformly thick all the way up, e.g. a laid or pletched hedge. A closed hedge could also be a hedge with a lot of debris in the bottom, for example corrugated iron infill. An open hedge typically would be a hedge in poor condition where the bottom has been allowed to thin out and all the vegetation is in the top of the hedge.

Q Is it possible to have multiple high and low cords?

A Yes. See fig 1

Q If a single point exists in two or more separate cords does that point need to be recorded twice?

A Yes

Q Can a high cord occur downstream of the structure, e.g. a railway culvert?

A Yes. The high cord should maintain its true coordinates.

Q How are building damp proof courses coded?

A They are not recorded in EACSD.

Q How do I survey pipes crossing the watercourse?

A Where pipes are attached, or within a metre or two of bridges and do not encroach on the bridge opening, they should not be surveyed. If the bottom of the pipe does encroach significantly on the bridge opening, it should be surveyed as a second opening using SL2, SO2, SR2 codes.

For isolated pipes that are large enough to be included in the survey, the pipe should be surveyed as if it were a bridge, generally using SL, SO, SR for the invert and HC for the top as in Fig 2a, and a suitable structure note added.

Q I am surveying a concrete (or other) channel with steps in the long section at frequent intervals (eg 20m), how should I survey these?

A This should be stated in the scope and depends upon the significance of the steps. If they need to be modelled, sections will be required at the top and the bottom of the steps. If not, they should be shown in the long section deepest bed data string and on

the long section drawings. Long section LB / RB points will be required if the bank levels change at the steps, but if they do, this is an indication that full cross-sections should be observed.

9 References

Literature

Crump Weir Design, Water Resources Board, February 1970
National Standard Contract and Specification For Surveying Services V4.01, Environment Agency, May 2013 (can be downloaded from: https://ea.sharefile.com/d-sfe8a266730d4b63a

Websites

Conveyance Estimator www.river-conveyance.net
EACSD www.EACSD.co.uk
FLOOD MODELLER www.floodmodeller.com

10 Contact & Feedback

Further information, documentation and an EACSD validator tool can be found on:
www.eacsd.co.uk

Feedback is always welcome. Please contact Environment Agency Geomatics:
survey@environment-agency.gov.uk