Road BOQ Estimator — User Manual

Nov 3, 2026 · BESPA Expert Systems

This manual covers **Road BOQ Estimator 1.7.0** at **road-estimator.bespa.online**. It reads survey exports of shapes 1, 2 and 3, written by field app versions up to 1.7.0. It replaces the manual for version 1.5.1.

Output is preliminary and must be checked by a qualified engineer.

1. What it does, and what it does not

The Road BOQ Estimator turns a walked condition survey of a low-volume road into a priced, CESMM4-coded bill of quantities. Two independent calculations must agree before the bill can be issued.

You describe the road as it is: the surface and its condition, the ditches, the culverts that stand and the ones that are needed. The estimator measures the work that follows from that description and prices it at default rates, which you then update for your project.

It does	It does not
Measure every item of work implied by the survey, station by station	Design the road geometry. Where a section has been re-designed, the Road Design app supplies its earthworks and haulage (sections 9 and 10)
Apply your treatment rules to each stretch by surface and condition	Design the pavement beyond your rule and the thickness you set on Form F
Schedule and measure proposed culverts from standard details by type and size	Structurally design the culverts. The details are a fixed lookup; use Box Culvert Design for a box designed to its site
Band each haulage line by its distance and price it	Size anything hydraulically
Price every measured item at the default rates, for you to update	Decide whether the road should be built
Prove the bill twice, with two independent engines	

The figure it produces can be traced line by line back to the chainage that produced it. It is defensible as a measurement, not as a design. An engineer still has to judge whether the chosen treatment is right.

Who it is for. Quantity surveyors and highway engineers pricing low-volume road works to a CESMM4-coded bill. You should be able to read a bill of quantities and know what treatment a stretch of road needs. You need no knowledge of the software.

2. Before your first run

Six things decide whether your first bill is right.

#	What	Why it matters
1	You know the rates are defaults	Bespa's default rates are a starting point, not your prices. Review them in the downloaded bill for every tender and at least once a year.
2	The survey is finished	A survey exported mid-walk carries only the chainage the crew had reached. The bill will be short. The report says so, but the survey still prices. Price only surveys whose status is ended.
3	Form F is confirmed for this road	Form F holds 53 road constants. 23 are marked "!" as template values: haul distances, aggregate yields, road furniture and defect rates. A wrong haul distance moves the bill more than most people expect, and it also changes which haulage band is billed.
4	Form F sets the pavement thickness	The sub-base and base items are chosen from the Form F thicknesses: 100, 150 or 200 mm sub-base and 150, 200 or 250 mm base. Any other thickness is billed nowhere and holds the bill.
5	Form E says what you mean	The treatment rules are the design decision inside the measurement. A rule's position in the table is its identity: never reorder the rows.
6	The road fits one survey	A form block holds 200 rows and the line diagram covers 20 km. A longer road is split into two surveys, whose bills you then add together.

Default rates and the General Items. No survey file carries a rate. Every bill is priced at the master's default rates current when it is priced, in cedis (GH₵). The run records which master was used. Update the rates to your own market prices in the downloaded bill; the amounts and totals recalculate. Bill No. 1, General Items, now carries default quantities and prices (section 10). Change them in the downloaded bill to suit your project.

3. The survey: two ways in

The estimator accepts two file shapes. The same road in either must price to the same figure.

	.xlsx / .xlsm — the survey workbook	.json — the app export
What it is	Seven sheets: README, A_Corridor, B_Drainage, C_Pavement, D_Points, E_Rules, F_Road_Data. The file a surveyor hands over, and the file the Road Design app writes for a designed road.	The survey app's "raw data + photos" export
Shape	One row per stretch, per sheet	Chainage runs: each item recorded as from, to, value
Who uses it	Anyone. An office working from paper fills in the blank workbook by hand.	Crews going straight from phone to estimator
Can hold	A frozen snapshot, with the status written into the README	An unfinished survey (status: running)
Form F	Every named row with a value is read	Only the original 37 constants are read (see section 9)

The JSON route reads export shapes 1, 2 and 3. Shape 3, from field app 1.7.0, adds a GPS track and a position on each point. Both are carried with the survey but do not affect the bill.

If you work on paper, the workbook is all you need: fill it in and upload it, without touching JSON.

Chainages in the workbook. Type chainages in metres (1200), in kilometres, or as km+m (1+200), and declare which in the README's "Chainage format" cell. The estimator checks that the chainages fit the declared format and the road length before it prices anything. Section 15 lists every message.

Any file that is not .json, .xlsx or .xlsm is refused before it is read.

Upload the survey, nothing else. Upload either the survey workbook, named after the road, or the survey app's JSON export. Check the file name before you upload.

4. Form A — corridor, clearing and earthworks

Form A has five items, recorded against chainage. In the workbook they are on sheet A_Corridor, with the header on row 4 and data on rows 5 to 204.

Key	Column heading	Kind	Unit	Values
town	Township Y/N	flag	—	Y or blank. Township length attracts its own items.
veg	Vegetation	code	—	EB existing bush · GB grass · LB light bush · SB savannah · TB thick bush
raise	Raise road: fill (cm)	height	cm	Depth of fill to raise the formation
cut	Cut to widen (cm) · Cut width L+R (m)	two cells	cm, m	Depth, then total width with both sides added
fillw	Fill to widen (cm) · Fill width L+R (m)	two cells	cm, m	Depth, then total width with both sides added

Depths are centimetres, widths are metres. A 150 mm raise is entered as 15, not 0.15. A cut 1.2 m wide on each side is entered as 2.4, not 1.2. Nothing will query a plausible-looking wrong number.

Designed sections. Over the chainages the Road Design app has re-designed, its earthworks replace Form A's. The app writes the survey workbook that way, with Form A's earthworks blank over the designed stretch. If you type the design quantities into Form F yourself (section 9), blank Form A's raise, cut and fill over the same stretch, or the earthworks will be billed twice.

5. Form B — drainage

Form B has eleven items, recorded per side where a side exists, on sheet B_Drainage.

Key	Column heading	Values
ditchL / ditchR	Ditch L · Ditch R	CL clean out · RE re-excavate · EC excavate new
udL / udR	U-drain L (legend) · U-drain R (legend)	U-1 to U-7 (table below); upper or lower case
trapL / trapR	Trap. drain L · Trap. drain R	Present, or blank

Key	Column heading	Values
kerbL / kerbR	Kerb L · Kerb R	Concrete kerb present, or blank
scour	Scour checks · Scour spacing (m)	1 = one side, 2 = both sides, "-" cancels an earlier row; then the spacing along the ditch
retL / retR	Ret. wall L · Ret. wall R	Retaining wall present, or blank

U-drains are recorded by legend, not by size. A width alone cannot say which of the lined drains is meant. A size typed in a U-drain cell is refused at upload, because it would otherwise measure the drain at nothing. Re-enter such runs in field app 1.7.0 or later, which offers the seven legends labelled with their sizes.

Legend	Internal width × height × wall (mm)	Item	Default rate (GH¢/m)
U-1	450 × 450 × 150	K490.1	824.76
U-2	600 × 600 × 150	K492.5	1,049.69
U-3	600 × 750 × 200	K492.6	1,666.18
U-4	600 × 900 × 200	K492.7	1,866.12
U-5	750 × 750 × 200	K493.1	1,766.15
U-6	750 × 925 × 200	K493.2	1,999.42
U-7	900 × 900 × 200	K494.1	2,066.07

Walls are 150 mm thick below 750 mm internal height and 200 mm from 750 mm up. The rates share one basis: U-1's rate per cubic metre of concrete section, applied to each drain's own section. The same legend table is printed at the foot of the Line Diagram.

6. Form C — pavement and surfacing

Form C is where the design decision enters the measurement. You record the surface type and its condition, and the treatment rules in Form E turn that pair into a pavement build-up. The override columns let you depart from the rule for one stretch without changing the rule. Sheet C_Pavement.

Key	Column heading	Unit	Values
surf	Surface	—	GRAV gravel · BIT bituminous (export shape 2 and later)
cond	Surface condition	—	G good · F fair · P poor · VP very poor · NR no road
ovrTreat	Treatment (override)	—	A treatment named in Form E
ovrSub	Sub-base cm (ovr)	cm	Any value above 0 means there is a sub-base here
ovrBase	Base cm (ovr)	cm	Any value above 0 means there is a base here
ovrPrime	Prime (ovr)	—	Y, blank, or -
ovrS1	Seal 1 (ovr)	—	Y, blank, or -
ovrS2	Seal 2 (ovr)	—	Y, blank, or -
pot	Potholes	—	L · M · S band (shape 2 and later)
potA	Pothole m²/100m (ovr)	m²/100 m	Measured area, overriding the band rate
crk	Cracking	—	L · M · S band (shape 2 and later)
crkL	Crack m/100m (ovr)	m/100 m	Measured length, overriding the band rate

The thickness comes from Form F, not from these cells. The centimetre values in Form C and Form E only say *where* there is a sub-base or base. The thickness billed is the Form F value P_SubbaseT or P_BaseT, which selects the item:

Layer	Thickness	Item
Sub-base	100 / 150 / 200 mm	R113 / R114 / R115
Base	150 / 200 / 250 mm	R124 / R125 / R127

Any other thickness has no item. It is billed nowhere and holds the bill as NOT FOR ISSUE.

Blank and "-" are not the same. A blank override means "no instruction here", so the Form E rule applies. A hyphen means "explicitly none here". A prime or seal is laid only where the cell or the rule says Y (or 1). Use "-" where a rule would otherwise prime or seal a stretch you have decided to leave.

7. Form D — point items and culverts

Form D holds everything that happens at a chainage rather than along a stretch. Sheet D_Points has twelve columns.

Column	Meaning	Unit / values
Chainage	Chainage of the point	m
Type	What it is	PR_CULVERT proposed · EX_CULVERT existing · JN_CULVERT junction · EX_BRIDGE · PR_BRIDGE · GULLY · TURNOUT_L · TURNOUT_R · PITCHING
Family	Culvert family	PC pipe · UC U-culvert · BC box
Cells	Number of barrels	1 to 3 (pipe, U-culvert); 1 to 4 (box)
Size	Nominal size	Pipe 600, 900, 1200, 1500, 1800 mm · U-culvert 700X900, 900X1200, 1250X1800, 1800X1800 · box: see below
Length (m)	Barrel length	m
Orientation	Skew	Right Angle (default if blank) or Skew. A skew culvert gets a catchpit inlet instead of a normal endwall.
Quantity	For non-culvert points	m³ for a gully, m² for pitching, m for a turnout; blank for culverts
Water table	Recorded at the point	Recorded, not priced
Channel width (m)	Recorded at the point	Recorded, not priced
Flood mark (m)	Recorded at the point	Recorded, not priced
Notes	Free text	Carried through, priced at nothing

The 19 standard box types (cells/span x height, m): 1/2x2, 2/2x2, 3/2x2, 4/2x2, 1/3x2, 2/3x2, 3/3x2, 2/3x2.4, 1/3x3, 2/3x3, 3/3x3, 4/3x3, 1/4x3, 2/4x3, 3/4x3, 1/4x4, 2/4x4, 3/4x4, 4/4x4. The culvert schedule holds up to 100 proposed culverts.

Only proposed culverts are built. PR_CULVERT points enter the priced culvert schedule. EX_CULVERT and JN_CULVERT points are recorded, but nothing is measured or priced against them. A culvert that is to be rebuilt is a proposed culvert.

Box culvert details. Each box type's details are fixed standard data from an AASHTO LRFD 9th Edition, Section 12.11 design. They are looked up, not recomputed from your survey. The bar schedule now has 15 marks per type. The exterior walls carry separate inner-face (mark 6) and outer-face (mark 15) bars, and reinforcement is billed as high-yield steel. Outlet scour protection, hold-down and site-specific boxes are designed and billed by the Box Culvert Design app, not by the estimator.

8. Form E — the treatment rules

Form E has ten rows that say, for each surface type and condition, what work the road needs. It is the smallest part of the survey and the most consequential: it turns a one-letter condition into a pavement build-up for every stretch with that condition.

#	Column	Meaning
1	SURF	GRAV or BIT
2	Condition	G · F · P · VP · NR
3	What it looks like	Your own description, read by people, never by the software
4	Treatment	Gravel: BLADE · RESHAPE · SCARIFY. Bituminous: ROUTINE · PATCH+SEAL · RECONSTRUCT
5	Scarify bit. surface	Y where the bituminous surface is scarified
6	Sub-base	cm; above 0 means a sub-base is laid
7	Base	cm; above 0 means a base is laid
8	Primer seal	Y or -
9	First seal	Y or -
10	Second seal	Y or -

A rule's position in the table is its identity. Rules are matched by surface and condition, and the table is always padded or cut to exactly ten rows. Do not reorder the rows or leave a gap in the middle: a rule that moves takes its stretches with it. Surveys from app 1.4.0 carry the older eight-column, gravel-only rules, which are widened automatically.

9. Form F — road data, 53 constants

Form F holds the numbers that are true of this road but not recorded stretch by stretch. In the workbook they sit on sheet F_Road_Data and are matched by the name in column G, so the row order does not matter.

A missing value is not zero. Where the survey does not give a constant, the master's standard value is used. For a .json survey the estimator lists those keys in the report under "FORM F values the survey did not carry". In the workbook, a blank cell keeps the master's value without a note, so check the "!" rows before pricing.

The original 37 constants

Key	Meaning	Unit
P_CW	Carriageway width	m
P_SW	Shoulder width, one side	m
P_ExtCW	Existing carriageway width	m
P_PrimeW	Width receiving primer seal	m
P_SealW	Width receiving sealing	m
P_SubbaseT	Sub-base thickness: 0.10, 0.15 or 0.20	m
P_BaseT	Base thickness: 0.15, 0.20 or 0.25	m
P_OH_Sub	Overhaul, borrow pit to site, less 1 km free haul	km
P_OH_Base	Overhaul, quarry to site, less 1 km free haul	km
P_PrimeRate	Primer seal binder rate	l/m²
P_Seal1Rate	First seal binder rate; also used for the second seal	l/m²
P_Seal2Rate	Second seal binder rate (recorded; the second seal is priced at P_Seal1Rate)	l/m²
P_BinderPct	Binder fraction of primer	0–1
P_CutterPct	Cutter-oil fraction of primer; with the binder fraction, must sum to 1.00	0–1
P_Chip10	10 mm chipping coverage	m²/m³
P_Chip14	14 mm chipping coverage	m²/m³
P_HaulSand	Haul distance, sand	km
P_HaulCoarse	Haul distance, coarse aggregate	km

Key	Meaning	Unit
P_HaulChip	Haul distance, chippings	km
P_HaulFill	Haul distance, borrow pit to site for designed fill	km
P_FineLean	Fine aggregate per m³ of lean concrete	m³/m³
P_CoarseLean	Coarse aggregate per m³ of lean concrete	m³/m³
P_FineStr	Fine aggregate per m³ of structural concrete	m³/m³
P_CoarseStr	Coarse aggregate per m³ of structural concrete	m³/m³
P_SignsPerKm	Traffic signs per km, each type (three types billed)	nr/km
P_StopPerKm	STOP line per km	m/km
P_RampsPerKm	Speed ramps per km	nr/km
P_LaneLineF	Lane separation line, as a fraction of sealed length	m/m
P_CentreLnF	Centre line factor	m/m
P_EdgeLnF	Edge line factor, both edges	m/m
P_PedXF	Pedestrian crossing factor	m/km
P_PotL · P_PotM · P_PotS	Pothole patching rate, large / medium / small band	m²/100 m
P_CrkL · P_CrkM · P_CrkS	Crack sealing rate, large / medium / small band	m/100 m

The six pothole and crack rates are read only from export shape 2 and later. A shape-1 survey uses the standard values.

Design earthworks and signs (16 new rows). These are filled by the Road Design app for a re-designed section. Leave them at 0 when the road was not designed.

Key	Meaning	Unit	Billed as
P_DE_Topsoil	Topsoil strip area, 150 mm deep	m²	E210
P_DE_Cut	Cut, other than topsoil	m³	E220.1
P_DE_Reuse	Cut placed as fill	m³	E624
P_DE_Borrow	Fill from borrow	m³	E625.1
P_DE_Spoil	Surplus cut to spoil	m³	E533.2

Key	Meaning	Unit	Billed as
P_DE_HaulReuse	Haulage, cut placed as fill	m³·km	Banded E900 (section 10)
P_DE_HaulBorrow	Haulage, fill from borrow	m³·km	Banded E900
P_DE_HaulTopsoil	Haulage, topsoil to stockpile	m³·km	Banded E900
P_DE_HaulSpoil	Haulage, surplus cut to tip	m³·km	Banded E900
P_DE_LeadReuse	Haul distance, cut to fill	km	Sets the band of the cut-to-fill haul
P_DE_LeadTopsoil	Haul distance, topsoil to stockpile	km	Sets the band of the topsoil haul
P_DE_Sign811_1	Warning signs ahead of reduced-speed zones	nr	Added to R811.1
P_DE_Sign811_3	Posted speed-limit signs	nr	Added to R811.3
P_DE_TopsoilV · P_DE_Haul	Topsoil volume, total haul	m³, m³·km	Recorded only
P_HaulSpoil	Haul distance, surplus cut to tip, supplied by the Engineer	km	Sets the band of the spoil haul

The design rows reach the estimator only through the survey workbook, which the Road Design app writes. A .json survey does not carry them. Designed quantities appear in the bill's Re-alignment column.

The "!" marks. Column A carries "!" against the 23 figures that are still template values: the overhaul and haul distances, the aggregate yields, the road-furniture rates and the defect rates. Nothing refuses to price because of them, but clear them before a bill goes to a client.

10. How the estimate is computed, and the rates

The estimator's quantities come from your survey and any design hand-off. Four calculation engines measure them, and every line is priced from the master's rate register.

Engine	What it computes
Roads engine	Clearing, earthworks, pavement and surfacing, ditches, U-drains and trapezoidal drains, kerbs, scour checks, road furniture and haulage, station by station; plus any designed earthworks handed over
Pipe culvert engine	Every proposed pipe culvert: excavation, bedding, pipes, headwalls, wingwalls, aprons and backfill
Box culvert engine	Every proposed box culvert of the 19 standard types: concrete by member, formwork, reinforcement from its own 15-mark bar schedule, and the abstract of quantities
U-culvert engine	U-culverts and similar composite items

You can trace every quantity in the bill back through the take-off to the stations and culverts that produced it (section 12).

The rate register. The register holds 280 items in CESMM4-style codes, priced in cedis (GH¢). A few rates are still marked for confirmation, including the three gabion mattress items. They are a sound starting point but not your prices: update them for every tender and at least once a year. In the downloaded bill the Rate column can be edited, and each amount, bill total and the Grand Summary recalculate.

Haulage is banded by distance. Every haulage line (the E900 items) is priced per m³·km. The band is chosen from the distance the material travels:

Band	Distance	Default rate (GH¢ per m³·km)
1	over 0, up to 20 km	7.91
2	over 20, up to 100 km	7.08
3	over 100, up to 250 km	6.83

A distance of exactly 20 km is band 1, and exactly 100 km is band 2. A distance over 250 km has no band: the line cannot be billed, and the bill is held NOT FOR ISSUE.

Material	Bill	Banded by
Designed earthworks: cut to fill, borrow, topsoil, spoil	3 Earthworks	Each movement's own distance (below); bands 1 and 2 only

Material	Bill	Banded by
Pipe and box culvert concrete aggregate	4 Insitu Concrete	P_HaulSand (fine), P_HaulCoarse (coarse)
U-drain concrete aggregate	8 Drains and Ditches	P_HaulSand, P_HaulCoarse
U-culvert aggregate	9 U-Culverts	P_HaulSand, P_HaulCoarse
Sub-base and base	10 Roads and Pavings	P_OH_Sub and P_OH_Base; both must fall in the same band
Chippings	10 Roads and Pavings	P_HaulChip

Designed earthworks haulage. For a re-designed section, the Road Design app hands over four haulage quantities in m³·km. The first kilometre of each is free. Each is banded by its own distance:

- **Cut placed as fill:** the cut-to-fill lead, computed by the design (P_DE_LeadReuse).
- **Borrow:** the borrow-pit distance (P_HaulFill), supplied by the Engineer.
- **Topsoil to stockpile:** the topsoil lead (P_DE_LeadTopsoil).
- **Surplus cut to tip:** the tip distance (P_HaulSpoil), supplied by the Engineer.

The Road Design app cannot know where the borrow pit or the tip is, so the Engineer gives those distances on its input form. A blank distance is never priced as nil. Instead, the bill is held until the distance is given. The bill is also held when a designed movement is longer than 100 km.

General Items (Bill No. 1). These now carry default quantities and rates, so every road starts with about GH₵538,447 in Bill 1:

Item	Description	Default quantity	Default rate (GH₵)
A110 – A150	Performance bond and the four insurances	1 each	79,494.72 each
A221.2	Resident Engineer's vehicle	12 vehicle-months	1,500
A231	Resident Engineer's office equipment	1	4,539
A279	Contract sign post	1	8,500

Item	Description	Default quantity	Default rate (GH¢)
A311.1 / .2 / .3	Contractor's compound: set up / maintain / remove	1 / 12 months / 1	8,000 / 3,000 / 800
A420.1 – A420.5	Drinking water, protective clothing, its replacement, latrines, first aid	1 each	27,000 / 9,600 / 9,600 / 3,500 / 1,500
A420.8	25% adjustment on A231 and A420.1 – A420.7	computed	0.25

Other General Items are at zero, and several are marked "Tenderer prices this item". Set every General Item to suit the project and your policy in the downloaded bill. **A420.8 is a fixed figure in the download.** If you change the items it adjusts, recalculate it yourself.

An item with no rate. A line that is measured but has no rate is not dropped. It stays in the bill at zero, is listed in the report under "ITEMS MEASURED BUT NOT PRICED", and shows "no rate" in red on screen. The bill is held NOT FOR ISSUE until a rate is entered, because a bill that silently omits work is worse than one that shows a gap.

Items the estimator never measures. The register also holds outlet cut-off walls (F642.2, F643.2) and gabion mattresses (X420.1, X420.2, X420.3). These are billed by the Box Culvert Design app's outlet design and always read zero in an estimator run.

11. Pricing a road

Sign in at road-estimator.bespa.online with your Bespa licence. The page header shows the master in use and the service version (agent 1.7.0).

1. **Upload.** Drop the app's .json export or the .xlsx survey workbook on the **New survey** panel, or click to choose the file. The survey is read and its version checked, and the road is created or matched. A successful read reports the road and its size, for example "Acceptance Road — 10 entries, 3 points", with any notes in amber. Refusals happen here, in red, before anything is priced.
2. **Price.** Pricing starts by itself as soon as the upload is accepted. There is no separate Price button. To reopen a road later, click it in the **Roads** panel: its newest run opens, or its newest survey is priced if it has none.
3. **Measure.** The first engine measures and prices every item. The bill lines can be viewed from this point.
4. **Confirm.** A second, independent calculation prices the whole estimate again. The two are compared line by line, and the bill workbook is built and checked.

5. **Read.** Open the bill, the take-off behind any line, the reconciliation checks and the documents.

The page refreshes every 1.5 seconds and shows the state of the run:

State	On screen	Meaning
queued	queued	Waiting for a worker
measuring	the port is measuring	The first calculation is running
confirming	LibreOffice is confirming	The second, independent calculation is running
checked	both engines agree	Both finished and agreed, and the bill workbook was built and checked
disputed	the engines disagree	Both finished and disagreed (section 13)
unconfirmed	measured, not confirmed	The first engine measured the bill but confirmation failed. The lines stay on screen, but no bill or report file is made.
failed	failed	Measurement itself failed, and there is no bill. The reason is shown under "What went wrong".

A pill beside the total reads AGREED, DISAGREE, checking or not checked. The panel also shows each engine's total and how long it took.

12. Reading the bill, and the take-off behind it

On screen. The bill shows Item, Description, Unit, Quantity, Rate and Amount, with a total for each bill and the grand total. A toggle switches between the measured lines only and all lines, for example "73 measured, 207 carried at nothing". A line with no rate shows "no rate" in red. Rates cannot be edited on screen; edit them in the download.

Provenance: where a quantity came from. Click any line to open its take-off. It shows the surveyed runs that produced the line, each with its chainage range.

On screen	Where the quantity came from
Measured over	A surveyed chainage run, shown as e.g. 1+200–1+800
At	A specific culvert or point item, e.g. "2 nr 600 dia x 8.0 m"

On screen	Where the quantity came from
Derived from	Computed from other measured quantities
From the project data	A Form F constant applied across the road, including design hand-off quantities

This answers the question that arrives three months after tender: where did this figure come from?

The documents. Once a run is checked, the **Documents** panel offers two downloads:

File	What it is
`<road>_BOQ.xlsx` — "Bill of Quantities, line diagram and taking-off (Excel)"	The priced bill, in seven sheets ready to print: Bill of Quantities, Line Diagram, Taking-off Roadworks, Taking-off Culverts, Taking-off Box Culverts, Box Culvert Abstract and Box Culvert Bar Schedule
`<road>_report.txt` — "Pricing report"	Road identity, survey status, the master used, the recalculation, the service version and the version of the field app that wrote the survey; every bill total and the grand total; the reconciliation result; items measured but not priced; Form F values the survey did not carry; and the NOT FOR ISSUE banner if one applies

In the file names, every character other than a letter or digit becomes "_", for example `Acceptance_Road_BOQ.xlsx`.

In the bill workbook:

- On the Bill of Quantities, the quantities, rates and General Items can be edited. Each amount (quantity × rate, to 2 decimals), bill total and the Grand Summary recalculate. The other sheets are the measured record, stored as values.
- The bill shows where each quantity came from in source columns: Roadworks, Drains, Pipe culv., Box culv., U-culv. and Re-alignment. Re-alignment holds the earthworks handed over by the Road Design app.
- The Line Diagram ends with the legend of the concrete-lined U-drains, U-1 to U-7, with their sections and item codes.
- The Box Culvert Bar Schedule lists all 15 bar marks for each box type used.

13. Every bill is calculated twice

Every road is priced by two independent calculations that share no code: the Python engine ("Python port") and a full recalculation of the master workbook ("LibreOffice"). They are compared line by line, to two decimal places. The comparison covers every quantity, rate and amount, the grand total, and every reconciliation check the two have in common.

One calculation that is wrong is wrong silently. Two that agree are strong evidence. Two that disagree prove something is wrong, and the estimator will not let the bill be issued. The panel "The two engines do not agree" lists each difference, for example "R114 quantity: port X, workbook Y" or "GRAND TOTAL: port …, workbook …". Report a disagreement to Bespa: it is a defect in the software, not in your survey.

14. NOT FOR ISSUE, and how to clear it

A bill can be issued only when all of these hold:

- the run is **checked**;
- the two calculations **agree**;
- every reconciliation check passes. The workbook runs 27 checks; the screen shows the 20 the Python engine shares;
- nothing measured is unpriced.

Otherwise a red banner names the reason.

Banner	What it means	What to do
NOT FOR ISSUE — n reconciliation test(s) did not pass	Shown while the run is being confirmed: the first engine's checks found a problem	Wait for confirmation, then read the final banner
NOT FOR ISSUE — work measured that the bill cannot price	Shown while confirming: something was measured that has no rate	Enter a rate in the downloaded bill. The report lists every such item with its quantity.
NOT FOR ISSUE — the two engines disagree on n value(s)	The two calculations reached different figures	Do not issue, and do not pick one. Send the run to Bespa.

Banner	What it means	What to do
NOT FOR ISSUE — n of N reconciliation tests have not passed. Read the reconciliation checks before this bill leaves the office.	The final verdict after the engines agree: the bill workbook's own checks found n problems	Open the report or the Reconciliation panel. Each failed check names what was expected and what was found.

Common reasons for a failed check

Reason	What to do
A measured item has no rate	Enter the rate
The road is longer than the 20 km the line diagram covers	Split the road into two surveys
A sub-base or base thickness on Form F has no item (section 6)	Use 100, 150 or 200 mm sub-base and 150, 200 or 250 mm base
A haul distance has no band: over 250 km, or sub-base and base in different bands	Check the distances on Form F
A designed haul has no distance, or a designed movement is over 100 km	Give the borrow-pit and tip distances on the Road Design app's input form, and design again

A survey that was still running. A survey exported mid-walk prices without complaint, but it measures only as far as the crew had reached. The report's status line says so: STILL RECORDING — INCOMPLETE, or PAUSED — INCOMPLETE, against ENDED for a finished survey. The estimator does not refuse it, because a partial bill is sometimes what you want mid-survey. Check the status line before issuing anything. A workbook survey shows no status line, so check it yourself.

15. Every refusal, and what to do about it

These are the exact messages. Each one is a refusal to guess.

At upload

Message	Cause and cure
the upload was empty	A zero-byte file. Export it from the app again.

Message	Cause and cure
upload the app's .json export or its .xlsx survey workbook — '…' is neither	Wrong file type. Only .json, .xlsx and .xlsm are read.
that file is not the app's .json export (…)	The file does not read as JSON, usually because a download was cut short or the file was edited in a word processor.
that .json has no survey in it — export 'raw data + photos' from the app	The wrong export option was chosen.
that file is not a readable workbook (…)	The .xlsx is damaged or is not a workbook.
that workbook is not a survey export — it has no A_Corridor block and no README stamp	You uploaded another spreadsheet, not the survey.
This survey was written by app version … (export shape …). This service reads shapes 1, 2, 3. Do not price it …	The survey app is newer than the estimator. Do not price it; contact Bespa.
This survey records its U-drains by size (…), not by legend. …	A U-drain was entered as a size. Re-enter those runs in field app 1.7.0 or later with the legends U-1 to U-7. They are not converted automatically.
README 'Chainage format' is '…' - use metres, km or km+m (as 1+200)	Correct the README cell.
the chainages cannot be read safely, nothing was priced: …	Up to 12 problems are listed. Typical ones: a cell that "is TRUE/FALSE, not a chainage"; "is a plain number, but the README declares 1+200 format"; more than 999 m after the "+"; "From a m is not less than To b m"; or chainages that "look like KILOMETRES". Correct the cells, or declare the right chainage format.

Notes at upload (shown in amber; the survey is still read):

- "this survey was exported by an app older than 1.4.0 and carries no version stamp — it has been read, but update the phones"
- "survey written by app …, service is 1.7.0 — same export shape, so this is safe, but keep them in step"
- "chainages converted to metres: …"

While viewing a run

Message	Cause and cure
no such survey · no such run · no such road · this run has no line '…'	An identifier that does not exist, usually from an old browser tab. Reload the page.
this run has no bill — it is measuring (or another state)	You asked for a document before it was made. Wait for the run to be checked. An unconfirmed run never gets documents.

Under "What went wrong"

Message	Cause and cure
PricingFailed: the confirming calculation returned no grand total - price again, and contact Bespa if it repeats	A server fault. Price again.
PricingFailed: LibreOffice did not finish within 900 seconds	The server is heavily loaded. Price again later.
PricingFailed: LibreOffice produced nothing (…) or LibreOffice is not installed on this server	A server fault. Contact Bespa.
SystemExit: 2	The road needs more than 200 rows on one form. Split it into two surveys.

16. The files that ship with this manual, and the acceptance check

Four files ship with this manual. Start from the two workbooks: the survey workbook is what a phone hands you, and what a surveyor without a phone fills in by hand. The two JSON files hold the same surveys in the app's own export format.

File	What it is
Survey_Workbook_BLANK.xlsx	The blank survey workbook: README, A_Corridor, B_Drainage (U-drain legend columns), C_Pavement, D_Points (12 columns), E_Rules and F_Road_Data (53 rows), with the ten treatment rules and the Form F template values filled in. Start here for a road surveyed on paper.

File	What it is
Example_Survey_Workbook.xlsx	The worked survey workbook for the 8 km acceptance road: five Form A rows, two Form B rows, one Form C row and three culverts on Form D
survey_template_blank.json	Every key the JSON reader accepts, with its units, in export shape 3. Nothing is filled in.
Acceptance_Road.json	The acceptance road as the app's own export, shape 3

The acceptance check. Upload either acceptance-road file. The run should end **checked**, with the screen reading "both engines agree" and AGREED, and with:

- **grand total GH₵ 17,130,656.69**, reached by both calculations;
- 280 bill lines, "73 measured, 207 carried at nothing";
- reconciliation: 20 checks with none failed on screen, and 27 with none failed in the report;
- no NOT FOR ISSUE banner.

That figure is checked on every release and is the quickest way to confirm an installation is sound. The JSON route reports "Acceptance Road — 10 entries, 3 points" on upload.

The figure for version 1.5.1 was GH₵ 18,017,884.18. It moved because the General Items are now priced, haulage is banded, the U-drains are billed by legend on one rate basis, and the box bar schedule was corrected.

What changed since version 1.5.1

- Reads field-app exports up to 1.7.0 (export shape 3, with the GPS track carried).
- U-drains are recorded by legend U-1 to U-7, and a size is refused. Their rates share one concrete-volume basis, and the legend is printed on the Line Diagram.
- Sub-base and base are billed at the thickness set on Form F: 100, 150 or 200 mm sub-base and 150, 200 or 250 mm base.
- Every haulage line is banded by its distance (up to 20, 20 to 100, and 100 to 250 km).
- Re-designed sections can bring their earthworks and banded earthworks haulage from the Road Design app, through 16 new Form F rows, including the Engineer's borrow and tip distances. They are billed in the Re-alignment column.
- The General Items are priced by default, about GH₵538,000 per road. Edit them in the download.

- Form D records water table, channel width and flood mark. Bituminous treatment rules use ROUTINE, PATCH+SEAL and RECONSTRUCT.
- Box culverts: 19 standard types, with a corrected AASHTO bar schedule of 15 marks and high-yield reinforcement.
- The register adds outlet cut-off walls and gabion mattresses, used by Box Culvert Design.
- Pricing starts as soon as the survey is uploaded.
- A stricter issue gate: all 27 of the bill workbook's own checks must pass. Roads over 20 km, thicknesses with no item, and haul distances that cannot be banded are held.
- New acceptance figure: GH₵ 17,130,656.69.