CIVIL ENGINEERING ELEMENTAL COST ANALYSIS (CEECA)

PENGENALAN KEPADA CEECA
PRINSIP PENYEDIAAN CEECA

COST ANALYSIS

- Used in establishing Preliminary Estimate
- Negotiation
- Basis for Detailed Estimate

Principle of Analysis

- The CEECA shall be prepared based on the finalised re-measured quantities from the original scope of works **ONLY**.
- For projects with multiple structures, each structure shall be analysed separately.
- The analysis of data shall be tabulated in the following sequence by using the standard format:

Principle of Analysis

No.	Form	Title	Description
i -	Form 1	General Project Information	General information of the analysed project.
ii	Form 2	Project Cost Analysis	Total Overall Project Cost and Total Cost Analysis of each element in standard Bills of Quantities related to the project.
iii	Form 3	Analysis of Structural Elements	Bridges, Viaducts, Interchange Structure etc., shall be analysed separately.
iv	Form 4	Brief Specification	General specification of each element.
v	Form 5	Final Re-measurement of Project Cost	Cost information of the elements taking into account **ONLY** re-measured quantities.

Principle of Analysis

- The Prime Cost and Provisional Sum related to the Builder's Works (Item 2a to 2k - Form 2), if any, shall be apportioned to the particular element that is to be analysed. The remaining Prime Cost & Provisional Sum items (refer clause 3.1.11 - List and Content of Elements) shall be inserted in item 3 - Form 2 and the amount shall be as allocated in the contract.
- Rationalised rates shall be used instead of tendered rates, (where applicable).
- Contingency Sum to cover unforeseen expenditure shall not be included in the analysis.

CEECA FORM

- FORM 1
- FORM 2
- FORM 3
- FORM 4
- FORM 5

FORM I

INFORMATION ON CONTRACT

A) JOB TITLE

Name of project.

B) CLIENT

Example - Kementerian Kerja Raya, Kementerian Kemajuan Luar Bandar dan Wilayah, etc.

C) LOCATION

State, example - Pahang.

D) PROJECT DETAILS AND SITE CONDITION

Project Brief Description

Description of project shall include limit of project area, length of road constructed, type of work (new works/upgrading work) with specified length.

JKR Design Standard

Example - R3, R5, U5 etc.

Terrain/Geographical Condition

Example - flat, undulating, mountainous etc.

FORM I

No. of Berms

To specify number of berms representing the major length of the berm

Overall Road Length

Length of road is measured gross from chainage to chainage.

Road Length (Nett)

Length of road excluding roads above elevated structure (bridges, viaduct and interchange).

Shoulder Width

Refer Sketch

Type of Shoulder

Example - paved, earth-filled etc.

Median Width

Refer Sketch

Type of Median

Example - paved, earth-filled etc.

FORM 1

No. of Lanes

Number of lanes constructed

Type of Carriageway

Example - four lane dual carriageway etc.

No. of Structure

Total number of structures constructed (for multiple structures projects).

Note :

In cases where the scope of works involves variety of types and designs (e.g. : design standard, type of shoulder/median, width of shoulder/median etc.), the major scope (in term of length) shall determine the project details

FORM 1

E) CONTRACT PARTICULARS

- Contract No.
- Basis of tender - Open/Selective Tender or Negotiated. (Prequalification to be treated as selective tender)
- Type of Contract - Conventional, Design & Build, Turnkey or Cost Plus including whether tendered internationally or locally
- Form of Contract – e.g.: PWD 203A
- Contract Period
- Date of Tender - Date of closing tender (for open/selective tender) or date of final negotiation (for direct negotiated tender)
- Commencement Date
- Completion Date (Original)

FORM 1

F) ADJUSTMENT OF CONTRACT SUM

Original Contract Sum

As stated in Letter of Acceptance.

Adjusted Contract Sum

Contract Sum after taking into account final re-measured quantities excluding Variation Works and Variation of Price.

G) OTHER INFORMATION

Source of Materials

Haulage distance for sand, crusher run, asphaltic concrete binder course, asphaltic concrete wearing course and imported earth.

FORM 2

- The analysis is tabulated in a format comprising of:
  - Description
  - Percentage of contract sum
  - Cost per kilometre (cost/km)
  - Total cost of element (RM)

FORM 2

The elements of works shall be described as follows:

1) Preliminaries
   - General Item
   - Turnkey Elements (if applicable)

2) Main Works

2a) Site Clearance & Demolition Works

2b) Earthworks

2c) Drainage Works

2d) Pavements Works

2e) Road Furniture

2f) Geotechnical Works

2g) Structures

2h) Traffic Management & Control

2i) Environmental Protection Works

2j) Routine Maintenance Works

2k) Others (To specify, if any)

3) Prime Cost Sum & Provisional Sum (not related to builder's work)

The Prime Cost and Provisional Sum related to the Builder's Works (Item 2a to 2k - Form 2), if any, shall be apportioned to the particular element that is to be analysed. The remaining Prime Cost & Provisional Sum items (refer clause 3.1.11 - List and Content of Elements) shall be inserted in item 3 - Form 2 and the amount shall be as allocated in the contract.

FORM 2

PERCENTAGE OF CONTRACT SUM

- The percentage calculation is derived from cost of each element over the Contract Sum and shall be calculated to the nearest one decimal place.

- However, the percentage of Preliminaries shall be based on the remainder of Contract Sum excluding Preliminaries. General Item and Turnkey Element of Preliminaries shall be analysed separately.

TOTAL COST OF ELEMENT (RM)

- The total cost shall include the amount for the related Prime Cost Sum and Provisional Sum items that have been apportioned to that particular element. The amount is carried from Form 5 – Final Re-measurement of Project Cost.

COST PER KILOMETRE (Cost/km)

- The total cost for each element is divided by length of the road (nett) in kilometre (to the nearest Sen).

FORM 3

The type of structures is categorised as follows:

- Bridge
- Viaduct
- Interchange
- Underpass
- Tunnel
- Culverts (more than 3 meter wide) (Culverts function as drainage shall be analysed under Element Drainage Works)

Type of Structure

- Type of structure shall be stated.
- The following shall be described :
  - i) Type of pile
  - ii) Type of structure (e.g. beam, box girder / segmental)
  - iii) No. of span

Dimension

A) Bridge

Length (L) – measured from abutment to abutment

Width (W) – measured from the outer edge of parapet

FORM 3

B) **Pedestrian Bridge / Pedestrian Bridge with Motorcycle Ramp**

Length (L) – total length of bridge from end A to end B

Width (W) – measured from the outer edge of slab

C) **Viaduct/ Interchange**

Length (L) – total length of bridge from end A to end B

Width (W) – measured from the outer edge of parapet

D) **Underpass/ Tunnel/ Culvert**

Length (L) – total length of bridge from end A to end B

Width (W) – measured from the outer edge of wall

FORM 3

Area of structure (m2)

Measured to the nearest whole number.

Total length of pile (m)

Measured from toe to cut-off level

Cost of structure (RM)

Cost excludes temporary work. Refurbishment works (if any) and bridge widening shall not be analysed.

COMPONENT	ITEM
Temporary Works	Temporary work for the particular analysed structure.
Piling	The quantities shall be in accordance with the final re-measured Bill of Quantities.
Substructure	Pile caps, abutments, piers and inclusive of any related miscellaneous item but excluding temporary works.
Superstructure	i. Structure with piers - Any item above piers inclusive of any related miscellaneous item but excluding pavement. i. Structure without piers – Any item above foundation inclusive of any related miscellaneous item but excluding pavement.
Pavement	Pavement on elevated structure (bridges, viaduct and interchange).

FORM 3

STRUCTURE COMPONENT

FORM 4

BRIEF SPECIFICATION		
REF	BILL	SPECIFICATION
2	**MAIN WORKS**	
2a	Site Clearance & Demolition Works	Nature of site clearance and type of structure to be demolished
2b	Earthworks	Type of work *(e.g. : excavation, filling, etc)* / nature of work *(e.g.: common, hard, etc.)* / quantity of respective type / nature of work
2c	Drainage Works	Type and size of drain / culvert / etc *(e.g. : Roadside Drain (RSD),Medium Drain Urban (MDU), berm drain (BF), etc)*
2d	Pavement Works	Type and thickness of base and finishing coarses
2e	Road Furniture	Major type of work i.e : type of signages, type of traffic barriers etc . *(e.g. : butterfly gantry, 1.95m single mounted guardrail etc.)*
2f	Geotechnical Works	Type and material used *(e.g. : stone column, piled embankment etc)*
2g	**Structures** i) Sub-structure ii) Super-Structure	 Type and general sizing of foundation (e.g. : bored pile etc) Type of structure *(e.g. : T-beam, box girder etc)*
2h	Traffic Management & Control	As per standard requirement
2i	Environmental Protection Works	As per standard requirement
2j	Routine Maintenance Works	As per standard requirement
2k	**Others (If any)**	State specification for the relevant works

FORM 5

The final re-measurement of project cost is tabulated in a format comprising of:

- Description of work
- Contract cost (RM)
- Allocation of provisional sum items from original contract cost (RM)
- Adjustment due to re-measurement of final quantities (Addition/Omission) (RM)
- Final cost (RM)

DESCRIPTION OF WORKS

The elements of works shall be stated.

CONTRACT COST (RM)

The amounts for the particular elements are derived from the original Contract Amount.

ALLOCATION OF PROVISIONAL SUM ITEMS FROM ORIGINAL CONTRACT COST (RM)

The Prime Cost and Provisional Sum related to the Builder's Works (Item 2a to 2k - Form 2), if any, shall be apportioned to the particular element that is to be analysed. The remaining Prime Cost & Provisional Sum items (refer clause 3.1.11 - List and Content of Elements) shall be inserted in item 3 - Form 2 and the amount shall be as allocated in the contract.

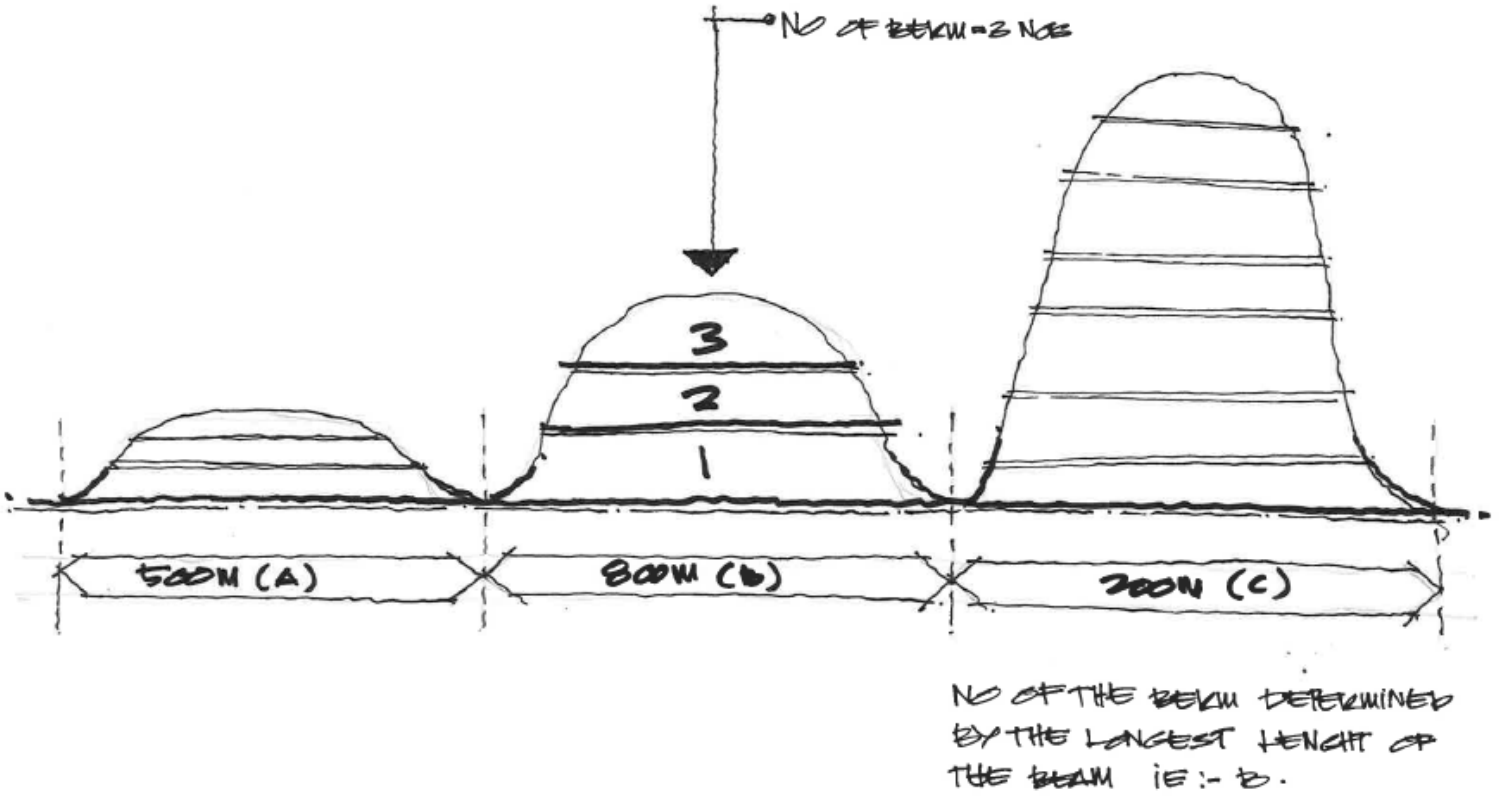
FORM 5

ADJUSTMENT DUE TO RE-MEASUREMENT OF FINAL QUANTITIES (ADDITION/OMISSION) (RM)

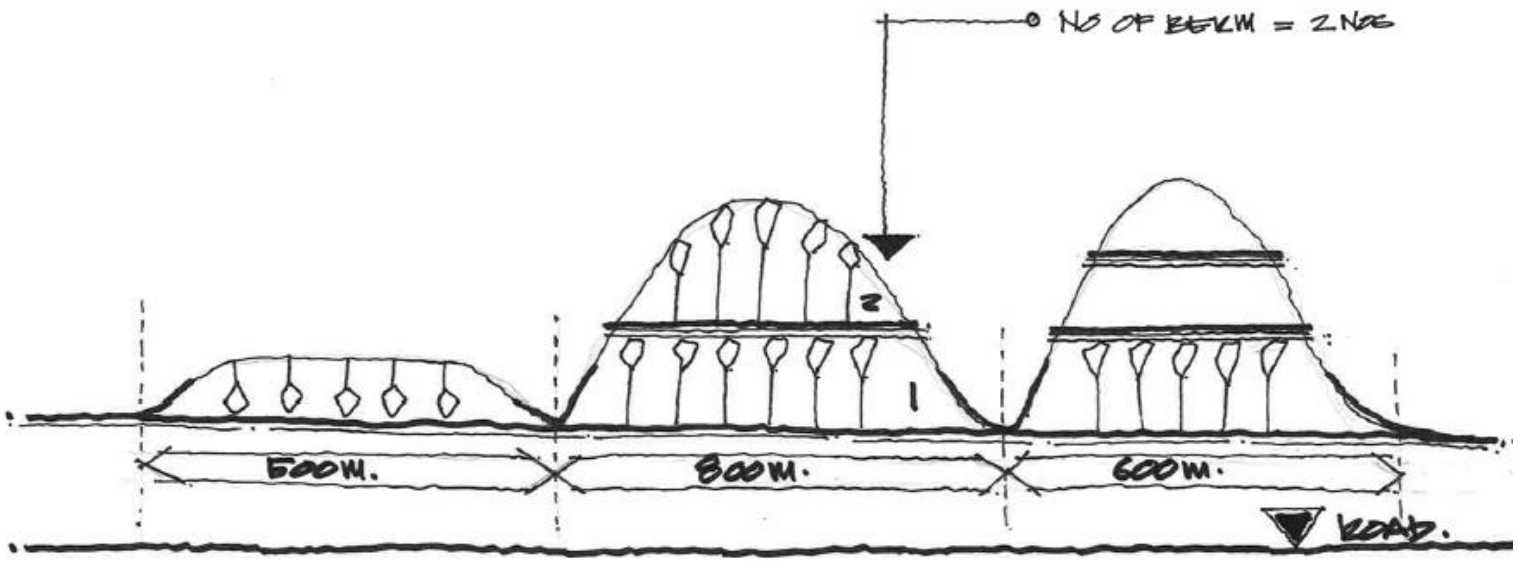
The nett addition/omission due to the re-measurement of quantities shall be stated for the particular element EXCEPT for works with variation due to substitution, the original amount shall remain.

FINAL COST (RM)

The final cost for the particular element after the adjustment shall be taken to Form 2.


NO OF BEAM = 3 NOS
3
2
1
500M (A)
800M (B)
300M (C)
NO OF THE BEAM DETERMINED BY THE LONGEST LENGHT OF THE BEAM IE :- B.

SKETCH 1+2.

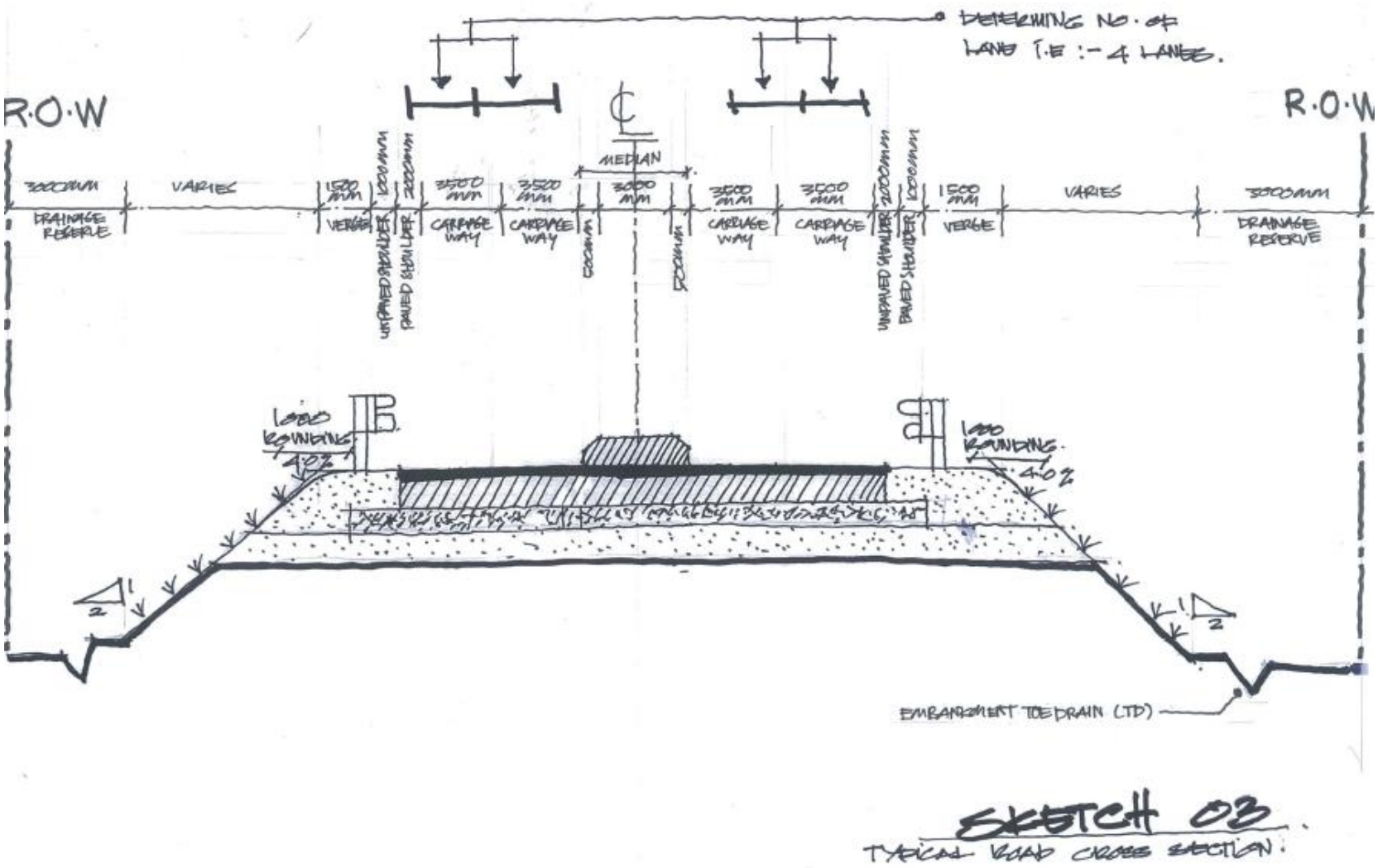


NO OF BERM DETERMINED BY THE LARGEST BERM CONSTRUCTED

EG : BERM B (800M), NO OF BERM IS 2 NOS.

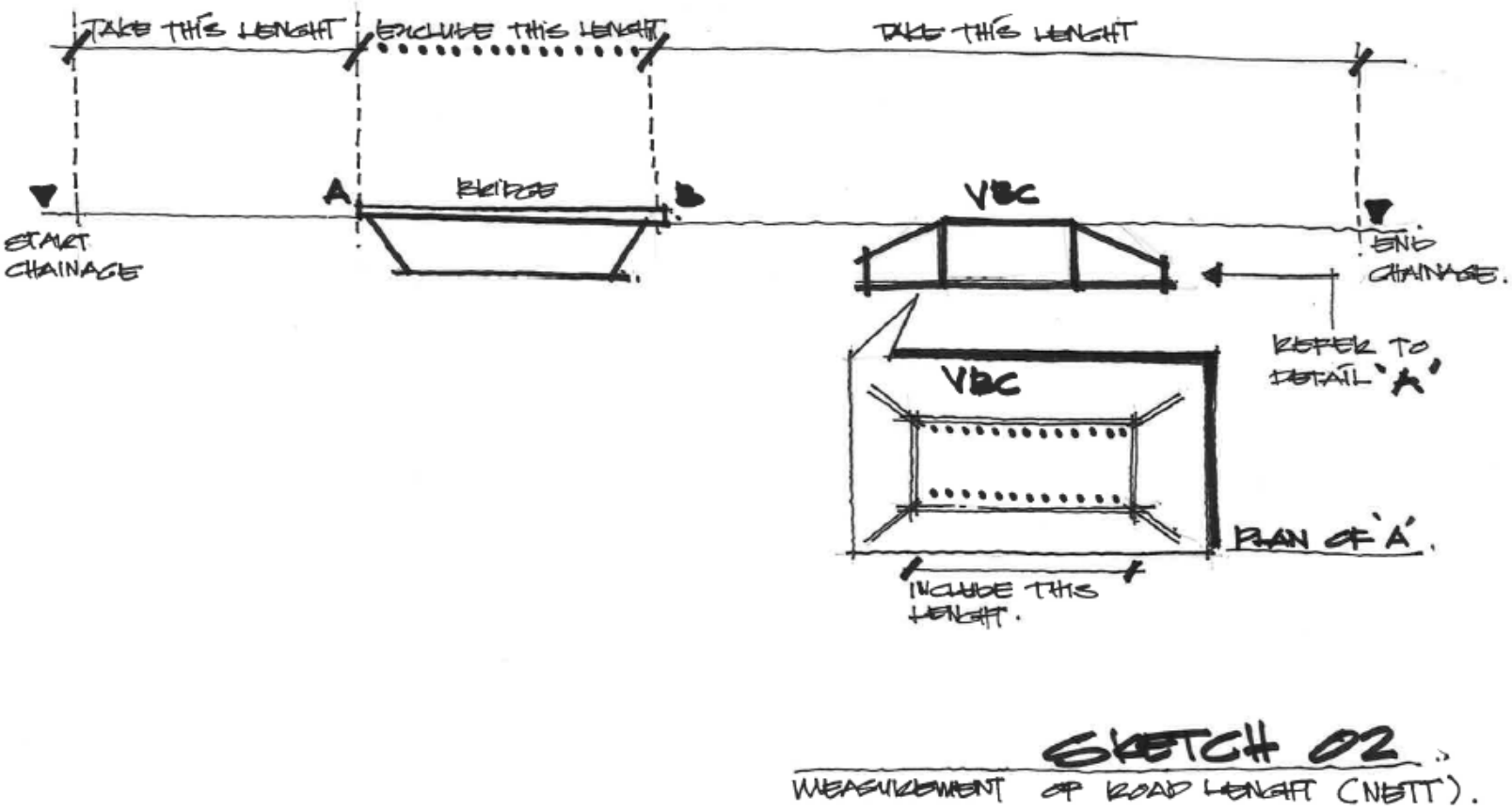
SKETCH 01

DETERMINING OF BERM.



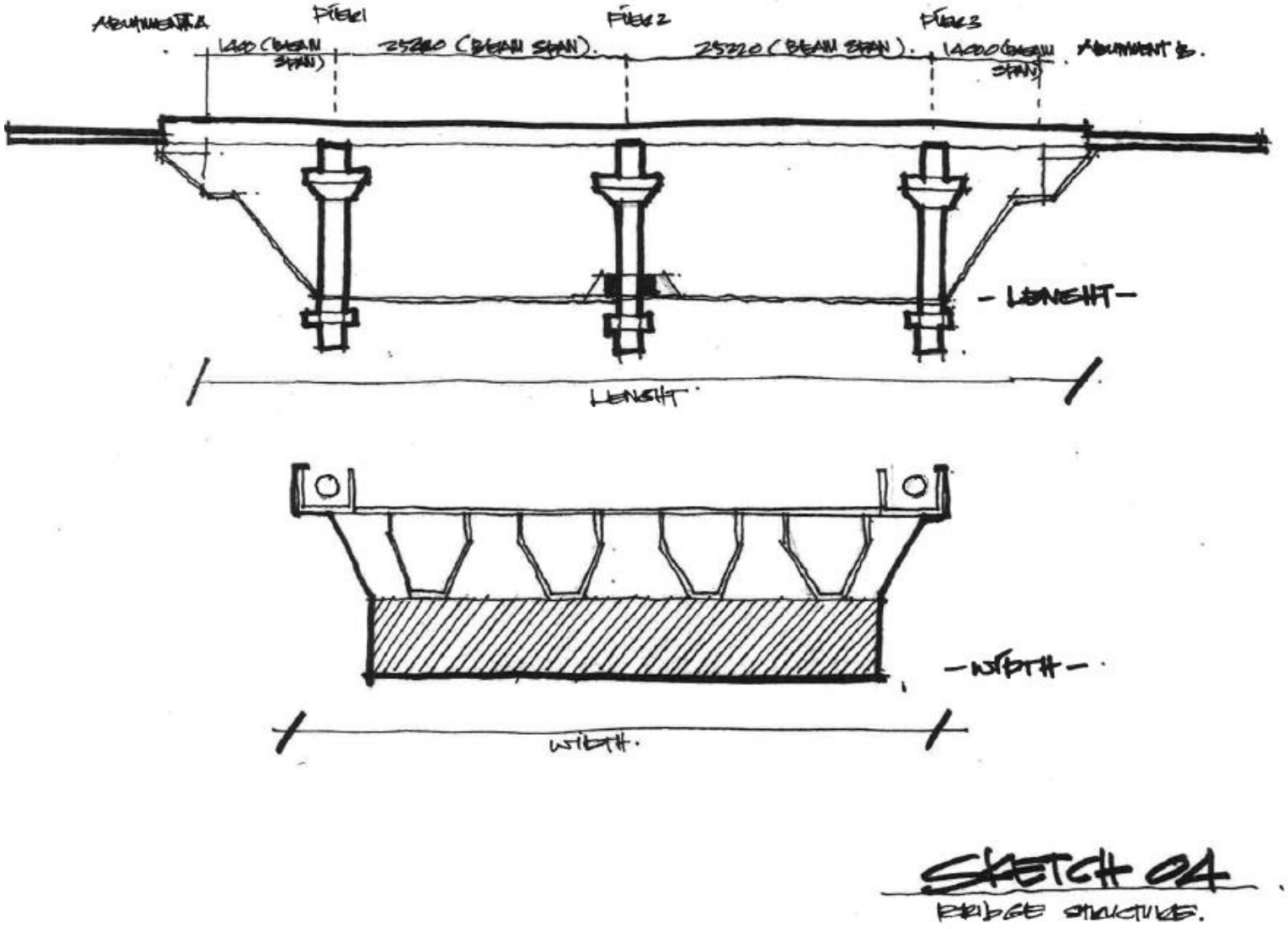
SKETCH 03

TYPICAL ROAD CROSS SECTION.

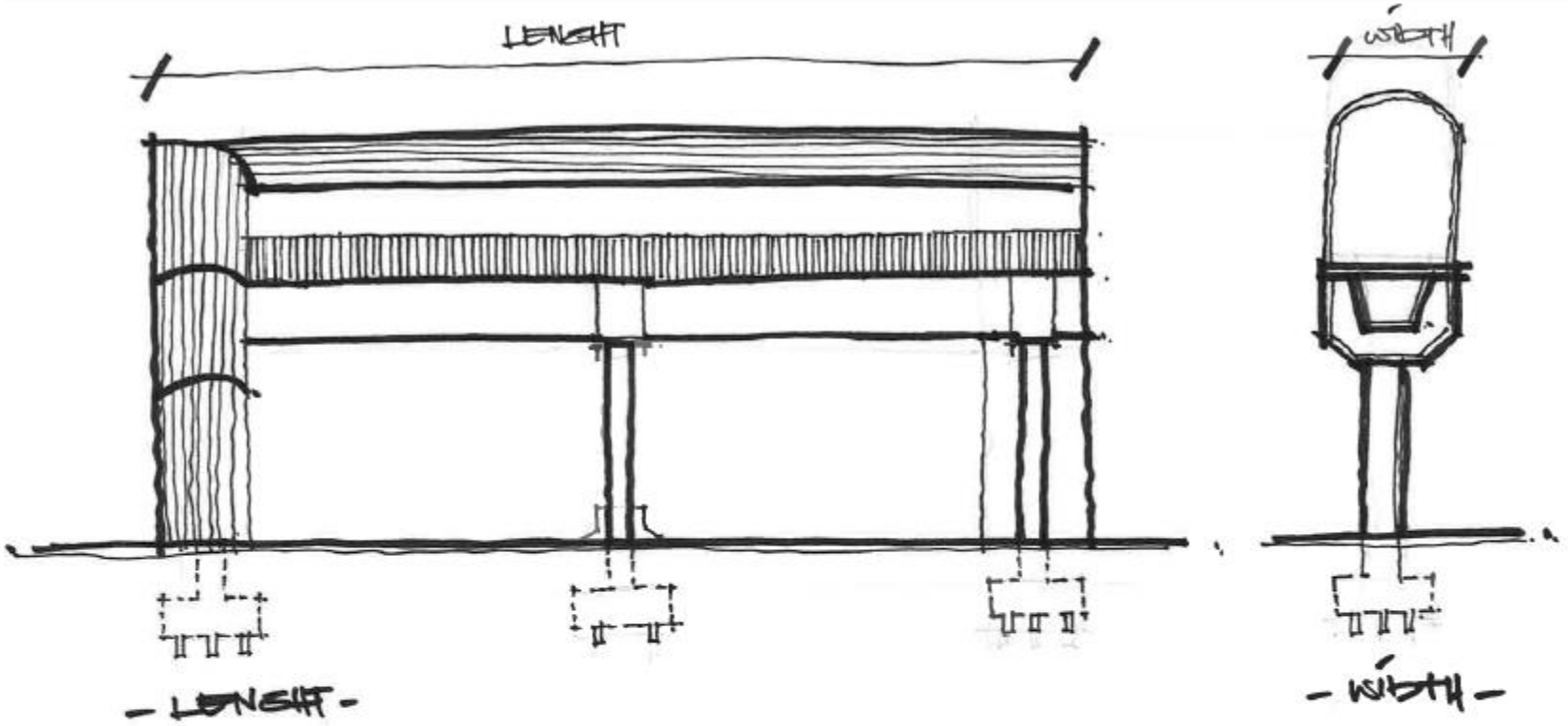


SKETCH 02.

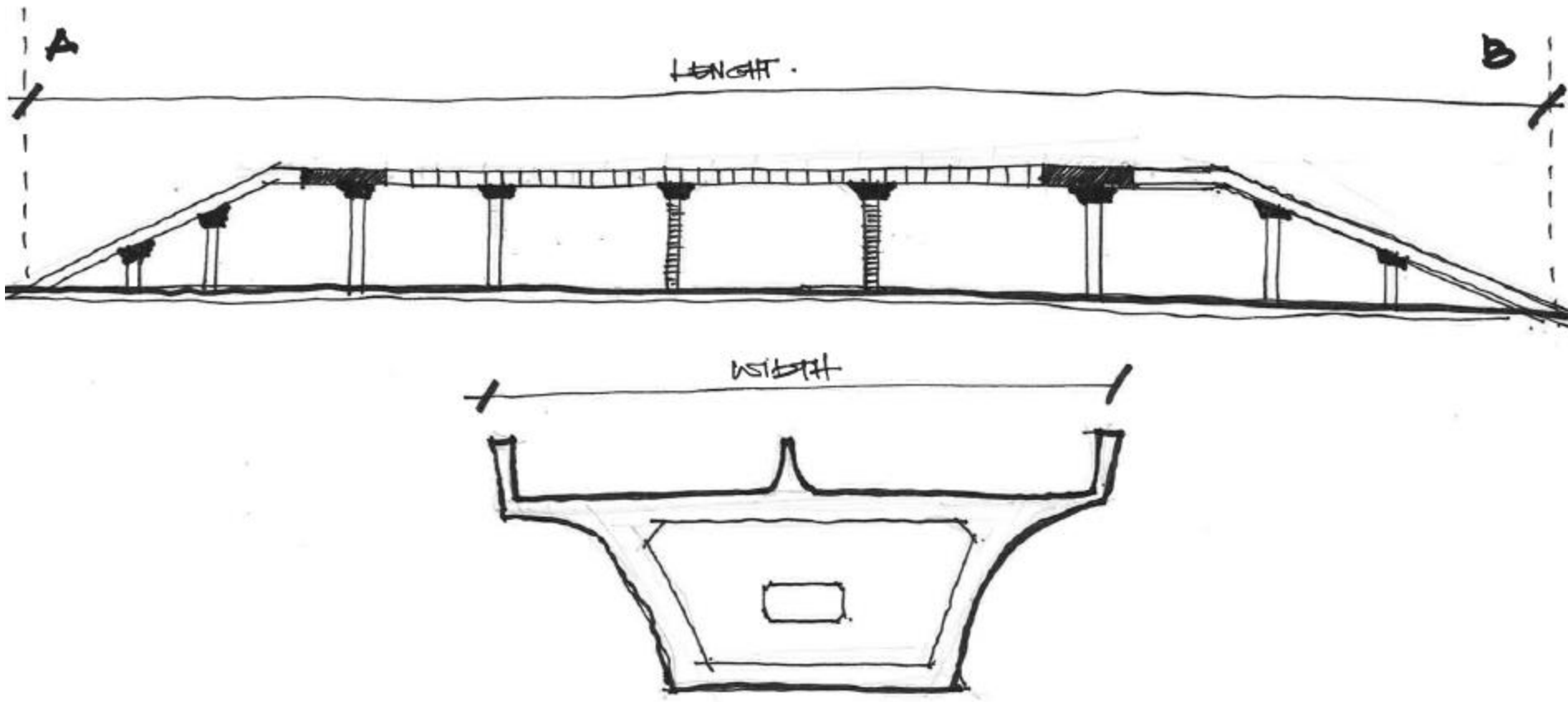
MEASUREMENT OF ROAD LENGHT (NETT).



SKETCH 04
BRIDGE STRUCTURES.

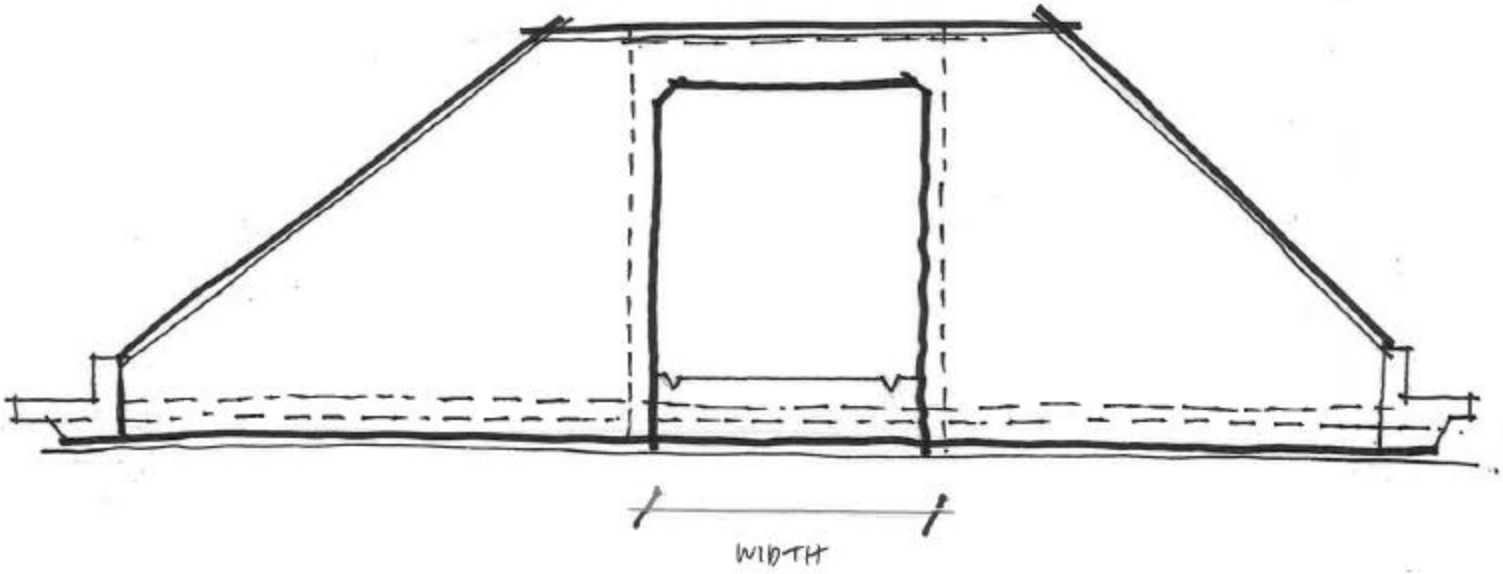


SKETCH 5.
PEDESTRIAN BRIDGE.



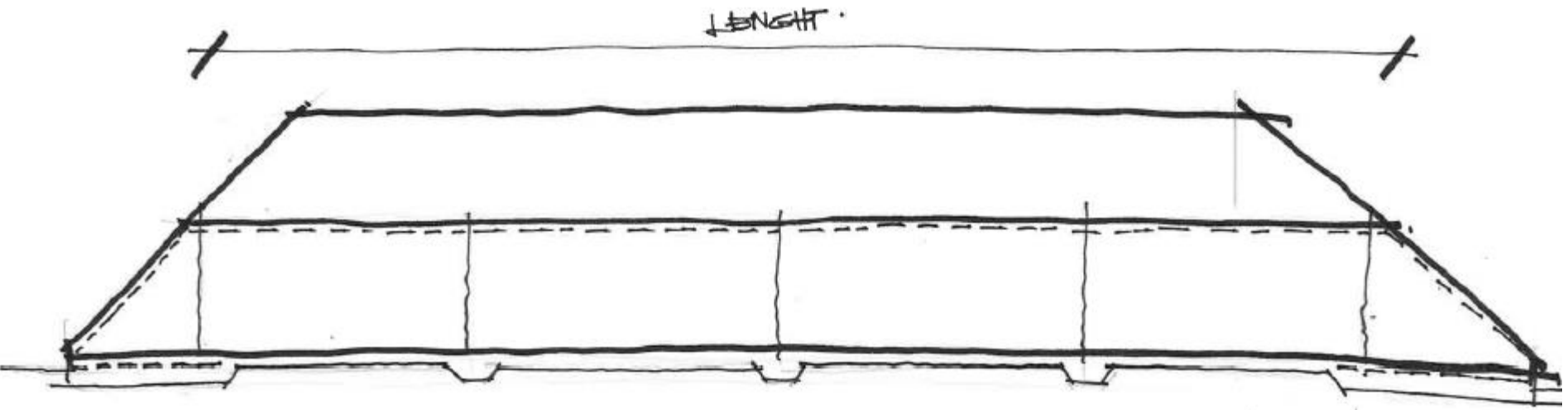
SKETCH 06

VIADUCT / INTERCHANGE



SKETCH 07

UNDERPASS / TUNNEL / CULVERT.


LENGHT