



# Particular Design Elements

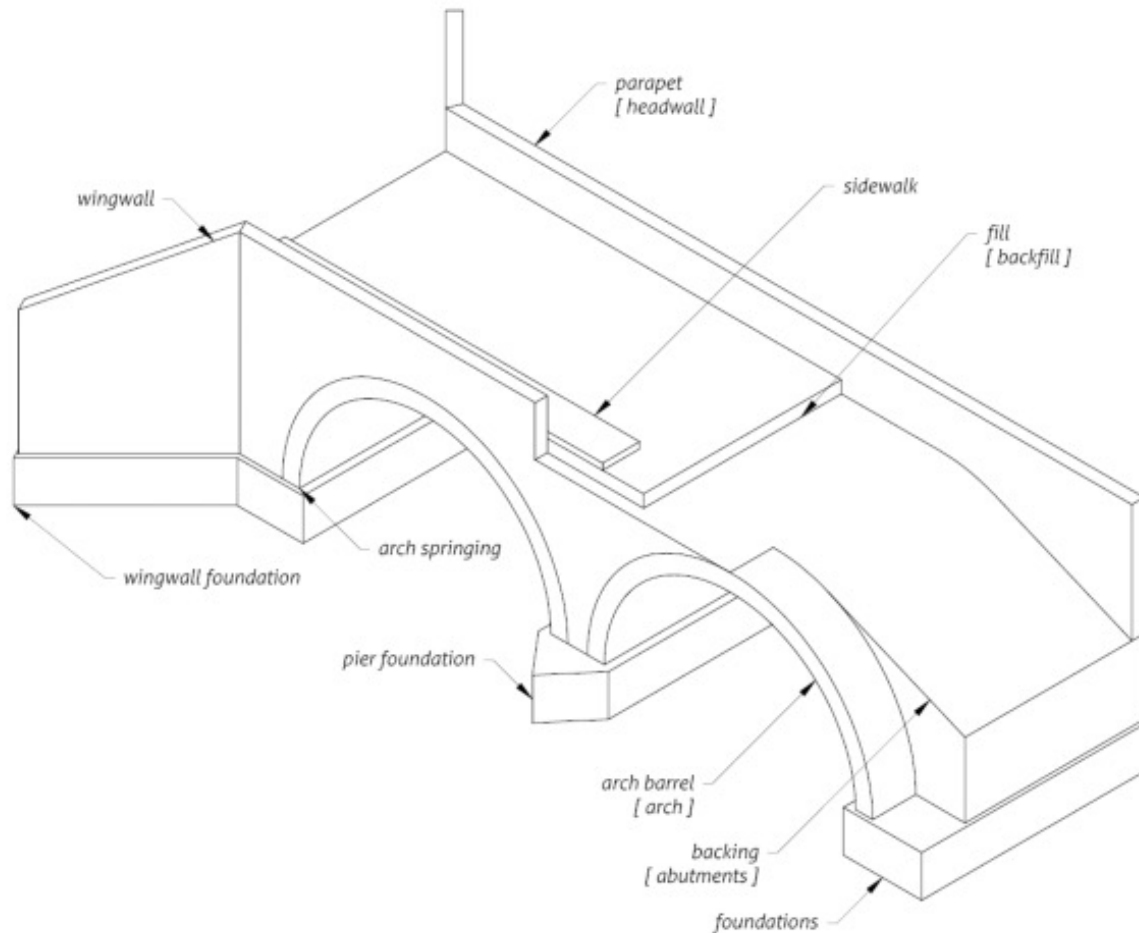
Stone Arch Bridges

Belgian development agency

[enabel.be](http://enabel.be)



# General Stone Arch Bridge Elements

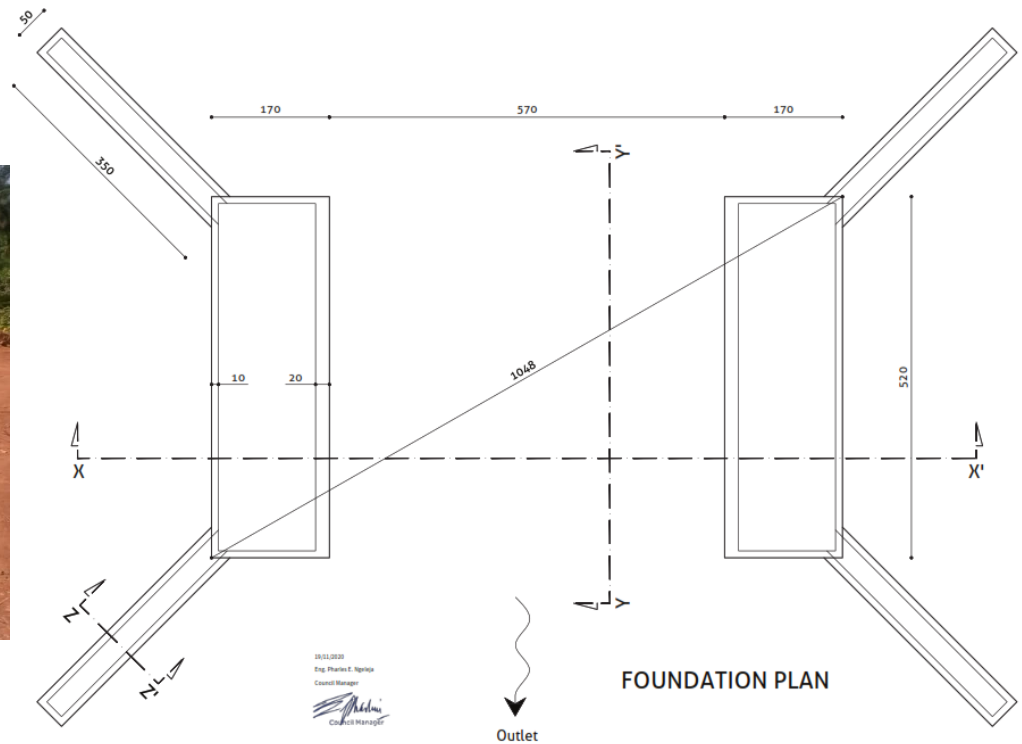




# Structural Elements



*Kilema Bridge Mkongoro-Kigoma*



## Foundations and Piers

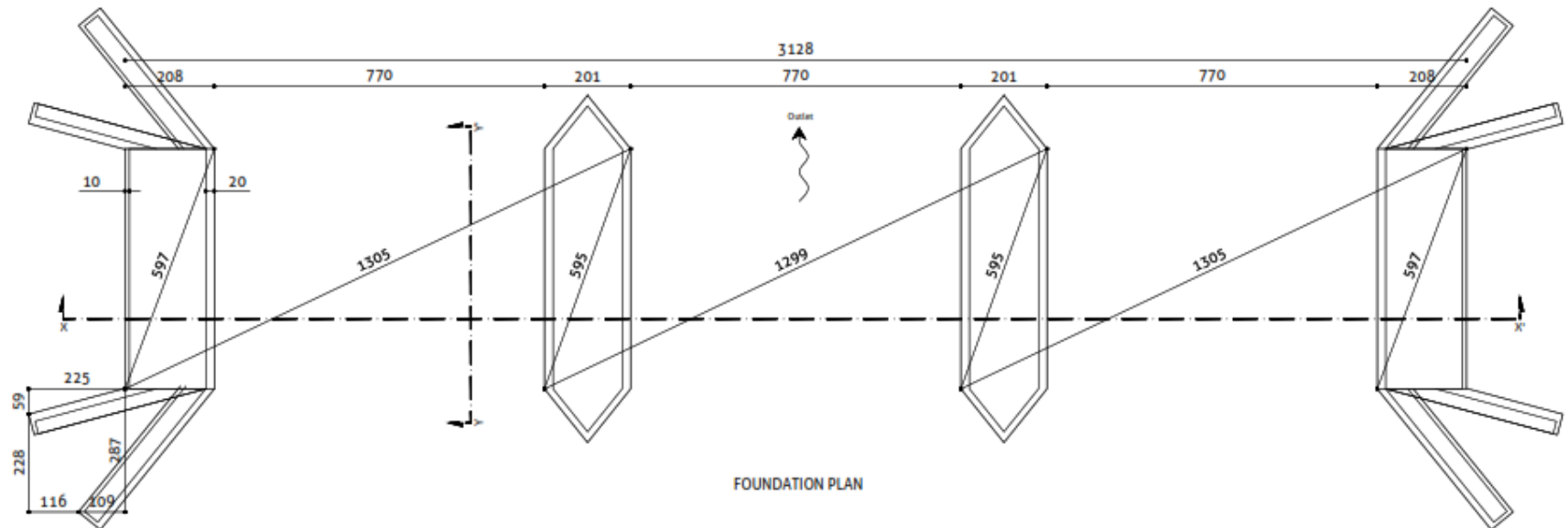
Arches

Shoulders/Backings

Deck



# Structural Elements



## Foundations and Piers

Arches

Shoulders/Backings

Deck



*Nyamihanga Bridge Buhigwe-Kigoma*





# Structural Elements

## Excavation and Dewatering



### Foundations and Piers

Arches

Shoulders/Backings

Deck

*Titye Bridge foundations Kasulu-Kigoma*





# Structural Elements

## Excavation and Dewatering



## Foundations and Piers

Arches

Shoulders/Backings

Deck

*Titye Bridge foundations Kasulu-Kigoma*





# Structural Elements

Completed Structure



**Foundations and Piers**

Arches

Shoulders/Backings

Deck

*Titye Bridge foundations Kasulu-Kigoma*





# Structural Elements



*Nyabigufa Bridge - Kigoma*



*Nyamihanga Bridge Buhigwe-Kigoma*

Foundations and Piers

**Arches**

Shoulders/Backings

Deck



# Structural Elements



*Nyamihanga Bridge Buhigwe-Kigoma*

Foundations and Piers

Arches

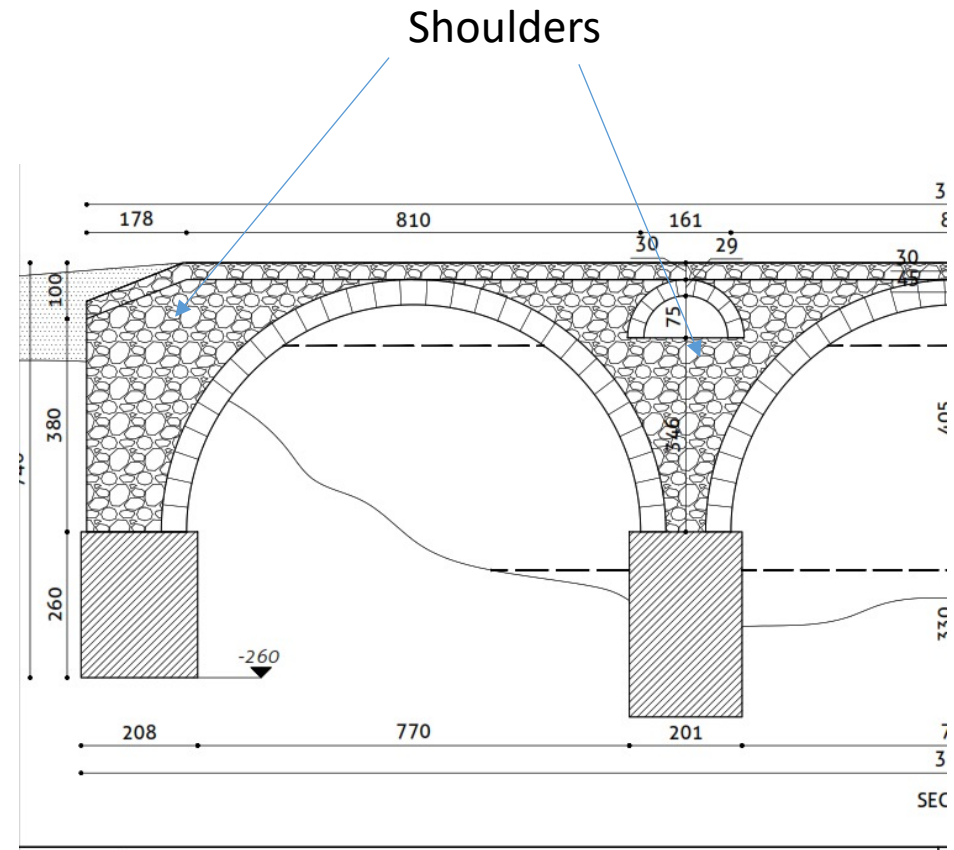
Shoulders/Backings

Deck





# Structural Elements



*Nyamihanga Bridge Buhigwe-Kigoma*

Foundations and Piers

Arches

**Shoulders/Backings**

Deck





# Structural Elements



*Nyabigufa Bridge Mkongoro - Kigoma*

Foundations and Piers

Arches

**Shoulders/Backings**

Deck



# Structural Elements



*Stone lining Deck Nyamihanga Bridge Buhigwe - Kigoma*

Foundations and Piers

Arches

Shoulders/Backings

**Deck**





# Structural Elements



*Stone lining Deck Muhunga Bridge Buhigwe - Kigoma*

Foundations and Piers

Arches

Shoulders/Backings

**Deck**





# Structural Elements



*Backfill Deck Kacheli Bridge Uvinza - Kigoma*



*Backfill Deck Kilema Bridge Mkongoro - Kigoma*

Foundations and Piers

Arches

Shoulders/Backings

**Deck**



# Safety , retaining and Drainage Elements

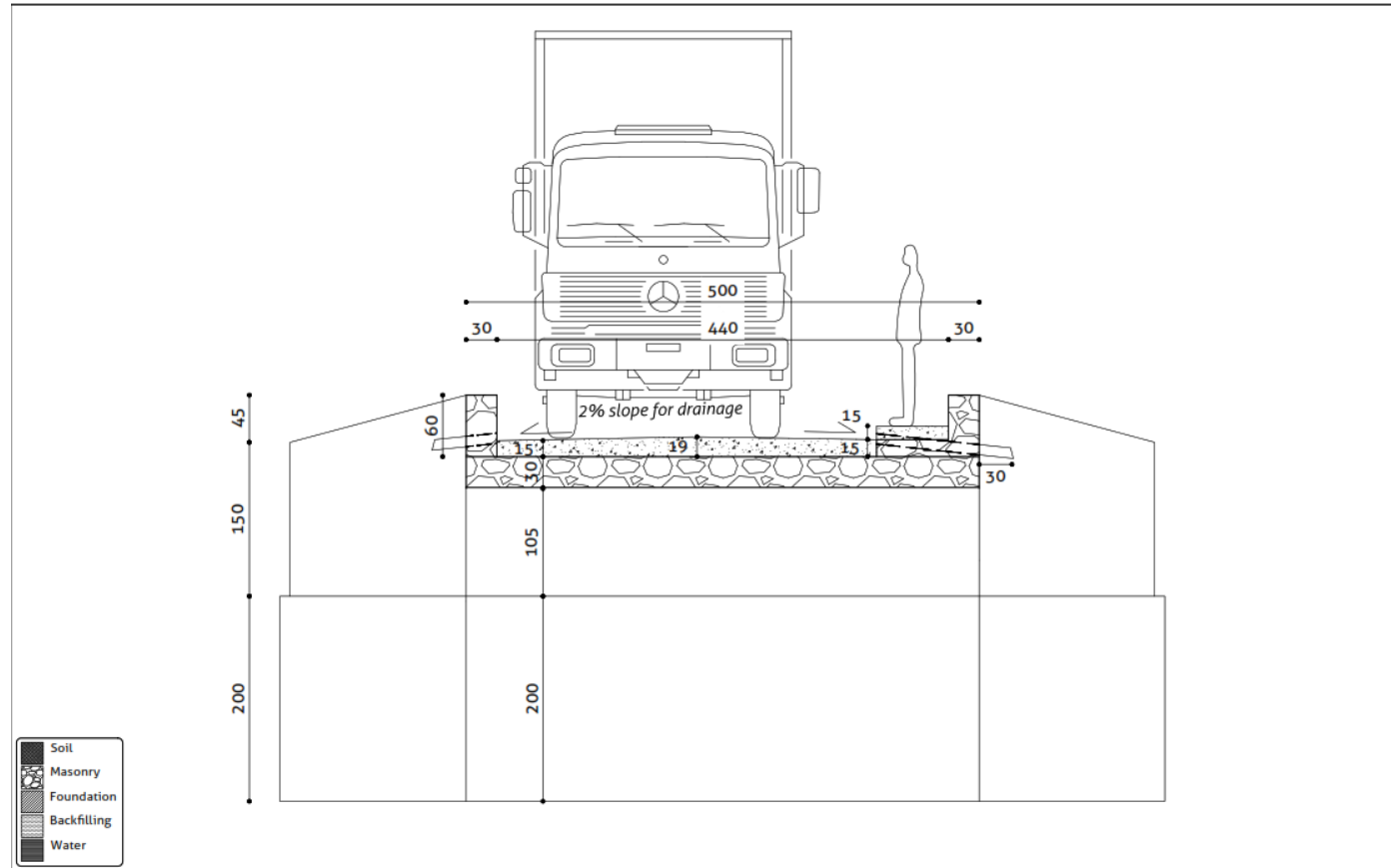
## Headwalls

V Shaped Piers

Cut off walls

Wingwalls

Drainage system



30cm Headwalls



# Safety Elements, retaining Elements and Drainage Elements

## Headwalls

V Shaped Piers

Cut off walls

Wingwalls

Drainage system



*Headwalls Mlela Bridge Uvinza - Kigoma*





# Safety Elements, retaining Elements and Drainage Elements

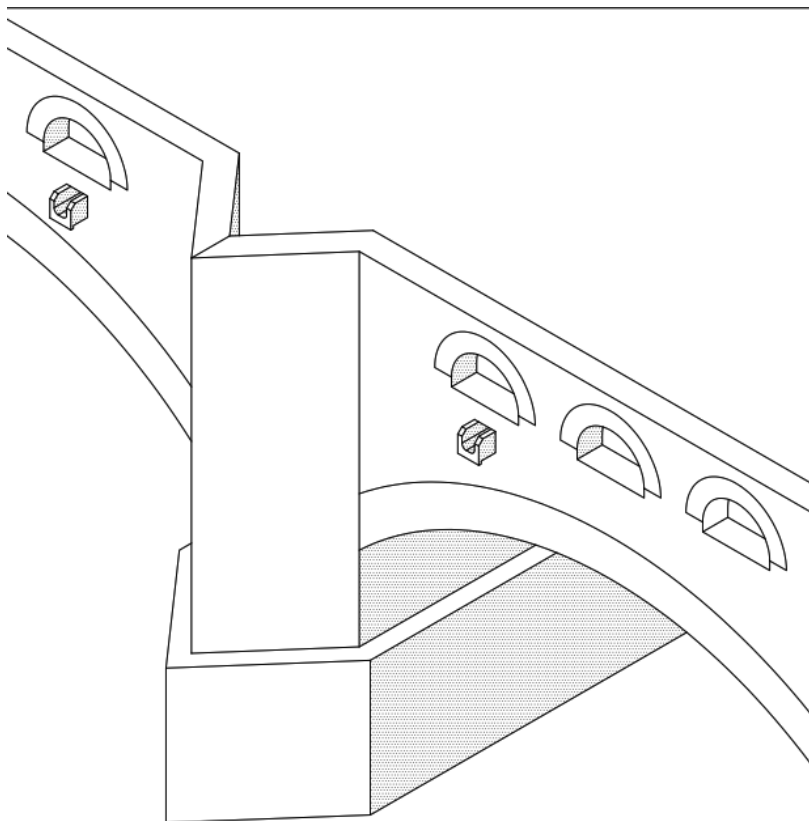
## Headwalls

V Shaped Piers

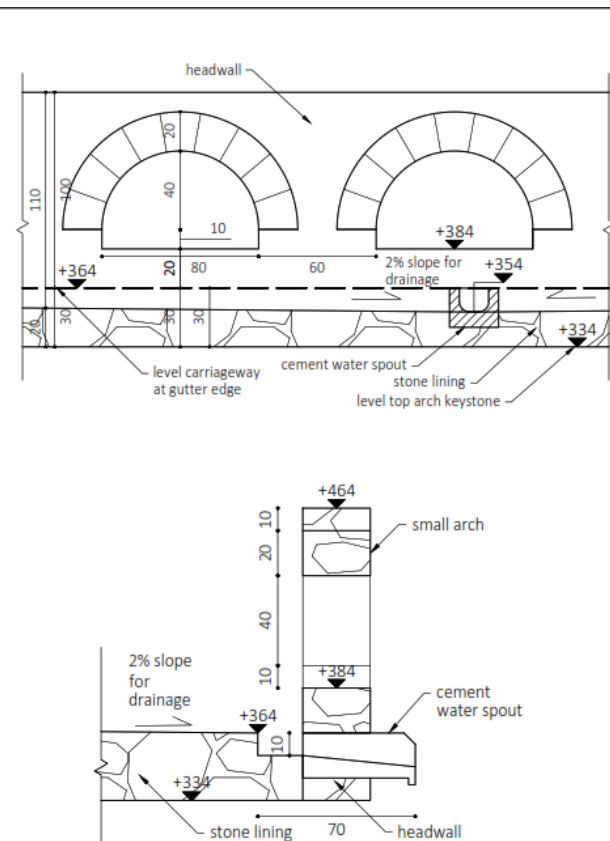
Cut off walls

Wingwalls

Drainage system



DETAIL TRIANGULAR SHAPE



DETAIL HEADWALL ARCHES

*1 m Headwalls Muhunga Bridge*



# Safety Elements, retaining Elements and Drainage Elements

## Headwalls

V Shaped Piers

Cut off walls

Wingwalls

Drainage system



*Early Headwalls Design Chankabwimba Bridge*





# Safety Elements, retaining Elements and Drainage Elements

Headwalls

V Shaped Piers

Cut off walls

Wingwalls

Drainage system



*Headwalls in Muhunga bridge in Buhigwe Kigoma*



# Safety Elements, retaining Elements and Drainage Elements

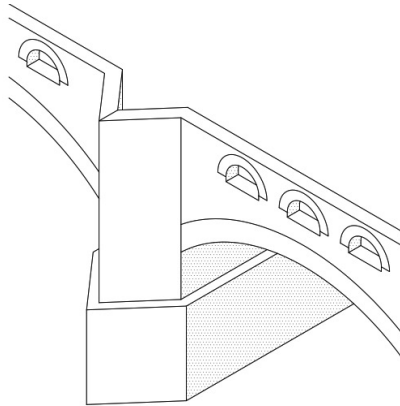
Headwalls

**V Shaped Piers**

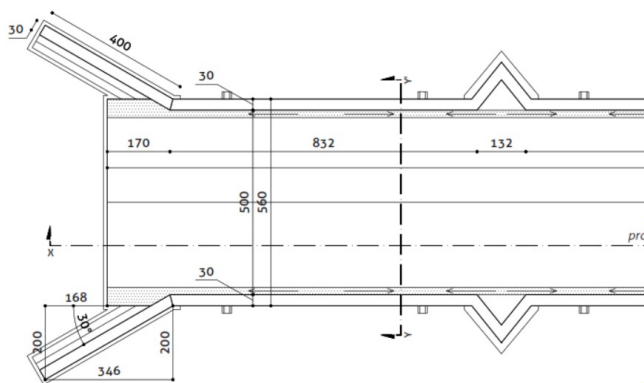
Cut off walls

Wingwalls

Drainage system



VIEW PIER







# Safety Elements, retaining Elements and Drainage Elements

Headwalls and V shaped Piers Muhunga Bridge Buhigwe Kigoma

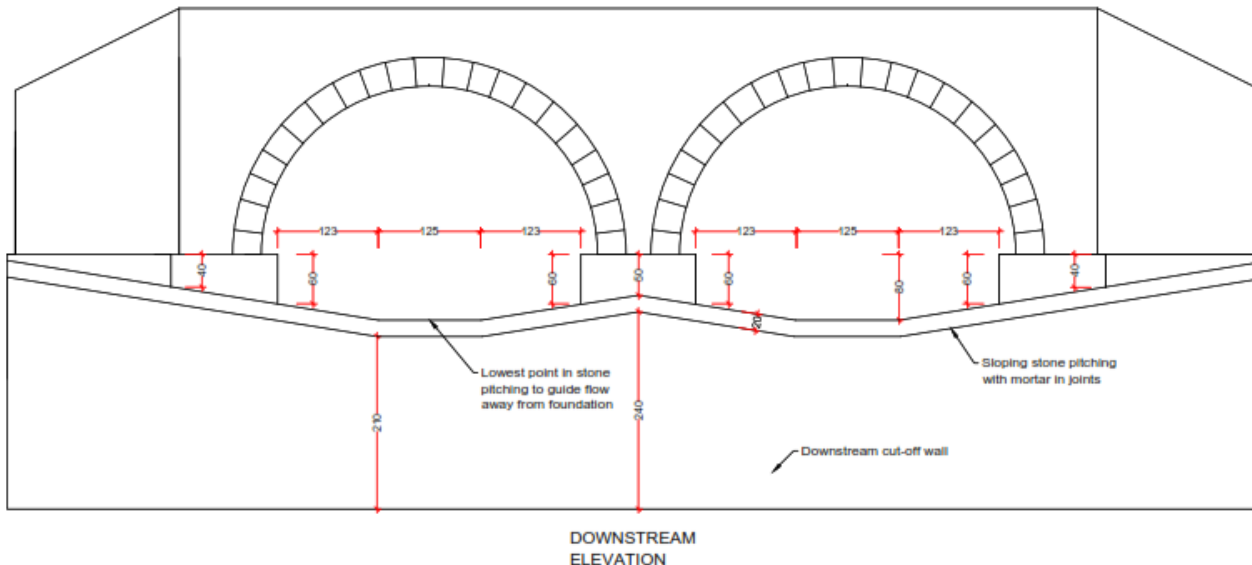




## V Shaped Piers

## Wingwalls

## Drainage system







# Safety Elements, retaining Elements and Drainage Elements

Headwalls

V Shaped Piers

Cut off walls

Wingwalls

Drainage system





# Safety Elements, retaining Elements and Drainage Elements

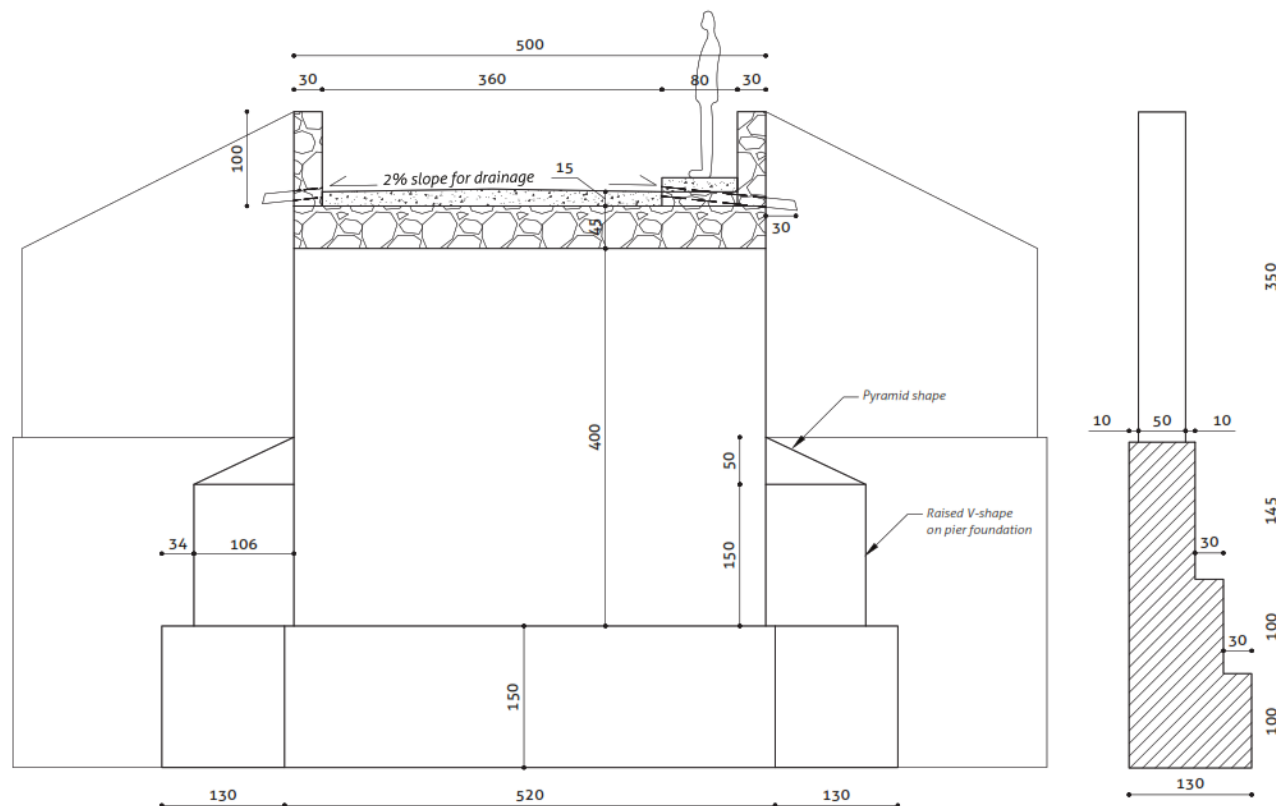
Headwalls

V Shaped Piers

Cut off walls

**Wingwalls**

Drainage system



Chankabwimba Bridge wingwalls – stepped retaining wall  
Best Practise for huge bridges



# Safety Elements, retaining Elements and Drainage Elements

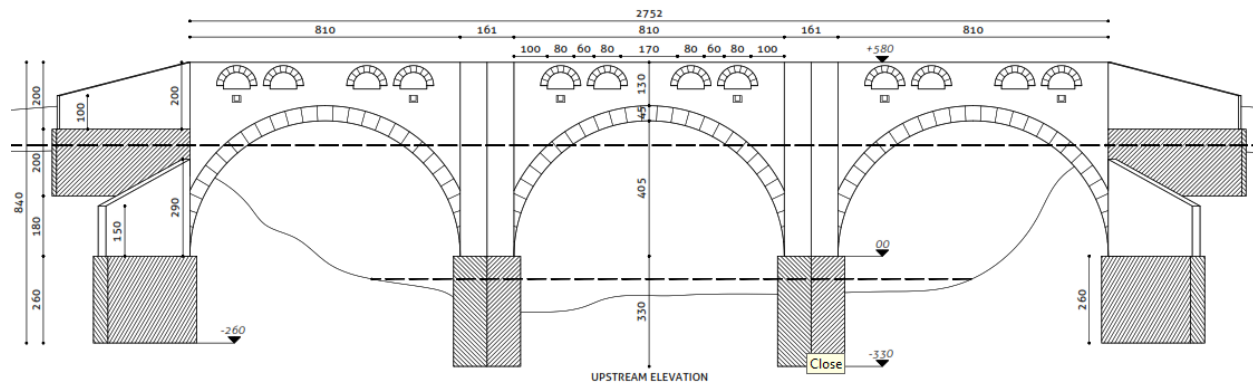
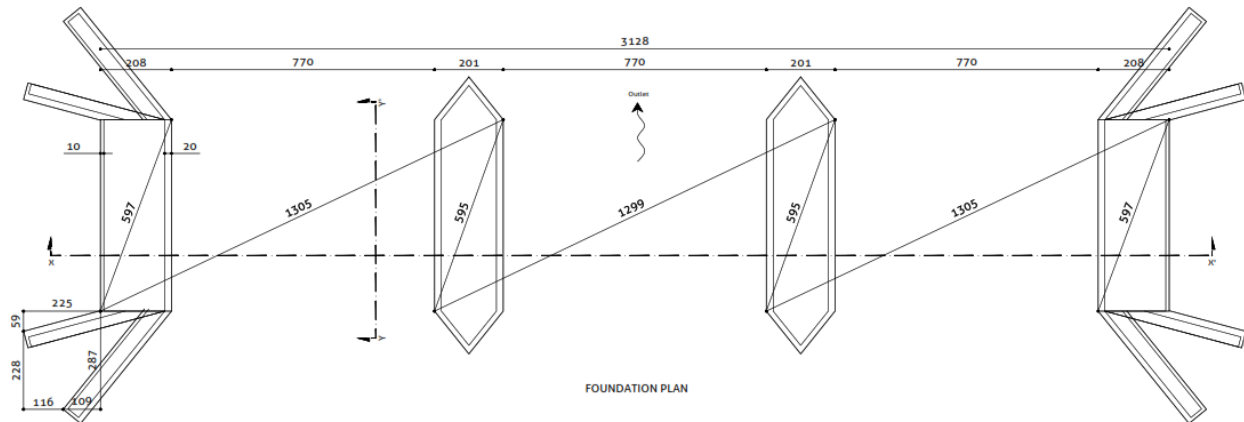
Headwalls

V Shaped Piers

Cut off walls

Wingwalls

Drainage system



Double wingwall system – initial design Nyamihanga Bridge





## Drainage system





# Safety Elements, retaining Elements and Drainage Elements

Headwalls

V Shaped Piers

Cut off walls

**Wingwalls**

Drainage system



Mlela Bridge Dry stacked Stones



# Safety Elements, retaining Elements and Drainage Elements

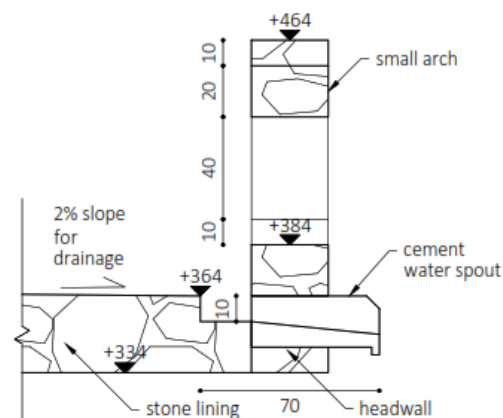
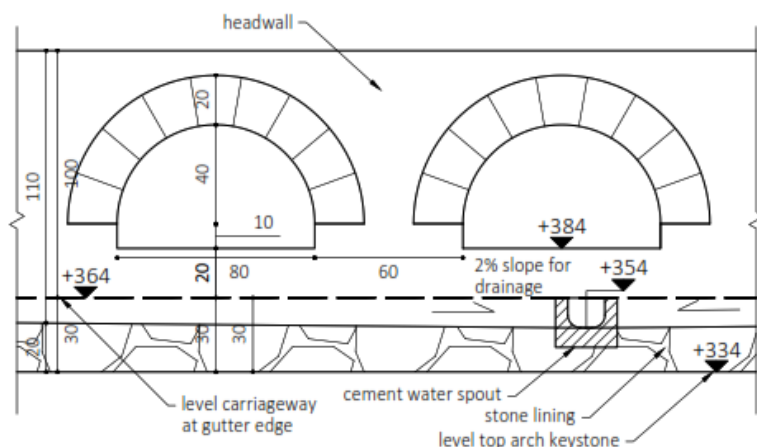
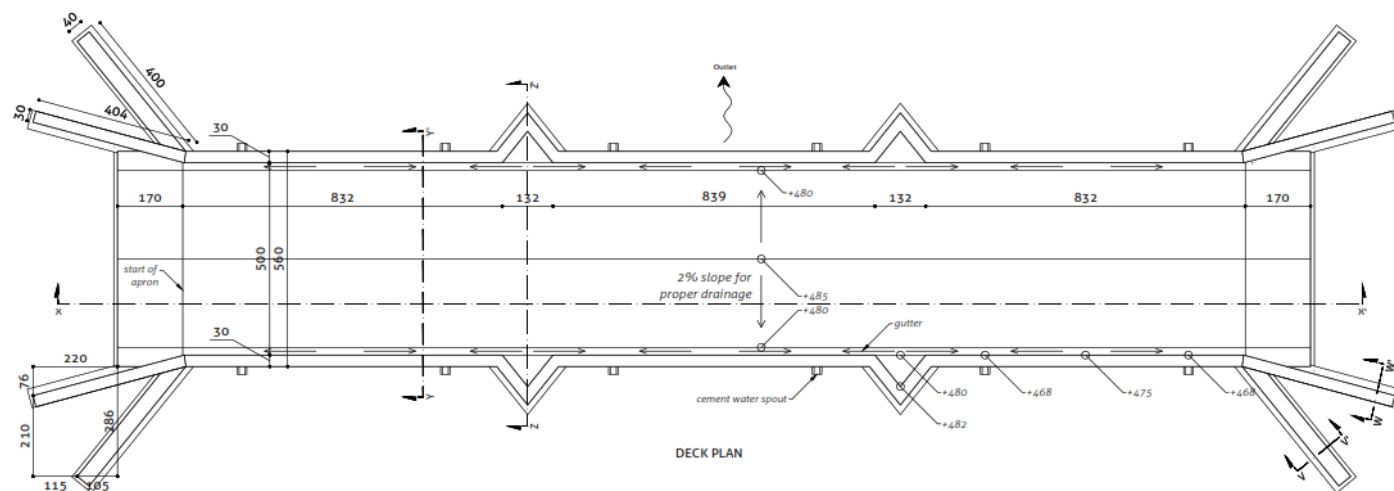
Headwalls

V Shaped Piers

Cut off walls

Wingwalls

Drainage System







# Safety Elements, retaining Elements and Drainage Elements

Headwalls

V Shaped Piers

Cut off walls

Wingwalls

Drainage System





Bridging present and the future,  
One stone at a Time

Q/A

thank you