

BRICK ARCHES

STRUCTURAL OPENINGS

DECORATIVE

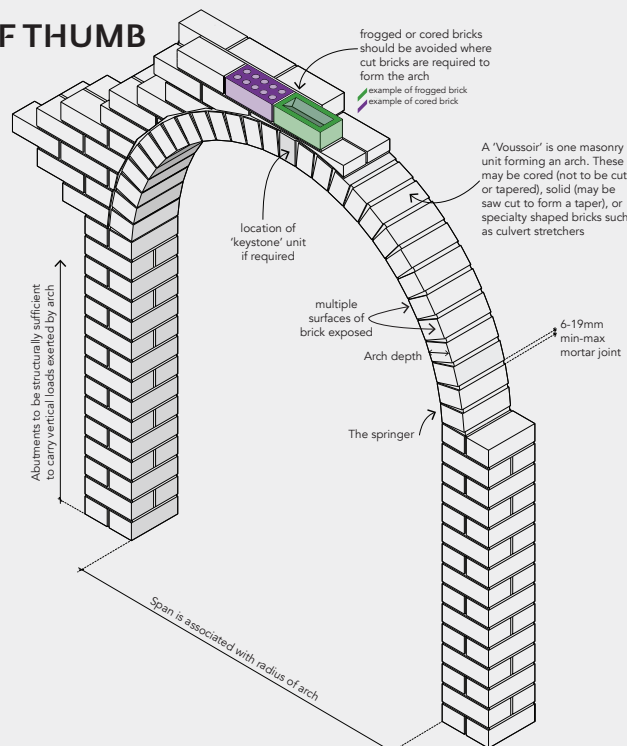
TRADE SKILL LEVEL:

EXTERNAL OR INTERNAL

LOADBEARING / NON-LOADBEARING



SOME RULES OF THUMB

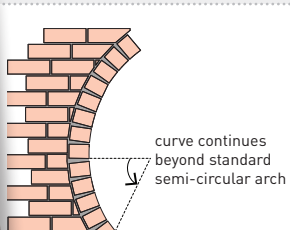


SOME OTHER BRICK ARCHES WE LOVE



TRADE SKILL LEVEL:

Owen + Vokes + Peters
Double Courtyard House

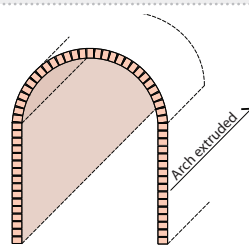


curve continues beyond standard semi-circular arch



TRADE SKILL LEVEL:

Genesis Studio
Antica Pizzeria e Cuccina, SA

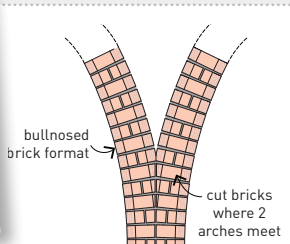


Arch extruded



TRADE SKILL LEVEL:

SARM Architects
OLSH Presbytery, NSW



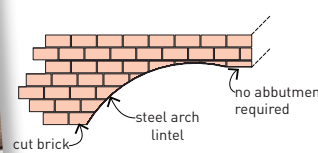
bullnosed brick format

cut bricks where 2 arches meet



TRADE SKILL LEVEL:

MGS Architects
Australian Ballet School, VIC



cut brick

steel arch lintel

no abutment required

Seek advice and input from a Structural Engineer.

Arches are a decorative and playful alternative to standard flat lintels above openings.

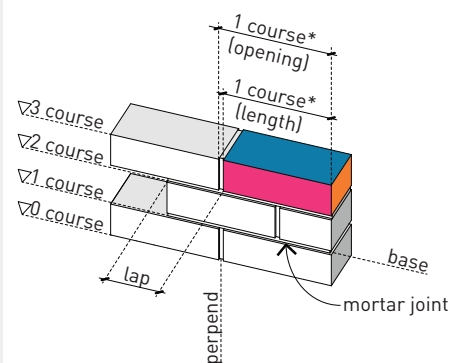
The arch span should be considered when selecting brick type: Tapered bricks allow for a consistent joint thickness, producing a more refined finish in short span arches. Un-tapered bricks are generally sufficient in arches with a more gradual curve.

Non-loadbearing arches with added structure allow for even greater experimentation with arch shape, depth, span and the requirement for abutments.

Vertical expansion joints should not be placed in the area directly above an arch or close to where the abutments and arch meet.

The most likely location of cracking is at the apex of the arch; a keystone or larger brick may be laid here to move the first mortar joint further away from the midspan.

Take steps to ensure the skill level and qualification of the bricklayer is appropriate for the project.



* non-standard brick layouts may affect coursing.

Stretcher face
Header face
Sailor face

BACKGROUND

The strength of an archway originates from its ability to utilise its curvature to redirect vertical loads laterally into the supports of an arch, also known as abutments. Using the geometric orientation of the structure, a brick arch utilises the compressive strength of a brick, ensuring that the structure will only fail from excessive movement of the abutments.

The design of arches has been outlined in 'arches and lintels' in AS3700 and 'arches for unreinforced masonry walls' in AS4773.2.

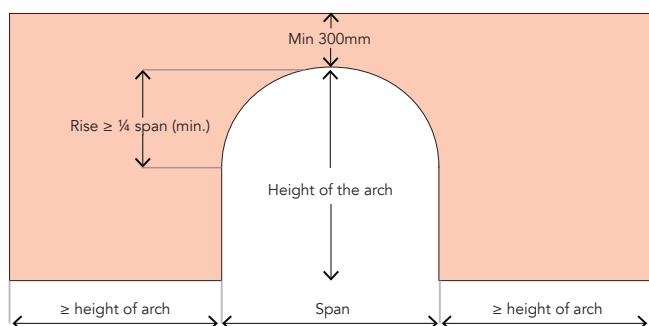
DESIGN CONSIDERATIONS

In accordance to AS3700, all arches must have adequate rise to resist the vertical load and buttresses that can resist the lateral forces of each arch. It is highly recommended that an engineer be consulted when designing for larger arches.

ARCH DESIGN CONSIDERATION

Arches in small buildings that are built to the following specifications are deemed to satisfy AS4773.2:

- **Rise to span ratio** must be greater or equal to 0.25 in accordance to AS4773.2, clause 8.4;
- Height of masonry above the keystone of the arch must be greater than or equal to 300mm in accordance to AS4773.2, clause 8.4; and
- Length of wall (continuous masonry buttresses) on either side must be greater than the height of the arch.



If an arch does not satisfy these dimensional requirements, its design falls outside of the scope of AS4773.2 and it is recommended that you consult a structural engineer.

STRUCTURAL DESIGN CONSIDERATIONS

The arch must not invalidate any of the following:

- Robustness requirements of AS 3700, Section 4;
- Durability requirements of AS 3700, Section 5; and
- Structural design requirements of AS 3700, Section 7.

Please note: If further support of the archway is required, consider utilising a steel angle to bend to the curvature of the inside of the arch.

ABUTMENT DESIGN CONSIDERATIONS

The design of the abutments must resist:

- The concentrated load as defined by AS 3700 Clause 7.3.5 especially when approaching the base of the structure and,
- Other common design loads of walling systems as detailed in section 7 and/or 8 of AS 3700.

CONSTRUCTION CONSIDERATIONS

Some design considerations in constructing a brick arch include:

- Possible lateral reinforcements (engaged piers or columns) if the abutment's ability to resist lateral force is lacking or diminished.
- Recommended insertion of bedded mesh reinforcement and flashing in the brickwork directly above the archway.

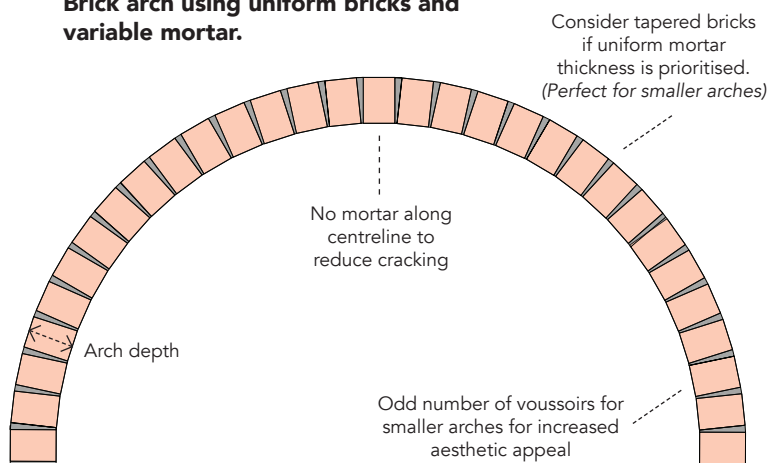
Please note that all arches must be supported throughout the construction process. The removal of these supports during this time will result in the collapse of the arch due to incomplete curing of the mortar. Out of plane supports will also be required during this time.

DETAILING CONSIDERATIONS

As the detailing for brick arches are mainly cosmetic, it allows for increased freedom for architects and designers alike. Some detailing considerations are:

- If variable bricks sizes are used, consider a special order from a manufacturer. (cut bricks may vary in taper and diminish aesthetic appeal)
- Arch depth should increase with arch span as to maintain consistency and visual appeal. The rule of thumb for semicircular arches is to apply an increase of at least 25mm in depth for every 300mm of span. E.g. for a 2.4m span the depth of the arch should be at least 200mm.

Brick arch using uniform bricks and variable mortar.



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