



Reinforced Concrete Box Culverts (RCBC) Technical Guide

| April 2025 Version |



INTRODUCTION

Introduction

Welcome to Civilmart's technical product guide for our range of precast Reinforced Concrete Box Culverts (RCBC). This technical guide will focus on our suite of Reinforced Concrete Box Culvert crown units, link slabs and base slabs in both Small Span (not exceeding 1200mm) and Large Span (exceeding 1200mm up to 4200mm) offering.

Although Civilmart's precast Box Culvert range is designed and manufactured to comply with the relevant Australian Standards - being AS1597.1 for small span and AS1597.2 for large span - we are able to offer products that meet the various Australian road and rail authorities specifications, as well as applications where project designs call for heavy vehicle loadings or large fill heights.

Civilmart hold pre-approval and are registered precast suppliers with various state Road Authorities. In addition to this we are also able to design and manufacture custom solutions to accommodate non-standard loading (eg: mining vehicles, aircraft loading), splay units, starter bars, high fill and openings in leg or crown. Although Box Culverts are typically utilised for Stormwater applications, Civilmart are able to offer solutions that can accommodate aggressive environments – such as saltwater or chemical exposure – as well as alternative use applications – such as encasements for electrical, oil & gas conduits.

About us

Civilmart are a national network of experts in the design, manufacture and delivery of quality precast concrete products for commercial, civil and residential projects. We have a wide range of precast products that are suitable for a variety of applications and our team is dedicated to providing the best possible service to our customers.

As your number one distributor of precast concrete products, our range is expertly engineered and designed to meet the needs of the Civil industry. Our products are constructed with the highest-grade materials, built tough to withstand civil applications.

Precast concrete is a wise investment. Its longevity means that our product range works for you today, and tomorrow. Cleverly designed, our extensive range means there's a Civilmart product to meet your needs. Offering a solid, tough and durable product range, all civil applications are catered for. As an Australian owned and operated business, with a manufacturing network across Victoria, New South Wales, Queensland and South and Western Australia, our commitment to customer satisfaction is as long lasting as our products. So if you need quality products to fulfil a civil project, contact a Civilmart Specialist today. They'll guide you through the range, product applications, installation and delivery.



Disclaimer

This guide is intended to provide an overview of the options available as well as general advice on the selection, handling, and installation of Civilmart's precast Box Culvert range. Given the nature and application of these products, it is recommended that the customer confirms the suitability of the selected Civilmart solution with the project specification and follows the regional or project specific engineering details regarding connection, installation, and backfilling requirements. In the absence of project specific installation advice, refer to AS 1597.1 or AS 1597.2.

It is the purchaser's responsibility to ensure that installation work is carried out by competent tradespeople. It is the responsibility of the selected installation contractor, under the relevant state and federal WHS (Workplace Health & Safety) guidelines, legislation and Codes of Practices, to ensure a safe working environment for all employees.

Civilmart does not accept responsibility for any costs, delays, or failures caused by the use or misuse of this guide, nor accepts any responsibility for any claims resulting directly or indirectly from the use of this guide.

Foreword on nomination and selection of product solutions

Information contained in this document is based upon Civilmart's general range of precast Reinforced Concrete Box Culverts, better known simply as Box Culverts. Civilmart's operational footprint is Australia-wide however due to local, regional and state based scenarios, there may be subtle differences between the style and shape of Box Culvert's manufactured and supplied across Civilmart's network.

Please contact your local Civilmart representative for more information on products specific to your region.

Our mission is to make high quality products and continue providing exceptional customer service while delivering value for money.

REINFORCED CONCRETE BOX CULVERTS (RCBC) – KEY DEFINITIONS

Reinforced Concrete Box Culverts are a type of 'culvert' structure typically nominated to allow water to flow through. Pipes and Arches are other common forms of 'culverts'.

Civilmart's precast Box Culvert offering is based around the Crown and Invert styles, which are widely used and recognized across the Australian marketplace.

The industry terms "Crown" and "Invert" define the orientation of the Box Culvert structure, with Crown implying 'legs down' and Invert indicating 'legs up'.

The selection and nomination of precast Culvert unit orientation is generally set by 'default' regional preferences as well as project requirements. In most applications the default unit is a Crown (legs down) style, with the key exception being the Victorian market where small span Box Culverts are traditionally supplied as Invert (legs up).

Another key component of the precast Box Culvert solution is the selection and use of Base Slabs, Link Slabs and Lids. Depending on project designs and authority specifications, Box Culvert "Crown" designs may choose to utilise a precast base slab in lieu of an in-situ slab to sit each Box Culvert unit on. Where projects require the use of multi-cell structures (i.e. applications requiring more than one line of parallel culvert structures) it may be advantageous to utilise Link Slabs between precast RCBC Crown units.

Likewise "Invert" designs may be able to take advantage of a precast concrete Lid. Box Culvert structures with inverts and lids can be designed to allow the lid to be removed. This can be useful for applications where access to pipework or electrical conduits is required from time to time.

Link Slabs are fixed to adjacent crown units using dowel bars designed to restrain the horizontal soil loads, reducing the overall cost of the installed structure. Civilmart can design and supply precast Crown units, Inverts, Base Slabs, Link Slabs or Lids to suit standard and non-standard design application and installation conditions.

Civilmart are also able to offer end treatment solutions – such as headwalls, wingwalls and endwalls – for a complete precast solution.

For further details please contact your local Civilmart representative for more information on products accessories specific to your region.

Benefits

Reinforced Concrete Box Culverts offer structural integrity, durability, and product designs that are suitable for various environments and loading conditions. They suit a wide variety of applications across diverse settings, from minor subdivision sites to major infrastructure projects, in both rural and urban areas. Given their ability to be supplied in various sizes and configurations, Box Culverts can be tailored for specific needs, including differing fill heights, and environmental conditions such as saltwater exposure.

Box Culverts have an instant bridging capability meaning they are designed to support the loading conditions immediately after installation and backfilling, where as in-situ applications require periods of curing post stripping before the solution is capable of use.

REINFORCED CONCRETE BOX CULVERTS (RCBC) – KEY DEFINITIONS

Box Culverts have the ability to withstand heavy wheel loads with minimal fill. Standard Box Culverts are designed to accommodate 0-2 metres of fill, whilst custom design solutions can be designed for much larger fill heights. . Moreover, Box Culverts are particularly well-suited for carrying high flows, bridging flow crossings or scenarios with limited hydraulic head. The shape and size of Box Culverts makes them ideal as drainage structures, allowing for configuration to minimize impact on upstream water levels and downstream flow velocities compared to equivalent pipe structures.

Due to the design, installation of Box Culverts requires minimal excavation and backfill making it superior to other options, even when dealing with difficult site conditions such as excavation through rock.

APPLICATIONS

Key applications for RCBC's are:

- Highway culverts
- Railroad culverts
- Short- span highway bridges
- Storm drains
- Utility Tunnels
- Underground stormwater
- Underground Detention systems
- Jacked or Tunneled Installations

Flexible design options have allowed for use in these scenarios

- Pedestrian use
- Stock crossings
- Electrical cabling
- Emergency / fire exits
- Ducting
- Air or hot water

Overall, the use of precast Box Culverts offers efficiency, durability, and adaptability, making them a preferred choice for various infrastructure projects.



DESIGN CONSIDERATIONS

Reinforced Concrete Box Culverts are commonly used as conduit (passage) under roadways or railways. They can be nominated for a variety of applications including but not limited to stormwater drainage, On Site Detention (OSD), animal crossings, pedestrian thoroughfares or electrical and telecommunication conduits.

The Civilmart Engineering Design Section can design and certify Box Culverts for standard and non-standard applications.

Standard Box Culverts are typically designed for exposure classification B2, 0-2m fill range and standard road traffic loading in accordance with AS 1597.1 / AS 1597.2 and AS 5100.

Non-standard applications include, but are not limited to, rail loading, aircraft loading, mining vehicles, fills higher than 2m, higher exposure classification, splay units and openings in the crown or leg.

Product drawings and design details are available for standard culvert and non-standard design details are available on request.

Designers will need to consider project specific factors when selecting and sizing Box Culverts for a particular application. This can include the following:

- Hydraulic analysis and flow rates
- Maximum available height above the box culvert structure
- Available width of structure (ie: multi-cell structure which may include link slabs)
- Insitu base slab or precast base slab
- Durability and exposure classification
- Minimum and maximum fill height
- Construction traffic (some construction vehicles may impose loads that are in excess of standard road traffic loads and may become the worst design case)
- Splayed units for skewed alignments (or for following a curved alignment).
- Non-standard lengths
- Openings in crown (eg: skylight for underpass) or leg (eg: for pipe inlets)
- Starter bars (eg: for insitu end-treatment or bulkhead)

A good reference for the hydraulic design and analysis of box culvert drainage structures is "Hydraulics of Precast Concrete Conduits " available from the CPAA website.

For large volume underground on-site storage tanks (OSD), Civilmart can size and design a specific solution including project specific MUSIC modelling. Contact Civilmart for more information.

Sizes & Terminology

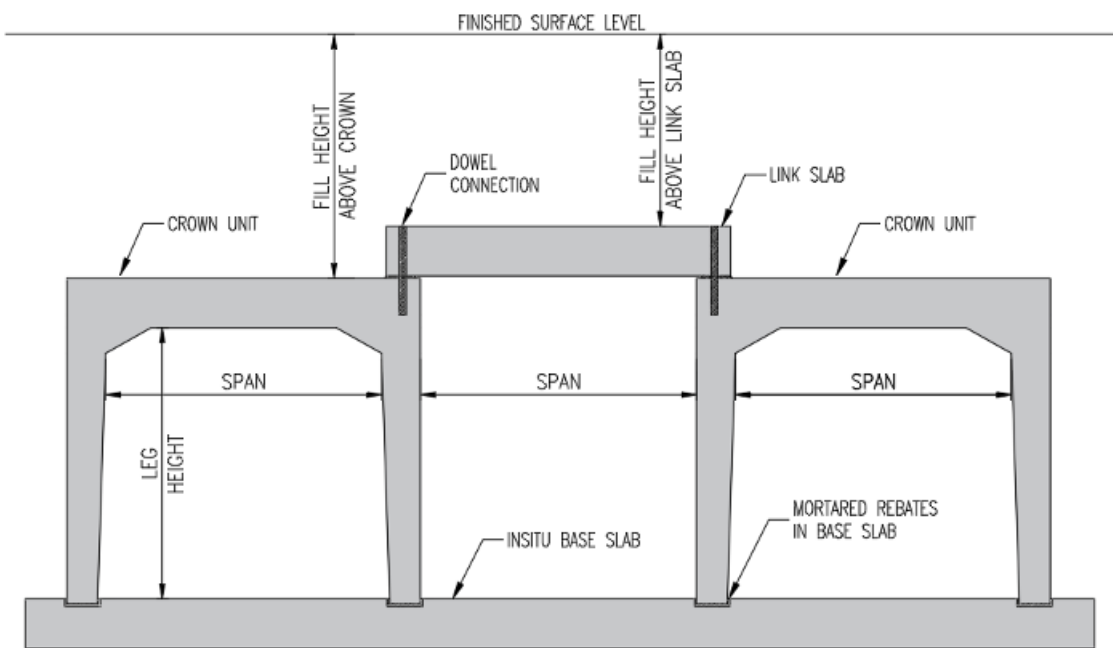
Civilmart has a national manufacturing footprint and can supply Box Culverts for small and large projects in all States across Australia. Our standard range includes sizes which are defined in the Australian Standard.

AS 1597.1 covers small span Box Culverts ranging from 225mm span to 1200mm span. AS 1597.2 covers large span Box Culverts ranging from 1500mm span up to and including 4200mm span in 300mm increments. Leg heights for each span typically start from 300mm and increase in 300mm increments. The maximum leg height is equal to the span.

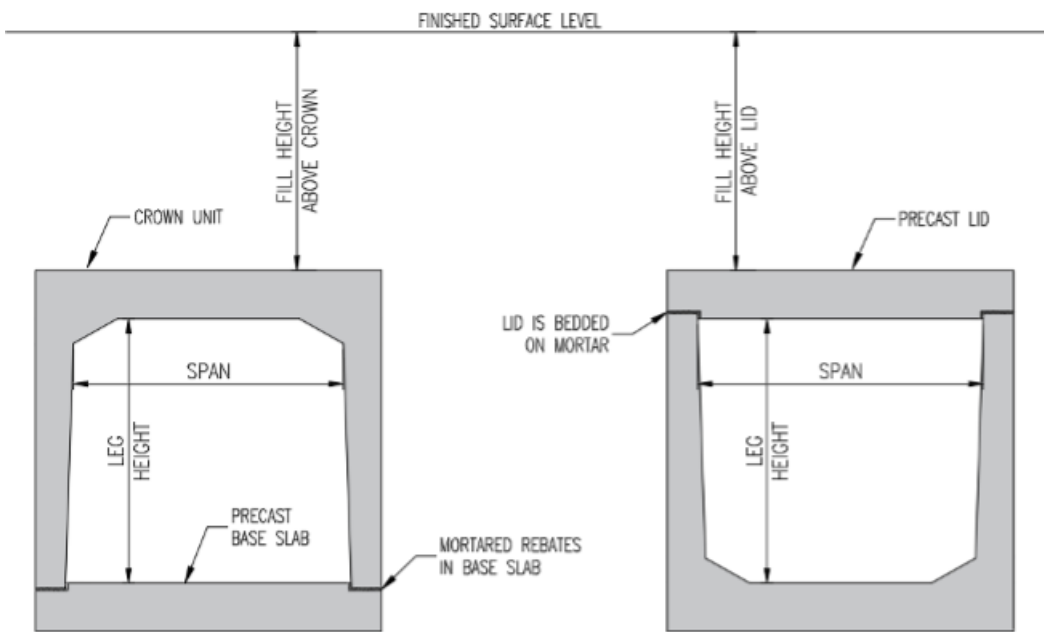
Lengths will vary from State to State but will typically have a nominal length of 1.2m or 2.4m. Similarly, crown thickness, leg thickness and haunch details will vary from state to state. Contact your local Civilmart branch for accurate information on standard lengths.

DESIGN CONSIDERATIONS

Diagrams below depict typical arrangements for box culvert installations



Typical multi-span arrangement with crown units and link slab



Typical single cell crown unit & base slab arrangement

Typical single cell invert & lid arrangement

DESIGN CONSIDERATIONS

Design Standards

Civilmart Box Culvert components are designed by the Civilmart Engineering team to AS 1597.1 (small span Box Culverts) and AS 1597.2 (large span Box Culverts).

Civilmart Box Culverts also conform with AS5100 durability and traffic loading requirements.

In addition, many Box Culverts are designed and supplied to prevailing Authority Specifications such as Queensland Department of Transport and Main Roads (QDTMR), Transport for NSW (TfNSW), Department of Transport and Planning (DTP/VicRoads), Department for Infrastructure and Transport South Australia (DPTI) and Main Roads Western Australia (MRWA).

In some States, Civilmart small span Box Culverts are designed by load testing in accordance with AS 1597.1. In other States they are designed by calculation in accordance with AS 1597.2. For all large Box Culverts, Civilmart Box Culverts are designed by calculation in accordance with AS 1597.2. In all cases, Civilmart Box Culverts are in full compliance with Australian Standards and project specific requirements resulting in a design life of 100 years.

One of the advantages of a Box Culvert structure is its ability to transmit large volumes of water, often with low available "headroom". This makes Box Culverts a great solution for transverse drainage across roadways, flood-plains and river crossings. In scenarios where a wide structure is required, a multi-cell box culvert structure is often the most cost effective solution. Multi-cell box culvert structures will either consist of multiple crown units (ie: side by side) or will include crown units with link slabs.

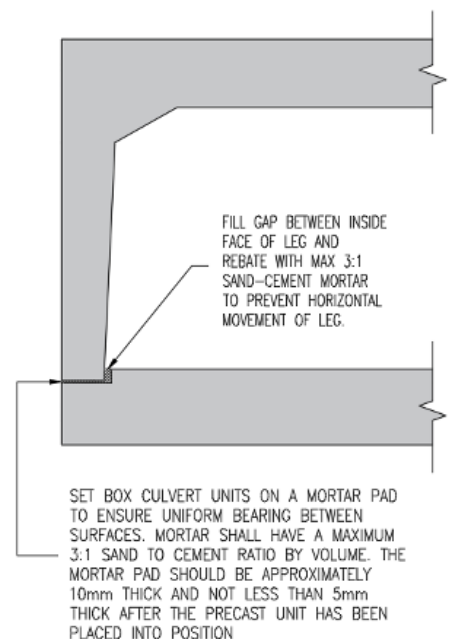
Base Slabs

In multi-cell Box Culverts installations, an insitu base slab is typically used, although a precast base slab for some multi-cell applications can be designed on a project-by-project basis. It is important to understand that some installations may require an insitu base slab, either because of ground conditions or because of a requirement from an Authority or project specification.

Insitu base slabs will need to have rebates or upstands to ensure that the legs are restrained laterally after the units are backfilled and compacted. Civilmart precast base slabs will have rebates.

For long structures, it is common to allow for a nominal gap of 10mm between culvert units to allow for manufacturing and construction tolerances. This needs to be considered when determining the overall length of the base slab and is particularly important for installations with multiple splayed along the structure.

Base preparation and foundation work should be carried out in accordance with AS 1597.2 and project specifications.



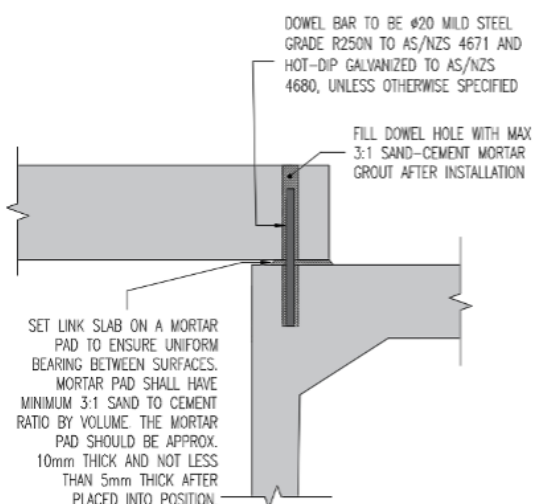
MULTI-CELL ARRANGEMENTS

Crown Units with Link Slabs

Where link slabs are used in a multi-cell structure they are attached to the adjacent Box Culvert crown units using steel dowel pins. Corresponding holes will be provided in both the crown units and the link slabs at the Civilmart factory. It is vital that the crown units are installed accurately to ensure that the dowel holes will line up.

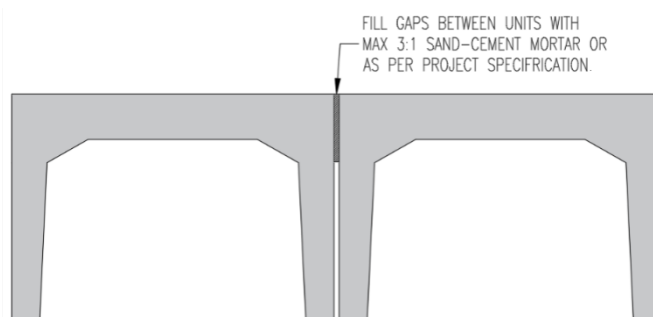
Link slabs also need to be seated on a bed of mortar that is 50mm back from the edge of the crown unit.

Note that in some cases a simply supported rebated link slab may be acceptable. Check with the project or Authority specification prior to adopting this style of link slab.



Multi-cell Structures with Crown Units

Crown units can be installed side by side without the use of link slabs. It is important to ensure that the horizontal earth loads from one side of the structure are transmitted to the other side so that the Box Culverts are not subjected to any side-sway forces. Gaps between cells should be filled with mortar to at least the thickness of the crown. Some specifications will enforce a minimum gap between cells and specify that the crown, or sometimes the entire leg, is filled with mortar. Refer to the project specification or Authority specification for more details.



OTHER INSTALLATION CONSIDERATION

Backfilling & Compaction

In general terms, backfilling and compaction should be carried out in accordance with project specifications and project drawings. Advice on bedding, backfilling and compaction of fill is also provided in AS 1597.1 and AS 1597.2.



ACCESSORIES

Civilmart stock a range of accessories to assist with the supply and installation of precast Box Culverts.

To assist with the sealing of joints between RCBC units to prevent ingress of surrounding soils and minor water seepage - we recommend the use of a Rock Wrap Tape (Butyl Adhesive). It should be used in conjunction with a Butyl Mastic Primer. More info on the use can be found in the Sealing Section of the Installation guidance.

Starter bars can be designed to be incorporated into the manufacture of crown units and link slabs during manufacture. This can be done to allow in-situ works – such as slabs, headwalls, wingwalls or endwalls - to be stitched back into the precast Box Culvert. As an alternative to starter bars, ferrules or couplers can be used instead of protruding starter bars. This option is often preferred to avoid starter bars from being damaged during transport and handling. Threaded bars can then be installed on site once the units are installed and in position.



ACCESSORIES

Customisation

The Civilmart team can design & certify both standard and non-standard Box Culvert structures that will be manufactured by one of our operational sites. Non-standard options can be incorporated in our product solutions include splays, skewes, block out's, non-standard fill heights, non- standard cover to reinforcement and starter bars.

Our team will work with you the customer to determine the specific requirements and ensure that the proposed solution fulfils all aspects of the project, whilst ensuring that the structure can be physically made and meet all design requirements.

Where applicable associated design drawings can be provided to assist with the overall concept and ensure all parties are in agreement with the product solution prior to manufacture.



HANDLING & INSTALLATION

This handling and installation section of the Civilmart Box Culvert technical guide provides an overview for contractors engaged in the handling and installation of precast Box Culvert on projects whilst promoting good practice and safe site operations. As outlined at the start of this guide project specifications, site safety requirements, along with project related conditions (weather and ground conditions, accessibility, fill & foundations materials etc) need to be considered first and foremost.

It must also be stated that all details related to a project specific installation and the selected installation

methodology will ultimately be managed and controlled by the project engineer. This includes the project drawings, project specification and any other direction from the project engineer.

In addition to the project specifications, Australian Standards AS 1597.1 and AS 1597.2 provide a comprehensive section on installation that may be beneficial to review prior to any works being undertaken. The contractor must consult with the project engineer and specifier to determine the applicability for the project in question.

LIFTING, HANDLING & INSTALLATION

Foundation Preparation

To deliver a successful project a solid foundation is key. Whether an in-situ slab or precast base slab is selected, or Invert RCBC units are being utilised, it is recommended that the installation contractor reviews site specific design requirements to account for local ground conditions and to establish a suitable foundation to support the structure and accompanying service loads.

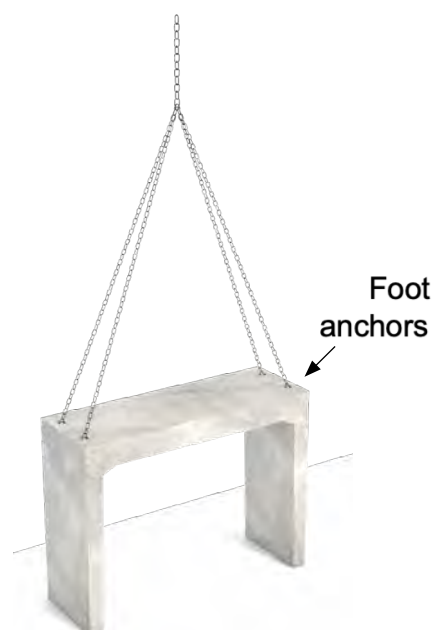
Provision for Lifting

Civilmart precast Box Culverts are designed with proprietary lifting anchors cast in to assist with lifting and handling. Location of the lifting anchors are determined based on the intended orientation of the Box Culvert structure (Crown or Invert) as well as consideration for mould stripping, storage and transportation.

All lifting anchors are designed in accordance with AS 3850 using appropriate design factors for lifting and handling. For large span box culvert crown units, it is a requirement that a load equalisation device is used to effectively distribute the load equally between all four lifting points. For base slabs, Links slabs and small span box culvert crown units, a load equalisation device is generally not required. Lifting points as well as a lifting diagram for each component is provided on the Civilmart product drawing.

Contractors should establish a lift plan for all unloading, storage and installation of precast Box Culverts in conjunction with the project engineer and any contracted parties supporting the site's craneage needs. All provisions for lifting shall comply with the requirements of the appropriate regulatory authority and approved work method statements and ensure that certified lifting equipment is utilised at all times

Please Note: this guide incorporates a specific section on lifting and handling of precast RCBC units on site. This can be found in the next section.



PRECAST REINFORCED CONCRETE BOX CULVERTS (RCBC) INSTALLATION GUIDE

Transportation

Where Civilmart's supply chain has been nominated for the collection and delivery of precast Box Culvert units, these shall be transported in accordance with appropriate transport practices and to prevent damage. Civilmart will adhere to the requirements outlined in our "Load Restraint Guide for Box Culverts". It is the responsibility of the contractor to advise of any site related conditions that may hinder access to the pre-determined delivery point. Where delivery requires Civilmart nominated transport to be unloaded by a 3rd party coordination and scheduling will need to be clearly defined and agreed upon prior to the delivery date.

Placing Precast Units *(In accordance with AS1597.1 Section 4.4 & AS 1597.2 Section 5.4)*

There are several key considerations for the installation contractor to be aware of during the installation process.

Base slabs, whether cast insitu or Civilmart precast base slabs, need to have a rebate to accommodate the leg of the accompanying crown unit(s). This is to ensure that horizontal loads from the adjacent fill are adequately restrained at the base of the leg. For base slabs, an upstand may have been designed on the inside of the leg to replace the need for a rebate.

Prior to placing precast units, the surface bearing area of the support shall be cleaned of dust and grit. Project specification may vary but it is typical that the rebate is subsequently covered with a layer of stiff cement mortar mix. Spacers or shims (typically 5mm thick) can be placed in the rebate with the mortar to level the Box Culverts as they are placed.

If spacers are used, a flowable grout can be used instead of a stiff mortar. This will allow the crown units to be installed first and then the flowable grout can be applied to flow underneath the legs and also to fill the gap on the inside of the leg at the same time.

Following the placement of the precast crown units onto the base slab, ensure that the gap between the inside of the leg and the rebate is completely filled with sand-cement mortar or with flowable grout. Again, project specification may nominate other methods or materials to be used.



PRECAST REINFORCED CONCRETE BOX CULVERTS (RCBC) INSTALLATION GUIDE

Sealing and Finishing

After installation of the precast Box Culvert units, it is sometimes a requirement to fill all the lifting anchor voids. If required, fill all lifting anchors with prescribed material.

Unless specified otherwise, vertical gaps and horizontal



gaps (on the top of the crown and link slabs) should be sealed with a butyl mastic strip. Civilmart can supply primer and rolls of butyl mastic tape for this use.

Backfilling

It is generally accepted practice to commence backfilling once all precast components are installed, grouting of base slabs, between crown unit cells and link slabs have cured and joints have been sealed. Backfilling shall be carried out in accordance with project specifications and AS 1597.1 or AS 1597.2.

Sealing Procedure

- Using a brush, clean any material away from the outside surfaces adjacent to the culvert joint and ensure the surfaces are clean and dry.
- Using a brush or roller apply a 100mm wide strip of
- primer to both outside surfaces adjacent to the joint.
- Apply the tape along the joint and remove paper backing as it is applied. press the exposed tape along the joint ensure it equally spans the joint.



Construction Loads

Project drawings should nominate what construction loads can be used to backfill and compact over the top of Box Culverts. Since standard Box Culverts are designed for 0-2m of fill and standard road traffic loads, then standard construction equipment which impose loads less than standard road loads (SM1600, A160, W80, HLP400), can be used. Many larger construction equipment may be in excess of these loads and should first be checked. In some cases, these heavier construction loads can still be used by first applying some fill to distribute the load on the top of the precast units. Check with the project engineer or Civilmart first before attempting to apply heavy construction loads or to determine how much fill is required.

LIFTING AND HANDLING OF PRECAST REINFORCED CONCRETE BOX CULVERTS

This section provides additional lifting and handling details for installation contractors using Civilmart's precast Box Culverts on their projects.

This guide is intended to provide a broad overview of the appropriate handling of precast Box Culvert structures and where applicable, how to handle and rotate structures that have been designed to be manufactured or transported in one orientation (i.e. legs down or legs up) but installed in the alternative orientation (i.e. legs up or legs down).

It must also be stated that all details related to the selected installation methodology will ultimately be managed and controlled by the project

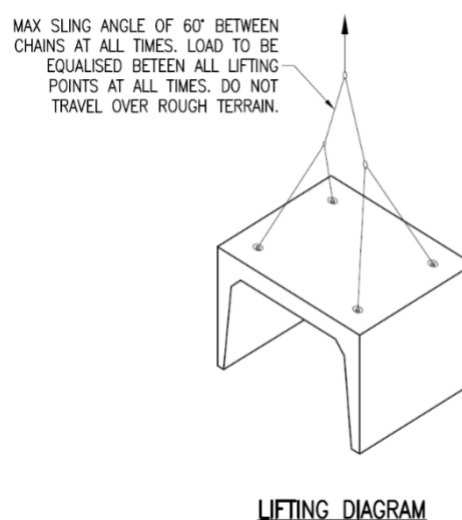


engineer and with consultation for the installation contractor and where applicable the 3rd party lifting contractor. Appropriate consideration should be given to the site-specific conditions at the time of lifting and handling. All work should be executed in accordance with an approved lifting plan.

Lifting Anchors

Civilmart's precast crown units, link slabs and precast base slabs will typically have four lifting points cast into the top face for handling and installation on site.

Additional anchors may be cast into the unit for turning on site or in the factory. Lifting anchors shall be nominated on the Civilmart product drawing together with an appropriate lifting diagram. A typical lifting diagram is shown below:



For large span Box Culvert crown units, it is a requirement that a load equalisation device is used to effectively distribute the load equally between all four lifting points. For base slabs, Links slabs and small span Box Culvert crown units, a load equalisation device is generally not required. Refer to the lifting diagram provided on the Civilmart drawing.

For inverted box culvert units, four lifting anchors are provided generally in the haunches. Take care when moving these units as the lifting points are typically below the center of gravity of the product.

Lifting clutches used for lifting Civilmart products must be certified and appropriate for the nominated lift.

Other equipment used in the lifting and handling of Civilmart products (eg: chains, slings & shackles) must be certified and appropriate for the nominated lift.

A branding mass may be branded on the product and will also be nominated on the Civilmart product drawing. The branding mass will be rounded up from the actual design mass and is only to be used for assessing the lifting and handling of the product.

LIFTING AND HANDLING OF PRECAST REINFORCED CONCRETE BOX CULVERTS

Rotating a precast RCBC

Some Box Culverts crown units may need to be rotated, either from the on-edge to legs-up or legs down, or from legs-up to legs-down. The reason for this may be due to how it was manufactured and stripped from the mould, but it may also be due to how long the legs are and the center of gravity of the product. Some box culverts may not be safe to deliver as legs-down as they will be too “top heavy”.

Where a crown unit is delivered in the legs-up position, additional lifting anchors will be cast into the unit to facilitate turning the product over into the legs-down position.

The following sections detail one method for turning box culvert crown units, but this is not the only method. Other methods may include using a special turning attachment on a crane or using two cranes. It is the responsibility of the installer to assess a safe and appropriate method of turning crown units on site and for developing a lift plan.



LIFTING AND HANDLING OF PRECAST REINFORCED CONCRETE BOX CULVERTS

Lifting and Handling Box Culvert Crown Units in the legs-down Position

When lifting and handling crown units in the legs-down position, all four anchors in the top face of the crown must be connected. The sling angle between all chains at the point of lift must be 60 degrees or less. Units should not be transported over rough terrain to minimise dynamic loading. If a load equalisation device is nominated on the Civilmart drawings, then an appropriate method of distributing the load between all four points must be used.



Turning RCBC Crown Units from Legs-Down Position to On-edge Position

It may be necessary to transport large Box Culvert crown units on their edge to ensure they are not too “top heavy” for transport. If this is the case, additional lifting points will be provided for turning.

To turn a crown unit from the legs-down position to the on-edge position, connect to the four lifting points in the top of the crown unit as shown below. Ensure that the surrounding ground is flat and even and that there is an exclusion zone set up for the turning operation.

Slowly lift and move the culvert sideways (as shown below) to rotate the unit to the on-edge position. Gently lower the unit to the ground. Keep the culvert in contact with the ground and take care not to drag the culvert along the ground as damage to the bottom corner may result.

The sling angle between the chains must be 60 degrees or less.



LIFTING AND HANDLING OF PRECAST REINFORCED CONCRETE BOX CULVERTS

Lifting and Handling RCBC Crown Units in the On-Edge Position

Once the RCBC Crown unit is in the on-edge position, attach to the two anchors in the face of the leg (or to the lifting holes in the side of the leg where RUD uni-directional lifters are used) and the topmost two anchors in the top of the crown. The leg anchors are positioned so that they are equidistant from the centre of gravity to the top of the crown, ensuring that the lift is balanced.

The sling angle between all chains at the point of lift must be 60 degrees or less. Units should not be transported over rough terrain to minimise dynamic loading.



LIFTING AND HANDLING OF PRECAST REINFORCED CONCRETE BOX CULVERTS

Turning Box Culvert Crown Units from On-Edge Position to Invert (legs up)

If a crown unit is on its side (on-edge) and needs to be turned into the legs-up position, the following procedure is recommended.

Before turning, ensure that the surrounding ground is flat and even and that there is an exclusion zone set up for the turning operation.

To turn a crown unit from the on-edge position to the legs-up position, connect to the two lifting anchors in the face of the legs. Alternatively, where uni-directional lifters are used, connect to the two uni-directional anchor points in the side of the legs. Slowly lift the culvert as shown below to rotate the culvert into the legs-up position. Take care not to drag the culvert along the ground as damage to the bottom corner may result.



Proprietary Lifting anchors in face of leg

In addition to crown units with long legs, invert units that have been specifically designed to be installed in the legs up orientation (with lids) will also have anchors positioned in the haunches for transporting and installation. For these specially designed inverts, they can be offloaded and installed in the legs-up position.

Uni-Directional anchors inside of the leg

LIFTING AND HANDLING OF PRECAST REINFORCED CONCRETE BOX CULVERTS

Lifting and Handling RBCB Crown Units in the Invert (legs up) Position

Box Culverts that are to be transported in the legs-up position will have four anchors that are generally cast into the haunch of the unit. There will also be additional anchors in the leg to facilitate turning.

Lifting and handling short units (1.2m nominal length) long units with long legs in the legs-up position can become unstable given the higher center of gravity of the unit and relatively short length. For this lift, it is recommended that in addition to the four anchors in the base/haunch, an additional two chains are connected to the leg anchors for safety.

The sling angle must be 60 degrees or less, however the chain length should be as long as possible with the lifting point at least higher than the top of the legs. The two safety chains must remain slightly loose when the four lifting chains are fully tensioned (see diagram). Units should not be transported over rough terrain to minimise dynamic loading.

For 2.4m long units with leg height less than 2400mm there should not be any stability issue, however the installer should always carry out their own assessment during the development of their safety plan.

Turning from Invert Position back to Crown (legs down) Position

To turn a crown unit from the legs-up position to the legs-down position, the procedure is essentially reversed (i.e required steps above should be completed in reverse).





The logo features the word "CIVILMART" in large, bold, white capital letters. Below it, in smaller white capital letters, is "A CRH COMPANY". This text is centered within a white outline of the map of Australia. The background of the entire top half of the image is a dark blue gradient, overlaid with a faint, larger-scale image of a semi-truck and the "CIVILMART" logo and website address "civilmart.com.au" on a building facade.

CIVILMART

A CRH COMPANY



Scan here to find a
location near you:

civilmart.com.au

Precast | Sleepers | Poles | Water Quality | Pipes