Pinnacle® Sealed Box Culvert System

Hynds Pinnacle Sealed Box Culvert system uses the innovative TyloxF® SuperSeal™ pre-lubricated gasket by Hamilton Kent to simplify the construction process, providing a fast, reliable and cost-effective sealed culvert solution.

Applications
- Stock underpass for rural highway crossings
- Pedestrian tunnels
- Stormwater culverts
- Vertical chambers
- Retention tanks
- Water storage
- Pump chamber

Product Attributes
- Large range of strengths and opening sizes
- Optional precast wingwalls and headwalls available to match
- Self contained pre-lubricated sealing gasket
- Sealed joint rated to 5m head

Quality

Approvals/Standards
- Purpose designed for various load configurations up to HN–H0–72
- NZS 3101, Concrete Structures Standard
- NZS3109, Concrete Construction

We are the supply partner of choice for New Zealand’s civil construction industry, specialising in water and infrastructure based solutions.
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**Product Attributes**

- Customisable for special conditions or shapes
- Longer life and smoother surface compared to steel culverts
- Simplifies preparation of site plans for council approval

**Design Options**

- Stormwater Culverts: Opening width and height are determined by the hydraulic requirements of the specific site. Hydraulic calculations can be performed by referring to the CPAA “Hydraulics of Precast Concrete Conduits Manual”.
- Pedestrian Tunnels: Opening size is to be determined by the tunnel space desired. For Pedestrian Tunnels, this is usually dependant on the NZ Building Code.
- Recommendations for herd sizes:
  - For a herd size of 450 – 650 head of cattle, a 2 m x 2 m* box culvert should be the minimum size opening selected.
  - For a herd size of 650 head of cattle or more, the recommended minimum size of the box culvert should be a 3 m x 2 m* structure.

*Please note: The recommendations above are based on the assumption that the underpass is not too close to buildings on either side. Sizes are span x depth.

**Vertical Chambers:** Hynds box culvert units may also be used to form vertical chambers.

**Wingwall Options**

Hynds supplies wingwall panels with fixing holes, brackets and dressing sets so that the panels can be fixed to the box culvert. These panels have reinforcing starter bars protruding at the bottom of the panel. The bars are fixed to the base reinforcing mat, and the base is then poured in-situ on site by the contractor.

**Headwall Options**

Hynds will supply the end units of the conduit structure with suitable headwalls as part of the box culvert unit if requested.

**Culvert Dimensions**

- Hynds Box Culvert Systems are made to order.
- A variety of opening sizes are available to suit most farm types and stock quantities.
- Box culverts dimensions can be customised for specific site conditions. (e.g. matching existing box culverts.)

*Note: Preferred sizes are detailed in Table 1.*

**Culvert Strength**

- Culvert strength is dependent on earth loads, highway loads and cover to the finished culvert.
- Hynds Technical Services Department will design the precast concrete box culverts to suit the specified highway loading and cover.
- Recommended minimum cover over the box culvert is 400 – 500 mm.

**Concrete Surface Finishes**

- Hynds Box Culverts are generally manufactured to F3/F4 finish as detailed in NZS3114:1987 – Specification for Concrete Surface Finishes. This finish is typical of structures which will not be seen or are only going to be observed from a distance.
Higher classes of finish may be required in elements subject to frequent observation (F4), subject to frequent close scrutiny (F5) or elements with painted surfaces. In these instances the finish required must be advised at time of quotation and a sample panel will be cast and approved prior to commencement of manufacture.

### Installation

Culvert and wingwall units are delivered to site by our trucks. Off-loading can be arranged if required. Culvert installation should be done by an experienced contractor who understands the necessity of jointing, bedding and backfilling the structure properly as well as the highway safety requirements applicable to such an installation.

### Handling

- Box culvert units are normally supplied with swiftlift anchors cast into the top of each unit. Appropriately rated chains and lifting beam must be used when handling the units.
- Lifting anchor positioning and lifting equipment specifications can be supplied upon request.

### Basic Bedding Preparation

- Sufficient foundation support and backfill compaction is required to prevent settlement of the imported layers conduit after installation.
- The bedding must be able to support the full load of the installed culvert, its contents, and the loads above the culvert. For this reason the box culvert should be laid on compacted granular hardfill to the specified line and gradient.
- Bedding design for a box culvert conduit should be undertaken by a local consulting engineer as local knowledge of ground conditions is important to ensure a successful installation.
- As a general guide, the compacted thickness of a basic bedding over the full width of the trench can vary between 150 to 250 mm (depending on culvert bearing loads) with compacted layers not exceeding 150 mm thick.
- Trench width for most installations should be equal to the external width of the culvert plus 600 mm.
- Local soft spots in the trench must be excavated and the voids filled with well compacted hardfill to provide uniform support under the entire structure. This must provide a bearing capacity of a minimum of 100kPa. Failure to do so could result in settlement of the units at a later stage.

### Jointing

- Hynds Pinnacle® Sealed Box Culvert system are manufactured with a collar and spigot which together with the dog bone connector locates and locks adjacent units together.
- The Tylox SuperSeal pre-lubricated gasket comes pre-installed on the spigots at the downstream end of the culvert units. The gasket negates the need for any further sealing agents for most installs, contact your local Hynds Sales Branch to discuss your requirements.

### Laying

- A box culvert line is usually laid from the downstream end with the sockets facing upstream to receive the next culvert to be laid.
- The box culvert units should be inspected before laying to ensure that the jointing surfaces are clean.
- The unit is then lowered carefully onto the prepared base, aligning the spigot with the socket of the unit already laid.
- Loose surface bedding material must not enter the joint space between the units – particularly along the bottom – during positioning of the unit. Ensure gasket free of contaminants.
- If any adjustment of level is necessary, remove the box culvert, adjust the surface layer of the bedding and place again. Do not use local packers to adjust the level.
- Hynds Box Culverts are manufactured with our exclusive Dog Bone Connector System. The units can then be tied together on site by a specialist contractor once the units have been installed. Recommended practise is as follow:
  - Place first box culvert into required position.
  - Using the crane, position the second culvert as close as possible to the previously installed culvert, and whilst being supported by the crane pull the culverts together with come-alongs attached to the internal swiftlifts.

  **Note:** DO NOT use the dog-bone connectors to pull the culverts together.

  - Line up two half dog-bone connector recesses.
  - Place threaded rod connecting set in groove.
  - Tighten nuts equally at each end using a socket wrench and an ø16 set to a maximum torque of 100Nm (standard use).
  - See Figures 1-3 for visual steps.
- Where required Hynds Box Culverts can be manufactured with a duct in each corner. The units can then be post-tensioned on site. Recommended practise is to insert the tie rods as the first unit is placed and push through subsequent units as they are installed.
Dog Bone Connector Jointing System:

Hynds Box Culverts are manufactured with our exclusive Dog Bone Connector System, the ideal solution for tying together culvert sections. This system combined with the pre installed rubber gasket joint allows a fast and accurate installation.

Backfilling

- Backfilling should commence as soon as possible after the box culverts have been laid.
- Fill the trench to the level of the top of the culvert working evenly on each side.
- Use selected backfill material well compacted in layers not exceeding 200 mm thickness.
- Do not use heavy vibratory equipment.
- Continue to fill the culvert conduit in well compacted layers
- Do not run heavy rollers or construction equipment over the culvert conduit without checking beforehand that the units are designed to withstand these loads.

Installation:

FIG. 1 Place first culvert into required position

FIG. 2 Place the next culvert as close as possible to desired position and then pull into correct position with a come-along, connected to the swiftlifts in the culvert. Line up two half dog-bone connector recesses.

FIG. 3 Place threaded rod connecting set in groove. Tighten nuts equally at each end, using a socket wrench to a maximum torque of: Ø16 set: 100 Nm; Ø20 set: 125 Nm; Ø24 set: 150 Nm

FIG. 4 Grout recess with Sika grout 212 or equivalent