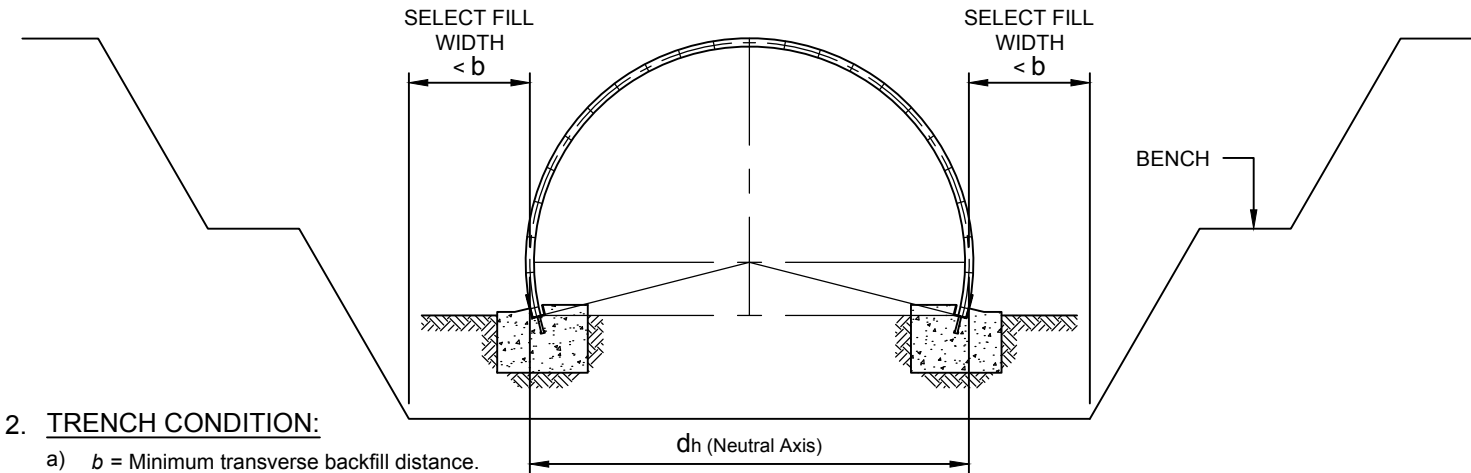


FOUNDATION AND FOOTINGS



TRENCH CONDITION

2. TRENCH CONDITION:

- a) b = Minimum transverse backfill distance.
- b) Where a structure is in a trench, the select fill shall extend to a minimum distance equal to the value given in AS/NZS 2041.2:2011 Table 2.4.3

Structural Backfill Location	Structural Backfill Type	Minimum Transverse Backfill Distance (b), mm				
		Structure Type (All Structures except for metal box culverts)				
		$d_h \leq 600$	$600 < d_h \leq 3000$	$3000 < d_h \leq 8000$	$8000 < d_h \leq 12000$	$d_h > 12000$
Trench in Rock	Compacted	600	800	1000	1200	1200
Trench in Rock	Flowable	150	200	300	750	750
Trench in good insitu soil	Compacted	600	800	1000	1200	1200
Trench in poor insitu soil	Compacted	600	$d_h/2$ but not less than 600	$d_h/2$ but not less than 1500	$d_h/2$ but not less than 3000	$d_h/2$ but not less than 5000 (see Note 1)
Embankment Construction	Compacted	600	$d_h/3$ but not less than 800	$d_h/3$ but not less than 1500	$d_h/3$ but not less than 3000	$d_h/3$ but not less than 5000 (see Note 1)

NOTE:
1. Minimum transverse backfill distance for structures with $d_h > 12000$ mm may be larger (but not smaller) than the above values if required by the designer.

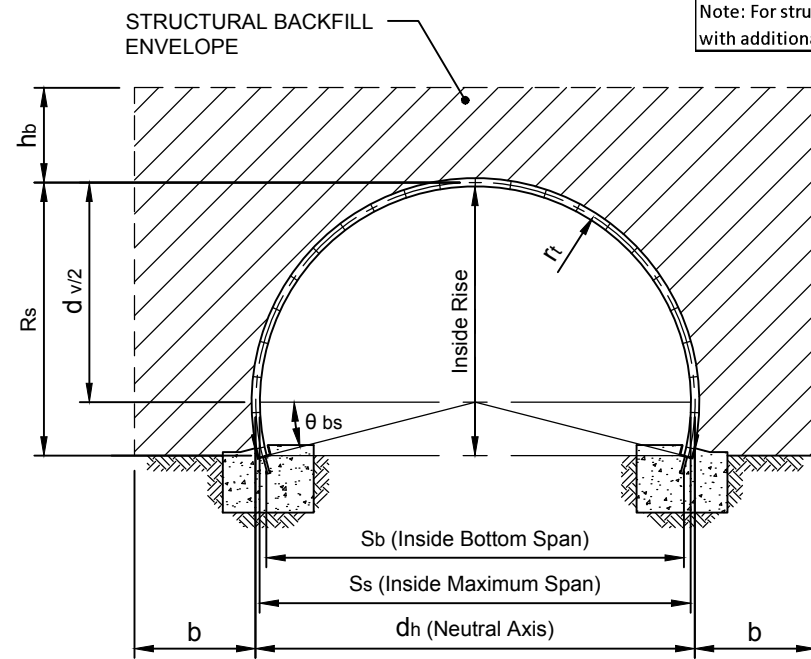
Structural Backfill Location	Structural Backfill Type	Transverse Distance between Structures (S_m), mm				
		Structure Type (All structures except for metal box culverts)				
		$d_h \leq 600$	$600 < d_h \leq 3000$	$3000 < d_h \leq 8000$	$8000 < d_h \leq 12000$	$d_h > 12000$
Between Adjacent Structures	Compacted	600	800	1000	1200	To be determined by limit state design or numerical modelling
Between Adjacent Structures	Flowable	150	200	300	750	To be determined by limit state design or numerical modelling

1. FOUNDATION AND FOOTINGS: (Ref. AS/NZS 2041.2:2011 Section 2.6)

- a) The Foundation for Arches shall be assessed to determine that the actual bearing capacity of the underlying material exceeds the bearing capacity assumed in the design.
(Where considered necessary, appropriate geotechnical advice shall be obtained.)
- b) Installation of Concrete works (designed and supplied by others) shall be in accordance with AS3600 and installed in accordance with the information supplied by the designer.
(Provision shall be made to ensure footings are not undermined by stream flows.)
- c) Base Channels (H.D.Galv.) supplied with B200 Arch Structure, to be cast in-situ with concrete footing.
(For installation and setout details, refer to "project specific"; Base Channel Setout drawings, supplied by Roundel Civil Products).
- d) After concrete works, at least 48 hours shall lapsed before stripping any formwork and a further 5 days (7 days total) shall have lapsed before the backfilling operations.

Soil Type	Span Range Unified Soil Classification	$d_h \leq 3000$	$3000 < d_h \leq 8000$	$8000 < d_h \leq 12000$	$d_h > 12000$
		1-Coarse	GW, GP	Acceptable	Acceptable
	SW, SP	Acceptable	Acceptable	Acceptable	Acceptable
	GW-GM, GP-GM	Acceptable	Acceptable	Acceptable	Acceptable
	SW-SM, SP-SM	Acceptable	Acceptable	Acceptable	Acceptable
	GW-GC, GP-GC	Acceptable	Acceptable	Acceptable	Not Acceptable
2-Medium	GM	Acceptable	Acceptable	Not Acceptable	Not Acceptable
	SM	Acceptable	Acceptable	Not Acceptable	Not Acceptable
	GC	Acceptable	Acceptable	Not Acceptable	Not Acceptable
3-Fine	SC	Acceptable	Acceptable	Not Acceptable	Not Acceptable
	ML, CL, OL	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable
	MH, CH, OH	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable
	Pt	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable
Maximum percentage fines (%) *		20	12	10	10
Coefficient of Gradation (C_c)		0.5-3.0	0.7-3.0	1-3	1-3
Minimum Coefficient of Uniformity (C_u)		2	3	4 for Gravels 6 for Sands	4 for Gravels 6 for Sands
Maximum Linear Shrinkage (%)		10	8	7	6
Maximum Plasticity Index (%) **		15	12	10	8

* The percentage of soil passing the 75 μ m sieve
** Plasticity index is waived if fines content is less than or equal to 5%
Note: For structures with $d_h > 12000$ mm the soil types and parameters shall be set out in the above table with additional parameters as specified by the designer.



BACKFILL ENVELOPE

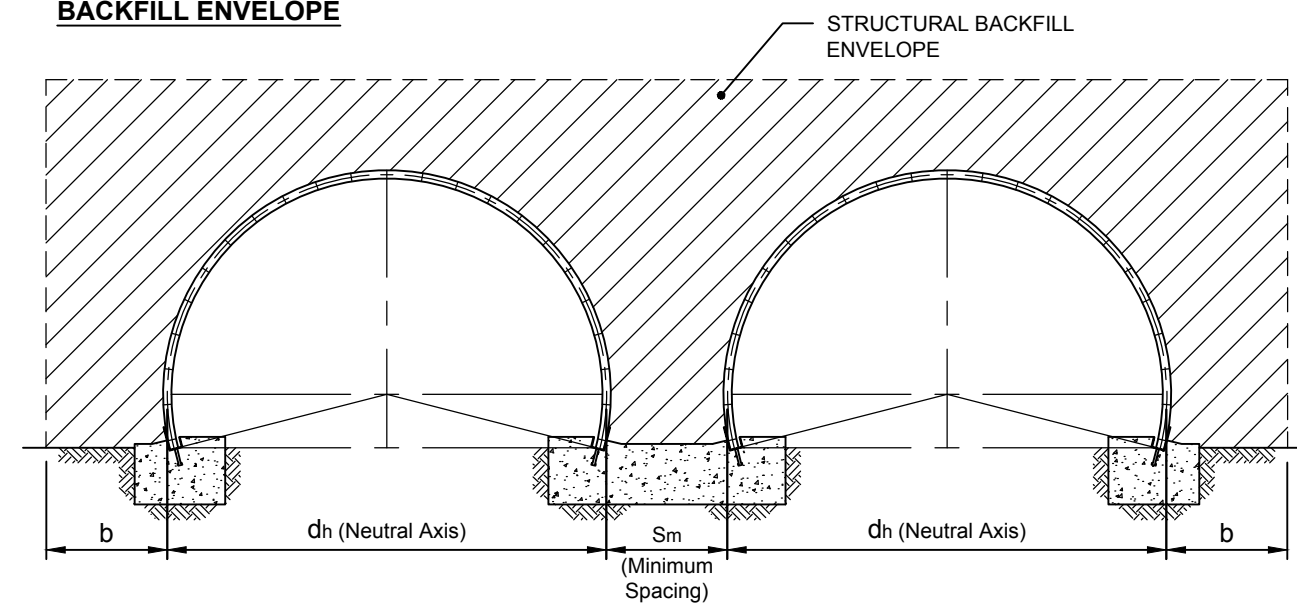
3. BACKFILL ENVELOPE:

- a) b = Minimum transverse backfill distance.
- b) The structural backfill for a single-conduit structures under different fill conditions shall extend transversely at least the distance specified in AS/NZS 2041.2:2011 Table 2.4.3 and shown in the Backfill Envelope detail on each side (b) beyond the spring lines of the conduit, and vertically up to the minimum design height of cover required, (h_b)
- c) Select Engineered Backfill shall be compacted to greater than or equal to 95% of the Maximum Dry Density ratio for standard compaction as specified by the designer and in accordance with the relevant AS 1289 test method.
Moisture control during compaction shall be $\pm 3\%$ of optimum moisture content or $\pm 2\%$ if the material has more than 20% passing the 0.425mm sieve.

**PRELIMINARY
ISSUE
ISSUED FOR COMMENT**

4. MINIMUM SPACINGS FOR MULTIPLE STRUCTURES:

- a) The minimum spacing between adjacent multiple structures shall be sufficient to ensure adequate select fill support is provided to the structures and the fill above. Spacings shall be as specified in the design but not less than the minimum spacings given in AS/NZS 2041.2:2011 Table 2.5.
- b) These limits may be inadequate where earthquake effects are important and may need to be increased when significant earthquake effects are expected.
- c) The limit state design method takes account of the effect of spacing on buckling of the corrugated metal structure.



MINIMUM SPACINGS FOR MULTIPLE STRUCTURES

5						
4						
3						
2						
1						
0	11 SEP 17	INITIAL ISSUE	BF	BF		
Rev	Date	Revision Description	Drawn	Draft Chk	Des Eng	Lead Eng

A3 Scale:
N.T.S.
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