

Technical Note

Project No 10741: Glyn Neath

Date: 13th November 2020 Rev 2

Prepared by Leighton Roberts: Technical Director.

Subject: Planning Ref No: P2011/0486 :Condition 4 :Proposed Road Culvert

1.0 Introduction

- 1.1 The purpose of the Technical Note is to provide supplementary technical information in response received from NPTCBC drainage department which seeks clarification of the proposed replacement of the existing culvert to satisfy condition 4 of planning ref no P2011/0486.
- 1.2 A site survey and photographic records of the culvert was undertaken in July 2020. (Appendix A). The existing structure consists of a formalised three-sided half box channel with an in-situ concrete cover slab length 17.9 liner metres. Upstream and downstream of the culverted section the channel is an open ditch. The culverted section crosses the existing concrete road the cross section is rectangular in profile and the channel geometry has a depth of the channel of 500mm from the soffit of the channel cover slab and the average width of the channel is 900mm. Cross sectional area 0.450m².
- 1.3 The Technical Note should be read in conjunction with the Drainage Culvert Plan. Ref Drg No 10741-506-04 & 507-01 and John Vincent Topographical Survey (June 2020).
- 1.4 To realise the development expectations, the proposal is to replace the existing culverted section of channel with a "like for like" box culvert designed to carry highway HA loading to Department of Transport standards and designed to ISO 9001 and ISO 14001.
- 1.5 The replacement culvert is based on the premise that the surface water runoff from the existing contributing catchment area entering the watercourse remains unchanged and is based on managing the surface water to the pre-development runoff rate.

2.0 Design Information: (Ref Drgs :10741-506-04)

- 2.1 Using the formula for discharge of channel flow: $Area = Width \times Depth$ ($0.5 \times 0.9 = 0.450 \text{ m}^2$)
- 2.2 Existing longitudinal channel gradient 1:48: Manning's based on a gravel bed (see photo) 0.03-0.04
- 2.3 Proposed longitudinal channel gradient 1:30: Manning's based on concrete lined channel of box culvert 0.012-0.013.
- 2.4 Determination of proposed culvert capacity based on steady flow running at full in a 1000mm x 500mm internal dimensions flat invert culvert units: $Flow \text{ Area} = 0.465 \text{ m}^2$. $Discharge \text{ rate} = 0.40 \text{ m}^3/\text{sec}$.

3.0 Comparison.

3.1 Box sections used for culverts are evaluated by major factors affecting the hydraulic capacity which as follows:

- Geometry
- Combined influence of size, shape, gradient and surface roughness of culvert

3.2 Existing culvert capacity running full at flat invert: Flow Area= 0.45m². Proposed Culvert Flow Area =0.46m²

3.3 The comparison between the proposed culvert and the existing culvert is as follows:

	Existing Culvert	Proposed Culvert
Shape	Rectangular Internal dimensions (900mm x 500mm)	Rectangular Internal dimensions (1000x 500mm)
Flow Area	0.450m ²	0.485m ² (<i>Flow area 0.465m²</i>)
Longitudinal Gradient	1:48	1:30
Culvert Length	17.923m	7m
Roughness Coefficient (n)	0.03	0.012

3.4 The proposed culvert offers a marginal “*Betterment*” with 2.1% increases in flow area, a 10m reduction in length of the closed channel and an improved roughness coefficient. In addition, the replacement precast concrete box culvert offers proven structural strength, durability, design life and performance characteristics.

4.0 Survey Information

4.1 Site survey photographs July 2020 (Photos 1-6)



Photo 1: Shows taped measured dept of existing culvert from soffit of cover slab.



Photo 2: *Shows open channel of the ditch.*



Photo 3: Shows the taped measured width of the existing Culvert



Photo 4: Shows the extent of the existing culvert cover slab in the road crossing.



Photo 5: Shows the outfall of the existing culvert.



Photo 6: Shows the outfall of the existing culvert and the road crossing.

Appendix A: Confirmation of Loading

Robin Powell

From: JANE WOOLSTON <JANE.WOOLSTON@marshalls.co.uk>
Sent: 06 July 2020 11:27
To: Robin Powell
Subject: RE: Box Culvert - Glynneath

Good Morning Robin,

Thank you for your enquiry for box culverts, our MC.10.05 stock culverts are designed for full road loading (LM1-LM3) with 0.300 – 2.00 m cover, so yes 400 mm cover would be fine.

Kind Regards

Jane Woolston
Sales Advisor
Internal Sales

I AM CURRENTLY WORKING FROM HOME AND CAN ONLY BE CONTACTED BY EMAIL

From: Robin Powell <Robin.Powell@vale-consultancy.co.uk>
Sent: 06 July 2020 10:40
To: Sales Email <Salesemail@marshalls.co.uk>
Cc: Leighton Roberts <leighton.roberts@vale-consultancy.co.uk>
Subject: Box Culvert - Glynneath

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Our REF:10741/2020.07.06/Rp-02

Good Morning,

We are proposing to relay the existing culverted watercourse using the Marshalls MC10.05(2m long) Units.

Can you please confirm that this is acceptable with 400mm cover form road to top of culvert. Total Length of Proposed Culvert is 180m Long

Kind Regards

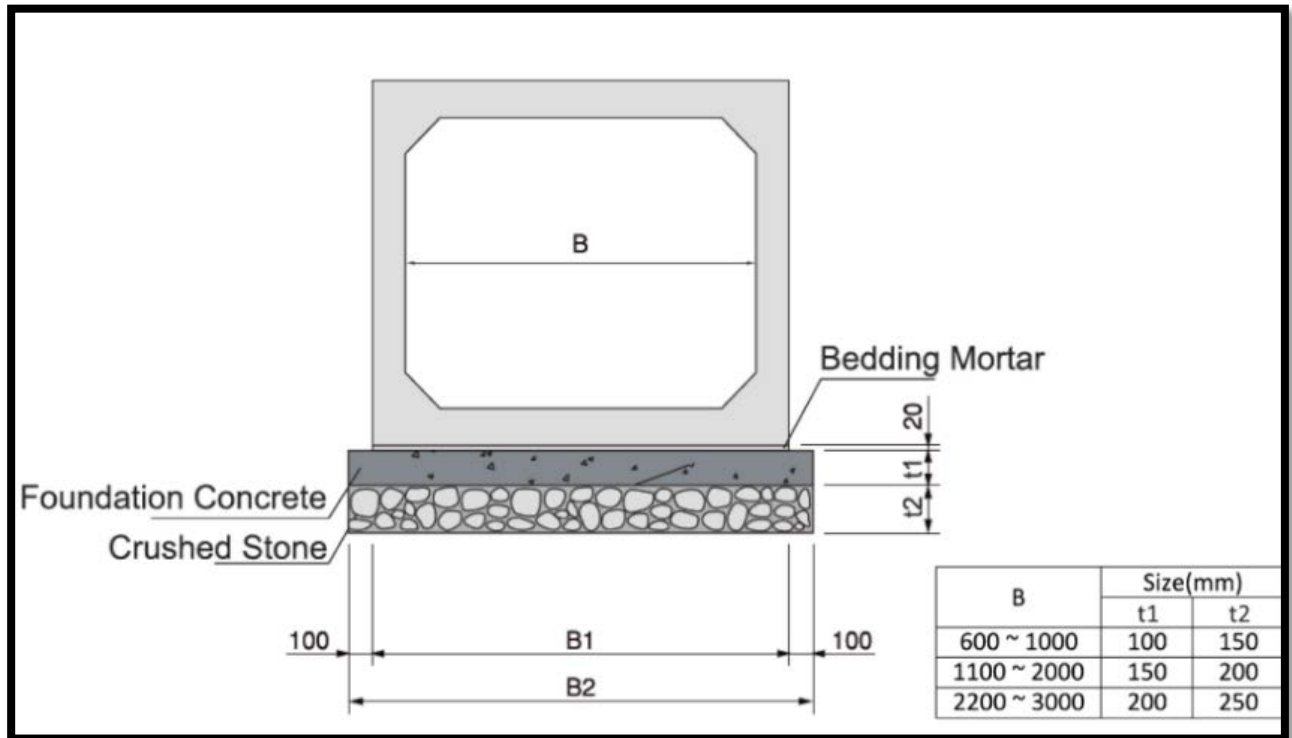
Robin

Robin Powell EngTech TMICE



Vale Consultancy
CONSULTING CIVIL & STRUCTURAL ENGINEERS

Reference	Eff. Area	Internal Dimensions			External Dimensions		Normal Thickness		Approx Weight
* Stock Item	m.sq	Width m	Height m	Length m	Width m	Height m	Walls mm	Slabs mm	Tonnes
*MC 10.05	0.485	1.000	0.500	2.000	1.30	0.800	150	150	2.77



Typical Box Culvert Section