3.2.2 CONCRETE BOX CULVERT

Historical Overview

An early mention of box culverts is contained in the 1900-01 Geological Survey Report. The author reported that "after a number of attempts the contractor abandoned the construction of a box culvert at this point and substituted 30-inch pipe" (Reid 1902: 133). This statement illustrates that box culverts were known to contractors in Maryland during the first few years of the twentieth century.

When the State Roads Commission issued the first Standard Plans for roadway structures in 1912, they included designs for both "box culverts" and "box bridges." The plans contained four designs for "steel-concrete" (reinforced concrete) culverts and one design for a "box bridge." The culverts ranged from 18 inches x 18 inches to 6 feet x 8 feet and specified plain concrete on the sides and bottom of the box and reinforced concrete on the top. The box bridge design was for spans from 10 feet to 16 feet and included reinforced concrete on all four sides of the box.

These designs may have continued in use until the State Roads Commission issued revised box culvert designs in 1931. The size of the culvert designs in 1931 ranged from a 2-foot x 2-foot box to a 6-foot x 6-foot box. Designs were included for eight sizes of box culverts and each size culvert had a separate design for no-fill, 5-foot maximum fill and 10-foot maximum fill. The no-fill designs had a parapet rail with an incised rectangular design.

The State Roads Commission Reports between 1935 and 1945 contain numerous references to the construction of box culverts on state roadways. For example, from 1938 to 1940, 31 box culverts were built. Over the next two-year period, 32 box culverts were constructed (Maryland State Roads Commission 1940: 54 and 1943: 42). The reports in the immediate post-World War II period continued to reference the construction of box culverts. Reinforced concrete box culvert construction is still used today.

Description

A box culvert is generally a four-sided drainage structure with a square or rectangular opening (Figures 3.6 and 3.7). A box culvert can carry the roadway on top of the box or the structure can be built well below the roadway with earth fill between the structure and the road. As a small structure, a box culvert can have one or more openings (boxes). Some or all sides of the structure may be reinforced.

Some examples of concrete boxed culverts in Maryland are:

BC3455 Belvedere Avenue over Chinquapin Run, Baltimore City 1936

19-foot long box culvert with two box openings. Incised parapet rail, wingwalls and 36-foot wide roadway.

07044XO US 40 over Branch of North East River, Cecil County 1938

12-foot by 9-foot concrete box with 8 feet of fill between top of box and roadway. Modern metal guardrail, concrete wingwalls.

07011XO US 40 over Branch of Perch Creek, Cecil County 1938

Two, 4-foot by 3-foot concrete boxes with 2 feet of fill between top of boxes and roadway. Modern metal guardrail, concrete wingwalls.

05012XO MD 577 over North Davis Millpond Road, Caroline County ca. 1941

Two, 7-foot by 9-foot boxes with no fill between top of box and roadway. Modern guardrail installed on top of slab, 22-foot wide roadway.

Tips for Dating Concrete Box Culverts

Concrete box culverts are ubiquitous; they have been in use from the earliest years of this century and are still used today. There are few useful tools for dating box culverts. Some of the earlier no-fill culverts had solid parapet rails such as those shown in the 1912 and 1931 Standard Plans (Appendix A, pages A-2, A-28-30).

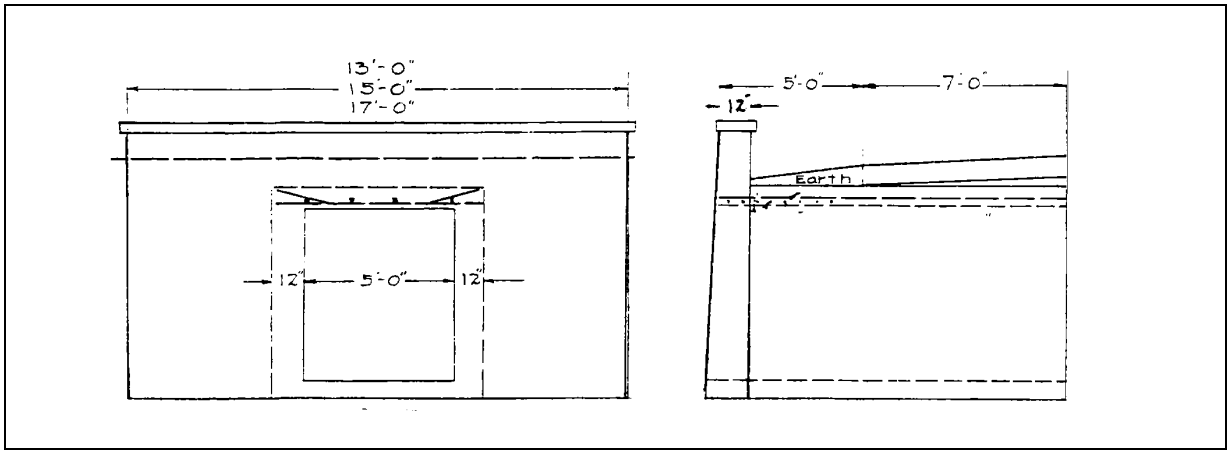

Figure 3.6. "Steel-concrete" box culvert, 1912 Standard Plans (Source: Maryland State Roads Commission 1912).

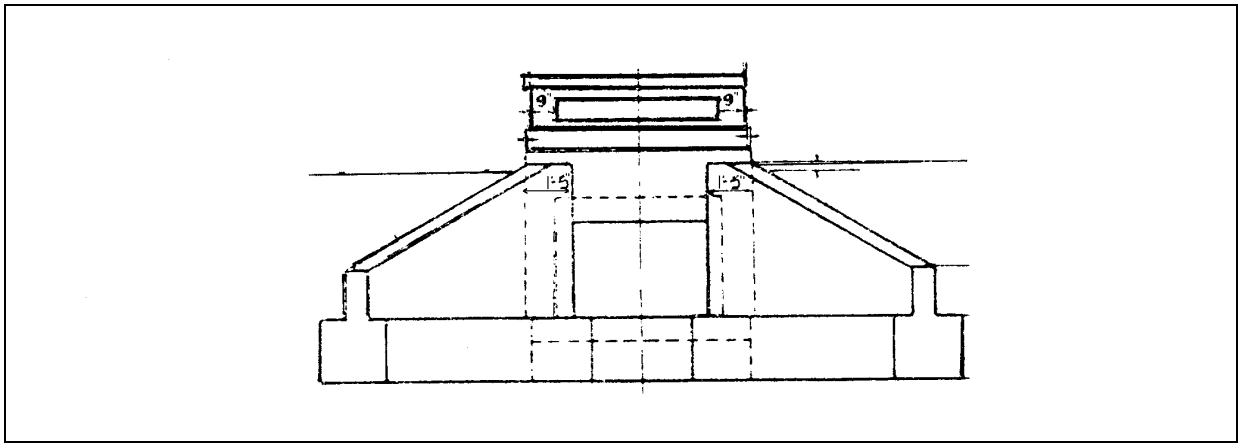

Figure 3.7. Box culvert from 1931 Standard Plans (Maryland State Roads Commission 1931). Note incised parapet.