U. S. Dept. of Agriculture   December 12, 1967
Soil Conservation Service
Engineering Division
Design Branch

DESIGN NOTE NO. 2

Subject: Required Three-Edge Bearing Strength for Rigid Pipe

A small problem arises when a pipe manufacturer proposes to furnish pipe
having an outside diameter greater than the b_c value used to compute the
required three-edge bearing strength.

An approximate but adequate solution to this problem for any reasonable
increase in wall thickness is:

> Let R_{bf} = the required three-edge bearing strength of
> the pipe to be furnished which has an outside
> diameter of D_{of}.

> Let R_{bp} = the required three-edge bearing strength of the
> pipe as specified on the plans, which pipe has
> an outside diameter of D_{op}.

> Then $\dfrac{R_{bf}}{D_{of}} = \dfrac{R_{bp}}{D_{op}}$

> or $R_{bf} = \dfrac{D_{of}}{D_{op}} R_{bp}$

This solution has been developed and used successfully by several of our
design engineers. Although it is not theoretically correct, it is an
adequate and fair approximation.

The above solution has been presented to the American Concrete Pressure
Pipe Association and has their approval.

We recommend that this method of adjustment in required three-edge bearing
strength be specified in the plans by a statement such as the following.

Where the pipe furnished has an outside diameter greater than that called
for on the plans, the three-edge bearing strength of the pipe furnished
must be equal to or greater than the specified three-edge bearing strength
multiplied by the ratio of the outside diameter of the pipe furnished to
the outside diameter specified.