

6"–64"

LONG SPAN AND BRIDGE CROSSING PIPE

U.S. PIPE AND FOUNDRY COMPANY / 866.DIP.PIPE / WWW.USPIPE.COM

P1

Long Span Overview

Long spans, aerial crossings and pipe on support applications such as creek crossings etc, are accomplished using standard U.S. Pipe joints such as TYTON JOINT®, TR FLEX®, HP LOK®, USIFLEX® and MJ HARNESS LOK Pipe or Flange Pipe.

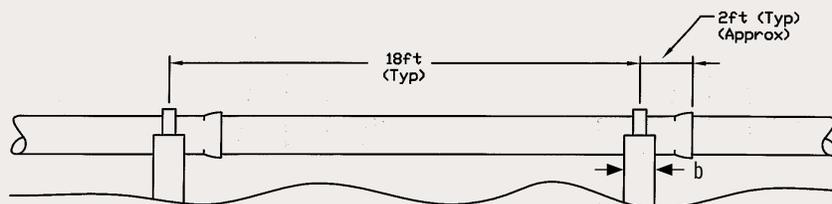
The following examples show different types of installations and typical joints that are utilized for those applications. See Long Span Pipe Notes on page 3.

Pipe on Supports

Pipe supports should be located on the bell side of the pipe typically within two feet of the bell. Supports should provide both vertical and horizontal support. Pipe should be ordered to exact lay lengths to fit pipe support spacing.

Simple Pipe On Supports

This application has each pipe supported within 2 feet (or less) of each bell. Any minimum pressure class pipe can be used; the determining factor is the working pressure of the line. Pipe should be ordered to exact lay lengths to fit pier spacing. TYTON JOINT, HP LOK, TR FLEX, USIFLEX or MJ HARNESS LOK Pipe may be used in this application. A detailed brochure of *Design of Ductile Iron Pipe on Supports* is available from the Ductile Iron Pipe Research Association (DIPRA - www.dipra.org). This brochure presents design and analyses criteria for pipe on support applications.



Note: FIELD LOK 350® Gaskets are not recommended for above ground installations. Contact your U.S. Pipe Sales Representative for recommended pier spacing.

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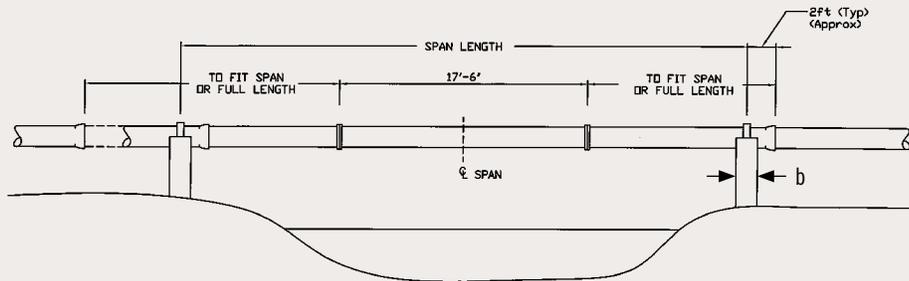
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P2

Long Span

This application utilizes Flanged Pipe, conforming to **AWWA/ANSI C115/A21.15**, in conjunction with TYTON JOINT®, HP LOK®, TR FLEX®, USIFLEX® or MJ HARNESS LOK Pipe as shown. Because high bending moments occur at the center of a span and place high stress on flange connections, U.S. Pipe does not recommend positioning a flanged joint at the center of a span but rather to straddle the center line of the span with a flange x flange pipe barrel as shown. See Table 1 for Span Lengths.



†-17.5ft L-L 4-42", 14, 16, 18, 20 and sizes available in 19.5-ft L-L-except in TR FLEX®. 19-ft L-L for 48-64" pipe.

Table 1 - Span Lengths

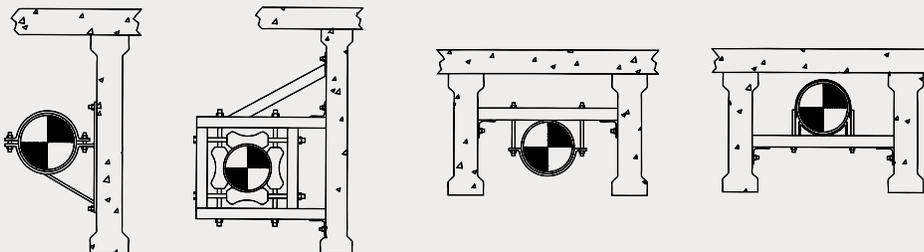
| SIZE Inches | SPAN LENGTHS Feet |
|----------------|----------------------|
| 6" | 28 |
| 8-10" | 30 |
| 12-14" | 35 |
| 16" | 40 |
| 18" | 42 |
| 20-64" | 45 |

Consult a U.S. Pipe Sales Representative if longer spans are needed and for 4" pipe spans.

Bridge Crossing Pipe Overview

TR FLEX® and HP LOK® restrained joint pipe are well suited for bridge applications. The deflection capabilities of these joints adapt easily to curves, radii and crowns of today's bridges and move with the bridge to absorb thermal and dynamic movement. Long span Flange pipe can be used in conjunction with TR FLEX® and HP LOK® restrained joints or other types of restrained joints, where bridge crossings may require a long clear span or multiple spans. Refer to the DIPRA brochure entitled **Bridge Crossings with Ductile-Iron Pipe**.

The following examples show different types of installations and typical joints that are utilized for those applications, See Long Span Pipe Notes on page 3.



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P3

Long Span and Bridge Pipe Notes:

1. If settlement is expected at pier locations, a flexible restrained joint is recommended.
2. Small diameter long span pipe may have an allowable deflection in the center of the span which may impede gravity flow situations- this aspect should be given consideration in the designing stage of the project.
3. A saddle angle of 120-degrees is recommended for all long span applications. A minimum saddle width using the formula $b = \sqrt{2Dt_e}$. Where b= Minimum saddle width, D= OD of pipe, t_e = nominal pipe thickness, is recommended.
4. Pipe used in pier and bridge crossing applications where supports will be pre-installed will require pipe to be cut to exact lay-lengths (LL). 17.5-ft L-L for 4-42" pipe. 14,16, 18, and 20" sizes available in 19.5-ft L-L- except TR FLEX®. 19-FT L-L for 48-64" pipe.
5. Long Span Pipe can be used in construction with bridge pipe where long clear spans are required.
6. Restrained joints have a small amount of pull-out per joint, this enables easy assembly but, the joint must be pulled out or extended during installation of the pipe into the supports or line growth can result causing unwanted line movement.
7. If settlement is possible or expected outside the bridge abutments, TR FLEX®, HP LOK® Bends or XTRA FLEX Bends offer high deflection capabilities and are well suited for connecting pipe entering and exiting the bridge by allowing greater movement in the bends.

Also see XTRA FLEX®, TR FLEX®, HP LOK®, USIFLEX®, MJ HARNESS LOK, FULL FACE FLANGE-TYTE™ and RING FLANGE TYTE™ Gasket brochures.

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P1

Bridge Crossing Notes:

Bridge Crossings:

Expansion couplings are generally not needed when TR FLEX® and HP LOK® are used.

Points to consider:

1. Liquid flowing through the pipe keeps the pipe at a fairly constant temperature (a 100° F temperature range is not realized).
2. Installations are done during warm months (pipe is at or near maximum expansion and the joint is left to contract for the cooler part of the season). Therefore, Thermal expansion and contraction is absorbed by the joint pull-out thus providing an "expansion coupling or joint" at every joint or every pipe length. In order for the pipe joint to be used as an expansion joint, each TR FLEX® or HP LOK® joint will be required to be pushed in or collapsed the desired amount from the fully extended position. Pipe supports must be designed to hold the pipe in place and resist thrust forces generated by test pressures and/or from deflected pipe joints in both the vertical and horizontal planes. Thrust blocking at the bridge ends or abutments will also be required (see note 3). Joint pull-out varies per size of pipe, which ranges from 1/2-inch for small diameter pipe to 1.2-inches for large pipe.
3. If an expansion coupling is used, thrust blocking of bends at the ends of the bridge, or restraining the pipe to the abutments will be required to balance the forces generated by the test pressure of the system. Expansion couplings can cause line length extensions that can over-deflect bends at the ends of the bridge and/or cause over-stressing of the pipe supports and the line to "snake". Expansion couplings should be equipped with travel stops and be attached to move with the bridge and not the pipeline. It is recommended that as shallow a bend angle as possible be used where the pipeline transitions between above and below ground.
4. A single rod or single roller support may not provide the proper support to keep the pipe aligned and may allow the line to "snake" when pressurized.

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