Aspects of Ductile Iron Pipelines

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Traditional applications, design, and installations of ductile iron pipelines are generally well known in the industry, and the ductile iron pipe market is growing. The bulk of past ductile iron projects as with other types of pipes have been designed with pipes to be installed with traditional trench or "cut and cover" construction (generally involving successive and contiguous installation and joining of single pipes in the trench). Other notable traditional applications of ductile iron piping are water, fire protection, and water and wastewater treatment plant and pump station piping systems, as well as pipeline bridge crossings, exterior "pipe-on-piers" and related crossings, and also numerous industrial and power piping applications such as penstocks, cooling water, water intakes and outfalls, etc.

Joined segments of ductile iron pipe, in effect moveable "mini-pipelines", have also been for several decades pulled or pushed as carrier pipes up inside larger casing pipes in conventional casing/carrier, sliplining, and various other crossing and special applications. Even rather long sections of fully assembled restrained joint ductile iron pipes have for many decades also been pull-installed as units in various special environments. Examples of such installations are river and lake, etc. crossings or intakes/outfalls wherein assembled sections of ball or other restrained joint pipes, or combinations of ball joint and less flexibly joined restrained pipes, are pulled along the bottom or the bottom of a trench in the body of water, or alternatively they are pull/floated into position and then sunk to the bottom, etc.

In recent years the proven advantages and toughness of ductile iron pipelines and the strength, flexibility, and quality of many joining structures available with ductile iron pipes are also being successfully applied to various types of trenchless technology and construction. Along with known procedures by which assembled sections of variously joined ductile iron pipe are being pushed or jacked directly through the ground (such as in pipe jacking, microtunneling, special pipe bursting, etc.) around the world, some restrained joint ductile iron pipelines are now also being pull-installed in designed and constructed boreholes by horizontal directional drilling methods. Additionally, specially designed ductile iron pipes are available from some manufacturers which are capable of great columnar pushing (jacking) strength for microtunneling, direct jacking, and some pipe bursting applications. All of these applications have their own individual design and installation considerations, as well as unique advantages of ductile iron pipes and their joining systems for the applications.

This presentation discusses the thickness design of ductile iron pipe with regard to internal and external pressures and loads, as well as the applicability and advantages of ductile iron pipe and its joining structures to various applications. As is the case with any piping material, the designer should also be concerned with the practical constructability of designs, as well as with all present and future interactions of the pipeline with its surrounding environment. While with metal pipes the most often mentioned exposure concerns are aspects of internal and external corrosion (and of course appropriate corrosion protection in potentially corrosive environments), in reality there are also a great many other considerations applicable to all piping materials in the modern engineering world. Included in these considerations should be the protection of human health and the environment, temperature effects on long-term structural strength and potential toxicity, effects of relative soil/pipe movements due to varying moisture content and/or thermal effects, potential seismic effects,

maintenance, future construction around and tap connections to the pipeline, and lately now a new or at least more visible "kid on the block", security of the pipeline and the public being served by it.

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If you have any questions, please contact **Dr. C.Vipulanandan**