Planning a Bore

A. Bore Pit Locations

Careful consideration should be given to the location of the bore. Adequate room for launch and reception pits, if necessary, should be provided. Potential utility conflicts with the bore pit should be identified and addressed. Restricting the size of the bore pit or work area may affect the boring method that can be used. When unsure about the size of bore pit required for a particular technique, it is recommended that the designer contact a boring contractor for additional information.

B. Manhole Locations

When possible, manholes should be located at both ends of a long or difficult bore. This allows minor deviations in line or grade between the bore and the open cut section to be corrected. In addition, it provides access to both ends of the section of pipe for maintenance purposes.

C. Bore Lengths

The length of the bore specified needs to be carefully considered. Crossing under a 24 foot roadway requires a bore longer than 24 feet. Adequate length to protect roadway and foreslope from loss of support and sloughing during bore entry and exit is required. If possible, it is desirable to place the bore pit locations beyond the roadway foreslope. For roadways with an urban section, the bore pits should be located several feet away from the back of the curb to prevent undermining of the roadway.

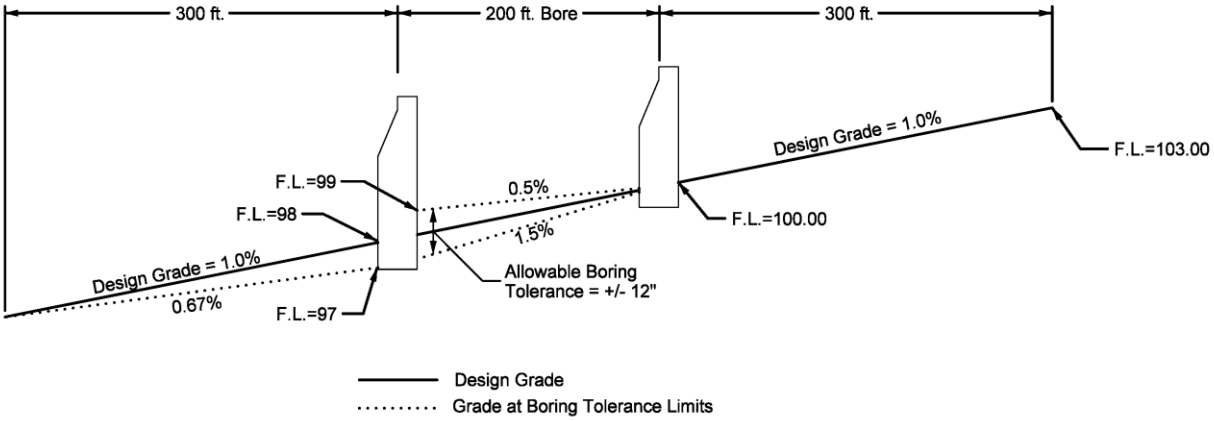
D. Acceptable Tolerances

The designer should recognize that as tolerance specifications tighten, the cost for boring will increase. Different trenchless methods have different tolerance limitations. Methods and machines that are able to meet tight tolerances tend to be more complex, and therefore, more costly. In addition, the contractor assumes a greater risk when agreeing to complete a bore with tight tolerance requirements.

Since every installation is unique, bore tolerances should be determined and specified on a case-by-case basis. Unless there are special circumstances, it would be unreasonable to require a water main or force main to meet the same tolerances as a gravity sewer line. In order to reduce costs, the designer should allow as much grade and alignment variation as possible while still meeting the operational requirements of the installation.

For example, assume a 12 inch sanitary sewer on a 1% grade is being bored for a length of 200 feet as shown in Figure 14B-1.01. Due to capacity/velocity limitations, the minimum allowable pipe slope is 0.5%. If the bore tolerances are set at ± 0.2% (common for gravity sewers) the project would likely require the use of a significantly oversized casing pipe with the auger boring technique to allow for adequate adjustment, or would need to be done by microtunneling in order to ensure compliance with the specifications. Increasing the allowable tolerances to ± 12 inches, would likely allow the steered auger boring method to be utilized, without an oversized casing pipe. This could result in significantly reduced boring costs, while still meeting the minimum grade requirements of the sewer line.

Figure 14B-1.01: Tolerance Considerations When Planning a Bore



For gravity sewers, which are laid at minimum grades, consideration should be given to providing additional slope through the length of the bore. While this may not always be possible, it helps reduce the potential for backfall in the pipe.

Often, the casing pipe may not meet the tolerances required in the specifications. However, the contractor normally has the ability to make grade corrections for the carrier pipe by using casing chocks. These chocks allow the position of the carrier pipe to be adjusted inside of the casing pipe as required to meet the specified grade. As mentioned above, for projects that require a high degree of accuracy, an oversized casing may be installed to allow additional maneuvering room inside the casing for the carrier pipe.

E. Information to Provide to Contractor

If soil borings were conducted, the soil boring log should be included with the specifications or at least be available upon request. The specifications should spell out in detail how unexpected circumstances will be handled. Will the contractor be entirely responsible if something goes wrong, or is there a risk allocation clause in place? In addition, the specifications should indicate what the tolerance requirements for the bore would be. Finally, the material requirements for the bore, including the casing pipe (see Section 9C-1), if required, should be indicated.

F. Risk Allocation

One of the factors that results in increased prices for tunneling and boring is the risk associated with the process. While soil borings and other information can provide a glimpse of the ground conditions that may be encountered, they do not provide the big picture. For example, a contractor may be nearing the end of a long bore when an unexpected large boulder or old foundation is struck. The only option may be to abandon the bore and begin again. Normally, the specifications place the costs associated with this upon the contractor. The boring contractors plan for these types of unexpected problems by increasing their bid prices to cover the costs associated with the additional work.

If the jurisdiction agrees to share in the costs that are associated with encountering differing site conditions, the contractor's risk is reduced, and they can lower their bid prices since they are no longer forced to "poke and hope."

By including a "differing site conditions" clause in the contract, the jurisdiction agrees to relieve the contractor from the burden of extraordinary costs required to complete its performance due to unexpected site conditions. This clause allows the contractor to negotiate an additional work order

when the site conditions encountered are different than those reasonably expected.

While the actual clause used in the contract documents may vary, the following is commonly used text found in federal contracts 48 C.F.R § 52.236-2. The intent of this language is to provide for an equitable adjustment, as well as the procedures necessary for a contractor to make a claim for differing site conditions:

1. The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Jurisdiction of (a) subsurface or latent physical conditions at the site which differ materially from those indicated in this contract, or (b) unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract.

2. The Jurisdiction shall investigate the site conditions promptly after receiving the notice. If the conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract, whether or not changed as a result of the conditions, an equitable adjustment shall be made under this clause and the contract modified in writing accordingly.

3. No request by the Contractor for an equitable adjustment to the contract under this clause shall be allowed, unless the Contractor has given the written notice required; provided, that the time prescribed in (1) above for giving written notice may be extended by the Jurisdiction.

4. No request by the Contractor for an equitable adjustment to the contract for differing site conditions shall be allowed if made after final payment under this contract.

G. Drawing on Contractor's Expertise

Once a tentative design has been laid out for a bore or tunnel, it may be prudent to discuss the proposed installation with an experienced tunneling and boring contractor. Most contractors are willing to discuss the practicality of a proposed installation, provide insight to potential problems, give a range of expected costs associated with the installation, and provide recommendations on how to reduce the overall cost of the project.