



Williams has requested that CCI perform a desktop study to evaluate the feasibility of using the HDD method of construction at three separate locations. The carrier pipe at each proposed crossing is specified to be 36-inch-diameter pipeline used to transport natural gas. A KMZ file has been provided to identify the approximate locations and surface constraints of each crossing.

Hensel Fork Rd HDD (MP 190.5 to MP 190.7) crosses beneath Hensel Fork Rd and multiple minor streams. In accordance with Williams' specifications and industry best management practices (BMPs), it is recommended that a design radius of 3,600 ft be utilized with the current pipe specifications. Taking into consideration the current proposed length along the alignment, the depth of cover would need to be sufficient to geometrically coincide with the design radius. It has not been determined where the rig will be placed but MP 190.5 is approximately 120 ft away from Hensel Fork Rd and appears to sit directly on top of a stream. MP 190.7 also appears to be on top of or near a stream. These conditions may create complications associated with the temporary workspace requirements for the contractor.

Drury Run Creek HDD crosses Drury Run Creek, associated wetland area and Tamarack Rd. it is recommended that a design radius of 3,600 ft be utilized with the current pipe specifications following standard industry BMPs. Taking into consideration the design radius, it appears that there is not sufficient ROW to accommodate the horizontal length that would be required to remain within geometrical tolerances. The HDD would encounter a terrain that slopes along the entry and exit angles required to achieve a recommended profile depth of cover beneath the creek. This scenario creates shallow cover and increases the likely hood of inadvertent fluid release to the surface near entry and exit as well as HDD equipment setup outside of typical industry practice. Conceptual design has the profile of that includes a horizontal curve that will likely overlap one or both vertical curves creating a combination curve.

The Young Woman Creek HDD crosses beneath Young Woman Creek, and due to the present constraints, would most likely cross beneath Young Woman Creek Rd and Little Italy Rd as well. As mentioned above, it is highly recommended that a design radius of 3,600 ft be utilized due to industry BMPs. Taking into consideration the design radius, it appears that there is not sufficient ROW to accommodate the horizontal length that would be required to remain within geometrical tolerances. The HDD could follow the alignment if the length to the west of Young Woman Creek was increased and a horizontal curve was introduced; however, this would increase the risk of steering outside of tolerances. Also, the alignment along this section is heavily wooded and would require clearing and grading.

These proposed crossings would most likely benefit environmentally, financially and have an increased chance of success using a open cut method of construction. The pipe strings for these HDDs would be placed along slopes ranging from 15 to 40%, increasing the installation risk. Due to these reasons listed above and unknown geotechnical conditions, HDDs (Drury Run Creek, Hensel Fork Rd HDD and Young Woman Creek HDD) are considered high risk and CCI has classified these locations as not feasible for the HDD method of construction.