December 14, 2016

Mr. Hani Shafai
Dream Design International
520 Kansas City Street
Rapid City, SD 57701

RE: Orchard Meadows Apartments
Preliminary Considerations for Accommodating Wastewater
KTM Project No. 12-0654

Dear Mr. Shafai:

This letter provides the findings of our preliminary investigation of potential alternate gravity solutions to accommodate wastewater generated at Orchard Meadows.

Given the limited capacity of the existing Pioneer Drive lift station, we first investigated the possibility of diverting wastewater flows in the Pioneer Drive sanitary sewer main, effectively bypassing the lift station. We considered the feasibility of providing a new gravity sanitary sewer – extending to the east – to drain wastewater from the existing 8-inch diameter sanitary sewer in Pioneer Drive to the existing 42-inch diameter sanitary sewer situated in the Highway 44 right-of-way.

It was quickly determined such an alternative is not realistic. The invert elevations of the existing 8-inch diameter sanitary sewer situated just upstream of the Pioneer Drive lift station are lower than elevations of the Highway 44 sanitary sewer, so it’s evidently not possible a new gravity connection to the 42-inch sewer would eliminate the need for the Pioneer Drive lift station. That information was shared and acknowledged in a brief impromptu meeting held recently with Rusty of the Rapid Valley Sanitary District.

We then investigated the possibility of a direct gravity connection between the 10-inch diameter sanitary sewer situated in Jim Street and a manhole in the Highway 44 sewer system. Such a connection would eliminate the connection between the Jim Street sewer and the Pioneer Drive sewer system, effectively bypassing the Pioneer Drive sewer system. No matter, this option also proved unworkable.

Enclosed are two (2) exhibits; the exhibits are provided as visual aids to help explain the situation. The exhibits include information about select sanitary sewer manholes located in the Highway 44 right-of-way; this information was furnished by City staff.
Exhibit 1 (Option 1) shows a simple—perhaps unrealistic—straight-line alignment for the sewer connection between the Jim Street manhole and the Highway 44 manhole. The invert elevation of the 10-inch diameter sewer inflow at the manhole located at the intersection of Jim Street and Pioneer Drive is 3090.36 ft. This elevation is 1.75 feet higher than the invert elevation of 3088.61 shown for the manhole situated in Highway 44 just west of its intersection with Covington Street. The straight-line distance between the Jim Street/Pioneer Drive intersection and the Highway 44 manhole is 2,600± feet. Assuming just 5 new manholes in that distance, at least another 0.5 feet of elevation difference would be lost due to the drop across the manholes. Consequently, the available pipe slope is at best only 0.0005 ft/ft, and that assumes matching inverts at the connecting manhole.

Exhibit 2 (Option 2) shows what is probably a more realistic alignment for the sewer connection between the Jim Street manhole and the Highway 44 manhole. However, such an alignment increases the total length of the sewer connection and requires even more manholes than assumed for the Option 1 alignment. The increased length and additional manholes in Option 2 result in an even flatter sewer slope.

The design criteria for sanitary sewers require a minimum pipe slope (based on the pipe diameter) and matching the crowns of different diameter sewers at the manhole connection. Based on those criteria, the information in hand, and the assumptions noted, it doesn’t appear draining wastewater by gravity flow from the south portion of the Orchard Meadows site—namely, the Orchard Meadows’ properties that don’t or can’t drain to the existing 27-inch diameter trunk sewer—to the Highway 44 sewer is possible. Other alternate solutions to address the wastewater situation should and must be considered.

Thank you for this opportunity to assist you and we look forward to working with you on this project. If you have questions or need additional information, please contact me at (605) 791-5866 or gregb@ktmdsi.com.

Sincerely,
KTM DESIGN SOLUTIONS, INC.

Gregory T. Barbeauld

Enclosures

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