

### **“Central Center: Creating an Engineering Feasibility Plan”**

Chillitopia, a city of 199,090 residents, is in the final process of redevelopment. The original design of Chillitopia, once called Chillicothe, was poorly organized. Retail, industry and residential were crowded together in small pockets resulting in traffic problems, poor road conditions, pollution issues, low resale value and limited green space. Large commercial areas grew quickly without the benefit of effective planning, limiting access for citizens and making the unattractive city appear scattered.

This feasibility plan determines whether it is possible to redevelop a rectangular, five acre abandoned strip mall with a grade of less than 5% into a well organized and beautifully built area. The redeveloped area, called *Central Center*, will have 33,300 square feet of residential condominiums, 16,000 square feet of retail area and an underground parking area.

Soil type and characteristic analysis determines if the lot is usable, durable, and safe to build on. The presence of a gas station warrants detection for underground structures and contamination. Analysis of water quality, quantity and infrastructure age assures retail and residential access to a clean reliable water source. Average daily traffic (ADT) analysis and road condition status helps ensure excellent, hassle free transportation access.

The Soil Survey of Ross County Ohio clearly states that soil found in the redeveloping area is Eldean Loam (Ee) with a B slope class indicating 2-6% slope (See Figure 1). Eldean Loam has a land capability rating of Class IIe (See Figure 2). This soil

drains water well, has moderately slow permeability and shrink swell potential.

Adequate green space is recommended to prevent erosion. Slow permeability is not an issue because city water and sewer systems will be used instead of septic tanks.

Considering the possible limitations of moderate shrink swell potential, a planned underground parking facility will provide stability for ground level buildings. This prevents the destruction of building foundations and surrounding areas.

The presence of a thirty-five feet long underground storage tank (UST) with dispensers directly above is a safety hazard in Central Center. As required by the Ohio Bureau of Underground Storage Tank Regulations, this UST must be removed and the area inspected by the Fire Marshall. Before the UST is removed, the gas and vapors must be extracted to prevent possible explosion. The UST and surrounding pipes can be excavated and placed on asphalt or concrete to prevent pollutant leakage. Within twenty-four hours, soil samples need be obtained from the following sites:

- 1) Under both ends and middle of the UST site
- 2) Every ten feet between UST and the dispenser
- 3) At ten feet intervals along the pipeline

The water treatment plant in Chillitopia was rebuilt 13 years ago and is in excellent condition. The sixteen-year-old wastewater treatment facility is in very good condition. Water pipes are four to twelve inches in diameter and forty-two years old. Sewer pipes are ten to twelve inches in diameter and in good condition. All pipes are

constructed of cast iron. Water pipe replacement around Central Center is recommended to ensure clean, reliable water.

The water demand for Central Center is 131,760 gallons per day. This number was calculated using Ohio EPA average daily flow rates for residential and retail areas. (See Figure 3). Our water plant can produce seven million gallons per day (MGPD) with a lifetime maximum usage of four MGPD. Based on this information, there is adequate water supply to sustain Central Center.

The excellent water quality has exceeded the Environmental Protection Agency standard for the last fifteen years. The water supply is free of pesticides, carcinogens, lead, and copper.

Central Center has three existing access sites, a traffic signal and a left turn lane (Figure 4). Once redevelopment is complete the average daily traffic during the peak hour is 272 trip ends: 123 exiting and 149 entering (see Figures 5 and 6). Road pavement conditions are fair to poor on side streets, and good on the main road. Side roads surrounding the redevelopment area should be repaved.

As "student" civil engineers we have worked closely with environmental engineers and construction engineers to gather information, used engineering calculations and analyzed information to make feasibility recommendations. Central Center redevelopment is recommended and will add greatly to the success of Chillitopia.

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