	Title: YALE OFFICE OF FACILITIES PROCEDURE MANUAL Chapter: 01 - Yale Design Standard Division: HVAC Standards	Section: 33 61 00 01 Underground Utility System Routing
		Date: 6/15/16
		Author: Office of Facilities
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PART 1 - INTRODUCTION

1.1 PURPOSE

- A. This section provides minimum requirements for Utility underground piping, conduits, manholes, and tunnel systems.

PART 2 - GENERAL DESIGN REQUIREMENTS

2.1 UNDERGROUND UTILITY SYSTEM ROUTING

A. GENERAL

1. Survey


- a. As part of the design/development of the underground utility routing, the proposed routing shall have a subsurface utility survey performed on it, including the four level utility steps (Utility Quality Levels A - D) to determine the exact location of all existing utilities within the utility routing.

2. Minimum Distance Between Utilities

- a. The minimum distance between new utilities and existing utilities shall be one foot. If less than one foot of clearance is utilized, flowable fill shall be used for backfill between and around the utilities (minimum six inches between utilities).

3. Vertical Pipe Routed

- a. It is preferred that no low points be created in piping systems between manholes so that all piping can be completely drained. Also, it is preferred that no high points be created in the piping systems between manholes so that all piping can be completely vented so that a hydrostatic test can occur.
- b. The minimum depth of the direct buried steam system and chilled water system shall be designed with a minimum cover of four feet. This minimum cover requirement can be reduced with approval from Yale Utilities and the design engineer taking into the necessary requirements to add additional insulation to protect from freezing and/or additional design for structural protection to

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protect against vertical loading. Within landscape and planting, including grass areas, the minimum four (4) feet cover should be maintained.

B. DIRECT BURIED STEAM SYSTEM

1. Thermal Expansion
 - a. The routing of the direct buried steam system shall take into consideration the thermal expansion of the system piping. An analysis shall be performed by the Engineer to determine if it is more beneficial to use straight runs with expansion joints in manholes versus using expansion loops and ells. Things to consider in the analysis include construction cost, phasing, and disturbance of grounds. If proper expansion cannot be compensated with expansion loops and ells, manholes with expansion joints can be utilized.
2. Pipe Slope
 - a. The direct buried steam piping shall be pitched/sloped at a minimum of 0.5% in the direction of steam flow or minimum of 1.0%. Manholes shall be placed at low points to provide minimally an area for trapping the condensate.
3. Maximum Distance Between Manholes
 - a. The maximum distance of the direct buried steam system between manholes with trap stations shall be 300 feet.

C. DIRECT BURIED CHILLED WATER SYSTEM

1. General
 - a. All direct buried chilled water line sizes 12 inches in diameter and larger shall have high point air release valves within manholes.

D. DIRECT BURIED CONDUIT

1. General
 - a. All direct buried conduits shall have a minimum of 12 inches of separation between steam, condensate, and chilled water system direct buried piping.

E. TUNNEL

1. General
 - a. Tunnels containing steam system piping shall be sloped as indicated above.