ULI DEVELOPMENT CASE STUDIES

Subtropolis

Kansas City, Missouri

Project Type:
Commercial/Industrial

Case No:
C028009

Year:
1998

SUMMARY

The largest underground business complex in the world, with more than 4.5 million square feet of leasable space and 10 million square feet of total developed space housed in a limestone mine. The project, which contains office and industrial uses, will include approximately 50 million square feet of developed space at buildout.

FEATURES

- Computer-monitored fire-sprinkler system
- 24-hour security
- Lease rates well below surface building rates because subsurface location ensures low utility costs due to constant year-round temperature range of 65 to 72 degrees
- Earthworks, a hands-on environmental learning center for elementary school children

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SPECIAL FEATURES

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- Earthworks, a hands-on environmental learning center for elementary school children

DEVELOPER, ARCHITECT, AND LAND PLANNER

Hunt Midwest Real Estate Development
8300 NE Underground Dr.
Kansas City, Missouri 64161
816-435-2500

GENERAL DESCRIPTION

Subtropolis is an 868-acre, master-planned underground complex that features both office and industrial uses and also functions as a limestone mine. The thriving subsurface business community includes approximately 55 tenants involved in a range of businesses, from office operations, light manufacturing, and warehousing to cold storage. The types of goods stored include food and paper products, stamp collections, and the original prints of classic Hollywood films such as Gone with the Wind. The temperate climate and low humidity of its underground location make SubTropolis an ideal place for companies to store their inventories. The vast majority of space is occupied by warehouse/industrial tenants.

The development is served by both rail and truck lines that are accessed from street level. Each building is served by its own dock, making it possible to load and unload without having to drive "down" into the development. The 314 truck dock locations are served by 200 national truck lines, and the 1.9 miles of railroad trunk lines provide access to the Burlington Northern Railroad. The complex's location near the Missouri River also allows access to barge traffic to and from the Gulf of Mexico. There are more than four miles of paved and lighted subsurface streets inside SubTropolis.

Subtropolis also includes Earthworks, a hands-on environmental learning center for third- and fourth-grade students. At Earthworks the students learn how to build and balance habitats by, for example, determining the proper habitat for crickets or by working together to find the best solution for cleaning up contaminated soils.

THE SITE

The site is located seven miles northeast of downtown Kansas City, Missouri, at the intersection of I-435 and Missouri 210 Highway; the city's entire central business district could fit within SubTropolis with room to spare. The development was created through the mining of a 270 million-year-old limestone deposit located along the bluffs of the Missouri River. The limestone itself is removed using the "room and pillar" method: a room is carved out of the solid stone and pillars are left as supporting columns. The pillars support an eight- to ten-foot-thick solid limestone roof.

The limestone shelf that houses Subtropolis—which is ideal for storage and distribution facilities because it is nearly level and very deep—begins 50 to 100 feet beneath the surface soil; the 4.5 million leasable square feet of office and industrial space is located about 100 to 150 feet beneath the surface. The development is accessed at street level through entrances in the sides of the hills that characterize the surface of the site.

The 2,500 acres above the underground complex includes two amusement parks, Oceans of Fun and Worlds of Fun, which draw 1.5 million visitors annually. Hunt Midwest, the original developer of these properties, eventually sold them but still owns the mining rights. The mining operations are separated from the underground office and industrial space by a wall that is 65 feet thick.

DESIGN/DEVELOPMENT PROCESS

Mining at the site began in the 1940s, and business and industrial uses were introduced in the 1960s. In the early phases of development at SubTropolis the layout of streets and rooms was piecemeal, and the curvilinear streets followed no specific plan. In recent years the planners and architects have based development on the grid system, which makes it easier to create the rectangular and square rooms that are ideal for storage and distribution systems. The grid system also has the advantage of providing easy access for trucks, which are the predominant method of transportation used at the development. By working on an exact 65-foot grid system, a series of 40-foot "rooms" is created with evenly spaced pillars that are 25 feet in diameter to support the eight- to ten-foot-thick solid-rock ceiling. The even spacing allows just enough room for 18-wheel trucks to maneuver into the docking ramps that are located throughout the facility.

Hunt Midwest employs its own on-site architects, who use computer-aided drafting systems to develop the design and construction documents for existing tenant expansions and new construction projects. Build-to-suit facilities are relatively simple to assemble due to the even spacing of the pillars, the paved flooring, and the smooth ceilings, which can be up to 16 feet high. Hunt Midwest can construct buildings of up to 1 million square feet. Tenants in need of 150,000 square feet or less in space can move in as little as 120 days.

The master plan of Subtropolis calls for the eventual development of 50 million square feet of space; the expansion, using the grid system as a framework, will continue northward of existing development. The underground location makes gaining approval from public agencies for expansion easier for several reasons, including the lack of any major structural issues because, since the foundation is solid rock, all footings are the same. There also are no major traffic or stormwater issues to address because the development is underground.

CONSTRUCTION/ENGINEERING

There are several advantages to creating office/industrial space in a limestone mine; one is that limestone is three times as strong as concrete. In addition, there are no major structural issues to contend with when pouring the

foundations because they are poured on solid rock. All the walls are constructed on the same footing.

The mining process at SubTropolis involves boring into the side of a hill to depths of 100 to 150 feet below the surface, where there are three distinct layers of limestone separated by two layers of shale. Crews remove only the bottom 12 feet of the 20-foot middle layer of Bethany Falls limestone and the 4-foot layer of shale that lies beneath it, leaving an eight- to ten-foot-thick roof of solid limestone. The thick roof ensures safety from structural problems. Beyond the solid limestone ceiling is a layer of shale, the top layer of limestone, and 50 to 100 feet of soil. Beneath the rooms is the bottom layer of solid limestone.

The presence of a second layer of shale did challenge the project architects and engineers. The second layer lies beneath the Bethany Falls limestone that is mined out; removing the shale by mining down to the bottom layer of limestone is necessary to prevent the foundation from shifting beneath the walls. The actual ceiling heights vary depending on the type of use involved. For instance, roadways inside the development have ceiling heights of 16 feet, railroad corridors are 18 to 20 feet high, and facility interiors range from 12 to 16 feet in height.

MARKETING/TENANTS

Slightly more than 70 percent of the building area at Subtropolis is used by tenants engaged in warehousing and distribution. Manufacturing/assembly tenants consume another 15 percent of leasable space, and freezer and cooler facilities use nearly 10 percent. Offices comprise about 6 percent of the total building area.

Project marketing has had to deal with a perception problem about exactly what Subtropolis is and what it is not. Potential tenants who initially may be skeptical of moving their business to what they wrongly perceive as dark, wet "caves" often change their mind when they discover that this development is clean, dry, and well lighted. Hunt Midwest employs an on-site maintenance crew that cleans and scrubs the roads and pillars regularly, ensuring that the project is attractive to potential tenants and maintaining its efficiency.

The bulk of marketing is aimed at local companies. However, Kansas City's location in the heart of the United States increases SubTropolis's appeal to national and international companies. There is no exclusive broker arrangement. Hunt Midwest Real Estate Development has an on-site property manager who handles expansions of existing tenants, which are the source of the greatest growth in leased space.

Perhaps the project's greatest marketing tool is the costs savings associated with locating a business in an underground development. Because of savings on utilities and taxes, lease rates often are one-third to one-half less than those of surface properties. Occupancy costs are 70 percent lower than those of surface buildings due to lower lease rates, utilities, and insurance. According to Hunt Midwest, for every one hundred dollars spent to occupy a surface building, seventy dollars will go toward a company's bottom line if it moves to SubTropolis.

Temperatures in this subsurface development are consistently between 65 and 72 degrees throughout the year, significantly reducing the need for cooling and heating systems and resulting in savings of as much as 80 percent of the cost of utilities for above-ground facilities. Cold storage in SubTropolis also has its advantages because keeping temperatures at or below freezing is easier in the heat of summer. In addition, in the event of a power failure or malfunction, temperatures rise only about one degree per day, allowing ample time to fix freezers without product loss. The underground facilities also provide weatherproof docks for loading and unloading regardless of outside conditions.

The natural safety and security of this underground location is enhanced by 24-hour security patrols. Access to the project after hours is limited to tenants only, making it an attractive property for clients concerned about the safety and security of their inventories.

SubTropolis lies within a state enterprise zone. Although it is not considered by Hunt Midwest to have had a significant impact on the business location decisions of clients, it does offer an array of incentives, such as employee tax credits for new jobs and training, investment tax credits, and property tax abatement.

MANAGEMENT

The management philosophy of Hunt Midwest Real Estate is embodied in the acronym QISS (Quality, Integrity, Safety, and Service). Quality is reflected in the cost-effective use of space and in the clean, well-lit interiors. Integrity is achieved through setting strict safety standards, such as that requiring a roof thickness of 8 feet or more. There is no "robbing the roof" to achieve greater ceiling heights at the expense of safety. The state-of-the-art computerized sprinkler system exceeds code requirements and provides the equivalent of a firefighter every 10 feet. In addition to high maintenance of the facilities, Hunt Midwest provides on-site architects to meet clients' specific space needs.

The common areas maintenance fee of 24 cents per square foot covers the cost of providing a 24-hour security patrol, the fire alarm/sprinkler system, and maintenance services to keep the underground streets and common areas clean.

EXPERIENCE GAINED

- The grid system has allowed more efficient use of space than the previous curvilinear layout; for example, the use of racking systems to stack goods is now more efficient.

- The presence of shale proved to be a problem due to shifting foundations. The excavation of the shale beneath all structures may cost more in the short term but over the long run saves the developer money. Removing shale also benefits clients because less effort is required to maintain buildings and ceiling heights are increased.
- As the project has grown over time Hunt Midwest has found new ways to increase efficiency in use of space. For example, the practice of putting one-foot-square concrete collars at the base of pillars was discontinued to create more space between pillars. The present method of "shooting" the pillars with a coating of concrete at the base has increased spacing between pillars from 38 feet to 40 feet.

PROJECT DATA

LAND USE INFORMATION

Site area: 868 Acres

Inside Uses

	Completed (square feet)	At buildout (square feet)
Gross building area	4,309,749	20,000,000 +
Office	131,317	
Warehouse/industrial	4,178,432	

Total parking spaces (underground): 1,758
Number of buildings: 54

Surrounding Uses

Direction	Land Use
North	Residential
South	Industrial/Missouri River
East	Undeveloped
West	Commercial/industrial

OFFICE/INDUSTRIAL TENANT INFORMATION

Percent of NRA occupied: 96 percent
Average annual rents: $1.35 to $2.75 per square feet
Average length of lease: two to seven years
Typical tenant size: office, 1,200 square feet; warehouse/industrial, 60,000 square feet.

DIRECTIONS

From Kansas City International Airport: I-435 East to Missouri 210 Highway. Take Missouri 210 Highway east for one mile to Eldon Road.

Driving time: Approximately 20 minutes in non-peak-hour traffic.

Michael Baker, Report Author
Mary B. Schwartz, Editor, Online Project Reference File
Eileen Hughes, Managing Editor

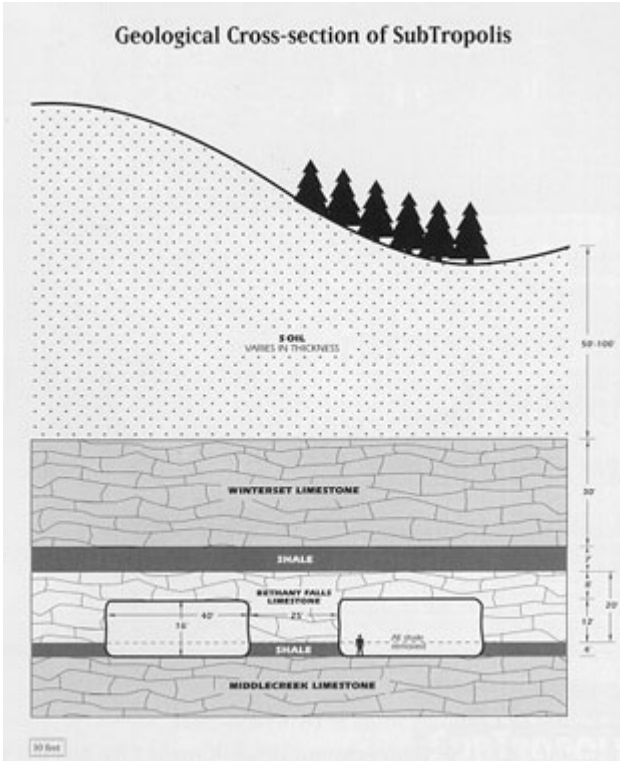
Main entrance to Subtropolis. Although the complex lies approximately 100 feet underground, openings in the hillsides provide street-level access.

paved, well-lighted roads within SubTropolis provide easy access for trucks. The 25-foot-diameter limestone pillars are created by removing the limestone surrounding them.

The rectangular rooms inside the development are ideal for storage.


LEGEND
SURFACE ROADS
UNDERGROUND ROADS
AVAILABLE UNDERGROUND SPACE
LEASED UNDERGROUND SPACE
north

Site plan.



Cross-section of typical warehouse facility.