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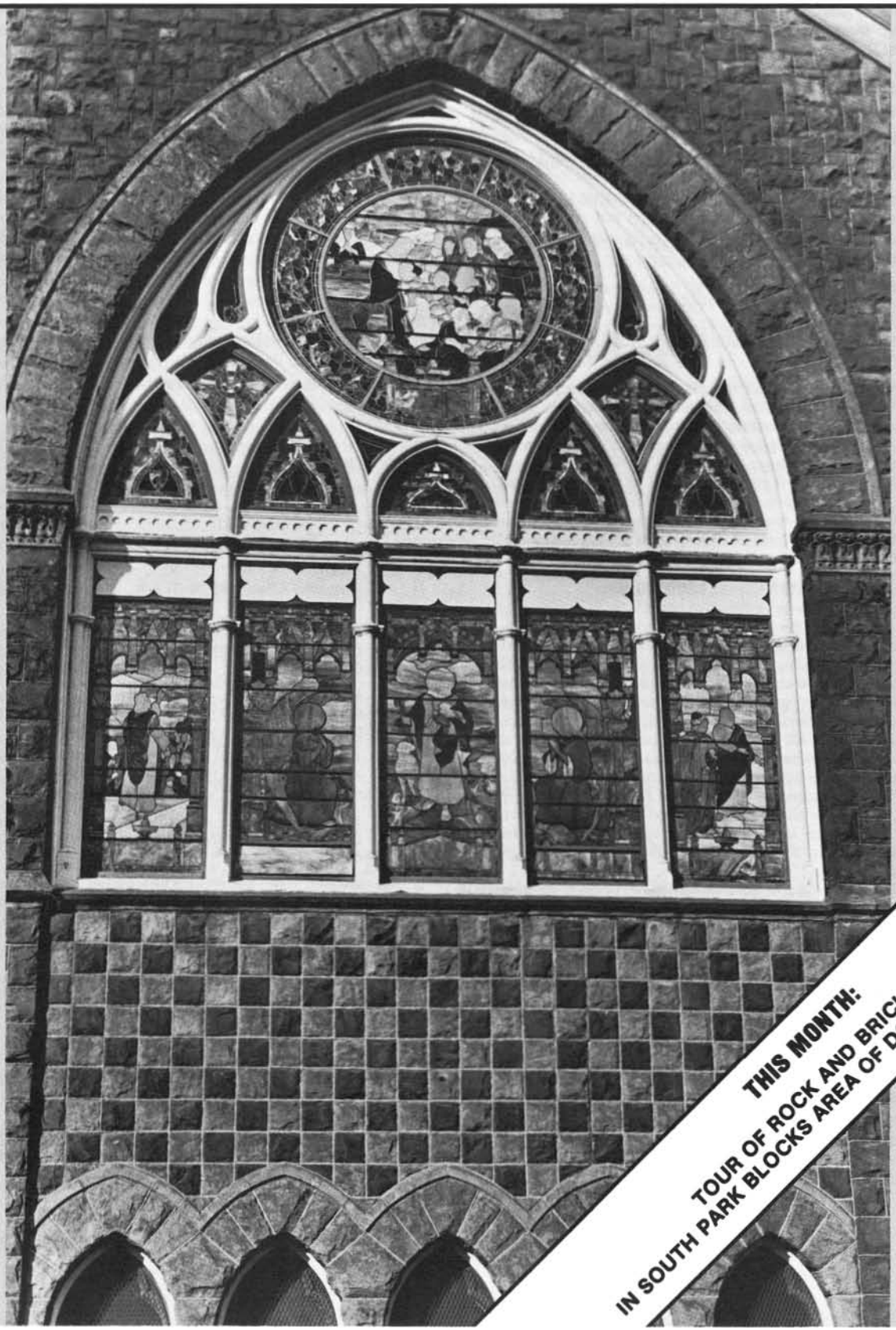

THIS MONTH:
TOUR OF ROCK AND BRICK WALLS
IN SOUTH PARK BLOCKS AREA OF DOWNTOWN PORTLAND

OREGON GEOLOGY

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The style to be followed is generally that of U.S. Geological Survey publications (see the USGS manual *Suggestions to Authors*, 6th ed., 1978). The bibliography should be limited to "References Cited." Authors are responsible for the accuracy of their bibliographic references. Names of reviewers should be included in the "Acknowledgments."

Authors will receive 20 complimentary copies of the issue containing their contribution. Manuscripts, news, notices, and meeting announcements should be sent to Beverly F. Vogt, Publications Manager, at the Portland office of DOGAMI.

COVER PHOTO

Dense, black Oregon basalt is the main material from which this wall at the First Congregational Church in Portland is built. The center of the wall shows a checkerboard pattern of alternating Oregon basalt and Washington sandstone. See related tour guide of walls in Portland's South Park Blocks area beginning on next page.

OIL AND GAS NEWS

ARCO buys Reichhold Energy Co.

On October 1, the sale of Reichhold Energy to ARCO Exploration Company took effect. Leaseholds as well as production facilities were included in the sale. Field operations will be shifted to ARCO's Bakersfield office, but the Reichhold office in Beaverton will remain open until December.

In the Mist Gas Field, site of most of Reichhold's drilling, eighteen of the nineteen producing wells have been operated by the company. ARCO is expected to continue active exploration and development in Columbia County after the sale.

Columbia County

Tenneco Oil has been successful with its first Oregon well. Columbia County 41-28 was drilled to 2,178 ft as an offset to ARCO's Columbia County 44-21 and was completed on September 28. No initial production figures are available at press time.

Exxon Company, USA, is drilling ahead on its GPE Federal Com. 1 in sec. 3, T. 4 N., R. 3 W., to a projected depth of 12,000 ft.

Coos County

Amoco Production Company has abandoned Weyerhaeuser F-1 in sec. 10, T. 25 S., R. 10 W., at a total depth of 4,428 ft. The well was 7 mi west of the company's 11,000-ft dry hole of last year.

Recent permits

Permit no.	Operator, well, API number	Location	Status, proposed total depth (ft)
335	ARCO Columbia County 41-24 009-00176	NE¼ sec. 24 T. 4 N., R. 4 W. Columbia County	Location; 12,000.
336	ARCO Columbia County 22-7 009-00177	NW¼ sec. 7 T. 6 N., R. 5 W. Columbia County	Location; 4,000±.
337	Reichhold Energy Columbia County 22-27 009-00178	NW¼ sec. 27 T. 6 N., R. 5 W. Columbia County	Location; 2,500.
338	Reichhold Energy Longview Fibre 23-25 009-00179	SW¼ sec. 25 T. 6 N., R. 5 W. Columbia County	Location; 2,100.
339	Reichhold Energy Columbia County 32-32 009-00180	NE¼ sec. 32 T. 6 N., R. 5 W. Columbia County	Location; 2,700.
340	ARCO Columbia County 14-30 009-00181	SW¼ sec. 30 T. 6 N., R. 3 W. Columbia County	Location; 6300 (measured depth)

□

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Walls worth walking by: A tour of the South Park Blocks area of downtown Portland

by Ralph S. Mason, former State Geologist, Oregon Department of Geology and Mineral Industries, retired

INTRODUCTION

Immediately south of the downtown business district of Portland is a group of buildings that demonstrate the use of various industrial minerals and rocks to form exterior facings. Several of the structures are included in the National Register of Historic Places, but others range in age and importance from fairly new and uninteresting to somewhat older and more interesting. There are also several wooden-sided buildings close by that are historically important, but since no mineral or rock products were used in their construction, they are excluded from this discussion. This article is the outgrowth of an impromptu walking tour of the area that was written by the author for a geology class in industrial minerals he was teaching at Portland State College (now University) many years ago. Over time, the tour acquired a rough map and later some brief descriptions of the industrial minerals and rocks used in the buildings. It is hoped that the present article will enable others to enjoy this hour-and-a-half-long stroll at their own pace and at a time best suited to them. The tour described here starts at Ira's Fountain (no. 1 on the perspective drawing shown in Figure 1) and works its way west up Market Street to the South Park Blocks, thence back and forth a bit, emerging at last on Fifth Avenue at the County Courthouse and heading southward with a few digressions to the State Office Building, in which, incidentally, the Oregon Department of Geology and Mineral Industries is located. The locations of all the buildings and features discussed in the article are shown in Figure 1.

The streets in the area of this tour are all oriented to magnetic north, in contrast to those north of West Burnside and in most of the rest of the city. The difference between magnetic north and true north in the Portland area is approximately 21 degrees. As you follow this trip guide, "east" means toward the Willamette River and "west" means toward the Portland Hills. The Park Blocks themselves are treated as if they ran north and south. All of the names of the streets and avenues in this part of Portland are preceded by the word "southwest," which, for the sake of brevity has been dropped throughout the article. While "SW Park" is the official name for both streets bounding the Park Blocks, we have, for this tour, called the street on the west side "West Park."

If this article and the tour described whet your interest in Portland's buildings, there are several other self-guiding walks that are described in the references at the end of this report. Although all of these tours can be made at any time, it is perhaps better to go on weekends or holidays when traffic is less and parking more readily available. Schedule your walks during times when the sun either is high in the sky or is obscured by the hills to the west. Trying to observe architectural details hidden in deep shadows is difficult, and squinting into low-angle sunshine is unpleasant.

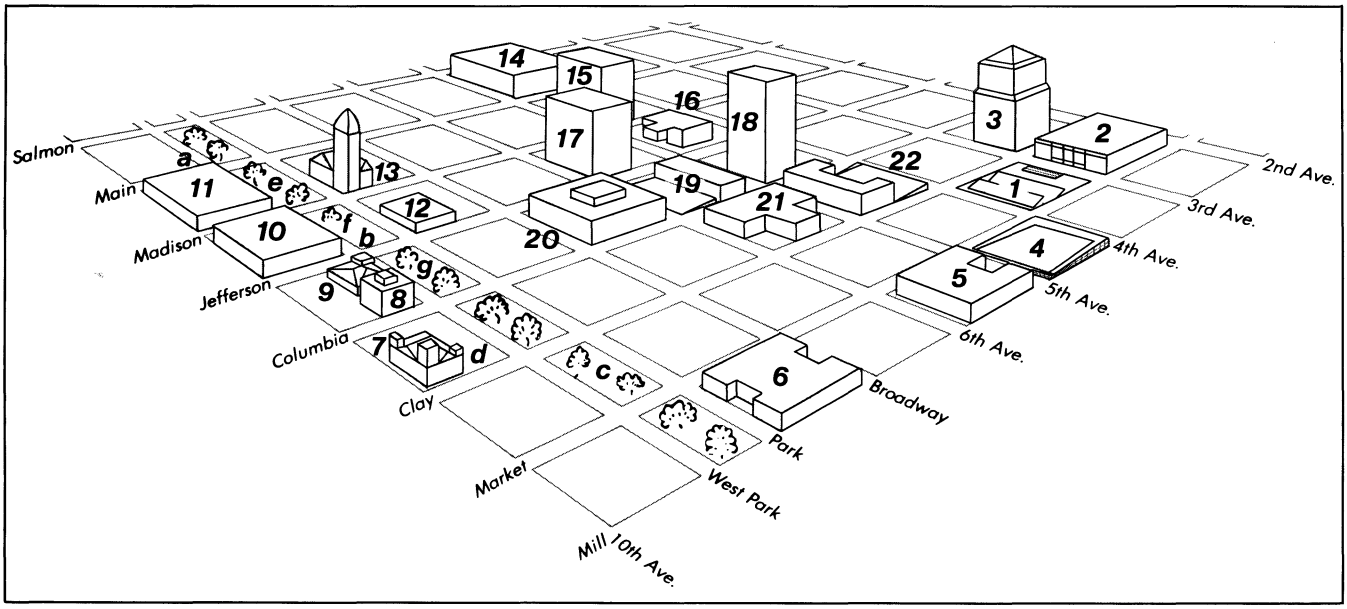

Figure 1. Perspective drawing showing locations of buildings and other features discussed in the trip guide. Numbers indicate the following structures: 1 = Ira's Fountain; 2 = Civic Auditorium; 3 = KOIN Center; 4 = old stone wall; 5 = St. Mary's Academy; 6 = old Lincoln High School (now Portland State's Lincoln Hall); 7 = Portland Korean Church; 8 = Sixth Church of Christ Scientist; 9* = St. James Evangelical Lutheran Church; 10* = Portland Art Museum; 11 = Masonic Temple; 12 = Oregon Historical Society; 13* = First Congregational Church; 14 = Multnomah County Courthouse; 15 = Portland Building; 16* = Portland City Hall; 17 = Pacwest Center; 18 = First Interstate Bank; 19 = Hoffman-Columbia Plaza; 20 =* The Oregonian *building; 21 = Portland Inn; 22 = State Office Building. Letters indicate the following points of interest: a* = Farrell's "sycamore" tree; b = Great Plank Road tablet; c = "In the Shadow of the Elm;" d = iron hitching ring; e = bronze statue of Lincoln; f = Bronze statue of Teddy Roosevelt; g = Peace Plaza sculptures. Asterisk indicates that the building or feature is on the National Register of Historic Places.*

Geologists and stonemasons differ considerably in the terminology they apply to various rocks that are suitable for use as building materials. The geologist is concerned primarily with the origins of the rocks, classifying them as either sedimentary, igneous, or metamorphic. Of lesser importance to the geologist is the physical appearance of the stones when they are prepared for market. To the stonemason who lays the stone and the architect who selects a type of stone to be used in a particular building, color and texture are of paramount concern, and little attention is paid to the niceties of genetic petrographic nomenclature. For instance, a stonemason may call a diabase or gabbro "black granite" and a fine-grained limestone that will take a polish a "marble." There is a certain reasonableness in all this, since the public generally understands what granite and marble are when they see them and are little concerned with the way a geologist may wish to classify them.

Further complicating all this is the common trade practice of attaching trade names to many building stones. Some names have become almost household terms: "Bedford Limestone," "Carrara Marble," and "White Georgia Marble" combine information about both the places of origin and the nature of the material. Some names give little hint as to what the stone really is but convey a certain feeling of quality or value: "Blue Pearl," "Black Diamond," and "Ruby Red" are but a few examples. One is tempted to speculate how much stone a mason-contractor would sell if a geologist were asked to provide names for the stones. Would you order a gabbroic-gneiss, a crypto-crystalline limestone, or a tholeiitic basalt?

In the following guide, every attempt will be made to use geologic terms to identify the materials used in the buildings along the route. In some cases, trade names may be used, but they are enclosed in quotation marks. In researching this article, this author unearthed several rather old references that had been prepared by stonemasons. Their use of trade names in identifying some of the building stones has been most helpful but at times somewhat confusing to someone trying to unravel the geologic nature of the material (see Table 1). At one time, granite was considered to have been formed under purely igneous conditions, but later studies have shown that some present-day granites have been formed from other rocks by processes best described as metamorphic.

A glossary of many terms used in this discussion appears at the end of the guide.

TRIP LOG

This tour begins on Third Avenue, between Clay and Market Streets.

Ira's Fountain (1)*, known also as the Forecourt Fountain, occupies the full block bounded by Third and Fourth Avenues and Clay and Market Streets and faces the Civic Auditorium across Third. Ira's Fountain was designed by the architect Lawrence Halprin and built as part of the South Park Blocks urban renewal project in 1970. A torrent of 13,000 gallons of water per minute cascades down over numerous concrete "cliffs." Look for the faint imprint of wood grain from the concrete-form lumber in the vertical walls. Another point of interest at the fountain is the wall of water that forms a transparent curtain for a walkway protected by an overhang. It is the only moving wall you will find on the tour. In contrast to most of the other structures on this tour, the fountain is composed entirely of manmade stone — concrete, one of the newest "artificial" inorganic building materials. Although the Romans were using natural-setting concretes in pre-Christian times, the development of the modern portland cement dates from 1824 in England.

*Numbers and letters in parentheses indicate locations shown on the perspective drawing in Figure 1.

Table 1. *Classification of some common building stones by geologic origin and equivalent trade names used in the stone industry*

Geologic term	Building trades designation
Igneous rocks:	
Basalt	Basalt
Granite	Granite
Diabase	"Granite"
Gabbro	"Granite"
Metamorphic rocks:	
Gneiss	"Granite"
Granite	Granite
Migmatite	"Granite"
Slate	Slate
Marble	Marble
Serpentine (serpentinite)	"Marble"
Sedimentary rocks:	
Travertine*	"Marble"
Limestone*	"Marble"
Sandstone*	Sandstone

*Identified as "marble" if the stone can be polished.

The Civic Auditorium (2), which is across the street on the east side of Third Avenue, was orginally built in 1917 and then completely renovated in 1967. Only the exterior walls of the old structure were saved, and even they were clothed with panels of white-on-white precast exposed quartz aggregate concrete. Many other modern buildings in Portland also have walls of this type. A wide variety of materials, ranging from white quartz and magnesite through yellow quartzite to dark red, brown, and black volcanic rock, is available for the exposed aggregate. The aggregate may be crushed to a wide range of sizes, or water-worn cobbles and pebbles are sometimes used without further treatment. Some panels are manufactured at the plant but may also be fabricated on the job. One of the more unusual exposed aggregate walls to be found in the greater Portland area consists of thousands of glass marbles, the kind children play with, set in a fine-grained matrix. The wall is located in the Lloyd Shopping Center in northeast Portland.

Across the street between Second and Third Avenues and Clay and Columbia Streets is the KOIN Center (3). Completed early in 1984, this building uses bricks made by the Klamath Brick and Tile Company of Klamath Falls. The bricks on the lower part of the building were laid in place, while those on the upper portions were prepared in reinforced prefabricated panels away from the building, hauled to the building site by truck, and lifted into position by a crane. The pink biotite granite around the planters and on the walls at the base of the building was imported from Sardinia. The light-gray sedimentary rock at the base of the building contains fossils and pieces of chert and shale. The marble in the north lobby of the complex came from several places — the red marble is from Spain, the beige from Sicily, and the white from Carrara, Italy. The fountain in the courtyard of the Fountain Plaza on the west side of the building contains more of the granite from Sardinia and has a pedestal of orbicular granite. The travertine on the walls and floor of the lobby of the Fountain Plaza on the west side of the complex is from an area just outside of Rome, Italy.

From the corner of Clay and Third, walk south to Market Street, turn right, and go west one block to Fourth Avenue.

The rubble wall (4) (Figure 2) that surrounds the block bounded by Fourth and Fifth Avenues and Market and Mill Streets has an interesting history. In the 1860's, sailing vessels arriving from Europe discharged their ballast at the foot of Clay

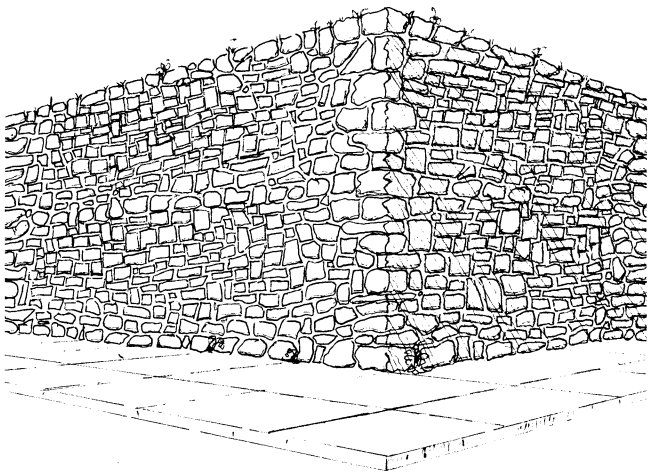

Figure 2. Basalt ballast wall (4) that surrounded the original St. Mary's Academy.

Street before taking on a shipment of grain. Parishioners of the local Catholic church hauled the basalt pieces in wheelbarrows up to St. Mary's Academy and built the wall that still stands intact today. Basalt is no stranger to the downtown area, and it is odd that rock from Belgium was used instead of the same kind of material from the cliff below Broadway Drive, which is several thousand miles closer and a downhill haul to the Academy.

Walk west one block to Fifth and Market.

The new St. Mary's Academy (5) employs the oldest manufactured building material — brick. Fired bricks have been used in construction for 5,000 years and remain today essentially unchanged in format and function. Unfired bricks predate those that are fired, but unfortunately they play a relatively temporary role in building construction and have no part in modern local architecture at all. Historically, bricks have been used in many impressive structures, including the Great Wall of China and the "step" pyramid in Egypt. Properly prepared and fired, bricks have great permanence, and much of our understanding of ancient civilizations comes from writing inscribed on clay tablets, the precursors to papyrus sheets and later paper.

Brick is the building material of choice for many of the buildings in the South Park Blocks area covered by this walking tour. Although standard bricks measuring approximately 2¼ by 3¾ by 8 inches are the most common, several walls use the long, thin Roman units measuring 1½ by 4 by 12 inches and the somewhat thicker Norman style. It should be pointed out, however, that bricks have been manufactured in many different sizes and places over the years. During the manufacturing process, bricks undergo two changes in dimensions: the first occurs during air drying after the brick is formed, and the second takes place when the brick is fired in the kiln. Even if all bricks were extruded from the same size dies in the brick-making machine, variations in the clay, the amount of water, and the presence of other materials such as sand would yield many different sizes of dried ware. In the kiln, there is also some variation in the maximum temperature reached in different places, and as a result, the amount of fired shrinkage also varies.

Surface treatment of bricks includes the plain, smooth finish found on most standard face bricks, the rugose textures known as rug or tapestry, the cracked and twisted overfired bricks, and the rough surfaces formed when Roman and Norman bricks are cracked apart at the job site. Note also the various treatments given to the mortar that holds the brick together (or apart). The joints may be struck flush, recessed, angled, cupped, or beaded. The mortar may be gray (most common), black (rare), white, red, or several other hues. Mortar laid up with too much lime tends to bleed a white smear over time. The Tower of Babel, which was made of brick, had a mortar made of natural bitumen.

The term "brick-red" is familiar to everyone but refers to no specific shade of red, since common bricks, when fired, develop a broad spectrum of "reds" ranging from the nearly black to the lightest of pinks. Differences in clay mixtures, methods of firing, and the distance from the firing ports in the kiln all affect the appearance of bricks. Iron is the chief colorant in brick clay. High-iron clays fire to a deep red, low-iron mixes develop lighter shades, and clays essentially devoid of any iron will turn out white or nearly so. To enhance the appearance of brick, some manufacturers add various materials that produce specks or streaks when fired.

Go west on Market to Broadway, which is one block west of Sixth Avenue.

The art of the bricklayer is often best displayed near the top of a brick wall or building. Look up at the northeast corner of the old (1911) Lincoln High School building (6) at the corner of Broadway and Market for a good example of basketweave brickwork (Figure 3). Other examples can be found with a little neck craning here and there in the area.

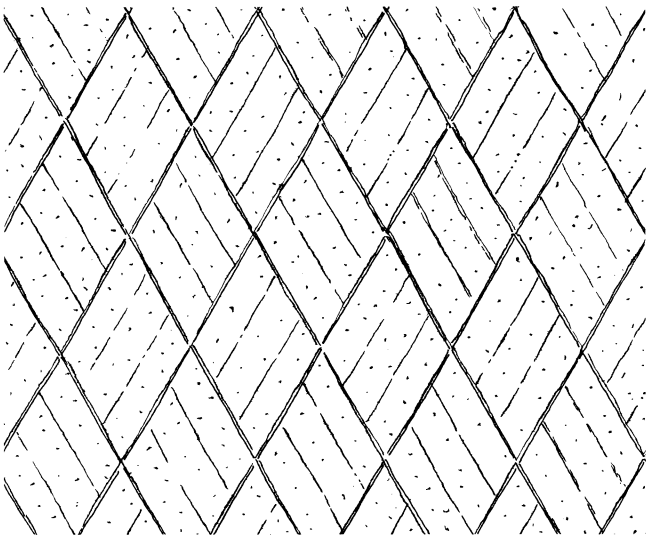

Figure 3. Detail, "basket weave" pattern in brick in east wall of the old Lincoln High School (6).

Continue west on Market Street to the South Park Blocks.

The Park Blocks actually consist of a park area bounded on the east side by Park Avenue and on the west side by what we are for the sake of convenience calling West Park Avenue and broken at intervals by streets that run roughly east-west. Part of the sidewalk running through the Park Blocks is made of hexagonal-shaped blocks of asphalt concrete. As you walk through the South Park Blocks, take a more critical look at all of the brickwork in the buildings on the Blocks, noting the texture, color, mortar, shape, and method of placement of the bricks.

Turn right and walk half a block north on the sidewalk in the center of the Park Blocks.

In the center of the sidewalk, the "Shadow of the Elm" (c) has been outlined in white Sierra granite by artist Paul Sutinen. The "shadow" stems from a circular stone medallion

representing the location of one of the original elms (*Ulnus americana*) that were planted in a regular pattern along the Park Blocks in 1877. Artist Sutinen's "elm" is actually a composite derived from several neighboring trees, but at first glance it appears to be the tracing of an actual tree between Market and Clay Streets.

Continue north to Clay Street, cross to the north side of Clay, turn left, and go for one block.

Imbedded in the Clay Street curbs, some of which date back to at least 1903, are iron rings (d) (Figure 4) about 4 inches in diameter. These were used for hitching horses left unattended by their owners who were making social or business calls. Drivers of commercial horse-drawn rigs, however, rarely bothered with the rings, choosing instead to use old flatirons or other weights to anchor the reins — or else to rely on the reluctance of a tired horse to go anywhere unless forced to do so. One small mystery surrounds these iron rings. Why, after being exposed to the weather for about a century, aren't the rings covered with rust?

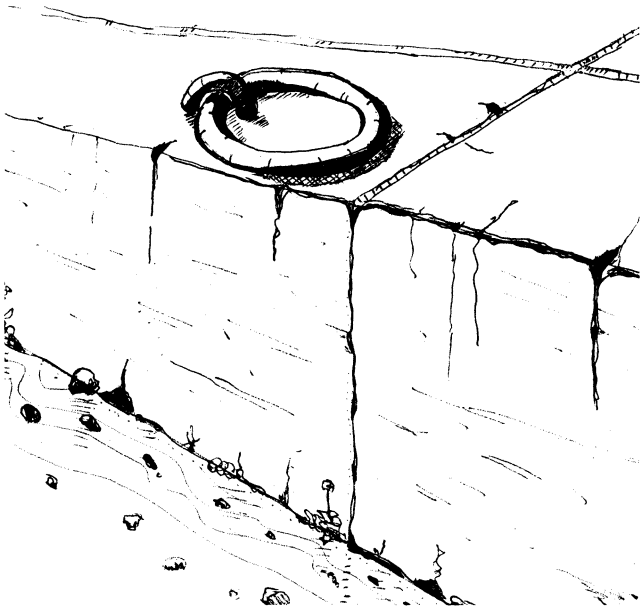

Figure 4. Old iron hitching ring (d).

Another relic of the past is the circular metal cover located in the sidewalk on the north side of Clay Street between West Park and Tenth Avenues. The metal plate covers the upper end of what used to be a basement coal bin. Many buildings in the area were heated with coal until the advent of either oil, gas, or commercial steam brought an end to the horse-drawn wagons that delivered coal in the fall and winter and ice in the summer. The teams pulling these wagons required no hitching rings — they knew all the stops and turns, and the driver rarely had to touch the reins while on the route.

The Portland Korean Church (7) on Clay between West Park and Tenth Avenues has overfired brick covering the walls of the lower portion of the building. The bricks are badly warped and twisted, and the brickmason had to resort to making a wavy mortar line between courses to accomodate the unevenness of the dark-red to nearly black brick.

Return to West Park, turn left, and go for one block.

Some nicely detailed brickwork is exhibited by the Sixth Church of Christ Scientist (8) at the corner of Columbia and West Park. Look at the details of the brickwork over the entire building and particularly at the east wall over the entrance. The church building is over 50 years old, yet the walls are remarkably crisp and fresh looking.

Proceed northward on West Park to the adjacent building.

St. James Evangelical Lutheran Church (9) (Figures 5 and 6) has stood, with several changes and additions, at the corner of Jefferson and West Park since 1890, when the Pioneer Chapel at the west side of the present complex was dedicated. In 1907, the addition adjoining the chapel on the east was completed, together with a somewhat smaller tower than the one that is now there. Both portions of the church are enclosed in Tenino, Washington, sandstone blocks with a rustic facing. The band course of the chapel on the northwest corner of the building is a dark-red sandstone that shows signs of rather severe

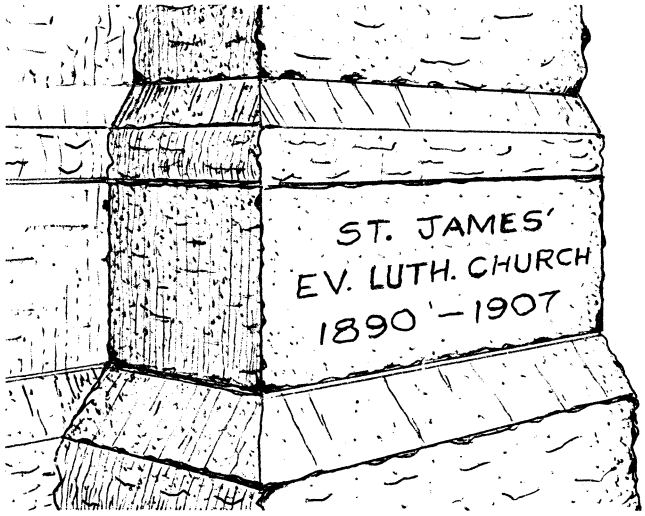

Figure 5. Cornerstone for St. James Evangelical Lutheran Church (9).

weathering. The equivalent band on the newer portion is buff colored and in much better condition. The original upper part of the tower was removed and restored after considerable reinforcing to maintain the integrity of the walls. Stone to renovate the tower was obtained from Harry Gindhart's quarry near Lebanon in the Willamette Valley. The more recent addition to the office and classroom complex on the south end of the building is faced on the east side with white marble panels. Note also the hornblende-biotite granite sculpture, "Within Reach," by Eugene, Oregon, sculptor Steve Gillman. The stone used in this sculpture came from near Sacramento, California.

St. James Church is the oldest building still standing in the South Park Blocks. The church has numerous stained glass

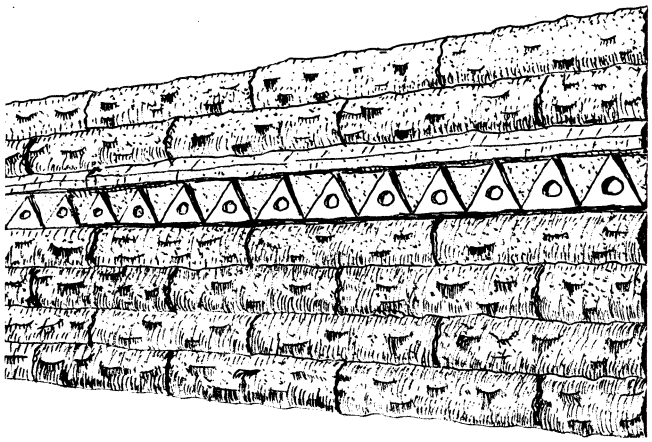

Figure 6. Detail, north wall, St. James Evangelical Lutheran Church (9).

windows. The large, upper windows were created by Povey, the lower ones by Bert Willemsee. Bryce Anderson produced the windows in the renovated tower. One of the most charming walls to be found on the entire walking tour is that on the west side of the Pioneer Chapel. The brick is undeniably not top quality, and the brickmasonry leaves much to be desired. Quite obviously, the wall was intended to have an exterior covering; but if it was ever applied, all traces have now vanished.

Return to West Park, cross Jefferson Street, and walk north to the middle of the block.

The Portland Art Museum (10) (Figure 7) between Jefferson and Madison Streets was built in 1932, with Pietro Belluschi as architect. The Hirsch Memorial Wing was added in 1939. The original design called for considerably more exterior embellishment than the massive brick walls trimmed with Colorado travertine that stand today. Note the copper staining on the travertine below the metal lights on both sides of the entrance. The building exhibits strong Roman elements that reflect the architect's student days in Italy. The Sculpture Mall adjoins the museum on the north side.

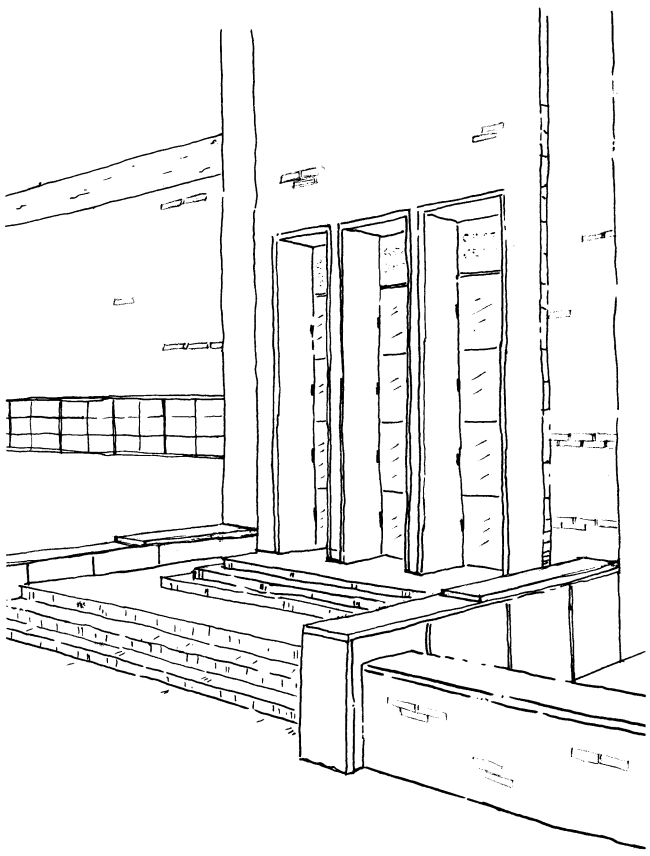

Figure 7. Entrance, Portland Art Museum (10).

Continue north on West Park, crossing the end of Madison Street.

The Masonic Temple (11), which occupies the block between Madison and Main Streets and faces on West Park, is another massive brick structure. The perimeter wall is capped with slabs of fairly coarse-grained manmade stone. Over the years, the matrix has begun to weather away, leaving the aggregate standing in relief. This tends to soften the appearance of the surface but presents a rather sandpapery texture to the touch. The building was built in 1927. If you examine closely the coarse-grained igneous rock forming the steps and porch of the Temple, you can see lath-shaped, iridescent, blue-colored labradorite crystals that are in subparallel alignment.

Cross Main Street and stop on the corner of Main and West Park.

At the northwest corner of the intersection of Main and West Park there stands a magnificent london plane tree (*Platanus acerifolia*) (a) that was planted in 1880 by Sylvester Farrell. At the base of the tree, a gneiss marker indicates incorrectly that the tree is a sycamore (which is a close relative of the london plane tree). The marker also left out an "L" in the gentleman's last name. The tree has been placed on the National Register of Historic Places. It is the sole survivor from pioneer times in the immediate area.

Walk east to the center of the Park Blocks and go south (right) on the center sidewalk through the Park Blocks for two blocks, admiring the heroic bronzes on the way.

Two larger-than-life statues grace the Park Blocks between Jefferson and Main Streets. Both were given to the city by Dr. Henry Coe in the 1920's. The statue of Lincoln (e), created by George Fite Waters, is an original and the only one ever cast. It stands on a granite base. The other statue is of Theodore Roosevelt (f), dressed in the military outfit he wore during the charge of the Rough Riders up San Juan Hill in Cuba in 1898. The Roosevelt statue was sculpted by A. Phimister Proctor, who also did another equestrian statue, the "Circuit Rider," which stands on the State Capitol grounds in Salem. A block of biotite granite forms the base of the Roosevelt bronze.

At the intersection of the center sidewalk and Jefferson is a tablet (b) set in a large block of basalt. The tablet commemorates the Great Plank Road, which extended from downtown Portland westward up the canyon now traversed by Canyon Road and on into the Tualatin Valley. The road provided a vital link between the burgeoning city of Portland, with its deep-water port, and the agricultural lands and forests of the Tualatin and Willamette Valleys. The road was paved with rough planks obtained from trees growing beside the right-of-way — a common practice where trees were plentiful and the mud deep. The Great Plank Road was completed in 1851.

Cross Jefferson and continue south along the center sidewalk for another half block.

Of more recent vintage than the bronze statues is the group of large, white granite blocks forming the sculpture named "Peace Chant" (g) that adorns the Peace Plaza in the Park Block between Columbia and Jefferson Streets. This 1984 sculpture is also by Eugene sculptor Steve Gillman. The stone came from near Fresno in southern California, and the upright piece weighs approximately 20,000 pounds. The long, thin grooves visible in the blocks are from the wire saw used to saw the blocks directly from the ground.

Return to the corner of Jefferson and Park.

Panels of exposed aggregate cover the walls of the Oregon Historical Society building (12) on the east side of Park Avenue between Jefferson and Madison Streets. The structure was erected in 1966.

Go north on Park to Madison.

The First Congregational Church (13), situated on the southwest corner of the block at Madison and Park Avenue, has walls that are composed largely of dense, black Oregon basalt (Figures 8 and 9). Relief from this dark appearance is provided by blocks of buff Tenino sandstone from the state of Washington, which on the south wall are laid up with alternate blocks of basalt to form a checkerboard pattern underneath the large, stained-glass Gothic windows (Figure 10). The same checkerboard pattern appears on the west side of the building. Elsewhere on the exterior walls, the basalt is in a random ashlar pattern. The blocks are squared up on all but the exposed faces, which are rough.

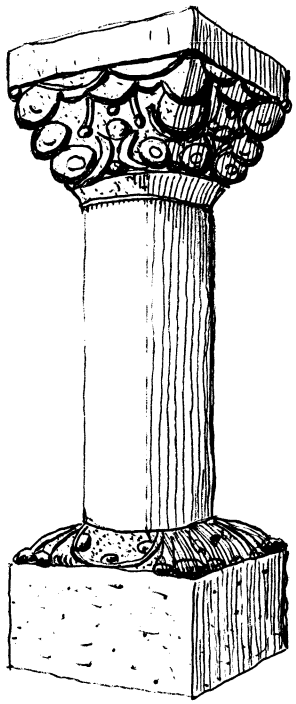

Figure 8. Detail, support column, main entrance, First Congregational Church (13).

This Venetian Gothic building was designed by Henry J. Hefty. Construction of the church began in October 1880, but delays, caused in part by the panic of 1893, slowed the work for several years. It was not until 1895 that the first service could be held in the church. The church was originally equipped with three towers, but the two 100-foot members were removed in 1940, leaving the present 185-foot-high bell tower on the southwest corner of the building. The Columbus Day windstorm in 1962 caused extensive damage to the sheet-metal work surrounding the carillon section of the tower. The church roof is covered with hand-wrought steel shingles. The virginia creeper (*Parthenociccus quinquefolia*) that covers part of the church's west side was planted in 1900.

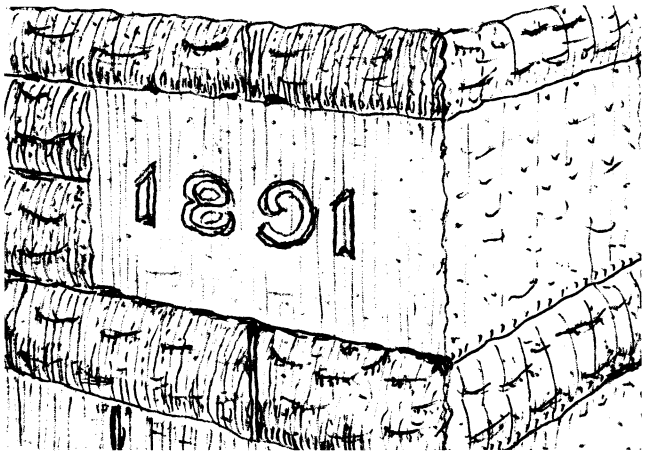

Figure 9. Cornerstone, First Congregational Church (13).

Go one block north to Main, turn right and go three blocks east on Main, noting the bedding, crossbedding, differential weathering, and exfoliation of the sandstone of the U.S. Courthouse between Broadway and Sixth and also the pink twinned potassium feldspar crystals in the coarse-grained granite ashlar masonry walls surrounding the Standard Plaza building between Sixth and Fifth.

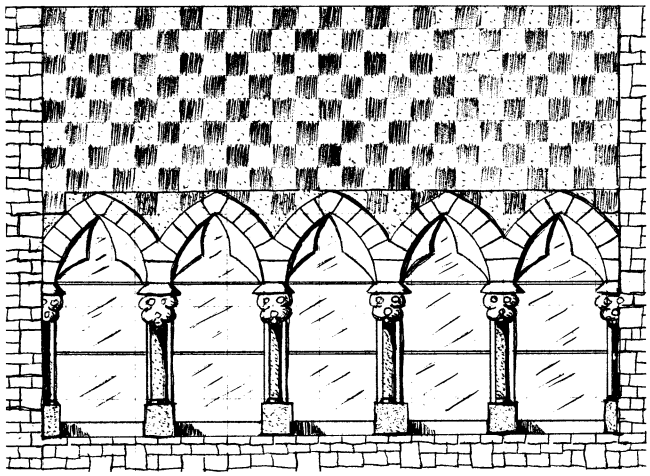

Figure 10. Detail, south wall, First Congregational Church (13).

The Multnomah County Courthouse (14), which occupies the block between Fourth and Fifth Avenues and between Salmon and Main Streets, is constructed of large sandstone blocks from Bedford, Indiana, resting on a base of California granite. The building was constructed in 1913.

Go south one block on Fifth Avenue.

The Portland Building (15) was completed in 1983. The walls at street level are covered with 6-inch-square blue glazed tile. The upper walls are embellished with earth-tone-colored tiles and stylized blue garlands that not only add variety to the local scene but also break up the otherwise boxy appearance of the building. The 6½-ton hammered-copper statue "Portlandia," by sculptor Raymond Kaskey, kneels over the west entrance. The building architect, Michael Graves, has created an edifice that is in sharp contrast to the massive, no-nonsense Court House to the north and the carefully crafted City Hall to the south.

Go south one block on Fifth Avenue.

City Hall (16), constructed in 1895, rests on the foundation for another building. The original construction was stopped when city annexations dictated the need for a much larger building, and a new structure was commissioned. The walls are covered with yellow-gray, cross-bedded fossiliferous sandstone from Wyoming, and the pillars supporting the portico consist of alternating sections of pink granite and sandstone. Blocks of granite are at the base of the building.

Cross to the west side of Fifth Avenue.

The highly polished stone decorating the planter and the lower portions of the Pacwest Center (17) on the west side of Fifth between Madison and Jefferson is "Blue Pearl," really a larvikite from Finland. The stone was quarried in Finland and shipped by boat to Italy, where it was cut and polished by stonecutters living near Carrara, center of stone fabrication for centuries and location of the quarry from which Michelangelo and many other sculptors obtained marble for their statues.

Return to the east side of Fifth Avenue and continue one block south on Fifth, crossing Jefferson.

The First Interstate Bank building (18), located between Columbia and Jefferson on Fifth Avenue, is bounded by a low wall of blocks of 1.8-billion-year-old red Cold Springs granite from the Minnesota River Valley in southwest Minnesota. The steps are also of the same granite. The walls of the 40-story building are covered with white Carrara marble from Italy.

Go one block west on Columbia.

The Hoffman-Columbia Plaza building (19) between Columbia and Jefferson streets and Fifth and Sixth Avenues has wall units of white-on-white quartz aggregate, with travertine and glazed brick on the plaza. The aggregate units each weigh 38 tons and were delivered to the job site with all glazing, ducting, wiring, and other utility conduits already installed. The building, which was also designed by Belluschi, was completed in 1965.

Cross Sixth Avenue, and examine The Oregonian *building.*

The Oregonian building (20), bounded by Columbia and Jefferson Streets and Fifth and Sixth Avenues also uses Cold Springs granite from Minnesota for its base course. This stone is probably better identified as a migmatite. The upper surfaces of the building are sheathed in buff-colored Bedford, Indiana, limestone. Some of the limestone panels have begun to weather slightly, and faint traces of the sedimentary bedding are now appearing. Pietro Belluschi designed this massive building that was completed in 1948.

Go to the corner of Columbia and Sixth, turn east, and walk down Columbia, examining the Portland Inn.

The once-white, but now painted tan, rubble wall on the north side of the Portland Inn (21) that faces Columbia Street between Fifth and Sixth Avenues is composed of magnesite, a magnesium carbonate mineral from the state of Washington. The large chunks penetrate the exterior wall and are also used to decorate the interior of the west (Sixth Avenue) entrance of the restaurant.

Cross Fifth Avenue, and examine the State Office Building.

The State Office Building (22) at 1400 SW Fifth is unique among the buildings visited on this walking tour. It is the only structure that is enclosed, except for the ground floor, by ceramic panels. The lower-level covering is again the same red Cold Springs granite used in both *The Oregonian* and the First Interstate Bank buildings. This 1.8-billion-year-old stone is by far the oldest building material used in any of the South Park Blocks area buildings. The foyer wainscot is Italian travertine, and the two cylindrical columns are black gabbro containing beautifully twinned feldspar crystals that flash rainbow colors when viewed in full sunlight.

This is the end of the official tour.

GLOSSARY

Aggregate — The mineral material, such as sand and gravel or crushed stone which, when mixed with cement, forms a mortar or concrete. In structural concretes the aggregate remains largely obscured by the cement-sand matrix, but in exposed-aggregate panels, specially selected aggregate is made visible by the removal of part of the enclosing matrix, leaving the aggregate standing in relief on the panel surface. Many different effects can be obtained by type of aggregate, amount of exposure, color of the matrix, and other factors.

Ashlar — A squared block of building stone, and also masonry composed of such stones. Various styles include coursed, random coursed, and broken coursed.

Band course — An ornamented course of stone usually set in relief in a wall and of a width differing from the rest of the courses.

Basalt — A dense, usually dark-colored lava. Basalt is extensively used as an aggregate in road construction but rather sparingly in building walls. Basalt flows cover vast areas of the Pacific Northwest. Weathered basalt turns a buckskin color and loses much of its compressive strength.

Diabase — Similar to gabbro but finer textured.

Dimension stone — See "Dressed Stone." Also called "cut stone."

Dressed stone — Stone blocks that have been shaped by either hand or machine tools. Also called "cut stone."

Gabbro — A dark, igneous rock, typically coarsely crystalline. Often called "black granite" by the building trades.

Gneiss — A metamorphic rock exhibiting banded, often swirled masses of minerals of contrasting color.

Granite — A coarse-grained igneous rock with great strength and durability that is much used in foundation work in older buildings. Granite is also fashioned into wall panels and other building elements. Both size of grain and color have wide ranges, and many beautiful and striking examples can be found in public buildings.

Limestone — Most limestones are composed of the mineral calcite, but various impurities are common, and many limestones may contain considerable amounts of quartz sand. Gradations from pure limestone through a sandy limestone to a limey sandstone produce building stones having markedly differing appearances and architectural applications.

Marble — Composed of calcium carbonate, marble is chemically similar to both travertine and limestone. In the building stone business, marble usually refers to any limestone that will take a polish. Much used in fine statuary, marble finds extensive use in architecture, particularly in interiors where smooth surfaces are easily maintained.

Migmatite — A composite rock containing igneous and/or metamorphic material, producing a rock of much visual interest. Some migmatite building stones have been called "agate granites" commercially.

Rubble — Rough or naturally formed stones that are laid up in masonry walls without extensive dressing.

Rustic — Walls laid up with building stones having a rough exposed surface.

Rusticated — Building stones having horizontal, recessed joints and roughened or otherwise treated faces to distinguish them from plain dressed stone.

Sandstone — As the name implies, the chief component of this important class of building stones is sand, usually composed of rounded quartz grains. The grains may be cemented by lime, silica, iron, or other minerals. Texture and color may vary widely.

Serpentine — A metamorphic rock, more correctly called "serpentinite," composed largely of the mineral serpentine, which is typically green, greenish-yellow, or greenish gray. Verde antique "marble" is mostly serpentinite.

Stone face — A rough, usually natural surface on the exposed cut stone face of a building stone. Stone used for rustic walls may have stone faces modified with a pitching tool. "Rock face" and "stone face" are equivalent terms.

Travertine — Composed of calcium carbonate, this buff- or tawny-colored stone is much used in building construction for walls, floors, trim, and other architectural embellishments. Typically the stone has a banded or swirled pattern with numerous irregular holes throughout. Much of the travertine used locally is imported from Italy.

Wainscot — The lower portion of a wall surfaced in a different material from the upper part. Many public buildings use stone panels for this surface.

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TO THE EDITOR

In the description of DOGAMI's new report, Oil and Gas Investigation 10, *Mist Gas Field: Exploration and Development 1979-1984,* on page 122 of the October 1985 issue of *Oregon Geology*, the following misstatement occurs: "A DOGAMI report of 1976 recommended the area near Mist for exploration. This recommendation finally led to the first gas well completion in Oregon on May 1, 1979." The first sentence is correct; the second is not.

Most of the leasing in the Mist area by Reichhold Energy Corporation, which drilled the discovery well, was done in 1975, and the leased area was based on mapping done in the late 1950's by Charles O. Newell of Tumwater, Washington. The location at which the discovery well was drilled was also picked on the basis of Newell's geologic mapping as updated and revised in a minor way by me.

The 1976 report referred to by the write-up was prepared by Vernon C. Newton, Jr. It was and still is a good report on the regional geology of the area, but Vern would be the first to tell you that it was not sufficiently detailed to guide exploration drilling, nor was it intended to do so. So far as Reichhold's exploratory plans in the area were concerned, the DOGAMI report was also after the fact.

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Slide program on minerals available from Maryland League of Women Voters

A slide program based on the book, *Minerals — Foundations of Society,* by Ann Dorr, may now be purchased from the Maryland League of Women Voters. The purpose of the program is to introduce, graphically as well as through photographs, the complex world of nonfuel minerals. Major topics considered are mineral origins, geographic distribution, development, and present and future U.S. and world needs.

A complete kit has been assembled by the Maryland League to be used as a two-part presentation of this program. The kit includes a copy of the book, *Minerals — Foundations of Society;* a two-part slide program, each about 45 minutes in length, including discussions and activities; a guide to presentation, with questions and activities; a printed script keyed to slides and the book; and a cassette tape of the script. This edition of the slide program is designed to involve the audience in active participation in the presentation.

Purchase price of this 95-slide presentation is $85. Orders should be sent prepaid to League of Women Voters of Montgomery County, Maryland, Inc., 12216 Parklawn Drive, Rockville, MD 20852, phone (301) 984-9585. In order to keep the price of the presentation low, the League is not able to send slide programs out for preview. When ordered with the slide program, extra copies of the book, *Minerals — Foundations of Society,* may be purchased for $2.50 each. □

Did you know . . .

Gold is called a "noble" metal (an alchemistic term) because it does not oxidize under ordinary conditions. Its chemical symbol Au is derived from the Latin word *aurum*. This word, by the way, is not related to "ore"! "Ore" is derived from the Latin word *aes* which meant "copper" or "bronze." □

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