GUIDE TO

TWENTY-THIRD ANNUAL FIELD CONFERENCE

OF THE

SECTION OF GEOLOGY

OF THE

OHIO ACADEMY OF SCIENCE

MAY 8 and 9, 1948

A STUDY OF

THE GEOLOGY OF LUCAS COUNTY

AND

THE LIME-DOLOMITE BELT

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CONFERENCE GUIDE

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GENERAL STATEMENT

Pages 1 and 2 of this circular give data and instructions needed to follow properly the course of the trip. On page 3 is a column of the rock formations present in Lucas County and on pages3, 4, and 5 will be found a short statement concerning the lithology and fauna of each formation.

On page 6, figure 1 is a map showing the areal distribution of each rock unit in Lucas County, the location and relation of the Lucas County monocline and the Wood County fault, and the location of the Silica, Holland and Waterville quarries which will be visited on Saturday. Figure 2 on page 7 is a geologic map of the area around the Silica quarries and figure 3 on page 8 is a geologic map of the area around the Holland quarry. Pages 9, 10, and 11 record the geologic sections by zones as exposed in the Silica, Holland, and Waterville quarries. Page 12 is a partial bibliography.

This circular has been compiled by J. Ernest Carman. The data upon which it is based is largely from the field notes and manuscripts of Mr. Carman. This information has been made available for this circular by the Geological Survey of Ohio but no part of it should be published without previous permission of the Geological Survey. The expenses for the drafting and printing of this circular have been borne by the Geological Survey of Ohio and the Department of Geology, Ohio State University.

SATURDAY, MAY 8

Meeting Place

The conference party will assemble at Toledo on Saturday morning, May 8. The exact time and place will be announced at the Friday afternoon session of the Geology Section at the University of Toledo.

Silica Quarries

Leaving Toledo the cars should follow the leading car to Silica. Anyone meeting the party at Silica should be on Sylvania road east of Centennial Road.

Figure 1 on page 6 shows the location of Silica. Figure 2 on page 7 is a geologic map of the area, showing the location of the several quarries and which rock unit is present in each. Silica is located on the Lucas County monocline where the rock strata dip westward at an angle of six to seven degrees. In the several quarries the Sylvania, Amherstburg-Lucas, Columbus, and Silica formations will be studied and some time allowed for collecting fossils from the Silica shale. The rock section exposed in the vicinity of Silica is recorded on page 9.

Holland Quarry

From Silica the route will be southward along the line of the monocline to the Holland quarry (see figure 1). Figure 3 on page 8 is a geologic map of the area around the Holland quarry. Here the Tymochtee, Put-in-Bay, Raisin River, Sylvania, and Amherstburg-Lucas formations will be studied. The rock section exposed at the Holland quarry is recorded on page 10. The general features of the Lucas County monocline will be observed at both Silica and Holland.

Lunch. The party will probably lunch at Maumee.

Waterville Quarry

During the afternoon the party will visit the Waterville quarry (see figure 1) and the nearby Maumee River valley where the best exposures of the Tymochtee formation will be seen. The rock section exposed at the Waterville quarry is recorded on page11. Here also is the only exposure of the Wood County fault or fault zone. The characteristics of this fault zone and its relations to the Lucas County monocline will be considered. Also several exposures showing interesting sedimentation and structural features in the Tymochtee formations along the Maumee River rapids will be visited.

Saturday night. The party will return to Toledo.

SUNDAY, MAY 9

Lime-dolomite belt

The trip planned for Sunday, May 9, will lead southward along the great Niagaran lime-dolomite belt through western Ottawa, Sandusky and Seneca counties. This is one of the most important areas in the United States for the manufacture of lime and dolomite products.

Along this route are a number of large quarries exposing the Guelph unit of the Niagaran and the Greenfield unit of the Bass Island. Stops will be made at quarries at Clay Center, Woodville, and Maplegrove to study the stratigraphy, faunas, minerals, and the stratigraphical relations of the two rock units.

At Clay Center good crystals of celestite, calcite, and fluorite will be found. The Guelph fauna is well developed at Clay Center and at Woodville where the large pelecypod Megalomus canadensis is abundant.

The end. The trip will end in the early afternoon at Maplegrove.

COLUMN OF ROCK FORMATIONS OF LUCAS COUNTY

Devonian system	
Ohio shale	100' +
Tenmile Creek dolomite	40'
Silica formation	40'
Blue limestone	8'
Columbus limestone	55'
Lucas dolomite	120'
Amherstburg arenaceous dolomite	10'
Sylvania sandstone	40'
Silurian system	
Raisin River dolomite	50'
Put-in-Bay dolomite	35'
Tymochtee shaly dolomite	150' +
Greenfield dolomite	50'
Guelph dolomite	100' +

CERTAIN GENERAL STATEMENTS CONCERNING EACH FORMATION

Guelph Dolomite

The Guelph dolomite is exposed in a number of quarries along the lime-dolomite belt in western Ottawa and Sandusky counties. It is a blue-gray, porous dolomite which appears in two types: (1) massive ledges of very porous or vesicular stone with corals and stromatoporoids abundant, being apparently reef-rock largely formed in place; (2) more even-textured, bedded stone with a greater variety of fossils, being apparently formed from sediments laid over the sea bottom between the reefs. The more common or distinctive fossils include:

Stromatopora sp.	Monomorella sp.
Favosites niagarensis	Trimerella ohioensis
Halysites catenulata	Megalomus canadensis
Pycnostylus guelphensis	Euomphalus rugosous
Syringopora sp.	Tremanotus alpheus

Greenfield Dolomite

The Greenfield dolomite is the first bed rock beneath the drift in the region around Toledo and most of the eastern part of the county. It is exposed at the margins of several of the Guelph dolomite quarries of the lime-dolomite belt resting disconformably on the Guelph dolomite. The Greenfield is a drab, fine-grained dolomite with carbonaceous partings and commonly in beds 2 to 6 inches thick but locally in thicker beds. The fauna includes about 15 species of which Hindella rostralis, Camarotoechia hydraulica, Schuchertella hydraulica, and Leperditia ohioensis are most characteristic.

Tymochtee shaly dolomite

The Tymochtee is drab, thin-bedded, laminated, argillaceous or shaly dolomite with much carbonaceous material as partings. No complete exposure is known but the thickness is more than 150 feet. It probably grades into the Greenfield without definite contact. The fauna includes only 3 species, and the specimens are few in number. They are small, depauperate Greenfield forms of Hindella and Leperditia.

Put-in Bay dolomite

The Put-in Bay is commonly a dark-drab, brecciated, rough-textured, massive dolomite but where not brecciated it is a bedded stone in layers 2 to 6 inches thick. The fauna includes about 10 species but fossils are rarely found. Eurypterus eriensis, Goniophora dubia, Leperditia alta, and Spirifer ohioensis are most characteristic.

Raisin River dolomite

The Raisin River is commonly blue-gray to drab, banded, argillaceous dolomite in beds 2 to 8 inches thick. Certain layers have a mottled, speckled or streaked color pattern. There are also, at places, thicker beds or massive, brecciated ledges. The fauna includes about 15 species but fossils are rare. Whitfieldella prosseri is diagnostic and Pterinea lanii and and Spirorbis laxus are characteristic.

Sylvania sandstone

The Sylvania is the lowest unit of Devonian age and rests disconformably on the Raisin River. It is an even-grained quartz sandstone of well rounded grains, loosely connected. It grades upward through dolomitic sandstone and arenaceous dolomite into the overlying Amherstburg or Lucas dolomite. Fossils commonly exist in the transition beds in the upper part and have been found to the base of the sandstone. The fossils are of the age of the overlying dolomite. The Sylvania is interpreted as an eolian sand reworked by the oncoming Devonian sea and is not of the same age at all places.

The Amherstburg dolomite

The typical Amherstburg dolomite is not present in Lucas County but the fossils in the transition beds at the top of the Sylvania are of Amherstburg age. By the time the transition to dolomite was completed the Lucas fauna had arrived. In fact the fauna in the Sylvania at the south border of Lucas County is of Lucas age. The Devonian sea reached Lucas County in late Amherstburg and early Lucas time. The Amherstburg fauna in the transition beds includes about 30 species with such characteristic Devonian genera as Stropheodonta, Heliophrentis, Cylindrohelium, Coratopora, Conocardium, Phacops, Proctus.

Lucas dolomite

The Lucas is gray to drab, bedded dolomite commonly in layers 3 to 12 inches thick but at places with thicker, rougher-textured ledges. It is only moderately fossiliferous with a fauna of about 40 species among which small gastropods predominate. A few layers contain an abundance of the brachiopod Prosserella lucasi. Some of the more common forms are as follows:

Prosserella lucasi	Acanthonema (3 species)
Prosserella subtransversa	Holopea (2 species)
Cylindrohelium heliophylloides	Hormotoma subcarinata
Cylindrohelium profundum	Conocardium monroicum

Columbus limestone

The lower part of the Columbus is a brown, grainy, thick-bedded dolomitic limestone with few fossils. The upper part is gray, crystalline, very fossiliferous limestone. The fauna includes about 75 species. A few of the more characteristic or abundant forms are as follows:

Prismatophyllum davidsoni	Atrypa reticularis
Favosites (several species)	Atrypa spinosa
Frond bryozoa	Cyrtina alpenensis
Paracyclas elliptica	Cyrtina umbonata
Conocardium cuneus	Productella spinulicosta
	Stropheodonta hemispherica

Blue limestone

The blue limestone is quite argillaceous, a lithologic transition from the purer limestone of the Columbus below to the dominantly shale characteristic of the Silica above. It contains a large fauna in which corals predominate. Some of the more abundant forms are as follows:

Prismatophyllum davidsoni	Atrypa reticularis
Cladopora roemeri	Chonetes coronatus
Cystiphyllum vesiculosum	Cyrtina alpenensis
Favosites (several species)	Spirifer audaculus
Helliophyllum halli	Spirifer mucronatus v. prolificum
Stromatopora nodosum	Stropheodonta perplana

The Silica formation

The Silica consists of alternating zones of blue shale and argillaceous limestone. The fauna of the exposed lower part (zones A to C of p. 9.) has been described by Dr. Grace Anne Stewart and published as Bulletin 32, Geological Survey of Ohio. It is a large fauna of about 75 species.

A few of the more abundant species are as follows:

Aulopora serpens	Rhipidomella vanuxemi
Heliophyllum halli	Spirifer audaculus
Arthracantha carpenteri	Spirifer bownockeri
Fenestella sp.	Spirifer mucronatus v. prolificum
Hederella sp.	Stropheodonta demissa
Atrypa reticularis	Pterinea flabellum
Chonetes coronatus	Platyceras bucculatum
Cyrtina hamiltonensis	Phacops rana v. milleri

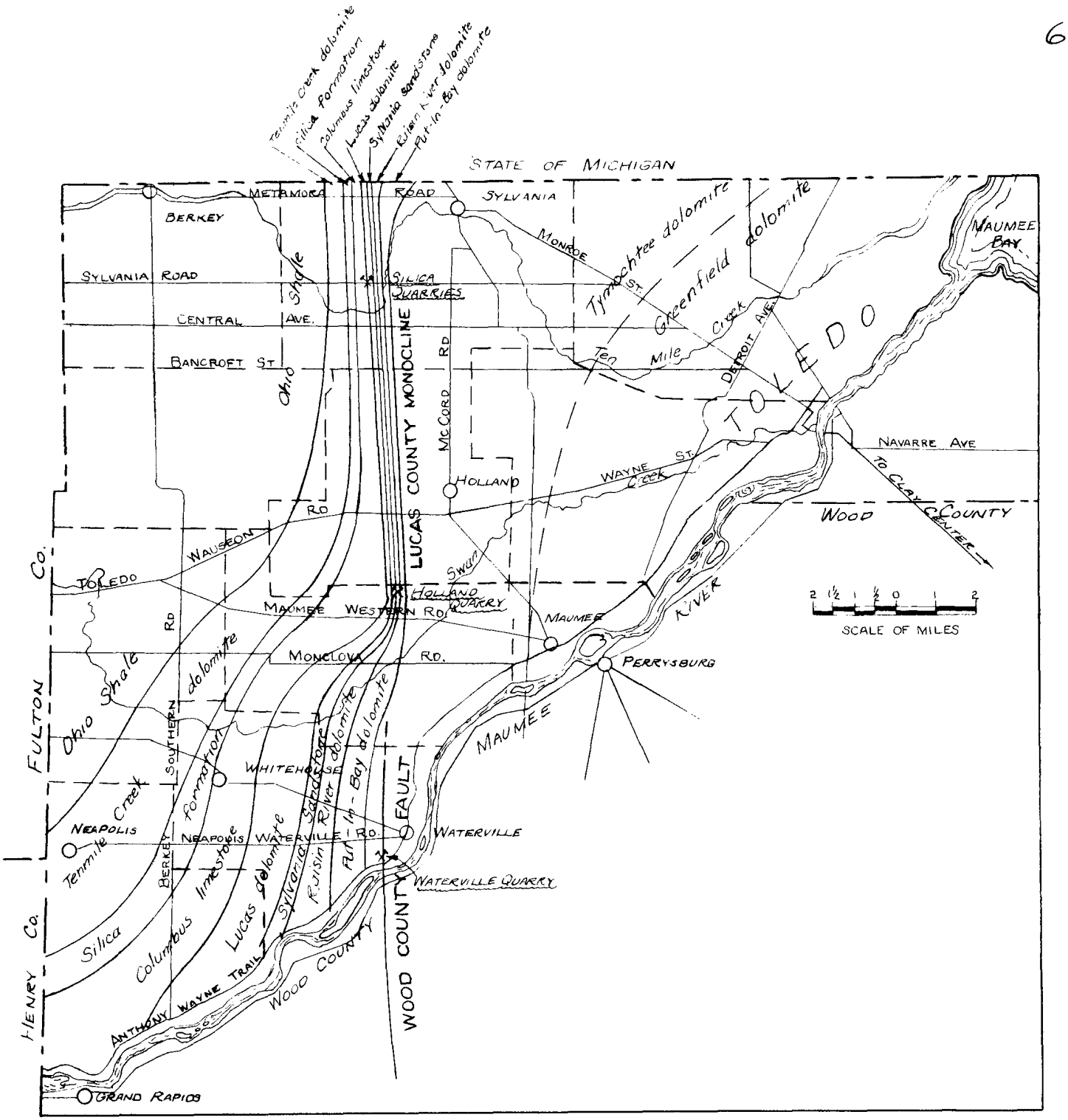

FIG. 1. MAP OF LUCAS COUNTY SHOWING THE AREAL EXTENT OF THE SEVERAL ROCK UNITS, THE LUCAS COUNTY MONOCLINE, THE WOOD COUNTY FAULT AND THE LOCATION OF THE THREE QUARRIES TO BE VISITED.

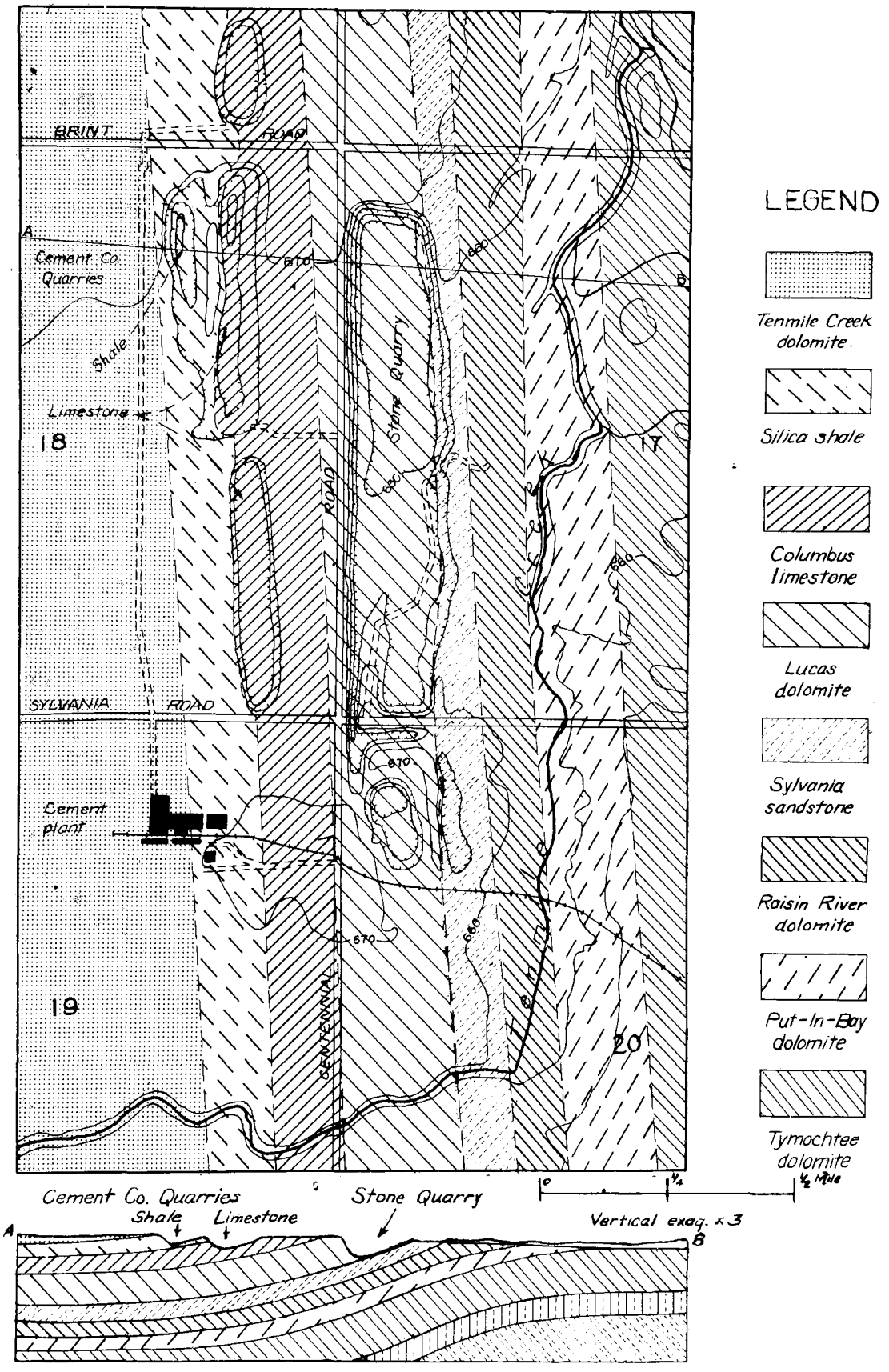

FIG. 2. GEOLOGIC MAP OF THE REGION AROUND SILICA AND A WEST-EAST CROSS-SECTION ALONG THE LINE A-B.

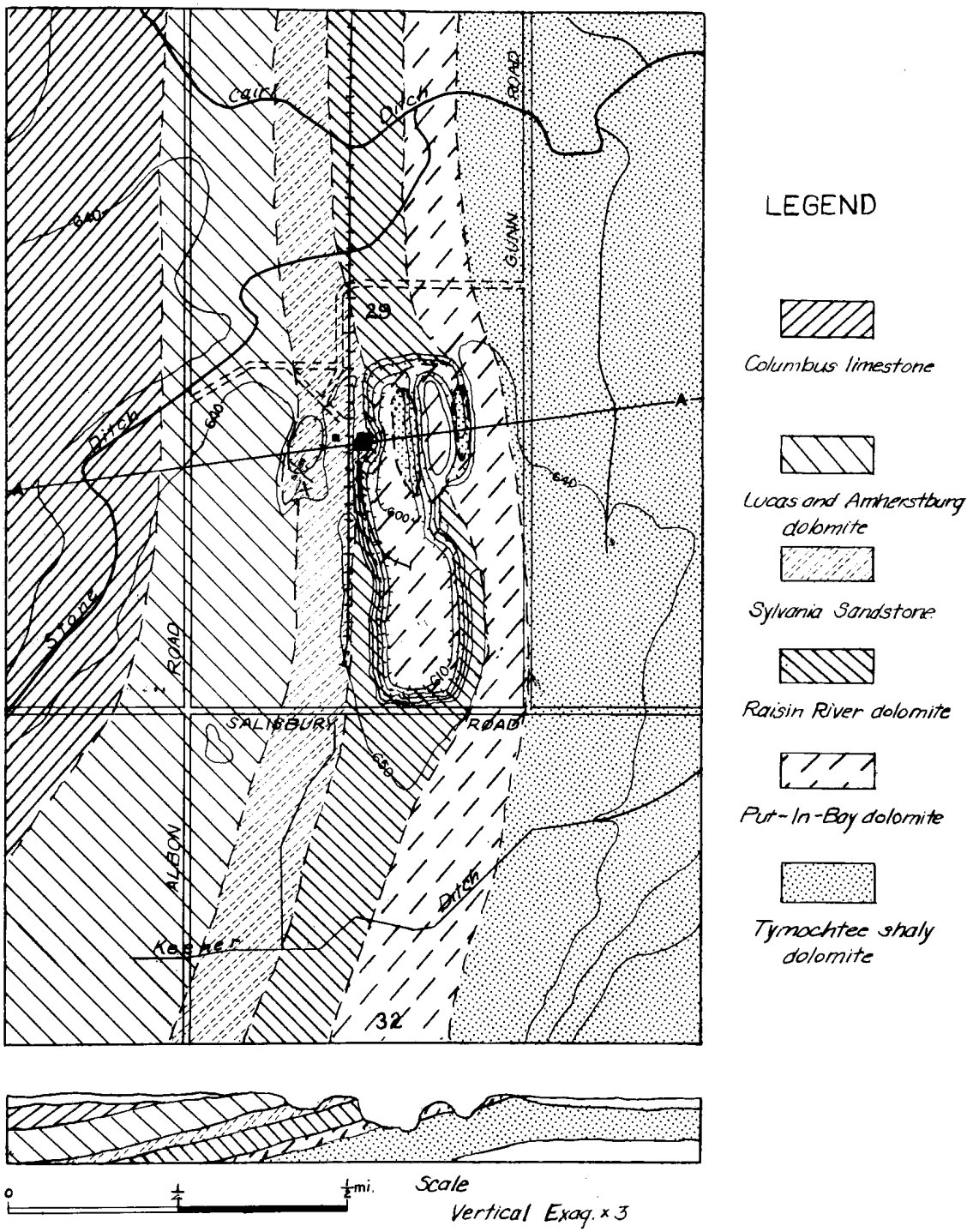

FIG. 3. GEOLOGIC MAP OF THE REGION AROUND THE HOLLAND QUARRY OF THE FRANCE STONE COMPANY AND A WEST-EAST CROSS-SECTION THROUGH THE QUARRY ALONG THE LINE A-A.

ROCK SECTION IN THE VICINITY OF SILICA

Ohio shale. Not exposed. . . . . Estimated 100'+
Black shale known in well borings west of Silica, overlying the dolomite

Tenmile Creek dolomite
Bluish-gray, fine-grained dolomite with some argillaceous or shaly beds and with fossils at several horizons. Poorly exposed along Tenmile Creek south of Silica, but will not be visited. . . . . 40'

Silica formation (about 45')

F.	Blue, argillaceous limestone (known by drill records)	9'
E.	Blue shale (known by drill records)	21'
D.	Blue, argillaceous limestone becoming shaly at top	4'
C.	Blue shale, with a shaly limestone layer in upper part. Contains many fossils. The "Silica Shale"	9'
B.	Blue, argillaceous limestone (floor of old shale quarry). . .	8"
A.	Blue shale with many fossils.	2' 6"

Blue limestone (8')

B.	Blue, argillaceous, fossiliferous limestone becoming shaly at top	4' 6"
A.	Blue, finely crystalline, fossiliferous limestone with shaly layer at top	3' 6"

Upper Columbus limestone (20')

E.	Gray, crystalline limestone with many fossils	5'
D.	Bluish gray, compact limestone with few fossils	3' 6"
C.	Gray, crystalline limestone with many fossils	2' 6"
B.	Brownish gray, firm, crystalline limestone with few fossils .	5' 6"
A.	Brownish gray, soft, crystalline limestone with many fossils.	3' 6"

Lower Columbus limestone . . . . . about 35'
Brown, grainy, even-textured dolomitic limestone. Upper 6' exposed. Remainder incompletely and poorly exposed
Contact with Lucas dolomite below unexposed.

Lucas dolomite (about 130')

J. Unexposed	Not over	10'
I. Bluish-drab to gray, dense dolo		19'
H. Gray-drab, compact or grainy, bedded dolo		19'
G. Gray-drab, grainy dolomite in beds 1 to 2 inches thick . .		19'
F. Drab dolomite with much calcite in pockets (Upper calcite zone). Fresh exposures yield good dog-tooth calcite crystals.		4'
E. Gray to drab dolomite in beds 2 to 10 inches thick		20'
D. Unevenly bedded dolomite with undulating laminae and carbonaceous films and with calcite lined pockets (Lower calcite zone)		2'
C. Bluish-gray to drab, gainy dolomite in beds 4 to 12 inches thick with some coral tubes		17'
B. Light gray, compact dolomite in beds 3 to 6 inches thick .		3'
A. Bluish gray mottled dolomite in part arenaceous		18'

Sylvania sandstone (about 50')

C. Arenaceous dolomite and dolomitic sandstone		10'
B. Fine-grained, thick bedded quartz sandstone		18'
A. Fine-grained, quartz sandstone. Disconformable on base. Not now exposed	Estimated	22'

Raisin River dolomite. Not now exposed . . . . . Estimated 50'

Put-in Bay dolomite. Only small part exposed . . . . . Estimated 40'

Tymochtee shaly dolomite. Exposed along Tenmile Creek to northeast

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ROCK SECTION AT THE HOLLAND QUARRY OF THE FRANCE STONE COMPANY

Amherstburg or Lucas dolomite

Dolomitic sandstone and arenaceous dolomite . . . . . Contains Amherstburg or Lucas fauna	15'+

Sylvania sandstone (25')

Medium grained, massive, quartz sandstone	15'
Medium grained quartz sandstone with Amherstburg fossils near base. Disconformity below	10'

Raisin River dolomite (53')

Dark drab to black, bedded dolomite with few fossils . . . . . In part brecciated with rounded fragments up to 6 inches in diameter	15'
Blue-gray, mottled, laminated dolomite . . . . . In part brecciated with small angular fragments.	38'

Put-in Bay dolomite

Drab, bedded dolomite and massive, brecciated dolomite	35'

Tymochtee shaly dolomite

Drab to brown laminated, shaly dolomite and blue, massive, argillaceous dolomite	26'+

ROCK SECTION AT THE WATERVILLE QUARRY OF THE FRANCE STONE COMPANY

J. Gray-drab dolomite with thin beds of shaly dolomite . . . . . 6'

I. Gray-drab or bluish-drab, even textured, argillaceous dolomite in layers 2 to 6 inches thick. Upper part more shaly. . . . . .10' 6"

H. Brown, grainy, laminated dolomite in beds 3 to 8 inches thick . . . 6' 9"

G. Drab to brownish drab, argillaceous dolomite in lenticular beds 3 to 6 inches thick . . . . . 3'

F. Drab, argillaceous dolomite in even layers 2 to 8 inches thick . . 6' 6"

E. Dark-drab dolomite in thin uneven layers 1 to 2 inches thick with cross-bedded, basin, inclined, and undulating structures . . . . 8'

D. Gray-drab, even-grained, argillaceous and shaly dolomite with carbonaceous partings . . . . . .10'

C. Dark-drab and gray-drab dolomite chiefly in layers 1 to 2 inches thick, but with some thicker, lenticular layers and with a few small pockets of gypsum . . . . . .15'

B. Dark-drab, finely-crystalline dolomite ledge with pockets of gypsum forming 5 to 10% of the whole. . . . . 2' 6"

A. Dark-drab, argillaceous dolomite in uneven layers 2 to 6 inches thick with carbonaceous partings . . . . . .13'

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