Form No. 10-300 (Rev. 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

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DATE ENTERED

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC
Ford River Rouge Complex

AND/OR COMMON
Ford River Rouge Complex

2 LOCATION

STREET & NUMBER
3001 Miller Road — NOT FOR PUBLICATION

CITY, TOWN
Dearborn — VICINITY OF

CONGRESSIONAL DISTRICT
16

STATE
Michigan

CODE
26

COUNTY
Wayne

CODE
163

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
X DISTRICT	— PUBLIC	X OCCUPIED	— AGRICULTURE	— MUSEUM
— BUILDING(S)	X PRIVATE	— UNOCCUPIED	— COMMERCIAL	— PARK
— STRUCTURE	— BOTH	— WORK IN PROGRESS	— EDUCATIONAL	— PRIVATE RESIDENCE
— SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	— ENTERTAINMENT	— RELIGIOUS
— OBJECT	— IN PROCESS	X YES: RESTRICTED	— GOVERNMENT	— SCIENTIFIC
	— BEING CONSIDERED	— YES: UNRESTRICTED	X INDUSTRIAL	— TRANSPORTATION
		— NO	— MILITARY	— OTHER.

4 OWNER OF PROPERTY

(Contact: Mr. Lee A. Iacocca, President)

NAME
Ford Motor Company

STREET & NUMBER
The American Road

CITY, TOWN
Dearborn — VICINITY OF

STATE
Michigan

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE, REGISTRY OF DEEDS, ETC.
Register of Deeds, City-County Building

STREET & NUMBER
Woodward Avenue at Jefferson

CITY, TOWN
Detroit

STATE
Michigan

6 REPRESENTATION IN EXISTING SURVEYS

TITLE
Historic American Engineering Record

DATE
1975-76

X FEDERAL — STATE — COUNTY — LOCAL

DEPOSITORY FOR SURVEY RECORDS
Historic American Engineering Record

CITY, TOWN
Washington

STATE
D.C.

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
__EXCELLENT	__DETERIORATED	__UNALTERED	X ORIGINAL SITE
X GOOD	__RUINS	X ALTERED	__MOVED DATE_____
__FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The Ford River Rouge Complex, one of the industrial wonders of the world and the only industrial area encompassing all the basic steps in automobile manufacturing, is situated west of Detroit in the city of Dearborn. Designed largely by noted industrial architect Albert Kahn and constructed for the most part between 1917 and 1927, the Rouge epitomizes Henry Ford's commitment to improved production methods and his dream of nonstop flow from raw material to assembled automobile. Because the complex was envisioned as constantly changing to take advantage of improved techniques, buildings were designed so that they could be easily modified. As a result, almost all structures have undergone some degree of alteration over the years, but a number of buildings like the Dearborn Assembly Plant, the Dearborn Iron Foundry, and Power House still exhibit much of their original architectural vitality. Also, a number of additional buildings have been constructed in the complex over the years. Although Ford's "Fairlane" Estate in Dearborn is already a National Historic Landmark and his Highland Park Plant is the subject of a separate inventory in this study, the River Rouge is signally worthy because of its unique nature and its vital contributions to improved manufacturing techniques.

The River Rouge Complex resulted from Henry Ford's constant search for improved manufacturing methods which would enable him to cut automobile prices and increase sales. Although the Highland Park Plant had been the scene of numerous breakthroughs like the moving assembly line, Ford, by the outbreak of World War I, had become convinced that it was obsolete. Not only did Highland Park lack adequate water and sewage facilities, but it could not be enlarged sufficiently to fulfill Ford's production dream of a million cars yearly. In 1915 Ford purchased nearly 2,000 acres along the Rouge River west of Detroit. At first, he envisioned using the site only to make coke, smelt iron, and build a tractor plant, but he soon began to envision the area as a giant industrial complex which would not only assemble automobiles but produce a large proportion of automotive components from raw materials as well.

The first major impetus to development of the Rouge came after the United States entered World War I in 1917, and Ford received a contract to build sub-chasers or Eagle Boats for the government. The Rouge River was widened in the area around the Ford property to make it navigable to the Detroit River; a factory, the present Dearborn Assembly Plant or B Building, was constructed to build ships on an assembly line basis; and a turning basin and

(continued

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW				
__PREHISTORIC	__ARCHEOLOGY-PREHISTORIC	__COMMUNITY PLANNING	__LANDSCAPE ARCHITECTURE	__RELIGION
__1400-1499	__ARCHEOLOGY-HISTORIC	__CONSERVATION	__LAW	__SCIENCE
__1500-1599	__AGRICULTURE	__ECONOMICS	__LITERATURE	__SCULPTURE
__1600-1699	__ARCHITECTURE	__EDUCATION	__MILITARY	__SOCIAL/HUMANITARIAN
__1700-1799	__ART	X ENGINEERING	__MUSIC	__THEATER
__1800-1899	__COMMERCE	__EXPLORATION/SETTLEMENT	__PHILOSOPHY	X TRANSPORTATION
X 1900-	__COMMUNICATIONS	X INDUSTRY	__POLITICS/GOVERNMENT	__OTHER (SPECIFY)
		__INVENTION		

SPECIFIC DATES 1917-present BUILDER/ARCHITECT Albert Kahn

STATEMENT OF SIGNIFICANCE

Although most Americans probably remember Henry Ford best for his Model T, his "unique achievement," according to distinguished historian Daniel J. Boorstin, "was less in designing a durable automobile than in organizing newer, cheaper ways to make millions of one kind of automobile. He transformed the making of automobiles from a jerking, halting process to a smooth-flowing stream."[1] After the founding of the Ford Motor Company in 1903, Ford and his engineers made significant breakthroughs in improving and speeding up auto assembly methods by developing new machinery and placing men and materials on the factory floor in such a manner that bottlenecks were eliminated and production was increased.

In 1910 the Ford Motor Company moved its operations to the new Highland Park Plant, and here, over the next 5 years the principles of modern mass production were developed by constantly rearranging men, machinery, and materials to systematize production, reduce unnecessary motion, and cut costs. In 1913 Ford and his engineers developed the continuously moving assembly line, "the crowning achievement," says company historian Allan Nevins, "in the creation of mass production techniques."[2] This technique reduced the assembly time of a completed automobile from 728 minutes to 93 minutes. Over the years, the company constantly refined its methods until by 1920, a Model T could be produced each minute of the working day. Ford assembly techniques reached their zenith on October 31, 1925, when Model T's rolled off the line at the rate of one every 10 seconds.

The economies of scale realized by Ford by concentrating on one car and reducing its manufacturing costs enabled him to reduce prices and increase his sales with each passing year. By 1924 the price of the Model T, which had been $850 in 1908, had dropped to $260. This car, says Ford biographer William Greenleaf, "put the

(continued)

[1]Daniel J. Boorstin, The Americans: The Democratic Experience (New York, 1973), 549.

[2]Allan Nevins, Ford: the Times, the Man, the Company (New York, 1954), 466.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

Boorstin, Daniel J., The Americans: The Democratic Experience (New York: Random House, 1973).

Burlingame, Roger, Henry Ford (Chicago: Quadrangle Books, 1970). Originally published in 1955.

(continued)

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY circa 900

UTM REFERENCES (See Continuation Sheet.)

	ZONE	EASTING	NORTHING		ZONE	EASTING	NORTHING
A				B			
C				D			

VERBAL BOUNDARY DESCRIPTION

(See last page of description.)

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE

Ralph J. Christian, Historian, Historic Landmarks Project

ORGANIZATION — DATE

American Association for State and Local History — May 1977

STREET & NUMBER — TELEPHONE

1400 Eighth Avenue South — 615/242-5583

CITY OR TOWN — STATE

Nashville, — Tennessee 37203

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE ___ LOCAL ___

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

FEDERAL REPRESENTATIVE SIGNATURE

TITLE — DATE

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION

ATTEST: DATE

KEEPER OF THE NATIONAL REGISTER

boat slip was dug from the river to a point near the factory to facilitate launching of the mass produced craft. Although the war ended just as large scale boat production had gotten underway, Ford quickly converted the facility to peacetime uses and launched an expansion program. During the war, his automotive operations had been hampered by raw materials shortages and steep price increases, and so he had grown increasingly determined to become at least in part self-sufficient.

In the early 1920's Ford added blast furnaces, coke ovens, miles of railroad tracks, large concrete storage bins for stock-piling raw materials, a foundry, and a power plant to the Rouge Complex. At the same time he purchased iron and coal mines plus ore boats and a railroad to transport ore and other raw materials to the Rouge. Within a short time, the Rouge produced enough coke and electricity to supply both itself and Highland Park; made half the iron needed for Model T's; dressed lumber for Model T bodies; and shipped engines, chassis, and body parts to the Highland Park assembly line.

By the time the final assembly line was shifted from Highland Park to the Rouge in 1927, the year in which Model A manufacture began, the complex had been expanded to include a glass plant; a cement plant; a paper mill; a coke by-products plant which produced cosmetics, laxatives, and aspirin; a motor assembly plant; an open hearth steel mill; and a steel rolling mill. In addition to miles of conveyors which cut manufacturing time and costs, the complex contained 53,000 machine tools and 90 miles of railroad track. Nearly 75,000 men worked at the Rouge, of whom almost 5,000 did nothing but keep it clean.

Over the years, the River Rouge Complex has been enlarged and modernized. Automobiles still roll off the assembly line here at the rate of one every 53 seconds, but the complex is far more important today as a manufacturing and supply plant for automotive components. Almost every day, 1,500 freight car loads of automobile parts leave the Rouge for Ford parts depots and assembly plants.

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Dearborn Assembly Plant (Building B). This steel-framed structure designed by Albert Kahn is the oldest extant building in the Ford River Rouge Complex. Situated immediately north of the River Rouge Turning Basin Slip, this edifice was designed for the mass production of sub-chasers or Eagle Boats. When completed in May, 1918, the one-story structure measured 350 by 1700 feet and was 100 feet high. The production area was divided into five huge aisles, each of which was 51 feet wide and 1700 feet long. Two of these aisles had a continuous railroad track for movin parts and materials while the other three aisles had tracks used for actual assembly of the boats. After the war, the structure was used to build Model T bodies and Fordson tractors and from 1927 to 1932, Model A's were assembled here.

Over the years the building has been modified somewhat to accomodate new production techniques. Although this structure is generally considered to mark Henry Ford's commitment to single-story factory construction, around 1919 it was converted to a two-story facility in order to fully utilize its height which would otherwise have been wasted. Over the years, its size was increased, and it presently measures 520 by 2600 feet. It still exhibits, however, much of its original exterior architectural vitality, and the interior has a number of original features such as support posts and wood block flooring in certain sections. Exterior walls are constructed of brick on the lower levels while asbestos-clad metal is used on the upper levels. Steel sash windows and butterfly monitors on the tile roof provide much natural lighting for the interior. At present, the building is used to assemble Mustang II's, which roll off the 1,200-foot assembly line at the rate of one every 53 seconds.

Dearborn Iron Foundry. When completed in 1921, Albert Kahn designed, this steel frame structure, situated about 350 feet east of the Turning Basin Slip, was probably the most impressive single unit of the Rouge. The largest foundry of its kind in the world, it not only poured 2,000 tons of castings each day but housed an impressive machining operation as well. The entire operation was so highly mechanized by a series of conveyors and tracks that little physical labor was necessary. Cupola cars brought huge ladles of molten metal direct from the blast furnaces located on the west side of the foundry where it could immediately

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be cast into engine blocks. After cooling the castings were routed to the machining department where after 43 different operations they emerged as Model-T engine blocks. By 1922 the foundry was casting 7,700 motor blocks daily for Model T's and Fordson tractors, a figure which increased to 10,055 in 1924.

Over the years the foundry has been enlarged somewhat, and now it measures 720 by 1,600 feet. Despite modernization, it retains some original exterior features like its lower walls of brick, its metal-clad upper walls, its gigantic steel sash windows, and its clerestory monitored roof which provides much lighting for the interior. Still serving its original purpose, the Dearborn Iron Foundry remains one of the largest production foundries in the United States.

Power House. Almost from the time of its completion in 1921, this 225-by-350-foot structure supplied power for both the Rouge and Highland Park. The edifice is constructed of red brick and has eight 333-foot-high smokestacks. Situated south of the Dearborn Iron Foundry, the Power House was equipped originally with eight turbo-generators, each of which had a capacity of 35,000 horsepower. Currently, it is equipped with four steam-driven turbo-generators, three 110,000 kilowatt units, and one 15,000 kilowatt unit, giving the plant a total rated capacity of 345,000 kilowatts. The generators are powered by seven giant boilers which are approximately seven-stories high. These are heated in turn by pulverized coal, coke oven, blast furnace or natural gas, used individually or in a mixture. Each day the Power House produces enough electricity to meet the domestic needs of a city of 600,000 people. Not only does the plant supply the Rouge Complex but furnishes over a million kilowatt hours yearly to Detroit Edison as part of an interchange agreement. The Power House has undergone practically little alteration except for modernization of equipment. It has 195 sub-stations scattered throughout the complex.

Henry Ford II, Benson Ford, and William Clay Ford Blast Furnaces (Blast Furnaces A, B, and C). Two of these furnaces, the Henry Ford II and the Benson Ford, date back to Henry Ford's time. They were designed by Julian Kennedy of Pittsburg and went into

(continued)

operation in 1920 and 1928 respectively. The William Clay Ford furnace dates back only to 1948. Situated between the ore storage bins and the Dearborn Iron Foundry, they have their molten metal transported immediately to that building for casting. Each furnace is capable of producing castings eight times each day, and together they have a daily capacity of 6,700 tons of molten metal. The furnaces are of steel shell construction and have been lined with refractory.

Coal, Iron Ore and Limestone Storage Bins. These 360-by-2,640-foot concrete storage facilities were completed in 1920 and are situated west of the blast furnaces and parallel to the east bank of the River Rouge Turning Basin Slip. The Rouge ore boats travel the upper Great Lakes from spring to fall and bring in 5 million tons of iron ore, coal, limestone, and other raw materials which are unloaded and deposited in these bins. The bins have a total capacity of 1.5 million tons, and during the winter months, when the lakes are unsuitable for shipping, they provide the Rouge with its raw material reserve.

Coke Ovens, Road By-Products Building (Building XX), Light Oil Building, and Gas Holder. These structures are situated south of the Power House and collectively make up an extensive coking and by-products operation. The first coke ovens were installed here in 1919, and presently 205 ovens are in operation. One hundred ninety-two are the Koppers-Becker type and 13 are the Wiloptte type. Each oven has a 17.5-ton capacity, and together they are capable of processing 4,200 tons daily. In addition, the ovens produce a number of by-products, most of which are consumed in the Rouge. Working at full capacity, the ovens turn out 53 million cubic feet of gas, 42,000 gallons of tar, 45,000 pounds of diamonium phosphate, and 10,000 gallons of light oil daily. The nearby Road By-Products Building, Light Oil Building, and Coke Lab Building utilize these by-products. The Gas Holder, situated near the north bank of the Rouge River, is 269 feet high, has a diameter of 128 feet, and has a storage capacity of 2.5 million cubic feet.

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Rouge Office Building. This three-story steel and reinforced concrete structure faces Miller Road north of the Dearborn Iron Foundry near the eastern edge of the Rouge Complex and is of relatively recent vintage. The exterior concrete walls of the two upper stories were poured at ground level, hoisted into place by hydraulic jacks, and then welded to the vertical steel members. The edifice is capped with a roof of concrete slab construction and contains 366,812 square feet of office space.. Presently it houses the administrative operations of the Engine, Casting, Steel, and Metal Stamping Divisions, plus the Electronic Computer Service and the Rouge Mail Service.

Glass Plant. Completed in 1925, the Glass Plant, which was designed by Albert Kahn and featured butterfly roofs and clerestory monitors, was considered a landmark in industrial architecture. The 240-by-760-foot structure was planned, however, so that it could be easily expanded and altered to meet the demands of constantly changing technology. As a result, the present 320-by-2,600-foot edifice bears little resemblance to Kahn's original design. Situated west of the Dearborn Assembly Plant, the Glass Plant is the scene of an almost completely automatic glass-making operation. Using the float process, the plant produces 13,41 miles or 500 tons of glass each working day.

Tire Plant (Dearborn Assembly Plant Stock Storage Warehouse). Situated south of the Glass Plant and fronting on the west bank of the River Rouge Turning Basin Slip, this building was the scene of Henry Ford's effort to manufacture tires using raw rubber from his own plantation in Brazil. Designed by Albert Kahn and completed in 1938, the 242-by-802-foot structure was constructed of steel and capped with a flat roof containing skylights. Although as many as 5,000 tires were produced daily here at one time, Ford broke up the operation at the start of World War II and sold the equipment to the Soviet Union. Except for being enlarged somewhat, the building has apparently undergone little alteration. Presently, it is used as a storage warehouse for the Dearborn Assembly Plant.

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Steel Mill Plant and Dearborn Stamping Plant (Steel Operations Building). The Steel Operations Building, which combines the Steel Mill Plant and Dearborn Stamping Plant under one roof, is over a mile long, covers an area of approximately 72 acres, and is situated in the center of the Rouge Complex. Included in this gigantic edifice are portions of the Open Hearth Building, the Rolling Mill, the Pressed Steel Building, and the Spring and Upset Building. All were designed by Albert Kahn and constructed in the 1920's. Also included is the 1938 Kahn-designed Press Shop. Generally, the structures rest on concrete foundations, have lower walls of brick, upper walls of metal, and are capped with butterfly and clerestory monitor roofs.

Dearborn Engine Plant. Since 1942 this 1,000-by-1,640-foot structure, situated west of the north end of the steel mill operation, has been the center for engine production at the Rouge. Each day an 8-hour shift aided by 6 miles of conveyors and 1,420 machines assembles 1,150 engines and turns out 1,050 crankshafts, 1,150 camshafts, 8,000 pistons, and 1,150 cast-iron cylinder blocks.

Tool and Die Building. Situated south of the south end of the Dearborn Engine Plant, this two-story, 320-by-1,080-foot structure has played an important role at the Rouge since its completion in 1936. Designed by Albert Kahn, it has brick foundations, steel sash windows, is clad in metal, and is capped with a flat roof.

Other Structures. In Addition to the structures described above, the Rouge Complex contains numerous others, most of whose construction dates from after World War II. Among these are the 680-by-1,080-foot Frame Plant which consumes 550 tons of steel each working day; the 200-by-500-foot Slabber Mill equipped with two hydraulic stripper cranes, each with a 400-ton lifting capacity; twenty-four 100-ton capacity Soaking Pits; a 400-by-2,240-foot Hot Strip Mill capable of reducing a slab of steel 32 feet long and 6 to 8 inches thick to a 2,500-foot-long coiled strip in less than 2 minutes; a 360-by-960-foot Basic Oxygen Furnace Building;

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a 480-by-960-foot Specialty Foundry; a 120-by-200-foot Oxygen Plant which each day produces 650 tons of gaseous oxygen, 30 tons of liquid oxygen, and 1 ton of liquid nitrogen for use in the steel mills; an 80-by-360-foot Ingot Mold Plant with a 30-ton pouring capacity; the Track Maintenance Building; the Dearborn Stamping Steel Warehouse; an Employment Building; the WW Building; the Steel Storage Building (EE Building); a Construction Services Building; the Railroad Car Control Building; the Marine Operations Building; a Skull Cracker; a Stripper Building; the Gas Booster Building; two sluice pits; the Mold Preparation Building; the Railroad Operations Office; the Quality Evaluation Building; the Slab Handling Building; the Transportation Services Building; an Oil Polishing Lagoon; and several water pumping stations which handle up to 10 million gallons of water per day.

The Ford River Rouge Complex is well-maintained and continues to operate as a facility capable of taking raw materials and converting them into automobiles. Because the facility is the center of Ford Motor Company production activities, it is constantly being upgraded, altered, and expanded to take advantage of the newest advances in technology like Henry Ford wished. This constant change is an important element of the historical significance of the complex.

Boundary Justification. The Boundary of the designated area includes approximately 900 of the 1,200 acres that make up the Ford River Rouge Complex and includes the most significant industrial and manufacturing structures. The 300 excluded acres are separated from the designated area by either railroad tracks, highways, or the river and contain little other than storage facilities.

Boundary Description. As indicated in red on the accompanying maps [(1) U.S.G.S. 7.5' Series, Mich., Dearborn Quad., 1968, photorevised 1973; and (2) Ford Motor Company Sketch Map], a line beginning at the southeast corner of the intersection of Dix and Miller Roads and extending northwestward approximately 7,100 feet along the west side of the right-of-way of Miller

(continued)

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Road to the south side of the right-of-way of Rotunda Drive; thence, westward approximately 1,850 feet along the south side of the right-of-way of Rotunda Drive to the southeast side of the right-of-way of the Detroit Industrial Freeway (Interstate 94); thence, southwestward approximately 3,200 feet along the southeast side of the right-of-way of the Detroit Industrial Freeway (Interstate 94) to the east side of the right-of-way of Schaefer Road; thence, southeastward approximately 7,100 feet along the east side of the right-of-way of Schaefer Road to the south bank of the relocated River Rouge channel; thence, northeastward approximately 5,050 feet along the south bank of the relocated River Rouge channel to the northwest side of the right-of-way of Dix Road; thence, northeastward approximately 850 feet along the northwest side of the right-of-way of Dix Road to the point of beginning.

nation on wheels, enormously accelerated the urbanization of America, and ultimately brought the motor transportation revolution to other countries."[3]

The new production methods developed at Highland Park also made it possible for Ford to substantially increase the wages of his workers. His announcement of the "Five Dollar Day" on January 5, 1914, made him world famous, and he soon became, according to intellectual historian Roderick Nash, "an international symbol of the new industrialism."[4] In Germany, the term "Fordismus" was coined to describe mass production, and in the Soviet Union Ford became something of a hero and was viewed more as a radical economic innovator than as a capitalist.

In the 1920's Ford improved mass production methods even further at his gigantic River Rouge Plant. Ford's "ideal," according to Boorstin, "was a continuous, nonstop flow from raw material to finished product, with no pauses even for warehousing or storage."[5] "By the mid-1920's," says Ford scholar David L. Lewis, "the Rouge was easily the greatest industrial domain in the world" and was "without parallel in sheer mechanical efficiency."[6] Here over some 1,150 acres Ford constructed blast furnaces, a steel mill, a large foundry, a gigantic power plant, a glass factory, an assembly plant, and numerous other structures--all specially designed to accomodate the flow of production and linked by nearly 60 miles of conveyers. Such a level of efficiency was reached that iron ore coming into the Rouge could be converted into engine blocks on the assembly line within 33 hours--a time which was later reduced to 28 hours.

(continued)

[3]William Greenleaf, "Henry Ford," Dictionary of American Biography, Supplement Four (New York, 1974), 295.

[4]Roderick Nash, The Nervous Generation: American Thought, 1917-1930 (Chicago, 1970), 155.

[5]Boorstin, The Americans: The Democratic Experience, 549.

[6]David L. Lewis, The Public Image of Henry Ford: An American Folk Hero and His Company (Detroit, 1976), 161.

As a result of the breakthroughs achieved at Highland Park and the Rouge, Ford "more than any other single man," in the opinion of the noted technological historian Roger Burlingame, "made it possible for the United States to become the 'arsenal of democracy' in the Second World War . . . because through the manufacture of twenty million cars over some forty years Ford had evolved a certain pattern for all large-scale manufacture including that of the atomic bomb."[7]

The Ford River Rouge Complex is one of the industrial wonders of the world and the only industrial area encompassing all the basic steps in automobile manufacturing. Situated west of Detroit in the city of Dearborn, the Rouge, designed largely by noted industrial architect Albert Kahn and constructed for the most part between 1917 and 1927, epitomizes Henry Ford's commitment to improved production methods and his dream of nonstop flow from raw material to assembled automobile. Because the complex was envisioned as constantly changing to take advantage of improved techniques, buildings were designed so that they could be easily modified, and as a result, almost all structures have been altered somewhat over the years. Although Ford's "Fairlane" Estate is already a National Historic Landmark and his Highland Park Plant is the subject of a separate inventory in this study, the Rouge is signally worthy because of its unique nature and its vital contributions to improved manufacturing techniques.

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[7]Roger Burlingame, Henry Ford (Chicago, 1970), 147.

History

Henry Ford was born July 30, 1863, on a farm near Dearborn, Mich., to William and Mary L. Ford. Like many rural youths of the era, much of his time was spent working on the family farm. Henry obtained his only formal education by attending country schools from 1871 to 1879. Although his early experiences gave him something of a lifelong affinity for the rural way of life, he detested the hard labor necessary to operate a farm successfully. From an early age, he had been fascinated by machinery, and by the time he was 15, he had become something of an expert at repairing watches.

At the age of 16, Henry left the family farm and moved to Detroit where he became an apprentice machinist and supplemented his income by working at night in a jewelry shop repairing watches. In 1880 he went to work for the Detroit Drydock Company, the city's largest shipbuilding concern. Working in its engine shop for the next 2 years, he acquired a rather extensive knowledge of the various types of power plants. In 1882 Ford obtained a position as road agent for the Westinghouse Engine Company which required his traveling throughout southern Michigan to service steam traction engines for farmers.

By 1884 Ford had returned to the family farm, and for the next few years he divided his time between operating and repairing steam engines, helping his father with farm work, and occasionally working in Detroit factories. After his marriage to Clara Bryant in 1888, Ford, for a time, operated a business selling firewood and lumber. His chief interests, however, were gasoline and steam engines, and he became increasingly interested in automobiles.

In 1891 the Fords moved to Detroit where Henry became an engineer for the Edison Illuminating Company. In his spare time he experimented with developing a gasoline engine to power an automobile, and in 1896 he built his first car, which he called a quadricycle. Continuing his experiments, Ford by 1899 had perfected a marketable automobile. With the backing of several wealthy Detroiters, he incorporated the Detroit Automobile Company to manufacture the vehicle, but by the fall of 1900, the firm had ceased operations due to a lack of sales. Late in 1901, shortly after Ford had attracted much publicity by

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defeating Alexander Winton in a Grosse Pointe auto race, the company was reorganized as the Henry Ford Company. Early in 1902, however, due to differences between himself and his backers, Ford left the company. Renamed the Cadillac Motor Car Company, this firm went on to earn a distinguished place in the annals of automotive history.

By mid-1902 Ford, influenced by Ransom E. Olds' success with the popular-priced Oldsmobile, had turned his attention to designing a low-priced vehicle with mass appeal. With financial backing from Alexander Y. Malcomson, Ford in 1903 launched the Ford Motor Company. Successful from the start, the company produced automobiles in several price ranges in its early years, but the excellent sales of the cheaper vehicles convinced Ford that the company should concentrate all its resources in this segment of the automobile market. His principal impediment, however, was a group of stockholders led by Malcomson who wanted the company to build expensive vehicles.

In 1906 Ford and James Couzens, his able business manager, gained firm control of the company by purchasing the stock of Malcomson and his supporters. That same year, Ford placed his Model N, priced at $700, on the market. Its success, says Ford biographer William Greenleaf, "raised the net income of the company for the first time to more than $1 million, placed the firm at the forefront of the industry, and showed that Ford was correct in his view that the future of the industry belonged to the quantity-produced small car."[8]

Meanwhile, Ford and his engineers were developing, says historian George S. May, "a 'universal car,' an inexpensive car that would be light in weight, yet durable, simple to repair, and simple to drive anywhere, regardless of road conditions."[9] The culmination of this work came in 1908 with the introduction of the famous Model T. This car's "essential note was certainly utility, not beauty," says company historian

(continued)

[8]Greenleaf, "Henry Ford," D. A. B., Supplement Four, 294.

[9]George S. May, A Most Unique Machine: The Michigan Origins of the Automobile Industry (Grand Rapids, 1975), 280.

Allan Nevins, "yet its very homeliness had an appealing quality . . . . Its basic merit lay in a hitherto unmatched combination of lightness, simplicity, and power." Although the Model T was the handiwork of a dozen men, Ford, in Nevins' opinion, "contributed the guiding concepts and furnished the guiding hand."[10]

The Model T was phenomenally successful from the start largely because of its attraction to rural Americans, who from 1909 to 1916 were undergoing a period of great prosperity. This rural market, says Greenleaf, "gave the first sustained impetus to the car that was principally responsible for taking the automobile out of the luxury class and making it an inexpensive necessity for the common man." This vehicle "put the nation on wheels, enormously accelerated the urbanization of America, and ultimately brought the motor transportation revolution to other countries."[11]

Ford achieved this position of dominance, according to automotive historian John B. Rae, "because, instead of starting out to produce a car as cheaply as possible, he concentrated first on designing a car that would be suitable for the mass market and then turned his attention to the problem of cutting manufacturing costs."[12] In fact, says distinguished historian Daniel J. Boorstin, Ford's "unique achievement was less in designing a durable automobile than in organizing newer, cheaper ways to make millions of one kind of automobile. He transformed the making of automobiles from a jerking, halting process to a smooth-flowing stream."[13]

Since the company's founding in 1903, Ford and his engineers had worked to improve and speed up auto assembly methods by developing new machinery and placing men and materials on the factory floor in such a manner that bottlenecks were eliminated and production was increased. In the first Ford plant on

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[10]Nevins, Ford: The Times, the Man, the Company, 388.

[11]Greenleaf, "Henry Ford," D. A. B., Supplement Four, 295.

[12]John B. Rae, The American Automobile: A Brief History (Chicago, 1965), 59.

[13]Boorstin, The Americans: The Democratic Experience, 549.

Mack Avenue in Detroit, crews of 2 or 3 men worked on 4 chassis simultaneously and sometimes assembled as many as 15 automobiles per working day. Soon this plant was too small, and in 1905 the firm moved to a larger factory on Piquette Avenue. Manufacturing techniques were further refined until by 1908, Ford was producing 101 cars per day. Despite these figures, which were amazing to most automobile manufacturers, Ford was not satisfied.

On January 1, 1910, Ford operations were shifted to the new Highland Park Plant (the house that Model T built), and here over the next 5 years the principles of modern mass production were developed. Ford and his associates, among whom were men like Peter E. Martin, Charles E. Sorenson, Carl Emde, Clarence W. Avery, and future General Motors president William S. Knudsen, spent much of their time on the factory floor where they rearranged machinery, men, and materials in such a manner as to systematize production, reduce unnecessary motion, and cut costs. Machines were arranged according to their function in the manufacturing process rather than by type; overhead conveyors, gravity chutes, and belts were used to transport materials from one work station to another so as to bring the work to the man rather than the man to the work; and each worker's task was constantly simplified by an increasingly minute subdivision of labor.

The great breakthrough at Highland Park came in 1913 when Ford and his engineers developed the continuously moving assembly line, "the crowning achievement," according to Nevins, "in the creation of mass production techniques."[14] The first step in this evolution in manufacturing methods occurred that spring when a conveyor belt was installed for assembling flywheel-magnetos. The average time required to put together one of these devices was cut from 20 to 5 minutes by using 29 workers, each of whom had one simple task to perform. By December 1, a continuously moving final assembly line went into operation which reduced assembly time of a completed automobile from 728 minutes to 93 minutes. The company continued to refine its assembly techniques, until by 1920 a Model T could be produced each minute of the working day. Ford assembly techniques reached their zenith on October 31, 1925, when Model T's rolled off the line at the rate of one every ten seconds.

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[14]Nevins, Ford: the Times, the Man, the Company, 466.

The economies of scale realized by Ford in adopting these techniques enabled him to reduce the price of the Model T, greatly increased his sales, and made him by far the Nation's leading automobile manufacturer. In 1908 when he introduced the Model T, he sold 5,986 touring cars at $850 each, but in 1916, after the moving assembly line was fully implemented, Ford had raised his output to 577,036 and reduced his price to $360, a figure which declined to $260 in 1924 when production was well over the million mark. In 1917 Ford controlled over 42 percent of the Nation's market for new cars and by 1921 had nearly 56 percent of total car sales. In fact, by this date every other automobile in the world was a Model T Ford.

The new production methods developed at Highland Park also made it possible for Ford to substantially increase the wages of his workers. His announcement of the "Five Dollar Day" on January 5, 1914, made him a worldwide figure and he "was praised as the prophet of a new industrial order and high-consumption society," says Greenleaf, "when he pointed out that workers should be paid high wages so that they might buy the goods they produced."[15] In Germany, the term "Fordismus" was coined to describe mass production, and in the Soviet Union, Ford became something of a hero, "not as a capitalist," says automotive historian James J. Flick, "but as a revolutionary economic innovator."[16]

By World War I Ford had become convinced that the Highland Park Plant was outmoded. In addition to inadequate water and sewage facilities, the factory complex could not be enlarged sufficiently to produce a million cars yearly as Ford desired. By this time, Ford's "ideal," according to Boorstin, "was a continuous, nonstop flow from raw material to finished product, with no pauses even for warehousing or storage."[17] Near Dearborn between 1919 and 1927 he constructed the River Rouge Plant which he envisioned as an almost self-contained industrial city that would not only assemble greater numbers of motor vehicles more efficiently but would produce the basic components from raw materials as well.

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[15]Greenfeaf, "Henry Ford," D. A. B., Supplement Four, 297.
[16]James J. Flick, The Car Culture (Cambridge, 1975), 71.
[17]Boorstin, The Americans: The Democratic Experience, 549.

"By the mid-1920's," says Lewis, "the Rouge was easily the greatest industrial domain in the world" and was "without parallel in sheer mechanical efficiency."[18] Here over some 1,150 acres Ford constructed blast furnaces, a steel mill, a large foundry, a gigantic power plant, a glass factory, an assembly plant, and numerous other structures--all specially designed to accomodate the flow of production and linked by nearly 60 miles of conveyors. Such a level of efficiency was reached that iron ore coming into the Rouge could be converted into engine blocks on the assembly line within 33 hours--a time which was later reduced to 28 hours. Gradually, the focus of company operations shifted from Highland Park to the Rouge, a move which was virtually completed in 1927 when the final assembly line was moved to the new plant.

In 1919 Ford gained total control of the company by buying out the other stockholders, giving him, according to Nevins, "industrial power such as no man had ever possessed before."[19] In the 1920's he created a virtual empire by establishing glass plants in Pennsylvania and Minnesota; by developing a rubber plantation in Brazil; by purchasing the Lincoln Motor Car Company; by entering the aircraft manufacturing industry; by entering into the manufacture of trucks and tractors; and by acquiring his own railroad.

Despite Ford's activities, his company's share of the automobile market began to decline after 1921 due to the rise of an affluent consumer culture which demanded comfort, fashion, style, and status in automobiles--a demand readily met by the General Motors Corporation while Ford virtually refused to make any changes on the Model T. Finally, in 1927 Ford discontinued the Model T and introduced the Model A, which enabled him to regain a large share of the automobile market before the onset of the Great Depression.

Ford's last major automotive innovation was a new eight-cylinder engine which he helped develop and which was placed on the market in 1932. After that date, he devoted little of

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[18] Lewis, The Public Image of Henry Ford, 161.

[19] Allan Nevins and Frank E. Hill, Ford: Expansion and Challenge, 1915-1933 (New York, 1957), 111.

his time to company affairs but still retained control over major policies until 1945. During his last years Ford devoted much of his time to developing Greenfield Village, a historical park. Increasingly conservative, he bitterly opposed unionization of his plants, and the Ford Motor Company was the last of the Big Three to be organized by the United Auto Workers. During World War II, the company played a vital role in defense production. Its major accomplishment was the huge Willow Run Factory for constructing B-24 Liberators. During the war years, Ford's health gradually deteriorated, and he died in Dearborn on April 7, 1947, at the age of 83.

Chandler, Alfred D., Jr. (ed.), Giant Enterprise: Ford, General Motors and the Automobile Industry (New York: Harcourt, Brace & World Inc., 1964).

Ferry, W. Hawkins, The Buildings of Detroit: A History (Detroit: Wayne State University Press, 1968).

Flink, James J., The Car Culture (Cambridge: M. I. T. Press, 1975).

Ford Motor Company, Ford at Fifty, 1903-1953 (New York: Simon and Schuster, Inc., 1953).

Ford Motor Company, The Ford Industries: Facts About the Ford Motor Company and Its Subsidiaries (Detroit: Ford Motor Company, 1924).

Greenleaf, William, "Henry Ford," Dictionary of American Biography, Supplement Four (New York: Charles Scribner's Sons, 1974), 291-304.

Hildebrand, Grant, Designing for Industry: The Architecture of Albert Kahn (Cambridge: M. I. T. Press, 1974).

Lewis, David L., The Public Image of Henry Ford: An American Folk Hero and His Company (Detroit: Wayne State University Press, 1976).

May, George S., A Most Unique Machine: The Michigan Origins of the Automobile Industry (Grand Rapids: William B. Eerdmans Publishing Company, 1975).

Nash, Roderick, The Nervous Generation: American Thought, 1917-1930 (Chicago: Rand McNally & Company, 1970).

Nevins, Allan, Ford: the Times, the Man, the Company (New York: Charles Scribner's Sons, 1954).

_____ and Frank E. Hill, Ford: Expansion and Challenge, 1915-1933 (New York: Charles Scribner's Sons, 1957).

_____, Ford: Decline and Rebirth, 1933-1962 (New York Charles Scribner's Sons, 1963).

Norwood, Edwin P., Ford Men and Methods (Garden City: Doubleday, Doran & Company, Inc., 1931).

Rae, John B., The American Automobile: A Brief History (Chicago: University of Chicago Press, 1965).

Sward, Keith, The Legend of Henry Ford (New York: Atheneum, 1968). Originally published in 1948.

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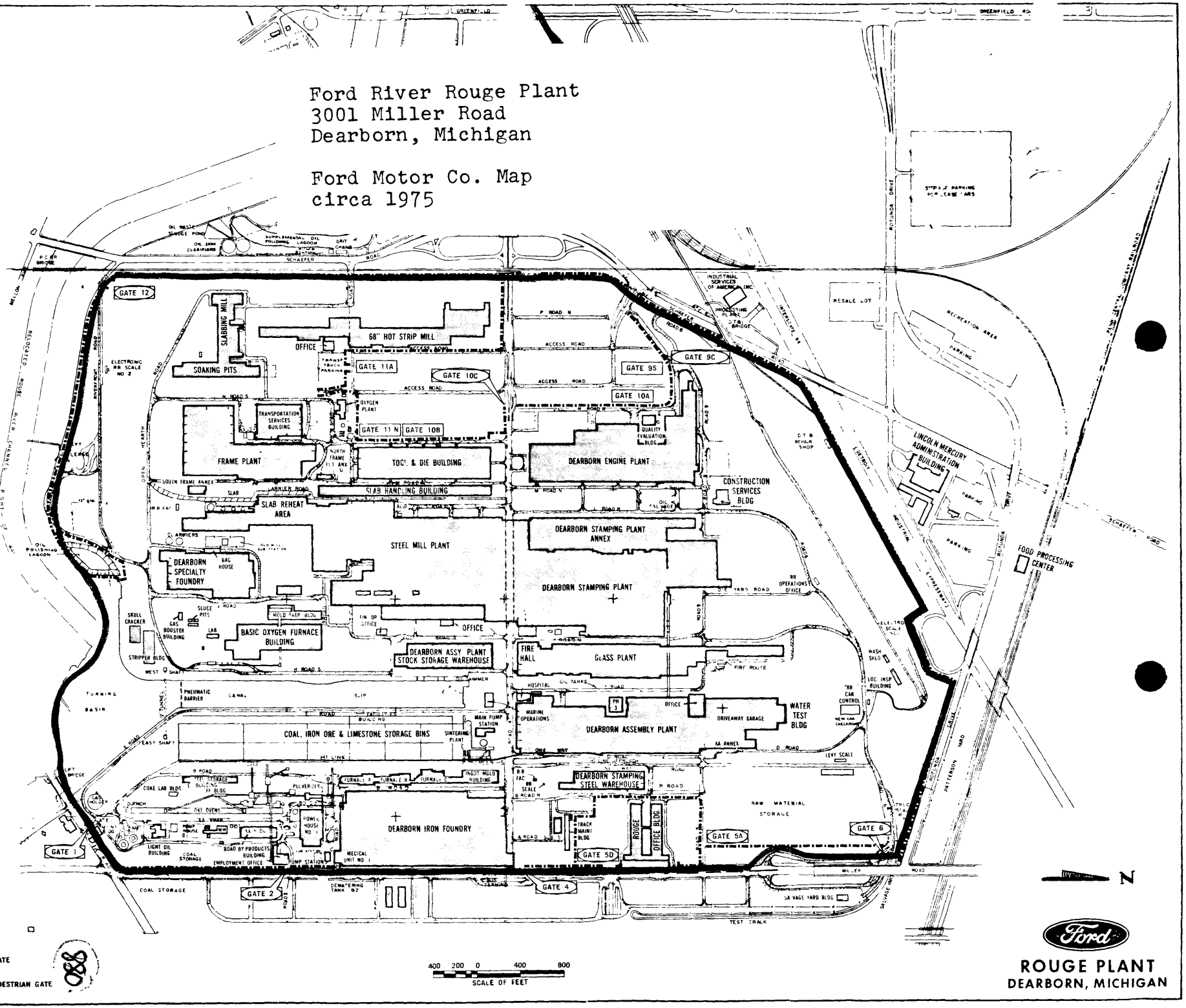
Ford River Rouge Plant
3001 Miller Road
Dearborn, Michigan

Ford Motor Co. Map
circa 1975



LEGEND

- VEHICLE GATE
- PEDESTRIAN GATE
- VEHICLE & PEDESTRIAN GATE

400 200 0 400 800
SCALE OF FEET

Ford

ROUGE PLANT
DEARBORN, MICHIGAN