





## General Motors Corporation Milford Proving Ground

### A Brief History

General Motors Milford Proving Ground was established as the first automotive proving ground during the early blossoming of the automobile industry. GM felt the need to monitor the quality and consistency of its product and to evaluate development ideas. In 1923, the administration of General Motors under the leadership of GM President, Alfred P. Sloan, Jr. became aware of a need for "extensive interchange of information among the divisions."<sup>1</sup> GM formed the General Technical Committee to serve this purpose. This group became responsible for the corporation's first regular testing program.

At first testing was conducted on public roads. It quickly became apparent that public roads were not reliable for consistent test results. General Motors engineers who took vehicles to Flint, Michigan for comparison testing found that the roads used originally had been torn up, changed and re-surfaced.

At their December 20, 1923 meeting, the General Technical Committee members agreed that General Motors should obtain a "large area which could be properly protected and closed to the public roads in order to conduct tests of various types representing all the various demands on the motorcar from the standpoint of high speed, hills of various grades, smooth roads, rough roads, ability of a car to move through water"<sup>2</sup> etc. Members felt that this would be a place where General Motors could "prove out our cars under controlled conditions both before and after production."<sup>3</sup> Furthermore, the committee members agreed that this land should be located centrally to the GM car-producing divisions that would be involved in testing vehicles for the corporation. It was in this meeting of the General Technical Committee that the idea of the first automotive proving ground was born.

In mid-November, the GM Real Estate Department suggested an area for the proving grounds on the eastern border of Livingston County known locally as "The Bluffs" which consisted of family-owned farmlands. Examination of topographical maps of the area proved that this land was quite suitable, with steep hills for climbing and braking as well as long flat areas for acceleration and fuel economy testing. As a first step, GM began acquiring options on the farms in that area.

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<sup>1</sup> "My Years With General Motors" A. P. Sloan, Jr.

<sup>2</sup> "My Years With General Motors" A. P. Sloan, Jr.

<sup>3</sup> "My Years With General Motors" A. P. Sloan, Jr.

After personal review of the property, the General Technical Committee members approved the land and its location at their January 17, 1924 meeting and purchasing these 1,125 acres began immediately. As early as May of 1924 the Handyside Construction Co. was building roads and the Austin Co. was constructing buildings. This was the nucleus of the first automotive proving ground test facility in the world.

Since that beginning, the General Motors Proving Ground has continually been under the ownership of General Motors Corporation and has been used for the purpose of testing vehicles, with some years during World War II devoted almost entirely to the testing of military vehicles for the war effort. There have been changes and expansion from time to time in keeping with changes in technology and growth in the corporation, but always the same focus of testing vehicles.

The first test roads in 1924 were a "graveled speed loop of about 3.8 miles, a level concrete straightaway, two concrete test hills of 7.26% and 11.65% grades, and a gravelled hill line."<sup>4</sup> To begin with, only two buildings were constructed: first a 60 ft x 200 ft garage for preparing and working on vehicles (Building #1) and then the Clubhouse for housing and feeding employees. Soon after that a very modest building was put up at the entrance to check employees and visitors in and out and to dispense fuel.

The General Motors vehicle development community was so eager for this type of consistent testing that even before the initial construction was complete, engineers from the GM divisions started to use the facility, bringing in their own crews, tools, and instruments as required. It was quickly evident that the building space was not nearly adequate for the workers that the GM divisions would be sending to this testing facility. In October of 1924 construction was started to double the size of Building #1. The eastern half of the building was ready for occupancy in May of 1925.<sup>5</sup>

Construction of other buildings and roads progressed over the years in keeping with the needs of the testing community. Everything at the Milford Proving Ground, including, construction and maintenance of roads and buildings, supports the overall function of vehicle testing and development.

During the years that followed, vehicle testing underwent remarkable changes. With these changes came the need for more complicated open air testing facilities and for elaborate testing laboratories as well as sophisticated electronic data recorders.

A very graphic example of this change can be found in testing to determine the effects of a collision. In one of the early testing innovations, the first rollover and barrier impact test was performed on the original GM Proving Ground road system, with a moving vehicle headed toward a barrier or down a hill. The driver of the vehicle would roll out of the vehicle just before impact.

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<sup>4</sup> GM Report No. PG-8928 "Proving Ground History" by R. L. McNeal

<sup>5</sup> GM Report No. PG-6136 "History of GM Proving Grounds" by T. M. Fisher

In contrast, twenty years later, two indoor sites (Building #25 and Building #61), were constructed for conducting impact tests, bringing better control to barrier testing. As a result of the testing in these laboratories, the Safety Research and Development Lab (SRDL) has introduced many innovations that contribute to safer vehicles and better protection for individuals traveling in those vehicles.

In the early 1940s military vehicle testing became the prime focus of the GM Milford Proving Ground. Some time before the declaration of war on Japan and Germany "the War Department had requested the Sound Laboratory at the P. G. to work on the sound problem in military vehicles."<sup>6</sup> Almost immediately after December 7, 1941, when Pearl Harbor was attacked, the War Department accepted GM's offer of the use of the Proving Ground facilities for testing military vehicles. Proving Ground roads and buildings were converted to testing tanks, gun carriages, reconnaissance cars, amphibious vehicles etc. manufactured by Ford, Chrysler, Allis Chalmers and others, along with those manufactured by GM's own divisions.

General Motors Proving Ground served its country well, weeding out unsatisfactory designs, determining the most durable components, and making recommendations for improved performance. The Proving Ground became one of the very few non-manufacturing facilities to earn the coveted Army-Navy "E" for excellence in helping the war effort, with white stars being added to the "E" flag on a regular basis as a recognition of continued excellence.<sup>7</sup>

In 1945, after the war was over, the agreement to test defense vehicles was terminated and GM began a return to testing personal vehicles. In 1951, GM purchased over 1,000 additional acres of property, mostly to the north, for the primary purpose of developing a heavy-duty vehicle testing area to accommodate other types of off-road vehicles as well.

In 1953, GM purchased 1,054 acres, again to the north, for the development of more test roads and facilities. Most notable in this area were the Circular Track in 1963 and the Vehicle Dynamics Test Area (VDTA) with a 67 acre paved area equal to 59 football fields which had two special skid pad surfaces.

As vehicles were tested on the Proving Ground roadways and General Motors Plant Engineering and Maintenance people worked to develop and improve these roadways, safety improvement was always an important consideration. In 1962 General Motors engineers used the construction of long-span bridges on the new Circular Test Track for the development of an improved concrete bridge rail to deflect errant vehicles with minimum damage to the vehicle and greatly improved safety to occupants.<sup>8</sup> This bridge parapet style is now used throughout the US and Canada.

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<sup>6</sup> "Thirty-five out of Fifty Years at the General Motors Proving Ground", 2-3-75, by William A. Pless

<sup>7</sup> GM Report No. PG-8928 "Proving Ground History" by R. L. McNeal

<sup>8</sup> Presentation to 44<sup>th</sup> Annual Meeting of the Highway Research Board, Washington, D.C., January 1965, "A Bridge Parapet Designed for Safety—General Motors Proving Ground Circular Test Track Project", L. C. Lundstrom, P. C. Skeels, B. R. Englund, R. A. Rogers

In 1965, when the use of breakaway sign supports was found to be a significant factor in reducing vehicle destruction and personal injury, GM worked with other agencies to develop this type of support and promote its use. Similarly, GM helped promote sideline clearance of trees and other obstructions along roadways when studies at the Milford Proving Ground proved that such clearance adds significantly to highway safety. The norm on GM Proving Ground test roads is 100-ft. clearance, but some modification is more common on public streets and highways where such distance is not practical.

Preparing test drivers at the Vehicle Dynamics Test Area (VDTA) by teaching skills like crash avoidance and how to handle a skid led naturally to performing a service to the community in the form of training courses for the police. At the request of Oakland County officials in the 1970s, "Doc" Whitworth of GM's Traffic Safety Department developed a one-day training for sheriff's department personnel at the VDTA in crash-avoidance, steering techniques, braking skills and maintaining control when a car starts to hydroplane. As a result, after two years, patrol car accidents were cut in half.<sup>9</sup>

This service to law enforcement agencies has expanded to the training of instructors for law enforcement personnel across the nation and to developing a training manual for the National Highway Traffic Safety Administration and the FBI. To date 831 instructors have been trained in this program. The Michigan State Police also use the "Precision Driving Manual and the "General Motors Advanced Driver Education Course Training Manual" developed by the GM Traffic Safety Department, in training their personnel. In addition, the GM Proving Ground continues to offer training to local emergency response agencies and to provide training materials to driver education programs.

In 1979 Building #40 opened for use by the Electromagnetic Compatibility Lab (EMC) to test the influence of radio waves and electromagnetic interaction on vehicle function. Results of these tests led to the development of new vehicle designs that safeguard the microprocessors controlling fuel injection, electrical systems and brake systems and protect them against such interference.

As you move through the General Motors Proving Ground of today, one sees many unusual things that indicate this is an automotive testing community. A forklift goes by carrying a vehicle frame on its way to the sled test. In the lobby of Building #25, a family of crash dummies lounges in overstuffed chairs, waiting their chance to star in a crash movie. One whole parking area is filled with mangled vehicle bodies and parts of bodies covered with colored markings and symbols. These are vehicles that have survived a barrier test and they may be used as evidence of test results.

Some vehicles in the lots or on the roads have strange padding and coverings. They could be prototype vehicles being tested before production. Other vehicles go by with an extra wheel running along behind, exhaust directed out the top, or electronic apparatus on the front seat. Some vehicles make their way around the Circular Track in the upper lane at 110 miles an hour while on another track some just stop for their own reasons and wait a specified time before going on.

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<sup>9</sup>Detroit Free Press, June 14, 1983, "On Patrol at GM's Track" by Greg Gardner

Building 94 is the newest building, home to the Noise and Vibration Center, which outgrew its old quarters in both space requirements and in sophistication of testing equipment. Across the Proving Ground campus projects are underway to improve the testing processes and prepare for the future. The biggest challenge is to find ways to support the shorter vehicle development programs. Laboratory and math based solutions are part of the Proving Ground arsenal complementing the on-road testing of the past.

Today's General Motors Milford Proving Ground is a far different place from the automotive proving ground conceived and developed by Alfred P. Sloan Jr. and the General Technical Committee in 1924, but the purpose of this facility remains the same as the original. The one constant that has always been there is the consistent and reliable testing of vehicles in order that General Motors Corporation can produce better and safer cars and trucks.



General Motors Corporation

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**Automotive Industry's First Proving Ground Celebrates 75 Years**

**Milford, Mich.** – Celebrating its 75<sup>th</sup> anniversary this year, General Motors Milford Proving Ground has a rich heritage as the headquarters for GM's vehicle durability and test operations.

Technology and test procedures have changed since GM established the auto industry's first Proving Ground in 1924, but according to Ian McEwan, executive director of GM North American Proving Grounds and Test Operations, GM's focus on providing the highest quality development, validation and test services continues. "Our mission remains to develop General Motors cars and trucks to meet the demands of both our customers and the environment in a competitive marketplace," McEwan said.

The Proving Ground was inaugurated in 1924 through the foresight of Alfred P. Sloan, Jr., President of General Motors. The General Motors' Technical Committee voted to spend \$300,000 to turn 1,125 acres of farmland outside of Milford into vehicle testing roadways and facilities. Prior to this time, all road tests were done on public highways.

Today, the Proving Ground site has grown to nearly 4,000 acres, encompassing Livingston and Oakland counties. And, employment has also grown from Ruggles Simcock, a maintenance superintendent – who was hired as the first employee Aug. 1, 1924 – to nearly 5,000 team members.

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Over the past 75 years, vehicles have become increasingly more complex, requiring drastic change in the type and amount of testing performed at the Proving Ground. "We perform vehicle tests for safety, compatibility with the environment, ease and comfort of operation, reliability, durability and efficiency," said McEwan. "And as the challenges of the 21<sup>st</sup> century emerge, testing will become more exacting and rigorous."

According to McEwan, the Proving Ground's primary focus has gradually shifted from road testing to lab testing, and now it supports the move to computer math simulation to reduce hardware testing and builds. However, he said, "Final vehicle validation is still required to measure the performance of vehicles, and the only way to accomplish this is through durability road testing and test analyst interface." The Proving Ground logs more than 12 million test miles per year.

In addition to Milford Proving Ground, General Motors maintains facilities for hot weather testing in Mesa, Ariz. for research, development and testing; cold weather facilities in Kapuskasing, Canada and Sault Ste. Marie, Mich.; a high altitude emission testing facility in Denver and a brake test facility in Pikes Peak, Colo.

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**General Motors Corporation  
Milford Proving Ground**

**ESTABLISHED IN 1924**

LAND AREA	Approximately 4,000 acres
RESIDENT DIVISIONS / STAFFS	25
NUMBER OF BUILDINGS	115
NUMBER OF EMPLOYEES	4,800
CAFETERIA	Serves over 1,000 meals per day
THREE LAKES ON PROPERTY	Sloan, Mott and Pickett

**ROAD SYSTEM INFORMATION:**

TEST ROADS	Equivalent to over 132 miles of two-lane highway
MILES DRIVEN ANNUALLY	15,000,000
1 billion miles driven - September 1994	
GASOLINE USED ANNUALLY	2,464,606
GALLONS OF ROAD STRIPING PAINT USED	16,550 gal. of white and yellow paint 35,000 lbs. of reflecting beads
VEHICLE DYNAMICS TEST AREA	67 Acres
Nicknamed "Black Lake"	approximately the equivalent of 59 football fields
OVAL TEST TRACK	3.8 miles
CIRCULAR TEST TRACK	4.5 miles
NORTH / SOUTH STRAIGHTAWAY	6.225 miles (including loops) 2.558 northbound (level) 2.617 southbound (level)
EAST / WEST STRAIGHTAWAY	3.104 miles (including loops) 1.204 miles each way (level)

**SAFETY RESEARCH AND DEVELOPMENT LABORATORY INFORMATION:**

FULL SCALE BARRIER TESTS	600 per year
HYGE SLED TESTS	1,000 per year
COMPONENT TEST LAB	3,000 tests run annually on various parts of GM vehicles

**PROVING GROUND DIRECTORS**

1924 - 1925	Fern M. Holden	1965 - 1974	Charles J. Brady
1925 - 1929	O. T. Kreuzer	1974 - 1978	Trevor O. Jones
1929 - 1941	A. J. Schamehorn	1978 - 1982	A. H. Kelly
1941 - 1944	Ernest E. Wilson	1982 - 1983	Donald R. Bowen
1944 - 1956	H. H. Barnes	1983 - 1992	Fraser D. Smithson
1956 - 1965	Louis C. Lundstrom	1992 -	Ian A. McEwan



**General Motors Corporation  
Milford Proving Ground  
Communications**

**History of Building Completion**

<u>Building #</u>	<u>Year</u>	<u>Current Tenant / Location</u>
1	1924	Powertrain
2	1926	Powertrain
3	1927	Powertrain
4	1935	Power Plant
5	1949	Powertrain
6	1947	Scale House
7	1947	Delphi Chassis
8	1936	Advanced Technology Vehicle
9	1927	Power Plant
10	1940	Power Plant Dynamometer
11	1950	Maintenance
12	1951	Heavy Vehicle Test
14	1951	Heavy Vehicle Test / Scale House
14A	1954	Fleet
16	1954	Mid Size Car Division
19	1974	Waste Water Treatment
20	1954	Primary Switch House
22	1956	Security / Medical
22A	1956	Main Gate (Security)
23	1956	Administration B-EDS / Purchasing / Finance / BSC
24	1961	Structural Development
24A	1997	Annex-Hydraulic System
25	1968	Safety / Research Development / Tire-Wheel Systems
26	1966	Truck Group
27	1967	Cadillac Luxury Div. / Brake & Bearing
30	1924	Cafeteria
31	1970	Powertrain
32	1972	Medium Duty Truck / Saturn
37	1975	Mail Room
38	1974	Saturn Storage S. B-32
40	1979	EMC
40A	1984	EMC / Radio Transmission Test
41	1976	Program Mileage Dyno
42A	1954	Delphi Energy
42B	1954	NAO Research and Development
43	1976	Gas Station / Barnes Circle
44	1954	Lundstrom House / SCMS / Communications Staff
47A	1954	Large Reynolds Barn
52	1969	Ice Surface Facility Building



**General Motors Corporation  
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Communications**

<u>Building #</u>	<u>Year</u>	<u>CurrentTenant / Location</u>
54	1959	Delco Electronics / Delphi Steering
56	1978	Noise Pass by Facility (NVL)
57	1984	Building at Ball Fields
61	1968	Safety Research & Development Barrier Bldg.
64	1951	Garage North of Paddock Rd.
65	1968	Simulator (Cad Lux Car Division) Inside TTL
66A	1957	Radio Frequency Bldg. inside VDTA
70	1981	Durability Test
73	1979	Truck Group
74	1979	Salt Storage Shed
75	1985	Antenna Device Bldg. on VDTA
78	1985	Truck Group
83	1986	Salt Spray Facility
84	1986	RTP Facility on East / West Straightaway
86	1986	Car Wash
92	1992	Natural Gas Fueling Facility
94	1998	Noise & Vibration Lab
95	1995	Radio Test Facility (EMC)
96	1998	Traffic Safety Tower at VDTA
98	1996	Electrical Sub-Station off of Hickory Ridge Road
100	1996	Show Building TTL Pad
103		New Chiller Building (Parking Lot C & Bldg. 26) *

\*Project incomplete



**General Motors Corporation  
Milford Proving Ground  
Communications**

**History of Road System Completion**

1924	11.6% Test Hill Access
1924	Oval Test Track
1926	N-S Straightaway
1926	E-W Straightaway
1926	GM Road
1929	11.6% Test Hill
1929	24% Downhill
1929	Barnes Circle Access
1929	Belgian Block Loop
1929	DuPont Circle Return
1929	Hill Route (DuPont Circle to S. Circle)
1930	Durability 11.6% Hill
1937	27% Test Hill
1939	Holden Test Area Ride Road
1949	Seven Sisters
1950	Noise Road
1951	Military Straightaway
1953	Pavement Joint Road
1953	Pontiac Trail
1953	Rough Track
1953	GM Road relocation
1954	16% Test Hill
1954	7.2% Test Hill Loop
1954	Barnes Circle & Track Overpass
1954	Pickett Lake Road
1954	Powder Valley Road
1955	N-S Straightaway extension
1955	South Loop Access
1955	Truck Test Loop
1956	DuPont Circle
1958	R & H Loop
1960	Hyne Road
1963	Circular Test Track, Track Access and Overpass
1964	Salt Splash Road
1964	Twelve Mile Road
1966	East Bamber Road
1966	Vehicle Evasive Performance Road
1968	Ice Surface Facility
1968	Natural Ice Facility
1968	Noise Passby Facility on East Bamber Road
1968	Vehicle Dynamics Test Area



**General Motors Corporation  
Milford Proving Ground  
Communications**

**History of Road System Completion**

1969	Salt Spray Facility
1973	GM Road relocation
1979	Interior Noise Road
1981	East Circle
1984	City Course
1984	Twist Ditch Course
1985	23% Test Hill
1985	RTP Facility
1986	Anti-Lock Brake Test Gravel Road
1993	Water Intrusion Facility
1994	Pothole Facility
1994	Truck Test Facility
1994-95	Antenna Test Site and Facility
1995	M-15 Road (former German Block Road)



## **General Motors Corporation Milford Proving Ground**

### **Operational Information**

#### **Durability Test**

The Durability Test Organization provides validation services that identify, analyze, and support the engineering operations in charge of building quality cars and trucks. Durability serves the primary function of the hands on experience, the eyes and ears of the customer, which translates vital information to increase the quality of the product being developed. The Durability Test team is the critical customer; citing preferences, identifying engineering problems, and offering data that helps engineers build a quality product.

#### **Vehicle Safety and Crashworthiness Lab**

The testing within the confines of this test lab go from the simple "Head Drop" of a Hybrid III ATD to the more complex setup of two moving vehicles impacting each other at different speeds. The Anthropomorphic Test Device lab area performs over 2,000 tests per year. The dummy family numbers in excess of 100 and ranges in size and age from 6 months to male adults (95 percentile) at 234 pounds. All of them have special devices to measure the type of physical input corresponding to the type of test.

Subsystems are either tested on HYGE sleds or on a DECEL sled. The sleds are very reliable development tools that can simulate actual crash forces. There are over 1,100 of these tests conducted annually. 500 Full Scale Tests are performed annually. Test devices and support items are placed on a vehicle with over 17 different types of tests available. These tests can be done to accomplish or support the many standards needed to sell the GM product throughout the world.

#### **Corrosion Engineering**

Corrosion Engineering has been a leader in the automobile industry for decades. GM customers benefit from cars and trucks that are among the most corrosion resistant in the industry. Corrosion testing includes both indoor laboratory testing with controlled environments, and road testing with cars and trucks driven on every imaginable road surface, and in every possible weather condition. Corrosion tests are used to provide information in several areas of interest,

such as product development, performance validation, material selection, corrosion prevention, quality control, and failure analysis.

### **Tire-Wheel Systems**

The Tire-Wheel Systems group works with suppliers and GM units to develop specifications, monitor performance, and analyze emerging technology in tires and wheels. Major groups within TWS are: Tire Engineering & Wheel and Trim Engineering; Engineering Analysis & Test Technology; Product & Field Service Support and Quality Assurance; Tire Dynamics; and Engineering Labs.

### **Small Car Vehicle Development**

The Small Car Development functions include: Chassis development; Acoustics; Wind Noise; Squeak and Rattle; Powertrain Pleasability and Powertrain mounting; Driveability; Total Vehicle Integration; Media Car preparation; and Fleet management.

### **Electromagnetic Compatibility (EMC) Department**

The EMC facility has full vehicle Anechoic chambers, shielded rooms for full vehicle and component testing, and magnetic field and conducted interference test laboratories. A Mobile Transmitter test site is located nearby. A Radio Frequency Interference (RFI) site is located in the Proving Ground that has been selected for minimal ambient interference from test vehicles and other sources.

### **Technical Support**

GM Uniform Test Specifications (GMUTS) determine procedures for durability, validation, and development. Technicians must follow consistent procedures in order to analyze test results and to report problems. Still Air Room - Body sealing is the bulk of what is done in the Still Air Room utilizing specialized tools from stethoscopes to smoke guns to seal margin gages. Measurement Engineering/Noise Vibration Structures – Measurement Engineering provides Road Load Data. Suspension systems, engine mounting, and vehicle components are all tested using the latest technology available in strain gauging, displacement, acceleration, and velocity measurements. Instrumentation – The primary function of the Instrumentation department is to provide state-of-the-art instrumentation, transducers and technical support to meet the data acquisition needs of engineering. Development Shop – The Development Shop offers a complete menu of fabrication services to aid in the rapid development of test fixtures and experimental vehicle systems. Product Electronics – PE provides electrical support for the Electrical Development Groups, and the various development car groups. Strain Gauge Room – The Strain Gauge Room designs and manufactures load sensing equipment for use in vehicle tests at the Proving Ground.

**HVA/C/PTC & Thermal Department** – has responsibility of developing heating, ventilation, air conditioning, powertrain cooling, and underhood and underbody thermal systems for Mid Lux and Small Car platforms. Testing is done at Climatic Wind Tunnels, at the Milford and the Desert Proving Ground, and at demanding geographic locations such as Death Valley and Kapuskasing. The technicians travel extensively throughout the calendar year to support vehicle testing at the off-site locations.

**Vehicle Development and Test** – Engineers integrate all aspects of vehicle performance to make sure it meets the customer's expectations. They establish requirements for how our cars should perform; then direct the testing and modifications to see that the requirements are met.

### **Service Operations**

Service Operation employees perform Tech 2 development/validation, Service Manual development/validation, and vehicle calibration activities at Milford Proving Ground to provide accurate vehicle diagnostics and service information.

### **Truck Development**

The importance of trucks in the individual life of their buyers has changed in recent years – more than any other element of the transportation industry . New lifestyles emerged during the '70's and a truck-type vehicle began to be used for personal tasks as it provided more flexibility than a car. Truck Development supports the testing required to develop engineering concepts into production vehicles. The latest products include the new GMT800 products, which include a complete line of pickups and sport utilities.

### **Chassis Center – Vehicle Dynamics**

The Vehicle Dynamics department provides GM's customers with the great ride and handling by supplying corporate car and truck programs with objective information on chassis performance in the areas of ride and handling. This is done using a library of computer programs to predict performance during the chassis design process, and using objective test procedures to support chassis development and performance validation activities.

### **Heavy Vehicle Test**

Heavy Vehicle Test (HVT) is a department for prototype builds and engineering development. Our technicians service five (5) customers: Special Vehicle Operations, Allison Transmission, Division, General Motors of Canada London/Oshawa, and Service Parts Operation. Projects



supported include: The building of military type vehicles, preparation for oversea sales, Central Tire Inflation System (CTIS), building and testing of the LCT transmission, testing and development of the Light Armored Vehicle (LAV), support for natural gas vehicles for GMOC, and the testing of accessory parts for SPO.

### **Structural Test Laboratories**

Provide customer-based engineering analysis, measurement, test development, and laboratory and computer simulation services. These services are performed throughout the vehicle development process to evaluate vehicles and their subsystems.

The following activities make up the lab's activities: Engineering Measurements & Transducers; Multi-Axial Structural Testing; Shipping Simulation Tests; Computer Simulations; Metallurgy & Failure Analysis; Data Analysis; and Unique Problem Solving Testing.

### **Traffic Safety**

The Advanced Driver Training Program, developed by the Traffic Safety Department, is used for teaching accident avoidance techniques including evasive driving maneuvers, off-road recovery, skid recovery, controlled braking, slalom course and blowouts. It was the first of its kind and has been taught to groups from around the world. Traffic Safety has responsibility for the safety of our road system.

**MPG COMMUNICATIONS**

**3300 GENERAL MOTORS ROAD**

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**MILFORD, MICHIGAN**

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