MONTANA
Department of Transportation

MDT-BRG-015 04/23

Montana Department of Transportation
Bridge Bureau
Approved Construction Equipment List

Make:	*Caterpillar*
Model:	*938M*
Equipment Type:	*Wheel Loader*
Contractor Modifications:	*None*

Interstate Approval Conditions

Approval Type	*Crossing only*
Speed:	*No Restriction*
Weight:	*36,156 lb or less*
Traffic:	*Approved with Regular Traffic*
Location Restrictions:	*No Restriction*

Non-Interstate Approval Conditions

Approval Type	*Crossing only*
Speed:	*No Restriction*
Weight:	*36,156 lb or less*
Traffic:	*Approved with Regular Traffic*
Location Restrictions:	*No Restriction*

Comments:

Equipment configuration, weights, and specifications on following pages. Approval does not apply to posted bridges. Other construction equipment is not allowed to operate on or cross bridge at the same time this equipment is on the bridge. Equipment must be empty while crossing.



Cat®
938M

Wheel Loader

M Series – Making Your Choice Easy:

- **Enjoy All Day Comfort** – Have a seat in the new M Series Small Wheel Loader and enjoy automatic temperature control, class leading sound levels, excellent all around visibility and low-effort joystick controls that move with you on a fully adjustable seat suspension. A large spacious operator environment combined with Caterpillar's exclusive hydraulic cylinder damping and smooth predictable controls make this the most comfortable seat on your job site.
- **Work Made Easy** – Move more with Caterpillar's patented quick loading Performance Series buckets and optimized Z-bar linkage that combines the digging efficiency of a traditional Z-bar with tool carrier capabilities. The parallel lift and high tilt forces throughout the working range allow you to safely and confidently handle loads with precise control.

  Multi-function work has never been easier with dedicated pumps for each system and a flow sharing implement valve governed by an intelligent power management system. Simultaneously lift, steer and drive without compromise. The M Series Small Wheel Loader simply does what you ask it to do.
- **Efficiently Powerful** – Experience hybrid like fuel efficiency with an intelligent hydrostatic power train and industry leading fuel savings through a lower maximum engine speed of just 1,600 rpm in Standard Mode. Power when you need it with Caterpillar's exclusive Power-by-Range technology that increases power in Range 4 for improved speed on grade. For your toughest and most demanding applications a new Performance Mode will allow you to boost the power and hydraulic speed in all Ranges to get the job done even quicker. Meets U.S. EPA Tier 4 Final/EU Stage IV emission standards with a Cat® C7.1 ACERT™ engine that is designed to manage itself so you can concentrate on your work.
- **Customize Your Experience** – Meet your application requirements and individual preferences with Caterpillar's industry first Hystat™ Operator Modes featuring four unique power train settings. Select classic Torque Converter for smooth rollout, conventional Hystat for aggressive engine braking, an Ice Mode that maximizes your control on slippery underfoot, or default mode which blends the best of Hystat and Torque Converter characteristics. Fine tune machine performance with adjustments at your fingertips through the soft touch buttons and optional secondary display. Quickly set hydraulic response along with linkage kick-out positions, maximum wheel torque, and peak ground speed to efficiently perform a multitude of tasks.

Specifications

Engine

Engine Model	Cat C7.1 ACERT	
Power Mode	Standard Mode	Performance Mode
Speed Range	Range 1-3*	Range 1-4
Maximum Gross Power		
Maximum Engine Speed	1,600 rpm	1,800 rpm
ISO 14396	129 kW 173 hp	140 kW 188 hp
ISO 14396 (DIN)	129 kW 175 hp	140 kW 190 hp
Rated Net Power	1,600 rpm	1,800 rpm
SAE J1349	125 kW 168 hp	136 kW 182 hp
SAE J1349 at Maximum Fan Speed	114 kW 153 hp	125 kW 168 hp
ISO 9249 (DIN)	126 kW 171 hp	137 kW 186 hp

Engine (continued)

	Standard Mode		Performance Mode	
Maximum Gross Torque				
ISO 14396	879 N·m	648 lbf-ft	879 N·m	648 lbf-ft
Maximum Net Torque				
SAE J1349	843 N·m	621 lbf-ft	843 N·m	621 lbf-ft
ISO 9249 (1977)/EEC 80/1269	852 N·m	628 lbf-ft	852 N·m	628 lbf-ft
Displacement	7.01 L	427 in³	7.01 L	427 in³

- Engine meets Tier 4 Final/Stage IV emission standards.
- Net power shown is the power available at the flywheel when the engine is equipped with alternator, air cleaner and diesel exhaust filter.

*Range 4 power is boosted to be the same as Performance Mode.

938M Wheel Loader

Buckets

Bucket Capacities – General Purpose	2.5-3.2 m^3	3.2-4.2 yd^3
Bucket Capacities – Light Material	3.1-5.0 m^3	4.0-6.5 yd^3

Steering

Steering Articulation Angle (each direction)	40°	
Maximum Flow – Steering Pump	130 L/min	34 gal/min
Maximum Working Pressure – Steering Pump	24 130 kPa	3,500 psi
Maximum Steering Torque:		
0 degrees (straight machine)	57 630 N·m	42,506 lbf-ft
40 degrees (full turn)	42 570 N·m	31,398 lbf-ft
Steering Cycle Times (full left to full right):		
At 1,800 rpm: 90 rpm steering wheel speed	2.3 seconds	
Number of Steering Wheel Turns – full left to full right or full right to full left	3.3 turns	

Loader Hydraulic System

Maximum Flow – Implement Pump	190 L/min	50 gal/min
3rd Function Maximum Flow*	190 L/min	50 gal/min
4th Function Maximum Flow*	160 L/min	42 gal/min
Maximum Working Pressure – Implement Pump	28 000 kPa	4,061 psi
Relief Pressure – Tilt Cylinder	30 000 kPa	4,351 psi
3rd Function Maximum Working Pressure	28 000 kPa	4,061 psi
4th Function Maximum Working Pressure	28 000 kPa	4,061 psi

Hydraulic Cycle Times:	Standard Mode	Performance Mode
	At 1,600 rpm	At 1,800 rpm
Raise (ground level to maximum lift)	6.2 seconds	5.5 seconds
Dump (at maximum lift height)	1.7 seconds	1.5 seconds
Float Down (maximum lift to ground level)	2.7 seconds	2.7 seconds
Total Cycle Time	10.6 seconds	9.7 seconds

*Adjustable from 20% to 100% of maximum flow through the secondary display, when equipped.

Service Refill Capacities

Fuel Tank	195 L	51.5 gal
Cooling System	32 L	7.9 gal
Engine Crankcase	20 L	5.3 gal
Transmission (gearbox)	11 L	2.9 gal
Axles:		
Front	35 L	9.2 gal
Rear	35 L	9.2 gal
Hydraulic System (including tank)	170 L	44.9 gal
Hydraulic Tank	90 L	23.8 gal
Diesel Exhaust Fluid (DEF) Tank	19 L	5 gal

- DEF used in Cat SCR systems must meet the requirements outlined in the International Organization for Standardization (ISO) standard 22241-1.

Transmission

Forward and Reverse:		
Range 1*	1-13 km/h	0.6-8 mph
Range 2	13 km/h	8 mph
Range 3	27 km/h	17 mph
Range 4	40 km/h	25 mph

*Creeper control allows maximum speed range adjustability from 1 km/h (0.6 mph) to 13 km/h (8 mph) in Range 1 through the secondary display, when equipped. Factory default is 7 km/h (4.4 mph).

Tires

Standard Size	20.5 R25, radial (L-3)	
Other Choices Include:	20.5 R25, radial (L-2)	23.5 R25, radial (L-3)
	20.5 R25, radial (L-5)	650/65 R25 radial (L-3)
	20.5-25 12PR (L-2)	Skidder/Agriculture
	20.5-25 12PR (L-3)	Flexports Gen II
	20.5-25 16PR (L-5)	

- Other tire choices are available. Contact your Cat dealer for details.
- In certain applications, the loader's productive capabilities may exceed the tire's tonnes-km/h (ton-mph) capabilities.
- Caterpillar recommends that you consult a tire supplier to evaluate all conditions before selecting a tire model.

Cab

ROPS	SAE J1040 MAY94, ISO 3471-1994
FOPS	SAE J/ISO 3449 APR98, Level II, ISO 3449 1992 Level II

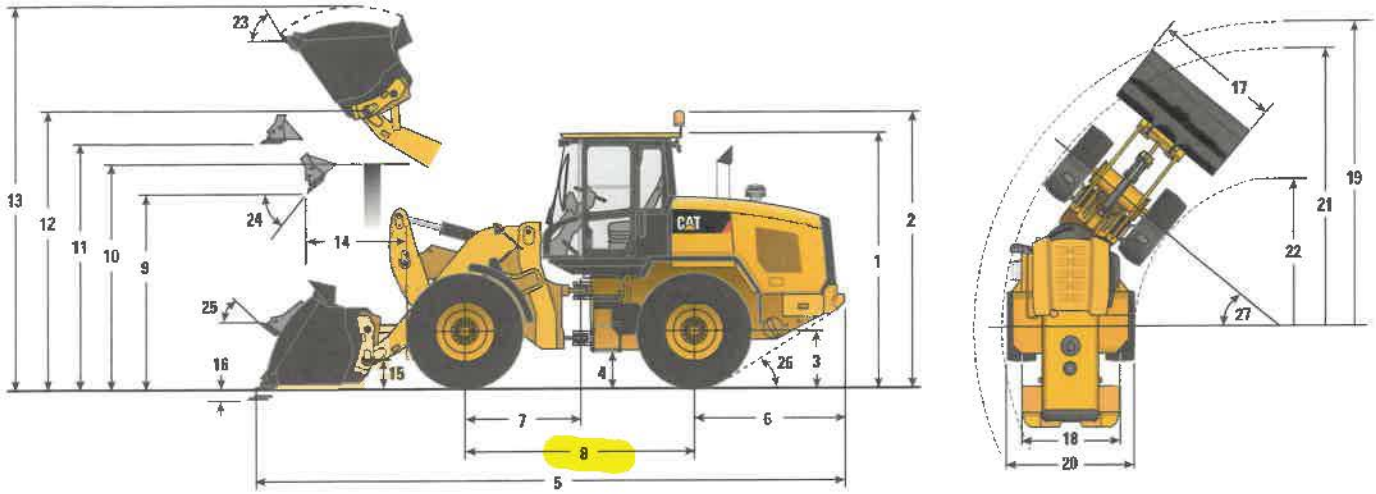
- Cab and Rollover Protective Structures (ROPS) are standard in North America and Europe.
- The declared dynamic operator sound pressure levels per ISO 6396:2008*, when properly installed and maintained, are:
  - Standard cab: 68 ±3 dB(A)
  - Deluxe cab: 66 ±2 dB(A)

*The measurements were conducted with the cab doors and windows closed and at 70% of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds.

Axles

Front	Fixed
	Locking differential (standard)
Rear	Oscillating ±11 degrees
	Open differential (standard)
	Limited slip differential (optional)

Dimensions and Operating Specifications (All dimensions are approximate. Dimensions vary with bucket and tire choice.)



		Standard Lift		High Lift	
** 1	Height: Ground to Cab	3340 mm	(10'11")	3340 mm	(10'11")
** 2	Height: Ground to Beacon	3669 mm	(12'0")	3669 mm	(12'0")
** 3	Height: Ground Axle Center	685 mm	(2'2")	685 mm	(2'2")
** 4	Height: Ground Clearance	386 mm	(1'3")	386 mm	(1'3")
* 5	Length: Overall	7656 mm	(25'1")	8397 mm	(27'6")
6	Length: Rear Axle to Bumper	1963 mm	(6'5")	1968 mm	(6'5")
7	Length: Hitch to Front Axle	1525 mm	(5'0")	1525 mm	(5'0")
8	Length: Wheel Base	3050 mm	(10'0")	3050 mm	(10'0")
* 9	Clearance: Bucket at 45 degrees	2834 mm	(9'3")	3415 mm	(11'2")
** 10	Clearance: Loadover Height	3354 mm	(11'0")	3561 mm	(11'8")
** 11	Clearance: Level Bucket	3641 mm	(11'11")	4222 mm	(13'10")
** 12	Height: Bucket Pin	3969 mm	(13'0")	4550 mm	(14'11")
** 13	Height: Overall	5273 mm	(17'3")	5853 mm	(19'2")
* 14	Reach: Bucket at 45 degrees	1146 mm	(3'9")	1413 mm	(4'7")
15	Carry Height: Bucket Pin	467 mm	(1'6")	686 mm	(2'2")
** 16	Dig Depth	101 mm	(3.9")	135 mm	(5.3")
17	Width: Bucket	2750 mm	(9'0")	2750 mm	(9'0")
18	Width: Tread Center	2065 mm	(6'9")	2065 mm	(6'9")
19	Turning Radius: Over Bucket	6133 mm	(20'1")	6490 mm	(21'3")
20	Width: Over Tires	2675 mm	(8'9")	2675 mm	(8'9")
21	Turning Radius: Outside of Tires	5537 mm	(18'1")	5537 mm	(18'1")
22	Turning Radius: Inside of Tires	2852 mm	(9'4")	2852 mm	(9'4")
23	Rack Angle at Full Lift	54 degrees		53 degrees	
24	Dump Angle at Full Lift	49 degrees		47 degrees	
25	Rack Angle at Carry	45 degrees		50 degrees	
26	Departure Angle	33 degrees		33 degrees	
27	Articulation Angle	40 degrees		40 degrees	
*	Tipping Load – Straight (ISO 14397-1)	11 837 kg	26,097 lb	8362 kg	18,435 lb
*	Tipping Load – Full Turn (ISO 14397-1)	10 045 kg	22,146 lb	7021 kg	15,480 lb
*	Breakout	13 170 kg	29,035 lb	12 663 kg	27,917 lb
*	Operating Weight	16 400 kg	36,156 lb	16 326 kg	35,993 lb

*Vary with bucket.

**Vary with tire.

Dimensions listed are for a machine configured with 2.5 m^3 (3.2 yd^3) general purpose Fusion™ bucket, bolt-on cutting edge, heavy counterweights, additional guarding, 80 kg (176 lb) operator and Michelin 20.5 R25 (L-3) XHA2 tires.