

# WASTE HANDLING

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## INTRODUCTION

An increasing volume of refuse is generated by every person, commercial entity and household day after day ... 365 days a year. Disposal of this waste is a major problem worldwide. Increased governmental legislation designed to protect the environment and rising transportation and land acquisition costs have made waste disposal a significant user of earthmoving and specialty mobile equipment.

## TRANSFER STATIONS

### TRANSFER STATIONS, MRF'S, (MATERIAL RECOVERY FACILITIES) SORTING STATIONS, RECYCLING STATIONS

#### Changing attitudes in waste applications

The growth in transfer stations has increased as the amount of material that is being recycled or otherwise diverted from landfill disposal has increased. As a result transfer stations, MRF's, (material recovery facilities), sorting stations and recycling stations, are becoming a more important part of the waste stream. As the number of disposal sites continues to decline and/or move further away from city centers, the number of transfer stations must increase to accommodate and redirect waste to the appropriate disposal facilities.

### Primary role

- Transfer stations, are designed to consolidate the loads of several delivery vehicles into long-haul transfer trailer or rail haul units. On average 2–5 inbound loads for transfer trailers and 5 or more for rail haul units can be consolidated into one outbound load. As a result transfer stations offer cost savings over direct haul to the landfill.
- MRF's, Sorting Stations, and Recycling Stations are designed to divert recyclable materials from the waste stream. Depending whether the material is pre-sorted, co-mingled, or MSW (municipal solid waste), the goal is to divert recyclable material for re-consumption and lower the amount of waste placed into the landfill thereby extending the landfills natural life.
- Safety is a major concern in today's Waste Industry Transfer Stations, Sorting Stations, MRF's, and Recycling Stations, all help reduce primary road and landfill traffic, by helping reduce smaller waste trucks and public traffic, leading to improved safety for everyone.

### Types of transfer stations

The two most popular styles of transfer stations in North America are top loading and compaction. While there are many different types of transfer stations, most operate out of these two designs.

Top loading systems are the most common and simplest to operate. Five types of top loading arrangements include direct loading, full separation, half-separation, floor loading, and surge pit. Depending on the type of transfer station, wheel loaders, track loaders, track-type tractors, compactors, and excavators, can be utilized alone or together in systems providing quick efficient waste handling.

Compaction transfer stations provide hydraulic compaction either prior to, or during the loading of the hauling vehicle. It is important to note this type of transfer station can utilize all of the same design features of the platform design except for the direct load and half-separation designs.

### Material Recovery Facility (MRF's), Sorting Stations, and Recycling Stations

A well-coordinated recycling program can reduce volume going to the landfill by up to 50% or more. The types of facility designs that sort recyclables out of the waste stream are:

1. *Recycling Facility* — Recyclables are separated at the source prior to being loaded into the haul vehicle. At the recycling station, the materials are unloaded, stored, sold and shipped to be remanufactured or recycled.
2. *Clean MRF's* — A "clean" MRF accepts source-separated recyclable material from residential and commercial sources delivered in separate collection vehicles.
3. *"Dirty" MRF* — A dirty MRF accepts mixed waste that later may be sorted for recycling; or source-separated waste that is delivered in the same collection vehicle (i.e. blue bag systems)
4. *Sorting Stations* — some transfer stations are designed for some waste diversion and recycling from mixed waste streams, and are normally described as 'sorting' stations.

### Typical Applications for Transfer Stations, Recycling Centers, MRF's, and Sorting Stations

There is a wide range of variability in transfer station applications and operations. Therefore, depending on facility size, amount of material handled, type of transfer station, etc., a wide variety of machines could be utilized.

Typically, residential and commercial waste trucks deposit the waste onto a tipping platform. A wheel loader then stockpiles it, loads it into the transfer trailers/rail units or moves it onto a conveyor or belt line for recycling. Some transfer stations utilize a hydraulic excavator to help sort, top off, and compact the material into the transfer trailer/rail units.

"Volumetric consolidation of material" is a method that is increasingly becoming more popular within transfer stations throughout the U.S. Volumetric consolidation of material prior to load-out helps maximize the allowable weight carried by each haul unit. Common machines used for material consolidation are, track-type tractors and track loaders. These machines are normally equipped with track shoes that help in shredding, compression, and compaction. Compactors can be used for material reduction and are normally aided by a combination of either wheel loaders and/or excavators.

For transfer, recycling, and sortings stations, and MRF's a vast amount of support equipment is utilized. These range from, skid steer loaders, backhoe loaders, compact wheel loaders, IT's, and small/medium wheel loaders.

## EQUIPMENT SELECTION

As in the landfill application, the largest single cost for daily operation in transfer stations, etc., is purchasing, operating, and maintaining the equipment. Undersized, inadequate or unreliable equipment results in higher maintenance and repair costs and improper operations.

Equipment in transfer stations and related applications perform these functions.

1. **Stockpiling the waste** once it is dumped onto the tip platform or in the surge pit. Machines used could be wheel loaders, track loaders, or track-type tractors, or any combination of these.
2. **Loading the waste** into the transfer trailers or rail cars. Material is either pushed, loaded and carried, or grappled into the transport vehicles. Wheel loaders, track loaders, track-type tractors, excavators, or any combination of these can be utilized.
3. **Support equipment** for all the different styles of transfer stations, recycling stations, sorting stations, and MRF's is a must. IT wheel loaders equipped with brooms, forks, specialty buckets, etc. can increase production and efficiency of the tip floors and load out areas. Skid steers, backhoe loaders, telehandlers and small compact equipment, with couplers and versatile attachments, can perform many necessary duties from clean up to load out.
4. **Reducing volume of material** is accomplished by continuous running over the waste, turning the waste over, and 'working' the waste. This type of operation compacts and shreds the waste allowing for less volume but higher weights in on road or rail haul transfer vehicles. Compactors, track-type tractors, and track-type loaders, equipped with wheels or undercarriages specifically designed to densify the waste, are normally utilized in this type of application.

## Machine Selection Factors

As in landfill applications, selecting the type, size, quantity, and combination of machines required in transfer stations and other sorting applications is determined by the following parameters.

1. Amount and type of waste to be handled daily — (daily tonnage) — again, machines should be spec'd towards peak times.
2. Type and size of the facility — top loading/compaction and the various floor arrangements possible.
3. Facility/load out dynamics
  - a. floor size — dimensions of the tip area, load out area, surge pit and storage area
  - b. ceiling height
  - c. haul unit specifications for load out
  - d. traffic patterns
4. Densification/compaction requirements for necessary load out tonnage's.
5. Supplemental tasks performed during the total workday.
6. Budget
7. Growth

## Track-Type Tractors

Track-type tractors are designed and guarded to accommodate all waste applications. Used primarily to aid spreading and compaction on landfills, track-type tractors offer another alternative for densification and waste movement in large transfer stations. Most track-type tractors are used in surge pit style transfer stations. In this application, waste can be dumped on a second level below the main tipping floor. The track-type tractor then works the waste, spreading, densifying, and loading haul vehicles for the trip to the landfill. This design is used when maximum volume reduction is required and/or when peak rate of waste exceeds the available floor space.

- Track Loaders
- Landfill Compactors
- Wheel Loaders

### Track Loaders

Track loaders are designed and guarded for many different types of waste applications. Because of its versatility, the track loader can perform several different functions within the transfer station. The machine's weight compacts the waste reducing volume and increasing density. This allows haul vehicles to obtain the maximum weight permissible for road or rail. They can either work alone, or in tandem with wheel loaders or excavators to load the haul vehicles. Equipping track loaders with multi-purpose buckets increases their versatility in allowing the operator to selectively grapple items for sorting and disposal.

### Landfill Compactors\*

Landfill compactors are specialized pieces of equipment primarily designed for spreading and compacting large volumes of waste in a landfill environment. However, in some instances around the world where transfer stations have a large enough working area and densification of the waste is an operational goal, Landfill compactors are being utilized.

Landfill compactors offer two major advantages.

1. They are already configured and guarded to work in a waste environment.
2. They are capable of achieving superior compaction levels as compared to other mobile equipment.

Although Landfill compactors are not typically viewed as a primary piece of transfer station equipment, they are occasionally being used and may offer an alternative solution to a transfer station operator. Please consider maximum density, weight needed in the hauler, tip floor size and possible contact by the compactor.

\*For this type of application, it is not recommended to use any steel wheeled compactor larger than the 826.

### Wheel Loaders

Wheel loaders are often one of the primary tools used in transfer stations to load and separate refuse. Almost all styles of transfer stations will utilize a wheel loader either on their tip floor, load out area, or as a support piece of equipment. Wheel loaders perform a variety of tasks such as, stockpiling of waste on the tip floor, feeding belts for the sorting line, top loading haul vehicles either same level, half separated, or full separation, and clean up around the facility. These machines are normally equipped with a wide variety of buckets, attachments, and tires. A good knowledge of the facility, its waste stream, and its limiting factors is needed for proper machine selection.

Depending on the size and design of the facility, amount and type of waste stream, and type of job the machine needs to perform, there are several models available for machine selection. Waste Handling Packages are offered on our large to medium wheel loader line and limited waste handling guarding packages are offered on our smaller wheel loaders.

Care should be taken in sizing your equipment for your peak periods, and your peak and support needs.

- **Compact wheel loaders (902–908)** — Normally utilized in small tonnage recycling stations, and support machines where maneuverability in cramped areas is needed.
- **Small wheel loaders (914G–930H)** — Used for maneuverability in stockpiling, sorting, and loading of types of material in transfer, recycling, and sorting stations. Also used as support and backup machines in larger applications.
- **Medium — large wheel loaders (938H–988H)** — Utilized for waste movement on tip floors and load out areas, the size, weight to horsepower ratios, and many options make these machines the work horse of the recycling, transfer, and sorting stations.
- **IT's or Integrated ToolCarriers (IT14G–IT62H)** — IT machines offer maneuverability and versatility in many different recycling, transfer, and sorting station applications. A wide variety of main and support attachments can be utilized daily for many different jobs to be performed around these facilities.

**Wheel Loader/IT Operating Recommendations**

Tons per Day Volume	Clean MRF/ Recycling	Dirty MRF Sorting Station	Waste Transfer Station	C and D Transfer Station	C and D MRF
0-100	902-930	924-930	924-930	930-950 <sup>b</sup>	930-966
100-350	914-924 <sup>a</sup>	924-930 <sup>a</sup>	924-930 <sup>a</sup>	950-966 <sup>d</sup>	950-966 <sup>d</sup>
350-500	930-938	924-938	950-966	966-980	966-980 <sup>a</sup>
500-1000	930-938 <sup>a</sup>	938-950 <sup>e</sup>	950-966 <sup>c</sup>	966-980 <sup>a,e</sup>	980 <sup>e</sup>
1000-1500	938-950 <sup>e</sup>	938-966 <sup>e</sup>	966-980 <sup>d</sup>	966-980 <sup>d,e</sup>	980 <sup>d,e</sup>
1500-2000	950-966 <sup>e</sup>	966-980 <sup>e</sup>	966-980 <sup>d</sup>	966-980 <sup>d,e</sup>	980 <sup>e</sup>
2000-2500	950-966 <sup>e</sup>	966-980 <sup>d,e</sup>	966-980 <sup>d,e</sup>	966-980 <sup>e</sup>	980 <sup>e</sup>
2500-3000	950-966 <sup>e</sup>	966-980 <sup>e</sup>	966-980 <sup>e</sup>	966-980 <sup>e</sup>	980 <sup>e</sup>
3000 Plus	966-980 <sup>e</sup>	980 <sup>e</sup>	980 <sup>e</sup>	980 <sup>e</sup>	980 <sup>e</sup>

C and D = Construction and Demolition

**Special Considerations**

All Machine Families — standard, IT (Integrated Toolcarrier), and custom product quick couplers should be considered available (contact dealer).

MRF — (Material Recovery Facility) — Clean and Dirty.

Clean MRF/Recycling — source separated material — no damaging material involved.

Dirty MRF/Sorting Station — non-separated material — has to be sorted — could involve moving damaging material.

a = Multiple machines recommended (contact your local Cat dealership for recommendations)

b = Depends on type and density of C and D material

c = Waste stream mixture may require multiple machines

d = Operating hours may require additional machines

e = Multiple machines required

**Additional Considerations**

All facilities are different and require special considerations when ordering and specifying equipment. Types of attachments/buckets and operating hours will dictate type of equipment and size necessary. Machine weight has to balance power for best traction on slick floors.

Front light guards, hinged crankcase guards, and power train guards (standard on the 938H, 950H, and 966H) help protect machine parts.

Optional guarding attachments available for the 924H, 930H, and IT38H include: windshield guards, engine crankcase guards, light guards, radiator guards and tilt cylinder guards for the 924H high lift.



**Hydraulic and Wheeled Excavators**

Hydraulic excavators are often found in recycling, transfer, and sorting stations as a primary tool for loading transfer trailers, railcars, waste compaction and for presorting material being loaded onto the sorting conveyors. The main advantages of an excavator in this role are its fast cycle times, its ability to maneuver within confined spaces, and the versatility of the many work tools with which a hydraulic excavator can be equipped. Certain tools are ideal when sorting or separating refuse is necessary, while others can be used for simple, high-production loading and compaction.

When sizing an excavator, it is important to take into account the daily tonnage of an operation as well as facility constraints, such as ceiling height and floor size. While no official “waste handling arrangement” is currently available for excavators, Caterpillar has configured excavators for many heavy-duty applications and all of the components that would ideally suit a machine to a transfer station application are available.

Wheeled hydraulic excavators add the benefits of greater speed for moving about the transfer station and therefore can be positioned to work in virtually any area of the transfer station within minutes.

They can also be equipped with an optional 1.2 m (4'0") fixed or 1.95 m (6'6") hydraulic cab riser for improved capability to see down in the “hole” when loading through the floor or seeing into trailers positioned at the same ground level as the wheeled excavator.

## LANDFILLS

The most commonly accepted way to dispose of refuse is to bury it in a landfill. A landfill protects the environment by disposing solid waste on land in an engineered cell. Building a cell involves spreading the waste in thin layers, compacting it to the smallest practical volume, covering it with soil by the end of each working day, and compacting the cover material. Proper equipment selection and operating technique can maximize refuse and cover compaction and extend the operational landfill life.

## LANDFILL METHODS

There are three basic landfill methods:

In the *area* method, waste is usually deposited at the toe of the previously compacted cell and then spread and compacted. This method is attractive for landfills receiving over 450 metric tons (500 tons) of refuse per day because it reduces truck unloading congestion. Cover material is normally handled by articulated trucks or wheel tractor-scrappers from nearby borrow sites.

The *trench* method is normally found at smaller landfills where the ground water table is deep. A trench is excavated and refuse is deposited and compacted within it. Excavated material becomes the cover material. Since the trench working face is narrow, truck congestion can occur. This method is usually attractive to landfills receiving under 450 metric tons (500 tons) of refuse per day.

The *ramp* method combines the characteristics of both area and trench designs. Refuse is dumped, spread and compacted on existing slopes and covered with material excavated directly in front of the working face. The excavated area becomes part of the next cell. This is a good way for a landfill to begin operation with a minimum of equipment expenditures.

## EQUIPMENT SELECTION

A landfill's largest single cost for daily operation is purchasing, operating and maintaining the mobile equipment. Undersized, inadequate or unreliable equipment results in breakdowns, higher operating costs and improper landfill operation.

Landfill equipment performs three distinct functions:

1. Waste handling and compaction equipment dispose of the waste. Track-type tractors, track loaders, and landfill compactors are the primary machines.
2. Cover material handling machines provide daily cover requirements. If supplying cover material is a machine's sole function at a landfill, it can be selected on the basis of normal earthmoving considerations, such as material characteristics, distance to borrow areas, volume to be transported, and other basic earthmoving principles, i.e., maximizing earth movement in the least amount of time at the lowest cost per yard.
3. Support equipment includes motor graders, backhoe loaders, hydraulic excavators, water trucks, air compressors, service vehicles, water pumps, generators and any other necessary equipment.

## Track-Type Tractors

The track-type tractor is the most popular and versatile machine on a landfill. They not only spread and compact refuse and cover material, they also prepare the site, rip cover material, build haul roads, knock down trees, remove stumps, and work in virtually all weather conditions. They are well-suited for all three landfill methods (area, ramp, and trench).

The crawler tractor can achieve compaction densities of 475 to 590 kg/m<sup>3</sup> (800-1000 lb/yd<sup>3</sup>). Maximum compaction is achieved when it works on a 3:1 or less slope, permitting the grousers to rip and tear while pushing and compacting waste up-slope. Economic limit of cover or waste movement by a track-type tractor is normally under 90 m (300 ft).

- Track Loaders
- Wheel Loaders
- Equipment Selection
- Landfill Compactors
- Wheel Tractor-Scrapers
- Articulated Trucks

### Track Loaders

Track loaders are highly versatile allowing them to perform many applications. Small landfills under 135 metric tons (150 tons) per day generally utilize a minimum amount of equipment. Track loaders can serve both the waste handling and cover material functions.

The track loader is an ideal machine for the trench method. Since the bucket does not extend outside the tracks, it can obtain full compaction to the trench walls. Rippers can be attached to handle frozen cover material. Compaction densities are similar to or slightly higher than the track-type tractor — 475 to 590 kg/m<sup>3</sup> (800-1000 lb/yd<sup>3</sup>). Many people believe track loaders equipped with single grouser shoes provide maximum demolition and compaction densities. Loading the bucket during compaction passes increases weight helping achieve higher densities.

Equipping track loaders with multi-purpose buckets increases their versatility in single machine applications, allowing the operator to selectively grapple items out of the working face.

### Landfill Compactors

Landfill compactors are specialized pieces of equipment effective in spreading and compacting large volumes of waste. Compactors offer higher operational speeds than track machines. This is the recommended machine if more than one spreading and compaction machine is needed and waste does not have to be pushed more than 90 m (300 ft).

Landfill compactors over 20 410 kg (45,000 lb) operating weight achieve the highest compaction levels — from 710 to 950 kg/m<sup>3</sup> (1200-1600 lb/yd<sup>3</sup>).

Landfill compactors normally operate on slopes no steeper than 4:1 due to reduced compaction and operational safety. Compactors should not be used to excavate cover material.

### Wheel Loaders

Although not recommended as a waste handling and compaction machine, wheel loaders are used by those communities sharing a single machine which travels from landfill to landfill. Versatility and mobility are the primary wheel loader advantages. In landfills over 272 metric tons (300 tons) per day, wheel loaders will sometimes be used to perform general clean-up tasks.

### Wheel Tractor-Scrapers

A scraper can be used to excavate trenches for site preparation, but usually performs a cover operation at a landfill and is most economical at distances over 185 m (600 ft). A scraper should be selected as if it were performing a typical earthmoving job.

Preferably, the scraper unloads the cover material close to the working face, either at the base or top. The cover material is then spread by the machine(s) working on the refuse. This reduces the possibility of tire damage from driving over the refuse. Foam filled tires are not recommended for scrapers due to the high travel speeds. Since excavating and transporting cover material is a major expense at a landfill, scrapers with work alone capability have been the most popular.

### Articulated Trucks

Articulated trucks are versatile, highly maneuverable, all-weather haulers that can negotiate poor underfoot conditions and tight spaces normally found in landfills. In combination with a variety of loading tools, articulated trucks typically work in site preparation, cell construction, hauling cover material, and are economically effective at haul distances ranging from 0.1 km-5 km (600 ft-3 miles). In dump configuration, cover material can be dumped close to the face and spread by other machines. In ejector configuration, articulated trucks provide on-the-go dumping and can operate in soft material and on side-slopes that would not be suitable for machines in dump configuration. In addition, Cat articulated trucks are available in a range of container handler and refuse body configurations for specialized landfill applications.

**Machine Selection Factors**

Selecting the type, size, quantity, and combination of machines required to spread, compact, and cover varying daily refuse volumes is determined by the following parameters:

1. Amount and type of waste to be handled (daily tonnage)
2. Amount and type of soil cover to be handled
3. Distance cover material to be transported
4. Weather conditions
5. Compaction requirements
6. Landfill method utilized
7. Supplemental tasks
8. Budget
9. Growth

A. *Daily tonnage and type of waste* — Amount of waste produced by a community is the major variable in selecting the appropriate size machine. The chart serves as a guideline in sizing a landfill machine. For example, if a community generates approximately 180 metric tons (200 tons) of refuse per day, a D6 or 953 and a 816F2 Landfill Compactor should be considered. See **Machine Tonnage and Usage Selection Guide** chart on next page.

Type of waste to be handled will strongly influence machine selection. The major solid waste components for a community should be identified and the proper machine chosen based on the type of waste and the compaction desired. For example, if the site receives a high proportion of noncompactible heavy industrial waste (rocks, bricks, concrete, reinforcing rod, etc.) a compactor might not achieve normal compaction densities and the pushing and tractive ability of a track-type tractor may be needed. However, tracked machines have more difficulty compacting bulk waste, trees, road materials, iron, and telephone poles than a landfill compactor.

On average, each American generates 2 kg (4.5 lb) of waste per day. While waste composition varies from location to location, even within a community, the following figures are representative of the waste stream in the U.S.:

<b>2003 Total U.S. Waste Generation*</b>	
Paper	35.2
Yard Waste	12.1
Food	11.7
Plastics	11.3
Metals	8
Rubber, Leather, Textiles	7.4
Glass	5.3
Wood	5.8
Other	3.4

\*Before Recycling. Courtesy U.S. EPA

**NOTE:** Moisture content can have a significant effect on weight characteristics. Field tests have indicated moisture content can vary from 10-80% during dry and wet seasons.

Machine Tonnage and Usage Selection Guide	D7R Series 2										
	D6T	D7R Series 2	D8T	D9T	D10T	953	963	973	816F2	826H	836H
<b>0 to 45.3 Metric Tons Per Day (0 to 50 Tons Per Day)</b>											
MSW Landfills	×					×					
MSW/Other Landfills	×					×					
Construction and Demolition Landfills		×						×			
<b>45.3 to 136 Metric Tons Per Day (50 to 150 Tons Per Day)</b>											
MSW Landfills	×					×					
MSW/Other Landfills	×					×			×		
Construction and Demolition Landfills		×						×		×	
<b>136 to 227 Metric Tons Per Day (150 to 250 Tons Per Day)</b>											
MSW Landfills	×					×					
MSW/Other Landfills	×					×			×		
Construction and Demolition Landfills		×	×					×		×	
<b>227 to 317.5 Metric Tons Per Day (250 to 350 Tons Per Day)</b>											
MSW Landfills	×					×	×		×		
MSW/Other Landfills		×				×	×		×		
Construction and Demolition Landfills			×	×				×		×	
<b>317.5 to 453.6 Metric Tons Per Day (350 to 500 Tons Per Day)</b>											
MSW Landfills		×					×		×	×	
MSW/Other Landfills		×					×		×	×	
Construction and Demolition Landfills			×	×				×			×
<b>453.6 to 680.4 Metric Tons Per Day (500 to 750 Tons Per Day)</b>											
MSW Landfills		×					×			×	
MSW/Other Landfills		×	×				×			×	
Construction and Demolition Landfills				×				×	×		×
<b>680.4 to 907.2 Metric Tons Per Day (750 to 1000 Tons Per Day)</b>											
MSW Landfills			×				×				×
MSW/Other Landfills			×				×	×			×
Construction and Demolition Landfills			×	×				×			×
<b>907.2 to 2721 Metric Tons Per Day (1000 to 3000 Tons Per Day)</b>											
MSW Landfills			×					×			×
MSW/Other Landfills			×	×				×			×
Construction and Demolition Landfills			×	×				×			×
<b>2721 Plus Metric Tons Per Day (3000 PLUS Tons Per Day)</b>											
MSW Landfills			×	×	×			×			×
MSW/Other Landfills			×	×	×			×			×
Construction and Demolition Landfills			×	×	×			×			×

**B. Amount and type of cover material to be handled** — Landfill size, type, and methods of operation vary dramatically from site to site. The type of cover material utilized is important. The utilization of Alternative Daily Cover (ADC) is highly recommended to reduce the loss of valuable airspace. The current trend is for landfill managers to track cover material as closely as they do airspace and maintenance.

When discussing and working with cover material, it needs to be broken down into the three segments: daily, intermediate, and final. No matter what your requirements are, most landfill operators agree that daily cover should be no more than approx. 10-12% of the entire lift (smaller tonnage landfills might see as high as 15-18%). No matter how much is used, it is recommended, if possible, to remove the daily cover before adding new waste each day. This will benefit airspace utilization as well as gas and leachate migration. When dealing with intermediate cover or higher than normal “deck” cover, once again, it is critical to remove as much of this cover before adding any new waste (not removing this type of cover leads to a higher possibility of leachate springs and subsequent fines). Total combination of daily cover and intermediate cover if not removed, could end up totaling more than 25%-35% of your total landfill airspace utilization, which is meant for waste, not dirt.

**C. Distance cover material is to be transported** will have a large effect on cover equipment selection. Whether working with daily, intermediate, or final cover, the following economic limits or guidelines are recommended for cover material movement. The quantity of material to be moved, the time available, and possible maintenance results, must also be considered when using these guidelines.

Track-type tractor            0-61 m     (0-200 ft)

Track loader

– push and spread            0-61 m     (0-200 ft)

– load, carry, and spread 0-150 m     (0-500 ft)

(Type of material/application should be considered for excessive track wear)

Wheel loader                 0-185 m     (0-600 ft)

Wheel tractor-scraper over 185 m     (over 600 ft)

Articulated trucks         over 185 m     (over 600 ft)

**D. Weather conditions** — when working in inclement weather, the tractive capability of a track-type machine may be necessary for poor underfoot conditions or to rip frozen cover material.

**E. Compaction requirements** — are becoming critical as extended landfill life is sought. If high density is desired, then a compactor may be necessary.

The following pages contain features, specifications and work tools for Cat Waste Handling machines. Additional information regarding drawbar pull/rimpull vs. groundspeed, controls, ground pressures, production estimating for these machines as well as specifications and performance information for Wheel Tractor Scrapers and Articulated Trucks can be found in their respective Performance Handbook sections.

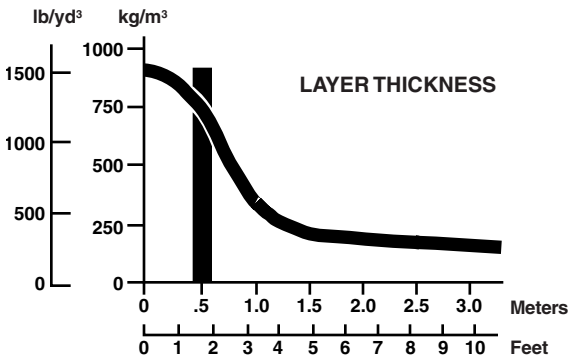
## REFUSE DENSITIES

Generally, loose residential and commercial refuse weighs 150-180 kg/m<sup>3</sup> (250-300 lb/yd<sup>3</sup>). A refuse collection vehicle will increase this density to 237-415 kg/m<sup>3</sup> (400-700 lb/yd<sup>3</sup>). In-place landfill density can vary from 355-890 kg/m<sup>3</sup> (600-1500 lb/yd<sup>3</sup>), depending on the compactive effort applied to the refuse. Landfill sites that accept a high percentage of demolition waste can have densities up to 1485 kg/m<sup>3</sup> (2500 lb/yd<sup>3</sup>). Cover material will generally raise fill densities 60-120 kg/m<sup>3</sup> (100-200 lb/yd<sup>3</sup>) over the figures given above.

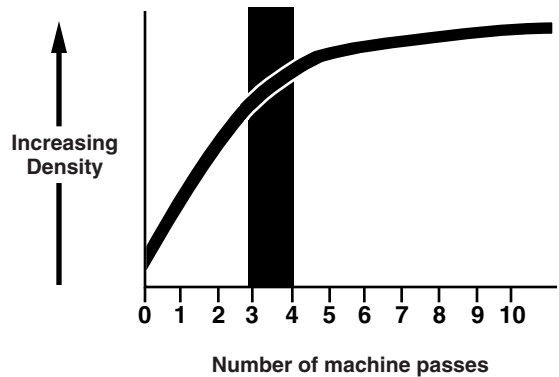
	Weight of Refuse	
	kg/m <sup>3</sup>	lb/yd <sup>3</sup>
Loose Refuse:	150-180	250-300
Packer Truck:	237-415	400-700
Fill Density:	355-890	600-1500
Refuse and Cover:	415-1009	700-1700

## FACTORS GOVERNING COMPACTION

Assuming equal machine weight, regardless of the type of machine, the following factors (1-4) affect compaction:



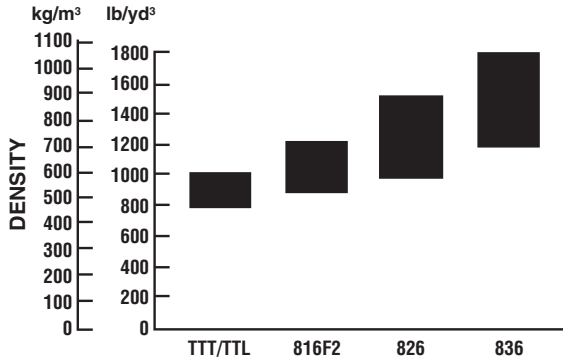
1. Refuse Layer Thickness — The depth of each compacted layer is perhaps the single most important controllable factor influencing density. To obtain maximum density, waste should be spread and compacted in layers **not exceeding a depth of 610 mm (2 ft)**. Thicker layers will reduce the density that a machine can develop in a given number of passes. (Density figures shown do not



- include cover material.)
2. Number of passes made over the refuse also affects density. Regardless of the type of machine used, the unit should make 3-4 passes to achieve optimum density. The following graph illustrates that more than four passes result in little additional compactive effort. The added expense of additional passes is not justified by the incremental increase in density.
3. Slope — Maximum compactive effort by a track-type unit is achieved by working the waste on a slope of 3:1 or less. Track-type machines achieve higher densities by grinding and shredding the refuse into smaller pieces as they climb a slope. Just the opposite is true for landfill compactors, the flatter the slope the better. This is because the weight of the landfill compactor is more efficiently utilized and concentrated when working on a flat surface. Landfill compactors that are used on slight slopes achieve a higher compaction density due to shearing stress that aids shredding and better blending of material.

**COMPACTION COMPARISON ESTIMATE**

The following graph may be used as a rule of thumb for the compactive ranges of various types of landfill machines if proper operating technique is employed.



**EXAMPLE OF INCREASED COMPACTION  
ON POTENTIAL LANDFILL LIFE**

Landfill refuse capacity	1 530 000 m <sup>3</sup> ( <b>2,000,000 yd<sup>3</sup></b> )
Operating days	260
Daily volume	365 metric tons ( <b>400 tons</b> )
Yearly volume	94 328 metric tons ( <b>104,000 tons</b> )

Compaction	Landfill Life	Gain
590 kg/m <sup>3</sup> <b>1000 lb/yd<sup>3</sup></b>	9.6 years	0
710 kg/m <sup>3</sup> <b>1200 lb/yd<sup>3</sup></b>	11.5 years	1.9 years
830 kg/m <sup>3</sup> <b>1400 lb/yd<sup>3</sup></b>	13.4 years	3.8 years
950 kg/m <sup>3</sup> <b>1600 lb/yd<sup>3</sup></b>	15.3 years	5.7 years
1070 kg/m <sup>3</sup> <b>1800 lb/yd<sup>3</sup></b>	17.2 years	7.6 years

**COMPUTER AIDED EARTHMOVING  
SYSTEMS (CAES)**

The Computer Aided Earth Moving System (CAES) is a landfill management system designed for the landfill industry. CAES is designed to enable landfill personnel to maximize machine productivity and job efficiency, conserve airspace, manage cover material, improve machine utilization, collect survey data and more by combining high precision GPS technology with a wireless mobile communications system. Planning and design operations can be transmitted to the machines onboard computer, which shows the machine location relative to the design area, current surface, and final design surface, (waste and cover). Landfill operators achieve maximum compaction effectiveness by making only the necessary number of passes over the waste. Working CAESultra as a team concept with Compactors, Track-type tractors

and cover machines will increase your airspace utilization, while reducing survey time and amount of unnecessary work. Additionally, CAES permits the recording of site-specific storage areas such as hazardous waste, medical, industrial, organic, or other materials that require special handling or a geographic record of their placement. CAES provides numerous reporting and recording features allowing landfill personnel to have real time information about landfill operations enabling them to make informative operational decisions. All of this is monitored and managed in the landfill office with CAESultra Office Software.

In this example, each 120 kg (200 lb) increase in refuse density results in an additional 1.9 years of landfill life. Also this example is exclusive of cover requirements.

**COMPACTOR PRODUCTION GUIDELINES**

Model	Tons/Day		Tons/Hr	
	Metric	U.S.	Metric	U.S.
836H	1016	<b>1000</b>	127	<b>125</b>
826H	813	<b>800</b>	102	<b>100</b>
816F2	508	<b>500</b>	63.5	<b>62.5</b>

All models are pushing refuse 61 m (200 ft) spreading and making 3 to 4 passes to compact. A pass is defined as: A machine traveling over the refuse one time in one direction on flat level ground. Adverse (uphill) or favorable (downhill) grades will effect the above production figures.

- F. *Landfill method utilized* — impacts the equipment needed. The area method, which is generally suited for flat or gradual sloping surfaces will get maximum compaction effort with a compactor. The trench method may require a track loader due to its excavating and tractive capabilities.
- G. *Supplemental tasks* — should be reviewed before selecting a landfill machine. Will the machine be required for site clearing, maintaining access roads, excavating, etc.? Auxiliary duties may require additional machine capability and/or attachments. If versatility is the key consideration, a track-type machine again becomes the logical choice.
- H. *Budget* — Smaller landfill operations with limited budgets may have to consider single machine versatility ahead of specialized machines or multiple units.
- I. *Growth* — Future increases in refuse volume must be considered to properly size machines.

## LANDFILL ESTIMATING

### Example Problem #1

A professional engineer has developed a small, rural landfill master plan. The local legislative regulatory agency has approved the plan and site.

Assume:

Waste generation: 2.04 kg/day (4.5 lb/day) per person

Waste collection: 6 days/week

Topography: flat

Land availability:

area has several suitable sites at nominal price

Population served: 30,000

Projected population in 3 years: 40,000

Current daily refuse volume: ?

Type of refuse: mostly household, some commercial

Operation: propose 8 hours/day, 5½ days/week

Present equipment: none — new site

What would your comments and recommendations be on the following?:

- Probable amount of refuse generated daily?
- Type of machine for the proposed Landfill?
- Size of machine for the proposed Landfill?

### Solution

- The current incoming waste stream can be determined to be 2.04 kg/day (4.5 lb/day) per person × 30,000 people = 61.2 metric tons (67.5 tons) daily. You must now multiply that daily generation rate by 7 for the total weekly generation, and divide by the number of days that the waste is collected (6). Therefore, your waste collection per day will be (61.2 tons/day × 7 days)/6 days of collection = 71.4 metric tons (78.7 tons) collected daily.

The same equation can be used to determine the three year projected waste stream of 40,000 residents to be 81.6 metric tons (90 tons) generated daily, 95.2 metric tons (105 tons) collected each day.

- Track loader — excavating ability, single machine application based on tonnage requirements.
- 953C handle current refuse, and has extra capacity for future growth. Small compactor if additional compaction is required.

### Example Problem #2

Existing landfill has been in operation for several years.

Assume:

Type of operation: area fill

Cover material: suitable material within 90 m (300 ft)

Current daily refuse volume: 500 metric tons (550 tons)

Anticipated daily refuse volume in 3 years:

680 metric tons (750 tons)

Type of refuse: household, commercial, large amount of brush and building demolition debris

Land availability: limited, very expensive

Available Refuse Volume: 3 249 125 m<sup>3</sup> (4,250,000 yd<sup>3</sup>)

Operation: 8 hours/days, 5½ days/week

Present equipment: D8 (3 years old)

What would your comments and recommendations be on the following:

- What range of in-place densities could be expected using a track-type tractor; a Cat steel wheeled landfill compactor?
- What effect does machine selection have on site life?
- What are the advantages and limitations of steel wheeled landfill compactors?
- What are the advantages and limitations of track-type units?
- How many machines should be used on the site?
- What type should they be?
- What size should they be?

Solution

- a. The Track-Type Tractor will achieve 475 to 595 kg/m<sup>3</sup> (800 to 1000 lb/yd<sup>3</sup>) in-place density. The Cat steel wheeled landfill compactor will achieve 595 to 830 kg/m<sup>3</sup> (1000 to 1400 lb/yd<sup>3</sup>) in-place density.
- b. There are 3 249 125 m<sup>3</sup> (4,250,000 yd<sup>3</sup>) available. 500 metric tons (550 tons) per day is how many m<sup>3</sup> (yd<sup>3</sup>)? Assume a minimum density of 475 kg/m<sup>3</sup> (800 lb/yd<sup>3</sup>).

$$500 \text{ metric tons/day} \times \frac{1000 \text{ kg/metric ton}}{475 \text{ kg/m}^3} = 1052 \text{ m}^3/\text{day}$$

$$550 \text{ tons/day} \times \frac{2000 \text{ lb/ton}}{800 \text{ lb/yd}^3} = 1375 \text{ yd}^3/\text{day}$$

$$5.5 \text{ days/week} \times 52 \text{ weeks/year} = 286 \text{ days/year}$$

$$\text{Yearly volume: } 1052 \times 286 = 300\,872 \text{ m}^3$$

$$1375 \times 286 = 393,250 \text{ yd}^3$$

Landfill life at this density:

$$\frac{3\,250\,000 \text{ m}^3}{300\,872 \text{ m}^3/\text{year}} = \frac{4,250,000 \text{ yd}^3}{393,250 \text{ yd}^3/\text{year}} = 10.8 \text{ years}$$

Similar calculations are performed to generate the following tables.

**500 METRIC TONS/DAY (550 TONS/DAY)**

kg/m <sup>3</sup>	Density		Landfill Life (years)
	kg/m <sup>3</sup>	lb/yd <sup>3</sup>	
475	800		10.8
595	1000		13.5
715	1200		16.2
835	1400		18.9
950	1600		21.6

**680 METRIC TONS/DAY (750 TONS/DAY)**

kg/m <sup>3</sup>	Density		Landfill Life (years)
	kg/m <sup>3</sup>	lb/yd <sup>3</sup>	
475	800		7.9
595	1000		9.9
715	1200		11.9
835	1400		13.9
950	1600		15.9

From the tables we determine that a track-type tractor, at 500 metric tons per day (550 tons/day), will provide 13.5 landfill life years at 595 kg/m<sup>3</sup> (1000 lb/yd<sup>3</sup>). Compaction will extend that life 5.4 years to 18.9 years at 835 kg/m<sup>3</sup> (1400 lb/yd<sup>3</sup>).

Proper compaction techniques are necessary to achieve the higher refuse densities and increase landfill life.

- c. Advantages: Provides highest compaction densities extending landfill life.

Limitations: Specialty unit designed to spread and compact — does not excavate virgin material economically, but can handle stockpile cover material.

- d. Advantages: most versatile unit, well suited to site preparation, finishing and access road construction and maintenance; all weather machines with excellent tractive ability.

Limitation: compaction — cannot achieve the in-place refuse densities of the specialized landfill compactors.

- e. Minimum of two. Additional equipment would depend on supplemental tasks.

- f. Track-type tractor — for earthmoving and refuse spreading work; steel wheeled compactor-quantity of refuse and land cost would justify.

- g. D8 — keeping existing unit; D9 — when new tractor is necessary; 826H — with large amount of demolition debris and brush and projected increase in tonnage would justify 826H over 816F2.

**NOTE:** Ballasting the wheels on Cat Landfill Compactors to increase machine weight and achieve higher compaction densities is not recommended. Landfills are high rimpull applications. Ballasting the wheels will significantly increase machine weight but decrease overall performance when traveling on the fill. Also, wheels are not necessarily air tight or leak proof.

Cat Waste Handling Track-Type Tractor modifications are purpose built and installed at the original manufacturing facility prior to shipment.

#### Features:

- **Hinged heavy duty radiator doors** are guarded to prevent excessive trash build-up. Quick release handles allow easy access for cleaning.
- **Final drive, pivot shaft, and idler seal guarding** helps prevent wire, cable and similar material from winding around components and damaging seals.
- **Striker bars for front, rear and ripper (all optional)** keep trash from damaging fenders, fuel and hydraulic tanks or other sheet metal.
- **Lighting protection.** Front lights are mounted on top of bulldozer lift cylinders. Rear lights are ROPS mounted.
- **AMOCs Waste Handling Arrangement radiator** with 6 fins/inch. (Required on D6T through D10T, not available for D6N.)
- **Flexaire fan** is mandatory option for D6T and D7R Series 2, not available for D6N.
- **Elevated sprocket** removes final drives from wear environment and eliminates impact loading for extended power train life.
- **Sheet metal guarding** near track and on dozer tilt hoses.
- **Fuel tank guards** keep trash from damaging fuel and hydraulic tanks or other sheet metal.
- **Clamshell guards** — a non-rotating guard installed over the final drives to help prevent wire wrap. Guards include inspection plates, not available for D6N and D6T EAME.
- **Reversible hydraulic demand fan** required for D8T, D9T, D10T, not available for D6N.
- **Heavy duty steps and grab handles** resist damage from landfill debris.
- **Center-shaped center hole track shoes (optional)** help keep track clean during machine operation.
- **Blade trash racks (optional)** prevent blade spill-over and damage to cylinders or radiator guard.
- **95 amp ducted alternator available on D6T, D7R Series 2, D8T, D9T, D10T** insures adequate current is available to maintain battery and operate accessories.
- **Elevated prescreener** to remove engine air inlet from debris environment. Larger surface area to resist plugging. Turbine precleaner is optional.
- **Cat turbine precleaner optimax dual-stage precleaner** removes large particulates from incoming air before they reach the air filter, helps extend filter life. (Optional on D6T through D10T.)
- **ROPS mounted air conditioning** helps prevent condenser core plugging. Provides full utilization of jacket water cooling system by avoiding additional heat load from radiator mounted condenser.
- **Laminated thermal shields** cover the exhaust stack inside the engine compartment, hot-side of the turbocharger, and the exhaust manifold. These shields reduce surface temperatures well below the flash point of most common combustibles encountered. (Optional on D6T through D8. Standard on D9T, D10T, not available for D6N.)
- **Chassis Guards.**
- **Sealed belly guards.**
- **Perforated engine enclosures** standard on D6T, D7R Series 2, D8T, D9T, and D10T. This configuration is unavailable when Sound Suppression is ordered.
- **Carrier rollers** not recommended.



MODEL	D6N XL		D6N LGP		D6T WHA	
Flywheel Power	111.8 kW	150 hp	111.8 kW	150 hp	138 kW	185 hp
Operating Weight (Power Shift Differential Steer)* SU Blade	—		—		18 393 kg	40,550 lb
Engine Model	C6.6 ACERT		C6.6 ACERT		C9 ACERT	
Rated Engine RPM	2200		2200		1850	
No. of Cylinders	6		6		6	
Bore	105 mm	4.13"	105 mm	4.13"	112 mm	4.4"
Stroke	127 mm	5.0"	127 mm	5.0"	149 mm	5.9"
Displacement	6.6 L	403 in <sup>3</sup>	6.6 L	403 in <sup>3</sup>	8.8 L	537 in <sup>3</sup>
Track Rollers (Each Side)	7		8		6	
Width of Standard Track Shoe	610 mm	2'0"	840 mm	2'9"	560 mm	1'10"
Length of Track on Ground	2581 mm	8'6"	3117 mm	10'3"	2.67 m	8'9"
Ground Contact Area (with Std. Shoe)	3.15 m <sup>2</sup>	4882 in <sup>2</sup>	5.24 m <sup>2</sup>	8122 in <sup>2</sup>	2.98 m <sup>2</sup>	4620 in <sup>2</sup>
Track Gauge	1.89 m	6'2"	2.16 m	7'1"	1.88 m	6'2"
GENERAL DIMENSIONS:						
Height (Stripped Top)**	—		—		2.38 m	7'10"
Height (To Top of ROPS Canopy)	3.04 m	10'0"	3.14 m	10'4"	3.20 m	10'6"
Height (To Top of ROPS Cab)	3.10 m	10'2"	3.20 m	10'6"	3.19 m	10'5"
Overall Length (without Blade)	3.74 m	12'3"	4.17 m	13'8"	3.86 m	12'8"
with S Blade	—		—		4.90 m	16'1"
with SU Blade	5.16 m	16'11"	—		5.10 m	16'9"
with VPAT Blade	4.90 m	16'1"	5.37 m	17'7"	—	
with Angle Blade	—		—		5.01 m	16'5"
Width (Over Trunnion)	2.63 m	8'8"	—		2.64 m	8'8"
Width (without Trunnion — Std. Track)	2.50 m	8'2"	—		2.44 m	8'0"
Ground Clearance	394 mm	1'4"	507 mm	1'8"	383 mm	1'3"
Blade Types and Widths:						
Straight	—		—		3.36 m	11'0"
Angle Straight	—		—		4.17 m	13'8"
Full 25° Angle	—		—		3.78 m	12'5"
Semi-U	3.19 m	10'6"	—		3.26 m	10'8"
VPAT (Variable pitch, angle, and tilt) straight	3.27 m	10'9"	4.08 m	13'5"	—	
Fuel Tank Refill Capacity	299 L	79 U.S. gal	299 L	79 U.S. gal	424 L	112 U.S. gal

\* Operating Weight includes ROPS canopy, operator, lubricants, coolant, full fuel tank, hydraulic controls and fluid, straight dozer with tilt, horn, back-up alarm, retrieval hitch and front pull hook.

\*\* Height (stripped top) — without ROPS canopy, exhaust, pre-cleaner, seat back or other easily removed encumbrances.



MODEL	D6T XL WHA		D6T XW WHA		D6T LGP WHA	
Flywheel Power	149 kW	200 hp	149 kW	200 hp	149 kW	200 hp
Operating Weight (Power Shift Differential Steer)* SU Blade	20 148 kg	44,420 lb	20 739 kg	45,723 lb	21 783 kg	48,024 lb
Engine Model	C9 ACERT		C9 ACERT		C9 ACERT	
Rated Engine RPM	1850		1850		1850	
No. of Cylinders	6		6		6	
Bore	112 mm	4.4"	112 mm	4.4"	112 mm	4.4"
Stroke	149 mm	5.9"	149 mm	5.9"	149 mm	5.9"
Displacement	8.8 L	537 in <sup>3</sup>	8.8 L	537 in <sup>3</sup>	8.8 L	537 in <sup>3</sup>
Track Rollers (Each Side)	7		7		8	
Width of Standard Track Shoe:	560 mm	1'10"	760 mm	2'6"	915 mm	3'0"
VPAT	560 mm	1'10"	760 mm	2'6"	810 mm	2'10"
Length of Track on Ground	2.87 m	9'5"	2.87 m	9'5"	3.28 m	10'9"
Ground Contact Area (with Std. Shoe)	3.22 m <sup>2</sup>	4972 in <sup>2</sup>	4.36 m <sup>2</sup>	6780 in <sup>2</sup>	5.99 m <sup>2</sup>	9288 in <sup>2</sup>
VPAT	3.22 m <sup>2</sup>	4972 in <sup>2</sup>	4.36 m <sup>2</sup>	6780 in <sup>2</sup>	5.31 m <sup>2</sup>	8256 in <sup>2</sup>
Track Gauge	1.88 m	6'2"	2.03 m	6'8"	2.29 m	7'6"
VPAT	2.13 m	7'0"	2.29 m	7'6"	2.29 m	7'6"
GENERAL DIMENSIONS:						
Height (Stripped Top)**	2.38 m	7'10"	2.38 m	7'10"	2.43 m	8'0"
Height (To Top of ROPS Canopy)	3.20 m	10'6"	3.20 m	10'6"	3.25 m	10'8"
Height (To Top of ROPS Cab)	3.20 m	10'6"	3.20 m	10'6"	3.25 m	10'8"
Overall Length (without Blade)	3.86 m	12'8"	3.86 m	12'8"	4.25 m	13'11"
with S Blade	—	—	—	—	5.47 m	17'11"
with SU Blade	5.33 m	17'6"	5.33 m	17'6"	—	—
with VPAT Blade	5.27 m	17'4"	5.27 m	17'4"	5.97 m	19'7"
with Angle Blade	5.21 m	17'1"	5.21 m	17'1"	—	—
Overall Length (VPAT)	3.86 m	12'8"	3.86 m	12'8"	4.25 m	13'11"
with S Blade	—	—	—	—	5.47 m	17'11"
with SU Blade	5.33 m	17'6"	5.33 m	17'6"	—	—
with VPAT Blade	5.27 m	17'4"	5.27 m	17'4"	5.97 m	19'7"
with Angle Blade	5.21 m	17'1"	5.21 m	17'1"	—	—
Width (Over Trunnion)	2.64 m	8'8"	2.95 m	9'8"	3.43 m	8'8"
Width (without Trunnion — Std. Track)	2.44 m	8'0"	2.74 m	9'0"	3.15 m	10'4"
Ground Clearance	383 mm	1'3"	383 mm	1'3"	433 mm	1'5"
Blade Types and Widths:						
Straight	—	—	—	—	4.06 m	13'4"
Angle Straight	4.17 m	13'8"	4.20 m	13'9"	—	—
Full 25° Angle	3.78 m	12'5"	3.81 m	12'6"	—	—
Semi-U	3.26 m	10'8"	3.56 m	11'8"	—	—
VPAT (Variable pitch, angle, and tilt) straight	3.88 m	12'9"	4.16 m	13'8"	4.16 m	13'8"
VPAT Full 25° Angle	3.55 m	11'8"	3.81 m	12'6"	3.81 m	12'6"
Fuel Tank Refill Capacity	424 L	112 U.S. gal	424 L	112 U.S. gal	424 L	112 U.S. gal

\* Operating Weight includes ROPS canopy, operator, lubricants, coolant, full fuel tank, hydraulic controls and fluid, straight dozer with tilt, horn, back-up alarm, retrieval hitch and front pull hook.

\*\* Height (stripped top) — without ROPS canopy, exhaust, pre-cleaner, seat back or other easily removed encumbrances.

# Waste Handling Track-Type Tractors

## Specifications



MODEL	D7R Series 2 WHA		D7R XR Series 2 WHA		D7R LGP Series 2 WHA		D8R WHA	
Flywheel Power	179 kW	<b>240 hp</b>	179 kW	<b>240 hp</b>	179 kW	<b>240 hp</b>	228 kW	<b>305 hp</b>
Operating Weight:* Power Shift Differential Steer	28 108 kg	<b>61,912 lb</b>	28 764 kg	<b>63,357 lb</b>	30 328 kg	<b>66,802 lb</b>	37 630 kg	<b>82,880 lb</b>
Engine Model	<b>3176C SCAC</b>		<b>3176C SCAC</b>		<b>3176C SCAC</b>		<b>3406E TA</b>	
Rated Engine RPM	<b>2100</b>		<b>2100</b>		<b>2100</b>		<b>2100</b>	
No. of Cylinders	<b>6</b>		<b>6</b>		<b>6</b>		<b>6</b>	
Bore	125 mm	<b>4.92"</b>	125 mm	<b>4.92"</b>	125 mm	<b>4.92"</b>	137 mm	<b>5.4"</b>
Stroke	140 mm	<b>5.5"</b>	140 mm	<b>5.5"</b>	140 mm	<b>5.5"</b>	165 mm	<b>6.5"</b>
Displacement	10.3 L	<b>629 in<sup>3</sup></b>	10.3 L	<b>629 in<sup>3</sup></b>	10.3 L	<b>629 in<sup>3</sup></b>	14.6 L	<b>893 in<sup>3</sup></b>
Track Rollers (Each Side)	<b>7</b>		<b>8</b>		<b>7</b>		<b>8</b>	
ERF†	—		—		<b>9</b>		—	
Width of Standard Track Shoe	560 mm	<b>1'10"</b>	610 mm	<b>2'0"</b>	914 mm	<b>3'0"</b>	560 mm	<b>1'10"</b>
Length of Track on Ground	2.89 m	<b>9'5"</b>	3.05 m	<b>10'0"</b>	3.16 m	<b>10'5"</b>	3.21 m	<b>10'6"</b>
Ground Contact Area (w/Std. Shoe)	3.22 m <sup>2</sup>	<b>4996 in<sup>2</sup></b>	3.72 m <sup>2</sup>	<b>5768 in<sup>2</sup></b>	5.78 m <sup>2</sup>	<b>8960 in<sup>2</sup></b>	3.57 m <sup>2</sup>	<b>5544 in<sup>2</sup></b>
Track Gauge	1.98 m	<b>6'6"</b>	1.98 m	<b>6'6"</b>	2.24 m	<b>7'4"</b>	2.08 m	<b>6'10"</b>
GENERAL DIMENSIONS:								
Height (Stripped Top)**	2.56 m	<b>8'5"</b>	2.56 m	<b>8'5"</b>	2.74 m	<b>9'0"</b>	2.67 m	<b>8'9"</b>
Height (To Top of ROPS Canopy)	3.53 m	<b>11'7"</b>	3.53 m	<b>11'7"</b>	3.52 m	<b>11'6"</b>	3.51 m	<b>11'6"</b>
Height (To Top of ROPS Cab)	3.43 m	<b>11'2"</b>	3.43 m	<b>11'2"</b>	3.58 m	<b>11'9"</b>	3.45 m	<b>11'3"</b>
Overall Length (with SU Blade)***	—	—	—	—	—	—	6.91 m	<b>22'8"</b>
(without Blade)	—	—	—	—	—	—	4.93 m	<b>16'2"</b>
Overall Length (with S Blade)	5.69 m	<b>18'8"</b>	5.81 m	<b>19'1"</b>	5.78 m	<b>19'0"</b>	—	—
(without Blade)	4.67 m	<b>15'4"</b>	4.67 m	<b>15'4"</b>	4.67 m	<b>15'4"</b>	—	—
Width (Over Trunnion)	2.87 m	<b>9'5"</b>	2.87 m	<b>9'5"</b>	3.37 m	<b>11'1"</b>	3.05 m	<b>10'0"</b>
Width (without Trunnion — Std. Shoe)	2.54 m	<b>8'4"</b>	2.59 m	<b>8'6"</b>	3.15 m	<b>10'4"</b>	2.70 m	<b>8'8"</b>
Ground Clearance	414 mm	<b>16.3"</b>	414 mm	<b>16.3"</b>	496 mm	<b>1'7.5"</b>	606 mm	<b>1'11"</b>
Blade Types and Widths:								
Straight	3.52 m	<b>11'7"</b>	3.32 m	<b>11'7"</b>	4.55 m	<b>14'11"</b>	—	—
Angle Straight	4.50 m	<b>14'9"</b>	4.50 m	<b>14'9"</b>	—	—	4.99 m	<b>16'4"</b>
Full 25° Angle	4.12 m	<b>13'6"</b>	4.12 m	<b>13'6"</b>	—	—	4.52 m	<b>14'10"</b>
Universal	3.98 m	<b>13'1"</b>	3.98 m	<b>13'1"</b>	—	—	4.26 m	<b>14'0"</b>
Semi-U	3.69 m	<b>12'2"</b>	3.69 m	<b>12'2"</b>	—	—	3.94 m	<b>12'11"</b>
Fuel Tank Refill Capacity	479 L	<b>127 U.S. gal</b>	479 L	<b>127 U.S. gal</b>	479 L	<b>127 U.S. gal</b>	625 L	<b>165 U.S. gal</b>

\* Operating Weight includes ROPS canopy, operator, lubricants, coolant, full fuel tank, hydraulic controls and fluid, straight dozer with tilt, horn, back-up alarm, retrieval hitch and front pull hook.

— D8R equipped with track guides, ROPS/FOPS cab, single shank ripper and SU blade.

\*\* Height (stripped top) — without ROPS canopy, exhaust, seat back or other easily removed encumbrances.

\*\*\* Includes drawbar.

† ERF — Extended Track Roller Frame. Extends frame 366 mm (14.4"), adds 3 track sections and 2 rollers/side.



MODEL	D8T WHA		D9T WHA		D10T WHA	
Flywheel Power	231 kW	310 hp	306 kW	410 hp	433 kW	580 hp
Operating Weight*	—		—		65 764 kg	144,986 lb
Power Shift Differential Steer	38 660 kg	85,150 lb	49 567 kg	109,180 lb	—	
Engine Model	C15 ACERT		C18 ACERT		C27 ACERT	
Rated Engine RPM	1850		1800		1800	
No. of Cylinders	6		8		12	
Bore	137 mm	5.4"	145 mm	5.7"	137 mm	5.4"
Stroke	172 mm	6.75"	183 mm	7.2"	152 mm	6"
Displacement	15.2 L	928 in <sup>3</sup>	18.1 L	1106 in <sup>3</sup>	27 L	1649 in <sup>3</sup>
Track Rollers (Each Side)	8		8		8	
Width of Standard Track Shoe	560 mm	1'10"	610 mm	2'0"	610 mm	2'0"
Length of Track on Ground	3.21 m	10'6"	3.47 m	11'5"	3.88 m	12'9"
Ground Contact Area (w/Std. Shoe)	3.58 m <sup>2</sup>	5544 in <sup>2</sup>	4.24 m <sup>2</sup>	6569 in <sup>2</sup>	4.74 m <sup>2</sup>	7347 in <sup>2</sup>
Track Gauge	2.08 m	6'10"	2.25 m	7'5"	2.55 m	8'4"
GENERAL DIMENSIONS:						
Height (Stripped Top)**	2.67 m	8'9"	3.00 m	9'10"	3.22 m	10'7"
Height (To Top of ROPS Canopy)	3.46 m	11'4"	3.99 m	13'1"	4.34 m	14'3"
Height (To Top of ROPS Cab)	3.46 m	11'4"	3.82 m	12'6"	4.07 m	13'4"
Overall Length (with Blade and Ripper)	—		—		9.26 m	30'5"
(without Blade and Ripper)	—		—		5.33 m	17'6"
Overall Length (with SU Blade)***	6.09 m	20'0"	6.63 m	21'10"	7.50 m	24'8"
(without Blade)	4.64 m	15'2"	4.91 m	16'1"	5.33 m	17'6"
Width (Over Trunnion)	3.05 m	10'0"	3.30 m	10'10"	3.72 m	12'2"
Width (without Trunnion — Std. Shoe)	2.64 m	8'8"	2.87 m	9'5"	3.16 m	10'4"
Ground Clearance	618 mm	2'0"	596 mm	1'11"■	615 mm	2'0"
Blade Types and Widths:						
Angle Straight	4.99 m	16'4"	—		—	
Full 25° Angle	4.52 m	14'10"	—		—	
Universal	4.26 m	14'0"	4.65 m	15'3"	5.26 m	17'3"
Semi-U	3.94 m	12'11"	4.31 m	14'2"	—	
Fuel Tank Refill Capacity	643 L	170 U.S. gal	889 L	235 U.S. gal	1109 L	293 U.S. gal

\* Operating Weight includes ROPS canopy, operator, lubricants, coolant, full fuel tank, hydraulic controls and fluids, semi universal blade with tilt, back-up alarm, seat belts, lights, rigid drawbar and front towing device.

— D8T and D9T equipped with track guides, ROPS/FOPS cab, single shank ripper and SU blade.

— D10T includes 10 SU blade single shank ripper and ROPS cab.

\*\* Height (stripped top) — without ROPS canopy, exhaust, seat back or other easily removed encumbrances.

\*\*\* Includes drawbar.

■ SAE J1234.

MODEL	D6T, D6T XL and D6T LGP			
	6SU		6SU XL	
Type	Semi Universal		Semi Universal	
Blade Capacities w/Trash Rack*	11.2 m <sup>3</sup>	14.3 yd <sup>3</sup>	11.2 m <sup>3</sup>	14.3 yd <sup>3</sup>
Weight, Shipping** (Dozer)	3026 kg	6657 lb	3026 kg	6657 lb
Tractor and Dozer Dimensions:				
A Length (Blade Straight)	5.31 m	17'5"	5.55 m	18'2"
Blade Dimensions:				
B Width (including std. end bits)	3.26 m	10'8"	3.26 m	10'8"
C Height	2019 mm	6'7"	2019 mm	6'7"
D Max. Digging Depth	473 mm	18.6"	459 mm	18.1"
E Ground Clearance @ Full Lift	1104 mm	3'7.5"	1195 mm	3'11.1"
F Manual Tilt	670 mm	2'2.4"	670 mm	2'2.4"
G Max. Pitch		+5.3°–4.8°		+5.3°–4.8°
H Max. Hydraulic Tilt	743 mm	2'5.3"	743 mm	2'5.3"
J Hydraulic Tilt (Manual Brace Centered)	408 mm	16.1"	408 mm	16.1"

\*Blade capacities as determined by SAE J1265.

Notice that the capacity of the U-blade is the volume carried by a straight blade of the same dimensions plus the volume included in the "cup" of the U-blade. It is intended for **relative comparisons of dozer sizes**, and not for predicting capacities or productivities in actual field conditions.

\*\* Shipping Weight — Total Bulldozer Arrangement includes: Blade, push arms or C-frame, braces, cylinders, lines, trunnions and lift cylinder mountings.

MODEL	D6T, D6T XL and D6T LGP			
	6S LGP		6SU XW	
Type	Straight		Semi Universal	
Blade Capacities*	9.4 m <sup>3</sup>	12.3 yd <sup>3</sup>	11.2 m <sup>3</sup>	14.3 yd <sup>3</sup>
Weight, Shipping** (Dozer)	2840 kg	6262 lb	3026 kg	6657 lb
Tractor and Dozer Dimensions:				
A Length (Blade Straight)	5.71 m	18'9"	—	—
Blade Dimensions:				
B Width (including std. end bits)	4.04 m	13'3"	3.56 m	11'8"
C Height	1101 mm	3'7.3"	2019 mm	6'7"
D Max. Digging Depth	655 mm	2'1.2"	459 mm	18.1"
E Ground Clearance @ Full Lift	1083 mm	3'6.6"	1195 mm	3'11"
F Manual Tilt	632 mm	2'0.9"	670 mm	2'2.4"
G Max. Pitch		+5.3°–4.8°		+5.3°–4.8°
H Max. Hydraulic Tilt	701 mm	2'3.6"	743 mm	2'5.3"
J Hydraulic Tilt (Manual Brace Centered)	385 mm	15.2"	743 mm	2'5.3"

\*Blade capacities as determined by SAE J1265.

Notice that the capacity of the U-blade is the volume carried by a straight blade of the same dimensions plus the volume included in the "cup" of the U-blade. It is intended for **relative comparisons of dozer sizes**, and not for predicting capacities or productivities in actual field conditions.

\*\* Shipping Weight — Total Bulldozer Arrangement includes: Blade, push arms or C-frame, braces, cylinders, lines, trunnions and lift cylinder mountings.

MODEL	D7R Series 2 and D7R LGP Series 2			
	7S		7SU	
Type	Straight		Semi Universal	
Blade Capacities*	10.9 m <sup>3</sup>	14.2 yd <sup>3</sup>	14.0 m <sup>3</sup>	18.4 yd <sup>3</sup>
Weight, Shipping** (Dozer)	4028 kg	8861 lb	4083 kg	8982 lb
Tractor and Dozer Dimensions:				
A Length (Blade Straight)	5.81 m	19'1"	6.03 m	19'9"
Blade Dimensions:				
B Width (including std. end bits)	3.90 m	12'10"	3.69 m	12'1"
C Height	1971 mm	6'6"	2133 mm	7'0"
D Max. Digging Depth	527 mm	1'8.7"	527 mm	1'8.7"
E Ground Clearance @ Full Lift	1145 mm	3'9.1"	1145 mm	3'9.1"
G Max. Pitch Adjustment	+3.1°–3.9°		+3.1°–3.9°	
H Max. Hydraulic Tilt	845 mm	2'9.3"	799 mm	2'7.4"
J Hydraulic Tilt (Manual Brace Centered)	501 mm	1'7.7"	474 mm	18.6"

\* Blade capacities as determined by SAE J1265.

Notice that the capacity of the U-blade is the volume carried by a straight blade of the same dimensions plus the volume included in the "cup" of the U-blade. It is intended for **relative comparisons of dozer sizes**, and not for predicting capacities or productivities in actual field conditions.

\*\* Shipping Weight — Total Bulldozer Arrangement includes: Blade, push arms or C-frame, braces, cylinders, lines, trunnions and lift cylinder mountings.

MODEL	D7R Series 2 and D7R LGP Series 2			
	7U		7S LGP	
Type	Universal		Straight	
Blade Capacities*	16.8 m <sup>3</sup>	22 yd <sup>3</sup>	12.3 m <sup>3</sup>	16.1 yd <sup>3</sup>
Weight, Shipping** (Dozer)	4402 kg	9684 lb	4113 kg	9061 lb
Tractor and Dozer Dimensions:				
A Length (Blade Straight)	6.27 m	20'7"	5.81 m	19'1"
Blade Dimensions:				
B Width (including std. end bits)	3.98 m	13'1"	4.50 m	14'9"
C Height	2162 mm	7'1"	1971 mm	6'6"
D Max. Digging Depth	527 mm	1'8.7"	668 mm	2'2.3"
E Ground Clearance @ Full Lift	1145 mm	3'9.1"	1153 mm	3'9.4"
G Max. Pitch Adjustment	+3.1°–3.9°		+3.0°–3.9°	
H Max. Hydraulic Tilt	861 mm	2'9.9"	686 mm	2'3"
J Hydraulic Tilt (Manual Brace Centered)	511 mm	1'8.1"	426 mm	16.8"

\* Blade capacities as determined by SAE J1265.

Notice that the capacity of the U-blade is the volume carried by a straight blade of the same dimensions plus the volume included in the "cup" of the U-blade. It is intended for **relative comparisons of dozer sizes**, and not for predicting capacities or productivities in actual field conditions.

\*\* Shipping Weight — Total Bulldozer Arrangement includes: Blade, push arms or C-frame, braces, cylinders, lines, trunnions and lift cylinder mountings.

<b>MODEL</b>	<b>D8T WHA</b>					
	<b>8SU</b>		<b>8U</b>		<b>8SU LGP</b>	
Type						
Blade Capacities*	20 m <sup>3</sup>	<b>26.1 yd<sup>3</sup></b>	24.8 m <sup>3</sup>	<b>32.4 yd<sup>3</sup></b>	21.1 m <sup>3</sup>	<b>27.6 yd<sup>3</sup></b>
Dozer Weight**	5466 kg	<b>12,025 lb</b>	6313 kg	<b>13,888 lb</b>	5624 kg	<b>12,400 lb</b>
Tractor and Dozer Dimensions:						
Length Blade Straight	6.39 m	<b>21'0"</b>	6.79 m	<b>22'3"</b>	6.39 m	<b>21'0"</b>
Blade Dimensions:						
Width including std. end bits	3.94 m	<b>12'11"</b>	4.26 m	<b>14'0"</b>	4.52 m	<b>14'10"</b>
Height	2464 mm	<b>8'1"</b>	2515 mm	<b>8'3"</b>	2465 mm	<b>8'1"</b>
Maximum Dig Depth	582 mm	<b>1'10.9"</b>	582 mm	<b>1'10.9"</b>	582 mm	<b>1'10.9"</b>
Ground Clearance at full raise	1231 mm	<b>4'0.5"</b>	1231 mm	<b>4'0.5"</b>	1231 mm	<b>4'1"</b>
Maximum Hydraulic Tilt	951 mm	<b>3'1.4"</b>	1028 mm	<b>3'4.5"</b>		—

<b>MODEL</b>	<b>D9T WHA</b>				<b>D10T WHA</b>	
	<b>9SU</b>		<b>9U</b>		<b>10U</b>	
Type						
Blade Capacities*	28.8 m <sup>3</sup>	<b>37.6 yd<sup>3</sup></b>	33.5 m <sup>3</sup>	<b>43.8 yd<sup>3</sup></b>	48.9 m <sup>3</sup>	<b>63.9 yd<sup>3</sup></b>
Dozer Weight**	6964 kg	<b>15,353 lb</b>	8059 kg	<b>17,751 lb</b>		—
Tractor and Dozer Dimensions:						
Length Blade Straight	6.84 m	<b>22'5"</b>	7.18 m	<b>23'7"</b>	8.01 m	<b>26'3"</b>
Blade Dimensions:						
Width including std. end bits	4.31 m	<b>14'2"</b>	4.65 m	<b>15'3"</b>	5.26 m	<b>17'3"</b>
Height	2845 mm	<b>9'4"</b>	2845 mm	<b>9'4"</b>	3174 mm	<b>10'5"</b>
Maximum Dig Depth	606 mm	<b>1'11.9"</b>	606 mm	<b>1'11.9"</b>	679 mm	<b>2'2.5"</b>
Ground Clearance at full raise	1422 mm	<b>4'8"</b>	1422 mm	<b>4'8"</b>	1497 mm	<b>4'10.9"</b>
Maximum Hydraulic Tilt	940 mm	<b>3'1"</b>	1014 mm	<b>3'3.9"</b>	1074 mm	<b>3'6.3"</b>

\*Blade capacities, weights and heights include 762 mm (2'6") trash rack on D8T blades, 914 mm (3'0") trash rack on D9T blades, and 1067 mm (3'6") trash rack on D10T blades.  
 \*\*Total bulldozer arrangement includes blade with trash rack, pusharms, braces, cylinders, lines, trunnions and lift cylinder mountings.

**Features:**

- **Unmatched versatility** — excavates, loads, carries, covers, dozes, spreads, compacts, shreds, sorts, grapples — a true all purpose machine. Performs well as a one-machine fleet, a support machine or an all-around backup unit.
- **Demolition applications** — The Waste Handling Arrangement (963C and 973C Waste Demolition Specials) can also be used in demolition or demolition transfer stations when properly equipped with the extra guarding required for this severe environment.
- **Special guard** protects the final drive seals, pivot shafts and idlers from debris that can wrap around and damage these components.
- **Cat Turbine Precleaner** with prescreener to prevent airborne debris from clogging engine air intake.
- **Additional heavy duty guarding** helps protect sheet metal and machine components from damage in waste handling applications.
- **Improved serviceability** — swing open doors, guards and air coolers give quick access for cleaning debris and servicing.
- **Hinged, heavy duty radiator guard** with quick release “T” handles allows for easy access to clean the radiator.
- **Debris Barrier Package** protects machine from material entering engine and other compartments.
- **Lamp guard group** protects front and rear lamps with bolt on grids.
- **Optional rear striker bars** keep trash from climbing the track and damaging fenders.
- **Optional final drive abrasion guards** are available in two-piece or four-piece sections to protect the final drive case from premature wear from abrasion or gouging.
- **Optional single grouser, trapezoidal-shaped center hole track shoes** provide maximum traction. The center holes allow sprocket to punch out dirt and debris, best choice for landfill applications.
- **Flexxaire engine cooling fan** (optional on 973C) manually or automatically changes direction to purge accumulated debris from the radiator.
- **SystemOne™** undercarriage system is a Caterpillar exclusive that matches the customer requirements of longevity and reliability and enables the owner to get higher profitability and a better return on investment. This revolutionary undercarriage significantly reduces the Owning & Operating costs and has been totally redesigned. This feature offers a dramatic increase in reliability for this most demanding application.
- **Cab and Operator Comfort** — Standard air suspension seat, air conditioning, adjustable steering pedals, storage area, and excellent visibility enable the operator to be more comfortable in this application for better profitability.



MODEL	953D WHA		963D WHA		973C WHA	
Flywheel Power	110 kW	<b>148 hp</b>	141 kW	<b>189 hp</b>	178 kW	<b>239 hp</b>
Operating Weight*	15 595 kg	<b>34,381 lb</b>	21 000 kg	<b>46,305 lb</b>	27 803 kg	<b>61,295 lb</b>
Engine Model	<b>C6.6 ACERT</b>		<b>C6.6 ACERT</b>		<b>C9 ACERT</b>	
Rated Engine RPM	<b>2000</b>		<b>2000</b>		<b>2000</b>	
Bore	105 mm	<b>4"</b>	105 mm	<b>4.13"</b>	112 mm	<b>4.41"</b>
Stroke	127 mm	<b>5"</b>	127 mm	<b>5"</b>	149 mm	<b>5.87"</b>
No. Cylinders	<b>6</b>		<b>6</b>		<b>6</b>	
Displacement	6.6 L	<b>402.7 in<sup>3</sup></b>	6.6 L	<b>402.7 in<sup>3</sup></b>	8.8 L	<b>537 in<sup>3</sup></b>
Speeds, Forward/Reverse:						
1st	0-10 km/h	<b>0-6.2 mph</b>	0-10 km/h	<b>0-6.2 mph</b>	0-10 km/h	<b>0-6.2 mph</b>
2nd	<b>Infinitely</b>		<b>Infinitely</b>		<b>Infinitely</b>	
3rd	<b>Variable</b>		<b>Variable</b>		<b>Variable</b>	
Hydraulic Cycle Time, Bucket Empty, in Seconds:						
Raise	<b>6.1</b>		<b>5.9</b>		<b>6.7</b>	
Dump	<b>3.1</b>		<b>3.7</b>		<b>1.5</b>	
Lower (Empty, Float Down)	<b>3.2</b>		<b>2.2</b>		<b>2.9</b>	
Track Rollers (Each Side)	<b>6</b>		<b>6</b>		<b>7</b>	
Width of Standard Track Shoes	480 mm	<b>19"</b>	550 mm	<b>21.6"</b>	500 mm	<b>19.7"</b>
Length of Track on Ground	2323 mm	<b>91.4"</b>	2543 mm	<b>100.1"</b>	2930 mm	<b>115"</b>
Ground Contact Area (with Standard Shoes)	2.3 m <sup>2</sup>	<b>3565 in<sup>2</sup></b>	2.8 m <sup>2</sup>	<b>4340 in<sup>2</sup></b>	2.93 m <sup>2</sup>	<b>4542 in<sup>2</sup></b>
Ground Pressure	65.5 kPa	<b>9.5 psi</b>	71.5 kPa	<b>10.3 psi</b>	93.1 kPa	<b>13.5 psi</b>
Ground Clearance	436 mm	<b>17.2"</b>	483 mm	<b>19"</b>	457 mm	<b>17.9"</b>
Track Gauge	1800 mm	<b>71"</b>	1850 mm	<b>72.8"</b>	2080 mm	<b>82"</b>
Width without Bucket	2280 mm	<b>89.7"</b>	2400 mm	<b>94.5"</b>	2580 mm	<b>102"</b>
Fuel Tank Refill Capacity	285 L	<b>75.3 U.S. gal</b>	336.5 L	<b>88.8 U.S. gal</b>	430 L	<b>113 U.S. gal</b>
Hydraulic System Refill Capacity	124 L	<b>32.8 U.S. gal</b>	166 L	<b>43.8 U.S. gal</b>	159 L	<b>42 U.S. gal</b>

\*Includes GP landfill bucket with bolt-on adapters, long tips and segments.

See Wheel Loader section of this book for summary of S.A.E. Guidelines for Loader Specifications, to which Caterpillar adheres.

**MULTI-PURPOSE  
LANDFILL BUCKETS**

Machine Model	953D		963D		973C	
Bucket Model	<b>B53-3ML 293-1974</b>		<b>B63-4ML 286-0049</b>		<b>B73-6ML 271-7028</b>	
Capacity, rated (Refuse)	2.1 m <sup>3</sup>	<b>2.75 yd<sup>3</sup></b>	2.7 m <sup>3</sup>	<b>3.5 yd<sup>3</sup></b>	4.1 m <sup>3</sup>	<b>5.36 yd<sup>3</sup></b>
Capacity, rated (Earth)	1.5 m <sup>3</sup>	<b>2 yd<sup>3</sup></b>	1.8 m <sup>3</sup>	<b>2.4 yd<sup>3</sup></b>	2.68 m <sup>3</sup>	<b>3.5 yd<sup>3</sup></b>
Width	2536 mm	<b>99.84"</b>	2573 mm	<b>101.30"</b>	2816 mm	<b>110.87"</b>
Height	1677 mm	<b>66.02"</b>	1750 mm	<b>68.90"</b>	1945 mm	<b>76.57"</b>
Depth	1433 mm	<b>56.41"</b>	1537 mm	<b>60.51"</b>	1608 mm	<b>63.30"</b>
Teeth — Optional		<b>8</b>		<b>8</b>		<b>8</b>
Clearance @ 45° dump	2738 mm	<b>9'0"</b>	2870 mm	<b>9'5"</b>	3121 mm	<b>10'3"</b>
Reach @ 45° dump	961 mm	<b>3'2"</b>	1013 mm	<b>3'4"</b>	1220 mm	<b>4'0"</b>
Digging Depth	147 mm	<b>5.7"</b>	161 mm	<b>6.3"</b>	200 mm	<b>7.9"</b>
Weight (approx.)	1668 kg	<b>3678 lb</b>	2206 kg	<b>4864 lb</b>	3189 kg	<b>7032 lb</b>

**GENERAL PURPOSE  
LANDFILL BUCKETS**

Machine Model	953D		963D		973C	
Bucket Model	<b>B53-3ML 264-1911</b>		<b>B63-4ML 264-4742</b>		<b>B73-6ML 269-8041</b>	
Capacity, rated (Refuse)	2.3 m <sup>3</sup>	<b>3.0 yd<sup>3</sup></b>	3.1 m <sup>3</sup>	<b>4.1 yd<sup>3</sup></b>	4.7 m <sup>3</sup>	<b>6.1 yd<sup>3</sup></b>
Capacity, rated (Earth)	1.75 m <sup>3</sup>	<b>2.29 yd<sup>3</sup></b>	2.3 m <sup>3</sup>	<b>3.0 yd<sup>3</sup></b>	3.5 m <sup>3</sup>	<b>4.6 yd<sup>3</sup></b>
Width	2458 mm	<b>96.77"</b>	2612 mm	<b>102.83"</b>	2854 mm	<b>112"</b>
Height	1607 mm	<b>63.2"</b>	1778 mm	<b>70"</b>	1936 mm	<b>76.22"</b>
Depth	1450 mm	<b>57.1"</b>	1480 mm	<b>58.3"</b>	1541 mm	<b>60.6"</b>
Teeth — Optional		<b>8</b>		<b>8</b>		<b>8</b>
Clearance @ 45° dump	2855 mm	<b>9'0"</b>	3155 mm	<b>10'4"</b>	3121 mm	<b>10'3"</b>
Reach @ 45° dump	999 mm	<b>3'3"</b>	1147 mm	<b>3'9"</b>	1220 mm	<b>4'0"</b>
Digging Depth	85 mm	<b>5.7"</b>	161 mm	<b>6.3"</b>	200 mm	<b>7.9"</b>
Weight (approx.)	1266 kg	<b>2792 lb</b>	1888 kg	<b>4163 lb</b>	1957 kg	<b>4314 lb</b>

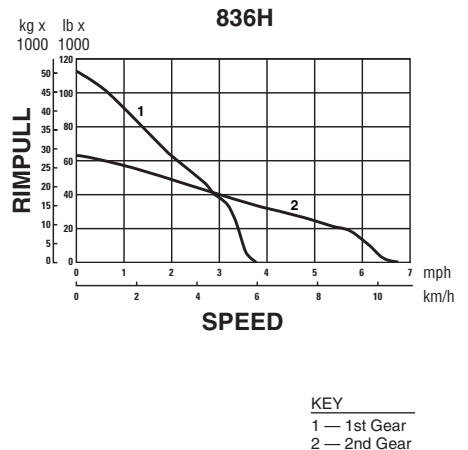
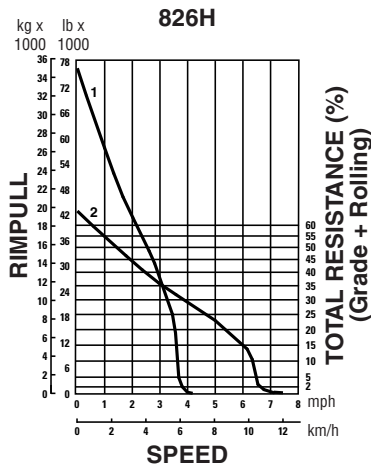
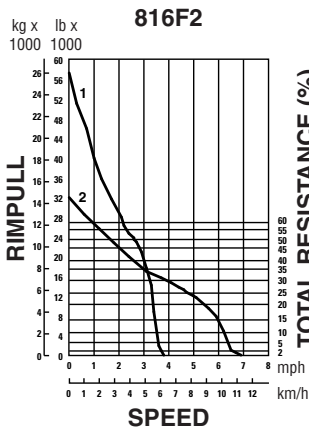
### Features:

- **Caterpillar designed and manufactured power train** ... for optimum match, performance and efficiency. Responsive Cat diesel engine. Single-lever planetary power shift. All-wheel drive.
- **Center-point articulation** ... excellent maneuverability. Front and rear drums track, so material is chopped and compacted twice each pass.
- **Protective guarding** ... helps keep trash from damaging machine components.
- **Cat landfill blades** spread refuse and cover material ... built strong to handle the wide range of refuse encountered in landfills.
- **Operator comfort and convenience** ... sound suppressed cab with pressurized and filtered air circulation system. Adjustable suspension seat. Electronic Monitoring System and gauge package is standard. Optional air conditioner available.
- **Striker bars** ... standard on 816F2, 826H and 836H, prevents refuse from being carried over the rear wheels.
- **Smooth wheel option** ... If our tip selection does not meet your needs, consider our Cat smooth steel wheel. We test and build a Cat system. Engineers who work together with our power train, structures and manufacturing engineers design and manufacture our wheels in the same facility in which the machines are designed and built. This ensures the entire system is complemented by each component. If you alter components, you could compromise a system that was designed and tested for peak performance. If a wheel is produced that does not meet our design specifications and does not balance the load over our final drives, it could reduce the life of the bearing substantially and wear out other components creating unnecessary downtime. This also allows our standard axle guard system to work with the components for which it was designed.



MODEL	816F2		826H		836H	
Flywheel Power	189 kW	253 hp	264 kW	354 hp	372 kW	499 hp
Operating Weight*	23 744 kg	52,364 lb	36 967 kg	81,498 lb	53 682 kg	118,348 lb
Engine Model	C9 ACERT		C15 ACERT		C18 ACERT	
Rated Engine RPM	2100		1800		1800	
No. Cylinders	6		6		6	
Displacement	8.8 L	537 in <sup>3</sup>	15.2 L	928 in <sup>3</sup>	18.1 L	1105 in <sup>3</sup>
Speeds:						
Forward	2		2		2	
Reverse	2		2		2	
Turning Radius with Straight Blade						
Inside Blade Corner	3.5 m	11'6"	3.2 m	10'6"	4.3 m	14'11"
Outside Blade Corner	6.5 m	21'2"	7.3 m	24'6"	9.0 m	29'6"
Fuel Tank Refill Capacity	464 L	122.6 U.S. gal	640 L	169.1 U.S. gal	795 L	210 U.S. gal
WHEELS:	PLUS TIP		PLUS TIP		PLUS TIP	
Each Drum Width	1.02 m	3'4"	1.2 m	3'11"	1.4 m	4'7"
Diameters, over Tips	1.7 m	5'10"	1.9 m	6'6"	2.0 m	6'9"
Drum only	1.3 m	4'3"	1.53 m	5'0"	1.62 m	5'8"
Tips per Wheel	20		25		35	
Tip Height	158 mm	6.5"	158 mm	6.5"	158 mm	6.5"
Chopper Blades per Wheel	20		24		28	
Blade Height	152 mm	6"	158 mm	6"	158 mm	6"
Width of Two Pass Coverage	4.5 m	14'9"	4.78 m	15'8"	5.67 m	18'7"
GENERAL DIMENSIONS:						
Height (Overall)	3.8 m	12'8"	4.2 m	13'7"	4.5 m	14'9"
Height (Top of Cab)	3.4 m	11'3"	3.8 m	12'8"	4.1 m	13'6"
Wheel Base	3.35 m	11'0"	3.7 m	12'2"	4.55 m	14'11"
Overall Length with Dozer	7.85 m	25'7"	8.27 m	27'2"	10.18 m	33'5"
Width over Drums	3.33 m	10'11"	3.8 m	12'8"	4.18 m	14'1"
Ground Clearance	456 mm	1'5"	489 mm	1'6"	697 mm	2'3"
LANDFILL BULLDOZER:						
Width	3.65 m	12'0"	4.5 m	14'9"	5.19 m	17'0"
Height**	1.91 m	6'3"	1.91 m	6'3"	2.22 m	7'3"

\*Operating Weight includes coolant, full hydraulics, full fuel tank, all heaviest options and 82 kg (180 lb) operator.  
\*\*Height (stripped top) — without ROPS cab, exhaust, seat back or other easily removed encumbrances.



<b>MODEL</b>	<b>816F2</b>		<b>826H</b>		<b>836H</b>	
Type	<b>Landfill Spreading</b>		<b>Landfill Spreading</b>		<b>147-4425 Straight</b>	
Capacity**						
Earth	2.9 m <sup>3</sup>	<b>3.79 yd<sup>3</sup></b>	3.68 m <sup>3</sup>	<b>4.81 yd<sup>3</sup></b>	5 m <sup>3</sup>	<b>6.66 yd<sup>3</sup></b>
Refuse	11 m <sup>3</sup>	<b>14.39 yd<sup>3</sup></b>	13 m <sup>3</sup>	<b>17 yd<sup>3</sup></b>	19.8 m <sup>3</sup>	<b>25.9 yd<sup>3</sup></b>
Weight, Dozer*	2107 kg	<b>4645 lb</b>	2739 kg	<b>6038 lb</b>	3400 kg	<b>7650 lb</b>
General Dimensions: (Tractor and Dozer)						
Length	7.85 m	<b>25'9"</b>	8.33 m	<b>27'4"</b>	10.18 m	<b>33'4"</b>
Width	3.65 m	<b>12'0"</b>	4.5 m	<b>14'9"</b>	5.19 m	<b>17'0"</b>
Blade Dimensions:						
Width, End Bits	3.65 m	<b>12'0"</b>	4.5 m	<b>14'9"</b>	5.19 m	<b>17'0"</b>
Height, Trash Rack	1914 mm	<b>6'3"</b>	1898 mm	<b>6'2"</b>	2222 mm	<b>7'3"</b>

\*Total Bulldozer Arrangement.

\*\*Blade capacities determined by SAE recommended practice J1265.

<b>U-BLADE</b>	<b>816F2</b>		<b>826H</b>		<b>836H</b>	
<b>Model:</b>	<b>7Q-8239</b>		<b>263-6869</b>		<b>260-2015</b>	
<b>Blade:</b>						
Capacity (Refuse)	9.74 m <sup>3</sup>	<b>12.74 yd<sup>3</sup></b>	16.7 m <sup>3</sup>	<b>21.8 yd<sup>3</sup></b>	9.74 m <sup>3</sup>	<b>13 yd<sup>3</sup></b>
Length (Cutting Width)	3.73 m	<b>12'3"</b>	4.39 m	<b>14'5"</b>	3.73 m	<b>12'3"</b>
Weight, Installed (without Hydraulics)	—	—	2935 kg	<b>6471 lb</b>	3839 kg	<b>8465 lb</b>

<b>SEMI-U BLADE</b>	<b>816F2</b>		<b>826H</b>		<b>836H</b>	
<b>Model:</b>	<b>213-4473</b>		<b>263-6870</b>		<b>260-2016</b>	
<b>Blade:</b>						
Capacity (Refuse)	8.95 m <sup>3</sup>	<b>11.71 yd<sup>3</sup></b>	14.5 m <sup>3</sup>	<b>18.9 yd<sup>3</sup></b>	22.4 m <sup>3</sup>	<b>29.3 yd<sup>3</sup></b>
Length (Cutting Width)	3.71 m	<b>12'2"</b>	4.49 m	<b>14'9"</b>	5.31 m	<b>17'5"</b>
Weight, Installed (without Hydraulics)	—	—	3004 kg	<b>6623 lb</b>	3744 kg	<b>8256 lb</b>

**Features:**

Cat Waste Handling Wheel Loaders are equipped with the features and protection required in a demanding waste handling environment. These Caterpillar designed and built machines feature the following advantages:

- **Exceptional productivity** with fast cycle times for maximum production day-in day-out whether dozing, loading, stacking, or load and carry.
- **Protected work environment** enhances operator comfort, convenience and productivity.
- **Modified front frames** — (Standard on the 980H WHA) provide large cutouts that allows debris to fall out rather than packing and also provide easy access if cleaning is necessary.
- **Standard front drive guard and axle seal guards** (except 980H) protect from wire, string, strapping and other debris from wrapping and causing damage.
- **Front light guards** protect the lights from debris falling over the bucket spill plate.
- **Hinged crankcase and power train guards** help protect the engine and power train. The hinged design provides easy access for cleaning. (Powered guards available on some models.)
- **Standard waste application cooling system.** The improved, trash-resistant, multi-row module (IMRM) radiator, hood and engine enclosures work as a system to keep the radiator and engine compartment free of debris.
- **Trash resistant IMRM radiator** has six fins per inch (25.4 mm) and in-line tubes that resist plugging by allowing debris to pass through the core.
- **Hinged radiator prescreener** (966H and 972H) eliminates debris larger than what the radiator core will pass.
- **Hinged grill** (966H and 972H) allows access to hydraulic oil cooler and air conditioning condenser, which swing out for easy cleaning.

**Recommended Waste Handling Options**

- **Powered crankcase and power train guards** raise and lower at the flip of a switch allowing fast, easy and frequent cleanings.
- **High lift arrangement** increases bucket hinge pin height offering increased stacking and stockpiling capability. A critical feature when incoming volumes exceed conveyor capacity or floor space.
- **Traction control system (TCS)** option for 938H/IT38H provides maximum traction in slippery conditions. TCS electronically senses and limits wheel slip at each wheel independently.
- **Limited-slip differential** limits tire slip on both front and rear axles. Increases traction and reduces tire wear and scuffing in wet or dry conditions. Provides an alternative to the No SPIN differential which is not recommended due to increased tire wear, turning interference and poor tracking on dry surfaces.
- **Tire options:**
  - L-5 bias hard rock lug
  - L-5 slick
  - RL-5K Goodyear radials
  - XMINE Michelin radials (varies by model)
  - Foam-filled
- **Hitch guards** help protect components in hitch area from damage.
- **Reversing radiator fan** is hydraulically driven and can be reversed by a switch in the operator station or automatically by timer. Reduces need for cooling system cleaning and improves cooling capability.
- **Other guarding and options** are available. Contact your Cat dealer for information.

**Work Tools**

- **Refuse bucket** has excellent dozing and stockpiling capability. Large spill plate helps protect the machine from debris falling over the top of the bucket. Available in pin-on or quick coupler configurations.
- **Pallet forks** are ideal for handling refuse destined for further recycling or stacking refuse in landfills for covering.

- **Multi-purpose bucket** has the capability to clamp and sort large objects, doze cover material or other light dozing chores.
- **Quick coupler** increases versatility by allowing a single machine to utilize a wide variety of work tools in a host of applications.



MODEL	924Hz WHA		924H WHA		928Hz WHA		930H WHA	
Flywheel Power	96 kW	<b>129 hp</b>	96 kW	<b>129 hp</b>	111 kW	<b>149 hp</b>	111 kW	<b>149 hp</b>
Peak Power	102 kW	<b>137 hp</b>	102 kW	<b>137 hp</b>	119 kW	<b>160 hp</b>	119 kW	<b>160 hp</b>
Engine Model	<b>C6.6</b>		<b>C6.6</b>		<b>C6.6</b>		<b>C6.6</b>	
Rated Engine RPM	<b>2300</b>		<b>2300</b>		<b>2300</b>		<b>2300</b>	
Bore	105 mm	<b>4.13"</b>	105 mm	<b>4.13"</b>	105 mm	<b>4.13"</b>	105 mm	<b>4.13"</b>
Stroke	127 mm	<b>5"</b>	127 mm	<b>5"</b>	127 mm	<b>5"</b>	127 mm	<b>5"</b>
No. Cylinders	<b>6</b>		<b>6</b>		<b>6</b>		<b>6</b>	
Displacement	6.6 L	<b>403 in<sup>3</sup></b>	6.6 L	<b>403 in<sup>3</sup></b>	6.6 L	<b>403 in<sup>3</sup></b>	6.6 L	<b>403 in<sup>3</sup></b>
Speeds Forward	<b>km/h</b>	<b>mph</b>	<b>km/h</b>	<b>mph</b>	<b>km/h</b>	<b>mph</b>	<b>km/h</b>	<b>mph</b>
1st	6.6	<b>4.1</b>	6.6	<b>4.1</b>	7.9	<b>4.9</b>	6.9	<b>4.3</b>
2nd	12.0	<b>7.5</b>	12.0	<b>7.5</b>	12.6	<b>7.8</b>	12.9	<b>8.0</b>
3rd	21.3	<b>13.2</b>	21.3	<b>13.2</b>	25.8	<b>16.0</b>	22.9	<b>14.2</b>
4th	38.0	<b>23.6</b>	38.0	<b>23.6</b>	37.7	<b>23.4</b>	39.7	<b>24.7</b>
Speeds Reverse								
1st	6.6	<b>4.1</b>	6.6	<b>4.1</b>	7.9	<b>4.9</b>	6.9	<b>4.3</b>
2nd	12.0	<b>7.5</b>	12.0	<b>7.5</b>	12.6	<b>7.8</b>	12.9	<b>8.0</b>
3rd	21.3	<b>13.2</b>	21.3	<b>13.2</b>	25.8	<b>16.0</b>	22.9	<b>14.2</b>
Hydraulic Cycle Time*								
Rated Load in Bucket:	<b>Seconds</b>		<b>Seconds</b>		<b>Seconds</b>		<b>Seconds</b>	
Raise	<b>5.2</b>		<b>5.2</b>		<b>6.0</b>		<b>5.0</b>	
Dump	<b>1.1</b>		<b>1.6</b>		<b>1.2</b>		<b>1.7</b>	
Lower (empty, float down)	<b>3.0</b>		<b>2.7</b>		<b>3.0</b>		<b>2.9</b>	
Total	<b>9.3</b>		<b>9.5</b>		<b>10.2</b>		<b>9.6</b>	
Tread Width**	1.83 m	<b>6'0"</b>	1.83 m	<b>6'0"</b>	1.95 m	<b>6'5"</b>	1.96 m	<b>6'5"</b>
Width Over Tires**	2.44 m	<b>8'0"</b>	2.44 m	<b>8'0"</b>	2.57 m	<b>8'5"</b>	2.57 m	<b>8'5"</b>
Ground Clearance**	436 mm	<b>1'5"</b>	436 mm	<b>1'5"</b>	408 mm	<b>1'4"</b>	411 mm	<b>1'4"</b>
Fuel Tank Capacity	225 L	<b>59.4 U.S. gal</b>	225 L	<b>59.4 U.S. gal</b>	225 L	<b>59.4 U.S. gal</b>	225 L	<b>59.4 U.S. gal</b>
Hydraulic Tank Capacity	70 L	<b>18.5 U.S. gal</b>	70 L	<b>18.5 U.S. gal</b>	70 L	<b>18.5 U.S. gal</b>	70 L	<b>18.5 U.S. gal</b>
Hinge Pin Height:								
Full Lift Std.	3.76 m	<b>12'4"</b>	3.88 m	<b>12'9"</b>	3.87 m	<b>12'8"</b>	4.049 m	<b>13'3"</b>
High Lift	—		4.32 m	<b>14'2"</b>	—		4.549 m	<b>14'11"</b>
Operating weight up to:	12 613 kg	<b>27,749 lb</b>	13 191 kg	<b>29,020 lb</b>	14 092 kg	<b>31,002 lb</b>	14 751 kg	<b>32,452 lb</b>

\*With standard lift arms.

\*\*With standard tires.



**938H WHA  
IT38H WHA**

**950H WHA**

**962H WHA  
IT62H WHA**

<b>MODEL</b>	<b>938H WHA IT38H WHA</b>		<b>950H WHA</b>		<b>962H WHA IT62H WHA</b>	
Net Power	134 kW	<b>180 hp</b>	146 kW	<b>196 hp</b>	158 kW	<b>211 hp</b>
Gross Power	147 kW	<b>197 hp</b>	161 kW	<b>216 hp</b>	172 kW	<b>230 hp</b>
Engine Model	<b>C6.6</b>		<b>C7 ATAAC</b>		<b>C7 ATAAC</b>	
Rated Engine RPM	<b>2100</b>		<b>1800</b>		<b>1800</b>	
Bore	105 mm	<b>4.13"</b>	110 mm	<b>4.3"</b>	110 mm	<b>4.3"</b>
Stroke	127 mm	<b>5"</b>	127 mm	<b>5"</b>	127 mm	<b>5"</b>
No. Cylinders	<b>6</b>		<b>6</b>		<b>6</b>	
Displacement	6.6 L	<b>403 in<sup>3</sup></b>	7.2 L	<b>439 in<sup>3</sup></b>	7.2 L	<b>439 in<sup>3</sup></b>
Speeds Forward	<b>km/h</b>	<b>mph</b>	<b>km/h</b>	<b>mph</b>	<b>km/h</b>	<b>mph</b>
1st	7.9	<b>4.9</b>	6.9	<b>4.3</b>	7.0	<b>4.4</b>
2nd	14.2	<b>8.8</b>	12.7	<b>7.9</b>	13.0	<b>8.1</b>
3rd	25.0	<b>15.5</b>	22.3	<b>13.9</b>	22.6	<b>14.0</b>
4th	41.1	<b>25.5</b>	37.0	<b>23.0</b>	38.0	<b>23.6</b>
Speeds Reverse						
1st	7.9	<b>4.9</b>	7.6	<b>4.7</b>	7.6	<b>4.7</b>
2nd	14.2	<b>8.8</b>	13.9	<b>8.6</b>	13.9	<b>8.6</b>
3rd	25.0	<b>15.5</b>	24.5	<b>15.2</b>	24.5	<b>15.2</b>
4th	—		40.5	<b>24.9</b>	40.0	<b>24.9</b>
Hydraulic Cycle Time*	<b>Seconds</b>		<b>Seconds</b>		<b>Seconds</b>	
Rated Load in Bucket:	<b>938H</b>	<b>IT38H</b>				
Raise	<b>5.4</b>	<b>5.0</b>	<b>6.2</b>		<b>6.2</b>	
Dump	<b>1.4</b>	<b>2.0</b>	<b>1.3</b>		<b>1.3</b>	
Lower (empty, float down)	<b>2.7</b>	<b>2.7</b>	<b>2.5</b>		<b>2.5</b>	
Total	<b>9.5</b>	<b>9.7</b>	<b>10.0</b>		<b>10.0</b>	
Tread Width**	2.02 m	<b>6'8"</b>	2.14 m	<b>7'0"</b>	2.14 m	<b>7'0"</b>
Width Over Tires**	2.65 m	<b>8'8"</b>	2.79 m	<b>9'2"</b>	2.79 m	<b>9'2"</b>
Ground Clearance**	397 mm	<b>16"</b>	412 mm	<b>16"</b>	412 mm	<b>16"</b>
Fuel Tank Capacity	247 L	<b>65.3 U.S. gal</b>	314 L	<b>83 U.S. gal</b>	314 L	<b>83 U.S. gal</b>
Hydraulic Tank Capacity	89 L	<b>23.5 U.S. gal</b>	110 L	<b>29 U.S. gal</b>	110 L	<b>29 U.S. gal</b>
Hinge Pin Height:						
Full Lift Std.	3.85 m	<b>12'7"</b>	3.99 m	<b>13'1"</b>	3.99 m	<b>13'1"</b>
High Lift w/L-5 tires	4.27 m	<b>13'11"</b>	4.54 m	<b>14'10"</b>	—	
Operating weight up to:	18 143 kg	<b>40,000 lb</b>	19 213 kg	<b>42,365 lb</b>	20 269 kg	<b>44,693 lb</b>

\*With standard lift arms.

\*\*With standard tires.



MODEL	966H WHA		972H WHA		980H WHA	
Net Power	195 kW	262 hp	214 kW	287 hp	237 kW	318 hp
Gross Power	211 kW	283 hp	229 kW	307 hp	261 kW	351 hp
Engine Model	C11 ATAAC		C13 ATAAC		C15	
Rated Engine RPM	1800		1800		1800	
Bore	130 mm	5.1"	130 mm	5.1"	137 mm	5.4"
Stroke	140 mm	5.5"	157 mm	6.2"	171 mm	6.75"
No. Cylinders	6		6		6	
Displacement	11.1 L	677 in <sup>3</sup>	12.5 L	763 in <sup>3</sup>	15.2 L	928 in <sup>3</sup>
Speeds Forward	km/h	mph	km/h	mph	km/h	mph
1st	6.7	4.2	7.2	4.5	6.6	4.1
2nd	12.6	7.8	12.6	7.8	11.8	7.3
3rd	22.1	13.7	21.4	13.3	20.7	12.9
4th	37.4	23.2	36.9	22.9	36.3	22.6
Speeds Reverse						
1st	7.4	4.6	8.2	5.1	7.6	4.7
2nd	13.7	8.6	14.2	8.8	13.5	8.4
3rd	23.4	15.1	24.3	15.1	23.7	14.7
4th	37.4	23.2	38.8	24.0	41.5	25.8
Hydraulic Cycle Time*						
Rated Load in Bucket:	Seconds		Seconds		Seconds	
Raise	5.9		5.9		6.0	
Dump	1.6		2.1		2.0	
Lower (empty, float down)	2.4		2.4		3.4	
Total	9.9		10.4		11.4	
Tread Width**	2.23 m	7'4"	2.23 m	7'4"	2.44 m	8'0"
Width Over Tires**	3.00 m	9'10"	3.00 m	9'10"	3.23 m	10'7"
Ground Clearance**	496 mm	20"	496 mm	20"	442 mm	17.4"
Fuel Tank Capacity	380 L	100 U.S. gal	380 L	100 U.S. gal	479 L	127 U.S. gal
Hydraulic Tank Capacity	110 L	29 U.S. gal	110 L	29 U.S. gal	125 L	33 U.S. gal
Hinge Pin Height:						
Full Lift Std.	4.23 m	13'10"	4.87 m	14'8"	4.51 m	14'9"
High Lift w/L-5 tires	4.79 m	15'8"	4.81 m	15'9"	4.75 m	15'7"
Operating weight up to:	24 237 kg	53,443 lb	26 051 kg	57,442 lb	31 599 kg	69,676 lb

\*With standard lift arms.

\*\*With standard tires.