July 17, 2015

TO: Jeff Ray, E.I.T.; Abdel Hamed, P.E.

COPY:

FROM: Nelson Barrera, P.E.

THROUGH:

SUBJECT: ANALYSIS OF PROPOSED BYPASS PUMPS FOR LS233 IRON HORSE

I evaluated the Contractor's proposed diesel pumps and hoses to bypass LS233 Iron Horse. I modeled the typical bypass setup with the proposed hoses and our existing piping and force main. I also input the different manhole, pump and force main elevations for head calculation purposes.

For identification purposes and ease of understanding this analysis, the three bypass setups will be identified as follow:

Location 1: Manhole on 8-inch gravity main located about 400-ft away from the lift station (this is the furthest manhole) that receives flows from main located along Canyon River Street.

Location 2: Manhole on the 8-inch gravity main located about 200-ft away from the lift station, which also receives flows from LS257 Ranch at Iron Horse.

Location 3: Manhole on the 18-inch gravity main located few feet away outside the fence of the lift station.

Location 1 Analysis Results:

> All hoses considered in this analysis are 4-inch rubber hoses, valves and fittings, and the total bypass length is 400-ft from Location 1 and discharge into manhole at Location 3.

Load: 193-EDU @ 46-Ac; therefore PWWF = 90-gpm

Pump Performance: 300-gpm @ 45.2-ft @ 1,400-rpm(approx.)

Suction Lift Conditions: Static: 15.0-ft; Total: 19.4-ft

Suction Structure Elevations:

- MH Top Elevation: 1003.75-ft
- Spill Level Elev: 1003.75-ft (Location 1 MH)
- On Level Elev: 993.58-ft
- Off Level Elev: 991.00-ft
- MH Bot Elevation: 990.58-ft

No problems expected at Location 1 Bypass using the proposed CD100M pump and 4-inch hoses, valves and fittings.

Location 2 Analysis Results:

The performance for the proposed 4x4-inch CD100M pump is questionable using the proposed 4-inch hoses, valves and fittings.

This analysis shows the performance of the proposed 4x4-inch CD100M pump using 6-inch hoses, valves and fittings, and the total bypass length is 200-ft from Location 2 discharging into Location 3 manhole. The 4x6 reducers are required immediately at the pump suction and discharge.

Load: 350-EDU @ 121-Ac; therefore PWWF = 171-gpm; HOWEVER, LS257 Ranch at Iron Horse discharges about 440-gpm.

Pump Performance: 600-gpm @ 19.1-ft @ 1,450-rpm(approx.)

Suction Lift Conditions: Static: 8.5-ft; Total: 11.6-ft

Suction Structure Elevations:

- MH Top Elevation: 1005.50-ft
- Spill Level Elev: 1005.00-ft (Location 2 MH)
- On Level Elev: 1002.00-ft
- Off Level Elev: 1000.00-ft
- MH Bot Elevation: 999.07-ft

No problems expected at location 2 as long as 6-inch hoses, valves and fittings are used.

Location 3 Analysis Results:

The bypass at location 3 will be connected to the existing 4-inch bypass connection assembly located within the lift station dry vault. Location 3 will pump through the lift station existing 10-inch PVC force main. The total force main length is 3712-ft.

The proposed 8x8-inch CD225M pumps is questionable, and it requires the suction manhole to be surcharged by 14.4-ft. Surcharging the level like this leaves the critical manhole (spill manhole) to be about 4.5-ft to spill. This operating level is dangerously close to the spill level, therefore I don't recommend using the proposed 8x8-inch CD225M pumps. If the operating level drops lower, then the operating range of the CD225M falls out of range.

In the other hand, I recommend using a 6x6-inch CD160M with the proposed 8-inch hoses, valves and fittings. This pump has the capacity to overcome the restrictions imposed by the 4-inch bypass connection located in the dry vault.

Load: 1650-EDU @ 726-Ac; therefore PWWF = 839-gpm

Pump Performance: 1000-gpm @ 98-ft @ 1400-rpm(approx..)

Suction Lift Conditions: Static: 21.5-ft; Total: 23.7-ft

Suction Structure Elevations:

- MH Top Elevation: 1003.20-ft
- Spill Level Elev: 994.49-ft (8 manholes upstream of Location 3)
- On Level Elev: 987.00-ft
- Off Level Elev: 985.00-ft
- MH Bot Elevation: 975.60-ft

No problems expected using the proposed 8-inch hoses, valves and fittings with the recommended CD160M pump and connecting to the 4-inch bypass assembly in the dry vault.

If you have any questions or need additional information, please contact me.

Nelson Barrera, P.E.

Wastewater Infrastructure Planning
San Antonio Water System

CC: Nelson Barrera
File

Attachments:
1. Location 1 Hydraulic Calculations and CD100M Pump Curve
2. Location 2 Hydraulic Calculations and CD100M Pump Curve
3. Location 3 Hydraulic Calculations and CD160M Pump Curve

LS233 Iron Horse Bypass Location 1

INPUT INFORMATION

SELF PRIMING PUMP INFORMATION

Manufacturer	Godwin
Model	CD100M
Power (HP)	23.8
Impeller	9"
rpm	1400
Suction Pipe Diam (inch)	4
Pump Suction Diam (inch)	4
Pump Discharge Diam (inch)	4
Discharge Pipe Diam (inch)	4
Pumped Flow (gpm)	300.0
Sphere Pass (in)	3

SYSTEM INFORMATION

Header Diam. (inch)	4
FM maximum Elevation (ft)	1003
FM Elevation at Discharge Point (ft)	1003
All pumps OFF elevation (ft)	991
Pressure Head (ft)	0.0
Impeller's Center Elevation (ft)	1006
Discharge Gauge Elevation (ft)	1007
Suction Gauge Elevation (ft)	1007
Header Gauge Elevation (ft)	1007

EDU's INFORMATION

RESIDENTIAL EDUs	193
COMMERCIAL & RETAIL SQ FT	0
MULTI-FAMILY UNITS	0
RESTAURANT SEATS	0
TOTAL ACRES OF SITE	46

WET WELL INFORMATION

Wet Well Diam. (ft)	0.00
Pumps ON-OFF Distance (ft)	0.00
Reference Volume (gal)	0.0

PUMPS RUNNING SIMULTANEOUSLY

Number of Pumps	1

FORCE MAIN INFORMATION

Number of force mains 1

	FM 1	FM 2	FM 3	FM 4
Type	HOSE	DR11DIPS	DR11DIPS	DR11DIPS
Size (in)	4	0	0	0
Length (ft)	400	0	0	0

OUTPUT INFORMATION

FLOW & TOTAL HEAD

Flow per Pump (gpm)	**300.0**
Total Head (ft)	**45.2**
Total flow (gpm)	**300.0**

HEAD & LOSS BALANCE

Pressure Head (ft)	0.0
Static Head (ft)	12.0
Suction Line Loss (ft)	4.4
Discharge Line Loss (ft)	9.2
Header Loss (ft)	1.5
Force Main Loss (ft)	18.0
Total Head (ft)	45.2

POWER & EFFICIENCY

Hydraulic Power (HP)	3.4
Shaft Power (HP)	0.0
Input Power (HP)	0.0
Pump Efficiency (%)	#DIV/0!
Motor Efficiency (%)	#DIV/0!
Overall Efficiency (%)	#DIV/0!
Motor Power Factor (%)	0.8
Active Power (kW)	0.0
Apparent Power (kVA)	0.0
Reactive Power (kVAR)	0.0
Phase Angle (°)	36.9
Induced Torque (lb-ft)	89.3

CYCLE INFORMATION

DQ (gpm)	267.8
Filling Time (min)	0.0
Emptying Time (min)	0.0
Wet Well Retension Time (min)	0.0
Total Number of Pumps Installed	2
Pump ON (min)	0.0
Pump OFF (min)	0.0
Total Pump Cycle (min)	0.0
Cycles per Hour	#DIV/0!
Cycles Per Day	#DIV/0!
Hours of Operatiopn per Day	#DIV/0!

INCOMING FLOWS

ADF (gpm)	32.2
PWWF (gpm)	90.0
MDWF (gpm)	5.5

CAVITATION ANALYSIS

Static Suction Lift (ft)	15.0
Total Suction Lift (ft)	19.4
Pump Total Lift (ft)	15
Atm Pres (ft)	32.5
Vap Pres (ft)	1.1
NPSH Available (ft)	11.9
NPSH Required (ft)	Not Shown

CAVITATION PROBLEM

ENERGY INFORMATION

Pump Specific Speed	1390
Suction Specific Speed	#VALUE!
Max Operating Speed (rpm)	**#VALUE!**
Flow / Energy Rate (gal/kW-hr)	488.2
Monthly Energy (kW-hr/month)	#DIV/0!

FORCE MAIN DATA

	FM 1	FM 2	FM 3	FM 4
Flow (gpm)	300.0	0.0	0.0	0.0
Velocity (ft/s)	7.65	0.00	0.00	0.00
Rated Pressure (psi)	0	0	0	0
Maximum Pressure (psi)	#DIV/0!	0	0	0
Average Cycles to Flush	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Average Flush Time (min)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

OPERATING PRESSURES

Suction Pressure at Pump	-18.0	(in Hg)
Suction Flow Velocity (ft/s)	7.6	
Discharge Pressure at Pump (psi)	10.7	
Discharge Flow Velocity (ft/s)	7.6	
Discharge Pressure at Header (psi)	6.7	
Surge Pressure at Header (psi)	#DIV/0!	

CD100M Dri-Prime Pump

CD100M

The Godwin Dri-Prime CD100M pump offers flow rates to 1,013 USGPM and discharge heads to 124' (38m). Also it has the capability of handling solids up to 2" (45mm) in diameter.

The CD100M is able to prime to 28' (8.5 m) of suction lift from dry.

Indefinite dry-running is no problem due to the unique Godwin oil bath mechanical seal design. Solids handling, dry-running and portability make the CD100M the perfect choice for small dewatering and bypass applications. The standard model is mounted on a highway trailer, with a skid-mounted option.

Features

- Simple maintenance normally limited to checking fluid levels.
- Close coupled centrifugal pump with vacuum priming compressor mounted to a diesel engine. Also available in electric drive or as bare shaft pumpend.
- Extensive application flexibility. It will handle sewage, slurries and liquids with solids up to 2" in diameter.
- Continuously operated Godwin venturi air ejector priming device requiring no form of periodic adjustment or control.
- Dry-running heavy duty mechanical seal with abrasion-resistant interfaces.
- Also available in a Critically Silenced unit which drastically reduce noise levels of the pump.
- Standard engine Yanmar 3TNV88. Also avaliable with Caterpillar C1.5T.
- The volute & suction cover are made from cast iron bs1452:1990 grade 220 and the impeller is made from cast steel bs3100 a5 hardness to 200 hb brinell.

Specifications

Suction connection	4" 125# ANSI B16.1
Delivery connection	4" 125# ANSI B16.1
Max capacity	1013 USGPM
Max head	124' (38m)
Max solids handling	2" (45mm)
Max impeller diameter	9" (230mm)
Max operating temp	176°F (80°C)
Max working pressure	55.1 psi (3.8 bar)
Max suction pressure	39.9 psi (2.8 bar)
Max casing pressure	82.7 psi (5.7 bar)
Max operating speed	2200 rpm

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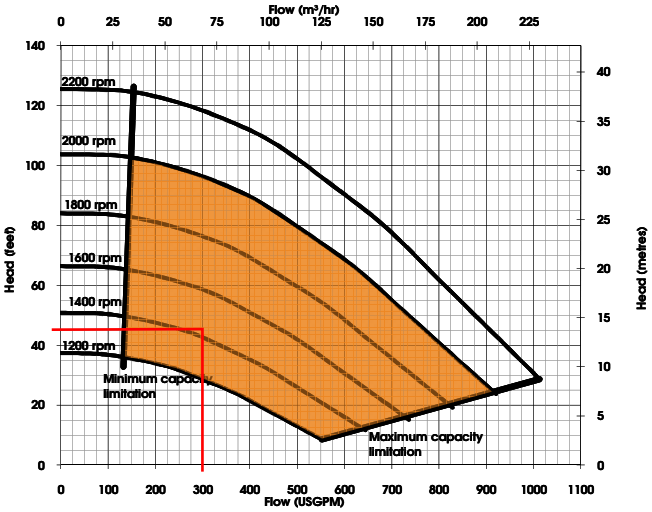
Reference number : 95-1007-3000
Date of issue : Auaust 25. 2011
Issue : 1

Please contact Godwin for further details.
A typical picture of the pump is shown.
All information is approximate and for general guidance only.

CD100M

Performance Curve



Materials

Pump casing & suction cover	Cast iron BS1452:1990 grade 220
Wearplates	Cast iron to BS1452 Gr220
Pump shaft	Carbon steel BS970 080M40
Impeller	Cast steel BS3100 A5 hardness to 200 HB Brinell
Non-return valve body	Cast iron
Mechanical seal faces	Silicon carbide vs silicon carbide

Engine option 1

Yanmar, 3TNV88, 23.8 HP @ 2000 rpm

Impeller diameter 9 " (230 mm)

Suction Lift Table

Total Suction Head (')	Total Delivery Head (')				
	12	34	45	59	70
	Output (USGPM)				
9.8	921	793	716	614	496
15.1	869	742	665	563	409
20.0	639	604	563	486	358
24.9	409	384	358	307	205

Fuel capacity (Full) 30 US Gal, (Usable) 30 US Gal

Fuel consumption @ 2000 rpm BEP 1.1 US Gal/hr

Weight: (Dry) 1,936 lbs, (Wet) 2,189 lbs

Dimensions: (L) 102" x (W) 54" x (H) 70"

Engine option 2

Caterpillar, C1.5T, 26.8 HP @ 2000 rpm

Impeller diameter 9 " (230 mm)

Suction Lift Table

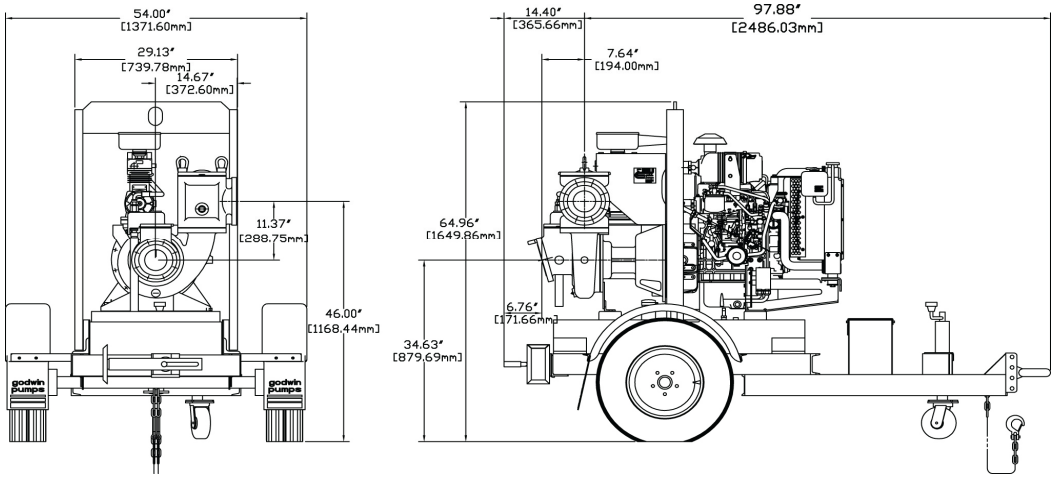
Total Suction Head (')	Total Delivery Head (')				
	12	34	45	59	70
	Output (USGPM)				
9.8	921	793	716	614	496
15.1	869	742	665	563	409
20.0	639	604	563	486	358
24.9	409	384	358	307	205

Fuel capacity (Full) 30 US Gal, (Usable) 30 US Gal

Fuel consumption @ 2000 rpm BEP 1.2 US Gal/hr

Weight: (Dry) 1,786 lbs, (Wet) 2,032 lbs

Dimensions: (L) 102" x (W) 54" x (H) 70"



Performance data provided in tables is based on water tests at sea level and 68°F ambient.

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84 Floodgate Road | Bridgeport, NJ 08014 USA

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LS233 Iron Horse Bypass Location 2

INPUT INFORMATION

SELF PRIMING PUMP INFORMATION

Manufacturer	Godwin
Model	CD100M
Power (HP)	23.8
Impeller	9"
rpm	1450
Suction Pipe Diam (inch)	6
Pump Suction Diam (inch)	4
Pump Discharge Diam (inch)	4
Discharge Pipe Diam (inch)	6
Pumped Flow (gpm)	600.0
Sphere Pass (in)	3

SYSTEM INFORMATION

Header Diam. (inch)	6
FM maximum Elevation (ft)	1003
FM Elevation at Discharge Point (ft)	1003
All pumps OFF elevation (ft)	1000
Pressure Head (ft)	0.0
Impeller's Center Elevation (ft)	1008.5
Discharge Gauge Elevation (ft)	1010
Suction Gauge Elevation (ft)	1010
Header Gauge Elevation (ft)	1010

EDU's INFORMATION

RESIDENTIAL EDUs	350
COMMERCIAL & RETAIL SQ FT	0
MULTI-FAMILY UNITS	0
RESTAURANT SEATS	0
TOTAL ACRES OF SITE	121

WET WELL INFORMATION

Wet Well Diam. (ft)	0.00
Pumps ON-OFF Distance (ft)	0.00
Reference Volume (gal)	0.0

PUMPS RUNNING SIMULTANEOUSLY

Number of Pumps	1

FORCE MAIN INFORMATION

Number of force mains 1

	FM 1	FM 2	FM 3	FM 4
Type	HOSE	DR11DIPS	DR11DIPS	DR11DIPS
Size (in)	6	0	0	0
Length (ft)	200	0	0	0

OUTPUT INFORMATION

FLOW & TOTAL HEAD

Flow per Pump (gpm)	**600.0**
Total Head (ft)	**19.1**
Total flow (gpm)	**600.0**

HEAD & LOSS BALANCE

Pressure Head (ft)	0.0
Static Head (ft)	3.0
Suction Line Loss (ft)	3.1
Discharge Line Loss (ft)	7.0
Header Loss (ft)	0.9
Force Main Loss (ft)	5.1
Total Head (ft)	19.1

Pump Specific Speed	3894
Suction Specific Speed	#VALUE!
Max Operating Speed (rpm)	**#VALUE!**

POWER & EFFICIENCY

Hydraulic Power (HP)	2.9
Shaft Power (HP)	0.0
Input Power (HP)	0.0
Pump Efficiency (%)	#DIV/0!
Motor Efficiency (%)	#DIV/0!
Overall Efficiency (%)	#DIV/0!
Motor Power Factor (%)	0.8
Active Power (kW)	0.0
Apparent Power (kVA)	0.0
Reactive Power (kVAR)	0.0
Phase Angle (°)	36.9
Induced Torque (lb-ft)	86.2

ENERGY INFORMATION

Flow / Energy Rate (gal/kW-hr)	976.4
Monthly Energy (kW-hr/month)	#DIV/0!

FORCE MAIN DATA

	FM 1	FM 2	FM 3	FM 4
Flow (gpm)	600.0	0.0	0.0	0.0
Velocity (ft/s)	6.80	0.00	0.00	0.00
Rated Pressure (psi)	0	0	0	0
Maximum Pressure (psi)	#DIV/0!	0	0	0
Average Cycles to Flush	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Average Flush Time (min)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

CYCLE INFORMATION

DQ (gpm)	541.7
Filling Time (min)	0.0
Emptying Time (min)	0.0
Wet Well Retension Time (min)	0.0
Total Number of Pumps Installed	2
Pump ON (min)	0.0
Pump OFF (min)	0.0
Total Pump Cycle (min)	0.0
Cycles per Hour	#DIV/0!
Cycles Per Day	#DIV/0!
Hours of Operatiopn per Day	#DIV/0!

INCOMING FLOWS

ADF (gpm)	58.3
PWWF (gpm)	171.0
MDWF (gpm)	11.3

CAVITATION ANALYSIS

Static Suction Lift (ft)	8.5
Total Suction Lift (ft)	11.6
Pump Total Lift (ft)	15
Atm Pres (ft)	32.5
Vap Pres (ft)	1.1
NPSH Available (ft)	19.8
NPSH Required (ft)	Not Shown

CAVITATION PROBLEM

OPERATING PRESSURES

Suction Pressure at Pump	-11.5	(in Hg)
Suction Flow Velocity (ft/s)	6.8	
Discharge Pressure at Pump (psi)	2.6	
Discharge Flow Velocity (ft/s)	6.8	
Discharge Pressure at Header (psi)	-0.4	
Surge Pressure at Header (psi)	#DIV/0!	

CD100M Dri-Prime Pump

CD100M

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The CD100M is able to prime to 28' (8.5 m) of suction lift from dry.

Indefinite dry-running is no problem due to the unique Godwin oil bath mechanical seal design. Solids handling, dry-running and portability make the CD100M the perfect choice for small dewatering and bypass applications. The standard model is mounted on a highway trailer, with a skid-mounted option.

Features

- Simple maintenance normally limited to checking fluid levels.
- Close coupled centrifugal pump with vacuum priming compressor mounted to a diesel engine. Also available in electric drive or as bare shaft pumpend.
- Extensive application flexibility. It will handle sewage, slurries and liquids with solids up to 2" in diameter.
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- The volute & suction cover are made from cast iron bs1452:1990 grade 220 and the impeller is made from cast steel bs3100 a5 hardness to 200 hb brinell.

Specifications

Suction connection	4" 125# ANSI B16.1
Delivery connection	4" 125# ANSI B16.1
Max capacity	1013 USGPM
Max head	124' (38m)
Max solids handling	2" (45mm)
Max impeller diameter	9" (230mm)
Max operating temp	176°F (80°C)
Max working pressure	55.1 psi (3.8 bar)
Max suction pressure	39.9 psi (2.8 bar)
Max casing pressure	82.7 psi (5.7 bar)
Max operating speed	2200 rpm

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A typical picture of the pump is shown.
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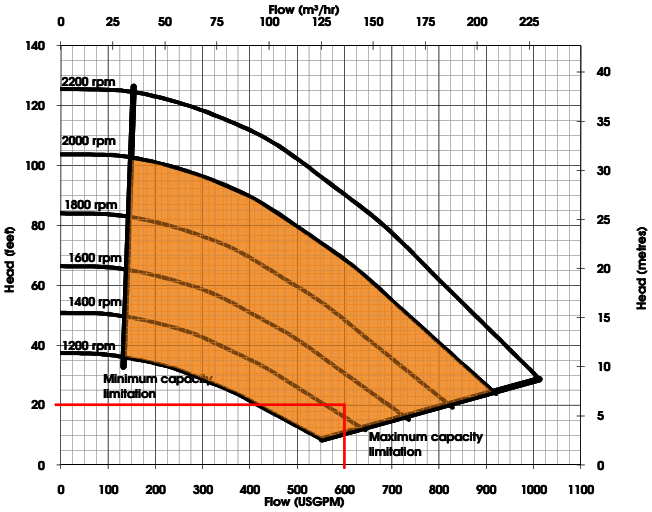
CD100M

Performance Curve



Materials

Pump casing & suction cover	Cast iron BS1452:1990 grade 220
Wearplates	Cast iron to BS1452 Gr220
Pump shaft	Carbon steel BS970 080M40
Impeller	Cast steel BS3100 A5 hardness to 200 HB Brinell
Non-return valve body	Cast iron
Mechanical seal faces	Silicon carbide vs silicon carbide

Engine option 1

Yanmar, 3TNV88, 23.8 HP @ 2000 rpm

Impeller diameter 9 " (230 mm)

Suction Lift Table

Total Suction Head (')	Total Delivery Head (')				
	12	34	45	59	70
	Output (USGPM)				
9.8	921	793	716	614	496
15.1	869	742	665	563	409
20.0	639	604	563	486	358
24.9	409	384	358	307	205

Fuel capacity (Full) 30 US Gal, (Usable) 30 US Gal

Fuel consumption @ 2000 rpm BEP 1.1 US Gal/hr

Weight: (Dry) 1,936 lbs, (Wet) 2,189 lbs

Dimensions: (L) 102" x (W) 54" x (H) 70"

Engine option 2

Caterpillar, C1.5T, 26.8 HP @ 2000 rpm

Impeller diameter 9 " (230 mm)

Suction Lift Table

Total Suction Head (')	Total Delivery Head (')				
	12	34	45	59	70
	Output (USGPM)				
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15.1	869	742	665	563	409
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Fuel consumption @ 2000 rpm BEP 1.2 US Gal/hr

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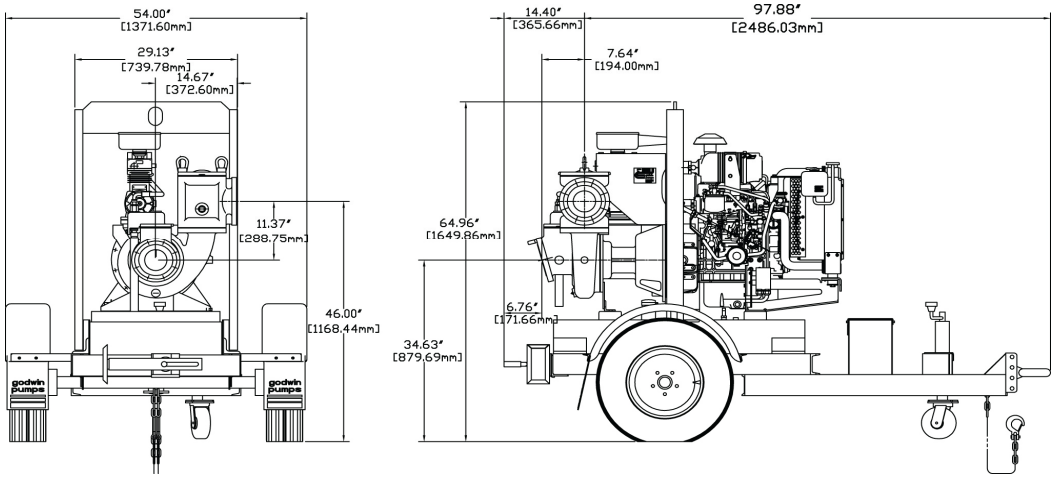

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LS 233 Iron Horse Bypass Location 3

INPUT INFORMATION

SELF PRIMING PUMP INFORMATION

Manufacturer	Godwin
Model	CD160M
Power (HP)	148.7
Impeller	14"
rpm	1400
Suction Pipe Diam (inch)	8
Pump Suction Diam (inch)	6
Pump Discharge Diam (inch)	6
Discharge Pipe Diam (inch)	8
Pumped Flow (gpm)	1000.0
Sphere Pass (in)	3

SYSTEM INFORMATION

Header Diam. (inch)	10
FM maximum Elevation (ft)	1005.59
FM Elevation at Discharge Point (ft)	1004.55
All pumps OFF elevation (ft)	985
Pressure Head (ft)	0.0
Impeller's Center Elevation (ft)	1006.5
Pressure Gauge Elevation (ft)	1008
Suction Gauge Elevation (ft)	1008
Header Gauge Elevation (ft)	997.0

EDU's INFORMATION

RESIDENTIAL EDUs	1650
COMMERCIAL & RETAIL SQ FT	0
MULTI-FAMILY UNITS	0
RESTAURANT SEATS	0
TOTAL ACRES OF SITE	726

WET WELL INFORMATION

Wet Well Diam. (ft)	0.00
Pumps ON-OFF Distance (ft)	0.00
Reference Volume (gal)	0.0

PUMPS RUNNING SIMULTANEOUSLY

Number of Pumps	1

FORCE MAIN INFORMATION

Number of force mains 1

	FM 1	FM 2	FM 3	FM 4
Type	SDR26	DR11DIPS	C115	C115
Size (in)	10	14	6	6
Length (ft)	3712.1	0	0	0

OUTPUT INFORMATION

FLOW & TOTAL HEAD

Flow per Pump (gpm)	**1000.0**
Total Head (ft)	**98.1**
Total flow (gpm)	**1000.0**

HEAD & LOSS BALANCE

Pressure Head (ft)	0.0
Static Head (ft)	19.6
Suction Line Loss (ft)	2.2
Discharge Line Loss (ft)	4.3
Header Loss (ft)	50.1
Force Main Loss (ft)	21.8
Total Head (ft)	98.1

POWER & EFFICIENCY

Hydraulic Power (HP)	24.8
Shaft Power (HP)	0.0
Input Power (HP)	0.0
Pump Efficiency (%)	#DIV/0!
Motor Efficiency (%)	#DIV/0!
Overall Efficiency (%)	#DIV/0!
Motor Power Factor (%)	0
Active Power (kW)	0.0
Apparent Power (kVA)	#DIV/0!
Reactive Power (kVAR)	#DIV/0!
Phase Angle (°)	90.0
Induced Torque (lb-ft)	557.8

CYCLE INFORMATION

DQ (gpm)	725.0
Filling Time (min)	0.0
Emptying Time (min)	0.0
Wet Well Retension Time (min)	0.0
Total Number of Pumps Installed	2
Pump ON (min)	0.0
Pump OFF (min)	0.0
Total Pump Cycle (min)	0.0
Cycles per Hour	#DIV/0!
Cycles Per Day	#DIV/0!
Hours of Operatiopn per Day	#DIV/0!

INCOMING FLOWS

ADF (gpm)	275.0
PWWF (gpm)	838.8
MDWF (gpm)	72.2

CAVITATION ANALYSIS

Static Suction Lift (ft)	21.5
Total Suction Lift (ft)	23.7
NPSH Available (ft)	9.7
NPSH Required (ft)	Not Shown

CAVITATION PROBLEM

ENERGY INFORMATION

Pump Specific Speed	1421
Suction Specific Speed	#VALUE!
Max Operating Speed (rpm)	**#VALUE!**
Flow / Energy Rate (gal/kW-hr)	666.7
Monthly Energy (kW-hr/month)	#DIV/0!

FORCE MAIN DATA

	FM 1	FM 2	FM 3	FM 4
Flow (gpm)	1000.0	0.0	0.0	0.0
Velocity (ft/s)	4.18	0.00	0.00	0.00
Rated Pressure (psi)	160	0	0	0
Maximum Pressure (psi)	103	0	0	0
Average Cycles to Flush	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Average Flush Time (min)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

OPERATING PRESSURES

Suction Pressure at Pump	-22.2	(in Hg)
Suction Flow Velocity (ft/s)	6.4	
Discharge Pressure at Pump (psi)	32.0	
Discharge Flow Velocity (ft/s)	6.4	
Discharge Pressure at Header (psi)	34.9	
Surge Pressure at Header (psi)	95.1	

CD160M Dri-Prime Pump

The Godwin Dri-Prime CD160M pump offers flow rates to 1,878 USGPM and discharge heads to 258' (79m). Also it has the capability of handling solids up to 3" (75mm) in diameter.

The CD160M is able to prime to 28' (8.5 m) of suction lift from dry.

Indefinite dry-running is no problem due to the unique Godwin oil bath mechanical seal design. Solids handling, dry-running and portability make the CD160M the perfect choice for small dewatering and bypass applications. The standard model is mounted on a highway trailer, with a skid-mounted option.

Features

- Simple maintenance normally limited to checking fluid levels.
- Close-coupled centrifugal pump with vacuum priming compressor mounted to a diesel engine. Also available in electric drive or as bare shaft pumpend.
- Extensive application flexibility. It will handle sewage, slurries and liquids with solids up to 3" in diameter.
- Continuously operated Godwin venturi air ejector priming device requiring no form of periodic adjustment or control.
- Dry-running heavy duty mechanical seal with abrasion-resistant interfaces.
- Also available in a Critically Silenced unit which drastically reduce noise levels of the pump.
- Standard engine John Deere 6068HF285. Also avaliable with Caterpillar C6.6E.
- The volute & suction cover are made from cast iron bs1452:1990 grade 220 and the impeller is made from cast steel bs3100 a5 hardness to 200 hb brinell.

Specifications

Suction connection	6" 125# ANSI B16.1
Delivery connection	6" 125# ANSI B16.1
Max capacity	1878 USGPM
Max head	258' (79m)
Max solids handling	3" (75mm)
Max impeller diameter	14" (356mm)
Max operating temp	176°F (80°C)
Max working pressure	130.5 psi (9.0 bar)
Max suction pressure	72.5 psi (5.0 bar)
Max casing pressure	195.8 psi (13.5 bar)
Max operating speed	2000 rpm

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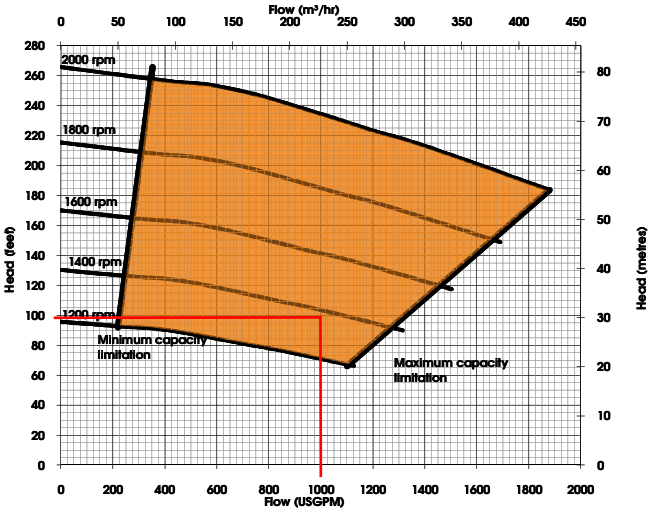
Reference number : 95-1012-3000
Date of issue : Auaust 25. 2011
Issue : 1

Please contact Godwin for further details.
A typical picture of the pump is shown.
All information is approximate and for general guidance only.

CD160M

Performance Curve



Materials

Pump casing & suction cover	Cast iron BS1452:1990 grade 220
Wearplates	Cast iron to BS1452 grade 220
Pump shaft	Nickel chrome steel to BS970 grade 817M40T
Impeller	Cast steel BS3100 A5 hardness to 200 HB Brinell
Non-return valve body	Cast iron
Mechanical seal faces	Silicon carbide vs silicon carbide

Engine option 1

John Deere, 6068HF285, 148.7 HP @ 2000 rpm

Impeller diameter 14 " (356 mm)

Suction Lift Table

Total Suction Head (')	Total Delivery Head (')				
	144	185	201	221	245
	Output (USGPM)				
9.8	2006	1712	1468	1027	489
15.1	2006	1614	1370	734	367
20.0	2006	1517	1223	416	-
24.9	1614	1223	1076	489	-

Fuel capacity (Full) 180 US Gal, (Usable) 180 US Gal

Fuel consumption @ 2000 rpm BEP 6.9 US Gal/hr

Weight: (Dry) 5,192 lbs, (Wet) 6,644 lbs

Dimensions: (L) 138" x (W) 53" x (H) 72"

Engine option 2

Caterpillar, C6.6E, 142.1 HP @ 2000 rpm

Impeller diameter 14 " (356 mm)

Suction Lift Table

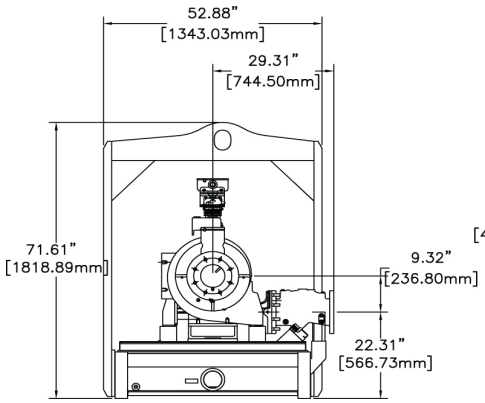
Total Suction Head (')	Total Delivery Head (')				
	144	185	201	221	245
	Output (USGPM)				
9.8	2006	1712	1468	1027	489
15.1	2006	1614	1370	734	367
20.0	2006	1517	1223	416	-
24.9	1614	1223	1076	489	-

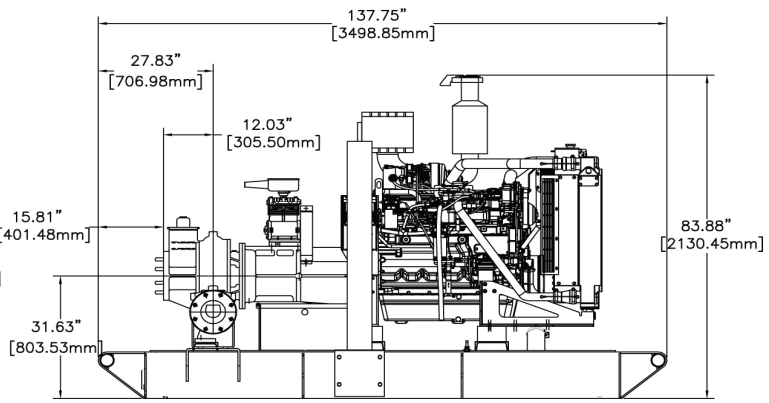
Fuel capacity (Full) 180 US Gal, (Usable) 180 US Gal

Fuel consumption @ 2000 rpm BEP 6.8 US Gal/hr

Weight: (Dry) 4,967 lbs, (Wet) 6,410 lbs

Dimensions: (L) 138" x (W) 53" x (H) 72"





Performance data provided in tables is based on water tests at sea level and 68°F ambient.

All information is approximate and for general guidance only.

Please contact Godwin Pumps for further details.

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Date of issue : August 25, 2011

Issue : 1

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