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VIA EMAIL ONLY dknafo@pods.com

29 June 2022

Mr. Daniel Knafo
PODS Moving & Storage
13535 Feather Sound Drive
Clearwater, FL 33762

Re: Acoustical Analysis — Short Form Sound Study
PODS Moving & Storage Facility
Town of North Castle, NY
OAA Project 4586A

Dear Mr. Knafo:

As requested, Ostergaard Acoustical Associates (OAA) has carried out a short form sound study to evaluate the potential acoustical impact of the proposed PODS Moving & Storage facility located in the hamlet of Armonk, within the Town of North Castle, Westchester County, New York. This study is based on the most recent version of the site plan prepared by Dynamic Engineering.

In summary, a proposed 24/7 warehouse with 16 loading docks was approved in a light industrial district adjacent to the Interstate. The proposed PODS facility use significantly reduces the intensity of loading dock activity by allocating a large portion of this area for outdoor storage needs. The remaining dock area will be used for overnight parking of trucks. The PODS facility will also operate only during daytime hours, six days a week, further reducing the potential intrusiveness of this site. A sound study was carried out to evaluate potential sound produced by the PODS facility and compare findings to applicable noise codes and project noise goals. Findings from these analyses show that the PODS facility use will have no negative impact on the area; details are provided below.

The proposed storage facility is proposed at 94 Business Park Drive, formerly occupied by a hotel. The site and much of the surrounding area is in the PLI, Planned Light Industrial, district. North of the site is an assisted living facility. Due west is Business Park Drive with a medical office beyond. Abutting the site to the south is a multi-use building that accommodates a tile contractor, dance school, and wrestling school. The entire east side of the site is common with Interstate-684. Beyond the Interstate are single family homes fronting on Limestone Road in the R-1A, Single-Family Residence (1 Acre), district. A review of aerial photos indicates that a substantial highway sound barrier exists between the site and these residences. Despite the area being properly zoned for this use and predominantly not sensitive to noise, the assisted living facility north of the site is of acoustical interest and the focus of this study. Specifically, there is an outdoor recreational area at

the assisted living facility nearby the site. Eastern residences are 600 feet or more from the site, protected by a highway sound barrier, and hence not a concern. Given our review of the area, we expect that Interstate-684 traffic flow sound is the dominant sound source in the region.

Plans call for the construction of an approximately 72,000 ft² warehouse-type building in the center of the site. The building is configured to have truck loading area along the east façade, facing the Interstate. The building is fitted with two ramps on the east side to accommodate forklifts; container storage will occur inside and outside the building as shown in the attached site plan. Personnel vehicle parking is provided along the remaining two sides of the building. Site access is provided from two driveways to the west. Our understanding of the acoustical aspects of interest for this project are as follows:

- The activities on site primarily comprise loading and unloading of full and empty containers in and out of the warehouse and delivered to customer's residences or place of business for use as temporary storage to assist with their moving and storage needs.
- The site will operate Monday through Friday, 6:00AM to 7:00PM, and Saturday 8:00AM to 6:00PM. The site is closed on Sundays. There will be no nighttime operations at the site, which is acoustically favorable.
- Containers are proposed to be stored both inside the building (full containers) as well as in a small, designated area outside, east of the building (empty containers).
- Containers are loaded and unloaded onto small trucks by a forklift that resides on-site. There will be approximately one or two Yale Model GP-175VX forklifts located on site. Forklifts are equipped with a factory installed self-adjusting backup alarm that produces 82-to-102 dB(A) at a distance of 1 foot. We understand that forklift back-up alarm activity at the site is a main concern of the Town review board and public. A catalog cut of the forklift is included at the end of this report.
- The site anticipates about 30-to-36 small trucks per week as well as 18 over-the-road line haul trucks. Line-haul trucks carry 3 containers while the small trucks can carry one.
- While loading docks are part of the building design, they will not be used by this proposed use. The loading and unloading process occurs with the forklift and is relatively brief compared to a traditional 53-foot line-haul trailer.

Local, county, and state noise codes were reviewed. The Town of North Castle discusses noise in Code Chapter 210: *Noise*. This code section discusses noise in a qualitative way and provides no limits. This section prohibits loud, disturbing, and unnecessary noises associated with engines without a muffler; construction activities that occurs during the night and Sundays; sounding a car horn except as a warning device; and loading and unloading containers that create unnecessary noise between 7:00PM and 7:30AM on Mondays through Fridays, 5:00PM and 9:00AM on Saturdays, and on all Sundays and federal holidays. In the zoning code under Section 355-62, noise limits are provided. This code section provides maximum allowable octave band center frequency limits. These limits equal an overall sound level of 55 dB(A). Language also seems to require that, during the nighttime hours and on Sunday, allowable limits are 6 dB lower, or 49 dB(A). Performance standards do not apply to noises not directly under the control of the property user, construction noise during allowable hours, noise from safety signals and warning devices, and transient noises from moving vehicles including trucks.

Additionally, noise from vehicles on public and private roads must also adhere to applicable state laws. New York State Vehicle and Traffic (VAT) Law states that all motor vehicles must have a muffler and must be below specific sound limits at a distance of 50 feet. Specifically, vehicles over 10,000 pounds must not exceed 86 dB(A) at speeds of 35 mph or less nor exceed 90 dB(A) at speeds above 35 mph. There are also limits for lighter weight vehicles and motorcycles. Overall, these State limits are generally easy to meet with modern, well-maintained vehicles. The New York State Department of Environmental Conservation (DEC) has a policy “Assessing and Mitigating Noise Impacts” that provides guidance for analyzing and minimizing the acoustical impact applicable to the State Environmental Quality Review Act (SEQRA) review. Guidelines require comparison of the average ambient sound level to proposed site sound emissions to determine the extent of any potential acoustical impact, if any. The DEC states that an increase in ambient sound level by 0-to-3 dB should have no appreciable effect on receptors and an increase of 3-to-6 dB is tolerable but may have potential for an adverse noise impact only in cases where the most noise sensitive of receptors are present. Increases of more than 6 dB require closer scrutiny, while increases of 10 dB deserve consideration of avoidance and mitigation measures in most cases. There are no applicable Westchester County noise codes that could be found.

Of the applicable codes, the Town performance standards provide the best direction for an acoustical study as it provides maximum allowable sound levels. However, it is noted that the noise sources of concern at this site, such as back-up alarms and occasional truck activity *are explicitly exempt* under this ordinance. OAA finds that the overall daytime limit of 55 dB(A) to be generally stringent; most noise ordinances have daytime sound limits closer to 65 dB(A) as receptors are less sensitive and ambient sound is higher during this period. For this site particularly, the nearby

Interstate is expected to produce average sound levels in the 55-to-65 dB(A) range in the vicinity of this site. The Town nighttime overall limit of 49 dB(A) is acceptable and aligned with nighttime limits found in other codes. The Town performance standards also seem to apply to any kind of receptor regardless of whether they are noise-sensitive or not.

OAA recommends that a project noise goal be set to minimize the acoustical impact of the site. Specifically, we recommend that sound emissions from on-site motor vehicles strive to not exceed levels of 65 dB(A) at the adjacent assisted living facility outdoor recreational area. This limit was selected for several reasons. It is in line with expected existing maximum sound levels from the nearby Interstate as well as the daytime noise code limit typically found in other noise codes. Lastly, meeting this limit will minimize the potential of speech interference. A conversation at 3 feet using a normal vocal cord effort is 65 dB(A), hence striving to have site maximums comparable to this will preserve communication at the adjacent assisted living facility and ensure that raised vocal efforts are not needed. Specific noise goals are not needed for neighboring commercial and industrial receptors as they are not considered noise sensitive. Steady noise sources, such as HVAC equipment, should fully comply with the nighttime noise code of 49 dB(A). While an analysis on this has not been done, OAA finds compliance with this nighttime limit to be straight forward and easily achievable given the distances involved. Meeting the recommended goal will meet the intent of the local noise code, will allow site noise to blend in with the acoustical environment, and will ensure no negative acoustical impact per DEC criteria.

OAA has surveyed multiple warehouses and distribution facilities similar to this site and maintains a robust database of site sound sources. A driving line-haul truck produces maximum sound levels of 74 dB(A) at 50 feet. Box trucks, which are more similar in size to the trucks expected at this site, produce lower maximum sound levels of 70 dB(A) at 50 feet. Personal vehicle movements are significantly lower in sound level, nominally 59 dB(A) at 50 feet, and therefore are generally not a concern. Forklift driving sound levels is not specifically known but assumed to be more comparable to a smaller box trucks or personal vehicles. The Yale forklift back-up alarm is rated for 82-to-102 dB(A) at 1 foot from the device. These on-site vehicle maximum sound levels were projected to nearby receptors. Shielding effects of buildings and terrain were not considered for simplicity.

Since the main subject is back-up alarms of forklifts, a more detailed discussion is needed. Over-the-road line-haul truck back-up alarms can vary from user to user. Based on our experience, about 1/3 of trucks are equipped with a standard tonal, "beeper" back-up alarm. Another 1/3 are equipped with a broadband, "shusher" style alarm. These broadband alarms are just as effective at alerting receptors, but because sound is in multiple frequency bands and not just one, the emitted sound blends in better with ambient sound at greater distances. Lastly, the last 1/3 of trucks observed by

OAA do not have any back-up alarm. It should be noted that both “beeper” and “shusher” style alarms come in either a constant level version or a self-adjusting version. The self-adjusting version, which is shown as standard on the forklift proposed on site, indicates that the alarm has a sensor which examines the existing sound in the vicinity and makes the alarm signal 10 dB above the existing sound. Self-adjusting, or “smart”, alarms ensure that the sound level is only as high as it needs to be to be effective. For example, ambient sound levels below 72 dB(A) will result in the self-adjusting alarm to be no higher in level than 82 dB(A) at 1-foot.

The outdoor storage area of the site will be approximately 175 feet away from the outside recreational area of the assisted living facility to the north. At its farthest point, the outdoor storage area is almost 400 feet away from this same location. Storage area noise sources were projected to these distances; results are shown as A-weighted sound pressure levels in dB re 20µPa and are summarized as follows:

	Projected to 175 feet	Projected to 400 feet
Forklift back-up alarm	37-57 dB(A)	30-50 dB(A)
Driving line-haul	63 dB(A)	56 dB(A)
Driving box truck/forklift	59 dB(A)	52 dB(A)

Results from the table above show that all outdoor storage activity is below the 65 dB(A) project goal. Back-up alarms at their highest permitted level are 8 dB(A) below the goal. For maximum back-up alarm levels to be realized, sound levels near the forklifts must approach 90 dB(A), which is not expected to occur often, if at all. We expect that back-up alarms from forklift activity to be on the lower end of the range in the table above, nominally between 30 and 40 dB(A). Levels of this magnitude will be significantly lower in level than the expected prevailing ambient sound from Interstate traffic flow. While projections were only done for the nearest receptor north of the site, receptors in other directions will receive sound levels far lower. Residential receptors to the east are significantly farther away and also shielded by the intervening highway sound barrier. Office receptors to the west of the site, are fully screened by the PODS building. As a result, outdoor storage activity is not expected to be a concern at receptors to the east and west. Given these results, no additional mitigation features are recommended or warranted as typical use of this site is expected to have no negative impact on the area.

This site is well suited for this use. The site is situated along a major highway, in a non-sensitive zoning district, and generally among other commercial/industrial uses. The exception is an assisted living facility to the north. Residences are to the east but are beyond the Interstate and have an intervening highway sound barrier. The site is anticipated to operate during the non-noise-sensitive

daytime hours, which is acoustically beneficial. The proposed use of this site is significantly lower in intensity than a permitted 24/7 warehouse use. The applicable local noise code discussed noise in both a qualitative and quantitative manner. Code limits provided were generally appropriate but did not apply to mobile noise sources or warning signals. OAA set a project noise goal for the unregulated noise sources to minimize the potential for complaints and to ensure speech intelligibility was preserved at neighboring properties. Meeting the project goal will also ensure no negative acoustical impact per NYDEC criteria. Projection of driving truck and forklift sound meets the project goal and hence will not have any negative acoustical impact on the area. In addition, forklift back-up alarms will also meet project goals. Because these alarms are self-adjusting, they are not expected to produce sound levels near their maximum capability. Instead, alarm sounds will typically be as much as 30 dB lower in level than their highest possible sound level. Given the above, the site is not anticipated to have a negative acoustical impact on the surrounding area and will blend in with existing sounds in the area.

I trust that the above is helpful. As always, if there are any questions, please let me know.

Regards,

OSTERGAARD ACOUSTICAL ASSOCIATES



Benjamin C. Mueller, P.E., Principal
bmueller@acousticalconsultant.com

BCM:amc

VX Series

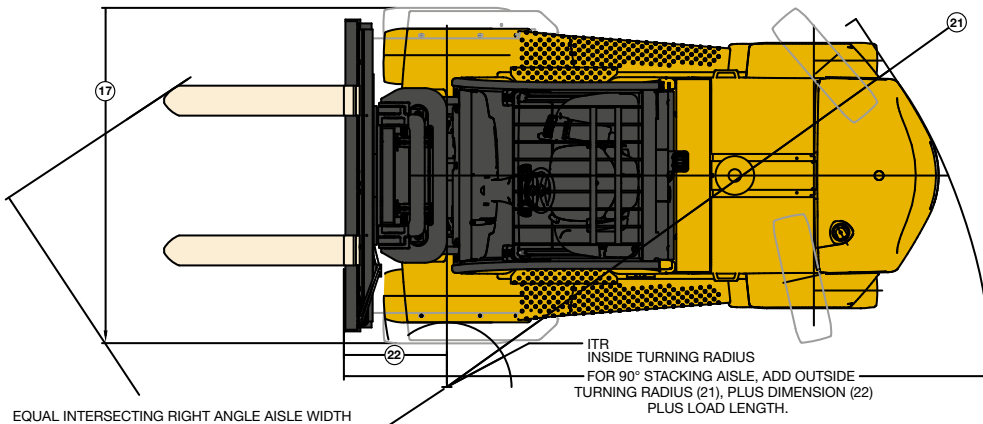
Diesel Forklift Trucks

17,000 / 17,500 / 19,000 lbs.

- Low cost of operation is derived from increased uptime, low maintenance and high productivity
- Designed for dependability in the most rigorous applications
- For use in high speed, high load, short shuttle applications
- Industry leading ergonomic features

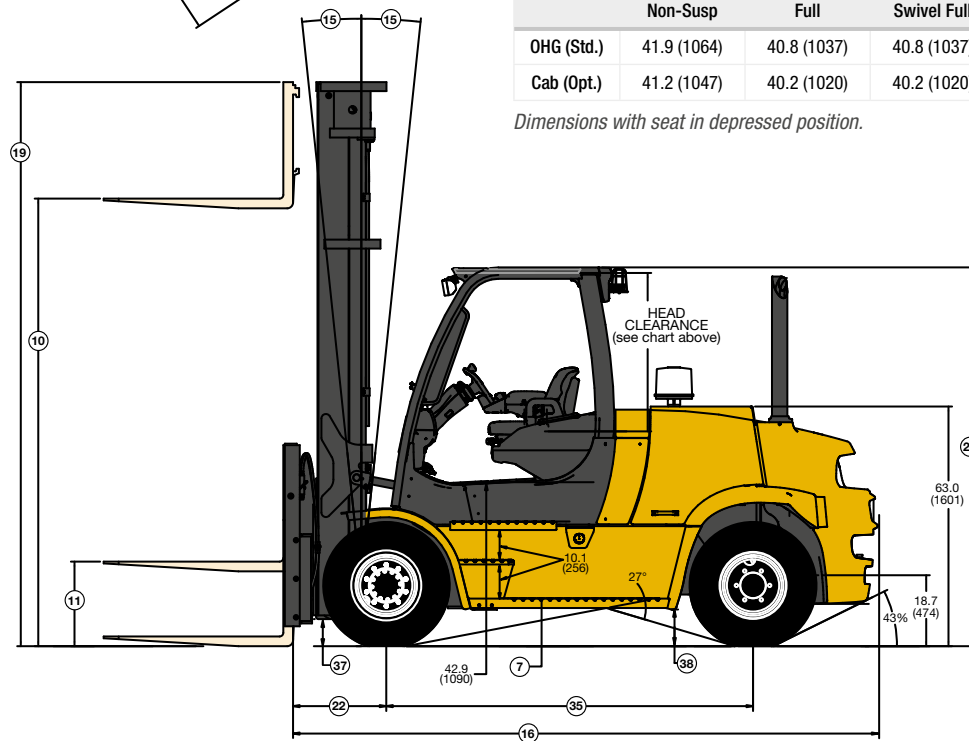


Truck Dimensions



	Non-Susp	Full	Swivel Full
OHG (Std.)	41.9 (1064)	40.8 (1037)	40.8 (1037)
Cab (Opt.)	41.2 (1047)	40.2 (1020)	40.2 (1020)

Dimensions with seat in depressed position.



Engine Specifications (High Output)

Kubota 3.8L High Output Tier 4 Turbo Diesel Engine

Cylinders	I-4
Displacement	230 cu.in./3.8 liter
Torque	373 lb.ft. @ 1600 RPM
Horsepower	110 hp @ 2400 RPM
Air Filtration	Two Stage, Dry Type
Emission Control	DPF/SCR Control

Engine Specifications (DOC - Diesel Oxidation Catalyst)

Kubota 3.8L DOC Tier 4 Final Turbo Diesel Engine

Cylinders	I-4
Displacement	230 cu.in./3.8 liter
Torque	227 (309) lb.ft. @ 1400 RPM
Horsepower	74 hp @ 2200 RPM
Air Filtration	Two Stage, Dry Type
Emission Control	DOC Control

General Specifications GP170VX - Diesel, LPG

		Yale®	
GENERAL	1	Manufacturer	GP170VX
	2	Model designation	GP170VX
	2a	Powertrain – engine transmission	Kubota 3.8L DOC Techtronix 332 Kubota 3.8L High Output Techtronix 332
	3	Load capacity	17,000 (8,000)
	4	Load center	24 (600)
	5	Drive power type: gas, diesel, LPG	Diesel
	6	Operation	Seated Rider
	7	Step height (from ground to running board)	12.6 (321)
	7a	Step height (between intermediate steps between running board and floor)	10.1 (256)
DIMENSIONS	8	Tires	Pneumatic
	9	Number of wheels, front/rear (X = driven)	4X/2 ¹
	10	Lift height, w/LBR (TOF) (rounded down)	219 (5565)
	11	Standard free lift height (rounded down)	4 (105)
	12	Fork carriage width – standard carriage	80 ³ (2030 ³)
	12b	Fork spacing - std. carriage - min. inside to inside edge	2.6 (65)
	13	Fork dimensions	7.9 X 2.5 X 47.2 (200 X 65 X 1200)
	13a	Fork carriage to DIN 15173. Class, A/B	IV A
	14	Fork spacing - std. carriage - max. outside to outside edge	78.3 (1990)
	15	Mast tilt, forward / back	5 / 9 ²
	16	Overall length (length to face of forks)	153 (3883)
	17	Overall width	88 (2239)
	18	Height of standard mast, lowered (rounded up)	156 (3962)
	19	Height of mast, extended w/o load backrest (rounded up)	266 (6739)
	19a	Height of mast, extended w/load backrest (rounded up)	270 (6847)
	20	Height to top of standard overhead guard (rounded up)	100 (2531)
	20a	Height to top of cab (rounded up)	101 (2549)
	20b	Towing coupling height	18.7 (476)
	21	Outer turning radius	145 (3673)
	21a	Inner turning radius	14.3 (362)
	22	Load distance (load face-center of wheel to face of forks– front overhang) 2-stage	23.6 (599.5)
	22a	Load distance (load face-center of wheel to face of forks– front overhang) 3-stage	25.6 (650.5)
	22b	Right angle stack (add length of load)	168 (4273)
	23	Right angle stack with pallets 42in wide x 48in long	216 (5492)
24	90° intersecting aisle (with pallet W=42in, L=48in)	120 (3056)	
PERFORMANCE	25a	Travel speed fwd, RL/NL	12.0/13.1 (19.3/21.1)
	25b	Travel speed rev, RL/NL	11.9/12.8 (19.1/20.5)
	26	Lifting speed, standard 2-stage LFL RL/NL	67/67 (.34/.34)
	26a	Lifting speed, optional 3-stage FFL RL/NL	64/67 (.33/.34)
	27	Lowering speed, standard 2-stage LFL RL/NL	81/73 (0.41/0.37)
	27a	Lowering speed, optional 3-stage FFL RL/NL	77/65 (0.39/0.33)
	28	Drawbar pull @ maximum RL/NL	12000/7213 (5443/3272)
	28a	Drawbar pull @ 1 mph RL/NL	11445/7213 (5192/3272)
	28b	Drawbar pull @ 3 mph RL/NL	4444/7213 (2016/3272)
	29	Maximum gradeability RL/NL	29/29
29a	Gradeability @ 1 mph RL/NL	27/29	
29b	Gradeability @ 3 mph RL/NL	11/29	
WT.	31	Weight, standard truck NL	24824 (11260)
	32a	Axle loading, static front/rear NL	12022/12800 (5453/5806)
	32b	Axle loading, static front/rear RL	37509/4314 (17014/1957)
WHEELS & TIRES	33	Tire size – front	8.25 X 15 -14PR ¹
	34	Tire size – rear	8.25 X 15 -14PR ¹
	35	Wheelbase	96.5 (2450)
	37	Ground clearance under mast, laden	6.8 (173)
	38	Ground clearance at center of wheelbase	10.0 (253)
	39	Brakes service – method of control/operation	Hydraulic/Foot
	40	Brakes park – method of control/operation	Mechanical/Hand
TRANS. & POWER UNIT	41	Battery type	Maintenance Free
	42	Battery volts/cold cranking amps	12V / 1010 X 2
	43	Engine manufacturer/type	Kubota 3.8L DOC Kubota 3.8L High Output
	44	Engine power @ governed speed	74 (55) @ 2200RPM 110 (82) @ 2400RPM
	45	Torque @ rated RPM	227 (309) @ 1400RPM 373 (275) @ 1600 RPM
	46	Number of cylinders/displacement	I-4/3769 (230)
	47	Gear change type	Electronically Controlled Powershift
	47a	Transmission: number of speeds forward/reverse	3F / 2R
	48	Fuel tank – capacity	19.8 (74.8)
	49	Working pressure for attachments	2250 (155)
	50	Oil flow for attachments	24 (93)
	51	Towing coupling type	Pin
52	Hydraulic tank – capacity (drain & refill)	18.7 (70.9)	

¹ Other tire options are available.

² Backtilt limited to 6 degrees with some mast options.

³ Carriage is 80" wide, load backrest is 82" wide.

General Specifications GP175VX - Diesel, LPG

GENERAL	1	Manufacturer	Yale®	
	2	Model designation	GP175VX	
	2a	Powertrain – engine transmission	Kubota 3.8L DOC Techtronix 332	Kubota 3.8L High Output Techtronix 332
	3	Load capacity	lbs (kg)	17,500 (8,000)
	4	Load center	in (mm)	36 (900)
	5	Drive power type: gas, diesel, LPG	Diesel	
	6	Operation	Seated Rider	
	7	Step height (from ground to running board)	in (mm)	12.6 (321)
	7a	Step height (between intermediate steps between running board and floor)	in (mm)	10.1 (256)
DIMENSIONS	8	Tires	Pneumatic	
	9	Number of wheels, front/rear (X = driven)	4X/2 ¹	
	10	Lift height, w/LBR (TOF) (rounded down)	in (mm)	219 (5565)
	11	Standard free lift height (rounded down)	in (mm)	4 (105)
	12	Fork carriage width – standard carriage	in (mm)	80 ³ (2030 ³)
	12b	Fork spacing - std. carriage - min. inside to inside edge	in (mm)	2.6 (65)
	13	Fork dimensions	in (mm)	7.9 X 2.5 X 47.2 (200 X 65 X 1200)
	13a	Fork carriage to DIN 15173. Class, A/B	class	IV A
	14	Fork spacing - std. carriage - max. outside to outside edge	in (mm)	78.3 (1990)
	15	Mast tilt, forward / back	degrees	5 / 9 ²
	16	Overall length (length to face of forks)	in (mm)	159 (4038)
	17	Overall width	in (mm)	88 (2239)
	18	Height of standard mast, lowered (rounded up)	in (mm)	156 (3962)
	19	Height of mast, extended w/o load backrest (rounded up)	in (mm)	266 (6739)
	19a	Height of mast, extended w/load backrest (rounded up)	in (mm)	270 (6847)
	20	Height to top of standard overhead guard (rounded up)	in (mm)	100 (2531)
	20a	Height to top of cab (rounded up)	in (mm)	101 (2549)
	20b	Towing coupling height	in (mm)	18.7 (476)
	21	Outer turning radius	in (mm)	149 (3794)
	21a	Inner turning radius	in (mm)	14.3 (362)
	22	Load distance (load face-center of wheel to face of forks– front overhang) 2-stage	in (mm)	23.6 (599.5)
	22a	Load distance (load face-center of wheel to face of forks– front overhang) 3-stage	in (mm)	25.6 (650.5)
	22b	Right angle stack (add length of load)	in (mm)	173 (4394)
	23	Right angle stack with pallets 42in wide x 48in long	in (mm)	221 (5613)
24	90° intersecting aisle (with pallet W=42in, L=48in)	in (mm)	123 (3126)	
PERFORMANCE	25a	Travel speed fwd, RL/NL	mph (km/hr)	11.9/13.1 (19.1/21.0)
	25b	Travel speed rev, RL/NL	mph (km/hr)	11.8/12.7 (19.0/20.5)
	26	Lifting speed, standard 2-stage LFL RL/NL	ft/min (m/sec)	64/67 (.32/.34)
	26a	Lifting speed, optional 3-stage FFL RL/NL	ft/min (m/sec)	61/67 (.31/.34)
	27	Lowering speed, standard 2-stage LFL RL/NL	ft/min (m/sec)	81/73 (0.41/0.37)
	27a	Lowering speed, optional 3-stage FFL RL/NL	ft/min (m/sec)	77/65 (0.39/0.33)
	28	Drawbar pull @ maximum RL/NL	lbs (kg)	12000/7213 (5443/3272)
	28a	Drawbar pull @ 1 mph RL/NL	lbs (kg)	11401/7213 (5171/3272)
	28b	Drawbar pull @ 3 mph RL/NL	lbs (kg)	4399/7213 (1996/3272)
29	Maximum gradeability RL/NL	%	27/29	
29a	Gradeability @ 1 mph RL/NL	%	26/29	
29b	Gradeability @ 3 mph RL/NL	%	29/29	
WT.	31	Weight, standard truck NL	lbs (kg)	26782 (12148)
	32a	Axle loading, static front/rear NL	lbs (kg)	11367/15415 (5156/6992)
	32b	Axle loading, static front/rear RL	lbs (kg)	39778/4502 (18043/2042)
WHEELS & TIRES	33	Tire size – front	8.25 X 15 -14PR ¹	
	34	Tire size – rear	8.25 X 15 -14PR ¹	
	35	Wheelbase	in (mm)	96.5 (2450)
	37	Ground clearance under mast, laden	in (mm)	6.8 (173)
	38	Ground clearance at center of wheelbase	in (mm)	10.0 (253)
	39	Brakes service – method of control/operation	Hydraulic/Foot	
	40	Brakes park – method of control/operation	Mechanical/Hand	
TRANS. & POWER UNIT	41	Battery type	Maintenance Free	
	42	Battery volts/cold cranking amps	12V / 1010 X 2	
	43	Engine manufacturer/type	Kubota 3.8L DOC	Kubota 3.8L High Output
	44	Engine power @ governed speed	hp (kw)	74 (55) @ 2200RPM
	45	Torque @ rated RPM	ft. lbs (N-m)	227 (309) @ 1400RPM
	46	Number of cylinders/displacement	No./cc (ci)	I-4/3769 (230)
	47	Gear change type	Electronically Controlled Powershift	
	47a	Transmission: number of speeds forward/reverse	3F / 2R	
	48	Fuel tank – capacity	gal (liters)	19.8 (74.8)
	49	Working pressure for attachments	psi (bar)	2250 (155)
	50	Oil flow for attachments	gal/min (l/min)	24 (93)
	51	Towing coupling type	Pin	
52	Hydraulic tank – capacity (drain & refill)	gal (liters)	18.7 (70.9)	

¹ Other tire options are available.

² Backtilt limited to 6 degrees with some mast options.

³ Carriage is 80" wide, load backrest is 82" wide.

General Specifications GP190VX - Diesel, LPG

GENERAL	1	Manufacturer		Yale®	
	2	Model designation		GP190VX	
	2a	Powertrain – engine transmission		Kubota 3.8L DOC Techtronix 332	Kubota 3.8L High Output Techtronix 332
	3	Load capacity	lbs (kg)	19,000 (9,000)	
	4	Load center	in (mm)	24 (600)	
	5	Drive power type: gas, diesel, LPG		Diesel	
	6	Operation		Seated Rider	
	7	Step height (from ground to running board)	in (mm)	12.6 (321)	
	7a	Step height (between intermediate steps between running board and floor)	in (mm)	10.1 (256)	
DIMENSIONS	8	Tires		Pneumatic	
	9	Number of wheels, front/rear (X = driven)		4X/2 ¹	
	10	Lift height, w/LBR (TOF) (rounded down)	in (mm)	219 (5565)	
	11	Standard free lift height (rounded down)	in (mm)	4 (105)	
	12	Fork carriage width – standard carriage	in (mm)	80 ³ (2030 ³)	
	12b	Fork spacing - std. carriage - min. inside to inside edge	in (mm)	2.6 (65)	
	13	Fork dimensions	in (mm)	7.9 X 2.5 X 47.2 (200 X 65 X 1200)	
	13a	Fork carriage to DIN 15173. Class, A/B	class	IV A	
	14	Fork spacing - std. carriage - max. outside to outside edge	in (mm)	78.3 (1990)	
	15	Mast tilt, forward / back	degrees	5 / 9°	
	16	Overall length (length to face of forks)	in (mm)	156 (3958)	
	17	Overall width	in (mm)	88 (2239)	
	18	Height of standard mast, lowered (rounded up)	in (mm)	156 (3962)	
	19	Height of mast, extended w/o load backrest (rounded up)	in (mm)	266 (6739)	
	19a	Height of mast, extended w/load backrest (rounded up)	in (mm)	270 (6847)	
	20	Height to top of standard overhead guard (rounded up)	in (mm)	100 (2531)	
	20a	Height to top of cab (rounded up)	in (mm)	101 (2549)	
	20b	Towing coupling height	in (mm)	18.7 (476)	
	21	Outer turning radius	in (mm)	147 (3723)	
	21a	Inner turning radius	in (mm)	14.3 (362)	
	22	Load distance (load face-center of wheel to face of forks– front overhang) 2-stage	in (mm)	23.6 (599.5)	
	22a	Load distance (load face-center of wheel to face of forks– front overhang) 3-stage	in (mm)	25.6 (650.5)	
	22b	Right angle stack (add length of load)	in (mm)	170 (4323)	
	23	Right angle stack with pallets 42in wide x 48in long	in (mm)	218 (5542)	
24	90° intersecting aisle (with pallet W=42in, L=48in)	in (mm)	121 (3085)		
PERFORMANCE	25a	Travel speed fwd, RL/NL	mph (km/hr)	11.9/13.0 (19.2/21.0)	13.4/14.4 (21.5/23.2)
	25b	Travel speed rev, RL/NL	mph (km/hr)	11.8/12.7 (19.1/20.5)	10.7/11.5 (17.2/18.5)
	26	Lifting speed, standard 2-stage LFL RL/NL	ft/min (m/sec)	54/67 (.27/.34)	78/89 (.40/.34)
	26a	Lifting speed, optional 3-stage FFL RL/NL	ft/min (m/sec)	50/67 (.26/.34)	75/89 (.38/.34)
	27	Lowering speed, standard 2-stage LFL RL/NL	ft/min (m/sec)	81/73 (0.41/0.37)	
	27a	Lowering speed, optional 3-stage FFL RL/NL	ft/min (m/sec)	77/65 (0.39/0.33)	
	28	Drawbar pull @ maximum RL/NL	lbs (kg)	12000/7213 (5443/3272)	12000/7213 (5443/3272)
	28a	Drawbar pull @ 1 mph RL/NL	lbs (kg)	11433/7213 (5186/3272)	12000/7213 (5443/3272)
	28b	Drawbar pull @ 3 mph RL/NL	lbs (kg)	4431/7213 (2010/3272)	8021/7213 (3638/3272)
29	Maximum gradeability RL/NL	%	27/29	27/29	
29a	Gradeability @ 1 mph RL/NL	%	25/29	27/29	
29b	Gradeability @ 3 mph RL/NL	%	10/29	18/29	
WT.	31	Weight, standard truck NL	lbs (kg)	25857 (11729)	
	32a	Axle loading, static front/rear NL	lbs (kg)	11693/14162 (5304/6424)	
	32b	Axle loading, static front/rear RL	lbs (kg)	40179/4678 (18225/2122)	
WHEELS & TIRES	33	Tire size – front		8.25 X 15 -14PR ¹	
	34	Tire size – rear		8.25 X 15 -14PR ¹	
	35	Wheelbase	in (mm)	96.5 (2450)	
	37	Ground clearance under mast, laden	in (mm)	6.8 (173)	
	38	Ground clearance at center of wheelbase	in (mm)	10.0 (253)	
	39	Brakes service – method of control/operation		Hydraulic/Foot	
	40	Brakes park – method of control/operation		Mechanical/Hand	
TRANS. & POWER UNIT	41	Battery type		Maintenance Free	
	42	Battery volts/cold cranking amps		12V / 1010 X 2	
	43	Engine manufacturer/type		Kubota 3.8L DOC	Kubota 3.8L High Output
	44	Engine power @ governed speed	hp (kw)	74 (55) @ 2200RPM	110 (82) @ 2400RPM
	45	Torque @ rated RPM	ft. lbs (N-m)	227 (309) @ 1400RPM	373 (275) @ 1600 RPM
	46	Number of cylinders/displacement	No./cc (ci)	I-4/3769 (230)	
	47	Gear change type		Electronically Controlled Powershift	
	47a	Transmission: number of speeds forward/reverse		3F / 2R	
	48	Fuel tank – capacity	gal (liters)	19.8 (74.8)	
	49	Working pressure for attachments	psi (bar)	2250 (155)	
	50	Oil flow for attachments	gal/min (l/min)	24 (93)	
	51	Towing coupling type		Pin	
52	Hydraulic tank – capacity (drain & refill)	gal (liters)	18.7 (70.9)		

¹ Other tire options are available.

² Backtilt limited to 6 degrees with some mast options.

³ Carriage is 80" wide, load backrest is 82" wide.

GP170-190VX Mast dimensions

Maximum Fork Height (TOF)	Overall Lowered Height	Overall Extended Height		Free-Lift (TOF)		Approx. Total Wt. of Std. Equipped Truck		
		w/ Load Backrest	w/o Load Backrest	w/ Load Backrest	w/o Load Backrest	GP170VX with NL	GP175VX with NL	GP190VX with NL
in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	lbs (kg)	lbs (kg)	lbs (kg)
2-Stage Limited Free-Lift (LFL) Mast								
140 (3565)	117 (2962)	191 (4850)	186 (4725)	4 (105)	4 (105)	23361 (11050)	26592 (12062)	25395 (11519)
179 (4565)	137 (3462)	231 (5850)	226 (5725)	4 (105)	4 (105)	24590 (11154)	26821 (12166)	25624 (11623)
219 (5565)	156 (3962)	270 (6850)	265 (6725)	4 (105)	4 (105)	24822 (11259)	27053 (12271)	25856 (11728)
3-Stage Full Free-Lift (FFL) Mast								
181 (4615)	107 (2702)	240 (6077)	235 (5952)	56 (1440)	61 (1565)	25216 (11438)	27447 (12450)	26250 (11907)
234 (5965)	125 (3152)	293 (7427)	288 (7302)	74 (1890)	79 (2015)	25527 (11579)	27758 (12591)	26561 (12048)
Heavy Duty 2-Stage Limited Free-Lift (LFL) Mast								
179 (4565)	137 (3462)	231 (5850)	226 (5725)	4 (105)	4 (105)	24943 (11314)	27174 (12326)	25977 (11783)
219 (5565)	156 (3962)	270 (6850)	265(6725)	4 (105)	4 (105)	25344 (11496)	27575 (12508)	26378 (11965)
Heavy Duty 3-Stage Full Free-Lift (FFL) Mast								
258 (6565)	133 (3362)	317 (8037)	312 (7912)	82 (2090)	87 (2215)	26052 (11817)	33711 (15291)	27086 (12286)

RL = Rated Load NL = No Load

Note: GP170-190VX use standard 8.25 x 15 x 14 PR pneumatic drive tires @ 82.0 inch (2082 mm) overall width.

Options

- Powertrain protection system with engine shutdown
- Premium monitoring package
- Integral sidsifter, and integral sidsifting fork positioner
- Accumulator
- Keyless start (with auxiliary key switch)
- LED brake and back-up lights
- Headlights and rear drive lights with halogen bulbs
- Headlights and rear drive lights with LED bulbs
- Traction speed limiter
- Return-to-set tilt
- Integral operator's cab
- Rear drive handle with horn button
- Swivel full-suspension vinyl and cloth seats
- High-visibility non-cinch seat belt with or without interlock
- Foot Directional Control pedal
- Impact monitor
- Operator password
- Alarm-reverse actuated 82-102 Db(A) – self-adjusting
- LED amber strobe light - keyswitch activated
- Solid and radial tires
- 4 function (2 aux) hydraulic control valve
- 5° forward/6° backward tilt
- UL type DS
- Fire extinguisher
- Lifting eyes
- Kubota 3.8L High Output Engine (110 HP)



Yale® Veracitor® GP-VX Series

The Veracitor® GP170-190VX truck is designed to meet and exceed your materials handling application requirements with excellent performance and low hourly cost of operation.

Engines

The Kubota 3.8L High Output Tier 4 Final turbo diesel engine and the standard Kubota 3.8L DOC Tier 4 Final turbo diesel engine both utilize a two piece cylinder block for outstanding durability while reducing engine noise. Cylinders are cast into the block for optimum durability and cooling efficiency. Cylinder heads feature a helical, 4-valve "Crossflow" design within each cylinder to create additional airflow into the cylinder for added power. The turbocharger is of a simple design, but uses a variable waste-gate to ensure the proper amount of boost at all engine speeds. Both engines are certified to EPA Tier 4 Final emissions standards.

Fuel System

The Kubota 3.8L DOC Tier 4 Final turbo diesel, and the Kubota 3.8L High Output Tier 4 Final turbo diesel engine fuel systems utilize an electronically controlled, high-pressure common-rail fuel system that sends five separate fuel deliveries per fuel injection power stroke for maximum power and efficiency while reducing the noise levels. The 3.8L High Output engine features a cooled exhaust to be re-burned, which helps reduce emissions. A Diesel Particulate Filter (DPF) captures particulates or "soot" and oxidizes the material to eliminate smoke from the exhaust. A separate display module is furnished to monitor and control the emissions system. The standard Kubota 3.8L DOC Tier 4 Final Turbo diesel engine features a maintenance free emissions system and requires no DPF or SCR.

Transmissions

The standard Techtronix 332 transmission features three speeds forward and two speeds in reverse for excellent gradeability and drawbar pull while allowing top travel speeds for maximum productivity. Auto Deceleration feature is accomplished through the controlled application of the clutch packs. Controlled power reversals are managed by precisely regulating engine speed to reduce driveline stress during directional changes. Inching is controlled electronically. This transmission also features electronic shift control, smooth electronic inching, neutral start switch, and anti-restart protection. A single pedal controls both inching and braking. Optional dual inch/brake pedals are available for operators who prefer this design. A 100 mesh suction and 10 micron return line filtration protect the transmission from abrasive contaminants.

Cooling System

The cooling system employs a modular radiator system, with sections for engine coolant, transmission oil, and engine intake (charge) air.

An 18" diameter blade pusher-type fan provides cooling air flow. A permanently lubricated water pump and a high capacity, cross-flow radiator ensure rapid heat dissipation. The sealed cooling system operates at a pressure of 15 psi and includes a coolant recovery tank for visual inspection of coolant level. The radiator is soft-mounted for excellent durability.

Drive Axle

The drive axles are designed to withstand heavy loads and absorb shocks. The wheel hubs rotate on large tapered roller bearings. The drive shaft transmits rotational torque to the drive axle from the engine and transmission. Transmission torque is distributed through planetary gear reduction and an industrial hypoid ring gear and pinion assembly.

The drive axle is a "self contained" assembly that is isolated from the transmission by the drive shaft and heavy duty rubber isolators. The axle shafts utilize a "rolled fillet" root spline design for increased resistance to torsion stress. A magnetic sump plug is used to collect any metal particles that are circulating in the axle oil, preventing component wear.

Oil-cooled wet disc brakes

Oil-cooled wet disc brakes are standard and internal to the axle for better protection against the elements. These low pedal effort brakes require no adjustments and very little maintenance, yet provide an extremely long service life.

Metered hydraulic oil pressure is used to actuate the wet disc brakes via a brake-pedal actuated modulating valve. This system yields consistent pedal travel for optimum control. Independent, hand adjustable parking brake with pushbutton release has an audible alarm to indicate when the operator has left the truck without applying the parking brake.

Hydraulic Power Steering

Hydraulic Power Steering (hydrostatic steering) provides responsive control and eliminates mechanical linkages for reduced surface shock and simplified maintenance. The steering wheel is 12 inches in diameter with a textured surface grip and spinner knob, and requires only four turns lock-to-lock. The center mounted steer cylinder is located within the confines of the steer axle for protection.

Steer Axle

Constructed of cast ductile iron and mounted on phenolic bushings, allows the steer axle excellent stability and axle articulation. The steer axle system features tapered spindle bearings and non-adjustable tie rod ends for durability.

Chassis

Designed by state-of-the-art finite element methods, the chassis features inch-thick frame members and contains a rugged, unitized

frame structure with a low step for simple entrance to the operator's compartment. Ergonomically designed overhead guard is bar type for excellent visibility and reduced noise. Gull wing doors on both the right and left sides provide excellent service access.

Operator's Compartment

The operator compartment features Accutouch minilever, electro-hydraulic controls integrated into the operator's right-side armrest allowing superior ergonomic actuation. Automotive-style pedal arrangement with a large, single inch/brake pedal is standard. Rubber floor mat reduces noise and vibration. The floorplate can be removed without tools for excellent service access. Low step height and a convenient hand grip provide easy entry and exit to and from the truck.

Intellix VSM

Intellix VSM acts as a master truck controller, providing extensive monitoring and control of truck functions and systems. CANbus technology reduces wiring complexity and enables comprehensive communications between truck systems. The ergonomically positioned dash display transmits continual feedback to the operator and allows for communication of service codes. Comprehensive on-board diagnostics enable quick and easy troubleshooting. The electrical system features sealed connectors and Hall Effect sensors for superior dependability.

Hydraulic System

Incorporating a gear type pump with a cast iron body for quiet efficiency, the hydraulic system is protected from overloads by a main relief valve for the lift circuit and a secondary relief valve for tilt and auxiliary functions. Oil is double filtered through a 100 mesh suction line strainer and 10 micron return line filter. The hydraulic tank is integrated into the frame. An emergency lowering valve is provided to allow the load to be lowered in the event of power loss. O-ring face seal fittings are used in all high pressure hydraulic connections.

Yale® Masts


Yale masts are available in Simplex LFL (Limited Free Lift) and Triplex FFL (Full Free Lift) models. The mast features pre-lubed and sealed full-radius load rollers that resist the forward, rearward and lateral forces. Side-thrust wear pads allow for periodic adjustments for lateral clearances. The rolled mast channels are made of high-strength steel to provide resistance to flaring of the channel flanges. 80" wide hook-type carriages are standard equipment, providing great visibility and handles a wide variety of forks and attachments.

The optional heavy duty mast provides a solution for users in extreme applications that require heavy attachment use or frequently moved maximum rated loads.



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2276-1E 6/2018 All trucks shown with optional equipment.