

Taladro de la Tierra[®]

A mechanized, pedal operated
urine diverting dry toilet

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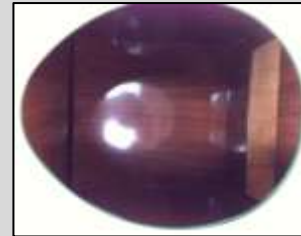
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+ Last year we focused in the interphase; to make it safe, clean and dignified..



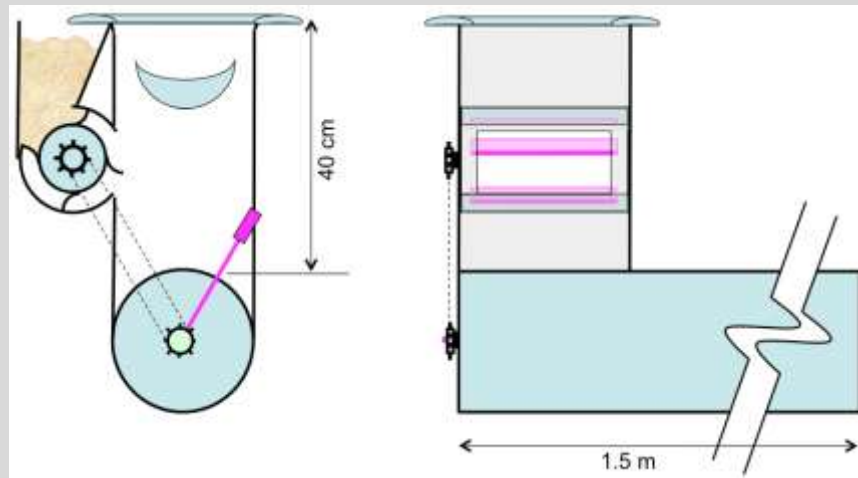
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+ ... And to make it hands-free pedal operated.



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+ We have now developed several functional prototypes that differ in price and number of accessories.



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+ Our prototypes are...

- Low cost (beginning at \$150)
- Water free
- Energy free
- Urine diverting system included
- Little odors or fly problems
- Safe and comfortable to use
- Easily operated and maintained



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+ Our prototypes are...



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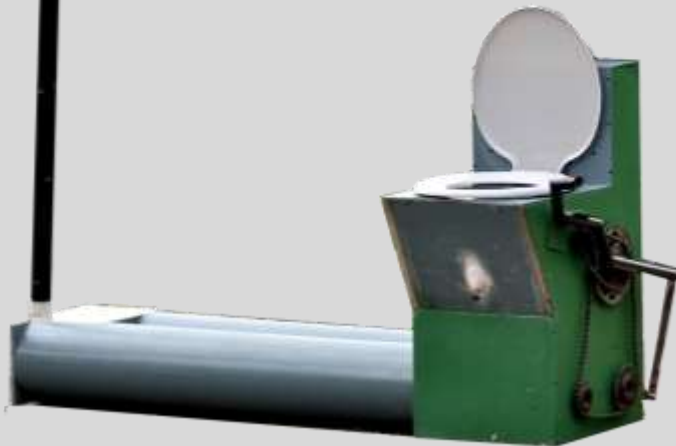
- Cheaply and easily repaired (if necessary)
- Compost (from excreta and dry material) and urine harvesting
- Pedal operated sawdust flushing
- Pedal operated mixer-auger (to process excreta + sawdust)
- Pedal operated flushing (to avoid visual contact)

+

“GRAN TALADRO”
is more fancy, but more
expensive and complex.



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“MINI
TALADRO”
is simpler
and
cheaper.

+ We tested them at “laboratory”, but now we are testing them with typical users



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+ This is typical user's current situation



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+ This is typical user's current situation



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+ This is typical user's current situation



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+ One of the main advantages is that Taladros can be located over the ground level, integrated to the house.



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+ Testing with typical users...



+ Testing with typical users...



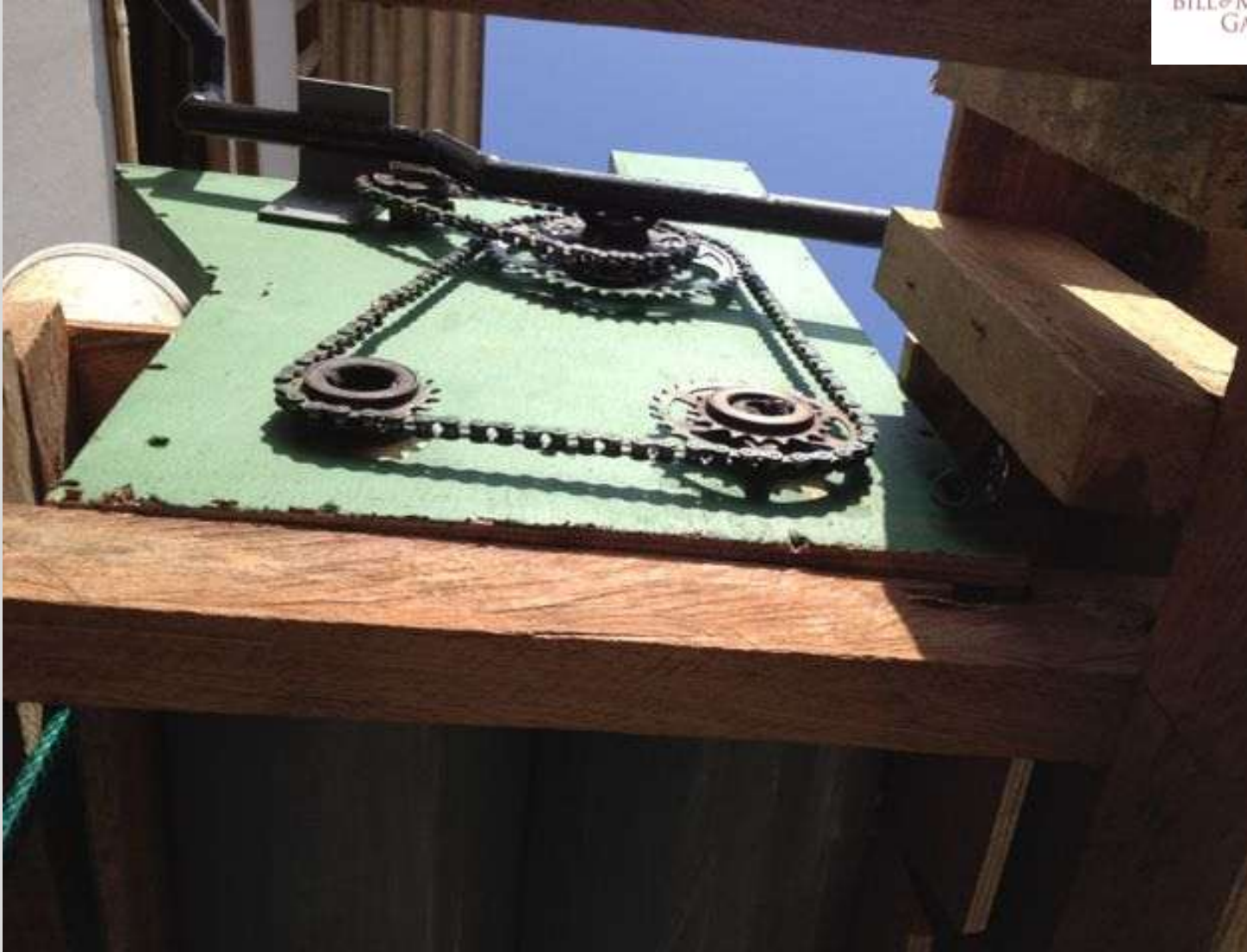
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+ Testing with typical users...



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+ Testing with typical users...



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+ Testing with typical users...



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+ Testing with typical users...



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+ Testing with typical users...



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+ Testing with typical users...



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+ Testing with typical users...



+ Monitoring and Feedback have bring important learning, but also great results!



MINI's didn't report problems

Family/house	Prot.	Started to be used	Problems reported		
			#	Description	Solution and comments
Sornoza Vera	Mini	16-Jul	0	-	-
Quezada Arias	Mini	20-Sep	0	-	-
Carpio Erazo	Mini	12-Sep	0	-	-
Concepto Azul*	Gran	09-Aug	1	Stuck	A large cardboard piece was removed. Transfer between tubes needs to accommodate big pieces.
Silva, Juana Elvira	Gran	04-Aug	0	-	-
Parrales, Nelly	Gran	09-Aug	2	Lever broken	No problems were reported after repaired and re-designed.
				Stuck	User added additional sawdust every usage, which was too much for the auger speed to move material.

+ “Multiple approaches” surveys indicate great acceptability and good willingness to pay for it.



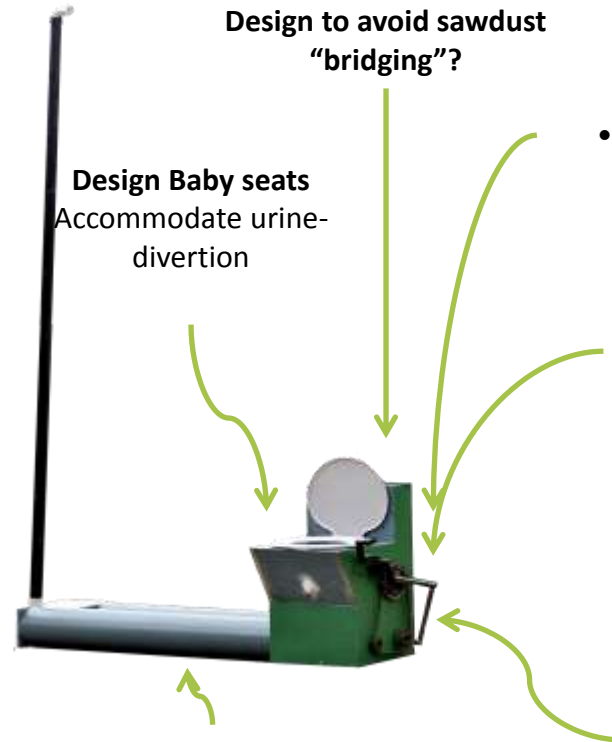
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Questions / Topics	*	Results
Are you satisfied having a "Taladro de la Tierra" at home?		All the respondents answered YES.
Have you had odors problems with your Taladro de la Tierra?		Low (3 respondents) or no odors (1) were reported.
Do you think this ecological toilet is appropriate for your family?		All the respondents answered YES.
Do you consider it better than the previous option you had?		All the respondents answered YES. Also, all the respondents considered it “better” than other available options, even when compared with conventional water toilets.
Is there something that you don't like or would like to change on your new ecological toilet?		None of respondents complained about the prototypes or their performance. Two respondents complain about the sawdust handling as it could be associated with breathing allergies.
If HOGAR DE CRISTO* would offer the “Taladro de la Tierra” as an option, would you interested in buy it? How much would you pay?		All respondents would be able to buy a “Taladro de la Tierra”. They would pay around US\$ 150, with a payment plan. They also answered YES, when they were asked if housing authorities should consider “El Taladro” for housing projects.
Worries or concerns mentioned		“Urine diversion is sometimes hard to use properly” “Lever could get broken”, “Sawdust handling”

+ Improvement Needed or Design Challenges on last prototypes.

Test part resistance

- Bucket Design**
- Easy bucket disconnection and replacement.
 - Develop a standard procedure for collection, storage and use.



Design to avoid sawdust "bridging"?

Design Baby seats
Accommodate urine-diversion

Single or Double Pipe?

- Is double pipe necessary and functional?
- Can we arrange double pipe in different ways?
 - Multiple tests?

Development of a versatile "sawdust distributor"

- Able to manage a variety of materials.
 - Low damage.
- Proper material distribution.

Evaluation of Sliding floor

- Necessity and functionality
- Accommodation of diarrhea, etc.

Pedal + Pinions - chains free- system?

- Can we do it with direct pinions, without chains?
- How to reduce broken or sticking?



OTHERS RELATED:

- Create a Committee of External Auditors (advisors)
- Research about sawdust and other dry materials availability.

...Investment is a lot lower than other conventional alternatives available in Ecuador



\$ 1840	• Baños portátiles
\$ 1737	• S. de arrastre hidráulico con tratamiento centralizado
\$1497	• S. de arrastre hidráulico con pozo séptico sellado
\$1154	• S. de arrastre hidráulico con pozo séptico infiltración
\$1054	• S. de arrastre hidráulico con conexión a alcantarillado público
\$ 342 - \$ 542	• Nuestros prototipos de baños Ecológicos producidos artesanalmente**
\$564	• S. de arrastre hidráulico con pozo ciego
\$ 188	• Letrina con pozo ciego

*Precios por instalación de un sanitario con lavamanos y el respectivo tratamiento de aguas grises, orina y excretas humanas.

*Incluye mantenimiento por tres años (hidrocleaner/aserrín/bacterias benéficas/planta tratamiento/otros)

* Precios no incluyen IVA, instalación eléctrica ni caseta.

•S de arrastre hidráulico con pozo ciego y letrina considerados como sistemas de saneamiento no mejorados.

**El precio puede bajar en más de un 30% producido a gran escala.

Fuente: Ambiente Creativo , Ecosanitarios, FCME, Ing. Martínez (2012) .

...Even if we consider medium or big scale projects (1000 houses i.e.)



\$ 634-\$1737

• **S. de arrastre hidráulico con tratamiento centralizado *****

\$1282

• **S. de arrastre hidráulico con pozo séptico sellado**

\$951

• **S. de arrastre hidráulico con conexión a alcantarillado público**

\$ 342 - \$ 542

• **Nuestros prototipos de Baños Ecológicos artesanalmente****

*Precios por instalación de 1 sanitario con lavamanos, tratamiento de aguas grises, orina y excretas humanas.

*Incluye mantenimiento por tres años (hidrocleaner/aserrín/planta tratamiento/otros)

*** **Precios varían en función de estrato social del proyecto habitacional (Terrenova vs Ciudad del Río)**

**El precio puede bajar en más de un 30% producido a gran escala.

•Precios no incluyen IVA, instalación eléctrica ni caseta

Fuente: Ambiente Creativo , Ecosanitarios, FCME, Ing. Martínez (2012) .



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The vision is scaling-up
the production to have a
cheaper and better
quality product.



Our vision is:



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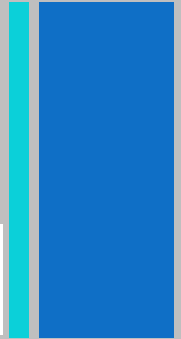
- Offer a functional, effective, comfortable and affordable urine-diverting dry toilet.
- Include financial mechanisms for customers.
- Housing projects could also include our toilets, and a communitarian organizations to maintain, harvest and fix them.



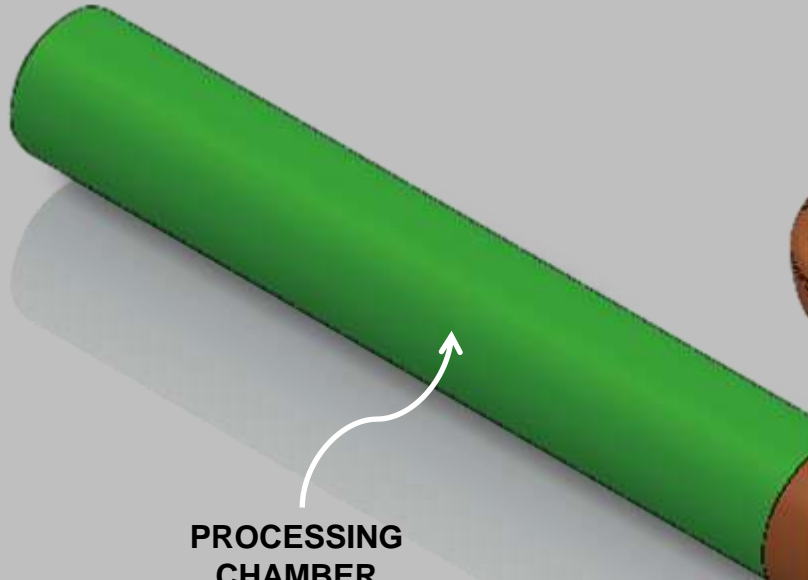
Components



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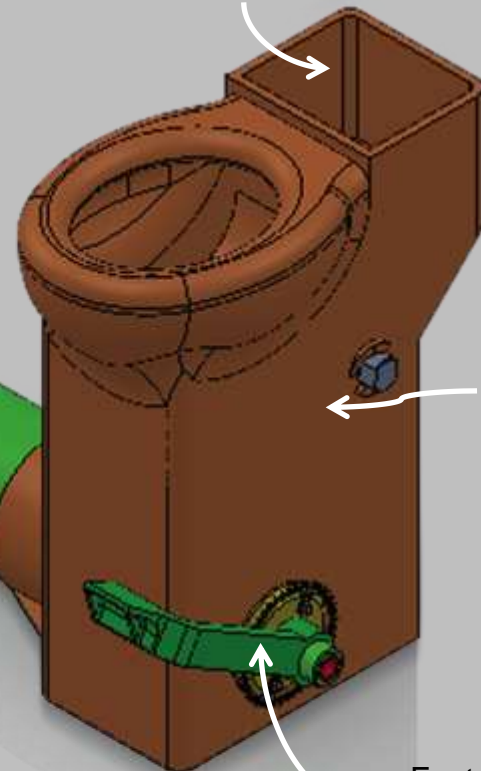


COMPOST EXIT
A small amount of compost exits after each flush, having been detained for 1-4 months (depending upon number of users).



PROCESSING CHAMBER
An auger inside mixes, aerates and moves compost.

SAWDUST STORAGE



DRY FLUSH
Processing takes place after each use.



PEDAL
Foot-actuated dry flush, sawdust delivery and compost mixing.

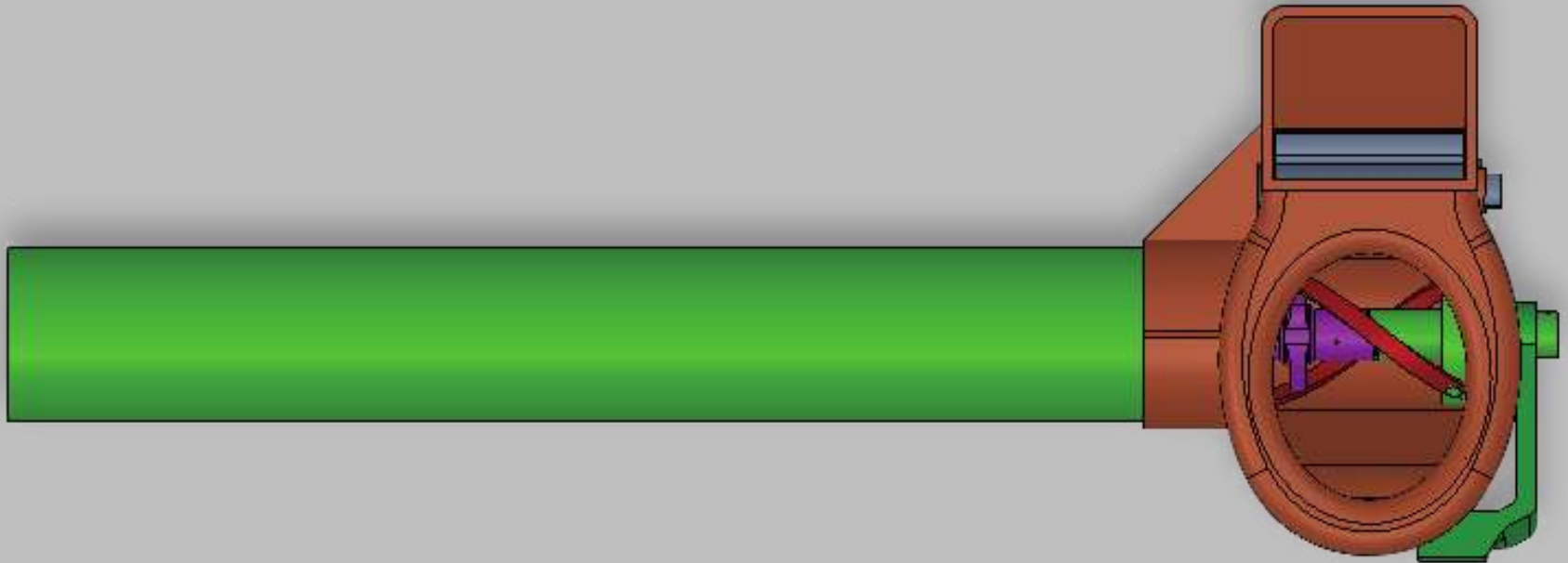




Components



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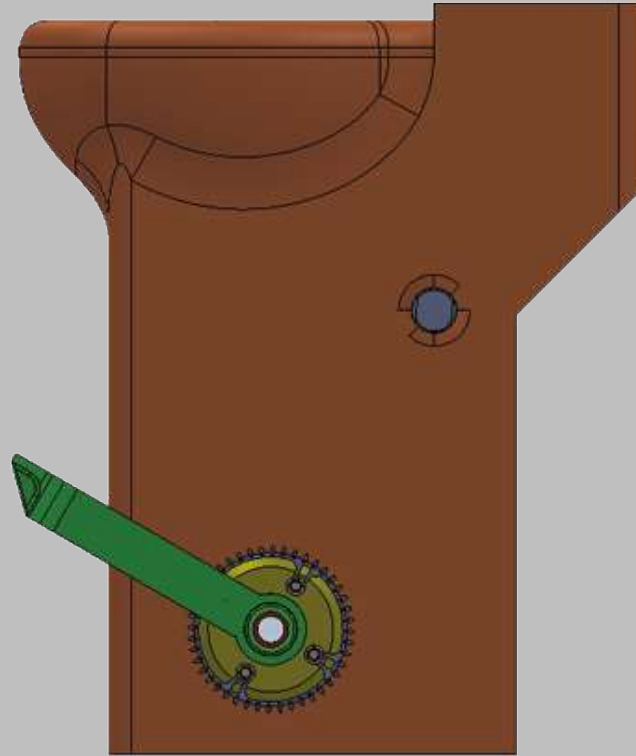
PLAN VIEW



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SIDE VIEW



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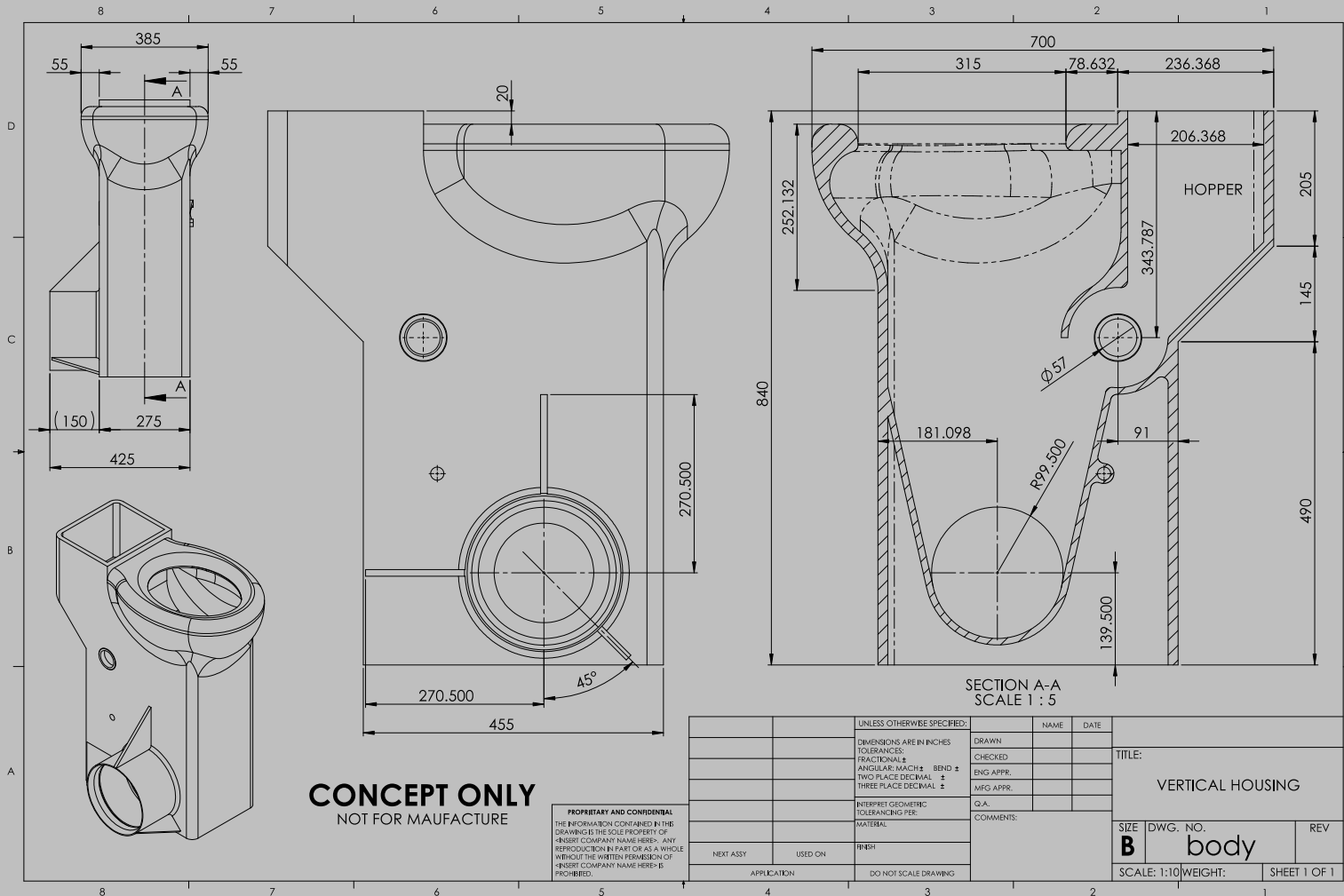
FRONT VIEW



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		DIMENSIONS ARE IN INCHES	DRAWN		TITLE: VERTICAL HOUSING	
		TOLERANCES:	CHECKED			
		FRACTIONALS:	ENG APPR.			
		ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±	MFG APPR.			
		INTERPRET GEOMETRIC TOLERANCING PER:	D.A.		SIZE DWG. NO. REV	
		MATERIAL	COMMENTS:		B body	
NEXT ASSY	USED ON	RPHR			SCALE: 1:10 WEIGHT: SHEET 1 OF 1	
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+ ¡Gracias!

Fundación In Terris.

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