7 | Title: NIC

Problem Brainstorming
- infrastructure / roads crumbling
- plastic pollution
- use of recycled plastic
- rail road system
- pump shutter
- white things getting dirty
- shank of pointe shoes
- skyline parking lot
- drying dishes
- celiac; lactose free pills - gluten free pills

Products / Processes
- frost proof dense longevity concrete pre-poured slab
- finding better ways to reprocess plastic / make it easier
- maintaining forest fires
- govt implemented new railroad system
- extracting natural gas
- robot mopper
- robot vacuum like roomba but that can climb up stairs
- unique screw toy
- better tests / labs for finding out certain diagnosis
- bluetooth gps for dogs sort of like invisible fence

Opportunities
- fun ways to workout to not be obese
- create a mass group to focus on one effort like area 51 raid but peace
- new way to tires
- reinvision the skyline parking lot
- automatic cars
- cardholder for car
- a bigger seat to place on a smaller seat for bigger ppl
- one universal apple charger
- 3D print in braille
- getting a universal sleep test for better sleep

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13 Title: Problem Statement Ideas

Ideas

- While global warming persists and plastic litters our oceans, we continue to use aspault and concrete for our road surfaces. Along with their suptibility to heaving and cracking, the process to refine and manufacture the materials pollutes our atmosphere with greenhouse gasses.

- The lack of usage of recycled plastics in large-scale production and manufacturing reduces the demand for recycling, which leads to many plastics in landfills and our oceans. Simultaneously, Michigan roads are reduced to even worse conditions

- For the past decade, the make-up and structure of roads has stayed relatively similar, but with advancements in technology, the crumbling infrastructure needs a change. Not only are our road conditions deterriorating, our nation also has an increasing waste stream of plastics, as the production of plastics is doubling every year.

increasing and need for environmentally friendly alternative

Problem Statement

In recent years, the make-up and structure of roads has stayed constant, but with advancements in technology and increasing need for environmentally friendly alternitaves, our crumbling infrastructure needs a change. Not only are our road conditions deteriorating, our nation also has an increasing waste stream of plastics, many of which are not recycled and end up in the oceans. Is there a way to improve roads through the use of recycled plastics?

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11 Title: IC Brainstorm ~ Based on rubric 11/13/19

Invention Process

Identifying + Understanding – Problem: Michigans crumbling infrastructure, and the commercial use of recycled plastics, global warming, plastic pollution

Who is effected: trucking and shipping industry → Michigans economy

Ideating – a road surface using a truss system made out of recycled plastic. The top layer will still be concrete but it will reduce the amount of plastic used

Design + Build – prototype – cross section of road
↳ have to make a mold for the truss

Testing + Refining – properties of our trusses and concrete
stress analyzer
changes how we design + create trusses

Invention Impact

Market Potential – How large is potential market
↳ many local/state government or use for private businesses
↳ Scope markets
determine who/where our invention will sell to

Value Preposition – Need to consider other impacts besides environment
Show the minimal adverse impact
↳ less concrete = less greenhouse gas emissions
do a calculation!!

Inventor Communication

Logbook – DO it as you go – NOT AFTER
↳ documents: problem identification
brainstorming, research, solution, test + redesign

Display Board – Aesthetic w/ graphs, pictures
Well written
Shows invention process – problem, research, solution, impact
UNIQUE

Prototype – shows key characteristics → truss system

Live Pitch

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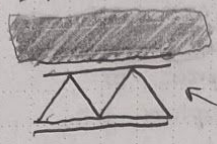
Type of plastic we need
recycled Polyethylene Terephthalate (PET)
Properties:
thermoplastic
hard, stiff, strong, dimensionally stable
absorbs very little water

truss system mold

Portland cement
↳ for overlay

We need to construct a box for pouring the cement

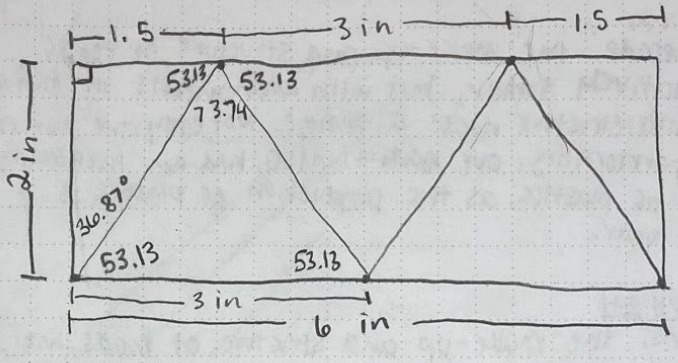
X seperate layers



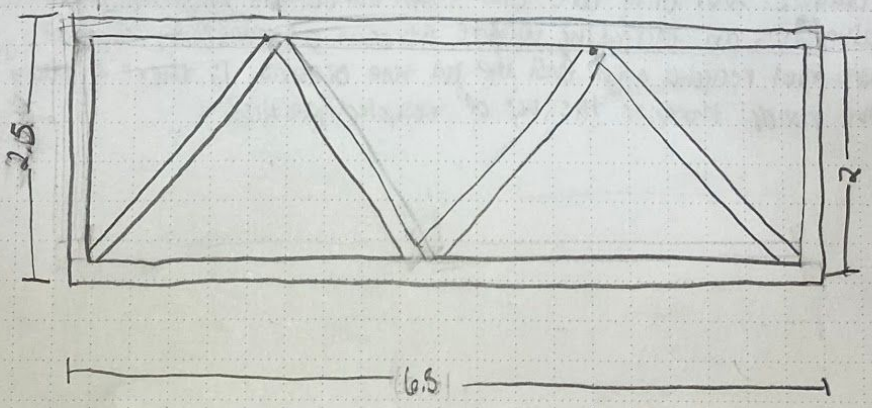
truss system under for strength
- concrete on top for smoothness

truss system in concrete

* this idea



* need to account for thickness in spacing + angles
diameter - 0.25 radius - 0.305



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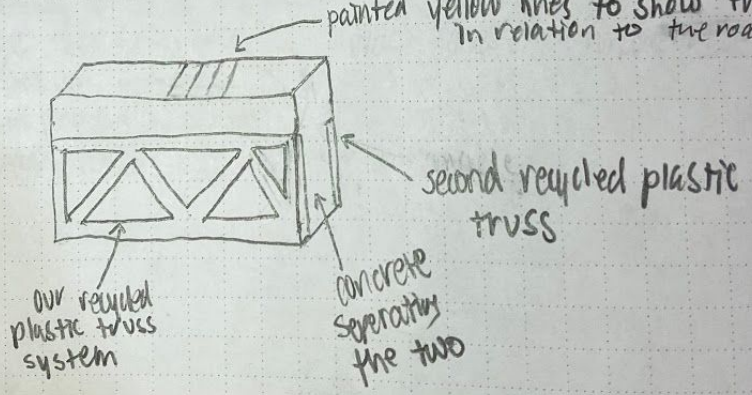
15 Title: Cement Research

Making concrete w/ cement powder
↳ WEAR BREATHING MASKS And GLOVES

- Pour cement powder in area
- Add water and stir until the consistency of "thin putty"
- If concrete doesn't already have sand, add sand

Ratios:
1 part cement
3* parts sand (start w/ a 1:1 cement sand ratio)
3 parts water

How We will USE cement for our project
- build a wooden box for us to pour the concrete into
  ↳ just a very thin prototype to show how it would work not a whole road or anything
- place our recycled plastic truss on an edge
- pour concrete to fill the box (ABOVE ~~the level of the truss~~



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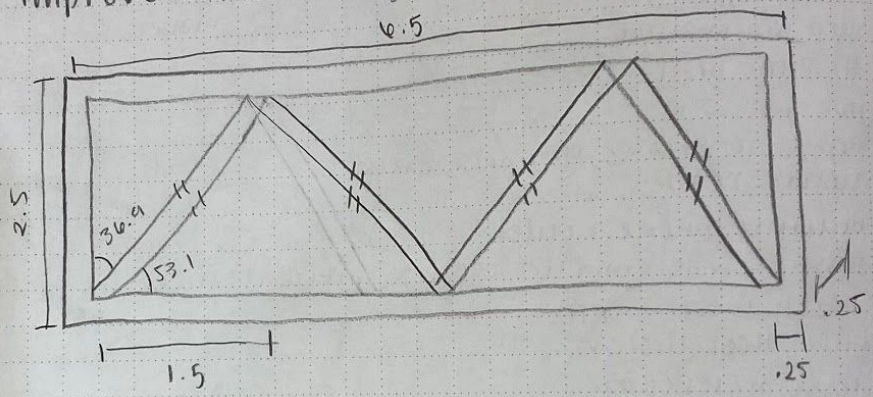
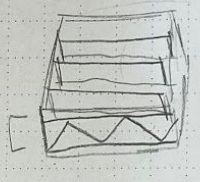
9 Title: invention convention

Problem statement:

In recent years, the make-up and structure of roads has stayed constant, but with advancements in technology and increasing need for environmentally friendly alternatives, our crumbling infrastructure needs a change. Not only are our road conditions deteriorating, our nation also has an increasing waste stream of plastics, many of which are not recycled and end up in the oceans. Is there a way to improve roads through the use of recycled plastics?





Order
- sand
- portland cement
- recycled plastic
- wood?

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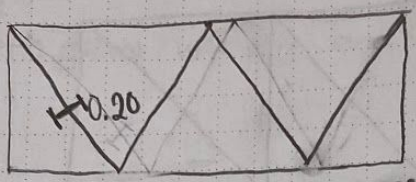
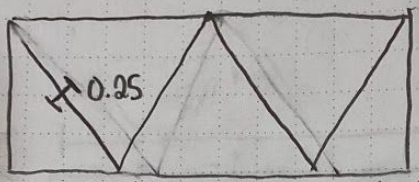
1-1



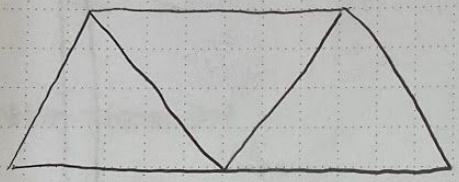
thickness of inner supports: 0.20 in

1-2



thickness of supports: 0.25 in

2



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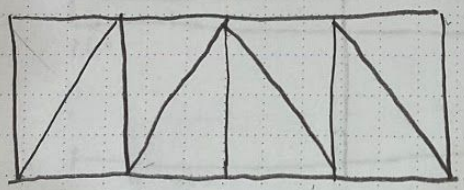
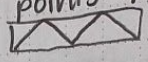
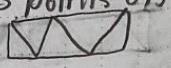


Title: Testing the Trusses

test	truss		placement
#1	1-1	Force = 69 lbs Displacement = 0.225	2 points up 
#2	2	Force = 50 Displacement = .180	
#3	3	Force: 186 Displacement: .131	
#4	1-1	Force: 168 Displacement: .135	3 points up 
#5	1-2	Force: 197 Displacement: .201	3 points up

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The "liquid rubber" molding material can be used multiple times.

For our prototype we need 2 recycled plastic masses
↳ 1 for each side of the model

At least 2 for stress analysis / material testing

We need a container (tubberware) to pour the liquid rubber into (w/ truss on top) to create our mold

11/7/2020

recyclable 1 plastics (PET) ~ plastic 2L bottles
↳ melting point of 255°F

According to Mold Making Technology website says that silicones have the ability to withstand a casting temperature range of 390 - 590°F
↳ Tin base = condensation cure
- outstanding resistance to inhibition
- cure rate adjustable w/ catalyst base mixture ratio
- excellent for single-stage book molds
- low durometer for flexibility in the demolding of complex parts

Title: Budget

(company $ product name)

OOmOO 30 Tin-Cure Silicone Rubber

ONLINE

Menards shopping list

portland cement mix ⟶ Mastercraft "concrete mix"
↳ combine with water

bucket + stir sticks

Item	Product	Supplier	Price		
Recycled Plastic	2 liter bottles	Gabi	$0		
5 gal pail	5 gal Menard Pai	Menards	$3.05		
Concrete	Concrete mix	Mendards	$3.17		
~~Molding Mix~~	~~Oomoo Tin-Cure~~	~~Mr. Pachera~~	~~$28.49~~	DEFECTIVE	
2nd Molding mix	Oomoo Tin-Cure	Amazon	$36.97		
Pot for melting pl	GG 1QT Saucep	Big Lots	$9.54		
		Net Total	$81.22		
		Total	$52.73	(what comes out of our budget)	

- 3-4 layers, with time for each layer to dry
- measuring cup
- pouring in one place will help no air bubbles
- not give model to base to make sure its no movement
- seal model, apply light mist coating
- dispense part A then B, then combine together and mix for about 3 mins until colors mixed
- let rubber rise and seek its own level over model
- cure at 16 hours room temperature

BUDGET

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- ♳ = HDPE

  - cut into strips
  - use blender to finely chop pieces → pulverize
    - ↳ smaller pieces melt easier
  - melt
    - ↳ grill w/ parchment paper over it
    - ↳ 350° → doesn't work
    - ↳ then in toaster oven?

Our plan:
- cut up pieces very finely w/ exacto knife
- melt in thrift store pot
- pour into mold x 3

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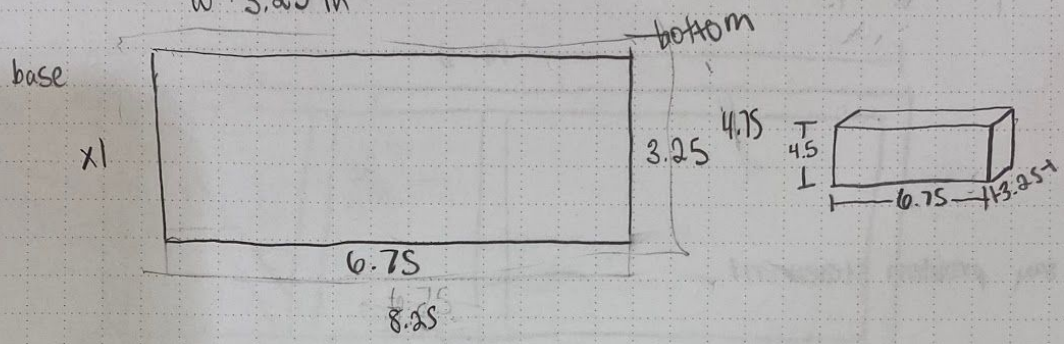
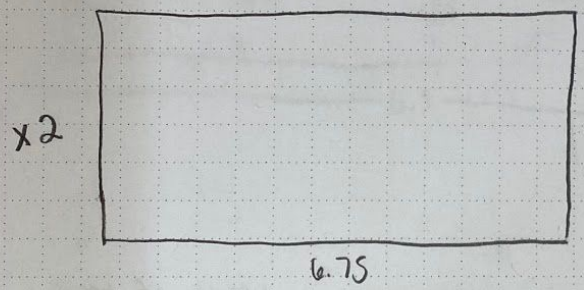
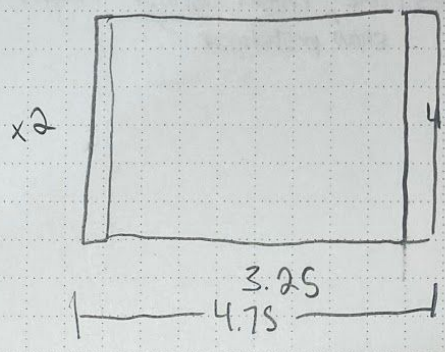
Truss dimentions
l: 6.5 in
h: 2.5 in

3/4 inch thick wood

Box dimentions
l: 6.75 in
h: 4.5 in
w: 3.25 in







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