

“PREVENTING BIN COLLAPSE”

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OPERATIONS

- Loading
- unloading

CONSTRUCTION

- Design
- Assembly
- Alterations



AGE

- Steel /rust
- Concrete/Cracks



NEW CARLYLE, OH, JAN22,2018 WDTN News

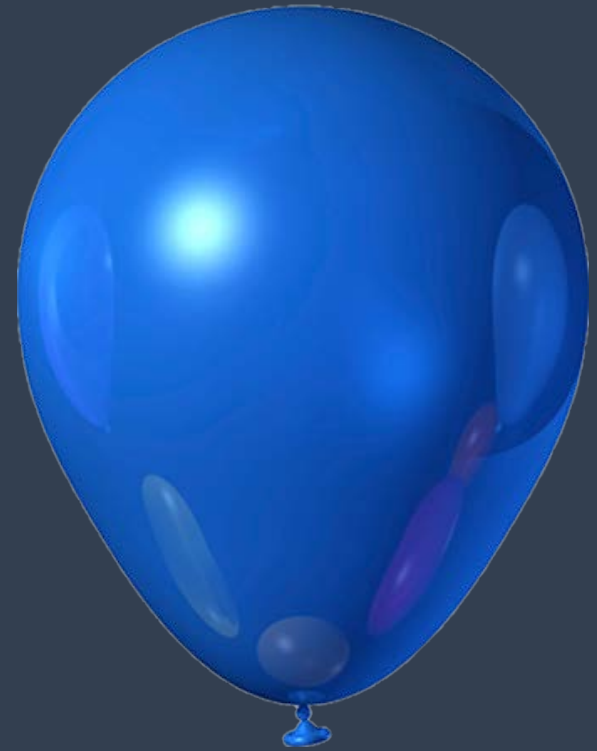
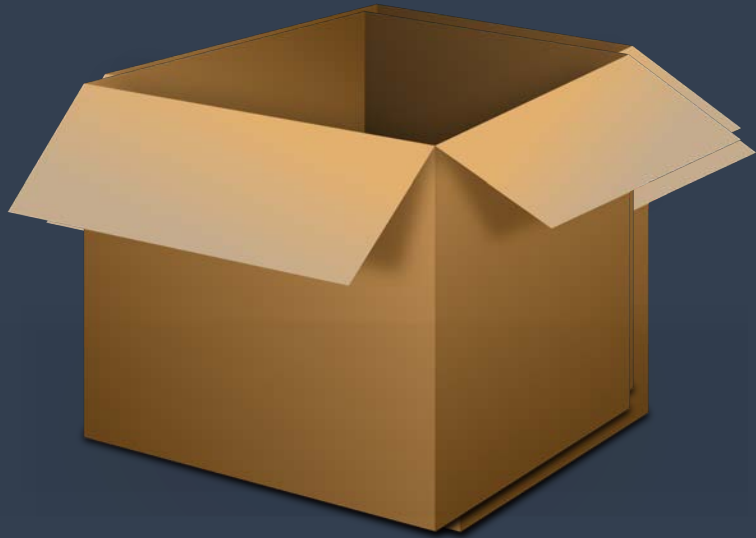


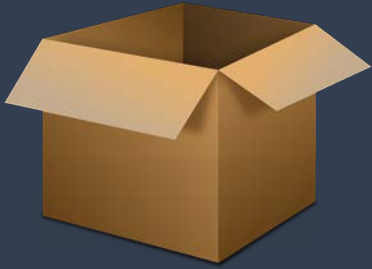
MELBOURNE, AUS



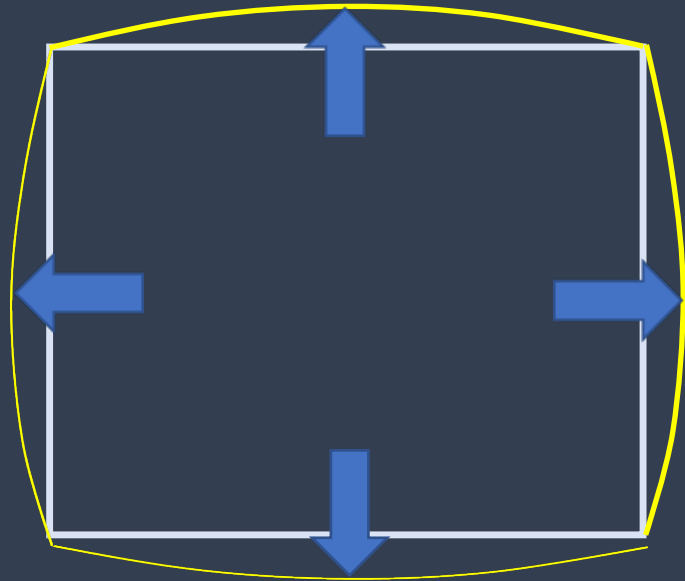
DANVILLE, IA, 1921

WHICH IS MOST CLOSELY RELATED TO A GRAIN BIN?





3.9"
30 GA



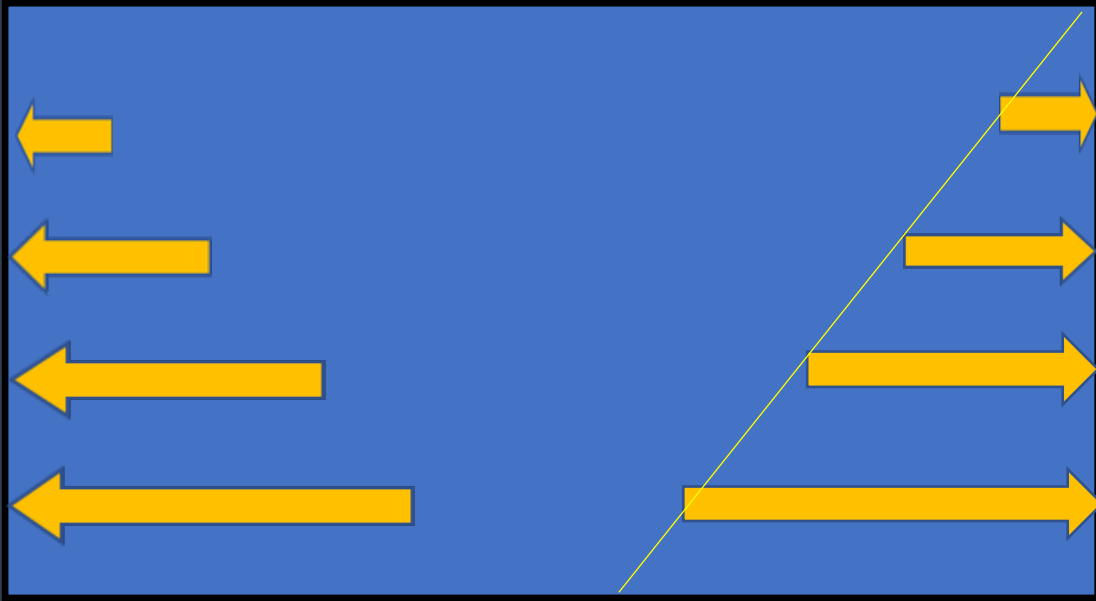


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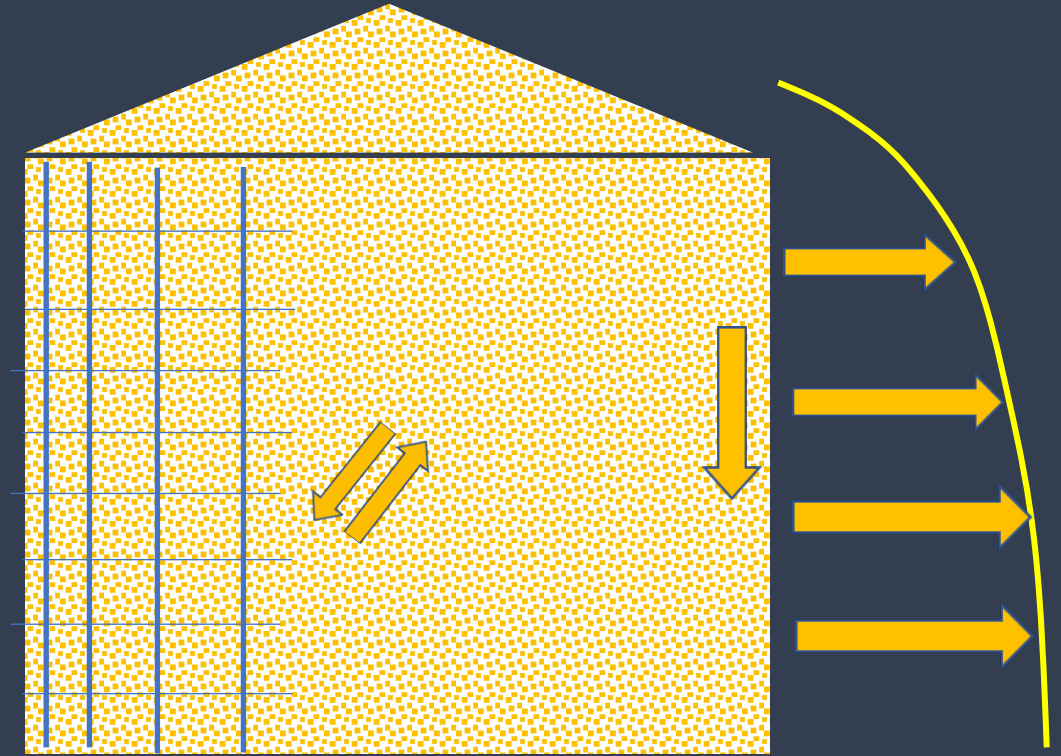


What are the loads?

FLUID

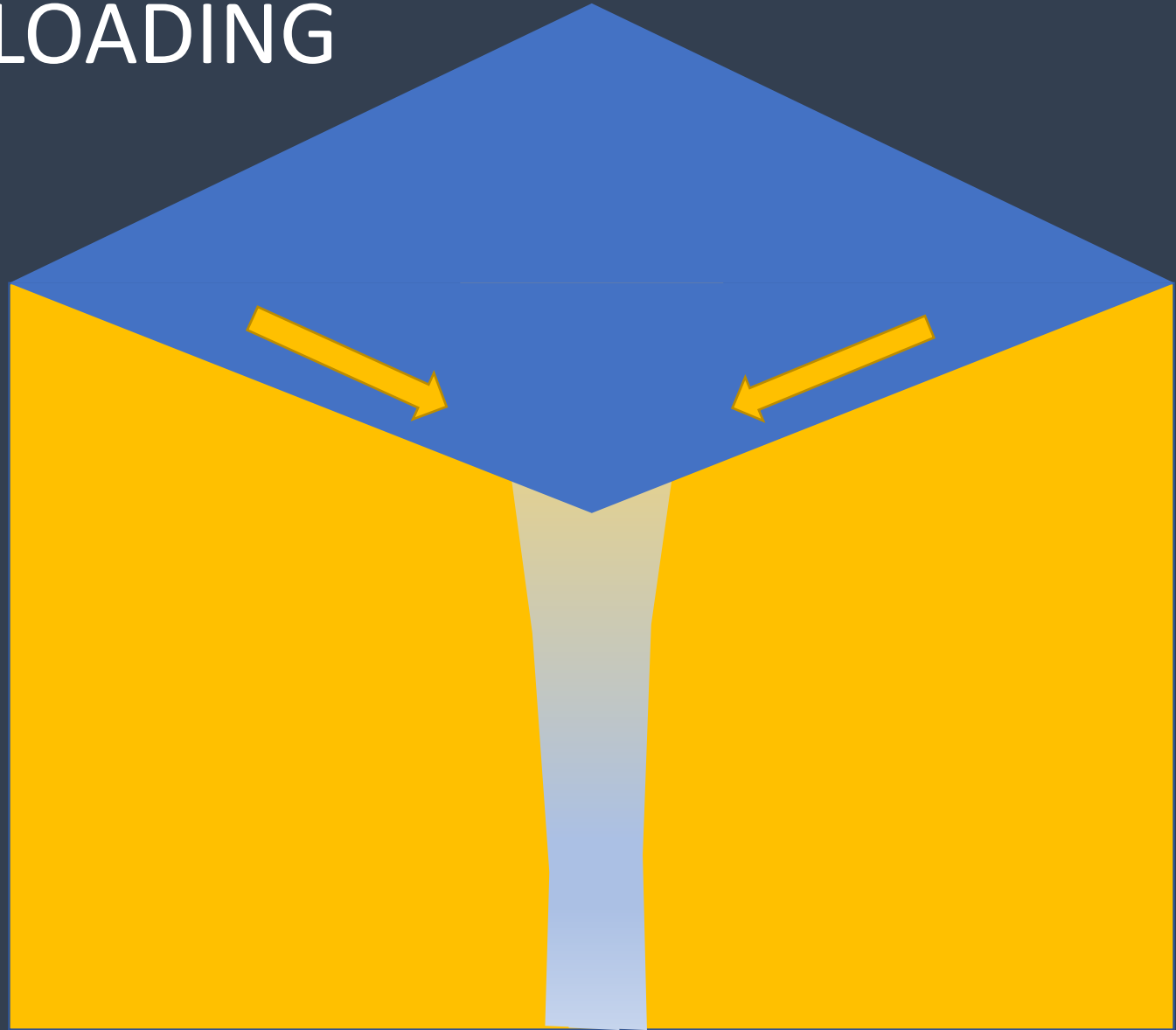


BULK SOLID

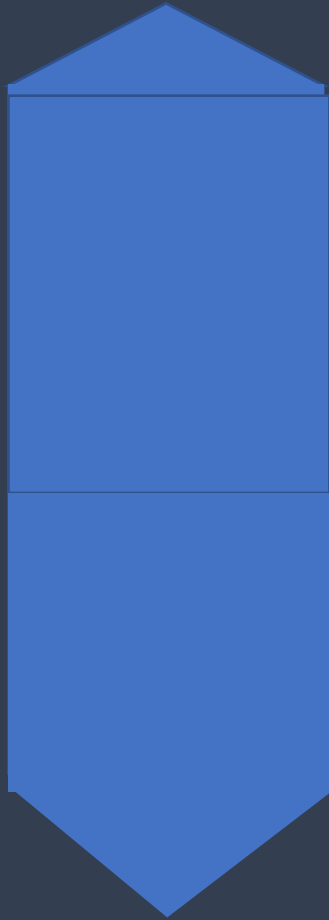


COMPLICATED STRUCTURE

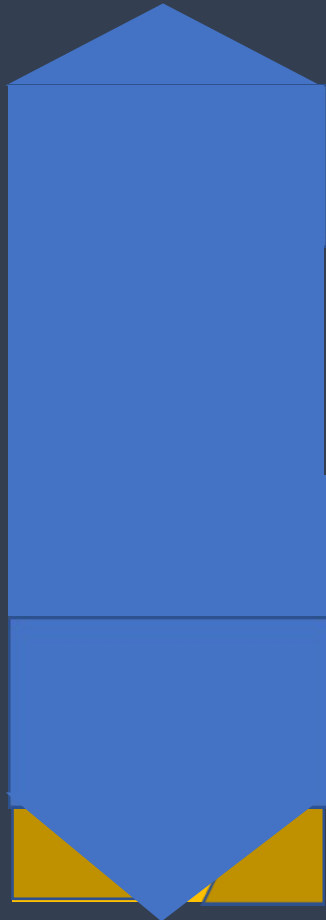
CENTER DRAW UNLOADING



Flow Patterns

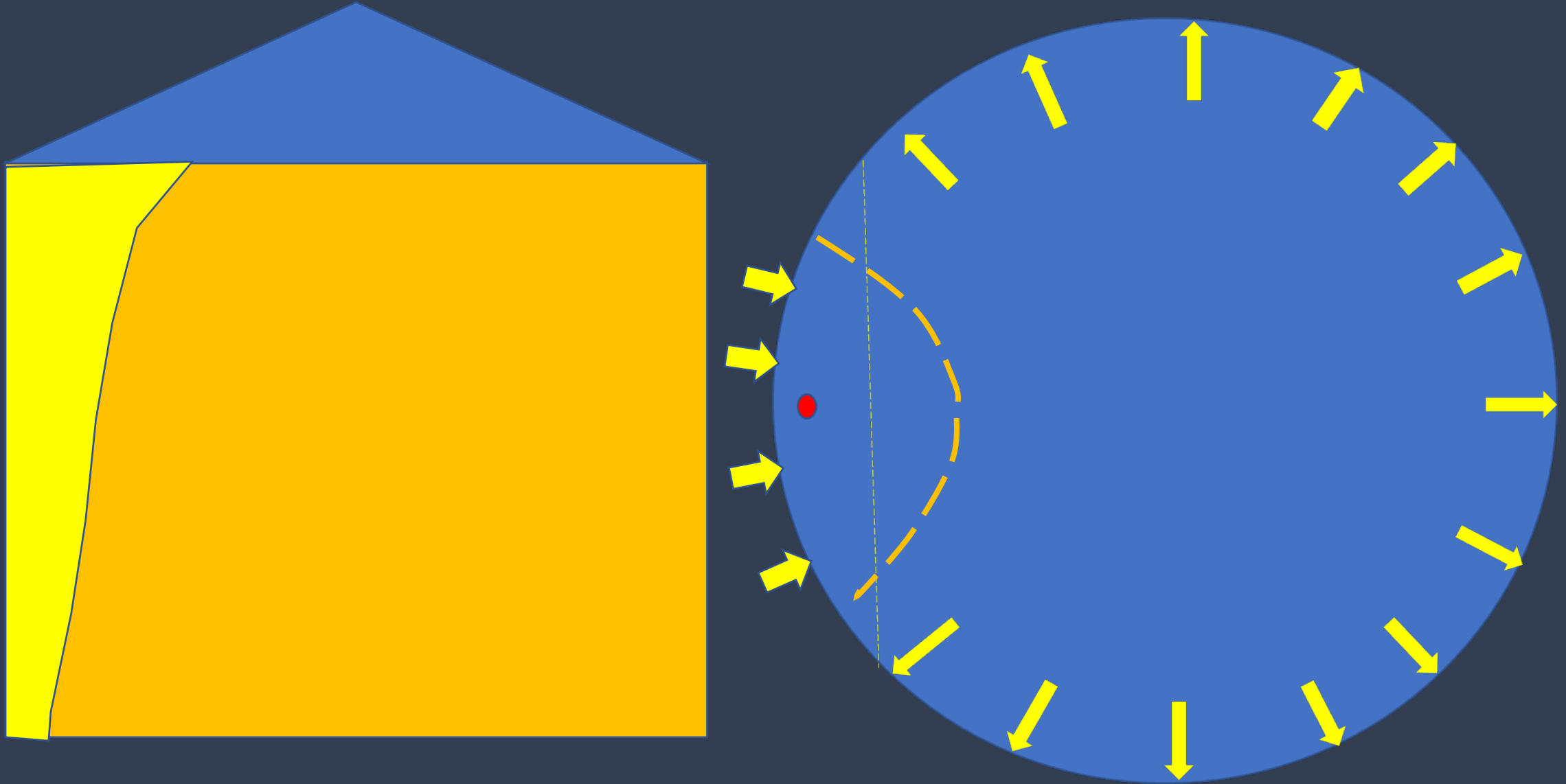


MASS FLOW (FIFO)



FUNNEL FLOW (LIFO)

ECCENTRIC UNLOADING





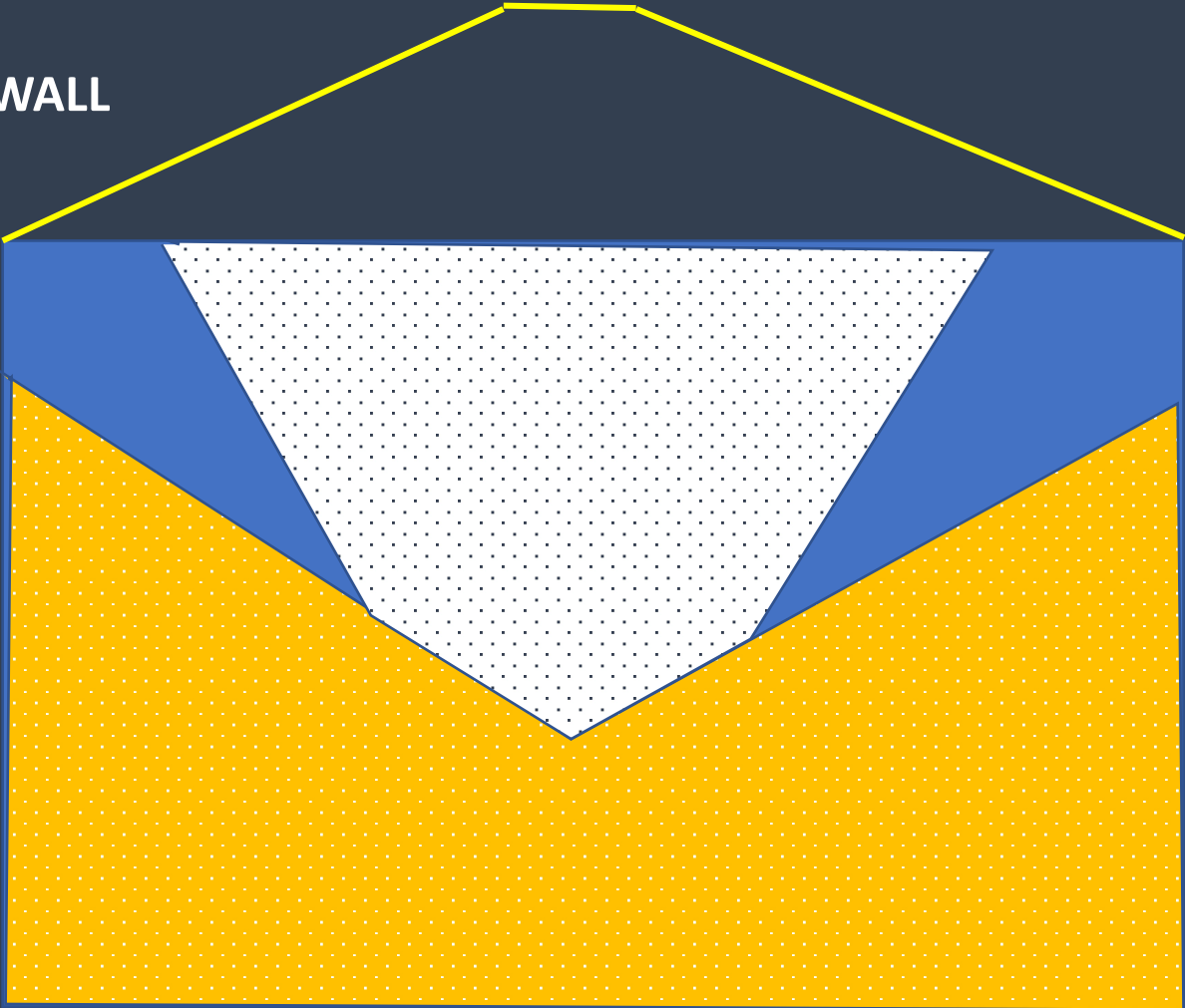
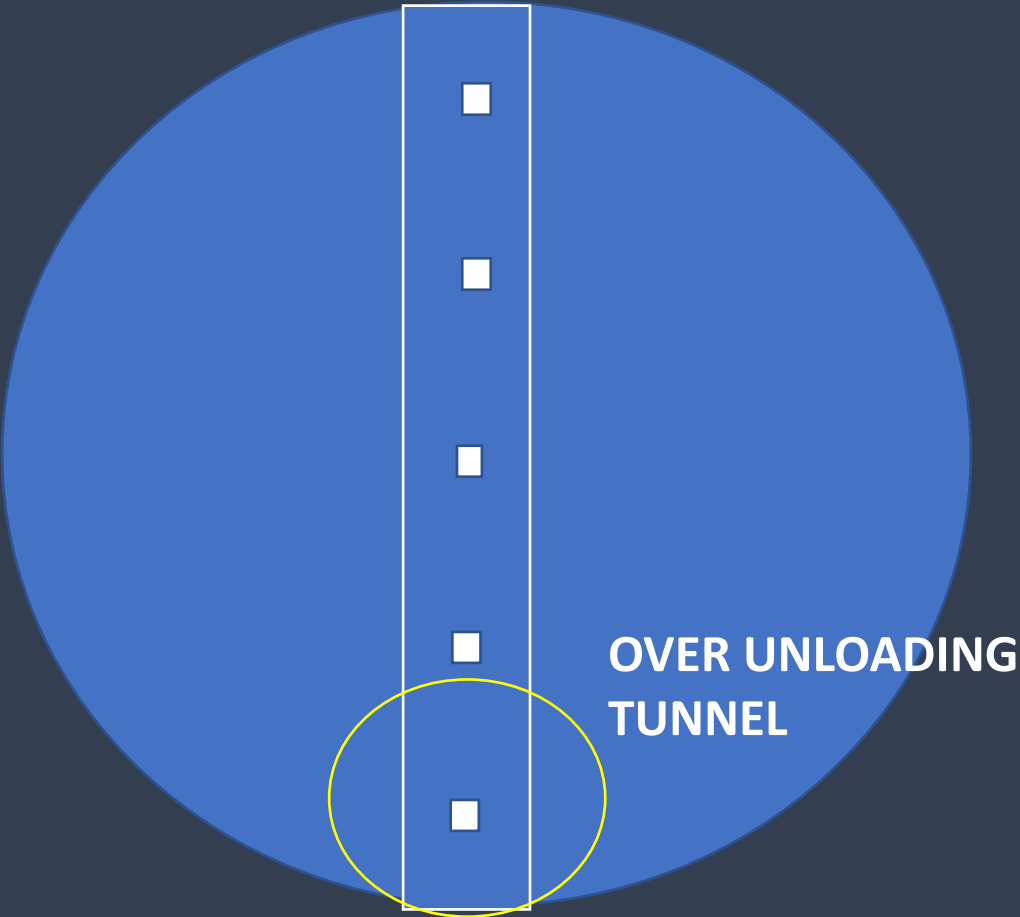
Eccentric Unloading

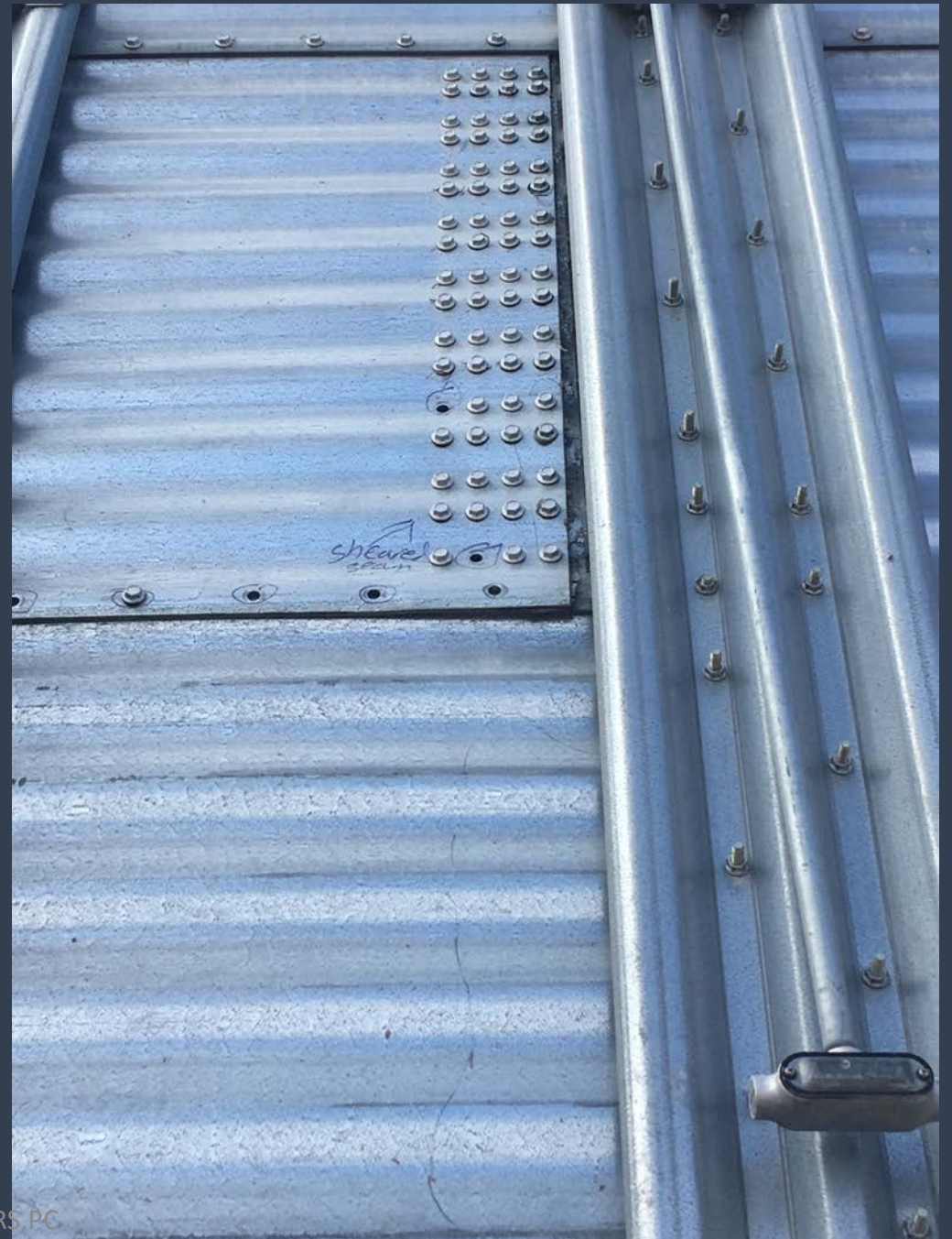




SIGNS OF ECCENTRIC UNLOADING

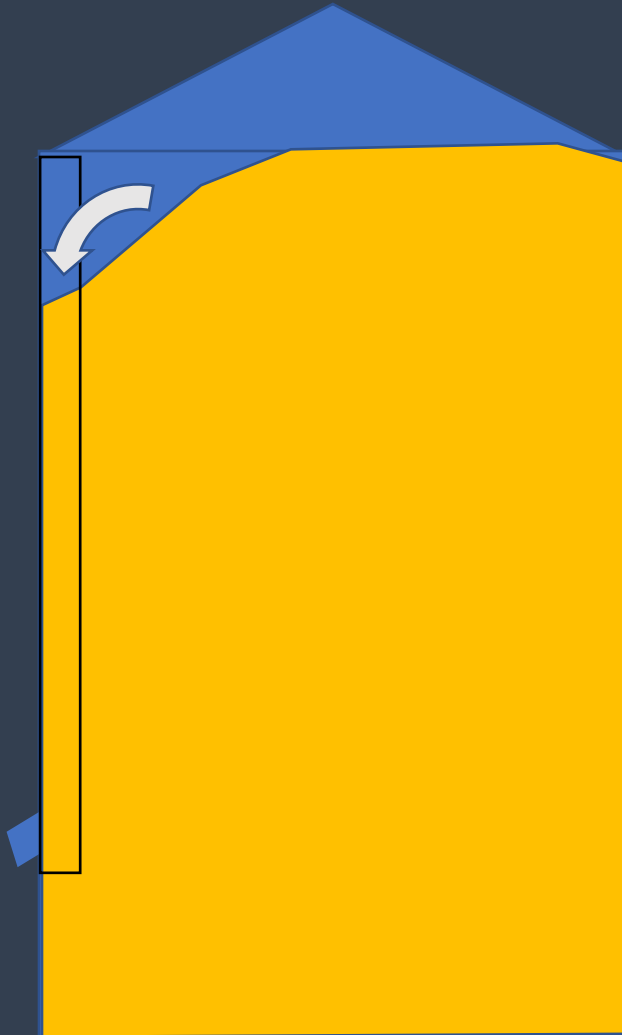
PATTERN ON BIN WALL







HOW DOES A SIDE DRAW FLUME WORK?*

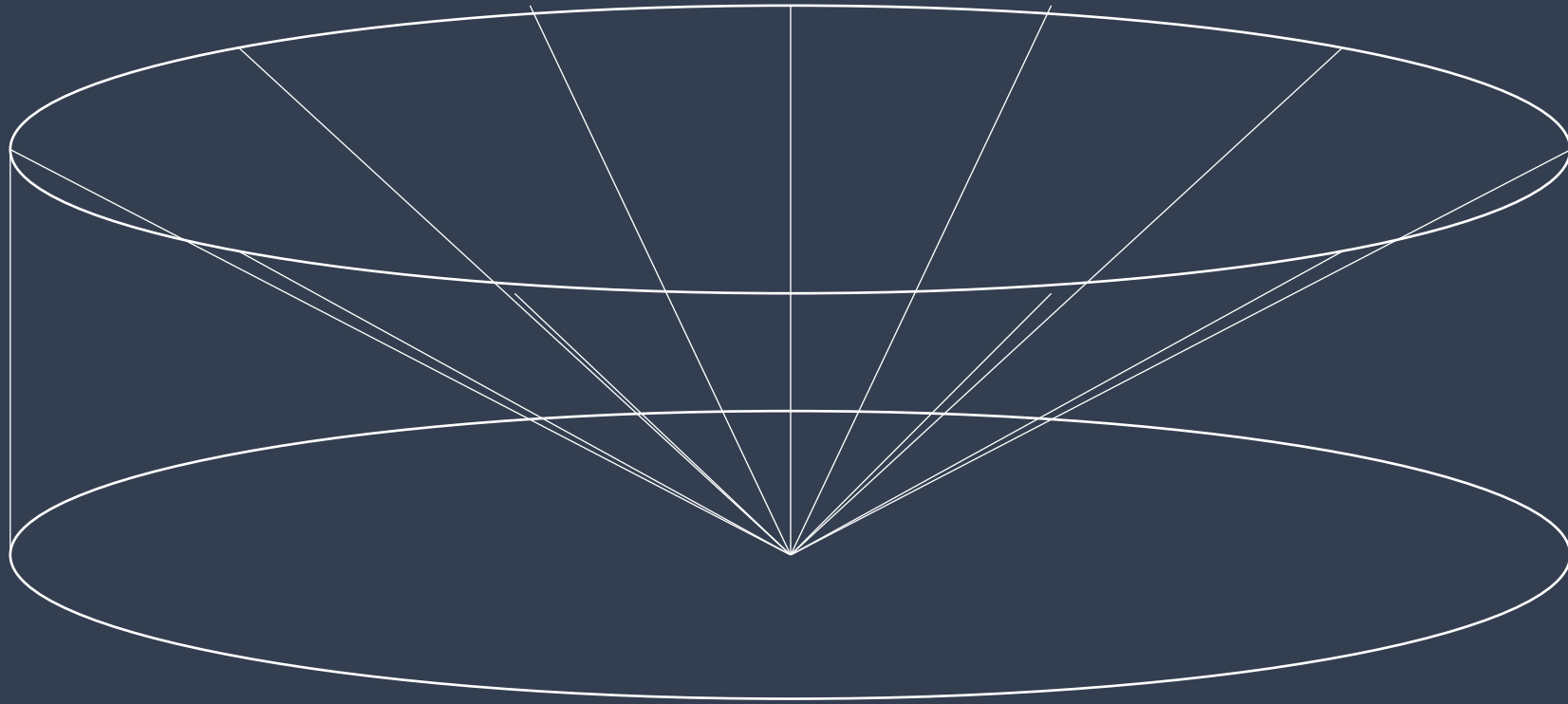


GRAIN FILLS FROM TOP
(LOWER WALL PRESSURE)

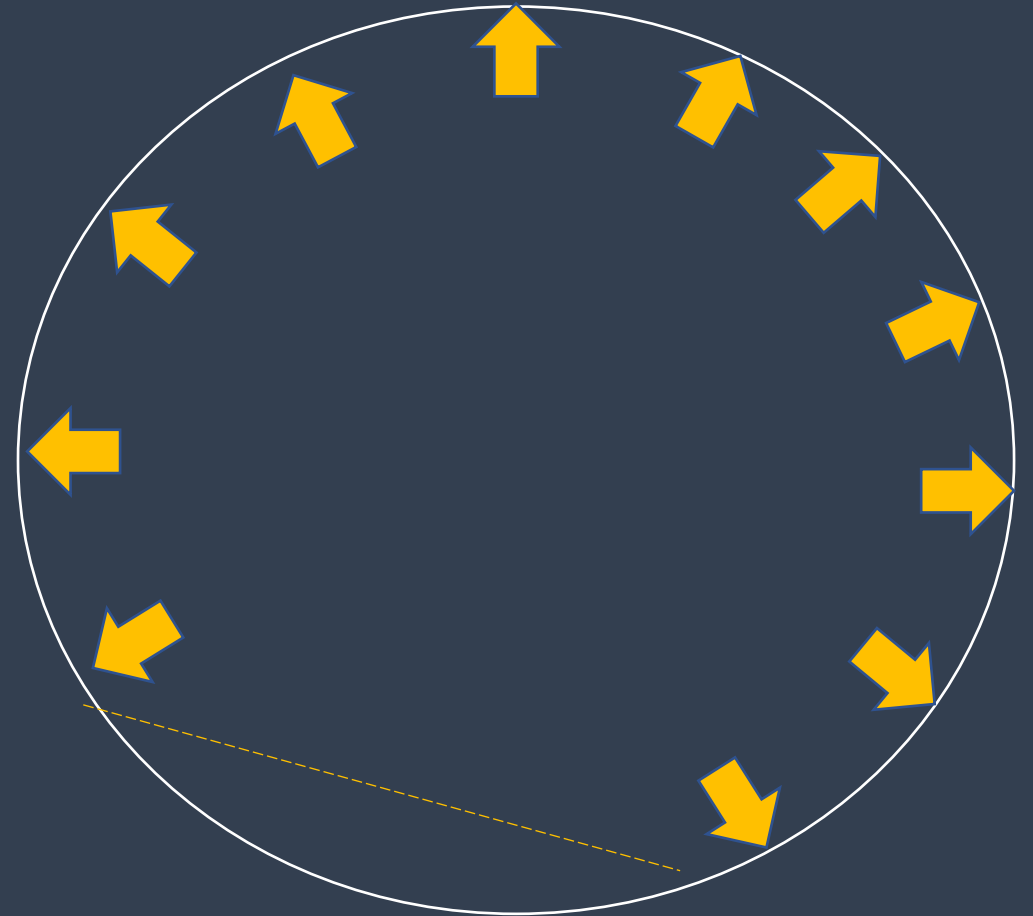
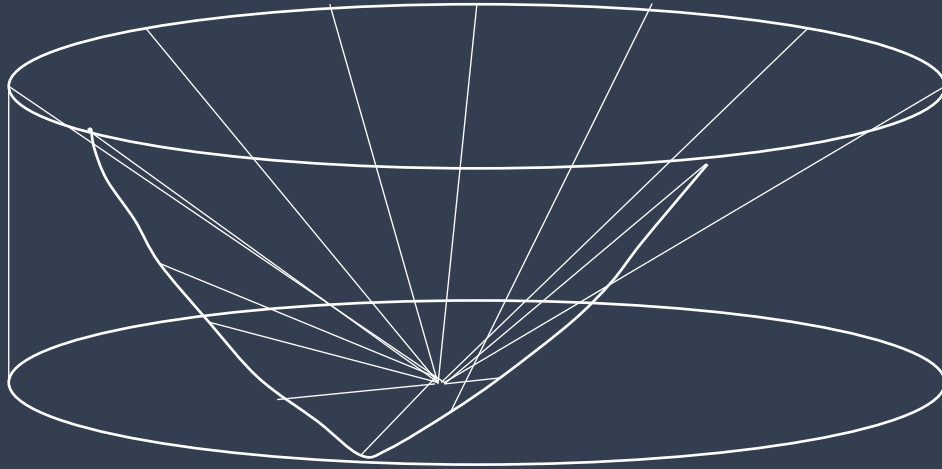
MINIMIZES LOW PRESSURE AREA

INCREASES VERTICAL STRENGTH

AFTER GRAVITY UNLOADING THROUGH CENTER

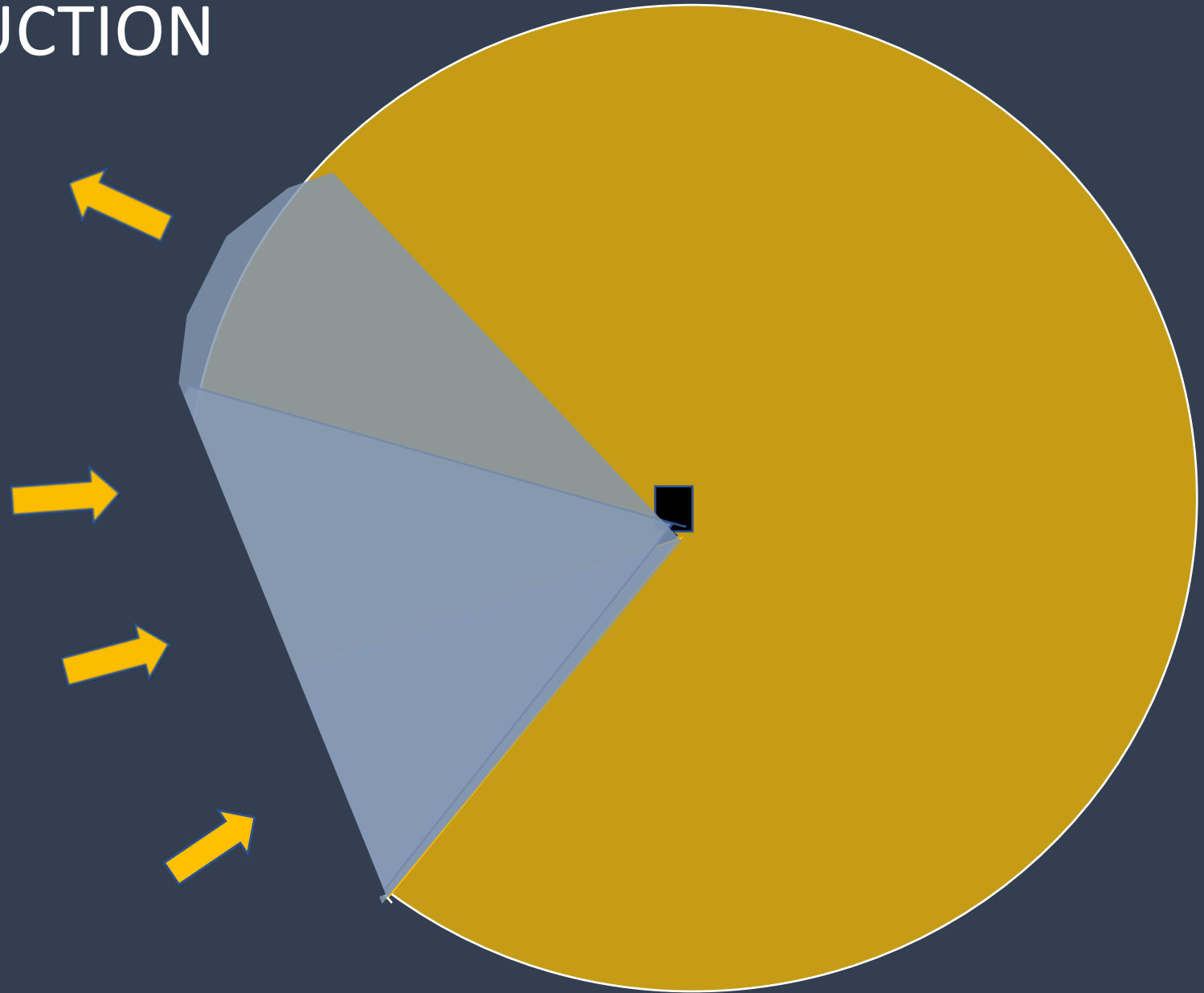


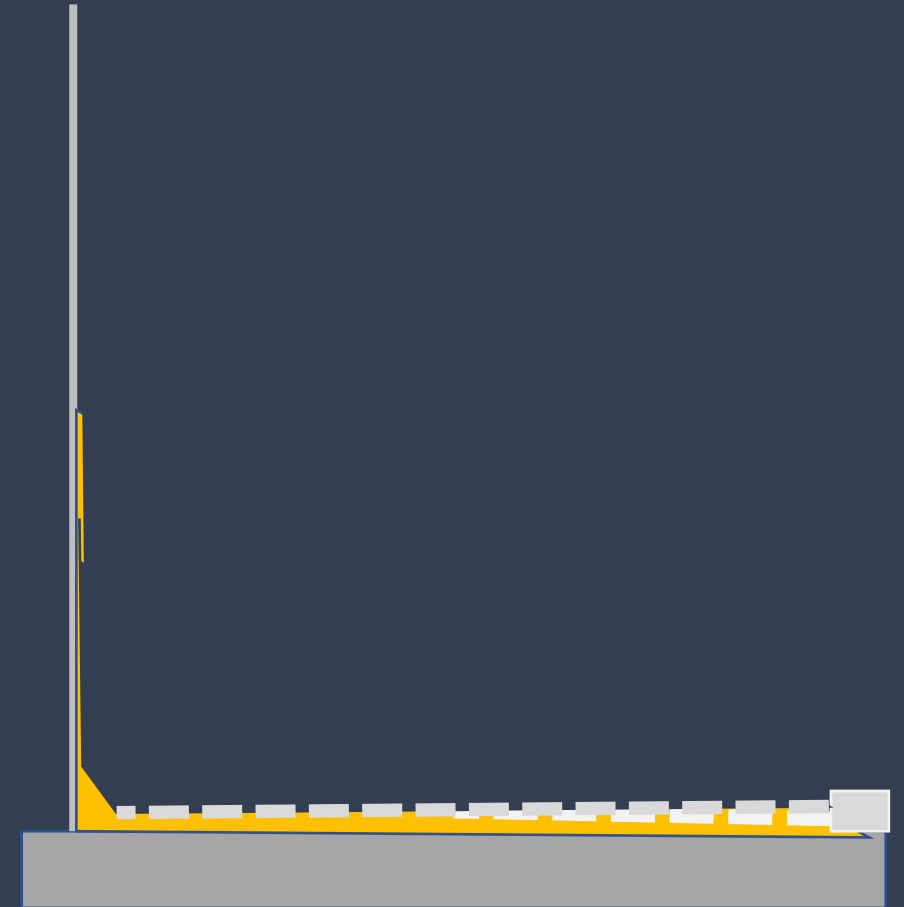
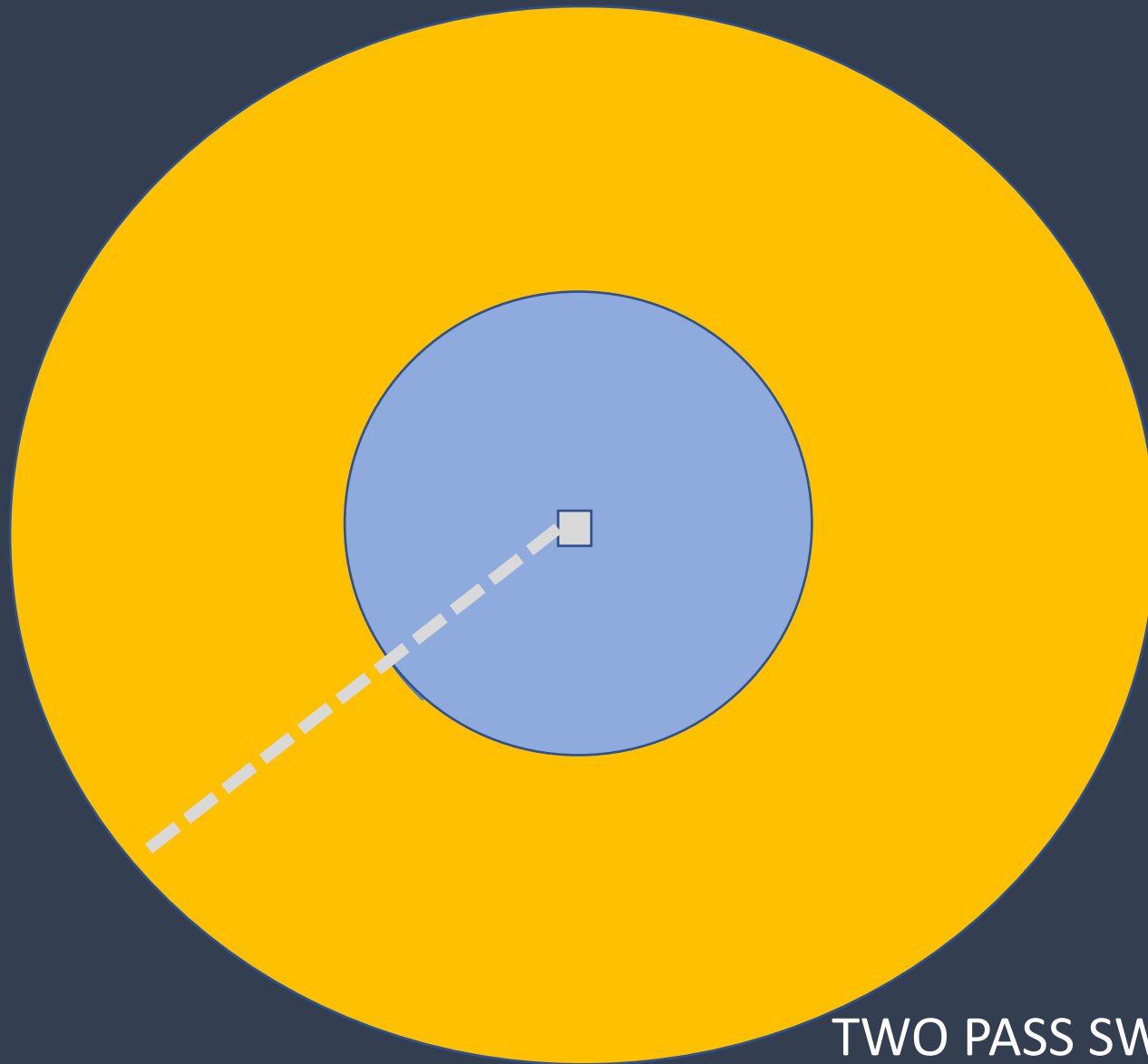
ABSENCE OF PRESSURE PULLS WALL INWARD





DESIGN/CONSTRUCTION





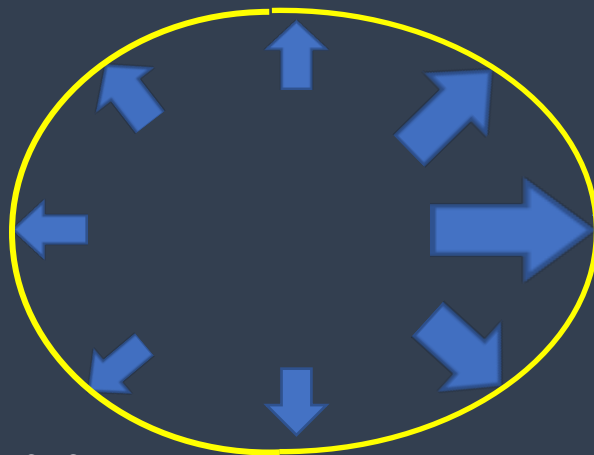
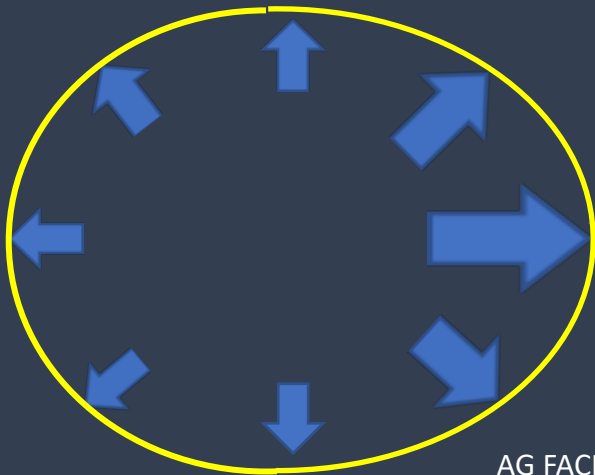
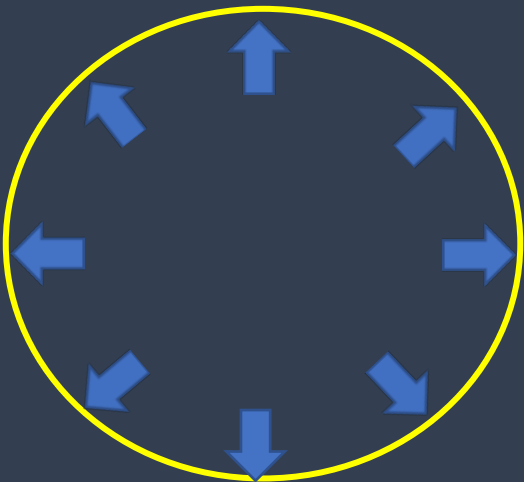
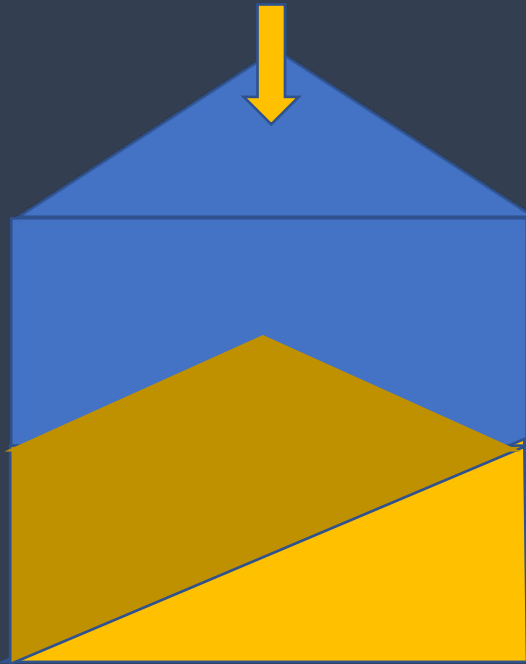
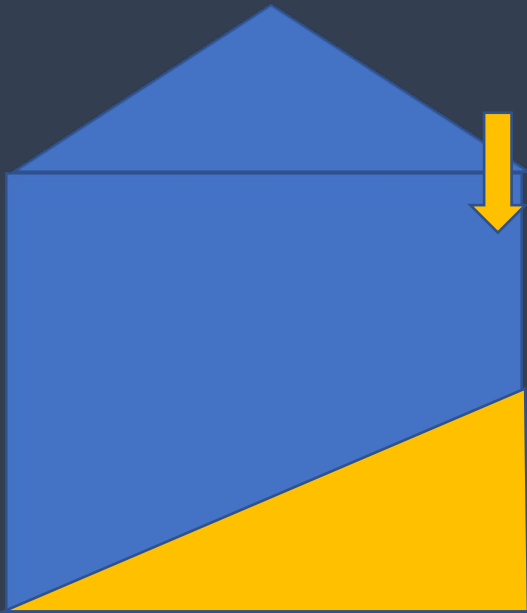
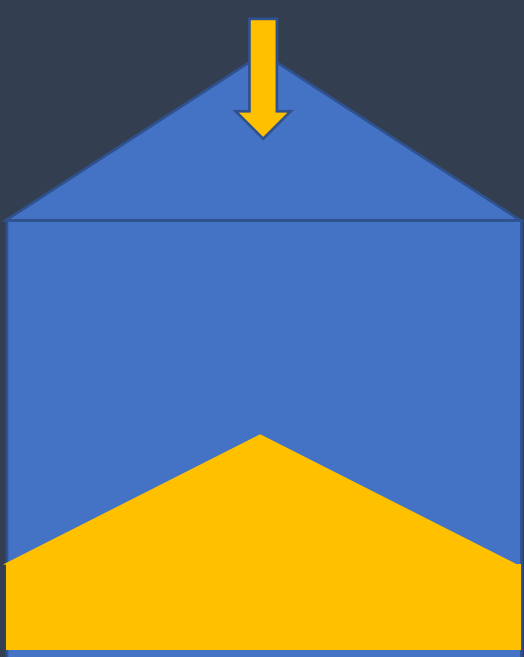
TWO PASS SWEEP

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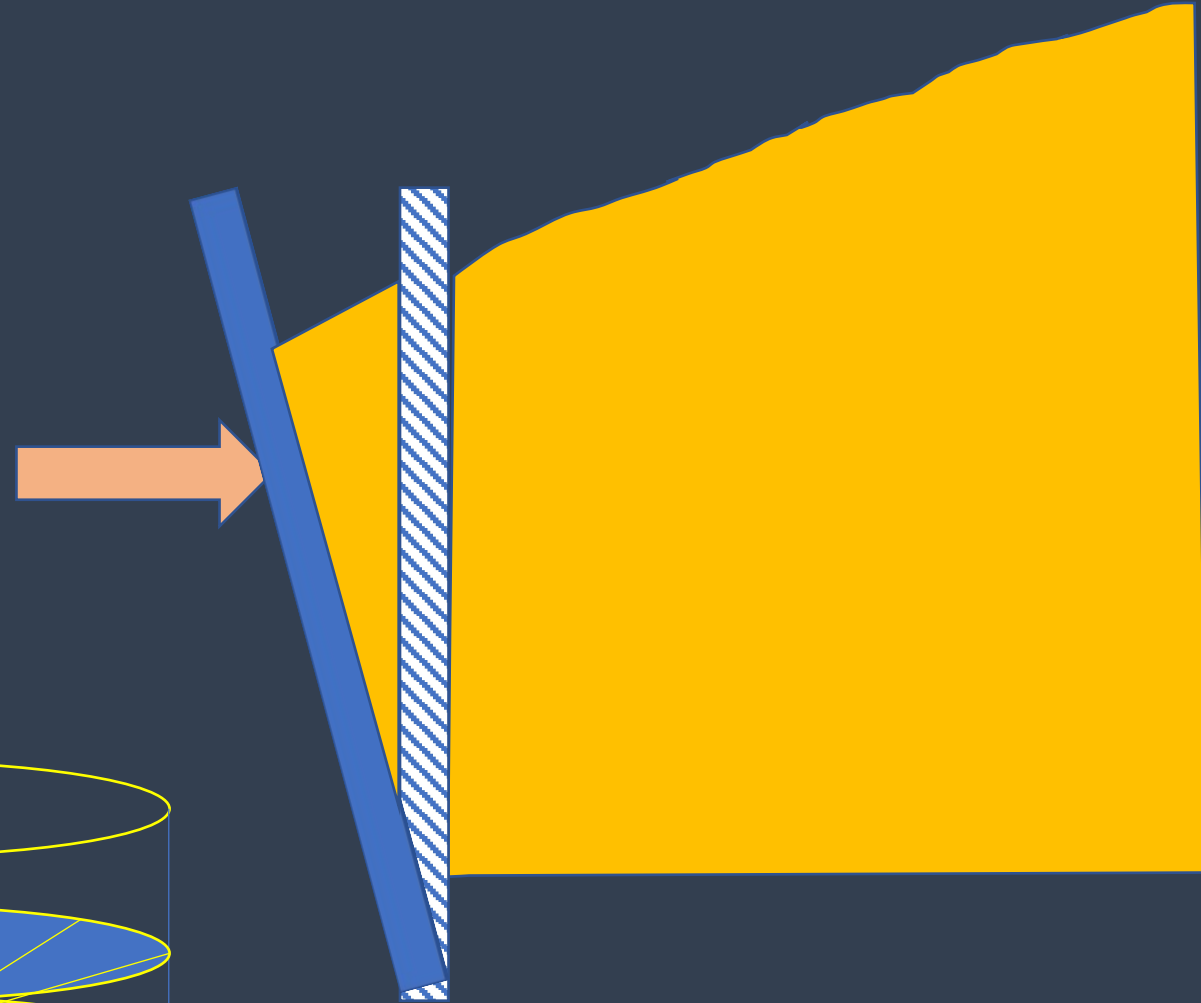
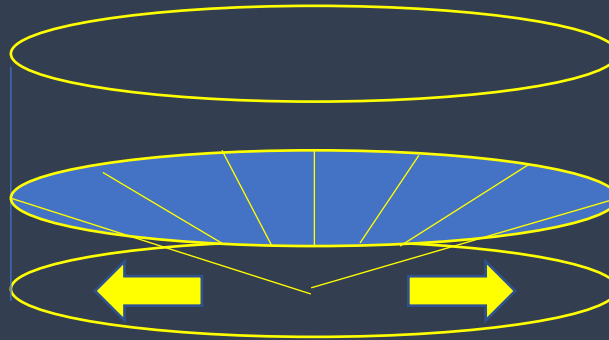
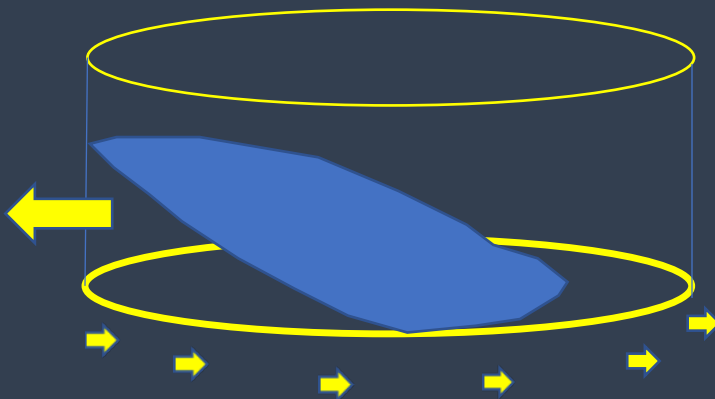


FILLING



ECCENTRIC LOADING*

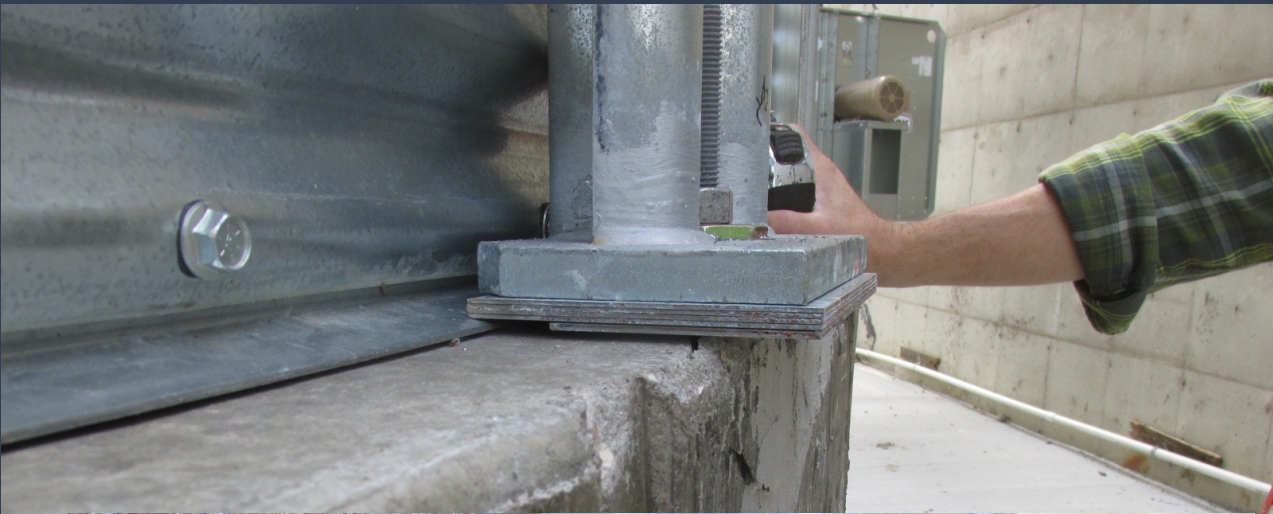
- BIN DISTORTION
- RATCHETING EFFECT
- SIZE OF LOAD



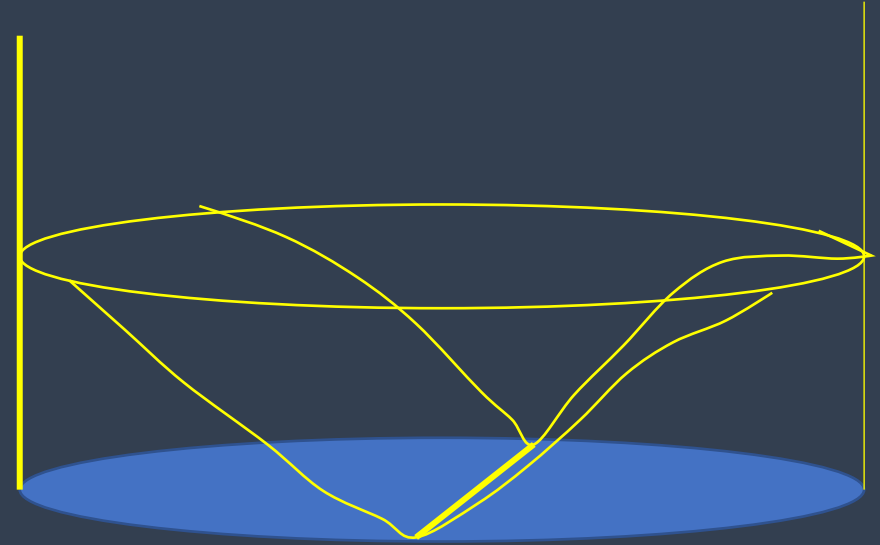
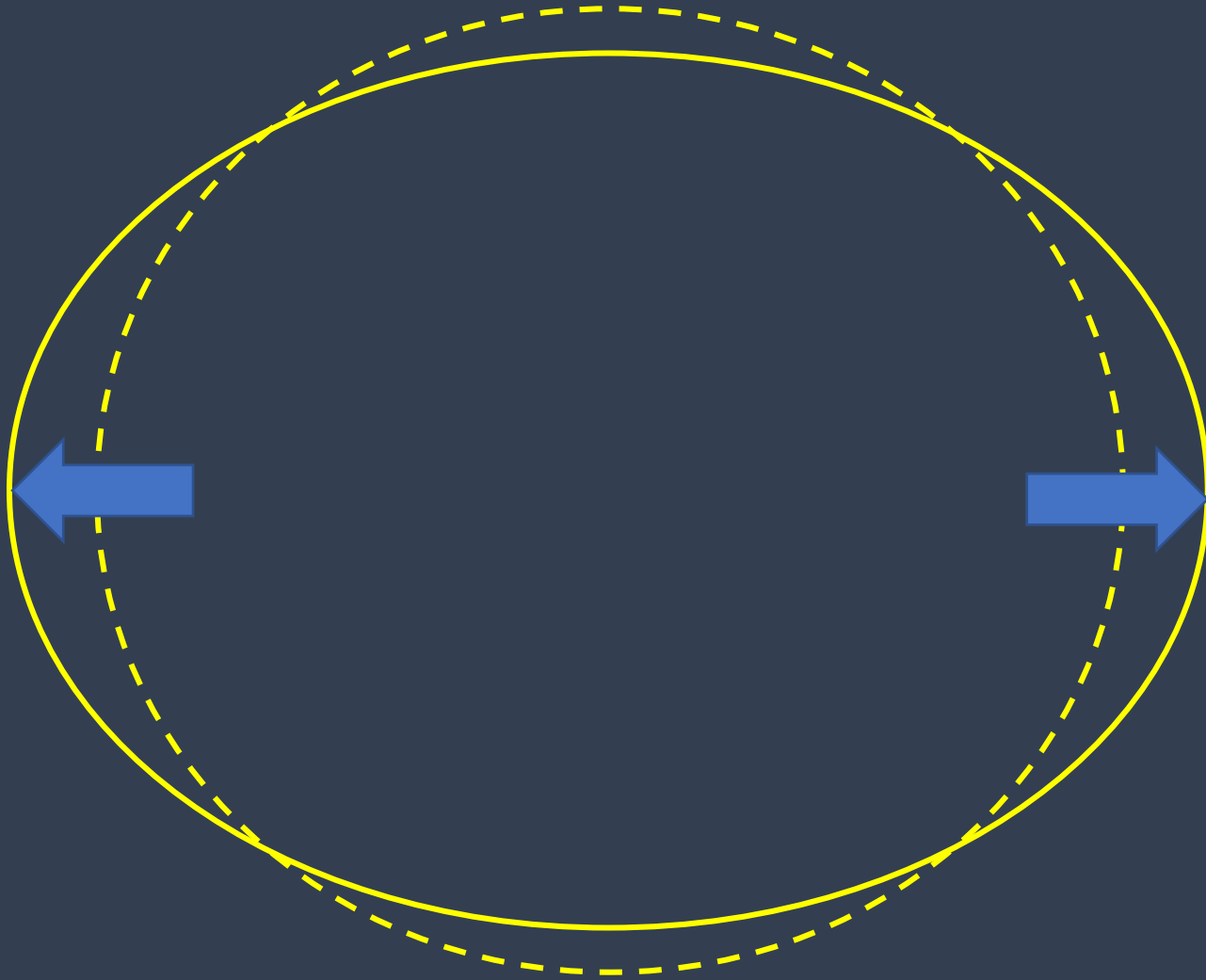
Large stress on anchors if:

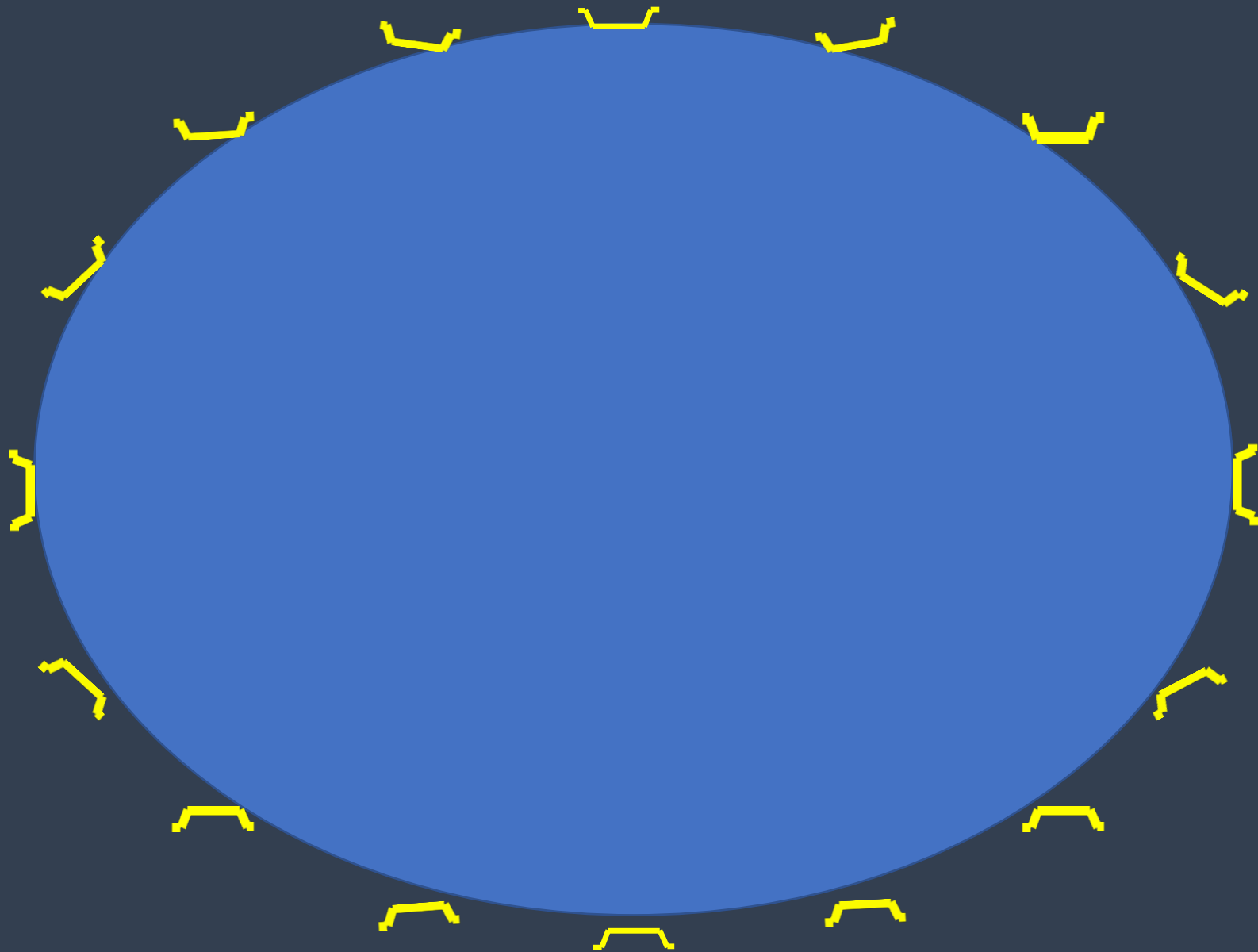
- Bin is not round
- Incorrect diameter
- Filled off center



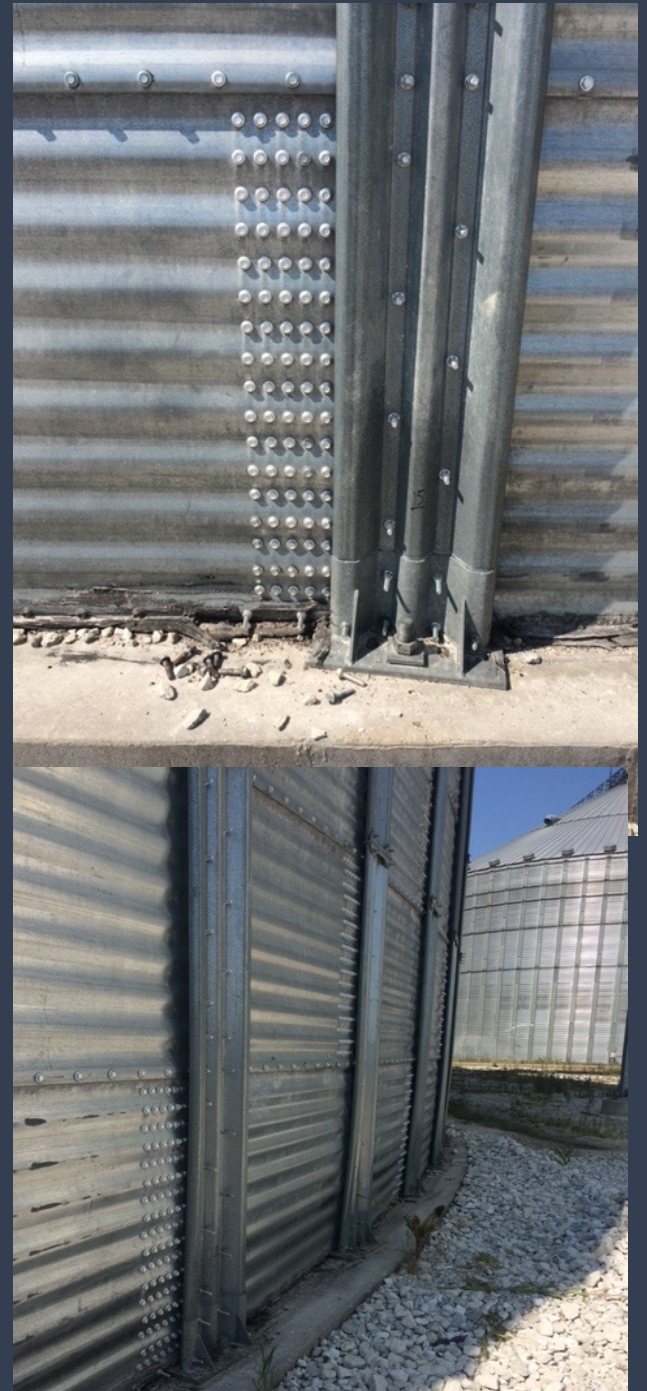


TWO UNLOAD POINTS*





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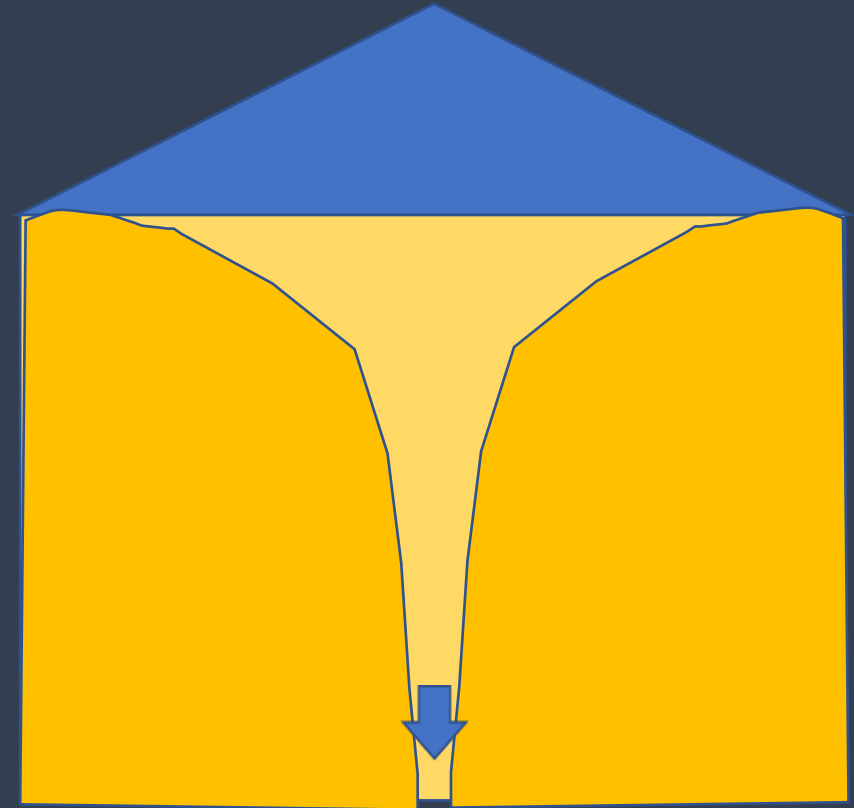




Flow Patterns

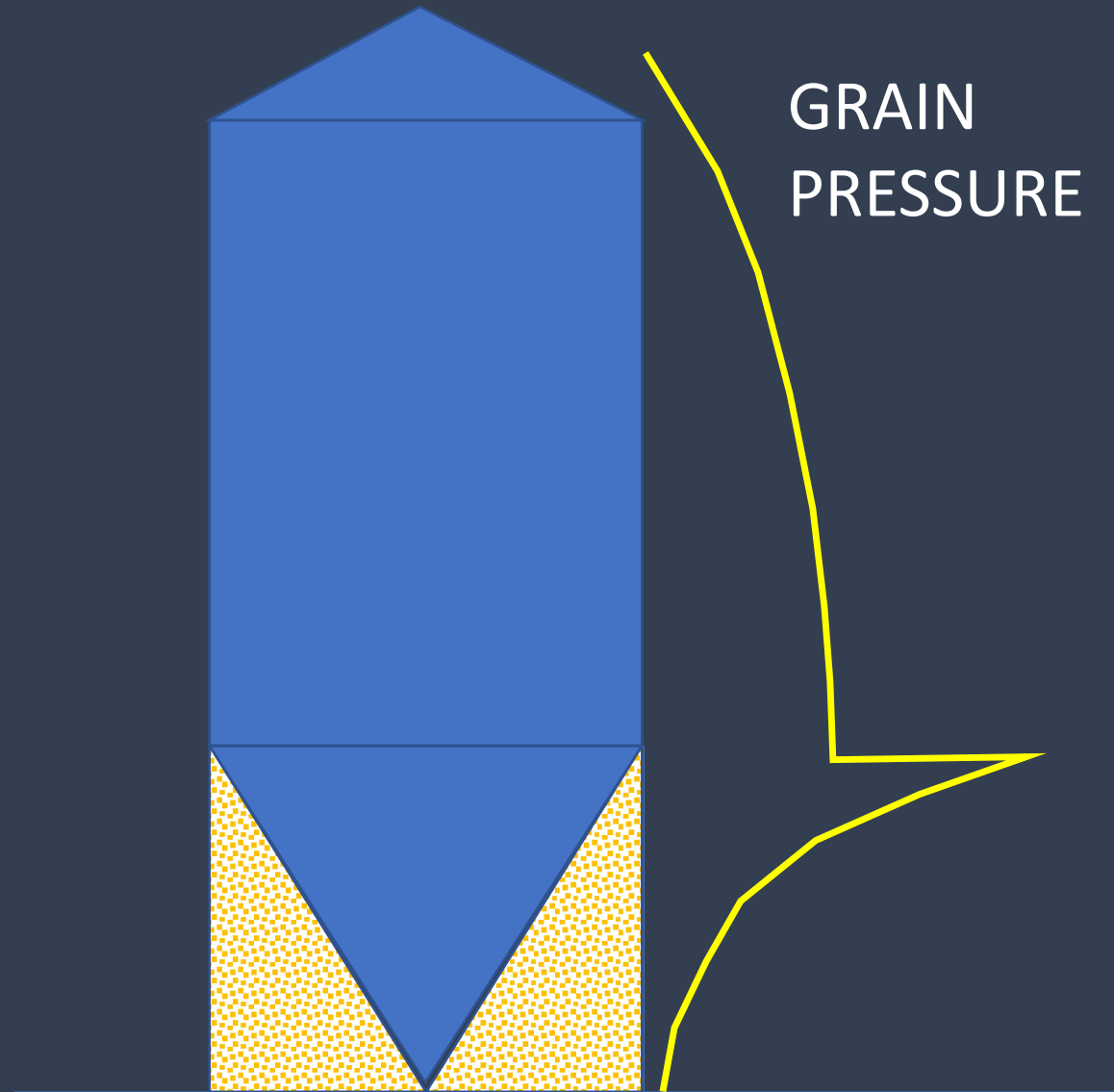


MASS FLOW (FIFO)

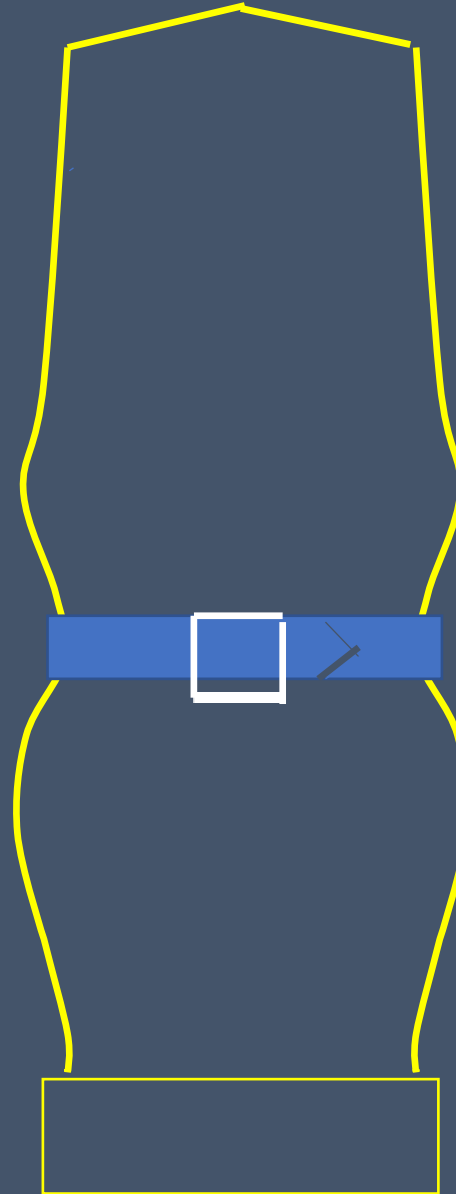


FUNNEL FLOW (LIFO)

DEEP BINS



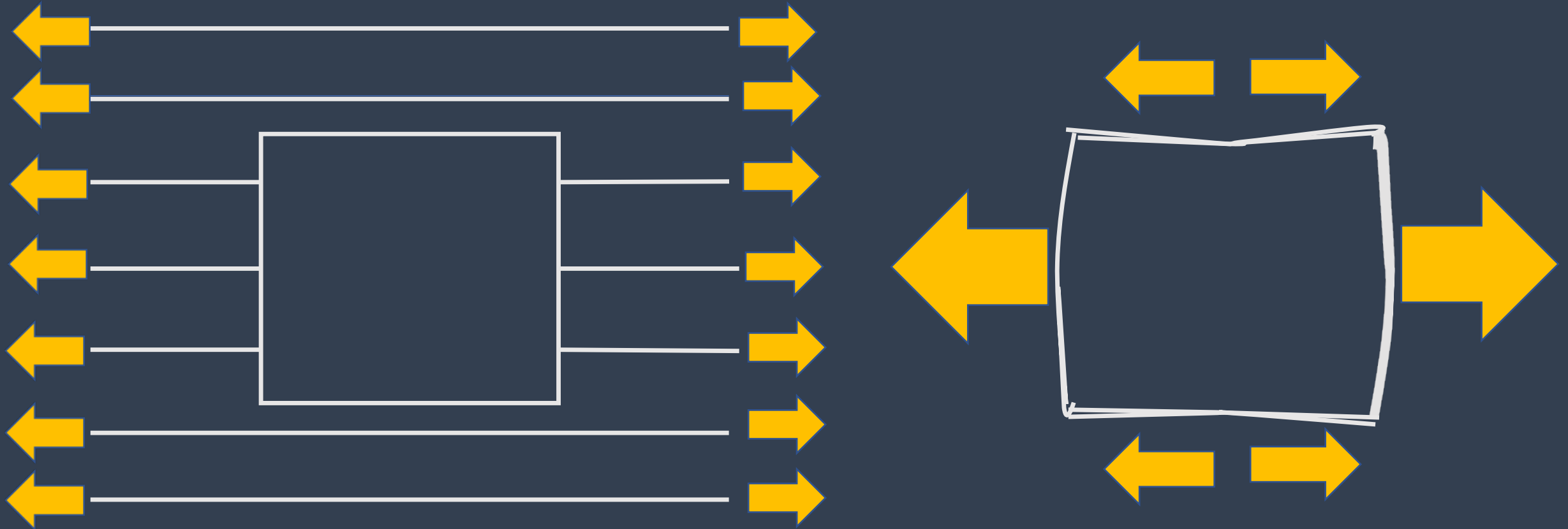
Shape the silo
is wanting to
become
under load



Horizontal reinforcing
steel acts like a belt



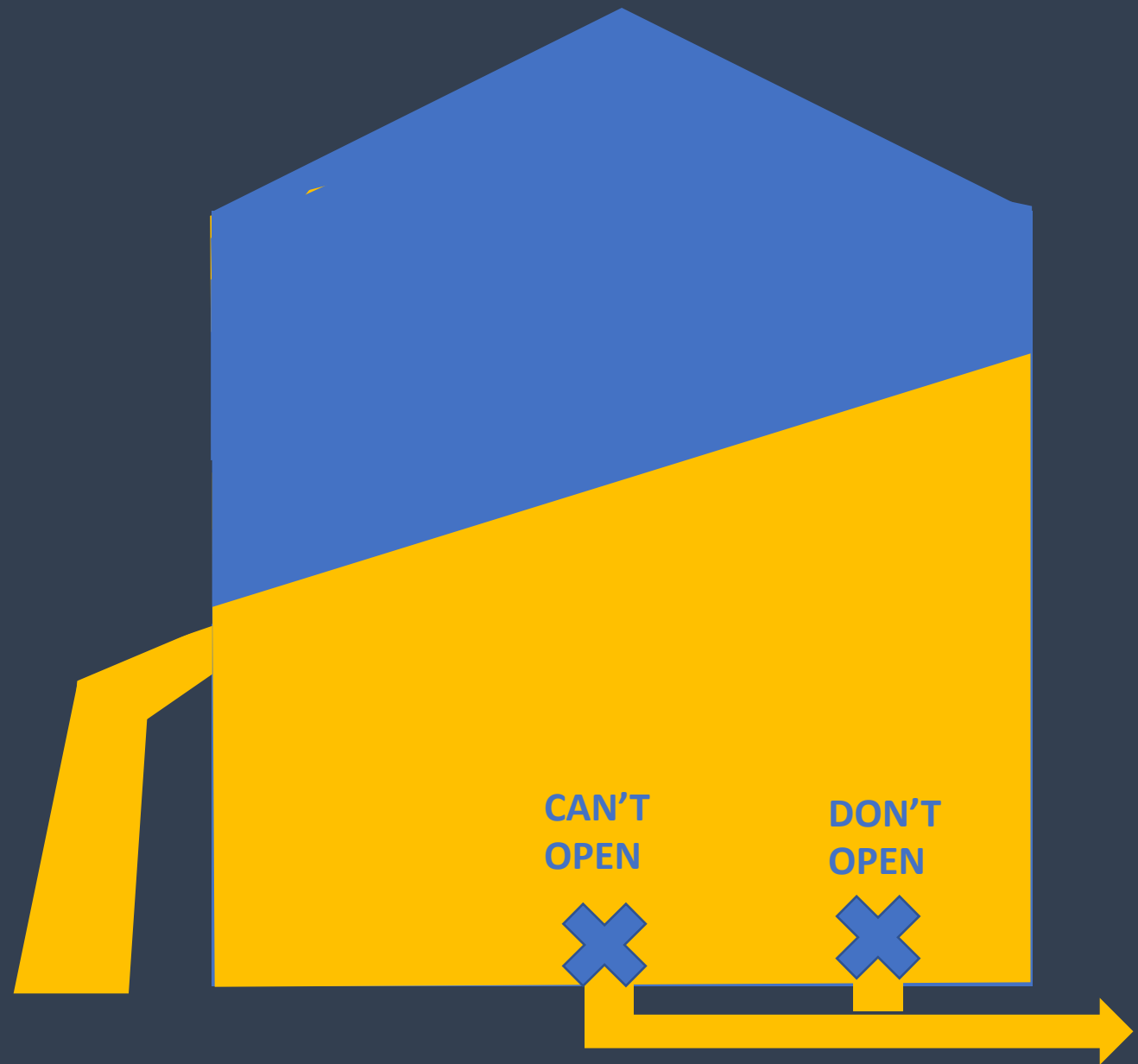
ALTERATIONS/OPENINGS





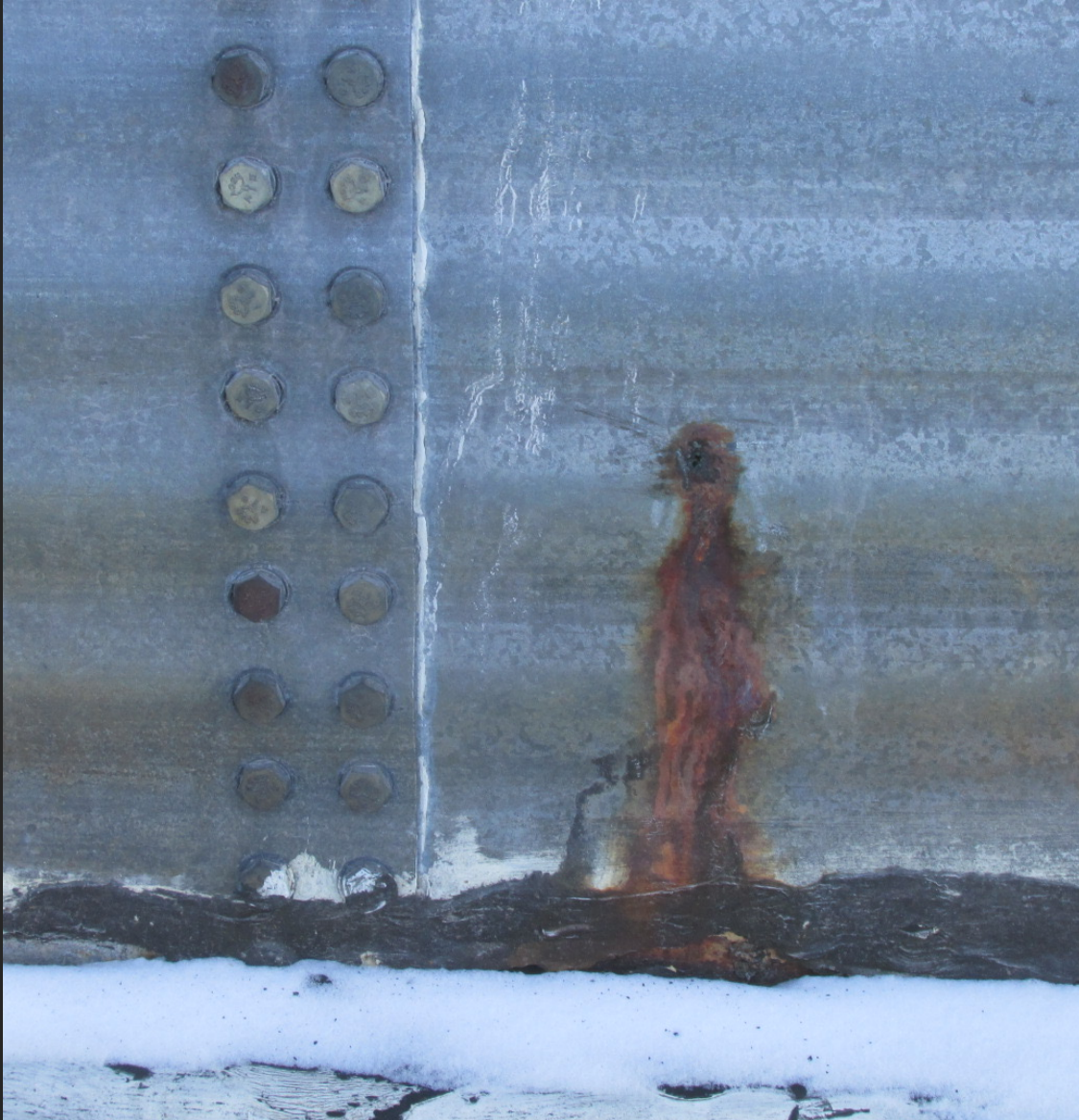




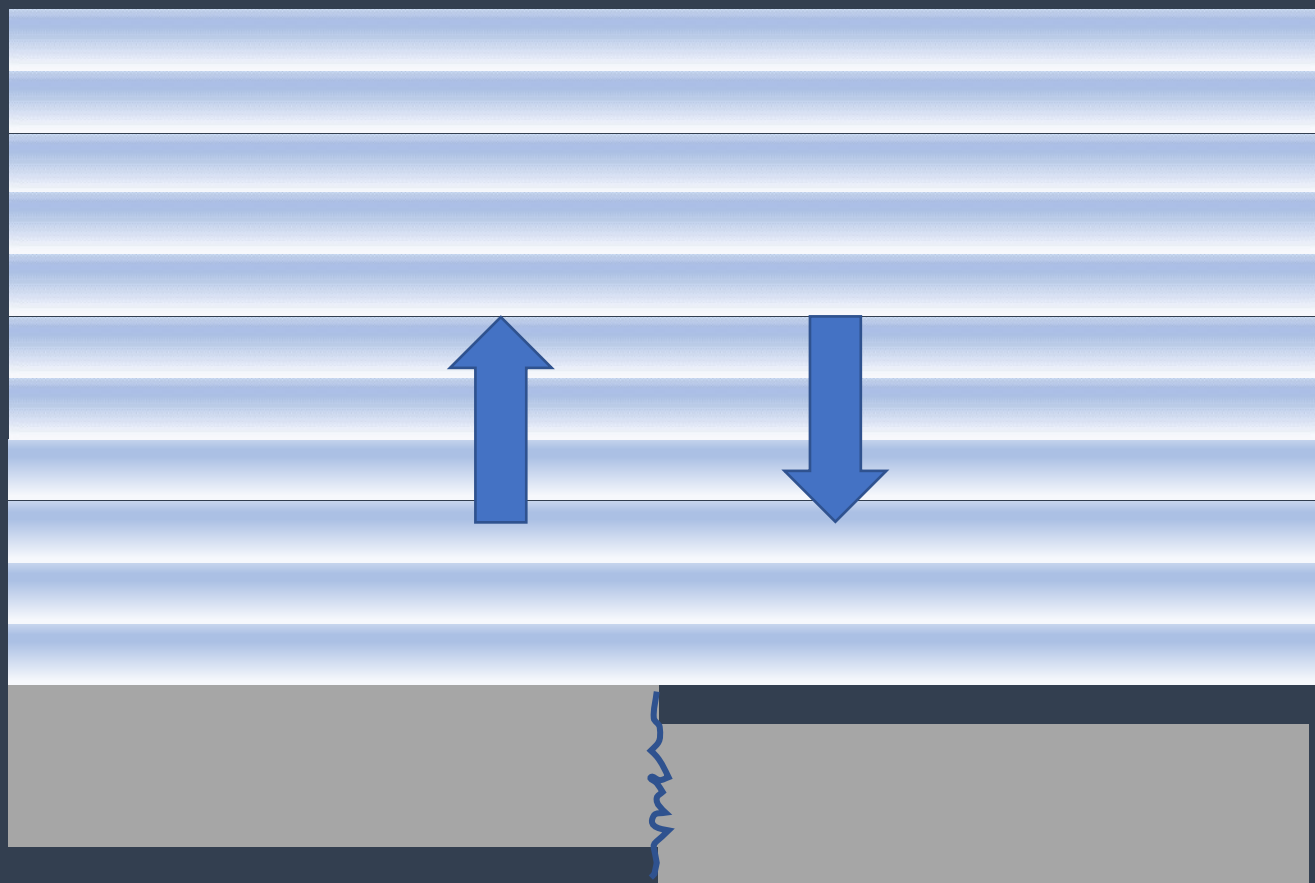




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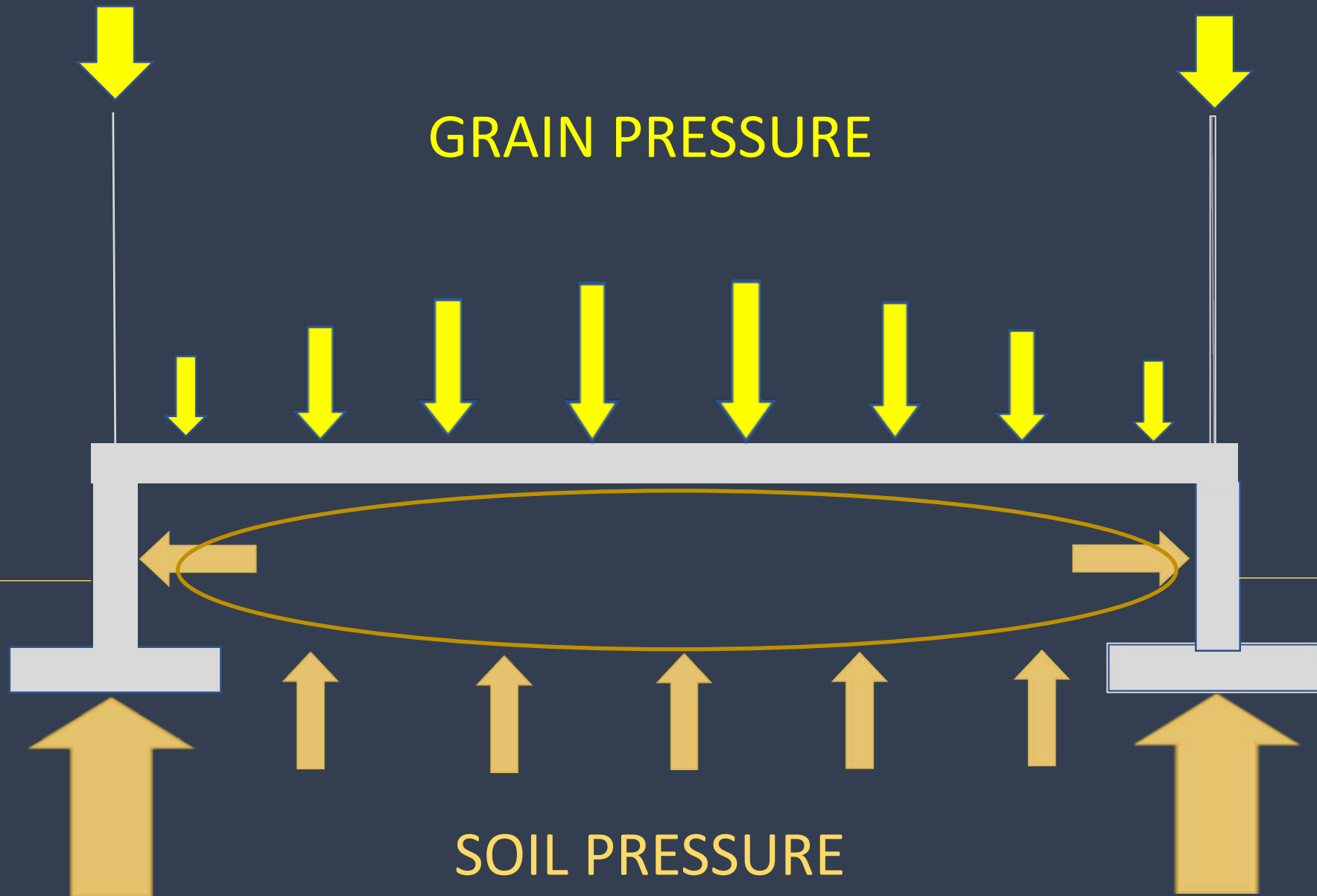


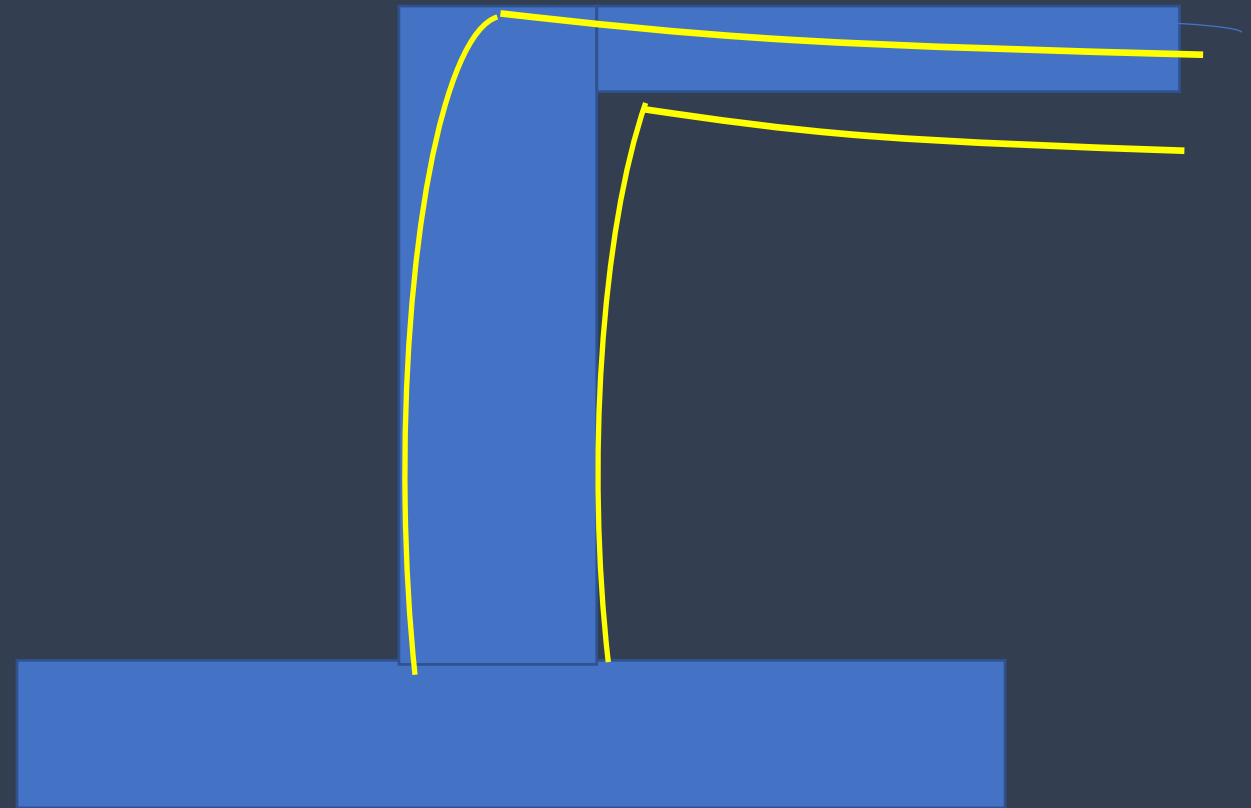


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OPERATION

CENTER FILL, CENTER UNLOAD
PROPER AERATION

AGE/WEAR

STEEL THICKNESS
DOOR FRAMES, OPENINGS
CRUMBLING/CRACKING CONCRETE

CONSTRUCTION

ROOF LOADING
ENGINEERED FOUNDATIONS
NO OPENINGS ADDED

Thank You