

# Aggregate Stockpiling and Handling

**IAAP 2019 Convention  
Education Program  
March 6, 2019**

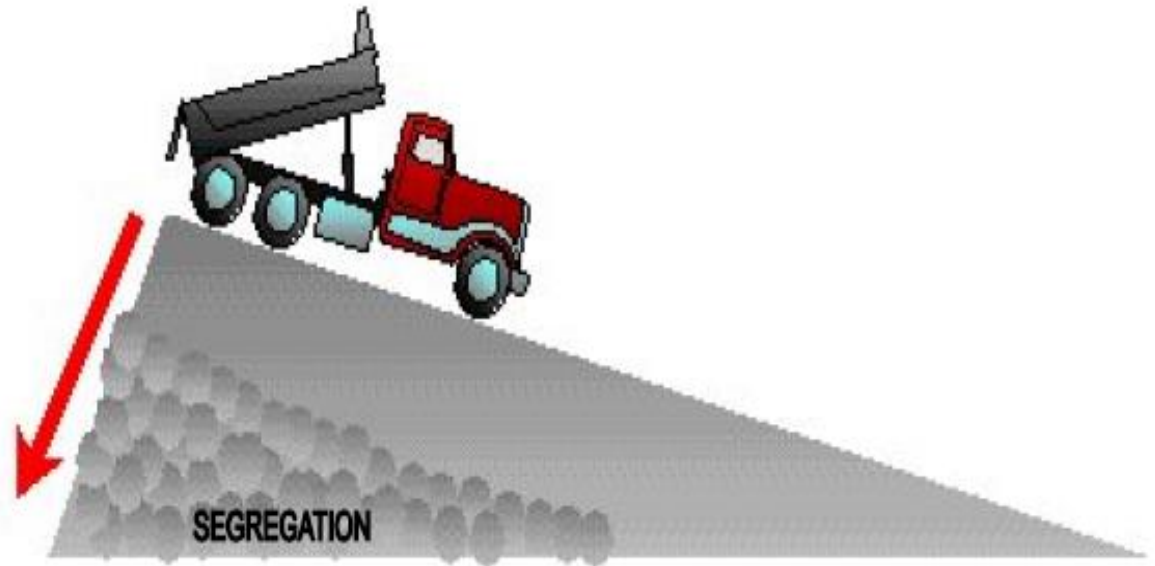


## Purpose of Training

- Importance of proper stockpiling
- Handling Material Correctly
- Loading out Correctly
- Asphalt Customers' Perspective
- Ready Mix Concrete Customers' Perspective

## Stockpiling Aggregates – What Do We Need to Know?

- Contamination
- Degradation
- Segregation
- Load-out
- Consistency
- Affects on customers



Contamination is defined as:

The introduction of  
extraneous material  
(normally deleterious) into  
a finished aggregate



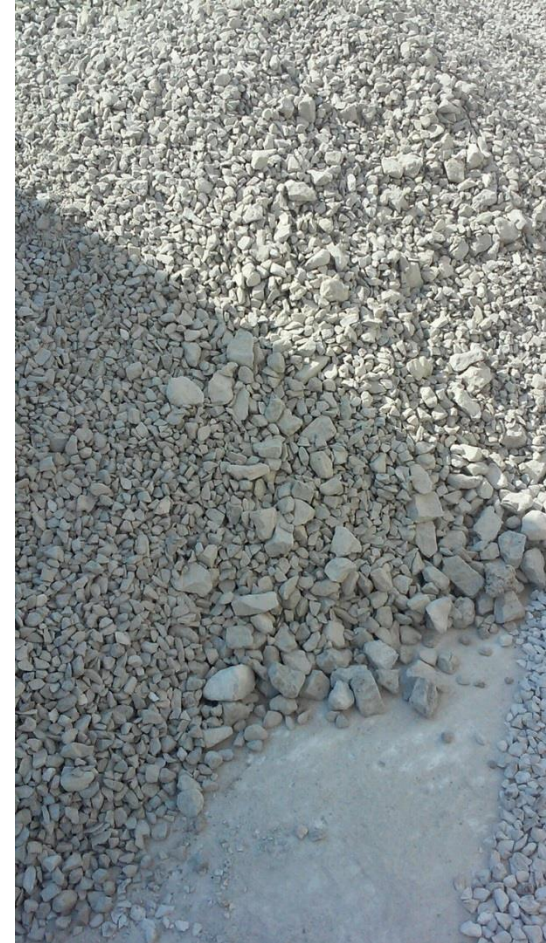
**Contamination by Tracking Mud and Clay on to Pile**



**Contamination by Digging into Stockpile Pad or Dumping Clean-up on Side of Pile**

# Contamination

- Floor (oversize or fines)
- Housekeeping – road materials
- Adjacent Stockpiles
  - If not separated
- Multi-tasking
- Loading multiple products, overloads



# Contamination

- DO
  - Use conveyors so foreign material isn't introduced by other equipment
  - Minimize inventory buffer – time increases chance for foreign material to overtake stockpile
- DON'T
  - Drive equipment on stockpile
  - Handle material more than once





# DEGRADATION

Degradation is defined as “The actual breakdown of individual aggregate particles due to abrasion and attrition during stockpiling and handling”

Can be detrimental to the final product due to the increased minus #200 material (fines)

Increased fines cause performance problems in the final products

# Degradation



# Degradation

**Degradation is defined as “The actual breakdown of individual aggregate particles due to abrasion and attrition during stockpiling and handling”**

Breakdown can change gradation significantly

Change in gradation could affect customer use OR make material OUT OF SPEC



# Managing Degradation

Recognize degradation  
in ramps or benches

Minimize areas for  
ramps or driving on  
piles

When possible blend  
degraded material with  
coarser material

If degraded material  
doesn't look right – too  
fine, e.g. - Call QC or  
supervision



# Segregation

Segregation – What is it?

- The separation of a well graded production aggregate into individual sizes due to gravity.

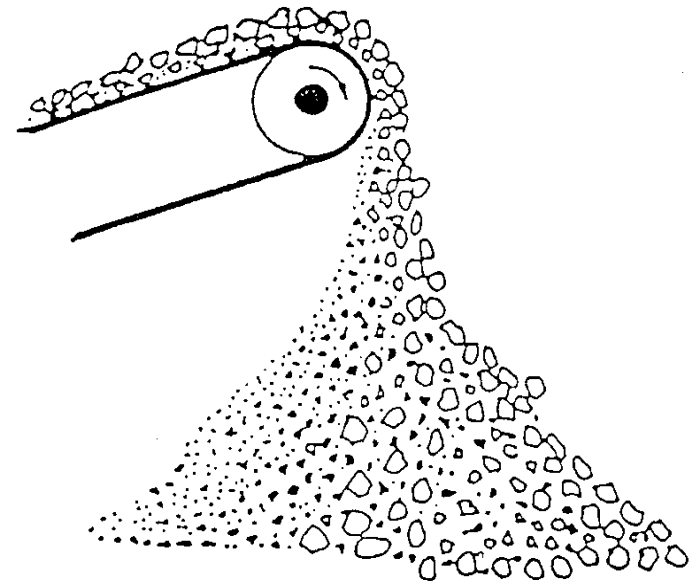
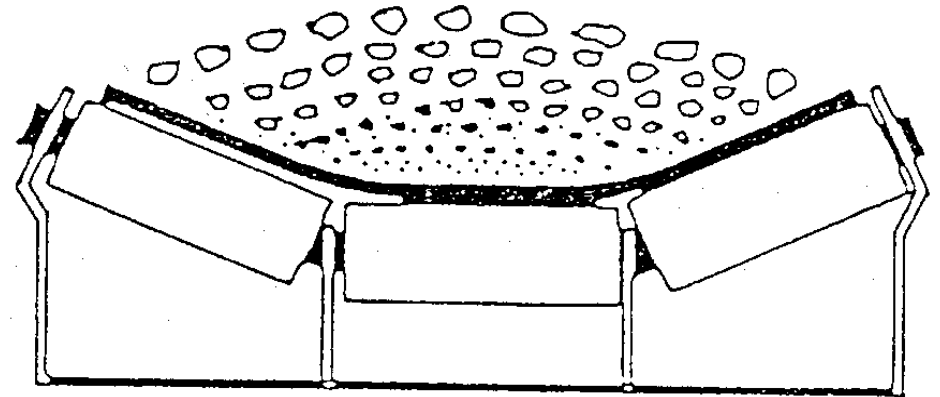


# Segregation

- DO
  - Minimize drop height to limit overrun (variable height conveyors)
  - Use telescoping conveyor and build in windrows
  - Load from end of pile
- DON'T
  - Build stockpile with fixed height conveyors
  - Build stockpiles with trucks, loaders or dozers

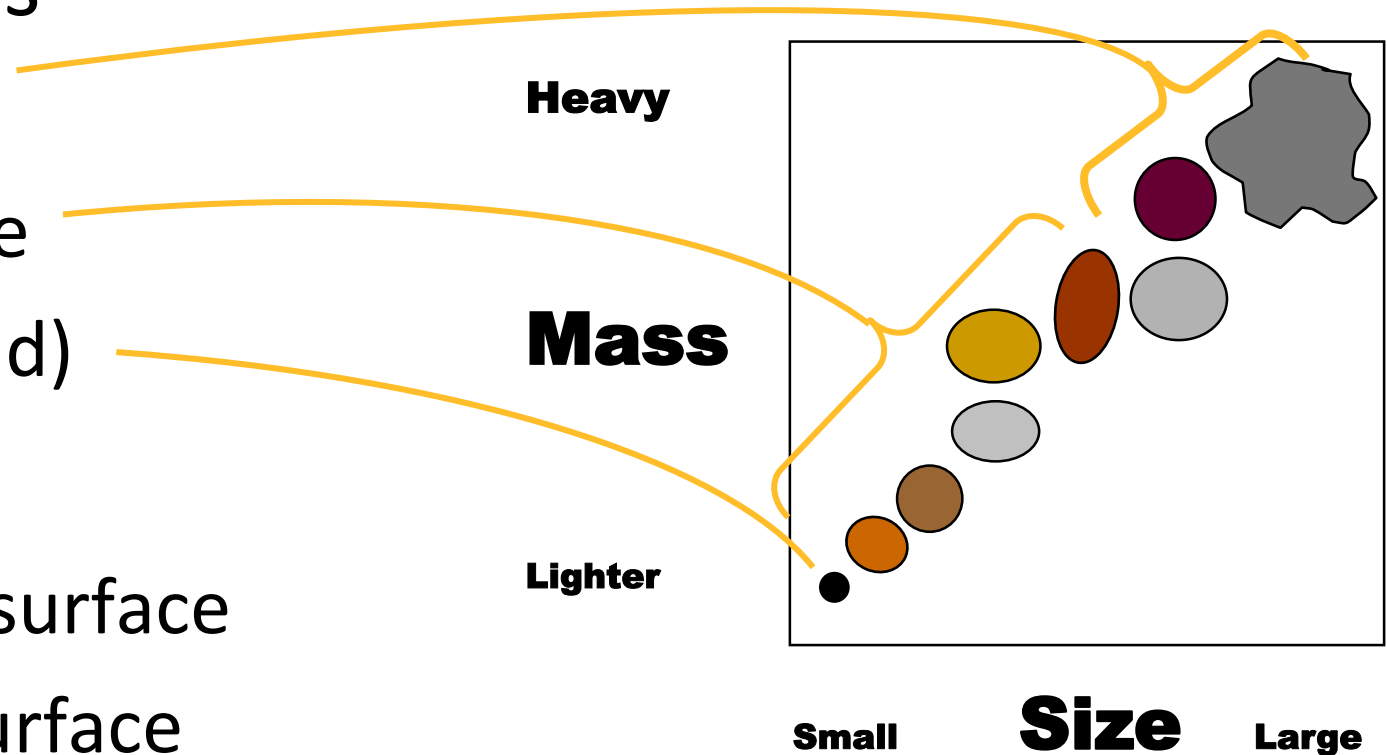


## Segregation - Stacker Conveyor



## Segregation - Size and Shape

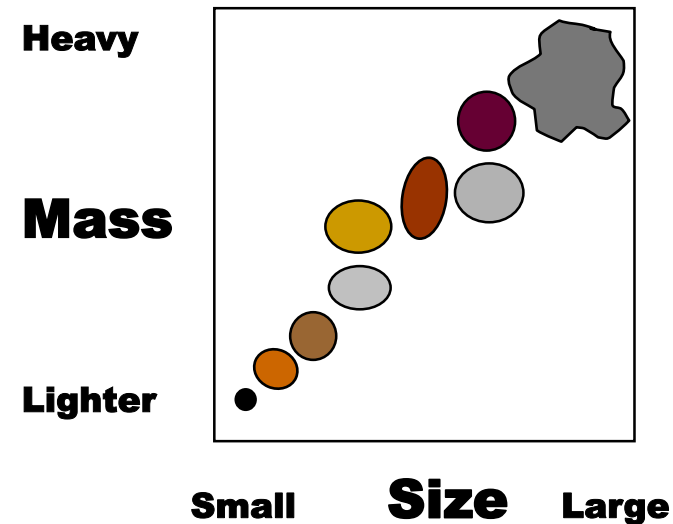
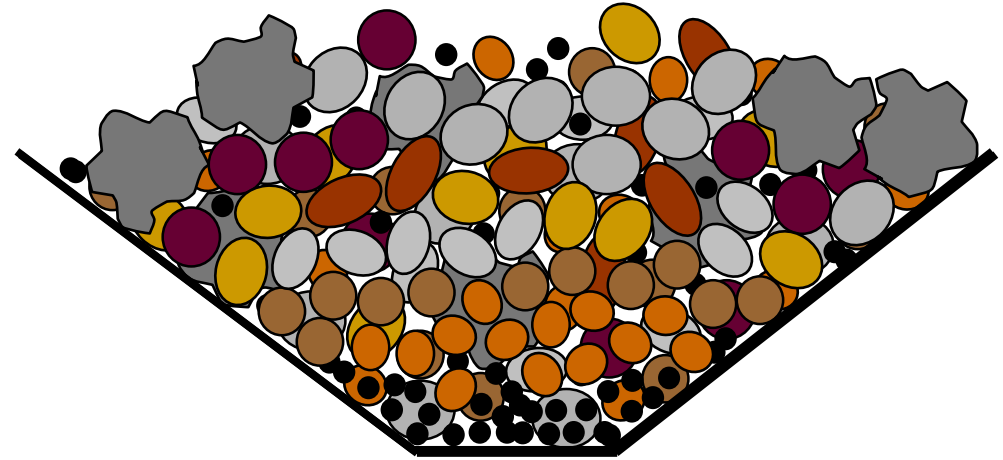
- Size ranges
  - Coarse
  - Midrange
  - Fine (sand)
- Texture
  - Smooth surface
  - Rough surface
- Shape





## Segregation

- Size and Mass
- Destroys blend
- Settling
- Erosion

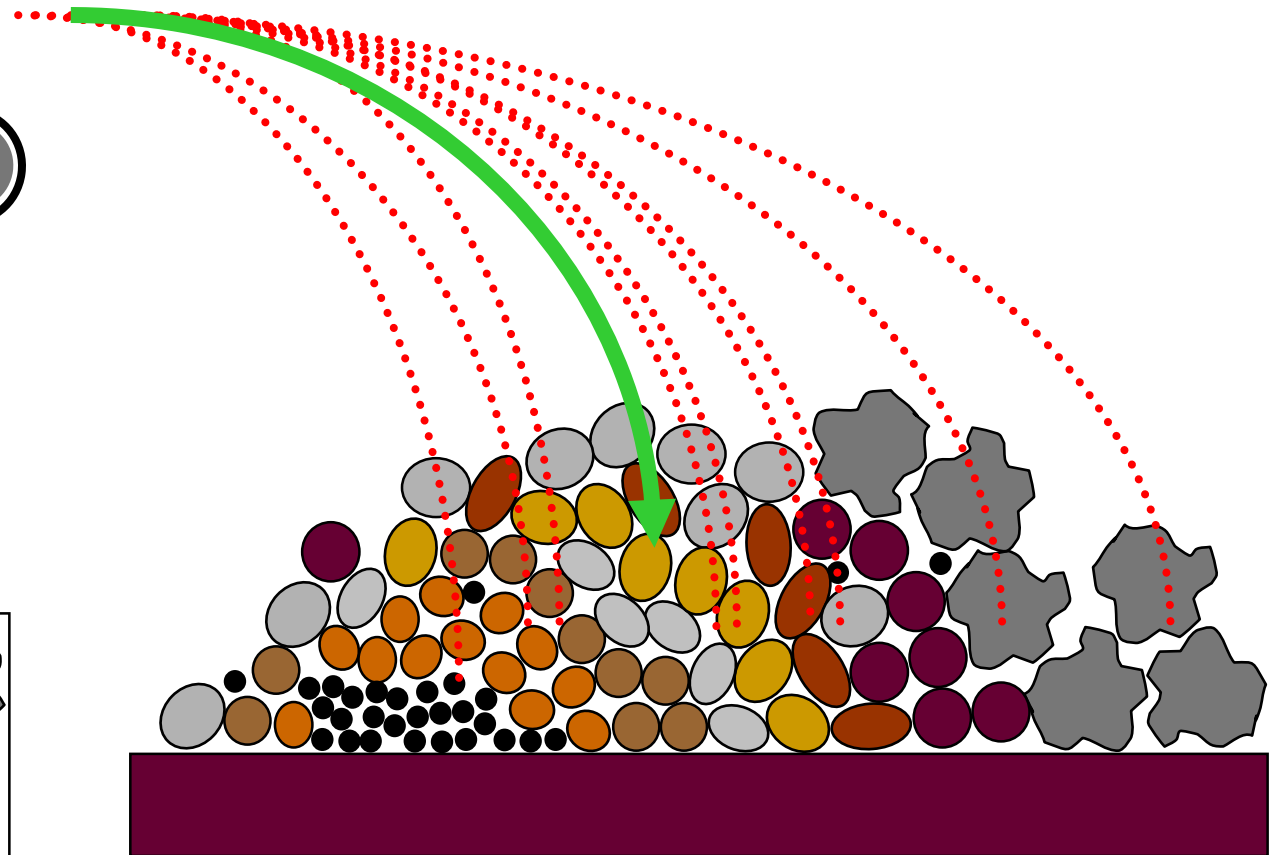


## Segregation - Casting Distance

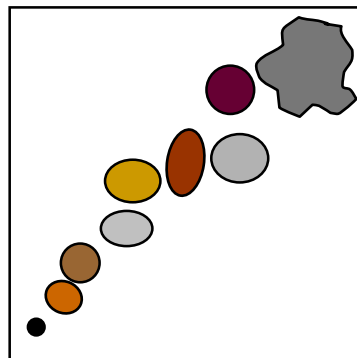
- Casting segregates material



- Drop distances
- Stockpile shapes



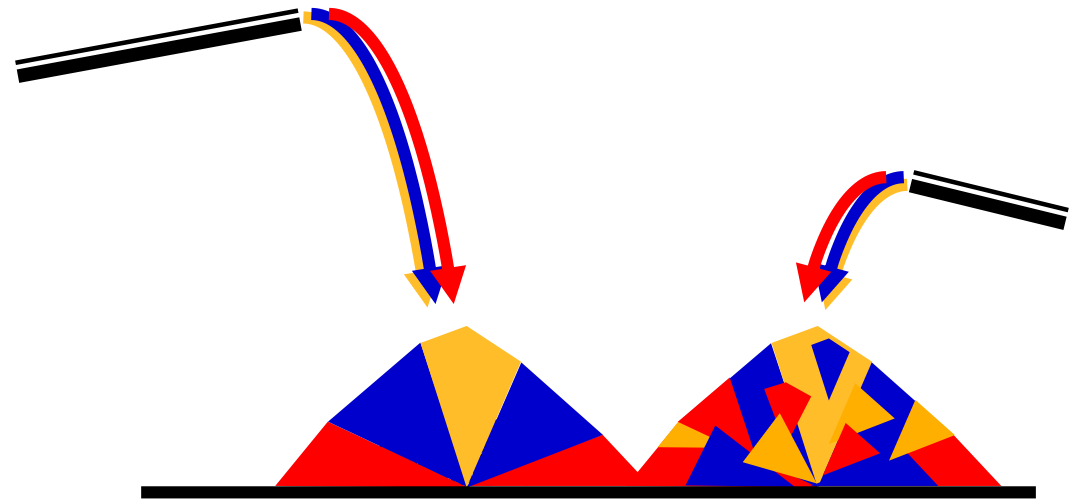
Mass



Size

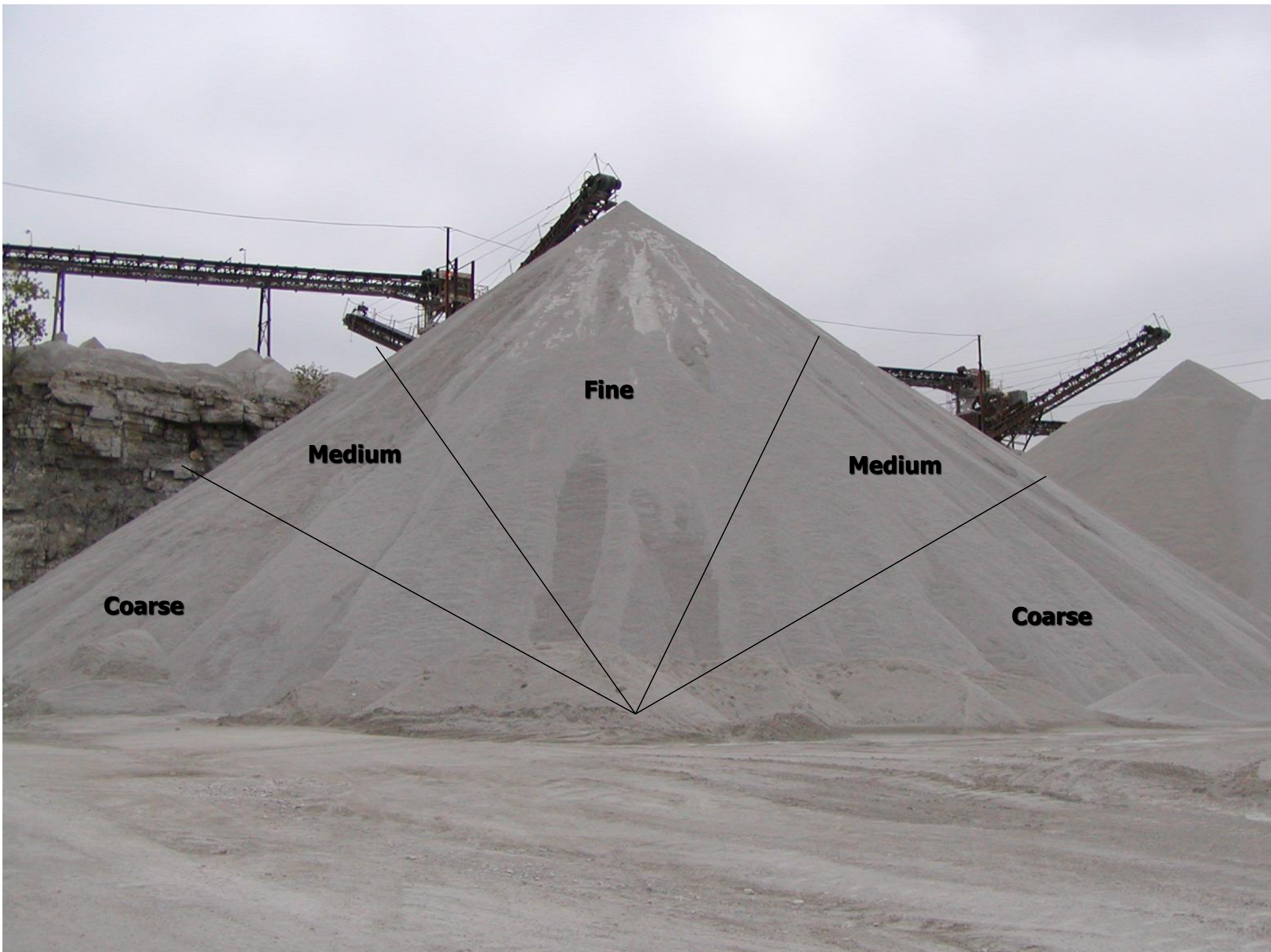
## Distance = Segregation

- Distance from
  - truck to ground
  - conveyor to pile
  - bucket to truck



- Keep your
  - conveyor low
  - bucket low
  - dump slow





**Fine**

**Medium**

**Medium**

**Coarse**

**Coarse**

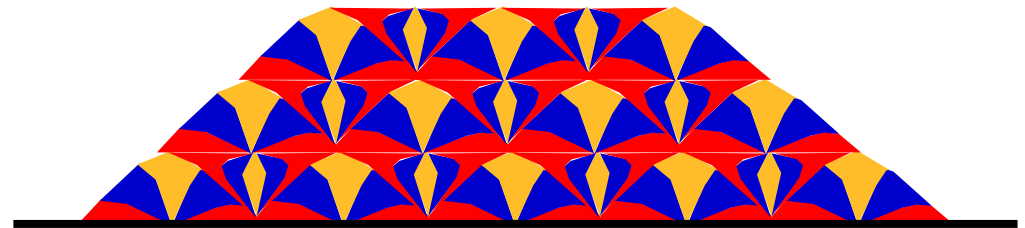
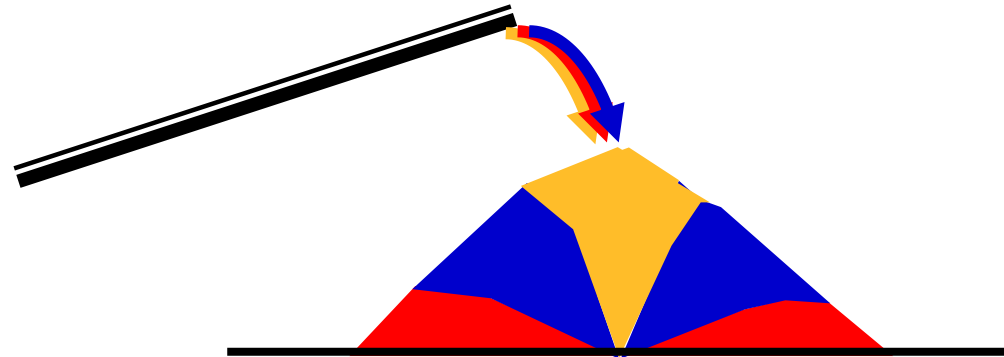
# Segregation – Problems it Causes

- Mix characteristics
- Control at aggregate & HMA plant
- Roadway
  - Structural integrity
  - Stripping potential
  - Raveling
  - Drainage



## Know Stockpile Construction

- Conical
  - most re-blending
- Windrow lifts
  - Least re-blending
- Layered
  - some re-blending



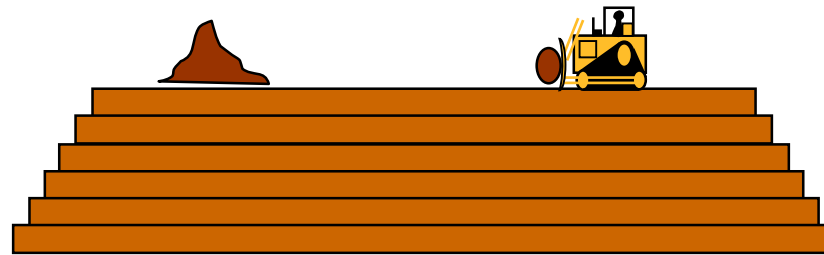
## Know Stockpile Shapes

- Cone

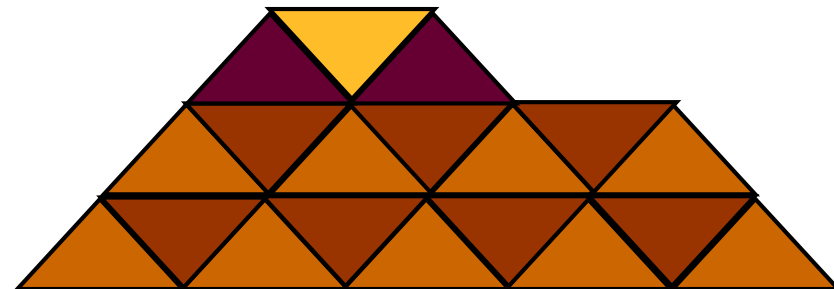


- Trapezoid

- Simple layer



- Windrow layer



You've got to be kidding?

# The 3 step process- Really?

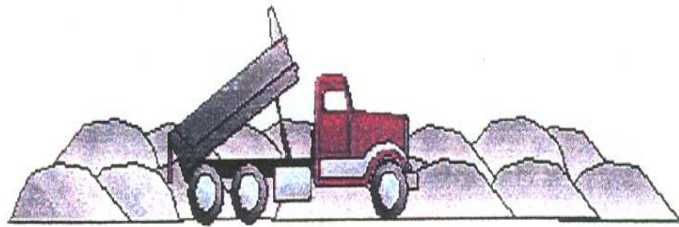




# Truck Stockpiling Methods

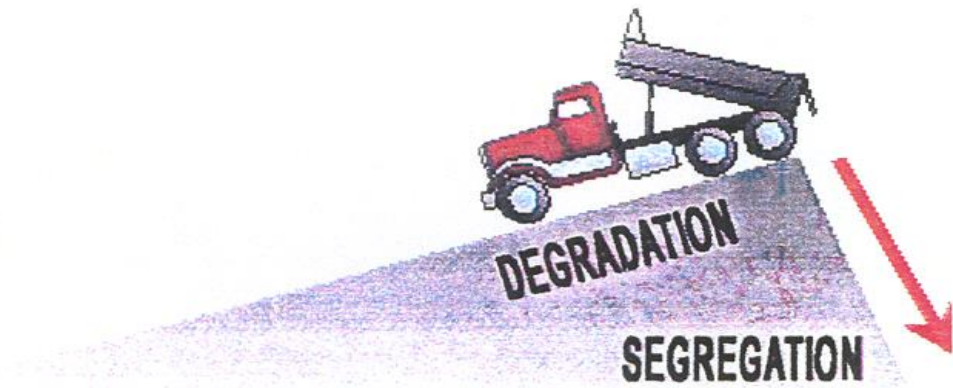


# Truck Stockpiling Method



- The piles built as single or multi layer
- A layer can be pushed up by loaders
- 2<sup>nd</sup> most common method
- Material should not be placed closer than 2'-4' to the layer's edge

**Avoid dropping over edge**



# Loader Stockpiling Method



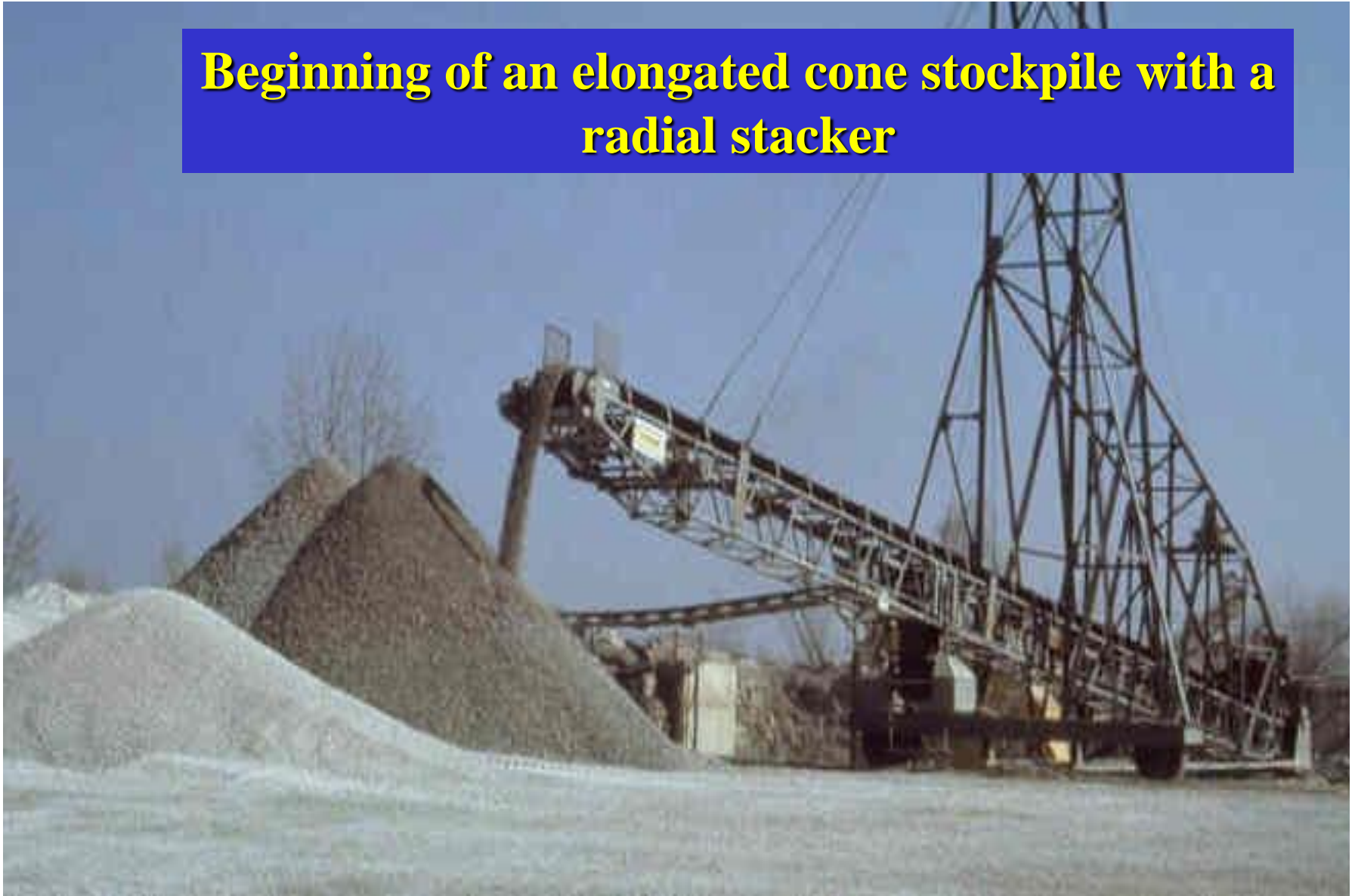
## Cone stockpile



**An adjustable radial stacker moves horizontally and vertically as the material is produced**



**Beginning of an elongated cone stockpile with a radial stacker**



# Radial Stockpile

- Easy pile to build
- Must have axle system to allow movement radially
- Feed point is stationary
- Simple way of increasing volume with the same feed point
- Increases live storage
- Most consistent product to load out



# Types of Stockpiling

Stockpiling Method	Stockpile Capacity	Capital Cost	Cost/ton	Degradation	Contamination	Segregation	Compaction	Air Quality
Radial Stacker	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Stacker	Fair	Excellent	Fair	Excellent	Excellent	Fair	Excellent	Poor
Tripper/Longitudinal	Excellent	Poor	Excellent	Fair	Fair	Fair	Excellent	Poor
Hoppers/Bins/Silos	Poor	Poor	Poor	Excellent	Excellent	Excellent	Excellent	Excellent
Dozers	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Fair
Loaders	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Fair
Trucks	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Fair



## Reclaiming Method

Tunnel Reclaim	Fair	Excellent	Excellent	Excellent	Excellent	Fair	Excellent	Excellent
Dozer Trap Reclaim	Fair	Excellent	Fair	Fair	Fair	Excellent	Fair	Fair
Continuous Reclaim	Excellent	Poor	Excellent	Excellent	Excellent	Excellent	Excellent	Poor
Loader Reclaim	Poor	Poor	Poor	Fair	Poor	Fair	Fair	Fair



# Successful Operations

Who is our customer?

Who can make a GREAT first impression?

Who interacts most with them at the quarry?



## Loader Techniques

- Know stockpile construction
- Loading point
- Working the face



### Stockpiling / Moving Piles

- Re-blend as you move
- Work the face of pile as if loading customer truck
- Stack as high as loader will reach
- Avoid ramping whenever possible (especially Fix plant customer stone)
- Do not cast over the side, this promotes segregation
- If ramping unavoidable, load ramped material for commercial uses (under slab, drainage fill, etc)

# Successful Loader Operations

- Asphalt and Concrete – Fixed Customers

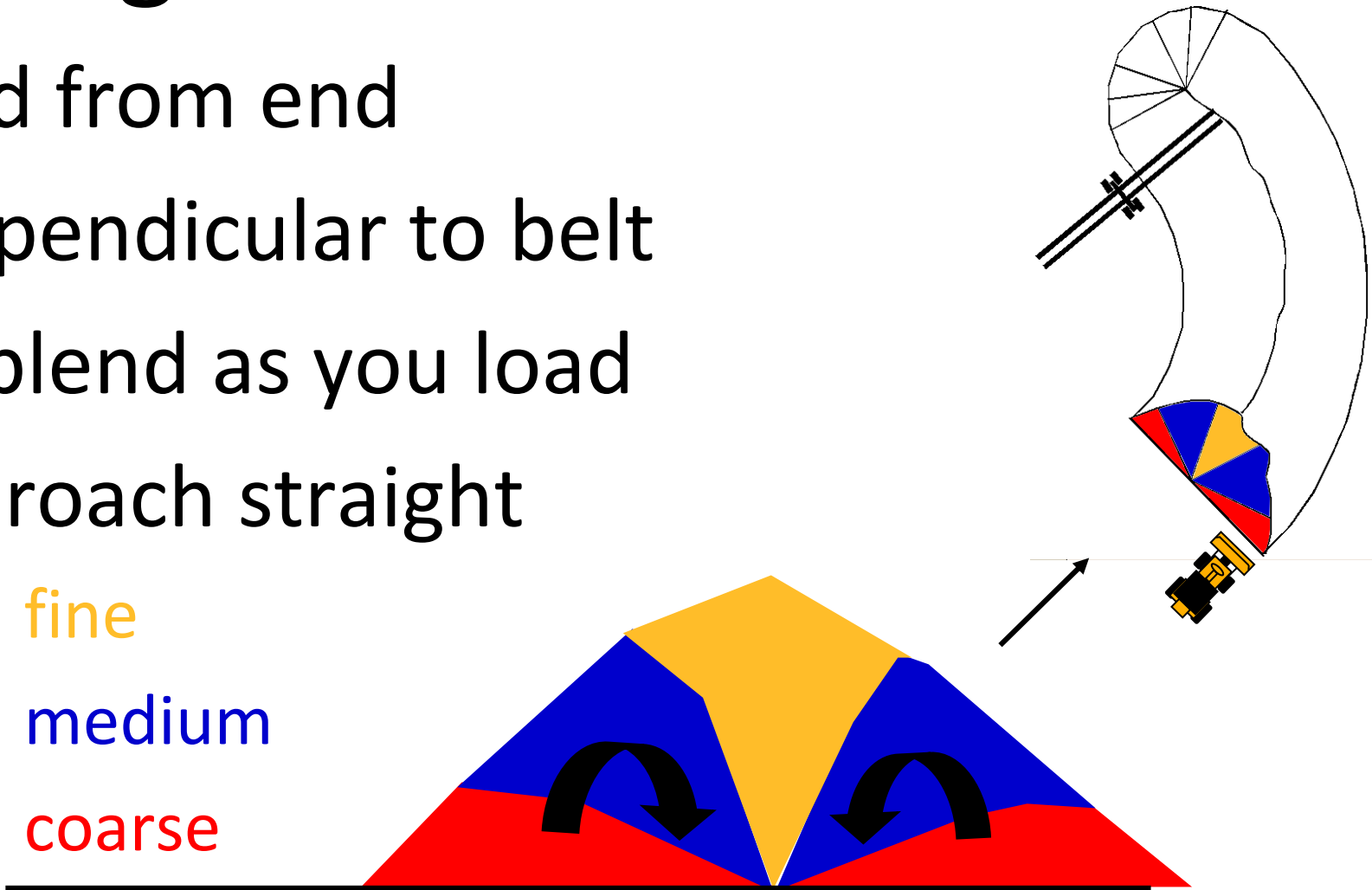


# WHY CONSISTENCY?

- Asphalt mixes are 95% aggregate...
- Concrete is about 85% aggregate...
- Properties of asphalt and concrete mixes are based on the properties of the aggregate...
- Changes in the aggregate properties will cause changes in the asphalt and concrete mix properties...
- Customer may get penalized...
- Performance does not meet expectations...
- Materials will prematurely fail!

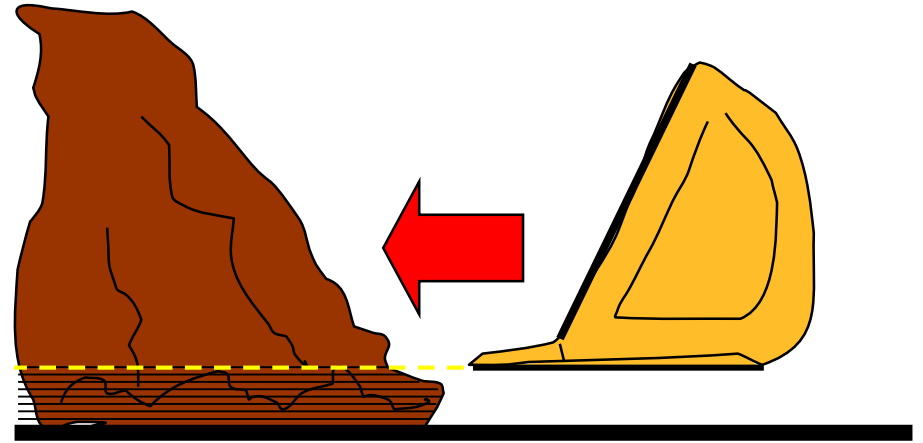
## Loading Point

- Load from end perpendicular to belt
- Re-blend as you load
  - fine
  - medium
  - coarse
- Approach straight



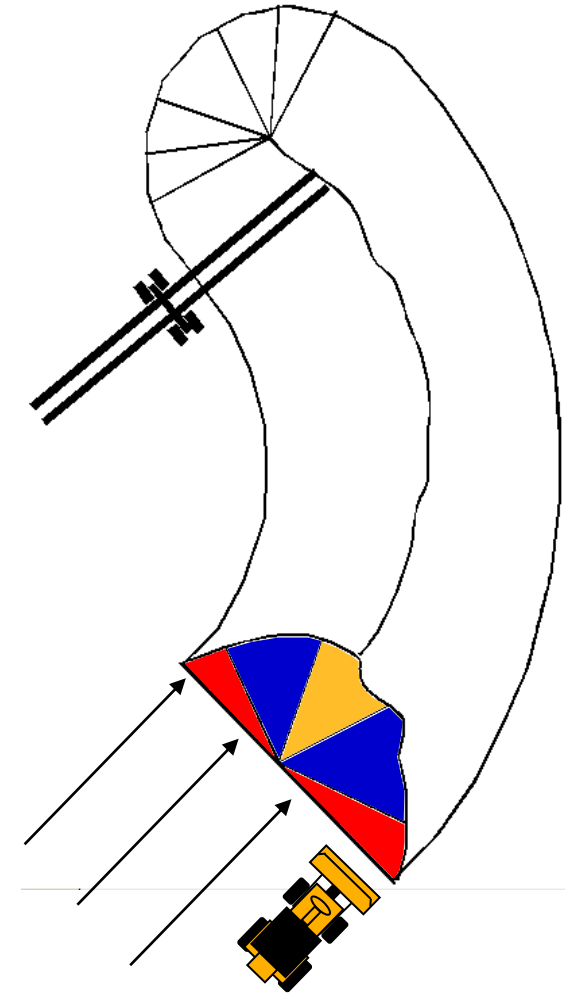
## Entering the Face

- Work upward
  - Do not scrape ground in front of pile
  - Wet
  - Contamination
- Split the seams
  - rotate up
  - back out



# Working the Face

- Move across face
  - Perpendicular to conveyor
  - Less segregation
  - better mix
    - fine
    - medium
    - coarse
- Avoid deep penetration





# Questions?