

# SILO INTERSTICE USAGE AND CAUTIONS



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KANSAS CITY • 2023



- Gerry Lynskey,
- S.E., P.E., P. Eng.
- **Principal and Founder**
- **SSI Consulting, LLC**
- Special Thanks to  
Tim Harvey, P.E.



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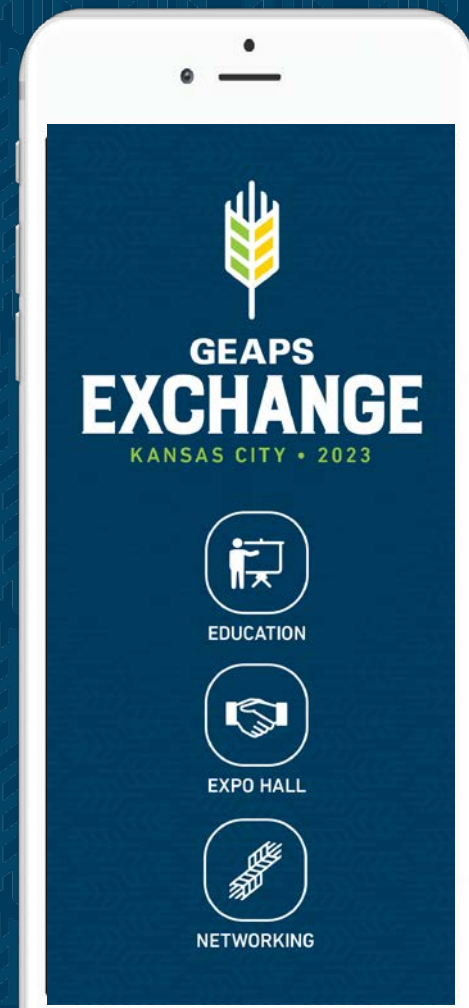
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# Today

- Silos / Basics
- Overview of Design
- Issues with Interstices



# Silo Storage

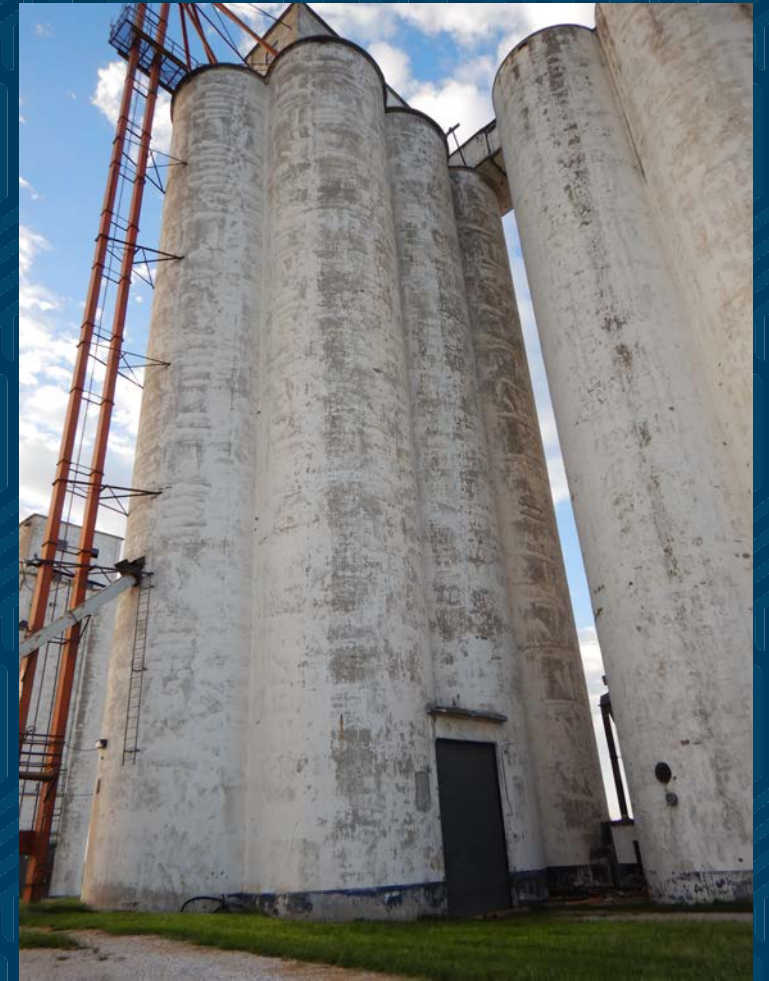
- Essential for elevators, processing
- Productivity depends on reliable storage





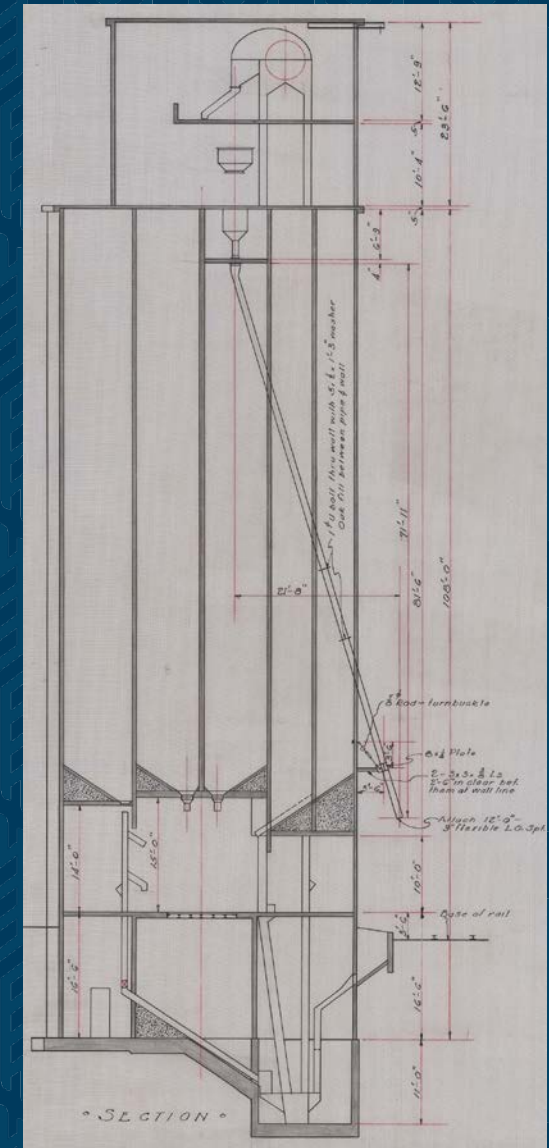
# Today

- Behavior Basics
- Design Considerations
  - Interstices
- Inspection - preventative



# Silos 101

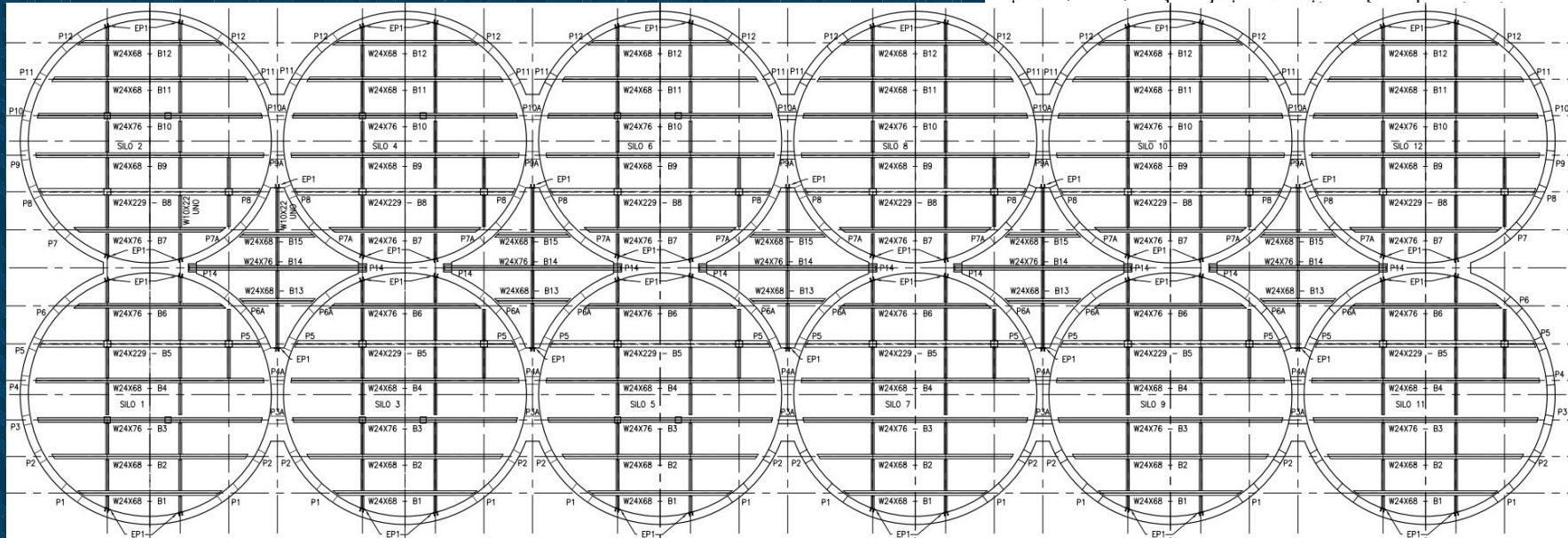
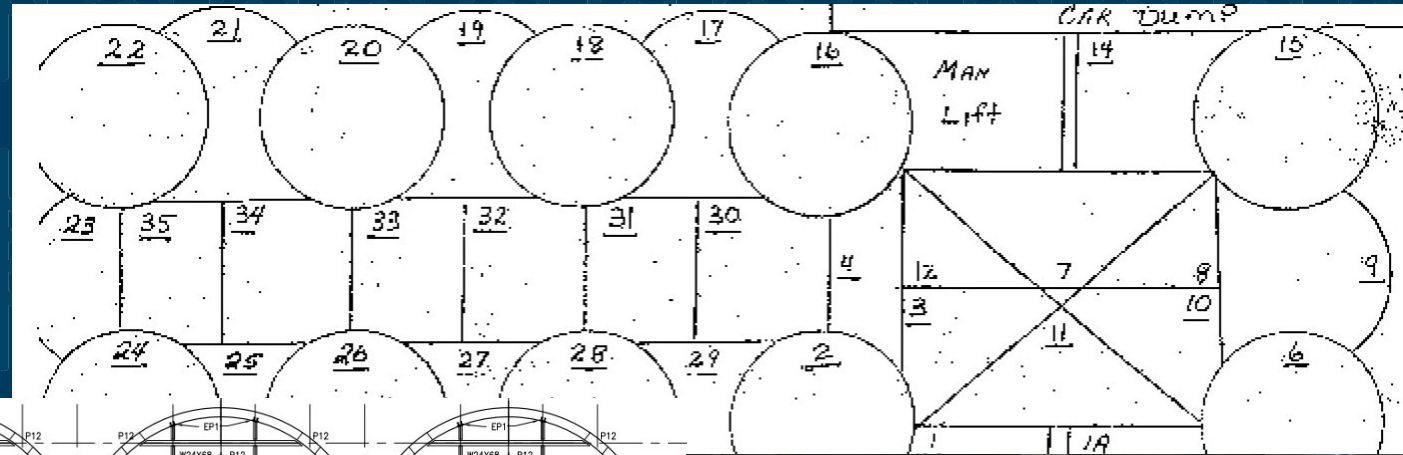
- Roof
- Walls
- Hopper / Reclaim
- Foundation
- Interstices





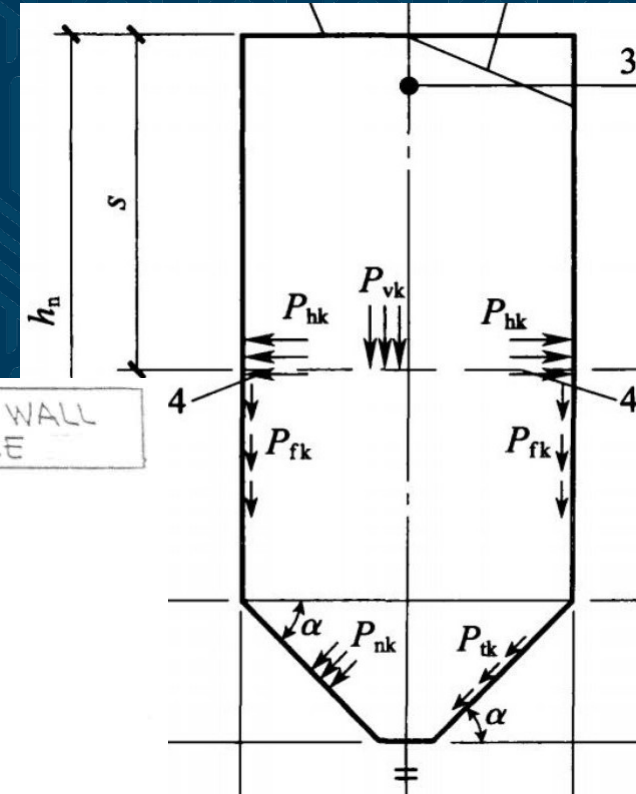
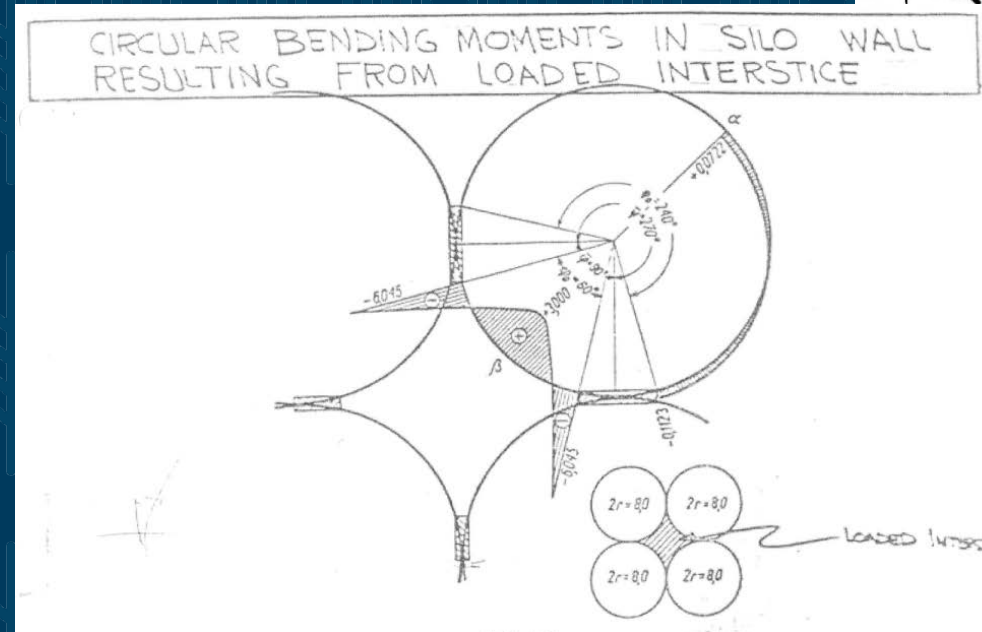
# Interstices

- Flat Walls
- Curved Walls



# Interstices

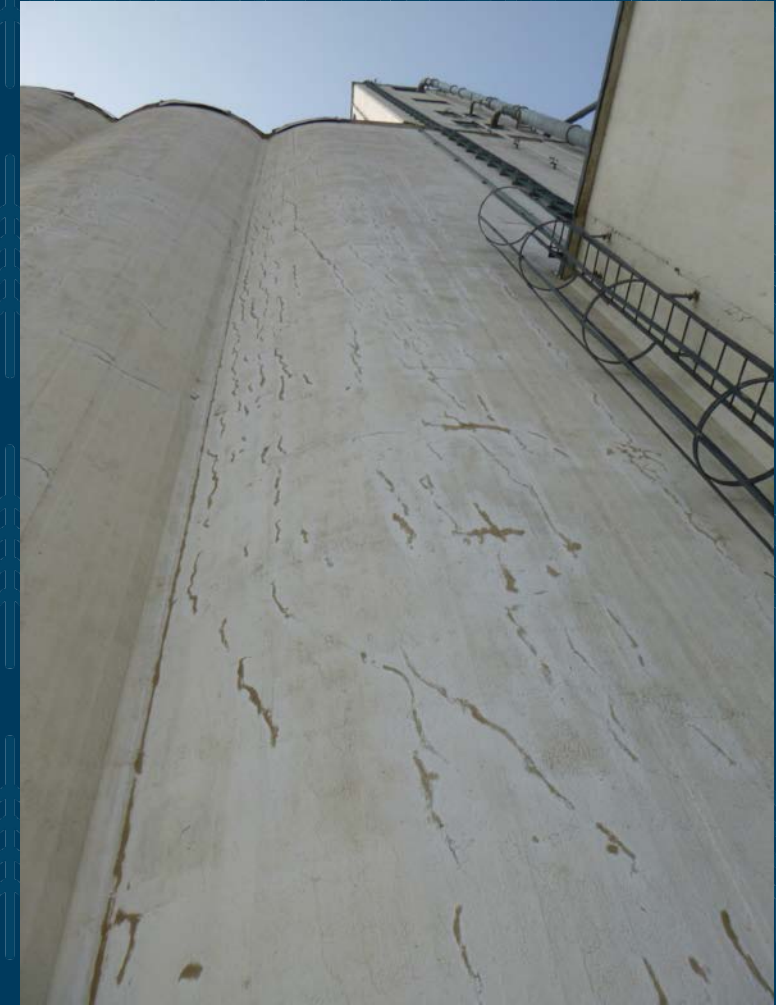
- Silo
  - No / min Flexure, Shear
- Interstice
  - Flexure, Shear





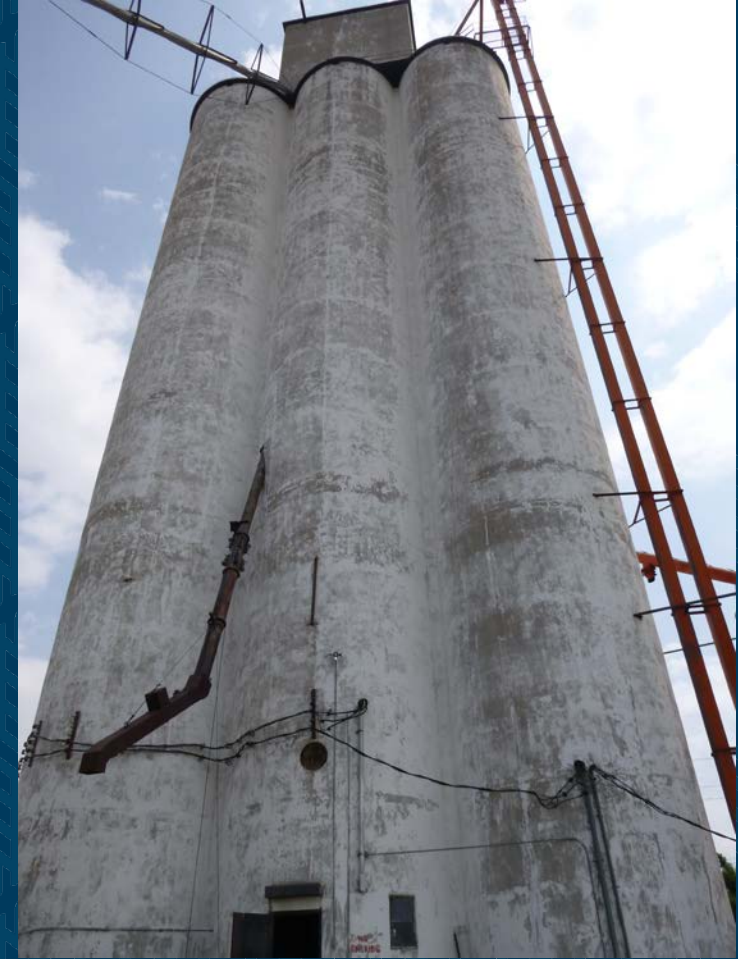
# Interstices

- Design Issues
  - Ignored
  - Assumed Fixed Arch
    - No flexure / bending, no shear



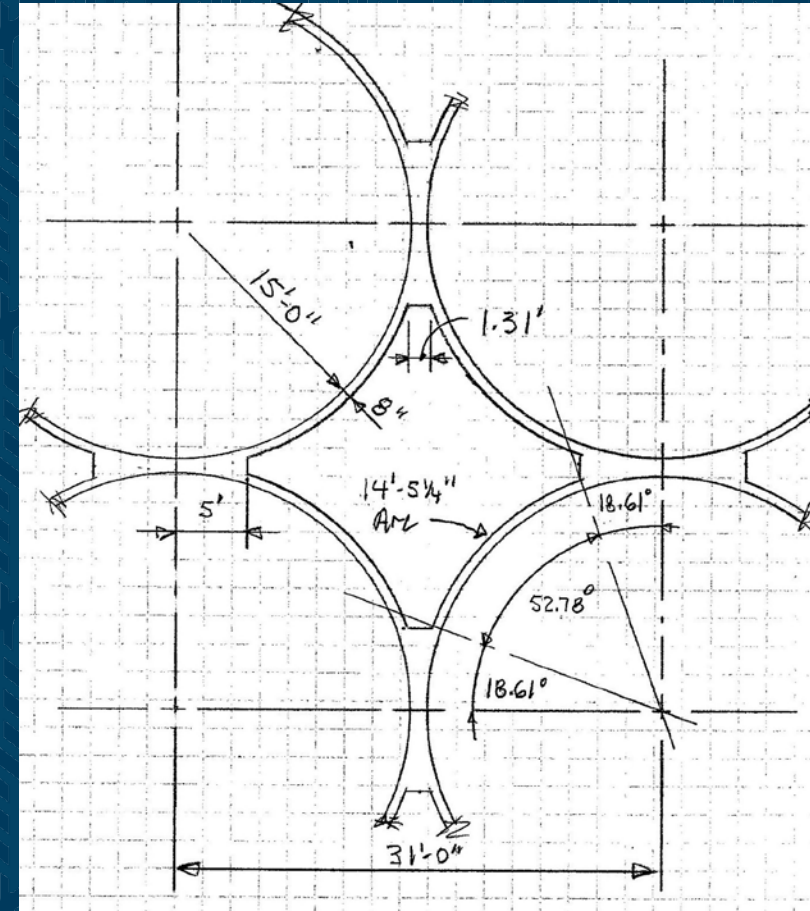
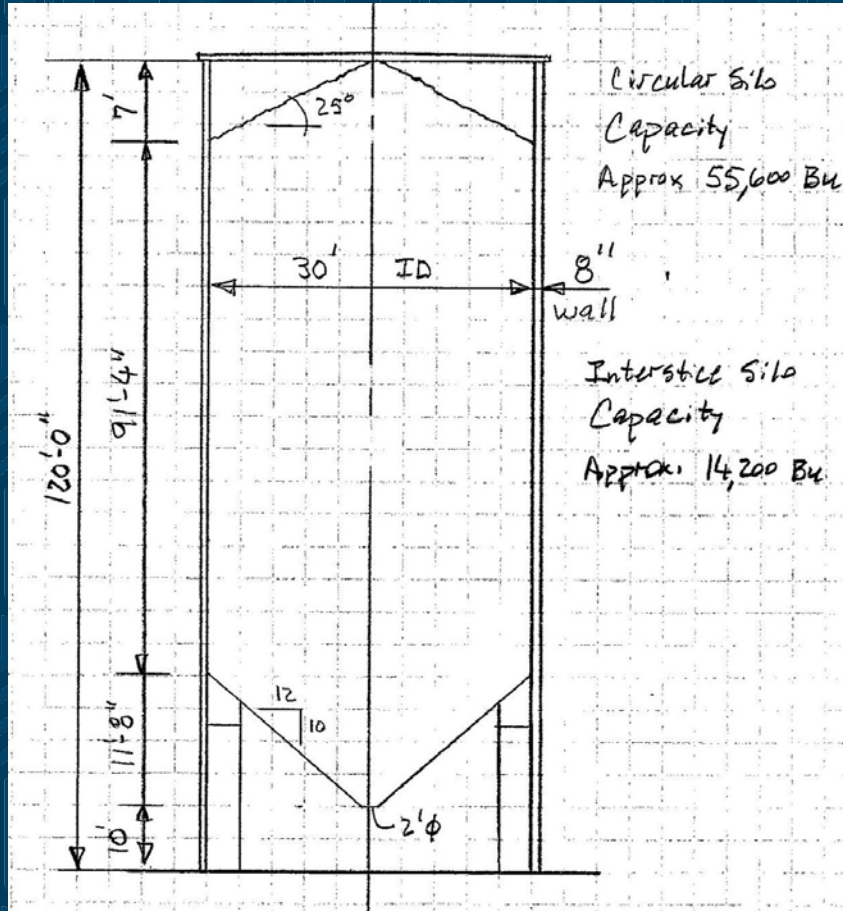
# Interstices

- Examples
  - 30' diameter
  - 40' diameter
  - 50' diameter



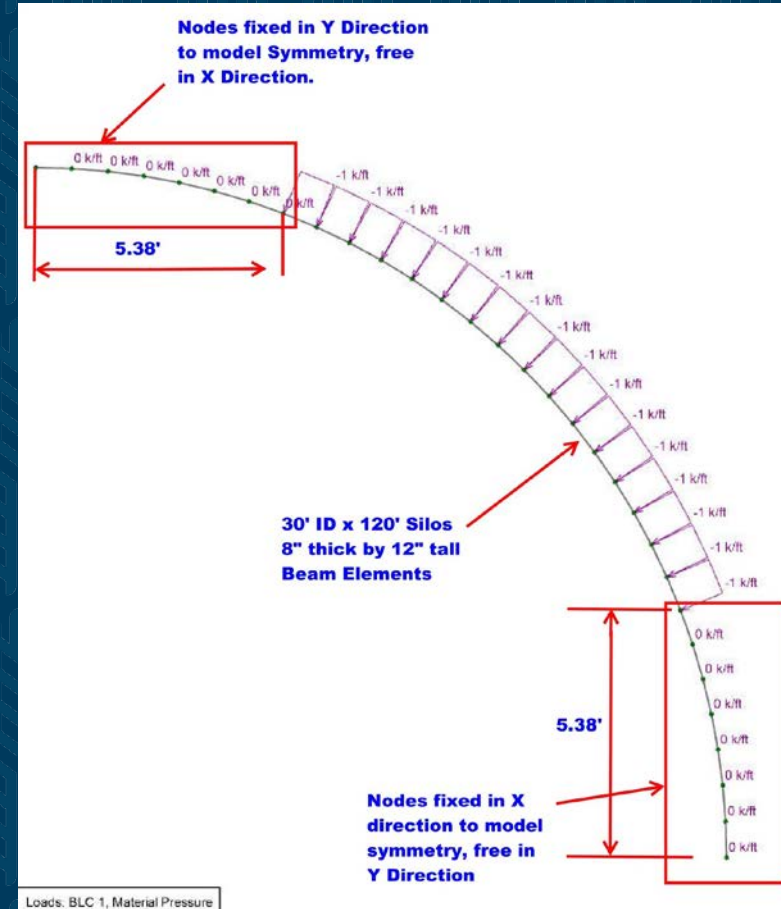
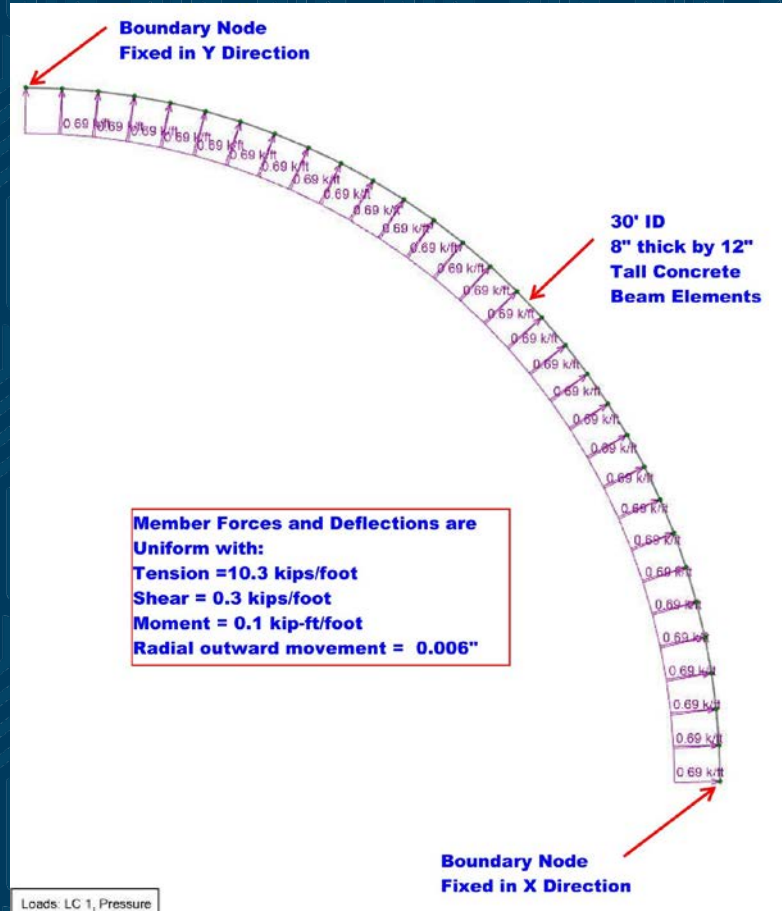


# Interstices – 30' Diameter Silo



# Interstices – 30' Diameter Silo

Circ.  
Silo

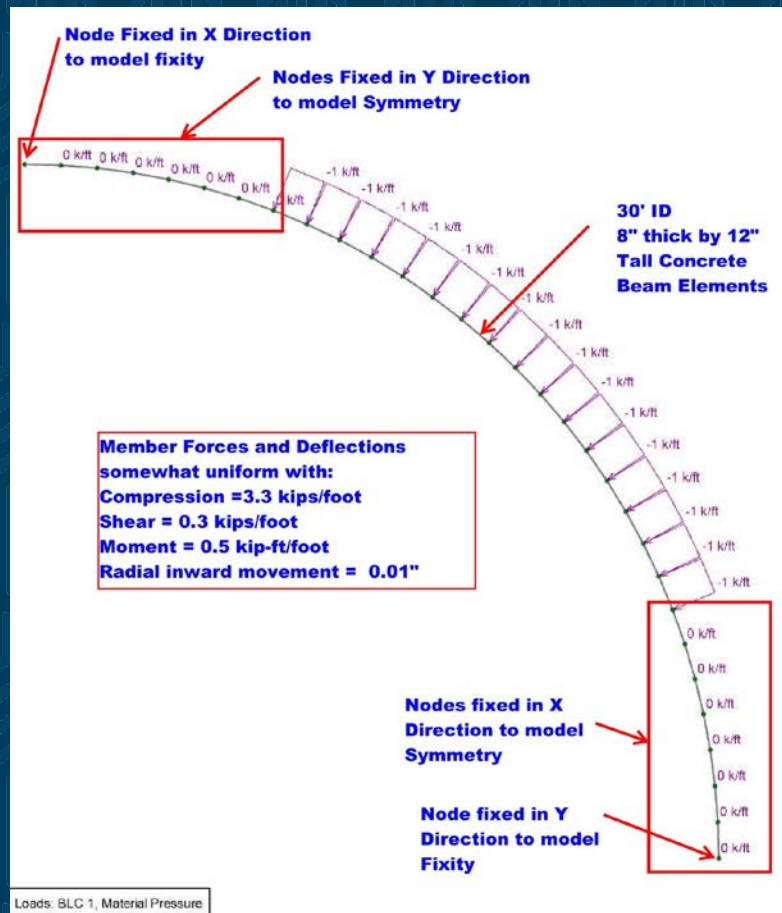


Interst  
Wall

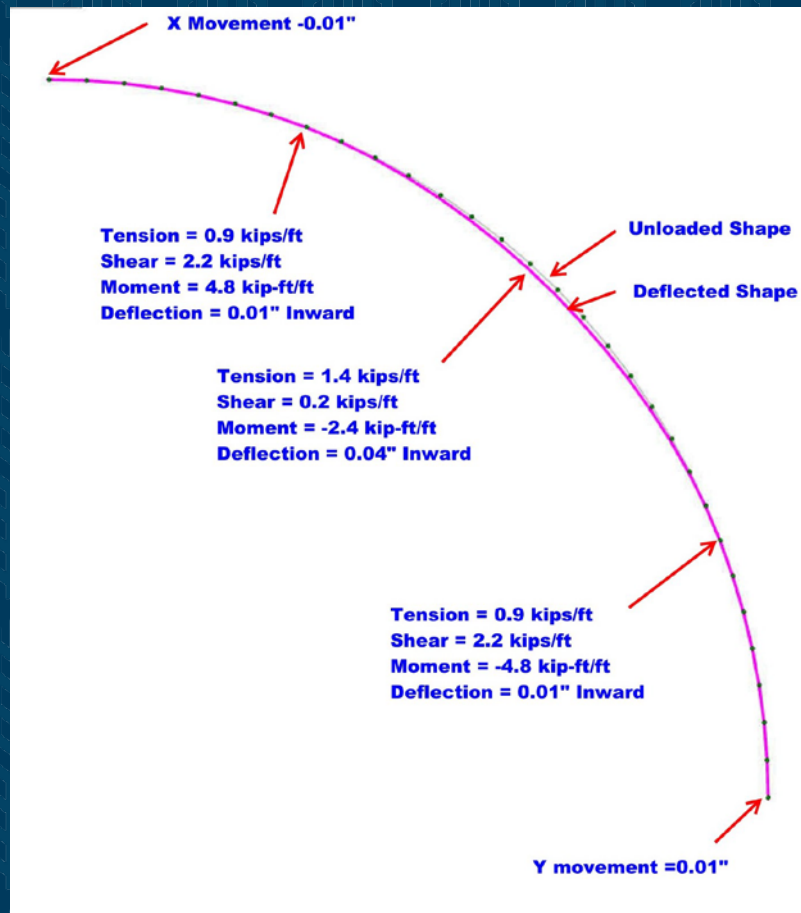


# Interstices – 30' Diameter Silo

Fixed Arch

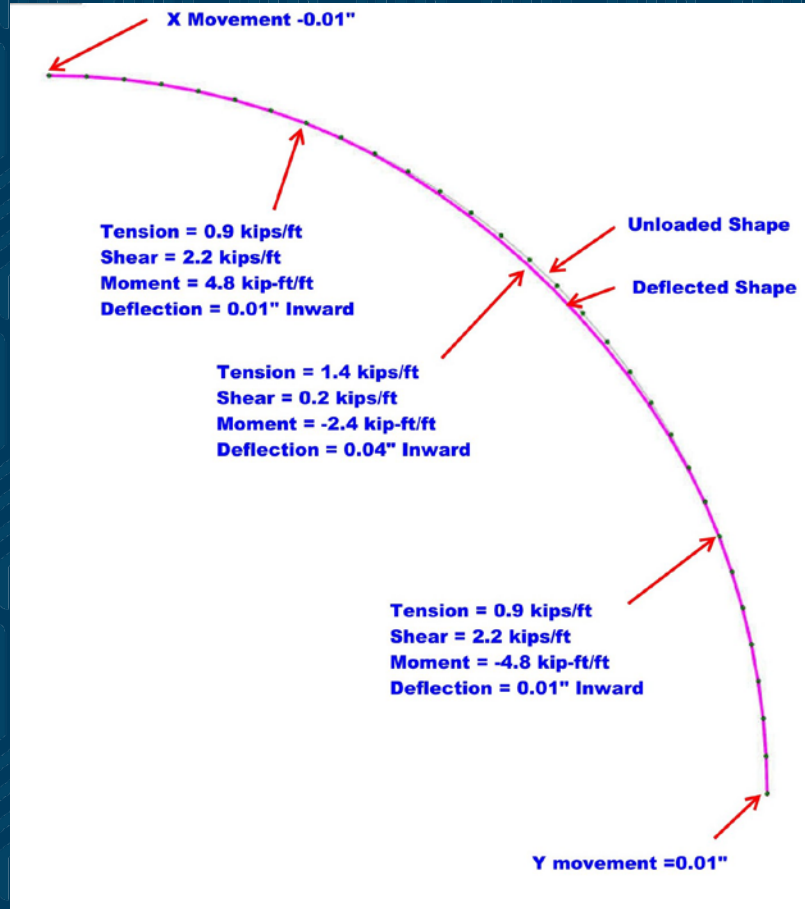


Interst Wall

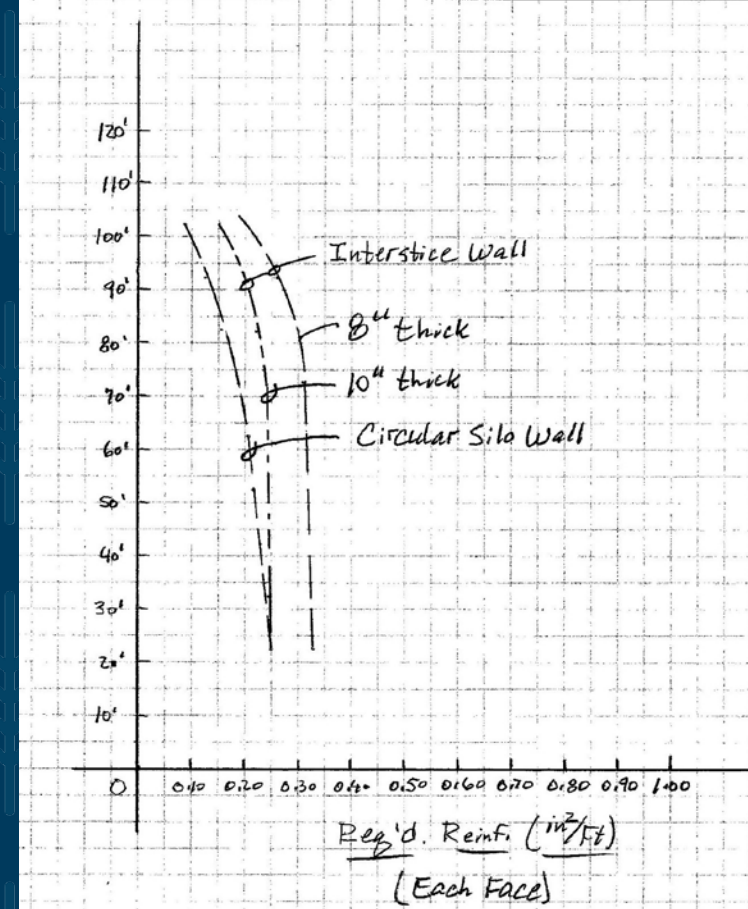


# Interstices – 30' Diameter Silo

Minor  
Move-  
ment

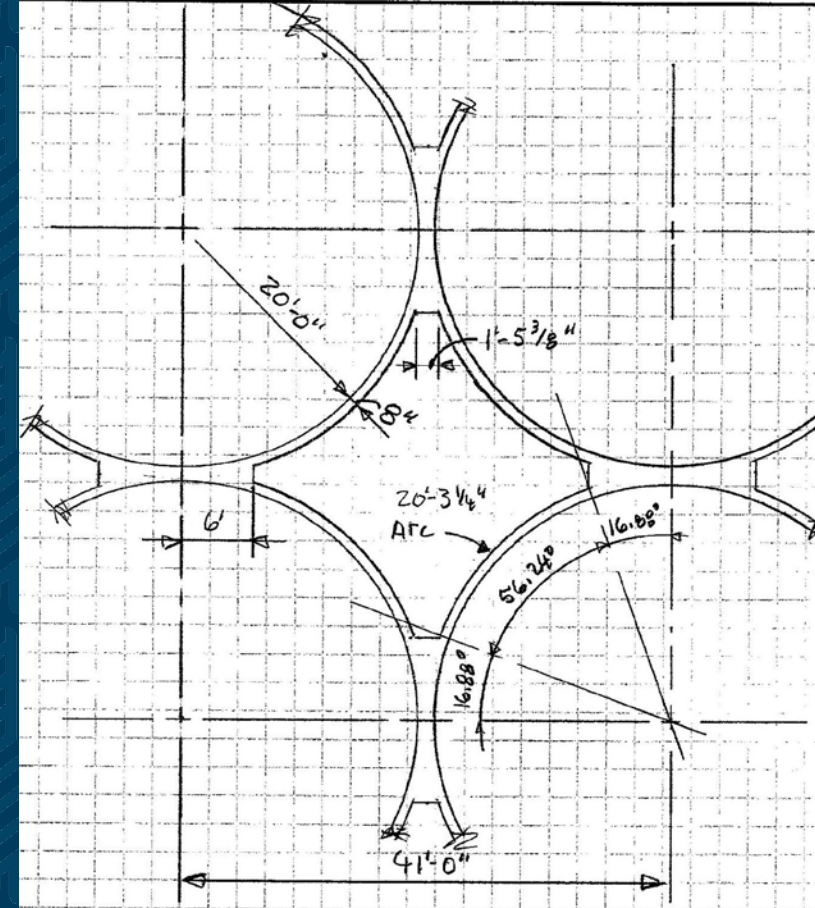
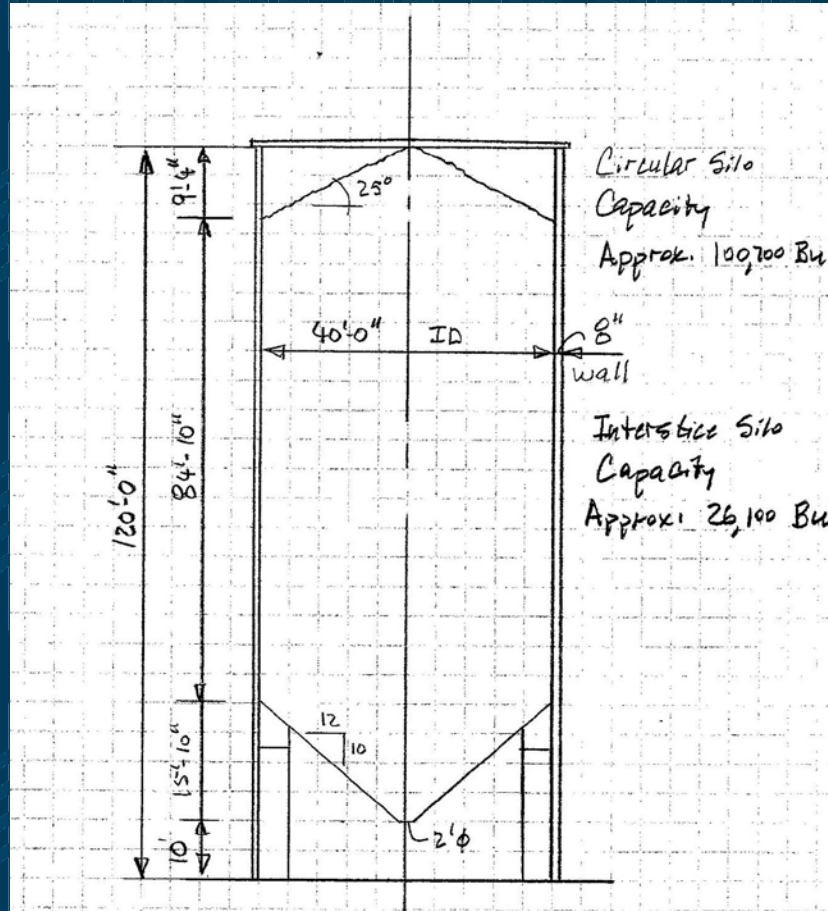


Reinf.  
Req'd





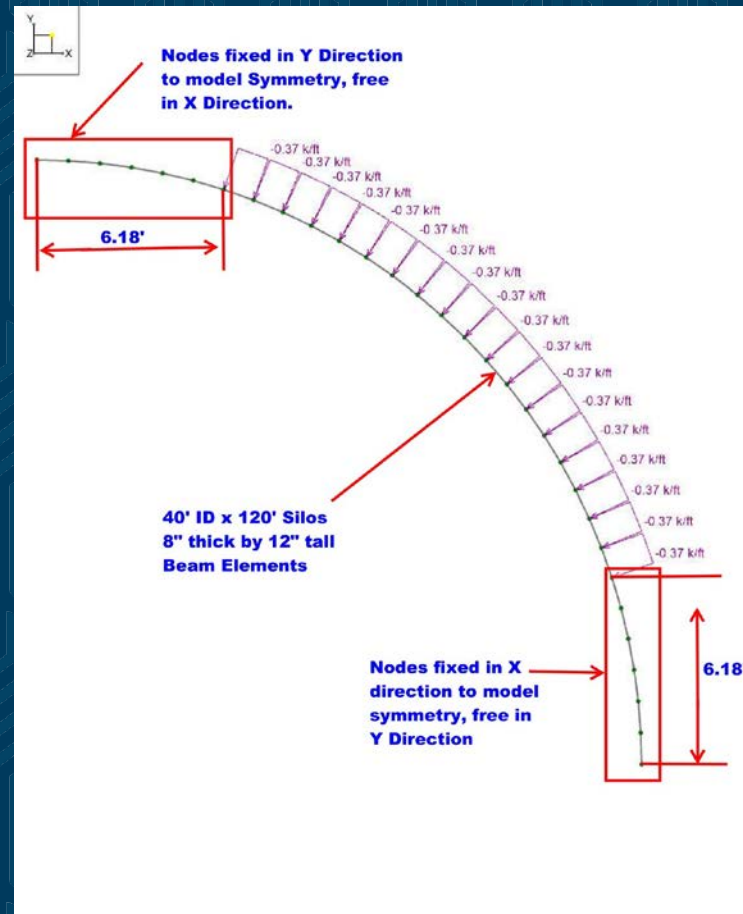
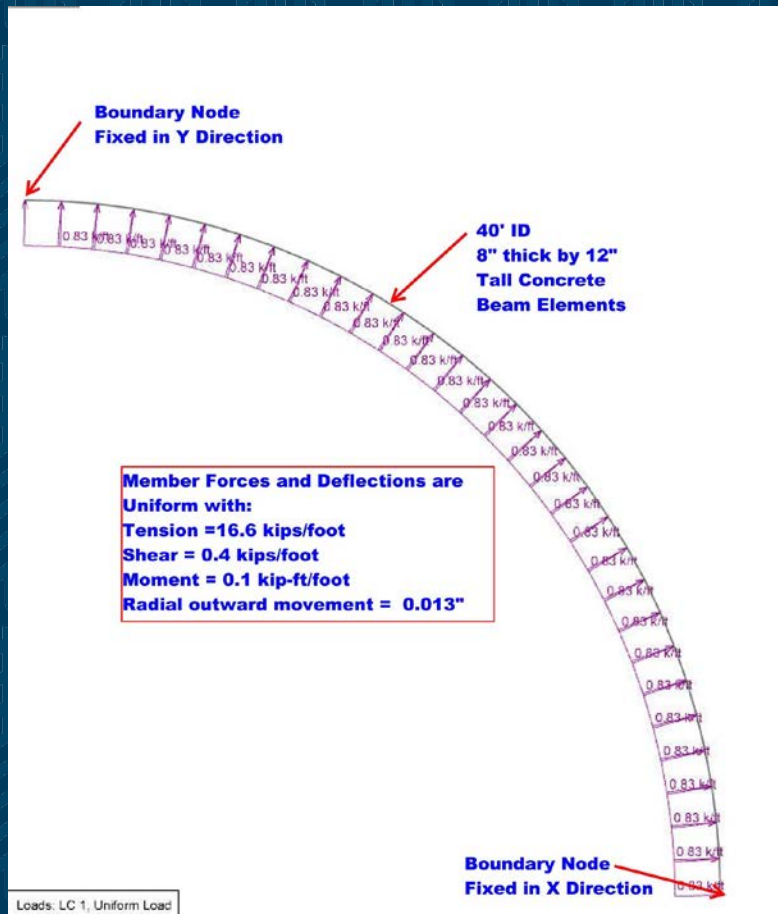
# Interstices – 40' Diameter Silo



# Interstices – 40' Diameter Silo

Circ.  
Silo

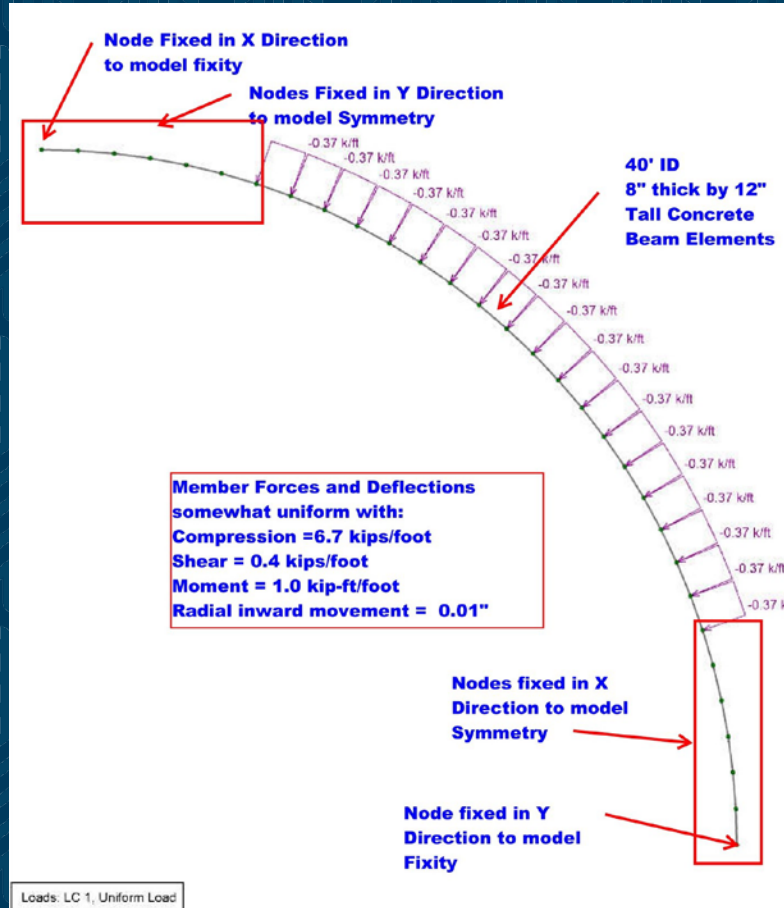
Interst  
Wall



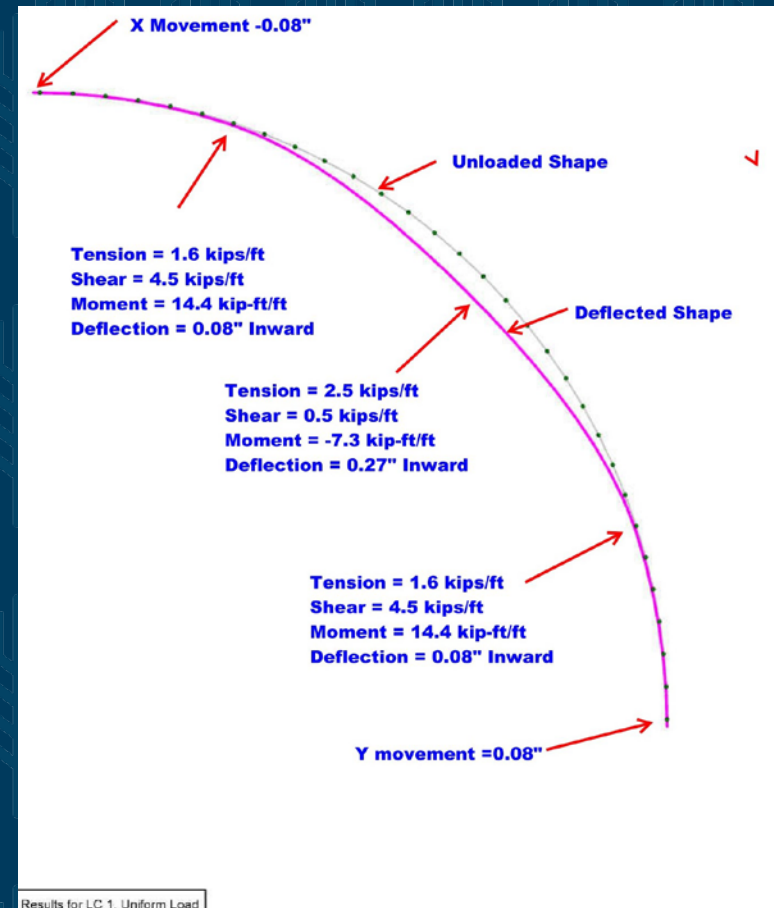


# Interstices – 40' Diameter Silo

Fixed Arch

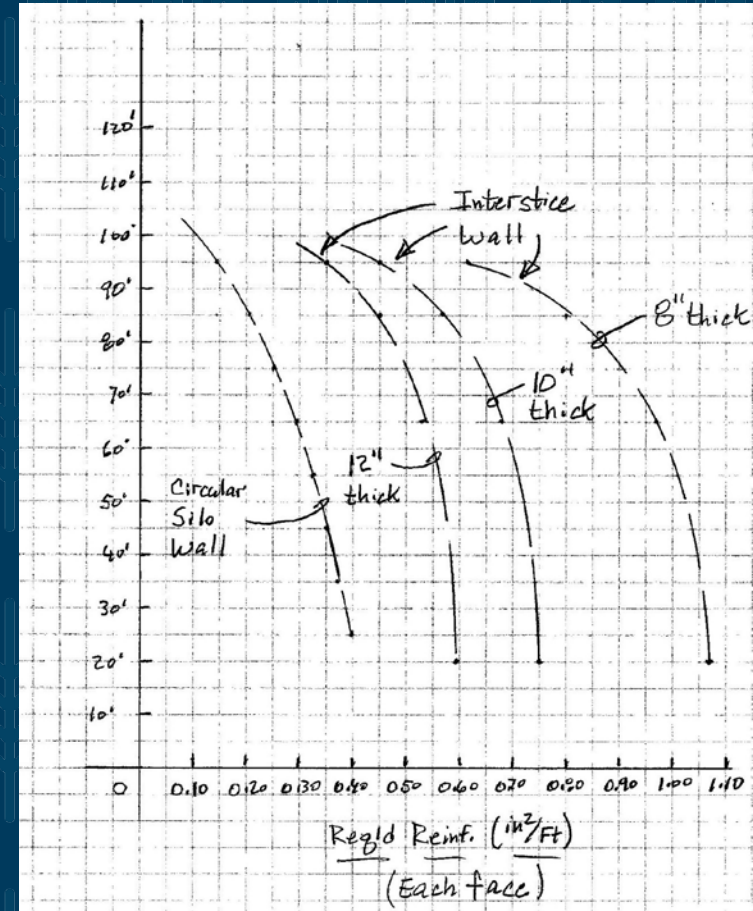
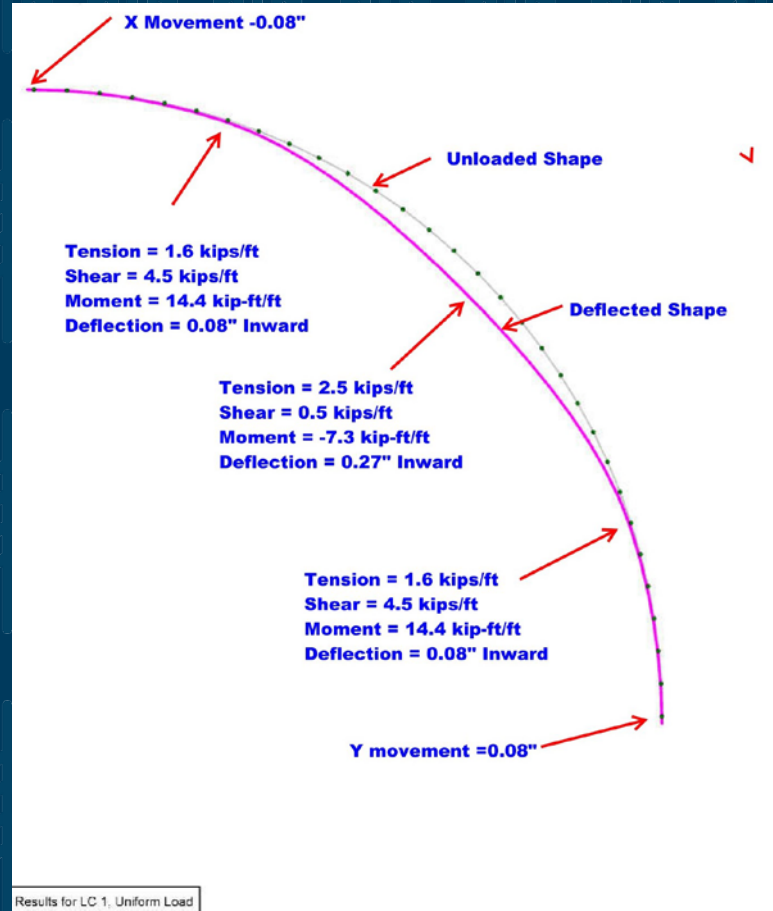


Interst Wall



# Interstices – 40' Diameter Silo

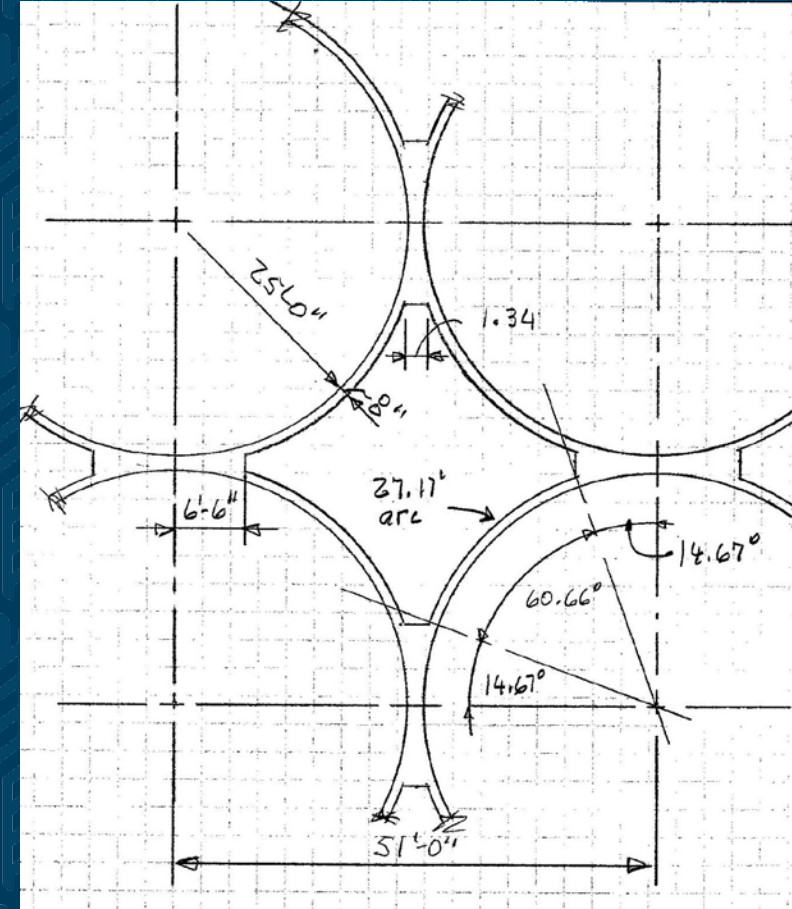
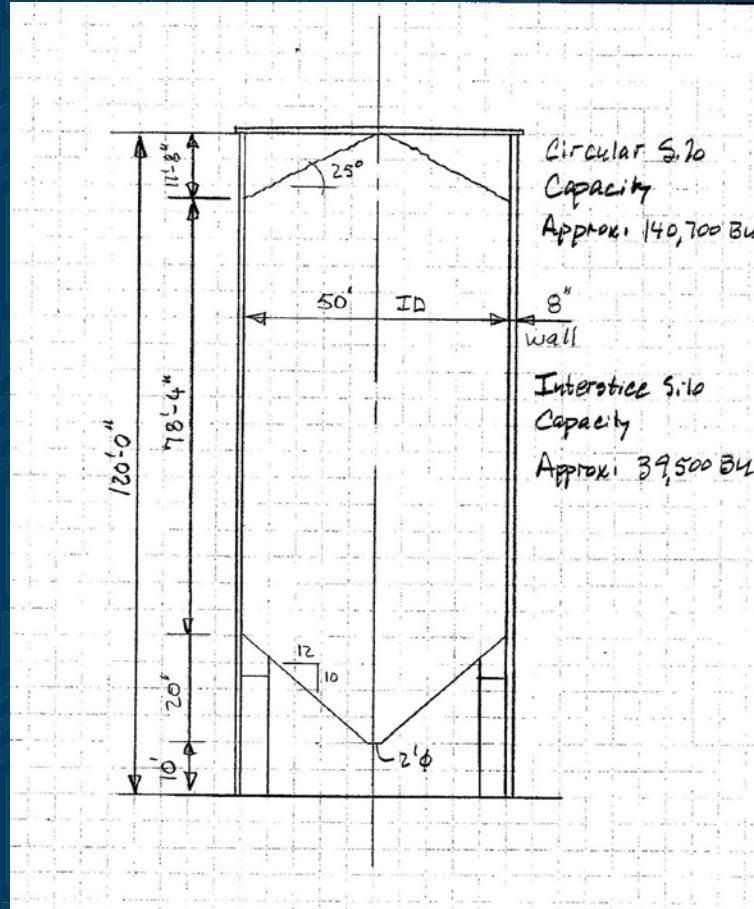
Minor  
Move-  
ment



Reinf.  
Req'd

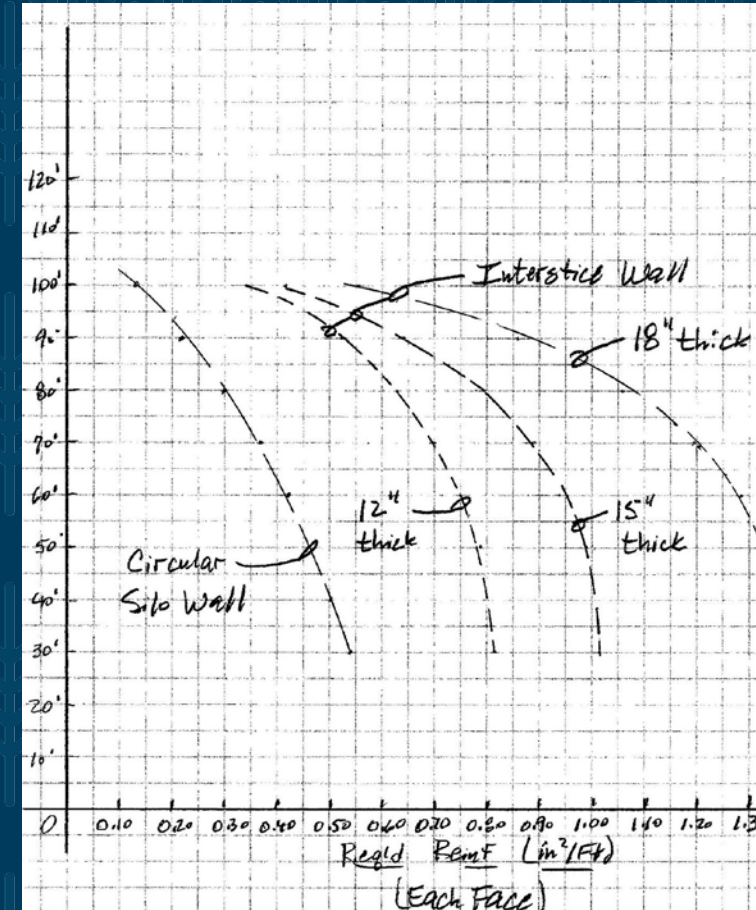
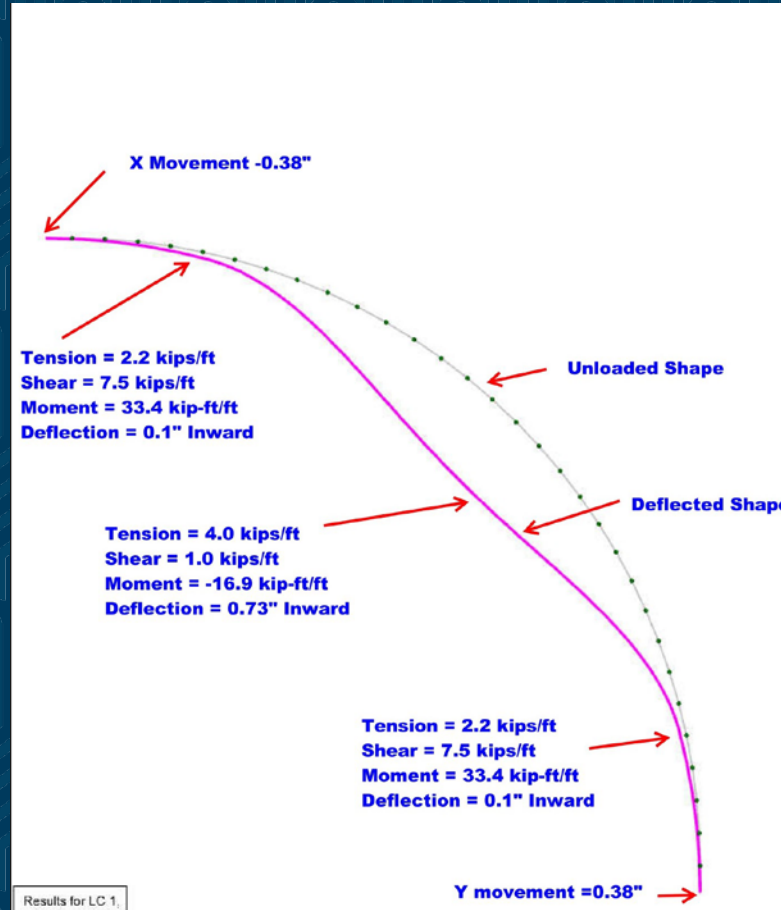


# Interstices – 50' Diameter Silo



# Interstices – 50' Diameter Silo

Minor  
Move-  
ment



Reinf.  
Req'd



# Interstices – Warning Signs

- Interior cracking
  - Wall
  - Joints



# Interstices – Warning Signs

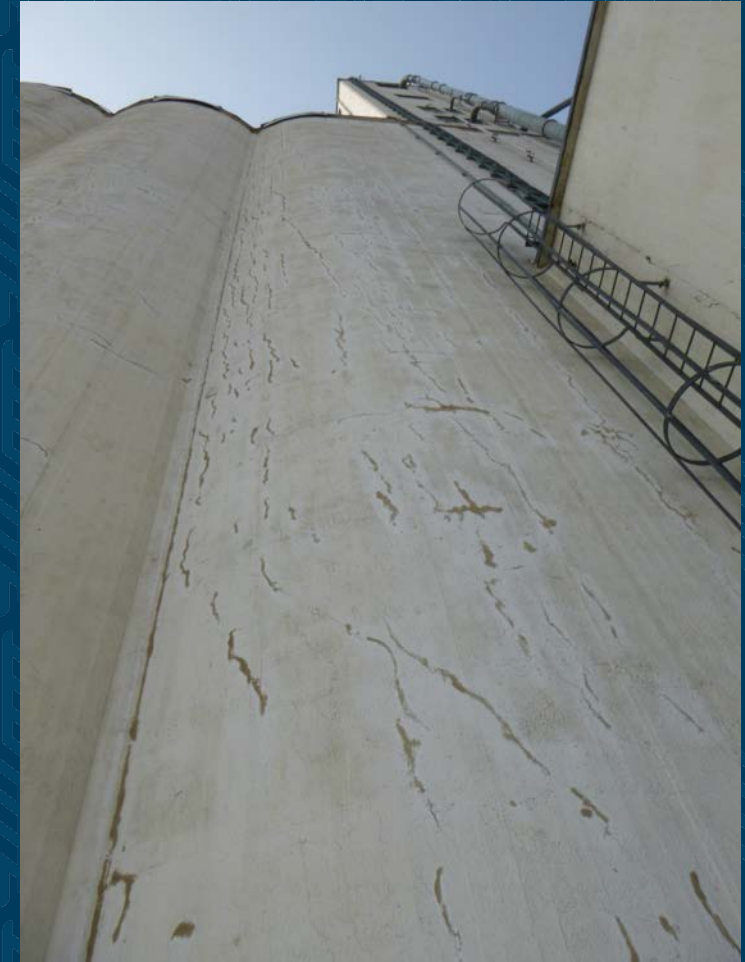
- Interior wall failure





# Interstices – Warning Signs

- Cracks at common wall



# Interstices – Warning Signs

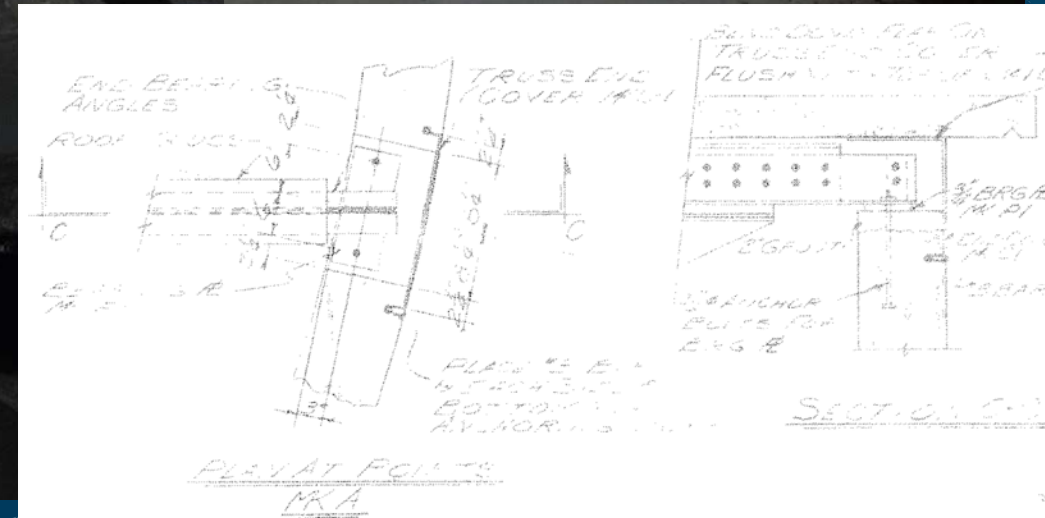
- Vertical cracks at corner silos





# Interstices

- Roof Beam / Truss Bearing Areas



# Inspections – Preventative

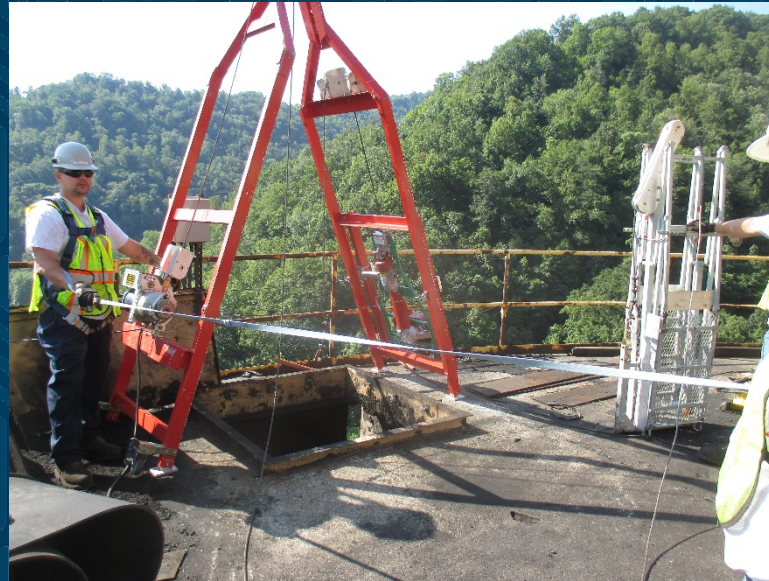
- Safety
- Stewardship
- Financial
- Planning





# Inspection Details

- Cursory / in depth
- Interior entry? Or exterior only?
- Experienced engineer?



# Inspection Details

- Cursory – inexpensive, inconclusive?





# Inspection Details

- Exterior only?  
Interior  
unknown





# Inspection Details

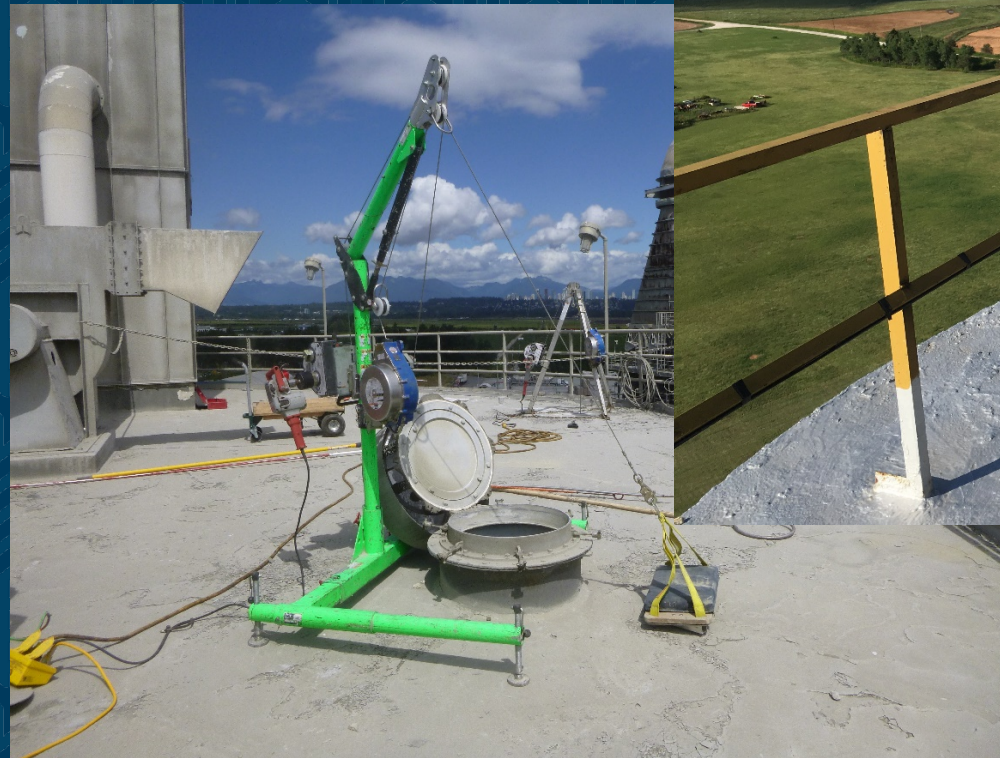
- Remote Camera / Drone
  - No cleaning, possible shadowing





# Inspection Details

- Interior access – accurate, time consuming, expensive





# Barriers to Inspection

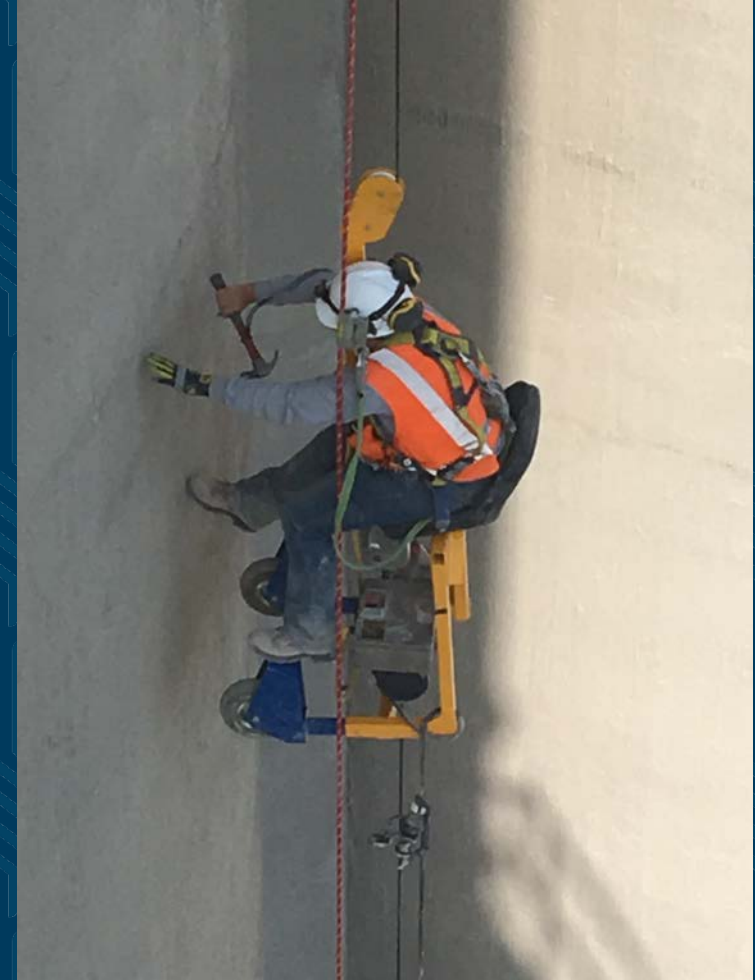
- Denial
- Lack of awareness
- Change in Management
- Cost – Inspection vs. Repairs





# Summary

- Not all interstices created equal
- Can take years to manifest
- Options for inspection
  - Cost, Accuracy, Effect on Operations
- You can start the process – look up!



# THANK YOU!

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Silo Interstice Usage and Cautions  
Post Survey



Please take a short survey for this session to help us plan for next year.

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## GEAPS Prize Bundle

- \$200 Visa Gift card and free registration to Leadership Conference
- Raffle will be drawn at Closing Celebration, Tue 2/28