



Building and Site Structure Systems – Recognize How Your Facility is Constructed and What You Can Expect and Protect Against

WELCOME

Moderated by: **Nicholas Laswell**, Vice President Chesapeake Chapter Professional Learning & Development Committee; Johns Hopkins University – Applied Physics Laboratory



Hosted by: CQI Associates and IFMA Chesapeake Chapter

**WEBINAR
PRESENTER**



Brian Tarantino – President,
Tarantino Engineering
Consultants (TEC)

Webinar Sponsored by:



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION





Contact us:

IFMA Chesapeake Chapter
PO Box 330
Woodstock, MD 21163

www.ifmachesapeake.org
Elizabeth@cqiassociates.com

2020 - 2021 CURRENT BOARD OF DIRECTORS

PRESIDENT
TREASURER
SECRETARY
PAST PRESIDENT
VP - CHAIR LEARNING & DEVELOPMENT
CO - CHAIR LEARNING & DEVELOPMENT
VP - INDUSTRY PARTNERING
CO - CHAIR INDUSTRY PARTNERING
VP - NETWORKING & MEMBER SERVICES
CO - CHAIR NETWORKING & MEMBER SERVICES
VP - EDUCATION & CREDENTIALING
CO - CHAIR EDUCATION & CREDENTIALING

RON SAUTER
KIM PERREAULT
RENE' CARTER
ROBERT PARKER
NICK LASWELL
MIKE ANTILL
WILLIE ARCE
ED DELAHA
BILL SELL
TONY BREEZE
DON BOOS
JIMMY PATEL

Webinar Sponsored by:



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION





Upcoming Events:

IFMA Chesapeake Chapter Idea Exchange

Date: Wednesday, August 26, 2020

Time: 8:30 AM – 9:30 AM

Topic:

**Virtual “Best Practice Idea Exchange”-
An Open Discussion Forum**

Join the Chesapeake chapter conversation to share your Best Practices. Exchange to focus on the 11 Core FM Skillsets.



September Outdoor Putt Putt Golf!

Date: Thursday, September 17, 2020

Time: 5:00 PM – 7:30 PM

Location: Mitchell's Golf Complex, Reisterstown, Maryland

***Join your colleagues in person
For a fun game of putt putt golf!***

***Enjoy socially distanced
networking, food and drink.
plenty of free parking.***

***9 Hole Sponsorships are available
for \$100 each!***

Visit the new chapter website
for more details and to register
to attend events

www.ifmachesapeake.org

Webinar Sponsored by:



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION





Platinum

Gold



Silver



Bronze



Chapter Sponsors

Webinar Sponsored by:



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION





August 19, 2020 Webinar Sponsors



- ❖ Global experts in industrial water treatment and process optimization, providing customized solutions to maximize efficiency and savings. The ChemTreat difference lies in the application of our advanced technologies and the partnerships we form with our customers.



- ❖ Specializing in the security business. That's our only business, and that's the reason for our continued growth. Experience, commitment, innovation, and follow-through always characterize Master Security's performance.



- ❖ Limbach is an integrated building systems provider - managing all components of mechanical, electrical, plumbing and control systems, from system design and construction through service and maintenance.



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Building and Site Structure Systems

Recognize How Your Facility is Constructed, and What You Can Expect and Protect Against



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Goals

- Structure is directly tied to public safety.
- Know your building.
- Lurking maintenance issues.
- Building limitations.
- Signs that something may be wrong.
- Materials
- Systems
 - Roof, Floors, Basement
 - Lateral force resisting systems
 - Foundations
 - Site walls/ stairs/ garages



Structural Design and Forensic Engineering

Structural Design

Blueprints, Building Design and Renovation

- Guinness Brewery
- MD Science Center
- Merriweather Post Pavilion
- Medstar Headquarters
- Airports, Hospital Systems, Universities

Forensic Engineering

Investigation of Building Damage and Collapse

- Deterioration
- Explosion
- Wind, Snow, Earthquake
- Vehicle Damage
- Poor design

25 years experience. 7 with TEC
TEC serves clients in states up and down the east coast



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Materials

- Metal
 - Structural steel
 - Cold formed metal
- Concrete (reinforced)
- Wood
 - Dimensional
 - Engineered
- Masonry
 - Concrete (CMU/ Cinderblock)
 - Brick (Clay)
- Other
 - Glass
 - Aluminum
 - Stainless Steel



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

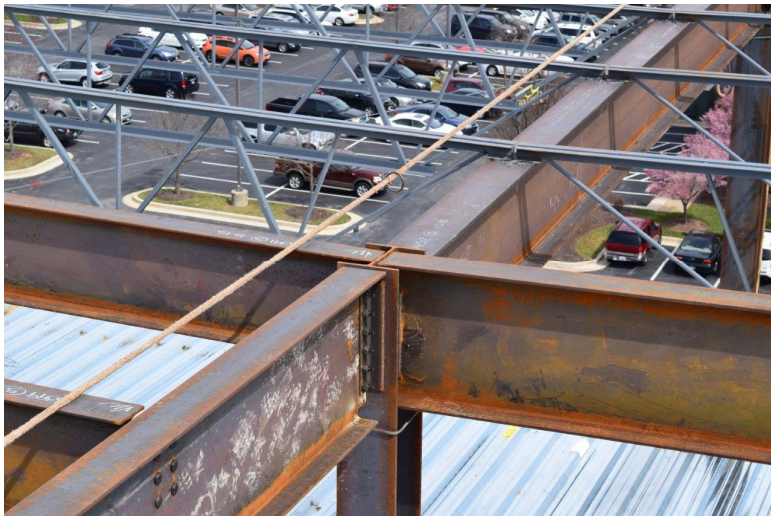
CERTIFICATION





Metal

- Structural Steel
 - W, L, C, HSS
 - Bar Joists
- Recycled material
- Metal alloy
- Susceptible to corrosion when wet or dissimilar metals.
- High strength to weight ratio.
- Treatments
 - Fire proofing
 - Galvanization



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Concrete

- Cement, water, aggregate
- Cement partly recycled material
- Heavy...there is a lightweight option
- Water resistant
- Naturally fire resistant
- Shallow floor systems, doubles as frame and floor.
- Formwork, slow



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



- Cast in place
 - Flat plate.
 - Beam and slab.
 - Pan joist.
 - Post tension.
 - Tilt-up
- Precast
 - Hollow core plank
 - Double T's



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Wood

- Dimensional (graded)
- Engineered (LVL, PSL, I joist, Glulam)
- Sheathing (OSB, Plywood, Planks)
- Renewable
- Treatments
 - Fire retardant
 - Pressure treated
- Shrinkage, combustible, glues susceptible to water
- Insects



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

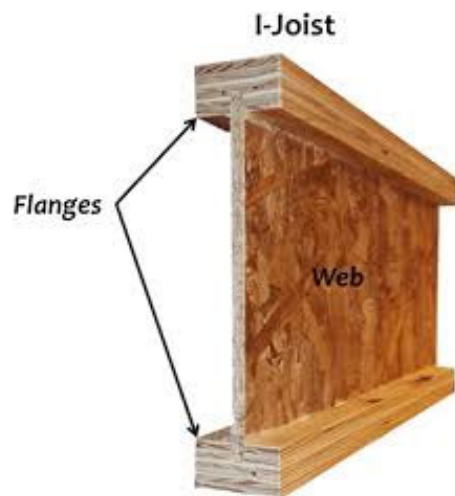
EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION





EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Masonry

- Concrete or clay
- Reinforced and grouted
- No formwork
- Fire resistant
- Walls
- Cheaper version of concrete.
- Susceptible to earthquake damage.



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION





- Glass
- Aluminum
- Stainless Steel
- Fiberglass



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Roof systems

- Decking
 - Wood (planks, plywood or OSB)
 - Cementitious with bulb tees,
 - Metal decking
 - Concrete
- Joists, beams, girders, trusses
 - Wood, steel bar joists or beams, concrete
- Pre-engineered buildings
 - cheap and lack of redundancies.
 - Hard to modify



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Pre-engineered buildings

- cheap and lack of redundancies.
- Hard to modify



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

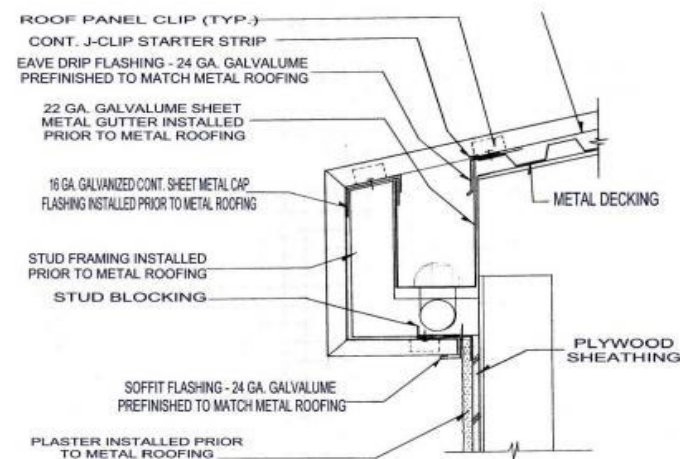
ENCOURAGEMENT

CERTIFICATION



Roofs What to look out for?

- Window washing equipment (testing, parapet damage)
- Hidden or concealed gutters
- Screen deterioration (hide RTU's)
- Water infiltration- parapet copings, ponding (low spots), interior drains.
- Associated corrosion and deterioration.
- Ballast movement



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Roofs What to look out for?

- Dunnage deterioration
- Roof top unit, fan, shaft alteration or replacement. New units are more efficient but typically heavier and curb adapters add weight.
- Adding sprinklers
- Solar panels
- Cold storage ceiling panels
- Welding.
- Cell towers



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



- MAINTENANCE, parapet coping upgrades, roof sloping, changes, roof changes, Rope Descent Systems.

- Identifiers: rust, cracking, ponding

- Sudden

- Snow in combination with other factors- wind, sprinklers upgrades
 - Pre-engineered metal building most common
 - Wind uplift, lack of anchorage on legacy systems or ballast removal.
 - Wall failure from tornados or vehicle damage
 - Parapet damage from wind, water, or earthquake

- Slow

- Corrosion, water infiltration



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION





EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



OSHA Anchorage Requirements for RDS

- 1910.27(b)(1)(i) now requires that before “employers use a rope descent system, the building owner must inform the employer in writing that the building owner has identified, tested, certified, and maintained each anchorage so it is capable of supporting 5,000 pounds in any direction, for each worker attached”. The new regulations also require that the building owner base the information provided to the employer on:

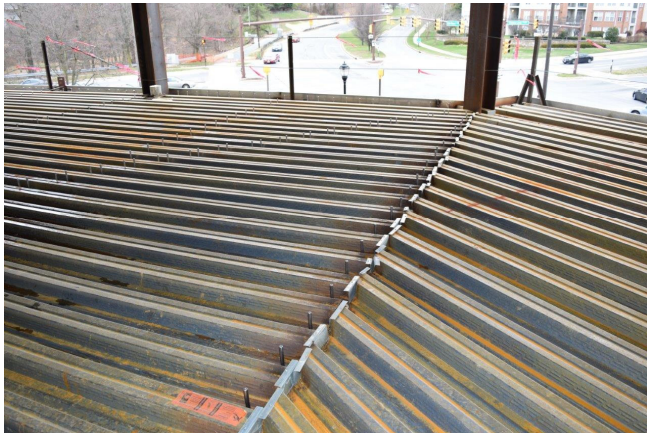
An annual inspection; and

A certification of each anchorage, as necessary, and at least every ten years.

- In case you are wondering about the certification as necessary language above, OSHA is saying that an accident that damages the anchor, major alterations to the building, or exposure to the elements might require more periodic re-certification.
- OSHA also outlines an employer’s responsibilities in 1910.27(b)(ii):
- “The employer must ensure that no employee uses any anchorage before the employer has obtained written information from the building owner that each anchorage meets the requirements of paragraph (b)(1)(i) of this section. The employer must keep the information for the duration of the job.”

Floor systems

- Decking
 - Wood (planks, plywood or OSB), metal decking with concrete topping, concrete,
 - Legacy systems- terra cotta and masonry between purlins.
- Joists, beams, girders
 - Wood, steel bar joists or beams, concrete
- Office 50 psf w 15 psf partitions or 100 psf class A
- Assembly 60 psf fixed seats, 100 psf moveable.
- Residential hotel 40 psf
- Hospitals 40 psf patient, 60 psf operating rooms
- Garages 40 psf
- Storage, 250 psf heavy, 125 psf light)
- Retail, 100 psf



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION





EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



- What to watch out for:
 - High density filing, folding partitions, unusually heavy furniture, ups rooms
 - Vibration sensitive equipment
 - Heavy equipment
 - Fireproofing disturbance
 - Post tension floors
 - Coring
- Deterioration rare on floors.



Roof Failures



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



- Sudden failure is rare.
- Usually have warning in the way of excessive movement or cracking of structures or surrounding finishes.
 - Occupancy change
 - Heavy equipment
 - Post tension cable snap
- Exterior Columns
 - Very susceptible to corrosion, failure of a column could lead to a building collapse. Waterproofing and galvanization has a limited life. Hidden dangers below grade.



Failures



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Lateral force resisting systems

- Bracing (x-brace)
- Shear walls
- Moment frames



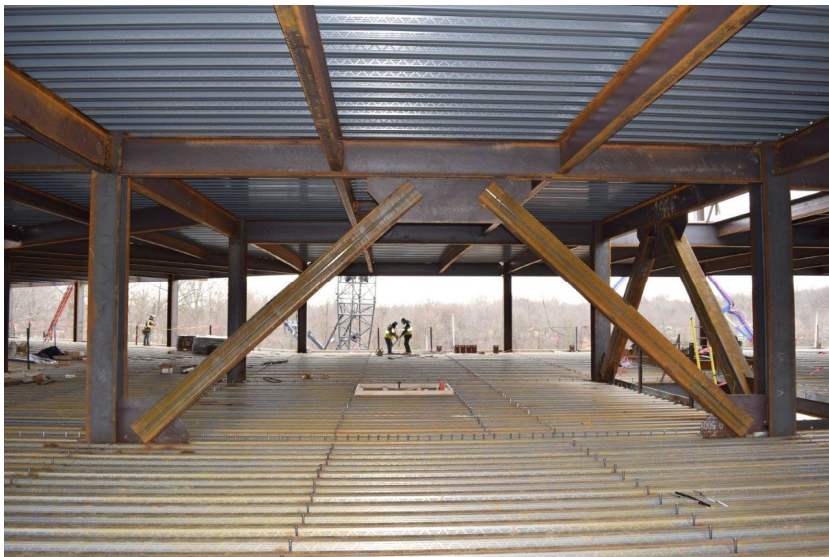
EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Above grade wall systems



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

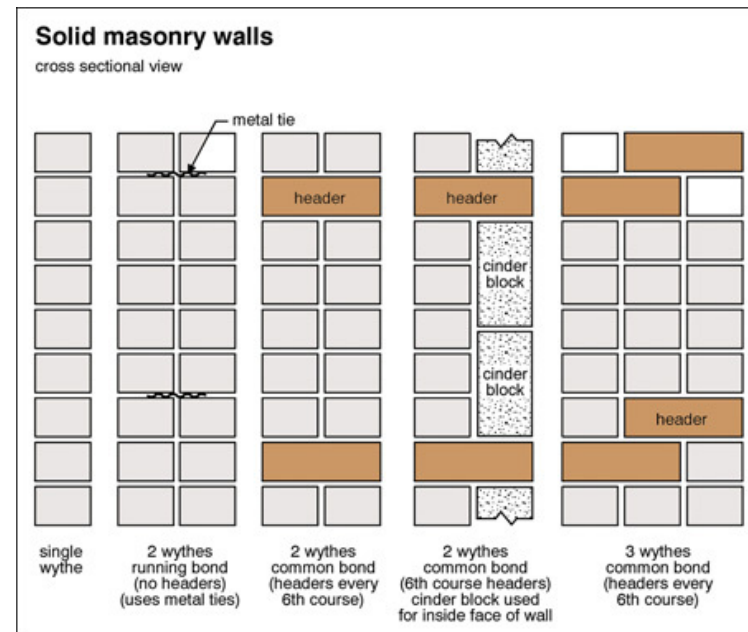
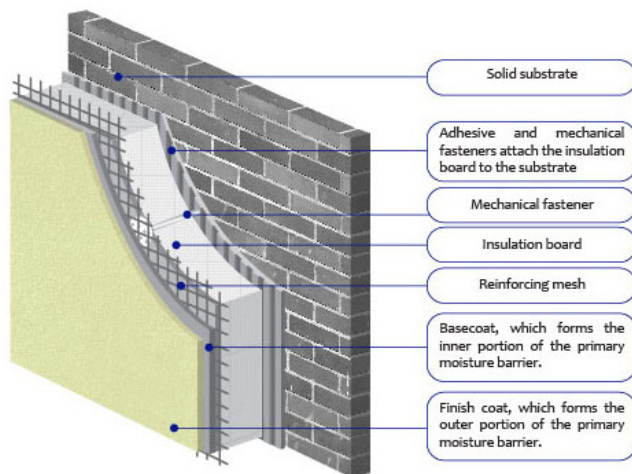
ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



- Mass wall legacy systems of brick and block- water infiltration, lack of water barrier
- Old EIFS systems
- Façade-Brick, precast, metal panel, cementitious (EIFS, dryvit)
- Backup systems, cold formed metal framing, wood, masonry
- What to watch out for:
 - Cracking on façade or interior
 - Temperature or settlement
 - Water staining lead to structural deterioration
 - Brick tie and intel rusting



Failures

- MAINTENANCE, caulking, window replacement, mason repointing
- Watch out for legacy systems.
- Sudden
 - Wind
- Slow
 - Water infiltration



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Below grade wall systems



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

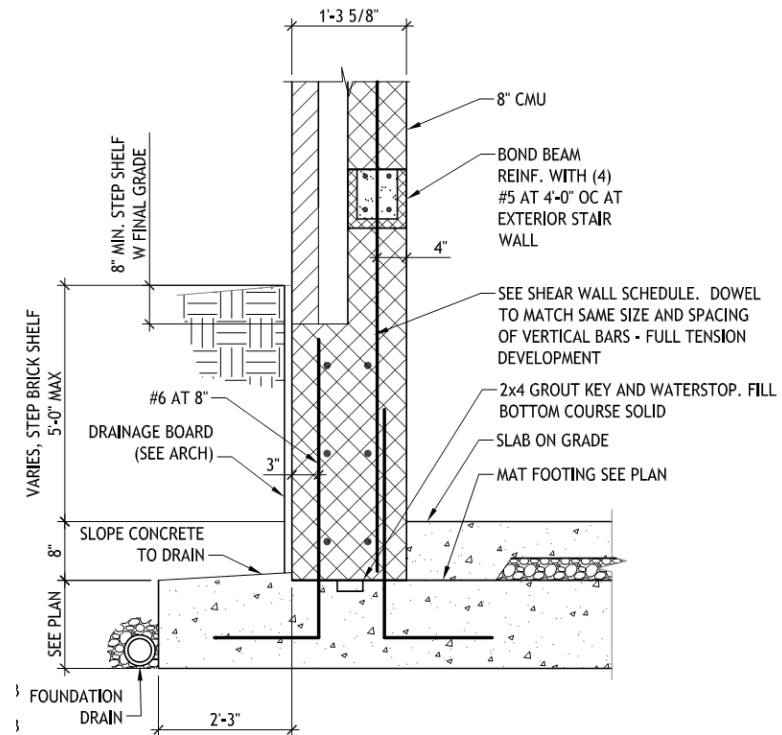
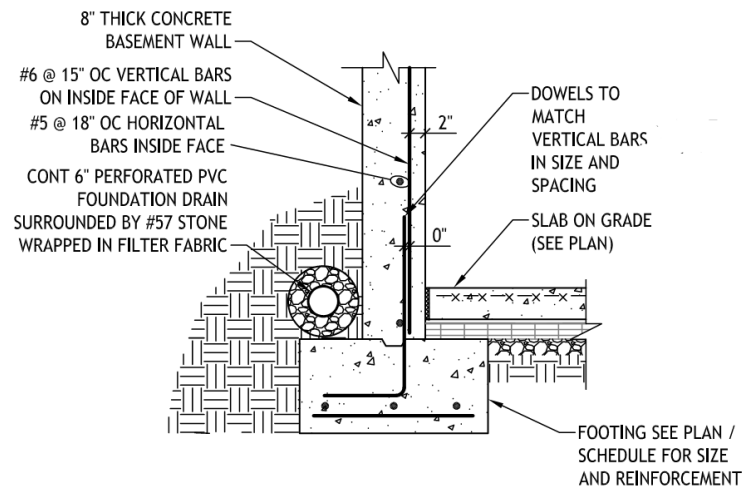
EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION

- Concrete and Masonry (reinforced)
- Dampproof
- Waterproofing
- Drain tile, pumps
- What to watch out for:
 - Cracking
 - Lateral earth pressure or settlement



Failures

Usually plenty of warning

- Cracking and water staining
- Why?
 - Under design
 - Groundwater changes
 - Waterproofing deterioration
 - Drain tile clogged, sump pump failures



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Slab systems

- Slab on grade, concrete varies from 4" to 8" over a vapor barrier on subbase of stone.
- Crawlspce over mudslab. (unusual in commercial, found in older wood commercial)
 - vented



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Slab systems

- Usually plenty of warning
 - Cracking and settlement
- Voids from groundwater
- Heavy equipment
 - Racking
 - Vehicles (trucks)



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

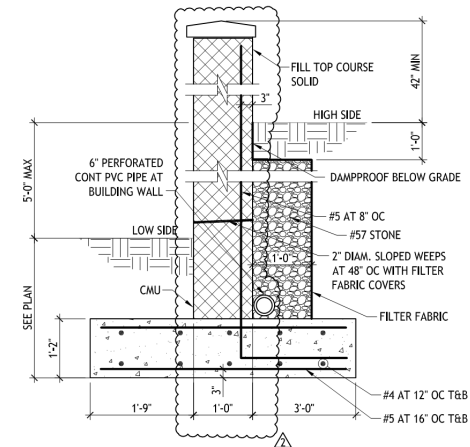
ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



- 



Failures

- Sudden, rare
- Usually plenty of warning
 - Walls: Leaning, cracking, deterioration
 - Soil slope stability, surcharge overload, ground water changes
 - Railings/ stairs, deterioration from metal posts. Caulking prevention.
 - Sidewalks
 - Salts and deicing



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Failures



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Foundation systems

- Shallow concrete spread footings
- Deep foundation systems
 - Wood, concrete or metal piles



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Failures

- Hope to never have maintenance issues
- Deep foundations that change conditions- wet/dry
- Differential settlement
- Groundwater



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Parking garages and plazas

- Precast concrete
 - Steel frame
 - Water and chemical damage
 - Constant maintenance, garages should last a long time.
 - Spalling or cracking concrete, rusting steel
 - If not maintained, connection failure could result in catastrophic failure.
-
- Plazas
 - Expensive



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

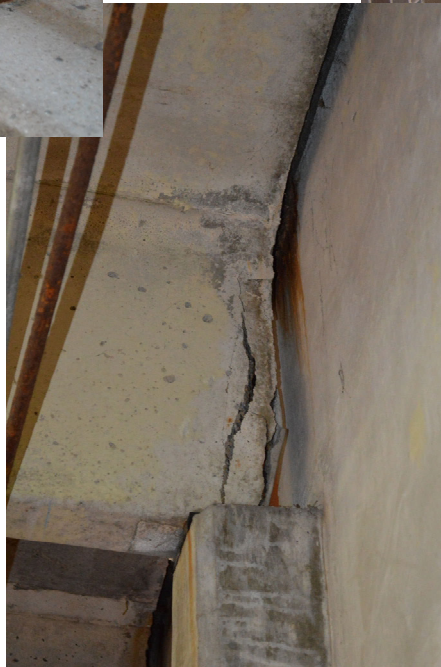
ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Failures



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Worst Failures

- Tornados
- Vehicle damage
- Snow failures on pre-engineered metal buildings.
- Exterior steel column failure (water)



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Worst Maintenance Offender



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Water



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Structural Engineer

- Cracking or corrosion in structural elements.
- Finish damage, cracking or water staining.
- Renovations, tenant modifications, equipment.
- Assessment before purchase.

www.tarantinoec.com



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION



Questions?



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION





This presentation on **Building and Site Structure Systems – Recognize How Your Facility is Constructed and What You Can Expect and Protect Against** can be applied to:

IFMA CFM Maintenance Activities

1 hour attendance of the CEU can contribute toward
Category 1 – FM Related Education
self report points and activities on the IFMA website
under the CAMP Portal

www.ifma.org

Webinar Sponsored by:



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION





Thank you to the Presenters for sharing their expertise!

Thank you to the webinar Sponsors for their support!

For additional information about the Chesapeake Chapter please visit:

www.ifmachesapeake.org

Join us in August and September:

- Join the conversation and share ***your*** Best Practice Ideas
- Come Outdoors and play Putt Putt Golf and get ready for the Golf Tournament in October

Thank you for attending!

Webinar Sponsored by:



EMPOWERING
FACILITY
PROFESSIONALS
WORLDWIDE

EDUCATION

ENGAGEMENT

ENCOURAGEMENT

CERTIFICATION

