Barrier Cable Systems, Inc.

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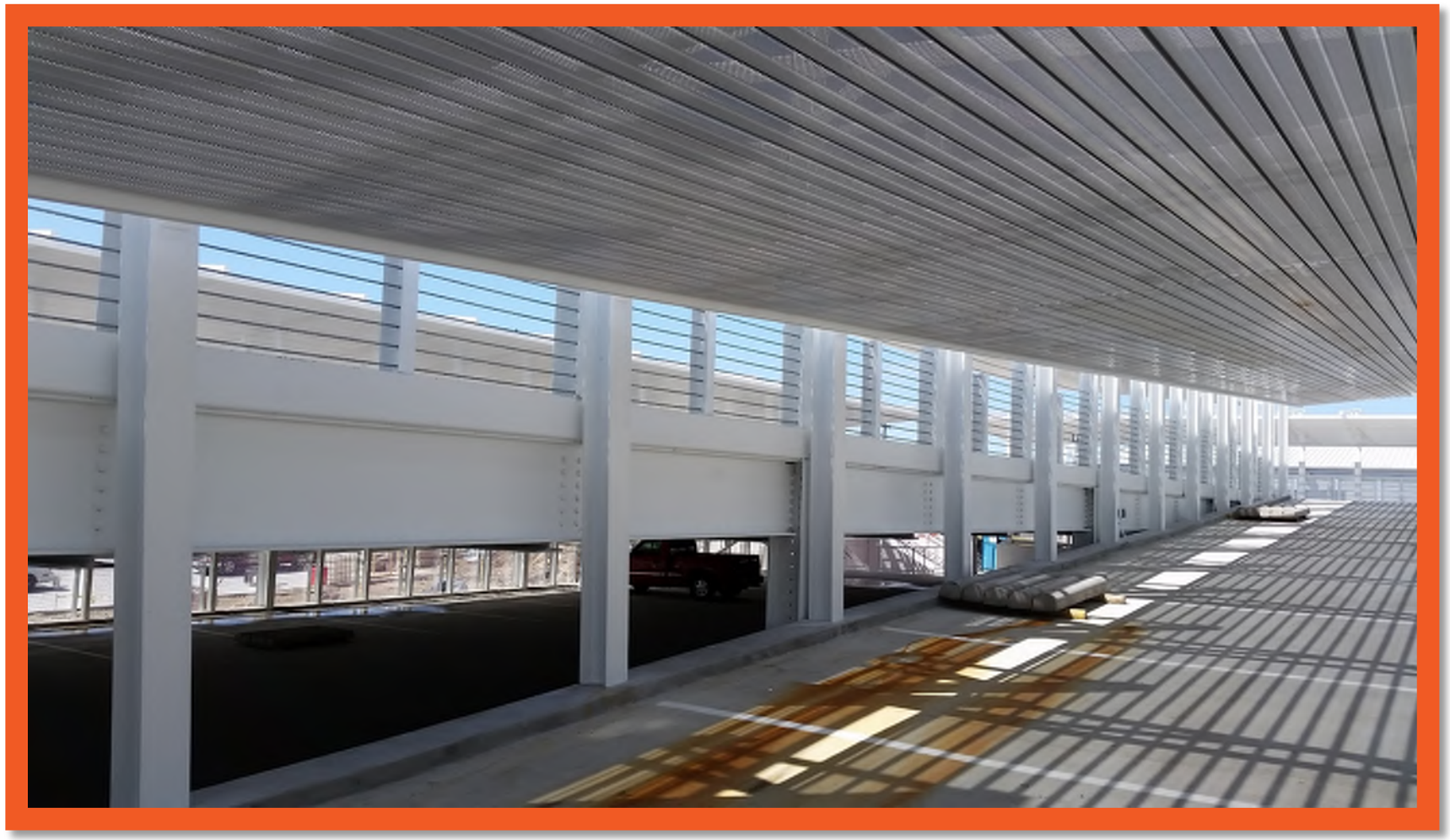

POST-TENSIONING INSTITUTE ®

American Concrete Institute
Always advancing

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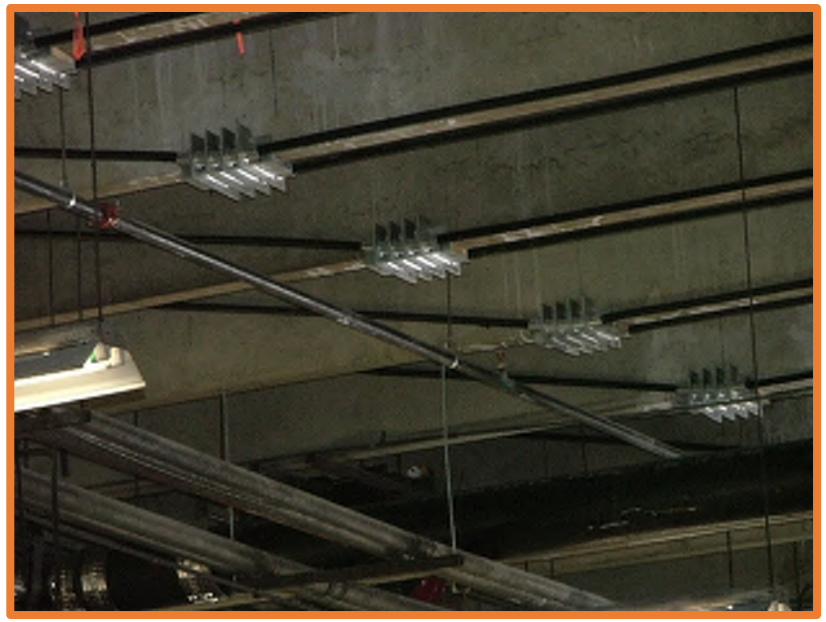

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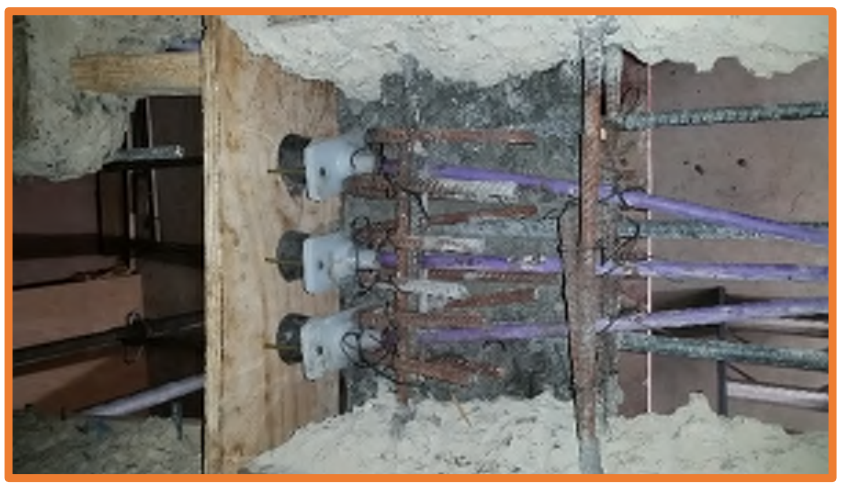

Barrier what?

Barrier Cable Systems are a Specialty type of cable guardrails that uses technologies derived from the Post-Tensioning technique in order to achieve a cable railing system capable of stopping vehicles in compliance with the building codes with the highest strength/weight and strength/cost ratios. wall…..

The use of very special carbon steel alloys (8 times stronger than the regular steel that would be used in common tube and plate guardrails…..) combined with the Pre-tensioning of the cables allows the barrier to resist to extremely high loads such as the ones generated by a vehicle impact and do so in a progressive way to arrest the vehicle “gently” when compared to crashing into a concrete barrier wall…..

Why Cables?

Barrier Cable Systems are:

- **The most cost effective solution with an average direct cost of $30/lf.**
- **The lightest solution, only 6 lbs/ft compared to 240 lb/ft for a 6” concrete crash wall….. That translates in cost savings on the structure and its foundations.**
- **Create an open structure where mechanical ventilation systems may not be necessary with direct and lifetime cost savings.**
- **Façade cables create open structures where the need for sprinkler systems can be waived (depending on local fire codes and authorities).**
- **A cable barrier restraint system is the greenest solution with the smallest carbon footprint of any vehicular barrier with the least and most effective use of materials mostly recycled (post-consumer).**

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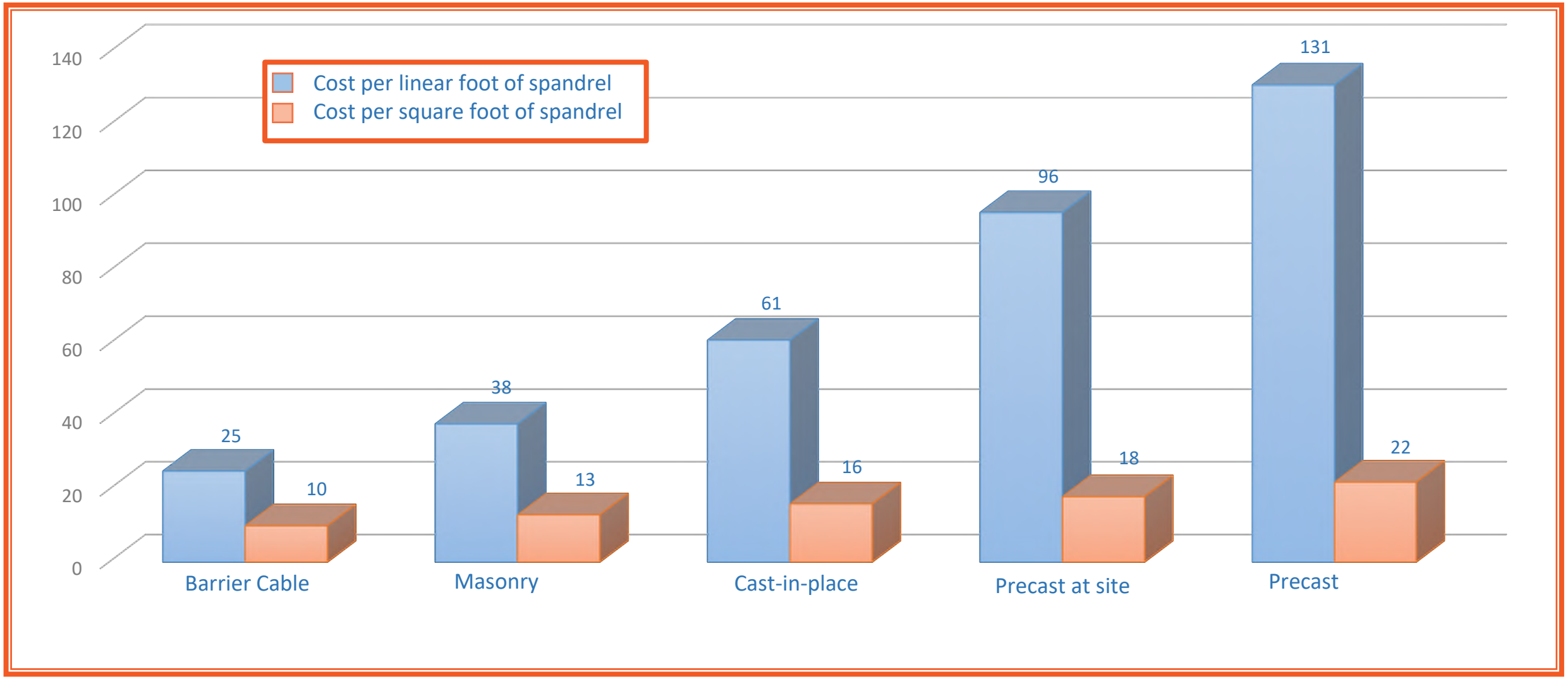
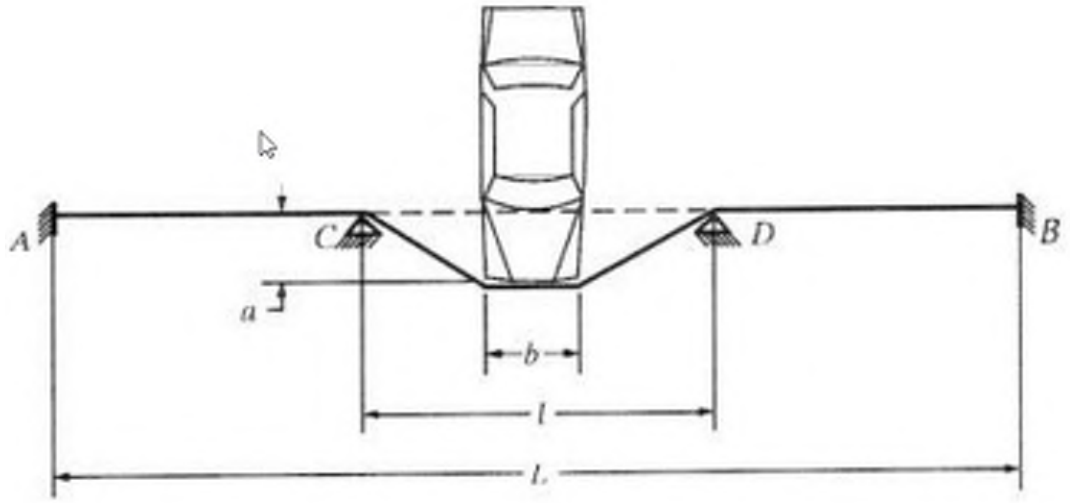


Why Cables?

Example of the most efficient design…..

Why Cables?



- Very high strength galvanized steel cables are tensioned to a force between 2,000 to 7,000 lbs each between the columns of the structure
- When impacted by a stray vehicle, the cables stretch and react against the vehicle until absorbing all its kinetic energy
- For a barrier to be considered a vehicular restraint, codes require that it resist to an equivalent static load of 6,000 lbs with the vehicle stopped within 18” of the cable plane.
- This typically requires 3 cables…. Common 11 cable barriers result from the consideration of pedestrian fall protection rules

Barrier Cable Design Process

- BC's are life safety systems, the supplier/installer of the Barrier cable should provide PE stamped fabrication/installation drawings and calculations demonstrating compliance with the code requirements as applied to each specific structure and eventually specific requirements defined by the Architect or Engineer of Record.

- When steel posts or angles are required for the barrier, these shall be Engineered by the barrier designer so that they are able to resist to the barrier loads (permanent and impact) as well as direct impact when possible.

- The EOR shall verify that the barrier cable reaction at the ends applied to the structures columns or walls is compatible with their strength.

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Design Criteria / Vehicle Restraint

1 – Needed when ever a vehicle is exposed to a 12” or more possible drop. Minimum height for vehicle restraint barriers is 33” (implies a minimum of 6 cables).

2 - Cable Sag Limitation : This criteria provides a minimum tension required to keep cables from sagging excessively (more than ¼”) and maintain the barriers intended geometry.

3 – Deflection Criteria : Resist to a vehicle impact simulated by a 6,000 lbs static force applied on a 12”x12” impact area located between 18” and 27” above the rolling surface with no more than 18” deflection (beyond the edge) or any permanent deformation or damage.

4 – All components and their anchoring to the Structure needs to be designed to resist loads resulting from permanent tensions and impact reactions. EOR to verify that the structure is capable of handling such loads.

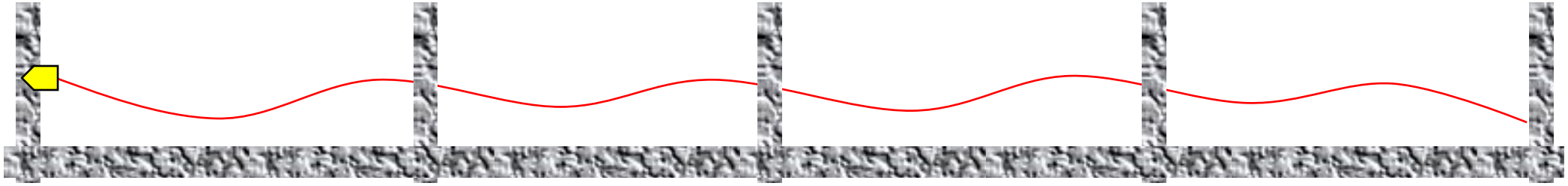
Design Criteria / Pedestrian Safety

1 – Needed whenever there is a possible drop/fall of 30” or more.

2 – Top rail located at a minimum 42” off the surface. Prevent the passage of a 4” sphere anywhere from the deck to 34” above it and of an 8” sphere above that height.

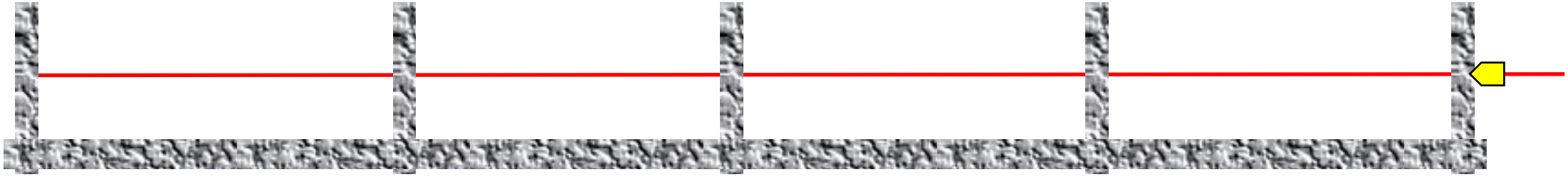
3 – Be able to resist a single localized force of 200 Lbs at any point of the barrier and/or 50 lbs/ft on the top rail.

Field Installation step 1



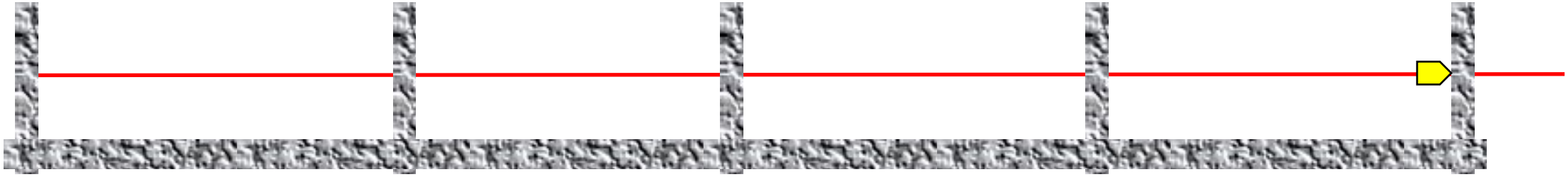
Feed cable from the stressing side to the opposite end and perform the back seating to a minimum 28 Kips at the Dead End

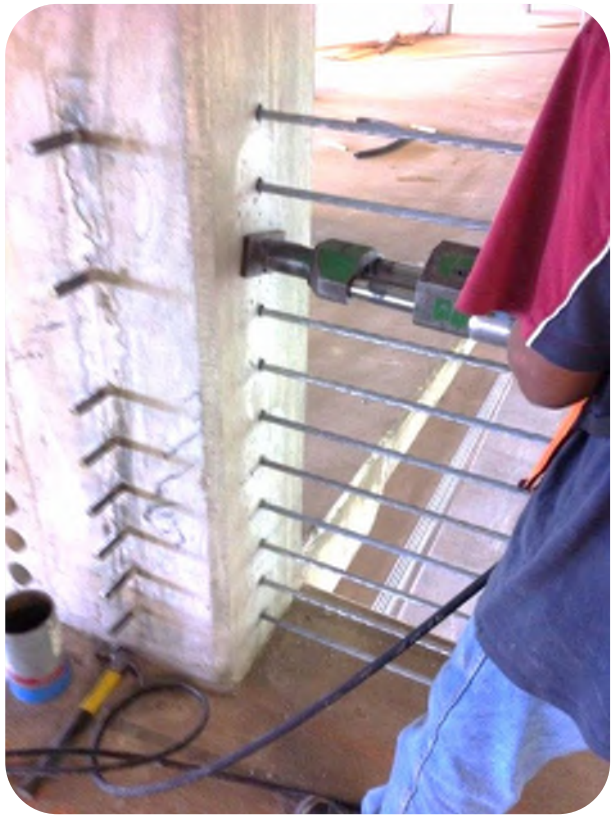
Field Installation step 2



Tension cable with a calibrated PT Jack to the required force, extend the piston an additional 3/8” to anticipate wedge set then release (elongation recording is not useful or required)

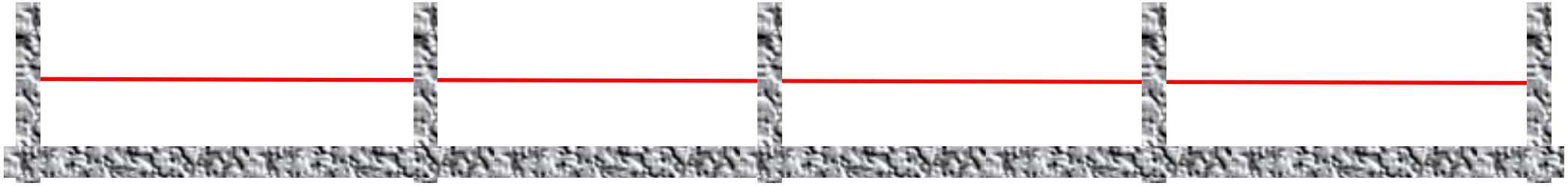
Field Installation step 3





Perform the back seating to a minimum 28 Kips at the Live End (the 3/8” extra elongation are then lost as the wedge draws in to a permanent lock)

Field Installation step 4



Trim tails inside the anchor pockets, patch pockets with non-shrink dry pack grout, touch-up jack gripper bites with cold galvanizing compound.

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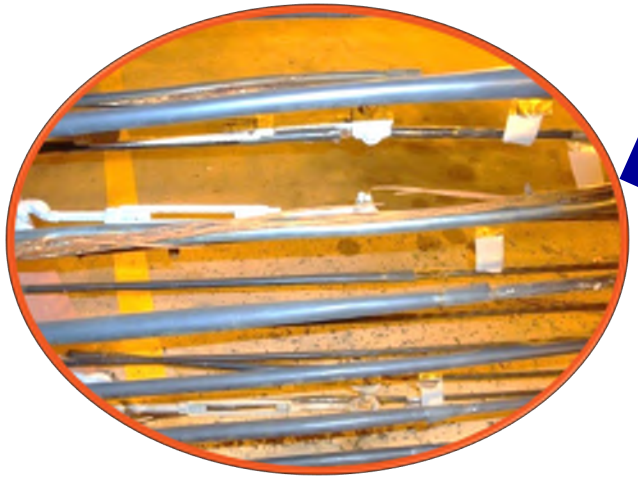
Testing & Commissioning

Are plastic sheathed strands OK?



References: Added & Temporary Systems

References: Cable & CLF Combinations

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Perimeter Roof Barrier Cables

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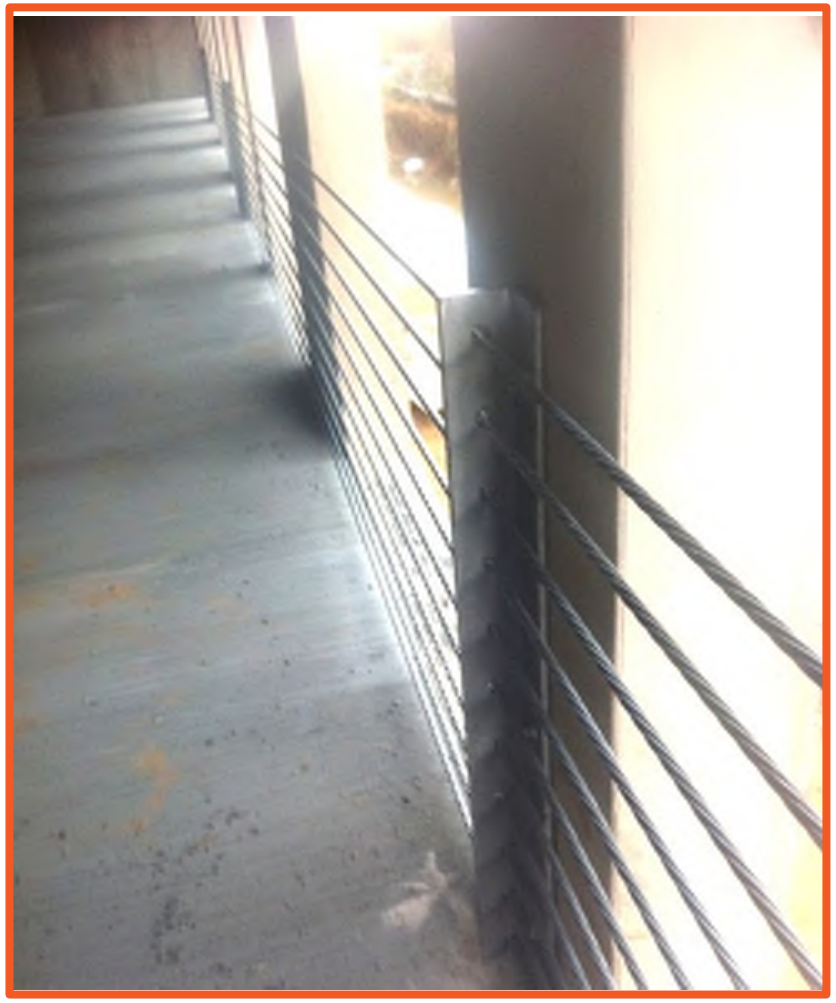
Barrier Cables in Precast Garage Structures



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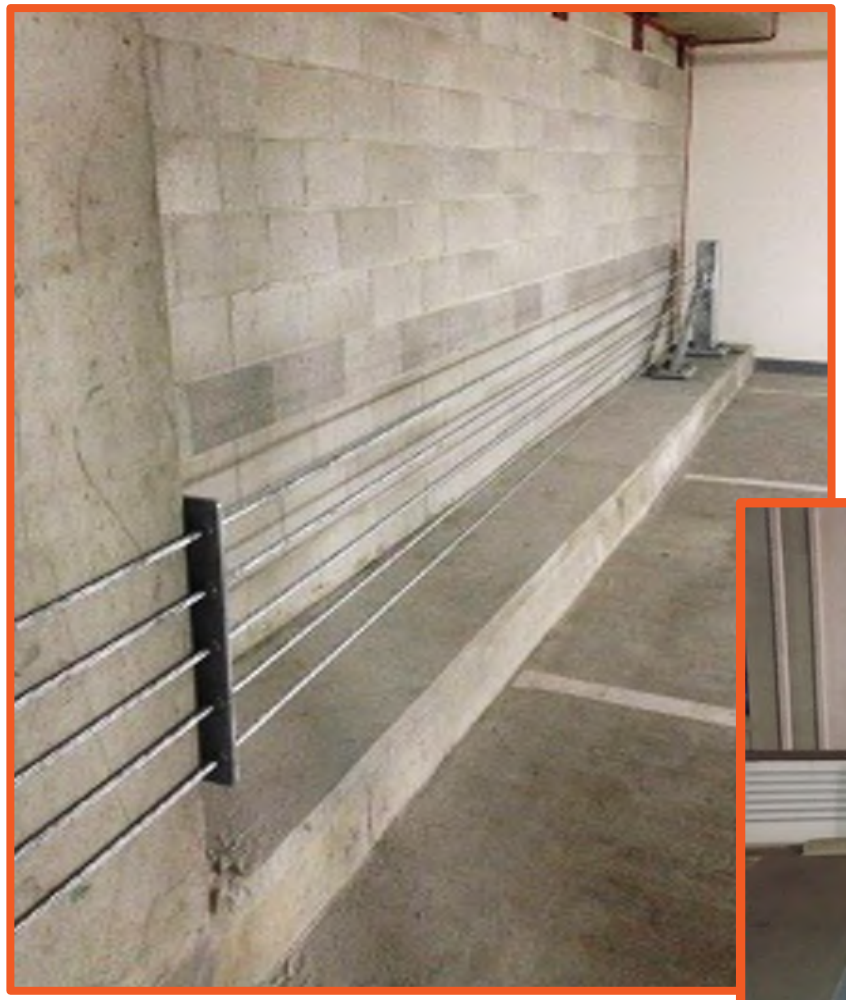
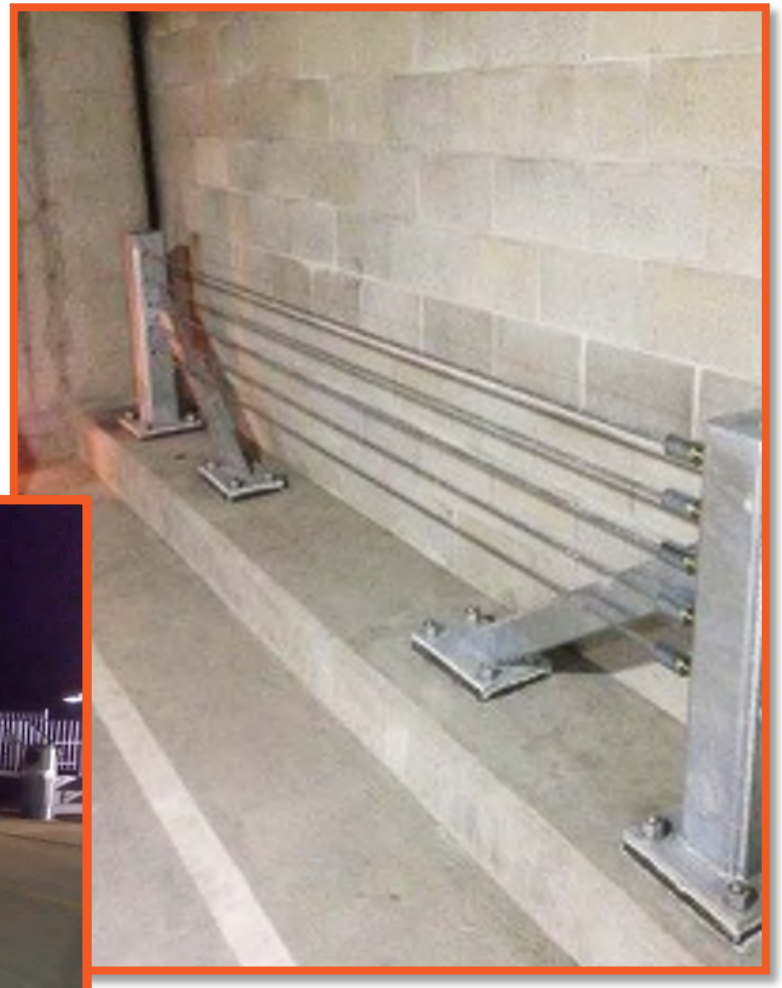
Barrier Cables added to existing Garages





Parapet Mounted Cable Railings

Questions?

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Thank You!

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