Transformed Specification for Horizontal Lifeline Fall Arrest System

Safety Seminar
22 June 2009

Background

- HA already installed HLL at sloping canopies at 161 blocks in 31 estates
- 3 years programme to install HLL for flat canopies involving 670 blocks
- Inadequacy & unclear requirements of the old EMD specification
- Need for maintenance/annual inspection of existing HLL after warranty period

Standards

- BS EN 795 : Protection against falls from height – Anchor devices – Requirements/testing
- BS EN 354 : Personal Protective Equipment against Falls from Height – Lanyards
- BS EN 355 : Energy Absorbers
- BS EN 361 : Full Body Harness
- BS EN 362 : Connectors
- BS EN 364 : Test Methods
- BS EN 365 : General Requirements for instructions for use and marking
- BS 7883: Code of Practice for anchor device

Requirements of EN 795

- Five classes of systems
- Class C = Horizontal Lifeline
- Designed to withstand twice the force arising in such components from the max line tension at fall arrest
- Static strength test: 1.5 times the manufacturer's permitted design force
- Dynamic performance test: line tension and deflection not vary >20% from that determined by the manufacturer
- Dynamic strength test: mass of 12 kN force be retained

General View

Cases photos

研究新知需創意
發展技術重分享

Mounting Types of Horizontal Lifeline

CEILING MOUNTING

WALL MOUNTING

POST MOUNTING

ROOF MOUNTING

End Bracket

研究新知需創意
發展技術重分享

- Taking major loading
- Suitable for load test

XENON

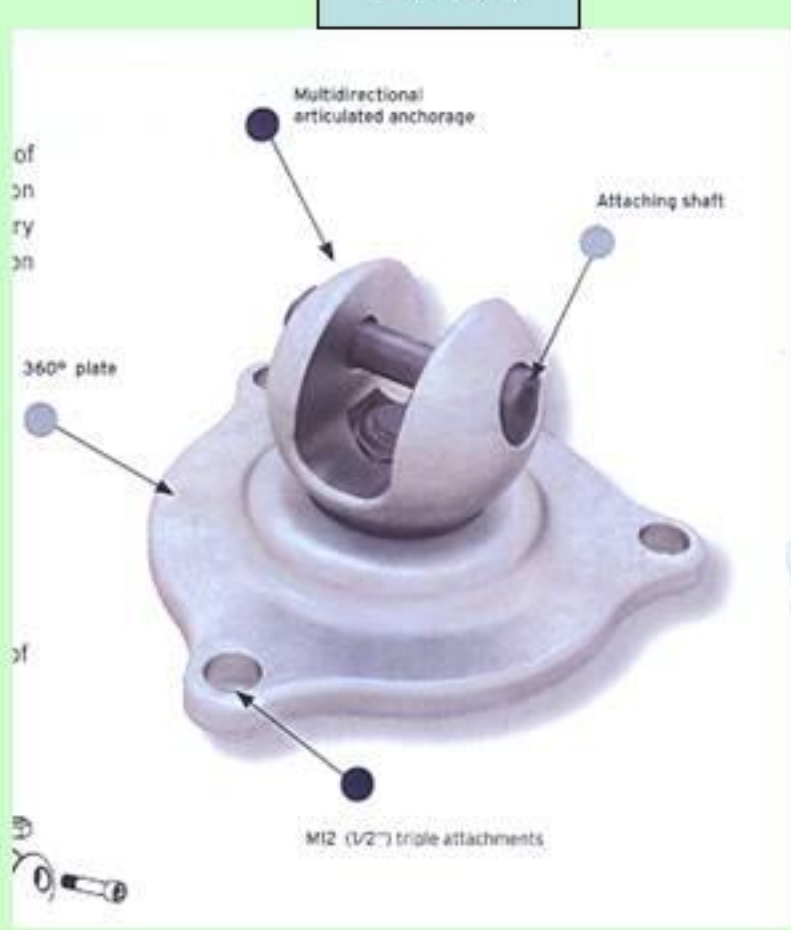
Product A

End Anchor Plate
末端固定點

End Anchor Piece
末端固定點

PROTECTA

SALA



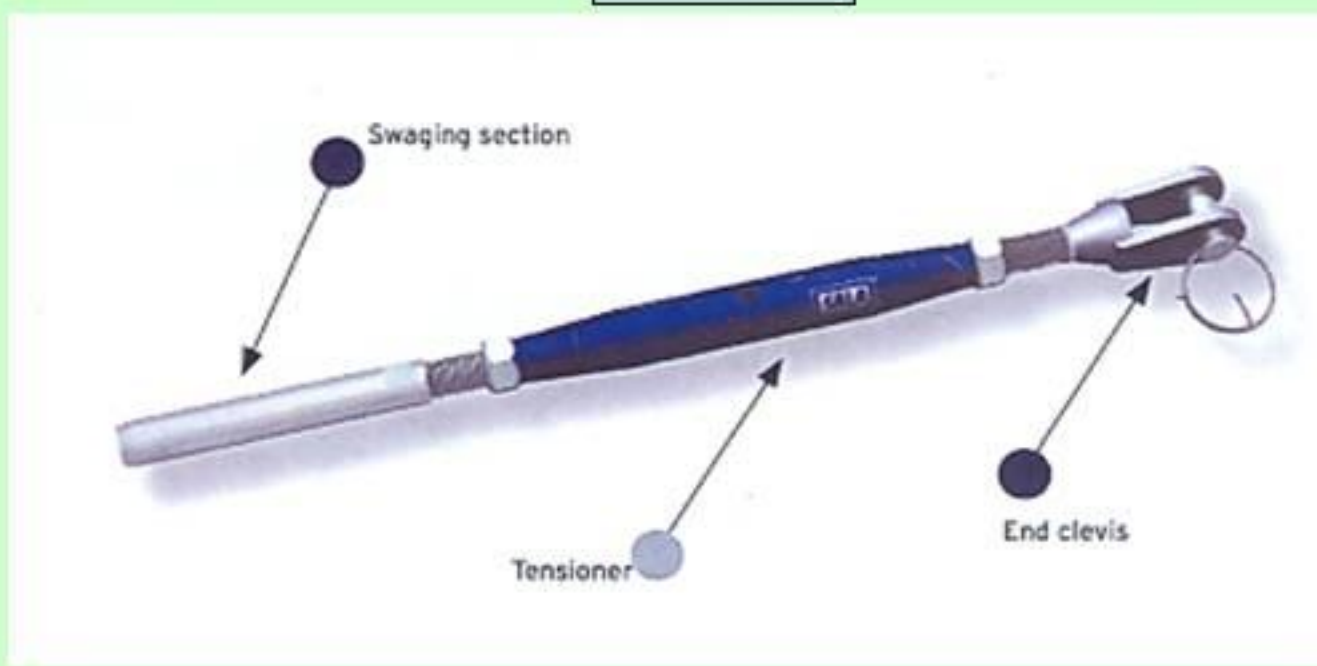
Tensioner & end clevis

Product A

XENON

PROTECTA

SALA



Intermediate Bracket

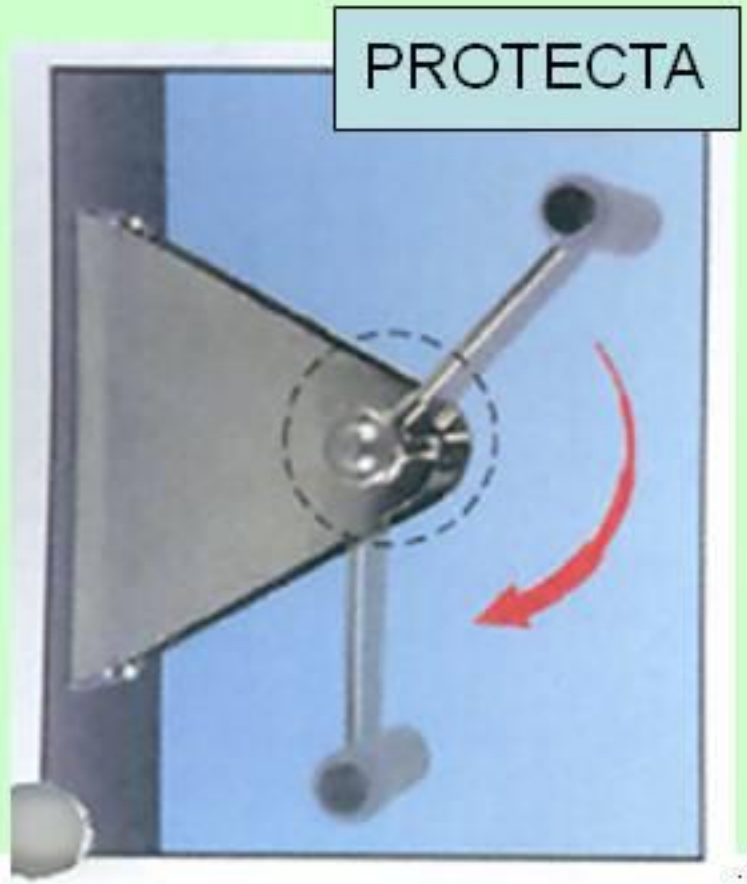
XENON

Product A

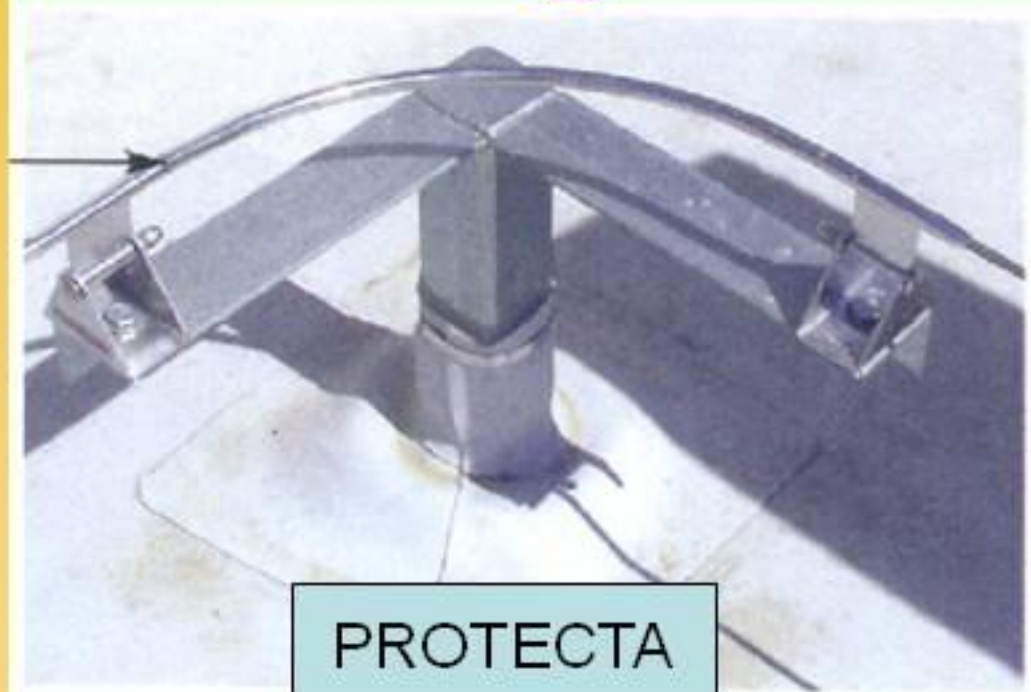
- Reduce span
- Guide direction
- Take certain load
- Dissipate energy

SALA

PROTECTA



Angle Kit / Corner unit



PROTECTA

Product A

XENON

SALA

Energy Absorber

- Deforms or with indicator after fall
- Reduce system force

XENON

Product A

PROTECTA

SALA

Shuttle

XENON

PROTECTA

SALA

Body Harness

- Distribute force evenly
- Upright position

PROTECTA

SALA

Lanyard

- Engergy absorbing, limit impact to user < 6kN
- Lengthen after fall
- Not exceed 2 M long

PROTECTA

SALA

Double lanyard

Cable

- Grade 316 Stainless Steel : min. 8 mm diameter (7x7)
- Diameter depends on nos. of users

Comparison of Horizontal lifeline specifications

研究新知需創意
發展技術重分享

Items	Ex. EMD specification	DCD central specification	Consultant's specification	Contractor A specification	Contractor B specification	New EMD Specification
EN standards	Not specified	Only EN 795	All relevant standards specified	Partly specified	All standards specified	**All relevant EN standards specified**
Manufacturer ISO quality system	Nil	Nil	Specified	Specified	Specified	**Specified**
Component Materials	Provision not clear	Provision not clear	All 316 SS (rare product choices)	Provision not clear	All 316 SS	**SS 304 & 316 Genuine parts for maintenance**
Nos. of users	2	Not clear	2 (130kg)	2	3	**2 (100kg)**
Energy absorber to lanyard	Provision not clear	Provision not clear	Provision clear	Provision not clear	Provision not clear	**Required**
Warranty	3 or 5 years	2	10 years	Partly 10 & partly 1 year	10 years	**2 years**
Free annual inspection	3 or 5 years	2	Nil	Nil	Nil	**2 years or as ordered**
Training	1+ or 5 times	1	Nil	Nil	1	**2 times or as ordered**
Check by registered engineer	Yes	Yes	Nil	Yes	Nil	**Yes**
Load Test after works	Nil	Nil	To all parts (unrealistic)	Yes but extent not clear	Nil	**To end brackets**
Maintenance Manual	Nil	Required	Required	Nil	Nil	**Required**

Actions taken/in progress

- EMD Performance Specification endorsed and uploaded in R&D website in Sep 2008

- Special term FAS contracts being arranged by SD unit for new installation and maintenance

Benefits of using term contracts

- Joint warranty provided by main contractor and the specialist contractor
- To facilitate prompt order of annual/ad hoc inspection, replacement of wearing parts & training
- Minimize colleague's effort and time spent on seeking and assessing quotation
- New specialist sub-contractors could entry whenever meeting our specification

Checklists for considering contractor proposal

- Evidence of Compliance with relevant EN standards
- Evidence of Manufacturer operating ISO quality system
- Material grade of major components
- Certificate of manufacturer's authorised competent person for installation/testing
- Samples

Checklists for Site Works

- Fall simulation analysis to show arrest distance:
  (a) EN 355: not exceeding (2 x lanyard + 1.75) M
  (b) preferably 1 m before reaching ground, whichever the less.
- Shop drawing to show exact routing
- Identification plate
- Completion certificate & annual inspection by competent person
- Independent Registered engineer report for initial completion
- Warranty certificate
- Maintenance manual
- Training arranged
- Nos. of personal safety kit ordered/received

Inspection & Maintenance

- Annual inspection
- Ad-hoc inspection after a fall accident
- Training course when necessary
- Components more likely to replace: energy absorbing lanyard, harness, shuttle, intermediate bracket, tensioner
- More durable components: cable line, end bracket

Design routing of HLL

- Ensure HLL next to access facilities
- Consider level difference situation
- Consider location for interface between different zones of HLL
- Plan HLL alignment to ensure cleaner reaching every part of the roof/canopy
- Provide structural plinth if roof mounted

Thank You

For enquiry, pls call
Matthew TM Chan, MS/R&D3
on 27615996

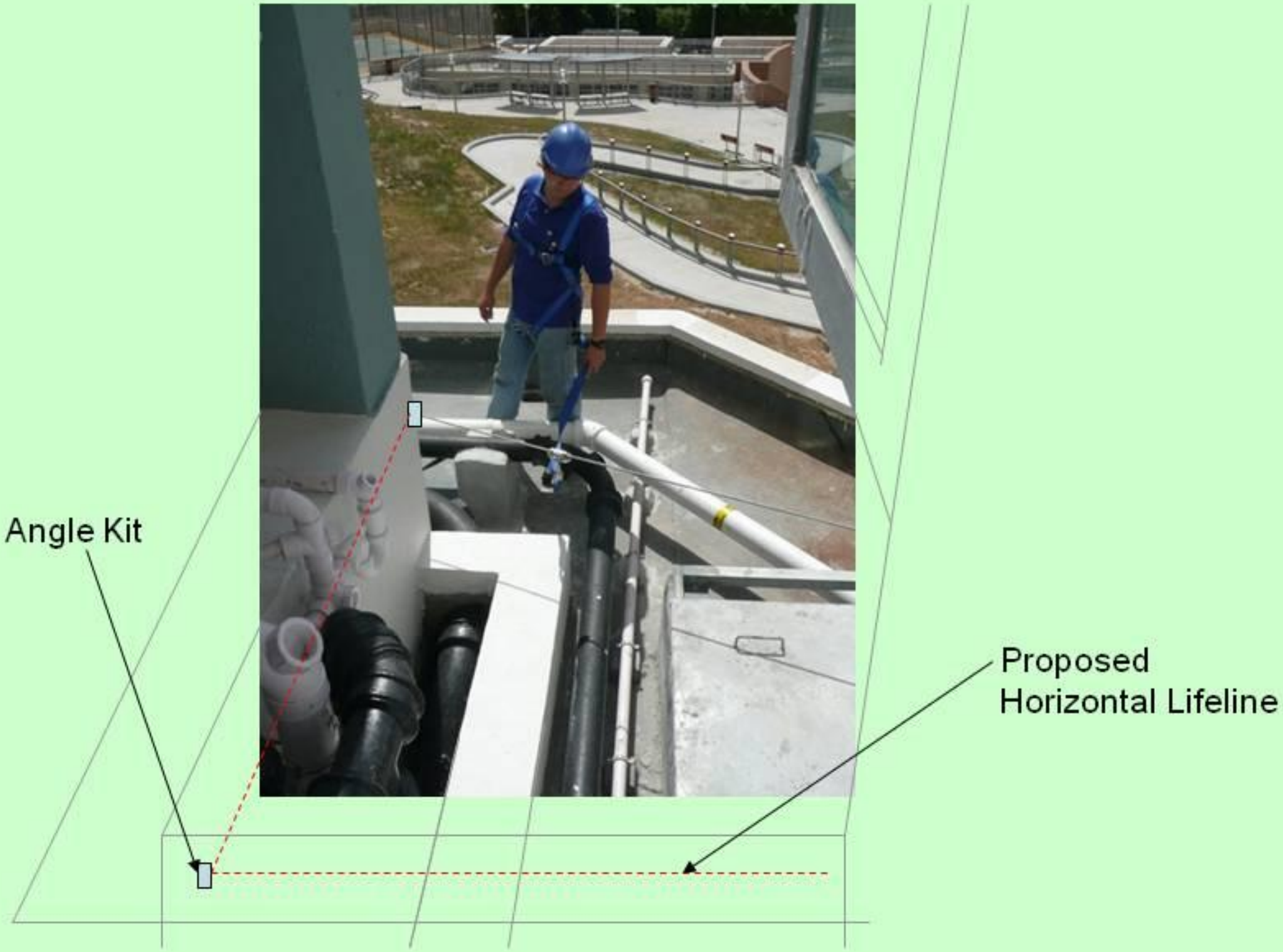
Cable line placed at proximity of access facility

Existing

Horizontal Lifeline

Proposed

Horizontal Lifeline



Bridging level difference

Zoning of HLLs and level difference

Routing of HLL at canopy of varying width