

# *Selection Guide for Fibertron's Perimeter Protection Solutions*

*SEP 2018*



**FIBERTRON CO., LTD.**

Innovative Fiber Optic Security  
& Safety Systems Manufacturer

[www.fibertron.co.kr](http://www.fibertron.co.kr)

# Overview

## Versatile perimeter protection Solution from Fibertron



**Multi Demo Kit**

Currently Fibertron offers our primary product **FOSM** (Fiber Optic Security Mesh) as the unique foolproof perimeter intrusion detection system being free from nuisance alarm.

**FOSM** (Fiber Optic Security Mesh) operates based on Optical Radar principle. The system periodically pumps Infrared Laser pulses into **FOM** (Fiber Optic Mesh) to identify intrusion from the presence of abnormal Optical echoes caused by either intruder cutting or pulling and pinpoints the intrusion spot on the monitor with audible & visible alarm at Security Control Center. Throughout all the world wide operating sites over past twenty years, the system was reputed as 'fool-proof accurate PIDS being free of nuisance alarm. (Please refer to [FOSMcata2017.pdf](#) for the detail).

The purpose of PIDS (Perimeter Intrusion Detection System) is to surely detect any possible intrusion which is expected very rare and made most likely by highly trained terrorist like Al-Qaeda. The site buys the PIDS to perfectly protect from any possible intrusion and have comfortable mind like buying an insurance. Poor PIDS that does not guarantee to alarm at actual intrusion without fail or put false alarms at usual time with no intrusion is actually of no security effect and is not worthwhile to have no matter how low it costs.

**FMVS** (Fence Mount Vibration Sensors) are known as ineffective because of severe nuisance alarms due to wind, rain, vehicle etc, and limitations not to detect intruder at bad weather as well as intruder climbing over fence from a shoulder /ladder without touching the fence mesh.

Recently for such facilities who try poor products just for low price but fail to comply with the purpose of PIDS, Fibertron Co., Ltd. presented **SW** (Sensing Wire) products and **FOSS** (Fiber Optic Stress Sensor) for low price but high cost-effective although not fool-proof as **FOSM** as an extended application of **FOSM** technology to eliminate the draw backs of other systems.

**SW** products employ a tiny stainless steel wire as the primary sensor to be mounted to chain link iron mesh or along with metal parts or in a net form and **FOSC** (Fiber Optic Sensor Cable) as the secondary sensor. For further detail, please refer to [FOSMcata2017.pdf](#), [SWFcata2017.pdf](#) or [SWNcata2017.pdf](#) respectively.

**FOSS** can be buried underground or under mat or mounted to concertina coils so as to trigger alarm at intruder's disturbances mainly for pipeline/border protection (Please refer to [FOSScata2017.pdf](#) for the detail).

# ① FOM overlaid to Metallic Fence

## FOM overlaid to Metallic Fence

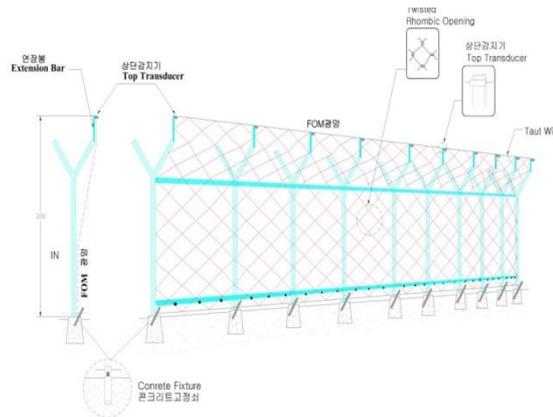
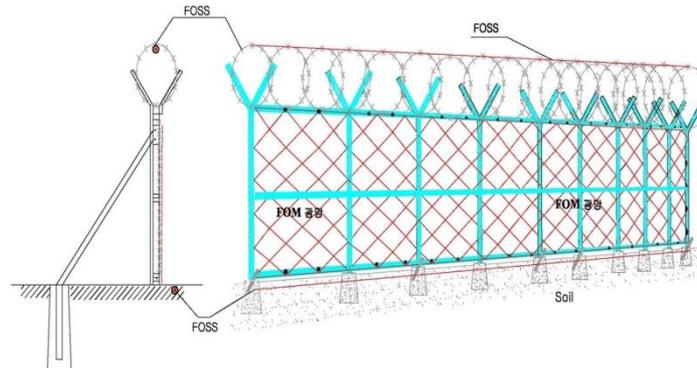


Fig. FOM overlaid to Fence on Concrete Foundation



Intrusion cutting through the fence mesh shall be detected by the foolproof FOM overlaid. Intrusion climbing over the fence shall be detected by FOSS mounted to the concertina top. Intruder presence in front of the fence shall be detected by buried sensors



## ② FOM Fence on Wall

### FOM Fence on Wall



The mesh is in a diamond shape that allows the mesh to be stretched to fit changing terrain and different fence heights. The fiber mesh cell size shall be narrow enough to sense penetration of an intruder trying to climb over the wall. The mesh is weaved with made-to-design fiber optic cable. Highly flexible insulation (high grade polyurethane) is used to make the cable to allow a bending radius of less than 10mm enabling it to be extra flexible and easy to manage on site. The flexible nature makes it more durable for rough handling and less prone to internal fiber breakage, which occurs in other fiber systems. In order to ensure an intruder climbing over the fence is detected the FOM is installed to the outside around the fence. The mesh is fixed to the Extension Bare top and concrete foundation and/or Grooved Rods.



### ③ Standing –free FOM Fence

#### FOM Fence on the Ground



# Standing –free FOM Fence

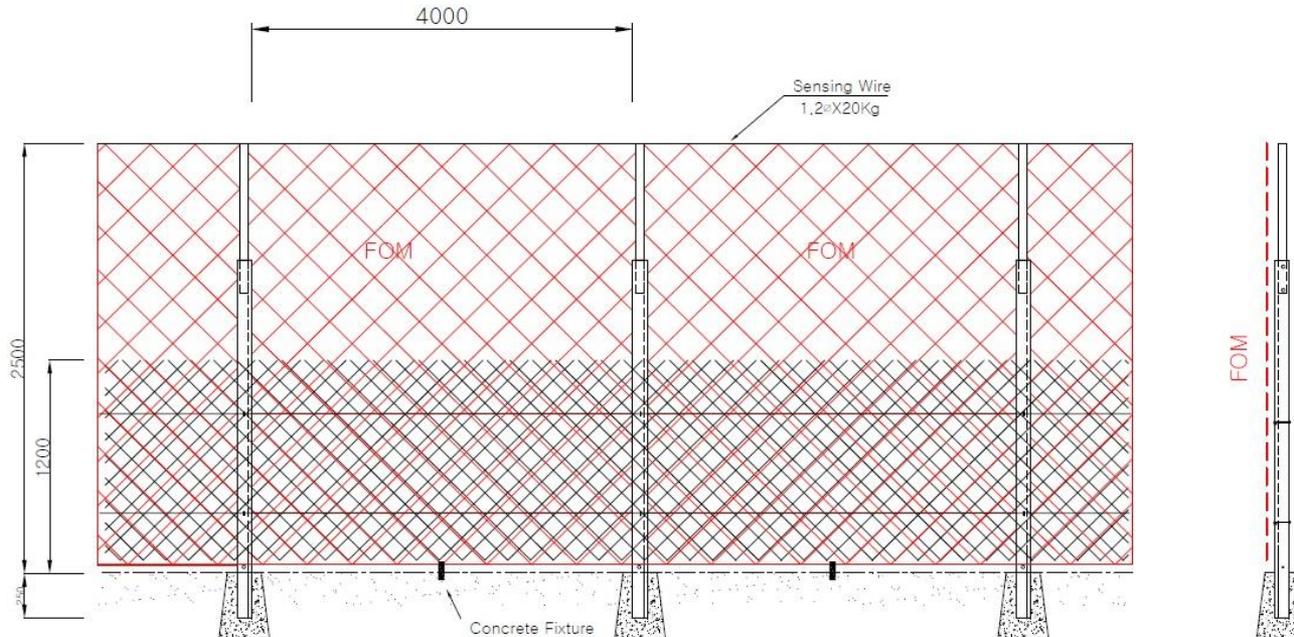
## FOM Fence on the Ground

The FOM Fence comprises steel post, chain link iron mesh and FOM and stands vertically on concrete foundation.

The site is first to prepare concrete foundation along the 12 km airport perimeter, second to put 1.8 meter high steel post at about 4meter spacing on the concrete foundation and third to attach 1.2 meter high chain link iron mesh to every Steel Post as illustrated in Fig.1. .

The FOM in 2.5 meters height shall be overlaid to the 0.7 meter extension to the steel posts from the bottom so as to trigger alarm 100% at intrusion either cutting through or climbing over the FOM fence (Refer to Fig.2).

The FOM bottom shall be tightly fixed to the concrete foundation with Concrete Fixture not to allow intruder's sneaking underneath the FOM bottom without being detected.



# Standing-free FOM Fence

## FOM Fence on the Ground

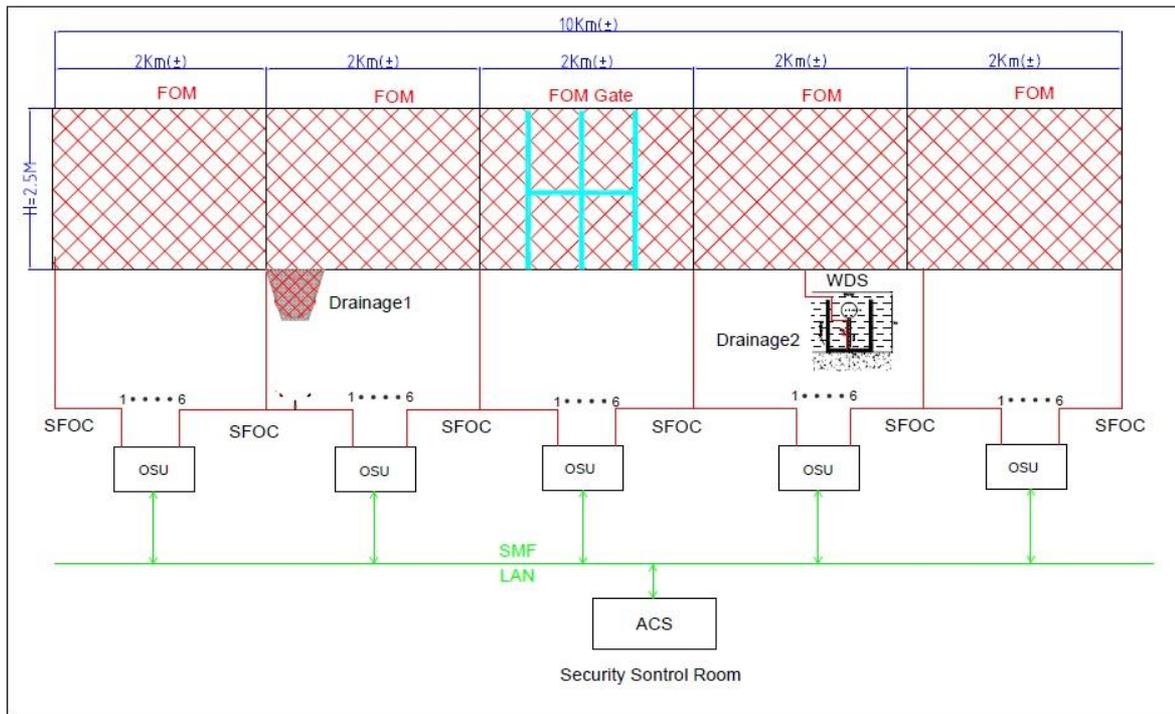
The FOM top shall maintain perfectly horizontal straight line at normal situation (no intrusion) but surly trigger alarm at pulling down more than 20 cm in the middle while attempting to climb over.

The FOM shall be in a twisted rhombic structure to suit to slight fence height variation and shall not allow intruder to open the Cross Fastener using commercial hand powered tools without triggering alarm.

The FOM can be overlaid to existing gates to detect intrusion thru and as well trigger alarm at the gate opening without needing additional electrical device.

The location along the perimeter needing a gate shall be protected by a FOM Gate which is specially built to be 2 x 1.5m wide typically with steel frame and FOM to allow passage by vehicles and personnel and to trigger alarm at intrusion through the gate as well as the gate opening without needing other magnetic gate sensor (Refer to Fig.3 & 4).

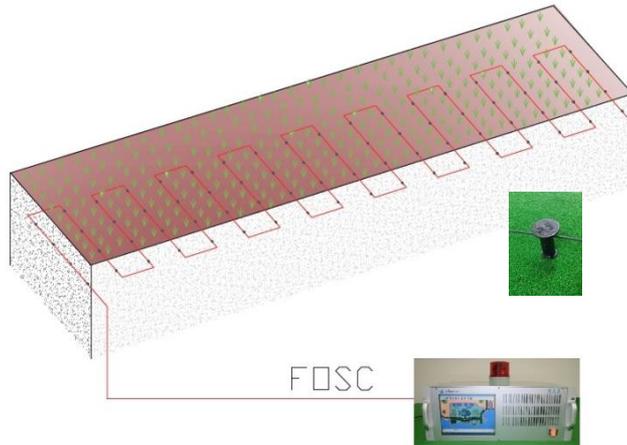
The drainage along the perimeter can protected by a FOM extension downward and its overflow due to heavy rain fall can be facilitated with a WDS (Water Depth Sensor) connected with the FOM so as to trigger alarm at water level exceeding the predetermined (Refer to Fig. 5 & 6 respectively).





## ⑤ Buried FOSS

### Buried FOSS



Bury FOSS in zig-zag pattern under grasses or soft ground in the vicinity of the fence/wall/pipelines/rails for triggering alarm at an intruder presence and locate accurately within 15 meters accuracy but no nuisance alarming.

### Buried FOSS Application



# ⑥ Security Matt

## Security Matt



Security Matt between two military fences



Security Matt, Top



Buried FOSS under Lawn



Buried Carpet, Red



Buried FOSS near by Rails



Security Matt, Bottom



Buried FOSS under Grasses



Buried Carpet, Green

Security Matt consists with a Matt and FOSS (Fiber Optic Sensor Cable) attached in zig-zag pattern to the Matt bottom with fixture. Either one or both ends of FOSS shall be connected to OIA (Alarm Control Station) which periodically pumps Infrared pulses in to FOSS and trigger alarm and locate intrusion accurately from the abnormal Optical echoes related to the stress by intruder presence on the Matt. The Coconut Matt is in widespread use to provide soft & pleasant way for walkers & pedestrians preventing the road surface from flood, grasses etc. In addition to this, the Security Matt having sensing capability itself shall protect the client facility/area from intrusion with following advantages;

- Hidden to intruder
- Easy to install
- Wide application unlimited by terrain surface condition
- Free from nuisance alarm
- Locate accurately within  $\pm 15$  m
- No field equipment up to 10KM
- Minimum maintenance
- Long life time use

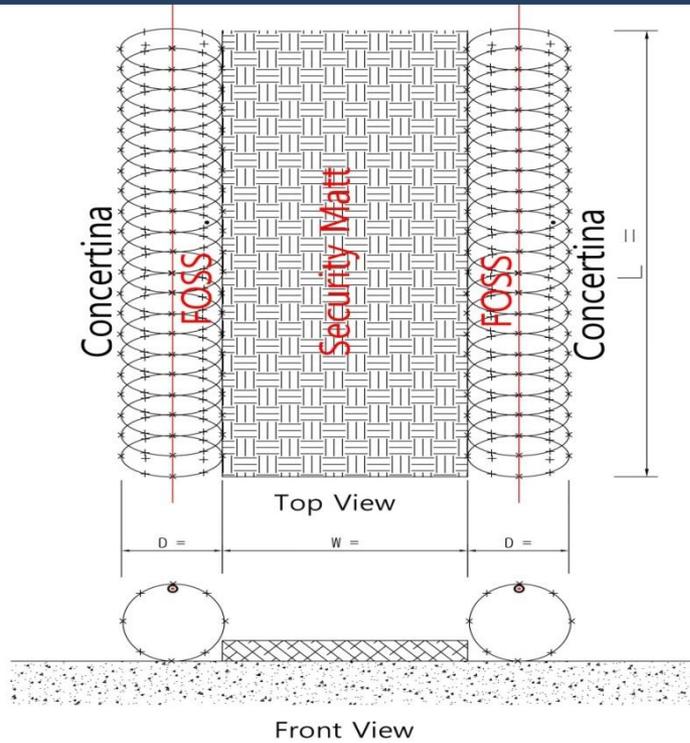
For other than Coconut Matt, a FOSS can be buried under carpet or grasses or gravel near by rails to alarm at intruder presence and locate accurately.

## Specification of Security Matt

- Coconut Matt Thickness : 40mm, typical
- Matt Width : 1 to 2 meters, typical
- Matt Weight : 8kg / square meter
- Material : Coconut
- Detection Coverage per OIA : 1.5M x 10KM
- Location Accuracy :  $\pm 15$  m,  $\pm 25$  m,  $\pm 50$  m,  $\pm 100$  m, Optional
- FOSS diameter: 3 mm
- Fiber Grade : MMF
- Immune to weather, free from nuisance alarm
- Power requirement for OIA : AC220V  $\pm 10\%$  50/60Hz, 100Watt approx

# ⑦ Concertina / Matt combined Smart Fence

## Concertina / Matt combined Smart Fence



Instead to have a conventional fence or concrete wall along a perimeter, it is strongly recommended to have a Smart Fence which consists with Security Matt and Concertina with FOSS for much higher security as well for much less cost. One or two Concertina coils equipped with FOSS shall be put along both sides of Security Matt.

An intruder crossing the Smart Fence must step on and disturb the concertina top and security matt to trigger alarm.  
The Security Matt shall provide a soft & pleasant way for patrol (security guard) preventing the road surface from flood, grasses etc.

The Smart Fence having sensing capability itself shall protect the client facility/area from intrusion with following advantages;

- Maximum obstacle to intruder
- Hidden to intruder
- Easy to install
- Wide application unlimited by terrain surface condition
- Free from nuisance alarm
- Locate accurately within  $\pm 15$  m
- No field equipment up to 10KM
- Minimum maintenance
- Long life time use

### Concertina /Matt combined Smart Fence

- Matt Thickness : 40mm, typical
- Matt Width = 1.5 to 2 meters, typical
- Matt Weight : 8kg / square meter
- Matt Material : Walnut
- Coverage per Control Equipment : 1.5M x 10KM
- Location Accuracy :  $\pm 15$  m,  $\pm 25$  m,

- FO Sensor Cable Diameter : 3 mm
- FO Sensor Grade : MMF
- Concertina Diameter  $D = 90$ cm, typical
- Environmental Characteristic : all weather

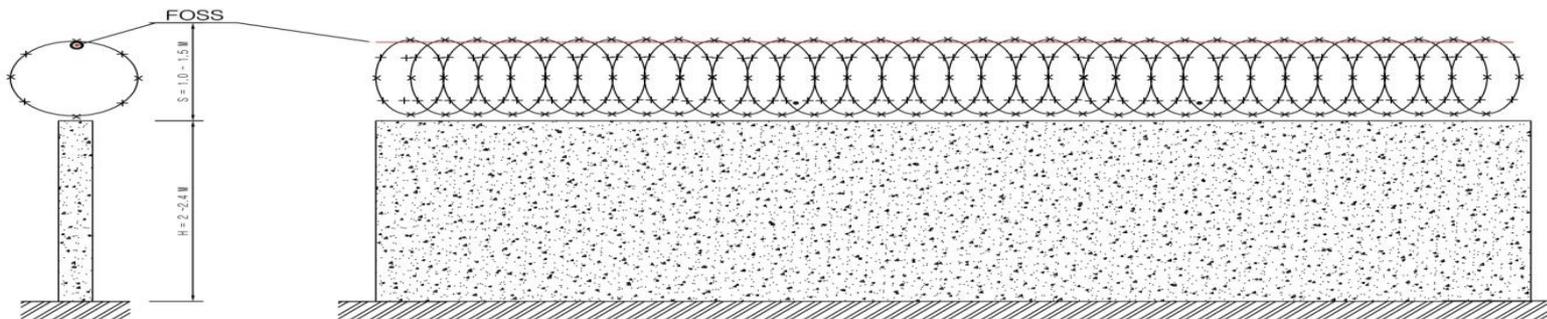
## ⑧ FOSS mounted to Concertina Top

To mount FOSS on the concertina top on the Wall



The FOSS was invented in unique design comprising a number of passive elements such as Sensing Bar, Tension Wire, Support and FOSC (Fiber Optic Sensor Cable) so as to sense intruder presence in the unit of 1.5M segment and its functioning can be easily illustrated by the Spine Analogy. The Human Spine is formed of 26 small segments. Each segment is only a few centimeters. All 26 spine segments share the same internal nerve which is connected to the brain. Tiny transverse impact to any spine segment by injury or disease will exert stress to the internal nerve and the nerve will send a pain signal to the brain for recognizing the stress.

The FOSS mounted to the 500M x 500M Concertina comprises 1,340 segments which are typically 1.5M long. All the 1,340 segments share the same FOSC connecting to OIA (Optical Intrusion Alarm) at SCC (Security Control Center). The FOSC functions as a nerve. Intruder presence on any one of FOSS segments shall exert transverse stress to the FOSC to generate abnormal Optical backscatter to the OIA for recognizing the stress and triggering alarm. Both ends of 500M x 500M FOSS shall be connected via FOSC to OIA(Optical Intrusion Alarm) at SCC (Security Control Center).

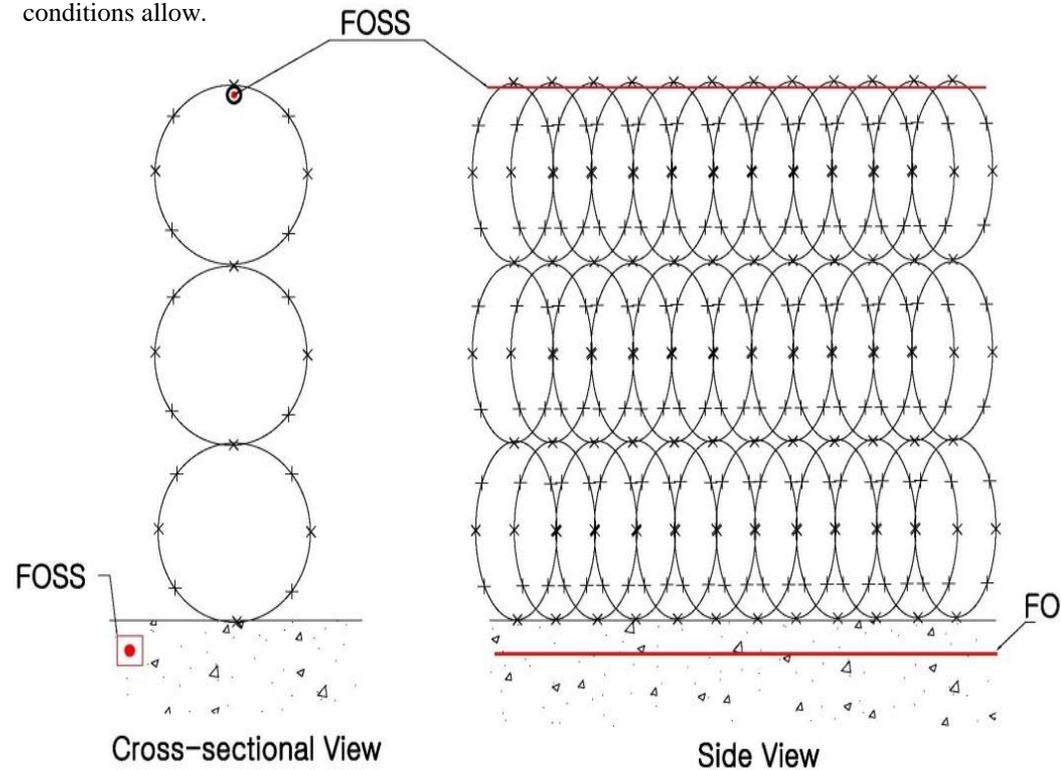
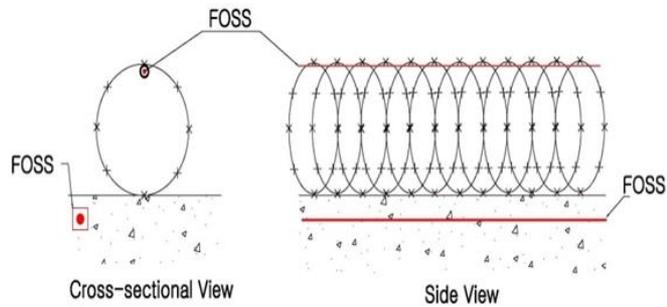


## FOSS mounted to Concertina Coil Top to detect intruder presence



Along steep cliffs /rugged areas of a border, place a number of concertina coils to a predetermined height (1 to 2 meters) and couple with the FOSS (Fiber Optic Stress Sensor) to detect intruders stepping on the concertina coils while trying to climb over using a blanket or ladder.

Also bury another FOSS in front of concertina coils to detect and locate, within  $\pm 25$ meter accuracy, intruder presence in front to the concertina coils if ground conditions allow.

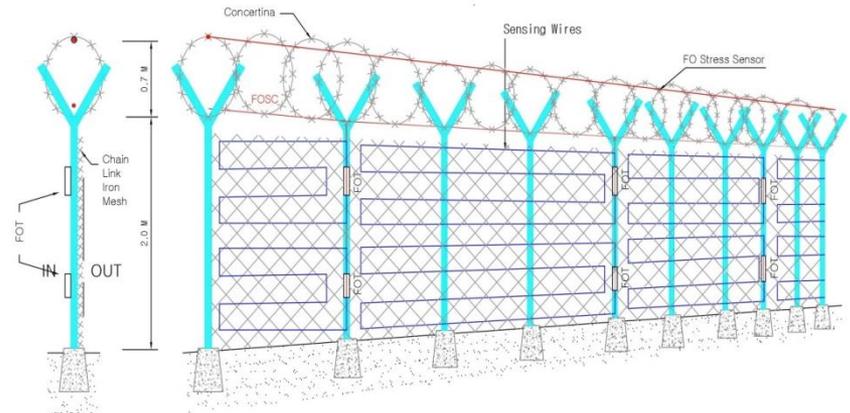


# @ FMSW (Fence Mount Sensing Wire)

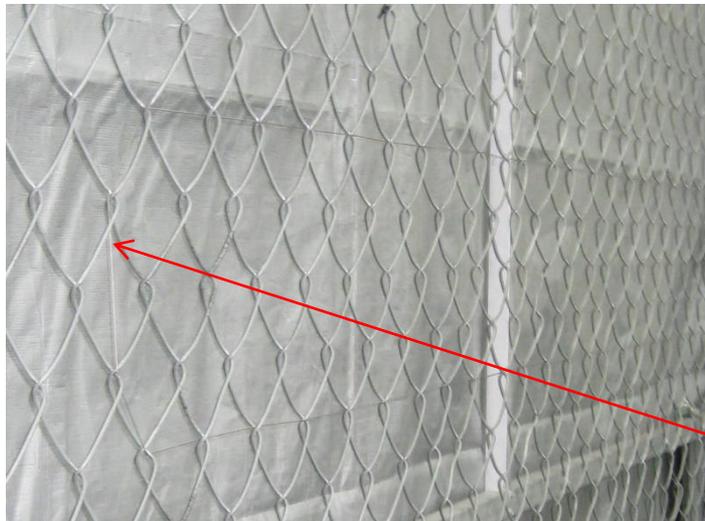
## Chain Link Fence, typical



## FMSW installation drawing



## Sensing Wire photograph



- Diameter : 1.0 mm typical
- Material : SUS 304
- Weight : 5kg / km.
- Op Temp : -40°C to + 75°C
- Allowable strength : 80kg
- Lifetime : over 20 years

**Sensing Wire**

SW (Sensing Wire) is a tiny & invisible stainless steel wire of dia 1.0 mm typically. It is inserted into iron mesh back & forth as well as mounted to fence outrigger in 20 cm vertical spacing typically, maintaining high tension and connected to FOT (Fiber Optic Transducer) at every 25 meters spacing. Intrusion either cutting through the chain link iron mesh to cut or pull SW and trigger alarm located within  $\pm 25$  meters by the control equipment. In addition, a FOSS (FO Stress Sensor) can be mounted to the Concertina top to trigger alarm at intruder stepping on the top while climbing over.

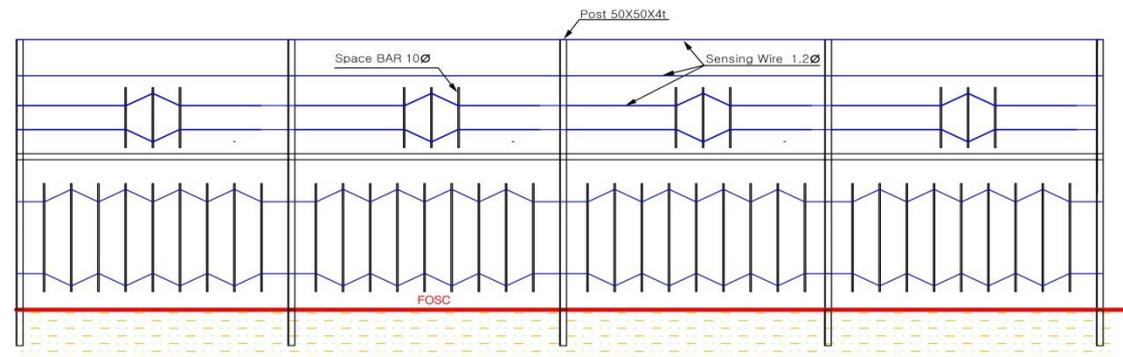
## ⑩ SWF (Sensing Wire Fence)

### SWF - Thin metallic fence having sensing capability itself

Sensing Wire Fence consists of metal Posts, thin Space Bars, Sensing Wires and a FOSC (Fiber Optic Sensor Cable). Install 2meter high Posts at 3 meter intervals along the perimeter. Mount two Sensing Wires with Space Bars up to 1.2meter height from the ground. Mount three Sensing Wires along with a FOSC (FO Sensor Cable) up to 3 meters height. Mount FOT (Fiber Optic Transducer) at about 25 meter spacing in a hidden place so the FOSC can detect wire cutting or pulling by an intruder.

The FOSC is connected to the OIA (Optical Intrusion Alarm) at SCR (Security Control Room) to receive Infrared Laser Pulses periodically. At reception of abnormal Optical echoes along FOSC, the OIA will signal an alarm & locate the intrusion spot within  $\pm 25\text{m}$  error visibly and audibly to operators.

The system will need no field equipment (Electrical Power, Communication Port, and Processor) along the fence and thus will minimize maintenance requirements during the expected 15 year life time. The Sensing Wire System will be intrinsically free from nuisance alarm and immune to environmental effects or outside influences such as aircraft/truck vibrations, high temperature, sunshine, rain, snow, haze, dirt, storm, lightening, surge, power lines, Electric ground loop, Electric cross talk etc.



## ⑪ SWN (Sensing Wire Net)

SWN to stop and detect intruder climbing over fence



### To stop and alarm at death-leap from a bridge

- For suicide fall prevention and alarm
- Rare nuisance alarm
- Nearly invisible
- Accurate locate
- No field equipment
- Compatible with CCTV camera and server



### To stop/trap and alarm at intruder scaling over a fence

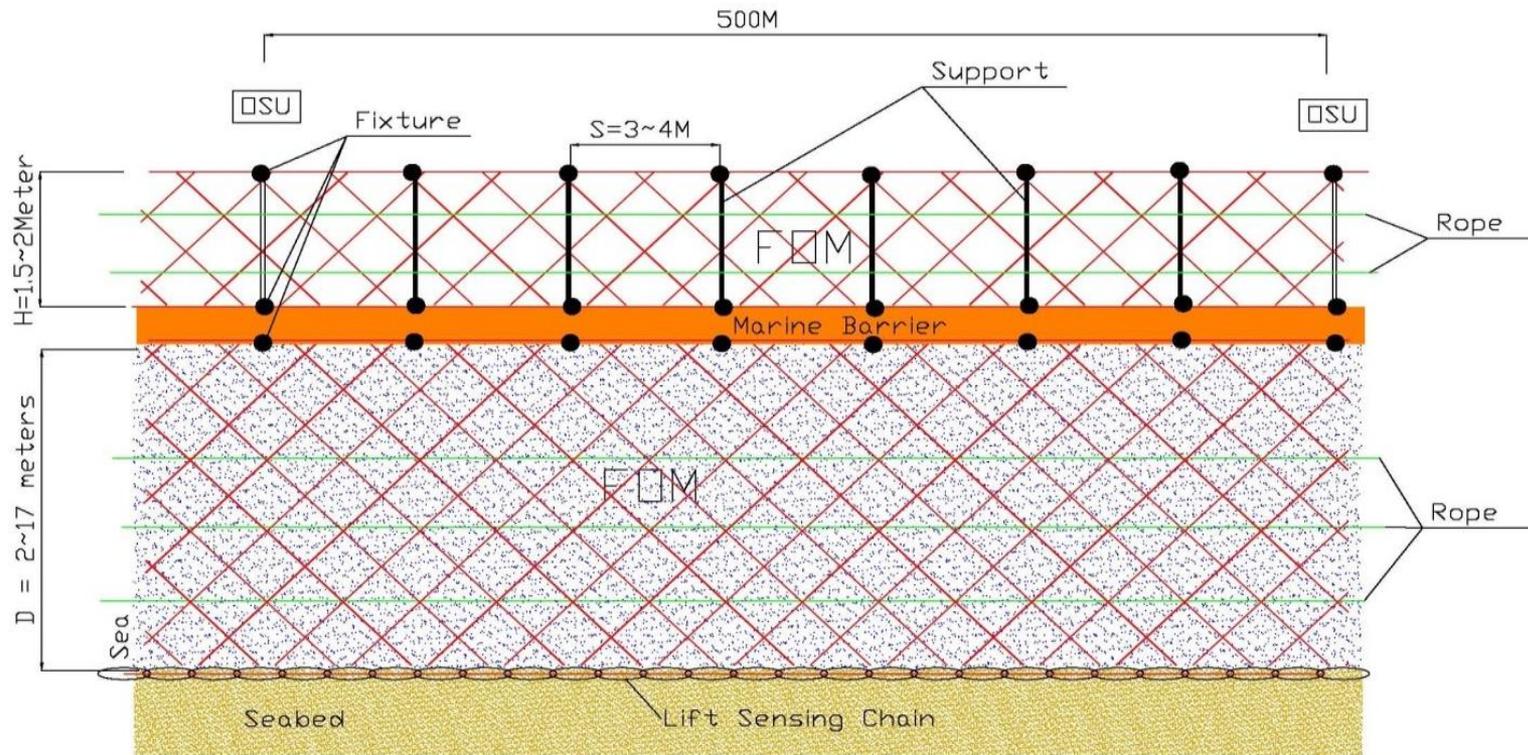


## SWN to stop and detect intruder climbing over fence

- ⊙ SWN is nearly invisible like a spider web and should be OK in aesthetically
- ⊙ SWN is free from nuisance alarm being immune to weather and environment (trees, animal, pedestrians etc.)
- ⊙ SWN shall stop/trap intruder scaling over the fence and have OIA at control center trigger alarm and locate with  $\pm 25$  meter accuracy and interface camera pop-up the intruder scene at control center.
- ⊙ SWN will require minimum/negligible maintenance and last over 15 years.
- ⊙ Increasing the fence height by putting more height may delay intrusion a few seconds but will neither detect nor capture intruder while being vulnerable to intruder scaling over with a makeshift ladder or from another guy's shoulder.
- ⊙ August 21, 1986 – Rosita Bourbon, scaled the northeast fence of the White House with a makeshift ladder and was arrested shortly afterwards.

## ⑫ Under Water FOM

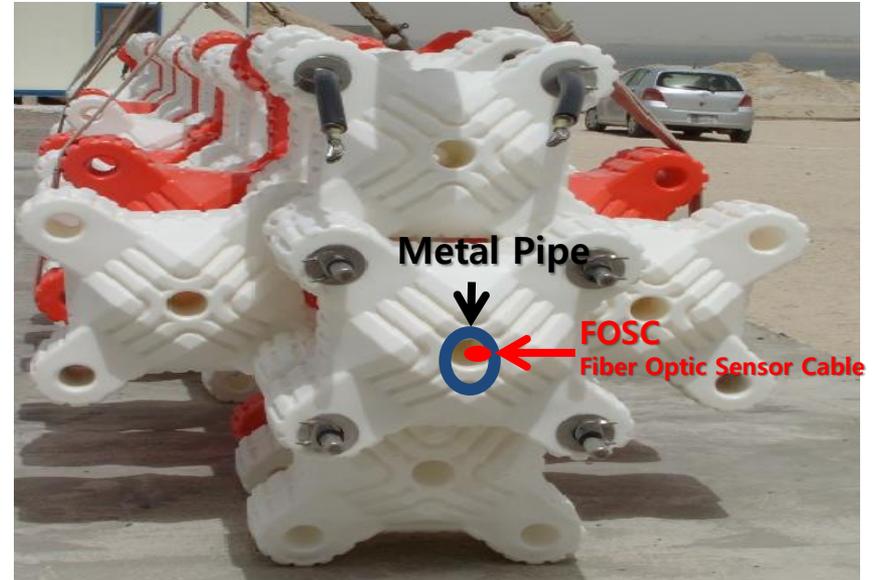
### uwFOM to detect cutting thru and FOSS to detect intrusion from seabed



FOSS can also be constructed alongside FOSM to create a unique underwater intrusion detection system to prevent unauthorized (also make sure words are not broken apart. underwater intrusion by divers, submarines etc. The FOSS is anchored to the seabed floor, which will trigger an alarm when being lifted by intruders underwater.

## 13 Marine Barrier with FOSS

### FOSS – Marine Barrier Crash Impact Detection



FOSS can be implemented to marine barrier structures to detect intrusion. A fiber optic sensor cable is built and laid within the barrier's core, which is connected to an Optical Intrusion Alarm. Any impact or disturbances to any of the barrier segments will trigger a detection to the FOSS, resulting in an alarm on the Optical Intrusion Alarm.

## ⑭ Drainage Protection

### FOM/Grill/Steel Rod covering



A drainage can be effectively protected by FOM/Grill/Steel Rod covering while allowing water flow but surely detecting intrusion through.

The FOM to drainage shall be connected to FOM Fence on Wall or FOSS buried without needing its own control equipment.

No need other sensor such as Electro Optic or Magnetic.

To propose FOM requires following site information;

- No of Drainage to be protected :
- Dimension and picture of each Drainage : :
- Location of Each Drainage along the perimeter wall/fence

## Materials to be reviewed

Please be advised to review following for further full detail;

**6Video.zip**(83MB)

- A1.FOSMvideo.mp4(15MB)
- A2.SWFvideo.mp4(12MB)
- A3.SWNvideo.mp4(7MB)
- A4.FMSWvideo.mp4(16MB)
- A5.ConcertiAlarm.mp4(14MB)
- A6.SecurityMatt.avi(27MB)

**7Catalog.zip**(9MB)

- C1.FOSMcata2017.pdf
- C2.FOSScata2017.pdf
- C3.SWFcata2017.pdf
- C4.SWNCata2015.pdf
- C5.FMSWcata2017.pdf
- C6.SecurityMattBit.pdf
- C7.BuriedFOSS.pdf

**ExFOM.zip**(32MB)

**SiteQs.doc** :- Provide site information and requirement for our best fit solution and quotation per specific site.

**14Solution.zip**(47MB)

- B1.4.5km5mFOMsolu.pdf
- B2. 4kmFOSMsoluTKR.pdf
- B3. 10km3mFOMsoluPPSx.pdf
- B4. FMSWsolu20Mx20M.pdf
- B5.FOMFenSolu3.6kmPOSCict.pdf
- B6. FOMpropoMexicoBorder2.pdf
- B7. FOMpropoMOD.pdf
- B8. FOPSolu200kmPipe.pdf
- B9. FOSMsolu2kmBOST.pdf
- B10. ONGC\_FOM\_Proposal.pdf
- B11. PropoMofalSS.pdf
- B12. uwFOMsolu5.1km.pdf
- B13.FOSSoluInstanbulAirport2.pdf
- B14.SWFsolu10kmZWA Park.pdf

**4Certificates.zip**(1MB)

# Thank you !!!!



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