public works

Department:
Public Works
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF PUBLIC WORKS

SECURITY

STANDARD TECHNICAL SPECIFICATION FOR A SECURITY TAUT WIRE DETECTION INNER FENCE FOR PRISONS

MAY 2005/Rev.2

INDEX

1 SPECIFICATION FOR SECURITY DETECTION FENCE

1.1. SCOPE

1.1.1 The contractor shall furnish labour, equipment, and materials for the following systems in this Section of the specification:

a. Security electronic equipment and cabinets.
b. Taut wire perimeter detection system.
c. Field Fiber-optic communication equipment.
d. Perimeter Controller.
e. Report printer.
f. Surge protectors.
g. Power supplies.
h. Training.
i. Spare Parts.

1.2 GENERAL

1.2.1 The Perimeter Protection Subsystem shall be based on the following stand-alone systems:

a. Electronic Detection Fence
b. Delay Fence integrity Detection
c. Gate area detection Solution

1.2.2 The Electronic Detection Fence shall employ the following two integrated technologies:

a. Taut wire Detection
b. Detection for delay fence

1.2.3 The Delay fence disturbance detection system shall be based on kinematics principles detecting any cut or removal of components of the delay fence as is detailed under Section 15 of this specification. This detection system shall be installed on the outer perimeter fence as indicated in the fence layout drawing.

1.2.4 The physical perimeter shall consist of an inner fence of 2.7m in height and an outer fence of 4.5m in height.

1.2.5 The Electronic taut wire detection system shall be implemented on the 2.7m inner fence, as described in this specification.

1.2.6 Furthermore the outer fence detection system shall be installed on the outer perimeter fence attached to the outer fence structure as per the specifications of the technology manufacturer.

1.2.7 Due to the various gate area designs found on various facilities a gate area security and detection solution has to be designed on an application to application basis and has to be approved by the appointed representative from the head office of the end-user. The representative shall be identified by the Department of Public works on a project to project basis.

1.3 DETECTION FENCE

1.3.1 The taut wire fence and alarm system shall act as an electronic barrier to detect and alarm escape attempts.

1.3.2 The taut wire system shall be installed as a stand-alone system located on the facility side of the outer perimeter fence.

1.3.3 The electronic barrier shall consist of the following:

a. A protective 2700 mm high barrier with 27 taut barbed wires, stretched between anchor posts, (wire tension shall be such that when a 2kg weight is applied between two slider posts the wire deflection shall be between 50mm and 75mm. All wires shall be of the same tension) and supported by a number of slider posts and detection sensors.

b. 600mm wide side walk shall be constructed directly below the taut wire system and extend 400 mm to the facility side of the taut wire fence as shown on the layout drawings i.e. 1000mm wide in total. The sidewalk shall run the continuous length of the inner perimeter fence as indicated on the perimeter fence layout drawing.

c. All corners shall be designed so the taut wire intersects.

1.3.4 The taut wire sensors shall be mounted on a sensor post constructed of galvanised steel. The sensors shall be spaced according to the wire spacing specification. (Bottom 18 wires 90mm, then 9 wires at 120mm spacing)

1.3.5 Movement transfer wires

High, tensile, double-braided barbed wire.

a. Minimum breaking strength of 439 Kg

b. Barbed 4 points.

c. Average spacing of the barbs is not to exceed 125 mm

d. Galvanised steel.

1.3.6 Tensioners

a. Tensioners shall be galvanised, ratchet wheel type.

b. At one end of the zone, each taut wire strand shall be attached to an individual tensioner.

1.3.7 Slider Post accessories: Slider mechanism with accessories that serve to support the wire system, converting vertical force into horizontal movement.

All slider posts shall be manufactured and supplied in accordance with the latest fence design drawings as attached.

All Slider post accessories shall be constructed of stainless steel.

1.3.8 Sensor Post Accessories: Sensor post shall be designed to contain the sensors.

At a minimum, the sensor post accessories shall be constructed of galvanised steel as per detail in the drawings.

1.3.9 Sensor, anchor and slider posts: All sections shall be at least 2750 mm in height.

1.3.10 Zones: The system shall be configured as shown on the drawings.

1.3.11 All wires shall be stored on the factory shipping reel until the wire is installed on the sensors.

1.3.12 Corner Configurations: All taut wire corner configurations shall be an intersecting type installation.

1.4 POSTS, FOOTERS AND SIDE WALK

1.4.1 Posts and Footers: Post and footers shall be an integral part of the side walk.

a. All slider posts shall be equidistant, between 3.5 to 4 m separation, depending on terrain and detection system requirements. Refer to structural layout drawings for intermediate post layout.

b. All posts shall be installed in accordance with detection system manufacturer recommendations.

c. All anchor posts shall be installed in accordance with the detection system manufacturer recommendations.

d. Slider and sensor post shall be installed in accordance with the detection system manufacturer recommendations.

e. Strain posts shall allow re-tensioning of fence wires and shall withstand wire tension force as well as additional loading of a reasonable intruder without causing permanent deformation. Refer to structural layout drawings for strain post layout.

1.4.2 Sidewalk and Post Footers: A concrete sidewalk shall be installed directly below the taut wire fence and shall run the continuous length of the system.

a. Sidewalks shall be minimum 100 mm thick and 1000mm wide as shown on the civil drawings and must include a gravel base with the appropriate wire mesh reinforcement.

b. To prevent cracking and chipping, sidewalk expansion joints shall be installed at 3000mm intervals and as necessary.

c. Expansion material shall be installed between the sidewalk and all posts mounted in the sidewalk barrier.

1.4.3 Concrete: All concrete shall be as specified by the Civil Engineer. At a minimum the concrete shall have a minimum compressive strength of 20MPa at 28 days.

1.4.4 Earth: Trenches and holes shall be excavated and formed as necessary to support the sidewalk and posts.

1.4.5 Rock: Holes in solid rock shall be 25 mm wider than pipe diameter, and at a minimum 300 mm deep for sensor posts, and 460 mm deep for anchor posts. Holes shall be back filled with non-shrink grout.

1.4.6 Backfill: Backfill and fill materials shall be installed in layers not to exceed 150 mm in depth.

a. Moisten or aerate each layer as necessary to facilitate compaction to the required density.

b. Do not place back fill or fill materials on surfaces that are muddy, frozen, or contain frost or ice.

15.4.7 Compaction: Each layer of fill and back fill shall be 90% of the maximum density.

1.5 CIVIL

Civil construction shall include route preparations, and casting a 1000mm wide concrete slab with welded mesh steel reinforcing a nominal thickness of 100mm and a minimum compressive strength of 20Mpa.

All existing electrical services as well as the cables required for this installation shall be installed in 50mm PVC sleeves in the concrete slab to ensure that these services can be maintained after completion of the contract.

The area underneath the concrete plinth shall be cleared of all vegetation prior to casting and treated with a suitable sterilization herbicide to prevent any vegetation growth.

The contractor shall allow and install a 250 micron PVC sheet underneath the concrete slab, to prevent any vegetation growth.

1.6 POWER AND COMMUNICATIONS CABLE

All cables must comply with the manufacturer recommendations.

Exterior wire and cables shall be installed in schedule 40 PVC conduit and rated for direct burial use. The conduit shall be installed in the inner fence sidewalk.

Power distribution wire from the main equipment room to remote processors, transponders, microwave units, or other remote electronics on the site perimeter shall be minimum 2.5 mm^2 copper and shall be increased in size as necessary to ensure no more than 5% (AC or DC) voltage drop from the main equipment room to the remote equipment. Power voltage drop calculations shall be submitted for all field located perimeter equipment.

Provide a two core multimode fiber optic cable, direct bury type cable between all perimeter system enclosures and the head end to create a loop around the perimeter system. Provide 1500mm of spare cable for each cable in each perimeter system enclosure.

All cables that will be directly buried shall be, rated for direct burial and approved for wet locations.

All conductors shall be rated for direct burial and approved for wet locations in accordance with SABS.

Signal and power cables shall be separate cables and not combined as part of the same cabling jacket.

1.7 ACCESSORIES

The system shall include all accessories required to perform the functions described in this Section.

1.8 MARKERS AND NAMEPLATES

1.8.1 Cable Tags:

Cable tags shall be provided in accordance with SABS.

1.8.2 Nameplates:

a. Precision engraved letters and numbers with uniform margins.

b. Character sizes shall be a minimum of 50 mm high.

c. Indoor : Shall be phonemic, two colour laminated stock, 2 mm thick, machine engraved to expose inn core colour (white).

d. Outdoor: Shall be Standard aluminium alloy plate stock, minimum 1 mm thick, engraved areas shall be enamel filled or background enamelled with natural aluminium engraved characters.

e. All nameplates shall be permanently attached.

1.8.3 Zone Identification:

a. In order for the officers inside the compound to easily identify zone locations, at the top of each sensor post, a 250mm x 200mm sign shall be installed. The sign shall face the inside compound

b. All zones shall be identified by zone number.

c. Reflective white numbers on a dark blue background shall be used.

d. All signs shall be visible from a distance of 12 meters.

1.8.4 In order for the perimeter patrol officer to easily identify zone locations, at the end of each zone a 500mm x 250mm sign shall be installed. The sign shall face the perimeter road.

a. All zones shall be identified by zone number.

b. Black numbers on a reflective yellow background shall be used.

c. All signs shall be visible from a distance of 12000mm.

1.9 POWER SUPPLIES

Power supplies shall be furnished with characteristics as required to support the operational performance of the sensor and signal processors.

1.10 ENCLOSURES

All exterior post mounted enclosures must have the following features:

a. At least 1.6 mm stainless steel plate construction.

b. Continuously welded seams.

c. Cabinet lockable with all locks keyed alike.

d. Equipped with tamper detection device connected to the processor tamper circuit. The tamper switch shall detect any attempt to vandalise the enclosure including the opening of the door and the cutting or breaking of the enclosure.

1.11 EARTHING

1.11.1 A continuous 70mm^2, bare, stranded, copper earthing conductor shall be buried a minimum of 600 mm under the taut wire system's sidewalk and run the continuous length of the sidewalk.

1.11.2 At each sensor post, via cad-weld connections, the earthing conductor shall attach to the ground bus located inside the enclosure. Also, a 70mm^2 earthing conductor shall bond the sensor post, processor post, and the nearest inner and outer fence post to the 70mm^2 ground ring. All doors of sensor posts and field cabinets shall be earthed.

1.11.3 At a point nearest the main electronics equipment room, a 70 mm^2, bare, stranded, copper conductor shall bond the buildings electrical system ground bus to the 70mm^2 ground ring buried under the taut wire system's sidewalk. All direct buried ground connections shall be cad-weld type connections.

1.11.4 All systems described in this section shall be grounded in accordance with the responsible engineer's recommendations and meet the minimum requirements of the manufacturer.

1.12 SURGE PROTECTION

1.12.1 All metallic data, communications, video, and sensor lines entering or leaving a building shall be protected with surge protection devices.

1.12.2 Earthing of protective devices shall be in accordance with the manufacturer's recommendations and/or as described in these specifications and drawings.

1.12.3 All signal line protective devices shall be located at the terminal point nearest the cable interface with the exterior cable plant. Devices shall be mounted to the back panel of the cabinet.

1.12.4 Where equipment is fed from a panel board not protected by a panel board protector, provide a branch circuit protector installed at the panel board.

1.13 CLEAN UP

At the end of each day, the Contractor shall be responsible for the clean up, removal, and secure disposal of all debris.

1.14 COOPERATION WITH OTHER TRADES:

The contractor shall coordinate the work as detailed in this paragraph of the specification with that of other paragraphs of this specification as well as all other contracting disciplines as required to ensure that the entire work of this project shall be carried out in an orderly, complete, and coordinate fashion.

1.15 DETECTION MEASURES

1.15.1 TAUT WIRE

Each sensor shall contain a dedicated microprocessor enabling a unique detection algorithm to be assigned as required.

The horizontal wires shall be attached to the sensors. The taut wire sensor shall be capable of producing an alarm when a wire is deflected by no more than 75mm. The taut wire sensor shall also respond to a cut in the wire.

The above system configuration shall have the capability to detect any attempt to penetrate the perimeter by climbing, cutting or spreading the fence wires apart.

a. The sensor detection parameters and detection performance should be accessible from the master controller on an individual sensor basis.

b. The taut wire detection performance should comply with the following minimum criteria:

Nuisance alarm rate:	Not more than one per zone per month
Probability of detection:	At least 95%.

c. The TWFDS shall annunciate an alarm condition in the event of one or combination of the following:

- Climbing the taut wire fence.
- Cutting the taut wire fence.
- Spreading the taut wire fence wires no further that the adjacent wire.
- Tampering with the processor enclosure.
- Attempting to remove the sensor post.
- Attempting to cut the power or communications of the processor to the perimeter security system.

d. Processing algorithms shall be provided as part of the TWFDS to process alarm events. Each individual wire shall be monitored for alarm conditions.

e. Subsequent attempts to climb, cut or spread the fence even after a tamper alarm condition is detected and annunciated, shall cause the processor to activate a new intrusion alarm.

f. Maximum permissible zone length is 100 meters.

g. The TWFDS shall have the ability to automatically adjust the centre of alarm detection range for gradual changes in sensor position caused by the environment, casual contact or ageing thus significantly lowering periodic maintenance.

1.15.2 OUTER FENCE DETECTION SYSTEM

This will only be part of the contract if the bowed outer fence is also installed simultaneously

1.15.2.1 PURPOSE OF SYSTEM

The main detection fence of a perimeter is surrounded by a bowed welded mesh fence structure as per the attached drawings which have the purpose of protecting the main perimeter fence from tampering, but acts mainly as a delay system once a detection alarm is received to allow sufficient time for the reaction force to reach the point of intrusion.

This delay functions of the outer fence need to be protected to ensure that it fulfils its purpose. Detection is required to detect the cutting or removing of the structure and attempts thereof. The required detection is based on direct measurement of the causes of cutting and removing of the structure and not derivatives thereof such as short circuit detection or volumetric detection not measuring fence behavior. Detection shall be based on the measurement of the kinematical behavior of the structure during intrusion attempts.

The system shall be applied in order to ensure maximum coverage in the detection area.

1.15.2.2 DESCRIPTION OF SYSTEM

a. Zones

The system shall be installed in specific lengths called **Zones**. Each zone and detection device can provide and report its own intrusion alarms, therefore providing information on the area of any intrusion attempt. Zone lengths should not exceed 20m.

b. Detection units

Each zone shall be equipped with detection units, the detection unit shall include the transmitter, receiver, alarm processing unit and the required communication cable.

The parameters on the alarm processing unit must be adjustable in both the amplitude and frequency domain. The system must by commissionable to allow for maximum probability of detection (POD) and minimal nuisance alarms (NAR) and false alarms (FAR).

c. Installation

Measuring devices must be directly attached to the fence structure and connected via a field communication network. The network shall be connected to the main detection network via the field nodes and reflect in the main control room.

Each device with be represented in the main control user interface allow for parameter setting and diagnostics per device. The operator shall be able to identify the device that caused the alarm within a sector or zone.

The detection equipment shall be installed in accordance with the supplier specifications, the installation specifications must be presented before installation commences.

The detection units installed shall be sufficient to cover the specified area.

d. Maintenance

Sensor maintenance diagnostics shall be available in the control room and replacing a sensor shall be on a “plug and play” principle with no special tools required.

e. Detection

Detection parameters should be adjustable on an individual sensor basis for both the cutting and re-moving or moving of the fence and detection components.

The detection system shall announce at least the following alarm events:

- Fence cut
- Fence components removed
- Detection units moved

The contractor shall allow as part of this contract for the necessary tests to be effected as required by the end user.

1.16 FIELD CONTROLLER

1.16.1 Processor

Each zone shall be equipped with a field processor unit, performing all the functions associated with a particular zone. A field processor shall provide for / contain the following sub-systems:-

- Digital inputs (8x Supervised Loop)
- Relay outputs (4 x 24VDC 5Amp)
- Processor
- Data communication
- Reset key switch transmitter type

Field processors shall be installed in the middle of each zone. The enclosure shall be manufactured from Stainless steel. Enclosures shall be rated IP 65 and fitted with a door lock and tamper switch as per Par 1.10 d.

A zone reset button (if required) shall be accessible from inside the perimeter fence and shall be of the transmitter type.

All cable entries to field units, if exposed shall be protected against vandalism by means of stainless steel covers.

1.16.2 Data Communication

Field processors are linked with a fiber optic serial data communication cable, in a closed ring configuration. Communication shall be fully functional with a single cut in communication cable.

1.16.3 Power

A single phase power feed shall supply the field processors.
(230V should be supplied to each field node.)

All equipment shall be protected against lightning surges and transient voltages to all the relevant SABS specifications and regulations

1.16.4 Characteristics

The unit shall have features or characteristics as follows:

a. Accept eight (8) dry contact supervised inputs.

b. Provide two (4) dry contact outputs.

c. Input voltage - 230VAC ±5%.

d. Equipped with transient suppression.

e. Supervised circuits - inputs.

f. Temperature Operating: -20 deg C to +70 deg C

g. Humidity - 20% to 95% condensing.

h. Unit shall be field addressable.

i. Shall interface with the Perimeter Controller.

1.17 PERIMETER CONTROLLER

1.17.1 System operation

The system shall be installed as a zoned, automatic, supervised alarm detection system.

a. The alarm condition is transmitted from the post mounted, zone field microprocessor via redundant fiber-optic loop to the perimeter Master Controller.

b. Each detection zone shall be equipped with fiber-optic communication equipment to eliminate lightning surge problems.

c. Each independent defined intrusion event shall affect a unique signal on the perimeter controller.

d. The supervised circuit in the system causes a tamper/status alarm to signal if:

    i. Sensor circuitry is disturbed (opened or grounded).

    ii. Tamper switches are activated situated in the control cubicles in the field or control room.

e. The location at any point at which an attempt is made to tamper with the system shall be identified at the perimeter controller.

f. Approved detection measures shall be incorporated into the system and used as separate zones protecting the vehicle sally port. (One zone only)

g. System status and all alarm conditions shall be reported to the central control from the field controllers to a perimeter controller.

   i. From the perimeter controller each zone shall be capable of zone access, alarm acknowledges and alarm reset. The perimeter controller shall have a distinctive audible alarm. Alarm shall annunciate both visually and audibly. The same shall be possible from security management system.

   ii. The perimeter controller shall interface with an event printer located in Central Control. The event printer shall print a date and time stamped message indicating all alarms, alarm resets, and zone accesses.

h. System status and all alarm conditions shall be reported to the system operator from the perimeter controller to a graphics display unit.

i. All fixed components of the perimeter alarm system shall receive power from the UPS provided in central control or a main electronics equipment room.

1.17.2 Hardware

The perimeter controller shall be installed in the Central Control console as shown on the drawings.

The perimeter controller shall be based on a Linux operating system with the following characteristics:

a. Industrial grade hardware.

b. Solid state storage memory.

c. Complete with power supply.

d. Standard panel mounting for 19 inch EIA rack. Rack space requirements shall be no greater than as shown on the drawings.

e. Serial communication port

f. Ethernet port

g. Two USB ports

h. VGA port

i. Keyboard and mouse ports

The perimeter controller shall perform the following functions:

1.17.3 Field Communication

Communication with field controllers shall be via a redundant 2 core multimode optical fiber link. Operation of the system shall not be affected in case of a single break in the communication link.

1.17.4 Monitoring and Control

The controller shall contain the status map off all field detection and status devices. These devices shall include the following:

a. Taut wire sensor alarm status

b. Taut wire sensor maintenance status

c. Outer fence detection alarm

d. Outer fence detection maintenance

e. Field cabinet tamper

f. Auxiliary inputs including gate area detection devices and gate status contacts at sally port.

g. Field communication status for each field controller

1.17.5 Alarm and Event Printing

Alarms and selected events shall be printed on a suitable continuous paper printer via a parallel port

1.17.6 Alarm and Event Recording

The following shall be recorded on the alarm or event log:

a. All changes in the state of field devices. This includes alarm and maintenance conditions. These events shall be logged per zone and per device.

b. Operator master accept actions.

c. Field reset actions.

Log entries shall be date and time stamped to the nearest second.

1.17.7 External Interfaces

The perimeter controller shall provide the following data interfaces:

TCP/IP Socket interface

All perimeter or system devices shall be included in this interface mechanism. The external system shall initialise on selected devices and events shall be posted when any change occurs in the status of such devices. Events shall also be sent to the perimeter controller. Messages shall be in clear text.

Modbus serial and Modbus TCP/IP interface

Devices shall be mapped in a set of holding registers for access by an external SCADA system

These external data interfaces shall be used to integrate the perimeter system with a Security Management System or CCTV system.

Where a Security Management System is in operation the Perimeter system shall be fully integrated with the SMS and CCTV systems for annunciation, print recording, logging of alarms and initiation of CCTV system functions upon an alarm condition.

All perimeter alarms shall be logged, annunciated, recorded and managed by the SMS alarm terminal in Central Control. Fence Alarms, trouble and tamper conditions shall be separately annunciated by individual zone designations.

The interface definition shall be documented and delivered with the system as part of the deliverable of this project. (Proof of the operability of the interface must be given.)

1.17.8 Wide Area Networking

The Perimeter Controller shall be Internet Protocol (IP) enabled so as to be networked over a Wide Area Network (WAN) for the purposes of remote monitoring, control and viewing of historical information. This shall facilitate the performance assessment of both operator and equipment from anywhere on the client's network.

1.17.9 Diagnostic Tools

A diagnostic screen shall be included at the master indicating the following:-

- On/off line status of field processors
- The alarm and maintenance status of all individual sensors
- The alarm and maintenance status of any other equipment attached to the system as required.

The diagnostic software shall include a data recording facility to record all the digital and analogue signals from any selected field processor unit and any selected detection device.

1.18 USER INTERFACE – FUNCTIONAL OPERATION

This requirement shall apply to the graphical user interface that may form part of the perimeter controller or implemented on the Security Management System.

Site Perimeter Map

A graphical presentation of the site perimeter shall include the following:

a. Position of the perimeter

b. Detection zones

c. Gates

d. Other static information (buildings or roads) that may be required to assist the operator to identify the location of an occurrence.

The following Icons representing the alarm / maintenance status of field detection devices shall be included:

a. Alarm status of taut wire detection for each zone.

b. Alarm status of Delay Fence Integrity Detection for each zone.

c. Tamper status of each field enclosure.

d. The status of detection devices and status monitoring in the sally port area.

e. The operational (maintenance) status of field equipment for each field controller.

Abnormal conditions shall be acknowledged by the operator by activating a single icon. This shall also stop the audible sounder.

The colour of status icons shall change in the following sequence.

1.	Green	Normal condition
2.	Red - Flashing	New alarm condition
3.	Red - Solid	Condition has been accepted by the operator
4.	Yellow	Condition has been reset in the field
5.	Blue or Green	A reset was activated at the central controller

Blue shall indicate a device in a permanent abnormal condition and must be addressed by a maintenance repair procedure. Step 4 shall be omitted in case of certain maintenance devices or in case of CCTV surveillance where no field reset is required.

The following requirements shall be the minimum requirements for the user interface:

Operational Information

The following are shown on the operator interface:

Site perimeter Layout
Icons representing the alarm status of detection devices
Indications of field node status and tamper
Buttons to accept and reset alarms
Buttons to issue a reason for alarms

Management Information

Operational Status

Parameters providing a summary of the operational status of the equipment
This includes:
Percentage site online
Detection devices in inhibit status
Status of worst case field node
Condition of field communication network

System performance

Summary of the number alarms during a daily, weekly and monthly period. Alarms are categorized as the following types:
Valid Alarms
Nuisance Alarms
Unknown Alarms

Operator performance

Values representing the maximum time the current and previous operator took to accept and reset alarms. Unattended time shall also be indicated.

Alarm and Event Reporting

Open a window to view the log

Diagnostic Information

Real time Alarm status of all devices on the selected field node
Maintenance status of these devices
Buttons to inhibit any device
Analogue values of detection devices

Controls to adjust the operating parameters of field devices

Networking

Multiple operator interfaces can be linked to the same perimeter controller. These user workstations can be local or remote.

The graphical user interface as proposed must be presented to the end-user's authorised representative for approval before commencement of work. All available system information and specified requirements must be accessible through the User Interface. The user interface shall always be fully compliant to the above requirements.

1.19 TESTING:

1.19.1 The Contractor shall notify the Engineer two (2) weeks prior to the system tests so that arrangements can be made to have The DPW and DCS personnel witness the tests.

1.19.2 Each penetration of the taut wire system shall produce an alarm.

1.19.3 If an alarm is not detected on the first try of any test, the test shall be deemed a failure and all testing shall cease.

1.19.4 The Contractor shall be allowed time (not to exceed 1 hour) to make the necessary repairs before continuing the test. If additional failures are noted during the test, the test shall cease and be rescheduled for another day.

1.19.5 If the test is deemed a failure by the Engineer, DPW or DCS personnel, the Contractor shall be responsible for all cost incurred by the Government for scheduling a second test.

1.19.6 Taut Wire System: Test each system function step by step as summarised herein.

a. The simulated intrusion attempts shall be performed by a person weighing 45 Kg or more.

b. Safety equipment shall be provided by the Contractor and proper precautions shall be taken when performing the tests.

c. Each attempt shall be terminated upon detection.

d. Simulated escape attempts shall be performed at two (2) locations in each zone unless otherwise directed by the Engineer.

e. Fast Climb: Approach and make contact with the fence and rapidly try to scale the fence.

f. Slow/Stealth full Climb Over: Approach and make contact with the fence and slowly, deliberately, and stealth fully attempt to climb to the top of the fence.

g. Climb Through: Spread wires apart and attempt to climb through.

h. Tamper: Remove cover on zone processor.

i. Trouble: In each zone, remove one side of the alarm communications wire from the processor board.

j. Cut Test: The contractor must have the ability to simulate a "Cut Test" in any zone identified by the Contracting Officer.

1.19.7 The gate area detection system shall be tested based on the requirement that the gate area detection must be of the same standard as the perimeter detection system.

1.19.8 Delay Fence Integrity Detection System

A simulated breaching of the outer perimeter fence shall be performed.

The outer fence detection system shall generate an alarm when such an attempt is made.

1.20 SPARE PARTS

The Contractor shall provide the institution with the following spare parts upon system completion:

1.20.1. 27 Taut wire Sensors.

1.20.2. 2 complete field node equipment sets.

1.20.3. 900 m of Taut Barbed Wire.

1.20.4. 2 Copies of System Software.

1.20.5. Tensioners (2).

1.20.6 10 Delay fence detection units.

1.20.7. Perimeter controller.

1.21 COMPLIANCE TO THE SPECIFICATION

The Contractor shall comply with all the requirements as per this specification. Proposed deviations shall only be considered after the award of the contract. Proposed deviations shall only be accepted if it meets with all of the following criteria:

- The proposed deviation offers a substantial improvement to the final product offered.
- The proposed deviation has been proven in other applications.

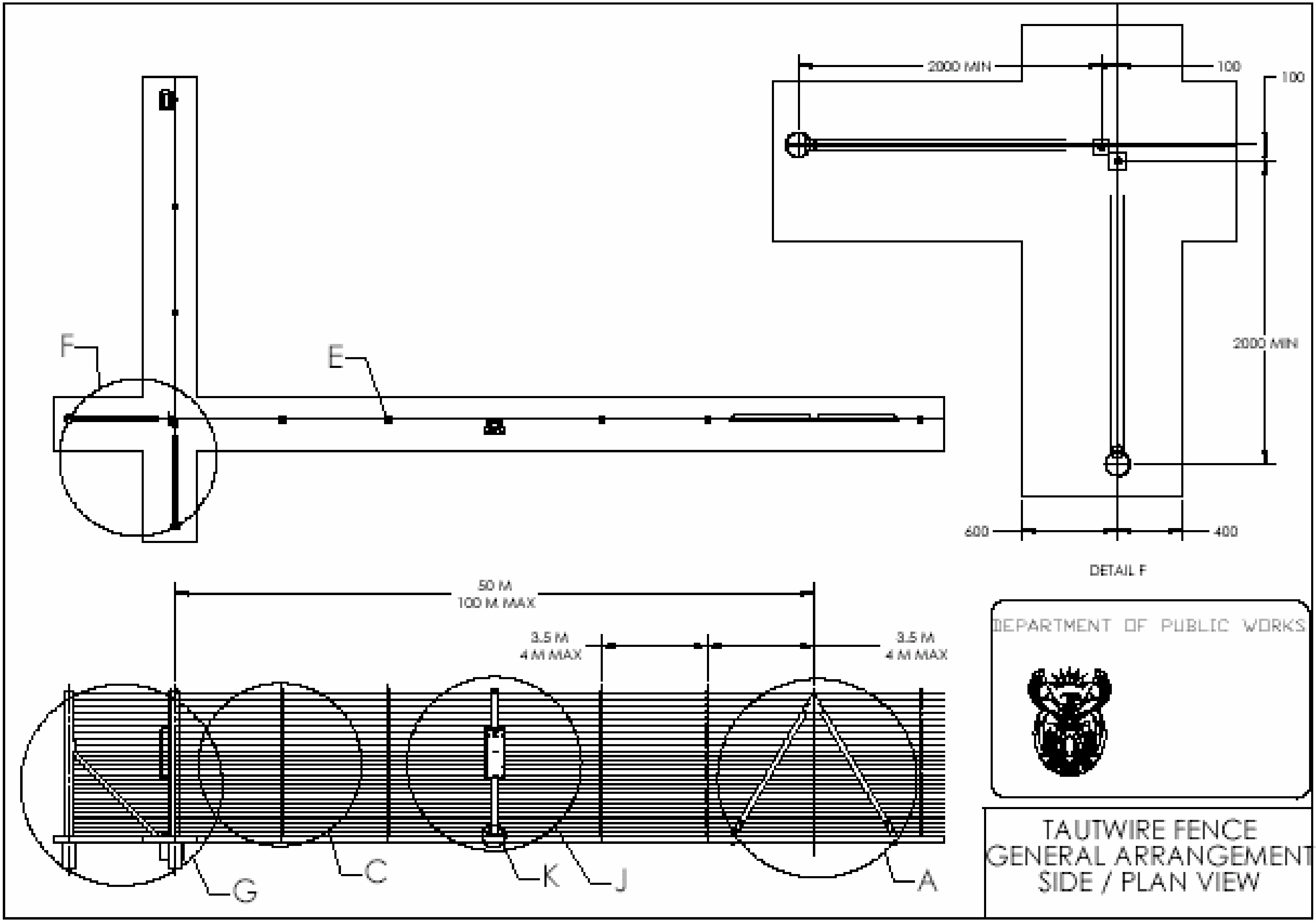
Any deviations from the specification can only be implemented with prior approval from the various representatives from DCS and DPW. The names of the authorised representatives should be obtained from the various Head Offices of the two involved government bodies.

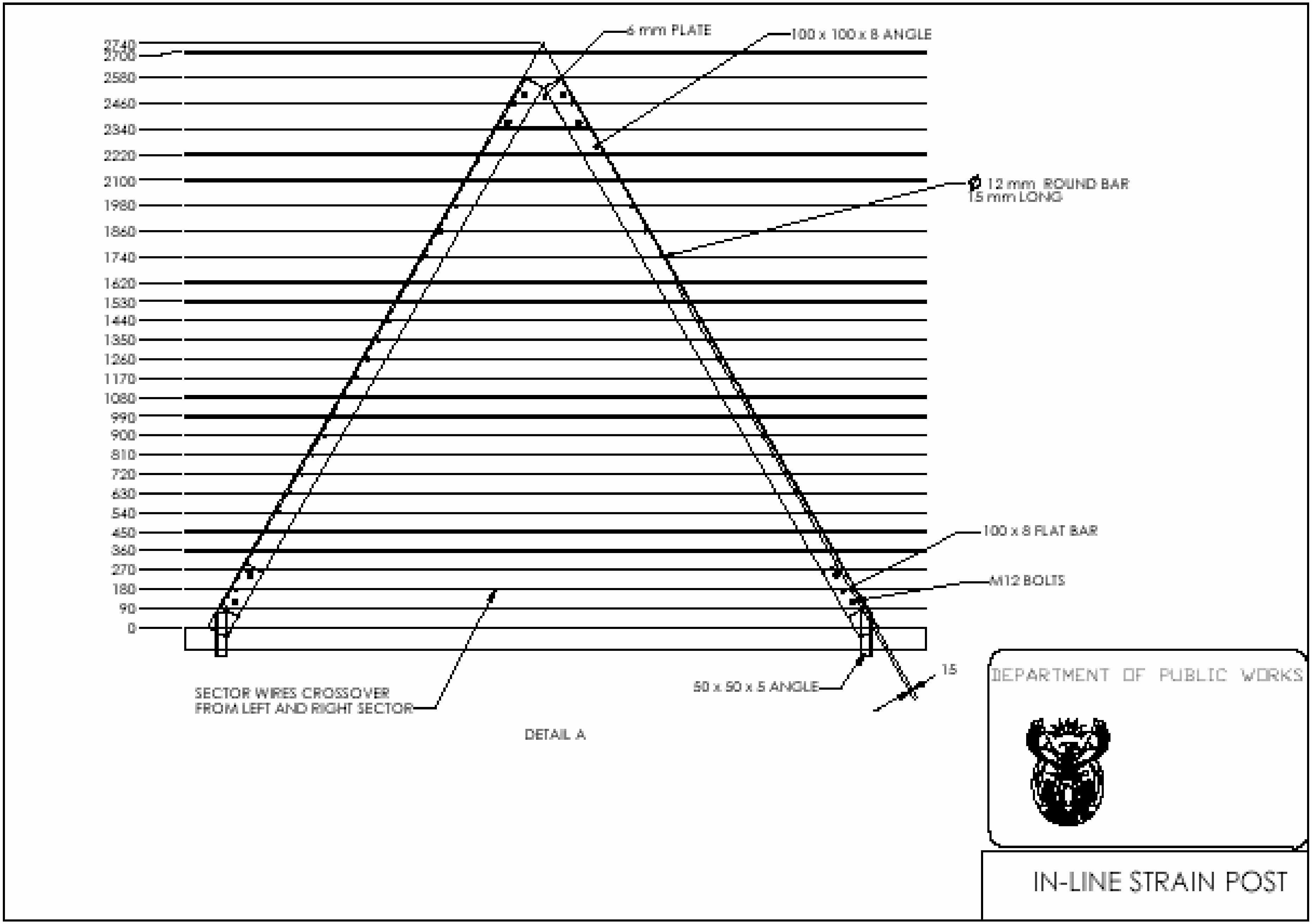
1.22 PROVEN PRODUCT

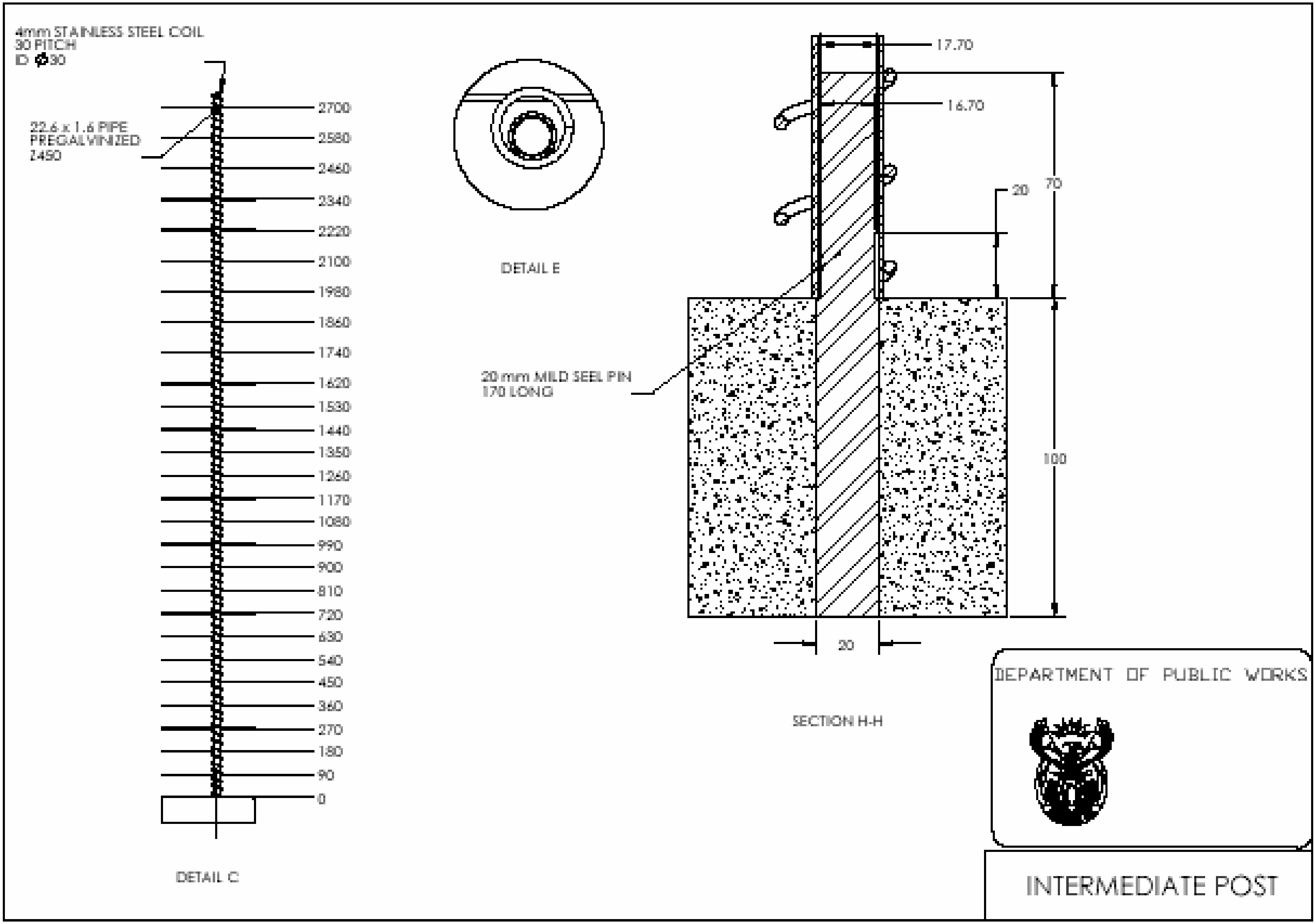
Due to the security nature of this requirement and the criticality of this application only proven product shall be considered.

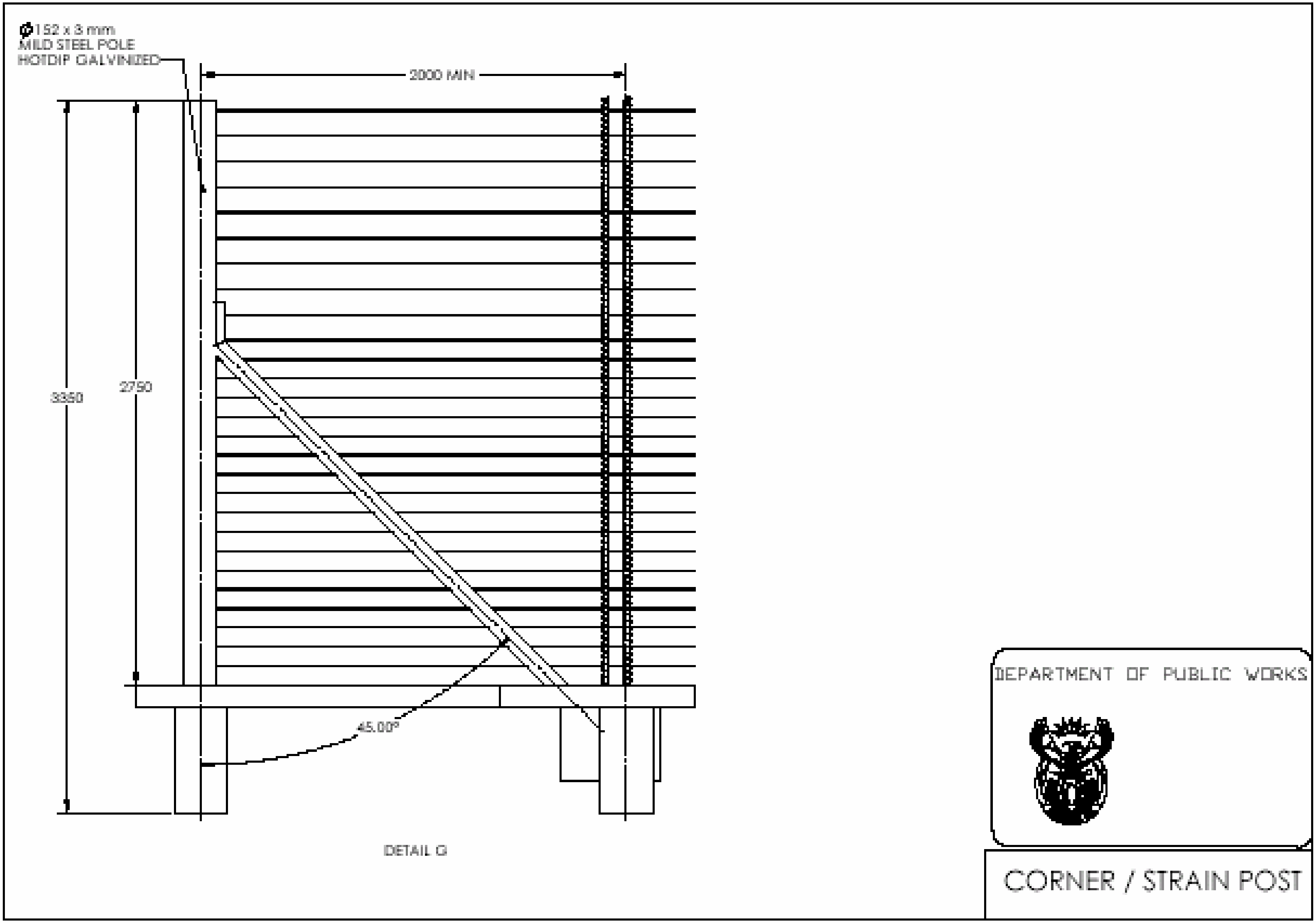
Product could be approved only after investigation by all applicable parties.

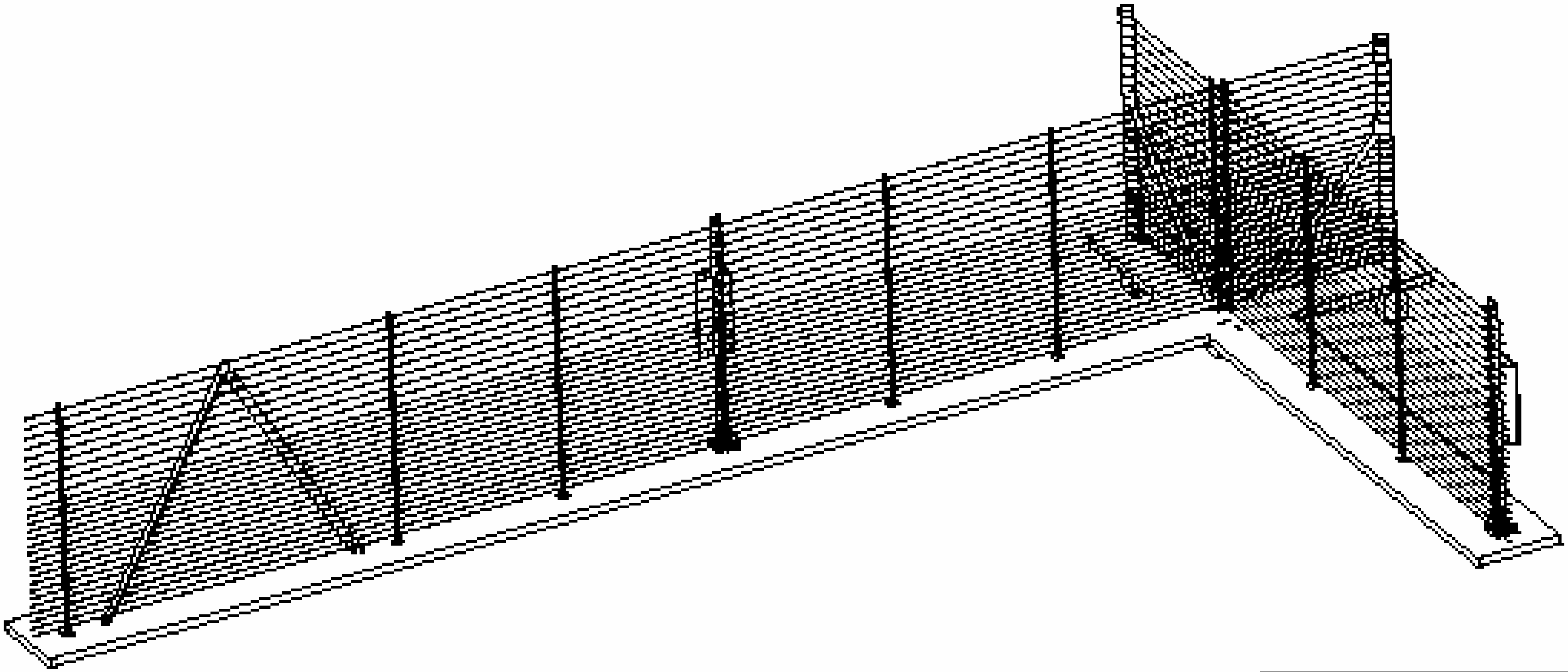
The international guideline for similar applications demands that five installations has to be operational in accordance with the above requirements for a minimum period of no less than two years before it would be considered as a proven product.


F
E
2000 MIN
100
100
2000 MIN
600
400
DETAIL F
50 M
100 M MAX
3.5 M
4 M MAX
3.5 M
4 M MAX
G
C
K
J
A
DEPARTMENT OF PUBLIC WORKS
TAUTWIRE FENCE
GENERAL ARRANGEMENT
SIDE / PLAN VIEW


6 mm PLATE
100 x 100 x 8 ANGLE
2740
2700
2580
2460
2340
2220
2100
1980
1860
1740
1620
1530
1440
1350
1260
1170
1080
990
900
810
720
630
540
450
360
270
180
90
0
Ø 12 mm ROUND BAR
15 mm LONG
100 x 8 FLAT BAR
M12 BOLTS
15
50 x 50 x 5 ANGLE
SECTOR WIRES CROSSOVER
FROM LEFT AND RIGHT SECTOR
DETAIL A
DEPARTMENT OF PUBLIC WORKS
IN-LINE STRAIN POST

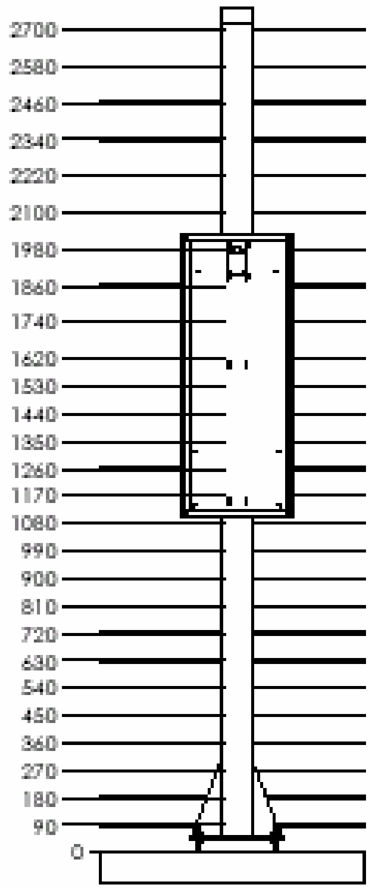

4mm STAINLESS STEEL COIL
30 PITCH
ID ⌀30
22.6 x 1.6 PIPE
PREGALVINIZED
2450
2700
2580
2460
2340
2220
2100
1980
1860
1740
1620
1530
1440
1350
1260
1170
1080
990
900
810
720
630
540
450
360
270
180
90
0
DETAIL C
DETAIL E
17.70
16.70
20
70
20 mm MILD SEEL PIN
170 LONG
100
20
SECTION H-H
DEPARTMENT OF PUBLIC WORKS
INTERMEDIATE POST


Ø152 x 3 mm
MILD STEEL POLE
HOTDIP GALVINIZED
2000 MIN
3350
2790
45.00°
DETAIL G
DEPARTMENT OF PUBLIC WORKS
CORNER / STRAIN POST

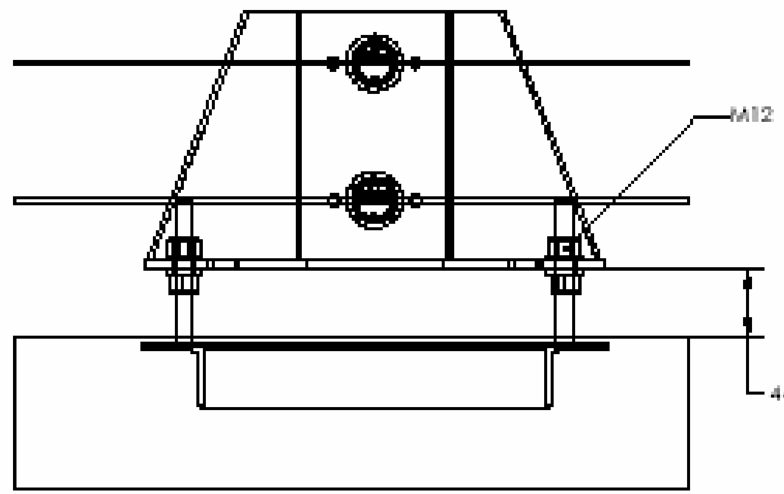


DEPARTMENT OF PUBLIC WORKS

TAUTWIRE FENCE
GENERAL ARRANGEMENT
ISO VIEW



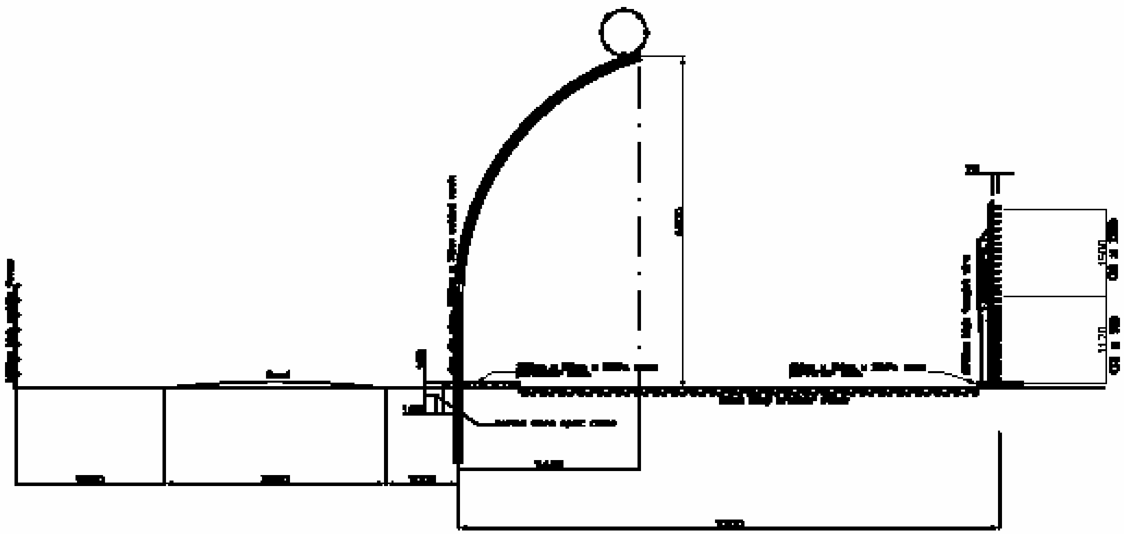
DETAIL J



DETAIL K

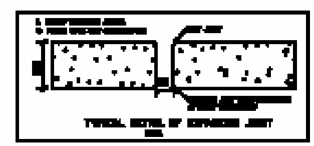
DEPARTMENT OF PUBLIC WORKS

TAUT WIRE POST



SECTION THROUGH PERIMETER FENCES

SCALE 1:50



NEW GENERATION PRISONS

PERIMETER FENCE DETAIL