

Hanwha Techwin is a global leading supplier of solutions for IP and analog video surveillance. Building on the company's history of innovation, Hanwha Techwin is dedicated to providing systems solutions with the highest levels of performance, reliability and cost-effectiveness. Hanwha Techwin is committed to the continued development of innovative systems products for professional security applications.

For additional information, visit <http://hanwha-security.com/>

**6MP NETWORK IR Bullet CAMERA**

**DIVISION 28 – ELECTRONIC SAFETY AND SECURITY**

**Notes to Specifier:**

1. Where several alternative parameters or specifications exist, or where, the specifier has the option of inserting text, such choices are presented in **<bold text>.**

2. Explanatory notes and comments are presented in **colored** text.

**Important: See further notes on the following page.**

**Important Note to Security Systems Specifiers**

CSI MasterFormat 2016 incorporates numerous significant changes affecting electronic safety and security. This document is written to provide flexibility in using either format, although adoption of MasterFormat 2016 is encouraged. The following is a guide to the MasterFormat numbers relevant to the product referenced in this specification.

**Primary Specification Area:**

**MasterFormat 2014**:

28 20 00 Electronic Surveillance

28 23 00 Video Surveillance

28 23 29 Video Surveillance Remote Devices and Sensors

**MasterFormat 2016**:

28 20 00 Video Surveillance

28 2x xx Surveillance Cameras

28 2x xx IP Cameras

**Related Requirements:**

**MasterFormat 2014**:

27 20 00 Data Communications

28 23 13 Video Surveillance Control and Management Systems

28 23 16 Video Surveillance Monitoring and Supervisory Interfaces

28 23 19 Digital Video Recorders and Analog Recording Devices

28 23 23 Video Surveillance Systems Infrastructure

**MasterFormat 2016**

27 15 01.xx Video Surveillance Communications Conductors and Cables

27 20 00 Data Communications

28 05 xx.xx PoE Power Sources for Electronic Safety and Security

28 05 xx Storage Appliances for Electronic Safety and Security

28 05 xx.xx Network Video Recorders

28 05 xx Cyber Requirements for Electronic Safety and Security

28 05 xx Safety and Security Network Communications Equipment

28 2x 00 Video Management System

**2 MP FULL HD NETWORK IR BULLET CAMERA**

1. **GENERAL**
   1. **SUMMARY**
      1. Section includes a 6MP IP video camera.
      2. Product - A 6MP IP video camera, with multi-streaming H.265, H.264 and MJPEG capability in a vandal resistant IK10 rated bullet housing with integral IR illuminator.

## Related Requirements

**Refer to MasterFormat notes at the beginning of this document to select requirements specific to the MasterFormat version being used in the specification.**

* 1. **REFERENCES**
     1. Abbreviations
        1. AGC Auto Gain Control
        2. AES Advanced Encryption Standard
        3. API Application Programming Interface
        4. ARP Address Resolution Protocol
        5. AWB Auto White Balance
        6. BLC Back light compensation
        7. CBR Constant Bit Rate
        8. CVBS Composite Video Blanking and Sync
        9. DHCP Dynamic Host Configuration Protocol
        10. DNR Digital Noise Reduction
        11. DNS Domain Name Server
        12. DDNS Dynamic Domain Name Server
        13. DSCP Differentiated Services Code Point
        14. fps frames per second
        15. FTP File Transfer Protocol
        16. GOV Group of Video
        17. GUI Graphical User Interface
        18. HD High Definition
        19. HTTP Hypertext Transfer Protocol
        20. HTTPS Secure HTTP
        21. ICMP Internet Control Message Protocol
        22. IGMP Internet Group Management Protocol
        23. IP Internet Protocol
        24. IR Infrared
        25. JPEG Joint Photographic Experts Group
        26. LAN Local Area Network
        27. LED Light Emitting Diode
        28. LDC Lens Distortion Correction
        29. LLDP Link Layer Discovery Protocol
        30. LPR License Plate Recognition
        31. MJPEG Motion JPEG
        32. MP Megapixel
        33. MPEG Moving Pictures Experts Group
        34. NAS Network Attached Storage
        35. NTP Network Time Protocol
        36. NVR Network Video Recorder
        37. PIM-SM Protocol Independent Multicast-Sparse Mode
        38. PoE Power over Ethernet
        39. PPPoE Point to Point Protocol over Ethernet
        40. QoS Quality of Service
        41. RTP Real-Time Transport Protocol
        42. RTCP Real-Time Control Protocol
        43. RTSP Real-Time Streaming Protocol
        44. SDK Software Development Kit
        45. SFP Small Form factor Pluggable
        46. SMTP Simple Mail Transfer Protocol
        47. SNMP Simple Network Management Protocol
        48. SSDR Super Smart Dynamic Range
        49. SSNR Super Smart Noise Reduction
        50. SSL Secure Sockets Layer
        51. TCP Transmission Control Protocol
        52. UDP User Datagram Protocol
        53. UPnP Universal Plug and Play
        54. VBR Variable Bit Rate
        55. VMS Video Management System
        56. WDR Wide Dynamic Range
     2. Reference Standards
        1. Network - IEEE
           1. 802.3 Ethernet Standards
           2. 802.1x Port-based Network Access Control
           3. IPv4 IP addressing version 4
           4. IPv6 IP addressing version 6
           5. QoS Quality of Service
        2. Video
           1. ISO / IEC 23008-2:2013, MPEG-H Part2 (ITU H.265, HEVC)
           2. ISO / IEC 14496–10, MPEG-4 Part 10 ( ITU H.264)
           3. ISO / IEC 10918 – JPEG
           4. ONVIF – Profiles S, G, T
        3. EMC & Safety
           1. FCC 47 CFR Part 15 Subpart B

ANSI C63.4-2014 Class A

* + - * 1. IC Regulation ICES-003:2016

ANSI C63.4-2014 Class A

* + - * 1. CE EMC-Directive 2014/30/EU

EN 55032:2015 Class A

EN 50130-4:2011+A1:2014

* + - * 1. VCCI-CISPR 32: Class A
        2. AS/NZS CISPR32:2015 Class A
        3. UL listed
        4. CE EN 50581:2012 (hazardous substances)
      1. Ingress Protection and Vandal Resistance
         1. ANSI / IEC60529 – Degrees of Protection Provided by Enclosures – IP66 / IP67
         2. IEC EN 62262 - Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts : IK10
         3. IEC 60068-2-75 : IK10
    1. Definitions
       1. GOV (Group of Video object planes) - A set of video frames for H.264 and H.265 compression, indicating a collection of frames from the initial I-Frame (key frame) to the next I-Frame. GOV consists of 2 kinds of frames: I-Frame and P-Frame.
       2. Dynamic GOV – Dynamic assignment of GOV length based on the complexity of the scene to efficiently manage bitrate of the video stream and reduce the storage required.
       3. Multi-exposure wide dynamic range - Operation which automatically adjusts shutter speed to provide a wide range between dark and light areas visible at the same time, preventing backlighting issues. Long exposure is used for dark areas and a short exposure is used in light areas.
       4. Dynamic fps – Dynamic assignment of fps (frames per seconds) based on the movement of object(s) in the scene to efficiently manage bitrate of the video stream and reduce the storage required.
       5. Smart Codec – Smart Codec that controls quantization parameter and dynamic fps in H.265 and H.264 to efficiently manage bitrate of the video stream and reduce the storage required.
       6. WiseStream Ⅱ – Technology that controls quantization parameter, fps, and GOV length in H.265 and H.264 to efficiently manage bitrate of the video stream and reduce the storage required.
       7. DORI (Detect, Object, Recognize, Identify) – A standard system (EN-62676-4) for defining the ability of a camera to distinguish persons or objects within a covered area.
          1. Detect : 25PPM / 8PPF
          2. Object : 63PPM / 19PPF
          3. Recognize : 125PPM / 38PPF
          4. Identify : 250PPM / 76PPF
  1. **SUBMITTALS**
     1. Product Data
        1. Manufacturer’s printed or electronic data sheets
        2. Manufacturer’s installation and operation manuals
        3. Warranty documentation
  2. **QUALIFICATIONS**
     1. Manufacturer shall have a minimum of five years’ experience in producing IP video equipment.
     2. Installers shall be trained and authorized by the Manufacturer to install, integrate, test, and commission the system.
  3. **DELIVERY, STORAGE AND HANDLING**
     1. Deliver the camera in the manufacturer’s original, unopened, undamaged container with identification labels intact.
     2. Store the camera in a temperature environment specified in section 2.04 Detailed Specification, protected from mechanical and environmental conditions as designated by the manufacturer.
  4. **WARRANTY, LICENSING AND SUPPORT**
     1. Manufacturer shall provide at least a limited 3 year warranty for the product to be free of defects in material and workmanship.
     2. Manufacturer shall provide embedded camera video analytics free of license charges.

END OF SECTION

1. **PRODUCTS**
   1. **EQUIPMENT**
      1. Manufacturer: Hanwha Techwin

<http://hanwha-security.com/>

* + 1. Model XNO-8082R
    2. Alternates: None
  1. **GENERAL DESCRIPTION**
     1. Video Compression and Transmission – The camera shall have the following properties relating to the video signals it produces.
        1. H.265, H.264 and MJPEG compression, each derived from a dedicated encoder and capable of being streamed independently and simultaneously
           1. H.265 and H.264 – frame rates to maximum 30 fps (60 Hz) / 25 fps (50 Hz) at all resolution
           2. MJPEG – frame rates to maximum 15 fps (60 Hz) / 12 fps (50 Hz) at all resolution
        2. The camera shall be able to configure up to 10 independent video stream profiles with differing encoding, quality, frame rate, resolution, and bit rate settings.
        3. The camera shall be able to configure various resolution selections.
           1. 16:9 aspect ratio : 3328x1872, 3072x1728, 2688x1520, 1920x1080,

1280x720, 800x448, 640x360

* + - * 1. 4:3 aspect ratio : 2592 x 1944, 1600x1200,1024x768, 800x600, 640x480, 320x240
        2. 5:4 aspect ratio : 1280 x 1024, 720 x 576
        3. 3:2 aspect ratio : 720 x 480
      1. The camera shall support unicast video streaming up to 20 users.
      2. The camera shall support multicast video streaming up to 10 profiles.
      3. The camera shall be able to configure Dynamic DNS (DDNS). DDNS shall be provided with no additional cost by the manufacturer.
      4. The camera shall provide WiseStream Ⅱ, Dynamic GOV and Dynamic fps to efficiently manage bit rate of the video stream and reduce storage.
    1. Camera – The camera device shall have the following physical and performance properties:
       1. IK10 rated for protection against impacts.
       2. True day/night operation with removable IR cut filter
          1. Low light level operation to 0.05 lux at F1.2 in color mode and 0 lux in black and white mode with IR LED on.
       3. The camera shall be able to produce clear images in highly contrast scenes with multi-exposure wide dynamic range.
       4. The camera shall support digital noise reduction using both 2D and 3D noise reduction technology.
       5. The camera shall be able to configure 32 privacy masking areas with polygonal zones.
       6. The camera shall have the defog feature to remove fogginess of scene which can be triggered automatically from the fog detection event.
       7. The camera shall provide video display on smart phone (iPhone, Android) to adjust viewing angle, rotation and focus..
    2. Intelligence and Analytics – The camera shall have a suite of integral intelligent operations and analytic functions to include:
       1. Motion detection with 8 definable detection areas with 8 point polygonal zones, and minimum/maximum object size.
       2. Motion detection hand-over to PTZ cameras. The camera shall be able to call a preset of PTZ camera when motion event is triggered.
       3. Detection of logical events of specified conditions from the camera’s video
          1. Defocus detection
          2. Fog detection
          3. Directional detection
          4. Motion detection
          5. Digital auto tracking
          6. Appear/Disappear
          7. Enter/Exit
          8. Loitering
          9. Tampering
          10. Virtual line
          11. Audio detection
          12. Sound classification
          13. Shock detection
          14. Face/upper body detection
       4. Business Intelligence features
          1. People counting
          2. Queue management
          3. Heatmap
       5. Detection and classification of the following sound.
          1. Scream
          2. Gunshot
          3. Explosion
          4. Crashing glass
    3. Interoperability – The camera shall be ONVIF Profile S / G and T compliant.
    4. The camera shall possess the following further characteristics:
       1. Built-in web server, accessed via non-plugin browsers including Google Chrome, MS Edge, Mozilla Firefox and Apple Safari.
       2. The camera shall provide streaming to multiple smart phones with DDNS provided freely from the manufacturer. In addition, the application shall be available for both iOS and Adroid, free of charge with search keyword, ‘Wisenet Mobile’.
       3. Micro SD/SDHC/SDXC memory card with configurable pre-alarm and post-alarm recording intervals
       4. NAS recording option with configurable pre-alarm and post-alarm recording intervals
       5. Alarms and notifications
          1. alarm notification triggers:

Analytics

Network disconnect

Alarm input

* + - * 1. available notification means upon trigger:

File Upload via FTP and E-mail

Notification via E-mail

Local storage (SD / SDHC / SDXC) or NAS recording at event triggers

Alarm output

PTZ preset

Handover

Audio playback

* + - 1. Pixel Counter available in the web viewer.
      2. PoE capable
      3. IP66/IP67, IK10, NEMA4X
      4. This device has been verified using STP cable. The use of appropriate GND grounding and STP cable is recommended to effectively protect your product and property from transient voltage, thunderstrike, communication interruption.
  1. **CAMERA SOFTWARE**
     1. The camera shall have a built in web server which supports browser-based configuration using Google Chrome, Mozilla Firefox, and Apple Safari from a PC or Mac.
     2. The web viewer shall provide a monitoring screen which displays live camera video and simultaneously provides same-screen access to the following functions:
        1. Live view window size
        2. Resolution setting
        3. Image (snapshot) capture
        4. Manual recording to SD or NAS
        5. Audio/microphone control
        6. Access recorded data playback and camera configuration menus
        7. Digital PTZ
     3. The web viewer shall provide a playback screen which provides access to the following functions:
        1. Recorded data search using date and time range
        2. Recorded data search using event type
        3. Play a recorded video by event triggering
        4. Set resolution
        5. Play audio if present
        6. Generate a backup copy of saved video data
     4. The web viewer shall provide a setup screen which provides access to the following configuration settings and functions in the camera:
        1. Digital video profile to include compression type, maximum or target bit rate, frame rate, multicast parameters, crop encoding area
        2. User profile to include password, access level, authentication
        3. Date and time
        4. Network settings and IP version
           1. DDNS
           2. SSL/TLS, including certificate management
           3. 802.1x authentication
           4. Quality of Service settings
           5. SNMP to include version selection and settings
           6. Auto configuration
        5. Video setup
           1. Flip / mirror mode
           2. Video output type
           3. Privacy zone
        6. Audio setup to include source, audio codec type, gain, and bit rate
        7. Camera settings to include image preset, sensor frame capture, dynamic range, white balance, back light, exposure, day/night operation, on-screen display, IR illumination, sharpness, contrast, color level, lens distortion correction.
        8. Event detection setup to include notification parameters, recording rules, time schedule, tamper protection, motion detection, event triggers
        9. System function to include reboot, upgrade, check system and event logs, application (SDK) management
        10. View profile information
     5. Client requirements
        1. Recommend Browser: Chrome
        2. Acceptable Browser: Chrome, Safari, Firefox, MS Edge(chromium based)
        3. Acceptable Operating Systems: Windows, MAC, Android, iOS, Chrome
        4. Verified Environment:
           1. Windows 10: Google chrome version 80 above, Firefox version 72 above,   
               MS Edge version 83 above
           2. Mac 10.13/14: Safari version 11.0.1 above
* Decoding performance in web viewer depends on CPU/GPU performance of user
  1. **DETAILED SPECIFICATIONS**
     1. Video
        1. Imaging device 1/2.8" CMOS
        2. Image Pixels 3840(H)x2160(V)
        3. Scanning Progressive
        4. Minimum Illumination Color: 0.05Lux (F1.2, 1/30sec),

B/W: 0Lux (IR LED On)

* + 1. Lens:
       1. Focal length 2.8~8.4mm(3x) motorized varifocal
       2. Max. Aperture Ratio F1.2(Wide)~F2.8(Tele)
       3. Field of View H: 114°(Wide)~40.2°(Tele)

V: 62.0°(Wide)~22.5°(Tele)

D:133.0°(Wide)~46.3°(Tele)

* + - 1. Min. Object Distance 0.7m (2.23ft)
      2. Focus Control Simple focus
      3. Lens Type DC auto iris, P iris
    1. Operational Functions
       1. IR Viewable Length 40m(131.23ft)
       2. Camera Title Off / On (Displayed up to 85 characters)
          1. W/W English / Numeric / Special characters
          2. China English / Chinese / Numeric / Special characters
          3. Common Multi-line (Max. 5), Color (Grey/Green/Red/Blue/Black/White),

Transparency, Auto scale by resolution

* + - * 1. Image BMP 20x20 pixel
      1. Day/Night Setting Auto (ICR) / Color / B/W / External / Schedule
      2. Backlight Compensation BLC / HLC / WDR / SSDR
      3. WDR extreme WDR (120dB)
      4. Digital Noise Reduction (DNR) Support (SSNR Ⅴ)
      5. Digital Image Stabilization (DIS) Support (built-in gyro sensor)
      6. Defog Support
      7. Motion Detection Off / On (8ea, 8-point polygonal)
      8. Privacy Masking Off / On (32 zones, polygonal)

- Color: Grey / Green / Red / Blue / Black / White

- Mosaic

* + - 1. Auto Gain Control Off / Low / Middle / High
      2. White Balance ATW / Narrow ATW / AWC / Manual / Indoor / Outdoor
      3. LDC Support
      4. Electronic Shutter Speed Min / Max / Anti-flicker (1/5 ~ 1/12,000sec)
      5. Digital PTZ Support (Preset, Group)
      6. Image Rotation Flip: Off / On

Mirror: Off / On

Hallway view: 0˚ / 90˚ / 270˚

* + - 1. Alarm I/O 2 configurable I/O ports (total 2 I/O port)
      2. Alarm Triggers Alarm Input, Analytics, Network Disconnection
      3. Alarm Events File Upload via FTP and E-mail, Notification via E-mail,

SD/SDHC/SDXC or NAS recording at event triggers,

Alarm output, Handover, PTZ preset, Audio playback

* + - 1. Pixel Counter Support
      2. Storage Micro SD/SDHC/SDXC 512GB (256GB x 2 slots)
      3. Analytics Defocus detection, Directional detection, Motion detection,

Fog detection, Digital auto tracking, Appear/Disappear, Enter/Exit, Loitering,

Tampering, Virtual line, Audio detection, Sound classification,

Shock detection, Face/upper body detection

* + - 1. Video Out (Installation) CVBS: 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P)

USB: Micro USB type B, 1280 x 720 for installation

* + - 1. Memory 4GB RAM, 512MB Flash
      2. DORI Distance

Detect Wide: 49.9m(163.71ft) / Tele: 209.9m(688.65ft)

Observe Wide: 19.9m(65.29ft) / Tele: 83.9m(275.26ft)

Recognize Wide: 10.0m(32.80ft) / Tele: 42.0m(137.80ft)

Identify Wide: 5.0m(16.40ft) / Tele: 21.0m(68.90ft)

* + 1. Video Streams
       1. Video compression H.265, H.264, MJPEG
       2. Resolution 3328x1872, 3072x1728, 2592x1944, 2688x1520,

1920x1080, 1600x1200, 1280x1024, 1280x960, 1280x720,

1024x768, 800x600, 800x448, 720x576, 720x480, 640x480,

640x360, 320x240

* + - 1. Maximum Framerate
         1. H.265 / H.264 H.265/H.264: Max. 30fps/25fps(60Hz/50Hz)
         2. MJPEG Max. 15/12fps(60Hz/50Hz)
      2. Smart Codec Manual Mode (area-based : 5EA)
      3. WiseStream Ⅱ Support
      4. Bitrate Control Method H.265 / H.264: CBR or VBR

MJPEG: VBR

* + - 1. Streaming Capability Multiple streaming (Up to 10 profiles)
      2. Streaming method Unicast / Multicast
      3. Simultaneous Users 20 maximum (Unicast)
      4. Profile set Max. 10ea
      5. Interoperability ONVIF Profile S / G / T, SUNAPI(HTTP API), Open Platform
    1. Audio
       1. Audio In Selectable(mic in/line in/Built-in mic)

Supply voltage: 2.5V DC(4mA), Input impedance: 2K Ohm

* + - 1. Audio Out Line out, Max. output level 1Vrms
      2. Audio Compression G.711 u-law /G.726 Selectable

G.726(ADPCM) 8KHz, G.711 8KHz

G.726: 16Kbps, 24Kbps, 32Kbps, 40Kbps

AAC-LC: 48Kbps at 16KHz

* + 1. Network
       1. Connectivity – Shielded RJ-45(10/100/1000BASE-T)
       2. Protocol
          1. IP v4 / v6, TCP, UDP
          2. Configuration: DHCP, LLDP
          3. Web service: HTTP, HTTPS
          4. Network Service: ARP, Bonjour, DNS, ICMP, NTP, PIM-SM, SNMP v1/2c/3 – MIB-2, UPnP
          5. Media: RTP, RTCP, RTSP
          6. Unicaset: SRTP (TCP, UDP Unicast)
          7. Multicast: IGMP
          8. Notifications: FTP, SMTP
          9. Remote Access: PPPoE
       3. Serial Interface RS-485(Samsung-T, Pelco-D/P, Panasonic, Bosch, AD, GE,

Vicon, Honeywell)

* + - 1. DDNS – The camera shall support DDNS services offered by the manufacturer and others publicly available service offerings
      2. QoS – Layer 3 DSCP
      3. Security Feature
         1. User password protection
         2. The device shall not provide a manufacture default password. Initial password setting shall be required to access the camera.
         3. A minimal level of password complexity shall be required by the camera.
         4. The camera shall not have a manufacturer back-door password.
         5. The manufacturer shall provide a tool that provides the ability to make password changes to multiple cameras at the same time.
         6. IP address filtering – List of allowed or blocked IP addresses.
         7. SRTP secured video communication for multicast.
         8. Digest login authentication.
         9. User access log.
         10. 802.1X Authentication (EAP-TLS, EAP-LEAP)
         11. Device Certificate (Hanwha Techwin Root CA)
         12. HTTPS(SSL/TLS) login authentication and secured video communication with TLS v1.3
         13. Disk encryption on SD card recording (AES-256)
         14. File encryption on local disk recording via web browser (AES-256)
         15. Mutual Authentication (Client Authentication) for secure communication
         16. CyberSecurity assuarance program UL CAP (UL 2900-1)
      4. Discovery – The manufacturer shall offer a discovery program to identify all devices of them on the network.
      5. Configuration – The manufacturer shall offer a configuration program that remotely allows users to change settings on multiple cameras simultaneously.
      6. Firmware upgrade – The manufacturer shall offer a program capable of upgrading multiple cameras at the same time (not requiring access to individual cameras).
      7. Camera backup setting – The manufacturer shall provide a program that provides the ability to save multiple camera settings to a file and restore these camera settings if needed.

Reporting – The manufacturer shall provide a tool that can generate a report including thumbnail view, MAC address, IP address, serial number and other camera setting

* + 1. Electrical
       1. Power
          1. Input Voltage / Current PoE (IEEE802.3af, Class3), 12V DC, 24VAC
          2. Power Consumption: Typ 10.5W, Max 12.95W (PoE)

Typ 9.4W, Max 12.5W (12VDC)

Typ 11.2W, Max 14.5W (24VAC)

Power redundancy failover

* + 1. Mechanical And Environmental
       1. Color/Material White / Aluminum, Hard-coated dome bubble
       2. RAL Code RAL9003
       3. Dimensions (Ø x H): 91 x 368.6 mm (3.85 x 14.51”).
       4. Weight 2.2 Kg (4.85 lb.)
       5. Temperature:
          1. Operating: -50° C to 60° C (-58° F to 140° F)

\* Start up should be done at above -30°C

* + - * 1. Storage: -50° C to 60° C (-58° F to 140° F)
      1. Humidity
         1. Operating Less than 95% RH (non condensing)
         2. Storage Less than 90% RH
      2. Environmental Rating:
         1. Mechanical (Vandal) Protection IK10, NEMA4X
         2. Water/Dust Ingress Protection IP66 / IP67
      3. DORI (EN62676-4 standard)
         1. Detect (25PPM/ 8PPF) Wide: 49.9m(163.71ft) / Tele: 209.9m(688.65ft)
         2. Observe (63PPM/ 19PPF) Wide: 19.9m(65.29ft) / Tele: 83.9m(275.26ft)
         3. Recognize (125PPM/ 38PPF) Wide: 10.0m(32.80ft) / Tele: 42.0m(137.80ft)
         4. Identify (250PPM/ 76PPF) Wide: 5.0m(16.40ft) / Tele: 21.0m(68.90ft)

END OF SECTION

1. **EXECUTION**
   1. **INSTALLERS**
      1. Contractor personnel shall comply with all applicable state and local licensing requirements.
   2. **PREPARATION**
      1. The network design and configuration shall be verified for compatibility and performance with the camera(s).
      2. Network configuration shall be tested and qualified by the Contractor prior to camera installation.
      3. All firmware found in products shall be the latest and most up-to-date provided by the manufacturer, or of a version as specified by the provider of the Video Management Application (VMA) or Network Video Recorder (NVR).
      4. All equipment requiring users to log on using a password shall be configured with user/site-specific password/passwords. No system/product default passwords shall be allowed.
   3. **INSTALLATION**
      1. The Contractor shall carefully follow instructions in documentation provided by the manufacturer to insure all steps have been taken to provide a reliable, easy-to-operate system.
      2. All equipment shall be tested and configured in accordance with instructions provided by the manufacturer prior to installation.
      3. Before permanent installation of the system, the Contractor shall test the system in conditions simulating the final installed environment.
   4. **STORAGE**
      1. The hardware shall be stored in an environment where temperature and humidity are in the range specified by the Manufacturer.

END OF SECTION