

SECTION 265619 – LED TRACKBED, PARAPET, AND PYLON LIGHTING

The intent of this specification is for the design, manufacturing and supplying of fixtures to provide the performance, quality, durability and maintainability described in this and the following sections and illustrated in the attached fixture drawings.

The train room, where these fixtures will be installed, is a harsh environment for fixtures with intense vibrations and pressure from passing trains, magnetic break dust and a difficult maintenance regimen due 24/7 operation and “track-right” access to certain areas.

The descriptions included in the accompanying fitting specification and drawings are definitive. The electrical description and lighting performance shall be conformed to. The general description and construction, where specified are indicative of the physical and aesthetic qualities desired in the fittings. They do not preclude consideration of fittings utilizing different types of construction or form factors which provide equivalent appearance and performance.

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid-state luminaires that are designed for and exclusively use LED lamp technology.
 - 2. Luminaire supports.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color rendering index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. Lumen: Measured output of luminaire.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of luminaire.

1. Arrange in order of luminaire designation.
 2. Include data on features, accessories, and finishes.
 3. Include physical description and dimensions of luminaire.
 4. Lamps, include life, output (lumens, CCT, and CRI), and energy-efficiency data.
 5. Photometric data and adjustment factors based on laboratory tests, complying with IES LM-79 and LM-80.
 - a. Manufacturer's Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products.
 - b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
 6. Wiring diagrams for power, control, and signal wiring.
 7. Photoelectric relays.
 8. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.
- B. Samples: For each luminaire type and for each color and texture indicated with factory-applied finish.
- C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing laboratory providing photometric data for luminaires.
- B. Product Certificates: For each type of the following:
1. Luminaire.
- C. Product Test Reports: For each luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency and/or a qualified testing agency.
- D. Source quality-control reports.
- E. Sample warranty.

1.6 QUALITY ASSURANCE

- A. All fixtures shall be designed and constructed in accordance with Underwriters' Laboratories Publication UL 57 Safety Standard for Electric Lighting Fixtures or ETL and UL 8750 Safety Standard for Light Emitting Diode (LED) Equipment. They shall either bear the U.L. label or be approved by the applicable inspecting authority. Conformance labels shall be not be visible from the platform or the mezzanines above. Fixtures shall have Underwriter's

Laboratory Listing for the classes of service described in subsequent sections of the Specification.

- B. All LED fixtures shall comply with FCC Rule Part 15 governing electromagnetic interference.
- C. Fixtures shall be free of light leaks.
- D. The manufacturer of LEDs shall utilize an advanced production LED binning process to maintain color consistency. LEDs and LED modules shall have a color consistency between each other of no more than 2 MacAdam ellipses.
- E. Manufacturer shall conduct a 48-hour "burn in" of the fixtures prior to shipment to minimize failure in the initial one thousand hours. In this 48 hour test, the fixtures shall cycle through being on for a period of 4 hours and off for a period of 2 hours. This shall be repeated until the 48 hour period is over.
- F. Fixture shall have a minimum vibration rating of 3G ANSI 136.31.
- G. Fixtures shall have a minimum impact rating of IK06.
- H. Lighting performance data verified by an acceptable independent testing laboratory shall be submitted for each fixture. These tests shall include distribution curve and lumen output data.

1.7 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures, including luminaire support components.
 - b. Faulty operation of luminaires and accessories.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: 5 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fixtures shall be installed and mounted as described so that they:
 - 1. Maintain all seals and gasketed junctions.
 - 2. Maintain proper fixture seating in mounting brackets.
 - 3. Maintain all clearances required for described maintenance procedures.

- B. All joints shall be sealed or caulked such that it will withstand water-jet cleaning of 1500 psi sprayed straight down from a distance of 5'.
- C. The fixtures shall be fixed focus with no adjustability in them. The fixtures should fall perfectly into focus when replaced by maintenance. Focus is achieved by shimming of the brackets by the contractor upon installation.
- D. Each fixture shall be able to have a mounting bracket to properly support and orient the housing that is configured and keyed so that it accepts only the appropriate Type L, Type L10, Type LW, Type P, or Type PH fixture in the proper orientation. The configuration of the receiving part of the mounting bracket may vary to support the same fixture type with a different orientation, i.e. the linear parapet fixtures are the Type L fixture but oriented with a 10° tilt.
- E. The fixtures shall be designed so that they can be removed and installed by one person.
- F. Each Light fixture type shall be able to have its own mounting bracket configuration as shown making it impossible for anyone to ever install the wrong fixture in the wrong location or with the wrong orientation (as in the case of PH). The final shape of the mounting brackets may vary, but the logic and intent of the mounting brackets shall not.
- G. All fixtures shall easily slide into place and sit properly and firmly their respective mounting brackets.
- H. Fixtures shall be designed to allow the following operations to be done by one man in one ladder position:
 - 1. To be able to reach the power and/or control cables to undo them before removing the fixture.
 - 2. To not be able to confuse the power cable and the control cables, nor plug one into the socket of the other.
 - 3. To replace the fixture without tools so that it rests firmly in the correct focus.

2.2 LUMINAIRE REQUIREMENTS

- A. The spacing and power of the LEDs shall be as required to produce the lighting effect herein after described.
- B. LEDS and LED modules shall be manufactured by a trusted manufacturer with a proven track record for performance and reliability, with at least 5 years' experience.
- C. The nominal LED color temperature shall be 3000K (+/- 20K) and appear to be the same color, even if made by different manufacturers. All lighting systems shall be verifiable per IESNA LM-79 test measurement for solid state luminaries. The CRI shall be 80. Not only shall one fixture type match the color of another fixture of the same type, the different type fixtures from different manufacturers – trackbed & pylon or parapet & central trackbed – shall appear to the naked eye to be the same color. If the different fixture types installed do not appear to be the same color, the Contractor will be responsible for removing the fixtures and replacing them with fixtures that do match in color and are the color that WMATA approved.

- D. LED fixtures shall be thermally protected using one or more of the following thermal management techniques: heat sink, metal core board, gap pad, and/or internal monitoring firmware.
- E. LED array shall be provided with protection mechanisms to prevent string failures like individual shorts or open.
- F. LEDs shall have a minimum lifetime of L70 (not lose more than 30% of their initial brightness) of 100,000 hours per US DOE Caliper Test for solid state lighting. The Thermal resistance shall be less than 10 degrees C/Watt to allow heat transfer from LED junction to the LED board.
- G. LED modules shall employ remote phosphor or cold phosphor technology.
- H. The efficiency of LED light engines or LEDs shall be no less than 80 lumens per Watt.
- I. Collimating Lenses or acrylic lens overlay shall be:
 - 1. Highest Quality, Optically-Clear Acrylic
 - 2. Molded and polished to provide the specified optics
 - 3. Wavelength range: 200-2000 nm
 - 4. Operating temperature 150° C
- J. Source Limitations: For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.
- K. LED Drivers:
 - 1. Drivers shall be manufactured by a trusted manufacturer with a proven track record for performance and reliability, with at least 5 years experience.
 - 2. All drivers shall be constant current; thereby, operating the LED at constant and carefully regulated current. LEDs shall not be overdriven beyond their specified junction temperature and nominal voltage and current.
 - 3. LED drivers shall be able to communicate with the central system in a "feedback" system reporting on its status and usage for maintenance and sustainability planning.
 - 4. Drivers shall come with an NTC interface for robust thermal management.
 - 5. Electronics shall be self-protected, including surge protection and short circuit protection.
 - 6. Drivers shall have a startup of less than one second without any flickering.
 - 7. Input voltage shall be 277V (+/-10%).
 - 8. Drivers shall provide Class 2 LED output.
 - 9. Frequency shall be between 47-63Hz.
 - 10. Power factor shall be no less than 0.9 at full load.
 - 11. All drivers shall be UL or ETL approved for use in damp and wet locations.
 - 12. Ambient operating temperature range shall be -25°C to +50°C. Case temperature maximum shall be 75°C. TC lifetime shall be 75°C.
 - 13. The system shall conform to all local and international codes and in particular IEC 62386 Digital Lighting Interface.
 - 14. Surge protection shall be 4kV per IEC 61000-4-5.
 - 15. All drivers shall have a sound rating of A.

16. All drivers shall be guaranteed by manufacturer against defects in material and workmanship. Guarantee shall include on-site inspection, labor and material for replacement of defective drivers for a period of 5 years.
17. All LED drivers shall have, at minimum, 0-10V dimming capability.
18. All fixtures and drivers shall adhere to the UL8750 safety standard.

L. Lighting Performance

1. Each fixture shall produce a smooth, even field of light on the surface which it is designed to light. The field shall be free of hot spots, dark spots, or filament striations.
2. Photometric performance shall be defined by any of the following:
 - a. Photometric curves.
 - b. Beam spread as specified by spacing to mounting height ratio or degrees.
 - c. Zonal lumen distribution.
 - d. Reference to a specific fixture by manufacturer and catalogue number.
 - e. Delivered Lumens, that number of lumens that makes it out of the fixture and into the beam angle, not field angle.
3. The beam spread of lights shall be defined by:
 - a. Beam angle defined as the angle from nadir at which the beam intensity, in candelas, equals 50% of the center beam intensity.
 - b. Field angle defined as the angle from nadir at which the beam intensity, in candelas, equals 10% of the center beam intensity. The field angle for a 30° beam angle shall not be more than 10° more than the beam angle. The field angle for a 10° fixture shall not be more than 5° more than the beam angle. The field angle for a 60° shall not be more than 15° more than the beam angle.
4. The efficiency of fixtures shall be expressed as a percentage of lamp lumens which is directed into the useful light beam.
5. It is the intent of this lighting specification to procure a train room lighting system that after a reduction to 70% of initial light output and working at WMATA's proscribed maintenance factor of 55% for indirect lighting at the track level produces the illumination levels described in the *WMATA Manual of Design Criteria Section 4.5.2* under "Minimum Illumination Level-Initial of 5fc. This means the initial light output of the fixture shall produce 10 fc of light when measured 3' above the platform. The review of a mockup at Federal Triangle on May 2, 2016 indicated that this will be achieved by the installation of LED luminaires with the light output herein after described and installed as shown in the lighting plans. As a final step in the development of these systems, the contractor will furnish a sample of each fixture type so that WMATA can:
 - a. Verify the color of the LEDs
 - b. Compare the color between fixtures or lighting systems
 - c. Verify the beam angle of the fixtures

M. Electrical

8. Types L, L10 and LW shall have a 5-pin, male, amp-type connector that can lock with the female tail or whip waiting for each fixture at the junction box to form an IP67 connection. Three of the pins are for the 277v power and 2 pins are for the 0-10v or DMX control for the dimming driver.

9. Types P and PH can come with a power cable and a separate control cable to connect to the driver located just below the fixture. These shall also provide IP67 connections to the fixture and the driver box.
10. The AMP-type connector for the power shall be different from the AMP-type connector for the control cable so that there can never be any confusion as to which is which or what gets plugged into what. The connector shall also have an overlap protector that provides IP66 protection. The connector shall have a spring-loaded stop to prevent interruption due to train vibration and to signal to the installer that the connection is complete.
11. LEDs and LED modules: Wattages are shown to indicate the required electrical circuitry. The LEDs and LED modules actually to be used are the ones on the approved shop drawings.
12. All hardwired connections to LED fixtures shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
13. Wiring: 105°C U.L. approved fixture wire.
14. The LED fixtures shall not be constructed or intended for through wiring.
15. The electrical input to the LED fixtures shall be 277v AC.
16. The control cable shall be shielded and flexible for plug connection to the lighting control grid.

2.3 LUMINAIRE TYPES

A. Trackbed Lighting:

1. Luminaires:
 - a. **Type L:** 4ft, minimum-profile, linear LED uplight for mounting in the central platform trackbed troughs and the parapets for lighting sides of train room vault. 1636 delivered lms/ft within the beam angle; 6600 delivered lumens; 82.5W maximum per 4' fixture.
 - b. **Type L10:** 4ft, minimum-profile, linear LED uplight for mounting in the trackbed of the lower, central-platform trackbed troughs of the hub stations for lighting the double-height sides of the train room vault. 1636 delivered lms/ft within the beam angle, 6600 delivered lumens; 82.5W maximum per 4' fixture.
 - c. **Type LW:** 4ft, minimum-profile, linear LED uplight for mounting in the central trackbed trough of a split platform station for uplighting train room vault. 2000 delivered lms/ft within the beam angle; 8000 delivered lumens; 100W maximum per 4' fixture
2. Mounting: Trackbed and parapet linear fixtures shall be mounted on a non-ferrous rail, as shown on the contractor's drawings. Mounting rails shall be installed at the correct height so that the fixture when installed is exactly located as shown in the drawings, i.e. below and out of the line of sight of someone standing on the edge of the platform. The installation of non-ferrous rail may vary from location type to location type, i.e. trackbed, side platform parapet and hub station mezzanine parapet. Refer to drawings.
3. Optics:
 - a. **Type L:** 30° x 30°

- b. **Type L10:** 10° x 30°
- c. **Type LW:** 60° x 60°

B. Pylon Lighting:

1. Luminaires:
 - a. **Type P:** Maximum 1'-10" x 1'-10", LED uplight that is mounted inside of the Type C or C3 Pylon for uplighting the train room vault in the central platform stations. 65,400 delivered lumens within the beam angle, 850W maximum per fixture.
 - b. **Type PH:** Maximum 1'-10" x 1'-10", LED uplight that is mounted inside of the Type C or C3 Pylon for uplighting the train room vault in the central platform stations. 65,400 delivered lumens within the beam angle, 850W maximum per fixture.
2. Mounting: Type P and Type PH shall have non-ferrous mounting brackets (4 per fixture) and configured to perform as shown on the drawings. These mounting brackets shall be installed at the correct height so that the fixture when installed is exactly located as shown in the drawings, i.e. above and out of the line of sight of someone standing on the platform.
3. Optics:
 - a. **Type P:** Type V; 120° x 120°; Optics shall be truly symmetrical in all directions.
 - b. **Type PH:** Type IV; Optics shall produce a smooth field of light over the vault ceiling when laid out in two rows of lights oriented 45° off of perpendicular to the direction of the hall

2.4 MATERIALS

- A. The fixtures shall consist of a factory-sealed, cast or extruded aluminum housing, an integral or remote driver housing, heatsink and mounting brackets (2 per fixture for trackbed, 4 per fixture for pylons). The body of the fixtures shall be a one piece extrusion with die cast end caps and driver housing designed so that when assembled it forms a single rigid assembly that is rated IP66 and when supported at its ends its maximum sag is .0625".

Each fixture assembly shall consist of:

1. A protective glass or lens:
 - a. The lens shall be constructed of flexible tempered glass and shall be clear as shown. It shall sit firmly on a frame formed by the extrusion such that its exterior is flush with the exterior of the housing.
 - b. The junction of the protective glass and the housing shall be factory sealed. This junction shall also meet the requirements of IP66 and able to withstand 1500 psi straight down from 5ft away. It shall be a minimum of 0.12" thick.
2. A component board:
 - a. The board shall be bedded firmly inside the fixture and be factory removable for replacing or reconditioning. It may be modular. The spacing and power of the LEDs shall be as required to produce the lighting effect herein after described.
 - b. It contains and supports the LEDs, the collimating lenses and necessary onboard electronics attached firmly in such a way to prevent disconnection caused by vibration from passing trains or reasonable handling. There shall be a firm

maintained continuity between the computer board and its heat sink in order to conduct the heat away from the LED.

- c. All junctions shall be configured so that the heat is conducted away from the LED. These junctions shall be designed to not be interrupted by the vibrations of passing trains nor the reasonable handling of a fixture being transported or installed.
 3. Collimating lenses for the linear fixtures and an acrylic lens overlay for the pylon fixtures with the focal lengths as required to produce the specified lighting performance.
 4. A single power chord with a male plug for water-proof connection to the LED power grid as shown. The fixtures are intended to be unplugged and removed to be returned to the factory for any maintenance, so there shall not be any through wiring. The flexible, shielded power chord or whip shall be short (approx. 10") for ease of handling and storage. The power chord shall be sheathed to be protected from rodents. The connection shall be locking and IP67 rated.
 5. A section of the extrusion or casting which is configured to act as a heatsink.
 6. An integral driver for the trackbed fixtures and an integral or remote driver for the pylon fixtures.
 - a. The pylon driver, whether remote or integral, shall be located beneath the fixture in the conical space allowed for it as shown. The pylon driver shall be configured in a way that the pylon shall not require an extension greater than 6".
 - b. If remote, the pylon driver box or housing shall be NEMA 4X or IP66. The box shall be UL-approved for use with the pylon fixture.
- B. Materials for Trackbed Fixtures:
1. Body – extruded aluminum.
 2. Ends – Die cast aluminum.
- C. Materials for Pylon Fixtures:
1. Aluminum extrusion or casting
 - a. 100 inch minimum wall thickness
 - b. .067 inch minimum thickness for tabs, stops, etc
 2. Sheet Aluminum
 - a. .100 inch minimum thickness
- D. Brackets and Miscellaneous Angles
1. Cast or Formed Aluminum or Stainless Steel
 - a. .125 minimum thickness
- E. Springs
1. High temperature, tempered stainless steel.
 2. Spring characteristics shall not be reduced by welding or hot riveting to fixture components.
- F. Nuts, Bolts, Rivets:
1. Nuts, bolts, rivets and miscellaneous fasteners shall be sized in accordance with the technical standards of the Industrial Fasteners Institute.
 2. Nuts, bolts, rivets and miscellaneous fasteners shall be manufactured in accordance with the standards of the specifications of the Industrial Fasteners Institute.

G. Gaskets

1. Physical characteristics:
 - a. Compliance- Gasket shall compress sufficiently to seal fixture along the entire perimeter.
 - b. Resiliency- Gasket shall have quick recovery to original shape after compression.
 - c. Temperature Flexibility -There shall be no noticeable stiffening of the gasket at temperatures down to 0°C. There shall be no change in modulus temperatures up to 100°C.
 - d. Permeability -Water and aqueous solutions shall neither swell, nor be absorbed by, the gasket.
 - e. Flame resistance -The gasket shall be self-extinguishing after a few seconds, and shall have flame resistant characteristics.
2. Configuration
 - a. One piece and continuous along fixture perimeter.
 - b. Any joints shall be permanent with a glued diagonal overlap providing a seal equivalent to the continuous portions.
3. Attachment to Chassis: Glued to continuous seat. Seat shall not allow gasket to shift under compression.
4. Conformance with Labeling: Gasket supplied with fixtures shall be exactly the same as that used when U.L. label for "Enclosed and Gasketed" was secured.

H. Attachment to Chassis: Glued to continuous seat. Seat shall not allow gasket to shift under compression.

I. For Trackbed Fixtures: The total weight of a nominal 4' fixture with an integral driver shall not be greater than 20lbs.
For Pylon Fixtures: The total weight of a fixture shall not be greater than 35lbs. If remote, the weight of the driver in its housing shall not exceed 25lbs.

J. All screws or fasteners on the end caps of the assembled module shall be flush.

K. All parts of the mounting system shall be made of non-ferrous metal. Mounting brackets shall have a minimum thickness of 0.125" in order to resist denting or bending and therefore preventing the fixture to slide in firmly into the bracket and its position.

2.5 FINISHES

A. Aluminum extrusions, castings or exposed housings.

1. Dressed free of burrs or mold marks.
2. 9-step powder coat process, including marine epoxy undercoat and polyester top coat.
3. Paint color of exposed fixture assembly shall be "WMATA Brown", glossy. Color and Finish per Engineer's sample.
4. Color and Finish sample shall be submitted to Engineer for review and sign off prior to any fabrication.

B. All fixtures shall have a permanent manufacturer designation indicating the product type so as to minimize the chance of the wrong fixture being placed in the wrong location or orientation.

- C. The fixtures shall not be powder-coated until the mounting system has been developed and coordinated with the contractor.

END OF SECTION 265619

FIXTURE TYPE P

Type P is a minimum-profile, industrial, IP66, 120°x120° Type V-optic (as shown below) LED uplight that is mounted in the top of Type C or C3 Pylon for uplighting the train room vault in the central platform stations. Type P's maximum dimensions are 1'-10" x 1'-10" wide. Type P is mounted in the top of the pylons as shown on the drawings.

Type P will have a mounting frame made of non-ferrous material and configured as shown on the drawings. This mounting frame shall be installed at the correct height so that the fixture when installed is exactly located as shown in the drawings, i.e. above and out of the line of sight of someone standing on the platform. Each light fixture shall have a permanent manufacturer designation indicating the product type so as to minimize the chance of the wrong fixture being placed in the wrong location or orientation.

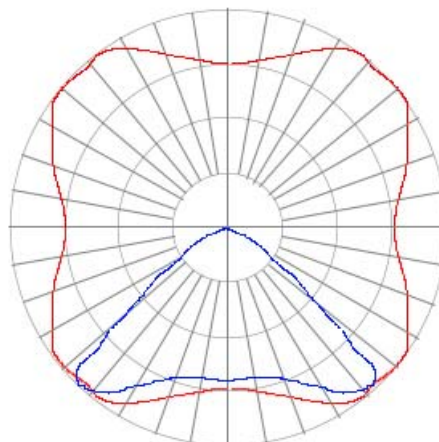
The LED light engine or module shall produce a consistent 3000K color of light with no apparent variation between fittings either upon installation or afterwards.

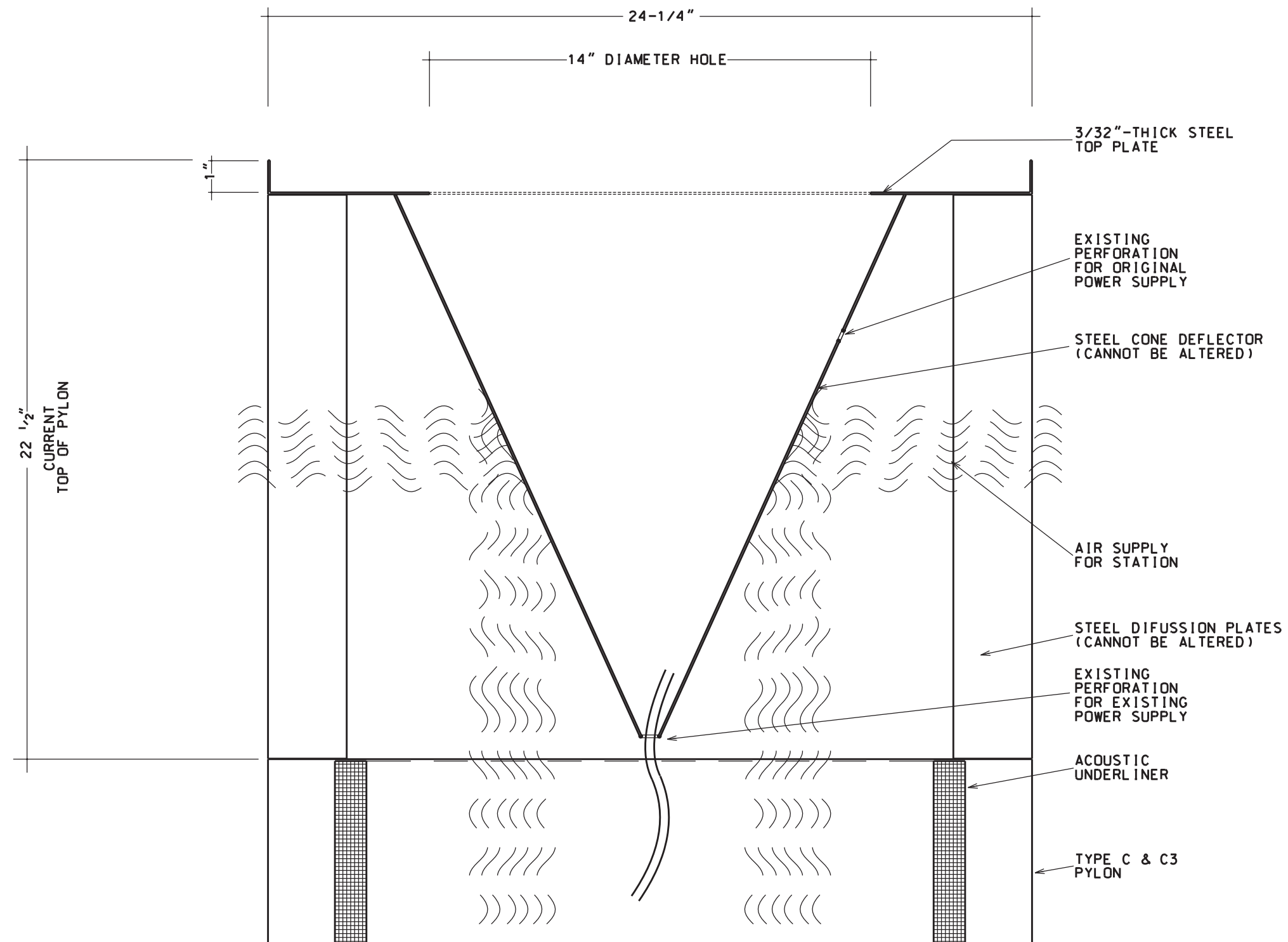
The driver box or housing shall be UL-approved, IP66-rated, and easily accessible for maintenance. The drivers shall be configured in a way that they shall fit within the cone of the pylons, as shown in the architectural drawings. The pylon driver, whether remote or integral, shall be located beneath the fixture in the conical space allowed for it as shown. The driver shall be configured in a way that the pylon shall not require an extension greater than 6".

The heat sink shall work passively and maintain the LED connections and circuitry at the proper temperature to ensure their full life. The LEDs shall have a life of no less than 100,000 hours and not lose anymore than 70% of their lumen output after a period of 3 years.

Lamp:

850W LED
65,400 delivered lumens
120° x 120° optics
3000K





—14" DIAMETER HOLE—

3/32"-THICK STEEL
TOP PLATE

EXISTING
PERFORATION
FOR ORIGINAL
POWER SUPPLY

STEEL CONE DEFLECTOR
(CANNOT BE ALTERED)

AIR SUPPLY
FOR STATION

STEEL DIFFUSION PLATES
(CANNOT BE ALTERED)

EXISTING
PERFORATION
FOR EXISTING
POWER SUPPLY

ACOUSTIC
UNDERLINER

TYPE C & C3
PYLON

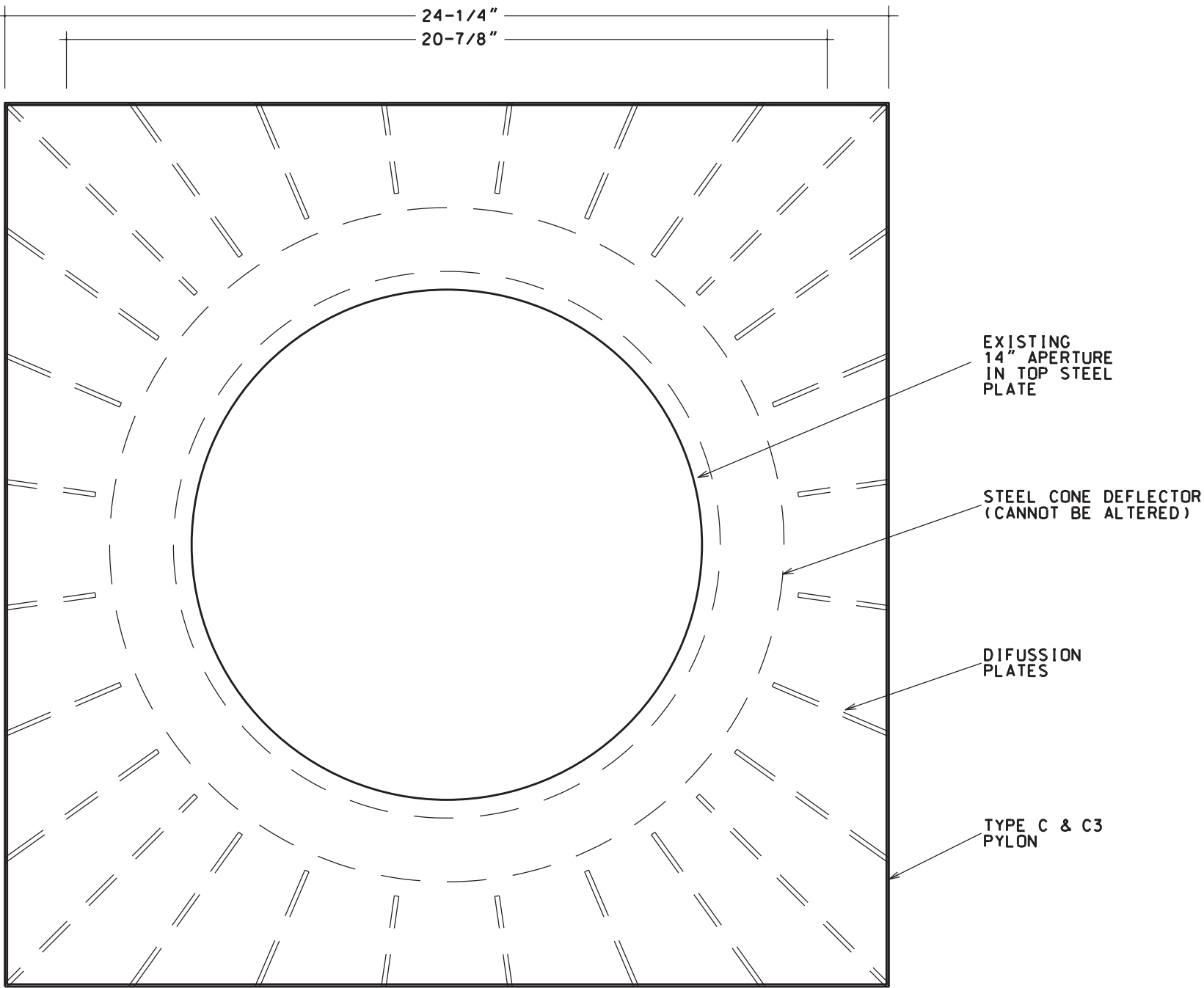
22 1' 2"
CURRENT
TOP OF PYLON

CURRENT
TOP OF PYLON

1"

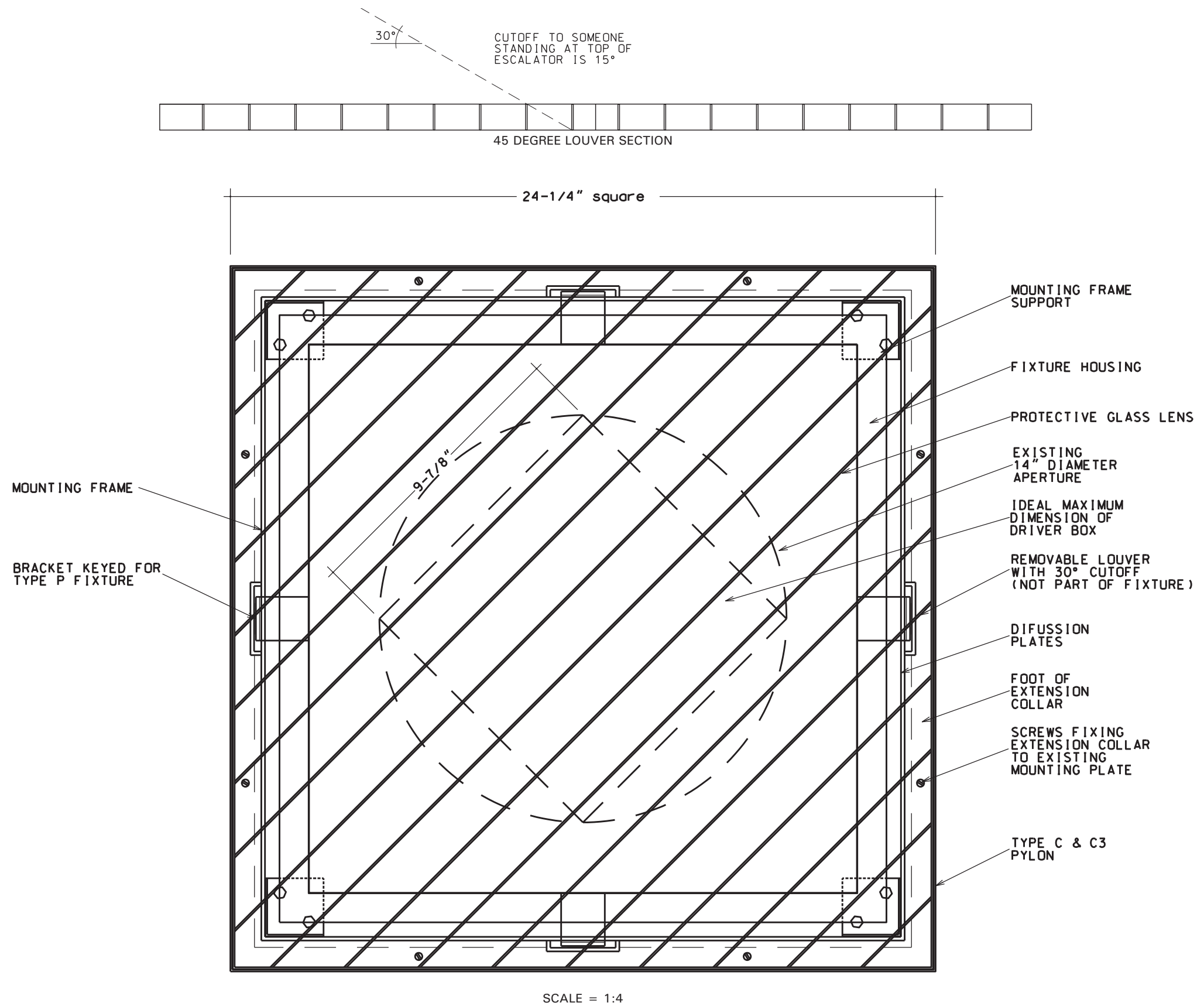
SCALE = 1:4

EXISTING PYLON (section)



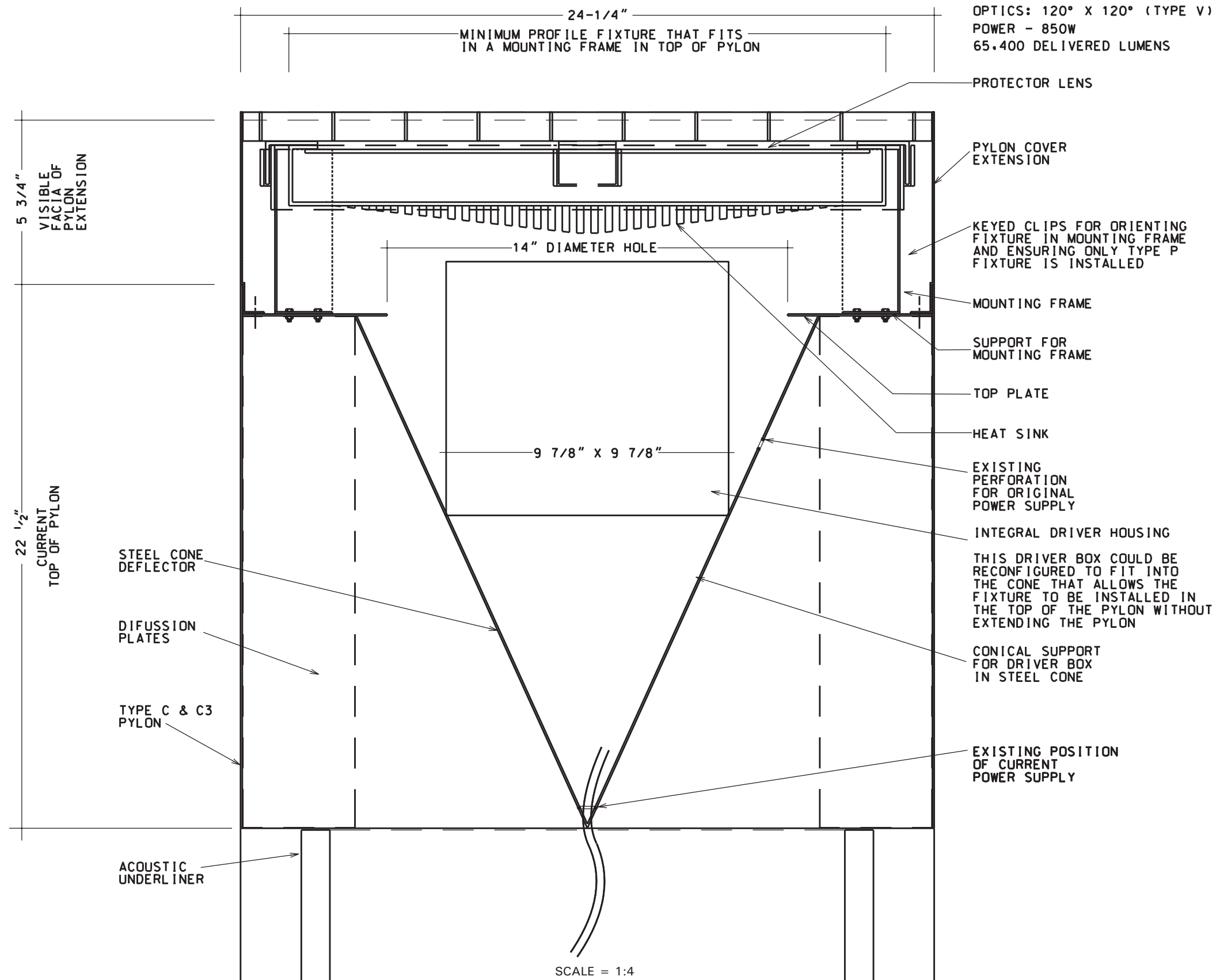
SCALE = 1:4

EXISTING PYLON (plan)



THE DOWNSIDE OF THIS OPTION IS THAT THE PYLON WILL NEED TO BE EXTENDED BY ALMOST 6 INCHES.

P - with standard driver box (plan)



THE DOWNSIDE OF THIS OPTION IS THAT THE PYLON WILL NEED TO BE EXTENDED BY ALMOST 6 INCHES.

P - with standard driver box (section)

FIXTURE TYPE PH

Type PH is a nominal minimum-profile, industrial, IP66, Type IV-optic (as shown below) LED uplight that is mounted in the top of Type C or C3 Pylon on the mezzanine in the hub stations for uplighting the train room vault. Type PH's maximum dimensions are 1'-10" x 1'-10" wide. Type PH is mounted in the top of the pylons as shown on the drawings.

Type PH will have a mounting frame made of aluminum or stainless steel and configured as shown on the drawings. This mounting frame shall be installed at the correct height so that the fixture when installed is exactly located as shown in the drawings, i.e. above and out of the line of sight of someone standing on the platform. Each light fixture shall have a permanent manufacturer designation indicating the product type so as to minimize the chance of the wrong fixture being placed in the wrong location or orientation.

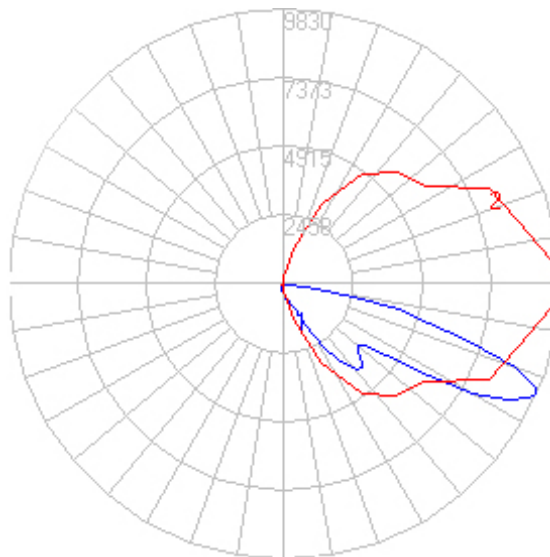
The LED light engine or module shall produce a consistent 3000K color of light with no apparent variation between fittings either upon installation or afterwards.

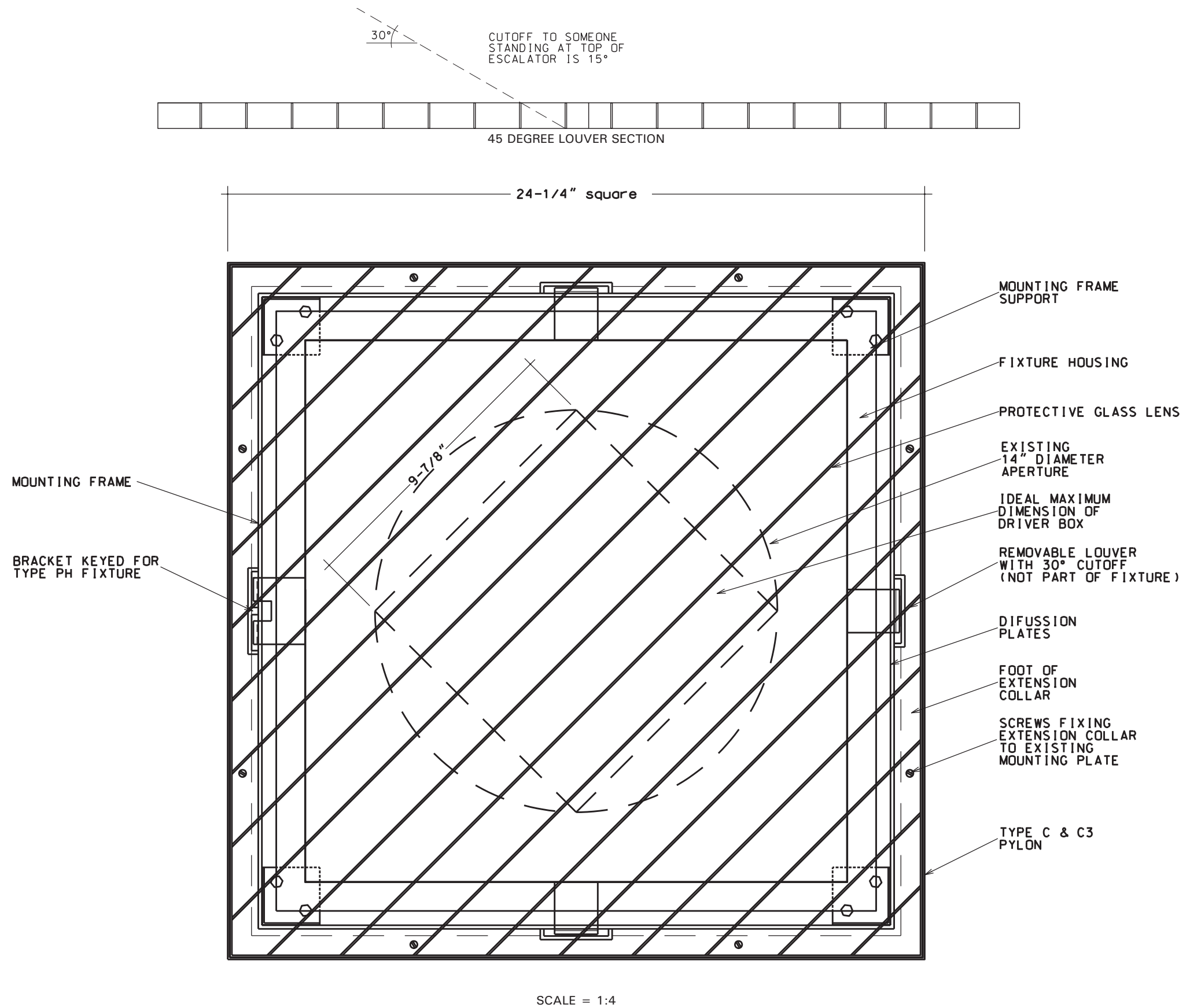
The driver box or housing shall be UL-approved, IP66-rated, and easily accessible for maintenance. The drivers configured in a way that they shall fit within the cone of the pylons, as shown in the architectural drawings. The pylon driver, whether remote or integral, shall be located beneath the fixture in the conical space allowed for it as shown. The driver shall be configured in a way that the pylon shall not require an extension greater than 6".

The heat sink shall work passively and maintain the LED connections and circuitry at the proper temperature to ensure their full life. The LEDs shall have a life of no less than 100,000 hours and not lose anymore than 70% of their lumen output after a period of 3 years.

Lamp:

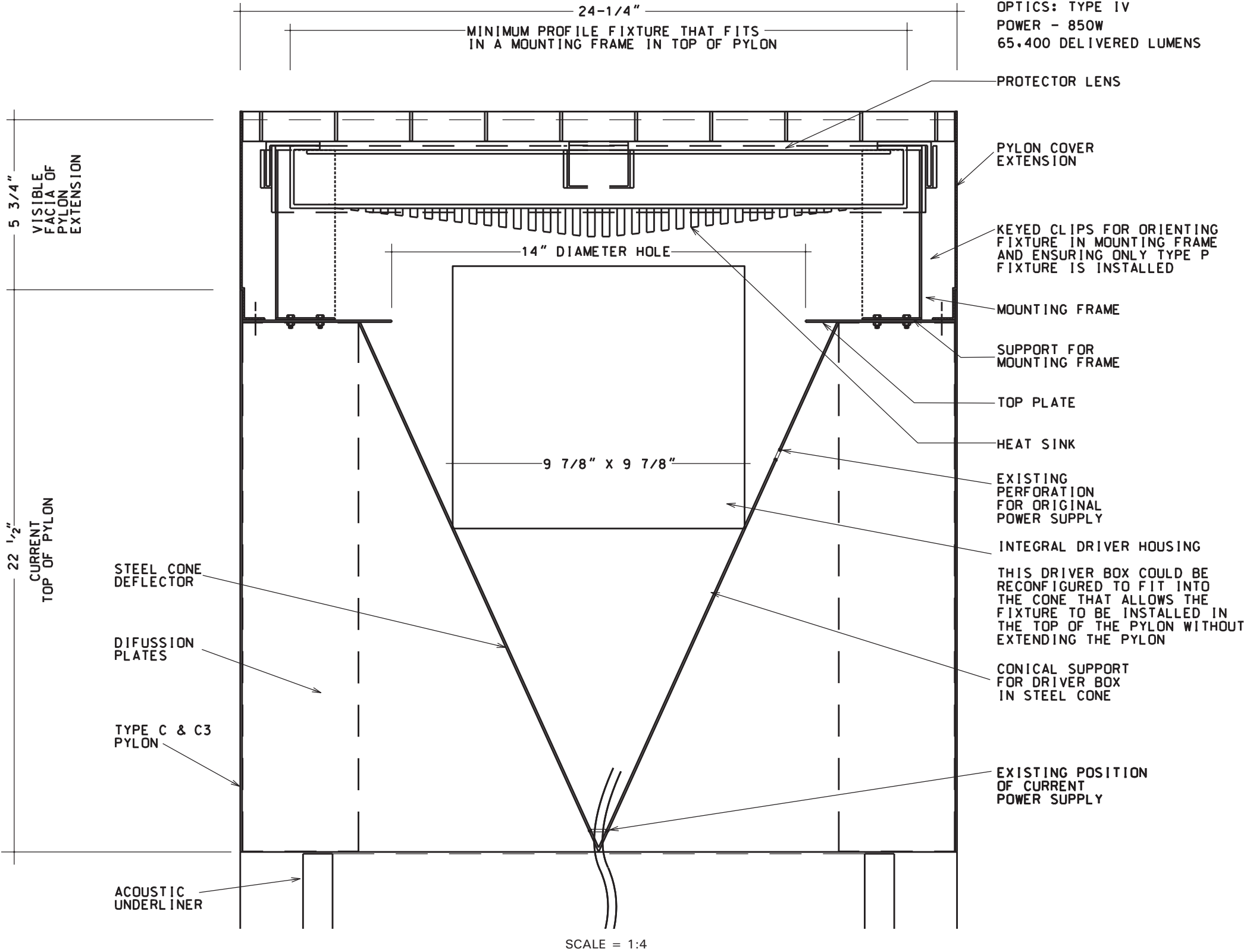
820W LED
65,400 delivered lumens
Type IV optics (shown below)
3000K





SCALE = 1:4

PH (plan)



PH (section)

FIXTURE TYPE L

Type L is a nominal 4'-long, minimum-profile, industrial, IP66, linear LED uplight that is mounted on the sides of the parapet wall in a split platform station or in the trackbed trough of a central platform station for lighting the sides of the train room vault. Type L has a clean beam of 30° x 30°. It's maximum dimensions are 2.75" wide x 3" high. Type L is mounted continuously, spaced evenly around the 8'-4" module of the stations as shown on the drawings.

For mounting details, please see architectural drawings.

Type L shall be rated IP66 and be suitable for wet locations. It shall be constructed of low-copper, die-cast, marine-grade extruded aluminum with isolated stainless steel fasteners. The fixture must be able to withstand water-jet cleaning of 1500 psi straight down from a distance of 5'. The lens shall be made of clear, tempered glass (silicate) so as to repel brake dust.

The finish of the light fittings must be electro-statically applied polyester powder coat. The end caps must be machined aluminum and gasketed. All hardware for the fittings must be made from corrosion-proof stainless steel. There shall be no tools required for moving the fixtures.

Type L shall be mounted on a non-ferrous rail, as shown on the contractor's drawings. Mounting rails shall be installed at the correct height so that the fixture when installed is exactly located as shown in the drawings, i.e. below and out of the line of sight of someone standing on the edge of the platform. The installation of non-ferrous rail may vary from location type to location type, i.e. trackbed, side platform parapet and hub station mezzanine parapet.

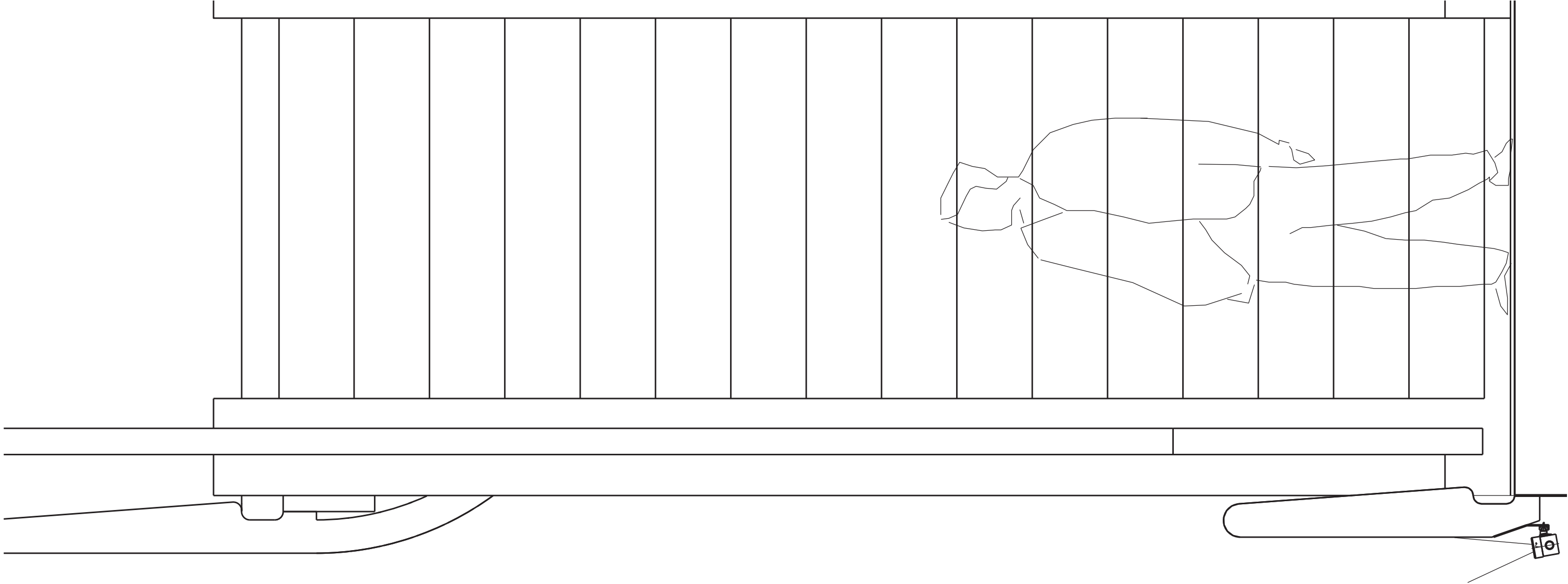
The light fittings shall have 30 x 30 degree optics and shall provide a continuous wash of light without any striations or dark spots on the fin either within a single beam angle or between fittings.

The LED used for this tube shall be of the highest quality and apparently consistent in color and brightness to the eye. The electronics shall be per the specification of the highest grade, maintaining the LEDs at their proper junction temperature. The final color for the LEDs shall be 3000K. Fixture is to be driven at lowest possible amperage to conserve in wattage consumption.

Type L shall produce a minimum of 1636 delivered lumens per foot within the beam angle.

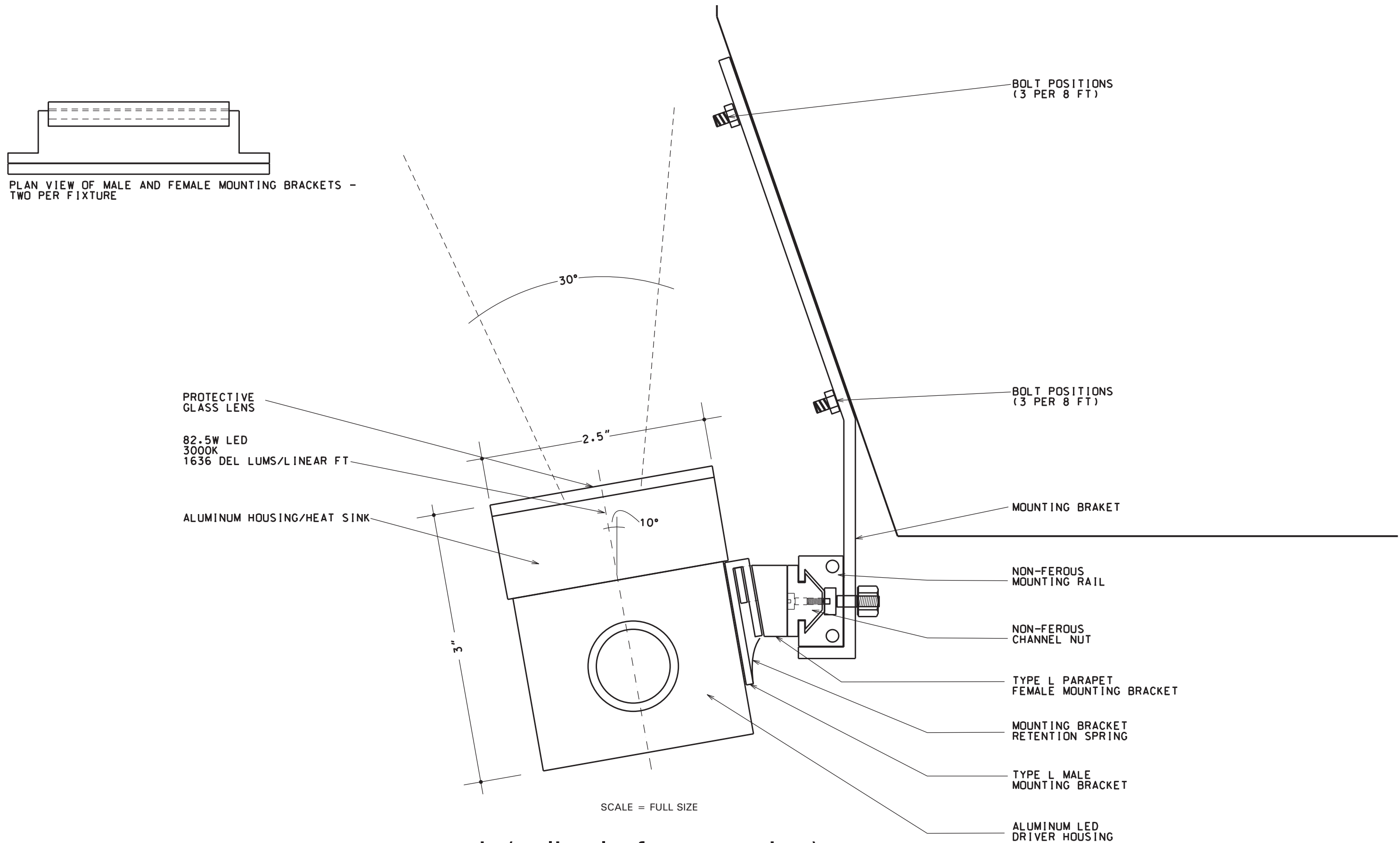
Lamp:

- 82.5W LED
- 1636 delivered lumens/ft
- 30° x 30° optics
- 3000K

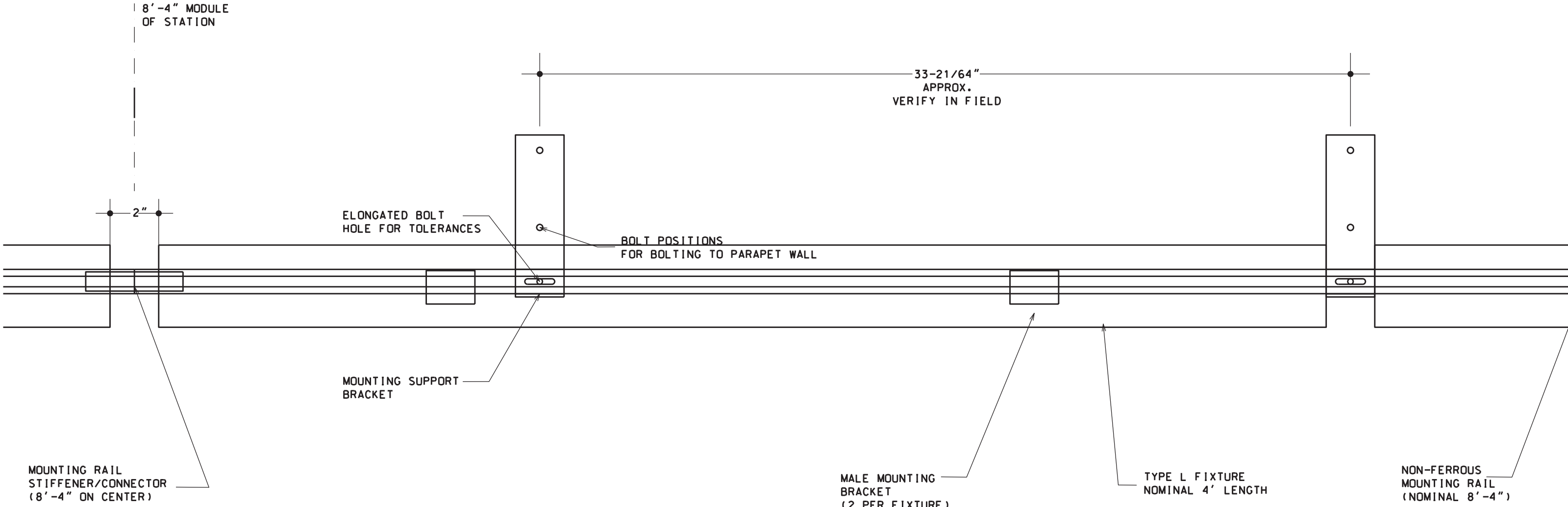


SCALE = ONE TWELFTH FULL SIZE

L (split platform)



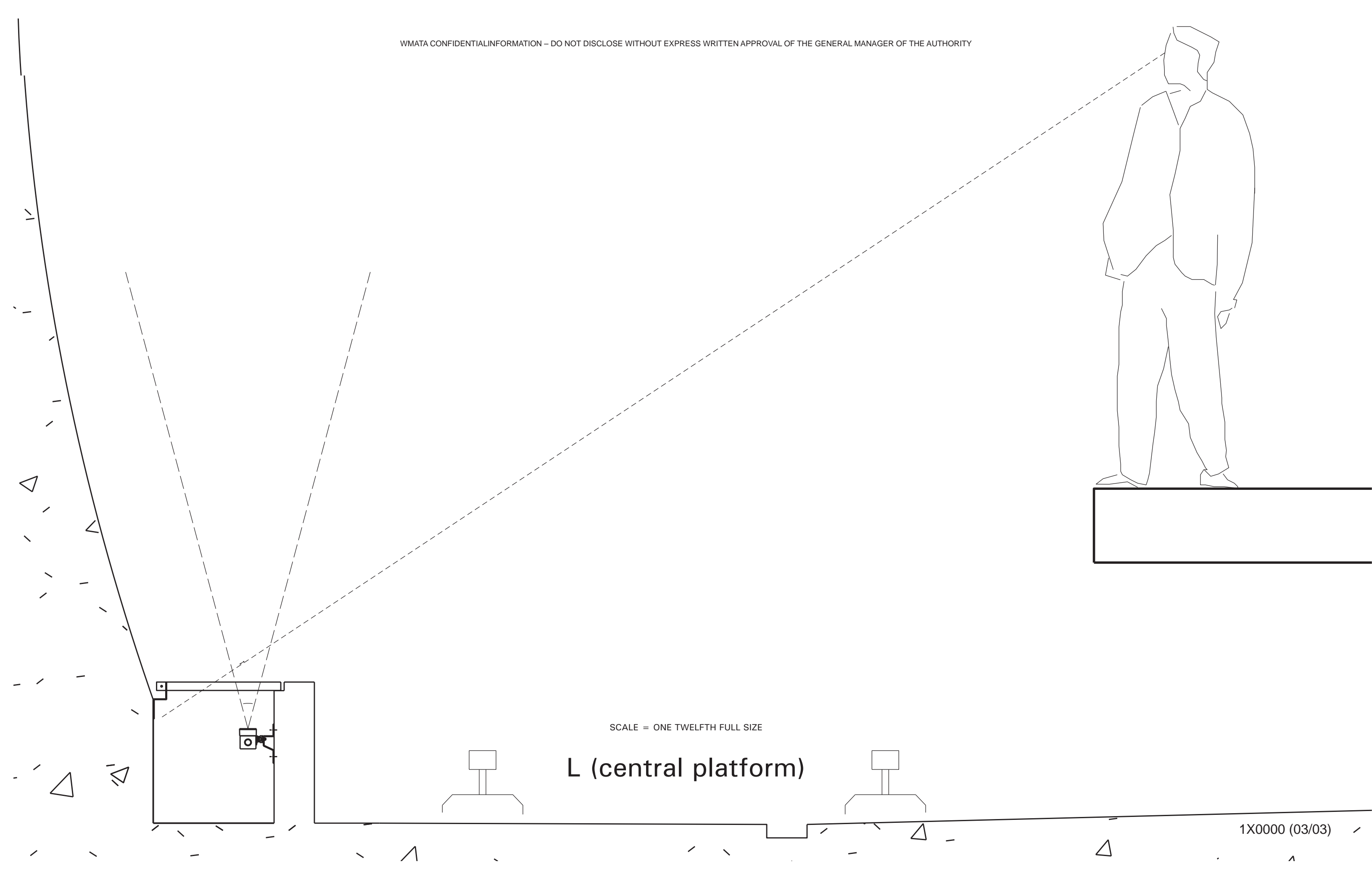
L (split platform section)



ALL MOUNTING ELEMENTS
AND LIGHTING SYSTEM
MUST FIT INTO EXISTING
8'-4" MODULE

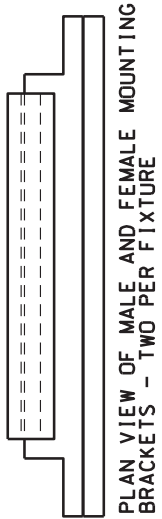
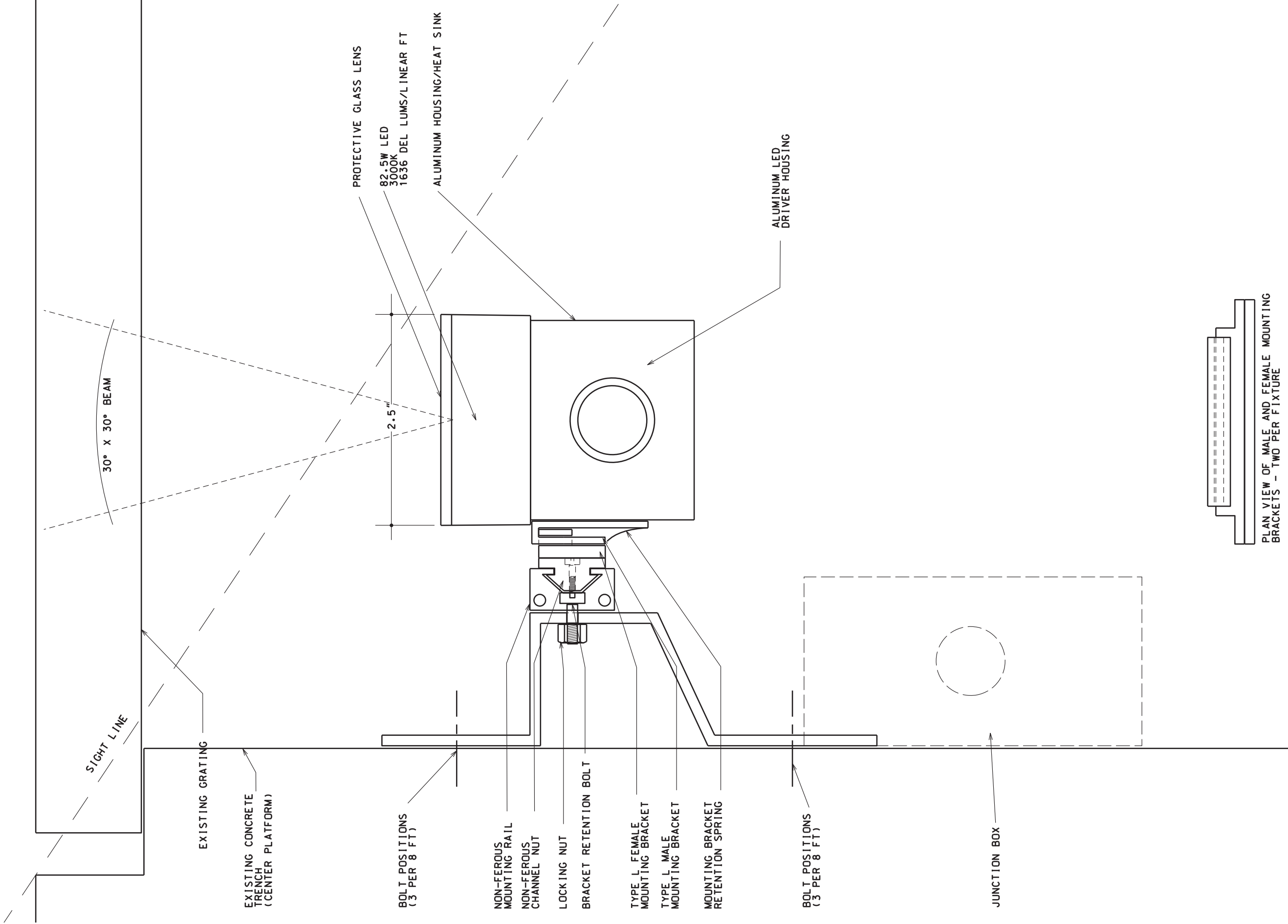
SCALE = ONE QUARTER FULL SIZE

L (split platform elevation)



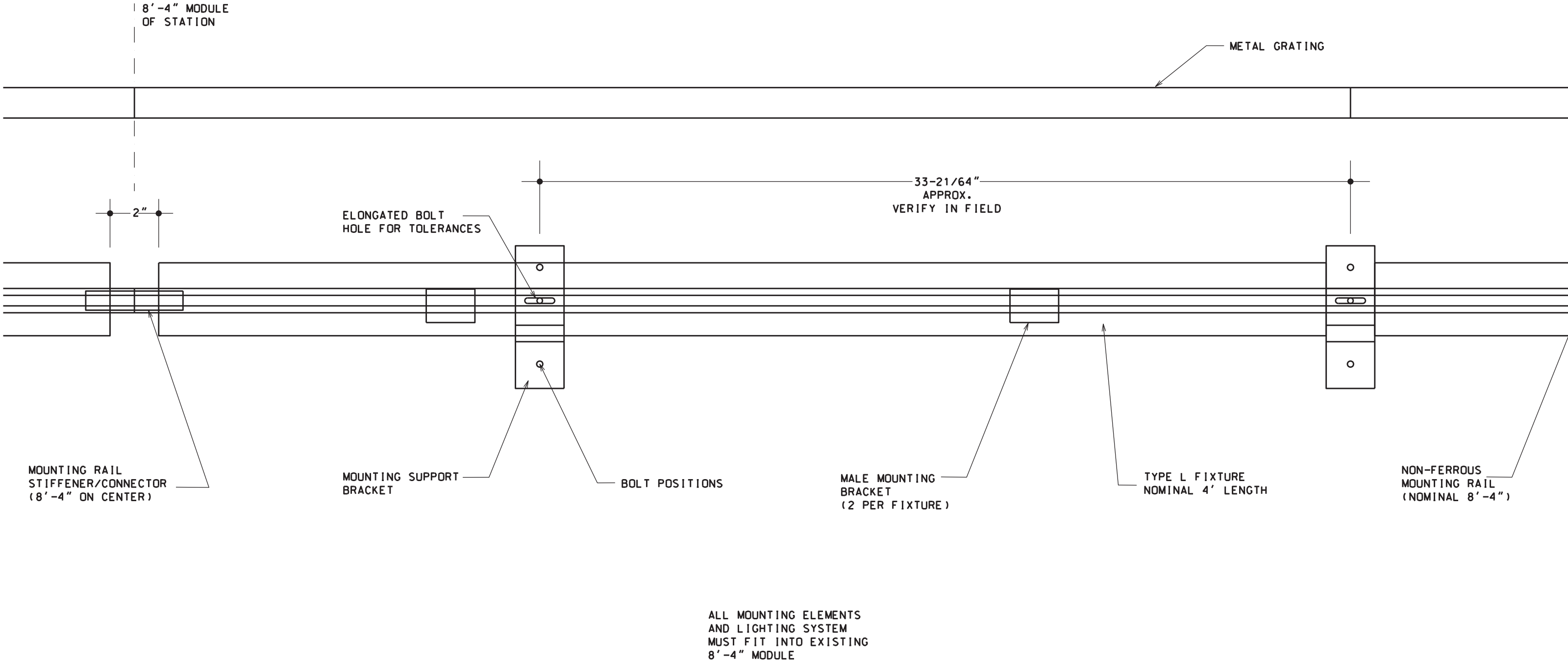
SCALE = ONE TWELFTH FULL SIZE

L (central platform)



SCALE = FULL SIZE

L (central platform section)



SCALE = ONE QUARTER FULL SIZE

L (central platform elevation)

FIXTURE TYPE L10

Type L10 is a nominal 4'-long, minimum-profile, industrial, IP66, linear LED uplight that is mounted on the sides of the parapet wall in a split platform station or in the trackbed trough of a central platform station for lighting the sides of the train room vault. Type L has a clean beam of 30° x 30°. It's maximum dimensions are 2.75" wide x 3" high. Type L is mounted continuously, spaced evenly around the 8'-4" module of the stations as shown on the drawings.

For mounting details, please see architectural drawings.

Type L10 shall be rated IP66 and be suitable for wet locations. It shall be constructed of low-copper, die-cast, marine-grade extruded aluminum with isolated stainless steel fasteners. The fixture must be able to withstand water-jet cleaning of 1500 psi straight down from a distance of 5'. The lens shall be made of clear, tempered glass (silicate) so as to repel brake dust.

The finish of the light fittings must be electro-statically applied polyester powder coat. The end caps must be machined aluminum and gasketed. All hardware for the fittings must be made from corrosion-proof stainless steel. There shall be no tools required for moving the fixtures.

Type L10 shall be mounted on a non-ferrous rail, as shown on the contractor's drawings. Mounting rails shall be installed at the correct height so that the fixture when installed is exactly located as shown in the drawings, i.e. below and out of the line of sight of someone standing on the edge of the platform. The installation of non-ferrous rail may vary from location type to location type, i.e. trackbed, side platform parapet and hub station mezzanine parapet.

The cable entry to the fitting must be fitted with a submersible cable gland. The fitting shall also allow thru wiring.

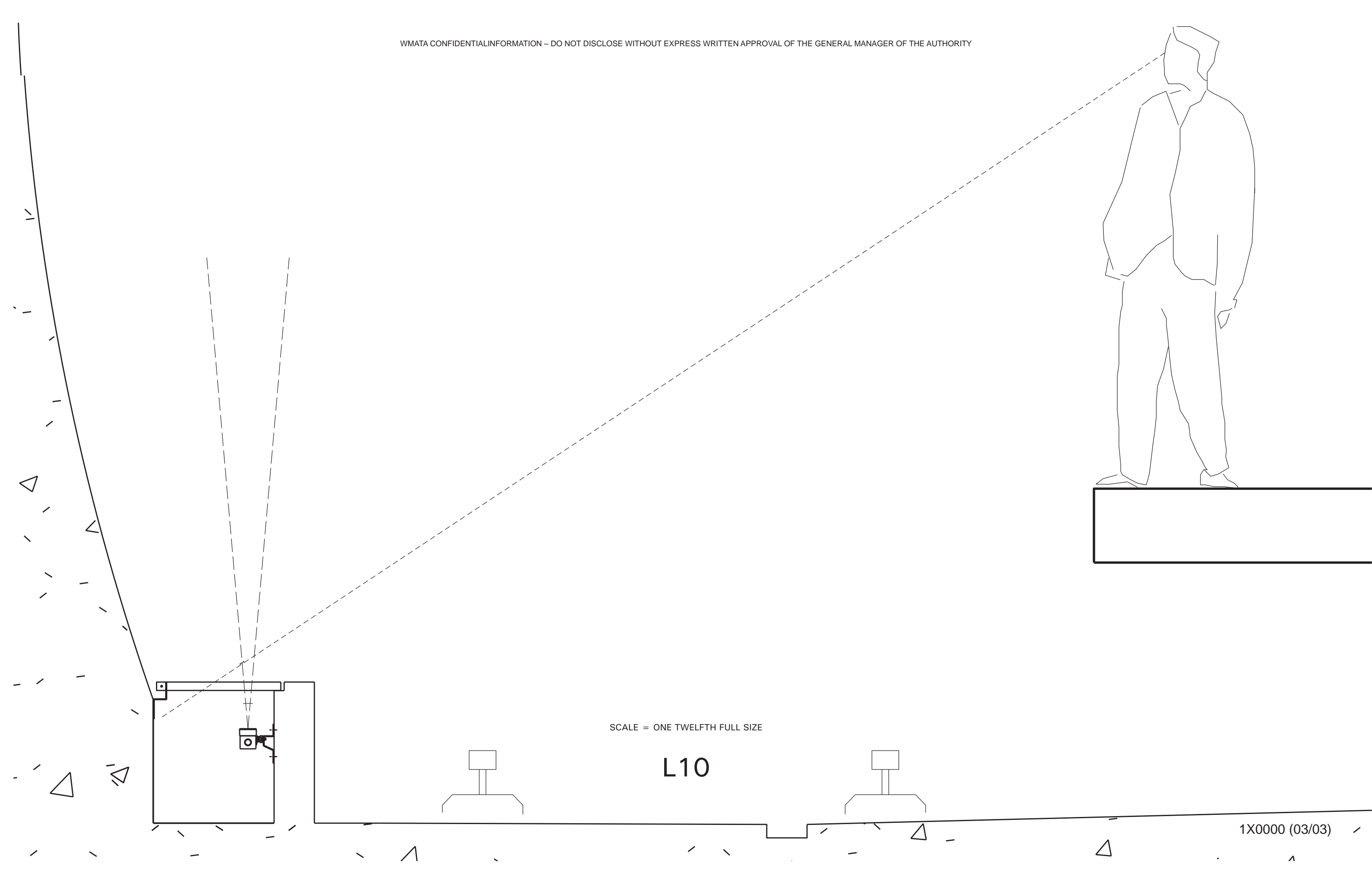
The light fittings shall have 10 x 30 degree optics and shall provide a continuous wash of light without any striations or dark spots on the fin either within a single beam angle or between fittings.

The LED used for this tube shall be of the highest quality and apparently consistent in color and brightness to the eye. The electronics shall be per the specification of the highest grade, maintaining the LEDs at their proper junction temperature. The final color for the LEDs shall be 3000K. Fixture is to be driven at lowest possible amperage to conserve in wattage consumption.

Type L shall produce a minimum of 1636 delivered lumens per foot within the beam angle.

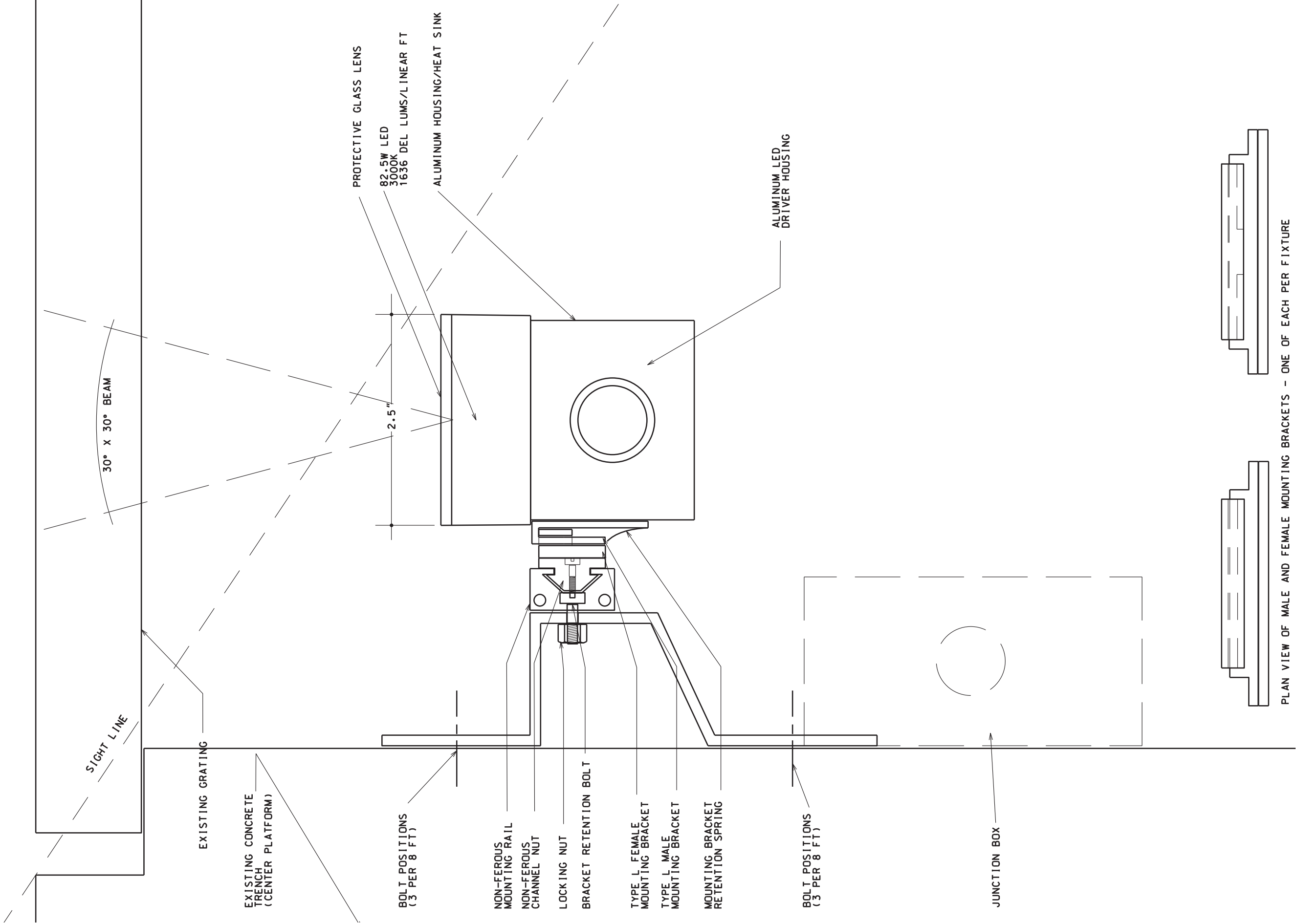
Lamp:

- 82.5W LED
- 1636 delivered lumens/ft
- 10° x 30° optics
- 3000K



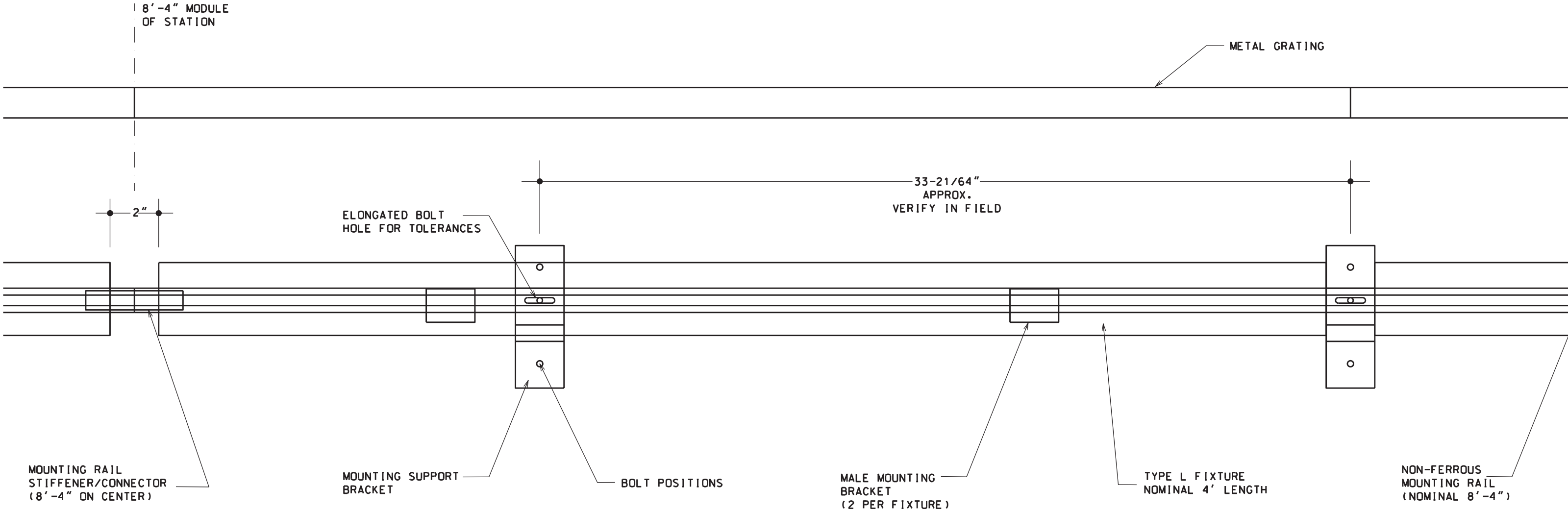
SCALE = ONE TWELFTH FULL SIZE

L10



SCALE = FULL SIZE

L10 (section)



ALL MOUNTING ELEMENTS
AND LIGHTING SYSTEM
MUST FIT INTO EXISTING
8'-4" MODULE

SCALE = ONE QUARTER FULL SIZE

L10 (elevation)

FIXTURE TYPE LW

Type LW is a nominal 4'-long, minimum-profile, industrial, IP66, linear LED uplight that is mounted in split platform central trackbed trough for uplighting the train room vault. Type LW has a clean beam of 60° x 60°. It's maximum dimensions are 2.75" wide x 3" high x 4' long. Type LW is mounted continuously, spaced evenly around the 8'-4" module of the stations as shown on the drawings.

For mounting details, please see architectural drawings.

Type LW shall be rated IP66 and be suitable for wet locations. It shall be constructed of low-copper, die-cast, marine-grade extruded aluminum with isolated stainless steel fasteners. The fixture must be able to withstand water-jet cleaning of 1500 psi straight down from a distance of 5'. The lens shall be made of clear, tempered glass (silicate) so as to repel brake dust.

The finish of the light fittings must be electro-statically applied polyester powder coat. The end caps must be machined aluminum and gasketed. All hardware for the fittings must be made from corrosion-proof stainless steel. There shall be no tools required for moving the fixtures.

Type LW shall be mounted on a non-ferrous rail, as shown on the contractor's drawings. Mounting rails shall be installed at the correct height so that the fixture when installed is exactly located as shown in the drawings, i.e. below and out of the line of sight of someone standing on the edge of the platform. The installation of non-ferrous rail may vary from location type to location type, i.e. trackbed, side platform parapet and hub station mezzanine parapet.

The cable entry to the fitting must be fitted with a submersible cable gland. The fitting shall also allow thru wiring.

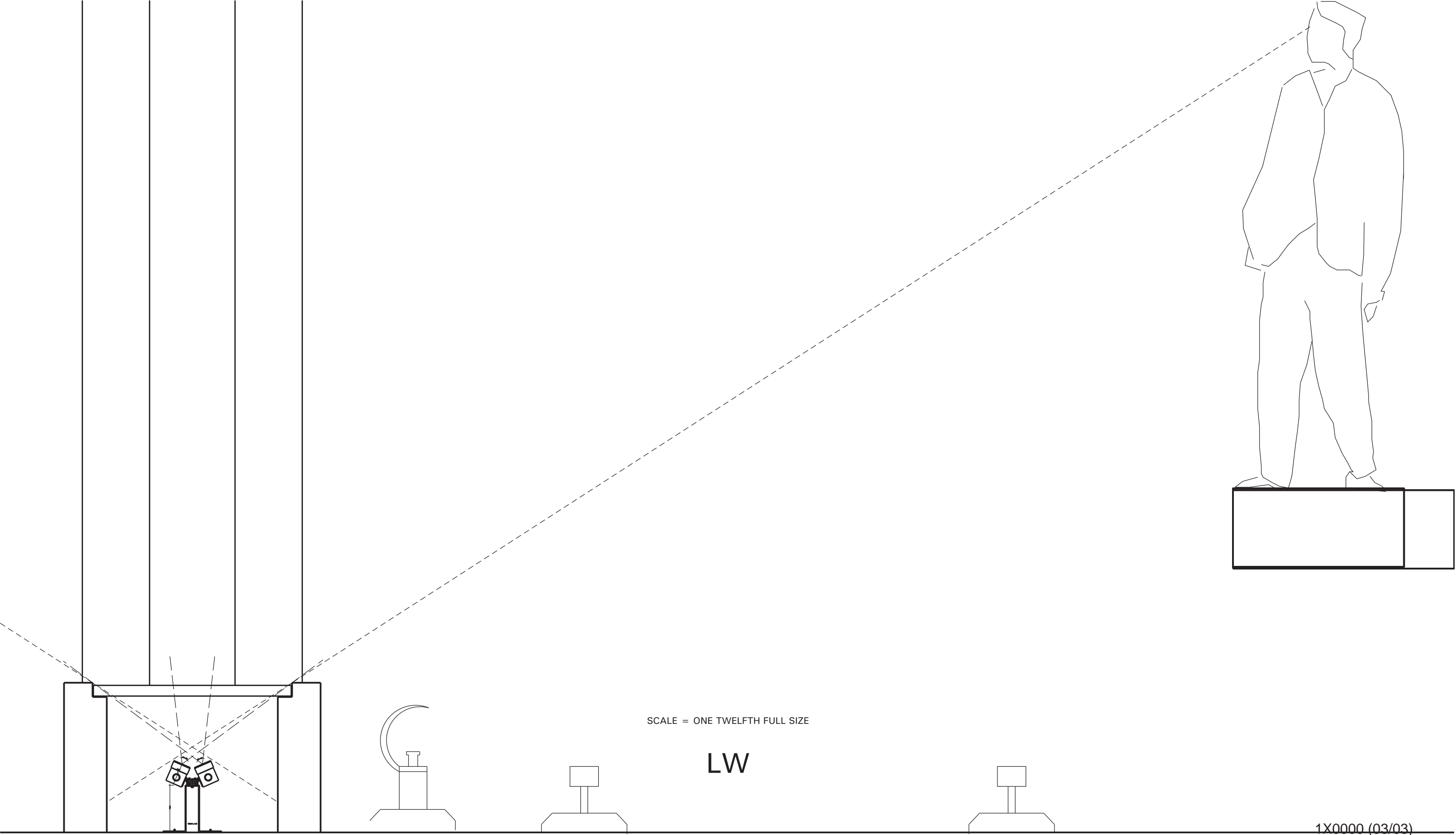
The light fittings shall have 60 x 60 degree optics and shall provide a continuous wash of light without any striations or dark spots on the fin either within a single beam angle or between fittings.

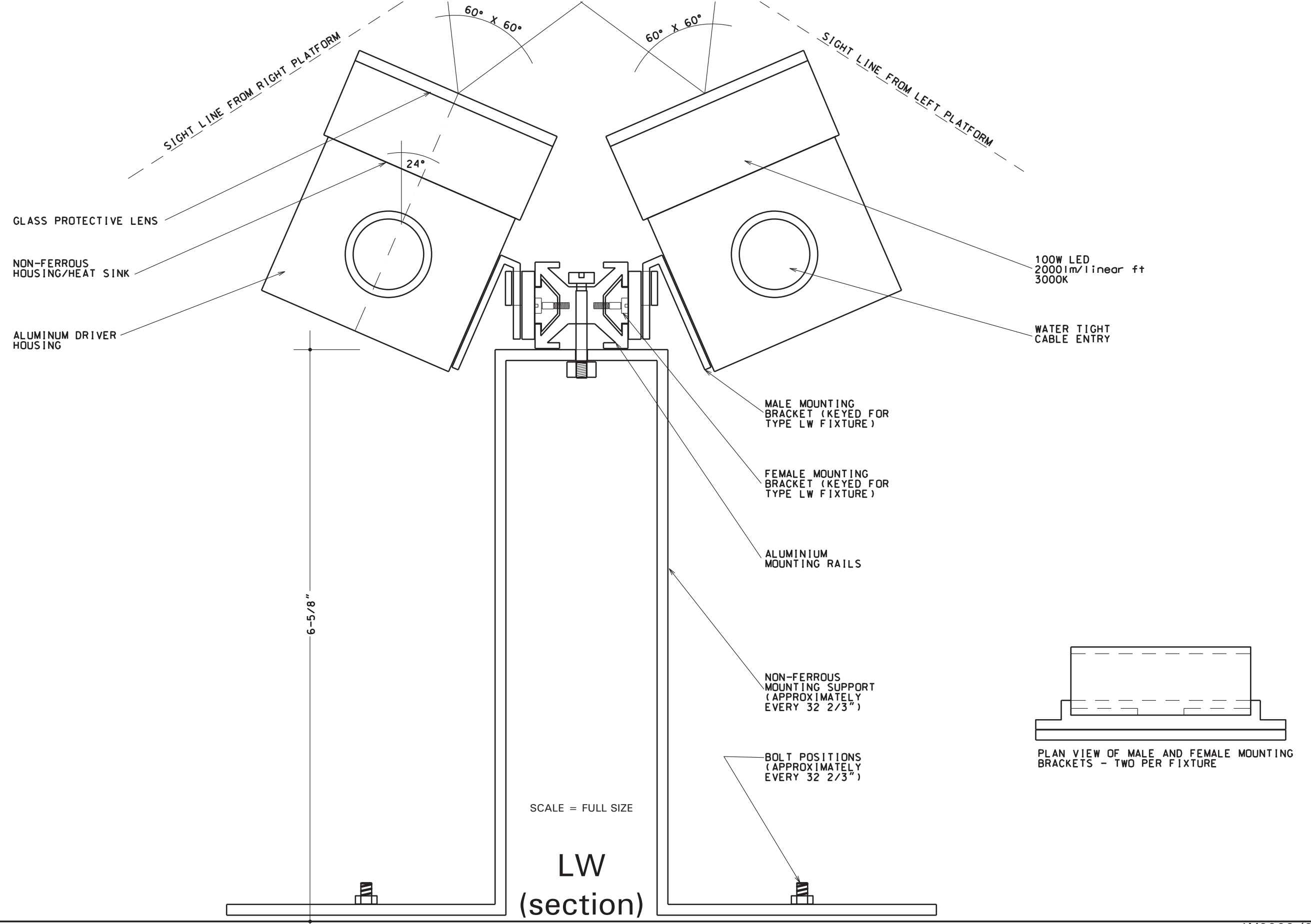
The LED used for this tube shall be of the highest quality and apparently consistent in color and brightness to the eye. The electronics shall be per the specification of the highest grade, maintaining the LEDs at their proper junction temperature. The final color for the LEDs shall be 3000K. Fixture is to be driven at lowest possible amperage to conserve in wattage consumption.

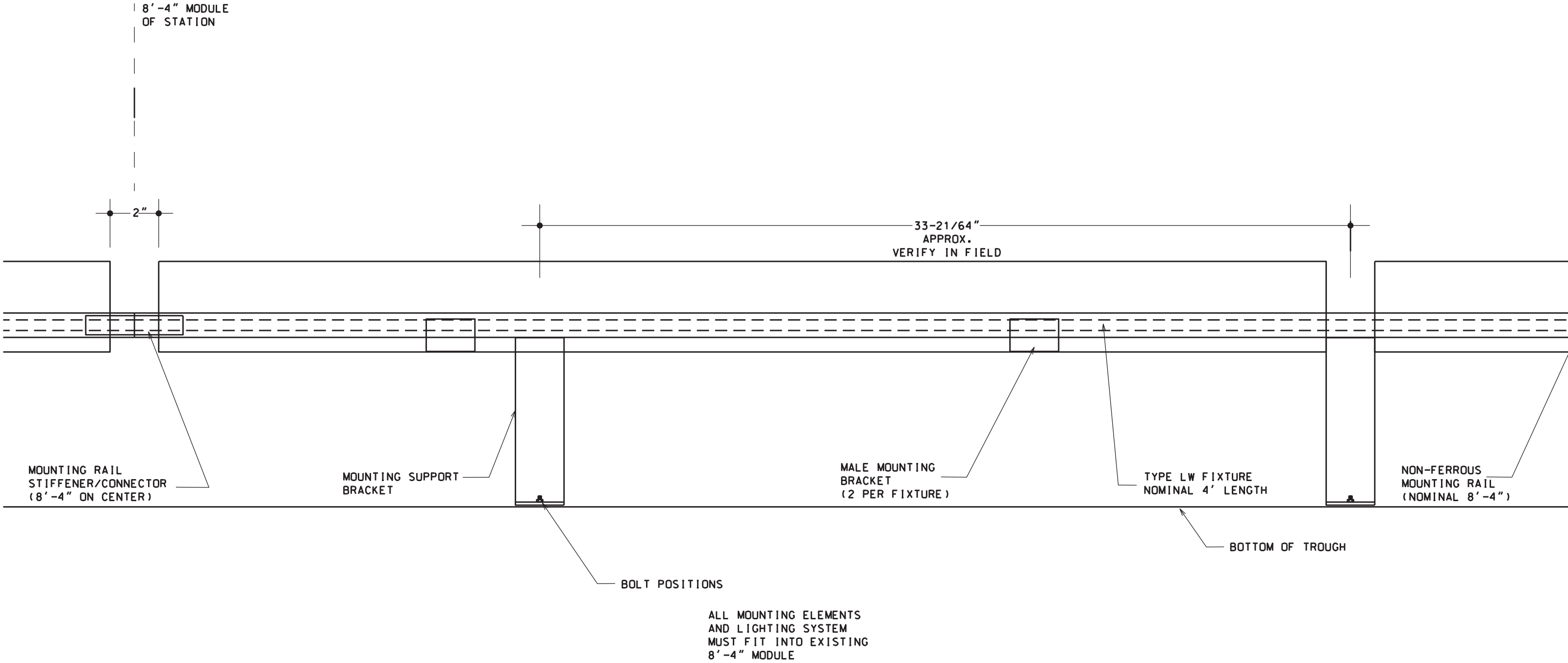
Type LW shall produce a minimum of 2000 delivered lumens per foot within the beam angle.

Lamp:

- 100W LED
- 2000 delivered lumens/ft
- 60° x 60° optics







SCALE = ONE QUARTER FULL SIZE

LW (elevation)