

SECTION 07 56 00

FLUID APPLIED ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Seamless Fluid Applied Composite Roofing Systems.
- B. Roof Flashings.
- C. Roof Accessories.

1.2 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim.
- C. Section 07 72 00 - Roof Accessories.
- D. Section 22 30 00 - Plumbing Equipment.
- E. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.3 REFERENCES

- A. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual.
- B. ASTM International (ASTM):
 - 1. ASTM D 570 - Standard Test Method for Water Absorption of Plastics.
 - 2. ASTM D 1079 - Standard Terminology Relating to Roofing, Waterproofing, and Bituminous Materials.
 - 3. ASTM D1227 - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.
 - 4. ASTM D 2523 - Standard Practice for Testing Load-Strain Properties of Roofing Membranes.
 - 5. ASTM E 108 - Standard Test Methods for Fire Tests of Roof Coverings.
 - 6. ASTM E 548 - Standard Guide for General Criteria Used for Evaluating Laboratory Competence.
 - 7. ASTM E 1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
- C. Underwriters Laboratories (UL): ANSI/UL 790 - Standard Test Methods of Roof Coverings.
- D. Underwriters Laboratories (UL) - Roofing Systems and Materials Guide.

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- E. CRRC - Cool Roof Rating Council.
- F. California Building Standards Code - Title 24.
- G. Sheet Metal and Air Conditioning Contractors National Association, 1nc. (SMACNA) - Architectural Sheet Metal Manual.

1.4 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to Work in this Section.

1.5 PERFORMANCE REQUIREMENTS

- A. General: Provide watertight roofing membrane and flashing system that does not permit the passage of water and is capable of withstanding thermally induced movement and exposure to weather without failure.
- B. Energy Performance:
 - 1. Low-Slope Roofs: Provide roofing system with Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
 - 2. Roof membrane finish must comply with current California Title 24 Part 6 requirements:
 - a. Minimum three (3) year aged solar reflectance: 0.55.
 - b. Minimum Thermal Emittance: 0.75.
- C. Wind Resistance: Provide roofing membrane, base flashings and component materials that comply with requirements in FMG 4450, FMG 4470, UL 580 or UL 1897 as part of a membrane roofing system.
 - 1. Wind Load Resistance: 1-90
- D. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FM, Intertek, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
 - 1. Exterior Fire-Test Exposure: Class A ASTM E 108 for application and roof slopes indicated.

1.6 SUBMITTALS

- A. Product Data: For each product note in this section, submit printed or digital copies of manufacturers product information including the following:
 - 1. Printed affirmation of performance characteristics.
 - 2. Roofing system design.
 - 3. Application Instructions.
 - 4. Technical Data Sheets.
 - 5. Material Safety Data Sheets.

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- B. Shop Drawings: Provide plan, elevation, section and isometric drawings outlining waterproofing conditions at transitions, terminations, penetrations and attachments to adjacent work.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of the roofing system.
- D. Research & Evaluation Reports: For components of the roofing system.
 - 1. Include report from UL, or another testing and inspecting agency acceptable to authorities having jurisdiction, stating entire system meets fire-test-response characteristics listed.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Installer must be authorized by the roofing system manufacturer to perform all Work specified in this section and provide an executed manufacturer's warranty.
- B. Manufacturer Qualifications: A qualified manufacturer that has UL listing for roofing system identical to that used for this project.
- C. Manufacturer must demonstrate successful product installation for minimum of 20 years in a similar climate.
- D. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- E. Source Limitations: Obtain base material components for roofing system approved by roofing system manufacturer.

1.8 PRE-INSTALLATION CONFERENCE

- A. Prior to commencement of Work, conduct a pre installation conference on site for project Management and Coordination. Review and affirm methods and procedures related to the work specified in this section, including but not limited to the following:
 - 1. Meet with owner, roofing installer, roofing system manufacturer's representative, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including the manufacturer's written instructions.
 - 3. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Examine existing roof and substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 5. Review structural loading limitations of roof deck during and after roofing.
 - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs and condition of other construction that will affect roofing system.

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7. Review governing regulations and requirements for insurance and certificates, if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in original containers, with seals unbroken, and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage. For bulk-delivered materials, identify manufacturer's name and product designation with delivery receipts and material manifests.
- B. Store liquid materials in their original, undamaged containers in a clean, dry, and protected location, and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
- C. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- D. Protect roofing materials from physical damage and from deterioration due to sunlight, moisture, soiling and other sources. Store in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

1.10 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

- A. Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of roofing system within specified warranty period.
 1. Warranty includes roofing membrane and base flashings.
 2. Warranty Period: Thirty (40) years from date of Substantial Completion.
- B. Coating Warranty: Manufacturer's standard form, without monetary limitation, in which coating manufacturer agrees to repair or replace coating that fails in materials or workmanship within specified warranty period. Failure includes shrinkage, flaking, chipping and peeling during normal wear.
 1. Warranty Period: Twelve (12) years from date of Substantial Completion.
- C. Project Warranty: Submit roofing installer's warranty, signed by installer, covering work of this Section, including all components of roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards and walkway products for the following warranty period:
 1. Warranty Period: Two (2) years from date of Substantial Completion.

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PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Liquiform Technologies Inc - WeatherWeld
 - 1. Subject to compliance with requirements, provide the following composite roofing membrane System: R-1P-16-45-A.
 - 2. Within 72 hours of the job walk, equal systems from Garland or Tremco Roofing will be considered, providing the systems meet warranty requirements, physical characteristics and do not use solvents or fire during installation.

2.2 COMPOSITE MEMBRANE SYSTEM

- A. Roofing system shall comply with 2019 CBC, Chapter 15.
- B. Physical Characteristics:
 - 1. Total weight: 2.20 pounds per square foot (1.01 kg) dry.
 - 2. Total thickness: 350 mil dry.
 - 3. Minimum Strength: Not less than 150 PSI per ASTM D 4830.
 - 4. Minimum Elongation: Not less than 5% per ASTM D 4830.
 - 5. Minimum Puncture Not less than 400 lbs. per ASTM D 4830.
 - 6. Water Absorption: 1% max by weight per ASTM D 570.
 - 7. Fire Rating: UL Class "A" assembly.

2.3 COMPOSITE MEMBRANE MATERIALS

- A. Base Sheet: Glass felt impregnated asphalt roll roofing surfaced with mineral granules conforming to ASTM D 3909 Class III.
 - 1. VOC Content (Maximum): 0 g/l.
- B. Base Sheet Adhesive: General purpose roof adhesive meeting or exceeding the requirements of ASTM D 3019 Type III.
 - 1. VOC Content (Maximum): 300 g/l.
 - 2. Weight per Gallon: 8.3 - 8.5 Lbs (994 - 1017 g/l).
 - 3. Solids Content by Volume: 70%.
- C. Polyester Sheet Base Sheet:
 - 1. Elongation (Initial): 61-63%.
 - 2. Tensile Strength: 57.1 lbs.
 - 3. Tear Strength: 16.1 lbs.
 - 4. Weight: 3 oz/ sq. yd.
- D. Asphalt Emulsion: WeatherWeld Asphalt Emulsion meeting or exceeding the requirements of ASTM D1227.
 - 1. VOC Content (Maximum): 0 g/L.
 - 2. Weight: 8.5 – 9.1 Lbs./Gal. (1018 - 1089 g/l).
 - 3. Solids Content by Volume: 49-53%.
- E. Fiberglass Reinforcement (Type E): Multi-end continuous fiberglass roving designed for spray operations.

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F. Surfacing:

1. Acrylic Surfacing: CA Title 24 Cool Roof Reflective Coating as supplied by the manufacturer of the membrane system.
 - a. Solids Content by Volume: >45-50%.
 - b. VOC Content (maximum): 400 g/l.
 - c. Weight: 7.7 - 8.7 lbs./Gal. (922 – 1041 g/l).
 - d. Solar Reflectance:
 - 1) Initial: 0.53.
 - 2) 3 Year Aging: 0.42.
 - e. Thermal Emittance:
 - 1) Initial: 0.50.
 - 2) 3 Year Aging: 0.56.
 - f. Solar Reflectance Index (SRI)
 - 1) Initial: 48.
 - 2) 3 Year Aging: 33.
 - 3) 3 Year Aging: 0.53.
 - g. Solar Reflectance Index (SRI)
 - 1) Initial: 47.
 - 2) 3 Year Aging: 44.

2.4 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.
- B. Fasteners: Factory-coated steel fasteners and metal meeting corrosion-resistance provisions in FMG 4470, designed for fastening roofing membrane components to substrate, tested by manufacturer for required pullout strength and acceptable to roofing system manufacturer.
- C. Flashing Cement: Trowel grade SBS-modified flashing cement made from heavy-bodied asphalt reinforced with organic fibers.
 1. VOC Content (Maximum): 290 g/l.
 2. Weight per Gallon: 8.25 – 9.25 Lbs (988 – 1107 g/l).
- D. Metal Flashing Sheet: Metal flashing sheet as specified in Division 07 Section "Sheet Metal Flashing and Trim."
- E. Separation Sheet:
 1. Elongation: 50%.
 2. Puncture Resistance: 535 lbs.

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3. Tensile Strength: 205 lbs.
4. Tear Strength: 85 lbs.
5. Weight: 8 oz/ sq. yd.

2.5 ACCESSORIES

- A. General: Roofing accessories recommended by manufacturer for intended use and compatible with membrane roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate and acceptable to roofing system manufacturer.

2.6 WALKWAYS

- A. Walkway Pads: Mineral-granule-surfaced, reinforced asphaltic composition, slip-resisting pads, manufactured as a traffic pad for foot traffic and acceptable to roofing system manufacturer, 1/2 in (13mm). thick, minimum.
 1. Pad Size: 36 inches by 60 inches (914mm x 1524mm) minimum.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, work areas and field conditions, for compliance with the following requirements and other conditions which may affect the performance of roofing system:
 1. Conduct Aerial Thermal Moisture Scan. Provide owner and roofing manufacturer with detailed report containing areas of moisture in roof system.
 2. Identify locations where water stands on roof. Provide detailed plan to owner and Roofing Manufacturer to remove/ eliminate standing water.
 3. Verify surfaces are clean, rigid, dry, smooth and free from cracks, holes, blisters, debris and sharp changes in elevation greater than 1/4 inch (6mm).
 4. Verify roof openings and penetrations are adequately installed, and that roof drains are securely clamped in place.
 5. Verify cants, blocking, curbs and nailers are installed in accordance with manufacturers requirements.
 6. Verify all drains and scuppers are free of ruptures and sealed on all four sides on the exterior face of walls.

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7. Verify surface plane flatness and fastening of roof deck complies with manufacturers requirements.
8. Verify chemicals that may impair adhesion of roofing components have been removed.
9. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method in accordance with ASTM D 4263.
10. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prior to application, clean surface with water. Where wash water must be reclaimed due to contamination concentrations, roof water collection design of the building or local ordinances. Conform to local requirements for disposal of wash water.
- B. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation in accordance with the roofing system manufacturer's written instructions.
- C. Remove or correct all sharp projections which may interfere with the integrity of the membrane.
- D. Protect roof drains and edges during construction to prevent materials from entering roof drains and conductors or migrating onto surfaces of adjacent construction. Remove roof drain plugs when no work is taking place or when rain is forecast.
- E. Protect adjacent materials and lower paving, prior to starting work, in accordance with roofing system manufacturer's instructions.

3.3 ROOFING MEMBRANE INSTALLATION - GENERAL

- A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations of ARMA/NRCA.
- B. Commence installation of roofing membrane in presence of roofing system manufacturer's technical personnel.
- C. Cooperate with testing and inspecting agencies engaged or required to perform services during roofing system installation.
- D. Coordinate installation so materials that will not be permanently exposed are not subject to moisture or left uncovered at the end of a workday.
 1. Provide tie-offs at the end of each day's work to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement with joints and edges sealed.
 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 3. Remove and discard temporary seals before beginning work on adjoining roofing.
- E. Substrate Joint Penetrations: Prevent roofing cement from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

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3.4 POLYESTER LEVELING SYSTEM

- A. Over the prepared gravel roof, apply one layer of polyester ply embedded in emulsion at rate of 20 gal. of undiluted emulsion per 100 sq. ft (6.1 L/m²).
- B. Both polyester ply and emulsion must be thoroughly saturated, creating a solid surface.
- C. Extend polyester leveling system to cover the entire embedded gravel roof.

3.5 FLASHING INSTALLATION

- A. Refer to the manufacturer's application manual for flashing of specific details.
- B. Materials used in these steps are in addition to the main fiberglass composite application.
- C. All flashings must have a minimum 500 mil of fiberglass composite upon completion of the installation.
- D. Expansion and Control Joints: Any joint in the structure intended to allow for movement must be divorced from the seamless reinforcement composite. Install an 18 inch (457mm). wide dry slip sheet consisting of inverted (mineral-side down) cap sheet, laid dry over the joint and extending 36 inches (914mm) at each end. Over the slip sheet, solidly adhere a 36 inches (914mm) polyester ply in 4 gallons per 100 square feet (1.63 L/m²) of emulsion and reinforce with 500 mil of seamless composite.
- E. Pipe Penetrations: All penetrations must be flashed with a minimum 24 gauge galvanized sheet metal storm collars attached approximately 1 inch (25mm) above the top of the flashing boot, secured with a draw band and approved sealant.
- F. Roof Drains and Scuppers:
 - 1. Install 500 mil of fiberglass composite completely into the drain and seal to the bowl.
 - 2. Ensure that all field applications adhere to the sides of the drain bowl.
 - 3. After system is dry, reinstall compression ring.
 - 4. Wall scuppers shall be treated so that field layers of composite extend 2 inches (51mm) beyond the field applications, to adhere a minimum of 2 inches (51mm) to the metal of the inside of the scupper.
- G. Edge Flashing:
 - 1. Install 24 gauge galvanized steel sheet drip edge flashing with rise sufficient in width and height to tightly lay over the metal edge. Metal must be wide enough to cover any outside gap in fascia and allow a 4 inch (102mm) flange onto the roof deck. Lap ends a minimum of 4 inches (102mm) with sealant and fasteners.
 - 2. Stagger field attachment on 6 inch (152mm) centers. Adhere a continuous strip of self-adhering membrane to the metal flange approximately 2 inches (51mm) from the edge and 6 inches (152mm) onto the existing roof surface.
 - 3. Reinforce with 500 mil of seamless composite. Extend field application of composite to the outside edge of the metal flashing.
 - 4. Ensure that composite is flush with the edge such that water does not pond.

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- H. Parapet Walls:
 - 1. Apply 500 mil composite application up and over parapet walls, extending down the outside edge of the wall a minimum of 1 inch (13 mm).
 - 2. Cover parapet wall tops with 500 mil of seamless composite prior to installation of the coping.
 - 3. Install a minimum 24-gauge metal coping cap with continuous cleat attached on the outside of the wall to meet FM 1-90 wind uplift requirements.
 - 4. Sheet metal joints must be field-soldered or have cover plates solidly installed in sealant and anchored to meet FM 1-90 wind uplift requirements.
- I. Concrete Masonry Unit Parapets: Apply 500 mil of seamless composite to the outside edges of concrete walls such that the seamless composite seals a minimum of 3 inches (76mm) to the CMU and forms a solid continuous seal to the top of the wall.
- J. Pipe Supports:
 - 1. All pipes 2 inches (51mm) in diameter or less must be supported with polymer pipe supports at no greater than 8 feet (2438mm) on center.
 - 2. Install in accordance with support manufacturer guidelines for spacing requirements. Traffic pad cushions must be installed under pipe supports. Fasteners must not penetrate the roofing membrane.
 - 3. All pipes over 2 inches (51mm) in diameter must be supported in movable pipe hangers or other approved support system.
- K. Sheetmetal Duct Encapsulation
 - 1. Apply 500 mil composite application onto Sheetmetal duct system.
 - 2. Encapsulate top and both side walls making duct a seamless encapsulated unit.
 - 3. Do not install composite onto expansion joint bellows or HVAC mechanical units.
- L.
- M. Rooftop equipment Curbs/ Platforms
 - 1. Apply 500 mil composite application onto roofed equipment curbs terminating at Sheetmetal counterflashing.
 - 2. If applicable, Cover Sheetmetal pans with 500 mil of seamless composite
 - 3. Install a Sheetmetal extension flashing tucked under existing termination flashing. Extending min. 3" below termination of seamless composite. Anchor with self-sealing screws or rivets.

3.6 SEAMLESS COMPOSITE REINFORCEMENT INSTALLATION (ROOF AND SHEETMETAL DUCT SYSTEM)

- A. Apply one layer of the composite roofing at the following ratio:
 - 1. Asphalt Emulsion (undiluted): 30 gal. per 100 square feet (18.3 L/m²).
 - 2. Fiberglass Reinforcement: 16 lb. per 100 square feet (0.78 Kg/m²).
- B. No water or other material may be added to the emulsion to thin or extend pot life.
- C. Fiberglass must be disbursed from the applicator in varying intertwined lengths, up to 24 inches (610mm).
- D. Thoroughly mix fiberglass and emulsion prior to application on roof deck.

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- E. Any loose strands must be brushed by hand, removed or filled-in with emulsion to create a solid surface.
- F. Upon completion, no area may be less than 250 mil dry film thickness (DFT).
- G. Areas such as base flashings and penetrations, where application exceeds 500 mils wet, must be brushed by hand to prevent surface crazing.
- H. Allow 14 days for applications to cure prior to installing reflective coating system below

3.7 REFLECTIVE COATING INSTALLATION

- A. Prior to reflective coating application, wash the roof surface with water. Do not commence application until the system has thoroughly dried, as registered by a reading of zero on a calibrated moisture meter.
- B. Apply Title 24 roof coating at a minimum of 1 1/2 gal. per 100 square feet (0.6 L/m²). in each of two passes to total 3 gallons per 100 square feet. (1.2 L/m²). Back rolling is recommended to ensure even coverage throughout.
- C. Fully embed 1 polyester ply in finished Composite applications leaving the top surface uncoated for application of acrylic coating system in areas where water stands on roof to resist peeling.

3.8 WALKWAY INSTALLATION

- A. Walkway Pads:
 - 1. Install walkway pads using units of size indicated on contract drawings.
 - 2. Where not expressly specified, install manufacturer's recommended size for the location and anticipated traffic volume.
 - 3. Install walkway pads with a cold adhesive compatible with the membrane specified

3.9 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to owner.
- B. Notify owner 48 hours in advance of date and time of inspection.
- C. Repair or replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
- D. Additional testing and inspecting, at contractor's expense, will be performed to determine compliance of repaired or replaced work with specified requirements.

3.10 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roof for deterioration and damage. Where any defects or damage are identified describe their nature and extent in a written report, with copies to architect and owner.

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- B. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

System Overview

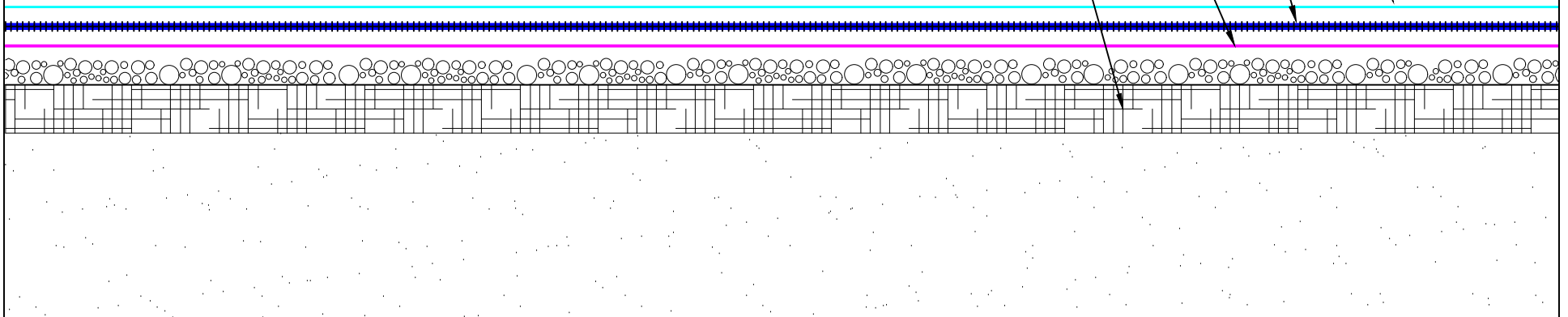
Deck:	Approved Gravel Surfaced Roof
Base Sheet:	Polyester Leveling System
Asphalt Emulsion:	45 Gal
Fiberglass Roving:	16 Lbs
Coating:	CA Title 24 Cool Roof Reflective Coating (3 Gal. / 100 Sq.Ft.)

TITLE 24 COATING

R-1P-16-45-A WEATHERWELD APPLICATION
45 GAL / 100 SQ. FT. ASPHALT EMULSION
16 LBS / 100 SQ. FT. FIBERGLASS ROVING

POLYESTER LEVELING SYSTEM

EXISTING APPROVED GRAVEL SURFACED ROOF



SYSTEM:

R-1P-16-45-A

WEATHERWELD

A DIVISION OF LIQUIFORM TECHNOLOGIES, INC.

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PREPARED FOR:

DRAWING TITLE:

SYSTEM OVERVIEW

DESIGNED BY:

DRAWN BY:

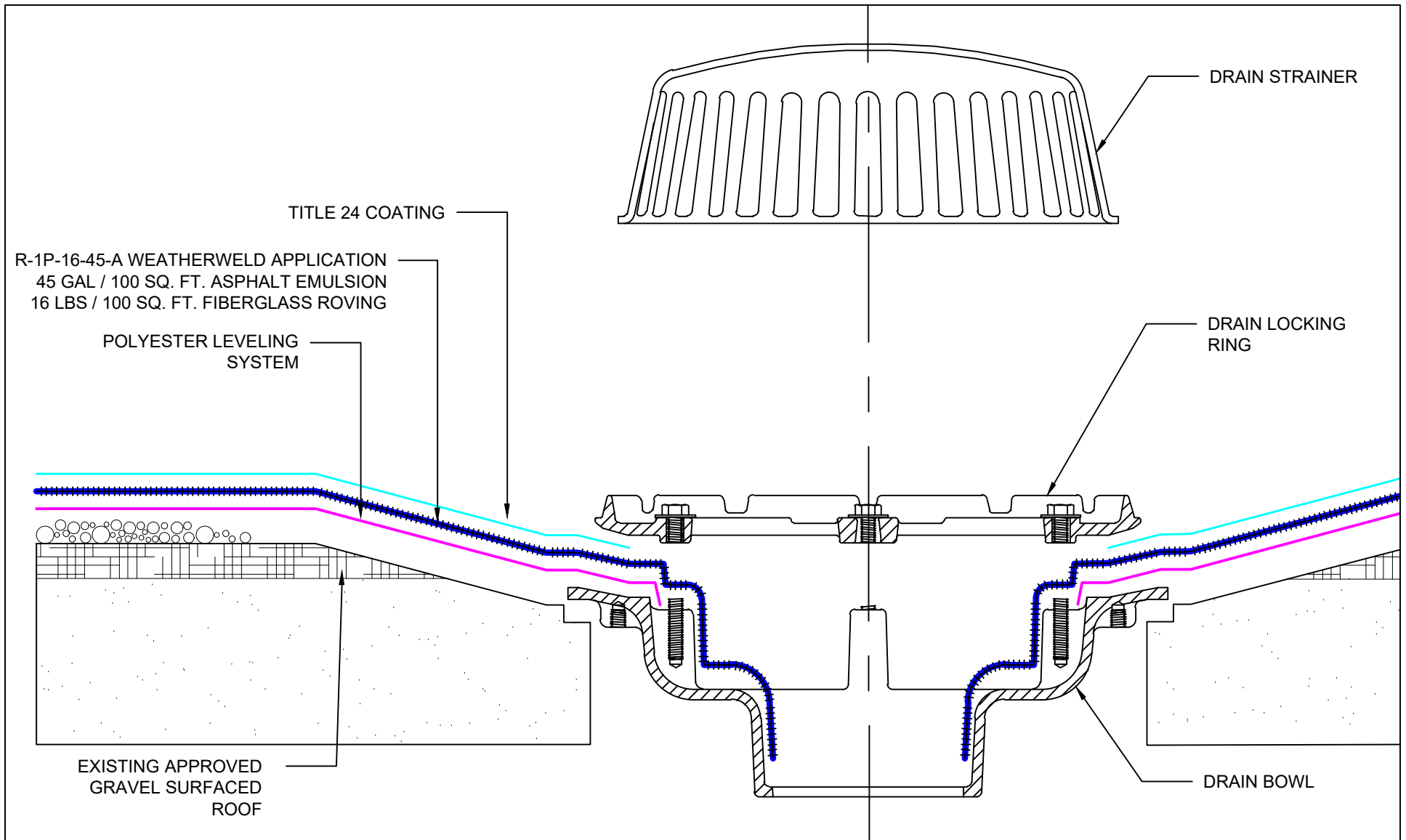
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SYSTEM:

R-1P-16-45-A

WEATHERWELD

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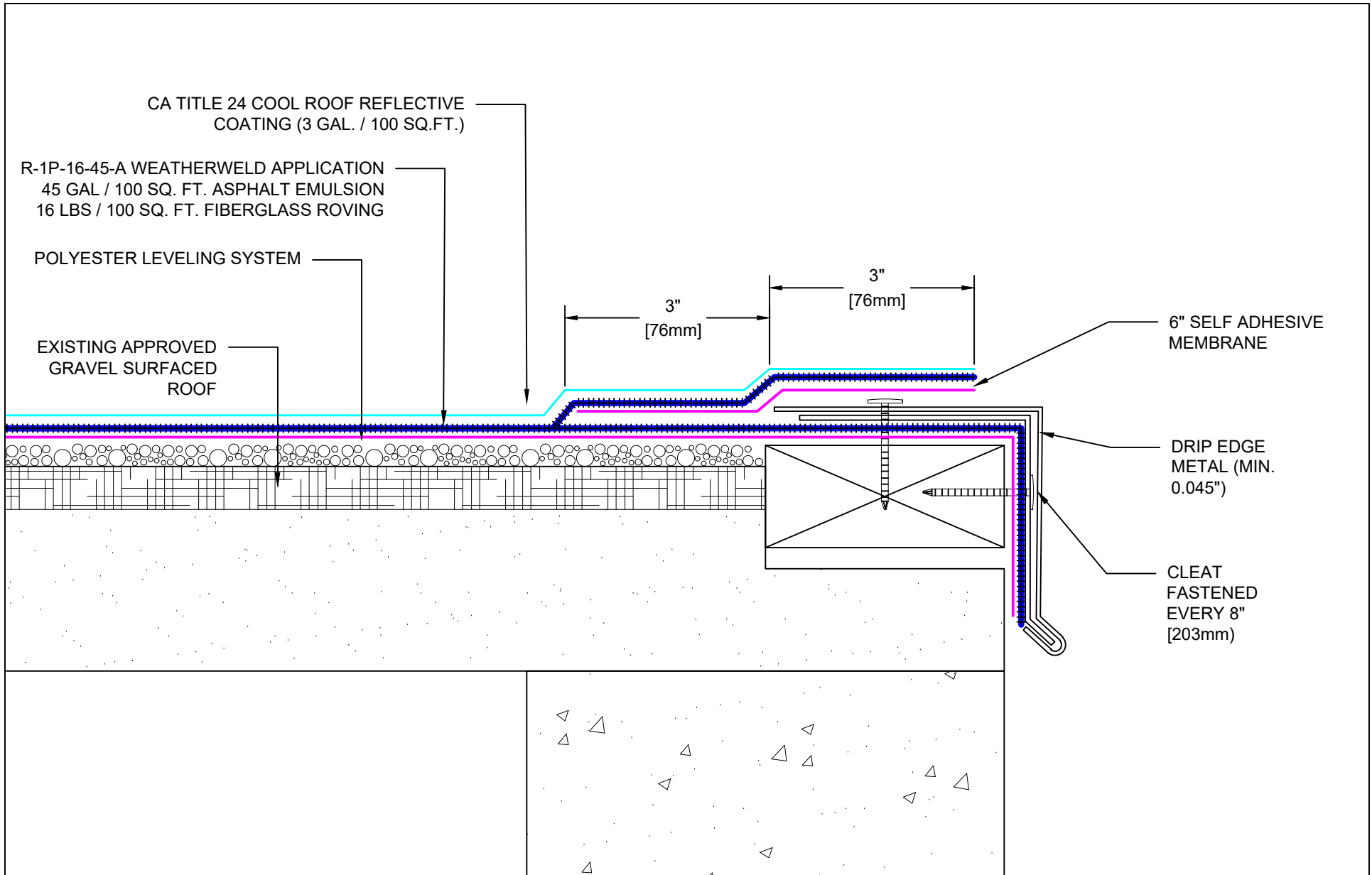
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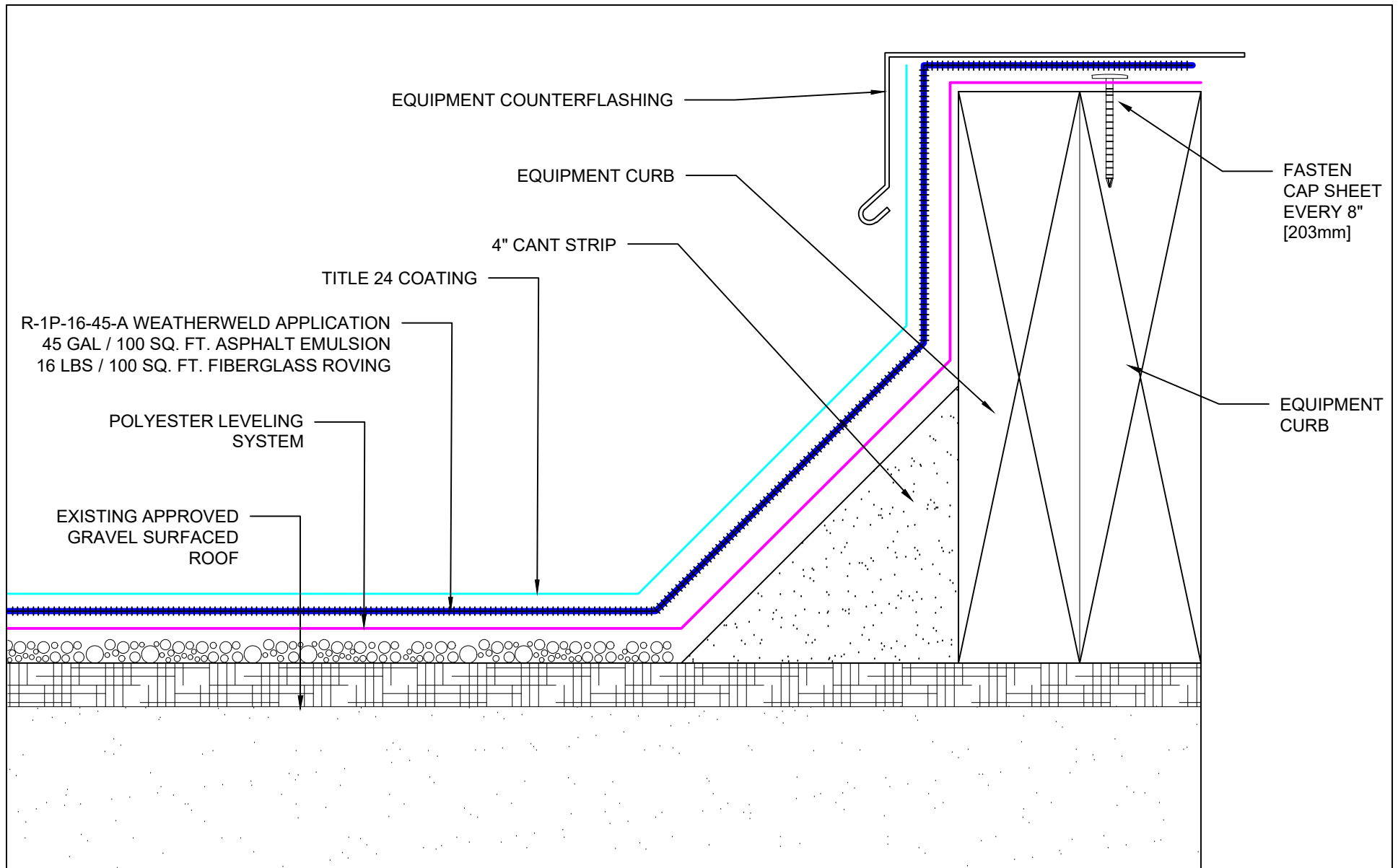
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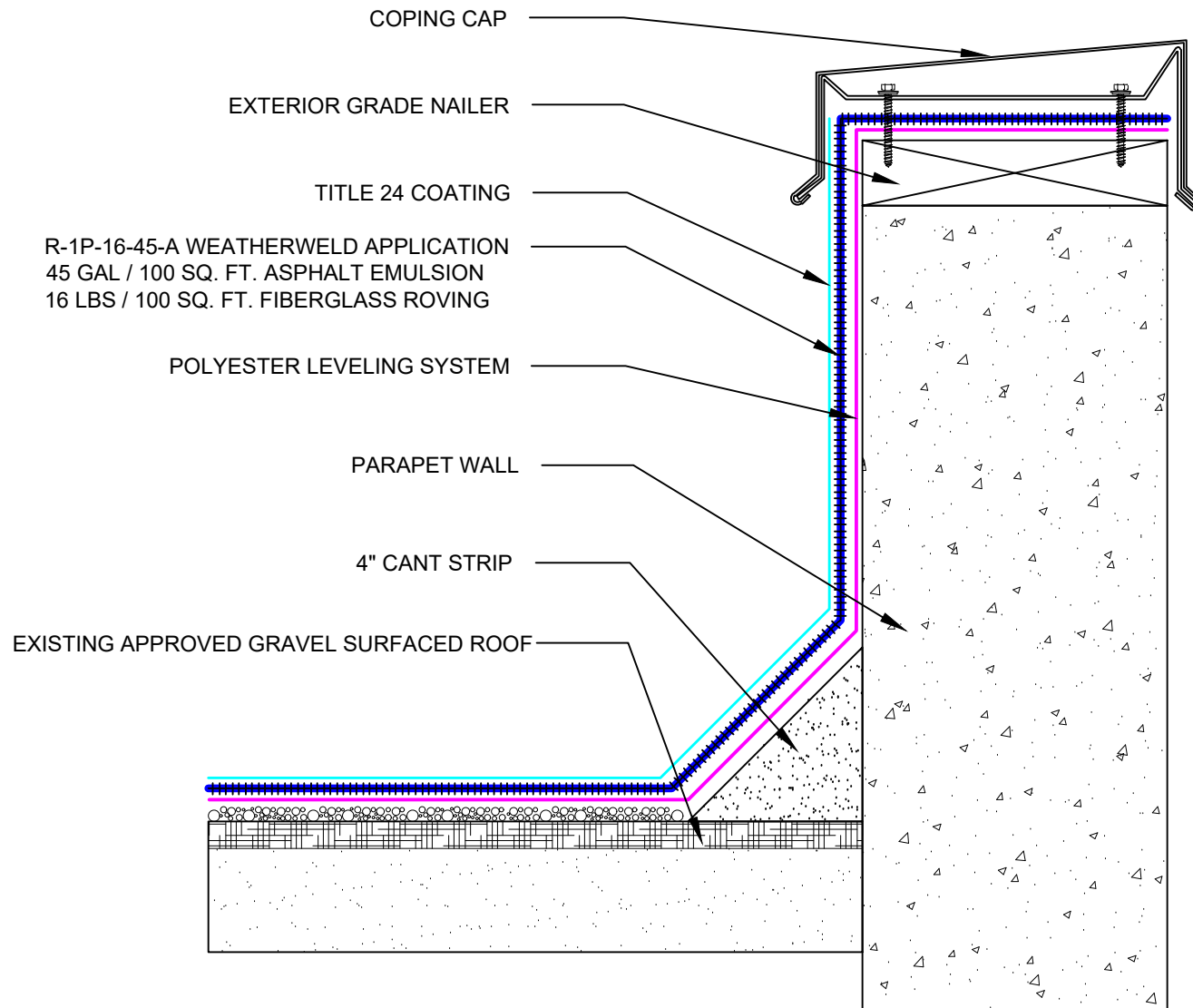
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SYSTEM: <div>R-1P-16-45-A</div>	<div>  9757 7th Street Suite 803 Rancho Cucamonga, CA 91730-5297 (888) 440-3224 www.weatherweld.com </div> <div> A DIVISION OF LIQUIFORM TECHNOLOGIES, INC. </div>	PREPARED FOR:				
	DRAWING TITLE: <div>EDGE FLASHING</div>	DESIGNED BY:	DRAWN BY:	CHECKED BY:	DATE: <div>11/11/20</div>	SCALE: <div>NTS</div>



SYSTEM:



SYSTEM:

R-1P-16-45-A

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DRAWING TITLE:

PARAPET WALL FLASHING

DESIGNED BY:

DRAWN BY:

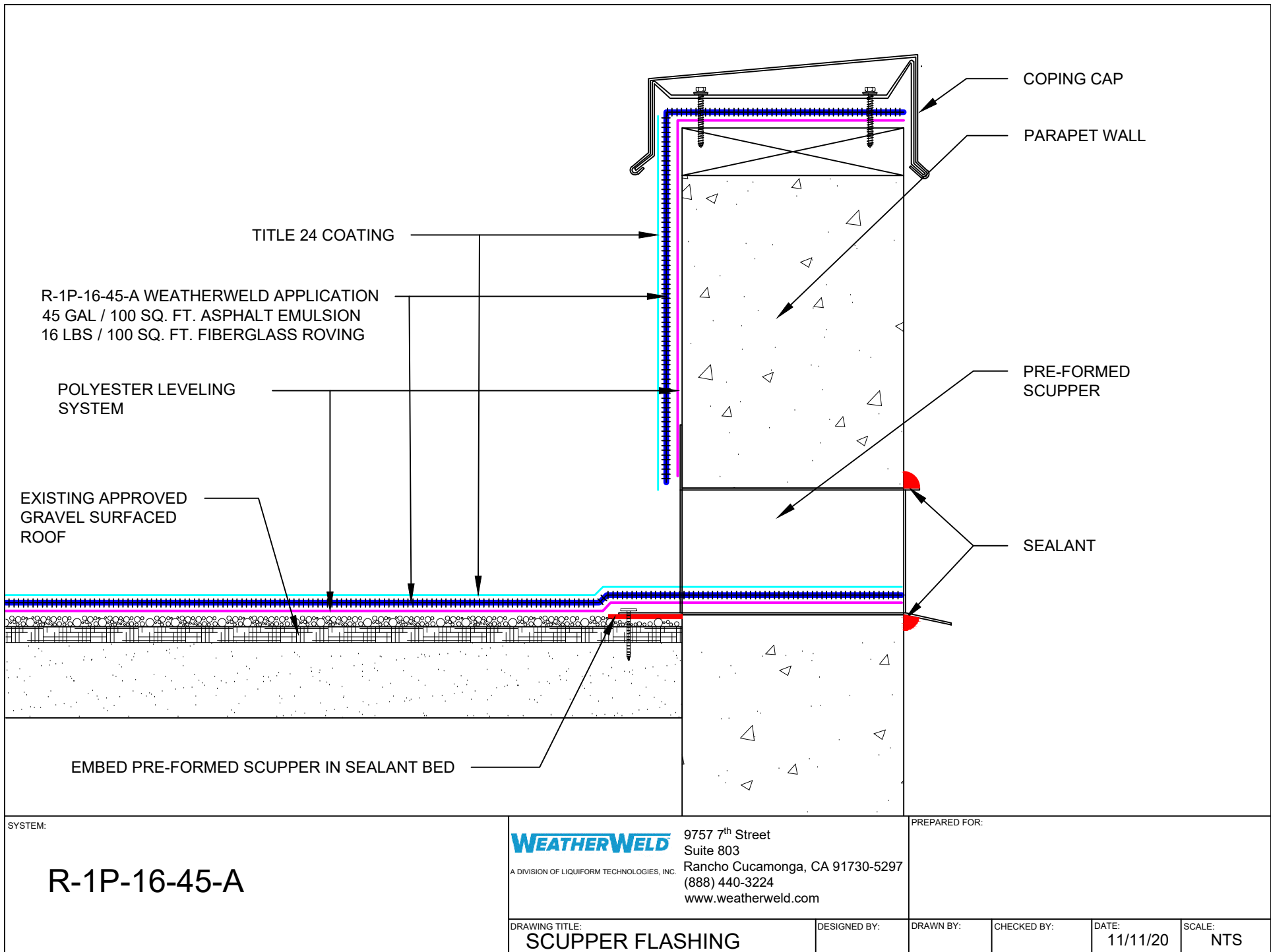
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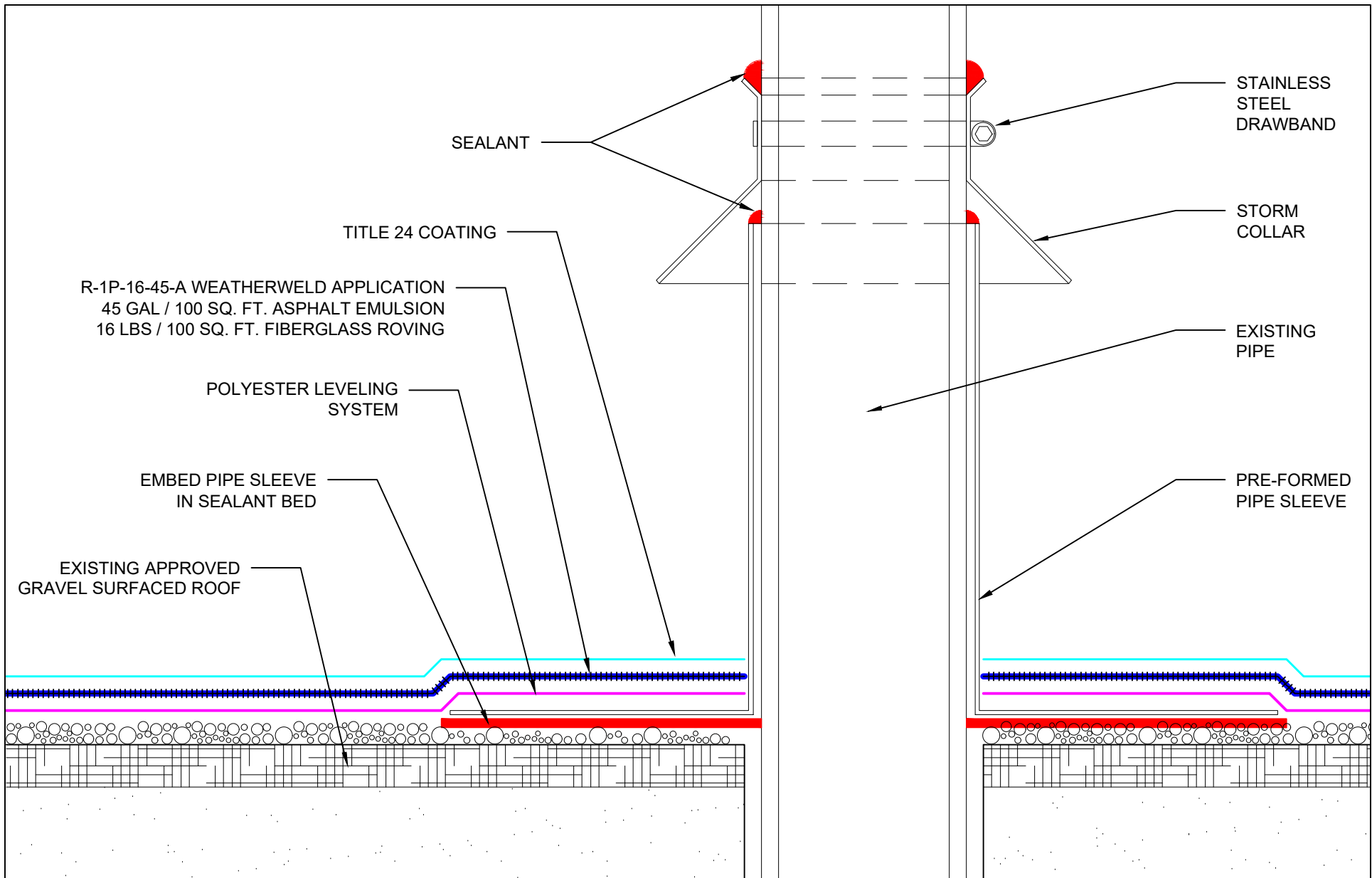
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