

Engineering Department

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To: Consultants, Contractors, Developers and Suppliers

From: Dave Wostenberg, PE, Director of Engineering

Date: July 23, 2024

RE: Sanitary Sewer Manholes – PVC Lined

The City of Yuma (City) Construction Standard Detail Drawings 6-020 and 6-025 required precast manholes used for sanitary sewer service to be lined with PVC T-Lock and sealed gas tight. The liner and interior surfaces must be spark tested.

On December 4, 2019, the City issued an Interim SOP regarding sanitary sewer manholes that was in response to the supplier (Northwest Pipe Company) temporarily discontinuing production of T-Lock PVC lined sewer manholes. The interim SOP allowed for four different protective coating products to be spray-applied to the interior surface of the manhole to form a continuous barrier against corrosion from hydrogen-sulfide gases.

In 2024, precast sanitary sewer manholes with PVC liners meeting the City of Yuma standards and specifications are being manufactured. As such, this memo rescinds City of Yuma Engineering Department Interim SOP dated December 4, 2019. The use of protective coating products to be spray-applied to the interior surface of the sanitary sewer manholes is no longer acceptable for use on City projects.

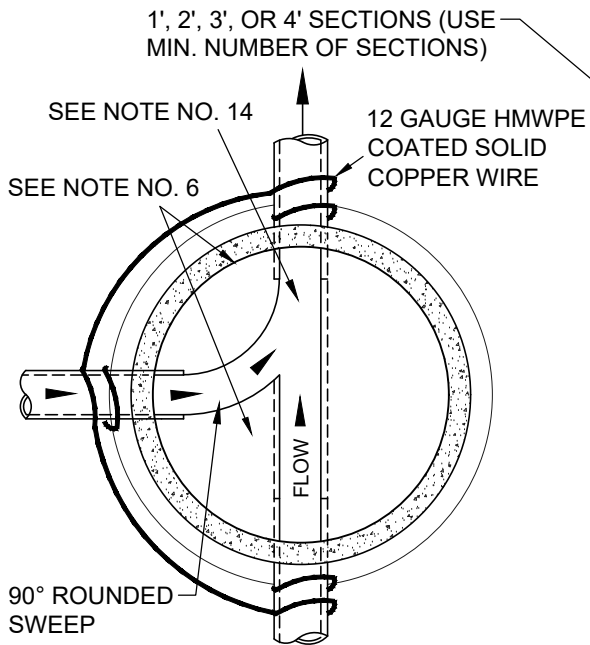
City of Yuma Construction Standard Detail Drawings 6-020 and 6-025 (attached) have been revised. Note 10 on both drawings has been revised from "...PVC T-Lock liner..." to "...PVC liner with embedment into precast pipe...". Sanitary sewer manhole PVC liners meeting City of Yuma Standard Detail Drawings are currently being supplied by ARMORLOK Inc. in San Bernardino, CA.

The contractor may submit PVC Liner products manufactured by suppliers other than ARMORLOK Inc. for approval by the City Engineer. The City reserves the right to reject precast sanitary sewer manholes not meeting the City of Yuma standards and specifications.


Attachments: ARMORLOK Inc. protective linings specifications and details for precast sewer manholes
Revised City of Yuma Construction Standard Detailed Drawings No.'s 6-020 and 6-025

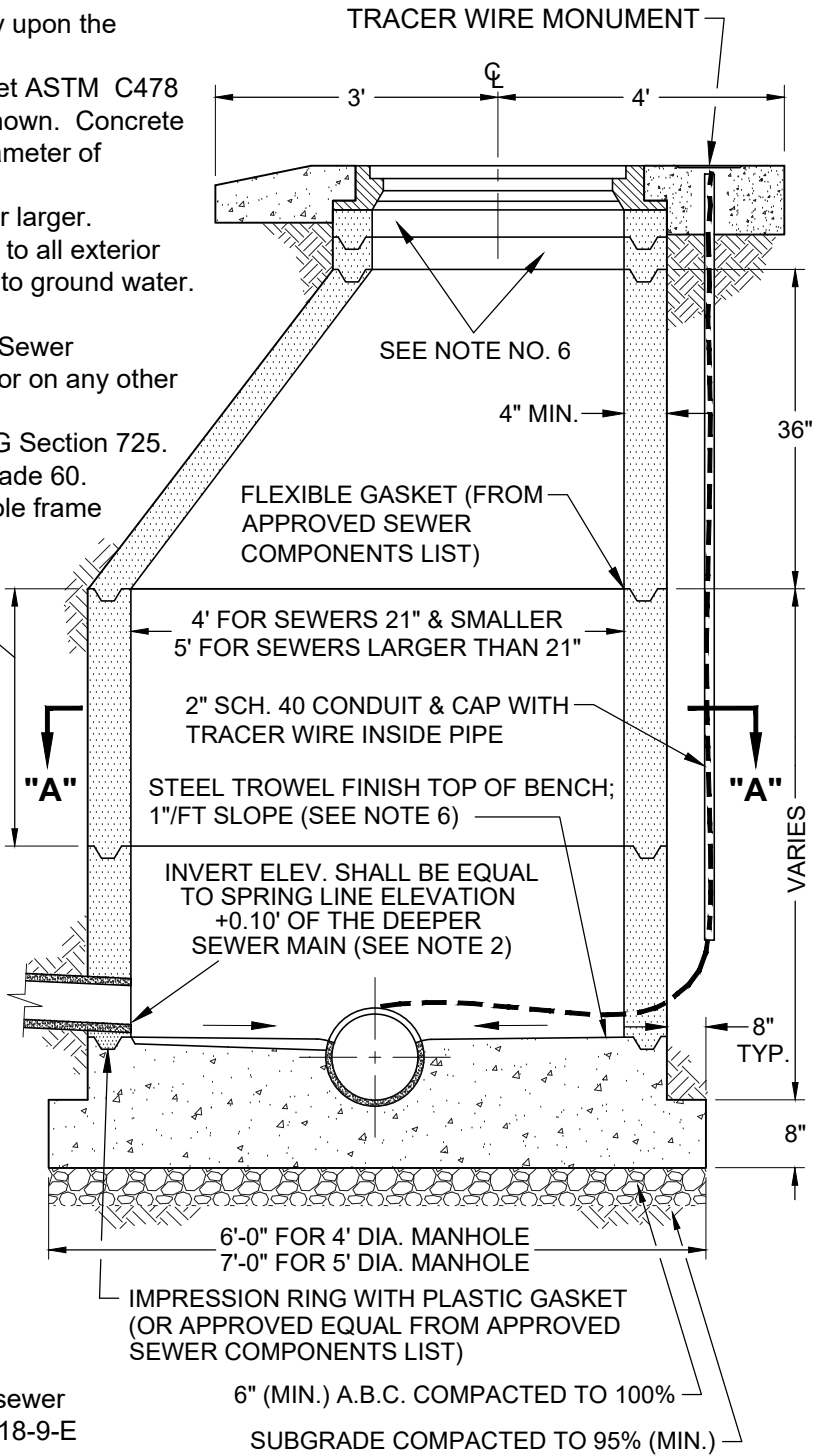
NOTES

1. Concentric manholes shall be constructed only upon the approval of the City Engineer.
2. Precast concrete cones and sections shall meet ASTM C478 specifications (latest revision) except where shown. Concrete shall be Type III with flyash additive. Inside diameter of manhole and elevations as shown on plans.
3. Use Polymer manhole for any sewer line 15" or larger.
4. An asphalt waterproofing seal shall be applied to all exterior surfaces of the manhole that may be exposed to ground water.
5. Provide a 20' wide vehicular access road.
6. Apply interior surface sealant (from Approved Sewer Components List) on adjustment rings, bench or on any other concrete surface.
7. Base constructed of Class A concrete per MAG Section 725.
8. Base reinforcing steel shall be ASTM A615, grade 60.
9. See standard Detail 6-040 for adjusting manhole frame and cover to final grade.



SECTION "A-A"

10. Precast concrete manholes shall have a PVC  liner with embedment into precast pipe and sealed gas tight. Liner and interior surfaces shall be spark tested (applies only to sanitary sewer manholes, see Arizona Administrative Code R18-9-E 301 D.3.e Manholes General Permit: Sewage Collection Systems pertaining to Holiday testing).
11. Backfill used to fill manhole excavation shall be a one sack cement per cubic yard of sand slurry mixture, unless otherwise approved.
12. Grout seal around pipe. Match and apply same protective coating on grout as used on the other exposed concrete surfaces (see Note 6).
13. Special details shall be required for: Manholes greater than 40' in depth; at deflection manholes; for multiple pipe penetrations with at least one pipe greater than 21"; or if sewer main is larger than 48" in diameter. Calculations shall be signed/sealed by a registered professional engineer (AZ license) and submitted to the City Engineer for review & acceptance.



14. For mainline pipe installation through manhole, see standard Detail 6-030.

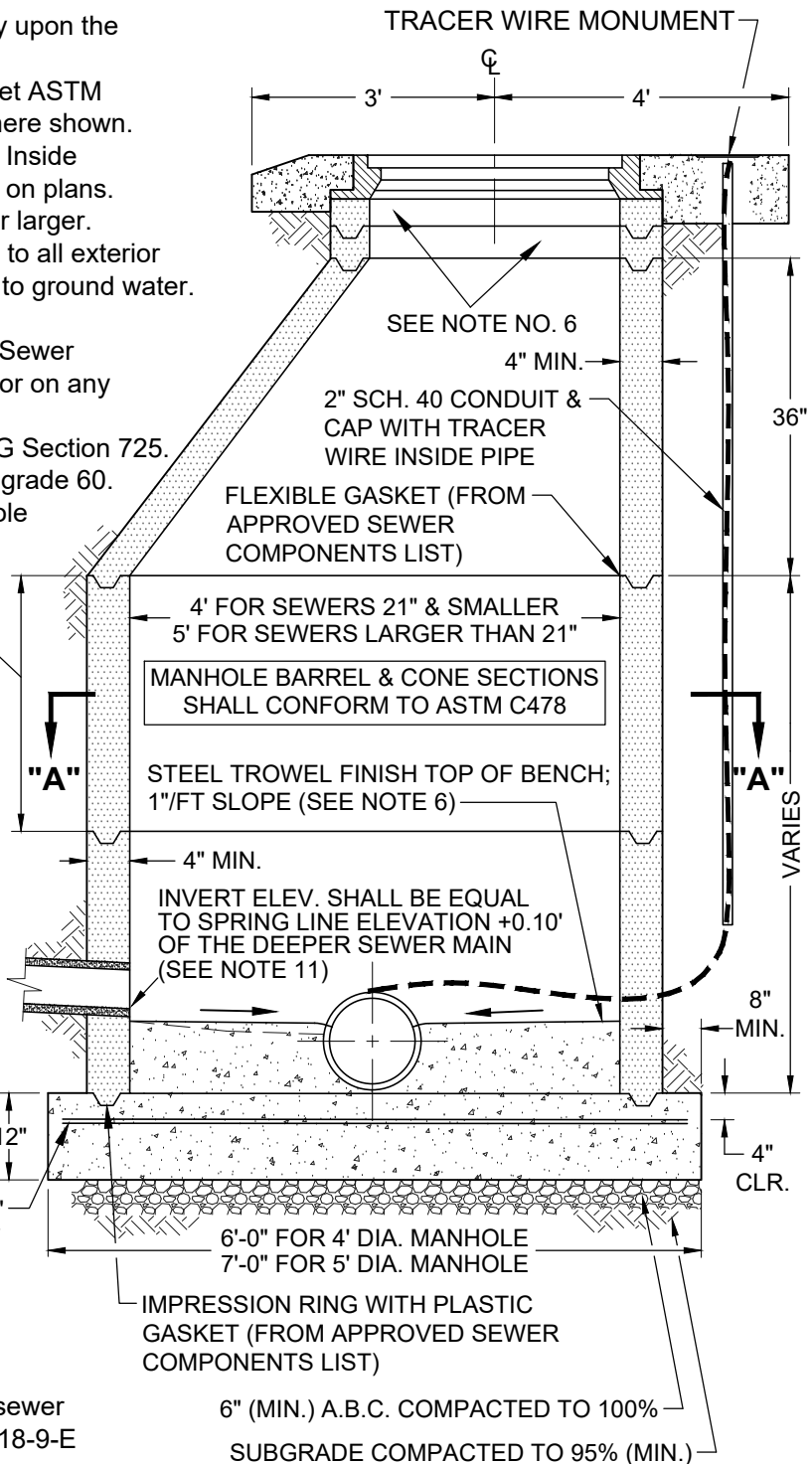
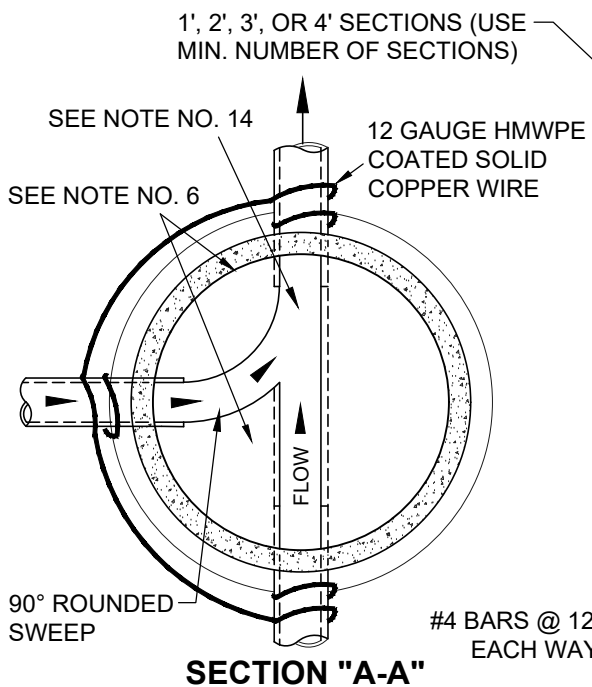
Issued: May 2019  Modified JULY 2024

CITY OF YUMA
CONSTRUCTION STANDARD DETAIL DRAWINGS

**STANDARD NO. 6-020
LESS THAN 13' DEEP
PRECAST CONCRETE MANHOLE**

NOTES

1. Concentric manholes shall be constructed only upon the approval of the City Engineer.
2. Precast concrete cones and sections shall meet ASTM C478 specifications (latest revision) except where shown. Concrete shall be Type III with flyash additive. Inside diameter of manhole and elevations as shown on plans.
3. Use polymer manhole for any sewer line 15" or larger.
4. An asphalt waterproofing seal shall be applied to all exterior surfaces of the manhole that may be exposed to ground water.
5. Provide a 20' wide vehicular access road.
6. Apply interior surface sealant (from Approved Sewer Components List) on adjustment rings, bench or on any other concrete surface.
7. Base constructed of Class A concrete per MAG Section 725.
8. Base reinforcing steel should be ASTM A615, grade 60.
9. See standard Detail 6-040 for adjusting manhole frame and cover to final grade.



10. Precast concrete manholes shall have a PVC liner with embedment into precast pipe and sealed gas tight. Liner and interior surfaces shall be spark tested (applies only to sanitary sewer manholes, see Arizona Administrative Code R18-9-E 301 D.3.e Manholes General Permit: Sewage Collection Systems pertaining to Holiday testing).
11. Backfill used to fill manhole excavation shall be a one sack cement per cubic yard of sand slurry mixture, unless otherwise approved.
12. Grout seal around pipe. Match and apply same protective coating on grout as used on the other exposed concrete surfaces (see Note 6).
13. Special details shall be required for: Manholes greater than 40' in depth; at deflection manholes; for multiple pipe penetrations with at least one pipe greater than 21"; or if sewer main is larger than 48" in diameter. Calculations shall be signed/sealed by a registered professional engineer (AZ license) and submitted to the City Engineer for review & acceptance.

14. For mainline pipe installation through manhole, see standard Detail 6-030.

Issued: May 2019 Modified JULY 2024

CITY OF YUMA
CONSTRUCTION STANDARD DETAIL DRAWINGS

STANDARD NO. 6-025
13'-40' DEEP PRECAST
CONCRETE MANHOLE

ARMORLOK

PVC PROTECTIVE LININGS

PVC Liner Sheet with Locking Extensions for Pipe and Structures 1.2

1. General

This specification covers the supply and installation of a flexible PVC sheet liner with continuous locking extensions in reinforced concrete pipe and auxiliary structures to effectively protect the exposed concrete surfaces from corrosion. To accomplish this, the liner must be continuous and free of pinholes both across the joints and in the liner itself. All work for and in connection with the installation of the lining in concrete pipe, and the field sealing and welding of joints, shall be done in strict conformity with all applicable specifications, instructions and recommendations of the lining manufacturer.

2. Material

2.1 Liner shall be ArmorLok Liner as distributed by ArmorLok PVC Protective Linings, San Bernardino California.

2.2 Composition

The material used in the liner, welding strips and other accessory items, shall be a combination of poly vinyl chloride resin, pigments and plasticizers, specially compounded to remain flexible.

2.3 Physical Properties

2.3.1 All plastic liner plate sheets, welding strips and other accessory items, shall have the following physical properties when tested at 77°F±5° (25°C±3°). Chemical resistance listed below.

PROPERTY	TEST METHOD	MINIMUM REQUIREMENT
Tensile Strength	ASTM D412-16	2200 PSI
Elongation	ASTM D412	200%
Hardness	ASTM D2240 Type D	50-60 1 sec. – 35-50 10 sec.
Tearing Strength	ASTM D1004 -13	=/>80 N/mm
Plasticizer Permanence	ASTM D1203-16	<1.0 %
Water Absorption	ASTM D570-98	<0.1 %
Pull Out Strength of Key	SSPWC 210.2.6.4.1	=/> 100lbs per linear inch
Brittle Point	D746	5 degrees F

CHEMICAL PROPERTY	CONCENTRATION	MINIMUM REQUIREMENT
Sulfuric Acid (H ₂ SO ₄)	20%	+/- 0.1%
Sodium Hydroxide (NaOH)	5%	+/- 0.2%
Ammonium Hydroxide (NH ₄ OH)	5%	+/- 1.0%
Nitric Acid (HNO ₃)	1%	+/- 0.1%
Ferric Chloride (FeCl ₃)	1%	+/- 0.2%
Sodium Hypochlorite (NaOCl)	1%	+/- 0.1%
Soap	0.10%	NA
Detergent	0.10%	NA
Bacteriological (BOD)	=/> 700 ppm	NA

2.3.2 Tensile specimens shall be prepared and tested in accordance with ASTM D412 using Die B. Weight change specimens shall be 1-inch (25-mm) by 3-inch (75-mm) samples. Specimens for testing of initial physical properties may be taken from liner sheet and welding strip at any time prior to final acceptance of the work.

2.3.3 Continuous locking extensions embedded in concrete shall withstand a test pull of at least 100 pounds per linear inch (1800 kg/m), applied perpendicularly to the concrete surface for a period of one minute, without rupture of the locking extensions or withdrawal from embedment. This test shall be made at a temperature of 70° - 80°F (21° - 27°C).

2.3.4 All plastic liner plate sheets, including locking extensions, all joint, corner and welding strips shall be free of cracks, cleavages or other defects adversely affecting the protective characteristics of the material. The engineer may authorize the repair of such defects by approved methods.

2.3.5 The lining shall have good impact resistance, shall be flexible and shall have an elongation sufficient to bridge up to 1/4-inch (6 mm) settling cracks, which may occur in the pipe or in the joint after installation, without damage to the lining.

2.3.6 The lining shall be repairable at any time during the life of the pipe or the structure.

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2.4 Details and dimensions of basic size sheets

2.4.1 Liner sheets shall be a minimum of 0.065 inch (1.65 mm) in thickness. Locking extensions (Tor D shaped) of the same material as that of the liner shall be integrally extruded with the sheet. Locking extensions shall be approximately 2 1/2 inches (67 mm) apart and shall be at least 0.375-inch (9.5 mm) high.

2.4.2 Sheets shall have a nominal width of 4 feet and a length of not more than 8 feet, except that longer lengths may be supplied on special order. Lengths specified shall include a tolerance at a ratio of $\pm 1/2$ inch (12 mm) for each 100 inches (2500 mm).

2.4.3 Special sized, factory pre-welded sheets are available on special order.

2.5 Pipe-size sheets and accessories

2.5.1 Pipe linings shall be supplied as pipe-size sheets, fabricated by shop-welding the basic-size sheets together. Shop welds shall be made by lapping sheets a minimum of 1/2 inch and applying heat and pressure to the lap to produce a continuous welded joint. Tensile strength measured across shop-welded joints in accordance with ASTM D412 shall be at least 2000 psi (14 MPa).

2.5.2 If required, strap channels shall be 1-inch (25-mm) wide maximum and formed by removing the locking extensions so that a maximum of 3/16 inch (5 mm) remains.

2.5.3 Sheets also can be supplied in prefabricated, pipe-size tubular-shaped sheets, ready to lower onto the inner pipe forms. These normally do not require the use of strap channels.

2.5.4 Transverse flaps may be provided at the ends of sheets for pipe. Locking extensions shall be removed from flaps so that a maximum of 1/32 inch (1mm) of the base of the locking extension is left on the sheet.

2.5.5 Welding strips shall be approximately 1-inch (25 mm) wide with a minimum width of 7/8 inch (22 mm).

Thickness of weld strip shall be a nominal 1/8 inch (3 mm).

2.5.6 Joint strips for pipe shall be 4-inches (100 mm) wide with a minimum width of 3 3/4 inches (94 mm). Thickness of joint strips shall be a nominal of 3/32 inch (2.3 mm).

3. Installation of Lining

3.1.1 Installation of the lining, including preheating of sheets in cold weather and the welding of all joints, shall be done in accordance with the recommendations of the liner manufacturer.

3.1.2 Coverage of the lining shall not be less than the minimum shown on the plans.

3.1.3 The lining shall be installed with the locking extensions running parallel with the longitudinal axis of a pipe.

3.1.4 The lining shall be held snugly in place against inner forms.

3.1.5 Locking extensions shall terminate not more than 1 1/2 inches (38 mm) from the end of the inside surface of the pipe section. Joint flaps when used shall extend approximately 4 inches (100 mm) beyond the end of the inside surface.

3.1.6 Concrete poured against lining shall be vibrated, spaded or compacted in a careful manner so as to protect the lining and produce a dense, homogenous concrete, securely anchoring the locking extensions into the concrete.

3.1.7 In removing forms, care should be taken to protect the lining from damage. Sharp instruments shall not be used to pry forms from lined surfaces. When forms are removed, any nails that remain in the lining shall be pulled, without tearing the lining, and the resulting holes clearly marked.

3.1.8 All nail and tie holes and all cut, torn and seriously abraded areas in the lining shall be patched. Patches made entirely with welding strip are only permitted if the repair can be accomplished with a single weld strip. Patches up to 12" x 12" will require adding plain liner sheet. All edges must be covered with welding strip fused to the patch and the sound lining adjoining the damaged area.

3.1.9 Hot joint compounds, such as coal tar, shall not be poured or applied to the lining.

3.1.10 The contractor shall take all necessary measures to prevent damage to installed lining from equipment and materials used in or taken through the work.

3.2 Application to concrete pipe - Special requirements

3.2.1 The lining shall be set flush with the inner edge of the bell or spigot end of a pipe section and shall extend to the opposite end or to approximately 4 inches (100 mm) beyond the opposite end depending upon the type of lining joint to be made with the adjoining concrete pipe.

3.2.2 Wherever concrete pipe or cast-in-place structures protected with lining joint structures not so lined (such as brick structures, concrete pipe or cast-in-place structures with clay lining or clay pipe), the lining shall be extended over and around the end of the pipe and back into the structure for not less than 4 inches (100 mm). This protecting cap may be

molded or fabricated from the lining material but need not be locked into the pipe.

3.2.3 Where a pipe lateral (not of plastic lined concrete) is

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installed through lined concrete pipe, the seal between the lined portion and the lateral shall be made by the method prescribed for cast-in-place structures under Paragraph 3.4.2.

3.2.4 Lined concrete pipe may be cured by standard curing methods.

3.2.5 Care shall be exercised in handling, transporting and placing lined pipe to prevent damage to the lining. No interior hooks or slings shall be used in lifting pipe. All handling operations shall be done with an exterior sling or with a suitable fork lift.

3.2.6 On pipe having a 360° liner coverage, the longitudinal edges of the sheet shall be lap welded. When pipe tubes are furnished, these are shop-welded joints made in accordance with 2.5.1.

3.2.7 No pipe with damaged lining will be accepted until the damage has been repaired to the satisfaction of the engineer.

3.3 Field joints in lining for concrete pipe

3.3.1 The joint between sections of lined pipe shall be prepared in the following manner:

If required, the inside joint shall be filled and carefully pointed with cement mortar in such a manner that the mortar shall not, at any point, extend into the pipe beyond the straight line connecting the surfaces of the adjacent pipe sections. Pipe joints must be dry before lining joints are made.

3.3.2 All mortar and other foreign material shall be removed from lining surfaces adjacent to the pipe joint, leaving them clean and dry.

3.3.3 Field joints in the lining at pipe joints may be either of the following described types:

Type J-1: The joint shall be made with a separate 4-inch (100 mm) joint strip and two welding strips. The 4-inch (100 mm) joint strip shall be centered over the joint, heat sealed to the lining with the goal that all overlapping liner is bonded, an angle grinder with a sanding disk shall be used to lightly profile area where 1" welding strip will be placed to remove sheen and contaminants, then welded along each edge to adjacent liner sheets with a 1-inch (25 mm) weld strip all ends of weld strip shall be melted smooth to avoid snags. The 4-inch (100 mm) joint strip shall lap over each sheet a minimum of 1/2 inch (13 mm).

Type J-2: The joint shall be made with a joint flap with locking extensions removed per Paragraph 2.5.4 and extending approximately 4 inches (100 mm) beyond the pipe end. The joint flap shall overlap the lining in the adjacent pipe section a minimum of 1/2 inch (13 mm) and

be heat-sealed in place with the goal that all overlapping liner is bonded, an angle grinder with a sanding disk shall be used to lightly profile area where 1" welding strip will be placed to remove sheen and contaminants prior to welding. The field joint shall be completed by welding the flap to the lining of the adjacent pipe using 1-inch (25 mm) weld strip all ends of weld strip shall be melted smooth to avoid snags. Care shall be taken to protect the flap from damage. Excessive tension and distortion in bending back the flap to expose the pipe joint during laying and joint mortaring shall be avoided. At temperatures below 50°F (10°C), heating of the liner may be required to avoid damage.

3.3.4 The joint flap or strip on beveled pipe shall be trimmed to a width (measured from the end of the spigot) of approximately 4 inches (100 mm) for the entire circumferential length of the lining.

3.3.5 All welding of joints is to be in strict conformance with the specifications and instructions of the lining manufacturer. Welding shall fuse both sheets and weld strip together to provide a continuous joint equal in corrosion resistance and impermeability to the basic liner sheet. Hot-air welding tools shall provide effluent air to the sheets to be joined at a temperature between 500° and 600°F (260° and 316°C). Welding tools shall be held approximately 1/2 inch (13 mm) from and moved back and forth over the junction of the two materials to be joined. The welding tool shall be moved slowly enough as the weld progresses to cause a small bead of molten material to be visible along both edges and in front of the weld strip.

3.3.6 The following special requirement shall apply when the liner coverage is 360 degrees: When groundwater is encountered the lining joint shall not be made until pumping of groundwater has been discontinued for at least three days and no visible leakage is evident at the joint. When welding the downstream side of a joint strip or flap, do not weld 6 to 8 inches (150 to 200 mm) at the pipe invert to provide relief of potential future groundwater buildup.

3.4 Application to cast-in-place concrete structures - Special requirements

3.4.1 Liner sheets shall be closely fitted and properly secured to the inner forms. Sheets shall be cut to fit curved and warped surfaces using a minimum number of separate pieces.

3.4.2 Unless otherwise shown on the plans, the lining shall be returned at least 2 inches (50 mm) at the surfaces of contact between the concrete structure and items not of

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concrete (including manhole frames, gate guides, clay pipe or brick manholes and clay or cast iron pipes). The same procedure shall be followed at joints where the type of protective lining is changed or the new work is built to join existing unlined concrete. At each return, the returned liner shall be attached to the item in contact with the plastic-lined concrete using manufactures recommendations. If the liner cannot be sealed against the item because of the joint at the return being too wide or rough or because of safety regulations contact ArmorLok for recommendations.

3.4.3 A Termination Strip of a minimum 2 keys must be installed at the lower limits of the liner unless the liner can be returned into the concrete a minimum 2 inches. (See Termination Strip Detail)

3.5 Joints in lining for cast-in-place concrete structures

Type J-1: The joint shall be made with a separate 4-inch (100 mm) joint strip and two welding strips. The 4-inch (100 mm) joint strip shall be centered over the joint, heat-sealed to the liner with the goal that all overlapping liner is bonded, an angle grinder with a sanding disk shall be used to lightly profile area where 1" welding strip will be placed to remove sheen and contaminants, then welded along each edge to adjacent sheets with a 1-inch (25 mm) wide welding strip all ends of weld strip shall be melted smooth to avoid snags. The 4-inch (100 mm) joint strip shall lap over each sheet a minimum of 1/2 inch (13 mm). It may be used at any transverse or longitudinal joint.

Type J-2: The joint shall be made by lapping sheets not less than 1/2 inch (13 mm). One 1-inch (25 mm) welding strip is required. The upstream sheet shall overlap the one downstream. The lap shall be heat-sealed with the goal that all overlapping liner is bonded, an angle grinder with a sanding disk shall be used to lightly profile area where 1" welding strip will be placed to remove sheen and contaminants prior to welding on the 1-inch (25 mm) welding strip all ends of weld strip shall be melted smooth to avoid snags.

3.6 Testing and repairing damaged surfaces

3.6.1 At the point of completion of welding where areas can be isolated and or exposure to damage can be mitigated, all surfaces covered with lining, including welds, shall be tested with an approved electrical holiday detector (Tinker & Rasor Model No. AP-W with power pack) with the instrument set between 18,000 and 22,000 volts. All welds shall be visually inspected and physically

tested by a nondestructive probing method. Personnel conducting said test shall be approved and /or trained by ArmorLok. All patches over holes, or repairs to the liner wherever damage has occurred, shall be accomplished in accordance with Paragraph 3.1.8.

4. Procurement of Materials

4.1 Placing orders

4.1.1 Materials can only be purchased by ArmorLok approved installers. Procurement by others will only be approved if an approved installer has been contracted to install the liner.

4.1.2 At time of purchase order specific project information including end owners project name and contact information are required.

4.1.3 Materials purchased are not to be resold or transferred without the explicit approval of ArmorLok.

4.1.4 ArmorLok reserves the right to deny or discontinue sale of materials based on conditions defined by ArmorLok to be detrimental to the quality of the product.

5. Training

5.1 Installation / Application

5.1.1 Training for installation of ArmorLok PVC liners will only be conducted by ArmorLok. Only after successfully completing training will a company be approved for procurement of materials. At any time during the course of a project ArmorLok reserves the right to make a sight visit to insure specifications are being met.

5.1.2 Training for the welding of the liner will only be conducted by ArmorLok. Welders successfully completing training will be issued a "Welders Certification" which is valid for a period of 2 years from the date of issue. Welders certifications are specific to the individual and are transferable between approved installation companies.

6. Product Compatibility

6.1 Similar PVC Materials

6.1.1 Shop testing has shown ArmorLok PVC liner and accessories to be compatible with similar PVC products.

6.1.2 Adhesion / Fusion to similar PVC products shall be determined on a case by case basis. Testing and acceptance of said compatibility is the sole responsibility of the project owner or his representatives.

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Warranty

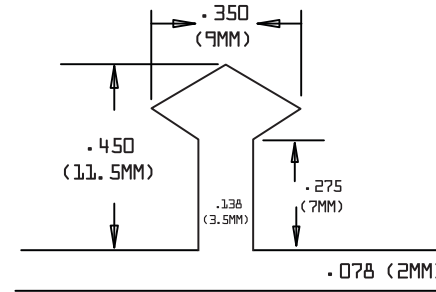
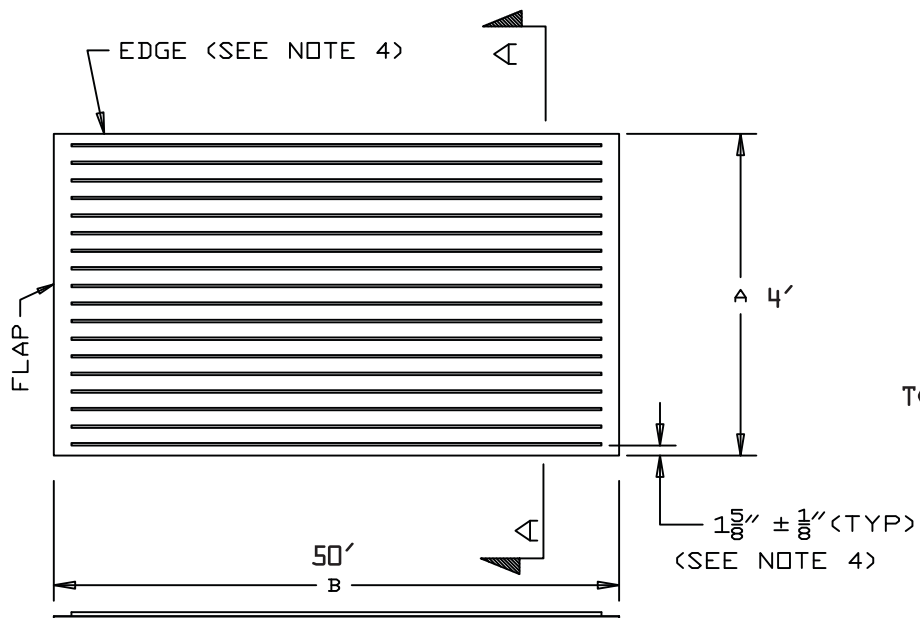
ArmorLok warrants that the product conforms to the specific description in ArmorLok trade literature as to character and quality of the raw materials, workmanship and adaptability for recommended use. Within one year from date of purchase, ArmorLok shall supply replacement material for this product or any portion thereof, or at its option equivalent material, F.O.B. ArmorLok distributing facility, if it fails to meet the foregoing warranty, provided that installation and application of the product have been properly accomplished and that ArmorLok has been promptly notified of the defect.

The preceding constitutes the sole remedy of the Buyer and the sole liability of ArmorLok for product defect.

No other express or implied warranties, whether of merchantability or of fitness for any particular purpose or use, shall apply. ArmorLok shall not be responsible for consequential damages. ArmorLok's Standard Terms and Conditions of Sale apply to purchase of this product. The product data sheet and the recommendations for usage it contains were based on test data believed to be reliable, and are intended for use by personnel having skill and know-how, at their own discretion and risk, in accordance with current industry practice and normal operating conditions. Variation in environment, changes in operating procedures or extrapolation of data may cause unsatisfactory results. **Since we have no control over the conditions or service, we expressly disclaim responsibility for the results obtained or for any consequential or incidental effects of any kind. Also refer to ArmorLok "Safety Precautions," and ArmorLok Terms and Conditions of Sale.**

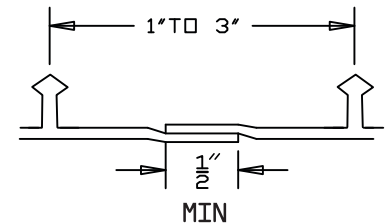
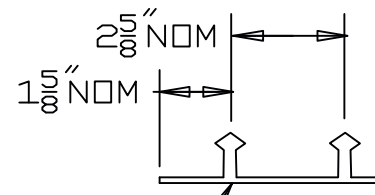
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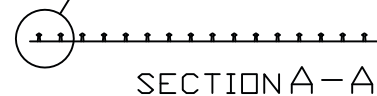


D KEY

ALL DIMENSIONS ARE NOMINAL AND ARE SUBJECT TO MANUFACTURING TOLERANCES THAT DO NOT AFFECT THE MINIMUM PERFORMANCE SPECIFICATIONS



TYPICAL LONGITUDINAL FACTORY WELD



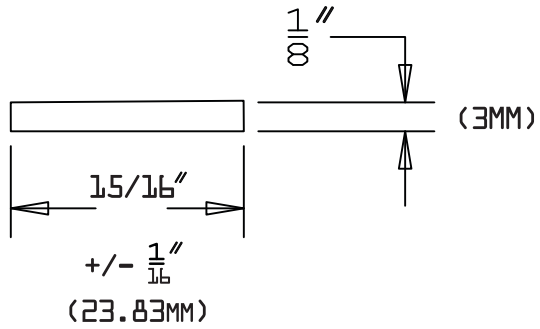
NOTES:

- 1) STANDARD SHEETS ARE 4' X 50' KEYS RUNNING LONGITUDINAL
- 2) SHEET IS EXTRUDED IN " WIDTHS +/- 1". SHEETS WITH A DIMENSION GREATER THAN " WILL HAVE ONE OR MORE LONGITUDINAL WELDS.
- 3) END FLAPS ARE FABRICATED BY REMOVING LOCKING EXTENSIONS TO WITHIN 0.035" OF THE SURFACE ON THE MAIN SHEET. LENGTH OF FLAP DEPENDS ON HOW SHEETS WILL BE USED.
- 4) WIDTH OF EDGES DEPENDS ON HOW SHEET WILL BE USED.
- 5) TOLERANCE ON DIMENSIONS A AND B IS RATIO OF +/- 1/2" FOR EACH 96 INCHES.

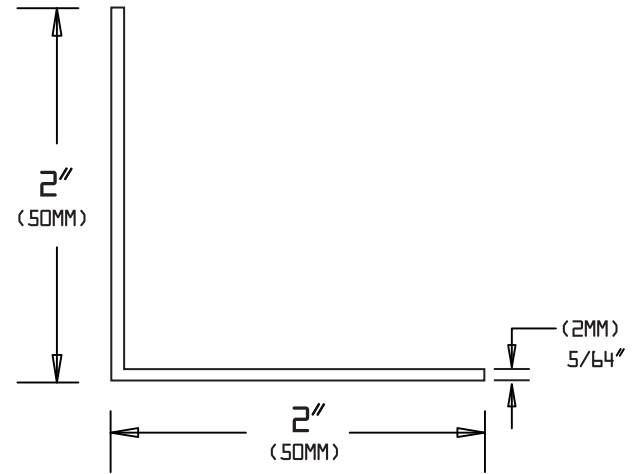
ARMORLOK PROTECTIVE LININGS

POUR IN PLACE EMBEDDED
KEYED LINER SHEET

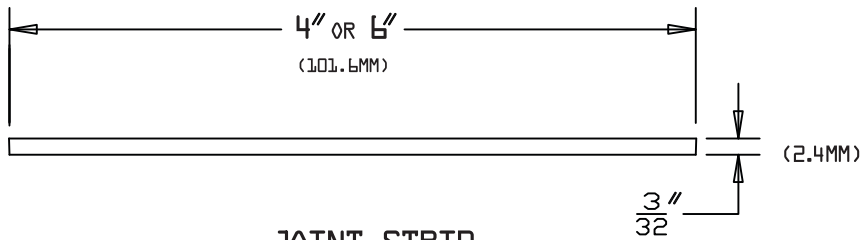
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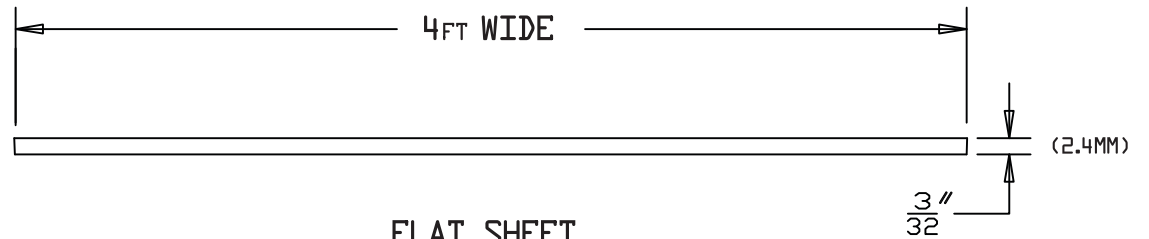
1" WELDING STRIP
(100FT ROLL)



2" X 2" CORNER STRIP
(50FT ROLL)



JOINT STRIP
(50FT ROLL)



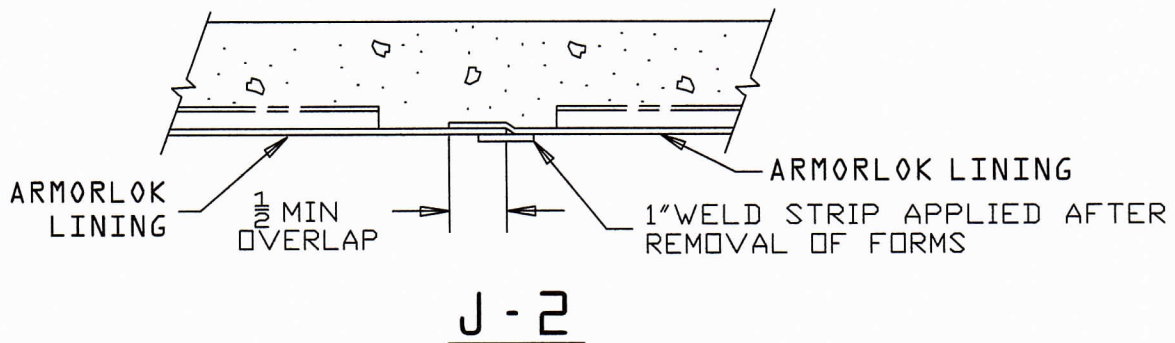
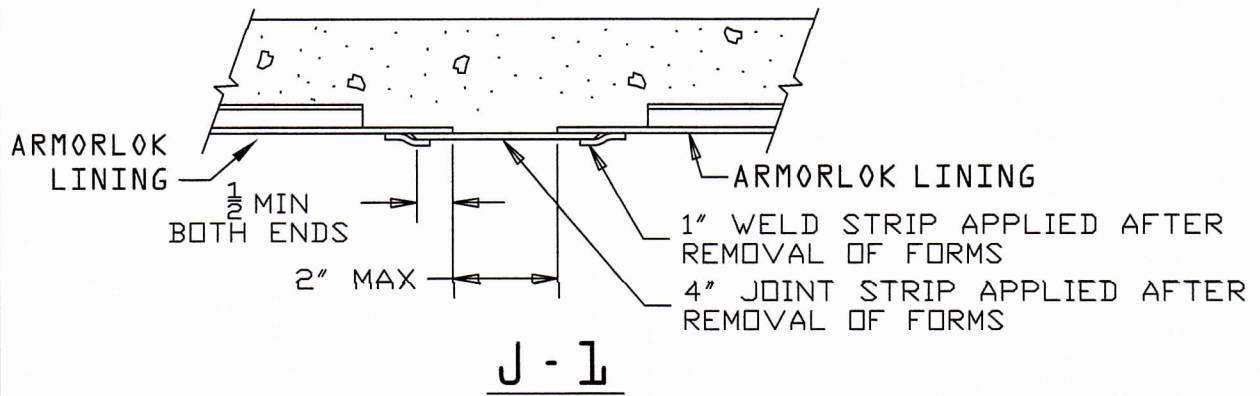
FLAT SHEET
(50FT ROLL)

NOTE: ALL DIMENSIONS ARE NOMINAL AND ARE SUBJECT TO MANUFACTURING TOLERANCES THAT DO NOT AFFECT THE MINIMUM PERFORMANCE SPECIFICATIONS

ARMORLOK PROTECTIVE LININGS

STANDARD ACCESSORIES

6.8.22

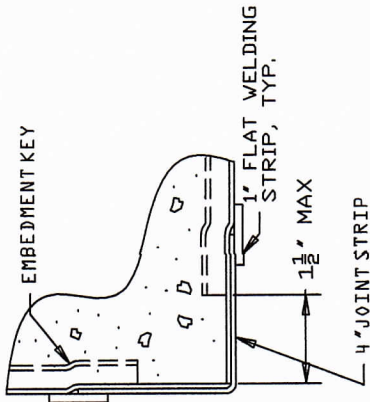


ARMORLOK PROTECTIVE LININGS

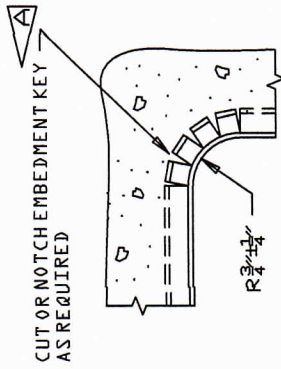
JOINTS

AK

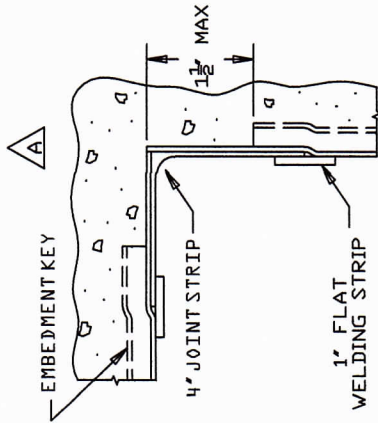
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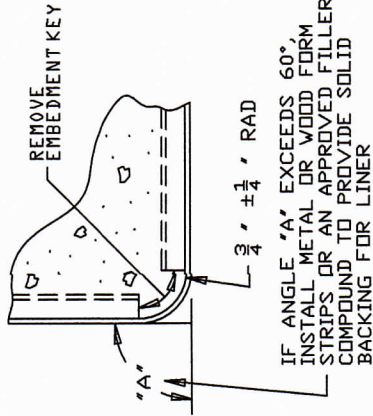
OUTSIDE CORNER



INSIDE CORNER



INSIDE CORNER



OUTSIDE CORNER

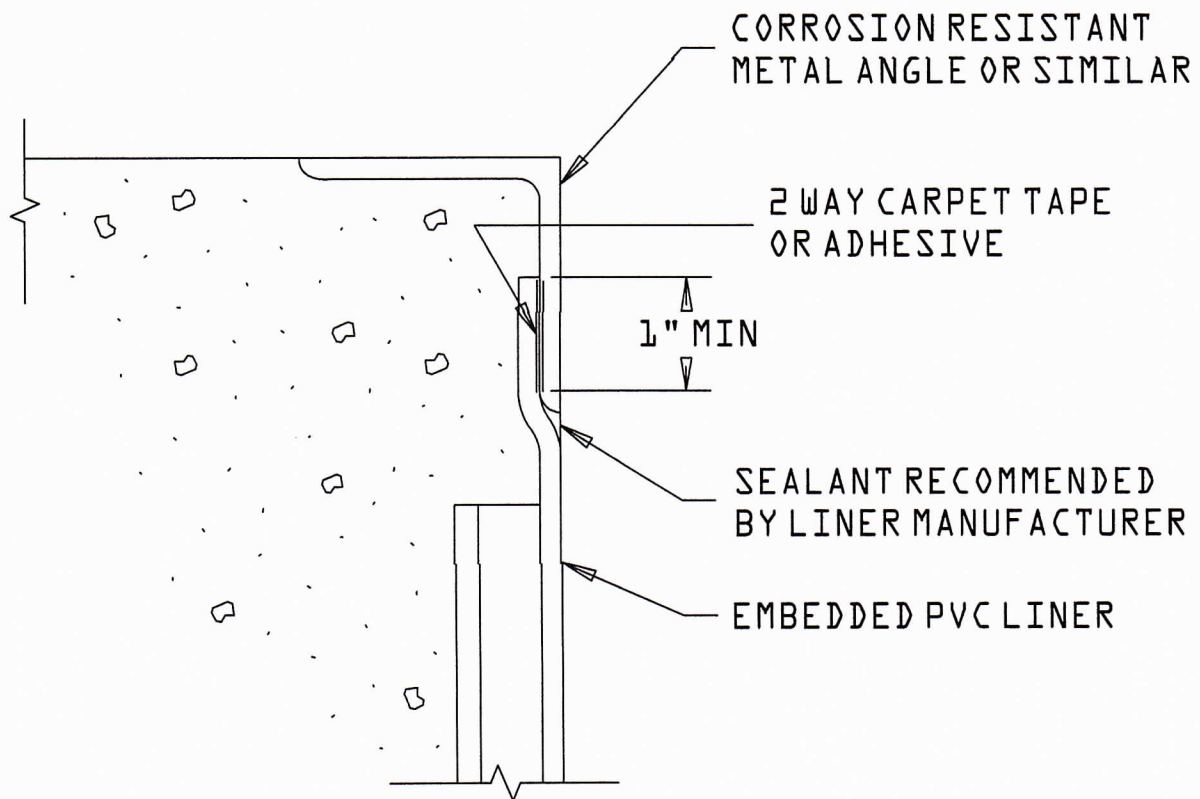
NOTES:

- A THE CUTTING, NOTCHING AND/OR REMOVAL OF EMBEDMENT KEY FROM LINER PLATE SHEETS TO BE DONE IN SUCH A MANNER SO AS NOT TO DAMAGE THE MAIN SHEET.
- B THE EMBEDMENT KEY SHALL BE REMOVED TO WITHIN 1/32" OF THE FACE OF THE MAIN SHEET.
- C) SHEET MUST BE ABOVE 50°F TO PERMIT BENDING AND HIGHER TEMPERATURES ARE RECOMMENDED TO IMPROVE HANDLING.

ARMORLOK PROTECTIVE LININGS

CORNER DETAILS

AKL - .02



ARMORLOK PROTECTIVE LININGS

TERMINATION OF LINER
AT METAL ANGLE

AK

.02

EMBEDDED PVC LINER IN
PIPE OR STRUCTURE WALL

PIPE OR
STRUCTURE WALL

SPECIAL FORMED
BOOT - MINIMUM
THICKNESS 0.065

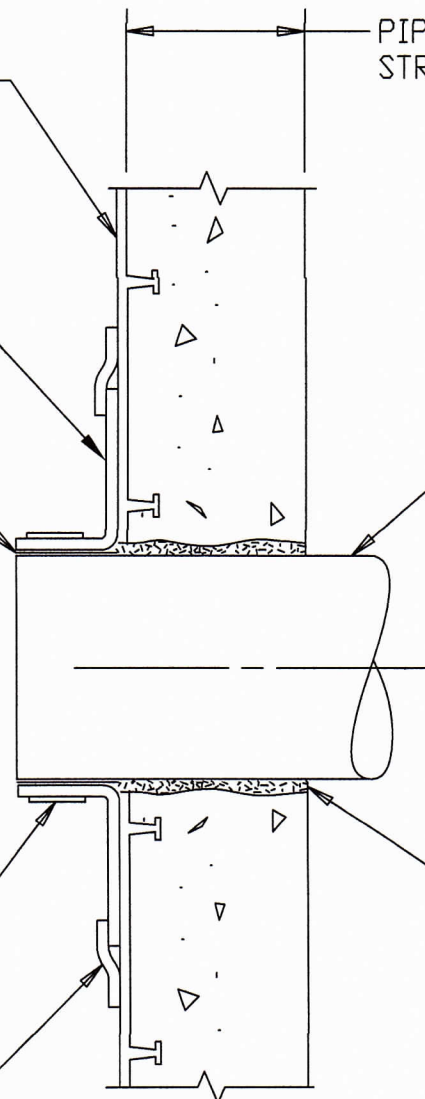
SEALANT RECOMMENDED BY
LINER MANUFACTURER

PIPE PENETRATION

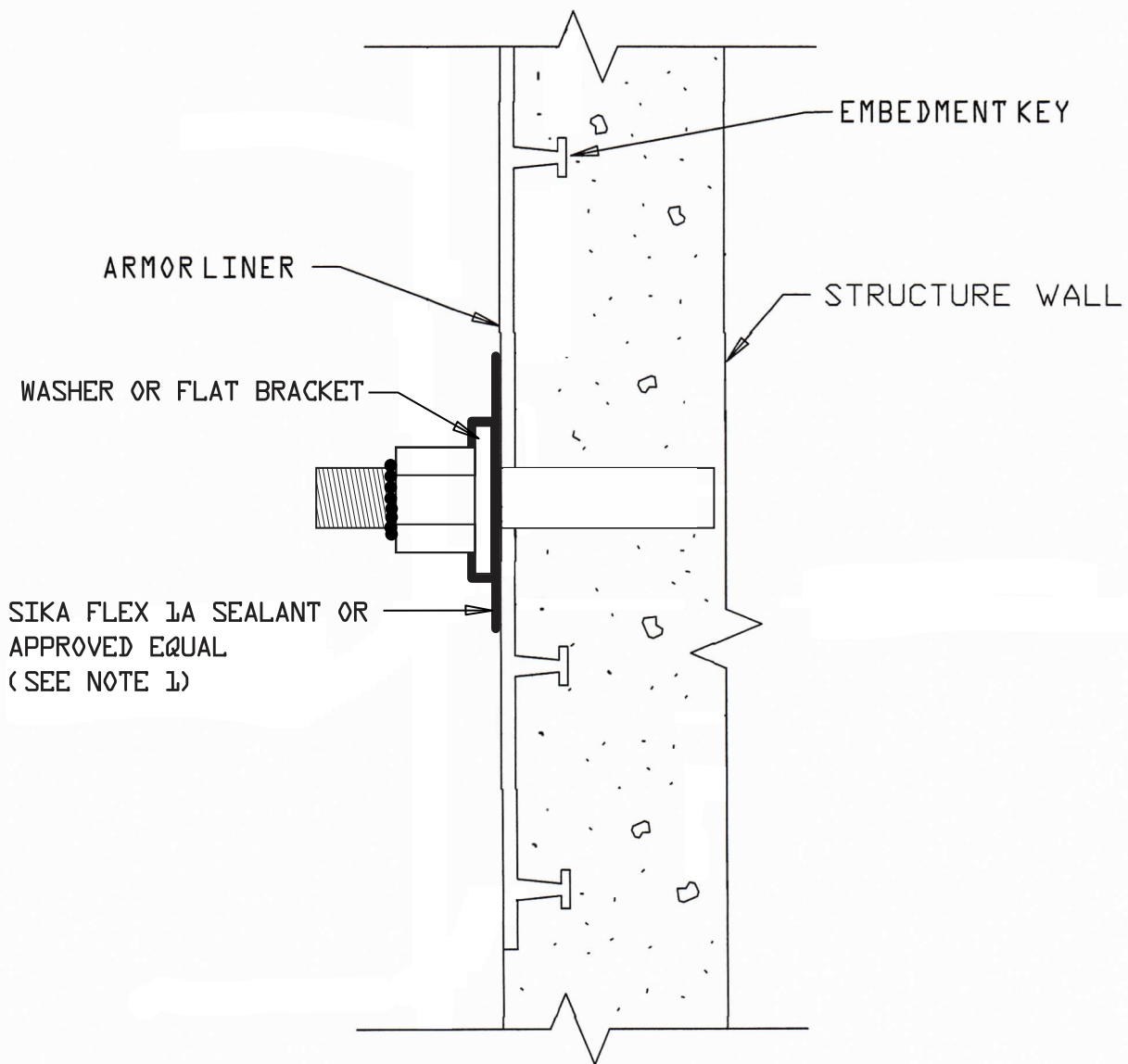
STAINLESS STEEL CLAMP
(SECURE BOOT TO PIPE
PENETRATION)

GROUT OR POUR
IN PLACE AS REQ'D

1" WELD STRIP



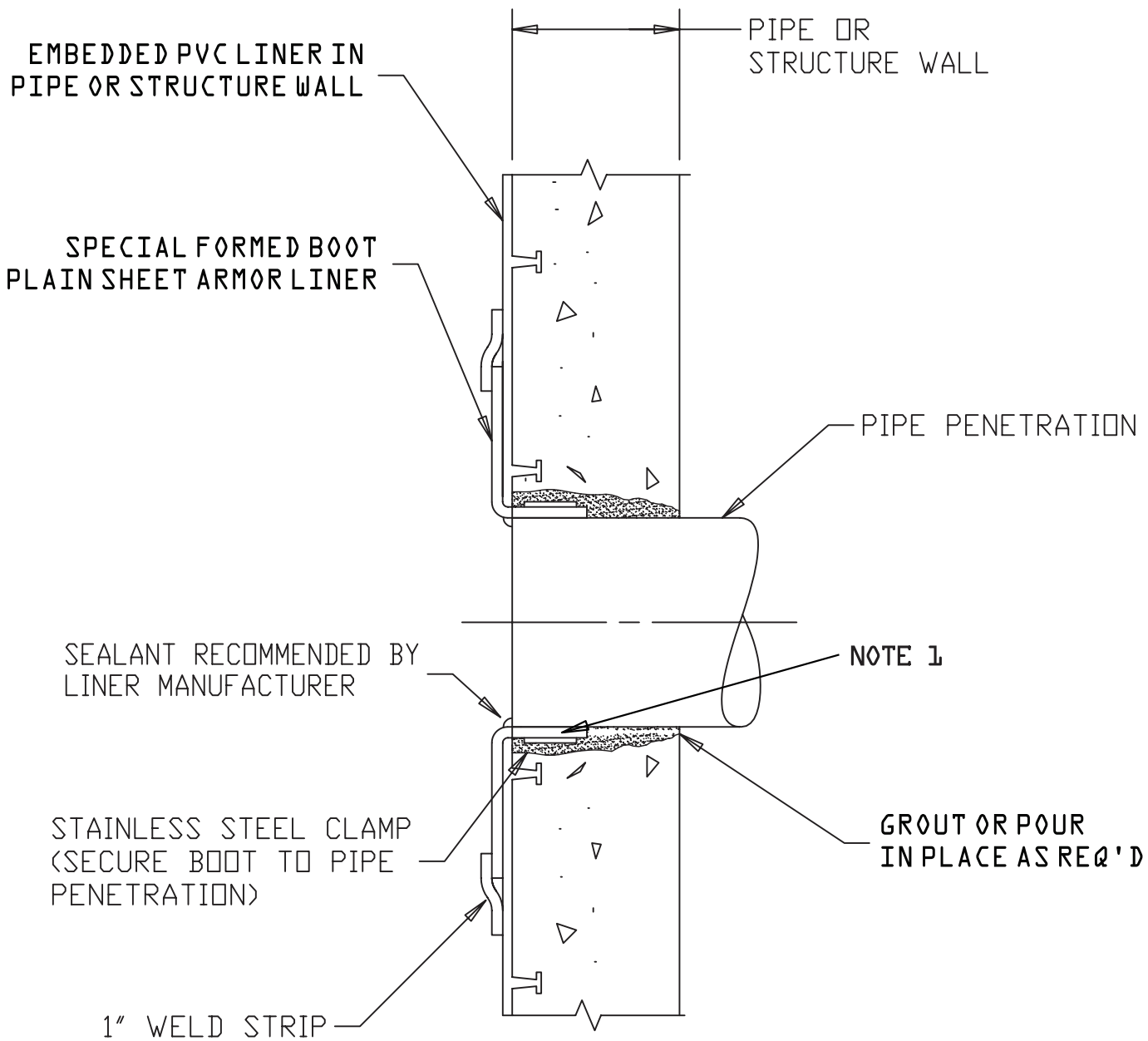
ARMORLOK PROTECTIVE LININGS	
SEALING PENETRATIONS THRU LINED WALLS TYPE 1	
<i>AK</i>	02



NOTES:

1) APPLY GENEROUS AMOUNT OF SEALANT TO BASE OF ANCHOR. INSTALL WASHER/BRACKET AND NUT WHILE SEALANT IS WET. UNIFORMLY WORK EXCESS AROUND NUT AND WASHER.

ARMORLOK PROTECTIVE LININGS	
HARDWARE PENETRATIONS	
<i>JAV</i>	.02

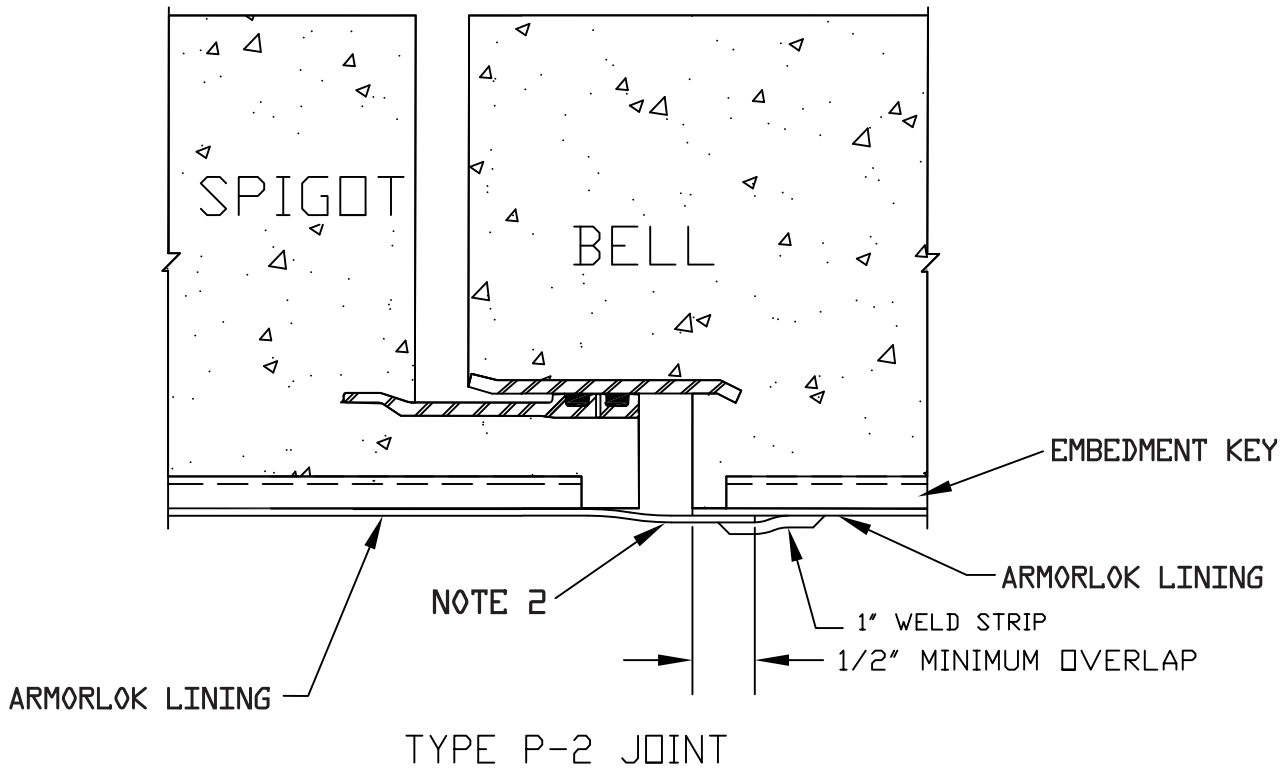
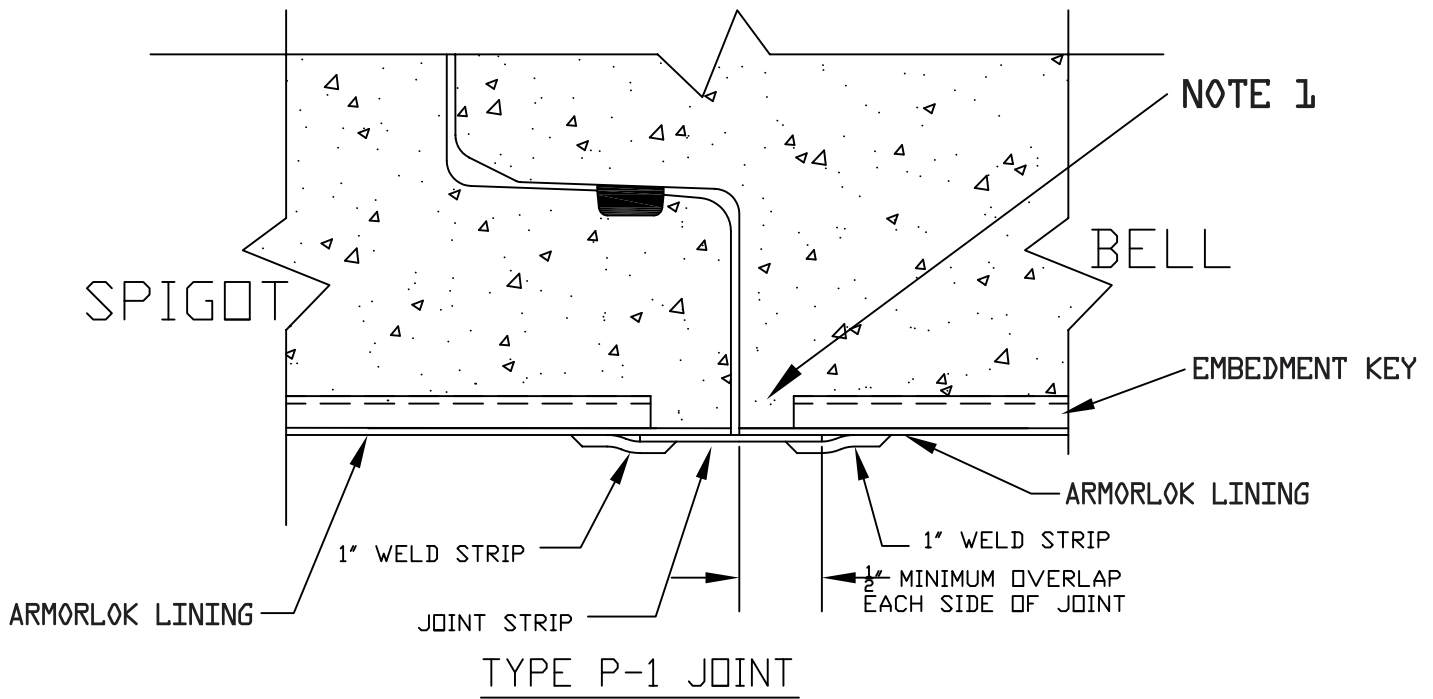


NOTES:

- 1) FOR REHABILITATION ON 24" AND ABOVE, AN 1/8" WIDE X 1 1/2" DEEP GROOVE CAN BE SAW CUT AROUND PIPE AND LINER SHEET CAN BE PUSHED INTO GROOVE ONLY IF ORIGINAL LINER ANCHORAGE IS WITHIN 2" OF THE CIRCUMFERENCE OF THE PENETRATION. SMALLER PENETRATIONS MUST BE CHIPPED OUT AND CLAMP MUST BE APPLIED

ARMORLOK PROTECTIVE LININGS

**SEALING PENETRATIONS
THRU LINED WALLS TYPE 2**



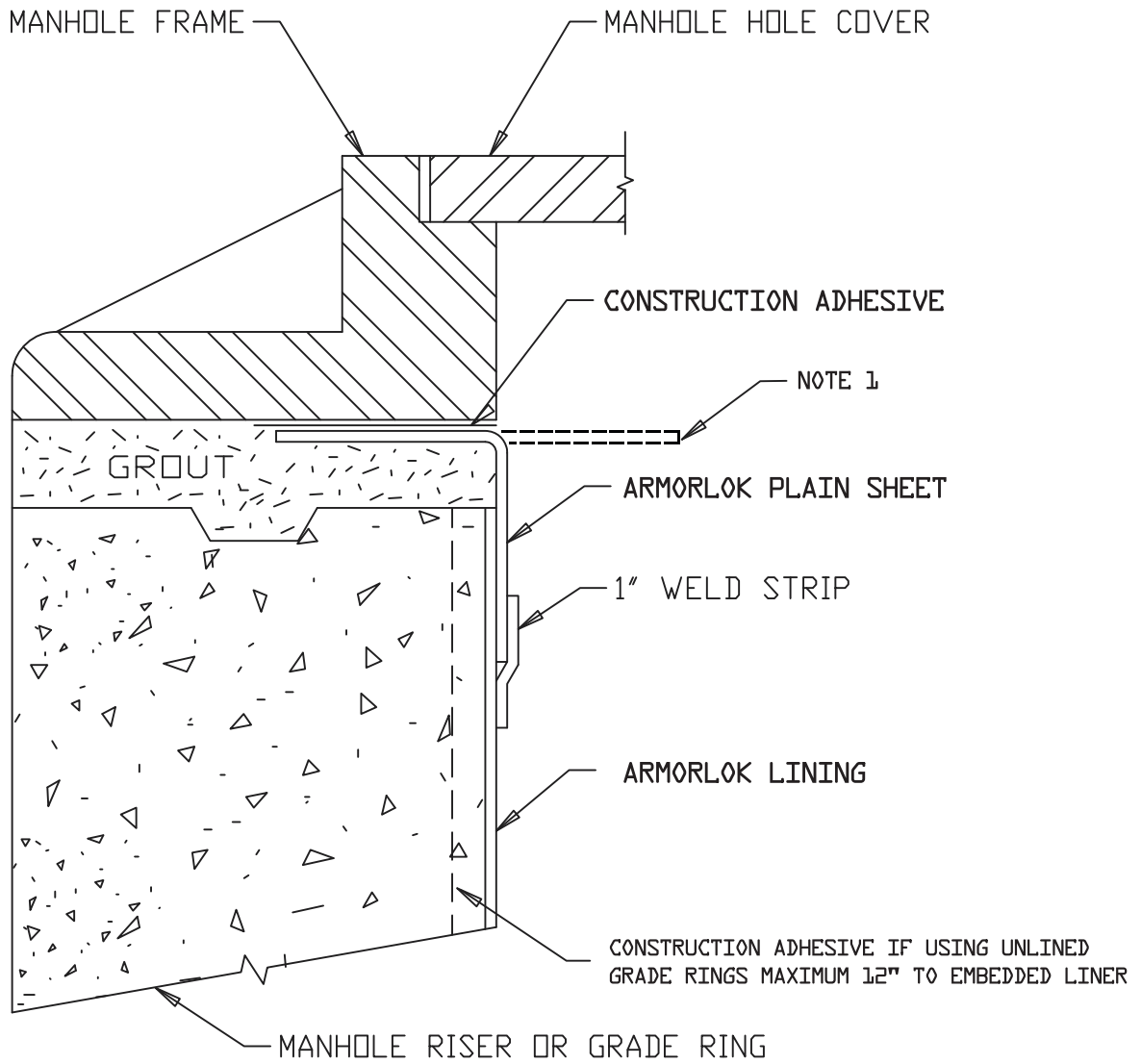
NOTES:

1) DUE TO MANUFACTURING CONSTRAINTS AND FIELD CONDITIONS OR REQUIREMENTS A MAXIMUM OF 8" IS ACCEPTABLE BETWEEN THE ENDS OF EMBEDDED LINER SHEETS ACROSS A JOINT.

2) THE FLAP ON THE TYPE P-2 JOINT MAY BE ON EITHER THE BELL OR THE SPIGOT END OF THE PIPE.

3) BOTH TYPES OF ARMORLOK JOINTS ARE SUITABLE FOR EITHER CONCRETE JOINTS OR JOINTS WITH STEEL END RINGS.

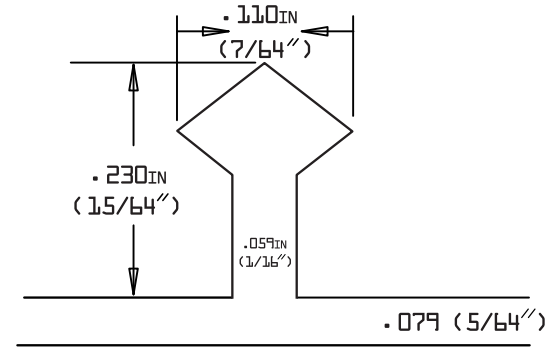
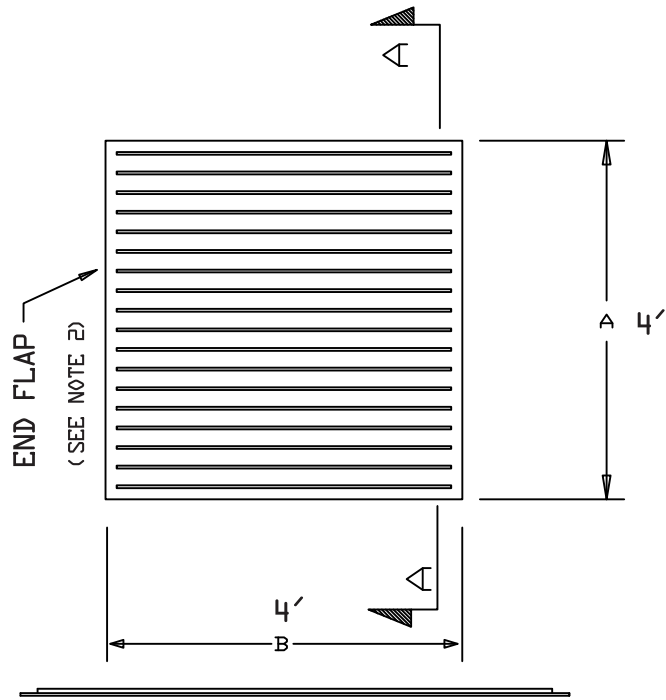
ARMORLOK PROTECTIVE LININGS	
FIELD JOINTS FOR ARMORLOK LINED PIPE	
2/7/21	<i>[Signature]</i>



NOTES:

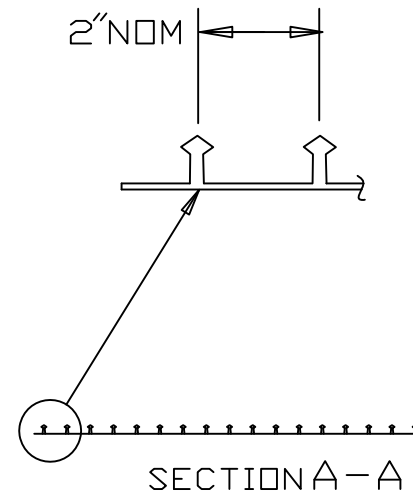
- 1) INSTALL PRIOR TO GROUTING, PLACED AT THE UPPER LIMITS OF LINER AS REQUIRED BY PROJECT SPECIFICATIONS. MINIMUM 2 INCH RETURN INTO CONCRETE

ARMORLOK PROTECTIVE LININGS	
MH-RC RETURN	
	5/19/21



MINI D KEY

ALL DIMENSIONS ARE NOMINAL AND ARE SUBJECT TO MANUFACTURING TOLERANCES THAT DO NOT AFFECT THE MINIMUM PERFORMANCE SPECIFICATIONS

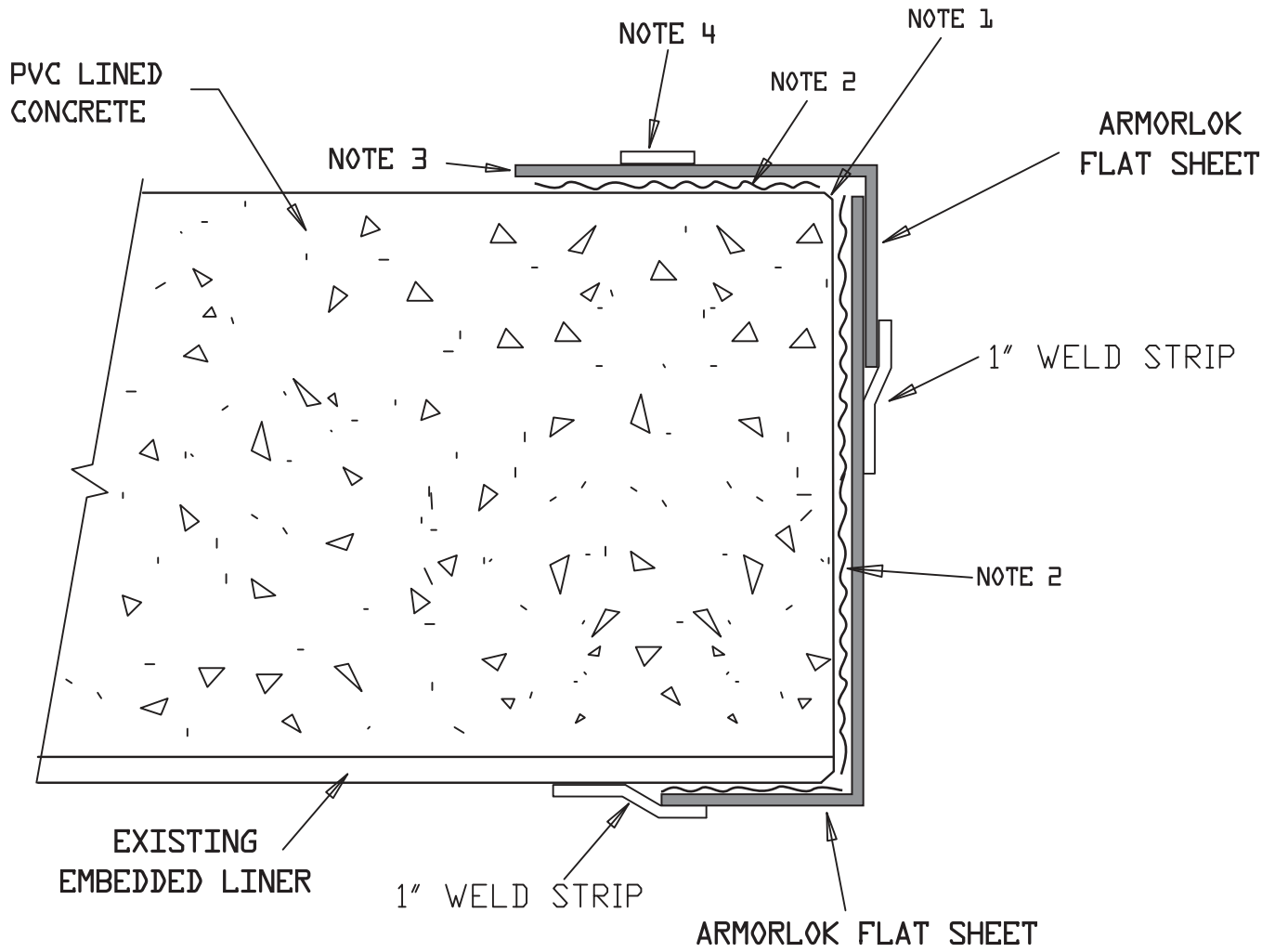


NOTES:

- 1) STANDARD SHEETS ARE 4' X 4'
- 2) END FLAPS ARE FABRICATED BY REMOVING LOCKING EXTENSIONS TO WITHIN 0.035" OF THE SURFACE ON THE MAIN SHEET. LENGTH OF FLAP DEPENDS ON HOW SHEETS WILL BE USED.

ARMORLOK PROTECTIVE LININGS

REHABILITATION MINI D
KEYED LINER SHEET



NOTES:

- 1) BEVEL SHARP EDGES
- 2) APPLY CONSTRUCTION ADHESIVE - Maximum 12" to mechanical anchorage
- 3) EXTEND LINER MIN. OF 2" INSIDE THE LIMITS OF THE INSIDE WALL OF ADJOINING STRUCTURE
- 4) EITHER STEEL BANDING AROUND PIPE OR 1/4" X 1.5" CONCRETE ANCHORS WITH 1" WASHERS AT 8" ON CENTER FOR FLAT SURFACES

ARMORLOK PROTECTIVE LININGS	
PVC LINER RETURN INTO ADJOINING STRUCTURES	

J-1 (REHAB)

EXISTING LINER

NOTE 1

1/2 INCH MIN
OVERLAP BOTH SIDES

1 INCH WELD STRIP

NOTE 2

J-2 (REHAB)

PATCH

NOTES
1 & 2

NOTES
1 & 2

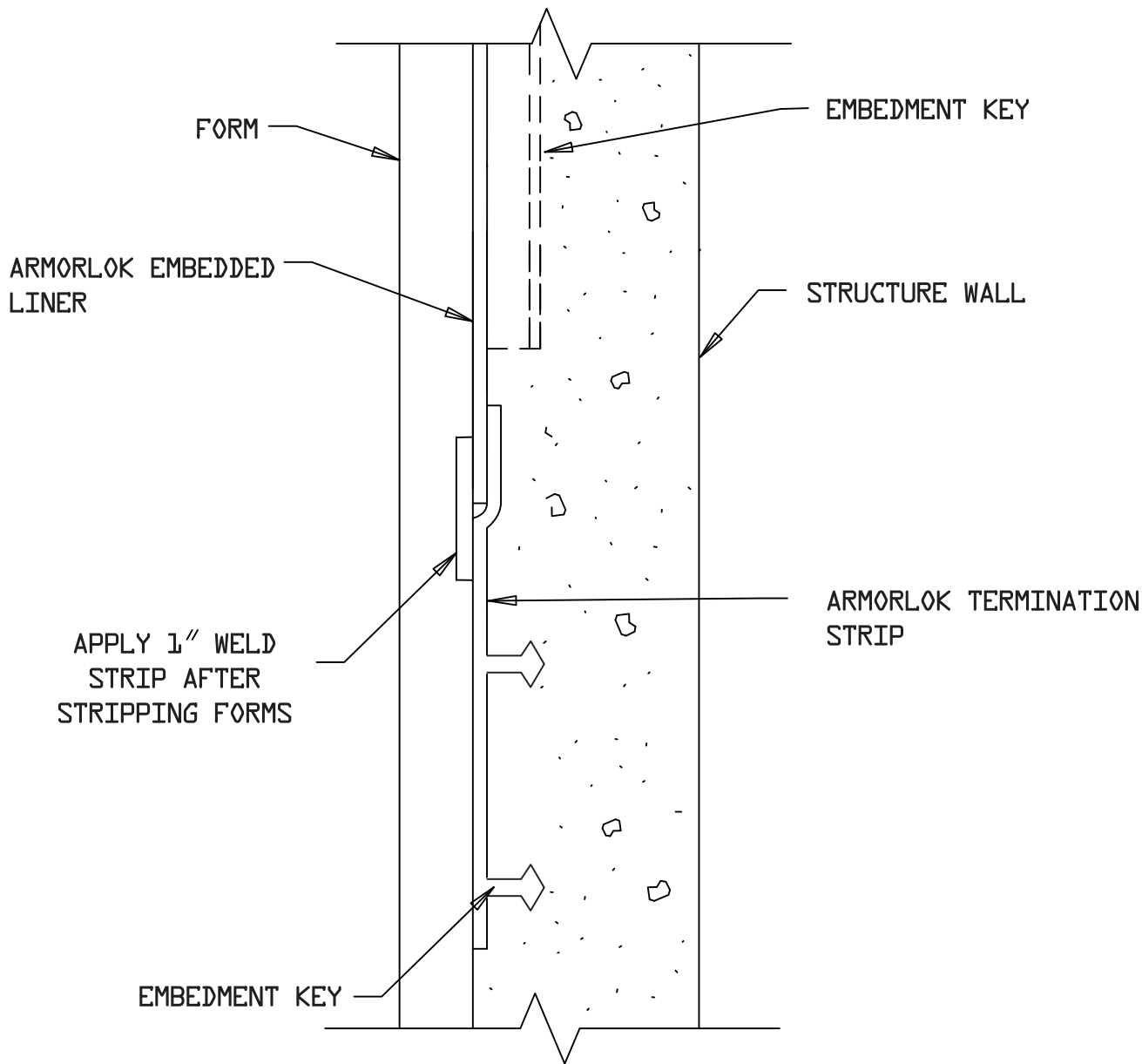
NOTES:

- 1) REMOVE DAMAGED LINER AND SUBSTRATE AND REPAIR IF REQUIRED BY ENGINEER
- 2) LIGHTLY ABRADE EXISTING LINER TO THE LIMITS OF THE NEW ARMORLOK PLAIN SHEET TO REMOVE CONTAMINANTS. INSTALL PLAIN SHEET OVER REPAIR AREA AND WELD TO MEET ARMORLOK SPECIFICATIONS. MAXIMUM SIZE 12 INCH TO ORIGINAL LINER ANCHORAGE. For larger areas the ShieldLok epoxy mastic system must be applied. (see website for product information)

ARMORLOK PROTECTIVE LININGS

REHAB JOINTS

8/24/23



NOTE:

TERMINATION STRIP IS ONLY REQUIRED ON VERTICAL WALLS WHEN THE LOWER LIMITS OF THE LINER ARE ABOVE THE FLOOR. WHERE IT IS PRACTICAL TO EXTEND LOWER LIMITS OF THE LINER TO A MINIMUM OF 2" BELOW THE FLOOR OR INFILL NO TERMINATION STRIP IS REQUIRED

ARMORLOK PROTECTIVE LININGS	
TERMINATION STRIP ON VERTICAL WALLS	
	11/27/23