



ATLANTIC CONCRETE PRODUCTS, INC.

PO Box 129, 8900 Old Route 13, Tullytown PA 19007-7129 • Tel (215) 945-5600 Fax (215) 946-3102

Find this catalog and more on our website.

www.AtlanticConcrete.com



ATLANTIC
CONCRETE PRODUCTS, INC.

Quality Concrete Products

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- Whats New
- Customer Resources
- Employee Resources
- Employment Opps.
- Affiliates
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Mission Statement
We are a leading manufacturer of innovative, quality, Precast Concrete Products, servicing our customers in the stormwater, wastewater and transportation industries.

Our Vision
We are dedicated to providing a profitable future for all stakeholders by utilizing unmatched leadership, innovative technology, skilled employees, quality concrete products, and customer service that will place our company as the Precast Concrete industry leader.

Email: staff@atlanticconcrete.com



NPCC
CERTIFIED PLANT





ATLANTIC CONCRETE PRODUCTS, INC.

PO Box 129, Tullytown PA 19007-7129

Dear Sir or Madam,

I would like to introduce the individuals in our company who can be of assistance to you. Their positions, phone numbers and fax numbers are as follows:

Sales and Service:

(215) 945-5600

(215) 946-3102 FAX

Jerry Donahue Sales Manager

Barry Sullivan Sales Representative

Production and Deliveries:

(215) 945-4990

(215) 945-9336 FAX

Bill Watson Production Manager

Ken Van Bramer Shipping Manager

Chris Long Production Administrator

Accounts Receivable / Credit and Collections:

(215) 945-5600

(215) 945-5016 FAX

Steve Schlussel Billing Administrator

Our street address is 8900 Old Route 13 (Bristol Pike), Tullytown PA 19007-0098

Respectfully Yours,

ATLANTIC CONCRETE PRODUCTS, INC.

Gerald J Donahue

Sales Manager

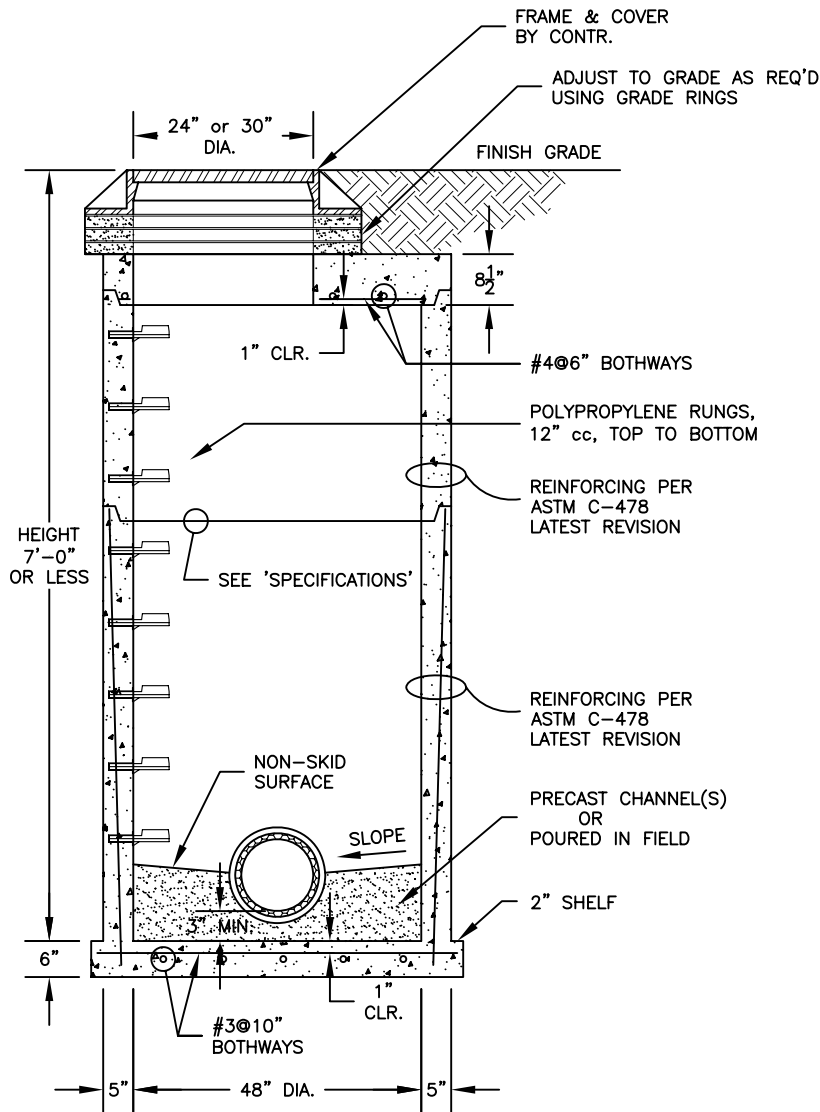


NPCA
CERTIFIED PLANT

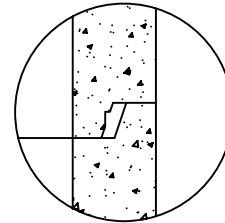


SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE MANHOLE IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-478, "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
- THE REINFORCED CONCRETE STRUCTURE IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME AND COVER BY OTHERS).
- A-LOK GASKETS ARE DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-923, "RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE MANHOLE STRUCTURES AND PIPES."
- THE REINFORCED CONCRETE BASE SLAB IS DESIGNED FOR A MAXIMUM DEPTH OF 25 FT (DEPTH = F.G. TO TOP OF BASE SLAB).

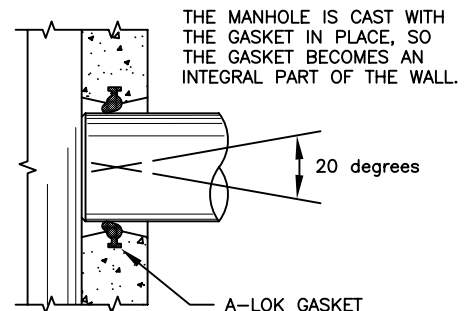


SECTION VIEW
NOT TO SCALE



SEAL WITH BUTYL RUBBER (ASTM C-990) OR D-LOK RUBBER GASKET (ASTM C-443)

TYPICAL JOINT SECTION
NOT TO SCALE



A-LOK (TYP.) SECTION
NOT TO SCALE

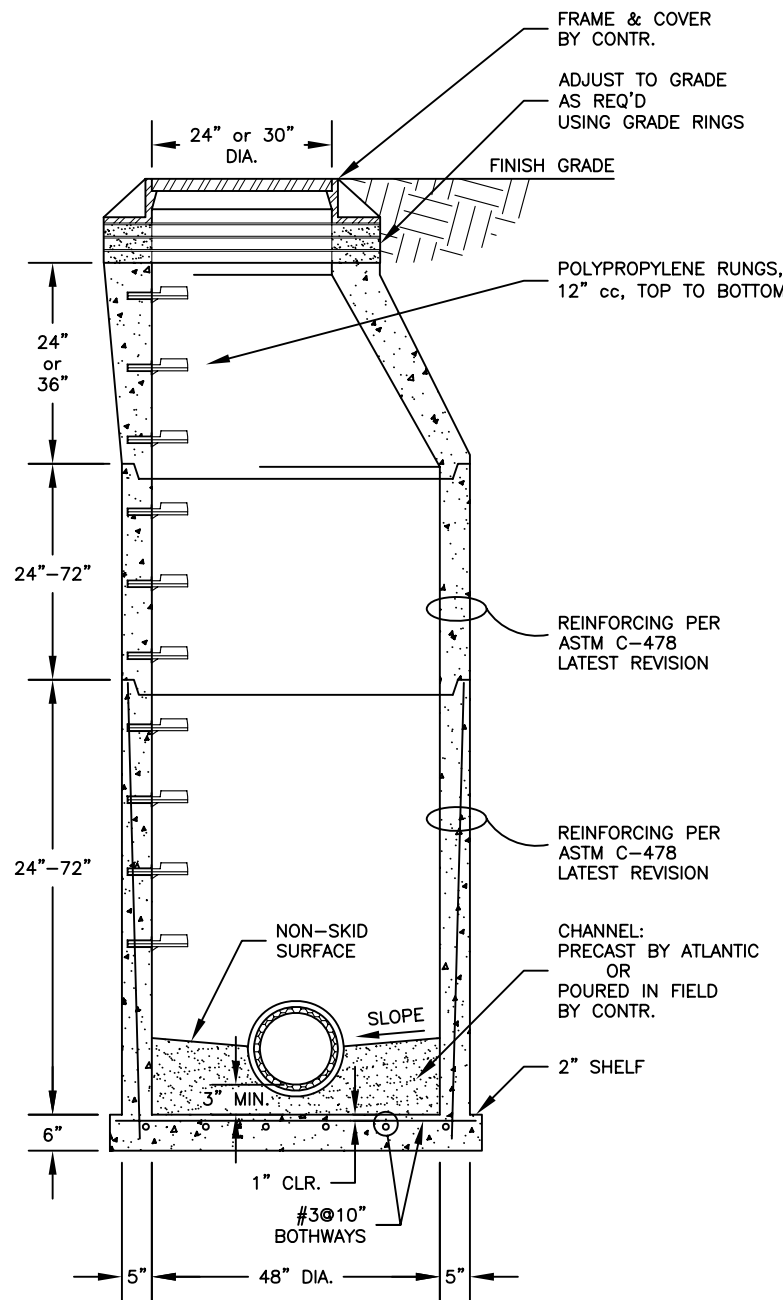


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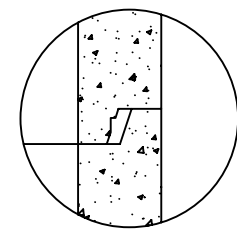
SHALLOW MANHOLE (4-FT DIA.) WITH A-LOK SEAL

NOTE:
FOR MANHOLES WITH A HEIGHT
OF LESS THAN 10 FT,
THE TOP CONE MAY BE
REPLACED WITH A TOP SLAB.

- SPECIFICATIONS:**
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 - THE REINFORCED BASE SLAB IS DESIGNED FOR A MAXIMUM DEPTH OF 20 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
 - A-LOK GASKETS ARE DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-923, "RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE MANHOLE STRUCTURES AND PIPES."

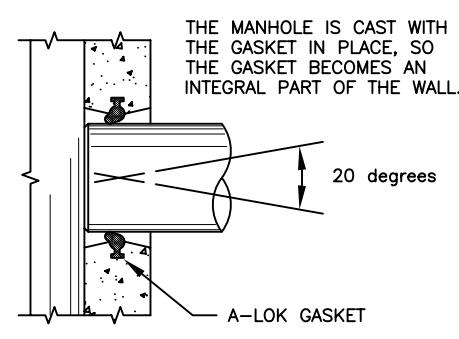


SECTION VIEW
NOT TO SCALE



SEAL WITH
BUTYL RUBBER
(ASTM C-990)
OR
D-LOK RUBBER GASKET
(ASTM C-443)

TYPICAL JOINT SECTION
NOT TO SCALE



A-LOK (TYP.) SECTION
NOT TO SCALE



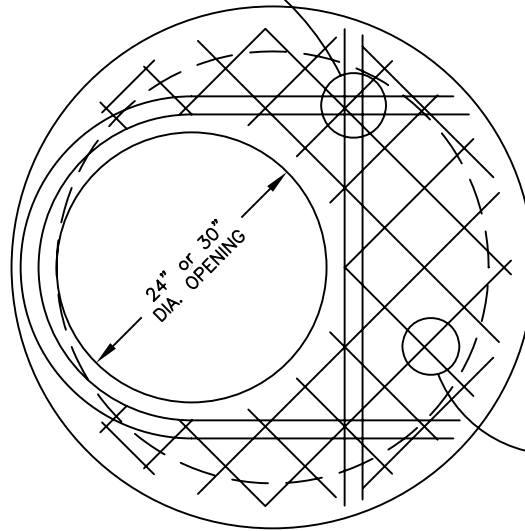
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**48" DIA. MANHOLE
WITH A-LOK SEAL**
(RECOMMENDED FOR PIPE SIZES 4"-18")
(THIS DIAMETER RECOMMENDED FOR MANHOLES UP TO 15 FT IN DEPTH)

SPECIFICATIONS:

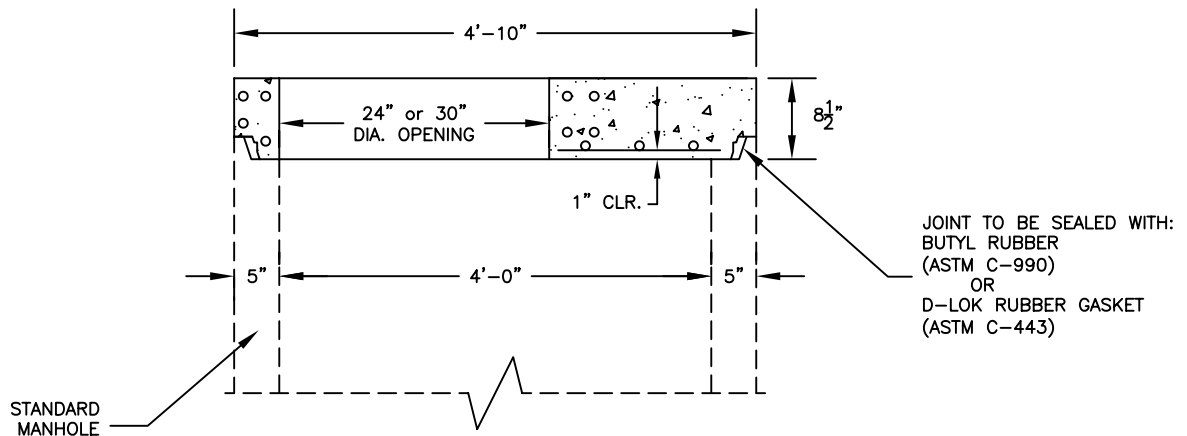
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(2) #4 AROUND OPENING,
TOP AND BOTTOM (TYP.)



#4@6" BOTHWAYS

PLAN VIEW
NOT TO SCALE



JOINT TO BE SEALED WITH:
BUTYL RUBBER
(ASTM C-990)
OR
D-LOK RUBBER GASKET
(ASTM C-443)

STANDARD
MANHOLE

CROSS SECTION
NOT TO SCALE

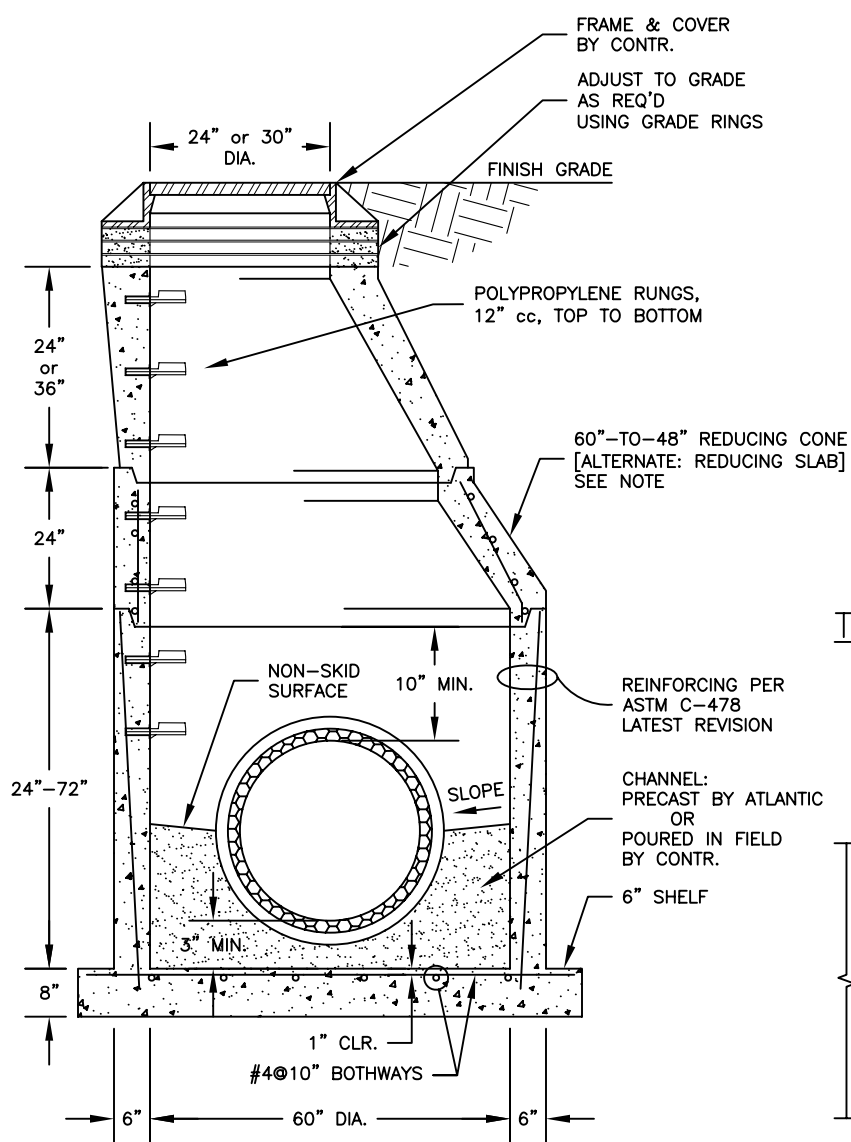


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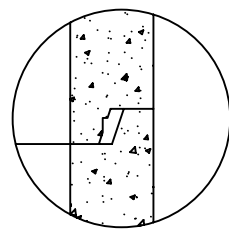
TOP SLAB
48" DIA. MANHOLE

NOTE:
FOR MANHOLES WITH A HEIGHT
OF LESS THAN 10 FT,
THE TOP CONE MAY BE
REPLACED WITH A TOP SLAB.

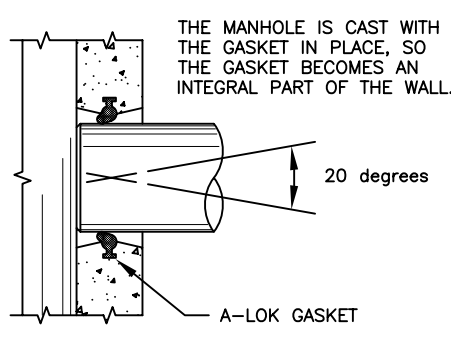
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 - THE REINFORCED BASE SLAB IS DESIGNED FOR A MAXIMUM DEPTH OF 30 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
 - A-LOK GASKETS ARE DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-923, "RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE MANHOLE STRUCTURES AND PIPES."



SECTION VIEW
NOT TO SCALE



TYPICAL JOINT SECTION
NOT TO SCALE



A-LOK (TYP.) SECTION
NOT TO SCALE



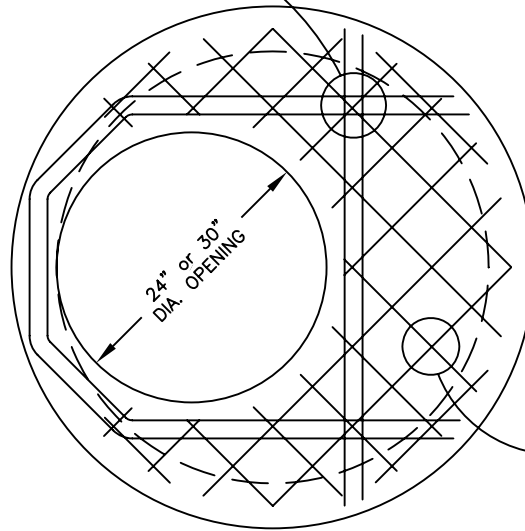
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**60" DIA. MANHOLE
WITH A-LOK SEAL**
(RECOMMENDED FOR PIPE SIZES 20"-30")
(MINIMUM DIAMETER RECOMMENDED FOR MANHOLES OVER 15 FT IN DEPTH)

SPECIFICATIONS:

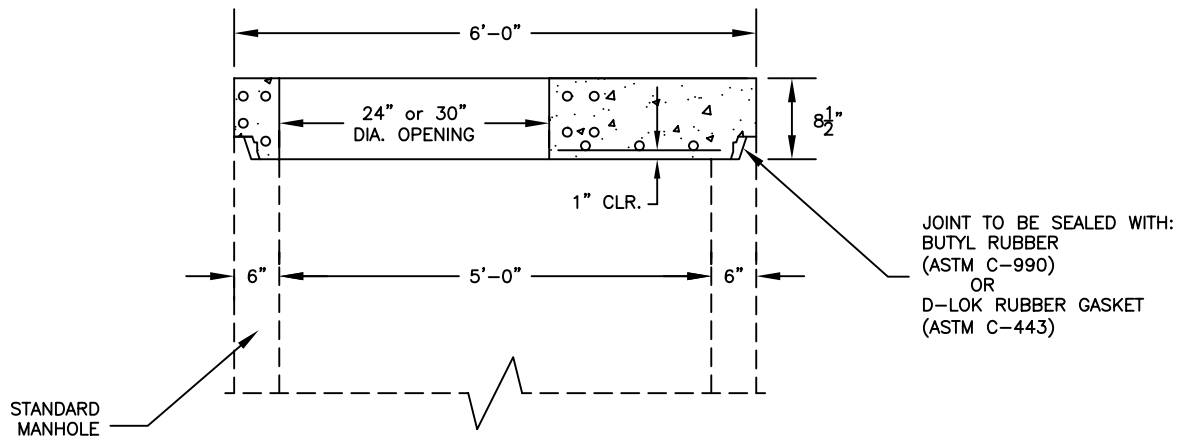
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(2) #4 AROUND OPENING,
TOP AND BOTTOM (TYP.)



#6@9" BOTHWAYS

PLAN VIEW
NOT TO SCALE



CROSS SECTION
NOT TO SCALE

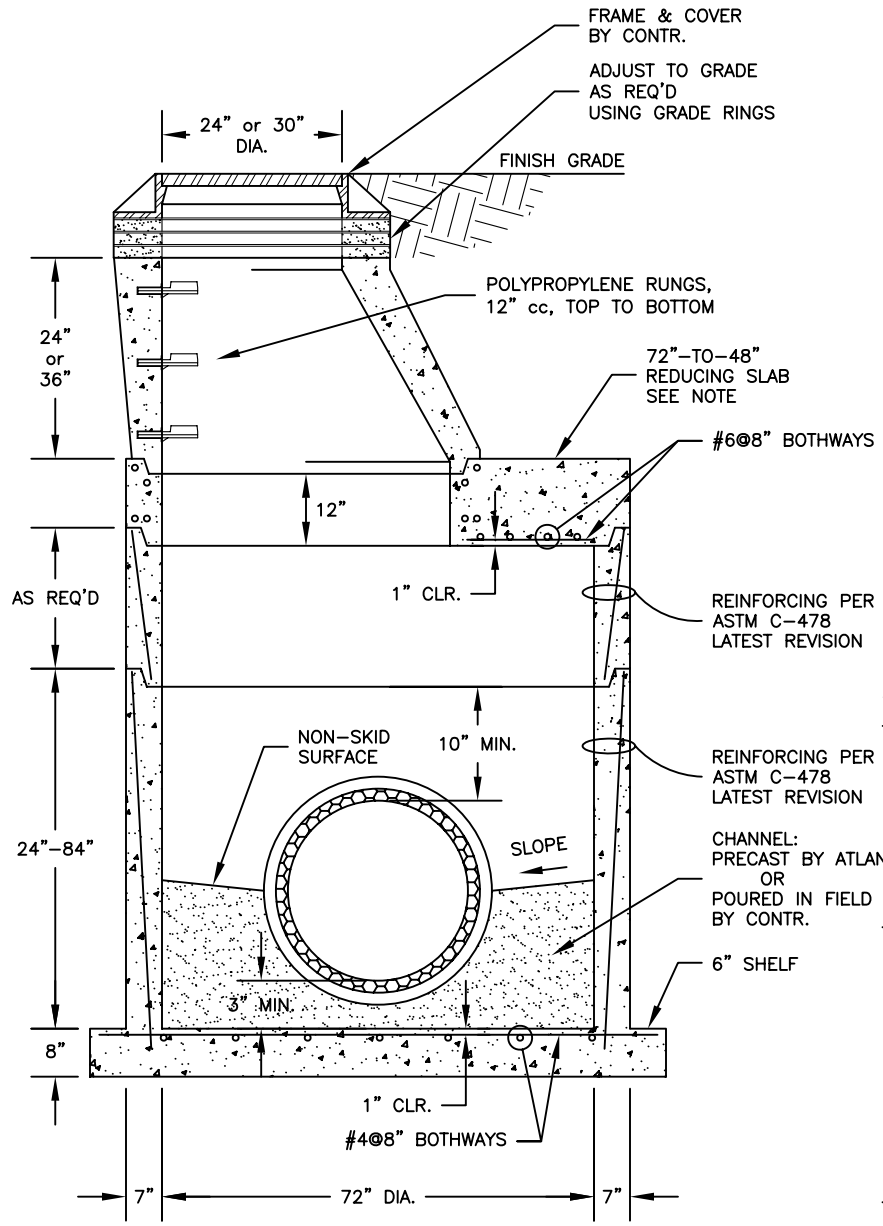


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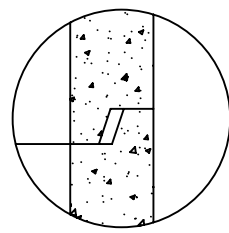
TOP SLAB
60" DIA. MANHOLE

NOTE:
FOR MANHOLES WITH A HEIGHT
OF LESS THAN 10 FT,
THE TOP CONE MAY BE
REPLACED WITH A TOP SLAB.

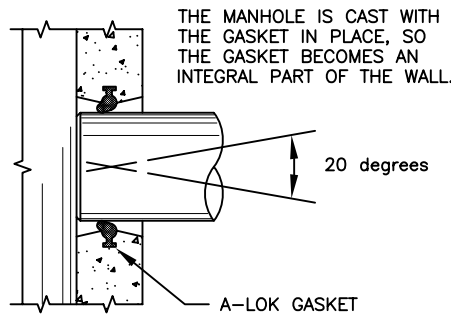
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 - THE REINFORCED BASE SLAB IS DESIGNED FOR A MAXIMUM DEPTH OF 30 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
 - THE REINFORCED CONCRETE REDUCING SLAB IS DESIGNED FOR A MAXIMUM EARTH COVER OF 20 FT (EARTH COVER = F.G. TO TOP OF REDUCING SLAB).
 - A-LOK GASKETS ARE DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-923, "RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE MANHOLE STRUCTURES AND PIPES."



SECTION VIEW
NOT TO SCALE



TYPICAL JOINT SECTION
NOT TO SCALE



A-LOK (TYP.) SECTION
NOT TO SCALE



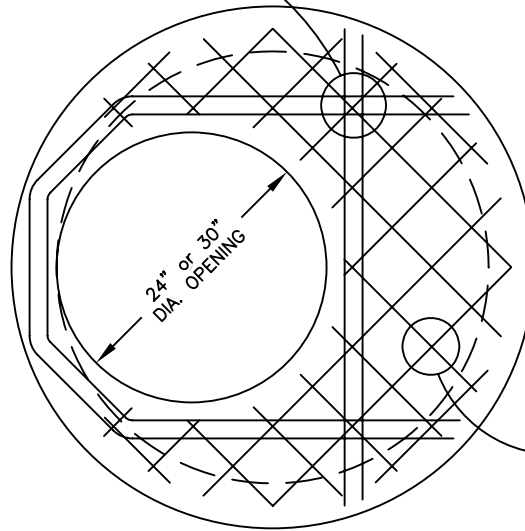
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72" DIA. MANHOLE
WITH A-LOK SEAL
(RECOMMENDED FOR PIPE SIZES 33"-36")

SPECIFICATIONS:

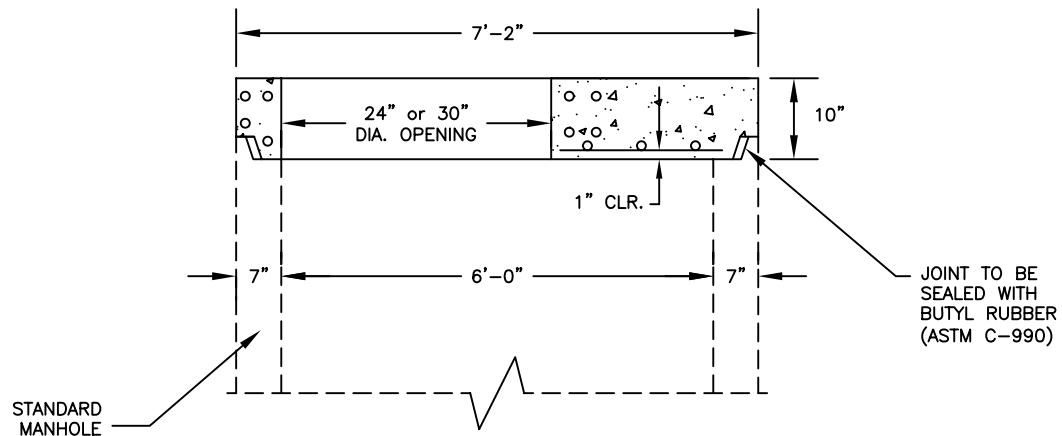
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- THE REINFORCED CONCRETE STRUCTURE IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME AND COVER BY OTHERS).

(2) #4 AROUND OPENING,
TOP AND BOTTOM (TYP.)



#6@8" BOTHWAYS

PLAN VIEW
NOT TO SCALE



CROSS SECTION
NOT TO SCALE



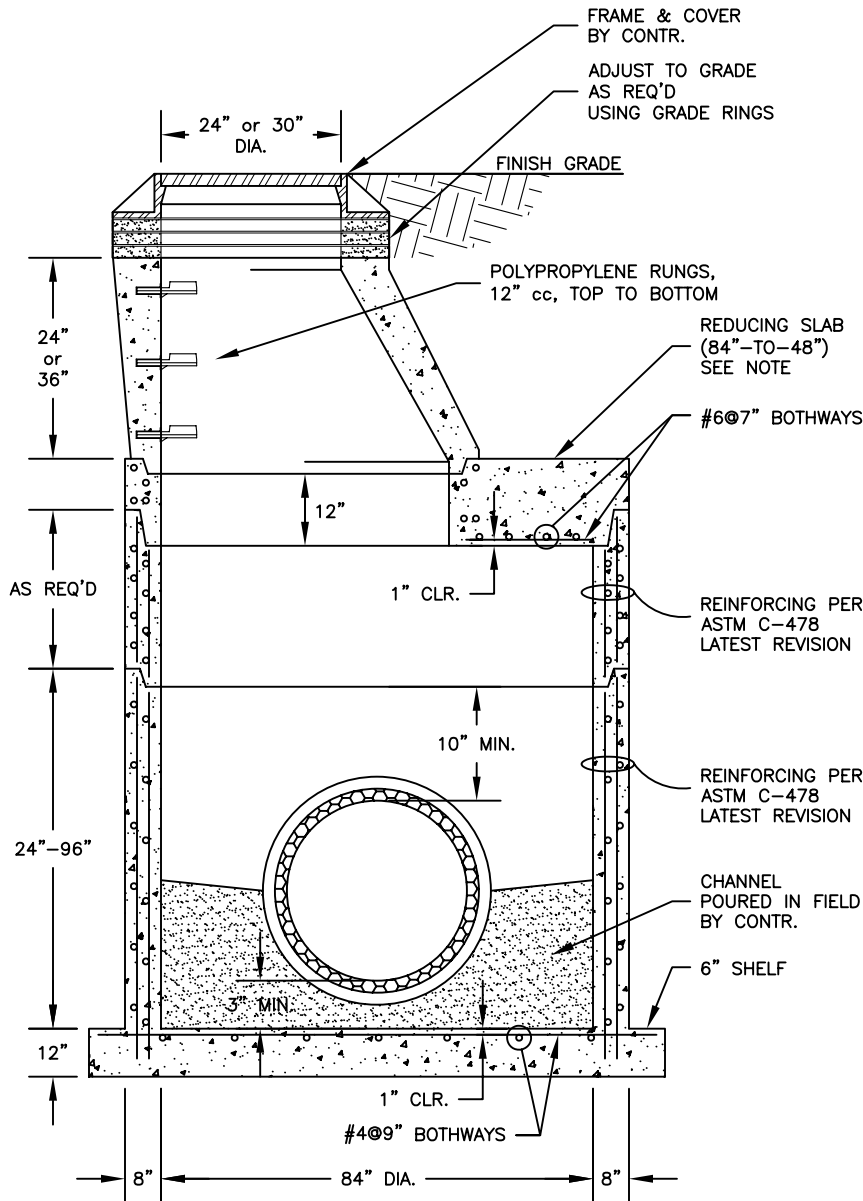
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TOP SLAB
72" DIA. MANHOLE

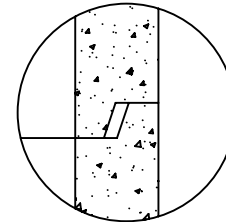
NOTE:
FOR MANHOLES WITH A HEIGHT
OF LESS THAN 10 FT,
THE TOP CONE MAY BE
REPLACED WITH A TOP SLAB.

SPECIFICATIONS:

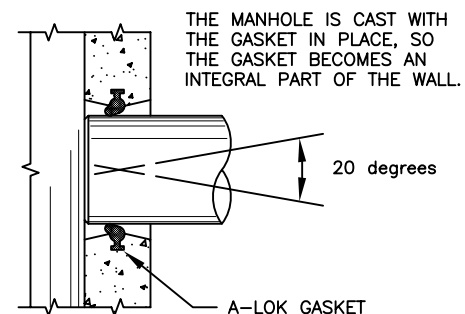
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- THE REINFORCED BASE SLAB IS DESIGNED FOR A MAXIMUM DEPTH OF 30 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- THE REINFORCED CONCRETE REDUCING SLAB IS DESIGNED FOR A MAXIMUM EARTH COVER OF 10 FT (EARTH COVER = F.G. TO TOP OF REDUCING SLAB).
- A-LOK GASKETS ARE DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-923, "RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE MANHOLE STRUCTURES AND PIPES."



SECTION VIEW
NOT TO SCALE



TYPICAL JOINT SECTION
NOT TO SCALE



A-LOK (TYP.) SECTION
NOT TO SCALE



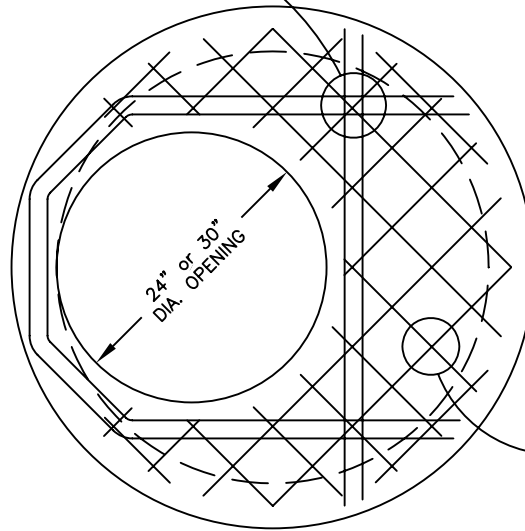
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84" DIA. MANHOLE
WITH A-LOK SEAL
(RECOMMENDED FOR PIPE SIZES 42"-48")

SPECIFICATIONS:

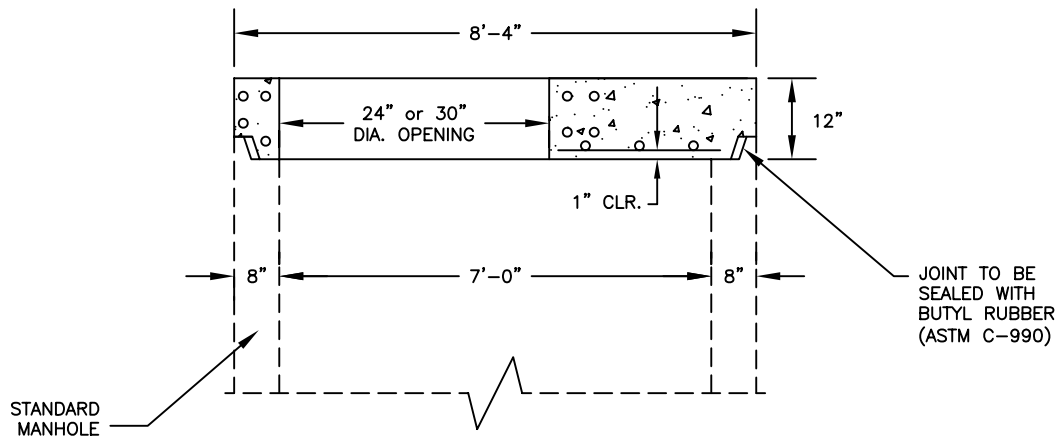
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(2) #4 AROUND OPENING,
TOP AND BOTTOM (TYP.)



#6@8" BOTHWAYS

PLAN VIEW
NOT TO SCALE



STANDARD
MANHOLE

JOINT TO BE
SEALED WITH
BUTYL RUBBER
(ASTM C-990)

CROSS SECTION
NOT TO SCALE

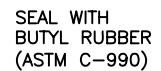
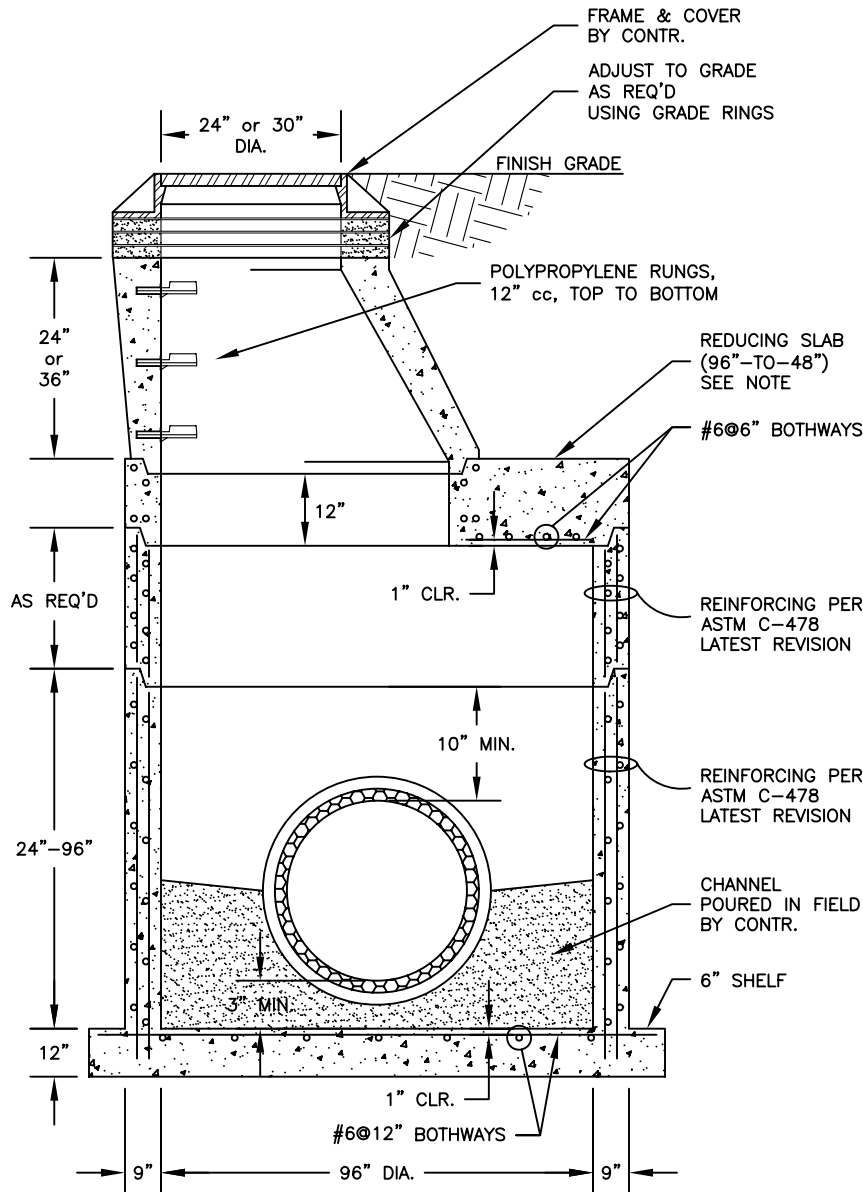


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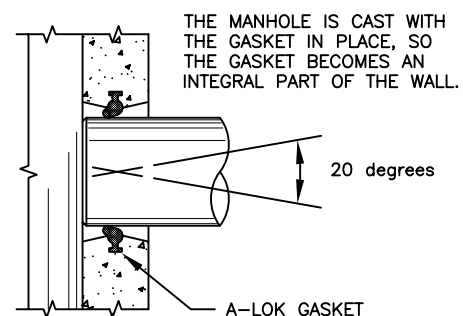
TOP SLAB
84" DIA. MANHOLE

NOTE:
FOR MANHOLES WITH A HEIGHT
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THE TOP CONE MAY BE
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- A-LOK GASKETS ARE DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-923, "RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE MANHOLE STRUCTURES AND PIPES."



TYPICAL JOINT SECTION
NOT TO SCALE



A-LOK (TYP.) SECTION
NOT TO SCALE



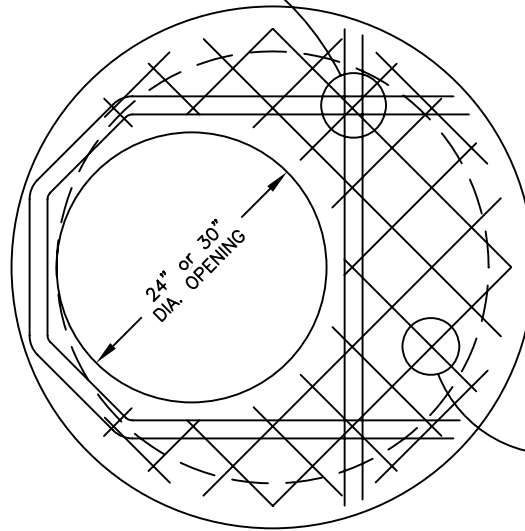
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96" DIA. MANHOLE
WITH A-LOK SEAL
(RECOMMENDED FOR PIPE SIZES 54"-60")

SPECIFICATIONS:

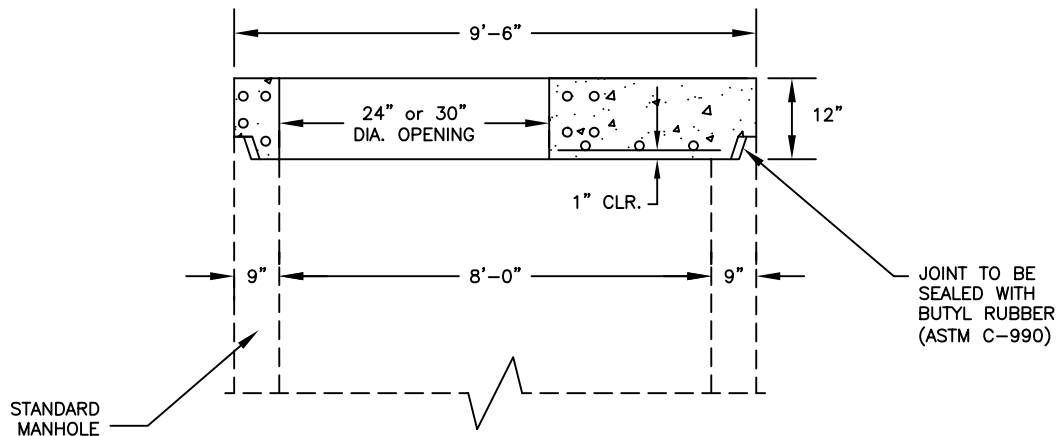
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(2) #4 AROUND OPENING,
TOP AND BOTTOM (TYP.)



#6@6" BOTHWAYS

PLAN VIEW
NOT TO SCALE



CROSS SECTION
NOT TO SCALE



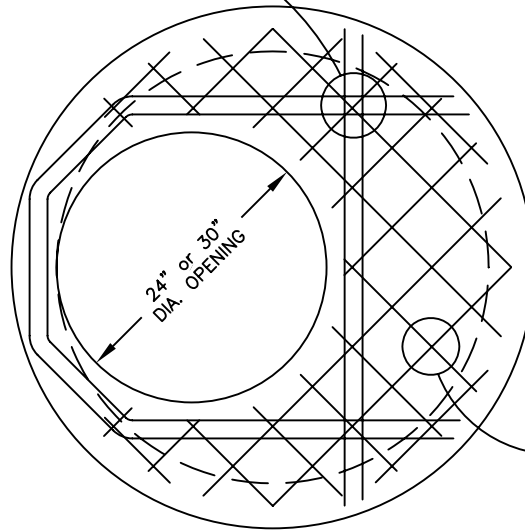
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TOP SLAB
96" DIA. MANHOLE

SPECIFICATIONS:

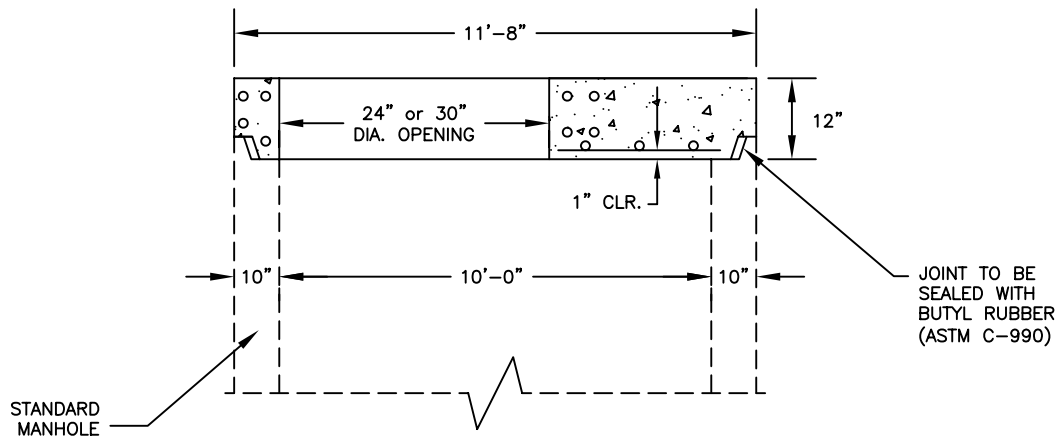
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(2) #4 AROUND OPENING,
TOP AND BOTTOM (TYP.)



#6@6" BOTHWAYS

PLAN VIEW
NOT TO SCALE



CROSS SECTION
NOT TO SCALE



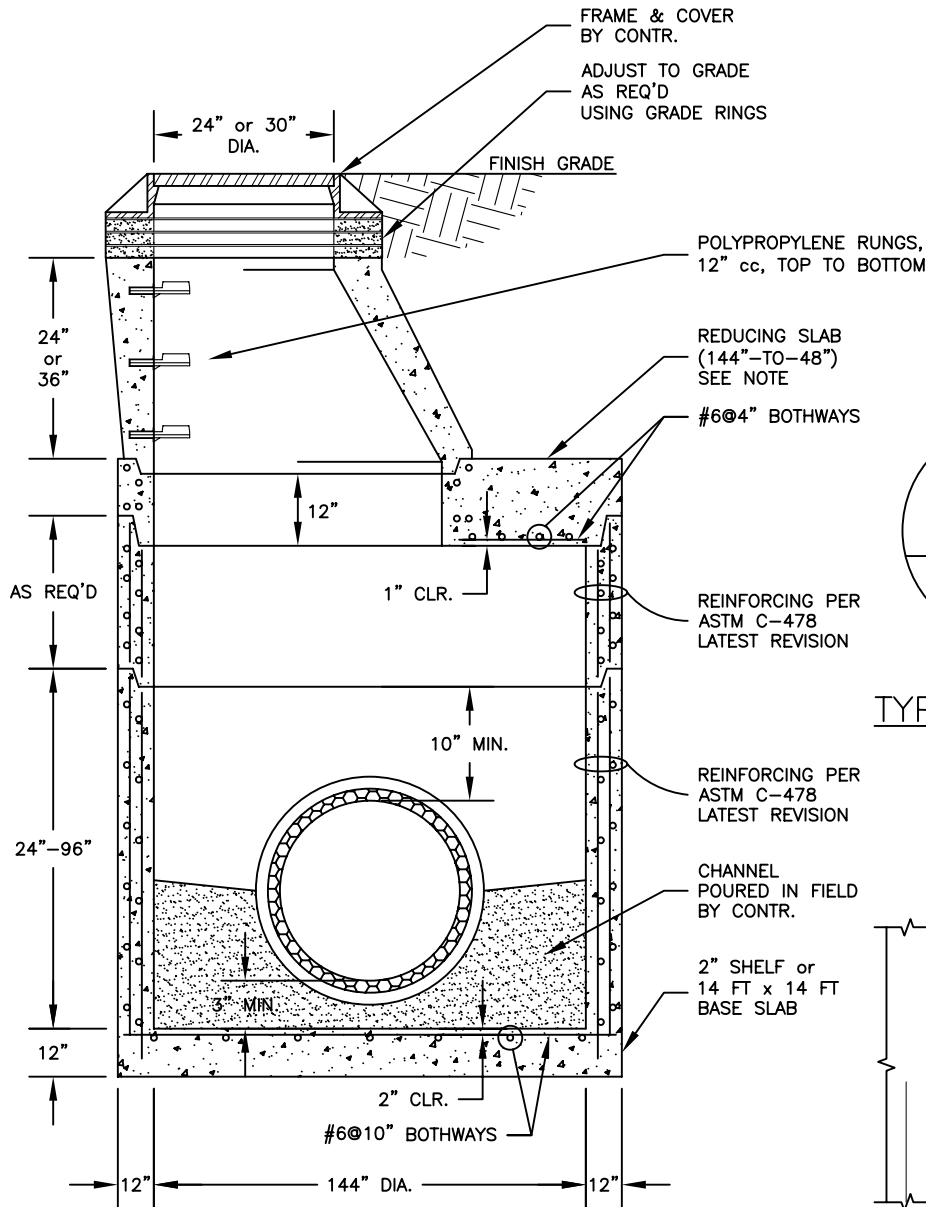
ATLANTIC CONCRETE PRODUCTS, INC.
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P.O. Box 129, Tullytown, PA 19007-7129
Phone: (215) 945-5600
Fax: (215) 946-3102
Web: www.atlanticconcrete.com

TOP SLAB
120" DIA. MANHOLE

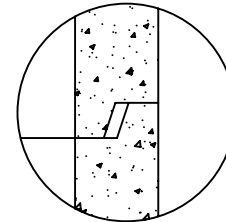
NOTE:
FOR MANHOLES WITH A HEIGHT
OF LESS THAN 10 FT,
THE TOP CONE MAY BE
REPLACED WITH A TOP SLAB.

SPECIFICATIONS:

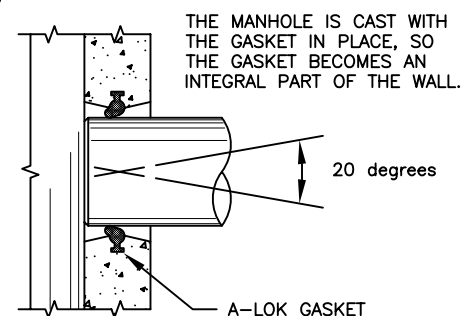
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE MANHOLE IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-478, "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
- THE REINFORCED CONCRETE STRUCTURE IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME AND COVER BY OTHERS).
- THE REINFORCED BASE SLAB IS DESIGNED FOR A MAXIMUM DEPTH OF 30 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- THE REINFORCED CONCRETE REDUCING SLAB IS DESIGNED FOR A MAXIMUM EARTH COVER OF 10 FT (EARTH COVER = F.G. TO TOP OF REDUCING SLAB).
- A-LOK GASKETS ARE DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-923, "RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE MANHOLE STRUCTURES AND PIPES."



SECTION VIEW
NOT TO SCALE



TYPICAL JOINT SECTION
NOT TO SCALE



A-LOK (TYP.) SECTION
NOT TO SCALE



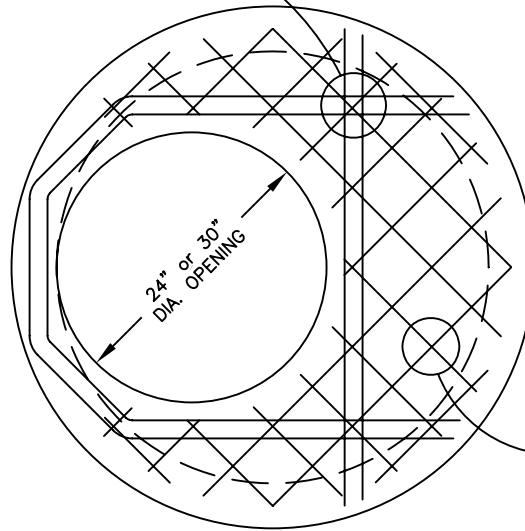
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144" DIA. MANHOLE
WITH A-LOK SEAL
(RECOMMENDED FOR PIPE SIZE 72")

SPECIFICATIONS:

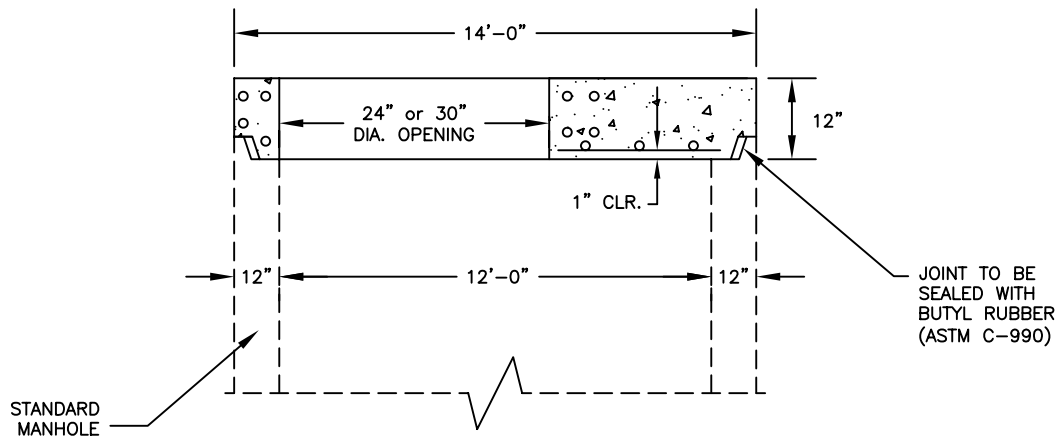
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 5,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE MANHOLE IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-478, "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
- THE REINFORCED CONCRETE STRUCTURE IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME AND COVER BY OTHERS).

(2) #4 AROUND OPENING,
TOP AND BOTTOM (TYP.)



#6@4" BOTHWAYS

PLAN VIEW
NOT TO SCALE

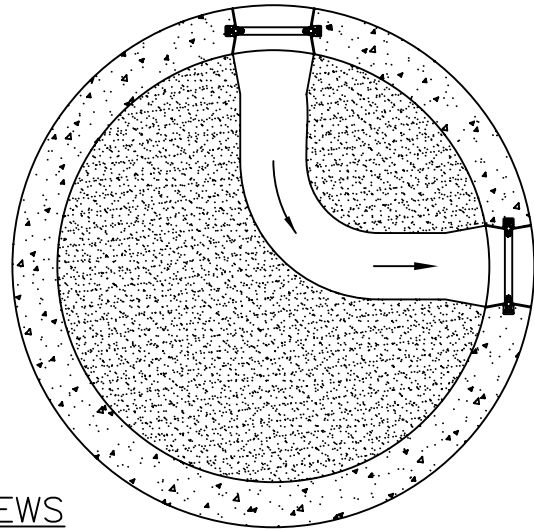
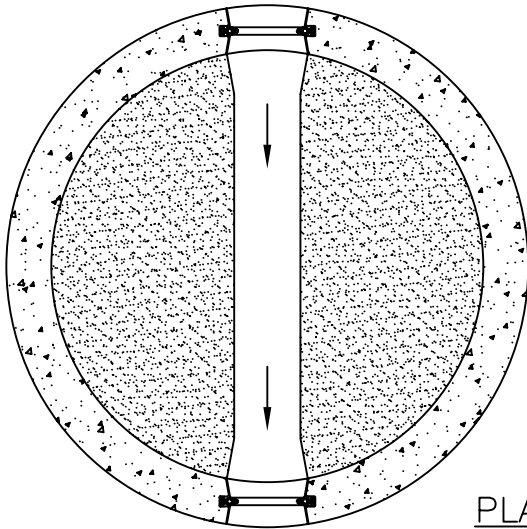


CROSS SECTION
NOT TO SCALE



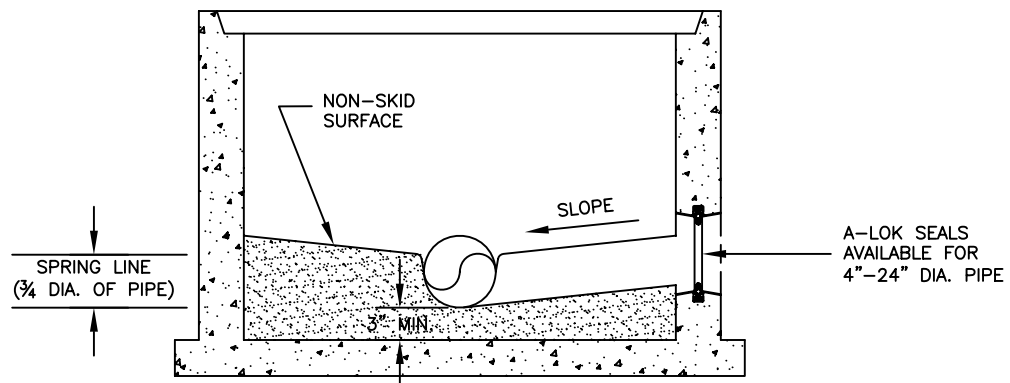
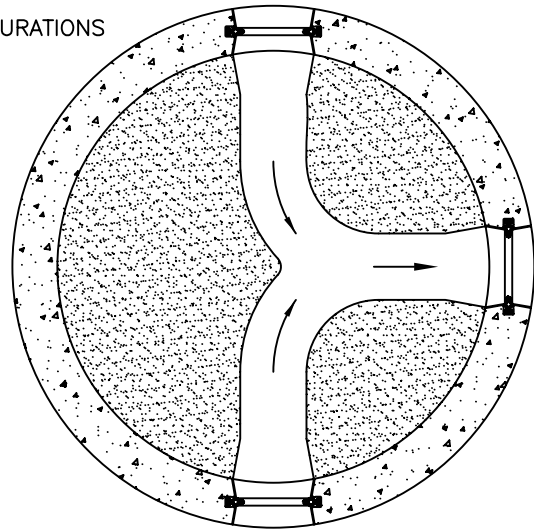
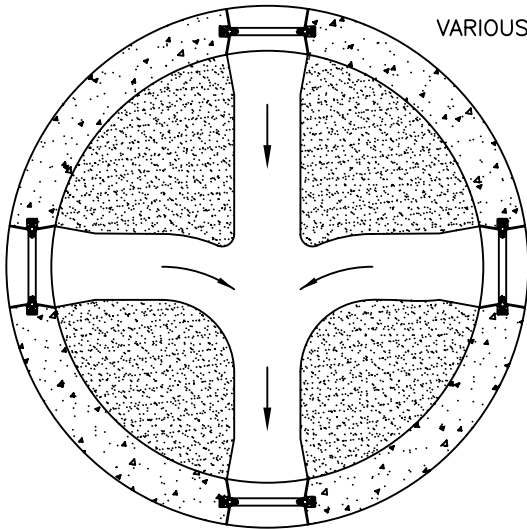
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TOP SLAB
144" DIA. MANHOLE



PLAN VIEWS

VARIOUS CONFIGURATIONS



TYPICAL CROSS SECTION

THE INVERT IS POURED AT THE PLANT USING PRECISION FORMS TO CREATE A SMOOTH, ACCURATE CHANNEL THAT MINIMIZES TURBULANCE AND RESULTS IN OPTIMUM FLOW.



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INVERT



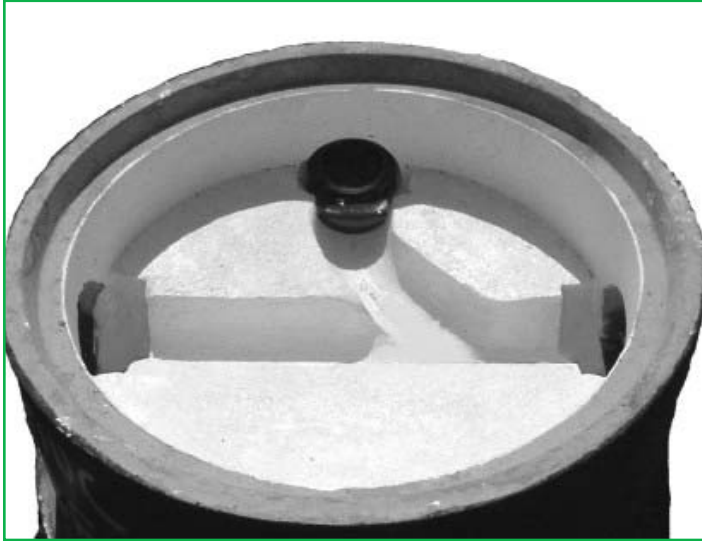
The Company With Connections®



SECONDARY INVERT FORMING SYSTEM

TRU-CONTOUR

● TRU-CONTOUR



A-LOK Products, Inc. and Tru-Contour have joined forces to bring together the best in secondary precast inverts available today. The Tru-Contour Invert Forming System offers the manhole producer a very durable, systematic and versatile method of forming all invert configurations from 4" through 48" diameter.

● KEY ADVANTAGES

Two, three, and four way configurations including dead end combinations with a standard .2 ft. of elevation difference (fall) can be made easy and rapidly without the need for skilled labor.

Greater fall can be obtained based on the operators' ability to experiment. The system's versatility is due to an unlimited combination of

four basic wedges. With the combination of one or more of these wedges, any angle can be obtained within 1.5 degrees. This allows enough flexibility to effectively form an invert which aligns perfectly with the entering pipeline.

System also available in Single Piece construction.

The Tru-Contour system cuts costly labor both in set-up and concrete finishing time. A basic three way can be set up in approximately fifteen minutes and depending on pouring procedures, can allow an average of four inverts per day to be formed from a single system. Finishing time is kept to a minimum due to the accuracy of flows the forms create. Each invert in regard to channel width, depth and radial turn is form finished.

The Tru-Contour standard system allows for 2/3 invert depth and is compatible with a variety of flexible pipe to manhole connectors. Full depth systems are also available.

The Tru-Contour assembly consists of:

- 1) A hole adapter which is designed to align the invert assembly with the flexible pipe to manhole connector. This insures pipe to invert compatibility.
- 2) A series of 4 wedges and straight sections which when combined provides an unlimited selection of angles to create enough flexibility to form an in invert within 1.5 degrees.
- 3) A stabilizing jack which prevents from floatation during casting operations. This insures that correct fall is maintained across the manhole base.

● AVAILABILITY CHART

SIZE (IN/DIA.)	2-WAY	3-WAY	4-WAY
4"	•	•	•
6"	•	•	•
8"	•	•	•
10"	•	•	•
12"	•	•	•
15"	•	•	•
18"	•	•	•
21"	•		
24"	•		
27"	•		
30"	•		
36"	•		
42"	•		
48"	•		



INSTALLATION INSTRUCTIONS



#1 ASSEMBLY STARTS WITH CENTERING TRIANGLE IN LOW HOLE



#2 ASSEMBLE SMALLEST ANGLE WITH CENTERING ADAPTOR



#3 SMALLEST ANGLE ASSEMBLY IN LOW HOLE AND UPSTREAM SIDE.



#4 POSITION ANTI FLOTATION BAR AND ADDITIONAL CHANNEL

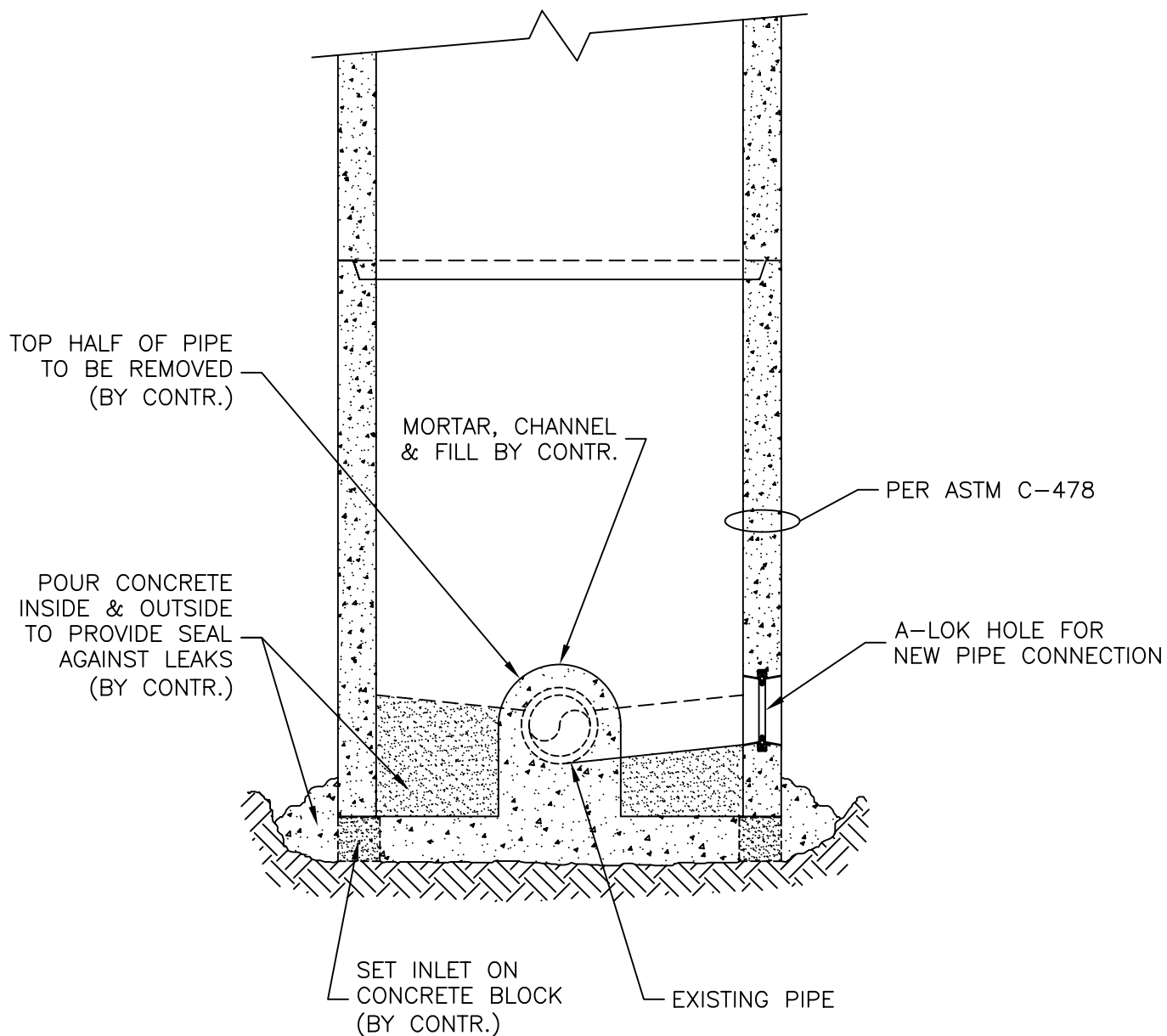


#5 POSITION HUBS



#6 COMPLETED THREE-WAY ASSEMBLY READY TO POUR

ANY QUESTIONS REGARDING TRU-CONTOUR INSTALLATION, PLEASE CALL 1-800-822-2565

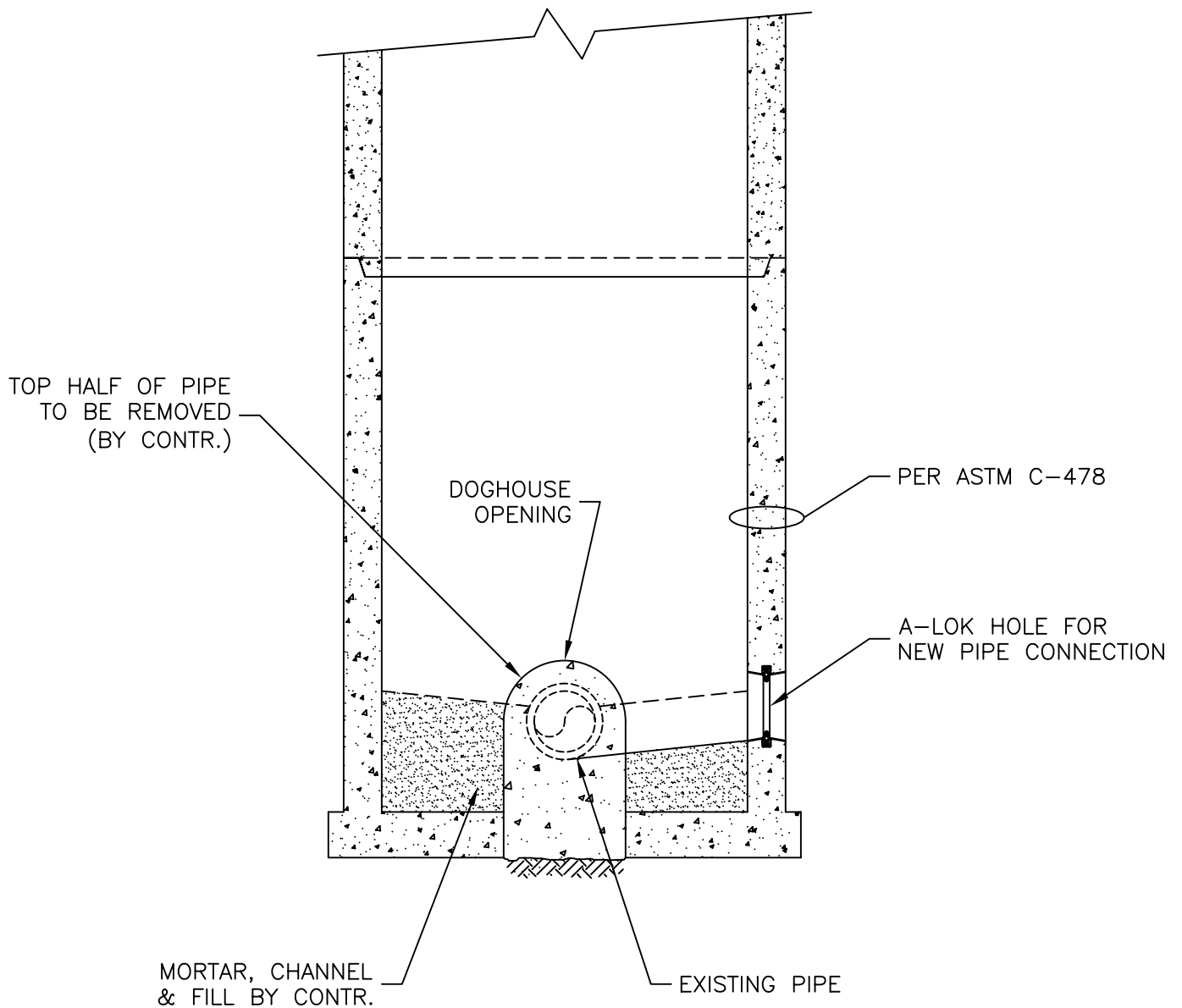


SECTION VIEW
NOT TO SCALE



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DOGHOUSE MANHOLE RISER

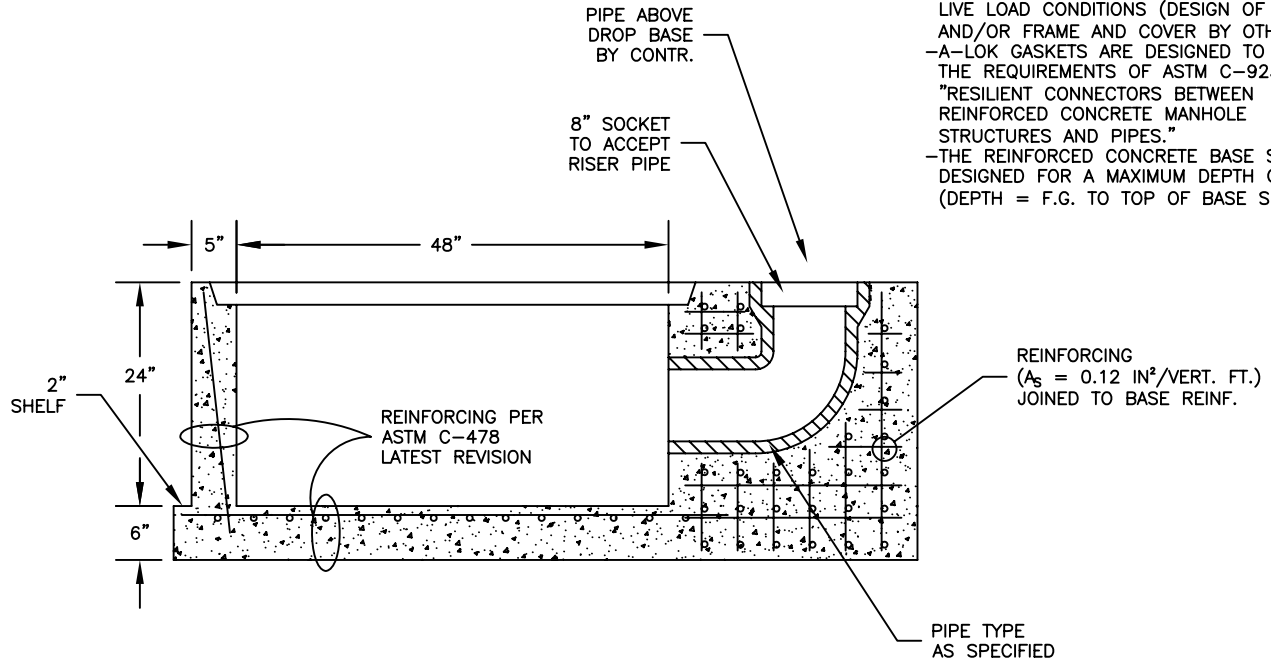


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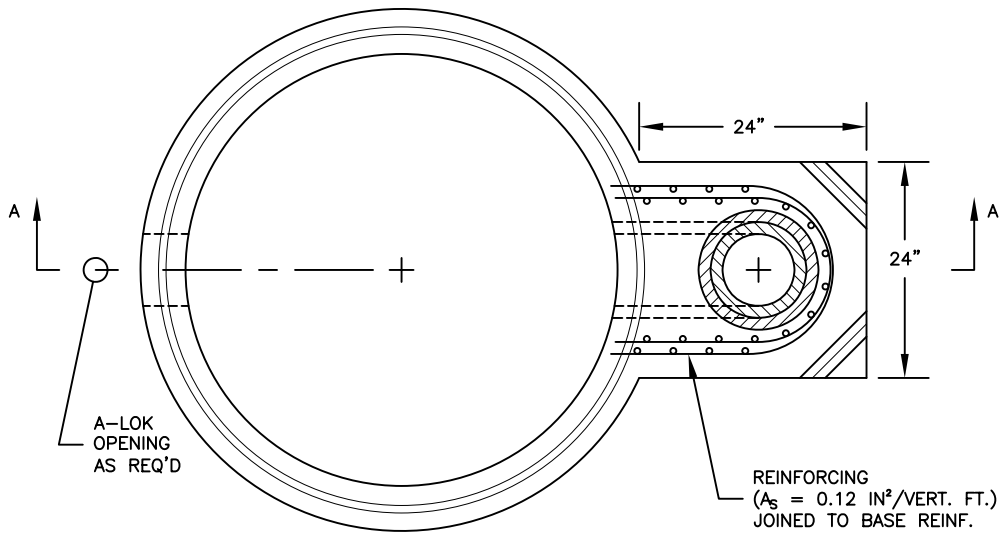
DOGHOUSE MANHOLE BASE

SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE MANHOLE IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-478, "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
- THE REINFORCED CONCRETE STRUCTURE IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME AND COVER BY OTHERS).
- A-LOK GASKETS ARE DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-923, "RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE MANHOLE STRUCTURES AND PIPES."
- THE REINFORCED CONCRETE BASE SLAB IS DESIGNED FOR A MAXIMUM DEPTH OF 20 FT (DEPTH = F.G. TO TOP OF BASE SLAB).



SECTION A-A
NOT TO SCALE

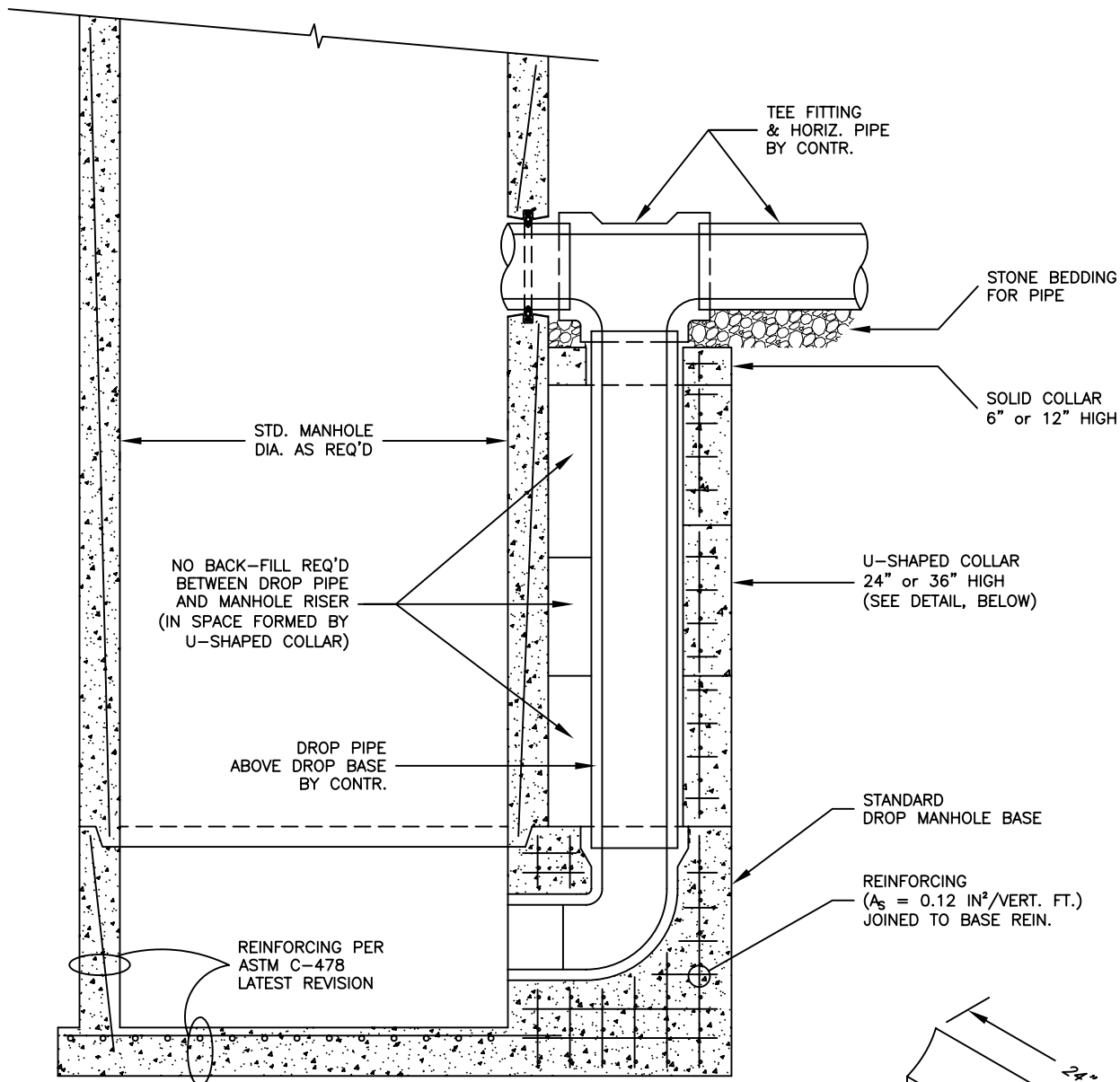


PLAN VIEW
NOT TO SCALE

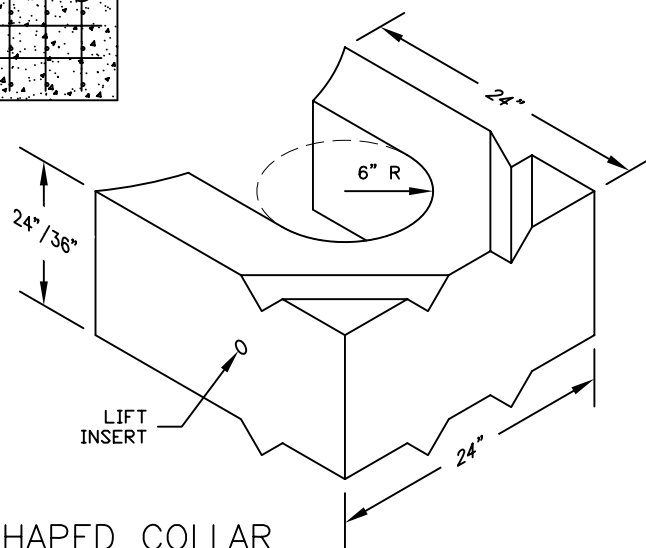
DROP MANHOLE BASE 48" DIA.



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CROSS-SECTION
OF
DROP MANHOLE
NOT TO SCALE



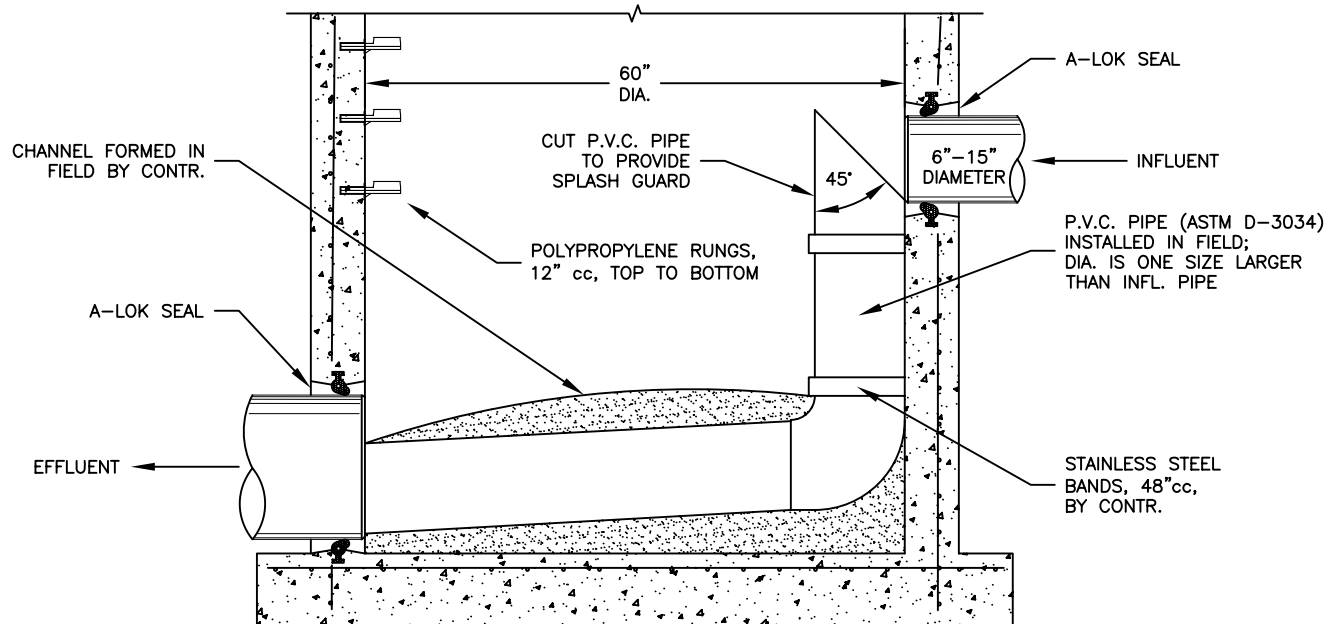
U-SHAPED COLLAR
NOT TO SCALE



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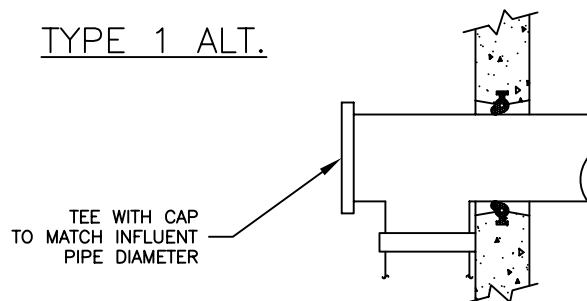
DROP MANHOLE COLLARS

ALL PIPE, FITTINGS, AND BANDS
TO BE INSTALLED BY CONTR.



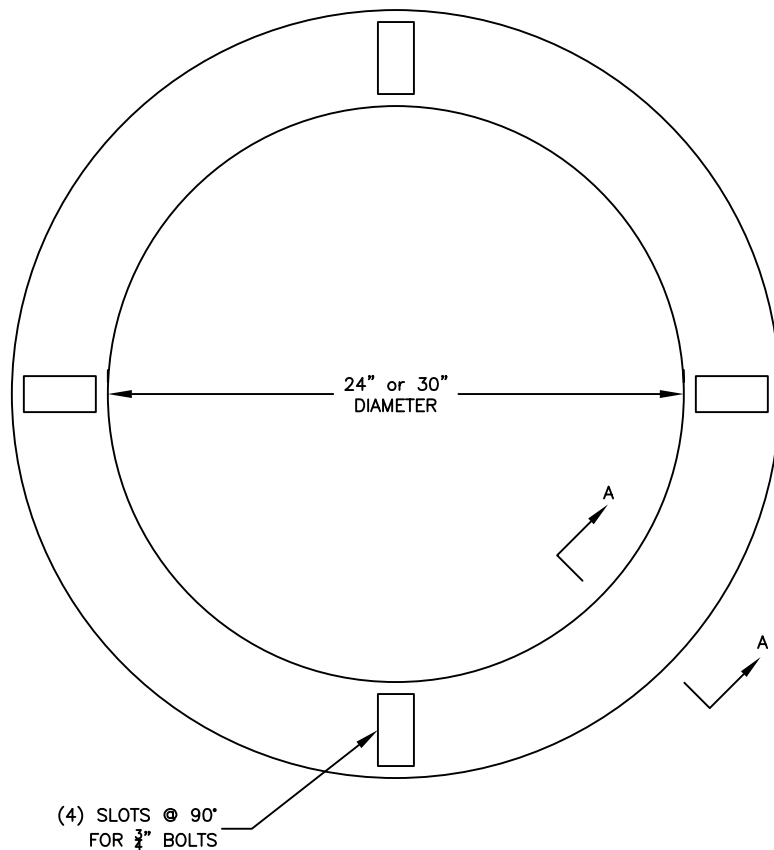
SECTION VIEW
NOT TO SCALE

TYPE 1 ALT.

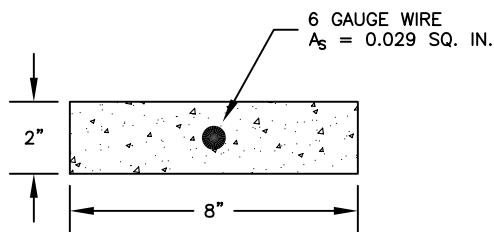


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INSIDE DROP MANHOLE TYPE 1



PLAN VIEW
NOT TO SCALE

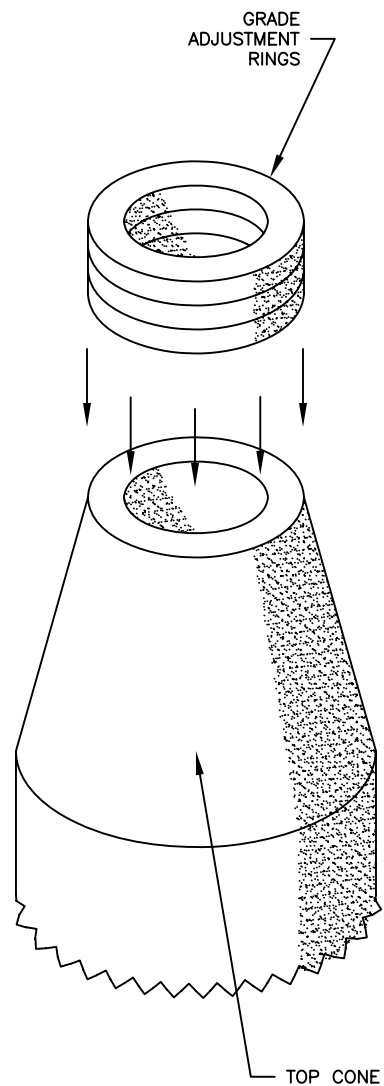


SECTION A-A
NOT TO SCALE

SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE MANHOLE IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-478, "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
- THE REINFORCED CONCRETE STRUCTURE IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS.
- WEIGHT OF ONE GRADE RING

24" DIA.	140 LB
30" DIA.	165 LB



NOTE:

GRADE RINGS ARE SEALED BY CONTRACTOR USING TROWELABLE BUTYL RUBBER (AS PER ASTM C-990) OR GROUT.



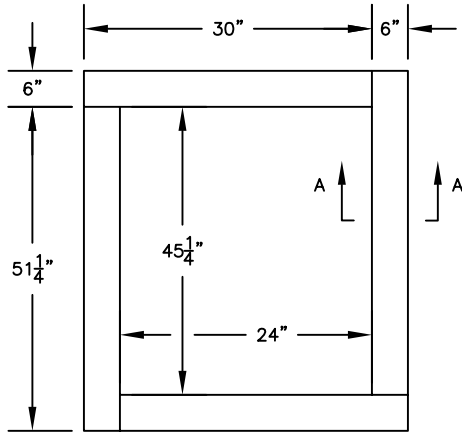
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STANDARD MANHOLE
GRADE RING
24" DIA. & 30" DIA.

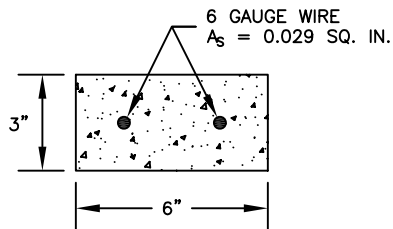
SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE INLET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-913, "PRECAST CONCRETE WATER AND WASTEWATER STRUCTURES."
- THE REINFORCED CONCRETE STRUCTURE IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS.
- WEIGHT OF ONE GRADE RING

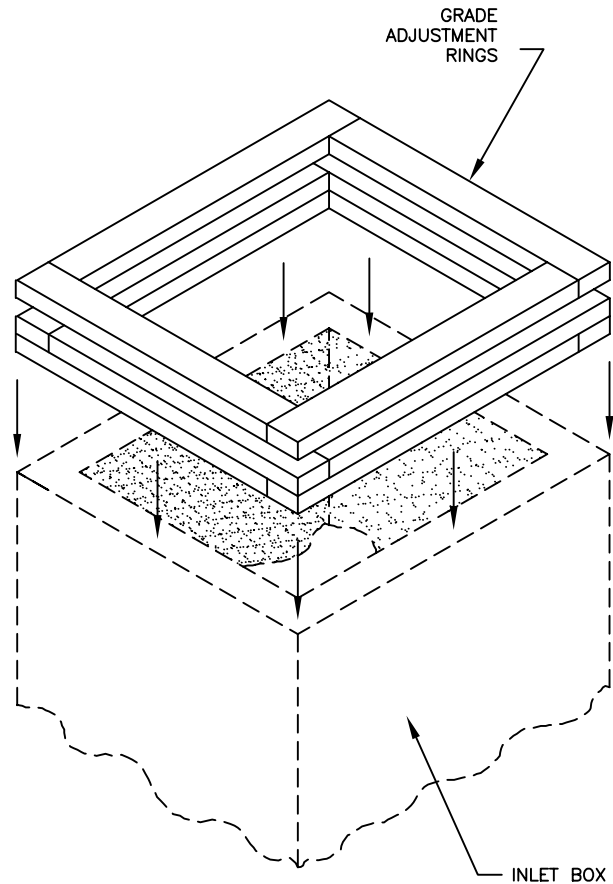
3" x 6" x 30"	47 LBS
3" x 6" x 51 $\frac{1}{4}$ "	80 LBS



PLAN VIEW
NOT TO SCALE



SECTION A-A
NOT TO SCALE



NOTE:

GRADE RINGS ARE SEALED BY CONTRACTOR USING TROWELABLE BUTYL RUBBER (AS PER ASTM C-990) OR GROUT.



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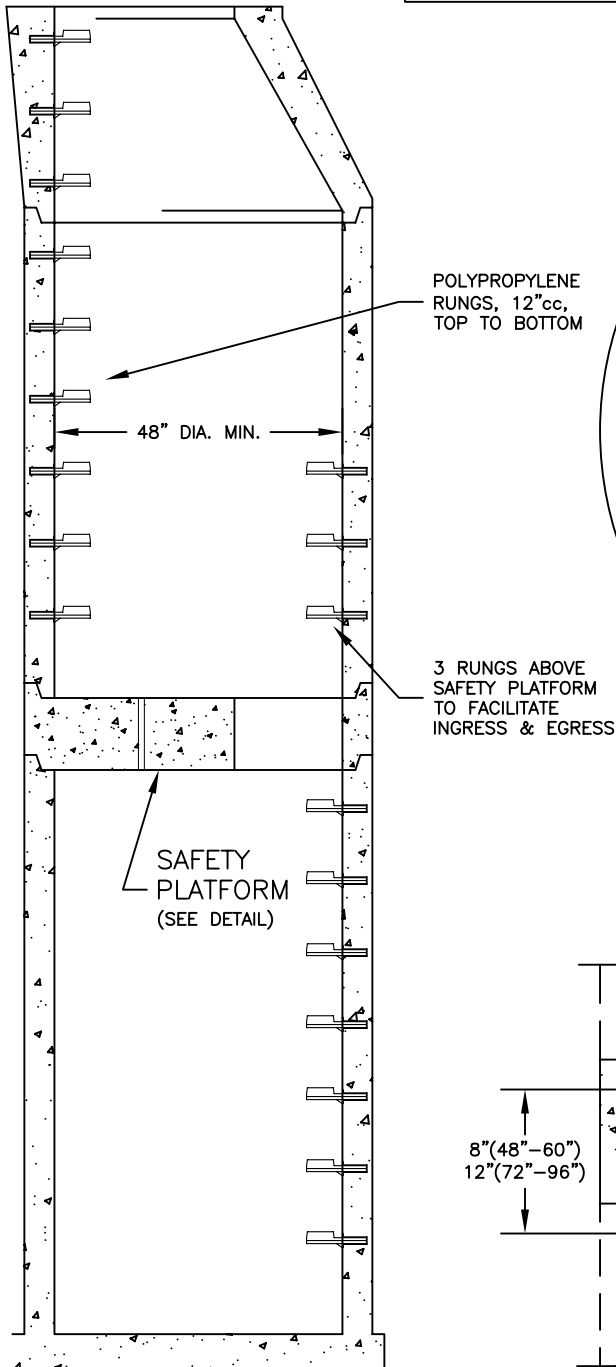
GRADE RING
FOR PENNDOT INLETS
TYPE C & M & S

NOTE:

ONE SAFETY PLATFORM IS RECOMMENDED FOR STRUCTURES WHEN DEPTH REACHES 15 FT; TWO ARE RECOMMENDED IF DEPTH EXCEEDS 25 FT.

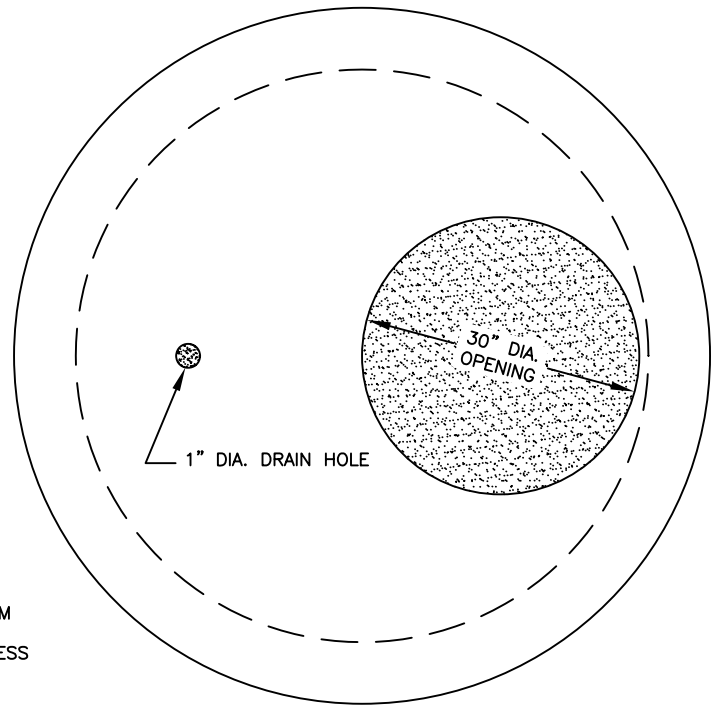
SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE SLABS ARE DESIGNED FOR 300 LBS/SQ FT. LIVE LOAD.



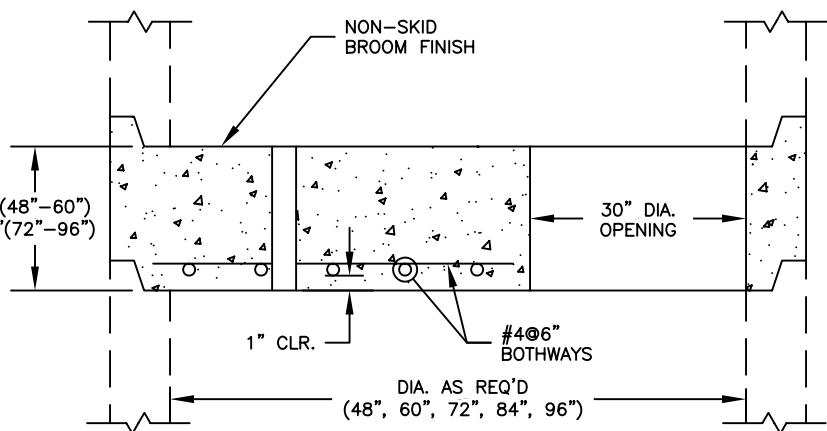
MANHOLE CROSS-SECTION

NOT TO SCALE



PLAN VIEW

NOT TO SCALE



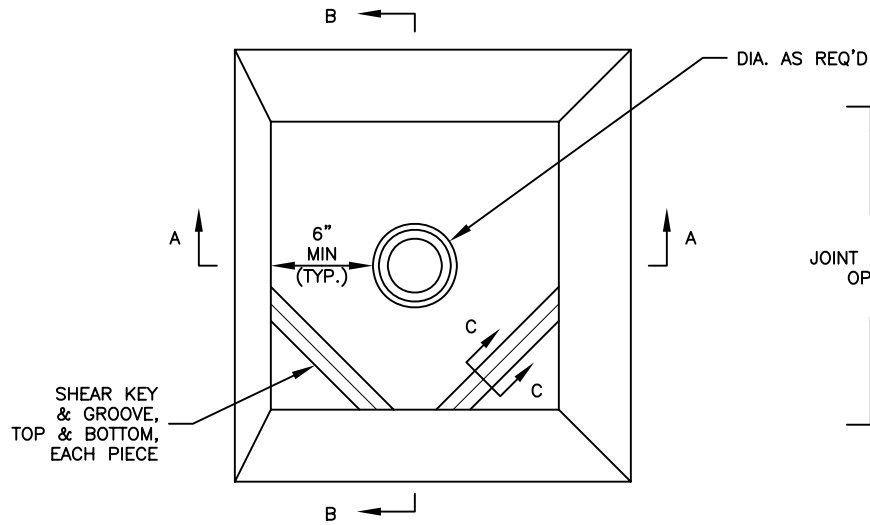
SAFETY PLATFORM DETAIL

NOT TO SCALE

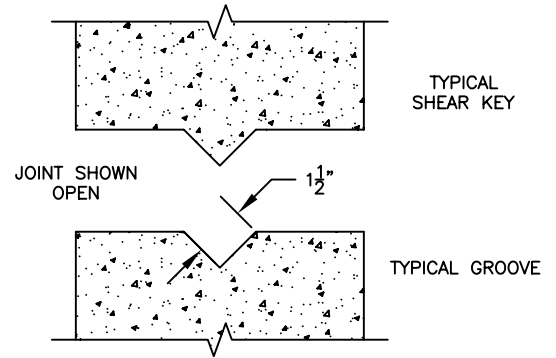


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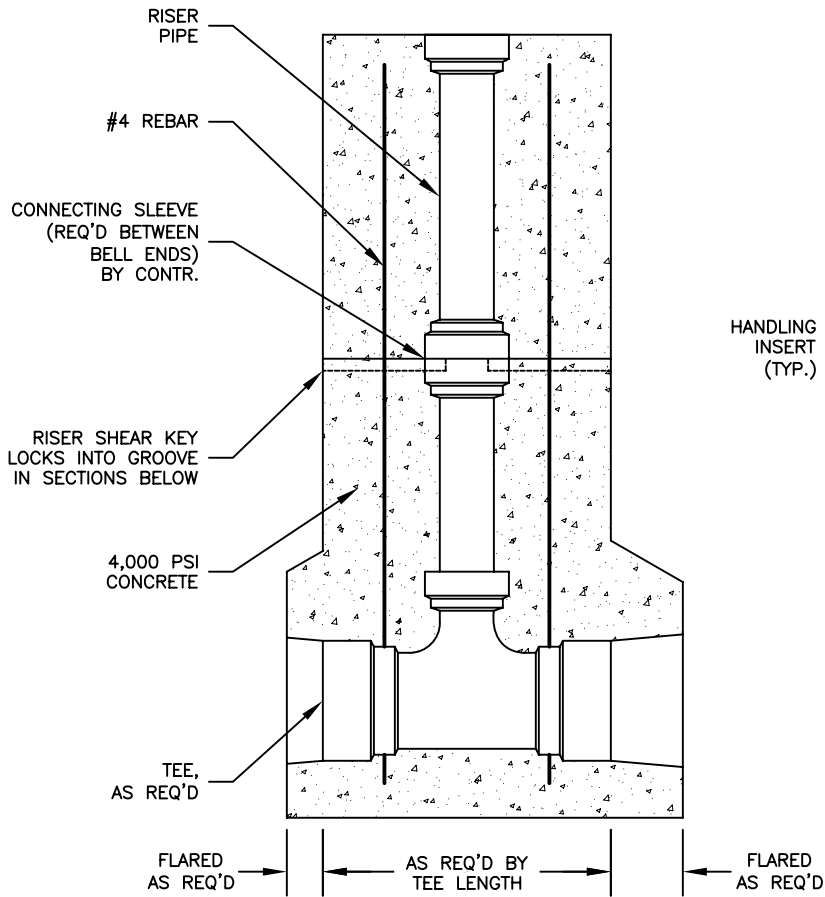
SAFETY PLATFORM
FOR
DEEP MANHOLES



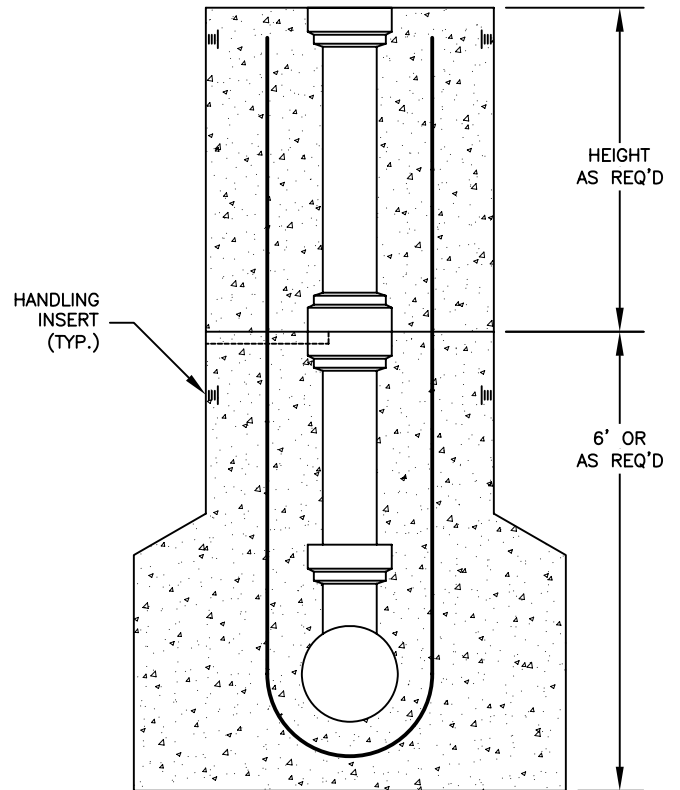
TOP VIEW
NOT TO SCALE



SECTION C-C
NOT TO SCALE



SECTION A-A
NOT TO SCALE

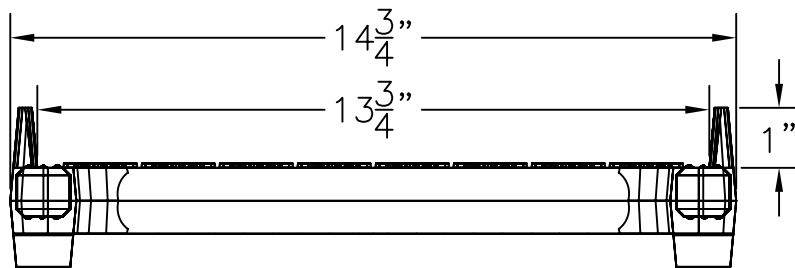
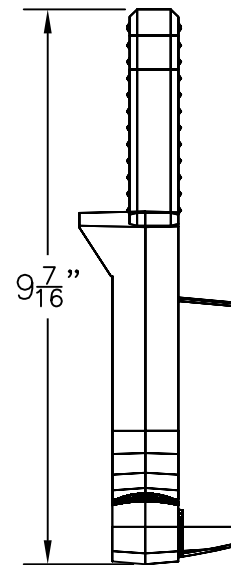
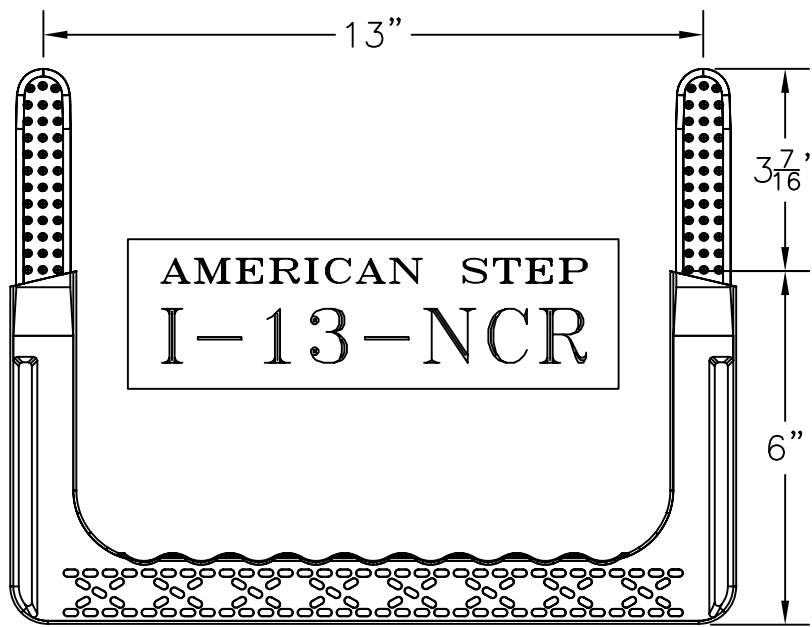


SECTION B-B
NOT TO SCALE

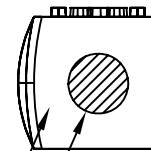


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TEE
FOR DEEP HOUSE CONNECTION



COPOLYMER
POLYPROPYLENE



1/2" ASTM A-615
GRADE 60 STEEL
REINFORCEMENT

- DRAWING IS NOT TO SCALE
- THIS STEP MEETS OR EXCEEDS
ASTM C-478 AND OSHA STANDARDS
WHEN PROPERLY INSTALLED.

AMERICAN STEP COMPANY, INC.
830 EAST BROADWAY
PO BOX 137, GRIFFIN, GA
30224-0137

TOLL FREE (800) 988-STEP
OFFICE: (770) 467-9844
FAX: (770) 467-8011



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POLYPROPYLENE RUNG



The Company With Connections®



PIPE TO STRUCTURE CONNECTOR FOR STORMWATER SYSTEMS

A•LOK STM

A•LOK STM

The **A•LOK STM** is a flexible pipe-to-man-hole connector designed for the prevention of soil and water infiltration into stormwater sewer systems. It can be used with both round and elliptical shaped pipes and curved and flat wall structures. It is available for 8" diameter and larger pipes.



MATERIAL

The standard connector is extruded from a polyisoprene compound engineered to conform with the requirements outlined in section 4.1.1 of ASTM C-1478 "Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes, and Laterals". Alternative compounds are available for unusual applications upon special order.

KEY ADVANTAGES

The **A•LOK STM Connector** functions on pure compression, making field installation quick and easy. Just clean and lubricate the connector and pipe, center the pipe in the connector, and insert. This rapid installation permits immediate backfilling, enhancing project safety and overcomes the normal problems encountered with water, running sand and other unstable trench conditions. This results in shorter job projections, while minimizing traffic interruption and cost overruns.

The **A•LOK STM** provides up to 10° of omnidirectional deflection while still maintaining a watertight seal. This design allows the connector to compensate for shear due to settlement or ground movement preventing water and soil infiltration into the sewer system. This proper pipe-to-structure connection minimizes the chance of pothole formation and sediment build-up in the storm system, saving states and municipalities money over the life of the structure.

On larger diameter pipe when size prohibits a gasket from being installed in a flat plane, an **A•LOK STM Connector** can be configured for casting in a curve with the connector staying perpendicular to the center line of the pipe. This design has resulted from years of extensive research and development and causes no loss of compression or deflection.

PRODUCT REFERENCES

A.) ASTM C-1478

Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes, and Laterals.

B.) ASTM C-1244

Standard Test Method For Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test

C.) ASTM C-478

Standard Specification for Precast Reinforced Concrete Manhole Sections

PERFORMANCE STANDARD

The **A•LOK STM** meets or exceeds all material and test requirements of ASTM C-1478: "Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes, and Laterals".

See following chart:

RESILIENT MATERIAL TEST OF ASTM C-1478

TEST	RESULTS	ASTM METHOD
Chemical resistance 1 N Sulfuric acid 1 N Hydrochloric Acid	no weight loss no weight loss	D 543 at 22°C for 48h
Tensile strength	1200 psi or 8.5 MPa, min	D 412
Elongation at break	350% min.	
Hardness	±5 from mfg's. specified hardness	D 2240 (Shore A durometer)
Accelerated oven-aging	decr. of 15%, max. of original tensile strength, decr. of 20% max. of elongation	D 573, 70±1°C for 7 days
Compression set	decr. of 25%, max. of original deflection	D 395, Method B, at 70°C for 22h
Water absorption	increase of 10%, max. of original by weight	D 471, immerse 0.75 by 2-in. or 19 by 25-mm Specimen in distilled water at 70°C for 48h
Ozone resistance	rating 0	D 1171
Low-temp brittle point	no fracture at -40°C	D 746
Tear resistance	200 lbf/in. or 34 kn/m	D 624, Method B

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PART 6 • DIMENSIONAL DATA

A•LOK STM Cross Section / Pipe Size OD's



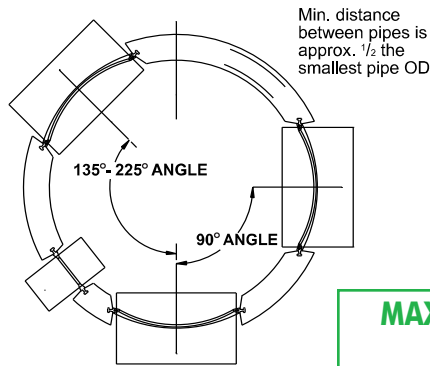
93 Series
8.50" - 29.00"



94 Series
30.00" - 59.50"



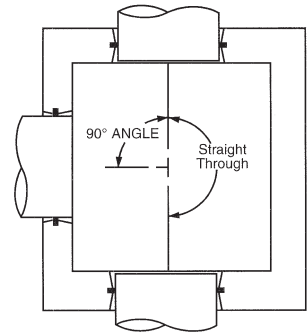
95 Series
60.00" - 87.50"
Larger Sizes Available
Upon Special Request



MAX. PIPE SIZE OD's

MAX. PIPE SIZE OD's

Manhole Diameter	135° - 225° Pipe Angle	90° Pipe Angle
42"	26.5"	22.0"
48"	31.5"	25.0"
60"	42.0"	32.0"
72"	52.5"	38.0"
84"	59.5"	44.0"
96"	73.5"	50.0"
108"	76.0"	56.0"
120"	85.0"	62.0"



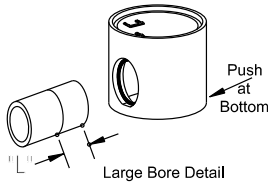
MAX. PIPE SIZE OD's BOX STRUCTURES

Inside Wall Dimension	Straight Through	90° Pipe Angle
2'	19.50"	17.50"
3'	32.00"	30.00"
4'	44.00"	42.00"
5'	56.00"	54.00"
6'	67.00"	65.00"
7'	80.50"	78.50"
8'	91.25"	89.25"
9'	103.25"	101.25"

INSTALLATION INSTRUCTIONS

STEP 1:

Confirm that the pipe surface is smooth, clean and free of foreign materials, chips, gouges and form seams due to manufacturing or handling. Slightly bevel any sharp or blunt edges caused by the cutting of the pipe.



STEP 2:

Lubricate the connector and the entire section of the pipe that will be inserted into the connector. The chart below lists A•LOK's minimum lubrication length "L".

PIPE SIZE	MIN. LUBRICATION LENGTH "L"
4" - 15"	12"
16" - 18"	18"
21" & Larger	24"

STEP 3:

Center the pipe and connector square to each other and insert the pipe into the connector using a bar or back hoe depending on the size. Once the pipe is coupled with the connector, deflect the structure or pipe to achieve the proper angle.

WARNING

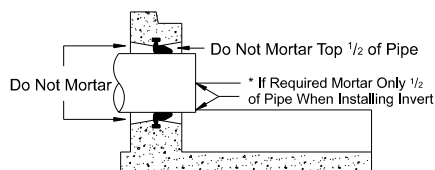
To ensure the A•LOK STM Connector remains a flexible watertight connector, it is **A•LOK Products, Inc.** strong recommendation that no mortar be placed between the pipe and wall of the concrete structure. The use of mortar in this area would decrease the effectiveness of the connector to compensate for shear caused by settlement or ground movement.

NOTE:

To find approximate subgrade, measure from the outside base of the structure to the junction of the connector and flat spot. Then add the wall thickness of the pipe plus 1/4 inch.

CAUTION:

When installing pipe stubs for future pipeline installation, all stubs must be properly restrained to prevent any movement by means other than the **A•LOK STM Connector**.



PRODUCT SPECIFICATIONS

A flexible pipe to manhole connector shall be used whenever a pipe penetrates into a precast concrete manhole or structure used in a stormwater drainage system.

The connector shall be the **A•LOK® STM CONNECTOR** as manufactured by A•LOK PRODUCTS, INC., Tullytown, PA, or approved equal.

The design of the connector shall provide a flexible, watertight seal between the pipe and concrete structure. The connector shall assure that a seal is made between:

(1) The connector and the structure wall by casting the connector integrally with the structure wall during the manufacturing process in a manner that it will not pull out during pipe coupling. The connector shall also be capable of being cast into a round structure by curving the connector in a manner that allows it to remain centrally located within the structure wall and perpendicular to the pipe. This configuration will result in no loss of seal or deflection of pipe entering a concrete structure.

(2) The seal between the connector and the pipe shall be made by the compression of the connector between the outside circumference of the pipe and the interior hole opening of the structure. The connector shall be the only component to affect the seal between the pipe and structure.

The connector shall be made from materials that conform to the physical and chemical requirements outlined in Section 4, "Materials and Manufacture" of ASTM C-1478 "Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes, and Laterals," and the overall design will meet or exceed Section 7, "Test Methods and Requirements" of ASTM C-1478.

The connector shall be sized specifically for the type of pipe being used and shall be installed in accordance with the recommendations of the manufacturer.

**ANY QUESTIONS REGARDING A•LOK STM CONNECTOR
INSTALLATION, PLEASE CALL 1-800-822-2565**



The Company With Connections®



PIPE TO MANHOLE CONNECTOR FOR SANITARY OR STORMWATER SYSTEMS

G3 BOOT SYSTEM

A•LOK G3 BOOT SYSTEM

The Revolutionary **G3 Band** makes installation into a structure simple and fast. Just install the connector perpendicular to the hole and tighten the stainless steel nut. As the nut is tightened, a compressive force is applied to the G3 band ends, causing them to slide past each other into straight alignment. This movement increases the bands overall circumference and compresses the connector against the opening in the structure wall, creating a watertight seal. To insure the best seal, place the bolt in the 12 o'clock position of the hole opening and tighten the nut to the specified torque value.



**G3 BOOT SYSTEM
WITH
COMPONENT PACKAGING
AND TORQUE WRENCHES**

MATERIAL

The connector shall be made from materials that conforms to the physical and chemical requirements outlined in Section 4, "Materials and Manufacture" of ASTM C-923 "Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals", and the overall design will meet or exceed Section 7, "Test Methods and Requirements" of ASTM C-923.

The connector shall be sized specifically for the type of pipe being used and shall be installed in accordance with the recommendations of the manufacturer.

PRODUCT REFERENCES

G3 Boot System meets or exceeds requirements of ASTM C-923

KEY ADVANTAGES

The **G3 Boot System** can withstand 15° of omnidirectional deflection and ½" of centerline offset while still maintaining a watertight connection. This flexibility eliminates infiltration due to pipe shear caused by settlement or ground movement.

The **inner O-ring design of the G3 Connector** eliminates rubber wrinkling, compensates for pipe irregularity and wall thickness to insure a watertight seal.

G3 Component Packaging, featuring a tough loop lock fastener that keeps installation instructions, take down clamp, boot and band secure together from factory to job site.

PRODUCT SPECIFICATIONS

A flexible pipe to manhole connector shall be used whenever a pipe penetrates into a precast concrete manhole or structure.

The connector shall be the G3 Boot System featuring component packaging as manufactured by A•LOK PRODUCTS, INC., Tullytown, PA, or approved equal.

The design of the connector shall provide a flexible, watertight seal between the pipe and concrete structure. The connector shall assure that a seal is made between (1) the connector and the structure wall by placing the connector and expansion band into the center third of the concrete hole opening. The band is then expanded by tightening the expansion mechanism increasing the bands overall circumference and compressing the connector against the sides of the hole opening. (2) The seal between the connector and the pipe shall be made by compressing the connector against the outside circumference of the pipe by means of a stainless steel take-down band.

PART 6 • DIMENSIONAL DATA

G3 BOOT SIZE LIST

ITEM	PIPE O.D. RANGE	HOLE SIZE
	Min.-Max.	
G3-0804	3.50"-4.50"	8"
G3-1206	6.0"-6.875"	12"
G3-1208	8.0"-9.5"	12"
G3-1410	10.0"-11.25"	14"
G3-1612	12.0"-13.5"	16"



PERFORMANCE STANDARD

ASTM C-923 Section 4.1 RESILIENT MATERIALS TESTS

TEST	RESULTS	ASTM METHOD
Chemical resistance 1 N Sulfuric acid 1 N Hydrochloric acid	no weight loss no weight loss	D 543, at 22°C for 48h
Tensile strength	1200 psi, min.	D 412
Elongation at break	350% min.	
Hardness ^B	±5 from mfg's. specified hardness	D 2240 (Shore A durometer)
Accelerated oven-aging	decr. of 15%, max. of original tensile strength, decr. of 20% max. of elongation	D 573, 70±1°C for 7 days
Compression set	decr. of 25%, max. of original deflection	D 395, Method B, at 70°C for 22h
Water absorption	increase of 10%, max. of original by weight	D 471, immerse 0.75 by 2-in. or 19 by 25-mm Specimen in distilled water at 70°C for 48h
Ozone resistance	rating 0	D 1171
Low-temperature brittle point	no fracture at -40°C	D 746
Tear resistance	200 lbf/in.	D 624, Die B

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INSTALLATION INSTRUCTIONS



- 1) Position G3-1208 Boot & Band in hole, then tighten to 25 ft-lbs using torque wrench.



- 2) Insert pipe into rolled in connector. For inside mount, affix clamp behind O-ring. Torque to 60 in-lbs and backfill.



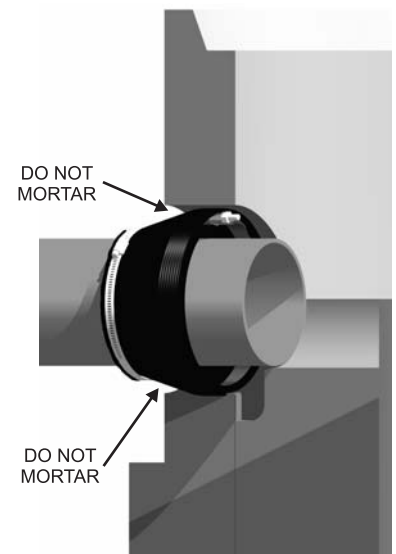
- 3) For outside mount: pull pipe back, reposition pipe within the wall and affix clamp directly behind O-ring. Torque to 60 in-lbs and backfill.

WARNING: To ensure the G3 Boot System remains a flexible watertight connector, it is A•LOK Products, Inc. strong recommendation that **no mortar** be placed between the pipe and wall of the concrete structure. The use of mortar in this area would decrease the effectiveness of the connector to compensate for shear caused by settlement or ground movement.

NOTE: A•LOK strongly suggests use of proper torque wrenches to secure the G3 Boot in the structure as well as to secure the takedown clamp around the connector and pipe. Both torque wrenches are available through A•LOK Products, Inc.

CAUTION: When installing pipe stubs for future pipeline installation, all stubs must be properly restrained to prevent any movement by means other than the G3 Connector.

ANY QUESTIONS REGARDING G3 BOOT SYSTEM, PLEASE CALL 1-800-822-2565



D•LOK

US PATENTS
3,891,224 3,980,311
CANADIAN PATENT
1,054,835

MANHOLE JOINT GASKET

D-LOK is a rubber gasket specifically designed for joints between precast concrete sections of vertically installed manholes.

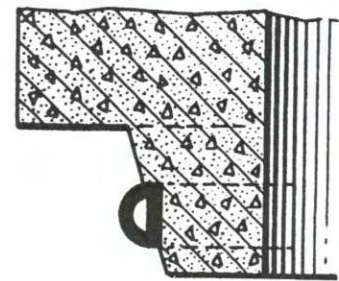
The joint is designed to utilize the weight of the manholes to seat the gasket to maximum compression while still allowing section to be completely coupled, concrete to concrete bearing, resulting in a stable watertight structure.

This short, blocky, single offset joint has physical design and shape to allow some abuse without appreciable damage. This is an important feature, considering a manhole section is normally handled and shipped in a vertical position, resting on the end joint.

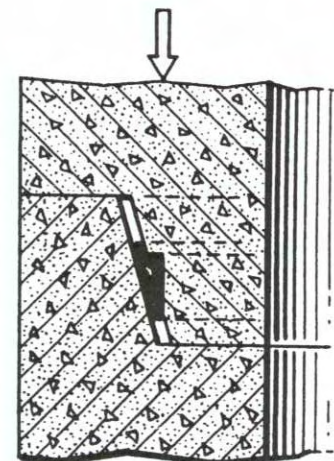
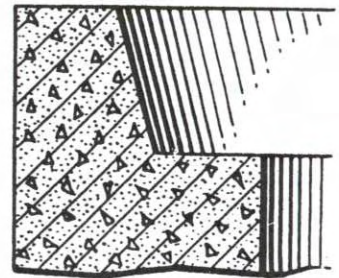
The D-LOK Joint has been tested to heads in excess of 20 feet and will meet performance and test requirements of ASTM C 425, and gasket complies to physical requirements of ASTM C 443 for concrete sewer pipe.

The joint is single offset, and so designed to compound compression of rubber as it is coupled thus sealing minor damage in joint area. Installation has been enhanced as only the socket is lubricated, the gasket is installed dry over single offset on spigot.

D-LOK has diagonally aligned surfaces with inherent self-centering characteristics which allow rapid coupling and conversely compound the compression of the rubber for assured watertightness.



SECTION VIEW OF
OPEN JOINT



SECTION VIEW OF
COUPLED JOINT



ATLANTIC CONCRETE PRODUCTS, INC.
P.O. BOX 129, Tullytown, PA 19007
Phone: 215/945-5600
Fax: 215/946-3102

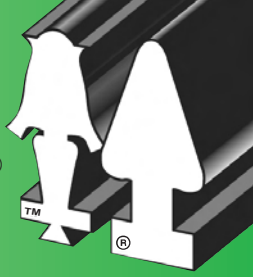
ATLANTIC CONCRETE PRODUCTS, INC.
Beaver Dam Road, Box 305, Cockeysville, MD 21030
Phone: 410/785-1777
Fax: 410/785-0219

D-LOK JOINT GASKET

1998



The Company With Connections®



SLOTTED INSERT TO ANCHOR CAST IRON FRAME TO STRUCTURE

BOLT SLOT INSERT

A•LOK BOLT SLOT INSERT



The **A•LOK BOLT SLOT INSERT** is a slotted insert designed to be cast into the conical or slab top section of underground concrete structures for the purpose of anchoring the cast iron frame to the structure. The insert assembly consists of a tough polypropylene shell and a .75 inch square galvanized nut.

The key purpose of the insert is to allow for center to center adjustment of the .75 inch galvanized nut to match the bolt center of the manhole frame. Traditional anchoring inserts require precise positioning on center to assure proper alignment of assembly. With the availability of the Bolt Slot Insert in overall lengths of 3 inches and 6 inches, any manhole frame can be accommodated regardless of bolt centers.

The inserts are shipped assembled for standard installation into the precast top section.

Inserts are held in position during the casting operation by a Four-Way Installation Holder in the four quadrants on a predetermined center to allow maximum adjustment in matching the bolt center of the manhole frame.

MATERIAL

The insert is molded from a copolymer polypropylene compound. The .75 inch square nut is galvanized.

KEY ADVANTAGES

- Guaranteed alignment of galvanized nut and bolt centers of manhole frame.
- The .75 inch square nut is galvanized to prevent corrosion.
- In traffic areas, misalignment of frame and structure top is eliminated due to shifting or movement during construction, or during routine maintenance.
- In easement areas, the frame assembly is protected against theft or vandalism by being firmly secured to the structure.
- Precast top sections can be standardized to accept any manhole frame regardless of bolt centers.

PRODUCT REFERENCES

A.) ASTM C-1244

Standard Test Method For Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test

B.) ASTM C-478

Standard Specification for Precast Reinforced Concrete Manhole Sections

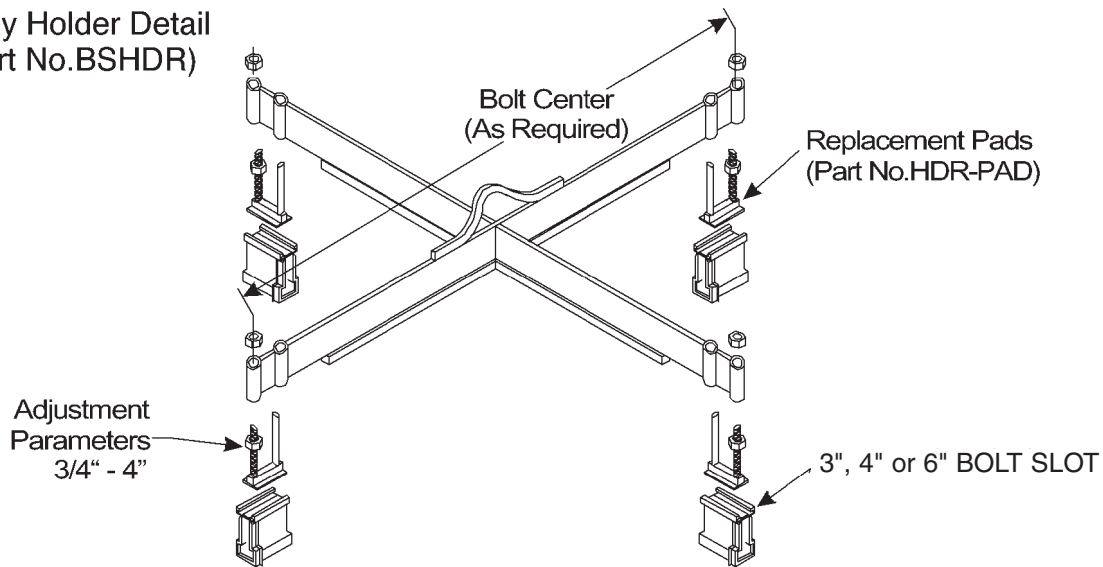
C.) FEDERAL REGULATION CODE RR-F-621

Specification for Frame, Covers, Gratings, Steps, Sump Catch Basins, Manholes

PART 6 • DIMENSIONAL DATA

PART NUMBER	LENGTH	INSERT ADJUSTMENT CAPABILITY
3 BOLT	3.125"	1.50"
4 BOLT	4.125"	2.00"
6 BOLT	6.125"	3.00"

4 Way Holder Detail (Part No.BSHDR)



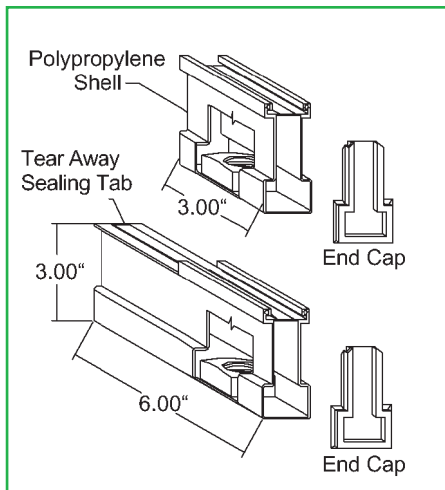
INSTALLATION INSTRUCTIONS

PLANT INSTALLATION

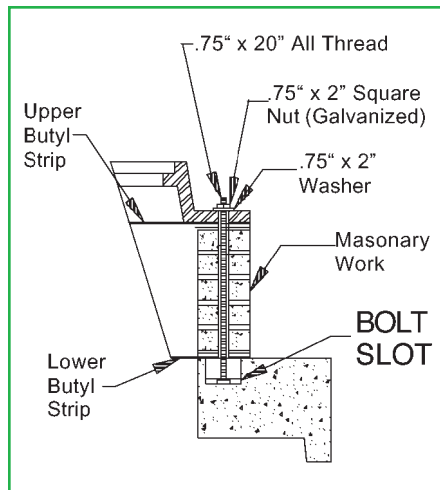
1. Load Four-Way Installation Holder by sliding the (4) A•LOK BOLT SLOTS on to the Pads. Position each insert alike on the Pads to assure uniform placement in the precast section.
2. Pour concrete in form to desired level, and then press loaded Four-Way Installation Holder into concrete keeping common center of holder and core opening properly aligned.
3. When loaded holder and inserts have reached their proper position, use trowel to place concrete around inserts and finish top area.
4. When concrete has hardened, Four-Way Installation Holder and Pads can be removed.

FIELD INSTALLATION

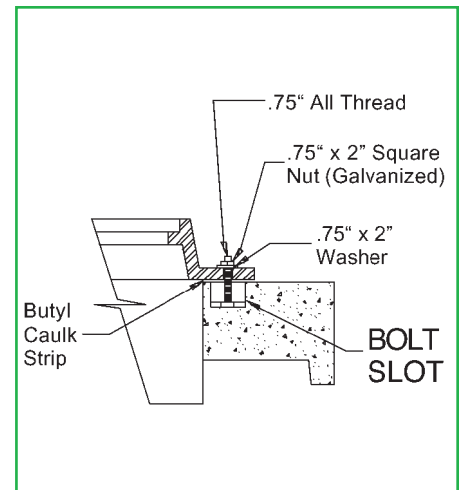
1. Prior to placing the grade rings and manhole frame on the concrete structure, the sealing tab is removed from the top of the A•LOK BOLT SLOT to gain access to the .75 inch square nut.
2. An all thread rod is then threaded into .75 inch nut and adjusted to the proper center to match frame.
3. After the grade work and frame are in place, the top nuts are installed and tightened and excess rod is cut off.



TYPICAL BOLT SLOT DETAIL



TYPICAL WATERTIGHT ASSEMBLY
(WITH GRADE WORK)



TYPICAL WATERTIGHT ASSEMBLY
(WITH NO GRADE WORK)

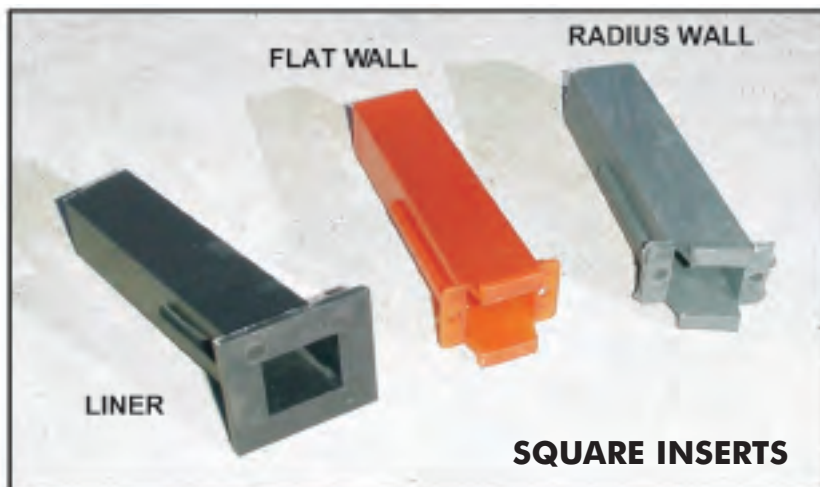
ANY QUESTIONS REGARDING A•LOK BOLT SLOT INSERT INSTALLATION, PLEASE CALL 1-800-822-2565

FLEX-LOK STEP INSERT

A series of polypropylene inserts for the purpose of securing steps in the wall of a precast concrete manhole or other concrete structure.

BENEFITS:

- Placement of insert is done at the time of manufacture.
- Concrete wall remains watertight.
- Guaranteed alignment and projection of steps.
- Precise hole to accept step shank.
- Interference fit makes installation of step rapid and simple.
- Polypropylene offers excellent chemical resistance.



SPECIFICATIONS:

- Insert meets the requirements of ASTM C-478 section 16.
- Exceeds the performance test procedures of ASTM C-497 section 10.





The Company With Connections®

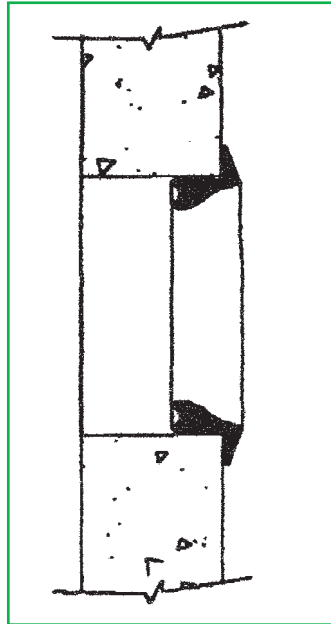


PIPE-TO-MANHOLE AND LATERAL CONNECTORS

INSERTA•LOK™

A-LOK INSERTA•LOK™

The **INSERTA•LOK™ Pipe to Manhole Connector** and **INSERTA•LOK MD Lateral Connector** are flexible connectors specifically engineered to produce a positive watertight seal for pipes entering precast concrete structures and the structure itself. The INSERTA•LOK Connectors are manufactured to meet or exceed the requirements set forth in ASTM C-923 titled *"Resilient Connector Between Reinforced Concrete Structures and Pipe."*



MATERIAL

The connector is extruded from a compound formulated for wastewater applications and engineered to conform with the Resilient Material Requirements of section 4.1.1. Alternative compounds are available for unusual applications upon special order.

KEY ADVANTAGES

The INSERTA•LOK Connectors function on pure compression making field installation quick and easy. Clean and lubricate both connector and pipe, center pipe in connector, and insert.

The connector provides a tapered profile which enhances coupling characteristics by allowing final compression to be gradual, thereby reducing the overall coupling force.

The INSERTA•LOK Connectors can be installed in a precision cast or cored opening as a mainline connector for new construction, a retrofit or a tie in for new construction.

The connector assures a positive watertight connection providing over 7 degrees of omnidirectional deflection to eliminate infiltration and shear due to settlement or ground movement. This flexibility permits immediate backfill enhancing project safety, and overcoming the problems normally encountered with water, running sand and other unstable trench conditions.

PRODUCT REFERENCES

A.) ASTM C-923

Resilient Connector Between Reinforced Concrete Manholes Structures and Pipe.

B.) ASTM C-1244

Standard Test Method For Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test

C.) ASTM C-478C

Standard Specification for Precast Reinforced Concrete Manhole Sections

PERFORMANCE STANDARD

The INSERTA•LOK Connectors meets or exceeds all material and performance requirements of ASTM Standard C-923 titled *"Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes."*

PART 6 • DIMENSIONAL DATA

INSERTA•LOK™
FOR SANITARY MANHOLES ROUND AND FLATWALL

TYPE OF PIPE	Nominal Pipe O.D.	Inserta•LOK HOLE SIZE	Inserta•LOK MD HOLE SIZE
4" P VC SDR 35	4.25"	—	5.00"
4" PVC SDR 40	4.50"	—	5.25"
4" DUCTILE	4.75"	—	5.50"
6" PVC SDR 35	6.25"	—	7.00"
6" DUCTILE	6.875"	—	7.625"
8" PVC SDR 35	8.50"	10.00"	9.25"
8" DUCTILE	9.00"	10.50"	9.75"
10" PVC SDR 35	10.50"	12.00"	11.50"
10" DUCTILE	11.25"	12.50"	12.00"
12" PVC SDR 35	12.50"	14.00"	13.25"
12" DUCTILE	13.00"	14.50"	13.75"

FOR LATERAL CONNECTORS YOU MUST USE MD INSERTA•LOK WITH 2 STAGE CORE BIT



PERFORMANCE STANDARD

RESILIENT TEST REQUIREMENTS OF A.S.T.M. C-923

TEST	RESULTS	ASTM METHOD
Chemical resistance 1 N Sulfuric acid 1 N Hydrochloric Acid	no weight loss no weight loss	at 22°C for 48h
Tensile strength	1200 psi or 8.5 MPa, min	D 412
Elongation at break	350% min.	
Hardness	±5 from mfg's. specified hardness	D 2240 (Shore A durometer)
Accelerated oven-aging	decr. of 15%, max. of original tensile strength, decr. of 20% max. of elongation	D 573, 70±1°C for 7 days
Compression set	decr. of 25%, max. of original deflection	D 395, Method B, at 70°C for 22h
Water absorption	increase of 10%, max. of original by weight	D 471, immerse 0.75 by 2-in. or 19 by 25-mm Specimen in distilled water at 70°C for 48h
Ozone resistance	rating 0	D 1171
Low-temperature brittle point	no fracture at -40°C	D 746
Tear resistance	200 lbf/in. or 34 kn/m	D 624, Method B



PRODUCT SPECIFICATIONS

A flexible pipe to manhole connector shall be used for sanitary and drain pipe penetrations into precast concrete manholes and structures.

The connector shall be the **INSERTA•LOK™ CONNECTOR** as manufactured by **A•LOK PRODUCTS, INC.**, Tullytown, PA, or approved equal.

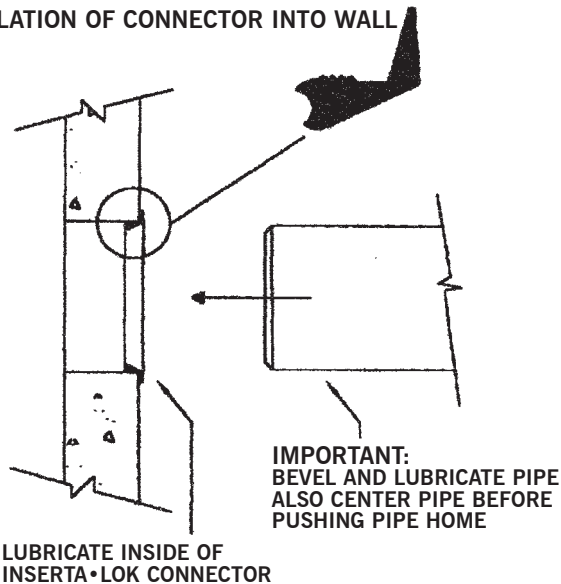
The design of the seal shall provide a flexible, positive watertight connection between the pipe and concrete wastewater structures. The connector shall assure that a seal is made between (1) the connector and the structure wall, and (2) between the connector and the pipe. The seal between the connector and the structure wall will be made by pure compression of the resilient material against the wall of the structure. The seal between the connector and the pipe will be made by pure compression of the resilient material against the outside diameter of the pipe. The connector shall be the only component to affect the seal between the pipe and structure.

The connector shall be extruded and vulcanized from materials whose physical/chemical properties meet or exceed the physical/chemical resistant properties outlined in ASTM C-923.

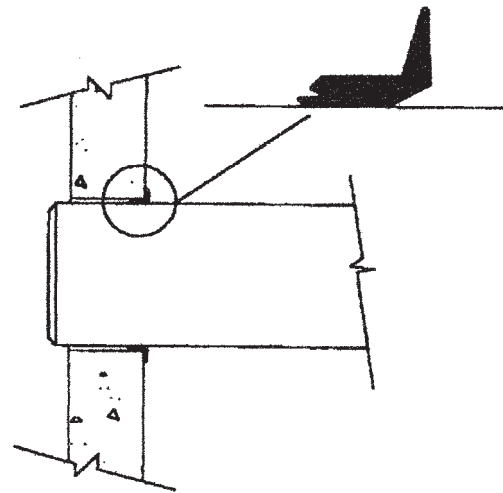
The connector shall be of size specifically designed for the pipe material being used and shall be installed in accordance with the recommendations of the manufacturer.

INSTALLATION INSTRUCTIONS

INSTALLATION OF CONNECTOR INTO WALL



INSTALLATION OF PIPE INTO CONNECTOR



WARNING: To ensure the INSERTA•LOK™ Connector remains a flexible, watertight joint, it is A•LOK Products, Inc. strong recommendation that **no mortar** be placed between the pipe and wall of the precast concrete unit. The use of mortar in this area would eliminate the flexibility for which the connector was designed and cause problems of shear.

NOTE: Approximate subgrade of trench at the structure can be determined by measuring from the bottom of the connector or flat spot if present, to the bottom of the manhole and wall thickness of pipe.

CAUTION: When installing pipe stubs for future pipeline, installation of all stubs should be properly restrained to prevent any movement by means other than, and in addition to, the resilient connector.

ANY QUESTIONS REGARDING A•LOK INSERTA•LOK INSTALLATION, PLEASE CALL 1-800-822-2565



The Company With Connections®



LIFTING SYSTEM FOR PRECAST STRUCTURES

KEY-LOK

● A-LOK KEY-LOK™



Certified A-LOK lift bar with Choker chains for lifting cones.

The **KEY-LOK™ LIFTING SYSTEM** is designed to provide a safe, watertight and economical means of handling precast concrete structures.

The polypropylene lift pin insert is installed during the manufacturing process and becomes an integral part of the structure with a predetermined thickness of concrete forming a barrier to prevent infiltration into the structure.



The lift pin and lift bar hardware is designed to provide a safe and durable means of handling precast concrete structures.

● MATERIAL

The **KEY-LOK™ Lift Pin Insert** is molded from a copolymer polypropylene compound.

The **Lift Pin and Lift Bar hardware** is designed and made to meet The Code of Federal Regulations: 29 CFR 1926.704(d) and CFR 1926.251(a) (4) for lifting devices. Quality and reliability is assured through testing each device.

● KEY ADVANTAGES

The **KEY-LOK™ LIFT INSERT** is designed with a key slot to prevent rotation in the mold and to provide easy form removal in both wet cast and dry cast methods of production.

The insert forms a precise cavity to accept the keyed lifting pins. This assures minimum movement of the lifting device during handling.

The shape of the insert locks the lifting device into the cavity. As lifting tension is applied, the **KEY-LOK™ Lift Pins** rotate 90° for removal.

The **KEY-LOK™ Lift Pin Insert** eliminates the necessity of a cold joint in patching the lift hole allowing immediate backfilling of the structure, enhancing project quality and safety.

The use of an **A-LOK® Manhole Lift Bar** assures that the Lift Pins stay perpendicular to the manhole wall while lifting.

● PRODUCT REFERENCES

A.) ASTM-C-478

Standard Specification for Precast Reinforced Concrete Manhole Sections.

B.) FEDERAL REGULATION CODES

29 CFR 1926.704(c) and (d)
29 CFR 1926.251 (a) (4)

● PERFORMANCE STANDARD

The A-LOK® Lift Pin's working load is in observance of Federal Regulation codes 29 CFR 1926. 704 (d) and 29 CFR 1926.251 (a) (4).

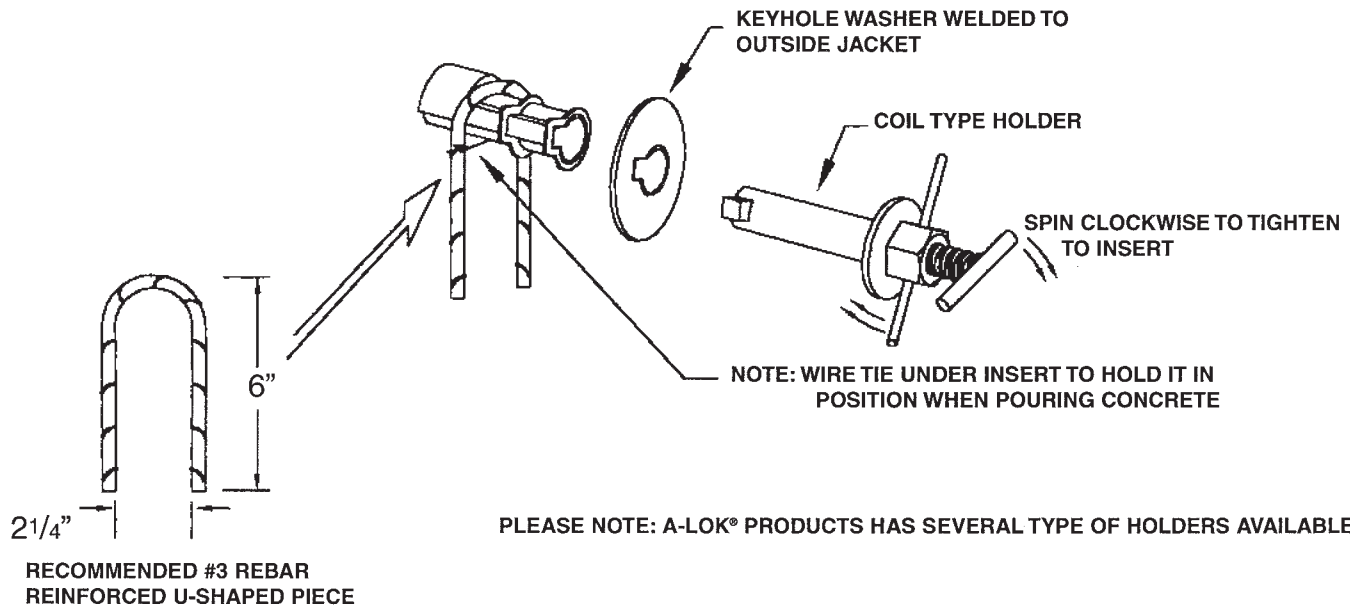
● PART 6 • DIMENSIONAL DATA

Listed below are the proof of design testing results:

Wall Thickness (Inches)	Insert No.	Working Load/Pin (lb.)
5	1095	4500
4-1/2	1096	3400
6	1097	6500
3-1/2	1098	2000

NOTE: The concrete had a 28 day compressive strength of 4,000 PSI. The U-shaped reinforcement in the following illustration, is required to obtain the above proof of design.

PRODUCTION INSTRUCTIONS

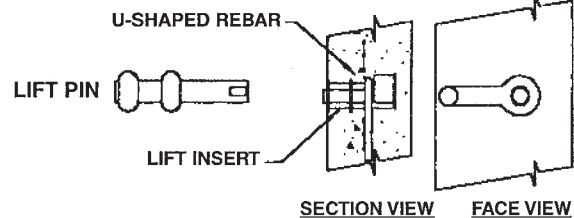
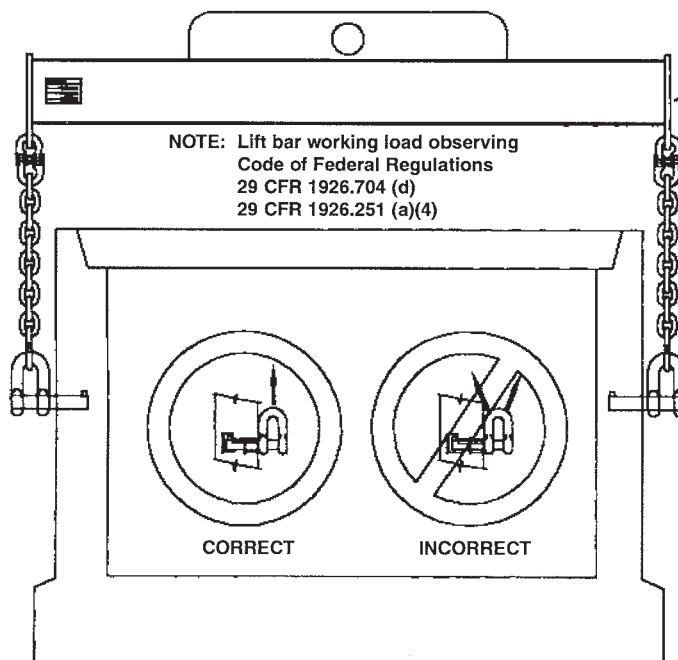


MANHOLE LIFT INSTRUCTIONS

The A•LOK® Lift Bar is designed to provide a safe and economical means of handling pre-cast manholes and other concrete structures. As lifting tension is applied, the lift pins rotate 90 degrees in the A•LOK® Insert to a locked position for safe handling. A•LOK® meets OSHA 5:1 safety factor. PLEASE NOTE: Lift Bar, pins and chains should be vertical with manhole when lifting.

TECHNICAL DATA CHART:

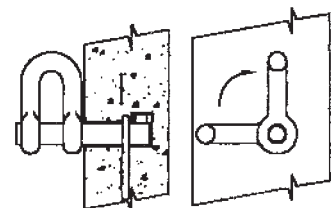
LIFT BAR	LIFT INSERTS	WORKING LOAD (lb.)
48" Ø 5" WALL	1095 (2)	9000
60" Ø 6" WALL	1097 (2)	13,000



TECHNICAL DATA CHART:

LIFT PIN No.	WORKING LOAD/PIN (lb.)
1095	4500
1096	3400
1097	6500
1098	2000

NOTE: Lift bar working load observing Code of Federal Regulations 29 CFR 1926.704 (d) 29 CFR 1926.251 (a)(4)



WARNING: Serious harm or death may result from safety hazards caused by improper use and installation of this product. Use of this product in applications other than those stated should first be carefully tested prior to general production use. Testing must accurately represent intended use, with full consideration to all field conditions and factors of safety. The safe working load of this product should always be observed. PLEASE NOTE: A LIFT BAR SHOWING ANY SIGNS OF DEFORMATION OR WEAKNESS SHOULD BE DISCARDED.



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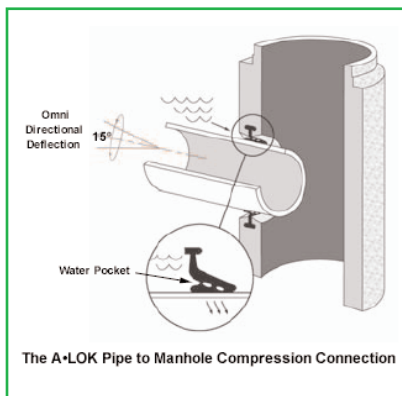


INCOMPARABLE PIPE-TO-MANHOLE CONNECTORS FOR SANITARY SYSTEMS

X-CEL

● A•LOK X-CEL

Designed to produce a guaranteed watertight seal between pipe and concrete, the **A•LOK X-CEL** flexible pipe-to-manhole connector provides maximum performance on the job site. Its unique design not only saves valuable project time, but also ensures longevity and offers unsurpassed environmental benefits.



A•LOK X-CEL connectors prevent infiltration and ex-filtration into wastewater or stormwater systems, and are installed in the precast structure in a way that does not require coring or placement after the base component is cast. This eliminates residual waste from coring, disposal of the slugs or wasted raw material utilization or energy. Once cast-in, the connector becomes an integral component of the structure wall.

Based on the traditional **A•LOK** connector, the **X-CEL's** enhanced features improve performance. Take the patented "water pocket" for example, which utilizes the untapped pressure of ground water to exert a clamping force around the connector and pipe, allowing the connector to perform in deeper installations.

Demonstrated in tests higher than 15 psi of hydrostatic water pressure, the **X-CEL's** unique design provides 45 percent more rubber contact with the pipe, allowing for greater pipe deflection.

● MATERIAL

Molded or extruded from compounds formulated for wastewater applications and engineered to conform to the requirements of section 4.1.1 of ASTM C-923, the standard rubber connector is available in alternative compounds upon request. Contact an **A•LOK** representative regarding special applications, such as the presence of hydrocarbons.

● KEY ADVANTAGES

The **A•LOK X-CEL** offers distinct advantages for engineers, specifiers, precasters and municipalities. An enhanced profile gives the connector 45% greater rubber contact with the pipe, thus allowing the pipe to be deflected in excess of 10 degrees of omnidirectional deflection, all the while maintaining a watertight seal. These enhancements allow for more flexibility to compensate for pipe shear due to settlement or ground movement.

● KEY ADVANTAGES (continued)

On larger-diameter pipe, where size prohibits a gasket from being installed in a flat plane, the **X-CEL** can be configured for casting in a curve with the connector staying perpendicular to the center line of the pipe. Discovered through years of extensive research and development, the configurations cause no loss of compression or deflection.

Functioning on pure compression, the **X-CEL** allows for fast and easy field installation. After the connector and pipe are cleaned and lubricated, the pipe is simply centered in the connector and inserted. Backfilling can be done immediately, thus enhancing project safety and overcoming the typical problems of water, running sand and other unstable trench conditions.

For Specifiers, the **X-CEL** connector offers a guaranteed solution to the age-old containment system problem of the best way to connect pipes and concrete structures. Precasters using **X-CEL** connectors experience increased satisfaction due to their ability to offer a complete watertight, guaranteed product, while municipalities that install **X-CEL** will ultimately spend less on road repair by avoiding the possibility of pot/sink holes that are often the result of leaking, non-connected, systems.

● PRODUCT REFERENCES

A.) ASTM C-923

Resilient Connector Between Reinforced Concrete Manholes Structures, Pipe and Laterals.

B.) ASTM C-1244

Standard Test Method For Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test

C.) ASTM C-478

Standard Specification for Precast Reinforced Concrete Manhole Sections

● PERFORMANCE STANDARD

The **A•LOK X-CEL** guaranteed Connector meets or exceeds all material and test requirements outlined in ASTM C-923: *"Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals."*

Molded or extruded from compounds formulated for wastewater applications, the standard rubber connector is engineered to confirm with the requirements of section 4.1.1 of ASTM C-923. Alternative compounds are available upon special request.

● PERFORMANCE STANDARD (continued)

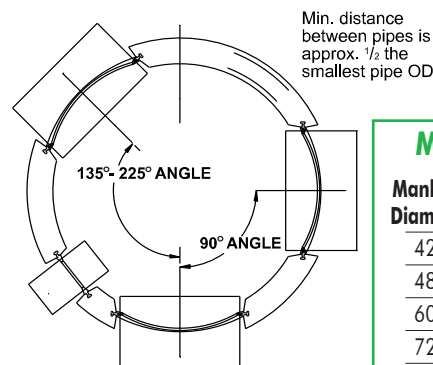
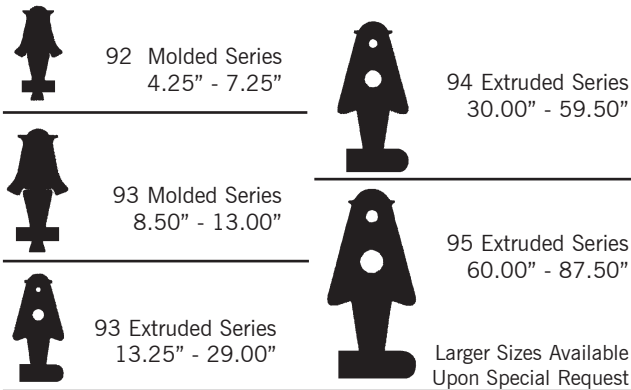
RESILIENT TEST REQUIREMENTS OF A.S.T.M. C-923

TEST	RESULTS	ASTM METHOD
Chemical resistance 1 N Sulfuric acid 1 N Hydrochloric Acid	no weight loss no weight loss	at 22°C for 48h
Tensile strength	1200 psi or 8.5 MPa, min	D 412
Elongation at break	350% min.	
Hardness	±5 from mfg's. specified hardness	D 2240 (Shore A durometer)
Accelerated oven-aging	decr. of 15%, max. of original tensile strength, decr. of 20% max. of elongation	D 573, 70±1°C for 7 days
Compression set	decr. of 25%, max. of original deflection	D 395, Method B, at 70°C for 22h
Water absorption	increase of 10%, max. of original by weight	D 471, immerse 0.75 by 2-in. or 19 by 25-mm Specimen in distilled water at 70°C for 48h
Ozone resistance	rating 0	D 1171
Low-temp brittle point	no fracture at -40°C	D 746
Tear resistance	200 lbf/in. or 34 kn/m	D 624, Method B

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● DIMENSIONAL DATA

A•LOK X-CEL Cross Sections / Pipe Size OD's



MAX. PIPE SIZE OD's

MAX. PIPE SIZE OD's

Manhole Diameter	135° - 225° Pipe Angle	90° Pipe Angle
42"	26.5"	22.0"
48"	31.5"	25.0"
60"	42.0"	32.0"
72"	52.5"	38.0"
84"	59.5"	44.0"
96"	73.5"	50.0"
108"	76.0"	56.0"
120"	85.0"	62.0"

● PRODUCT SPECIFICATIONS

A flexible pipe to manhole connector shall be used whenever a pipe penetrates into a precast concrete manhole or structure. The connector shall be the **A•LOK X-CEL CONNECTOR** as manufactured by **A•LOK PRODUCTS, INC.**, Tullytown, PA, or approved equal.

The design of the connector shall provide a flexible, watertight seal between the pipe and concrete structure. The connector shall assure that a seal is made between:

(1) The connector and the structure wall by casting the connector integrally with the structure wall during the manufacturing process in a manner that it will not pull out during pipe coupling. The connector shall also be capable of being cast into a round structure by curving the connector in a manner that allows it to remain centrally located within the structure wall and perpendicular to the pipe. This configuration will result in no loss of seal or deflection of pipe entering a concrete structure.

(2) The seal between the connector and the pipe shall be made by the compression of the connector between the outside circumference of the pipe and the interior hole opening of the structure. The connector shall be the only component to affect the seal between the pipe and structure.

The connector shall be made from materials that conform to the physical and chemical requirements outlined in Section 4, "Materials and Manufacture" of ASTM C-923 Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals, and the overall design will meet or exceed Section 7, "Test Methods and Requirements" of ASTM C-923.

The connector shall be sized specifically for the type of pipe being used and shall be installed in accordance with the recommendations of the manufacturer.

INSTALLATION INSTRUCTIONS

STEP 1:

Confirm that the pipe surface is smooth, clean and free of foreign materials, chips, gouges and form seams due to manufacturing or handling. Slightly bevel any sharp or blunt edges caused by the cutting of the pipe.

STEP 2:

Lubricate the connector and the entire section of the pipe that will be inserted into the connector. The chart below lists A-LOK's minimum lubrication length "L".

PIPE SIZE	MIN. LUBRICATION LENGTH "L"
4" - 15"	12"
16" - 18"	18"
21" & Larger	24"

STEP 3:

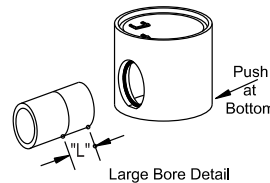
Center the pipe and connector square to each other and insert the pipe into the connector using a bar or back hoe depending on the size. Once the pipe is coupled with the connector, deflect the structure or pipe to achieve the proper angle.

WARNING

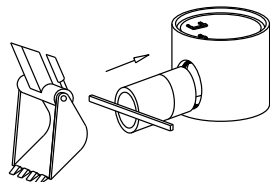
To ensure the A-LOK X-CEL Connector remains a flexible watertight connector, it is A-LOK Products, Inc. strong recommendation that no mortar be placed between the pipe and wall of the concrete structure. The use of mortar in this area would decrease the effectiveness of the connector to compensate for shear caused by settlement or ground movement.

NOTE:

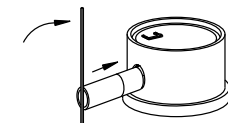
To find approximate subgrade, measure from the outside base of the structure to the junction of the connector and flat spot. Then add the wall thickness of the pipe plus 1/4 inch.



Large Bore Detail

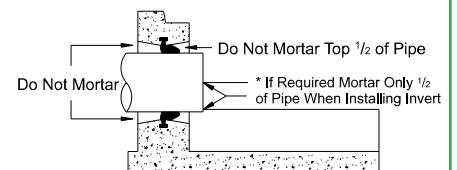


Small Bore Detail



CAUTION:

When installing pipe stubs for future pipeline installation, all stubs must be properly restrained to prevent any movement by means other than the **A•LOK X-CEL Connector**.





The Company With Connections®



PIPE TO MANHOLE CONNECTOR FOR SANITARY SYSTEMS

Z•LOK CAST IN BOOT CONNECTOR

● Z•LOK PIPE TO MANHOLE CONNECTOR

The **Z•LOK Pipe to Manhole Connector** is a flexible connector specifically engineered to produce a positive watertight seal for pipes entering precast concrete structures and the structure itself. Its heavier wall is designed to provide the highest performance. The **Z•LOK CONNECTOR** is manufactured to meet or exceed the requirements set forth in ASTM C-923 titled *"Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals"*.



● MATERIAL

The **Z•LOK CONNECTOR** is molded from an EPDM compound engineered to conform with the requirements of section 4.1.1 of ASTM C-923. Alternative compounds are available for unusual applications upon special order.

All stainless steel hardware is in compliance with section 4.2, *"Mechanical Devices"* of ASTM C-923.

● KEY ADVANTAGES

The **Z•LOK CONNECTOR** assures a positive watertight connection and provides up to 25° of omnidirectional deflection and 1.50" of vertical or horizontal movement without loss of seal, providing greater flexibility in the design and installation of pipelines and structures. These design features of the **Z•LOK CONNECTOR** prevent infiltration due to shear caused by settlement or ground movement.

The inner rubber O-ring design eliminates rubber wrinkling, compensates for pipe irregularity and wall thickness insuring a watertight seal.

The unique bi-directional design, permits the **Z•LOK CONNECTOR** take-down clamp to be fastened from either the inside or outside of the structure. Once fastened, immediate backfilling is possible enhancing project safety and overcomes the normal problems encountered with water, running sand and other unstable trench conditions.

When casting the **Z•LOK CONNECTOR** into the structure, making it an integral part of the wall, 50% of the opportunity for infiltration is eliminated.

● PRODUCT REFERENCES

A.) ASTM C-923

Resilient Connector Between Reinforced Concrete Manholes Structures, Pipe and Laterals.

B.) ASTM C-1244

Standard Test Method For Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test

C.) ASTM C-478

Standard Specification for Precast Reinforced Concrete Manhole Sections

● PERFORMANCE STANDARD

The **Z•LOK Connector** meets or exceeds all material and test requirements of ASTM C-923: *"Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals"*.

See following chart:

RESILIENT TEST REQUIREMENTS OF A.S.T.M. C-923

TEST	RESULTS	ASTM METHOD
Chemical resistance 1 N Sulfuric acid 1 N Hydrochloric Acid	no weight loss no weight loss	at 22°C for 48h
Tensile strength	1200 psi or 8.5 MPa, min	D 412
Elongation at break	350% min.	
Hardness	±5 from mfg's. specified hardness	D 2240 (Shore A durometer)
Accelerated oven-aging	decr. of 15%, max. of original tensile strength, decr. of 20% max. of elongation	D 573, 70±1°C for 7 days
Compression set	decr. of 25%, max. of original deflection	D 395, Method B, at 70°C for 22h
Water absorption	increase of 10%, max. of original by weight	D 471, immerse 0.75 by 2-in. or 19 by 25-mm Specimen in distilled water at 70°C for 48h
Ozone resistance	rating 0	D 1171
Low-temp brittle point	no fracture at -40°C	D 746
Tear resistance	200 lbf/in. or 34 kn/m	D 624, Method B

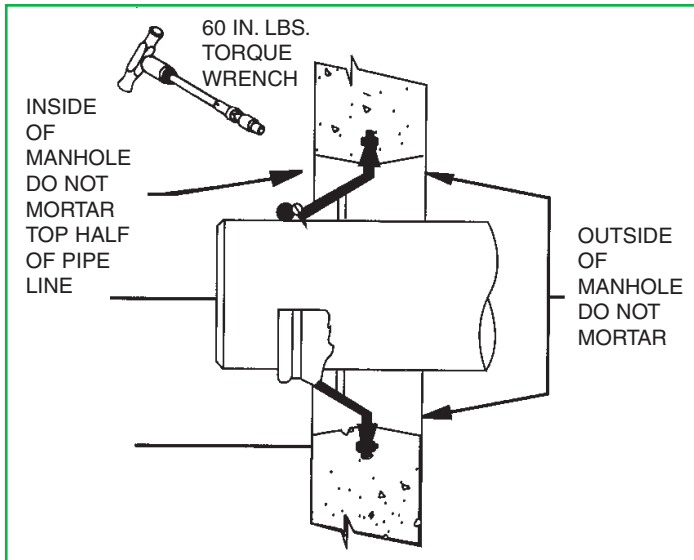
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PART 6 • DIMENSIONAL DATA

Z-LOK RING NO.	PIPE O.D. MIN.	INCHES MAX.	CLAMP NUMBER
C107-1	1.25"	1.75"	CL-040
C107-2	2.00"	2.50"	CL-040
C107-3	2.75"	3.75"	CL-088
C107-4	4.25"	6.25"	CL-128
C107-6	6.25"	8.25"	CL-128
F208-8	8.25"	9.10"	CL-152
C107-8	8.25"	10.25"	CL-188
C107-10	10.25"	12.25"	CL-188
C107-12	12.25"	14.25"	CL-248
C107-15	14.25"	16.00"	CL-EV15-18-L
C107-16	16.25"	18.00"	CL-EV15-18-L
C107-18	18.25"	21.25"	CL-EV15-18-L

NOTE:

- F208-8 GASKET CAN BE USED ON C107-6 MANDREL
- WHEN ORDERING CLAMPS, PIPE OD'S ARE REQUIRED
- C107-1 AND C107-2 USE THE SAME MANDREL
- C107-16 AND C107-18 USE THE SAME MANDREL
- REDI-LOK CLAMP IS REQUIRED FOR C107-15 THROUGH C107-18 GASKETS



WARNING: To ensure the **Z-LOK Connector** remains a flexible watertight connector, it is A•LOK Products, Inc. strong recommendation that **no mortar** be placed between the pipe and wall of the concrete structure. The use of mortar in this area would decrease the effectiveness of the connector to compensate for shear caused by settlement or ground movement.

NOTE: The 60 in.-lb. Torque Wrench is available through A•LOK Products, Inc.

CAUTION: When installing pipe stubs for future pipeline installation, all stubs must be properly restrained to prevent any movement by means other than the Z-LOK Connector.

**ANY QUESTIONS REGARDING Z-LOK CONNECTOR,
PLEASE CALL 1-800-822-2565**

PRODUCT SPECIFICATIONS

A flexible pipe to manhole connector shall be used whenever a pipe penetrates into a precast concrete manhole or structure.

The connector shall be the **Z•LOK CONNECTOR** as manufactured by **A•LOK PRODUCTS, INC.**, Tullytown, PA, or approved equal.

The design of the connector shall provide a flexible, watertight seal between the pipe and concrete structure. The connector shall assure that a seal is made between:

(1) The connector and the structure wall by casting the connector integrally with the structure wall during the manufacturing process in a manner that it will not pull out during pipe coupling.

(2) The seal between the connector and the pipe shall be made by compressing the connector against the outside circumference of the pipe by means of a stainless steel take-down band.

The connector shall be made from materials that conform to the physical and chemical requirements outlined in Section 4, "Materials and Manufacture" of ASTM C-923 "Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals", and the overall design will meet or exceed Section 7, "Test Methods and Requirements" of ASTM C-923.

The connector shall be sized specifically for the type of pipe being used and shall be installed in accordance with the recommendations of the manufacturer.

INSTALLATION INSTRUCTIONS

Z-LOK CONNECTOR – INWARD POSITION



STEP 1:

Bevel pipe.
Clean connector.
Clean pipe of dirt & debris.

INSIDE Z-LOK CONNECTOR INSTALLATION



STEP 2:

Center pipe in connector and push through.

STEP 3:

Attach proper size clamp beside o-ring then center pipe in connector and **VERY IMPORTANT** tighten clamp with torque wrench to 60 inch pounds.

OUTSIDE INSTALLATION



STEP 4:

When installing a Z-LOK connector in the outside of the manhole position pull pipe back out after inserting so the connector flips outward, then **VERY IMPORTANT** - center pipe in connector and tighten the take down clamp to 60 inch pounds with a torque wrench.



The Company With Connections®



A BOOT STYLE CONNECTOR FOR SANITARY OR STORMWATER SYSTEMS

Z•LOK STM

Z•LOK STM

The **Z•LOK STM CONNECTOR** was designed by A-LOK Products, Inc. to address the need for a boot style connector for large diameter pipe. This makes it ideally suited for sanitary applications, using smooth wall pipe or corrugated pipe with a factory installed smooth over sleeve and stormwater applications, with corrugated or smooth wall pipe. Available for 6"-102" pipes.

The **Z•LOK STM Pipe to Manhole Connector** is a flexible connector specifically engineered to produce a positive watertight seal for pipes entering precast concrete structures and the structure itself.



**Z•LOK STM Connector
cast into storm structure.**

MATERIAL

The **Z•LOK STM CONNECTOR** is molded from a polyisoprene compound engineered to conform with the requirements of section 4.1.1 of ASTM C-923. Alternative compounds are available for unusual applications upon special order.

All stainless steel hardware is in compliance with section 4.2, "Mechanical Devices" of ASTM C-923.

KEY ADVANTAGES

The **Z•LOK STM CONNECTOR** assures a positive watertight connection and provides up to 15" of omnidirectional deflection and 1.50" of vertical or horizontal movement without loss of seal, providing greater flexibility in the design and installation of pipelines and structures. These design features of the **Z•LOK STM CONNECTOR** prevent infiltration due to shear caused by settlement or ground movement.

Once fastened, immediate backfilling is possible enhancing project safety and overcomes the normal problems encountered with water, running sand and other unstable trench conditions.

When casting the **Z•LOK STM CONNECTOR** into the structure, making it an integral part of the wall, 50% of the opportunity for infiltration is eliminated.

PRODUCT REFERENCES

A.) ASTM C-923

Resilient Connector Between Reinforced Concrete Manholes Structures, Pipe and Laterals.

B.) ASTM C-1478

Resilient Connectors Between Reinforced Concrete Storm Sewers Structures, Pipes and Laterals.

C.) ASTM C-1244

Standard Test Method For Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.

PERFORMANCE STANDARD

The **Z•LOK STM Connector** meets or exceeds all material and test requirements of ASTM C-923-00: "Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals".

See following chart:

RESILIENT TEST REQUIREMENTS OF A.S.T.M. C-923

TEST	RESULTS	ASTM METHOD
Chemical resistance 1 N Sulfuric acid 1 N Hydrochloric Acid	no weight loss no weight loss	at 22°C for 48h
Tensile strength	1200 psi or 8.5 MPa, min	D 412
Elongation at break	350% min.	
Hardness	±5 from mfg's. specified hardness	D 2240 (Shore A durometer)
Accelerated oven-aging	decr. of 15%, max. of original tensile strength, decr. of 20% max. of elongation	D 573, 70±1°C for 7 days
Compression set	decr. of 25%, max. of original deflection	D 395, Method B, at 70°C for 22h
Water absorption	increase of 10%, max. of original by weight	D 471, immerse 0.75 by 2-in. or 19 by 25-mm Specimen in distilled water at 70°C for 48h
Ozone resistance	rating 0	D 1171
Low-temp brittle point	no fracture at -40°C	D 746
Tear resistance	200 lb/in. or 34 kN/m	D 624, Method B

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● PRODUCT SPECIFICATIONS

A flexible pipe to manhole connector shall be used whenever a pipe penetrates into a precast concrete manhole or structure.

The connector shall be the **Z•LOK STM CONNECTOR** as manufactured by **A•LOK PRODUCTS, INC.**, Tullytown, PA, or approved equal.

The design of the connector shall provide a flexible, watertight seal between the pipe and concrete structure. The connector shall assure that a seal is made between:

(1) The connector and the structure wall by casting the connector integrally with the structure wall during the manufacturing process in a manner that it will not pull out during pipe coupling.

(2) The seal between the connector and the pipe shall be made by compressing the connector against the outside circumference of the smooth wall pipe or against the inside walls of the valley of the corrugated pipe by means of a stainless steel take-down clamp.

The connector shall be made from materials that conform to the physical and chemical requirements outlined in Section 4, "Materials and Manufacture" of ASTM C-923 "Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals", and the overall design will meet or exceed Section 7, "Test Methods and Requirements" of ASTM C-923, using smooth wall pipe or corrugated pipe with a factory installed smooth over sleeve, and ASTM C-1478 with smooth wall pipe or corrugated pipe.

The connector shall be sized specifically for the type of pipe being used and shall be installed in accordance with the recommendations of the manufacturer.

● FIELD INSTALLATION INSTRUCTIONS



CORRUGATED PIPE

FIELD INSTALLATION

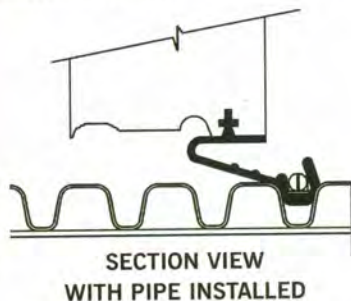
STEP 1:
Z•LOK STM Connector cast into storm structure.



STEP 2:
Pipe is centered through the connector. The Stainless Steel Clamp is centered above the valley of pipe making sure the fastening points are positioned in the two cutout areas of the rubber connector.



STEP 3:
Stainless Steel Clamp is **tightened equally** about the take-up point to 60 in./lbs. This action compresses the rubber against the side walls of the pipe valley and a watertight connection is formed.



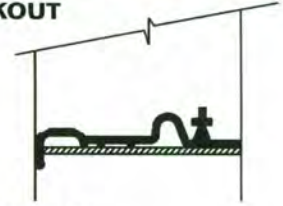
IMPORTANT: After groove of pipe is centered in gasket tighten stainless steel clamp equally to 60 in. lbs. with an A•LOK Torque Wrench.

● PRECAST INSTALLATION INSTRUCTIONS

ONE-PIECE WEDGE KNOCKOUT

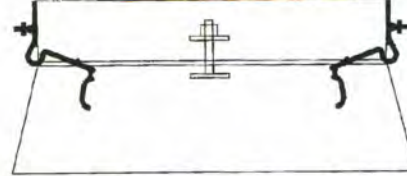
For 6" Flatwall

Pull connector over one-piece Wedge Knockout Hole Former as shown.



TWO-PIECE MANDREL

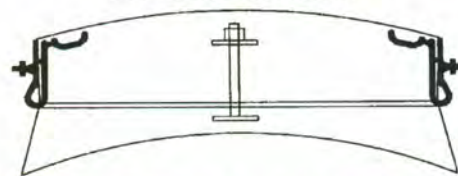
For 8" Flatwall and above



1. Stretch gasket over outside mandrel half, with cut-outs positioned at 3 and 9 o'clock.
2. Force gasket down inside mandrel before installing in form.
3. Use coil nut to tighten gasket and mandrels together.

TWO-PIECE MANDREL

For Round Manholes



● FIELD INSTALLATION INSTRUCTIONS



SMOOTH WALL PIPE

FIELD INSTALLATION

STEP 1:
Z•LOK STM Connector cast into storm structure.

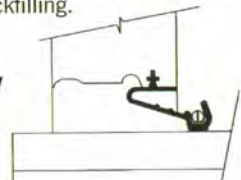


STEP 2:
Pipe is inserted and centered within the connector to obtain proper mechanical seal.



STEP 3:
Stainless Steel Clamp is tightened equally about the take-up point to 60 in./lbs, insuring a watertight connection. This should be done prior to any pipe deflection or backfilling.

SECTION VIEW WITH PIPE INSTALLED



Z-LOK STM CONNECTORS

SMOOTH WALL PIPE DATA

FLATWALL CONNECTORS ARE MARKED (S-F) ROUNDWALL CONNECTORS ARE MARKED (S-R)
SMOOTHWALL Z-LOK STM CONNECTORS DO NOT HAVE NOTCHES AT 3 & 9 TO TIGHTEN DOWN CLAMPS

Z-LOK STM PART #	MIN. PIPE O.D.	MAX. PIPE O.D.	Z-LOK STM MANDREL PART#	Z-LOK STM CLAMP PART#
ZS-8016-S-F ZS-8016-S-R	14.00"	15.00"	SM-8016-F SM-8016-R	CL-128 + CL-188
ZS-8019-S-F ZS-8019-S-R	16.00"	17.00"	SM-8019-F SM-8019-R	CL-128 + CL-188
ZS-8020-S-F ZS-8020-S-R	17.00"	18.00"	SM-8020-F SM-8020-R	CL-128 + CL-188
ZS-8021-S-F ZS-8021-S-R	18.00"	19.00"	SM-8021-F SM-8021-R	CL-128 + CL-188
ZS-8022-S-F ZS-8022-S-R	19.00"	20.00"	SM-8022-F SM-8022-R	CL-128 + CL-188
ZS-8023-S-F ZS-8023-S-R	20.00"	21.00"	SM-8023-F SM-8023-R	CL-088 + CL-248
ZS-8024-S-F ZS-8024-S-R	21.00"	22.00"	SM-8024-F SM-8024-R	CL-088 + CL-248
ZS-8025-S-F ZS-8025-S-R	22.00"	23.00"	SM-8025-F SM-8025-R	CL-128 + CL-248
ZS-8026-S-F ZS-8026-S-R	23.00"	24.00"	SM-8026-F SM-8026-R	CL-188 + CL-248
ZS-8027-S-F ZS-8027-S-R	24.00"	25.00"	SM-8027-F SM-8027-R	CL-188 + CL-248
ZS-8028-S-F ZS-8028-S-R	25.00"	26.00"	SM-8028-F SM-8028-R	CL-248 (2)*
ZS-8029-S-F ZS-8029-S-R	26.00"	27.00"	SM-8029-F SM-8029-R	CL-248 (2)*
ZS-8030-S-F ZS-8030-S-R	27.00"	28.00"	SM-8030-F SM-8030-R	CL-248 (2)*
ZS-8031-S-F ZS-8031-S-R	28.00"	29.00"	SM-8031-F SM-8031-R	CL-248 (2)*
ZS-8032-S-F ZS-8032-S-R	29.00"	30.00"	SM-8032-F SM-8032-R	CL-248 (2)*
ZS-8033-S-F ZS-8033-S-R	30.00"	31.00"	SM-8033-F SM-8033-R	CL-248 (2)*
ZS-8034-S-F ZS-8034-S-R	31.00"	32.00"	SM-8034-F SM-8034-R	CL-040 + CL-248 (2)*
ZS-8035-S-F ZS-8035-S-R	32.00"	33.00"	SM-8035-F SM-8035-R	CL-040 + CL-248 (2)*
ZS-8036-S-F ZS-8036-S-R	33.00"	34.00"	SM-8036-F SM-8036-R	CL-040 + CL-248 (2)*
ZS-8037-S-F ZS-8037-S-R	34.00"	35.00"	SM-8037-F SM-8037-R	CL-088 + CL-248 (2)*
ZS-8038-S-F ZS-8038-S-R	35.00"	36.00"	SM-8038-F SM-8038-R	CL-088 + CL-248 (2)*
ZS-8039-S-F ZS-8039-S-R	36.00"	37.00"	SM-8039-F SM-8039-R	CL-128 + CL-248 (2)*
ZS-8040-S-F ZS-8040-S-R	37.00"	38.00"	SM-8040-F SM-8040-R	CL-128 + CL-248 (2)*
ZS-8041-S-F ZS-8041-S-R	38.00"	39.00"	SM-8041-F SM-8041-R	CL-128 + CL-248 (2)*
ZS-8042-S-F ZS-8042-S-R	39.00"	40.00"	SM-8042-F SM-8042-R	CL-128 + CL-248 (2)*
ZS-8043-S-F ZS-8043-S-R	40.00"	41.00"	SM-8043-F SM-8043-R	CL-188 + CL-248 (2)*
ZS-8044-S-F ZS-8044-S-R	41.00"	42.00"	SM-8044-F SM-8044-R	CL-188 + CL-248 (2)*
ZS-8045-S-F ZS-8045-S-R	42.00"	43.00"	SM-8045-F SM-8045-R	CL-188 + CL-248 (2)*
ZS-8046-S-F ZS-8046-S-R	43.00"	44.00"	SM-8046-F SM-8046-R	CL-248 (3)*
ZS-8047-S-F ZS-8047-S-R	44.00"	45.00"	SM-8047-F SM-8047-R	CL-248 (3)*
ZS-8048-S-F ZS-8048-S-R	45.00"	46.00"	SM-8048-F SM-8048-R	CL-248 (3)*

NOTE: 2 PIECE MANDRELS MUST BE USED FOR FLATWALL STRUCTURES ABOVE 6" AND ALL ROUNDWALL STRUCTURES.
Z-LOK STM SMOOTHWALL CONNECTORS NEED BETWEEN 1-3 CLAMPS DEPENDING ON SIZE. SEE (*)

ANY QUESTIONS REGARDING Z•LOK STM CONNECTOR INSTALLATION, PLEASE CALL 1-800-822-2565

Z-LOK STM CONNECTORS

CORRUGATED PIPE DATA

FLATWALL CONNECTORS ARE MARKED (C-F) ROUNDWALL CONNECTORS ARE MARKED (C-R)
CORRUGATED Z-LOK STM CONNECTORS HAVE NOTCHES LOCATED AT 3 & 9 FOR TAKE-DOWN CLAMP ADJUSTMENT.

Z-LOK STM PART #	PIPE SIZE	MAX. O.D.	Z-LOK STM MANDREL PART#	Z-LOK STM CLAMP SIZE
ZS-8016-C-F ZS-8016-C-R	12" CPP	15.00"	SM-8016-F SM-8016-R	CL-EV12L
ZS-8019-C-F ZS-8019-C-R	15" CPP	17.75"	SM-8019-F SM-8019-R	CL-EV15-18L
ZS-8022-C-F ZS-8022-C-R	18" CPP	21.47"	SM-8022-F SM-8022-R	CL-EV15-18L
ZS-8029-C-F ZS-8029-C-R	24" CPP	27.80"	SM-8029-F SM-8029-R	CL-EV24L
ZS-8031-C-F ZS-8031-C-R	24" HANCOR ONLY	28.40"	SM-8031-F SM-8031-R	CL-EV24H
ZS-8039-C-F ZS-8039SCR	30" CPP	35.50"	SM-8039-F SM-8039-R	CL-EV30H
ZS-8045-C-F ZS-8045-C-R	36" CPP	41.75"	SM-8045-F SM-8045-R	CL-EV36H

CORRUGATED POLYETHYLENE PIPE (CPP) NEEDS THE EV CLAMP DESIGN.

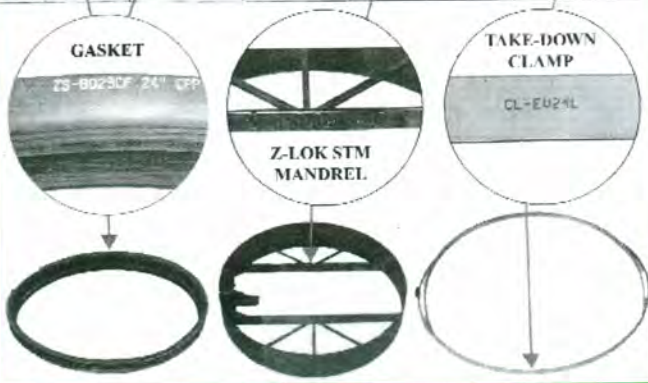
NOTE: NEED TO INDICATE WHEN ORDERING IF GASKETS ARE FOR ROUND OR FLATWALL

EXAMPLE: ZS-XXXX-C-F = CORRUGATED FOR FLATWALL STRUCTURES
 ZS-XXXX-C-R = CORRUGATED FOR ROUND STRUCTURES

NOTE: ZS-8031 WOULD BE FOR 24" HANCOR PIPE BECAUSE OF THE LARGER VALLEY ON THE PIPE.

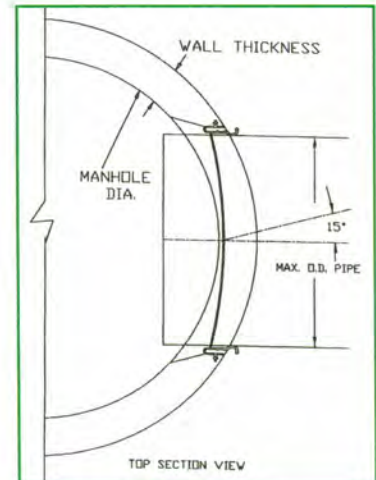
COMPONENT IDENTIFICATION FOR Z-LOK STM CONNECTORS

Z-LOK STM PART#	PIPE SIZE	MAX. O.D.	Z-LOK STM MANDREL PART #	Z-LOK STM CLAMP SIZE
ZS-8016-C-F ZS-8016-C-R	12" CPP	15.00"	SM-8016-F SM-8016-R	CL-EV12L
ZS-8019-C-F ZS-8019-C-R	15" CPP	17.75"	SM-8019-F SM-8019-R	CL-EV15-18L
ZS-8022-C-F ZS-8022-C-R	18" CPP	21.47"	SM-8022-F SM-8022-R	CL-EV15-18L
ZS-8029-C-F ZS-8029-C-R	24" CPP	27.80"	SM-8029-F SM-8029-R	CL-EV24L
ZS-8031-C-F ZS-8031-C-R	24" HANCOR ONLY	28.40"	SM-8031-F SM-8031-R	CL-EV24H
ZS-8039-C-F ZS-8039-C-R	30" CPP	35.50"	SM-8039-F SM-8039-R	CL-EV30H
ZS-8045-C-F ZS-8045-C-R	36" CPP	41.75"	SM-8045-F SM-8045-R	CL-EV36H



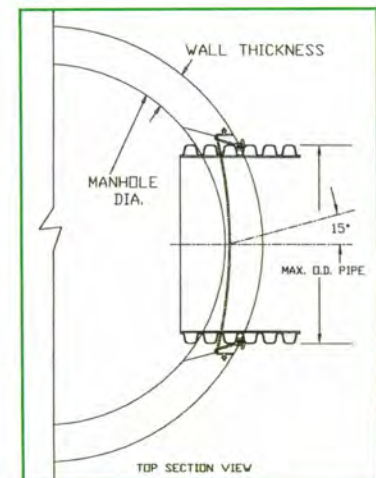
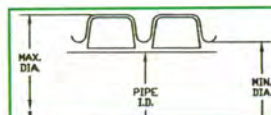
Smooth Wall Pipe

MANHOLE DIA.	MAX. O.D. PIPE
48" DIA. 5" WALL	28 IN.
60" DIA. 6" WALL	30 IN.
72" DIA. 7" WALL	37 IN.
84" DIA. 8" WALL	44 IN.
96" DIA. 9" WALL	51 IN.



Corrugated Pipe

MANHOLE DIA.	MAX. O.D. PIPE
48" DIA. 5" WALL	22 IN.
60" DIA. 6" WALL	30 IN.
72" DIA. 7" WALL	37 IN.
84" DIA. 8" WALL	42 IN.





CONSEAL™
CONCRETE SEALANTS INC.

Don't Just Seal It. ConSeal It!

ConWrap™ CS-212

POLYOLEFIN BACKED EXTERIOR JOINT WRAP

Membrane Waterproofing and Exterior Joint Wrap for Precast Concrete Joints – Meets ASTM C877

APPLICATIONS

For joints in: Box Culverts, Underground Concrete Vaults, Segmented Bridge Structures, Wastewater Structures and Arched Bridge Structures, Manholes. **Not intended for use in expansion joints or joints that move.**

SEALING PROPERTIES

- Excellent resistance to puncture, tear and abrasions.
- Aggressively bonds to concrete and metal structures.
- Provides a permanent flexible water and soil barrier.
- Will not shrink, harden or oxidize upon aging.
- Available in numerous standard sizes.
 - **Standard thicknesses: 0.065" (1.65mm) and 0.100" (2.54mm)**
 - **Standard widths: 4", 6", 8", 9", 12", 24", 36" and 48"**
- Custom widths and lengths available upon request.
- No priming normally necessary. When confronted with difficult installation conditions, such as wet concrete or temperatures below 40°F (4°C), priming the concrete will improve the bonding action. Consult Concrete Sealants for the proper primer to meet your application.
- Meets ASTM C877 Type III, Type A Specification

PHYSICAL PROPERTIES & CHEMICAL COMPOSITION

Description	Spec	Required	CS-212
Color			Black
Backing Band:			
Thickness, in.		0.004	0.004
Tensile Strength, min, psi, mach. direction	D882	4,000	4,158
Elongation at break, min, %, mach. direction	D882	100	107
Tear resistance, min, psi, mach. Direction	D624	1500	1508
Water absorption, max, %	D570	0.01	0.01
Butyl Rubber Adhesive:			
Thickness, in, min		0.030	0.060
Ash-inert Matter, %	D1278	30-50	35-45
Volatiles, %	C681	0.1-2.0	0.8-1.2
Specific Gravity	D792	1.15-1.50	1.20-1.30
Adhesion, lb/in	D903		4.2
Penetration at 77°F	D217	50-100 dmm	65-75 dmm
Hydrocarbon blend content, % by weight	D4	50-70	52 min
Ductility, @77°F, min.	D113	5.0	12 cm
Softening point, °F, min	D36	320°F	335°F



INSTALLATION GUIDELINES

The following procedures should be followed for optimum sealant performance.

- Clean the surface with a brush and remove any dirt, debris, flashing, or concrete high points, which could keep ConWrap CS-212 from adhering to the concrete.
- ConSeal recommends the use of surface primers, as primers improve adhesion. When using a primer, allow the primer to dry before placing sealant.
- ConSeal primers are specifically designed for use with ConSeal products. Contact ConSeal for the best primer for the projects specific application.
- To apply ConWrap to a horizontal joint, begin by removing the release paper from the adhesive side and apply the ConWrap to the concrete.
- Continue around the joint by removing the release paper as the roll of ConWrap is unrolled. Press the wrap firmly by hand against the entire surface as it is applied to assure full contact.
- Where joining two sections, or where two ends meet together, provide an overlap of approximately 2" and firmly press the overlapping strip onto the end of the underlying strip to seal the joint.

Reference Installation Instructions for "ConWrap (Exterior Joint Wrap)" for more detailed instructions.

LIMITED WARRANTY

This information is presented in good faith, but we cannot anticipate all conditions under which this information and our products, or the products of other manufacturers in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety and suitability of our products, either alone or in combination with other products. Users are advised to make their own tests to determine the safety and suitability of each such product or product combinations for their own purposes. It is the **users' responsibility** to satisfy himself as to the suitability and completeness of such information for this own particular use. We sell this product without warranty, and buyers and users assume all responsibility and liability for loss or damage arising from the handling and use of this product, whether used alone or in combination with other products.

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USA | CANADA +1.800.332.7325 | INTERNATIONAL +1.937.845.8776

VERSION: 7-APR-2022



CONCRETE SEALANTS, INC.
ISO 9001:2015 REGISTERED

**CONSEAL™**
Concrete Sealants INC.**CS102****Butyl Rubber Sealant For All Precast Structures;
Meets Specs.**

APPLICATIONS

For self-sealing joints in: Manholes, Concrete Vaults, Septic Tanks, Concrete Pipe, Box Culverts, Utility Vaults, Burial Vaults, and Vertical Panel Structures.

SEALING PROPERTIES

- Provides permanently flexible watertight joints.
- Low to high temperature workability: 30°F to 120°F (-1°C to 48°C)
- Rugged service temperature: -30°F to +200°F (-34°C to +93°C)
- Excellent chemical and mechanical adhesion to clean, dry surfaces.
- Sealed Joints will not shrink, harden or oxide upon aging.
- No priming normally necessary. When confronted with difficult installation conditions, such as wet concrete or temperatures below 40°F (4°C), priming the concrete will improve the bonding action. Consult Concrete Sealants for the proper primer to meet your application.

HYDROSTATIC STRENGTH

ConSeal CS-102 meets the hydrostatic performance requirement as set forth in ASTM C-990 section 10.1 (Performance requirement: 10psi for 10 minutes in straight alignment – in plant, quality control test for joint materials.)

SPECIFICATIONS

ConSeal CS-102 meets or exceeds the requirements of Federal Specification SS-S-210 (210-A), AASHTO M-198B, and ASTM C-990-91.



CONSEAL™
Concrete Sealants INC.

CS102

**Butyl Rubber Sealant For All Precast Structures;
Meets Specs.**

PHYSICAL PROPERTIES

	Spec	Required*	CS 102
Hydrocarbon blend content % by weight	ASTM D4 (mod.)	50% min.	51%
Inert mineral filler % by weight	AASHTO T111	30% min.	35%
Volatile Matter % by weight	ASTM D6	2% max.	1.2
Specific Gravity, 77°F	ASTM D71	1.15-1.50	1.25
Ductility, 77°F	ASTM D113	5.0 min.	10
Penetration, cone 77°F, 150 gm. 5 sec.	ASTM D217	50-100	55-60
Penetration, cone 32°F, 150 gm. 5 sec.	ASTM D217	40 mm	40-65
Flash Point, C.O.C., °F	ASTM D92	350°F min.	450°F
Fire point, C.O.C., °F	ASTM D92	375°F min.	475°F

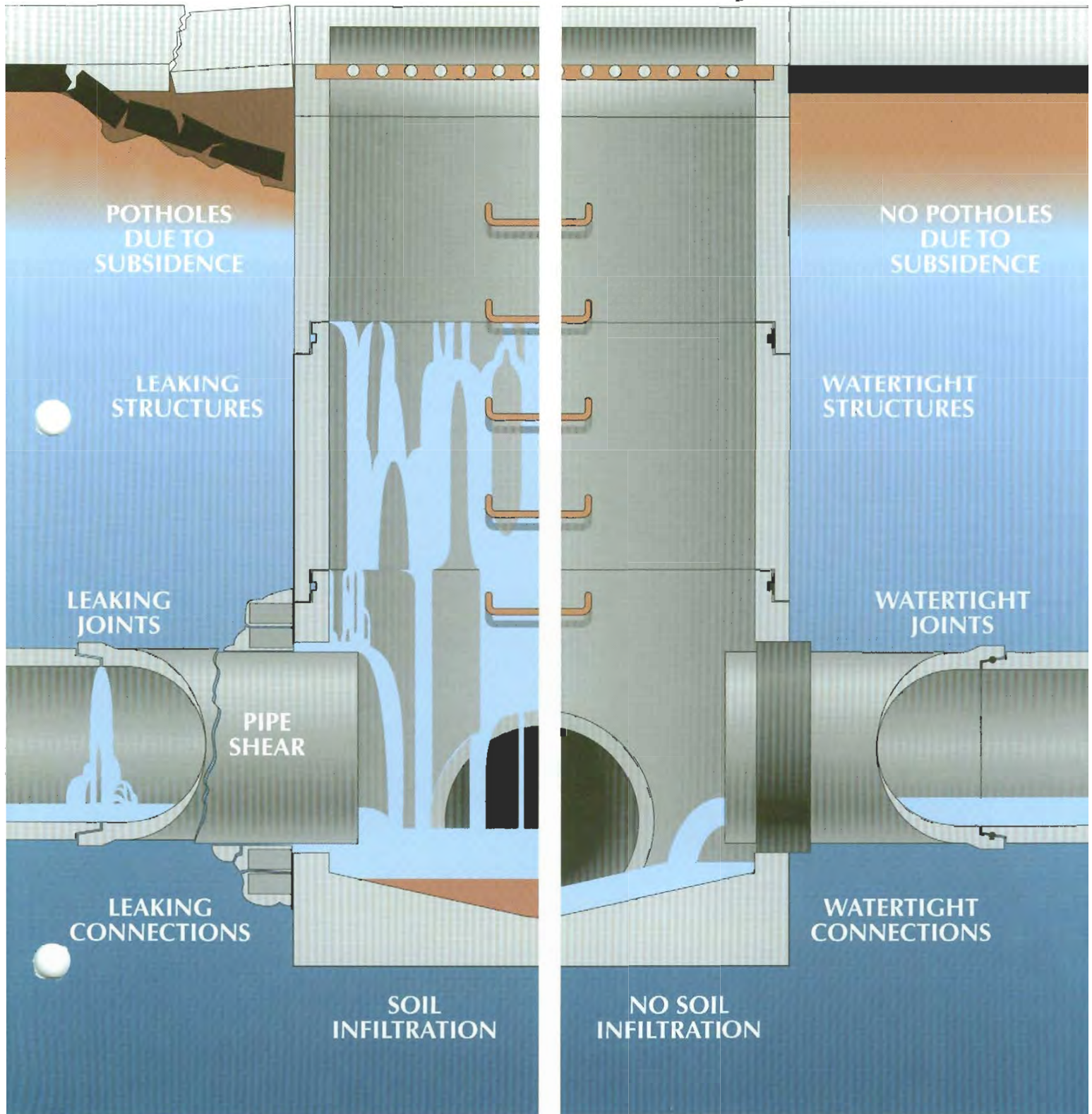
IMMERSION TESTING

- 30-Day Immersion Testing: No visible deterioration when tested in 5% Caustic Potash, 5% Hydrochloric Acid, 5% Sulfuric Acid, and 5% saturated Hydrogen Sulfide. *
- One Year Immersion Testing: No visible deterioration when tested in 5% Formaldehyde, 5% Formic Acid, 5% Sulfuric Acid, 5% Hydrochloric Acid, 5% Sodium Hydroxide, 5% Hydrogen Sulfide and 5% Potassium Hydroxide.
- Requirements of ASTM C-990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

LIMITED WARRANTY

This information is presented in good faith, but we cannot anticipate all conditions under which this information and our products, or the products of other manufacturers in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety and suitability of our products, either alone or in combination with other products. Users are advised to make their own tests to determine the safety and suitability of each such product or product combinations for their own purposes. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for this own particular use. We sell this product without warranty, and buyers and users assume all responsibility and liability for loss or damage arising from the handling and use of this product, whether used alone or in combination with other products.

Watertight Storm Sewers Save Money



Engineers, Municipalities Watertight Storm



Marc Eshelman, P.E.
Special Projects Group Leader
P. B. Booker Associates Inc.
St. Louis, MO

"Connectors, whether they are flexible or not, seldom cost more than 3% of the total job, but the greatest expense of not using flexible connections comes later, if those connections start to leak. Then, you have the cost of going back and uncovering the structure, fixing the problem, backfilling, and repairing the street.

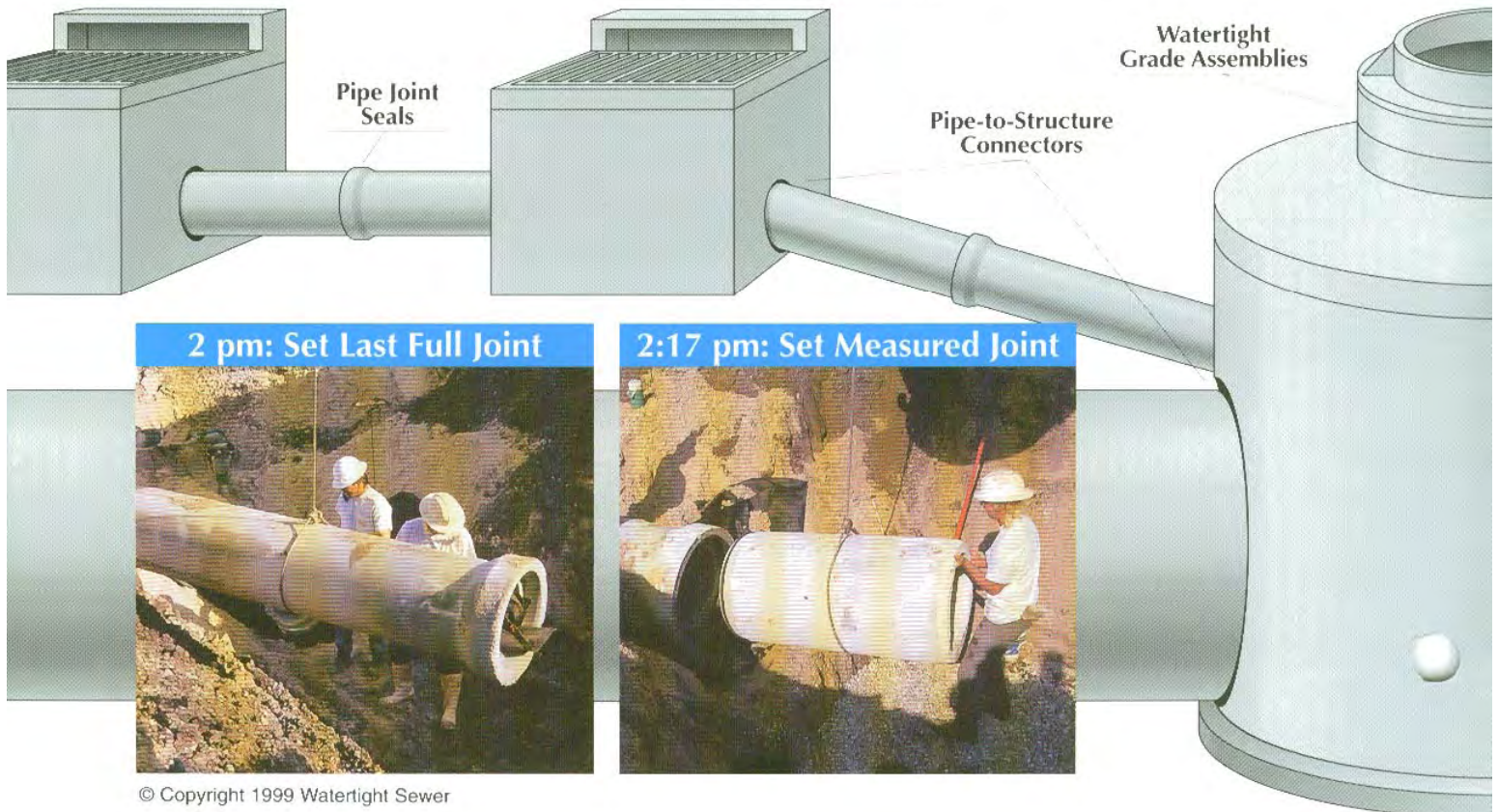
"Just stopping a leak can be expensive, but repairing a sheared pipe or pavement failure is very expensive. A pavement failure due to subsidence can cost several thousand dollars to repair, plus the danger and disruption. If it's severe, it could cost much more.

"We have found that when we use flexible connectors, we are less dependent on field conditions and construction methods. We have more confidence in products which have been manufactured in a controlled environment, and we have found that installation quality is more consistent than with brick and mortar construction.

"A flexible connection is an important advantage. Sometimes the soil material around a structure will shift or settle. If you have a tightly grouted connection, you run the risk of cracking the structure or the pipe. At the very least, the mortar can crack and the watertight seal will be lost."



Ronald L. Moore
Materials Engineer
Metropolitan St. Louis Sewer District
St. Louis, MO

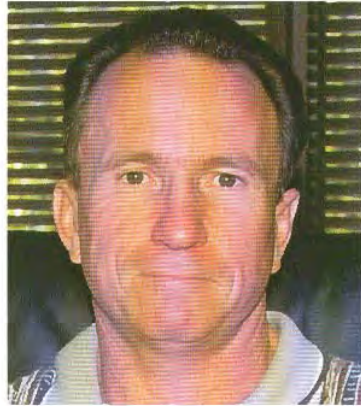


es, and Contractors agree Sewers Save Money

"At Metropolitan St. Louis Sewer District, we have insisted on watertight storm sewer systems for over 10 years. Watertight systems prevent erosion and subsidence around structures, and eliminate the high cost of repairing damage to streets and sidewalks caused by leaks. That's the main reason we specify that watertight, flexible connectors must be used in all connections in our storm sewer system.

"If you have a failure at a structure in a street and you have to dig down and fix the connection, the minimum cost is about \$1,500 and it can run up to two or three times that much. That type of repair used to be common, but I haven't seen one needed anywhere we have used flexible connectors.

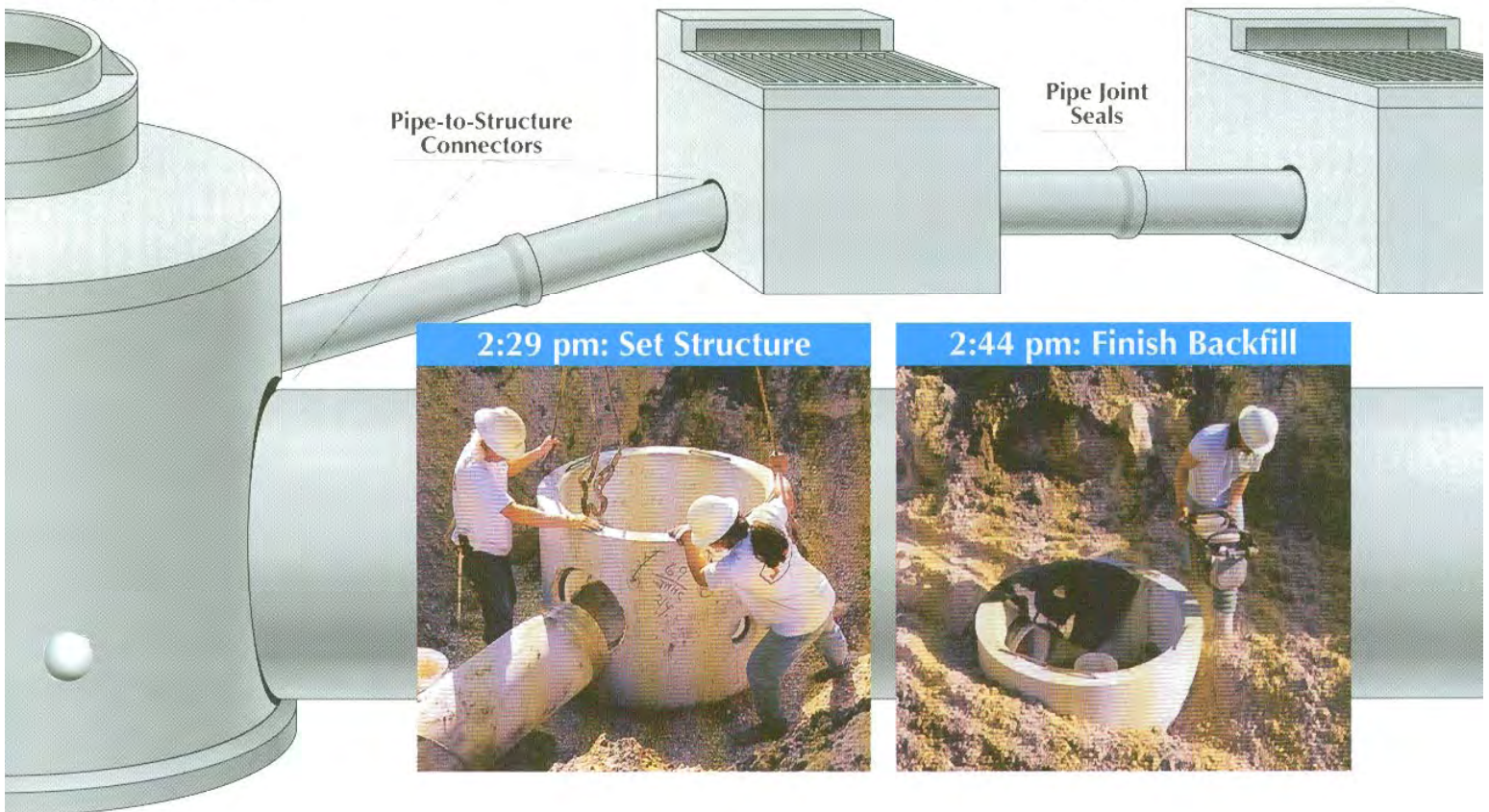
"I believe when structures are precast with flexible connectors in place, contractors can make pipe connections to those structures much easier than before. In the past, contractors would have to mix and match mortar and bricks to close the holes between pipes and structures. Now, they just connect the pipe right into the structure and they have a watertight seal. That means that projects take less time than they used to, and we have fewer open excavations."



Steve Blomeley
President
JMHC, Inc.
Longwood, FL

"There are so many benefits of using flexible connectors that I would be hard-pressed to think of them all. First of all, it's hard to accurately estimate the cost of using brick and mortar connectors. It's different with every crew, every job, and every structure. But, I know almost exactly what it will cost to use flexible connectors. And, I know I will not have to go back later and stop leaks. Plus, I'll get at least 10% more total production when I use the flexible connectors, often 20%. That gives me a competitive advantage.

"We cost a structure almost as if it were another piece of pipe. We include the cost of the structure, the connectors, and whatever materials go under it. The materials then, are a fixed cost. You don't have the variables of lost bricks, cement that gets caught in the rain, whether or not water is available, how long you'll have to wait before you backfill, and the other variable costs that go into brick and mortar connections. We have very identifiable, fixed costs. That's important if you have 100 structures on a job. With flexible connectors, you are not leaving yourself open to how long it might take to seal up a 48-inch pipe, how much material might be used or lost, and the quality of the connection."



The table below is a comparison of the tangible and intangible costs associated with making one connection between an 18"-diameter concrete pipe and a precast concrete structure.

Brick and Mortar		Flexible Connector	
Bricks Used	\$ 18.00	Flexible Connector	\$ 180.00
Bricks Wasted	\$\$.\$		
Mortar Used	30.00		
Mortar Wasted	\$\$.\$		
Water	2.00		
Labor	75.00		
Additional Supervision	15.00		
Additional Bookkeeping	7.50		
Callbacks to Seal Leaks	50.00	Average per occurrence	
<i>Lost Production due to:</i>			
De-watering	\$\$.\$		
Waiting for Mortar to Set	150.00		
Backtracking Machinery	50.00		
<i>Intangible Costs:</i>			
Prolonged Danger of Open Trench	\$\$.\$		
Lost Momentum of Crew	\$\$.\$		
Property Owner Dissatisfaction	\$\$.\$		
<i>Probable Future Costs:</i>			
Remove Silt from Pipeline	3.00	Per lineal foot	
Subsidence Danger to Vehicles	\$\$.\$		
Repair Subsidence Damage	1,000.00	Average per occurrence	
Repair Leaking Connection	50.00	Average per occurrence	
Lower Property Values	\$\$.\$	and votes	
Lower Tax Revenues	\$\$.\$	and growth	
Total	\$\$.\$		\$ 180.00



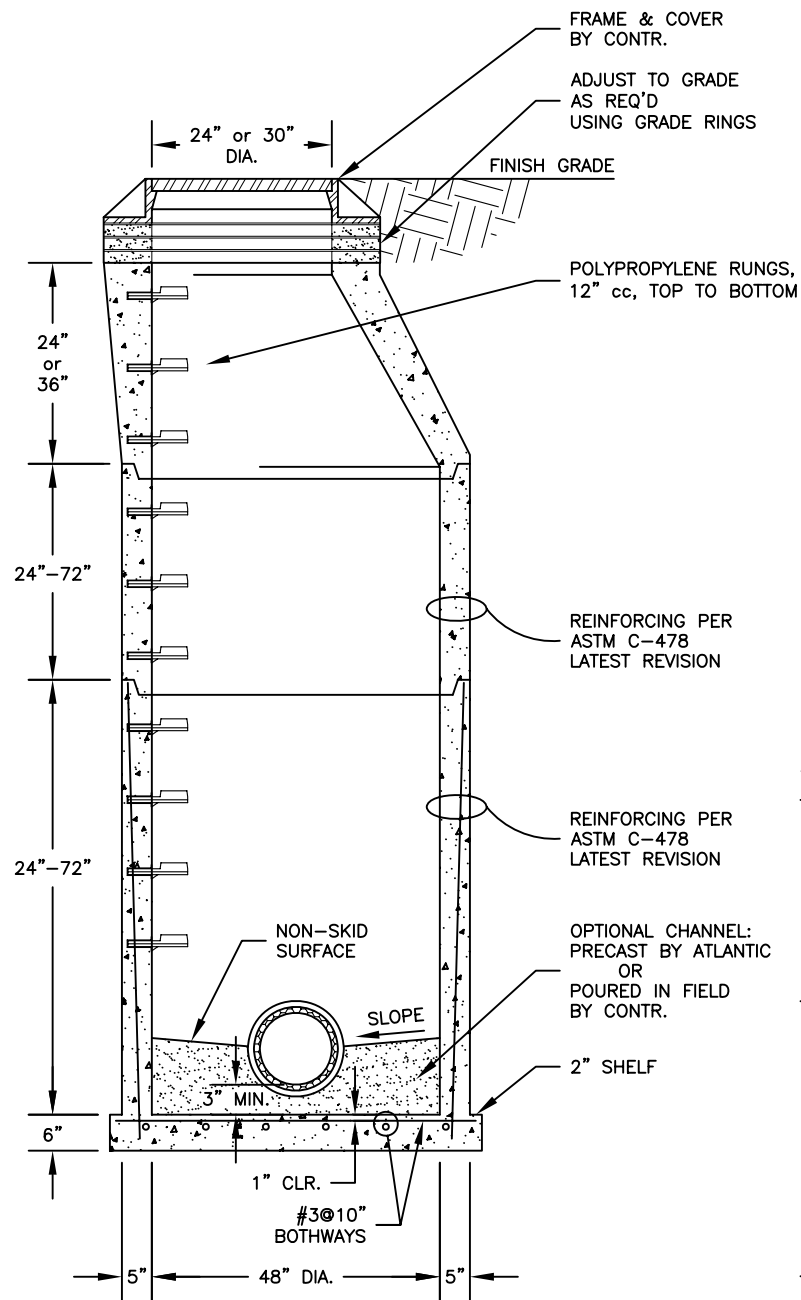
800-822-2565 • 215-547-3366 • FAX 215-547-5260

P.O. BOX 1647 • TULLYTOWN, PA 19007

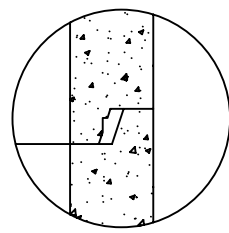
Website: www.a-lok.com • E-mail: info@a-lok.com

NOTE:
FOR MANHOLES WITH A HEIGHT
OF LESS THAN 10 FT,
THE TOP CONE MAY BE
REPLACED WITH A TOP SLAB.

- SPECIFICATIONS:**
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
 - THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
 - THE MANHOLE IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-478, "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
 - THE REINFORCED CONCRETE STRUCTURE IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME & COVER BY OTHERS).
 - THE REINFORCED BASE SLAB IS DESIGNED FOR A MAXIMUM DEPTH OF 20 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
 - THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."

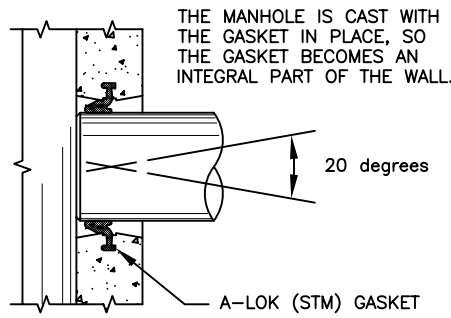


SECTION VIEW
NOT TO SCALE



OPTIONAL SEAL:
D-LOK GASKET
(ASTM C-443)

TYPICAL JOINT SECTION
NOT TO SCALE



OPTIONAL A-LOK (STM) SECTION
NOT TO SCALE

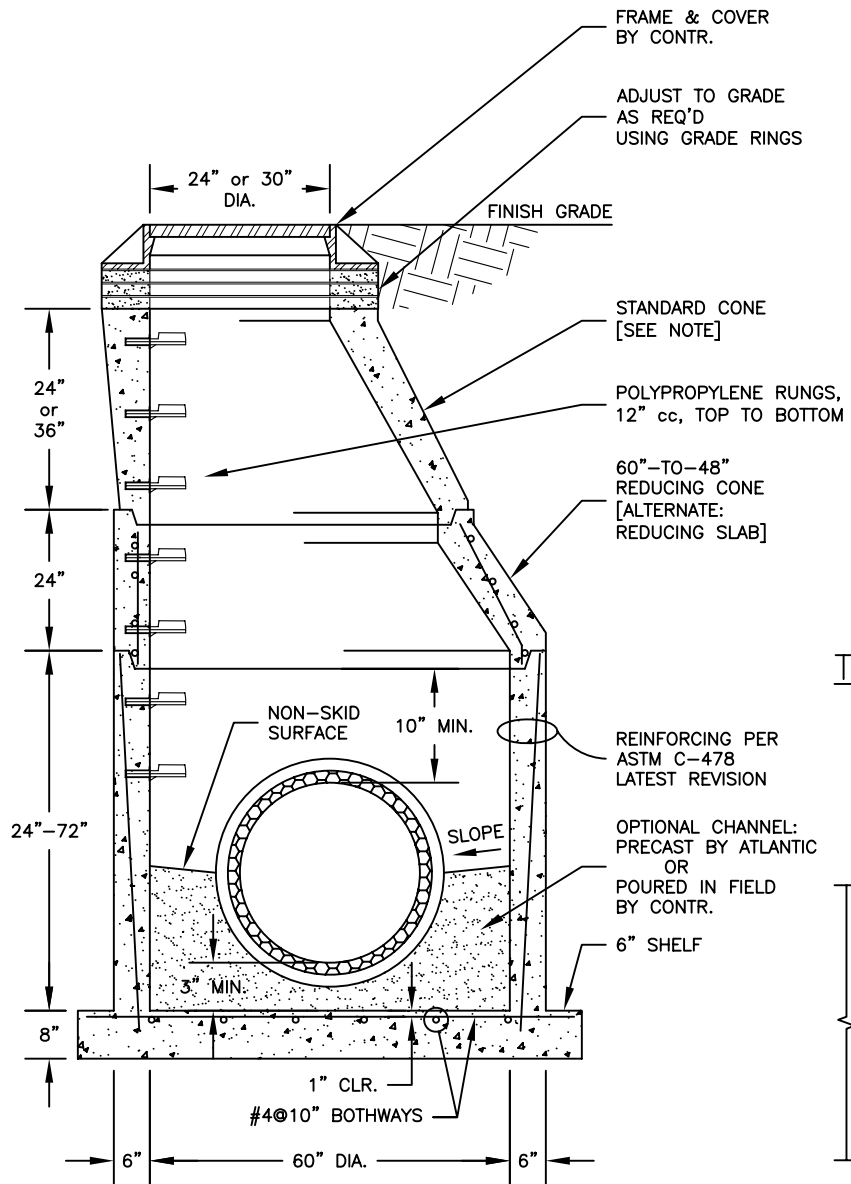


ATLANTIC CONCRETE PRODUCTS, INC.
8900 Old Route 13
P.O. Box 129, Tullytown, PA 19007-7129
Phone: (215) 945-5600
Fax: (215) 946-3102
Web: www.atlanticconcrete.com

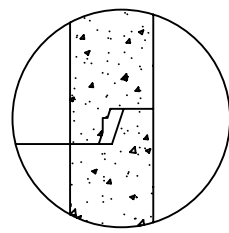
STORM MANHOLE
48" DIA.

NOTE:
FOR MANHOLES WITH A HEIGHT
OF LESS THAN 10 FT,
THE TOP CONE MAY BE
REPLACED WITH A TOP SLAB.

- SPECIFICATIONS:**
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
 - THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
 - THE MANHOLE IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-478, "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
 - THE REINFORCED CONCRETE STRUCTURE IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME AND COVER BY OTHERS).
 - THE REINFORCED BASE SLAB IS DESIGNED FOR A MAXIMUM DEPTH OF 30 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
 - THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."

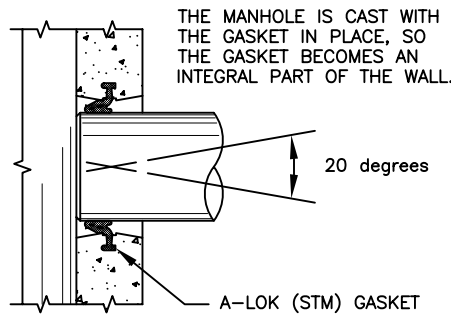


SECTION VIEW
NOT TO SCALE



OPTIONAL SEAL:
D-LOK GASKET
(ASTM C-443)

TYPICAL JOINT SECTION
NOT TO SCALE



OPTIONAL A-LOK (STM) SECTION
NOT TO SCALE



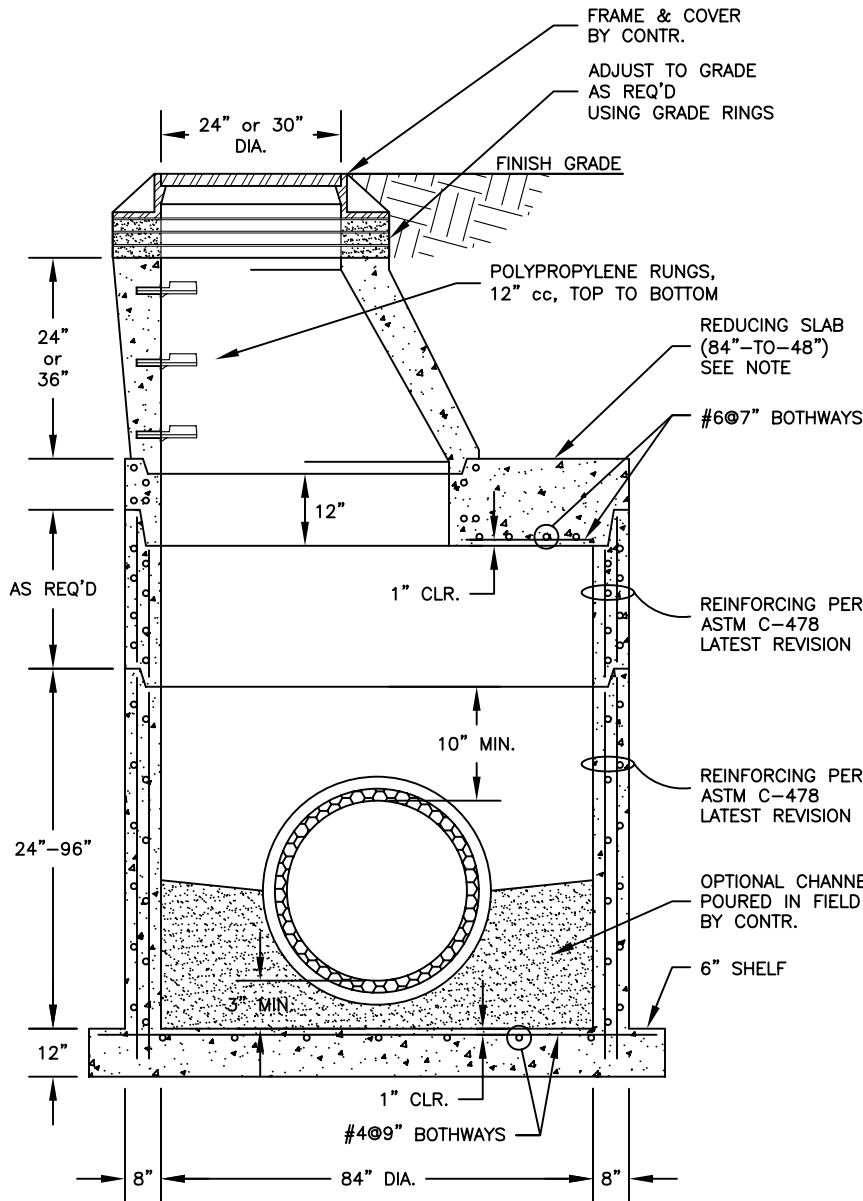
ATLANTIC CONCRETE PRODUCTS, INC.
8900 Old Route 13
P.O. Box 129, Tullytown, PA 19007-7129
Phone: (215) 945-5600
Fax: (215) 946-3102
Web: www.atlanticconcrete.com

STORM MANHOLE 60" DIA.

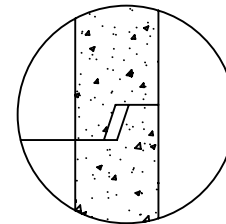
NOTE:
FOR MANHOLES WITH A HEIGHT
OF LESS THAN 10 FT,
THE TOP CONE MAY BE
REPLACED WITH A TOP SLAB.

SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE MANHOLE IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-478, "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
- THE REINFORCED CONCRETE STRUCTURE IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME AND COVER BY OTHERS).
- THE REINFORCED BASE SLAB IS DESIGNED FOR A MAXIMUM DEPTH OF 30 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- THE REINFORCED CONCRETE REDUCING SLAB IS DESIGNED FOR A MAXIMUM EARTH COVER OF 10 FT (EARTH COVER = F.G. TO TOP OF REDUCING SLAB).
- THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."

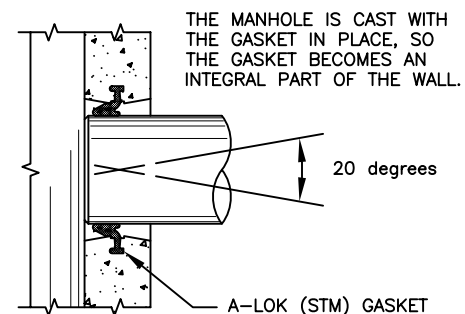


SECTION VIEW
NOT TO SCALE



OPTIONAL SEAL:
BUTYL RUBBER
(ASTM C-990)

TYPICAL JOINT SECTION
NOT TO SCALE



OPTIONAL A-LOK (STM) SECTION
NOT TO SCALE



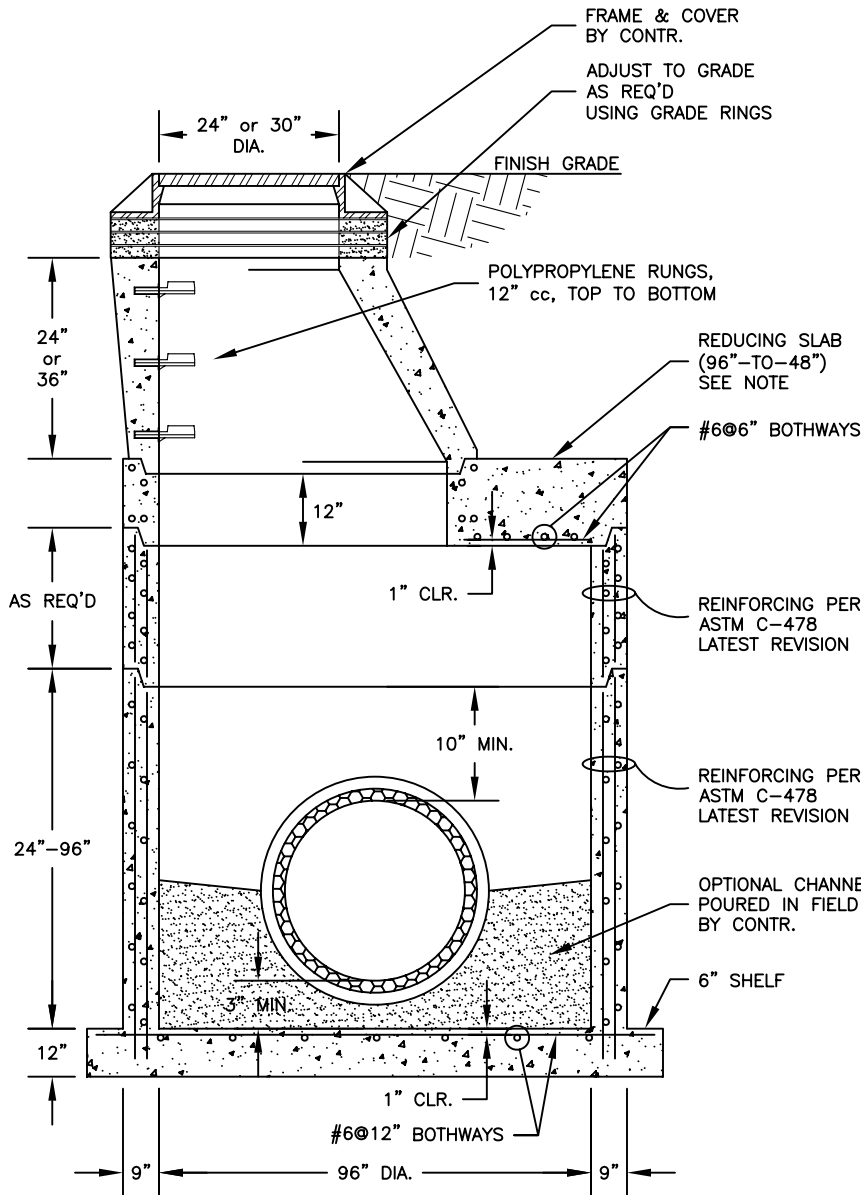
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STORM MANHOLE
84" DIA.

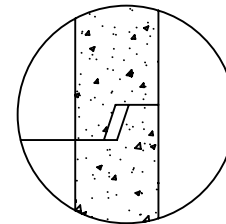
NOTE:
FOR MANHOLES WITH A HEIGHT
OF LESS THAN 10 FT,
THE TOP CONE MAY BE
REPLACED WITH A TOP SLAB.

SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE MANHOLE IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-478, "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
- THE REINFORCED CONCRETE STRUCTURE IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME AND COVER BY OTHERS).
- THE REINFORCED BASE SLAB IS DESIGNED FOR A MAXIMUM DEPTH OF 30 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- THE REINFORCED CONCRETE REDUCING SLAB IS DESIGNED FOR A MAXIMUM EARTH COVER OF 10 FT (EARTH COVER = F.G. TO TOP OF REDUCING SLAB).
- THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."

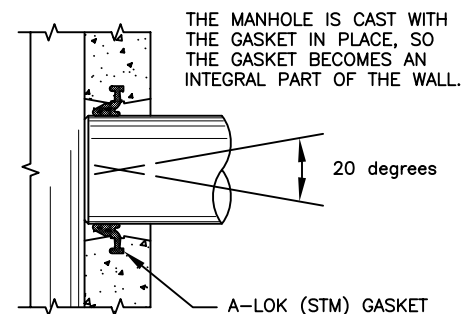


SECTION VIEW
NOT TO SCALE



OPTIONAL SEAL:
BUTYL RUBBER
(ASTM C-990)

TYPICAL JOINT SECTION
NOT TO SCALE



OPTIONAL A-LOK (STM) SECTION
NOT TO SCALE



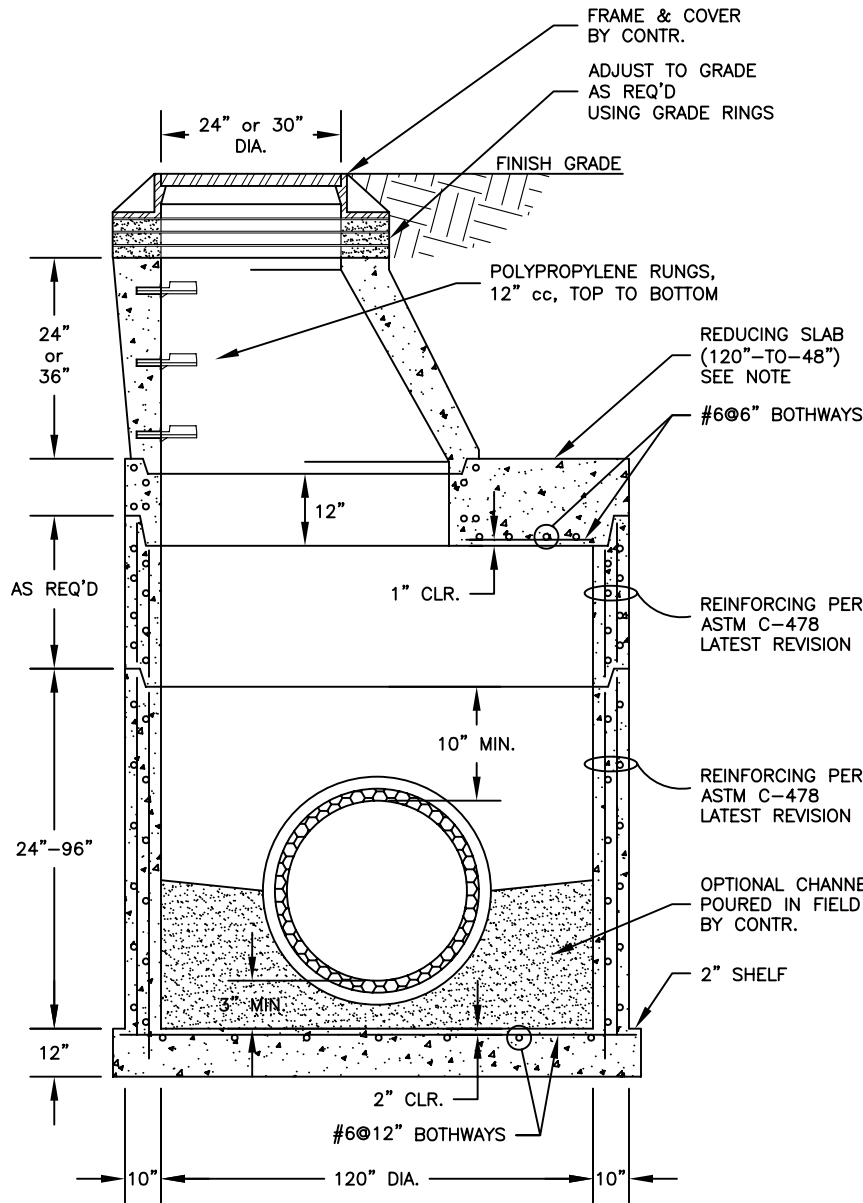
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STORM MANHOLE
96" DIA.

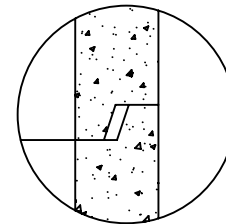
NOTE:
FOR MANHOLES WITH A HEIGHT
OF LESS THAN 10 FT,
THE TOP CONE MAY BE
REPLACED WITH A TOP SLAB.

SPECIFICATIONS:

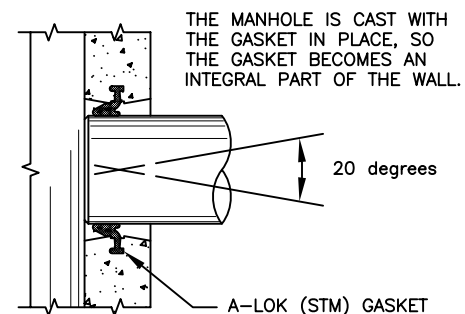
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE MANHOLE IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-478, "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
- THE REINFORCED CONCRETE STRUCTURE IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME AND COVER BY OTHERS).
- THE REINFORCED BASE SLAB IS DESIGNED FOR A MAXIMUM DEPTH OF 30 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- THE REINFORCED CONCRETE REDUCING SLAB IS DESIGNED FOR A MAXIMUM EARTH COVER OF 10 FT (EARTH COVER = F.G. TO TOP OF REDUCING SLAB).
- THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."



SECTION VIEW
NOT TO SCALE



TYPICAL JOINT SECTION
NOT TO SCALE



OPTIONAL A-LOK (STM) SECTION
NOT TO SCALE



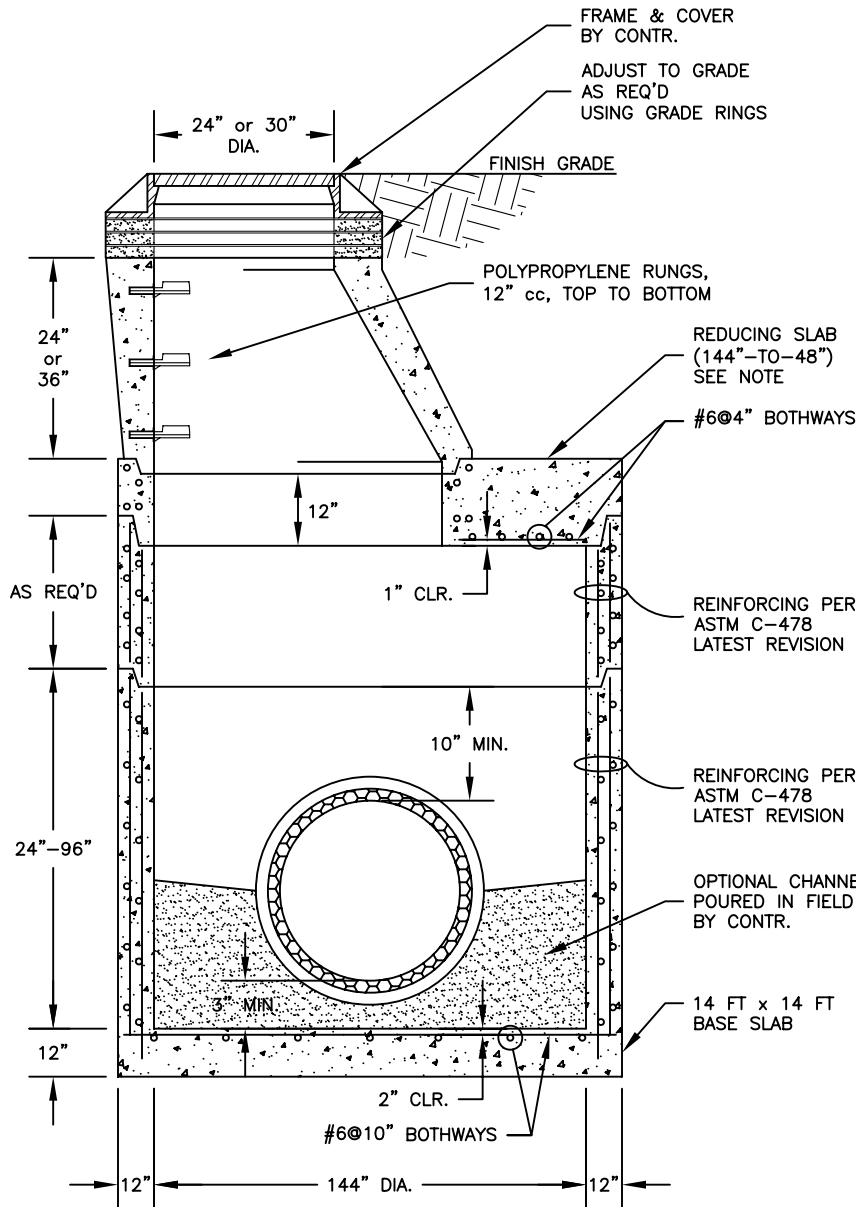
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STORM MANHOLE
120" DIA.

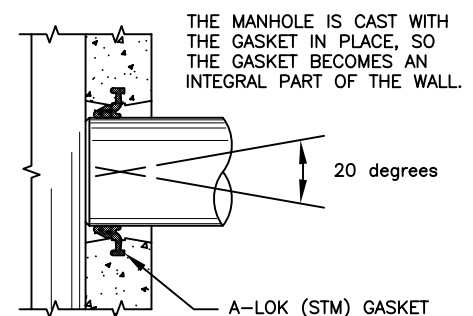
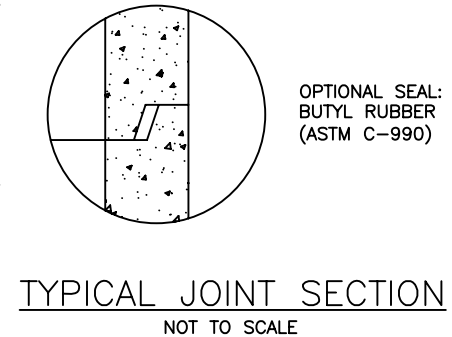
NOTE:
FOR MANHOLES WITH A HEIGHT
OF LESS THAN 10 FT,
THE TOP CONE MAY BE
REPLACED WITH A TOP SLAB.

SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE MANHOLE IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-478, "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
- THE REINFORCED CONCRETE STRUCTURE IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME AND COVER BY OTHERS).
- THE REINFORCED BASE SLAB IS DESIGNED FOR A MAXIMUM DEPTH OF 30 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- THE REINFORCED CONCRETE REDUCING SLAB IS DESIGNED FOR A MAXIMUM EARTH COVER OF 10 FT (EARTH COVER = F.G. TO TOP OF REDUCING SLAB).
- THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."



SECTION VIEW
NOT TO SCALE

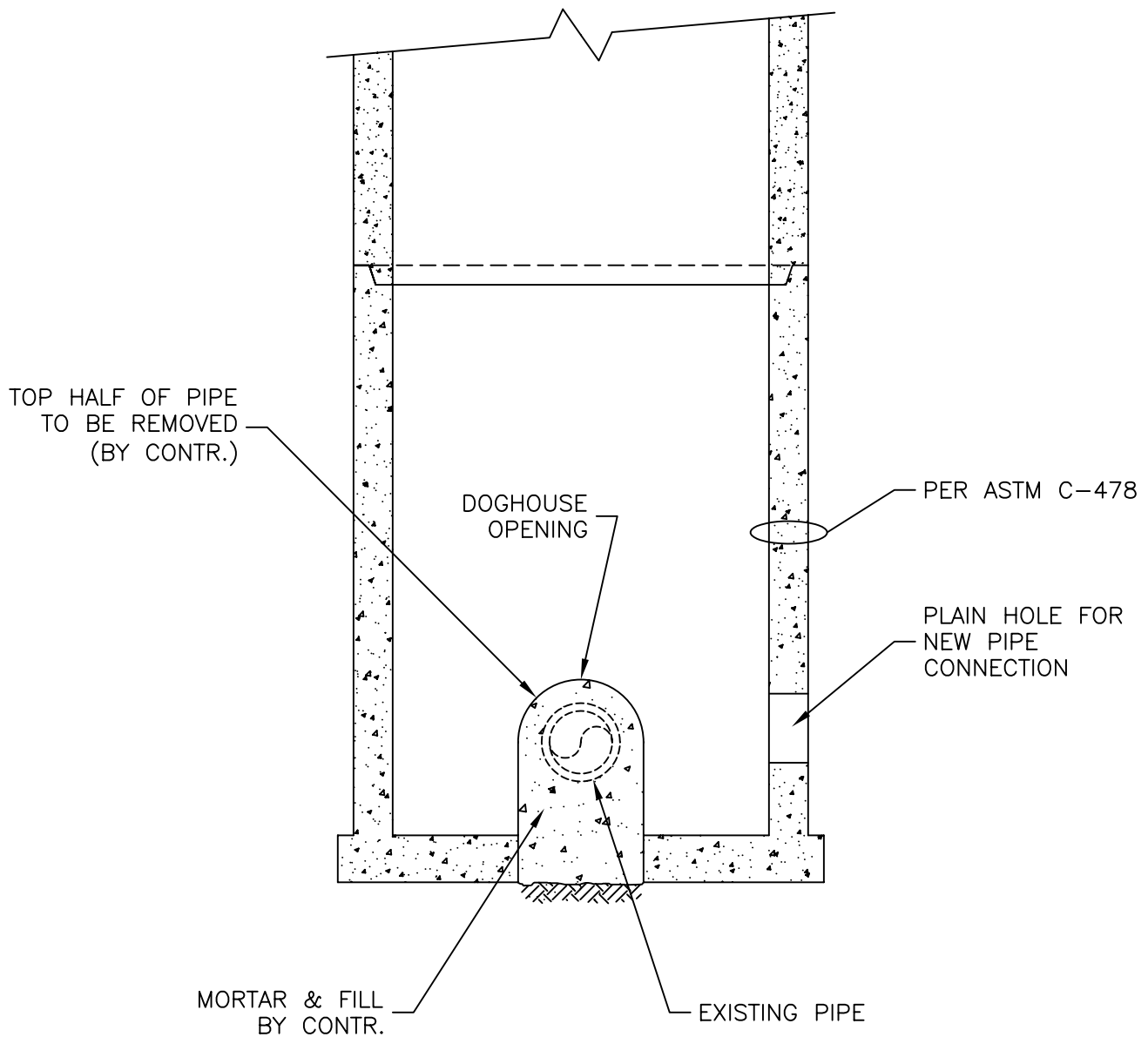


OPTIONAL A-LOK (STM) SECTION
NOT TO SCALE



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STORM MANHOLE
144" DIA.

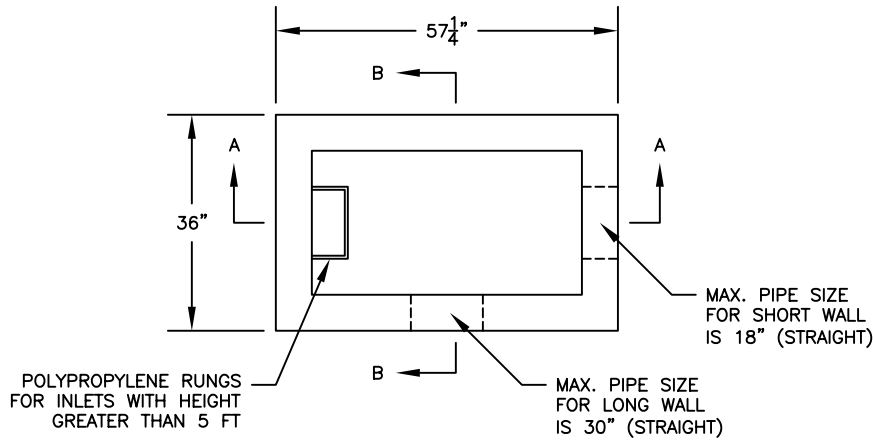


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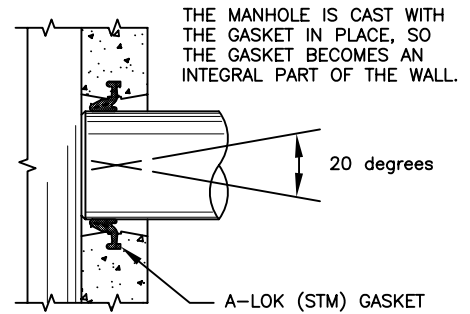
DOGHOUSE MANHOLE BASE (STORM)

SPECIFICATIONS:

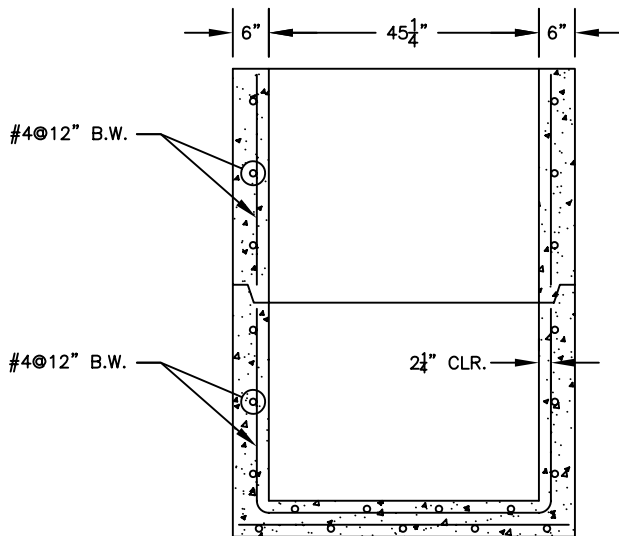
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE INLET SHALL BE DESIGNED TO MEET PENNDOT SPEC. FORM 408 FOR PRECAST CONCRETE CATCH BASINS (RC-34).
- THE REINFORCED CONCRETE BASE SLAB IS DESIGNED FOR A MAXIMUM DEPTH OF 20 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."



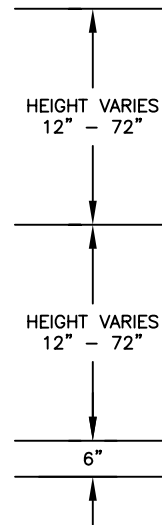
PLAN VIEW
NOT TO SCALE



OPTIONAL A-LOK (STM) SECTION
NOT TO SCALE



SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

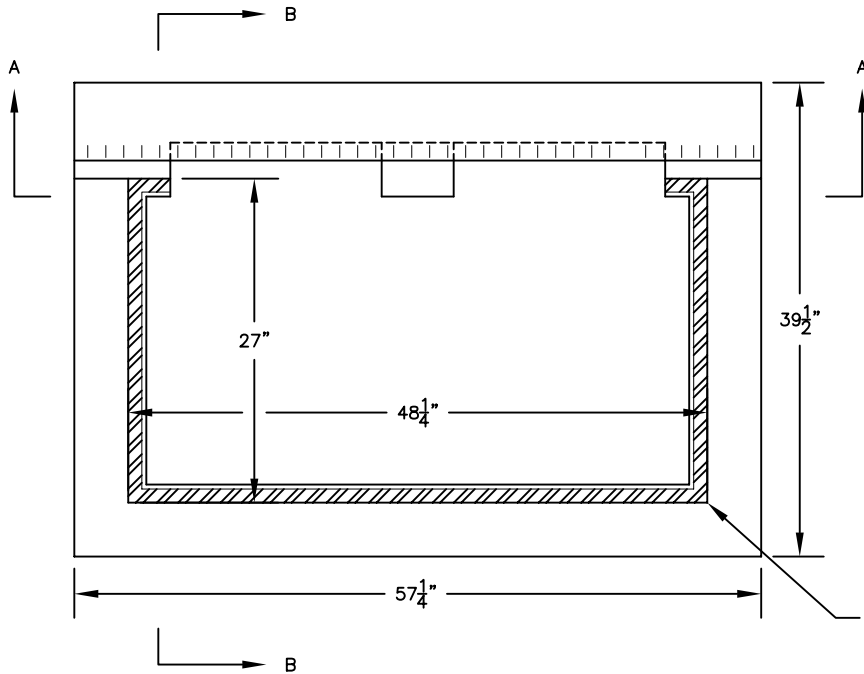


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INLET BASE & RISER
PENNDOT (RC-34)
TYPE C & M & S

SPECIFICATIONS:

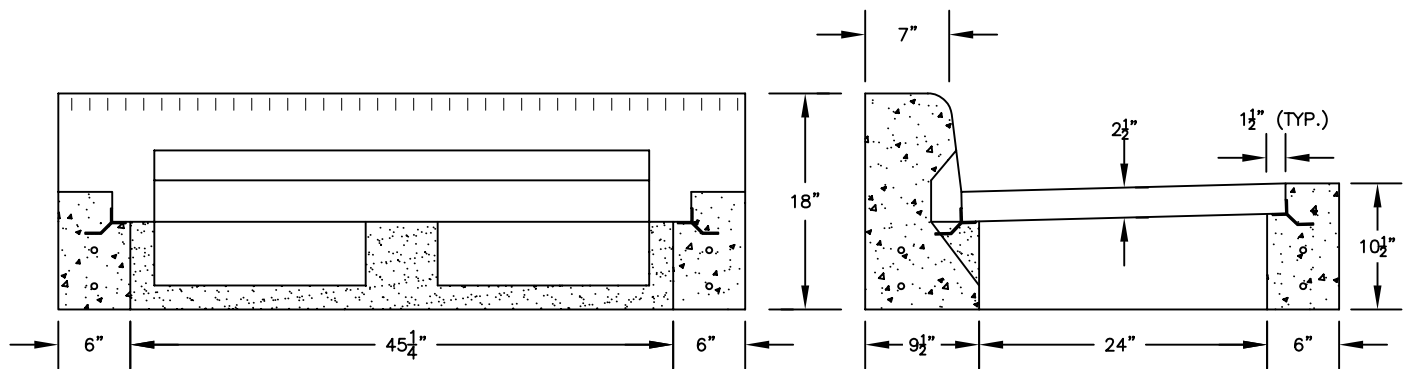
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE INLET SHALL BE DESIGNED TO MEET PENNDOT SPEC. FORM 408 FOR PRECAST CONCRETE CATCH BASINS (RC-34).



THE INLET TOP IS CAST AROUND THE FRAME FOR A STANDARD GRATE (PER PENNDOT STANDARD DRAWING RC-34); LEDGE WIDTH IS $1\frac{1}{2}$ " AND DEPTH IS $2\frac{1}{2}$ " ALL AROUND TO ACCOMMODATE A FRAME WITH AN ANGLE OF $1\frac{1}{4}$ " x $1\frac{1}{4}$ " x $\frac{1}{8}$ " (MIN.)

PLAN VIEW

NOT TO SCALE



SECTION A-A

NOT TO SCALE

SECTION B-B

NOT TO SCALE

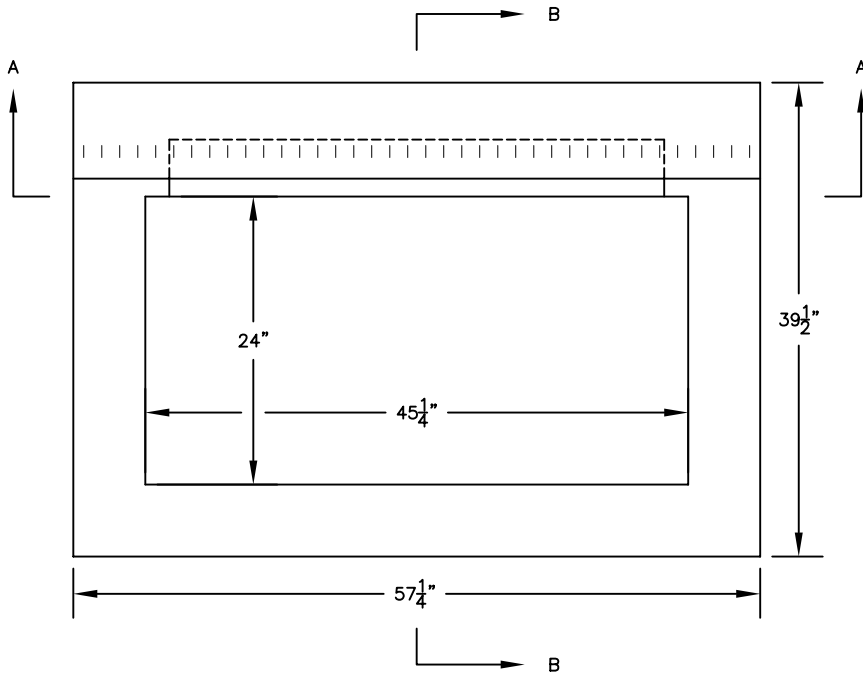


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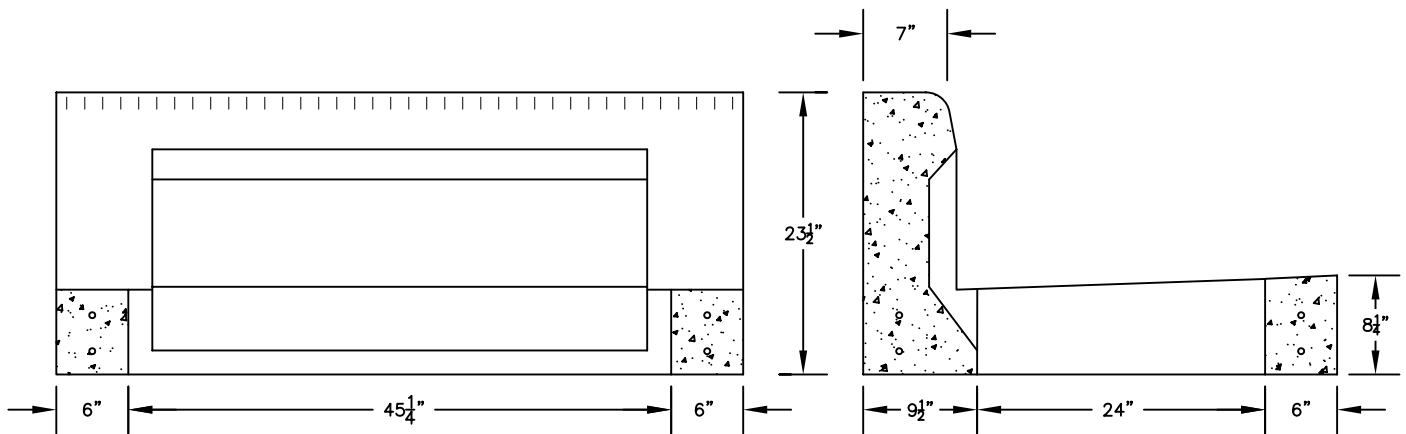
INLET TOP
PENNDOT (RC-34)
TYPE C

SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE INLET SHALL BE DESIGNED TO MEET PENNDOT SPEC. FORM 408 FOR PRECAST CONCRETE CATCH BASINS (RC-34).



PLAN VIEW
NOT TO SCALE



SECTION A-A
NOT TO SCALE

SECTION B-B
NOT TO SCALE

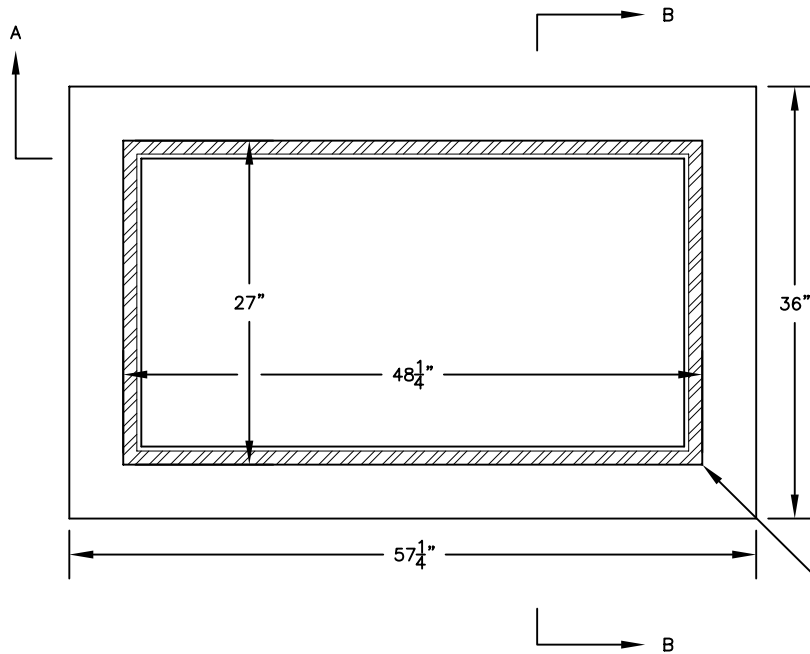


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INLET TOP
PENNDOT (RC-34)
TYPE C (ALT)

SPECIFICATIONS:

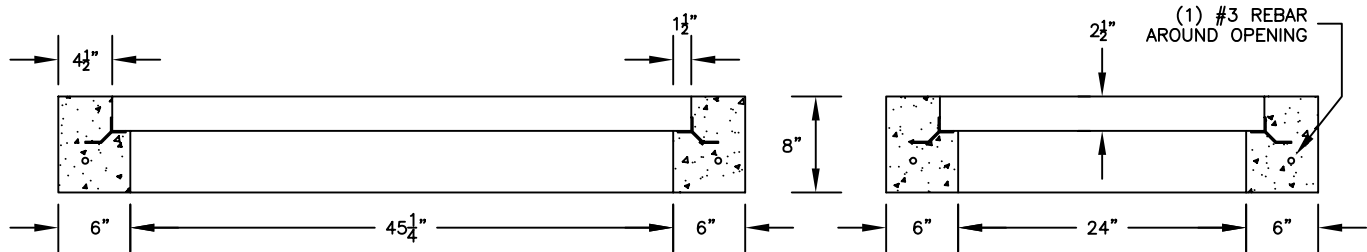
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE INLET SHALL BE DESIGNED TO MEET PENNDOT SPEC. FORM 408 FOR PRECAST CONCRETE CATCH BASINS (RC-34).



THE INLET TOP IS CAST AROUND THE FRAME FOR A STANDARD GRATE (PER PENNDOT STANDARD DRAWING RC-34); LEDGE WIDTH IS 1 1/2" AND DEPTH IS 2 1/2" ALL AROUND TO ACCOMMODATE A FRAME WITH AN ANGLE OF 1 1/4" x 1 1/4" x 1/8" (MIN.)

PLAN VIEW

NOT TO SCALE



SECTION A-A

NOT TO SCALE

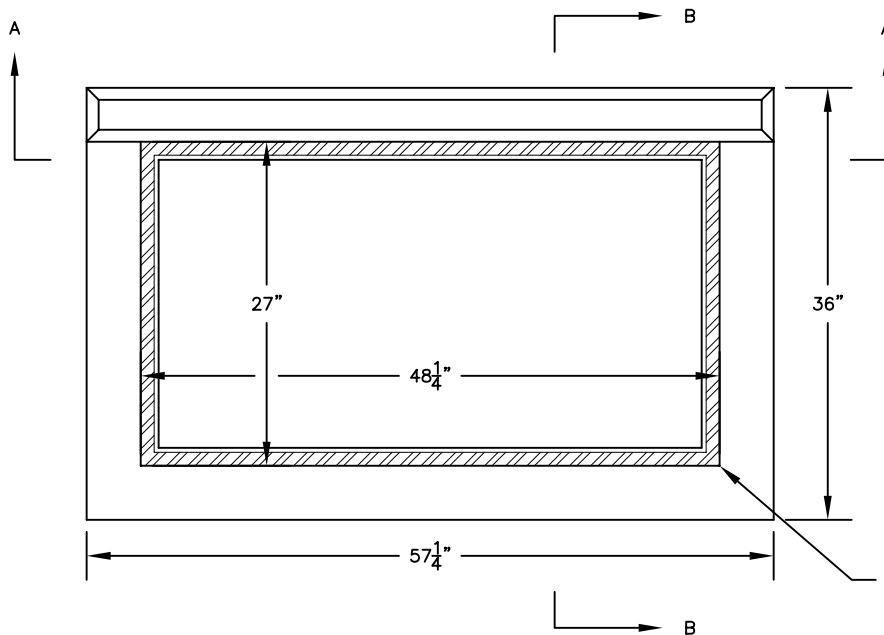
SECTION B-B

NOT TO SCALE



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INLET TOP
PENNDOT (RC-34)
TYPE M



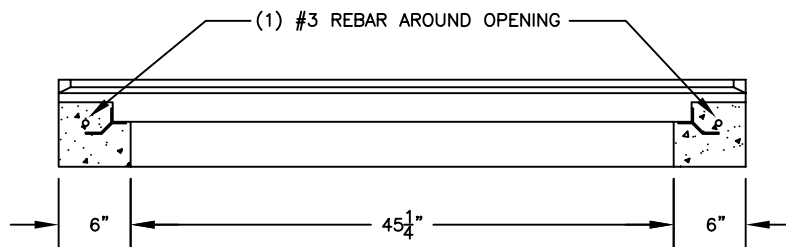
SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE INLET SHALL BE DESIGNED TO MEET PENNDOT SPEC. FORM 408 FOR PRECAST CONCRETE CATCH BASINS (RC-34).

THE INLET TOP IS CAST AROUND THE FRAME FOR A STANDARD GRATE (PER PENNDOT STANDARD DRAWING RC-34); LEDGE WIDTH IS 1 $\frac{1}{2}$ " AND DEPTH IS 2 $\frac{1}{2}$ " ALL AROUND TO ACCOMMODATE A FRAME WITH AN ANGLE OF 1 $\frac{1}{4}$ " x 1 $\frac{1}{4}$ " x $\frac{1}{8}$ " (MIN.)

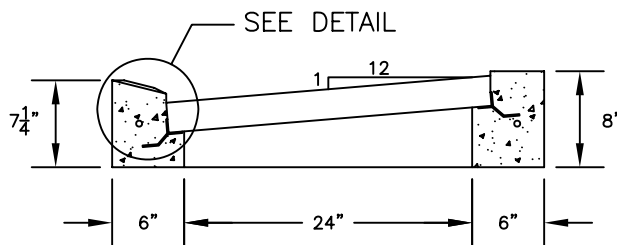
PLAN VIEW

NOT TO SCALE



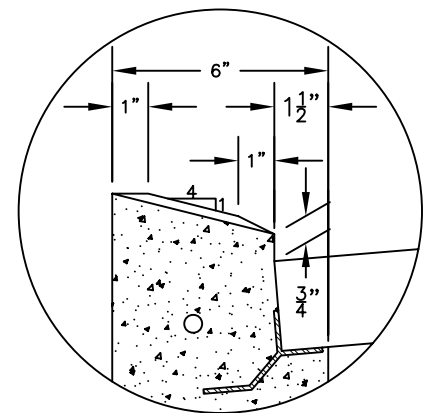
SECTION A-A

NOT TO SCALE



SECTION B-B

NOT TO SCALE



DETAIL

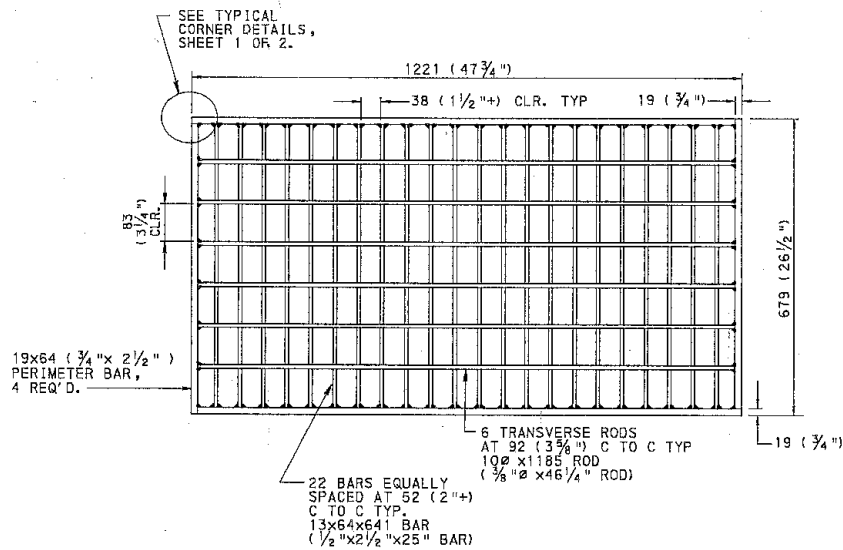
(SEE SECTION B-B)

NOT TO SCALE

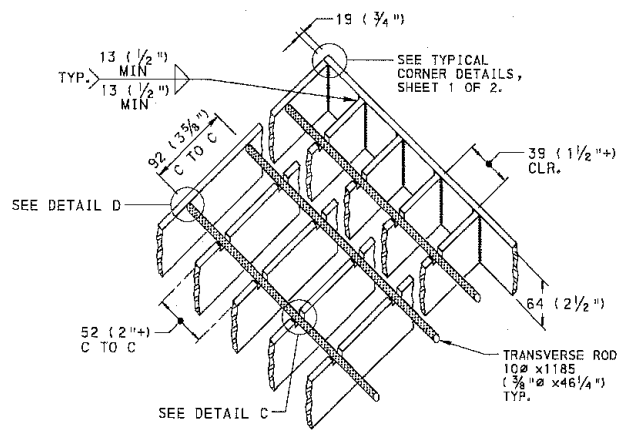


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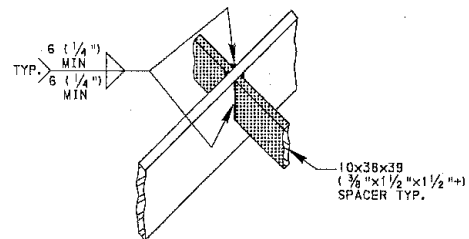
INLET TOP
PENNDOT (RC-34)
TYPE S



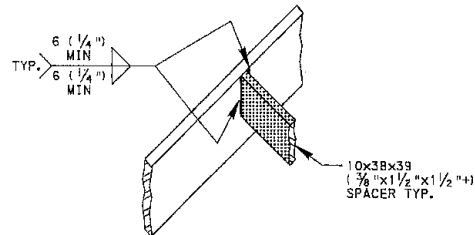
STRUCTURAL STEEL GRATE BICYCLE SAFE



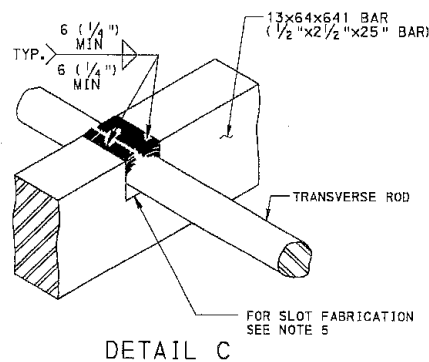
BAR AND ROD SPACER DETAIL



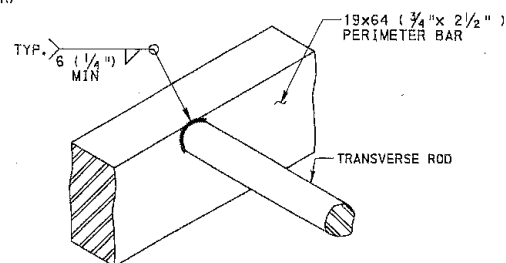
DETAIL A



DETAIL B



DETAIL C

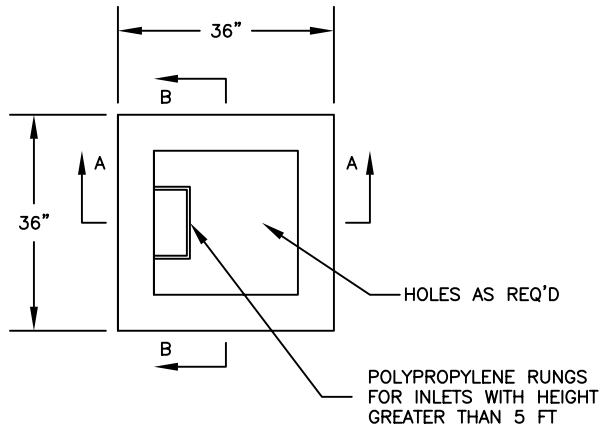


DETAIL D



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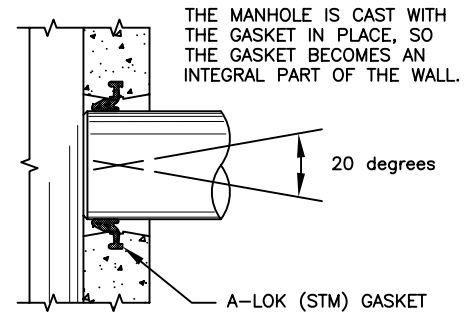
GRATE
FOR PENNDOT INLETS (RC-34)
BIKE SAFE (HS-25)



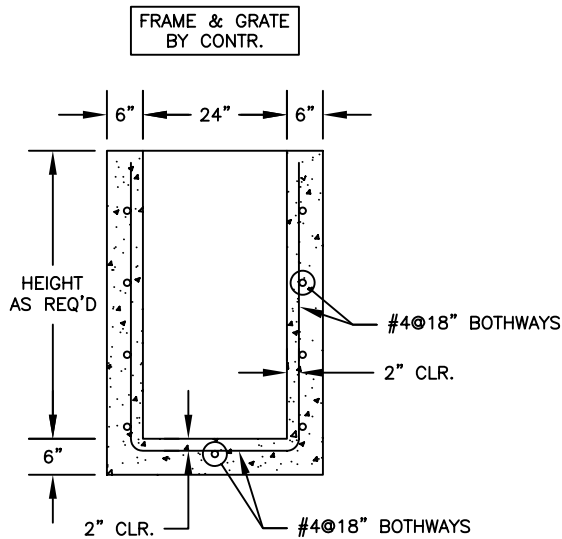
PLAN VIEW
NOT TO SCALE

SPECIFICATIONS:

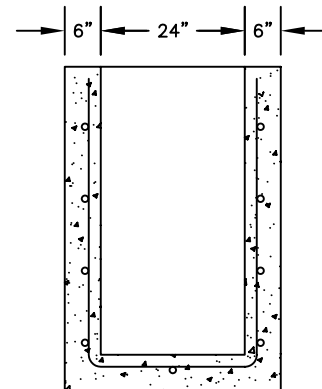
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE INLET SHALL BE DESIGNED TO MEET ASTM C-913, "PRECAST CONCRETE WATER AND WASTEWATER STRUCTURES."
- THE INLET IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME & COVER BY OTHERS).
- THE REINFORCED CONCRETE WALLS AND BASE SLAB ARE DESIGNED FOR A MAXIMUM DEPTH OF 20 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."



OPTIONAL A-LOK STM SECTION
NOT TO SCALE



SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

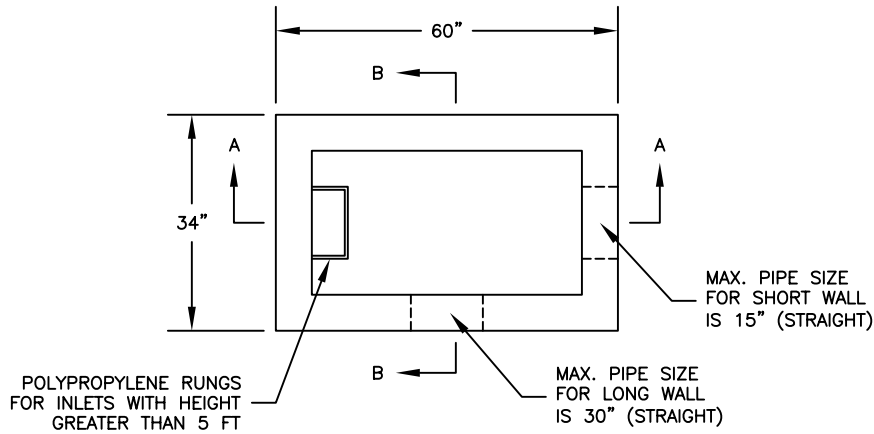


ATLANTIC CONCRETE PRODUCTS, INC.
8900 Old Route 13
P.O. Box 129, Tullytown, PA 19007-7129
Phone: (215) 945-5600
Fax: (215) 946-3102
Web: www.atlanticconcrete.com

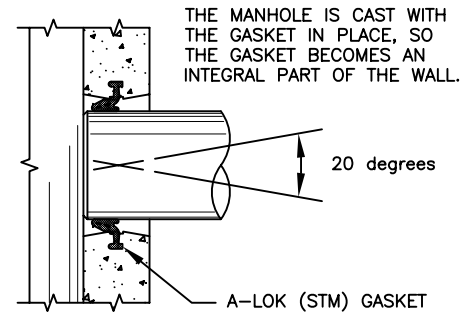
YARD INLET
24" x 24"

SPECIFICATIONS:

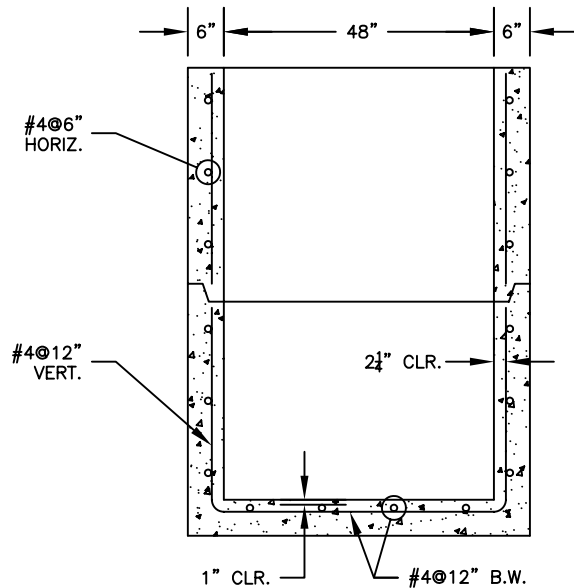
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE INLET SHALL BE DESIGNED TO MEET ASTM C-913, "PRECAST CONCRETE WATER AND WASTEWATER STRUCTURES."
- THE INLET IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME & COVER BY OTHERS).
- THE REINFORCED CONCRETE WALLS AND BASE SLAB ARE DESIGNED FOR A MAXIMUM DEPTH OF 20 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- STRUCTURE IS DESIGNED TO MEET NJDOT SPECS.
- THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."



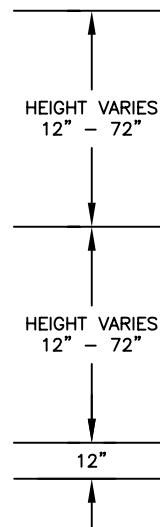
PLAN VIEW
NOT TO SCALE



OPTIONAL A-LOK STM SECTION
NOT TO SCALE



SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

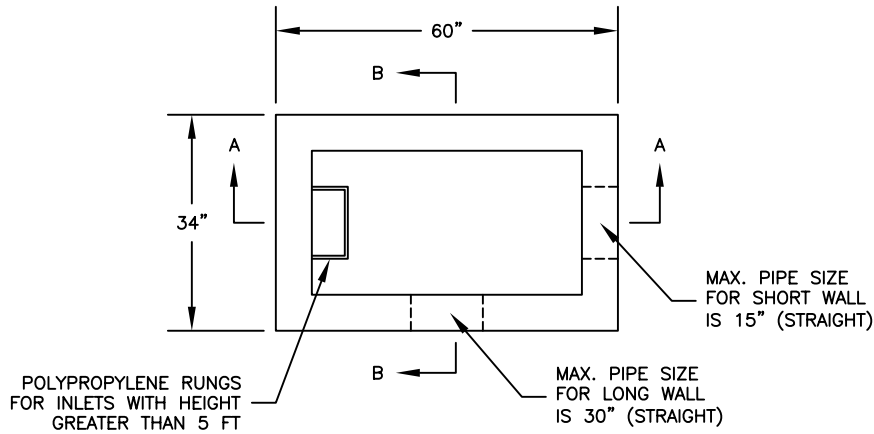


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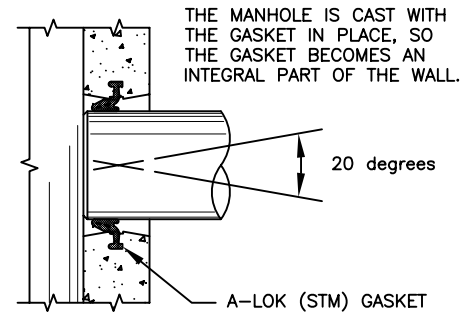
INLET BASE & RISER
NJDOT TYPE A - DEEP

SPECIFICATIONS:

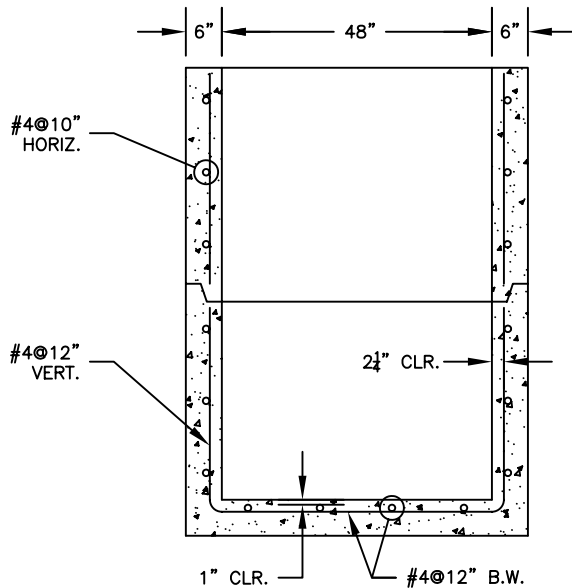
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE INLET SHALL BE DESIGNED TO MEET ASTM C-913, "PRECAST CONCRETE WATER AND WASTEWATER STRUCTURES."
- THE INLET IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME & COVER BY OTHERS).
- THE REINFORCED CONCRETE WALLS AND BASE SLAB ARE DESIGNED FOR A MAXIMUM DEPTH OF 10 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- STRUCTURE IS DESIGNED TO MEET NJDOT SPECS.
- THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."



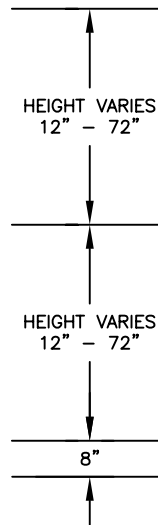
PLAN VIEW
NOT TO SCALE



OPTIONAL A-LOK STM SECTION
NOT TO SCALE



SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

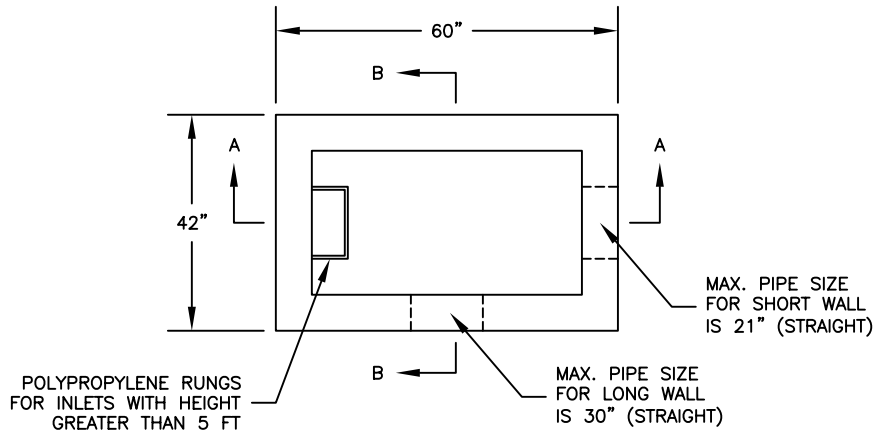


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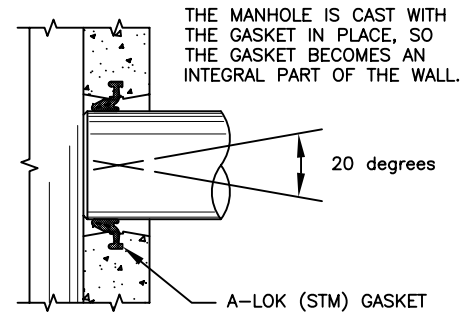
INLET BASE & RISER
NJDOT TYPE A - SHALLOW

SPECIFICATIONS:

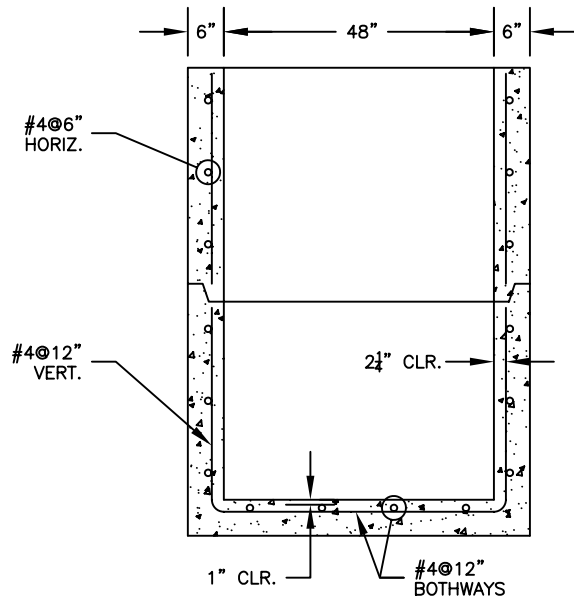
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE INLET SHALL BE DESIGNED TO MEET ASTM C-913, "PRECAST CONCRETE WATER AND WASTEWATER STRUCTURES."
- THE INLET IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME & COVER BY OTHERS).
- THE REINFORCED CONCRETE WALLS AND BASE SLAB ARE DESIGNED FOR A MAXIMUM DEPTH OF 20 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- STRUCTURE IS DESIGNED TO MEET NJDOT SPECS.
- THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."



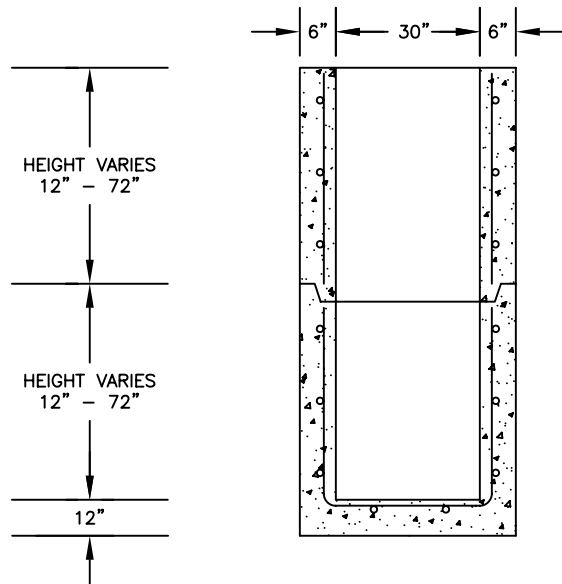
PLAN VIEW
NOT TO SCALE



OPTIONAL A-LOK STM SECTION
NOT TO SCALE



SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

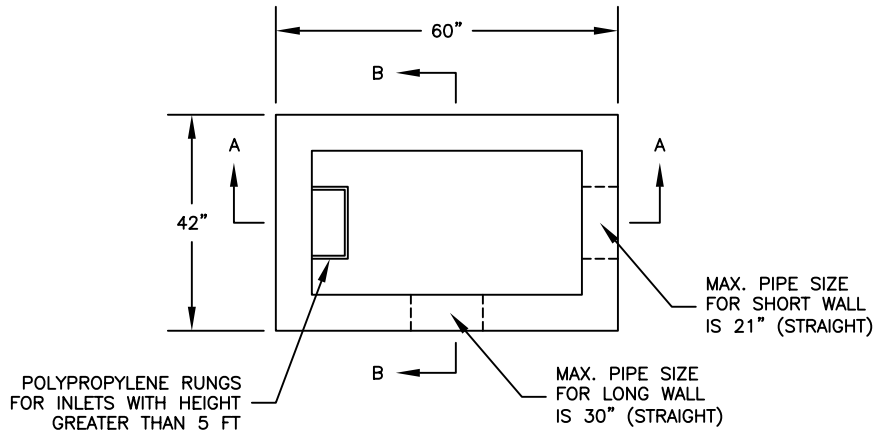


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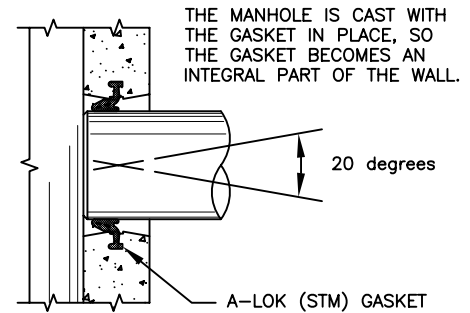
INLET BASE & RISER
NJDOT TYPE D - DEEP

SPECIFICATIONS:

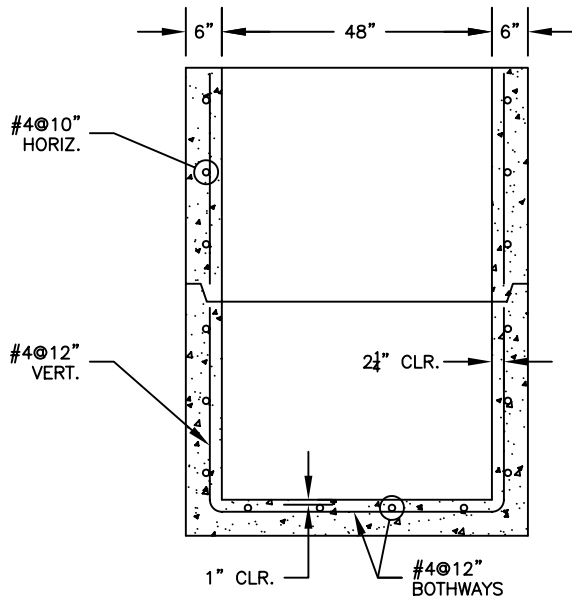
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE INLET SHALL BE DESIGNED TO MEET ASTM C-913, "PRECAST CONCRETE WATER AND WASTEWATER STRUCTURES."
- THE INLET IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME & COVER BY OTHERS).
- THE REINFORCED CONCRETE WALLS AND BASE SLAB ARE DESIGNED FOR A MAXIMUM DEPTH OF 10 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- STRUCTURE IS DESIGNED TO MEET NJDOT SPECS.
- THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."



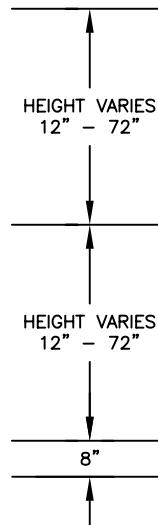
PLAN VIEW
NOT TO SCALE



OPTIONAL A-LOK STM SECTION
NOT TO SCALE



SECTION A-A
NOT TO SCALE

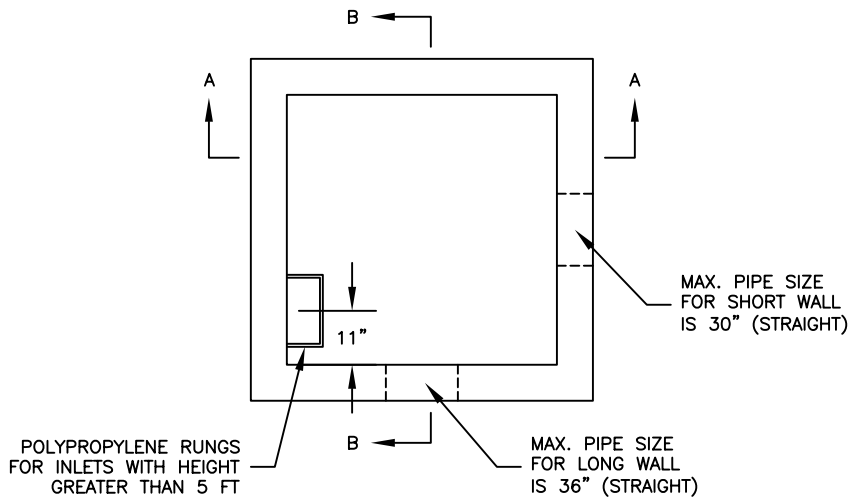


SECTION B-B
NOT TO SCALE



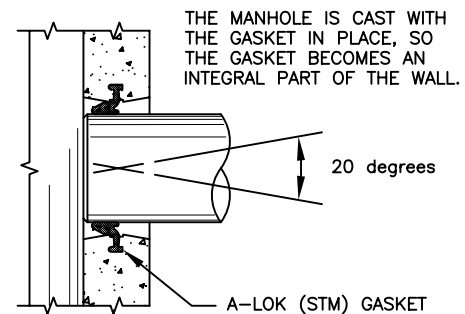
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INLET BASE & RISER
NJDOT TYPE D - SHALLOW

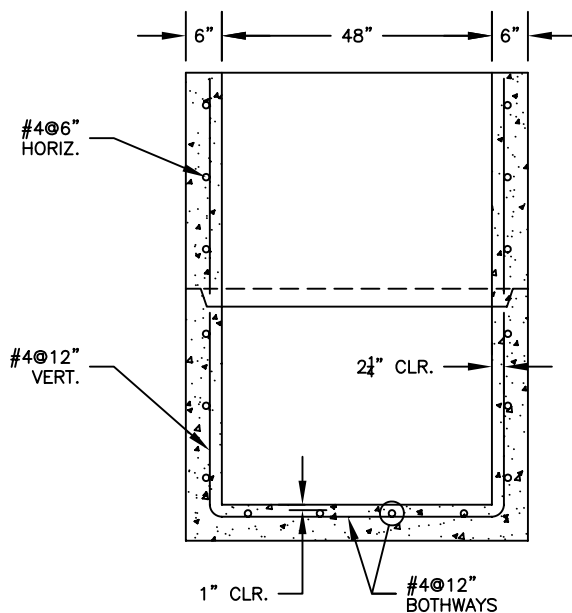


PLAN VIEW
NOT TO SCALE

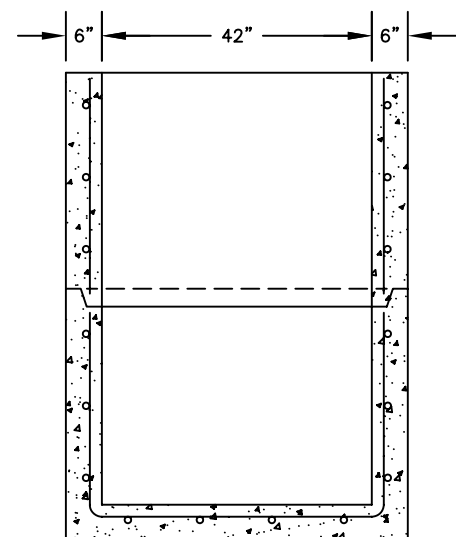
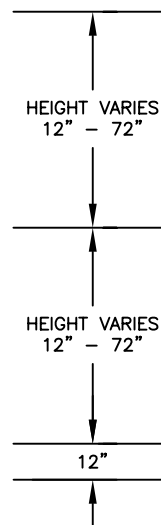
- SPECIFICATIONS:**
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
 - THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
 - THE INLET SHALL BE DESIGNED TO MEET ASTM C-913, "PRECAST CONCRETE WATER AND WASTEWATER STRUCTURES."
 - THE INLET IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME & COVER BY OTHERS).
 - THE REINFORCED CONCRETE WALLS AND BASE SLAB ARE DESIGNED FOR A MAXIMUM DEPTH OF 20 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
 - STRUCTURE IS DESIGNED TO MEET NJDOT SPECS.
 - THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."



OPTIONAL A-LOK STM SECTION
NOT TO SCALE



SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

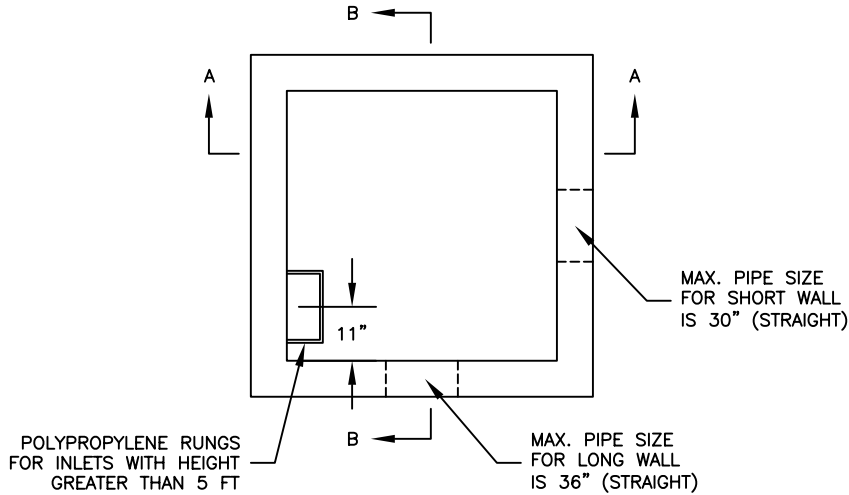


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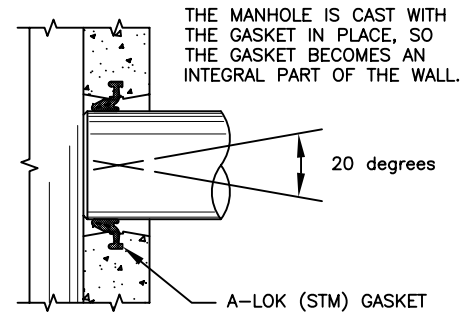
INLET BASE & RISER
NJDOT TYPE B & C & E - DEEP

SPECIFICATIONS:

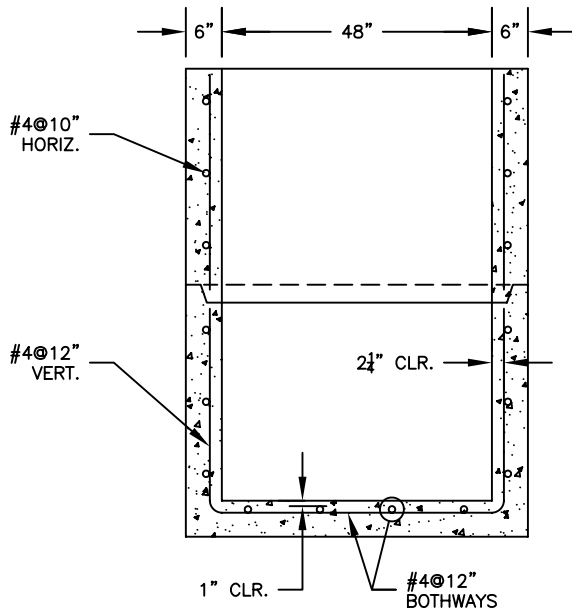
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE INLET SHALL BE DESIGNED TO MEET ASTM C-913, "PRECAST CONCRETE WATER AND WASTEWATER STRUCTURES."
- THE INLET IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME & COVER BY OTHERS).
- THE REINFORCED CONCRETE WALLS AND BASE SLAB ARE DESIGNED FOR A MAXIMUM DEPTH OF 10 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- STRUCTURE IS DESIGNED TO MEET NJDOT SPECS.
- THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."



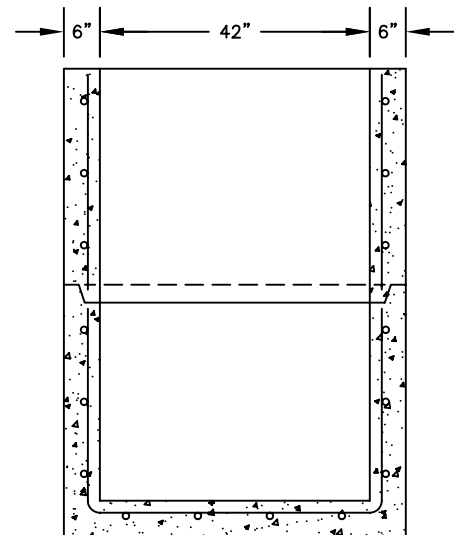
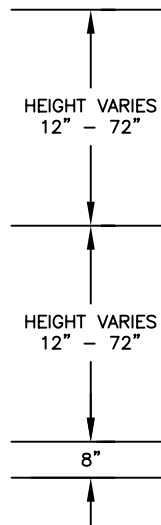
PLAN VIEW
NOT TO SCALE



OPTIONAL A-LOK STM SECTION
NOT TO SCALE



SECTION A-A
NOT TO SCALE

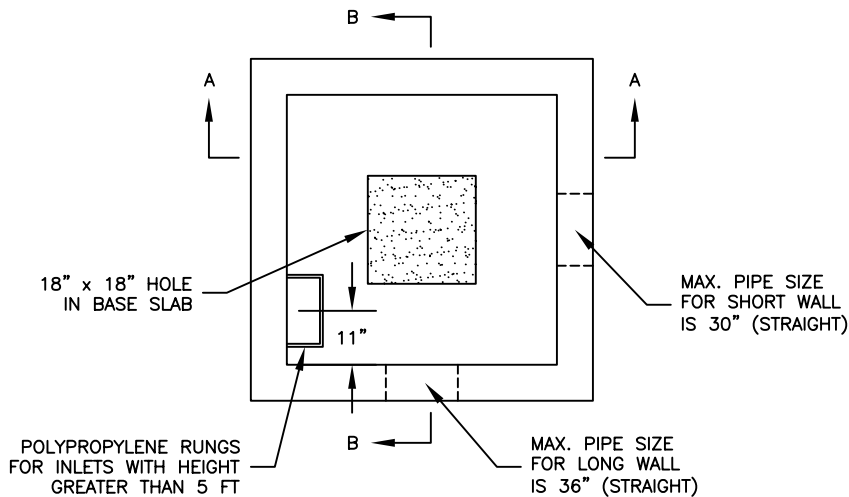


SECTION B-B
NOT TO SCALE



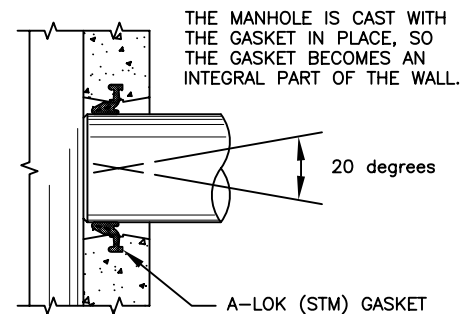
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INLET BASE & RISER
NJDOT TYPE B & C & E - SHALLOW

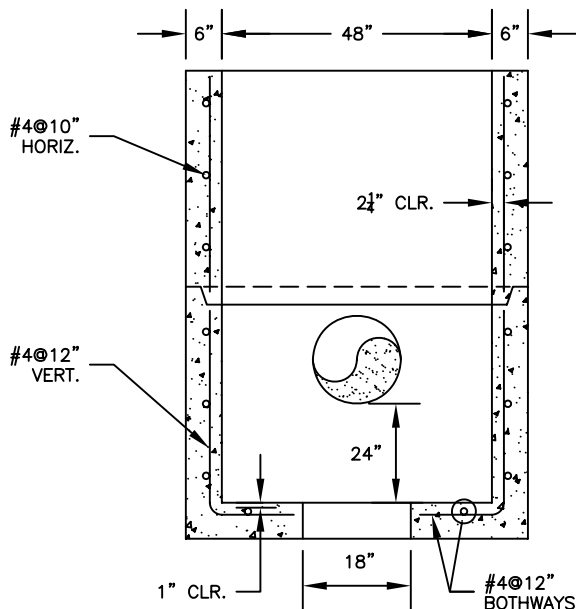


PLAN VIEW
NOT TO SCALE

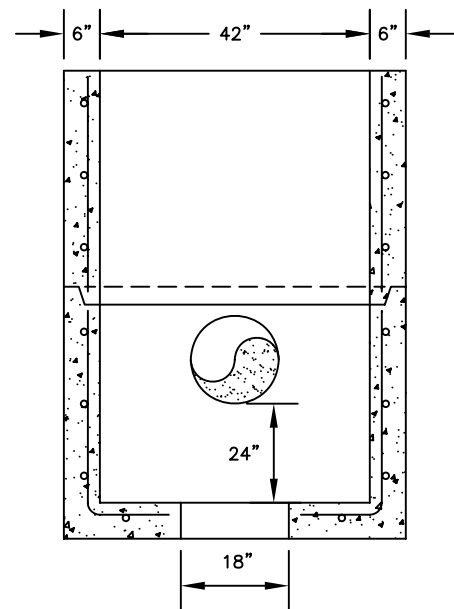
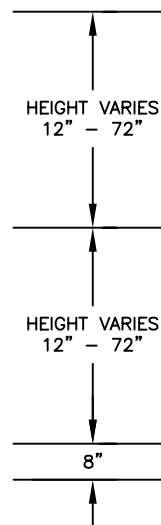
- SPECIFICATIONS:**
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
 - THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
 - THE INLET SHALL BE DESIGNED TO MEET ASTM C-913, "PRECAST CONCRETE WATER AND WASTEWATER STRUCTURES."
 - THE INLET IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME & COVER BY OTHERS).
 - THE REINFORCED CONCRETE WALLS AND BASE SLAB ARE DESIGNED FOR A MAXIMUM DEPTH OF 20 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
 - STRUCTURE IS DESIGNED TO MEET NJDOT SPECS.
 - THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."



OPTIONAL A-LOK STM SECTION
NOT TO SCALE



SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

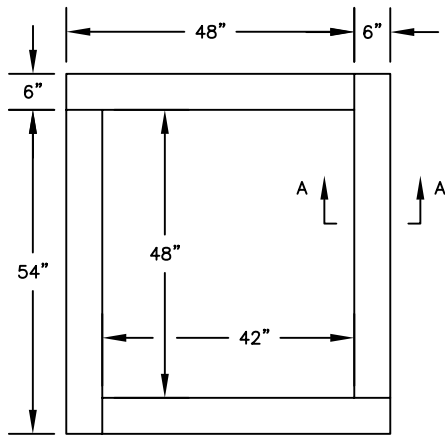


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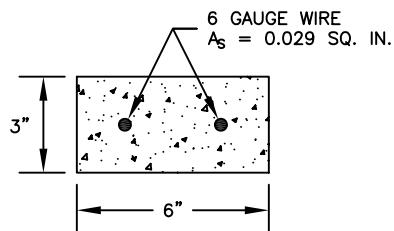
INLET BASE & RISER
NJDOT TYPE B & C & E - SUMP

SPECIFICATIONS:

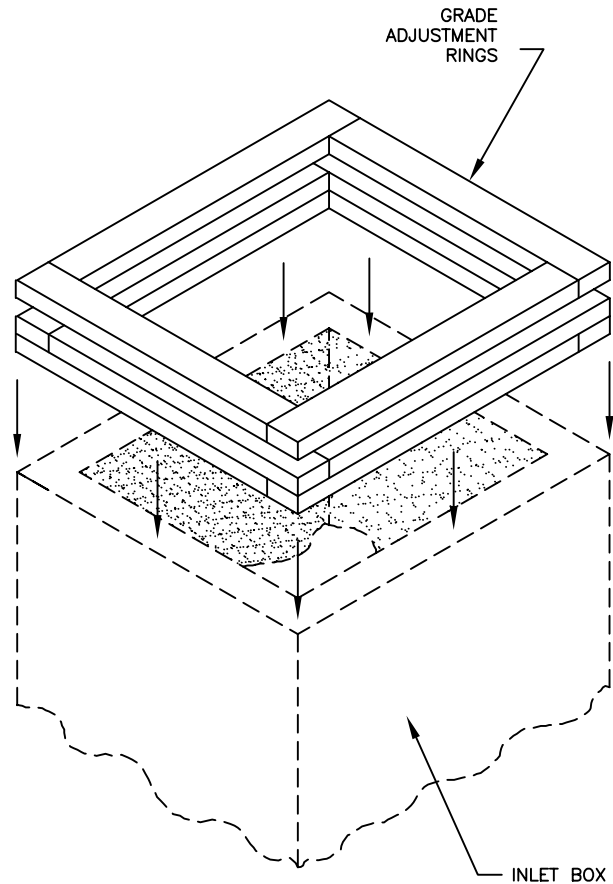
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE MANHOLE IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-478, "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
- THE REINFORCED CONCRETE STRUCTURE IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS.
- WEIGHT OF ONE GRADE RING
 - 3" x 6" x 48" 75 LBS
 - 3" x 6" x 54" 84 LBS



PLAN VIEW
NOT TO SCALE



SECTION A-A
NOT TO SCALE



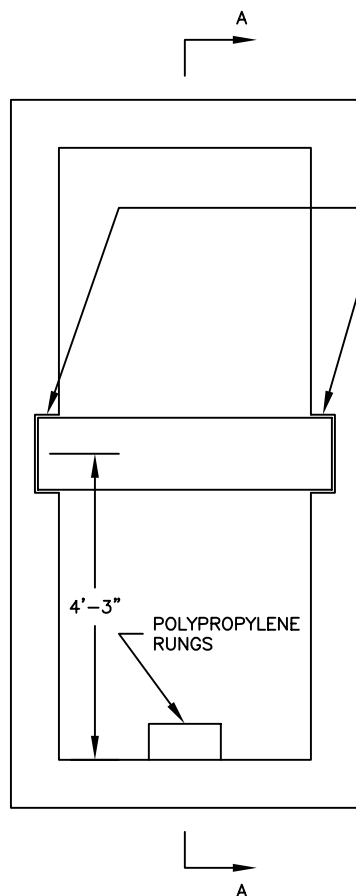
NOTE:

GRADE RINGS ARE SEALED BY CONTRACTOR USING TROWELABLE BUTYL RUBBER (AS PER ASTM C-990) OR GROUT.

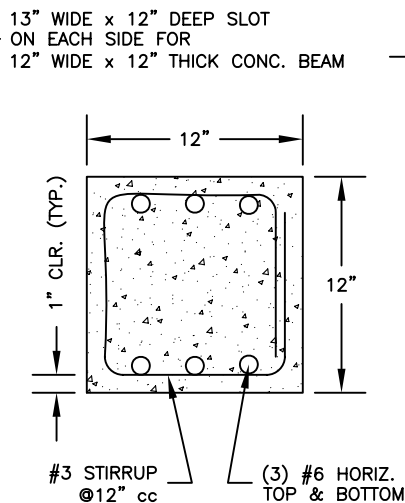


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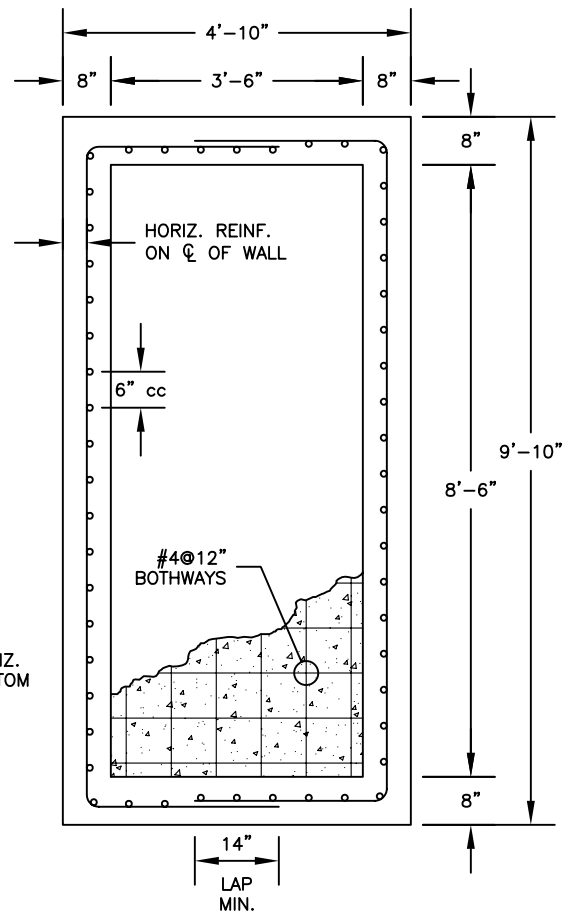
GRADE RING
FOR NJDOT TYPE B & C & E INLETS



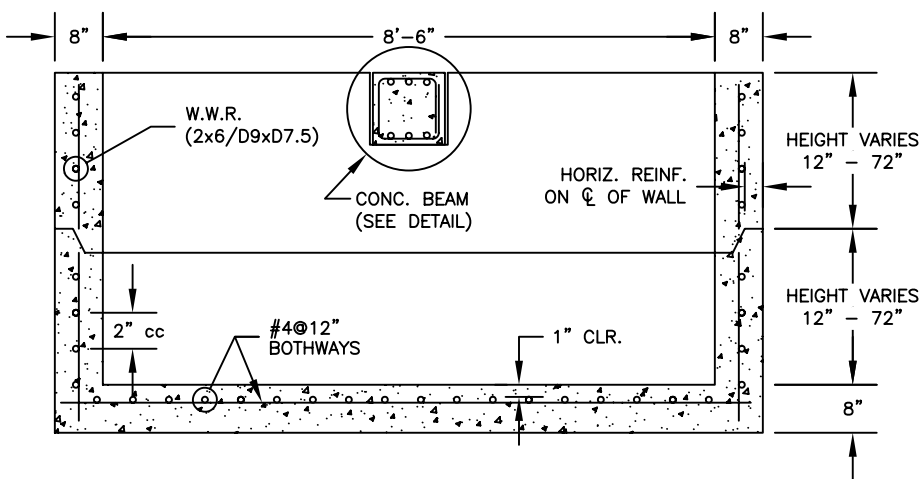
PLAN VIEW — HOLES
NOT TO SCALE



DETAIL
CONCRETE BEAM
NOT TO SCALE



PLAN VIEW — REINFORCING
NOT TO SCALE



SECTION A-A
NOT TO SCALE

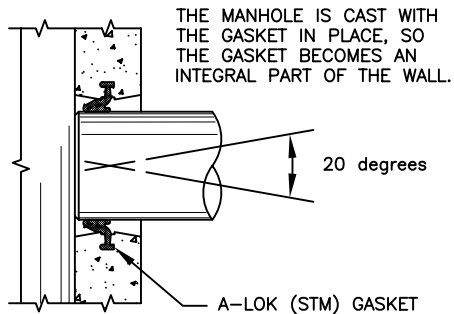
SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 5,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE INLET IS DESIGNED TO MEET ASTM C-913, "PRECAST CONCRETE WATER AND WASTEWATER STRUCTURES."
- THE INLET IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME & COVER BY OTHERS).
- THE REINFORCED CONCRETE WALLS AND BASE SLAB ARE DESIGNED FOR A MAXIMUM DEPTH OF 10 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- STRUCTURE IS DESIGNED TO MEET NJDOT SPECS.
- THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."



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INLET BASE & RISER NJDOT TYPE DOUBLE B

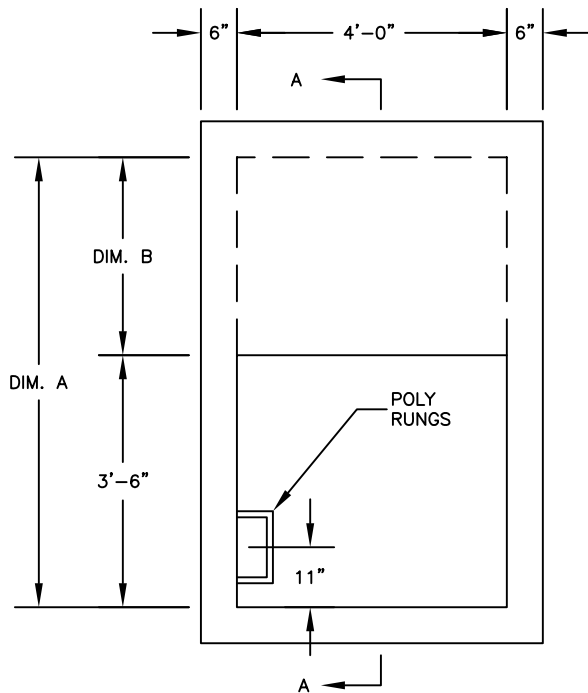


A-LOK (STM) SECTION
NOT TO SCALE

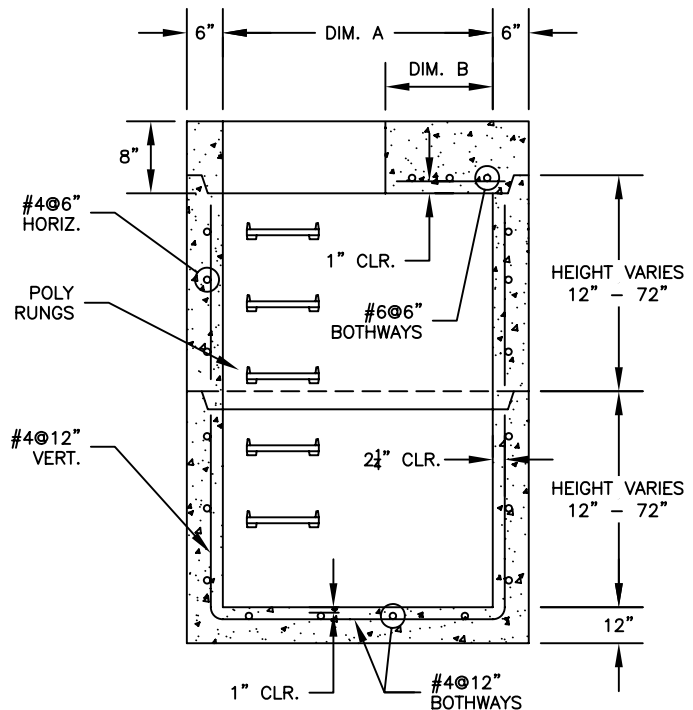
SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE INLET SHALL BE DESIGNED TO MEET ASTM C-913, "PRECAST CONCRETE WATER AND WASTEWATER STRUCTURES."
- THE INLET IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME & COVER BY OTHERS).
- THE REINFORCED CONCRETE WALLS AND BASE SLAB ARE DESIGNED FOR A MAXIMUM DEPTH OF 20 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- STRUCTURE IS DESIGNED TO MEET NJDOT SPECS.
- THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."

STATE OF NEW JERSEY		
DOT C.B. TYPE	DIM. A	DIM. B
B1 & E1	4'-6"	1'-0"
B2 & E2	5'-6"	2'-0"



PLAN VIEW
NOT TO SCALE

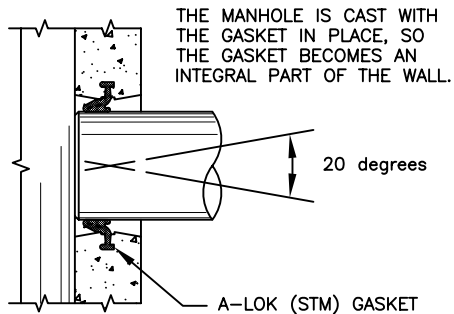


SECTION A-A
NOT TO SCALE



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INLET BASE & RISER
NJDOT TYPE B1/B2/E1/E2 - DEEP

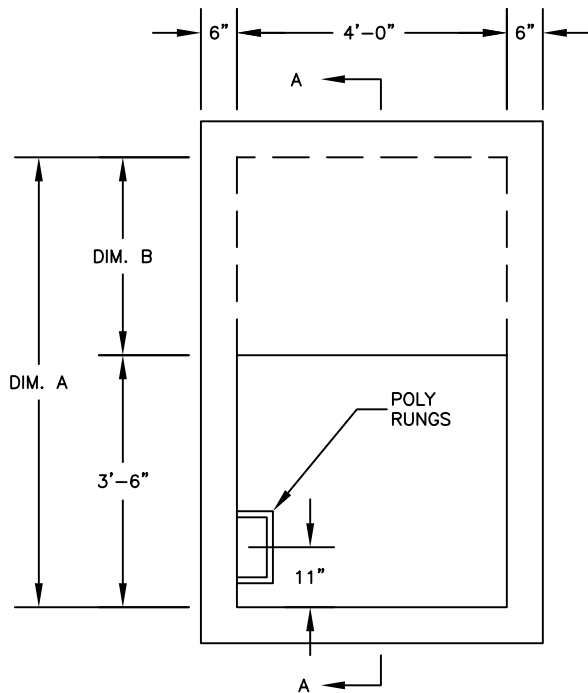


A-LOK (STM) SECTION
NOT TO SCALE

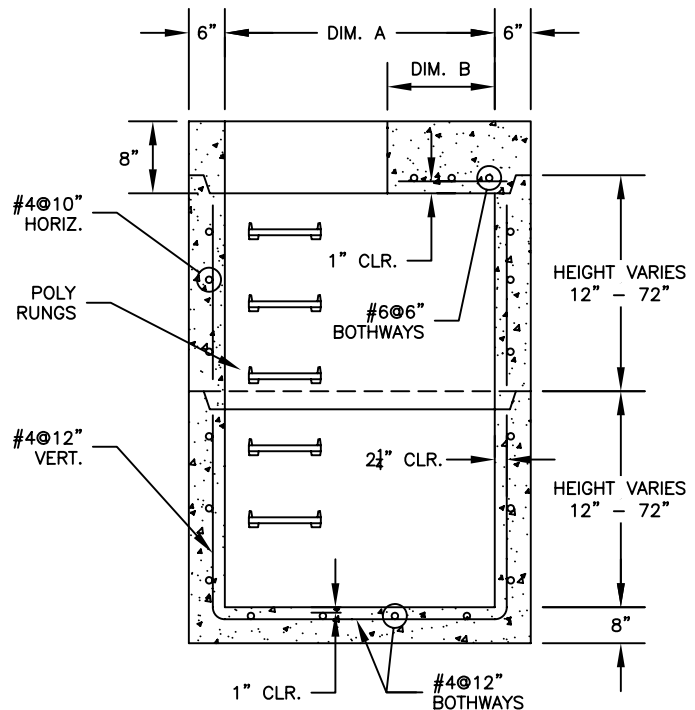
SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE INLET SHALL BE DESIGNED TO MEET ASTM C-913, "PRECAST CONCRETE WATER AND WASTEWATER STRUCTURES."
- THE INLET IS DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF HATCH AND/OR FRAME & COVER BY OTHERS).
- THE REINFORCED CONCRETE WALLS AND BASE SLAB ARE DESIGNED FOR A MAXIMUM DEPTH OF 10 FT (DEPTH = F.G. TO TOP OF BASE SLAB).
- STRUCTURE IS DESIGNED TO MEET NJDOT SPECS.
- THE OPTIONAL A-LOK STORM GASKET IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-1478, "STORM DRAIN RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE STORM SEWER STRUCTURES, PIPES, AND LATERALS."

STATE OF NEW JERSEY		
DOT C.B. TYPE	DIM. A	DIM. B
B1 & E1	4'-6"	1'-0"
B2 & E2	5'-6"	2'-0"



PLAN VIEW
NOT TO SCALE

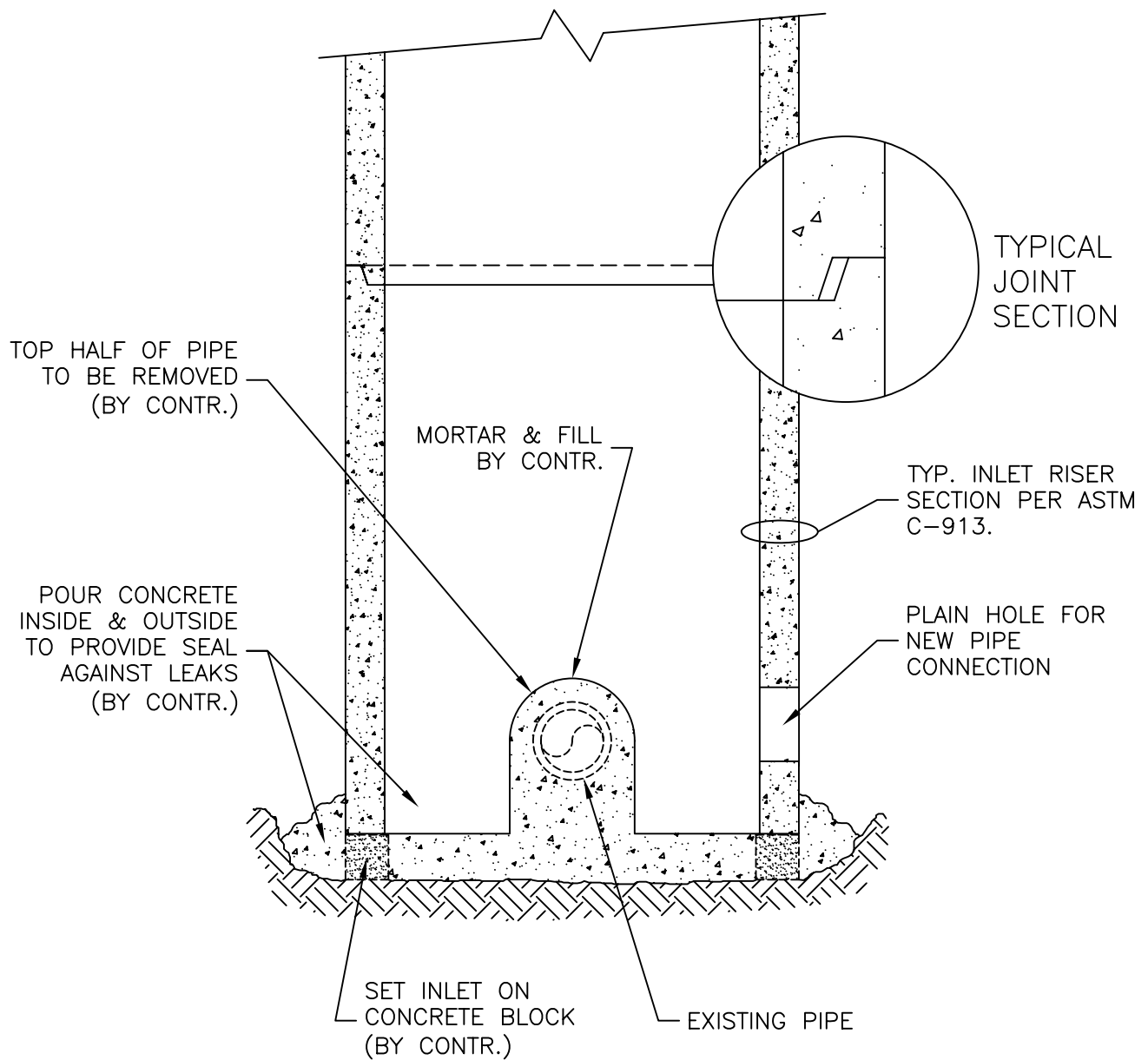


SECTION A-A
NOT TO SCALE



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INLET BASE & RISER NJDOT TYPE B1/B2/E1/E2 - SHALLOW



SECTION VIEW
NOT TO SCALE

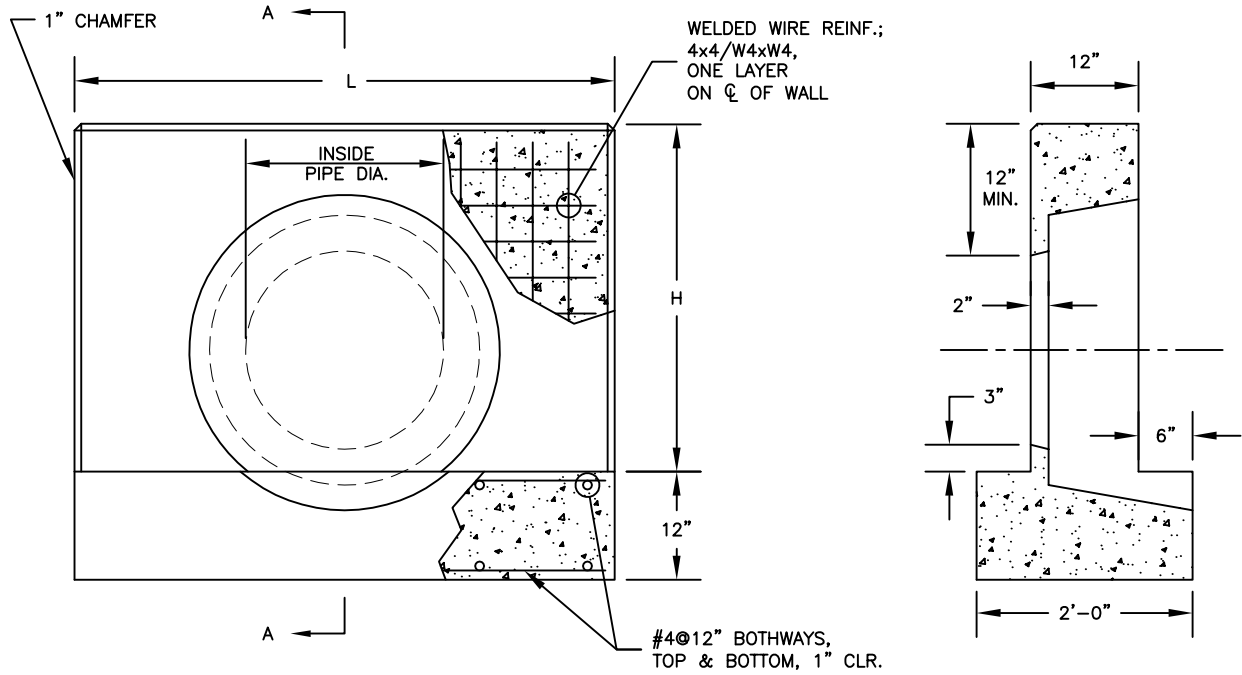


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DOGHOUSE INLET RISER

SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.
- THE WELDED WIRE REINFORCEMENT HAS A YIELD STRENGTH OF 75,000 PSI.



FRONT VIEW
NOT TO SCALE

SECTION A-A
NOT TO SCALE

INSIDE PIPE DIA. (IN)	WEIGHT (LBS)	L (IN)	H (IN)
12-15	3,375	60	30
18-21	3,750	60	36
24-27	5,775	84	42
30-33	7,200	108	48
36	7,900	108	57
42	9,380	128	66

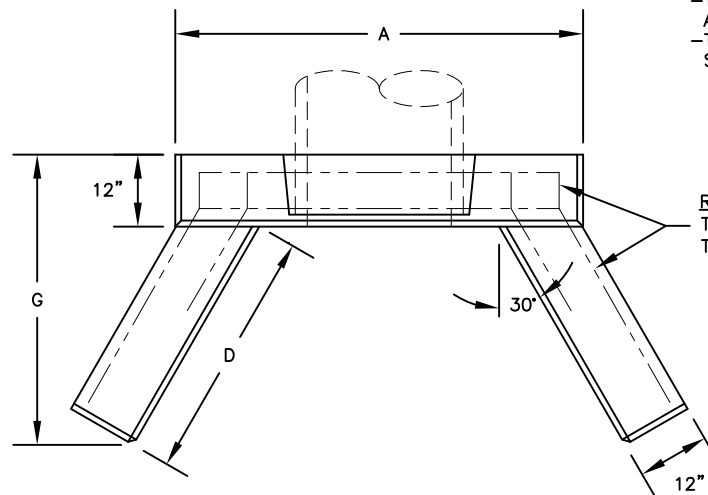


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ENDWALL
PENNDOT TYPE D

SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.

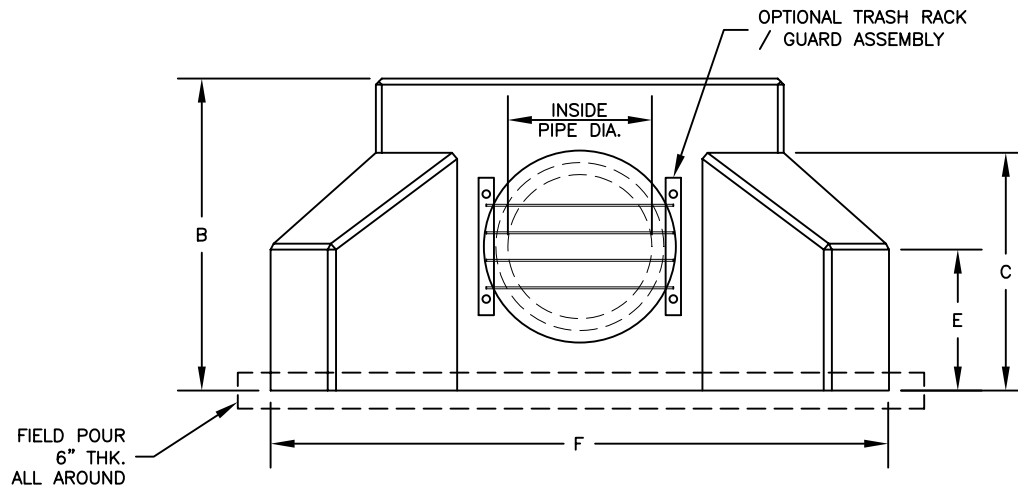


REINF. STL.

- TYPE I-III = #4@10" B.W.
- TYPE IV-VIII = #5@10" B.W.

PLAN VIEW

NOT TO SCALE



FRONT VIEW

NOT TO SCALE

TYPE	INSIDE PIPE DIA. (IN)	WEIGHT (LB)	A (IN)	B (IN)	C (IN)	D (IN)	E (IN)	F (IN)	G (IN)
I	12-15	3400	56	39	26	36	12	86	44
II	18-21	4880	64	48	36	39	20	96	48
III	24-27	5270	68	52	40	42	24	104	48
IV	30-36	9250	79	65	54	63	28	134	67
V	42	9500	88	71	54	63	28	143	67
VI	48	12780	96	78	66	81	30	170	83
* VII	54-60	32830	122	108	99	97	51	211	96
* VIII	72	41361	142	122	113	110	51	245	107

TYPE MARKED BY * INDICATES WALL MAY BE FABRICATED IN THREE (3) PIECES.

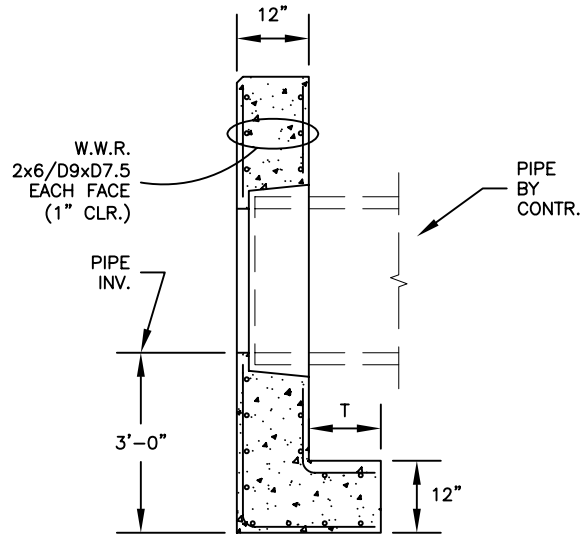


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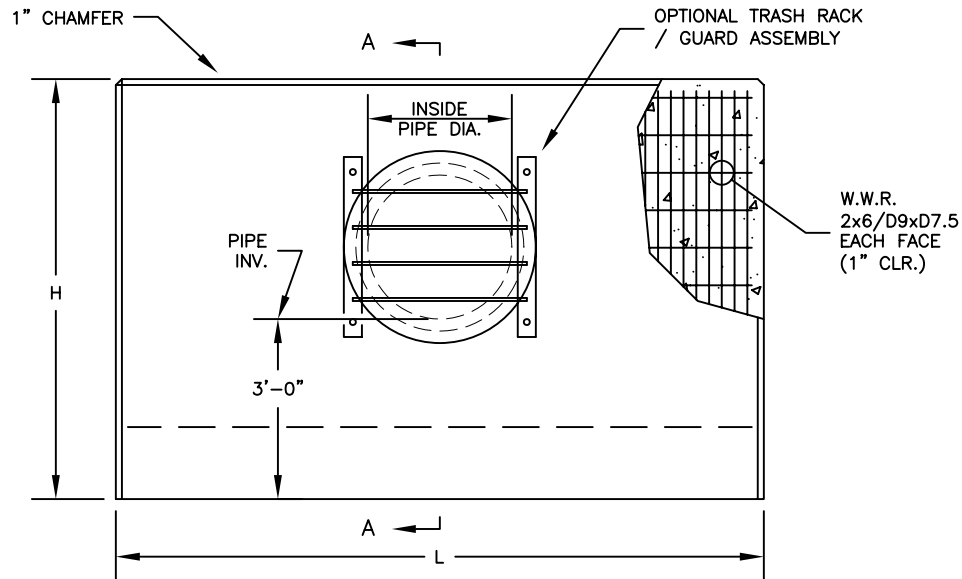
ENDWALL
PENNDOT TYPE DW

SPECIFICATIONS:

- CONCRETE TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- WELDED WIRE REINFORCEMENT TO HAVE A YIELD STRENGTH OF 75,000 PSI.



SECTION A-A
NOT TO SCALE



FRONT VIEW
NOT TO SCALE

TYPE	INSIDE PIPE DIA. (IN.)	WEIGHT (LB.)	L (IN.)	H (IN.)	T (IN.)
I	12-15	4360	60	63	12
II	18-21	6490	84	69	12
III	24-27	9520	108	75	18
IV	30-33	12240	132	81	18
V	36	14320	144	84	24
VI	42	17480	168	90	24

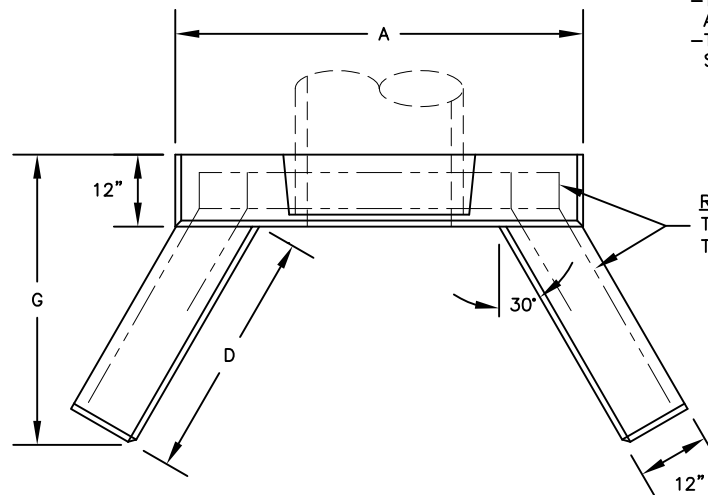


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ENDWALL
NJDOT TYPE D

SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.

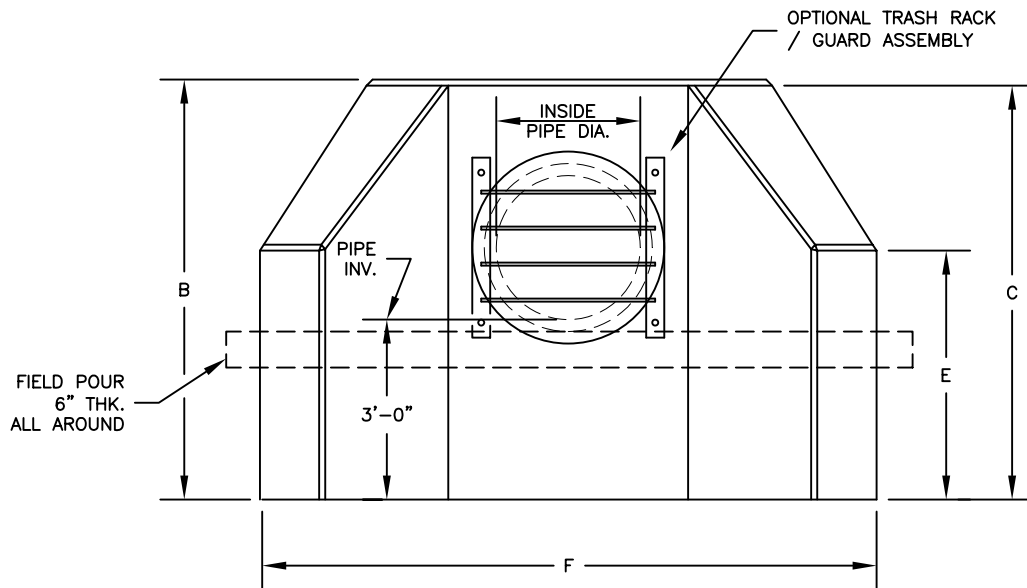


REINF. STL.

- TYPE I-IV = #4@10" B.W.
- TYPE V-VIII = #6@10" B.W.

PLAN VIEW

NOT TO SCALE



FRONT VIEW

NOT TO SCALE

TYPE	INSIDE PIPE DIA. (IN.)	WEIGHT (LB.)	A (IN.)	B (IN.)	C (IN.)	D (IN.)	E (IN.)	F (IN.)	G (IN.)
I	12-15	6670	56	63	63	30	51	86	38
II	18-21	9350	64	69	69	42	57	106	49
III	24-27	12060	68	75	75	54	63	122	59
IV	30-36	17270	79	84	84	72	72	151	75
* V	42	29980	111	96	93	84	83	172	85
* VI	48	35320	118	103	99	96	89	192	95
* VII	54-60	47370	132	116	112	120	102	242	116
* VIII	72	61770	148	130	126	144	116	286	137

TYPE MARKED BY * INDICATES WALL MAY BE FABRICATED IN (3) PIECES

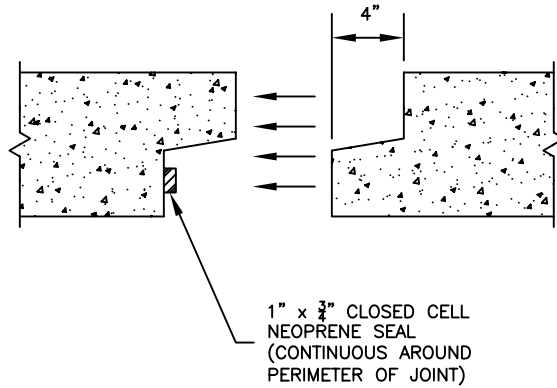


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ENDWALL
NJDOT TYPE DW

SPECIFICATIONS:

- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 5,000 PSI IN 28 DAYS.
- THE WELDED WIRE FABRIC HAS A YIELD STRENGTH OF 75,000 PSI.
- THE BOX CULVERT IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM-C-1433, "PRECAST REINFORCED CONCRETE MONOLITHIC BOX SECTIONS FOR CULVERTS, STORM DRAINS, AND SEWERS."
- ALL VERTICAL JOINT LOCATIONS ARE TO BE DETERMINED BY THE PRODUCTION DEPARTMENT.



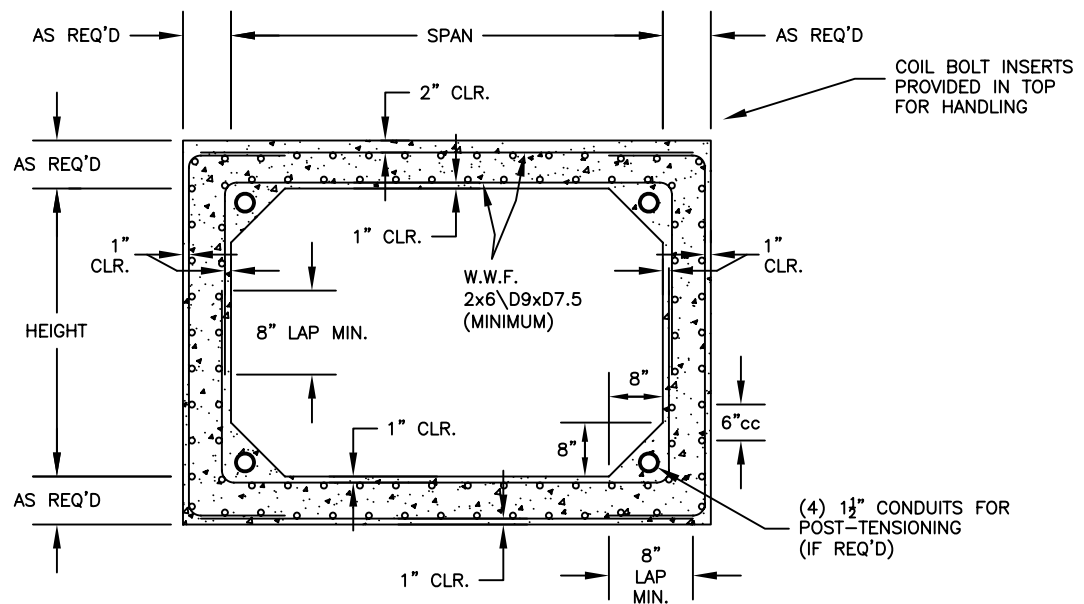
DETAIL — JOINT

NOT TO SCALE

CULVERTS ARE AVAILABLE IN VARIABLE SIZES

$$2 \times (\text{SPAN} + \text{HEIGHT}) = 56' \text{ MAXIMUM}$$

$$\text{LENGTH} = 8' \text{ MAXIMUM}$$



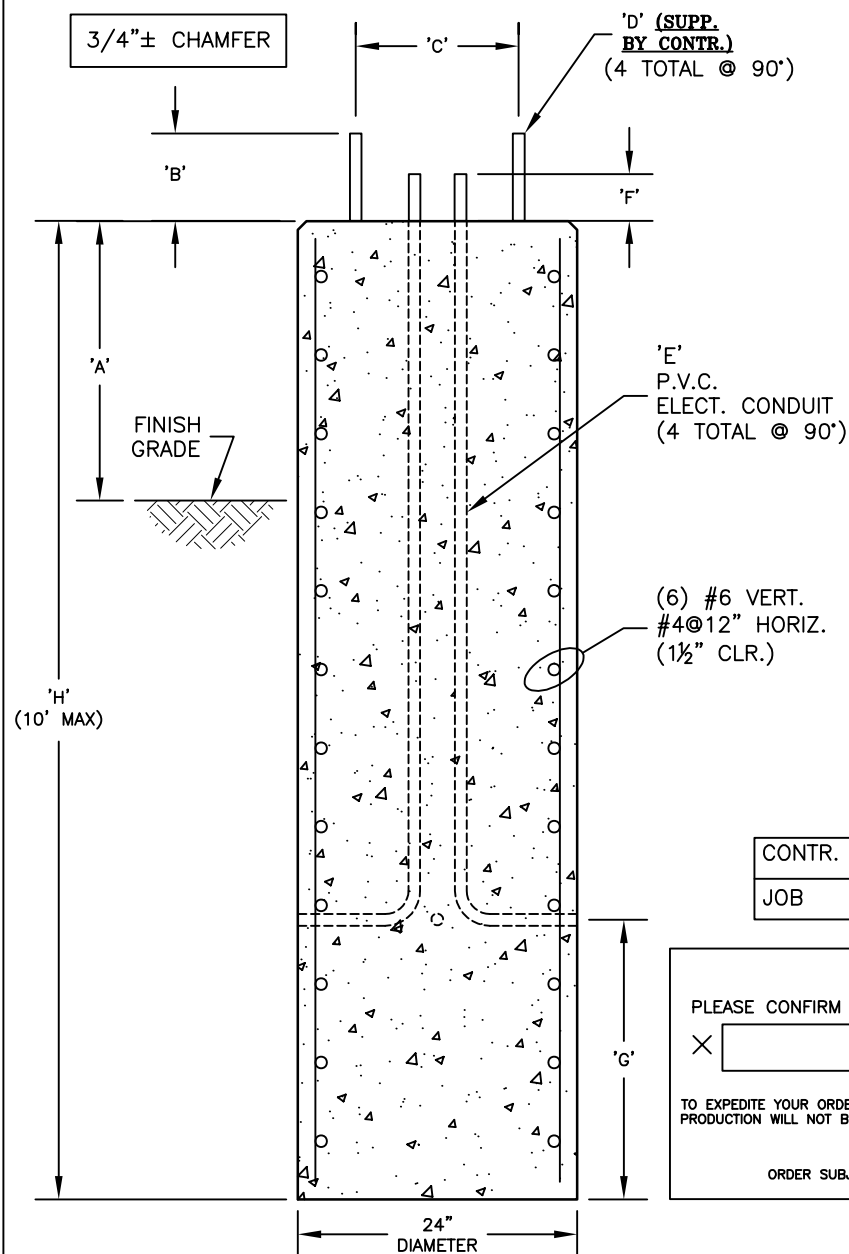
CROSS-SECTION

NOT TO SCALE



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BOX CULVERT



SECTION VIEW
NOT TO SCALE

- (A) CONCRETE ABOVE GRADE _____
- (B) BOLT PROJECTION (6" MAX.) _____
- (C) BOLT CIRCLE DIA. _____
- (D) SIZE OF ANCHOR BOLTS (SUPP. BY CONTR.) _____
- (E) SIZE OF CONDUIT (1" MAX) _____
- (F) CONDUIT OUT OF CONCRETE FROM TOP OF BASE (6" MX.) _____
- (G) CONDUIT LOCATION _____
- (H) OVERALL HEIGHT (10' MAX) _____

WEIGHT = 471 LBS./VT. FT.

CONTR.	
JOB	

*****IMPORTANT*****

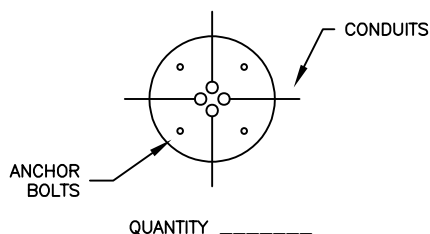
PLEASE CONFIRM THESE SPECIFICATIONS WITH YOUR SIGNATURE

X DATE:

TO EXPEDITE YOUR ORDER, PLEASE SIGN, DATE, AND RETURN.
PRODUCTION WILL NOT BEGIN WITHOUT THIS COMPLETED FORM.

SPECIFICATIONS ARE BASED ON PRICING ATTACHED.

ORDER SUBJECT TO APPROVAL AT CORPORATE HEADQUARTERS



PLAN VIEW
NOT TO SCALE

SPECIFICATIONS:

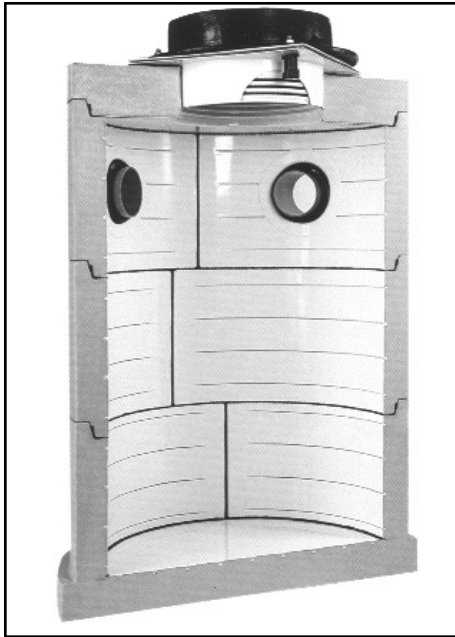
- THE CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
- THE REINFORCING STEEL HAS A YIELD STRENGTH OF 60,000 PSI.



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LIGHT POLE BASE ORDER FORM

DURA PLATE 100 LINER CORROSION RESISTANT SYSTEM



Part 1. The Dura Plate 100 Liner System

The objective of this specification is to cover the supply and installation of a vacuum formed semi-rigid liner for use in wastewater and light industrial concrete structures to effectively shield the interior of the structure from corrosion.

The design of the liner system shall insure that it will conform to the contour of the structure and form a permanent mechanical bond to the concrete through use of preformed horizontal ribs and dovetails. The liner will be formed in such a manner that the joints between the structure sections will be afforded protection through the use of a continuous PVC return into the joint for a minimum of .50 of an inch. Provisions will be made to allow the pipe penetrations to be sealed by applying a cementitious corrosion resistant material to the unlined exposed areas within the openings.

Part 2. Material

2.1 Liner shall be Dura Plate 100 as manufactured by A-LOK® Products, Incorporated, Tullytown, Pennsylvania.

2.2 Liner Composition - The liner, channel joints, H-joints and corner joints shall be manufactured from an Acrylic PVC Alloy.

All sheet compound will result in a semi-rigid material suitable for ther-

moforming to the contour of the structure and shall maintain a minimum wall thickness of .065 inches.

2.3 Rubber Joint Composition - The fabricated liner panels shall be joined together by a slotted strip of EPDM rubber according to the manufacturer's specification as illustrated in Figure 1A.

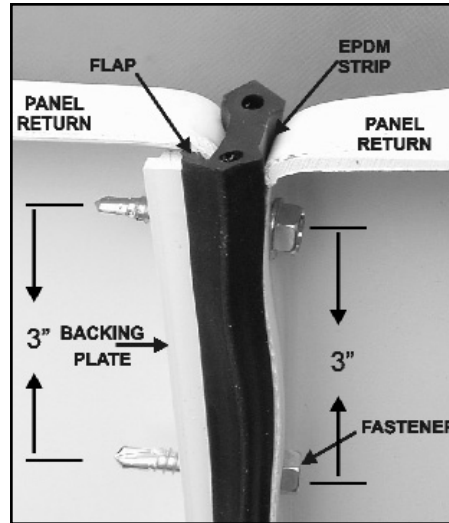


Figure 1A - Panel Joint Detail

2.4 Butyl Joint Composition - Sections of lined concrete structures shall be joined together by an approved butyl strip (A-LOK® Products, Inc. Tullytown, PA. MT-329) designed to produce sufficient squeeze-out between PVC returns.

Note: All EPDM and Butyl joint compound shall be formulated to meet the chemical resistant properties of Section 3.1.1.

Part 3. Physical Properties

3.1 General - All materials shall meet the physical and chemical resistant properties specified in the following appropriate section.

3.1.1 Physical Properties - All semi-rigid liner sheets, joint assembly components, corner and weld strips shall have the following properties when tested at 77 degrees +/- 5 degrees Fahrenheit.

Chemical Resistant:

Chemical	Solution
Sulfuric Acid (H ₂ SO ₄)	20%
Sodium Hydroxide (NaOH)	5%
Ammonium Hydroxide (NH ₃ OH)	5%
Nitric Acid (HNO ₃)	1%
Ferric Chloride (FeCl ₃)	1%
Soap	0.10%
Detergent	0.10%

Physical Properties of Liner Panel:

Test	ASTM Method	Minimum Value
Tensile	D-638	6,100 psi
Elongation	D-638	28.5%
Tensile Modulus	D-638	325,000 psi
Flexural Strength	D-790	9,200 psi
Flexural Modulus	D-790	340,000 psi
Tensile Impact	D-1822	640 in-lb

3.1.2 Antifungal and Antibacterial Properties - Dura Plate 100 Liner shall be made from Acrylic PVC Alloy sheets that resist bacteriological and fungal development. Sheet shall not readily provide a source of nutrients for bacteria and fungi. Plasticizers that allow a source of nutrients which support microbial growth for bacterial or fungal growth shall not be permitted.

Sheet shall be subjected to fungus resistance testing in accordance with ASTM G-21 and bacteria resistance testing in accordance with ASTM G-22, Procedure B.

Fungus Resistance Testing, ASTM G-21: Eighteen day cultures of the following pure culture fungi were harvested, washed and their spore counts adjusted to 1,000,000 (±200,000 per ml).

Organism	ATCC Number
Aspergillus niger	9642
Penicillium pinophilum	11797
Gliocladium virans	9645
Aureobasidium pullulans	15233
Chaetomium globosum	6205

The spore suspensions were combined and sprayed on the samples and controls which were placed on mineral salts agar and placed in the test chamber.

The samples, along with controls were incubated for 28 days and examined weekly.

Sample Designation	Observations (Rating*)			
	7 Days	14 Days	21 Days	28 Days
Thermoplastic Sheet:				
#1	0	0	0	0
#2	0	0	0	0
#3	0	0	0	0
#4	0	0	0	0
Controls:				
Filter Paper	4	4	4	4
Glass Slides	0	0	0	0

*Rating: 0=no growth, 1=traces, 2=light, 3=moderate, 4=heavy growth

Bacteria Resistance Testing, ASTM G-22: Conclusion of Fungus Resistance Testing: The sheet samples did not allow any fungus growth (rating of 0).

A twenty-four hour culture of *Pseudomonas aeruginosa* (ATCC 13388) was harvested and washed three times by centrifugation using sterile distilled water. The bacterial suspension was added to sterile, melted minerals salts agar, mixed and plates poured. A sample of the inoculated agar was taken and a plate count to determine the number of viable pseudomonas present.

Sample Designation	Observations (Rating*)		
	7 Days	14 Days	21 Days
Thermoplastic Sheet:			
#1	0	0	0
#2	0	0	0
#3	0	0	0
#4	0	0	0
Controls:			
Inoculated Agar	0	0	0
Glass Slides	0	0	0
Plate Count Agar	1	1	1

*Rating: 0=no growth, 1=growth

Conclusion of Bacteria Resistance Testing: The sheet samples did not allow any bacterial growth (rating of 0).

Part 4. Details and Dimensions of Standard Liner

4.1 Liner panels shall have a minimum thickness of .065 inches. A combination of standing ribs and mechanical dovetails shall be used to secure the liner panels to the wall of the structure and shall be spaced a maximum of 6.0 inches apart.

4.2 Liner panels with a combination of standing ribs and dovetails in diameters of 48" through 60" shall be at least .50 inches high. Panels of 72" diameter and above shall be at least .75 inches high.

4.3 Liner with locking extensions shall be able to withstand a test pull of 100 pounds per linear inch applied perpendicular to the concrete surface for a period of 60 seconds. No rupture of the locking extensions or withdrawal from embedment shall be acceptable. This test shall be made at a temperature between 70 and 80 degrees Fahrenheit inclusive.

4.4 Liner panels shall be formed to the correct radius to assure a true diameter match between joined precast sections when assembled.

4.5 Liner panels shall be formed with a continuous return into the joint for a minimum of .50 of a inch which shall afford protection between the lined precast sections.

4.6 All radius panels shall be vacuum tested for pinholes during the molding process and shall withstand a minimum of 25 inches of mercury for a period of 60 seconds.

4.7 Panel sections shall be custom formed to a specified height not to exceed 6' in overall length. Lengths specified shall include a tolerance ratio of +/- .0625 per foot.

Part 5. Plant Installation of Liner

5.1 General - Installation of all lining shall be done in accordance with the manufacturer's recommendations.

5.2 Lining coverage shall not be less than the minimum shown on the approved shop drawings or construction plans.

5.3 The liner panels when assembled shall form a circular cylinder that fits snugly against the inner steel core of the form. A removable extruded rubber profile or suitable one-sided tape can be used to seal the liner against the core to prevent concrete fines from washing down between the liner and steel core.

5.4 Concrete poured around the liner shall be distributed evenly to prevent shifting of the liner.

5.5 Concrete poured against the liner shall be vibrated, or compacted in a manner to protect the liner and produce a dense homogenous concrete to securely anchor the assembly to the exposed surfaces on the interior of the structure.

5.6 When extracting the steel core, care should be taken to protect the liner from damage. Instruments with sharp or jagged edges should not be used to release the forms from the liner.

5.7 Visual inspection of the liner shall be made after demolding and any cuts or tears shall be repaired by following the manufacturer's repair recommendations.

5.8 The concrete producer shall take all necessary measures to prevent damage due to casting, demolding, and delivery of the lined concrete structure.

Part 6. Field Installation of Lining

6.1 General - Field installation of all lined precast sections shall be done in accordance with the recommendations of the manufacturer.

6.2 The horizontal joints between sections of lined concrete structures can be made by either butyl or a combination of butyl and rubber joint per the recommendation of the concrete manufacturer. (See Fig. 2)

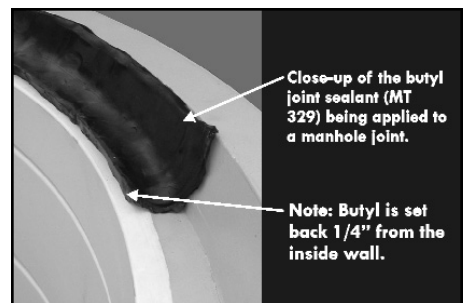


Figure 2 - Butyl Joint

6.3 Joint surfaces must be clean to ensure proper adhesion of the butyl. An application of a butyl based primer will produce the highest degree of adhesion to the joint surfaces.

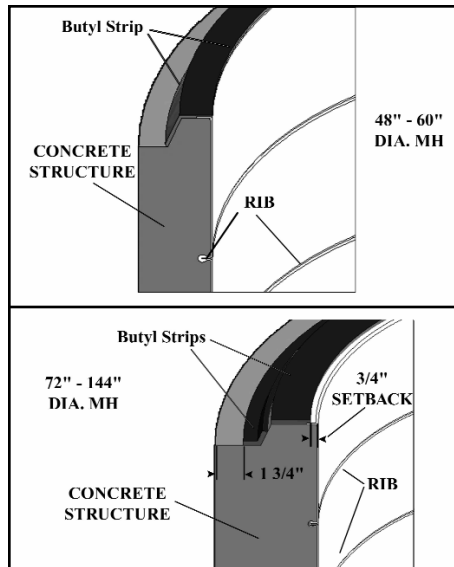


Figure 2A - Spigot Up Joint Detail

6.4 Place specified butyl material as indicated in Figures 2A and 3A. Butt ends of material together. Material should never be overlapped. Butyl material shall be an approved strip per Section 2.4.

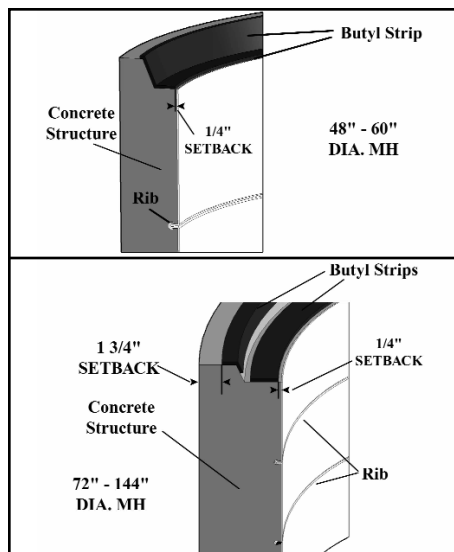


Figure 3A - Bell Up Joint Detail

6.5 Lined sections should be carefully centered and lowered to complete coupling process. Apply sufficient pressure to properly seat joint and achieve squeeze out.

6.6 After structure is in place, care should be taken to properly plug all lift pin inserts or holes with a suitable non-shrink grout.

6.7 The installing contractor shall take all necessary measures to prevent damage to the liner due to material handling, installation, or equipment or material used in installing, or used in or taken through the structure.

Part 7. Testing and Inspection

7.1 General - This section covers the in-plant and field inspection and testing method of lined concrete sections.

7.2 The liner manufacturer shall test each panel to withstand a constant vacuum of 25 inches of mercury for a period of 60 seconds. Any sections failing to meet this requirement shall be rejected.

7.3 In-plant inspections of panels cast into concrete sections shall be visually inspected for cuts or tears and shall be repaired following the manufacturers recommendations.

Part 8. Liner Appurtenances

8.1 Steps or Ladders

8.1.1 Steps shall be attached by either casting a preformed polypropylene insert to accept a polypropylene drive in step (Fig. 4), or by casting or drilling a precise hole to accept a polypropylene press fit step (Fig. 4A), as per the recommendations of the step manufacturer.

8.1.2 After installation of either the steps or ladders, the junction point of the device and the liner shall be sealed by applying an approved butyl caulking material (A-LOK® Products, Inc., Tullytown, Pennsylvania, Lap Sealant).

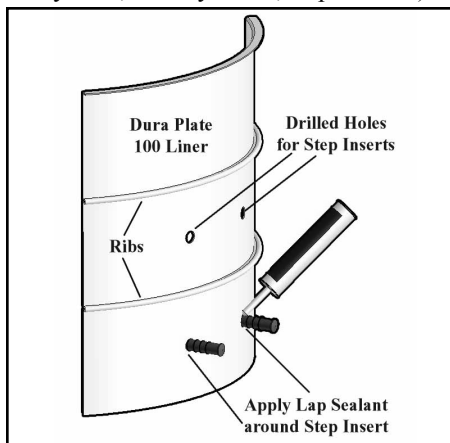


Figure 4 - Casting in Polypropylene Step Insert

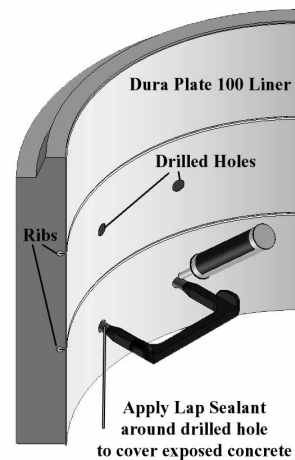


Figure 4A - Drilled Hole Detail for Steps or Ladders



Figure 5

8.2 Hole Liners

8.2.1 Pipe penetrations through the lined wall shall be afforded protection by applying .125 inch trowelable, chemical and corrosion resistant epoxy mortar to the unlined exposed areas within the openings and shall overlap the liner wall a minimum of 1.50 inches as illustrated in Figure 5A.



Figure 5A - Hole Liner Detail

8.3 Grade Work Protection

8.3.1 Corrosion protection between the lined concrete structure and the cast iron frame and cover shall be obtained through the use of a telescoping Liner System (A-LOK® Products, Inc.,

Tullytown, Pennsylvania, Water-LOK Connector) illustrated in Figure 6A below.

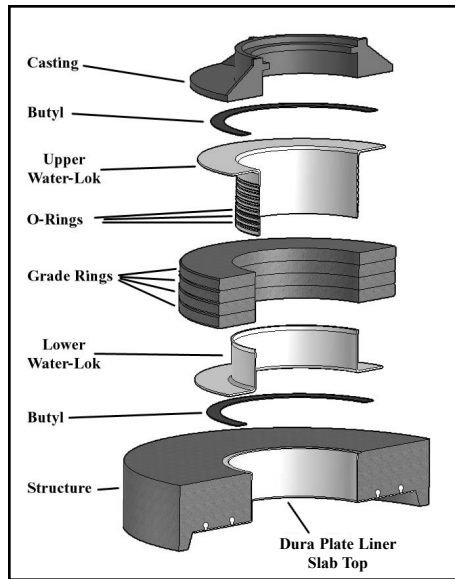


Figure 6A - Water-LOK Components and Duraplate Slab Top Liner

8.3.2 Corrosion protection shall be afforded for aluminum entry frames and doors by fabricating a semi-rigid riser to match the inside dimensions of the access frame.

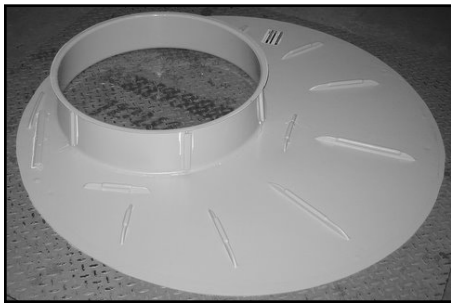


Figure 7A - Duraplate Slab Top With Opening

Part 9. Warranty

A-LOK® Products, Incorporated warrants that the product described in this bulletin meets that material, quality, and workmanship conformable to the recommended use.

A-LOK® Products, Incorporated liability is limited to replacement or repair of defective parts, excluding cost of removal, installation or unauthorized repairs. A-LOK® Products will not be responsible for incidental or consequential damages or for products which have been altered or modified. No representative of the company, or any other person, has the authority to waive, alter or add to this guarantee or to assume for the company any obligation or liability in connection with the sale or installation of A-LOK® Products, Inc. products. This warranty is in lieu of all other warranties, express or implied.

A-LOK® Products, Inc. Standard Terms and Conditions of Sale apply to purchase of this product.

All information is subjected to change without notice.

Part 10. Specifications of Manhole Coatings and Linings

Interior Lining

- (1) The concrete structure shall have a liner that is integrally cast with the precast section, at the time of manufacture.

- (2) The liner shall be manufactured from an acrylic modified PVC alloy.
- (3) The liner shall be thermo-vacuum formed to create a semi-rigid liner.
- (4) The liner shall conform to the interior diameter of the structure.
- (5) The liner shall be formed with dovetail ribs so that it is securely anchored to the concrete structure.
- (6) The liner shall be formed with returns into the bell and spigot joints to allow for butyl sealant to be placed and to eliminate the need for any field welding of the joint.
- (7) The liner shall be light in color to reflect light.
- (8) The liner shall have both antifungal and antibacterial properties that will not readily provide a source of nutrients for bacteria or fungi.
- (9) The liner shall be a minimum of .065" thick.
- (10) The liner panels shall be joined together by an EPDM slotted rubber strip.
- (11) All materials shall meet the physical and chemical properties specified in the appropriate ASTM specification.
- (12) The liner shall be Dura Plate 100 as manufactured by A-LOK® Products, Incorporated. Tullytown, PA, or approved equal.

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US Patents 4,751,799 and 5,081,802
Canadian Patents 1,285,501 and 2,030,017
Other Patents Pending

WATER•LOK™

GRADE WORK PROTECTION SYSTEM

Inflow & Infiltration (I&I) deterioration of grade work is one of the leading causes of pothole formation around manholes. Grade work is constantly being attacked by the pounding and vibration of traffic, the corrosive effect of chemicals produced by bacteria found in sewer systems, and the freeze/thaw cycle. These forces destroy the grade work by creating voids that eventually turn into potholes.

Protect your grade work with WATER•LOK.

WATER•LOK is a telescopic liner system that protects the grade work area from water infiltration as well as chemical attack. The self adjustability of the system allows it to compensate for grade movement after installation.

Water•LOK can be used in both new and rehabilitation projects and is compatible with all mechanical means for securing castings to structures.

**BRING YOUR GRADE WORK UP
TO GRADE WITH WATER•LOK**

IS YOUR GRADE WORK PROTECTED?



**The Problem With
Unprotected Grade Work.**



**The Solution is
WATER•LOK!**



697 Main Street • P.O. Box 1647 • Tullytown, PA 19007
800-822-2565 • 215-547-3366 • 215-547-5260 Fax
<http://www.a-lok.com> • e-mail info@a-lok.com

WATER•LOK™

Durability

Made from materials highly resistant to a sewer system's corrosive environment.

Adjustability

Telescopic design allows up to 14" of vertical movement along with enough deflection to accommodate changes in grade, or road height due to re-paving.

Reliability

High quality O-rings and butyl create a permanent watertight seal without the need for mechanical parts or tools.

Can not be accidentally dislodged while entering or exiting structure.

Compatibility

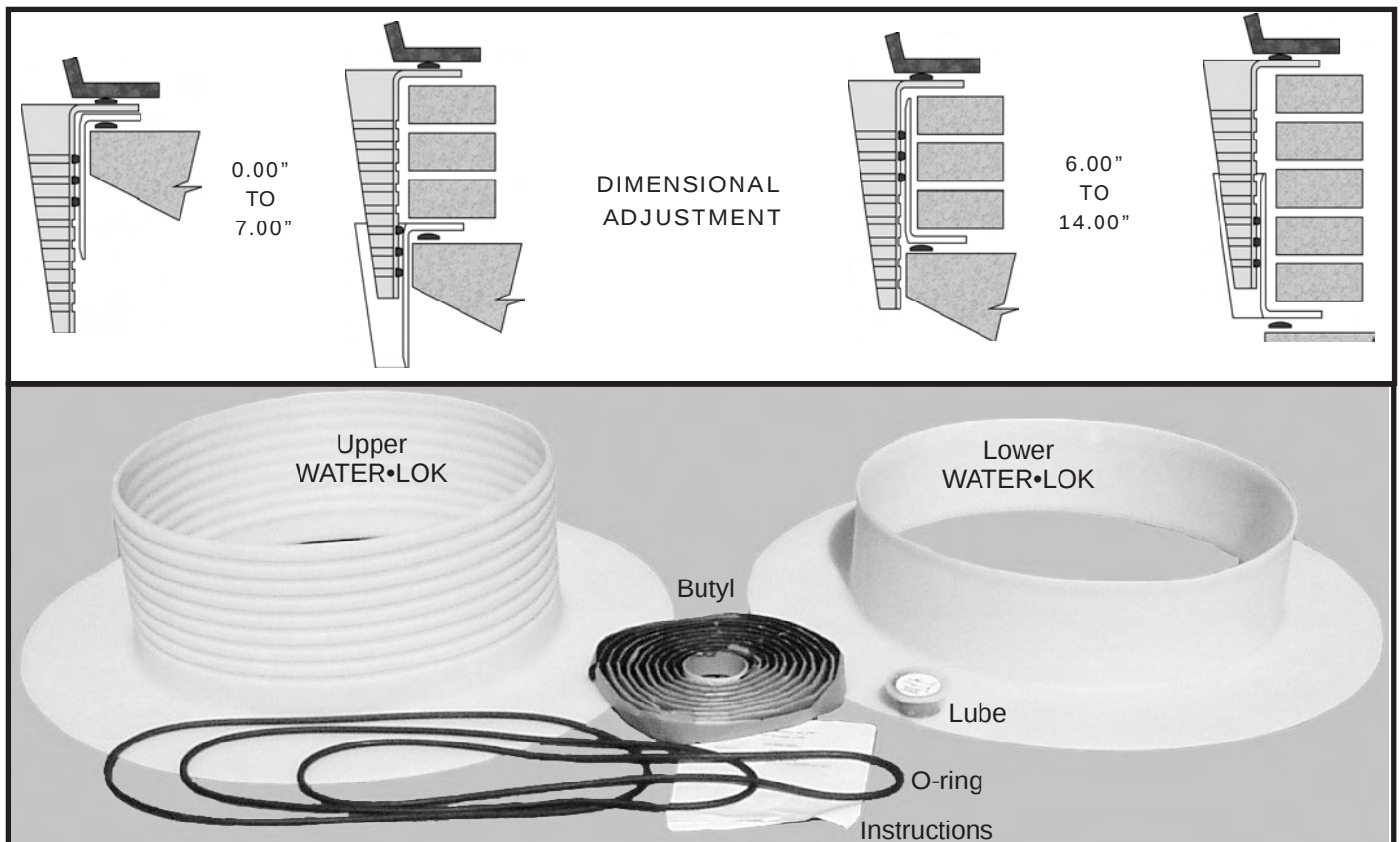
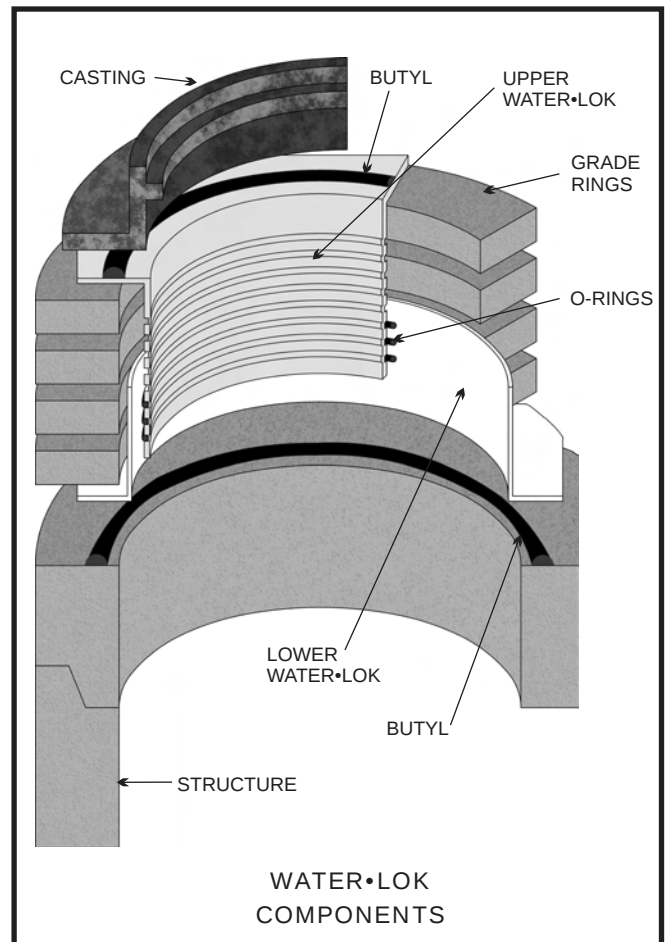
Use with the Dura Plate 100 Liner system for total structural corrosion protection.

Availability

Available for 24", 27" and 30" structure openings

Testability

When vacuum testing is required expandable steel bands are available to hold O-Rings in place and retain the shape of the Upper and Lower Water-Lok Parts.



WATER•LOK Installation Kit

Every WATER•LOK connector is shipped boxed with everything needed for installation. Instructions, O-rings, Lube, Butyl and Connectors.



The Company With Connections®



PIPE TO CONCRETE STRUCTURE COLD JOINT CONNECTOR

WATER-STOP For all Corrugated or Smooth Wall Pipes

WATER-STOP CONNECTORS

WATER-STOP

Connectors easily install to the outside diameter of corrugated or smooth wall pipe. Designed for use with new or existing round or flat wall structures to seal cold joint pipe penetrations.



(Fig. 1) Tightening down one piece spliced WATER-STOP with torque wrench prior to grouting.

MATERIAL

WATER-STOP is extruded from an Polyisoprene/SBR blend compound engineered to conform with the requirements of Section 4.1.1 of ASTM C-923. Alternative compounds are available for unusual applications upon special order.

All stainless steel hardware is in compliance with Section 4.2, "Mechanical Devices" of ASTM C-923.

KEY ADVANTAGES

The WATER-STOP profile provides a better surface than PVC or corrugated HDPE for grout to adhere as well as a watertight connection between the connector and pipe. The "Special T" profile also helps prevent water and soil infiltration for all types of pipe. This connector is made from a Polyisoprene SBR blend. The WATER-STOP Wedge Kit (see Fig. 2) can easily be installed around existing pipes during the rehabilitation process.

The one piece spliced WATER-STOP (see Fig. 1) is normally installed over the end of new pipe installations such as field poured structures, mortared connections to precast structures, casting pipe hubs into concrete structures and doghouse field poured collars.

PRODUCT REFERENCES

A.) ASTM C-923

Resilient Connector Between Reinforced Concrete Manholes Structures, Pipe and Laterals.

B.) ASTM C-1244

Standard Test Method For Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test

C.) ASTM 1478

Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes and Laterals.

PERFORMANCE STANDARD

WATER-STOP passes ASTM C-1244 Vacuum Test and meets and exceeds all material and test requirements of ASTM 1478 and ASTM C-923 Resilient Materials Test, Section 4: "Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals".

See following chart:

RESILIENT TEST REQUIREMENTS OF A.S.T.M. C-923

TEST	RESULTS	ASTM METHOD
Chemical resistance 1 N Sulfuric acid 1 N Hydrochloric Acid	no weight loss no weight loss	at 22°C for 48h
Tensile strength	1200 psi or 8.5 MPa, min	D 412
Elongation at break	350% min.	
Hardness	±5 from mfg's. specified hardness	D 2240 (Shore A durometer)
Accelerated oven-aging	decr. of 15%, max. of original tensile strength, decr. of 20% max. of elongation	D 573, 70±1°C for 7 days
Compression set	decr. of 25%, max. of original deflection	D 395, Method B, at 70°C for 22h
Water absorption	increase of 10%, max. of original by weight	D 471, immerse 0.75 by 2-in. or 19 by 25-mm Specimen in distilled water at 70°C for 48h
Ozone resistance	rating 0	D 1171
Low-temp brittle point	no fracture at -40°C	D 746
Tear resistance	200 lbf/in. or 34 kN/m	D 624, Method B

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DIMENSIONAL DATA

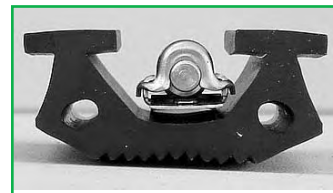
Plus or minus 1" of the nominal pipe O.D. When ordering for corrugated pipe, it is important to specify the pipe manufacturer and the O.D. of the crest of the corrugation, if possible, for proper fit.

Up to 18" corrugated uses single clamp as does all sizes of smooth wall pipe.

24" corrugated pipe and above uses double clamp connector design.



Double clamp WATER-STOP profile for corrugated over 18" diameter.



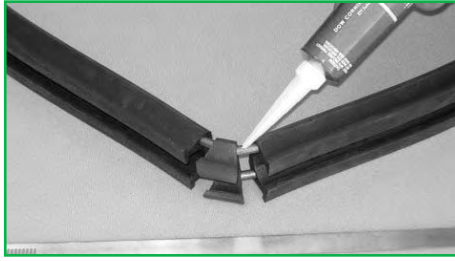
Single clamp WATER-STOP profile for all smooth wall and less than 18" diameter corrugated pipe.

WEDGE STYLE WATER-STOP KIT (Fig. 2)

INSTALLATION INSTRUCTIONS (Existing Pipe)

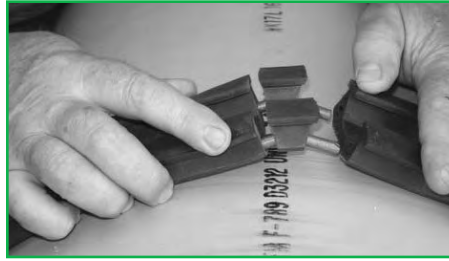
COMPONENTS: Connector to fit Pipe O.D.
Tube of Glue
1 Rubber Wedge
2 Steel Alignment Pins

STEP 1



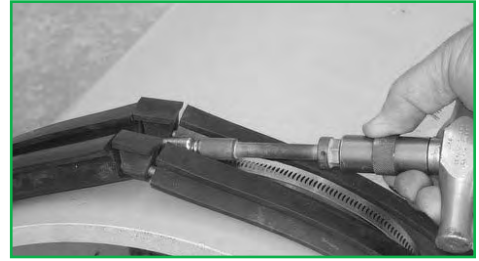
Insert pins in wedge and apply glue to both sides of wedge.

STEP 2



Wrap WATER-STOP around pipe. Install pins and wedge to WATER-STOP.

STEP 3



Torque down take down clamp to 60" pounds to squeeze wedge with glue together. Once glue is set grouting can begin.

ONE PIECE SPLICED STYLE WATER-STOP

INSTALLATION INSTRUCTIONS (New Pipe) CORRUGATED PIPE FOR SIZES 18" AND ABOVE

1. Cast or core an opening in the structure 5" larger than the O.D. of the pipe.
2. Center one piece Water-Stop CPP over the crest of pipe corrugation.
3. Position the take down clamp(s) in grooves of Water-Stop CPP. Then torque clamp(s) to 60 in.- lbs. with Torque wrench.
4. Align pipe and connector in center of structure opening and mortar completely around annular space with non-shrink grout.
5. If pouring in place, vibrate properly to insure complete compaction around seal.

NOTE: Up to 15" use a single clamp connector design and 18" and above use double clamp connector design.

NOTE: The 60 in.-lb. Torque Wrench is available through A•LOK Products, Inc.



ANY QUESTIONS REGARDING WATER-STOP CONNECTOR, PLEASE CALL 1-800-822-2565

Design Data 12

PRECAST CONCRETE MANHOLES

The proper functioning of a sewer system depends to a large degree on the performance of its appurtenances, with manholes being one of the most important. Precast concrete manholes offer significant savings in labor cost over poured-in-place concrete, masonry or brick manholes and are universally accepted for use in sanitary or storm sewers. Precast reinforced concrete manhole sections are available throughout the United States and Canada, and are generally manufactured in accordance with the provisions of American Society for Testing and Materials Specification C478.

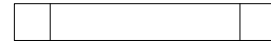
The typical precast concrete manhole consists of riser sections, a top section, grade rings and, in many cases, precast base sections or tee sections. The riser sections are usually 48 inches in diameter, but are also available up to 72 inches and larger. They are of uniform circular cross section, and a number of sections may be jointed vertically on top of the base or junction chamber. Most precast manholes employ an eccentric cone section instead of a slab top. These reinforced cone sections effect the transition from the inside diameter of the riser sections to the specified size of the top opening. Flat slab tops are normally used for very shallow manholes and consist of a reinforced circular slab at least 6 inches thick for up to 48 inches in diameter and 8 inches thick for larger sizes. The slab which rests on top of the riser sections has an access opening cast into it.

Precast grade rings, which are placed on top of either the cone section or flat slab top, are used for close adjustment of top elevation. Cast iron manhole cover assemblies are normally placed on top of the grade rings.

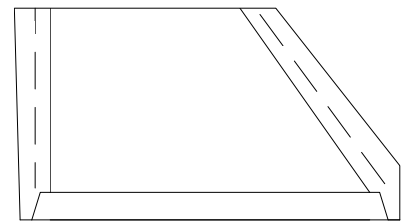
The entire manhole assembly may be furnished with or without steps inserted into the walls of the sections as specified. Reinforcement required by ASTM Specification C478 is primarily designed to resist handling stresses incurred before and during installation. Such stresses are more severe than those encountered in the vertically installed manhole. In such normal installations, the intensity of the earth loads transmitted to the manhole risers is only a fraction of the intensity of the vertical pressure.

To determine the allowable depth to which the precast concrete manholes can be placed, it is necessary to consider the forces acting on the manhole ring. Using the most severe loading condition, where the water table is at the same elevation as the ground surface, the forces acting on the manhole ring are illustrated in *Figure 2*. The total force is comprised of two components: active lateral earth pressure and hydrostatic pressure.

FIGURE 1: Typical Precast Concrete Manhole



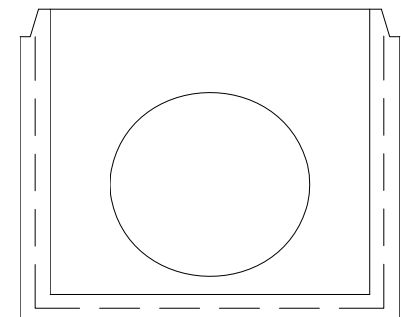
GRADE RING



ECCENTRIC CONE SECTION

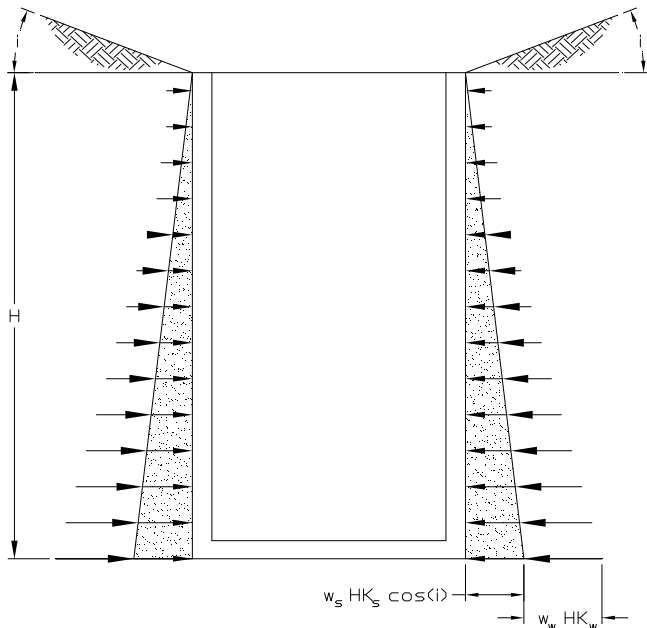
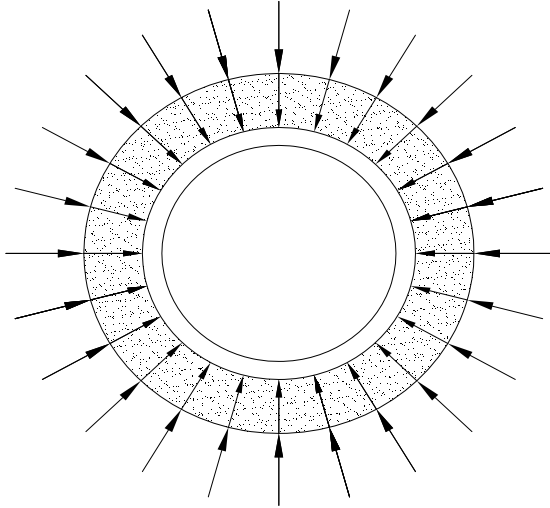


RISER SECTION



PRECAST BASE SECTION

FIGURE 2: Forces Action on a Manhole



Both components are uniformly distributed around the periphery of the manhole with no bending moment imparted to the manhole section. Based on this uniform load distribution, the lateral earth pressure and hydrostatic pressure at any depth within the soil mass is given by the equation:

$$p = w_s HK_s \cos i + w_w HK_w \quad (1)$$

where p = total lateral earth and hydrostatic pressure, pounds per square foot

w_s = effective unit weight of the backfill material, pounds per cubic foot

H = depth of manhole, feet

K_s = conjugate ratio for soil

i = angle between backfill surface and the horizontal, degrees

w_w = unit weight of water (62.4 pounds per cubic foot)

K_w = conjugate ratio for water (1.0)

In most cases $i = 0$; therefore, $\cos i = 1$ and equation (1) reduces to:

$$p = W_s HK_s + 62.4 H \quad (2)$$

K_s is further defined as:

$$K_s = \frac{\sqrt{\mu^2 + 1} - \mu}{\sqrt{\mu^2 + 1} + \mu} \quad (3)$$

where $\mu = \tan \phi$ = coefficient of friction for the soil

ϕ = angle of internal friction of the soil, degrees

Table 1 lists the normal range of the angle of internal friction for various types of soils.

TABLE 1

Backfill Material	Angle of Internal Friction ϕ
Plastic Clay	0 - 10
Wet, Fine Sand	15 - 30
Dry Sand	25 - 40
Gravel	30 - 40
Compact Clay	25 - 45

For design purposes the average value of ϕ is usually assumed to be 30° . Since $\tan 30^\circ$ is equal to $\frac{1}{\sqrt{3}}$, substitution of this value in equation (3) results in K_s equal to $1/3$.

If a saturated unit weight of the backfill is 120 pounds per cubic foot, the effective or submerged unit weight, because of the buoyant effect of water, would be $120 - 62.4 = 57.6$ pounds per cubic foot. Substituting the effective unit weight of 57.6 pounds per cubic foot and $K = 1/3$ in equation (2):

$$p = 57.6 \times H \times 1/3 + 62.4 H$$

$$p = 81.6 H \quad (4)$$

Except for the section of the manhole where the sewer line is connected, the pressure (p) will act on the manhole ring equally around the periphery of the ring and therefore put the ring section in pure compression without introducing bending moments in the concrete section in the horizontal plane. The compressive stress in any section of the manhole ring is given by the equation:

$$s = \frac{pD}{2t}$$

where s = unit compressive stress in the ring, I pounds per square foot

p = total lateral earth and hydrostatic pressure, pounds per square foot

D = diameter of the manhole, feet

t = thickness of the manhole wall, feet

if the minimum specified wall thickness is used, the wall thickness would be one-twelfth the manhole diameter. Substitution of this wall thickness and the expression for p as given in equation (4) into equation (5) and converting the compressive stress to pounds per square inch:

$$s = \frac{81.6H \times D}{144 \times 2 \times 1/12 D}$$

$$s = 3.4H$$

where s = unit compressive stress in the ring, pounds per square inch

H = depth of manhole, feet

Using an allowable concrete stress of 45 percent of the minimum specified compressive strength of 4000 psi, the allowable compressive stress would be 1800 psi. Substituting this value in equation (6):

$$1,800 = 3.4 H$$

$$H = 530 \text{ feet}$$

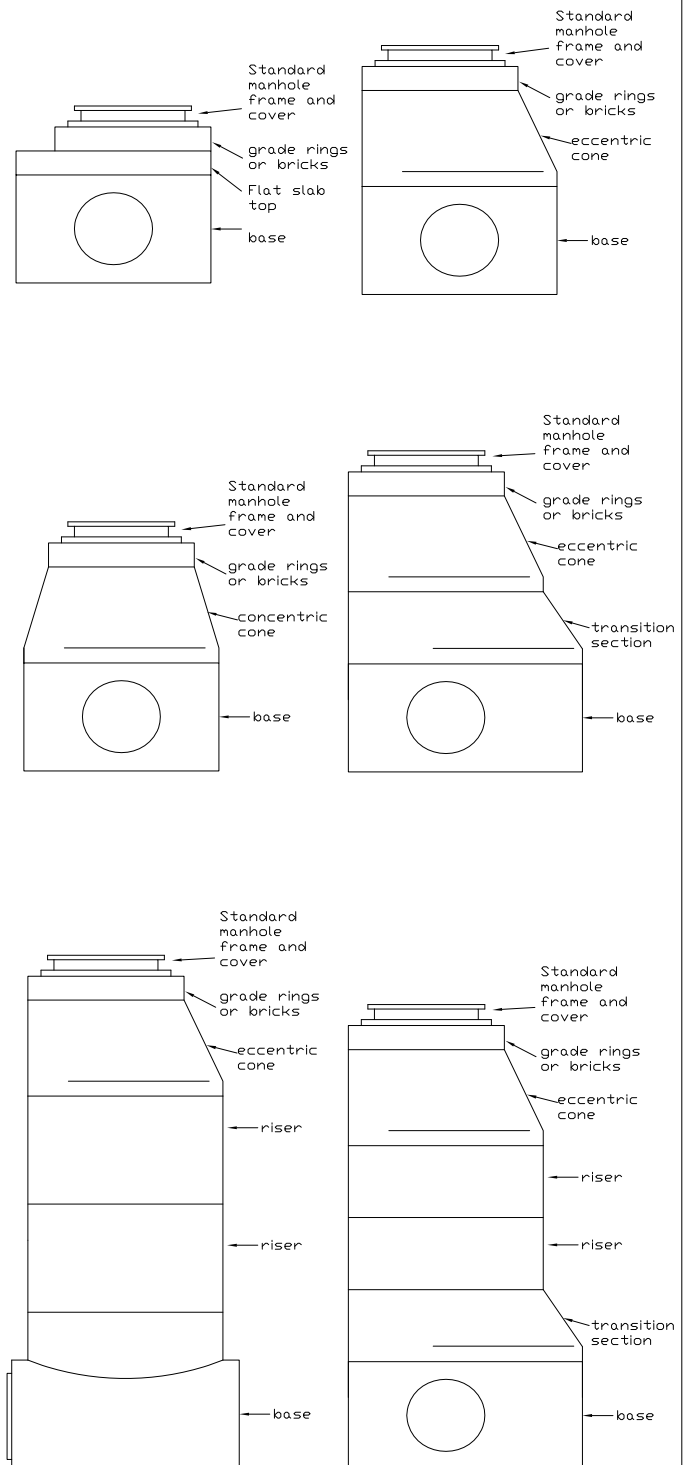
The maximum allowable depth of a typical precast concrete manhole is in excess of 500 feet or, for all practical purposes, unlimited. This indicates that the critical or limiting factor for manhole depth is the supporting strength of the base structure or the resistance to crushing of the ends of the riser sections. This phenomena, being largely dependent on the relative settlement of the adjacent soil mass, does not lend itself to precise analysis. However, if only the weight of the manhole riser and top were considered, with an allowable crushing stress of 1800 psi, a theoretical height of over 1,700 feet could be allowed. Even the most conservative approach would conclude that up to several hundred feet could be safely withstood by the riser sections without end crushing, based on the assumption that provision is made for uniform bearing at the ends of the riser sections and the elimination of localized stress concentrations.

When confronted with manhole depths greater than those previously encountered, there may be a tendency to specify additional circumferential reinforcement in the manhole riser sections. Class III or Class IV reinforcement has been specified for manhole depths as low as 25 to 30 feet. Such requirements are completely unnecessary and only result in increasing the cost of the manhole structure.

A number of joint types are employed for manhole risers and tops using mortar, mastic, rubber gaskets or combinations of these three basic types for sealing purposes. Consideration should be given to manhole depth, the presence of groundwater and the minimum allowable leakage rates in the selection of specific joint requirements.

*The allowable compressive stress of 45 percent of the ultimate compressive concrete strength is based on ACI Code. This design requirement is primarily intended for field-placed concrete and its application to precast and pretested concrete is considered conservative.

FIGURE 3: Typical Assembly Combinations



Specific information concerning precast concrete manhole assemblies to meet individual project requirements is available from any member company of the American Concrete Pipe Association.