CONTECH®
ENGINEERED SOLUTIONS

CORLIX Corrugated Aluminum Pipe

Long Service Life Economy

Contech's CORLIX® aluminum pipe provides a predictable service life of more than 75 years when installed in the recommended soil/water environment. It is the ideal pipe for municipal storm sewers, underground storm water detention systems or any standard drainage project that must withstand alkali soils and erosive environments. In addition to its long design life, CORLIX is an economical alternative to reinforced concrete pipe.

Economical

Lower initial cost starts with the fact that CORLIX weighs only 1/35 as much as reinforced concrete. Lighter weight means easier installation. Trench width (and depth) are reduced due to the smaller outside diameter, resulting in time and cost savings for both excavation and backfill. Installation of bigger and longer sections is more practical, and the pipe can often be handled without special lifting equipment.

Bundles of lightweight CORLIX being prepared for shipping.

Single lengths up to 40 feet ensure more accurate pipe alignment at time of placement and through the life of the system. Longer lengths save installation time with fewer joints. Even more footage per truckload is possible with bundles of nested pipe—and unloading time is minimal.

Easy, fast pipe cutting on the job is simple with standard tools. Since there are no riveted joints, CORLIX Pipe can be cut at any point. Cuts and welds need no protective treatment.

Wide availability of fittings saves installation time in the field. Fabricated elbows, manholes and catch basins minimize hydraulic losses at junction structures.

A CORLIX storm sewer system with prefabricated stubs eliminates the need for forming concrete junction boxes.

Table 1
Handling Weights for Corrugated Aluminum Pipe[1]
2 2/3" x 1/2" Corrugation

Diameter or Span (In.)	Weight (Lb./Lineal Ft.) Equiv. Standard Gauge					
	(.048") 18	(.060") 16	(.075") 14	(.105") 12	(.135") 10	(.164") 8[3]
6 [2]	1.3	1.6				
8 [2]	1.7	2.1				
10 [2]	2.1	2.6				
12		3.2	4.0			
15		4.0	4.9			
18		4.8	5.9			
21		5.6	6.9			
24		6.3	7.9	10.8		
27			8.8	12.2		
30			9.8	13.5		
36			11.8	16.3	20.7	
42				19.0	24.2	
48				21.7	27.6	33.5
54				24.4	31.1	37.7
60					34.6	41.9
66						46.0
72						50.1

Table 2
Handling Weights for Corrugated Aluminum Pipe[1]
3" x 1" Corrugation

Diameter or Span (In.)	Weight (Lb./Lineal Ft.) Equiv. Standard Gauge				
	(.060") 16	(.075") 14	(.105") 12	(.135") 10	(.164") 8[3]
30	9.3	11.5			
36	11.1	13.7			
42	12.9	16.0	22.0		
48	14.7	18.2	25.1	32.0	
54	16.5	20.5	28.2	35.9	
60	18.3	22.7	31.3	40.0	48.3
66	20.2	24.9	34.3	43.7	53.0
72	22.0	27.1	37.4	47.6	57.8
78		29.3	40.4	51.5	62.5
84			43.5	55.4	67.2
90			46.6	59.3	71.9
96			49.6	63.2	76.7
102				66.6	80.8
108				71.0	86.1
114					90.9
120					95.6

Notes
1. Helical lockseam pipe only. Annular riveted pipe weights will be higher.
2. 1 1/2" x 1/4" Corrugation.
3. 8-gauge pipe has limited availability.

Durability

Long service life with CORLIX aluminum pipe

When defining the durability of a drainage product, both corrosion resistance and abrasion resistance must be considered. The protection afforded by aluminum's tough, oxide surface film barrier permits aluminum to resist the detrimental effects of corrosion-abrasion cycles.

Superior corrosion resistance

CORLIX's superior corrosion resistance is achieved by a special aluminum clad culvert material. The rugged core alloy 3004- (H32 or H34) is itself rated as highly corrosion resistant. But aluminum culvert coil is also clad on both sides with alloy 7072, which is anodic to the core alloy—protecting it both physically and electrochemically against corrosion.

The aluminum alloys in CORLIX have a proven history of excellent corrosion resistance. This is primarily due to a thin, tenacious, inert oxide barrier that forms on the metal surface when exposed to air.

This tough, tightly adhering oxide barrier cannot be easily removed. If damaged or affected by an aggressive environment, the oxide barrier reforms. This is referred to as a "self-healing" effect. The oxide barrier appears on the pipe surface as a grayish-white coating that will build up over time.

Service-life expectancy studies on installed aluminum drainage products have been conducted since the early 1960s by state and federal agencies. Sixteen gauge (0.060") corrugated aluminum pipe provides a predictable service life of 75+ years in the recommended soil/water environments with a pH range of 4.0 to 9.0 and a resistivity of 500 ohm-cm or greater.

In addition, good performance may be expected in seawater environments of 35 ohm-cm when the pipe is backfilled with a clean, granular material.

As a matter of good design, there should be no black carbon steel in contact with or bonded to the pipe. Experience has shown that galvanized steel fasteners are compatible with aluminum. Other metal-to-metal systems must be insulated with non-conducting coatings or materials.

Superior abrasion resistance

Aluminum's superior abrasion resistance has been proven through years of exposure to wet/dry abrasion-corrosion cycles. In normally abrasive runoffs, aluminum will only peen with minimum metal loss.

The Aluminum Association presented a paper to the Transportation Research Board in January 1969, reporting on more than 1,000 aluminum culverts*. (An updated report was presented in 1986**). Both reports included a method of predicting abrasion performance of aluminum corrugated drainage pipe, whereby peak energy curves were converted into a service-life chart.

When a pipe is proposed to be installed in a stream with high velocity (more than 15 fps) runoff and with heavy bed load (especially angular rocks with sharp corners), it is recommended that the Aluminum Association abrasion papers be reviewed. Copies are available from Contech on request.

* *"The Mechanisms of Abrasion of Aluminum Alloy Culvert, Related Field Experiences, and a Method to Predict Culvert Performance."*

** *"Abrasion Resistance of Aluminum Culvert Based on Long-Term Field Performance."*

Reference Specifications	
Material	AASHTO M197 ASTM B744
Pipe	AASHTO M196 ASTM B745
Design	AASHTO Section 12 ASTM B790
Installation	AASHTO Section 26 ASTM B788

Aluminum pipe can be installed in salt water environments. (See Superior corrosion resistance section above.)

Certain aspects of this product are manufactured under U.S. patent 5,842,727.

Heights-of-Cover Tables Corrugated Aluminum Pipe

Contech produces two CORLIX pipe shapes, round and pipe-arch. Round pipe is suitable for most applications. Pipe-arch is used when limited headroom conditions exist.

Height-of-cover limits [1]
For corrugated aluminum round pipe

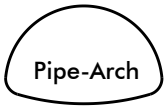
Table 3
2 2/3" x 1/2" Corrugation LOCKSEAM
HS 20 Live Load

Diameter or Span (In.)	Minimum Cover (In.)	Maximum Cover, (Ft.)[2] Equiv. Standard Gauge 16	14	12	10	8[7]
6 [4]	12	237				
8 [4]	12	178				
10 [4]	12	142	178			
12	12	118	148			
15	12	94	118			
18	12	78	98			
21	12	67	84			
24	12		73	103		
27	12		65	92		
30	12		58	82		
36	12		48	68	88	
42	12			58	76	
48	12			51	60	81
54	15			45	58	72
60	15				48	60
66	18					50
72	18					40

Table 5
3" x 1" Corrugation LOCKSEAM
HS 20 Live Load

Diameter or Span (In.)	Minimum[3] Cover (In.)	Maximum Cover, (Ft.)[2] Equiv. Standard Gauge 16	14	12	10	8[7]
30	12	54	68	95	127	150
36	12	44	56	79	106	125
42	12	38	47	67	91	107
48	12	33	42	59	79	93
54	15	29	37	52	70	83
60	15	26	33	47	63	74
66	18	23	30	42	57	68
72	18	21	27	39	52	62
78	21		25	36	48	57
84	21			33	45	53
90	24			31	42	49
96	24			29	39	46
102	24				36	43
108	24				34	41
114	24					37
120	24					33

The low, wide pipe-arch design distributes the area horizontally to provide capacity without lowering grade. It is also valuable where fast, unrestricted runoff is required. Pipe-arch functions more effectively at low water levels than round pipe.



Height-of-cover limits [1]
For corrugated aluminum pipe-arch

Table 4
2 2/3" x 1/2" Corrugation LOCKSEAM
HS 20 Live Load

Round Pipe Dia. (In.)	Size, (In.) Span x Rise	Minimum Gauge	Minimum[3] Cover (In.)	Maximum [2] Cover (Ft.)
15	17 x 13	16	12	11
18	21 x 15	16	12	9
21	24 x 18	16	12	8
24	28 x 20	14	12	7
30	35 x 24	14	12	5
36	42 x 29	12	12	5
42	49 x 33	12	15	5
48	57 x 38	10	15	5
54	64 x 43	10	18	6
60	71 x 47	8[7]	18	6

Table 6
3" x 1" Corrugation LOCKSEAM
HS 20 Live Load

Size, (In.) Span x Rise	Minimum Gauge	Minimum[3] Cover (In.)	Maximum [2] Cover (Ft.)
53 x 41	14	15	8
60 x 46	14	15	8
66 x 51	14	18	9
73 x 55	14	21	10
81 x 59	14	21	11
87 x 63	14	24	10
95 x 67	14	24	11
103 x 71	14	24	10
112 x 75	14	24	10

Notes
1. Height of cover is measured from top of rigid pavement or to bottom of flexible pavement.
2. Maximum cover meets AASHTO design criteria.
3. Minimum cover meets ASTM B 790 design criteria.
4. 1 1/2" x 1/4" corrugation.
5. Limited availability on these sizes.
6. Non-linear values due to R_f/R_c ratio.
7. 8-gauge pipe has limited availability.
8. For construction loads, see Table 7, Page 7.

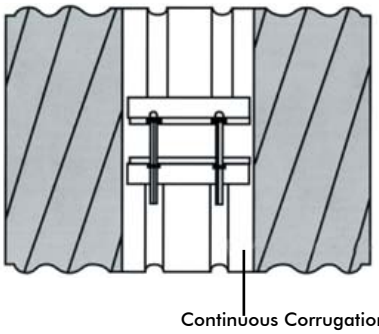
Bands and accessories

Annular rerolled ends

Annular rerolled ends are an optional feature of CORLIX Pipe and Pipe-Arch. With annular rerolled ends, a HUGGER® Band may be used. This band offers simple, easy installation and excellent soil tightness.

Optional annular rerolled ends on CORLIX pipe.

The HUGGER Band, plus optional bolt, bar and strap connector and gaskets, effectively joins sections of CORLIX Pipe to meet most infiltration and/or exfiltration requirements.



Accessories and fittings

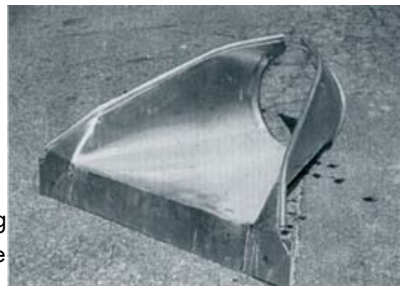
Aluminum welded fittings are designed to offer a complete CORLIX Pipe System and to minimize installation time.

Accessories to meet most requirements can be fabricated to the engineer's specification. Prefabricated manholes and elbows minimize hydraulic junction losses. Prefabricated risers and elbows also speed installation.

CORLIX fittings improve installation time in the field.

End Sections

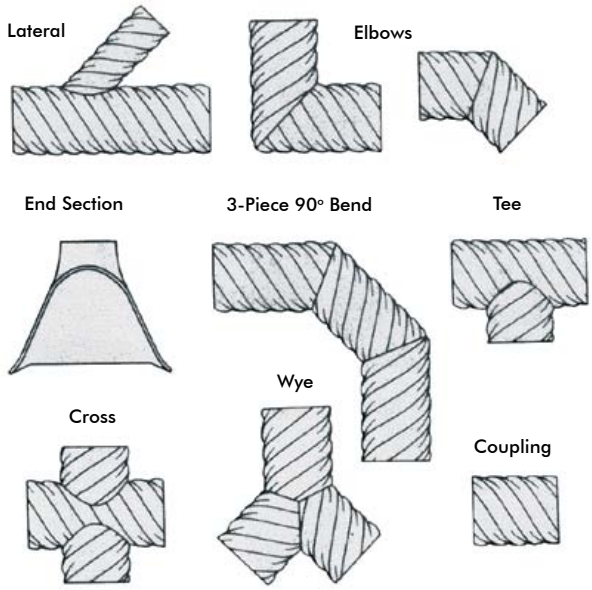
CONTECH aluminum End Sections provide economical, attractive, hydraulically efficient and durable inlets and outlets on culverts and storm sewers. End Sections provide protection against erosion and scouring, plus improve hydraulic capacity by channeling flow into and out of the pipe efficiently. They can be used with annular and helically corrugated aluminum pipe and are reusable if lengthening or relocating the drainage structure is necessary.



Aluminum End sections are available in smaller diameters.

End Sections present a clean-cut effect that is aesthetically pleasing. The tapered sides blend with the contour of the slope to increase roadside aesthetics. Compared with most concrete headwalls, End Sections are safer and easier to maintain. Weeds are cut easily with regular highway mowers. The wide opening minimizes collection of fallen branches, silting, and other unsightly debris.

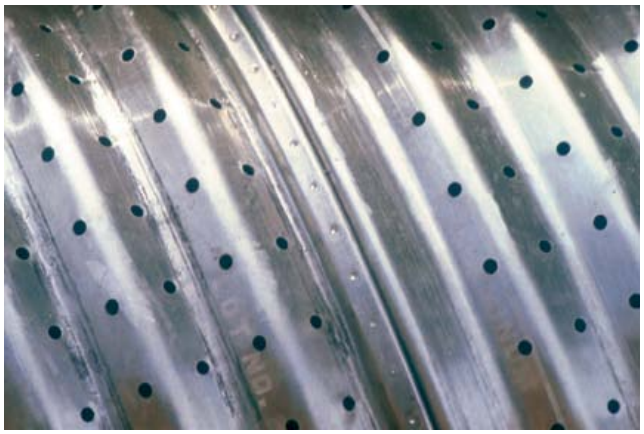
Typical fittings



Perforated pipe

Perforated pipe for underdrainage or recharge systems is available. Consult your CONTECH Sales Engineer for more details.

Tight lockseam ensures the integrity of the entire drainage system. Aluminum lock seams are staked for added tensile strength.



Perforated CORLIX Pipe is available for recharge or underdrain systems.

Aluminum Pipe is easily cut in the field.

With proper backfilling and cover, CORLIX is an excellent choice for drainage pipe.

CORLIX Pipe cuts installation time and adapts well to a designer's detention/recharge system.

Installation
Corrugated Aluminum Pipe

Required elements

Satisfactory site preparation, trench excavation, bedding, and backfill operations are essential to develop the strength of any flexible conduit. In order to obtain proper strength while preventing settlement, it is necessary that the soil envelope around the pipe be of good granular material, properly placed, and carefully compacted.

A qualified engineer should be engaged to design a proper foundation, adequate bedding, and backfill. (Reference: ASTM B 788).

Trench excavation

If the adjacent embankment material is structurally adequate, the trench requires only a bottom clear width of the pipe's span, plus sufficient room for compaction equipment.

Bedding

Bedding preparation is critical to both pipe performance and service life. The bed should be constructed to uniform line and grade to avoid distortions that may create undesirable stresses in the pipe and/or rapid deterioration of the roadway. The bed should be free of rock formations, protruding stones, frozen lumps, roots and other foreign matter that may cause unequal settlement.

It is recommended that the bedding be a stable, well graded, granular material. Placing the pipe on the bedding surface is generally accomplished by one of two methods to ensure satisfactory compaction in the haunch area. One method is shaping the bedding surface to conform to the lower section of the pipe.
The other is carefully tamping a granular or select material in the haunch area to achieve a well-compacted condition.

Backfill

Satisfactory backfill material, proper placement and compaction are key factors in obtaining maximum strength and stability.

The backfill material should be free of rocks, frozen lumps and foreign matter that could cause hard spots or decompose to create voids. Backfill material should be a well graded, granular material that meets the requirements of AASHTO M145. Backfill should be placed symmetrically on each side of the pipe in six-inch to eight-inch loose lifts. Each lift is to be compacted to a minimum of 90 percent density per AASHTO T180.

A high percent of silt or fine sand in the native soils suggests the need for a well graded, granular backfill material to prevent soil migration, or a geotextile separator can be used.

During backfill, only small tracked vehicles (D-4 or smaller) should be near the pipe as fill progresses above the top and to finished grade. The engineer and contractor are cautioned that the minimum cover may need to be increased to handle temporary construction vehicle loads (larger than a D-4). Refer to **Heavy construction loads** below.

Salt water installation

In salt water installations, the bedding and backfill around the pipe must be clean granular material. If the backfill is subject to possible infiltration by the adjacent native soil, the clean granular backfill should be wrapped in a geotextile.

Pavement

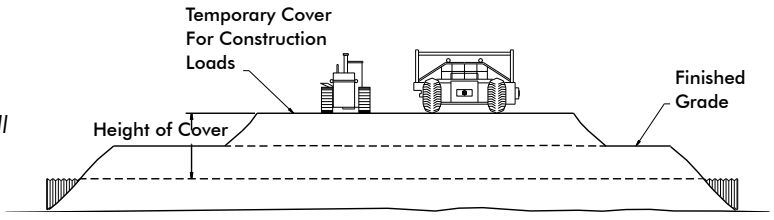
For minimum cover applications, Contech recommends that a properly designed flexible or rigid pavement be provided to distribute level loads and maintain cover heights.

Heavy construction loads

For temporary construction vehicle loads, an extra amount of **compacted cover** may be required over the top of the pipe. The height-of-cover shall meet the minimum requirements shown in Table 7. The use of heavy construction equipment necessitates greater protection for the pipe than finished grade cover minimums for normal highway traffic.

Table 7
Minimum Height-of-Cover Requirements for Construction Loads On Corrugated Aluminum Pipe

Diameter/ Span (Inches)	Axle Load (Kips)			
	18-50	50-75	75-110	110-150
Aluminum				
12-42	3.0′	3.5′	4.0′	4.0′
48-72	4.0′	4.0′	5.0′	5.5′
78-120	4.0′	5.0′	5.5′	5.5′



Site Development Solutions

Innovative Civil Engineering Solutions is the hallmark of Contech's nationwide team of sales engineer. Combined with our wide variety of site development products we can solve most civil engineering problems. Innovative applications for stormwater detention systems, stormwater treatment, storm drainage, sewage lines, bridges, tunnels, retaining walls and erosion control begin at Contech.

HEL-COR® Corrugated Steel Pipe and CORLIX® Corrugated Aluminum Pipe ... Designed for drainage culverts, storm sewers, stream enclosures and underground conduits for highway, railway, industrial and municipal applications. Provided in a variety of linings and coatings to meet specific durability and hydraulic requirements.

HEL-COR CL Pipe ... Concrete-lined for top-flow capacity plus proven strength of corrugated steel design.

End Sections ... An end finish for culverts and sewer outfalls, either pipe or pipe-arch structures in steel or aluminum.

ULTRA FLO® Storm Sewer Pipe ... Offers improved hydraulic capacity and lightweight for storm sewers.

Slotted Drain® ... An efficient system for highways, parking lots, or other surface drainage involving only narrow slots on the surface.

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True-Span™ Vehicular Bridges ... Steadfast's True-Span bridges provide a clear-span up to 150 feet, reducing site preparation time and eliminating costly piers. They meet skewed alignments, a roadway width of up to 40 feet, AASHTO HS-20 and HS-25 demands or the heavier loads required by the mining industry.

Keystone Retaining Walls ... Aesthetically pleasing high-strength, low-absorption concrete walls that can be used for projects up to 60 feet in height.

Bin-Type Retaining Walls ... Use for unstable slopes, limited right-of-way, shore and bank protection.

Liner Plate ... Designed for constructing new utility tunnels and relining structures under existing highways and railroads.

Bridge Plank ... Ideal for reflooring bridges and for new bridge construction.

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DuroMaxx® Steel Reinforced Polyethylene Pipe ... Eighty (80) ksi steel reinforcing (SR) provides the strength; pressure rated polyethylene (PE) resin provides the durability. The combination of materials results in an extraordinarily strong and durable pipe that sets a new industry standard.

A-2000™ PVC Pipe ... High-strength construction and smooth interior for sanitary collector sewers and storm sewers. Meets ASTM F 949.

A2 Liner Pipe™... Smooth interior for sliplining storm and sanitary sewers.

ABS and PVC TRUSS PIPE® ... Combines strength, stiffness, joint integrity and economy for gravity-flow sanitary sewers. Meets ASTM D 2680.

Geosynthetics ... Contech Woven and Nonwoven Geotextiles for drainage, separation, filtration and stabilization. • STRIPDRAIN for highway edge drains and building foundation drainage. • Contech Excelsior Mat for erosion control. • PavePrep® for retarding reflective cracking in pavements.

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