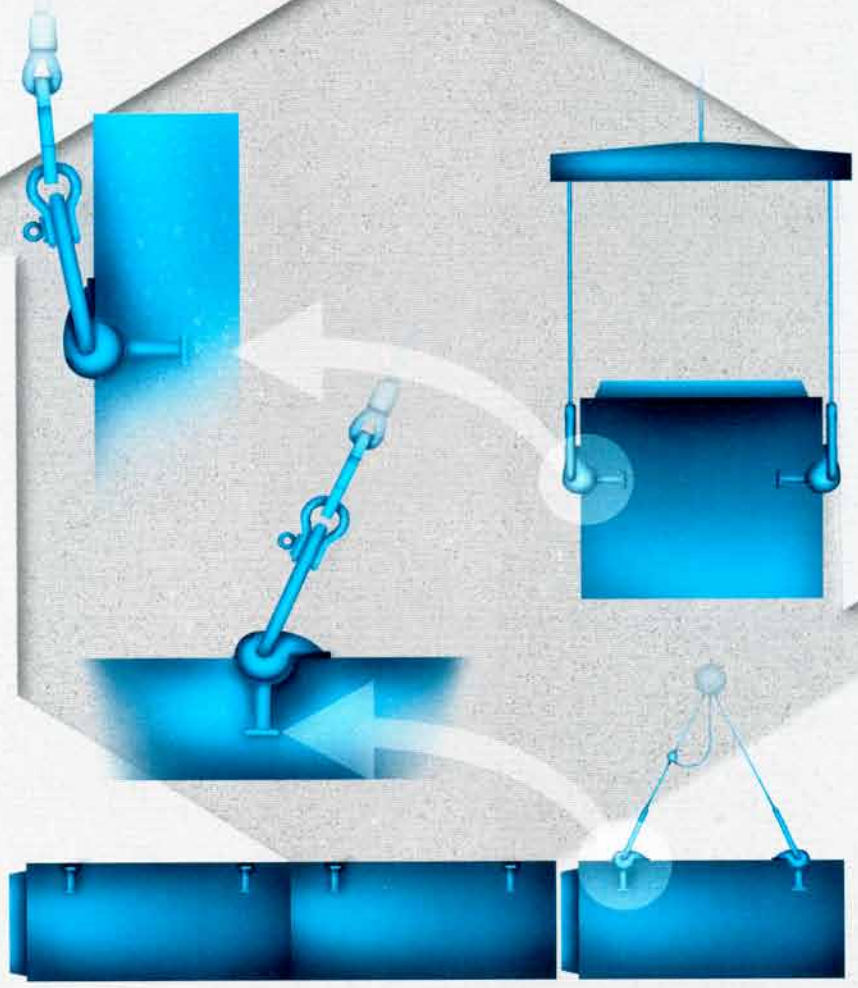
DAYTON/RICHMOND®
CONCRETE ACCESSORIES
A Dayton Superior Division

GUIDELINES for HANDLING CONCRETE PIPE and UTILITY PRODUCTS



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Guidelines For Handling Concrete Pipe and Utility Products

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⚠WARNING

Never permit persons to be in a location where a concrete pipe or utility product could fail. Being in such a location could injure the person or damage other objects or building components that could cause injury or death.

Never permit untrained or unqualified persons on the jobsite during the installation of concrete pipes and maintenance hole.

Always wear hard hats and steel toe shoes, safety glasses and clothing as required by OSHA or as required by other state, local, contract or employer regulations.

Never use any Dayton/Richmond product unless you have read and understand the technical portions of all materials supplied by Dayton/Richmond that apply to that product.

Inspect each Dayton/Richmond product before use and follow all instructions, labels and/or information on the product or product packaging. Call any unusual observations to the attention of a qualified engineer or to Dayton/Richmond before attempting to use the product.

Dayton/Richmond products are intended for use by trained, qualified and experienced persons only. Misuse or lack of supervision and inspection can contribute to serious accidents or death. Any application other than those shown in this handbook should be carefully field tested before use.

The user of Dayton/Richmond products must evaluate the product application, determine the safe working load and control all field conditions to prevent applications of loads in excess of the safe working load. Safety factors as shown are approximate. Safe working loads must never be exceeded.

Worn Working Parts

For safety, precast accessories must be properly used and maintained. The lifting hardware shown in this handbook may be subject to wear, overloading, corrosion, deformation, intentional alteration and other factors which may affect the hardware's safe working load. All hardware must be inspected regularly by the user to determine if they may be used at the rated safe working load. The frequency of inspection depends upon factors such as frequency of use, period of use and environment. It is the responsibility of the user to set up a schedule to inspect lifting hardware for wear and to discard the parts when wear is noted.

Shop or Field Welding

Welding precast accessories can be hazardous. Knowledge of materials, heat treatment and welding procedures is necessary for proper welding. Consult your local welding supply dealer for assistance in determining the required welding procedures.

DO NOT WELD TO ANY CASTING unless approved by a licensed metallurgical engineer. Welding to iron castings causes carbides and extreme brittleness near the weld and destroys most of the casting's load capacity.

Since Dayton/Richmond cannot control either the workmanship or conditions under which the work is done, Dayton/Richmond cannot be responsible for any product altered in any way after it has left the Dayton/Richmond plant.

Interchangeability

Many of the products that Dayton/Richmond manufactures are designed as a system for lifting precast concrete products. Dayton/Richmond cannot be certain that the components from systems supplied by other manufacturers are interchangeable with components supplied by Dayton/Richmond.
Used properly and in accordance with handbook instructions, Dayton/Richmond products have proven to be among the best designed and safest in the industry. Used improperly, or with components supplied by other manufacturers, the system may be rendered unsafe.

Design Changes

Dayton/Richmond reserves the right to change product designs, rated loads and product dimensions at any time without prior notice.

Safety Factors

The safety factor to be applied to a particular product is a variable, depending on the degree of hazard or risk involved in the application of that product. In precast concrete construction various conditions can often increase the loading, as well as the degree of risk involved. Jerking of the crane during lifting, use of a crane not adequate for the job, bouncing of the precast element after it has been lifted, handling the element more than anticipated, transporting over rough road surfaces, etc. all have high risk factors. The user should increase safety factors to reduce these risks.

Dayton/Richmond recommends that the following minimum safety factors be used when determining a product's safe working load and that the provisions of OSHA (Occupational Safety and Health Administration Act, Part 1910) and American National Standards institute (ANSI 10.9) be strictly followed when considering safety factors:

Safety Factor	Intended Use of Product
4 to 1	Inserts used for lifting and handling
5 to 1	Hardware used for lifting and handling

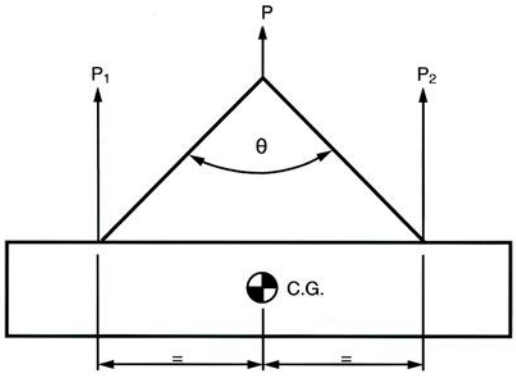
If a different safety factor is needed for any reason, a product's safe working load must be changed accordingly by the user. The following equation is used to increase or reduce a safe working load:

$$\frac{\text{SWL} \cdot \text{Published Factor of Safety}}{\text{Required Factor of Safety}} = \text{New SWL}$$

Note: Load must be applied simultaneous to all Swift Lift Anchors in order to safely lift product.

The following chart shows a simplified method for determining the increased loads that are transferred from the slings to the anchor when using multi-leg slings. As the fleet angle θ (Theta) increases, the sling load also increases, which applies additional load to the anchor.

Multiplication Factor "F" for Calculating Applied Load on Sling/SL Anchor with a Fleet Angle of θ					
θ	0°	30°	60°	90°	120°
"P"	1.00	1.04	1.16	1.42	2.00



P = Actual weight of precast element including adhesion load

θ = Fleet angle

P_1 or P_2 = Anchor load when using a 2 leg bridle sling

PxF = Effective weight of precast element

$$P_1 \text{ or } P_2 = \frac{P \times F}{2}$$

Warning: Use of a sling fleet angle greater than 120° is dangerous and must be avoided, it could overload the anchors and lead to premature failure.

It is recommended that for handling concrete pipe and utility products, the fleet angle not be less than or equal to 60 degrees.

Note: The Precast/Prestressed Concrete Institute (PCI) states in its design handbook that deformed reinforcing steel members should not be used as handling devices for precast concrete elements.

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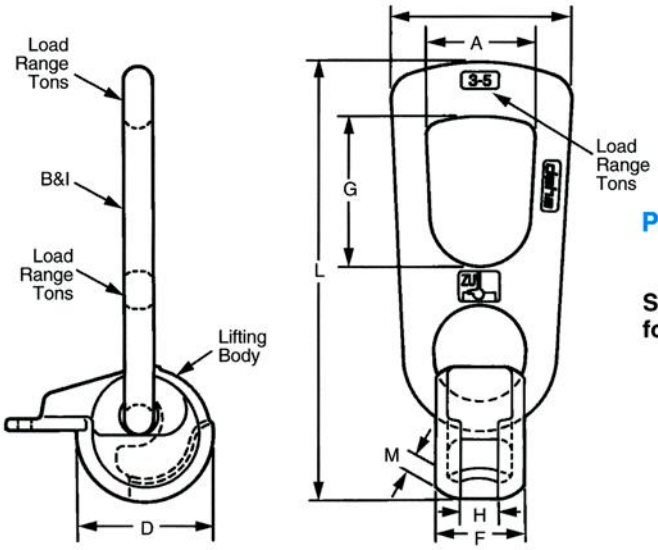
P-50 SL Universal Lifting Eye

The SL Universal Lifting Eye consists of a flat sided spherical lifting body and a high strength bail. The lifting body has a T-shaped slot which permits rapid attachment and release of the Lifting Eye, even while wearing work gloves.

The design of the P-50 Universal Lifting Eye permits the bail to freely rotate 180°, and the complete Lifting Eye to rotate 360°. This design feature allows your precast concrete elements to be turned, tilted and/or rotated under load.



Patent #4,398,762

See chart at bottom of page for H and M values.

General Information - Dimensions of P-50 SL Universal Lifting Eye							
Rated Load Tons	Load Range Tons	A	B	D	F	G	L
1	1-1.3	1.87" 48mm	2.95" 75mm	2.20" 64mm	1.26" 32mm	2.80" 71mm	7.40" 188mm
2	1.5-2.5	2.34" 60mm	3.58" 91mm	2.68" 68mm	1.61" 41mm	3.41" 87mm	9.06" 230mm
4	3-5	2.76" 70mm	4.65" 118mm	3.46" 88mm	2.22" 57mm	3.46" 88mm	11.14" 283mm
8	6-10	3.47" 88mm	6.30" 112mm	4.41" 112mm	2.83" 72mm	4.52" 115mm	15.79" 401mm
20	12-20	4.18" 106mm	7.09" 152mm	6.00" 152mm	4.29" 110mm	5.31" 135mm	20.00" 508mm

The rated load provides a factor of safety of approximately 5 to 1 - ultimate to rated load.

Inspection and Maintenance

The SL Universal Lifting Eye may be subjected to wear, misuse, overloading and many other factors which may affect the lifting eye's rated load. Therefore, the lifting eye must be inspected by the user at least once a month to determine its general condition and degree of wear.

During the monthly inspection, check for evidence of heat application. If evidence of heat application is found, the unit must be scrapped. Check for bent or twisted bails. Discard all units with bent or twisted bails. Also, check to make certain that the bail can rotate freely in all directions.

At least once every three months, dimension "H" and "M" on each unit should be checked. The upper limits are shown in the chart. If either of these limits is exceeded, the SL Universal Lifting Eye must be removed from service and destroyed.

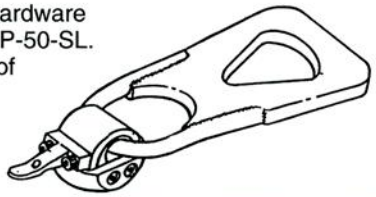
The proper method to use in scraping a lifting eye is to cut through the bail with a cutting torch.

No repairs or welding to the P-50 SL Universal Lifting Eye are permitted.

Limiting Dimensions on P-50 SL Universal Lifting Eye			
Rated Load Tons	Load Range Tons	H Maximum Width	M Minimum Thickness
1	1-1.3	0.512" 13mm	0.217" 5.5mm
2	1.5-2.5	0.709" 18mm	0.236" 6.0mm
4	3-5	0.984" 25mm	0.315" 8.0mm
8	6-10	1.260" 32mm	0.472" 12.0mm
20	12-20	1.811" 46mm	0.709" 18.0mm

P-50-PL Swift Lift Plus Hardware

This newly designed lifting hardware may be used in place of the P-50-SL. The locking feature may be of interest on certain projects



Guidelines For Handling Concrete Pipe and Utility Products

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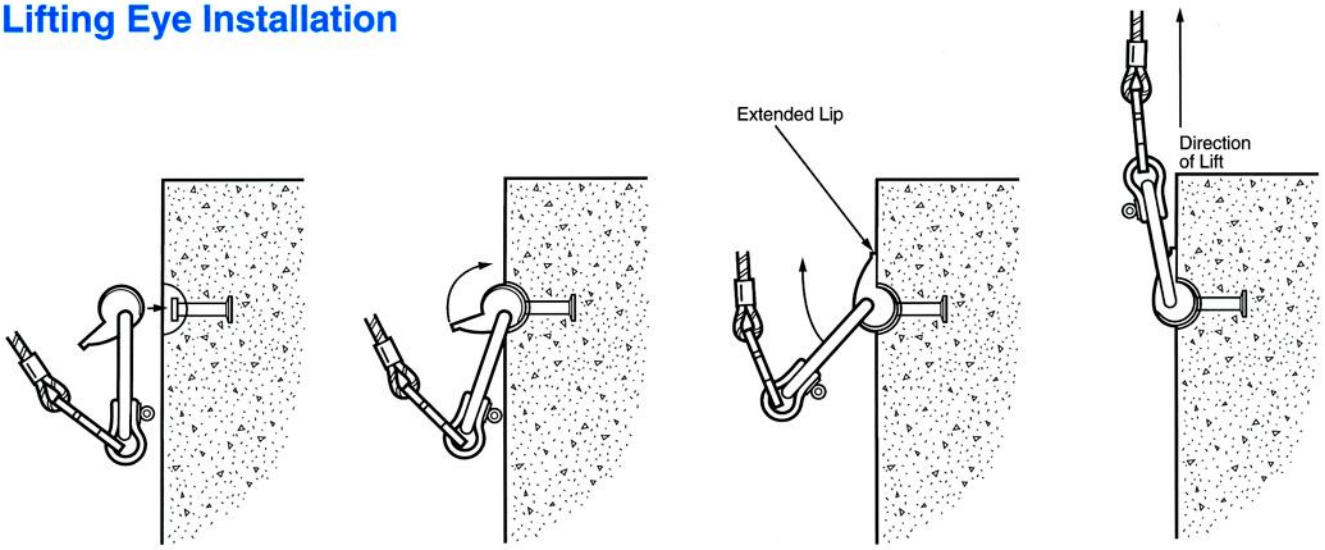
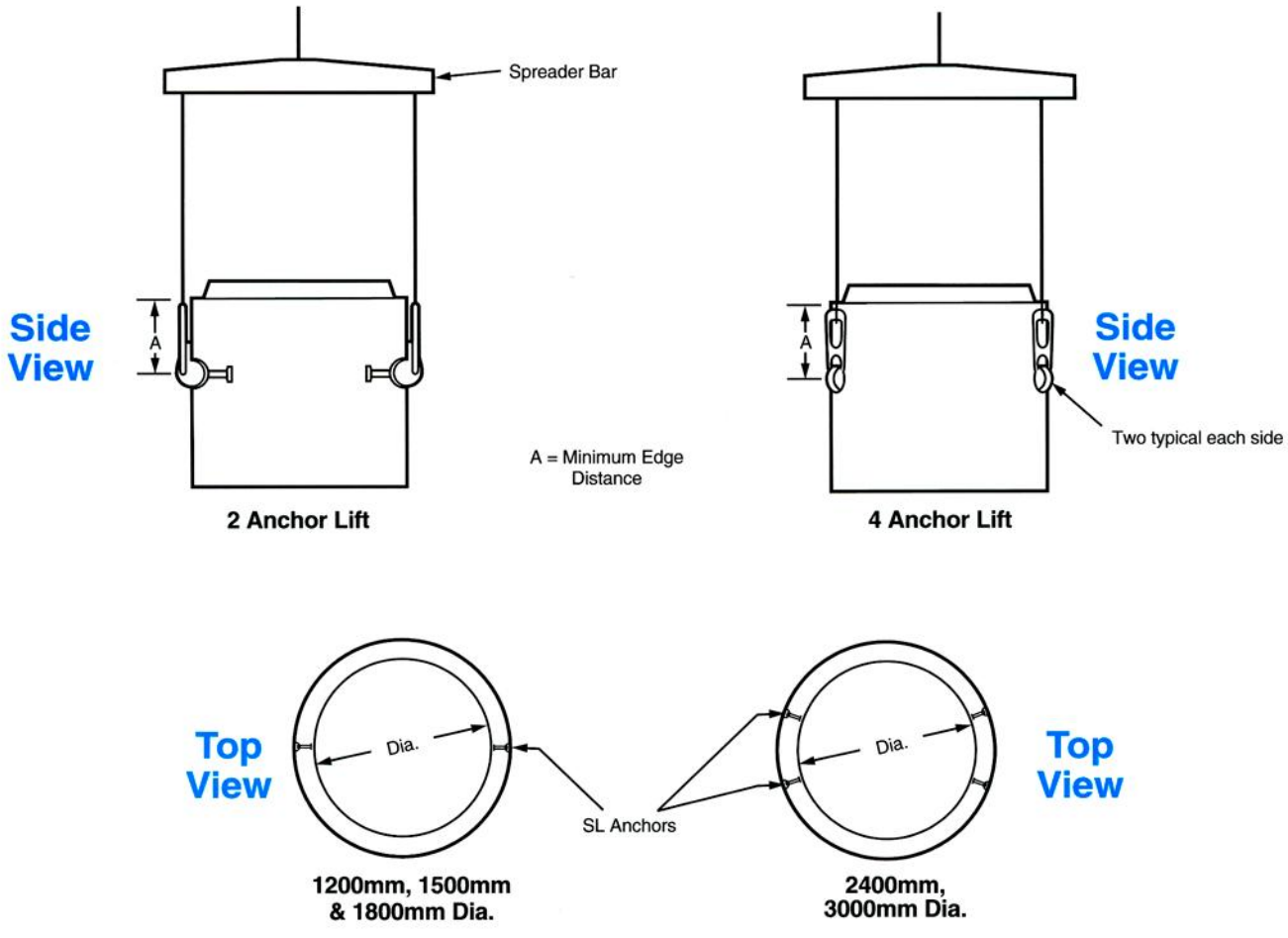
Lifting Eye Installation



Note: Direction of extended lip should be in the direction of lift.

How to Use the SL Universal Lifting Eye



Note: Load must be applied simultaneous to all Swift Lift Anchors in order to safely lift product.

Guidelines For Handling Concrete Pipe

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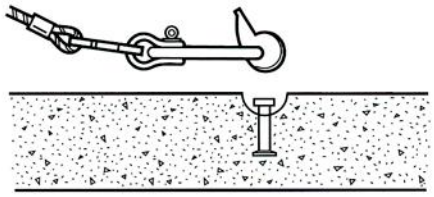
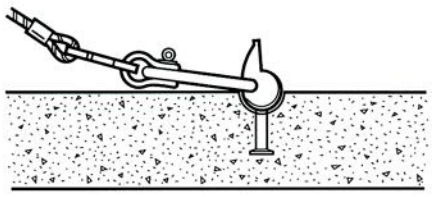
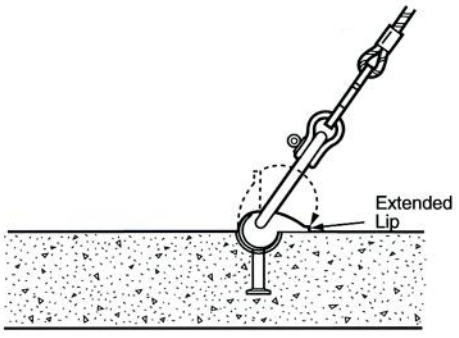
How to Use the SL Universal Lifting Eye



To install the P-50 SL Universal Lifting Eye, hold the unit upside down with the T-shaped slot of the body directly over the head of the Swift Lift Anchor.



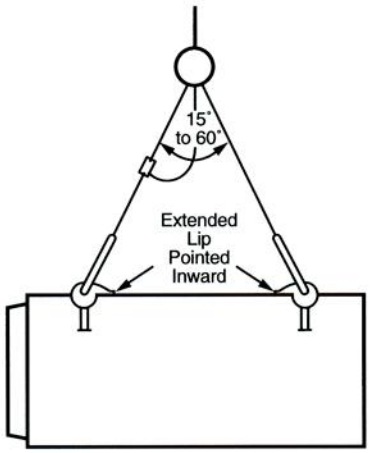
Lower the body of the lifting eye until the T-shaped slot engages the head of the anchor.

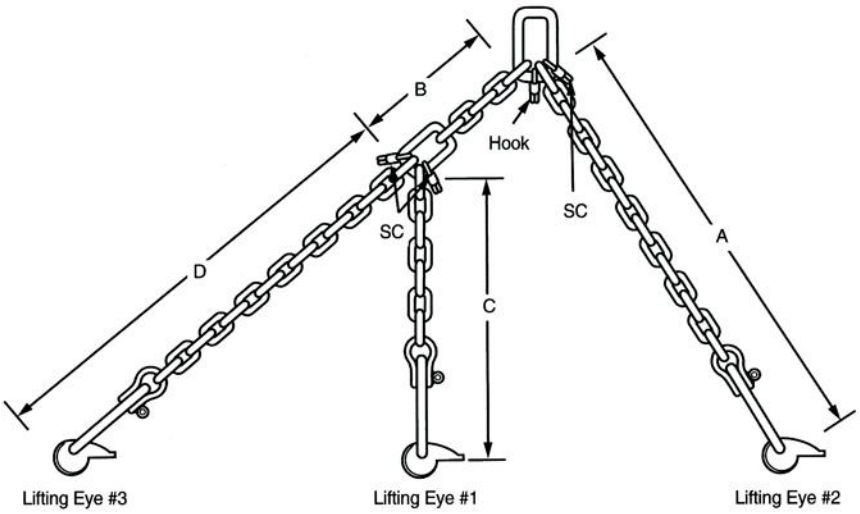


Rotate the body until the extended lip rests on the concrete surface.

Correct Method for Lifting and Placing Pipe

Note: Load must be applied simultaneous to all Swift Lift Anchors in order to safely lift product.





A three-legged chain sling with three P-50 SL Universal Lifting Eyes and three shortening clutches (SC) for altering the chain lengths: so constructed that as required, a symmetrical or asymmetrical lifting sling can be made.

Pipe Lengths		A	B	C	D
From	To				
60" (1.5M)	96" (2.5M)	57" (144cm)	16" (40cm)	41" (104cm)	76" (194cm)
96" (2.5M)	138" (3.5M)	75" (190cm)	24" (60cm)	51" (130cm)	110" (280cm)

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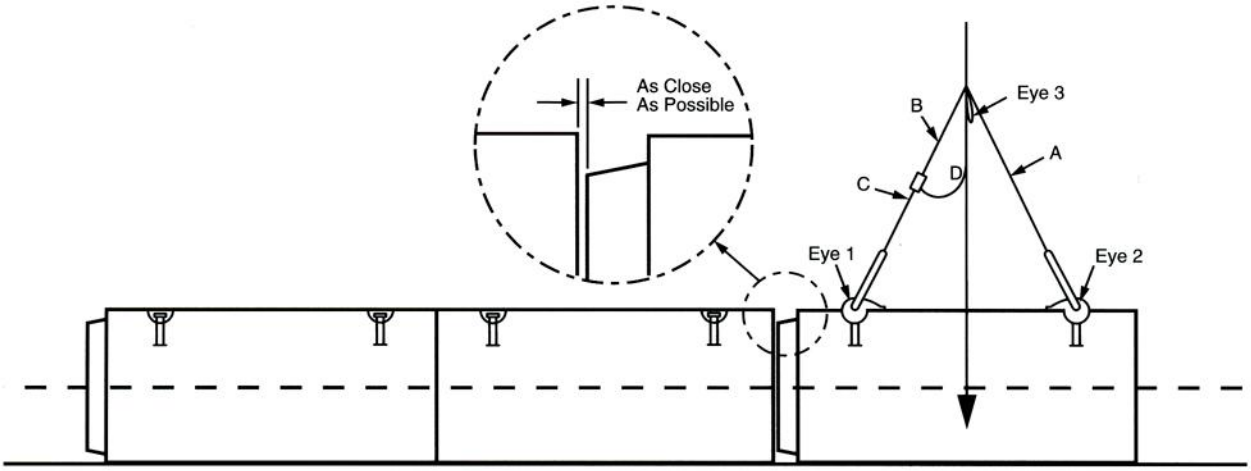
How to Use SL Universal Lifting Eye for Setting Concrete Pipe

Note: As with lifting any concrete element, special care should be taken by the driver of the placement vehicle to ensure that the impact or dynamic loads are reduced to a minimum. Impact of dynamic loads can greatly overload the anchors and cause failure.

Note: Load must be applied to all anchors simultaneously.

The pipe is first transported to the installation site with the symmetrical sling and lowered close to the already placed pipe.

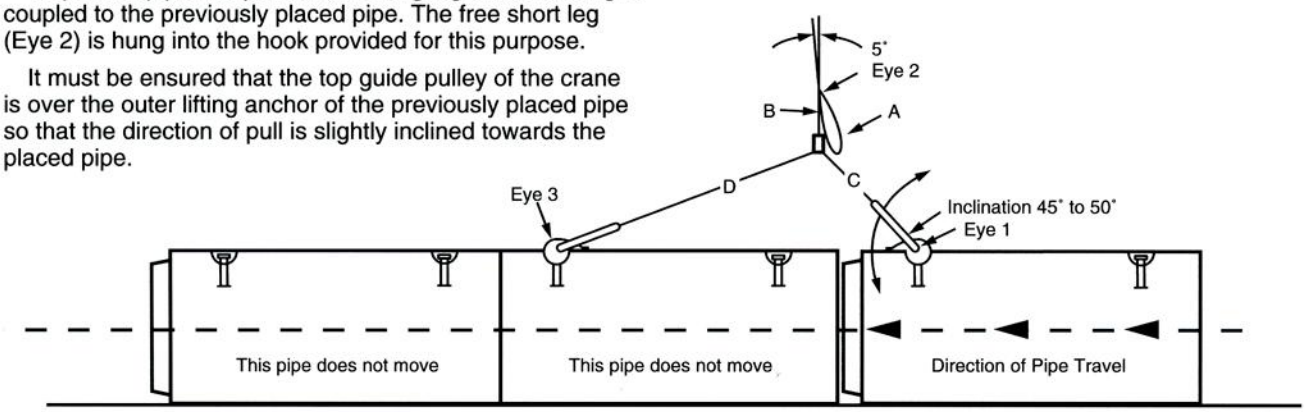
Note: Friction between the sand or gravel fill and the concrete pipe equals 0.4 to 0.5.



Correct Method for Pulling Pipe Together

To pull the pipe into position, the long leg of the lift sling is coupled to the previously placed pipe. The free short leg (Eye 2) is hung into the hook provided for this purpose.

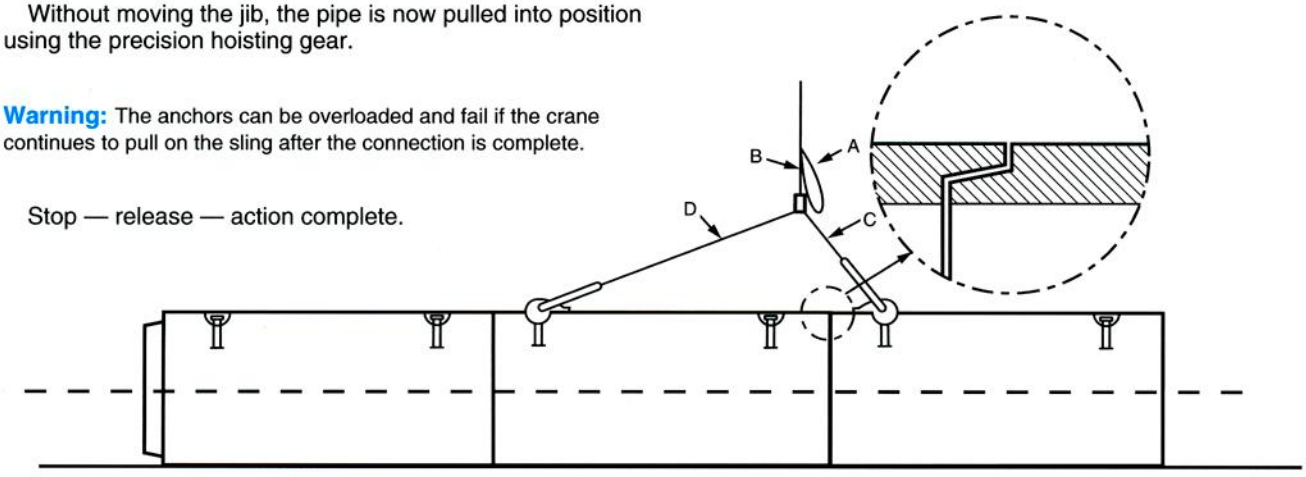
It must be ensured that the top guide pulley of the crane is over the outer lifting anchor of the previously placed pipe so that the direction of pull is slightly inclined towards the placed pipe.



Without moving the jib, the pipe is now pulled into position using the precision hoisting gear.

Warning: The anchors can be overloaded and fail if the crane continues to pull on the sling after the connection is complete.

Stop — release — action complete.



Guidelines For Handling Concrete Box Sections

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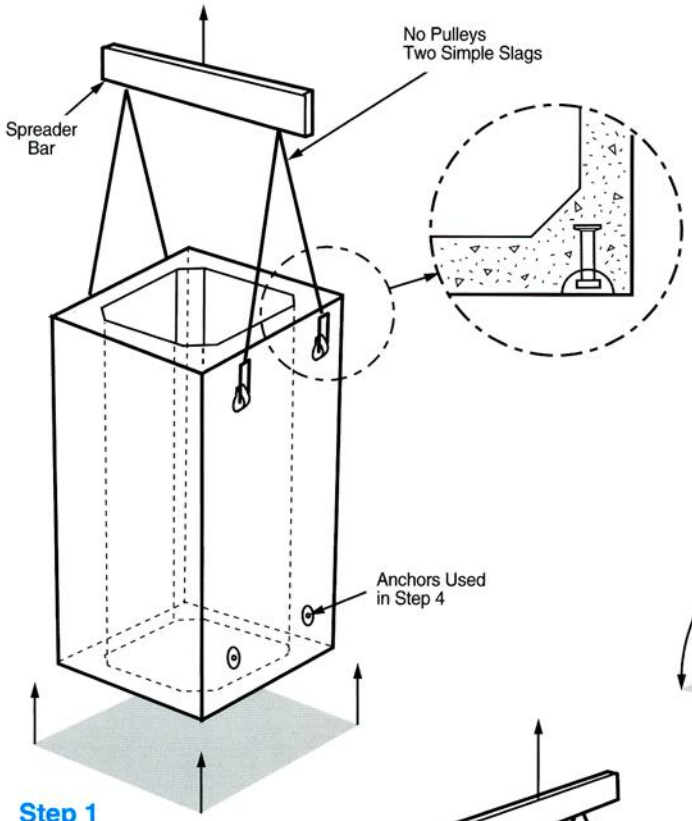
How to Handle and Set Concrete Box Sections

Step 1: Remove form to allow the attachment of lifting eyes to two anchors on each side near the top edge (four total).

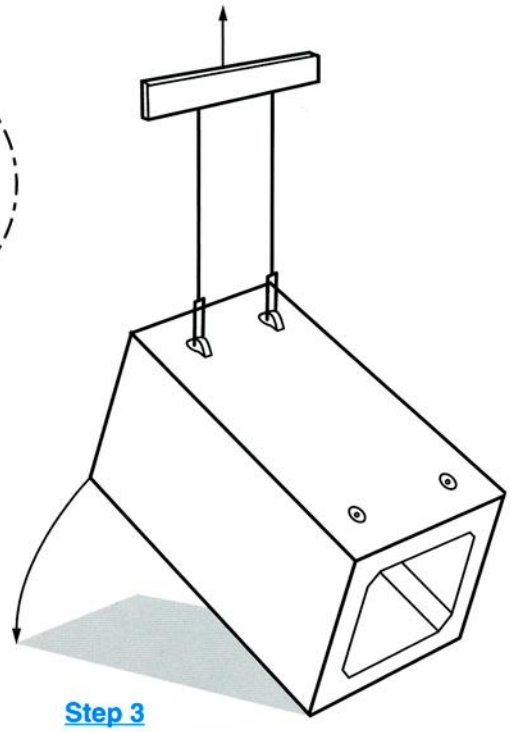
Step 2: Move to desired position.

Step 3: Using two of the top edge anchors, rotate the box section to a horizontal position.

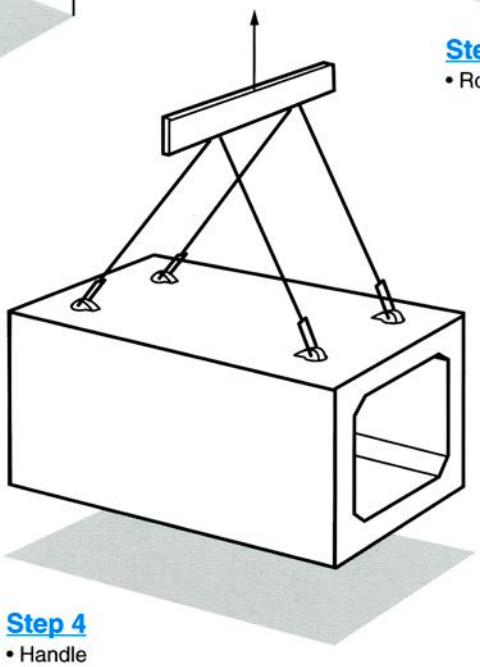
Step 4: Attach lifting eyes to the four anchors and lift and handle as required.



Step 1
- Strip
- Handle



Step 3
- Rotate to horizontal position



Step 4
- Handle
- Set
- Final set (see next page)

Guidelines For Handling and Setting Concrete Box Sections

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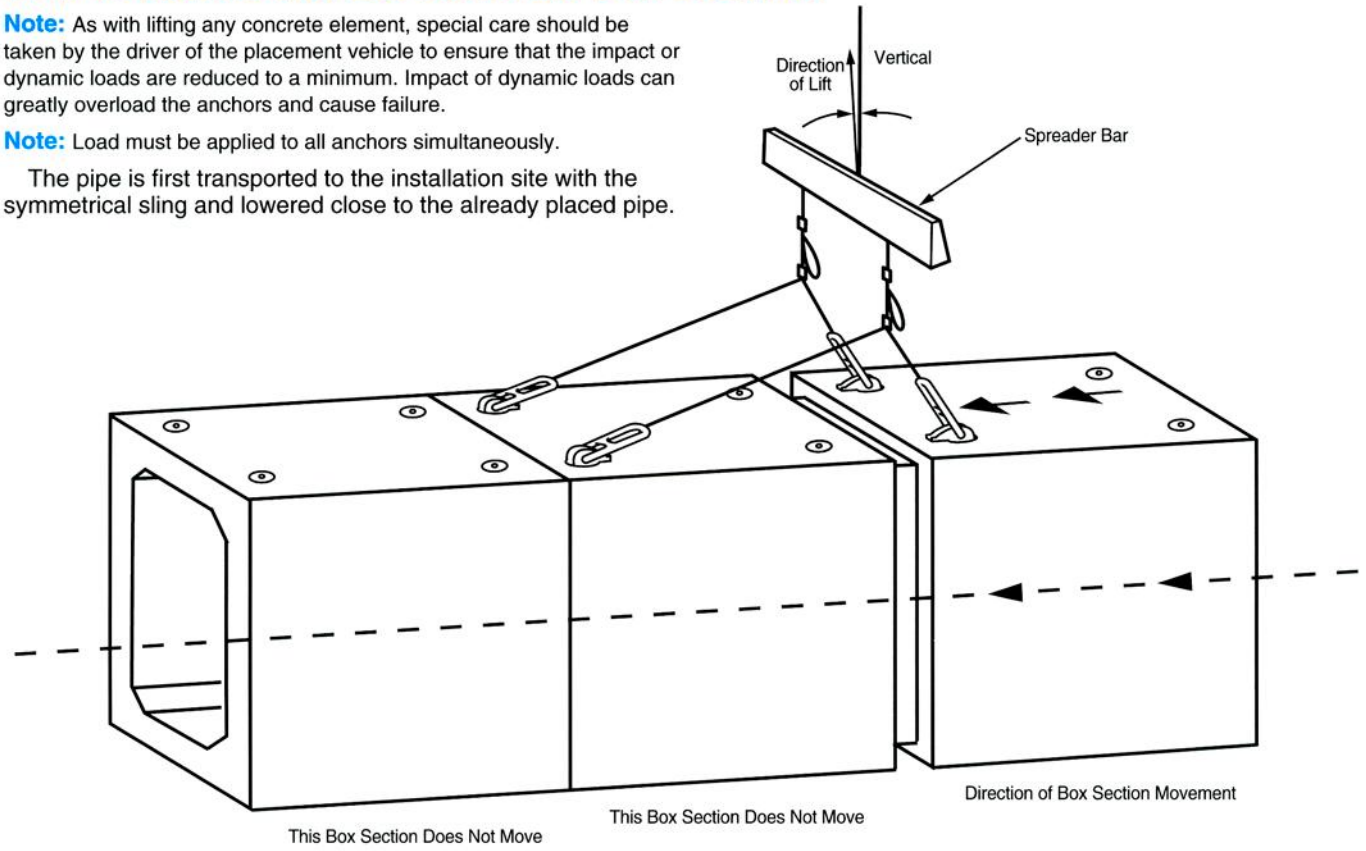
How to Handle and Set Concrete Box Sections

Note: As with lifting any concrete element, special care should be taken by the driver of the placement vehicle to ensure that the impact or dynamic loads are reduced to a minimum. Impact of dynamic loads can greatly overload the anchors and cause failure.

Note: Load must be applied to all anchors simultaneously.

The pipe is first transported to the installation site with the symmetrical sling and lowered close to the already placed pipe.

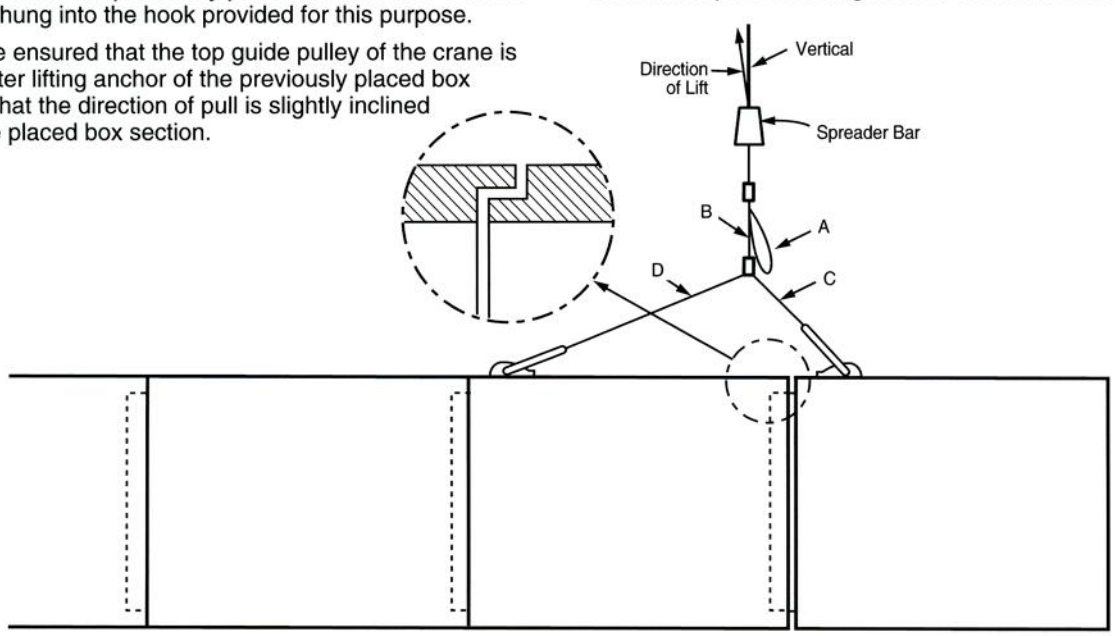


Correct Method for Pulling Box Sections Together

To pull the box section into position, the long leg of the lift sling is coupled to the previously placed box section. The free short leg is hung into the hook provided for this purpose.

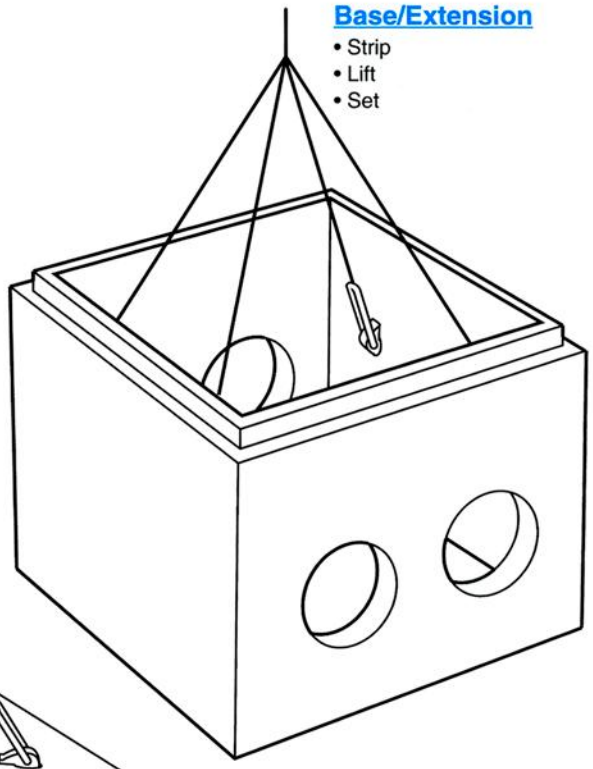
It must be ensured that the top guide pulley of the crane is over the outer lifting anchor of the previously placed box section so that the direction of pull is slightly inclined towards the placed box section.

Warning: The anchors can be overloaded and fail if the crane continues to pull on the sling after the connection is complete.

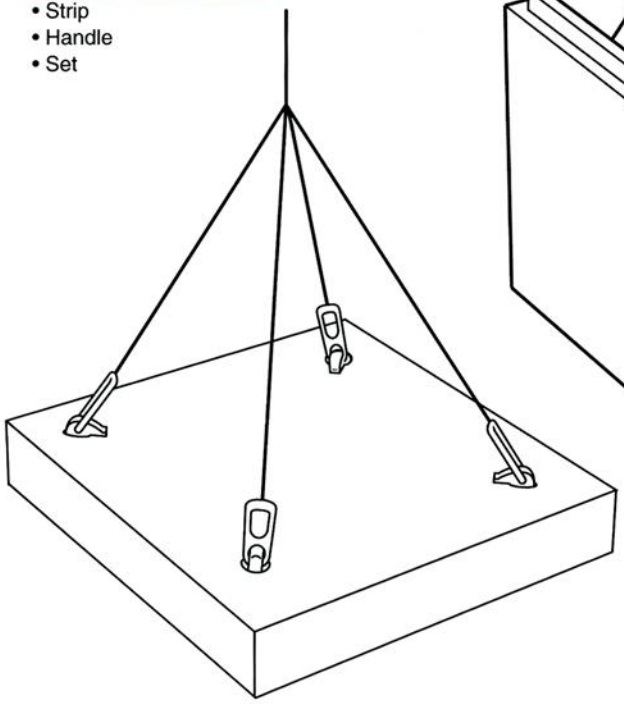


Typical Applications

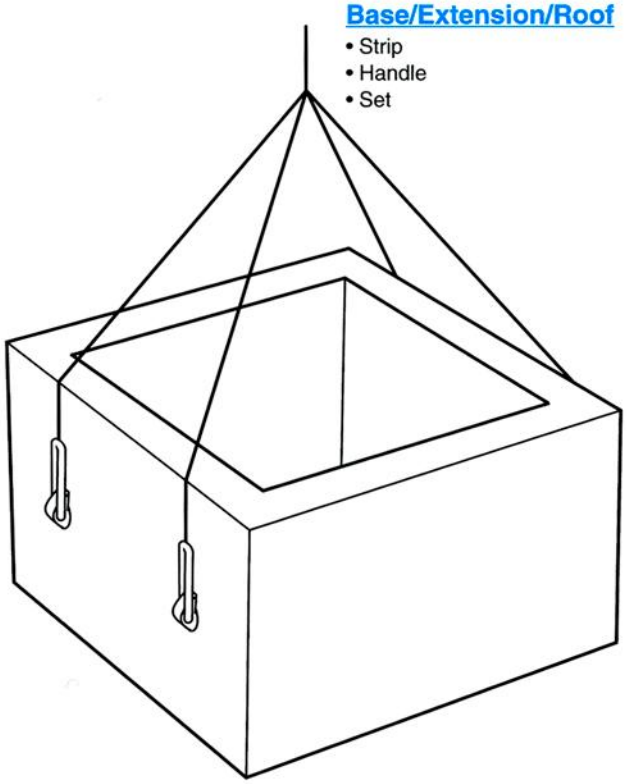
Base/Extension
- Strip
- Lift
- Set



Base/Slab/Lid/Roof
- Strip
- Handle
- Set

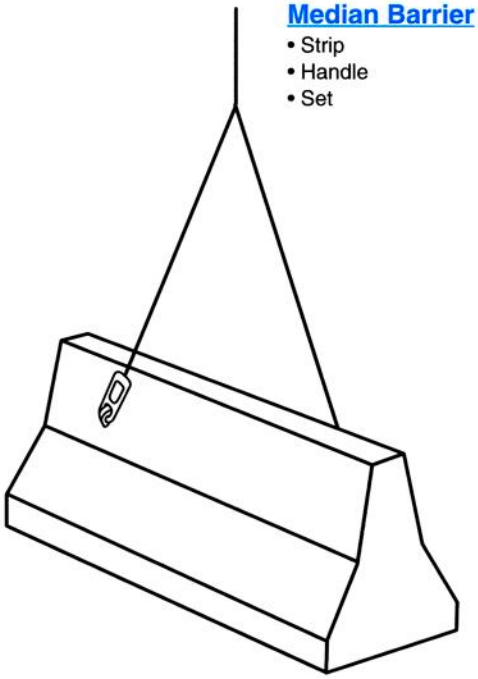


Base/Extension/Roof
- Strip
- Handle
- Set

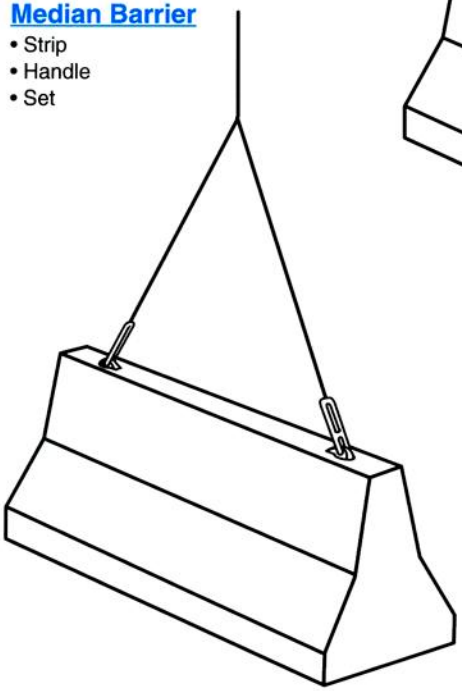


Typical Applications

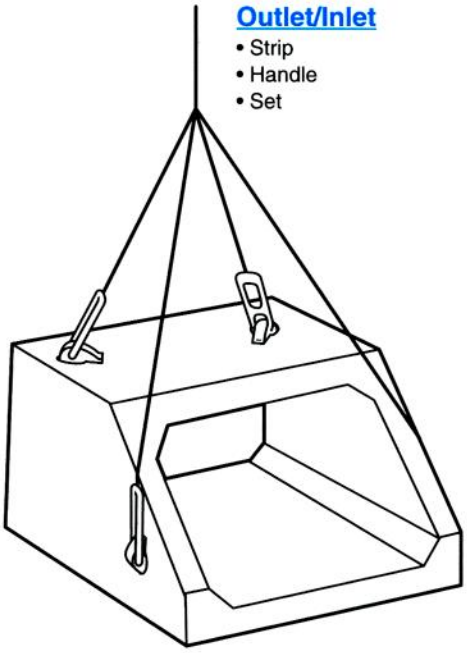
Median Barrier
- Strip
- Handle
- Set



Median Barrier
- Strip
- Handle
- Set



Outlet/Inlet
- Strip
- Handle
- Set



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