

# REACT 350<sup>®</sup> Wide

## Assembly Manual



**TRINITY**  
**HIGHWAY**

*Ahead of the Curve<sup>™</sup>*

# REACT 350<sup>®</sup> Wide

The REACT 350<sup>®</sup> Wide has been tested pursuant to National Cooperative Highway Research Program (“NCHRP”) Report 350 specifications. The REACT 350<sup>®</sup> Wide has been deemed eligible for federal-aid reimbursement on the National Highway System by the Federal Highway Administration (“FHWA”).

## Assembly Manual



2525 N. Stemmons Freeway  
Dallas, Texas 75207



**Warning:** The local highway authority, distributors, owners, contractors, lessors, and lessees are responsible for the assembly, maintenance, and repair of the REACT 350<sup>®</sup> Wide system. Failure to fulfill these **RESPONSIBILITIES** with respect to the assembly, maintenance, and repair of the REACT 350<sup>®</sup> Wide system could result in serious injury or death.



**Important:** These instructions are for standard assembly specified by the appropriate highway authority. In the event the specified system assembly, maintenance, or repair would result in a deviation from these assembly instructions, contact the appropriate highway authority engineer.

**This manual must be available to the worker overseeing and/or assembling the product at all times. For additional copies, contact Trinity Highway at (888) 323-6374 or visit [TrinityHighway.com](http://TrinityHighway.com).**

The instructions contained in this manual supersede all previous information and manuals. All information, illustrations, and specifications in this manual are based on the latest REACT 350<sup>®</sup> Wide system information available to Trinity Highway at the time of printing. We reserve the right to make changes at any time. Please contact Trinity Highway to confirm that you are referring to the most current instructions.

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## Customer Service Contacts

Trinity Highway is committed to the highest level of customer service. Feedback regarding the REACT 350® Wide, its assembly procedures, supporting documentation, and performance is always welcome. Additional information can be obtained from the contact information below:

### Trinity Highway:

Telephone	(888) 323-6374 (USA) +1 214 589-8140 (International)
E-mail	<a href="http://TrinityHighway.com/Contact">TrinityHighway.com/Contact</a>

## Important Introductory Notes

Proper assembly of the REACT 350® Wide is critical to achieve performance that has been evaluated and accepted by the FHWA per NCHRP Report 350. These instructions should be read in their entirety and understood before assembling the REACT 350® Wide. These instructions are to be used only in conjunction with the assembly of the REACT 350® Wide and are for standard assemblies only as specified by the applicable highway authority. If you need additional information, or have REACT 350® Wide questions, please contact the highway authority that has planned and specified this assembly and, if needed, contact Trinity Highway's Customer Service Department. This product must be assembled in the location specified by the appropriate highway authority. If there are deviations, alterations, or departures from the assembly protocol specified in this manual, the device may not perform as it was tested and accepted.

This system, like other Trinity Highway systems, has been crash tested pursuant to NCHRP Report 350 mandated criteria.



**Important: DO NOT** use any component part that has not been specifically crash tested and/or approved for this system during assembly, repair, or maintenance of this system.

This product has been specified for use by the appropriate highway authority and has been provided to that user who has unique knowledge of how this system is to be assembled. No person should be permitted to assist in the assembly, maintenance, or repair of this system that does not possess the unique knowledge described herein. These instructions are intended for an individual who is qualified to both read and accurately interpret them as written. These instructions are intended only for an individual experienced and skilled in the assembly of highway products that are specified and selected by the highway authority.

A manufacturer's drawing package will be supplied by Trinity Highway upon request. Each system will be supplied with a specific drawing package unique to that system. Such drawings take precedence over information in this manual and shall be studied thoroughly by a qualified individual who is skilled in interpreting them before the start of any product assembly.

## Safety Symbols

This section describes the safety symbols that appear in this REACT 350® Wide manual. Read the manual for complete safety and assembly information.

### Symbol

### Meaning



**Safety Alert Symbol:** Indicates Danger, Warning, Caution, or Important. Failure to read and follow the Danger, Warning, Safety, or Caution indicators could result in serious injury or death to the workers and/or bystanders.



**Important:** Read safety instructions thoroughly and follow the assembly directions and suggested safe practices before assembling, maintaining, or repairing the REACT 350® Wide. Failure to follow this warning could result in increased risk of serious injury or death in the event of a vehicle impact with a system.



**Important:** Please keep up-to-date instructions for later use and reference by anyone involved in the assembly of the product.

## Safety Rules for Assembly

### **\* Important Safety Instructions \***

This manual must be kept in a location where it is readily available to persons who assemble, maintain, or repair the REACT 350® Wide. Additional copies of this manual are available from Trinity Highway by calling (888) 323-6374 or visiting [TrinityHighway.com/Contact](http://TrinityHighway.com/Contact). Please contact Trinity Highway if you have any questions concerning the information in this manual or the REACT 350® Wide.

Always use appropriate safety precautions when operating power equipment and when moving heavy equipment or the REACT 350® Wide components. Safety articles including but not necessarily limited to work gloves, eye protection, safety-toe shoes, and back support should be used.



**Warning:** Safety measures incorporating traffic control devices specified by the highway authority must be used to provide safety for personnel while at the assembly, maintenance, or repair site.



**Warning:** Use only Trinity Highway parts on the REACT 350® Wide for assembly, maintenance, or repair. **The assembly or comingling of unauthorized parts is strictly PROHIBITED.** The REACT 350® Wide and its component parts have been accepted for state use by the FHWA. However, a comingled system has not been accepted and any use of unauthorized parts could result in serious injury or death.

## **Limitations and Warnings**

Trinity Highway, in compliance with the National Cooperative Research Highway Program Report 350 (NCHRP Report 350) “Recommended Procedures for the Safety Performance of Highway Safety Features”, contracts with FHWA approved testing facilities to perform crash tests, evaluation of tests, and submittal of results to the FHWA for review.

The REACT 350<sup>®</sup> Wide system has been approved by FHWA as meeting the requirements and guidelines of NCHRP Report 350 TL-1, TL-2, and TL-3. These tests typically evaluate product performance by closely simulating actual impacts involving a typical range of vehicles on our roadways, from lightweight cars (approx. 820kg [1800 lb.]) to full size pickup trucks (approx. 2000 kg [4400 lb.]) as specified by the FHWA. A product can be certified for multiple Test Levels. The REACT 350<sup>®</sup> Wide is certified to the Test Level(s) as shown below:

**Test Level 1: 50 km/h [31 mph]**

**Test Level 2: 70 km/h [43 mph]**

**Test Level 3: 100 km/h [62 mph]**

**These FHWA directed tests are not intended to represent the performance of systems when impacted by every vehicle type or every impact condition existing on the roadway. This system is tested only to the test matrix criteria of NCHRP Report 350 as approved by FHWA.**

Trinity Highway expressly disclaims any warranty or liability for injury or damage to persons or property resulting from any impact, collision or harmful contact with products, other vehicles, or nearby hazards or objects by any vehicle, object or person, whether or not the products were assembled in consultation with Trinity Highway or by third parties.

The REACT 350<sup>®</sup> Wide is intended to be assembled, delineated, and maintained within specific state and federal guidelines. It is important for the highway authority specifying the use of a highway product to select the most appropriate product configuration for site specifications. The customer should be careful to properly select, assemble, and maintain the product. Careful evaluation of site layout, traffic speed/type, direction, and visibility are some of the elements that require evaluation by the highway authority in the selection of a highway product. For example, curbs could cause an untested effect on an impacting vehicle.

After an impact occurs, the debris from the impact should be removed from the area immediately and the specified highway product should be evaluated and restored to its original specified condition or replaced as the highway authority determines as soon as possible.

## **System Overview**

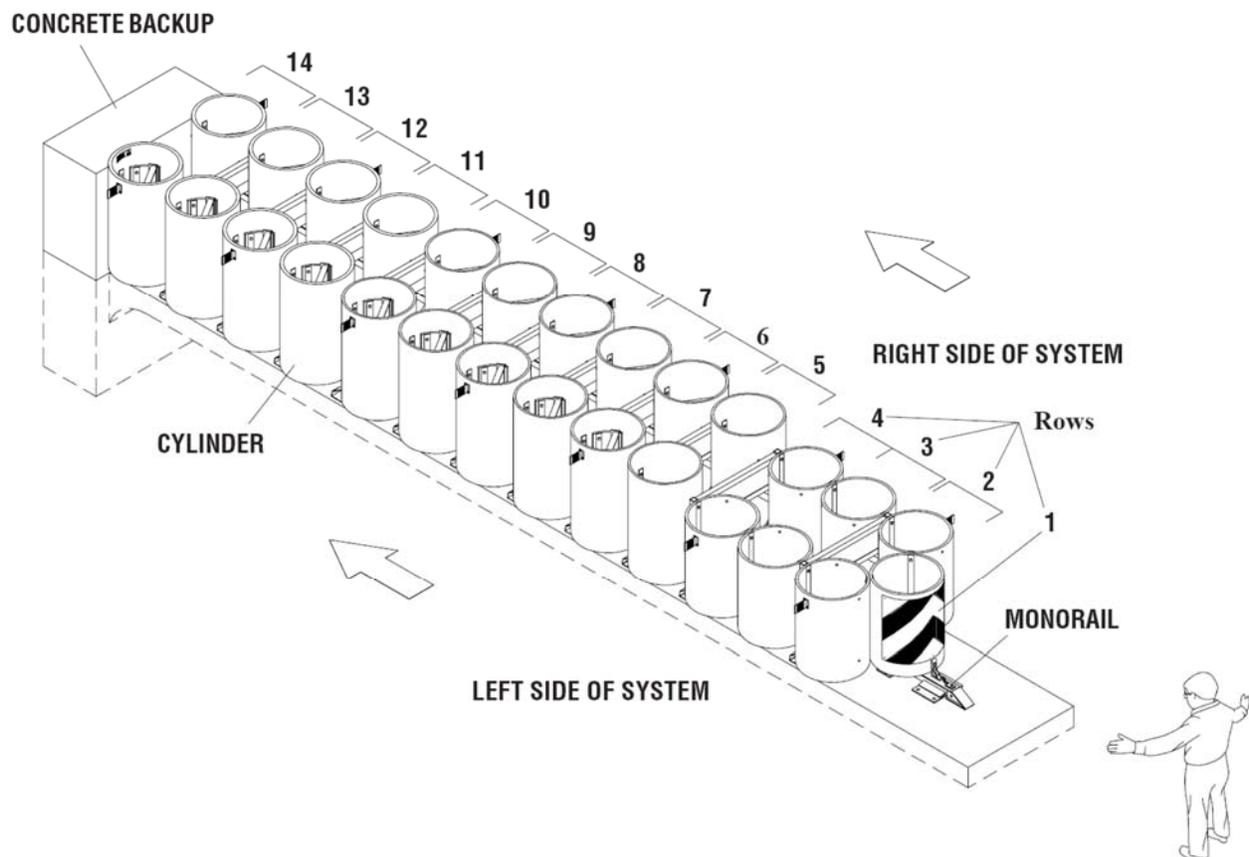
The REACT 350® Wide is a potentially reusable, re-directive, non-gating crash cushion for road features ranging in width from 60" to 120" [1,524 mm to 3,048 mm].

The REACT 350® Wide system utilizes three types of energy-absorbing Cylinders in a "staged" configuration to address both lighter cars and heavier, high center-of-gravity vehicles. Its modular design allows the system length to be tailored to the design speed of a site. Refer to the REACT 350® Wide Product Manual to determine the appropriate length system for a given speed.

## **Impact Performance**

REACT 350® Wide systems have successfully passed the requirements stipulated in NCHRP Report 350, at Test Level 1, 2 and 3 tests, with both the light car and pickup at speeds of up to 62 mph [100 kph] at angles up to 20 degrees.

During head-on impacts, within the NCHRP Report 350 criteria, the REACT 350® Wide travels rearward and crushes to absorb the impact energy. Side impacts within NCHRP Report 350 criteria have been shown to safely redirect the vehicle back toward its original travel path and away from the road feature.



**Figure 1**  
**REACT 350® Wide (60") TL-3 Orientation**

## Recommended Tools

### Documentation

- Manufacturer's Assembly Manual
- Manufacturer's Drawing Package

### Cutting equipment

- Rebar cutting bit
- Concrete drill bits – 7/8" (22 mm) x 7" [178 mm](Two Fluted)
- Grinder, Hacksaw or Torch (optional)
- Drill motor



**Important:** Trinity Highway recommends using **two fluted drill bits** to achieve optimum tensile strength when applying a Trinity Highway approved adhesive.

### Hammers

- Rotary Hammer
- Sledgehammer

### Wrenches

- Heavy duty impact wrench
- Standard adjustable wrench
- Box/Open end wrenches: 9/16" , 3/4", 15/16", 1 1/4"
- 1/2" drive sockets: 9/16", 3/4", 15/16", 1 1/4"
- 1/2" drive Deep sockets: 15/16", 1 1/4"
- 1/2" drive Ratchet and attachments
- 1/2" drive Breaker bar - 24" long
- 1/2" drive Torque wrench: 200 ft-lb
- Allen wrench: 3/8
- Impact wrench: 1/2"

### Screwdrivers

- Screw Gun or Standard Drill with adapter chuck and 1/4 & 3/8" sockets
- Flat Screwdriver
- Phillips Screwdriver

### Personal Protective equipment

- Eye Protection
- Gloves
- Safety toe shoes
- Protective clothing



**Important:** Because every impact is different, Trinity Highway makes no recommendation whether use or reuse of any part of the system is appropriate or acceptable following an impact. It is the sole responsibility of the project engineer and/or the local highway authority and its engineers to make that determination. It is critical that you inspect this product after assembly is complete to make certain that the instructions provided in this manual have been strictly followed.

## Miscellaneous

- Traffic control equipment
- Lifting and moving equipment (A lifting device is preferred although a forklift can be used.) Minimum 5,000 lb. capacity required.
- Compressor (100 psi) and Generator (5 kW)
- Long pry bar
- Drift pin
- Tape measure 15 m [35']
- Chalk line
- Steel bristle tube brush for cleaning 7/8" drilled holes
- Rags, water, and solvent for clean-up



**Important:** The above list of tools is a general recommendation and should not be considered an extensive list. Depending on specific site conditions and the complexity of the assembly specified by the appropriate highway authority, the required tools may vary. Decisions as to what tools are needed to perform the job are entirely within the discretion of the specifying highway authority and the authority's selected contractor performing the assembly of the system at the authority's specified assembly site.

## Site Preparation/Foundation

A REACT 350<sup>®</sup> Wide (60"/96"/120") should be assembled only on an existing or freshly placed and cured concrete base (4000 psi [28 MPa] minimum). Location and orientation of the concrete base and attenuator must comply with project plans or as otherwise determined by the resident project engineer.

Recommended dimension and reinforcement specifications for new concrete pads are provided in Trinity Highway concrete pad drawing, supplied with the system.

The REACT 350<sup>®</sup> Wide (60"/96"/120") may be assembled on a non-reinforced concrete roadway (minimum 8" [200 mm] thick). Deployment cross-slope shall not exceed 8% and should not twist more than 2% over the length of the system; the pad surface shall have a light broom finish.



**Caution:** It is the responsibility of the installer to ensure accurate placement of all steel rebar to avoid interference with the concrete anchor bolts.



**Warning:** Ensure that the REACT 350<sup>®</sup> Wide system and delineation used meet all federal, state, specifying agency, and local specifications. Failure to follow this warning could result in serious injury or death in the event of a collision.



**Warning:** Ensure that your assembly meets all appropriate Manual on Uniform Traffic Control Devices (MUTCD) and local standards. Failure to follow this warning could result in serious injury or death in the event of a collision.

## Inspect Shipping

Before deploying the REACT 350<sup>®</sup> Wide, check the received parts against the shipping list supplied with the system. Make sure all parts have been received.

# Trinity Highway Approved Adhesive Anchoring System

A Trinity Highway approved adhesive anchoring system is required to securely anchor crash cushions. Each approved adhesive kit contains adhesive, studs, nuts and washers. Both vertical and horizontal assemblies are possible using an approved adhesive anchoring system.

**Note: Read all Trinity Highway approved adhesive instructions before starting.**

## 1) Prepare the Concrete Foundation



**Warning:** Do not allow anchoring adhesive to contact skin or eyes. See safety data sheet supplied with adhesive kit for first-aid procedures. Use only in well-ventilated area. Do not use near open flame.



**Warning:** Wear gloves and eye protection during application.

The anchors (studs) that anchor the REACT 350® Wide to the concrete foundation must be those shipped in the kit or of high strength steel (830 MPa [120,000 psi] minimum tensile strength). These studs must be set in minimum 28 MPa [4000 psi] concrete. Allow the concrete to cure a minimum of seven days before drilling and applying anchoring adhesive.

## 2) Drill Boreholes



**Caution: Consult OSHA silica respiratory standard 29 CFR 1910.134 for debris removal from borehole(s) and use Trinity Highway approved adhesive to achieve optimum tensile strength. Do not use diamond drill bits for drilling boreholes.**

Use the Monorail(s) and Tension Strut Backup as drilling templates. Use a rotary hammer drill to drill the boreholes 22 mm [7/8"] diameter to the recommended depth. See the approved adhesive instructions provided with adhesive kit. Check to ensure each borehole is drilled to the proper depth and aligned with the part to be anchored per the Anchoring Information chart.

Anchoring Information				
Stud Size:	Orientation	Concrete Bit Size	Minimum Depth	Recommended Torque
3/4"x 6 1/2"	Horizontal	22 mm [7/8"]	113 mm [5 1/4"]	Manufacturer Spec
3/4"x 7"	Vertical	22 mm [7/8"]	140 mm [5 3/4"]	Manufacturer Spec
3/4"x 18"	Vertical	22 mm [7/8"]	420 mm [16 3/4"]	15 N-m [10 ft-lb] ⚠



**Important: When mounting on asphalt, initial torque shall be as shown in the Anchoring Information chart. Due to the properties of asphalt, anchors may loosen over time. For this reason Trinity Highway recommends anchoring to asphalt only at temporary locations. It is recommended to re-torque anchors in asphalt every six (6) months to the proper initial torque specified.**

### 3) Clean the Boreholes

Blow the concrete dust from the borehole using oil-free compressed air. Thoroughly brush it with a 7/8" diameter steel bristle tube brush and then blow it out again. If the borehole is wet, completely flush it with water while brushing and then blow it clean to remove all water using oil-free compressed air.

**Note:** Use of Trinity Highway approved vacuum drilling equipment is authorized to replace the blowing and brushing requirement in Step 3.

### 4) Apply Approved Adhesive

Fill the borehole 100% full.



**Caution:** Fill borehole 100% full so it is even with the pavement surface per manufacturer's instructions.

### 5) Add Nuts to Anchor Studs

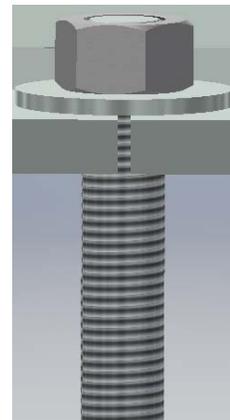
Place a flat washer onto the stud then thread a nut on until the end of the stud is flush with the NUT (Figure 2).

### 6) Insert Studs in Boreholes and Wait for Adhesive to Cure

Push the stud down through the part to be anchored and into the borehole. Give the stud several twists in the approved adhesive to completely wet the threads.



**Caution:** Do not disturb or load the anchor until the approved adhesive material has hardened per instructions supplied with the approved adhesive kit.



**Figure 2**  
**Preposition nut & washer**  
**for insertion into**  
**adhesive filled bore hole.**

### 7) Torque the Nuts

Once the adhesive has fully cured, torque the nut to the adhesive manufacturer's recommended values.

## Anchor Assembly Cautions

### 1) Steel rebar

If steel rebar is encountered while drilling an anchor bolt borehole, apply one of the following solutions:

A) Use a rebar drill bit for the **rebar only** and then switch back to the concrete bit to finish drilling into the underlying concrete until the proper borehole depth is reached.



**Caution:** Do not drill through rebar without first obtaining permission to do so from the project engineer.

B) Drill a new borehole down at an angle past the rebar to the proper depth. Anchor the stud by completely filling both boreholes with an approved adhesive.

## Assembly Procedures (60" Wide Systems)

**Note:** The Drawing Package supplied with the REACT 350® Wide (60") must be used with these instructions for proper assembly and should take precedence over these general instructions.

### 1) Deploy Traffic Control

A MUTCD compliant traffic control plan appropriate to the complexity of the project should be prepared and understood by all parties before the REACT 350® Wide (60") is deployed.

Deploy appropriate work zone safety devices in conformance with the regulations, plans, and specifications of the appropriate highway authority, prior to beginning the deployment and keep them present through all phases of assembly.

### 2) Mark the System Location

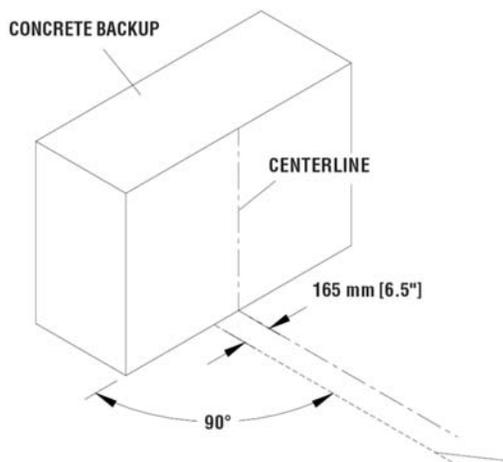
Typically the basepoint of the REACT 350® Wide (60") will be the midpoint of the roadside feature at its front face. This may change if bidirectional traffic or expansion joints are present.

Note that the REACT 350® Wide (60") with Concrete Backup, when properly deployed, appears to be an extension of the object which it is shielding.

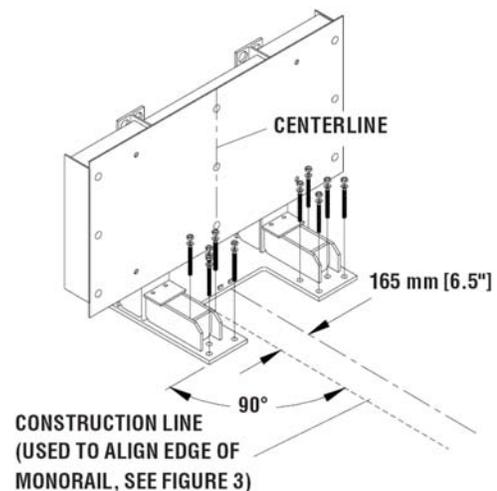
Extend a chalk line from the basepoint, perpendicular to the hazard face, or as determined by project engineer, to a distance greater than the maximum length of the REACT 350® Wide (60") (refer to the drawings provided). This chalk line will become the centerline for the REACT 350® Wide (60").

Mark a construction line parallel to the centerline and offset 165 mm [6.5"] to one side (Figure 3a). The edge of the Monorail will be placed on this line (Figure 3b).

**Note:** The Backup and pad should be assembled per the project plans supplied with the system and be fully cured before proceeding.



**Figure 3a**  
System Location – Concrete Backup



**Figure 3b**  
System Location – Self-Contained Backup

### 3) Place Monorail

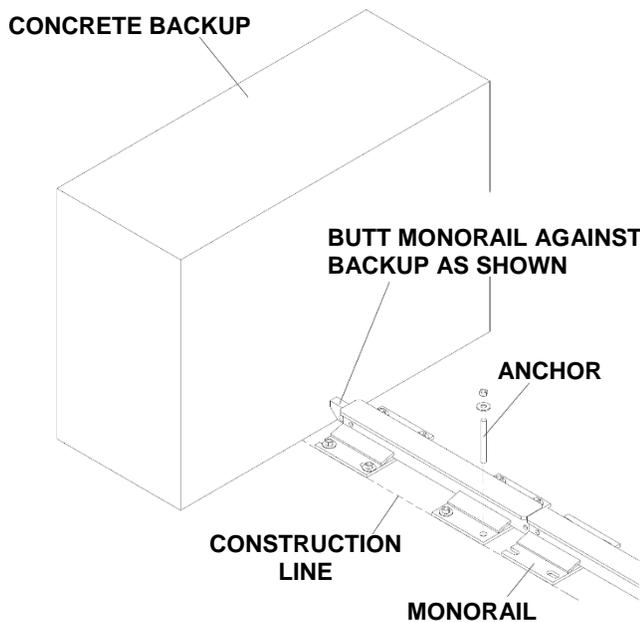
Starting at the Backup and working toward the front of the system, lay the Monorail sections down using the construction line as a guide (Figures 4a and 4b). Refer to the Monorail Assembly drawing for proper order of the segments. It is important to attach each segment of Monorail from the back to the front of the system within  $\pm 6$  mm [ $1/4$ "] straightness.

Use the holes in the Monorail as a template to locate and drill holes, 22 mm [ $7/8$ "] diameter x 140 mm [ $5\ 3/4$ "] deep into the concrete pad. Use approved adhesive kits to anchor  $3/4$ " diameter x 7" long studs using instructions included with kit. After adhesive has hardened, use  $3/4$ " flat washers and nuts provided with kit to anchor Monorail to foundation. Place nut and washer as shown flush with end of stud before placing in adhesive filled holes (p. 10).

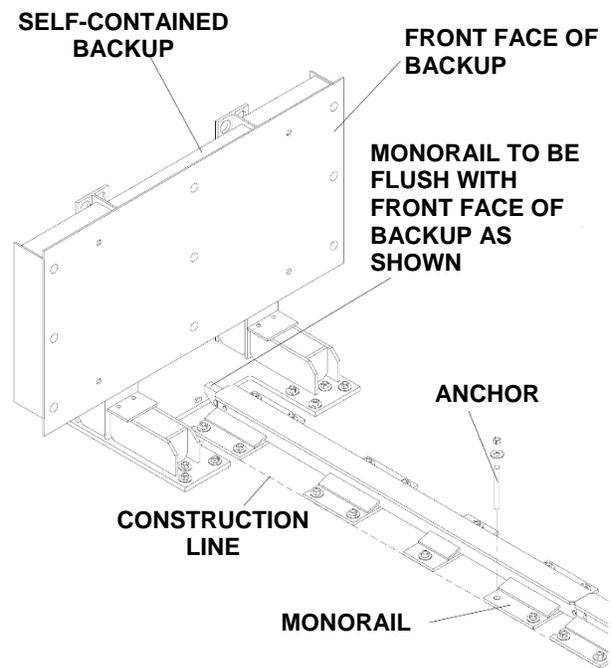
**Note:** All holes in Monorail must be used to anchor the REACT 350® Wide (60") to the foundation.



**Warning:** Once the approved adhesive has hardened, torque nuts to manufacturer specifications.



**Figure 4a**  
Monorail Assembly

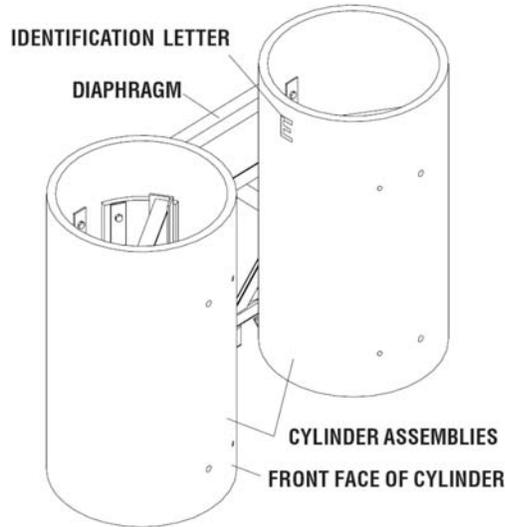


**Figure 4b**  
Monorail Assembly

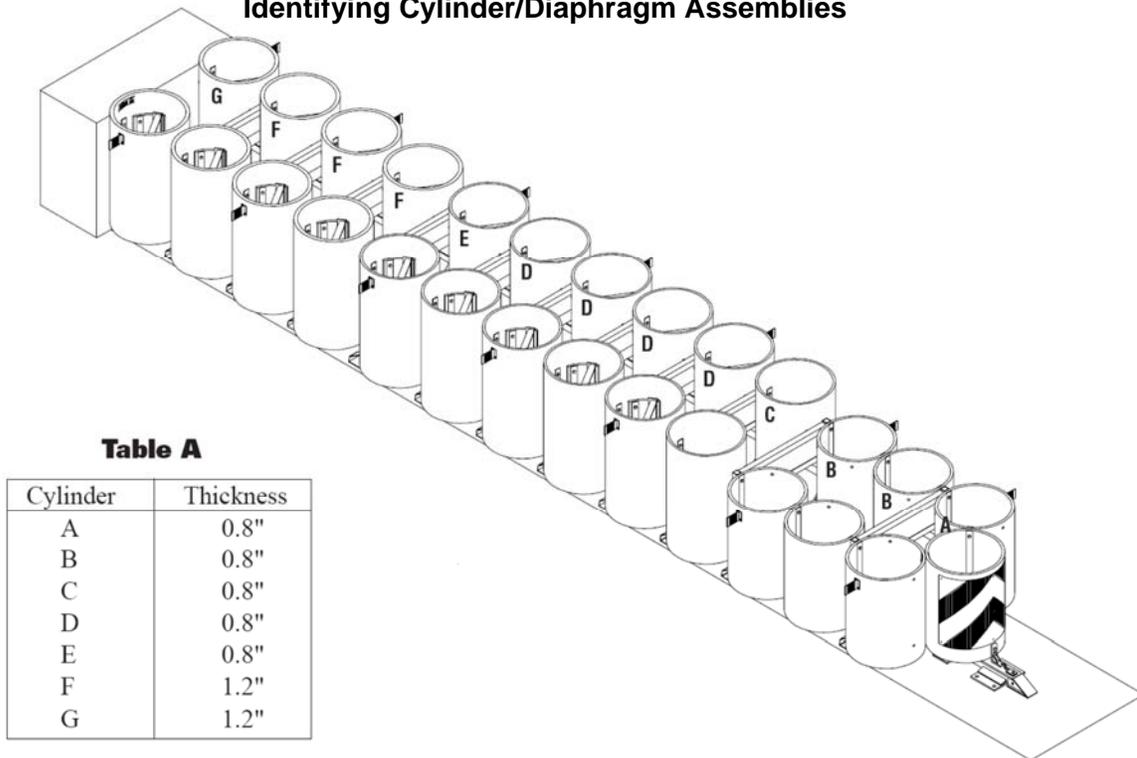
**4) Locate and Identify Cylinder/Diaphragm Assemblies**

With the exception of the last row, all Cylinder/Diaphragm assemblies are shipped assembled. Each Cylinder is marked with a letter ranging from A to G. These letters correspond to the drawings that came with the REACT 350® Wide (60"). The letter will be located on the upper end of each Cylinder, facing inward as shown in Figure 5.

When the REACT 350® Wide (60") is properly assembled, the Cylinders will be oriented as shown in Figure 6. The two Cylinders marked "G" will be against the Backup, and the letters will ascend as you move toward the front of the system (Figure 6).



**Figure 5**  
**Identifying Cylinder/Diaphragm Assemblies**



**Table A**

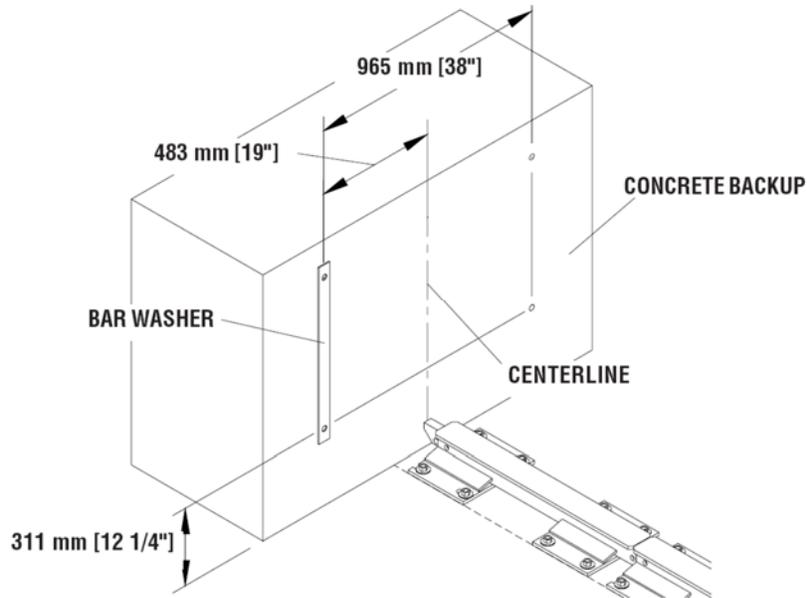
Cylinder	Thickness
A	0.8"
B	0.8"
C	0.8"
D	0.8"
E	0.8"
F	1.2"
G	1.2"

**Figure 6**  
**Properly Assembled REACT 350® Wide (60)**

5) **Attach Rear Cylinder Assemblies  
(Concrete Backup)**

For Concrete Backup, use bar washer as a template to locate and drill 22 mm diameter [7/8" diameter] holes to a depth of 115 mm + 13 mm -0 [4 1/2" + 1/2" -0] into the Concrete Backup, four places as shown in Figure 7.

**Note:** Accurate location of these holes is critical to ensure assembly. The holes in the "G" Cylinder should be used to check vertical alignment before drilling. Refer to pages 9 & 10 for drilling and anchor assembly details.



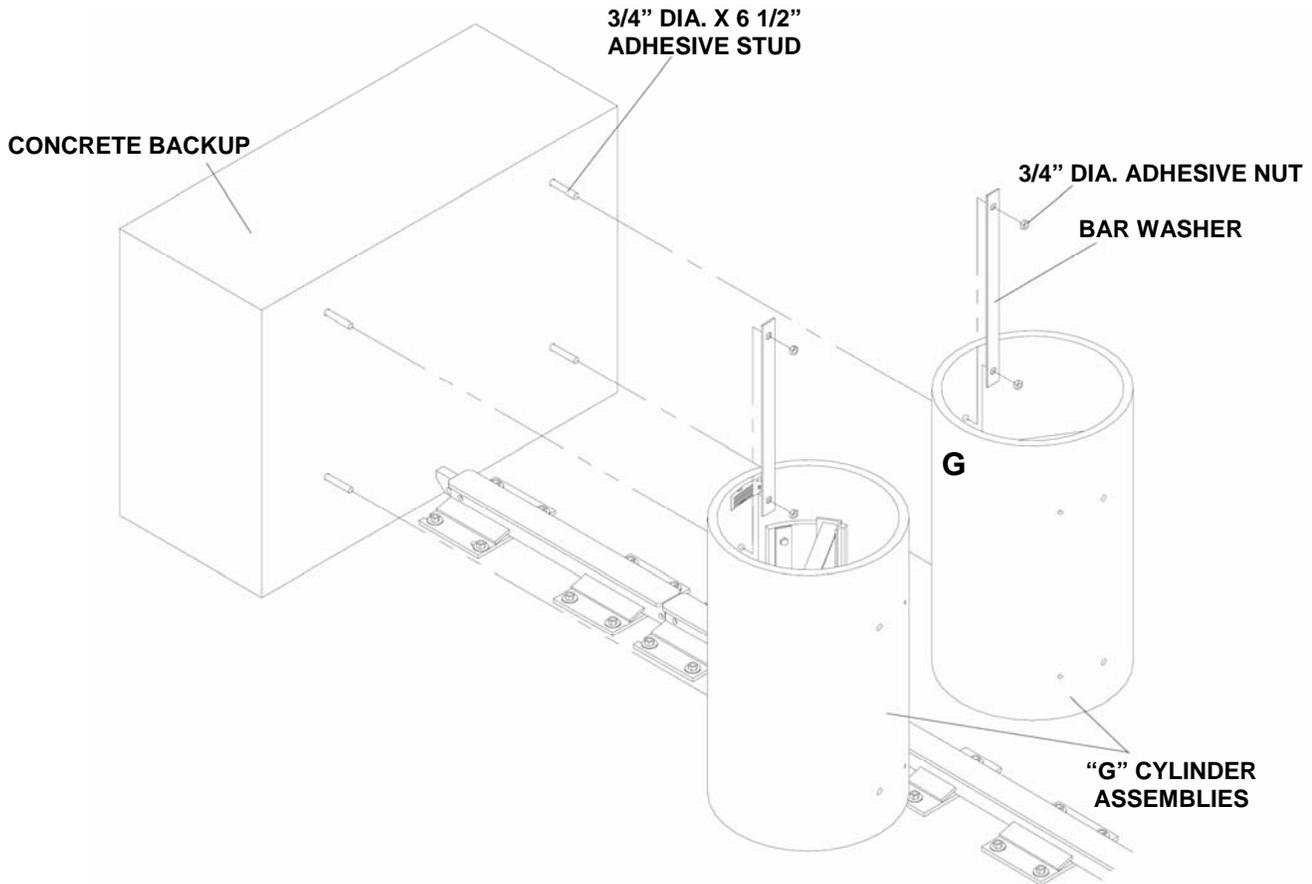
**Figure 7  
Drilling Anchor Holes**

Refer to the instructions included with the approved adhesive kit to anchor the rear Cylinder Assemblies to the Backup using 3/4" diameter x 6 1/2" long approved adhesive studs, 2" x 28" Bar Washers and 3/4" nuts provided with the approved adhesive kit. Tighten all fasteners. When oriented correctly, the "G" letters will be facing each other (Figure 7a).

**Note:** The rear Cylinder assemblies are not attached to a Diaphragm when shipped. Also note that they have the letter "G" marked on them.



**Warning:** Once the approved adhesive has hardened, torque nuts to manufacturer specifications (p. 9).

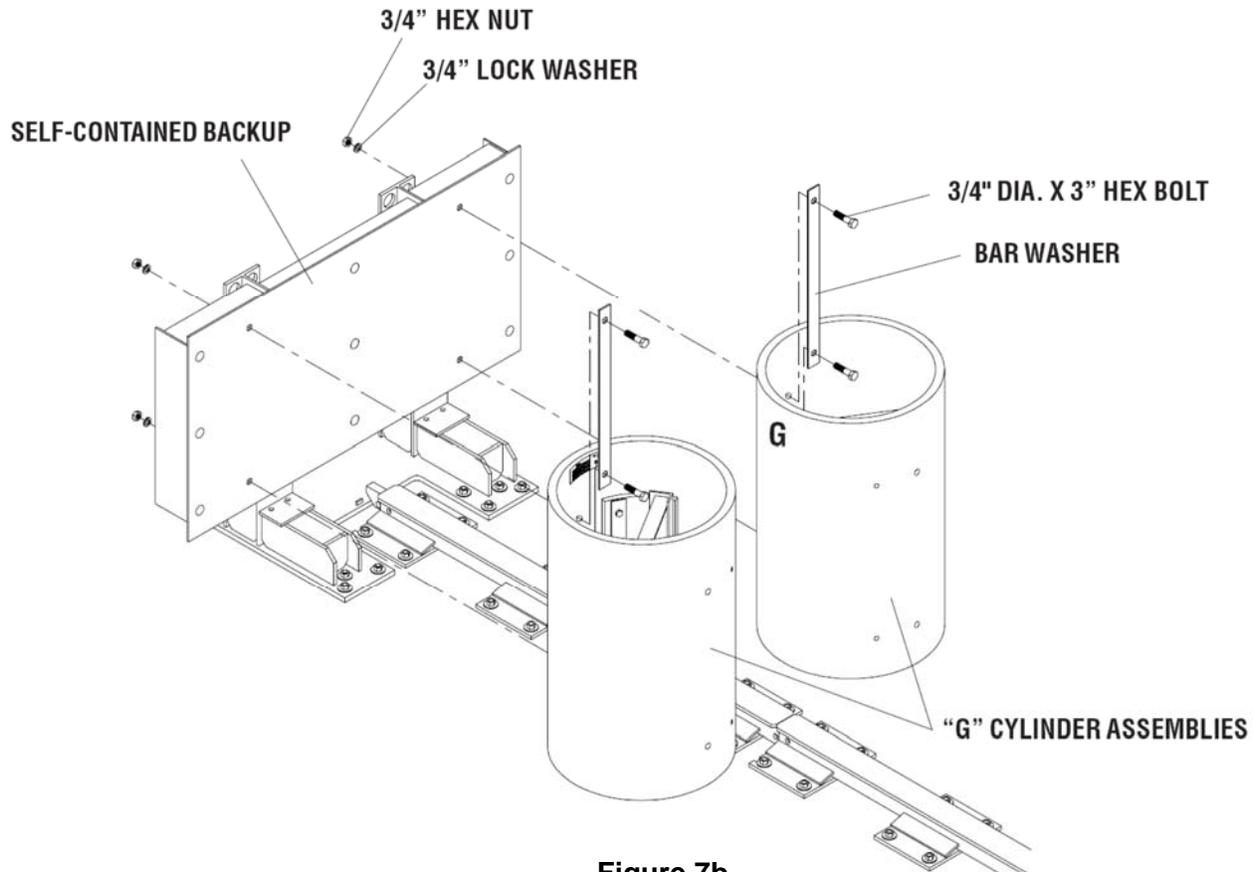


**Figure 7a**  
**Attaching Rear Cylinder Assemblies to Concrete Backup**

**5) Attach Rear Cylinder Assemblies (Self-Contained Backup)**

For the Self-contained Backup, attach the Rear Cylinder Assemblies to the Backup using 3/4" diameter x 3" long hex bolts, Bar Washers, 3/4" lock washers and 3/4" hex nuts provided with the Backup Assembly. Tighten all fasteners. When oriented correctly, the "G" letters will be facing each other (Figure 7b).

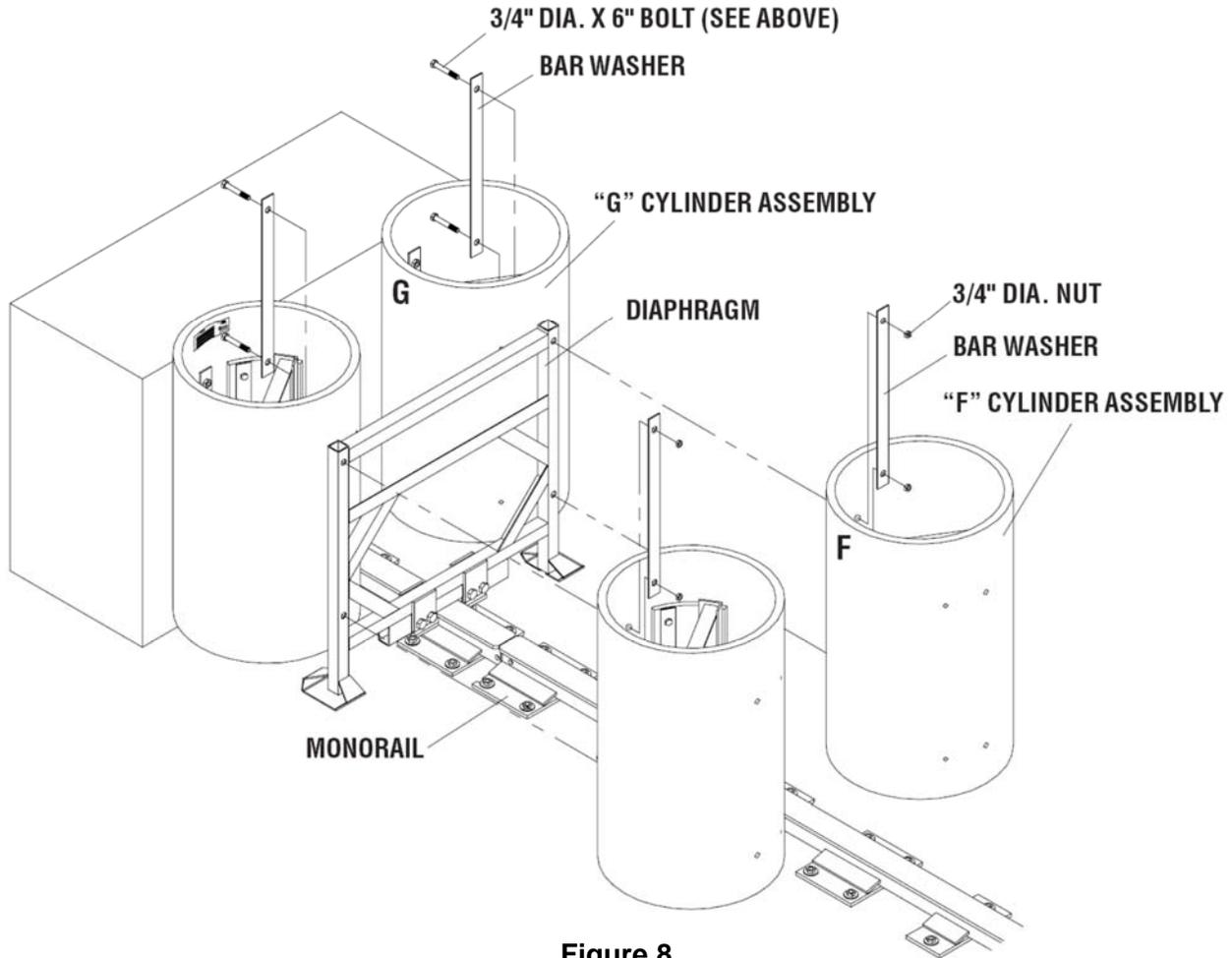
**Note:** The Rear Cylinder Assemblies are not attached to a Diaphragm when shipped. Also note that they have the letter "G" marked on them.



**Figure 7b**  
**Attaching Rear Cylinder Assemblies to Self-Contained Backup**

## 6) Attach "F" Cylinder Assemblies

1. Disassemble "F" Cylinder/Frame Assembly.
2. Slide Diaphragm onto Monorail and against the "G" Cylinders.
3. Reassemble "F" Cylinder/Diaphragm Assembly onto "G" Cylinder Assemblies as shown in Figure 8.
4. Repeat the above steps to attach remaining two "F" Cylinder Diaphragm Assemblies.
5. Tighten all fasteners.

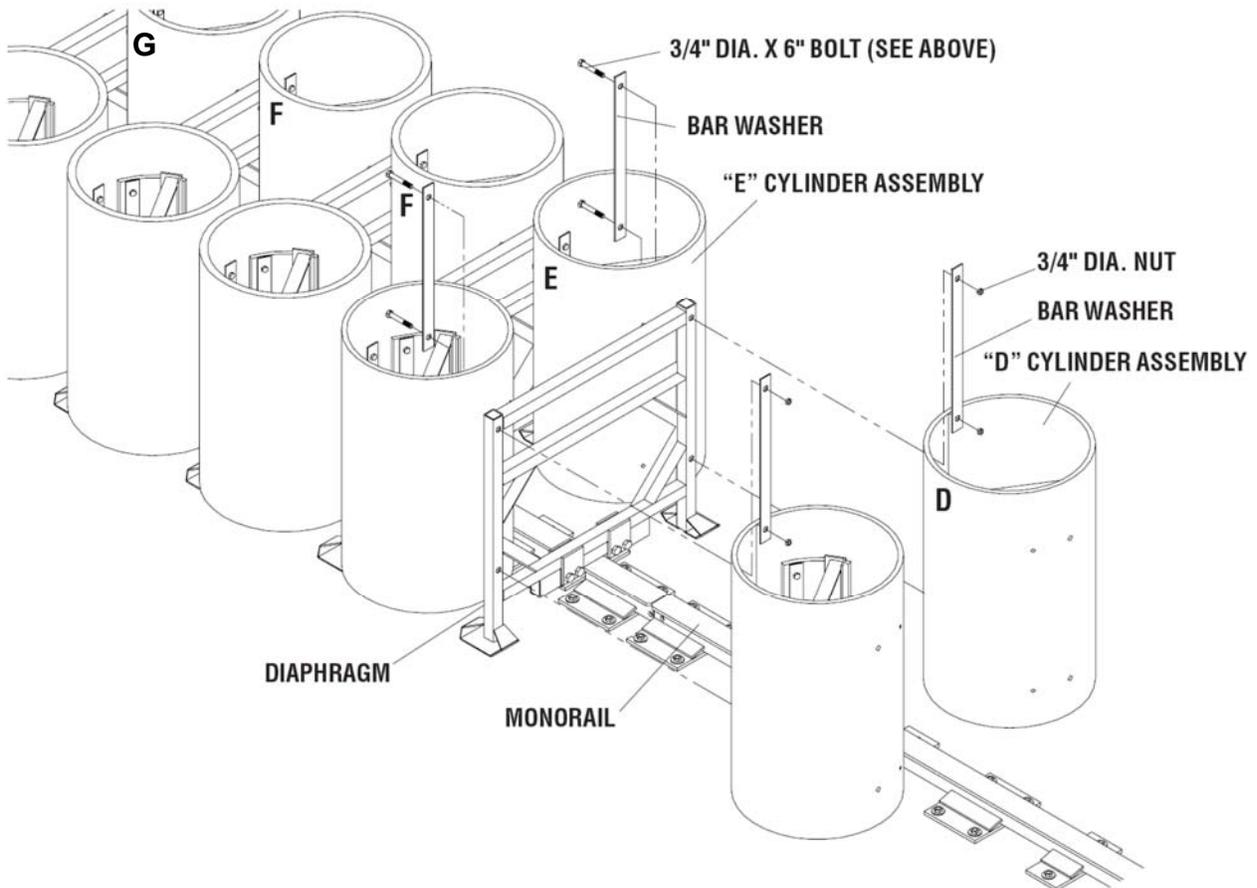


**Figure 8**  
**"F" to "G" Cylinder Assembly Attachment**



## 8) Attach "D" Cylinder Assemblies

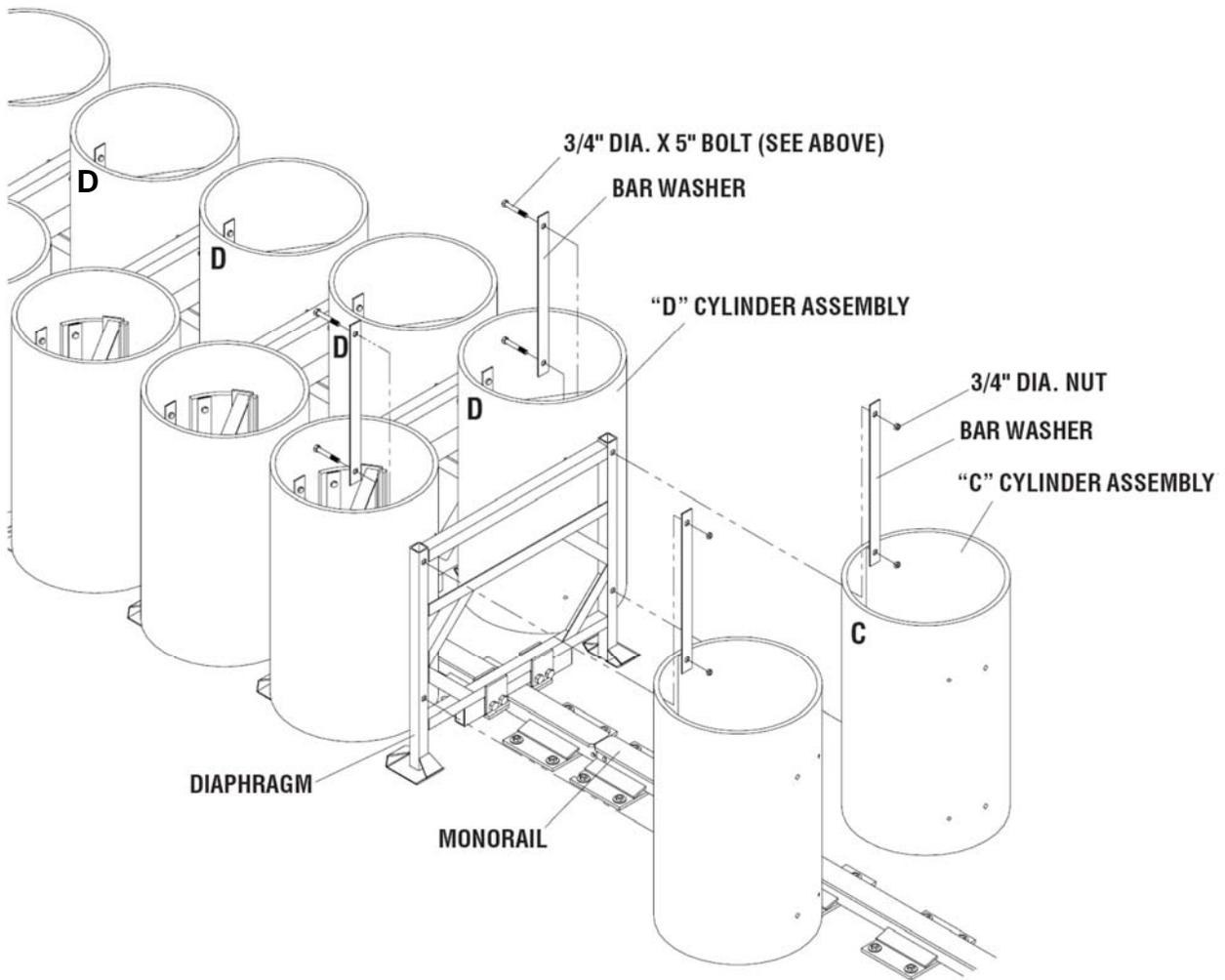
1. Disassemble "D" Cylinder/Frame Assembly.
2. Slide Diaphragm onto Monorail and against "E" Cylinders.
3. Reassemble "D" Cylinder/Diaphragm Assembly onto "E" Cylinder Assemblies as shown in Figure 10.
4. Tighten all fasteners.
5. Repeat the above steps to attach remaining three "D" Cylinder/Diaphragm Assemblies.



**Figure 10**  
**"D" to "E" Cylinder Assembly Attachment**

**9) Attach "C" Cylinder Assemblies**

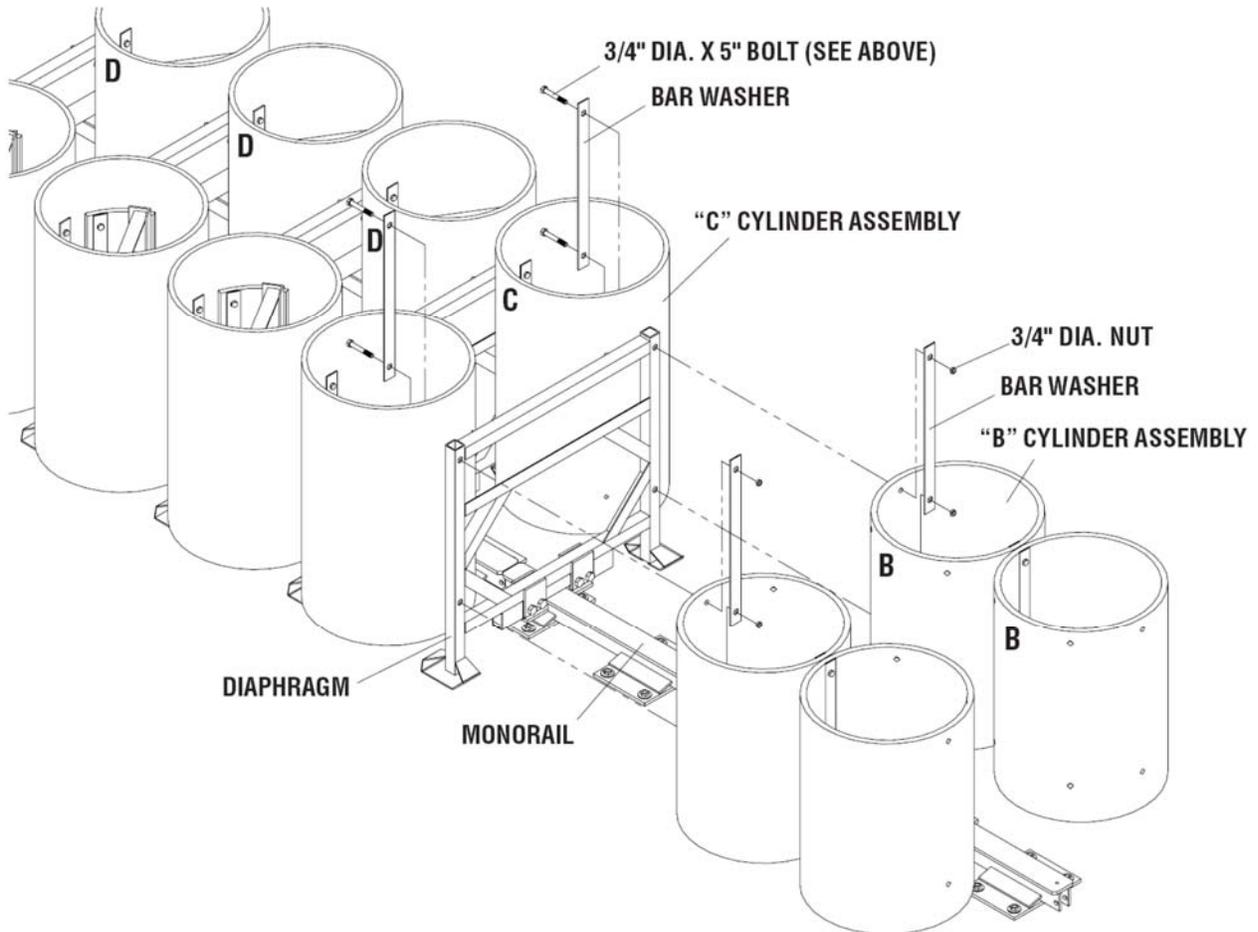
1. Disassemble "C" Cylinder/Frame Assembly.
2. Slide Diaphragm onto Monorail and against "D" Cylinders.
3. Reassemble "C" Cylinder/Diaphragm Assembly onto "D" Cylinder Assemblies as shown in Figure 11.
4. Tighten all fasteners.



**Figure 11**  
**"C" to "D" Cylinder Assembly Attachment**

## 10) Attach "B" Cylinder Assemblies

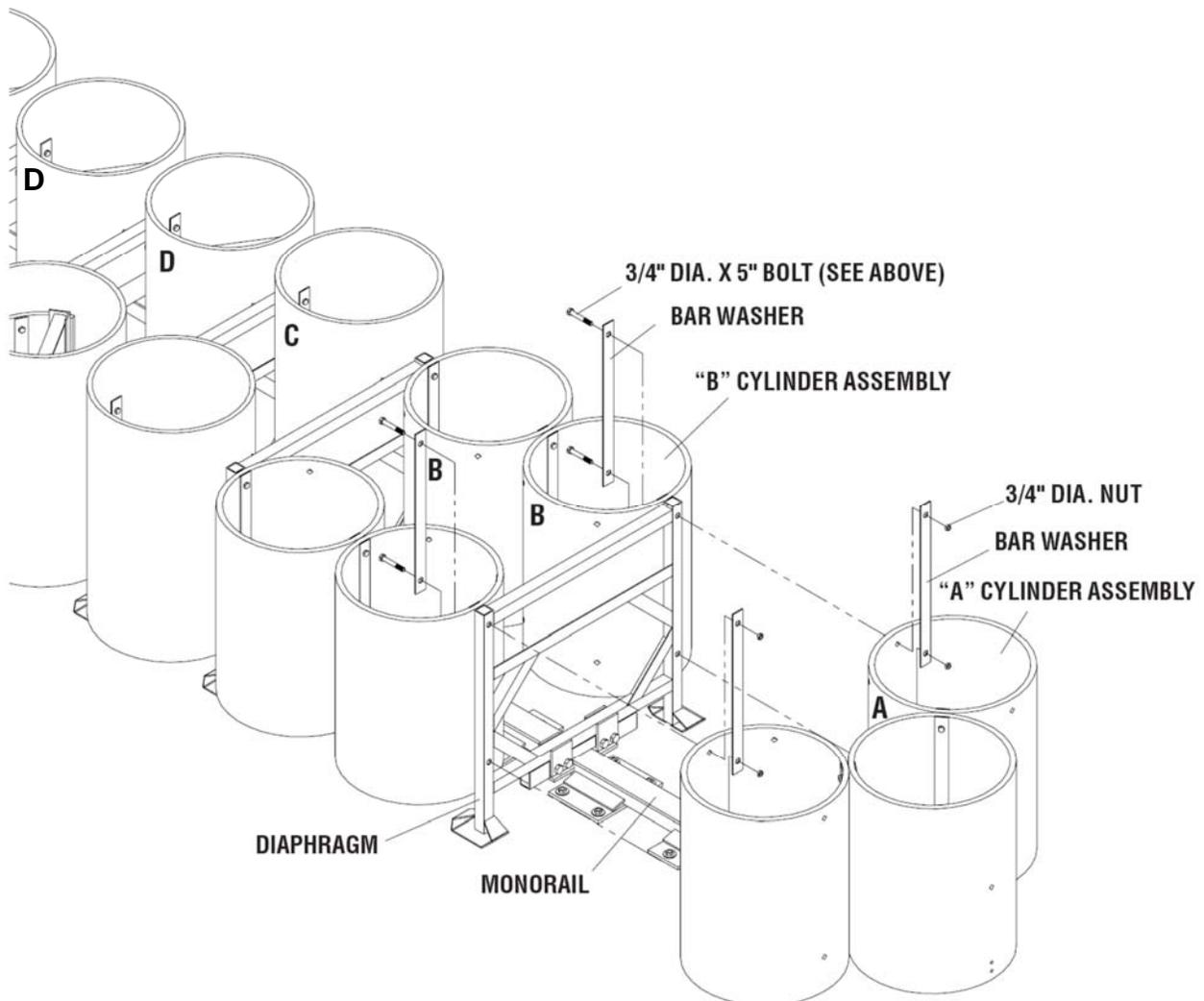
1. Remove Diaphragm from "B" Cylinder/Diaphragm Assembly.
2. Slide Diaphragm onto Monorail and against "C" Cylinders.
3. Reassemble "B" Cylinder/Diaphragm Assembly onto "C" Cylinder Assemblies as shown in Figure 12.
4. Tighten all fasteners.



**Figure 12**  
**"B" to "C" Cylinder Assembly Attachment**

## 11) Attach "A" Cylinder Assemblies

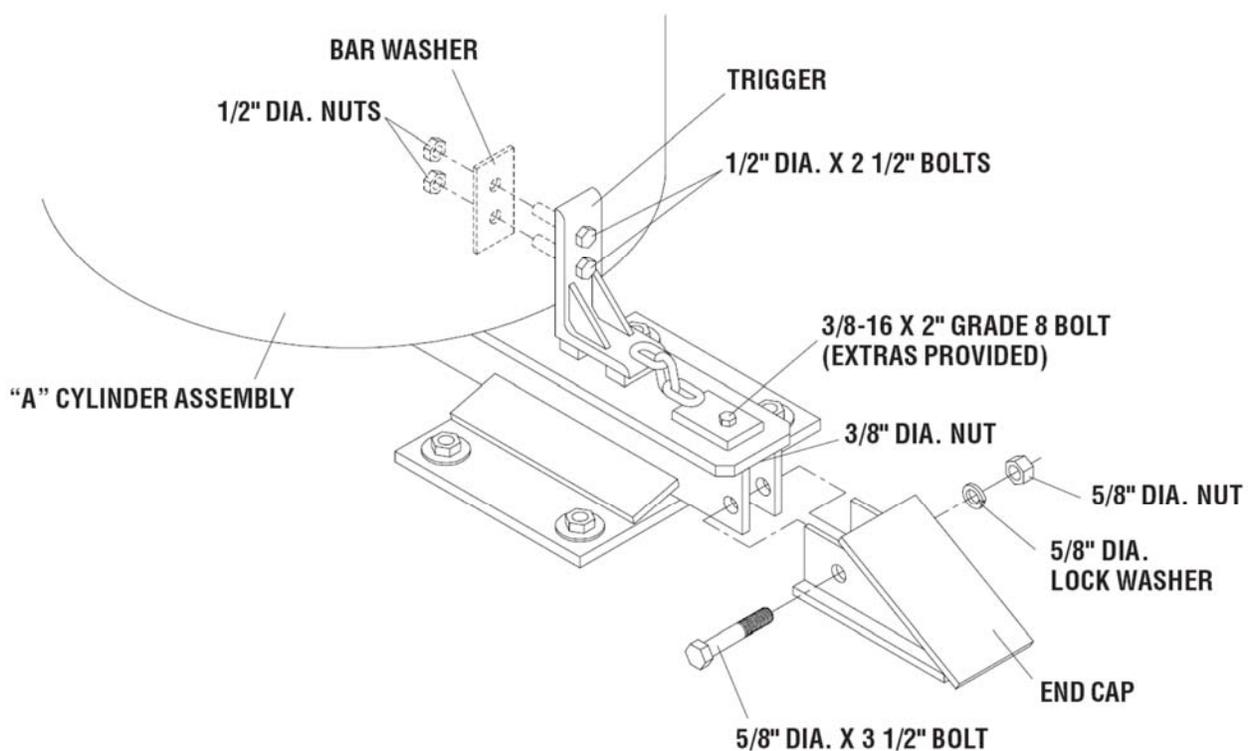
1. Remove Diaphragm from "A" Cylinder/Diaphragm Assembly.
2. Slide Diaphragm onto Monorail and against "B" Cylinders.
3. Reassemble "A" Cylinder/Diaphragm Assembly onto "B" Cylinder Assemblies as shown in Figure 13.
4. Tighten all fasteners.



**Figure 13**  
**"A" to "B" Cylinder Assembly Attachment**

## 12) Attach Monorail End Cap and Trigger

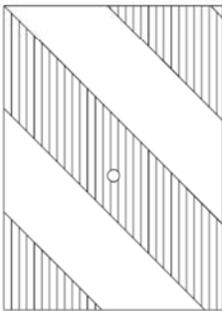
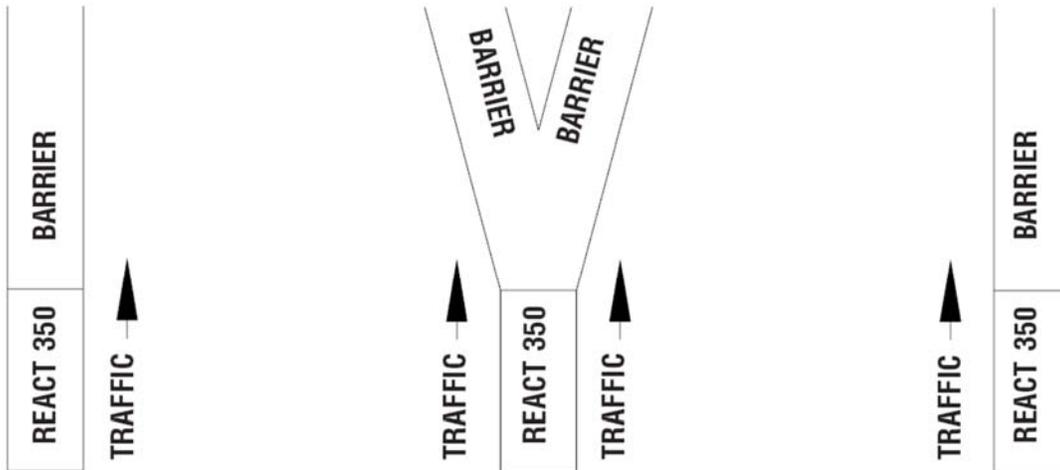
1. Use two 1/2" diameter x 2 1/2" bolts, two 1/2" diameter nuts, and Bar Washer to attach trigger to "A" Cylinder Assembly (Figure 14).
2. Use hole in trigger to locate and drill 7/8" hole in center of Monorail as shown in Figure 14.
3. Use 3/8" diameter x 2" grade 8 bolt and 3/8" diameter nut provided to attach trigger to Monorail as shown in Figure 14.
4. Attach End Cap to Monorail using 5/8" diameter x 3 1/2" bolt, 5/8" diameter nut, and 5/8" diameter lock washer.
5. Tighten all fasteners.



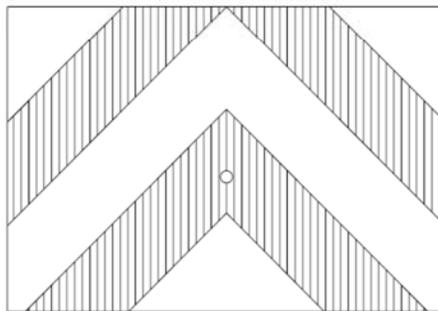
**Figure 14**  
**Monorail End Cap and Trigger Assembly**

**13) Attach Nose Cover and Side Mount Reflectors**

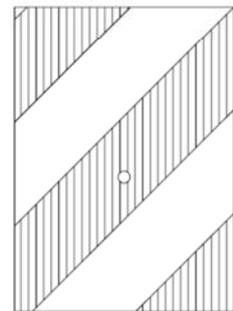
1. Ensure that the Nose Cover suits the site (Nose Cover Selection below). Refer to local standards, applicable DOT regulations, specifications of the appropriate highway authority and “Manual on Uniform Traffic Control Devices” (MUTCD).



**Figure 15a**  
For traffic on Right  
Side of System only



**Figure 15b**  
For traffic on Both  
Sides of System



**Figure 15c**  
For traffic on Left  
Side of System only

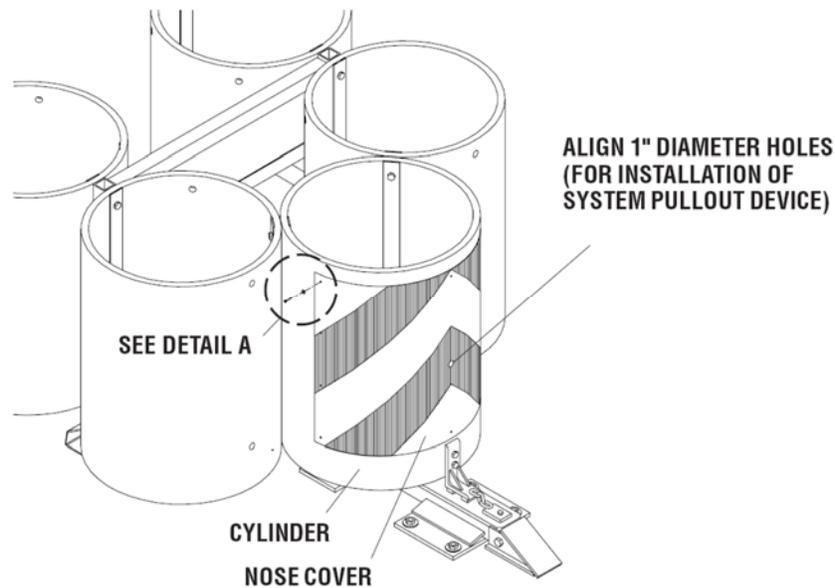
**Nose Cover Assembly**

2. Align 1" diameter hole in nose cover with 1" diameter hole in Cylinder.
3. Screw #8 self-tapping screw through reflective tape, existing holes in nose cover, and into the Cylinder for all 10 holes in the nose cover (Figure 16).

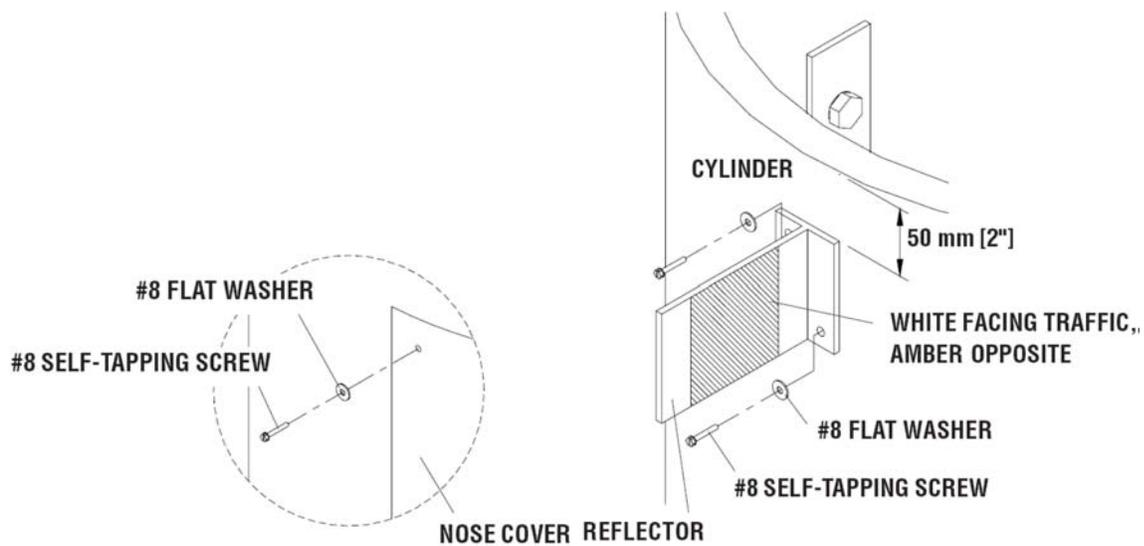
#### 14) Attach Side Mount Reflectors

Refer to local standards and "Manual on Uniform Traffic Control Devices" (MUTCD) for reflectors.

For side mount reflectors, attach to traffic side(s) of the system with the white side facing traffic by screwing #8 self-tapping screws through the reflector and into the Cylinder until head of fastener is flush (2 places per reflector), (Detail B).



**Figure 16**  
**Nose Cover Assembly**

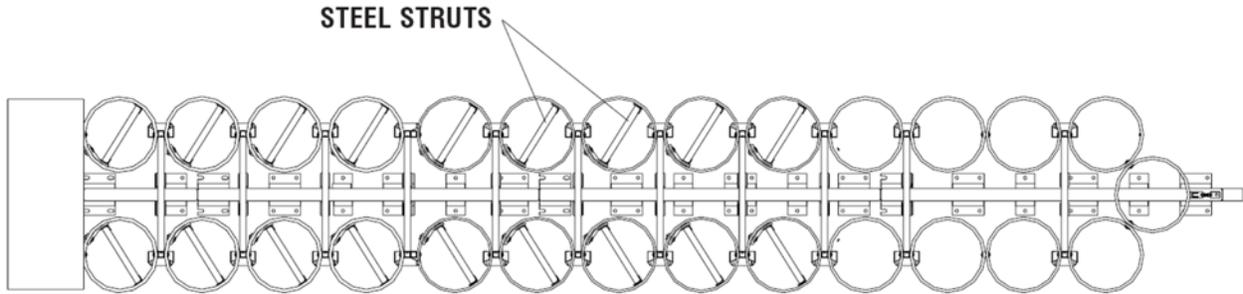


**Detail A**

**Detail B**  
**Side Mounted Reflector**



**Warning:** Orientation of Cylinder Assemblies is critical. The Steel Struts inside the Cylinders are the primary redirecting component of the REACT 350® Wide (60"). Ensure all Steel Struts inside Cylinders are positioned as shown in Figure 17.



**Figure 17**  
**Assembled REACT 350® Wide (60") – Plan view**

## **Assembly Procedures (96” and 120” Wide Systems)**

**Note:** The drawing package provided with the REACT 350® Wide (96”/120”) must be used with these instructions for proper assembly and should take precedence over these general instructions.

**Note:** Refer to pages 7 and 8 for “Recommended Tools” and “Site Preparation/Foundation.”

### **1) Deploy Traffic Control**

A MUTCD compliant traffic control plan appropriate to the complexity of the project should be prepared and understood by all parties before the REACT 350® Wide (96”/120”) is assembled.

Deploy the appropriate work zone safety devices prior to beginning the assembly and keep them present through all phases on the assembly.

### **2) Mark the System Location**

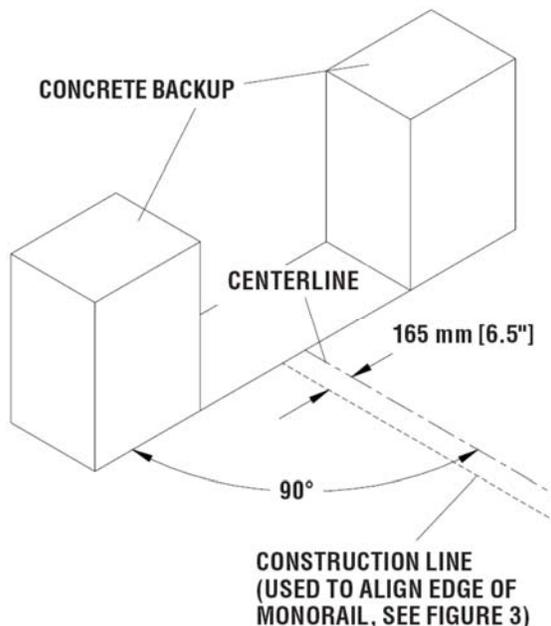
Typically the basepoint of the REACT 350® Wide (96”/120”) will be the midpoint of the hazard at its front face. This may change if bidirectional traffic or expansion joints are present.

Note that the REACT 350® Wide (96”/120”) Concrete Backup, when properly deployed, appears to be an extension of the object which it is shielding.

Extend a chalk line from the basepoint, perpendicular to the hazard face, or as determined by project engineer, to a distance greater than the maximum length of the REACT 350® Wide (96”/120”) (refer to the drawings provided). This chalk line will become the centerline for the REACT 350® Wide (96”/120”).

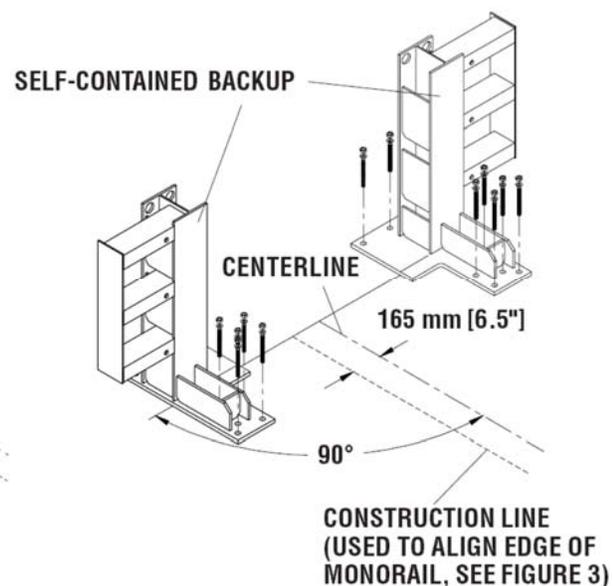
Mark a construction line parallel to the centerline and offset 165 mm [6.5”] to one side. The edge of the Monorail will be placed on this line (Figures 18a and 18b).

**Note:** The Concrete Backup and pad should be assembled per the project plans supplied with the system and be fully cured before proceeding.



**Figure 18a**

**System Location – Concrete Backup**



**Figure 18b**

**System Location – Self-Contained Backup**

### 3) Place Monorail

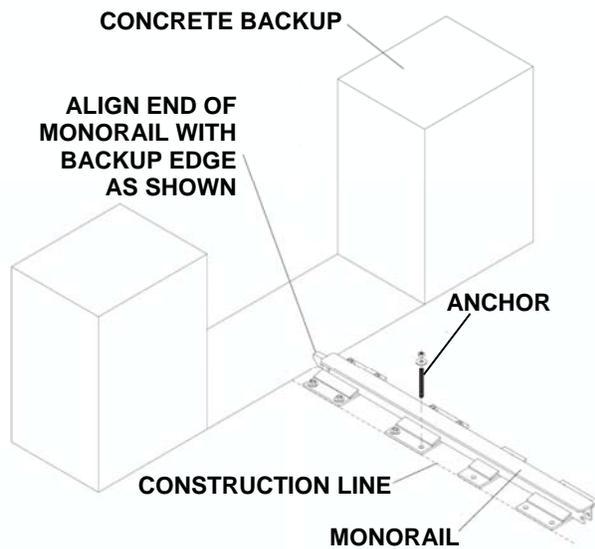
Starting at the Backup and working toward the front of the system, lay the Monorail sections down using the construction line as a guide (Figures 19a and 19b). Refer to the Monorail Assembly drawing for proper order of the segments. It is important to assemble each segment of Monorail from the back to the front of the system within  $\pm 6$  mm [ $1/4$ "] straightness.

Use the holes in the Monorail as a template to locate and drill holes, 22 mm [ $7/8$ "] diameter x 140 mm [ $5 3/4$ "] deep into the concrete pad. Use approved adhesive kits to anchor  $3/4$ " diameter x 7" long studs using instructions included with kit. After adhesive has hardened, use  $3/4$ " flat washers and nuts provided with kit to anchor Monorail to foundation. Place nuts and washers as shown flush with end of stud before placing in adhesive filled holes. Refer to pages 9 & 10 for drilling and anchor assembly details.

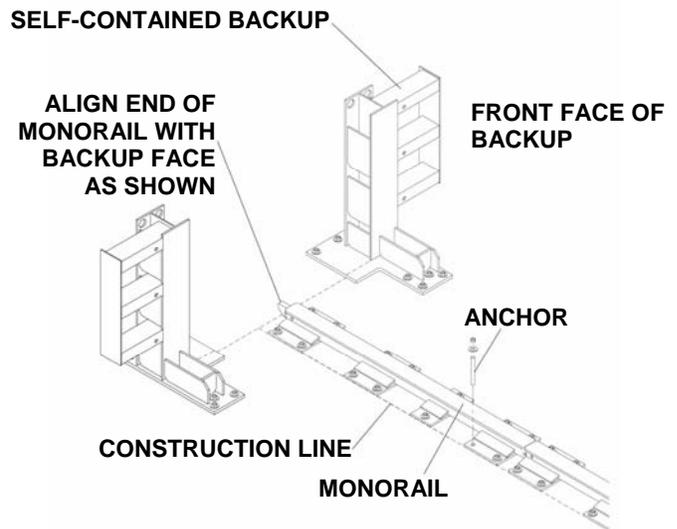
**Note:** All holes in Monorail must be used to anchor to REACT 350® Wide ( $96$ "/ $120$ "") to the foundation.



**Warning:** Once the approved adhesive has hardened, torque nuts to manufacturer specifications.



**Figure 19a**  
Assembling Monorail  
Concrete Backup

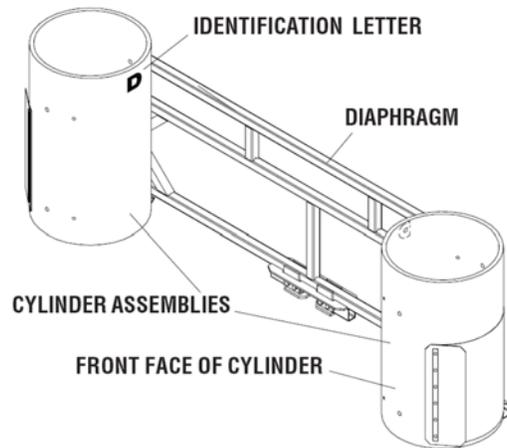


**Figure 19b**  
Assembling Monorail  
Self-Contained Backup

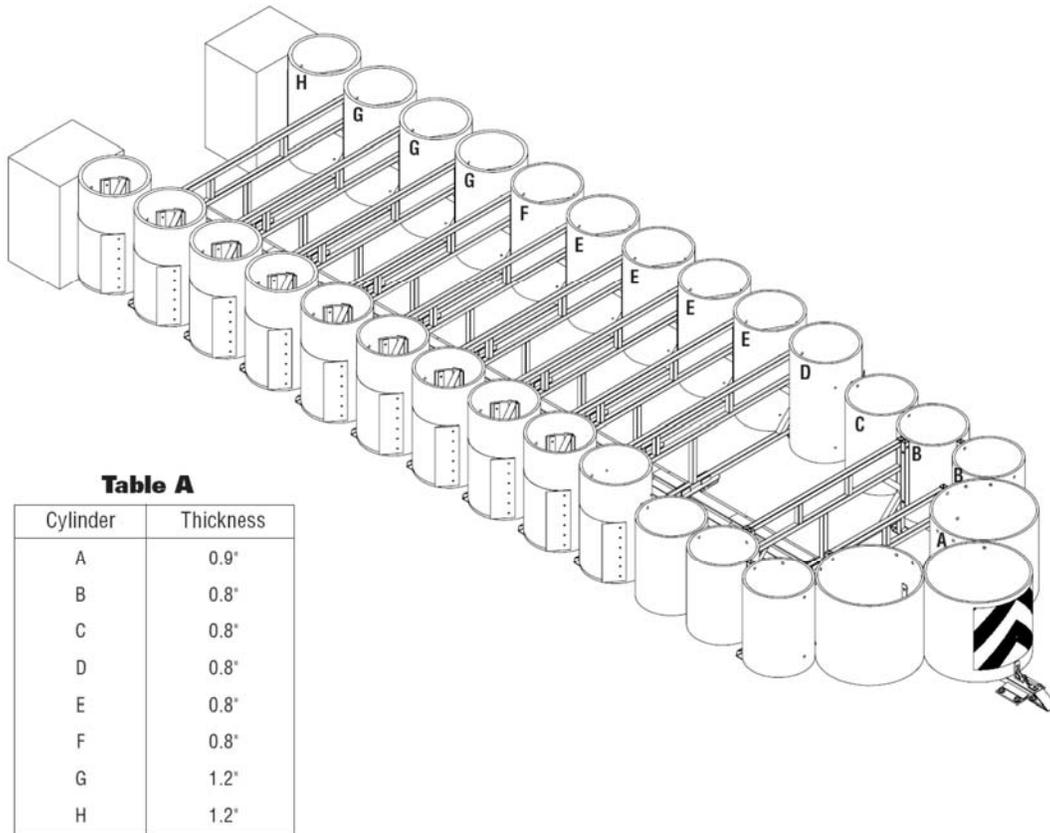
**4) Locate and Identify Cylinder/Diaphragm Assemblies**

With the exception of the last row, all Cylinder/Diaphragm Assemblies are shipped assembled. Each Cylinder is marked with a letter ranging from A to H. These letters correspond to the drawings that came with the REACT 350® Wide (96"/120"). The letter will be located on the upper end of each Cylinder, facing inward as shown in Figure 20.

When the REACT 350® Wide (96"/120") is properly assembled, the Cylinders will be oriented as shown in Figure 24 on page 31. The two Cylinders marked "H" will be against the Backup, and the letters will ascend as you move toward the front of the system (Figure 21).



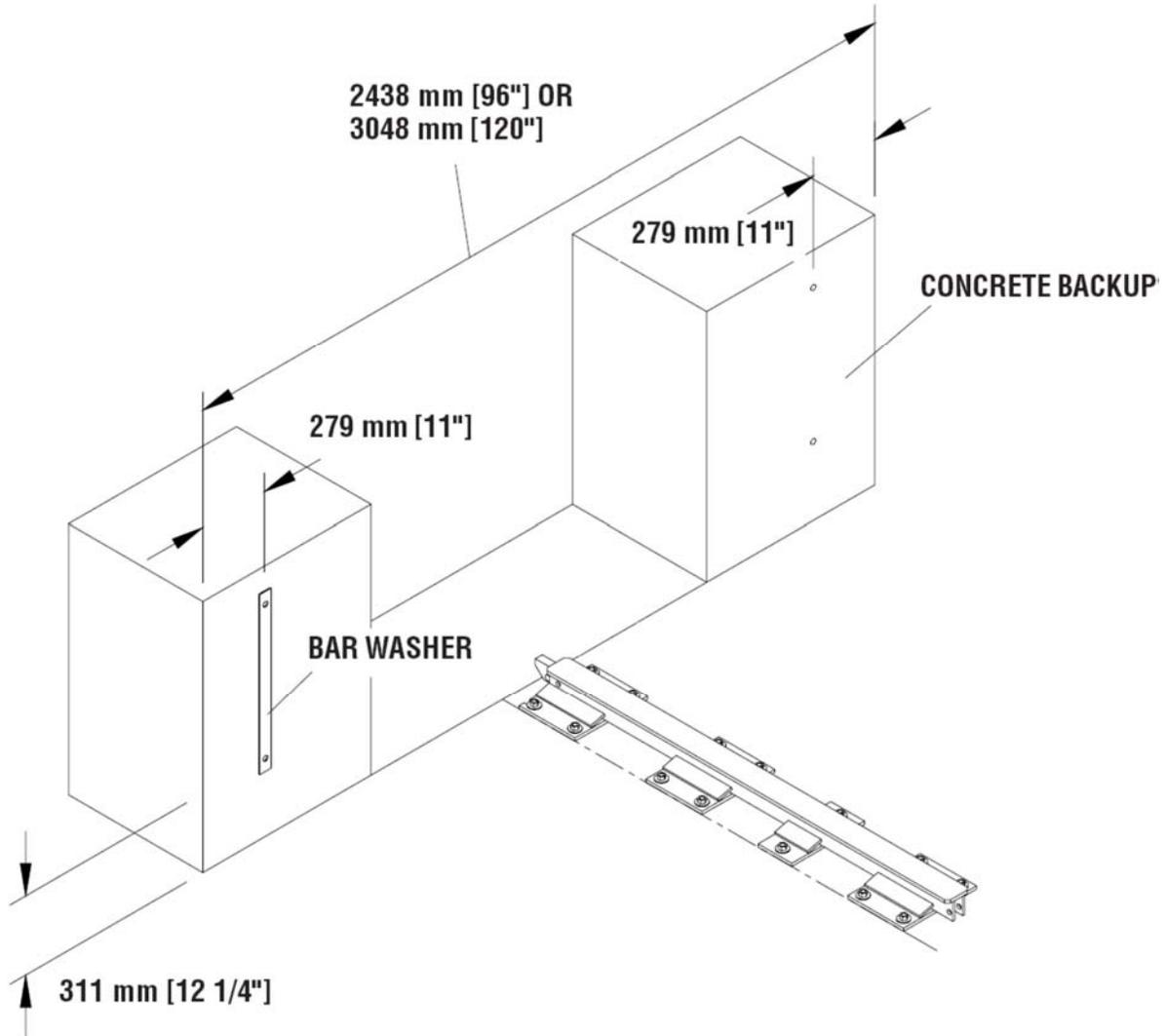
**Figure 20**  
Identifying Cylinder/Diaphragm Assemblies



**Figure 21**  
Properly assembled REACT 350® Wide (96"/120")

**5a) Attach Rear Cylinder Assemblies  
(Concrete Backup)**

For Concrete Backup, use Bar Washer as a template to locate and drill 22 mm diameter [7/8" diameter] holes to a depth of 115 mm + 13 mm -0 [4 1/2" + 1/2" -0] into the Concrete Backup, four places as shown in Figure 22. See pages 9 & 10 for drilling and anchor assembly details.



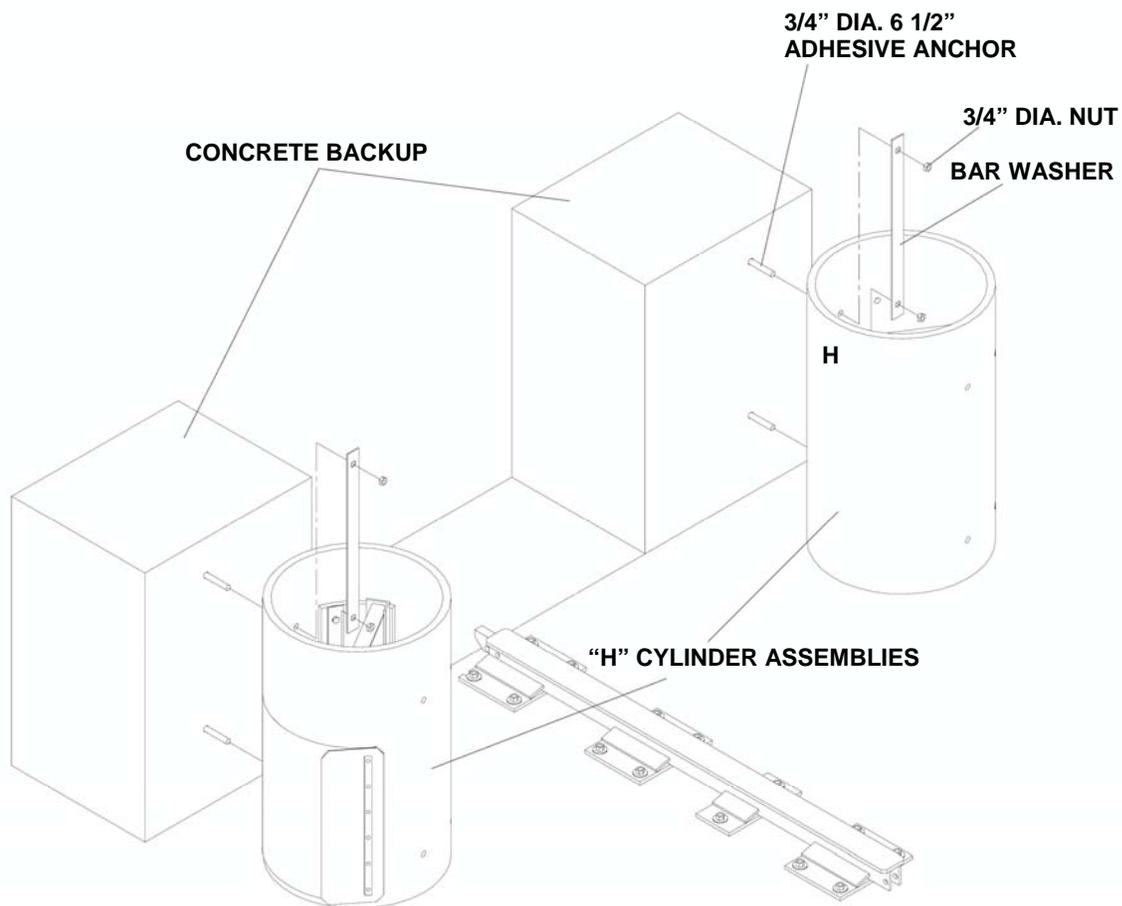
**Figure 22  
Drilling Anchor Holes**

Refer to the instructions included with an approved adhesive kit to anchor the Rear Cylinder Assemblies to the Backup using 3/4" diameter x 6 1/2" long approved adhesive studs, 2" x 28" Bar Washers and 3/4" nuts provided with the approved adhesive kit. When oriented correctly, the letters "H" will be facing each other (Figure 23a).



**Warning:** Once the adhesive has hardened, tighten nuts to manufacturer specifications.

**Note:** The Rear Cylinder Assemblies will not be attached to a Diaphragm and will have the letter "H" marked on them.

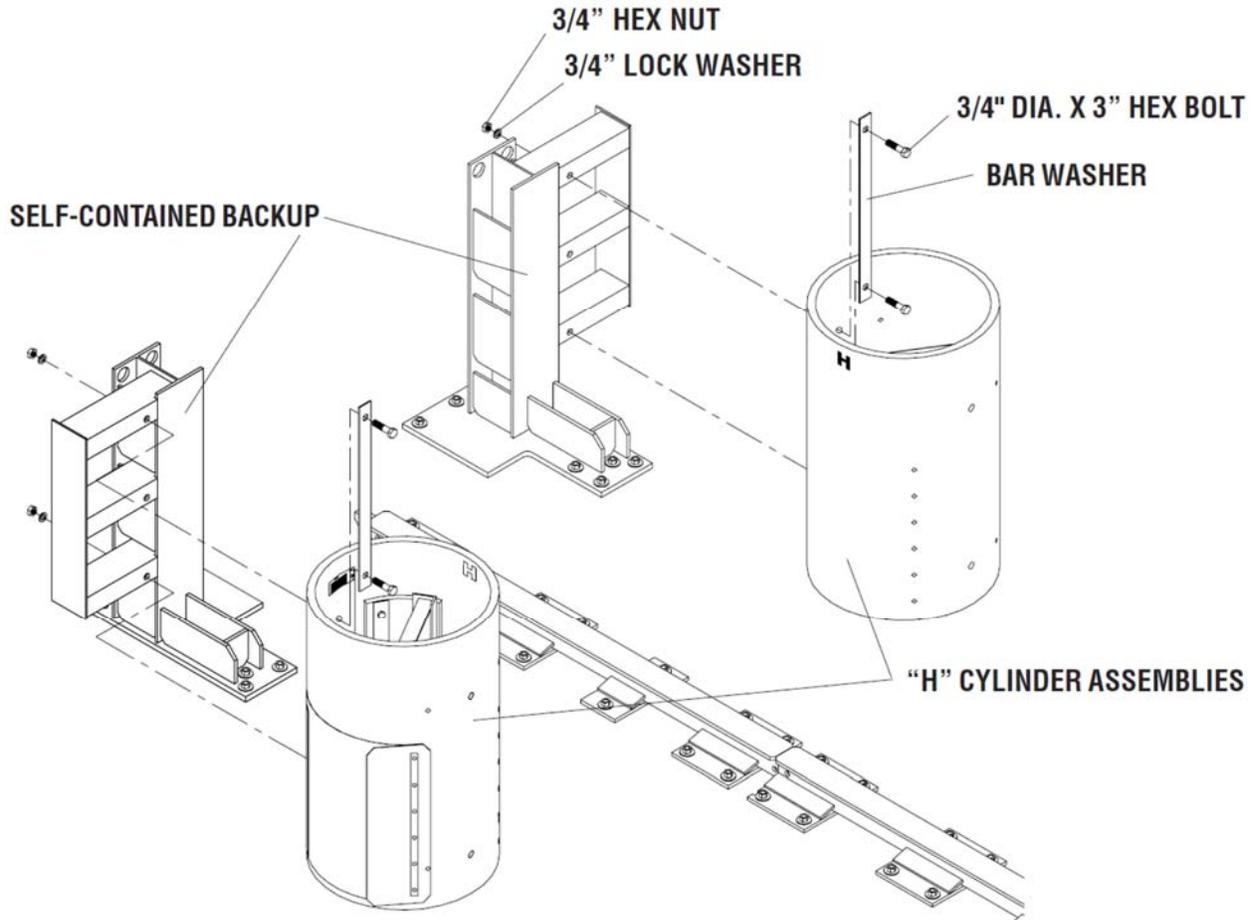


**Figure 23a**  
**Attaching "H" Cylinder Assemblies to Concrete Backup**

**5b) Attach Rear Cylinder Assemblies  
(Self-Contained Backup)**

For the Self-Contained Backup, attach the Rear Cylinder Assemblies to the Backup using 3/4" diameter x 3" long hex bolts, Bar Washers, 3/4" lock washers and 3/4" hex nuts provided with the Backup Assembly. Tighten all fasteners. When oriented correctly, the letters "H" will be facing each other (Figure 23b).

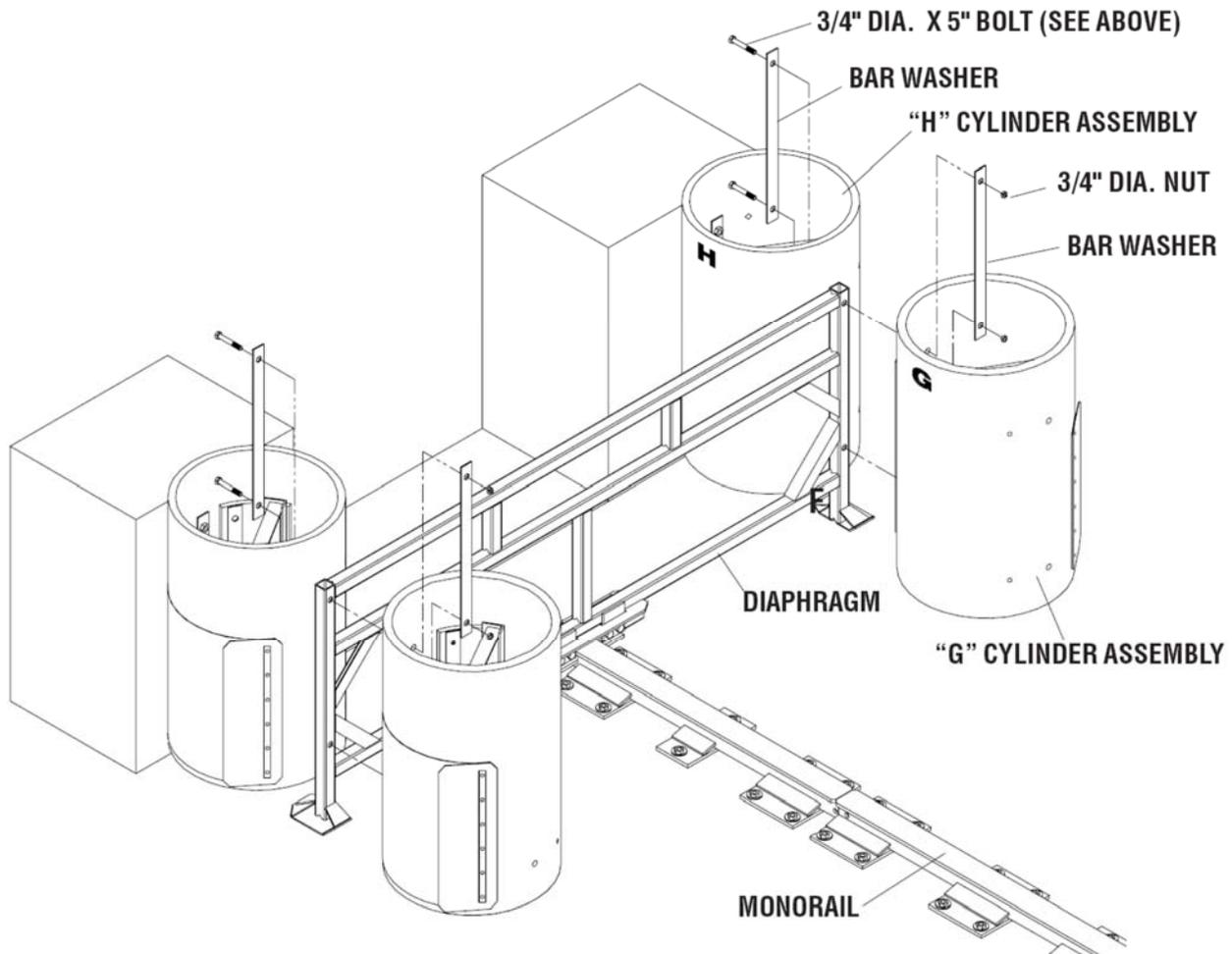
**Note:** The Rear Cylinder Assemblies will not be attached to a Diaphragm when shipped. Also note that they have the letter "H" marked on them.



**Figure 23b**  
**Attaching "H" Cylinder Assemblies to Self-Contained Backup**

## 6) Attach "G" Cylinder

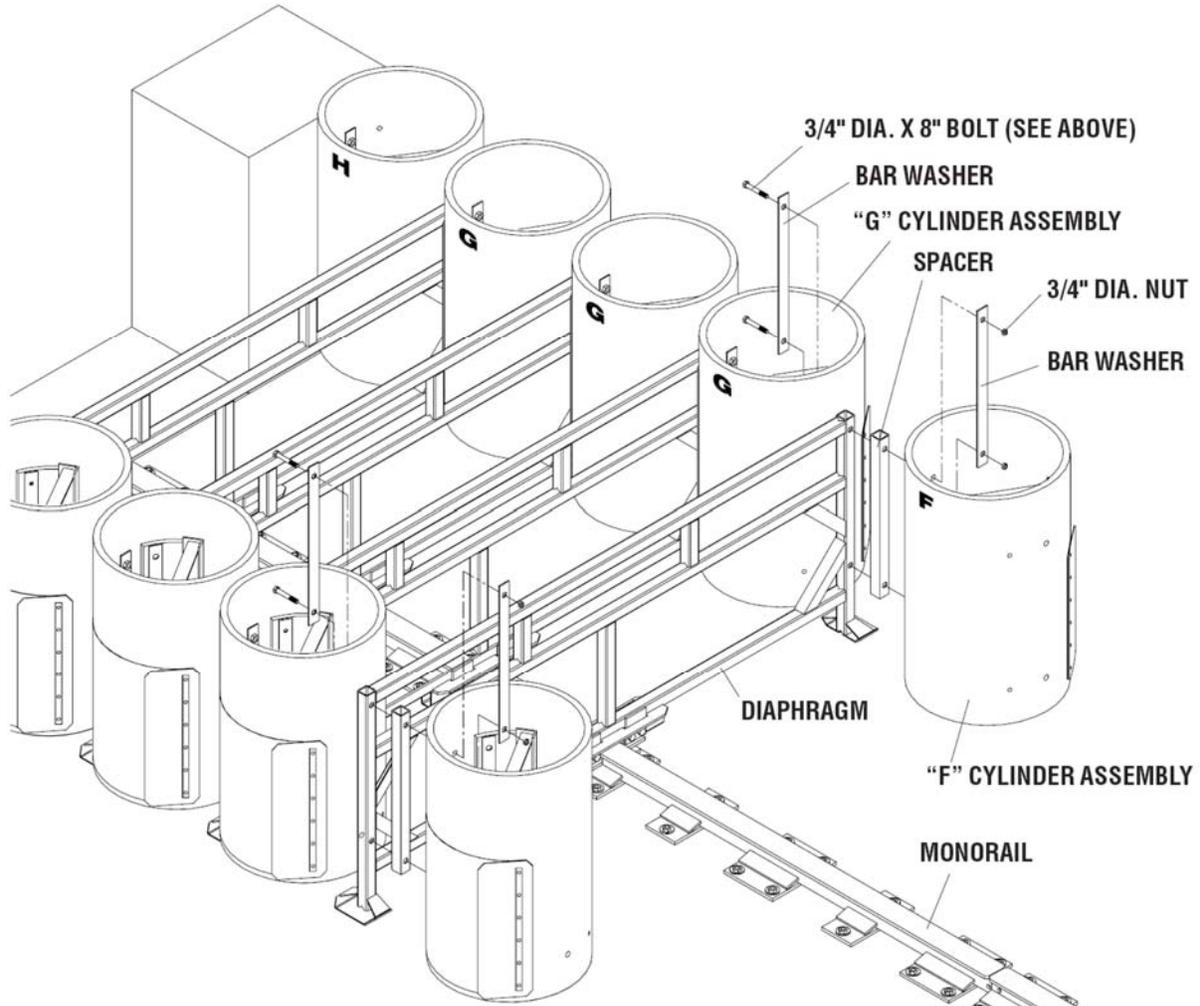
1. Disassemble "G" Cylinder/Frame Assembly.
2. Slide Diaphragm onto Monorail and against "H" Cylinders.
3. Reassemble "G" Cylinder/Diaphragm Assembly onto "H" Cylinder Assemblies as shown in Figure 24.
4. Tighten all fasteners.
5. Repeat the above steps to attach remaining two "G" Cylinder/Diaphragm Assemblies.



**Figure 24**  
**"G" to "H" Cylinder Assembly Attachment**

## 7) Attach "F" Cylinder Assemblies

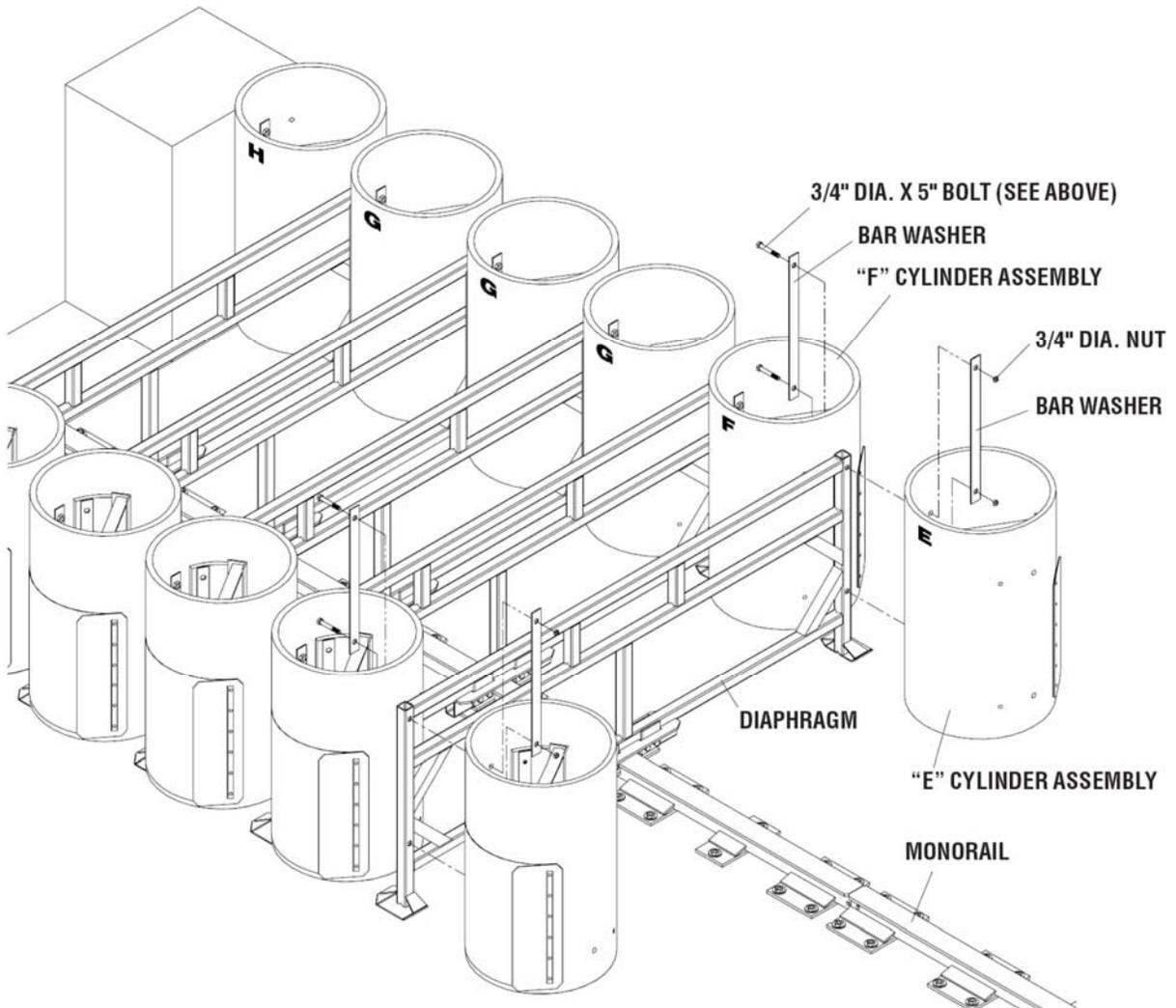
1. Disassemble "F" Cylinder/Frame Assembly.
2. Slide Diaphragm onto Monorail and against "G" Cylinders.
3. Reassemble "F" Cylinder/Diaphragm Assembly onto "G" Cylinder Assemblies as shown in Figure 25.
4. Tighten all fasteners.



**Figure 25**  
**"F" to "G" Cylinder Assembly Attachment**

## 8) Attach "E" Cylinder Assemblies

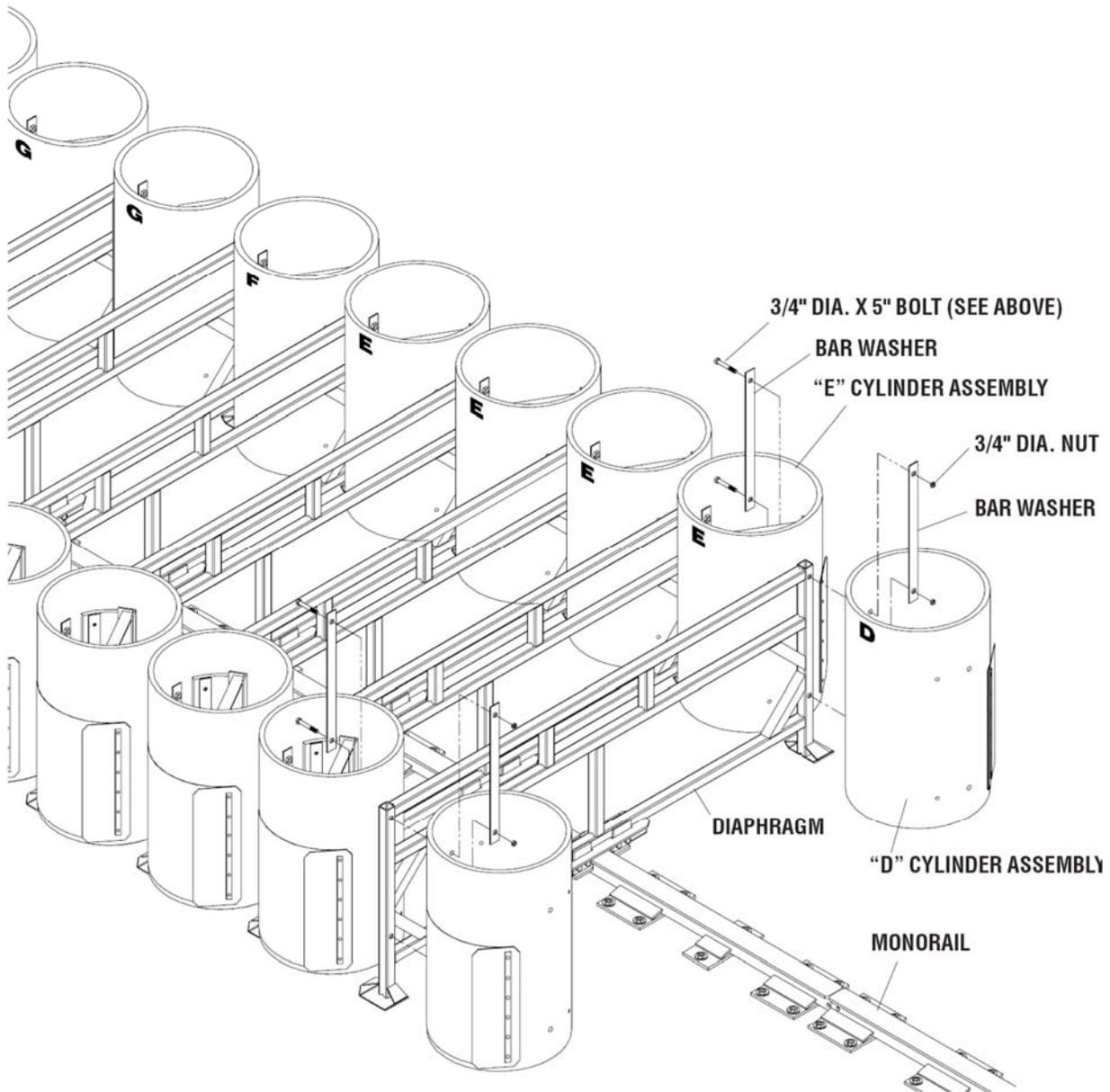
1. Disassemble "E" Cylinder/Frame Assembly.
2. Slide Diaphragm onto Monorail and against "F" Cylinders.
3. Reassemble "E" Cylinder/Diaphragm Assembly onto "F" Cylinder Assemblies as shown in Figure 26.
4. Tighten all fasterers.
5. Repeat the above steps to attach remaining three "E" Cylinder/Diaphragm Assemblies.



**Figure 26**  
**"E" to "F" Cylinder Assembly Attachment**

## 9) Attach "D" Cylinder Assemblies

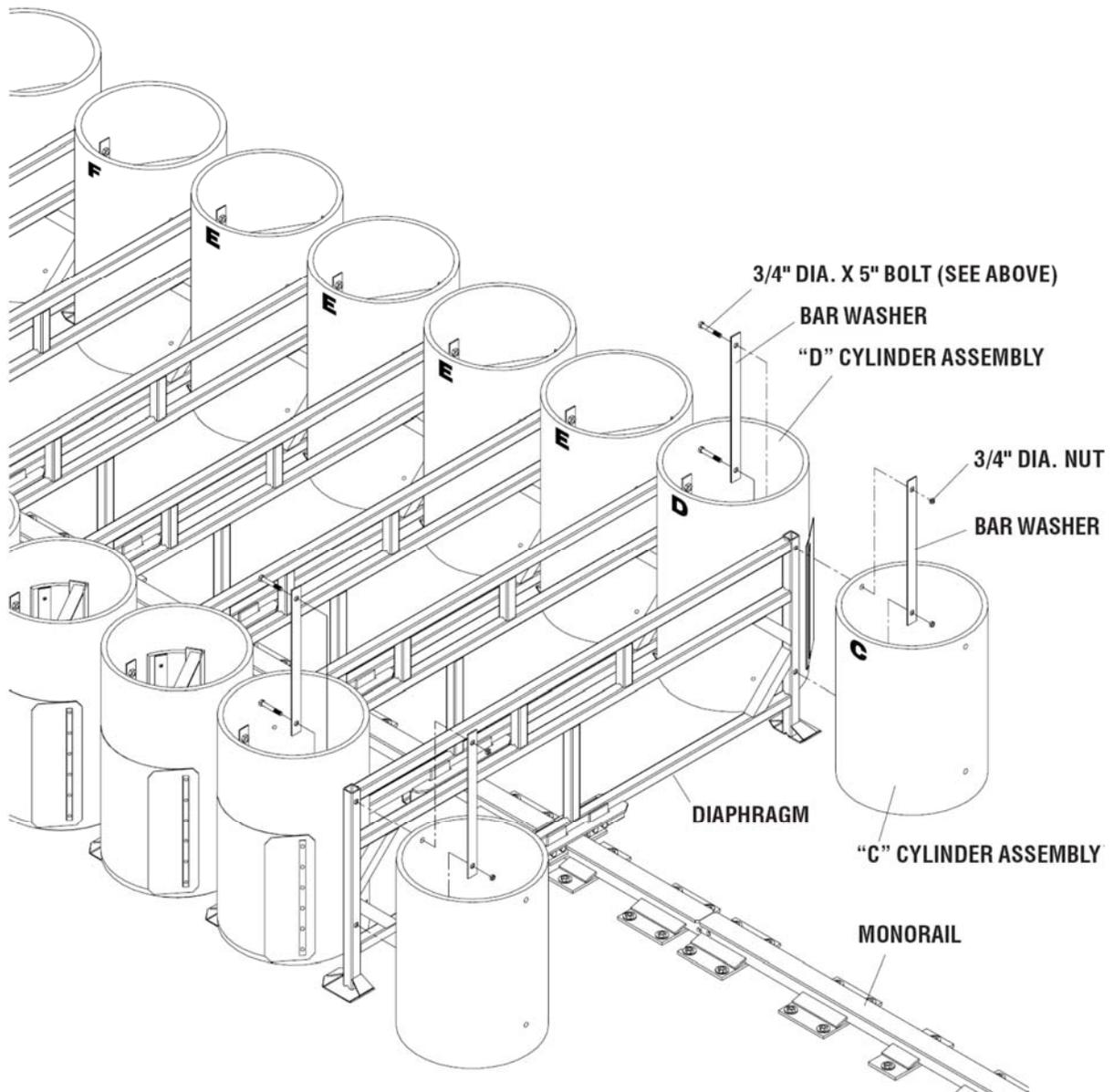
1. Disassemble "D" Cylinder/Frame Assembly.
2. Slide Diaphragm onto Monorail and against "E" Cylinders.
3. Reassemble "D" Cylinder/Diaphragm Assembly onto "E" Cylinder Assemblies as shown in Figure 27.
4. Tighten all fasteners.



**Figure 27**  
**"D" to "E" Cylinder Assembly Attachment**

## 10) Attach "C" Cylinder Assemblies

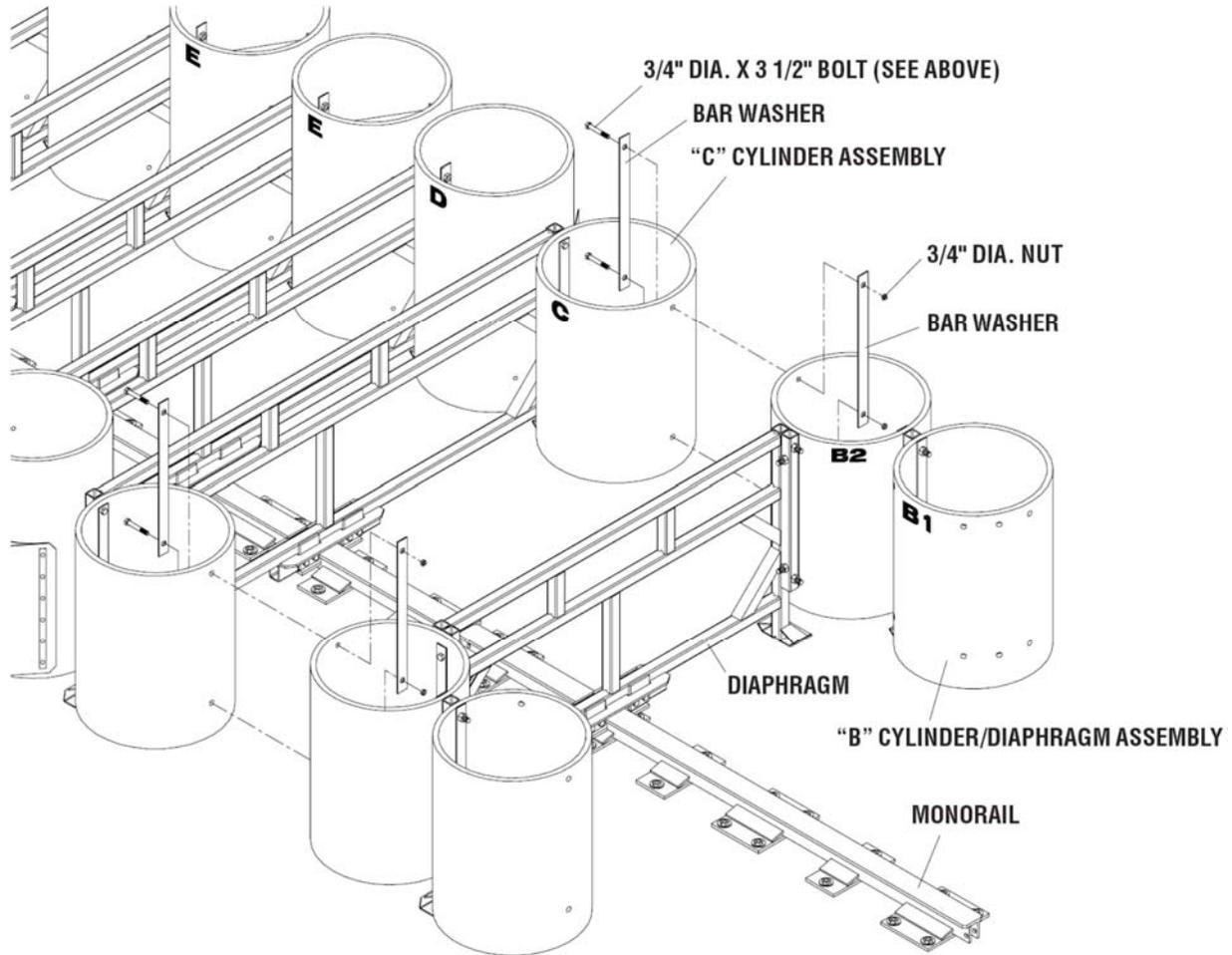
1. Disassemble "C" Cylinder/Frame Assembly.
2. Slide Diaphragm onto Monorail and against "D" Cylinders.
3. Reassemble "C" Cylinder/Diaphragm Assembly onto "D" Cylinder Assemblies as shown in Figure 28.
4. Tighten all fasteners.



**Figure 28**  
**"C" to "D" Cylinder Assembly Attachment**

## 11) Attach "B" Cylinder/Diaphragm Assemblies

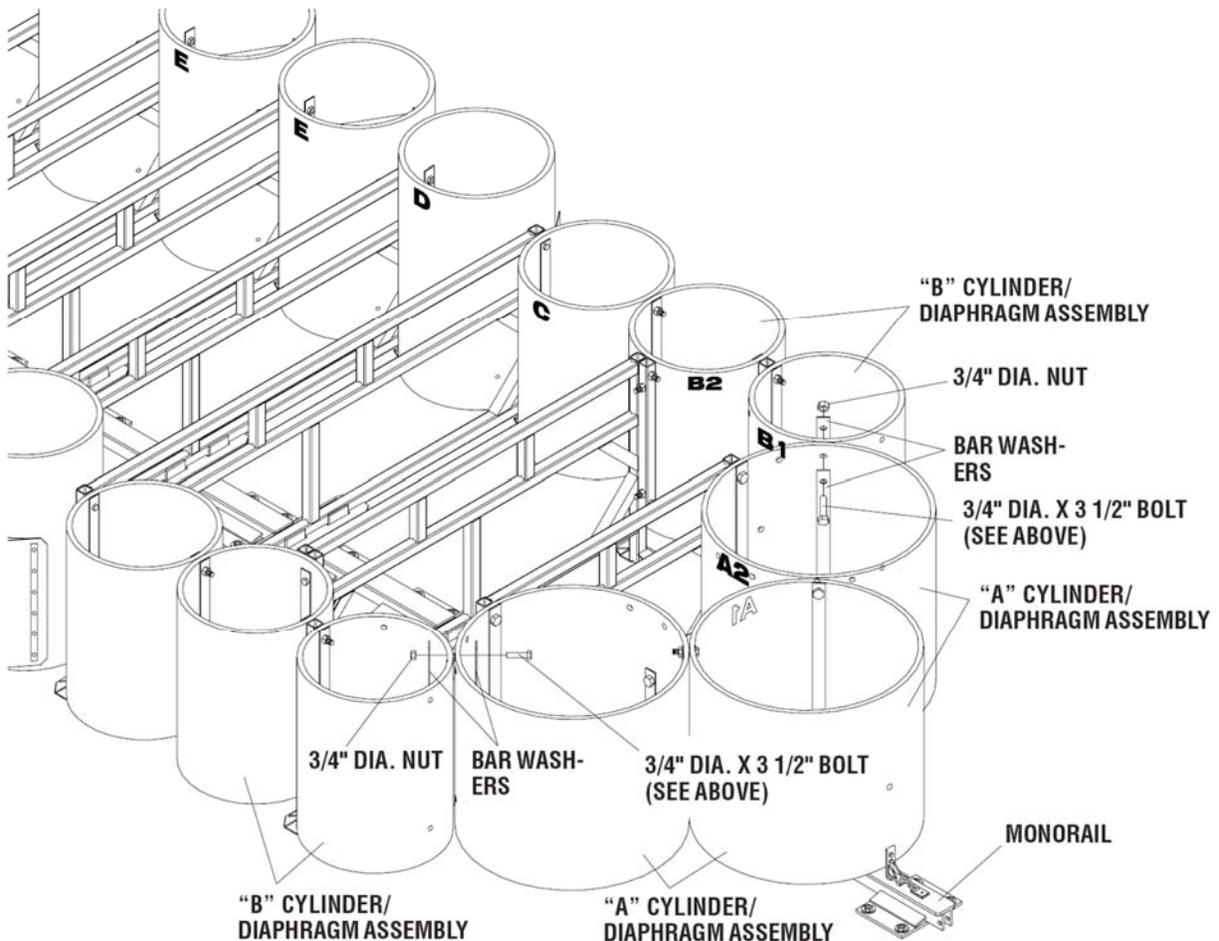
1. Without disassembling "B" Cylinder/Diaphragm Assembly, slide onto Monorail and against "C" Cylinders.
2. Assemble "B" Cylinder/Diaphragm Assembly onto "C" Cylinder Assemblies as shown in Figure 29.
3. Tighten all fasteners.



**Figure 29**  
**"B" to "C" Cylinder Assembly Attachment**

## 12) Attach "A" Cylinder/Diaphragm Assembly

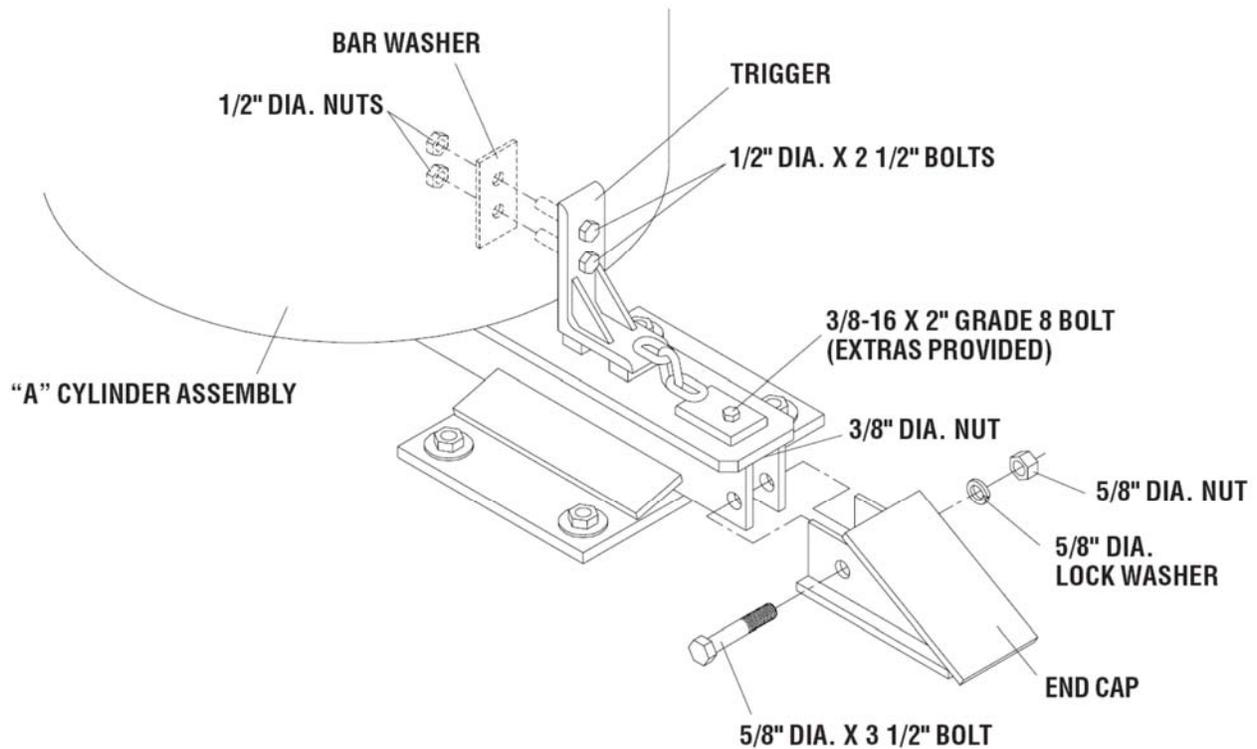
1. Without disassembling "A" Cylinder/Diaphragm Assembly, slide onto Monorail and against "B" Cylinders.
2. Assemble "A" Cylinder/Diaphragm Assembly onto "B" Cylinder Assemblies as shown in Figure 30.
3. Tighten all fasteners.



**Figure 30**  
**"A" to "B" Cylinder Assembly Attachment**

### 13) Attach Monorail End Cap and Trigger

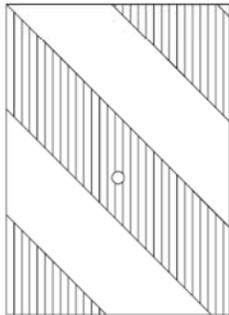
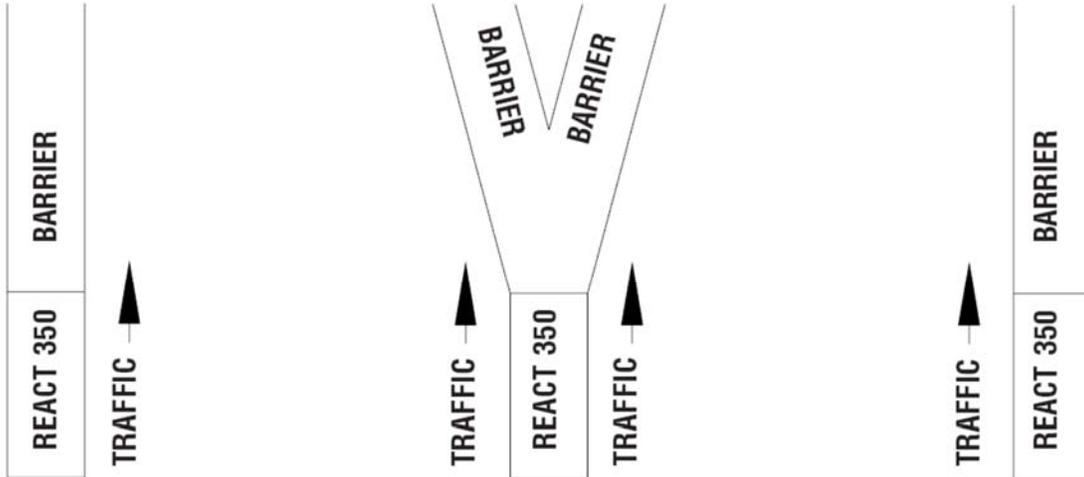
1. Use two 1/2" diameter x 2 1/2" bolts, two 1/2" diameter nuts, and Bar Washer to attach trigger to "A" Cylinder Assembly (Figure 31).
2. Use hole in trigger to locate and drill 7/8" hole in center of Monorail as shown in Figure 31.
3. Use 3/8" diameter x 2" grade 8 bolt and 3/8" diameter nut provided to attach trigger to Monorail (Figure 31).
4. Attach End Cap to Monorail using 5/8" diameter x 3 1/2" bolt, 5/8" diameter nut and 5/8" diameter lock washer.
5. Tighten all fasteners.



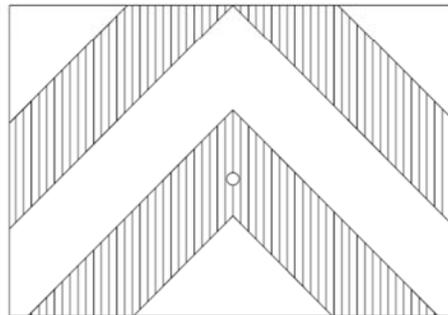
**Figure 31**  
**Monorail End Cap and Trigger Assembly**

#### 14) Attach Nose Cover and Side Mount Reflectors

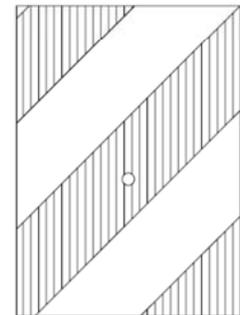
1. Ensure that the Nose Cover suits the site as shown below. Refer to local standards and “Manual on Uniform Traffic Control Devices” (MUTCD).



**Figure 32a**  
For traffic on Right  
Side of System only



**Figure 32b**  
For traffic on Both  
Sides of System



**Figure 32c**  
For traffic on Left  
Side of System only

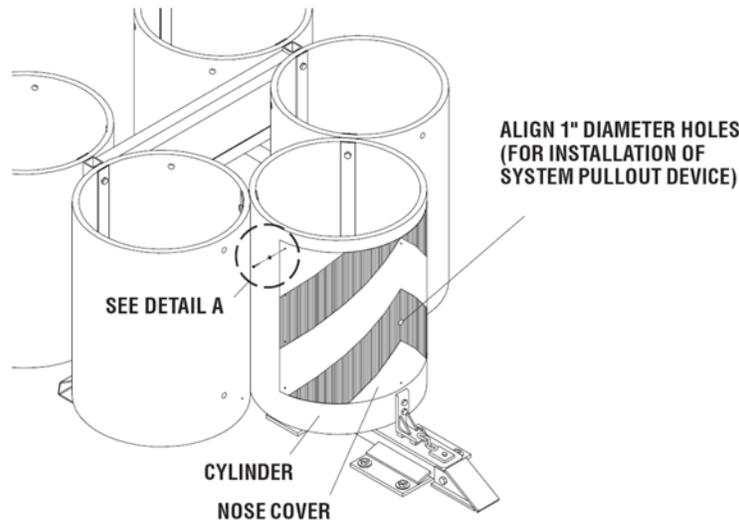
### Nose Cover Selection

2. Align 1" diameter hole in Nose Cover with 1" diameter hole in Cylinder.
3. Screw #8 self-tapping screw into Cylinder punching through reflective tape and through the existing holes in Nose Cover and into the cylinder for all 10 holes in the Nose Cover (Figure 33).

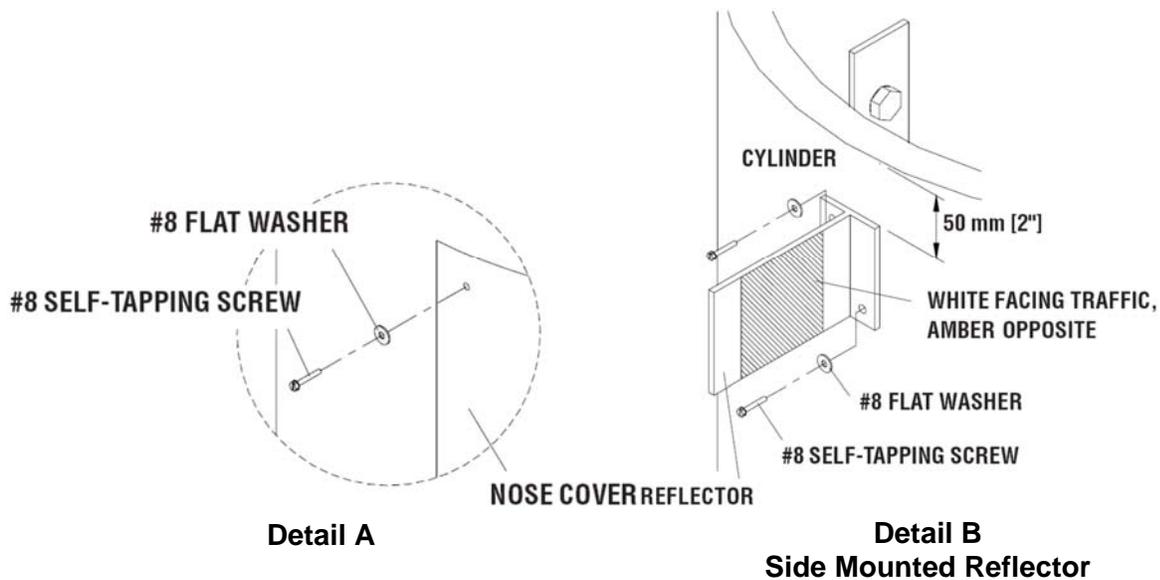
**15) Attach Side Mounted Reflectors**

Refer to local standards and "Manual on Uniform Traffic Control Devices" (MUTCD) for reflectors.

For side mount reflectors, attach to traffic side(s) of the system with the white side facing traffic by screwing #8 self-tapping screws through the reflector and into the Cylinder until head of fastener is flush (2 places per reflector) (Detail B).

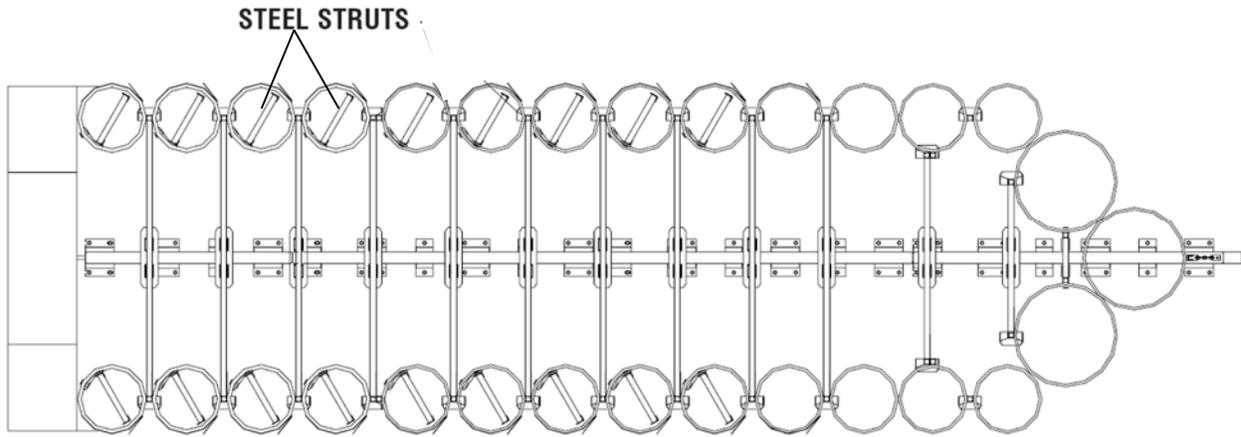


**Figure 33  
Nose Cover Assembly**





**Warning:** Orientation of Cylinder Assemblies is critical. The Steel Struts inside the Cylinders are the primary redirecting component of the REACT 350® Wide (96"/120"). Ensure all Steel Struts inside Cylinders are positioned as shown in Figure 34.



**Figure 34**  
**Assembled REACT 350® Wide (120") – Plan View**

# REACT® 350 Wide Final Inspection Checklist

Date: \_\_\_\_\_

Inspector: \_\_\_\_\_

- Every hole on the Monorail is fastened by an anchor.
- Torque each anchor to adhesive manufacturer specifications.
- Pre-assembled hardware and fasteners have not loosened during shipment.
- Each Diaphragm is properly positioned on Monorail (p. 26 & 43).
- Both End Cap and Trigger Assembly are attached (p. 23 & 40).
- Appropriate transitions are in place and properly fitted.
- Clear all construction debris in and around system.

## Inspection Notice

For applications on asphalt, Trinity Highway recommends that the system be inspected by qualified personnel according to the guidelines set forth in the Maintenance and Repair section with the following additions:

1. Deploy the appropriate **traffic control** devices to protect your crew.



**Warning:** The correct safety equipment and approved traffic management must be used as required for Walk-Up Inspections of the REACT 350® Wide.

2. Increase the frequency of Walk-Up Inspections to once every six months (instead of once every 12 months for concrete applications).
3. Check to see that all anchor bolts have remained firmly anchored in the roadway surface and in the Concrete Backup, if applicable. Replace any anchors that are loose, broken, or pulled out.

If the system is anchored to asphalt, up to 10% of the total anchors may be replaced if damaged. If more than 10% of the anchors are damaged the system should be relocated to fresh, undisturbed asphalt and redeployed using 460 mm [18"] threaded rods.



**Warning:** Use only Trinity Highway parts that are specified herein for the REACT 350® Wide for assembling, maintaining, or repairing the REACT 350® Wide. **Do not utilize or otherwise comingle parts from other systems, even if systems are other Trinity Highway systems.** Such configurations have not been tested, nor have they been accepted for use. Assembly, maintenance, or repairs using unspecified parts or accessories is strictly prohibited. Failure to follow this warning could result in serious injury or death in the event of a vehicle impact with an UNACCEPTED system.

## Maintenance and Repair

### Inspection Frequency

Inspections are recommended as needed based upon volume of traffic and impact history. Visual Drive-By Inspections are recommended at least once a month. Walk-Up Inspections are recommended at least once a year for REACT 350® Wide systems on asphalt.

### Visual Drive-By Inspection



**Warning:** After an impact, always follow the “Post Impact Instructions.”

- 1) Check to see if there is evidence of an impact. Check to verify that the REACT 350® Wide (60”/96”/120”) is fully extended from the Backup. If it is not fully extended, a walk-up inspection will be necessary.
- 2) Note the location and condition of the REACT 350® Wide (60”/96”/120”) and date of visual drive-by inspection.

### Walk-Up Inspection

- 1) Check for any foreign matter or debris that may interfere with the smooth operation of the REACT 350® Wide (60”). Check for and remove any debris found inside the Cylinders. Check for and remove any debris found under and around the REACT 350® Wide (60”/96”/120”).

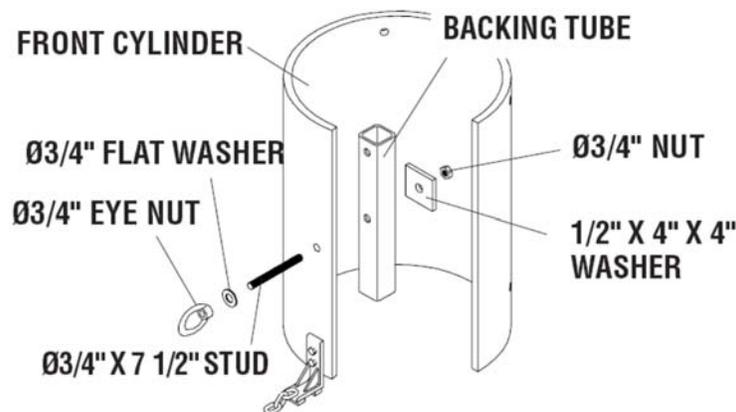


**Warning:** Debris inside the Cylinders may prevent the REACT 350® Wide (60”/96”/120”) from effectively absorbing the impact of a crash. Perform a walk-up inspection as needed to check for and dispose of any debris inside Cylinders.

- 2) Check for evidence of bent or damaged parts. Replace as soon as possible.
- 3) Verify that all nuts and bolts are tight and rust free.
- 4) Ensure the approved adhesive concrete anchor bolts are torqued to adhesive manufacturer’s instructions.
- 5) Verify that all Cylinders are in good condition. Any Cylinder that is cracked or otherwise damaged should be replaced.
- 6) Note the location and condition of the REACT 350® Wide (60”/96”/120”) and any work done in the Impact Attenuator Inspection Logbook under the date of this inspection. If further repair is necessary, note repair request date in logbook. Refer to the standard drawings and assembly section of the Manual for more information.
- 7) Check wear and weathering of all reflective components to make sure it is still in conformance with all regulations and standards of the DOT, or other appropriate highway authority and replace when needed.

## **Post-Impact Instructions**

- 1) Deploy the appropriate traffic-control devices to protect your crew.
- 2) Check to see that all Anchor Bolts have remained firmly anchor in the roadway surface and in the Concrete Backup. Replace any that are loose, broken, or pulled out.
- 3) Clear and dispose of any debris inside the Cylinders and on the site.
- 4) Check the condition of the Cylinders. Any Cylinder that is cracked or otherwise damaged should be replaced.
- 5) Inspect for bent Diaphragms and other damaged parts. Replace all damaged parts before putting REACT 350® Wide (60"/96"/120") back into service.
- 6) Pull system out to original length and reattach trigger (Figure 37).
- 7) Insert a new shear bolt (3/8 – 16 x 2" grade 8 hex cap screw) at the nose of the system (extras provided) (Figure 37).
- 8) Ensure reflective nose cover and side mounted reflectors are intact and replace if necessary.



**Figure 37**  
**System Pullout Setup**

# Site Data Sheet

Submitted by \_\_\_\_\_

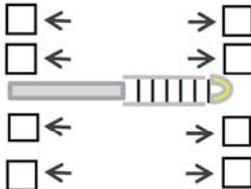
Company \_\_\_\_\_ Date Requested \_\_\_\_\_

Contact Info Phone \_\_\_\_\_ Email \_\_\_\_\_

Site Location / Title \_\_\_\_\_

City / County \_\_\_\_\_ State / Country \_\_\_\_\_

1. Location of road feature:  Median  Roadside  Toll

2. Direction of traffic (circle traffic flow)  \_\_\_\_\_ Offset [inches]

3.  TL-3  TL-2  Other [mph]

4. Attaching to:

Concrete Barrier:  NJ Safety  Single Slope / **Other** \_\_\_\_\_

Guardrail:  Thrie-Beam  W-Beam  31" W-Beam / **Other** \_\_\_\_\_

5. Foundation:  Grade  Deck Structure  Continuous Concrete Pavement

6. Does an expansion joint pass through system location?  No  Yes  
If yes, attach a site sketch or drawing showing joint direction, location, and amount of movement.

7. System option(s):  QG  QGII  QG Elite  QG M10  REACT II  
 REACT  VULCAN  TRACC  N-E-A-T  ENERGITE

8. QG Nose Type:  Steel  Plastic  Belt

9. Provide sketch or drawing of the site. Include dimensions, approach angle and nearby obstacles of road feature. Please also disclose any special site conditions and photos.

10.  PE Stamp Required \_\_\_\_\_ Model / Drawing # (if known)

**Make copies, fill out, and send in completed form for each drawing request.**

# Order Form

(Please copy this form)

Bill To: \_\_\_\_\_  
\_\_\_\_\_

Date: \_\_\_\_\_ Order No. \_\_\_\_\_

Job No. \_\_\_\_\_

Ship To: \_\_\_\_\_  
\_\_\_\_\_

Job Name: \_\_\_\_\_

Project No. \_\_\_\_\_

Section No. \_\_\_\_\_

**IMPORTANT: Use one sheet per System unless the Systems are identical.**

Special instructions \_\_\_\_\_  
\_\_\_\_\_

## Transitions

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Reflective Nose Cover (Specify one)

\_\_\_ Right    \_\_\_ Gore    \_\_\_ Left    \_\_\_ Special



**Notes:**

**Notes:**



# TRINITY

## HIGHWAY

*Ahead of the Curve™*

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