REACT 350®
Narrow (36”)

The REACT 350® Narrow system has been tested pursuant to National Cooperative Highway Research Program (“NCHRP”) Report 350 specifications. The REACT 350® Narrow system has been deemed eligible for federal-aid reimbursement on the National Highway System (“NHS”) by the Federal Highway Administration (“FHWA”) as a TL-2 or TL-3 device.

Product Description Manual

2525 N. Stemmons Freeway
Dallas, Texas 75207

Important: These instructions are to be used only in conjunction with the assembly, maintenance, and repair of the specified REACT 350® Narrow system. These instructions are for standard assemblies specified by the appropriate highway authority only. In the event the specified system assembly, maintenance, or repair would require a deviation from standard assembly parameters, contact the appropriate highway authority engineer. Trinity Highway representatives are available for consultation if required.

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.

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® Narrow 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® Narrow system, 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)                           |
|                 | (214) 589-8140 (International)                |
| E-mail:         | product.info@trin.net                         |
| Website:        | www.trinityhighway.com                       |

Important Introductory Notes

Proper assembly of the REACT 350® Narrow system is critical to achieve performance that has been evaluated and deemed eligible by the FHWA per NCHRP Report 350. These instructions should be read in their entirety and understood before assembling the REACT 350® Narrow system. These instructions are to be used only in conjunction with the assembly of REACT 350® Narrow system and are for standard assemblies only as specified by the applicable highway authority. If you need additional information, or have questions about the REACT 350® Narrow system, 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 instructions specified in this manual, the device may not perform as tested.

Important: DO NOT use any component part that has not been specifically approved for this system during the assembly or repair 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 assemble, maintain, or repair this system that does not possess the unique knowledge described above. These instructions are intended for an individual 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.

**Important:** Read safety instructions thoroughly and follow the assembly directions and suggested safe practices before assembling, maintaining, or repairing the REACT 350® Narrow system. Failure to follow this warning can result in serious injury or death to workers and/or bystanders. It further compromises the eligibility of this system by the FHWA. Please keep up-to-date instructions for later use and reference by anyone involved in the assembly of the product.

**Warning:** Ensure that all of the REACT 350® Narrow system Danger, Warning, Caution, and Important statements within the REACT 350® Narrow Manual are completely followed. Failure to follow this warning could result in serious injury or death in the event of a collision.

### Safety Rules for Assembly

* **Important Safety Instructions** *

This manual must be kept in a location where it is readily available to persons who are skilled and experienced in the assembly, maintenance, or repair of the REACT 350® Narrow system. Additional copies of this manual are immediately available from Trinity Highway by calling (888) 323-6374 or by email at product.info@trin.net. Please contact Trinity Highway if you have any questions concerning the information in this manual or about the REACT 350® Narrow system.

Always use appropriate safety precautions when operating power equipment, mixing chemicals, and when moving heavy equipment or the REACT 350® Narrow components. Gloves, safety goggles, safety toe shoes, and back protection should be used.

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

This section describes the safety symbols that appear in this REACT 350® Narrow Manual. Read the manual for complete safety, assembly, operating, maintenance, repair, and service information.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Safety Alert Symbol" /></td>
<td><strong>Safety Alert Symbol:</strong> Indicates Danger, Warning, Caution, or Important. Failure to read and follow the Danger, Warning, Caution, or Important indicators could result in serious injury or death to the workers and/or bystanders.</td>
</tr>
<tr>
<td><img src="image" alt="Warning" /></td>
<td><strong>Warning:</strong> Failure to comply with these warnings could result in increased risk of serious injury or death as a result of a vehicle impact with a system that has not been deemed eligible by the FHWA.</td>
</tr>
<tr>
<td><img src="image" alt="Warning" /></td>
<td><strong>Warning:</strong> Do not assemble, maintain, or repair the REACT 350® Narrow system until you have read this manual thoroughly and completely understand it. Ensure that all Danger, Warning, Caution, and Important statements within the manual are completely followed. Please call Trinity Highway at (888) 323-6374 if you do not understand these instructions.</td>
</tr>
<tr>
<td><img src="image" alt="Warning" /></td>
<td><strong>Warning:</strong> Use only Trinity Highway parts that are specified herein for the REACT 350® II for assembling, maintaining, or repairing the REACT 350® II system. <strong>Do not utilize or otherwise comingle parts from other systems even if those systems are other Trinity Highway systems.</strong> 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.</td>
</tr>
<tr>
<td><img src="image" alt="Warning" /></td>
<td><strong>Warning:</strong> Do NOT modify the REACT 350® Narrow system in any way.</td>
</tr>
<tr>
<td><img src="image" alt="Warning" /></td>
<td><strong>Warning:</strong> Ensure that the REACT 350® Narrow system and delineation used meet all federal, state, specifying agency, and local specifications.</td>
</tr>
<tr>
<td><img src="image" alt="Warning" /></td>
<td><strong>Warning:</strong> Ensure that your assembly meets all appropriate Manual on Uniform Traffic Control Devices (“MUTCD”) and local standards.</td>
</tr>
</tbody>
</table>
Limitations and Warnings

Trinity Highway contracts with FHWA approved testing facilities to perform crash tests, evaluate, and submit results to the FHWA for review.

The REACT 350® Narrow system has been deemed eligible for reimbursement by FHWA as meeting the requirements and guidelines of NCHRP Report 350. NCHRP Report 350 tests are designed to evaluate product performance involving a typical range of vehicles on our roadways, from lightweight cars (approx. 820 kg [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® Narrow is certified to the Test Level(s) as shown below:

Test Level 2: 70 km/h [43 mph] (4 Bay system)
Test Level 3: 100 km/h [62 mph] (9 Bay system)

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® Narrow system 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® Narrow is a potentially reusable, re-directive, non-gating crash cushion for roadside obstacles ranging in width from 203 mm to 914 mm (8" to 36"). It consists of high molecular weight, high density polyethylene (HMW/HDPE), energy-absorbing Cylinders. Again, the decision as to whether this product is reusable after impact rests solely within the sound discretion of the trained engineer, experienced in highway products, who is working at the direction of the local DOT, or appropriate highway authority which specified and now owns the product.

The REACT 350® Narrow system utilizes three types of cylinders in a “staged” configuration designed 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 this REACT 350® Narrow Product Description Manual to determine the appropriate length system for a given speed.

Impact Performance

The 4 Cylinder REACT 350® Narrow (TL-2) system has successfully passed the requirements outlined in NCHRP Report 350, with both the light car and pickup at speeds of up to 70 km/h [43 mph] at angles up to 20 degrees.

The 9 Cylinder REACT 350® Narrow (TL-3) system has successfully passed the requirements outlined in NCHRP Report 350, with both the light car and pickup at speeds of up to 100 km/h [62 mph] at angles up to 20 degrees.

During head-on impacts, within the above-referenced NCHRP Report 350 criteria, the REACT 350® Narrow Cylinders is designed to compress rearward to absorb the energy of impact. When impacted from the side, within the applicable NCHRP Report 350 criteria, it is designed to redirect the vehicle back toward its original travel path and away from the roadside feature.

System Overview

Two Backup options are available to further meet specific requirements of each location. A Self-Contained Backup is available, or the system can be mounted to a new or existing Concrete Backup. In some locations, either Backup type may be appropriate (see p. 8).

Important: 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 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.

Warning: Ensure the proposed assembly site conforms with the guidance provided by the AASHTO Roadside Design Guide, including, but not limited to, guidance regarding placement on or adjacent to curbs.

Warning: Ensure that there is proper site grading for the REACT 350® Narrow system placement as dictated by the state or specifying agency, pursuant to FHWA guidelines.
Warning: Safety measures incorporating appropriate traffic control devices specified by the highway authority must be used to protect all personnel while at the assembly, maintenance, or repair site.

Warning: Use only Trinity Highway parts that are specified herein for the REACT 350® Narrow for assembling, maintaining, or repairing the REACT 350® Narrow system. Do not utilize or otherwise comingle parts from other systems even if those systems are other Trinity Highway systems. Such configurations have not been tested, nor have they been deemed eligible for use. Assembly, maintenance, or repairs using unspecified parts or accessories is strictly prohibited.
**REACT 350® Narrow Criteria**

The REACT 350® Narrow is available with a Self-contained Backup or may be attached to a Concrete Backup (see Figures 2 and 3 along with the Backup Assembly drawings to determine which type of Backup is appropriate).

**Self-Contained Backup**

REACT 350® Narrow with a Self-Contained “Steel Tube” Backup requires two Cables, one Cable on each side of the Cylinders. These Cables begin at the front of the system, travel through the Cable Guides on the Cylinders, loop around the Backup structure, travel back through the Cable Guides, and terminate at the front of the system.

![1 Cable, 2 Runs](image)

**Concrete Backup**

The REACT 350® Narrow system with Concrete Backup requires four Cables. Two Cables on each side of the Cylinders begin at the Side Anchor Plates, travel through the Cable Guides on the Cylinders, loop around the pin on the Front Anchor Plates, travel back through the Cable Guides, and terminate at the Side Anchor Plates. Existing concrete structures may serve as backups for the REACT 350® Narrow provided they meet specific size and strength requirements.

![Concrete Backup](image)
Number of Bays

A Bay consists of one Cylinder. The terms Bay and Cylinder may be used interchangeably. The Cylinder at the front of the system (on-coming traffic end) is always Bay 1, and each subsequent Bay is sequentially numbered to the rear of the system (roadside feature end). The standard REACT 350® Narrow is available in 4, 6, and 9 Bay configurations so the length of the system can be tailored for the design speed of the roadway.

Figure 4
Number of Bays

Key
A. Cylinder/Bay
B. Backup (Self-Contained or Concrete)
C. Steel Base Track
D. Cables (Quantity varies with Backup)
E. Cable Guide
**REACT 350® Foundation/Anchoring**

**Warning:** Ensure that this assembly conforms with the guidance provided by the AASHTO Roadside Design Guide, including, but not limited to, those regarding placement on or adjacent to curbs.

**Asphalt Installations**

REACT 350® Narrow systems with a Self-Contained Backup may be installed in construction zones on asphalt. Assemblies on Asphalt Concrete ("A.C.") must provide a minimum of 76 mm [3"] layer of asphalt over a minimum of 76 mm [3"] layer of Portland Cement Concrete ("P.C.C."), 152 mm [6"] layer of asphalt over 152 mm [6"] layer of subbase, or 203 mm [8"] layer of asphalt with no subbase.

**Important:** Only 460 mm [18"] threaded rods, utilizing Trinity Highway approved adhesive, can be used with asphalt foundations. Contact Customer Service for a complete list of approved adhesives (see p. 3).

**Concrete Installations**

For concrete installations, the REACT 350® Narrow system should be installed only on an existing or freshly placed and cured concrete base (28 MPa [4000 psi] minimum). Orientation of the concrete base and the attenuator must comply with the project plans or as otherwise determined by the resident project engineer or appropriate highway authority.

Recommended dimension and reinforcement specifications for new concrete pads can be found on the standard drawings.

The REACT 350® Narrow system may be installed on any of the following foundations using the specified anchorage:

**Foundation A: Concrete Pad or Roadway**

Foundation: 150 mm [6"] minimum depth Portland Cement Concrete (P.C.C.)
Anchorage: Approved adhesive with 180 mm [7"] studs 140 mm [5.5"] embedment

**Foundation B: Asphalt over P.C.C.**

Foundation: 76 mm [3"] minimum asphalt concrete (A.C.) over 76 mm [3"] minimum P.C.C.
Anchorage: Length of anchor required is 180 mm [18"] 420 mm [16.5"] embedment

**Foundation C: Asphalt over Subbase**

Foundation: 150 mm [6"] minimum A.C. over 150 mm [6"] minimum Compacted Subbase (C.S.)
Anchorage: Approved adhesive with 460 mm [18"] studs 420 mm [16.5"] embedment

**Foundation D: Asphalt**

Foundation: 200 mm [8"] minimum A.C.
Anchorage: Approved adhesive with 460 mm [18"] studs - 420 mm [16.5"] embedment

**Foundation Specifications**

for Foundations A, B, C and D mentioned above:
A. C. (Asphalt Concrete)
AR-4000 A. C. (per ASTM D3381 13) .75" Maximum, Medium (Type A or B) aggregate

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Operating Range (%) Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>100</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>95-100</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>65-80</td>
</tr>
<tr>
<td>No. 4</td>
<td>49-54</td>
</tr>
<tr>
<td>No. 8</td>
<td>6-40</td>
</tr>
<tr>
<td>No. 30</td>
<td>8-21</td>
</tr>
<tr>
<td>No. 200</td>
<td>3-8</td>
</tr>
</tbody>
</table>

Caution: Walk-up inspections should be conducted at least once every six months for installations on asphalt.

P.C.C. (Portland Cement Concrete)
Stone aggregate concrete mix
4000 psi minimum compressive strength
(Sampling per ASTM C31- 1/2 or ASTM C42- 1/3, testing per ASTM C39- 1/5)

C.S. (Compacted Subbase)
150 mm [6"] minimum depth 95% compaction
Class 2 aggregate

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Moving Average % Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot;</td>
<td>100</td>
</tr>
<tr>
<td>2 1/2&quot;</td>
<td>90-100</td>
</tr>
<tr>
<td>No. 4</td>
<td>40-90</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-25</td>
</tr>
</tbody>
</table>
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, washers and instructions. Both vertical and horizontal assemblies are possible using an approved adhesive anchoring system.

**Important:** Follow adhesive manufacturer's temperature storage requirements.

**Anchor Assemblies**

**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 material 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 protective eyewear during application.

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

2) Drill Boreholes

**Important:** Use only double-fluted drill bits with Trinity Highway approved adhesive to achieve optimum tensile strength. Do not use diamond drill bits for anchors as the surface will be too smooth for adhesive.

Use the part that is to be anchored as a drilling template. Use a rotary hammer drill to drill the boreholes 3 mm [1/8"] larger than the stud diameter to the recommended depth. See the approved adhesive instructions provided with your kit. Check to be sure all the boreholes are drilled to the proper depth and aligned with the part to be anchored (see Table A).

**Table A**

<table>
<thead>
<tr>
<th>Stud Size</th>
<th>Concrete Bit Size</th>
<th>Minimum Depth</th>
<th>Recommended Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;x 6 1/2&quot;</td>
<td>22 mm [7/8&quot;]</td>
<td>125 mm [5&quot;]</td>
<td>Consult Adhesive Kit Spec</td>
</tr>
<tr>
<td>3/4&quot;x 7&quot;</td>
<td>22 mm [7/8&quot;]</td>
<td>140 mm [5 3/4&quot;]</td>
<td>Consult Adhesive Kit Spec</td>
</tr>
<tr>
<td>3/4&quot;x 18&quot;</td>
<td>22 mm [7/8&quot;]</td>
<td>420 mm [16 1/2&quot;]</td>
<td>15 N-m [10 ft-lb] ▲</td>
</tr>
</tbody>
</table>

**Important:** When mounting on asphalt, initial torque shall be as shown in Table A. Due to the instability 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 months to the proper initial torque specified.
3) **Clean the Boreholes**

   Blow the concrete dust from the borehole using (90 psi) oil-free compressed air. Thoroughly brush the borehole with a 7/8” diameter steel bristle tube brush and then blow it out again to ensure it is completely dry and debris free.

4) **Apply Approved Adhesive**

   Fill the borehole with enough adhesive so when the anchor is inserted a small portion of anchoring adhesive is squeezed out.

   **Caution:** Fill the borehole from bottom up to prevent air pockets. Do not overfill or under-fill the borehole. If the borehole is overfilled, there will not be enough adhesive to anchor all of the studs provided in the kit. If borehole is underfilled, the adhesive may not develop the required pull out strength.

5) **Add Nuts to Anchor Studs**

   Thread the nut on until flush with the end of the stud (see Figure 7).

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

   Push the stud, nut, and washer assembly down through the part and into the borehole until the washer is seated against the part (see Figure 7).

   **Warning:** Do not disturb or load the stud until the approved adhesive material has fully cured (see instructions supplied with the approved adhesive kit).

7) **Torque the Nuts**

   Once the adhesive has fully cured, torque the nut to the manufacturer’s recommended values (see Table A). [Figure 7 Anchor Application (Before Applied Torque)]

**Assembly Cautions**

1) **Steel rebar**

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

   A) Using a diamond core drill bit or rebar drilling tool, drill through the rebar only, then switch back to the concrete bit and drill 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.
Special Site Conditions

Contact Trinity Highway Customer Service Department if you would like assistance with your application as proper model selection is essential to the performance of the REACT 350® Narrow system. You will need to answer the following questions:

1. Are curbs, islands, or elevated objects (delineators or signs) present at the site? What height and width are they? All curbs and elevated objects should be removed. Curbs should be removed from behind the Backup to approximately 15 m [50'] in front of the REACT 350® Narrow system. Any curbs that must remain should be 102 mm [4"] maximum and be mountable. Signs should not interfere with the system’s ability to collapse. Generally, a vehicle should not interact with the two appurtenances at the same time. Allow for adequate spacing.

2. If the deployment site is a gore area (place where two roads diverge), what is the angle of divergence?

3. What is the general geometry of the site? Include the roadway for 150 m [500'] in front of the roadside obstacle, so traffic patterns can be visualized.

4. Is there an existing guardrail or median barrier at the site?

5. What is the width of the feature to be protected?

6. Will there be traffic approaching from the rear of the system? Is the system in a two-way traffic situation with traffic going in opposite directions on either side of the system? Or, is the system on the side of the road where cross over traffic is a concern? If so, a transition from the roadside obstacle to the rear of the system may be necessary to prevent a vehicle from interacting with the rear of the system. See Bidirectional Traffic on page 16.

7. Are there any other unique features at the site that may affect the positioning or performance of the REACT 350® Narrow system?

Other Factors That May Affect Your Assembly:

1. The existence of drain inlets or buried culvert pipe.

2. Junction boxes or other appurtenances located near the roadside feature.

3. Insufficient space for the length of system preferred.

4. The location and movement of expansion joints.

5. Breaking cross-slopes under or near the proposed assembly or severe cross-slope under the system. Provide leveling to 8% maximum slope (see Figure 8). Often a system can be moved further forward to a more level site. Transitioning may be extended back to the existing roadside condition to accommodate the site.

Figure 8
Cross Slope
**Impact conditions which differ from those described in the NCHRP Report 350 test matrix for non-gating re-directive crash cushions may result in different crash results than those encountered in testing. Furthermore, impacts in excess of TL-3 impact severity or the existence of unusual impact conditions such as vehicle instability resulting from traversing curbs or excessive cross-slopes prior to impact may compromise crash performance and have not been crash tested. Article performance relative to structural adequacy, occupant risk, and vehicle trajectory may not meet NCHRP Report 350 evaluation criteria.**

**Model Number Description**

<table>
<thead>
<tr>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Contained Steel Backup</td>
<td>Concrete Backup with side mount anchors</td>
</tr>
<tr>
<td>Typical feature width 203 mm [8”] (Safety Shape Barrier)</td>
<td>Max. feature width 914 mm [36”]</td>
</tr>
</tbody>
</table>

Impact conditions which differ from those described in the NCHRP Report 350 test matrix for non-gating re-directive crash cushions may result in different crash results than those encountered in testing. Furthermore, impacts in excess of TL-3 impact severity or the existence of unusual impact conditions such as vehicle instability resulting from traversing curbs or excessive cross-slopes prior to impact may compromise crash performance and have not been crash tested. Article performance relative to structural adequacy, occupant risk, and vehicle trajectory may not meet NCHRP Report 350 evaluation criteria.
**Self-Contained Backup**

**Overview**

The REACT 350° Narrow system, with a Self-Contained Backup, is designed to minimize installation time. This type of system arrives at the site fully assembled. The assembly crew needs only to lift and place the system in front of the barrier, then drill and set the anchors. (Refer to the Assembly Manual for a complete list of instructions.)

![Self-Contained Backup](image)

**Feature Width**

The REACT 350° Narrow, with a Self-Contained Backup, can shield obstacles in gore, non-gore, and bidirectional applications (see Bidirectional Traffic and Offsetting the System on p. 16 and 17).

When shielding median barriers, a Self-contained Backup system may be used if the base or “toe” of the barrier is tapered (see Figure 10). Contact Trinity Highway for more information (see p. 3).

![Figure 9 Self-Contained Backup](image)

![Figure 10 Taper](image)
Guardrail Attachment

Hardware is available to mount W-Beam Guardrail or a safety shaped barrier to the Self-Contained Backup of the REACT 350® Narrow system. A Folded Transition Plate and W-Beam Connector can mount to either or both sides of the Backup assembly (see Figure 11). If bidirectional traffic is present, then special post spacing, rail, and a rubrail will be required for Guardrail.

![Guardrail Attachment Hardware](image1)

**Figure 11**
Guardrail Attachment Hardware

Bidirectional Traffic

If bidirectional traffic (vehicles traveling opposite directions on either side of the system) is present, special considerations need to be taken when placing the system. It is important that the Self-Contained Backup does not become an obstacle to the reverse direction traffic. If a system is placed in a location where traffic will be approaching from the rear of the system, transition hardware may be required. Optionally, if space permits, the REACT 350® Narrow may be offset such that the Backup structure is shielded by the roadside feature (see Offsetting the System p. 19). Guardrail transition hardware may also be used.

![Bidirectional Traffic](image2)

**Figure 12**
Bidirectional Traffic
Offsetting the System

The REACT 350® Narrow system, with a Self-Contained Backup, may be offset from the center of the roadside obstacle if space permits. Offsetting may be necessary for two reasons.

1) To shield a feature wider than 200 mm [8”]
2) If bidirectional traffic is present

When offsetting the system, align the vertical face of the Backup structure with the face of the barrier (see Figure 13). With this method, REACT 350® Narrow with Self-Contained Backup can shield obstacles wider than 200 mm [8”]. If a wider roadside feature is present or if bidirectional traffic is present a Concrete Backup may be required. Contact Trinity Highway Customer Service Department for offsetting input questions (see p. 3).

Concrete Backup

Overview

The REACT 350® Narrow is also designed to mount directly to a new or existing Concrete Backup. This type of system requires slightly more deployment time, as the cables must be assembled on site. Refer to the Assembly Manual for a complete list of instructions. Existing Concrete Backups must be a minimum of 1 m [40"] high, 610 mm [24"] long, and 762 mm [30"] to 914 mm [36"] wide, with 28 day curing strength of 28 MPa (4000 psi) and fully reinforced. If your existing structure does not meet these minimums, special hardware and designs may be available for them. You may Contact Trinity Highway Customer Service Department with your site information if you would like input (see p. 3).
Roadside Feature Width
The REACT 350® Narrow with a Concrete Backup is intended to protect features up to 914 mm [36"] wide. The Backup must be 762 mm [30"] to 914 mm [36"] wide to use standard Side Anchor hardware.

Bidirectional Traffic
If bidirectional traffic (vehicles traveling opposite directions on either side of the system) is present, special consideration needs to be taken when placing the system. It is important that the Concrete Backup itself does not become an obstacle to the reverse direction traffic. If a system is placed in a location where traffic will be approaching from the rear of the system, the Backup should not protrude beyond the obstacle being shielded. Concrete tapering may be required. Also, an additional standard Side Anchor plate should be rotated 180 degrees and placed behind the First Anchor Plate (see Figure 15). In this case, the Backup must be 762 mm [30"] long.

![Figure 15](image1.png)

Asphalt/Concrete

Joints
The REACT 350® Narrow system with Concrete Backup and split Basetrack may span longitudinal expansion or construction joints. Any system interactive joint movement must be limited to 38 mm [1-1/2”].

![Figure 16](image2.png)

Longitudinal or Transverse Joints

Important: The REACT 350® Narrow system is not designed to span a transverse joint.
REACT 350®, TL-2 w/Concrete Backup, Uni-Directional
REACT 350®, TL-2 w/Concrete Backup and Transition, Multi-Directional
REACT 350®, 90 km/h [56 mph] w/Self-Contained Backup and Transition, Multi-Directional
REACT 350®, 90 km/h [56 mph] w/Concrete Backup and Transition, Multi-Direction
REACT 350®, 90 km/h [56 mph] w/Self Contained Backup and Transition, Uni-Directional
REACT 350®, TL-3 w/Self-Contained Backup Transition, Multi-Directional
REACT 350®, TL-3 w/Concrete Backup and Transition, Multi-Directional
REACT 350®, TL-3 113 km/h [70 mph] w/Concrete Backup, Multi-Directional
REACT 350®, TL-3 113 km/h [70 mph] w/Self-Contained Backup and Transition, Multi-Directional
REACT 350®, TL-3 113 km/h [70 mph] w/Concrete Backup and Transition, Multi-Directional
REACT 350®, TL-3 113 km/h [70 mph] w/Self Contained Backup, Bi-Directional, Offset
REACT 350®, TL-3 113 km/h [70 mph] w/Self Contained Backup and Transition, Uni-Directional
Notes: