SoftStop™
End Terminal

Product Description
Assembly Manual

Important: This Manual is to be used only in conjunction with the assembly, maintenance, and repair of the SoftStop™ End Terminal. These instructions are for standard assemblies specified by the appropriate highway authority only. In the event the specified system assembly, maintenance, or repair requires or involves deviations from standard parameters, contact the appropriate highway authority engineer. Ingal Civil Products 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 Ingal Civil Products on 09 295 1444 or download from websites listed below.

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 SoftStop™ End Terminal system information available to Ingal Civil Products at the time of printing. We reserve the right to make changes at any time. Please contact Ingal Civil Products to confirm that you are referring to the most current instructions.
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Customer Service Contacts

Ingal Civil Products is committed to the highest level of customer service. Feedback regarding the SoftStop™ End Terminal, its assembly procedures, supporting documentation, and performance is always welcome. Additional information can be obtained from the contact information below:

Ingal Civil Products Corporate Contacts:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Telephone:</td>
<td>09 295 1444 (NZ Calls)</td>
</tr>
<tr>
<td></td>
<td>+64 9295 1444 (International Calls)</td>
</tr>
<tr>
<td>E-mail:</td>
<td><a href="mailto:sales@ingalcivil.co.nz">sales@ingalcivil.co.nz</a></td>
</tr>
<tr>
<td>Internet: Ingal Civil Products</td>
<td><a href="http://www.ingalcivil.co.nz">http://www.ingalcivil.co.nz</a></td>
</tr>
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</table>

Regional Telephone Contacts:

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</thead>
<tbody>
<tr>
<td>Christchurch</td>
<td>0211 983 311</td>
</tr>
<tr>
<td>Sydney, Australia</td>
<td>+61 2 9827 3333</td>
</tr>
</tbody>
</table>
**Important Introductory Notes**

Proper assembly of the SoftStop™ End Terminal is critical to achieve performance that has been evaluated and accepted by the NZ Transport Agency (NZTA) per Manual for Assessing Safety Hardware (MASH). These instructions should be read in their entirety and understood before assembling the SoftStop™ End Terminal. These instructions are to be used only in conjunction with the assembly of the SoftStop™ End Terminal and are for standard assemblies only as specified by the applicable highway authority. If you need additional information, or have questions about the SoftStop™ End Terminal, please contact the highway authority that has planned and specified this assembly and, if needed, contact Ingal Civil Products Customer Service Department. This product must be assembled in the location specified by the appropriate highway authority just as it was tested. 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 has been crash tested pursuant to MASH mandated criteria. Based on a specific assembly of component parts, the performance of this system, under those criteria, has been observed and reported as such. **DO NOT** use any component part that has not been specifically crash tested and/or approved for this system during the assembly or repair of this system.

Further, 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 above. These instructions are intended for an individual who is qualified to both read and accurately interpret them as written. They are intended for the individual who is experienced and skilled in the assembly of highway products which are specified and selected by the highway authority.
Important: Read safety instructions thoroughly and follow the suggested safe practices before assembling, maintaining, or repairing the SoftStop™ End Terminal. Failure to follow this warning can result in serious injury or death to the worker and/or bystanders. Please keep these instructions for later use and reference by anyone involved in the assembly of this product.

Warning: Ensure that all of the SoftStop™ End Terminal Warnings, Cautions, and Important Statements within the SoftStop™ End Terminal Manual are completely followed. Failure to follow this warning could result in serious injury or death in the event of a collision.

Recommended 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 SoftStop™ End Terminal. Additional copies of this Manual are immediately available from Ingal Civil Products by calling 0929 51444 or by e-mail at sales@ingalcivil.co.nz. Please contact Ingal Civil Products if you have any questions concerning the information in this Manual or about the SoftStop™ End Terminal. This manual may also be downloaded directly from the websites listed below.

Always use appropriate safety precautions when operating power equipment and when moving heavy equipment or the SoftStop™ End Terminal components. Work gloves, safety goggles, steel toe boots, and back protection should be used.

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.
Safety Symbols

This section describes safety symbols that may appear in the SoftStop™ End Terminal Manual. Read the Manual for complete safety and assembly information.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Safety Alert Symbol]</td>
<td>Safety Alert Symbol: Indicates Danger, Warning, Important, or Caution. Failure to read and follow the Danger, Warning, Important, or Caution indicators could result in serious injury or death to the workers and/or bystanders.</td>
</tr>
</tbody>
</table>

Warnings and Cautions

Read all instructions before assembling, maintaining, or repairing the SoftStop™ End Terminal.

**Warning:** Do not assemble, maintain, or repair the SoftStop™ End Terminal until you have read this Manual thoroughly and completely understand it. Ensure that all Warnings, Cautions, and Important Statements within the Manual are completely followed. Please call Ingal Civil Products at 0929 51444 if you do not understand these instructions. UNDER NO CIRCUMSTANCES SHOULD ASSEMBLY, MAINTENANCE, OR REPAIR BE ATTEMPTED BY SOMEONE WHO DOES NOT HAVE THE EXPERIENCE, SKILL, OR ABILITY, TO READ, COMPREHEND, AND PRECISELY FOLLOW THESE INSTRUCTIONS. Failure to follow this warning could result in serious injury or death in the event of a collision.

**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. Failure to follow this warning could result in serious injury or death in the event of a collision.

**Warning:** Be sure adequate time is available for complete assembly, maintenance, or repair before beginning the assembly, maintenance, or repair process. Failure to follow this warning could result in serious injury or death in the event of a collision.

**Warning:** Use only Ingal Civil Products parts that are specified herein for the SoftStop™ End Terminal for assembling, maintaining, or repairing the SoftStop™ End Terminal. Do not utilize or otherwise comingle parts from other systems even if those systems are other Energy Absorption Systems or Ingal Civil Products systems. Such configurations have not been tested, nor have they been approved 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.

**Warning:** Do NOT modify the SoftStop™ End Terminal in any way. Failure to follow this warning could result in serious injury or death in the event of a collision.
Warning: Ensure that the SoftStop™ End Terminal 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 specifications. If you have any questions during the assembly of a SoftStop™ End Terminal at a particular system assembly site, contact the specifying highway authority immediately. Failure to follow this warning could result in serious injury or death in the event of a collision.

Warning: Ensure that there is proper site grading for SoftStop™ End Terminal placement as dictated by the state or specifying agency, pursuant to NZ Transport Agency (NZTA) acceptance. Failure to follow this warning could result in serious injury or death in the event of a collision.

Warning: Do not attach the Anchor Rail to Post 2.

Warning: Do not place anything under the rail to post bolt head that would prevent the bolt from pulling through the Rail Panel shown on Page 16 for the appropriate Test Level. Failure to follow this warning could result in serious injury or death in the event of a collision.

Limitations and Warnings

Ingal Civil Products, in compliance with the Manual for Assessing Safety Hardware (MASH), contracts with FHWA approved testing facilities to perform crash tests, evaluation of tests, and submittal of results to the FHWA for review.

The SoftStop™ End Terminal has been accepted as meeting the requirements and guidelines of MASH, Test Level 3 (TL-3). These tests evaluate product performance by closely simulating actual impacts involving a range of vehicles from lightweight cars (approx. 1100 kg [2420 lb.]) to full size pickup trucks (approx. 2270 kg [5000 lb.]).

These tests are not intended to represent the performance of products when impacted by every vehicle type, nor every impact condition existing on the roadway. The tests are performed to measure impacts involving vehicles specified by MASH, and permitted by AASHTO, under those specific impact conditions.

Ingal Civil Products does not represent nor warrant that the results of these MASH tests show that vehicle impacts with the products would avoid injury to person(s) or property. Impacts that exceed the design capabilities of the product may not result in acceptable impact performance as outlined in MASH, relative to structural adequacy, occupant risk, and vehicle trajectory.

Ingal Civil Products expressly disclaims any warrant 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.

The SoftStop™ End Terminal is intended to be assembled, delineated, and maintained in accordance with specific state and federal guidelines.
The highway authority should be careful to properly select, assemble, and maintain the product. Careful evaluation of the site geometry, vehicle population type, speed, traffic direction, and visibility are some of the elements that require evaluation in the proper selection of a highway appurtenance. For example, curbs or islands could cause conditions which differ from those described in MASH for gating, redirecting end terminals and may result in different crash results than those encountered in testing.

**System Overview**

The SoftStop™ End Terminal is a 787 mm high energy absorbing end treatment used to terminate 787mm high W-Beam Guardrail. The SoftStop™ consists of a SoftStop™ Head, SoftStop™ Anchor W-Beam Guardrail, Anchor Post (Post 0), and two Steel Yielding Terminal (SYT) Posts (Posts 1 and 2). The SoftStop™ End Terminal can be assembled as a TL-3, TL-2, or TL-1 system. The remaining length of the TL-3 and TL-2 systems beyond Post 2 uses standard line steel guardrail posts.

The SoftStop™ End Terminal can be assembled with a flare to offset the Head 300mm for the TL-3 system, 150mm for the TL-2 system, and 75mm for the TL-1 system. The flare must be over the length of the system.

**Know Your SoftStop™ End Terminal**

For specific assembly, maintenance, or repair details refer to the state or specifying agency’s standard drawing(s) and/or Ingal Civil Products standard layout drawings (See Pages 32 and 33).

**Inspect Shipment**

Carefully uncrate all components. Before assembling the SoftStop™ End Terminal, check the received parts against the shipping list supplied with the system. Refer to the System Components section on the next page of this Manual for help in identifying each component. Verify that all parts were received. If parts are missing from the shipment or parts not specified herein were part of the shipment, do not attempt to assemble the system; contact your Ingal Civil Regional Sales Person immediately (See Page 3).
# System Components
Below is the list of system components and quantities. See Ingal Civil Products drawings for specific list of components and quantities.

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>PART NO.</th>
<th>QTY. TL-1</th>
<th>QTY. TL-2</th>
<th>QTY. TL-3</th>
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</thead>
<tbody>
<tr>
<td>SoftStop™ Anchor Guardrail</td>
<td>15200A</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Terminal Guardrail</td>
<td>11G</td>
<td>0</td>
<td>1</td>
<td>3</td>
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<tr>
<td>SoftStop™ Head</td>
<td>15208A</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Post #1 1460mm (SYTP)</td>
<td>15203G</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Post #2 1830mm (SYTP)</td>
<td>15000G</td>
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<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Posts #3 - #8 1830mm line post</td>
<td>533G</td>
<td>0</td>
<td>2</td>
<td>6</td>
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<tr>
<td>M16 x 32 Splice Bolt Grade 8.8</td>
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<td>16</td>
<td>32</td>
</tr>
<tr>
<td>King Block 150 x 190 x 355mm</td>
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<td>3</td>
<td>7</td>
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<tr>
<td>Guardrail Anchor Plate</td>
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<td>1</td>
<td>1</td>
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<tr>
<td>Anchor Post #0</td>
<td>15205A</td>
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<tr>
<td>Anchor Post Angle 250mm LG</td>
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<td>Anchor Keeper Plate (24 GA)</td>
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<td>1</td>
<td>1</td>
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<tr>
<td>Anchor Plate Washer (25mm THK)</td>
<td>15206G</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Ground Strut x 1429mm LG</td>
<td>15202G</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>SoftStop™ Head Approach Right Side</td>
<td>15209A</td>
<td>1</td>
<td>1</td>
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<td><strong>HARDWARE</strong></td>
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<tr>
<td>Washer 1”</td>
<td>4902G</td>
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<td>1</td>
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<tr>
<td>Hex Nut 1”</td>
<td>3908G</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Hex Head Bolt 3/4” x 2 1/2”</td>
<td>3717G</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Washer 3/4”</td>
<td>3701G</td>
<td>4</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Hex Nut 3/4”</td>
<td>3704G</td>
<td>2</td>
<td>2</td>
<td>2</td>
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<tr>
<td>HGR Splice Bolt M16 x 32</td>
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<td>16</td>
<td>32</td>
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<tr>
<td>HGR Post Bolt 5/8” x 14”</td>
<td>3540G</td>
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<td>3</td>
<td>7</td>
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<tr>
<td>Hex Head Bolt 5/8” x 1 3/4”</td>
<td>3391G</td>
<td>1</td>
<td>1</td>
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<tr>
<td>HARDWARE</td>
<td>PART NO.</td>
<td>QTY. TL-1</td>
<td>QTY. TL-2</td>
<td>QTY. TL-3</td>
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<tr>
<td>Hex Head Bolt 5/8&quot; x 9&quot;</td>
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<td>1</td>
</tr>
<tr>
<td>Washer 5/8&quot;</td>
<td>4372G</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Hex Nut 5/8&quot;</td>
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<td>2</td>
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</tr>
<tr>
<td>HGR Hex Nut 5/8&quot;</td>
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<td>7</td>
</tr>
<tr>
<td>Hex Head Bolt 5/16&quot; x 2 1/2&quot;</td>
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<tr>
<td>Hex Head Bolt 5/16 x 1 1/2&quot;</td>
<td>105286G</td>
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<td>Washer 5/16&quot;</td>
<td>3240G</td>
<td>6</td>
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<td>6</td>
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<tr>
<td>Hex Nut 5/16&quot;</td>
<td>3244G</td>
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<td>HGR Post Bolt 5/8&quot; x 10&quot;</td>
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<td>3</td>
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<tr>
<th>ANCHOR GUARDRAIL PANEL PREP HARDWARE</th>
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<td>3300G</td>
<td>4</td>
<td>4</td>
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<tr>
<td>HGR Hex Nut 5/8&quot;</td>
<td>3340G</td>
<td>4</td>
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<tr>
<td>All Thread Rod 5/8 x 15&quot;</td>
<td>4552G</td>
<td>2</td>
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**Note:** The following components are not shown to scale.

*SoftStop™ Anchor Guardrail*  
*SoftStop™ Head*  
*Preassembled Head Right*

<p>| | | | | |</p>
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<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>15200G</td>
<td>x1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15208A</td>
<td>x1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15209A</td>
<td>x1</td>
<td></td>
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</tbody>
</table>

*The Head and Anchor Guardrail may be preassembled from the factory.*

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<tbody>
<tr>
<td>Preassembled Head Left</td>
<td>15210A</td>
<td>x1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4'-9 1/2&quot; (1.46 m) SYT Post</td>
<td>15203G</td>
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</tr>
<tr>
<td>6'-0&quot; (1.83 m) SYT Post</td>
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<td></td>
</tr>
<tr>
<td>Item Description</td>
<td>Qty **</td>
<td>Item Description</td>
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<tr>
<td>M16 Oversize Nut</td>
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<td>190mm King Offset Block</td>
<td>10001397</td>
<td>Guardrail Anchor Plate</td>
</tr>
<tr>
<td>Anchor Post</td>
<td>15205A</td>
<td>Anchor Post Angle</td>
<td>15201G</td>
<td>Anchor Keeper Plate</td>
</tr>
<tr>
<td>Anchor Plate Washer</td>
<td>15206G</td>
<td>Ground Strut</td>
<td>15202G</td>
<td>1&quot; Flat Washer</td>
</tr>
<tr>
<td>1&quot; Hex Nut</td>
<td>3908G</td>
<td>3/4&quot; x 2 1/2&quot; Hex Bolt</td>
<td>3717G</td>
<td>3/4&quot; Flat Washer</td>
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** See Page 9 for specific quantities.
<table>
<thead>
<tr>
<th><strong>3/4” Hex Nut</strong></th>
<th><strong>5/8” x 1 1/4” HGR Splice Bolt</strong></th>
<th><strong>5/8” x 14” HGR Post Bolt</strong></th>
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</thead>
<tbody>
<tr>
<td>3704G x2</td>
<td>3360G **Qty **</td>
<td>3540G **Qty **</td>
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<thead>
<tr>
<th><strong>5/8” x 10” HGR Post Bolt</strong></th>
<th><strong>5/8” x 1 3/4” Hex Bolt</strong></th>
<th><strong>5/8” x 9” Hex Bolt</strong></th>
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<tbody>
<tr>
<td>3500G x1</td>
<td>3391G x1</td>
<td>4489G x1</td>
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<thead>
<tr>
<th><strong>5/8” Flat Washer</strong></th>
<th><strong>5/8” Hex Nut</strong></th>
<th><strong>5/8” HGR Hex Nut</strong></th>
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<tbody>
<tr>
<td>4372G x4</td>
<td>3361G x2</td>
<td>3340G **Qty **</td>
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<th><strong>5/16” x 1 1/2” Hex Bolt</strong></th>
<th><strong>5/16” Flat Washer</strong></th>
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</thead>
<tbody>
<tr>
<td>105285G x2</td>
<td>105286G x1</td>
<td>3240G x6</td>
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**See Page 9 for specific quantities.**
<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Description</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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<td>5/8” Washer</td>
<td>3300G</td>
<td>Terminal Guardrail</td>
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<td>x3</td>
<td></td>
<td>x4</td>
<td></td>
</tr>
<tr>
<td>5/8” x 15” All Thread Rod</td>
<td>4552G</td>
<td>Post 6” -0” 8.5 DDR</td>
<td>533G</td>
<td>Qty **</td>
</tr>
<tr>
<td></td>
<td>x2</td>
<td></td>
<td>Qty **</td>
<td></td>
</tr>
</tbody>
</table>

** See Page 9 for specific quantities.
SoftStop™ End Terminal Assembly

Recommended Tools

Documentation
- Manufacturer’s Product Description Assembly Manual
- Manufacturer’s Drawing Package (as required)

Wrenches
- SAE Combination Wrench Set

Personal protective equipment
- Safety Glasses
- Work Gloves
- Steel Toe Boots
- Back Protection
- Hard Hat
- Reflective Vest

Miscellaneous
- Traffic Control Equipment
- Sockets
- Hammer
- Chalk Line
- Tape Measure
- Marking Paint
- Straight Edge
- Level
- Plumb Line
- Augers
- Soil Tamper
- Post Pounder (commonly used for driving posts)
- Come-Along Puller
- 5/8” Alignment Tool (16mm Drift Pin)
- Vice Grip Pliers
- C-Clamps

Note: The above list of tools is a general recommendation. Depending on specific site conditions and the complexity of the assembly specified by the appropriate highway authority, additional or fewer tools may be required. 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 site.
Assembly Procedures

Deploy Traffic Control

A traffic control plan appropriate to the complexity of the project should be prepared and understood by all parties before the assembly of the SoftStop™ End Terminal begins.

Deploy the appropriate work zone safety devices prior to beginning the assembly and keep them present through all phases on the assembly. Please refer to the local highway authority for the traffic control plan unique to the place where assembly is occurring.

**Warning:** The correct safety equipment and approved traffic management must be used as required for any particular assembly site using the SoftStop™ End Terminal.

**Important:** Positioning of the posts is critical. Double check all measurements before placing the posts into the ground.

1) System Lengths

The lengths for the SoftStop™ systems for the following Test Levels are:

<table>
<thead>
<tr>
<th>Test Level</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL-1</td>
<td>4.05 m</td>
</tr>
<tr>
<td>TL-2</td>
<td>7.86 m</td>
</tr>
<tr>
<td>TL-3</td>
<td>15.48 m</td>
</tr>
</tbody>
</table>

The system can be attached to any of the following line guardrail systems:

a. 31" (787 mm) high, 305mm offset block with 6' (1.83 m) long W6x8.5 steel posts
b. 31" (787 mm) high, 200mm offset block with 6' (1.83 m) long W6x8.5 steel posts
c. Ezy-Guard 4 System
d. Any other approved 31" (787 mm) Guardrail System
2) Determine Post Locations

The orientation of the Posts is shown in Figure 1.

Use the center line of the line guardrail posts for the reference line to establish the location of Posts 0 to 8 (See Figure 2).

A) Along the reference line, starting at Post 9 (TL-3), Post 5 (TL-2), or Post 3 (TL-1), measure upstream 6’ 3” (1.91 m) to establish the center line of the first terminal post (8 or 4). Along this line, measuring 6’ 3” (1.91 m) to establish the locations of the remaining Terminal Posts and Post 2.

B) Along the reference line from Post 2, measure a distance of 5’ 8” (1.73 m) to establish the location of Post 1. The center of Post 1 will be 1’ 5 1/4” (438 mm) measured perpendicular towards the roadway for 305mm block outs and 1’ 1 1/4” (337 mm) measured perpendicular towards the roadway for 200mm block outs (See Figure 2).
C) Along the reference line from Post 1, measure a distance of 4’ 7” (1.40 m) to establish the location of Post 0. The center of Post 0 will be 1’ 5 1/4” (438 mm) offset towards the roadway for 305mm block outs and 1’ 1 1/4” (337 mm) offset towards the roadway for 190mm block outs (See Figure 2).

Note: Post 9 is the first downstream guardrail post and not part of SoftStop™ End Terminal system.

Figure 2 - SoftStop™ Post Layout
3) Post Assembly

A) At Post locations 3-8, (TL-3) or 3-4, (TL-2), place a 1.83m Terminal Post (PN-533G) so the top of the post is approximately 813mm above the ground.

B) At Post 2 locations, place a 1.83m SYT Post (PN-15000G) so the top of the post is approximately 813mm above the ground. The 21mm diameter yielding holes should be approximately centered on the ground line (See Figure 3).

C) At Post 1 location, place a 1.46m SYT Post (PN-15203G) so the top of the post is approximately 1445mm above the ground. The 21mm diameter yielding holes should be approximately centered on the ground line (See Figure 3).

**Warning:** Ensure that the proper Leaveout (the specified area of open space in the pavement) around the posts is reserved and filled with state or specifying agency approved backfill material that will not prevent movement, for any posts placed in rigid pavement such as any thickness of concrete or asphalt. Failure to follow this warning could result in serious injury or death in the event of a collision.

![SYT Post Placements](image-url)
D) At Post 0 location, place the 1.95m Anchor Post (PN-15205A) so that the top of the Post is 124mm above the ground line. See Figure 4 for Post orientation.

Figure 4 - Anchor Post (Post 0) Placement
4) **Terminal Guardrail/King Offset Block Assembly (Posts 3-8, TL-3 / Posts 3-4, TL-2)**

A) Starting at Post 8, (TL-3) or Post 4, (TL-2), attach the Terminal Guardrail (PN-11G) and 305mm Offset Block (PN-6100B) or 190mm offset blocks (PN-4076B) at the appropriate posts.

B) Splice the first Terminal Guardrail Panel to the last Line Guardrail Post between Posts 8 and 9 (TL-3) or Posts 4 and 5 (TL-2) with eight (8) 5/8” x 1-1/4” (16 mm x 32 mm) HGR Splice Bolts (PN-3360G) and 5/8” (16 mm) HGR hex nuts (PN-3340G). Splice all remaining Terminal Guardrail Panels by this method.

C) At all Post locations bolt the Rail Panel and a 305mm Offset Block (PN 6100B) or 190mm Offset Block (PN 4076B) to the SYT Post. The Rail Panel and Block is attached using one (1) 5/8” x 14” (16 mm x 356 mm) for the 305mm Block or 5/8” x 10” HGR Splice Bolt (16 mm x 254 mm) for the 190mm Block and a 5/8” (16 mm) HGR hex nut.

**Note:** The Rail Panels should be lapped in the direction of traffic.

5) **King Offset Block Placement (Post 2)**

A) At Post Location 2, bolt a 305mm Offset Block (PN 6100B) or 190mm Offset Block (PN 4076B) to the SYT Post. The Block is attached using one (1) 5/8” x 14” (16 mm x 356 mm) for the 305mm Block or 5/8” x 10” HGR Splice Bolt (16 mm x 254 mm) for the 200mm Block and a 5/8” (16 mm) HGR hex nut (See Figure 5).

**Note:** The HGR post bolt at Post 2 will not attach through Guardrail.

![Figure 5 - Offset Block Attachment (Post 2)](image)

**Warning:** Do not bolt the Anchor Rail Panel to Post 2.
6) Anchor Guardrail Panel/StopHead Assembly

The SoftStop™ Anchor Guardrail Panel (PN-15200G) and SoftStop™ Head (PN-15208A) can be assembled in the field. Pre-assembled Unit for the Approach Direction/Right Side, (PN-15209A) or for the Trailing End (Reverse Direction)/Approach Direction/Left Side, (PN-15210A) can be ordered.

If the Anchor Guardrail and SoftStop™ Head are to be assembled in the field, perform one of the two methods:

**Method 1: Rail Not-Pre-flattened**

A. Insert the rail panel into the SoftStop™ Head. Make sure that when the Rail Panel is placed in the head, it has the traffic face of the Panel oriented with respect to the traffic. Attach a Come-Along Puller to the Rail Panel and the SoftStop™ Head and pull the Anchor Guardrail Panel through the head until the end of the Anchor Guardrail Panel is 1321mm from the end of the guide channels (See Figure 6).

Note: Step A can be accomplished in the yard before going to the assembly site.

B. Place the Anchor Guardrail Panel/SoftStop™ Head Assembly on top of Post 1. Splice the Anchor Guardrail to the first terminal rail panel between Posts 2 and 3 with eight (8) 5/8” x 1 1/4” (16 mm x 32 mm) HGR Splice Bolts (PN-3360G) and 5/8” (16 mm) HGR hex nuts (PN-3340G) (See Figure 7).

C. With the rail splice complete, attach the Come-Along Puller to the head and Post 3. Pull the Head until the bracket on the head is against Post 1. Attach the bracket to Post 1 with one (1) 5/16” x 1 1/2” (8mm x 38 mm) hex head bolt (PN-105286G), two (2) 5/16” (8 mm) flat washers (PN-3240G), one under the bolt head and one under the 5/16” (8 mm) hex nut (PN-3244G) (See Figure 8). There is no torque requirement for this bolt. They should be tightened to a snug position.

D. Place in the two (2) sets of (4) splice holes of the end of the Anchor Guardrail Panel that has gone through the Head a 5/8” x 15” (16 mm x 381 mm) All Thread Rod (PN-4552G. Place a 5/8” (16 mm) flat washer (PN-3300G) and 5/8” (16 mm) HGR hex nut (PN-3340G) on each end of the All Thread Rods. Tighten the nuts until the Rail Panel is flat (See Figure 9).

E. Once the Rail Panel is flat, place a “C” clamp on the flattened Rail Panel to hold it in place when the rods are removed. Remove the threaded rod from the splice holes furthest from the end of the rail panel. Place from the bottom up, one (1) 3/4” x 2 1/2” (19 mm x 64 mm) hex head bolt (PN-3717G) and one (1) 3/4” (19 mm) flat washer (PN-3701G) under the bolt head (See Figure 11).

F. Place the Guardrail Anchor Plate (PN-15204A) on top of the flattened Rail Panel and the 3/4” (20 mm) bolt. Secure the Guardrail Anchor Plate to the Rail Panel with a 3/4” (20 mm) flat washer (PN-3701G) and 3/4” (20 mm) hex nut (PN-3704G) (See Figure 11). Do not tighten the bolt at this time.

G. Remove the other threaded rod from the splice holes. Place from the bottom up, one (1) 3/4” x 2 1/2” (19 mm x 64 mm) hex head bolt (PN-3717G) and one (1) 3/4” (19 mm) flat washer (PN-3701G) under the bolt head. Remove the “C” clamp. Align the Guardrail Anchor Plate so the bolt passes through the plate. Secure the Guardrail Anchor Plate to the Rail Panel with a 3/4” (20 mm) flat washer (PN-3701G) and 3/4” (20 mm) hex nut (PN-3704G).
H. Tighten the bolts. There is no torque requirement for these bolts. They should be tightened to a snug position.

Method 2: Rail Field Pre-flattened

A. Place a 5/8" x 15" (16 mm x 381 mm) All Thread Rod (PN-4522G) through each set of 4 splice bolt holes of the Anchor Guardrail Panel (PN-15200G). Place a 5/8" (16 mm) flat washer (PN-3300G) and 5/8" (16 mm) HGR hex nut (PN-3340G) on each end of the thread rods. Tighten the nuts until the Rail Panel is flat (See Figure 10).

B. Once the rail is flat, place a “C” clamp on the flattened rail panel to hold it in place when the rods are removed. Remove the threaded rods from the splice holes, one at a time and place in the hole from the bottom up, one (1) 3/4" x 2 1/2" (19 mm x 64 mm) hex head bolt (PN-3717G) and one (1) 3/4" (19 mm) flat washer (PN-3701G) under the bolt head. The nut should be tightened to a snug position.

Note: If permitted by the local highway authority, Steps A and B could be accomplished in the yard before going to the assembly site.

C. Insert the flattened Anchor Guardrail Panel end into the SoftStop™ Head with the heads of the 3/4" (19mm) bolts on the bottom of the panel. Make sure that when the Rail Panel is placed in the head it will have the traffic face of the panel oriented with respect to the traffic. Attach a Come-Along Puller to the Rail Panel and the SoftStop™ Head and pull the Anchor Guard Panel through the Head until the end of the Anchor Guardrail Panel is 1321mm from the end of the guide channels (See Figure 6).

D. Place the Anchor Guardrail Panel/SoftStop™ Head Assembly on top of Post 1. Splice the Anchor Guardrail to the first terminal rail panel between Posts 2 and 3 with eight (8) 5/8” x 1 1/4” (16 mm x 32 mm) HGR Splice Bolts (PN-3360G) and 5/8” (16 mm) HGR hex nuts (PN-3340G) (See Figure 7).

E. With the rail splice completed, attach the Come-Along Puller to the Head and Post 3. Pull the Head until the Bracket on the Head is against Post 1. Attach the Bracket to Post 1 with one (1) 5/16” x 1 1/2” (8 mm x 38 mm) hex head bolt (PN-105286G), two (2) 5/16” (8 mm) flat washers (PN-3240G), one under the bolt head and one under the 5/16” (3 mm) hex nut (PN-3244G) (See Figure 8). There is no torque requirement for this bolt and should be tightened to a snug position.

F. Remove the 3/4” (20 mm) nuts from the bolts on the flattened end. Place the Guardrail Anchor Plate (PN-15204A) on top of the flattened Rail Panel and the 3/4” (20 mm) bolt (See Figure 11). Secure the Guardrail Anchor Plate to the rail panel with a 3/4” (20 mm) flat washer (PN-3701G) and 3/4” (20 mm) hex nut (PN-3704G) placed on the 3/4” bolt. Place the flat washer under the hex nut (See Figure 11).

G. Tighten the bolts. There is no torque requirement for these bolts. They should be tightened to a snug position.
Figure 6 - Anchor Guardrail/SoftStop™ Head Assembly

Figure 7 - Anchor Guardrail/Terminal Guardrail Splice
Figure 8 - SoftStop™ Head Attachment to Post 1

Figure 9 - Method 1

5/16" (8 mm) HEX NUT
5/16" (8 mm) FLAT WASHER (TYP)
5/16" x 1 1/2" (8 mm x 38 mm) HEX BOLT

5/8" (16 mm) HEX NUT (TYP)
5/8" (16 mm) FLAT WASHER (TYP)
5/8" x 15" (16 mm x 381 mm) THREADED ROD (TYP)
Figure 10 - Method 2

GUARDRAIL ANCHOR PLATE

5/8" (16 mm) HEX NUT (TYP)
5/8" (16 mm) FLAT WASHER (TYP)
5/8" x 15" (16 mm x 381 mm) THREADED ROD (TYP)

Figure 11 - Guardrail Anchor Plate Attachment

GUARDRAIL ANCHOR PLATE

3/4" (20 mm) HEX NUT (TYP)
3/4" (20 mm) FLAT WASHER (TYP)
3/4" x 2 1/2" (20 mm) HEX BOLT (TYP)
7) Guardrail Anchor / Post 0 Assembly

A) Place the threaded rod of the Guardrail Anchor Plate (PN-15204A) in the notch of the anchor post (See Figure 12).

B) Place on the threaded rod of the Anchor Keeper Plate (PN-15207G) and Anchor Plate Washer (PN-15206).

C) Attach the Anchor Keeper Plate and the Anchor Plate Washer (PN-15205G) to the Anchor Post (PN-15205G) with two (2) 5/16” x 2 1/2” (8 mm x 64 mm) hex head bolts (PN-105285G), a 5/16” (8 mm) flat washer (PN-3240G) under the bolt head, and the 5/16” (8 mm) hex nut (PN-3244G) (See Figure 12). There is no torque requirement for these bolts. Bolts should be tightened to a snug position.

D) Place on the threaded rod a 1” (25 mm) flat washer (PN-4902G) and 1” (25 mm) hex nut (PN-3908G) (See Figure 12). Tighten nut to a snug position. There is no torque requirement for this bolt.

![Figure 12 - Guardrail Anchor / Post Assembly](image-url)
8) Ground Strut Assembly

A) Position the Anchor Post Angle (PN-15201) on the Anchor Post (Post Location 0) (See Figure 13). Place the Ground Strut (PN-15202) on the embankment side of the post outside of the Anchor Post Angle.

![Figure 13 - Post 0 Anchor Post Angle/Strut Assembly](image)

B) Place on the 5/8" x 9" (16 mm x 229 mm) hex bolt (PN-4489G) 5/8" (16 mm) a 5/8" flat washer (PN-4372G). From the embankment side, insert the bolt through the holes of the Ground Strut, Anchor Post Angles, and the Anchor Post (See Figure 13).

C) On the hex bolt, place a 5/8" (16 mm) flat washer and 5/8" (16 mm) hex nut (PN-3361G) (See Figure 13). Tighten nut to snug position.

Note: The preferred location of the Ground Strut is on the embankment side of the posts. It can be placed on either side of the posts.

![Figure 14 - Post 1 Strut Assembly](image)

Note: There is no torque requirement for these bolts. They should be tightened to a snug position.
9) **Delineation**

A) Apply High Intensity Reflective Sheeting (PN-5852B Right Side) or (PN-5851B Left Side) on the front face of the SoftStop™ Head, per the state/specifying agency’s MUTCD for proper delineation.

**Note:** The reflective sheeting is an option to the SoftStop™ and needs to be ordered separate from the SoftStop™ package. Please make sure that the reflective sheeting placed on each assembly conforms to the specific standards set forth by the appropriate highway authority that has specified the use of this product.

**Maintenance and Repair**

**Maintenance**

1. Complete the following periodically to check the safety of the SoftStop™ End Terminal.
2. Check that the guardrail is still attached to the Anchor Post. Tighten or replace as needed.
3. Check that no bolts have come loose or been removed. Tighten or replace as needed.

⚠️ **Warning:** The system must be periodically inspected to ensure proper operation.

**Note:** Inspections by the appropriate highway authority are recommended as needed based upon volume of traffic and impact history. Visual drive-by inspections are recommended at least once every month. Walk-up inspections are recommended at least twice a year.

**Visual Drive-By Inspection**

The purpose of the visual inspection is to spot any conditions that would prevent the system from functioning as intended.

1. Check for an unrecorded impact, misalignment, missing fasteners, corrosion, vandalism, etc.
2. Clear any buildup of trash or dirt around the system that could interfere with intended performance.

**Walk-Up Inspection**

1. Clear and dispose of any debris on the site.
2. Be sure all fasteners are tight.

**Repair**

A) Complete the following steps to repair the SoftStop™ End Terminal.

Set up necessary traffic control at the accident site and then remove any debris that has encroached onto the traveled way or shoulder.
Warning: Ensure that the necessary traffic control is set up and any debris that has encroached onto the traveled way or shoulder has been removed before beginning the repair. Failure to follow this warning could result in serious injury or death in the event of a collision.

Warning: Safety measures incorporating traffic control devices must be used to protect all personnel while at the maintenance or repair site. Failure to follow this warning could result in serious injury or death to the workers and/or bystanders. Ingal Civil Products offers an economical and effective truck mounted attenuator, the MPS-350, for the protection of workers in work zones. For more information on the MPS-350, call 0929 15444 or visit the Ingal Civil Products website at www.ingalcivil.co.nz.

Note: Take inventory of the damaged system and determine what parts are reusable as defined by the state/specifying agency and what parts need to be replaced.

B) Obtain the Ingal Civil Products parts that need to be replaced from Ingal Civil Products (See Page 14 of this Manual for a list of recommended tools for the repair of the SoftStop™ End Terminal.

Warning: Use only Ingal Civil Products parts on the Ingal Civil SoftStop™ End Terminal system for assembly, maintenance, or repair. The assembly or comingling of unauthorized parts is strictly prohibited. Failure to follow this warning could result in serious injury or death in the event of a vehicle impact with a system that has not been accepted by the Federal Highway Administration (FHWA). The SoftStop™ End Terminal system and its component parts have been accepted for state use by the FHWA. However, a comingled system has not been accepted. NEVER COMINGLE PARTS from other systems, even if the system is a Ingal Civil Products system.

C) Return to the repair site with the replacement parts and tools needed.

D) Disconnect and remove the damaged rail from the posts. Remove any damaged SYT Posts and line posts.

E) Pull the squished rail panel from the impact head. This is done by holding on to the extruder head and pulling the rail from the head.

F) Reassemble the system following the assembly instructions in this Manual.

Warning: Do NOT perform assembly, maintenance, or repair if the SoftStop™ End Terminal systems site, shoulder, or traveled area are covered or encroached by road debris. Failure to follow this warning could result in serious injury or death in the event of a collision.

G) Attach proper delineation necessary for the repaired SoftStop™ End Terminal in accordance with the state/specifying agency’s MUTCD.

Warning: Ensure that all system products 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.
Assembly Checklist

Assembly performed by: ........................................................................................................

Assembly date: ...................................................................................................................

Assembly location: ..............................................................................................................

☐ Verify the Rail height is 787mm above grade (See system drawing).

☐ Verify that all fasteners are tightened to a snug position.

☐ Confirm that the head of the 5/8" x 10" or 14" (16 mm x 254 mm or 356 mm) Post Bolt at Post 2 is positioned between the rail sections and the 190mm King Block. The post bolt must not fasten the Rail Panel to the King Offset Block (See section 4.0).

☐ Verify that rails are lapped correctly at the downstream rail to system connection (refer to Section 4.0).
For more complete information on Ingal Civil Products, visit us on the web at www.ingalcivil.co.nz. Please contact Ingal Civil Products to confirm that you are referring to the most current instructions.