

***NDDOT Guidelines for the Use of Dynamic Speed
Display Signs on the State Highway System
November 2010***

General Information:

The North Dakota Department of Transportation (NDDOT) has developed guidelines to allow municipalities to install and maintain Dynamic Speed Display Signs (DSDS) within the right-of-ways on the State Highway System. These guidelines are to be used by the District Engineers for requests to install permanent dynamic speed display signs in right-of-ways on state highways.

When requested, DSDS will be considered for use on the State Highway System where the speed limit is 40 MPH or less. In speed zones over 40 mph, the NDDOT will review the request on a case-by-case basis.

A. Purpose & Objective:

Dynamic speed display signs are installed to provide a real-time dynamic display of a driver's vehicular speed at a particular location where speeding has been determined and documented to be a safety problem. When used in conjunction with a regulatory speed limit sign (R2-1), drivers receive immediate confirmation of their actual speed in comparison to the legal speed limit static signs. DSDS are allowed under, and guidance is provided for their use in, Part 2 of the MUTCD.

DSDS are typically used at locations where a speed limit transition occurs or in an area where driving the appropriate speed for the highway conditions is particularly critical, such as around school speed zones. Because law enforcement agencies cannot be expected to constantly monitor speeds in a particular location, the DSDS serve to supplement regular enforcement of speed limits alerting drivers to specific driving behavior.

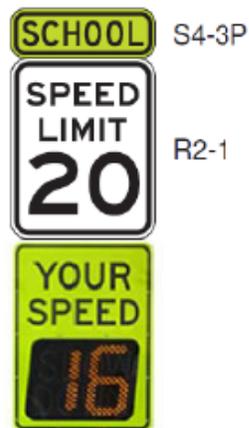
B. Technical Requirements:

DSDS must meet the following specifications and documentation and supplied to NDDOT District as outlined in Section F:

1. Installation of any DSDS shall be a stand-alone structure located at a minimum of 100' from the transition speed limit sign. A Speed Limit sign (standard or school speed zone) shall be installed above the DSDS.
2. The minimum height from the bottom of the signs to the edge of the driving lane shall be 5' if no parking or pedestrian traffic is present. If pedestrian traffic or parking is present or if it is in a 4-lane section of roadway, the

minimum height shall be 7'. The sign should face oncoming traffic at an appropriate angle for the radar to be picked up by passing motorists (specified by the manufacturer).

3. Installation is restricted to one DSDS in each direction for the area being addressed.
4. The DSDS static sheeting shall include the legend "YOUR SPEED" centered on the sign. The legend and background shall match the regulatory sign it is paired with. The static sheeting for the speed limit (R2-1) shall be white with a black legend. For school speed limit assemblies (R2-1 with S4-3), the static sheeting shall be fluorescent yellow-green with black legend.



5. The changeable message display shall have a black background with an amber (yellow) illuminated legend.
6. The changeable display shall be programmed to read "XX" or have no display when the vehicle speed exceeds 15 MPH over the posted speed.
7. When activated, the DSDS shall give drivers immediate feedback on their individual driving speed when the posted speed is exceeded. The flash rate shall be between 50 & 60 cycles per minute.
8. The installation shall **not** interfere with the visibility and general effectiveness of any other signs in the area. A minimum distance of 300' of clear sight distance should be maintained. Consideration should be given to existing road geometry, topography and roadside vegetation.
9. When installed in association with school speed zones, the DSDS shall operate only when the school speed zone is in effect. (Generally, the DSDS will operate only on days that schools are in session, for thirty minutes before and thirty minutes after the time in which the school day begins; and thirty minutes before and thirty minutes after the time in which the school day ends). Use of DSDS in conjunction with school speed zones "when children are present" is not allowed.
10. Information shall be supplied to the District that documents that the DSDS and sign support assembly and installation meet the requirements for crash-worthiness as defined in the National Cooperative Highway Research Program (NCHRP) Report 350. DSDS shall be mounted to a breakaway support that meets NDDOT specifications.

11. The DSDS shall be constructed of materials that withstand extreme temperatures and are vandalism resistant. Lenses shall be shatter proof plexi-glass with water tight seals and a locked access to the interior electronics.
12. All elements of the DSDS shall conform to the guidance and standards as outlined in the latest edition of the MUTCD adopted by the NDDOT.
13. Identification and contact information for the municipality in which it is installed shall be displayed on the case of the DSDS.

C. Eligible Requesting Entities:

All requests for DSDS on the North Dakota State Highway System shall be submitted by the governing body of a municipality *unless* the DSDS is a specific permit condition on a private developer. Where the DSDS has been made a permit condition to a developer, the municipality shall be the co-applicant on the permit application.

D. Municipal Responsibility:

Municipalities shall be responsible for all costs of the installation, maintenance, and removal of the DSDS located within the state's highway right-of-way (ROW).

Municipalities shall be responsible for ongoing electric costs and all maintenance of the DSDS, including annual maintenance and replacement if damaged. The municipalities are responsible to contact OneCall and submit a copy of the diagram or plan including connections to power poles and their location to them.

E. Permits and Maintenance Agreement:

Access permits for work performed by non-NDDOT personnel in the ROW, must be obtained with a Utility Occupancy Application and Permit for the installation of permanent post mounted DSDS.

Information can be found on the NDDOT website under NDDOT, click on Business, Signing and Utilities then Utility Occupancy Application and Permit Information or access the site by clicking on the link:

www.dot.nd.gov/divisions/design/utilitypermits.htm

F. Application Process:

Requests from the governing bodies of municipalities shall include the following information:

1. Cover letter addressed to the NDDOT District requesting permission for installation of the DSDS.
2. Submission of a Utilities Occupancy Application and Permit.
3. A scaled drawing that shows the existing regulatory speed signs and their legends; the location and legend of other nearby signs, and adjacent features (sidewalks, driveways, existing street lighting, traffic signals, adjacent land uses). The sketch or plan must either be at a specific scale or include measured distances between pertinent features.
4. A diagram or plan indicating how the DSDS will be powered (solar or hard-wired, including connections to power poles and their location).
5. Documentation that the technical requirements outlined in Section B have been met.

H. Ongoing Maintenance and Evaluation of Permanent Signs:

The requesting entity shall have the DSDS calibrated once a year at a minimum and submit the results to the District. Calibration obtained by comparing the output reading with a Highway Patrol radar gun is acceptable.

I. Removal of Permanent Signs:

The NDDOT reserves the right to remove any non-compliant DSDS if they are determined not in conformance with the statutory requirements and conditions set forth in the Utility Occupancy Application Permit at the expense of the municipality.

If the governing body of a municipality no longer desires the DSDS, or the NDDOT District Engineer determines that the DSDS are no longer warranted, the municipality is responsible for all costs associated with the removal or restoration of the State Highway ROW to the satisfaction of the NDDOT.

J. Approval Process:

The NDDOT District Office will issue the governing body of the municipality a permit after determining that the proposed DSDS meets the Technical Requirements outlined in Section B, above. Assurance of financial and maintenance responsibility of the municipality is a requirement of the permit and every other year permit renewal.

The NDDOT District Engineer will review, approve and process the permit and submit a copy along with the supporting documentation to the NDDOT Programming Division. The District will then input the DSDS location(s) in the RIMS database inventory as a utility component under the facility code **98** that has been created for Dynamic Speed Display Signs. The Utility Company will be entered as “City of _____”.

This document is subject to revision.

Attachments:

- 1- SFN 7995, Utility Occupancy Application and Permit
- 2- Installation of a Dynamic Speed Display Sign (DSDS) for Municipalities
- 3- Dynamic Speed Display Sign Details
- 4- Breakaway Coupler System for Perforated Tubes, use with Standard Drawings :
 - D754-23, Assembly Details (Perforated Tube)
 - D754-24, Mounting Details, Perforated Table (Slip Base)
 - D754-25, Mounting Details Perforated Tube (Posts)
- 5- Breakaway Coupler System for Standard Pipe, Stub Post, use with Standard Drawings:
 - D754-1, Pipe Assembly Details
 - D754-2, Breakaway Base and Foundation Details
 - D754-4, Multi-Directional Breakaway Base
 - D754-5, Foundation Data for Steel Supports
 - D754-7, Mounting, Post Cap, and Panel Details
 - D754-8, Attachment Brackets for Standard Steel Pipe

Installation of a Dynamic Speed Display Sign (DSDS) For Municipalities

Technical Requirements:

DSDS must meet the following specifications and documentation to that effect must be supplied to NDDOT District as outlined in the Application Process below:

1. Installation of any DSDS shall be a stand-alone structure located at a minimum of 100' from the transition speed limit sign. A Speed Limit sign (standard or school speed zone) shall be installed above the DSDS.
2. The minimum height from the bottom of the signs to the edge of the driving lane shall be 5' if no parking or pedestrian traffic is present. If pedestrian traffic or parking is present or if it is in a 4-lane section of roadway, the minimum height shall be 7'. The sign should face oncoming traffic at an appropriate angle for the radar to be picked up by passing motorists (specified by the manufacturer).
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4. A diagram or plan indicating how the DSDS will be powered (solar or hard-wired, including connections to power poles and their location).
5. Documentation that the technical requirements outlined in Section C have been met.

Maintenance and Evaluation of Permanent Signs:

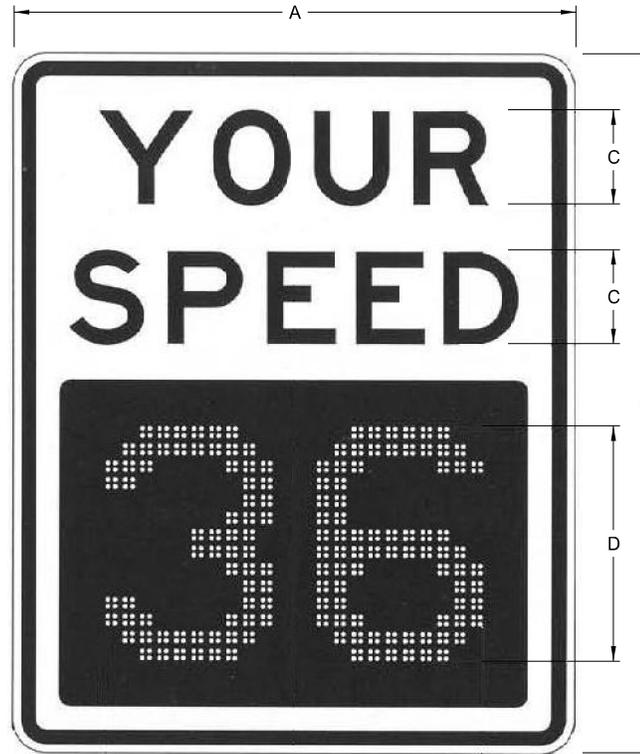
The requesting agency shall have the DSDS calibrated once a year at a minimum and submit the results to the District. Calibration obtained by comparing the output reading with a Highway Patrol radar gun is acceptable.

Removal of Permanent Signs:

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If the governing body of a municipality no longer desires the DSDS, or the NDDOT District Engineer determines that the DSDS are no longer warranted, the municipality is responsible for all costs associated with the removal or restoration of the State Highway ROW to the satisfaction of the NDDOT.

DYNAMIC SPEED DISPLAY SIGN DETAILS



Sign		
	Conventional Road	Expressway
A	24" - 30"	36" - 41"
B	30" - 42"	48" - 55"
C	4" min (a)	6" min (a)
D	12" - 15"	16" min

(a) Series D or E font

Perforated Tube Support		
	Conventional Road	
Maximum post length	14.4'	16.7'
Perforated tube size	2.5" x 2.5" 12 ga	2.5" x 2.5" 10 ga
Sleeve size	2.25" x 2.25" 12 ga	2.19" x 2.19" 10 ga
Sleeve length	Post length minus 9.4'	Post length minus 10.9'
Anchor size	3" x 3" 7 ga	3" x 3" 7 ga
Anchor length	4'	4'
Slip base	Yes (b)	Yes (b)

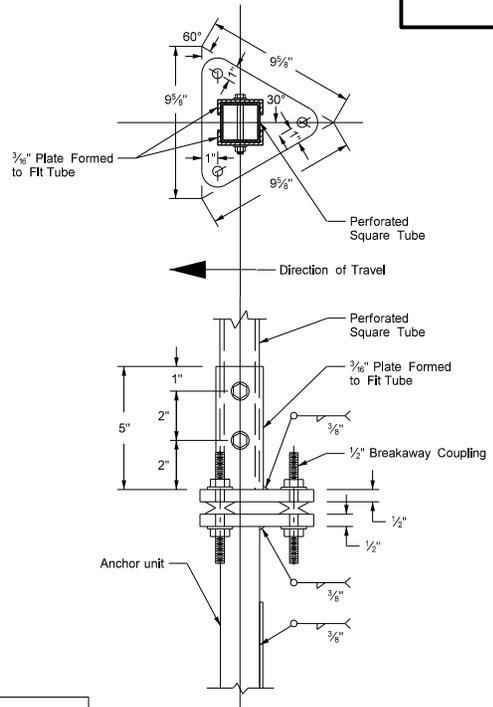
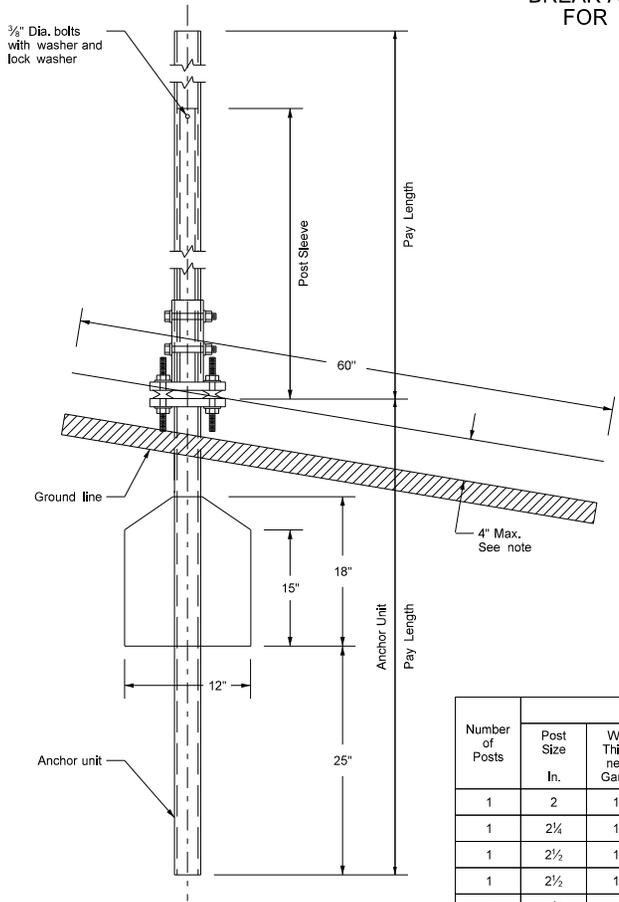
(b) See Standard Drawing D754-24 and Break-Away Coupler System for Perforated Tubes Detail Sheet

Pipe Support	
	Expressway
Pipe size	5"
Maximum pipe length	18.9'
Slip base	Yes (c)
Foundation dia	1.8'
Foundation depth	8.5'
Foundation volume	.8 CY

(c) See Standard Drawing D754-02 and Break-Away Coupler System for Standard Pipe Detail Sheet

BREAK-AWAY COUPLER SYSTEM FOR PERFORATED TUBES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND			



- NOTES:
1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
 2. Anchor unit shall be the same size as the post and shall have the same specification as the post.
 3. When used in concrete sidewalk, anchor shall be the same except the anchor plate shall be omitted.
 4. Four post signs shall have 8' between the first and fourth post.
 5. In lieu of the breakaway base system on standard D-754-24 the breakaway coupling system may be used. The breakaway coupler system shall be manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements as specified by DENT BREAKAWAY INC, INC. which meets the test requirements of NCHRP Report 350.
 6. Base plates and formed plates shall be fabricated from steel meeting the requirements of AASHTO M-163 and M232.

**BASE PLATE WITH
BREAKAWAY COUPLER**

Number of Posts	Telescoping Perforated Tube					
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size In.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			B	2 1/2
1	2 1/2	10			Yes	2 1/2
1	2 1/4	12	2	12	Yes	2 1/4 & 2 Sleeve
1	2 1/2	12	2 1/4	12	Yes	2 1/2 & 2 1/4 Sleeve
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	2 1/2
2	2 1/2	10			Yes	2 1/2
2	2 1/4	12	2	12	Yes	2 1/4 & 2 Sleeve
2	2 1/2	12	2 1/4	12	Yes	2 1/2 & 2 1/4 Sleeve
3 & 4	2 1/2	12			Yes	2 1/2
3 & 4	2 1/2	10			Yes	2 1/2
3 & 4	2 1/4	12	2 1/4	12	Yes	2 1/2 & 2 1/4 Sleeve
3 & 4	2 1/4	12	2	12	Yes	2 1/4 & 2 Sleeve
3 & 4	2 1/2	10	2 3/8	10	Yes	2 1/2 & 2 3/8 Sleeve

Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Class Section In. ²	Section Modulus In. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/8 x 2 3/8	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785

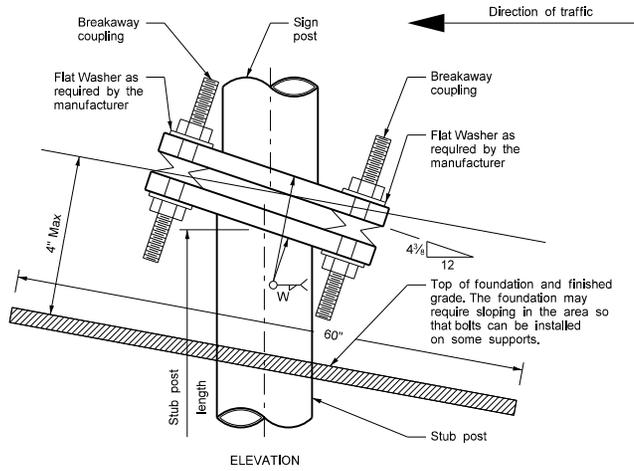
B - The 2 1/2" 12 gauge posts do not need breakaway bases when placed in standard soils. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

The 2 3/8" size 10 gauge is shown as 2.19" size on the plans. The 2 1/4" size 10 gauge is shown as 2.51" size on the plans.

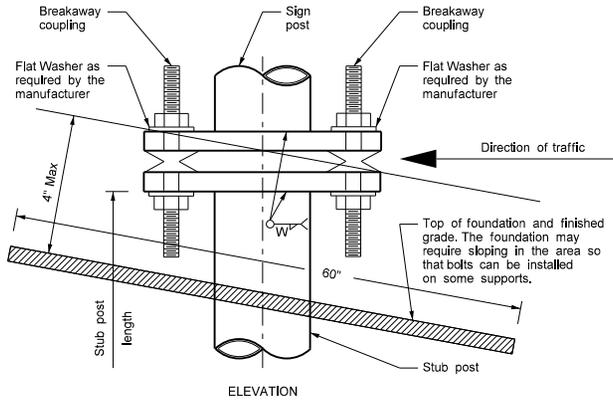
**Break-Away Coupler System
for Perforated Tube Detail**

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND			

BREAK-AWAY COUPLER SYSTEM FOR STANDARD PIPE STUB POST



SINGLE POST SIGN AND STUB POST
Type A



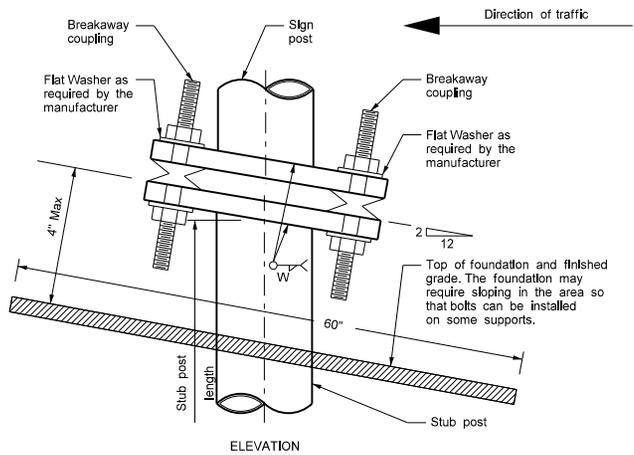
TWO OR MORE POST SIGN AND STUB POST
FOR TWO POST SIGNS WITH 8' OR MORE POST SPACING
AND ALL THREE OR MORE POST SIGNS
Type C

NOTES:

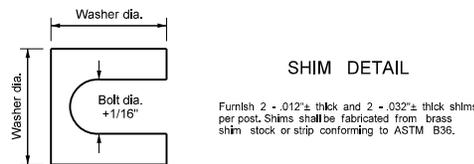
Fuse Joint Cuts - Steel posts may be cut after galvanizing and cut surface treated with an approved zinc solder meeting the Federal Spec. D.G-93 (stick only) or the cut may be galvanized after fabrication. Aluminum posts will need no treatment.

Assembly Procedure

1. Assemble post to stub with breakaway coupling bolts and one flat washer as shown.
2. Shim as required to plumb post.
3. Tighten all bolts the maximum possible with 12" to 15" wrench.
4. In lieu of the breakaway base system on standards D-754-3 and D-754-4 the breakaway coupler system may be used. The breakaway coupler system shall be manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements as specified by DENT BREAKAWAY IND., INC. which meets the requirements of NCHRP Report 350.

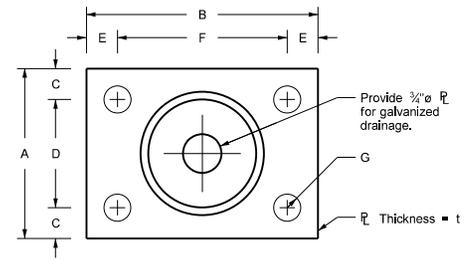


TWO POST SIGN AND STUB POST
FOR SIGNS WITH LESS THAN 8' POST SPACING
Type B



SHIM DETAIL

Furnish 2 - .012"± thick and 2 - .032"± thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.



PLAN BASE PLATE

DIMENSION NOM. PIPE SIZE	BASE DATA TABLE										
	BREAKAWAY COUPLING	A	B	C	D	E	F	G	t	W	STUB POST LENGTH
STEEL											
3 1/2"ø	1/2"ø x 4 1/2"	5 1/2"	8 3/4"	1 3/8"	3 1/8"	1 3/8"	6 3/4"	1 1/2"	3/8"	3/8"	1'-6"
4"ø	5/8"ø x 4 1/2"	5 1/2"	8 3/4"	1"	3 1/2"	1"	6 3/4"	1 1/2"	3/8"	3/8"	1'-6"
5"ø	3/4"ø x 5 1/4"	6 1/2"	10"	1 1/4"	4 1/4"	1 1/4"	7 3/4"	1 3/8"	1"	1/2"	2'-0"
6"ø	1"ø x 5 1/4"	7 1/2"	11 3/4"	1 3/8"	4 3/4"	1 3/8"	9"	1 1/2"	1 1/4"	1/2"	2'-0"
8"ø	1"ø x 5 1/4"	9 1/2"	13 1/4"	1 3/8"	6 3/4"	1 3/8"	10 1/2"	1 1/2"	1 1/4"	1/2"	2'-6"
10"ø	1"ø x 5 1/4"	11 3/4"	15 1/4"	1 3/8"	9"	1 3/8"	12 1/2"	1 1/2"	1 1/4"	1/2"	3'-0"
12"ø	1 1/4"ø x 7"	13 3/4"	18"	1 3/8"	10 1/2"	1 3/8"	14 3/4"	1 1/2"	1 1/4"	1/2"	3'-0"
ALUMINUM											
3 1/2"ø	1/2"ø x 4 1/2"	5 1/2"	8 3/4"	1 3/8"	3 1/8"	1 3/8"	6 3/4"	1 1/2"	3/8"	3/8"	1'-6"
4"ø	5/8"ø x 4 1/2"	5 1/2"	8 3/4"	1"	3 1/2"	1"	6 3/4"	1 1/2"	1"	1/2"	1'-6"
5"ø	3/4"ø x 5 1/4"	6 1/2"	10"	1 1/4"	4 1/4"	1 1/4"	7 3/4"	1 3/8"	1"	1/2"	2'-0"
6"ø	1"ø x 5 1/4"	7 1/2"	11 3/4"	1 3/8"	4 3/4"	1 3/8"	9"	1 1/2"	1 1/4"	1/2"	2'-0"
8"ø	1"ø x 5 1/4"	9 1/2"	13 1/4"	1 3/8"	6 3/4"	1 3/8"	10 1/2"	1 1/2"	1 1/4"	1/2"	2'-6"
10"ø	1"ø x 5 1/4"	11 3/4"	15 1/4"	1 3/8"	9"	1 3/8"	12 1/2"	1 1/2"	1 1/4"	1/2"	3'-0"
12"ø	1 1/4"ø x 7"	13 3/4"	18"	1 3/8"	10 1/2"	1 3/8"	14 3/4"	1 1/2"	1 1/4"	1/2"	3'-0"

Break-Away Coupler System
for Standard Pipe Detail