



PERFORMANCE TEST REPORT

Rendered to:

FORMTECH ENTERPRISES, INC.
126 Ben Burton Circle
Bogart, Georgia 30622

Report No.: B7179.01-122-42
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Project Summary: Architectural Testing, Inc., an Intertek company ("Intertek-ATI"), was contracted by Formtech Enterprises, Inc. to perform flexural testing on their Truline PVC seawall system at Intertek-ATI's test facility in York, Pennsylvania. Test specimen description and results are reported herein.

Product Description:

Series/Model: Truline 800 and 1200 Series

Product Type: PVC Seawall

Four different PVC seawall specimens were supplied to Intertek-ATI by Formtech Enterprises on March 23, 2012. Three 8" thick (with reinforcement) Truline 800 series and one 12" Truline 1200 series seawall specimen were tested. All specimens were approximately 3 feet wide by 14 feet in length. The PVC seawall is constructed by assembling individual sections of extruded PVC "C" shaped pile sections. Each has a pair of interlocking "J" channels on each end to allow the extrusions to be slipped together to form the wall (see photos in Appendix A). The end section is closed off with an extruded PVC cover which interlocks with the "J" channel on the open end of the last section. Each extruded section is filled with 3,000 psi concrete.

Concrete compressive strength was determined by ASTM C39/39M-11 *Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens* on the day of flexural testing and is detailed in Intertek-ATI Report No. B7179.03-122-31. All of the specimens contained rebar reinforcement as shown in the table below. Rebar tensile strength was determined by ASTM E8/E8M-09 *Standard Test Method for Tension Testing of Metallic Materials* and is detailed in Intertek-ATI Report No. B7179.02-122-31.

Product Description: (Continued)**Specimen Designations:****Specimen #1:** 1200 Series (u-channel part #51200)

Nominal Thickness: 12"

Reinforcement: (4) #8 rebar in each extrusion, 5-1/2" by 8" pattern (centered)

Specimen #2: 800 Series (u-channel part #50800)

Nominal Thickness: 8"

Reinforcement: (4) #5 rebar in each extrusion, 2-1/2" by 6" pattern (centered)

Additional Information: Holes through web for monolithic pour

Specimen #3: 800 Series (u-channel part #50800)

Nominal Thickness: 8"

Reinforcement: (1) #5 rebar in each extrusion; offset 2-1/2" from surface, 4" from side

Specimen #4: 800 Series (u-channel part #50800)

Nominal Thickness: 8"

Reinforcement: (4) #5 rebar in each extrusion, 2-1/2" by 6" pattern (centered)

Test Setup: Each seawall specimen was placed horizontally on a steel test fixture and supported on 50" centers. Each support location contained a 1" diameter by 36" long lubricated steel bar sandwiched by two 1/2" thick by 4" wide steel support plate. Each of the support plates was machine with a 1/2" radius to capture the steel rod and allow up to 9 degrees of rotation.

The seawall was loaded using two steel load beams on 144" centers. The load beams also contained the 1" diameter lubricated steel rod and 4" wide support plates. Each load beam (including the pivot plates and pivot bar) weighed 283 lbs. The ends of each of the load beams were connected via steel pins to the rod end of a 5" bore hydraulic cylinder (2" diameter rod). The cap end of the hydraulic cylinder was mounted via steel pins to the steel text fixture (see Photo #1 in Appendix A).

The four hydraulic cylinders (one at each corner) were connected to a 1250 psi hydraulic system to provide up to 41000 lbs of load at each end of the seawall. To determine load, a pressure transducer was connected to a manifold where all of the hydraulic lines terminate. All hoses and supply tubing was matched to length.

Three linear variable differential transformers (LVDT) mounted to the center of the test fixture recorded deflection of the seawall system. The LVDTs were located at the center of each extrusion for the 8" thick specimens (12" centers) and at the center of each extrusion and center of the wall (seam) of the 12" specimen (9" centers). The transducers have an accuracy of ± 0.001 inches.

Test Procedure: The test specimen temperature is measured and the specimen visually inspected prior to testing to verify size and general condition of the materials, assembly and installation. Any potential compromising defects observed are noted prior to the load tests. The seawall was given an initial load of approximately 1000 lbs and returned to zero. The LVDTs and pressure transducers were then zeroed at zero load. Upon initiation of testing data logging was started and the pressure manually increased until the load reached the following set points (1000 lbs, 2500 lbs, 5000 lbs, 7500 lbs, 10000 lbs, 15000 lbs, 20000 lbs, 25000 lbs, 30000 lbs, 35000 lbs, 40000 lbs). At each load set point the deflection and pressure reading was manually recorded. Upon reaching either the pressure limit of the hydraulic system or the stroke of the hydraulic cylinders, a final deflection reading was made. The hydraulic system pressure was then adjusted to zero and after 1 minute a final deflection reading (permanent set) was recorded.

Test Results: The following tests were performed on the PVC seawall assembly. Except as noted, all loads and displacement measurements are normal to the wall (horizontal).

Graphs documenting the load versus deflection behavior of the test wall are presented in Appendix B.

Specimen #2 (800 Series) - 04/12/12 - 62°F			
Applied Load (lbs)	Displacement (LVDT)		
	1	2	3
1000	0.023"	0.024"	0.022"
2500	0.038"	0.038"	0.034"
5000	0.078"	0.075"	0.067"
7500	0.126"	0.121"	0.113"
10000	0.173"	0.167"	0.158"
15000	0.352"	0.345"	0.335"
20000	0.866"	0.854"	0.862"
22773*	1.277"	1.239"	1.271"
0 (1 min. recovery)	0.477"	0.449"	0.455"

* Cylinder travel limit reached

Note: PVC cover is to LVDT1 side

Test Results: (Continued)

Specimen #1 (1200 Series) - 04/13/12 - 60°F			
Applied Load (lbs)	Displacement (LVDT)		
	1	2	3
1000	0.000"	0.000"	0.000"
2500	0.001"	0.000"	0.000"
5000	0.001"	0.000"	0.000"
7500	0.002"	0.000"	0.000"
10000	0.014"	0.004"	0.000"
15000	0.031"	0.020"	0.001"
20000	0.048"	0.038"	0.019"
25000	0.065"	0.056"	0.037"
30000	0.084"	0.076"	0.056"
35000	0.105"	0.098"	0.078"
40000*	0.156"	0.152"	0.132"
0 (1 min. recovery)	0.046"	0.040"	0.030"

* Hydraulic system limit reached

Note: PVC Cover is to LVDT3 side

Specimen #4 (800 Series) - 04/13/12 - 63°F			
Applied Load (lbs)	Displacement (LVDT)		
	1	2	3
1000	0.001"	0.000"	0.001"
2500	0.000"	0.001"	0.001"
5000	0.041"	0.045"	0.032"
7500	0.079"	0.089"	0.070"
10000	0.115"	0.130"	0.107"
15000	0.194"	0.217"	0.190"
20000	0.463"	0.488"	0.457"
24053*	1.080"	1.076"	1.027"
0 (1 min. recovery)	0.362"	0.350"	0.328"

* Cylinder travel limit reached

Note: PVC Cover is to LVDT1 side

Test Results: (Continued)

Specimen #3 (800 Series) - 04/16/12 - 67°F			
Applied Load (lbs)	Displacement (LVDT)		
	1	2	3
1000	0.000"	0.001"	0.002"
2500	0.000"	0.001"	0.008"
5000	0.051"	0.034"	0.026"
7500	0.119"	0.100"	0.089"
10000	0.191"	0.173"	0.161"
15000	0.420"	0.399"	0.383"
20000	0.896"	0.876"	0.850"
22507*	1.255"	1.123"	1.197"
0 (1 min. recovery)	0.391"	0.366"	0.335"

* *Cylinder travel limit reached*

Note: PVC Cover is to LVDT1 side



Intertek-ATI will service this report for the entire test record retention period. Test records that are retained such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by Intertek-ATI for the entire test record retention period.

Results obtained are tested values and were secured using the designated test methods. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimens tested. This report may not be reproduced, except in full, without the written approval of Intertek-ATI.

For INTERTEK-ATI:

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JMB:gh/kf

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix A - Photographs (3)
Appendix B - Graphs (4)



Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	06/13/12	N/A	Original report issue
1	04/20/15	Cover, 1, 3	Removed Cover Page, Revised first sentence in Project Summary to read Architectural Testing, Inc., and Intertek company, ("Intertek-ATI"). Replaced all instances of Architectural Testing with Intertek-ATI.
		1, 5	Corrected appendix references.



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APPENDIX A

Photographs



**Photo No. 1
Typical Test Setup**



**Photo No. 2
Bottom Center of Test Specimen showing LVDT locations**



Photo No. 3
Typical 8" Thick Specimen at Full Cylinder Travel



Photo No. 4
Typical Cracks in 8" Thick Specimen after Testing (End Cover Removed)



Photo No. 5
End View of 12" Thick Specimen (Series 1200)

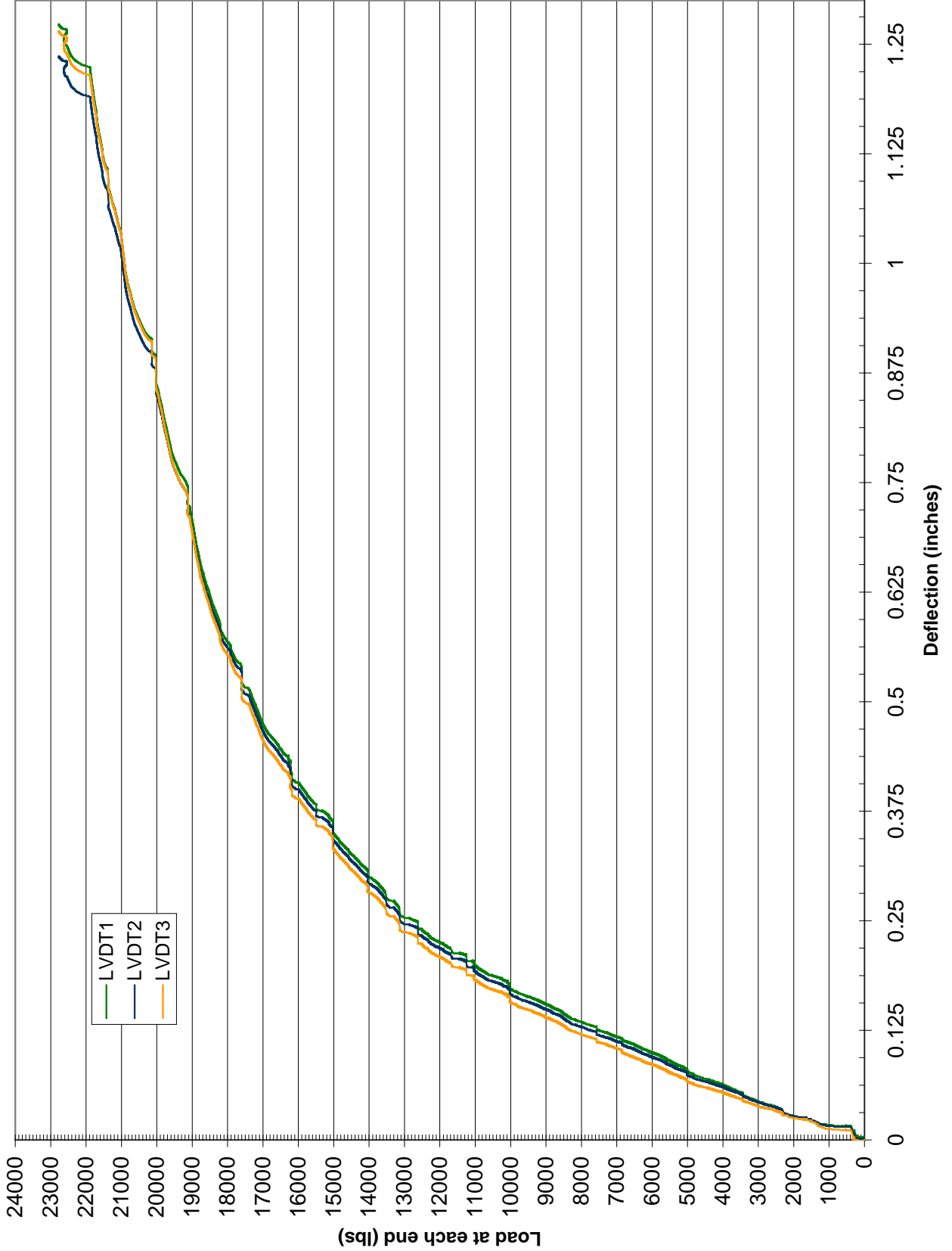


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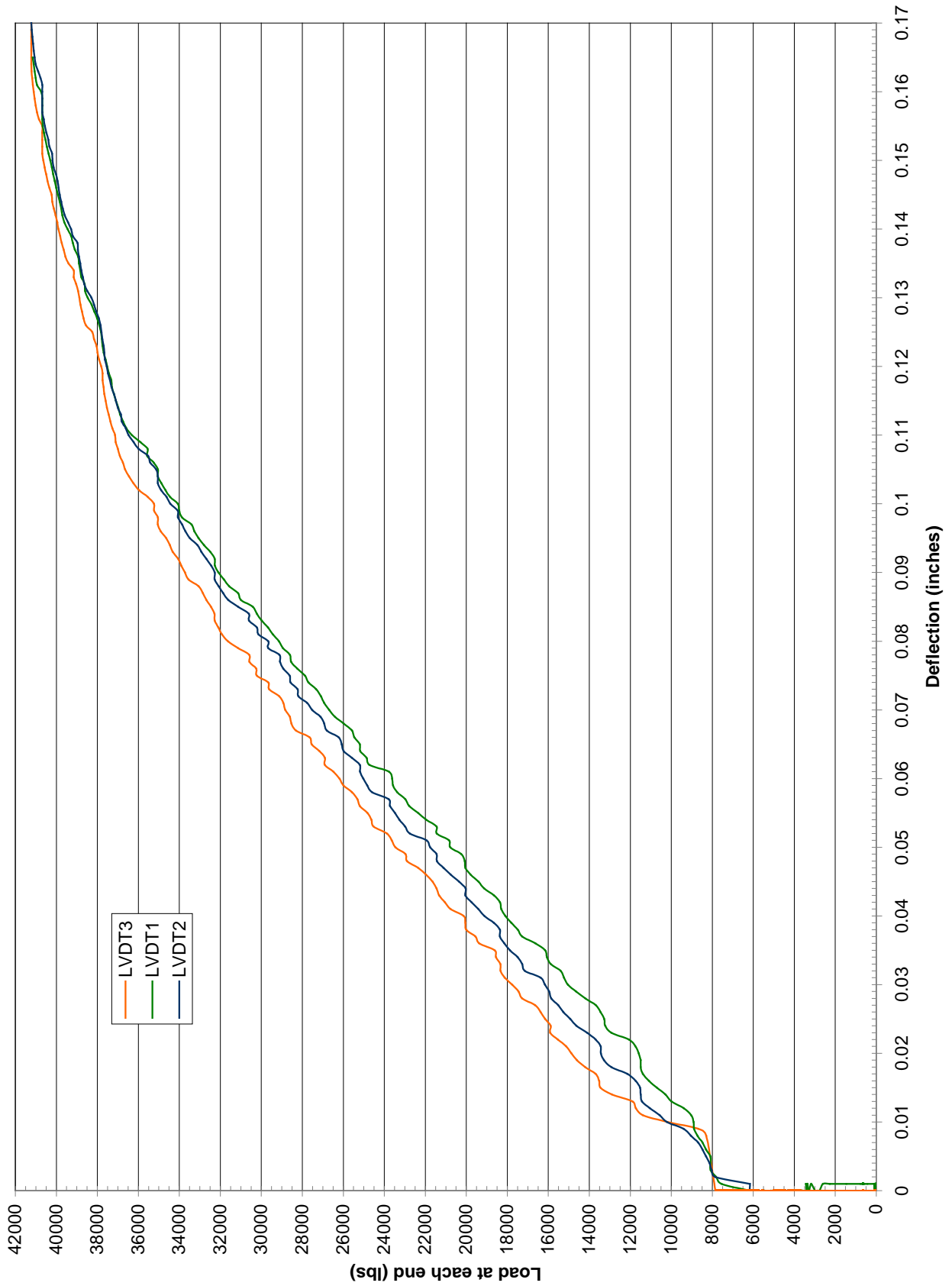
APPENDIX B

Graphs

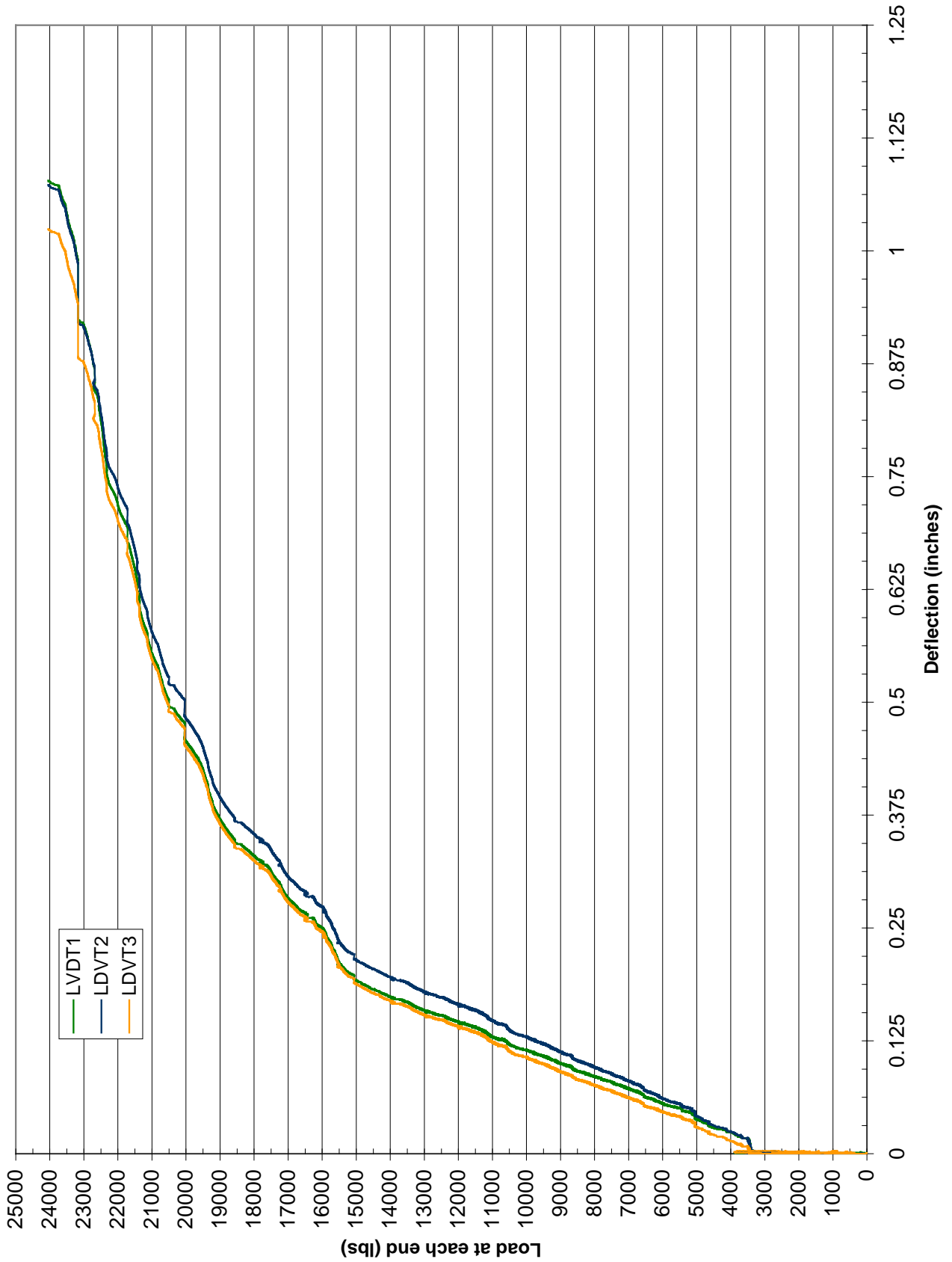
PVC Seawall Flexural Test (Specimen #2- 800 Series)



PVC Seawall Flexural Test (Specimen #1, 1200 Series)



PVC Seawall Flexural Test (Specimen #4 - 800 Series)



PVC Seawall Flexural Test (Specimen #3 - 800 Series)

