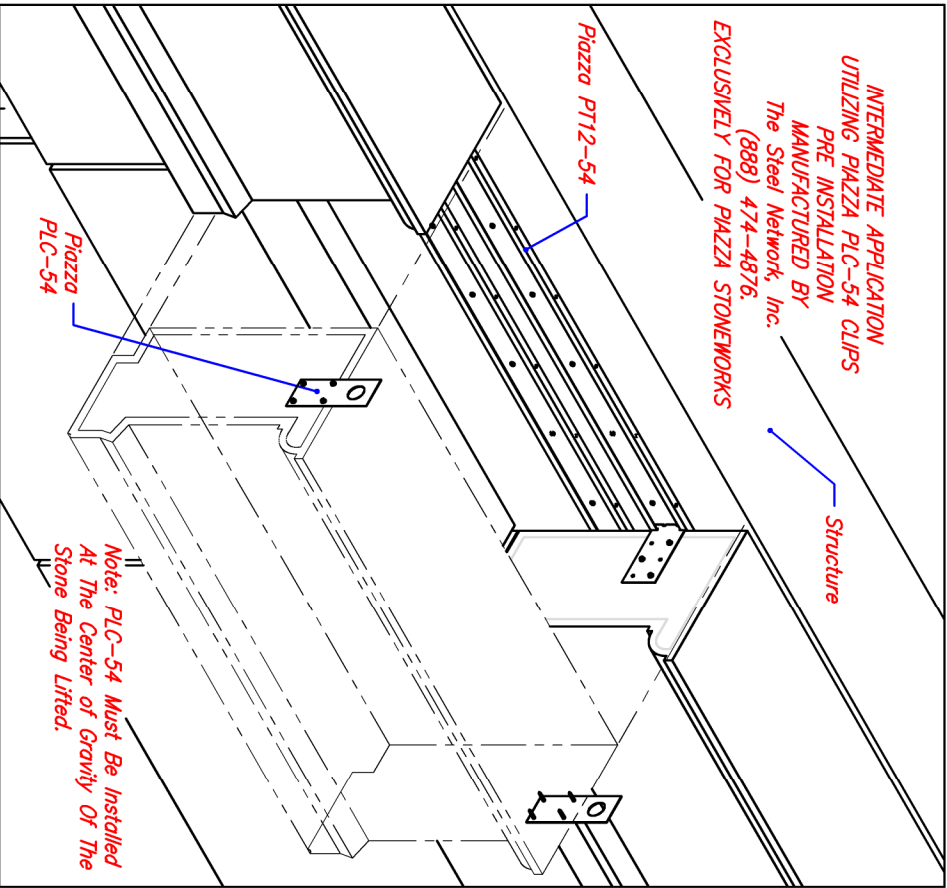
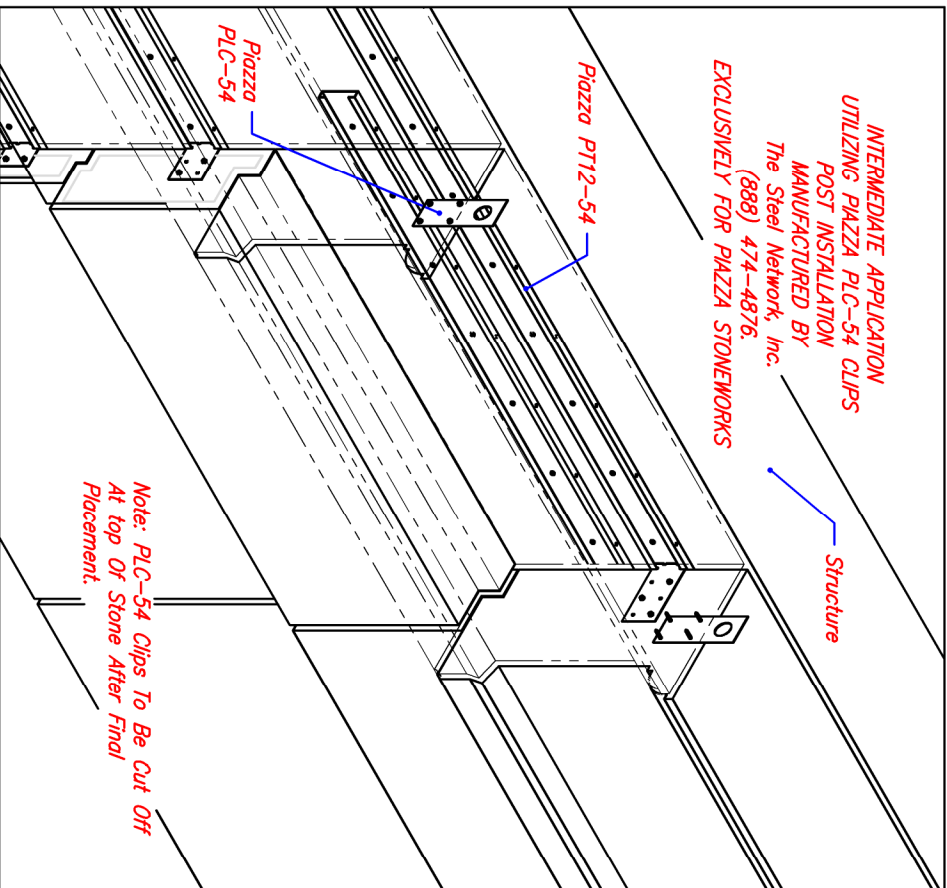


INTERMEDIATE APPLICATION  
 UTILIZING PIAZZA PLC-54 CLIPS  
 PRE INSTALLATION  
 MANUFACTURED BY  
 The Steel Network, Inc.  
 (888) 474-4876.  
 EXCLUSIVELY FOR PIAZZA STONENETWORKS



INTERMEDIATE APPLICATION  
 UTILIZING PIAZZA PLC-54 CLIPS  
 POST INSTALLATION  
 MANUFACTURED BY  
 The Steel Network, Inc.  
 (888) 474-4876.  
 EXCLUSIVELY FOR PIAZZA STONENETWORKS



DRAWING NUMBER	PLC-54 APP	REVISION
DRAWN	CBS	
CHECKED	mjh	
DATE	1/13/2021	
SHEET		

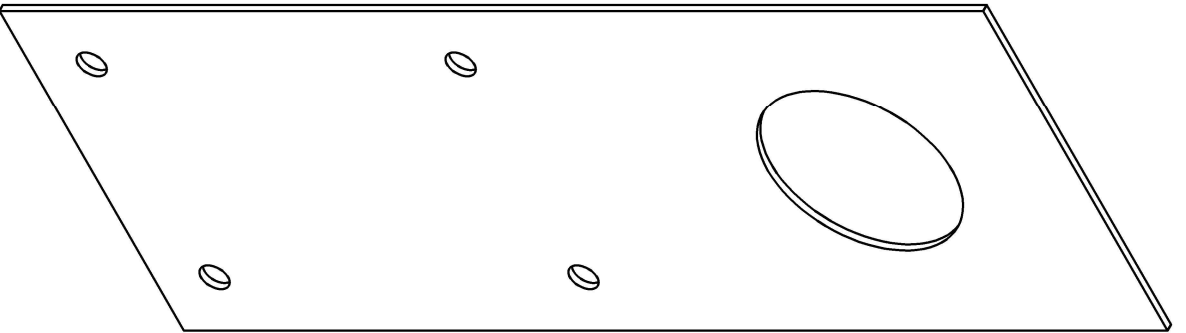
TITLE	PIAZZA PRODUCT APPLICATION
CUSTOMER	PIAZZA STONENETWORKS

PROJECT	PIAZZA PRODUCTS
SHEET TITLE	PLC-54 APPLICATION

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Confidential:  
 PLC-54  
 54mil Min Thickness  
 50ksi Min Yield  
 G90 Min Coating



DRAWING NUMBER		PLC-54	REVISION
DRAWN	CHECKED		
CBS	mjh		
SHEET	DATE		
	1/6/2020		

TITLE  
 PIAZZA PRODUCT DETAIL  
 CUSTOMER  
 PIAZZA STONEWORKS

PROJECT  
 PIAZZA PRODUCT W/ ISO  
 SHEET TITLE  
 PIAZZA PLC-54

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# Structural Test Report

Piazza PLC-54

F3 (Gravity)

12/31/2020

**Written by:** Sean Doty

**Reviewed by:** Matt Harford, Director of Engineering and Quality

**The Steel Network, Inc.**

Engineering Department

PO Box 13887, Durham, NC 27709

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## BACKGROUND

The PiazzaStone track and clip system is designed for lightweight stone attachment to structures. Various combinations of PiazzaStone clips can be used on their own or in conjunction with a track in accordance with design requirements.

Prior to installation, sometimes the panels are heavy enough that it is best to lift them into place with a hoist. To provide a solution in this scenario, PiazzaStone has requested The Steel Network, the exclusive manufacturer of these clips, to provide a lift clip that is tested and load-rated for this application.

## PURPOSE OF CURRENT TESTS

The present tests were conducted to evaluate the strength in the gravity directions of a single PLC-54 clip. This test did not analyze the out-of-plane (F2) strength of the clip or any combination of load directions.

This test was required to obtain a sufficiently conservative ASD value for the PLC-54 when it is used to lift panels into place. It should be noted that the test analyzes the strength of the clip itself, but not the entire connection. The connection of the fasteners into the stone must still be analyzed by a design professional.

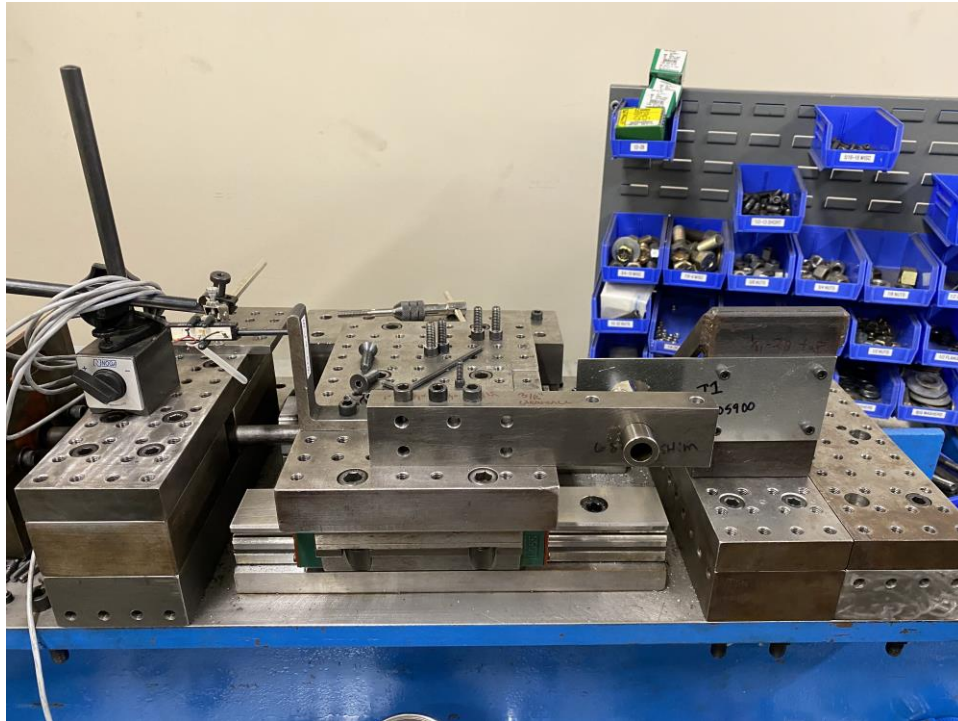
## EQUIPMENT

The following equipment was used:

1. A test setup illustrated by Figure 1 and Figure 2
2. A hydraulic cylinder capable of applying excess of 50 kips of linear load
3. A load cell capable of measuring load at 0.5s increments
4. Linear potentiometers capable of measuring up to 1.5" of linear deflection
5. Angle, plate, and block fixtures to locate the test specimens
6. Socket-head cap screws to secure the test samples to the stationary block and pillow block, respectively
7. A National Instruments program to record incoming data from the strain gauge and potentiometers in a CSV file with a time stamp and date stamp
8. A Microsoft Excel worksheet developed to calculate clip ASD and LRFD design loads in accordance with AISI S100-16, Chapter K
9. A Microsoft Excel worksheet developed to calculate connection design loads based on screw orientation in accordance with AISI S100-16, Chapter K

## PROCEDURE

The Piazza PLC-54 has a large hole through which a 1" tube was run. The other end of the clip has four smaller holes through which 1/4-20 SCHCs were run. These SCHCs mounted the clip to a supported L-angle which was securely bolted down into a stationary block. The 1" tube was inserted snugly into a block which was securely bolted down into the pillow block, through which the load was applied. This test setup can be seen in figure 1. A diagram of the test bench can be seen in Figure 2.



*Figure 1: Test Setup*

The 1.5" linear potentiometer was placed on the pillow block to measure the deflection of the clips.

Load was applied until failure. After the completion of the test, the data was analyzed in accordance with AISI S100-16, Section K.

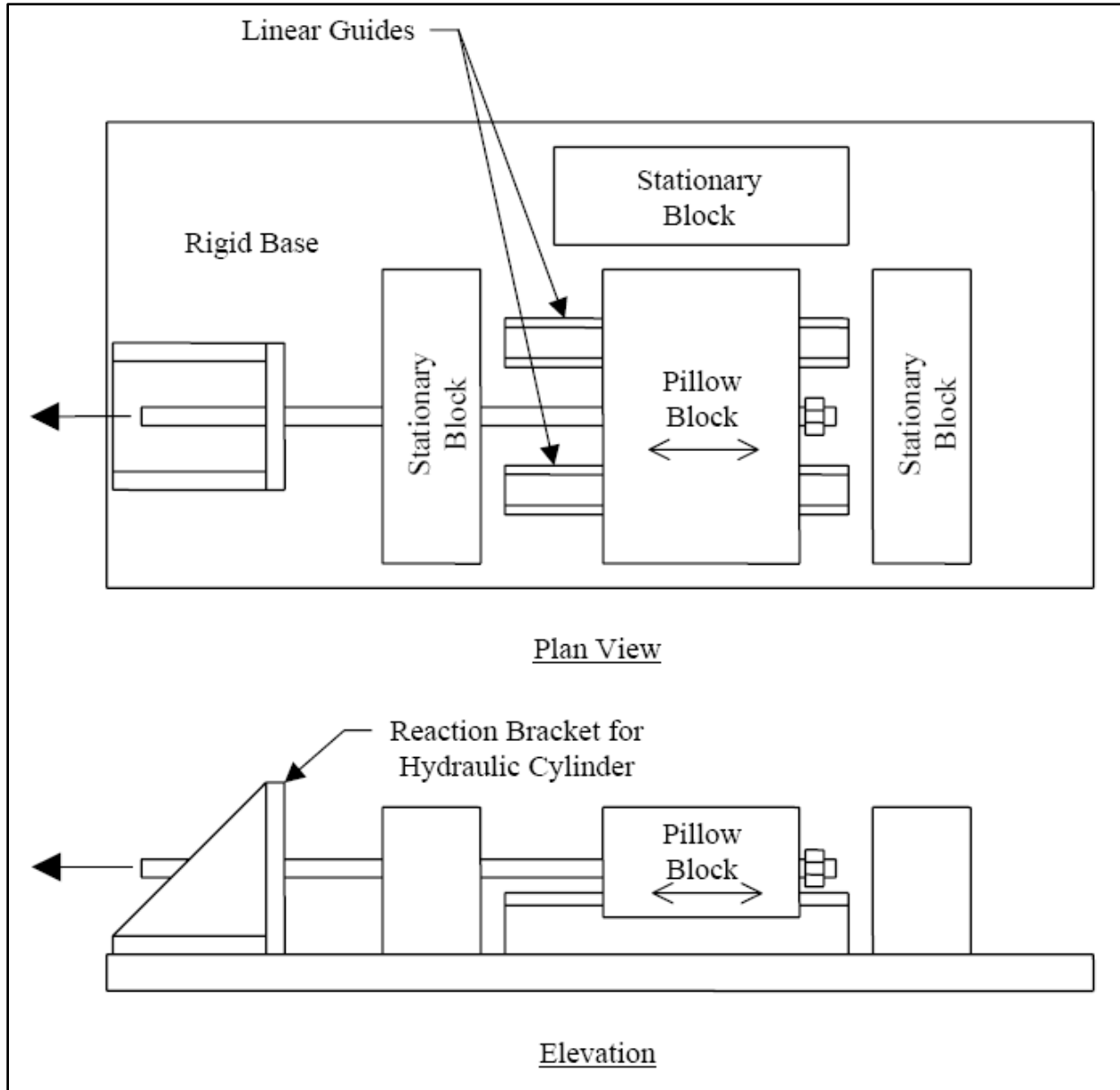


Figure 2: Test Apparatus Diagram

## TEST MATRIX

Product	F1	F2	F3	M1
			x	

## RESULTS

### Test 1

Design Information (lbs)	
ASD	589
$\omega$	3.50
LRFD	942
$\phi$	0.457
Nominal	1047
Ultimate	2062

## OBSERVATIONS

### Test 1

The hydraulic cylinder was slowly pumped and the load steadily increased in a steep slope. Buckling in the clip began occurring before the 1/8" serviceability limit. A false maximum occurred after this buckling before the load resumed rising. At approximately 2200 lbs in each test, the clip began tearing which led to a dramatic reduction in the load. This was considered to be the failure mode.

This behavior is demonstrated by the chart attached to this test report. The calculated design load of 589 lbs is sufficiently conservative, as this load was significantly prior to deformation in the clip on all 3 tests.

## SUMMARY OF RESULTS

In summary, the Piazza PLC-54 clip can be rated for an ASD of 589 lbs based on the test presented in this report. The connection to the stone must be analyzed separately from the results of this test and this is the responsibility of the design professional.

## ATTACHMENTS

See additional pages appended to this Structural Test Report for material test information pertaining to the test samples in this report.

The attachments which follow contain detailed test information from each structural test mentioned in this report. In addition, there is a drawing of the version of the clip which was tested.



## Piazza PLC-54 F3

Test #	Load @ 1/8 in	Max Load Unscaled
1	1190	2353
2	1190	2165
3	1231	2379

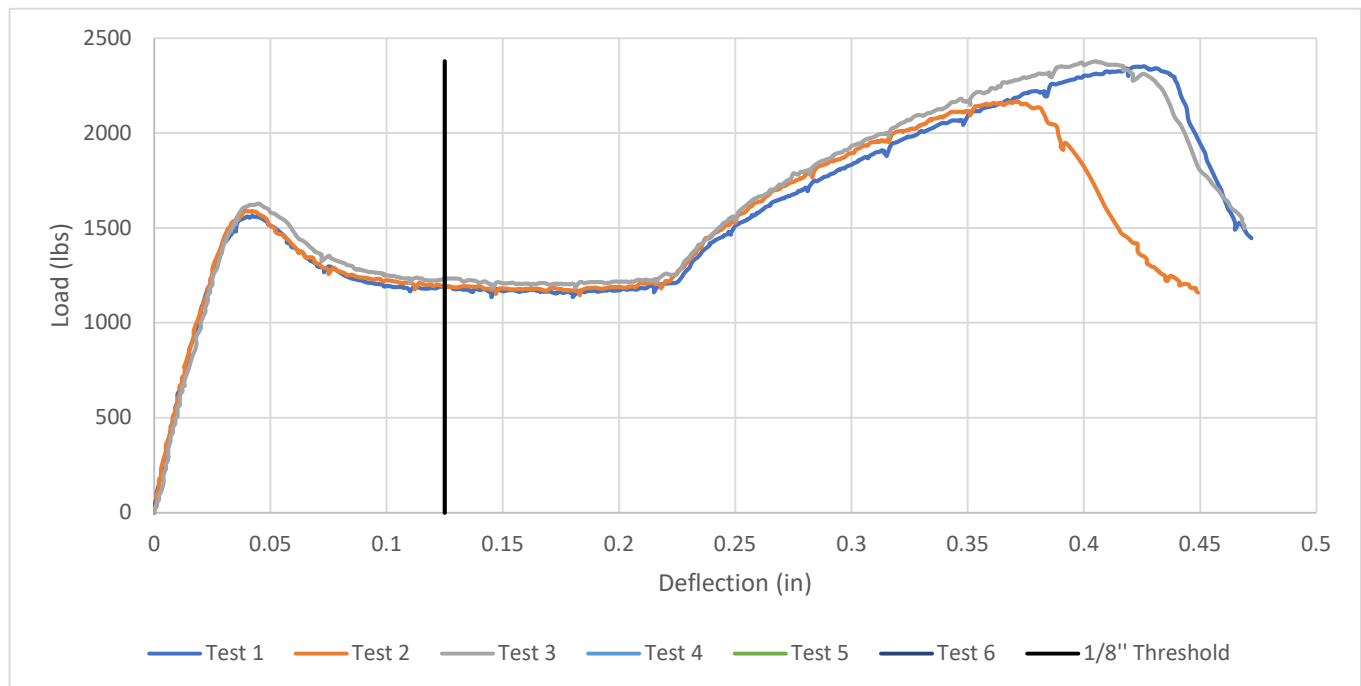
Test ID	PLC-54-1-F3
Date	12/30/2020
Standard	AISI S100-16, Chapter K
Avg Max Load Unscaled	2299
Strength Scale Factor	0.897
Thickness Scale Factor	1
Avg Scaled Max Load/F.S.	589
Avg Load @ 1/8 in	1204

Design Information (lbs)	
ASD	589
$\omega$	3.50
LRFD	942
$\phi$	0.457
Nominal	1047
Ultimate	2062

Sensors Calibrated?	Yes
AISI Test Type	Screw Connections
Failure Mode	Clip tearing

### Test Results

The hydraulic cylinder was slowly pumped and the load steadily increased in a gentle slope. Buckling in the clip began occurring before the 1/8 serviceability limit. A false maximum occurred after this buckling before the load resumed rising. At approximately 2200 lbs in each test, the clip began tearing which led to a dramatic reduction in the load.

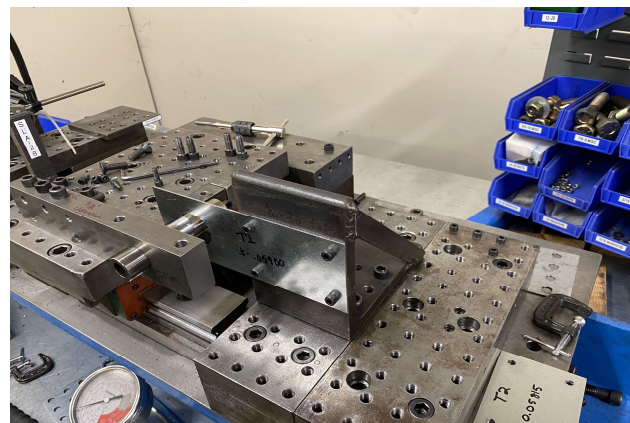


## Test Sample Information

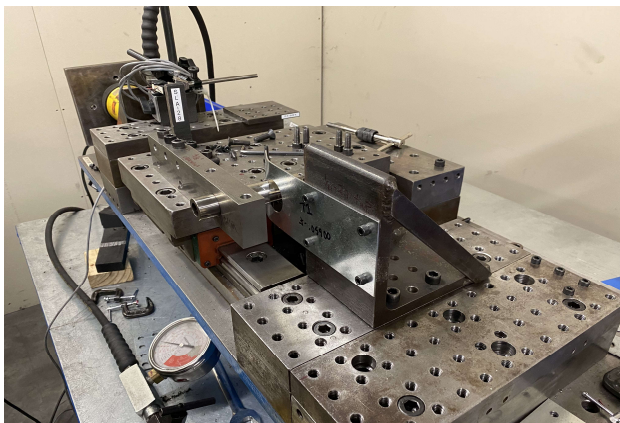
Specified Clip Material Properties	
Steel Grade	ASTM A1003 ST50H
Coating	ASTM A653 G90
Specified Yield Strength (ksi)	50
Specified Tensile Strength (ksi)	65
Specified Design Thickness (in)	0.0566

ASTM A370 Tested Material Properties	
Material Property Source	ASTM A370 Test by Steel Mill
Actual Yield Strength	53.18
Actual Tensile Strength	72.47
Elongation	30.5
Material Test Vendor	N/A
Material Test Number	N/A

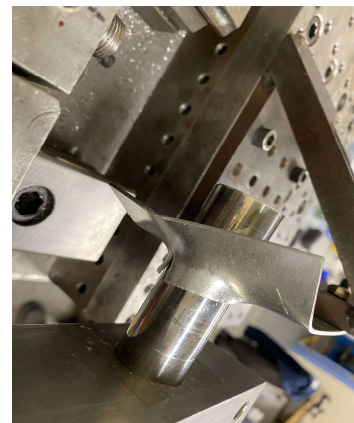
Measured Thicknesses	
Sample	Actual Thickness
Test 1	0.059
Test 2	0.05815
Test 3	0.0577



Pre Test

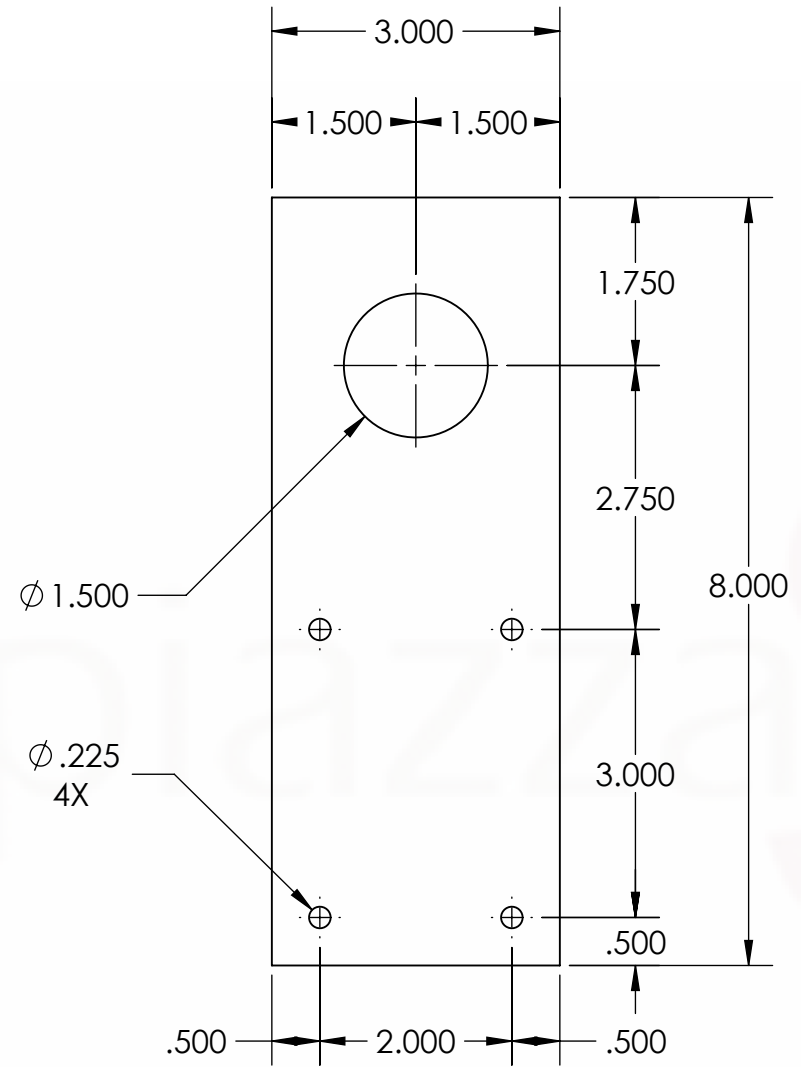


Mid Test



Post Test

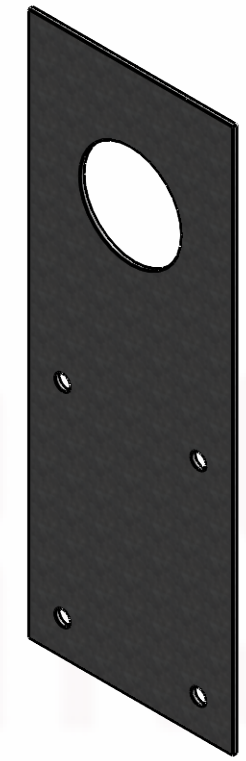
Material Gauge	Bend Allowance
16ga/54mil	0.1



**FRONT VIEW**  
SCALE: 1" = 1" 1:2



**SIDE VIEW**  
SCALE: 1" = 1" 1:2



**ISOMETRIC VIEW**  
SCALE: 1/2" = 1" 1:2



PART NAME PLC-54		
DRAWN BY BRS	APPROVED BY MJH	DRAWING VERSION Production
DATE 12/29/2020	DATE 12/29/2020	VIEW SCALE 1:2

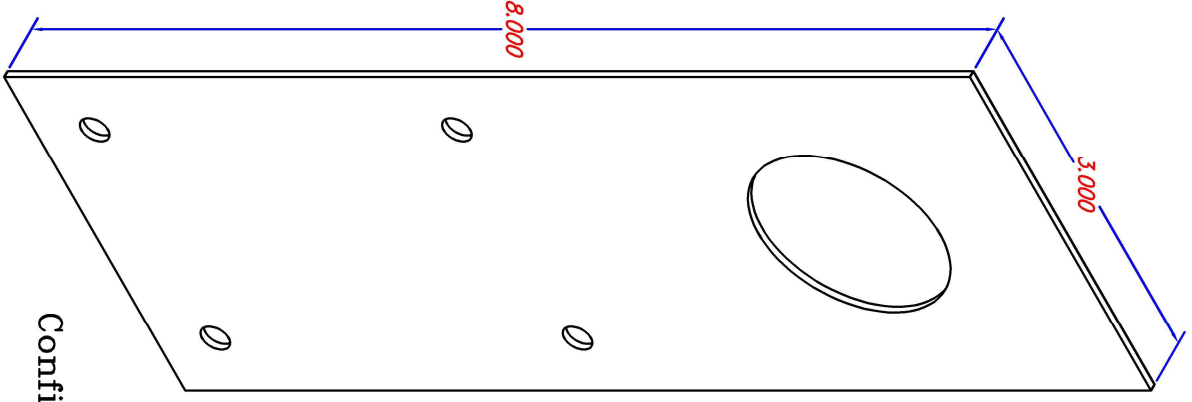
REVISION MAP			
REV.	DESCRIPTION	DATE	APPROVED
01	Initial release	12/29/2020	mharford

MATERIAL SPECIFICATION
ASTM A1003 ST50H 50ksi Min Yield Strength 60ksi Min Tensile Strength 0.0538 Min Base Metal Thickness 0.0553 Min Coated Thickness G90 Min Coating or Approved Equivalent

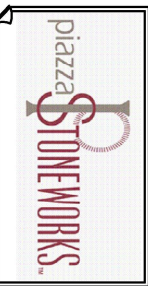
TOLERANCE
1.00" and Under: ±0.031" 1.00"-2.00": ±0.047" Over 2.00": ±0.062" Holes and Slots: ±0.005" Angles: ±1.5° Inside Radius = 1.5(Thickness)

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HARDCOPY LOCATIONS
Production File



Confidential: PLC-54



PART NUMBER		REVISION	
PLC-54	APPROVED		
DRAWN	mjh		
DATE	DATE		
1/4/2021	1/4/2021		

**MATERIAL SPECIFICATION**  
 ASTM A 1003 ST50H  
 50ksi Min Yield Strength  
 65ksi Min Tensile Strength  
 0.0538" Min Base Metal Thickness  
 0.0563" Min Coated Thickness  
 G90 Min Coating or Approved Equivalent

**TOLERANCE**  
 1.00" and Under: ±0.031"  
 1.00"-2.00": ±0.047"  
 Over 2.00": ±0.062"  
 Holes and Slots: ±0.005"  
 Angles: ±1.5°  
 Inside Radius = 1.5(Thickness)

**HARD COPY LOCATIONS**  
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