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TITAN BUILDING PRODUCTS
TEST REPORT

SCOPE OF WORK
EVALUATION OF CEDAR AND SPF POSTS FITTED WITH THE TITAN HARDWOOD POST ANCHOR PIPE, TRANSVERSE AXIAL TENSION BRACKET, AND TIEV 3.5 IN. POST ANCHOR.

REPORT NUMBER
103343068TOR-001

TEST DATE
02/20/18

REVISION DATE
05/02/18

RECORD RETENTION END DATE
05/02/23

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13

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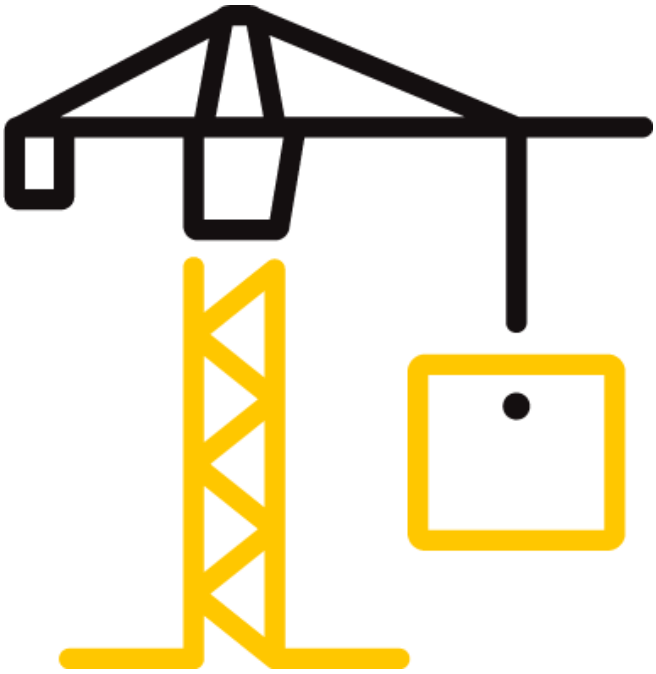

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TEST REPORT FOR TITAN BUILDING PRODUCTS
Report No.: 103343068TOR-001
Revision Date: 05/02/18

REPORT ISSUED TO

TITAN BUILDING PRODUCTS
5450 Canotek Rd Unit 71
Ottawa, ON K1J9G6
Canada

SECTION 1

SCOPE

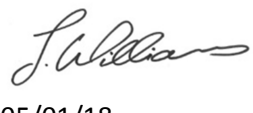
Intertek Building & Construction (B&C) was contracted by Titan Building Products to perform testing of 4 in. x 4 in. western red cedar and SPF posts fitted with the Titan Hardwood Post Anchor Pipe, Transverse Axial Tension Bracket, and TIEV 3.5 in. Post Anchor, following the testing methods outlined in *Acceptance Criteria for Handrails and Guards* (AC 273) " (Approved June 2017)-Section 4.4.This evaluation was conducted on February 20th, 2018.

SECTION 2

SUMMARY OF TEST RESULTS

The 4 in. x 4 in. western red cedar and SPF posts fitted with the Titan Hardwood Post Anchor Pipe, Transverse Axial Tension Bracket, and TIEV 3.5 in. Post Anchor, installed on concrete, achieved the deflection and ultimate load results as summarized in Section 7 of this report.

For INTERTEK B&C:

COMPLETED BY:	Tyrone Williams	**REVIEWED BY:**	Joe DeRose, P. Eng
TITLE:	Technician – Building Products	**TITLE:**	Project Engineer, Evaluation Services
SIGNATURE:		**SIGNATURE:**	
DATE:	05/01/18	**DATE:**	05/01/18

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SECTION 3
TEST METHOD(S)

The specimen was evaluated in accordance with the following:

- Post, post base and post base attachment to substrate testing of individual posts per Acceptance Criteria for Handrails and Guards (AC 273) "(Approved June 2017)-Section 4.4.

SECTION 4
EQUIPMENT

Calibration of test equipment was performed by Intertek B&C in accordance with ISO 17025 requirements.

Instrument/Equipment	Asset #	Calibration Due Date
2K Load Cell with Digital Indicator	280-01-0774	December 11th 2018
Stop Watch	273-01-1202	November 28th 2018
1200mm Scale	280-01-0919	December 4th 2018
Powerfist 24" stroke hydraulic ram	N/A	N/A
Electric Hydraulic Pump	N/A	N/A

SECTION 5
TEST SAMPLE

5.1 SAMPLE SELECTION

The client submitted thirteen (13) 4 in. x 4 in. SPF wood posts and nineteen (19) 4 in. x 4 in. western red cedar wood posts to the evaluation center on December 20th, 2017.

5.2 SAMPLE ASSEMBLY AND DESCRIPTION

The wooden posts provided by Titan for testing were nominal 4 in. x 4 in. square western red cedar and SPF. The bottom of the posts were fitted by Titan with a 1.25 in. dia. x 11 in. threaded steel pipe secured in place by two (2) 0.5 in. dia. x 3.38 in. steel bolts. Per the drawings appended to this report the posts were connected to a steel base plate via a 0.8 in. dia. x 1.75 in. threaded steel bolt, screwed into a 0.77 in. dia. hole located in the center of the base plate. The steel base plate measuring 3.5 in. x 3.5 in. x 0.5 in. thick consists of four (4) additional holes spaced 2.5 in. on center. The four holes were 0.4 in. dia. x 0.25 in. thickness with a 0.8 in. x 0.25 in. deep counterbore.

Base plates were anchored to a concrete substrate using four (4) 0.375 in. dia. x 3 in. hex head concrete screws.

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SECTION 6
TESTING AND EVALUATION

6.1 Specimen Preparation

The post, post base and anchors were shipped to the Intertek laboratory in Mississauga, Ontario. The Posts were assembled and anchored to a concrete substrate.

6.2 Conditioning

The post specimens were tested in the laboratory under ambient conditions. No specific conditioning parameters were required before testing. After arrival, the SPF and Cedar wood posts were allowed to be acclimatized to the test environment for a minimum of two weeks.

6.3 Procedure

Horizontal Concentrated Load on Post

The initial position of the top of the post was measured. A concentrated horizontal load of 200 lbf (0.89 kN), delivered with a 4 in. by 4 in. platen was applied to the top of the post by means of a calibrated load cell/single ram/pump system and held for 1 minute. The position of the post was again measured and recorded. The load was then increased to 500 lbf (2.22 kN) for concrete substrates, and held for 1 minute. The load was then released. After release of the load, the post, post base and attachment were evaluated for failure, evidence of disengagement and/or visible cracks in any component. The horizontal load was then applied until failure occurred.

The load was applied at a height of 42 inches (1067 mm) from the deck floor.

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SECTION 7
TEST RESULTS

Sample	Measured Net Deflection At 200 lbf (in.)	Allowable Deflection at 200 lbf (h/12) (in.)	Test Results at 500 lbf load	Ultimate Load (lbs)	Conformance to AC273 Post Performance Requirements
CEDAR POST (Transverse Axial Tension Bracket Incorporated)					
1	1.4	3.5	After release of the load there was no evidence of disengagement or visible cracks in any component of the post, post base and attachment system	589	Pass
2	1.6			594	
3	0.9			640	
SPF POST (Transverse Axial Tension Bracket Incorporated)					
1	1.4	3.5	After release of the load there was no evidence of disengagement or visible cracks in any component of the post, post base and attachment system	578	Pass
2	1.0			604	
3	1.5			557	

The maximum allowable post spacing as per AC273 section 4.3, for guard and handrail systems with wood component(s), shall be the average ultimate load divided 150 lbf/ft. The resulting maximum allowable post spacing for posts fitted with fitted with the Titan Hardwood Post Anchor Pipe, Transverse Axial Tension Bracket, and TIEV 3.5 in., is 3.86 ft. for SPF posts and 4.0 ft. for Cedar posts.

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SECTION 8
CONCLUSION

Intertek Building & Construction (B&C) has conducted testing of 4 in. x 4 in. cedar and SPF posts fitted with the Titan Hardwood Post Anchor Pipe, Transverse Axial Tension Bracket, and TIEV 3.5 in. Post Anchor. Testing was conducted with the posts anchored to concrete, following the testing methods outlined in Acceptance Criteria for Handrails and Guards (AC 273) Approved June 2017, Section 4.4.

The posts, post bases and post base attachments as detailed in this report achieved the performance results summarized in Section 7.

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

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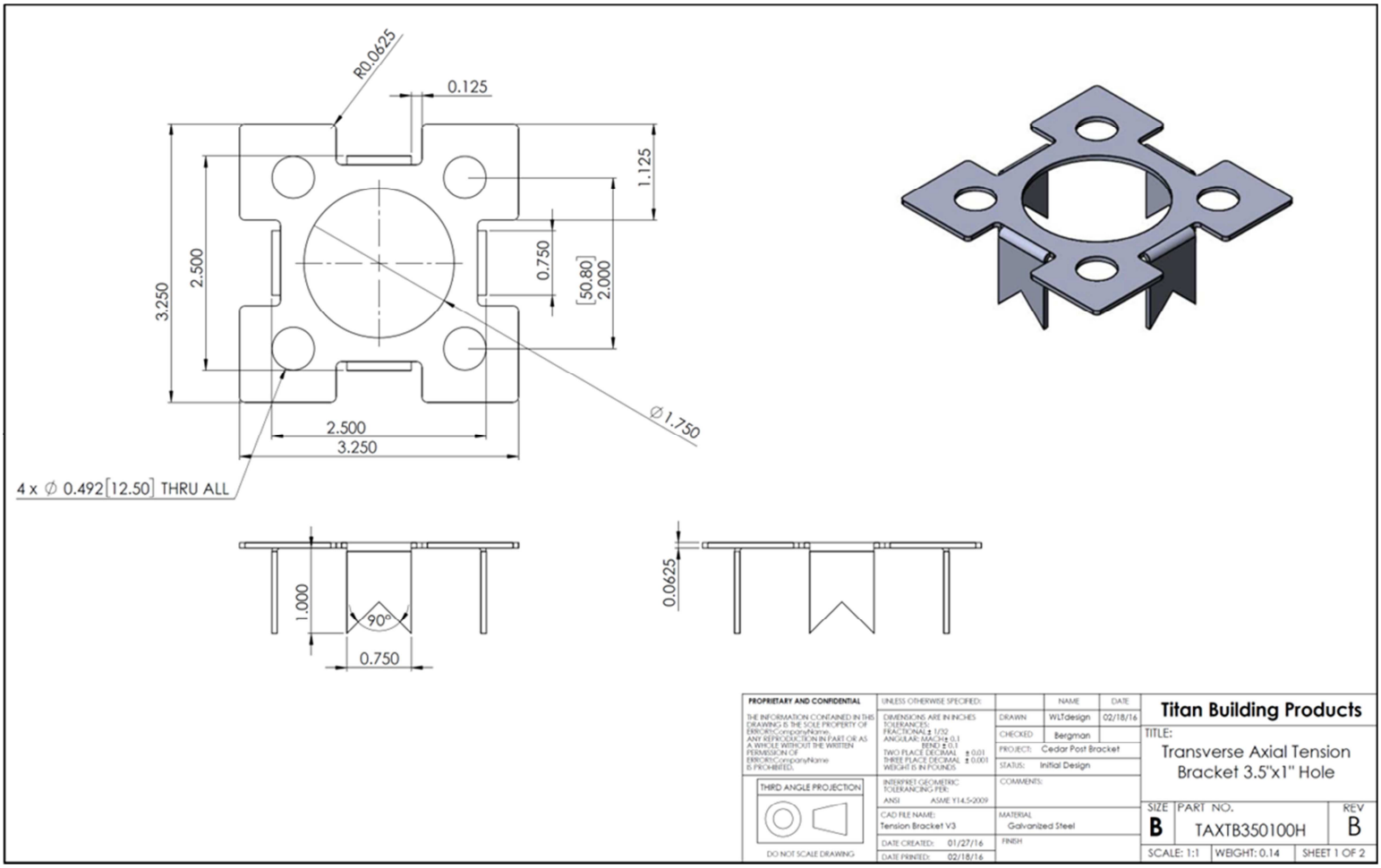
SECTION 9
APPENDIX - DRAWING



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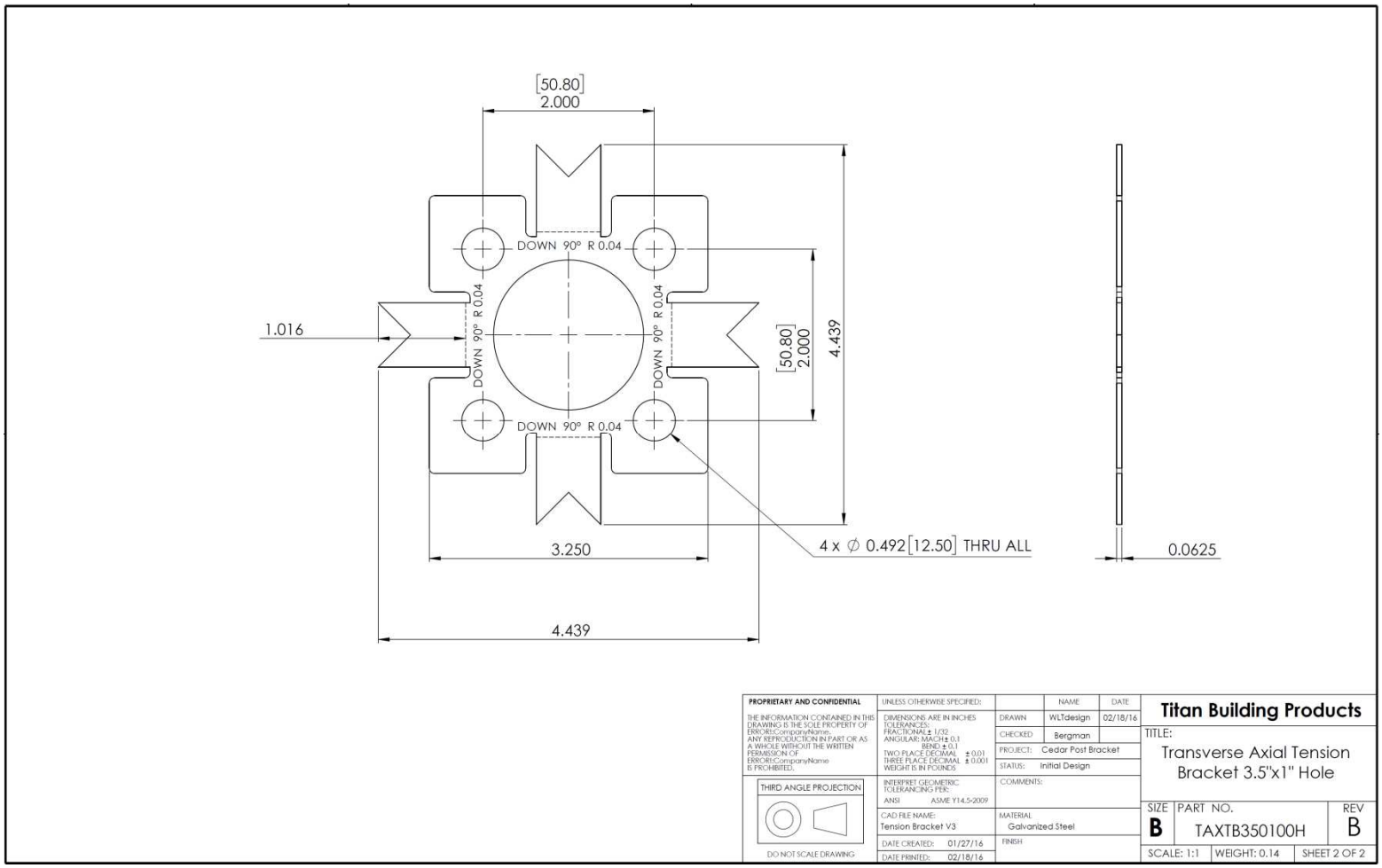

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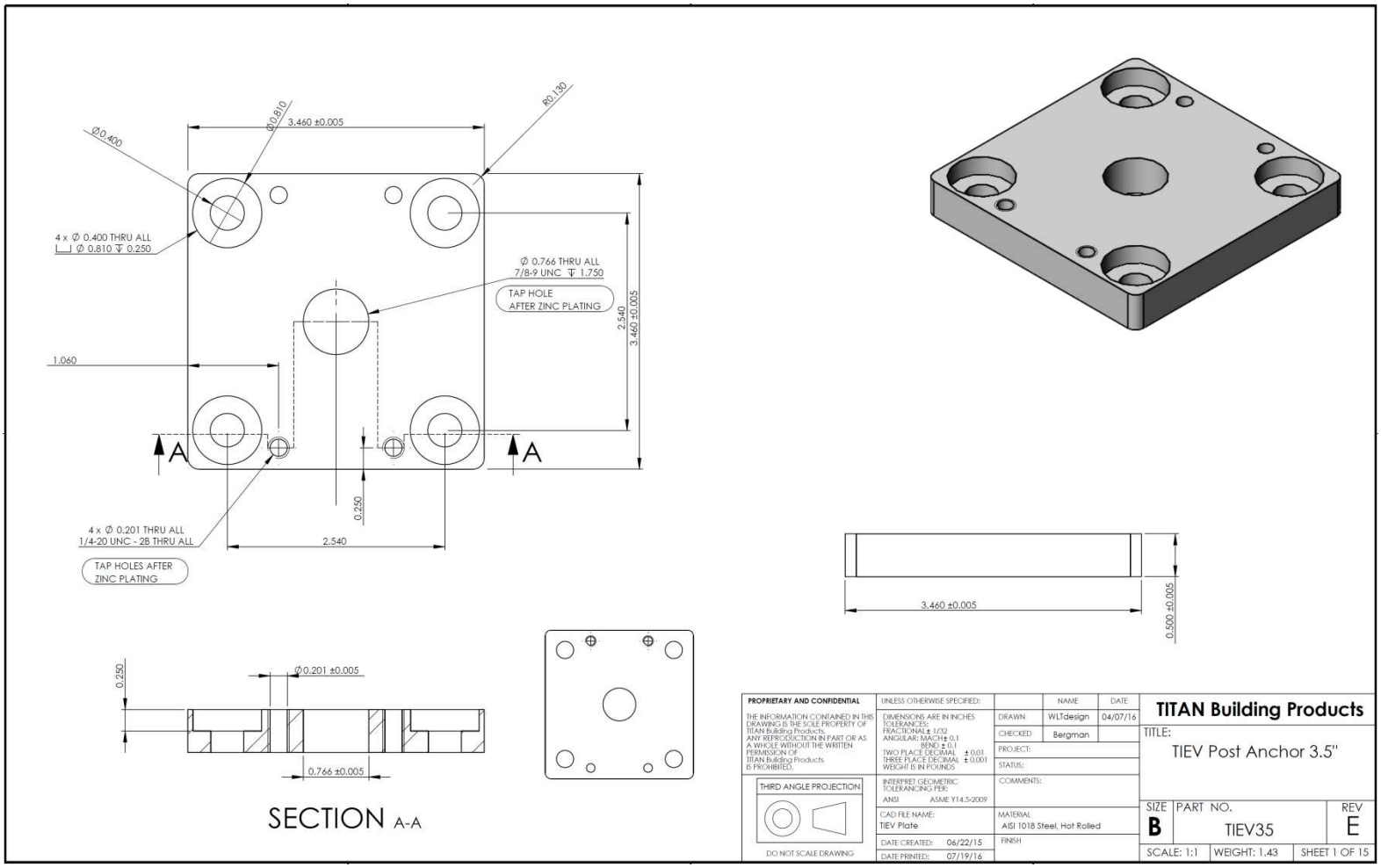

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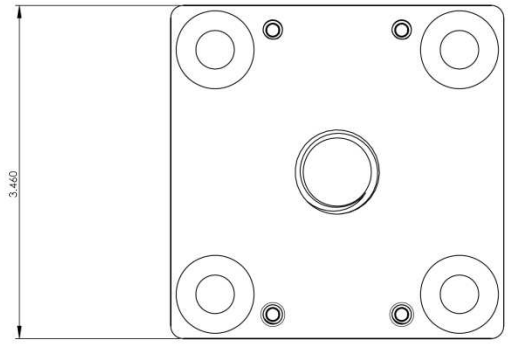
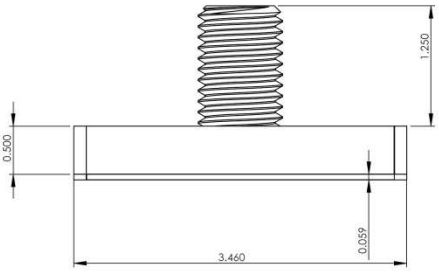
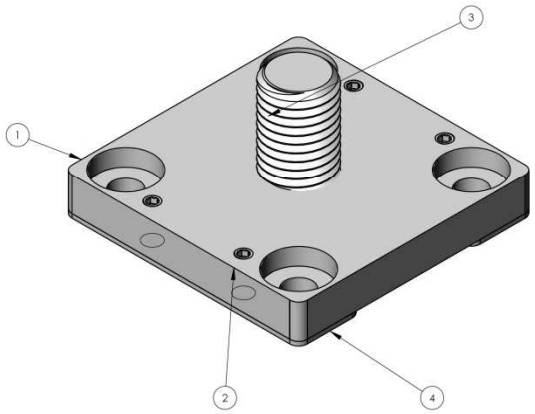
ITEM NO.	PART NUMBER	DESCRIPTION	TIEV-35/SteelOnly
1	TIEV35	TIEV Post Anchor 3.5"	1
2	94105A537	Set Screw 1/4-20 x 0.5"	4
3	90322A203	Rod Grade8-B7 7/8-9 x 1.75	1
4	TIEV35-SP	TIEV Set Screw Surface Plate 3.5"	2







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DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ± 1/32
ANGULAR: MACH ± 0.1
BEND ± 0.1
TWO PLACE DECIMAL ± 0.01
THREE PLACE DECIMAL ± 0.001
WEIGHT IS IN POUNDS
INTERPRET GEOMETRIC TOLERANCING PER:
ANSI ASME Y14.5-2009
CAD FILE NAME: TIEV Post Anchor
DATE CREATED: 06/22/15
DATE PRINTED: 07/19/16

	NAME	DATE
DRAWN	WLTdesign	04/07/16
CHECKED	Bergman	
PROJECT:		
STATUS:		
COMMENTS:		
MATERIAL	See BOM	
FINISH		

TITAN Building Products
TITLE: TIEV 3.5" Post Anchor
SIZE B | PART NO. TIEV35 | REV F
SCALE: 1:2 | WEIGHT: 1.80 | SHEET 14 OF 15

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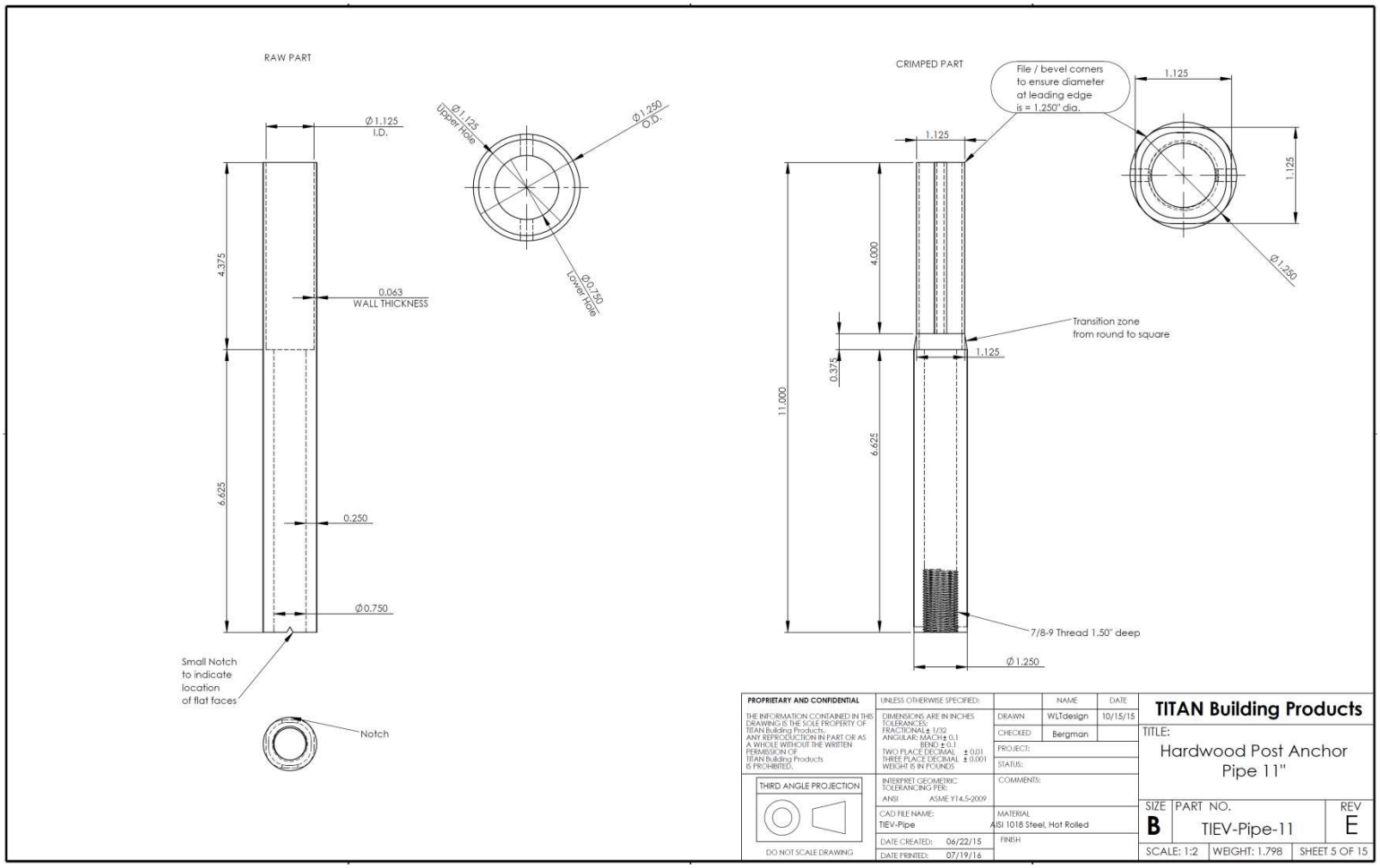

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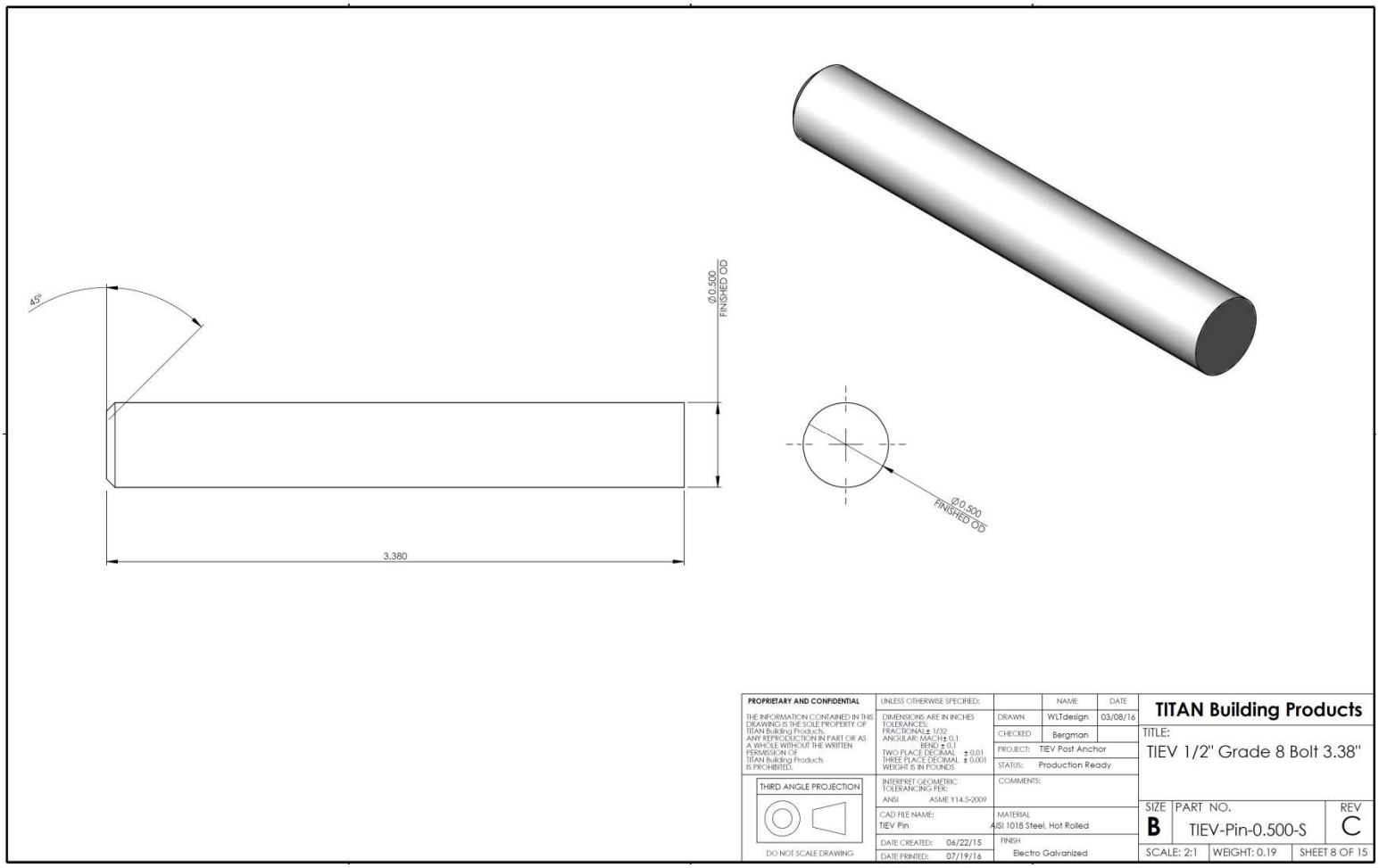

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SECTION 10
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	02/28/18	-	Original Report Issue
1	04/03/18	2, 3	Editorial change to Section 3- Header location.
2	05/01/18	5, 6	Results for posts without the incorporation of transverse axial tension brackets were removed as Titan considered these results unnecessary.