SPECIFICATIONS
Wheel Traps
NB688000-16- 03032

BACKGROUND

The Ion Storage Group is a part of the Time and Frequency Division of the National Institute of Standards and Technology (NIST) in Boulder, CO. Started in 1978, the Ion Storage Group develops high-accuracy optical atomic clocks based on trapped and laser cooled atomic ions. The aluminum and mercury ion clock systems pioneered by the Ion Storage Group are strong candidates for next-generation time and frequency standards that will further advance modern metrology. In these systems, precise, low-noise ion traps play a critical role.

PURPOSE

NIST uses Radio Frequency on traps in order to confine and isolate single atomic ions. These traps confine the ions at the center of an RF electric quadrupole potential generated using precision machined electrodes driven by phase coherent RF synthesizers. Thermal performance is also important, as the trap must dissipate the RF power with minimal heating. NIST requires ion traps that are laser-cut from high thermal-conductivity diamond and metallized with gold electrodes.

DELIVERABLES

Four laser-cut diamond ion traps with gold metallization.

TECHNICAL SPECIFICATIONS

NIST requires four of the ion trap Hard-Wired_Wheel_Trap_v2 as specified in the attached document WheelTrapC-SMB81.pdf. The traps must be laser-cut from high thermal-conductivity diamond with a tolerance of ±0.005 mm. Gold is to be plated onto the indicated areas by sputtering. Adhesion-layers must not include magnetic materials. Electrical isolation between all electrode pairs and from ground to each electrode must be greater than 550 M-Ohm at an applied voltage of 500 V. Carbon residue from laser machining process, which can lead to electrical shorting, must not be present in locations between electrodes.

TECHNICAL CONSIDERATIONS

The most important specifications are the electrical isolation, mechanical tolerances, and gold metallization.

GOVERNMENT FURNISHED PROPERTY OR INFORMATION

N/A

DELIVERABLE SCHEDULE

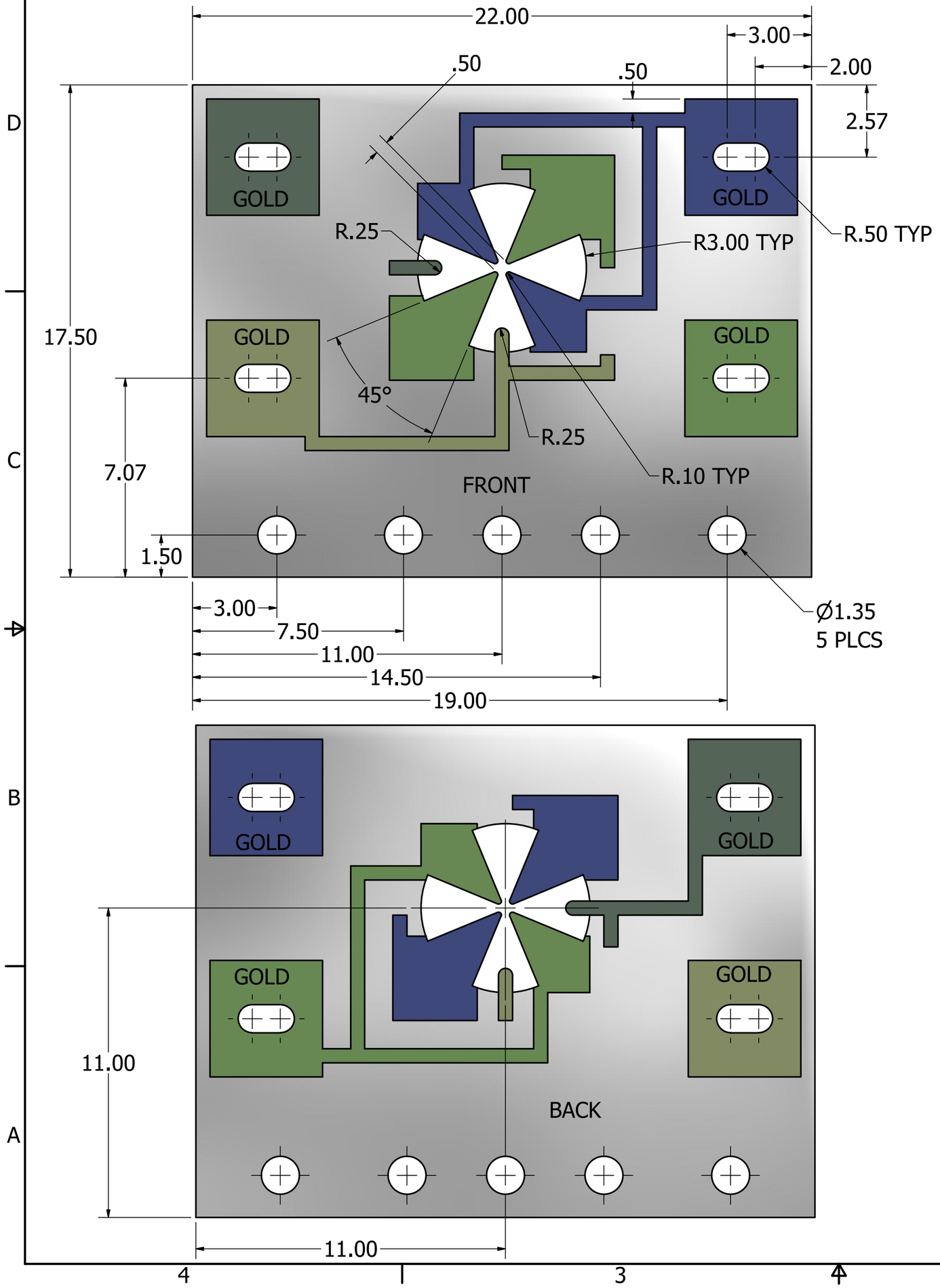
Delivery is required no later than ten (10) weeks after receipt of order.

INSPECTION AND ACCEPTANCE

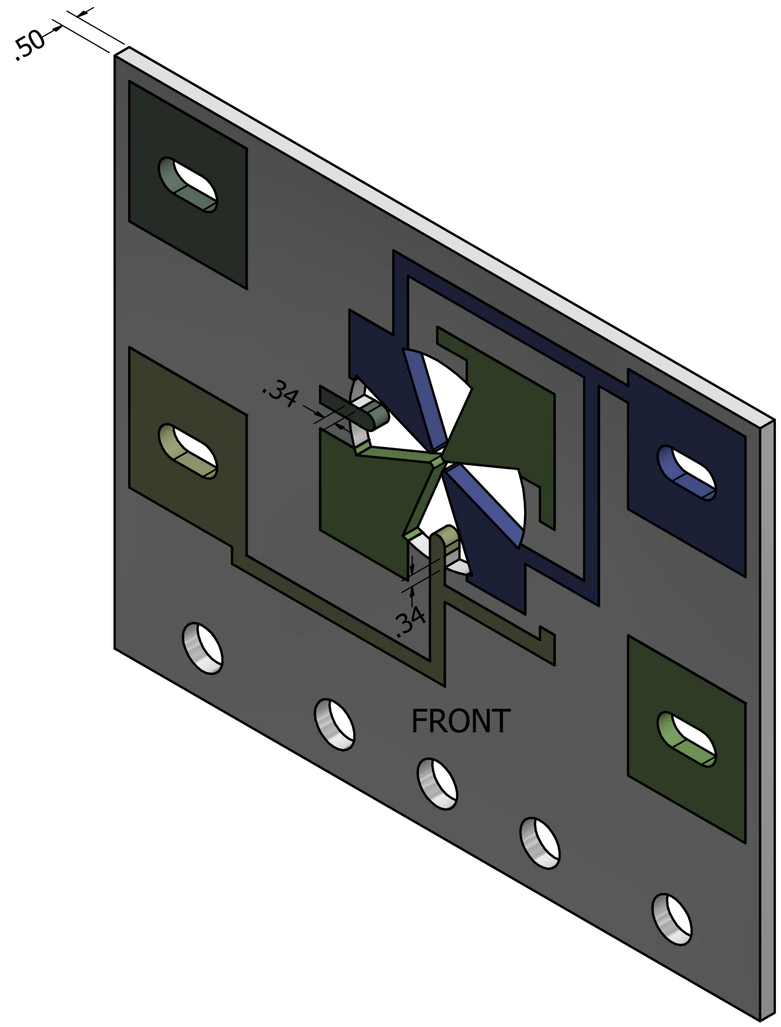
Equipment must meet all technical specifications above and in the attached document: WheelTrapC-SMB81.pdf.

ATTACHMENTS/REFERENCES

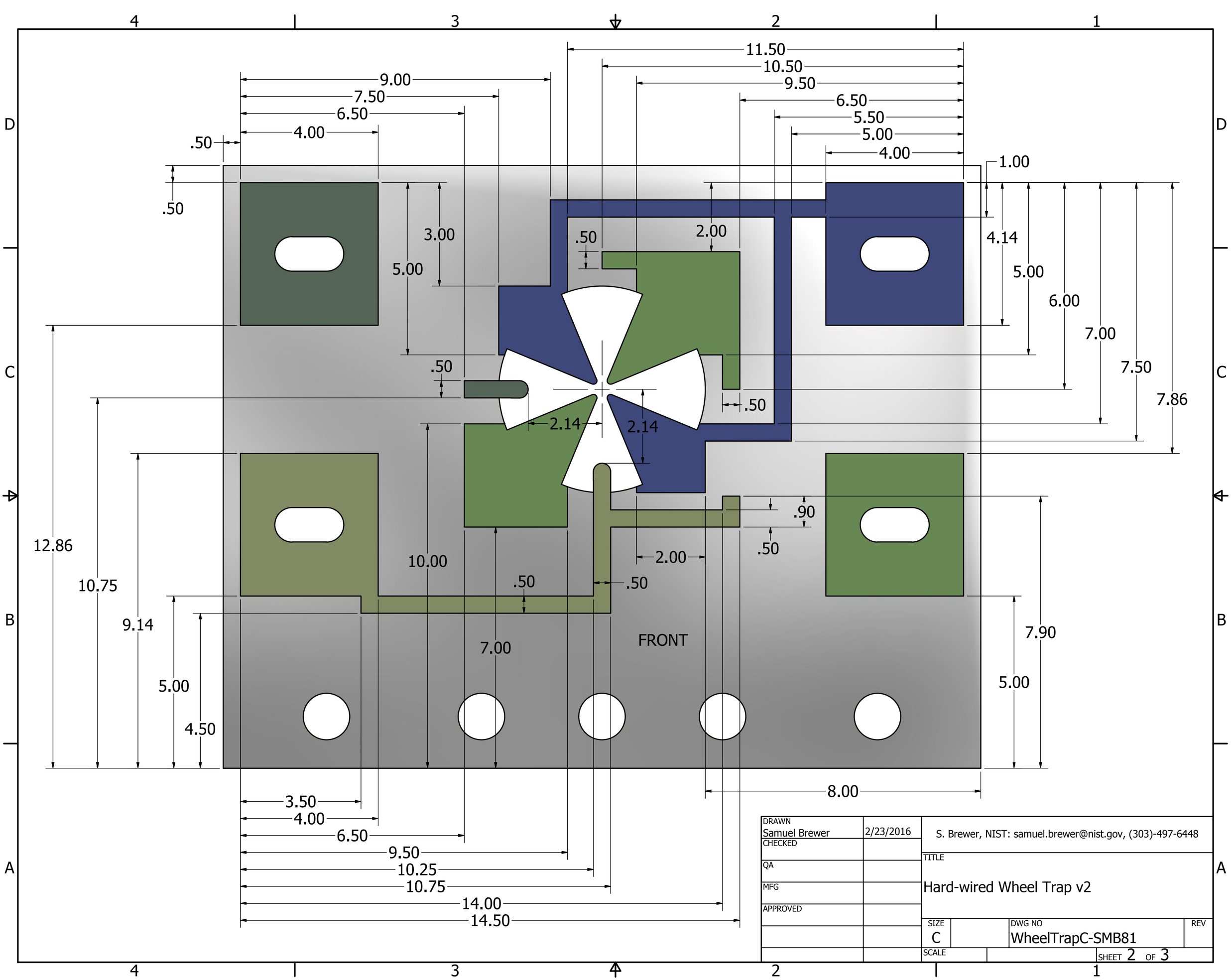
WheelTrapC-SMB81.pdf



Units: mm
Material: High thermal-conductivity diamond, 0.5 mm thick
Tolerance: +/- 0.005 mm
Taper: less than 2°
Metalization: Gold to be sputtered on colored areas as indicated. Adhesion-layer must be non-magnetic. Gold thickness should be 0.005 mm.
Edges: Inner edges between front and back gold are also gold-coated



DRAWN Samuel Brewer	2/23/2016	S. Brewer, NIST: samuel.brewer@nist.gov, (303)-497-6448	
CHECKED		TITLE Hard-wired Wheel Trap v2	
QA			
MFG			
APPROVED			
		SIZE C	DWG NO WheelTrapC-SMB81 REV
		SCALE	SHEET 1 OF 3



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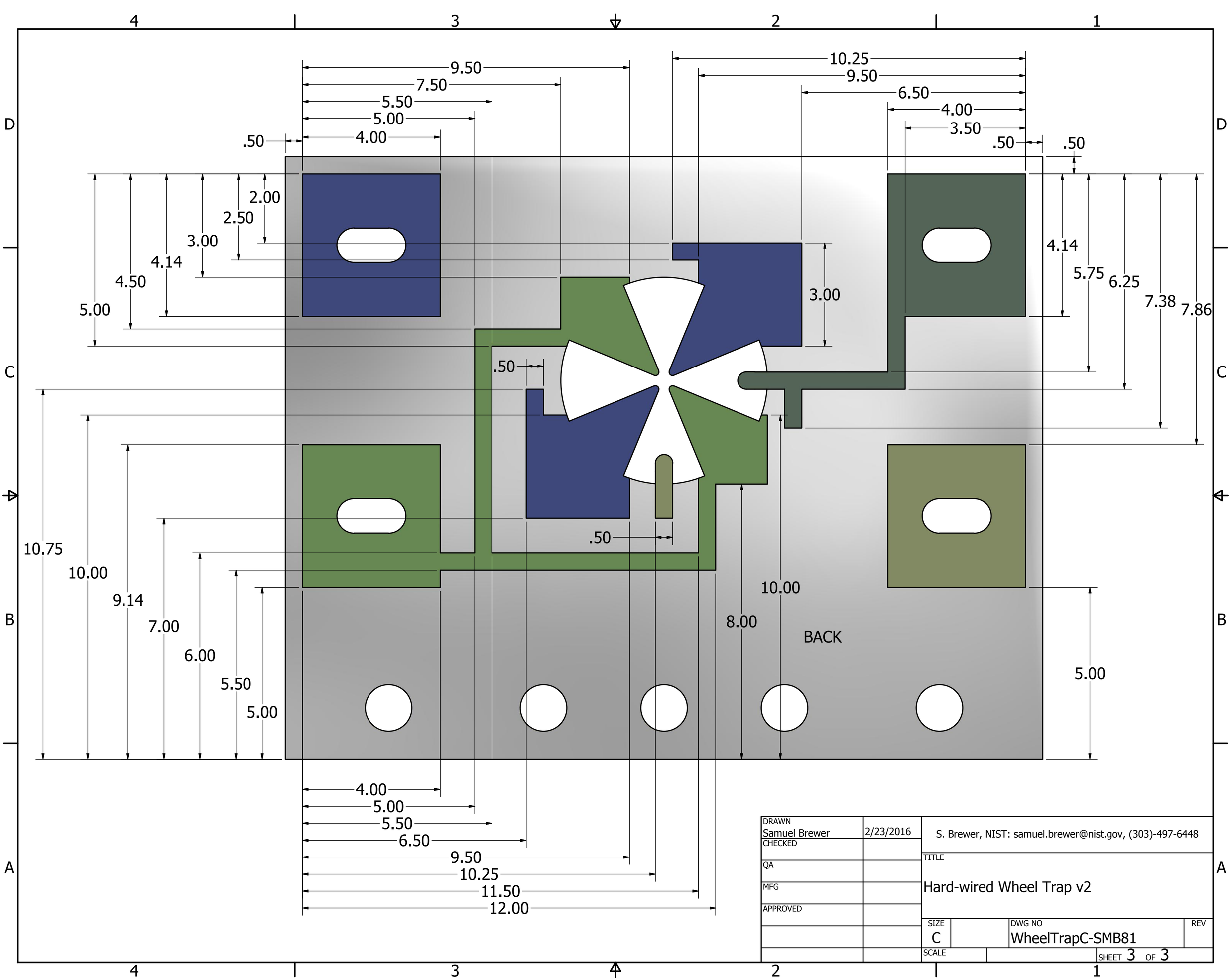

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SCALE	SHEET 3 OF 3	