

From: Barbadora, Jeff <Jeff.Barbadora@crowncastle.com>
Sent: Thursday, September 7, 2023 2:14 PM
To: CSC-DL Siting Council <Siting.Council@ct.gov>
Subject: TS-VER-056-200407 - 92 Weston Street Hartford CT - 876325

Good afternoon,

Construction is completed. Modification report too large to send in one email so second email to follow.

Thanks,

Jeffrey Barbadora
Site Acquisition Specialist
781-970-0053

Crown Castle
1800 W. Park Drive, Suite 250
Westborough, MA 01581

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Date: May 5, 2021
Engineered Tower Solutions, PLLC
3227 Wellington Court
Raleigh, NC 27615
Office: (919) 782-2710



Modification Inspection Report

Crown Castle Site Information

Crown POC: Dan Vadney
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065
BU Number: 876325
Site Name: Weston Square
Site Address: 92 Weston Street, Hartford, CT 06103-1217, Hartford County, USA

Latitude 41° 47' 12.3", **Longitude** -72° 39' 44.42"
110 Foot – Monopole Tower

Engineered Tower Solutions, PLLC is pleased to submit this **“Modification Inspection Report”** to Crown Castle for the modification/reinforcement to the subject structure. This Modification Inspection (MI) was performed in accordance with CED-SOW-10007 Modification Inspection SOW.

Based on our inspection, Engineered Tower Solutions, PLLC determines this project:

PASSING MI

The configuration, materials and/or workmanship of the modifications are installed in accordance with the Contract Documents. If additional information or the full report are required, please contact Crown Castle.

Modification Design Information:

SDD Vendor: Black & Veatch
SDD Date: February 4, 2020
Vendor Job Number: 1823828
Name of EOR: Joshua J. Riley
Source of SDD: 8923131

MI Vendor Information:

Dates on Site: 5/5/2021
MI Crew Lead: Hunter Thomas

We at Engineered Tower Solutions, PLLC appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted,

Frederic Geoffrey Bost, PE
President
Engineered Tower Solutions, PLLC

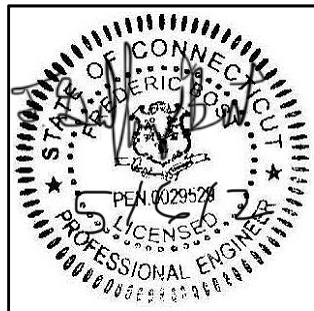


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RECORD DRAWINGS

9.2.1 MI INSPECTOR REDLINE OR RECORD DRAWING(S)

MONOPOLE REINFORCEMENT DRAWINGS

SITE NAME: WESTON SQUARE
BU NUMBER: 876325

SITE ADDRESS:
92 WESTON STREET
HARTFORD, CT 06103-1217
HARTFORD COUNTY, USA

PREPARED FOR:

CROWN CASTLE



BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
 OVERLAND PARK, KS 66211

PROJECT NO: 400087
 DRAWN BY: TYW
 CHECKED BY: PD

| HOT WORK INCLUDED | |
|-------------------|-------------------------------|
| N/A | BASE GRINDING ONLY |
| X | BASE WELDING (AND GRINDING) |
| N/A | AERIAL GRINDING ONLY |
| N/A | AERIAL WELDING (AND GRINDING) |

SAFETY CLIMB: 'LOOK UP'
 THE INTEGRITY OF THE WIRE ROPE SAFETY CLIMB SYSTEM SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER REINFORCEMENTS AND EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF ANY WIRE ROPE SAFETY CLIMB ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, OR IMPACT TO THE ANCHORAGE POINTS IN ANY WAY. ANY COMPROMISED SAFETY CLIMB MUST BE REPORTED TO YOUR CROWN POC FOR RESOLUTION, INCLUDING EXISTING CONDITIONS.

CODE COMPLIANCE

THIS REINFORCEMENT DESIGN IS BASED ON THE TIA-222-H STRUCTURAL STANDARD USING AN ULTIMATE 3-SECOND GUST WIND SPEED OF 125 MPH FROM THE 2018 CONNECTICUT BUILDING CODE, 50 MPH WITH 2.00 INCH ICE THICKNESS AND 60 MPH UNDER SERVICE LOADS, EXPOSURE CATEGORY C.

TOWER INFORMATION

TOWER MANUFACTURER / CCI DOC #: ROHN / CCI DOC #2192540

TOWER HEIGHT / TYPE: 110 FT MONOPOLE TOWER

TOWER LOCATION: LATITUDE 41° 47' 12.3"
 DATUM: NAD 1983 LONGITUDE -72° 39' 44.42"

STRUCTURAL DESIGN DRAWING: B&V / WO #1819530
 STRUCTURAL ANALYSIS REPORT: B&V / WO #1815154
 ORDER ID: 508994 REV #0

PROJECT CONTACTS

CROWN PROJECT MANAGER
 DAN VADNEY
 (518) 373-3510
 DAN.VADNEY@CROWNCastle.COM

BLACK & VEATCH CONTACTS
 CROWNCastleRF@BV.COM
 PATRICK DAVIS, P.E.
 (913) 458-6984

LOCATION MAP

ETS REDLINE DRAWINGS
PASSING MI

CREW LEAD: Hunter Thomas
 DATE: 5/5/2021

DRIVING DIRECTIONS

FROM SPRINGFIELD, TAKE 91 SOUTH TO EXIT 33, BEAR RIGHT ON JENNINGS ROAD. TAKE LEFT ON WESTON STREET AND TOWER ON LEFT AFTER RED ROOF INN.

ATTENTION ALL CONTRACTORS

ANYTIME YOU ACCESS A CROWN SITE FOR ANY REASON YOU ARE TO CALL THE CROWN NOC UPON ARRIVAL AND DEPARTURE, DAILY AT 800-788-7011.

DRAWING INDEX

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DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS & EXISTING DIMENSIONS & CONDITIONS ON THE JOB SITE & SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME

| REV | DATE | DESCRIPTION |
|-----|----------|-------------------------|
| 0 | 01/15/20 | ISSUED FOR CONSTRUCTION |

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

BU #876325
 WO #1819530
 WESTON SQUARE
 92 WESTON STREET
 HARTFORD, CT 06103-1217
 HARTFORD COUNTY, USA

SHEET TITLE
TITLE PAGE

SHEET NUMBER
TM-1

| MI CHECKLIST | | | |
|-------------------------------------|----------------------------------------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| REQUIRED | REPORT ITEM | APPLICABLE CROWN DOC # | BRIEF DESCRIPTION |
| PRE-CONSTRUCTION | | | |
| X | MI CHECKLIST DRAWING | CED-SOW-10007 | THIS CHECKLIST SERVES AS A GUIDELINE FOR THE REQUIRED CONSTRUCTION DOCUMENTS AND INSPECTIONS FOR THIS MODIFICATION. |
| X | EOR APPROVED SHOP DRAWINGS | CED-SOW-10007 | ONCE THE PRE-MODIFICATION MAPPING IS COMPLETE AND PRIOR TO FABRICATION, THE CONTRACTOR SHALL PROVIDE DETAILED ASSEMBLY DRAWINGS AND/OR SHOP DRAWINGS. THESE ARE TO INCLUDE, BUT ARE NOT LIMITED TO, A VISUAL LAYOUT OF NEW REINFORCEMENT, EXISTING REINFORCEMENT CONFIGURATION, PORTHOLES, MOUNTS, STEP PEGS, SAFETY CLIMBS AND ANY OTHER MISCELLANEOUS ITEMS WHICH MAY AFFECT SUCCESSFUL INSTALLATION OF MODIFICATIONS ON THE TOWER. THESE DRAWINGS SHALL BE SUBMITTED TO THE EOR FOR APPROVAL. SHOP DRAWING SUBMISSION SHALL INCLUDE THE EOR RFI FORM DETAILING ANY CHANGES FROM ORIGINAL DESIGN. |
| X | FABRICATION INSPECTION | CED-SOW-10007 | A LETTER FROM THE FABRICATOR, STATING THAT THE WORK WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THE CONTRACT DOCUMENTS, SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT. |
| X | FABRICATOR CERTIFIED WELD INSPECTION | CED-SOW-10007 CED-STD-10069 | A CWI SHALL INSPECT ALL WELDING PERFORMED ON STRUCTURAL MEMBERS DURING FABRICATION. A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT. |
| X | MATERIAL TEST REPORTS (MTR) | CED-SOW-10007 | MATERIAL TEST REPORTS SHALL BE PROVIDED FOR MATERIAL USED AS REQUIRED PER SECTION 9.2.5 OF CED-SOW-10007. MTRS SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT. |
| N/A | FABRICATOR NDE INSPECTION REPORT | CED-SOW-10066 CED-STD-10069 | CRITICAL SHOP WELDS THAT REQUIRE TESTING ARE NOTED ON THESE CONTRACT DRAWINGS. A CERTIFIED NDT INSPECTOR SHALL PERFORM NON-DESTRUCTIVE EXAMINATION AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT. |
| N/A | NDE OF MONOPOLE BASE PLATE | ENG-SOW-10033 | A NDE OF THE POLE TO BASE PLATE CONNECTION IS REQUIRED AND A WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT. |
| X | PACKING SLIPS | CED-SOW-10007 | PACKING/SHIPPING LIST FOR ALL MATERIAL USED DURING CONSTRUCTION OF THE MODIFICATION. |
| ADDITIONAL TESTING AND INSPECTIONS: | | | |
| N/A | | | |
| CONSTRUCTION | | | |
| N/A | FOUNDATION INSPECTIONS | CED-SOW-10144 | A VISUAL OBSERVATION OF THE EXCAVATION AND REBAR SHALL BE PERFORMED BEFORE PLACING THE CONCRETE. A VISUAL OBSERVATION OF THE REBAR SHALL BE PERFORMED BEFORE PLACING THE EPOXY. A SEALED WRITTEN REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT. |
| N/A | CONCRETE COMP. STRENGTH AND SLUMP TEST | CED-SOW-10144 | THE CONCRETE MIX DESIGN, SLUMP TEST, AND COMPRESSIVE STRENGTH TESTS SHALL BE PROVIDED AS PART OF THE FOUNDATION REPORT. |
| N/A | EARTHWORK | CED-SOW-10144 | FOUNDATION SUB-GRADES SHALL BE INSPECTED AND APPROVED BY AN APPROVED FOUNDATION INSPECTOR AND RESULTS INCLUDED AS PART OF THE FOUNDATION REPORT. |
| N/A | MICROPILE/ROCK ANCHOR | CED-SOW-10144 | MICROPILES/ROCK ANCHORS SHALL BE INSPECTED BY THE FOUNDATION INSPECTION VENDOR AND SHALL BE INCLUDED AS PART OF THE FOUNDATION INSPECTION REPORT, ADDITIONAL TESTING AND/OR INSPECTION REQUIREMENTS ARE NOTED IN THESE CONTRACT DOCUMENTS. |
| X | POST-INSTALLED ANCHOR ROD VERIFICATION | CED-SOW-10007 CED-FRM-10358 | POST INSTALLED ANCHOR ROD VERIFICATION SHALL BE PERFORMED IN ACCORDANCE WITH CROWN REQUIREMENTS AND A REPORT SHALL BE PROVIDED TO THE MI INSPECTOR FOR INCLUSION IN THE MI REPORT. |
| X | BASE PLATE GROUT VERIFICATION | ENG-STD-10323 | THE GENERAL CONTRACTOR SHALL PROVIDE DOCUMENTATION TO THE MI INSPECTOR THAT CERTIFIES THAT THE GROUT WAS REMOVED AND/OR INSTALLED IN ACCORDANCE WITH CROWN REQUIREMENTS FOR INCLUSION IN THE MI REPORT. |
| X | FIELD CERTIFIED WELD INSPECTION | CED-SOW-10066 CED-STD-10069 | A CROWN APPROVED CERTIFIED WELD INSPECTOR SHALL INSPECT AND TEST FIELD WELDS, FOLLOWING ALL PROCEDURES SPECIFIED IN CROWN STANDARD DOCUMENTS APPLICABLE TO WELD INSPECTIONS. A REPORT SHALL BE PROVIDED. NDE OF FIELD WELDS SHALL BE PERFORMED AS REQUIRED BY CROWN STANDARDS AND CONTRACT DOCUMENTS. THE NDE REPORT SHALL BE INCLUDED IN THE CWI REPORT. |
| X | ON-SITE COLD GALVANIZING VERIFICATION | ENG-STD-10149 CED-FRM-10358 | THE GENERAL CONTRACTOR SHALL PROVIDE WRITTEN AND PHOTOGRAPHIC DOCUMENTATION TO THE MI INSPECTOR VERIFYING THAT ANY ON-SITE COLD GALVANIZING WAS APPLIED PER MANUFACTURER SPECIFICATIONS AND APPLICABLE STANDARDS. |
| N/A | TENSION TWIST AND PLUMB | CED-PRC-10182 CED-STD-10261 | THE GENERAL CONTRACTOR SHALL PROVIDE A REPORT IN ACCORDANCE WITH APPLICABLE STANDARDS DOCUMENTING TENSION TWIST AND PLUMB. |
| X | GC AS-BUILT DRAWINGS | CED-SOW-10007 | THE GENERAL CONTRACTOR SHALL SUBMIT A LEGIBLE COPY OF THE ORIGINAL DESIGN DRAWINGS EITHER STATING "INSTALLED AS DESIGNED" OR NOTING ANY CHANGES THAT WERE REQUIRED AND APPROVED BY THE ENGINEER OF RECORD. EOR/RFI FORMS APPROVING ALL CHANGES SHALL BE SUBMITTED. |
| ADDITIONAL TESTING AND INSPECTIONS: | | | |
| N/A | | | |
| POST-CONSTRUCTION | | | |
| X | CONSTRUCTION COMPLIANCE LETTER | CED-SOW-10007 CED-FRM-10358 | A LETTER FROM THE GENERAL CONTRACTOR STATING THAT THE WORKMANSHIP WAS PERFORMED IN ACCORDANCE WITH INDUSTRY STANDARDS AND THESE CONTRACT DRAWINGS, INCLUDING LISTING ADDITIONAL PARTIES TO THE MODIFICATION PROCESS. |
| X | POST-INSTALLED ANCHOR ROD PULL TESTS | CED-PRC-10119 | POST-INSTALLED ANCHOR RODS SHALL BE TESTED BY A CROWN APPROVED PULL TEST INSPECTOR AND A REPORT SHALL BE PROVIDED INDICATING TESTING RESULTS. |
| X | PHOTOGRAPHS | CED-SOW-10007 | PHOTOGRAPHS SHALL BE SUBMITTED TO THE MI. PHOTOS SHALL DOCUMENT ALL PHASES OF THE CONSTRUCTION. THE PHOTOS SHALL BE ORGANIZED IN A MANNER THAT EASILY IDENTIFIES THE EXACT LOCATION OF THE PHOTO. |
| N/A | BOLT HOLE INSTALLATION VERIFICATION REPORT | CED-SOW-10007 | THE MI INSPECTOR SHALL VERIFY THE INSTALLATION AND TIGHTNESS 10% OF ALL NON PRE-TENSIONED BOLTS INSTALLED AS PART OF THE MODIFICATION. THE MI INSPECTOR SHALL LOOSEN THE NUT AND VERIFY THE BOLT HOLE SIZE AND CONDITION. THE MI REPORT SHALL CONTAIN THE COMPLETED BOLT INSTALLATION VERIFICATION REPORT, INCLUDING THE SUPPORTING PHOTOGRAPHS. |
| X | PUNCHLIST DEVELOPMENT AND CORRECTION DOCUMENTATION | CED-PRC-10283 CED-FRM-10285 | FINAL PUNCHLIST INDICATING ALL NONCONFORMANCE(S) IDENTIFIED AND THE FINAL RESOLUTION AND APPROVAL. |
| X | MI INSPECTOR REDLINE OR RECORD DRAWING(S) | CED-SOW-10007 | THE MI INSPECTOR SHALL OBSERVE AND REPORT ANY DISCREPANCIES BETWEEN THE CONTRACTOR'S REDLINE DRAWING AND THE ACTUAL COMPLETED INSTALLATION. |
| ADDITIONAL TESTING AND INSPECTIONS: | | | |
| N/A | | | |

THE MI CHECKLIST SHALL BE REVIEWED PRIOR TO THE START OF CONSTRUCTION. ALL PARTIES TO THE MODIFICATION SHALL UNDERSTAND CROWN REQUIREMENTS AND INSPECTIONS/DOCUMENTATION THAT ARE APPLICABLE TO THE SOW THEY ARE PERFORMING. ERRORS ON THE CHECKLIST DO NOT ABSOLVE THE GC OR MI INSPECTOR FROM PERFORMING/COLLECTING DOCUMENTATION.

MODIFICATION INSPECTION NOTES

GENERAL

1. THE MI IS AN ON-SITE VISUAL AND HANDS-ON INSPECTION OF TOWER MODIFICATIONS INCLUDING A REVIEW OF CONSTRUCTION REPORTS AND ADDITIONAL PERTINENT DOCUMENTATION PROVIDED BY THE GENERAL CONTRACTOR (GC), AS WELL AS ANY INSPECTION DOCUMENTS PROVIDED BY 3RD PARTY INSPECTORS. THE MI IS TO ENSURE THE INSTALLATION WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NAMELY THE MODIFICATION DRAWINGS; IN ACCORDANCE WITH APPLICABLE CROWN STANDARDS; AND AS DESIGNED BY THE ENGINEER OF RECORD (EOR).
2. NO DOCUMENT, CODE OR POLICY CAN ANTICIPATE EVERY SITUATION THAT MAY ARISE. ACCORDINGLY, THIS CHECKLIST IS INTENDED TO SERVE AS A SOURCE OF GUIDING PRINCIPLES IN ESTABLISHING GUIDELINES FOR MODIFICATION INSPECTION.
3. THE MI IS TO CONFIRM INSTALLATION CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A REVIEW OF THE MODIFICATION DESIGN ITSELF, AND THE MI INSPECTOR DOES NOT TAKE OWNERSHIP OF THE MODIFICATION DESIGN. OWNERSHIP OF THE STRUCTURAL MODIFICATION DESIGN EFFECTIVENESS AND INTEGRITY RESIDES WITH THE EOR AT ALL TIMES. THE MI INSPECTOR SHALL INSPECT AND NOTE CONFORMANCE/NONCONFORMANCE AND PROVIDE TO THE CROWN POINT OF CONTACT (CROWN POC) FOR EVALUATION.
4. ALL MI'S SHALL BE CONDUCTED BY A CROWN APPROVED MI INSPECTOR, WORKING FOR A CROWN APPROVED MI VENDOR. SEE CROWN CED-LST-10173, "APPROVED MI VENDORS".
5. TO ENSURE THAT THE REQUIREMENTS OF THE MI ARE MET, IT IS VITAL THAT THE GENERAL CONTRACTOR (GC) AND THE MI INSPECTOR BEGIN COMMUNICATING AND COORDINATING AS SOON AS A PURCHASE ORDER (PO) IS RECEIVED. IT IS EXPECTED THAT EACH PARTY WILL BE PROACTIVE IN REACHING OUT TO THE OTHER PARTY. IF CONTACT INFORMATION IS NOT KNOWN THE GC AND/OR INSPECTOR SHALL CONTACT THE CROWN POINT OF CONTACT (CROWN POC).
6. REFER TO CROWN CED-SOW-10007, "MODIFICATION INSPECTION SOW", FOR FURTHER DETAILS AND REQUIREMENTS.

SERVICE LEVEL COMMITMENT

1. THE FOLLOWING RECOMMENDATIONS AND SUGGESTIONS ARE OFFERED TO ENHANCE THE EFFICIENCY AND EFFECTIVENESS OF DELIVERING AN MI REPORT:
 - THE GC SHALL PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, PREFERABLY 10, TO THE MI INSPECTOR AS TO WHEN THE SITE WILL BE READY FOR THE MI TO BE CONDUCTED.
 - THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
 - WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS.
 - WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE DURING THE MI TO HAVE ANY MINOR DEFICIENCIES CORRECTED DURING THE INITIAL MI. THEREFORE, THE GC MAY CHOOSE TO COORDINATE THE MI CAREFULLY TO ENSURE ALL CONSTRUCTION FACILITIES ARE AT THEIR DISPOSAL WHEN THE MI INSPECTOR IS ON SITE.

REQUIRED PHOTOS

1. BETWEEN THE GC AND THE MI INSPECTOR THE FOLLOWING PHOTOGRAPHS, AT A MINIMUM, ARE TO BE TAKEN AND INCLUDED IN THE MI REPORT:
 - PRE-CONSTRUCTION GENERAL SITE CONDITION
 - PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION
 - RAW MATERIALS
 - PHOTOS OF ALL CRITICAL DETAILS
 - FOUNDATION MODIFICATIONS
 - WELD PREPARATION
 - BOLT INSTALLATION
 - FINAL INSTALLED CONDITION
 - SURFACE COATING REPAIR
 - POST CONSTRUCTION PHOTOGRAPHS
 - FINAL INFELD CONDITION
2. PHOTOS OF ELEVATED MODIFICATIONS TAKEN ONLY FROM THE GROUND SHALL BE CONSIDERED INADEQUATE.
3. THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, FOR COMPLETE LIST OF PHOTO SEE DOCUMENT # CED-SOW-10007.



PREPARED FOR:

CROWN CASTLE



BLACK & VEATCH

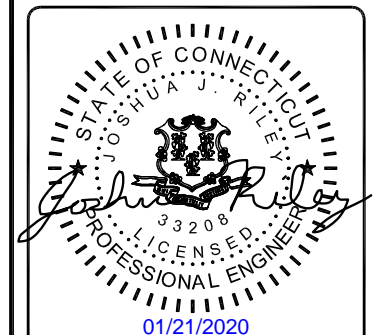
6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

PROJECT NO: 400087

DRAWN BY: TYW

CHECKED BY: PD

| REV | DATE | DESCRIPTION |
|-----|----------|-------------------------|
| 0 | 01/15/20 | ISSUED FOR CONSTRUCTION |



IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

BU #876325
WO #1819530
WESTON SQUARE
92 WESTON STREET
HARTFORD, CT 06103-1217
HARTFORD COUNTY, USA

SHEET TITLE
MODIFICATION
INSPECTION CHECKLIST

SHEET NUMBER

TM-2



4/28/21

INSTALLED AS DESIGNED



GENERAL NOTES

- The General Contractor (GC) shall reference CED-STD-10159, "Tower Modification Construction Specifications", as a continuation of the following General Notes. The GC shall keep a copy of this document with the Structural Design Drawings (SDD) at all times, and shall ensure that all Contractor Personnel are aware of the information enclosed within the General Notes and CED-STD-10159.
- The Contract Documents are the property of Crown Castle (Crown). They are provided to the GC and its Lower Tier Contractors and material suppliers for the limited purpose of use in completing the Work for this Site, and shall be kept in strict confidence and not disclosed to any third parties. The Contract Documents shall not be used for any other purpose whatsoever without the prior written consent of Crown.
- Detail drawings, including notes and tables, shall govern over general notes and typical details. Contact the Crown Point of Contact (POC) and Engineer of Record (EOR) for clarification as needed.
- Do not scale drawings.
- Any Work performed without a prefabrication mapping is done at the risk of the GC and/or fabricator. All dimensions of existing structural elements are assumed based on the available documentation and are preliminary until field-verified by the GC, unless noted otherwise (UNO). Where discrepancies are found, GC shall contact the Crown POC and EOR through RFI.
- For this analysis and modification, the tower has been assumed to be in good condition without any structural defects, UNO. If the GC discovers any indication of an existing structural defect, contact the Crown POC and EOR immediately.
- All construction means and methods, including but not limited to erection plans, rigging plans, climbing plans, and rescue plans, shall be the responsibility of the GC responsible for the execution of the Work contained herein, and shall meet ANSI/ASSE A10.48 (latest edition); federal, state, and local regulations; and any applicable industry consensus standards related to the construction activities being performed. All rigging plans shall adhere to ANSI/ASSE A10.48 (latest edition) and Crown standard CED-STD-10253, "Rigging Program", including the required involvement of a qualified engineer for class IV construction to certify the supporting structure(s) in accordance with the ANSI/TIA-322 (latest edition).
- The structural integrity of the modification design extends to the complete condition only. The GC must be cognizant that the removal of any structural component of an existing tower has the potential to cause the partial or complete collapse of the structure. All necessary precautions must be taken to ensure structural integrity, including, but not limited to, engineering assessment of construction stresses with installation maximum wind speed and/or temporary bracing and shoring.
- Aerial and underground utilities and facilities may or may not be shown on the drawings. The GC shall take every precaution to preserve and protect these items, which may include aerial or underground power lines, telephone lines, water lines, sewer lines, cable television facilities, pipelines, structures and other public and private improvements within or adjacent to the Work area. The responsibility for determining the actual on-site location of these items shall rest exclusively with the GC.
- All manufacturer's hardware assembly instructions shall be followed, UNO. Conflicting notes shall be brought to the attention of the EOR and the Crown POC.

- The GC shall fabricate all required items per the materials specified below, UNO on the detail drawing sheets. If the GC finds for any component that the materials have not been clearly specified, the GC shall submit an RFI to the EOR to confirm the required material.

All structural elements shall be new and shall conform to the following requirements, UNO:

Monopoles:

- Structural shapes and plates: ASTM A572 Grade 65 (Fy = 65 KSI)
- Welding electrodes, SMAW: E80XX
- Welding electrodes, FCAW: E8XT-XX
- Welding electrodes, GMAW: ER80S-X

Self-Support and Guyed Towers:


- Structural shapes and plates: ASTM A572 Grade 50 (Fy = 50 KSI)
- Welding electrodes, SMAW: E70XX
- Welding electrodes, FCAW: E7XT-XX
- Welding electrodes, GMAW: ER70S-X

All tower types:

- Steel angle: ASTM A572 Grade 50 (Fy = 50 KSI)
- Solid rod: ASTM A36 (Fy = 36 KSI)
- Pipe/tube (round): ASTM A500 Grade C (Fy = 46 KSI)
- Pipe/tube (square): ASTM A500 Grade C (Fy = 50 KSI)
- Bolts: ASTM F3125 Grade A325 Type 1
- U-bolts: ASTM A307 Grade A, or SAE J429 Grade 2
- Nuts: ASTM A563 Grade DH
- Washers: ASTM F436 Type 1
- Guy Wires: ASTM A475 Grade EHS
- Bridge Strand: ASTM A586 Grade 1

- After fabrication, hot-dip galvanize all steel items, UNO. Galvanize per ASTM A123, ASTM A153/A153M, or ASTM A653 G90, as applicable. ASTM A490 bolts shall not be hot-dip galvanized, but shall instead be coated with Magni 565 or EOR approved equivalent, per ASTM F2833.
- Contractor Personnel shall not drill holes in any new or existing structural members, other than those drilled holes shown on structural drawings, without the approval of the EOR.
- For a list of Crown-approved cold galvanizing compounds, refer to ENG-STD-10149, "Tower Protective Coatings Guidelines".
- All exposed structural steel as the result of this scope of Work including welds (after final inspection of the weld by the CWI), field drilled holes, and shaft interiors (where accessible), shall be cleaned and two (2) coats cold galvanizing shall be applied by brush in accordance with ENG-STD-10149, "Tower Protective Coatings Guidelines". Photo documentation is required to be submitted to the MI Inspector.
- If removal of existing modifications is required per the modification scope, the GC shall clean and cold galvanize any existing empty bolt holes, UNO. If additional unexpected, oversized, or slotted holes are found, the GC shall contact the EOR and Crown POC for guidance prior to proceeding with the modifications.
- All Work involving base plate grout scope items or resulting in disturbance of base plate grout shall reference ENG-STD-10323, "Base Plate Grout", and shall follow any Base Plate Grout Removal Notes contained herein.

- All tower grounding affected by the Work shall be repaired or replaced in accordance with OPS-STD-10090, "Tower Grounding", and OPS-BUL-10133, "Grounding Repair Recommendation".
- If scope of modification requires removal or covering of tower ID tag, the tag must be replaced.
- Any hardware removed from the existing tower shall be replaced with new hardware of equal size and quality, UNO. No existing fasteners shall be reused.
- All joints using ASTM A325 or A490 bolts, U-bolts, V-bolts, and threaded rods shall be snug tightened, UNO.
- A nut locking device shall be installed on all proposed and/or replaced snug tightened ASTM A325 or A490 bolts, U-bolts, V-bolts, and threaded rods.
- All joints are bearing type connections UNO. If no bolt length is given in the Bill of Materials, the connection may include threads in the shear planes, and the GC is responsible for sizing the length of the bolt.
- Blind bolts shall be installed per the installation specifications on the corresponding Approved Fastener sheets contained in CED-CAT-10300, "Monopole Standard Drawings and Approved Reinforcement Components".
- If ASTM A325 or A490 bolts, and/or threaded rods are specified to be pre-tensioned, these shall be installed and tightened to the pretensioned condition according to the requirements of the RCSC Specification for Structural Joints Using ASTM High Strength Bolts.
- All proposed and/or replaced bolts shall be of sufficient length such that the end of the bolt be at least flush with the face of the nut. It is not permitted for the bolt end to be below the face of the nut after tightening is completed.



ETS
ENGINEERED TOWER SOLUTIONS, PLLC

ETS REDLINE DRAWINGS
PASSING MI

CREW LEAD: Hunter Thomas
DATE: 5/5/2021



4/28/21

INSTALLED AS DESIGNED



PREPARED FOR:

CROWN CASTLE



BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

| | |
|-------------|--------|
| PROJECT NO: | 400087 |
| DRAWN BY: | TYW |
| CHECKED BY: | PD |

| REV | DATE | DESCRIPTION |
|-----|----------|-------------------------|
| 0 | 01/15/20 | ISSUED FOR CONSTRUCTION |
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STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED PROFESSIONAL ENGINEER
01/21/2020

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

BU #876325
WO #1819530
WESTON SQUARE
92 WESTON STREET
HARTFORD, CT 06103-1217
HARTFORD COUNTY, USA

SHEET TITLE
NOTES

SHEET NUMBER
TM-3

CONCRETE NOTES


- All concrete work shall be in accordance with ACI 301 specifications for structural concrete (latest edition). All concrete shall have a minimum 28 day compressive strength of 4500 PSI.
- Prepare and submit batch tickets for each type and strength of concrete.
- For field mixing, prepare and submit mix designs for pre-approval for each type and strength of concrete in accordance with ACI 211, "Proportioning Concrete Mixtures", and ACI 301, "Specifications for Structural Concrete".
- All concrete shall be normal weight concrete.
- Slump tests shall be made in accordance with ASTM C143. The allowable concrete slump shall be 4 inches (+/- 1") unless admixtures are used. Admixtures shall be in accordance with ASTM C494 standard types A, B, C, D, or E.
- The engineer shall pre-approve superplasticizer use.
- Cement shall conform to ASTM C150 Type II. Fine aggregate shall conform to ASTM C33. Coarse aggregate shall be gravel or crushed stone conforming to C33. Maximum aggregate size shall be 3/4".
- Water shall be clean and free from oils, acids, alkalies, and organic materials. No additional water shall be added to the concrete at the job site.
- Do not use chloride-containing admixtures.
- Air entraining admixtures shall conform to ASTM C260.
- Hot weather concrete placement shall comply with ACI 305R. Cold weather concrete placement shall comply with ACI 306.1.
- Concrete shall be placed within 24 hours of excavation inspections. The contractor shall be responsible for protecting exposed excavations prior to concrete placement.
- Place concrete by using a chute or hopper device such that concrete shall not free fall from a height greater than 5 feet. Deposit concrete within the center of the steel reinforcing cage to prevent segregation.
- Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 309R. Do not use vibrators to transport concrete.
- Concrete shall be cured in accordance with ACI 301. When applicable, curing compounds shall be water clear, styrene acrylate type with a minimum solids content of 30%. Application shall be in conformance with manufacturer's instructions.
- All concrete testing shall be in accordance with ACI 318. A minimum of two 6"x12" concrete cylinders per anchor block (Guyed towers only) and a minimum six 6"x12" concrete cylinders per batch are required.
- A chamfer of 3/4" shall be provided at all exposed edges of concrete, unless noted otherwise, in accordance with ACI 301.

CONCRETE REINFORCING STEEL NOTES

- All reinforcing steel shall be deformed billet steel conforming to ASTM A615, Grade 60 unless noted otherwise.
- Reinforcing steel shall be detailed, fabricated, bent, and placed in accordance with the CRSI Manual of Standard Practice and ACI 315 (latest edition).
- Welding of reinforcing and embedments is prohibited.
- All reinforcing steel shall have a minimum three (3) inches concrete coverage unless noted otherwise.
- Spacing devices shall be used as required to maintain the side and bottom clearance between the steel reinforcement and excavation.

BASE PLATE GROUT REMOVAL NOTES

- When base plate grout removal is specified in the tower modification table, the contractor shall take the following steps:
 - The GC shall begin this procedure as early as possible during the modification process so that if issues arise, they can be resolved within the anticipated modification timeline.
 - If any deteriorated grout exists, begin at this location. Remove deteriorated grout and the grout around the nearest one or two anchor rods to fully expose the leveling nut. If the GC discovers that a half nut or jam nut was used as a leveling nut, or if no leveling nut is present, immediately contact CED and the Crown POC (typically the Mod PM) for a resolution. Do not remove any additional grout until directed to by Crown.
 - Otherwise, check the leveling nut for tightness in accordance with Section 7.2.3 of ENG-STD-10323 "Base Plate Grout". If severe corrosion / material loss is found or corrosion exists to the point where the leveling nut is unable to be tightened when obviously loose, immediately notify the Crown POC (typically the Mod PM). Reference ENG-BUL-10114 "Rust Classification" for examples of material loss. Do not remove any additional grout until directed to by Crown.
 - In the event that severe corrosion is not encountered, and being sure to check each anchor rod for corrosion per ENG-BUL-10114 "Rust Classification", remove all existing base plate grout while checking each leveling nut for tightness in accordance with Section 1.3.2.3 of ENG-STD-10323 "Base Plate Grout".
 - Consistent with Section 7.2.4 of ENG-STD-10323 "Base Plate Grout", hand tool clean to SSPC-SP2 and solvent clean to SSPC-SP1, all exposed structural steel elements, including anchor rods, leveling nuts, and underside of base plate to the greatest extent possible. Ensure that all existing grout is removed to allow cold galvanizing to adhere to the steel.
 - Apply by brush two coats of a Crown-approved cold-galvanizing compound to all exposed structural steel elements beneath the base plate, and allow curing in accordance with the manufacturer's recommendation. A list of Crown-approved direct application cold-galvanizing compounds can be found in ENG-STD-10149 "Tower Protective Coatings Guidelines" Section 2.1.1.
 - The GC shall provide after cleaning but before cold-galvanization, f



ETS
ENGINEERED TOWER SOLUTIONS, PLLC

ETS REDLINE DRAWINGS
PASSING MI

CREW LEAD: Hunter Thomas
DATE: 5/5/2021



4/28/21

INSTALLED AS DESIGNED



PREPARED FOR:

CROWN
CASTLE

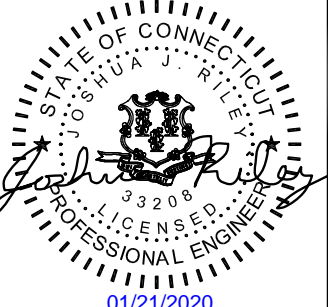


BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

| | |
|-------------|--------|
| PROJECT NO: | 400087 |
| DRAWN BY: | TYW |
| CHECKED BY: | PD |

| REV | DATE | DESCRIPTION |
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| 0 | 01/15/20 | ISSUED FOR CONSTRUCTION |
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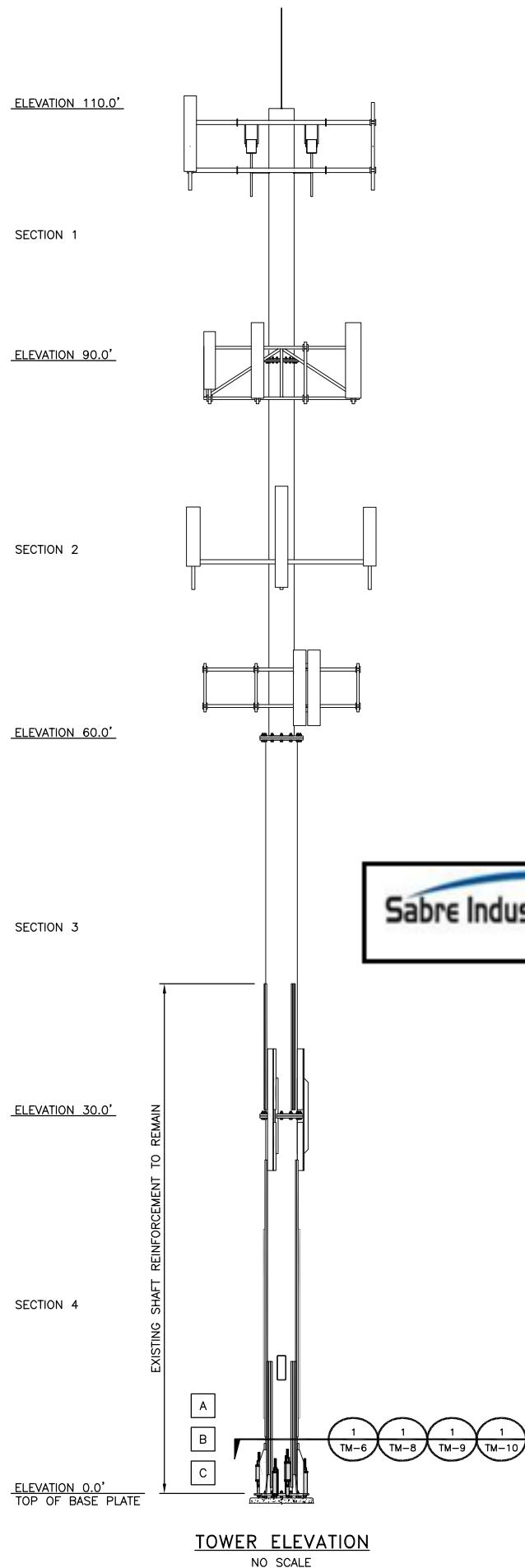
STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED PROFESSIONAL ENGINEER
01/21/2020

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

BU #876325
WO #1819530
WESTON SQUARE
92 WESTON STREET
HARTFORD, CT 06103-1217
HARTFORD COUNTY, USA

SHEET TITLE
NOTES

SHEET NUMBER
TM-4



| POLE MODIFICATION SCHEDULE | | | |
|----------------------------|----------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------|
| CALLOUT | ELEVATION (FT) | MODIFICATION | REFERENCE SHEET |
| A | 0.0 | REMOVE EXISTING BASE PLATE GROUT SEE BASE PLATE GROUT REMOVAL NOTES | TM-4 |
| B | 0.0 | INSTALL (3) NEW ANCHOR RODS WITH ANCHOR ROD BRACKETS | TM-6 & TM-7 |
| C | 0.0 | REMOVE (3) EXISTING ANCHOR ROD BRACKETS AND INSTALL (3) NEW ANCHOR RODS WITH ANCHOR ROD BRACKETS | TM-8, TM-9, TM-10, TM-11, & TM-12 |

FOR PARTS NOT DETAILED WITHIN THE DRAWING AND STARTING WITH "CCI-", SEE THE FOLLOWING CATALOG FOR DETAILS: CED-CAT-10300, MONOPOLE STANDARD DRAWINGS AND APPROVED REINFORCEMENT COMPONENTS.

PRIOR TO FABRICATION AND INSTALLATION, CONTRACTOR SHALL FIELD VERIFY ALL LENGTH AND QUANTITIES GIVEN. LENGTHS AND QUANTITIES GIVEN ARE FOR QUOTING PURPOSES ONLY, AND SHALL NOT BE USED FOR FABRICATION.

| MANUFACTURER POLE SPECIFICATIONS | | | | | | |
|----------------------------------|----------------------|--|--|--|--|--|
| POLE SHAFT TYPE | ROUND | | | | | |
| TAPER | 0.00 IN/FT | | | | | |
| BASE PLATE STEEL | ASTM A36 GRADE 36 | | | | | |
| ANCHOR RODS | 1 1/2" A193 GRADE B7 | | | | | |

| MANUFACTURER SHAFT SECTION DATA | | | | | | | |
|---------------------------------|-------------------|----------------|---------------------|--------------------------|-----------------|---------------------------|--------|
| SHAFT SECTION | SHAFT LENGTH (FT) | THICKNESS (IN) | SECTION GRADE (KSI) | FLANGE PLATE GRADE (KSI) | LAP SPLICE (IN) | DIAMETER ACROSS FLAT (IN) | |
| | | | | | | TOP | BOTTOM |
| 1 | 20.00 | 0.2500 | 42 | 36 | N/A | 24.00 | 24.00 |
| 2 | 30.00 | 0.3750 | 42 | 36 | | 24.00 | 24.00 |
| 3 | 30.00 | 0.3750 | 42 | 36 | | 30.00 | 30.00 |
| 4 | 30.00 | 0.5000 | 42 | 36 | | 30.00 | 30.00 |

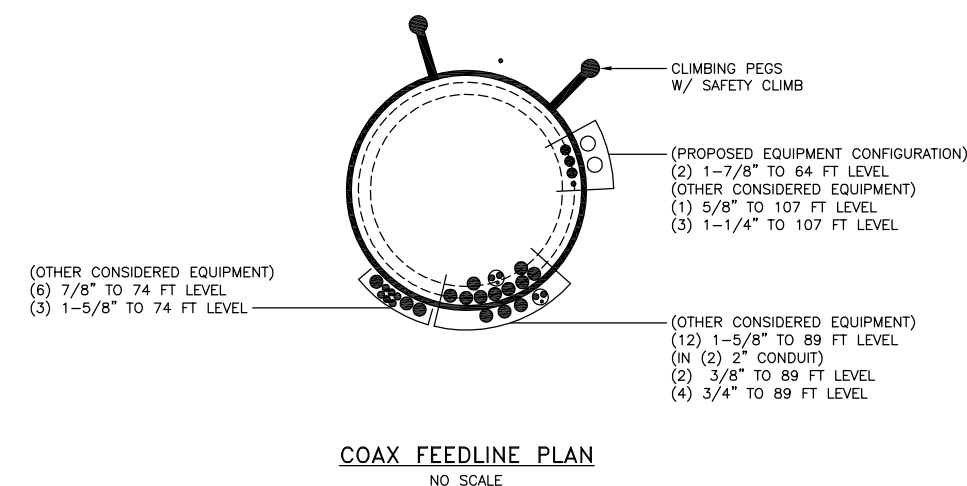
NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

PRIOR TO FABRICATION AND INSTALLATION, CONTRACTOR SHALL FIELD VERIFY ALL LENGTHS AND QUANTITIES GIVEN. LENGTH AND QUANTITIES PROVIDED ARE FOR QUOTING PURPOSES ONLY AND SHALL NOT BE USED FOR FABRICATION.

**ETS REDLINE DRAWINGS
PASSING MI**

CREW LEAD: Hunter Thomas
DATE: 5/5/2021

Sabre Industries **4/28/21** **INSTALLED AS DESIGNED** Phillip Feora



PREPARED FOR:

CROWN CASTLE

BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

| | |
|-------------|--------|
| PROJECT NO: | 400087 |
| DRAWN BY: | TYW |
| CHECKED BY: | PD |

| REV | DATE | DESCRIPTION |
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| 0 | 01/15/20 | ISSUED FOR CONSTRUCTION |

STATE OF CONNECTICUT
JOSHUA J. RILEY
PHILLIP FEORA
33208
LICENSED PROFESSIONAL ENGINEER
01/21/2020

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BU #876325
WO #1819530
WESTON SQUARE
92 WESTON STREET
HARTFORD, CT 06103-1217
HARTFORD COUNTY, USA

SHEET TITLE
TOWER
ELEVATION

SHEET NUMBER
TM-5


| ANCHOR ROD SPECIFICATIONS | | | | | | | | |
|---------------------------|-------------------|-----------------------|------------|--------------------|---------------------------------|----------------------------|---------|---------------------------|
| CROWN PART # | ROD DIAMETER (IN) | INSTALLED LENGTH (IN) | MATERIAL | HOLE DIAMETER (IN) | EMBEDMENT DEPTH (IN) (+2", -0") | TARGET TENSION LOAD (KIPS) | EPOXY | CA-ONLY PROOF LOAD (KIPS) |
| CCI-AR-0175 | 1.75 | 96 | A193 GR B7 | 2 | 60 | 111 | AF35LVE | - |

C40041287

| | | | |
|--|----------------|-------------------------------------------|----------------------|
| | 4/28/21 | INSTALLED PER EOR APPROVED CHANGES | <i>Phillip Feora</i> |
|--|----------------|-------------------------------------------|----------------------|

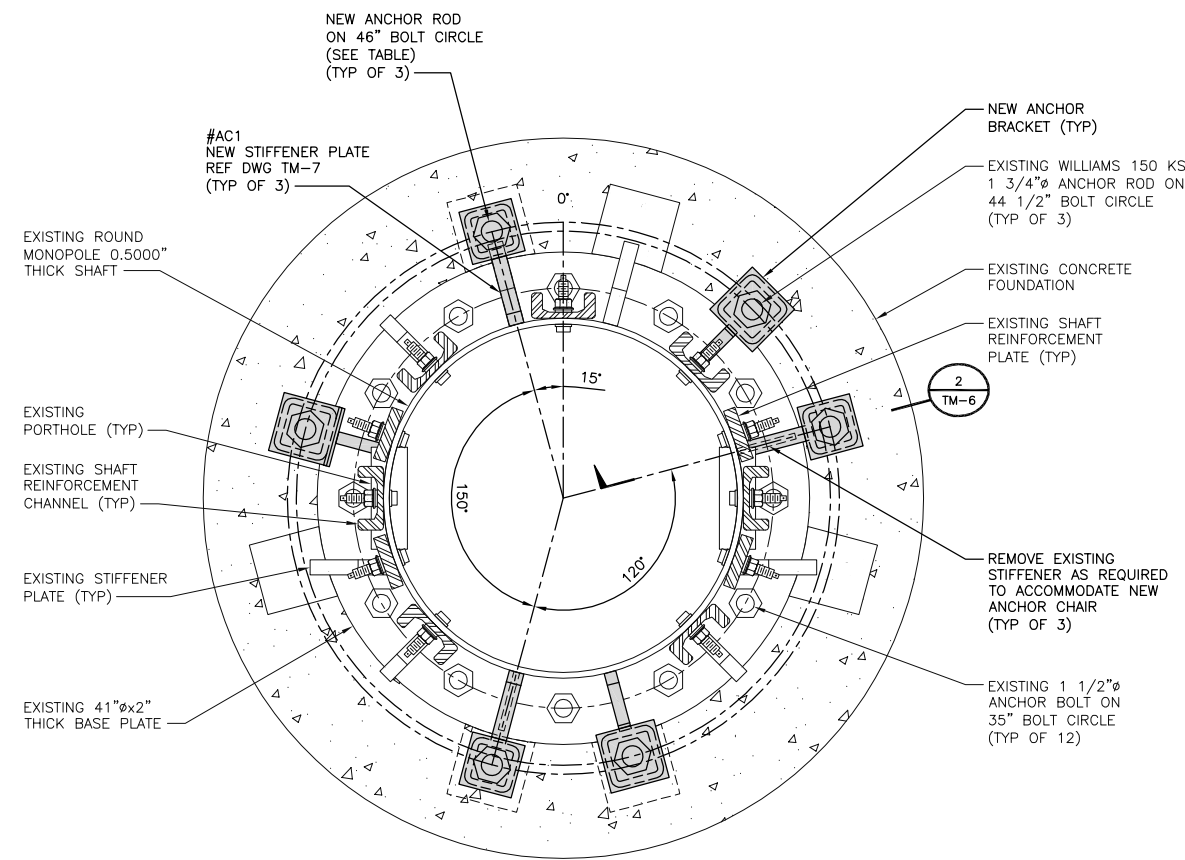
NOTES

- PLATE WASHER MUST FULLY BEAR ON THE TUBE.
- REFERENCE CC APPROVED COMPONENTS (CURRENT VERSION) FOR ANCHOR ROD DIMENSIONS.
- RODS MUST BE GALVANIZED FROM THE TOP OF THE PROJECTION TO 15" BELOW THE SURFACE OF THE CONCRETE, AT A MINIMUM.
- CORED HOLES MUST BE MECHANICALLY ROUGHENED USING A CARBIDE HOLE ROUGHENER OR EQUIVALENT. BRUSHING WITH A NYLON OR WIRE BRUSH SHALL BE USED IN THE PROCESS OF HOLE CLEANING, BUT DOES NOT SATISFY THE HOLE ROUGHENING REQUIREMENT.
- FOLLOW EPOXY MANUFACTURER'S RECOMMENDATIONS FOR HOLE CLEANING.
- ALL HOLES MUST BE DRY PRIOR TO PLACING EPOXY.
- FOLLOW EPOXY MANUFACTURER'S RECOMMENDATIONS REGARDING HUNTING OF TUBES FOR EPOXY, AS WELL AS ALL INSTALLATION REQUIREMENTS.
- TAKE ALL MEASUREMENTS NECESSARY FOR CORING OPERATIONS. NOTIFY EOR IMMEDIATELY IF CORING OPERATIONS INTERFERE WITH PLACEMENT OF NEW ANCHORS MAY BE REQUIRED.
- IF BASE PLATE GROUT REPAIR IS REQUIRED, FOR DETERMINE THE QUANTITY REQUIRED.
- ONCE ALL RESIN AND GROUT HAVE CURED TO THE VALUE LISTED IN TESTING POST-INSTALLED ANCHOR TESTING.
- CONTRACTOR TO VERIFY THAT A PULL TEST IS PERFORMED ON ALL ANCHORS SHOWN.
- ANCHOR ROD TO BE WRAPPED IN EPOXY 12" FROM TOP OF FOUNDATION. CONCRETE EQUIVALENT). FOR CORE DRILLING OF HOLES FOR ANCHOR INSTALLATION. REFERENCE TO SHEET NOTES FOR HOLE DIAMETER AND EPOXY REQUIREMENTS.
- WHEN COMPLETED WITH EPOXY INSTALLED AROUND EXPOSED PORTION OF THE ANCHOR ROD.



ETS REDLINE DRAWINGS
PASSING MI

CREW LEAD: Hunter Thomas
DATE: 5/5/2021



SECTION 1
ANCHOR ROD PLAN
NO SCALE

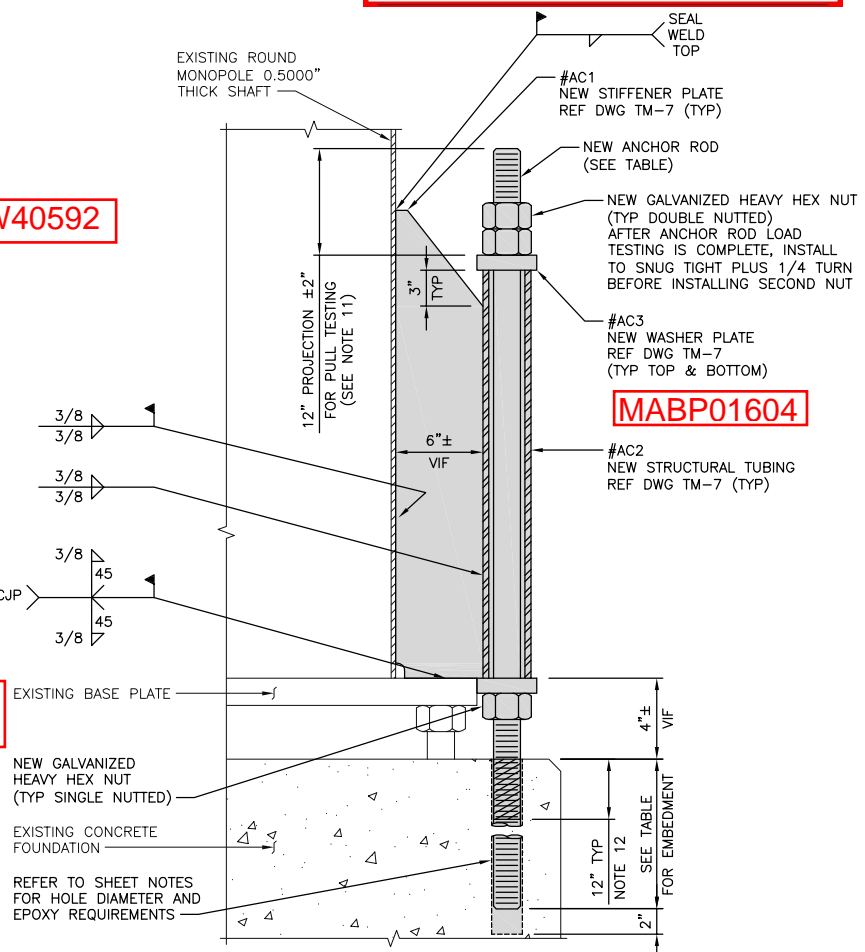
one rod installed at 4'-8" per RFI 3/15/21

used a R74-14-SN-LR-D-0S to adapt the new right hand thread rod to the existing left hand thread? per RFI

3 1/4" was taken out of the top of the stiffener due to port hole per RFI 3/18/21

MABW40592

Hunter Thomas



SECTION 2
ANCHOR ROD DETAILS
NO SCALE

PREPARED FOR:

CROWN CASTLE


BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

| | |
|-------------|--------|
| PROJECT NO: | 400087 |
| DRAWN BY: | TYW |
| CHECKED BY: | PD |

| REV | DATE | DESCRIPTION |
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| 0 | 01/15/20 | ISSUED FOR CONSTRUCTION |

STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED PROFESSIONAL ENGINEER
01/21/2020

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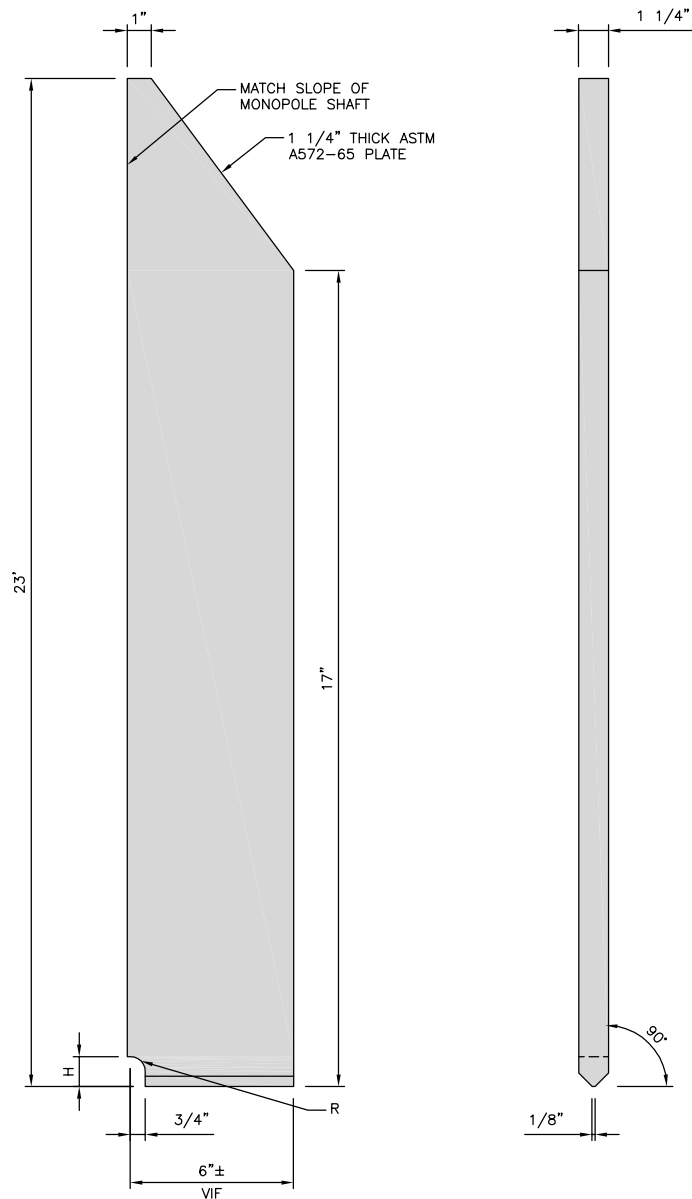
BU #876325
WO #1819530
WESTON SQUARE
92 WESTON STREET
HARTFORD, CT 06103-1217
HARTFORD COUNTY, USA

SHEET TITLE
BASE PLATE ANCHOR
ROD CHAIR DETAILS

SHEET NUMBER
TM-6

MABW40592

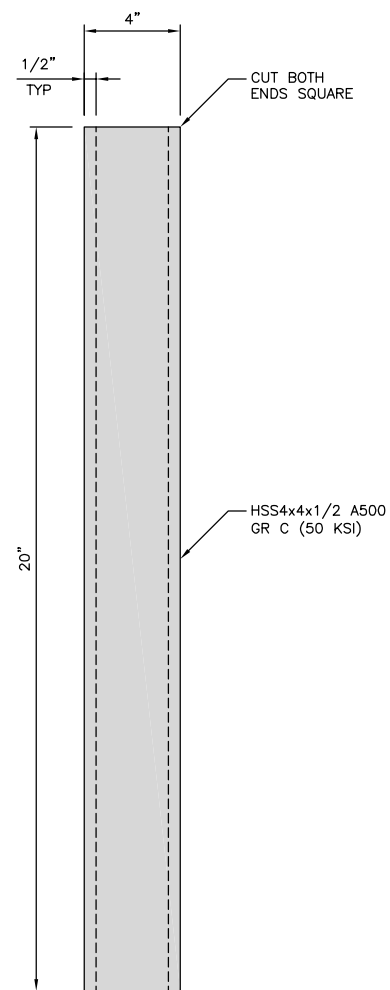
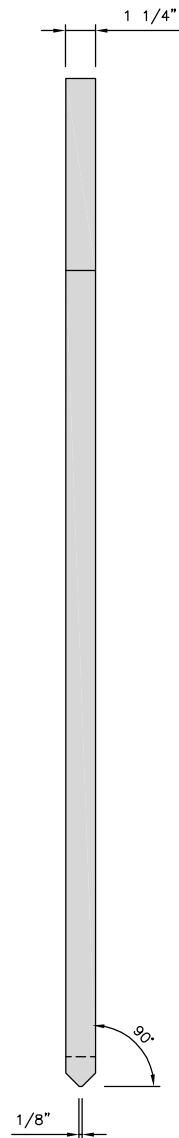
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|--|----------------|------------------------------|----------------------|
| | 4/28/21 | INSTALLED AS DESIGNED | <i>Phillip Feora</i> |
|--|----------------|------------------------------|----------------------|



MABWS00891

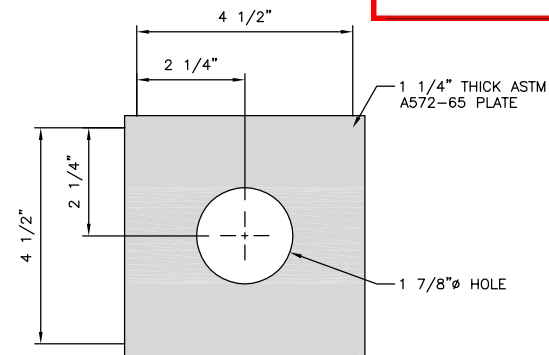
NOTE
 R = STIFFENER THICKNESS/2
 H = STIFFENER THICKNESS

#AC1
STIFFENER PLATE
 NO SCALE



#AC2
STRUCTURAL TUBING
 NO SCALE

MABWS00223



#AC3
WASHER PLATE
 NO SCALE

MABP01604

ENGINEERED TOWER SOLUTIONS, PLLC

ETS REDLINE DRAWINGS

PASSING MI

CREW LEAD: Hunter Thomas
 DATE: 5/5/2021

PREPARED FOR:

CROWN CASTLE



BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

| | |
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BU #876325
 WO #1819530
 WESTON SQUARE
 92 WESTON STREET
 HARTFORD, CT 06103-1217
 HARTFORD COUNTY, USA

SHEET TITLE
**BASE PLATE ANCHOR
 ROD CHAIR DETAILS**

SHEET NUMBER
TM-7



**ETS REDLINE DRAWINGS
PASSING MI**

CREW LEAD: Hunter Thomas
DATE: 5/5/2021

| ANCHOR ROD SPECIFICATIONS | | | |
|----------------------------------|-------------------|-----------------------|--------------|
| PART # | ROD DIAMETER (IN) | INSTALLED LENGTH (IN) | MATERIAL |
| WILLIAMS 150 KSI ALL THREAD BARS | 1.75 | 39 | ASTM A722-07 |

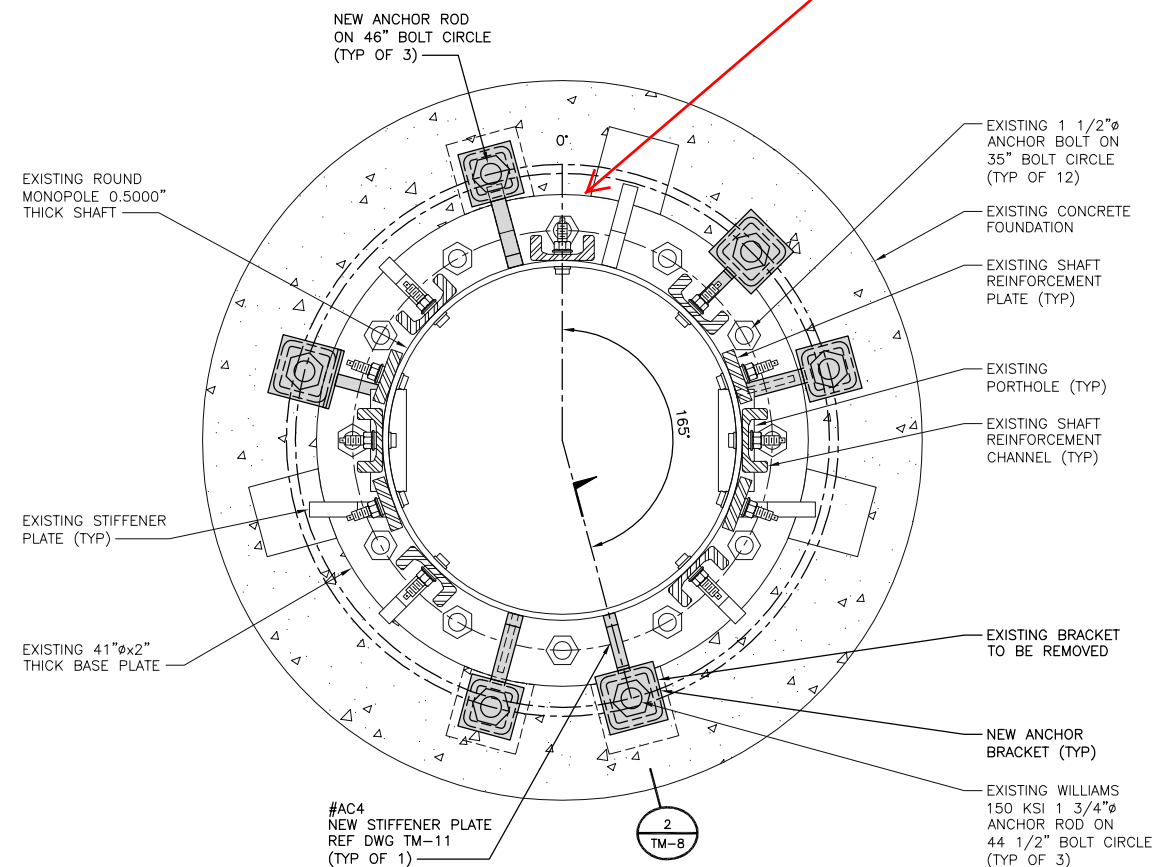
Z40998163

ARB was Notched per RFI 3/15/21

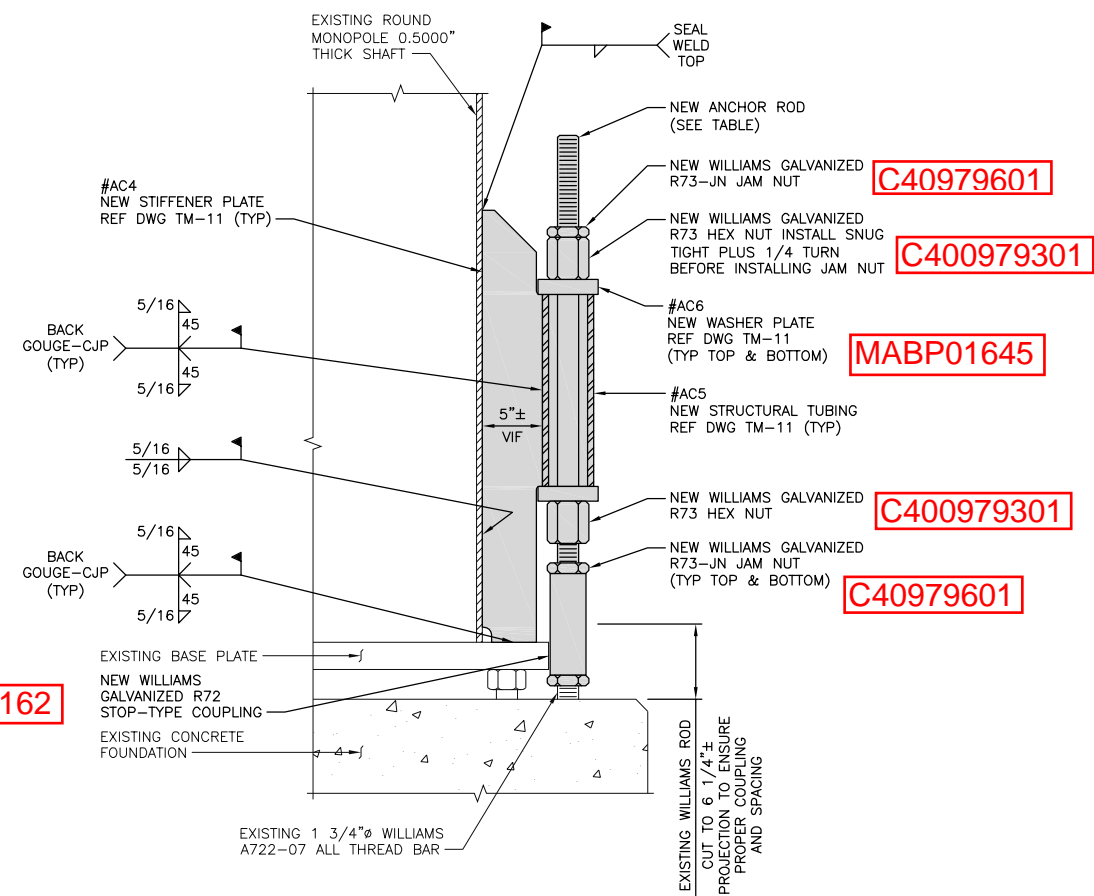
MABW40593

NOTES

1. PLATE WASHER MUST FULLY BEAR ON THE TUBE.



**SECTION 1
ANCHOR ROD PLAN
NO SCALE**



**SECTION 2
ANCHOR ROD CHAIR DETAILS
NO SCALE**

Z40998162

C40979601

C400979301

MABP01645

C400979301

C40979601

PREPARED FOR:

**CROWN
CASTLE**

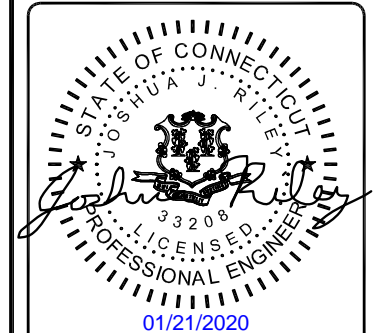


BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

| | |
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BU #876325
WO #1819530
WESTON SQUARE
92 WESTON STREET
HARTFORD, CT 06103-1217
HARTFORD COUNTY, USA

SHEET TITLE
**BASE PLATE ANCHOR
ROD CHAIR DETAILS**

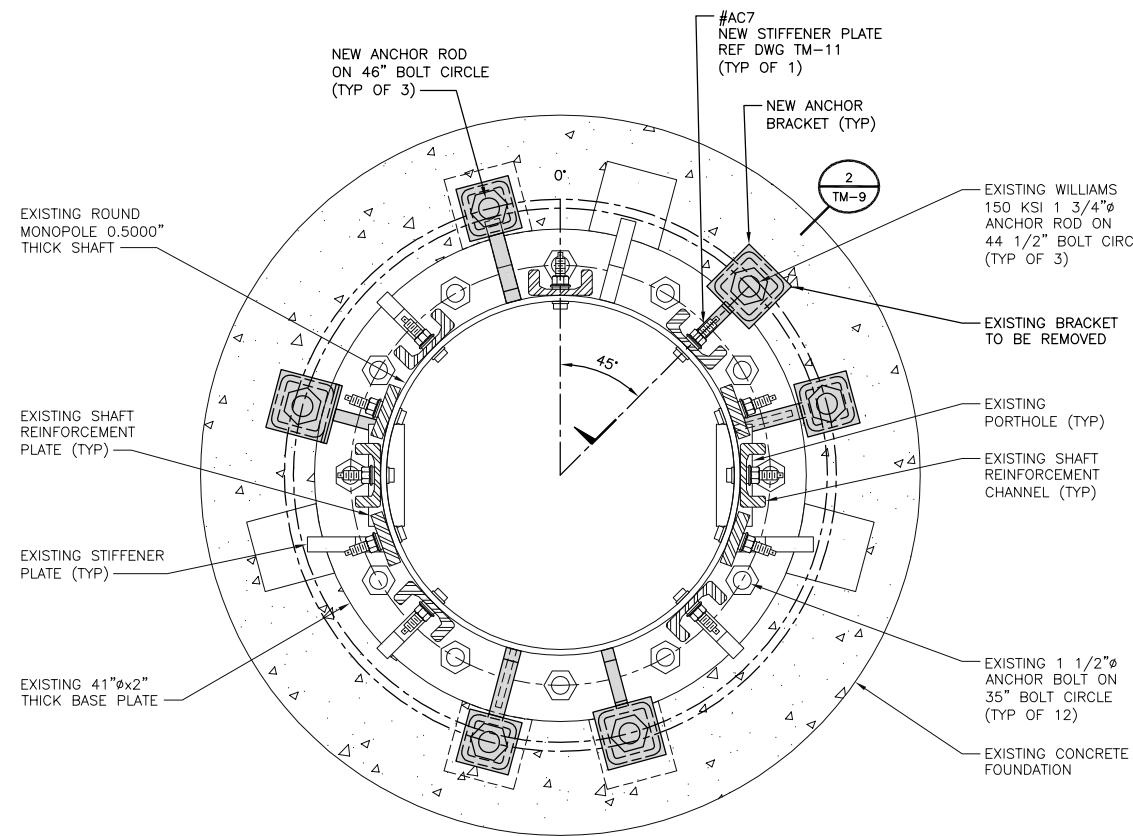
SHEET NUMBER
TM-8



4/28/21

**INSTALLED PER EOR
APPROVED CHANGES**


Phillip Feora



SECTION 1
ANCHOR ROD PLAN
NO SCALE

NOTES

1. PLATE WASHER MUST FULLY BEAR ON THE TUBE.



ETS
ENGINEERED TOWER SOLUTIONS, PLLC

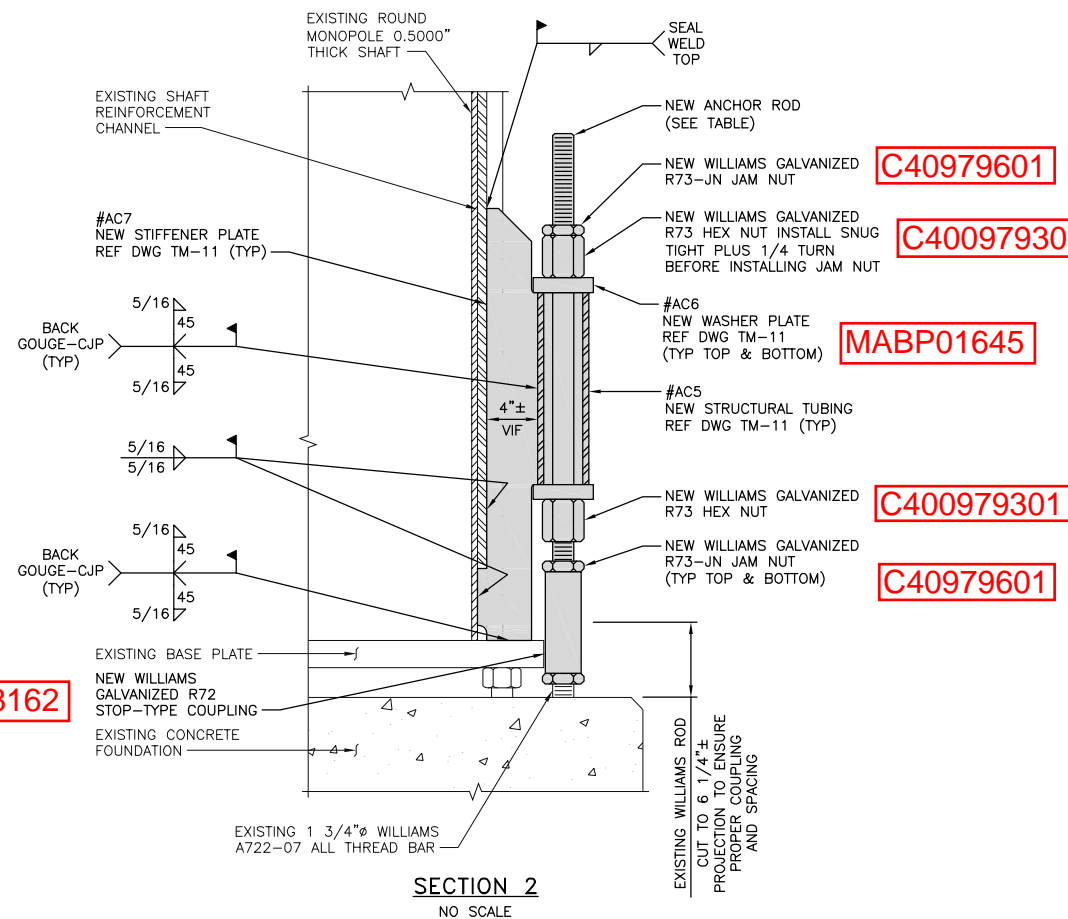
ETS REDLINE DRAWINGS
PASSING MI

CREW LEAD: Hunter Thomas
DATE: 5/5/2021

| ANCHOR ROD SPECIFICATIONS | | | |
|----------------------------------|-------------------|-----------------------|--------------|
| PART # | ROD DIAMETER (IN) | INSTALLED LENGTH (IN) | MATERIAL |
| WILLIAMS 150 KSI ALL THREAD BARS | 1.75 | 39 | ASTM A722-07 |

Z40998163

MABW40594



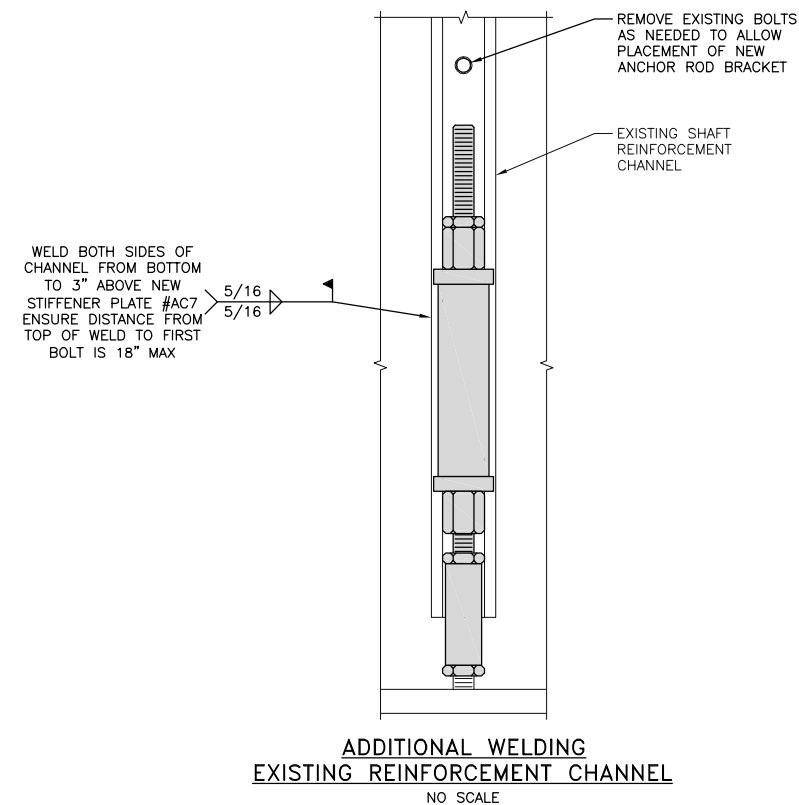
SECTION 2
NO SCALE



4/28/21

INSTALLED AS DESIGNED





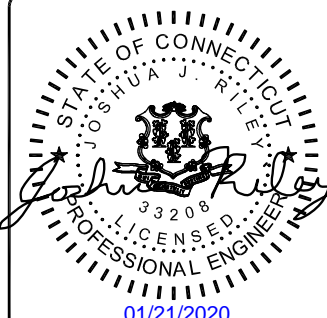
ADDITIONAL WELDING
EXISTING REINFORCEMENT CHANNEL
NO SCALE

PREPARED FOR:
CROWN CASTLE


BLACK & VEATCH
6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

PROJECT NO: 400087
DRAWN BY: TYW
CHECKED BY: PD

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STATE OF CONNECTICUT
JOSHUA J. RILEY

LICENSED PROFESSIONAL ENGINEER
01/21/2020

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BU #876325
WO #1819530
WESTON SQUARE
92 WESTON STREET
HARTFORD, CT 06103-1217
HARTFORD COUNTY, USA

SHEET TITLE
BASE PLATE ANCHOR ROD CHAIR DETAILS

SHEET NUMBER
TM-9



**ETS REDLINE DRAWINGS
PASSING MI**

CREW LEAD: Hunter Thomas
DATE: 5/5/2021

| ANCHOR ROD SPECIFICATIONS | | | |
|----------------------------------|-------------------|-----------------------|--------------|
| PART # | ROD DIAMETER (IN) | INSTALLED LENGTH (IN) | MATERIAL |
| WILLIAMS 150 KSI ALL THREAD BARS | 1.75 | 39 | ASTM A722-07 |

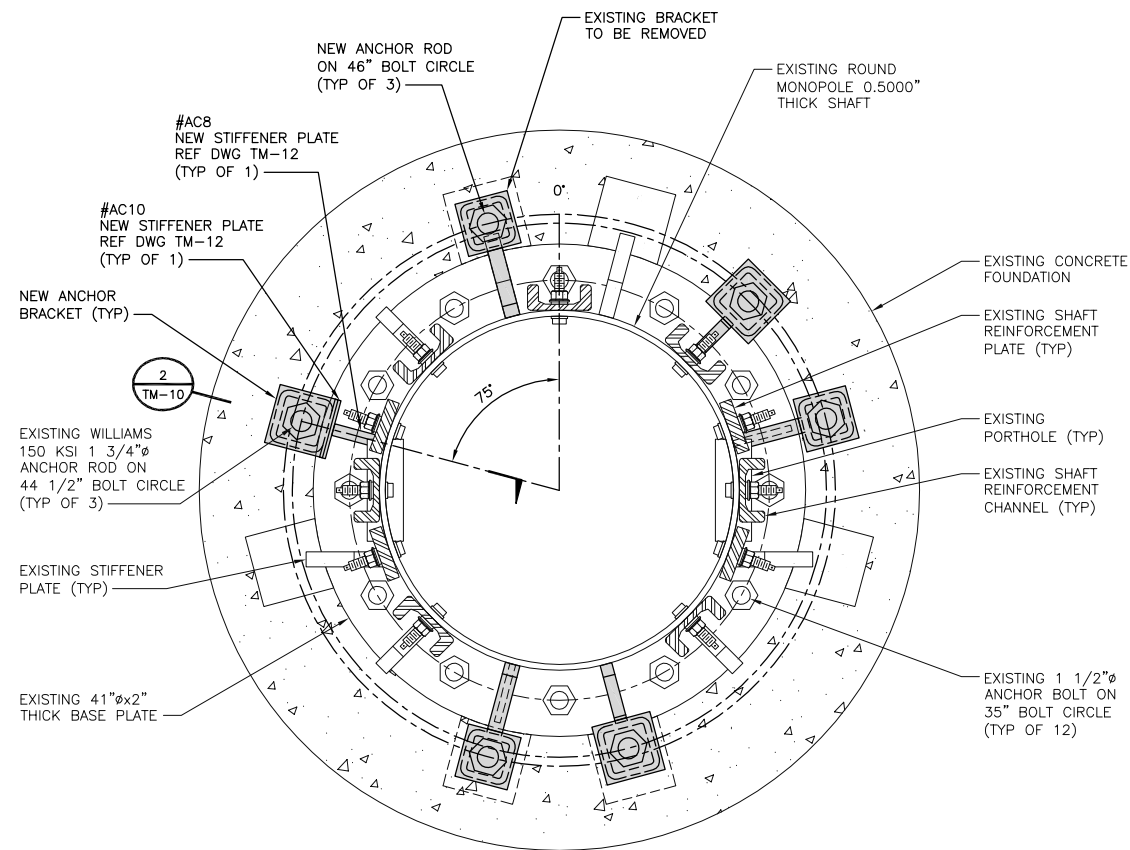
C40998163

| | | | |
|--|----------------|------------------------------|----------------------|
| | 4/28/21 | INSTALLED AS DESIGNED | <i>Phillip Feora</i> |
|--|----------------|------------------------------|----------------------|

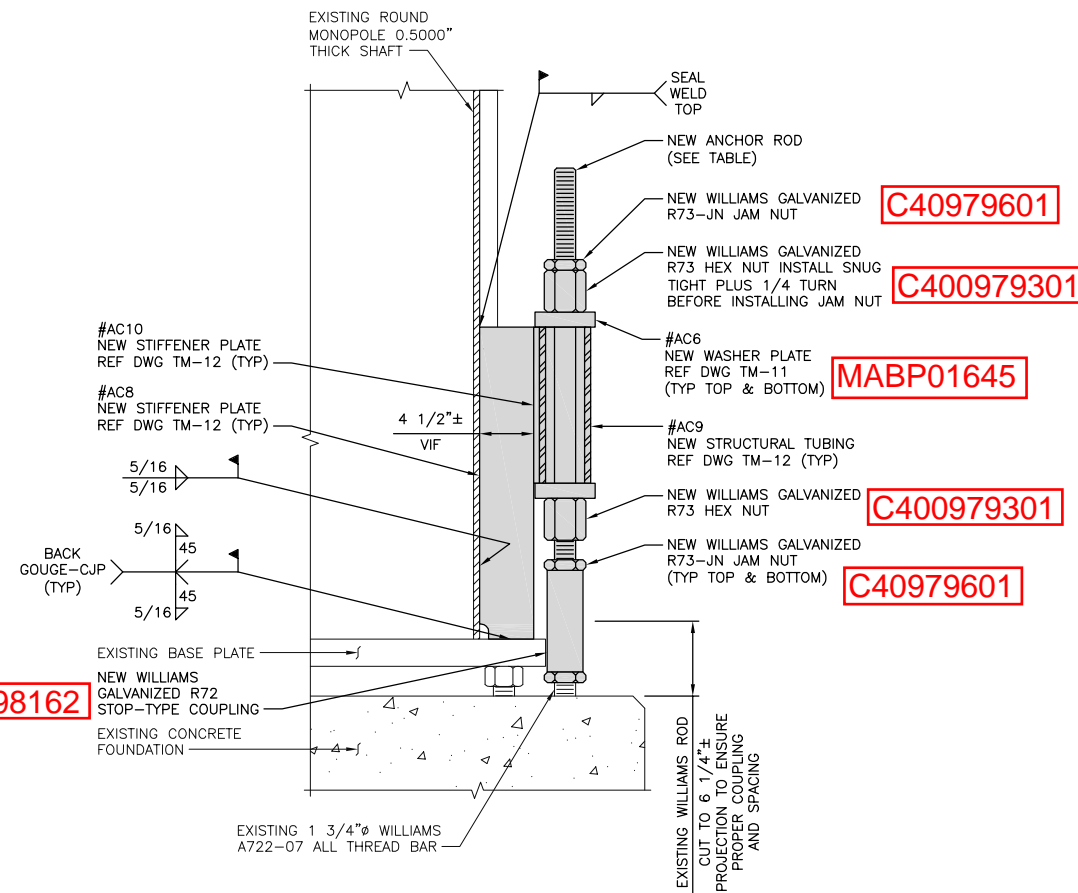
MABW40595

NOTES

1. PLATE WASHER MUST FULLY BEAR ON THE TUBE.
2. CONTRACTOR TO ENSURE THAT THE FULL 26" GUSSET TO POLE SHAFT WELD IS ACHIEVED, IF THIS CANNOT BE ACCOMPLISHED CONTACT THE EOR IMMEDIATELY.



**SECTION 1
ANCHOR ROD PLAN**
NO SCALE



SECTION 2
NO SCALE

PREPARED FOR:

**CROWN
CASTLE**

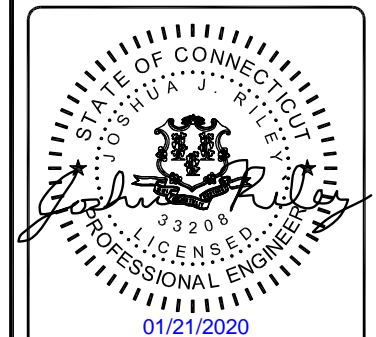


BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

| | |
|-------------|--------|
| PROJECT NO: | 400087 |
| DRAWN BY: | TYW |
| CHECKED BY: | PD |

| REV | DATE | DESCRIPTION |
|-----|----------|-------------------------|
| 0 | 01/15/20 | ISSUED FOR CONSTRUCTION |



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BU #876325
WO #1819530
WESTON SQUARE
92 WESTON STREET
HARTFORD, CT 06103-1217
HARTFORD COUNTY, USA

SHEET TITLE
**BASE PLATE ANCHOR
ROD CHAIR DETAILS**

SHEET NUMBER
TM-10

MABW40593

MABW40594

PREPARED FOR:

CROWN CASTLE

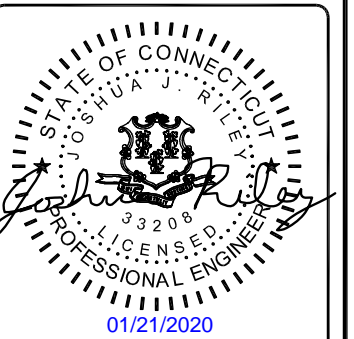


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6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

PROJECT NO: 400087
DRAWN BY: TYW
CHECKED BY: PD

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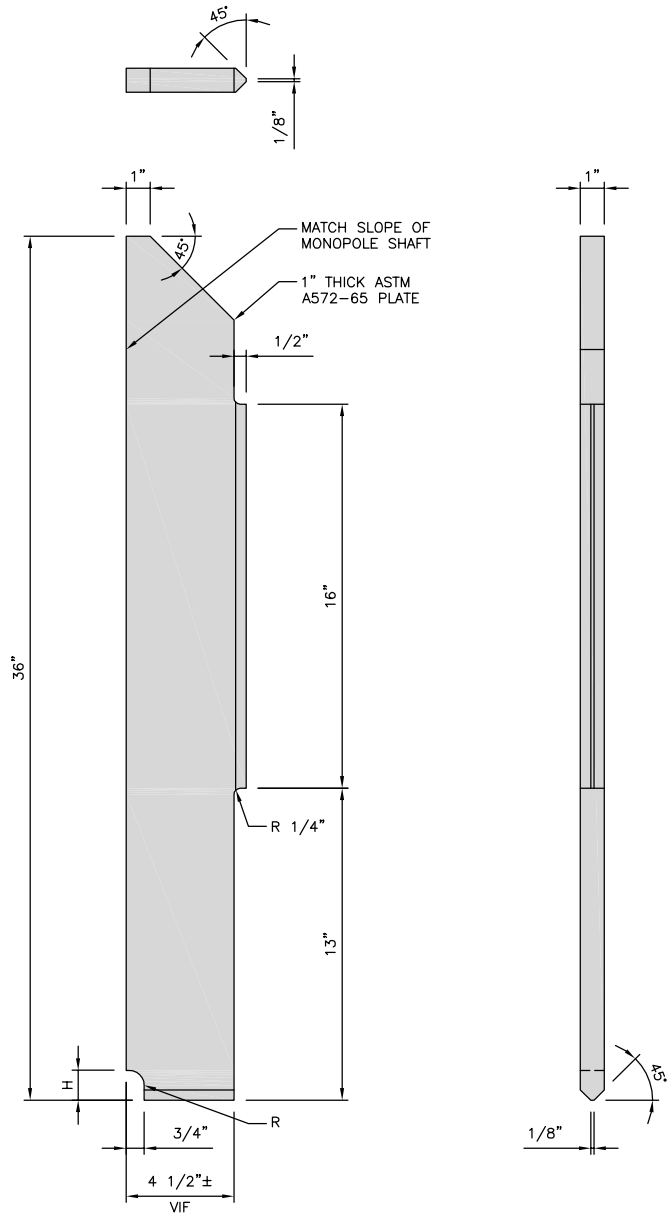


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BU #876325
WO #1819530
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92 WESTON STREET
HARTFORD, CT 06103-1217
HARTFORD COUNTY, USA

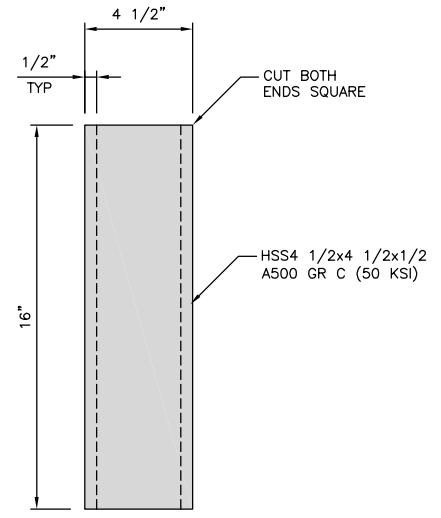
SHEET TITLE
BASE PLATE ANCHOR
ROD CHAIR DETAILS

SHEET NUMBER
TM-11



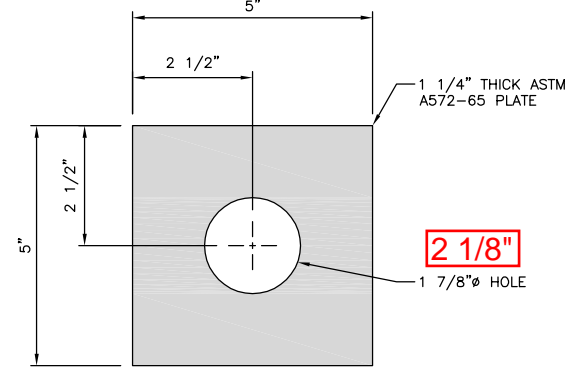
NOTE
R = STIFFENER THICKNESS/2
H = STIFFENER THICKNESS
#AC4
STIFFENER PLATE
NO SCALE

MABWS00892



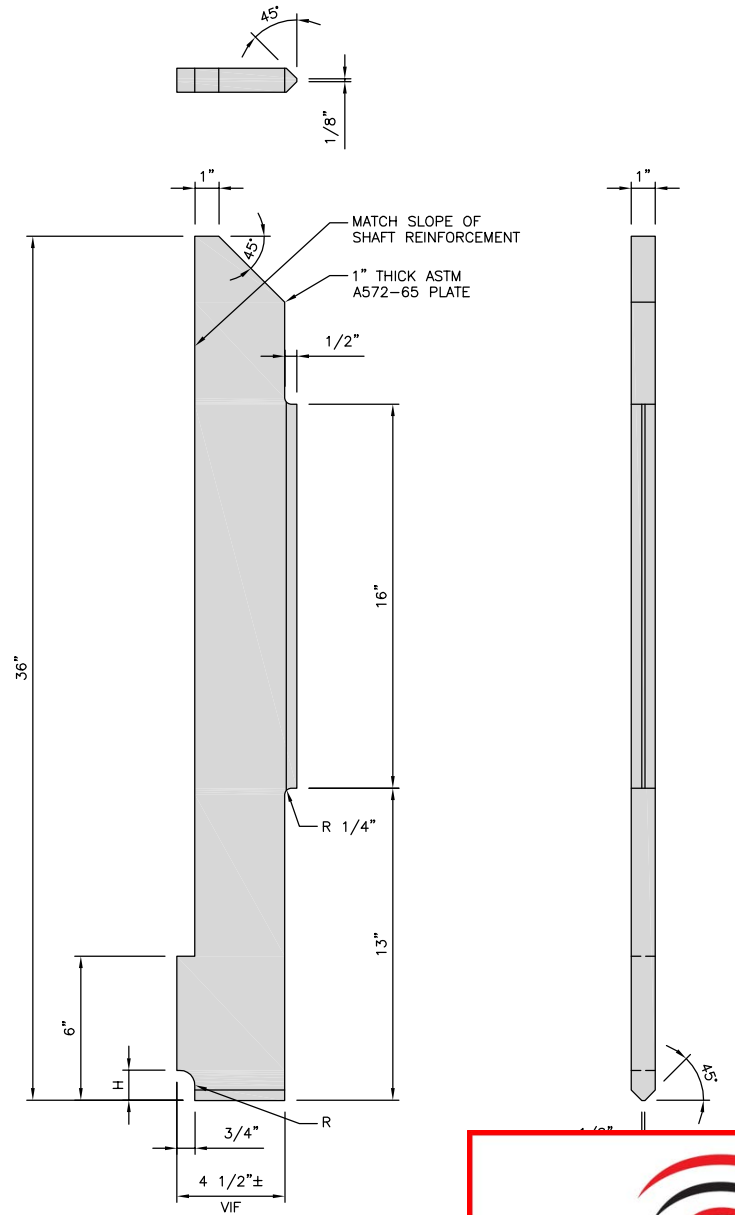
#AC5
STRUCTURAL TUBING
NO SCALE

MABWS00945



#AC6
WASHER PLATE
NO SCALE

MABP01645



NOTE
R = STIFFENER THICKNESS/2
H = STIFFENER THICKNESS
#AC7
STIFFENER PLATE
NO SCALE

MABWS00946

ETS
ENGINEERED TOWER SOLUTIONS, PLLC

ETS REDLINE DRAWINGS
PASSING MI

CREW LEAD: Hunter Thomas
DATE: 5/5/2021

MABW40595



ETS REDLINE DRAWINGS
PASSING MI

CREW LEAD: Hunter Thomas
DATE: 5/5/2021

PREPARED FOR:

CROWN
CASTLE

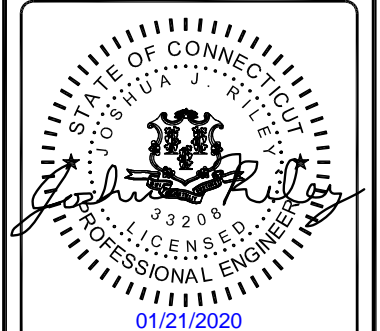


BLACK & VEATCH

6800 W 115TH ST, SUITE 2292
OVERLAND PARK, KS 66211

PROJECT NO: 400087
DRAWN BY: TYW
CHECKED BY: PD

| REV | DATE | DESCRIPTION |
|-----|----------|-------------------------|
| 0 | 01/15/20 | ISSUED FOR CONSTRUCTION |



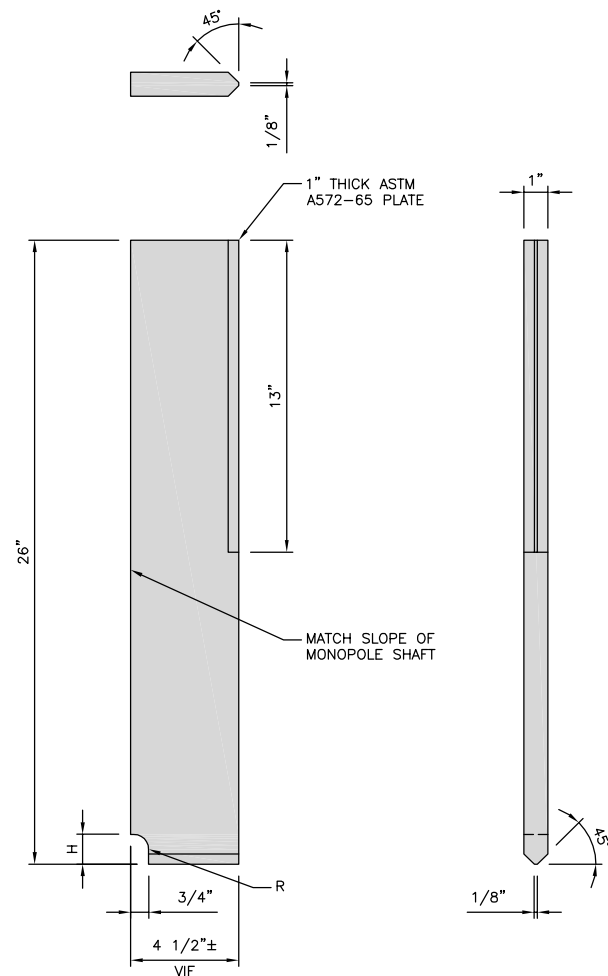
IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

BU #876325
WO #1819530
WESTON SQUARE
92 WESTON STREET
HARTFORD, CT 06103-1217
HARTFORD COUNTY, USA

SHEET TITLE
BASE PLATE ANCHOR
ROD CHAIR DETAILS

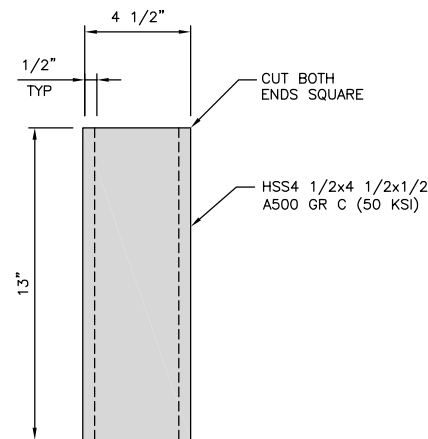
SHEET NUMBER

TM-12



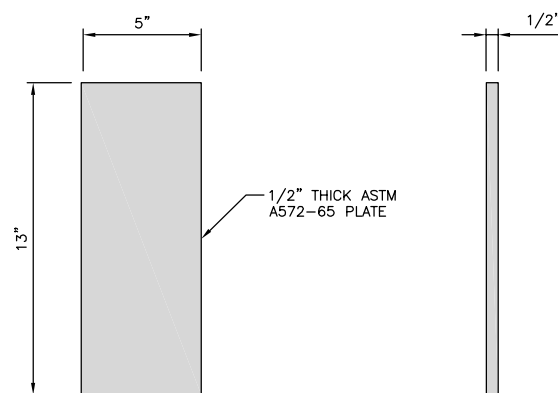
NOTE
R = STIFFENER THICKNESS/2
H = STIFFENER THICKNESS
#AC8
STIFFENER PLATE
NO SCALE

MABWS00947



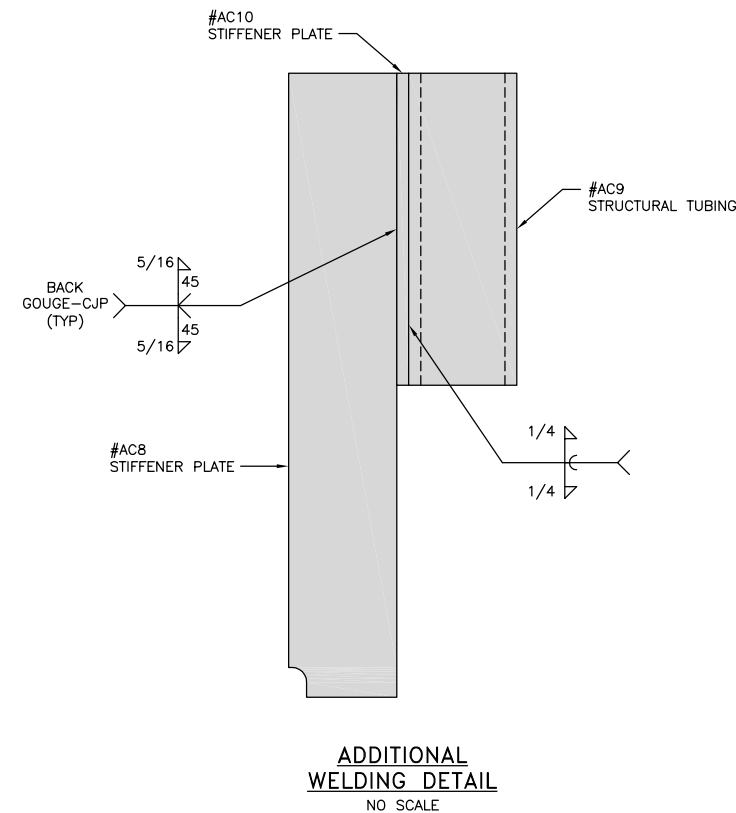
#AC9
STRUCTURAL TUBING
NO SCALE

MABWS00948



#AC10
STIFFENER PLATE
NO SCALE

MABWS00949



ADDITIONAL
WELDING DETAIL
NO SCALE

9.2.2 EOR RFI FORMS

General Information

| | | | |
|------------|----------------------------|----------------|----------------|
| Company: | Sabre Industries | Phone #: | 936-206-1684 |
| Email | pfeora@sabreindustries.com | GC Project #: | 473085 |
| BU #: | 876325 | Crown POC: | Dan Vadney |
| Site Name: | Weston Square,CT | EOR: | Black & Veatch |
| WO: | 1819530 | EOR Project #: | 400087 |

Instructions

General Contractor(GC) to Complete Engineering Issue Section

RFIs shall be submitted to the EOR prior to deviating from the original design drawings. This includes changes required based on the pre-fabrication mapping. Changes required based on the mapping shall be documented in the EOR RFI Form and submitted to the EOR alongside shop drawings.

RFIs shall be submitted for configuration and material changes. Approved changes shall be documented on the GC As-builts and shall require Crown approval if changes impact structural capacity, climbing facilities, appurtenances, or future maintenance of the tower. See CED-SOW-10007 for further guidance.

Issue Type Dropdown Menu - select the reason for the question from the drop down

- **Drawing Review Waiver** – Requesting a waiver of the shop drawing review prior to the start of construction.
- **Drawing Approval/No Deviation** – For shop drawing review when the drawings do not deviate from the original design drawings.
- **Drawing Approval/Deviation** – For shop drawing review when the drawings deviates from the original design drawing. The drawings should highlight any and all deviations from the original drawings. In addition, in the Engineering Issue box a description of the changes should be given with a reason for the deviation.
- **Clarification** –If a further explanation of the design is needed to properly fabricate or install the modification as intended.
- **Change Request** – If seeking approval for a deviation from the design documents. This should be used for changes that are outside of the shop drawing review process.
- **Direction** – If a course of action is needed from the EOR to proceed with the installation of the modifications as designed.
- **Interference/Field Issue** – If there is a fit up issue with the modification as designed due to a field condition. This should be used for field issues outside of the shop drawing review process.
- **Other** – All other requests.

Attachments – When sketches, photos, and/or drawings are attached select "Yes" in the drop down.

Engineering Issue Box– This space should contain a detailed explanation of the question along with any other information that the EOR might need to completely answer the inquiry. **As part of this description, please provide any information regarding contributing factors and possible resolutions based on your capabilities in the field and general means and methods.**

Engineer of Record(EOR) to Complete Resolution Section

Resolution Box – This space shall contain the resolution from the EOR or approval of the option provided by the contractor.

Drawing Change Needed – If this is marked 'Yes' then a drawing revision is required based upon the resolution.

Crown Approval – If this is marked 'Needed' then Crown must be contacted for approval of the resolution.

Sketch/Drawing Attached – If this is marked 'Yes' then there is an illustration attached as part of the resolution.

ESP # – Associated ESP # should be included, if applicable.

Resolved By – The first and last name of the Engineer that approved the resolution should be entered with the date.

Notes: This RFI form is for the purpose of addressing technical and construction related questions and issues. Final work authorization shall be approved by the Crown POC prior to proceeding with any work that deviates from the original design, scope, price and/or schedule. This form is not an authorization of a change order.

Engineering Issue

| | | | |
|-------------|-------|--------------|----|
| Issue Type: | Other | Attachments: | No |
|-------------|-------|--------------|----|

Looking for EOR approval

Can we use Hilti for the anchor rods?

Will you please clarify page TM-5 item C of the Mod Schedule calls out removing 3 brackets and rods. the rest of the drawings do not. It only calls for new brackets.

| | | | |
|---------------|---------------|-------|---------|
| Submitted by: | Phillip Feora | Date: | 2/18/21 |
|---------------|---------------|-------|---------|

Resolution

| | | | |
|-----------------|----|----------------|------------|
| Drawing Change: | No | Crown Approval | Not Needed |
|-----------------|----|----------------|------------|

| | | | |
|--------------------------|----|--------|--|
| Sketch/Drawing Attached: | No | ESP #: | |
|--------------------------|----|--------|--|

Approved

| | | | |
|--------------|---------------|-------|---------|
| Resolved By: | Patrick Davis | Date: | 2/22/21 |
|--------------|---------------|-------|---------|

Engineering Issue

| | | | |
|-------------|-------|--------------|----|
| Issue Type: | Other | Attachments: | No |
|-------------|-------|--------------|----|

Looking for EOR direction

The ARB that goes in between the C channel is notched 6 inches. The C channel however is 4 ⁷/₈" from the base plate. I can notch the bottom of the ARB to 4 ⁵/₈" or I can cut the C channel up to 6 ¹/₄". How should we proceed?

| | | | |
|---------------|---------------|-------|---------|
| Submitted by: | Phillip Feora | Date: | 3/15/21 |
|---------------|---------------|-------|---------|

Resolution

| | | | |
|-----------------|----|----------------|------------|
| Drawing Change: | No | Crown Approval | Not Needed |
|-----------------|----|----------------|------------|

| | | | |
|--------------------------|----|--------|--|
| Sketch/Drawing Attached: | No | ESP #: | |
|--------------------------|----|--------|--|

Notching the ARB is approved.

| | | | |
|--------------|---------------|-------|---------|
| Resolved By: | Patrick Davis | Date: | 3/15/21 |
|--------------|---------------|-------|---------|

Engineering Issue

| | | | |
|--------------------|-------|---------------------|----|
| Issue Type: | Other | Attachments: | No |
|--------------------|-------|---------------------|----|

Looking for EOR direction

On one of the new rods being installed the crew is hitting a vertical run of rebar at 4'-8". We can install the rod at this depth or move 2"-3" to the right.

| | | | |
|----------------------|--|--------------|--|
| Submitted by: | | Date: | |
|----------------------|--|--------------|--|

Resolution

| | | | |
|------------------------|----|-----------------------|------------|
| Drawing Change: | No | Crown Approval | Not Needed |
|------------------------|----|-----------------------|------------|

| | | | |
|---------------------------------|----|---------------|--|
| Sketch/Drawing Attached: | No | ESP #: | |
|---------------------------------|----|---------------|--|

a 4'-8" embedment is acceptable in this case.

| | | | |
|---------------------|---------------|--------------|---------|
| Resolved By: | Patrick Davis | Date: | 3/15/21 |
|---------------------|---------------|--------------|---------|

Engineering Issue

| | | | |
|-------------|-------|--------------|----|
| Issue Type: | Other | Attachments: | No |
|-------------|-------|--------------|----|

Looking for EOR approval.

The existing anchor rods are left hand thread.

Q1. Can we use a R74-14-SN-LR-D-0S (item 5 of the attachment) to adapt the new right hand thread rod to the existing left hand thread?

We will also need to use a Left hand thread jam nut. PN#R74-14-JN-LH-D-0S (item three of the attachment)

| | | | |
|---------------|--|-------|--|
| Submitted by: | | Date: | |
|---------------|--|-------|--|

Resolution

| | | | |
|-----------------|----|----------------|------------|
| Drawing Change: | No | Crown Approval | Not Needed |
|-----------------|----|----------------|------------|

| | | | |
|--------------------------|----|--------|--|
| Sketch/Drawing Attached: | No | ESP #: | |
|--------------------------|----|--------|--|

Approved.

| | | | |
|--------------|---------------|-------|---------|
| Resolved By: | Patrick Davis | Date: | 3/17/21 |
|--------------|---------------|-------|---------|

Engineering Issue

Issue Type: Other

Attachments: No

Looking for EOR approval

We have a port hole that is at 23" the ARB stiffener is 26". For it to be in line with the existing anchor rod we are going to need to take out 3 1/4" out of the top of the stiffener. will this be acceptable?

Submitted by:

Date:

Resolution

Drawing Change:

No

Crown Approval

Not Needed

Sketch/Drawing Attached:

No

ESP #:

Approved.

Resolved By: Patrick Davis

Date:

3/18/21

9.2.3 PUNCH LIST DOCUMENTATION

Punchlist BU # 876325 - WESTON SQUARE

Status: Complete

| Project Information | Project Contacts | | Punchlist Issuance # | Date | Visit | Structural Impact To Capacity No # of Punchlist Items 0 |
|---------------------|----------------------|----------------------------------|----------------------|----------|--------|------------------------------------------------------------------|
| | MI Vendor | Engineered Tower Solutions, PLLC | 1 | 5/5/2021 | OnSite | |
| | MI On-site inspector | Hunter Thomas | | | | |
| | MI WO # | 1906719 | | | | |
| | General Contractor | Sabre | | | | |
| | Crown POC | Dan Vadney | | | | |
| | EOR | Black & Veatch | | | | |
| | BU | 876325 | | | | |
| Site Name | WESTON SQUARE | | | | | |

Zero Punchlist Items

| | | |
|-----------------------------------------------------------------|-----------------------------------------|-----|
| NonConformance Impact to Capacity (Shall Be Provided by EOR) | New Overall Structure Capacity Rating : | N/A |
|-----------------------------------------------------------------|-----------------------------------------|-----|

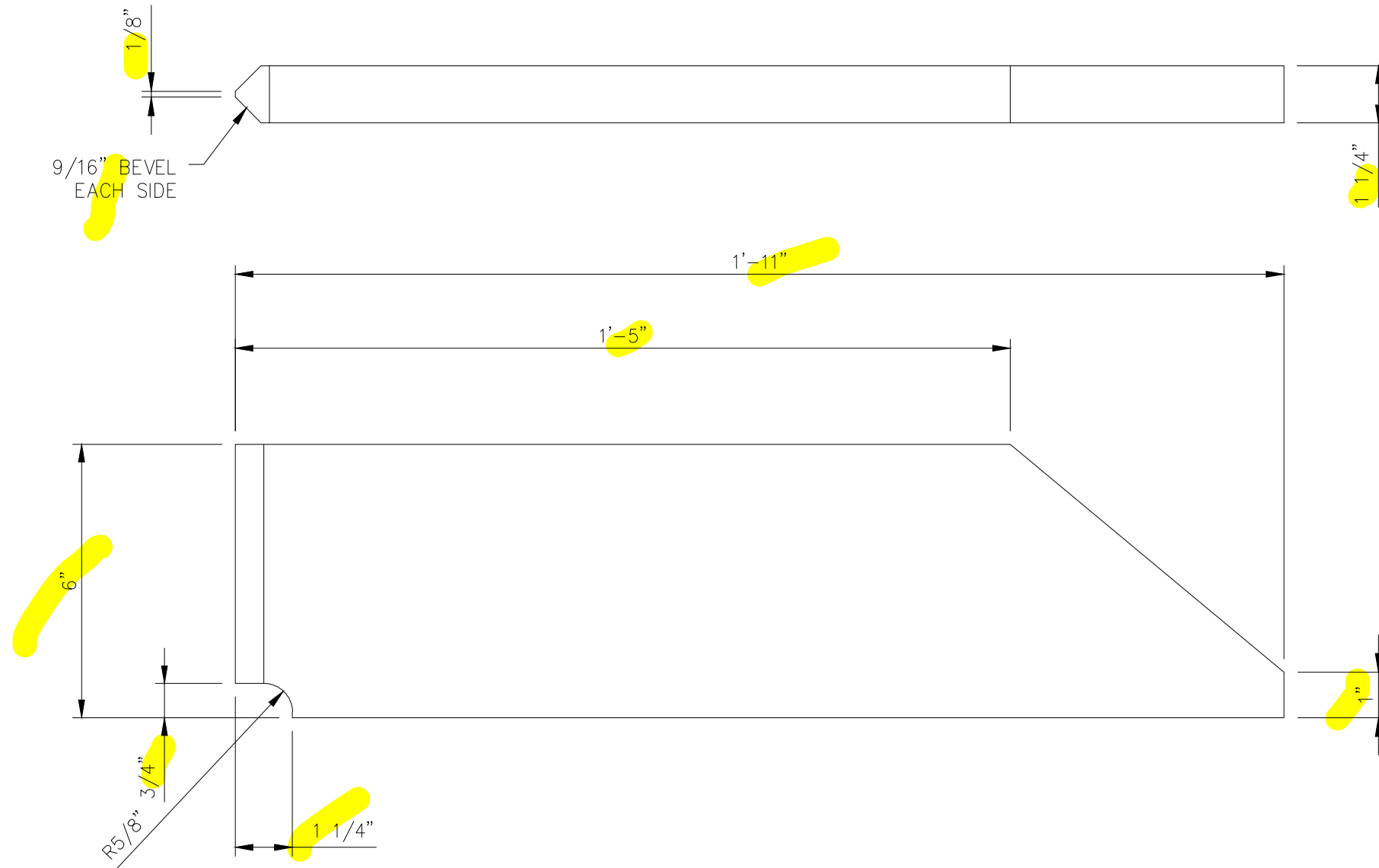
Documentation Complete / Documentation Missing

| MI Checklist Documents | Required | Submitted | Requirement Waived | Date Compliance Verified | Status |
|--------------------------------------------|-------------------------|-----------|--------------------|--------------------------|----------|
| | PRE-CONSTRUCTION | | | | |
| EOR Approved Shop Drawings | Required | 4/28/2021 | N/A | 4/30/2021 | Complete |
| Fabrication Inspection | Required | 4/28/2021 | N/A | 4/30/2021 | Complete |
| Fabricator Certified Weld Inspection | Required | 4/28/2021 | N/A | 4/30/2021 | Complete |
| Material Test Report (MTR) | Required | 4/28/2021 | N/A | 4/30/2021 | Complete |
| Fabricator NDE Report | N/A | N/A | N/A | - | N/A |
| NDE Insp. Report of Monopole Base Plate | N/A | N/A | N/A | - | N/A |
| Packing Slips | Required | 4/28/2021 | N/A | 4/30/2021 | Complete |
| Additional Pre-Construction Inspections | N/A | N/A | N/A | - | N/A |
| Pre-Construction Document Comments | | | | | |
| CONSTRUCTION | | | | | |
| Foundation Inspections | N/A | N/A | N/A | - | N/A |
| Post-Installed Anchor Rod Verification | Required | 4/28/2021 | N/A | 4/30/2021 | Complete |
| Base Plate Grout Verification | Required | 4/28/2021 | N/A | 4/30/2021 | Complete |
| Contractor's Certified Weld Inspection | Required | 4/28/2021 | N/A | 4/30/2021 | Complete |
| On-Site Cold Galvanizing Verification | Required | 4/28/2021 | N/A | 4/30/2021 | Complete |
| Tension Twist and Plumb Report | N/A | N/A | N/A | - | N/A |
| GC As-Built Drawings | Required | 4/28/2021 | N/A | 4/30/2021 | Complete |
| Additional Construction Inspections | N/A | N/A | N/A | - | N/A |
| Construction Document Comments | | | | | |
| POST-CONSTRUCTION | | | | | |
| Construction Compliance Verification | Required | 4/28/2021 | N/A | 4/30/2021 | Complete |
| Post-Installed Anchor Rod Pull-Out Testing | Required | 4/28/2021 | N/A | 4/30/2021 | Complete |
| Additional Post-Construction Inspections | N/A | N/A | N/A | - | N/A |
| Post-Construction Document Comments | | | | | |
| MI Checklist Comments | | | | | |

CONSTRUCTION **DOCUMENTATION**

9.3.1 EOR APPROVED SHOP DRAWINGS

SWO NO. _____
 PROJECT _____
 QUANTITY _____



ACCEPTED

Patrick Davis
Black & Veatch
1.15.21

BLACK STEEL WEIGHT = 43.3#

UNLESS OTHERWISE SPECIFIED
 ALL DIMENSIONS INCLUDE
 FINISHES AND ARE IN INCHES
 TOLERANCES: FRACTIONS $\pm 1/16''$
 ANGLES $\pm 1/2$ DEG.
 DECIMALS $\pm .010''$

MATERIAL: PLATE
 1 1/4 X 6 X 1'-11
 ASTM A572 GR. 65

TOLERANCES DO NOT APPLY
 TO RAW MATERIAL



PLATE, ANCHOR BOLT BRACKET

| REV | DATE | DRW | CHK | DESCRIPTION |
|-----|------|-----|-----|-------------|
| | | | | |
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| | | | | | | | |
|------------|----------|-------|------|-------------|------------|-----|---|
| DATE | 01/05/21 | SIZE | B | DRAWING NO. | MABWS00891 | REV | 0 |
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| CHECKED BY | mc | | | | | | |

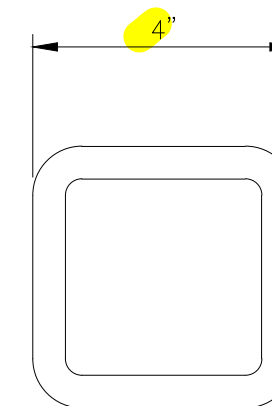
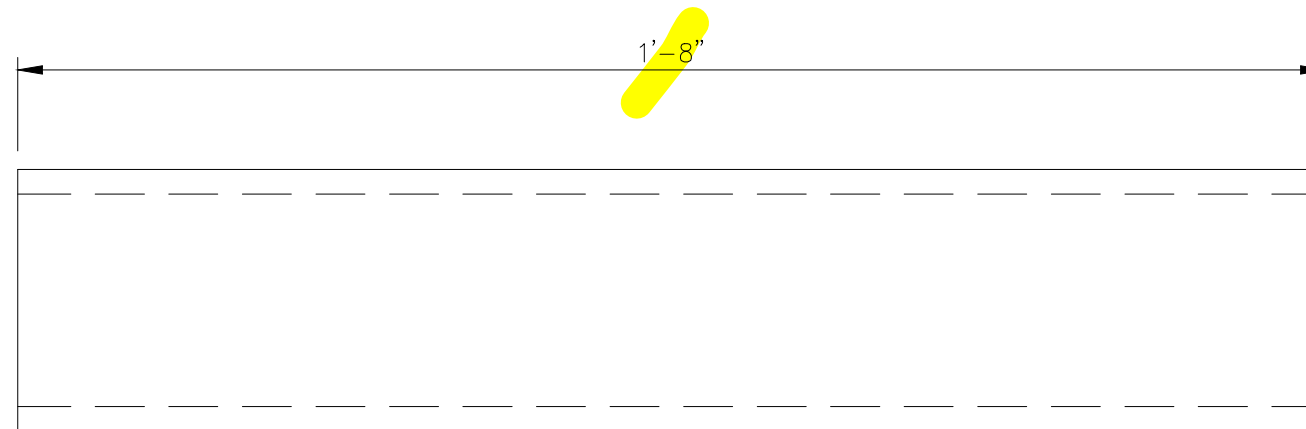
SWO NO. _____

PROJECT _____

QUANTITY _____

ACCEPTED

**Patrick Davis
Black & Veatch
1.15.21**



BLACK STEEL WEIGHT = 36.1#

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS INCLUDE
FINISHES AND ARE IN INCHES

TOLERANCES: FRACTIONS $\pm 1/16"$
ANGLES $\pm 1/2$ DEG.
DECIMALS $\pm .010"$

MATERIAL: TUBE
4 X 4 X 1/2 X 1'-8
Fy = 50 KSI

TOLERANCES DO NOT APPLY
TO RAW MATERIAL



TUBE, ANCHOR BOLT BRACKET

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| REV | DATE | DRW | CHK | DESCRIPTION |
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| 1 | 1/15/21 | mlc | mc | REVISED PIPE GRADE |

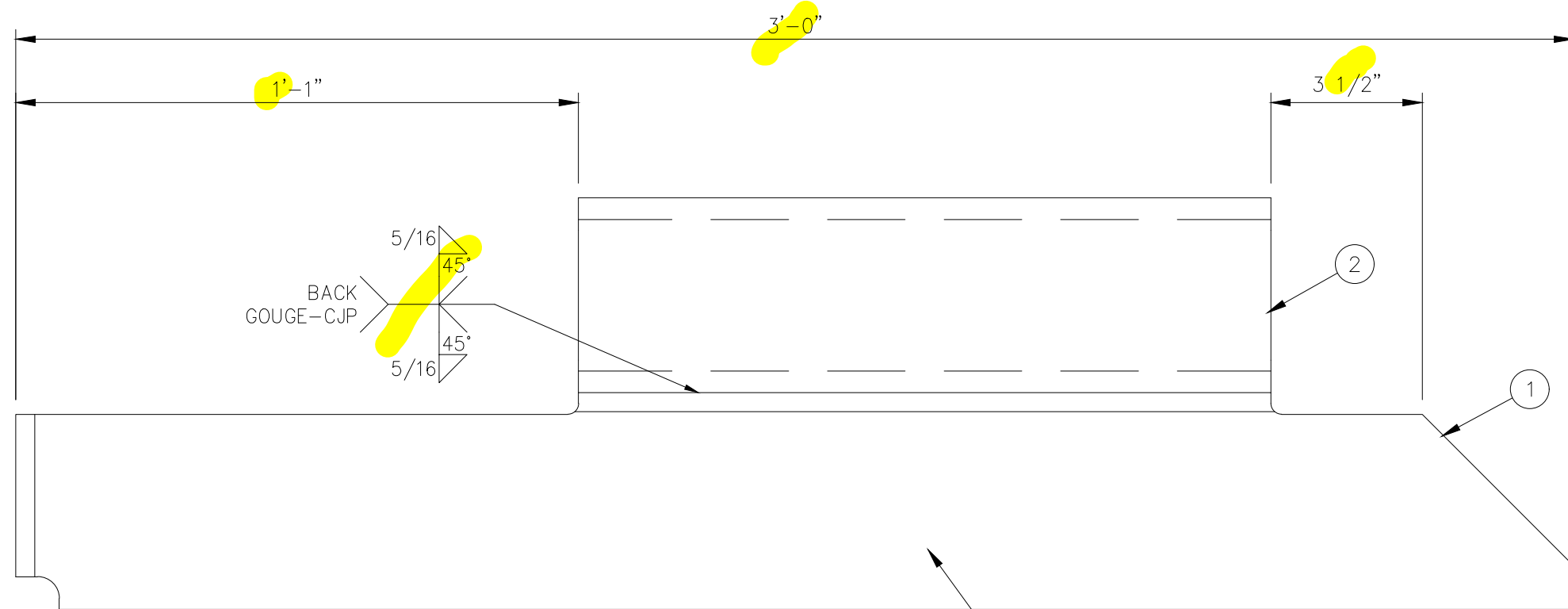
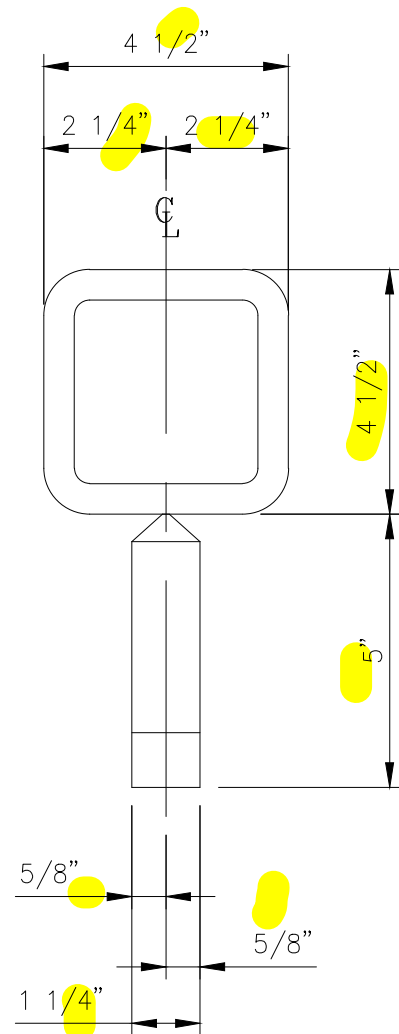
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| DATE | 9/17/15 | SIZE | B | DRAWING NO. | MABWS00223 | REV | 1 |
| DRAWN BY | FJM | SCALE | None | PAGE | 1 | OF | 1 |
| CHECKED BY | mc | | | | | | |

QC CHECK _____
 PREWELD _____
 WELD _____
 MAG _____

ACCEPTED

Patrick Davis
Patrick Davis
Black & Veatch
1.15.21

SWO NO. _____
 PROJECT _____
 QUANTITY _____



ASSEMBLY

DEPTH STAMP MABW40593
 LETTERS AND NUMBERS
 TO BE 1/2" HIGH
 DEPTH TO BE 1/32"

FINISH: HOT DIP GALV. PER ASTM A123.

LIST OF MATERIAL

| ITEM | QTY. | PART NO. | DESCRIPTION | WEIGHT |
|--------------------|------|------------|-------------------------------------------------------------|--------|
| 1. | 1 | MABWS00892 | PLATE, ANCHOR BOLT BRACKET (1" X 5" X 3'-0") | 45.8# |
| 2. | 1 | MABWS00945 | TUBE, ANCHOR BOLT BRACKET (4 1/2" X 4 1/2" X .500" X 1'-4") | 33.3# |
| TOTAL WEIGHT BLACK | | | | 79.1# |
| TOTAL WEIGHT GALV. | | | | 82.3# |

ALL WELDS ARE E80XX UNLESS NOTED OTHERWISE

| WELD TYPE | INSPECTION TYPE |
|-----------|---------------------|
| PJP | MT |
| CJP | UT/MT |
| FILLET | VISUAL CWI (U.N.O.) |

| | | | | | |
|------------------------------------------------------------------------------|------|---------|-----------------------------------------|--|--|
| UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS INCLUDE FINISHES AND ARE IN INCHES | | | MATERIAL: | | |
| TOLERANCES: FRACTIONS ± 1/16" | | | TOLERANCES DO NOT APPLY TO RAW MATERIAL | | |
| ANGLES ± 1/2 DEG. | | | | | |
| DECIMALS ± .010" | | | | | |
| REV | DATE | DRW/CHK | DESCRIPTION | | |

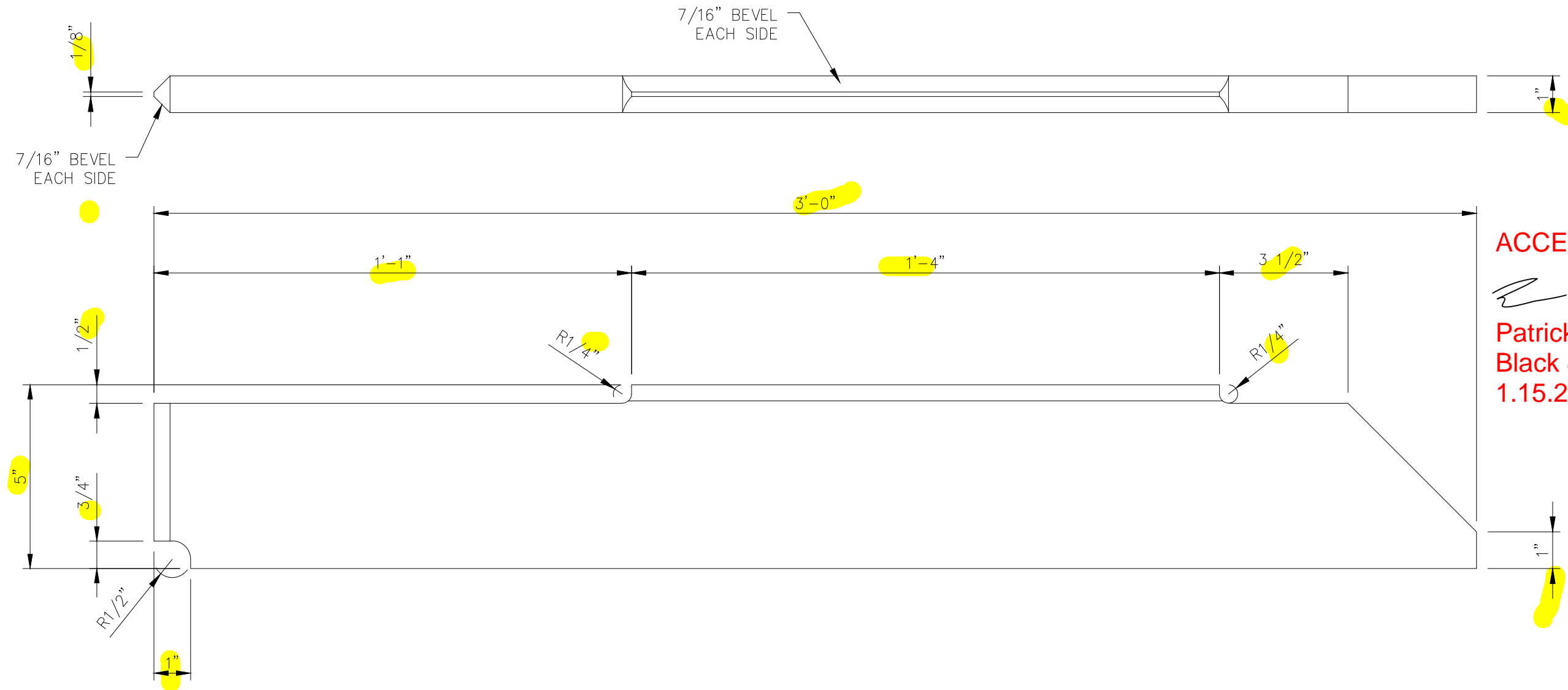


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WELDMENT, ANCHOR BOLT BRACKET

| | | | | | | | |
|------------|----------|-------|------|-------------|-----------|-----|---|
| DATE | 01/06/21 | SIZE | B | DRAWING NO. | MABW40593 | REV | 0 |
| DRAWN BY | PSB | SCALE | None | PAGE | 1 OF 1 | | |
| CHECKED BY | mc | | | | | | |

SWO NO. _____
 PROJECT _____
 QUANTITY _____



ACCEPTED

 Patrick Davis
 Black & Veatch
 1.15.21

BLACK STEEL WEIGHT = 45.8#

UNLESS OTHERWISE SPECIFIED
 ALL DIMENSIONS INCLUDE
 FINISHES AND ARE IN INCHES
 TOLERANCES: FRACTIONS $\pm 1/16"$
 ANGLES $\pm 1/2$ DEG.
 DECIMALS $\pm .010"$

MATERIAL: PLATE
 1 X 5 X 3'-0
 ASTM A572 GR. 65

TOLERANCES DO NOT APPLY
 TO RAW MATERIAL



PLATE, ANCHOR BOLT BRACKET

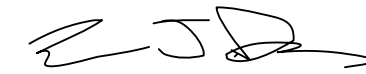
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| REV | DATE | DRW | CHK | DESCRIPTION |
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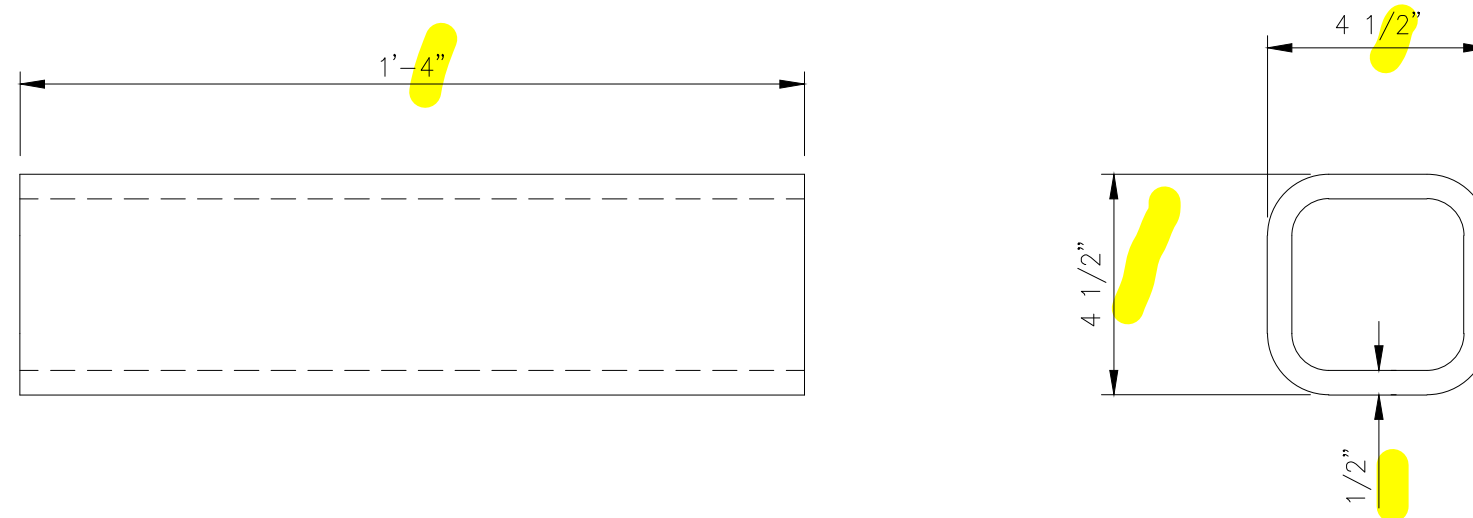
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|------------|----------|-------|------|-------------|------------|------|---|
| DATE | 01/06/21 | SIZE | B | DRAWING NO. | MABWS00892 | REV | 0 |
| DRAWN BY | PSB | SCALE | None | PAGE | 1 | OF 1 | |
| CHECKED BY | MC | | | | | | |

SWO NO. _____
 PROJECT _____
 QUANTITY _____

ACCEPTED



Patrick Davis
Black & Veatch
1.15.21



BLACK STEEL WEIGHT = 33.3#

UNLESS OTHERWISE SPECIFIED
 ALL DIMENSIONS INCLUDE
 FINISHES AND ARE IN INCHES
 TOLERANCES: FRACTIONS $\pm 1/16$ "
 ANGLES $\pm 1/2$ DEG.
 DECIMALS $\pm .010$ "

MATERIAL: TUBE
 4 1/2 X 4 1/2 X 1/2 X 1'-4
 ASTM A500 (50 KSI)

TOLERANCES DO NOT APPLY
 TO RAW MATERIAL



TUBE, ANCHOR BOLT BRACKET

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| REV | DATE | DRW | CHK | DESCRIPTION |
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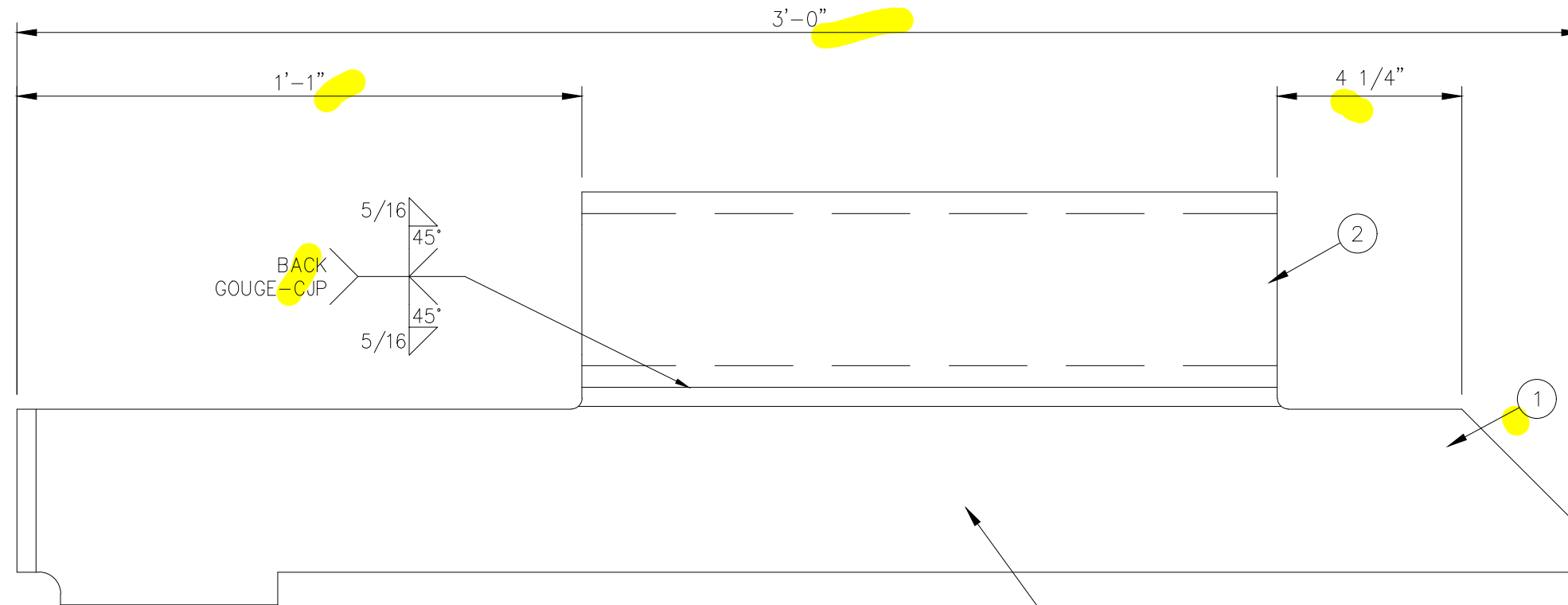
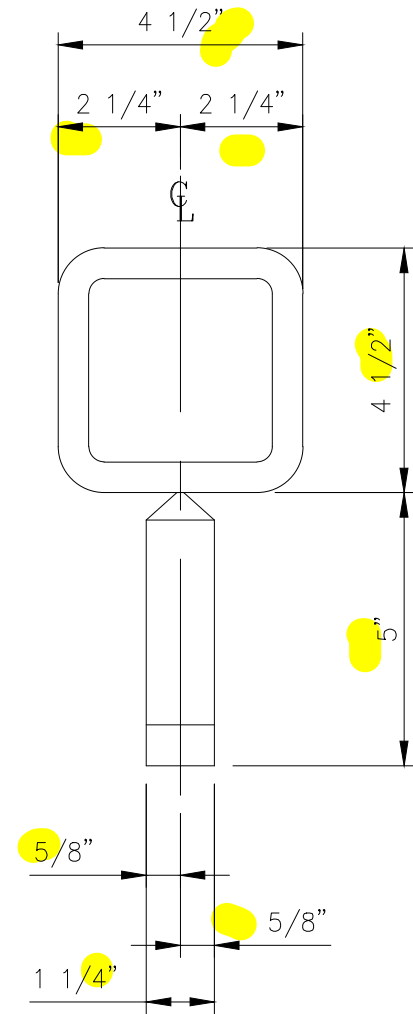
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|------------|----------|-------|------|-------------|------------|-----|---|
| DATE | 01/06/21 | SIZE | B | DRAWING NO. | MABWS00945 | REV | 0 |
| DRAWN BY | PSB | SCALE | NONE | PAGE | 1 | OF | 1 |
| CHECKED BY | MC | | | | | | |

QC CHECK _____
 PREWELD _____
 WELD _____
 MAG _____

ACCEPTED

[Signature]
Patrick Davis
Black & Veatch
1.15.21

SWO NO. _____
 PROJECT _____
 QUANTITY _____



ASSEMBLY

DEPTH STAMP MABW40594
 LETTERS AND NUMBERS
 TO BE 1/2" HIGH
 DEPTH TO BE 1/32"

FINISH: HOT DIP GALV. PER ASTM A123.

LIST OF MATERIAL

| ITEM | QTY. | PART NO. | DESCRIPTION | WEIGHT | |
|------|------|------------|-------------------------------------------------------------|--------------------|-------|
| 1. | 1 | MABWS00946 | PLATE, ANCHOR BOLT BRACKET (1" X 5" X 3'-0") | 39.6# | |
| 2. | 1 | MABWS00945 | TUBE, ANCHOR BOLT BRACKET (4 1/2" X 4 1/2" X .500" X 1'-4") | 33.3# | |
| | | | | TOTAL WEIGHT BLACK | 72.9# |
| | | | | TOTAL WEIGHT GALV. | 75.8# |

ALL WELDS ARE E80XX UNLESS NOTED OTHERWISE

| WELD TYPE | INSPECTION TYPE |
|-----------|---------------------|
| PJP | MT |
| CJP | UT/MT |
| FILLET | VISUAL CWI (U.N.O.) |

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS INCLUDE FINISHES AND ARE IN INCHES
 TOLERANCES: FRACTIONS ± 1/16"
 ANGLES ± 1/2 DEG.
 DECIMALS ± .010"

MATERIAL:
 TOLERANCES DO NOT APPLY TO RAW MATERIAL



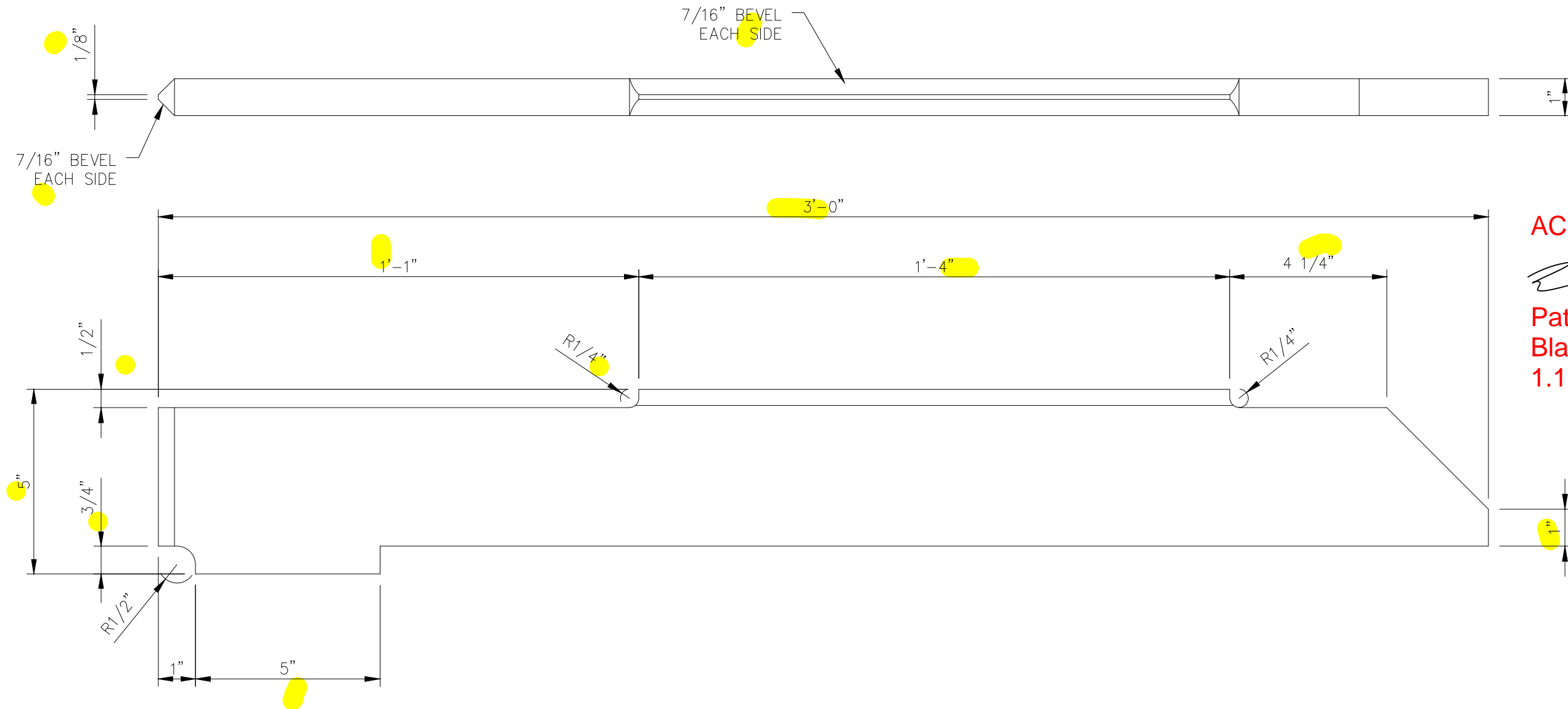
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WELDMENT, ANCHOR BOLT BRACKET

| REV | DATE | DRW | CHK | DESCRIPTION |
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| DATE | 01/06/21 | SIZE | B | DRAWING NO. | MABW40594 | REV | 0 |
|------------|----------|-------|------|-------------|-----------|-----|---|
| DRAWN BY | PSB | SCALE | None | PAGE | 1 | OF | 1 |
| CHECKED BY | mc | | | | | | |

SWO NO. _____
 PROJECT _____
 QUANTITY _____



ACCEPTED

Patrick Davis

Patrick Davis
 Black & Veatch
 1.15.21

BLACK STEEL WEIGHT = 39.6#

UNLESS OTHERWISE SPECIFIED
 ALL DIMENSIONS INCLUDE
 FINISHES AND ARE IN INCHES
 TOLERANCES: FRACTIONS $\pm 1/16$ "
 ANGLES $\pm 1/2$ DEG.
 DECIMALS $\pm .010$ "

MATERIAL: PLATE
 1 X 5 X 3'-0
 ASTM A572 GR. 65

TOLERANCES DO NOT APPLY
 TO RAW MATERIAL



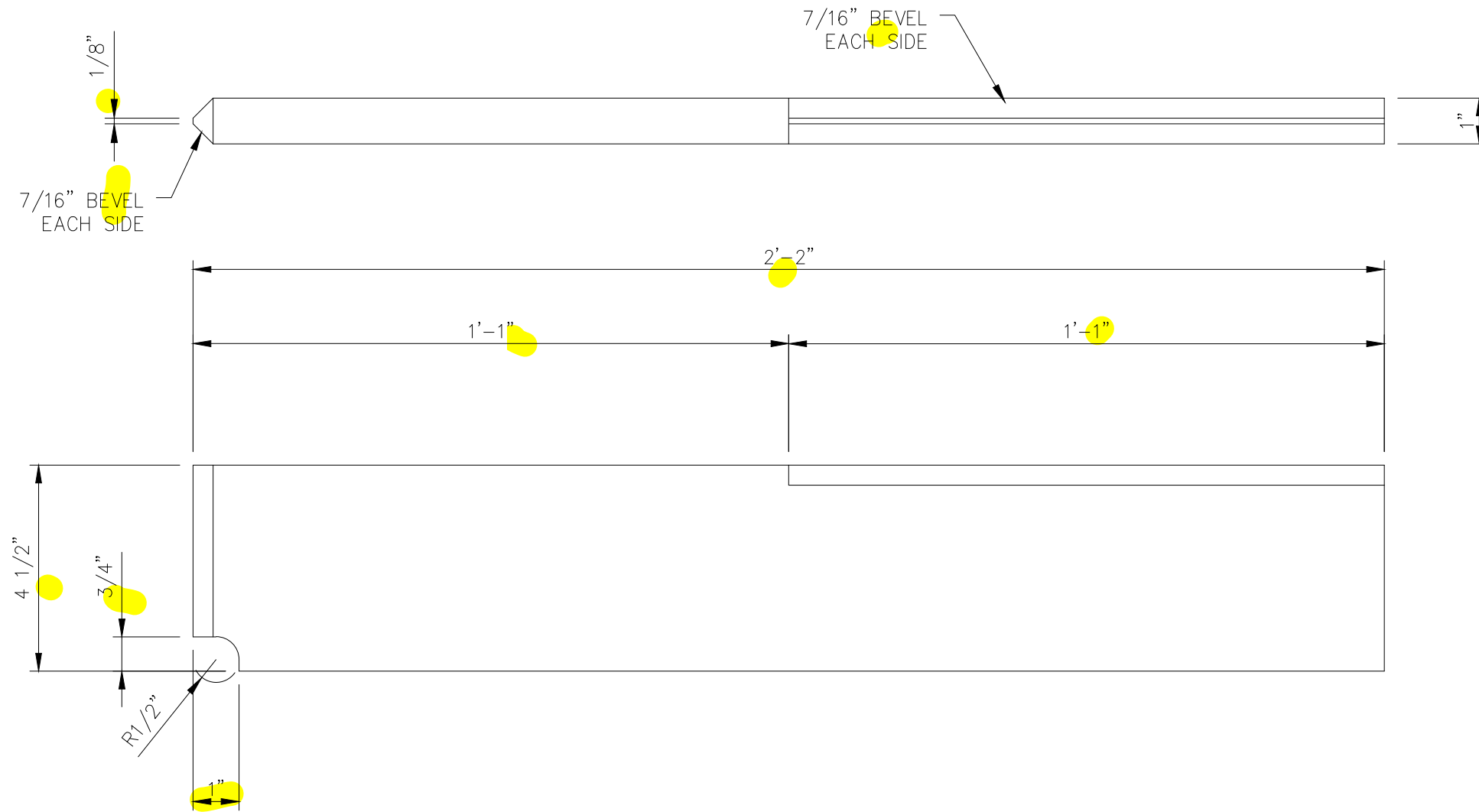
PLATE, ANCHOR BOLT BRACKET

| REV | DATE | DRW | CHK | DESCRIPTION |
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|------------|----------|-------|------|-------------|------------|-----|---|
| DATE | 01/06/21 | SIZE | B | DRAWING NO. | MABWS00946 | REV | 0 |
| DRAWN BY | PSB | SCALE | None | PAGE | 1 | OF | 1 |
| CHECKED BY | MC | | | | | | |

SWO NO. _____
 PROJECT _____
 QUANTITY _____



ACCEPTED

Patrick Davis

**Patrick Davis
 Black & Veatch
 1.15.21**

BLACK STEEL WEIGHT = 32.9#

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|------------------------------------------------------------------------------------|------|---------|---------------------------------------------------------|--|--|
| UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS INCLUDE FINISHES AND ARE IN INCHES | | | MATERIAL: PLATE 1 X 4 1/2 X 2'-2 ASTM A572 GR. 65 | | |
| TOLERANCES: FRACTIONS ± 1/16" ANGLES ± 1/2 DEG. DECIMALS ± .010" | | | TOLERANCES DO NOT APPLY TO RAW MATERIAL | | |
| REV | DATE | DRW/CHK | DESCRIPTION | | |
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PLATE, ANCHOR BOLT BRACKET


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|------------|----------|-------|------|-------------|------------|-----|---|
| DATE | 01/07/21 | SIZE | B | DRAWING NO. | MABWS00947 | REV | 0 |
| DRAWN BY | PSB | SCALE | None | PAGE | 1 | OF | 1 |
| CHECKED BY | MC | | | | | | |

SWO NO. _____

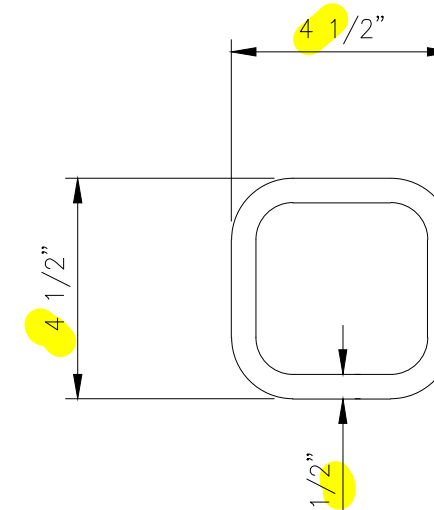
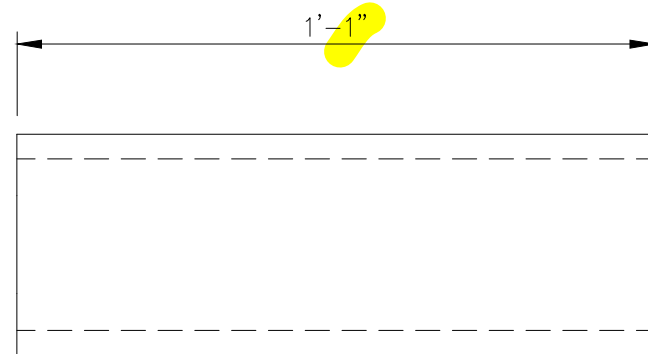
PROJECT _____

QUANTITY _____

ACCEPTED



**Patrick Davis
Black & Veatch
1.15.21**



BLACK STEEL WEIGHT = 27.1#

| | |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS INCLUDE FINISHES AND ARE IN INCHES | MATERIAL: TUBE 4 1/2 X 4 1/2 X 1/2 X 1'-1 ASTM A500 (50 KSI) |
| TOLERANCES: FRACTIONS ± 1/16" ANGLES ± 1/2 DEG. DECIMALS ± .010" | TOLERANCES DO NOT APPLY TO RAW MATERIAL |



TUBE, ANCHOR BOLT BRACKET

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| REV | DATE | DRW | CHK | DESCRIPTION |
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|------------|----------|-------|------|-------------|------------|-----|---|
| DATE | 01/07/21 | SIZE | B | DRAWING NO. | MABWS00948 | REV | 0 |
| DRAWN BY | PSB | SCALE | NONE | PAGE | 1 | OF | 1 |
| CHECKED BY | MC | | | | | | |



SWO NO. _____
 PROJECT _____
 QUANTITY _____



ACCEPTED

Patrick Davis
Black & Veatch
1.15.21

BLACK STEEL WEIGHT = 9.2#

UNLESS OTHERWISE SPECIFIED
 ALL DIMENSIONS INCLUDE
 FINISHES AND ARE IN INCHES
 TOLERANCES: FRACTIONS $\pm 1/16''$
 ANGLES $\pm 1/2$ DEG.
 DECIMALS $\pm .010''$

MATERIAL: BAR
 1/2 X 5 X 1'-1
 ASTM A572 GR. 65

TOLERANCES DO NOT APPLY
 TO RAW MATERIAL



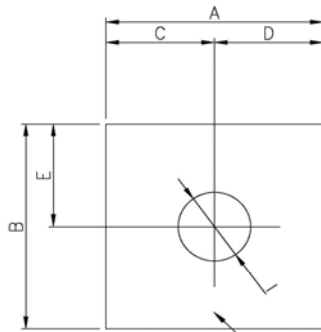
BAR, ANCHOR BOLT BRACKET

| REV | DATE | DRW/CHK | DESCRIPTION |
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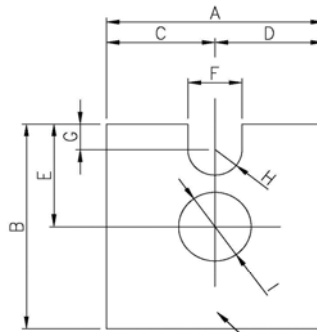
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|------------|----------|-------|------|-------------|------------|------|---|
| DATE | 01/07/21 | SIZE | B | DRAWING NO. | MABWS00949 | REV | 0 |
| DRAWN BY | PSB | SCALE | None | PAGE | 1 | OF 1 | |
| CHECKED BY | MC | | | | | | |

Patrick Davis
Black & Veatch
1.15.21



DEPTH STAMP MABPXXXXX
LETTERS AND NUMBERS
TO BE 1/2" HIGH
DEPTH TO BE 1/32"



DEPTH STAMP MABPXXXXX
LETTERS AND NUMBERS
TO BE 1/2" HIGH
DEPTH TO BE 1/32"

| Part Number | A | B | C | D | E | F | G | H | I | Black Weight (lbs.) | Galv. Weight (lbs.) |
|-------------|--------|--------|--------|--------|--------|--------|------|------|--------|---------------------|---------------------|
| MABP01601 | 3" | 3" | 1 1/2" | 1 1/2" | 1 1/2" | N/R | N/R | N/R | 1 7/8" | 2.09 | 2.17 |
| MABP01602 | 3 1/2" | 3 1/2" | 1 3/4" | 1 3/4" | 1 3/4" | N/R | N/R | N/R | 1 7/8" | 3.22 | 3.35 |
| MABP01603 | 4" | 4" | 2" | 2" | 2" | N/R | N/R | N/R | 1 7/8" | 4.54 | 4.72 |
| MABP01604 | 4 1/2" | 4 1/2" | 2 1/4" | 2 1/4" | 2 1/4" | N/R | N/R | N/R | 1 7/8" | 6.07 | 6.31 |
| MABP01605 | 5" | 5" | 2 1/2" | 2 1/2" | 2 1/2" | N/R | N/R | N/R | 1 7/8" | 7.76 | 8.07 |
| MABP01606 | 5 1/2" | 5 1/2" | 2 3/4" | 2 3/4" | 2 3/4" | N/R | N/R | N/R | 1 7/8" | 9.6 | 9.98 |
| MABP01607 | 6" | 6" | 3" | 3" | 3" | N/R | N/R | N/R | 1 7/8" | 11.64 | 12.11 |
| MABP01608 | 6 1/2" | 6 1/2" | 3 1/4" | 3 1/4" | 3 1/4" | N/R | N/R | N/R | 1 7/8" | 13.83 | 14.38 |
| MABP01609 | 7" | 7" | 3 1/2" | 3 1/2" | 3 1/2" | N/R | N/R | N/R | 1 7/8" | 16.23 | 16.88 |
| MABP01610 | 7 1/2" | 7 1/2" | 3 3/4" | 3 3/4" | 3 3/4" | N/R | N/R | N/R | 1 7/8" | 18.84 | 19.59 |
| MABP01611 | 8" | 8" | 4" | 4" | 4" | N/R | N/R | N/R | 1 7/8" | 21.54 | 22.40 |
| MABP01612 | 8 1/2" | 8 1/2" | 4 1/4" | 4 1/4" | 4 1/4" | N/R | N/R | N/R | 1 7/8" | 24.45 | 25.43 |
| MABP01613 | 9" | 9" | 4 1/2" | 4 1/2" | 4 1/2" | N/R | N/R | N/R | 1 7/8" | 26.7 | 27.77 |
| MABP01614 | 9 1/2" | 9 1/2" | 4 3/4" | 4 3/4" | 4 3/4" | N/R | N/R | N/R | 1 7/8" | 30.89 | 32.13 |
| MABP01615 | 10" | 10" | 5" | 5" | 5" | N/R | N/R | N/R | 1 7/8" | 34.31 | 35.68 |
| MABP01616 | | | | | | | | | | | |
| MABP01617 | | | | | | | | | | | |
| MABP01618 | | | | | | | | | | | |
| MABP01619 | | | | | | | | | | | |
| MABP01620 | | | | | | | | | | | |
| MABP01621 | | | | | | | | | | | |
| MABP01622 | | | | | | | | | | | |
| MABP01623 | 4" | 4" | 2" | 2" | 2" | 1 1/2" | 0" | 3/4" | 1 7/8" | 4.24 | 4.41 |
| MABP01624 | 4 1/2" | 4 1/2" | 2 1/4" | 2 1/4" | 2 1/4" | 1 1/2" | 0" | 3/4" | 1 7/8" | 5.72 | 5.95 |
| MABP01625 | 5" | 5" | 2 1/2" | 2 1/2" | 2 1/2" | 1 1/2" | 1/2" | 3/4" | 1 7/8" | 7.15 | 7.44 |
| MABP01626 | 5 1/2" | 5 1/2" | 2 3/4" | 2 3/4" | 2 3/4" | 1 1/2" | 1/2" | 3/4" | 1 7/8" | 9.04 | 9.40 |
| MABP01627 | 6" | 6" | 3" | 3" | 3" | 1 1/2" | 3/4" | 3/4" | 1 7/8" | 10.92 | 11.36 |
| MABP01628 | 6 1/2" | 6 1/2" | 3 1/4" | 3 1/4" | 3 1/4" | 1 1/2" | 3/4" | 3/4" | 1 7/8" | 13.12 | 13.64 |
| MABP01629 | 7" | 7" | 3 1/2" | 3 1/2" | 3 1/2" | 1 1/2" | 3/4" | 3/4" | 1 7/8" | 15.52 | 16.14 |
| MABP01630 | 7 1/2" | 7 1/2" | 3 3/4" | 3 3/4" | 3 3/4" | 1 1/2" | 3/4" | 3/4" | 1 7/8" | 18.12 | 18.84 |
| MABP01631 | 8" | 8" | 4" | 4" | 4" | 1 1/2" | 3/4" | 3/4" | 1 7/8" | 20.88 | 21.72 |
| MABP01632 | 8 1/2" | 8 1/2" | 4 1/4" | 4 1/4" | 4 1/4" | 1 1/2" | 3/4" | 3/4" | 1 7/8" | 23.79 | 24.74 |
| MABP01633 | 9" | 9" | 4 1/2" | 4 1/2" | 4 1/2" | 1 1/2" | 3/4" | 3/4" | 1 7/8" | 26.9 | 27.98 |
| MABP01634 | 9 1/2" | 9 1/2" | 4 3/4" | 4 3/4" | 4 3/4" | 1 1/2" | 3/4" | 3/4" | 1 7/8" | 30.17 | 31.38 |
| MABP01635 | 10" | 10" | 5" | 5" | 5" | 1 1/2" | 3/4" | 3/4" | 1 7/8" | 33.64 | 34.99 |
| MABP01636 | | | | | | | | | | | |
| MABP01637 | | | | | | | | | | | |
| MABP01638 | | | | | | | | | | | |
| MABP01639 | | | | | | | | | | | |
| MABP01640 | | | | | | | | | | | |

MATERIAL: A572 GR65 OR EQUAL

FINISH: HOT DIP GALV. PER ASTM A123

DRAWING NO: MABP-41

Date: 3/19/15

PLATE ANCHOR BOLT WASHER

Drawn By: MLC

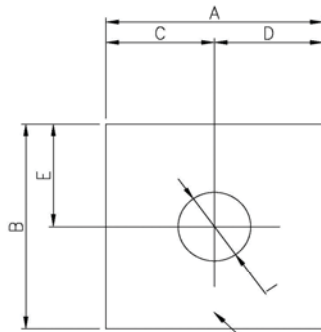
1 1/4" THICK - 1 7/8" HOLE

Checked By: MC

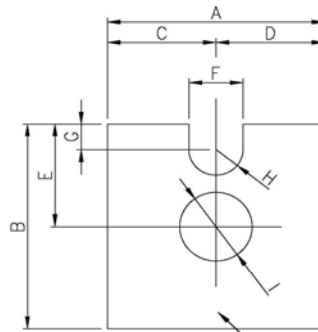
Rev. 1



Patrick Davis
Black & Veatch
1.15.21



DEPTH STAMP MABPXXXXX
LETTERS AND NUMBERS
TO BE 1/2" HIGH
DEPTH TO BE 1/32"



DEPTH STAMP MABPXXXXX
LETTERS AND NUMBERS
TO BE 1/2" HIGH
DEPTH TO BE 1/32"

| Part Number | A | B | C | D | E | F | G | H | I | Black Weight (lbs.) | Galv. Weight (lbs.) |
|-------------|--------|--------|--------|--------|--------|--------|------|------|--------|---------------------|---------------------|
| MABP01641 | 3" | 3" | 1 1/2" | 1 1/2" | 1 1/2" | N/R | N/R | N/R | 2 1/8" | 1.79 | 1.86 |
| MABP01642 | 3 1/2" | 3 1/2" | 1 3/4" | 1 3/4" | 1 3/4" | N/R | N/R | N/R | 2 1/8" | 2.91 | 3.03 |
| MABP01643 | 4" | 4" | 2" | 2" | 2" | N/R | N/R | N/R | 2 1/8" | 4.24 | 4.41 |
| MABP01644 | 4 1/2" | 4 1/2" | 2 1/4" | 2 1/4" | 2 1/4" | N/R | N/R | N/R | 2 1/8" | 5.77 | 6.00 |
| MABP01645 | 5" | 5" | 2 1/2" | 2 1/2" | 2 1/2" | N/R | N/R | N/R | 2 1/8" | 7.45 | 7.75 |
| MABP01646 | 5 1/2" | 5 1/2" | 2 3/4" | 2 3/4" | 2 3/4" | N/R | N/R | N/R | 2 1/8" | 9.29 | 9.66 |
| MABP01647 | 6" | 6" | 3" | 3" | 3" | N/R | N/R | N/R | 2 1/8" | 11.33 | 11.78 |
| MABP01648 | 6 1/2" | 6 1/2" | 3 1/4" | 3 1/4" | 3 1/4" | N/R | N/R | N/R | 2 1/8" | 13.53 | 14.07 |
| MABP01649 | 7" | 7" | 3 1/2" | 3 1/2" | 3 1/2" | N/R | N/R | N/R | 2 1/8" | 15.93 | 16.57 |
| MABP01650 | 7 1/2" | 7 1/2" | 3 3/4" | 3 3/4" | 3 3/4" | N/R | N/R | N/R | 2 1/8" | 18.53 | 19.27 |
| MABP01651 | 8" | 8" | 4" | 4" | 4" | N/R | N/R | N/R | 2 1/8" | 21.24 | 22.09 |
| MABP01652 | 8 1/2" | 8 1/2" | 4 1/4" | 4 1/4" | 4 1/4" | N/R | N/R | N/R | 2 1/8" | 24.15 | 25.12 |
| MABP01653 | 9" | 9" | 4 1/2" | 4 1/2" | 4 1/2" | N/R | N/R | N/R | 2 1/8" | 27.31 | 28.40 |
| MABP01654 | 9 1/2" | 9 1/2" | 4 3/4" | 4 3/4" | 4 3/4" | N/R | N/R | N/R | 2 1/8" | 30.58 | 31.80 |
| MABP01655 | 10" | 10" | 5" | 5" | 5" | N/R | N/R | N/R | 2 1/8" | 34 | 35.36 |
| MABP01656 | | | | | | | | | | | |
| MABP01657 | | | | | | | | | | | |
| MABP01658 | | | | | | | | | | | |
| MABP01659 | | | | | | | | | | | |
| MABP01660 | | | | | | | | | | | |
| MABP01661 | | | | | | | | | | | |
| MABP01662 | | | | | | | | | | | |
| MABP01663 | | | | | | | | | | | |
| MABP01664 | 4 1/2" | 4 1/2" | 2 1/4" | 2 1/4" | 2 1/4" | 1 1/2" | 0" | 3/4" | 2 1/8" | 5.41 | 5.63 |
| MABP01665 | 5" | 5" | 2 1/2" | 2 1/2" | 2 1/2" | 1 1/2" | 1/4" | 3/4" | 2 1/8" | 6.99 | 7.27 |
| MABP01666 | 5 1/2" | 5 1/2" | 2 3/4" | 2 3/4" | 2 3/4" | 1 1/2" | 1/2" | 3/4" | 2 1/8" | 8.73 | 9.08 |
| MABP01667 | 6" | 6" | 3" | 3" | 3" | 1 1/2" | 3/4" | 3/4" | 2 1/8" | 10.62 | 11.04 |
| MABP01668 | 6 1/2" | 6 1/2" | 3 1/4" | 3 1/4" | 3 1/4" | 1 1/2" | 3/4" | 3/4" | 2 1/8" | 12.81 | 13.32 |
| MABP01669 | 7" | 7" | 3 1/2" | 3 1/2" | 3 1/2" | 1 1/2" | 3/4" | 3/4" | 2 1/8" | 15.21 | 15.82 |
| MABP01670 | 7 1/2" | 7 1/2" | 3 3/4" | 3 3/4" | 3 3/4" | 1 1/2" | 3/4" | 3/4" | 2 1/8" | 17.82 | 18.53 |
| MABP01671 | 8" | 8" | 4" | 4" | 4" | 1 1/2" | 3/4" | 3/4" | 2 1/8" | 20.53 | 21.35 |
| MABP01672 | 8 1/2" | 8 1/2" | 4 1/4" | 4 1/4" | 4 1/4" | 1 1/2" | 3/4" | 3/4" | 2 1/8" | 23.48 | 24.42 |
| MABP01673 | 9" | 9" | 4 1/2" | 4 1/2" | 4 1/2" | 1 1/2" | 3/4" | 3/4" | 2 1/8" | 26.6 | 27.66 |
| MABP01674 | 9 1/2" | 9 1/2" | 4 3/4" | 4 3/4" | 4 3/4" | 1 1/2" | 3/4" | 3/4" | 2 1/8" | 29.86 | 31.05 |
| MABP01675 | 10" | 10" | 5" | 5" | 5" | 1 1/2" | 3/4" | 3/4" | 2 1/8" | 33.34 | 34.67 |
| MABP01676 | | | | | | | | | | | |
| MABP01677 | | | | | | | | | | | |
| MABP01678 | | | | | | | | | | | |
| MABP01679 | | | | | | | | | | | |
| MABP01680 | | | | | | | | | | | |

MATERIAL: A572 GR65 OR EQUAL

FINISH: HOT DIP GALV. PER ASTM A123

DRAWING NO: MABP-42

Date: 3/19/15

PLATE ANCHOR BOLT WASHER

Drawn By: MLC

1 1/4" THICK - 2 1/8" HOLE

Checked By: MC

Rev. 1



9.3.2 FABRICATOR INSPECTIONS



GALVAN INDUSTRIES, INC.

To: Sabre Communications

Re: Promise of Compliance to Stated Specifications

For all purchase orders, projects or jobs processed:

Standards:

ASTM A123/A123M-09: Hot Dip Galvanized Coatings on Iron and Steel Products

ASTM A153/A153M-09: Hot Dip Galvanized Coatings on Iron and Steel Hardware

This document shall serve as notification that the galvanized protective coating applied to all materials furnished by Sabre Communications and processed by Galvan Industries, Inc and are certified to meet the specifications and requirements of the standards listed above as applicable to the shape, size and/or manufacture of the article or assembly.

An individual Certification of Compliance is available for any project or purchase order upon request.

Sincerely,

Ben Kelly
Galvanizing Sales Manager
Galvan Industries, Inc



CERTIFICATE OF COMPLIANCE

Sabre Sales Order 473085

Site: 876325 Weston Square

92 Weston Street

Hartford, CT 06103

This is to certify that all fabricated components have been inspected in accordance with the current Sabre drawings.

Approval Signature:

A handwritten signature in black ink, appearing to read 'Matt Veyber', is written over a solid black horizontal line.

Date: 01 / 19 / 2021

JF Fabricators

CERTIFICATE OF COMPLIANCE

Sabre Sales Order 473085

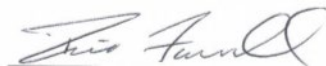
Site: 876325 Weston Square

92 Weston Street

Hartford, CT 06103

This is to certify that all fabricated components have been inspected in accordance with the current Sabre drawings.

Approval Signature:



Date: 01 / 19 / 2021

9.3.3 FABRICATOR CERTIFIED WELD INSPECTIONS



CONSTRUCTION WELDING INSPECTION SERVICES INCORPORATED

P.O. Box 673 · Matthews, NC 28106
Phone (704) 560-9755
cwiservice@bellsouth.net

MT

MAGNETIC PARTICLE
TEST REPORT

Report No. _____ Page 2 of 2

To: JF Fabricators LLC
Date: 2/4/21
Job No.: 473085

Project: WESTON SQUARE

MAGNETIC PARTICLE INSPECTION REPORT

Material type: Carbon Steel Part Size: Various
Standard: ASTM E709
Procedure: MT-D1-10

METHOD

Dry Wet

Particles

Particle Color: Red
Particle Manufacture: Magnaflux
Particle Batch No. On File

Magnetic Field

Yoke AC DC Longitudinal/ 2 Directions
Field Verified by: Pie Gage Demagnetized Yes No

EQUIPMENT USED

Parker Probe (DA - 400) S/N _____ Cal Due Date: _____

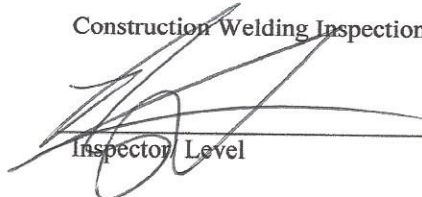
INSPECTION RESULTS

| Quantity | Part Number | Description | Results |
|----------|-------------|----------------|---------|
| 1 | MABW40593 | ANCHOR BRACKET | Accept |
| 1 | MABW40594 | ANCHOR BRACKET | Accept |
| 1 | MABW40595 | ANCHOR BRACKET | Accept |
| | | | |
| | | | |

Comments: All Pre-During-Post Welding Operations Meet AWS D1.1

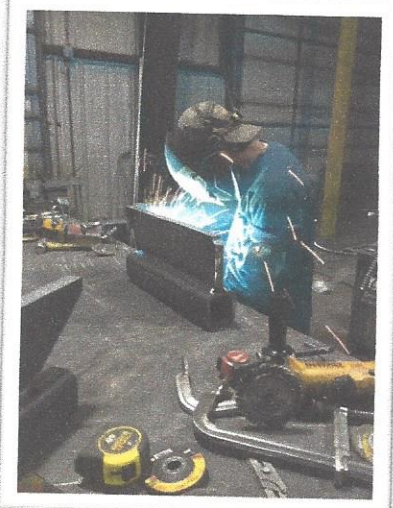
Respectfully submitted,

Construction Welding Inspection Services Inc.


Inspector Level 2/4/21 Date

OBSERVATIONS REPORTED HEREIN ARE INDICATIVE OF CONDITIONS FOUND AT THE EXACT LOCATION AND TIME OF OBSERVATION ONLY. THE ABOVE SERVICES AND REPORT WERE PERFORMED PURSUANT TO THE TERMS AND CONDITIONS OF THE CONTRACT BETWEEN CWI SERVICES INC. AND CLIENT UNDER THE STANDARD OF REASONABLE CARE APPLICABLE TO SUCH FIELD OBSERVATIONS GENERALLY. NO OTHER WARRANTY, GUARANTY, OR REPRESENTATION, EXPRESSED OR IMPLIED, IS INCLUDED OR INTENDED.

Reviewed By _____ Date _____
(Signed Copy on File)





**WELDER OR WELDING OPERATOR
PERFORMANCE QUALIFICATION RECORD (WPQR)
(4C, AWS D1.1/D1.1M-15, STRUCTURAL WELDING CODE - STEEL)**

CAROLINA SPECIALTY INSPECTION SERVICES, INC

Welder Name: Patricia Ann Hernandez ID No.: NCDL ****3006 Stamp No: PAH
 Welding Procedure Specification No.: JF-WPS-GMAW-G A5.28 Rev.: 0 Date: 5/22/19
 Welding Process: Gas Metal Arc Welding (GMAW) Type: Semi-Automatic

| Variables | Actual Values Used In Qualification | Qualification Range |
|-----------------------------------|-------------------------------------|----------------------------------------|
| Backing (Yes or No) Material Type | Yes - Carbon Steel (Table 3.1) | Required - Carbon Steel (Table 3.1) |
| Back Gouge (Yes or No) | Yes | Allowed with or without backing |
| Base Metal Specification | | |
| Group No. | Table 3.1 Grp II | All AWS Approved (Grp I, II, & III) |
| Thickness (Plate) | | |
| Groove | 1" 1G | 1/8" through Unlimited |
| Fillet | NA | 1/8" through Unlimited |
| Thickness (Pipe/Tube) | | |
| Groove | NA | 24" and over with backing or backgouge |
| Fillet | NA | Over 24" diameter |
| Filler Metal | | |
| Specification No. | A5.28 | A5.18 and A5.28 |
| Class | ER80S-1 | Any A5.18 and A5.28 |
| Deposited Weld Metal | | |
| Groove | 1" 1G | |
| Fillet | NA | |
| Weld Position | | |
| Orientation | 1G (Flat) | 1F, 1G |
| Weld Progression | Forehand | Forehand |
| Gas Type | | |
| Shielding | 92%Ar / 8%O2 | Per Manufacture's Recommendation |
| Backing | NA | NA |
| Electrical Characteristics | | |
| Current | DC | Per Manufacture's Recommendation |
| Polarity | EP | Per Manufacture's Recommendation |

Qualification Test Results

Visual Inspection

Appearance Acceptable
 Results Passed

Radiographic Testing

Film Identification NA
 Results NA

Guided Bend Test

| Type and Figure No. | Results | Type and Figure No. | Results |
|---------------------|---------|---------------------|---------|
| 1G Side (4.16) | Pass | NA | NA |
| 1G Side (4.16) | Pass | NA | NA |

Fillet Weld Test

Figure No.: NA Fillet Size NA
 Fracture Test NA Macroetch NA

Test Conducted by: Ryan Fitzgerald Test Number: PAH1G-GMAW
 Ryan N Fitzgerald
 Inspector CWI 00010581 Date: 5/22/19
QC1 EXP. 11/2021

We, the undersigned certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in conformance with the requirements of Clause 4 of AWS D1.1/D1.1M 2015 Structural Welding Code - Steel.

Authorized By: John Fennell Organization: JF Fabricators
 Date: 5/22/19



**WELDER OR WELDING OPERATOR
PERFORMANCE QUALIFICATION RECORD (WPQR)
(4C, AWS D1.1/D1.1M-15, STRUCTURAL WELDING CODE – STEEL)**

CAROLINA SPECIALTY INSPECTION SERVICES, INC.

Welder Name: David Alan Hernandez ID No.: NCDL ****2457 Stamp No: DAH
 Welding Procedure Specification No.: JF-WPS-GMAW-G A5.28 Rev.: 0 Date: 01/30/2019
 Welding Process: Gas Metal Arc Welding (GMAW) Type: Semi-Automatic

| Variables | Actual Values Used In Qualification | Qualification Range |
|-----------------------------------|-------------------------------------|----------------------------------------|
| Backing (Yes or No) Material Type | Yes –Carbon Steel (Table 3.1) | Required - Carbon Steel (Table 3.1) |
| Back Gouge (Yes or No) | Yes | Allowed with or without backing |
| Base Metal Specification | | |
| Group No. | Table 3.1 Grp II | All AWS Approved (Grp I, II, & III) |
| Thickness (Plate) | | |
| Groove | 1" 2G | 1/8" through Unlimited |
| Fillet | NA | 1/8" through Unlimited |
| Thickness (Pipe/Tube) | | |
| Groove | NA | 24" and over with backing or backgouge |
| Fillet | NA | Over 24" diameter |
| Filler Metal | | |
| Specification No. | A5.28 | A5.18 and A5.28 |
| Class | ER80S-1 | Any A5.18 and A5.28 |
| Deposited Weld Metal | | |
| Groove | 1" 2G | |
| Fillet | NA | |
| Weld Position | | |
| Orientation | 2G (Horizontal) | 1F, 1G, 2F, 2G |
| Weld Progression | Forehand | Forehand |
| Gas Type | | |
| Shielding | 92%Ar / 8%O2 | Per Manufacture's Recommendation |
| Backing | NA | NA |
| Electrical Characteristics | | |
| Current | DC | Per Manufacture's Recommendation |
| Polarity | EP | Per Manufacture's Recommendation |

Qualification Test Results

Visual Inspection

Appearance Results Acceptable
Passed

Radiographic Testing

Film Identification Results NA
NA

Guided Bend Test

| Type and Figure No. | Results | Type and Figure No. | Results |
|---------------------|---------|---------------------|---------|
| 2G Side (4.19) | Pass | NA | NA |
| 2G Side (4.19) | Pass | NA | NA |

Fillet Weld Test

Figure No.: NA Fillet Size NA
 Fracture Test NA Macroetch NA

Test Conducted by: Ryan Fitzgerald Test Number DAH2G-GMAW

Inspector  Ryan N Fitzgerald Date 1/30/19
CWI 06010581
QC1 EXP. 1/1/2021

We, the undersigned certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in conformance with the requirements of Clause 4 of AWS D1.1/D1.1M 2015 Structural Welding Code - Steel.

Authorized By: John Fennell Organization: JF Fabricators
 Date 1/30/19



**WELDER OR WELDING OPERATOR
PERFORMANCE QUALIFICATION RECORD (WPQR)
(4C, AWS D1.1/D1.1M-15, STRUCTURAL WELDING CODE - STEEL)**

CAROLINA SPECIALTY INSPECTION SERVICES, INC.

Welder Name: Matthew Benjamin Styles ID No.: NCDL 31081326 Stamp No: MBS
 Welding Procedure Specification No.: CSI-WPS-GMAW-G-WQ Rev.: 2 Date: 10/3/19
 Welding Process: Gas Metal Arc Welding (GMAW) Type: Semi-Automatic

| Variables | Actual Values Used In Qualification | Qualification Range |
|-----------------------------------|-------------------------------------|----------------------------------------|
| Backing (Yes or No) Material Type | Yes - Base Metal Carbon | With or without backing |
| Base Metal Specification | | |
| Group No. | Table 3.1 Grp II | All AWS Approved (Grp I, II, & III) |
| Thickness (Plate) | | |
| Groove | 1" | 1/8" through Unlimited |
| Fillet | NA | 1/8" through Unlimited |
| Thickness (Pipe/Tube) | | |
| Groove | NA | 24" and over with backing or backgouge |
| Fillet | NA | Over 24" diameter |
| Filler Metal | | |
| Specification No. | A5.28 | A5.18 and A5.28 |
| Class | ER80S-1 | Any A5.18 and A5.28 |
| Deposited Weld Metal | | |
| Groove | CJP | |
| Fillet | NA | |
| Weld Position | | |
| Orientation | Horizontal (2G) | 1F, 2F, 1G, 2G |
| Weld Progression | Forehand | Forehand /Push |
| Gas Type | | |
| Shielding | AR=98% / CO2=2% | Per Manufacturers Recommendation |
| Backing | NA | |
| Electrical Characteristics | | |
| Current | Direct (DC) | Per manufacturers recommendation |
| Polarity | Reverse (EP) | Per manufacturers recommendation |

Qualification Test Results

Visual Inspection

Appearance Acceptable
 Results Passed

Radiographic Testing

Film Identification NA
 Results NA

Guided Bend Test

| Type and Figure No. | Results | Type and Figure No. | Results |
|-----------------------|-------------|---------------------|-----------|
| <u>2G Side (4.21)</u> | <u>Pass</u> | <u>NA</u> | <u>NA</u> |
| <u>2G Side (4.21)</u> | <u>Pass</u> | <u>NA</u> | <u>NA</u> |

Fillet Weld Test

| | | | |
|---------------|-----------|-------------|-----------|
| Figure No.: | <u>NA</u> | Fillet Size | <u>NA</u> |
| Fracture Test | <u>NA</u> | Macroetch | <u>NA</u> |

Test Conducted by: John Fennell

 Inspector

Test Number MBS2G
 Date 8/30/16

We, the undersigned certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in conformance with the requirements of Clause 4 of AWS D1.1/D1.1M 2010 Structural Welding Code - Steel.

Authorized By: John Fennell Organization: JF Fabricators
 Date 10/3/2019

Rev2: Revised base metal specifications.

Welding Procedure Specification

JF-WPS-GMAW-G A5.18

WPS No. JF-WPS-GMAW-G A5.18 Revision 1 Date 10/3/2019 By Ryan Fitzgerald, CWI 060110581
 Authorized By John Fennell Date 8/3/2018 Prequalified
 Welding Process(es) GMAW Type: Manual Machine Semi-Auto Auto
 Supporting PQR(s) NA NA NA NA

JOINT
 Type Butt, Tee, Corner
 Backing Yes No Single Weld Double Weld
 Backing Material AWS Table 3.1
 Root Opening See Sketch Root Face Dimension See Sketch
 Groove Angle Sketch Radius (J-U) NA
 Back Gouge Yes No
 Method See Note 7

TC-U4a-GF

| Welding Process | Joint Configuration | Shielding Gas | Electrode | Electrode Diameter | Groove Preparation | | Permitted | Gas Shielding | Notes |
|-----------------|---------------------|---------------|-----------|--------------------|--------------------|-----------|-----------|---------------|-------|
| | | | | | Bevel Angle | Root Face | | | |
| GMAW | Butt-GF | Ar | E70S-X | .035 | R = 2T | a = 2T | Yes | None | A-5 |
| | | | | | R = 2T | a = 2T | Yes | None | A-5 |
| | | | | | R = 2T | a = 2T | Yes | None | A-5 |

BASE METALS
 Material Spec. Table 3.1 to Grp I, II, & III
 Type or Grade Table 3.1 to Grp I, II, & III
 Thickness: Groove (in) 1/8 - Unlimited
 Fillet (in) NA - NA
 Diameter (Pipe, in) Over 24 - Diameter

POSITION
 Position of Groove ALL Fillet NA
 Vertical Progression: Up Down

FILLER METALS
 AWS Specification A5.18 A5.18
 AWS Classification ER70S-X All A5.18

ELECTRICAL CHARACTERISTICS
 Transfer Mode (GMAW):
 Short-Circuiting Globular Spray
 Current: AC DCEP DCEN Pulsed
 Other NA
 Tungsten Electrode (GTAW):
 Size NA Type NA

SHIELDING
 Flux NA Gas AR / CO2
NA Composition 92%AR / 8%CO2
 Electrode-Flux (Class) NA Flow Rate 30 to 50
NA Gas Cup Size 1/2" to 3/4"

TECHNIQUE
 Stringer or Weave Bead Either
 Multi-pass or Single Pass (per side) Either
 Number of Electrodes 1
 Electrode Spacing: Longitudinal NA
 Lateral NA
 Angle NA
 Contact Tube to Work Distance .750"
 Peening Not Allowed
 Interpass Cleaning Grind, Brush, Chip

PREHEAT
 Preheat Temp., Min. 32
 Thickness Up to 3/4" Temperature 32
 Over 3/4" to 1-1/2" 50
 Over 1-1/2" to 2-1/2" 150
 Over 2-1/2" 225
 Interpass Temp., Min. 32 Max. 400

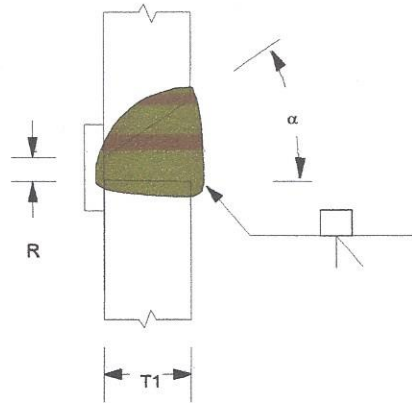
POSTWELD HEAT TREATMENT PWHT Required
 Temp. NA Time NA

WELDING PROCEDURE

| Layer/Pass | Process | Filler Metal Class | Diameter | Cur. Type | Amps or WFS | Volts | Travel Speed | Other Notes |
|------------|---------|--------------------|----------|-----------|-------------|---------|--------------|---------------|
| 1 - ALL | GMAW | ER70S-X | .035 | DCEP | 176 - 214 | 19 - 26 | 6 - 10 | 337 - 412 WFS |
| 1 - ALL | GMAW | ER70S-X | .035 | DCEP | 207 - 253 | 24 - 33 | 6 - 10 | 450 - 500 WFS |
| 1 - ALL | GMAW | ER70S-X | .035 | DCEP | 248 - 302 | 25 - 34 | 8 - 12 | 540 - 660 WFS |
| 1 - ALL | GMAW | ER70S-X | .045 | DCEP | 256 - 313 | 23 - 31 | 6 - 10 | 315 - 385 WFS |
| 1 - ALL | GMAW | ER70S-X | .045 | DCEP | 302 - 368 | 25 - 34 | 6 - 10 | 428 - 522 WFS |
| 1 - ALL | GMAW | ER70S-X | .045 | DCEP | 306 - 374 | 25 - 34 | 8 - 12 | 450 - 550 WFS |

TC-U4a-GF

Single-bevel-groove-weld (4)
Butt joint (B)



| Welding Process | Joint Designation | Base Metal Thickness (U=unlimited) | | Groove Preparation | | | | Permitted Welding Positions | Gas Shielding for FCAW | Notes |
|-----------------|-------------------|------------------------------------|----|--------------------|---------------------|--------------------------|------------------------|-----------------------------|------------------------|------------|
| | | T1 | T2 | Root Opening | Groove Angle | Tolerances | | | | |
| | | | | | | As Detailed (see 3.13.1) | As Fit Up (see 3.13.1) | | | |
| GMAW FCAW | B-U4a-GF | U | - | R = 3/16 | $\alpha = 30^\circ$ | R = +1/16, -0 | +1/4, -1/16 | All | Required | a, g, k, o |
| | | | | R = 3/8 | $\alpha = 30^\circ$ | | | F | Not req. | |
| | | | | R = 1/4 | $\alpha = 45^\circ$ | | | All | Not req. | |

MEMO

1. This procedure meets the general requirements of AWS D1.1 clause 3 for prequalified status.
2. This procedure is to be used for welding carbon steel when post weld heat treatment and impact testing is not required by the governing codes.
3. At JF Fabrication's option, pre qualified weld joint sketches in accordance with AWS D1.1 figures 3.2 and 3.3 may be attached to illustrate joint design changes, weld layers, and bead sequences without the complete re-writing of this procedure.
4. Positions qualified are all unless noted otherwise on the weld detail. Vertical welds must be done in upward progression. Vertical welds on tubular welds may be upward or downwards dependent on welder qualification.
5. Maximum root pass thickness and single pass fillet weld size; Flat 3/8", Horizontal 5/16", Vertical 1/2", Overhead 5/16".
6. When base metal is below 32 F, the base metal shall be pre heated to a minimum of 70 F and the minimum interpass temperature shall be maintained during welding.
7. Backgouging is permitted in this procedure for purposes of removing backing bars and back welding. Backgouging shall be performed by grinding only. Thermal backgouging is not permitted in this procedure.

- A. Not pre-qualified for GMAW-S nor GTAW.
- C. Cyclic load application places restrictions on the use of this detail for butt joints in the flat position.
- E. SMAW detailed joints may be used for prequalified GMAW (except GMAW-S) and FCAW.
- G. If fillet welds are used in statically loaded structures to reinforce groove welds in corner and T-Joints, these shall be equal to T / 4, but need not exceed 3/8". Groove welds in corner and T-joints of cyclically loaded structures shall be reinforced with fillet welds equal to T / 4, but need not exceed 3/8".
- J. The orientation of two members in the joints may vary from 135° to 180° for butt joints, 45° to 135° for corner joints and from 45° to 90° for T-joints.
- K. For corner joints, the outside groove preparation may be in either or both members, provided the basic groove configuration is not changed and adequate edge distance is maintained to support the welding operations without excessive edge melting.
- O. For corner and T-Joints the member orientation may vary from 90° to less than or equal to 170° provided the groove angle and root opening are maintained, and the angle between the groove faces and the steel backing is at least 90°.

Revisions:

MEMO (continue)

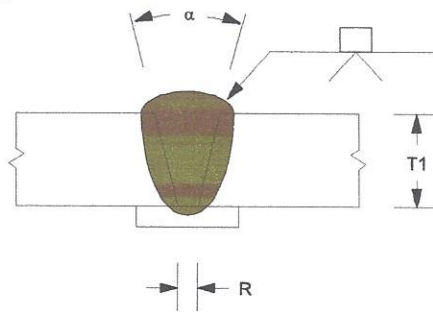
K. For corner joints, the outside groove preparation may be in either or both members, provided the basic groove configuration is not changed and adequate edge distance is maintained to support the welding operations without excessive edge melting.
O. For corner and T-Joints the member orientation may vary from 90° to less than or equal to 170° provided the groove angle and root opening are maintained, and the angle between the groove faces and the steel backing is at least 90°.

Revisions:

- 1) Add Table 3.1 group III as prequalified.

B-U-2a-GF

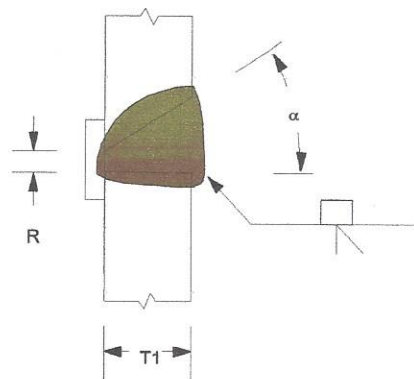
Single-V-groove weld (2)
Butt joint (B)



| Welding Process | Joint Designation | Base Metal Thickness (U=unlimited) | | Groove Preparation | | | | Permitted Welding Positions | Gas Shielding for FCAW | Notes |
|-----------------|-------------------|------------------------------------|----|--------------------|---------------------|-------------------------------------------------|--------------------------------------|-----------------------------|------------------------|-------|
| | | T1 | T2 | Root Opening | Groove Angle | Tolerances | | | | |
| | | | | | | As Detailed (see 3.13.1) | As Fit Up (see 3.13.1) | | | |
| GMAW FCAW | B-U2a-GF | U | - | R = 3/16 | $\alpha = 30^\circ$ | R = +1/16, -0 $\alpha = +10^\circ, -0^\circ$ | +1/4, -1/16 $+10^\circ, -5^\circ$ | F, V, OH | Required | e, j |
| | | | | R = 3/8 | $\alpha = 30^\circ$ | | | F, V, OH | Not req. | |
| | | | | R = 1/4 | $\alpha = 45^\circ$ | | | F, V, OH | Not req. | |

B-U4a-GF

Single-bevel-groove-weld (4)
Butt joint (B)



| Welding Process | Joint Designation | Base Metal Thickness (U=unlimited) | | Groove Preparation | | | | Permitted Welding Positions | Gas Shielding for FCAW | Notes |
|-----------------|-------------------|------------------------------------|----|--------------------|---------------------|-------------------------------------------------|--------------------------------------|-----------------------------|------------------------|---------|
| | | T1 | T2 | Root Opening | Groove Angle | Tolerances | | | | |
| | | | | | | As Detailed (see 3.13.1) | As Fit Up (see 3.13.1) | | | |
| GMAW FCAW | B-U4a-GF | U | - | R = 3/16 | $\alpha = 30^\circ$ | R = +1/16, -0 $\alpha = +10^\circ, -0^\circ$ | +1/4, -1/16 $+10^\circ, -5^\circ$ | Al I | Required | c, e, j |
| | | | | R = 3/8 | $\alpha = 30^\circ$ | | | F | Not req. | |
| | | | | R = 1/4 | $\alpha = 45^\circ$ | | | Al I | Not req. | |

Welding Procedure Specification

JF-WPS-GMAW-Gr Db1

WPS No. JF-WPS-GMAW-Gr Db1 Revision 1 Date 10/3/2019 By Ryan Fitzgerald, CWI 060110581
 Authorized By John Fennell Date 8/3/2018 Prequalified
 Welding Process(es) GMAW Type: Manual Machine Semi-Auto Auto
 Supporting PQR(s) NA NA NA NA

JOINT
 Type Butt, Tee, Corner
 Backing Yes No Single Weld Double Weld
 Backing Material AWS Table 3.1
 Root Opening See Sketch Root Face Dimension See Sketch
 Groove Angle Sketch Radius (J-U) NA
 Back Gouge Yes No
 Method See Note 7

B-U3-GF

| Welding Process | Joint Designation | Base Metal Thickness (Unlimited) | | Groove Preparation | | Permitted Welding Positions | Gas Shielding for FCAW | Notes |
|-----------------|-------------------|----------------------------------|----|---------------------------------------------|-----------------------------------------------------------------|--------------------------------------|------------------------|----------------------------------|
| | | T1 | T2 | Root Opening | Tolerances | | | |
| GMAW FCAW | B-U3-GF | U | - | R = 0 to 1/8 f = 0 to 1/8 α - β = 60° | As Detailed (see 3.13.1) +1/16, -0 +1/16, -0 +10°, -0° | As F8 Up (see 3.13.1) +1/16, -1/8 | All | Not required A D H J |

BASE METALS
 Material Spec. Table 3.1 to Grp I, II, & III
 Type or Grade Table 3.1 to Grp I, II, & III
 Thickness: Groove (in) 1/8 - Unlimited
 Fillet (in) NA - NA
 Diameter (Pipe, in) Over 24 - Diameter

POSITION
 Position of Groove ALL Fillet NA
 Vertical Progression: Up Down

FILLER METALS
 AWS Specification A5.18 A5.18
 AWS Classification ER70S-X ER70S-X

ELECTRICAL CHARACTERISTICS
 Transfer Mode (GMAW):
 Short-Circuiting Globular Spray
 Current: AC DCEP DCEN Pulsed
 Other NA
 Tungsten Electrode (GTAW):
 Size NA Type NA

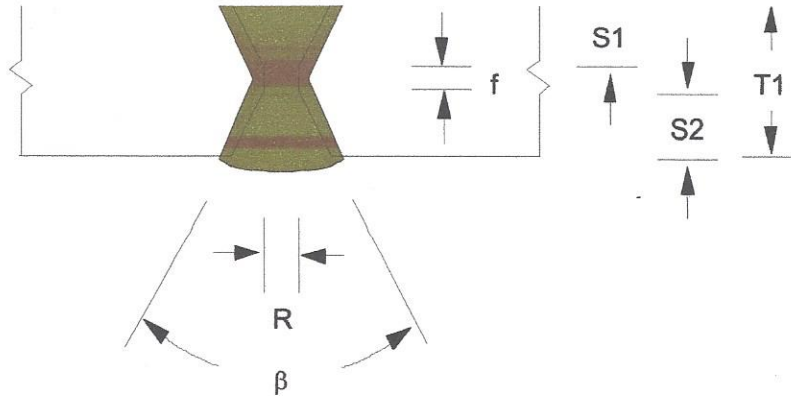
SHIELDING
 Flux NA Gas AR / CO2
 Composition 75%AR / 25%CO2
 Electrode-Flux (Class) NA Flow Rate 30 to 50
 Gas Cup Size 1/2" to 3/4"

TECHNIQUE
 Stringer or Weave Bead Either
 Multi-pass or Single Pass (per side) Either
 Number of Electrodes 1
 Electrode Spacing: Longitudinal NA
 Lateral NA
 Angle NA
 Contact Tube to Work Distance .750"
 Peening Not Allowed
 Interpass Cleaning Grind, Brush, Chip

PREHEAT
 Preheat Temp., Min. 32
 Thickness Up to 3/4" Temperature 32
 Over 3/4" to 1-1/2" 50
 Over 1-1/2" to 2-1/2" 150
 Over 2-1/2" 225
 Interpass Temp., Min. 32 Max. 400

POSTWELD HEAT TREATMENT PWHT Required
 Temp. NA Time NA

| WELDING PROCEDURE | | | | | | | | |
|-------------------|---------|--------------------|----------|-----------|-------------|---------|--------------|---------------|
| Layer/Pass | Process | Filler Metal Class | Diameter | Cur. Type | Amps or WFS | Volts | Travel Speed | Other Notes |
| 1 - ALL | GMAW | ER70S-X | .035 | DCEP | 176 - 214 | 22 - 24 | 6 - 11 | 282 - 468 WFS |
| 1 - ALL | GMAW | ER70S-X | .035 | DCEP | 207 - 253 | 27 - 31 | 6 - 11 | 375 - 625 WFS |
| 1 - ALL | GMAW | ER70S-X | .035 | DCEP | 248 - 302 | 28 - 32 | 8 - 14 | 450 - 750 WFS |
| 1 - ALL | GMAW | ER70S-X | .045 | DCEP | 256 - 313 | 26 - 28 | 6 - 11 | 315 - 385 WFS |
| 1 - ALL | GMAW | ER70S-X | .045 | DCEP | 302 - 368 | 28 - 32 | 6 - 11 | 428 - 522 WFS |
| 1 - ALL | GMAW | ER70S-X | .045 | DCEP | 306 - 374 | 28 - 32 | 8 - 14 | 450 - 500 WFS |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

B-U3-GF


| Welding Process | Joint Designation | Base Metal Thickness (U=unlimited) | | Groove Preparation | | | Permitted Welding Positions | Gas Shielding for FCAW | Notes |
|-----------------|-------------------|------------------------------------|----|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------|-----------------------------|------------------------|------------------|
| | | T1 | T2 | Root Opening | Tolerances | | | | |
| | | | | Root Face | As Detailed (see 3.13.1) | As Fit Up (see 3.13.1) | | | |
| GMAW FCAW | B-U3-GF | U | - | Root Opening $R = 0 \text{ to } 1/8$ Root Face $f = 0 \text{ to } 1/8$ Groove Angle $\alpha = \beta = 60^\circ$ | $+1/16, -0$ $+1/16, -0$ $+10^\circ, -0^\circ$ | $+1/16, -1/8$ Not limited $+10^\circ, -5^\circ$ | All | Not required | A D H J |

MEMO

1. This procedure meets the general requirements of AWS D1.1 clause 3 for prequalified status.
2. This procedure is to be used for welding carbon steel when post weld heat treatment and impact testing is not required by the governing codes.
3. At JF Fabrication's option, pre qualified weld joint sketches in accordance with AWS D1.1 figures 3.2 and 3.3 may be attached to illustrate joint design changes, weld layers, and bead sequences without the complete re-writing of this procedure.
4. Positions qualified are all unless noted otherwise on the weld detail. Vertical welds must be done in upward progression. Vertical welds on tubular welds may be upward or downwards dependent on welder qualification.
5. Maximum root pass thickness and single pass fillet weld size; Flat 3/8", Horizontal 5/16", Vertical 1/2", Overhead 5/16".
6. When base metal is below 32 F, the base metal shall be pre heated to a minimum of 70 F and the minimum interpass temperature shall be maintained during welding.
7. Backgouging shall be performed by grinding only. Thermal backgouging is not permitted in this procedure.

- A. Not pre-qualified for GMAW-S nor GTAW.
- C. Cyclic load application places restrictions on the use of this detail for butt joints in the
- D. Backgouge root to sound metal before welding second side.
- G. If fillet welds are used in statically loaded structures to reinforce groove welds in corner and T-Joints, these shall be equal to $T / 4$, but need not exceed 3/8". Groove welds in corner and T-joints of cyclically loaded structures shall be reinforced with fillet welds equal to $T / 4$, but need not exceed 3/8".
- H. Double groove welds may have grooves of unequal depth, but the depth of the shallower groove shall be no less than one-fourth of the thickness of the thinner part joined.
- J. The orientation of two members in the joints may vary from 135° to 180° for butt joints, 45° to 135° for corner joints and from 45° to 90° for T-joints.
- K. For corner joints, the outside groove preparation may be in either or both members, provided the basic groove configuration is not changed and adequate edge distance is maintained to support the welding operations without excessive edge melting.

Revisions:

MEMO (continue)

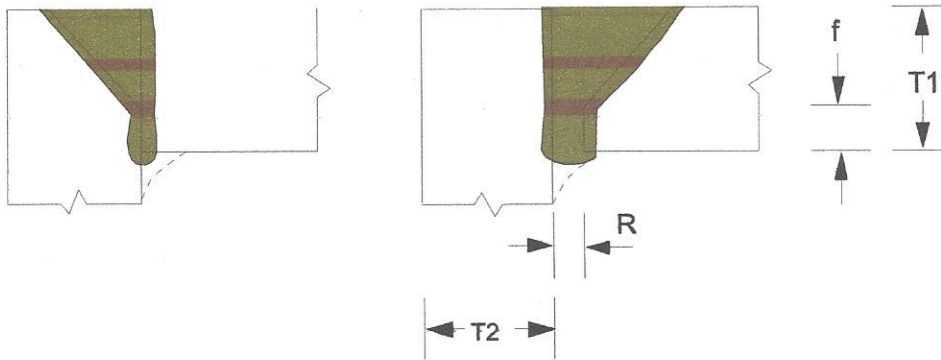
for T-joints.

K. For corner joints, the outside groove preparation may be in either or both members, provided the basic groove configuration is not changed and adequate edge distance is maintained to support the welding operations without excessive edge melting.

Revisions:

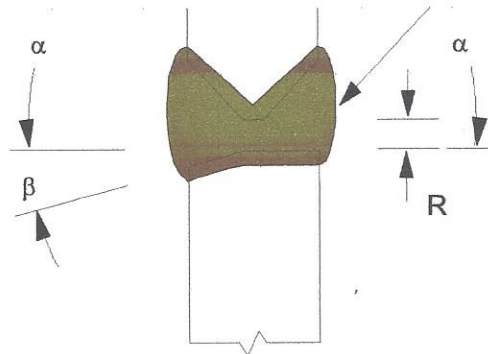
- 1) Add Table 3.1 group III as prequalified.

TC-U4B-GF



| Welding Process | Joint Designation | Base Metal Thickness (U=unlimited) | | Groove Preparation | | | Permitted Welding Positions | Gas Shielding for FCAW | Notes | |
|-----------------|-------------------|------------------------------------|----|-------------------------------------|----------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------|------------------------|--------------|-----------------------|
| | | T1 | T2 | Root Opening | Tolerances | | | | | |
| | | | | Root Face | As Detailed (see 3.13.1) | As Fit Up (see 3.13.1) | | | | |
| GMAW FCAW | TC-U4b-GF | U | U | Groove Angle $\alpha = 45^\circ$ | $R = 0 \text{ to } 1/8$ $f = 0 \text{ to } 1/8$ | $+1/16, -0$ $+1/16, -0$ $+10^\circ, -0^\circ$ | $+1/16, -1/8$ Not limited $+10^\circ, -5^\circ$ | All | Not required | A D G J K |

B-U5-GF

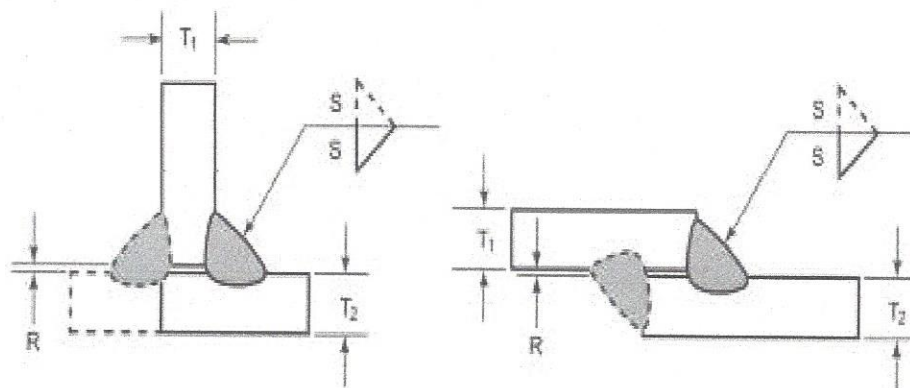


| Welding Process | Joint Designation | Base Metal Thickness (U=unlimited) | | Groove Preparation | | | Permitted Welding Positions | Gas Shielding for FCAW | Notes | |
|-----------------|-------------------|------------------------------------|----|-------------------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------|------------------------|--------------|-----------------------|
| | | T1 | T2 | Root Opening | Tolerances | | | | | |
| | | | | Root Face | As Detailed (see 3.13.1) | As Fit Up (see 3.13.1) | | | | |
| GMAW FCAW | B-U5-GF | U | - | Groove Angle $\alpha = 45^\circ$ $\beta = 0^\circ \text{ to } 15^\circ$ | $R = 0 \text{ to } 1/8$ $f = 0 \text{ to } 1/8$ | $+1/16, -0$ $+1/16, -0$ $\alpha + \beta = +10^\circ, -0^\circ$ | $+1/16, -1/8$ Not limited $\alpha + \beta = +10^\circ, -5^\circ$ | All | Not required | A C D H J |

Welding Procedure Specification

JF-WPS-GMAW-F 80KSI

Fillet

 Fillet weld (12)
 T-joint (T)
 Corner joint (C)
 Lap joint (L)


ALL DIMENSIONS IN mm

| Welding Process | Joint Designation | Base Metal Thickness | Joint Design/Geometry | | | Allowed Welding Positions | Notes |
|-----------------|-------------------|----------------------------------|-----------------------|-------------|-----------|---------------------------|---------|
| | | T ₁ or T ₂ | Root Opening | Tolerances | | | |
| | | | | As Detailed | As Fit-Up | | |
| SMAW | TC-F12 | <3 | R = 0 | +1/16, -0 | 3/16 max. | All | a, b, d |
| | TC-F12a | ≥3 | | | 5/16 max. | | a, b, d |
| | L-F12 | <3 | | | 3/16 max. | | a, b, c |
| | L-F12a | ≥3 | | | 5/16 max. | | a, b, c |
| FMAW FCAW | TC-F12-GF | <3 | R = 0 | +1/16, -0 | 3/16 max. | All | a, b, d |
| | TC-F12a-GF | ≥3 | | | 5/16 max. | | a, b, d |
| | L-F12-GF | <3 | | | 3/16 max. | | a, b, c |

MEMO

- This procedure meets the general requirements of AWS D1.1 clause 3 for prequalified status.
- This procedure is to be used for welding carbon steel when post weld heat treatment and impact testing is not required by the governing codes.
- Positions qualified are all unless noted otherwise on the weld detail. Vertical welds must be done in upward progression. Vertical welds on tubular welds may be upward or downwards dependent on welder qualification.
- Maximum single pass fillet weld sizes are defined by table 3.7 as Flat: 1/2", Horizontal: 3/8", Vertical: 1/2", and Overhead: 5/16"
- When base metal is below 32 F, the base metal shall be pre heated to a minimum of 70 F and the minimum interpass temperature shall be maintained during welding.
- The specified preheat and interpass temperatures in this procedure are for base metals within category A and B of table 3.3. Please refer to table 3.3 for minimum preheat and interpass temperatures for category C

- Fillet welds size ("S"). See 2.4.2.8 and clause 5.14 for minimum fillet weld sizes. See table 3.7 for maximum single pass size.
- See 5.22.1 for additional fillet weld assembly requirements or exceptions.
- See 2.4.2.9 for maximum weld size in lap joints.
- Perpendicularity of the members shall be within +/- 10 degrees.

Revisions:

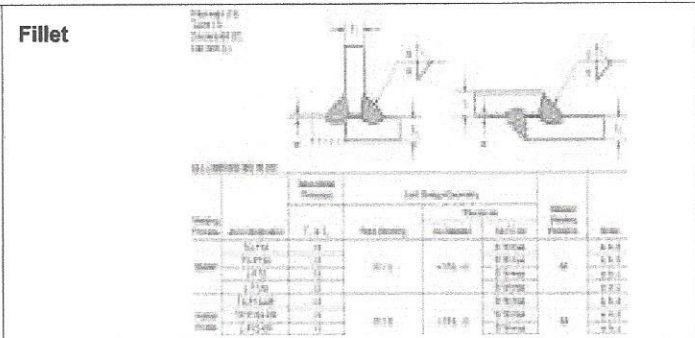
- Add Table 3.1 group III as prequalified.

Welding Procedure Specification

JF-WPS-GMAW-F

WPS No. JF-WPS-GMAW-F Revision 1 Date 10/3/2019 By Ryan Fitzgerald, CWI 060110581
 Authorized By John Fennell Date 8/3/2018 Prequalified
 Welding Process(es) GMAW Type: Manual Machine Semi-Auto Auto
 Supporting PQR(s) NA NA NA NA

JOINT
 Type Tee, Corner, Lap
 Backing Yes No Single Weld Double Weld
 Backing Material AWS Table 3.1
 Root Opening See Sketch Root Face Dimension See Sketch
 Groove Angle NA Radius (J-U) Sketch
 Back Gouge Yes No
 Method _____



BASE METALS
 Material Spec. Table 3.1 to Grp I, II, & III
 Type or Grade Table 3.1 to Grp I, II, & III
 Thickness: Groove (in) NA - NA
 Fillet (in) 1/8 - Unlimited
 Diameter (Pipe, in) Over 24 - Unlimited

POSITION
 Position of Groove NA Fillet ALL
 Vertical Progression: Up Down

FILLER METALS
 AWS Specification A5.18 A5.18
 AWS Classification ER70S-X ER70S-X

ELECTRICAL CHARACTERISTICS
 Transfer Mode (GMAW):
 Short-Circuiting Globular Spray
 Current: AC DCEP DCEN Pulsed
 Other NA
 Tungsten Electrode (GTAW):
 Size NA Type NA

SHIELDING
 Flux NA Gas AR/O2
 Composition 98%AR/2%O2
 Electrode-Flux (Class) NA Flow Rate 30 to 50
 Gas Cup Size 1/2" to 3/4"

TECHNIQUE
 Stringer or Weave Bead Either
 Multi-pass or Single Pass (per side) Either
 Number of Electrodes 1
 Electrode Spacing: Longitudinal NA
 Lateral NA
 Angle NA
 Contact Tube to Work Distance .750
 Peening Not Allowed
 Interpass Cleaning Grind, Brush, Chip

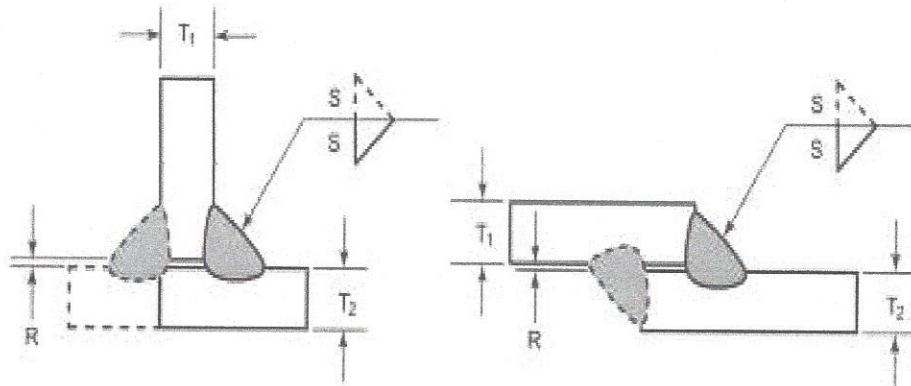
PREHEAT
 Preheat Temp., Min. 32
 Thickness Up to 3/4" Temperature 32
 Over 3/4" to 1-1/2" 50
 Over 1-1/2" to 2-1/2" 150
 Over 2-1/2" 225
 Interpass Temp., Min. 32 Max. 400

POSTWELD HEAT TREATMENT PWHT Required
 Temp. NA Time NA

| WELDING PROCEDURE | | | | | | | | |
|-------------------|---------|--------------------|----------|-----------|-------------|---------|--------------|---------------|
| Layer/Pass | Process | Filler Metal Class | Diameter | Cur. Type | Amps or WFS | Volts | Travel Speed | Other Notes |
| 1 - ALL | GMAW | ER70S-X | .035 | DCEP | 176 - 214 | 22 - 24 | 6 - 11 | 262 - 468 WFS |
| 1 - ALL | GMAW | ER70S-X | .035 | DCEP | 207 - 253 | 27 - 31 | 6 - 11 | 375 - 625 WFS |
| 1 - ALL | GMAW | ER70S-X | .035 | DCEP | 248 - 302 | 28 - 32 | 8 - 14 | 450 - 750 WFS |
| 1 - ALL | GMAW | ER70S-X | .045 | DCEP | 256 - 313 | 26 - 28 | 6 - 11 | 315 - 385 WFS |
| 1 - ALL | GMAW | ER70S-X | .045 | DCEP | 302 - 368 | 28 - 32 | 6 - 11 | 428 - 522 WFS |
| 1 - ALL | GMAW | ER70S-X | .045 | DCEP | 306 - 374 | 28 - 32 | 8 - 14 | 450 - 550 WFS |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Fillet

Fillet weld (12)
 T-joint (T)
 Corner joint (C)
 Lap joint (L)



ALL DIMENSIONS IN mm

| Welding Process | Joint Designation | Base Metal Thickness | Joint Design/Geometry | | | Allowed Welding Positions | Notes |
|-----------------|-------------------|----------------------------------|-----------------------|-------------|-----------|---------------------------|---------|
| | | T ₁ or T ₂ | Root Opening | Tolerances | | | |
| | | | | As Detailed | As Fit-Up | | |
| SMAW | TC-F12 | <3 | R = 0 | +1/16, -0 | 3/16 max. | All | a, b, d |
| | TC-F12a | ≥3 | | | 5/16 max. | | a, b, d |
| | L-F12 | <3 | | | 3/16 max. | | a, b, c |
| | L-F12a | ≥3 | | | 5/16 max. | | a, b, c |
| FMAW | TC-F12-GF | <3 | R = 0 | +1/16, -0 | 3/16 max. | All | a, b, d |
| TC-F12a-GF | ≥3 | 5/16 max. | | | a, b, d | | |
| FCAW | L-F12-GF | <3 | | | 3/16 max. | | a, b, c |

MEMO

1. This procedure meets the general requirements of AWS D1.1 clause 3 for prequalified status.
2. This procedure is to be used for welding carbon steel when post weld heat treatment and impact testing is not required by the governing codes.
3. Positions qualified are all unless noted otherwise on the weld detail. Vertical welds must be done in upward progression. Vertical welds on tubular welds may be upward or downwards dependent on welder qualification.
4. Maximum single pass fillet weld sizes are defined by table 3.7 as Flat: 1/2", Horizontal: 3/8", Vertical: 1/2", and Overhead: 5/16"
5. When base metal is below 32 F, the base metal shall be pre heated to a minimum of 70 F and the minimum interpass temperature shall be maintained during welding.

- a. Fillet welds size ("S"). See 2.4.2.8 and clause 5.14 for minimum fillet weld sizes. See table 3.7 for maximum single pass size.
- b. See 5.22.1 for additional fillet weld assembly requirements or exceptions.
- c. See 2.4.2.9 for maximum weld size in lap joints.
- d. Perpendicularity of the members shall be within +/- 10 degrees.

Revisions:

- 1) Add Table 3.1 group III as prequalified.

Welding Procedure Specification

JF-WPS-GMAW-G A5.28

WPS No. JF-WPS-GMAW-G A5.28 Revision 1 Date 10/3/2019 By Ryan Fitzgerald, CWI 060110581
 Authorized By John Fennell Date 10/4/2018 Prequalified
 Welding Process(es) GMAW Type: Manual Machine Semi-Auto Auto
 Supporting PQR(s) NA NA NA NA

JOINT
 Type Butt, Tee, Corner
 Backing Yes No Single Weld Double Weld
 Backing Material AWS Table 3.1
 Root Opening See Sketch Root Face Dimension See Sketch
 Groove Angle Sketch Radius (J-U) NA
 Back Gouge Yes No
 Method See Note 7

TC-U4a-GF

| Welding Process | Joint Configuration | Base Metal Thickness | Groove Preparation | | | | Permitted Welding Positions | Cin. Restrict. |
|-----------------|---------------------|----------------------|--------------------|---------|--------------|------------|-----------------------------|----------------|
| | | | Root | Face | Angle | Face | | |
| GMAW FCMAY | Butt-GF | 1/2" | R = 3/16" | a = 30° | R = 1/16", 0 | +16L, -15B | All | Restricted |
| | | | R = 3/8" | a = 30° | R = 1/16", 0 | +16L, -15B | F | Not req. |
| | | | R = 1/4" | a = 45° | a = 15°, 0° | +15°, 0° | All | Not req. |

BASE METALS
 Material Spec. Table 3.1 to Grp I, II, & III
 Type or Grade Table 3.1 to Grp I, II, & III
 Thickness: Groove (in) 1/8 - Unlimited
 Fillet (in) NA - NA
 Diameter (Pipe, in) Over 24 - Diameter

POSITION
 Position of Groove ALL Fillet NA
 Vertical Progression: Up Down

FILLER METALS
 AWS Specification A5.28 A5.28
 AWS Classification ER80S-XXX All A5.28

ELECTRICAL CHARACTERISTICS
 Transfer Mode (GMAW):
 Short-Circuiting Globular Spray
 Current: AC DCEP DCEN Pulsed
 Other NA
 Tungsten Electrode (GTAW):
 Size NA Type NA

SHIELDING
 Flux NA Gas AR / CO2
 Composition 92%AR / 8%CO2
 Electrode-Flux (Class) NA Flow Rate 30 to 50
 Gas Cup Size 1/2" to 3/4"

TECHNIQUE
 Stringer or Weave Bead Either
 Multi-pass or Single Pass (per side) Either
 Number of Electrodes 1
 Electrode Spacing: Longitudinal NA
 Lateral NA
 Angle NA
 Contact Tube to Work Distance .750"
 Peening Not Allowed
 Interpass Cleaning Grind, Brush, Chip

PREHEAT
 Preheat Temp., Min. 32
 Thickness Up to 3/4" Temperature 32
 Over 3/4" to 1-1/2" 50
 Over 1-1/2" to 2-1/2" 150
 Over 2-1/2" 225
 Interpass Temp., Min. 32 Max. 400

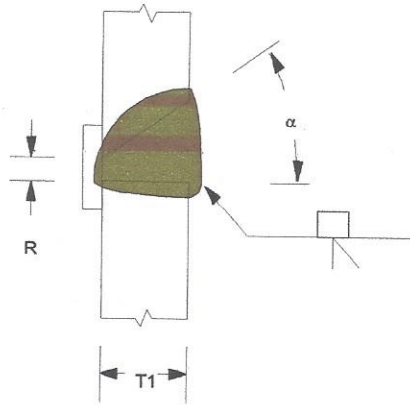
POSTWELD HEAT TREATMENT PWHT Required
 Temp. NA Time NA

WELDING PROCEDURE

| Layer/Pass | Process | Filler Metal Class | Diameter | Cur. Type | Amps or WFS | Volts | Travel Speed | Other Notes |
|------------|---------|--------------------|----------|-----------|-------------|---------|--------------|---------------|
| 1 - ALL | GMAW | ER80S-XXX | .035 | DCEP | 176 - 214 | 19 - 26 | 6 - 10 | 337 - 412 WFS |
| 1 - ALL | GMAW | ER80S-XXX | .035 | DCEP | 207 - 253 | 24 - 33 | 6 - 11 | 450 - 500WFS |
| 1 - ALL | GMAW | ER80S-XXX | .035 | DCEP | 248 - 302 | 25 - 34 | 8 - 12 | 540 - 660 WFS |
| 1 - ALL | GMAW | ER80S-XXX | .045 | DCEP | 256 - 313 | 23 - 31 | 6 - 10 | 315 - 385 WFS |
| 1 - ALL | GMAW | ER80S-XXX | .045 | DCEP | 302 - 368 | 25 - 34 | 6 - 10 | 428 - 522 WFS |
| 1 - ALL | GMAW | ER80S-XXX | .045 | DCEP | 306 - 374 | 25 - 34 | 8 - 12 | 450 - 550 WFS |

TC-U4a-GF

Single-bevel-groove-weld (4)
Butt joint (B)



| Welding Process | Joint Designation | Base Metal Thickness (U=unlimited) | | Groove Preparation | | | | Permitted Welding Positions | Gas Shielding for FCAW | Notes |
|-----------------|-------------------|------------------------------------|----|--------------------|---------------------|--------------------------|------------------------|-----------------------------|------------------------|------------|
| | | T1 | T2 | Root Opening | Groove Angle | Tolerances | | | | |
| | | | | | | As Detailed (see 3.13.1) | As Fit Up (see 3.13.1) | | | |
| GMAW FCAW | B-U4a-GF | U | - | R = 3/16 | $\alpha = 30^\circ$ | R = +1/16, -0 | +1/4, -1/16 | Al I | Required | a, g, k, o |
| | | | | R = 3/8 | $\alpha = 30^\circ$ | | | F | Not req. | |
| | | | | R = 1/4 | $\alpha = 45^\circ$ | | | Al I | Not req. | |

MEMO

1. This procedure meets the general requirements of AWS D1.1 clause 3 for prequalified status.
2. This procedure is to be used for welding carbon steel when post weld heat treatment and impact testing is not required by the governing codes.
3. At JF Fabrication's option, pre qualified weld joint sketches in accordance with AWS D1.1 figures 3.2 and 3.3 may be attached to illustrate joint design changes, weld layers, and bead sequences without the complete re-writing of this procedure.
4. Positions qualified are all unless noted otherwise on the weld detail. Vertical welds must be done in upward progression. Vertical welds on tubular welds may be upward or downwards dependent on welder qualification.
5. Maximum root pass thickness and single pass fillet weld size; Flat 3/8", Horizontal 5/16", Vertical 1/2", Overhead 5/16".
6. When base metal is below 32 F, the base metal shall be pre heated to a minimum of 70 F and the minimum interpass temperature shall be maintained during welding.
7. Backgouging is permitted in this procedure for purposes of removing backing bars and back welding. Backgouging shall be performed by grinding only. Thermal backgouging is not permitted in this procedure.

- A. Not pre-qualified for GMAW-S nor GTAW.
- C. Cyclic load application places restrictions on the use of this detail for butt joints in the flat position.
- E. SMAW detailed joints may be used for prequalified GMAW (except GMAW-S) and FCAW.
- G. If fillet welds are used in statically loaded structures to reinforce groove welds in corner and T-Joints, these shall be equal to T / 4, but need not exceed 3/8". Groove welds in corner and T-joints of cyclically loaded structures shall be reinforced with fillet welds equal to T / 4, but need not exceed 3/8".
- J. The orientation of two members in the joints may vary from 135° to 180° for butt joints, 45° to 135° for corner joints and from 45° to 90° for T-joints.
- K. For corner joints, the outside groove preparation may be in either or both members, provided the basic groove configuration is not changed and adequate edge distance is maintained to support the welding operations without excessive edge melting.
- O. For corner and T-Joints the member orientation may vary from 90° to less than or equal to 170° provided the groove angle and root opening are maintained, and the angle between the groove faces and the steel backing is at least 90°.

Revisions:

MEMO (continue)

K. For corner joints, the outside groove preparation may be in either or both members, provided the basic groove configuration is not changed and adequate edge distance is maintained to support the welding operations without excessive edge melting.

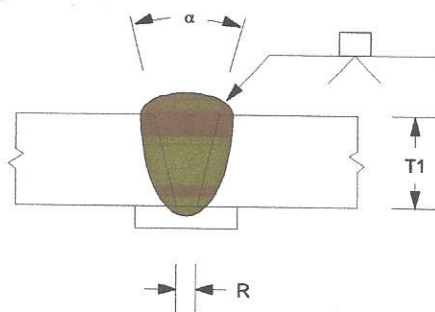
O. For corner and T-Joints the member orientation may vary from 90° to less than or equal to 170° provided the groove angle and root opening are maintained, and the angle between the groove faces and the steel backing is at least 90°.

Revisions:

- 1) Add Table 3.1 group III as prequalified

B-U-2a-GF

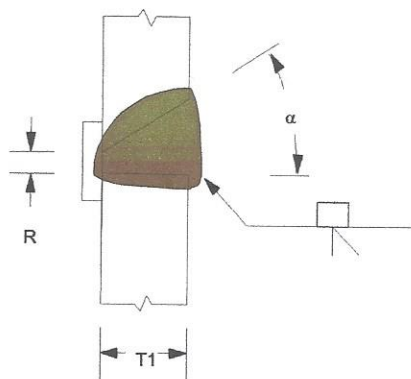
Single-V-groove weld (2)
Butt joint (B)



| Welding Process | Joint Designation | Base Metal Thickness (U=unlimited) | | Groove Preparation | | | | Permitted Welding Positions | Gas Shielding for FCAW | Notes |
|-----------------|-------------------|------------------------------------|----|--------------------|---------------------|-------------------------------------------------|--------------------------|-----------------------------|------------------------|---------|
| | | T1 | T2 | Root Opening | Groove Angle | Tolerances | | | | |
| | | | | | | As Detailed (see 3.13.1) | As Fit Up (see 3.13.1) | | | |
| GMAW FCAW | B-U2a-GF | U | - | R = 3/16 | $\alpha = 30^\circ$ | R = +1/16, -0 $\alpha = +10^\circ, -0^\circ$ | +1/4, -1/16 +10°, -5° | F,V,OH | Required | e, j |
| | | | | R = 3/8 | $\alpha = 30^\circ$ | | | F,V,OH | Not req. | |
| | | | | R = 1/4 | $\alpha = 45^\circ$ | | | F,V,OH | Not req. | |

B-U4a-GF

Single-bevel-groove-weld (4)
Butt joint (B)



| Welding Process | Joint Designation | Base Metal Thickness (U=unlimited) | | Groove Preparation | | | | Permitted Welding Positions | Gas Shielding for FCAW | Notes |
|-----------------|-------------------|------------------------------------|----|--------------------|---------------------|-------------------------------------------------|--------------------------|-----------------------------|------------------------|---------------|
| | | T1 | T2 | Root Opening | Groove Angle | Tolerances | | | | |
| | | | | | | As Detailed (see 3.13.1) | As Fit Up (see 3.13.1) | | | |
| GMAW FCAW | B-U4a-GF | U | - | R = 3/16 | $\alpha = 30^\circ$ | R = +1/16, -0 $\alpha = +10^\circ, -0^\circ$ | +1/4, -1/16 +10°, -5° | Al I | Required | c, e, j |
| | | | | R = 3/8 | $\alpha = 30^\circ$ | | | F | Not req. | |
| | | | | R = 1/4 | $\alpha = 45^\circ$ | | | Al I | Not req. | |



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Waltham, MA 02453

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www.olympus-ims.com

CERTIFICATE OF CALIBRATION

Certificate number: 002-20200516-14181503
Equipment: Epoch 650
Serial number: 201076705
Equipment description: Factory Certification
Calibration date (YYYY/MM/DD): 2020/05/16
Manufacturer facility: Massachusetts, Waltham
Status after calibration: Within tolerances
Work Order: SO-U1197958
Calibration type: New Unit
Customer: Summit Engineering
3575 Centre Circle Dr
Fort Mill
SC, 29715
United States

Calibrated by:

Nileshkumar Patel

Nileshkumar Patel (ID# 002-048)

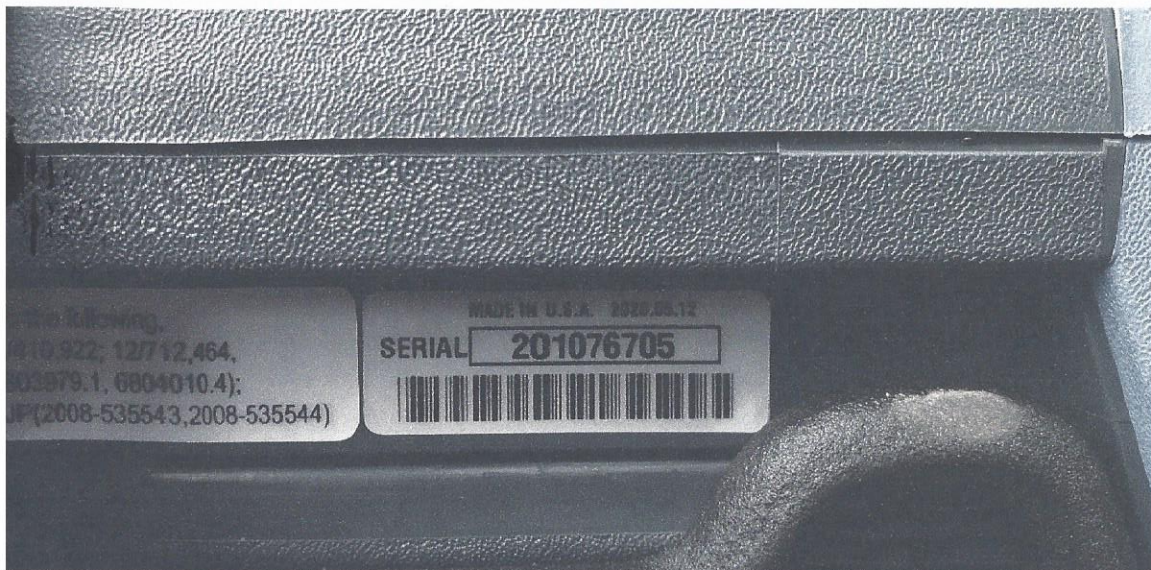
Verified by:

Phanyarra Say

Phanyarra Say (ID# 002-099)

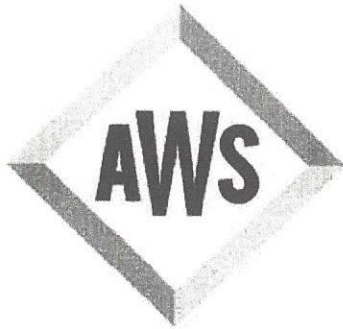
This certifies that the above product was calibrated in compliance with a quality system registered to ISO9001 using applicable Olympus procedures.

This document certifies the instrument described above has been tested and the calibration accuracy verified to meet the original manufacturer's specification. The calibration results published in this certificate were obtained using equipment capable of producing results that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI).



Following:
10,922; 12712,464,
03879.1, 6804010.4);
(2008-535543,2008-535544)

MADE IN U.S.A. 2008.05.12
SERIAL 201076705
[Barcode]



American Welding Society®

Certifies that Welding Inspector

Ryan Fitzgerald

*has complied with the requirements of AWS QC1,
Standard for AWS Certification of Welding Inspectors*

06010581

CERTIFICATE NUMBER

Jan/01/2024

EXPIRATION DATE



AWS PRESIDENT

AWS QUALIFICATION & CERTIFICATION
COMMITTEE CHAIR

Crown Castle Approved Personnel

Ryan Fitzgerald

2018248

Hair

Eyes

Cert. Date

Blonde

Blue

1/26/2018



Welding

Inspection

SMAW 3G 4G

CWI



FCAW 3G 4G

TIA



Lighting

MI Crew Lead



Lighting

Foundation



Anchor Rod



**CONSTRUCTION WELDING INSPECTION SERVICES INC.
CERTIFICATE OF PERSONNEL QUALIFICATIONS**

The individual named below has met the qualification and certification requirements of Construction Welding Inspection Services Inc.'s WRITTEN PRACTICE NONDESTRUCTIVE EXAMINATION PROCEDURE FOR PERSONNEL QUALIFICATION AND CERTIFICATION (NDT-Qual-1) in the method listed below.

Magnetic Particle Examination Method-Level II /SNT-TC-1A

Employment/Education History

Name Ryan Fitzgerald Date Employed 03/28/2015
 High School Graduate (Date) 2001 Course Hours in Technical/Scientific Areas NA
 College CPCC Yrs. 1.5 Degree No Year NA
NA NA NA NA
 Previous NDE Experience NDT Level II (MT, VT, UT), AWS CWI

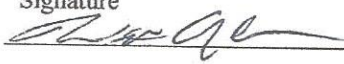
EXAMINATION

Exam Grades: General 95 Specific 98 Practical 100
 Average 97.6

CERTIFICATION

Training Certified by CWI Services Inc - William A. Clark NDT Level III
 Qualified by CWI Services Inc - William A. Clark NDT Level III
 Date of Certification 3/28/2015
 Level Certified to II Certified by William A Clark NDT Level III

RECERTIFICATION

Date of Recertification March 2018 Signature 
March 2021

I, the undersigned, verify that all information contained on the Certificate of Personnel Qualification forms of the above individual is true. The examination scores, dates and names and signatures of qualified examiners listed on these forms were taken from the original or copies of the original documents.


 William A. Clark, NDT Level III



9.3.5 MATERIAL TEST REPORTS (MTR)



6226 W. 74th St.
Chicago, IL 60638
708-496-0380
Fax: 708-563-1950

<https://www.nucortubular.com>
<https://www.ntportal.com>
Certificate Number: DCR 203163

Sold By:
INDEPENDENCE TUBE CORPORATION
6226 W. 74th St.
Chicago, IL 60638
Tel: 708-496-0380
Fax: 708-563-1950

Purchase Order No: 7454225
Sales Order No: DCR 119007 - 4
Bill of Lading No: DCR 83753 - 3
Invoice No:

Shipped: 12/2/2019
Invoiced:

Sold To:
145 - KLOECKNER METALS CORPORATION
500 COLONIAL PARKWAY
SUITE 500
ROSWELL, GA 30076

Ship To:
5 - KLOECKNER METALS-CHARLOTTE(SPECIAL)
1300 EXCHANGE STREET
ROOSEVELT BROOKS 704-930-0357
CHARLOTTE, NC 28208

CERTIFICATE of ANALYSIS and TESTS

Certificate No: DCR 203163

Customer Part No:

Test Date: 11/26/2019

TUBING A500 GRADE B(C)
4" SQ X 1/2" X 40'

Total Pieces 9 Total Weight Lbs 7,787

| Bundle Tag | Mill | Heat | Specs | Y/T Ratio | Pieces | Weight Lbs |
|------------|------|--------|------------------------------|-----------|--------|------------|
| 485708 | 40N | SJ5504 | YLD=79100/TEN=85700/ELG=25.5 | 0.9230 | 9 | 7,787 |

Mill #: 40N Heat #: SJ5504 Carbon Eq: 0.1846 Heat Src Origin: MELTED AND MANUFACTURED IN THE USA

| C | Mn | P | S | Si | Al | Cu | Cr | Mo | V | Ni | Nb | Cb |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.0600 | 0.6200 | 0.0090 | 0.0020 | 0.2750 | 0.0340 | 0.1000 | 0.0500 | 0.0100 | 0.0030 | 0.0300 | 0.0090 | 0.0090 |
| Sn | N | B | Ti | Ca | | | | | | | | |
| 0.0020 | 0.0062 | 0.0001 | 0.0020 | 0.0011 | | | | | | | | |

LEED Information (based on the most recent LEED information from the producing mill)

| Method | Location | Recycled Content | Post Consumer | Post Industrial |
|--------|-------------|------------------|---------------|-----------------|
| EAF | Decatur, AL | 61.6% | 27.2% | 34.4% |

T/R FAX

Certification:

I certify that the above results are a true and correct copy of records prepared and maintained by Independence Tube Corporation. Sworn this day, 11/26/2019.

WE PROUDLY MANUFACTURE ALL OUR PRODUCTS IN THE USA
NUCOR TUBULAR PRODUCTS ARE MANUFACTURED, TESTED
AND INSPECTED IN ACCORDANCE WITH ASTM STANDARDS.
MATERIAL IDENTIFIED AS A500 GRADE B(C) MEETS BOTH
ASTM A500 GRADE B AND A500 GRADE C SPECIFICATIONS.

Chris Allen, ASQ CMQ/OE
Quality Systems Supervisor

CURRENT STANDARDS:

A252-10
A500/A500M-18
A513/A513M-15
ASTM A53/A53M-12 | ASME SA-53/SA-53M-13
A847/A847M-14
A1085/A1085M-15
IN COMPLIANCE WITH EN 10204 SECTION 4.1
INSPECTION CERTIFICATE TYPE 3.1



Test Certificate

12400 Highway 43 North, Axis, Alabama 36505, US

WARNING: This product can expose you to chemicals including nickel and nickel compounds, which are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Form TC1: Revision 4: Date 6 Feb 2019

| | | | |
|---------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------|-----------------------------------------------------------|
| Customer: KLOECKNER METALS CORPORATION 500 COLONIAL CENTER PKWY ROSWELL GA 30076 | Customer P.O.No.: CLT-7450764 | Mill Order No. 41-588588-01 | Shipping Manifest: AT301384 |
| | Product Description: ASTM A572(18) 65/M450 | | Ship Date: 09 Jan 20 Cert Date: 09 Jan20 |
| Size: 1.250 X 96.00 X 480.0 (IN) | | | Cert No: 081754670 (Page 1 of 1) |

| Tested Pieces: | | | Tensiles: | | | | | Charpy Impact Tests | | | | | | | | | | | | | | | |
|----------------|----------|------------------|-----------|----------|-----------|-----|---------|---------------------|---------|----------|-------------------|---|---|-----|---------|---|---|-----|---------|---------|--------------|----------------|--|
| Heat Id | Piece Id | Piece Dimensions | Tst Loc | YS (KSI) | UTS (KSI) | %RA | Elong % | | Tst Dir | Hardness | Abs. Energy(FTLB) | | | | % Shear | | | | Tst Tmp | Tst Dir | Tst Siz (mm) | BDWTT Tmp %Shr | |
| | | | | | | | 2in | 8in | | | 1 | 2 | 3 | Avg | 1 | 2 | 3 | Avg | | | | | |
| E9L236 | D25 | 1.247 (DISCRT) | L 74 | 93 | | | 34 | | T | | | | | | | | | | | | | | |
| | | | T 72 | 92 | | | 35 | | T | | | | | | | | | | | | | | |
| E9L236 | D26 | 0.749 (DISCRT) | L 73 | 95 | | | 34 | | T | | | | | | | | | | | | | | |
| | | | T 72 | 95 | | | 34 | | T | | | | | | | | | | | | | | |
| W9L577 | E03 | 1.249 (DISCRT) | L 72 | 95 | | | 38 | | T | | | | | | | | | | | | | | |
| | | | T 72 | 95 | | | 40 | | T | | | | | | | | | | | | | | |

| Heat Id | Chemical Analysis | | | | | | | | | | | | | | | ORGN | |
|---------|-------------------|------|------|------|-----|--------|-----|-----|-----|-----|------|------|------|-------|-------|------|-----|
| | C | Mn | P | S | Si | Tot Al | Cu | Ni | Cr | Mo | Cb | V | Ti | B | N | | |
| E9L236 | .16 | 1.53 | .009 | .003 | .03 | .044 | .16 | .09 | .17 | .03 | .048 | .092 | .008 | .0001 | .0103 | | USA |
| W9L577 | .16 | 1.51 | .008 | .001 | .04 | .039 | .15 | .10 | .17 | .04 | .045 | .094 | .006 | .0001 | .0100 | | USA |

KILLED STEEL
 MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
 MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
 100% MELTED AND MANUFACTURED IN THE USA
 NO WELD REPAIR HAS BEEN PERFORMED ON THIS MATERIAL.
 PRODUCTS SHIPPED:
 W9L577 E03 PCES: 2, LBS: 32670 E9L236 D24 PCES: 1, LBS: 16335

(P) Cust Part #: _____ WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

 Justin Ward
 SENIOR METALLURGIST - PRODUCT

02-03-2021 11:19
 J F Fabricators, LLC
 Cust. PO - WESTON SQUARE 473085
 Load - 3748065
 BL - 6435806
 Heat - W9L577
 Order - 19376187
 b1r466



12400 Highway 43 North, Axis, Alabama 36505, US

Test Certificate

Form TC1: Revision 3: Date 7 Feb 2018

| Customer: KLOECKNER METALS CORPORATION 500 COLONIAL CENTER PKWY SUITE 500 ROSWELL GA 30076 | | | | Customer P.O.No.: CLT-7278400 | | Mill Order No. 41-543617-01 | | Shipping Manifest: AR269322 | | | | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------|---------|---------------------------------------------------|-----------|------------------------------------|--------------------|------------------------------------------------------------|----------|----------------------------------------------------------------------------------------------------------------------------------|-----|------|------|---------|-------|-------|-----|---------|--------------------------------------------------------------|--------------|-------------------|
| | | | | Product Description: ASTM A572(18) 65/M450 | | | | Ship Date: 22 Jul 18 Cert Date: 22 Jul 18 | | Cert No: 081673851 (Page 1 of 1) | | | | | | | | | | | |
| | | | | Size: 1.000 X 96.00 X 480.0 (IN) | | | | | | | | | | | | | | | | | |
| Tested Pieces: | | | | Tensiles: | | | | Charpy Impact Tests | | | | | | | | | | | | | |
| Heat Id | Piece Id | Piece Dimensions | Tst Loc | YS (KSI) | UTS (KSI) | %RA | Elong % 2in 8in | Tst Dir | Hardness | Abs. Energy(FTLB) | | | | % Shear | | | | Tst Tmp | Tst Dir | Tst Siz (mm) | BDWTT Tmp %Shr |
| E8G093 | E07 | 1.002 (DISCRT) | L | 72 | 86 | | 20 | T | | 1 | 2 | 3 | Avg | 1 | 2 | 3 | Avg | | | | |
| M8G093 | E06 | 1.003 (DISCRT) | T | 69 | 84 | | 22 | T | | | | | | | | | | | | | |
| | | | L | 72 | 89 | | 20 | T | | | | | | | | | | | | | |
| | | | T | 67 | 84 | | 22 | T | | | | | | | | | | | | | |
| Heat Id | | Chemical Analysis | | | | | | | | | | | | | | ORGN | | | | | |
| E8G093 | | C | Mn | P | S | Si | Tot Al | Cu | Ni | Cr | Mo | Cb | V | Ti | B | N | USA | | | | |
| M8G093-E06 | | .15 | 1.30 | .008 | .001 | .03 | .045 | .15 | .08 | .10 | .02 | .035 | .080 | .007 | .0001 | .0088 | USA | | | | |
| | | .16 | 1.38 | .008 | .001 | .03 | .045 | .14 | .08 | .13 | .02 | .040 | .086 | .008 | .0001 | .0083 | USA | | | | |
| <p>KILLED STEEL MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT. MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT 100% MELTED AND MANUFACTURED IN THE USA. NO WELD REPAIR HAS BEEN PERFORMED ON THIS MATERIAL. PRODUCTS SHIPPED: E8G093 E07 PCES: 3, LBS: 39204 M8G093 E06 PCES: 2, LBS: 26136</p> | | | | | | | | | | | | | | | | | | | | | |
| (P) Cust Part #: SLT | | | | | | | | | | WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION | | | | | | | | | _____ Justin Ward SENIOR METALLURGIST - PRODUCT | | |

02-03-2021 11:19
 J F Fabricators, LLC
 Cust. PO - WESTON SQUARE 473085
 Load - 3748065
 BL - 6435806
 Heat - E8G093
 Order - 19376187

blr466

Atlas Tube Canada ULC
 200 Clark Street
 Harrow, Ontario, Canada
 NOR 1G0
 Tel: (519) 738-5000
 Fax: (519) 738-3537



Ref.B/L: 80785031
 Date: 10.06.2017
 Customer: 193

MATERIAL TEST REPORT

Sold to

Tubular Steel
 1031 Executive Parkway
 ST. LOUIS MO 63141
 USA

Shipped to

Tubular Steel
 7220 Polson Lane
 HAZELWOOD MO 63042
 USA

Material: 4.5x4.5x500x40'0"(3x1)NMH

Material No: 45045500

Made In: Canada

Melted in: Canada

Sales order: 1212469

Purchase Order: PO-063899

Cust Material #: 031281

| Heat No | C | Mn | P | S | Si | Al | Cu | Cb | Mo | Ni | Cr | V | Ti | B | N |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 830183 | 0.200 | 0.780 | 0.009 | 0.009 | 0.010 | 0.039 | 0.045 | 0.005 | 0.003 | 0.013 | 0.042 | 0.002 | 0.002 | 0.000 | 0.006 |

| Bundle No | PCs | Yield | Tensile | Elr.2In | Certification | CE: 0.34 |
|------------|-----|------------|------------|---------|------------------------|----------|
| M101704783 | 3 | 065505 Psi | 071082 Psi | 32.6 % | ASTM A500-13 GRADE B&C | |

Material Note:
 Sales Or.Note:

Material: 4.5x4.5x500x40'0"(2x1)NMH

Material No: 45045500

Made In: Canada

Melted in: Canada

Sales order: 1212459

Purchase Order: PO-063899

Cust Material #: 031281

| Heat No | C | Mn | P | S | Si | Al | Cu | Cb | Mo | Ni | Cr | V | Ti | B | N |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 785394 | 0.200 | 0.800 | 0.011 | 0.009 | 0.016 | 0.047 | 0.041 | 0.006 | 0.002 | 0.013 | 0.038 | 0.002 | 0.002 | 0.000 | 0.006 |

| Bundle No | PCs | Yield | Tensile | Elr.2In | Certification | CE: 0.35 |
|------------|-----|------------|------------|---------|------------------------|----------|
| M101704777 | 2 | 069195 Psi | 075394 Psi | 31.9 % | ASTM A500-13 GRADE B&C | |

Material Note:
 Sales Or.Note:

Material: 6.0x6.0x375x25'0"(3x3)NMH

Material No: 60060375

Made In: Canada

Melted In: USA

Sales order: 1214775

Purchase Order: PO-064067

Cust Material #: 012583

| Heat No | C | Mn | P | S | Si | Al | Cu | Cb | Mo | Ni | Cr | V | Ti | B | N |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| L64854 | 0.220 | 0.840 | 0.013 | 0.011 | 0.016 | 0.049 | 0.060 | 0.005 | 0.007 | 0.020 | 0.070 | 0.001 | 0.000 | 0.000 | 0.003 |

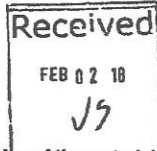
| Bundle No | PCs | Yield | Tensile | Elr.2In | Certification | CE: 0.38 |
|------------|-----|------------|------------|---------|------------------------|----------|
| M101709508 | 9 | 058603 Psi | 067901 Psi | 34.5 % | ASTM A500-13 GRADE B&C | |

Material Note:
 Sales Or.Note:

ALRO STEEL/METAL



RT08846558



Jason Richard
 Jason Richard

Authorized by Quality Assurance:
 The results reported on this report represent the actual attributes of the material furnished and indicate full compliance with all applicable specification and contract requirements.
 CE calculated using the AWS D1.1 method.





12400 Highway 43 North, Axis, Alabama 36505, US

Test Certificate

WARNING: This product can expose you to chemicals including nickel and nickel compounds, which are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Form TC1: Revision 4: Date 6 Feb 2019

| | | | |
|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|------------------------------------|------------------------------------------------------------|
| Customer: KLOECKNER METALS CORPORATION 500 COLONIAL CENTER PKWY SUITE 500 ROSWELL GA 30076 | Customer P.O.No.: CLT-7353795 | Mill Order No. 41-563983-03 | Shipping Manifest: AT283258 |
| | Product Description: ASTM A572(18) 65/M450 TYPE 2 | | Ship Date: 14 Feb 19 Cert Date: 14 Feb 19 |
| Size: 0.500 X 84.00 X 134.7 (IN) | | | Cert No: 081709511 (Page 1 of 1) |

| Tested Pieces: | | | | Tensiles: | | | | | Charpy Impact Tests | | | | | | | | | | | | |
|----------------|----------|------------------|---------|-----------|-----------|-----|--------------------|---------|---------------------|--------------------|---|---|-----|---------|---|---|----------|---------|--------------|----------------|--|
| Heat Id | Piece Id | Piece Dimensions | Tst Loc | YS (KSI) | UTS (KSI) | %RA | Elong % 2in 8in | Tst Dir | Hardness | Abs. Energy (FTLB) | | | | % Shear | | | Tst Temp | Tst Dir | Tst Siz (mm) | BDWTT Tmp %Shr | |
| | | | | | | | | | | 1 | 2 | 3 | Avg | 1 | 2 | 3 | Avg | | | | |
| W9A585 | F63 | 0.496 (DISCRT) | L T | 71 91 | 90 91 | | 19 19 | T T | | | | | | | | | | | | | |

| Heat Id | Chemical Analysis | | | | | | | | | | | | | | ORGM |
|---------|-------------------|------|------|------|-----|--------|-----|-----|-----|-----|------|------|------|-------|------|
| | C | Mn | P | S | Si | Tot Al | Cu | Ni | Cr | Mo | Cb | V | Ti | N | |
| W9A585 | .18 | 1.20 | .015 | .002 | .27 | .029 | .29 | .11 | .15 | .04 | .002 | .091 | .009 | .0099 | USA |

KILLED STEEL
 MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
 ! WARNING: THIS PRODUCT CAN EXPOSE YOU TO CHEMICALS INCLUDING NICKEL AND NICKEL COMPOUNDS, WHICH ARE KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. FOR MORE INFORMATION GO TO WWW.P65WARNINGS.CA.GOV.
 MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
 100% MELTED AND MANUFACTURED IN THE USA.
 NO WELD REPAIR HAS BEEN PERFORMED ON THIS MATERIAL.
 PRODUCTS SHIPPED:
 W9A585 F63 PCS: 1, LBS: 1606

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward
 SENIOR METALLURGIST - PRODUCT

02-03-2021 11:19
 J F Fabricators, LLC
 Cust. PO - WESTON SQUARE 473085
 Load - 3748065
 BL - 6435806
 Heat - W9A585
 Order - 19376187

blr466