

Red Hill Tank Cleaning Verification

Tank Cleaning Verification Procedures

This document section outlines validation procedures for Tank Cleaning Verification at Red Hill Bulk Fuel Storage Facility, to accompany the Department of Navy's Red Hill Closure Plan (Nov 2022), Supplement #1 (Feb 2023) and Supplement #2 (May 2023).

The ensuing procedure presents a means of 1) setting a cleaning standard, 2) evaluating cleaned surfaces, and 3) tracking/reporting. The level of effort required will vary based on the product stored and tank-specific interior condition. Tanks 1, 13, 14, 17, 18 and 19 have been out of service and not in the queue for cleaning. Tanks 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16 and 20 are to be degassed, opened, cleaned, and effectively retired with an anticipated end state of "abandon in place." As such, the guiding principle is that if the tanks accumulate water there won't be a threat of petroleum release to the environment.

Contractor to follow cleaning sequence provided in Work Plan: 1) residual draining, 2) degassing, 3) detergent solution wash, 4) water wash, 5) drying, 6) inspection. Verification of cleanliness should occur in synchronization with the Contractor Quality Control process to minimize impact to production and prevent rework.

1. Cleaning Standard

Contractor's provided and Government accepted definition of clean is "The removal of all product, vapor, sludge, and residue from a tank, and washing, rinsing, and drying a tank so that no product or residue remains on any tank surfaces (shell, bottom, piping, appurtenances, etc.)." Part 3 Project Program references 33 01 50.55 as the applicable specification for the tank cleaning, which does not establish a criterion. Part 3 Project Program also references API RP 1604 Closure of Underground Petroleum Storage Tanks (4th ed. Feb 2021); this also does not establish a level of cleanliness, only a process for rendering the tank for ultimate disposal. Typically, tanks are cleaned for the purpose of surface preparation and coating, which provides a baseline for cleanliness.

Reference: *NACE (now AMPP) SSPC-SP No. 1 – Solvent Cleaning*

This standard defines the end-condition of a metal surface from which visible deposits of oil, grease, and other visible contaminants have been removed in preparation for subsequent application of protective coatings or for the use of additional methods to prepare the surface for the application of coatings. The standard also includes requirements for materials and procedures necessary to achieve and verify the end condition.

When viewed without magnification, a solvent-cleaned surface shall be free of visible oil, grease, dust, dirt, drawing and cutting compounds, and other visible soluble contaminants. "Visible" means detectable with normal or corrected normal vision without the use of additional test equipment.

Wipe Test: *A clean dry white rag is wiped across the dry cleaned area(s) and examined for visible residue.*

Evaluating Cleaned Surfaces

The Contractor will utilize the Three Phases of Quality Control (QC): Preparatory, Initial, and Follow-Up. The Preparatory Phase allows the Quality Validation (QV) Team to review approved submittals for products, qualifications, and plans. The Initial Phase will allow the QV Team to participate and document as the Government Quality Assurance (QA) Team 1) Check preliminary work, 2) Establish level of workmanship, 3) Resolve all differences. The Initial Phase shall be repeated for each new crew to work onsite, or any time established level of workmanship is not being met.

Government QA Team and Contractor QC Team will complete Follow-Up Phase inspections to assure continuing compliance with the level of workmanship set in the Initial Phase. As part of the QV effort, an independent Third-Party Association for Materials Protection and Performance (AMPP) Coating Inspector Program (CIP) Level II Inspector will evaluate and document the tank surface for cleanliness IAW the SSPC SP-1 procedure above. The QV Team will spot check Follow-Up Inspections, as described in Section 3 below. A Final Inspection will be attended by the QC, QA, and QV Teams.

NCTF will send a request to schedule the AMPP Certified Coatings Inspector at regular intervals (3 visits weekly during the lunch break). This will need to be field adjusted to production rate, tank cleanliness, residual moisture, and which area of the tank is being cleaned. Locations inspected will be tracked on the shell roll-out. Areas for re-cleaning will be communicated to NCTF and NAVFAC for their action. NAVFAC will be performing QA concurrent with Contractor QC.

At the Initial Phase and Follow-Up Final Inspection, The QV Team will conduct visual testing and a cloth rub test for oil and grease contamination IAW UFGS 09 97 13.15 Section 3.9.4.1, as referenced in paragraph a and d below. Cloth rub testing is not set at a frequency, but rather by visual indication of contamination. The AMPP Inspector will visually inspect the entire interior surface to guide rub tests. The Contractor will utilize visual inspection and water break testing as part of their operational quality checks.

Reference: *UFGS 09 97 13.15 Section 3.9.4.1 Pre-Preparation Testing for Oil and Grease Contamination*

- a. *Inspect all surfaces for oil and grease contamination using two or more of the following inspection techniques: 1) Visual Inspection, 2) Water Break Test, 3) Black Light Test, and 4) Cloth Rub Test. Reject oil or grease contaminated surfaces, clean using a water-based pH neutral degreaser in accordance with SSPC SP 1 and recheck for Contamination until surfaces are free of oil and grease.*
- b. *Water Break Test – Spray atomized mist of distilled water onto surface and observe for water beading. If water "wets" surface rather than beading up, surface can be considered free of oil or grease contamination. Beading of water (water forms droplets) is evidence of oil or grease contamination.*
- c. *Black Light Test – Inspect surfaces for oil and grease contamination using the light specified in paragraph Black Light. Use light no more than 381 mm 15 inches from surface unless testing indicates that the specific oil or grease found in tank fluoresce at a greater distance. Use light in tank that is completely sealed from light infiltration, under*

a hood, or at night. Any fluorescing on steel surfaces is indication of petroleum oil/grease contamination. Use either Water Break Test or Cloth Rub Test to confirm both contaminated and non-contaminated areas detected by Black Light Test. The Black Light Test may not be used during inspection of prepared surfaces for oil and grease contamination unless proven to fluoresce the oil and grease found in the specific tank and documented during testing prior to abrasive blasting. Generally, only petroleum oil/grease will fluoresce, however, some may not fluoresce sufficiently to be recognized and other methods, such as the Water Break Test or Cloth Rub Test, must be used to confirm findings of the Black Light Test.

- d. *Cloth Rub Test - Rub a clean, white, lint free, cotton cloth onto surface and observe for discoloration. To confirm oil or grease contamination in lightly stained areas, a non-staining solvent may be used to aid in oil or grease extraction.*

While tests are intended to verify contamination, Regulatory Agencies have expressed a need for a minimum sampling frequency for areas that have been cleaned to provide a physical record. After considering contractor production rate and available inspection time, HDR suggests a 1% frequency (10 SF per 1,000 SF) cloth rub crossing plates and weld surfaces on the tank shell, and a minimum of one (1) wipe sample per 25 linear feet of catwalk and center tower. Each tank has approximately 84,000 SF of tank shell (84 samples locations), 225 linear feet of center tower (10 sample locations) and 50 linear feet of catwalk (2 sample locations), totaling a minimum of 96 samples per tank to augment the rub tests the inspector completes to confirm suspected contamination. If the residue does not look, smell, or feel like fuel, the AMPP Certified Coatings Inspector will classify the result as negative. If the residue on the rag appears to be fuel, the area will be marked for rework and re-inspection, noted on the summary drawing and communicated to NAVFAC and NCTF for further action.

The AMPP Certified Coatings Inspector will rely primarily on in-tank lighting to inspect the tank surface. The inspector will maintain a separate light source for up-close inspection as well as for areas where in-tank lighting is not sufficient. For compatible products, a blacklight (365 nanometer intensity of 4,000 microwatts per square centimeter at 15 inches) may augment inspection to facilitate screening.

For inaccessible areas, such as outside framing of the catwalk and center tower, the AMPP Certified Coatings Inspector will utilize a hand mirror to evaluate cleanliness. For piping inaccessible to the inspector, the contractor will provide camera inspection footage for review after lines are water jetted.

Regulatory Agencies have requested to be involved in the inspection process. The Contractor controls the entry into the tank and have listed training and credentials that must be submitted and reviewed prior to granting access. Current Confined Space Entry and Fall Protection training are required at a minimum. NCTF will have to coordinate with the Contractor for operator support to transport Regulatory Agency inspectors by basket. Access through the 20-inch nozzle into 32-inch pipe is also an option.

2. Progress Tracking & Reporting

As part of the Daily Reporting and QC process, the contractor will utilize a shell roll-out drawing to track plates that have been washed to ensure 100% of the tank interior is cleaned to the agreed

standard. Locations and dates of QC actions or verification samples will be added to the roll-out drawing to track progress and facilitate reporting.

The Contractor conducts weekly QC meetings where the QA and QV Teams can engage with the QC Team for tracking progress, coordinating inspections and sampling. Third-Party AMPP CIP Inspection reports will be compiled and presented for each tank as supporting documentation for QV Reports. The Contractor will summarize data as part of a Final Report, but for purposes of Quality Validation the weekly QC meeting will be the primary means for gathering information on a timely basis to allow timely QV Report production as soon as possible following Final Inspection and Acceptance for each tank.

Quality Validation Procedures

QV procedures will be in accordance with the previously accepted *JTF-RH Red Hill Defuel Independent Third-Party Quality Validation Plan (November 1, 2022)* (QV Plan) and as described below.

1. Tank/Pipe Repair and Modification

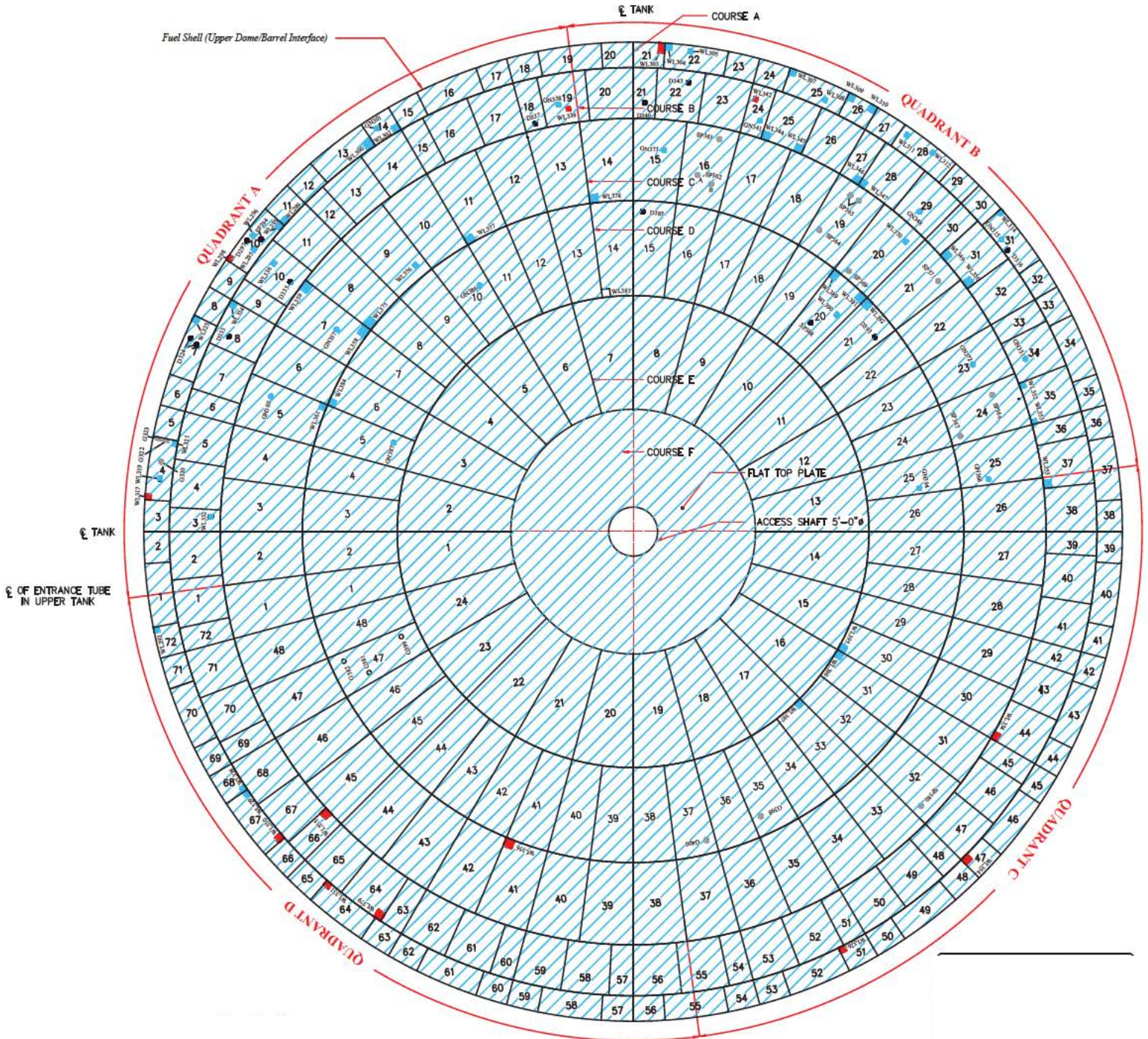
If any tank/pipe repairs or modifications are performed as part of the retiring of the tanks, the process defined in the QV Plan will be utilized. QV reports will have the same format and content as the reports submitted for the Consolidated List of Repairs.

2. Cleaning of Tanks

Procedures used in the field to verify cleaning activities will be as described above. A QV Report will be submitted for each tank cleaned. A modified version of the QV Report form will be used for cleaning tasks, containing the following information:

- a. Tank I.D.
- b. Product Service
- c. Cleaning Process
- d. Recovery Process and Destination of Sludge Removed / Sludge Volume Removed / Volume of Rinseate (measured at distribution meter) / Volume of Simple Green consumed (visual estimate based on spent containers)
- e. Interior Repairs or Modifications to Tank
- f. Contract / Service Order
- g. Description of QA Validation
- h. Third-Party AMPP CIP Inspection Reports / Photos
- i. Tabulated Results of Testing Performed
- j. Summary Drawing of Sample Locations
- k. Photographs (including screen captures of camera inspections of decommissioned product lines)
- l. Government Acceptance

Shell Rollout Drawings



1

2

3

4

5

D

D

C

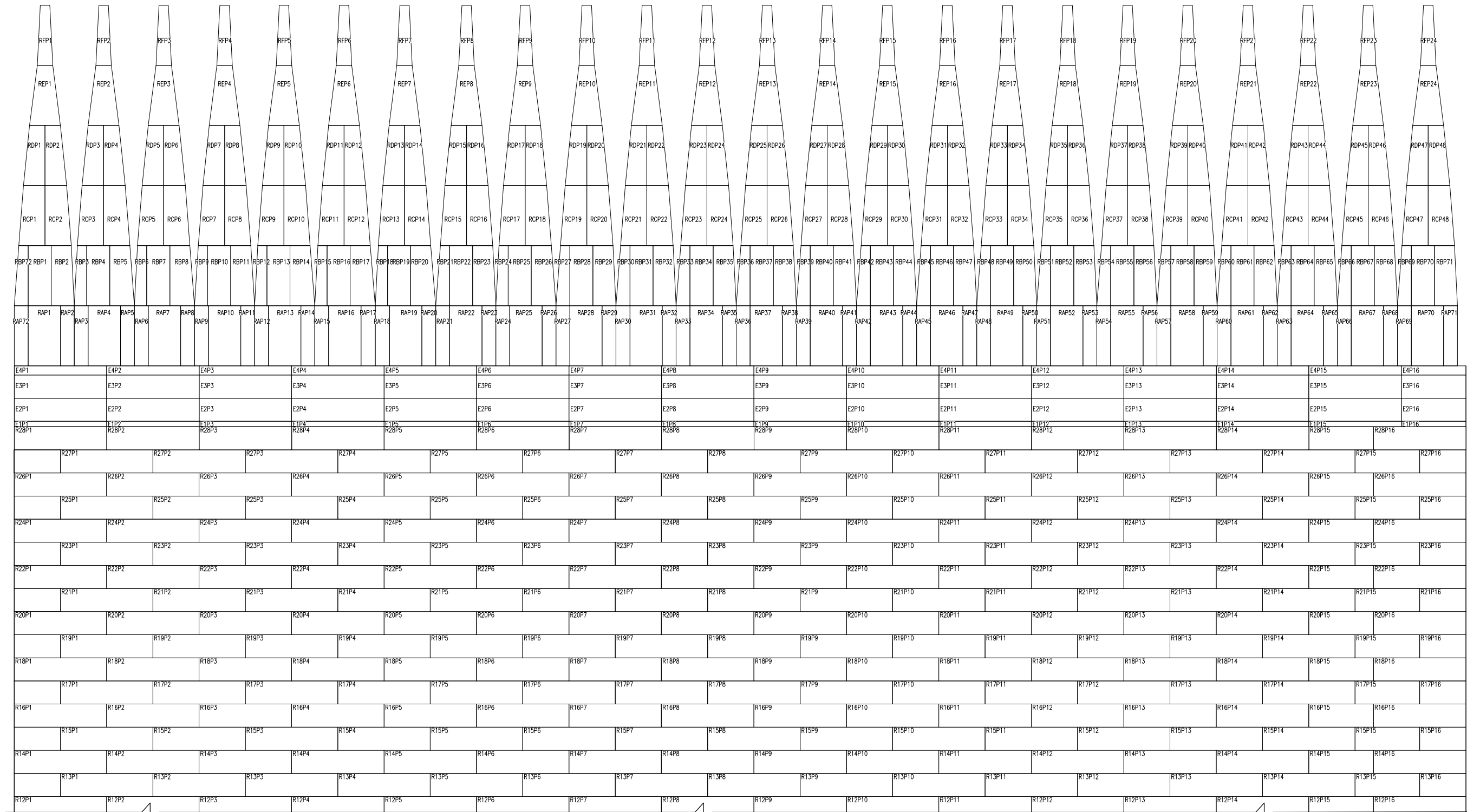
C

B

B

A

A



SEE MATCH-LINE G-101

TOP of TANK - SHELL ROLL-OUT

PLATE LAYOUT

SCALE: N.T.S.

IF SHEET IS LESS THAN (22" x 34")
 IT IS A REDUCED PRINT-SCALE. REDUCE ACCORDINGLY.
 PRINT DRAWINGS IN PDF FORMAT ON 11x17 PAPER.
 THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE WORK
 AMONG THE VARIOUS TRADES AS NECESSARY TO AVOID CONFLICTS AND TO
 ENSURE THE INSTALLATION OF ALL WORK WITHIN THE AVAILABLE SPACE.



DATE	08/29/2019	DJK	APR
DESCRIPTION	100% DESIGN FOR REVIEW		
SYN	A		

2525 CABELL STREET SUITE 200 FARMINGDALE, NY 11735
 (907) 563-3835 TEL. (207) 869-8006
 (907) 563-3817 FAX (207) 869-8018

APPROVED: _____
 FOR COMMANDER NAFAC

ACTIVITY: _____

SATISFACTORY TO DATE: _____
 DES: DJK | DW: MUE | CHK: SJD

PAU/SM: _____
 BRANCH MANAGER: _____
 CHIEF ENGR/ARCH: _____
 FIRE PROTECTION: _____

DEPARTMENT OF THE NAVY
 NAVAL FACILITIES ENGINEERING COMMAND
 PORT HUENEME, CA
 JOINT BASE PEARL HARBOR HICKAM
 PEARL HARBOR, HI
**CLEAN, INSPECT AND REPAIR
 RED HILL TANK 17**

SCALE: AS NOTED
 EPROJCT NO.: 1548681
 CONSTR. CONTR. NO. N39430-15-D-1632
 NAFAC DRAWING NO. XXXXXXXXX
 SHEET 2 OF 10
G-100
DRAWING REVISION: 31 JANUARY 2017

1

2

3

4

5

1

2

3

4

5

D

D

C

C

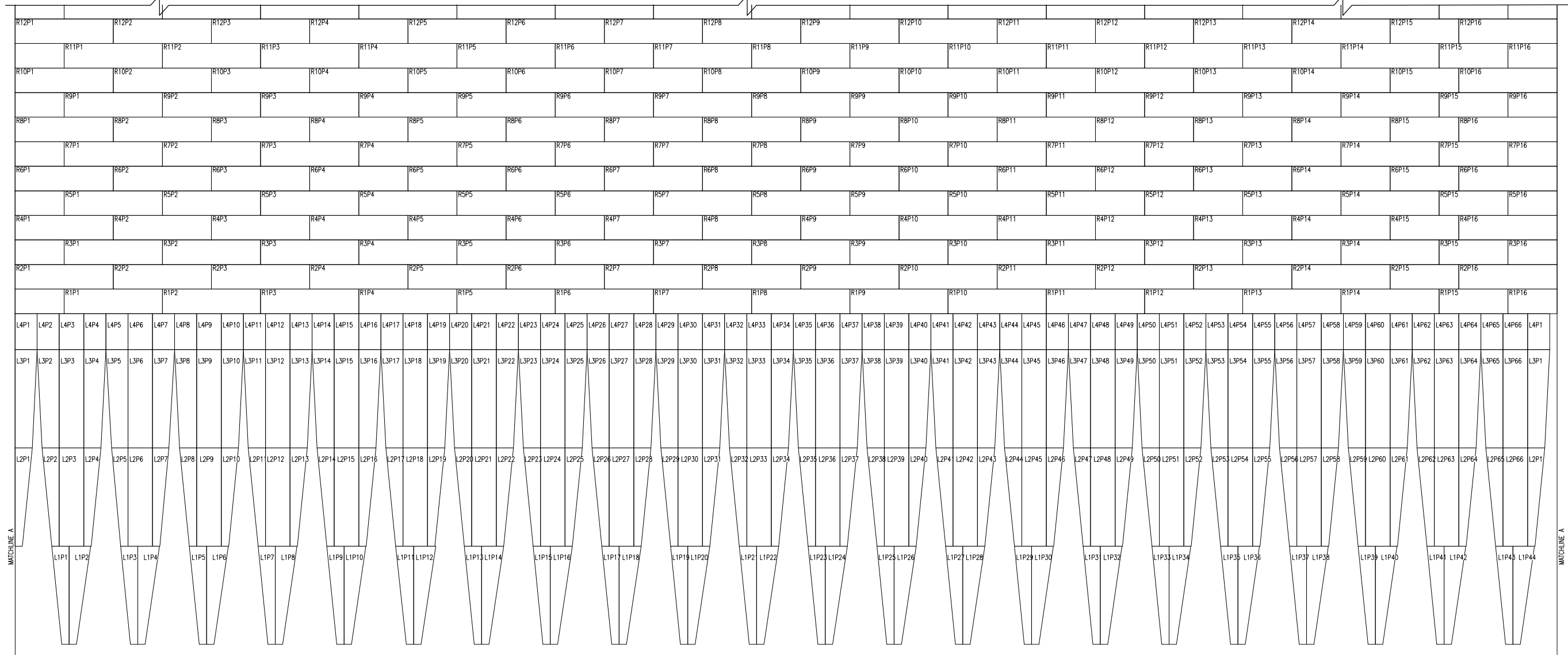
B

B

A

A

SEE MATCH-LINE G-100



BOTTOM of TANK - SHELL ROLL-OUT

PLATE LAYOUT

SCALE: N.T.S.

DATE	08/29/2019	DJK	APP
DESCRIPTION	100% DESIGN FOR REVIEW		
SYN	A		



ENTERPRISE ENGINEERING, INC.
 2525 CAMELL STREET SUITE 200 FARMVILLE, NC 27834
 TEL: (919) 563-3835 FAX: (919) 563-3817
 400 US ROUTE 1 NORTH SUITE B FARMVILLE, NC 27834
 TEL: (207) 869-8006 FAX: (207) 869-8016

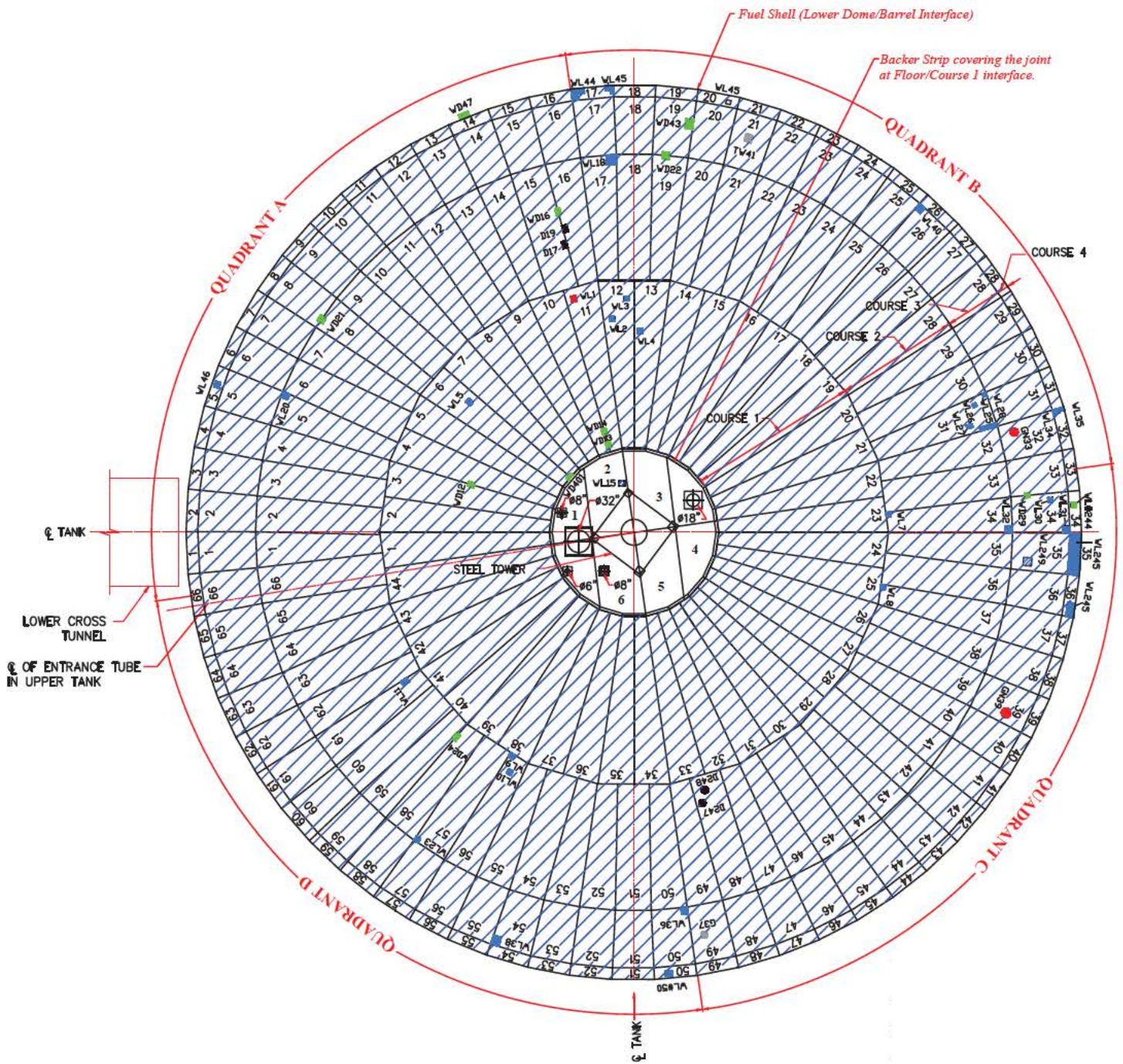
APPROVED	
FOR COMMANDER NAFAC	
ACTIVITY	
SATISFACTORY TO DATE	
DES	DJK
DRW	MJE
CHK	SJD
PA/SM	
BRANCH MANAGER	
CHIEF ENG/ARCH	
FIRE PROTECTION	

DEPARTMENT OF THE NAVY
 NAVAL FACILITIES ENGINEERING COMMAND
 PORT HUENEME, CA
 JOINT BASE PEARL HARBOR HICKAM
 PEARL HARBOR, HI
**CLEAN, INSPECT AND REPAIR
 RED HILL TANK 17**
 TANK 17 PLATE LAYOUT (2)

SCALE:	AS NOTED
PROJECT NO.:	1548681
CONSTR. CONTR. NO.	N39430-15-D-1632
NAFAC DRAWING NO.	XXXXXXXXXX
SHEET	3 OF 10
G-101	

IF SHEET IS LESS THAN (22" x 34")
 IT IS A REDUCED PRINT-SCALE. REDUCE ACCORDINGLY.
 PRINT DRAWINGS IN PDF FORMAT ON 11x17 PAPER.
 THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE WORK
 AMONG THE VARIOUS TRADES AS NECESSARY TO AVOID CONFLICTS AND TO
 ENSURE THE INSTALLATION OF ALL WORK WITHIN THE AVAILABLE SPACE.





Drawing is not to scale