Request for Tender

CHUUK TERMINAL TANK API653 UPGRADE

Tender Submission Date: 15 May 2025

TABLE OF CONTENT

SECTION 1
REQUEST FOR QUOTE

1 BACKGROUND

1.1 About Federal States of Micronesia (FSM)

FSM is an independent, sovereign island nation, made up of four states from west to east: Yap, Chuuk, Pohnpei and Kosrae. The FSM is located approximately 4,000 km southwest of the main islands of Hawaii and about 2,900 km north of eastern Australia, and east of Palau and the Philippines.

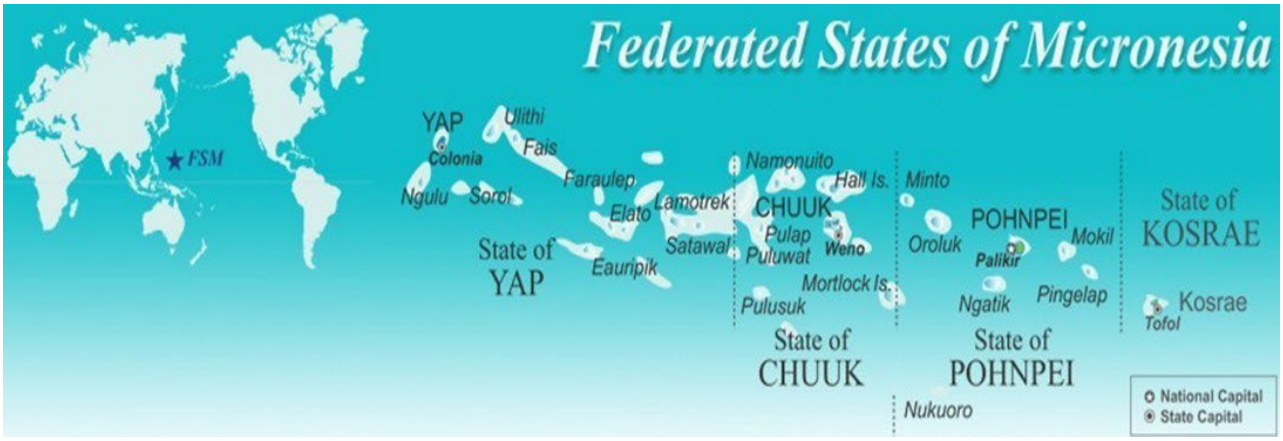


Figure 1 - Vital Energy FSM Operations

1.2 About FSM Petroleum Corporation (VITAL ENERGY)

FSM Petroleum Corporation (d/a Vital or VITAL ENERGY or the Corporation) is a state-owned energy services company with an experienced, qualified and trained workforce of over 120 people with combined petroleum and aviation fuel handling team experience exceeding 150 years. Vital is the largest energy supplier in the FSM.

In addition, Vital is an independent terminal operator who owns, operates and/or leases over seven fuel terminals, thirty-seven storage tanks and pipeline systems, and a fleet of fourteen bulk trucks and aviation fuellers across Micronesia.

Operations conducted by Vital include:

- Road tanker deliveries and drum filling services from Vital's four Bulk Terminals;
- Marine bunkering at each main port in Pohnpei, Chuuk, Yap and Kosrae;
- Plane re-fueling operations in four of the eight international airports of the region (Yap, Chuuk, Pohnpei and Kosrae); and
- Sale of a variety of lubricants and chemical solvents.
- Nauru Terminal Operations.

Vital was formed after it acquired the operations and assets of Mobil Oil Micronesia Incorporated in the Federated States of Micronesia ("FSM") in June 2008. Vital took over a business which had operations, existence and experience in Micronesia of over 50 years.

2 OBJECTIVES

Vital Energy is inviting interested API650 and API653 Tank contractors to carry out the repairs for Chuuk Tank 3 and 5 in Chuuk Fuel Terminal. The works shall be carried out in accordance with API653 and JIG 2 Standard requirements for all inspection and repairs. The tank shall be repaired and commissioned to be able to store Diesel, Unleaded and Jet A1. The contractor shall be competent and have proven experiences working on vertical fuel storage tanks. The project scope for Tank 3 and 5 attached as **Appendix A & B** respectively. Both Tanks were completed with their API653 Out of Service Inspection in 2016, and reports are attached in **Appendix D &E** respectively.

A copy of Chuuk Terminal Layout is also provided in **Appendix E**. Tank 3 drawing package is attached in **Appendix F** and Tank 5 drawing package is attached in **Appendix G.**

We have also provided a copy of Contractor Safety Admin Requirements (CASR) which establishes Vital Energy's contractual guidelines for a contractor company's management on safety (refer to **Appendix G**). Should Bidders have own CASR guidelines Vital Energy can review and comment on its suitability with company's guidelines.

In accordance with the detailed requirements set forth in this Invitation to Tender (ITT) document to bid for **Chuuk Tank 3 & 5 API653 Out of Service Inspection, Repairs and to meet JIG requirements for Jet A1 Storage.**

2.1 Tendering Phases

The entire tendering process will consist of single phases, all bidders shall provide complete documents as requested:

1. Final RFQ and Commercial Bid

2.2 Pre-Qualification

Pre-Qualification bid review, the Bidder's Proposals in response to the ITT will be evaluated on a technical basis, which includes the following:

- Proven records of API 650 and API653 Tank Works.
- Technical understanding of JIG Standards and requirements.
- Safety Management System (may include audit);
- Quality Management System (include forms and templates)
- Completed projects including projects of similar type;
- References;

- Last 3 years financial statements;
- Organization Structure and Management Team;
- Technical capabilities;
- Existing litigations disclosures;
- Regional presence;

3 FINAL REVIEW AND NOTICE OF AWARD

At the end of the Bid Assessment phase, VITAL ENERGY shall release a Notice of Award (NOA) in discussion with the successful Bidder.

The NOA shall be released and successful bidder to provide the following,

- 5% Performance bond – 10 Days
- Quality Management Plan – 30 working days
- Project Schedule detailed in line with the WBS Template.

4 GENERAL CONDITIONS OF THE CONTRACT

The Conditions of Contract comprise the "General Conditions", which form part of the "**Conditions of Contract for Chuuk Terminal Tank 3 and 5 OOSI-R & JIG Upgrade**" AS 4920-2003 General conditions of conduct for the provisions of asset maintenance and services.

Please refer to **Appendix T** for Sub-Clauses of the General Conditions which need to be commented by Bidders in response to the ITT (as noted in **Appendix T**) as part of the submission due on 15 May 2025.

4.1 Timeline and Milestones

The contracting timeline and milestones are summarized below:

	Subject	**Indicative Due Date**
1	Release of Expression of Interest (EoI)	27 March 2025
2	Closing Date for EoI Submission	4 April 2025
3	EoI review and shortlisting	8 April 2025
4	Release of Invitation To Tender	11 April 2025
5	Submission from Bidders on proposed Changes and Clarifications to the Technical Standards	25 April 2025

6	Submission of the Tender,	15 May 2025
7	Notice of Award	20 May 2025
8	Signing of Contract Agreement	30 May 2025
9	Issuance of Performance Security	12 June 2025

5 INSTRUCTION TO BIDDERS

1.1. VITAL ENERGY Contact Officer

a. All enquiries regarding this ITT should be directed via email to: rfp@fsmpc.com

b. Addressed to: PO Box 1762, Kolonia, Pohnpei FM 96941 Email subject: **"ITT-Chuuk Terminal Tank 3 and 5 OOSI-R & JIG Upgrade Works"**

c. Any contact with any other VITAL ENERGY staff member relating to this ITT other than through the Vital Energy Contact Officer may, at the absolute discretion of the Chief Executive Officer, invalidate the ITT submission.

5.1 Documents to be Lodged

a. Operational Philosophy and Technical Standards for each of the Sections have been prepared by Vital Energy and are included within this ITT. The final technical requirements will be distributed only to the firms that will be evaluated as qualified following the Pre-Qualification phase. Further, **Chuuk Terminal Layout, Appendix H** and **Site Hazard Zone as Appendix I** are included within this ITT to provide an overall with respect to intended site layout. This will get further streamlined as we get inputs from the PMO, Tank Engineers.

b. All documents which form part of this ITT dossier shall be considered explanatory of each other. Potential ambiguities in the documents and/or contradictions among them can be resolved by written instructions of the VITAL ENERGY.

c. Bidders are required to fully complete and return the following documents:
   i. Cover sheet;
   ii. Application form;
   iii. Response statements;
   iv. A technical proposal **Appendix V (All Forms shall be completed)**;
   v. Quality Management System processes and documentation.

vi. Safety management system or any other related information existing for the Bidder;
vii. References (relevant);
viii. Last 3 years financial statements;
ix. Organisation structure and management team;
x. Technical capabilities;
xi. Existing litigations along with current status;
xii. Regional presence;
xiii. Amendments or compliance with the CASR guidelines (as noted in **Appendix C**); and
xiv. Comments against Sub-Clauses of the General Conditions (as noted in **Appendix D**).

5.2 Lodgement Requirements

a. Please provide one (1) pdf electronic copy of your proposal via email as follows:
   i. Email subject: "**ITT**- **Chuuk Tank 3 & 5 OOS-R & JIG Upgrade**"
   ii. Proposals are to be received by: rfp@fsmpc.com no later than 4:00pm, FSM local time, 15 May 2025.).
   iii. Proposals received after the above due date and time will not be considered

b. One set of physical responses lodged by mail will be accepted addressed as following:
   PO Box 1762, Kolonia, Pohnpei FM 96941
   "**ITT**- **Chuuk Tank 3 & 5 OOS-R & JIG Upgrade**"

6 VITAL ENERGY'S RIGHTS

Vital Energy may:

a. amend this ITT;
b. require additional information or clarification from Bidders;
c. provide additional information or clarification to Bidders;
d. negotiate with any one or more Bidders including terminating any negotiations being conducted from time to time;
e. not release a RFQ;
f. change the structure and timing of tendering process at any time, VITAL ENERGY can terminate the ITT process if:
g. it is in the public's interest to do so;
h. no response meets the minimum content and format requirements (e.g. Mandatory requirements about responses);

i. no Bidders meets the conditions for participation (e.g. mandatory requirements about Bidders (such as the Bidders holding a particular license);
j. no Bidder is fully capable of undertaking the services; or
k. no Proposal represents value for money.

If it terminates the ITT process, VITAL ENERGY may:

a. negotiate with any one or more of the Bidders or any other person for the supply of all, or any, of the services;
b. call for new proposals;
c. engage in any other selection process for the supply of the services;
d. add to, alter, delete or exclude any services;
e. short list Bidders;
f. negotiate with any person who is not a Bidder and enter into a contract with that person on terms determined by VITAL ENERGY;
g. allow or not allow a related body corporate or other entity to take over a response in substitution for the original Bidder;
h. enter into any arrangements which will best meet VITAL ENERGY's needs;
i. allow a Bidder to correct an unintentional error or form in a response; and
j. suspend the ITT (on the same basis as termination).

Nothing in this ITT or arising from the ITT process shall give rise to any contractual obligations binding VITAL ENERGY (including a process contract). No proposal will be taken to have been accepted unless and until a contract is executed between the relevant vendor and VITAL ENERGY. Any conduct or statement by VITAL ENERGY whether prior to or subsequent to the issue of the ITT is not, and must not be deemed to be:

a. An offer to enter into a contract; or
b. A binding undertaking of any kind by VITAL ENERGY (including, without limitation, an undertaking that could give rise to quasi-contractual rights, promissory estoppels or rights with a similar legal basis).

7 CONFIDENTIALITY

All information submitted with a Bidder's submission will be treated as confidential to VITAL ENERGY and its consultants.

8 CONFLICT OF INTEREST

Bidders, at the time of lodging their proposal, must declare any conflict of interest that exists, or is likely to arise, which would affect the performance of their obligations, if the Bidder were to enter into a contract with VITAL ENERGY.
In the event of a conflict of interest being identified, VITAL ENERGY may, at its discretion, exclude the proposal from further consideration.

9 PROHIBITIONS

Bidders must not:

a. make false or misleading statements;
b. receive improper assistance from VITAL ENERGY employees;
c. engage in collusive tendering or anti-competitive conduct; or
d. attempt to improperly influence VITAL ENERGY's employees.

10 DOCUMENTATION REQUIREMENTS

Bidders are to be aware that the tender and subsequent contract documentation requirement for each project is inclusive of plans and other documents to satisfy both VITAL ENERGY and the processes of all relevant authorities.

Vital Energy requires all additional documentation from the contractor within 30 working days from the Notice of award, the following shall be submitted,

11 BIDDERS TO NOTE

The issue of this ITT, or any Proposal to it, does not commit, obligate or otherwise create a legal relationship between VITAL ENERGY and a Bidder in respect of:

a. an obligation on VITAL ENERGY to issue an RFQ to a Bidder;
b. VITAL ENERGY entering into a contract with a Bidder; or
c. the process to be followed in handling any responses.

In no event will VITAL ENERGY be liable for any cost, expense, loss, claim or damage arising out of a Bidder's participation in this ITT process or any subsequent RFQ.

12 EVALUATION

The decision to approve or reject a submission for evaluation is at the absolute discretion of VITAL ENERGY, who shall not be held liable for any costs incurred or damages arising out of such discretion.
The evaluation may involve discussions with some or all Bidders to seek further clarification of their submissions, requests to some or all Bidders to provide written clarification of various aspects of their submissions and discussions with and visits to, customers of some or all Bidders and their subcontractors, whether or not those customers are listed as referees in the Bidder's submission.
The providers submitting a Proposal will be assessed against the following evaluation criteria. VITAL ENERGY may make independent enquiries about any matters that may be relevant to the evaluation of a submission.
Submissions will be evaluated against the following criteria, which are not specified in any order of importance:

a. **Criterion 1**: Demonstrated capability and capacity to undertake these sections for VITAL ENERGY;
b. **Criterion 2**: The suitability of the Bidder's Proposal to meet VITAL ENERGY's requirements;
c. **Criterion 3**: Demonstrated ability to complete projects on time, on budget and to agreed quality standards; and
d. **Criterion 4**: Demonstrated financial capacity and capability to undertake projects for the duration.

13 CONSULTANTS

To assist VITAL ENERGY with the evaluation process VITAL ENERGY may employ the services of consultants to assist in all or part of the evaluation. All information will be treated as Commercial-in-Confidence.

14 EVALUATION PROCEDURES

VITAL ENERGY will appoint an evaluation committee to evaluate the proposals received.
Each Bidder grants to VITAL ENERGY the right to:

a. seek clarification from the Bidder in relation to any information contained in its proposal;
b. obtain information from any referee nominated in its proposal;
c. conduct its own inquiries in relation to the Bidder or the Bidder's past performance; and
d. make independent enquiries about any matter that may be relevant to the evaluation of any response.

Where VITAL ENERGY requests any clarification from a Bidder, VITAL ENERGY:

a. may nominate a time for any response by the Bidder; and shall be entitled to:
    i. rely on the information provided in the proposal where a response is not provided within the time nominated by VITAL ENERGY; and
    ii. reject any information.

Where VITAL ENERGY believes that more than one Bidder is able to satisfy its requirements, VITAL ENERGY may:

a. develop a short list;
b. seek additional information from one or more Bidders to enable it to complete its evaluation; and
c. request one or more Bidder to make a formal presentation.

ITTs are to be assessed on the basis of Value for Money as between VITAL ENERGY and the Bidders. Value for money is a comprehensive assessment that takes into account both the

representations made by Bidder against the evaluation criteria, in the context of the risk profile presented by each response.

15 SELECTION DECISION

All successful Bidders will be informed in writing of the outcome of the bidding process at its conclusion and will be offered the opportunity for a presentation to VITAL ENERGY.

16 APPLICATION FORM AND DECLARATION

Bidder's Legal Name:			
Bidder's Business or Trading Name:			
Date when Business Commenced Operation:			
Legal entity of above for Registration/Contracting (Tick as applicable)			
Evidence of Legal Entity attached			
Business Address:			
Postal Address:			
Contact Person:			
Contact Number (s):	**Bus:**	**Cell:**	
Facsimile Number:			
Email Address:			
Preferred Method of Delivery of Information:	**Email**	**Fax**	**Postal**
Membership Details of Industry Association(s) (if applicable):			

Licence No. & Type	
Copy of License Attached	

COMPANY DETAILS (to be completed by Companies only):

Date of Registration: *A copy of registration documents must be submitted on initial registration and if name change occurs*	
Is company involved in any trust relationships? *If yes, give full details*	
If a subsidiary company, state name of holding company.	
If a holding company, state names of divisions, and/or subsidiaries	
State Trading Name	

BUSINESS DETAILS (to be completed by Sole Traders and Partnerships only):

State whether a Sole Trader, or Partnership	
State names and address of all members of business.	
State Trading Names	

ADDITIONAL DETAILS

Have you, or any business you have been managing, ever failed to complete a construction contract?	Yes/No (If yes, please provide details)
Have you, or any business you have been managing, been declared bankrupt or	Yes/No (If yes, please provide details)

been subject to repossession proceedings over the last 7 years?	
Are there any judgment debts or court orders against the Bidder?	

17 DECLARATION BY BIDDER

I/ We have noted and accept all the conditions contained in this Request for Expressions of Interest.
I/ We hereby submit the Expression of Interest with the Federated States of Micronesia Petroleum Corporation (VITAL ENERGY) and declare that to the best of my/our knowledge the particulars shown herein are true and correct.

Date:	
Signed for the Bidder by:	
In the Officer Bearer capacity of:	
Name *(IN BLOCK LETTERS)*:	

18 RESPONSE STATEMENTS

- Bidders are required to demonstrate, to VITAL ENERGY's satisfaction, that they have the capability, capacity, experience and financial standing to manage and deliver the construction services required by VITAL ENERGY.
- Bidders must provide Response Statements to the evaluation criteria that are identified in the ITT, which incorporate as a minimum the following information:

Response Statement 1: Demonstrated capability and capacity to undertake Tank upgrade projects for VITAL ENERGY

18.1 Availability of Professional Staff

- Bidders are to provide details of all senior tank construction staff, showing their qualifications and experience, including any membership of relevant professional associations, and providing details of current and anticipated project commitments.
- Bidders are to provide the details of workers that are still in the organisation from the past and some recent projects.
- All Welders on the project shall hold current ASME Boiler and Pressure Code Section 9 for qualifications with approved weld procedures.

18.2 Key Management Personnel

- Bidders should provide a list of all Directors, Partners, and Executives, and indicate any relevant cross-directorships that could potentially either support or be in conflict with a contractual relationship with VITAL ENERGY.

18.3 Use of Subcontractors

- Bidders are to nominate the work proposed to be subcontracted and provide details of the intended businesses to do this work. Only parts of the work such as protective coating and any of their internal inspection shall be contracted out.
- Details are to include the qualifications and experience of the personnel intended to undertake the VITAL ENERGY projects, including membership of relevant professional/ trade associations.

18.4 Quality Management

- Bidders are to provide details, and where possible examples, of their quality management system and the status of implementation.
- Written quality plan to be submitted 30 days after the Notice of Award.

18.5 Risk Management

- Bidders are to provide details, and where possible examples, of their risk management policies and approach to risk management, together with details and copies of current insurance coverage. Insurance policy details should include the type of policy, the name of the insurer, the amount of cover and the expiry date as a minimum.
- Successful Bidders may be required to carry current Indemnity Insurance, Public Liability and Workers Compensation with a reputable and secure insurance provider.

18.6 OH&S and Industrial Relations Policies

- Bidders are to provide details, and where possible examples, on the establishment and implementation of OH&S Plans both generally and on specific projects. Bidders

are also to provide details of any of the following to which it is a party or for which it has arrangements in place:

a. Enterprise agreements, together with expiry dates;
b. Superannuation Agreements;
c. Redundancy Schemes; and
d. long Service Leave.

- Bidder are to provide HSSE Plan for the project 30 days after the Notice of Award. Within the plan, the following must be clearly outlined,

a. Site barricade system.
b. Site Access Control for authorized workers and visitors
c. Emergency Response
d. Medical Evacuation

Response Statement 2: Demonstrated ability to complete construction projects on time, on budget and to agreed quality standards

18.7 Current Projects

- Bidders are to provide details of all residential construction work currently in hand, providing:
  a. project name and description;
  b. contract sum; and
  c. start dates and expected completion dates.

18.8 Completed Projects

- Bidders are to provide the following details of relevant Tank projects completed within the last 24 months.
  a. the initial contract sum;
  b. the end contract sum;
  c. an explanation of the variation in the contract sum (eg. client-initiated variations, disputes leading to claims etc);
  d. details of any claims (other than progress claims) over $50,000 made by either party to the contract;
  e. details of any issues which arose and how they were resolved; and
  f. any added value for money achieved on those projects.

18.9 Contract Administration

- Bidders should provide details, and where possible examples, of their approach to contract administration, including quality control, risk management, cost control, programming, timely completion and standards compliance.

18.10 Defect and Warranty Performance

- Bidders should provide details, and where possible examples, of their approach to defect and warranty performance during warranty periods and contract finalization.
- There shall be 10% retention held for period of 12months for this project.

18.11 Referees

- Bidders are to nominate and provide contact details of at least three referees who can verify or provide information from a client perspective regarding previous experience, quality of work, performance and timely completion of projects.

Response Statement 3: Demonstrated financial capacity and capability to undertake housing construction projects for the duration of the Panel of Builders' arrangements

18.12 Financial Capacity & Capability

- Bidders are required to submit full and comprehensive financial information e.g. Annual Reports and Financial Statements for a formal financial assessment, which may be carried out by VITAL ENERGY's independent financial consultant. The financial information provided is to be in respect of the legal entity of the Bidder, but corporate relationships that may be relevant should be stated. When the Bidder is a subsidiary, the information provided is to be in respect of the Subsidiary and not its Holding Company.
- Note that if a Subsidiary does not have sufficient financial capability in its own right, assessment may be sought in the name of the Holding company, or in the name of Holding and Subsidiary Companies, joint and severally. It should be noted that pre-qualification of an entity or entities, if achieved, will not extend to other associated or subsidiary entities owned or controlled by the Bidder.

Response Statement 4: Additional Information

- Bidders should provide any additional information they consider relevant in support of their Tender Document.

DATE: _____

19 ATTACHMENTS

Appendix A	*Chuuk Tank 3 Scope of Upgrades Works*
Appendix B	*Chuuk Tank 5 Scope of Upgrade Works*
Appendix C	*Project Architecture – Roles and Responsibilities*
Appendix D	*Chuuk Tank 3 Out of Service Report*
Appendix E	*Chuuk Tank 5 Out of Service Report*
Appendix F	*Chuuk Tank 3 Drawing Package*
Appendix G	*Chuuk Tank 5 Drawing Package*
Appendix H	*Chuuk Terminal Layout*
Appendix I	*Chuuk Terminal Hazard Drawing Layout*
Appendix J	*Contractor Safety Administrative Requirements*
Appendix K	*Vital HSSE Policy*
Appendix L	*Vital's Payment Process*
Appendix M	*Vital Energy Tank Work Breakdown Structure*
Appendix N	*FSMPC GP External and Internal Painting of Bulk Tanks*
Appendix O	*OOSI Flow Process*
Appendix P	*OOSI-R Flow Process*
Appendix Q	*Inspection Test Plan – Sample*
Appendix R	*Project Reporting Forms (Daily & Monthly)*
Appendix S	*Project QC Forms for Tanks (including all Tank and aviation*
Appendix T	*forms)* Contract Agreement
Appendix U	*Particular Conditions of Contract*
Appendix V	*Tender and Price Submission Forms*

SECTION 2

ATTACHMENTS

- Section 2.1 - Construction Documents
- Section 2.2 - Health, Safety, Security & Environment
- Section 2.3 - Vital's Standards and Specifications
- Section 2.4 - Contracting

SECTION 2.1

CONSTRUCTION DOCUMENTS

- Appendix A Chuuk Tank 3 Scope of Upgrade Works
- Appendix B Chuuk Tank 5 Scope of Upgrade Works
- Appendix C Project Architecture - Roles and Responsibilities
- Appendix D Chuuk Tank 3 API653 Out of Service Report
- Appendix E Chuuk Tank 5 API653 Out of Service Report
- Appendix F Chuuk Tank 3 Drawing Package
- Appendix G Chuuk Tank 5 Drawing Package
- Appendix H Chuuk Terminal Layout

Appendix A

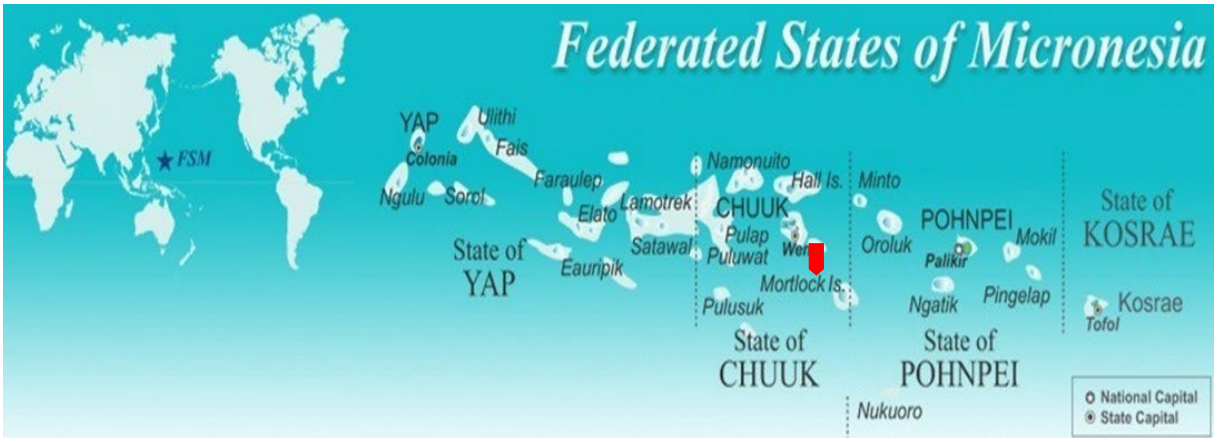
Chuuk Tank 3 Scope of Upgrade Works

Chuuk Terminal – Scope for Chuuk Tank 3 OOSIR-JIG Upgrades

Rev	Date	Description	Prepared By	Checked By	Approved
A	6 Feb 2025	Issued for Approval	AS	JCM	JCM

1 Introduction

Vital Energy, as owner, is undertaking remedial and upgrade work to the Chuuk Fuel Storage Terminal in accordance to the Capital Investment and Improvement Plan (CIIP), to ensure security of fuel supply to Chuuk State in Federated States of Micronesia.



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Operations conducted by Vital include:

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- Plane re-fueling operations in four of the eight international airports of the region (Yap, Chuuk, Pohnpei and Kosrae); and
- Sale of a variety of lubricants and chemical solvents.

Vital was formed after it acquired the operations and assets of Mobil Oil Micronesia Incorporated in the Federated States of Micronesia ("FSM") in June 2008. Vital took over a business which had operations, existence and experience in Micronesia of over 50 years.

This tank is currently sitting on steel saddles designed to hold the load during the foundation works, appointed civil works contractor will finish the ring beam foundation and prepare the tank

floor base for the tank contractor to place the floor plates and proceed with the works. Vital Energy has 12 sets of Tank Jacks, scaffolding, steel plates and other associated materials as per Annex 2 – Materials supplied by Vital Energy.

2 Objective

Carry out Tank 3 repairs and upgrades so the tank meets API653 Fitness for Service and Joint Inspection Group (JIG) compliance and requirements, this tank shall return to service as JET A1 storage and contractor shall ensure all internal and external requirements for API and JIG is completed. Chuuk Terminal pipeline replacement project is progressing, and this will require some coordination between the two contractors.

3 Tank Data

Table A – General Tank Information

Tank General information					
Tank Number	T3		**Owner**	Vital FSM Petro Corp	
Tank Location	Chuuk Terminal - FSM		**Manufacture**	N/A	
Tank Diameter	6,096mm or 20.000ft		**Product**	JetA1	
Tank Height	10,973mm or 36.000ft		**Specific Gravity**	0.820	
Maximum Filling Height	9,893mm or 32.457ft		**Nominal Capacity (m³)**	84602\JSG	
Design Code	API650	**Heating System**	No	**Cathodic Protection**	No
Data Plate	Yes	**Insulation**	No	**Leak Detection**	No
Tank Component Geometry Information					
Foundation	On Ground	**Roof**	Fixed Cone Roof		
Shell	Butt Weld	**Bottom**	Flat		
Tank Component Coating Availability					
Shell	Internal	Coated	**Roof**	Internal	Coated
	External	Coated		External	None
Bottom	Coated				
Tank Dates Information					
Year of Commission	1980	Year of Last Inspection	N/A		
Year of Current Inspection	2016	Year of last Bottom Plates Change	N/A		
Other Information					
Access to Roof	Spiral Stairway				

4 High Level Scope & Responsibilities

The high-level scope throughout the Chuuk Tank 3 project life cycle is noted with stakeholder responsibilities as follows: refer to project architecture document for more detail.

Table B – Scope Responsibility

Scope	Responsible party
HSSE & Contractor Induction & SWP	Vital HSSE Team
Contractor Site Mobilization and Work Area	Contractor
Site Safety Monitoring	Chuuk Terminal OIC
Site Clearance & Work Monitoring	Vital OSS
Complete tank stripping and isolation – Not Required	Vital Operations
Carry out tank cleaning and sludge disposal – Not Required	Contractor
Issue Tank gas-free and CSE certification	Vital OSS or OIC
Carry out API653 Internal/External Inspection & Report	NDT
Carry out design & engineering within planning phase	Vital PM, or Tank Engineers
Complete tank upgrades per Scope of Work (API653 & JIG)	Tank Engineers
Completion of Tank Works ITP/ Methodology/ QAQC/ Safety Plan	Contractor
JIG and Tank Forms issuance & completion	Vital Quality Assurance Manager
Engineering and technical Support	Tank Engineers
Provide engineering construction support	Tank Engineers
Carry out API653 Post Repair Inspection coordinated by contractor	3rd Party Inspection Company
Carry out Tank Calibration & Report coordinated by contractor	3rd Party Inspection Company
Issue Tank Fitness for Service Certificate	3rd Party Inspection Company
Project Management of Engineering and Design	Vital PM

5 High Level Milestones and Deliverables

The high-level milestones throughout the Tank 3 project life cycle are noted with target dates set from the Notice of Award (NOA). Scheduling is aggressive with Vital approval set at Ten working days, and the assumption of contract finalization being a maximum of Ten working days per contract. High level costs are detailed in Section 7.1.

Table C – Milestone & Deliverable list

Milestone & Deliverables	Target Date
M1 – Contract Establishment	
D1 - Release of Proposal for Quotation	
D2 - Contractors Proposal	
D3 - Bid Review and Award	
D4 - Issue Notice of Award	
D5 - Contract Signing	
M2 - Contractor Mobilization & Site Safety	
D1 – Contractor Site Office & Work area Establishment	
D2 – Contractor Team Induction, Audit Contractors, and Permitting Approval	
D3 – Area Barricade/ Signages/ Control Access/ Visibility/ Monitor & Maintain	
M3 – Tank Cleaning & Isolation	

D1 – Product Transfer & Empty Tank to lowest level
D2 – LOTO Process & Signages
D3 – Tank cleaning and Sludge Disposal (to approved treatment facility)
M4 – Tank Internal Repairs & Upgrades
D1 – New Ring Beam Construction
D2 - Tank Floor & Sump Replacement
D3 – NDT Inspection on Welding
D4 – Hydro Testing and Report
M5 – Tank Shell Welding Repair & Upgrade Works
D1 – Strake 1 Shell Plate Replacements
D2 – Replacement of All Tank Shell Nozzles
D3 – Tank Shell Repairs
D4 – Installation Fire System support brackets
D5 – NDT Inspection on Welding
M6 – Tank Roof Repairs & Upgrades
D1 – Replace all Roof Nozzles
D2 – Installation of Stilling Well
D3 – Installation of New Roof Hatch
D4 – Repairs/ Replacement of Handrails
D5 – Installation of Fire Systems support brackets
D6 - NDT Inspection on Welding
M7 – Post Repair Inspection
D1 – Post Repair Inspection Report
D2 – Highlight issues or defects rectified.
M8 – Tank Internal Blasting & Coating
D1 – Tank Internal Blasting
D2 – Tank Internal Coating (Prime & Finish Coat with JIG approved coating)
D3 – Coating Inspection and Reports
D4 – Soak Test Report
M9 – Tank External Blasting & Coating
D1 – Tank External Blasting
D2 – Tank External Coating (Prime & Finish Coat)
D3 – Coating Inspection and Reports
M10 – Ancillary Fittings & Final Reports
D1 – Outlet Nozzle as per Aqua[1] Standard – Annex XXX
D2 – Installation of Roof Nozzles
D3 – Quick Flash Tank Piping Installation
D4 – Installation of Ground Level Indicator
D5 – Tank Pipework connections
D6 – Tank Calibration and Reports
D7 – Tank and JIG QC Forms Completed
D8 – Fitness for Service Report
D9 – Tank Labelling

[1] Aqua Standard – XOM Standard document – Outlet Nozzle design shall be provided.

M11 – Demobilizing
D1 – Tank Handover
D2 – Site Equipment/ Materials/ Waste Removal
D3 – Documentation and Handover/ Contract Closed
D4 – Site Cleanup and Worker Demobilization

6 Milestones Definitions

6.1 Contract Establishment:

Contract establishment is a critical phase in the project lifecycle that ensures clear terms, responsibilities, and expectations between the contracting parties. The process involves defining the scope, pricing, payments, risks, and compliance requirements to align with API 653 and JIG standards. Each of the contract requirements and document submission shall be done on time and reviewed with Vital Team. Contractor shall adhere to API 653 (Tank Inspection, Repair, and Alteration), API 650 (Tank Construction), and JIG (Joint Inspection Group) standards and related Standards referenced in each of them.

6.2 Contractor Mobilization and Site Safety

Contractor mobilization and site safety are critical phases in ensuring a smooth, safe, and compliant execution of API 653 tank repairs and upgrades, particularly in aviation fuel storage facilities. Contractor shall efficiently deploy personnel, equipment, and resources while ensuring full compliance with project, safety, and regulatory requirements. Refer to Contractor Safety Administrative Requirements. The contract shall follow the requirements and ensure all measures are in place with clear markings and barriers keeping non-work-related people away from the work zone. All contractors' staff shall be inducted to the site and go through the onboarding of the site and safety induction that generally takes two days. Every work package or a few works packages combined will require a Safe Work Permit (SWP) that requires contractors' team to develop the Job Safety Analysis and demonstrate that the controls placed shall minimize or eliminate the risk. SWP's can take 3 to 5 days for review and approval.

6.3 Tank Cleaning & Isolation

Operations team carry out the product transfer and determine the sludge that will not be pumped into another tank. Contractor shall prepare tank cleaning and work with the operations team in the isolation are critical steps before starting any API 653 tank repairs or upgrades, especially for aviation fuel storage tanks that must comply with Joint Inspection Group (JIG) standards. The lockout and Tagout process shall be followed during the isolation and Officer In-Charge shall be holding all keys or designating the custodian. These processes ensure a safe, contamination-free, and gas-free work environment while preventing fuel quality issues. All tank sludge shall be removed and taken away from site for further treatment and disposal by the contractor and

report submitted to project manager to confirm the disposal process. THIS TANK IS CLEANED AND ISOLATED.

6.4 Tank Internal Repairs & Upgrades

Tank internal repairs and upgrades are essential to ensure the structural integrity, safety, and compliance of aviation fuel storage tanks. These activities must follow API 653 standards and align with Joint Inspection Group (JIG) guidelines to maintain fuel quality, prevent contamination, and extend the tank's service life. This tank requires floor replacement and a new ring beam foundation that will raise the tank 300mm(1ft) and stabilize tank base. The tank is currently jacked-up for floor replacement, new tank foundation and ring beam. The new position of the tank will be aligned with the new pipelines connecting to the tank. All internal nozzles and supports shall be removed and replaced including the stiffener plates. Tank internal shall be coated 100% to control corrosion and give extended life of the tank using approved coating. This tank will be installed with floating suction and stilling well. All stages of works shall be inspected and approved prior to the next works activities; failure shall result in the contractor re-doing the works to an acceptable level.

6.5 Tank Shell Welding Repairs and Upgrade Works

Tank shell welding repairs and upgrades are crucial for maintaining the structural integrity, safety, and compliance of aviation fuel storage tanks. All welding procedures must adhere to API 653 (Tank Inspection, Repair, and Alteration), API 650 (Tank Construction), and JIG (Joint Inspection Group) standards to ensure safe fuel storage and prevent leaks, contamination, or failures. Tank Shell strake 1 needs replacement inspected and works confirms API653 Standard. All Welds shall be inspected, and NDT works performed, after approval the next work activity such as coating can be proceeded. All tank nozzles shall be replaced, the position of the outlet, inlet and water drain shall align to the new pipeline that is currently been installed. The tank shall be fitted with Cooling ring brackets and raiser pipe brackets for the future Fire Suppression System. Tank Stairs require repairs in areas, and this shall be repaired to an acceptable level.

6.6 Tank Roof Repairs & Upgrades

Tank roof welding repairs and upgrades shall be done in accordance to API653 (Tank Inspection, Repair, and Alteration). This tank requires all nozzle replacements with hatches, new stilling well and hatches. Tank handrails to be replaced with new. Tank roof shall be fitted with fire system support brackets for cooling water ring for future Fire Suppression System.

6.7 Post Repair Inspection

The Post-Repair Inspection is a critical process conducted after tank repairs and upgrades to ensure structural integrity, safety, and compliance with API 653, API 650, and JIG (Joint Inspection Group) standards and this shall be arranged by Vital Project Manager with 3rd party Inspection

and Verification companies. This phase involves a combination of visual inspections, non-destructive testing (NDT), hydrostatic testing, and operational checks before the tank is returned to service. Upon successful completion, the inspection company shall issue acceptance certificate.

6.8 Tank Internal Blasting and Coating

Tank shall be 100% blasted and coated internally as per FSMPC GP External and Internal Painting of Bulk Tanks, all stages of coating reports shall be provided to Vital Project Manager ensuring each coating meets acceptance thickness. Perform holiday test on the tank floor and 1st strake, repair defects as per coating manufacture's recommendation. Tank internal will be subjected to Soak Test, the samples will be obtained and sent to SGS Lab in Guam for analysis and final report shall be at acceptable level to confirm fuel don't have any contamination from the coating.

6.9 Tank External Blasting & Coating

Tank shall be 100% blasted and coated externally as per FSMPC GP External and Internal Painting of Bulk Tanks. All stages of coating reports shall be submitted to Vital Project Manager for acceptance. All supporting structures of the tank shall be coated. Contractor to discuss with OPS team and place all Tank signages and Name Plate upon completion.

6.10 Ancillary Fittings & Final Reports

All associated tank internal pipes shall be installed and checked to ensure that they are intact with gaskets. The tank contractor shall fit out tank with Ground Level Indicator, Stilling Well, Floating Suction, QFT Connections, All Roof Hatches and Manholes, Sample Points, receiving and discharge lines. Tank pipework's are done as separate project, this tank nozzles shall be correctly oriented to match the pipeline flange. Final Inspection & Test Plan shall be submitted by the contractor with weld map and traceability matrix to confirm all welds done are by qualified welders according to API653. Vital PM to arrange for Tank calibration once all internal fittings are completed. Fitness for Service cert to be obtained by Vital PM to confirm the upgrades meet API653 acceptance. All JIG related forms shall be completed and issued to Project Manager for the creation of the Tank Master File.

6.11 Demobilizing

The final phase of a project where all temporary facilities, equipment, and personnel are systematically removed from the site, restoring it to a safe and compliant condition. This process ensures that all work areas, infrastructure, and environmental considerations meet regulatory and contractual obligations before project closure and handing over the asset to custodian.

7 Documents Submittals & Approvals

The guidelines given under API Standard 650 Annex W (Commercial and Documentation Recommendations) shall be followed.

There are several forms that shall be completed for review and approval by the Principal shall include but necessarily be limited to with the Contractor, PMO, Terminal Team, Quality Assurance Manager, and external inspectors. These are to be completed in stages at specific activity, Contractor and Vital Project Manager is responsible to have this completed before moving to the next stage and having them approved as per the table A. These forms shall be listed in the contractors Inspection Test Plan as per the sequence of works.

Table D – Documents Submittals

Document Submittals – Preparation, Review & Approval			
Form Name	**Responsible**	**Review**	**Approval**
Tank Data Sheet	Project Manager	SME	Tank Engineer
Out of Service Inspection Report	3rd Party Inspector	Project Manager	Tank Engineer
Construction/ Alterations/ Repair Quality Plan	Contractor	Project Manager/ QAM/SME/OPS	Tank Engineer
General Arrangement Drawings	Tank Engineer	Project Manager /SME/QAM/OPS	Jared Morris
Material Selection Report	Contractor	Project Manager	Tank Engineer
Tank Design Calculations	Not Required		
Tank Venting Calculations	Tank Engineer	Project Manager	Tank Engineer
Nozzle Load Computations	Not Required		
Seal Selection Materials	Contractor	Project Manager	Tank Engineer
Foundation Detail Design	Tank Engineer	Project Manager	Project Sponsor
Tank Constriction Drawings	Tank Engineer	Project Manager/ SME/QAM/OPS	Jared Morris
PWHT Requirements	Contractor	Project Manager/ SME	Tank Engineer
Weld Procedure Specifications (WPSs)	Contractor	Project Manager/ SME	Tank Engineer
Procedure Qualification Records (PQRs)	Contractor	Project Manager/ SME	Tank Engineer
Inspection Test Plan	Contractor	Project Manager/ SME	Tank Engineer
Tank Repair/ Alterations Method Statement	Contractor	Project Manager/ SME	Tank Engineer
Coating Quality Assurance Plan	Contractor	Project Manager/ SME/ QAM	Tank Engineer
Welder Testing Records	Contractor	Project Manager/ SME	Tank Engineer
Weld Map Records	Contractor	Project Manager	Tank Engineer
Post Repair Inspection Report	3rd Party Inspector	Project Manager/ SME/ Contractor	Tank Engineer
Hydro Test Procedure	Contractor	Project Manager/ SME	Tank Engineer
EF-P903-Tank Cleaning Checklist Rev1	Project Manager	SME/OIC/QAM	Project Sponsor
EF-P907 Tank Re-Commissioning Checklist	Project Manager	SME/OIC/QAM	Project Sponsor
EF P941 Change of Service Review Checklist	Project Manager	SME/OIC/QAM	Project Sponsor
AGD-F-M100 - Fixed Tank Summary	Project Manager	SME/OIC/QAM	Project Sponsor
AGD-F-M003 - Fixed Tank Inspection and Cleaning and Internal Maintenance	Project Manager	SME/OIC/QAM	Project Sponsor
AGD-P-Z815 - Storage Tank Visual Inspection and	Project Manager	SME/OIC/QAM	Project Sponsor

Tank Cleanliness Assessment			
AGD-F-M100 - Inspection& Maintenance of Pipes	Project Manager	SME/OIC/QAM	Project Sponsor
AGD-P-M201 – Floating Suction Inspection	Project Manager	SME/OIC/QAM	Project Sponsor
Daily Coating Inspection Record	Contractor	OSS/ Project Manager	Tank Engineer
Coating Inspection Report	Contractor	OSS/ Project Manager	Tank Engineer
Holiday Test Report	Contractor	OSS/ Project Manager	Tank Engineer
Tank Calibration Table (Metric & Imperial)	3rd Party Inspectors	Project Manager/ SME	Tank Engineer
Fitness for Service Certificate	3rd Party Inspection	Project Manager	Project Sponsor
As Built Redline Drawing	Contractor	Project Manager	Tank Engineer
Final As Built Drawings – Updated	Tank Engineer	Project Manager/ SME/ OIC/ QAM	Jared Morris
Tank Master File	Project Manager	SME	Project Sponsor

8 Requirements and Scope of Services

8.1 Objective

Chuuk Tank 3 API653 Inspection had been done by SGS in 2016, and the plan was to mothball until the facility upgrade starts, it was used as JET A1 previously. After the upgrades, the tank will return to be used for JET A1 thus the tank shall meet API650 compliance and JIG requirements. This tank shall be equipped with Fire Systems brackets and stilling well for future use, the provision will be given now so the tank can be in service while the equipment's and instruments are installed. This tank will be raised 300mm (12in) from the bund floor finish level, (this works currently being done by local contractor), this to allow good drainage system to take water away and reduces the underside corrosion. Strake 1 has been identified as thinning in some areas so 100% of strake shall be replaced including the tank floor and sump. All nozzles shall be replaced with new on the shell and roof. Tank internal and external shall be coated 100% to control corrosion as the tank is located next to the lagoon.

The aim is to get the tank back in service, attaining API653 Fitness for Service Certificate, JIG requirements met, and future Fire System and Instrumentation provisions given so tank does not need to be empty. If any parts of the scope that the contractor feels is not suitable and will be deficit in the requirements shall be identified in the pricing template as additional item or recommendations.

8.2 Tank 3 Inspection and Assessment –Report Attached

a. Conduct API 653 out-of-service inspection (visual, ultrasonic thickness (UT), magnetic particle, radiographic, etc.).
b. Evaluate tank integrity, including shell, bottom, roof, and nozzles.
c. Perform floor scanning to assess corrosion and thinning.
d. Assess settlement and foundation conditions.
e. Verify compliance with JIG Guidelines, including water detection, contamination risks, and

quality assurance.

f. Conduct fitness-for-service (FFS) assessment to determine repair or replacement needs.

g. Tank Calibration and Report (This report shall be in Metric and Imperial)

h. Contractor to check and additional scope is required and make allowances as PC Sum.

8.3 Reconstruction Drawing Package

All tank reconstruction drawings shall be supplied with general arrangement drawings showing details, the contractor shall verify all details shown on these drawings and establish the suitability of tank three ensuring the details meet the API653 and JIG Requirements. If there are details missing, Vital appointed Tank Engineers will provide clarification and additional details as required.

8.4 General Requirements

This scope covers the inspection, repairs, and upgrades of aviation fuel storage tanks to comply with API650, (Oil Tank Storage), **API 653 (Tank Inspection, Repair, Alteration, and Reconstruction)** and **Joint Inspection Group (JIG) Standards** for aviation fuel storage facilities.

a. The Scope is written as amendments and supplements to API Standard 650, Twelfth Edition, March 2013, API Standard 653, and JIG 2 Standard. Wherever reference is made to API Standard 650, it shall be understood to mean API Standard 650 as amended/supplemented by this scope document.

b. Clauses in API Standard 650, which are not mentioned in this Scope Document, shall remain valid as written.

c. If a discrepancy is noted between this Scope document and API Standard 650, the discrepancy shall be brought to the attention of the Principal, who shall initiate a review by the Principal's appointed Tank Engineers for resolution.

d. Review and approval by the Principal of any project documentation shall not relieve the Contractor of its obligation to fully comply with local legislative requirements, relevant design codes and project specifications.

e. Contractor shall be responsible to providing inspection date and direct engagement with the appointed 3rd party inspection company and keeping Vital Project Manager in the communication.

f. Where requirements for engineering authentication and sign offs are not locally regulated, good engineering practices shall be followed.

It is the responsibility of the contractor to ensure that all aspects of Tank 3 are designed to fulfil the intended range of operating and service conditions.

8.4.1 Tank 3 Upgrade Scope

8.4.1.1 Products

This Tank is intended to for the storage of Jet A1 product. The Tank shall meet API650, API653, Aqua Standard and JIG 2 Standard. All relevant Tank and JIG requirements forms shall be completed. In future the tank can be used as swing tank and store USLD or ULP.

8.4.1.2 Foundations – Works completed by others.

a. All tank foundations shall be designed and constructed to uniformly transfer loads, minimize tank settlement, prevent water pooling around the base of the foundation and safeguard against underside corrosion of the bottom plates.

b. Tank foundations shall be designed with the tank bottom elevated to a minimum of 300mm (12 in) above the surround finished grade.

c. This tank foundation is designed with concrete ring beam with compacted granular infill.

d. The asphalt bedding layer shall be compacted and finished to match the design profile of the tank bottom. The maximum particle size of the aggregate component of the asphalt mix shall not exceed 6mm (1/4 in).

e. The surface of the compacted asphalt bedding layer shall have a smooth finish to ensure that no sharp edges from the aggregates will protrude against the underside of the tank bottom plates.

f. The shoulders of the compacted gravel pad shall be lined with a compacted asphalt apron (topping) or other impervious overlay (e.g., concrete), to stop erosion and prevent moisture ingress into the foundation base.

g. The seam along the outer edge of the chime plate shall be cleaned and sealed with a weather resistant industrial grade bitumastic sealant to prevent water ingress under the bottom plates.

h. When a concrete mat or slab type foundation is provided, the finish on the concrete surface shall be trowelled smooth and free from any sharp pebbles or protrusions.

i. Where a concrete mat or slab type foundation is completed with a smooth trowel finish, the tank bottom plates can be placed directly on the finished concrete surface.

j. Where a concrete mat or slab type foundation is not completed with a smooth trowel finish, a bedding layer with a 50 mm (2 in) thick compacted granular asphalt medium shall be provided between the concrete surface and the tank bottom plates.

k. Asphalt bedding shall not be used on foundations that support storage tanks with bottom side cathodic protection.

l. The natural grade around the tank base shall be sloped away from the tank to prevent ponding and permit efficient shedding of rainwater runoff away from the tank foundation.

8.4.1.3 Release Prevention Barrier/ Leak Detection System – Works Completed by Others

a. If required by local legislative regulations or where specified by the Principal, the tank foundation shall include an impermeable hydrocarbon release prevention barrier (RPB) complete with an external leak detection system.

b. The RPB shall be installed to drain to a collection sump which is connected via approved piping to a leak detection monitoring well located outside the edges of the tank foundation base.

8.4.1.4 New Floor Plate and Sump

a. The tank has been jacked and floor plates cut and removed.

b. Install all 8mm thick precut floor plates as per drawing, all joints shall be prepared as per API653 Section 9.10 and shall meet all requirements of API650 Section 5.1.5.4.

c. Supply and install new 600mm diameter dished sump, place and weld to all plates sloping towards the sump. Contractor to confirm the foundation slop is sufficient.

d. Contractor shall plan sequence of welding to minimize distortions, plates with excessive distortions shall be removed and replaced at contractors' cost.

e. Contractor to ensure there are no arc strikes on the new floor plates, if any arc strikes are visible, the contractor shall repair as per weld procedure and perform NDE to confirm there are no cracks. The spot is to be marked for Tank Inspector to perform further inspection and confirm this meets API650 requirements.

f. NDE to be performed on 100% of the floor welds to confirm quality of the weld. Vacuum test shall be performed to confirm that there are no leaks on any weld.

8.4.1.5 Strake 1 Replacement

a. Tank strake needs to be replaced with a new 1800mm x 6000mm x 6mm plate. All plates shall be supplied, contactor to inspect and verify condition during site visit.

b. Contractor to cut 50mm above the horizontal weld, prepare the edge for welding.

c. Preset and roll all required shell plates. The contractor shall check and plan this work during the site visit.

d. After welding the shell plates in place, the tank can be lowered using the jacks on site.

e. Perform Shell to Floor weld, ensure the joint is prepared as per API650 Section 5.1.5.7.

f. NDE to be performed on 100% of the welds to confirm no cracks or pin holes. Vacuum test to be done all around the annular to shell weld.

8.4.1.6 Fire Protection System

a. Fire protection systems for aboveground storage tanks shall comply with

AS1940:2017 Flammable Liquids Storage and Handling Standard.

b. This Tank shall be fitted with all support brackets for future cooling ring and raiser pipes.

c. The Principle shall be accountable for design and contractor responsible for installation of attachments, pipe risers, foam pourers, pipe support brackets, and splash plates as required for the specified fire protection system, up to the grade level flange on the vertical riser. All detailed drawing is provided in the drawing package,

d. Beyond the grade level flange on the vertical riser, connections and tie-ins to the facility fire water hydrant system and foam supply, including commissioning of the fire protection system, shall be the responsibility of the Principal (unless this is specifically included in the tank contractors' scope of work).

8.4.1.7 Coatings

a. Where external coating or internal lining of the storage tank is specified, all aspects of coating selection, product testing, surface preparation, application, inspection, testing and quality assurance shall be in accordance with the relevant provisions under the FSMPC GP External and Internal Painting of Bulk Tanks Annexed C.

b. Coating and lining selection and testing data for each individual tank shall be reviewed and approved by the Principals Technical Authority – Protective Coatings.

c. All Tank internal lining shall be coated with Amercoat 240 with dft ~300 microns.

d. In the sections that will be internally lined, preparation of all internal welds shall conform to the applicable NACE Specifications.

e. Coating or lining application shall not commence unless all welding, grinding, post repair inspection, repairs (if required) and hydrostatic testing of the tank is complete.

8.4.1.8 Tank Appurtenances

8.4.1.8.1 Inlet Nozzle

a. Install the new 150NB Class 150 nozzle to be welded in line with the tank receiving line with reinforcement plate as per API653 Section 9.5. This shall meet the API650 compliance.

b. Internal nozzle shall be installed on the inlet as per the General Arrangement drawing with a diffuser, this shall be designed to ensure as exit flow velocity of less than or equal to 1m/s (3ft/s).

c. Install the Tank Valve (supplied by Vital) with sealing gasket.

d. Connect the inlet line after hydro test or prior to commissioning.

8.4.1.8.2 Outlet Nozzles

a. Install the new 150NB Class 150 nozzle to be welded to match the outlet line of the tank with new reinforcing plate as per API653 Section 9.5. This shall meet the API650 compliance.

b. Internal pipe connection on the outlet shall be installed as per AQUA Standard, the nozzle drawing is provided in the drawing package. This design meets the JIG requirements.

8.4.1.8.3 Tank Isolation Valves

a. Vital Energy will supply all tank valves.

8.4.1.8.4 Thermal Relief Bypass

a. Flanged nozzles for thermal relief bypass connections shall be installed on the bottom shell course at or near the associated isolation valve or piping connection. Inlet and Outlet Nozzle shall be welded with 25NB (1 in) weldolet and flange connection that will need to be aligned with the pipelines. Refer to the general arrangement drawings for the thermal relief bypass.

b. All pipes for the thermal bypass shall be of carbon steel 25mm (1in) Sch 80.

c. All valves shall be of Class 800 and flange type.

8.4.1.8.5 Floating Suction

a. This tank shall not be installed with any floating suction.

b. The tank will be installed with Aqua Standard.

8.4.1.8.6 Tank Bottom Sumps

a. Tanks with a cone down bottom shall be provided with a minimum of one (1) bottom sump. Contractor to supply and install one piece dished down sump.

8.4.1.8.7 Water Draw Off

a. Install new 100NB nozzle for stripping line as per drawing.

b. Install new line as per drawing inside the tank.

c. Fabricate new supports for the internal pipe.

8.4.1.8.8 Stilling Well

a. A new Stilling well shall be installed on the roof as per the drawing package. This will need to be blind flanged for future use.

b. Stilling well pipe shall have equally spaced holes to prevent product stratification inside the well. Clean all drill burs and smooth edges.

c. Welding of internal support brackets to be as per the Stilling well drawing.

d. Connection area to be determined on site.

8.4.1.8.9 Shell Manways

a. This tank is fitted with only one manway, this will need to be changed since Strake 1 is replaced with new. Install with new 610mm (24 in) Shell Manway as per drawing meeting API60 Compliance.

b. Shell Manway to be located close to the water draw off sump as this will assist in the future tank cleaning operations.

8.4.1.8.10 Roof Nozzles

a. The number of nozzles on the roof is provided in the general arrangement drawing with schedule of all Tank Nozzles.

b. The tank shall be fitted with the following roof nozzles.

- **150NB Center Gauge Nozzle** – remove existing and install new gauge hatch that will be provided. Contractor to allow for installation including bolts and nuts, gaskets, and tools.
- **150NB Corner Gauge Hatch nozzle** – remove existing and install new gauge hatch that will be provided. Contractor to allow for installation including bolts and nuts, gaskets, and tools.
- **200NB Free Vent** – Remove exiting vent and nozzle. Install new nozzle and free vent as per drawing.
- **500mm Roof Manhole** – cut and remove existing then fabricate and install new roof manway as per drawing. Install at the existing positing.
- **150NB Spare Nozzle** – install new nozzle for future ATG system.

8.4.1.8.11 Ground Lugs

a. Grounding lugs shall be seal welded to the bottom shell course at a height of 300 mm (12 in) above the floor plate projection.

b. Each lug shall be provided with a 20 mm (3/4 in) diameter pre-drilled hole for the grounding cable connection.

c. A minimum of two (2) grounding lugs per storage tank shall be provided.

d. Provide grounding cable from the tank to earth rod.

8.4.1.8.12 Product Sample Point

a. The tank shall be fitted with 3 x 80NB nozzle for draw off sample point system with valve manifold for high, midway, and low connected to 20NB draw off valve.

b. The system shall be set up with manifold type with two valves, one each at the tank nozzle and 20NB.

c. Nozzle size pipe shall be installed inside the tank as be drawing for mid and high-level point.

d. Refer to the drawing for the for details.

8.4.1.8.13 Stairways, Platforms and Handrails

a. Stairways, platform, and railings shall be designed in conformance with the requirements under the local jurisdictional occupational health and safety regulations.

b. Repair Stairways and landing in area. These areas can be verified during the site inspection by the contractor.

c. All rungs and post of the handrails shall be finished with Golden Yellow.

8.4.1.8.14 Brackets and Supports

a. Brackets and supports that are attached to the tank as permanent attachments shall be installed with wear pads that are sealed welded to the tank.

b. Wear pads shall not be welded over vertical or horizontal weld seams.

8.4.1.8.15 Foam Pourer

m. Install new Foam Pourer as per drawing.

8.5 Materials

a. All materials shall be suitable for the minimum design metal temperature specified for the storage tank.

b. Materials specifications that have been accepted for the project shall not be substituted without the prior written approval of the Principal.

c. All plates thickness greater than 12.5mm ($^1/_2$ in) shall not be used for the shell, shell reinforcement or tank bottom annular plates.

d. All bolt heads and nuts shall be of heavy hex pattern.

e. Gaskets shall be of spiral wound for flanges and compressed Non-Asbestos Fibre.

Component	Material Specification	Standard
Tank Shell and Floor Materials		
Tank Shell	Carbon Steel (e.g., ASTM A36, A516 Gr. 70)	API 650, API653, ASME Sec. VIII
Tank Floor	Carbon Steel (ASTM A36, A283 Gr. C)	API 650, API 653
Tank Roof	Carbon Steel (ASTM A36, A516 Gr. 70)	API 650, API 653
Piping & Nozzles		
Inlet/Outlet Piping	Carbon Steel (ASTM A106 Gr. B, ASTM A53)	ASME B31.3, API 570
Nozzles & Flanges	Carbon Steel (ASTM A105, A350 LF2)	ASME B16.5
Gaskets	Spiral Wound (SS 316 + Graphite/PTFE)	ASME B16.20
Internal Lining & Coating		
Coating Type	**Application**	**Standard**
Epoxy Lining - Internal	Amercoat 240 Buff & White	API652, NACE RP0178, MIL-PRF-23236
Epoxy Lining – External	Amercoat 240 Buff/ White	API652, NACE RP0178

	Sigama Guard series finish coat – white Sigama Guard – Golden Yellow – handrails	
Roof & Structural Components		
Support Structures	Carbon Steel (ASTM A36, A992)	API 650
Handrails and Ladders	Carbon Steel (ASTM A36)	API 650
Additional Components		
Bolts and Fasteners	ASTM A193 B7	ASME B18.2.1
Seals	Compressed Non-Asbestos Fibre	API650

8.6 Fabrication

a. All plate cutting shall be cut using plasma cutter or oxy-acetylene.

b. Edge preparation for proper welding, slags shall be removed.

c. All cutting shall be uniform and consistent for root weld, uneven edges shall be corrected before assembly.

d. Rolling, bending, and forming of plates to required dimensions.

e. All authorised and accepted welders to perform welding.

f. Using of correct welding electrodes (Low Hydrogen) for all welding.

g. All assembly shall be checked by appointed person on site prior to welding.

h. All defects' welds shall be properly repaired.

i. There shall be no arc strikes on the tank surface; welders are to keep the striking plate. If there are strike marks, they shall be grounded off and repaired. NDT to be performed on all repaired welds and new welds.

8.7 Hydro Testing Requirements

a. The contractor shall submit a detailed procedure and plan for hydrostatic testing of the storage tank for review and approval by the Principal.

b. Hydrostatic testing of the tank shall not commence unless the Principal has provided written confirmation of acceptance of the Contractor hydrostatic testing procedures.

8.8 Welding Procedures and Welder Qualification

a. All WPS and PQR shall be submitted to the Principal for approval for each welder.

b. Ideally each welder must have 6G qualification that will allow him/her to weld in any areas of the tank.

c. All procedures shall be on the contractors' company name only that will be accepted.

d. All qualifications shall be done to ASME IX BPV Standard.

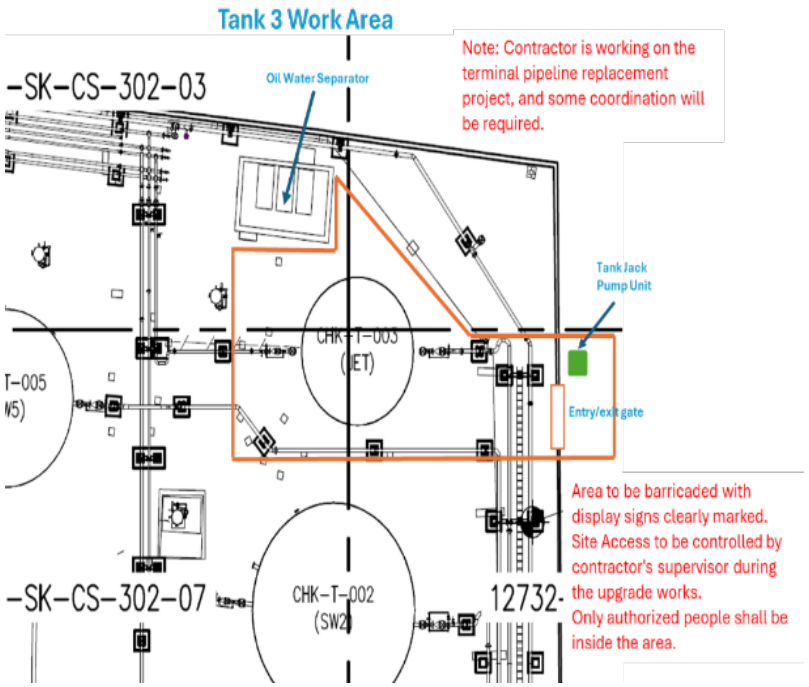
8.9 Tank Marking & Labels

a. Tank Nameplate shall be provided.

b. Attach all tank labels.

c. Tank Number shall be painted with Signal Red colour.

9 Tank Photos



Site Overview

Contractor will have limited area as Tank 2 is a live tank with Jet A1.

Works are ongoing on the terminal pipeline replacement and coordination will be required between contractors.

All Equipment's are to be placed outside the bund area.

Contractor site will need to be closed and access authorized people under the safe work permit.

Terminal Overview

Site showing the location of Tank 3.

Tank View

The tank has been jacked and placed on steel saddles and jacks removed.

Civil Contractor is working on the new ring beam and floor foundation.

Civil contractor will finish leak detection system.

Tank number written in Signal Red colour with White background.

Tank View

Repairs on spiral stairs. Allow 30% replacement.

Roof handrails required. Allow 100% replacement.

Handrails to be finished coated as Golden Yellow.

Tank Internal

Tank coating to be removed and apply new coating with Amercoat240.

Refer to coating specification document.

Soak testing required and shall meet JIG approvals. Failure of soak test will require recoating of the tank internal.

	**Strake 1** Stiffener welded and Tank sitting on the saddle. Strake 1 to be removed and replaced with a new plate. All plates are on site. Contractor to inspect during site inspection. Replace all nozzles with new.
	**Ring Beam & foundation** Works to be completed by local contractor. Finish level will be done by local contractor.

Tank Shell

Replace Strake 1, all tank nozzles and add Sample point nozzles as per drawings.

Install Fire System Brackets on the shell and cooling water around the top strake as per drawings.

Install Foam pourer as per drawing.

Tank Roof 1 - this picture was taken in 2010

Tank 3 Roof

Replace all roof nozzles with new.

Install new stilling well as per drawing.

Replace all the roof handrails. Finish paint with Golden Yellow.

Strip paint marking from the platform to the Center and Corner Dip Hatch with non-skid type coating in Golden Yellow.

	**Tank Earth Lug** Contractor to weld two earth lug on the tank as per API650. Electrical cabling to be done to the earth rod. Earth rod to be installed by Vital appointed Contractor.
	**Tank Number & Labels** Write Tank number on Signal Red Background Provide all Tank Labels for all the components on the tank.

Appendix B

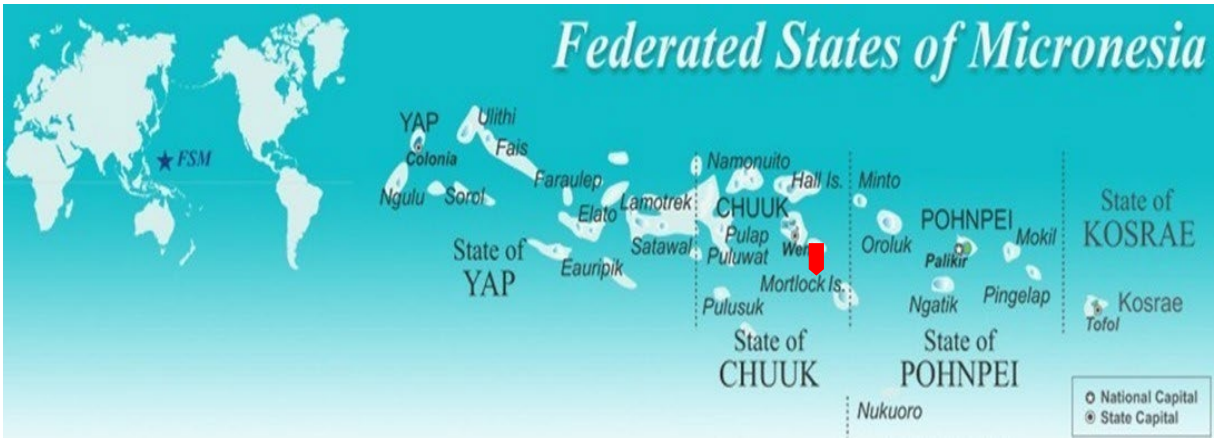
Chuuk Tank 5 Scope of Upgrade Works

Chuuk Terminal – Scope for Chuuk Tank 5 OOSIR-JIG Upgrades

Rev	Date	Description	Prepared By	Checked By	Approved
A	6 Feb 2025	Issued for Approval	AS	JCM	JCM

1 Introduction

Vital Energy, as owner, is undertaking remedial and upgrade work to the Chuuk Fuel Storage Terminal in accordance to the Capital Investment and Improvement Plan (CIIP), to ensure security of fuel supply to Chuuk State in Federated States of Micronesia.



In addition, Vital is an independent terminal operator who owns, operates and/or leases over seven fuel terminals, thirty-seven storage tanks and pipeline systems, and a fleet of fourteen bulk trucks and aviation fuellers across Micronesia.

Operations conducted by Vital include:

- Road tanker deliveries and drum filling services from Vital's four Bulk Terminals;
- Marine bunkering at each main port in Pohnpei, Chuuk, Yap and Kosrae;
- Plane re-fueling operations in four of the eight international airports of the region (Yap, Chuuk, Pohnpei and Kosrae); and
- Sale of a variety of lubricants and chemical solvents.

Vital was formed after it acquired the operations and assets of Mobil Oil Micronesia Incorporated in the Federated States of Micronesia ("FSM") in June 2008. Vital took over a business which had operations, existence and experience in Micronesia of over 50 years.

This tank is currently sitting on steel saddles designed to hold the load during the foundation works, appointed civil works contractor will finish the ring beam foundation and prepare the tank

floor base for the tank contractor to place the floor plates and proceed with the works. Vital Energy has 12 sets of Tank Jacks, scaffolding, steel plates and other associated materials as per Annex 2 – Materials supplied by Vital Energy.

2 Objective

Carry out Tank 5 repairs and upgrades so the tank meets API653 Fitness for Service and Joint Inspection Group (JIG) compliance and requirements, this tank shall return to service as JET A1 storage and contractor shall ensure all internal and external requirements for API and JIG is completed. Chuuk Terminal pipeline replacement project is progressing, and this will require some coordination between the two contractors.

3 Tank Data

Table A – General Tank Information

Tank General information					
Tank Number	T5		**Owner**	Vital FSM Petro Corp	
Tank Location	Chuuk Terminal - FSM		**Manufacture**	N/A	
Tank Diameter	6,096mm or 20.000ft		**Product**	JetA1	
Tank Height	10,973mm or 36.000ft		**Specific Gravity**	0.820	
Maximum Filling Height	9,893mm or 32.457ft		**Nominal Capacity (m³)**	84602\JSG	
Design Code	API650	**Heating System**	No	**Cathodic Protection**	No
Data Plate	Yes	**Insulation**	No	**Leak Detection**	No
Tank Component Geometry Information					
Foundation	On Ground	**Roof**	Fixed Cone Roof		
Shell	Butt Weld	**Bottom**	Flat		
Tank Component Coating Availability					
Shell	Internal	Coated	**Roof**	Internal	Coated
	External	Coated		External	None
Bottom	Coated				
Tank Dates Information					
Year of Commission	1980		Year of Last Inspection	N/A	
Year of Current Inspection	2016		Year of last Bottom Plates Change	N/A	
Other Information					
Access to Roof	Spiral Stairway				

4 High Level Scope & Responsibilities

The high-level scope throughout the Chuuk Tank 3 project life cycle is noted with stakeholder responsibilities as follows: refer to project architecture document for more detail.

Table B – Scope Responsibility

Scope	Responsible party
HSSE & Contractor Induction & SWP	Vital HSSE Team
Contractor Site Mobilization and Work Area	Contractor
Site Safety Monitoring	Chuuk Terminal OIC
Site Clearance & Work Monitoring	Vital OSS
Complete tank stripping and isolation –	Vital Operations
Carry out tank cleaning and sludge disposal –	Contractor
Issue Tank gas-free and CSE certification	Vital OSS or OIC
Carry out API653 Internal/External Inspection & Report	NDT
Carry out design & engineering within planning phase	Vital PM, or Tank Engineers
Complete tank upgrades per Scope of Work (API653 & JIG)	Tank Engineers
Completion of Tank Works ITP/ Methodology/ QAQC/ Safety Plan	Contractor
JIG and Tank Forms issuance & completion	Vital Quality Assurance Manager
Engineering and technical Support	Tank Engineers
Provide engineering construction support	Tank Engineers
Carry out API653 Post Repair Inspection coordinated by contractor	3rd Party Inspection Company
Carry out Tank Calibration & Report coordinated by contractor	3rd Party Inspection Company
Issue Tank Fitness for Service Certificate	3rd Party Inspection Company
Project Management of Engineering and Design	Vital PM

5 High Level Milestones and Deliverables

The high-level milestones throughout the Tank 5 project life cycle are noted with target dates set from the Notice of Award (NOA). Scheduling is aggressive with Vital approval set at Ten working days, and the assumption of contract finalization being a maximum of Ten working days per contract. High level costs are detailed in Section 7.1.

Table C – Milestone & Deliverable list

Milestone & Deliverables	Target Date
M1 – Contract Establishment	
D1 - Release of Proposal for Quotation	
D2 - Contractors Proposal	
D3 - Bid Review and Award	
D4 - Issue Notice of Award	
D5 - Contract Signing	
M2 - Contractor Mobilization & Site Safety	
D1 – Contractor Site Office & Work area Establishment	
D2 – Contractor Team Induction, Audit Contractors, and Permitting Approval	
D3 – Area Barricade/ Signages/ Control Access/ Visibility/ Monitor & Maintain	

M3 – Tank Cleaning & Isolation
D1 – Product Transfer & Empty Tank to lowest level
D2 – LOTO Process & Signages
D3 – Tank cleaning and Sludge Disposal (to approved treatment facility)
M4 – Tank Internal Repairs & Upgrades
D1 – New Ring Beam Construction
D2 - Tank Floor & Sump Replacement
D3 – NDT Inspection on Welding
D4 – Hydro Testing and Report
M5 – Tank Shell Welding Repair & Upgrade Works
D1 – Strake 1 Shell Plate Replacements
D2 – Replacement of All Tank Shell Nozzles
D3 – Tank Shell Repairs
D4 – Installation Fire System support brackets
D5 – NDT Inspection on Welding
M6 – Tank Roof Repairs & Upgrades
D1 – Replace all Roof Nozzles
D2 – Installation of Stilling Well
D3 – Installation of New Roof Hatch
D4 – Repairs/ Replacement of Handrails
D5 – Installation of Fire Systems support brackets
D6 - NDT Inspection on Welding
M7 – Post Repair Inspection
D1 – Post Repair Inspection Report
D2 – Highlight issues or defects rectified.
M8 – Tank Internal Blasting & Coating
D1 – Tank Internal Blasting
D2 – Tank Internal Coating (Prime & Finish Coat with JIG approved coating)
D3 – Coating Inspection and Reports
D4 – Soak Test Report
M9 – Tank External Blasting & Coating
D1 – Tank External Blasting
D2 – Tank External Coating (Prime & Finish Coat)
D3 – Coating Inspection and Reports
M10 – Ancillary Fittings & Final Reports
D1 – Outlet Nozzle as per Aqua[1] Standard – Annex XXX
D2 – Installation of Roof Nozzles
D3 – Quick Flash Tank Piping Installation
D4 – Installation of Ground Level Indicator
D5 – Tank Pipework connections
D6 – Tank Calibration and Reports
D7 – Tank and JIG QC Forms Completed

[1] Aqua Standard – XOM Standard document – Outlet Nozzle design shall be provided.

D8 – Fitness for Service Report
D9 – Tank Labelling
M11 – Demobilizing
D1 – Tank Handover
D2 – Site Equipment/ Materials/ Waste Removal
D3 – Documentation and Handover/ Contract Closed
D4 – Site Cleanup and Worker Demobilization

6 Milestones Definitions

6.1 Contract Establishment:

Contract establishment is a critical phase in the project lifecycle that ensures clear terms, responsibilities, and expectations between the contracting parties. The process involves defining the scope, pricing, payments, risks, and compliance requirements to align with API 653 and JIG standards. Each of the contract requirements and document submission shall be done on time and reviewed with Vital Team. Contractor shall adhere to API 653 (Tank Inspection, Repair, and Alteration), API 650 (Tank Construction), and JIG (Joint Inspection Group) standards and related Standards referenced in each of them.

6.2 Contractor Mobilization and Site Safety

Contractor mobilization and site safety are critical phases in ensuring a smooth, safe, and compliant execution of API 653 tank repairs and upgrades, particularly in aviation fuel storage facilities. Contractor shall efficiently deploy personnel, equipment, and resources while ensuring full compliance with project, safety, and regulatory requirements. Refer to Contractor Safety Administrative Requirements. The contract shall follow the requirements and ensure all measures are in place with clear markings and barriers keeping non-work-related people away from the work zone. All contractors' staff shall be inducted to the site and go through the onboarding of the site and safety induction that generally takes two days. Every work package or a few works packages combined will require a Safe Work Permit (SWP) that requires contractors' team to develop the Job Safety Analysis and demonstrate that the controls placed shall minimize or eliminate the risk. SWP's can take 3 to 5 days for review and approval.

6.3 Tank Cleaning & Isolation

Operations team carry out the product transfer and determine the sludge that will not be pumped into another tank. Contractor shall prepare tank cleaning and work with the operations team in the isolation are critical steps before starting any API 653 tank repairs or upgrades, especially for aviation fuel storage tanks that must comply with Joint Inspection Group (JIG) standards. The lockout and Tagout process shall be followed during the isolation and Officer In-Charge shall be holding all keys or designating the custodian. These processes ensure a safe, contamination-free, and gas-free work environment while preventing fuel quality issues. All tank sludge shall be

removed and taken away from site for further treatment and disposal by the contractor and report submitted to project manager to confirm the disposal process. THIS TANK IS CLEANED AND ISOLATED.

6.4 Tank Internal Repairs & Upgrades

Tank internal repairs and upgrades are essential to ensure the structural integrity, safety, and compliance of aviation fuel storage tanks. These activities must follow API 653 standards and align with Joint Inspection Group (JIG) guidelines to maintain fuel quality, prevent contamination, and extend the tank's service life. This tank requires floor replacement and a new ring beam foundation that will raise the tank 300mm(1ft) and stabilize tank base. The tank is currently jacked-up for floor replacement, new tank foundation and ring beam. The new position of the tank will be aligned with the new pipelines connecting to the tank. All internal nozzles and supports shall be removed and replaced including the stiffener plates. Tank internal shall be coated 100% to control corrosion and give extended life of the tank using approved coating. This tank will be installed with floating suction and stilling well. All stages of works shall be inspected and approved prior to the next works activities; failure shall result in the contractor re-doing the works to an acceptable level.

6.5 Tank Shell Welding Repairs and Upgrade Works

Tank shell welding repairs and upgrades are crucial for maintaining the structural integrity, safety, and compliance of aviation fuel storage tanks. All welding procedures must adhere to API 653 (Tank Inspection, Repair, and Alteration), API 650 (Tank Construction), and JIG (Joint Inspection Group) standards to ensure safe fuel storage and prevent leaks, contamination, or failures. Tank Shell strake 1 needs replacement inspected and works confirms API653 Standard. All Welds shall be inspected, and NDT works performed, after approval the next work activity such as coating can be proceeded. All tank nozzles shall be replaced, the position of the outlet, inlet and water drain shall align to the new pipeline that is currently been installed. The tank shall be fitted with Cooling ring brackets and raiser pipe brackets for the future Fire Suppression System. Tank Stairs require repairs in areas, and this shall be repaired to an acceptable level.

6.6 Tank Roof Repairs & Upgrades

Tank roof welding repairs and upgrades shall be done in accordance to API653 (Tank Inspection, Repair, and Alteration). This tank requires all nozzle replacements with hatches, new stilling well and hatches. Tank handrails to be replaced with new. Tank roof shall be fitted with fire system support brackets for cooling water ring for future Fire Suppression System.

6.7 Post Repair Inspection

The Post-Repair Inspection is a critical process conducted after tank repairs and upgrades to ensure structural integrity, safety, and compliance with API 653, API 650, and JIG (Joint Inspection

Group) standards and this shall be arranged by Vital Project Manager with 3rd party Inspection and Verification companies. This phase involves a combination of visual inspections, non-destructive testing (NDT), hydrostatic testing, and operational checks before the tank is returned to service. Upon successful completion, the inspection company shall issue acceptance certificate.

6.8 Tank Internal Blasting and Coating

Tank shall be 100% blasted and coated internally as per FSMPC GP External and Internal Painting of Bulk Tanks, all stages of coating reports shall be provided to Vital Project Manager ensuring each coating meets acceptance thickness. Perform holiday test on the tank floor and 1st strake, repair defects as per coating manufacture's recommendation. Tank internal will be subjected to Soak Test, the samples will be obtained and sent to SGS Lab in Guam for analysis and final report shall be at acceptable level to confirm fuel don't have any contamination from the coating.

6.9 Tank External Blasting & Coating

Tank shall be 100% blasted and coated externally as per FSMPC GP External and Internal Painting of Bulk Tanks. All stages of coating reports shall be submitted to Vital Project Manager for acceptance. All supporting structures of the tank shall be coated. Contractor to discuss with OPS team and place all Tank signages and Name Plate upon completion.

6.10 Ancillary Fittings & Final Reports

All associated tank internal pipes shall be installed and checked to ensure that they are intact with gaskets. The tank contractor shall fit out tank with Ground Level Indicator, Stilling Well, Floating Suction, QFT Connections, All Roof Hatches and Manholes, Sample Points, receiving and discharge lines. Tank pipework's are done as separate project, this tank nozzles shall be correctly oriented to match the pipeline flange. Final Inspection & Test Plan shall be submitted by the contractor with weld map and traceability matrix to confirm all welds done are by qualified welders according to API653. Vital PM to arrange for Tank calibration once all internal fittings are completed. Fitness for Service cert to be obtained by Vital PM to confirm the upgrades meet API653 acceptance. All JIG related forms shall be completed and issued to Project Manager for the creation of the Tank Master File.

6.11 Demobilizing

The final phase of a project where all temporary facilities, equipment, and personnel are systematically removed from the site, restoring it to a safe and compliant condition. This process ensures that all work areas, infrastructure, and environmental considerations meet regulatory and contractual obligations before project closure and handing over the asset to custodian.

7 Documents Submittals & Approvals

The guidelines given under API Standard 650 Annex W (Commercial and Documentation Recommendations) shall be followed.

There are several forms that shall be completed for review and approval by the Principal shall include but necessarily be limited to with the Contractor, PMO, Terminal Team, Quality Assurance Manager, and external inspectors. These are to be completed in stages at specific activity, Contractor and Vital Project Manager is responsible to have this completed before moving to the next stage and having them approved as per the table A. These forms shall be listed in the contractors Inspection Test Plan as per the sequence of works.

Table D – Documents Submittals

Document Submittals – Preparation, Review & Approval			
Form Name	**Responsible**	**Review**	**Approval**
Tank Data Sheet	Project Manager	SME	Tank Engineer
Out of Service Inspection Report	3rd Party Inspector	Project Manager	Tank Engineer
Construction/ Alterations/ Repair Quality Plan	Contractor	Project Manager/ QAM/SME/OPS	Tank Engineer
General Arrangement Drawings	Tank Engineer	Project Manager /SME/QAM/OPS	Jared Morris
Material Selection Report	Contractor	Project Manager	Tank Engineer
Tank Design Calculations	Not Required		
Tank Venting Calculations	Tank Engineer	Project Manager	Tank Engineer
Nozzle Load Computations	Not Required		
Seal Selection Materials	Contractor	Project Manager	Tank Engineer
Foundation Detail Design	Tank Engineer	Project Manager	Project Sponsor
Tank Constriction Drawings	Tank Engineer	Project Manager/ SME/QAM/OPS	Jared Morris
PWHT Requirements	Contractor	Project Manager/ SME	Tank Engineer
Weld Procedure Specifications (WPSs)	Contractor	Project Manager/ SME	Tank Engineer
Procedure Qualification Records (PQRs)	Contractor	Project Manager/ SME	Tank Engineer
Inspection Test Plan	Contractor	Project Manager/ SME	Tank Engineer
Tank Repair/ Alterations Method Statement	Contractor	Project Manager/ SME	Tank Engineer
Coating Quality Assurance Plan	Contractor	Project Manager/ SME/ QAM	Tank Engineer
Welder Testing Records	Contractor	Project Manager/ SME	Tank Engineer
Weld Map Records	Contractor	Project Manager	Tank Engineer
Post Repair Inspection Report	3rd Party Inspector	Project Manager/ SME/ Contractor	Tank Engineer
Hydro Test Procedure	Contractor	Project Manager/ SME	Tank Engineer
EF-P903-Tank Cleaning Checklist Rev1	Project Manager	SME/OIC/QAM	Project Sponsor
EF-P907 Tank Re-Commissioning Checklist	Project Manager	SME/OIC/QAM	Project Sponsor
EF P941 Change of Service Review Checklist	Project Manager	SME/OIC/QAM	Project Sponsor
AGD-F-M100 - Fixed Tank Summary	Project Manager	SME/OIC/QAM	Project Sponsor
AGD-F-M003 - Fixed Tank Inspection and Cleaning and Internal Maintenance	Project Manager	SME/OIC/QAM	Project Sponsor
AGD-P-Z815 - Storage Tank Visual Inspection and	Project Manager	SME/OIC/QAM	Project Sponsor

Tank Cleanliness Assessment			
AGD-F-M100 - Inspection& Maintenance of Pipes	Project Manager	SME/OIC/QAM	Project Sponsor
AGD-P-M201 – Floating Suction Inspection	Project Manager	SME/OIC/QAM	Project Sponsor
Daily Coating Inspection Record	Contractor	OSS/ Project Manager	Tank Engineer
Coating Inspection Report	Contractor	OSS/ Project Manager	Tank Engineer
Holiday Test Report	Contractor	OSS/ Project Manager	Tank Engineer
Tank Calibration Table (Metric & Imperial)	3rd Party Inspectors	Project Manager/ SME	Tank Engineer
Fitness for Service Certificate	3rd Party Inspection	Project Manager	Project Sponsor
As Built Redline Drawing	Contractor	Project Manager	Tank Engineer
Final As Built Drawings – Updated	Tank Engineer	Project Manager/ SME/ OIC/ QAM	Jared Morris
Tank Master File	Project Manager	SME	Project Sponsor

8 Requirements and Scope of Services

8.1 Objective

Chuuk Tank 5 API653 Inspection had been done by SGS in 2016, and the plan was to mothball until the facility upgrade starts, it was used as JET A1 previously. After the upgrades, the tank will return to be used for JET A1 thus the tank shall meet API650 compliance and JIG requirements. This tank shall be equipped with Fire Systems brackets and stilling well for future use, the provision will be given now so the tank can be in service while the equipment's and instruments are installed. This tank will be raised 300mm (12in) from the bund floor finish level, (this works currently being done by local contractor), this to allow good drainage system to take water away and reduces the underside corrosion. Strake 1 has been identified as thinning in some areas so 100% of strake shall be replaced including the tank floor and sump. All nozzles shall be replaced with new on the shell and roof. Tank internal and external shall be coated 100% to control corrosion as the tank is located next to the lagoon.

The aim is to get the tank back in service, attaining API653 Fitness for Service Certificate, JIG requirements met, and future Fire System and Instrumentation provisions given so tank does not need to be empty. If any parts of the scope that the contractor feels is not suitable and will be deficit in the requirements shall be identified in the pricing template as additional item or recommendations.

8.2 Tank 5 Inspection and Assessment –Report Attached

a. Conduct API 653 out-of-service inspection (visual, ultrasonic thickness (UT), magnetic particle, radiographic, etc.).
b. Evaluate tank integrity, including shell, bottom, roof, and nozzles.
c. Perform floor scanning to assess corrosion and thinning.
d. Assess settlement and foundation conditions.
e. Verify compliance with JIG Guidelines, including water detection, contamination risks, and

quality assurance.

f. Conduct fitness-for-service (FFS) assessment to determine repair or replacement needs.

g. Tank Calibration and Report (This report shall be in Metric and Imperial)

h. Contractor to check and additional scope is required and make allowances as PC Sum.

8.3 Reconstruction Drawing Package

All tank reconstruction drawings shall be supplied with general arrangement drawings showing details, the contractor shall verify all details shown on these drawings and establish the suitability of tank three ensuring the details meet the API653 and JIG Requirements. If there are details missing, Vital appointed Tank Engineers will provide clarification and additional details as required.

8.4 General Requirements

This scope covers the inspection, repairs, and upgrades of aviation fuel storage tanks to comply with API650, (Oil Tank Storage), **API 653 (Tank Inspection, Repair, Alteration, and Reconstruction)** and **Joint Inspection Group (JIG) Standards** for aviation fuel storage facilities.

a. The Scope is written as amendments and supplements to API Standard 650, Twelfth Edition, March 2013, API Standard 653, and JIG 2 Standard. Wherever reference is made to API Standard 650, it shall be understood to mean API Standard 650 as amended/supplemented by this scope document.

b. Clauses in API Standard 650, which are not mentioned in this Scope Document, shall remain valid as written.

c. If a discrepancy is noted between this Scope document and API Standard 650, the discrepancy shall be brought to the attention of the Principal, who shall initiate a review by the Principal's appointed Tank Engineers for resolution.

d. Review and approval by the Principal of any project documentation shall not relieve the Contractor of its obligation to fully comply with local legislative requirements, relevant design codes and project specifications.

e. Contractor shall be responsible to providing inspection date and direct engagement with the appointed 3rd party inspection company and keeping Vital Project Manager in the communication.

f. Where requirements for engineering authentication and sign offs are not locally regulated, good engineering practices shall be followed.

It is the responsibility of the contractor to ensure that all aspects of Tank 3 are designed to fulfil the intended range of operating and service conditions.

8.4.1 Tank 5 Upgrade Scope

8.4.1.1 Products

This Tank is intended to for the storage of Jet A1 product. The Tank shall meet API650, API653, Aqua Standard and JIG 2 Standard. All relevant Tank and JIG requirements forms shall be completed. In future the tank can be used as swing tank and store USLD or ULP.

8.4.1.2 Foundations –

a. All tank foundations shall be designed and constructed to uniformly transfer loads, minimize tank settlement, prevent water pooling around the base of the foundation and safeguard against underside corrosion of the bottom plates.

b. Tank foundations shall be designed with the tank bottom elevated to a minimum of 300mm (12 in) above the surround finished grade.

c. This tank foundation is designed with concrete ring beam with compacted granular infill.

d. The asphalt bedding layer shall be compacted and finished to match the design profile of the tank bottom. The maximum particle size of the aggregate component of the asphalt mix shall not exceed 6mm (1/4 in).

e. The surface of the compacted asphalt bedding layer shall have a smooth finish to ensure that no sharp edges from the aggregates will protrude against the underside of the tank bottom plates.

f. The shoulders of the compacted gravel pad shall be lined with a compacted asphalt apron (topping) or other impervious overlay (e.g., concrete), to stop erosion and prevent moisture ingress into the foundation base.

g. The seam along the outer edge of the chime plate shall be cleaned and sealed with a weather resistant industrial grade bitumastic sealant to prevent water ingress under the bottom plates.

h. When a concrete mat or slab type foundation is provided, the finish on the concrete surface shall be trowelled smooth and free from any sharp pebbles or protrusions.

i. Where a concrete mat or slab type foundation is completed with a smooth trowel finish, the tank bottom plates can be placed directly on the finished concrete surface.

j. Where a concrete mat or slab type foundation is not completed with a smooth trowel finish, a bedding layer with a 50 mm (2 in) thick compacted granular asphalt medium shall be provided between the concrete surface and the tank bottom plates.

k. Asphalt bedding shall not be used on foundations that support storage tanks with bottom side cathodic protection.

l. The natural grade around the tank base shall be sloped away from the tank to prevent ponding and permit efficient shedding of rainwater runoff away from the

tank foundation.

8.4.1.3 Release Prevention Barrier/ Leak Detection System –

a. If required by local legislative regulations or where specified by the Principal, the tank foundation shall include an impermeable hydrocarbon release prevention barrier (RPB) complete with an external leak detection system.

b. The RPB shall be installed to drain to a collection sump which is connected via approved piping to a leak detection monitoring well located outside the edges of the tank foundation base.

8.4.1.4 New Floor Plate and Sump

a. Install all 8mm thick precut floor plates as per drawing, all joints shall be prepared as per API653 Section 9.10 and shall meet all requirements of API650 Section 5.1.5.4.

b. Supply and install new 600mm diameter dished sump, place and weld to all plates sloping towards the sump. Contractor to confirm the foundation slop is sufficient.

c. Contractor shall plan sequence of welding to minimize distortions, plates with excessive distortions shall be removed and replaced at contractors' cost.

d. Contractor to ensure there are no arc strikes on the new floor plates, if any arc strikes are visible, the contractor shall repair as per weld procedure and perform NDE to confirm there are no cracks. The spot is to be marked for Tank Inspector to perform further inspection and confirm this meets API650 requirements.

e. NDE to be performed on 100% of the floor welds to confirm quality of the weld. Vacuum test shall be performed to confirm that there are no leaks on any weld.

~~*8.4.1.5 Strake 1 Replacement*~~

a. Tank strake needs to be replaced with a new 1800mm x 6000mm x 6mm plate. All plates shall be supplied, contactor to inspect and verify condition during site visit.

b. Contractor to cut 50mm above the horizontal weld, prepare the edge for welding.

c. Preset and roll all required shell plates. The contractor shall check and plan this work during the site visit.

d. After welding the shell plates in place, the tank can be lowered using the jacks on site.

e. Perform Shell to Floor weld, ensure the joint is prepared as per API650 Section 5.1.5.7.

f. NDE to be performed on 100% of the welds to confirm no cracks or pin holes. Vacuum test to be done all around the annular to shell weld.

8.4.1.6 Fire Protection System

a. Fire protection systems for aboveground storage tanks shall comply with

AS1940:2017 Flammable Liquids Storage and Handling Standard.

b. This Tank shall be fitted with all support brackets for future cooling ring and raiser pipes.

c. The Principle shall be accountable for design and contractor responsible for installation of attachments, pipe risers, foam pourers, pipe support brackets, and splash plates as required for the specified fire protection system, up to the grade level flange on the vertical riser. All detailed drawing is provided in the drawing package,

d. Beyond the grade level flange on the vertical riser, connections and tie-ins to the facility fire water hydrant system and foam supply, including commissioning of the fire protection system, shall be the responsibility of the Principal (unless this is specifically included in the tank contractors' scope of work).

8.4.1.7 Coatings

a. Where external coating or internal lining of the storage tank is specified, all aspects of coating selection, product testing, surface preparation, application, inspection, testing and quality assurance shall be in accordance with the relevant provisions under the FSMPC GP External and Internal Painting of Bulk Tanks Annexed C.

b. Coating and lining selection and testing data for each individual tank shall be reviewed and approved by the Principals Technical Authority – Protective Coatings.

c. All Tank internal lining shall be coated with Amercoat 240 with dft ~300 microns.

d. In the sections that will be internally lined, preparation of all internal welds shall conform to the applicable NACE Specifications.

e. Coating or lining application shall not commence unless all welding, grinding, post repair inspection, repairs (if required) and hydrostatic testing of the tank is complete.

8.4.1.8 Tank Appurtenances

8.4.1.8.1 Inlet Nozzle

a. Install the new 150NB Class 150 nozzle to be welded in line with the tank receiving line with reinforcement plate as per API653 Section 9.5. This shall meet the API650 compliance.

b. Internal nozzle shall be installed on the inlet as per the General Arrangement drawing with a diffuser, this shall be designed to ensure as exit flow velocity of less than or equal to 1m/s (3ft/s).

c. Install the Tank Valve (supplied by Vital) with sealing gasket.

d. Connect the inlet line after hydro test or prior to commissioning.

8.4.1.8.2 Outlet Nozzles

a. Install the new 150NB Class 150 nozzle to be welded to match the outlet line of the tank with new reinforcing plate as per API653 Section 9.5. This shall meet the API650 compliance.

b. Internal pipe connection on the outlet shall be installed as per AQUA Standard, the nozzle drawing is provided in the drawing package. This design meets the JIG requirements.

8.4.1.8.3 Tank Isolation Valves

a. Vital Energy will supply all tank valves.

8.4.1.8.4 Thermal Relief Bypass

a. Flanged nozzles for thermal relief bypass connections shall be installed on the bottom shell course at or near the associated isolation valve or piping connection. Inlet and Outlet Nozzle shall be welded with 25NB (1 in) weldolet and flange connection that will need to be aligned with the pipelines. Refer to the general arrangement drawings for the thermal relief bypass.

b. All pipes for the thermal bypass shall be of carbon steel 25mm (1in) Sch 80.

c. All valves shall be of Class 800 and flange type.

8.4.1.8.5 Floating Suction

a. This tank shall not be installed with any floating suction.

b. The tank will be installed with Aqua Standard.

8.4.1.8.6 Tank Bottom Sumps

a. Tanks with a cone down bottom shall be provided with a minimum of one (1) bottom sump. Contractor to supply and install one piece dished down sump.

8.4.1.8.7 Water Draw Off

a. Install new 100NB nozzle for stripping line as per drawing.

b. Install new line as per drawing inside the tank.

c. Fabricate new supports for the internal pipe.

8.4.1.8.8 Stilling Well

a. A new Stilling well shall be installed on the roof as per the drawing package. This will need to be blind flanged for future use.

b. Stilling well pipe shall have equally spaced holes to prevent product stratification inside the well. Clean all drill burs and smooth edges.

c. Welding of internal support brackets to be as per the Stilling well drawing.

d. Connection area to be determined on site.

8.4.1.8.9 Shell Manways

a. This tank is fitted with only one manway, this will need to be changed since Strake 1 is replaced with new. Install with new 610mm (24 in) Shell Manway as per drawing meeting API60 Compliance.

b. Shell Manway to be located close to the water draw off sump as this will assist in the future tank cleaning operations.

8.4.1.8.10 Roof Nozzles

a. The number of nozzles on the roof is provided in the general arrangement drawing with schedule of all Tank Nozzles.

b. The tank shall be fitted with the following roof nozzles.

- **150NB Center Gauge Nozzle** – remove existing and install new gauge hatch that will be provided. Contractor to allow for installation including bolts and nuts, gaskets, and tools.
- **150NB Corner Gauge Hatch nozzle** – remove existing and install new gauge hatch that will be provided. Contractor to allow for installation including bolts and nuts, gaskets, and tools.
- **200NB P&V** – Remove existing P&V Vent. Supply and install new Vent as per recommendation by Vital appointed Tank Engineers.
- **500mm Roof Manhole** – cut and remove existing then fabricate and install new roof manway as per drawing. Install at the existing positing.
- **150NB Spare Nozzle** – install new nozzle for future ATG system.

8.4.1.8.11 Ground Lugs

a. Grounding lugs shall be seal welded to the bottom shell course at a height of 300 mm (12 in) above the floor plate projection.

b. Each lug shall be provided with a 20 mm (3/4 in) diameter pre-drilled hole for the grounding cable connection.

c. A minimum of two (2) grounding lugs per storage tank shall be provided.

d. Provide grounding cable from the tank to earth rod.

8.4.1.8.12 Product Sample Point

a. The tank shall be fitted with 3 x 80NB nozzle for draw off sample point system with valve manifold for high, midway, and low connected to 20NB draw off valve.

b. The system shall be set up with manifold type with two valves, one each at the tank nozzle and 20NB.

c. Nozzle size pipe shall be installed inside the tank as be drawing for mid and high-level point.

d. Refer to the drawing for the for details.

8.4.1.8.13 Stairways, Platforms and Handrails

a. Stairways, platform, and railings shall be designed in conformance with the requirements under the local jurisdictional occupational health and safety regulations.

b. Repair Stairways and landing in area. These areas can be verified during the site inspection by the contractor.

c. All rungs and post of the handrails shall be finished with Golden Yellow.

8.4.1.8.14 Brackets and Supports

a. Brackets and supports that are attached to the tank as permanent attachments shall be installed with wear pads that are sealed welded to the tank.

b. Wear pads shall not be welded over vertical or horizontal weld seams.

8.4.1.8.15 Foam Pourer

a. Install new Foam Pourer as per drawing.

8.5 Materials

a. All materials shall be suitable for the minimum design metal temperature specified for the storage tank.

b. Materials specifications that have been accepted for the project shall not be substituted without the prior written approval of the Principal.

c. All plates thickness greater than 12.5mm ($^1/_2$ in) shall not be used for the shell, shell reinforcement or tank bottom annular plates.

d. All bolt heads and nuts shall be of heavy hex pattern.

e. Gaskets shall be of spiral wound for flanges and compressed Non-Asbestos Fibre.

Component	Material Specification	Standard
Tank Shell and Floor Materials		
Tank Shell	Carbon Steel (e.g., ASTM A36, A516 Gr. 70)	API 650, API653, ASME Sec. VIII
Tank Floor	Carbon Steel (ASTM A36, A283 Gr. C)	API 650, API 653
Tank Roof	Carbon Steel (ASTM A36, A516 Gr. 70)	API 650, API 653
Piping & Nozzles		
Inlet/Outlet Piping	Carbon Steel (ASTM A106 Gr. B, ASTM A53)	ASME B31.3, API 570
Nozzles & Flanges	Carbon Steel (ASTM A105, A350 LF2)	ASME B16.5
Gaskets	Spiral Wound (SS 316 + Graphite/PTFE)	ASME B16.20
Internal Lining & Coating		
Coating Type	**Application**	**Standard**
Epoxy Lining - Internal	Amercoat 240 Buff & White	API652, NACE RP0178, MIL-PRF-23236
Epoxy Lining – External	Amercoat 240 Buff/ White	API652, NACE RP0178

	Sigama Guard series finish coat – white Sigama Guard – Golden Yellow – handrails	
Roof & Structural Components		
Support Structures	Carbon Steel (ASTM A36, A992)	API 650
Handrails and Ladders	Carbon Steel (ASTM A36)	API 650
Additional Components		
Bolts and Fasteners	ASTM A193 B7	ASME B18.2.1
Seals	Compressed Non-Asbestos Fibre	API650

8.6 Fabrication

a. All plate cutting shall be cut using plasma cutter or oxy-acetylene.

b. Edge preparation for proper welding, slags shall be removed.

c. All cutting shall be uniform and consistent for root weld, uneven edges shall be corrected before assembly.

d. Rolling, bending, and forming of plates to required dimensions.

e. All authorised and accepted welders to perform welding.

f. Using of correct welding electrodes (Low Hydrogen) for all welding.

g. All assembly shall be checked by appointed person on site prior to welding.

h. All defects' welds shall be properly repaired.

i. There shall be no arc strikes on the tank surface; welders are to keep the striking plate. If there are strike marks, they shall be grounded off and repaired. NDT to be performed on all repaired welds and new welds.

8.7 Hydro Testing Requirements

a. The contractor shall submit a detailed procedure and plan for hydrostatic testing of the storage tank for review and approval by the Principal.

b. Hydrostatic testing of the tank shall not commence unless the Principal has provided written confirmation of acceptance of the Contractor hydrostatic testing procedures.

8.8 Welding Procedures and Welder Qualification

a. All WPS and PQR shall be submitted to the Principal for approval for each welder.

b. Ideally each welder must have 6G qualification that will allow him/her to weld in any areas of the tank.

c. All procedures shall be on the contractors' company name only that will be accepted.

d. All qualifications shall be done to ASME IX BPV Standard.

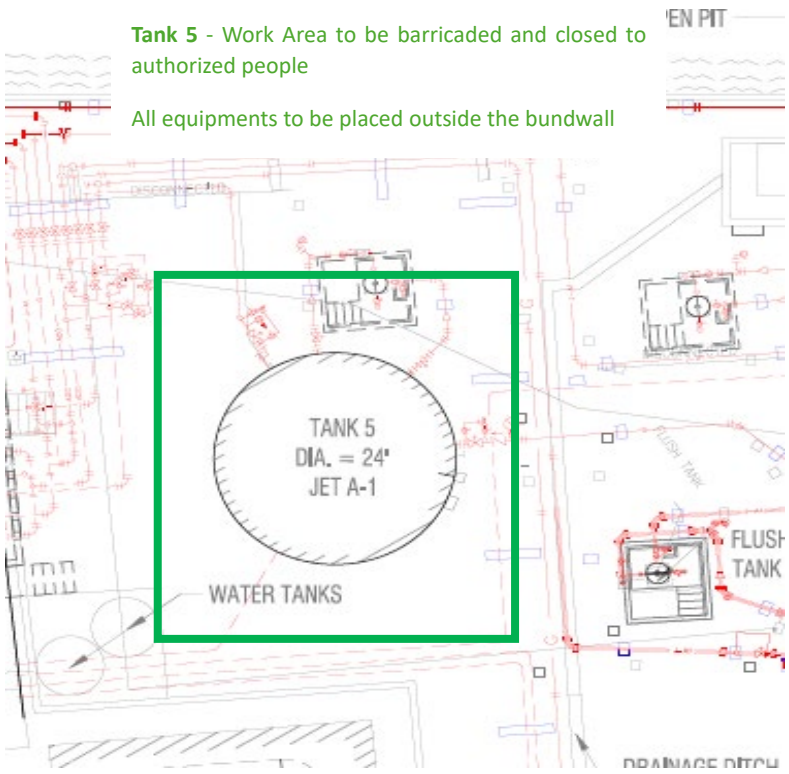
8.9 Tank Marking & Labels

a. Tank Nameplate shall be provided.

b. Attach all tank labels.

c. Tank Number shall be painted with Signal Red colour.

9 Tank Photos



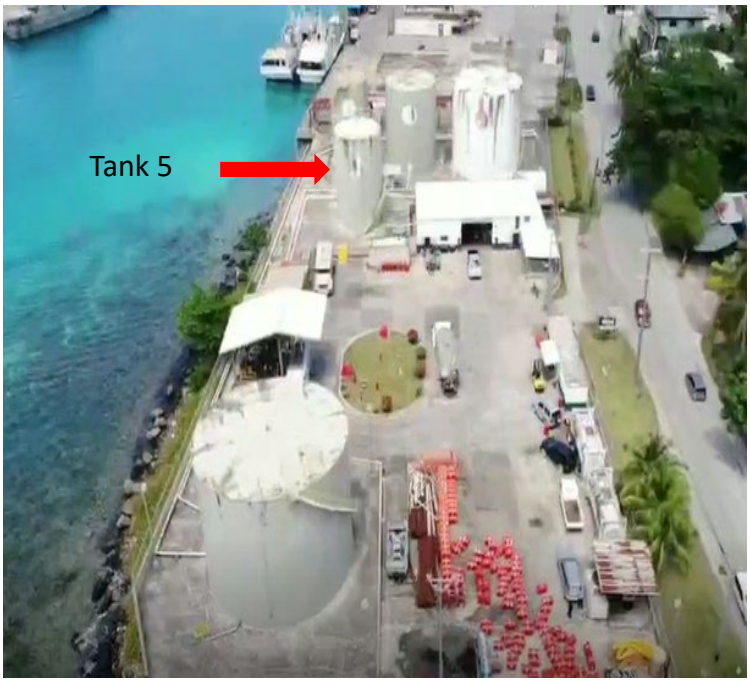
Site Overview

Contractor will have limited area as Tank 2 is a live tank with Jet A1.

Works are ongoing on the terminal pipeline replacement and coordination will be required between contractors.

All Equipment's are to be placed outside the bund area.

Contractor site will need to be closed and access authorized people under the safe work permit.

	**Terminal Overview** Site showing the location of Tank 5.
	**Tank 5 View** 100% Tank Upgrade to API653/ JIG requirements. Tank is empty and ready for works. New Foundation to be constructed to elevate the tank for better drainage.

	**Tank Foundation** Construct new ring beam foundation. New Tank Floor plate to be installed. New Leak detection system to be installed.
	**Tank Internal** Apply new coating with Amercoat240. Refer to coating specification document. Soak testing required and shall meet JIG approvals. Failure of soak test will require recoating of the tank internal. Tank floor to be replaced. View of Tank floor from the roof.

	**Spiral Stairs** Replace corroded stairs. Contractor to estimate 30% replacement. This to be checked during site visit. All handrails and stairs to be finished coated with golden Yellow.
	**Spiral Stairs Platform** To be replaced with new.

	**Tank Shell** Install Fire System Brackets on the shell and cooling water around the top strake as per drawings. Install Foam pourer as per drawing.
	**Tank Roof** Replace all roof nozzles with new. Install new stilling well as per drawing. Replace all the roof handrails. Finish paint with Golden Yellow. Strip paint marking from the platform to the Center and Corner Dip Hatch with non-skid type coating in Golden Yellow.

	**Ground Level Indicator** Replace with New GLI. Install and test during hydro test of tank.
	**Tank Earth Lug** Contractor to weld two earth lug on the tank as per API650. Electrical cabling to be done to the earth rod. Earth rod to be installed by Vital appointed Contractor.

	**Tank Number & Labels** Write Tank number on Signal Red Background Provide all Tank Labels for all the components on the tank.
	**Tank Fitting** Replace all hatches with new. Replace new P&V Vent. Venting calculation to be verified by Vital appointed Tank Engineers.

Appendix C

Project Architecture - Roles and Responsibilities

PROJECT ARCHITECTURE

Chuuk Terminal Tank Upgrade Works OOSI-R & JIG

Table of Contents

The following criteria will be used to determine if an individual will be included as a stakeholder:

1. Will the person or their organization be directly or indirectly affected by this project?
2. Does the person or their organization hold a position from which they can influence the project?
3. Does the person have an impact on the project's resources (material, personnel, funding)?
4. Does the person or their organization have any special skills or capabilities the project will require?
5. Does the person potentially benefit from the project or are they able to resist this change?

Any individual who meets one or more of the above criteria will be identified as a stakeholder. Stakeholders from the same organization will be grouped to simplify communication and stakeholder management.

Vital Energy

Sponsor: Jared Morris

- Responsible for:
    - Project Document Approval
    - Budget Review and Approval
    - Conflict Resolution
    - Change Request Approval for,
        - Schedule slip/delay by 10% of the duration.
        - Cost increases by over 10% of the approved budget.
        - Change in Agreed Scope.
        - Change in Quality or Compliance.
    - Travel Approvals
    - Design and Drawings Approvals

Operation, Logistics and Maritime Manager: Savenaca Tamani

- Demonstrates that his Function is a Responsible and Prudent Operator of the Asset by:
    - Compliance with company policies, procedures, and processes.
    - Ensures that operators are 'Can Do' for product, service and safety critical processes and procedures.
    - Site HSSE overview
    - Inventory Oversight

Asset Custodian: Wilton Masaichy

- Responsible for:
    - For coordinating the safe and operational readiness for the release of the MCA to the Project Team.
    - Establish the Lock-Outs and Tag Outs for the Terminal Operations Team.
    - Conduct of Daily Toolbox meeting and ensuring integration of the project with operational activities.
    - Site Safety and Incident reporting. Takes lead role for overall HSSE for Chuuk Terminal.
    - Ensure the project gets operational support so that it can be completed on time, to specification and compliance.
    - Witness and Sign-Off on Hand-Over Certificate.
    - Schedule and Coordinate the Soak Tests and other commissioning arrangements.

- Plan to place the tank back in operational service.

Subject Matter Expert: Abdul Saheem

- Abdul Saheem (Tanks and Pipelines)

Contract Administrator: TBA

- Responsible for;
  - Contract Administrator:
    - Will authorize Invoices for Payment based on Payment Claim Certificates issued by the Project Manager.
    - Will prepare/obtain approvals to Change Orders from authorized persons.
  - Appoint a project manager and manage their performance.
  - Maintain a list of authorized vendors and contractors eligible to do work for Vital.
  - Escalate Problems and Issues to the Sponsor as and when needed.
  - Conduct and lead the Project Kick Off Meeting.
    - Coordinate with the Asset Operator and Custodian, the practicalities for taking a MCA out of service.
    - Obtain signoff of the Team Operating Agreement.
  - Provide Contract Performance Report

Asset Integrity Manager: Neil Halstead

- Responsible for:
  - Strategic asset management, and compliance with the E2E: Asset Lifecyle Process.
  - Tactical asset level considerations and recommendations to inspect, maintain, upgrade, mothball, decommission or to extend life shall be made by the Asset Integrity Team in consultation with the Asset Owner and the Asset Operator.
    - Review and accept Out-of-Service-Inspection (OOSI) Report.
    - Review and approve Repair Methodology for all major repair works.
    - Review post-repair inspection, confirm repair works and issue a OOSIR Report.
    - Maintain asset related critical records.

Asset Integrity Officer: Epeli Sauleca

- Responsible for:
  - Monitoring the Asset Condition Index (ACI) for mission critical assets
  - Work with the PMO to ensure that the master plan for terminals consider ACI.
  - Based on ACI conditions, request for a major repair to be scheduled within the year.
  - Coordinate with the Asset Custodian, the practicalities of taking a MCA out of service.

Asset Integrity Technician: Calvin Yetasurmwai

- Responsible for:
  - a ‘digital-twin’ of physical assets by using CARL Source, a computerized asset management system and development.
  - monitors the OI and PMI reports and triggers an ACI review when circumstances change.

- Produce reports on the efficiency, efficacy, and compliance of OI and PMI inspection regimes.

Project Management Office: Abdul Saheem

- Responsible for:
  - Coordination of the annual capital planning project cycle for the company and the production of the following deliverables:
    - A revised high level asset master plan (AMP) and future project pipeline(s) for a location and ensure that the schedule and prioritization of projects considers the ACI and state of compliance with standards.
    - A capital allocation plan(s) (CAP) in consultation with function, portfolio, program, and operational managers.
    - A high level cashflow forecast for the AMP and the CAP.
  - Responsible for ensuring that projects identified within the CAP are efficiently progressed through the Vital Project Management Cycle, Project Documentation requirements, and verification processes to ensure that project Specification has been achieved.

Vital On-Site Supervisor: Eneriko Volau

- Responsible for:
  - Participation in the contractors Job Safety Analysis (JSA) and Method Statements
  - Establish the Lock-Outs and Tag Outs for the Project Team.
  - Escalate Problems and Issues to the Project Manager as and when needed.
  - Coordinate project activities with operational activities with the Asset Custodian.
  - Responsible for the oversight of contractor activities. This work involves:
    - maintaining a Project Diary.
    - facilitating Contractor access to project site.
    - receiving instructions from the Project Manager.
    - providing instructions to Contractor.
    - oversight of SWP Controls; and
    - liaison with the OIC/Terminal Supervisor.
    - Witness Project Documentation as necessary to verify key milestones.
    - Sign the Hand Over Certificate confirming that the Tank is now being managed by the Custodian and Operator.

Permit Officer: Eneriko Volau

- Responsible for,
  - Gas Testing for Site Clearance.
  - Tank Isolation
  - Lock Out Tag Out process with Project Manager.
  - Observe site safety.
- Report Near Miss or Incidents/ Accidents

SAFER Manager: Juanito Hasugulmal

- Responsible for:
  - Induction of Contractors and New employees.
  - Cold-eye review of the JSA and Method Statements.

- Work with Permit Officers and Senior Permit Officers to have SWP created and approved.
- Update as necessary the Contractor Safety Administration requirements as necessary.
- Review Tool-Box meeting discussion and extract information related to safety and incidents.
- Review of random Daily Dairy or site report and extracting information related to safety in terms of near misses or incidents and raising awareness with the project team.

Quality Assurance Manager: Maltrick Yamauchi

- Responsible for aviation quality:
  - JIG and EI Compliance.
  - Inspection of assets at stages and critical HOLD POINT for approval.
  - Liaise with appointed JIG Inspectors as and when required.

Procurement Manager: Garry Garsain

- Responsible for
  - contributing to the procurement strategies, and the finally approved Procurement Management Plan for the Project(s).
  - Responsible for the implementation of the Procurement Management Plan, and ensuring the procurement Policies, Procedures and Authorities are obtained where necessary for project expenditure.
  - Work with PM to obtain and order all materials confirmed in the Bill of Materials

Travel Coordinator: Rosmina P. Eperiam

- Responsible for Vital Teams
  - Travel between locations.
  - Arrangement of Hotels.
  - Arrangements of Car Rentals.

Inventory Coordinator: Esther Nedlic

- Responsible for Fuel Inventory Management
  - Monthly Stock Updates and reconciliation
  - Reports on available Stock on Hand

Account: Jovaleen Cantero

- Responsible for,
  - Online Payment Processing

Fixed Asset Manager: Relian Mudong

- Responsible for,
  - Asset the Project Team in the development of the Sanction.
  - Posting payments in accounting system and liaising with finance team.
  - Update the Fixed Asset Register (FAR) following Project Completion Report

Project Manager: Aliveretii Masitabua

- Responsible for:
  - Maintain the Asset Masterfile during the Project.

- Escalate Problems and Issues to the AIM as and when needed.
- Development and issuing *Scope of Work* with endorsement from the AIM.
  - OOSIR Inspections
  - Repair Methodology(ies)
  - Inspection Test Plans
  - Work Instructions to the Contractor
  - High level Milestones Schedule
- Development of the *Project Management Plan* including and its subsidiary components with the endorsement of the Project Team, namely:
  - Sanction for Planning, and Execution
  - Quality Management Plan
  - Risk Management Plan
  - Procurement Plan
  - Bill of Materials
  - Work Breakdown Structure
  - Detailed Schedule of Project
- Managing the Project to meet the agreed Project requirements/specification, within budget, and schedule.
- Responsible for day-to-day management Project Officers / OSS and issue of Work Orders
- Issue the Contractor Progress Payment Certificate.
- Manage *Project Closing* including:
  - Project Closing Report
  - Handover Certificate
  - Punch List
  - Review and refile the Master File in the Terminal Library
- Maintenance and Project Teams for preventative or corrective maintenance activities to defined SOW's provided by the Project Manager.
- Review of Daily Dairy or site report and extracting information related to safety in terms of near misses or incidents and raising awareness with the project team.
- Review and approve request for materials from inventory. (This can be listed in the procurement plan and all assigned materials for each tank released and moved to spare container that shall be managed by Sun Engineering OSS)

Project Officer: TBA

- Responsible for,
  - Project Meeting coordination.
  - Document Control and uploading to Vital nominated project site.
  - Project update in Sensei
  - Monthly Project Report from Sensei

TBA – Appointed Contractor

Contractor's - Project Manager: TBA

- Responsible for:
  - Site Safety and Quality Management
  - Developing a Bill of Materials for additional works

- Developing a Schedule and Manhour Budget.
- Developing a Materials Budget (If required)
- Managing the Work Crew to deliver the SOW.
  - As Specified
  - On Budget.
  - On Schedule
- Complies with Vitals Contractor Safety Administration requirements.
- Provides daily reports to the OSS.
- Participate in the Job Safety Analysis (JSA) and Method Statements.
- Maintain compliance with the approved Safe Work Permit (SWP) Conditions.
- Provides Monthly reports as per template.
- Write the required Methodology document.
- Writing Project Quality document
- Writing HSSE Plan for the project.

Contractor - Project Administrator: Liam McMonagle

- Responsible for:
  - Contract and Payment Administration
  - Alerting scope or boundaries outside of the contract
  - Contract costing.
  - Invoicing and Payments, accounts reconciliation.

Contractor - On Site Engineer/ Supervisor: TBA

- Responsible for:
  - Lead the Job Safety Analysis (JSA) and Method Statements
  - Inspect the Lock-Outs and Tag Outs for the Project Team.
  - Escalate Problems and Issues to the Project Manager as and when needed.
  - Coordinate project activities with operational activities with the Asset Custodian.
  - Responsible for the day-to-day management of the Project. This work involves,
    - maintaining the Project Diary.
    - receiving instructions from the Project Manager.
    - providing instructions to Contractor.
    - implementation of SWP Controls; and
    - liaison with the OIC/Terminal Supervisor.
    - Managing site safety and site access.
  - Maintenance and Project Teams for preventative or corrective maintenance activities to defined SOW's provided by the Project Manager.

Third Party Inspection Team

: TBA

- Provide a Proposal for and Out of Service Inspection (OOSI)
- Conduct the Out-of-Service-Inspection (OOSI) in accordance with the appropriate standard and issue the OOSI Report.
- Issue a Repair Methodology Report for all major repair works.
- Conduct post-repair inspection, confirm repair works and issue an OOSIR Report.
- Issue a Fitness-for-Service Certificate.
- Tank Calibration and providing table

Third Party Tank Engineers

- Responsible for,
  - Providing Tank Drawings
  - Reviewing of Contractors' documents and providing clarification to Project Manager
    - Quality Plan
    - Inspection & Test Plan
    - HSSE Plan
    - Methodology Statement
  - Design Calculation and Stress Analysis
  - Engineering Support
  - Standard and Specification verification and confirmation

Contact Details

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TBA		
3rd Party Inspectors		
TBA		
TBA		
Contractor		
Contractor Administrator		
Admin Office		
Project Manager		
Project Engineer		
Site Supervisor		

Appendix D

Chuuk Tank 3 API653 Out of Service Report

CLIENT :	**Vital FSM PetroCorp**
LOCATION :	**Chuuk Terminal, Federal State of Micronesia**
TANK NUMBER :	**T3**
TYPE OF INSPECTION :	**Out of Service Inspection**
JOB NUMBER:	**10155546**
INSPECTION DATE :	**16 Dec 2016 to 17 Dec 2016**
JOB EXECUTED BY :	**Amirin Adli Abu Bakar** **Sukri Omar**

PREPARED BY :	REVIEWED BY :	APPROVED BY :
Amirin Adli Abu Bakar	Hilmi Soh	Wan Adlan

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REVIEWED / WITNESSED / VERIFIED

HILMI SOH
API 653 AUTHORISED INSPECTOR
CERT NO : 32396
Date:

All orders are accepted and all report and certificates issued subject to the General Condition of Service (Copies available upon request)

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1. Introduction

Tank T3 have been inspected at Chuuk Terminal, Federal State of Micronesia for Vital FSM PetroCorp.

Inspection Equipments use as below table:

Equipment	Brand	Model	Serial Number	Calibration Due Date
Ultrasonic Thickness Gauge	Sonatest	Sonatest Site Scan D10L+	I 010111	20 Dec 2016
Magnetic Flux Leakage (MFL)	Silverwing	Floormap VS2i	6930706	30 Dec 2016
Total Station	Sokkia	Set630RK	157779	11 Jul 2017

1.1. General Tank information

Tank General Information						
Tank Number	T3		Owner	Vital FSM PetroCorp		
Tank Location	Chuuk Terminal, Federal State of Micronesia		Manufacturer	N/A		
Tank Diameter	6,096mm or 20.000ft		Product	Jet A1		
Tank Height	10,973mm or 36.000ft		Specific Gravity	0.820		
Maximum Filling Height	9,893mm or 32.457ft		Nominal Capacity (m^3)	84602 USG		
Design Code	API 650	Heating System	No	Cathodic Protection	No	
Data Plate	Yes	Insulation	No	Leak Detection	No	

Tank Component Geometry Information			
Foundation	On Ground	Roof	Fixed Cone Roof
Shell	Butt Weld	Bottom	Flat

Tank Component Coating Availability							
Shell	Internal	Coated	Roof	Internal	Coated	Bottom	Coated
	External	Coated		External	None		

Tank Dates Information			
Year Commission	1980	Year of Last Inspection	N/A
Year of Current Inspection	2016	Year of Last Bottom Plates Change	N/A

Other Information	
Access To Roof	Spiral Stairway

1.2. Summary of Findings

1.2.1. Engineering Evaluation

1.2.1.1. Differential Settlement

The Permissible Out-Of-Plane Settlement (mm)	Maximum Differential Settlement, Si (mm)	Result
2.87	4.39	Out of Tolerance

Please see page 57 for more information.

1.2.1.2. Differential Settlement (as per EEMUA 519)

The Permissible Out-Of-Plane Settlement (mm)	Maximum Differential Settlement, Si (mm)	Result
100.64	4.4	Within Tolerance

Please see page 59 for more information.

1.2.1.3. Roof Plate

Item	Nominal Thickness (mm)	Minimum Measured Thickness (mm)	Minimum Required Thickness (mm)	Corrosion Rate (mm/Year)	Remaining Life (Year)
Roof Plates	4.76	4.45	2.29	0.009	249.29

Please see page 64 for more information.

1.2.1.4. Shell Plate Evaluation

Course	Previous Thickness(mm)	Minimum Measured Thickness (mm)	Minimum Required Thickness (mm)	Remaining Life (year)	Next Inspection Interval
1	6.35	6.00	2.54	355.89	15.00
2	6.35	6.11	2.54	535.50	15.00
3	6.35	6.07	2.54	453.86	15.00
4	6.35	6.10	2.54	512.64	15.00
5	6.35	6.07	2.54	453.86	15.00
6	6.35	6.09	2.54	491.54	15.00

Note: Previous Thickness taken from As Built Drawing.

Please see page 68 for more information.

1.2.1.5. Plumbness (Tank Tilt)

Acceptance Value(mm)	Maximum Out-of-Plumbness Value (mm)	Result
0.0	-37	Within Tolerance
45.0	-39	Within Tolerance
90.0	-46	Within Tolerance
135.0	-21	Within Tolerance
180.0	68	Within Tolerance
225.0	62	Within Tolerance
270.0	41	Within Tolerance
315.0	-21	Within Tolerance

Please see page 72 for more information.

1.2.1.6. Bottom plate (Before repair/ No repair needed)

Item	Year- In Service	Nominal Thickness (mm)	RT_{bc} (mm)	Rt_{ip} (mm)	S_tP_r (mm)	U_{pr} (mm)	MRT (mm)	Calculated Life Span (Year)	Next Inspection Interval, Or
Bottom Plates	36	9.53	5.00	7.50	0.0563	0.1257	2.54	13.52	13.52
Critical Zone	36	9.53	5.00	7.50	0.0563	0.1257	2.54	13.52	13.52

MRT = *minimum remaining thickness at the end of interval Or.*
O_r = *in-service interval of operation (years to next internal inspection) not to exceed that allowed by 6.4.2,*
RT_{bc} = *minimum remaining thickness from bottom side corrosion after repairs,*
RT_{ip} = *minimum remaining thickness from internal corrosion after repairs,*
S_tP_r = *maximum rate of corrosion not repaired on the top side.* S_tP_r = *0 for coated areas of the bottom.*
UP_r = *maximum rate of corrosion on the bottom side.*

Please see page 80 for more information.

1.2.2. Visual Inspection

1.2.2.1. Foundation

Item	Findings	Recommendations	Repair Priority
1. Foundation	General View.	• Not Applicable	Not Applicable
2. Bottom Projection Plate and Foundation	Sealent between bottom projection plate and tank foundation found deteriorated/damaged.	• To replace with new plinth seal.	Online Or Offline
3. Tank Earthing	Two earthing cable for grounding were noted on projection plate and physically condition of cable found satisfactory.	• Recommended to carry out resistance test as per API 575 clause 7.2.6. The total resistance from tank to earth should not exceed 25 ohm and monitor during routine inspection.	Online Or Offline

1.2.2.2. Shell

Item	Findings	Recommendations	Repair Priority
1. Shell Plate	Numerous location of paint blistering and corrosion were observed on shell plate external.	• Power brush affected area and recoat as per owner's painting specification.	Offline
2. Shell Plate (Internal)	Internal shell was covered with protective coating. No significant finding was noted during inspection.	• Not Applicable	Not Applicable
	Several attachment/pipe holders were noted attached to shell.	• Not Applicable	Offline
3. First Course Weldment (Internal)	Weldment was covered with protective coating. No significant finding was noted during inspection.	• Not Applicable	Not Applicable
4. Shell Plate - 1st course at 202.5°	Bulging with maximum depth of 34mm was noted. See survey data.	• To monitor.	Not Applicable
5. Manway - Size: 24 inch.	Tell tale hole noted plugged with coating.	• Unplug tell tale and seal with suitable sealent (e.g grease, etc) to prevent water from seep underneath between reinforcement and shell plate and cause unseen corrosion.	Online Or Offline
	Paint failure were observed on the flange and bolting.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
6. Manway (Internal) - Size: 24 inch.	No significant finding was noted during inspection.	• Not Applicable	Not Applicable
7. Inlet - Size: 6 inch.	Tell tale hole noted plugged with coating.	• Unplug tell tale and seal with suitable sealent (e.g grease, etc) to prevent water from seep underneath between reiforcement and shell plate and cause	Online Or Offline

		unseen corrosion.	
	Paint flaking and corrosion was noted on the flange and bolting.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
8. Inlet (Internal) - Size: 6 inch.	Paint failure noted.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
9. Water Drain Off - Size: 4 inch.	Tell tale hole noted plugged with coating.	• Unplug tell tale and seal with suitable sealent (e.g grease, etc) to prevent water from seep underneath between reiforcement and shell plate and cause unseen corrosion.	Offline
	Corrosion and scalling noted on flange and bolting.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
10. Water Drain Off (Internal) - Size: 4 inch.	Paint failure noted.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
11. Outlet - Size: 6 inch.	Tell tale hole noted plugged with coating.	• Unplug tell tale and seal with suitable sealent (e.g grease, etc) to prevent water from seep underneath between reiforcement and shell plate and cause unseen corrosion.	Online Or Offline
	Paint flaking and corrosion noted.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
12. Outlet (Internal) - Size: 6 inch.	Paint failure and corrosion noted.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
13. Blind - Size: 6 inch.	Tell tale hole noted plugged with coating.	• Unplug tell tale and seal with suitable sealent (e.g grease, etc) to prevent water from seep underneath between reiforcement and shell plate and cause unseen corrosion.	Online Or Offline
	Paint flaking and corrosion noted.	• To made good surface preparation and recoat as per owner's painting specification and install a	Offline

		new gasket.	
14. Blind (Internal) - Size: 6 inch.	Paint flaking and corrosion noted.	• To made good surface preparation and recoat as per paint manufacturer' specification.	Offline
15. Drain Nozzle - Size: 4 inch.	Tell tale hole noted plugged with coating.	• Unplug tell tale and seal with suitable sealent (e.g grease, etc) to prevent water from seep underneath between reiforcement and shell plate and cause unseen corrosion.	Online Or Offline
	Paint failure and corrosion noted.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
16. Drain Nozzle (Internal) - Size: 4 inch.	Paint flaking was noted.	• To made good surface preparation and recoat as per paint manufacturer' specification.	Offline
17. Spiral Stairway	Paint failure with isolated corrosion were observed on stairway thread, stringer and support.	• To made good surface preparation and recoat as per paint manufacturer' specification.	Offline

1.2.2.3. Fixed Roof

Item	Findings	Recommendations	Repair Priority
1. Roof Plate	Approximately 70% of roof plate suffered from paint flaking and corrosion were observed.	• To made good surface preparation and recoat as per paint manufacturer' specification.	Offline
2. Crown Plate	Paint failure and corrosion noted.	• To made good surface preparation and recoat as per paint manufacturer' specification.	Offline
3. Roof Plate (Internal)	No significant finding was noted.	• Not Applicable	Not Applicable
4. Sampling/ Gauging Hatch - 6 inch.	Deterioration/damaged due to severe corrosion was noted.	• To replace affected area.	Offline
	Paint failure with surface rust was observed on the neck, securing bolts and flange.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
5. Roof Manway - 20 inch.	Paint failure with surface rust was observed on the neck, securing bolts and flange.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
6. Goose Neck Vent - 8 inch.	Paint failure with surface rust was observed on the neck, securing bolts and flange.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket. •	Offline

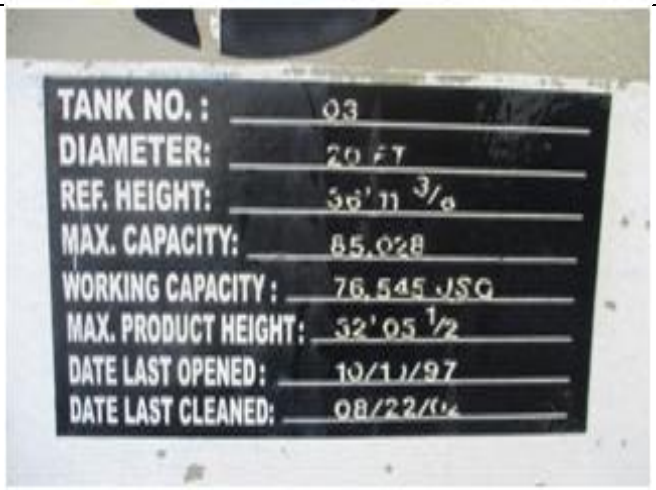
	Mesh screen found in satisfactory condition.	• Recommend to replace mesh screen to preferable "Basket type" for easier monitoring purpose.	
7. Interconnection Bridge	Paint failure and corrosion noted.	• To made good surface preparation and recoat as per paint manufacturer' specification.	Offline
8. Handrail	Paint failure and corrosion noted.	• To made good surface preparation and recoat as per paint manufacturer' specification.	Offline
9. Frangible joint (Joint between roof plate and shell top angle)	Roof handrails were welded on top of roof to shell frangible joint. This will streghten the joint and not complies with API 650, Section 3.10.2.6.	• Consideration to redesign the roof handrails which allow weak roof-to-shell attachment.	To Monitor

1.2.2.4. Bottom

Item	Findings	Recommendations	Repair Priority
1. Bottom Plate	Approximately 80% of bottom plate suffered from general pitting with the maximum depth of 2.5mm. Bottom plate was covered with protective coating.	• Not Applicable	Not Applicable
2. Bottom Plate - Plate number: 2-1	Non-API standard patch plate repair noted.	• To monitor in next inspection interval.	Not Applicable
3. Bottom Plate - Plate number: 4-1	Non-API standard patch plate repair noted.	• To monitor in next inspection interval.	Not Applicable
4. Bottom Plate weldment	Weldment was covered with protective coating. No significant finding was noted during inspection.	• Not Applicable	Not Applicable
5. Shell to Bottom Joint	Weldment was covered with protective coating. No significant finding was noted during inspection.	• Not Applicable	Not Applicable
6. Drain Sump	No significant finding was noted during inspection.	• Not Applicable	Not Applicable
7. Diping Plate	No significant finding was noted during inspection.	• Not Applicable	Not Applicable

1.3. Visual Inspection Photo with Comment

1.3.1. General View of Tank

	**General View of Tank T3**
	**General View of Name plate**

1.3.2. Foundation

	**Foundation** General view of Foundation.

Bottom Projection Plate and Foundation

Finding:
Sealent between bottom projection plate and tank foundation found deteriorated/damaged.
Recommendation:
To replace with new plinth seal.
Repair Priority: *Online Or Offline*

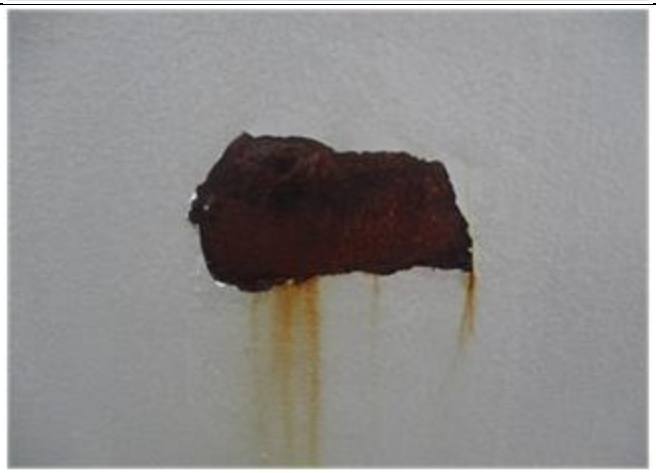
Tank Earthing

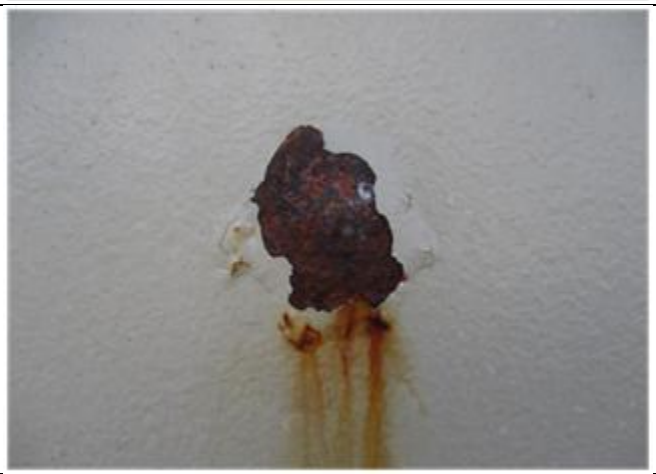
Finding:
Two earthing cable for grounding were noted on projection plate and physically condition of cable found satisfactory.
Recommendation:
Recommended to carry out resistance test as per API 575 clause 7.2.6 (if not done yet). The total resistance from tank to earth should not exceed 25 ohm and monitor during routine inspection.
Repair Priority: *Online Or Offline*

1.3.3. Shell

Shell Plate

Finding:
Numerous location of paint flaking and corrosion were observed on shell plate external.
Recommendation:
Power brush affected area and recoat as per owner's painting specification.
Repair Priority: *Offline*






3

Shell Plate (Internal)

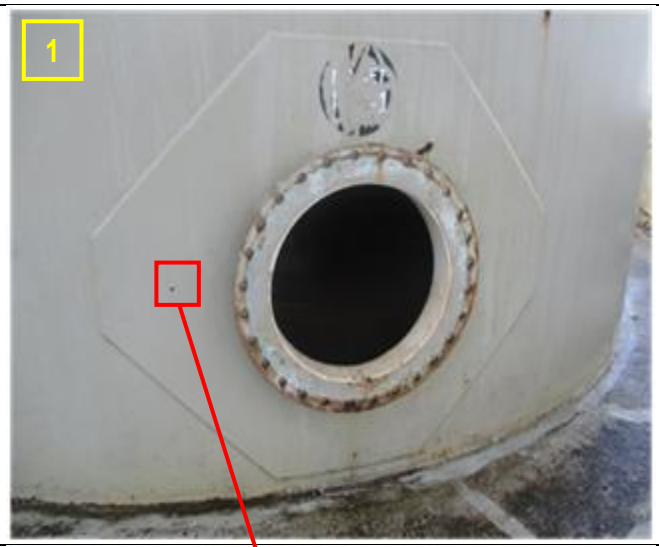
Finding:
Internal shell was covered with protective coating. No significant finding was noted during inspection.
Recommendation:
None/ Not Applicable.
Repair Priority: *None/ Not Applicable.*

First Course Weldment (Internal)

Finding:
Weldment was covered with protective coating. No significant finding was noted during inspection.
Recommendation:
None/ Not Applicable.
Repair Priority: *None/ Not Applicable.*

Shell Plate - 1st course at 225° station.

Finding:
Bulging with maximum depth of 34mm was noted. See survey data.
Recommendation:
To monitor.
Repair Priority: *None/ Not Applicable.*

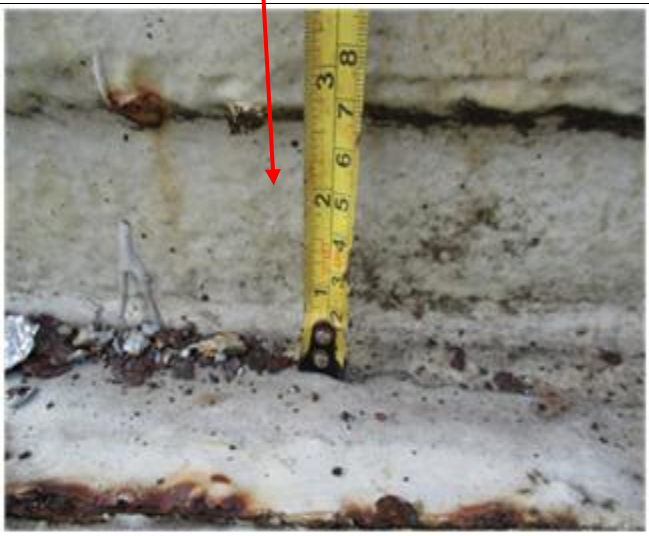


Manway - Size: 24 inch.

Finding:
1) Tell tale hole noted plugged with coating.
Recommendation:
Unplug tell tale and seal with suitable sealent (e.g grease, etc) to prevent water from seep underneath between reiforcement and shell plate and cause unseen corrosion.
Repair Priority: *Online Or Offline*

Finding:
2) Paint failure were observed on the flange and bolting.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Finding:
3) Non-API standard reinforcement plate repair noted.
Recommendation:
To monitor.
Repair Priority: *None/ Not Applicable.*



Manway (Internal) - Size: 24 inch.

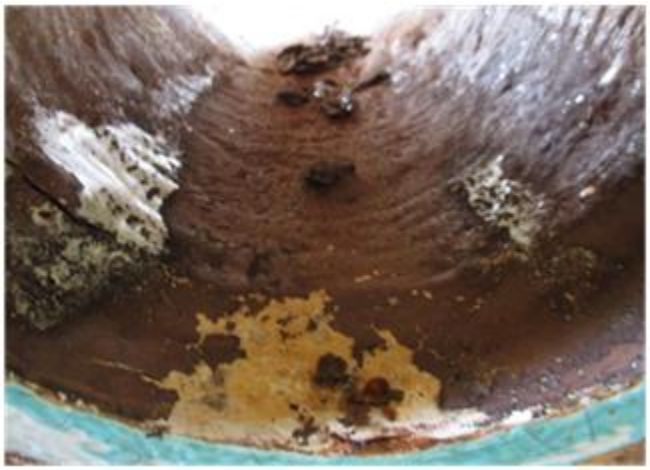
Finding:
No significant finding was noted during inspection.
Recommendation:
None/ Not Applicable.
Repair Priority: *None/ Not Applicable.*

Inlet - Size: 6 inch.

Finding:
1) Tell tale hole noted plugged with coating.
Recommendation:
Unplug tell tale and seal with suitable sealent (e.g grease, etc) to prevent water from seep underneath between reiforcement and shell plate and cause unseen corrosion.
Repair Priority: *Online Or Offline*

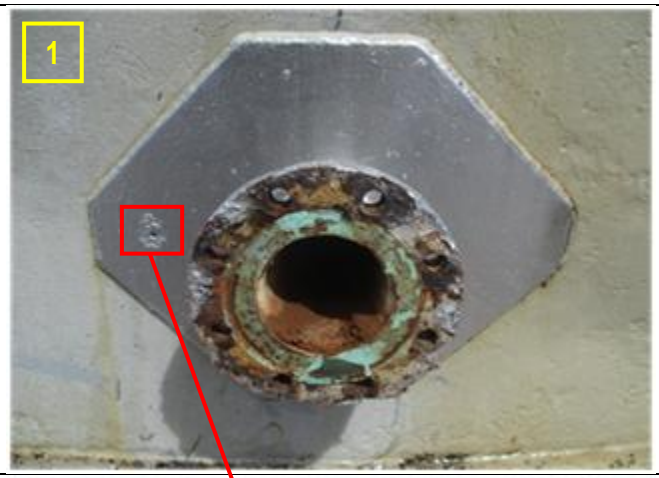
Finding:
2) Paint flaking and corrosion was noted on the flange and bolting.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Finding:
3) Non-API standard reinforcement plate repair noted.
Recommendation:
To monitor.
Repair Priority: *None/ Not Applicable.*



Inlet (Internal) - Size: 6 inch.

Finding:
Paint failure noted.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*



Water Drain Off - Size: 4 inch.

Finding:
1) Tell tale hole noted plugged with coating.
Recommendation:
Unplug tell tale and seal with suitable sealent (e.g grease, etc) to prevent water from seep underneath between reiforcement and shell plate and cause unseen corrosion.
Repair Priority: *Offline*

Finding:
2) Corrosion and scalling noted on flange and bolting.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Water Drain Off (Internal) - Size: 4 inch.

Finding:
Paint failure noted.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Outlet - Size: 6 inch.

Finding:
1) Tell tale hole noted plugged with coating.
Recommendation:
Unplug tell tale and seal with suitable sealent (e.g grease, etc) to prevent water from seep underneath between reiforcement and shell plate and cause unseen corrosion.
Repair Priority: *Online Or Offline*

Finding:
2) Paint flaking and corrosion noted.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Finding:
3) Non-API standard reinforcement plate repair noted.
Recommendation:
To monitor.
Repair Priority: *None/ Not Applicable.*

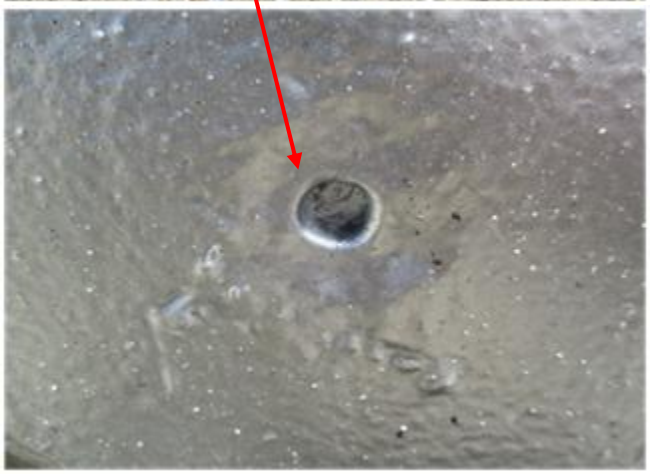

2


2


3

Outlet (Internal) - Size: 6 inch.

Finding:
Paint failure and corrosion noted.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*



Blind - Size: 6 inch.

Finding:
1) Tell tale hole noted plugged with coating.
Recommendation:
Unplug tell tale and seal with suitable sealent (e.g grease, etc) to prevent water from seep underneath between reiforcement and shell plate and cause unseen corrosion.
Repair Priority: *Online Or Offline*

Finding:
2) Paint flaking and corrosion noted.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Finding:
3) Non-API standard reinforcement plate repair noted.
Recommendation:
To monitor.
Repair Priority: *None/ Not Applicable.*


2


2


3

Blind (Internal) - Size: 6 inch.

Finding:
Paint flaking and corrosion noted.
Recommendation:
To made good surface preparation and recoat as per paint manufacturer' specification.
Repair Priority: *Offline*

Drain Nozzle - Size: 4 inch.

Finding:
1) Tell tale hole noted plugged with coating.
Recommendation:
Unplug tell tale and seal with suitable sealent (e.g grease, etc) to prevent water from seep underneath between reiforcement and shell plate and cause unseen corrosion.
Repair Priority: *Online Or Offline*

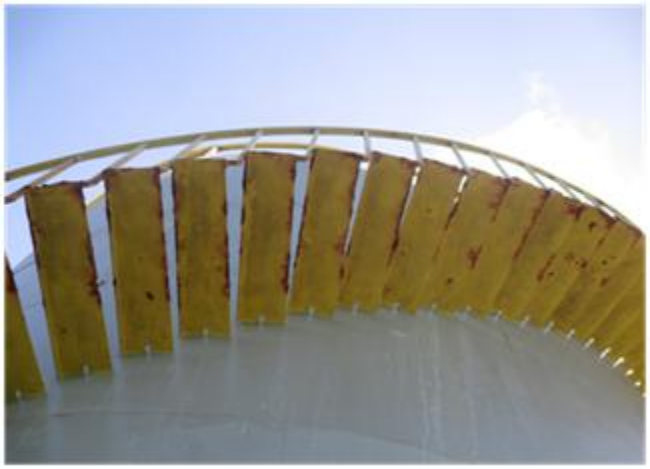
Finding:
2) Paint failure and corrosion noted.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Drain Nozzle (Internal) - Size: 4 inch.

Finding:
Paint flaking was noted.
Recommendation:
To made good surface preparation and recoat as per paint manufacturer' specification.
Repair Priority: *Offline*

Shell Plate

Finding:
Several attachment/pipe holders were noted attached to the shell wall.
Recommendation:
None/ Not Applicable.
Repair Priority: *None/ Not Applicable.*



Spiral Stairway

Finding:
Paint failure with isolated corrosion were observed on stairway thread, stringer and support.
Recommendation:
To made good surface preparation and recoat as per paint manufacturer' specification.
Repair Priority: *Offline*

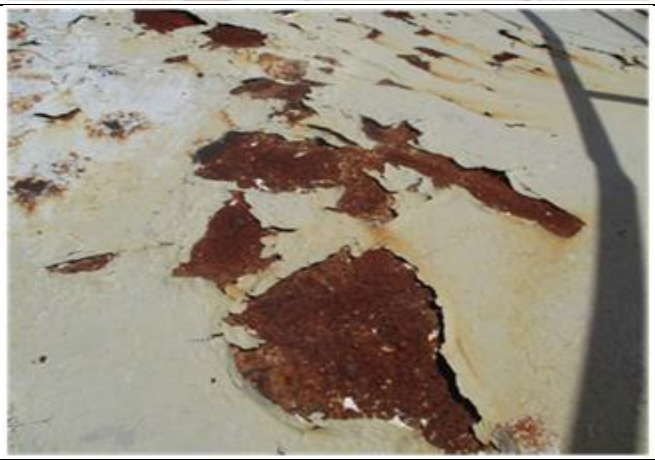
1.3.4. Fixed Roof

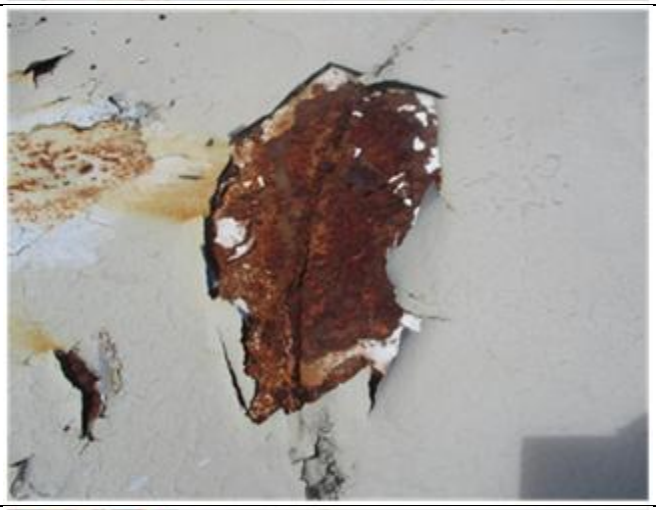
Roof Plate

General view of Roof Plate.

Roof Plate

Finding:
Approximately 70% of roof plate suffered from paint flaking and corrosion were observed.
Recommendation:
To made good surface preparation and recoat as per paint manufacturer' specification.
Repair Priority: *Offline*





Crown Plate

Finding:
Paint failure and corrosion noted.
Recommendation:
To made good surface preparation and recoat as per paint manufacturer' specification.
Repair Priority: *Offline*

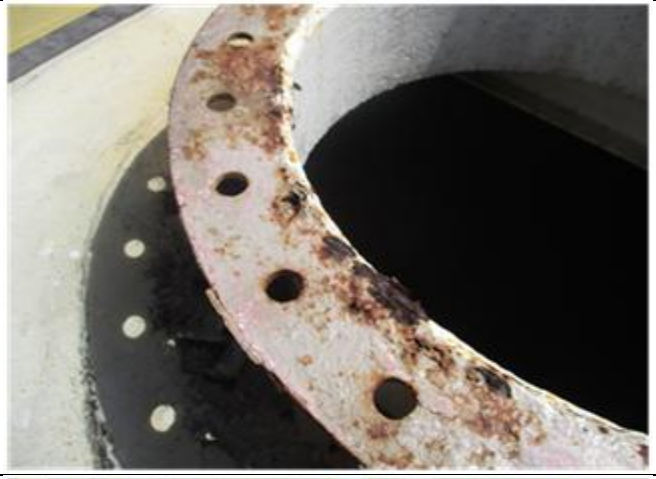
Roof Plate (Internal)

Finding:
No significant finding was noted.
Recommendation:
None/ Not Applicable.
Repair Priority: *None/ Not Applicable.*

Sampling/ Gauging Hatch - 6 inch.

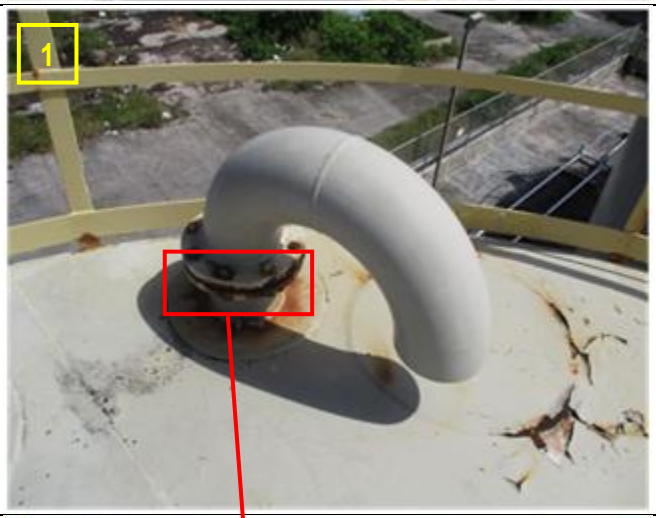
Finding:
1) Deterioration/damaged due to severe corrosion was noted.
Recommendation:
To replace with new Sampling Hatch.
Repair Priority: *Offline*

Finding:
2) Paint failure with surface rust was observed on the neck, securing bolts and flange.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*



Roof Manway - 20 inch.

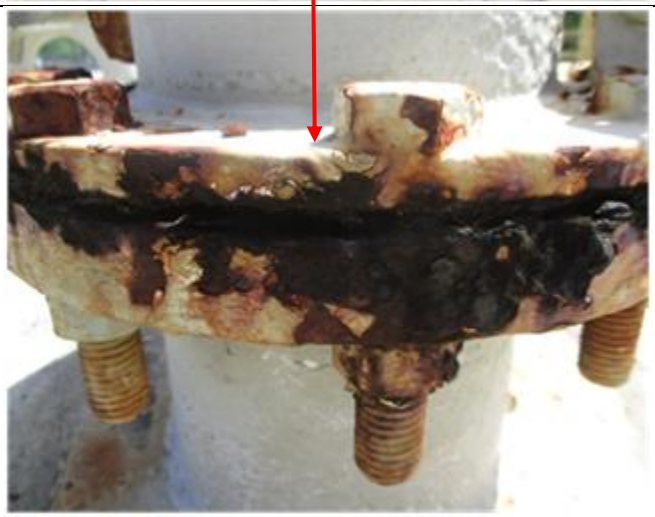
Finding:
Paint failure with surface rust was observed on the neck, securing bolts and flange.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*



Goose Neck Vent - 8 inch.

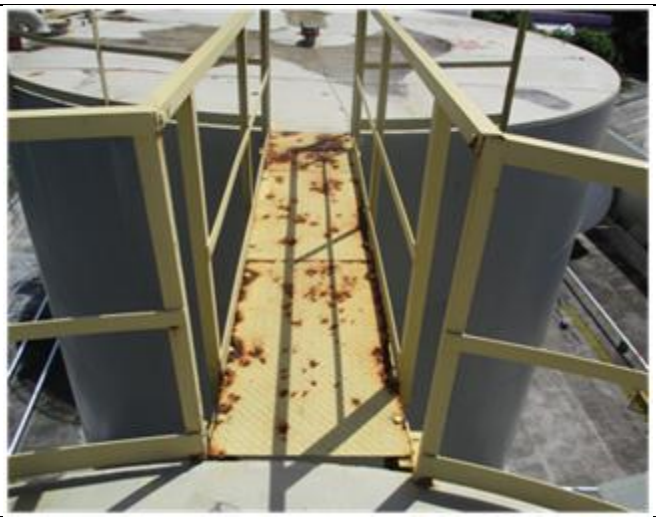
Finding:
1) Paint failure with surface rust was observed on the neck, securing bolts and flange.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

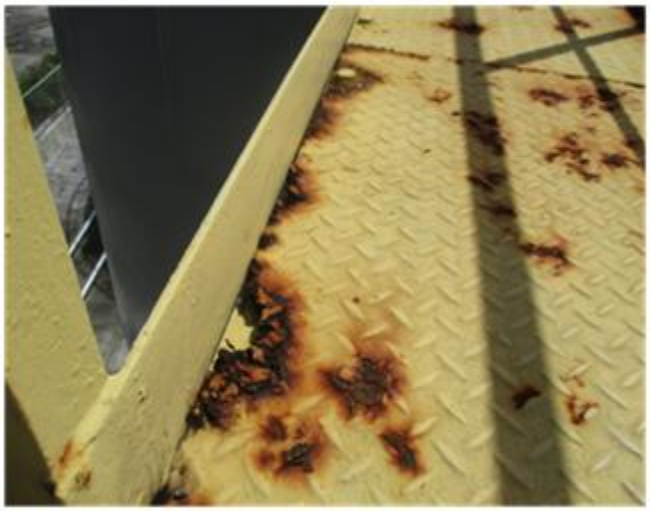
Finding:
2) Mesh screen found in satisfactory condition.
Recommendation:
Recommend to replace mesh screen to preferable "Basket type" for easier monitoring purpose.
Repair Priority: *None/ Not Applicable.*

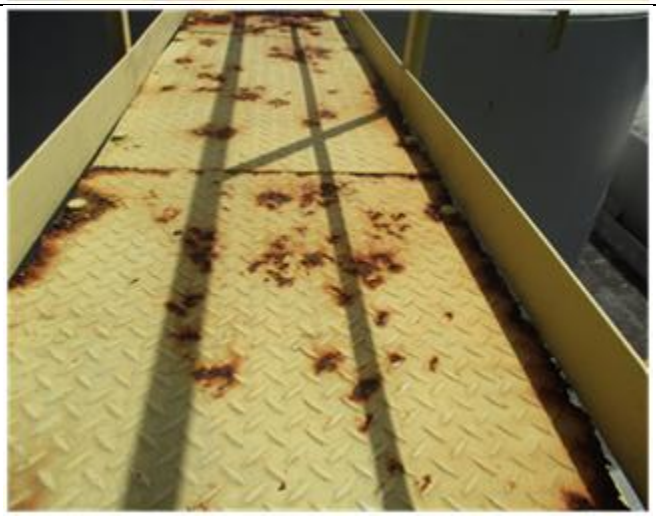


Sampling/ Gauging Hatch - 6 inch.

Finding:
Paint failure with surface rust was observed on the neck, securing bolts and flange.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*







Interconnection Bridge

Finding:
Paint failure and corrosion noted.
Recommendation:
To made good surface preparation and recoat as per paint manufacturer' specification.
Repair Priority: *Offline*

Handrail

Finding:
Paint failure and corrosion noted.
Recommendation:
To made good surface preparation and recoat as per paint manufacturer' specification.
Repair Priority: *Offline*

Frangible joint (Joint between roof plate and shell top angle)

Finding:
Roof handrails were welded on top of roof to shell frangible joint. This will streghten the joint and not complies with API 650, Section 3.10.2.6.
Recommendation:
Consideration to redesign the roof handrails which allow weak roof-to-shell attachment.
Repair Priority: *To Monitor*

1.3.5. Bottom

Bottom Plate

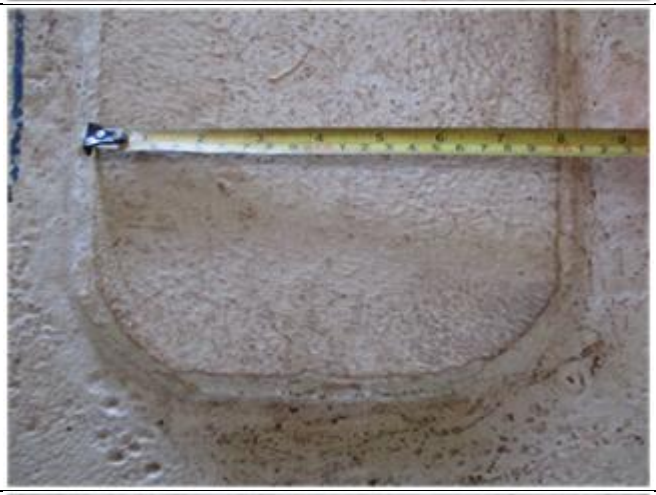
Finding:
Approximately 80% of bottom plate suffered from general pitting with the maximum depth of 2.5mm. Bottom plate was covered with protective coating.
Recommendation:
None/ Not Applicable.
Repair Priority: None/ Not Applicable.

Bottom Plate - Plate number: 2-1 (300x350mm)

Finding:
Non-API standard patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 4-1 (250x500mm)

Finding:
Non-API standard patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*



Bottom Plate - Plate number: 4-1 (200x230mm)

Finding:
Non-API standard patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 4-1 (200x200mm)

Finding:
Non-API standard patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate weldment

Finding:
Weldment was covered with protective coating. No significant finding was noted during inspection.
Recommendation:
None/ Not Applicable.
Repair Priority: *None/ Not Applicable.*

Shell to Bottom Joint

Finding:
Weldment was covered with protective coating. No significant finding was noted during inspection.
Recommendation:
None/ Not Applicable.
Repair Priority: *None/ Not Applicable.*

Drain Sump

Finding:
No significant finding was noted during inspection.
Recommendation:
None/ Not Applicable.
Repair Priority: *None/ Not Applicable.*

Diping Plate

Finding:
No significant finding was noted during inspection.
Recommendation:
None/ Not Applicable.
Repair Priority: *None/ Not Applicable.*

1.4. Visual Inspection Checklist

- Out of Service Inspection Checklist

No.	Items	Completed √	Comments
1	**OVERVIEW**		
1.1	Check that tank has been cleaned, is gas free, and safe for entry.	√	N/A
1.2	Check that the tank is completely isolated from product lines, all electrical power, and steam lines.	√	N/A
1.3	Check that roof is adequately supported, including fixed roof structure and floating roof legs.	√	N/A
1.4	Check for presence of failing object hazards, such as corroded-through roof rafters, asphalt stalactites, and trapped hydrocarbons in unopened or plugged equipment or appurtenances, ledges, etc.	√	N/A
1.5	Inspect for slipping hazards on the bottom and roof decks.	√	N/A
1.6	Inspect structural welds on accessways and clips.	√	N/A
1.7	Check surface needing inspection for a heavy-scale buildup and check weld seams and oily surfaces where welding is to be done. Note areas needing more cleaning, including blasting.	√	N/A
2	**TANK EXTERIOR**		
2.1	Inspect appurtenances opened during cleaning such as lower floating swing sheave assemblies, nozzle interiors (after removal of valves).	√	N/A
2.2	Hammer test or ultrasonically test the roof.	√	UT
2.3	Enter and inspect the floating roof pontoon compartments.	N/A	N/A
3	**BOTTOM INTERIOR SURFACE**		
3.1	Using a flashlight held close to and parallel to the bottom plates, and using the bottom plate layout as a guide, visually inspect and hammer test the entire bottom.	√	N/A
3.2	Measure the depth of pitting and describe the pitting appearance (sharp edged, lake type, dense, scattered, etc).	√	N/A
3.3	Mark areas requiring patching or further inspection.	√	N/A
3.4	Mark locations for turning coupons for inspection.	√	N/A
3.5	Inspect all welds for corrosion and leaks, particularly the shell-to-bottom weld.	√	N/A
3.6	Inspect sketch plates for corrosion.	√	N/A
3.7	Check condition of internal sump, if applicable. Standing liquid should be removed from the sump to allow for complete inspection and vacuum testing of weld seams as appropriate. Sump bottom and sidewall plate and seams need to be evaluated for both product-side and soil-side corrosion.	√	N/A
3.8	Locate and mark voids under the bottom.	√	N/A
3.9	Record bottom data on a layout sketch using the existing bottom plates as a grid. List the number and sizes of patches required.	√	N/A
3.1	Vacuum test the bottom lap welds.	N/A	N/A

3.11	Hammer test or ultrasonically examine any slightly discolored spots or damp areas.	√	UT
3.12	Check for reinforcing pads under all bottom attached clips, brackets, and supports.	√	N/A
3.13	Inspect floating roof leg pads for pitting or cutting, and excessive dimpling (indicating excessive loading).	N/A	N/A
3.14	Check the column bases of fixed roof supports for adequate pads and restraining clips.	N/A	N/A
3.15	In earthquake zones 3 and 4, check that roof supports are not welded down to the tank bottom, but are only restrained from horizontal movement.	N/A	N/A
3.16	Check area beneath swing line cable for indications of cable cutting or dragging.	N/A	N/A
3.17	Mark old oil and air test connection for removal and patching.	N/A	N/A
3.18	Identify and report low areas on the bottom that does not drain adequately.	√	N/A
3.19	Inspect coating for holes, disbonding, deterioration, and discoloration.	√	N/A
4	**SHELL SEAMS AND PLATE**		
4.1	On cone up bottoms, closely inspect and gauge the depth of metal loss on the lower 2 in. to 4 in. of the shell (area of standing water).	N/A	N/A
4.2	Measure the depth of pitting on each course.	N/A	N/A
4.3	Inspect and estimate the amount of metal loss on the heads of rivets and bolts.	√	N/A
4.4	Inspect shell-to-bottom riveted lap joints.	N/A	N/A
4.5	Inspect for vertical grooving damage from seal assembly protrusions.	√	N/A
4.6	Inspect existing protective coatings for damage, deterioration, and disbonding.	√	N/A
4.7	Check for areas of rubbing (indicating too much pressure by the seal assembly shoes or inadequate annular space).	N/A	N/A
4.8	Visually inspect the shell plates and seams for indications of leakage.	√	
4.9	If the shell has riveted or bolted seams, record the leak locations by film or chart in case the locations are lost during surface preparation for painting.	N/A	N/A
4.1	Measure annular space at 40-ft intervals.	N/A	N/A
4.11	Survey the shell to check for roundness and plumb.	√	See Survey Data
5	**SHELL-MOUNTED OVERFLOWS**		
5.1	Inspect overflow for corrosion and adequate screening.	N/A	N/A
5.2	Check location of overflow that it is not above any tank valves or equipment.	N/A	N/A
6	**ROOF INTERIOR SURFACE**		
6.1	**General**		
6.1.1	Visually inspect the underside surface of the roof plates for holes, scale buildup, and pitting.	N/A	N/A

6.1.2	Hammer test or ultrasonically examine to check for thin areas, particularly in the vapor space of floating roofs and at edge of roof on cone roof tank.	√	UT
6.1.3	Check all clips, brackets, braces, etc., welded to the roof deck plate for welded reinforcing pads and see that they have not broken free.	N/A	N/A
6.1.4	If no pad is present, penetrant test for cracking of the weld or deck plate.	N/A	N/A
6.1.5	Inspect for protective coating for breaks, disbondment, and deterioration.	N/A	N/A
6.1.6	Spark test the interior surface coating if recoating is not planned.	N/A	N/A
6.2	**Fixed Roof Support Structure**		
6.2.1	Inspect the support columns for thinning in the upper 2 ft.	N/A	N/A
6.2.2	On API columns (two channels welded together) check for corrosion scale breaking the tack welds, unless the joint between the channels is completely seal welded.	N/A	N/A
6.2.3	Check that the reinforcing pad on the bottom is seal-welded to the tank bottom with horizontal movement restraining clips welded to the pad.	N/A	N/A
6.2.4	Determine if pipe column supports are concrete filled or open pipe. If open pipe, check for a drain opening in the bottom of the pipe.	N/A	N/A
6.2.5	Inspect and gauge rafters for thinning, particularly near the center of the roof. Report metal loss.	N/A	N/A
6.2.6	Check for loose or twisted rafters.	N/A	N/A
6.2.7	Inspect girders for thinning and check that they are attached securely to the top of the columns.	N/A	N/A
6.2.8	Report if the columns have cross bracing in the area between the low pump out of the top of the shell (for future internal floating roof installation).	N/A	N/A
6.2.9	Inspect and report presence of any roof-mounted swing line bumpers.	N/A	N/A
6.2.10	Photograph the roof structure if no rafter layout drawing exists.	N/A	N/A
7	**FIXED ROOF APPURTENANCES**		
7.1	**Inspection and Light Hatches**		
7.1.1	Inspect the hatches for corrosion, paint and coating failures, holes, and cover sealing.	N/A	N/A
7.1.2	On loose covers, check for a safety chain in good condition.	N/A	N/A
7.1.3	On light hatches over 30 in. across, check for safety rods.	N/A	N/A
7.1.4	Inspect the condition of the gaskets on bold or latched down hatch covers.	N/A	N/A
7.2	**Staging Support Connection**		
7.2.1	Inspect the condition of the staging support for corrosion.	√	N/A
7.3	**Breathers and Vents**		
7.3.1	Inspect and service the breather.	√	N/A
7.3.2	Inspect screens on vents and breathers.	√	N/A
7.4	**Emergency P/V Hatches**		

7.4.1	Inspect and service pressure/vacuum hatches. (Setting should be high enough to prevent chattering of breather during normal operation. See breather manufacturer's guide.	N/A	N/A
7.4.2	Inspect liquid seal hatches for corrosion and proper liquid level in the seal.	N/A	N/A
7.5	**Sample Hatches**		
7.5.1	Inspect sample hatch for corrosion.	√	N/A
7.5.2	Check that the cover operates properly.	√	N/A
7.5.3	If the tank has no gauge well, check for a hold-off distance marker and check measurement.	√	N/A
8	**FLOATING ROOF**		
8.1	**Roof Deck**		
8.1.1	Hammer test the area between roof rim and shell. (If access for hammer testing is inadequate, measure the distance from the bottom edge of the roof to the corroded area and then hammer test from inside the pontoon).	N/A	N/A
8.1.2	In sour water service, clean and test all deck plate weld seams for cracking unless the lower laps have been seal-welded.	N/A	N/A
8.1.3	Check that either the roof drain is open or the drain plug in the roof is open in case of unexpected rain.	N/A	N/A
8.1.4	On flat bottomed and cone bottom roof decks, check for a vapor dam around the periphery of the roof. The dam should be continuous without break to prevent escape of vapors to the seal area from under the center of the roof.	N/A	N/A
8.2	**Floating Roof Pontoons**		
8.2.1	Visually inspect each pontoon for liquid leakage.	N/A	N/A
8.2.2	Run a light wire through the gooseneck vents on locked down inspection hatch covers to make sure they are open.	N/A	N/A
8.2.3	Inspect lockdown latches on each cover.	N/A	N/A
8.2.4	Check and report if each pontoon is :	N/A	N/A
	1. Vapor tight (bulkhead seal welded on one side on bottom, sides, and top) 2. Liquid tight (seal-welded on bottom and sides only), or 3. Unacceptable (minimum acceptable conditions is liquid tight).	N/A	N/A
8.3	**Floating Roof Cutouts**		
8.3.1	Inspect underside of cutouts for mechanical damage.	N/A	N/A
8.3.2	Inspect welds for cracks.	N/A	N/A
8.3.3	Inspect plate thinning, pitting, and erosion.	N/A	N/A
8.3.4	Measure mixer cutouts and record plate thickness for future mixer installation or replacement. Plate thickness_____.	N/A	N/A
8.4	**Floating Roof Supports**		
8.4.1	Inspect fixed low and removable high floating roof legs for thinning.	N/A	N/A
8.4.2	Inspect for notching at bottom of legs for drainage.	N/A	N/A
8.4.3	Inspect for leg buckling or felling at bottom.	N/A	N/A
8.4.4	Inspect pin hole in roof guide for tears.	N/A	N/A

8.4.5	Check plumb of all legs.	N/A	N/A
8.4.6	Inspect for adequate reinforcing gussets on all legs through a single portion of the roof.	N/A	N/A
8.4.7	Inspect the area around the roof legs for cracking if there is no internal reinforcing pad or if the topside pad is not welded to the deck plate on the underside.	N/A	N/A
8.4.8	Inspect the sealing system on the two-position legs and the vapor plugs in the fixed low leg for deterioration of the gaskets.	N/A	N/A
8.4.9	On shell-mounted roof supports, check for adequate clearance based on the maximum floating roof movement as determined by the position of the roof relative to the gauge well and/or counter-rotational device.	N/A	N/A
9	**FLOATING ROOF SEAL ASSEMBLIES**		
9.1	**Primary Shoes Assembly**		
9.1.1	Remove four sections of foam log (foam-filled seals) for inspection on 90^0 locations.	N/A	N/A
9.1.2	Inspect hanger attachment to roof rim for thinning, bending, broken welds, and wear of pin holes.	N/A	N/A
9.1.3	Inspect clips welded to roof rim for thinning.	N/A	N/A
9.1.4	Shoes-inspect for thinning and holes in shoes.	N/A	N/A
9.1.5	Inspect for bit-metal bolts, clips, and attachment.	N/A	N/A
9.1.6	Seal fabric-inspect for deterioration, stiffening, holes, and tears in fabric.	N/A	N/A
9.1.7	Measure length of fabric from top of shoe to roof rim, and check against maximum anticipated annular space as roof operates.	N/A	N/A
9.1.8	Inspect any modification of shoes over shell nozzles, mixers, etc., for clearance.	N/A	N/A
9.1.9	Inspect shoes for damage caused by striking shell nozzles, mixers, etc.	N/A	N/A
9.2	**Primary Toroidal Assembly**		
9.2.1	Inspect seal fabric for wear, deterioration, holes, and tears.	N/A	N/A
9.2.2	Inspect hold-down system for buckling or bending.	N/A	N/A
9.2.3	Inspect foam for liquid absorption and deterioration.	N/A	N/A
9.3	**Rim-Mounted Secondaries**		
9.3.1	Inspect the rim-mounted bolting bar for corrosion and broken welds.	N/A	N/A
9.3.2	Measure and chart seal-to-shell gaps.	N/A	N/A
9.3.3	Visually inspect seam from below, looking for holes as evidenced by light.	N/A	N/A
9.3.4	Inspect fabric for deterioration and stiffness.	N/A	N/A
9.3.5	Inspect for mechanical damage, corrosion, and wear on tip in contact with shell.	N/A	N/A
9.3.6	Inspect for contact with obstructions above top of shell.	N/A	N/A
10	**FLOATING ROOF APPURTENANCES**		
10.1	**Roof Manways**		
10.1.1	Inspect walls of manways for pitting and thinning.	N/A	N/A

10.1.2	On tanks with interface autogauges, check seal around gauge tape cable and guide wires through manway cover.	N/A	N/A
10.1.3	Inspect cover gasket and bolts.	N/A	N/A
10.2	**Rim Vent**		
10.2.1	Check rim vent for fitting and holes.	N/A	N/A
10.2.2	Check vent for condition of screen.	N/A	N/A
10.2.3	On floating roof tanks where the environmental rules require closing off the vent, check the vent pipe for corrosion at the pipe-to-rim joint and check that the blinding is adequate.	N/A	N/A
10.3	**Vacuum Breaker, Breather Type**		
10.3.1	Service and check operation of breather valve.	N/A	N/A
10.3.2	Check that nozzle pipe projects no more than 1/2 in. below roof deck.	N/A	N/A
10.4	**Vacuum Breaker, Mechanical Type**		
10.4.1	Inspect the stem for thinning. Measure how far the vacuum breaker cover is raised off the pipe when the roof is resting on high or low legs.	N/A	N/A
	a. On high legs :	N/A	N/A
	b. On low legs :	N/A	N/A
10.5	**Roof Drains : Open Systems, Including Emergency Drains.**		
10.5.1	Check liquid level inside open roof drains for adequate freeboard. Report if there is insufficient distance between liquid level and top of drain.	N/A	N/A
10.5.2	If tanks comes under Air Quality Monitoring District rules, inspect the roof drain vapor plug.	N/A	N/A
10.5.3	If emergency is not at the center of the roof, check that there are at least three emergency drains.	N/A	N/A
10.6	**Closed Drain System : Drain Basins**		
10.6.1	Inspect for thinning and pitting.	N/A	N/A
10.6.2	Inspect protective coating (topside).	N/A	N/A
10.6.3	Inspect basin cover or screen for corrosion.	N/A	N/A
10.6.4	Test operation of check valve.	N/A	N/A
10.6.5	Check for presence of check valve where bottom of basin is below product level.	N/A	N/A
10.6.6	Inspect drain basin(s) to roof deck welds for cracking.	N/A	N/A
10.6.7	Check drain basin(s) outlet pipe for adequate reinforcement to roof deck (including reinforcing pad).	N/A	N/A
10.7	**Closed Drain Systems : Fixed Drain Line on Tank Bottom**		
10.7.1	Hammer test fixed drain line on tank bottom for thinning and scale/debris plugging.	N/A	N/A
10.7.2	Inspect supports and reinforcing pads for weld failures and corrosion.	N/A	N/A
10.7.3	Check that pipe is guided, not rigidly locked to support, to avoid tearing of tank bottom plate.	N/A	N/A
10.8	**Closed Drain Systems : Flexible Pipe Drain**		
10.8.1	Inspect for damage to exterior of pipe.	N/A	N/A
10.8.2	Check for obstructions that pipe could catch on.	N/A	N/A
10.8.3	Inspect shields to protect pipe from snagging.	N/A	N/A

10.8.4	Inspect results of hydrostatic test on flexible roof drain system.	N/A	N/A
10.9	**Closed Drain System : Articulated Joint Drain**		
10.9.1	Hammer test rigid pipe in flexible joint systems for thinning and scale/debris plugging.	N/A	N/A
10.9.2	Inspect system for signs of bending or strain.	N/A	N/A
10.9.3	Inspect results of system hydrostatic test.	N/A	N/A
10.9.4	Inspect landing leg and pad.	N/A	N/A
10.10	**Autogauge System and Alarms**		
10.10.1	Check freedom of movement of tape through autogauge tape guide.	N/A	N/A
10.10.2	Inspect sheaves for freedom of movement.	N/A	N/A
10.10.3	Test operation checker.	N/A	N/A
10.10.4	Inspect tape and tape cable for twisting and fraying.	N/A	N/A
10.10.5	Test the tape's freedom of movement through guide sheaves and tape guide pipe.	N/A	N/A
10.10.6	On open-top tanks, check that gate tapes with cables have no more than one foot of tape exposed with float at lowest point.	N/A	N/A
10.10.7	Check float for leakage.	N/A	N/A
10.10.8	Test float guide wire anchors for spring action by pulling on wire and releasing.	N/A	N/A
10.10.9	Inspect floatwells in floating roofs for thinning and pitting of walls just above the liquid level.	N/A	N/A
10.10.10	Check that the autogauge tape is firmly attached to the float.	N/A	N/A
10.10.11	Inspect the tape cable and float guide wire fabric seals through the float well cover.	N/A	N/A
10.10.12	Inspect the bottom guide wire attachment clip : inspect for a temporary weighted bar instead of a permanent welded down clip.	N/A	N/A
10.10.13	Inspect board-type autogauge indicators for legibility and freedom of movement of indicator.	N/A	N/A
10.10.14	Measure and record these distances to determine if seal damage will occur if tank is run over from :	N/A	N/A
	1. Shell top angle to underside of tape guide system.	N/A	N/A
	2. Liquid level on floating top to top of secondary seal.	N/A	N/A
10.10.15	Identify floating roofs where the tape is connected directly to the roof.	N/A	N/A
10.10.16	Overfill alarm : Inspect tank overfill prevention alarm switches for proper operation.	N/A	N/A
11	**COMMON TANK APPURTENANCES**		
11.1	**Gauge Well**		
11.1.1	Inspect gate well pipe for thinning at about two-thirds distance above the bottom: look for thinning at the edge of the slots.	N/A	N/A
11.1.2	Check for corrosion on the pipe joint. Check that sample cords, weights, thermometers, etc., have been removed from the pipe.	N/A	N/A
11.1.3	Check for cone at bottom end of pipe about one foot above the bottom.	N/A	N/A

11.1.4	Check condition of well washer pipe and that its flared end is directed at the near side of the hold of pad.	N/A	N/A
11.1.5	Check that supports for gauge well are welded to pad or to shell and no directly to bottom plate.	N/A	N/A
11.1.6	Check operation of gauge well cover.	N/A	N/A
11.1.7	Check presence of a hold-off distance marker in well pipe and record hold-off distance. Hold-off distance_____ .	N/A	N/A
11.1.8	Identify and report size and pipe schedule, and whether pipe is solid or slotted. Report slot size.	N/A	N/A
11.1.9	Check that the hold-off distance plate is seal-welded to the bottom and that any gauge well supports are welded to the plate and not directly to the bottom.	N/A	N/A
11.1.10	Inspect vapor control float and cable.	N/A	N/A
11.1.11	Check for presence and condition of gauge well washer.	N/A	N/A
11.1.12	Check for bull plug or plate blind on gauge well washer valve.	N/A	N/A
11.1.13	Inspect gauge well guide in floating roof for pitting and thinning.	N/A	N/A
11.1.14	Inspect the guide rollers and sliding plates for freedom of movement.	N/A	N/A
11.1.15	Inspect condition of gauge well pipe seal system.	N/A	N/A
11.1.16	On black oil and diesel services: if gauge well is also used for sampling, check for presence of a thief-and gauge-type hatch to avoid spillage.	N/A	N/A
11.1.17	Visually inspect inside of pipe for pipe weld protrusions which could catch or damage vapor control float.	N/A	N/A
11.2	**Sampling Systems : Roof Sample Hatches**		
11.2.1	Inspect roof-mounted sample hatches for reinforcing pads and cracking.	√	N/A
11.2.2	Inspect cover for operation.	√	N/A
11.2.3	For tanks complying with Air Quality Monitoring District rules, inspect sample hatch covers for adequate sealing.	√	N/A
11.2.4	Check horizontal alignment of internal floating roof sample hatches under fixed roof hatches.	N/A	N/A
11.2.5	Inspect the sealing system on the internal floating roof sample hatch cover.	N/A	N/A
11.2.6	Inspect floating roof sample hatch cover recoil reel and rope.	N/A	N/A
11.3	**Shell Nozzles**		
11.3.1	Inspect shell nozzles for thinning and pitting.	√	UT
11.3.2	Inspect hot tap nozzles for trimming of holes.	√	N/A
11.3.3	Identify type of shell nozzles.	√	N/A
11.3.4	Identify and describe internal piping, including elbow-up and elbow-down types.	√	N/A
11.4	**For Nozzles Extended Into the Tank**		
11.4.1	Inspect pipe support pads welded to tank bottom.	√	N/A
11.4.2	Inspect to see that pipe is free to move along support without strain or tearing action on bottom plate.	N/A	Pipe was removed
11.4.3	Inspect nozzle valves for packing leaks and damaged flange faces.	√	N/A
11.4.4	Inspect heater stream nozzle flanges and valves for wire cutting.	N/A	N/A

11.4.5	Report which nozzles have thermal pressure relief bosses and valves.	√	N/A
11.4.6	In internal elbow-down fill line nozzles, inspect the wear plate on the tank bottom.	N/A	N/A
11.4.7	On elbow-up fill lines in floating roof tanks, check that opening is directed against underside of roof, not against vapor space. Inspect impact are for erosion.	N/A	N/A
11.5	**Diffusers and Air Rolling Systems**		
11.5.1	Inspect diffuser pipe for erosion and thinning.	N/A	N/A
11.5.2	Check holes in diffuser for excessive wear and enlargement.	N/A	N/A
11.5.3	Inspect diffuser supports for damage and corrosion.	N/A	N/A
11.5.4	Check that diffuser supports restrain, not anchor, longitudinal line movement.	N/A	N/A
11.5.5	Inspect air spiders on bottom of lube oil tanks for plugging and damaged or broken threaded joints.	N/A	N/A
11.6	**Swing Lines**		
11.6.1	Inspect flexible joint for cracks and leaks.	N/A	N/A
11.6.2	Scribe the flexible joint across the two moving faces and raise end of swing line to check the joint's freedom of movement, indicated by separation of scribe marks.	N/A	N/A
11.6.3	Check that flexible joints over 6 in. are supported.	N/A	N/A
11.6.4	Inspect the swing pipe for deep pitting and weld corrosion.	N/A	N/A
11.6.5	Loosen the vent plugs in the pontoons and listen for a vacuum. Lack of a vacuum indicates a leaking pontoon.	N/A	N/A
11.6.6	Check the results of air test on pontoons during repairs.	N/A	N/A
11.6.7	Inspect the pontoons for pitting.	N/A	N/A
11.6.8	Inspect the pull-down cable connections to the swing.	N/A	N/A
11.6.9	Inspect the condition of the bottom-mounted support, fixed roof limiting bumper, or shell-mounted limiting bumper for wood condition, weld and bolt corrosion, and seal welding to bottom or shell.	N/A	N/A
11.6.10	Inspect safety hold-down chain for corrosion and weak links.	N/A	N/A
11.6.11	Check that there is a welded reinforcing pad where the chain connects to the bottom.	N/A	N/A
11.6.12	If the floating swing in a floating or internal floating roof tank does not have a limiting device preventing the swing from exceeding 60 degrees, measure and calculate the maximum angle possible with the roof on overflow. Max. angle on Overflow :(If the calculated angle exceeds 65 degrees, recommended installation of a limiting bracket.):	N/A	N/A
11.6.13	Inspect pull-down cable for frying.	N/A	N/A
11.6.14	Inspect for three cable clamps where cable attaches to end of swing line (single-reeved) or to roof assembly (double-reeved). Inspect sheaves for freedom of movement.	N/A	N/A
11.6.15	Inspect winch operation and check the height indicator for legibility and accuracy.	N/A	N/A
11.6.16	Inspect bottom-mounted sheave assembly at end of pontoon for freedom of rotation of sheave.	N/A	N/A

11.6.17	Inspect shell-mounted lower sheave assembly for freedom of rotation of sheave, corrosion thinning, and pitting of sheave housing.	N/A	N/A
11.6.18	Inspect upper sheave assembly for freedom of movement of sheave.	N/A	N/A
11.6.19	Inspect the cable counterbalance assembly for corrosion and freedom of operation.	N/A	N/A
11.7	**Manway Heater Racks**		
11.7.1	Inspect the manway heater racks for broken welds and bending of the sliding rails.	N/A	N/A
11.7.2	Measure and record the length of the heater and length of the track.	N/A	N/A
11.8	**Mixer Wear Plates and Deflector Stands**		
11.8.1	Inspect bottom and shell plates and deflector stands.	N/A	N/A
11.8.2	Inspect for erosion and corrosion on the wear plates. Inspect for rigidity, structural soundness, corrosion, and erosion of deck plates and reinforcing pads that are seal-welded to the bottom under the deflector stand legs.	N/A	N/A
11.8.3	Measure for propeller clearance between the bottom of deflector stand and roof when the roof is on low legs.	N/A	N/A
12	**ACCESS STRUCTURES**		
12.1	**Handrails**		
12.1.1	Identify and report type (steel pipe, galvanized pipe, square tube, angle) and size of handrails.	√	N/A
12.1.2	Inspect for pitting and holes, paint failure.	√	N/A
12.1.3	Inspect attachment welds.	√	N/A
12.1.4	Identify cold joints and sharp edges. Inspect the handrails and midrails.	√	N/A
12.1.5	Inspect safety drop bar (or safety chain) for corrosion, functioning, and length.	√	N/A
12.1.6	Inspect the handrail between the rolling ladder and the gauging platform for the hazardous opening when the floating roof is at its lowest level.	N/A	N/A
12.2	**Platform Frame**		
12.2.2	Inspect frame for corrosion and paint failure.	√	N/A
12.2.3	Inspect the attachment of frame to supports and supports to tank for corrosion and weld failure.	√	N/A
12.2.4	Check reinforcing pads where supports are attached to shell or roof.	√	N/A
12.2.5	Inspect the surface that deck plate or grating rests on, for thinning and holes.	√	N/A
12.2.6	Check that flat-surface-to-flat-surface junctures are seal-welded.	√	N/A
12.3	**Deck Plate and Grating**		
12.3.1	Inspect deck plate for corrosion-caused thinning or holes (not drain holes) and paint failure.	√	N/A
12.3.2	Inspect plate-to-frame weld for rust scale buildup.	√	N/A
12.3.3	Inspect grating for corrosion-caused thinning of bars and failure of welds.	√	N/A

12.3.4	Check grating tie down clips. Where grating has been retrofitted to replace plate, measure the rise of the step below and above the grating surface and compare with other risers on the stairway.	√	N/A
12.4	**Stairway Stringers**		
12.4.1	Inspect spiral stairway stringers for corrosion, paint failure, and weld failure. Inspect attachment of stairway treads to stringer.	√	N/A
12.4.2	Inspect stairway supports to shell welds and reinforcing pads.	√	N/A
12.4.3	Inspect steel support attachment to concrete base for corrosion.	√	N/A
12.5	**Rolling Ladder**		
12.5.1	Inspect rolling ladder stringers for corrosion.	N/A	N/A
12.5.2	Identify and inspect ladder fixed rungs (square bar, round bar, angles) for weld attachment to stringers and corrosion, particularly where angle rungs are welded to stringers.	N/A	N/A
12.5.3	Check for wear and corrosion where rolling ladder attaches to gauging platform.	N/A	N/A
12.5.4	Inspect pivot bar for wear and secureness.	N/A	N/A
12.5.5	Inspect operation of self-leveling stairway treads.	N/A	N/A
12.5.6	Inspect for corrosion and wear on moving parts.	N/A	N/A
12.5.7	Inspect rolling ladder wheels for freedom of movement, flat spots, and wear on axle.	N/A	N/A
12.5.8	Inspect alignment of rolling ladder with roof rack.	N/A	N/A
12.5.9	Inspect top surface of rolling ladder track for wear by wheels to assure at least 18 in. Of unworn track (track long enough).	N/A	N/A
12.5.10	Inspect rolling ladder track welds for corrosion.	N/A	N/A
12.5.11	Inspect track supports on roof for reinforcing pads seal-welded to deck plate.	N/A	N/A
12.5.12	Check by dimensioning, the maximum angle of the rolling ladder when the roof is on low legs. Max.angle _____ .	N/A	N/A
12.5.13	If rolling ladder tracks extends to within 5ft of the edge of the roof on the far side, check for a handrail on the top of the shell on that side.	N/A	N/A

2 Foundation

2.1. Tank Settlement

Tank Settlement survey was carried out to determine the soil effects of soil settlement on storage tanks.

The minimum number of elevation points shall be as indicated by the following equation:

$$N = D/10$$

Where,

N = the minimum required number of settlement measurement points, but no less than eight. All values shall be rounded to the next higher whole number. The maximum spacing between settlement measurement points shall be 32 ft;

D = the tank diameter, in feet (ft).

The survey data was then be calculated to form a best fit cosine curve.

The permissible out of Plane Settlement is given by the following equation:-

$$S_{max} = (L2 \times Y \times 11) / 2[(E \times H)]$$

Where,

S = Deflection, in ft (out of plane distortion),

L = Arc length between measurement points, in ft,

Y = Yield strength, in lbf /in²,

E = Young's modulus, in lbf /in²,

H = tank height, in ft.

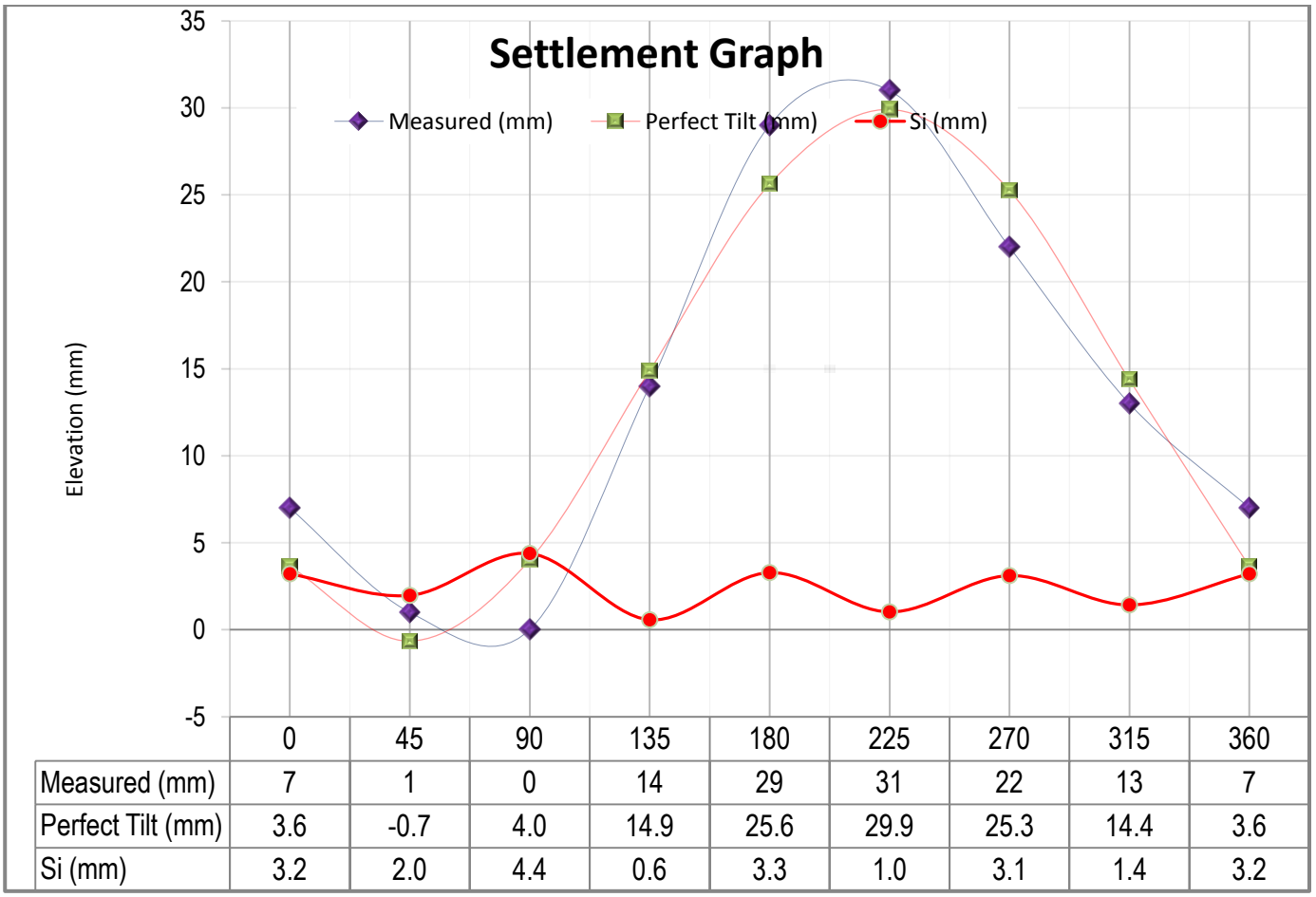
The survey data is recorded on Table 2-1 : General Detail for Settlement Evaluation, Table 2-2 : Optimum Cosine Curve Base On Survey Data and Figure 2-1 : Graphical Representation of Shell Settlement.

Table 2-1 : General Detail for Settlement Evaluation

Tank Number	T3
Tank Diameter	6,096 mm or 20.000 ft
Tank Shell height	10,973 mm or 36.000 ft
Minimum Settlement Point Required	8
Actual Settlement Point, N	8
Settlement spacing, L	2,393.9 mm or 7.85 ft
Yield stress, Y	30,000 psi
Young's modulus, E	30 MSI
Readings Average ,ao	14.63 mm or 0.58 in.
a1, (2 x Ui x Cos(θ)/N)	-10.98 mm or -0.43 in
b1 , (2 x Ui x Sin(θ)/N)	-10.63 mm or -0.42 in
Smax	4.39 mm or 0.17 in.
Si (as per API 653 Allowed)	2.87 mm or 0.11 in.

Table 2-2 : Optimum Cosine Curve Base On Survey Data

Station, (°)	Measured Reading, Ui (mm)	Reading, Ui (inch)	Perfect Tilt (mm)	Differential Settlement, Si (mm)	Absolute Finite Difference, Smax (mm)	Top Shell Radial Move (mm)
0	7	0.276	3.6	3.4	3.2	37.5
45	1	0.039	-0.7	1.7	2.0	23.1
90	0	0.000	4.0	-4.0	4.4	51.2
135	14	0.551	14.9	-0.9	0.6	6.7
180	29	1.142	25.6	3.4	3.3	38.3
225	31	1.220	29.9	1.1	1.0	12.0
270	22	0.866	25.3	-3.3	3.1	36.3
315	13	0.512	14.4	-1.4	1.4	16.7



	0	45	90	135	180	225	270	315	360
Measured (mm)	7	1	0	14	29	31	22	13	7
Perfect Tilt (mm)	3.6	-0.7	4.0	14.9	25.6	29.9	25.3	14.4	3.6
Si (mm)	3.2	2.0	4.4	0.6	3.3	1.0	3.1	1.4	3.2

Figure 2-1 : Graphical Representation of Shell Settlement

Conclusion:

The Settlement survey is out of permisible value, further analysis required

2.2. Tank Settlement as per EEMUA 519.

In accordance to EEMUA 159, the maximum differential settlement between any two points at 10 m intervals should not exceed 100 mm. This limit has been established to avoid severe localised stress increases in tank components.

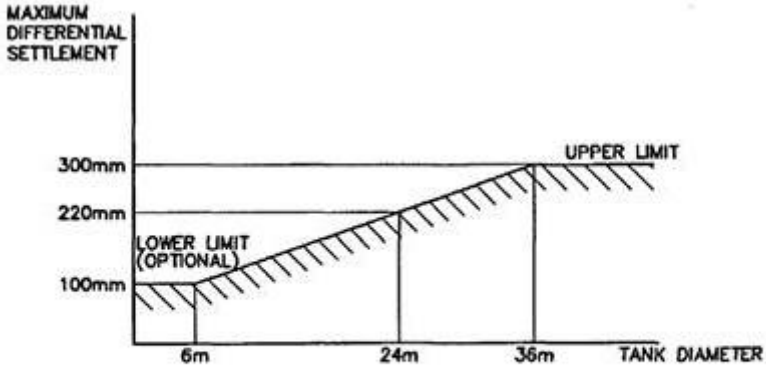


Figure 7.5.1-1 Maximum Allowable Settlement between any Two Points along the Circumference

For the 6.096m diameter tank, the maximum acceptable differential settlement is 100.64 mm.

Different Reading between Point

Station point	0˚ - 45˚	45˚	90˚	135˚	180˚	225˚	270˚	315˚
Readings (mm)	3.2	2.0	4.4	0.6	3.3	1.0	3.1	1.4

Conclusion:

The maximum Settlement (maximum acceptable differential settlement) is 100.64 mm, and the maximum different reading between Point is 4.4 mm, therefore the settlement survey found within the permissible value as per EEMUA 159.

2.3. Bottom Plate Settlement

These settlements readings was recorded by taking elevation measurements around the tank circumference and across the tank diameter have an idea of bottom plate elevation profile.

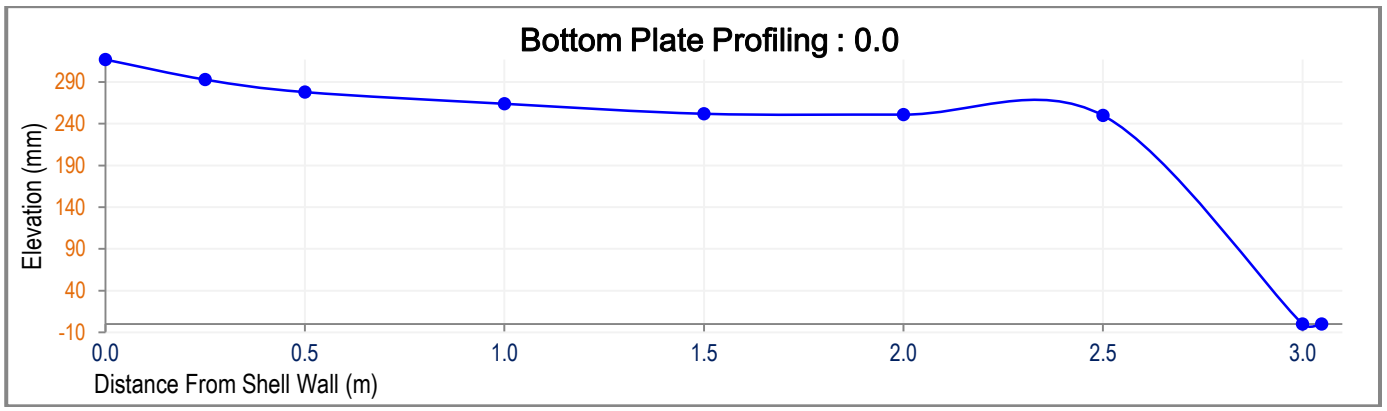
The survey is only to give an idea of the bottom plate settlement profile. Unless there is severe bulging or depression of the bottom plate noted on the bottom plate during visual inspection, then more inspection/evaluation using API 653 Appendix B should be perform.

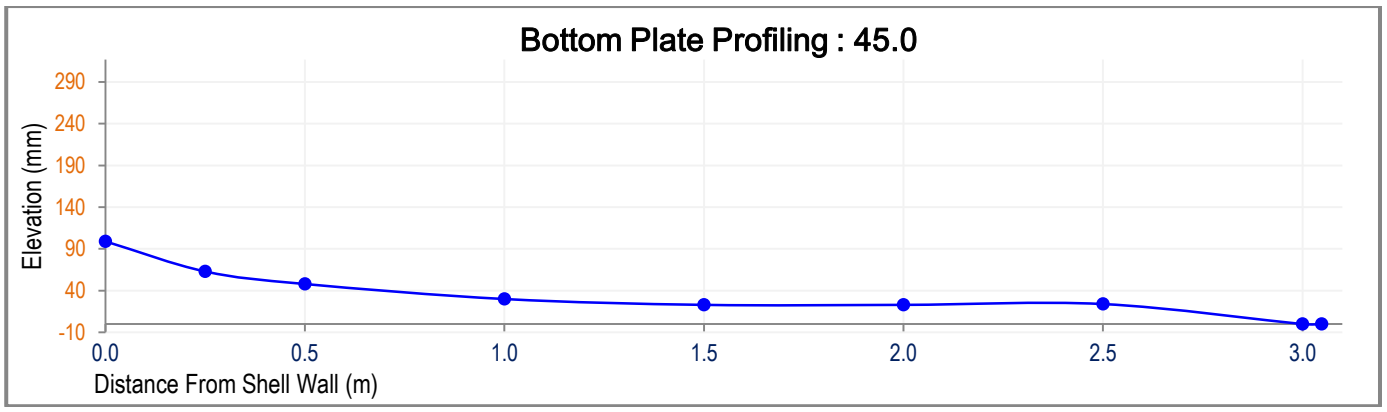
Results of Bottom Plate settlement was recorded on Table 2-3 : Bottom Plate Settlement/Elevation Readings.

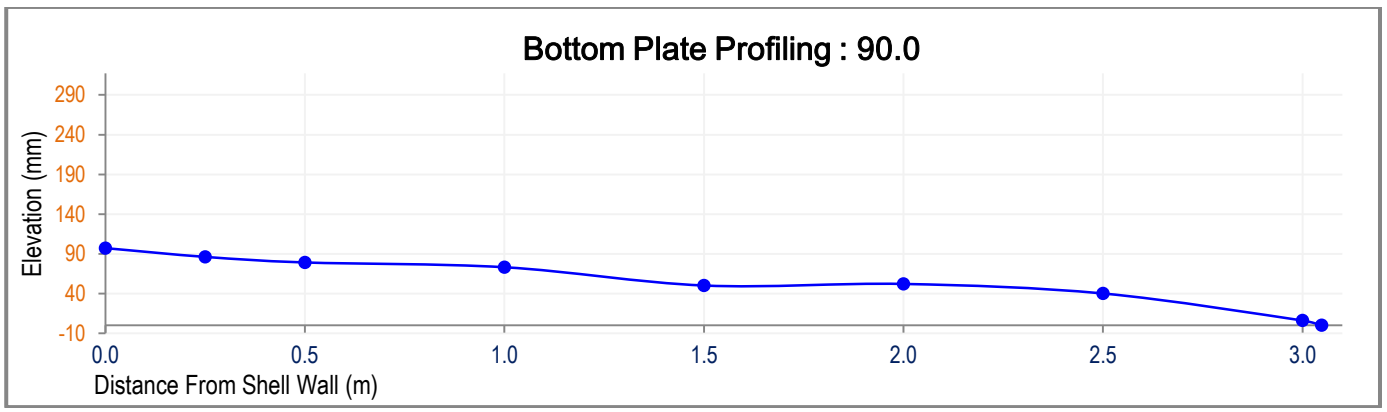
Table 2-3 : Bottom Plate Settlement/Elevation Readings

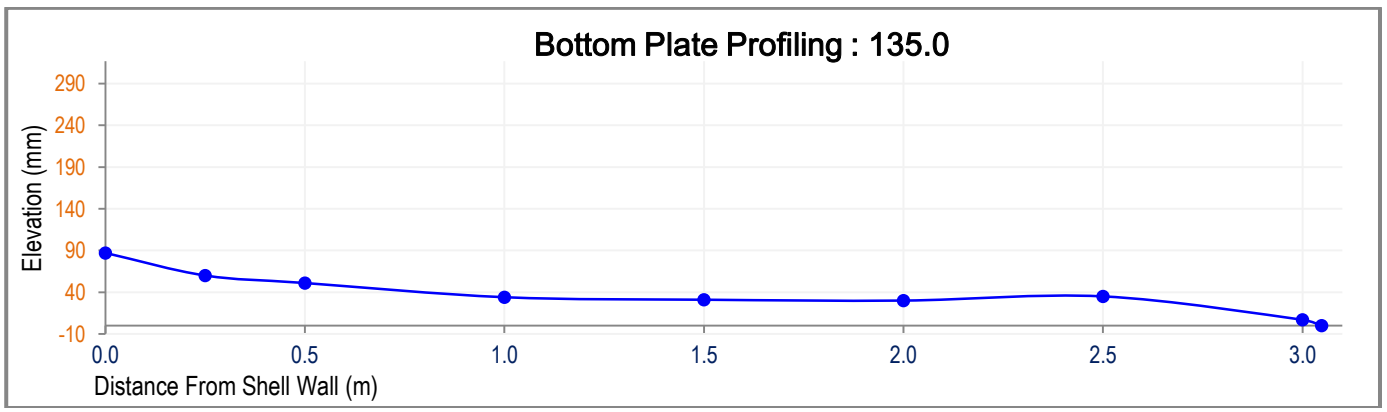
Distance From Shell (m)	Station (°) - Elevation Readings (mm)							
	0	45	90	135	180	225	270	315
0.00	317	99	97	87	73	68	76	299
0.25	293	63	86	60	75	54	61	300
0.50	278	48	79	51	70	39	48	300
1.00	264	30	73	34	55	35	28	289
1.50	252	23	50	31	34	27	22	271
2.00	251	23	52	30	33	28	22	264
2.50	250	24	40	35	26	14	23	250
3.00	0	0	6	7	-3	-10	23	0
3.05	0	0	0	0	0	0	0	0

Figure 2-2 : Illustration of Bottom Plate Settlement Profiling

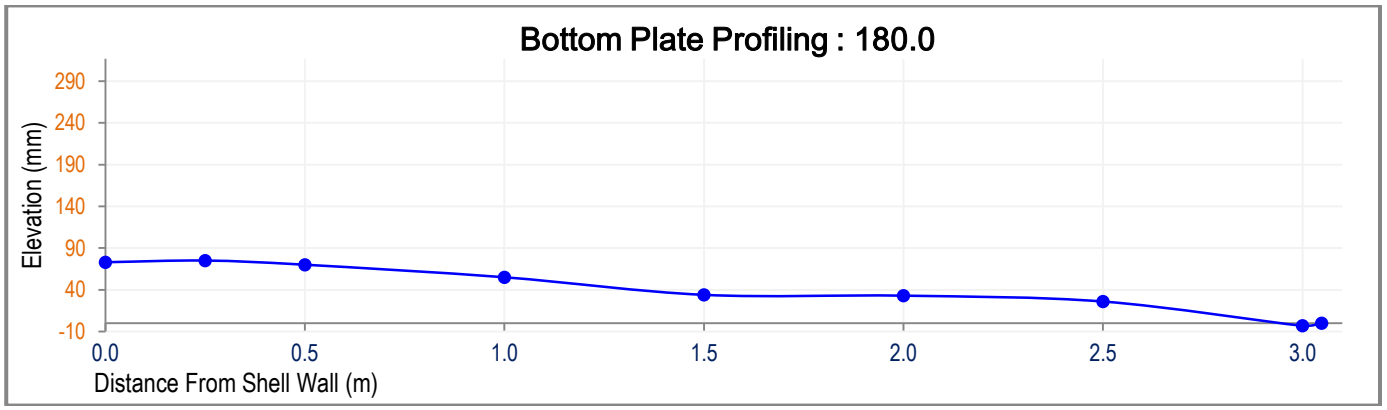


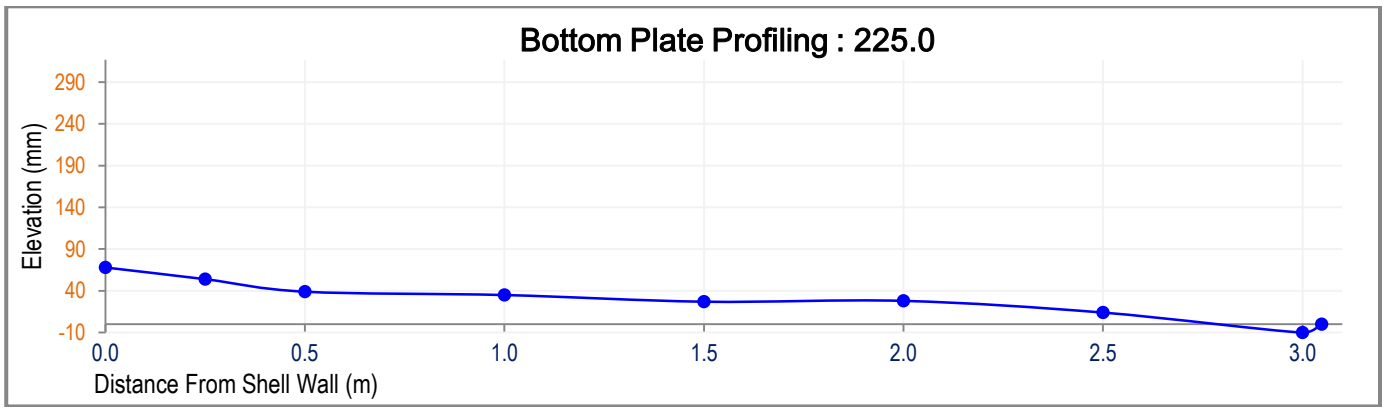


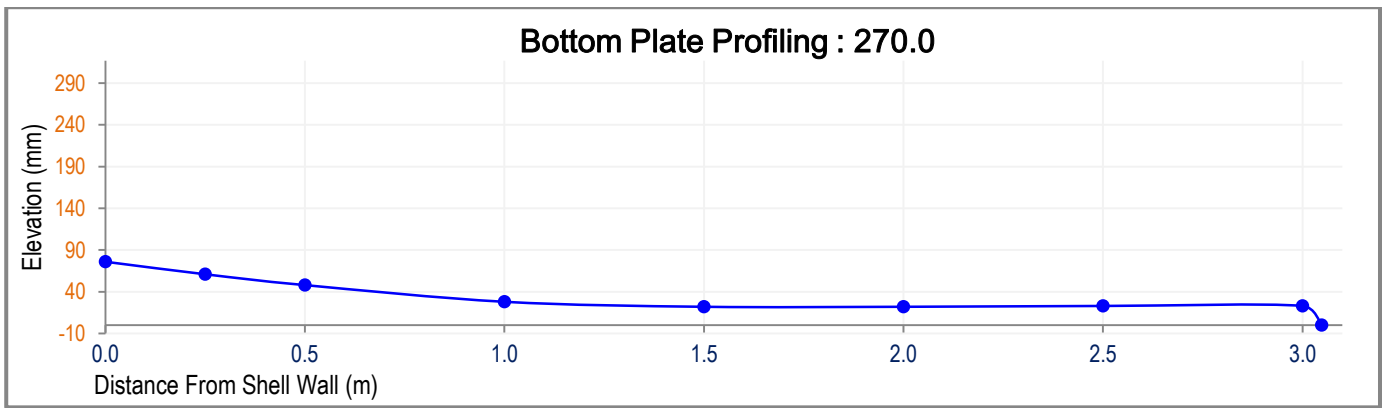


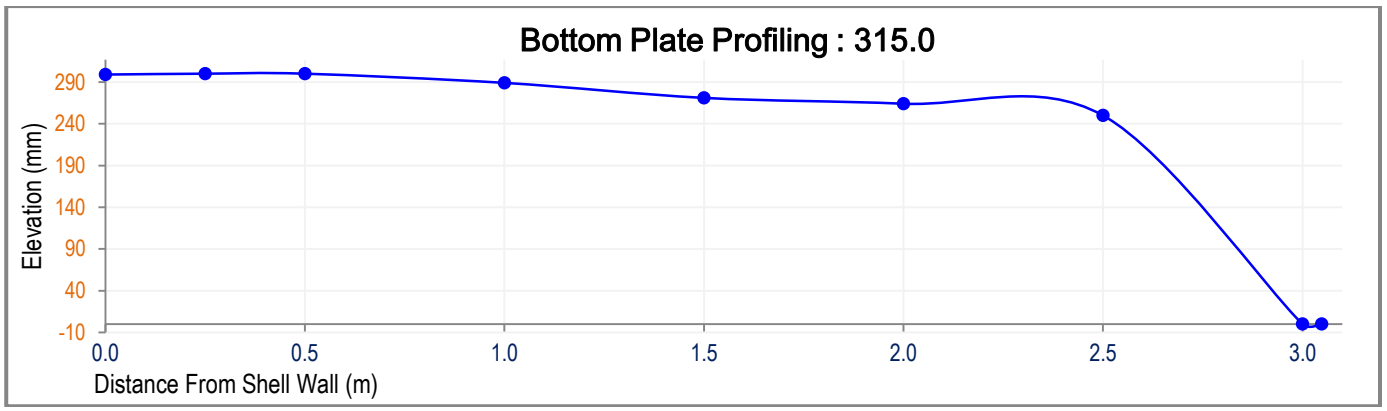


SGS	CLIENT :	Vital FSM PetroCorp		
	JOB NUMBER :	10155546	TANK NUMBER :	T3
	TYPE OF INSPECTION :	Out of Service Inspection		









3 Ultrasonic Thickness Measurements Report

SGS

PETROTECHNICAL INSPECTION (M) SDN BHD
ULTRASONIC THICKNESS MEASUREMENT REPORT

GENERAL DETAIL	
Client :	Vital FSM PetroCorp
Project :	Out of Service Inspection
Location :	Chuuk Terminal, Federal State of Micronesia
Job No. :	10155546
Report No :	10155546/VITAL/PTI/UTTM/TK3
Item Description :	Tank 3
Nominal Thickness :	N/A
Material :	Carbon Steel
Procedure No :	WI-TM-104/VER.01/01.01.2016/REV 1
Acceptance Standard :	API 653 Ed 2009
Drawing No. :	N/A
Test Surface. Temp. (°C) :	Ambient
Heat Treatment :	N/A
Surface Condition :	Painted
, Date of Inspection :	16/12/2016
INSPECTION / TESTING / EXAMINATION	
Technique :	Random Spot Measurement
Couplant :	Wall Paper Paste
Calibration Block :	Stepwedge, Serial Number : PTI/CSSW/2013/02
Test Restriction :	N/A
Parent Metal Sensitivity :	Second Backwall Echo At Full Screen Height Using Appropriate Stepwedge Thickness
EQUIPMENT	
Equipment Model :	Sonatest Site Scan D10L
Equipment Serial No :	I010111
Type of Cable :	Lemo 00 - Lemo 00
Manufacturer :	Sonatest

PROBE

Ultrasonic Scan	Probe Brand	Serial No.	Type	Probe Angle	Freq. (MHz)	Size (mm)	Range	Gain (dB)		
								Trans. Loss	Reference	Scanning
Parent Metal	Tru-Sonic	54339	Twin	0	5	10	50	0	33	36

INSPECTION RESULT

No.	Identification / Pipeline No	Nominal Thickness (mm)	Minimum Wall Thickness(mm)				Remarks
			0°	90°	180°	270°	
1. .	Roof Plates		Refer to Section 4.1, page 64.				
2. .	Roof Nozzles and Reinforcement Plates		Refer to Section 4.2, page 65.				
3. .	Shell Plates		Refer to Section 5.1, page 67.				
4. .	Shell Nozzles & Reinforcement Plates		Refer to Section 5.3, page 69.				
5.	Bottom Plates		Refer to Section 6.1, page 76.				
6.	Bottom Projection Plates		Refer to Section 6.3, page 81.				

	Inspected By :	Reviewed By :	Approved By :
Signature :			
Name :	Sukri Omar	Saravanan Maniam	Saravanan Maniam
Designation :	ASNT Level II UTTG	NDT Technical Manager	NDT Technical Manager
Date :	16/12/2016		

WI-TM-104/VER.01/01.01.2016/IR.NON-DSM

4 Roof

4.1. Thickness Measurements on Roof Plate

The ultrasonic thickness measurement of roof plates can be carried out using hand held digital instruments.
Measurements are taken circumferentially around the tank roof along radial lines that are an extension of the shell scan lines and extend to the center of the tank.
Initially three measurements along each radial line shall be taken; at 200 mm (8 in) from the shell (or annular pontoon if applicable), at 2/3 radius and at 1/3 radius.

The result thickness readings are recorded in Table 4-1 : Thickness Measurements on Roof Plate (mm).

Code Reference

API 653 Paragraph 4.2.1.2 *Roof plates corroded to an average thickness of less than 0.09 in. in any 100 in.^{2} area or roof plates with any holes through the roof plate shall be repaired or replaced.*

Table 4-1 : Thickness Measurements on Roof Plate (mm)

Ring Distance from Center	2848 mm	Ring Distance from Center	2032 mm	Ring Distance from Center	1016 mm
UT Location	Readings (mm)	UT Location	Readings (mm)	UT Location	Readings (mm)
R1-1	4.45	R2-1	4.5	R3-1	4.71
R1-2	4.7	R2-2	4.81	R3-2	4.63
R1-3	4.52	R2-3	4.55	R3-3	4.62
R1-4	4.86	R2-4	4.52	R3-4	4.63

Note : please refer Figure 4-1 : Tank Roof Layout for UT location.

Thickness Measurements on Crown Plate (mm)

Plate Number	Reading 1	Reading 2	Reading 3	Reading 4
C-1	4.61	4.58	4.69	4.70

Table 4-2 : Roof Plate Life Span Calculation

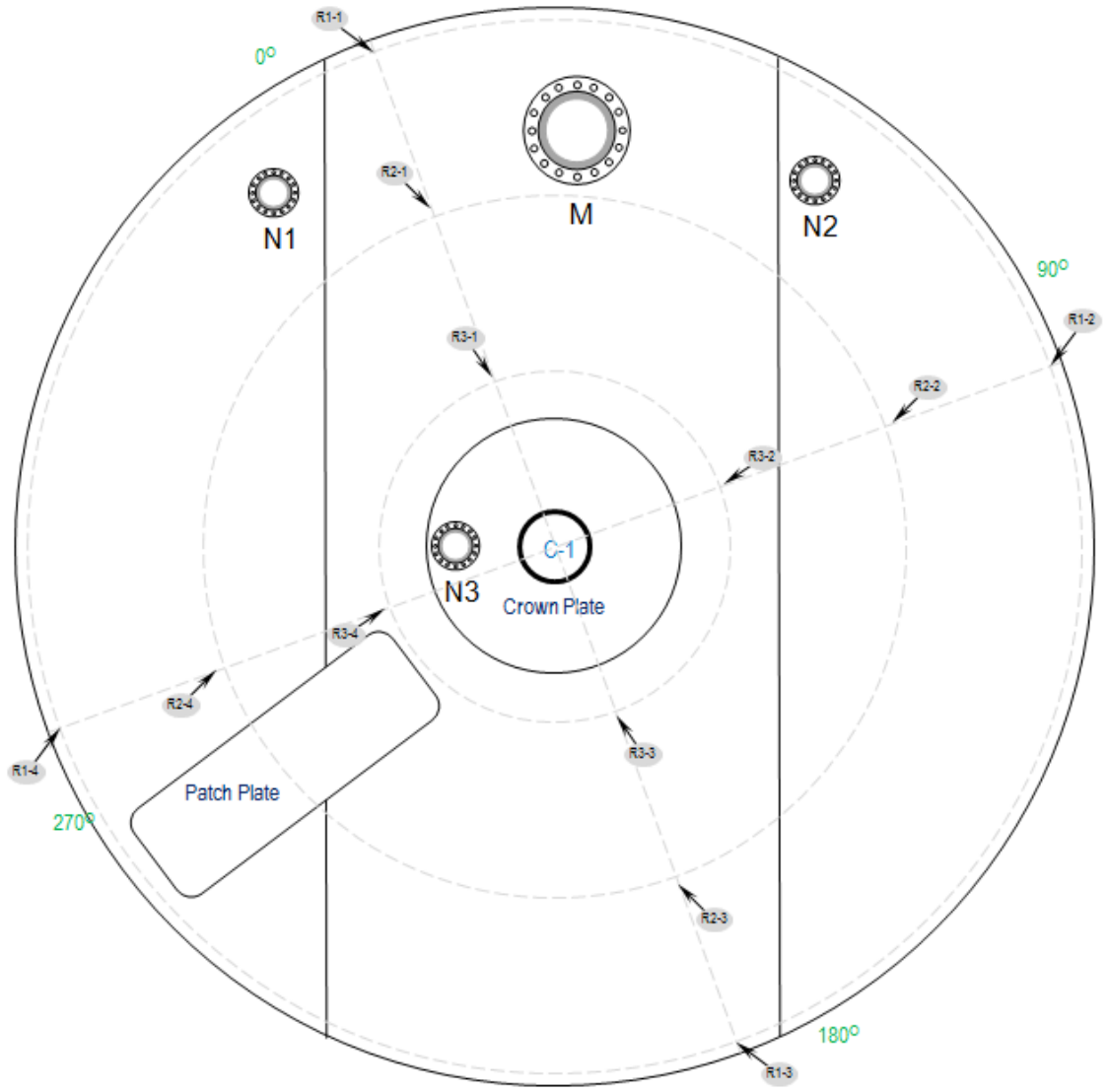
Item	Nominal Thickness (mm)	Minimum Measured Thickness (mm)	Minimum Required Thickness (mm)	Corrosion Rate (mm/Year)	Remaining Life (Year)
Roof Plates	4.76	4.45	2.29	0.009	249.29

4.2. Thickness Measurements on Roof Nozzles and Reinforcement Plates.

Ultrasonic thickness measurements were taken at quadrants of nozzle neck and reinforcement plate.

Table 4-3 : Thickness Measurements Readings On Roof Nozzle Necks and Reinforcement Plates (mm)

No	Item ID	Item	Nozzle				Reinforcement Plate			
			0 °	90 °	180 °	270 °	0 °	90 °	180 °	270 °
1	M	24" Manhole	6.95	6.38	7.12	6.35	6.51	6.63	6.48	6.45
2	N1	6" Sampling Hatch 1	6.04	6.17	6.10	6.11	5.89	5.92	5.90	5.92
3	N2	8" Goose Neck Vent	8.28	8.41	9.46	9.12	6.56	6.67	6.50	6.60
4	N3	6" Sampling Hatch 2	6.70	6.77	6.60	6.63	6.32	6.48	6.41	6.39



Drawing for inspection reference only. Not To Scale.

Legend:

1-1	Plate Number
0°	Station Point Reference
R1-1	UT. Measurement Location
M	20" Manhole
N1	6" Sampling Hatch 1
N2	8" Goose Neck Vent
N3	6" Sampling Hatch 2

Figure 4-1 : Tank Roof Layout

5 Shell

5.1. Thickness Measurements on Shell Plates

Ultrasonic thickness measurements was carried out on the shell plates .
The thickness reading was recorded in Table 5-1 : Thickness Readings at Shell Plate (mm).

Table 5-1 : Thickness Readings at Shell Plate (mm).

Vertical Scan Location/ Station (Degree): 0.0				
Course No.	Point 1	Point 2	Point 3	Minimum Reading
1	6.54	6.29	6.26	6.26
2	6.34	6.35	6.35	6.34
3	6.07	6.17	6.07	6.07
4	6.14	6.10	6.10	6.10
5	6.07	6.32	6.10	6.07
6	6.14	6.09	6.11	6.09

Vertical Scan Location/ Station (Degree): 90.0				
Course No.	Point 1	Point 2	Point 3	Minimum Reading
1	6.23	6.35	6.20	6.20
2	6.30	6.27	6.20	6.20
3	6.17	6.10	6.23	6.10
4	6.15	6.27	6.20	6.15
5	6.10	6.15	6.20	6.10
6	6.13	6.20	6.32	6.13

Vertical Scan Location/ Station (Degree): 180.0				
Course No.	Point 1	Point 2	Point 3	Minimum Reading
1	6.17	6.20	6.31	6.17
2	6.38	6.35	6.20	6.20
3	6.30	6.10	6.14	6.10
4	6.17	6.10	6.12	6.10
5	6.22	6.20	6.15	6.15
6	6.12	6.20	6.15	6.12

Vertical Scan Location/ Station (Degree): 270.0				
Course No.	Point 1	Point 2	Point 3	Minimum Reading
1	6.00	6.10	6.14	6.00
2	6.12	6.11	6.15	6.11
3	6.20	6.21	6.20	6.20
4	6.11	6.26	6.14	6.11
5	6.20	6.15	6.15	6.15
6	6.17	6.18	6.16	6.16

5.2. Shell Plate Acceptable Thickness Calculation

The minimum acceptable thickness for entire shell course, t_{min} is calculated as follows:-

$$t_{min} = \frac{2.6(H-1)DG}{SE}$$

where

t_{min} is the minimum acceptable thickness, in inches for each course as calculated from the above equation; however, *t*min shall not be less than 0.1 in. for any tank course;

D is the nominal diameter of tank, in feet (ft);

H is the height from the bottom of the shell course under consideration to the maximum liquid level when evaluating an entire shell course, in feet (ft); or is the height from the bottom of the length *L* (see 4.3.2.1) from the lowest point of the bottom of *L* of the locally thinned area to the maximum liquid level, in feet (ft); or is the height from the lowest point within any location of interest to the maximum liquid level, in feet (ft);

G is the highest specific gravity of the contents;

The information and calculation of minimum thickness required is recorded in Table 5-2 : Information For Shell Plates Minimum Acceptable Thickness **Calculation** and Table 5-3 : Shell Plate Minimum Acceptable Thickness.

Table 5-2 : Information For Shell Plates Minimum Acceptable Thickness Calculation

Tank Number	T3
Tank Diameter	6,096 mm or 20.000 ft
Tank Height	10,973 mm or 36.000 ft
Maximum Filling Height	9,893 mm or 32.457 ft
Product	Jet A1
Specific Gravity, G	0.82
Year of Commission	1980
Year of Last Inspection	N/A
Year of Current Inspection	2016
Type of Shell Weld	Butt weld
Corrosion Allowance	0.00
Joint Efficiency, E	0.85

.

Table 5-3 : Shell Plate Minimum Acceptable Thickness Calculation.

Course No	Height Per Course (mm)	Material	Allowable Product Stress, S (lbf/in.2)	*Previous Thickness (mm)	Minimum Measured Thickness (mm)	Minimum. Acceptable Thickness, Tmin (mm)	Corrosion Rate (mm/year)	Remaining Life (year)	Inspection Interval (year)
1	1,829	Unknown	23,600	6.35	6.00	2.54	0.010	355.89	15.00
2	1,829	Unknown	23,600	6.35	6.11	2.54	0.007	535.50	15.00
3	1,829	Unknown	26,000	6.35	6.07	2.54	0.008	453.86	15.00
4	1,829	Unknown	26,000	6.35	6.10	2.54	0.007	512.64	15.00
5	1,829	Unknown	26,000	6.35	6.07	2.54	0.008	453.86	15.00
6	1,829	Unknown	26,000	6.35	6.09	2.54	0.007	491.54	15.00

*Previous Thickness taken from : As Built Drawing

Note: API653 section 6.3.3.3: Internal inspection of the tank shell, when the tank is out of service, can be substituted for a program of external ultrasonic thickness measurement if the internal inspection interval is equal to or less than the interval required in 6.3.3.2 b).

Conclusion:

The minimum remaining life calculated as per API 653 on tank shell is 355.89 years , therefore the next inspection is 15 years

5.3. Thickness Measurement on Shell Nozzles and Reinforcement Plates

Ultrasonic thickness measurements were taken at quadrants of the nozzles neck and reinforcement plates.

Table 5-4 : Thickness Measurement Readings on Shell Nozzle Neck and Reinforcement Plate (mm)

No	Item ID	Item	Nozzle				Reinforcement Plate			
			0 ^{o}	90 ^{o}	180 ^{o}	270 ^{o}	0 ^{o}	90 ^{o}	180 ^{o}	270 ^{o}
1	M1	24" Manhole	6.48	5.89	5.80	6.17	6.45	6.50	6.45	6.43
2	N1	6" Inlet	6.85	6.70	6.69	6.69	6.17	6.20	6.29	6.25
3	N2	4" Water Drain Off	4.58	4.61	4.40	4.41	9.02	9.75	9.69	9.50
4	N3	6" Outlet	6.83	6.73	6.72	6.70	6.23	6.29	6.51	6.30
5	N4	6" Blind	6.95	6.98	6.90	6.90	5.96	5.98	5.92	5.98
6	N5	4" Sump Drain	5.36	5.32	5.40	5.36	6.57	6.23	6.23	6.27

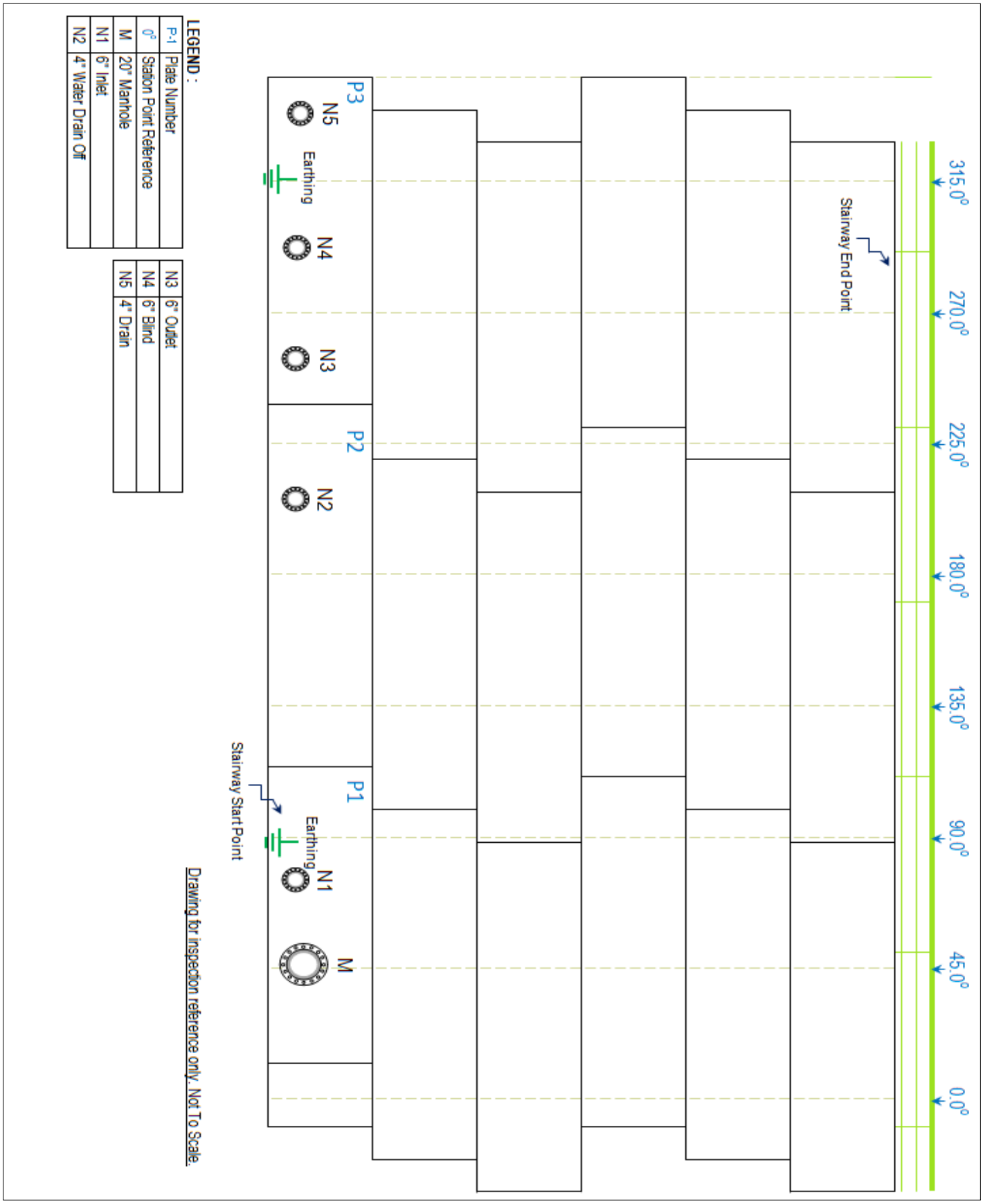


Figure 5-1 : Tank Shell Plate and Nozzle Layout

5.4. Tank Plumbness- Tank Verticality check

Plumbness Survey was carried out to determine the verticality of tank.

The required numbers of survey stations are not mentioned in API 653. However as a guidance, the number of survey station determined will be the same for tank settlement as mentioned below:

$$N = D/10$$

Where,

N is the minimum required number of settlement measurement points, but no less than eight. All values shall be rounded to the next higher whole number. The maximum spacing between settlement measurement points shall be 32 ft;

D is the tank diameter, in feet (ft).

The required information and result of plumbness is shown in Table 5-5 : Information for Plumbness Survey, Table 5-5 : Information for Plumbness Survey and Table 5-6 : Plumbness Readings (mm).

Simplified Acceptance Criteria for Plumbness as per API 653 is shown as below:-

Type of Tank	Tolerance
Fixed Roof Tank	1/100 of tank Height with a maximum of 5 inch
Tank with Floating Roof (Internally or Externally)	1/200 of tank height with a maximum of 5 inch

Code Reference

API 653 Paragraph 10.5.2.1

The maximum out-of-plumbness of the top of the shell relative to the bottom of the shell shall not exceed 1/100 of the total tank height, with a maximum of 5 in. The 1/100 criteria, with a maximum of 5 in., shall also apply to fixed roof columns. For tanks with internal floating roofs, apply the criteria of this section or API 650, Appendix H, whichever is more stringent.

API 650 Annex H.6.1

….. Any defects, projections, obstructions or tank tolerance limits (exceeding those defined in 7.5 of this Standard), which would inhibit proper internal floating roof and seal operation, that are identified by the internal floating roof erector shall be reported to the Purchaser.

API 650 Paragraph 7.5.2 a

The maximum out-of-plumbness of the top of the shell relative to the bottom of the shell shall not exceed 1/200 of the total tank height.

Table 5-5 : Information for Plumbness Survey

Tank Number	T3
Tank Diameter	6096 mm or 20.000 ft.
Tank Height	10973 mm or 36.000 ft.
Minimum Plumbness Survey Station Required	8.00
Actual Plumbness Station (°)	8
Plumbness Circumference Spacing:	2394 mm or 7.854 ft.
Plumbness Survey Carried Out From:	Internal
Number of Shell Course :	6
Floating Roof on Tank:	No
Acceptance Value	110 mm or 4.320 in.

Table 5-6 : Plumbness Readings (mm)

Station (°)	Course - Distance Readings (mm) Relative To Shell To Bottom Weld						
	0	1	2	3	4	5	6
0.0	0	-8	-10	-14	-20	-30	-37
45.0	0	-11	-9	-15	-20	-25	-39
90.0	0	-5	-11	-19	-25	-27	-46

Station (°)	Course - Distance Readings (mm) Relative To Shell To Bottom Weld						
	0	1	2	3	4	5	6
135.0	0	-2	5	-4	-13	-13	-21
180.0	0	18	33	34	51	58	68
225.0	0	-32	22	37	49	48	62
270.0	0	7	15	31	33	42	41
315.0	0	5	-1	-12	-17	-21	-21

Note : Course 0 is area near to shell to bottom weld

Table 5-7 : Plumbness Readings for 225 Degree at 1st course (Bulging Area) (mm)

Station (°)	Distance measured - Distance Readings (mm) Relative To Shell To Bottom Weld															
	0	10	20	30	40	50	60	70	80	9	100	110	120	130	140	150
225.0	0	-4	-18	-26	-31	-24	-15	-8	-6	-5	-6	-8	-8	-6	-4	0

Note : Course 0 is area near to shell to bottom weld

Table 5-8 : Plumbness Survey Results

Station (°)	Out-of-plumbness of the top of the shell relative to the bottom of the shell (mm)	Result
0.0	-37	Within Tolerance
45.0	-39	Within Tolerance
90.0	-46	Within Tolerance
135.0	-21	Within Tolerance
180.0	68	Within Tolerance
225.0	62	Within Tolerance
270.0	41	Within Tolerance
315.0	-21	Within Tolerance

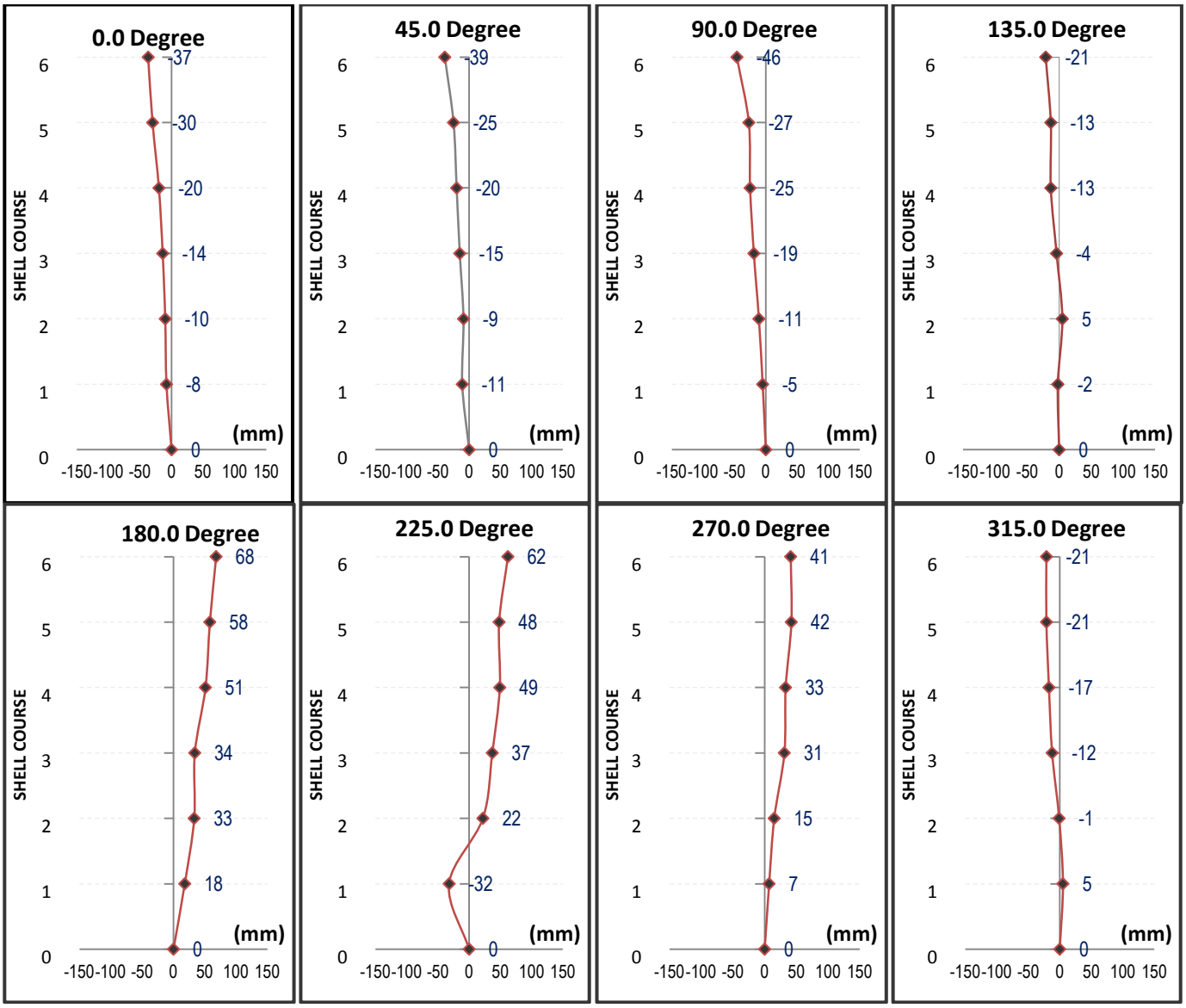


Figure 5-2 : Plumbness Plot

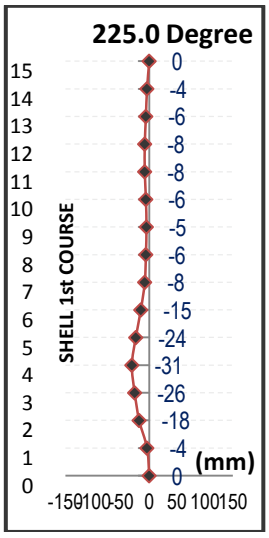


Figure 5-3 : Plumbness Plot for 225 Degree at 1st course (Bulging Area).

5.5. Out Of Roundness

Out of roundness survey was measured at 1 ft above the shell-to-bottom weld.
The roundness result shall not exceed the tolerances shown in API 653 Table 10.2 as below.

Radius tolerances measured higher than one foot above the shell-to-bottom weld shall not exceed three times the tolerances given in Table 10.2.

API 653, Table 10.2- Radii Tolerances

Tank Diameter, ft (mm)	Radius Tolerances, in (mm)
< 40ft (12192 mm)	± ½ in (12.7 mm)
40 ft (12192 mm) to <150 ft (45720 mm)	± ¾ in (19.05mm)
150 ft (45720 mm) to <250 ft (76200 mm)	±1 in (25.4 mm)
≥250 ft (76200 mm)	±1 ¼ in (31.75mm)

Table 5-9 : Tank General Information

Tank Number:	T3
Tank Inside Diameter:	6,096 mm or 20.000ft
Survey- Unit of measurement:	meter
Survey From:	Internal
Tank Internal Radius- For Calculation:	3.048
No. of Survey Level:	1
No. of Station:	8
Method of Analysis/ Survey:	E-N-Z Coordinate at all level

Table 5-10 : Out of Roundness Survey Result

Level 1 Location:	**1 ft from Shell to Bottom Joint**		**Acceptance Criteria (m):**	**0.013**
Station	Measured Internal Radius (m)	Different to Internal Radius (m)	Remark	
0	3.051	0.003	Within Tolerance	
45	3.040	-0.008	Within Tolerance	
90	3.038	-0.010	Within Tolerance	
135	3.038	-0.010	Within Tolerance	
180	3.042	-0.006	Within Tolerance	
225	3.015	-0.033	**Out of Tolerance**	
270	3.042	-0.006	Within Tolerance	
315	3.049	0.001	Within Tolerance	

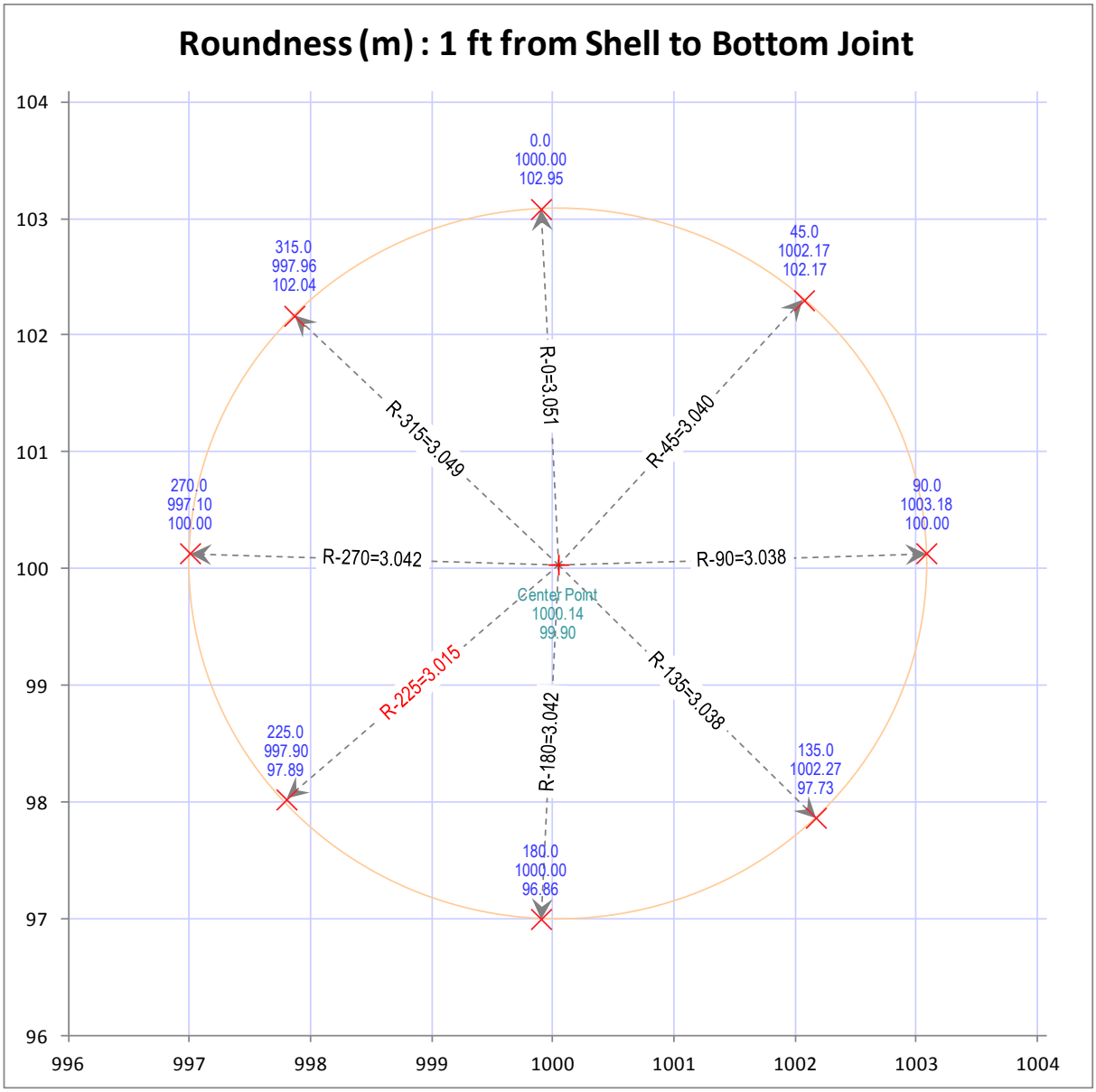


Figure 5-4 : Out of Roundness Ilustration

6 Bottom

6.1. Thickness Measurements on Bottom Plate

Ultrasonic thickness measurements are taken at each plate with 3 readings.

For bottom plates that are welded to the tank shell, ultrasonic Thickness readings are taken as near and as practically close to tank shell.

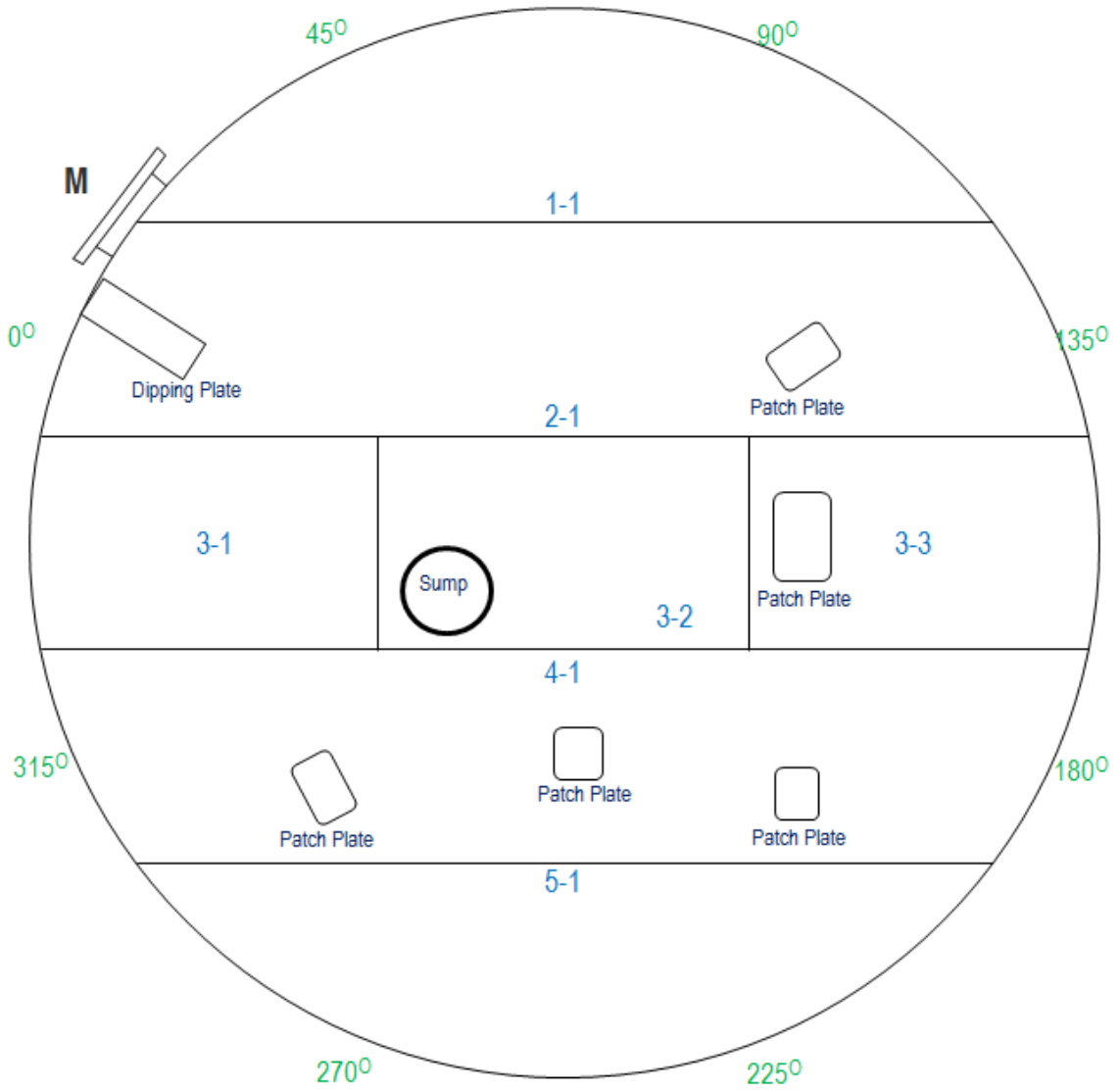
The results of Ultrasonic thickness readings are show in Table 6-1 : Thickness Measurements on Bottom Plates (mm)

Table 6-1 : Thickness Measurements on Bottom Plates (mm)

Plate No.	Point 1	Point 2	Point 3	Min. Reading
1-1	9.84	9.62	9.60	9.60
2-1	9.36	9.60	9.28	9.28
3-1	9.56	9.60	9.53	9.53
3-2	9.69	9.44	9.75	9.44
3-3	9.89	9.59	9.20	9.20
4-1	9.94	9.81	9.97	9.81
5-1	9.00	9.46	9.28	9.00

Ultrasonic Thickness Measurements on Cylinder Shape Drain Sump (mm)

Drain Sump	Side1	Side 2	Side 3	Side 4	Bottom 1	Bottom 2	Bottom 3	Bottom 4	Center	Minimum Reading
S-1	8.00	7.79	8.07	8.00	7.89	8.00	8.05	7.82	7.79	7.79



Drawing for inspection reference only. Not To Scale.

Legend:

1-1	Plate Number
45°	Tank Reference- Station
M	24" Manhole

Figure 6-1 : Tank Bottom Layout

6.2. Bottom Plates Life Span Calculation

Magnetic Flux Leakage (MFL) scanning is carried out on tank bottom.
MFL method is used for screening to detect underside and topside corrosion.
MFL report is shown in attachment 1.

Code and Reference:

API 653 Section 4.4.5.1:- Minimum Thickness for Tank Bottom Plate

An acceptable method for calculating the minimum acceptable bottom thickness for the entire bottom or portions thereof is as follows:

MRT = *(Minimum of* RT_{bc} *or* RT_{ip}*) – Or* $(S_tP_r + UP_r)$
Where,
MRT = *minimum remaining thickness at the end of interval Or.*
O_r = *in-service interval of operation (years to next internal inspection) not to exceed that allowed by 6.4.2,*
RT_{bc} = *minimum remaining thickness from bottom side corrosion after repairs,*
RT_{ip} = *minimum remaining thickness from internal corrosion after repairs,*
S_tP_r = *maximum rate of corrosion not repaired on the top side.* $S_tP_r = 0$ *for coated areas of the bottom.*
UP_r = *maximum rate of corrosion on the bottom side.*

Bottom Plate Life Span Calculation:

API 653 Section 4.4.5.3 *If the minimum bottom thicknesses, at the end of the in-service period of operation, is calculated to be less than the minimum bottom renewal thicknesses given in API 653 Table 4.4.*

API 653, Table 4.4 – Bottom Plate Minimum Thickness

Minimum Bottom Plate Thickness at Next Inspection	Tank bottom / Foundation Design
0.10 in. (2.54 mm)	Tank bottom/foundation with no means for detection and containment of a bottom leak.
0.05 in (1.27 mm)	Tank bottom/foundation design with means to provide detection and containment of a bottom leak.
0.05 in (1.27 mm)	Applied tank bottom reinforced lining > 0.05 in. thick, in accordance with API 652

Annular Plate Life Span Calculation:

API 653 Section 4.4.6.2 *For tanks in service with a product specific gravity less than 1.0, which require annular plates for other than seismic loading considerations, the thickness of the annular plates shall be not less than the thicknesses given in API 653, Table 4.5, plus any specified corrosion allowance. Interpolation is allowed within Table 4.5 based on shell stress determined per Note b of Table 4.5.*

API 653 Table 4.5 -Annular Bottom Plate Thicknesses (in.) (Specific Gravity < 1.0)

Plate Thickness [a] of First Shell Course	Stress [b] in First Shell Course (lbf/in.^{2})			
	< 24,300	< 27,000	< 29,700	< 32,400
$t \le 0.75$in (19.05mm)	0.17	0.2	0.23	0.3
$0.75 < t \le 1.00$in (25.4mm)	0.17	0.22	0.31	0.38
$1.00 < t \le 1.25$in (31.75mm)	0.17	0.26	0.38	0.48
$1.25 < t \le 1.50$in (38.1mm)	0.22	0.34	0.47	0.59

a. Plate thickness refers to the tank shell as constructed.
b. Stresses are calculated from $[2.34D\,(H-1)]/t$.

API 653, Section 4.4.6.3: *For tanks in service with a product specific gravity of 1.0 or greater, which require annular plates for other than seismic loading considerations, the thickness of the annular plates shall be in accordance with API 650, Table 5-1, plus any specified corrosion allowance.*

API 650, Table 5-1b - (USC) Annular Bottom Plate Thickness (t_b)				
Plate Thickness[a] of First Shell Course	Stress[b] in First Shell Course (lbf/in.^{2})			
	≤27,000	≤30,000	≤32,000	≤36,000
$t \leq 0.75$in (19.05mm)	0.236	0.236	9/32	11/32
$0.75 < t \leq 1.00$in (25.4mm)	0.236	9/32	3/8	7/16
$1.00 < t \leq 1.25$in (31.75mm)	0.236	11/32	15/32	9/16
$1.25 < t \leq 1.50$in (38.1mm)	5/16	7/16	9/16	11/16
$1.50 < t \leq 1.75$in	11/32	1/2	5/8	3/4
Product Stress =((td – CA)/corroded t) (Sd) Hydrostatic Test Stress = (tt /nominal t) (St)				

Lifespan Calculation of Plate at Critical Zone:

API 653 Section 4.4.5.4 *Unless a stress analysis is performed, the minimum bottom plate thickness in the critical zone of the tank bottom defined in 9.10.1.2 shall be the smaller of one-half the original bottom plate thickness (not including the original corrosion allowance) or 50 % of tmin of the lower shell course per 4.3.3.1 but not less than 0.1 in. Isolated pitting will not appreciably affect the strength of the plate.*

Bottom Plate Lifespan Calculation:

The required information and calculation result is shown in
Table 6-2 : General Information for Tank Bottom Lifespan Calculation and Table 6-3 : Lifespan Calculation

Table 6-2 : General Information for Tank Bottom Lifespan Calculation

Tank Number	T3
Tank Diameter	6,096 mm or 20.000 ft
Tank Height	10,973 mm or 36.000 ft
Maximum Filling Height	9,893 mm or 32.457 ft
Year of Commission	1980
Year of Last Inspection	N/A
Year of Current Inspection	2016
Year of Last Bottom Plates Change	N/A
Tank bottom have coating? The expected life of the coating must equal or exceed, O_r	NO
Tank bottom Have effective cathodic protection?	NO
Tank bottom have reinforced lining> 0.05 in. (1.27mm)?	NO
Tank have detection and containment of bottom leak?	NO
***Does the tank bottom require repair?**	**NO**

*if tank bottom require repair, please see Attachment 1 : Tank Floor Scanning, Magnetic Flux Leakage Reportfor location of repair (by patch plate or weld built up) and patch plate size.

Table 6-3 : Lifespan Calculation of Tank Bottom (Before repair or no repair required)

Lifespan Calculation for Bottom Plates

Bottom Plate Thickness	9.53

Year In Service (Years)	Nominal Thickness (mm)	RT_{bc} (mm)	Rt_{ip} (mm)	StP_r (mm)	U_{pr} (mm)	MRT (mm)	Calculated Life Span (Year)	Next Inspection Interval, Or
36	9.53	5.00	7.50	0.0563	0.1257	2.54	13.52	13.52

Lifespan calculation for plates at Critical Zone

Nominal Thickness of plate under critical zone.	9.53 mm or 0.375
One-half of original Plate Thickness under critical zone	4.76 mm or 0.188
Material of Lower Shell Course	Unknown
Shell Plate Joint Efficiency, E	0.85
Product Specific Gravity, G	0.82
Product Stress, S	23600 lbf/in.^{2}
Tmin of the Lower Shell Course per API 653,4.3.3.1	2.54 mm or 0.100
50% of Tmin of the Lower Shell Course per API 653,4.3.3.1	1.27 mm or 0.050

Year-In Service (Years)	Nominal Thickness (mm)	RT_{bc} (mm)	Rt_{ip} (mm)	S_tP_r (mm)	U_{pr} (mm)	MRT (mm)	Calculated Life Span (Year)	Next Inspection Interval, Or
36	9.53	5.00	7.50	0.0563	0.1257	2.54	13.52	13.52

Conclusion :

a) Life span of bottom plates is calculated to be 13.52 years, recommend to perform tank bottom inspection before next inspection interval which is 13.52 years from current inspection year.

b) Life span of plate in critical zone is calculated to be 13.52 years, recommend to perform tank bottom inspection before next inspection interval which is 13.52 years from current inspection year.

6.3. Bottom Projection Plate

Ultrasonic Thickness Measurements are taken at a maximum 2 meters interval apart around tank circumferences

API 653 Sections 4.4.5.7

The thickness of the projection of the bottom plate beyond the shell as measured at the toe of the outside bottom-to-shell fillet weld shall not be less than 0.1 in (2.54mm). The projection of the bottom plate beyond the outside toe of the shell-to-bottom weld shell shall be at least 3/8 in (9.53mm).

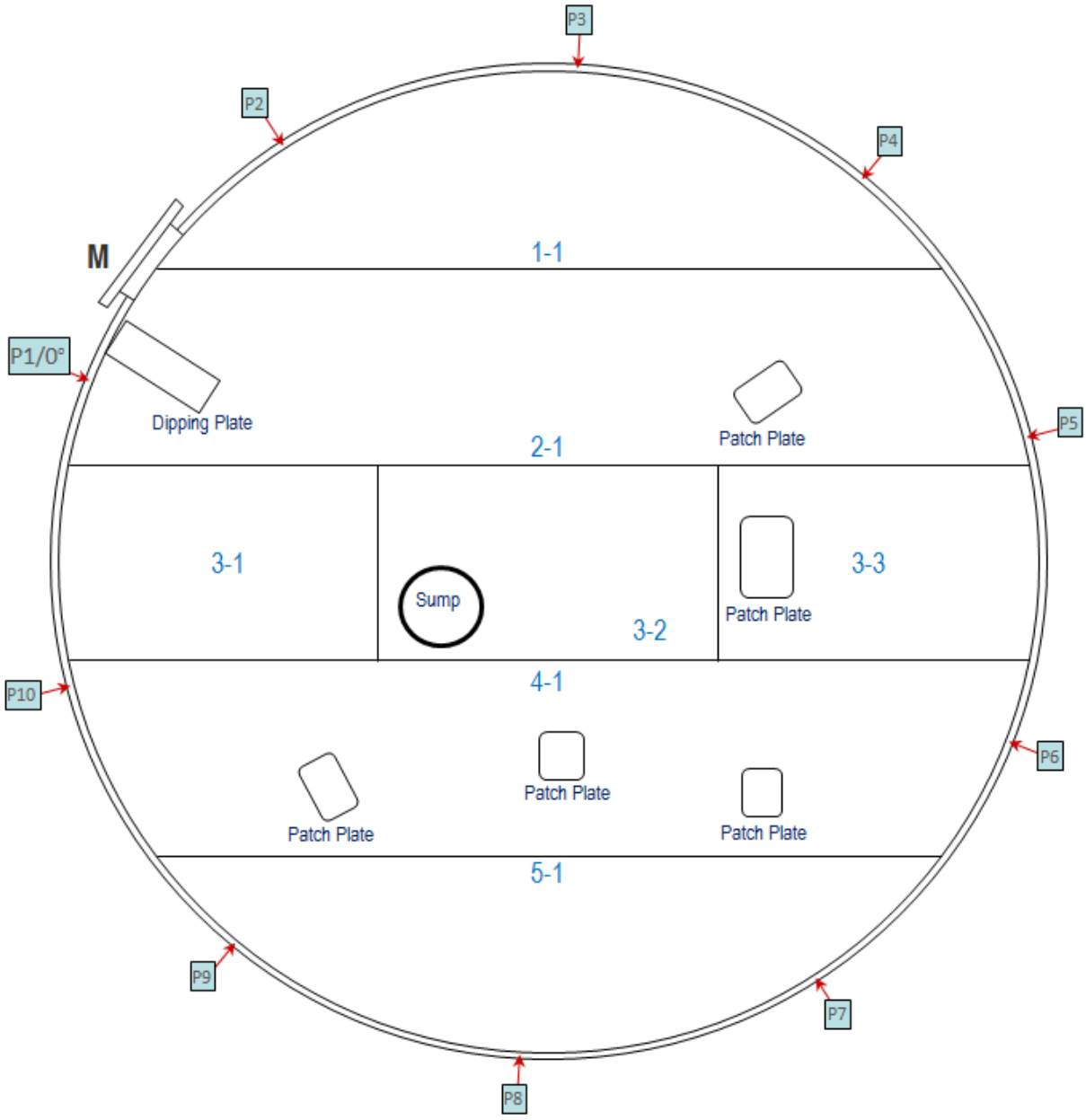
Table 6-4 : Thickness Measurement on Bottom Projection Plates (mm)

UT Location	1	2	3	4	5	6	7	8	9	10
Readings(mm)	9.89	9.90	9.84	9.88	9.56	9.48	9.66	9.69	9.70	9.78

Note: First Ultrasonic Thickness location is at 0^{o} degree of the tank reference

Conclusion:

The Lowest reading found on bottom projection plate is 9.48mm, therefore, the thickness on bottom projection plate is within API 653 tolerance.



Drawing for inspection reference only. Not To Scale.

Legend:

1-1	Plate Number
P3	UT Measurement Location
M	24" Manhole

Figure 6-2 : Bottom Projection Plate Layout

Attachment 1 : Tank Floor Scanning, Magnetic Flux Leakage Report

Tank Inspection Report

Client: Vital FSM PetroCorp

Location: □□□□Terminal, Federal State of Micronesia

Tank ID: 3

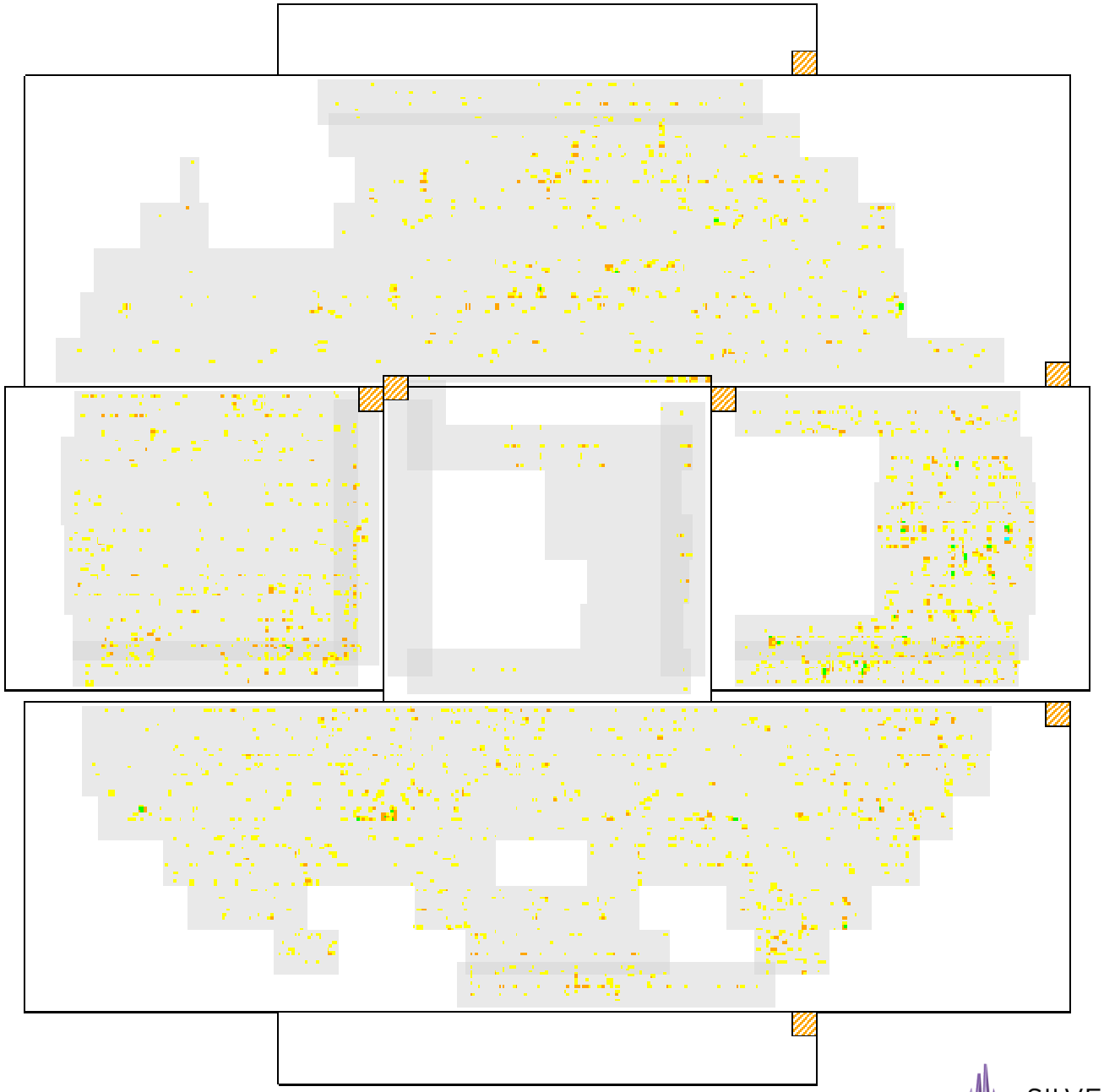
Inspection Date: 16-12-2016

Tank Floor Layout Showing Discontinuities

Tank	3
Location	Truk Micronesia
Client	Vital FSM PetroCorp
Operator Company	SGS Malaysia
Outer Tank Diameter	6096 mm
Lower Threshold	20%
Upper Threshold	100%
Defect Enhancment Setting	10

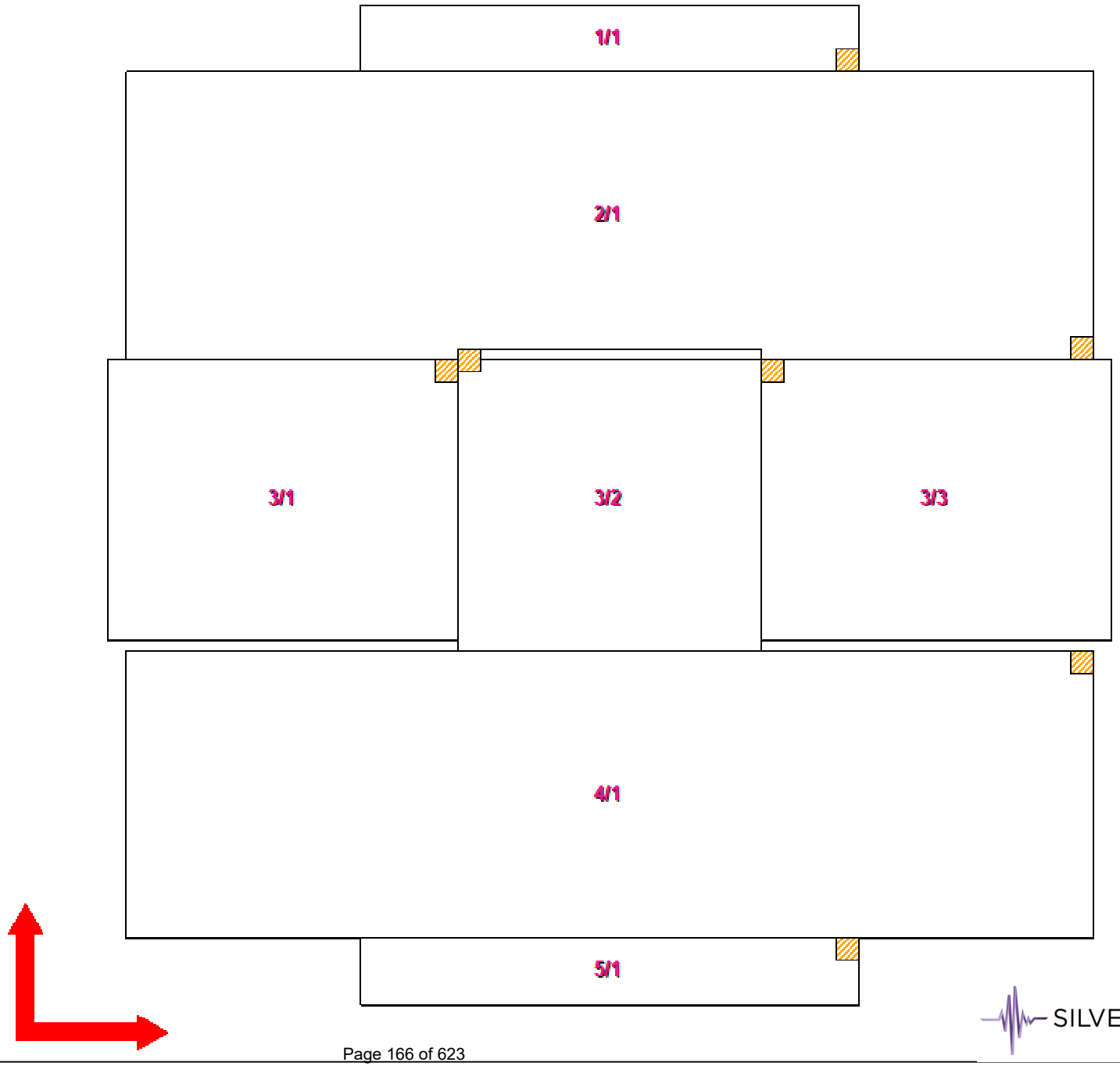
Discontinuity Colour Scheme

20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity



Tank Floor Numbering System

Tank	3
Location	Truk Micronesia
Client	Vital FSM PetroCorp
Operator Company	SGS Malaysia
Outer Tank Diameter	6096 mm
Lower Threshold	20%
Upper Threshold	100%
Defect Enhancment Setting	10



Tank Floor Layout With Symbols

Tank	3
Location	Truk Micronesia
Client	Vital FSM PetroCorp
Operator Company	SGS Malaysia
Outer Tank Diameter	6096 mm
Lower Threshold	20%
Upper Threshold	100%
Defect Enhancment Setting	10

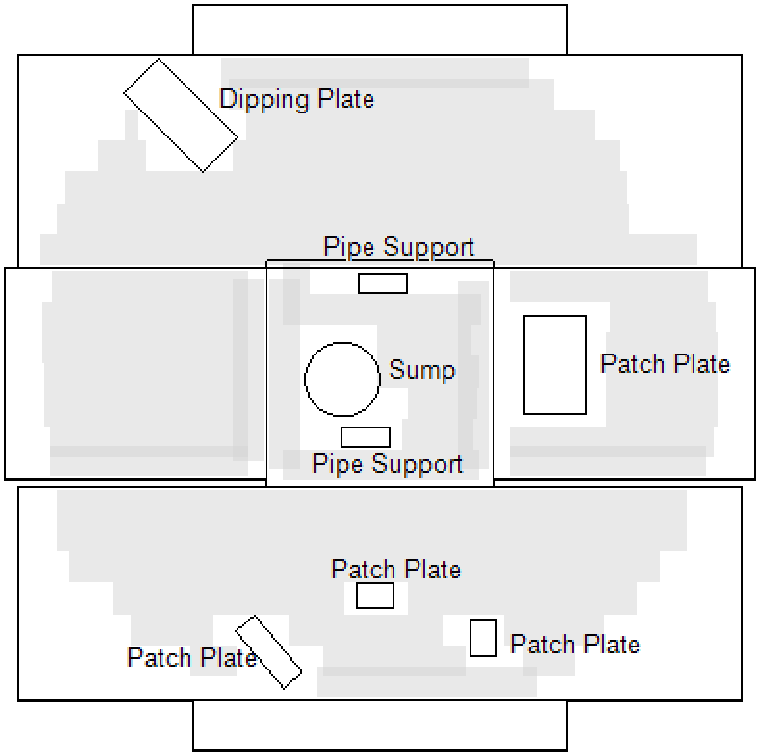
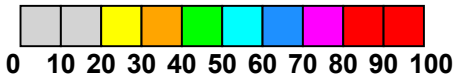


Plate summary

Tank: 3

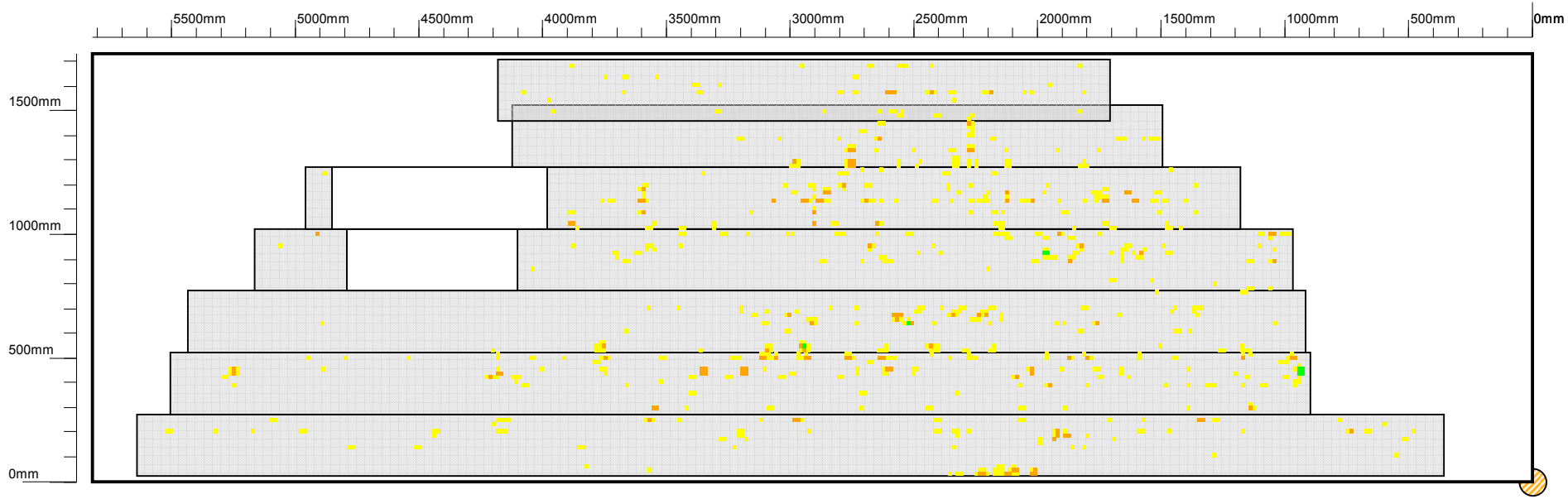
Date: 16-12-2016

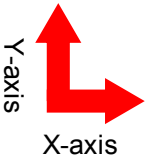


Discontinuities found on all plates (ignoring thresholds)

Row	Plate	Minimum discontinuity %	Maximum discontinuity %	Severity
1	1	20	0	
2	1	20	45	
3	1	20	45	
3	2	20	34	
3	3	20	50	
4	1	20	46	
5	1	20	0	

Total number Of plates for Tank 3 = 7





SILVERWING

SGS

Row:	2	**Plate:**	1
Plate Length (mm):	5820	**Plate Width (mm):**	1730
Orientation:	Horizontal	**Scan Method:**	Parallel
Max discontinuity:	45	**Showing defects from:**	**TOP & BOTTOM**
Lower Threshold:	20%	**Upper Threshold:**	100% **(Import Threshold: 20%)**
Defect enhancment setting:	**Not used**		

Discontinuity Colour Scheme

20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity

Symbols

Track
Non-Scanned Area
Plate Reference
Tank Reference

Tank:	3	**Operator:**	sukri
Date:	16-12-2016	**Equipment Serial:**	6930706
Location:	Truk Micronesia		
Company:	SGS Malaysia		
Client:	Vital FSM PetroCorp		

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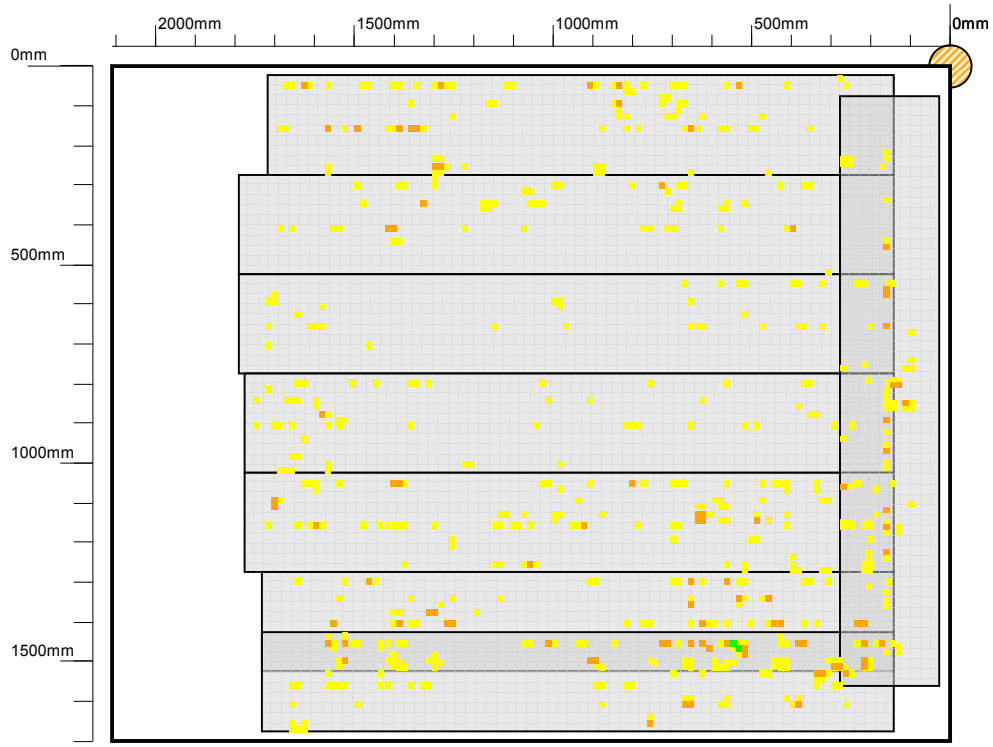

Y-axis

X-axis

SILVERWING

SGS

Row:	3	**Plate:**	1
Plate Length (mm):	2110	**Plate Width (mm):**	1700
Orientation:	Horizontal	**Scan Method:**	Parallel
Max discontinuity:	45	**Showing defects from:**	**TOP & BOTTOM**
Lower Threshold:	20%	**Upper Threshold:**	100% **(Import Threshold: 20%)**
Defect enhancment setting:	**Not used**		

Discontinuity Colour Scheme

20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity

Symbols

Track
Non-Scanned Area
Plate Reference
Tank Reference

Tank:	3	**Operator:**	sukri
Date:	16-12-2016	**Equipment Serial:**	6930706
Location:	Truk Micronesia		
Company:	SGS Malaysia		
Client:	Vital FSM PetroCorp		

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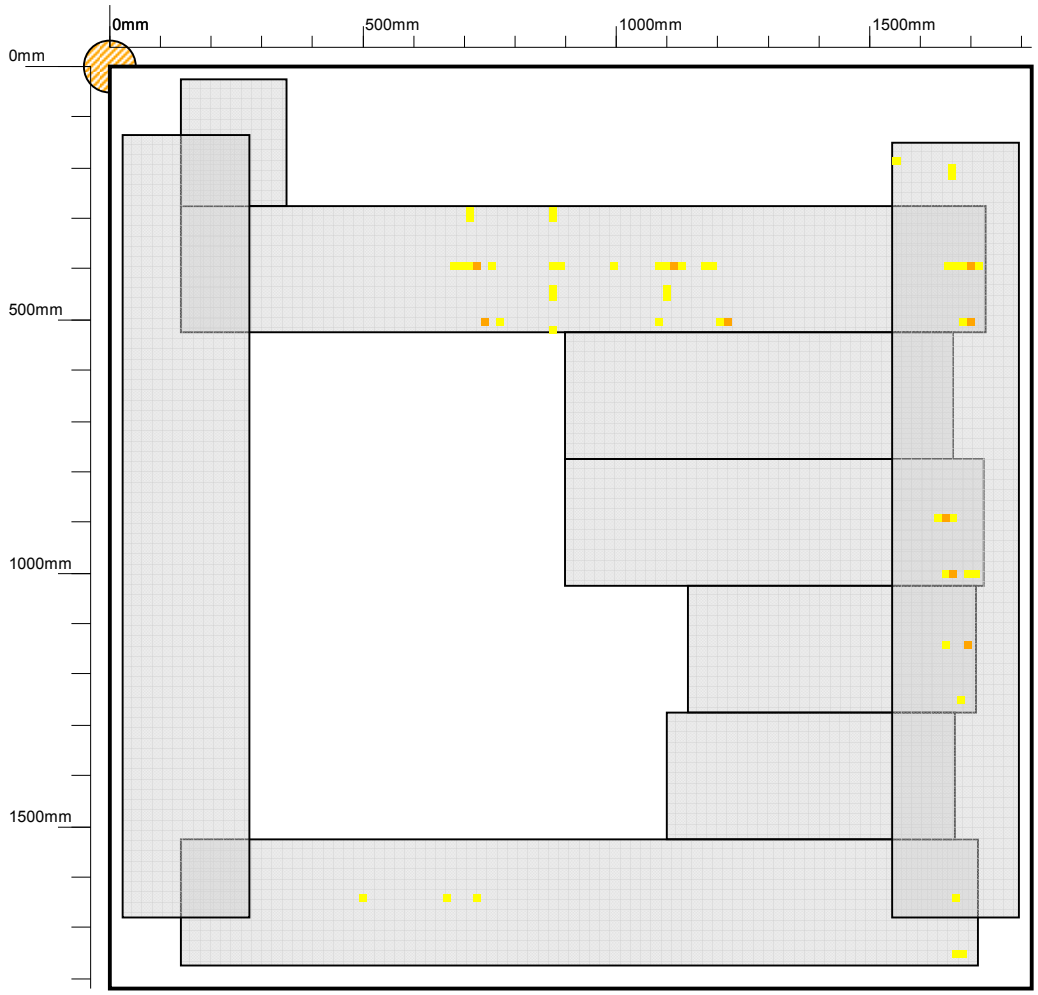

SILVERWING

SGS

Row:	3	**Plate:**	2
Plate Length (mm):	1820	**Plate Width (mm):**	1820
Orientation:	Horizontal	**Scan Method:**	Parallel
Max discontinuity:	34	**Showing defects from:**	**TOP & BOTTOM**
Lower Threshold:	20%	**Upper Threshold:**	100% **(Import Threshold: 20%)**
Defect enhancment setting:	**Not used**		

Discontinuity Colour Scheme

20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity

Symbols

Track
Non-Scanned Area
Plate Reference
Tank Reference

Tank:	3	**Operator:**	sukri
Date:	16-12-2016	**Equipment Serial:**	6930706
Location:	Truk Micronesia		
Company:	SGS Malaysia		
Client:	Vital FSM PetroCorp		

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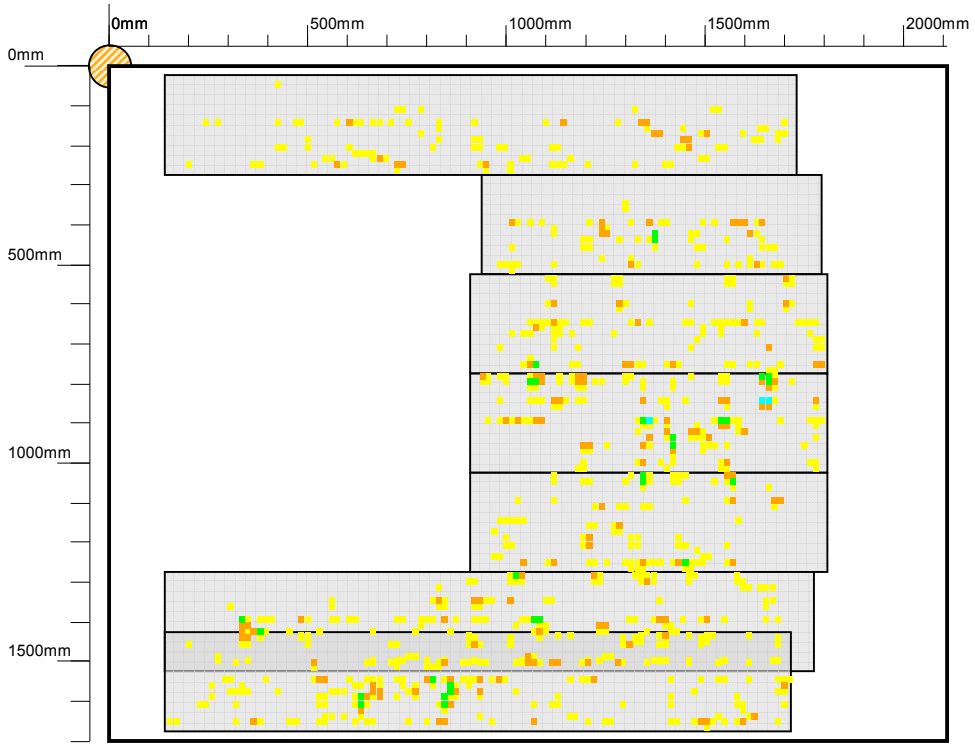

Y-axis

X-axis

SILVERWING

SGS

Row:	3	**Plate:**	3
Plate Length (mm):	2110	**Plate Width (mm):**	1700
Orientation:	Horizontal	**Scan Method:**	Parallel
Max discontinuity:	50	**Showing defects from:**	**TOP & BOTTOM**
Lower Threshold:	20%	**Upper Threshold:**	100% **(Import Threshold: 20%)**
Defect enhancment setting:	**Not used**		

Discontinuity Colour Scheme

20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity

Symbols

Track
Non-Scanned Area
Plate Reference
Tank Reference

Tank:	3	**Operator:**	sukri
Date:	16-12-2016	**Equipment Serial:**	6930706
Location:	Truk Micronesia		
Company:	SGS Malaysia		
Client:	Vital FSM PetroCorp		

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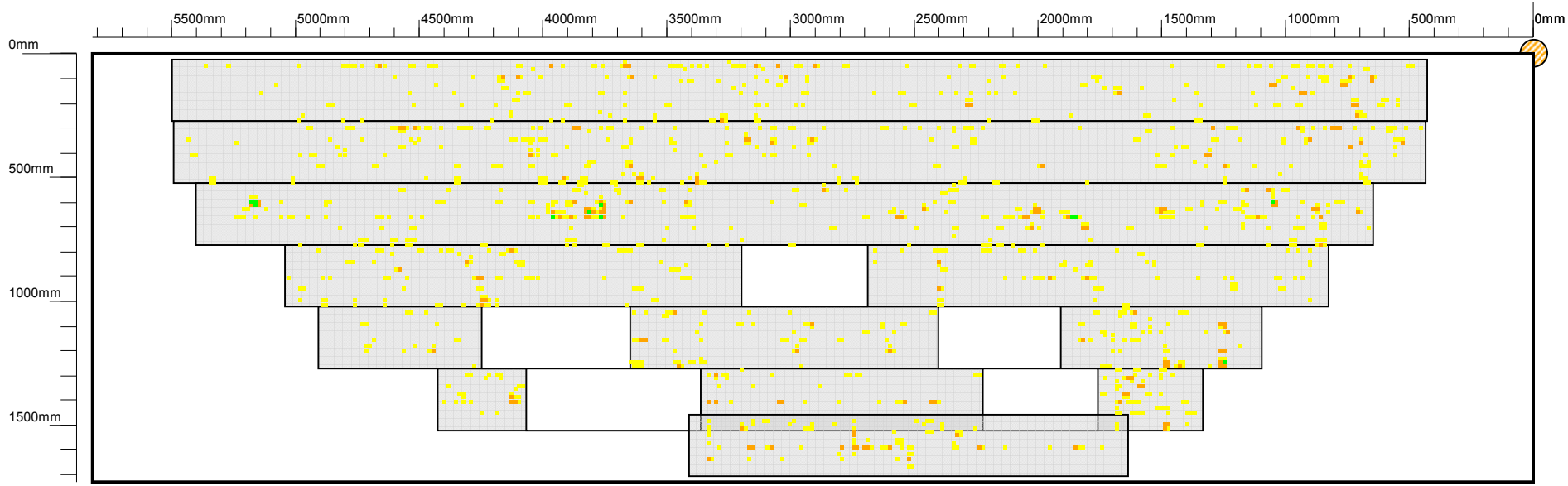

Y-axis

X-axis

SILVERWING

SGS

Row:	4	**Plate:**	1
Plate Length (mm):	5820	**Plate Width (mm):**	1730
Orientation:	Horizontal	**Scan Method:**	Parallel
Max discontinuity:	46	**Showing defects from:**	**TOP & BOTTOM**
Lower Threshold:	20%	**Upper Threshold:**	100% **(Import Threshold: 20%)**
Defect enhancment setting:	**Not used**		
Tank:	3	**Operator:**	sukri
Date:	16-12-2016	**Equipment Serial:**	6930706
Location:	Truk Micronesia		
Company:	SGS Malaysia		
Client:	Vital FSM PetroCorp		

Discontinuity Colour Scheme

20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity

Symbols

Track
Non-Scanned Area
Plate Reference
Tank Reference

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Appendix D

Chuuk Tank 3 API653 Out of Service Report

CLIENT :	**Vital FSM PetroCorp**
LOCATION :	**Chuuk Terminal, Federal State of Micronesia**
TANK NUMBER :	**T5**
TYPE OF INSPECTION :	**Out of Service Inspection**
JOB NUMBER:	**10155546**
INSPECTION DATE :	**18 Dec 2016 to 20 Dec 2016**
JOB EXECUTED BY :	**Amirin Adli Abu Bakar** **Sukri Omar**

PREPARED BY :	REVIEWED BY :	APPROVED BY :
Amirin Adli Abu Bakar	Hilmi Soh	Wan Adlan

Petrotechnical Inspection (M) Sdn Bhd
No. 26, Jalan Anggerik Vanilla 31/93
Kota Kemuning, 40460, Shah Alam
Selangor Darul Ehsan, Malaysia
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Petrotechnical Inspection (M) Sdn Bhd
REVIEWED / WITNESSED / VERIFIED

HILMI SOH
API 653 AUTHORISED INSPECTOR
CERT NO : 32396
Date:

All orders are accepted and all report and certificates issued subject to the General Condition of Service (Copies available upon request)

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Table of Table **Page**

1. Introduction

Tank T5 have been inspected at Chuuk Terminal, Federal State of Micronesia for Vital FSM PetroCorp.

Inspection Equipments use as below table:

Equipment	Brand	Model	Serial Number	Calibration Due Date
Ultrasonic Thickness Gauge	Sonatest	Sonatest Site Scan D10L+	I 01011	20 Dec 2016
Magnetic Flux Leakage (MFL)	Silverwing	Floormap VS2i	6930706	30 Dec 2016
Total Station	Sokkia	Set630RK	157779	11 Jul 2017

1.1. General Tank information

Tank General Information						
Tank Number	T5		Owner	Vital FSM PetroCorp		
Tank Location	Chuuk Terminal, Federal State of Micronesia		Manufacturer	N/A		
Tank Diameter	7,620mm or 25.000ft		Product	LSADO		
Tank Height	10,973mm or 36.000ft		Specific Gravity	0.950		
Maximum Filling Height	10,389mm or 34.083ft		Nominal Capacity (m^3)	N/A		
Design Code	N/A	Heating System	No	Cathodic Protection		
Data Plate	Yes	Insulation	No	Leak Detection	No	

Tank Component Geometry Information			
Foundation	On Ground	Roof	Fixed Cone Roof
Shell	Butt Weld	Bottom	Cone Down

Tank Component Coating Availability							
Shell	Internal	Up to 1st course	Roof	Internal	None	Bottom	Coated
	External	Coated		External	None		

Tank Dates Information			
Year Commission	1974	Year of Last Inspection	N/A
Year of Current Inspection	2016	Year of Last Bottom Plates Change	N/A

Other Information	
Access To Roof	Spiral Stairway

1.2. Summary of Findings

1.2.1. Engineering Evaluation

1.2.1.1. Differential Settlement

The Permissible Out-Of-Plane Settlement (mm)	Maximum Differential Settlement, Si (mm)	Result
4.49	4.27	Within Tolerance

Please see page 61 for more information.

1.2.1.2. Roof Plate

Item	Nominal Thickness (mm)	Minimum Measured Thickness (mm)	Minimum Required Thickness (mm)	Corrosion Rate (mm/Year)	Remaining Life (Year)
Roof Plates	4.76	4.27	2.29	0.012	169.19

Please see page 67 for more information.

1.2.1.3. Shell Plate Evaluation

Course	Previous Thickness(mm)	Minimum Measured Thickness (mm)	Minimum Required Thickness (mm)	Remaining Life (year)	Next Inspection Interval
1	7.00	6.45	2.59	295.01	15.00
2	7.00	6.34	2.54	241.82	15.00
3	7.00	6.32	2.54	233.47	15.00
4	7.00	6.17	2.54	183.69	15.00
5	7.00	6.20	2.54	192.15	15.00
6	5.00	4.45	2.54	145.85	15.00

Note: Previous Thickness taken from As Built Drawing.

Please see page 71 for more information.

1.2.1.4. Plumbness (Tank Tilt)

Acceptance Value(mm)	Maximum Out-of-Plumbness Value (mm)	Result
0.0	-12	Within Tolerance
45.0	24	Within Tolerance
90.0	83	Within Tolerance
135.0	54	Within Tolerance
180.0	34	Within Tolerance
225.0	-39	Within Tolerance
270.0	-57	Within Tolerance
315.0	-67	Within Tolerance

Please see page 75 for more information.

1.2.1.5. Bottom plate (Before repair/ No repair needed)

Item	Year- In Service	Nominal Thickness (mm)	RT_{bc} (mm)	Rt_{ip} (mm)	S_tP_r (mm)	U_{pr} (mm)	MRT (mm)	Calculated Life Span (Year)	Next Inspection Interval, Or
Bottom Plates	42	10.00	3.20	7.30	0.0643	0.1619	2.54	2.92	2.92
Critical Zone	42	10.00	3.40	7.60	0.0571	0.1571	2.54	4.01	4.01

MRT = minimum remaining thickness at the end of interval Or.
O_r = in-service interval of operation (years to next internal inspection) not to exceed that allowed by 6.4.2,
RT_{bc} = minimum remaining thickness from bottom side corrosion after repairs,
RT_{ip} = minimum remaining thickness from internal corrosion after repairs,
S_tP_r = maximum rate of corrosion not repaired on the top side. S_tP_r = 0 for coated areas of the bottom.
UP_r = maximum rate of corrosion on the bottom side.

Please see page 83 for more information.

1.2.2. Visual Inspection

1.2.2.1. Foundation

Item	Findings	Recommendations	Repair Priority
1. Foundation	General view.	• Not Applicable	Not Applicable
2. Bottom Projection Plate and Foundation	Sealent between bottom projection plate and tank foundation found deteriorated/damaged.	• To replace with new plinth seal.	Online Or Offline
3. Tank Earthing	Two earthing cable for grounding were noted on tank projection plate and physically condition of cable found satisfactory.	• Recommended to carry out resistance test as per API 575 clause 7.2.6. The total resistance from tank to earth should not exceed 25 ohm and monitor during routine inspection.	Offline

1.2.2.2. Shell

Item	Findings	Recommendations	Repair Priority
1. Shell Plate	No significant finding was noted during inspection.	• Not Applicable	Not Applicable
2. Shell Plate (Internal)	Rusting and product stain were noted on the shell plate.	• To made good surface preparation and recoat as per paint manufacturer' specification.	Offline
	Several attachment/pipe holders were noted attached to the shell wall	• Not Applicable	Offline
3. Shell Plate - Location: Near Shell to Bottom Weld	Non-API standard Patch plate repair noted.	• To monitor.	Not Applicable
4. Shell Plate - Location: 6th Course	Non-API standard Patch plate repair noted.	• To monitor.	Not Applicable
5. Manway - Size: 24 inch.	Paint failure and rust were observed on the flange, nozzle and bolting.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
	Non-API standard Reinforcement plate noted.	• To monitor.	Not Applicable
6. Manway (Internal) - Size: 24 inch.	Paint failure and rust was noted.	• To made good surface preparation and recoat as per paint manufacturer' specification.	Offline
7. Blind Nozzle - Size: 6 inch.	Corrosion/scaling noted.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
	Non-API standard Reinforcement plate noted.	• To monitor.	Not Applicable
8. Blind Nozzle (Internal) - Size: 6 inch.	Corrosion/scaling noted.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
9. Outlet - Size: 6 inch.	Scaling noted.	• To made good surface	Offline

		preparation and recoat as per owner's painting specification and install a new gasket.	
	Non-API standard Reinforcement plate noted.	• To monitor.	Not Applicable
	Corrosion/Scaling noted.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
10. Water Drain Off - Size: 4 inch.	Corrosion/scaling noted.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
11. Water Drain Off (Internal) - Size: 4 inch.	Corrosion/scaling noted.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
12. Inlet - Size: 6 inch.	Corrosion/Scaling noted.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
	Non-API standard Patch plate repair noted.	• To monitor.	Not Applicable
13. Inlet (Internal) - Size: 6 inch.	Scaling noted.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
14. Spiral Stairway	Paint failure with isolated corrosion were observed on stairway thread, stringer and support.	• To made good surface preparation and recoat as per paint manufacturer' specification.	Offline

1.2.2.3. Fixed Roof

Item	Findings	Recommendations	Repair Priority
1. Roof Plate	Several location of paint failure/rusting were noted on roof plate.	• To power brush affected area and recoat as per paint manufacturer' specification.	Offline
2. Crown Plate	Stain and paint failure noted.	• To made good surface preparation and recoat as per paint manufacturer' specification.	Offline
3. Roof Plate (Internal)	General View.	• Not Applicable	Not Applicable
4. Sampling/ Gauging Hatch - 6 inch.	Paint failure with surface rust was observed on the neck, securing bolts and flange.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
	Broken cover's hinge was noted.	• To repair/replace affected area.	Offline

5. Roof Manway - 20 inch.	Paint failure with surface rust was observed on the neck, securing bolts and flange.	• To made good surface preparation and recoat as per owner's painting specification and install a new gasket.	Offline
6. Free Vent - 6 inch.	Paint failure and corrosion was noted.	• To made good surface preparation and recoat as per paint manufacturer' specification.	Offline
	Mesh screen found in satisfactory condition.	• Not Applicable	Not Applicable
7. Pressure Vacuum Vent - 6 inch.	Mesh screen found in satisfactory condition.	• Not Applicable	Not Applicable
8. Handrail	Paint failure due to atmospheric corrosion was noted.	• To made good surface preparation and recoat as per paint manufacturer' specification.	Offline

1.2.2.4. Bottom

Item	Findings	Recommendations	Repair Priority
1. Bottom Plate	Approximately 70% of bottom plate suffered from general pitting with the maximum depth of 2.7mm. Product stain noted concentrated at the center of tank floor.	• To abrasive blasting surface preparation to a minimum of near white finish (NACE No.2/SSPC-SP10) and apply new protective coating.	Offline
2. Bottom Plate weldment	No significant finding was noted during inspection.	• Not Applicable	Not Applicable
3. Bottom Plate - Plate number: 1 (1860x600mm)	Non-API standard Patch plate repair noted.	• To monitor in next inspection interval.	Not Applicable
4. Bottom Plate - Plate number: 1 (460x600mm)			
5. Bottom Plate - Plate number: 2-1 (300x300mm)			
6. Bottom Plate - Plate number: 2-1 (150x150mm)			
7. Bottom Plate - Plate number: 2-1 (300x150mm)			
8. Bottom Plate - Plate number: 2-1 (160x160mm)			
9. Bottom Plate - Plate number: 2-1 (320x250mm)			
10. Bottom Plate - Plate number: 2-1 (250x230mm)			
11. Bottom Plate - Plate number: 2-2 (150x150mm)			
12. Bottom Plate - Plate			

number: 3-1 (170x170mm)			
13. Bottom Plate - Plate number: 3-1 (20mm gap)			
14. Bottom Plate - Plate number: 3-2 (250x600mm)			
15. Bottom Plate - Plate number: 3-2 (300x230mm)			
16. Bottom Plate - Plate number: 3-2 (150x150mm)			
17. Bottom Plate - Plate number: 3-2 (160x160mm)			
18. Bottom Plate - Plate number: 3-2 (1870x460mm)			
19. Bottom Plate - Plate number: 3-3 (400x250mm)			
20. Bottom Plate - Plate number: 3-3 (600x200mm)			
21. Bottom Plate - Plate number: 3-3 (400x200mm)			
22. Bottom Plate - Plate number: 3-3 (150x150mm)			
23. Bottom Plate - Plate number: 4-1 (170x170mm)			
24. Bottom Plate - Plate number: 4-2 (170x170mm)			
25. Bottom Plate - Plate number: 4-2 (600x1070mm)			
26. Bottom Plate - Plate number: 4-2 (160x300mm)			
27. Bottom Plate - Plate number: 4-2 (180x320mm)			
28. Bottom Plate - Plate number: 5 (330x480mm)			
29. Bottom Plate - Plate number: 5 (170x170mm)			
30. Bottom Plate - Plate number: 5 (200x410mm)			

31. Shell to Bottom Joint	No significant finding was noted during inspection.	• Not Applicable	Not Applicable
32. Drain Sump	Paint blister and stain noted.	• To made good surface preparation and recoat as per paint manufacturer' specification.	Offline
33. Support Bracket for internal piping.	Internal piping were secured to tank bottom with U type support bracket.	• Futher consideration should be given to replace existing support with H-type support which prevents horizontal movement but allows for vertical movement.	Offline
34. Diping Plate	No significant finding was noted during inspection.	• Not Applicable	Not Applicable
35. Floating Device	No significant finding was noted during inspection.	• To test for its fuctionality.	Not Applicable

1.3. Visual Inspection Photo with Comment

1.3.1. General View of Tank

	**General View of Tank T5**

1.3.2. Foundation

	**Foundation** General view.
	**Bottom Projection Plate and Foundation** **Finding:** Sealent between bottom projection plate and tank foundation found deteriorated/damaged. **Recommendation:** To replace with new plinth seal. **Repair Priority:** *Online Or Offline*

Tank Earthing

Finding:
Two earthing cable for grounding were noted on tank projection plate and physically condition of cable found satisfactory.

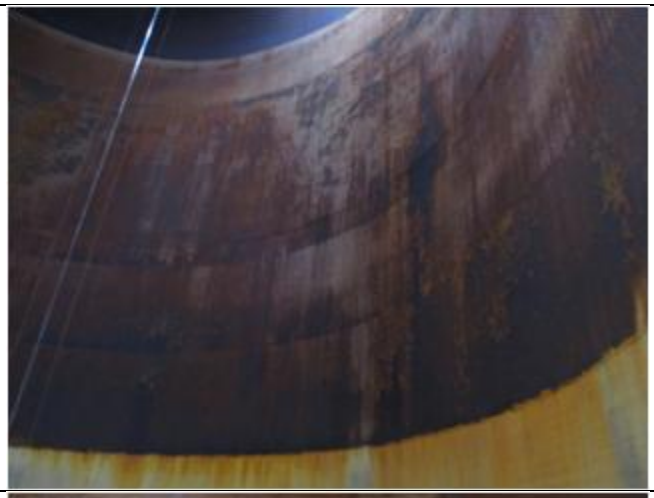
Recommendation:
Recommended to carry out resistance test as per API 575 clause 7.2.6 (if not done yet). The total resistance from tank to earth should not exceed 25 ohm and monitor during routine inspection.

Repair Priority: *Offline*

1.3.3. Shell

Shell Plate

Finding:
No significant finding was noted during inspection.
Recommendation:
None/ Not Applicable.
Repair Priority: None/ Not Applicable.



Shell Plate (Internal)

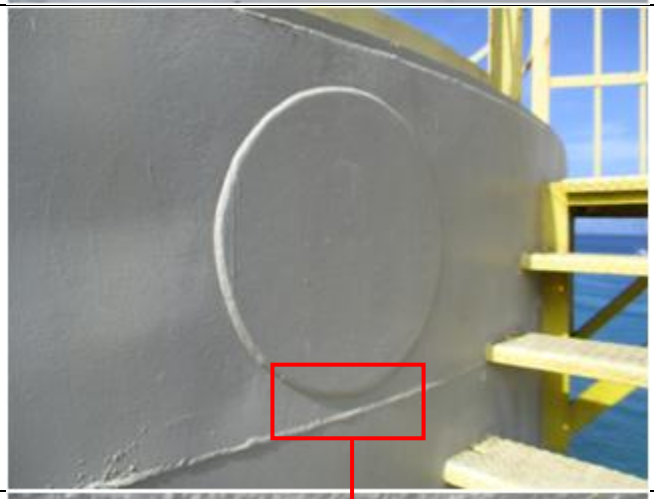
Finding:
Rusting and product stain were noted on the shell plate.
Recommendation:
To made good surface preparation and recoat as per paint manufacturer' specification.
Repair Priority: *Offline*

Shell Plate

Finding:
Several attachment/pipe holders were noted attached to shell.
Recommendation:
None/ Not Applicable.
Repair Priority: *Offline*

Shell Plate - Location: Near Shell to Bottom Weld

Finding:
Non-API standard patch plate repair noted.
Recommendation:
To monitor.
Repair Priority: *None/ Not Applicable.*



Shell Plate - Location: 6th Course

Finding:
Non-API standard patch plate repair noted.
Recommendation:
To monitor.
Repair Priority: *None/ Not Applicable.*

Manway - Size: 24 inch.

Finding:
1) Paint failure and rust were observed on the flange, nozzle and bolting.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Finding:
2) Non-API standard Reinforcement plate noted.
Recommendation:
To monitor.
Repair Priority: *None/ Not Applicable.*

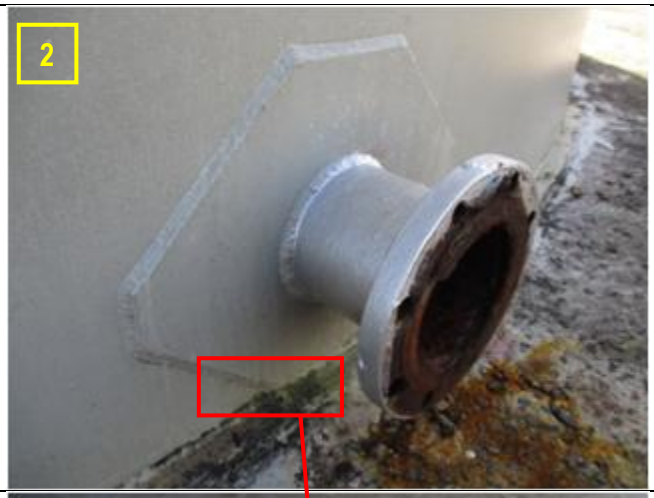
Manway (Internal) - Size: 24 inch.

Finding:
Paint failure and rust was noted.
Recommendation:
To made good surface preparation and recoat as per paint manufacturer' specification.
Repair Priority: *Offline*

Blind Nozzle - Size: 6 inch.

Finding:
1) Corrosion/scaling noted.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Finding:
2) Non-API standard Reinforcement plate noted.
Recommendation:
To monitor.
Repair Priority: *None/ Not Applicable.*



Blind Nozzle (Internal) - Size: 6 inch.

Finding:
Corrosion/scaling noted.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Outlet - Size: 6 inch.

Finding:
1) Scaling noted.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Finding:
2) Non-API standard Reinforcement plate noted.
Recommendation:
To monitor.
Repair Priority: *None/ Not Applicable.*

Outlet (Internal) - Size: 6 inch.

Finding:
Corrosion/Scaling noted.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Water Drain Off - Size: 4 inch.

Finding:
Corrosion/scaling noted.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Water Drain Off (Internal) - Size: 4 inch.

Finding:
Corrosion/scaling noted.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

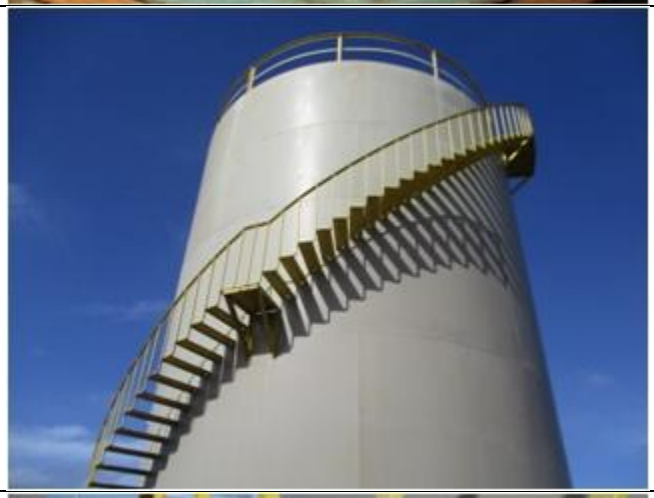
Inlet - Size: 6 inch.

Finding:
1) Corrosion/Scaling noted.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Finding:
2) Non-API standard Reinforcement plate noted.
Recommendation:
To monitor.
Repair Priority: *None/ Not Applicable.*

Inlet (Internal) - Size: 6 inch.

Finding:
Scaling noted.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*



Spiral Stairway

Finding:
Paint failure with isolated corrosion were observed on stairway thread, stringer and support.
Recommendation:
To made good surface preparation and recoat as per paint manufacturer' specification.
Repair Priority: *Offline*

1.3.4. Fixed Roof

Roof Plate

Finding:
Several location of paint failure/rusting were noted on roof plate.
Recommendation:
To power brush affected area and recoat as per paint manufacturer' specification.
Repair Priority: *Offline*

Crown Plate

Finding:
Stain and paint failure noted.
Recommendation:
To made good surface preparation and recoat as per paint manufacturer' specification.
Repair Priority: *Offline*

Roof Plate (Internal)

General view.

Sampling/ Gauging Hatch - 6 inch.

Finding:
1) Paint failure with surface rust was observed on the neck, securing bolts and flange.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Finding:
2) Broken cover's hinge was noted.
Recommendation:
Repair/replace affected area.
Repair Priority: *Offline*

Roof Manway - 20 inch.

Finding:
Paint failure with surface rust was observed on the neck, securing bolts and flange.
Recommendation:
To made good surface preparation and recoat as per owner's painting specification and install a new gasket.
Repair Priority: *Offline*

Free Vent - 6 inch.

Finding:
1) Paint failure and corrosion was noted.
Recommendation:
To made good surface preparation and recoat as per paint manufacturer' specification.
Repair Priority: *Offline*

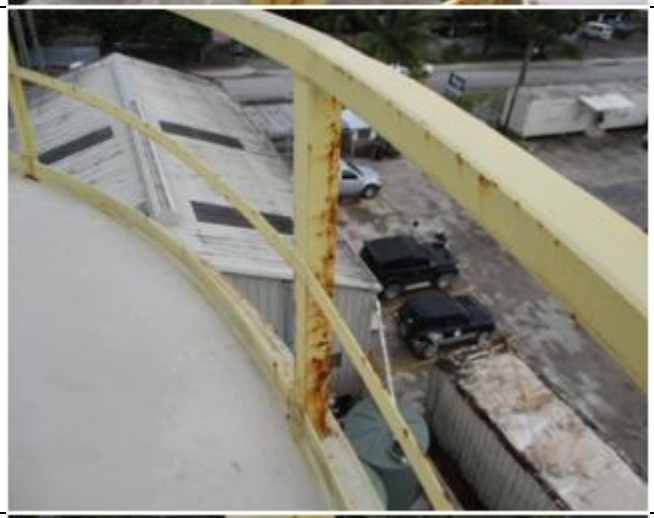
Finding:
2) Mesh screen found in satisfactory condition.
Recommendation:
None/ Not Applicable.
Repair Priority: *None/ Not Applicable.*

Sampling/ Gauging Hatch - 6 inch.

Finding:
No significant finding was noted.
Recommendation:
None/ Not Applicable.
Repair Priority: *None/ Not Applicable.*

Pressure Vacuum Vent - 6 inch.

Finding:
Mesh screen found in satisfactory condition.
Recommendation:
None/ Not Applicable.
Repair Priority: *None/ Not Applicable.*



Handrail

Finding:
Paint failure due to atmospheric corrosion was noted.
Recommendation:
To made good surface preparation and recoat as per paint manufacturer' specification.
Repair Priority: *Offline*

1.3.5. Bottom

Bottom Plate

Finding:
Approximately 70% of bottom plate suffered from general pitting with the maximum depth of 2.7mm. Product stain noted concentrated at the center of tank floor.
Recommendation:
To abrasive blasting surface preparation to a minimum of near white finish (NACE No.2/SSPC-SP10) and apply new protective coating.
Repair Priority: *Offline*

Bottom Plate weldment

Finding:
No significant finding was noted during inspection.
Recommendation:
None/ Not Applicable.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 1 (1860x600mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 1 (460x600mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 2-1 (300x300mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 2-1 (150x150mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

	**Bottom Plate - Plate number: 2-1 (150x150mm)** **Finding:** Non-API standard Patch plate repair noted. **Recommendation:** To monitor in next inspection interval. **Repair Priority:** *None/ Not Applicable.*
	**Bottom Plate - Plate number: 2-1 (300x150mm)** **Finding:** Non-API standard Patch plate repair noted. **Recommendation:** To monitor in next inspection interval. **Repair Priority:** *None/ Not Applicable.*
	**Bottom Plate - Plate number: 2-1 (160x160mm)** **Finding:** Non-API standard Patch plate repair noted. **Recommendation:** To monitor in next inspection interval. **Repair Priority:** *None/ Not Applicable.*
	**Bottom Plate - Plate number: 2-1 (150x150mm)** **Finding:** Non-API standard Patch plate repair noted. **Recommendation:** To monitor in next inspection interval. **Repair Priority:** *None/ Not Applicable.*

	**Bottom Plate - Plate number: 2-1 (320x250mm)** **Finding:** Non-API standard Patch plate repair noted. **Recommendation:** To monitor in next inspection interval. **Repair Priority:** *None/ Not Applicable.*
	**Bottom Plate - Plate number: 2-1 (250x230mm)** **Finding:** Non-API standard Patch plate repair noted. **Recommendation:** To monitor in next inspection interval. **Repair Priority:** *None/ Not Applicable.*
	**Bottom Plate - Plate number: 2-2 (150x150mm)** **Finding:** Non-API standard Patch plate repair noted. **Recommendation:** To monitor in next inspection interval. **Repair Priority:** *None/ Not Applicable.*
	**Bottom Plate - Plate number: 3-1 (170x170mm)** **Finding:** Non-API standard Patch plate repair noted. **Recommendation:** To monitor in next inspection interval. **Repair Priority:** *None/ Not Applicable.*

Bottom Plate - Plate number: 3-1 (300x300mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 3-2 (250x600mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 3-2 (300x230mm)

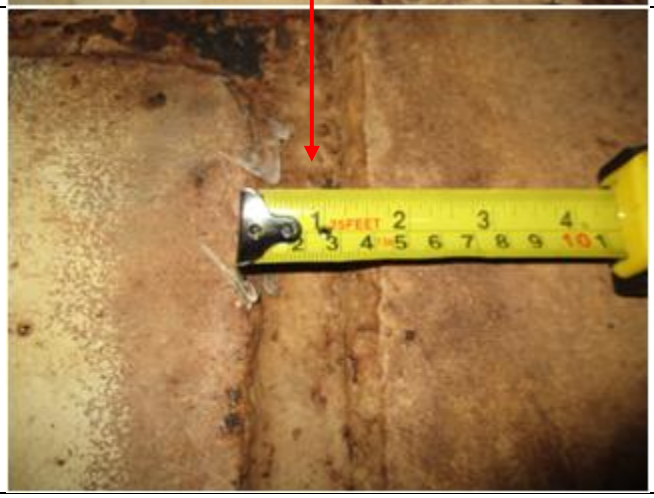
Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 3-2 (150x150mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 3-2 (160x160mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*



Bottom Plate - Plate number: 3-2 (1870x460mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 3-3 (400x250mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 3-3 (600x200mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 3-3 (400x200mm)

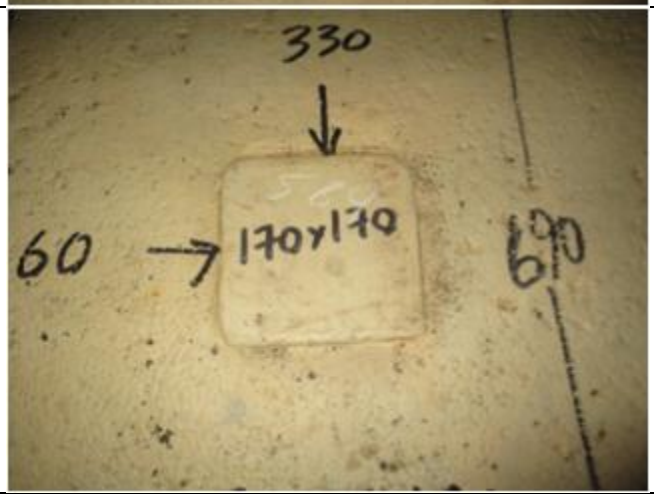
Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

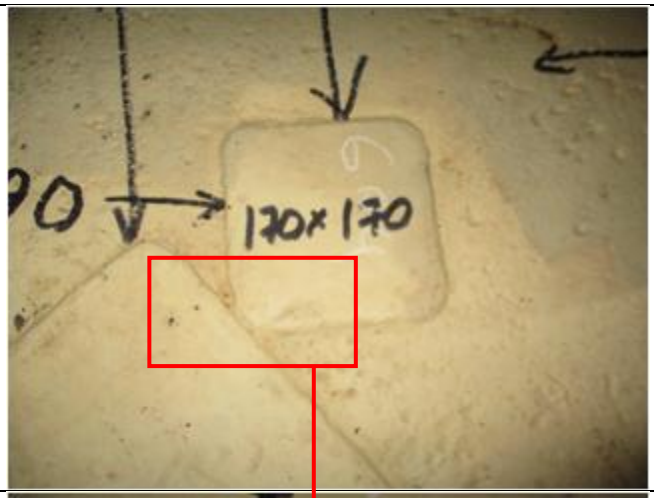
Bottom Plate - Plate number: 3-3 (150x150mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 3-3 (150x150mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

	**Bottom Plate - Plate number: 3-3 (150x150mm)** **Finding:** Non-API standard Patch plate repair noted. **Recommendation:** To monitor in next inspection interval. **Repair Priority:** *None/ Not Applicable.*
	**Bottom Plate - Plate number: 4-1 (170x170mm)** **Finding:** Non-API standard Patch plate repair noted. **Recommendation:** To monitor in next inspection interval. **Repair Priority:** *None/ Not Applicable.*
	**Bottom Plate - Plate number: 4-2 (170x170mm)** **Finding:** Non-API standard Patch plate repair noted. **Recommendation:** To monitor in next inspection interval. **Repair Priority:** *None/ Not Applicable.*
	**Bottom Plate - Plate number: 4-2 (170x170mm)** **Finding:** Non-API standard Patch plate repair noted. **Recommendation:** To monitor in next inspection interval. **Repair Priority:** *None/ Not Applicable.*



Bottom Plate - Plate number: 4-2 (170x170mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 4-2 (600x1070mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 4-2 (160x300mm)

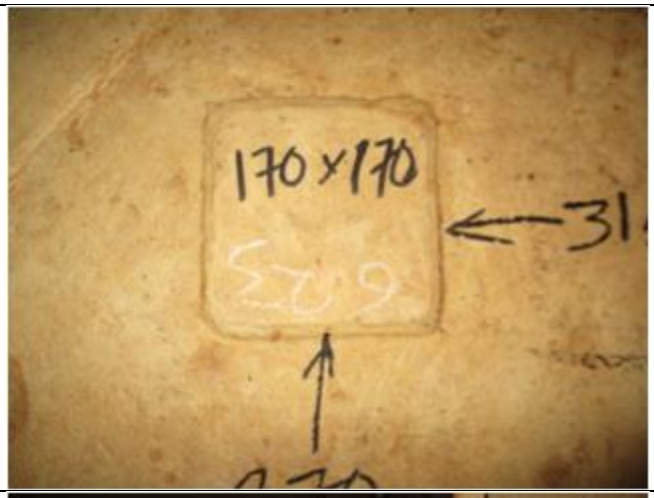
Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

Bottom Plate - Plate number: 4-2 (180x320mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

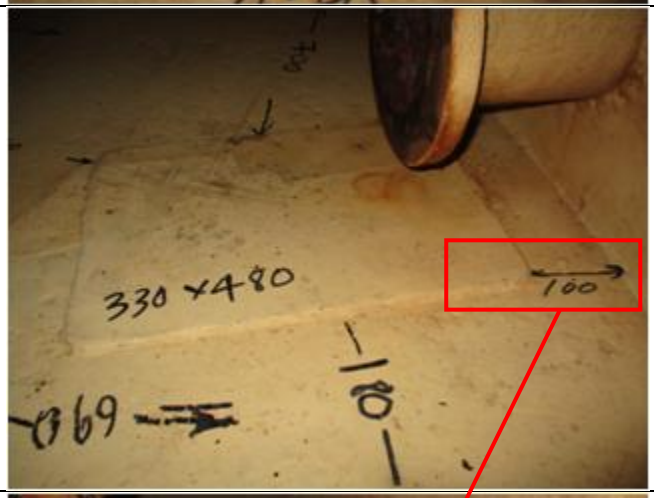
Bottom Plate - Plate number: 4-2 (180x320mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*



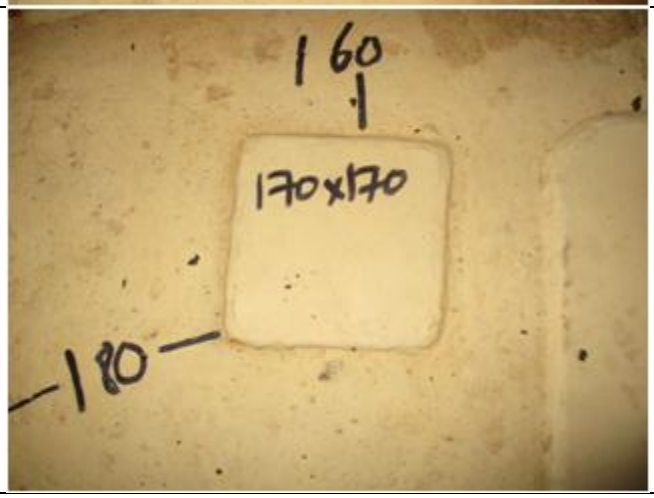
Bottom Plate - Plate number: 4-2 (170x170mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*



Bottom Plate - Plate number: 5 (330x480mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*



Bottom Plate - Plate number: 5 (170x170mm)

Finding:
Non-API standard Patch plate repair noted.
Recommendation:
To monitor in next inspection interval.
Repair Priority: *None/ Not Applicable.*

	**Bottom Plate - Plate number: 5 (170x170mm)** **Finding:** Non-API standard Patch plate repair noted. **Recommendation:** To monitor in next inspection interval. **Repair Priority:** *None/ Not Applicable.*
	**Bottom Plate - Plate number: 5 (170x170mm)** **Finding:** Non-API standard Patch plate repair noted. **Recommendation:** To monitor in next inspection interval. **Repair Priority:** *None/ Not Applicable.*
	**Bottom Plate - Plate number: 5 (200x410mm)** **Finding:** Non-API standard Patch plate repair noted. **Recommendation:** To monitor in next inspection interval. **Repair Priority:** *None/ Not Applicable.*

Shell to Bottom Joint

Finding:
No significant finding was noted during inspection.
Recommendation:
None/ Not Applicable.
Repair Priority: *None/ Not Applicable.*

Drain Sump

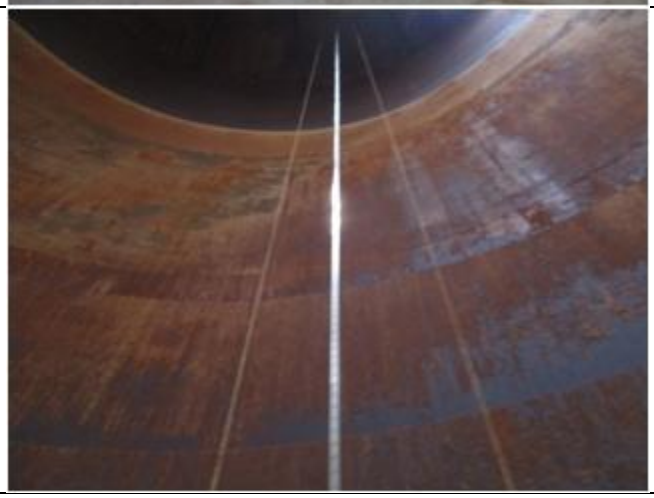
Finding:
Paint blister and stain noted.
Recommendation:
To made good surface preparation and recoat as per paint manufacturer' specification.
Repair Priority: *Offline*

Support Bracket for internal piping.

Finding:
Internal piping were secured to tank bottom with U type support bracket.
Recommendation:
Futher consideration should be given to replace existing support with H-type support which prevents horizontal movement but allows for vertical movement.
Repair Priority: *Offline*

Diping Plate

Finding:
No significant finding was noted during inspection.
Recommendation:
None/ Not Applicable.
Repair Priority: *None/ Not Applicable.*



Floating Device

Finding:
No significant finding was noted during inspection.
Recommendation:
To test for its fuctionality.
Repair Priority: *None/ Not Applicable.*

1.4. Visual Inspection Checklist

- Out of Service Inspection Checklist

No.	Items	Completed √	Comments
1	**OVERVIEW**		
1.1	Check that tank has been cleaned, is gas free, and safe for entry.	√	N/A
1.2	Check that the tank is completely isolated from product lines, all electrical power, and steam lines.	√	N/A
1.3	Check that roof is adequately supported, including fixed roof structure and floating roof legs.	√	N/A
1.4	Check for presence of failing object hazards, such as corroded-through roof rafters, asphalt stalactites, and trapped hydrocarbons in unopened or plugged equipment or appurtenances, ledges, etc.	√	N/A
1.5	Inspect for slipping hazards on the bottom and roof decks.	√	N/A
1.6	Inspect structural welds on accessways and clips.	√	N/A
1.7	Check surface needing inspection for a heavy-scale buildup and check weld seams and oily surfaces where welding is to be done. Note areas needing more cleaning, including blasting.	√	N/A
2	**TANK EXTERIOR**		
2.1	Inspect appurtenances opened during cleaning such as lower floating swing sheave assemblies, nozzle interiors (after removal of valves).	√	N/A
2.2	Hammer test or ultrasonically test the roof.	√	UT
2.3	Enter and inspect the floating roof pontoon compartments.	N/A	N/A
3	**BOTTOM INTERIOR SURFACE**		
3.1	Using a flashlight held close to and parallel to the bottom plates, and using the bottom plate layout as a guide, visually inspect and hammer test the entire bottom.	√	N/A
3.2	Measure the depth of pitting and describe the pitting appearance (sharp edged, lake type, dense, scattered, etc).	√	N/A
3.3	Mark areas requiring patching or further inspection.	√	N/A
3.4	Mark locations for turning coupons for inspection.	√	N/A
3.5	Inspect all welds for corrosion and leaks, particularly the shell-to-bottom weld.	√	N/A
3.6	Inspect sketch plates for corrosion.	√	N/A
3.7	Check condition of internal sump, if applicable. Standing liquid should be removed from the sump to allow for complete inspection and vacuum testing of weld seams as appropriate. Sump bottom and sidewall plate and seams need to be evaluated for both product-side and soil-side corrosion.	√	N/A
3.8	Locate and mark voids under the bottom.	√	N/A
3.9	Record bottom data on a layout sketch using the existing bottom plates as a grid. List the number and sizes of patches required.	√	N/A
3.1	Vacuum test the bottom lap welds.	N/A	N/A

3.11	Hammer test or ultrasonically examine any slightly discolored spots or damp areas.	√	UT
3.12	Check for reinforcement pads under all bottom attached clips, brackets, and supports.	√	N/A
3.13	Inspect floating roof leg pads for pitting or cutting, and excessive dimpling (indicating excessive loading).	N/A	N/A
3.14	Check the column bases of fixed roof supports for adequate pads and restraining clips.	N/A	N/A
3.15	In earthquake zones 3 and 4, check that roof supports are not welded down to the tank bottom, but are only restrained from horizontal movement.	N/A	N/A
3.16	Check area beneath swing line cable for indications of cable cutting or dragging.	N/A	N/A
3.17	Mark old oil and air test connection for removal and patching.	N/A	N/A
3.18	Identify and report low areas on the bottom that does not drain adequately.	√	N/A
3.19	Inspect coating for holes, disbonding, deterioration, and discoloration.	√	N/A
4	**SHELL SEAMS AND PLATE**		
4.1	On cone up bottoms, closely inspect and gauge the depth of metal loss on the lower 2 in. to 4 in. of the shell (area of standing water).	N/A	N/A
4.2	Measure the depth of pitting on each course.	N/A	N/A
4.3	Inspect and estimate the amount of metal loss on the heads of rivets and bolts.	√	N/A
4.4	Inspect shell-to-bottom riveted lap joints.	N/A	N/A
4.5	Inspect for vertical grooving damage from seal assembly protrusions.	√	N/A
4.6	Inspect existing protective coatings for damage, deterioration, and disbonding.	√	N/A
4.7	Check for areas of rubbing (indicating too much pressure by the seal assembly shoes or inadequate annular space).	N/A	N/A
4.8	Visually inspect the shell plates and seams for indications of leakage.	√	
4.9	If the shell has riveted or bolted seams, record the leak locations by film or chart in case the locations are lost during surface preparation for painting.	N/A	N/A
4.1	Measure annular space at 40-ft intervals.	N/A	N/A
4.11	Survey the shell to check for roundness and plumb.	√	See Survey Data
5	**SHELL-MOUNTED OVERFLOWS**		
5.1	Inspect overflow for corrosion and adequate screening.	N/A	N/A
5.2	Check location of overflow that it is not above any tank valves or equipment.	N/A	N/A
6	**ROOF INTERIOR SURFACE**		
6.1	**General**		
6.1.1	Visually inspect the underside surface of the roof plates for holes, scale buildup, and pitting.	N/A	N/A

6.1.2	Hammer test or ultrasonically examine to check for thin areas, particularly in the vapor space of floating roofs and at edge of roof on cone roof tank.	√	UT
6.1.3	Check all clips, brackets, braces, etc., welded to the roof deck plate for welded reinforcement pads and see that they have not broken free.	N/A	N/A
6.1.4	If no pad is present, penetrant test for cracking of the weld or deck plate.	N/A	N/A
6.1.5	Inspect for protective coating for breaks, disbondment, and deterioration.	N/A	N/A
6.1.6	Spark test the interior surface coating if recoating is not planned.	N/A	N/A
6.2	**Fixed Roof Support Structure**		
6.2.1	Inspect the support columns for thinning in the upper 2 ft.	N/A	N/A
6.2.2	On API columns (two channels welded together) check for corrosion scale breaking the tack welds, unless the joint between the channels is completely seal welded.	N/A	N/A
6.2.3	Check that the reinforcement pad on the bottom is seal-welded to the tank bottom with horizontal movement restraining clips welded to the pad.	N/A	N/A
6.2.4	Determine if pipe column supports are concrete filled or open pipe. If open pipe, check for a drain opening in the bottom of the pipe.	N/A	N/A
6.2.5	Inspect and gauge rafters for thinning, particularly near the center of the roof. Report metal loss.	N/A	N/A
6.2.6	Check for loose or twisted rafters.	N/A	N/A
6.2.7	Inspect girders for thinning and check that they are attached securely to the top of the columns.	N/A	N/A
6.2.8	Report if the columns have cross bracing in the area between the low pump out of the top of the shell (for future internal floating roof installation).	N/A	N/A
6.2.9	Inspect and report presence of any roof-mounted swing line bumpers.	N/A	N/A
6.2.10	Photograph the roof structure if no rafter layout drawing exists.	N/A	N/A
7	**FIXED ROOF APPURTENANCES**		
7.1	**Inspection and Light Hatches**		
7.1.1	Inspect the hatches for corrosion, paint and coating failures, holes, and cover sealing.	N/A	N/A
7.1.2	On loose covers, check for a safety chain in good condition.	N/A	N/A
7.1.3	On light hatches over 30 in. across, check for safety rods.	N/A	N/A
7.1.4	Inspect the condition of the gaskets on bold or latched down hatch covers.	N/A	N/A
7.2	**Staging Support Connection**		
7.2.1	Inspect the condition of the staging support for corrosion.	√	N/A
7.3	**Breathers and Vents**		
7.3.1	Inspect and service the breather.	√	N/A
7.3.2	Inspect screens on vents and breathers.	√	N/A
7.4	**Emergency P/V Hatches**		

7.4.1	Inspect and service pressure/vacuum hatches. (Setting should be high enough to prevent chattering of breather during normal operation. See breather manufacturer's guide.	N/A	N/A
7.4.2	Inspect liquid seal hatches for corrosion and proper liquid level in the seal.	N/A	N/A
7.5	**Sample Hatches**		
7.5.1	Inspect sample hatch for corrosion.	√	N/A
7.5.2	Check that the cover operates properly.	√	N/A
7.5.3	If the tank has no gauge well, check for a hold-off distance marker and check measurement.	√	N/A
8	**FLOATING ROOF**		
8.1	**Roof Deck**		
8.1.1	Hammer test the area between roof rim and shell. (If access for hammer testing is inadequate, measure the distance from the bottom edge of the roof to the corroded area and then hammer test from inside the pontoon).	N/A	N/A
8.1.2	In sour water service, clean and test all deck plate weld seams for cracking unless the lower laps have been seal-welded.	N/A	N/A
8.1.3	Check that either the roof drain is open or the drain plug in the roof is open in case of unexpected rain.	N/A	N/A
8.1.4	On flat bottomed and cone bottom roof decks, check for a vapor dam around the periphery of the roof. The dam should be continuous without break to prevent escape of vapors to the seal area from under the center of the roof.	N/A	N/A
8.2	**Floating Roof Pontoons**		
8.2.1	Visually inspect each pontoon for liquid leakage.	N/A	N/A
8.2.2	Run a light wire through the gooseneck vents on locked down inspection hatch covers to make sure they are open.	N/A	N/A
8.2.3	Inspect lockdown latches on each cover.	N/A	N/A
8.2.4	Check and report if each pontoon is :	N/A	N/A
	1. Vapor tight (bulkhead seal welded on one side on bottom, sides, and top) 2. Liquid tight (seal-welded on bottom and sides only), or 3. Unacceptable (minimum acceptable conditions is liquid tight).	N/A	N/A
8.3	**Floating Roof Cutouts**		
8.3.1	Inspect underside of cutouts for mechanical damage.	N/A	N/A
8.3.2	Inspect welds for cracks.	N/A	N/A
8.3.3	Inspect plate thinning, pitting, and erosion.	N/A	N/A
8.3.4	Measure mixer cutouts and record plate thickness for future mixer installation or replacement. Plate thickness_____.	N/A	N/A
8.4	**Floating Roof Supports**		
8.4.1	Inspect fixed low and removable high floating roof legs for thinning.	N/A	N/A
8.4.2	Inspect for notching at bottom of legs for drainage.	N/A	N/A
8.4.3	Inspect for leg buckling or felling at bottom.	N/A	N/A
8.4.4	Inspect pin hole in roof guide for tears.	N/A	N/A

8.4.5	Check plumb of all legs.	N/A	N/A
8.4.6	Inspect for adequate reinforcement gussets on all legs through a single portion of the roof.	N/A	N/A
8.4.7	Inspect the area around the roof legs for cracking if there is no internal reinforcement pad or if the topside pad is not welded to the deck plate on the underside.	N/A	N/A
8.4.8	Inspect the sealing system on the two-position legs and the vapor plugs in the fixed low leg for deterioration of the gaskets.	N/A	N/A
8.4.9	On shell-mounted roof supports, check for adequate clearance based on the maximum floating roof movement as determined by the position of the roof relative to the gauge well and/or counter-rotational device.	N/A	N/A
9	**FLOATING ROOF SEAL ASSEMBLIES**		
9.1	**Primary Shoes Assembly**		
9.1.1	Remove four sections of foam log (foam-filled seals) for inspection on 90^0 locations.	N/A	N/A
9.1.2	Inspect hanger attachment to roof rim for thinning, bending, broken welds, and wear of pin holes.	N/A	N/A
9.1.3	Inspect clips welded to roof rim for thinning.	N/A	N/A
9.1.4	Shoes-inspect for thinning and holes in shoes.	N/A	N/A
9.1.5	Inspect for bit-metal bolts, clips, and attachment.	N/A	N/A
9.1.6	Seal fabric-inspect for deterioration, stiffening, holes, and tears in fabric.	N/A	N/A
9.1.7	Measure length of fabric from top of shoe to roof rim, and check against maximum anticipated annular space as roof operates.	N/A	N/A
9.1.8	Inspect any modification of shoes over shell nozzles, mixers, etc., for clearance.	N/A	N/A
9.1.9	Inspect shoes for damage caused by striking shell nozzles, mixers, etc.	N/A	N/A
9.2	**Primary Toroidal Assembly**		
9.2.1	Inspect seal fabric for wear, deterioration, holes, and tears.	N/A	N/A
9.2.2	Inspect hold-down system for buckling or bending.	N/A	N/A
9.2.3	Inspect foam for liquid absorption and deterioration.	N/A	N/A
9.3	**Rim-Mounted Secondaries**		
9.3.1	Inspect the rim-mounted bolting bar for corrosion and broken welds.	N/A	N/A
9.3.2	Measure and chart seal-to-shell gaps.	N/A	N/A
9.3.3	Visually inspect seam from below, looking for holes as evidenced by light.	N/A	N/A
9.3.4	Inspect fabric for deterioration and stiffness.	N/A	N/A
9.3.5	Inspect for mechanical damage, corrosion, and wear on tip in contact with shell.	N/A	N/A
9.3.6	Inspect for contact with obstructions above top of shell.	N/A	N/A
10	**FLOATING ROOF APPURTENANCES**		
10.1	**Roof Manways**		
10.1.1	Inspect walls of manways for pitting and thinning.	N/A	N/A

10.1.2	On tanks with interface autogauges, check seal around gauge tape cable and guide wires through manway cover.	N/A	N/A
10.1.3	Inspect cover gasket and bolts.	N/A	N/A
10.2	**Rim Vent**		
10.2.1	Check rim vent for fitting and holes.	N/A	N/A
10.2.2	Check vent for condition of screen.	N/A	N/A
10.2.3	On floating roof tanks where the environmental rules require closing off the vent, check the vent pipe for corrosion at the pipe-to-rim joint and check that the blinding is adequate.	N/A	N/A
10.3	**Vacuum Breaker, Breather Type**		
10.3.1	Service and check operation of breather valve.	N/A	N/A
10.3.2	Check that nozzle pipe projects no more than 1/2 in. below roof deck.	N/A	N/A
10.4	**Vacuum Breaker, Mechanical Type**		
10.4.1	Inspect the stem for thinning. Measure how far the vacuum breaker cover is raised off the pipe when the roof is resting on high or low legs.	N/A	N/A
	a. On high legs :	N/A	N/A
	b. On low legs :	N/A	N/A
10.5	**Roof Drains : Open Systems, Including Emergency Drains.**		
10.5.1	Check liquid level inside open roof drains for adequate freeboard. Report if there is insufficient distance between liquid level and top of drain.	N/A	N/A
10.5.2	If tanks comes under Air Quality Monitoring District rules, inspect the roof drain vapor plug.	N/A	N/A
10.5.3	If emergency is not at the center of the roof, check that there are at least three emergency drains.	N/A	N/A
10.6	**Closed Drain System : Drain Basins**		
10.6.1	Inspect for thinning and pitting.	N/A	N/A
10.6.2	Inspect protective coating (topside).	N/A	N/A
10.6.3	Inspect basin cover or screen for corrosion.	N/A	N/A
10.6.4	Test operation of check valve.	N/A	N/A
10.6.5	Check for presence of check valve where bottom of basin is below product level.	N/A	N/A
10.6.6	Inspect drain basin(s) to roof deck welds for cracking.	N/A	N/A
10.6.7	Check drain basin(s) outlet pipe for adequate reinforcement to roof deck (including reinforcement pad).	N/A	N/A
10.7	**Closed Drain Systems : Fixed Drain Line on Tank Bottom**		
10.7.1	Hammer test fixed drain line on tank bottom for thinning and scale/debris plugging.	N/A	N/A
10.7.2	Inspect supports and reinforcement pads for weld failures and corrosion.	N/A	N/A
10.7.3	Check that pipe is guided, not rigidly locked to support, to avoid tearing of tank bottom plate.	N/A	N/A
10.8	**Closed Drain Systems : Flexible Pipe Drain**		
10.8.1	Inspect for damage to exterior of pipe.	N/A	N/A
10.8.2	Check for obstructions that pipe could catch on.	N/A	N/A
10.8.3	Inspect shields to protect pipe from snagging.	N/A	N/A

10.8.4	Inspect results of hydrostatic test on flexible roof drain system.	N/A	N/A
10.9	**Closed Drain System : Articulated Joint Drain**		
10.9.1	Hammer test rigid pipe in flexible joint systems for thinning and scale/debris plugging.	N/A	N/A
10.9.2	Inspect system for signs of bending or strain.	N/A	N/A
10.9.3	Inspect results of system hydrostatic test.	N/A	N/A
10.9.4	Inspect landing leg and pad.	N/A	N/A
10.10	**Autogauge System and Alarms**		
10.10.1	Check freedom of movement of tape through autogauge tape guide.	N/A	N/A
10.10.2	Inspect sheaves for freedom of movement.	N/A	N/A
10.10.3	Test operation checker.	N/A	N/A
10.10.4	Inspect tape and tape cable for twisting and fraying.	N/A	N/A
10.10.5	Test the tape's freedom of movement through guide sheaves and tape guide pipe.	N/A	N/A
10.10.6	On open-top tanks, check that gate tapes with cables have no more than one foot of tape exposed with float at lowest point.	N/A	N/A
10.10.7	Check float for leakage.	N/A	N/A
10.10.8	Test float guide wire anchors for spring action by pulling on wire and releasing.	N/A	N/A
10.10.9	Inspect floatwells in floating roofs for thinning and pitting of walls just above the liquid level.	N/A	N/A
10.10.10	Check that the autogauge tape is firmly attached to the float.	N/A	N/A
10.10.11	Inspect the tape cable and float guide wire fabric seals through the float well cover.	N/A	N/A
10.10.12	Inspect the bottom guide wire attachment clip : inspect for a temporary weighted bar instead of a permanent welded down clip.	N/A	N/A
10.10.13	Inspect board-type autogauge indicators for legibility and freedom of movement of indicator.	N/A	N/A
10.10.14	Measure and record these distances to determine if seal damage will occur if tank is run over from :	N/A	N/A
	1. Shell top angle to underside of tape guide system.	N/A	N/A
	2. Liquid level on floating top to top of secondary seal.	N/A	N/A
10.10.15	Identify floating roofs where the tape is connected directly to the roof.	N/A	N/A
10.10.16	Overfill alarm : Inspect tank overfill prevention alarm switches for proper operation.	N/A	N/A
11	**COMMON TANK APPURTENANCES**		
11.1	**Gauge Well**		
11.1.1	Inspect gate well pipe for thinning at about two-thirds distance above the bottom: look for thinning at the edge of the slots.	N/A	N/A
11.1.2	Check for corrosion on the pipe joint. Check that sample cords, weights, thermometers, etc., have been removed from the pipe.	N/A	N/A
11.1.3	Check for cone at bottom end of pipe about one foot above the bottom.	N/A	N/A

11.1.4	Check condition of well washer pipe and that its flared end is directed at the near side of the hold of pad.	N/A	N/A
11.1.5	Check that supports for gauge well are welded to pad or to shell and no directly to bottom plate.	N/A	N/A
11.1.6	Check operation of gauge well cover.	N/A	N/A
11.1.7	Check presence of a hold-off distance marker in well pipe and record hold-off distance. Hold-off distance_____ .	N/A	N/A
11.1.8	Identify and report size and pipe schedule, and whether pipe is solid or slotted. Report slot size.	N/A	N/A
11.1.9	Check that the hold-off distance plate is seal-welded to the bottom and that any gauge well supports are welded to the plate and not directly to the bottom.	N/A	N/A
11.1.10	Inspect vapor control float and cable.	N/A	N/A
11.1.11	Check for presence and condition of gauge well washer.	N/A	N/A
11.1.12	Check for bull plug or plate blind on gauge well washer valve.	N/A	N/A
11.1.13	Inspect gauge well guide in floating roof for pitting and thinning.	N/A	N/A
11.1.14	Inspect the guide rollers and sliding plates for freedom of movement.	N/A	N/A
11.1.15	Inspect condition of gauge well pipe seal system.	N/A	N/A
11.1.16	On black oil and diesel services: if gauge well is also used for sampling, check for presence of a thief-and gauge-type hatch to avoid spillage.	N/A	N/A
11.1.17	Visually inspect inside of pipe for pipe weld protrusions which could catch or damage vapor control float.	N/A	N/A
11.2	**Sampling Systems : Roof Sample Hatches**		
11.2.1	Inspect roof-mounted sample hatches for reinforcement pads and cracking.	√	N/A
11.2.2	Inspect cover for operation.	√	N/A
11.2.3	For tanks complying with Air Quality Monitoring District rules, inspect sample hatch covers for adequate sealing.	√	N/A
11.2.4	Check horizontal alignment of internal floating roof sample hatches under fixed roof hatches.	N/A	N/A
11.2.5	Inspect the sealing system on the internal floating roof sample hatch cover.	N/A	N/A
11.2.6	Inspect floating roof sample hatch cover recoil reel and rope.	N/A	N/A
11.3	**Shell Nozzles**		
11.3.1	Inspect shell nozzles for thinning and pitting.	√	UT
11.3.2	Inspect hot tap nozzles for trimming of holes.	√	N/A
11.3.3	Identify type of shell nozzles.	√	N/A
11.3.4	Identify and describe internal piping, including elbow-up and elbow-down types.	√	N/A
11.4	**For Nozzles Extended Into the Tank**		
11.4.1	Inspect pipe support pads welded to tank bottom.	√	N/A
11.4.2	Inspect to see that pipe is free to move along support without strain or tearing action on bottom plate.	N/A	Pipe was removed
11.4.3	Inspect nozzle valves for packing leaks and damaged flange faces.	√	N/A
11.4.4	Inspect heater stream nozzle flanges and valves for wire cutting.	N/A	N/A

11.4.5	Report which nozzles have thermal pressure relief bosses and valves.	√	N/A
11.4.6	In internal elbow-down fill line nozzles, inspect the wear plate on the tank bottom.	N/A	N/A
11.4.7	On elbow-up fill lines in floating roof tanks, check that opening is directed against underside of roof, not against vapor space. Inspect impact are for erosion.	N/A	N/A
11.5	**Diffusers and Air Rolling Systems**		
11.5.1	Inspect diffuser pipe for erosion and thinning.	N/A	N/A
11.5.2	Check holes in diffuser for excessive wear and enlargement.	N/A	N/A
11.5.3	Inspect diffuser supports for damage and corrosion.	N/A	N/A
11.5.4	Check that diffuser supports restrain, not anchor, longitudinal line movement.	N/A	N/A
11.5.5	Inspect air spiders on bottom of lube oil tanks for plugging and damaged or broken threaded joints.	N/A	N/A
11.6	**Swing Lines**		
11.6.1	Inspect flexible joint for cracks and leaks.	N/A	N/A
11.6.2	Scribe the flexible joint across the two moving faces and raise end of swing line to check the joint's freedom of movement, indicated by separation of scribe marks.	N/A	N/A
11.6.3	Check that flexible joints over 6 in. are supported.	N/A	N/A
11.6.4	Inspect the swing pipe for deep pitting and weld corrosion.	N/A	N/A
11.6.5	Loosen the vent plugs in the pontoons and listen for a vacuum. Lack of a vacuum indicates a leaking pontoon.	N/A	N/A
11.6.6	Check the results of air test on pontoons during repairs.	N/A	N/A
11.6.7	Inspect the pontoons for pitting.	N/A	N/A
11.6.8	Inspect the pull-down cable connections to the swing.	N/A	N/A
11.6.9	Inspect the condition of the bottom-mounted support, fixed roof limiting bumper, or shell-mounted limiting bumper for wood condition, weld and bolt corrosion, and seal welding to bottom or shell.	N/A	N/A
11.6.10	Inspect safety hold-down chain for corrosion and weak links.	N/A	N/A
11.6.11	Check that there is a welded reinforcement pad where the chain connects to the bottom.	N/A	N/A
11.6.12	If the floating swing in a floating or internal floating roof tank does not have a limiting device preventing the swing from exceeding 60 degrees, measure and calculate the maximum angle possible with the roof on overflow. Max. angle on Overflow :(If the calculated angle exceeds 65 degrees, recommended installation of a limiting bracket.):	N/A	N/A
11.6.13	Inspect pull-down cable for frying.	N/A	N/A
11.6.14	Inspect for three cable clamps where cable attaches to end of swing line (single-reeved) or to roof assembly (double-reeved). Inspect sheaves for freedom of movement.	N/A	N/A
11.6.15	Inspect winch operation and check the height indicator for legibility and accuracy.	N/A	N/A
11.6.16	Inspect bottom-mounted sheave assembly at end of pontoon for freedom of rotation of sheave.	N/A	N/A

11.6.17	Inspect shell-mounted lower sheave assembly for freedom of rotation of sheave, corrosion thinning, and pitting of sheave housing.	N/A	N/A
11.6.18	Inspect upper sheave assembly for freedom of movement of sheave.	N/A	N/A
11.6.19	Inspect the cable counterbalance assembly for corrosion and freedom of operation.	N/A	N/A
11.7	**Manway Heater Racks**		
11.7.1	Inspect the manway heater racks for broken welds and bending of the sliding rails.	N/A	N/A
11.7.2	Measure and record the length of the heater and length of the track.	N/A	N/A
11.8	**Mixer Wear Plates and Deflector Stands**		
11.8.1	Inspect bottom and shell plates and deflector stands.	N/A	N/A
11.8.2	Inspect for erosion and corrosion on the wear plates. Inspect for rigidity, structural soundness, corrosion, and erosion of deck plates and reinforcement pads that are seal-welded to the bottom under the deflector stand legs.	N/A	N/A
11.8.3	Measure for propeller clearance between the bottom of deflector stand and roof when the roof is on low legs.	N/A	N/A
12	**ACCESS STRUCTURES**		
12.1	**Handrails**		
12.1.1	Identify and report type (steel pipe, galvanized pipe, square tube, angle) and size of handrails.	√	N/A
12.1.2	Inspect for pitting and holes, paint failure.	√	N/A
12.1.3	Inspect attachment welds.	√	N/A
12.1.4	Identify cold joints and sharp edges. Inspect the handrails and midrails.	√	N/A
12.1.5	Inspect safety drop bar (or safety chain) for corrosion, functioning, and length.	√	N/A
12.1.6	Inspect the handrail between the rolling ladder and the gauging platform for the hazardous opening when the floating roof is at its lowest level.	N/A	N/A
12.2	**Platform Frame**		
12.2.2	Inspect frame for corrosion and paint failure.	√	N/A
12.2.3	Inspect the attachment of frame to supports and supports to tank for corrosion and weld failure.	√	N/A
12.2.4	Check reinforcement pads where supports are attached to shell or roof.	√	N/A
12.2.5	Inspect the surface that deck plate or grating rests on, for thinning and holes.	√	N/A
12.2.6	Check that flat-surface-to-flat-surface junctures are seal-welded.	√	N/A
12.3	**Deck Plate and Grating**		
12.3.1	Inspect deck plate for corrosion-caused thinning or holes (not drain holes) and paint failure.	√	N/A
12.3.2	Inspect plate-to-frame weld for rust scale buildup.	√	N/A
12.3.3	Inspect grating for corrosion-caused thinning of bars and failure of welds.	√	N/A

12.3.4	Check grating tie down clips. Where grating has been retrofitted to replace plate, measure the rise of the step below and above the grating surface and compare with other risers on the stairway.	√	N/A
12.4	**Stairway Stringers**		
12.4.1	Inspect spiral stairway stringers for corrosion, paint failure, and weld failure. Inspect attachment of stairway treads to stringer.	√	N/A
12.4.2	Inspect stairway supports to shell welds and reinforcement pads.	√	N/A
12.4.3	Inspect steel support attachment to concrete base for corrosion.	√	N/A
12.5	**Rolling Ladder**		
12.5.1	Inspect rolling ladder stringers for corrosion.	N/A	N/A
12.5.2	Identify and inspect ladder fixed rungs (square bar, round bar, angles) for weld attachment to stringers and corrosion, particularly where angle rungs are welded to stringers.	N/A	N/A
12.5.3	Check for wear and corrosion where rolling ladder attaches to gauging platform.	N/A	N/A
12.5.4	Inspect pivot bar for wear and secureness.	N/A	N/A
12.5.5	Inspect operation of self-leveling stairway treads.	N/A	N/A
12.5.6	Inspect for corrosion and wear on moving parts.	N/A	N/A
12.5.7	Inspect rolling ladder wheels for freedom of movement, flat spots, and wear on axle.	N/A	N/A
12.5.8	Inspect alignment of rolling ladder with roof rack.	N/A	N/A
12.5.9	Inspect top surface of rolling ladder track for wear by wheels to assure at least 18 in. Of unworn track (track long enough).	N/A	N/A
12.5.10	Inspect rolling ladder track welds for corrosion.	N/A	N/A
12.5.11	Inspect track supports on roof for reinforcement pads seal-welded to deck plate.	N/A	N/A
12.5.12	Check by dimensioning, the maximum angle of the rolling ladder when the roof is on low legs. Max.angle _____ .	N/A	N/A
12.5.13	If rolling ladder tracks extends to within 5ft of the edge of the roof on the far side, check for a handrail on the top of the shell on that side.	N/A	N/A

2 Foundation

2.1. Tank Settlement

Tank Settlement survey was carried out to determine the soil effects of soil settlement on storage tanks.

The minimum number of elevation points shall be as indicated by the following equation:

$$N = D/10$$

Where,

N = the minimum required number of settlement measurement points, but no less than eight. All values shall be rounded to the next higher whole number. The maximum spacing between settlement measurement points shall be 32 ft;

D = the tank diameter, in feet (ft).

The survey data was then be calculated to form a best fit cosine curve.

The permissible out of Plane Settlement is given by the following equation:-

$$S_{max} = (L2 \times Y \times 11) / 2[(E \times H)]$$

Where,

S = Deflection, in ft (out of plane distortion),

L = Arc length between measurement points, in ft,

Y = Yield strength, in lbf /in²,

E = Young's modulus, in lbf /in²,

H = tank height, in ft.

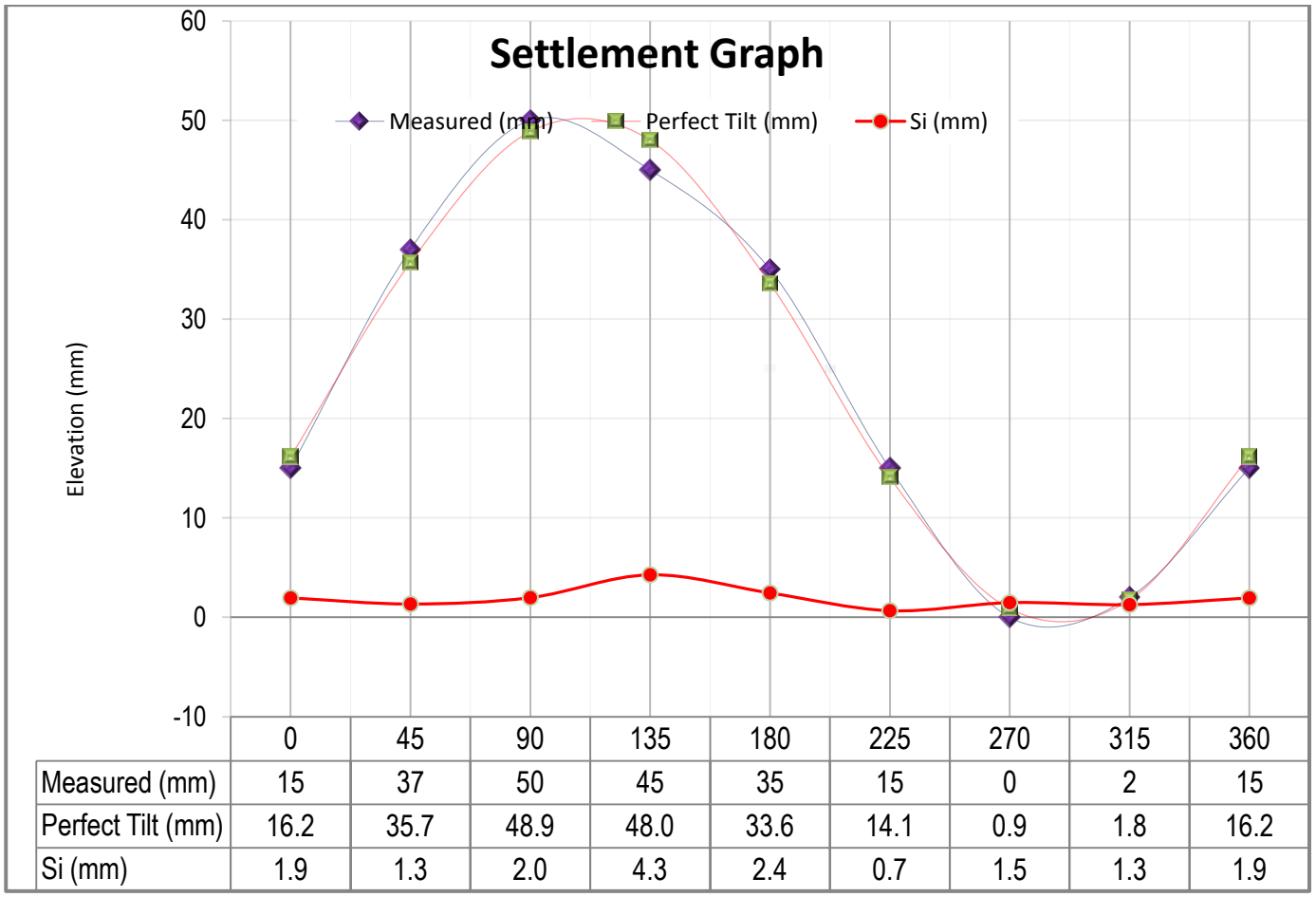
The survey data is recorded on Table 2-1 : General Detail for Settlement Evaluation, Table 2-2 : Optimum Cosine Curve Base On Survey Data and Figure 2-1 : Graphical Representation of Shell Settlement.

Table 2-1 : General Detail for Settlement Evaluation

Tank Number	T5
Tank Diameter	7,620 mm or 25.000 ft
Tank Shell height	10,973 mm or 36.000 ft
Minimum Settlement Point Required	8
Actual Settlement Point, N	8
Settlement spacing, L	2,992.4 mm or 9.82 ft
Yield stress, Y	30,000 psi
Young's modulus, E	30 MSI
Readings Average ,ao	24.88 mm or 0.98 in.
a1, (2 x Ui x Cos(θ)/N)	-8.71 mm or -0.34 in
b1 , (2 x Ui x Sin(θ)/N)	23.99 mm or 0.94 in
Smax	4.27 mm or 0.17 in.
Si (As per API 653 allowed)	4.49 mm or 0.18 in.

Table 2-2 : Optimum Cosine Curve Base On Survey Data

Station, (°)	Measured Reading, Ui (mm)	Reading, Ui (inch)	Perfect Tilt (mm)	Differential Settlement, Si (mm)	Absolute Finite Difference, Smax (mm)	Top Shell Radial Move (mm)
0	15	0.591	16.2	-1.2	1.9	18.2
45	37	1.457	35.7	1.3	1.3	12.5
90	50	1.969	48.9	1.1	2.0	18.4
135	45	1.772	48.0	-3.0	4.3	39.9
180	35	1.378	33.6	1.4	2.4	22.9
225	15	0.591	14.1	0.9	0.7	6.2
270	0	0.000	0.9	-0.9	1.5	13.8
315	2	0.079	1.8	0.2	1.3	11.9



	0	45	90	135	180	225	270	315	360
Measured (mm)	15	37	50	45	35	15	0	2	15
Perfect Tilt (mm)	16.2	35.7	48.9	48.0	33.6	14.1	0.9	1.8	16.2
Si (mm)	1.9	1.3	2.0	4.3	2.4	0.7	1.5	1.3	1.9

Figure 2-1 : Graphical Representation of Shell Settlement

Conclusion:

The settlement survey is acceptable, the API allowed is 4.49mm(0.18 inch), and the Smax is 4.27mm (0.17inch).

2.2. Bottom Plate Settlement

These settlements readings was recorded by taking elevation measurements around the tank circumference and across the tank diameter have an idea of bottom plate elevation profile.

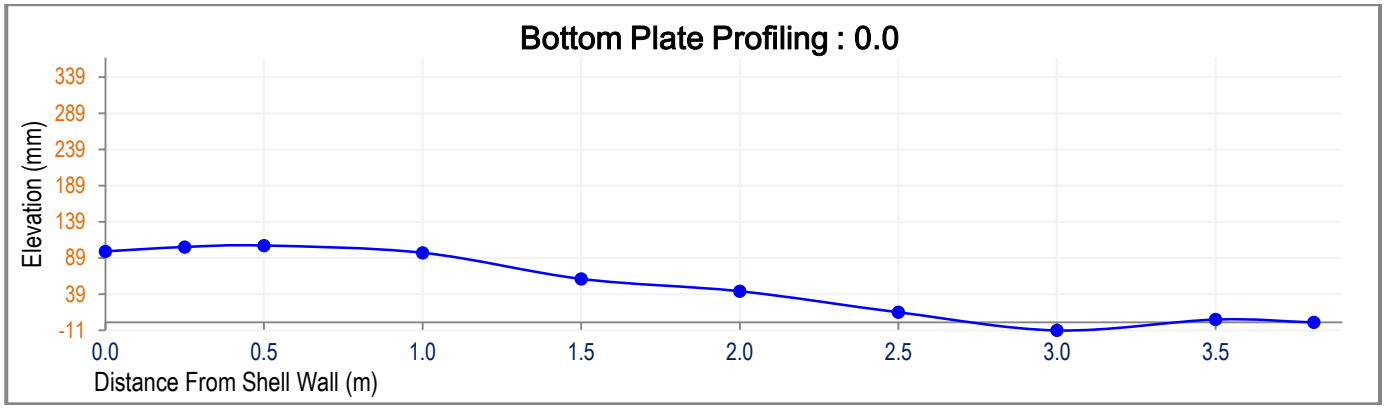
The survey is only to give an idea of the bottom plate settlement profile. Unless there is severe bulging or depression of the bottom plate noted on the bottom plate during visual inspection, then more inspection/evaluation using API 653 Appendix B should be perform.

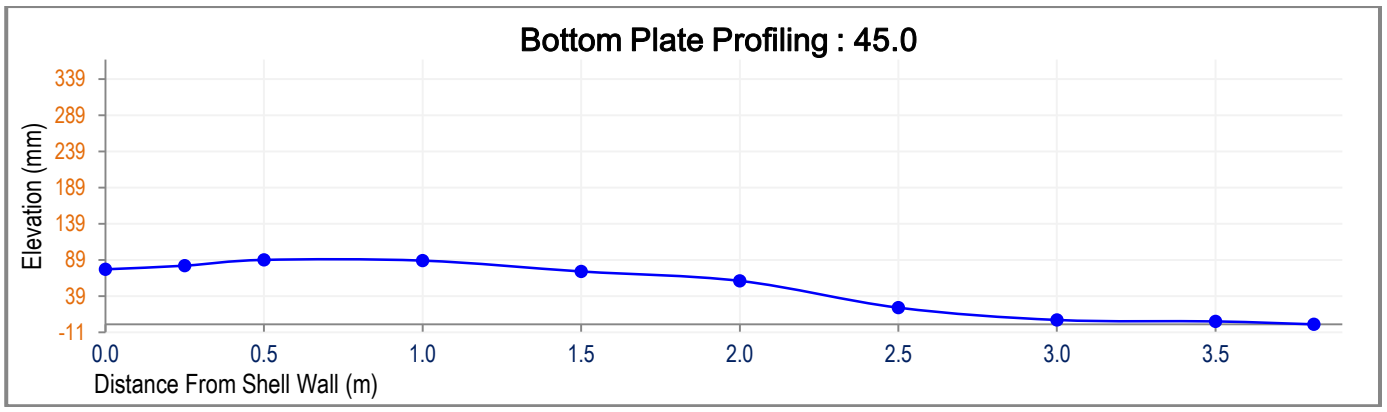
Results of Bottom Plate settlement was recorded on Table 2-3 : Bottom Plate Settlement/Elevation Readings.

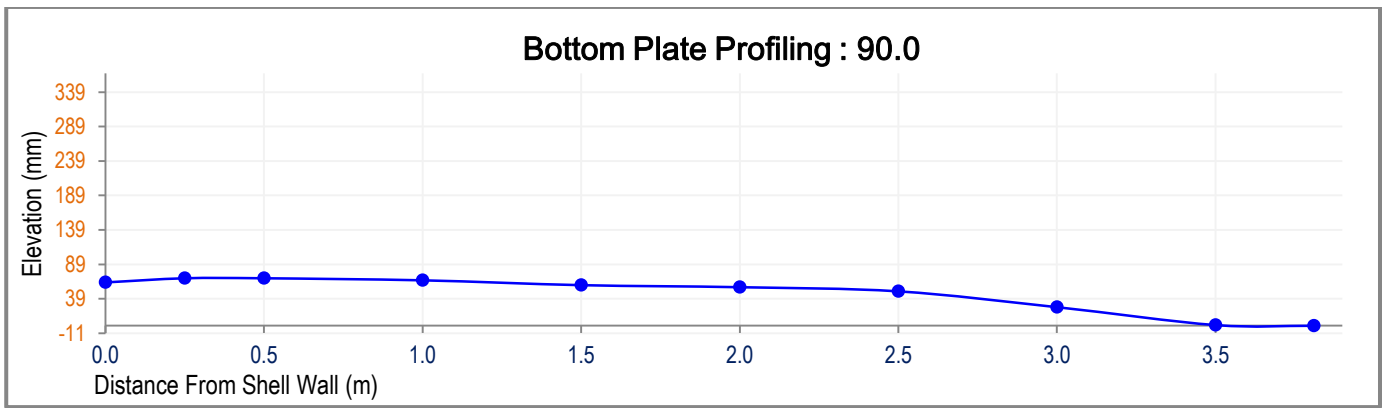
Table 2-3 : Bottom Plate Settlement/Elevation Readings

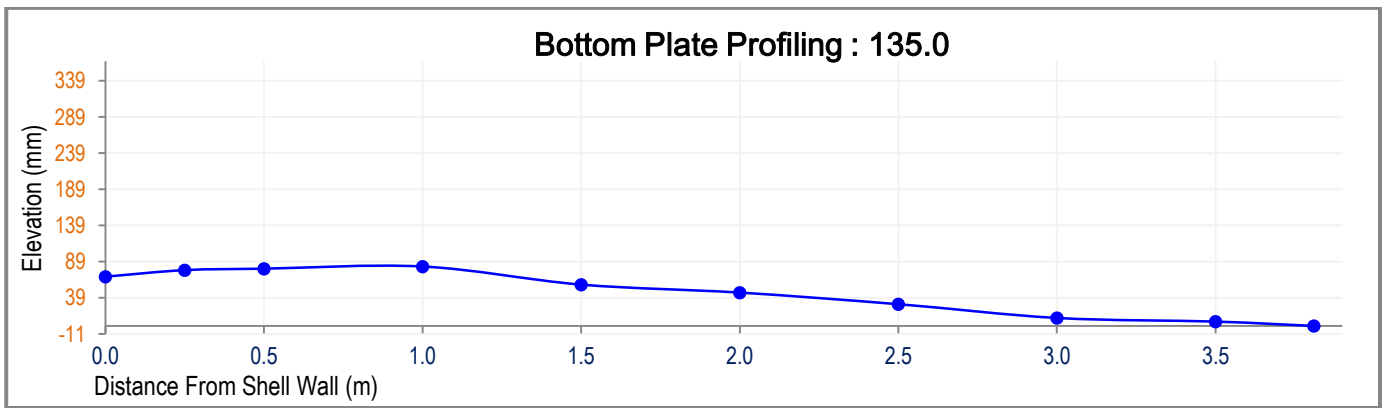
Distance From Shell (m)	Station (°) - Elevation Readings (mm)							
	0	45	90	135	180	225	270	315
0.00	98	76	63	68	78	98	366	111
0.25	104	81	69	77	75	95	364	110
0.50	106	89	69	79	71	102	345	96
1.00	96	88	66	82	65	83	335	98
1.50	60	73	59	57	34	70	312	81
2.00	43	60	56	46	23	44	285	45
2.50	14	23	50	30	25	28	278	5
3.00	-11	6	27	11	14	-2	250	-5
3.50	4	4	1	6	5	0	0	0
3.81	0	0	0	0	0	0	0	0

Figure 2-2 : Illustration of Bottom Plate Settlement Profiling

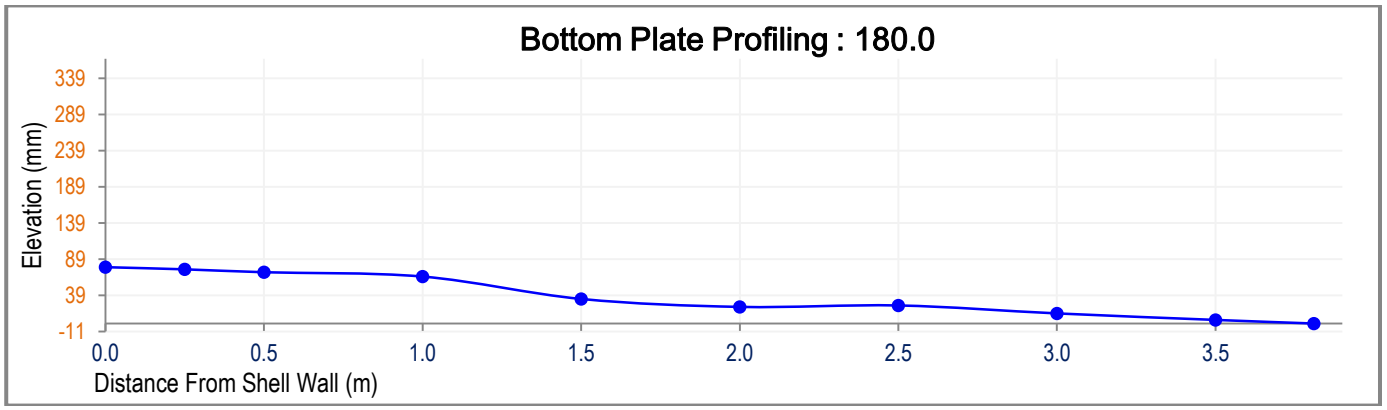


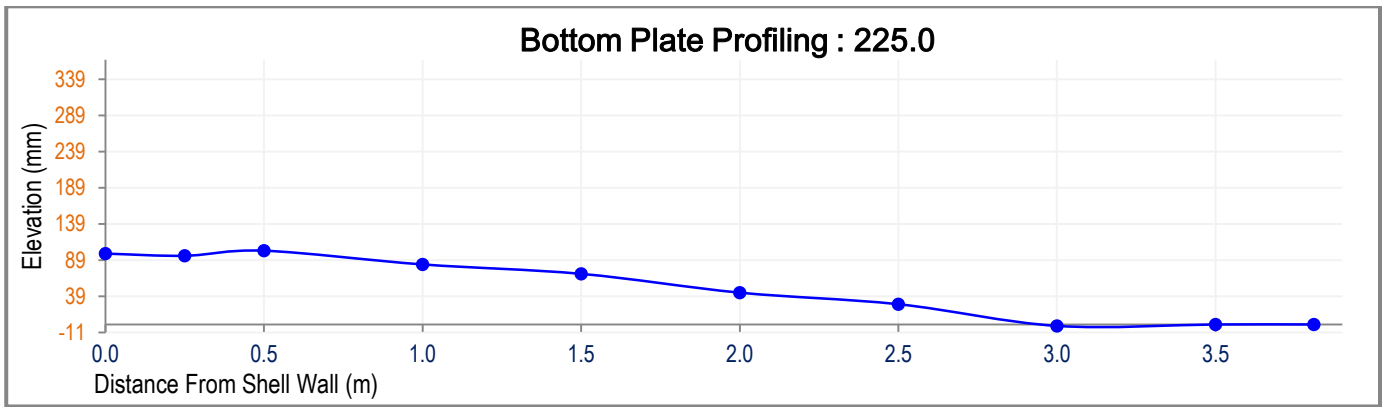


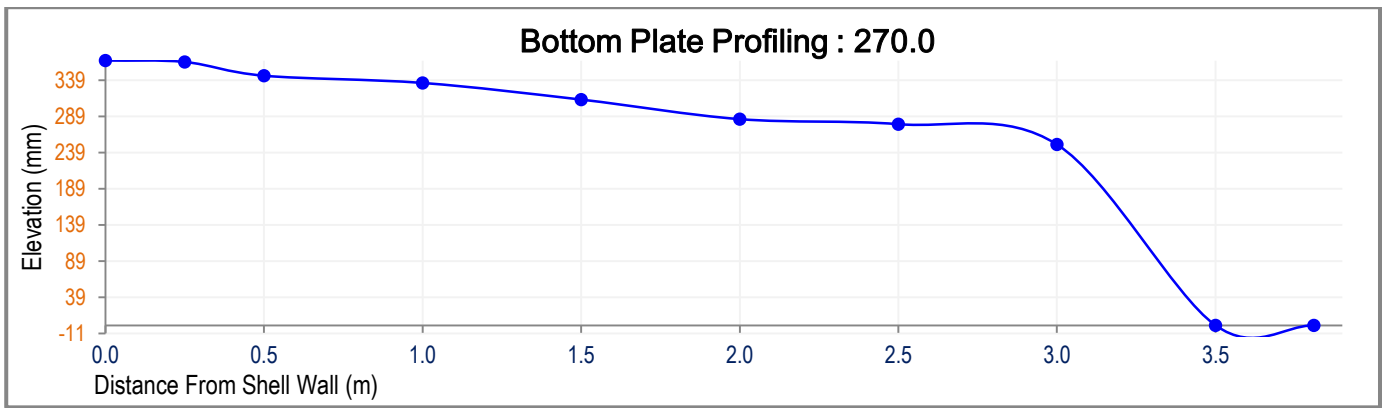


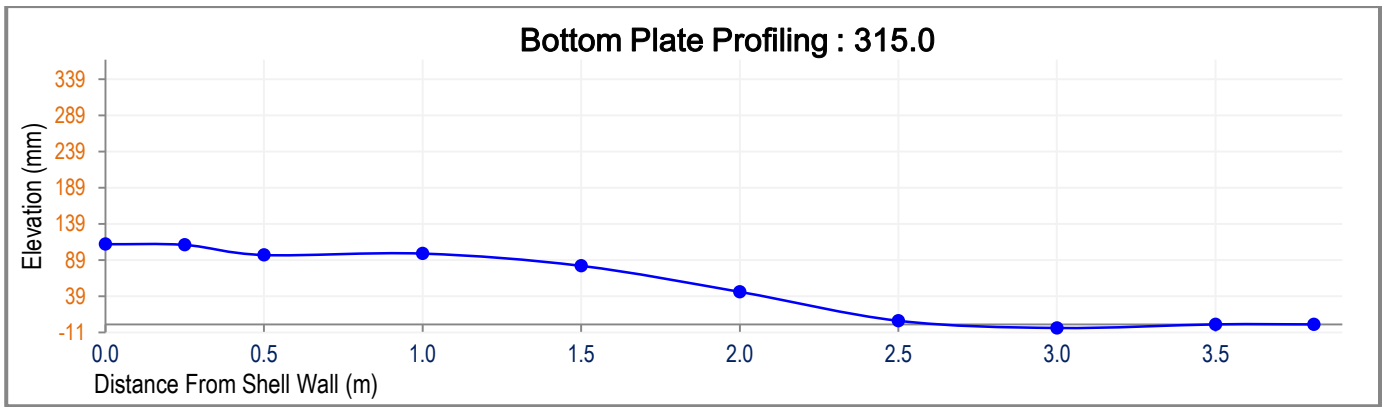


SGS	CLIENT :	Vital FSM PetroCorp		
	JOB NUMBER :	10155546	TANK NUMBER :	T5
	TYPE OF INSPECTION :	Out of Service Inspection		









3 Ultrasonic Thickness Measurements Report

SGS

PETROTECHNICAL INSPECTION (M) SDN BHD
ULTRASONIC THICKNESS MEASUREMENT REPORT

GENERAL DETAIL	
Client :	Vital FSM PetroCorp
Project :	Out of Service Inspection
Location :	ChuukTerminal, Federal State of Micronesia
Job No. :	10155546
Report No :	10155546/VITAL/PTI/UTTM/TK5
Item Description :	Tank 5
Nominal Thickness :	N/A
Material :	Carbon Steel
Procedure No :	WI-TM-104/VER.01/01.01.2016/REV 1
Acceptance Standard :	API 653 Ed 2009
Drawing No. :	N/A
Test Surface. Temp. (°C) :	Ambient
Heat Treatment :	N/A
Surface Condition :	Painted
, Date of Inspection :	16/12/2016
INSPECTION / TESTING / EXAMINATION	
Technique :	Random Spot Measurement
Couplant :	Wall Paper Paste
Calibration Block :	Stepwedge, Serial Number : PTI/CSSW/2013/02
Test Restriction :	N/A
Parent Metal Sensitivity :	Second Backwall Echo At Full Screen Height Using Appropriate Stepwedge Thickness
EQUIPMENT	
Equipment Model :	Sonatest Site Scan D10L
Equipment Serial No :	I010111
Type of Cable :	Lemo 00 - Lemo 00
Manufacturer :	Sonatest

PROBE

Ultrasonic Scan	Probe Brand	Serial No.	Type	Probe Angle	Freq. (MHz)	Size (mm)	Range	Gain (dB)		
								Trans. Loss	Reference	Scanning
Parent Metal	Tru-Sonic	54339	Twin	0	5	10	50	0	33	36

INSPECTION RESULT

No.	Identification / Pipeline No	Nominal Thickness (mm)	Minimum Wall Thickness(mm)				Remarks
			0°	90°	180°	270°	
1. .	Roof Plates		Refer to Section 4.1, page 67.				
2. .	Roof Nozzles and Reinforcement Plates		Refer to Section 4.2, page 68.				
3. .	Shell Plates		Refer to Section 5.1, page 70.				
4. .	Shell Nozzles & Reinforcement Plates		Refer to Section 5.3, page 72.				
5.	Bottom Plates		Refer to Section 6.1, page 79.				
6.	Bottom Projection Plates		Refer to Section 6.3, page 85.				

	Inspected By :	Reviewed By :	Approved By :
Signature :			
Name :	Sukri Omar	Saravanan Maniam	Saravanan Maniam
Designation :	ASNT Level II UTTG	NDT Technical Manager	NDT Technical Manager
Date :	16/12/2016		

WI-TM-104/VER.01/01.01.2016/IR.NON-DSM

4 Roof

4.1. Thickness Measurements on Roof Plate

The ultrasonic thickness measurement of roof plates can be carried out using hand held digital instruments.
Measurements are taken circumferentially around the tank roof along radial lines that are an extension of the shell scan lines and extend to the center of the tank.
Initially three measurements along each radial line shall be taken; at 200 mm (8 in) from the shell (or annular pontoon if applicable), at 2/3 radius and at 1/3 radius.

The result thickness readings are recorded in Table 4-1 : Thickness Measurements on Roof Plate (mm).

Code Reference

API 653 Paragraph 4.2.1.2 *Roof plates corroded to an average thickness of less than 0.09 in. in any 100 in.^{2} area or roof plates with any holes through the roof plate shall be repaired or replaced.*

Table 4-1 : Thickness Measurements on Roof Plate (mm)

Ring Distance from Center	3610 mm	Ring Distance from Center	2540 mm	Ring Distance from Center	1270 mm
UT Location	Readings (mm)	UT Location	Readings (mm)	UT Location	Readings (mm)
R1-1	4.3	R2-1	4.61	R3-1	4.4
R1-2	4.53	R2-2	4.6	R3-2	4.44
R1-3	4.27	R2-3	4.3	R3-3	4.39
R1-4	4.37	R2-4	4.31	R3-4	4.4

Note : please refer Figure 4-1 : Tank Roof Layout for UT location.

Thickness Measurements on Crown Plate (mm)

Plate Number	Reading 1	Reading 2	Reading 3	Reading 4
C-1	4.42	4.52	4.43	4.42

Table 4-2 : Roof Plate Life Span Calculation

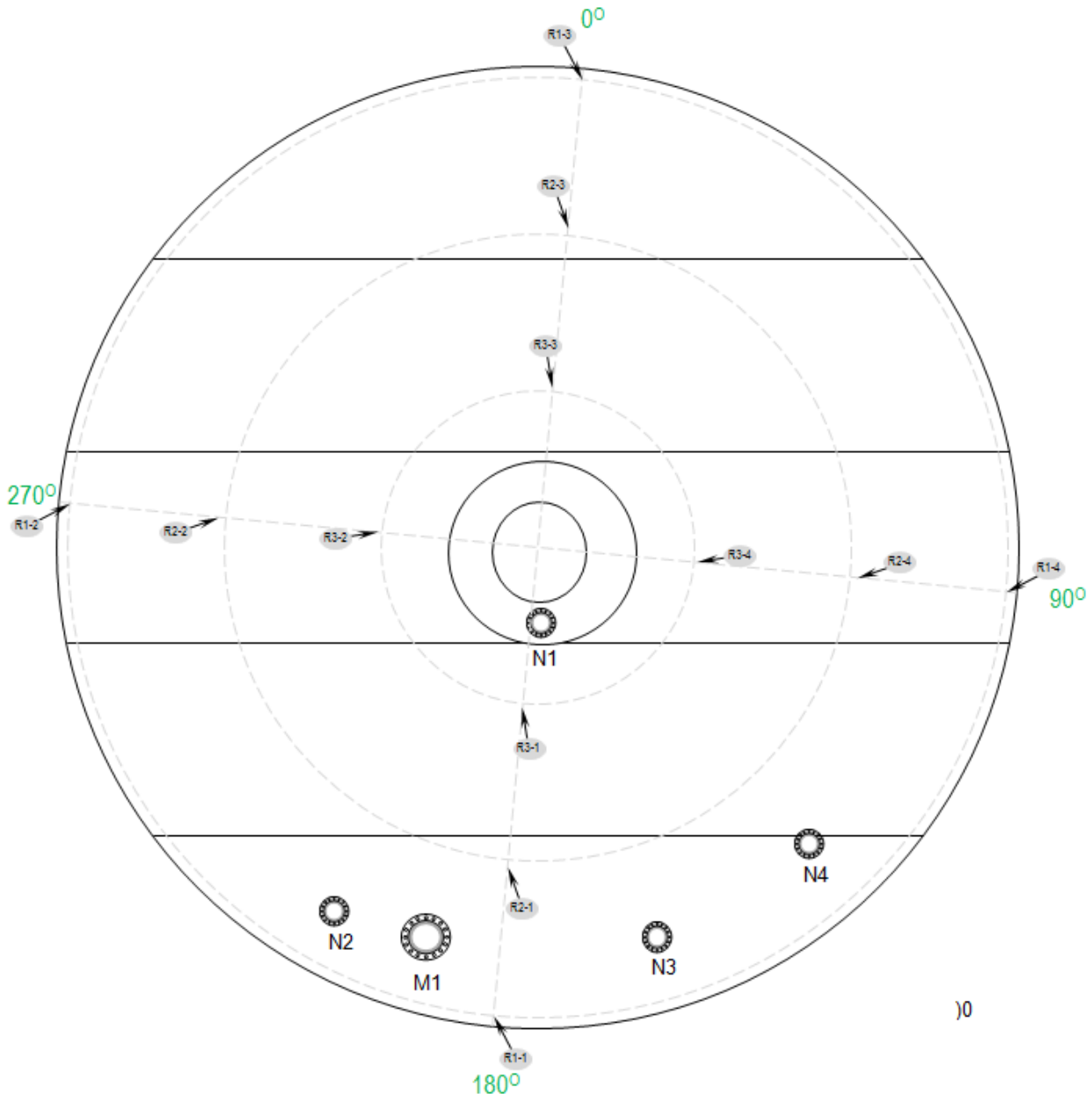
Item	Nominal Thickness (mm)	Minimum Measured Thickness (mm)	Minimum Required Thickness (mm)	Corrosion Rate (mm/Year)	Remaining Life (Year)
Roof Plates	4.76	4.27	2.29	0.012	169.19

4.2. Thickness Measurements on Roof Nozzles and Reinforcement Plates.

Ultrasonic thickness measurements were taken at quadrants of nozzle neck and reinforcement plate.

Table 4-3 : Thickness Measurements Readings On Roof Nozzle Necks and Reinforcement Plates (mm)

No	Item ID	Item	Nozzle				Reinforcement Plate			
			0 º	90 º	180 º	270 º	0 º	90 º	180 º	270 º
1	M	20" Manhole	6.42	6.20	6.10	6.15	4.45	4.22	4.24	4.32
2	N1	6" Sampling Hatch 1	6.73	6.73	6.70	6.69	4.39	4.47	4.38	4.38
3	N2	6" Free Vent	6.14	6.42	6.79	6.60	4.39	4.40	4.20	4.33
4	N3	6" Sampling Hatch 2	7.10	7.01	7.19	7.15	4.48	4.65	4.48	4.65
5	N4	6" Pressure Vacuum Vent	7.00	6.98	6.63	6.70	4.61	4.36	4.58	4.61



Drawing for inspection reference only. Not To Scale.

Legend:

1-1	Plate Number
0°	Station Point Reference
R1-1	UT. Measurement Location
M	20" Manway
N1	6" Sampling Hatch 1
N2	6" Free Vent
N3	6" Sampling Hatch 2
N4	6" Pressure Vacuum Vent

Figure 4-1 : Tank Roof Layout

5 Shell

5.1. Thickness Measurements on Shell Plates

Ultrasonic thickness measurements was carried out on the shell plates .
The thickness reading was recorded in Table 5-1 : Thickness Readings at Shell Plate (mm).

Table 5-1 : Thickness Readings at Shell Plate (mm).

Vertical Scan Location/ Station (Degree): 0.0				
Course No.	Point 1	Point 2	Point 3	Minimum Reading
1	6.67	6.63	6.80	6.63
2	6.70	6.65	6.70	6.65
3	6.45	6.40	6.42	6.40
4	6.20	6.26	6.17	6.17
5	6.42	6.63	6.50	6.42
6	4.45	4.58	4.52	4.45

Vertical Scan Location/ Station (Degree): 90.0				
Course No.	Point 1	Point 2	Point 3	Minimum Reading
1	6.60	6.64	6.59	6.59
2	6.52	6.45	6.41	6.41
3	6.32	6.48	6.42	6.32
4	6.23	6.43	6.32	6.23
5	6.34	6.29	6.36	6.29
6	4.56	4.62	4.81	4.56

Vertical Scan Location/ Station (Degree): 180.0				
Course No.	Point 1	Point 2	Point 3	Minimum Reading
1	6.72	6.45	6.61	6.45
2	6.40	6.35	6.50	6.35
3	6.40	6.41	6.42	6.40
4	6.31	6.20	6.24	6.20
5	6.41	6.25	6.21	6.21
6	4.64	4.65	4.71	4.64

Vertical Scan Location/ Station (Degree): 270.0				
Course No.	Point 1	Point 2	Point 3	Minimum Reading
1	6.48	6.68	6.50	6.48
2	6.42	6.34	6.34	6.34
3	6.63	6.33	6.42	6.33
4	6.36	6.34	6.36	6.34
5	6.23	6.20	6.30	6.20
6	4.66	4.54	4.55	4.54

5.2. Shell Plate Acceptable Thickness Calculation

The minimum acceptable thickness for entire shell course, t_{min} is calculated as follows:-

$$t_{min} = \frac{2.6(H-1)DG}{SE}$$

where

t_{min} is the minimum acceptable thickness, in inches for each course as calculated from the above equation; however, *t*min shall not be less than 0.1 in. for any tank course;

D is the nominal diameter of tank, in feet (ft);

H is the height from the bottom of the shell course under consideration to the maximum liquid level when evaluating an entire shell course, in feet (ft); or is the height from the bottom of the length *L* (see 4.3.2.1) from the lowest point of the bottom of *L* of the locally thinned area to the maximum liquid level, in feet (ft); or is the height from the lowest point within any location of interest to the maximum liquid level, in feet (ft);

G is the highest specific gravity of the contents;

The information and calculation of minimum thickness required is recorded in Table 5-2 : Information For Shell Plates Minimum Acceptable Thickness **Calculation** and Table 5-3 : Shell Plate Minimum Acceptable Thickness.

Table 5-2 : Information For Shell Plates Minimum Acceptable Thickness Calculation

Tank Number	T5
Tank Diameter	7,620 mm or 25.000 ft
Tank Height	10,973 mm or 36.000 ft
Maximum Filling Height	10,389 mm or 34.083 ft
Product	LSADO
Specific Gravity, G	0.95
Year of Commission	1974
Year of Last Inspection	N/A
Year of Current Inspection	2016
Type of Shell Weld	Butt weld
Corrosion Allowance	0.00
Joint Efficiency, E	0.85

.

Table 5-3 : Shell Plate Minimum Acceptable Thickness Calculation.

Course No	Height Per Course (mm)	Material	Allowable Product Stress, S (lbf/in.2)	*Previous Thickness (mm)	Minimum Measured Thickness (mm)	Minimum. Acceptable Thickness, Tmin (mm)	Corrosion Rate (mm/year)	Remaining Life (year)	Inspection Interval (year)
1	2,430	Unknown	23,600	7.00	6.45	2.59	0.013	295.01	15.00
2	2,430	Unknown	23,600	7.00	6.34	2.54	0.016	241.82	15.00
3	2,430	Unknown	26,000	7.00	6.32	2.54	0.016	233.47	15.00
4	1,820	Unknown	26,000	7.00	6.17	2.54	0.020	183.69	15.00
5	1,220	Unknown	26,000	7.00	6.20	2.54	0.019	192.15	15.00
6	620	Unknown	26,000	5.00	4.45	2.54	0.013	145.85	15.00

*Previous Thickness taken from : As Built Drawing

Note: API653 section 6.3.3.3: Internal inspection of the tank shell, when the tank is out of service, can be substituted for a program of external ultrasonic thickness measurement if the internal inspection interval is equal to or less than the interval required in 6.3.3.2 b).

Conclusion:

The minimum remaining life calculated as per API 653 on tank shell is 145.85 years , therefore the next inspection is 15 years

5.3. Thickness Measurement on Shell Nozzles and Reinforcement Plates

Ultrasonic thickness measurements were taken at quadrants of the nozzles neck and reinforcement plates.

Table 5-4 : Thickness Measurement Readings on Shell Nozzle Neck and Reinforcement Plate (mm)

No	Item ID	Item	Nozzle				Reinforcement Plate			
			0 ^{o}	90 ^{o}	180 ^{o}	270 ^{o}	0 ^{o}	90 ^{o}	180 ^{o}	270 ^{o}
1	M	24" Manhole	5.89	5.76	5.54	6.63	8.41	8.07	8.13	8.29
2	N1	6" Blind	7.00	6.57	6.92	6.84	10.00	9.94	9.97	9.97
3	N2	6" Outlet	6.45	6.55	6.42	6.39	9.94	10.00	10.09	10.11
4	N3	4" Water Drain Off	6.26	5.92	5.89	6.00	8.07	8.04	8.11	8.11
5	N4	6" Inlet	6.14	6.01	6.17	6.10	9.94	9.98	10.00	9.91

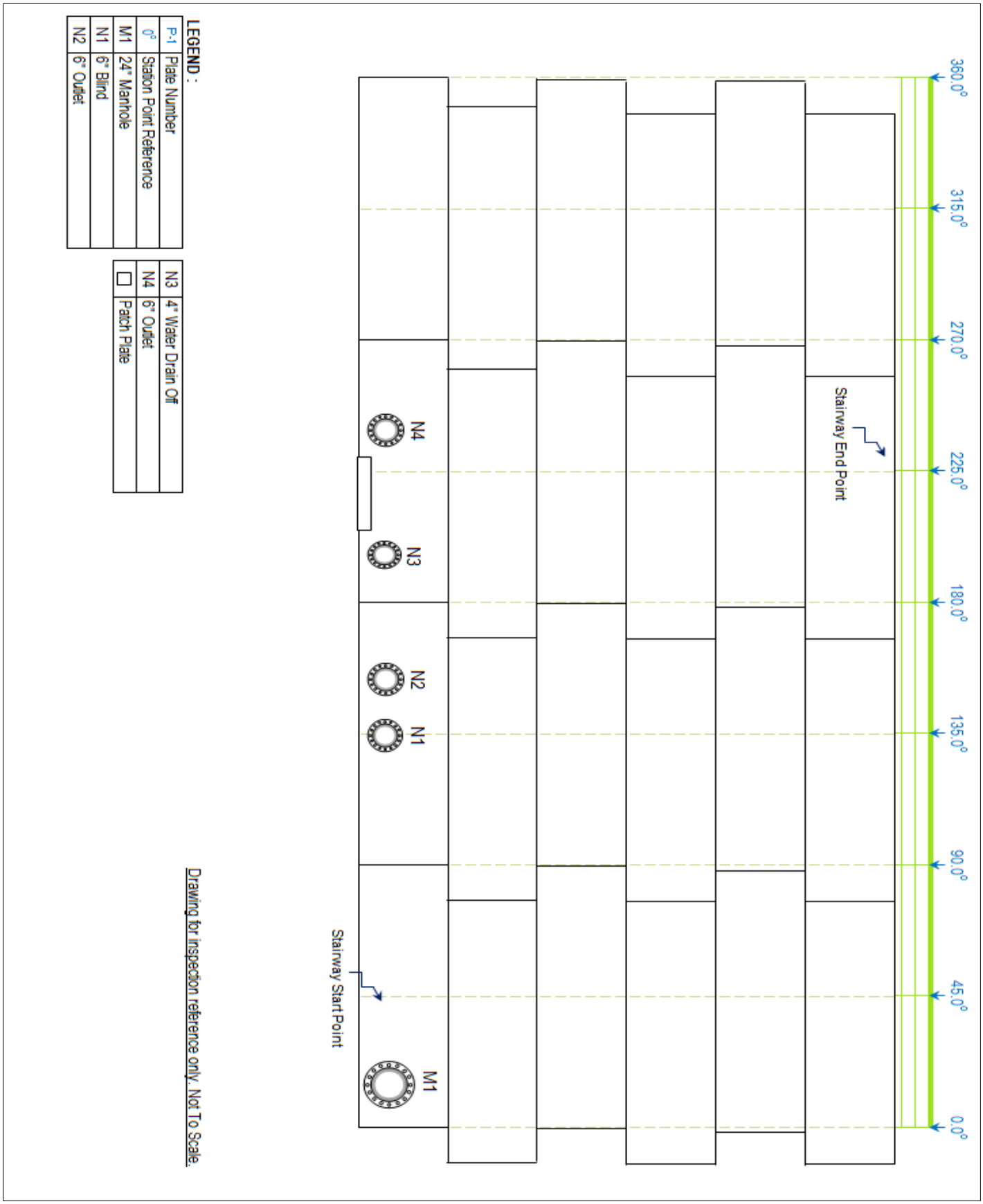


Figure 5-1 : Tank Shell Plate and Nozzle Layout

5.4. Tank Plumbness- Tank Verticality check

Plumbness Survey was carried out to determine the verticality of tank.

The required numbers of survey stations are not mentioned in API 653. However as a guidance, the number of survey station determined will be the same for tank settlement as mentioned below:

$$N = D/10$$

Where,

N is the minimum required number of settlement measurement points, but no less than eight. All values shall be rounded to the next higher whole number. The maximum spacing between settlement measurement points shall be 32 ft;

D is the tank diameter, in feet (ft).

The required information and result of plumbness is shown in Table 5-5 : Information for Plumbness Survey, Table 5-5 : Information for Plumbness Survey and Table 5-6 : Plumbness Readings (mm).

Simplified Acceptance Criteria for Plumbness as per API 653 is shown as below:-

Type of Tank	Tolerance
Fixed Roof Tank	1/100 of tank Height with a maximum of 5 inch
Tank with Floating Roof (Internally or Externally)	1/200 of tank height with a maximum of 5 inch

Code Reference

API 653 Paragraph 10.5.2.1

The maximum out-of-plumbness of the top of the shell relative to the bottom of the shell shall not exceed 1/100 of the total tank height, with a maximum of 5 in. The 1/100 criteria, with a maximum of 5 in., shall also apply to fixed roof columns. For tanks with internal floating roofs, apply the criteria of this section or API 650, Appendix H, whichever is more stringent.

API 650 Annex H.6.1

….. Any defects, projections, obstructions or tank tolerance limits (exceeding those defined in 7.5 of this Standard), which would inhibit proper internal floating roof and seal operation, that are identified by the internal floating roof erector shall be reported to the Purchaser.

API 650 Paragraph 7.5.2 a

The maximum out-of-plumbness of the top of the shell relative to the bottom of the shell shall not exceed 1/200 of the total tank height.

Table 5-5 : Information for Plumbness Survey

Tank Number	T5
Tank Diameter	7620 mm or 25.000 ft.
Tank Height	10973 mm or 36.000 ft.
Minimum Plumbness Survey Station Required	8.00
Actual Plumbness Station (°)	8
Plumbness Circumference Spacing:	2992 mm or 9.817 ft.
Plumbness Survey Carried Out From:	Internal
Number of Shell Course :	6
Floating Roof on Tank:	No
Acceptance Value	110 mm or 4.320 in.

Table 5-6 : Plumbness Readings (mm)

Station (°)	Course - Distance Readings (mm) Relative To Shell To Bottom Weld						
	0	1	2	3	4	5	6
0.0	0	10	-5	-23	-28	-21	-12
45.0	0	12	30	35	25	23	24
90.0	0	11	32	45	53	56	83

Station (°)	Course - Distance Readings (mm) Relative To Shell To Bottom Weld						
	0	1	2	3	4	5	6
135.0	0	0	11	21	35	42	54
180.0	0	4	18	26	27	25	34
225.0	0	-5	-7	-19	-28	-35	-39
270.0	0	7	-4	-26	-40	-51	-57
315.0	0	-8	-9	-33	-47	-63	-67

Note : Course 0 is area near to shell to bottom weld

Table 5-7 : Plumbness Survey Results

Station (°)	Out-of-plumbness of the top of the shell relative to the bottom of the shell (mm)	Result
0.0	-12	Within Tolerance
45.0	24	Within Tolerance
90.0	83	Within Tolerance
135.0	54	Within Tolerance
180.0	34	Within Tolerance
225.0	-39	Within Tolerance
270.0	-57	Within Tolerance
315.0	-67	Within Tolerance

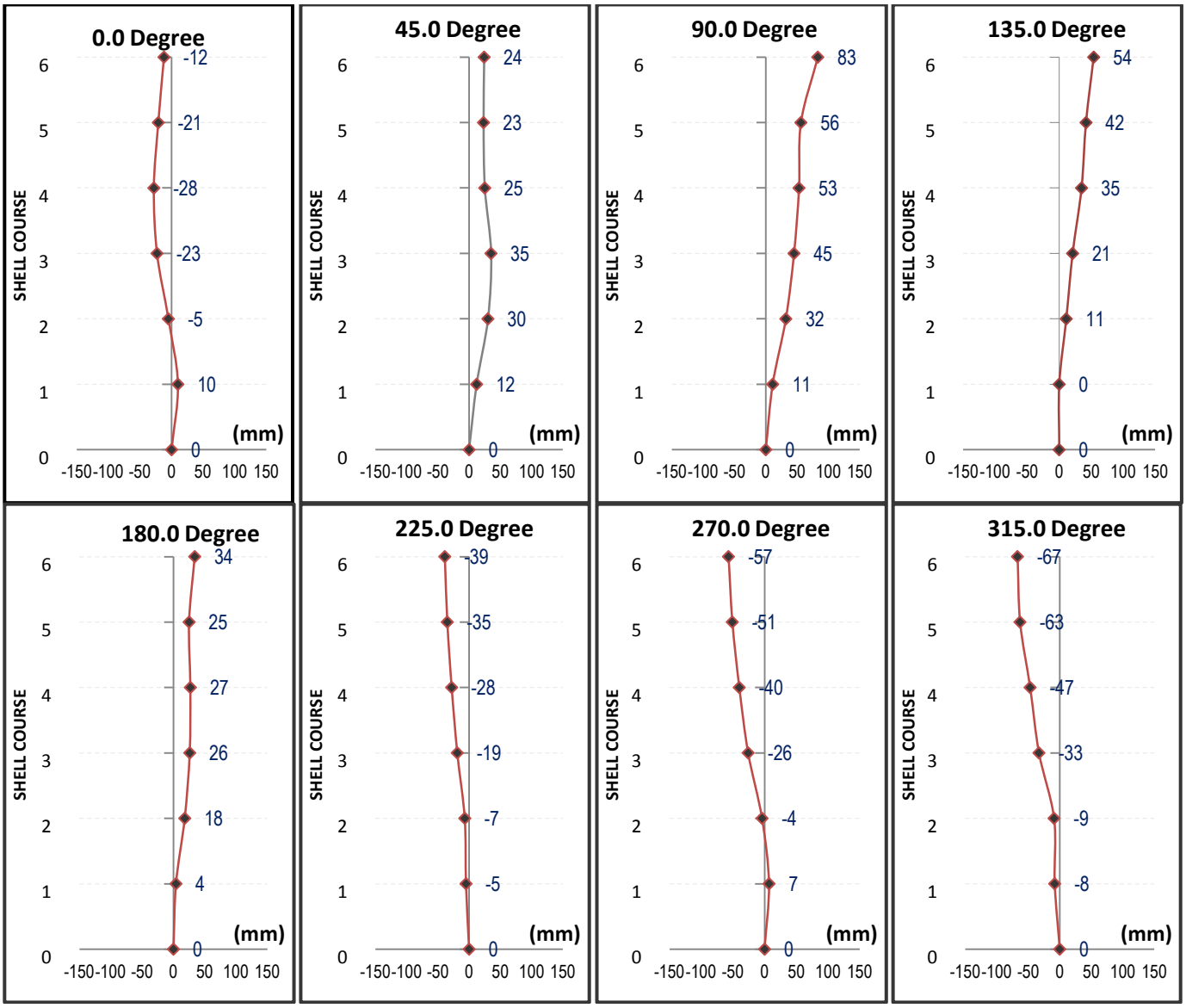


Figure 5-2 : Plumbness Plot

5.5. Out Of Roundness

Out of roundness survey was measured at 1 ft above the shell-to-bottom weld.
The roundness result shall not exceed the tolerances shown in API 653 Table 10.2 as below.

Radius tolerances measured higher than one foot above the shell-to-bottom weld shall not exceed three times the tolerances given in Table 10.2.

API 653, Table 10.2- Radii Tolerances

Tank Diameter, ft (mm)	Radius Tolerances, in (mm)
< 40ft (12192 mm)	± ½ in (12.7 mm)
40 ft (12192 mm) to <150 ft (45720 mm)	± ¾ in (19.05mm)
150 ft (45720 mm) to <250 ft (76200 mm)	±1 in (25.4 mm)
≥250 ft (76200 mm)	±1 ¼ in (31.75mm)

Table 5-8 : Tank General Information

Tank Number:	T5
Tank Inside Diameter:	7,620 mm or 25.000ft
Survey- Unit of measurement:	meter
Survey From:	Internal
Tank Internal Radius- For Calculation:	3.810
No. of Survey Level:	1
No. of Station:	8
Method of Analysis/ Survey:	E-N-Z Coordinate at all level

Table 5-9 : Out of Roundness Survey Result

Level 1 Location:	**1 ft from Shell to Bottom Joint**		**Acceptance Criteria (m):**	**0.013**
Station	Measured Internal Radius (m)	Different to Internal Radius (m)	Remark	
0	3.807	-0.003	Within Tolerance	
45	3.807	-0.003	Within Tolerance	
90	3.809	-0.001	Within Tolerance	
135	3.809	-0.001	Within Tolerance	
180	3.803	-0.007	Within Tolerance	
225	3.808	-0.002	Within Tolerance	
270	3.811	0.001	Within Tolerance	
315	3.804	-0.006	Within Tolerance	

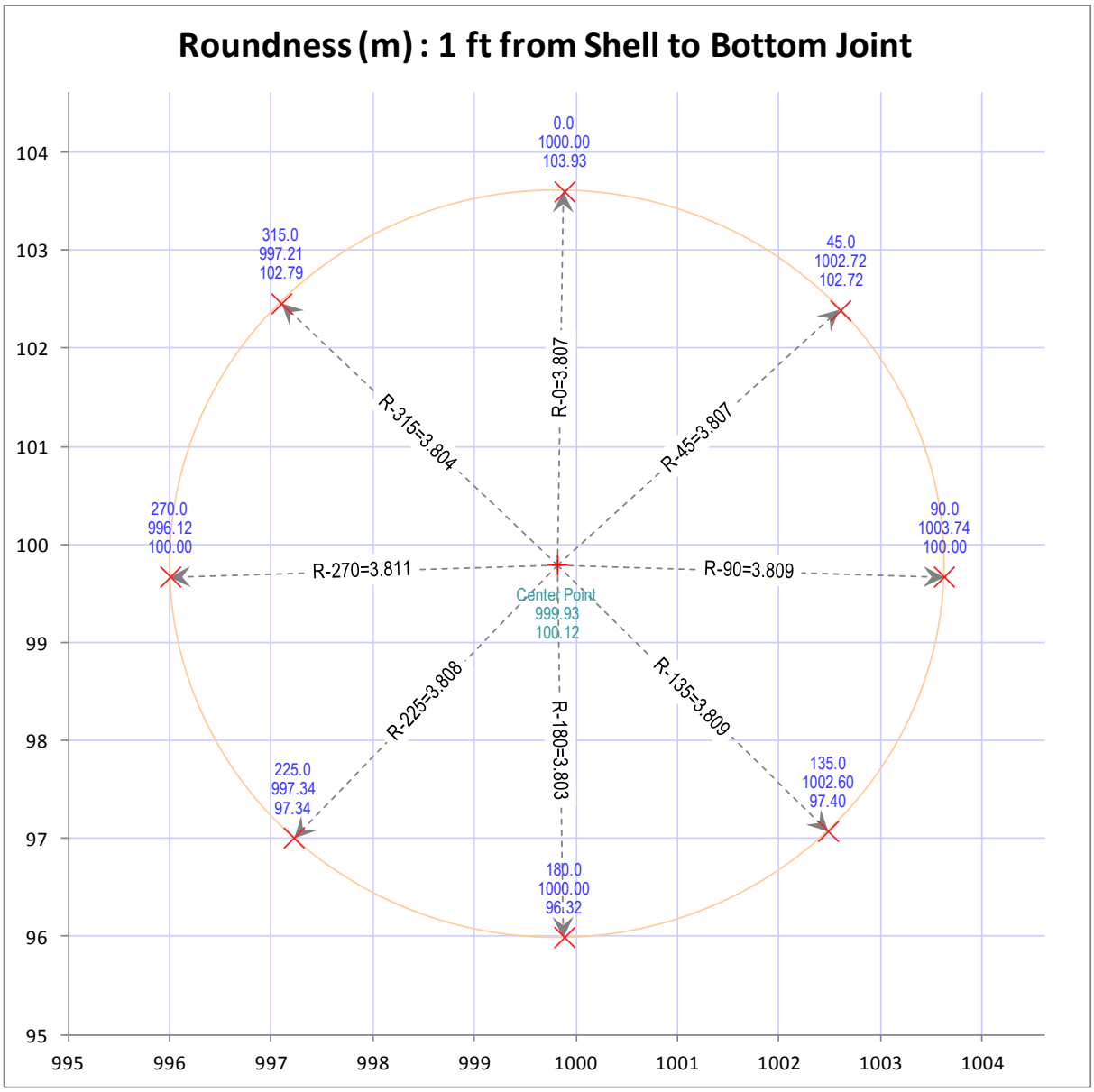


Figure 5-3 : Out of Roundness Ilustration

6 Bottom

6.1. Thickness Measurements on Bottom Plate

Ultrasonic thickness measurements are taken at each plate with 3 readings.

For bottom plates that are welded to the tank shell, ultrasonic Thickness readings are taken as near and as practically close to tank shell.

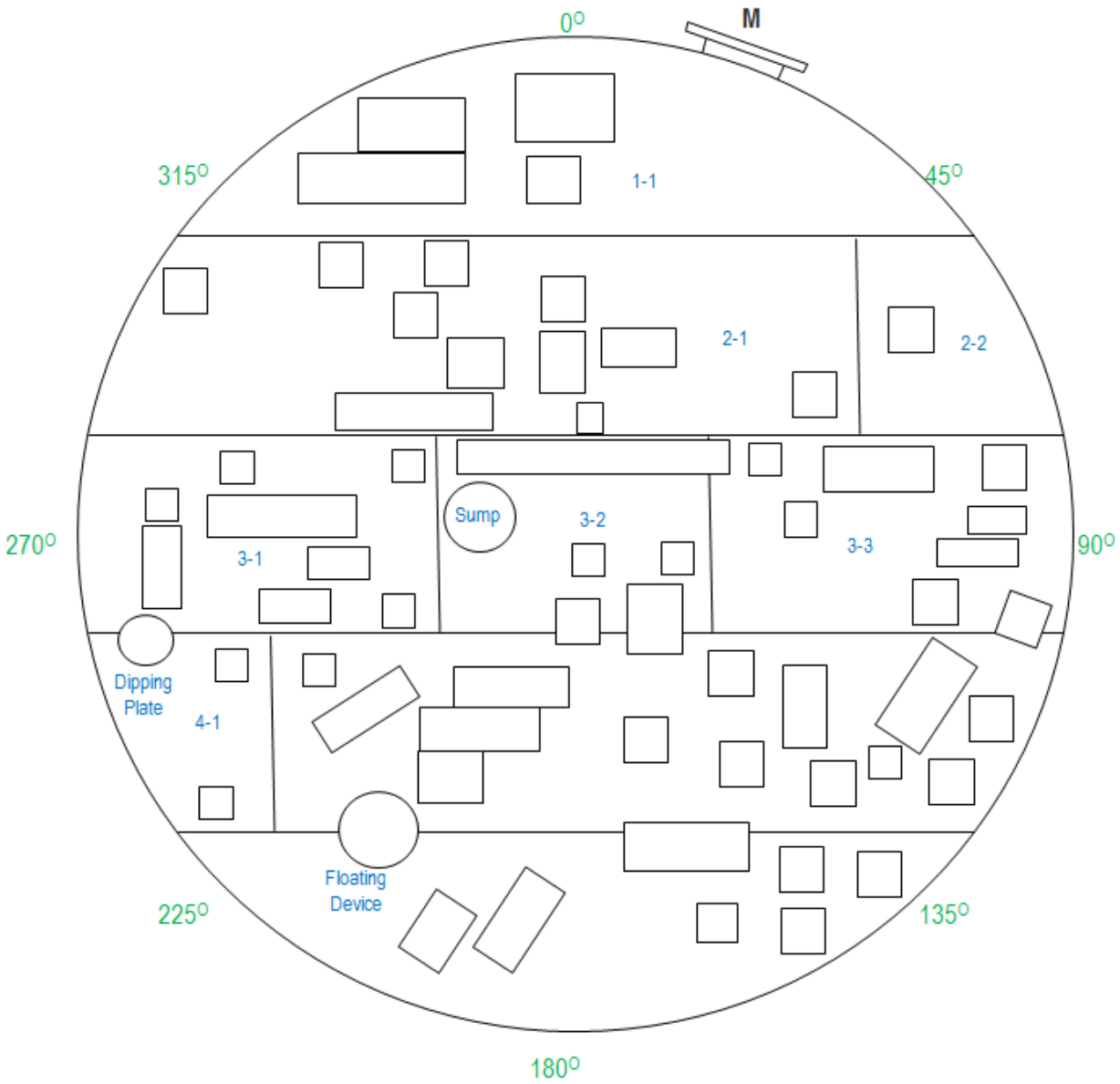
The results of Ultrasonic thickness readings are show in Table 6-1 : Thickness Measurements on Bottom Plates (mm)

Table 6-1 : Thickness Measurements on Bottom Plates (mm)

Plate No.	Point 1	Point 2	Point 3	Min. Reading
1-1	9.10	9.13	9.41	9.10
2-1	9.37	9.62	9.50	9.37
2-2	9.53	9.72	9.80	9.53
3-1	9.13	9.12	9.12	9.12
3-2	9.39	9.47	9.25	9.25
3-3	9.41	9.53	9.44	9.41
4-1	9.84	9.70	9.66	9.66
4-2	9.47	9.25	9.05	9.05
5-1	9.53	9.41	9.81	9.41

Ultrasonic Thickness Measurements on Cylinder Shape Drain Sump (mm)

Drain Sump	Side1	Side 2	Side 3	Side 4	Bottom 1	Bottom 2	Bottom 3	Bottom 4	Center	Minimum Reading
S-1	7.92	7.76	8.02	8.01	7.87	8.02	8.05	7.91	7.77	7.76



Drawing for inspection reference only. Not To Scale.

Legend:

1-1	Plate Number
45°	Tank Reference- Station
M	24" Manway
☐	Patch Plate

Figure 6-1 : Tank Bottom Layout

6.2. Bottom Plates Life Span Calculation

Magnetic Flux Leakage (MFL) scanning is carried out on tank bottom.
MFL method is used for screening to detect underside and topside corrosion.
All areas inaccessible by the MFL scanner will be scanned using the Phasor or handscan(if accessible).
MFL report is shown in attachment 1.

Code and Reference:

API 653 Section 4.4.5.1:- Minimum Thickness for Tank Bottom Plate

An acceptable method for calculating the minimum acceptable bottom thickness for the entire bottom or portions thereof is as follows:

MRT = *(Minimum of* RT_{bc} *or* RT_{ip}*) – Or* $(S_tP_r + UP_r)$
Where,
MRT = *minimum remaining thickness at the end of interval Or.*
O_r = *in-service interval of operation (years to next internal inspection) not to exceed that allowed by 6.4.2,*
RT_{bc} = *minimum remaining thickness from bottom side corrosion after repairs,*
RT_{ip} = *minimum remaining thickness from internal corrosion after repairs,*
S_tP_r = *maximum rate of corrosion not repaired on the top side.* $S_tP_r = 0$ *for coated areas of the bottom.*
UP_r = *maximum rate of corrosion on the bottom side.*

Bottom Plate Life Span Calculation:

API 653 Section 4.4.5.3 *If the minimum bottom thicknesses, at the end of the in-service period of operation, is calculated to be less than the minimum bottom renewal thicknesses given in API 653 Table 4.4.*

API 653, Table 4.4 – Bottom Plate Minimum Thickness

Minimum Bottom Plate Thickness at Next Inspection	Tank bottom / Foundation Design
0.10 in. (2.54 mm)	Tank bottom/foundation with no means for detection and containment of a bottom leak.
0.05 in (1.27 mm)	Tank bottom/foundation design with means to provide detection and containment of a bottom leak.
0.05 in (1.27 mm)	Applied tank bottom reinforced lining > 0.05 in. thick, in accordance with API 652

Annular Plate Life Span Calculation:

API 653 Section 4.4.6.2 *For tanks in service with a product specific gravity less than 1.0, which require annular plates for other than seismic loading considerations, the thickness of the annular plates shall be not less than the thicknesses given in API 653, Table 4.5, plus any specified corrosion allowance. Interpolation is allowed within Table 4.5 based on shell stress determined per Note b of Table 4.5.*

API 653 Table 4.5 -Annular Bottom Plate Thicknesses (in.) (Specific Gravity < 1.0)				
Plate Thickness [a] of First Shell Course	Stress [b] in First Shell Course (lbf/in.^{2})			
	< 24,300	< 27,000	< 29,700	< 32,400
$t \le 0.75$in (19.05mm)	0.17	0.2	0.23	0.3
$0.75 < t \le 1.00$in (25.4mm)	0.17	0.22	0.31	0.38
$1.00 < t \le 1.25$in (31.75mm)	0.17	0.26	0.38	0.48
$1.25 < t \le 1.50$in (38.1mm)	0.22	0.34	0.47	0.59
a. Plate thickness refers to the tank shell as constructed. b. Stresses are calculated from $[2.34D(H-1)]/t$.				

API 653, Section 4.4.6.3: *For tanks in service with a product specific gravity of 1.0 or greater, which require annular plates for other than seismic loading considerations, the thickness of the annular plates shall be in accordance with API 650, Table 5-1, plus any specified corrosion allowance.*

API 650, Table 5-1b - (USC) Annular Bottom Plate Thickness (t_b)				
Plate Thickness[a] of First Shell Course	Stress[b] in First Shell Course (lbf/in.^{2})			
	≤27,000	≤30,000	≤32,000	≤36,000
$t \leq 0.75$in (19.05mm)	0.236	0.236	9/32	11/32
$0.75 < t \leq 1.00$in (25.4mm)	0.236	9/32	3/8	7/16
$1.00 < t \leq 1.25$in (31.75mm)	0.236	11/32	15/32	9/16
$1.25 < t \leq 1.50$in (38.1mm)	5/16	7/16	9/16	11/16
$1.50 < t \leq 1.75$in	11/32	1/2	5/8	3/4
Product Stress =((td – CA)/corroded t) (Sd) Hydrostatic Test Stress = (tt /nominal t) (St)				

Lifespan Calculation of Plate at Critical Zone:

API 653 Section 4.4.5.4 *Unless a stress analysis is performed, the minimum bottom plate thickness in the critical zone of the tank bottom defined in 9.10.1.2 shall be the smaller of one-half the original bottom plate thickness (not including the original corrosion allowance) or 50 % of tmin of the lower shell course per 4.3.3.1 but not less than 0.1 in. Isolated pitting will not appreciably affect the strength of the plate.*

Bottom Plate Lifespan Calculation:

The required information and calculation result is shown in
Table 6-2 : General Information for Tank Bottom Lifespan Calculation and Table 6-3 : Lifespan Calculation

Table 6-2 : General Information for Tank Bottom Lifespan Calculation

Tank Number	T5
Tank Diameter	7,620 mm or 25.000 ft
Tank Height	10,973 mm or 36.000 ft
Maximum Filling Height	10,389 mm or 34.083 ft
Year of Commission	1974
Year of Last Inspection	N/A
Year of Current Inspection	2016
Year of Last Bottom Plates Change	N/A
Tank bottom have coating? The expected life of the coating must equal or exceed, O_r	NO
Tank bottom Have effective cathodic protection?	NO
Tank bottom have reinforced lining> 0.05 in. (1.27mm)?	NO
Tank have detection and containment of bottom leak?	NO
***Does the tank bottom require repair?**	**NO**

*if tank bottom require repair, please see Attachment 1 : Tank Floor Scanning, Magnetic Flux Leakage Reportfor location of repair (by patch plate or weld built up) and patch plate size.

Table 6-3 : Lifespan Calculation of Tank Bottom (Before repair or no repair required)

Lifespan Calculation for Bottom Plates

Bottom Plate Thickness	10.00

Year In Service (Years)	Nominal Thickness (mm)	RT_{bc} (mm)	Rt_{ip} (mm)	StP_r (mm)	U_{pr} (mm)	MRT (mm)	Calculated Life Span (Year)	Next Inspection Interval, Or
42	10.00	3.20	7.30	0.0643	0.1619	2.54	2.92	2.92

Lifespan calculation for plates at Critical Zone

Nominal Thickness of plate under critical zone.	10.00 mm or 0.394
One-half of original Plate Thickness under critical zone	5.00 mm or 0.197
Material of Lower Shell Course	Unknown
Shell Plate Joint Efficiency, E	0.85
Product Specific Gravity, G	0.95
Product Stress, S	23600 lbf/in.^{2}
Tmin of the Lower Shell Course per API 653,4.3.3.1	2.59 mm or 0.102
50% of Tmin of the Lower Shell Course per API 653,4.3.3.1	1.29 mm or 0.051

Year-In Service (Years)	Nominal Thickness (mm)	RT_{bc} (mm)	Rt_{ip} (mm)	S_tP_r (mm)	U_{pr} (mm)	MRT (mm)	Calculated Life Span (Year)	Next Inspection Interval, Or
42	10.00	3.40	7.60	0.0571	0.1571	2.54	4.01	4.01

Conclusion :

a) Life span of bottom plates is calculated to be 2.92 years, recommend to change/repair affected bottom plate(s).

b) Life span of plate in critical zone is calculated to be 4.01 years, recommend to change/repair affected plate.

Table 6-4 : Lifespan Calculation of Tank Bottom(After repair or repair required)

Lifespan Calculation for Bottom Plates

Bottom Plate Thickness	10.00 mm or 0.394 in.
Recommend to Recoat?	**Yes**

Year In Service (Years)	Nominal Thickness (mm)	RT_{bc} (mm)	Rt_{ip} (mm)	StP_r (mm)	U_{pr} (mm)	MRT (mm)	Calculated Life Span (Year)	Next Inspection Interval, Or
42	10.00	4.60	7.30	0.0000	0.1286	2.54	16.02	16.02

Lifespan calculation for plates at Critical Zone

Nominal Thickness of plate under critical zone.	10.00 mm or 0.394
One-half of original Plate Thickness under critical zone	5.00 mm or 0.197
Material of Lower Shell Course	Unknown
Shell Plate Joint Efficiency, E	0.85
Product Specific Gravity, G	0.95
Product Stress, S	23600 lbf/in.^{2}
Tmin of the Lower Shell Course per API 653,4.3.3.1	2.59 mm or 0.102
50% of Tmin of the Lower Shell Course per API 653,4.3.3.1	1.29 mm or 0.051

Year-In Service (Years)	Nominal Thickness (mm)	RT_{bc} (mm)	Rt_{ip} (mm)	S_tP_r (mm)	U_{pr} (mm)	MRT (mm)	Calculated Life Span (Year)	Next Inspection Interval, Or
42	10.00	4.60	7.60	0.0000	0.1286	2.54	16.02	16.02

Conclusion :

a) Life span of bottom plates is calculated to be 16.02 years, recommend to perform tank bottom inspection before next inspection interval which is 16.02 years from current inspection year.

b) Life span of plate in critical zone is calculated to be 16.02 years, recommend to perform tank bottom inspection before next inspection interval which is 16.02 years from current inspection year.

6.3. Bottom Projection Plate

Ultrasonic Thickness Measurements are taken at a maximum 2.000 meters interval apart around tank circumferences

API 653 Sections 4.4.5.7

The thickness of the projection of the bottom plate beyond the shell as measured at the toe of the outside bottom-to-shell fillet weld shall not be less than 0.1 in (2.54mm). The projection of the bottom plate beyond the outside toe of the shell-to-bottom weld shell shall be at least 3/8 in (9.53mm).

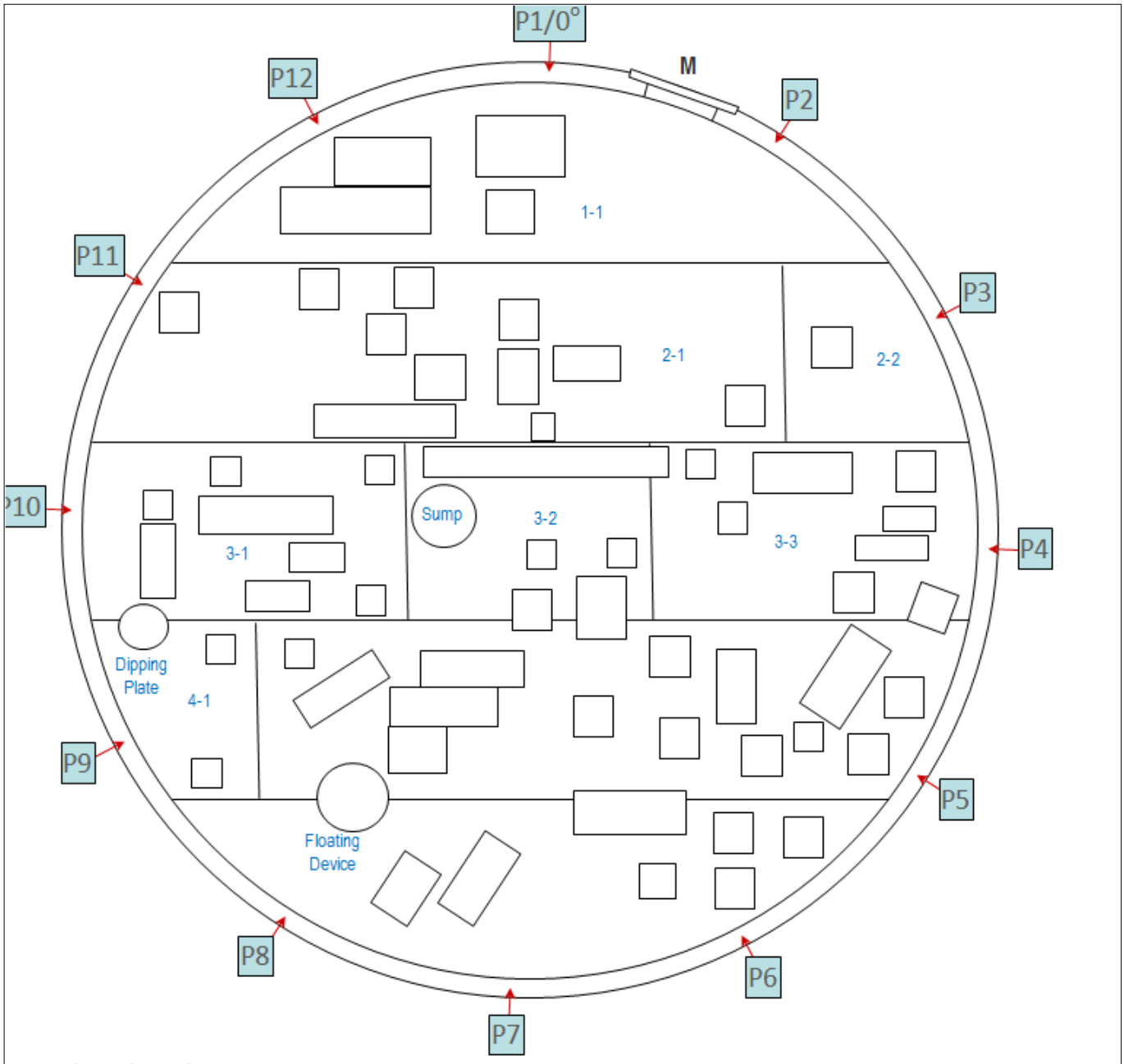
Table 6-5 : Thickness Measurement on Bottom Projection Plates (mm)

UT Location	1	2	3	4	5	6	7	8	9	10
Readings(mm)	9.89	9.90	9.44	9.88	9.22	9.48	9.36	9.69	9.70	9.78
UT Location	11	12	-	-	-	-	-	-	-	-
Readings(mm)	9.69	9.69	-	-	-	-	-	-	-	-

Note: First Ultrasonic Thickness location is at 0^{o} degree of the tank reference

Conclusion:

The Lowest reading found on bottom projection plate is 9.22mm, therefore, the thickness on bottom projection plate is within API 653 tolerance.



Drawing for inspection reference only. Not To Scale.

Legend:

1-1	Plate Number
P3	UT Measurement Location
M	24" Manway
	Patch Plate

Figure 6-2 : Bottom Projection Plate Layout

Attachment 1 : Tank Floor Scanning, Magnetic Flux Leakage Report

Tank Inspection Report

Client: Vital FSM PetroCorp

Location: Chuuk Terminal, Federal State of Micronesia

Tank ID: 5

Inspection Date: 16-12-2016

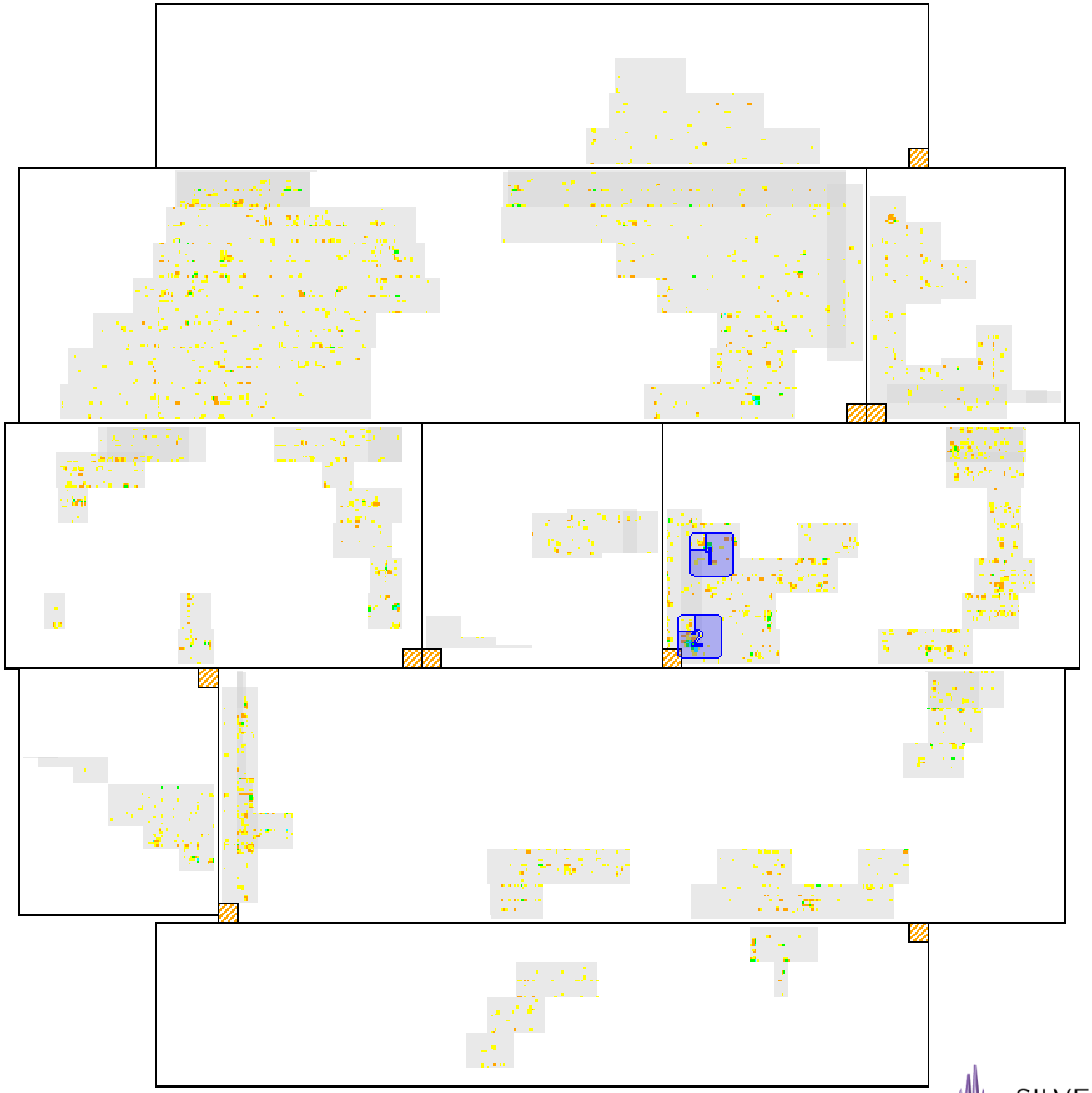
SILVERWING

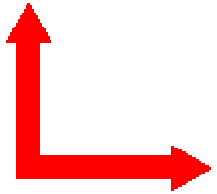
Tank Floor Layout Showing Discontinuities

Tank	5
Location	Chuuk Micronesia
Client	Vital FSM PetroCorp
Operator Company	SGS Malaysia
Outer Tank Diameter	7620 mm
Lower Threshold	20%
Upper Threshold	100%
Defect Enhancment Setting	10

Discontinuity Colour Scheme

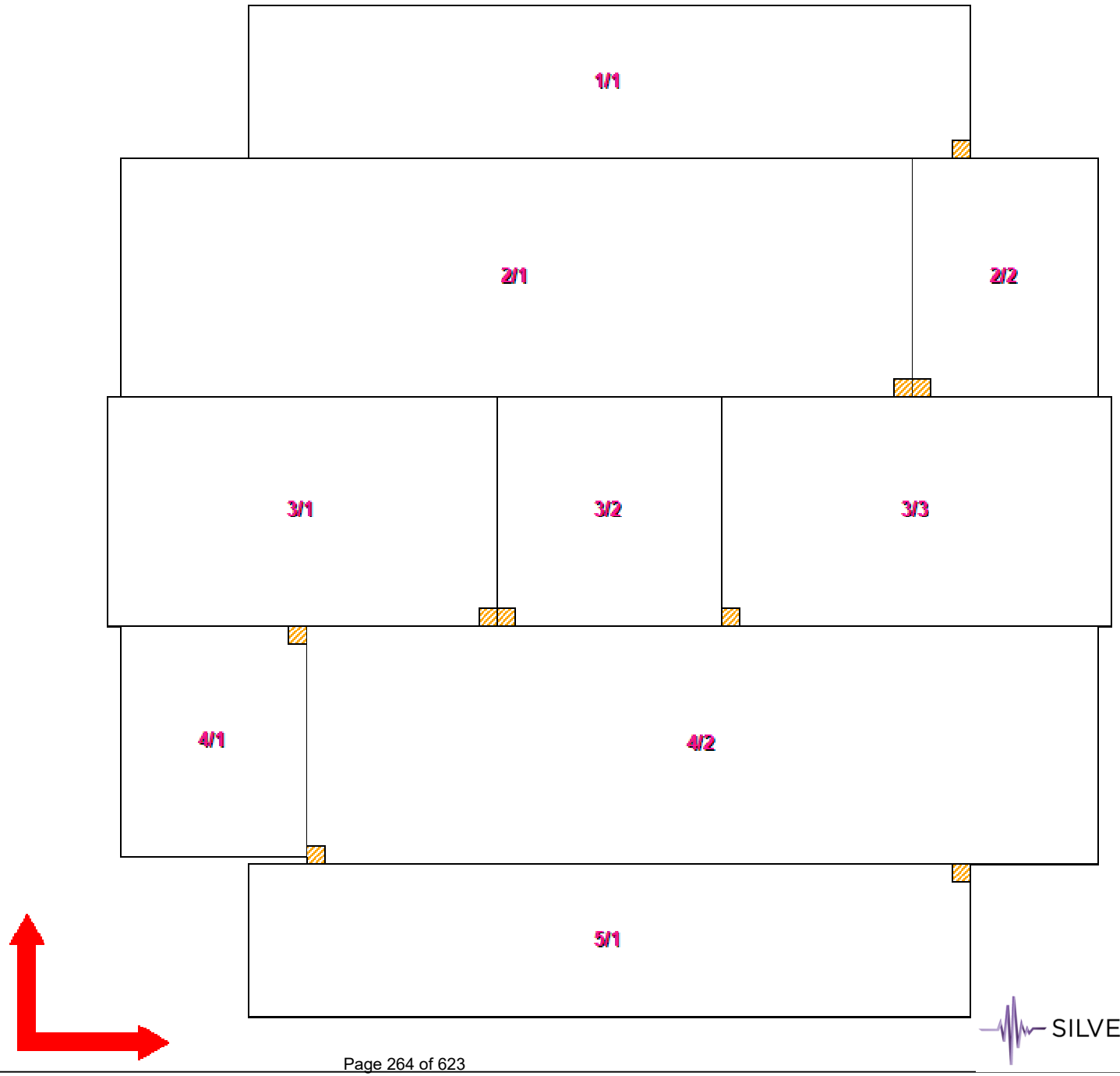
20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity





Tank Floor Numbering System

Tank	5
Location	Chuuk Micronesia
Client	Vital FSM PetroCorp
Operator Company	SGS Malaysia
Outer Tank Diameter	7620 mm
Lower Threshold	20%
Upper Threshold	100%
Defect Enhancment Setting	10



Tank Floor Layout With Symbols

Tank	5
Location	Chuuk Micronesia
Client	Vital FSM PetroCorp
Operator Company	SGS Malaysia
Outer Tank Diameter	7620 mm
Lower Threshold	20%
Upper Threshold	100%
Defect Enhancment Setting	10

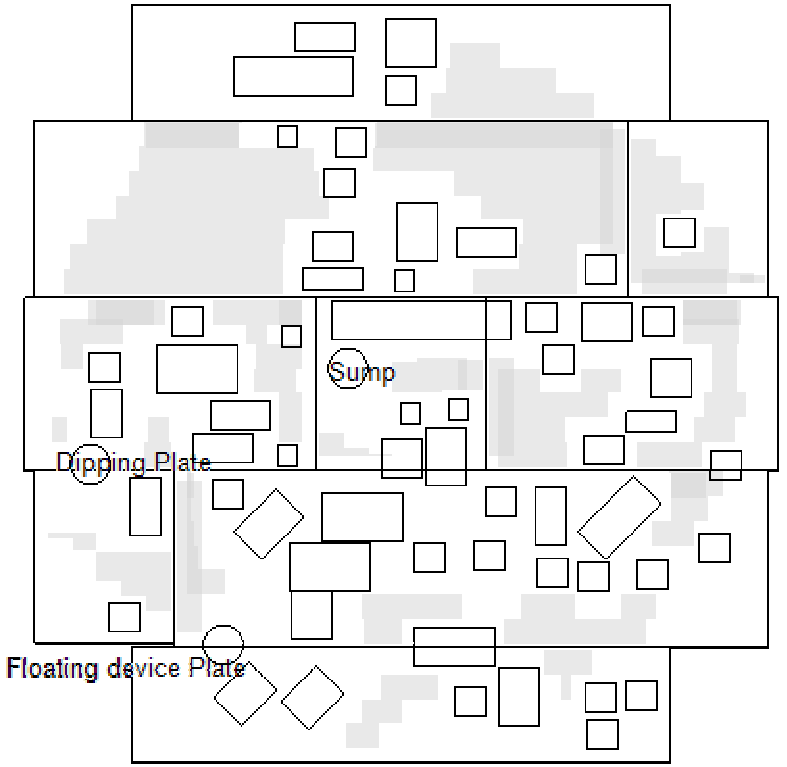
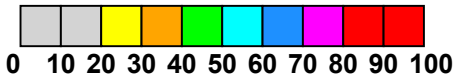


Plate summary

Tank: 5

Date: 16-12-2016



Discontinuities found on all plates (ignoring thresholds)

Row	Plate	Minimum discontinuity %	Maximum discontinuity %	Severity
1	1	20	39	
2	1	20	54	
2	2	20	42	
3	1	20	53	
3	2	20	41	
3	3	20	68	
4	1	20	51	
4	2	20	54	
5	1	20	52	

Total number Of plates for Tank 5 = 9

Patch plate summary

Tank: 5

Date: 16-12-2016

All X and Y coordinates are taken perpendicular from the plate reference to the TOP-LEFT corner of the patch plate concerened. See each plate illustration for further details

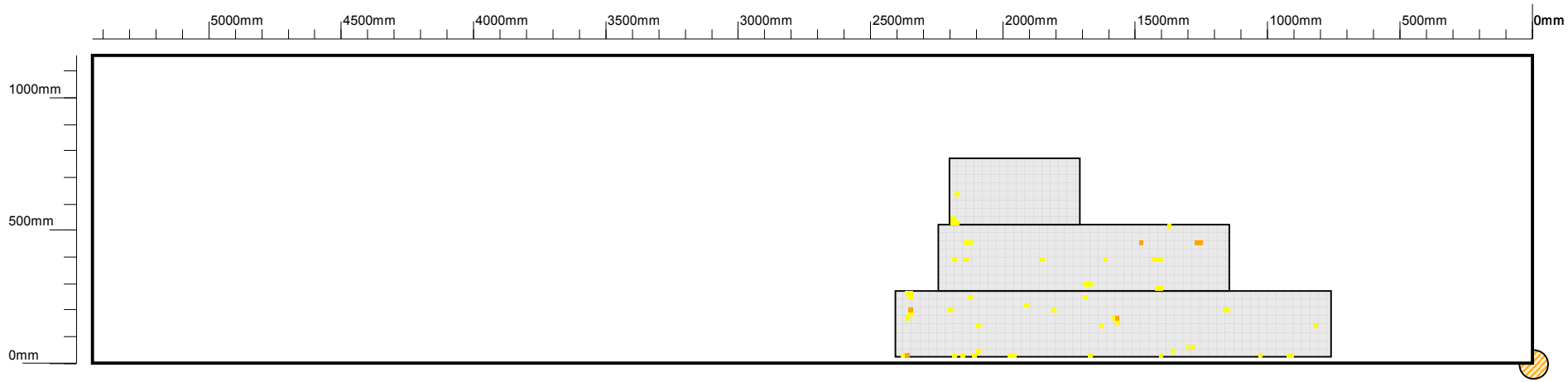
METRIC (mm), Height and Width are rounded up to nearest 10 mm

Row	Plate	Plate Ref.	Patch ID	X	Y	Height	Width	Rot (deg)	Radius	Type
3	3	Bottom-Left	3/3/1	191	959	300	300	0	32	**Ellipse**
3	3	Bottom-Left	3/3/2	108	380	300	300	0	32	**Ellipse**

Total No Of Patches on Row 3 Plate 3 = 2

Total No Of Patches for Tank 5 = 2

Total area of patch material required for Tank 5 = 0.18 meters squared



Y-axis

X-axis

SILVERWING

SGS

Row:	1	**Plate:**	1
Plate Length (mm):	5440	**Plate Width (mm):**	1160
Orientation:	Horizontal	**Scan Method:**	Parallel
Max discontinuity:	39	**Showing defects from:**	**TOP & BOTTOM**
Lower Threshold:	20%	**Upper Threshold:**	100% **(Import Threshold: 20%)**
Defect enhancment setting:	**Not used**		

Discontinuity Colour Scheme

20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity

Symbols

Track
Non-Scanned Area
Plate Reference
Tank Reference

Tank:	5	**Operator:**	sukri
Date:	16-12-2016	**Equipment Serial:**	6930706
Location:	Chuuk Micronesia		
Company:	SGS Malaysia		
Client:	Vital FSM PetroCorp		

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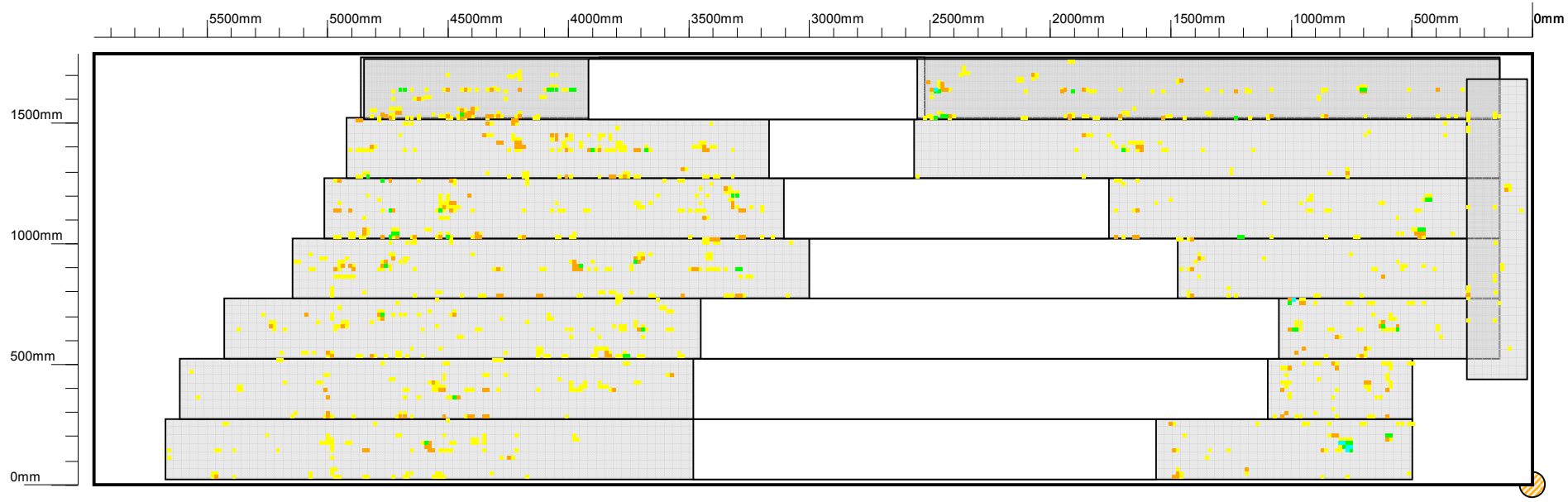

Y-axis

X-axis

SILVERWING

SGS

Row:	2	**Plate:**	1
Plate Length (mm):	5970	**Plate Width (mm):**	1790
Orientation:	Horizontal	**Scan Method:**	Parallel
Max discontinuity:	54	**Showing defects from:**	**TOP & BOTTOM**
Lower Threshold:	20%	**Upper Threshold:**	100% **(Import Threshold: 20%)**
Defect enhancment setting:	**Not used**		

Discontinuity Colour Scheme

20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity

Symbols

Track
Non-Scanned Area
Plate Reference
Tank Reference

Tank:	5	**Operator:**	sukri
Date:	16-12-2016	**Equipment Serial:**	6930706
Location:	Chuuk Micronesia		
Company:	SGS Malaysia		
Client:	Vital FSM PetroCorp		

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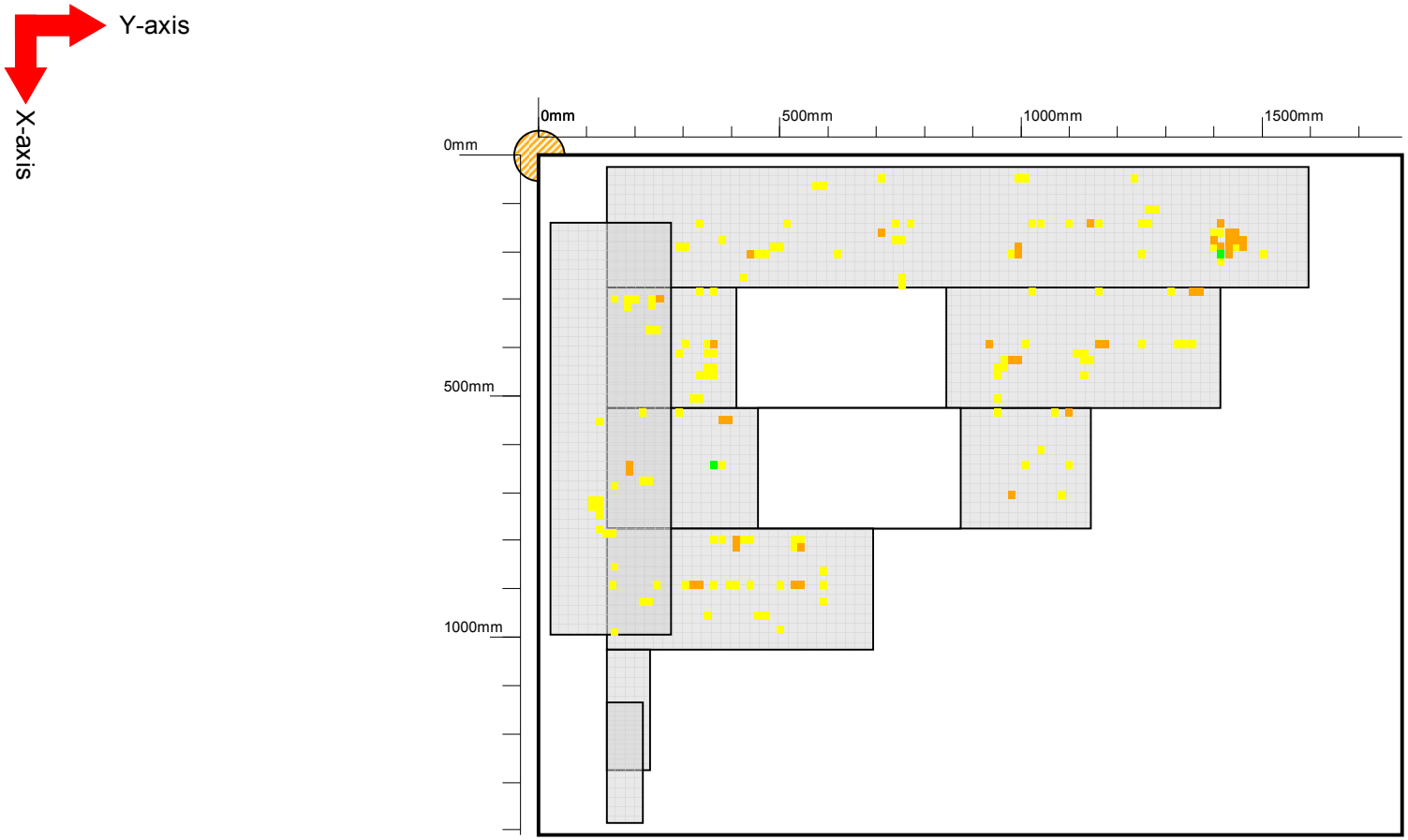

SILVERWING

SGS

Row:	2	**Plate:**	2
Plate Length (mm):	1790	**Plate Width (mm):**	1410
Orientation:	Vertical	**Scan Method:**	Parallel
Max discontinuity:	42	**Showing defects from:**	**TOP & BOTTOM**
Lower Threshold:	20%	**Upper Threshold:**	100% **(Import Threshold: 20%)**
Defect enhancment setting:	**Not used**		

Discontinuity Colour Scheme

20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity

Symbols

Track
Non-Scanned Area
Plate Reference
Tank Reference

Tank:	5	**Operator:**	sukri
Date:	16-12-2016	**Equipment Serial:**	6930706
Location:	Chuuk Micronesia		
Company:	SGS Malaysia		
Client:	Vital FSM PetroCorp		

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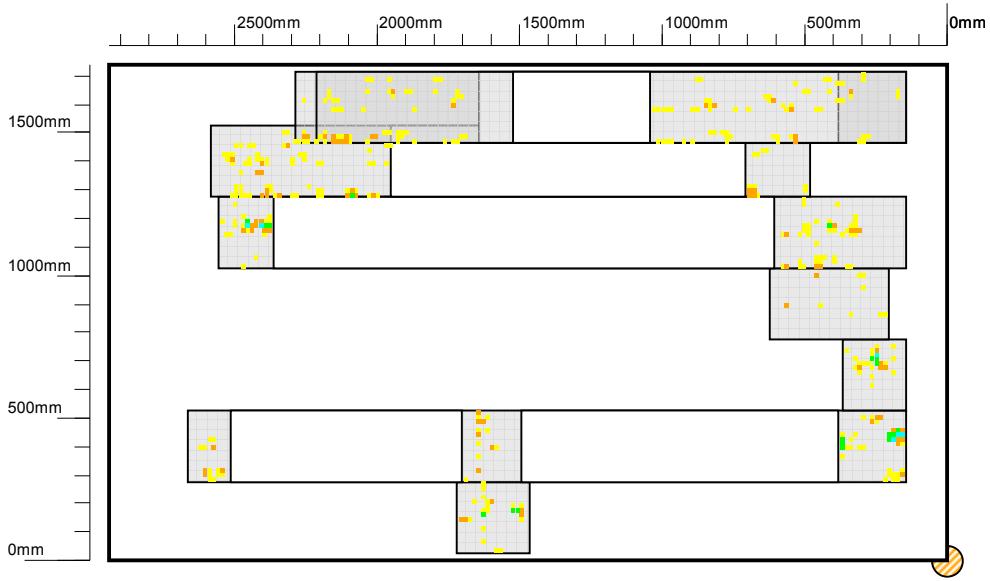

Y-axis

X-axis

SILVERWING

SGS

Row:	3	**Plate:**	1
Plate Length (mm):	2940	**Plate Width (mm):**	1740
Orientation:	Horizontal	**Scan Method:**	Parallel
Max discontinuity:	53	**Showing defects from:**	**TOP & BOTTOM**
Lower Threshold:	20%	**Upper Threshold:**	100% **(Import Threshold: 20%)**
Defect enhancment setting:	**Not used**		

Discontinuity Colour Scheme

20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity

Symbols

Track
Non-Scanned Area
Plate Reference
Tank Reference

Tank:	5	**Operator:**	sukri
Date:	16-12-2016	**Equipment Serial:**	6930706
Location:	Chuuk Micronesia		
Company:	SGS Malaysia		
Client:	Vital FSM PetroCorp		

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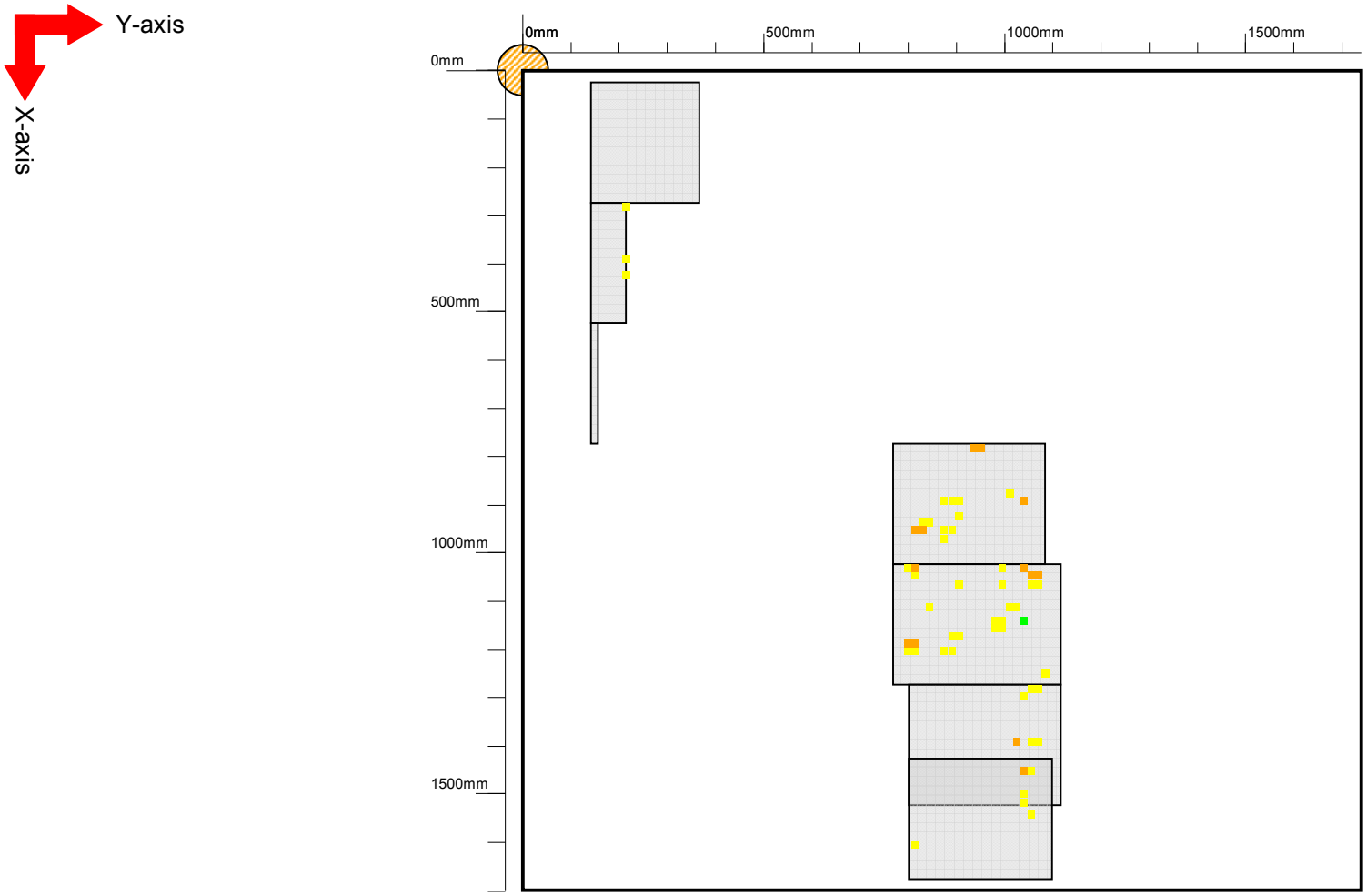

SILVERWING

SGS

Row:	3	**Plate:**	2
Plate Length (mm):	1740	**Plate Width (mm):**	1700
Orientation:	Vertical	**Scan Method:**	Parallel
Max discontinuity:	41	**Showing defects from:**	**TOP & BOTTOM**
Lower Threshold:	20%	**Upper Threshold:**	100% **(Import Threshold: 20%)**
Defect enhancment setting:	**Not used**		

Discontinuity Colour Scheme

20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity

Symbols

Track
Non-Scanned Area
Plate Reference
Tank Reference

Tank:	5	**Operator:**	sukri
Date:	16-12-2016	**Equipment Serial:**	6930706
Location:	Chuuk Micronesia		
Company:	SGS Malaysia		
Client:	Vital FSM PetroCorp		

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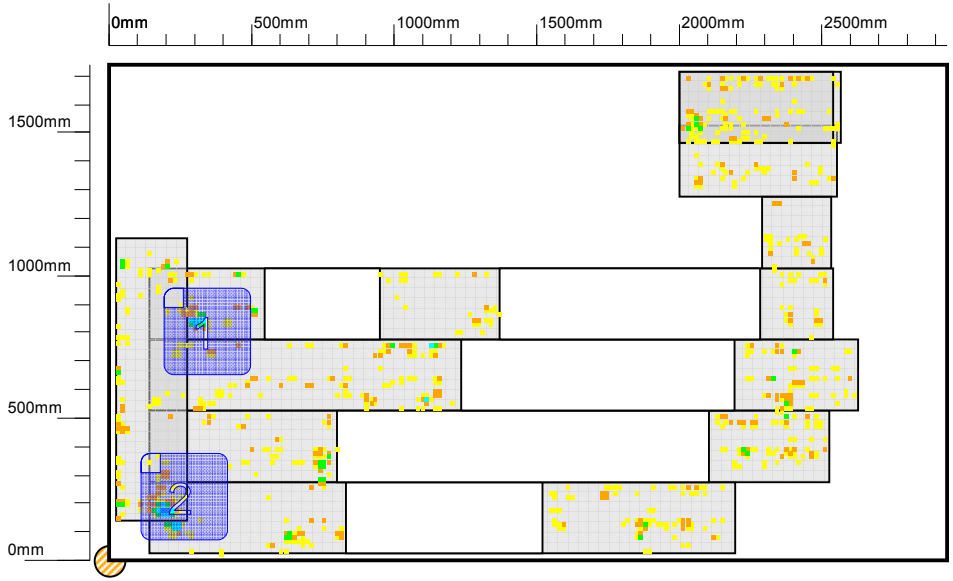

Y-axis

X-axis

SILVERWING

SGS

Row:	3	**Plate:**	3
Plate Length (mm):	2940	**Plate Width (mm):**	1740
Orientation:	Horizontal	**Scan Method:**	Parallel
Max discontinuity:	68	**Showing defects from:**	**TOP & BOTTOM**
Lower Threshold:	20%	**Upper Threshold:**	100% **(Import Threshold: 20%)**
Defect enhancment setting:	**Not used**		

Discontinuity Colour Scheme

20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity

Symbols

Track
Non-Scanned Area
Plate Reference
Tank Reference

Tank:	5	**Operator:**	sukri
Date:	16-12-2016	**Equipment Serial:**	6930706
Location:	Chuuk Micronesia		
Company:	SGS Malaysia		
Client:	Vital FSM PetroCorp		

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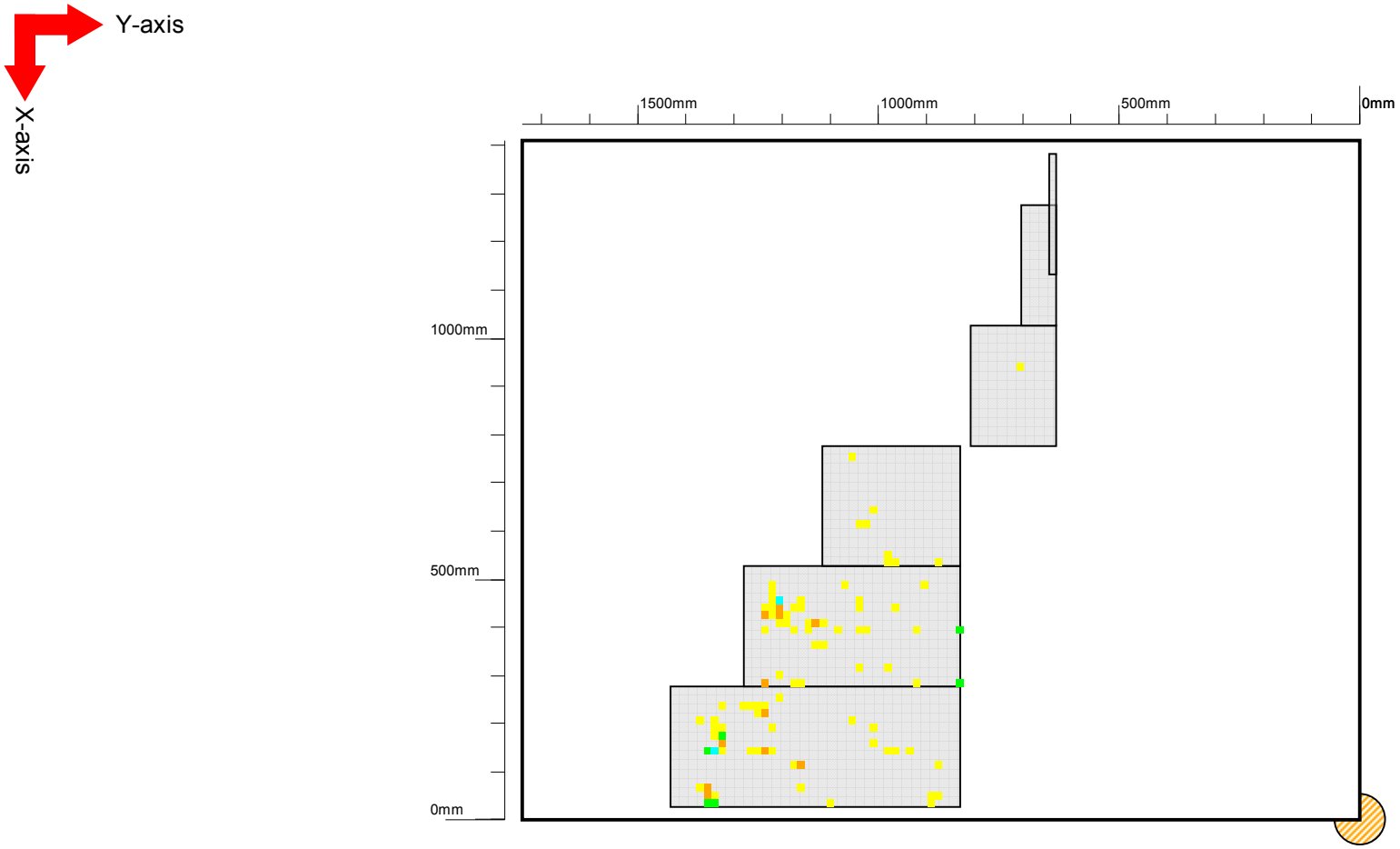

SILVERWING

SGS

Row:	4	**Plate:**	1
Plate Length (mm):	1740	**Plate Width (mm):**	1410
Orientation:	Vertical	**Scan Method:**	Parallel
Max discontinuity:	51	**Showing defects from:**	**TOP & BOTTOM**
Lower Threshold:	20%	**Upper Threshold:**	100% **(Import Threshold: 20%)**
Defect enhancment setting:	**Not used**		

Discontinuity Colour Scheme

20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity

Symbols

Track
Non-Scanned Area
Plate Reference
Tank Reference

Tank:	5	**Operator:**	sukri
Date:	16-12-2016	**Equipment Serial:**	6930706
Location:	Chuuk Micronesia		
Company:	SGS Malaysia		
Client:	Vital FSM PetroCorp		

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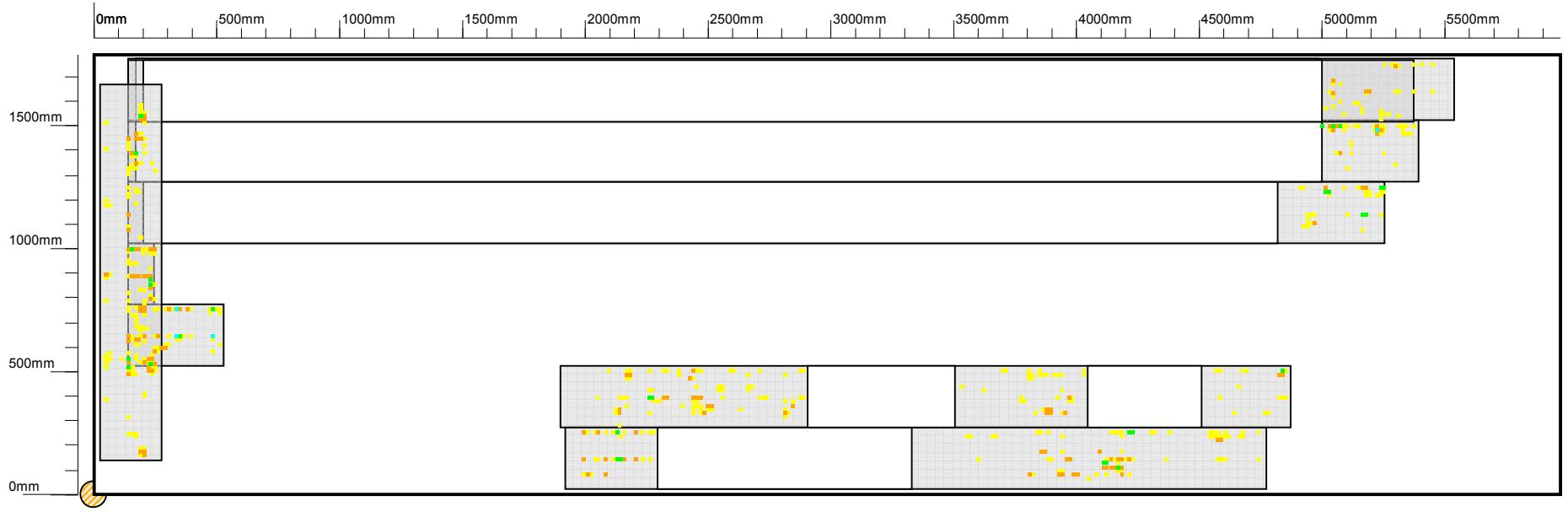

Y-axis

X-axis

SILVERWING

SGS

Row:	4	**Plate:**	2
Plate Length (mm):	5970	**Plate Width (mm):**	1790
Orientation:	Horizontal	**Scan Method:**	Parallel
Max discontinuity:	54	**Showing defects from:**	**TOP & BOTTOM**
Lower Threshold:	20%	**Upper Threshold:**	100% **(Import Threshold: 20%)**
Defect enhancment setting:	**Not used**		

Discontinuity Colour Scheme

20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity

Symbols

Track
Non-Scanned Area
Plate Reference
Tank Reference

Tank:	5	**Operator:**	sukri
Date:	16-12-2016	**Equipment Serial:**	6930706
Location:	Chuuk Micronesia		
Company:	SGS Malaysia		
Client:	Vital FSM PetroCorp		

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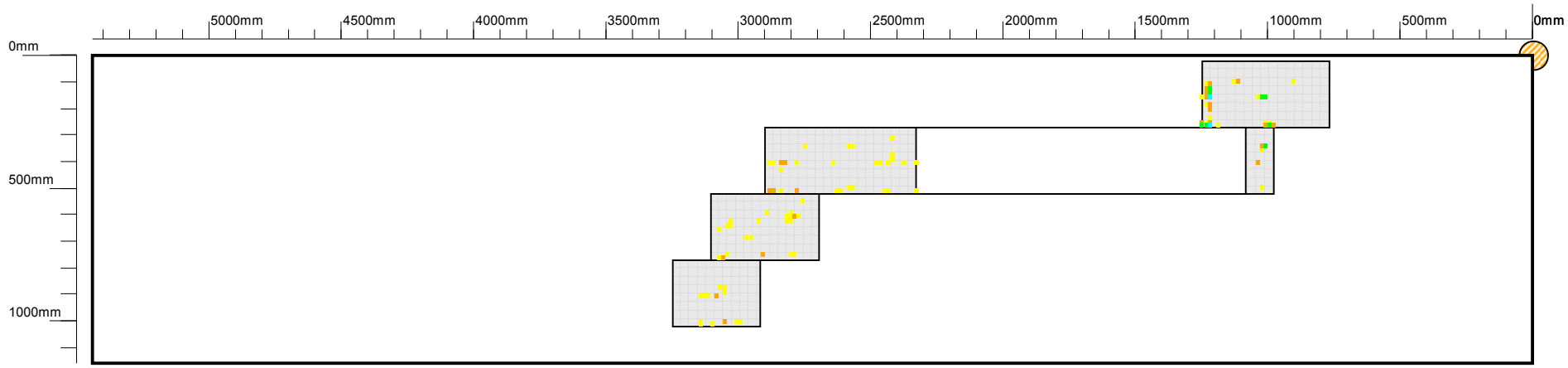

Y-axis

X-axis

SILVERWING

SGS

Row:	5	**Plate:**	1
Plate Length (mm):	5440	**Plate Width (mm):**	1160
Orientation:	Horizontal	**Scan Method:**	Parallel
Max discontinuity:	52	**Showing defects from:**	**TOP & BOTTOM**
Lower Threshold:	20%	**Upper Threshold:**	100% **(Import Threshold: 20%)**
Defect enhancment setting:	**Not used**		

Discontinuity Colour Scheme

20% - 29%
30% - 39%
40% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90% - 100%
Weld Discontinuity

Symbols

Track
Non-Scanned Area
Plate Reference
Tank Reference

Tank:	5	**Operator:**	sukri
Date:	16-12-2016	**Equipment Serial:**	6930706
Location:	Chuuk Micronesia		
Company:	SGS Malaysia		
Client:	Vital FSM PetroCorp		

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Appendix F

Chuuk Tank 3 Drawing Package

DESIGN CALCULATION REPORT

TANK NO.3
ABOVEGROUND STORAGE TANK
FOUNDATION

VITAL FSM PETROCORP.
CHUUK, FSM

AUGUST 24, 2023

Testplus Quality Control Services
101 Sitio Tacloban II, Lucanin, Mariveles, Bataan

Report No.: 2023-087

Revisions:
Rev. 1, 01/08/2024

Prepared by:

Joel B. Salamero
API 653 Cert. No. 27103
Tank Engineer

Reviewed by:

Eng'r. Laisa D. Palmero
Civil Engineer

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[illegible], FSM
Tan[illegible]
Fo[illegible]ndation [illegible]e[illegible]i[illegible]n [illegible]al[illegible]lation

1 INTRODUCTION

Testplus Quality Control Services contracted by Vital FSM Petrocorp. to provide Design of Tank 3 Storage Tank Foundation located at Chuuk Terminal, Federated State of Micronesia.

At the request of the owner, the intent of this intervention is to provide the design requirement of storage tank foundation in accordance with the applicable requirement of API 650 12th Edition 2013.

The information supplied in the tank foundation design is a reasonable engineering assessment and design consideration but is not judged to represent the condition of the tank with absolute certainty. Accordingly, Testplus Quality Control Services makes no warranty of any kind, expressed or implied. The tank owner must satisfy itself as to the adequacy and accuracy of the calculation and judge the value of the design presented.

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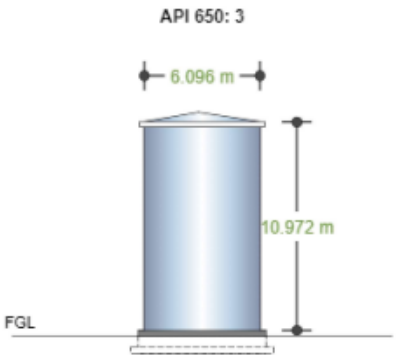
2□ Design Inputs

1.1 Design Options

Tank No	**3**
Foundation Type	**Soil Supported**
Tank Type	**API 650**
Design Standard	**American Standard**
Unit	**SI Unit**

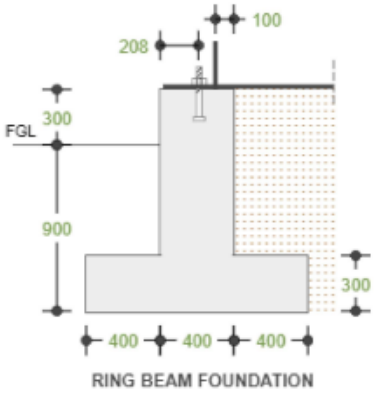


1.2 Tank Data

Roof Type			**Fixed (Non Frangible)**
Tank Inner Diameter	D_i	=	**6096** mm
Shell Height	H_t	=	**10972** mm
Roof Height	H_r	=	**500** mm
Bolt Center Diameter	D_{bcd}	=	**6280** mm
Corrosion Allowance	C_{af}	=	**0** %

1.2.1 Internal Pressure

Design Pressure	G_{design}	=	**0** kN/m²
Operating Pressure	G_{oper}	=	**0** kN/m²
Test Pressure	G_{test}	=	**0** kN/m²
External (Vacuum) Pressure	$G_{external}$	=	**0** kN/m²
Failure Pressure	$G_{failure}$	=	**0** kN/m²



1.3 Foundation Data

Depth of Foundation	D_f	=	**900** mm
Height of Ring Beam above Ground	H_{ag}	=	**300** mm
Width of Ring Beam	W_w	=	**400** mm
Width in Contact with Fluid	W_{wf}	=	**100** mm
Thickness of Footing	T_f	=	**300** mm
Width of Footing Inside Ring Beam	W_{fi}	=	**400** mm
Width of Footing Outside Ring Beam	W_{fo}	=	**400** mm

1.4 Grade Slab

Grade Slab	**None**

1.5 Rebars and Anchor Bolt

1.5.1 Reinforcement

Clear Cover for Ring Beam	C_{rb}	=	**50** mm
Clear Cover for Footing	C_{foot}	=	**50** mm

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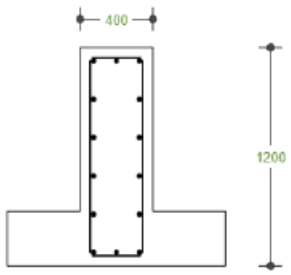
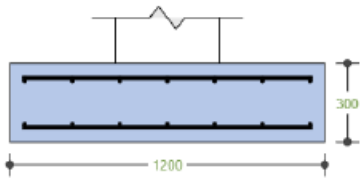
Ring Beam and Footing Reinforcement



Top and Bottom Layers (1): 3 - 12ϕ each.
Intermediate Layers (2): 4 - 12ϕ each. Total:1583 mm² (0.33%)
Vertical: 2L12ϕ - 150mm c/c (1508 mm²/m - 0.38%)



Bottom Main: 12ϕ - 150 mm c/c (754 mm² - 0.25 %)
Top Main: 12ϕ - 150 mm c/c (754 mm² - 0.25 %)

1.5.2 Anchor Bolts

Bolt Grade	f_b	=	F1554-55
Bolt Yield Strength	Y_b	=	379.23 N/mm²
Bolt Ultimate Strength	U_b	=	517.13 N/mm²
Bolt Size	d	=	M30
No. of Anchor Bolts	N_{ab}	=	10

1.5.3 Bolt Anchorage

Shear Resistance		=	Tankbase Friction
Anchorage Tension Capacity	C_t	=	190 kN
Anchorage Shear Capacity	C_s	=	190 kN

1.6 Soil

Allowable Increase of SBC for Test	SBC_t	=	20 %
Allowable Increase of SBC for Wind	SBC_w	=	33 %
Allowable Increase of SBC for Seismic	SBC_s	=	33 %
Allowable Safe Bearing Pressure	SBC	=	200 kN/m²
Unit Weight of Soil	γ_{soil}	=	18.5 kN/m³
Angle of Internal Friction	Φ	=	30 deg
Pressure Coefficient Type	K	=	Active (ka)
Co-efficient of Friction	μ	=	0.35
Poisson's Ratio	v	=	0.35
Ground Water Depth	H_{wt}	=	N/A

1.7 Reinforced Concrete Properties

Concrete Type		=	Normal Weight
Density of Steel	γ_{steel}	=	78.5 kN/m³
Density of Concrete	γ_{conc}	=	24 kN/m³
Compressive Strength of Concrete	f'_c	=	28 N/mm²
Yield Strength of Reinforcement	f_y	=	420 N/mm²
Concrete Modification Factor	λ	=	1
Modulus of Elasticity of Steel	E_s	=	200 kN/mm²

1.8 Stability Safety Factor

Factor of Safety against Sliding	γ_{Slide}	=	1.5
Factor of Safety against Overturning	γ_{Over}	=	1.5
Factor of Safety against Uplift	γ_{Up}	=	1.2

1.9 Load Cases

Notation	Description
Ds	Dead Loads
De	Empty Weight
Do	Operating Weight
Dt	Test Weight
L	Live Load
S	Snow Load
W	Wind Load
Eo	Seismic Load
Gdesign	Design Internal Pressure
Goper	Operating Internal Pressure
Gtest	Test Internal Pressure
Gexternal	External Pressure
Gfailure	Failure Pressure

1.10 Loads Data

1.10.1 Wind Load by Program

Code			ASCE-7 2016
Effective Diameter Factor	D_{eff}	=	1
Effective Height Factor	H_{eff}	=	1
Basic Wind Speed	V	=	50 m/sec
Terrain Exposure Category	Terrain	=	D
Topography Condition	Topography	=	Flat

1.10.2 Seismic Load by Program

Vertical Seismic Effect			Yes
Code			API 650 2013
Seismic Group			III
Site Class			D
Anchorage			Mechanical
Spectral Acceleration 0.2 Sec	S_s	=	0.25
Spectral Acceleration 1 Sec	S_1	=	0.1
Long Period Transition	T_L	=	4 sec

1.10.3 Tank Loads

Description	Axial Load (kN)	Shear at Tank Base (kN)	Moment at Tank Base (kN.m)
Empty Weight (De)	0.0		
Tank Bottom Plate Weight (Dbp)	0.0		
Floating Roof Weight (Drs)	0.0		
Operating Weight (Do)	0.0		

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Density of Operating Liquid	γ_{ol}	=	**9** kN/m³
Height of Test Liquid Level	H_{tl}	=	**10970** mm
Density of Test Liquid	γ_{tl}	=	**10** kN/m³

1.10.4 Tank Loads

Description	Axial Load (kN)	Shear at Tank Base (kN)	Moment at Tank Base (kN.m)
Live Load (L)	90.0		
Snow Load (S)	0.0		

1.11 Load Combination

1.11.1 Serviceability Load Combinations

No	Combination
SLS1	Ds + Do + Gdesign
SLS2	Ds + Dt + Gtest
SLS3	Ds + De + WL + 0.4Gdesign
SLS4	Ds + De + WL + Goper
SLS5	Ds + Do + WL + 0.4Gdesign
SLS6	Ds + Do + WL + Goper
SLS7	Ds + De + WL + 0.4Gexternal
SLS8	Ds + Do + WL + 0.4Gexternal
SLS9	Ds + Do + L + 0.4Gexternal
SLS10	Ds + Do + 0.4Gexternal
SLS11	Ds + De + 0.4L + Gexternal
SLS12	Ds + De + Gexternal
SLS13	Ds + Do + 0.4L + Gexternal
SLS14	Ds + Do + Gexternal
SLS15	Ds + Do + Eo + 0.4Gdesign
SLS16	Ds + Do + Eo + Goper

1.11.2 Ultimate Load Combinations

No	Combination
ULS1	1.4Ds + 1.4Do + 1.4Gdesign
ULS2	1.4Ds + 1.4Dt + 1.4Gtest
ULS3	0.9Ds + 0.9De + 1.6WL + 0.4Gdesign
ULS4	1.2Ds + 1.2De + 1.6WL + 0.5Gdesign
ULS5	0.9Ds + 0.9De + 1.6WL + 0.9Goper
ULS6	1.2Ds + 1.2De + 1.6WL + 1.2Goper
ULS7	0.9Ds + 0.9Do + 1.6WL + 0.4Gdesign
ULS8	1.2Ds + 1.2Do + 1.6WL + 0.5Gdesign
ULS9	0.9Ds + 0.9Do + 1.6WL + 0.9Goper
ULS10	1.2Ds + 1.2Do + 1.6WL + 1.2Goper
ULS11	0.9Ds + 0.9De + 1.6WL + 0.4Gexternal
ULS12	1.2Ds + 1.2De + 1.6WL + 0.5Gexternal
ULS13	0.9Ds + 0.9Do + 1.6WL + 0.4Gexternal
ULS14	1.2Ds + 1.2Do + 1.6WL + 0.5Gexternal

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1.11.2 Ultimate Load Combinations

No	Combination
ULS15	0.9Ds + 0.9Do + 0.8WL + 0.4Gexternal
ULS16	1.2Ds + 1.2Do + 1.6L + 0.8WL + 0.5Gexternal
ULS17	1.2Ds + 1.2Do + 0.8WL + 0.5Gexternal
ULS18	0.9Ds + 0.9De + 1.6WL + 0.9Gexternal
ULS19	1.2Ds + 1.2De + 0.6L + 1.6WL + 1.2Gexternal
ULS20	1.2Ds + 1.2De + 1.6WL + 1.2Gexternal
ULS21	0.9Ds + 0.9Do + 1.4Eo + 0.4Gdesign
ULS22	1.2Ds + 1.2Do + 1.4Eo + 0.5Gdesign
ULS23	0.9Ds + 0.9Do + 1.4Eo + 0.9Goper
ULS24	1.2Ds + 1.2Do + 1.4Eo + 1.2Goper

1.11.3 Additional Load Combinations

Change in Empty/Operating/Test Wt. **0** %

3□ Design Output

2.1 Geometry of Tank Foundation

Inner Diameter of Ring Beam	$D_{i_r} = D_i - 2 * W_{wf}$	**5.9** m
Outer Diameter of Ring Beam	$D_{o_r} = D_{i_r} + 2 * W_w$	**6.7** m
Overall Depth of Ring Beam	$H_{r_b} = D_f + H_{a_g}$	**1.2** m
Inner Diameter of Footing	$D_{i_f} = D_{i_r} - 2 * W_{f_i}$	**5.1** m
Outer Diameter of Footing	$D_{o_f} = D_{o_r} + 2 * W_{f_o}$	**7.5** m
Width of Footing	$W_f = W_{f_i} + W_w + W_{f_o}$	**1.2** m

2.2 Properties of Tank Foundation

Base Area of Ring Beam	$A_r = \frac{\pi}{4} * \left(D_{o_r}^2 - D_{i_r}^2\right)$	**7.9** m²
Area of Inner Footing Base	$A_{i_f} = \frac{\pi * \left(D_{i_r}^2 - D_{i_f}^2\right)}{4}$	**6.9** m²
Area of Footing Base	$A_f = \frac{\pi * \left(D_{o_f}^2 - D_{i_f}^2\right)}{4}$	**23.7** m²
Surface Area of Soil Enclosed by Ring Beam	$A_{s_r} = \frac{\pi * D_{i_r}^2}{4}$	**27.3** m²
Surface Area of Soil Enclosed by Footing Base	$A_{s_f} = \frac{\pi * D_{i_f}^2}{4}$	**20.4** m²
Section Modulus of Ring Foundation	$S_r = \frac{\pi * \left(D_{o_f}^4 - D_{i_f}^4\right)}{32 * D_{o_f}}$	**32.5** m³

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2.3 Load Calculation

[Tank Loads calculated by the program]

Cross Section Area of Tank	$A_t = \frac{\pi * D_i^2}{4}$	29.2 m²
Surface Area of Roof	$A_{ro} = \pi * \frac{D_i}{2} * \sqrt{\left(\frac{D_i}{2}\right)^2 + H_r^2}$	29.6 m²
Self-Weight of Fixed Roof	$W_{rp} = A_{ro} * t_r * \gamma_{st_{eel}}$	11.6 kN
Self-Weight of Shell	$W_{sp} = \pi * D_i * t_s * H * \gamma_{st_{eel}}$	45.5 kN
Self-Weight of Tank Base Plate	$D_{bp} = A_t * t_{bp} * \gamma_{st_{eel}}$	8.4 kN
Empty Weight Calculated	$D_e = D_{rs} + W_{rp} + W_{sp} + D_{bp}$	65.6 kN
Operating Liquid Weight Calculated	$D_o = \frac{\pi}{4} * D_i^2 * H_{ol} * \gamma_{ol} + D_e$	1273.9 kN
Test Liquid Weight Calculated	$D_t = \frac{\pi}{4} * D_i^2 * H_{tl} * \gamma_{tl} + D_e$	1538.4 kN
Self-Weight of Ring Beam	$W_{rb} = A_r * \left(H_{rb} - T_f\right) * \gamma_{con_c}$	170.9 kN
Self-Weight of Ring Footing	$W_{rf} = \left(A_f - A_r\right) * T_f * \gamma_{con_c}$	170.9 kN
Weight of Soil on Footing Inside	$W_{sf_i} = \left(A_{s_r} - A_{sf}\right) * \left(H_{rb} - T_f\right) * \gamma_{soil}$	115 kN
Weight of Soil on Footing Outside	$W_{sf_o} = \frac{\pi}{4} * \left(D_{of}^2 - D_{or}^2\right) * \left(D_f - T_f\right) * \gamma_{soil}$	99 kN
Weight of Soil Interior to Foundation	$W_{sf} = \left(A_{sf} * T_f + A_{s_r} * \left(H_{rb} - T_f\right)\right) * \gamma_{soil} + \gamma_w * \left(H_{wt} - D_f\right) * \left(A_{s_r} + A_{sf}\right)$	567.8 kN
% of Tank Content Load to Ring Beam	$R_w = \frac{A_t - A_{s_r}}{A_t} * 100$	6.5 %
% of Tank Content Load to Footing Base	$R_g = \frac{A_t - A_{sf}}{A_t} * 100 - R_w$	23.7 %
Tank Base Plate Load to Ring Beam	$W_{tr} = D_{bp} * R_w$	0.5 kN
Tank Base Plate Load to Footing Base	$W_{tf} = D_{bp} * R_g$	2 kN
Remaining Tank Base Plate Load	$D_{bp_f} = D_{bp} - W_{tr} - W_{tf}$	5.9 kN
Floating Roof Load to Ring Beam	$W_{rr} = D_{rs} * R_w$	0 kN
Floating Roof Load to Footing Base	$W_{fr} = D_{rs} * R_g$	0 kN
Design Floating Roof Load	$D_{fr} = W_{rr} + W_{fr}$	0 kN
Remaining Floating Roof Load	$D_{rs_f} = D_{rs} - D_{fr}$	0 kN
Design Live Load	$D_{Ll} = L$	69 kN
Shell Knife Edge Load	$W_{sk} = W_{sp} + W_{rp}$	57.1 kN

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Empty Weight to Ring Beam	$E_w = W_{s_k} + W_{t_r}$	57.7 kN
Total Empty Weight	$W_{e_t} = E_w + W_{t_f}$	59.7 kN
Operating Content Load to Ring Beam	$O_{w_r} = (D_o - D_e) * R_w$	78 kN
Operating Load to Footing Base	$O_{w_f} = (D_o - D_e) * R_g$	285.9 kN
Total Operating Content Weight	$W_{o_t} = O_{w_r} + O_{w_f}$	363.9 kN
Remaining Operating Content Weight	$W_{o_{t_f}} = D_o - D_e - W_{o_t}$	844.4 kN
Testing Content Load to Ring Beam	$T_{w_r} = (D_t * D_e) * R_w$	95.1 kN
Testing Content Load to Footing Base	$T_{w_f} = (D_t - D_e) * R_g$	348.5 kN
Total Test Content Weight	$W_{t_t} = T_{w_r} + T_{w_f}$	443.6 kN
Remaining Test Content Weight	$W_{t_{t_f}} = D_t - D_e - W_{t_t}$	1029.2 kN

2.4 Buoyancy Load

Buoyancy Load	0 kN

2.5 Wind Load Calculation - Program (ASCE-7 2016)

Effective Height	$H_{e_w} = H_{e_{f_f}} * H_t$	10.97 m
Effective Diameter	$D_{e_w} = D_{e_{f_f}} * Di$	6.1 m

Wind Directionality Factor	K_d	1	*Table 26.6-1*
Topographic Factor	K_{z_t}	1	
Ground Elevation Factor	K_e	0.97	*Table 26.9-1*
Velocity pressure Exposure Coefficient	K_z	1.2	*Cl. 27.3-1*
Wind Pressure	$q_z = 0.613 * K_z * K_{z_t} * K_e * K_d * V^2$	1075.42 N/m^2	*Cl. 26.10.2*
Wind Uplift Pressure	$q_u = 1.44 * q_z$	1.55 kN/m^2	
Wind Uplift Load	$W_u = q_u * A_t$	45.2 kN	
Wind Shear	$V_w = 0.86 * D_{e_w} * H_{e_w} * q_z$	61.86 kN	
Wind Moment	$M_w = V_w * \frac{H_{e_w}}{2}$	339.36 kN.m	

Note : *The Wind pressure on shell is multiplied by a factor of 0.6 as per API 650 - 2013 Section 5.2.1 (k)*

2.6 Seismic Load Calculation - Program (API 650 2013)

Seimic Load Reference	API 650 2013

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Product Height	H	10000 mm	
Product Weight	$W_p = D_o - D_e$	1208.3 kN	
Seismic Importance Factor	I	1.5	

2.6.1 Site Coefficients

	F_a	1.6	*Table E1*
	F_v	2.4	*Table E2*
Spectral Response Accln. Parameter at 0.2 sec	$S_{D_s} = \frac{2}{3} * F_a * S_s$	0.3	
Spectral Response Accln. Parameter at 1 sec	$S_{D1} = \frac{2}{3} * F_v * S_1$	0.2	

2.6.2 Impulsive Components

Response Modification Factor	R_{w_i}	4	*Table E4*
Acceleration Parameter	$A_i = max\left(S_{D_s} * \frac{I}{R_{wi}}, 0.007\right)$	0.1	*E4.6.1-1*
Effective Weight of Product	$W_i = \left(1 - 0.218 * \frac{D_i}{H}\right) * W_p$	1047.74 kN	*E6.1.1-2*
Shear Component	$V_i = A_i * \left(W_{sp} + W_{rp} + D_{b_p} + W_i\right)$	111.33 kN	*E6.1-2*
Center of Action for Ringwall Overturning Moment	$X_i = \left(0.5 - 0.094 * \frac{D_i}{H}\right) * H$	4.43 m	*E6.1.2.1-2*
Center of Action for Base Overturning Moment $X_{i_s} = \left(0.50 + 0.06\frac{D_i}{H}\right) * H$		5.37 m	*E6.1.2.2-2*

2.6.3 Convective Components

Response Modification Factor	R_{w_c}	2	*Table E4*
Sloshing Period	$T_c = \frac{1.8 * 0.578 * \sqrt{D_i}}{\sqrt{tanh\left(\frac{3.68 * H}{D_i}\right)}}$	2.57 sec	*E4.5.2-a*
Acceleration Parameter	$A_c = 1.5 * S_{D_1} * \frac{1}{T_c} * \frac{I}{R_{w_c}}$	0.07	*E4.6.1-4*
Effective Weight of Product	$W_c = 0.23 * \frac{D_i}{H} * tanh\left(\frac{3.67 * H}{D_i}\right) * D_o$	169.4 kN	*E6.1.1-3*
Shear Component	$V_c = A_c * W_c$	11.87 kN	*E6.1-3*
Center of Action for Ringwall Overturning Moment $X_c = \left(1 - \frac{cosh\left(\frac{3.67 * H}{D_i}\right) - 1}{\frac{3.67 * H}{D_i} * sinh\left(\frac{3.67 * H}{D_i}\right)}\right) * H$		8.35 m	*E61.2.1-3*
Center of Action for Baswe Overturning Moment $X_{c_s} = \left(1 - \frac{cosh\left(\frac{3.67 * H}{D_i}\right) - 1.937}{\frac{3.67 * H}{D_i} * sinh\left(\frac{3.67 * H}{D_i}\right)}\right) * H$		8.35 m	*E61.2.2-3*

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2.6.4 Design Seismic Forces

Seismic Shear	$V_s = \sqrt{(V_i)^2 + (V_c)^2}$	112 kN	*E6.1-1*
Seismic Ring Wall Moment	$M_{r_w} = \sqrt{\left(A_i * \left(W_i * X_i + W_{s_p} * \frac{H_t}{2} + W_{r_p} * \left(H_t + \frac{H_r}{2}\right)\right)\right)^2 + \left(A_c * W_c * X_c\right)^2}$	507.7 kN.m	*E6.1.5-1*
Seismic Base Moment	$M_s = \sqrt{\left(A_i * \left(W_i * X_{i_s} + W_{s_p} * \frac{H_t}{2} + W_{r_p} * \left(H_t + \frac{H_r}{2}\right)\right)\right)^2 + \left(A_c * W_c * X_{c_s}\right)^2}$	604.5 kN.m	*E6.1.5-2*
Vertical Seismic Coefficient	$A_v = \frac{2}{3} * 0.7 * S_{D_s}$	0.12	*EC6.1.3*

2.7 Loads on Foundation

Sl.No	Load Case	On Top of Foundation			
		Axial (kN)		Shear (kN)	Moment (kN.m)
1	Dc - Dead (Self) Weight of Concrete = $W_{rb} + W_{rf}$	341.8			
2	Ds - Dead (Self) Weight of Soil = $W_{sfi} + W_{sfo}$	214.0	567.8 *		
3	BL - Buoyancy Load = B_L	0.0			
4	De - Dead (Empty / Self) Weight of Tank = W_{et}	59.7	5.9 *		
5	Drs - Floating Roof Weight	0.0	0.0 *		
6	Do - Equipment Operating Content Weight = W_{ot}	363.9	844.4 *		
7	Dt - Equipment Test Content Weight = W_{tt}	443.6	1029.2 *		
8	L - Live Load	69.0			
9	S - Snow Load	0.0			
10	WL - Wind Load	45.2		61.9	339.4
11	Eo - Seismic Load Ring Beam Component			112.0	507.7
12	Eo - Seismic Load Slab Component				604.5

Note * : *The loads acting interior to the footing is considered only for Resisting Force Calculation in Sliding Check*

2.8 Service Loads on Foundation

SLS Comb	Total Vertical Load (max) (kN)	Total Vertical Load (min) (kN)	Total Shear (kN)	Total Moment (kN.m)
SLS1	979.3	979.3	0.0	0.0
SLS2	1059.0	1059.0	0.0	0.0
SLS3	615.4	615.4	61.9	413.6
SLS4	615.4	615.4	61.9	413.6
SLS5	979.3	979.3	61.9	413.6
SLS6	979.3	979.3	61.9	413.6
SLS7	615.4	615.4	61.9	413.6
SLS8	979.3	979.3	61.9	413.6
SLS9	1048.3	1048.3	0.0	0.0
SLS10	979.3	979.3	0.0	0.0
SLS11	643.0	643.0	0.0	0.0

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SLS Comb	Total Vertical Load (max) (kN)	Total Vertical Load (min) (kN)	Total Shear (kN)	Total Moment (kN.m)
SLS12	615.4	615.4	0.0	0.0
SLS13	1006.9	1006.9	0.0	0.0
SLS14	979.3	979.3	0.0	0.0
SLS15	1000.4	958.3	112.0	642.1
SLS16	1000.4	958.3	112.0	642.1

Note : *Total Vertical Load (max) - Considers downward vertical seismic effect.*
Total Vertical Load (min) - considers upward vertical seismic effect, buoyancy and corrosion reduction.

2.9 Stability Checks

2.9.1 Uplift Check

Sl.No	Downward Force (kN) Vertical Load	Upward Force (kN)	FOS	Status
SLS1	979.3	0.0	100.00	OK
SLS2	1059.0	0.0	100.00	OK
SLS3	615.4	0.0	100.00	OK
SLS4	615.4	0.0	100.00	OK
SLS5	979.3	0.0	100.00	OK
SLS6	979.3	0.0	100.00	OK
SLS7	615.4	0.0	100.00	OK
SLS8	979.3	0.0	100.00	OK
SLS9	1048.3	0.0	100.00	OK
SLS10	979.3	0.0	100.00	OK
SLS11	643.0	0.0	100.00	OK
SLS12	615.4	0.0	100.00	OK
SLS13	1006.9	0.0	100.00	OK
SLS14	979.3	0.0	100.00	OK
SLS15	958.3	0.0	100.00	OK
SLS16	958.3	0.0	100.00	OK

Note : *Vertical loads are Reduced by 0.4 * vertical seismic coefficient A_v for applicable load combinations.*

2.9.2 Critical Combinations - Failure Case

No	Combination
CLC1	Ds + De + WL + 1.5Gdesign
CLC2	Ds + De + 1.25Gtest
CLC3	Ds + Do + 1.5Gfailure

Note 1: Uplift Combinations are as generated as per API 650 2013 - F.8.2 with corroded empty factor for CLC1

2.9.3 Frictional Resistance Forces for Critical Combinations

Beneficial Frictional Resistance as per API 650 2013 F.8.2

Active Earth Pressure Coefficient $k = \frac{1 - Sin(\Phi)}{1 + Sin(\Phi)}$ **0.33**

Force due to Inside Soil Pressure $F_{i_{s_{oil}}} = 0.5 * k * \gamma_{s_{oil}} * H_{r_b}^2 * \pi * D_{i_r}$ **82.24 kN**

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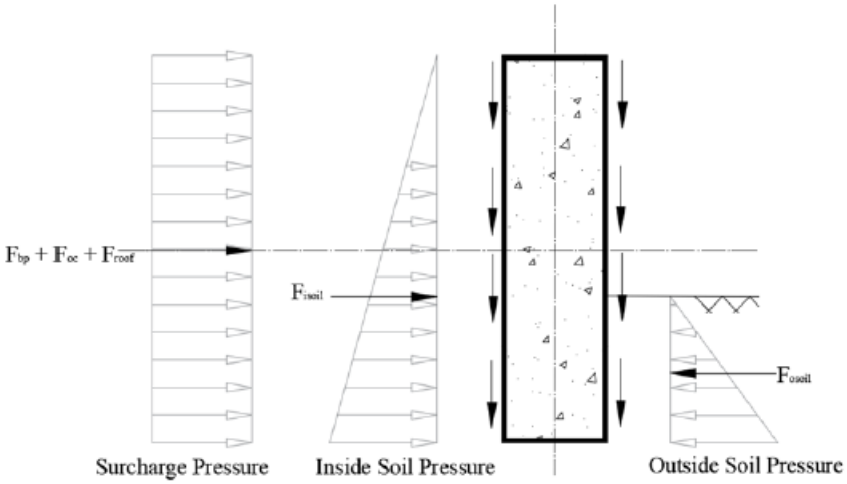
Force due to Outside Soil Pressure	$F_{os_{o_{i_l}}} = 0.5 * k * \gamma_{s_{o_{i_l}}} * (D_f)^2 * \pi * D_{o_r}$	52.54 kN
Force due to Floating Roof	$F_{roof} = k * \frac{D_{r_s} - W_{f_r}}{A_{s_r}} * H_{r_b} * \pi * D_{i_r}$	0 kN
Force due to Base Plate	$F_{b_p} = k * T_{b_p} * \gamma_{st_{e_l}} * H_{r_b} * \pi * D_{i_r}$	4.65 kN
Force due to Operating Liquid Pressure	$F_{o_c} = \frac{(D_o - D_e) * k * \gamma_{so_{i_l}} * H_{r_b}}{A_t} * \pi * D_{i_r}$	306.74 kN



2.9.4 Uplift Check - Critical Combination

Sl.No	Downward Force (kN) Vertical Load + ∑(Frictional Resis.)	Upward Force (kN)	FOS	Status
CLC1	615.4	0.0	100.00	OK
CLC2	615.4	0.0	100.00	OK
CLC3	1136.3	0.0	100.00	OK

2.9.5 Check for Sliding

Sl.No	Resisting Force (kN) Vertical Load * μ	Sliding Force (kN) (Hor. Shear Force)	FOS	Status
SLS1	839.1	0.0	100.00	OK
SLS2	931.7	0.0	100.00	OK
SLS3	416.2	61.9	6.73	OK
SLS4	416.2	61.9	6.73	OK
SLS5	839.1	61.9	13.56	OK
SLS6	839.1	61.9	13.56	OK
SLS7	416.2	61.9	6.73	OK
SLS8	839.1	61.9	13.56	OK

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SLS9	863.3	0.0	100.00	OK
SLS10	839.1	0.0	100.00	OK
SLS11	425.9	0.0	100.00	OK
SLS12	416.2	0.0	100.00	OK
SLS13	848.8	0.0	100.00	OK
SLS14	839.1	0.0	100.00	OK
SLS15	816.9	112.0	7.30	OK
SLS16	816.9	112.0	7.30	OK

Note : *Vertical loads are Reduced by 0.4 * vertical seismic coefficient A_v for applicable load combinations.*

2.9.6 Check for Overturning

Distance from Center to Edge of Ring Footing B_T 3.75 m

Sl.No	Resisting Moment (kN.m) (Vertical Load * B_T)	Overturning Moment (kN.m) (Hor. Moments)	FOS	Status
SLS1	3670.6	0.0	100.00	OK
SLS2	3969.2	0.0	100.00	OK
SLS3	2306.7	413.6	5.58	OK
SLS4	2306.7	413.6	5.58	OK
SLS5	3670.6	413.6	8.87	OK
SLS6	3670.6	413.6	8.87	OK
SLS7	2306.7	413.6	5.58	OK
SLS8	3670.6	413.6	8.87	OK
SLS9	3929.2	0.0	100.00	OK
SLS10	3670.6	0.0	100.00	OK
SLS11	2410.1	0.0	100.00	OK
SLS12	2306.7	0.0	100.00	OK
SLS13	3774.0	0.0	100.00	OK
SLS14	3670.6	0.0	100.00	OK
SLS15	3591.6	642.1	5.59	OK
SLS16	3591.6	642.1	5.59	OK

Note : *Vertical loads are Reduced by 0.4 * vertical seismic coefficient A_v for applicable load combinations.*

2.9.7 Check for Bearing Pressure

Sl.No	Base Pressure Under Tank (kN/m²)	Base Pressure Under Tank at Fdn. Level (kN/m²)	Max. Base Pressure Under Footing (kN/m²)	Min. Base Pressure Under Footing (kN/m²)	Contact %	Allowable Base Pressure (kN/m²)	Status
SLS1	42.03	64.23	41.26	NA	100.00	216.65	OK
SLS2	51.09	73.29	44.62	NA	100.00	256.65	OK
SLS3	0.63	22.83	38.65	13.21	100.00	282.65	OK
SLS4	0.63	22.83	38.65	13.21	100.00	282.65	OK
SLS5	42.03	64.23	53.98	28.54	100.00	282.65	OK
SLS6	42.03	64.23	53.98	28.54	100.00	282.65	OK
SLS7	0.63	22.83	38.65	13.21	100.00	282.65	OK
SLS8	42.03	64.23	53.98	28.54	100.00	282.65	OK

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SLS9	42.03	64.23	44.17	NA	100.00	216.65	OK
SLS10	42.03	64.23	41.26	NA	100.00	216.65	OK
SLS11	0.63	22.83	27.09	NA	100.00	216.65	OK
SLS12	0.63	22.83	25.93	NA	100.00	216.65	OK
SLS13	42.03	64.23	42.42	NA	100.00	216.65	OK
SLS14	42.03	64.23	41.26	NA	100.00	216.65	OK
SLS15	69.21	91.41	61.89	20.63	100.00	282.65	OK
SLS16	69.21	91.41	61.89	20.63	100.00	282.65	OK

Note 1 : *NA is displayed for Uniform Pressure distribution where Maximum and Minimum Bearing Pressure are same.*

Note : *Vertical loads are Increased / Reduced by 0.4 * vertical seismic coefficient A_v for applicable load combinations based on critical case.*

2.10 Anchor Bolt Calculation

Ref: ACI 318 - 19

Effective Threaded area of Anchor $A_{se} = \frac{\pi}{4} * \left(d - \frac{0.9743 * 25.4}{8} \right)^2$ **568.6** mm² *ASME B1.1*

2.10.1 Steel Resistance of Anchor

cl 17.6.1

Steel Tension Factor Φ_{s_t} **0.75**

Bolt Ultimate Strength $f_{u_{t_a}} = min\left(860, 1.9 * Y_b, U_b\right)$ **517.13** N/mm²

Tension Capacity of Bolts $\Phi_{N_{s_a}} = \Phi_{s_t} * A_{s_e} * S_{a_b}$ *eq 17.6.1.2*

Steel Shear Factor Φ_{s_v} **0.65**

Shear Capacity of Bolts $\Phi_{V_{s_a}} = \Phi_{s_v} * A_{s_e} * f_{u_{t_a}}$ **114.67** kN *eq 17.7.1.2*

Anchorage Tension Capacity $T_c = min\left(\Phi_{N_{s_a}}, C_t\right)$

Anchorage Shear Capacity $S_c = min\left(\Phi_{V_{s_a}}, C_s\right)$

Anchorage Interaction $I_{t_{s_a}} = \frac{T_{a_b}}{T_c} + \frac{V_{a_b}}{S_c}$

Sl.No	Tension per Bolt (T_{ab}) (kN)	Allowable Yield Stress (S_{ab}) (N/mm²)	Φ_{Nsa} (kN)	T_c (kN)	Shear per Bolt (V_{ab}) (kN)	S_c (kN)	I_{tsa}	Status
ULS1	No Tension	215.47	91.9	91.9	0.0	114.7	0	Pass
ULS2	No Tension	287.29	122.5	122.5	0.0	114.7	0	Pass
ULS3	29.2	413.70	176.4	176.4	0.0	114.7	0.166	Pass
ULS4	27.4	413.70	176.4	176.4	0.0	114.7	0.155	Pass
ULS5	29.2	413.70	176.4	176.4	0.0	114.7	0.166	Pass
ULS6	27.4	413.70	176.4	176.4	0.0	114.7	0.155	Pass
ULS7	29.2	287.29	122.5	122.5	0.0	114.7	0.238	Pass
ULS8	27.4	287.29	122.5	122.5	0.0	114.7	0.224	Pass
ULS9	29.2	287.29	122.5	122.5	0.0	114.7	0.238	Pass
ULS10	27.4	287.29	122.5	122.5	0.0	114.7	0.224	Pass
ULS11	29.2	413.70	176.4	176.4	0.0	114.7	0.166	Pass
ULS12	27.4	413.70	176.4	176.4	0.0	114.7	0.155	Pass

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ULS13	29.2	287.29	122.5	122.5	0.0	114.7	0.238	Pass
ULS14	27.4	287.29	122.5	122.5	0.0	114.7	0.224	Pass
ULS15	11.9	287.29	122.5	122.5	0.0	114.7	0.097	Pass
ULS16	No Tension	287.29	122.5	122.5	0.0	114.7	0	Pass
ULS17	10.1	287.29	122.5	122.5	0.0	114.7	0.083	Pass
ULS18	29.2	413.70	176.4	176.4	0.0	114.7	0.166	Pass
ULS19	23.3	413.70	176.4	176.4	0.0	114.7	0.132	Pass
ULS20	27.4	413.70	176.4	176.4	0.0	114.7	0.155	Pass
ULS21	40.2	413.70	176.4	176.4	0.0	114.7	0.228	Pass
ULS22	38.5	413.70	176.4	176.4	0.0	114.7	0.218	Pass
ULS23	40.2	413.70	176.4	176.4	0.0	114.7	0.228	Pass
ULS24	38.5	413.70	176.4	176.4	0.0	114.7	0.218	Pass

Note 1 : *Anchor bolt Capacity based on Ultimate Strength. Shear is resisted by tankbase friction*

Note 2 : *Vertical loads are Reduced by 0.4 * vertical seismic coefficient A_v for applicable load combinations.*

2.10.2 Anchor Bolt Check - Critical Combination

Sl.No	Tension per Bolt (T_{ab}) (kN)	Allowable Yield Stress (S_{ab}) (N/mm²)	Φ_{Nsa} (kN)	T_c (kN)	Shear per Bolt (V_{ab}) (kN)	S_c (kN)	I_{tsa}	Status
CLC1	15.6	413.70	176.4	176.4	0.0	114.7	0.089	Pass
CLC2	No Tension	215.47	91.9	91.9	0.0	114.7	0	Pass
CLC3	No Tension	517.13	220.5	190.0	0.0	114.7	0	Pass
Note 1: *Anchor bolt Capacity based on Ultimate Strength.*								

2.11 Ring Beam Design

2.11.1 Design of Circumferential Reinforcement for Ring Beam

Active Earth Pressure Coefficient	$k = \frac{1-Sin(\Phi)}{1+Sin(\Phi)}$	**0.33**
Radial Force due to Soil Pressure	$F_{so_{il}} = 0.5 * k * \gamma_{s_{oil}} * H_{r_b}^2$	**4.44 kN/m**
Radial Force due to Operating Surcharge	$F_{op_{er}} = k * \frac{D_o - D_e}{A_t} * H_{r_b}$	**16.56 kN/m**
Radial Force due to Test Surcharge	$F_{te_{st}} = k * \frac{D_t - D_e}{A_t} * H_{r_b}$	**20.18 kN/m**
Radial Force due to Base Plate	$F_{pl_{ate}} = k * T_{b_p} * \gamma_{st_{eel}} * H_{r_b}$	**0.3 kN/m**
Radial Force due to Floating Roof	$F_{roof} = k * \frac{D_{r_s} - W_{fr}}{A_{sr}} * H_{r_b}$	**0 kN/m**
Radial Force due to Sloshing Pressure	$F_{slosh} = k * \frac{M_s}{\frac{\pi}{32} * D_i^3} * H_{r_b}$	**27.2 kN/m**

2.11.2 Check for Torsion

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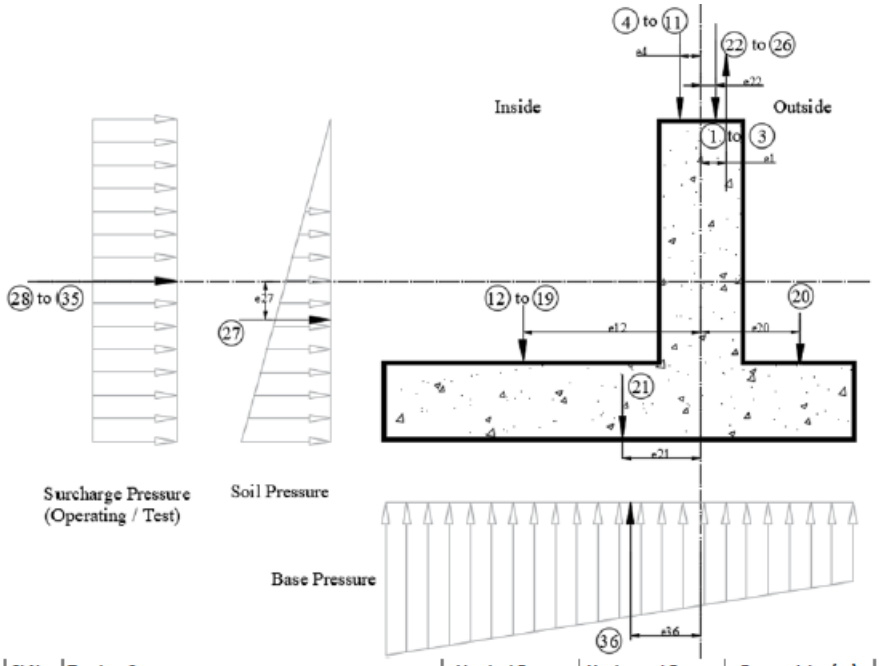

Sl No.	Torsion Components	Vertical Forces (kN/m)	Horizontal Forces (kN/m)	Eccentricity (m)
1	Shell Edge Load	3.0		0.1
2	Live Load	3.6		0.1
3	Snow Load	0.0		0.1
4	Base Plate Load on Ring Beam	0.0		0.2
5	Floating Roof Weight on Ring Beam	0.0		0.2
6	Operating Liquid Load on Ring Beam	4.1		0.2
7	Test Liquid Load on Ring Beam	5.0		0.2
8	Design Pressure on Ring Beam	0.0		0.2
9	Operating Pressure on Ring Beam	0.0		0.2
10	Test Pressure on Ring Beam	0.0		0.2
11	External Pressure on Ring Beam	0.0		0.2
12	Floating Roof Weight on Footing	0.0		0.4
13	Base Plate Load on Footing	0.1		0.4
14	Operating Liquid Load on Footing	16.6		0.4
15	Test Liquid Load on Footing	20.2		0.4
16	Soil Load on Inside Footing	6.7		0.4
17	Design Pressure on Footing	0.0		0.4
18	Operating Pressure on Footing	0.0		0.4
19	Test Pressure on Footing	0.0		0.4
20	Soil Load on Outside Footing	4.4		-0.4
21	Self-Weight of Foundation	17.3		0.0
22	Uplift Force - Wind Load	-11.0		0.0

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Tank No.
Foundation Design Calculation

23	Uplift Force - Seismic Load	-16.4		0.0
24	Uplift Force - Design Internal Pressure	0.0		0.0
25	Uplift Force - Operating Internal Pressure	0.0		0.0
26	Uplift Force - Test Internal Pressure	0.0		0.0
27	Force due to Soil Pressure		4.4	0.2
28	Force due to Surcharge Pressure - Operating Liquid		16.6	0.0
29	Force due to Surcharge Pressure - Test Liquid		20.2	0.0
30	Force due to Design Internal Pressure		0.0	0.0
31	Force due to Operating Internal Pressure		0.0	0.0
32	Force due to Test Internal Pressure		0.0	0.0
33	Force due to External Pressure		0.0	0.0
34	Force due to Base Plate Pressure		0.3	0.0
35	Force due to Floating Roof Pressure		0.0	0.0
36	Force due to Bearing Pressure	* Refer Bearing Pressure Force Table		

Note 1 : *The Vertical Rectangular Section of Ring Foundation alone is considered for the Torsion and Hoop Tension Resistance*

Note 2 : *Vertical loads are Increased / Reduced by 0.4 * vertical seismic coefficient A_v for applicable load combinations based on critical case.*

2.11.3 Bearing Pressure Force Calculation

Sl No.	Force due to Bearing Pressure (kN/m) (Area of Pressure Component)	CG of Pressure Force (m)	Eccentricity of Pressure Force (m) (W_w / 2 + W_f - CG)
ULS1	69.3	0.6	0.0
ULS2	75.0	0.6	0.0
ULS3	7.5	0.5	0.1
ULS4	16.8	0.6	0.0
ULS5	7.5	0.5	0.1
ULS6	16.8	0.6	0.0
ULS7	24.1	0.6	0.0
ULS8	38.9	0.6	0.0
ULS9	24.1	0.6	0.0
ULS10	38.9	0.6	0.0
ULS11	7.5	0.5	0.1
ULS12	16.8	0.6	0.0
ULS13	24.1	0.6	0.0
ULS14	38.9	0.6	0.0
ULS15	34.3	0.6	0.0
ULS16	54.7	0.6	0.0
ULS17	49.2	0.6	0.0
ULS18	7.5	0.5	0.1
ULS19	18.9	0.6	0.0
ULS20	16.8	0.6	0.0
ULS21	17.7	0.5	0.1
ULS22	32.8	0.6	0.0
ULS23	17.7	0.5	0.1
ULS24	32.8	0.6	0.0

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Hoop Tension	$T_h = \sum \left(RadialForces \right) * \frac{D_i}{2}$
Ring Beam Tension Capacity	T_{r_f}
Twisting Moment	$M_t = \sum \left(TorsionalMomentComponents * Eccentricity \right)$
Equivalent Bending Moment	$M_e = M_t * \left(\frac{D_i}{2} - W_{w_f} + \frac{W_w}{2} \right)$
Ring Beam Moment Capacity	M_{r_e}

Sl No.	Ring Beam / Footing				
	Forces and Moments for Circumferential Reinforcement Design				
	T_h (kN)	T_{rf} (kN)	M_t (kN.m/m)	M_e (kN.m)	M_{re} (kN.m)
ULS1	90.7	598.5	13.1	41.3	288.3
ULS2	106.2	598.5	15.3	48.3	279.9
ULS3	12.9	598.5	1.0	3.1	330.6
ULS4	17.2	598.5	1.6	5.1	328.3
ULS5	12.9	598.5	1.0	3.1	330.6
ULS6	17.2	598.5	1.6	5.1	328.3
ULS7	58.3	598.5	7.5	23.6	306.0
ULS8	77.7	598.5	10.3	32.5	295.4
ULS9	58.3	598.5	7.5	23.6	306.0
ULS10	77.7	598.5	10.3	32.5	295.4
ULS11	12.9	598.5	1.0	3.1	330.6
ULS12	17.2	598.5	1.6	5.1	328.3
ULS13	58.3	598.5	7.5	23.6	306.0
ULS14	77.7	598.5	10.3	32.5	295.4
ULS15	58.3	598.5	8.0	25.1	306.0
ULS16	77.7	598.5	11.4	35.8	295.4
ULS17	77.7	598.5	10.8	33.9	295.4
ULS18	12.9	598.5	1.0	3.1	330.6
ULS19	17.2	598.5	1.8	5.8	328.3
ULS20	17.2	598.5	1.6	5.1	328.3
ULS21	104.7	598.5	7.2	22.7	280.7
ULS22	124.1	598.5	10.0	31.5	270.1
ULS23	104.7	598.5	7.2	22.7	280.7
ULS24	124.1	598.5	10.0	31.5	270.1

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2.11.5 Unbalanced Moment on Ring Beam

Sl No.	Unbalanced Moment for Vertical Reinforcement Design	
	Unbalanced Moment (kN.m/m)	Moment Capacity (kN.m/m)
ULS1	10.7	194.0
ULS2	12.7	194.0
ULS3	0.1	194.0
ULS4	0.4	194.0
ULS5	0.1	194.0
ULS6	0.4	194.0

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ULS7	6.1	194.0
ULS8	8.4	194.0
ULS9	6.1	194.0
ULS10	8.4	194.0
ULS11	0.1	194.0
ULS12	0.4	194.0
ULS13	6.1	194.0
ULS14	8.4	194.0
ULS15	6.5	194.0
ULS16	8.7	194.0
ULS17	8.7	194.0
ULS18	0.1	194.0
ULS19	0.4	194.0
ULS20	0.4	194.0
ULS21	11.9	194.0
ULS22	14.2	194.0
ULS23	11.9	194.0
ULS24	14.2	194.0

2.12 Footing Design

2.12.1 Forces / Moments acting on Footing Top

Cl. 22.5.5.1

Sl No.	Forces / Moments for Top Rebar				
	Moment (kN.m/m)	Moment Capacity (kN.m/m)	Shear Force (kN/m)	Design Stress (N/mm^2)	Strength (N/mm^2)
ULS1	2.8	77.9	5.4	0.022	0.664
ULS2	3.4	77.9	6.6	0.027	0.664
ULS3	1.1	77.9	2.0	0.008	0.664
ULS4	1.0	77.9	2.0	0.008	0.664
ULS5	1.1	77.9	2.0	0.008	0.664
ULS6	1.0	77.9	2.0	0.008	0.664
ULS7	2.9	77.9	5.7	0.023	0.664
ULS8	3.5	77.9	6.8	0.028	0.664
ULS9	2.9	77.9	5.7	0.023	0.664
ULS10	3.5	77.9	6.8	0.028	0.664
ULS11	1.1	77.9	2.0	0.008	0.664
ULS12	1.0	77.9	2.0	0.008	0.664
ULS13	2.9	77.9	5.7	0.023	0.664
ULS14	3.5	77.9	6.8	0.028	0.664
ULS15	2.4	77.9	4.6	0.019	0.664
ULS16	2.6	77.9	5.0	0.020	0.664
ULS17	2.9	77.9	5.7	0.023	0.664
ULS18	1.1	77.9	2.0	0.008	0.664
ULS19	0.9	77.9	1.7	0.007	0.664
ULS20	1.0	77.9	2.0	0.008	0.664
ULS21	6.5	77.9	12.5	0.051	0.664
ULS22	7.1	77.9	13.7	0.056	0.664

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ULS23	6.5	77.9	12.5	0.051	0.664
ULS24	7.1	77.9	13.7	0.056	0.664

2.12.2 Forces / Moments acting on Footing Bottom *Cl. 22.5.5.1*

Sl No.	Forces / Moments for Bottom Rebar				
	Moment (kN.m/m)	Moment Capacity (kN.m/m)	Shear Force (kN/m)	Design Stress (N/mm²)	Strength (N/mm²)
ULS1	2.6	77.9	5.0	0.021	0.664
ULS2	2.9	77.9	5.7	0.024	0.664
ULS3	2.1	77.9	4.2	0.017	0.664
ULS4	2.3	77.9	4.5	0.019	0.664
ULS5	2.1	77.9	4.2	0.017	0.664
ULS6	2.3	77.9	4.5	0.019	0.664
ULS7	3.2	77.9	6.3	0.026	0.664
ULS8	3.8	77.9	7.4	0.030	0.664
ULS9	3.2	77.9	6.3	0.026	0.664
ULS10	3.8	77.9	7.4	0.030	0.664
ULS11	2.1	77.9	4.2	0.017	0.664
ULS12	2.3	77.9	4.5	0.019	0.664
ULS13	3.2	77.9	6.3	0.026	0.664
ULS14	3.8	77.9	7.4	0.030	0.664
ULS15	2.4	77.9	4.8	0.020	0.664
ULS16	3.4	77.9	6.6	0.027	0.664
ULS17	3.0	77.9	5.9	0.024	0.664
ULS18	2.1	77.9	4.2	0.017	0.664
ULS19	2.4	77.9	4.8	0.020	0.664
ULS20	2.3	77.9	4.5	0.019	0.664
ULS21	3.8	77.9	7.6	0.031	0.664
ULS22	4.4	77.9	8.7	0.036	0.664
ULS23	3.8	77.9	7.6	0.031	0.664
ULS24	4.4	77.9	8.7	0.036	0.664

4□ Summary

3.1 Stability Checks

Condition	Combination	Actual	Allowable	Status
FOS Uplift	SLS 1	100.00	1.20	Pass
FOS Uplift - CLC	CLC 1	100.00	1.00	Pass
FOS Sliding	SLS 3	6.73	1.50	Pass
FOS Overturning	SLS 3	5.58	1.50	Pass
Bearing Pressure under Fdn. (kN/m²)	SLS 15	61.89	282.65	Pass
Bearing Pressure under Tank (kN/m²)	SLS 15	91.41	282.65	Pass

3.2 Anchor Bolt

3.2.1 Bolt Anchorage Check

Description	Combination	Actual	Capacity	Status
Tension (kN)	**ULS 7**	**29.2**	**122.5**	**Pass**
Tension - CLC (kN)	**CLC 1**	**15.6**	**91.9**	**Pass**
Note : *Shear is resisted by tankbase friction*				

3.3 Ring Beam Design

3.3.1 Ring Beam Minimum Reinforcement

Position	Actual	Allowable	Status
Vertical Reinforcement Percentage (%)	**0.38**	**0.12**	**Pass**
Vertical Reinforcement Spacing (mm)	**150.0**	**192.0**	**Pass**
Longitudinal Reinforcement Percentage (%)	**0.33**	**0.20**	**Pass**
Side Bar Spacing (mm)	**210.4**	**226.2**	**Pass**
Main Bar Spacing (mm)	**138.0**	**280.0**	**Pass**

Note: 1. The minimum reinforcement required is computed as per Table 11.6.1.

2. The maximum allowed spacing for Side rebar is computed as per Cl. 9.9.3 (b).

3. The maximum allowed spacing for Side and Main rebar is computed as per Cl. 24.3.2.

3.3.2 Ring Beam Capacity

Condition	Combination	Required	Capacity	Status
Hoop Tension (kN)	**ULS 22**	**124.1**	**598.5**	**Pass**
Equivalent Bending Moment (kN.m)	**ULS 2**	**48.3**	**279.9**	**Pass**
Unbalanced Moment (kN.m/m)	**ULS 22**	**14.2**	**194.0**	**Pass**

Note: Hoop tension and equivalent bending due to torsion are resisted by the Hoop Reinforcement. The unbalanced moment transferred from footing is resisted by vertical reinforcement of ring beam.

3.4 Footing Design

3.4.1 Footing Minimum Reinforcement

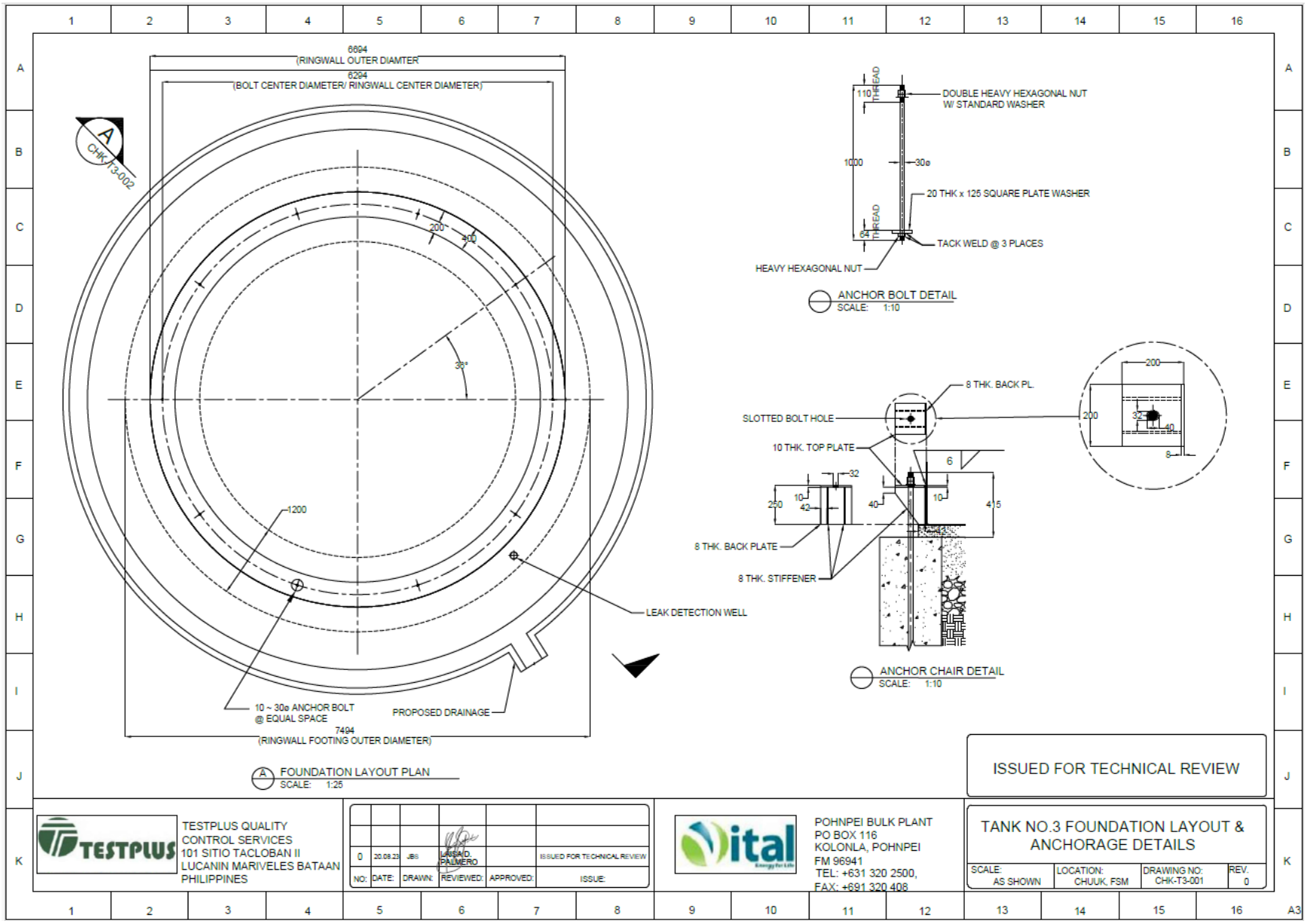
Position	Provided	Min.Percentange	Max Spacing	Status
Top - Main	**12Φ at 150.0 c/c 0.25%**	**0.18%**	**280.0**	**Pass**
Bottom - Main	**12Φ at 150.0 c/c 0.25%**	**0.18%**	**256.0**	**Pass**
Top - Secondary	**12Φ at 150.0 c/c 0.25%**	**0.18%**	**280.0**	**Pass**
Bottom - Secondary	**12Φ at 150.0 c/c 0.25%**	**0.18%**	**280.0**	**Pass**

Note: 1. The minimum reinforcement required is computed as per Cl. 9.6.1.2.

2. The maximum allowed spacing for rebar is computed as per Cl. 24.3.2.

3.4.2 Footing Capacity

Position	Combination	Required	Capacity	Status
Top Moment (kN.m/m)	**ULS 22**	**7.1**	**77.9**	**Pass**
Bottom Moment (kN.m/m)	**ULS 22**	**4.4**	**77.9**	**Pass**
Top - Shear Resistance (kN/m)	**ULS 22**	**13.7**	**161.9**	**Pass**
Bottom - Shear Resistance (kN/m)	**ULS 22**	**8.7**	**161.9**	**Pass**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(RINGWALL OUTER DIAMTER
6294
(BOLT CENTER DIAMETER/ RINGWALL CENTER DIAMETER)
A
CHK-T3-002
200
400
36°
1200
LEAK DETECTION WELL
10 ~ 30ø ANCHOR BOLT
@ EQUAL SPACE
PROPOSED DRAINAGE
7494
(RINGWALL FOOTING OUTER DIAMETER)
A FOUNDATION LAYOUT PLAN
SCALE: 1:25
THREAD
110
1000
30ø
64
DOUBLE HEAVY HEXAGONAL NUT
W/ STANDARD WASHER
20 THK x 125 SQUARE PLATE WASHER
TACK WELD @ 3 PLACES
HEAVY HEXAGONAL NUT
ANCHOR BOLT DETAIL
SCALE: 1:10
8 THK. BACK PL.
SLOTTED BOLT HOLE
10 THK. TOP PLATE
8 THK. BACK PLATE
8 THK. STIFFENER
200
32
40
8
6
10
42
250
415
ANCHOR CHAIR DETAIL
SCALE: 1:10
ISSUED FOR TECHNICAL REVIEW
TESTPLUS
TESTPLUS QUALITY
CONTROL SERVICES
101 SITIO TACLOBAN II
LUCANIN MARIVELES BATAAN
PHILIPPINES
0 20.08.23 JBS LANDAID. PALMERO ISSUED FOR TECHNICAL REVIEW
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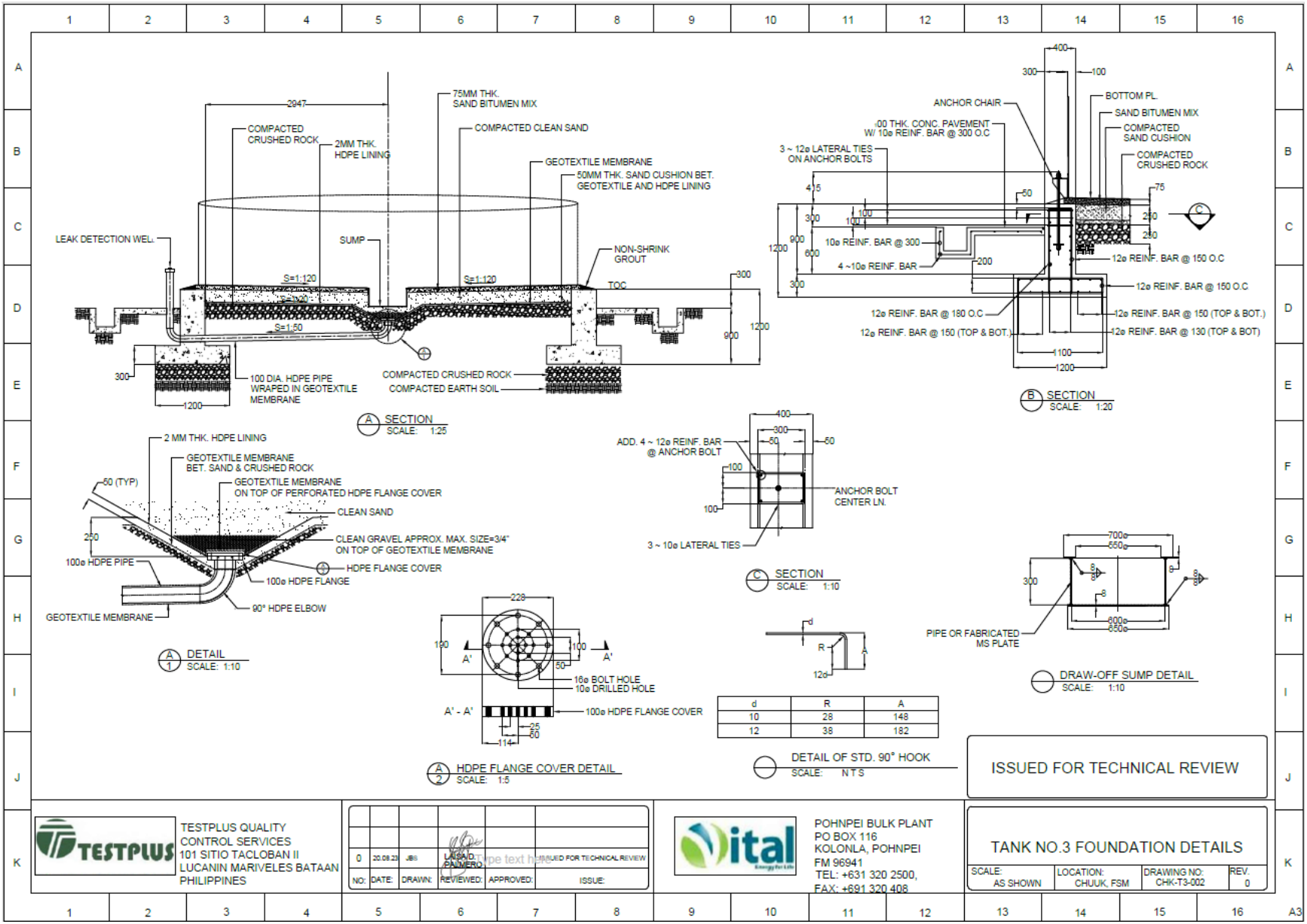
POHNPEI BULK PLANT
PO BOX 116
KOLONLA, POHNPEI
FM 96941
TEL: +631 320 2500,
FAX: +691 320 408
TANK NO.3 FOUNDATION LAYOUT &
ANCHORAGE DETAILS
SCALE: AS SHOWN
LOCATION: CHUUK, FSM
DRAWING NO: CHK-T3-001
REV. 0


2947
COMPACTED CRUSHED ROCK
2MM THK. HDPE LINING
75MM THK. SAND BITUMEN MIX
COMPACTED CLEAN SAND
GEOTEXTILE MEMBRANE
50MM THK. SAND CUSHION BET. GEOTEXTILE AND HDPE LINING
LEAK DETECTION WELL
SUMP
NON-SHRINK GROUT
TOC
S=1:120
S=1:120
S=1:50
300
1200
900
1200
100 DIA. HDPE PIPE WRAPED IN GEOTEXTILE MEMBRANE
COMPACTED CRUSHED ROCK
COMPACTED EARTH SOIL
A SECTION
SCALE: 1:25
ANCHOR CHAIR
BOTTOM PL.
SAND BITUMEN MIX
COMPACTED SAND CUSHION
COMPACTED CRUSHED ROCK
3 ~ 12ø LATERAL TIES ON ANCHOR BOLTS
10ø REINF. BAR @ 300
4 ~10ø REINF. BAR
12ø REINF. BAR @ 150 O.C
12ø REINF. BAR @ 180 O.C
12ø REINF. BAR @ 150 (TOP & BOT.)
12ø REINF. BAR @ 130 (TOP & BOT)
B SECTION
SCALE: 1:20
2 MM THK. HDPE LINING
GEOTEXTILE MEMBRANE BET. SAND & CRUSHED ROCK
50 (TYP)
GEOTEXTILE MEMBRANE ON TOP OF PERFORATED HDPE FLANGE COVER
CLEAN SAND
CLEAN GRAVEL APPROX. MAX. SIZE=3/4" ON TOP OF GEOTEXTILE MEMBRANE
100ø HDPE PIPE
HDPE FLANGE COVER
100ø HDPE FLANGE
90° HDPE ELBOW
GEOTEXTILE MEMBRANE
A DETAIL
SCALE: 1:10
ADD. 4 ~ 12ø REINF. BAR @ ANCHOR BOLT
ANCHOR BOLT CENTER LN.
3 ~ 10ø LATERAL TIES
C SECTION
SCALE: 1:10
228
190
100
50
A'
A' - A'
16ø BOLT HOLE
10ø DRILLED HOLE
100ø HDPE FLANGE COVER
25
50
114
A HDPE FLANGE COVER DETAIL
SCALE: 1:5
d
R
A
12ø
d R A
10 28 148
12 38 182
DETAIL OF STD. 90° HOOK
SCALE: NTS
700ø
550ø
600ø
650ø
PIPE OR FABRICATED MS PLATE
DRAW-OFF SUMP DETAIL
SCALE: 1:10
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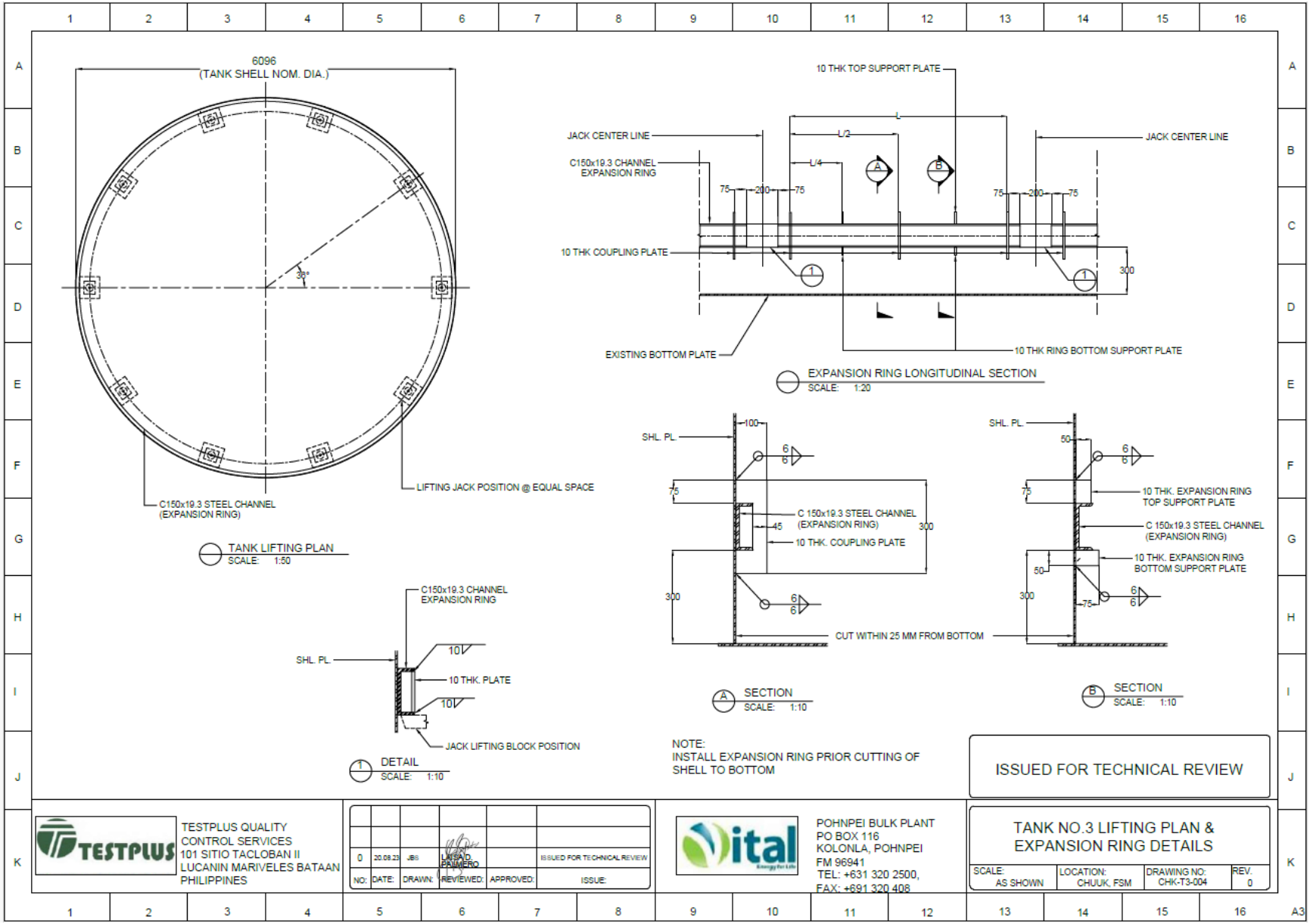
TANK NO.3 FOUNDATION DETAILS
SCALE: AS SHOWN
LOCATION: CHUUK, FSM
DRAWING NO: CHK-T3-002
REV. 0


6096
(TANK SHELL NOM. DIA.)
36°
C150x19.3 STEEL CHANNEL
(EXPANSION RING)
LIFTING JACK POSITION @ EQUAL SPACE
TANK LIFTING PLAN
SCALE: 1:50
10 THK TOP SUPPORT PLATE
JACK CENTER LINE
C150x19.3 CHANNEL
EXPANSION RING
10 THK COUPLING PLATE
EXISTING BOTTOM PLATE
10 THK RING BOTTOM SUPPORT PLATE
EXPANSION RING LONGITUDINAL SECTION
SCALE: 1:20
SHL. PL.
C 150x19.3 STEEL CHANNEL
(EXPANSION RING)
10 THK. COUPLING PLATE
CUT WITHIN 25 MM FROM BOTTOM
SECTION
SCALE: 1:10
10 THK. EXPANSION RING
TOP SUPPORT PLATE
10 THK. EXPANSION RING
BOTTOM SUPPORT PLATE
SECTION
SCALE: 1:10
10 THK. PLATE
JACK LIFTING BLOCK POSITION
DETAIL
SCALE: 1:10
NOTE:
INSTALL EXPANSION RING PRIOR CUTTING OF
SHELL TO BOTTOM
ISSUED FOR TECHNICAL REVIEW
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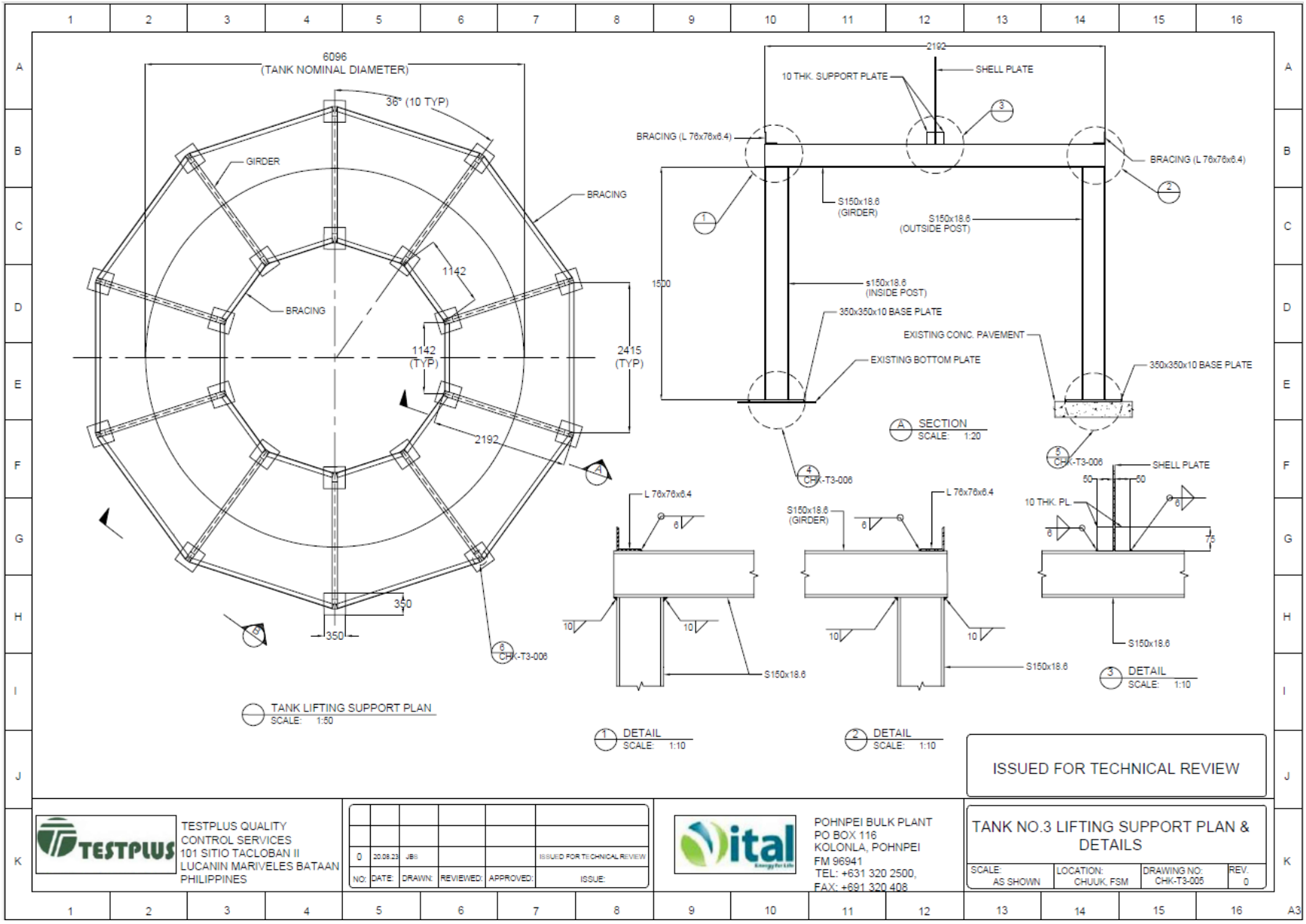
FM 96941
TEL: +631 320 2500,
FAX: +691 320 408
TANK NO.3 LIFTING PLAN &
EXPANSION RING DETAILS
SCALE: AS SHOWN
LOCATION: CHUUK, FSM
DRAWING NO: CHK-T3-004
REV. 0


6096
(TANK NOMINAL DIAMETER)
36° (10 TYP)
GIRDER
BRACING
BRACING
1142
1142
(TYP)
2415
(TYP)
2192
350
350
6
CHK-T3-006
TANK LIFTING SUPPORT PLAN
SCALE: 1:50
2192
10 THK. SUPPORT PLATE
SHELL PLATE
3
BRACING (L 76x76x6.4)
BRACING (L 76x76x6.4)
2
1
S150x18.6
(GIRDER)
S150x18.6
(OUTSIDE POST)
1500
s150x18.6
(INSIDE POST)
350x350x10 BASE PLATE
EXISTING CONC. PAVEMENT
EXISTING BOTTOM PLATE
350x350x10 BASE PLATE
A
SECTION
SCALE: 1:20
4
CHK-T3-006
5
CHK-T3-006
SHELL PLATE
50
50
10 THK. PL.
6
6
75
L 76x76x6.4
6
10
10
S150x18.6
1
DETAIL
SCALE: 1:10
S150x18.6
(GIRDER)
L 76x76x6.4
6
10
10
S150x18.6
2
DETAIL
SCALE: 1:10
S150x18.6
3
DETAIL
SCALE: 1:10
ISSUED FOR TECHNICAL REVIEW
TESTPLUS
TESTPLUS QUALITY
CONTROL SERVICES
101 SITIO TACLOBAN II
LUCANIN MARIVELES BATAAN
PHILIPPINES
0
20.08.23
JB/B
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POHNPEI BULK PLANT
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TEL: +631 320 2500,
FAX: +691 320 408
TANK NO.3 LIFTING SUPPORT PLAN & DETAILS
SCALE:
AS SHOWN
LOCATION:
CHUUK, FSM
DRAWING NO:
CHK-T3-005
REV.
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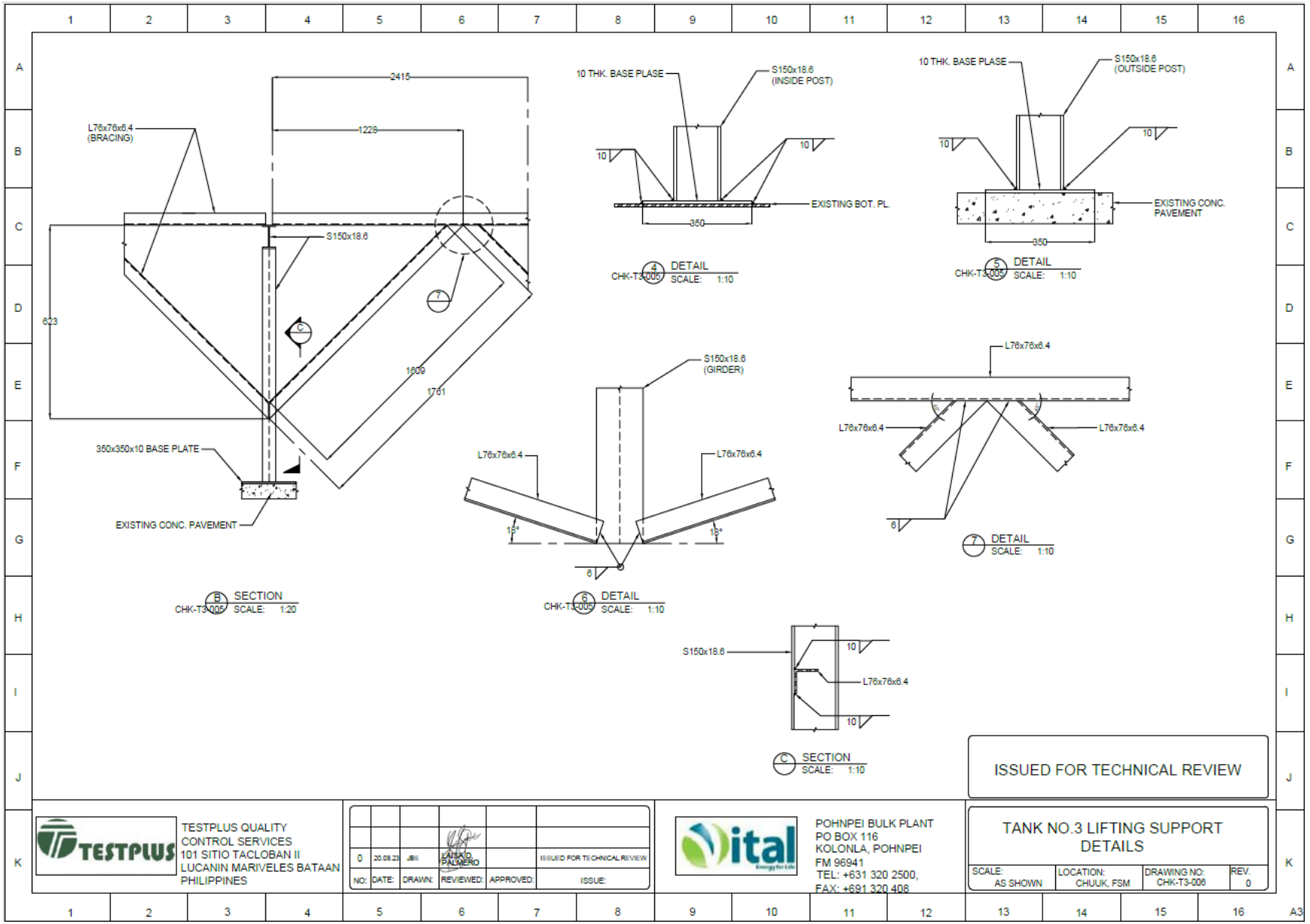
2415
1228
L76x76x6.4
(BRACING)
S150x18.6
623
1609
1761
350x350x10 BASE PLATE
EXISTING CONC. PAVEMENT
B SECTION
CHK-T3-005 SCALE: 1:20
10 THK. BASE PLASE
S150x18.6
(INSIDE POST)
EXISTING BOT. PL.
350
4 DETAIL
CHK-T3-005 SCALE: 1:10
10 THK. BASE PLASE
S150x18.6
(OUTSIDE POST)
EXISTING CONC.
PAVEMENT
350
5 DETAIL
CHK-T3-005 SCALE: 1:10
S150x18.6
(GIRDER)
L76x76x6.4
L76x76x6.4
15°
15°
6
6 DETAIL
CHK-T3-005 SCALE: 1:10
L76x76x6.4
L76x76x6.4
L76x76x6.4
6
7 DETAIL
SCALE: 1:10
S150x18.6
L76x76x6.4
C SECTION
SCALE: 1:10
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PHILIPPINES
0 20.08.23 JBS LAISA D. PALMERO ISSUED FOR TECHNICAL REVIEW
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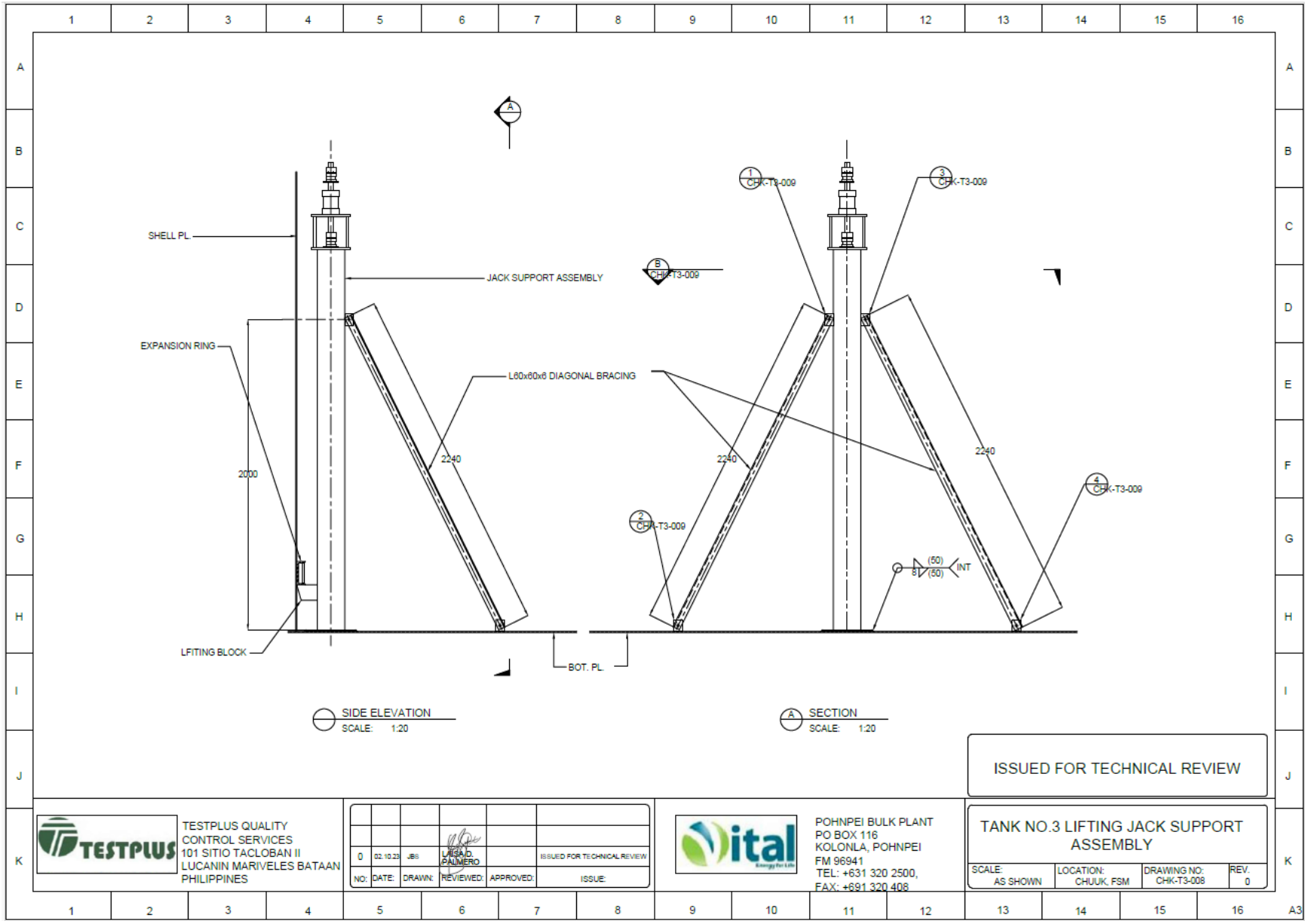
FM 96941
TEL: +631 320 2500,
FAX: +691 320 408
TANK NO.3 LIFTING SUPPORT
DETAILS
SCALE: AS SHOWN
LOCATION: CHUUK, FSM
DRAWING NO: CHK-T3-006
REV. 0



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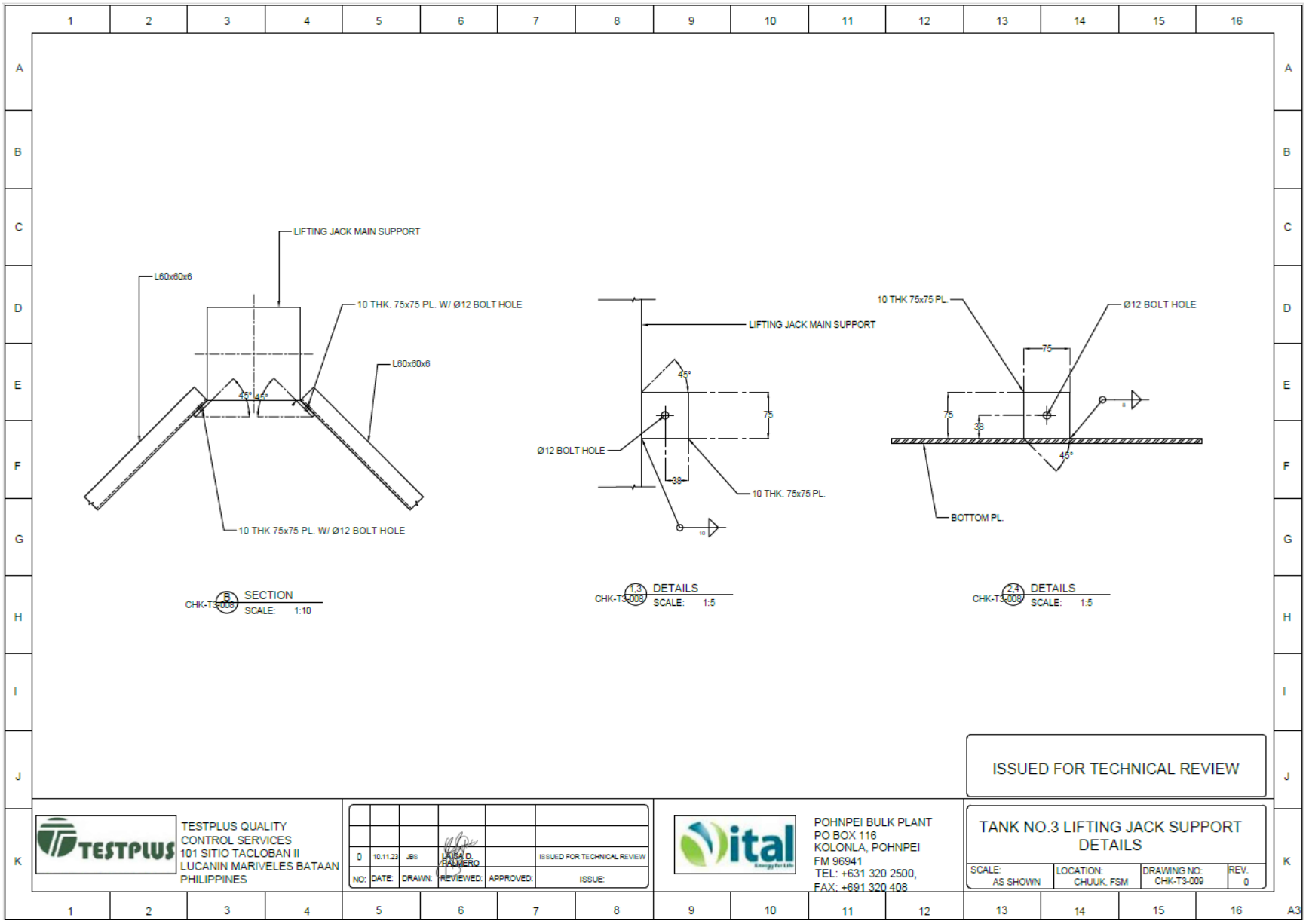
□□□ □□□anin, Mari□ele□, □ataan, □□ili□□ine□□Mo□ile no□□□□□□□□□□□□□□□□mail□te□t□l□□□□□□□ o□tloo□□om


LIFTING JACK MAIN SUPPORT
L60x60x6
10 THK. 75x75 PL. W/ Ø12 BOLT HOLE
L60x60x6
45°
45°
10 THK 75x75 PL. W/ Ø12 BOLT HOLE
B
SECTION
CHK-T3-008
SCALE: 1:10
LIFTING JACK MAIN SUPPORT
45°
75
Ø12 BOLT HOLE
38
10 THK. 75x75 PL.
1.3
DETAILS
CHK-T3-008
SCALE: 1:5
10 THK 75x75 PL.
Ø12 BOLT HOLE
75
75
38
45°
BOTTOM PL.
2.4
DETAILS
CHK-T3-008
SCALE: 1:5
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CONTROL SERVICES
101 SITIO TACLOBAN II
LUCANIN MARIVELES BATAAN
PHILIPPINES
NO: 0
DATE: 10.11.23
DRAWN: JBS
REVIEWED: LAISA D. PALMERO
APPROVED:
ISSUE: ISSUED FOR TECHNICAL REVIEW
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PO BOX 116
KOLONIA, POHNPEI
FM 96941
TEL: +631 320 2500,
FAX: +691 320 408
TANK NO.3 LIFTING JACK SUPPORT DETAILS
SCALE: AS SHOWN
LOCATION: CHUUK, FSM
DRAWING NO: CHK-T3-009
REV. 0

I. TANK AND FOUNDATION DESIGN CRITERIA

DESIGN STANDARD	:	API STD. 650
SYSTEM OF UNITS	:	SI
PRODUCT STORED	:	JET A1
PRODUCT SPECIFIC GRAVITY	:	0.70
TANK DESIGN SPECIFIC GRAVITY	:	1.00
TEST SPECIFIC GRAVITY	:	1.00
NOMINAL DIAMETER	:	6.096 m
NOMINAL HEIGHT	:	10.973 m
MAX. FILL HEIGHT	:	9.893 m
NOMINAL TANK CAPACITY	:	320 m^3
MAX. PUMPING RATE:		
IN	:	-
OUT	:	-
DESIGN METAL TEMPERATURE	:	10 °C
MAX. DESIGN TEMPERATURE	:	90 °C
DESIGN PRESSURES :		
INTERNAL	:	7.5 mbar
EXTERNAL	:	7.5 mbar
OPERATING PRESSURES:		
INTERNAL	:	1.6 mbar
EXTERNAL	:	1.6 mbar
CORROSION ALLOWANCE:		
BOTTOM (NEW)	:	2.0 mm
SHELL (EXISTING)	:	-
ROOF (EXISTING)	:	-
STRUCTURAL (EXISTING)	:	-
LOADINGS:		
ROOF LOADS		
UNIFORM LIVE	:	1.0 KPA
SNOW LOAD	:	0.0 KPA
SEISMIC LOAD		
DESIGN CODE	:	API 650 12TH EDITION 2013 ANNEX E ASCE 7 - 2016
SEISMIC GROUP	:	III
SITE CLASS	:	D
TRANSITION PERIOD	:	4
SPECTRAL ACC. (S_s)	:	0.25
SPECTRAL ACC. (S_1)	:	0.10
WIND LOADS		
DESIGN	:	API 650 12TH EDITION 2013 ASCE 7-16
VELOCITY	:	50 m/sec
WIND FACTOR	:	1.0
EXPOSURE CATEGORY	:	D
TANK VENT	:	API 2000
FOUNDATION		
DESIGN	:	API 650 12TH EDITION 2013 ASCE-7 2016
SAFE BEARING PRESSURE	:	200 KPa
TYPE	:	EARTH W/ CONCRETE RINGWALL
LEAK DETECTION	:	LEAK DETECTION WELL
LEAK PREVENTION BARRIER	:	HDPE LINING

II. MATERIAL SPECIFICATION

TANK		
BOTTOM PLATES	:	8 mm THK. ASTM A36 FULLY KILLED
ROOF PLATES (EXISTING)	:	5 mm THK. C.S. W/ UNKNOWN SPECS.
SHELL PLATES (EXISTING)	:	6 mm THK. C.S. W/ UNKNOWN SPECS.
ANCHOR CHAIR	:	8 mm THK. ASTM A36 FULLY KILLED
REINFORCING PLATES	:	6 mm THK. ASTM A36 FULLY KILLED
SHELL MANHOLE		
NECK	:	10 mm THK. ASTM A36 FULLY KILLED
FLANGE	:	12 mm THK. ASTM A36 FULLY KILLED
COVER	:	16 mm THK. ASTM A36 FULLY KILLED
SHELL NOZZLE PIPE	:	SCH. 80 ASTM A106-B
ROOF NOZZLE PIPE	:	SCH.40 ASTM A106-B
INTERNAL PIPING	:	SCH. 40 ASTM A106-B
NOZZLE FLANGES	:	ASTM A105
MANHOLE GASKET	:	GRAPHITE SHEET - 3 mm THK
NOZZLE GASKET	:	SPW GRAPHITE SS316
FOUNDATION		
CEMENT	:	ASTM C150, TYPE 2 / ASTM C595, TYPE 1
AGGREGATES	:	ASTM C33
STRUCTURAL CONCRETE	:	28 MPa (4,000 PSI) MIN. COMPRESSIVE STRENGTH @ 28 DAYS
REINFORCING BAR	:	ASTM A615 GRADE 60
ANCHOR BOLTS	:	ASTM F1554 GRADE 55
NUTS	:	ASTM A563, GRADE DH
HARDENED STEEL WASHER	:	ASTM F436
TIE WIRE	:	#16 GALVANIZED

III. CONCRETE (SITE MIX)

CEMENT-SAND-GRAVEL RATIO	:	CLASS AA (1 : 1.5 : 3)
CEMENT	:	PORTLAND - 50 KG. PER BAG
MAX. COARSE AGGREGATE SIZE	:	1"
MAX. WATER-CEMENT RATIO	:	28 LITERS PER BAG
MAX. SLUMP	:	100 mm
WATER	:	FRESH
TEST SAMPLES	:	MINIMUM OF 3 SAMPLES EACH DAY'S POUR
TESTING	:	1 SAMPLE @ 7 DAYS AND 2 SAMPLES @ 28 DAYS

IV. CONCRETE COVER TO REBARS : 50 mm

V. CONCRETE CURING : CONTINUOUSLY WET FOR 7 DAYS

VI. BITUMEN MIXED SAND : 10% NON-TOXIC BITUMEN
90% CLEAN DRY SAND

VII. STRUCTURAL STEEL

SHAPES AND PLATES	:	ASTM A36
WELDING ELECTRODES	:	AWS A5.1 E70XX

VIII. HYDRAULIC JACK

RATED LIFTING CAPACITY (PER JACK)	:	120 KN

IX. CORROSION PROTECTION

SHELL PAINT/COATING		
INTERIOR - FULLY COATED @ 500 MICRON TOTAL DFT		
PRIMER	:	EPOXY PRIMER
INTERMEDIATE	:	EPOXY MID COAT
TOP COAT	:	HIGH BUILD EPOXY TOP COAT
EXTERIOR - FULLY COATED @ 300 MICRON TOTAL DFT		
PRIMER	:	INORGANIC ZINC RICH PRIMER
INTERMEDIATE	:	EPOXY MID COAT
TOP COAT	:	HIGH BUILD ALIPHATIC POLYURETHANE 100 MICRON DFT
BOTTOM PLATE & SUMP UNDERSIDE		
UNDERSIDE	:	COAL TAR EPOXY - FULL COAT @ 300 MICRON TDFT
TOP SIDE	:	FULLY COATED SAME AS SHELL INTERIOR
FIXED ROOF		
INTERIOR	:	FULLY COATED SAME AS SHELL INTERIOR
EXTERIOR	:	FULLY COATED SAME AS SHELL EXTERIOR

X. NON-DESTRUCTIVE TESTING

WELDING EXAMINATION	:	PER API STD 653 5TH EDITION 2014, ANNEX F
LEAK TEST / HYDROSTATIC TEST	:	PER API STD 650 12TH EDITION 2013

XI. NOTES

1. THE CONTRACTOR SHALL VERIFY THE DIMENSION AND CONDITION AT THE JOB SITE PRIOR TO WORK EXECUTION OR FABRICATION.
2. TEMPORARY BRACING SHALL BE PROVIDED DURING TANK LIFTING.
3. EXISTING FACILITIES DAMAGED DURING CONSTRUCTION / INSTALLATION SHALL BE RESTORED BACK TO ITS ORIGINAL CONDITION.
4. SHORING SHALL BE PROVIDED FOR ALL EXCAVATION WHEREVER IS NECESSARY TO AVOID COLLAPSING OF THE EXCAVATED SIDES.
5. STRUCTURAL FILL UNDER THE TANK AND FOUNDATION SHALL BE AS SPECIFIED IN THE DRAWINGS AND SHALL BE COMPACTED TO AT LEAST 95% OF MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE DETERMINED AS PER ASTM D1557.
6. GENERAL FILL OTHER THAN SPECIFIED STRUCTURAL FILL AND CONSIST OF SUITABLE MATERIAL THAT CAN BE COMPACTED TO AT LEAST 90% OF MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE DETERMINED AS PER ASTM D1557.
7. ALL FILLS SHALL BE COMPACTED IN LAYERS OF 200 mm PRIOR LAYING THE NEXT LAYER.

XI. NOTES (CONT.)

8. ALL EMBEDDED ITEMS, SHALL BE PUT IN PLACE PRIOR TO CONCRETE POURING.
9. TEMPLATES FOR ANCHOR BOLT SETTING SHALL BE INSTALLED AND SUPPORTED AGAINST DISPLACEMENT.
10. REINFORCEMENT SPACING SHOWN IN THE DRAWINGS ARE MAXIMUM. WHEN REINFORCEMENT SPACING IS NOT PROVIDED IN THE DRAWINGS, BARS SHALL BE EQUALLY SPACED.
11. MINIMUM LAP LENGTH OF REINFORCEMENT SHALL BE 51 x BAR DIAMETER.
12. BOLT HOLE SHALL BE 2 mm LARGER THAN BOLT DIAMETER, UNLESS SPECIFIED OTHERWISE.
13. ALL ANCHOR BOLTS SHALL BE UNIFORMLY TIGHTENED TO A SNUG TIGHT FIT.

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PHILIPPINES

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TEL: +631 320 2500,
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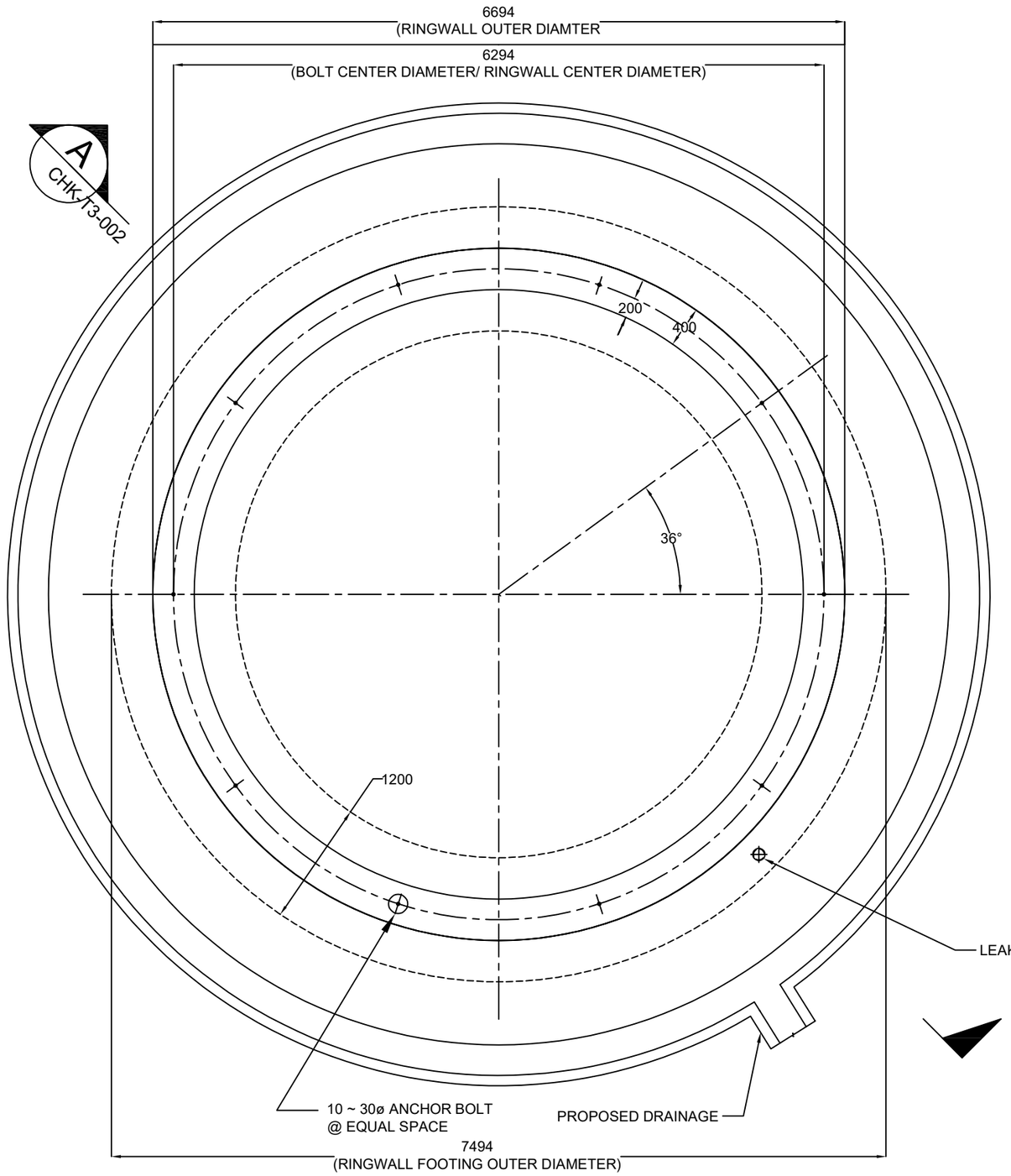
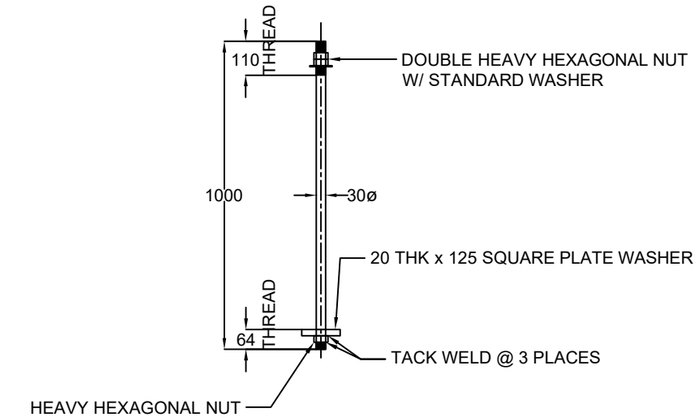
TANK NO.3
GENERAL SPECIFICATION

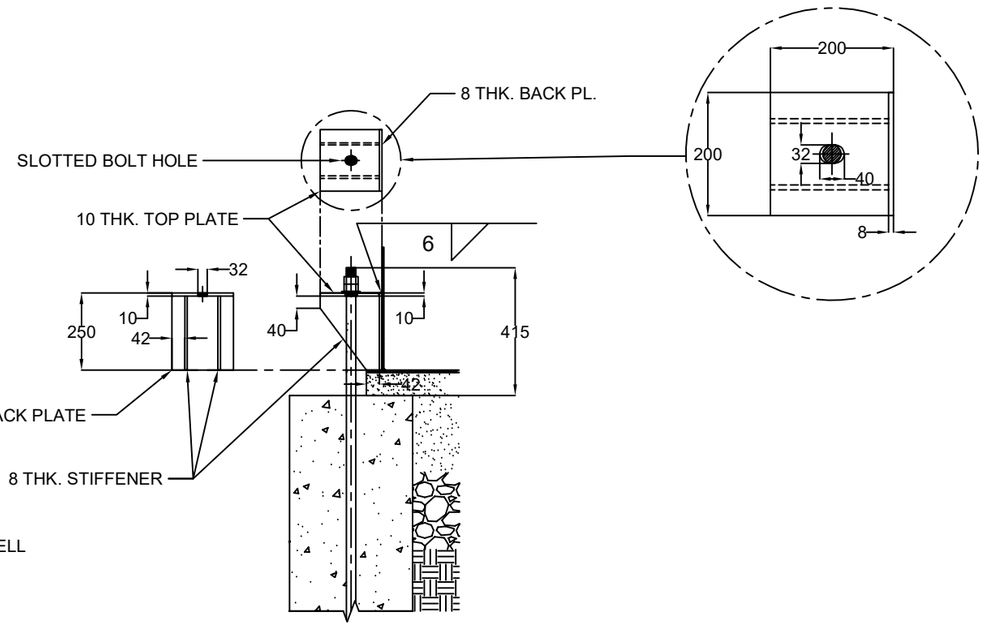
SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-000	0



A FOUNDATION LAYOUT PLAN
SCALE: 1:25



ANCHOR BOLT DETAIL
SCALE: 1:10



ANCHOR CHAIR DETAIL
SCALE: 1:10

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101 SITIO TACLOBAN II
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PHILIPPINES

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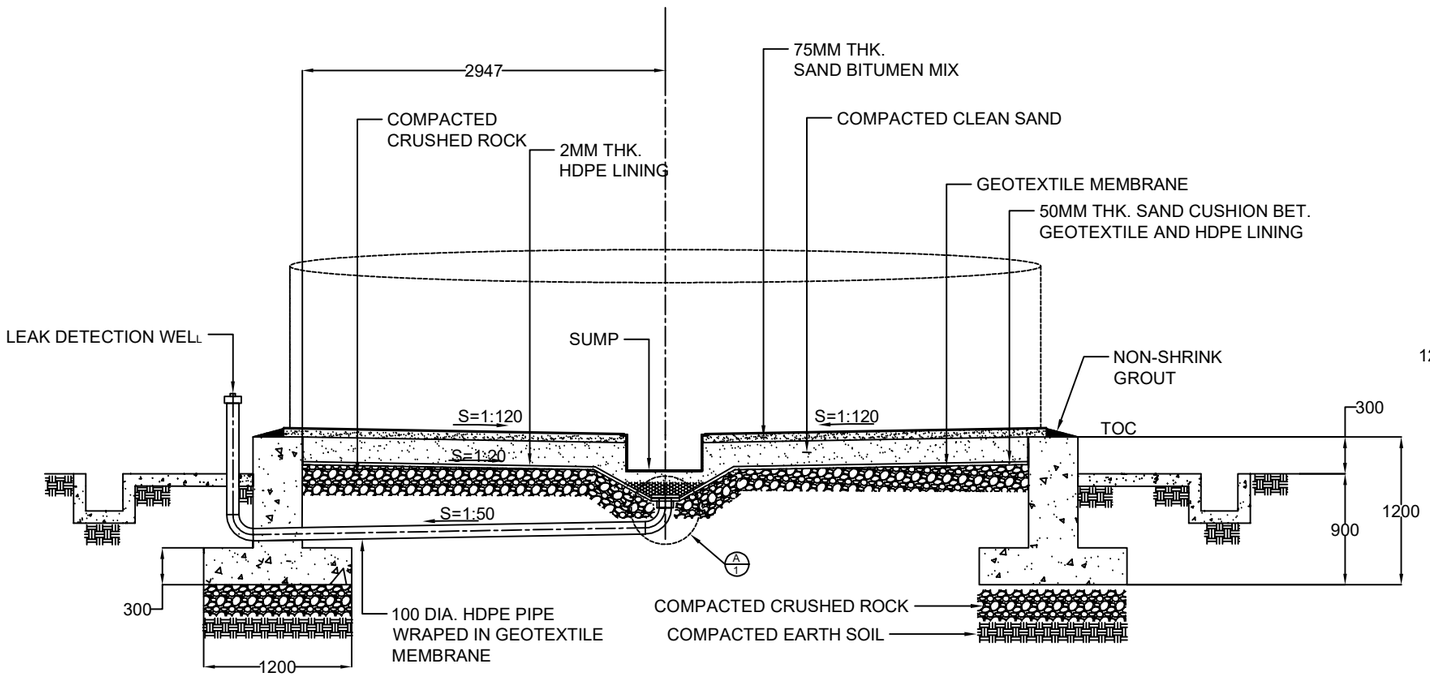
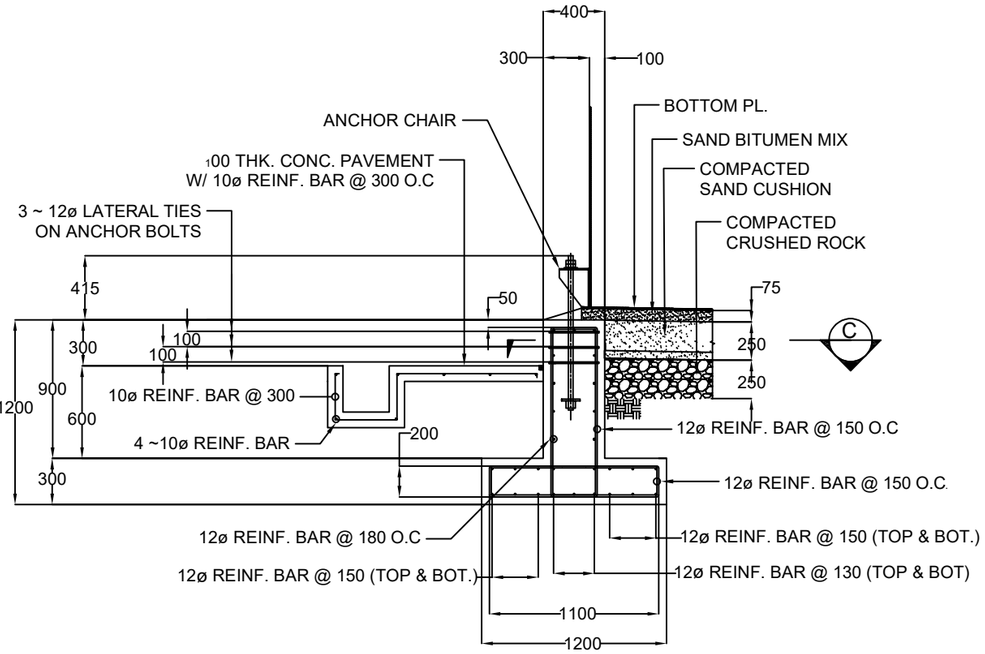
TANK NO.3 FOUNDATION LAYOUT & ANCHORAGE DETAILS

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-001	0



A SECTION
SCALE: 1:25



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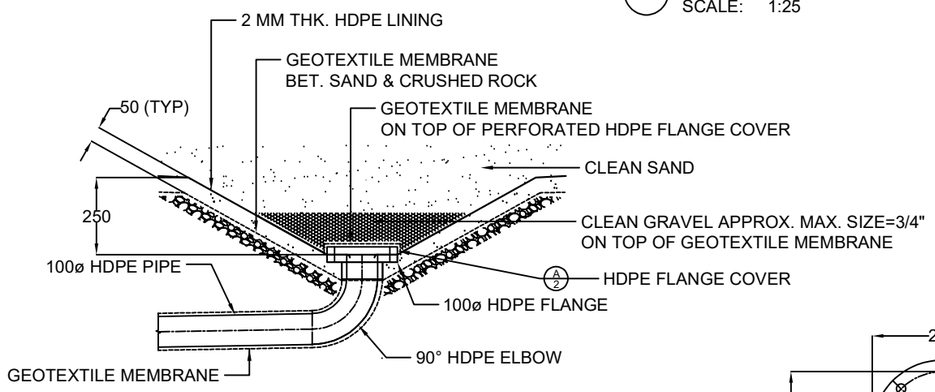
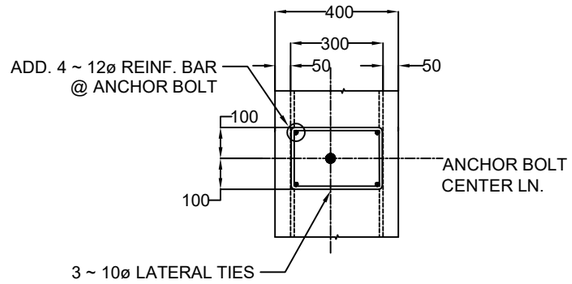
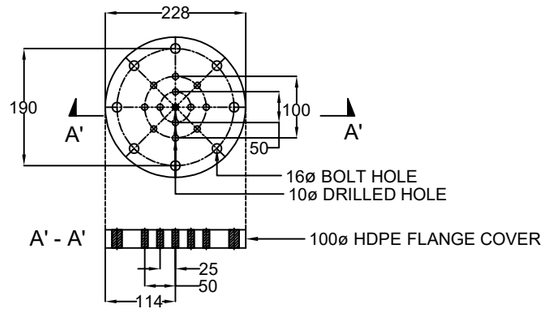


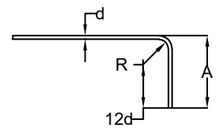
A1 DETAIL
SCALE: 1:10



C SECTION
SCALE: 1:10

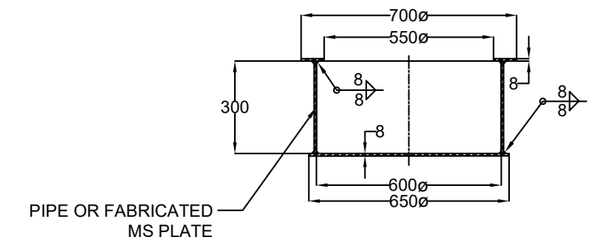


A2 HDPE FLANGE COVER DETAIL
SCALE: 1:5



d	R	A
10	28	148
12	38	182

DETAIL OF STD. 90° HOOK
SCALE: N T S



DRAW-OFF SUMP DETAIL
SCALE: 1:10

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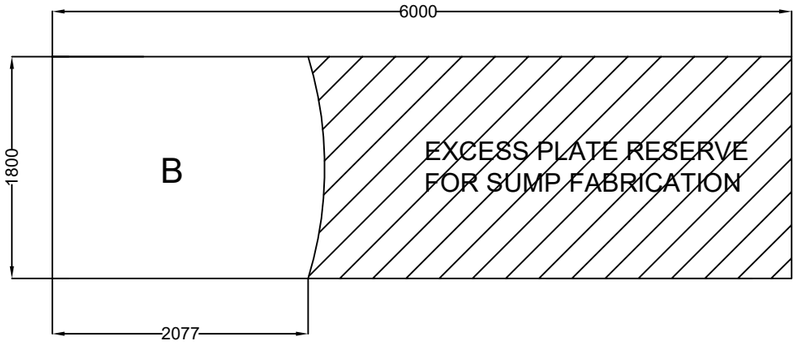
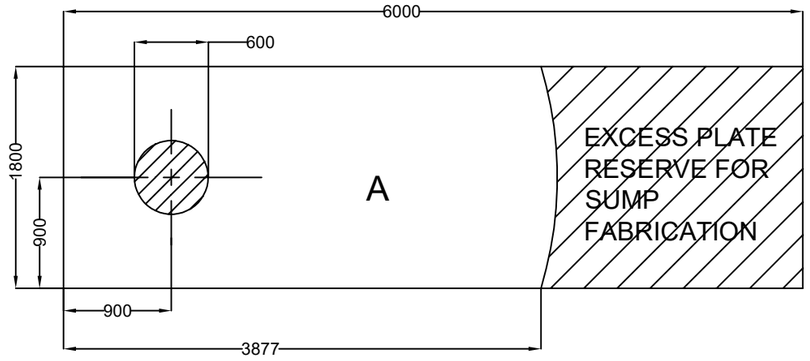
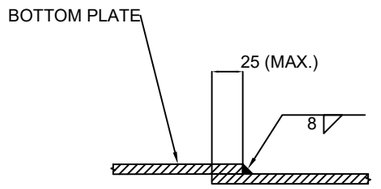
TANK NO.3 FOUNDATION DETAILS

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-002	0

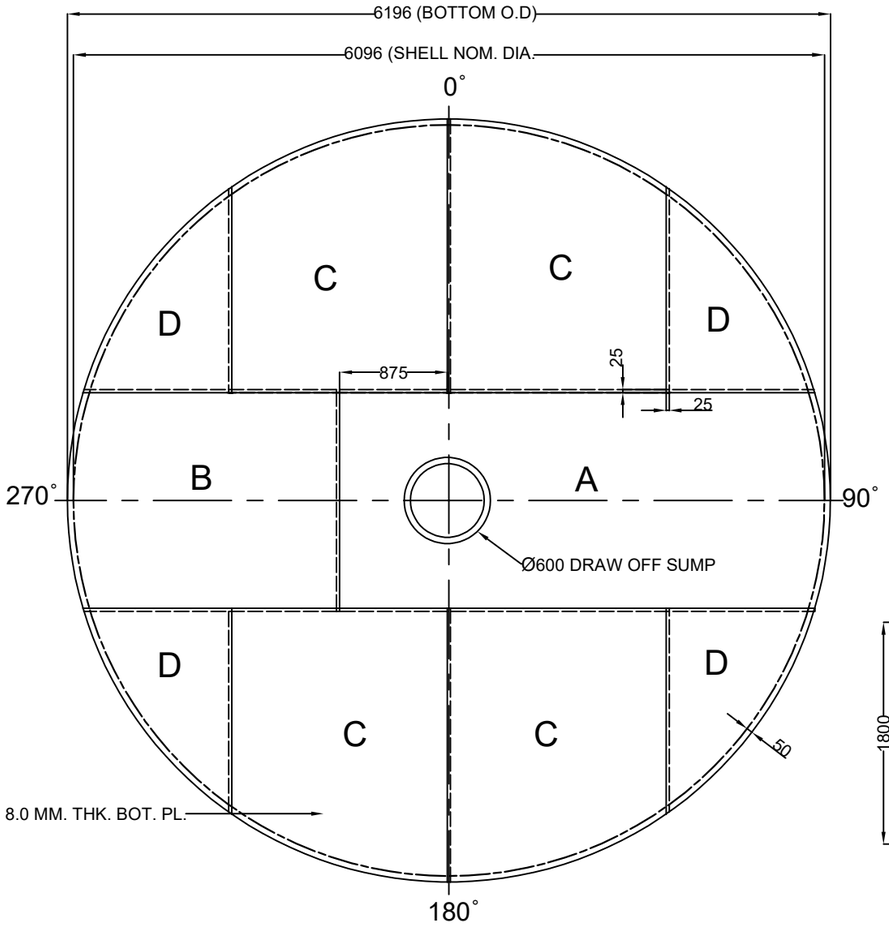






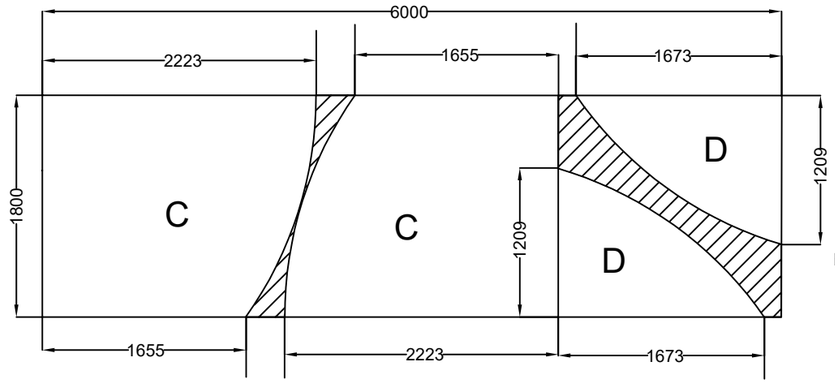
LAP-WELDED BOTTOM JOINT DETAILS

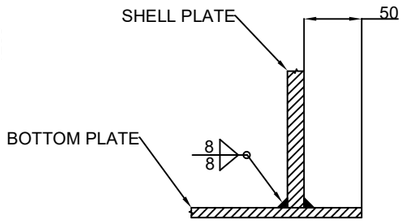
SCALE: 1:5



BOTTOM PLATE LAYOUT PLAN

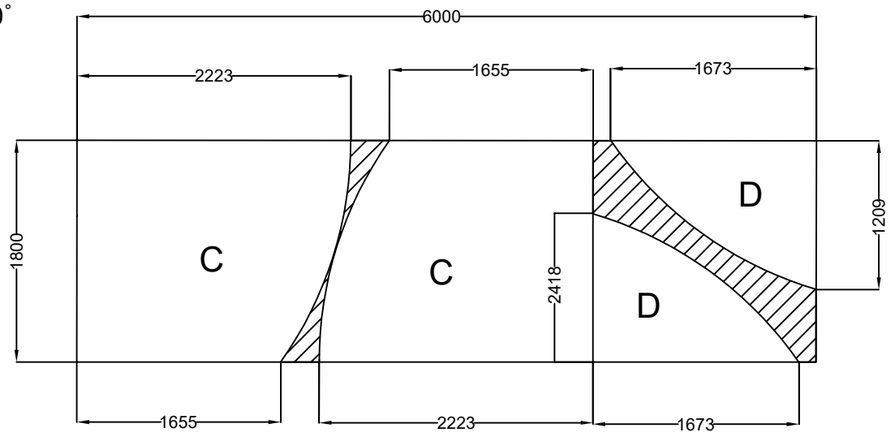
SCALE: 1:25





SHELL TO BOTTOM JOINT DETAILS

SCALE: 1:5



NOTE: PLATE CURVED SECTION CUT TO FIT BOTTOM RADIUS

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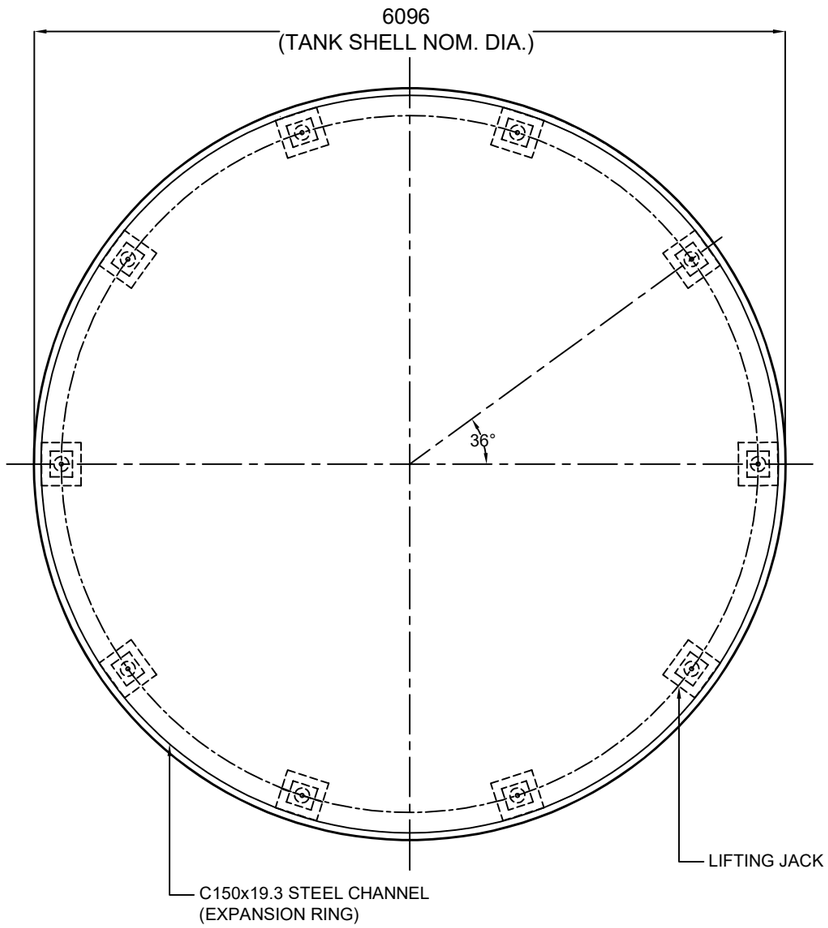
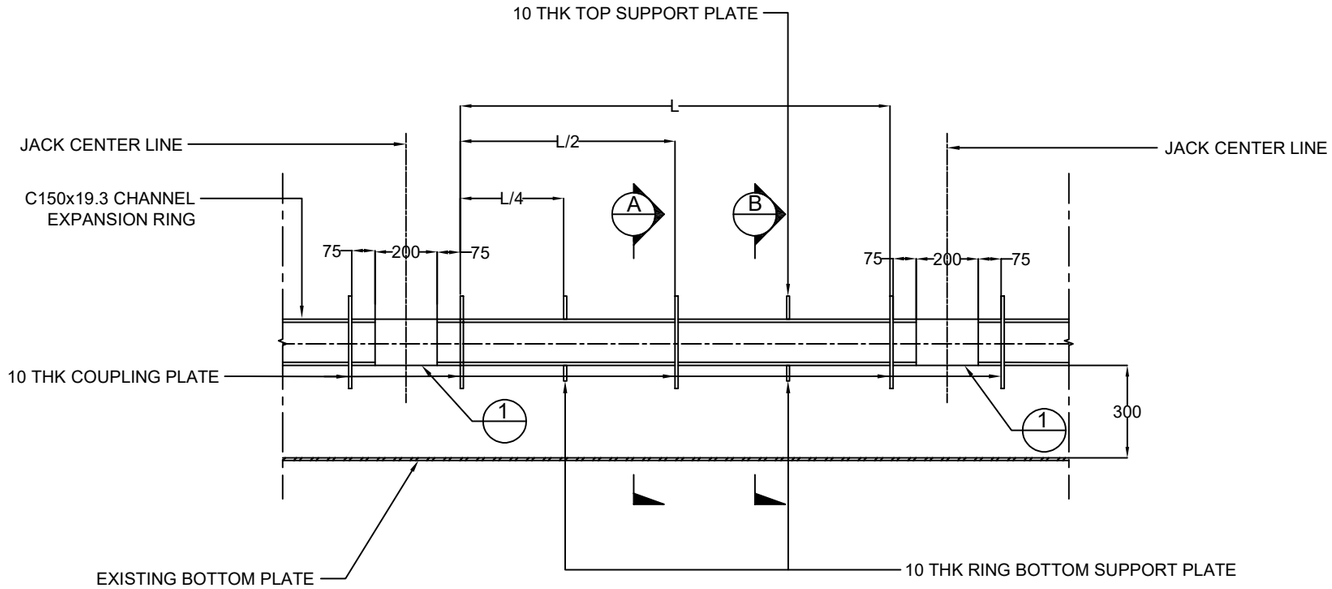
TANK NO.3 BOTTOM LAYOUT & PLATE CUTTING PLAN

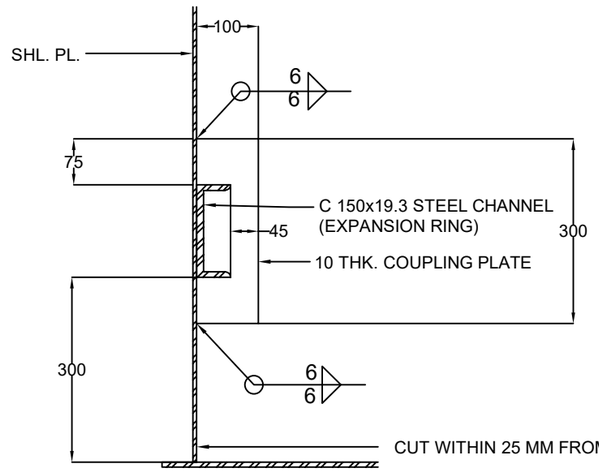
SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-003	0



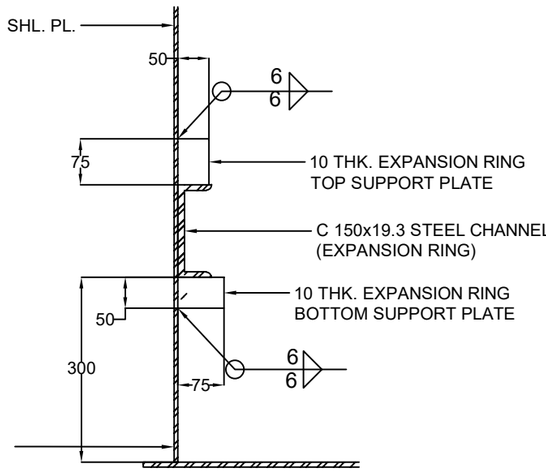
TANK LIFTING PLAN
SCALE: 1:50



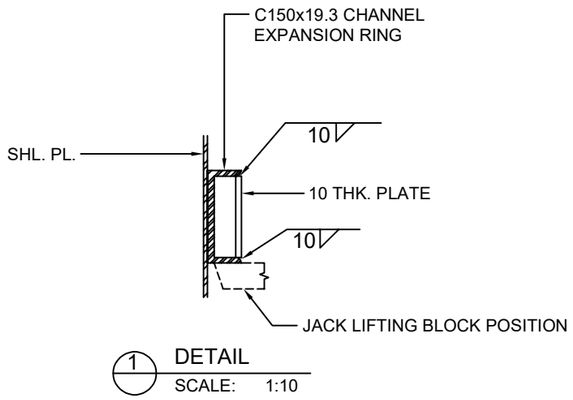
EXPANSION RING LONGITUDINAL SECTION
SCALE: 1:20



A SECTION
SCALE: 1:10



B SECTION
SCALE: 1:10



1 DETAIL
SCALE: 1:10

NOTE:
INSTALL EXPANSION RING PRIOR CUTTING OF SHELL TO BOTTOM

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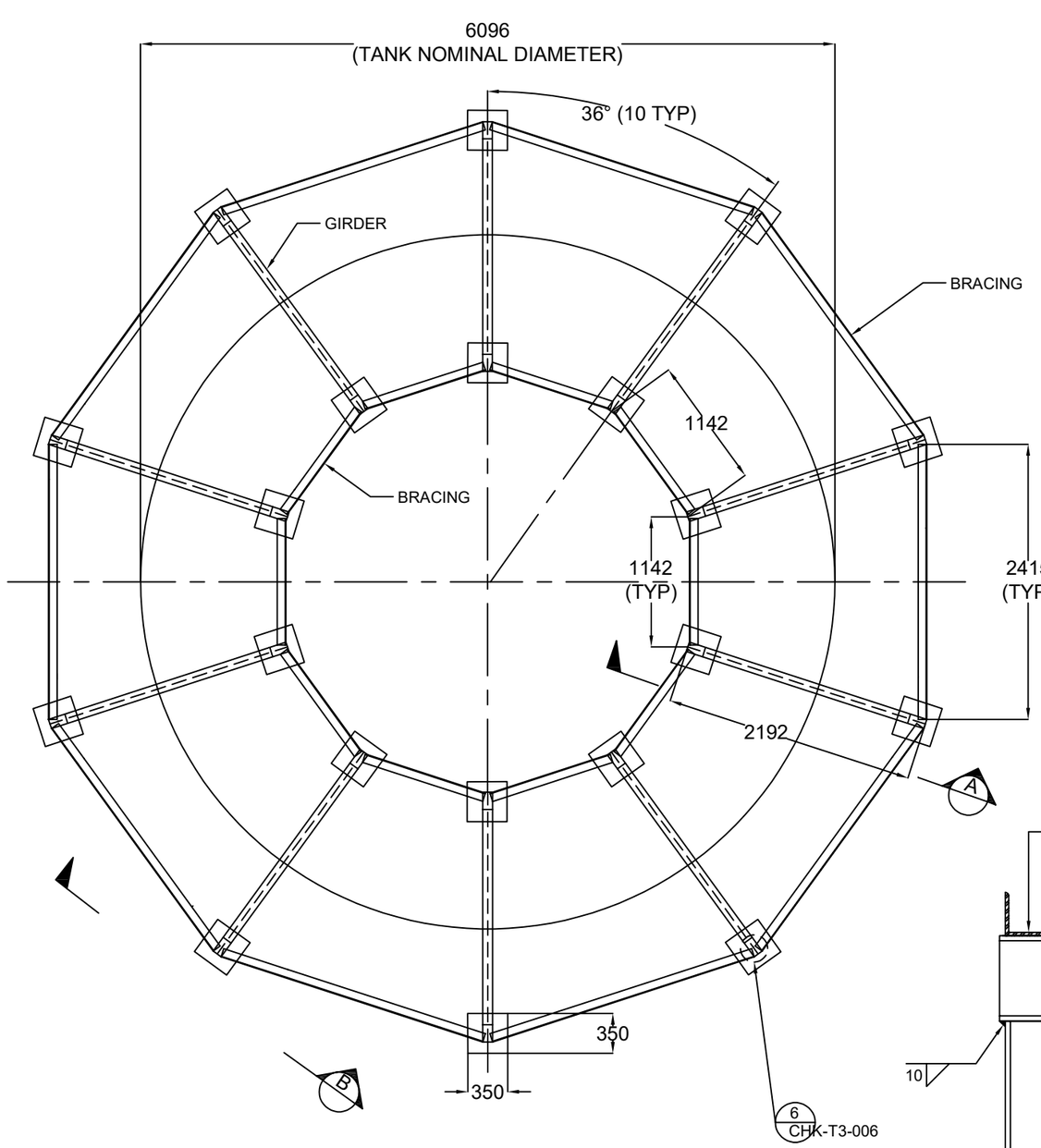
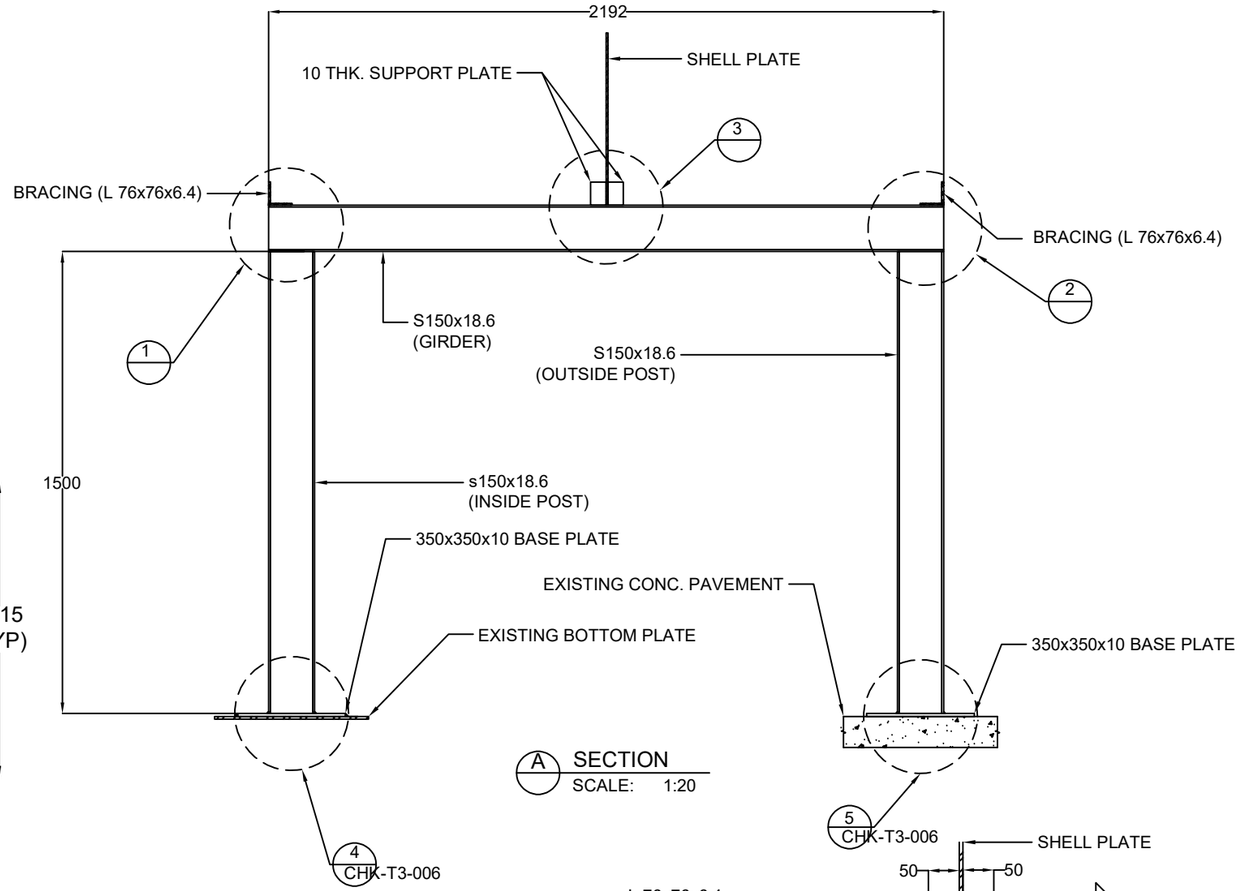
TANK NO.3 LIFTING PLAN & EXPANSION RING DETAILS

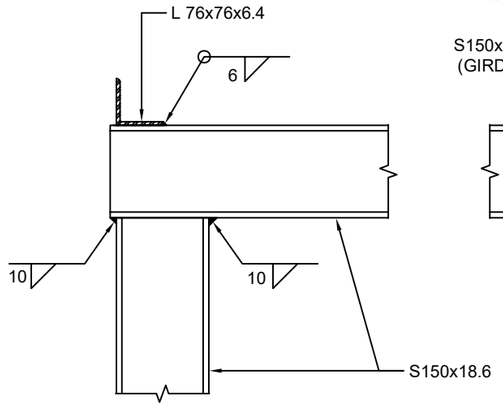
SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-004	0



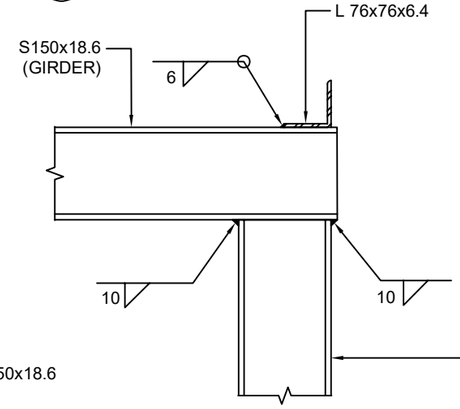
TANK LIFTING SUPPORT PLAN
SCALE: 1:50



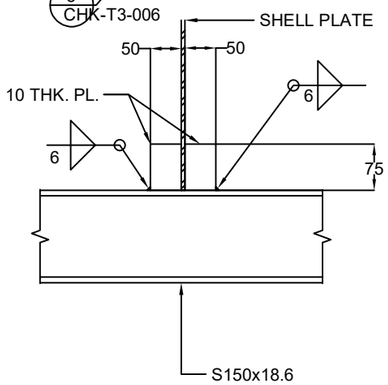
A SECTION
SCALE: 1:20



1 DETAIL
SCALE: 1:10



2 DETAIL
SCALE: 1:10



3 DETAIL
SCALE: 1:10

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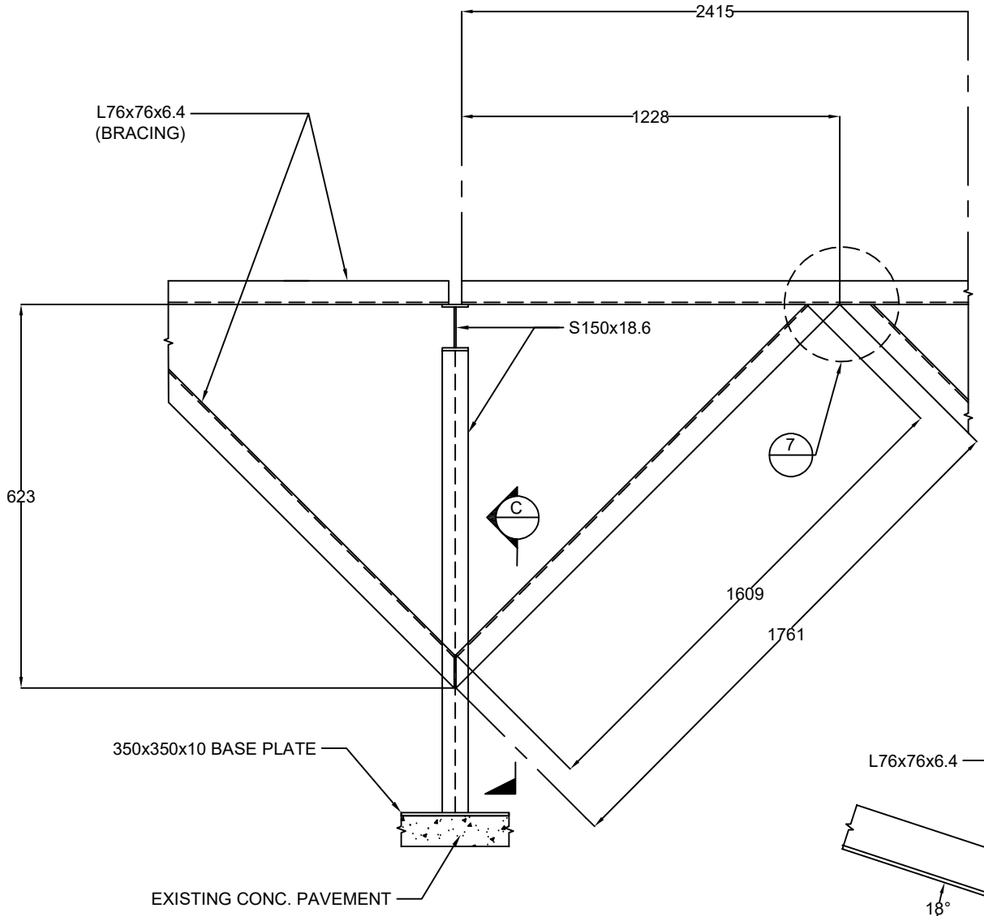
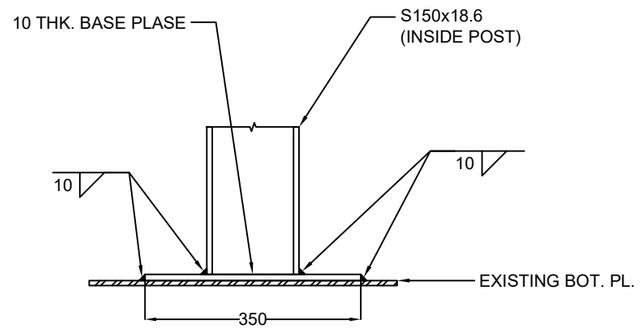
TANK NO.3 LIFTING SUPPORT PLAN & DETAILS

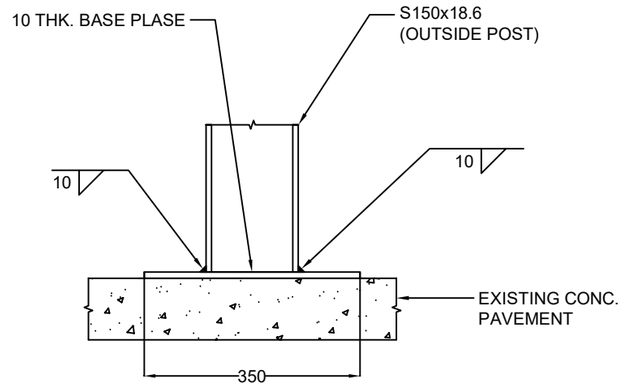
SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-005	0



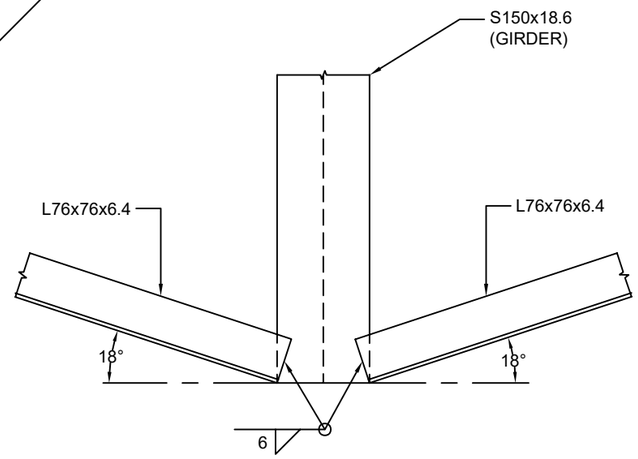
B SECTION
CHK-T3-005 SCALE: 1:20



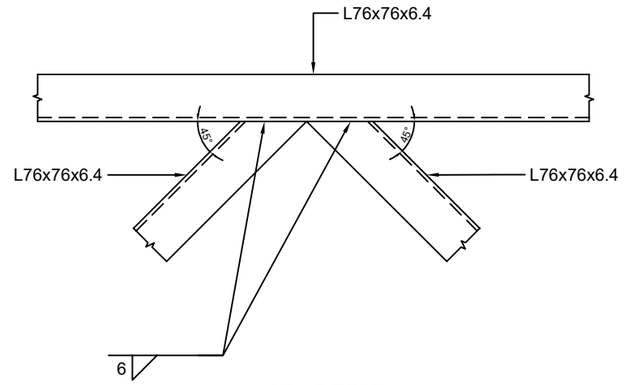
4 DETAIL
CHK-T3-005 SCALE: 1:10



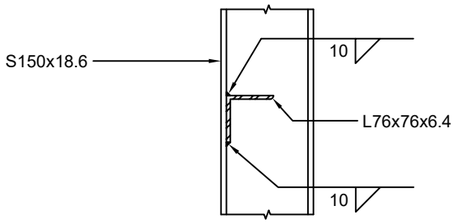
5 DETAIL
CHK-T3-005 SCALE: 1:10



6 DETAIL
CHK-T3-005 SCALE: 1:10



7 DETAIL
SCALE: 1:10



C SECTION
SCALE: 1:10

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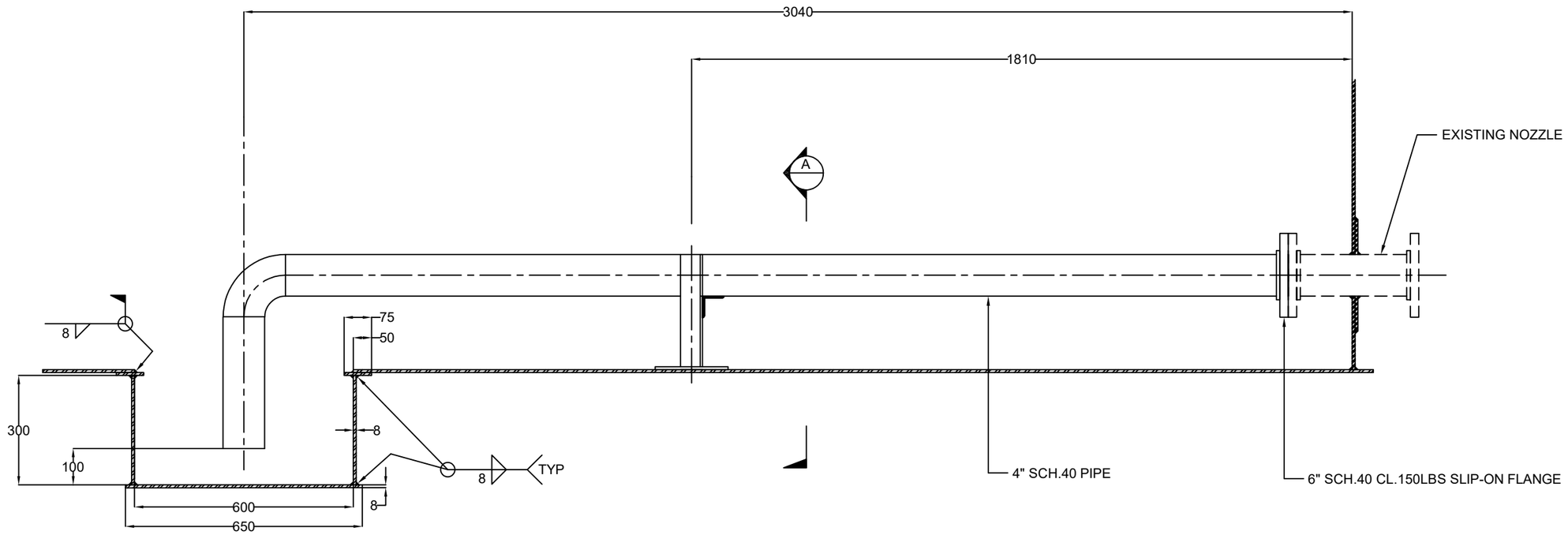
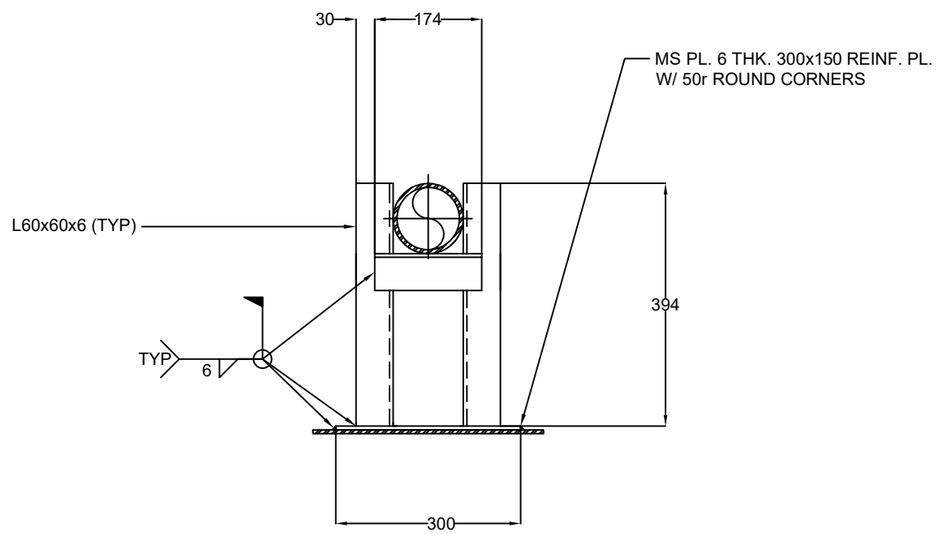
TANK NO.3 LIFTING SUPPORT DETAILS

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-006	0



WATER DRAW-OFF PIPE & SUMP DETAILS



A SECTION
SCALE: 1:10

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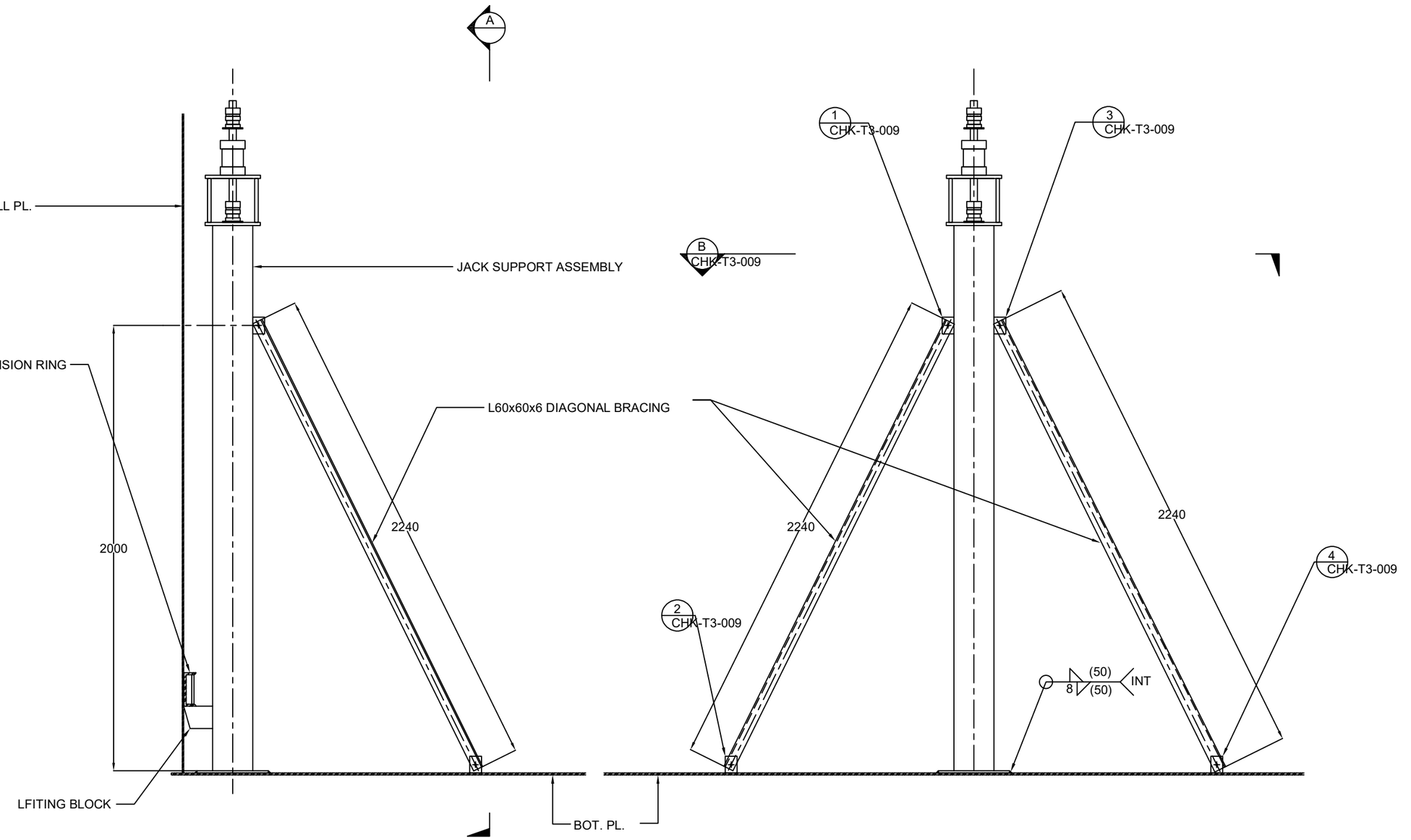
TANK NO.3 WATER DRAW-OFF PIPE & SUMP DETAILS

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-007	0



SIDE ELEVATION
SCALE: 1:20

A SECTION
SCALE: 1:20

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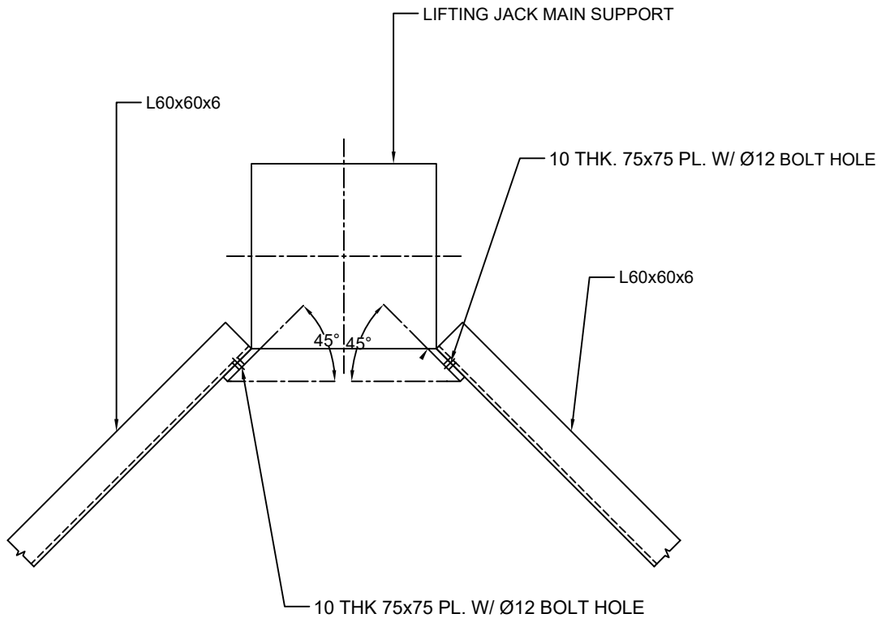
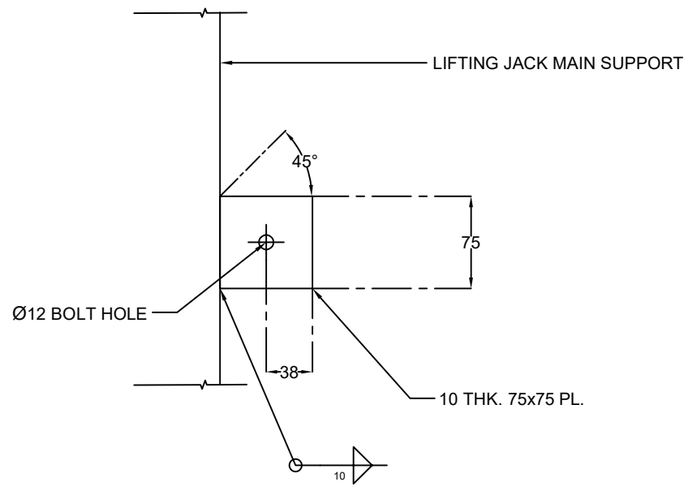
TANK NO.3 LIFTING JACK SUPPORT ASSEMBLY

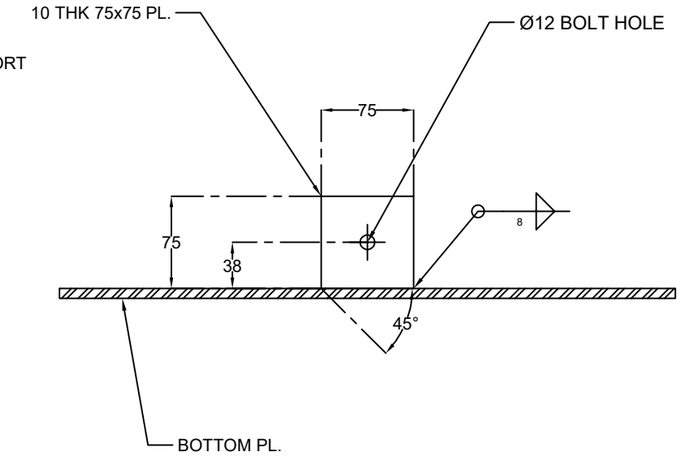
SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-008	0



B SECTION
CHK-T3-008 SCALE: 1:10



1,3 DETAILS
CHK-T3-008 SCALE: 1:5



2,4 DETAILS
CHK-T3-008 SCALE: 1:5

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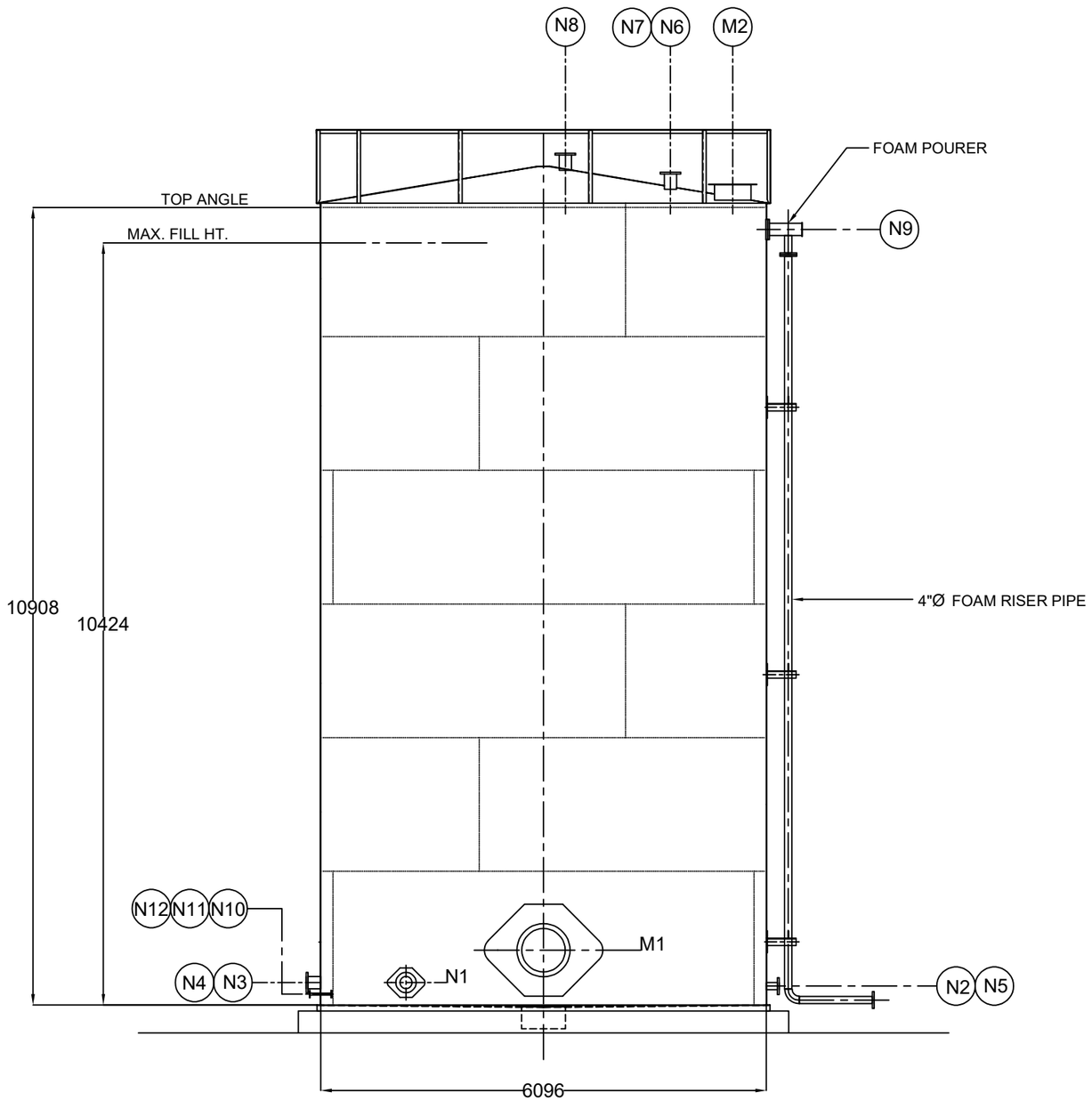
TANK NO.3 LIFTING JACK SUPPORT DETAILS

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-009	0



ELEVATION
SCALE: 1:75

NOZZLE SCHEDULE

NOZ. NO.	DIA. / SCH.	FLANGE RATING	NOZ. HT.	FL. PROJ	SERVICE
N1	6" / CS STD				INLET
N2	4" / CS STD				WDO
N3	6" / CS STD				OUTLET
N4	6" / CS STD				SPARE
N5	4" / CS STD				DRAIN
N6	6" / CS STD				GAUGE HATCH 1
N7	8" / CS STD				FREE VENT
N8	6" / CS STD				GAUGE HATCH 2
N9	4" / STD	150# RF	10608	-	NEW FOAM LINE
N10	3/4" / SS XS	150# RF	150	150	NEW SAMPLE PT. (TOP)
N11	3/4" / SS XS	150# RF	150	150	NEW SAMPLE PT. (MID)
N12	3/4" / SS XS	150# RF	150	150	NEW SAMPLE PT. (BOT)
M1	600 / t 6.4				SHELL MANHOLE
M2	500 / t 6.4				ROOF MANHOLE

NOTES:

1. DRAWN BASED FROM INSPECTION REPORT LAYOUT
2. VERIFY ACTUAL DIMENSION AT SITE FOR FOAM POURER CLEARANCE AGAINST MAX. FILL. HT.
3. NOZZLE ACTUAL DIMENSION AND ORIENTATION TO BE VERIFIED AT SITE.
4. NEW SAMPLING NOZZLE ORIENTATION TO BE DETERMINE AT SITE TO SUIT THE PURPOSE.

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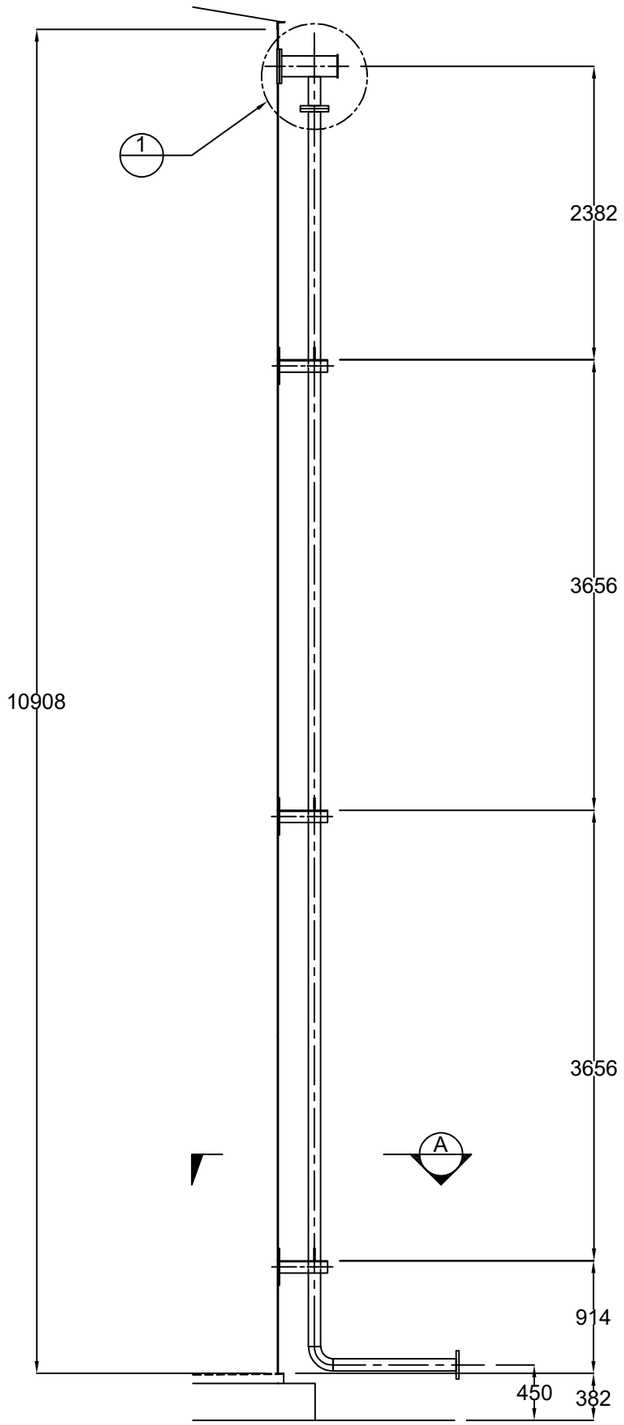
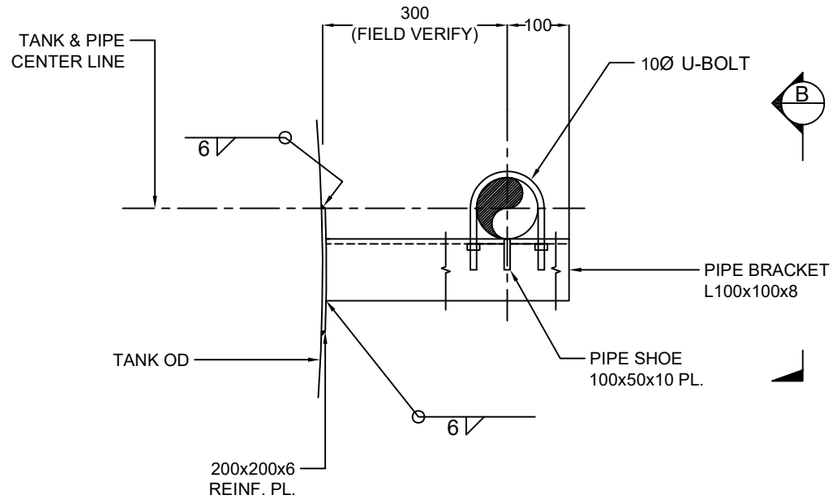
TANK NO.3 NOZZLE LAYOUT AND NEW FOAM LINE ASSY.

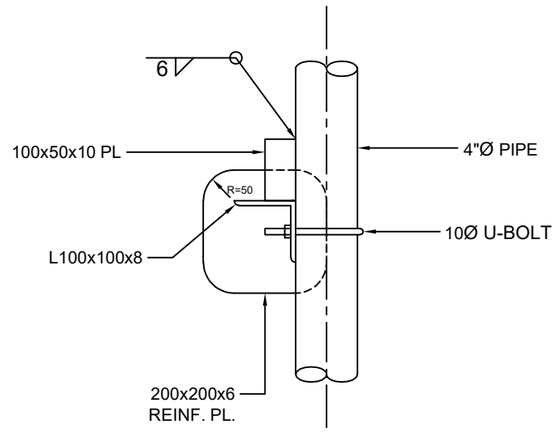
SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-010	0



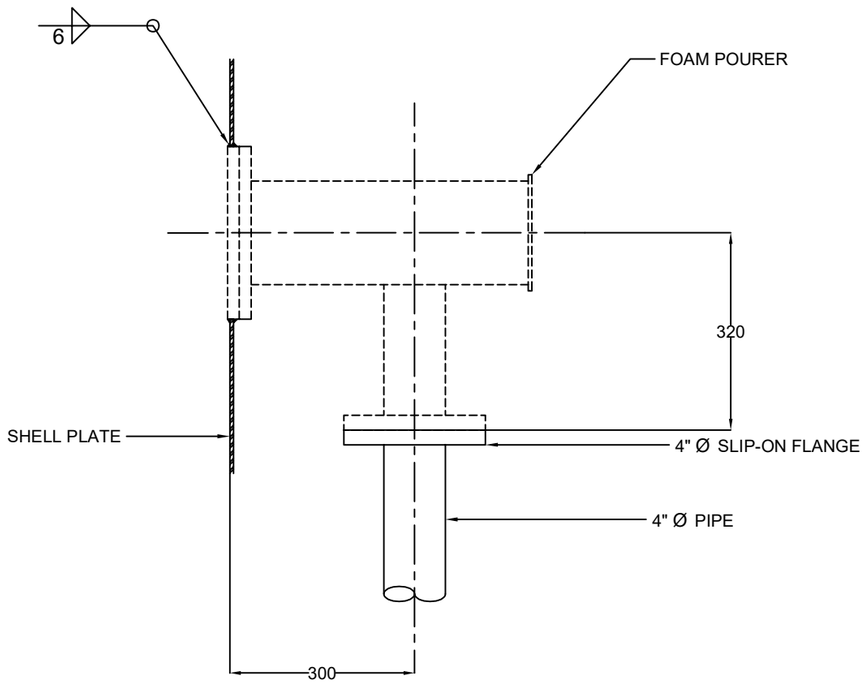
PIPE RISER ELEVATION
SCALE: 1:50



A SECTION (TYP. @ 3 - BRACKET)
SCALE: 1:10



B SECTION (TYP. @ 3 - BRACKET)
SCALE: 1:10



1 DETAIL
SCALE: 1:10

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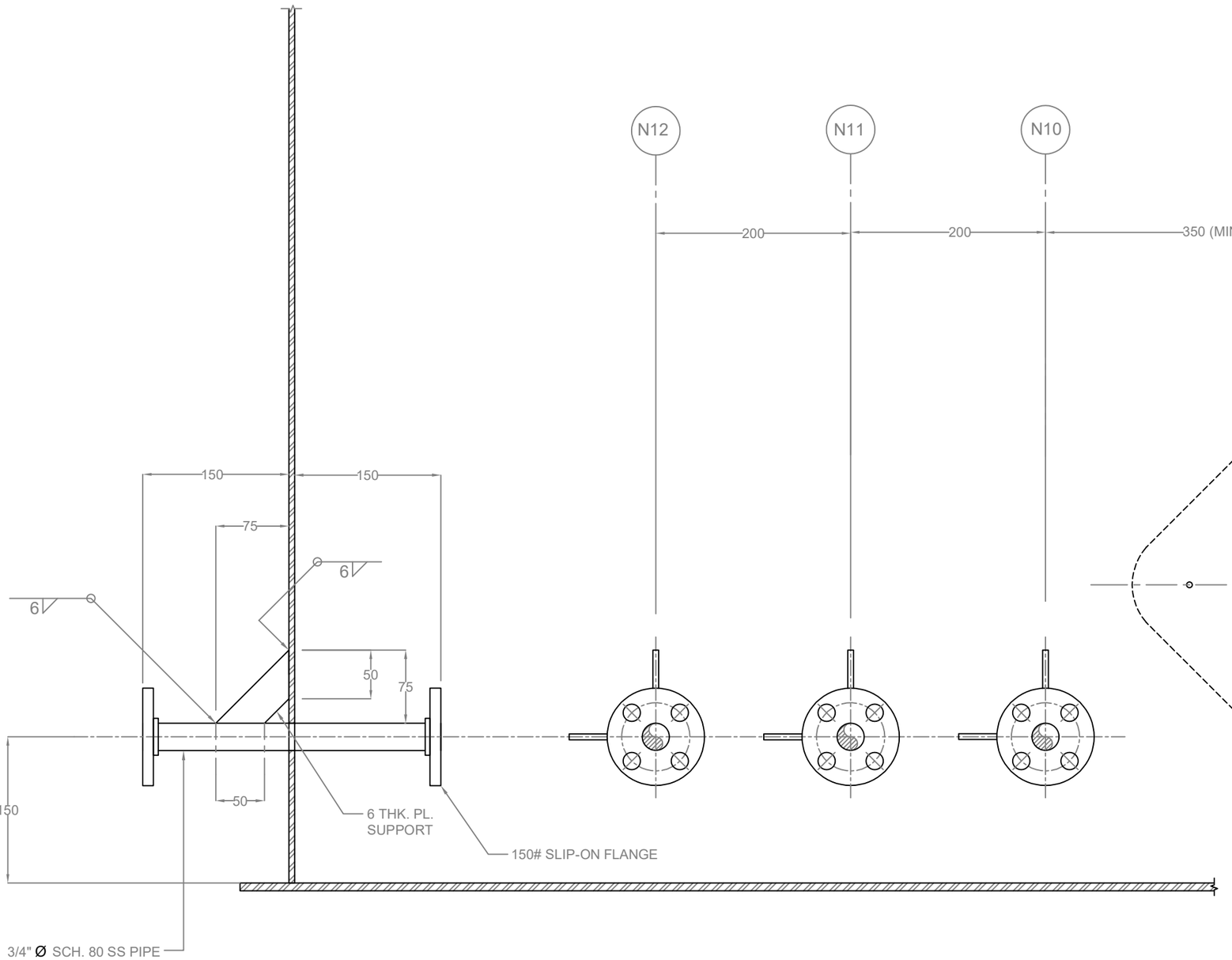
POHNPEI BULK PLANT
PO BOX 116
KOLONLA, POHNPEI
FM 96941
TEL: +631 320 2500,
FAX: +691 320 408

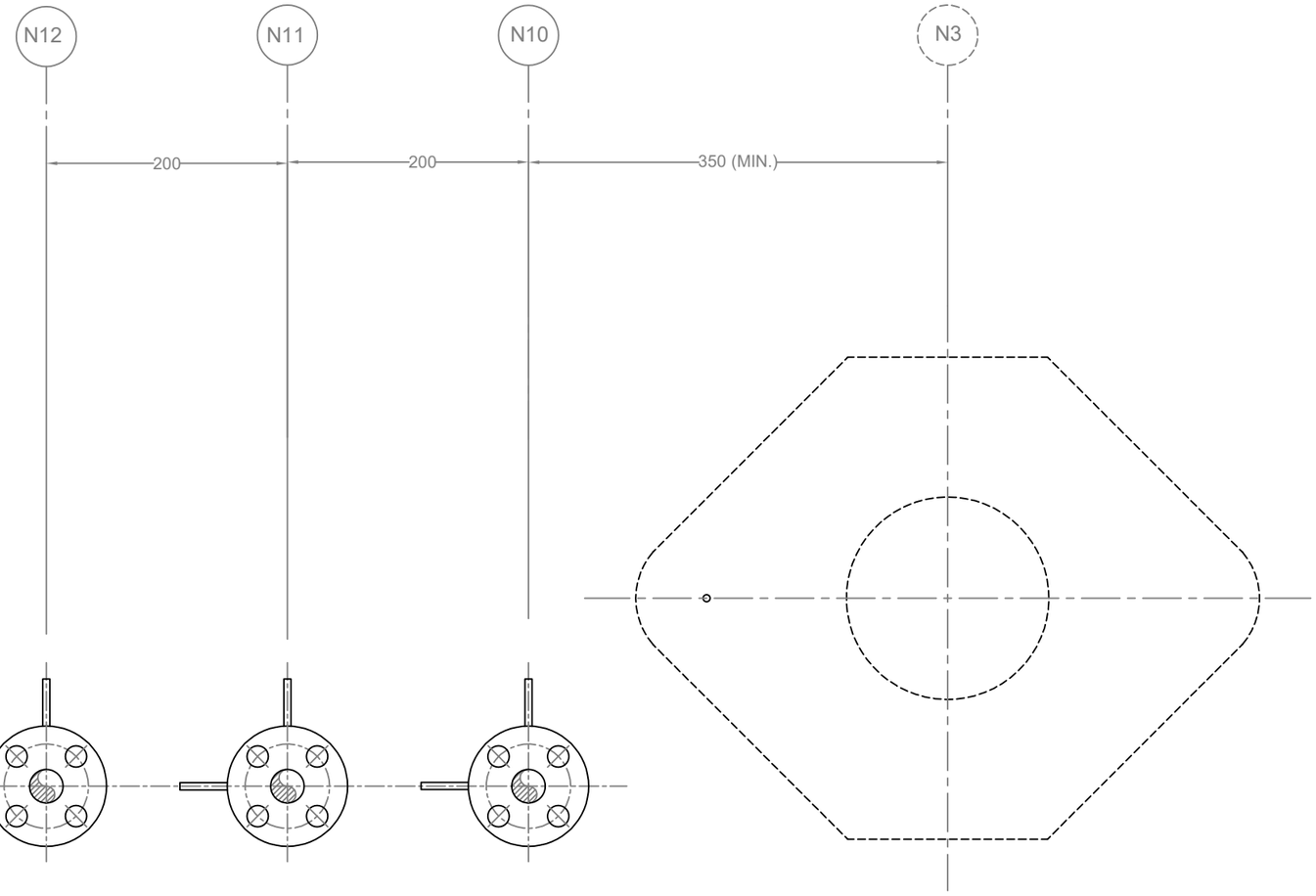
TANK NO.3
NEW FOAM LINE ASSEMBLY

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-011	0

NOTE:

1. SAMPLING NOZZLE ORIENTATION TO BE DETERMINE AT SITE TO SUIT THE PURPOSE.
2. SAMPLING PIPE TO BE FABRICATED TOGETHER WITH THE FLOATING SUCTION LINE.
3. REFER DWG. CHK-T3-010 FOR SAMPLING NOZZLE DESIGNATION





SUCTION LINE

SAMPLING NOZZLE
SCALE: 1:5

ISSUED FOR TECHNICAL REVIEW

TESTPLUS QUALITY CONTROL SERVICES
101 SITIO TACLOBAN II
LUCANIN MARIVELES BATAAN
PHILIPPINES

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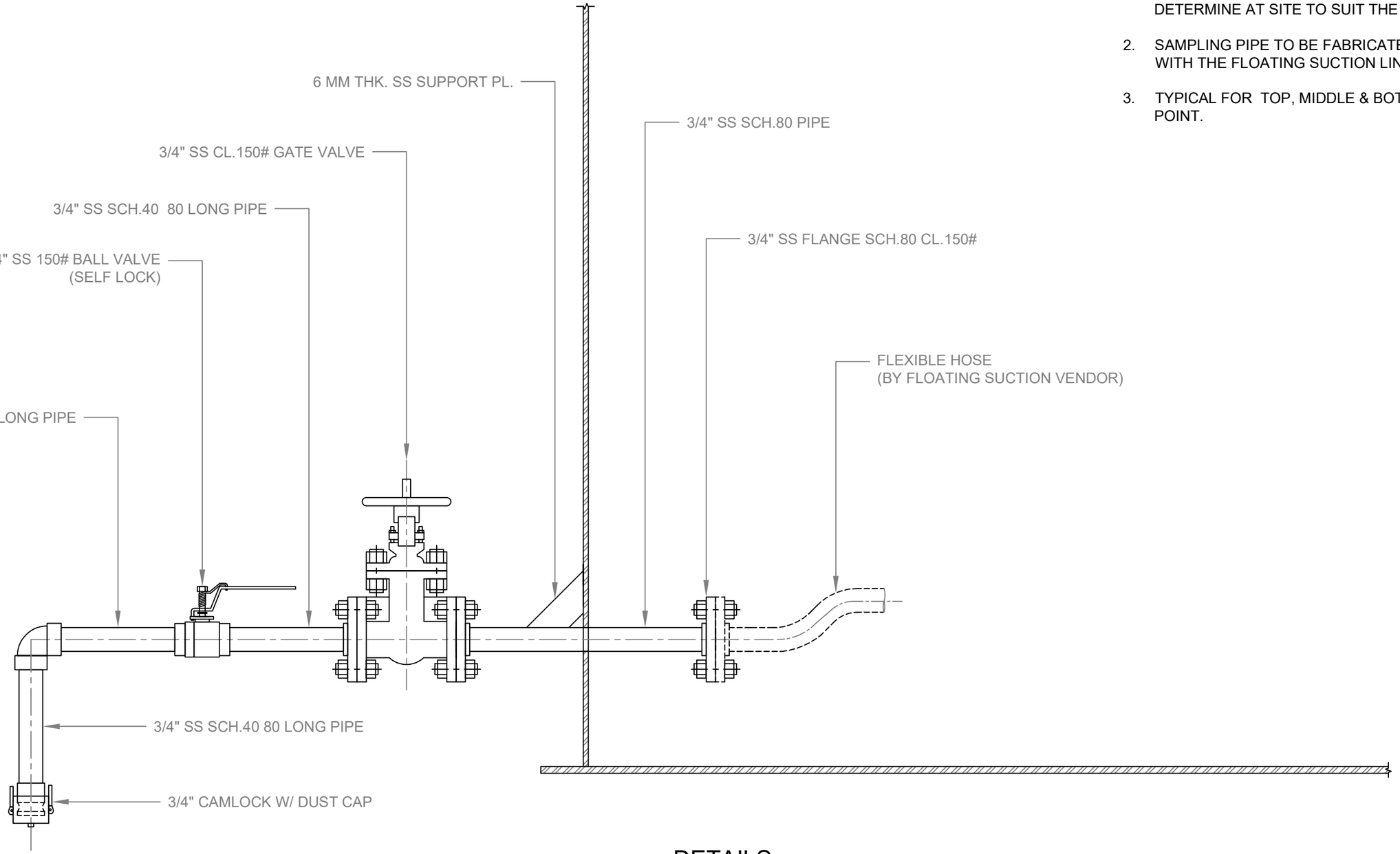
TANK NO.3 NEW SAMPLING NOZZLE

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-012	0

NOTE:

1. SAMPLING NOZZLE ORIENTATION TO BE DETERMINE AT SITE TO SUIT THE PURPOSE.
2. SAMPLING PIPE TO BE FABRICATED TOGETHER WITH THE FLOATING SUCTION LINE.
3. TYPICAL FOR TOP, MIDDLE & BOTTOM SAMPLING POINT.



DETAILS

SCALE: 1:5

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101 SITIO TACLOBAN II
LUCANIN MARIVELES BATAAN
PHILIPPINES

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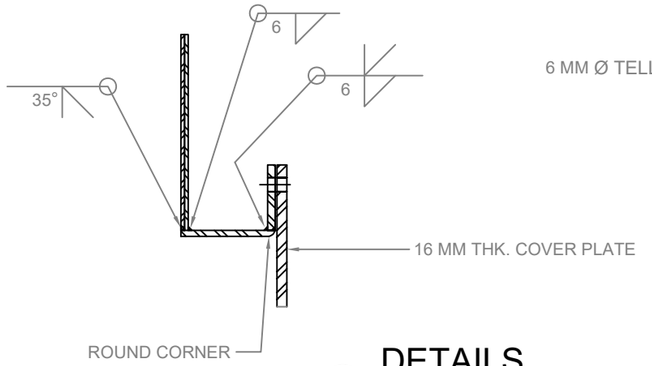
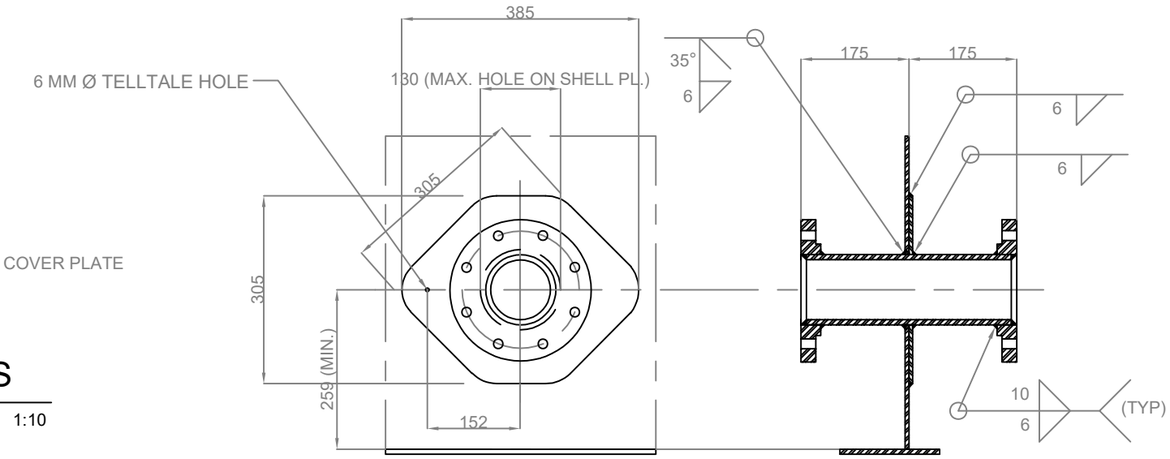
TANK NO.3 SAMPLING POINT
GENERAL ASSEMBLY

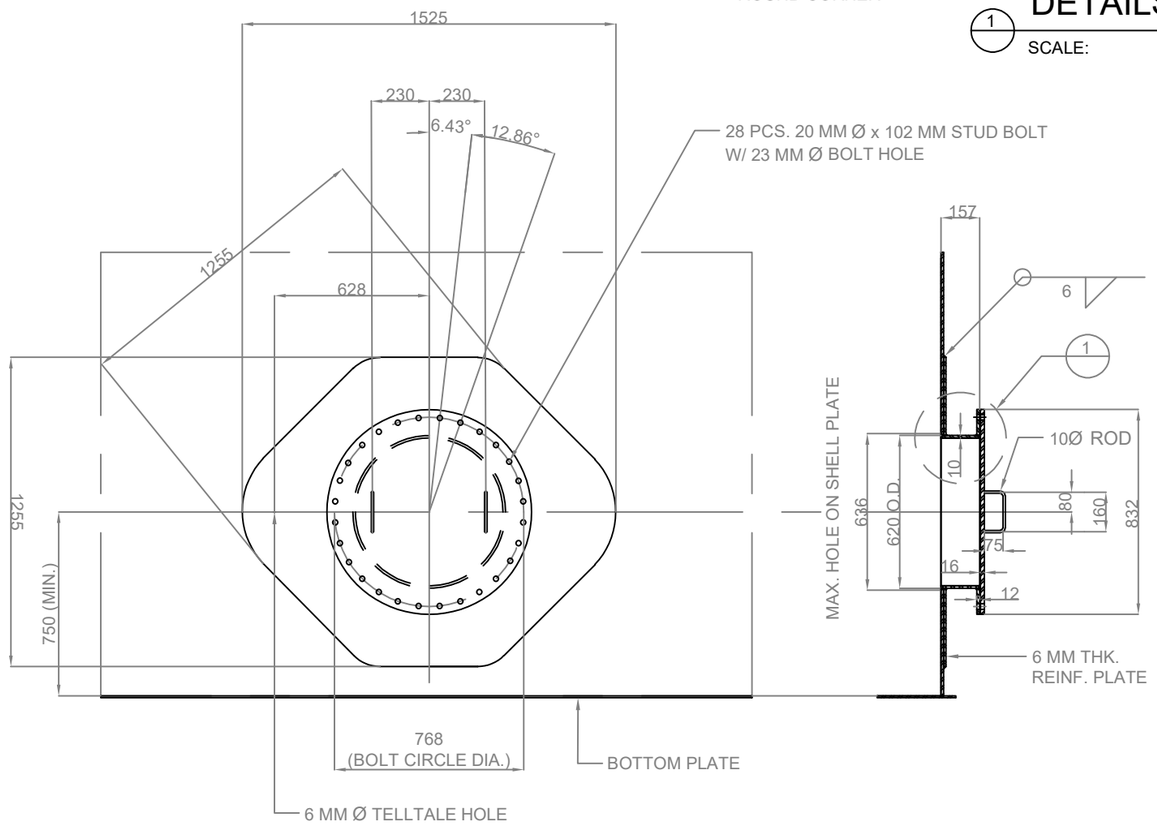
SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-013	0



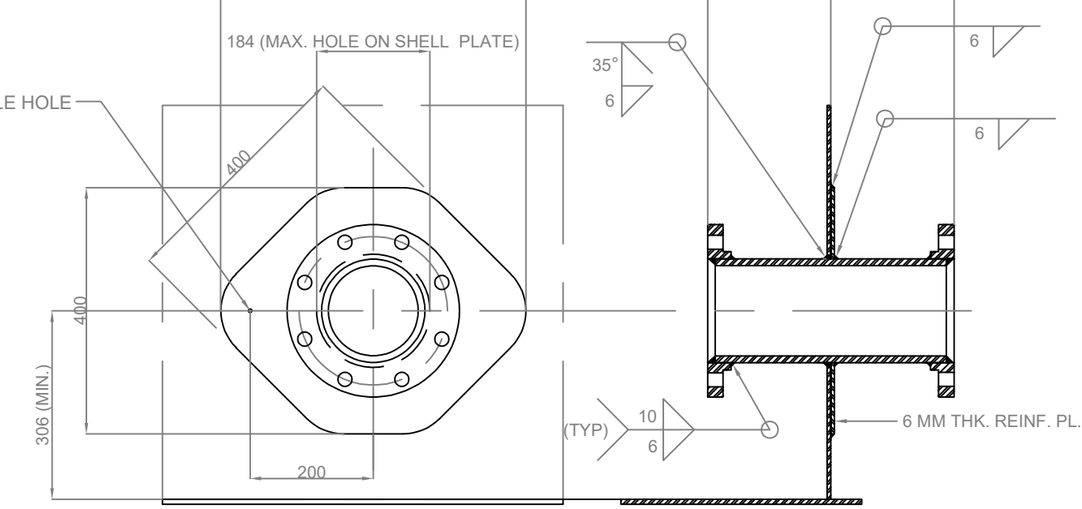
1 DETAILS
SCALE: 1:10



4" Ø SHELL NOZZLE
SCALE: 1:10



24" Ø MANHOLE
SCALE: 1:25



6" Ø SHELL NOZZLE
SCALE: 1:10

ISSUED FOR TECHNICAL REVIEW

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LUCANIN MARIVELES BATAAN
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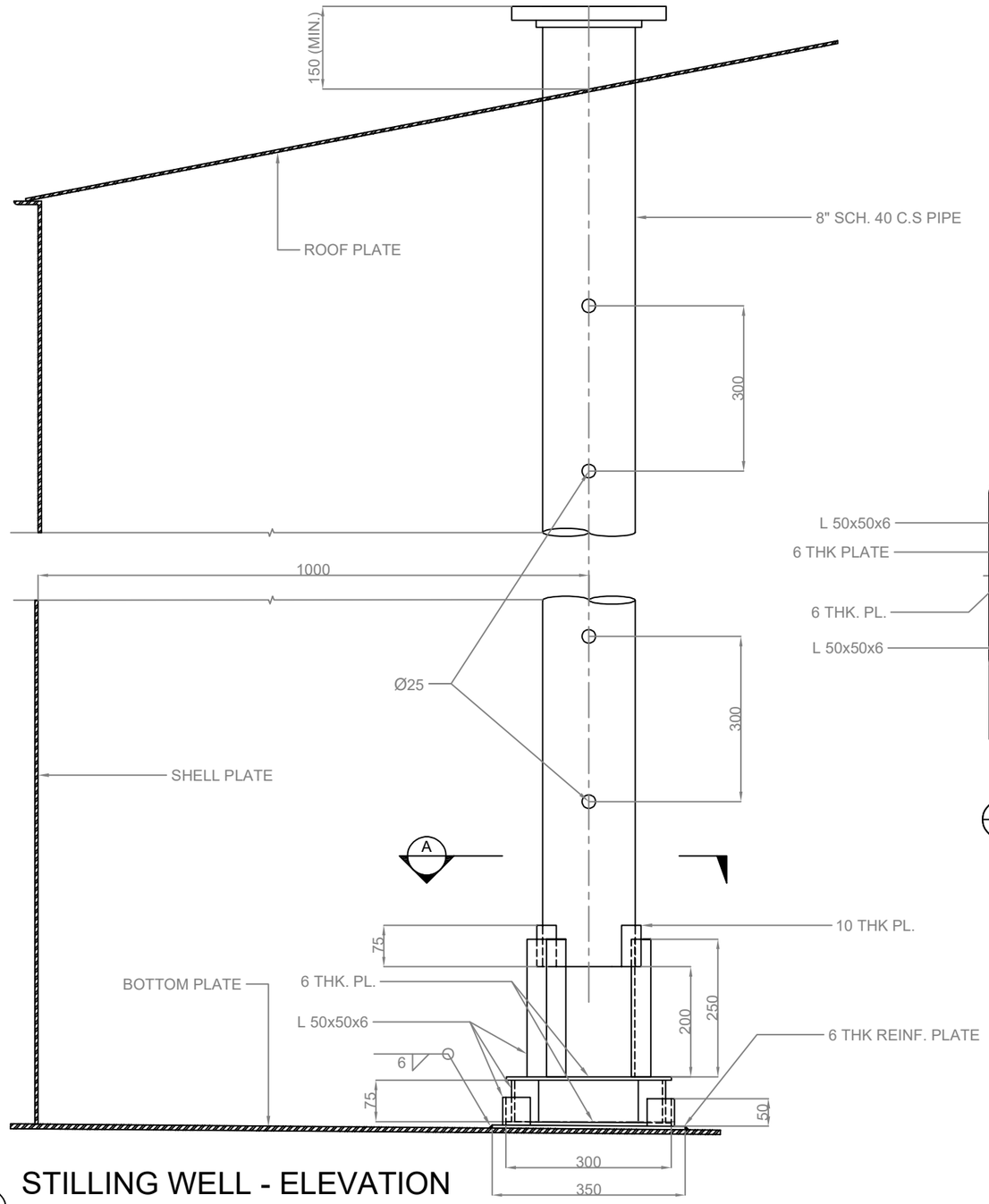
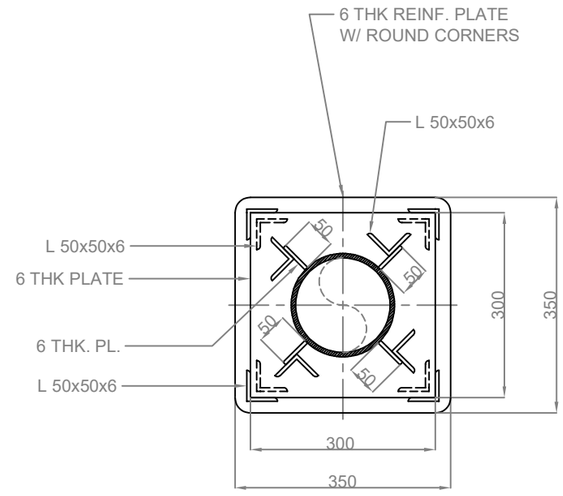
TANK NO.3
NEW SHELL MANHOLE & NOZZLE DETAILS

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-014	0



STILLING WELL - ELEVATION

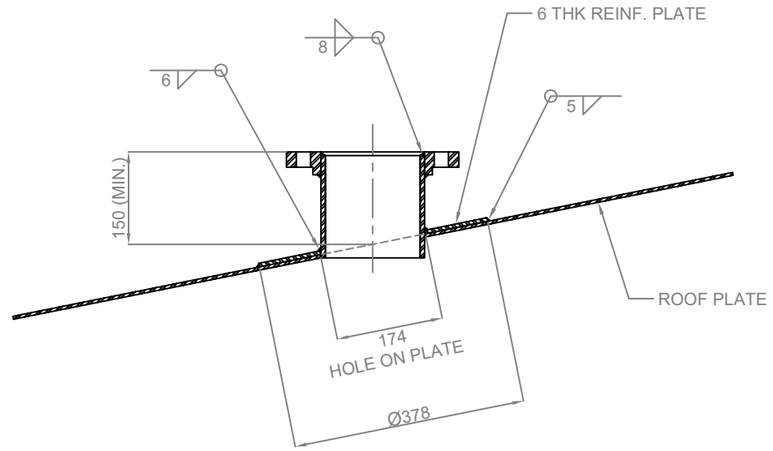
SCALE: N T S



SECTION

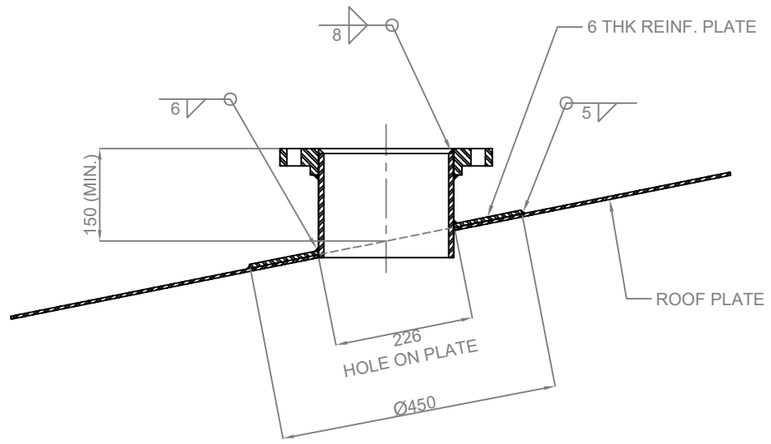
A

SCALE: 1:10



6" Ø ROOF NOZZLE

SCALE: 1:10



8" Ø ROOF NOZZLE

SCALE: 1:10

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LUCANIN MARIVELES BATAAN
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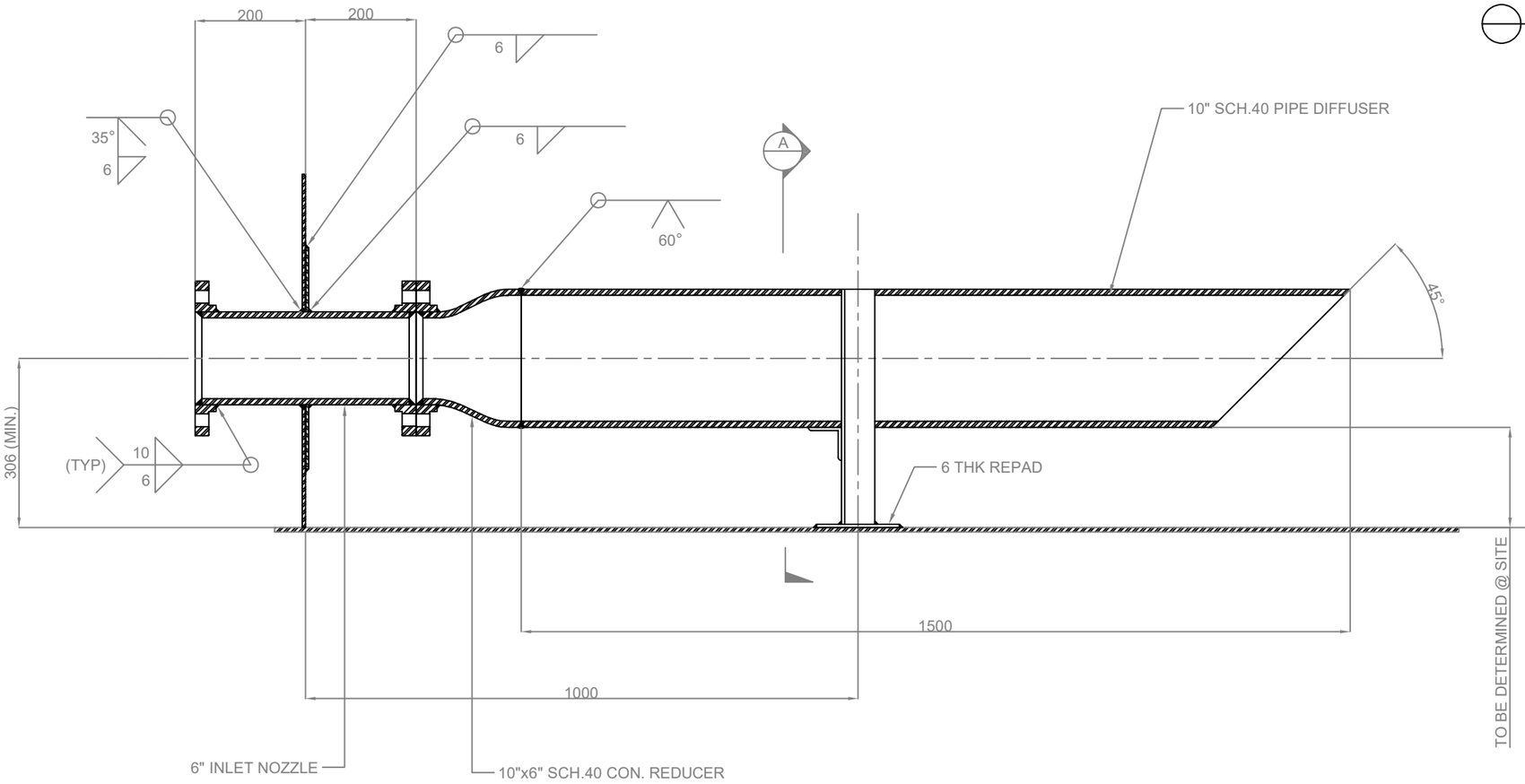
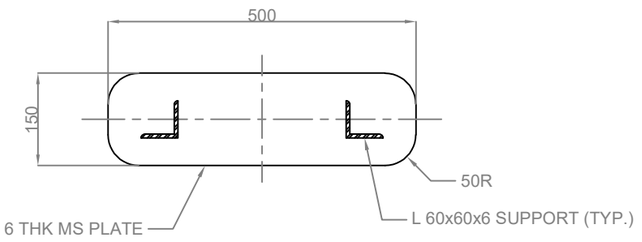
TANK NO.3
ROOF NOZZLE & STILLING WELL

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-015	0



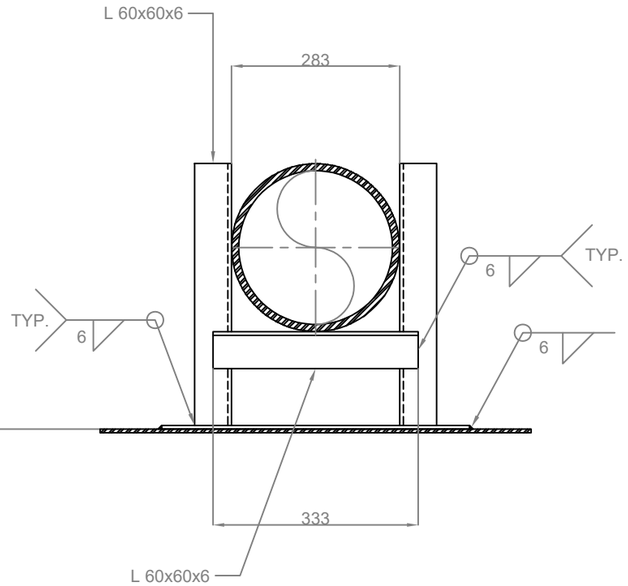
6" INLET NOZZLE - DIFFUSER

SCALE: 1:10



SUPPORT REPAD

SCALE: 1:10



SECTION

SCALE: 1:10

NOTE: DIFFUSER IS DESIGNED AT 286 CU.M. PER HR. MAX. FLOW RATE

ISSUED FOR TECHNICAL REVIEW

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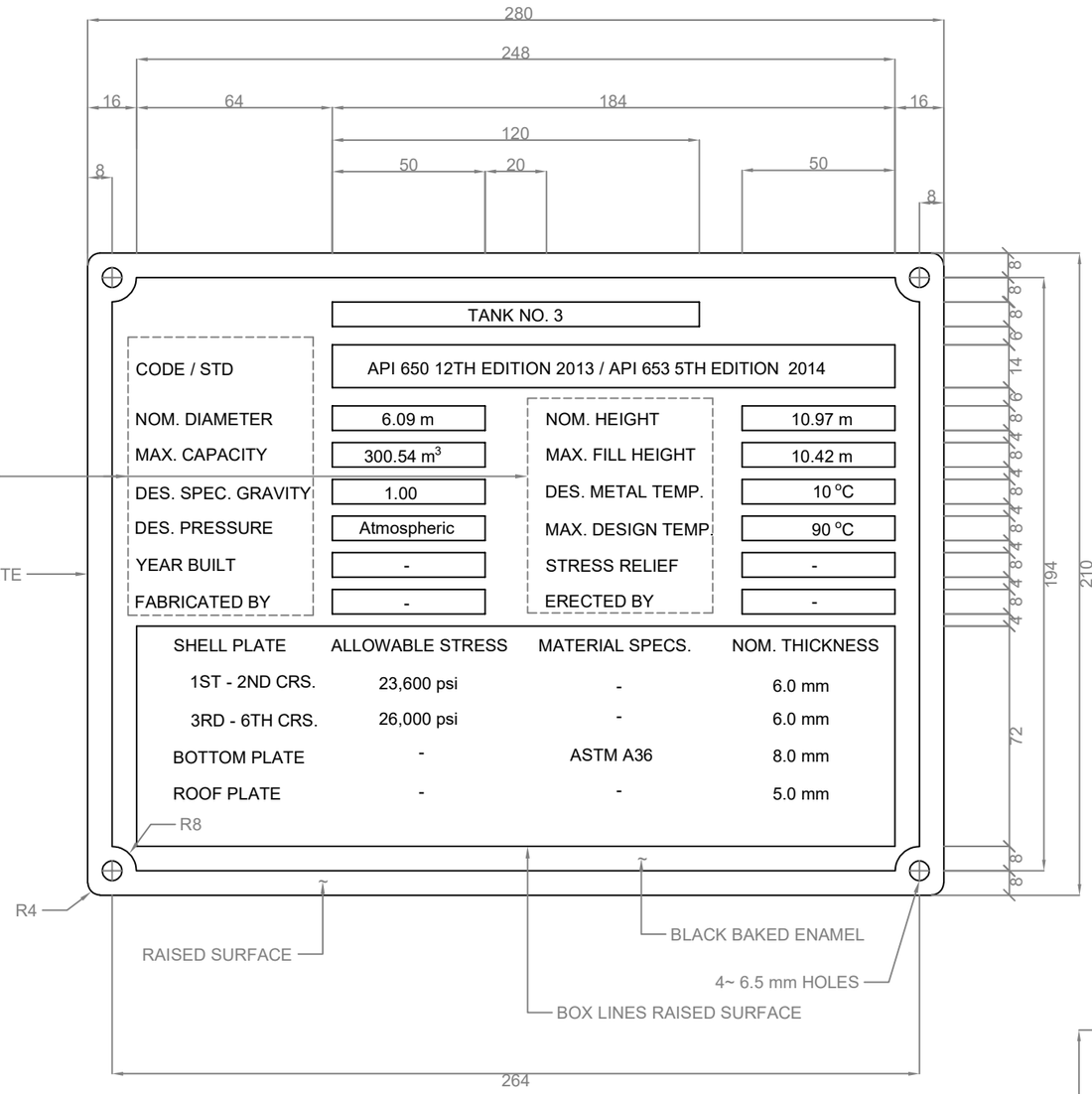
TANK NO.3
INLET DIFFUSER

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-016	0



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS SPECIFIED OTHERWISE.
2. THE MARKS, LETTERS AND BOX LINES SHALL BE RAISED SURFACE.
3. THE DESCRIPTION ENTERED IN THE BOX LINES SHALL BE ENGRAVED BY MEANS OF ETCHING.
4. USE 4 ~ 6 mm x 20 UNC x 16 LENGTH ROUND HEAD SCREW WITH NUTS

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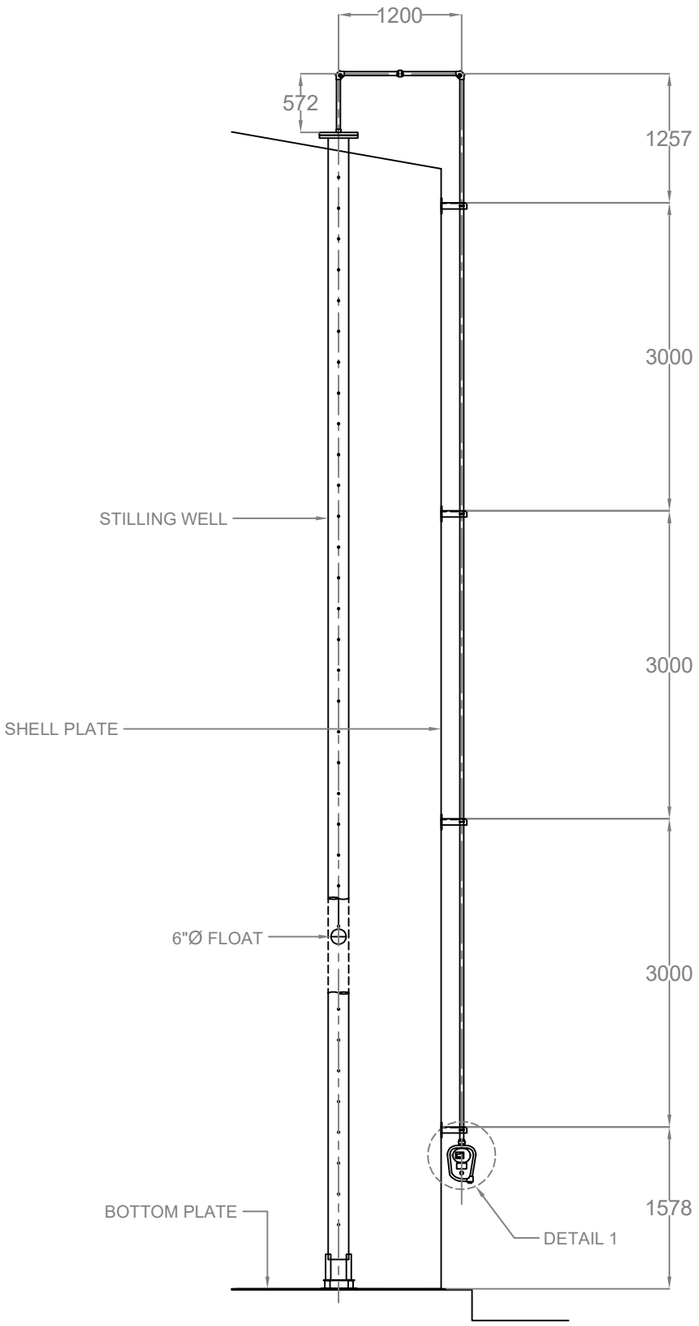
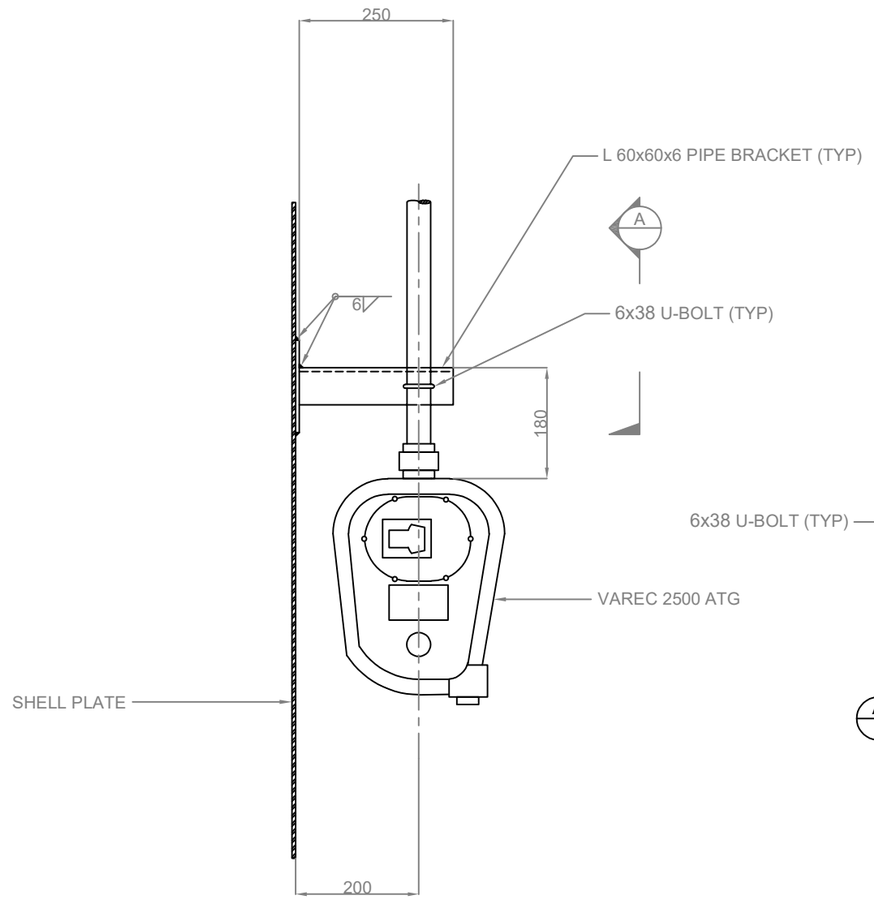
TANK NO.3 NAMEPLATE AND FRAME

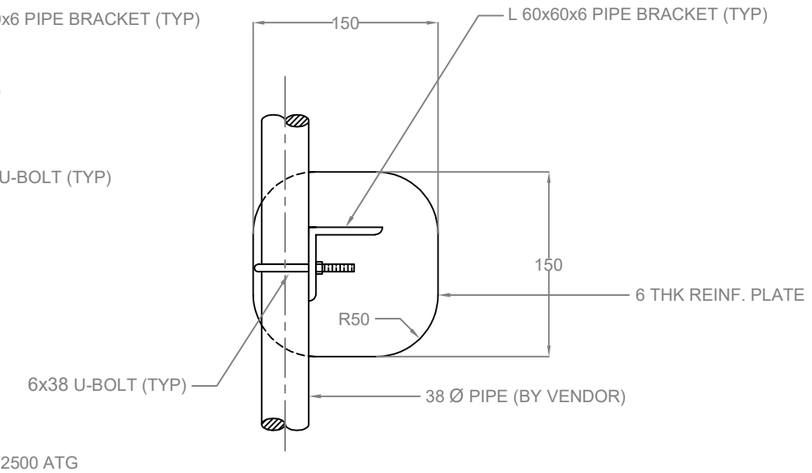
SCALE:	LOCATION:	DRAWING NO:	REV.
1 : 2	CHUUK, FSM	CHK-T3-017	0



ELEVATION
SCALE: 1:60



1 DETAIL
SCALE: 1:10



A SECTION
SCALE: 1:5

ISSUED FOR TECHNICAL REVIEW

TESTPLUS QUALITY CONTROL SERVICES
101 SITIO TACLOBAN II
LUCANIN MARIVELES BATAAN
PHILIPPINES

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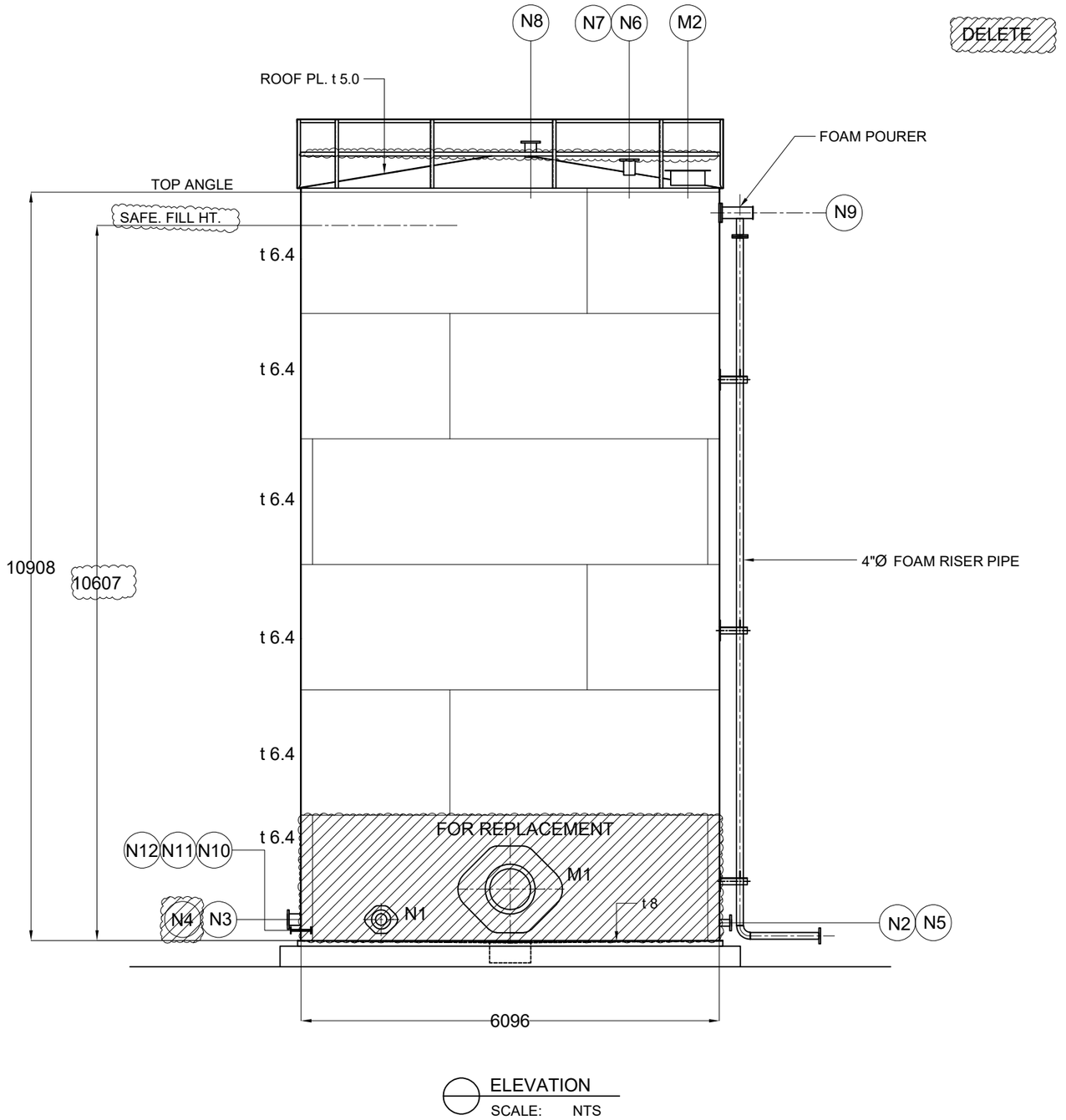
TANK NO.3
LEVEL INDICATOR PIPE BRACKET

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-018	0



ELEVATION
SCALE: NTS

DELETE

NOZZLE SCHEDULE					
NOZ. NO.	DIA. / SCH.	FLANGE RATING	NOZ. HT.	FL. PROJ	SERVICE
N1	6" / CS XS	150# RF	306	200	INLET
N2	4" / CS XS	150# RF	259	175	WDO
N3	6" / CS XS	150# RF	306	200	OUTLET
~~N4~~	~~6" / CS XS~~	~~150# RF~~	~~306~~	~~200~~	~~SPARE~~
N5	4" / CS XS	150# RF	259	175	DRAIN
N6	6" / CS STD	150# RF	-	150	GAUGE HATCH 1
N7	8" / CS STD	150# RF	-	150	FREE VENT
N8	6" / CS STD	150# RF	-	150	GAUGE HATCH 2
N9	4" / CS STD	150# RF	10608	-	NEW FOAM LINE
N10	3/4" / SS XS	150# RF	150	150	NEW SAMPLE PT. (TOP)
N11	3/4" / SS XS	150# RF	150	150	NEW SAMPLE PT. (MID)
N12	3/4" / SS XS	150# RF	150	150	NEW SAMPLE PT. (BOT)
M1	600 / t 6.4	6	750	125	SHELL MANHOLE
M2	500 / t 6.4	6	-	150	ROOF MANHOLE

NOTES:
1. THIS WAS DRAWN BASED FROM INSPECTION REPORT LAYOUT
2. VERIFY ACTUAL DIMENSION AT SITE FOR FOAM POURER CLEARANCE AGAINST SAFE FILL HEIGHT.
3. NOZZLES ACTUAL DIMENSION AND ORIENTATION TO BE VERIFIED AT SITE.
4. NEW SAMPLING NOZZLE ORIENTATION TO BE DETERMINE AT SITE TO SUIT THE PURPOSE.
5. SHELL MANHOLE AND NOZZLE'S REINFORCING PLATE SHALL BE 150 MM AWAY FROM SHELL VERTICAL JOINT AND 75 MM FROM HORIZONTAL JOINTS AND ADJACENT REINFORCING PLATE OF THE ADJACENT NOZZLE.
6. SHELL MANHOLE AND NOZZLES REINFORCING PLATE SHALL BE PROVIDED WITH AT LEAST 6MM TELLTALE HOLE.
7. ALL DIMENSIONS SHALL BE VERIFIED AT SITE.

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PHILIPPINES

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0	10.15.23	JBS			ISSUED FOR TECHNICAL REVIEW

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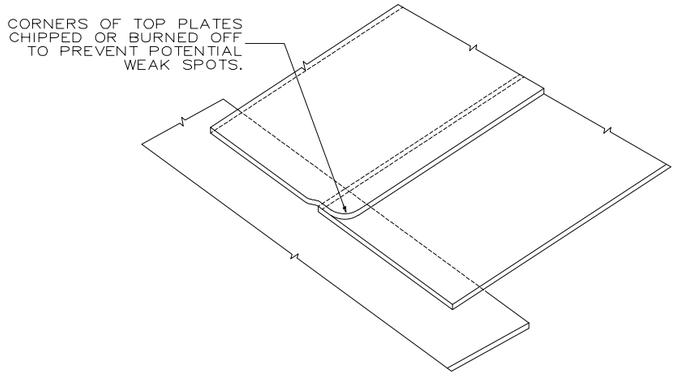
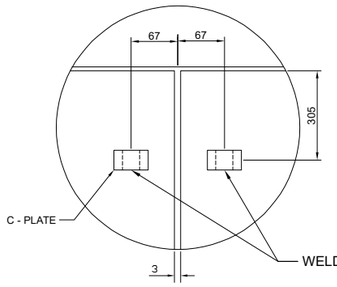
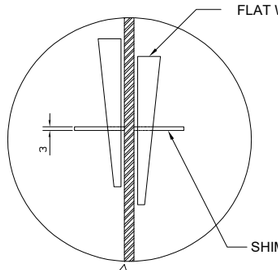
TANK NO.3 GENERAL ASSEMBLY

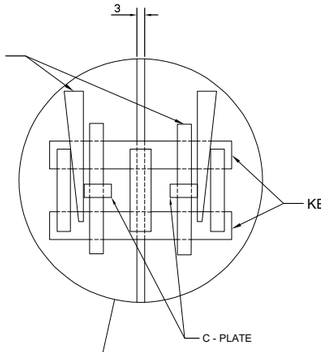
SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T3-010	1

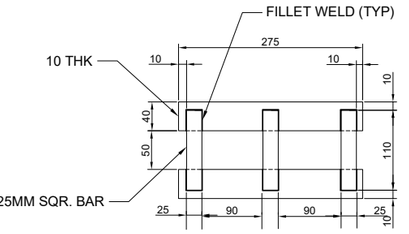


THREE-WAY LAP BOTTOM JOINT

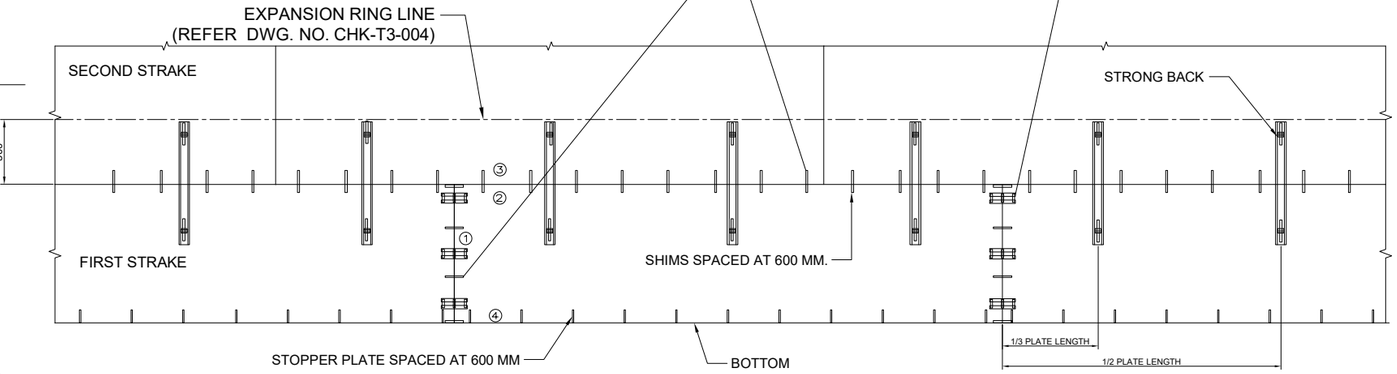


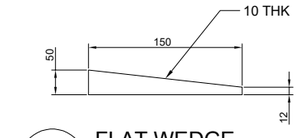




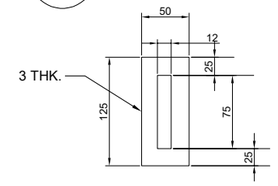


2 - WAY KEY PLATE

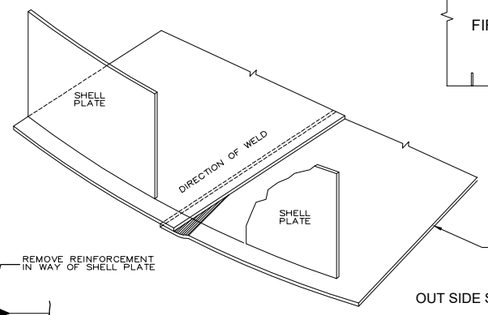




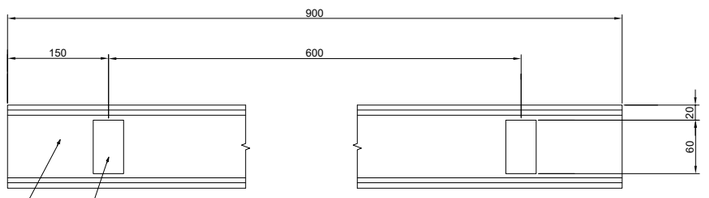
FLAT WEDGE



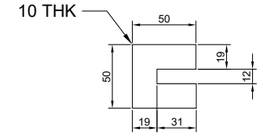
SHIM PLATE



JOGGLE JOINT



STRONG BACK



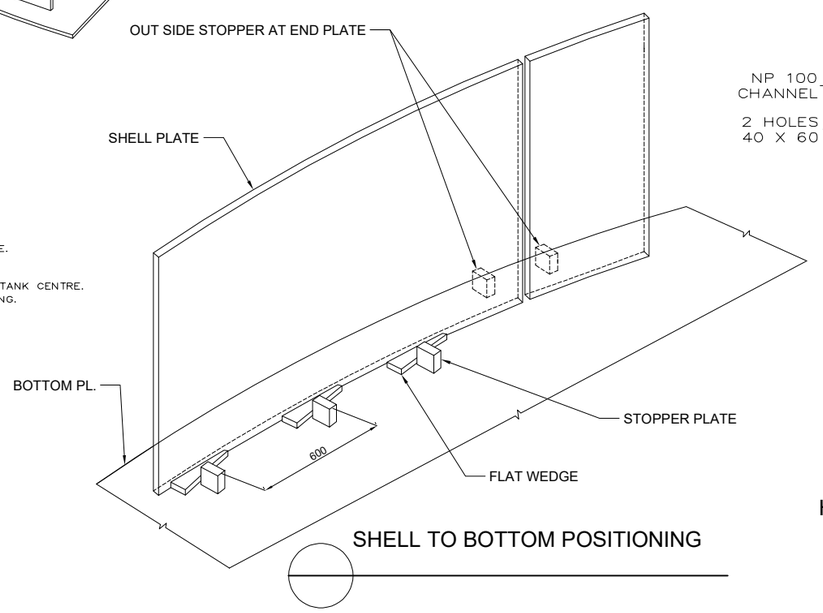
C - PLATE

PROCEDURE FOR SKETCH PLATES:
1. TACK SKETCH PLATES IN POSITION AND WELD A LIGHT PASS 230 MM IN LENGTH. WELDING IN TOWARDS THE TANK CENTRE. WELD AROUND OUTSIDE EDGE OF PLATE.
2. JOGGLE SKETCH PLATES – SEE ABOVE – UNTIL TOP OF PLATES ARE LEVEL. PLATES OVER 8 MM THICK WILL REQUIRE HEATING BEFORE HAMMERING DOWN.
3. COMPLETE BY A SECOND PASS OVER THE JOGGLE, AGAIN WELDING IN TOWARDS TANK CENTRE.
4. CLEAN OFF ANY WELD METAL IN WAY OF SHELL PLATES BY GRINDING OR CHIPPING.

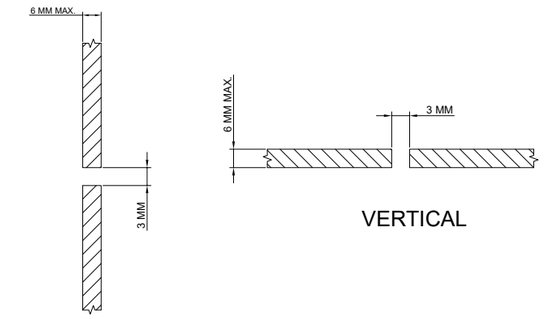
JOINTS IN BOTTOM PLATES OCCURING UNDER SHELL PLATES

PROCEDURE :
1. ERECT FIRST COURSE AND WELD VERTICAL SEAMS ①
2. TACK WELD HORIZONTAL SEAM BETWEEN FIRST AND SECOND COURSE ②
3. COMPLETE WELDING HORIZONTAL SEAM BETWEEN FIRST AND SECOUND COURSE ③
4. WELD LOWEST COURSE TO BOTTOM PLATES ④
5. COMPLETE WELDING SEQUENCE OUTERPART OF TANKBOTTOM. ⑤

NOTE :
DO NOT TACK HORIZONTAL SHELL SEAMS A HEAD OF ANY VERTICAL SEAMS NOT COMPLETED.
THE HORIZONTAL SEAM MAY BE TACKED BEYOND THE VERTICAL SEAM, PROVIDING THAT THE VERTICAL SEAM IS COMPLETE EXCEPT FOR FINISHING PASS.



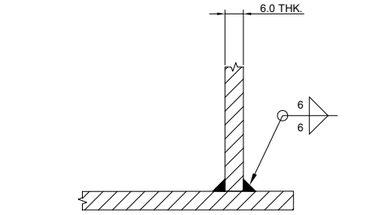
SHELL TO BOTTOM POSITIONING



HORIZONTAL

VERTICAL

SQUARE BUTT JOINT



SHELL TO BOTTOM JOINT

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101 SITIO TACLOBAN II
LUCANIN MARIVELES BATAAN
PHILIPPINES

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TANK 3 FIRST STRAKE INSTALLATION SEQUENCE

SCALE:	LOCATION:	DRAWING NO:	REV.
N T S	CHUUK, FSM	CHK-T3-019	0

Appendix G

Chuuk Tank 5 Drawing Package

I. TANK AND FOUNDATION DESIGN CRITERIA

DESIGN STANDARD	:	API STD. 650
SYSTEM OF UNITS	:	SI
PRODUCT STORED	:	JET A1
PRODUCT SPECIFIC GRAVITY	:	0.70
TANK DESIGN SPECIFIC GRAVITY	:	1.00
TEST SPECIFIC GRAVITY	:	1.00
NOMINAL DIAMETER	:	7.62 m
NOMINAL HEIGHT	:	10.97 m
MAX. FILL HEIGHT	:	10.29 m
NOMINAL TANK CAPACITY	:	469.74m^3
MAX. PUMPING RATE:		
IN	:	-
OUT	:	-
DESIGN METAL TEMPERATURE	:	10 °C
MAX. DESIGN TEMPERATURE	:	90 °C
DESIGN PRESSURES :		
INTERNAL	:	7.5 mbar
EXTERNAL	:	7.5 mbar
OPERATING PRESSURES:		
INTERNAL	:	1.6 mbar
EXTERNAL	:	1.6 mbar
CORROSION ALLOWANCE:		
BOTTOM (NEW)	:	2.0 mm
SHELL (EXISTING)	:	-
ROOF (EXISTING)	:	-
STRUCTURAL (EXISTING)	:	-
LOADINGS:		
ROOF LOADS		
UNIFORM LIVE	:	1.0 KPA
SNOW LOAD	:	0.0 KPA
SEISMIC LOAD		
DESIGN CODE	:	API 650 12TH EDITION 2013 ANNEX E ASCE 7 - 2016
SEISMIC GROUP	:	III
SITE CLASS	:	D
TRANSITION PERIOD	:	4
SPECTRAL ACC. (S_s)	:	0.25
SPECTRAL ACC. (S_1)	:	0.10
WIND LOADS		
DESIGN	:	API 650 12TH EDITION 2013 ASCE 7-16
VELOCITY	:	50 m/sec
WIND FACTOR	:	1.0
EXPOSURE CATEGORY	:	D
TANK VENT	:	API 2000
FOUNDATION		
DESIGN	:	API 650 12TH EDITION 2013 ASCE-7 2016
SAFE BEARING PRESSURE	:	200 KPa
TYPE	:	EARTH W/ CONCRETE RINGWALL
LEAK DETECTION	:	LEAK DETECTION WELL
LEAK PREVENTION BARRIER	:	HDPE LINING

II. MATERIAL SPECIFICATION

TANK		
BOTTOM PLATES	:	8 mm THK. ASTM A36 FULLY KILLED
ROOF PLATES (EXISTING)	:	5 mm THK. C.S. W/ UNKNOWN SPECS.
SHELL PLATES (EXISTING)	:	6 mm THK. C.S. W/ UNKNOWN SPECS.
ANCHOR CHAIR	:	8 mm THK. ASTM A36 FULLY KILLED
REINFORCING PLATES	:	6 mm THK. ASTM A36 FULLY KILLED
SHELL MANHOLE		
NECK	:	10 mm THK. ASTM A36 FULLY KILLED
FLANGE	:	12 mm THK. ASTM A36 FULLY KILLED
COVER	:	16 mm THK. ASTM A36 FULLY KILLED
SHELL NOZZLE PIPE	:	SCH. 80 ASTM A106-B
ROOF NOZZLE PIPE	:	SCH.40 ASTM A106-B
INTERNAL PIPING	:	SCH. 40 ASTM A106-B
NOZZLE FLANGES	:	ASTM A105
MANHOLE GASKET	:	GRAPHITE SHEET - 3 mm THK
NOZZLE GASKET	:	SPW GRAPHITE SS316
FOUNDATION		
CEMENT	:	ASTM C150, TYPE 2 / ASTM C595, TYPE 1
AGGREGATES	:	ASTM C33
STRUCTURAL CONCRETE	:	28 MPa (4,000 PSI) MIN. COMPRESSIVE STRENGTH @ 28 DAYS
REINFORCING BAR	:	ASTM A615 GRADE 60
ANCHOR BOLTS	:	ASTM F1554 GRADE 55
NUTS	:	ASTM A563, GRADE DH
HARDENED STEEL WASHER	:	ASTM F436
TIE WIRE	:	#16 GALVANIZED

III. CONCRETE (SITE MIX)

CEMENT-SAND-GRAVEL RATIO	:	CLASS AA (1 : 1.5 : 3)
CEMENT	:	PORTLAND - 50 KG. PER BAG
MAX. COARSE AGGREGATE SIZE	:	1"
MAX. WATER-CEMENT RATIO	:	28 LITERS PER BAG
MAX. SLUMP	:	100 mm
WATER	:	FRESH
TEST SAMPLES	:	MINIMUM OF 3 SAMPLES EACH DAY'S POUR
TESTING	:	1 SAMPLE @ 7 DAYS AND 2 SAMPLES @ 28 DAYS

IV. CONCRETE COVER TO REBARS : 50 mm

V. CONCRETE CURING : CONTINUOUSLY WET FOR 7 DAYS

VI. BITUMEN MIXED SAND : 10% NON-TOXIC BITUMEN
90% CLEAN DRY SAND

VII. STRUCTURAL STEEL

SHAPES AND PLATES	:	ASTM A36
WELDING ELECTRODES	:	AWS A5.1 E70XX

VIII. HYDRAULIC JACK

RATED LIFTING CAPACITY (PER JACK)	:	120 KN

IX. CORROSION PROTECTION

SHELL PAINT/COATING		
INTERIOR - FULLY COATED @ 500 MICRON TOTAL DFT		
PRIMER	:	EPOXY PRIMER
INTERMEDIATE	:	EPOXY MID COAT
TOP COAT	:	HIGH BUILD EPOXY TOP COAT
EXTERIOR - FULLY COATED @ 300 MICRON TOTAL DFT		
PRIMER	:	INORGANIC ZINC RICH PRIMER
INTERMEDIATE	:	EPOXY MID COAT
TOP COAT	:	HIGH BUILD ALIPHATIC POLYURETHANE 100 MICRON DFT
BOTTOM PLATE & SUMP UNDERSIDE		
UNDERSIDE	:	COAL TAR EPOXY - FULL COAT @ 300 MICRON TDFT
TOP SIDE	:	FULLY COATED SAME AS SHELL INTERIOR
FIXED ROOF		
INTERIOR	:	FULLY COATED SAME AS SHELL INTERIOR
EXTERIOR	:	FULLY COATED SAME AS SHELL EXTERIOR

X. NON-DESTRUCTIVE TESTING

WELDING EXAMINATION	:	PER API STD 653 5TH EDITION 2014, ANNEX F
LEAK TEST / HYDROSTATIC TEST	:	PER API STD 650 12TH EDITION 2013

XI. NOTES

1. THE CONTRACTOR SHALL VERIFY THE DIMENSION AND CONDITION AT THE JOB SITE PRIOR TO WORK EXECUTION OR FABRICATION.
2. TEMPORARY BRACING SHALL BE PROVIDED DURING TANK LIFTING.
3. EXISTING FACILITIES DAMAGED DURING CONSTRUCTION / INSTALLATION SHALL BE RESTORED BACK TO ITS ORIGINAL CONDITION.
4. SHORING SHALL BE PROVIDED FOR ALL EXCAVATION WHEREVER IS NECESSARY TO AVOID COLLAPSING OF THE EXCAVATED SIDES.
5. STRUCTURAL FILL UNDER THE TANK AND FOUNDATION SHALL BE AS SPECIFIED IN THE DRAWINGS AND SHALL BE COMPACTED TO AT LEAST 95% OF MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE DETERMINED AS PER ASTM D1557.
6. GENERAL FILL OTHER THAN SPECIFIED STRUCTURAL FILL AND CONSIST OF SUITABLE MATERIAL THAT CAN BE COMPACTED TO AT LEAST 90% OF MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE DETERMINED AS PER ASTM D1557.
7. ALL FILLS SHALL BE COMPACTED IN LAYERS OF 200 mm PRIOR LAYING THE NEXT LAYER.

XI. NOTES (CONT.)

8. ALL EMBEDDED ITEMS, SHALL BE PUT IN PLACE PRIOR TO CONCRETE POURING.
9. TEMPLATES FOR ANCHOR BOLT SETTING SHALL BE INSTALLED AND SUPPORTED AGAINST DISPLACEMENT.
10. REINFORCEMENT SPACING SHOWN IN THE DRAWINGS ARE MAXIMUM. WHEN REINFORCEMENT SPACING IS NOT PROVIDED IN THE DRAWINGS, BARS SHALL BE EQUALLY SPACED.
11. MINIMUM LAP LENGTH OF REINFORCEMENT SHALL BE 51 x BAR DIAMETER.
12. BOLT HOLE SHALL BE 2 mm LARGER THAN BOLT DIAMETER, UNLESS SPECIFIED OTHERWISE.
13. ALL ANCHOR BOLTS SHALL BE UNIFORMLY TIGHTENED TO A SNUG TIGHT FIT.

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TESTPLUS QUALITY CONTROL SERVICES
101 SITIO TACLOBAN II
LUCANIN MARIVELES BATAAN
PHILIPPINES

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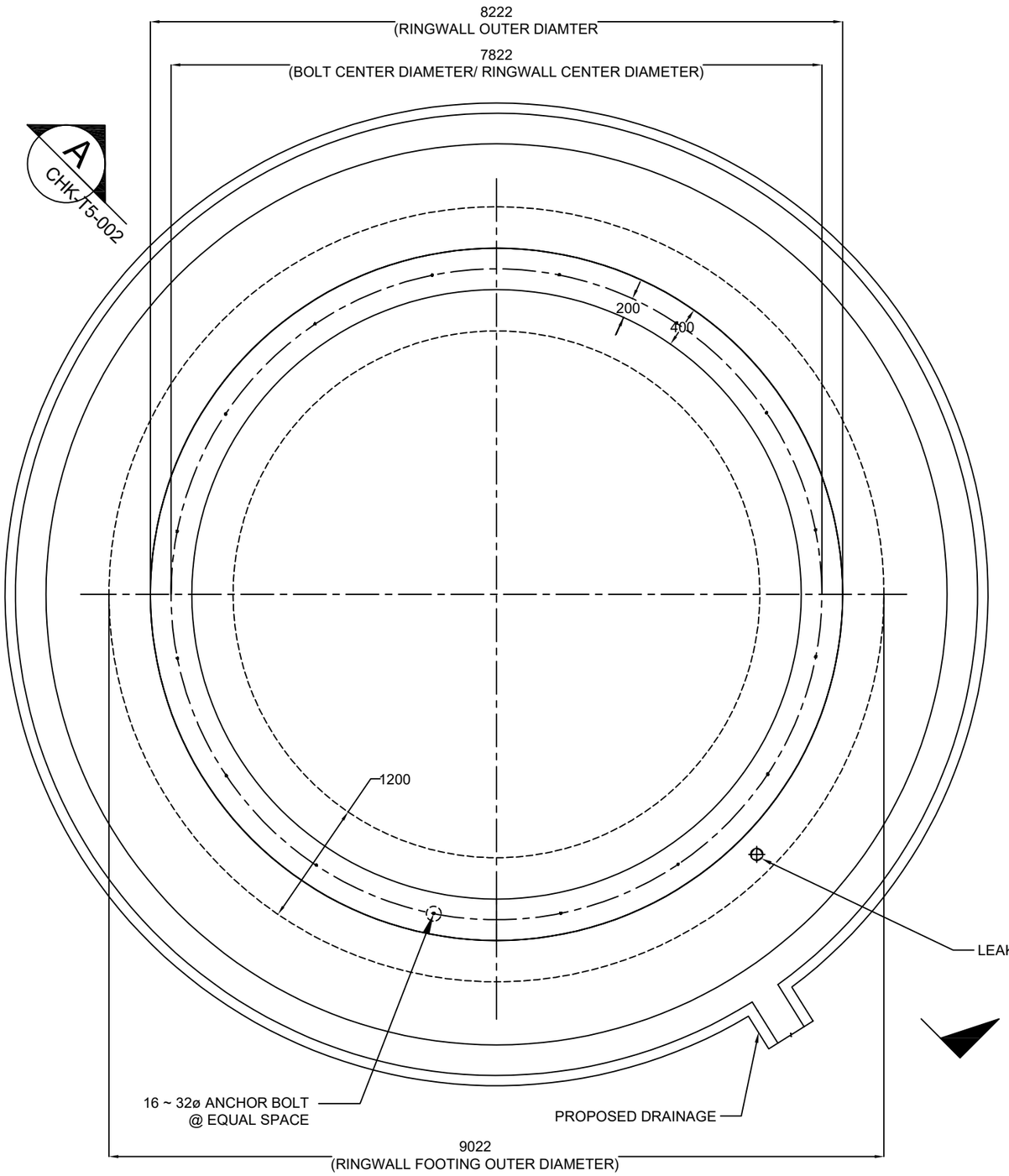
0	3.17.25	JBS			ISSUED FOR TECHNICAL REVIEW

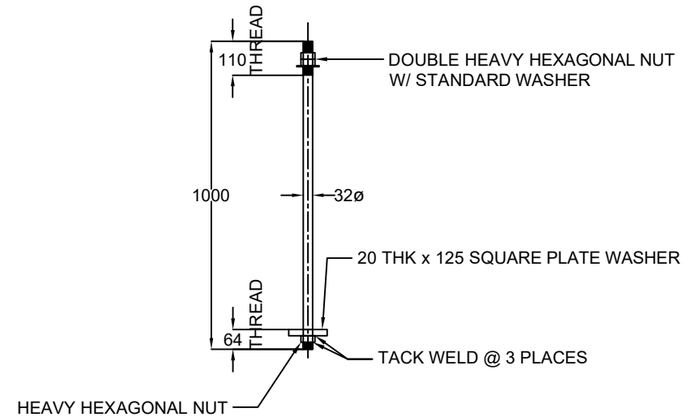
POHNPEI BULK PLANT
PO BOX 116
KOLONLA, POHNPEI
FM 96941
TEL: +631 320 2500,
FAX: +691 320 408

TANK NO.5
GENERAL SPECIFICATION

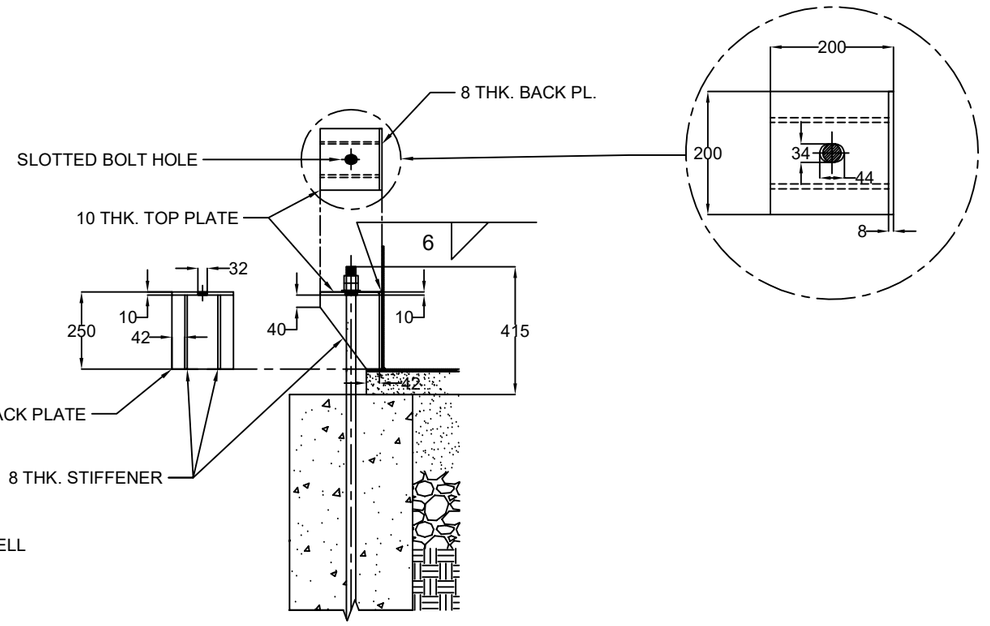
SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-000	0



A FOUNDATION LAYOUT PLAN
SCALE: NTS



ANCHOR BOLT DETAIL
SCALE: NTS



ANCHOR CHAIR DETAIL
SCALE: NTS

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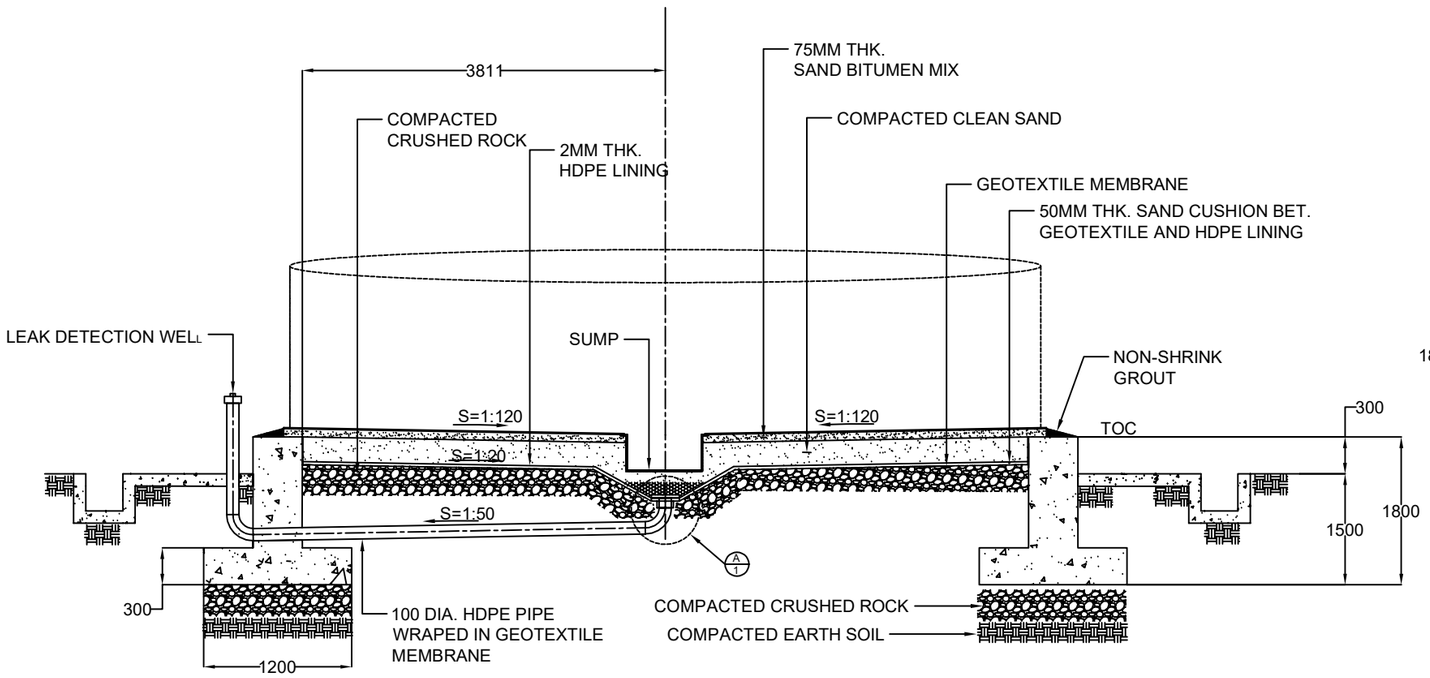
TANK NO.5 FOUNDATION LAYOUT & ANCHORAGE DETAILS

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-001	0



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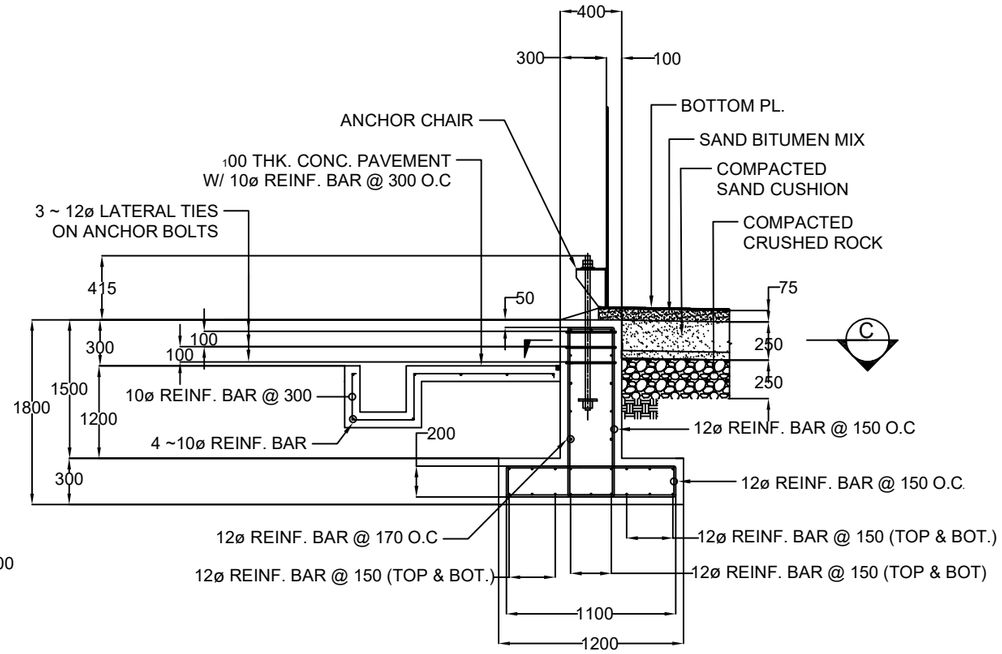

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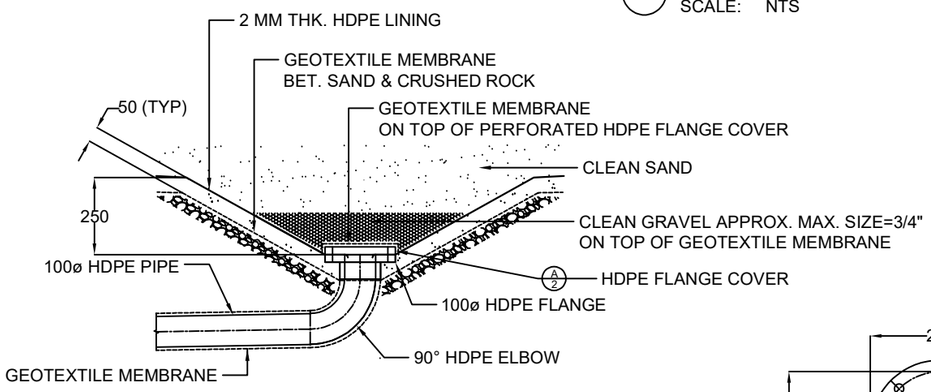

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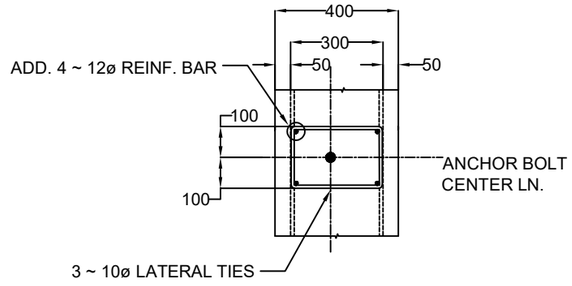
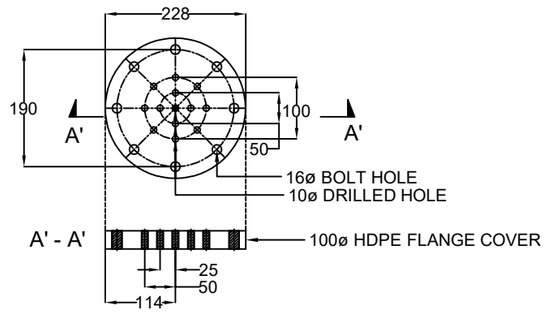


C SECTION
SCALE: 1:10



A2 HDPE FLANGE COVER DETAIL
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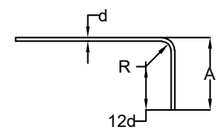

d	R	A
10	28	148
12	38	182

DETAIL OF STD. 90° HOOK
SCALE: N T S

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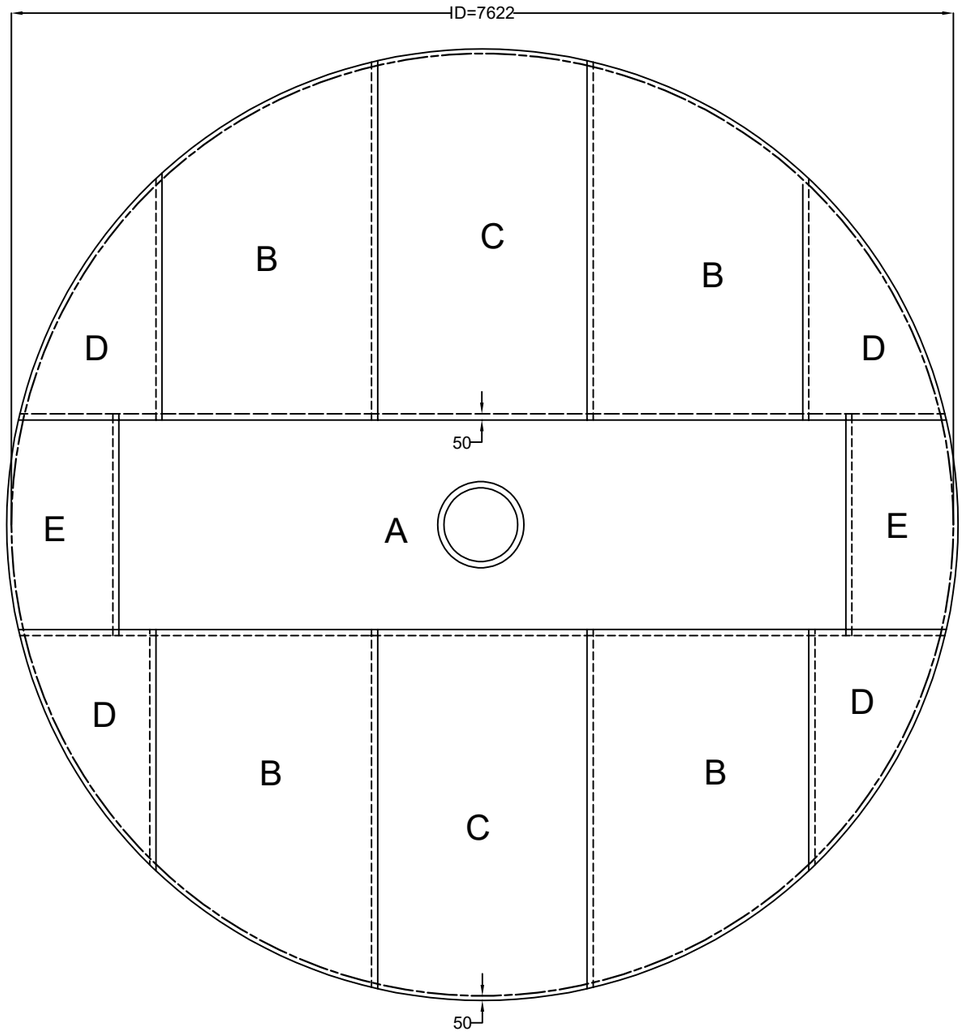
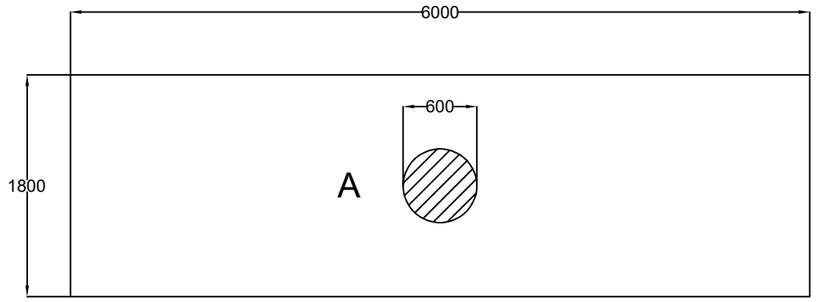
TANK NO.5 FOUNDATION DETAILS

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-002	0



BOTTOM DEVELOPMENT PLAN

SCALE: NTS



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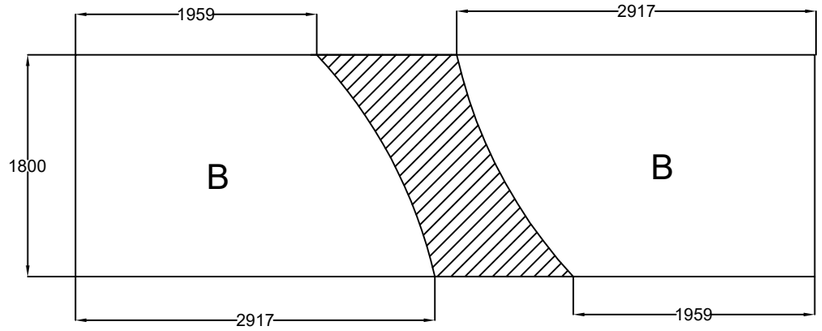

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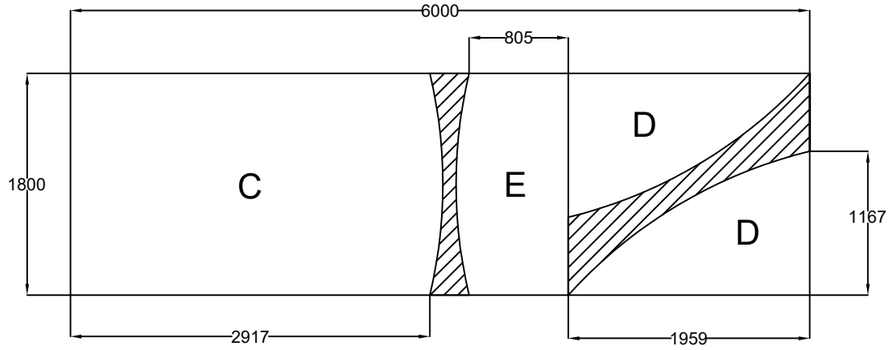
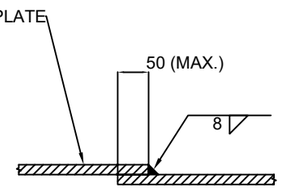


QTY - 2

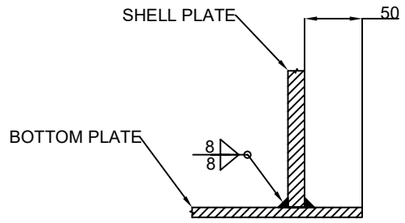
NOTE: PLATE CURVED SECTION CUT TO FIT BOTTOM RADIUS

TOTAL PLATES = 5 SHT. 8 x 1800 x 6000



LAP-WELDED BOTTOM JOINT DETAILS

SCALE: 1:5



SHELL TO BOTTOM JOINT DETAILS

SCALE: 1:5

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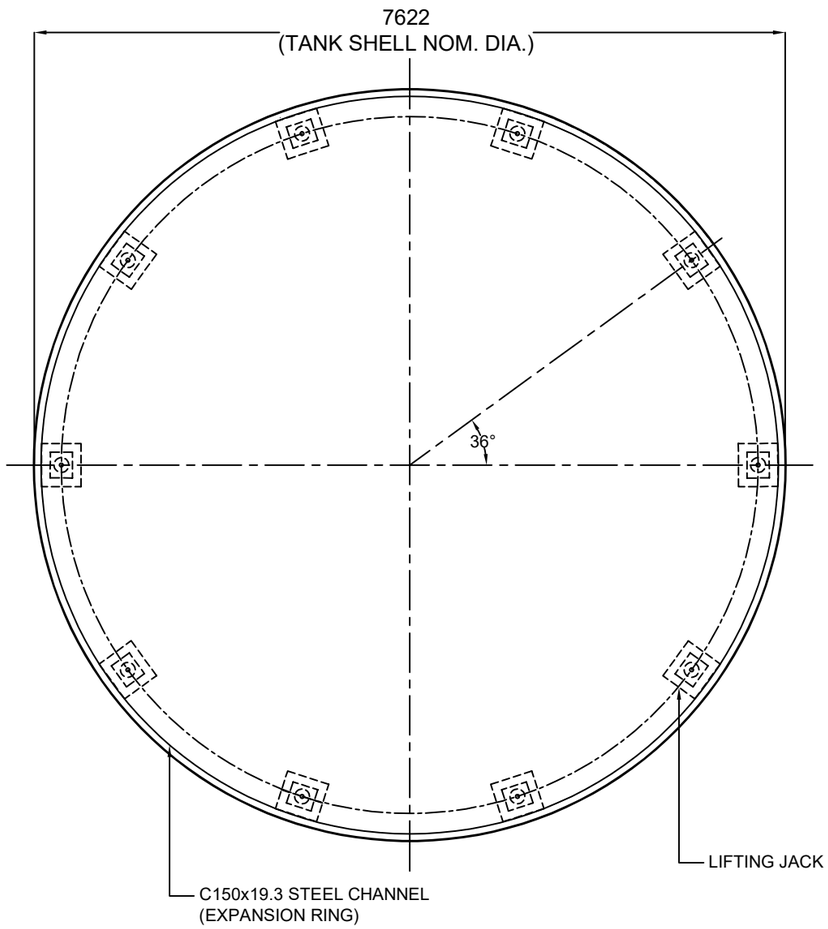
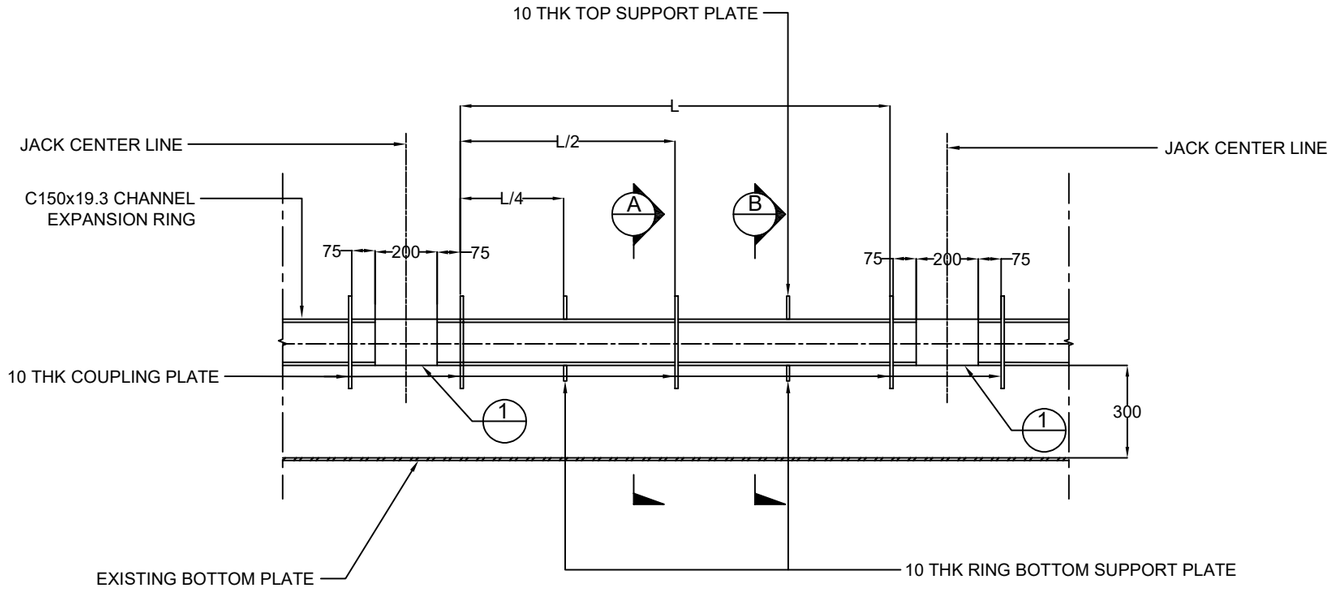
TANK NO.5 NEW BOTTOM LAYOUT & PLATE CUTTING PLAN

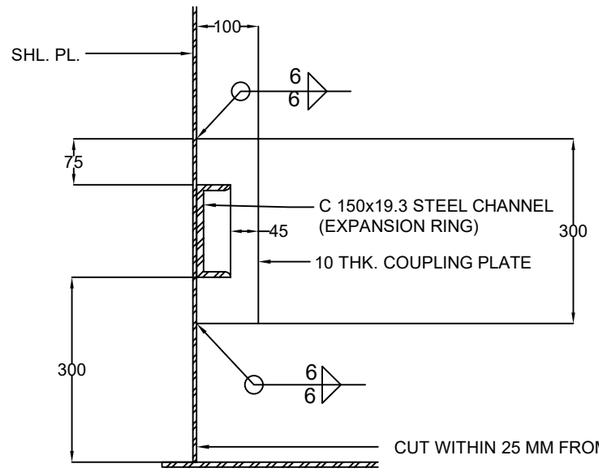
SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-003	1



TANK LIFTING PLAN
SCALE: NTS



EXPANSION RING LONGITUDINAL SECTION
SCALE: 1:20



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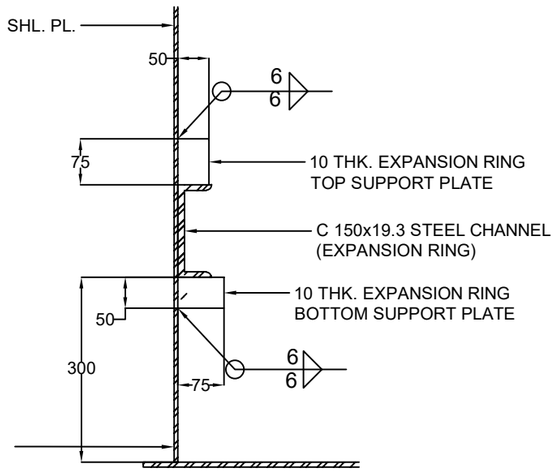
SCALE: 1:10



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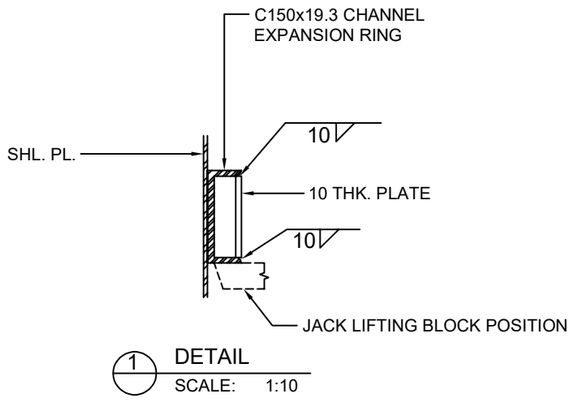

1 DETAIL
SCALE: 1:10

NOTE:
INSTALL EXPANSION RING PRIOR CUTTING OF SHELL TO BOTTOM

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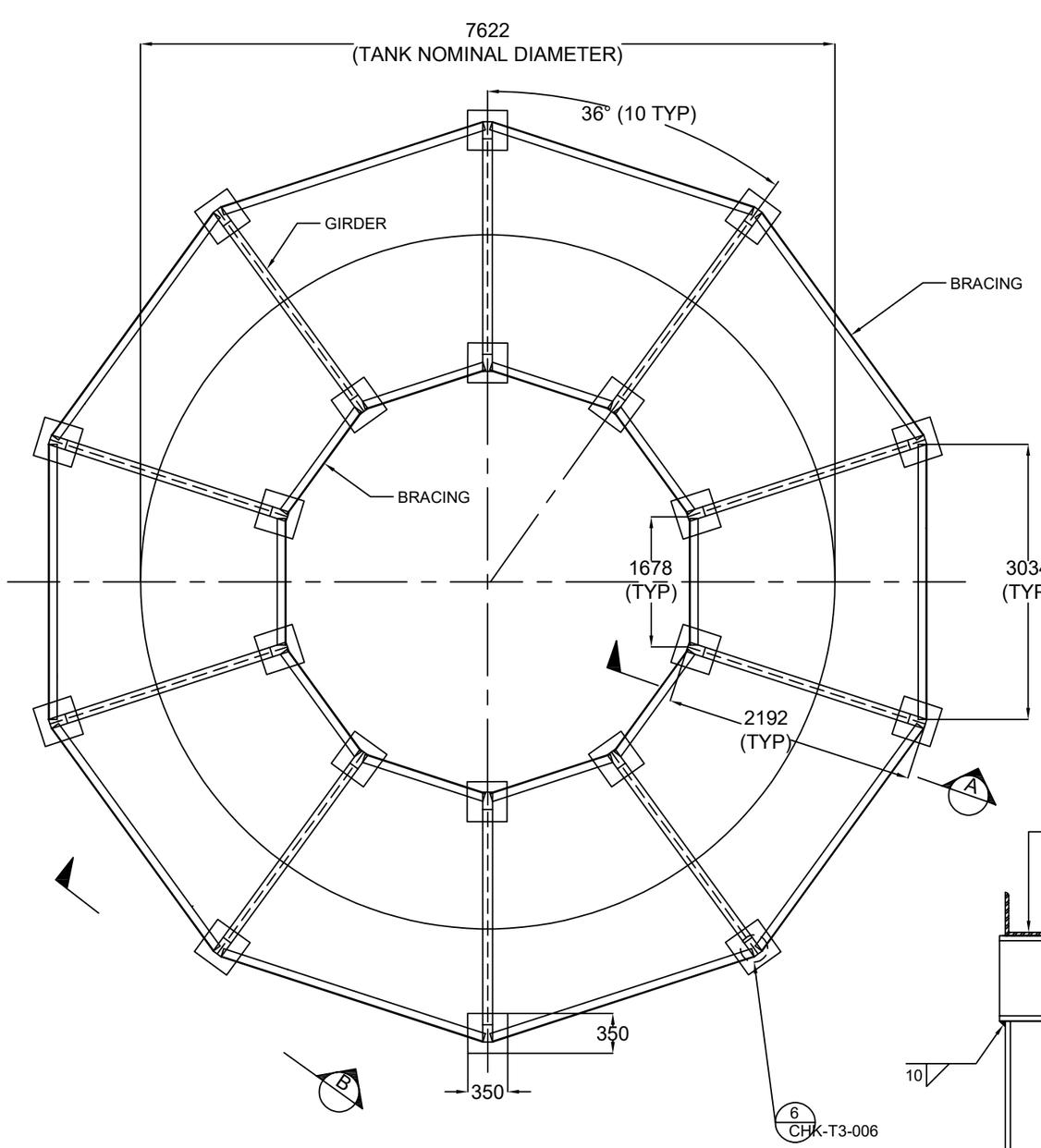
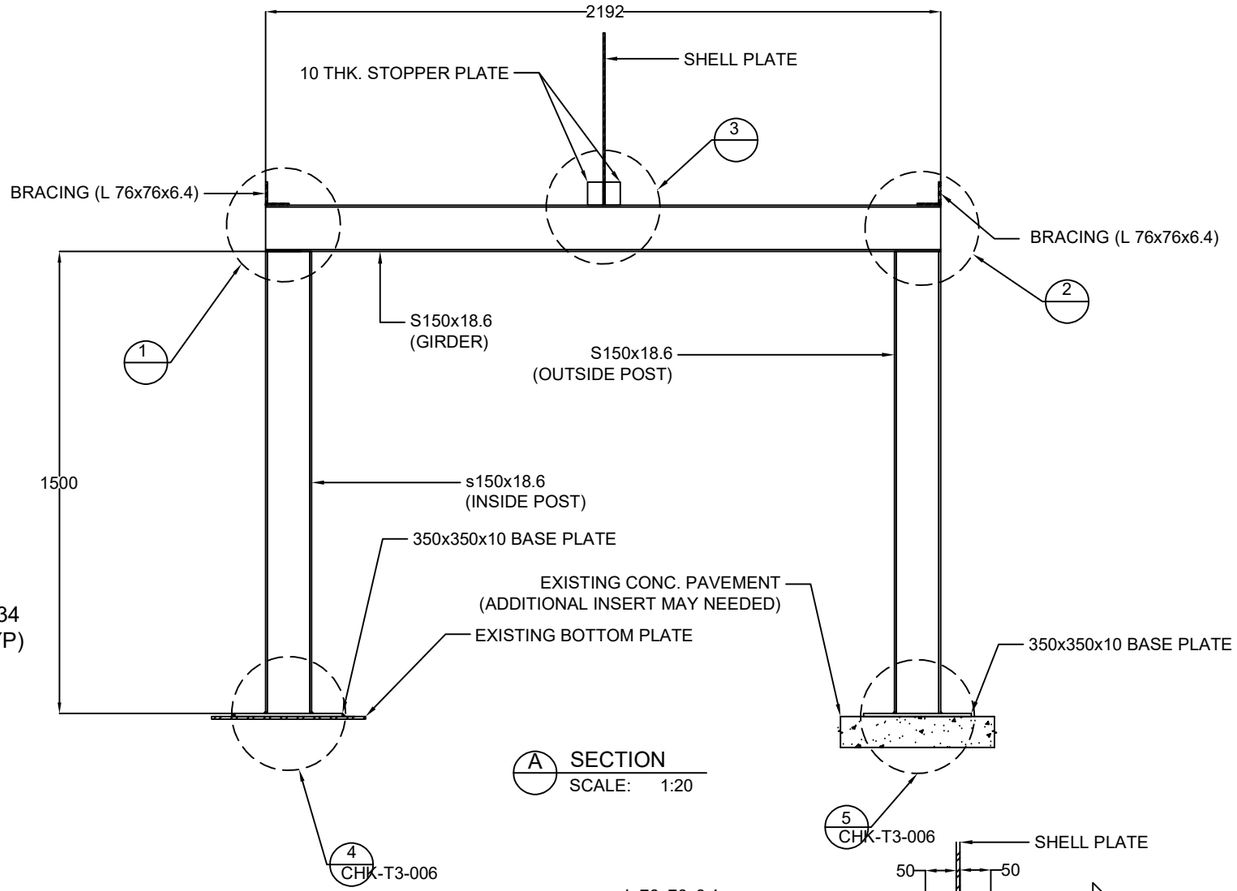
FAX: +691 320 408

TANK NO.5 LIFTING PLAN & EXPANSION RING DETAILS

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-004	0



TANK LIFTING SUPPORT PLAN
SCALE: NTS



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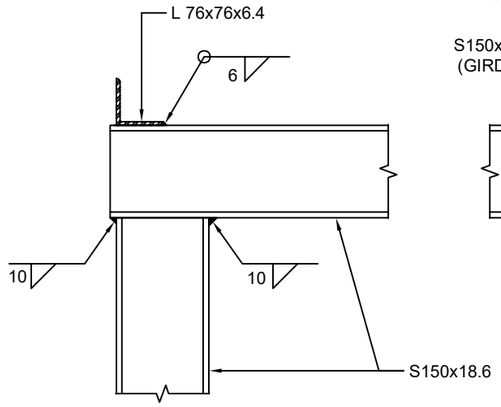
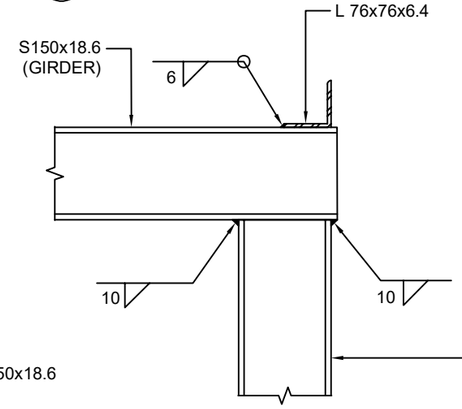
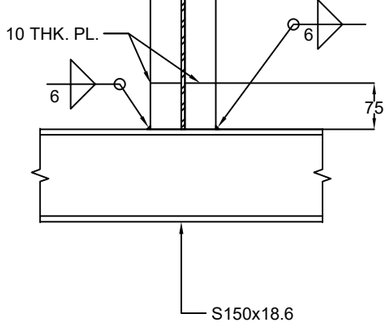
SCALE: 1:20



1 DETAIL
SCALE: 1:10



2 DETAIL
SCALE: 1:10



3 DETAIL
SCALE: 1:10

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TESTPLUS QUALITY CONTROL SERVICES
101 SITIO TACLOBAN II
LUCANIN MARIVELES BATAAN
PHILIPPINES

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POHNPEI BULK PLANT
PO BOX 116
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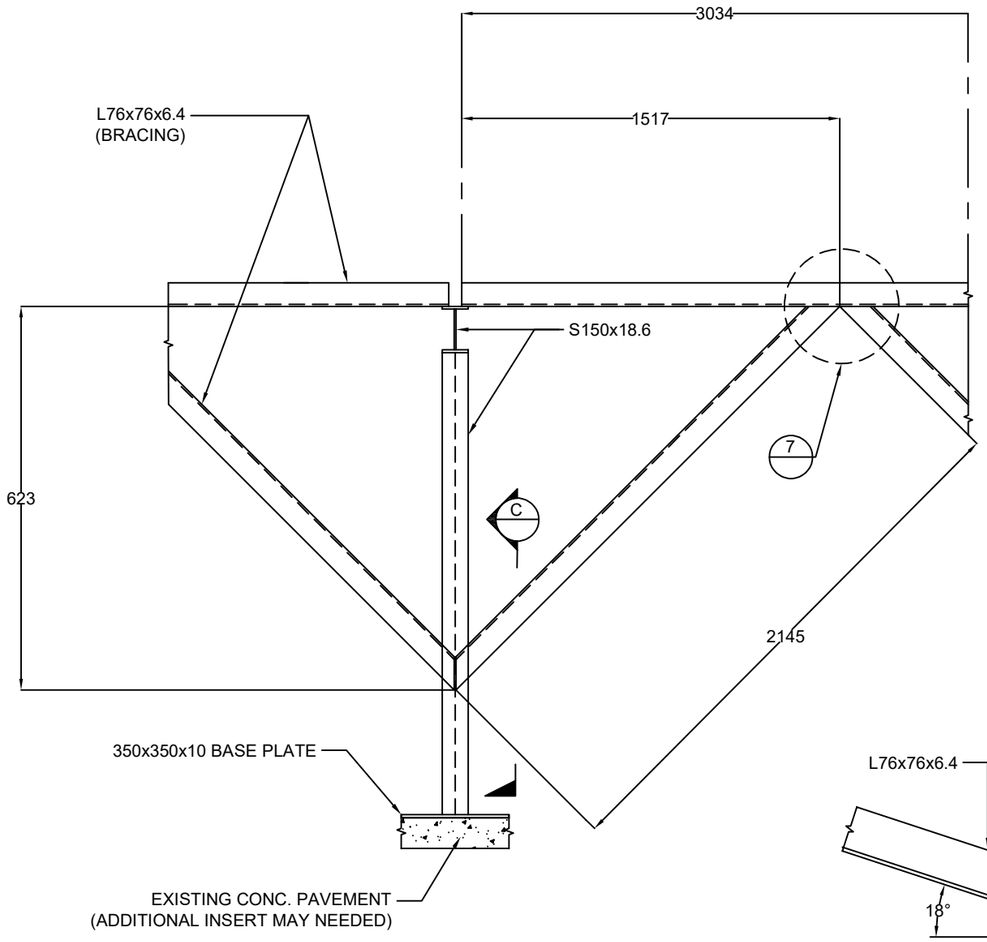
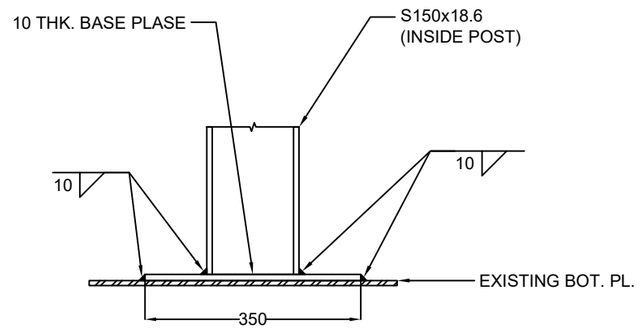
TEL: +631 320 2500,
FAX: +691 320 408

TANK NO.5 LIFTING SUPPORT PLAN & DETAILS

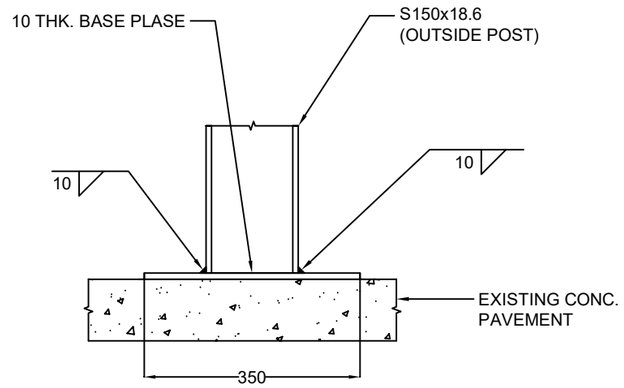
SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-005	0



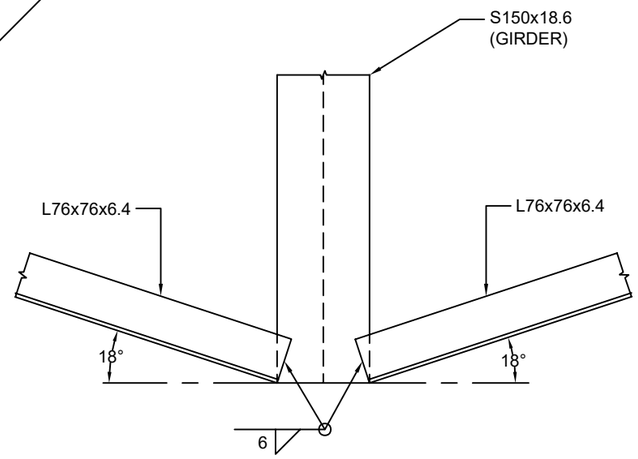
B SECTION
CHK-T5-005 SCALE: NTS



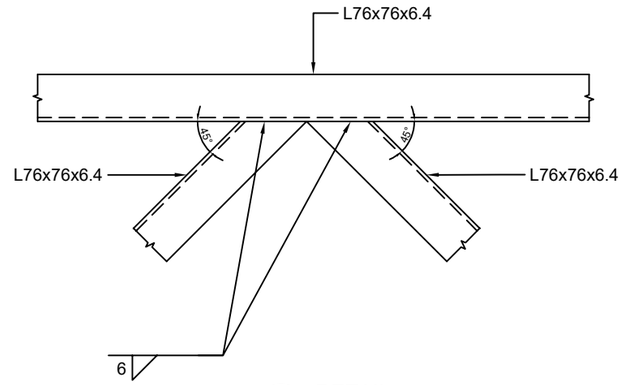
4 DETAIL
CHK-T5-005 SCALE: 1:10



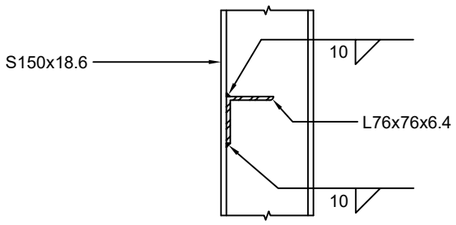
5 DETAIL
CHK-T5-005 SCALE: 1:10



6 DETAIL
CHK-T5-005 SCALE: 1:10



7 DETAIL
SCALE: 1:10



C SECTION
SCALE: 1:10

ISSUED FOR TECHNICAL REVIEW

TESTPLUS QUALITY CONTROL SERVICES
101 SITIO TACLOBAN II
LUCANIN MARIVELES BATAAN
PHILIPPINES

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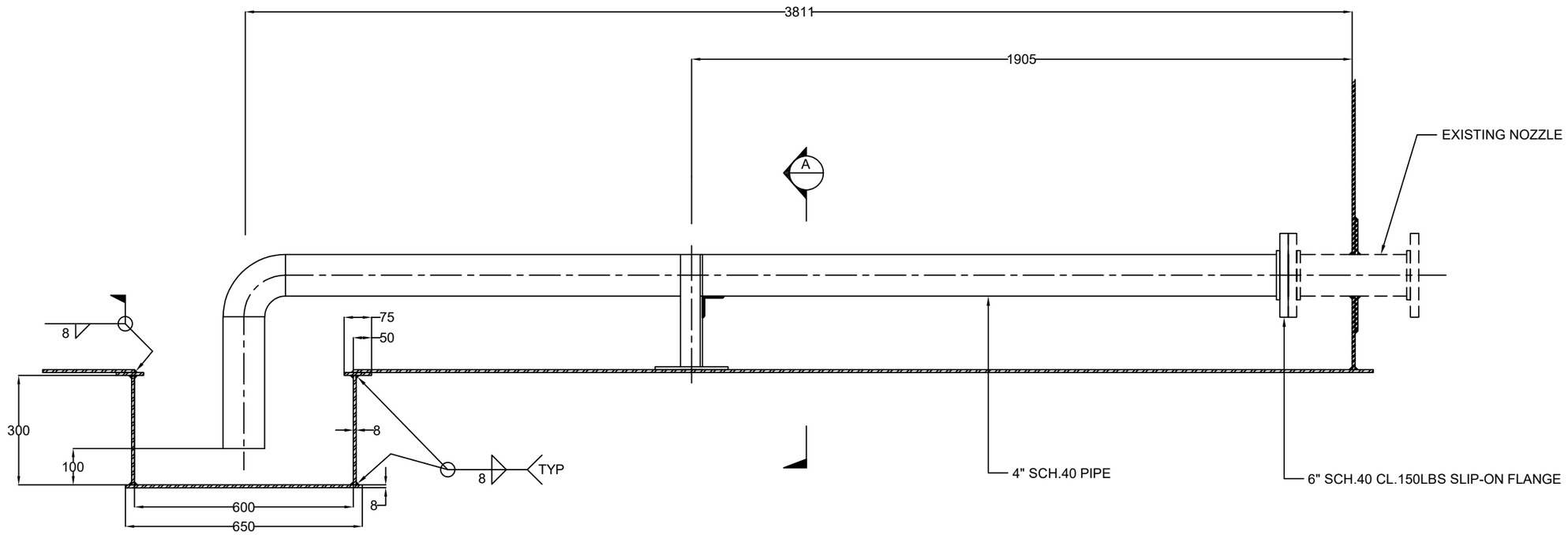
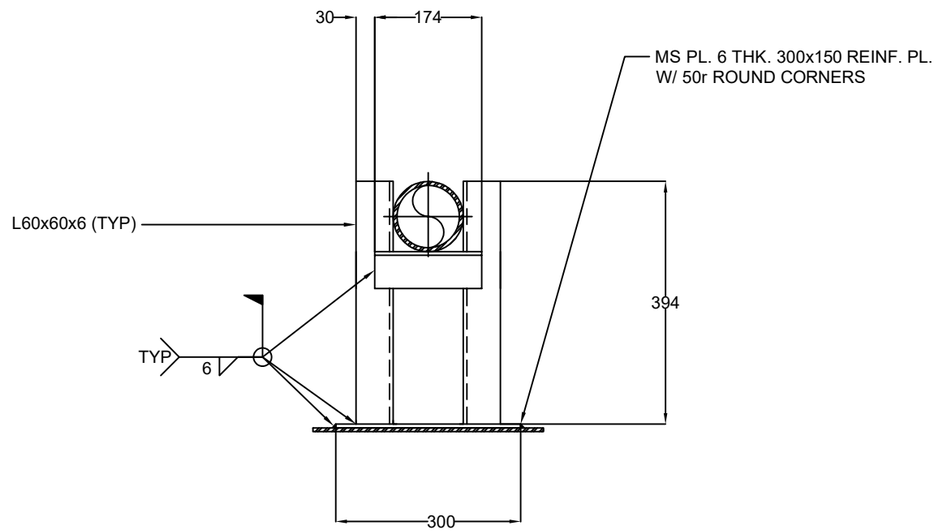
PO BOX 116
KOLONLA, POHNPEI
FM 96941
TEL: +631 320 2500,
FAX: +691 320 408

TANK NO.5 LIFTING SUPPORT DETAILS

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-006	0



WATER DRAW-OFF PIPE & SUMP DETAILS
SCALE: NTS



A SECTION
SCALE: 1:10

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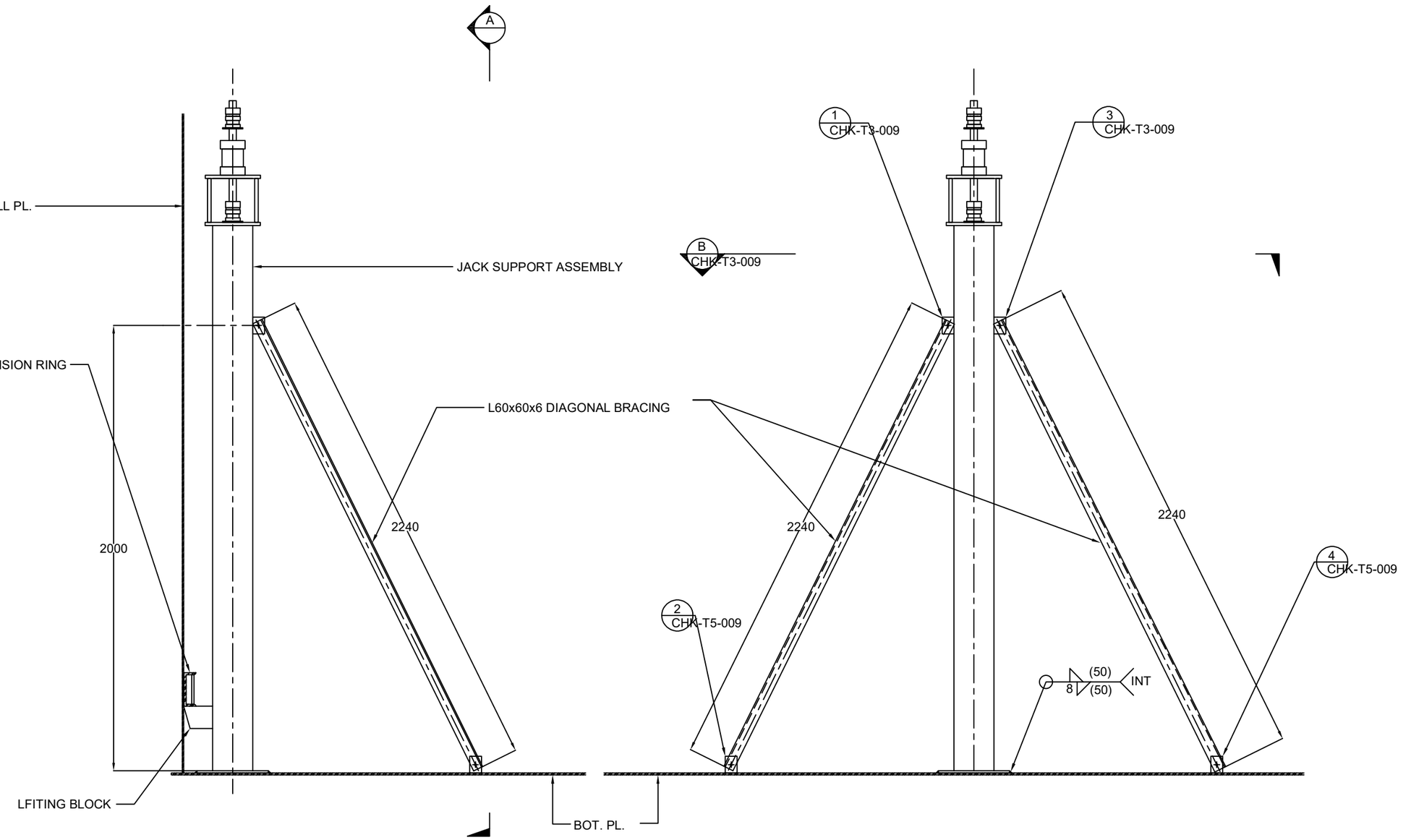
TANK NO.5 WATER DRAW-OFF PIPE & SUMP DETAILS

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-007	0



SIDE ELEVATION
SCALE: 1:20

A SECTION
SCALE: 1:20

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101 SITIO TACLOBAN II
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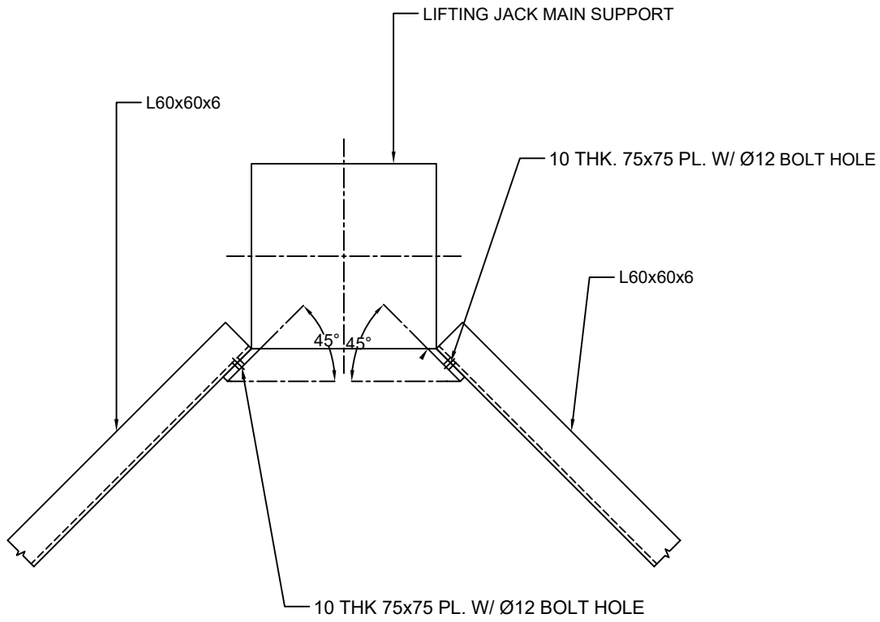
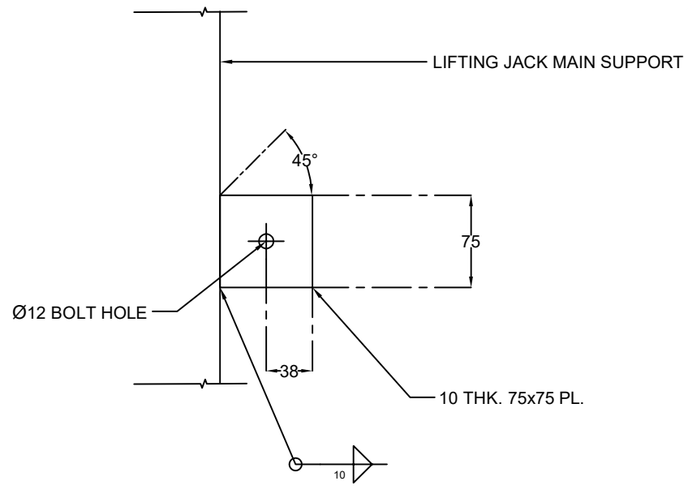
TANK NO.5 LIFTING JACK SUPPORT ASSEMBLY

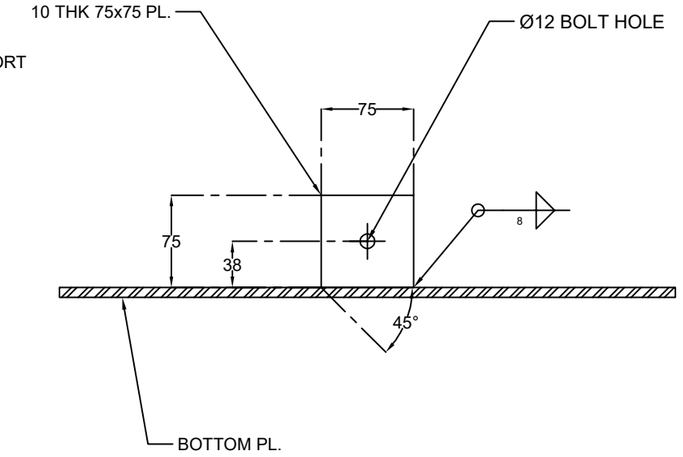
SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-008	0



B SECTION
CHK-T5-008 SCALE: 1:10



1,3 DETAILS
CHK-T5-008 SCALE: 1:5



2,4 DETAILS
CHK-T5-008 SCALE: 1:5

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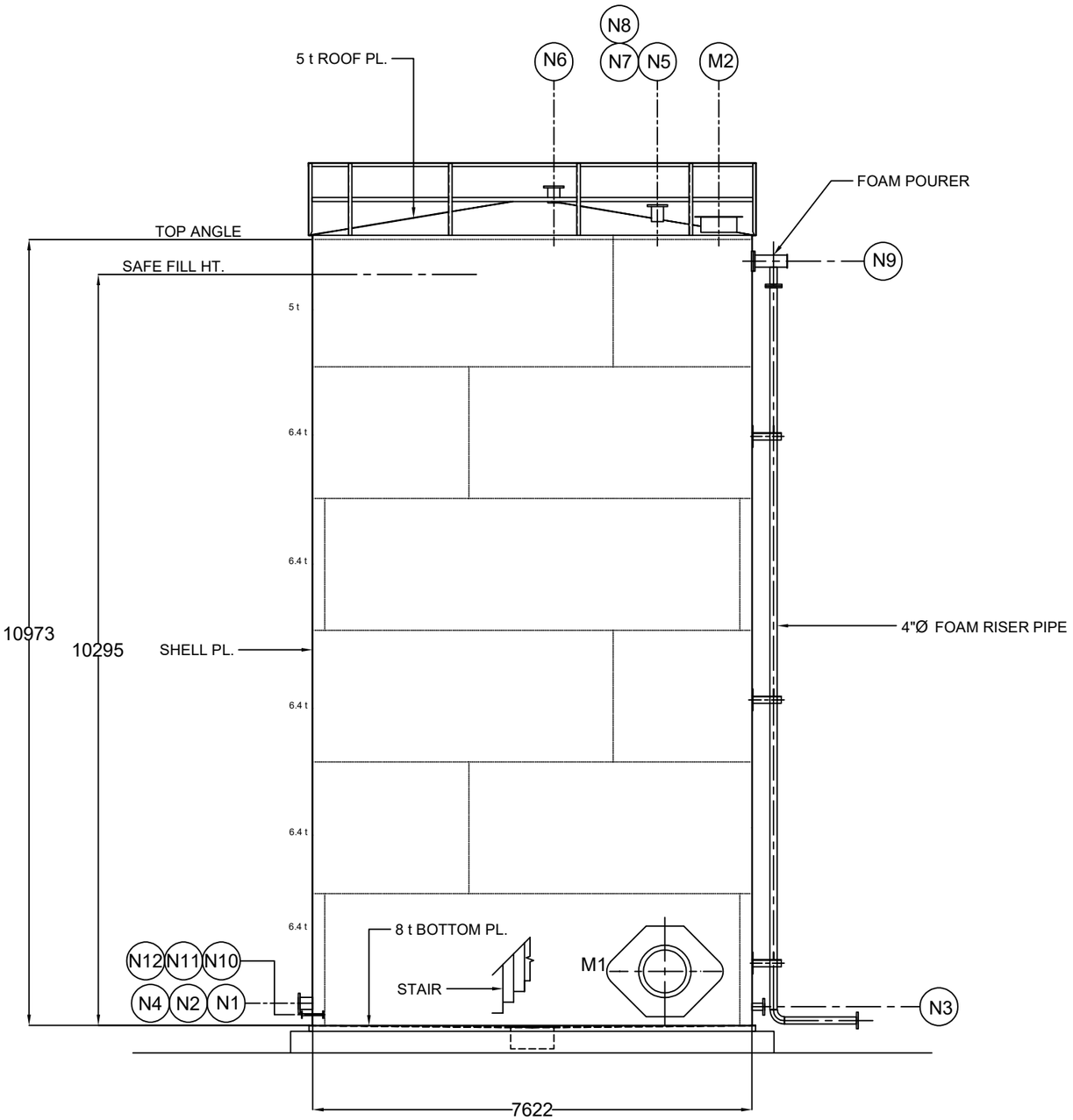
TANK NO.5 LIFTING JACK BRACING CONNECTION

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-009	0



ELEVATION
SCALE: NTS

NOZZLE SCHEDULE

NOZ. NO.	DIA. / SCH.	FLANGE RATING	NOZ. HT.	FL. PROJ	SERVICE
N1	6" / CS XS	150# RF	306	200	SPARE
N2	6" / CS XS	150# RF	306	200	OUTLET
N3	4" / CS XS	150# RF	259	175	WATER DRAW OFF
N4	6" / CS XS	150# RF	306	200	INLET
N5	6" / CS STD	150# RF	-	150	GAUGE HATCH 1
N6	8" / CS STD	150# RF	-	150	FREE VENT
N7	6" / CS STD	150# RF	-	150	GAUGE HATCH 2
N8	6" / CS STD	150# RF	-	150	PV VENT
N9	4" / CS STD	150# RF	10613	-	NEW FOAM LINE
N10	3/4" / SS XS	150# RF	150	150	NEW SAMPLE PT. (TOP)
N11	3/4" / SS XS	150# RF	150	150	NEW SAMPLE PT. (MID)
N12	3/4" / SS XS	150# RF	150	150	NEW SAMPLE PT. (BOT)
M1	600 / t 6.4	6	750	125	SHELL MANHOLE
M2	500 / t 6.4	6	-	150	ROOF MANHOLE

NOTES:

1. DRAWN BASED FROM INSPECTION REPORT LAYOUT
2. VERIFY ACTUAL DIMENSION AT SITE FOR FOAM POURER CLEARANCE AGAINST SAFE FILL. HT.
3. NOZZLE ACTUAL DIMENSION AND ORIENTATION TO BE VERIFIED AT SITE.
4. NEW SAMPLING NOZZLE ORIENTATION TO BE DETERMINE AT SITE TO SUIT THE PURPOSE.

ISSUED FOR TECHNICAL REVIEW

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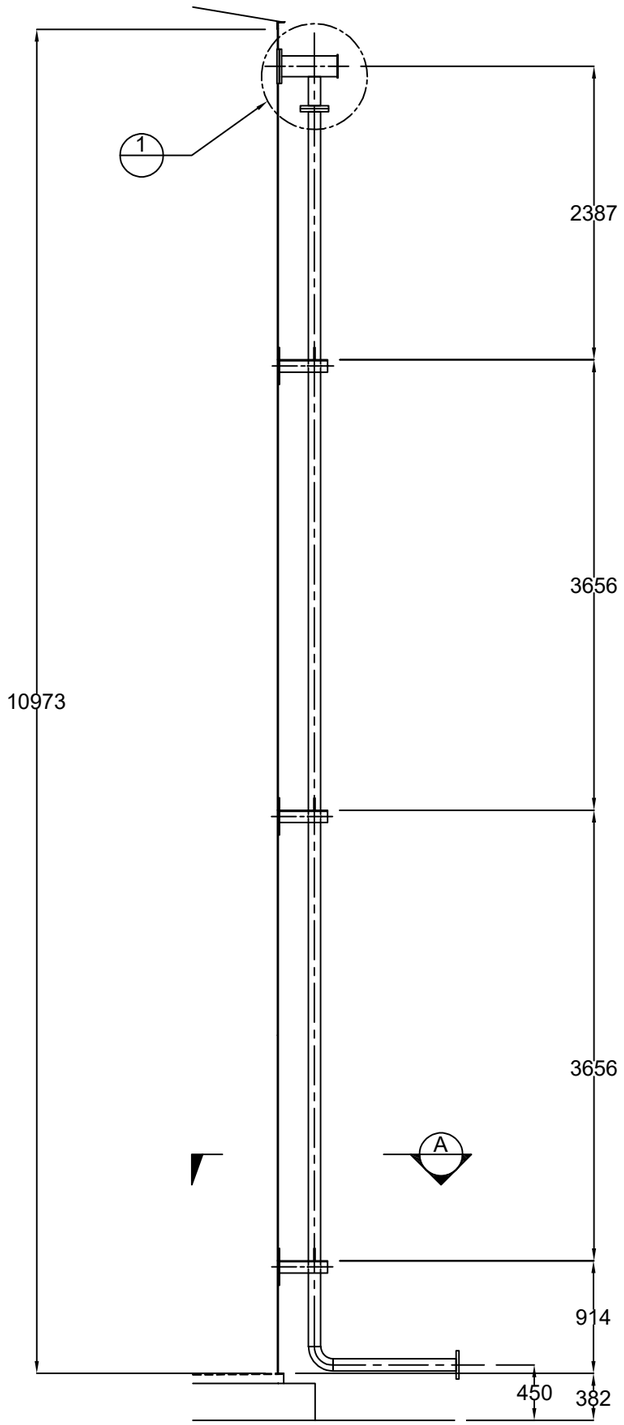
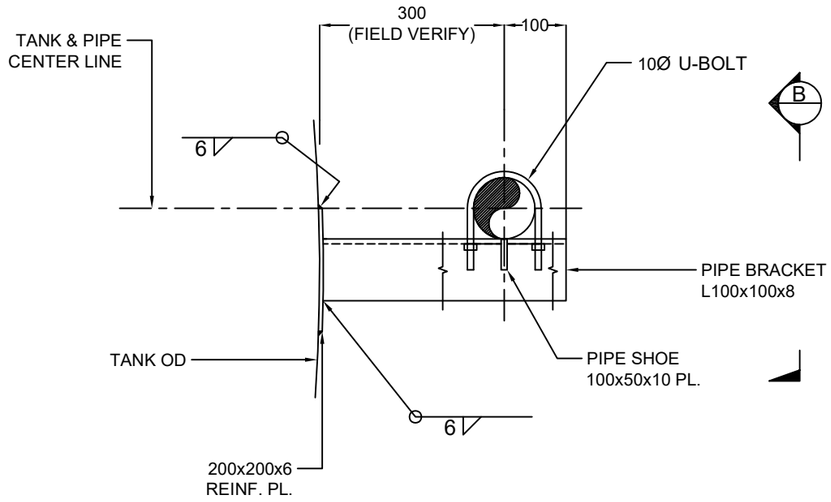
TANK NO.5 GENERAL ASSEMBLY

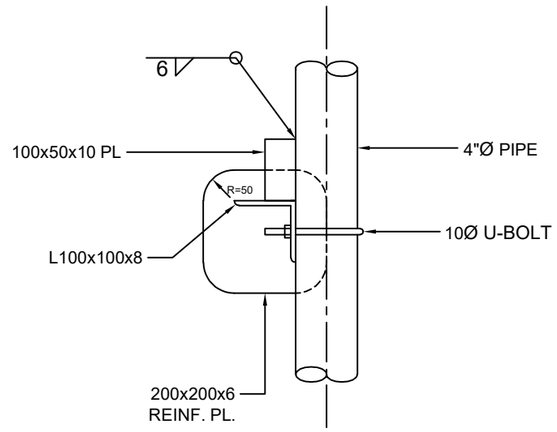
SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-010	0



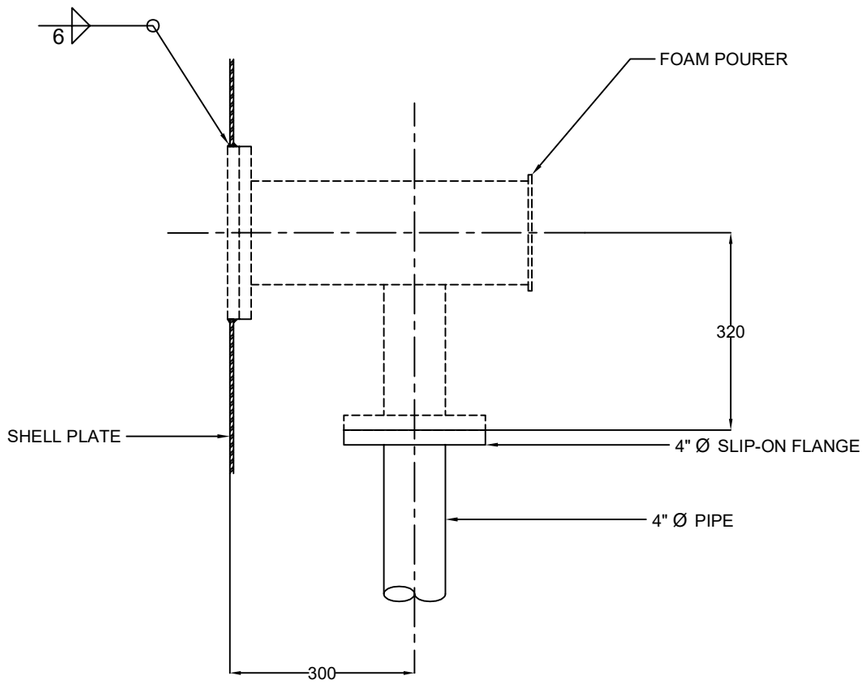
PIPE RISER ELEVATION
SCALE: NTS



A SECTION (TYP. @ 3 - BRACKET)
SCALE: 1:10



B SECTION (TYP. @ 3 - BRACKET)
SCALE: 1:10



1 DETAIL
SCALE: 1:10

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CONTROL SERVICES
101 SITIO TACLOBAN II
LUCANIN MARIVELES BATAAN
PHILIPPINES

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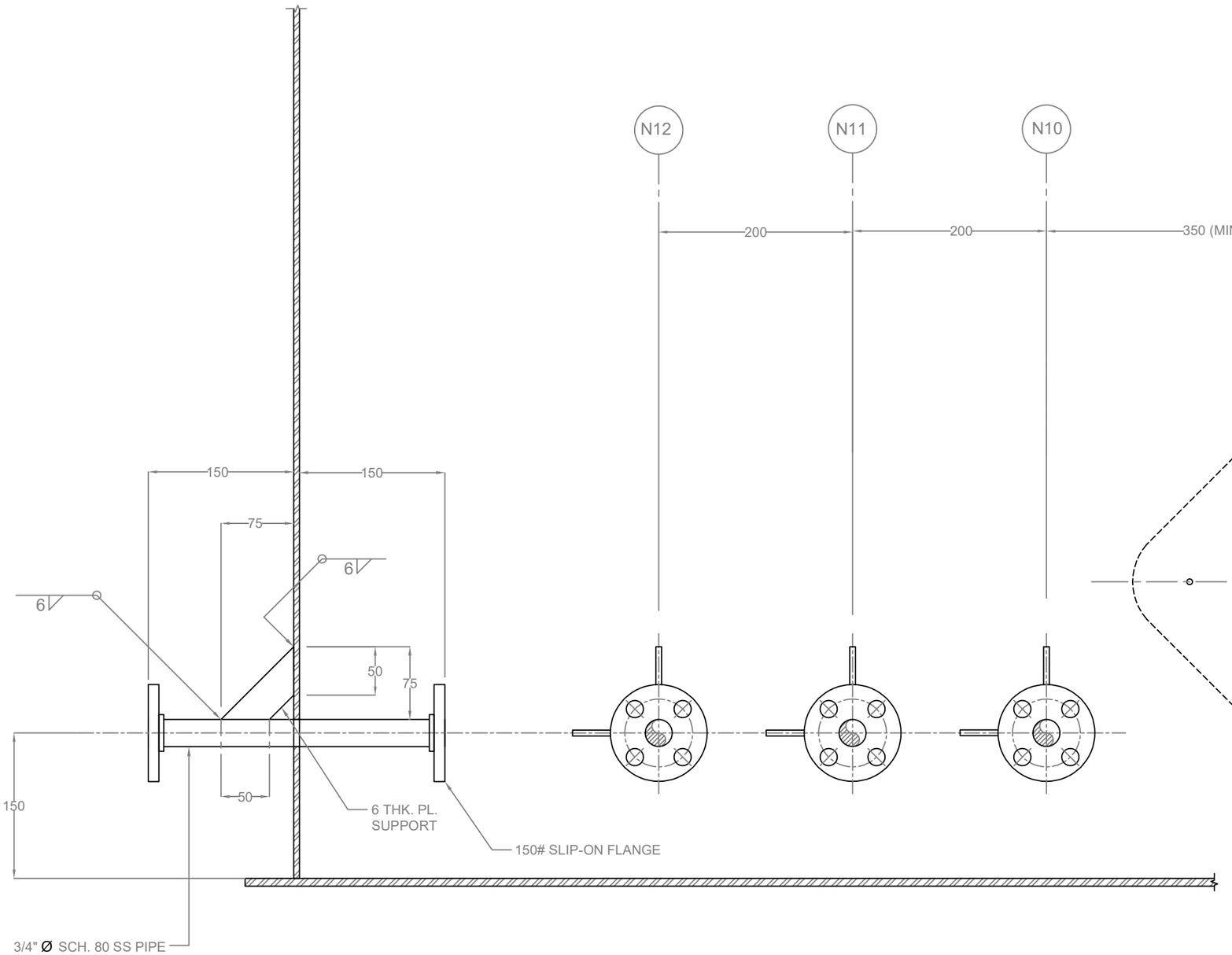
TANK NO.5
NEW FOAM LINE ASSEMBLY

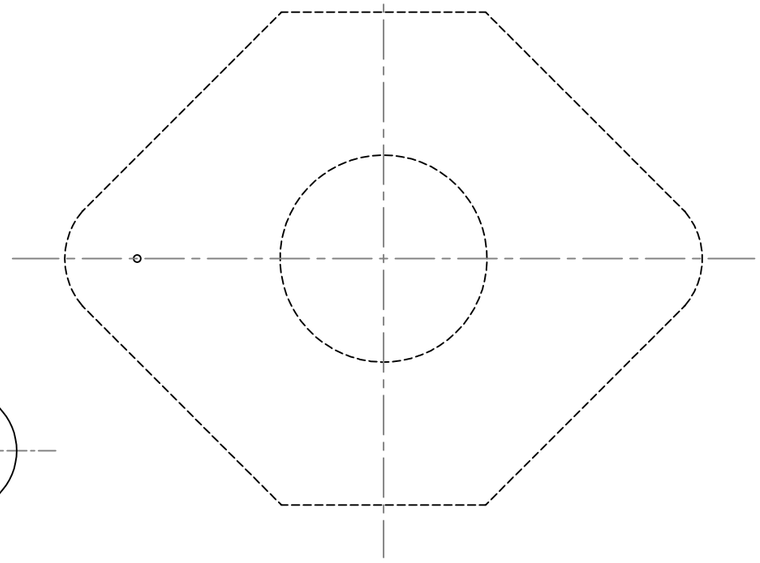
SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-011	0

NOTE:

1. SAMPLING NOZZLE ORIENTATION TO BE DETERMINE AT SITE TO SUIT THE PURPOSE.
2. SAMPLING PIPE TO BE FABRICATED TOGETHER WITH THE FLOATING SUCTION LINE.
3. REFER DWG. CHK-T5-010 FOR SAMPLING NOZZLE DESIGNATION



SAMPLING NOZZLE
SCALE: 1:5



SUCTION / OUTLET NOZZLE

ISSUED FOR TECHNICAL REVIEW

TESTPLUS QUALITY CONTROL SERVICES
101 SITIO TACLOBAN II
LUCANIN MARIVELES BATAAN
PHILIPPINES

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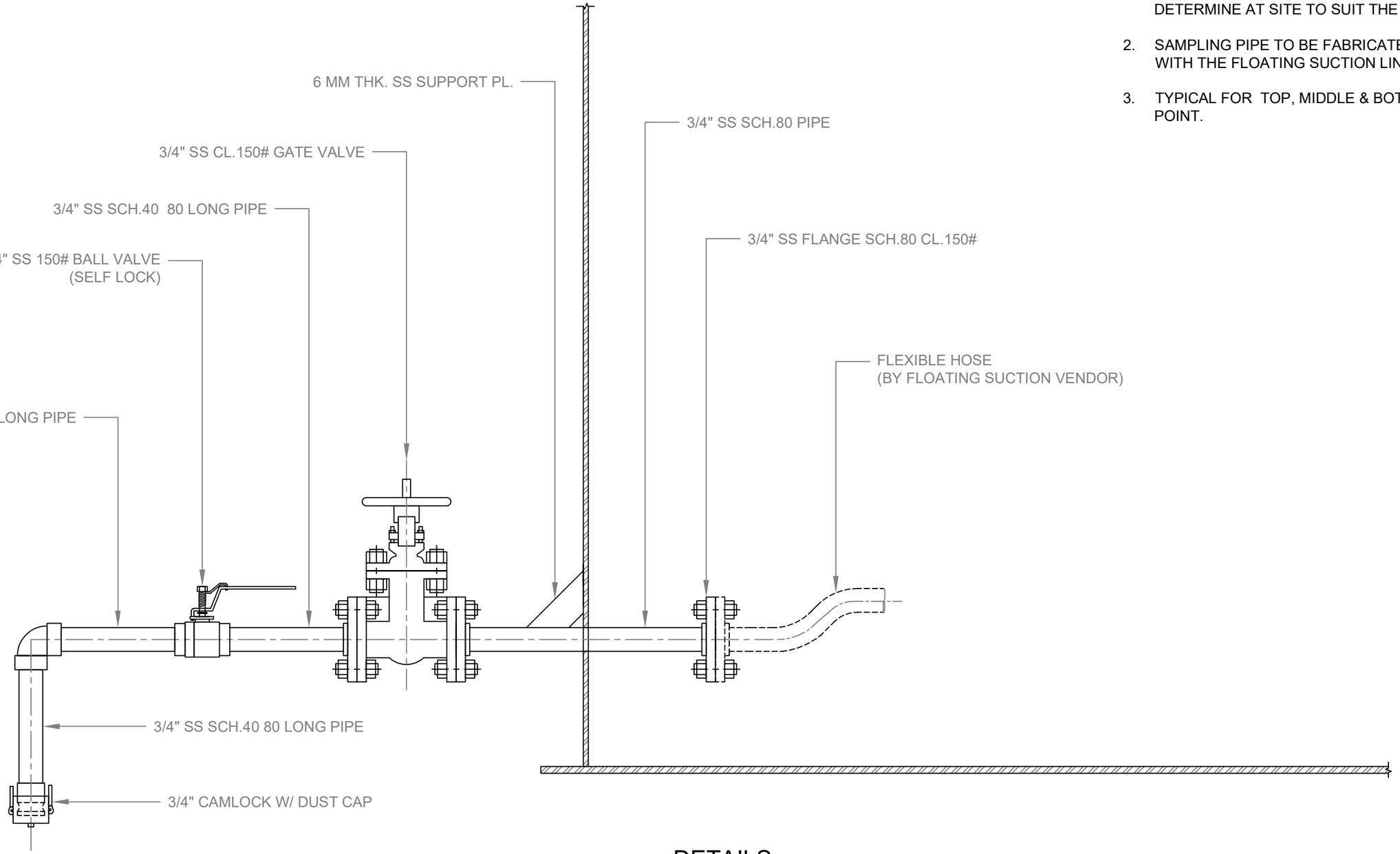
TANK NO.5 NEW SAMPLING NOZZLE

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-012	0

NOTE:

1. SAMPLING NOZZLE ORIENTATION TO BE DETERMINE AT SITE TO SUIT THE PURPOSE.
2. SAMPLING PIPE TO BE FABRICATED TOGETHER WITH THE FLOATING SUCTION LINE.
3. TYPICAL FOR TOP, MIDDLE & BOTTOM SAMPLING POINT.



DETAILS

SCALE: 1:5

ISSUED FOR TECHNICAL REVIEW

TESTPLUS QUALITY CONTROL SERVICES
101 SITIO TACLOBAN II
LUCANIN MARIVELES BATAAN
PHILIPPINES

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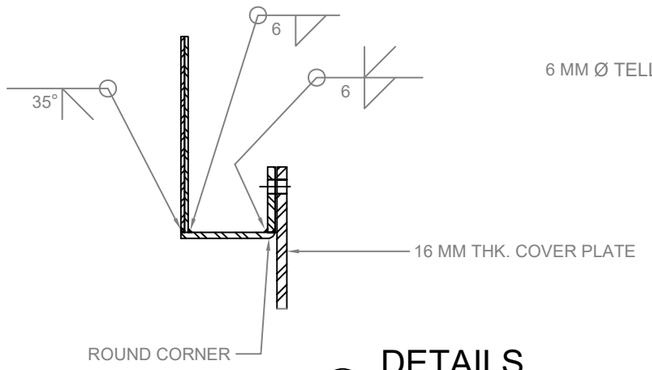
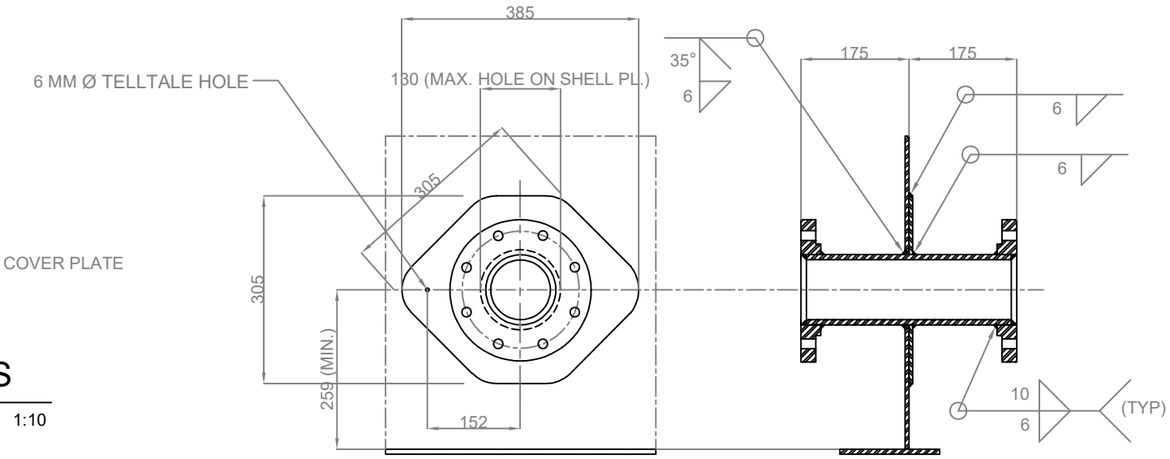
TANK NO.5 SAMPLING POINT
GENERAL ASSEMBLY

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-013	0



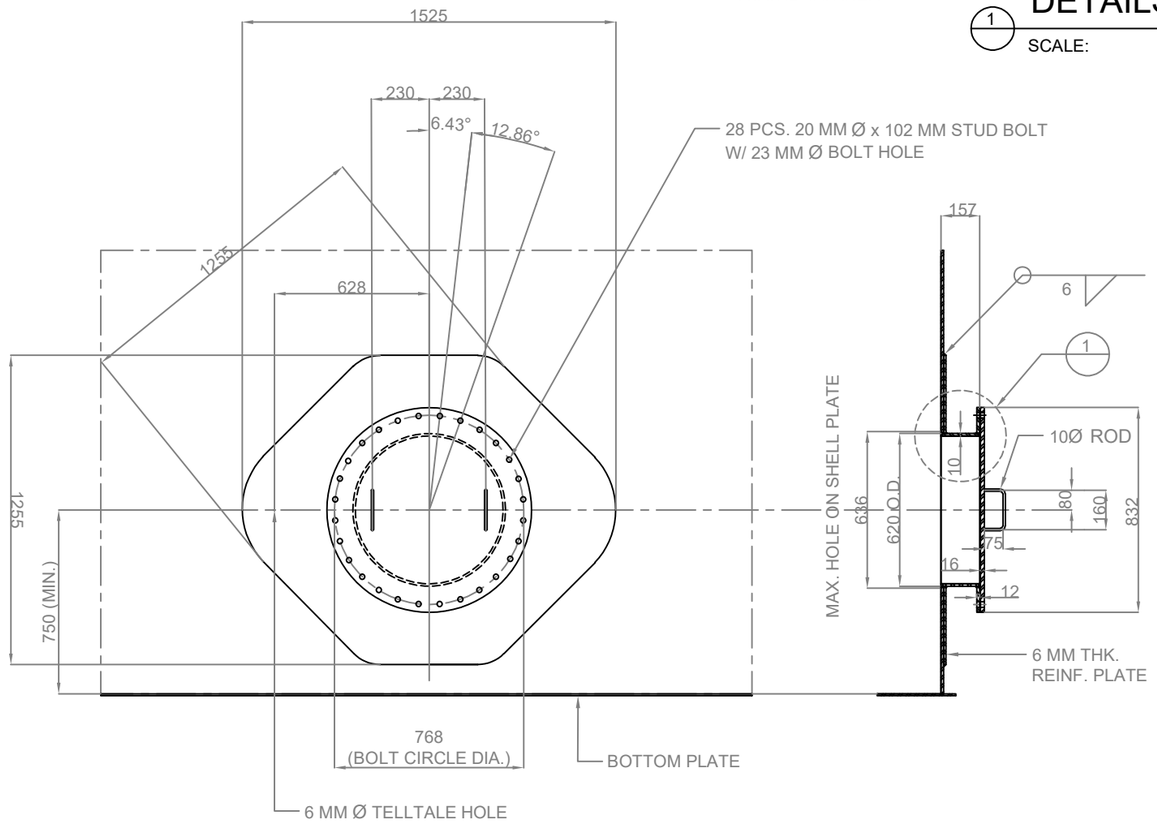
1 DETAILS

SCALE: 1:10



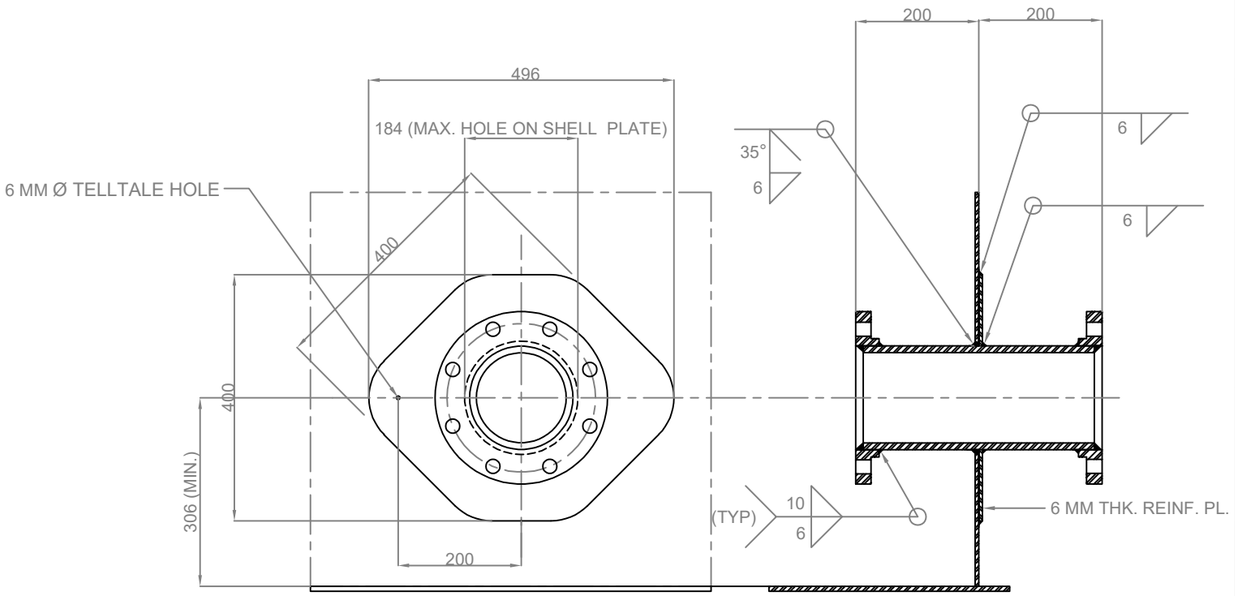
4" Ø SHELL NOZZLE

SCALE: 1:10



24" Ø MANHOLE

SCALE: 1:25



6" Ø SHELL NOZZLE

SCALE: 1:10

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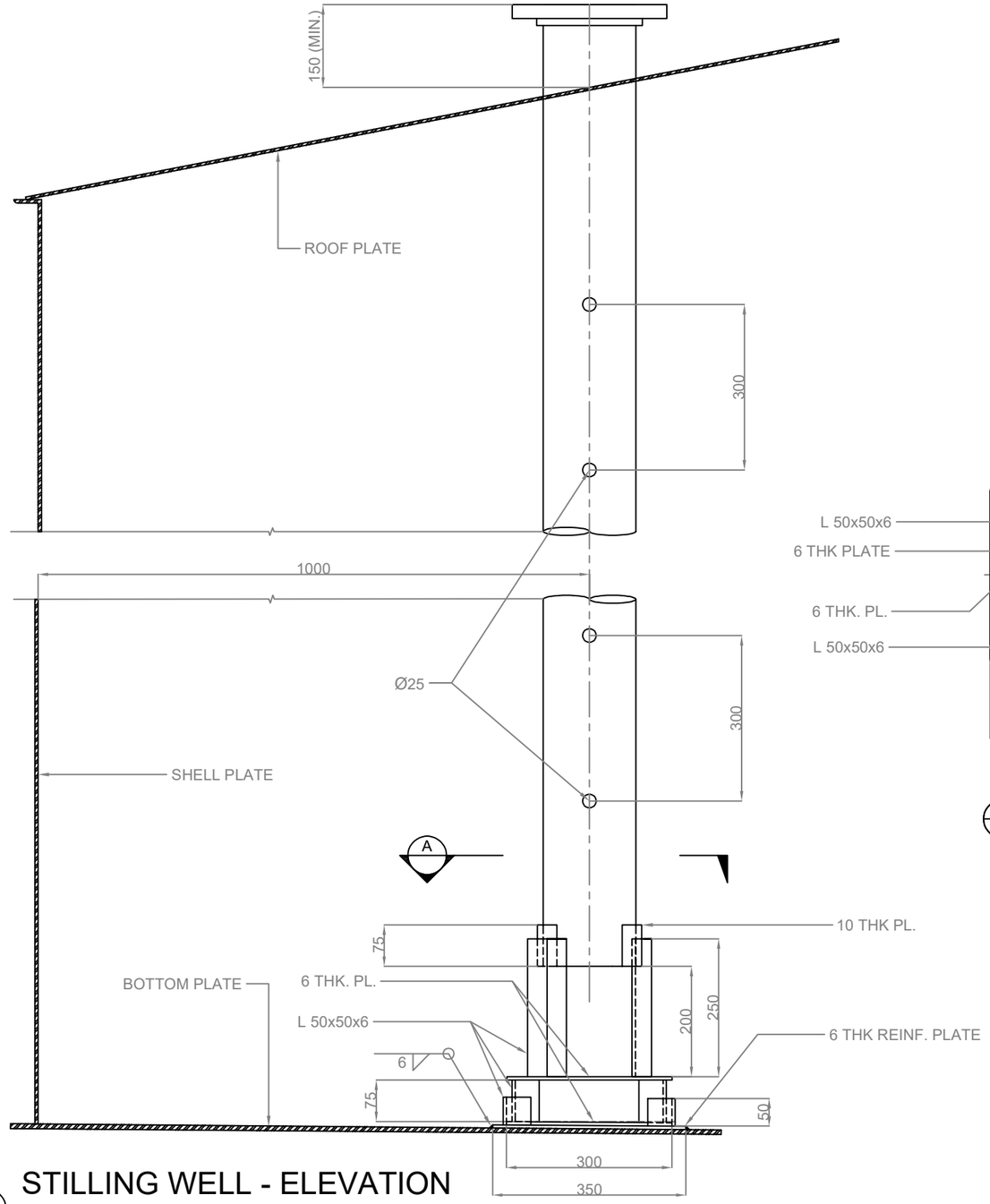
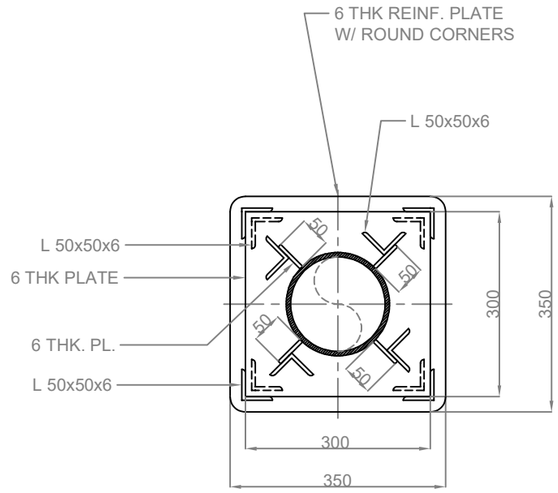
TANK NO.5
NEW SHELL MANHOLE & NOZZLE DETAILS

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-014	0



STILLING WELL - ELEVATION

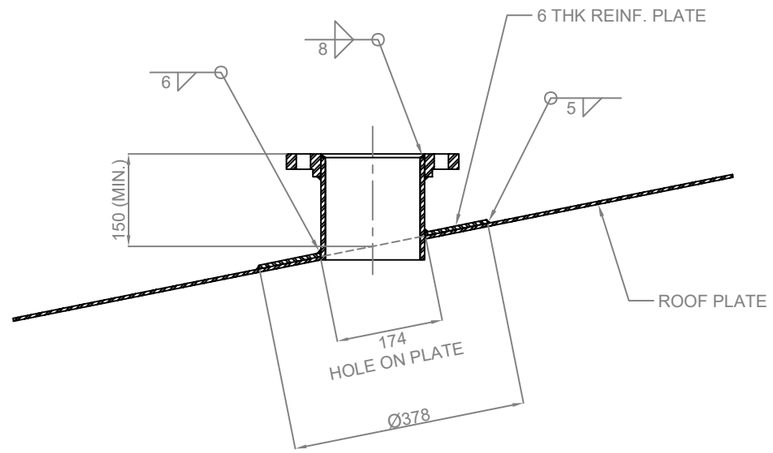
SCALE: N T S



SECTION

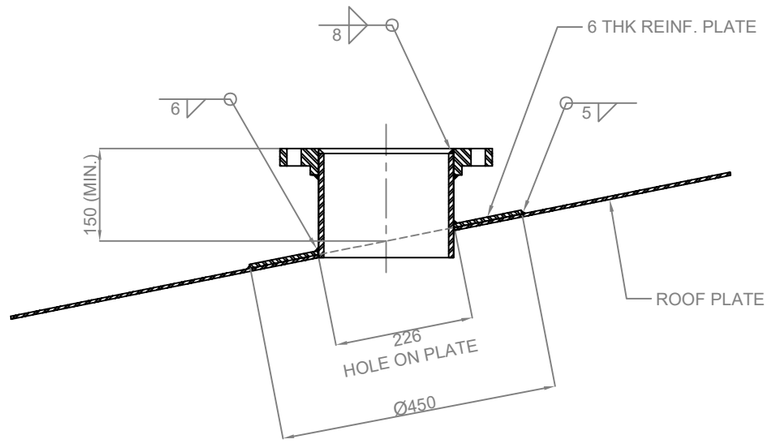
A

SCALE: 1:10



6" Ø ROOF NOZZLE

SCALE: 1:10



8" Ø ROOF NOZZLE

SCALE: 1:10

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LUCANIN MARIVELES BATAAN
PHILIPPINES

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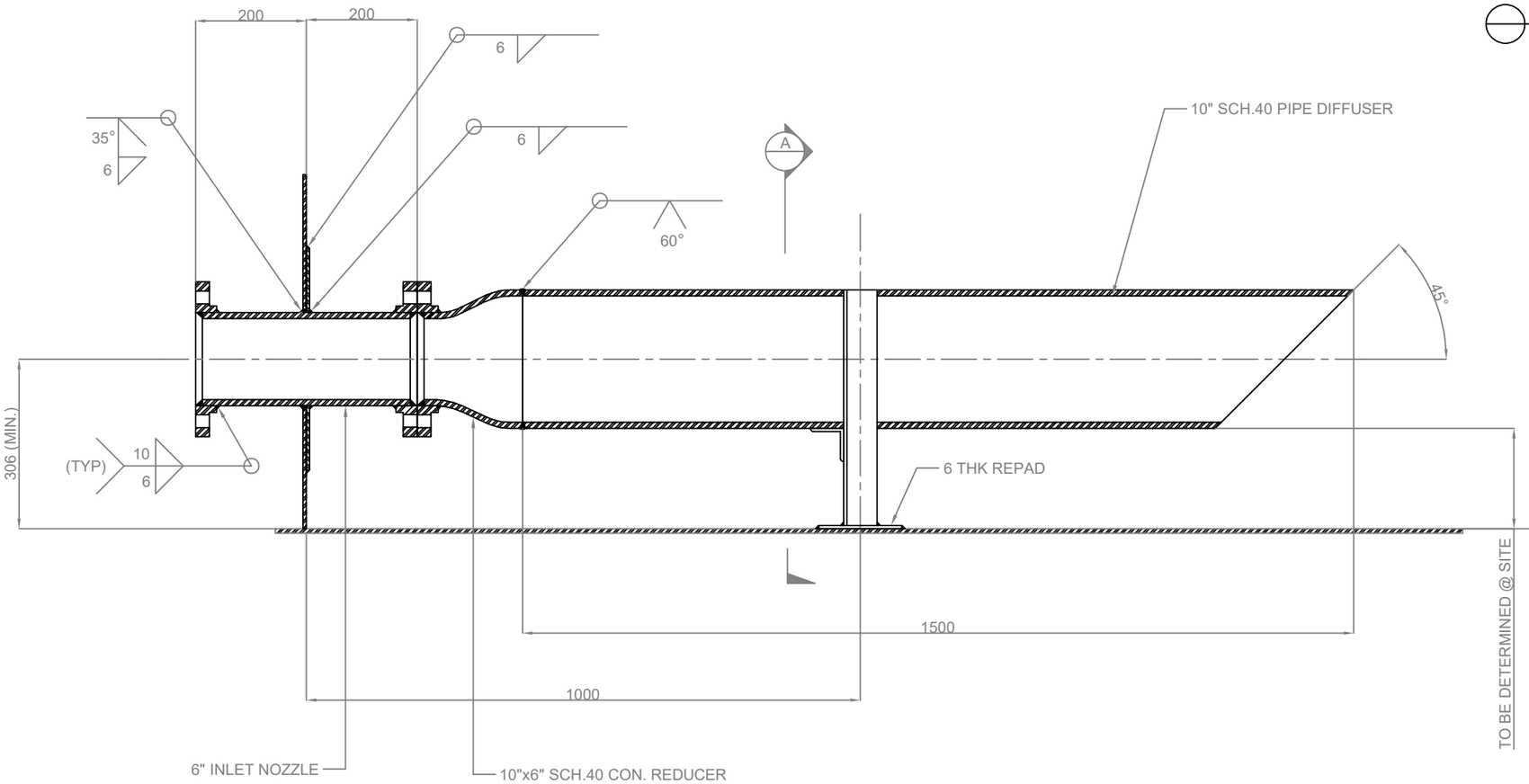
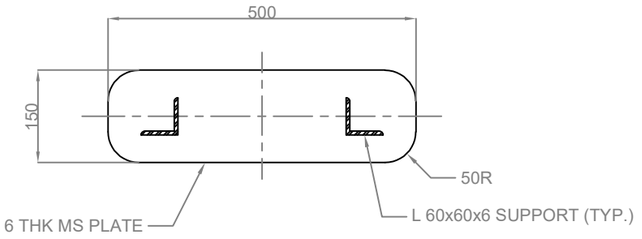
TANK NO.5
ROOF NOZZLE & STILLING WELL

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-015	0



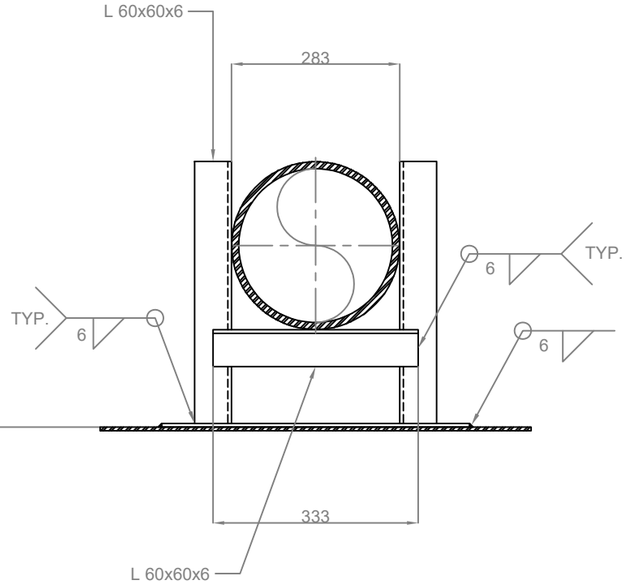
6" INLET NOZZLE - DIFFUSER

SCALE: 1:10



SUPPORT REPAD

SCALE: 1:10



SECTION

SCALE: 1:10

NOTE: DIFFUSER IS DESIGNED AT 286 CU.M. PER HR. MAX. FLOW RATE

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PHILIPPINES

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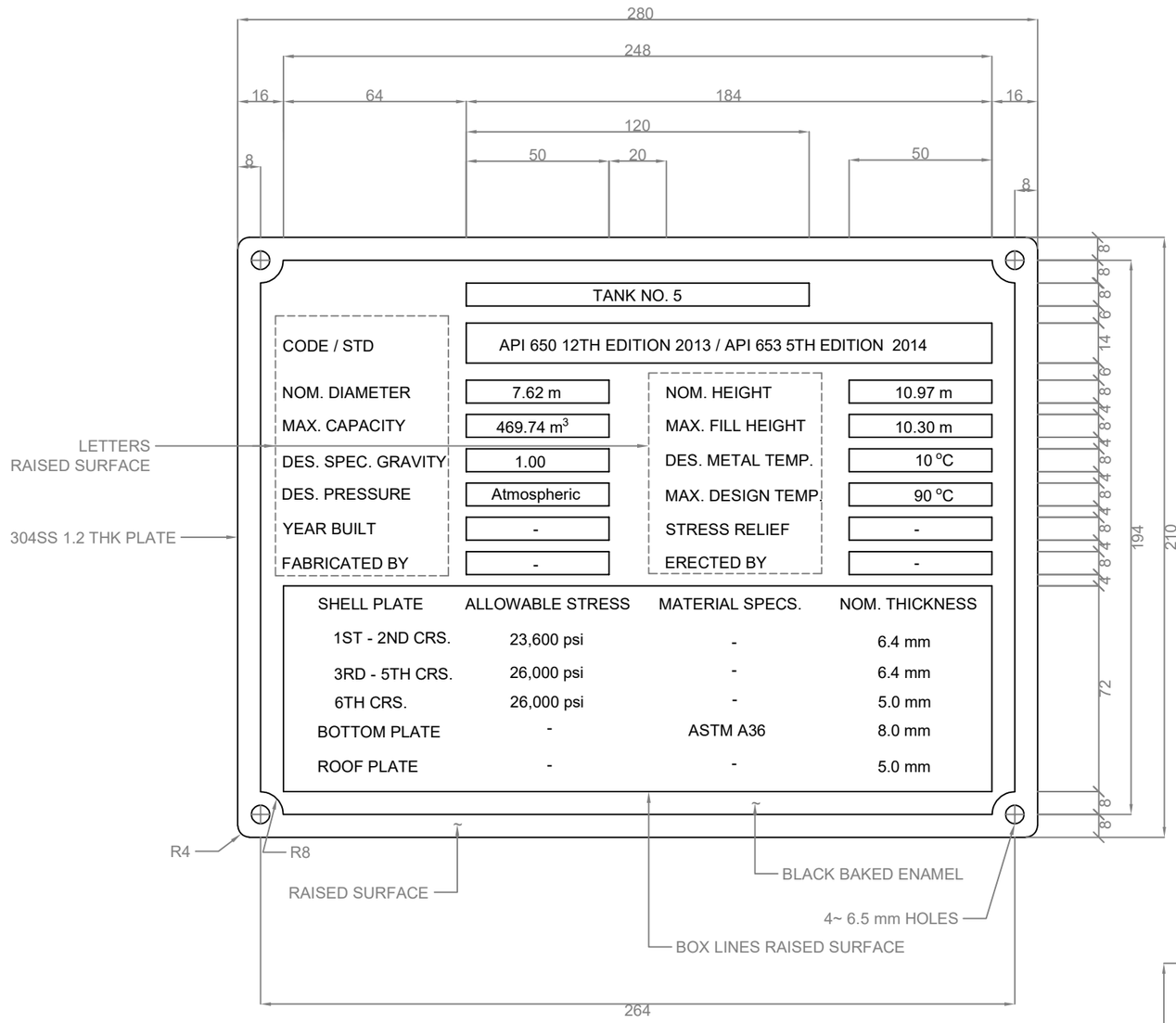
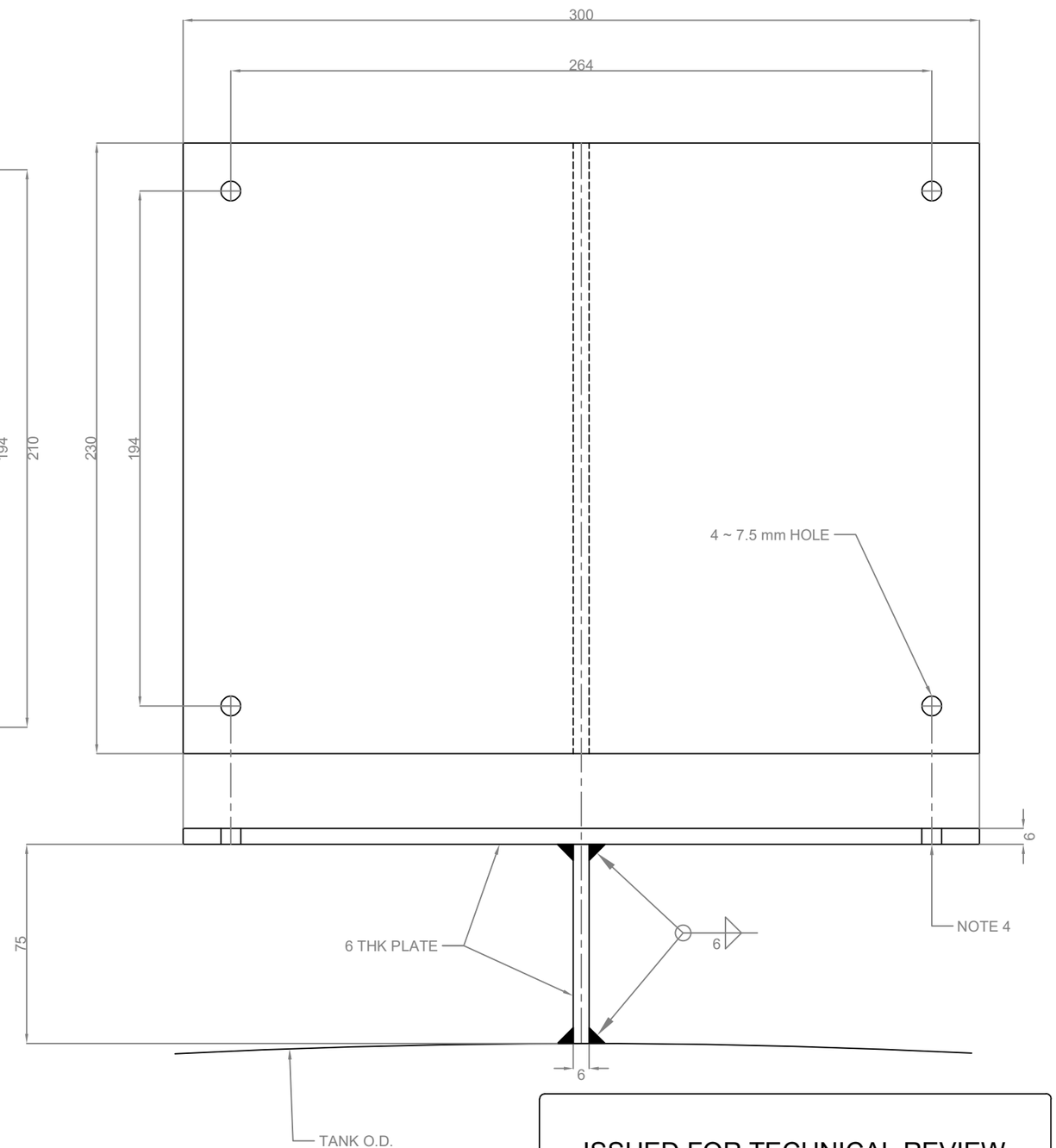
TANK NO.5
INLET DIFFUSER

SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-016	0





NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS SPECIFIED OTHERWISE.
2. THE MARKS, LETTERS AND BOX LINES SHALL BE RAISED SURFACE.
3. THE DESCRIPTION ENTERED IN THE BOX LINES SHALL BE ENGRAVED BY MEANS OF ETCHING.
4. USE 4 ~ 6 mm x 20 UNC x 16 LENGTH ROUND HEAD SCREW WITH NUTS
5. TANK DATA SHOULD BE PROVIDED BY OWNER.

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PHILIPPINES

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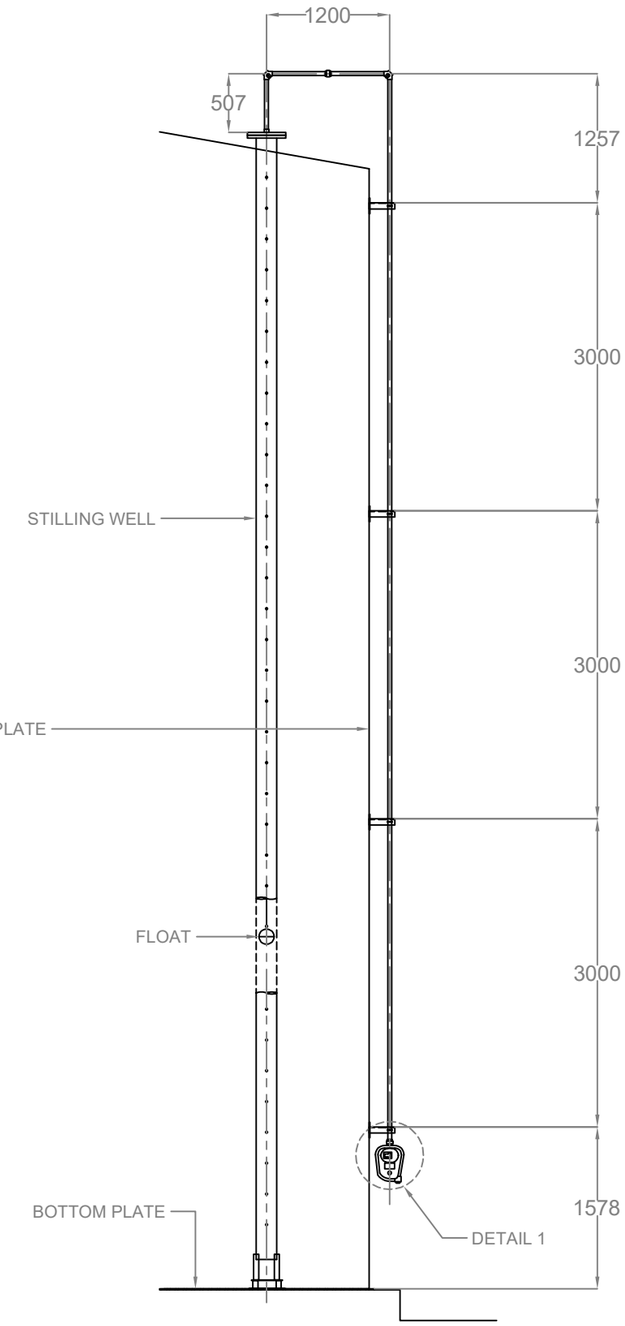
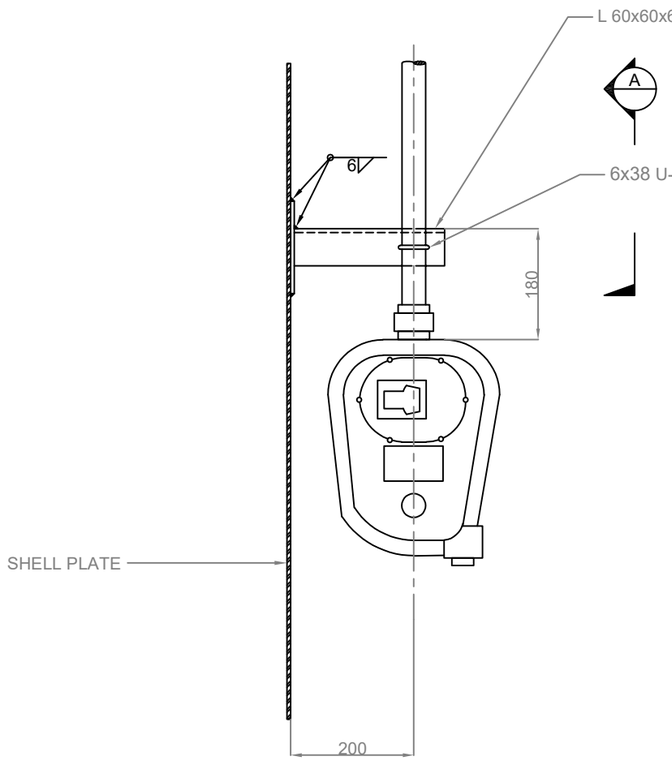
TANK NO.5
NAMEPLATE AND FRAME

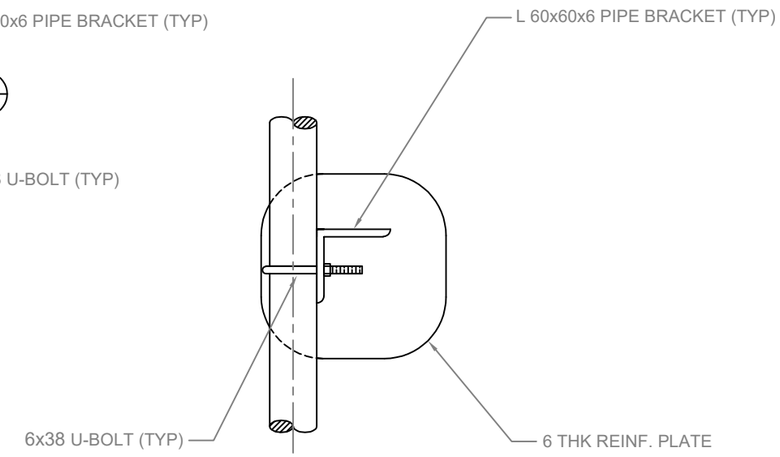
SCALE:	LOCATION:	DRAWING NO:	REV.
1 : 2	CHUUK, FSM	CHK-T5-017	0



ELEVATION
SCALE: 1:60



1 DETAIL
SCALE: 1:10



A SECTION
SCALE: 1:5

NOTE:
1. LEVEL INDICATOR ASSEMBLY BY VENDOR
2. SUPPORT LOCATION TO BE VERIFIED AT SITE

ISSUED FOR TECHNICAL REVIEW

TESTPLUS QUALITY CONTROL SERVICES
101 SITIO TACLOBAN II
LUCANIN MARIVELES BATAAN
PHILIPPINES

NO:	DATE:	DRAWN:	REVIEWED:	APPROVED:	ISSUE:
0	3.19.25	JBS			ISSUED FOR TECHNICAL REVIEW

POHNPEI BULK PLANT
PO BOX 116
KOLONLA, POHNPEI
FM 96941
TEL: +631 320 2500,
FAX: +691 320 408

TANK NO.5
LEVEL INDICATOR SUPPORT DETAILS

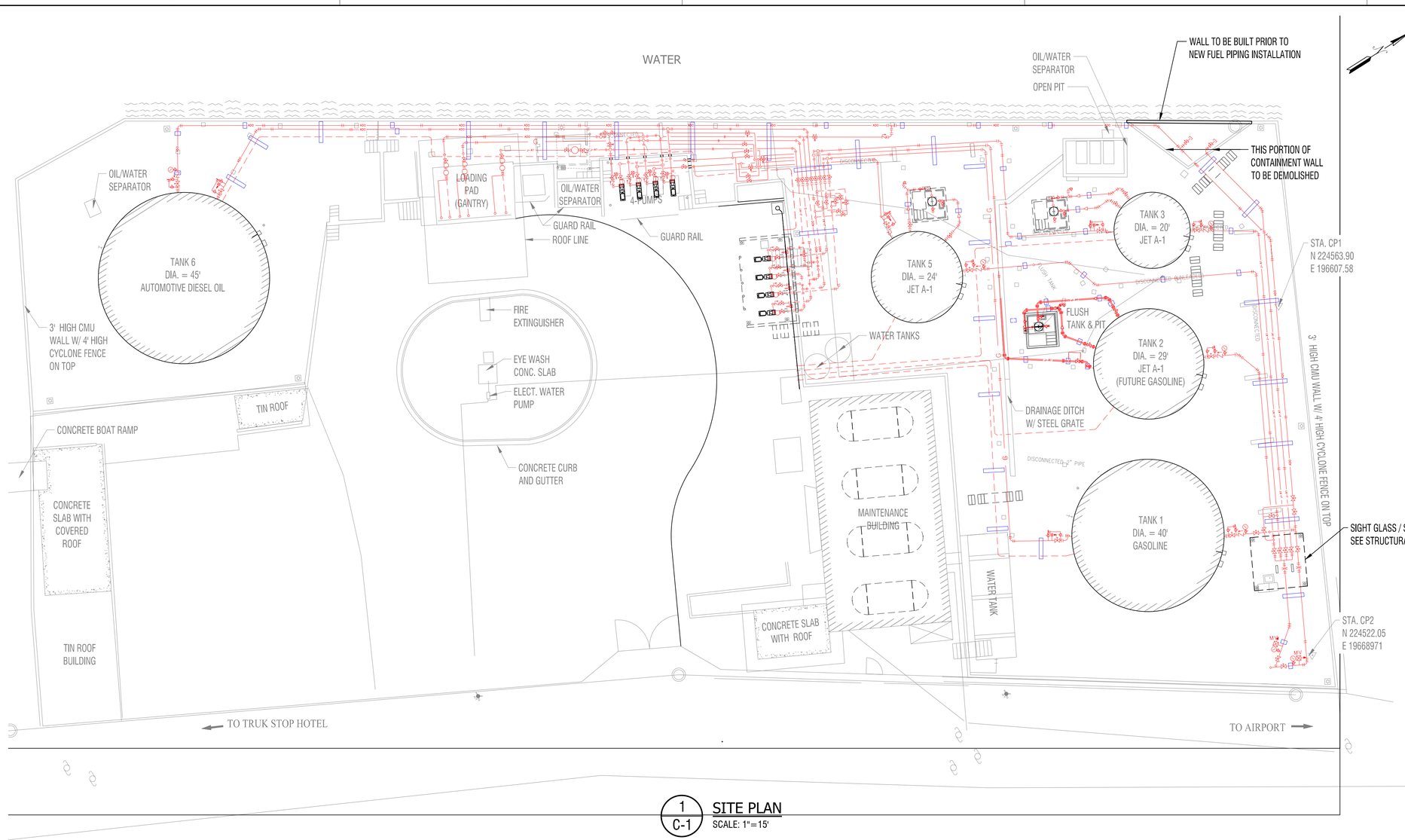
SCALE:	LOCATION:	DRAWING NO:	REV.
AS SHOWN	CHUUK, FSM	CHK-T5-018	0

Appendix H

Chuuk Terminal Layout

Chuuk Terminal & Biken Lot Facility

Tank 3 and 5 Upgrades Works



1 C-1 SITE PLAN
SCALE: 1"=15'

On-Going Project - Terminal Pipeline Replacement

All pipelines marked in RED are currently being replaced and target to be finished by July 2025. Works will need to be coordinated at times between the two projects.

LEGEND:

- EXISTING
- PROPOSED
- FUTURE (N.I.C.)
- FUTURE FOAM FIRE PROTECTION PIPING (NOT IN CONTRACT)

GRAPHICAL SCALE:

15' 0 15' 30' 45'
SCALE: 1"=15'

REVISION	BY	DATE	APPROVED

DESCRIPTION

PRYZM CONSULTING

CHUUK TERMINAL FUEL PIPELINE REPLACEMENT

SITE PLAN

DATE:	
SCALE:	AS NOTED
DRAWN BY:	GN
ENGINEER:	MT
CHECKED BY:	GC

C-1

SHEET 3 OF 38

SEA

SEAWALL

CONCRETE CONTAINMENT WALL WITH BOUNDARY CYCLONE FENCE ON TOP OF WALL

NEW PIPEWORK, RUNNING TO THE NEW OIL SEPARATOR. PIPEWORK MAY BE BELOW OR ABOVE GROUND, TO BE DETERMINED ON SITE

EXISTING IN GROUND OIL SEPARATOR TO BE REMOVED. TO BE REPLACED WITH NEW PUMPING CHAMBER AND PIPEWORK TO THE NEW OIL SEPARATOR

NEW CESS PIT

CONSTRUCTION JOINT

CONCRETE CONTAINMENT WALL WITH CYCLONE FENCE ON TOP OF WALL

EXISTING GROUND LEVELS ARE SHOWN IN FEET

EXISTING PIPES

EXISTING STEPS OVER WALL

CONSTRUCTION JOINT

CONCRETE CONTAINMENT WALL WITH CYCLONE FENCE ON TOP OF WALL

EXISTING PIPES

EXISTING GATE VALVE

EXISTING C.I PIPE

NEW PROPRIETARY OIL SEPARATOR TO REPLACE THE EXISTING IN GROUND SEPARATOR. EXISTING SEPARATOR TO BE REMOVED

DRAIN INVERT EL=3.00'

NEW PUMPING CHAMBER, PUMPING INTO THE NEW OIL SEPARATOR

C.I PIPE

NEW 225 DIAMETER DISCHARGE PIPE. 1 in 100 FALL TO GATE VALVE

NEW 1050 DIAMETER DISCHARGE MANHOLE, ADJACENT TO THE NEW OIL SEPARATORS OUTLET

END BROKEN WALL

DEPTH ±12 FT

EXISTING CONCRETE SLAB

CYCLONE WIRE 4 FT HIGH, ON TOP OF CHB ±3.8 FT HIGH

CONCRETE CONTAINMENT WALL 3' HIGH WITH BOUNDARY CYCLONE FENCE ON TOP OF WALL

CONTOURS SHOWN ARE EXISTING GROUND LEVELS, LEVELS SHOWN IN FEET

CONSTRUCTION JOINT. REFER 1 / C10

STA. CP 2
N 224522.05
E 196689.71

TANK 6
45' DIAMETER

TANK 5
24' DIA

TANK 3
20' DIA

TANK 2
29' DIAMETER

TANK 1
40' DIAMETER

RAISED LOADING PAD
RL 8.05

PUMP

OIL SEPERATOR

4 PUMPS

GUARD RAIL

STEPS

KERB/VEE-CHANNEL

ROOF OVER' LOADING AREA

GRASSED ROUNDABOUT

KERB/VEE-CHANNEL

CONCRETE CONTAINMENT WALLS

CONCRETE CONTAINMENT WALL

EXISTING STEPS OVER WALL

WATER TANKS
D=6.72'
SLAB RL 6.75'

NEW DRAINAGE CHANNEL WITH NEW STEEL GRATE (TO REPLACE THE EXISTING). REFER 5 / C10

DRAIN INVERT EL=3.85'

CONCRETE CONTAINMENT WALL

EXISTING TIN CLAD BUILDING

BM ELEV = 4.79 FEET

DISCONNECTED PIPE

DRAIN INVERT EL=3.40'

4" PIPE DISCONNECTED

DISCONNECTED (UNLEADED)

DISCONNECTED 2" PIPE

FRESH TANK

WATER TANK

CONC SLAB

JET A-1

6" PIPE UNLEADED

6" PIPE JET A-1

CONCRETE CONTAINMENT WALL WITH BOUNDARY CYCLONE FENCE ON TOP OF WALL

LP

FENCE

OFFICE

BOUNDARY FENCE

GATE

GATE

TO TRUK STOP HOTEL

TO AIRPORT

HATCH PATTERN INDICATES:

NEW TANK YARD CONCRETE SLABS:
NEW SLAB LEVELS TO MATCH THE EXISTING.
6" SLAB ON GROUND, 30MPa AT 28 DAYS.
REINFORCED WITH GRADE 40 BARS.
#4 (1/2") AT 8" CRS.
BOTH WAYS, 2"mm TOP COVER.
ALL LAPS 20", STAGGER LAP LOCATIONS BY 3'–0" (EVERY SECOND BAR STAGGERED BY 3'–0") on D.P.C.
on 6" MINIMUM COMPACTED HARDFILL.
SAWCUT SLAB, 1 1/2" DEEP x 1/4" AT MAXIMUM 14'–0"x14'–0" GRID.
BARS TO HAVE 3" CUT FROM EVERY SECOND BAR ALONG LENGTH OF JOINT.

Upcoming Works

~~Area inside the Bund is marked in~~ RED. This works will Start in June and end by Feb 2026. Works involve excavation and reconstruction of the bund floor and wall.

LEGEND:
CONSTRUCTION JOINTS

2 / – NEW SITE LAYOUT PLAN – OPTION 1

Fuel Tank Yard - Slab Replacement
Chuuk Terminal Fuel Storage Facility

REV	DESCRIPTION	DATE
A	Issued for Information	2023/10

Approved For Construction:

By:

Date:

Civil and Structural Engineers. Project Planners.
hlkjacob
Level 2, Vanua House, Victoria Parade, Suva, Fiji Islands. Phone (679) 3305 638 Fax (679) 3305 231
Unit 3, 25 Dacre St, Newton, Auckland, New Zealand. Phone (64–9) 377 5622 Fax (64–9) 373 2526

DWG. TITLE
CIVILWORKS
NEW SITE PLAN
OPTION 1

SCALE (A1)	1"=13'–4" (1:160)	PROJECT No: 24501	
SCALE (A3)	1"=26'–8" (1:320)	DWG. No.	
DESIGN	BJ	C02-1	B
DRAWN	IS		
DATE	8/2024		

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SECTION 2.2

HEALTH, SAFETY, SECURITY & ENVIRONMENT

- Appendix I Vital HSSE Policy
- Appendix J Contractor Safety Administrative Requirements
- Appendix K Chuuk Terminal Hazard Drawing Layout

Appendix I

Vital HSSE Policy

Health Safety, Security and Environment Policy

Vital is committed to:

Protection of the Health, Safety & Security of our employees, and others with whom we come into contact

Elimination of work-related illness

Minimization of environmental impact

Education of employees on HSSE to enhance their awareness and induce their voluntary participation and cooperation. Vital seeks the cooperation of its contractors, dealers and customers in relevant areas.

Establishing contingency plans against accidents and taking measures to contain damages to as low as reasonably practicable in collaboration with relevant authorities

Managing HSSE as a Key Achievement Area in our business.

HSSE Management System:

- The HSSE Management System is evaluated and updated annually.
- Risk management is an integral part of the organization's management and decision making process
- All employees and contractors are trained in the HSE aspects of their role during induction
- All hazardous work requires a Safe Work Permit prior to commencement
- All accidents, near misses, unsafe acts and unsafe conditions are reported
- All visitors report to Security, and receive HSSE orientation prior to gaining entry and conducting business in Vital's facilities
- Personal Protective Equipment as described in the safety management system is worn at all times while engaged on Vital business
- All employees are trained in their roles in Emergency Response;
- Employees preparedness is a priority, and maintained through scheduled drills, exercises and refresher training
- Vital regularly audits its compliance with relevant laws, regulations and voluntary rules concerning HSSE

Appendix J

Contractor Safety Administrative Requirements

Contractor Safety Administrative Requirements

PREPARED BY: JARED MORRIS

1.0 Purpose

The purpose of this document is to establish FSMPC's contractual guidelines for a contractor company's management on safety. These contractual requirements establish minimum acceptable safety-related administrative standards and are intended to supplement, not replace, the contractor's own safety program. Contractors shall implement additional measures as necessary to ensure workplace safety and shall implement all applicable measures required by Government laws and regulations. FSMPC considers safety to be no less of a priority than other business considerations, including schedule and cost.

2.0 Scope

These safety-related administrative standards shall apply to all contractor companies and their subcontractors working on long form contracts, mid form contracts and as applicable on short form contracts within Corporation facilities, project sites and at project support facilities covered under laydown, fabrication or maintenance yards, as well as contractor camps housing Corporate employees or contractor/subcontractor personnel who work on contracts with FSMPC on or off Corporation property.

3.0 Standards

The requirements of the following are mandatory for contractor compliance.

- *Work Permit System*
- *Pressure Testing Safely*
- *Gas Testing Procedure*
- *Land Use Permit Procedures*
- *Contractor Site Allotment Procedure*
- *Electrical Arc Flash Hazard Mitigation*
- *Reporting of Contractor On-Job Injuries/Occupational Illnesses*
- *Isolation, Lockout and Tag Out Procedure*
- *Control of Remote Area Travel and Search/Rescue Procedures*
- *Traffic and Vehicle Safety*
- *Marine Crane, Hoist, and Rigging Operations*
- *Heavy Equipment Operator Testing and Certification*
- *Crane and Heavy Equipment Incident Reporting Procedures*
- *Crane Suspended Personnel Platform (Man-basket) Operations*
- *Crane Lifts: Types and Procedures*
- *Rigging Hardware Requirements*
- *Inspection and Testing Requirements for Elevating/Lifting Equipment*

- *Heavy Equipment Services*
- *Safety Requirements for Scaffolds*
- *Basic Life Support (BLS) Heartsaver Automated External Defibrillator*
- *(AED) / Standard First Aid (SFA) and First Aid Kit*
- *Implementing a Sanitary Code*
- *Administration Procedure of Contractor Camps/Parks and*
- *Construction Camps*
- *Waste Management*
- *Road Closure: Excavations, Reinstatement and Traffic*
- *Controls*
- *Request for Air Medical Evacuation*
- *Inspection, Testing and Maintenance of Fire Protection Equipment*
    - Engineering Standards:
    - *Safety Requirements for Plant and Operations Support Buildings*
    - *Fire Water System Design*
    - *Portable, Mobile and Special Fixed Firefighting Equipment*
    - *FSMPC Security and General-Purpose Fencing*
    - *Building Code*
- *Construction Safety Manual (CSM)*
- *Medical Minimum Standards Requirements Manual (MMSR Manual)*

4.0 General Requirements

4.1 Contractor's Safety Program and Performance

A. The contractor shall establish an effective corporate (companywide) safety program that shall be fully implemented at each work site.
B. The contractor's corporate safety program shall be aligned with FSMPC safety requirements and shall govern how safety is managed throughout the contractor company.
C. The contractor's safety program shall be based on the safety/loss prevention policy formally endorsed by the contractor company's owner and/or senior management.
D. The contractor's safety program shall include procedures for effectively evaluating potential subcontractors' safety programs and for conducting regular site safety performance evaluations of their subcontractor's work at the job site.
E. FSMPC reserves the right to advise a contractor in writing of its objection to the safety program or safety performance of any subcontractor. The prime contractor retains full responsibility for the safety performance of his subcontractor(s). Contractor is not relieved from any liability or obligation as a result of contractor's use of subcontractors or non-objection of said subcontractors.
F. During planning and execution of contracted work, the contractor shall meet all safety requirements. Contractor site management shall ensure compliance with the requirements of this document, the Construction *Safety Manual* (CSM), other

applicable requirements and the Contractor Site Safety Program (CSSP) at the work site.

4.2 Contractor Safety Prequalification

In accordance with FSMPC's contracting procedures, contractor companies are required to be successfully prequalified in safety, before being eligible to be awarded a long form contact, mid form contract or short form contract for work to be performed within a FSMPC's facility or project site and considers the work to be inherently dangerous.

4.3 Contractor Pre-job Safety Explanation Meetings

A. The Corporation will communicate relevant general and site-specific safety standards and information to the contractor during pre-job safety explanation meetings, including:
    - Job Explanation meetings, which are held with potential bidders, and/or
    - Kick-off meetings, which are held with the contractor that is awarded the contract before they begin on-site work activities.

B. Following the pre-job safety explanation meeting, the contractor shall attend any site hazard identification tour led by the Corporation.

C. Safety, health and environmental standards and information covered during these meetings may not represent all areas of potential hazard to the contractor/subcontractor's personnel and equipment. It shall be the contractor's responsibility to fully comply with the contract, including identifying and addressing all potential safety, health and environmental hazards, and to include the costs of compliance in the contract.

4.4 Facility Safety Orientation

The Site Administrator requires all contractor and subcontractor personnel to attend a facility-specific safety orientation prior to receiving their FSMPC plant ID and/or being allowed to work on-site. Multiple safety orientations may be required if a plant ID permits access to more than one facility (e.g., one orientation for each facility). Unless provided by the CORPORATION, the contractor shall provide translation of the safety orientation presentation(s) and materials into languages understood by its employees.

4.5 Contractor Site Safety Staff

A. Contractor shall provide full-time and qualified site safety staff in accordance with Table 4.1, with respect to the maximum number of contractor and subcontractor employees who are present at the job site at a given time, or as otherwise requested by the CORPORATION (e.g., during a Job Explanation meeting).

Table 4.1

#Employees	Safety Manager required	Min. # Safety Supervisor(s) Required	Ratio of safety Officers to Employees Present (min.)
1 - 25	No	No	None
26 - 50	No	One (1)	None
51 - 500	No	One (1)	1:50
501 - 1,000	Yes	1 for every 10 safety officer	1:50
1,001 – 5,000	Yes	1 for every 10-safety officer	20 officers plus additional at ratio of 1:100
5,000	Yes	1 for every 10-safety officer	20 officers plus additional at ratio of 1:100

B. The site safety manager (whose job title could also be site safety superintendent, senior safety engineer, safety coordinator, etc.) shall be fluent in spoken and written English and shall have at least 10 years of safety experience specific to the contract's scope of work.
C. Site safety supervisor(s) shall be fluent in spoken and written English and shall have at least seven years of safety experience specific to the contract's scope of work.
D. All field safety officers (whose job title could also be safety inspector, site safety engineer, safety advisor, safety representative or similar position) shall be fluent in spoken and written English and have at least five years of safety experience specific to the contract's scope of work.
   Note: Safety officers with less than five years of safety experience, as well as clerical, fire watch, confined space standby men, hazardous materials handlers, etc., shall be excluded from the numbers of safety staff in Table 4.1. Contractor is advised that additional safety officers may be necessary based on the risk of the activities to be performed and as requested by the CORPORATION.
E. The contractor shall provide the safety manager and each safety supervisor with a personal means of communication (e.g., mobile phone) and a dedicated motor vehicle equipped for the travel environment that may be encountered during the course of his work.
F. The names and qualifications (e.g., CV/resume, training certificates) of the safety manager, site safety supervisor(s) and all field safety officers who will work on the job shall be submitted to the CORPORATION for review and concurrence prior to beginning work.
G. Prior to beginning work, the CORPORATION will review the qualifications of the contractor's on-site safety staff, including years of relevant safety work experience, academic education and degree(s), formal safety training and internationally recognized safety certifications (e.g., OSHA, NEBOSH, NSC). If requested by the CORPORATION, the contractor's safety staff shall also take and pass a written examination.

H. The CORPORATION reserves the right to reject proposed safety staff personnel based on review of their qualifications.
I. The safety manager/supervisor and field safety officer positions shall be filled prior to commencement of on-site work and shall remain filled until completion of work.
J. Contractor safety staff personnel shall not be assigned dual roles (e.g., Not a site safety officer and the scaffold inspector).
K. During the course of the work, safety staff qualifications shall be made available for review at the contractor's site office as requested by the CORPORATION.
L. Contractor's site safety staff personnel shall be present at the job site at all times while contractor and/or subcontractor personnel are working, including nights, weekends, holidays and extended working hours.
M. The CORPORATION reserves the right to require the contractor to replace the safety manager/supervisor or any safety officers whose work is deemed unacceptable by the CORPORATION.
N. The CORPORATION reserves the right to require the contractor to provide additional safety and health specialists where special technical expertise is required.

4.6 Safety Meetings

A. Contractor's site supervision shall conduct pre-job (toolbox) craft safety meetings with their personnel to address job-specific safety issues prior to beginning a different work activity. These pre-job craft safety meetings shall include a review of applicable sections of the hazard identification plan (HIP). See Section 6.0.
B. Contractor's site supervision shall also conduct weekly safety meetings in the native language of the attendees. Attendees shall include contractor's and subcontractor's site personnel. These safety meetings shall be no shorter than 15 minutes and shall cover, but not be limited to, work hazards and related job procedures, as well as a review/update of the HIP.
C. Weekly safety meetings shall be documented with records maintained and shall be made available for review by the CORPORATION upon request.
D. Contractor site management shall attend and participate in the contractor's weekly safety meetings.
E. Upon request by the CORPORATION, contractor's site management, site supervision and/or site safety staff shall attend the CORPORATION's safety meetings

4.7 Contractor Site Management Safety Meetings

In addition to making safety an agenda item at regular internal contractor company management meetings (e.g., project progress meetings), contractor site management (e.g., project manager, construction managers, site superintendents) shall conduct a separate meeting, at least monthly, to discuss safety, health and environmental issues. Minutes of these meetings shall be documented. Action items and needed corrective actions shall be documented and tracked until closed. Copies of these documents shall be provided to the CORPORATION upon request. Attendees shall include senior site supervision, the safety manager/supervisor(s), safety officers, key field personnel and, if requested, representatives from the CORPORATION and other applicable SA organizations.

4.8 Hazard Control and Personal Protective Equipment (PPE)

A. Hazards not eliminated through design shall be mitigated by appropriate administrative controls (e.g., safe work procedures) and/or personal protective equipment (PPE) controls.
B. Contractor and their subcontractor(s) shall provide the proper PPE (e.g., hard hat, safety glasses, safety shoes, hearing protection, gloves) that meets SA specifications to its employees.
C. Contractor and subcontractor personnel who work in SA plant areas where use of flame-resistant clothing (FRC) is required or who may be exposed to a flash fire hazard shall be provided by their employer with the proper type, size and quantity of FRC in accordance with CORPORATION requirements.
D. The type, size and quantity of arc flash PPE and FRC shall be provided to electrical workers by their employer and shall be properly used.

4.9 Health and Environmental Monitoring

Health and environmental monitoring shall be conducted by the contractor, as applicable (e.g., as identified in the HIP), to protect their personnel against exposure to health hazards (e.g., respiratory, noise etc). Monitoring shall be performed by qualified personnel and the results shall be submitted to the CORPORATION for review upon request.

4.10 Behavioural Observation and Site Safety Inspection

A. The contractor shall implement behavioural observation and site inspection programs to detect and correct unsafe acts and conditions. Observations and inspections shall be frequently (e.g., weekly) conducted by contractor site management (e.g., project manager, construction manager, site superintendent), safety staff, supervisors and employees, who shall be properly trained.
B. Unsafe acts and conditions shall be immediately reported to the relevant supervisor for correction as soon as practical. Life threatening hazards shall be corrected immediately. Corrective actions for unsafe conditions shall be identified and tracked until completion, with follow-up to verify proper implementation.
C. Contractor shall perform trending and analysis of behavioural observations and site safety inspections to identify negative trends and mitigate safety problems.
D. Statistics of inspection findings and observations shall be used to establish the priority of safety talks and training topics.
E. Contractor shall provide copies of any and all inspection and observation records as requested by the CORPORATION.

4.11 Site Safety Performance Monitoring

A. The CORPORATION will monitor, evaluate, inspect and report contractor job site safety performance. Performance monitoring will be performed in accordance with the SA Safety Management Guide, Contractor Site Safety Performance Monitoring and/or Project Management's Project Safety Index (PSI). Contractor shall participate in site safety evaluations and inspections, as requested by the CORPORATION.
B. A rating of poor (4) or unsatisfactory (5) in any evaluation category on the Contractor Site Safety Evaluation Form or PSI is considered a violation of the safety requirements of the contract. In this case, the CORPORATION reserves the right to conduct performance counselling meeting(s) with contractor management and/or take other measures in accordance with SA's contracting procedures.
C. Corrective actions shall be implemented by the contractor within any SA specified time period and in accordance with Section 4.14 herein. Corrective actions shall be identified and tracked until completion, with follow-up to verify proper implementation.

4.12 Work Permits

A. For work to be carried out at an FSMPC specified or restricted area, or as may be required by the CORPORATION, contractor and subcontractor personnel shall comply with the requirements of Chapter I-4, Work Permit System, of the CSM.
B. Contractor's and subcontractor's work permit receivers shall obtain the proper work permit (e.g., hot work permit or cold work permit) and any associated confined space entry and release permits for work to be carried out in a FSMPC specified or restricted area or as may be required by the CORPORATION.
C. Contractors shall maintain records of their current receiver certificate holders, with their names and corresponding certificate expiration dates.

4.13 Jobsite Safety Logbook (JSL)

A. For capital project construction contracts and other long form contracts as requested by the CORPORATION, a hardbound Jobsite Safety Logbook (JSL), supplied by the contractor(s), shall be maintained at the SA job site office. The JSL shall have pages that are sequentially numbered.
B. The CORPORATION (e.g., SA Project Management), or other FSMPC personnel will enter their name, date and comments regarding safety observations in the JSL on the left-hand page.
C. Contractor shall immediately take necessary corrective actions to mitigate observed safety hazards, including those documented in the JSL.
D. Contractor responses shall be entered within 48 hours on the right-hand page opposite the SA entry. Contractor responses shall clearly state action items, responsible parties, and estimated time for completion (ETC) in order to close the entry.
E. A member of the contractor's site management (e.g., project manager, job manager, site superintendent), other than safety staff, shall sign/date that entries are properly closed.

F. The CORPORATION reserves the right to notify contractor of failure to properly close JSL entries and to take necessary actions to eliminate the subsequent deficiency.
G. Failure to correct deficiencies noted in the JSL may result in that part of the job site work activities being suspended at the contractor's expense until the noted safety deficiencies have been corrected.
H. JSLs shall be given to the CORPORATION when all pages are filled and/or at job completion.

4.14 Failure to Comply

A. Upon receiving notification from the CORPORATION of failure to comply with the requirements of the contract and any actions needed to prevent the injury or death of personnel, damage to equipment, loss of process or damage to the environment during performance of work, the contractor shall immediately take all necessary actions including, but not limited to, action requested by the CORPORATION.
B. If contractor fails to take prompt corrective action, the CORPORATION may direct the contractor to suspend all or part of the work until satisfactory corrective action has been taken. Costs incurred by contractor as a result of such work suspension shall be solely the contractor's responsibility.
C. Disputes involving safety shall be elevated to the contractor's higher management for resolution before work can proceed.

4.15 Transportation

A. Contractor and their subcontractors shall provide safe and adequate transportation to and from the work site for their employees.
B. The contractor shall install and maintain roads as needed to access the work site (e.g., for remote capital projects).
C. Contractor-provided transportation shall stop at a safe location completely off the main road or highway (e.g., on a side street or authorized bus stop) and contractor personnel shall only disembark on the safe (i.e., sidewalk) side.
D. Motor vehicles used for transportation of contractor's employees shall have a valid SA sticker (if required to enter an FSMPC facility) and be kept in a clean and hygienic condition. Automobiles shall be air-conditioned. Defective vehicles shall not be used for transportation.
E. Contractor's employees shall be transported in the passenger compartments of motor vehicles equipped with seat belts for all occupants. All seats in cars and trucks shall face forward.
F. For larger sites, suitable buses may be used for transportation of employees. Buses without seat belts shall not be used after Jan. 1, 2015. Newly purchased buses shall have seat belts provided for all occupants and have air-conditioning installed.
G. Seat belts shall be continuously worn by all occupants of motor vehicles and buses in motion.

H. Buses shall not be overloaded (no more occupants than the manufacturer's stated seating capacity of the bus) and emergency exits shall be accessible and operable (not blocked or locked). Buses shall be equipped with fire extinguisher(s).
I. Motor vehicles and buses shall be in good working order. Documented inspections shall be performed for motor vehicles and buses at least monthly. Motor vehicles and buses shall be maintained in accordance with the manufacturer's instructions. The CORPORATION reserves the right to require removal and replacement of any motor vehicle or bus deemed unsafe or unfit for its intended purpose.
J. Personnel operating motor vehicles and buses on FSMPC property or project sites shall follow all FSM Government regulations, and the rules and requirements in Chapter I-8, *Traffic and Vehicle Safety*, of the CSM.
K. Contractor site management shall develop and implement a remote area travel program to control travel and provide for any necessary search and rescue of their employees in remote areas.
L. For remote travel and oversize/heavy loads, the contractor shall implement a journey management program.

4.16 Fitness for Duty

A. Contractor shall verify that its personnel are fit for duty relative to medical, physical and substance abuse considerations.
B. Contractor shall arrange for vision check(s) for all employees needing or suspected of needing corrective lenses in order to perform their assigned work.
C. Contractor shall ensure that personnel requiring sight correction (as determined by a vision check) wear appropriate safety eyewear (i.e., prescription safety glasses with side protection or safety over-glasses over standard prescription glasses). See Chapter I-3, *Personal Protective Equipment (PPE)*, of the CSM.
D. To prevent serious fatigue, contractor and subcontractor personnel shall not work excessive hours, with a maximum of 12 hours daily, except as may be requested/approved by the CORPORATION (e.g., during an emergency or unforeseen circumstances). Maximum work hours including portal-to-portal transportation shall not exceed 16 hours in any 24 hour period.

4.17 Heat Stress

A. Contractor management is responsible for managing their employees' work so as to avoid and prevent heat-related illnesses. Contractor shall ensure the requirements in Chapter I-13, *Heat Stress*, of the CSM are fully implemented at the work site.
B. Prior to performing work during hot weather, the contractor shall conduct a thorough heat stress evaluation to identify tasks and conditions that present a potential heat stress hazard. This evaluation shall include observations, discussions with workers and supervisors, review of any previously reported heat-related illnesses and shall be based on the U.S. Occupational Safety and Health Administration (OSHA) Technical Manual TED 01-00-015, Section III: Chapter 4, "Heat Stress" and/or the National

Institute for Occupational Safety and Health (NIOSH) *Occupational Exposure to Hot Environments.*

C. The contractor shall develop and implement a written heat stress management program based on the results of the heat stress evaluation, as well as SA's heat stress requirements. The contractor shall provide proper resources to support implementation of the plan, including but not limited to procurement and provision of materials and supplies. The contractor's heat stress management program shall be submitted to the CORPORATION for review and concurrence prior to the start of work during hot weather (i.e., prior to April 1).
D. The contractor's heat stress evaluation and management program shall address the following:
    - Job Location, specific locations of each task, including proximity to heat-producing equipment, confined spaces, work requiring specialized PPE, etc.
    - Work Duration and Schedule, frequency at which the task is performed and how much time and effort is required to perform the work.
    - Clothing, what workers wear can make a big difference in how much body heat they build up. Additional work clothing and/or more frequent laundry cycles shall be provided to enable workers to wear clean clothes each day.
    - Environmental Conditions, procedures to monitor air temperature and humidity and immediately communicate changing heat stress conditions to workers (e.g., use of color-coded flags and/or mass distribution of SMS mobile phone text messages to site supervisors and other personnel in non-restricted areas).
    - Controls, plan for and provide needed heat stress controls (i.e., engineering, administrative and personal protective controls) that shall be used to prevent heat-related illness. See Chapter I-13, *Heat Stress*, of the CSM.
E. Contractor shall provide training to site management and supervision on the heat stress management program, including recognition of, prevention of and response to heat-related illness, with emphasis on their responsibilities for ensuring safe working conditions (particularly suitable work/rest rotations for workers).
F. Contractor shall provide training and guidance to their employees in the recognition of, prevention of and response to heat-related illness.

4.18 Emergency Response

A. An emergency response plan (ERP) for each specific site shall be established by the contractor and/or by the contractor in coordination with the CORPORATION. For additional information, see the SA Emergency Management Guide. The contractor's ERP shall be submitted to the CORPORATION for review prior to the start of work.
B. Contractors shall ensure that their ERP is aligned with the CORPORATION and/or FSMPC facility's ERPs, as applicable.
C. Contractor shall train personnel on their specific roles in the ERP and shall conduct their own periodic emergency drills.
D. When an emergency alarm is sounded for any reason, all contractor personnel shall immediately shut down their job, make it safe and proceed in an orderly manner to the designated assembly point.

E. SA periodically conducts emergency response drills to perform and evaluate emergency response procedures. All contractor personnel are required to take part in these drills just as if it were an actual emergency as mentioned above.
F. Any action items from critiques of emergency drills that are applicable to the contractor shall be implemented by contractor site management. Review and verification of closure of these action items shall be performed during contractor site management safety meetings.
G. For projects outside of FSMPC facilities, the contractor shall install a proper emergency notification system and alarm(s), which shall include prompt activation of emergency response personnel. Contractor shall periodically conduct emergency response drills to evaluate emergency response systems and procedures.

4.19 Authority for Employees to Stop Work

Contractor shall provide the CORPORATION with written evidence that its employees and subcontractor employees clearly have authority to stop their own work and the work related to the contract due to unsafe conditions or acts.

4.20 Incident Reporting and Investigation

A. Contractor shall establish a policy and procedures to promote timely reporting of all unsafe acts and conditions, near-misses, injuries and other incidents, in accordance with GI 6.007 and Chapter I-2, *Incident Reporting and Investigation*. Proper corrective actions shall be promptly taken.
B. Contractor shall investigate all incidents involving their personnel and/or their subcontractors' personnel and shall participate in any SA incident investigation as requested by the CORPORATION.
C. Contractor's incident investigations shall be performed in a timely manner and root causes of the incident shall be properly identified. Effective corrective actions to prevent recurrence shall be identified and tracked to completion, with follow-up to verify proper implementation.

5.0 Contractor Site Safety Program (CSSP)

5.1 Contractor shall properly plan and establish job-specific safe work procedures for all contracted work. For long form capital project construction contracts where SA Project Management is the proponent or as requested in writing by the CORPORATION, the contractor shall develop, implement and adhere to a job-specific contractor site safety program (CSSP) that conforms to the requirements of the contract, this document and all other applicable SA safety requirements. If requested by the CORPORATION, the contractor shall submit a supplementary detailed safety plan as may be needed before starting a new major phase of work.

5.2 CSSP Submittal and Review Requirements

A. Within fifteen (15) working days of contract execution, contractor shall submit three copies of the job-specific CSSP to the CORPORATION for review. The CORPORATION will forward a copy of the CSSP to the Loss Prevention Department (LPD) and other applicable FSMPC organizations for additional review.
B. Any review comments will be forwarded to the contractor for its action. Contractor shall address all comments and resubmit the CSSP to the CORPORATION for final review and concurrence. Contractor shall not begin work onsite until the job-specific CSSP for the contract, if required, has been concurred with by the CORPORATION. The contractor shall furnish two (2) copies of the final CSSP to the CORPORATION prior to the start of work and shall also maintain copies at the job site.

5.3 The CSSP shall state specifically how the contractor will meet FSMPC's safety requirements for the work to be performed. The CSSP shall include the following, as applicable to the contract and work to be performed:

A. Title page, specifying budget item (BI), job order (JO) or contract number.
B. Job title and brief scope of work.
C. Site location map(s) with legend (symbols).
D. Contractor company's current safety policy (signed by their upper management).
E. Job-specific organization chart that clearly defines safety reporting relationships.
F. Names and qualifications (e.g., CV/resume) of safety manager/supervisor(s) and safety officers, as required.
G. Job-specific assignment of safety responsibilities by job classification.
H. Job-specific training needs analysis (e.g., training matrix) showing the safety training and job-skills/competency training required for all job classifications, as applicable to project's scope of work.
I. Written safety training program that includes: (1) a description of the basic safety training courses (e.g., first aid, fire safety, hazard recognition, confined space safety, driving safety) provided to contractor company's employees, (2) how these safety training courses are delivered (e.g., in-house, third-party) and (3) which of these courses are required for each type of job (e.g., documented in a safety training matrix or safety training plan).
J. *Written job skills/craft competency* training program that includes: (1) a description of the specific job skills/craft training courses required for each type of job (e.g., HVAC technician, plumber, pipefitter, scaffolder, welder) that are specific to their work for SA, (2) how these job skills/craft training courses are delivered (e.g., in-house and/or third-party) and (3) refresher training frequency.
K. List of jobs to be performed that require SA-approved certification (e.g., scaffold supervisor/inspector, crane/heavy equipment operator, rigger, welder).
L. Complete list of known subcontractors.
M. Project-specific plan/program the contractor will use for managing their subcontractors, including their safety performance.
N. Procedures for behavioural observations, site safety inspections, safety meetings, incident/injury/near miss reporting and investigation, safety training, safety recommendation tracking, etc.
O. Description of contractor's site safety incentive and/or disciplinary action programs.

P. Hazard identification plan (HIP) as per Section 6.0. Q. Waste management plan as per Section 10.0.

R. Hazardous substances plan, which describes the contractor's procedures for identifying and handling hazardous chemicals, materials, etc. Hazardous chemicals/materials shall be stored and handled in accordance with FSMPC chemical hazard bulletins (CHBs) and the manufacturer's material safety data sheets (MSDSs).

S. Job-specific and/or location specific safety procedures that are applicable to the contract's scope of work. These procedures may include but are not limited to: work permits, confined space entry, PPE, respiratory protection, fall protection, lock-out/tag-out, waste management, site demobilization/restoration, emergency response, etc., (see Section 6.2 for additional topics).

Note 1: When the CORPORATION has applicable procedures, the contractor shall adopt them by reference with the contractor's job-specific safety procedures supplementing FSMPC's requirements by explaining specifically *how* the contractor will meet FSMPC's requirements. The contractor's safety procedures shall *not be a verbatimcopy* of FSMPC's safety requirements (e.g., copied directly from the FSMPC *Construction Safety Manual*).

Note 2: If the CORPORATION confirms that they do not have the needed existing procedures or that their procedures are not applicable to the project, the contractor shall develop their own safety procedures.

5.4 Since the contractor is completely responsible for their subcontractors, the contractor shall verify that the safety procedures and safe work practices identified in each subcontractor's site safety program are adequate and satisfy SA's and the contractor's minimum expectations and requirements. In the event that any subcontractor's safety procedure or safe work practice does not meet the minimum expectation, contractor shall work closely with subcontractor to develop/upgrade the appropriate safety procedure or safe work practice. Contractor shall complete the verification process prior to commencement of the work. CORPORATION may participate in the development/upgrade process at their discretion.

6.0 Hazard Identification Plan (HIP) and Other Submittals

6.1 For all FSMPC contracts (e.g., long form, mid form and short form contracts), the contractor and/or their subcontractor(s) shall develop, implement and adhere to a contract-specific HIP. The HIP shall list all tasks/activities associated with the contracted work, potential hazards of each activity and control measures to mitigate these hazards. The contractor's HIP shall identify all potential hazards associated with the work to be performed. The HIP shall not be a list of generic hazards.

6.2 The topics in Table 6.1 represent some, but may not be all, of the safety issues that shall be considered when developing the HIP.

Table 6.1 Possible HIP Topic's

Abrasive blasting	Falling object prevention
Asbestos	First aid, hospital transfer provisions
Blinding	Hand tools
Cartridge operated tools (Hilti)	Heat stress hazards
Chemicals and chemical handling	Heavy equipment operations
Communications	Housekeeping
Compressed gas cylinders	Toxic gasses
Concrete forming and shorting	Hydro-testing
Concrete placement	Impact on FSMPC's operations
Confined space entry/ rescue	Ionizing radiation
Cranes and rigging	Isolation/ Lock out/ Tag out (LOTO)
Cutting, welding and brazing	Materials handling
De-mobilisation	Mechanical equipment
Demolition	Painting and coating
Driving/ vehicle safety	PPE
Dust control	Portable power tools
Electrical safety	Scaffolding
Elevating/ lifting equipment	Steel erection
Emergency response (ERP)	Transportation
Excavations and shorting's	Welding on lines in service
Explosives	Work at height
Fall prevention/ protection	Work over water
Fire prevention/ fire fighting	Work permits

6.3 Within fifteen (15) working days of contract execution, the contractor shall submit three copies of contractor's job-specific HIP to the CORPORATION for review. The CORPORATION will forward a copy of the HIP to the LPD and other applicable FSMPC organizations for additional review.

6.4 Any comments will be forwarded to the contractor for its action.
Contractor shall address all comments and resubmit the HIP to the CORPORATION for final review and concurrence. Contractor shall not begin work on-site until the HIP for the contract has been concurred with by the CORPORATION. The contractor shall furnish two (2) copies of the final HIP to the CORPORATION prior to the start of work and shall also maintain copies at the job site.

6.5 The contractor's job-specific HIP shall be revised and amended, as needed, when conditions change, new hazards are introduced or the scope of work changes.

6.6 In addition to the HIP, contractor shall submit, as applicable to the contract, job-specific plans such as, but not limited to: site layout plans, site-specific traffic flow plans, fire protection plans, security fence layout plans, project support facility plans (e.g., office, maintenance, sanitary, dining, laydown/storage facilities) and contractor camp plans (see Section 10.3 and Section 11.0 herein). The contractor shall submit three copies of these job-specific plans to the CORPORATION for review within fifteen (15) working days of contract execution. Contractor shall not begin work on-site until the job-specific plans for the contract have been reviewed by the CORPORATION. Contractor shall furnish two (2) copies of these job-specific plans

to the CORPORATION prior to the start of work and shall also maintain copies at the job site.

7.0 Contractor Personnel Safety Responsibilities

7.1 General

A. Each contractor employee working on FSMPC jobs shall comply with the SA GIs, standards, manuals and other contract documents that are applicable to the work, including the *SA Safety Handbook.*
B. The contractor's line management and site supervision shall be fully responsible for compliance with SA's safety requirements. This responsibility shall not be delegated to the contractor's safety manager/supervisor(s)/officer(s).
C. Contractor supervisory personnel or other qualified staff shall be present at the job site while work is in progress.
D. The contractor shall remove from the job site any of its employees who refuse or repeatedly fail to comply with safe work practices or supervisors who fail to enforce compliance, including as requested by the CORPORATION.
E. Listed below are some responsibilities associated with specific contractor job categories, as applicable (e.g., specific management and supervisory job categories may not be required or may be combined if agreed to by the CORPORATION). Contractor personnel working on FSMPC jobs shall abide by these responsibilities.

7.2 Contractor Management

Contractor company management shall:

- Ensure compliance with SA's safety requirements for the control of injury, damage and fire as stated in the contract.
- Ensure preparation and submittal of a contract-specific CSSP and/or
- HIP, as required by the CORPORATION.
- Ensure the contractor's subcontractor selection process includes an evaluation of subcontractor safety management program and performance.
- Provide the necessary personnel, training, tools, equipment and materials to enable the work to be performed competently and safely.
- Train and qualify contractor site management and supervision on their job safety responsibilities, including incident investigation and job safety analysis (JSA).
- Conduct training needs analysis to determine the required training for all levels of contractor employees.
- Ensure contractor employees are trained and qualified on their safety responsibilities.
- Provide needed PPE and establish training/procedures to ensure proper
- PPE selection, use and maintenance.

- Participate in coordination (interface) meetings between SA, subcontractors and any other contractors that may be working on the same jobsite to coordinate work activities.
- Ensure development, CORPORATION review and implementation of detailed procedures for critical work activities such as welding, tie-ins, hot taps, loop tests, excavations, confined space entries, equipment/vehicle access, etc.

7.3 Contractor Site Management

A. The contractor's site management (project manager, construction manager, site superintendent or equivalent position) shall establish the following at the planning stage:
   - Safety responsibilities for supervisors, subcontractors and other personnel.
   - Fire prevention and protection provisions.
   - Emergency vehicle access.
   - Specific hazards to be identified in the CSSP and/or HIP.
   - Job-skills/craft training and safety training/orientation requirements for personnel.
   - Types and quantities of PPE needed.
   - First aid, medical and sanitation facilities needed.
   - Work permit procedures and requirements, if not already established by the CORPORATION.
   - Emergency Response Plan (ERP) and/or emergency procedures aligned with any applicable CORPORATION ERP.

B. The contractor's site management shall be fully responsible for implementation of all contractual requirements at the job site and shall visibly demonstrate the priority of safety in all activities, including setting a good personal example and as follows:
   - Empower all contractor and subcontractor personnel on site to stop their own work and work related to the contract that they deem to be unsafe and take immediate corrective actions as needed.
   - Understand and implement the safety and health requirements of the contract.
   - Implement the CSSP and/or HIP and convey the safety responsibilities of each level of supervisory staff.
   - Use only FSMPC certified work permits when work will be conducted in FSMPC restricted areas or where required by the CORPORATION.
   - Implement contractor's work permit procedures in work areas where SA work permits are not required or as requested by the CORPORATION.
   - Attend/conduct safety meetings to promote and reinforce proper safety and health performance.
   - Periodically inspect the work site, report any unsafe acts/conditions to the contractor's site supervisor and/or foreman, provide recommendations to correct deficiencies and perform follow-up inspections to ensure corrective actions have been taken.

- Routinely consult with the contractor's safety manager/supervisor(s)/officers to assess the job site safety status and identify areas for supervisors and foremen to take corrective action.
- Provide and maintain a Jobsite Safety Logbook (JSL) at each separate job site (note: the JSL shall be used by SA and the contractor to document unsafe acts/conditions and the corrective actions taken).
- Ensure that the appropriate supervisor or foreman responds immediately to comments written in the JSL.
- Review work methods and precautions with site supervision before work starts.
- Immediately report all incidents and near misses to the CORPORATION.
- Ensure incidents and near misses are properly investigated to determine root causes, make recommendations to prevent recurrence and that corrective actions have been taken.

7.4 Site Safety Manager/Supervisor

The contractor's site safety manager/supervisor (site safety superintendent, senior safety engineer, safety coordinator or equivalent position) shall visibly demonstrate the priority of safety in all activities, including setting a good personal example and as follows.

- Be responsible and accountable for the proper performance of field safety officers under his authority.
- Be empowered in writing by his management to stop their own work and work related to the contract that they deem to be unsafe and take immediate corrective actions as needed.
- Understand safety and health requirements of the contract as well as the CSSP/HIP and CSM.
- Conduct safety 'kickoff' meetings with subcontractors to explain site-specific safety requirements and expectations.
- Ensure all contractor and subcontractor personnel attend site safety orientations, including as required by the CORPORATION, and ensure contractor and subcontractor personnel attend applicable safety training.
- Communicate safety rules and standards to the contractor and subcontractor workforce.
- Provide/assist with safety training for personnel.
- Periodically inspect the work site, report any unsafe acts/conditions to the area supervisor and/or foreman, provide recommendations to correct deficiencies and follow-up to verify corrective actions have been taken.
- Keep a record of safety meetings, including agendas and personnel attendance records.
- Keep a permanent record of job-related injuries/illnesses, near misses, fires, motor vehicle accidents, property damage, crane and heavy equipment incidents, etc.
- Participate in incident investigations, safety meetings, drills, etc., and conduct/facilitate safety training sessions.

- Ensure general safety rules are printed in languages understood by contractor and subcontractor personnel and are posted in areas where they are clearly visible.

7.5 Project Engineer

A. The contractor's project engineer (project superintendent or equivalent position) shall immediately notify the contractor's site management and the CORPORATION of the following:
   - Injury or death of personnel, damage to equipment, loss of process or damage to the environment.
   - Safety infractions noted during site inspections, etc.

B. The contractor's project engineer shall visibly demonstrate the priority of safety in all activities, including setting a good personal example and as follows:
   - Conduct daily site inspections and evaluate safe work methods in operation.
   - Monitor compliance with Government regulations and SA requirements, including the adequacy of sanitation and first aid/medical facilities.
   - Provide/assist with safety training for personnel.
   - Meet and discuss with the CORPORATION, regarding injury or death of personnel, damage to equipment, loss of process or damage to the environment.
   - Obtain and circulate relevant safety information applicable to personnel.
   - Attend safety meetings and report on-job safety performance.
   - Participate in incident investigations, drills, etc., and conduct/facilitate safety training sessions.

7.6 Site Supervision

The contractor's site supervision (field engineers, supervisors, foremen or equivalent position) shall visibly demonstrate the priority of safety in all activities, including setting a good personal example and as follows.

- Be qualified, proficient in both verbal and written English, provide direct and effective on-site supervision and be continuously present on- site.
- Be empowered in writing by their management to stop their own work and work related to the contract that they deem to be unsafe and to take immediate corrective actions as needed.
- Understand the safety and health requirements of the contract as well as the contractor's CSSP and/or HIP.
- Assess the workplace and work activities to determine hazards that are present or are likely to be present, in consultation with the safety manager/supervisor(s) or field safety officer as needed.
- Evaluate hazardous operations and implement needed precautions to ensure the safety of all affected personnel (note: hazardous operations may

include, but are not limited to: welding, radiography, abrasive blasting, asbestos removal, electrical work, solvent cleaning, crane operations, etc.).

- Understand the safest method of performing each job activity in their area of responsibility.
- Provide instructions to their personnel on proper work methods, sequence of operations, potential hazards at each stage and precautions to follow.
- Inform their personnel of safe work methods and safety requirements detailed in the CSSP and/or HIP prior to beginning a different work activity (i.e., conduct pre-job toolbox (craft safety meetings).
- Use only trained personnel who are properly qualified for the work to be performed.
- Ensure that equipment operators operate only the specific equipment for which they have been trained and/or certified.
- Plan and maintain good housekeeping in the work area.
- Coordinate with subcontractors and other contractors on-site to avoid confusion in areas with joint or overlapping responsibility or joint occupancy (note: this includes work that may be separate and unrelated).
- Position temporary equipment to avoid safety hazards.
- Provide the required PPE and ensure proper use.
- Ensure equipment and tools (both power and hand tools) are in good operating condition and properly used.
- Train their personnel on emergency response procedures/plans.
- Provide immediate assistance as requested by the contractor's safety manager/supervisor, emergency response organizations, CORPORATION, etc., during emergencies.
- Conduct weekly safety meetings for their personnel.
- Conduct daily work site inspections to identify and immediately correct unsafe acts, conditions and/or equipment.
- Document and coordinate safety inspection activities and findings with the safety manager/supervisor.
- Commend personnel who, by action and/or initiative, eliminate hazards.
- Immediately report all incidents, unsafe conditions and defects in equipment to the contractor's site management and the CORPORATION.
- Participate in incident investigations, safety meetings, drills, etc., and conduct/facilitate safety training sessions.

7.7 Field Safety Officer

The contractor's field safety officers (safety inspector, site safety engineer, safety advisor, safety representative or equivalent position) shall visibly demonstrate the priority of safety in all activities, including setting a good personal example and as follows:

- Be empowered in writing by their management to stop their own work and work related to the contract that they deem to be unsafe and take immediate corrective actions.
- Understand the safety and health requirements of the contract as well as the CSSP/HIP.

- Communicate safety rules and standards to the contractor and subcontractor workforce.
- Inspect the work site daily, report any unsafe acts/conditions to the supervisor and/or foreman, provide recommendations to correct deficiencies and follow-up to ensure corrective actions have been taken.
- Participate in incident investigations, safety meetings, drills, etc., and conduct/facilitate safety training sessions.

7.8 Equipment Manager/Supervisor

A. The contractor's equipment manager/supervisor or equivalent position shall ensure that all equipment purchased, rented or leased:
   - Has proper guarding for electrical, mechanical and chemical hazards.
   - Is equipped with required safety devices.
   - Has required testing laboratory stamps, labels and certifications affixed.

B. The equipment manager/supervisor shall visibly demonstrate the priority of safety in all activities, including setting a good personal example and as follows:
   - Attend and participate in safety meetings.
   - Verify heavy equipment operators are certified as required by SA.
   - Ensure hand-held electrical equipment and power tools are rated at 110 volts.
   - Ensure tools constructed of good quality materials are used. Use of homemade tools is prohibited.
   - Ensure periodic tests, inspections and maintenance of equipment are carried out when due and records are properly maintained and available for review by the CORPORATION.
   - Ensure equipment defects are promptly repaired and defective equipment is immediately tagged with in red, removed from service and discarded/destroyed.

7.9 Contractor Personnel

Contractor personnel shall visibly demonstrate the priority of safety in all activities and shall:

- Be empowered in writing by their management to stop their own work and work related to the contract that they deem to be unsafe (without fear of retribution).
- Immediately report all incidents or hazardous conditions to their supervisor.
- Never endanger themselves or their fellow workers, including refraining from horseplay.
- Take and pass required job-skills/craft training and safety training.
- Understand safety rules, safe work practices and follow special safety precautions (e.g., in FSMPC restricted areas).
- Properly use the correct tools and equipment for the job.
- Keep tools in good condition and repair.

- Properly use the correct PPE.
- Never remove, modify or abuse safety devices, equipment and welfare facilities.
- Attend and participate in safety meetings, —toolbox talksǁ, safety training, etc.
- Obey posted warning signs.

8.0 Personnel Qualifications, Training and Certification

8.1 General

A. Contractor shall ensure that all its personnel are qualified, competent and have demonstrated they have the necessary knowledge and skills to safely and properly perform their assigned work.
B. Contractor shall ensure their personnel receive documented training, based on job classification and training needs analysis, before being permitted access to the work site. This training shall include: (1) safety orientation, (2) job-specific safety training and (3) job-skills/craft competency training for personnel engaged in specific craft activities (e.g., electrical, scaffolding, steel erection, welding, cutting, crane/heavy equipment operation).
C. Contractor shall establish job classifications (e.g., welder, rigger, crane operator, heavy equipment operator, driver) required to perform the work and the specific job skills/craft competence and training requirements for each of these job classifications, including FSMPC and/or FSM Government certification/license requirements.
D. Where a specific job function requires FSMPC and/or FSM Government certification/license, these job functions shall be assigned only to properly certified/licensed personnel (e.g., certified crane/heavy equipment operators).
E. Contractor shall establish additional training programs for personnel who perform high-risk activities, such as but not limited to: confined space entry, fire watch, isolation and lock-out/tag-out, working on or near energized electrical equipment, working at height, lifting and rigging, excavation, specialized power tools and equipment, handling of hazardous chemicals, waste storage and handling, etc.
F. Contractor's in-house or third-party training shall include:
    - Training facilities complete with multimedia (audio/visual) resources.
    - Qualified instructors to ensure personnel properly receive the required training.
    - Verbal instruction and written materials in a language clearly understood by the personnel receiving the training.
    - Documented post-training competency assessments.
    - Documentation of completed safety training (e.g., pocket card, "safety passport" or file copies of training records).

G. Personnel shall maintain the required FSMPC and/or FSM Government certification/licenses in their possession at all times.
H. Contractor shall work closely with their subcontractors to provide training programs to ensure that subcontractor personnel have the necessary knowledge and skills required to safely and properly perform the assigned work.

8.2 Safety Orientation for Contractor Employees

A. Contractor companies shall ensure that their employees and subcontractor employees who are new to a particular work site attend and pass their own company's safety orientation, as well as any facility safety orientation that may be required by the CORPORATION.
B. The contractor's safety orientation program shall include an overview of relevant requirements in the SA Safety Handbook and Construction Safety Manual (CSM).
C. The contractor's safety orientation program shall include, but not be limited to, the applicable topics shown in Table 8.1.

Table 8.1 Contractors Safety Orientation Topics

Alarms and notifications	Incident reporting procedures
Assembly points	PPE
Basic safety rules	Smoking restrictions and locations
Break areas	Traffic rules and restrictions
Emergency response procedures (ERP)	Understanding safety signs and warnings
Heat stress precautions	Work permits
Toxic gasses	

8.3 Short Service Employee (SSE) Program

A. Contractor shall establish a short service employee (SSE) program. This program shall include identification of new or inexperienced personnel so others may take extra care in their presence and provide additional assistance.
B. The SSE program shall define the criteria for an inexperienced worker based on duration of employment, change of job scope and/or length of industry service.
C. All new or inexperienced workers shall be classified as a SSE for a predetermined duration (e.g., 3-6 months) and shall be assigned a mentor during this time.
D. All SSE's shall continuously wear a visual identifier while at the job site (e.g., green hard hat). The SSE visual identifier to be used shall be approved beforehand by the CORPORATION.
E. Before work commences, contractor shall inform the CORPORATION of the maximum ratio of SSEs to experienced workers that will be present at the job site at any given time. The CORPORATION reserves the right to require an alternate maximum ratio of SSEs.
F. Supervisors shall observe their SSE's work performance until they are satisfied that the employee can perform his job in a safe and effective manner.

G. The SSE program shall provide additional training as requested by the supervisor.

8.4 Job-Skills/Craft Competency Training and Safety Training

A. Contractor shall ensure that job-skills/craft and safety training fully qualify personnel to perform their job properly and safely.
B. Job-skills/craft competency training and safety training shall include, but not be limited to, the relevant topics listed in Table 8.2, depending upon the job scope and assigned responsibilities.

Table 8.2

Job-skills/Craft Training	**Safety Training**
Abrasive blasting	Basic life support (BLS)
Asbestos	Communications
Cartridge operated tools (Hilti)	Compressed gas cylinders
Concrete formwork/shoring	Confined space entry/rescue
Cranes and rigging	Emergency response procedures
Cutting, welding, brazing	Fall prevention/protection
Demolition	Falling object prevention/protection
Electrical systems/equipment	Fire prevention/firefighting
Elevating/lifting equipment	First aid
Excavations and shoring	Hazard recognition
Explosive materials	Hazardous chemicals
Gas testing	Heat stress
Hand tools and power tools	Housekeeping
Heavy equipment	Hydrogen sulfide (H2S)
Hydrotesting	Incident reporting/investigation
Ionizing radiation	Isolation/lockout/hold tag
Isolation and blinding	safety analysis (JSA)
Non-destructive testing (NDT)	Ladders
Painting and coating	Materials handling
Piling	Personal protective equipment (PPE)
Pipefitting	Respiratory protection
Plumbing	Vehicle/traffic/driving safety
Portable power tools	Work over water
Pressure testing	Work at heights
Scaffolding	Work permits

C. Contractors shall maintain training records for review by the CORPORATION upon request.
D. SA reserves the right to test/verify the job skills/craft competency and qualifications of contractor's employees and to remove any employee failing this test/verification.

E. Safety training shall also address off-job hazards (e.g., seat belt use, cooking safety).

8.5 Refresher Safety Training

Refresher safety training shall be:

- Conducted at a frequency not less than that established by FSM Government regulations or SA requirements (note: in the event that refresher safety training is not covered by FSM Government regulations or SA requirements, the CORPORATION or contractor shall document the refresher safety training frequency).
- Documented by the contractor, including the personnel that attended and passed refresher safety training.

8.6 Safety Training for Site Supervision and Safety Staff

A. Contractor shall ensure that all their site supervision and safety staff receive formal safety training, OSHA, NEBOSH, NSC or other CORPORATION approved equivalent safety training program. This training shall include a review of typical site hazards and safe work practices.

B. Contractor's site supervision and safety staff shall be trained in, but not be limited to, the following:

- The job-specific CSSP and HIP.
- The contract's safety requirements.
- Specific hazards and safe work practices associated with the job.
- Relevant sections of the SA *Safety Handbook* and the SA *Construction Safety Manual* (CSM).
- Injury/incident reporting and investigation.
- Applicable emergency response procedures.
- First aid and basic life support (BLS). Note: They shall have valid first aid and BLS certificates in their possession at all times.

9.0 Medical

9.1 General

Contractor shall provide for medical care of its employees according to requirements established by the FSM Government Ministry of Health (MOH) and FSM labour law. This medical care shall include, but not be limited to, first aid, urgent and emergency care, stabilization and immediate transfer of patients to hospital, inpatient/outpatient hospitalization and emergency and disaster response.

9.2 Provision of First Aid

A. First aid, which is the immediate help provided at the work site to injured or seriously ill personnel prior to the arrival of professional medical assistance.

B. Contractor shall provide and maintain adequate first aid supplies for contractor and subcontractor personnel at all work locations.

- If fewer than 50 people are at a work site, provide at least one 10-unit first aid kit/cabinet.
- If 50 people or more are at a work site, provide at least one 36-unit first aid kit/cabinet.
- If work is carried out at locations that are more than 500 m (1,500 ft) apart, a separate first aid kit/cabinet shall be provided for each group of workers.
- The contractor shall assign first aid attendant(s) to be responsible for each first aid kit/cabinet and to ensure there is sufficient stock of all supplies at all times.
- Signs/notices shall be posted near each first aid kit/cabinet stating the following:
    - Name of person(s) who is in charge of the first aid kit/cabinet.
    - Hospital where injured/ill personnel are to be transported.
    - Telephone number(s) of doctor(s) or first aid attendant(s).
    - Emergency telephone number(s).

C. First aid supplies shall be kept readily available in a first aid kit/cabinet designated for those supplies only. First aid supplies shall be kept in a sanitary condition at all times.

D. Contractor shall provide an adequate number of personnel at each work site who are trained in first aid and BLS, including those in charge of first aid supplies.

E. One four-wheel drive vehicle equipped with a well-stocked first aid kit for each crew shall be available for personnel performing pipeline or power- line work, or who are working in remote areas. These vehicles shall be marked to indicate they carry a first aid kit. A minimum of one person in every remote area crew shall have a valid first aid/BLS certificate.

F. A medical logbook shall be maintained at each first aid station and medical facility by the first aid attendant who shall log all injuries/illnesses treated. See the MMSR manual for a sample log.

G. Contractor or FSMPC shall provide Automated External Defibrillators (AEDs) as required. At each site with an AED, contractor shall provide an adequate number of personnel who are trained in AED operation.

9.3 Work Site Medical Facilities (Clinics)

A. Contractors employing more than fifty (50) total people for a given project (whether working on multiple shifts or not), including personnel employed by the contractor's subcontractors, shall contractually arrange with an FSMPC medical designated facility (MDF), or other medical facility recommended in writing by the Corporation.

B. Work site medical facilities (clinics) shall be fully established and in operation before work begins and shall:

- Have the capability to provide first aid, urgent care, prehospital and resuscitation care, stabilization and prompt transfer to the nearest hospital.
- Have an emergency response plan (ERP) detailing the response capabilities specific to the geographical location. A medical emergency and disaster call-out list shall be posted in the work site medical facility (clinic).

C. The contracted MDF or other medical facility shall provide, in addition to qualified manpower and proper supplies, all medical services required to operate the work site medical facility. This operation shall include, but not be limited to, providing the following services: clinic supervision, medical referral and consultation, pharmaceutical (drug formulary, storage, administration, dispensing and disposal), medical equipment and equipment maintenance, medical transportation, emergency/disaster response planning and training, healthcare policies and procedures, and other needed general and technical medical support services, including medical training to the contractor's employees.

D. Contractor shall make arrangements to have each work site medical facility (clinic) independently inspected/audited prior to 'startup' and at least semi-annually thereafter. These inspections/audits shall be performed by medically qualified personnel from the contracted MDF or other medical facility used by the contractor for its work site medical facilities (clinics), but shall not be personnel who staff the specific work site medical facility being inspected/audited.

E. These inspections/audits shall use a Survey and Compliance Review Report. The clinical and technical parts of the survey shall be performed by medically qualified personnel. The contractor shall be responsible for promptly correcting all deficiencies or violations identified by any such inspections/audits. Initial and periodic inspections/audits shall cover all areas mentioned in this Section 9.0 and:
    - General health care requirements.
    - Building specifications.
    - Manpower requirements.
    - Staff qualifications, continuing education and training.
    - Safety, environmental, health and infection control requirements.
    - Medical equipment and supplies.
    - Pharmaceutical Services.
    - Support services (communications/ambulance/janitorial services).
    - Medical emergency and disaster response procedures/Medevac procedures.
    - Health care policies, procedures and scope of service.
    - First aid kit/cabinets required, including an Automated External
    - Defibrillator (AED).

F. Contractor shall ensure that drug formulary, prescription, supplies, storage, administration and dispensing shall be under the supervision of a licensed pharmacist or physician from the contracted MDF or other medical facility used by the contractor for its work site medical facilities (clinics).

G. Contractor shall ensure it has or has arranged to have in place the necessary support services, including safety, environmental health and infection control (e.g., disposal of medical waste), equipment management, janitorial services and communication services.

H. Work site medical facilities (clinics) shall be subject to inspection by SA. The contractor shall be responsible for promptly correcting any deficiencies or violations identified by SA following any such inspections/audits.

9.4 Medical Professional Personnel

A. Medical professional personnel (e.g., physicians, nurses) shall at a minimum meet the licensing requirements of the FSM MOH and shall possess the necessary experience, training, minimum qualifications and required certification.
B. The names, qualifications and MOH certificates of the medical professional personnel who will staff a medical facility (clinic) shall be submitted to the CORPORATION for review before work begins.
C. Contractor shall have arrangements in place with the contracted MDF or other medical facility used by the contractor for its work site medical facilities (clinics) to provide medical professional personnel coverage for unplanned emergencies, holidays, sickness, off-duties, absences and other unplanned events.
D. Medical professional personnel shall be provided with periodic mandatory and continuing education by their employer as required by the MOH. This continuing education shall include, but not be limited to: first aid/BLS, safety and infection control, heat stress, fire and disaster training, etc.
E. Contractor shall make arrangements with the contracted MDF or another medical facility (e.g., hospital) for consultation services so a qualified physician (specialist or otherwise) can be consulted by the work site medical facility's staff 24 hours a day, seven days a week for medical advice, prescription of drugs, referral and/or transfer of patients as needed.
F. All medical professional personnel shall receive disaster training at least annually. Training shall include the application of the commonly used triage system in disaster management, communication strategies and participation in at least two disaster drills per year.

9.5 Medical Insurance and Ambulance(s)

A. To facilitate and expedite patient transfer and admission to a nearby hospital for definitive care and to comply with the FSM Government's medical insurance laws, contractors shall ensure all their employees, including subcontractor employees, are continuously provided with valid medical health insurance coverage, before they enter the work site, for outpatient, first aid, emergency, specialist and inpatient care at a nearby hospital that is operated 24-hours a day, seven days a week. Contractor shall submit documentary evidence of current medical health insurance coverage for its employees to the CORPORATION monthly and upon request.
B. Contractors shall provide or make arrangements to provide a dedicated, full-size emergency vehicle (ambulance, or other suitable method of transportation) at each work site medical facility (clinic) to transport injured/ill personnel to the nearest hospital. If the work location is off road, the contractor shall provide a four-wheel drive ambulance.

C. Ambulances (or other suitable method of transportation) shall be maintained in a safe, clean, sanitary and roadworthy condition in compliance with FSM Government regulations and FSMPC vehicle requirements. Ambulances shall be provided with a dedicated shaded parking space.
D. Ambulances shall have purpose markings, be configured safely and be equipped, at a minimum, with emergency and resuscitation supplies as specified in the MMSR manual.
E. A daily ambulance log and ambulance preventive maintenance work sheet shall be maintained (see the MMSR manual for samples).
F. Contractors shall provide ambulance drivers with first aid/BLS training, site orientation and medical facilities location training.
G. Ambulance drivers shall be qualified as per the MMSR manual and shall have a valid FSM Government driving license.

9.6 Air Medical Evacuation (Medevac)

A. Contractor shall ensure that needed Medevac procedures are incorporated into their emergency response procedures as a part of their CSSP.

10.0 Site Planning, Usage and Housekeeping

10.1 Initial Site Planning

A. Prior to start of on-site work, the contractor shall determine what personnel, equipment, procedures, etc., will be needed and how they will be provided in order to ensure that the work will be conducted in a safe manner.
B. The contractor's initial site planning shall consider, but not be limited to, the following topics:

- Site location—offices, worker camps, etc. (see Sections 10.0 and 11.0).
- Heavy equipment, chemicals, demolition, welding, non-destructive testing (NDT), etc.
- Personal protective equipment (PPE).
- Emergency response procedures.
- Work permit requirements.
- Control of falling objects.
- Required barriers.
- Medical and first aid resources needed (see Section 9.0).
- Heat stress management and prevention.
- Fire/drinking/sanitary water supply and distribution.
- Transportation.
- Excavations.
- Electrical tools and services.

- Scaffolding and work at heights.
- Safety staff (see Section 4.5).

Note: Some of the above topics are covered in further detail elsewhere in this manual.

10.2 Site Planning and Layout

A. Site planning shall include, but not be limited to: building spacing, fire protection, welfare facilities, rest areas, recreational facilities, assembly areas, offices, living quarters, medical facilities, dining facilities, prayer areas, laydown yards, fabrication shops, etc.

B. The site layout shall be planned before mobilization to the work site to identify issues such as, but not limited to: emergency access routes, normal traffic flow, parking areas, siting for cranes, staging areas, material storage, sanitation/welfare facilities, first aid stations/medical facilities, fixed/portable fire protection, utilities, etc.

C. Access road planning shall include, but not be limited to: traffic flow, load- bearing capacities, traffic signs and controls, road striping, parking areas, road intersections and multiple-use roads. Emergency response vehicle access shall be provided at all times to all locations.

D. Contractor shall provide adequate shelters/rest facilities and drinking water supply at construction sites and work locations, including as needed for prevention of heat stress.

10.3 Plans for Contractor Camps and Project Support Facilities

A. Contractor shall prepare comprehensive plans for all contractor camps and project support facilities that incorporate the requirements from the above planning and are in accordance with Section 11.0. These plans shall address, at a minimum, the following as applicable to the contract:

- Plot plans and building layouts, which for contractor camp facilities shall show the camp site layout including medical, dining, recreation and toilet/shower facilities.
- Interior building layout/space utilization, which shall show site offices, conference rooms, prayer rooms, open office space for clerks, partitioned office spaces, kitchens, storage areas, etc. For contractor camps, interior building layouts shall show dormitory room planned occupancy and furniture layout.
- Building architectural/structural design features, including materials of construction.
- Building fire protection and alarm systems.
- Building air-conditioning, heating and ventilation distribution systems, including temperature control and equipment sizing calculations.
- Electrical power distribution systems.
- Electrical outlets per room (number and location shall be sufficient to safely accommodate personal electronics needs, such as TVs, mobile phone chargers, radios, etc.).
- Building and area lighting.

- Communications systems, data cabling and equipment.
- First aid, ambulance and medical services/clinics.
- Fire prevention and firefighting provisions.
- Raw water treatment and drinking water supply.
- Sewage/waste water collection, treatment and disposal.
- Sanitation plan, including refuse handling requirements and waste management facilities.
- Storage, shop, fabrication areas.
- Roads and parking areas.
- Provisions for vehicle repairs, service and maintenance.
- Site lunch shelters.
- Site security fencing.

10.4 Land Use Permit

A. Whenever a contractor camp or project support facility is needed, the contractor shall obtain, through the CORPORATION, any required land use permit (LUP) prior to the commencement of any work activity at the site.
B. Contractor shall comply with all conditions stated on the FSMPC LUP.

10.5 Project Signs

A. A job activity information sign shall be erected at the main entrance(s) to the job site and shall comply with the requirements of this section.
B. At a minimum, the following information shall be shown on project signs:
    - CORPORATION name.
    - Project title.
    - Emergency contact numbers for CORPORATION and contractor representatives.
C. The design of project signs shall be:
    - A minimum of 1.2 m (4 ft) high and 2.4 m (8 ft) wide.
    - Printed in black and white.
    - Printed in English and the local language, with the local text located above or to the right of the English text.
D. Sufficient signs shall also be erected and maintained on or near the site to direct delivery vehicles and visitors to the work area.
E. Other signs, such as safety warnings, may be required (e.g., by the CORPORATION).

10.6 Entry and Exit

Safe entry and exit points shall be provided at work sites. Entry and exit points shall be kept clear and unobstructed at all times.

10.7 Pedestrian Pathways On-Site

On-site dedicated pedestrian walkways/pathways shall be clearly marked and distinct from vehicular travel routes. Physical barriers shall separate parallel personnel walkways/pathways from adjacent vehicular and heavy equipment traffic.

10.8 Barricades

Barricades shall be provided where required. Barricades shall be clearly marked with flagging. Barricades shall have protective lighting, when necessary.

10.9 Site Drainage

Sites shall have good drainage and be graded so water does not pool on job sites, camps, roads, etc.

10.10 Fire Protection and Prevention

A. Contractor shall provide firefighting equipment (e.g., fire extinguishers, hydrants, hoses, sprinklers, alarms).
B. Firefighting equipment shall be readily available and accessible. Areas around fire extinguishers, hydrants, hoses and other firefighting equipment shall be kept clear.
C. Fire extinguishers, hydrants, hoses and other firefighting equipment shall be regularly inspected and maintained. Contractor shall provide fire equipment inspection and maintenance records to the CORPORATION upon request.
D. Designated site personnel shall be trained in the use of the various types of firefighting equipment on-site.
E. Smoking shall be permitted only in designated areas.

10.11 Materials Storage Yards

A. Flammable and combustible material storage areas within materials storage yards shall be clearly marked and adequate in size and layout.
B. Material storage yards shall not be closer than 15 m (50 ft) to any other structure.

10.12 Site Illumination and Electrical

A. Adequate lighting shall be provided.
B. Grounding for electrical tools and wiring installations shall be in accordance with local safety requirements.
C. Contractor shall comply with the National Fire Protection Association, NFPA 70, *National Electrical Code (NEC)*, and FSMPC's electrical safety requirements.

10.13 Security Fencing

A. Contractor shall provide, install and maintain required temporary security fencing in accordance with Corporation requirements.

B. Fences shall be properly designed, grounded, of sound construction, appropriate for the intended purpose and built in accordance with FSMPC requirements.
C. Fences shall be periodically inspected.
D. Existing roadways and pedestrian walkways crossing the work site shall be rerouted outside the work site perimeter fence prior to the start of work.
E. Red and white, blue and white, or black and reflective yellow (or white) flags shall be fastened to the fence when a fence crosses an existing road.
F. Dead-end signs shall be erected on the approach to fences if access is blocked. The distance to the blocked access shall be noted on the sign. However, if there is a temporary bypass, a —DIVERSION AHEAD‖ sign, with diversion arrows showing the proper route, shall be erected on the approach to the fence in black and yellow (or white) reflective material.
G. At least two access gates 4.5 m (15 ft) wide, located at opposite ends, shall be provided to the site. Access gates, where possible, shall avoid opening onto main thoroughfares.
H. Standard stop signs shall be attached to vehicle access gates.
I. Temporary signs shall be erected to route traffic in the safest manner to, from and within the site. Temporary signs shall not be placed on public highways and roads (refer to government traffic regulations).

10.14 Securing Site and Equipment after Working Hours

A. Power-driven construction equipment shall have the ignition locked and key removed when not in use.
B. Heavy equipment that will be left unattended overnight shall be made immobile by disconnecting the battery or by other appropriate means if there is no lock for the cab and the engine compartment access is readily available.
C. Bulldozer blades, front loader and backhoe buckets and similar pieces of equipment shall be lowered to the ground when not in use.
D. Excavations or obstructions creating hazards to pedestrian or vehicular traffic at night shall have adequate lighting. Warning signs shall be posted on approved types of barricades.
E. Contractor shall provide night watchmen and security personnel as needed to control access to the site after hours.

10.15 Manholes and Covers

Open manholes and openings in grating on elevated levels shall be properly barricaded. Hard barricades and warning signs shall be installed prior to removing a manhole cover or grating. Manhole and grating shall be immediately put back in place upon completion of the work activity.

10.16 Guy Lines/Ropes

Temporary guy lines and barrier ropes shall be clearly marked with reflective tape and/or signs and barricades provided to protect them, when needed.

10.17 Road Closures

Road closures shall be performed in accordance with FSM Government regulations and Site Administrators requirements.

10.18 Dust Control

A dust control program shall be identified in the HIP, developed and implemented to protect personnel and the general public.

10.19 Protection of the General Public

The general public shall be protected from exposure to hazards associated with the contractor's work activities such as, but not limited to, abrasive blasting, radiation, painting, excavations and traffic routing.

10.20 Housekeeping

A. Contractor shall provide for:
   - Cleaning of the entire site, including identifying areas where each subcontractor is responsible for the cleaning.
   - Collection, storage and disposal of non-hazardous and hazardous waste.
   - An adequate amount of trash receptacles in work areas.
   - Keeping waste segregated at all times in accordance with waste handling requirements.

B. The contractor's site supervision shall ensure that trash and debris is properly collected and disposed of daily.

C. Trash containers shall be of durable construction and shall be located as needed throughout the work area. Trash containers shall be covered, clearly marked and emptied daily. Separate trash containers, with suitable disposable plastic liners, shall be provided for food scraps and other organic matter.

D. Refuse, trash and garbage shall only be disposed of at approved sites as designated by Site Administrator or local municipality.

E. Excavation spoils and building materials shall only be disposed of at other approved sites as designated by Site Administrator or local municipality.

F. Contractor shall establish a site-specific waste management plan, which shall include specific procedures for disposal of any hazardous wastes (e.g., waste oil, sewage, naturally occurring radioactive materials), in accordance with FSM Government regulations and Site Administration's Environmental Protection (EPD) requirements. Contractor shall submit their site-specific waste management plan to the CORPORATION for review. The CORPORATION reserves the right to forward a copy of the waste management plan to EPD for review.

11.0 Contractor Camps and Project Support Facilities

11.1 General

A. Contractor shall ensure contractor camps/compounds and project support facilities (e.g., site offices, storage/laydown yards, fabrication/maintenance shops, medical/clinics) that are provided for contractor's personnel, subcontractors' personnel and/or FSMPC employees comply with the provisions of the FSM Labour and Workmen Law and Site Administrators safety, health and environmental requirements.

B. Site Administrator will inspect and periodically re-inspect any contractor camp, other project support facility or work site, on or off Site Administrator property, for compliance with applicable laws and FSMPC's safety, health and environmental requirements. Corrective actions shall be taken as noted.

C. Contractor camps and project support facilities shall be located so as to minimize exposure to hazards (e.g., located upwind from process areas and well sites), including traffic hazards to work site(s). Site Administrators shall approve the location of contractor camps and project support facilities prior to their construction.

D. Buildings, including portable buildings, are not allowed within 50 m (164 ft) of a plant perimeter fence, pipeline corridor or well site without Site Administrators.

E. The Corporation shall furnish, install and maintain a fire alarm system for all contractor camp and project support buildings.

F. Contractor shall provide designated outdoor smoking facilities within contractor camp and project support facilities. Only smoking facilities approved by the CORPORATION shall be used by workers on jobs located within a Site Administration plant.

G. Prior to occupancy and connection of utilities, contractor camp and project support facilities shall be subject to inspection by the CORPORATION, LPD, Fire Protection Department, Inspection Department (electrical, mechanical, plumbing), EPD, and shall meet all applicable safety, fire and health standards. Any concerns generated during the inspection or otherwise brought to the attention of the contractor shall be promptly and satisfactorily resolved prior to occupancy.

H. For contractor camps and project support facilities, a dedicated and properly trained maintenance crew shall be available 24 hours per day. The names and contact information for these maintenance personnel shall be prominently displayed within the camp/facility.

I. High risk maintenance activities (e.g., confined space entry, electrical isolation, rigging and lifting) at contractor camps and project support facilities shall be controlled (e.g., by developing JSAs, using work permits, or issuing procedures).

11.2 Contractor Camp General Requirements

A. Contractor shall design and construct structures and buildings to meet the requirements of SAES-M-100.
B. Contractor shall provide a camp(s) to adequately house anticipated staff and labour force. Depending on the nature of the contract these camps may also house SA and subcontractor personnel in addition to contractor personnel.
C. Contractor shall operate and inspect (with corrective actions), manage and maintain accommodation camps so as to ensure an acceptable standard of living, including proper facility maintenance, hygiene standards, fire and life safety, pest control and food safety. Facilities for sleeping, dining, medical, firefighting, sanitation and recreation, as well as barber shops, bakeries, grocery/convenience markets, cleaning/laundry services, etc., shall be provided in accordance with the requirements of this document.
D. Sleeping and living areas within contractor camps shall be air-conditioned and periodically maintained on at least a biannual basis in accordance with the manufacturer's recommendations. The contractor shall submit to the CORPORATION a copy of the maintenance records, upon request.
E. Contractor camps shall include a fully equipped kitchen(s) and dining room(s) suitable for the preparation of high-quality meals. Dining facilities shall be provided with tables, chairs, utensils and cutlery.
F. Personnel housed in the contractor camp shall be provided with three ample and well-balanced meals per day.
G. Cooking shall not be allowed within contractor camp accommodation rooms. Use of hot plates, stoves, portable ovens, open-flame burners, etc., shall only be permitted in designated kitchen and break room areas. Use of smoking materials, including cigarettes, cigars, pipes, etc., and burning of candles, incense, etc., shall not be allowed inside any building.
H. Camp food establishments, grocery/convenience markets, etc., shall not sell raw meats, cooking oil, cooking pots and pans, cooking burners, hot plates or other food items and equipment that would enable camp residents to cook in their own rooms.
I. All buildings, including portable buildings, shall be equipped with hand- held fire extinguishers.
J. Any personal electrical items offered for sale to camp residents (e.g., in a camp grocery market or convenience store) or used in the camp shall be labelled as meeting CE, Underwriters' Laboratories (UL) or Factory Mutual (FM) requirements.
K. Contractor camps and project support facilities shall include adequate purpose-designed lighting for all streets, parking areas, sidewalks and around buildings and outdoor facilities.
L. Contractor camps and project support facilities shall be adequately drained on and away from the site.
M. Contractor camps and project support facilities shall include paved/designated streets and parking areas with a properly prepared and compacted base. Speed bumps/dips shall be installed on streets as required for pedestrian safety. The camp/support facility shall include paved/designated sidewalks for all areas to be

utilized as pedestrian walkways and shall include small diameter crushed stone as ground cover in unpaved areas around all buildings.

11.3 Minimum Safety Standards for Contractor Camp Buildings and Project Support Buildings

A. The minimum clear spacing between non-combustible buildings larger than 548 m2 (5,900 ft2) and/or between clusters of smaller buildings totaling more than 548 m2 (5,900 ft2) shall be 6.1 m (20 ft). The minimum clear spacing between smaller buildings and buildings within a cluster shall be 1.8 m (6 ft). The minimum clear spacing from perimeter fences to buildings shall be 3 m (10 ft).

B. The building's structural design shall be for applicable loads and in accordance with local regulations and be cyclone proof. Building frames shall be supported on concrete footings.

C. Camp accommodation rooms shall have not less than 4.6 m2 (50 ft2) of air-conditioned living area per person, preferably at least 6.5 m2 (70 ft2) per occupant.

D. A separate bed shall be provided for each camp occupant. Triple deck bunk beds are not permitted.

E. Sleeping rooms shall have an emergency egress opening, which can either be an outward opening man door or a window that opens to the outside. Emergency egress openings shall be operational from inside the room without use of keys or tools. All operable windows in accommodation rooms shall be provided with an insect screen.

F. Any newly installed, relocated or renovated building, whether portable or fixed, that is located in a zone predicted to receive at least 3.5 kPa gauge (0.5 psig) peak side-on overpressure from a vapour cloud explosion shall be designed and constructed in accordance with SAES-B-014.

G. Pre-engineered modular buildings meeting local requirements or equivalent standards of quality, durability, safety, sanitation and reliability may be proposed by the contractor for consideration by the CORPORATION. Proposals for pre-engineered modular buildings shall include the manufacturer's name, address, phone/facsimile numbers, Internet Web site address and sufficient product information to enable the CORPORATION to evaluate the suitability of such structures.

I. Pre-engineered modular buildings shall meet the following minimum requirements:

- 100 mm (4 inches) minimum wall thickness.
- Fully insulated walls and ceilings.
- Metal or other non-flammable roof materials.
- Suspended ceiling completely wired and plumbed with concealed wiring and plumbing.
- Built-in circuit breaker panel and exterior electrical connection.
- Ground fault circuit interruption (GFCI) devices on all electrical outlets within 1.8 m (6 ft) of a water source (e.g., sink, tub, toilet, shower, etc.).
- Air conditioning and heating with individual controls to maintain temperature between 21 and 24 °C (70-75 °F).

- Offices with full height walls shall be lockable and have windows facing the outside of the building with blinds.

J. External egress doors shall swing outward and shall be provided with panic push bars. Internal doors shall be painted solid core with frame and door stopper.
K. Buildings and structures shall be electrically grounded. Metal enclosures of power distribution panel boards shall be connected to a grounding system.

11.4 Welfare/Sanitation Facilities

A. Contractor shall provide welfare facilities (e.g., toilet/washing facilities) for personnel at contractor camps, project support facilities and other work sites.
B. Toilet facilities shall include western style toilets, urinals, ablution hoses, sinks, water heaters, air extractors, mirrors, toilet paper holders, paper towel holders, soap dispensers/dishes, coat hooks and garbage bins.
C. Toilet facilities shall be easily accessible and shall be of durable and hygienic construction consistent with their purpose and shall have adequate lighting, ventilation and a continuous supply of water.
D. Washing facilities shall be provided in the workers camp and prior to entering the dining hall.
E. Toilets and washing facilities shall be continuously maintained in a clean and sanitary condition.
F. Potable (fresh) drinking water shall be readily available. Contractor shall provide conveniently located bottled drinking water dispensers. Only water bottles with tops that have been sealed by the supplier shall be used (i.e., bottles shall not be refilled except by the bottle supplier). Water bottles shall be routinely changed and all water dispensers shall be frequently cleaned to maintain a sanitary and fresh supply of drinking water in each dispenser. Common drinking cups or dippers are prohibited. Disposable paper cups or other separate cups shall be provided for each person.
G. Sun-protected rest areas shall be provided and shall be away from operating equipment and work areas.

11.5 Electrical Power Generation and Distribution Systems

A. Contractor shall provide, install, operate and maintain power generation and distribution facilities at contractor camps, project support facilities and worksites, as needed.
B. The power system shall provide electrical power supply at 110 volts/60 Hz, on a 24 hour per day, 7 days per week basis, or as needed.
C. Power distribution panel boards shall be labelled to identify the service of individual breakers.
D. The entire electrical installation shall comply with the U.S. National Electrical Code (NEC) and be tested at least annually by a qualified electrical engineer from an independent source. The contractor shall submit to the CORPORATION a copy of the electrical test certificate, upon request.

11.6 Fire Protection Systems

A. Contractor shall design, install and operate a fire water system(s) with sufficient storage capacity to provide full fire protection coverage. Design plans for fire protection systems shall be submitted to the CORPORATION for review.
B. Inspection, testing and maintenance of fire alarm and protection systems, including sprinklers and portable fire extinguishers.
C. Dedicated fire water storage capacity shall not be used for any other purpose (e.g., drinking, bathing, ablution).

11.7 Raw Water Treatment and Drinking Water Supply Facilities

A. Contractor shall provide, install, operate and maintain all required raw water treatment facilities, potable water distribution systems, drinking water supply systems within the contractor's and subcontractor's assigned areas.
B. Plans for raw water treatment and drinking water shall be reviewed by the Corporation prior to construction
C. Contractor shall ensure that the bacteriological and chemical qualities of the drinking water, including during transportation and storage are with in US FDA requirements.

11.8 Sewage and Solid Waste Management Facilities

A. Contractor shall provide, install, operate and maintain all required sanitary sewer systems at contractor and subcontractor assigned areas, including contractor camps and project support facilities. The contractor shall be responsible for installing all required sewage collection manholes and piping.
B. Contractor shall remove all solid waste and debris from contractor camp and project support facilities on not less than a daily basis and dispose of it at a solid waste disposal facility approved by Site Administrator.
C. Plans for sewage collection, holding, treatment and final disposal and plans for solid waste management facilities shall be reviewed by the Site Administrator and FSMPC prior to construction.

PPE Chart for Tank Upgrading Works

Foundation Works

Examples										
	Clothing	**Safety Boots**	**Safety Glasses**	**Hard hat**	**Ear Protection**	**Kevlar Gloves**	**Fall Arrest**	**Leather Gloves**	**Face Shield**	**Respiratory Protection**
	Full length clothing, cotton. Fire Resistant	Rubber sole, Steel Cap, Fuel & Chemical resistant, Anti-Static	Anti Fog, Impact resistant	Plastic full brim or short bill, Chin Strap	Earmuffs or ear plugs					Fitted or open
	Single Layer HRC 2*	ANSI Z41-1991	ANSI Z87.1-2020	ANSI Z89.1-1986	ANSI S3.19					
Heavy Equipment Operator	✓	✓	✓	✓	✓	✓		✓		
Foundation Excavation	✓	✓	✓	✓	✓	✓		✓		
Mansory Works	✓	✓	✓	✓		✓		✓		
Materials Handling	✓	✓	✓	✓	✓	✓		✓		
Steel Fixing	✓	✓	✓	✓	✓	✓		✓		
Formwork	✓	✓	✓	✓		✓				
Concrete Pouring	✓	✓	✓	✓		✓				
Metal Cutting						✓			✓	

Notes:

Note: The list is generic, and contractor shall be aware of all the activities and required PPE for such activity. Vital OSS and HSSE team can stop works and review PPE requirements after incidents or near miss.

PPE Chart for Tank Upgrading Works

Welding & Assembly Works

Activity											
	Clothing	**Safety Boots**	**Welding Shield**	**Hard hat**	**Ear Protection**	**Kevlar Gloves**	**Fall Arrest**	**Welding Gloves**	**Safety Glasses**	**Face Shield**	**Welding Helmet with Air Supply**
	Full length clothing, cotton. Fire Resistant	Rubber sole, Steel Cap, Fuel & Chemical resistant, Anti-Static, inner metal in sole	Auto darkening,	Plastic full brim or short bill, Chin Strap	Earmuffs or ear plugs				Anti Fog, Z87+ marked for impact resistance	Fitted or open	Fitted with BA connections and fully enclosed shield
	Single Layer HRC 2*	ANSI Z41-1991	ANSI Z87.1-2020	ANSI Z89.1-1986	ANSI S3.19				ANSI Z87.1-1989		
Heavy Equipment Operator	✓	✓		✓	✓	✓			✓		
Plate Roller Operations	✓	✓		✓	✓	✓			✓		
Materials Handling	✓	✓		✓	✓	✓			✓		1
Working at Heights	✓	✓		✓		✓	✓		✓	✓	
Structural Steel Assembly	✓	✓		✓	**Optional**	✓		✓	✓	✓	
Welding Works	✓	✓	✓					✓	✓	✓	
Grinding and Flame Cutting *(either ONE eye or head protection to be used)*	✓	✓	**Optional**	**Optional**				✓	**Optional**	**Optional**	
Confine Space Welding											✓

Note: The list is generic, and contractor shall be aware of all the activities and required PPE for such activity. Vital OSS and HSSE team can stop works and review PPE requirements after incidents or near miss.

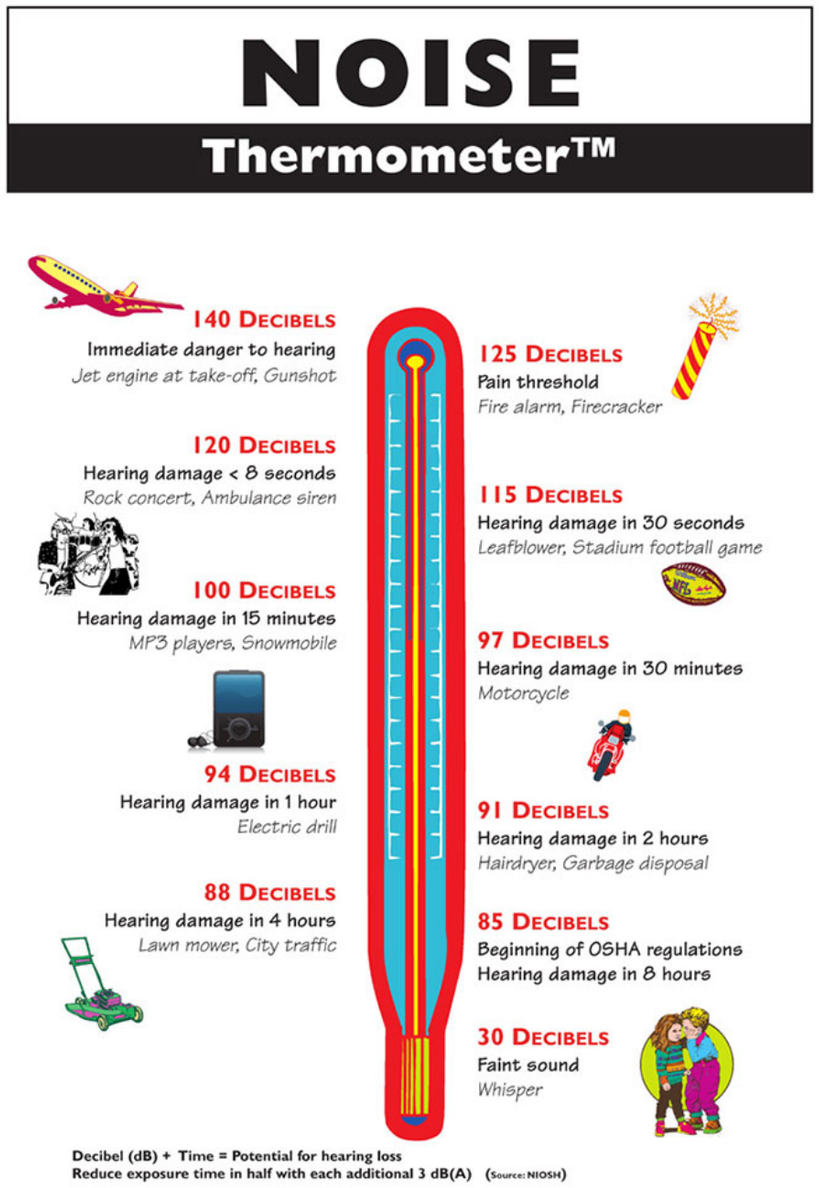
PPE Chart for Tank Upgrading Works

Routine Work

Examples											
	Clothing	**Safety Boots**	**Safety Glasses**	**Hard hat**	**Ear Protection**	**Leather Gloves**	**Electrical Safety Gloves**	**Leather Overgloves**	**Chemical Gloves**	**Face Shield**	**Respirators**
	Full length clothing, preferably cotton. Fire Resistant	Rubber sole, Leather		Plastic full brim or short bill	Earmuffs or ear plugs		See voltage classifications for correct colour		Nitrile rubber	Fitted or open	Types depends on risk
	Single Layer HRC 2*	ANSI Z41-1991	ANSI Z87.1-1989	ANSI Z89.1-1986	ANSI S3.19						
Operational Inspections	✓	✓	✓	✓	✓	✓					
Engine Service (Noise level above 85 dB)	✓	✓	✓	✓	✓						
Engine Service (Noise level below 85 dB)	✓	✓	✓	✓							
Operating LV Circuit Breakers	✓	✓	✓	✓	✓	✓					
Operating HV Circuit Breakers	✓	✓	✓	✓	✓		✓	✓		✓	
Lube/Coolant sampling	✓	✓	✓	✓	✓				✓	✓	
Coolant change	✓	✓	✓	✓	✓				✓	✓	✓

Note: The list is generic, and contractor shall be aware of all the activities and required PPE for such activity. Vital OSS and HSSE team can stop works and review PPE requirements after incidents or near miss.

PPE Chart for Tank Upgrading Works



PPE Chart for Tank Upgrading Works

Personal Protective Equipment [PPE] Checklist

PPE is personal and commentaries here must account for each and every individual worker who has to wear such equipment, e.g. body size for clothing; sight impairment for safety-glasses; facial hair for breathing apparatus

Date checklist completed		**Date for review**	
Name of Vital's rep.			
Name of Contractor's rep			

PPE Checklist	YES	NO
Selection of Personal Protective Equipment [PPE]		
1. Has a risk assessment been done to determine what PPE is required?	☐	☐
2. Have other control measures been implemented for the hazard identified (hierarchy of control) and what are they?	☐	☐
3. Have employees/workers been consulted in the process of selecting PPE for particular tasks?	☐	☐
4. Does the PPE fit properly and is comfortable to wear?	☐	☐
5. Are employees/workers trained in PPE procedures, such as the fit, use and maintenance of PPE? (Provide evidence)	☐	☐
6. Do employees/workers wear PPE in accordance with the instructions provided?	☐	☐
7. Is the PPE stored in a clean area where it will not be damaged or exposed to contaminants?	☐	☐
8. Is a maintenance program established for PPE and documented?	☐	☐
9. Have medical conditions or physical characteristics of employees/workers been taken into consideration?	☐	☐
Supervision		
10. Has suitable training and resources been provided to Supervisors to enable them to ensure the proper, selection, fit, use, cleaning and maintenance of PPE?	☐	☐
11. Are employees/workers aware of the disciplinary action to be taken if PPE procedures are not adhered to?	☐	☐

PPE Checklist	YES	NO
12. Has responsibility for supervision and enforcement of the organisations PPE policy and procedures been allocated to a senior manager?	☐	☐
13. Are Supervisors provided disciplinary powers and appropriate support?	☐	☐
Potential Hazards Requiring PPE		
14. If there is a danger of cuts, or exposure to corrosives, chemicals or infectious materials are protective goggles, gloves, aprons or shields worn?	☐	☐
15. Are hard hats provided where there is a risk of falling objects?	☐	☐
16. Is footwear provided where there is a risk of foot injuries from hot or corrosive substances, crushing or penetrating objects?	☐	☐
17. Are safety glasses, goggles provided for eye protection where there is a risk of flying objects, sparks, and filaments?	☐	☐
18. Is respiratory protection provided in areas where there is exposure to dust, gases, chemicals	☐	☐
19. Is other appropriate PPE provided for hot work, work near traffic, vibration, moving parts?	☐	☐
List additional hazard and PPE identified:		
Signage		
20. Are signs posted in the workplace wherever it is necessary to wear PPE?	☐	☐
21. Is the signage in the mandatory format?	☐	☐
22. Is PPE provided in accordance with the relevant WHS legislation and relevant International Standards and stamped accordingly?	☐	☐
Action Required:		

PPE Checklist	YES	NO

Date actions completed:	
Name:	**Position:**
Signature:	

Return completed form to:

_____ **Officer In Charge**

_____ **Project Manager**

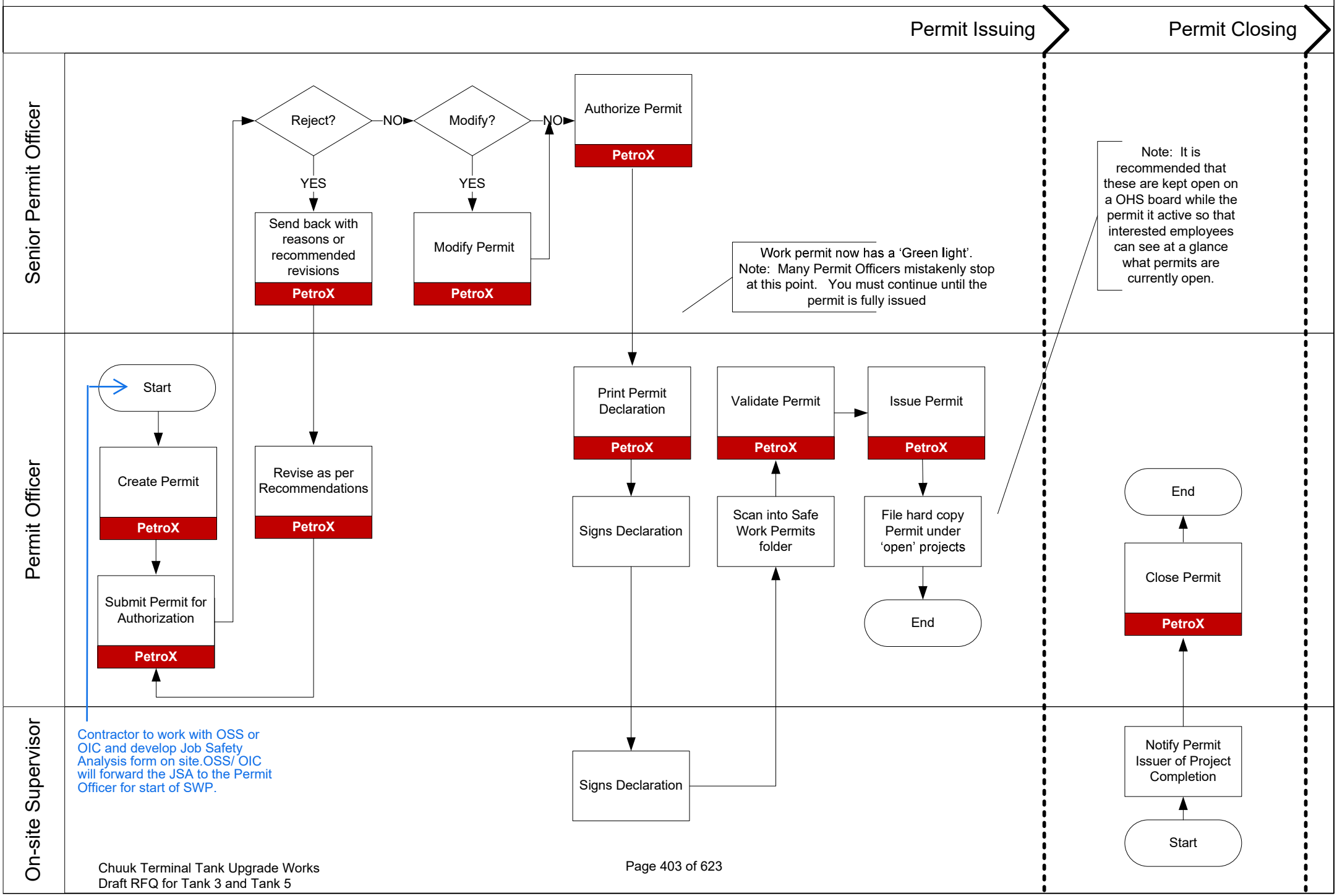
_____ **SAFER Manager**

_____**Contractors Representative**

Note:

1. Vital OSS to check the PPE for each of the contractor staff at the 1st day when they come to site, if they don't meet requirements or specifications, this needs to be reported, and employee shall not proceed to work area until resolved.
2. This form to be used by OSS for Vital Energy and Contractor's site supervisor or Project Manager at the start of the week during the toolbox meeting.
3. All non-conformances will need to be corrected by the contractor and staff will only be accessed and approved the OIC if he feels the situation is safe and person can be appointed to alternative task.

Safe Work Permit Process (As-is 2012/05)



SITE:	**DAILY SITE SAFETY TOOLBOX RECORD** SITE REGISTER OF EVERYBODY ENTERING SITE	

DATE:

1

NAME – FIRST NAME	**Type of work performed / Reason for visit**	**Time in**	**Time out**	**Visitor Signature (*)** *(Anyone not in the SWP)*	**JSA Reviewed / checklists completed**	**Attended today's toolbox Meeting**
					(Site Supervisor Initials for Acknowledgement)	

(*) Signatory acknowledges having either attended start work discussion (operatives) or read and understood the site safety rules (delivery – visit)

SITE: Yap Tank 2_Upgrading Works	**DAILY SITE SAFETY RECORD**	

DATE:

2

Start Work Discussion held by:

(Works to be performed during the day – Any safety precautions to take? – Review of hazardous situations spotted during the previous day **- see also start work discussion guide**)

Hazardous situations spotted during the day
(Describe briefly what? where? what could have happened?)

Safety Toolbox discussion topics (log attendance on page 1)

Notes and action points

Reviewed by: Signed Date

Project Engineer

Safety Consultant

Other (Contractor)

Start Work Discussion Guide

1) Log Attendees
2) List today's activities
   - See project planning
   - Use Site layout plan to locate
3) Discuss potential hazardous / higher risk activities involved
   - What did we learn from yesterday (hazards / near misses)
   - Include Weather conditions

4) Discuss type of hazards and preventive measures to take
   - Use Poster and seek input
   - Use toolbox packs to re-enforce
5) Verify understanding by attendees
6) Closure

3) Potential Hazardous activities

Consider:

- Demolition works?
- Excavation works?
- Working near objects that may move?
- Line breaching or potential hydrocarbon release?
- Working at height?
- Working near areas that could cause personnel to slip, trip or fall?
- Working with equipment or connections under pressure or life?
- The use of lifting equipment?
- Using portable electrical equipment and hand tools?
- Equipment which is potentially dangerous?
- Working with dangerous goods and substances hazardous to health?
- Working in noisy areas?
- Environmental impact?
- Manual handling – moving objects/loads
- Working in an area with poor lighting or a tight/confined space?
- Personnel who are new to work the site or each other?

4) Type of hazards

Consider:

Contact:

- Struck Against
- Struck By
- Harmful Contact with Object (cut, abrasion)

Caught:

- In
- Under
- Between
- By

Fall:

- Slip / Trip
- Fall on Same Level
- Fall from Height

Strains / Overexertion:

- Lifting
- Pushing / Pulling
- Bending
- Twisting

Exposure

- Extreme Temperature
- Chemical Burn
- Radiation
- Hazardous Atmosphere

Energy Sources:

- Electricity
- Pressure
- Compression / Tension

5) Verify understanding

Can all personnel in the group answer YES to the following questions?)

- Have all the significant hazards involved with the work been identified and control measures been identified for these hazards?
- Does everyone know that any changes to the work plan have to be communicated to everyone involved in the work?
- Does everyone know that any new people joining the work party must be given a full and thorough briefing prior to hand over?

For higher risk activities, ALL workers involved must have signed off on the JSA

6) Closure

- Reminder on Site Safety Rules (Golden Safety Rules)
- Reminder on every ones responsibility

Be their own keeper: Always perform your Last Minute Risk Assessment

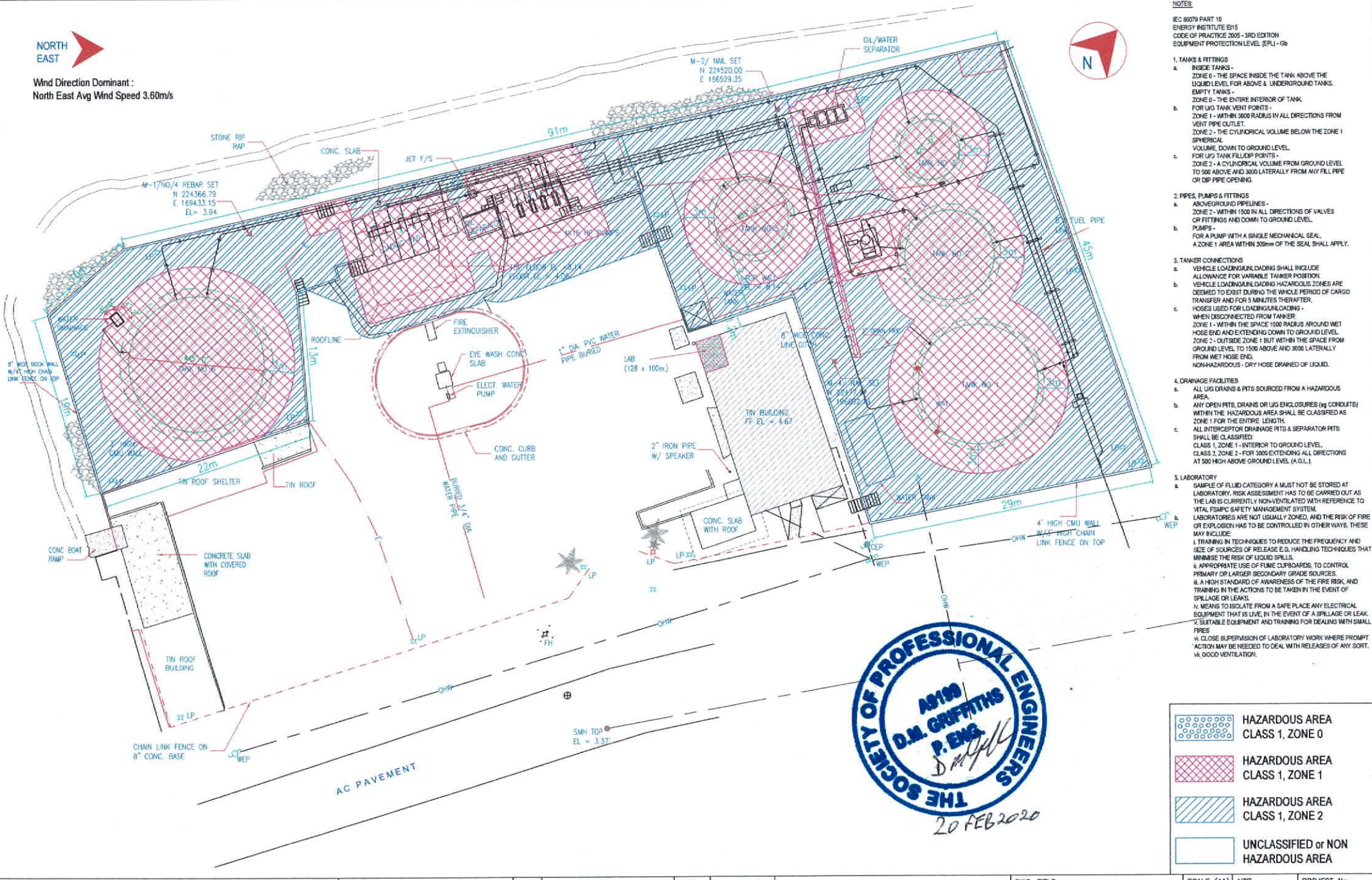
- No short cuts
- Follow the agreed procedures
- Using the correct tools for the job
- Being aware of the hazards around them and remaining vigilant to change
- Using the correct PPE for the job

Be their brothers keeper - Address any Hazard you see

- Invite all to mark any hazards spotted on the poster

Appendix K

Chuuk Terminal Hazard Drawing Layout



NOTES:

IEC 60079 PART 10
ENERGY INSTITUTE EI15
CODE OF PRACTICE 2005 - 3RD EDITION
EQUIPMENT PROTECTION LEVEL (EPL) - Gb

1. TANKS & FITTINGS
   a. INSIDE TANKS -
      ZONE 0 - THE SPACE INSIDE THE TANK ABOVE THE LIQUID LEVEL FOR ABOVE & UNDERGROUND TANKS.
      EMPTY TANKS -
      ZONE 0 - THE ENTIRE INTERIOR OF TANK.
   b. FOR U/G TANK VENT POINTS -
      ZONE 1 - WITHIN 3000 RADIUS IN ALL DIRECTIONS FROM VENT PIPE OUTLET.
      ZONE 2 - THE CYLINDRICAL VOLUME BELOW THE ZONE 1 SPHERICAL
      VOLUME, DOWN TO GROUND LEVEL.
   c. FOR U/G TANK FILL/DIP POINTS -
      ZONE 2 - A CYLINDRICAL VOLUME FROM GROUND LEVEL TO 500 ABOVE AND 3000 LATERALLY FROM ANY FILL PIPE OR DIP PIPE OPENING.

2. PIPES, PUMPS & FITTINGS
   a. ABOVEGROUND PIPELINES -
      ZONE 2 - WITHIN 1500 IN ALL DIRECTIONS OF VALVES OR FITTINGS AND DOWN TO GROUND LEVEL.
   b. PUMPS -
      FOR A PUMP WITH A SINGLE MECHANICAL SEAL,
      A ZONE 1 AREA WITHIN 300mm OF THE SEAL SHALL APPLY.

3. TANKER CONNECTIONS
   a. VEHICLE LOADING/UNLOADING SHALL INCLUDE ALLOWANCE FOR VARIABLE TANKER POSITION.
   b. VEHICLE LOADING/UNLOADING HAZARDOUS ZONES ARE DEEMED TO EXIST DURING THE WHOLE PERIOD OF CARGO TRANSFER AND FOR 5 MINUTES THEREAFTER.
   c. HOSES USED FOR LOADING/UNLOADING -
      WHEN DISCONNECTED FROM TANKER:
      ZONE 1 - WITHIN THE SPACE 1500 RADIUS AROUND WET HOSE END AND EXTENDING DOWN TO GROUND LEVEL.
      ZONE 2 - OUTSIDE ZONE 1 BUT WITHIN THE SPACE FROM GROUND LEVEL TO 1500 ABOVE AND 3000 LATERALLY FROM WET HOSE END.
      NON-HAZARDOUS - DRY HOSE DRAINED OF LIQUID.

4. DRAINAGE FACILITIES
   a. ALL U/G DRAINS & PITS SOURCED FROM A HAZARDOUS AREA.
   b. ANY OPEN PITS, DRAINS OR U/G ENCLOSURES (eg CONDUITS) WITHIN THE HAZARDOUS AREA SHALL BE CLASSIFIED AS ZONE 1 FOR THE ENTIRE LENGTH.
   c. ALL INTERCEPTOR DRAINAGE PITS & SEPARATOR PITS SHALL BE CLASSIFIED
      CLASS 1, ZONE 1 - INTERIOR TO GROUND LEVEL.
      CLASS 2, ZONE 2 - FOR 3000 EXTENDING ALL DIRECTIONS AT 500 HIGH ABOVE GROUND LEVEL (A.G.L.).

5. LABORATORY
   a. SAMPLE OF FLUID CATEGORY A MUST NOT BE STORED AT LABORATORY. RISK ASSESSMENT HAS TO BE CARRIED OUT AS THE LAB IS CURRENTLY NON-VENTILATED WITH REFERENCE TO VITAL FSMPC SAFETY MANAGEMENT SYSTEM.
      LABORATORIES ARE NOT USUALLY ZONED, AND THE RISK OF FIRE OR EXPLOSION HAS TO BE CONTROLLED IN OTHER WAYS. THESE MAY INCLUDE:
      i. TRAINING IN TECHNIQUES TO REDUCE THE FREQUENCY AND SIZE OF SOURCES OF RELEASE E.G. HANDLING TECHNIQUES THAT MINIMISE THE RISK OF LIQUID SPILLS.
      ii. APPROPRIATE USE OF FUME CUPBOARDS, TO CONTROL PRIMARY OR LARGER SECONDARY GRADE SOURCES.
      iii. A HIGH STANDARD OF AWARENESS OF THE FIRE RISK, AND TRAINING IN THE ACTIONS TO BE TAKEN IN THE EVENT OF SPILLAGE OR LEAKS.
      iv. MEANS TO ISOLATE FROM A SAFE PLACE ANY ELECTRICAL EQUIPMENT THAT IS LIVE, IN THE EVENT OF A SPILLAGE OR LEAK.
      v. SUITABLE EQUIPMENT AND TRAINING FOR DEALING WITH SMALL FIRES
      vi. CLOSE SUPERVISION OF LABORATORY WORK WHERE PROMPT ACTION MAY BE NEEDED TO DEAL WITH RELEASES OF ANY SORT.
      vii. GOOD VENTILATION.

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20 FEB 2020

HAZARDOUS AREA CLASS 1, ZONE 0
HAZARDOUS AREA CLASS 1, ZONE 1
HAZARDOUS AREA CLASS 1, ZONE 2
UNCLASSIFIED or NON HAZARDOUS AREA

Chuuk Terminal
General Arrangement
Hazardous Area Plan

vital Energy for Life

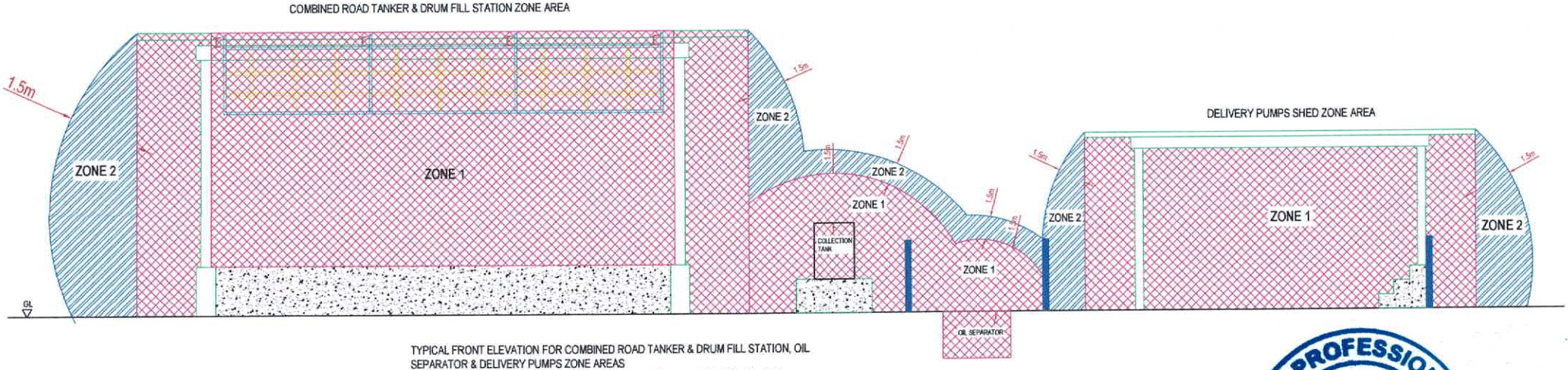
REV	DESCRIPTION	DATE
00	Preliminary Draft Information	JAN 2020
01	VITAL COMMENTS	FEB 2020
02	VITAL 2ND COMMENTS	FEB 2020

Approved For Construction:
By:

MDU Spec (M) Sdn Bhd
Commissioning and Consultantancy

DWG. TITLE
CHUUK TERMINAL
HAZARDOUS AREA
CLASSIFICATION

SCALE (A1)	NTS	PROJECT No:-
SCALE (A3)	NTS	DWG. No.
DESIGN	DMG	TKK-P169-HazGA-01
DRAWN	WK	AS BUILD
DATE	FEB2020	



TYPICAL FRONT ELEVATION FOR COMBINED ROAD TANKER & DRUM FILL STATION, OIL SEPARATOR & DELIVERY PUMPS ZONE AREAS

*Zone 1 to Roof line follow final ground level EI15 - Refer notes on General Arrangement Plan & Schedule of Release

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20 FEB 2020

NOTES:

1. Due to the possibility of mist, spray formation, the ullage space of Class II (1) and III(1) tanks should also be regarded as Zone 0. It is recommended that the area surrounding any vents or openings on the roof of such a tank be regarded as Zone 1 to a radius of 3 meters
2. In the event of a large loss of containment which fills the bund, the hazardous area would extend beyond the bund wall. Any sources of ignition located close to the bund wall should be isolated in this event.
3. Zone 2 is applicable where there is a possibility of a secondary grade release and the hazard for the primary grade release is less than 15m.
4. Category C fluid up to 50 degree C, height of bunded is nominally 1 meter.
5. Considered secondary grade release, the areas shown as Zones 0 and 1 would be Zones 1 and 2 respectively
6. Un-Classified storage of Oils and Chemicals are subject to compliance to Schedule of Release item 12 & EI 15 3 rd Edition 2005 - section 3– 3.1.4–Unclassified Flammable Liquids

HAZARDOUS AREA CLASS 1, ZONE 0
HAZARDOUS AREA CLASS 1, ZONE 1
HAZARDOUS AREA CLASS 1, ZONE 2
UNCLASSIFIED or NON HAZARDOUS AREA

Chuuk Terminal Side Elevation

REV	DESCRIPTION	DATE
00	Preliminary Draft Information	FEB 2020

Approved For Construction:
By:

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Commissioning and Consultantancy

DWG. TITLE
TYPICAL FRONT ELEVATION FOR COMBINED ROAD TANKER & DRUM STATION, OIL SEPARATOR AND DELIVERY PUMPS

SCALE (A1)	NTS	PROJECT No:–
SCALE (A3)	NTS	DWG. No. TKK–P169–HazGA–07
DESIGN	DMG	
DRAWN	WK	AS BUILD
DATE	FEB2020	

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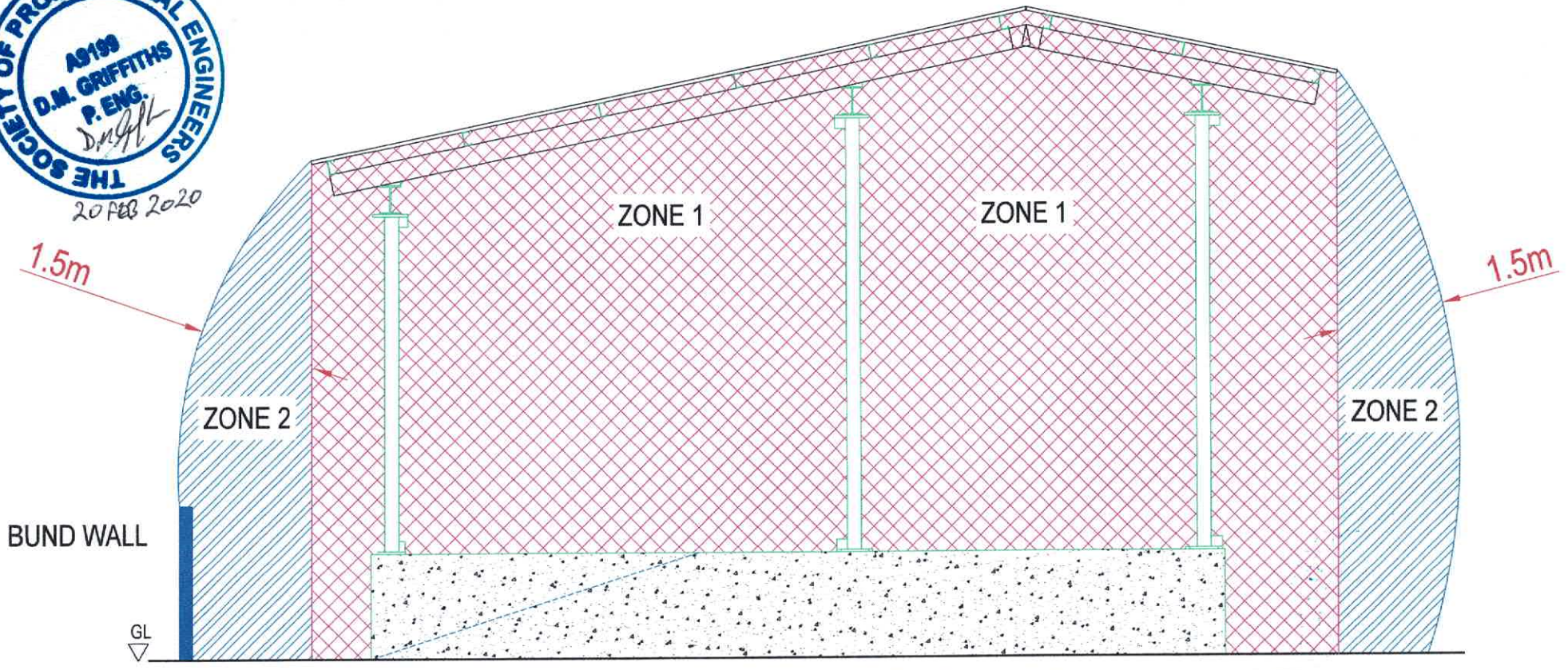
20 FEB 2020



TYPICAL SIDE ELEVATION FOR COMBINED ROAD TANKER & DRUM FILL STATION THE ZONE AREA
*NO VEHICLE PRESENT
*Zone 1 to Roof line follow final ground level El15 - Refer notes on General Arrangement Plan & Schedule of Release

NOTES:

1. Due to the possibility of mist, spray formation, the ullage space of Class II (1) and III(1) tanks should also be regarded as Zone 0. It is recommended that the area surrounding any vents or openings on the roof of such a tank be regarded as Zone 1 to a radius of 3 meters
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3. Zone 2 is applicable where there is a possibility of a secondary grade release and the hazard for the primary grade release is less than 15m.
4. Category C fluid up to 50 degree C, height of bunded is nominally 1 meter.
5. Considered secondary grade release, the areas shown as Zones 0 and 1 would be Zones 1 and 2 respectively

HAZARDOUS AREA CLASS 1, ZONE 0
HAZARDOUS AREA CLASS 1, ZONE 1
HAZARDOUS AREA CLASS 1, ZONE 2
UNCLASSIFIED or NON HAZARDOUS AREA

Chuuk Terminal
Side Elevation

REV	DESCRIPTION	DATE
00	Preliminary Draft Information	FEB 2020

Approved For Construction:
By:
Date:

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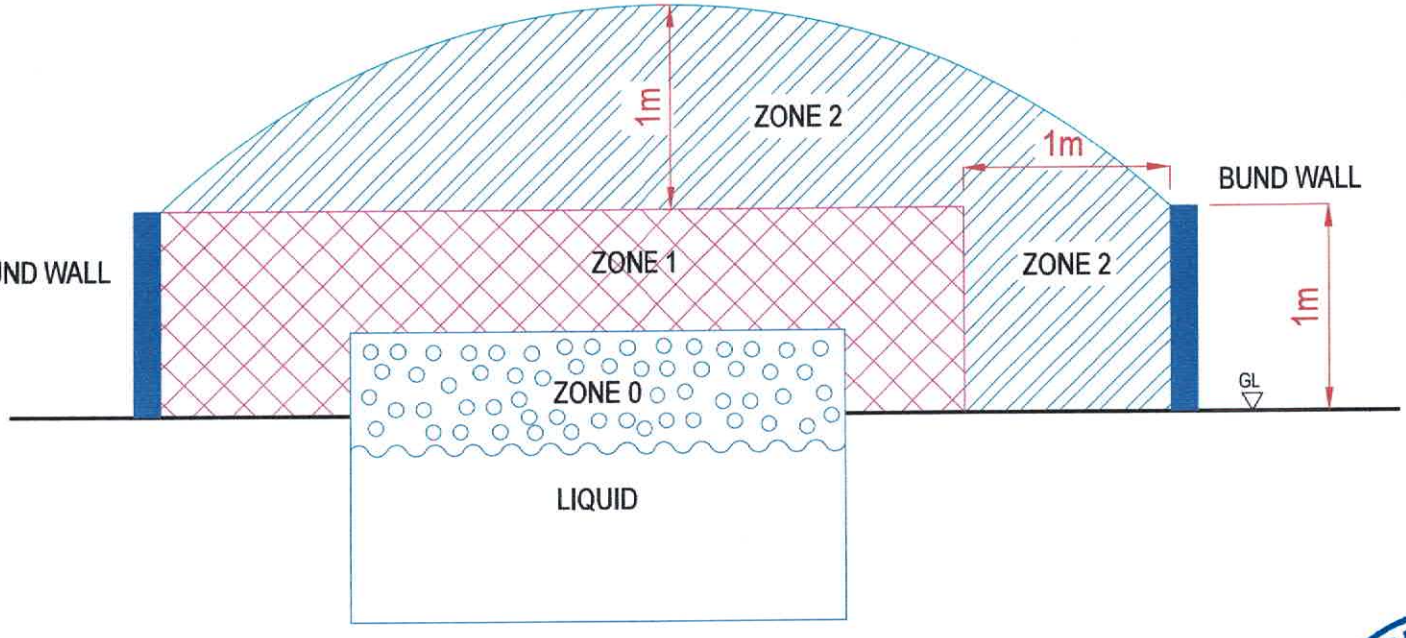
DWG. TITLE
TYPICAL SIDE ELEVATION FOR COMBINED ROAD TANKER & DRUM FILL STATION

SCALE (A1)	NTS	PROJECT No:-
SCALE (A3)	NTS	DWG. No. TKK-P169-HazGA-06
DESIGN	DMG	
DRAWN	WK	AS BUILD
DATE	FEB2020	



TYPICAL INTERCEPTOR OR WATER SEPARATOR SIDE ELEVATION

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20 FEB 2020

NOTES:

1. Due to the possibility of mist, spray formation, the ullage space of Class II (1) and III(1) tanks should also be regarded as Zone 0. It is recommended that the area surrounding any vents or openings on the roof of such a tank be regarded as Zone 1 to a radius of 3 meters
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3. Zone 2 is applicable where there is a possibility of a secondary grade release and the hazard for the primary grade release is less than 15m.
4. Category C fluid up to 50 degree C, height of bunded is nominally 1 meter.
5. Considered secondary grade release, the areas shown as Zones 0 and 1 would be Zones 1 and 2 respectively

HAZARDOUS AREA CLASS 1, ZONE 0
HAZARDOUS AREA CLASS 1, ZONE 1
HAZARDOUS AREA CLASS 1, ZONE 2
UNCLASSIFIED or NON HAZARDOUS AREA

Chuuk Terminal
Side Elevation

REV	DESCRIPTION	DATE
00	Preliminary Draft Information	FEB 2020
01	VITAL COMMENTS	FEB 2020

Approved For Construction:
By:

MDU Spec (M) Sdn Bhd
Commissioning and Consultantancy

DWG. TITLE: TYPICAL INTERCEPTOR OR WATER SEPARATOR SIDE ELEVATION

SCALE (A1)	NTS	PROJECT No:-
SCALE (A3)	NTS	DWG. No. TKK-P169-HazGA-04
DESIGN	DMG	
DRAWN	WK	AS BUILD
DATE	FEB2020	

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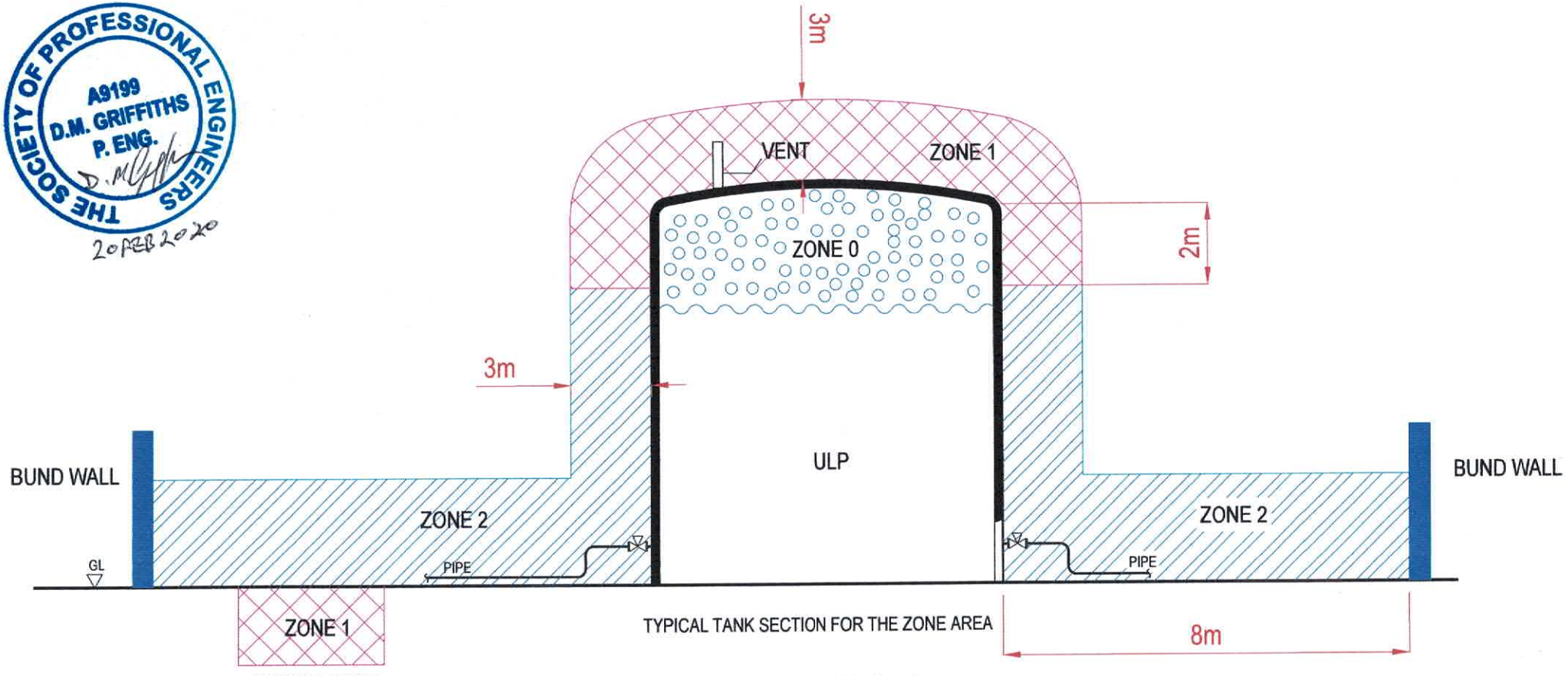

TANK NO.1

NOTES:

1. Due to the possibility of mist, spray formation, the ullage space of Class II (1) and III(1) tanks should also be regarded as Zone 0. It is recommended that the area surrounding any vents or openings on the roof of such a tank be regarded as Zone 1 to a radius of 3 meters
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3. Zone 2 is applicable where there is a possibility of a secondary grade release and the hazard for the primary grade release is less than 15m.
4. Category C fluid up to 50 degree C, height of bunded is nominally 1 meter.
5. Considered secondary grade release, the areas shown as Zones 0 and 1 would be Zones 1 and 2 respectively

HAZARDOUS AREA CLASS 1, ZONE 0
HAZARDOUS AREA CLASS 1, ZONE 1
HAZARDOUS AREA CLASS 1, ZONE 2
UNCLASSIFIED or NON HAZARDOUS AREA

Chuuk Terminal Side Elevation

REV	DESCRIPTION	DATE
00	Preliminary Draft Information	FEB 2020
01	VITAL COMMENTS	FEB 2020

Approved For Construction:
By:

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DWG. TITLE
TYPICAL TANK SECTION FOR THE ZONE AREA TANK NO.1

SCALE (A1)	NTS	PROJECT No:-
SCALE (A3)	NTS	DWG. No. TKK-P169-HazGA-02
DESIGN	DMG	
DRAWN	WK	AS BUILD
DATE	FEB2020	

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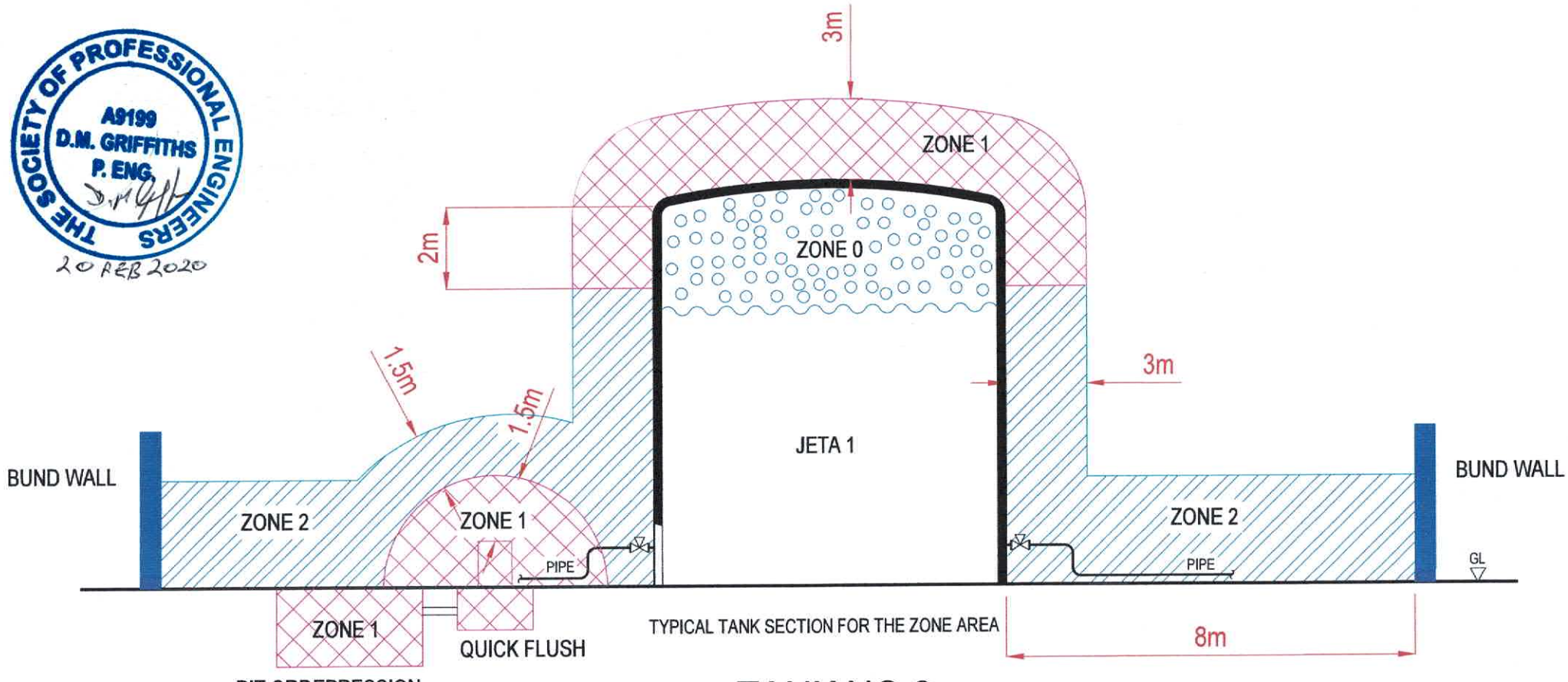
20 FEB 2020



TANK NO.2

NOTES:

1. Due to the possibility of mist, spray formation, the ullage space of Class II (1) and III(1) tanks should also be regarded as Zone 0. It is recommended that the area surrounding any vents or openings on the roof of such a tank be regarded as Zone 1 to a radius of 3 meters
2. In the event of a large loss of containment which fills the bund, the hazardous area would extend beyond the bund wall. Any sources of ignition located close to the bund wall should be isolated in this event.
3. Zone 2 is applicable where there is a possibility of a secondary grade release.
4. Category C fluid up to 50 degree C, height of bunded is nominally 1 meter.
5. Considered secondary grade release, the areas shown as Zones 0 and 1 would be Zones 1 and 2 respectively

HAZARDOUS AREA CLASS 1, ZONE 0
HAZARDOUS AREA CLASS 1, ZONE 1
HAZARDOUS AREA CLASS 1, ZONE 2
UNCLASSIFIED or NON HAZARDOUS AREA

Chuuk Terminal Side Elevation

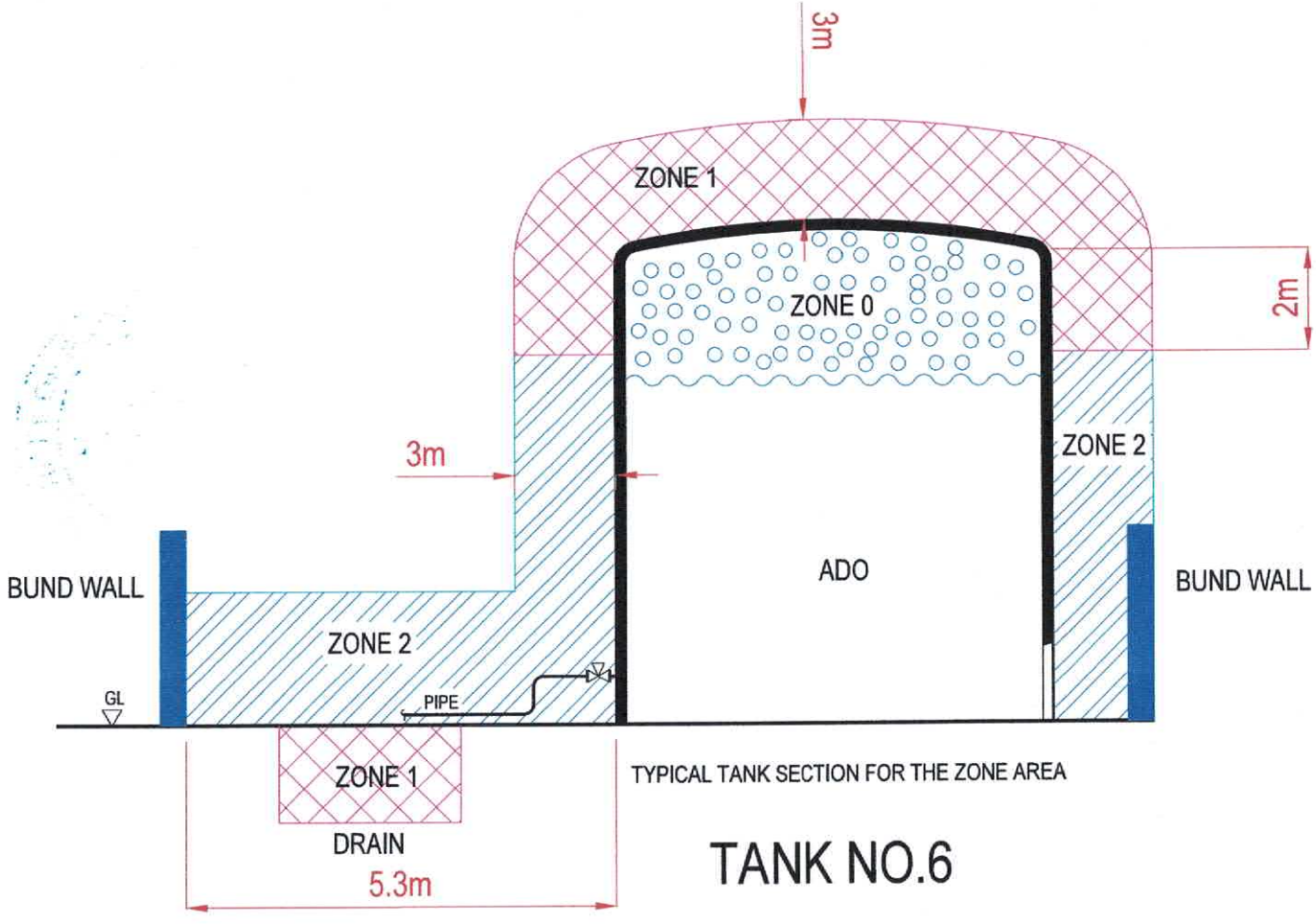
REV	DESCRIPTION	DATE
00	Preliminary Draft Information	FEB 2020
01	VITAL COMMENTS	FEB 2020

Approved For Construction:
By:

MDU Spec (M) Sdn Bhd
Commissioning and Consultancy

DWG. TITLE: TYPICAL TANK SECTION FOR THE ZONE AREA TANK NO.2

SCALE (A1)	NTS	PROJECT No:-
SCALE (A3)	NTS	DWG. No. TKK-P169-HazGA-03
DESIGN	DMG	
DRAWN	WK	AS BUILD
DATE	FEB2020	



TYPICAL TANK SECTION FOR THE ZONE AREA

TANK NO.6

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20 FEB 2020

NOTES:

1. Due to the possibility of mist, spray formation, the ullage space of Class II (1) and III(1) tanks should also be regarded as Zone 0. It is recommended that the area surrounding any vents or openings on the roof of such a tank be regarded as Zone 1 to a radius of 3 meters
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3. Zone 2 is applicable where there is a possibility of a secondary grade release.
4. Category C fluid up to 50 degree C, height of bunded is nominally 1 meter.
5. Considered secondary grade release, the areas shown as Zones 0 and 1 would be Zones 1 and 2 respectively

HAZARDOUS AREA CLASS 1, ZONE 0
HAZARDOUS AREA CLASS 1, ZONE 1
HAZARDOUS AREA CLASS 1, ZONE 2
UNCLASSIFIED or NON HAZARDOUS AREA

Chuuk Terminal
Side Elevation

REV	DESCRIPTION	DATE
00	Preliminary Draft Information	FEB 2020
01	VITAL COMMENTS	FEB 2020

Approved For Construction:
By:

MDU Spec (M) Sdn Bhd
Commissioning and Consultantancy

DWG. TITLE
TYPICAL TANK SECTION FOR THE ZONE AREA TANK NO.6

SCALE (A1)	NTS	PROJECT No:-
SCALE (A3)	NTS	DWG. No. TKK-P169-HazGA-05
DESIGN	DMG	AS BUILD
DRAWN	WK	
DATE	FEB2020	

SECTION 2.3

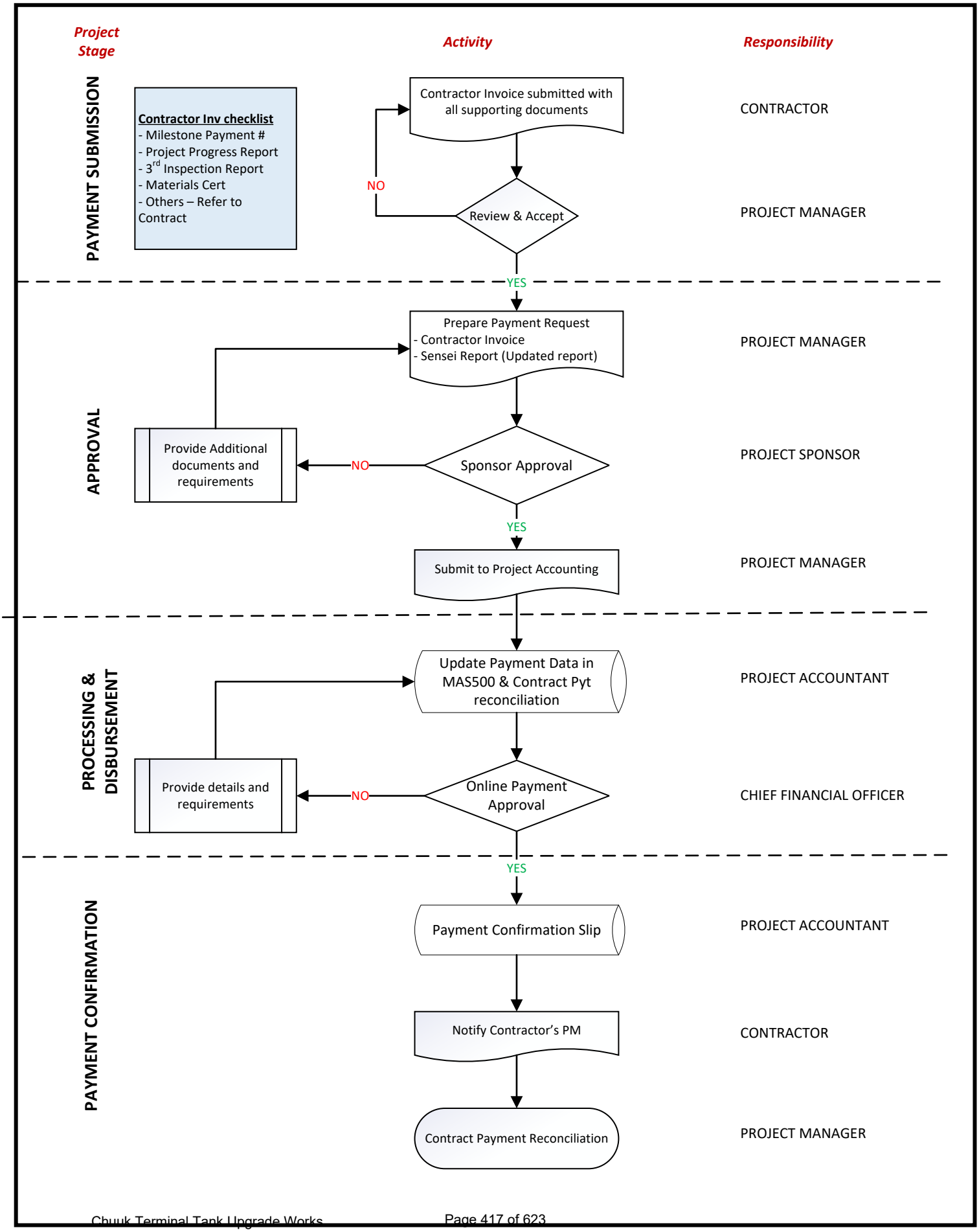
VITAL STANDARDS & SPECIFICATIONS

- Appendix L Vital's Payment Process
- Appendix M Vital Energy Tank Work Breakdown Structure
- Appendix N FSMPC GP External and Internal Painting of Bulk Tanks
- Appendix O OOSI Flow Process
- Appendix P OOSI-R Flow Process
- Appendix Q Inspection Test Plan – Sample
- Appendix R Project Reporting Forms (Daily & Monthly)
- Appendix S Project QC Forms for Tanks

Appendix L

Vital's Payment Process

CIIP PROJECT PAYMENT PROCESS



Appendix M

Vital Tank Work Breakdown Structure

contractor to follow the the attached WBS when developing the work schedule. Activities can be added and task that is not applicable shall be made inactive.

API653 Compliance Program

This template shall be used for the development of the Project Schedule by the Vital Project Manager and Appointed Contractor. The works steps to be added for some Activities and Tasks, if the task is not required, this can be marked as "inactive" in the MS Project Scheduling Tool.

Task	Duration	Deliverables	Milestone	Responsible
API653 Compliance - OOSI Works			No	
1. **Phase: Initiation**	**41**		**No**	
1.1. Business Case & ATOM Form	**11**		No	Project Manager
1.1.1. Develop Business Case	5	Business Case Document	No	Project Manager
1.1.2. Develop ATOM Form	2	ATOM Form	No	Project Manager
1.1.3. Documents Reviewed by P&P	3	Review and Comment on Document	No	Tank Engineers
1.1.4. Upload Document to SET V2 for PMO to review and submit	1	Document Uploaded to SETv2 & Review Done	No	Project Manager
1.1.5. Business Case & ATOM Submitted to CoRE or FM's	2	Review/ Approval by FM's	No	PMO
1.1.6. Project Initiation Document Approved	1	Initiation Document Approved	No	FM's or CoRE
1.1.7. Business Case & ATOM Complete	0	Approved Document Uploaded in SET V2	Yes	PMO
1.2. Identified Stakeholders	**9**		No	
1.2.1. Project Kick Off Meeting	**1**	Gather Information	No	Project Manager
1.2.2. Identify Project Stakeholders	2	List of Stakeholders	No	Project Manager
1.2.3. Conduct Stakeholder Analysis	2	Stakeholder Analysis Grid	No	Project Manager
1.2.4. Develop Stakeholder Register	1	Stakeholder Register	No	Project Manager
1.2.5. Upload Stakeholder Matrix to SET V2	1	Document Uploaded to SETv2 & Review Done	No	PMO
1.2.6. Stakeholder Matrix Approval by CoRE or FM's	2	Review/ Approval by FM's	No	FM's or CoRE
1.2.7. Stakeholder Matrix Approved	1	Initiation Document Approved	No	FM's or CoRE
1.2.8. Stakeholder Analysis Complete	0	Approved Document Uploaded in SETv2	Yes	PMO
1.3. Project Charter	**21**		No	
1.3.1. Identify Goals and Objectives	2	Goals and Objectives, List of Constraints	No	Project Manager
1.3.2. Develop Strategies and Plans	3	Strategies and Plans	No	Project Manager
1.3.3. Research Previous Experience	2	Sample Previous similar Projects	No	Project Manager
1.3.4. Develop Project Charter	5	Project Charter	No	Project Manager
1.3.5. Project Charter Review by P&P	3	Review and Comment on Document	No	Tank Engineers
1.3.6. Upload Project Charter to SET V2	2	Document Uploaded to SETv2 & Review Done	No	PMO
1.3.7. Project Charter Approval by CoRE or FM's	3	Review/ Approval by FM's	No	FM's or CoRE
1.3.8. Project Charter Approved	1	Initiation Document Approved	No	FM's or CoRE
1.3.9. Project Charter Complete	0	Approved Document Uploaded in SETv2	Yes	PMO
2. **Phase: Planning**	10		No	

2.1. Management of Change			No	
2.1.1. Project Meeting	**1**	Gather Information for MoC	No	Facility Manager
2.1.2. Identify Change using the Change Trigger Checklist	**2**	MoC Trigger Checklist in PetroX	No	Facility Manager
2.1.3. Complete a Management of Change (MoC) for identified Changes	**5**	MoC Developed in PetroX	No	Facility Manager
2.1.4. MoC's Completed and Submitted	**2**	MoC Ready for Review	No	Facility Manager
2.1.5. MoC Review by Reviewer	**2**	MoC Approval or Rejection	No	MoC Reviewer
2.1.6. MoC's Approved	**1**	MoC Approved	No	MoC Reviewer
2.1.7. Management of Change Approved	**1**	Approved Document Uploaded SETv2	No	PMO
2.1.8. MoC review by P&P Team for Scope Development	**1**	Information for Scope Development	No	Tank Engineers
2.1.9. MoC Complete			No	
2.2. Project Scope Statement			No	
2.2.1. Drone Report from Site – P&P Template				
2.2.1.1. Initiate PO for Drone Contractor	3	PO Issued to Drone Contractor	No	Procurement Team
2.2.1.2. JSA for Drone use inside facility	1	JSA Developed by Team	No	On Site Supervisor
2.2.1.3. SWP for Drone Report	2	Safe Work Permit raised in PetroX	No	Facility Manager
2.2.1.4. SWP Review and Approval	2	SWP Approved	No	Senior Permit Officer
2.2.1.5. Gast Testing Site Clearance	0.5	Gas Test Certificate and Site Clearance issued	No	Gas Testing Officer
2.2.1.6. Drone Team on site	2	Drone Video and Photos	No	Drone Contractor
2.2.1.7. Site Report on P&P Template	2	Drone Report	No	On Site Supervisor
2.2.1.8. Review and Comments from P&P Team	2	Finalized Report	No	Tank Engineers
2.2.2. Develop Scope Management Plan	10	Scope Management Plan	No	Tank Engineers
2.2.3. Define Project Scope	10	Definition of Project Scope	No	Tank Engineers
2.2.4. Specify Deliverables and Acceptance Criteria	5	Deliverable Specifications	No	Tank Engineers
2.2.5. Identify Project Exclusions	3	Project Exclusions	No	Tank Engineers
2.2.6. Document Assumptions and Constraints	3	List of Assumptions	No	Tank Engineers
2.2.7. Develop Project Scope Document	3	Project Scope	No	Tank Engineers
2.2.8. Upload Project Scope Document to SETv2	2	Document Uploaded to SETv2 & Review Done	No	PMO
2.2.9. Project Scope Document Approval by CoRE or FM's	2	Review/ Approval by FM's	No	FM's or CoRE
2.2.10. Project Scope Statement Approved	1	Initiation Document Approved	No	FM's or CoRE
2.2.11. Scope Document Complete	0	Approved Document Uploaded in SETv2	Yes	PMO
2.3. Work Break Structure & WBS Dictionary				
2.3.1. Build Project WBS – Refer to OOSI Template for Guidance	2	Detailed WBS – Template	No	Tank Engineers
2.3.2. Develop WBS Dictionary	1	Work Breakdown Structure Dictionary	No	Tank Engineers
2.3.3. WBS review by Sponsor	1	WBS Approved by Sponsor		
2.3.4. WBS Complete	0	WBS Approved Uploaded in SETv2	Yes	PMO
2.4. Project Schedule			No	
2.4.1. Document Schedule Management Plan	1	Schedule Management Plan – Template	No	PMO
2.4.2. Define Project Activities	2	Activity List – Template	No	PMO

2.4.3. Sequence Project Activities	2	Project Schedule Network Diagram - Template	No	PMO
2.4.4. Estimate Activity Resources	2	Resource Requirements	No	PMO
2.4.5. Estimate Activity Durations	2	Activity Durations Estimates	No	PMO
2.4.6. Develop Project Schedule	1	Project Schedule	No	PMO
2.4.7. Project Schedule Complete	0	Approved Schedule Uploaded to SETv2	Yes	PMO
2.5. Project Sanction			No	
2.5.1. Document Cost Management Plan	2	Cost Management Plan	No	Tank Engineers
2.5.2. Project Bill of Materials	5	BOM List – Template	No	Tank Engineers
2.5.3. Estimate Project Costs ±10%	3	Cost Estimates within ±10%	No	Tank Engineers
2.5.4. Determine Project Budget	2	Project Budgeting - Template	No	Tank Engineers
2.5.5. Develop Project Cash Flow	1	Project Cashflow – Template	No	Project Manager
2.5.6. Develop Project Sanction	1	Project Sanction – Template	No	Project Manager
2.5.7. Upload Project Sanction to SET V2	2	Document Uploaded to SETv2 & Review Done	No	PMO
2.5.8. Project Sanction Approval by CoRE or FM's	1	Review/ Approval by FM's	No	FM's or CoRE
2.5.9. Project Sanction Approved	1	Initiation Document Approved	No	FM's or CoRE
2.5.10. Update Project Budget in MAS500	1	Create Project Budget in MAS500	No	Asset Officer
2.5.11. Project Sanction Complete	0	Approved Document Uploaded in SETv2	Yes	PMO
2.6. Quality Plan	4		No	
2.6.1. Project Quality Plan	15	Quality Management Plan	No	Tank Engineers
2.6.2. Compile HSSE & QAQC Documents	0.5		No	
2.6.2.1. Develop Inspection Test Plan – Template	0.5	Inspection Test Plan	No	Tank Engineers
2.6.2.2. Working at Height – Checklist Template	0.5	Checklist Form	No	Vital Template
2.6.2.3. Confine Space Entry – Checklist Template	0.5	Checklist Form	No	Vital Template
2.6.2.4. Hot Works – Checklist Template	0.5	Checklist Form	No	Vital Template
2.6.2.5. Tank Inspection & Data Forms [A] (*Use Only Required Forms*)	0.5		No	
2.6.2.5.1. EF-P903-Tank Cleaning Checklist Rev1	0.5	Checklist Form	No	Vital Template
2.6.2.5.2. EF-P907 Tank Commissioning Checklist	0.5	Checklist Form	No	Vital Template
2.6.2.5.3. EF P941 Change of Service Review Checklist	0.5	Checklist Form	No	Vital Template
2.6.2.6. JIG 12 XOM Forms [B] (*Use Only Required Forms*)	0.5		No	
2.6.2.6.1. AGD-F-M100 - Fixed Tank Summary	0.5	Checklist Form	No	XOM Template
2.6.2.6.2. AGD-F-M003 - Fixed Tank Inspection and Cleaning and Internal Maintenance	0.5	Checklist Form	No	XOM Template
2.6.2.6.3. AGD-P-Z815 - Storage Tank Visual Inspection and Tank Cleanliness Assessment	0.5	Checklist Form	No	XOM Template
2.6.2.6.4. AGD-F-M100 -Inspection& Maintenance of Pipes	0.5	Checklist Form	No	XOM Template
2.6.2.7. HSSE Forms	0.5		No	
2.6.2.7.1. JSA Forms	0.5	Checklist Form	No	Checklist Form
2.6.2.7.2. Daily Toolbox Form	0.5	Vital Template	No	Vital Template

2.6.2.7.3. Daily Site Diary	0.5	Checklist Form	No	Checklist Form
2.6.3. Project Quality Plan Complete	0	Approved Quality Management Plan	Yes	PMO
2.7. Communication Plan			No	
2.7.1. Develop Project Communication Plan	2	Communication Management Plan	No	Project Manager
2.7.2. Project Reporting Structure	2	Reporting Structure	No	Project Manager
2.7.3. Approved Communication Plan	0	Approved Communication Plan	Yes	Project Manager
2.8. Risk Management Plan				
2.8.1. Develop Risk Management Plan	3	Risk Management Plan	No	Project Manager
2.8.2. Identify Project Risks	2	Risk Register	No	Project Manager
2.8.3. Perform Qualitative Risk Analysis	2	Risk Register	No	Project Manager
2.8.4. Perform Quantitative Risk Analysis	2	Risk Register	No	Project Manager
2.8.5. Plan Risk Responses	2	Risk Management Action Plan, Risk Register	No	Project Manager
2.8.6. Risk Review by P&P	3	Review Risk Document	Yes	Tank Engineers
2.8.7. Upload Project Risk to SET V2	1	Document Uploaded on SETv2	No	PMO
2.8.8. Project Risk Plan Approval by CoRE or FM's	2	Risk Plan and Register Reviewed	No	Project Manager
2.8.9. Project Scope Statement Approved	1	Risk Plan and Register Approved	No	Project Manager
2.8.10. Risk Management Plan Complete	0	Upload Risk document on SETv2	Yes	PMO
2.9. Procurement Management Plan				
2.9.1. Develop Procurement Plan	2	Procurement Plan	No	Project Manager
2.9.2. BoM and Sequence of purchase issued to Procurement	1	Bill of Materials with Vendors	No	Project Manager
2.9.3. Procurement Plan Complete uploaded to SETv2	1	Upload document to SETv2	No	PMO
2.9.4. Project Procurement Plan complete	0	Approved Plan	Yes	PMO
3. **Phase: Execution**			No	
3.1. Project Work Authorization			No	
3.1.1. Product Transfer & Isolation– Terminal & Contractor			No	
3.1.1.1. JSA for Decommissioning & Degas	2	Approved JSA	No	Project Site Team
3.1.1.2. SWP Generation in PetroX	2	SWP for Approval	No	Facility Manager
3.1.1.3. SWP Review and Approval	5	Approved SWP	No	Senior Permit Officer
3.1.1.4. Site Clearance for Mobilisation	0.5	Gas Test Certificate and Site Clearance	No	Gas Testing Officer
3.1.1.5. Site Team Induction (*if CPP Training is required, this will be added to specific project schedule)*	2	Site Induction by Facility Manager or Safety Manager	No	Facility Manager or Safety Manager
3.1.1.6. Complete EF-P903-Tank Cleaning Checklist Rev1	0.5	Completed EF-P903-Tank Cleaning Checklist Rev1	No	On Site Supervisor or Facility Manager
3.1.1.7. Complete AGD-F-M100 - Fixed Tank Summary	0.5	Completed AGD-F-M100 - Fixed Tank Summary	No	On Site Supervisor
3.1.1.8. Work Authorization Complete	0	Documents Uploaded on SETv2	Yes	PMO or Project Manager
3.2. Procurement and Logistics (ref to BoM file)			No	
3.2.1. Scaffolding Works			No	

3.2.1.1. Import Required Scaffolding to Site	5	Check and arrange for other sites if required	No	Procurement Team
3.2.1.2. Shipping to Site	45	Origin site to load and ship to site	No	Procurement Team
3.2.1.3. Clearance and Delivery to Site	5	Scaffolding on Site	No	Procurement Team
3.2.2. Blasting Abrasive			No	
3.2.2.1. Procure Garnet for Blasting	5	PO and Payment Secured with vendor	No	Procurement Team
3.2.2.2. Shipping to Site	45	On board and shipping to site	No	Procurement Team
3.2.2.3. Clearance and Delivery to Site	5	Garnets on site or inventory stores	No	Procurement Team
3.2.3. Sludge Treatment & Disposal			No	
3.2.3.1. Order Enertech Sludge Treatment Materials	5	PO and Payment Secured with vendor	No	Procurement Team
3.2.3.2. Shipping to Site	50	On board and shipping to site	No	Procurement Team
3.2.3.3. Clearance and Delivery to Site	5	Sludge materials on site or inventory stores	No	Procurement Team
3.2.4. NDT Inspection & Testing Equipment's			No	
3.2.4.1. Inspection and Testing Equipment Freight	20	Equipment Shipping to Site	No	Procurement Team
3.2.4.2. Travel for OOSI Technicians	5	Travel Approval for Technician	No	Project Manager
3.2.4.3. Clearance of Testing Equipment's	3	Equipment on Site	No	Procurement Team
3.2.5. Procurement Complete	0		Yes	
3.2.6. OOSI Process			No	
3.2.7. Tank Isolation Process			No	
3.2.7.1. Update Tank Master File	0.5	Tank Master File Updated	No	Project Manager
3.2.7.2. Gas Test and Site Clearance	0.5	Gas Test Certificate for Day Works	No	Gas Testing Officer
3.2.7.3. Product Transfer into Nominated Tank	3	Tank is Empty and ready for cleaning	No	Facility Staff
3.2.7.4. Pipeline Draining	0.5	Pipe connected to Tank ready for isolation	No	Facility Staff/ Contractor
3.2.7.5. Stock reconciliation in PetroX	0.5	Transferred Stock Updated in PetroX	No	Facility Manager
3.2.7.6. Open all tank fittings for degassing	2	Tank Open and allowed for degas	No	On Site Supervisor
3.2.7.7. Product Transferred and Isolated	0	Tank Ready for Internal cleaning	Yes	
3.2.8. Tank Cleaning Process				
3.2.8.1. JSA for Internal Blasting	1	JSA completed for Internal Blasting	No	On Site Team
3.2.8.2. SWP for Internal Blasting & Cleaning	2	SWP Submitted for Review	No	Facility Manager
3.2.8.3. SWP Approved for Blasting & Painting	2	SWP Approved	No	Senior Permit Officer
3.2.8.4. Gas Testing & Site Clearance	0.5	Site Clearance Issued	No	Gas Testing Officer
3.2.8.5. Equipment for Tank Cleaning	2	Equipment's place on site	No	On Site Supervisor
3.2.8.6. Clean Sludge and Dispose for treatment	10	Tank Sludge Removed	No	On Site Supervisor
3.2.8.7. Sludge Treatment and Disposal	120	Sludge disposed in Landfill	No	On Site Supervisor
3.2.8.8. Complete EF-P903-Tank Cleaning Checklist Rev1	1	Form Completed	No	On Site Supervisor
3.2.8.9. AGD-F-M003 - Fixed Tank Inspection and Cleaning and Internal Maintenance	1	Form Completed	No	On Site Supervisor
3.2.8.10. Tank Cleaning Complete	0	Tank Cleaned and Ready for Blasting	Yes	
3.2.9. Internal Blasting and Cleaning			No	

3.2.9.1. JSA for Internal Blasting	1	JSA completed for Internal Blasting	No	On Site Team
3.2.9.2. SWP for Internal Blasting & Cleaning	2	SWP Submitted for Review	No	Facility Manager
3.2.9.3. SWP Approved for Blasting & Painting	2	SWP Approved	No	Senior Permit Officer
3.2.9.4. Gas Testing & Site Clearance	0.5	Site Clearance Issued	No	Gas Testing Officer
3.2.9.5. Blasting Equipment Mobilisation to Site	2	Blasting Equipment on Site	No	On Site Supervisor
3.2.9.6. Tank Internal Blasting – Floor & Strake 1	10	Tank Floor and 1st Strake Blasted	No	On Site Supervisor
3.2.9.7. Tank Cleaning and Garnet Disposal/ Re-use	10	Tank Cleaned and ready for OOSI Technician	No	On Site Supervisor
3.2.9.8. Tank Report for Internal Blasting to P&P	2	Blasting Report Completed	No	On Site Supervisor
3.2.9.9. Tank Clean and Ready	0		Yes	
3.2.10. Erect Scaffolding – Tank External				
3.2.10.1. JSA for Internal Blasting	1	JSA completed for Internal Blasting	No	On Site Team
3.2.10.2. SWP for Internal Blasting & Cleaning	2	SWP Submitted for Review	No	Facility Manager
3.2.10.3. SWP Approved for Blasting & Painting	2	SWP Approved	No	Senior Permit Officer
3.2.10.4. Gas Testing & Site Clearance	0.5	Site Clearance Issued	No	Gas Testing Officer
3.2.10.5. Erect Scaffolding on the tank outside	20	Scaffolding Completed and Certified	No	On Site Supervisor
3.2.10.6. Scaffolding Completed			Yes	
3.2.11. NDT Inspection and Report			No	
3.2.11.1. JSA for Internal NDT	1	JSA completed for Internal Blasting	No	On Site Team
3.2.11.2. SWP for Internal NDT	2	SWP Submitted for Review	No	Facility Manager
3.2.11.3. SWP Approved for NDT	2	SWP Approved	No	Senior Permit Officer
3.2.11.4. Gas Testing & Site Clearance	0.5	Site Clearance Issued	No	Gas Testing Officer
3.2.11.5. NDT Equipment's on Site	1	NDT Equipment's arrived on site	No	On Site Supervisor
3.2.11.6. NDT Technicians arrive on Site	2	Inspection Team on Site	No	NDT Team
3.2.11.7. Tank Inspection by NDT Team	5	Tank Inspection and Reports	No	NDT Team
3.2.11.8. Draft OOSI Report for Review	10	Draft OOSI Report	No	NDT Team
3.2.11.9. Final OOSI Report	20	Final OODI Report	No	NDT Team
3.2.11.10. NDT Completed	0		Yes	
3.2.12. Repair Options Decision Analysis?			No	
3.2.12.1. NDT Team Report Review & PM's recommendation	3	PM's recommendation Report	No	Project Manager
3.2.12.2. Plant and Platform Consultant Recommendation	3	P&P's recommendation Report	No	Tank Engineers
3.2.12.3. FM's or CoRE to decide on the Option to repair or mothball	5	Management to decide on next step	No	Function Manager's
3.2.12.4. Option Decision by Management?	0	OOSR, Mothball or Decommission Tank	Yes	Function Manager's
3.2.12.4.1. Option 1 – Mothball	0			
3.2.12.4.2. Option 2 – OOSR Works	0			
3.2.12.4.3. Option 3 – Decommission Tank	0			
OPTION 2 – OOSR Proceeds				
3.2.13. Scope Management Processes				
3.2.13.1. Project Kick Off Meeting with stakeholders	1	Updated Project Meeting Notes	No	

3.2.13.2. Perform Scope Planning – PnP Template	1	OOSR Scope	No	
3.2.13.3. MoC development and Approval	4	Approved MoC	Yes	
3.2.13.4. Repair Methodology	3	Method Statement for Works	No	
3.2.13.5. Prepare Engineering Drawings	10	Project Drawings	No	
3.2.13.6. Review and Update Inspection Test Plan (ITP) – PnP Template	2	Approved ITP for the Project	Yes	
3.2.14. Work Planning				
3.2.14.1. Define Sequences of Works	4	Step by Step work sequence for Site Team	No	
3.2.14.2. Allocate Resources for Task	2	Updated Resource Matrix	No	
3.2.14.3. Update Project Schedule work packages in Sensei	2	OOSR Project Schedule	No	
3.2.15. Cost Planning			No	
3.2.15.1. Review Works recommendation from OOSI Report	2	Task Cost Breakdown Analysis	No	
3.2.15.2. Review Management of Change and cost impact	2	Updated MoC	No	
3.2.15.3. Update Project Costing Sheet & Amend Sanction	3	Updated OOSR Sanction	No	
3.2.15.4. Cost Submission to FM's review	1	Review and Comments from FM's	No	
3.2.15.5. Consideration of Project? Proceed/ Hold	2	Approval/ Rejection of Sanction	No	
3.2.15.6. OOSR Budget Approved	1	MAS500 Budget Update	No	
3.2.15.7. OOSR Sanction Approved	0	Budget ready to Use	Yes	
3.2.16. Site Works as per OOSR Repair Scope				
3.2.16.1. Drawings and Layouts				
3.2.16.1.1. Upgrading Works Drawing		Complete Drawings for Site Works	No	
3.2.16.1.2. Drawing Review by Team		Team Input and agreement	No	
3.2.16.1.3. Draft Drawing for Review & Approval		Approved Drawing for Site Works	No	
3.2.16.1.4. HAZOP Assessment & Approval		Approved HAZOP	No	
3.2.16.1.5. BOM & Confirm with Inventory		Final Bill of Materials for Ordering	No	
3.2.16.1.6. Issue BoM to Procurement		BoM sent to Procurement	No	
3.2.16.1.7. Issue Drawing and BoM to OSS		Site Team issued with Drawing Pack	Yes	
3.2.16.2. Procurement & Logistics				
3.2.16.2.1. Update BoM from PM		Procurement Team has BoM	No	
3.2.16.2.2. Ordering of required materials from BoM		Quote/Specs Approved	No	
3.2.16.2.3. Materials Delivery to Warehouse in Location		Material Received in Location Warehouse	No	
3.2.16.2.4. Issue to Site Team		Material Released to Site Team	No	
3.2.16.2.5. Material Receiving Reports closed		Items Checked and Reports closed	No	
3.2.16.2.6. PO Closed In MAS500		Purchased Order Closed	Yes	
3.2.16.3. External Works				
3.2.16.3.1. Vital HSSE				
3.2.16.3.1.1. Safety Forms – Work at Heights/ Hot Works		Safety Checklist Completed	No	
3.2.16.3.1.2. Develop JSA for External Works		Agreed JSA for SWP	No	
3.2.16.3.1.3. Develop SWP for Review/ Approval		SWP for Review by SPO	No	

3.2.16.3.1.4. SWP Approval		Approved SWP	No	
3.2.16.3.1.5. Site Induction and if Training Required		Team Inducted to Site	No	
3.2.16.3.1.6. Site Gas Testing and Clearance to work			No	
3.2.16.3.1.7. Site Barricade and Safety Signage			No	
3.2.16.3.1.8. Site Ready for Works			Yes	
3.2.16.3.2. Tank Bunding (ITP)				
3.2.16.3.3. Access to Tank area (ITP)				
3.2.16.3.4. Tank Bund House Keeping (ITP)				
3.2.16.3.5. Tank Foundation and Berm				
3.2.16.3.5.1. Vegetation				
3.2.16.3.5.2. Foundation and Annular Plate Sealing				
3.2.16.3.5.3. Drainage System				
3.2.16.3.6. Inlet Pipe-works (Task to be added as required)				
3.2.16.3.7. Outlet Pipe works (Task to be added as required)				
3.2.16.3.8. Ancillary Connections (Task to be added as required)				
3.2.16.3.9. Shell Nozzles (Task to be added as required)				
3.2.16.3.10. Roof Nozzles (Task to be added as required)				
3.2.16.3.11. Fire Systems (Task to be added as required)				
3.2.16.3.12. Foam System (Task to be added as required)				
3.2.16.3.13. Stairways (Task to be added as required)				
3.2.16.3.14. Handrails (Task to be added as required)				
3.2.16.3.15. Tank Shell (Task to be added as required)				
3.2.16.3.16. Tank Roof (Task to be added as required)				
3.2.16.4. Internal Works				
3.2.16.4.1. Vital HSSE				
3.2.16.4.1.1. Safety Forms – CSE/ Hot Works/ Work at Heights				
3.2.16.4.1.2. Develop JSA for External Works				
3.2.16.4.1.3. Develop SWP for Review/ Approval				
3.2.16.4.1.4. SWP Approval				
3.2.16.4.1.5. Site Induction and if Training Required				
3.2.16.4.1.6. Site Gas Testing and Clearance to work				
3.2.16.4.1.7. Safe Work Permits				
3.2.16.4.2. Floors Repairs (Task to be added as required)				
3.2.16.4.3. Internal Pipes and Nozzles (Task to be added as required)				
3.2.16.4.4. Tank Shell Repairs (Task to be added as required)				
3.2.16.4.5. Tank Internal Coating				
3.2.16.4.5.1. JSA for Blasting & Coating				

3.2.16.4.5.2.	SWP For Blasting & Coating				
3.2.16.4.5.3.	Abrasive Blasting Strake 1 and Floor				
3.2.16.4.5.4.	Strake 1 Coating – 1st Coat @150microns				
3.2.16.4.5.5.	Strake 1 Coating – 2nd Coat @ 150microns				
3.2.16.4.5.6.	Tank Floor Coating – @150microns per coat				
3.2.16.4.5.7.	Holiday Test Critical Areas				
3.2.16.4.5.8.	Coating Report				
3.2.16.4.5.9.	Coating Approved				
3.2.16.4.6. Post Repair Inspection					
3.2.16.4.6.1.	Inspection Team Mobilisation				
3.2.16.4.6.2.	SWP for Inspection Team				
3.2.16.4.6.3.	Inspection of Repairs				
3.2.16.4.6.4.	Report and Recommendation				
3.2.16.4.6.5.	Complete Repairs if Required				
3.2.16.4.6.6.	Hydro Test – if required				
3.2.16.4.6.7.	Fitness for Certificate Issued				
3.2.16.4.7. Tank External Coating					
3.2.16.4.7.1.	JSA for Blasting & Coating				
3.2.16.4.7.2.	SWP For Scaffolding/ Blasting & Coating				
3.2.16.4.7.3.	Erect Scaffolding around tank external				
3.2.16.4.7.4.	Abrasive Blasting				
3.2.16.4.7.5.	Tank Coating – 1st Coat @150microns				
3.2.16.4.7.6.	Tank Coating – 2nd Coat @ 150microns				
3.2.16.4.7.7.	Tank Final Coat – @150microns				
3.2.16.4.7.8.	Holiday Test Critical Areas				
3.2.16.4.7.9.	Coating Report				
3.2.16.4.7.10.	Coating Approved				
3.2.16.4.8. Tank Internal Coating					
3.2.16.4.8.1.	JSA for Blasting & Coating				
3.2.16.4.8.2.	SWP For Blasting & Coating				
3.2.16.4.8.3.	Abrasive Blasting Strake 1 and Floor				
3.2.16.4.8.4.	Strake 1 Coating – 1st Coat @150microns				
3.2.16.4.8.5.	Strake 1 Coating – 2nd Coat @ 150microns				
3.2.16.4.8.6.	Tank Floor Coating – @150microns per coat				
3.2.16.4.8.7.	Holiday Test Critical Areas				
3.2.16.4.8.8.	Coating Report				
3.2.16.4.8.9.	Coating Approved				
3.2.16.4.8.10.	Tank Internal Coating				

3.2.16.4.9. Tank Close Up and Commissioning				
3.2.16.4.9.1. Completed ITP				
3.2.16.4.9.2. Post Inspection Report				
3.2.16.4.9.3. Tank Calibration and Chart – if required				
3.2.16.4.9.4. Tank Commissioning Forms Completed				
3.2.16.4.9.5. JIG Forms Completed				
3.2.16.4.9.6. Pipework Connections & Tested				
3.2.16.4.9.7. Tank Receive Product				
3.2.16.4.9.8. Soak Testing & Results Review				
3.2.16.4.9.9. 90% Product Receipt				
3.2.16.4.9.10. Close MoC				
3.2.16.4.9.11. Close SWP's				
4. **Phase: Monitoring & Control**				
4.1. Project Change Request				
4.1.1. Change Request Scope	3	Scope of the change request completed	No	Project Manager
4.1.2. Change Request Form Completed	1	Change Request Completed	No	Project Manager
4.1.3. Upload Change Request in SET V2	1	FM's review	No	PMO
4.1.4. Change Request Reviewed by FM's	2	FM's Approved	No	FM's
4.1.5. Change Request Approved by FM's	1	Document Uploaded on SETv2	No	FM's
4.2. Project Acceptance Documents			No	
4.2.1. Approvals of Documents from FM's or CoRE		Approved Document Tracking	No	PMO
4.2.2. Upload on SETv2		Approvals Uploaded	No	PMO
4.3. Project Site Reports			No	
4.3.1. Daily Site Diary	2	Daily Site Diary Completed	No	On Site Supervisor
4.3.2. Daily Tool-Box Meeting	1	Daily Toolbox Meeting Documented	No	On Site Supervisor
4.3.3. Periodic Site Report	2	Site Report Completed	No	Project Manager
4.3.4. Materials Receiving Reports Completed			No	
4.4. Project Schedule Updates - Sensei			No	
4.4.1. Work Performance	1	Project Tracking Document	No	PMO
4.4.2. Maintain Project Schedule	1	Project Schedules	No	PMO
4.4.3. Maintain Work Plans	1	Work Plans	No	PMO
4.4.4. Update Actions Items	1	Actions Item Updated	No	PMO
4.5. Project Budget Reports			No	
4.5.1. Report from Asset Officer	1	MAS500 report	No	Asset Officer
4.5.2. Updates in Project Reports and Schedules	1	Cost Updated in Sensei	No	PMO
4.5.3.			No	
4.6. Quality Control Reports			No	
4.6.1. Tank Inspection Forms			No	Project Manager

4.6.2. JIG 12 XOM Forms			No	Project Manager
4.6.3. HSSE Forms			No	Project Manager
4.6.4. QAQC Forms			No	Project Manager
4.6.5. Inspection and Test Plan Report				
4.7. Project Status Reports			No	
4.7.1. Weekly Project Updates			No	Project Manager
4.7.2. Periodic Status Reports			No	PMO
4.8. Project Risk & Issues Log			No	
4.8.1. Update Risk and Issues in Sensei			No	
4.8.2.			No	
4.9. Stakeholder Engagements			No	
4.9.1. Project Kick Off Meeting			No	
4.9.2. Reports from Tank Engineers s			No	
4.9.3. Project Documents Update			No	
4.9.4. MoC Updates in PetroX			No	
5. **Phase: Project Closing**			No	Project Manager
5.1.1. Updates Assets in CARL System			No	Project Manager
5.1.1.1. Asset Information Uploaded			No	Project Manager
5.1.1.2. Asset Drawings & Reports			No	Project Manager
5.1.1.3. Asset Maintenance Schedule Rolled Out			No	Project Manager
5.1.2. Tank Master File Updated			No	Project Manager
5.1.3. Project Closure Report			No	Project Manager
5.1.3.1. Obtain Final Project Acceptance			Yes	Project Manager /
5.1.3.2. Operational Readiness Confirmed			No	Project Manager
5.1.3.3. Assess Stakeholder Satisfaction			No	Project Manager
5.1.3.4. Summarize Project Results and Lessons Learned			No	Project Manager
5.1.3.5. Review and Recognize Team Performance			No	Project Manager
5.1.3.6. Close Out the Project Records			No	Project Manager
5.1.3.7. Review and Reconcile Financial Performance			No	Project Manager
5.1.3.8. Financial Updated in MAS500			No	Project Manager
5.1.3.9. Closure Report Reviewed by FM's			No	Project Manager
5.1.3.10. Closure Report Approved by FM's			No	Project Manager
5.1.3.11. Upload Closure Report in SET V2			No	Project Manager
5.1.3.12. Project Closed in Sensei			No	PMO
5.1.3.13.				

Acronyms

ATOM	– Active Threat and Opportunity Management
API	– American Petroleum Institute
BOM	– Bill of Materials
FM's	– Function Manager's
JSA	– Job Safety Analysis
CSE	– Confine Space Entry
SWP	– Safe Work Permit
CoRE	– Committee on Resource Effectiveness
MoC	– Management of Change
PetroX	– Vital's Operations and HSSE Management Database Tool
NDT	- Non-Destructive Testing

Appendix N

FSMPC GP External and Internal Painting of Bulk Tanks

FSM PETROLEUM CORPORTION
GENERAL CODE OF PRACTICE
CONSTRUCTION STANDARD
FOR
INTERNAL & EXTERNAL PAINTING OF STEEL SURFACES

CONTENTS

1. SCOPE

This Standard specifies the general requirements of FSMPC for the protection of iron, steel and galvanised steel surfaces from corrosion by the use of paint coatings, including the standard to which the materials and work must conform, and the procedures to be followed for the on-site application of external paint coating systems to new equipment, for given exposure conditions. The equipment and exposure conditions are detailed in Sections 4 and 5 respectively.

This standard is to be used for new work or for maintenance work where the full surface is to be blasted clean of the existing coating.

In all applications covered by this Standard, iron surfaces shall be treated in an identical manner to steel surfaces subjected to the same conditions.

The general painting of building surfaces such as timber, plaster and building boards is not covered in this standard. Also excluded is the protection of buried or subsea pipelines by asphalt, coal tar enamels or tapes.

2. REFERENCE STANDARDS

AS1470 Health and Safety at Work - Principles and Practices

AS1580 Methods of Test for Paints and Related Materials

AS1627 Code of Practice for the Preparation and Pre-treatment of Steel Surfaces

AS1715&16 Respiratory Protective Devices

AS2310 Glossary of Paint and Painting Terms

AS2312 Guide to the Protection of Iron and Steel against Exterior Atmospheric Corrosion

AS3894 Site Testing of Protective Coating

3. SAFETY

Before tendering, the Contractor shall thoroughly familiarise himself with the safety requirements that apply to the site and FSMPC's Safe Work Permit. Particular reference is made to any work within a facility containing hazardous/flammable materials where there will be restrictions on hot work and the type of equipment which can be used.

Prior to commencement of work on site the Contractor shall obtain a Work Permit from the Superintendent and shall fully meet all the Work Permit Conditions specified during the execution of the work.

Where abrasive blasting or spray painting is performed, spray guns, sand blasting equipment and accessories shall be electrically earth bonded to the tank shell and the bond tested to ensure it is earthing adequately. Suitable respiratory protection shall be worn by operators at all times. Paints containing isocyanates shall only be applied when using positive pressure air supplied breathing equipment. When undertaking this work, the Contractor must ensure that no damages will be affected to FSMPC property, FSMPC personnel and/or any Third Parties, plant, equipment or personnel. The Contractor shall be held responsible for any such damages.

The Contractor shall ensure that the site is free of obstructions and safety hazards and kept clean. When work is completed all areas used by the Contractor shall be cleaned and returned to the condition prior to commencement of work.

All scaffolding shall be to the standard approved by the local statutory authority. Suspended scaffolds shall be manned by two persons at all times and only air driven winches are to be used.

The Contractor shall demonstrate that he has experience with the processes and materials selected and that he is familiar with the various government regulations which apply to the handling and storage of paint. The manufacturers Material Safety Data Sheets for all materials including thinners and solvents shall be reviewed with the Superintendent, and the Contractors procedures for handling each aspect shall be presented, including proposed methods for ensuring compliance by all employees and subcontractors.

4. ITEMS OF EQUIPMENT

The items of equipment covered by this standard are categorised as follows:

4.1 BULK TANKS

Constructed of mild steel materials and includes cone roof, floating roof, vertical and horizontal (service) tanks.

4.2 PIPELINES

This section includes pipes, pipe supports, pipe bridges, valves and fittings. The pipe material will be black steel.

4.3 STRUCTURES

This category of equipment focuses on the steel work incorporated into road and rail gantries, drum platforms, the supporting structures for elevated tanks and associated steel work for these items of equipment.

4.4 GALVANISED SECTIONS

Included in this category are galvanised pipe, galvanised fittings and steel galvanised gratings. All would be produced in accordance to ASTM 123 or equivalent with galvanising to approximately 75 microns.

5. EXPOSURE CONDITIONS

The terms for exposure conditions, as used in this standard are defined in this Section in order of severity.

CLASSIFICATION		CHARACTERISTICS	TYPICAL GEOGRAPHY
5.1	Mild	Rural areas	Most country/rural regions
		Arid areas	Areas 2 Miles inland from coast
		Chemically free to mild atmospheres	Areas 5 Miles inland from coast
5.2	Severe	High Humidity	All Terminal Locations
		Intense Sunlight	All Terminal Locations
		Tropical Regions	All Terminal Locations
		Coastal Regions	All Terminal Locations
		Rain	Pohnpei / Kosrae
		Salt Atmosphere	All Terminal locations

6. SELECTION AND APPLICATION OF PAINT COATING SYSTEM

The Contractor shall select a compatible system of paint coatings from one of the approved systems listed in Section 10 of this Standard.

The Contractor shall obtain from the manufacturer a comprehensive specification fully detailing methods and procedures, and ensure that they are followed by the applicator of the particular coating. The manufacturer's specification shall include reference to all relevant factors covered in Section 8 of AS2312.

A copy of the manufacturer's specification shall be approved by the Superintendent prior to commencement of the work. A copy shall be kept at the work site.

The Contractor may elect to use either a roller/brush application method or a spray application method. Section 10 of this Standard provides details for both methods, where the spray application method consists of;

- External coating method,
  - Spray System - 3 coat paint system, achieving 450microns
  - Roller/ Brush - 4 coat paint system, achieving 450microns
- Internal Coating Method,
  - Spray System - 2 coat paint system, achieving 300microns
  - Roller/ Brush - 3 coat paint system, achieving 300microns.

The Contractor shall take all reasonable precautions to prevent damage by drifting spray to both the Company's and adjoining property owner's property, buildings, and vehicles. Any such damage shall be fully repaired at the Contractor's expense.

7. SURFACE PREPARATION

The preferred surface preparation shall be by abrasive wet sand blast using the "CLEMO WET BLASTING SYSTEM" or similar process including accurately metered quantities of polyphosphate inhibitor injected in the correct ratio. The blasting medium shall be a clean dry angular abrasive such as garnet or basalt aggregates, or other as approved by the Superintendent, and as allowed by the relevant Statutory Authority. The abrasive shall be certified as clean and free from water soluble salts or other contaminants. Surface profiles shall be measured to the satisfaction of the Superintendent.

Blast cleaning shall be in accordance with AS1627 Class 2½ minimum finish. Surface profile height shall be not less than 30 microns or as stated in the paint specification data sheet. All weld spatter, sharp edges and surface defects likely to affect the life of the coating shall be removed.

The blasted surface shall be regularly checked at a sufficiently representative number of spots with a ferricyanide paper test to confirm that all residual soluble ferrous salts have been removed.

Blast cleaned surfaces shall be coated with primer as soon as possible after treatment and drying and before being subject to rain or moist air exposure. A blast cleaned surface shall not remain uncoated for a period exceeding 4 hours without the approval of the Superintendent.

It shall be the Contractor's responsibility to protect all equipment such as valve handles and spindles, instrumentation and sight glasses from accidental over blasting.

For bulk tanks and with the prior approval of the Superintendent, the Contractor may elect to blast and prime shell and roof plates off site. The blasting and priming shall be carried out after all rolling of plates is completed. Weld margins of 50mm will be left. After completion of tank erection all weld areas and areas of damage to the primer shall be blasted and them primed with Amercoat 240 prior to application of the intermediate coat.

For the instance where the equipment is painted prior to site delivery and installation, only the prime coat is to be applied in accordance of this standard, and a 50mm weld margin is to be left unpainted.

Under some circumstances dry blasting may be required. If this is the case then the procedure shall be submitted by the Contractor to the Superintendent for approval and shall fully detail personnel and safety precautions. The Contractor shall obtain written approval from the relevant statutory authorities.

For galvanised pipe sections, the surface preparation shall consist of a high pressure water blast at 28000 kPa minimum (4000 psi) to remove all poorly adhering coating, dirt, grime and oxidised deposits. In the case when high pressure water blast will not remove the existing protective coating, the Contractor is to consult with the Superintendent.

After surface preparation the prime coat is to be applied as per AS1627; i.e. within 4 hours of commencement of preparation or before visual deterioration becomes evident.

8. SUPERVISION AND INSPECTION

The Contractor shall employ on site at all times during the execution of the work a Representative capable of providing an adequate level of supervision and undertaking the necessary quality control checks and thickness testing. The Contractors daily log shall also include the following:

- Area treated
- Equipment used
- Paint quantity used
- Temperatures and relative humidity of the commencement and completion of work and maximum during the working day
- Manpower employed
- Accidents or injuries which arise out of the work

These requirements may be varied with agreement by the Superintendent.

The Contractor shall state clearly in the tender whether his Representative is to be performing site works other than supervision.

The Contractor shall provide the necessary approved scaffolding and access for the Superintendent and/or his/her appointed inspector, to carry out regular inspection and film thickness testing during both surface preparation and coating applications.

Wet film thickness gauges may be used as a guide during coating application but final dry film thickness shall be determined using an approved magnetic film thickness gauge calibrated and checked daily. Determination of dry film thickness shall be as specified in AS2312 Section 11, Inspection and Testing, with the number of measurements to be agreed between the Contractor and the Superintendent prior to commencement of work (a grid 1m square is suggested). Application of the intermediate coat shall not commence until the primer coat has been inspected and released by the Superintendent.

Holiday test shall be carried out for all internal coatings using approved holiday test equipment (Elcometer) by trained and authorised person. Determination of irregularities shall be as specified in AS2312, Inspection and Testing. Application of the intermediate coat shall not commence until the primer coat has been inspected and released by the Superintendent.

All coatings shall be of uniform thickness without coating defects. All repairs shall be carried out according to the manufactures recommendation.

The Superintendent may elect to have an adhesion test performed on the prime coat if he deems it necessary.

All coating Inspection and Test Plan must be completed and approved by all involved parties for every layer of coating applied.

9. COLOUR SCHEME AND AREAS OF APPLICATION

The colour scheme to be adopted for the areas of application is detailed below for the various items of plant.

9.1 BULK TANKS – EXTERNAL

The external surfaces including all appurtenances shall be painted in the colours specified in the following table according to whether the tank is designated as a "White Product" or a "Black Product" tank. (*Refer to Bulk Tank General Arrangement Drawing*)

AREA TO BE PAINTED	WHITE PRODUCT TANK
Roof, Shell, Flanged Stools and all attached pipes over the full height of the tank.	1st Coat Amercoat 240 Buff @150 microns. 2nd Coat Amercoat 240 White @150 microns 3rd Coat Amercoat 450 HS White @150 microns
Tank Identification Numbers	Amercoat 450 HS Signal Red @100 microns
Stairway and Walkway stringers and handrails. Light stanchions.	Amercoat 450 HS Golden Yellow @ 100microns
Stair treads- galvanised - ungalvanized	Leave uncoated White

Note: The Tank Identification Numbers are to be 300mm high.

The manhole cover to each tank shall have the following information stencilled in 50mm high lettering. The choice of manhole cover shall be determined by the Superintendent:

Date Painted:
Paint Contractor:
Date Inspected:
Date Cleaned:

9.2 BULK TANKS – INTERNAL

The internal surfaces including all pipes and flanges shall be painted in the colours specified in the following table according to the table below. (*Refer to Bulk Tank General Arrangement Drawing*)

AREA TO BE PAINTED	All PRODUCT TANK
Internal Shell, Internal Roof, Roof Trusses, Flanged Stools, and all attached pipes over the full height of the tank.	1st Coat Amercoat 240 Buff @150 microns. 2nd Coat Amercoat 240 White @150 microns

9.2 PIPELINES

The external surface of pipelines and associated equipment shall be painted in the colours specified in the following table.

AREA TO BE PAINTED	
Product Pipelines	White
Fire Water Pipeline	Red
Foam Concentrate Pipelines	Dark Blue (No 1)
Foam Mixture Pipelines	Light Blue (No 3)
Pipe Supports	White/ Galvanised
Pipe Bridges	White/ Galvanised
Valves - Bodies	White
Valves - Handles	Black

9.3 STRUCTURES

The colour scheme to be adopted for structures should be similar to the rest of the structure. The suggested colour for this is White.

9.4 SIGNWRITING

All sign writing and the FSMPC company identifier shall be in accordance with the Project Scope of Work. Refer also to the FSMPC Visual Standards Manual. This manual can also be used as a reference for the formulation of the above colours.

9.5 STAIR TREADS AND ROOF WALKWAYS

All trafficable areas including stairway treads and roof tracks or walkways shall be painted with a non slip coating consisting of a suitable base coating with the addition of a non skid aggregate. The coating is to be applied over the primed surface to the manufacturer's specification. PPG is the acceptable products for all mild steel surface coatings.

10. PAINT COATING SYSTEMS

The Contractor shall use one of the following approved paint coating systems.

10.1 SPRAY APPLICATION METHOD

10.1.1 PPG Products

		TANKS	PIPELINES	STRUCTURES	GALVANISED SECTIONS
		Internal			
		Amercoat 240 Buff DFT 150um. Amercoat 240 White DFT 150um.			
		External			
EXPOSURE CONDITIONS	MILD	Amercoat 240 Buff DFT 150um. Amercoat 240 White DFT 150um. Amercoat 450 White, DFT 150um.	Amercoat 240 Buff DFT 150um. Amercoat 450 White DFT 150um.	Amercoat 240 Buff DFT 150um. Amercoat 450 White DFT 150um.	Galvanised from primers, DFT 10um.
	SEVERE	Amercoat 240 Buff DFT 150um. Amercoat 240 White, DFT 150um. Amercoat 450 HS White, 150um.	Amercoat 240 Buff, 150um. Amercoat 450 White, 150um.	Amercoat 240 Buff, 150um. Amercoat 450 White, 150um.	Amercoat Galvanized Primer DFT 100um. Amercoat 450 HS White, DFT 150um

10.2 BRUSH OR ROLLER APPLICATION METHOD

10.2.1 PPG Products

		TANKS	PIPELINES	STRUCTURES	GALVANISED SECTIONS
		Internal			
		Amercoat 240 Buff DFT 150um. Amercoat 240 White DFT 150um.			
		External			
EXPO	MILD	Amercoat 240 Buff DFT 150um.	Amercoat 240 Buff DFT 150um.	Amercoat 240 Buff DFT 150um.	Galvanised from primers, DFT 10um.

SURE		Amercoat 240 White DFT 150um. Amercoat 450 White, DFT 150um.	Amercoat 450 White DFT 150um.	Amercoat 450 White DFT 150um.	
CONDITIONS	SEVERE	Amercoat 250 Buff DFT 150um. Amercoat 240 White, DFT 150um. Amercoat 450 White, 150um.	Amercoat 250 Buff, 150um. Amercoat 450 White, 150um.	Amercoat 250 Buff, 150um. Amercoat 450 White, 150um.	Amercoat Galvanized Primer DFT 100um. Amercoat 450 White, DFT 150um

10.3.1 AVAILABILITY

With the exemptions detailed below, the products nominated above are freely available through the manufacturers and/or their distributors in Guam, Hawaii and Australia.

Protective Coatings Supply, Inc.
Suite 500 Airport Industrial Center
165 Skyline Dr., Tamuning, GU 96913
PH: 671-649-4627 Fax: 671-649-4647
Cell: 671-482-7241
Email: pcs@pcsppgguam.com

Pacific Islands International
1/12 North Link Circuit,
Shaw, Townsville, QLD 4818, Australia
Phone. (+61) 7 4412 6800
m. (+61) 0421 835 375 (AUS) | (+677) 779 1547 (SB) | (+675) 7993 8391 (PNG)
Email: sales@pacificislands.com.au

Appendix O

OOSI Flow Process

Appendix P

OOSI-R Flow Process

Appendix Q

Inspection Test Plan - Sample Only

Note: Contractor to follow this and develop the ITP

INSPECTION AND TEST PLAN	VITAL ENERGY	PROJECT:

DESCRIPTION	LOCATION	REV 0	REV DESCRIPTION		APPROVED	DATE

LEGEND: P= Perform, W= Witness Activity, R=Review Doc, H=Hold Point, M=Monitor

ITP #. 1

ITEM No	WORK OPERATION DESCRIPTION	PROCEDURES & DOCUMENTS	ACCEPTANCE CRITERIA	Trademan		Supervisor		Project Engineer		Consultant	
				Key	Sign / Date	Key	Sign / Date	Key	Sign / Date	Key	Sign / Date
1											
2											
3											
4											
5											
6											
7											
8											

	Contractor	QAQC Inspection	Project Engineer	Client/ Consultant
DATE				
PRINT NAME				
SIGN				

TRACEABILITY RECORD FORM

PROJECT NAME:				
CONTRACTOR NAME:				
DATE		**DRAWING No:**		**SPOOL:**

PIPE NAME	UNIQUE #	DESCRIPTION OF ITEM	HEAT AND OR TRACEABILITY NUMBER	WELDER ID	WELDING PROCEDURE #	INSPECTOR	
						CONTRACTOR	VITAL INSPECTOR

	Contractor	QAQC Inspection	Project Engineer	Client/ Consultant
DATE				
PRINT NAME				
SIGN				
COMMENTS				

Appendix Q

Project Reporting Forms (Daily & Monthly)

GENERAL DAILY PROGRESS REPORT / DIARY

PROJECT INFORMATION

Project Name
Location
Contractor

Project ID
Date
Day of Week: Monday

Weather

Clear	Fair	Cloudy	Rain	Shower	Snow
☐	☐	☐	☐	☐	☐
TEMP	10-15 ☐	15-20 ☐	20-25 ☐	25-30 ☐	Over 30 ☐
WIND		Still ☐	Light ☐	Strong ☐	Gale ☐
HUMIDITY		Dry ☐	Low ☐	Medium ☐	High ☐

Vital/Contractor / Subcontractors	Hours

Number of Resources (Personal & Major Equipment)

Personnel	TOTAL PERSONNEL
	-
	-
	-
	-
	-

Major Plant and Equipment	TOTAL PLANT
	-
	-
	-
	-
	-

Location / Area	Activity / Description of Work	Quantity	% Prog	Comment
			0 %	
			%	
			%	
			%	
			%	
			%	
			%	
			%	
			%	
			%	

Hinderance / Effect to Normal Progress (weather, accidents, breakdowns, delays, etc)

Official Visitors

Name Surname	Representing	Time

General Comments

Signature
Site Supervisor

Signature
Project Manager

	PROJECT CONSTRUCTION SITE REPORT		
PROJECT NAME:		**REPORTING PERIOD**	Select date.
SUB-PROJECT WORK:			Select date.

PROJECT TEAM	
PROGRAM MANAGER	
PROJECT MANAGER	
SITE CONSTRUCTION MANAGER	
ON SITE SUPERVISOR	
ON SITE SAFETY OFFICER	
QAQC OFFICER	

OFFICIAL VISITORS			
NAME	REPRESENTING	DATE	PURPOSE
		Select date.	
		Select date.	
		Select date.	
		Select date.	

1. HEALTH, SAFETY & ENVIRONMENT

INCIDENT REPORTING	# OF NEAR MISSES RECORDED	# OF INCIDENTS RECORDED	# OF ACCIDENTS/ SPILLS RECORDED
WORKS READY STATUS	ALL ACTIONS ON TARGET	# OF MINOR ELEMENTS BEHIND	# OF MAJOR ITEMS BEHIND
RESOURCES	ALL RESOURCES AVAILABLE	SOME ROLE ISSUES EVIDENT	DELAYS FROM RESOURCING ISSUES
WEATHER	# OF RAIN DAYS THIS WEEK	# OF TOTAL HRS DELAYED	% OF WORK LOSS

2. CONSTRUTION ACTIVITIES

2.1. TASK FOR THIS WEEK:

2.2. TASK SCHEDULE TO START AND DID NOT START

2.3. TASK FINISHED THIS WEEK

2.4. WORK/ TASK BEHIND SCHEDULE

2.5. REASON FOR TASK NOT FINISHING

3. CHANGE REQUEST & APPROVALS

3.1. CHANGE REQUEST AND COMMUNICATION

CHANGE REQUEST OR RFI TITLE	DOC. #	DATE SUBMITTED	APPROVAL DATE	PRIORITY

3.2. DESIGN INFORMATION OR COORDINATION

CRITICAL INFORMATION REQUIRED			
DATE SUBMITTED	DESCRIPTION	DUE DATE	# OF DAYS

4. PROCUREMENT & SUBCONTRACTOR

4.1. MATERIALS ON ORDER

4.2. MATERIALS FORECAST

4.3. MATERIALS RECEIVED ON SITE

4.4. SUBCONTRACTORS

5. QUALITY ASSURANCE AND CONTROL

5.1. QUALITY INSPECTION ISSUES

5.2. CORRECTIVE ACTION PLAN

6. LOGISTICS

7. SITE PHOTOS

Appendix S

Project QC Forms for Tanks

WHO?	Maintenance Coordination/ Operations
WHEN?	During Re-commissioning of A/G Tanks
WHY?	To ensure Safe and Effective re-commissioning of tanks

Tank #	
Location	
Date	
Person Involved in Completing the checklist	**Engineering/ Maintenance**:
	Terminal Operations:

SECTION 1: TANK MAINTENANCE COMPLETION

No.	Description of Check	Comp (√) (x) (na)	Sign	Comment
1.	Inspection and Test Plan (ITP) – all signatures present			
2.	Tank Internal Clean and free of Debris/ Water			
3.	Details of dimensions of tank internal nozzles and pipe-work recorded.			
4.	Drawing/Sketch showing locations of internal and external repairs or modifications.			
5.	Photographs of tank internals			
6.	Punch List of Outstanding items prepared – all items have an agreed action plan			
7.	Fire systems tested and report available – if applicable			
8.	PV Vent Operational (if Applicable)			
9.	Thermal relief valves tested and installed			
10.	Sample points include any internal lines fully complete			
11.	De-watering system operational			
12.	Varec/ Tank gauge operational			
13.	High Level alarm checked for correct height setting (If Applicable)			
14.	Temperature Indicator Installed			
15.	Tank strapping completed and operational summary data available. PCM/HCP Coordinator advised. Entries updated with new calibration values			
16.	Strapping data analysed for variations between previous product and current data. Any changes should be subject to MOC and necessary communication. Depending on the discrepancy this may not prevent the tank being returned to service (must be initialled but may not necessary be completed)			

17.	Tank Safe height verified. Check tank for any modifications which may alter safe fill height.			
18.	All signage on the tank complete, updated & correct. Include 10 yearly inspection date, IFR installation date and internal coating date.			
19.	Earth straps, (roof, floating suction) are present and in good condition. Is tank earth currently tested?			
20.	Internal Floating Roof access hatches closed –if applicable.			
21.	IFR roof seals installed and checked – if applicable.			
22.	IFR legs in correct position, pins installed & secured.			
23.	Floating suction checked and ready for operation- if applicable.			
24.	Tank Painting is complete.			
25.	Tank Internal coating is complete.			
26.	Existing walkways, hand rails, paths and steps are satisfactory for use.			
27.	Dip hatch is clean and operational.			
28.	Foam piping to foam pourers or sub-surface injection is re-installed and in good condition.			
29.	All surplus nozzles are blanked.			
30.	Compound is free of surplus equipment, trash, oil, sludge, debris, grass etc.			
31.	Compound drain is closed and operational.			
32.	Tanks bund are intact and good condition.			
33.	Temporary wind sock removed.			
34.	Tank OOS Maintenance Checklist completed.			

All necessary maintenance work is complete and tank can be boxed up and de-isolated ready for filling.

Signed:_____ _____ _____

Terminal Operations Engineer/ Maintenance Date

Note: Notify supply coordinator for tank progress.

Section 2: TANK DE-ISOLATION

No.	Description of Check	Comp (√) (x) (na)	Sign	Comment
1.	Manways in place. Check all studs & nuts in place and tight			
2.	All valves in place. All studs & nuts in place and tight. Motor operated valves installed and connected-if applicable. All valves in closed position.			
3.	All automated vales have been stroked and checked for correct operations.			
4.	All automated valves operate in remote – if applicable.			
5.	All blinds/ spades removed. All pipe spools in-installed (including foam lines –if applicable) Note: This step to occur if product is immediately available. If product not available **DO NOT** progress beyond this step.			
6.	All valves de-isolated and tags/locks removed.			
7.	Blinds List and isolation register have been signed off.			
8.	Tank Hydrotest report available – if applicable.			
9.	Tank recommissioning procedure available. (i.e. filling rate, rundown rate vs gravitation, checks etc)			
10.	High level alarm re-energised and checked for correct operations- if applicable			
11.	**REFER PCM REQUIREMENTS 060.17 AND 060.18 PRIOR TO TANK RECEIVING PRODUCT**.			

The tank has been de-isolated (locks and tags removed, blinds/ spades removed) and the tank is ready to receive product.

Signed:_____ _____ _____

Terminal Operations Engineer/ Maintenance Date

Note: Notify supply coordinator for tank progress.

SECTION 3: TANK COMMISSIONING

No.	Description of Check	Comp (√) (x) (na)	Sign	Comment
1.	When either the roof has been floated or there is sufficient product in the tank, a manual check of the dip should be taken to check the Varec dip. If necessary, calibrate the Varec reading to actual dip reading – if applicable.			
2.	Varec dip matches the manual dip.			
3.	At approximately 1m level a sample should be drawn from the tank to ensure the products quality. Product on spec? (Clear and bright, density etc)			
4.	When roof is fully flanged and access is allowed, check the roof vent for proper operations.			

The tank level measurement has been checked and tank can be filled to normal heights.

Signed:_____ _____
Terminal Operations Date

Note: Notify supply coordinator for tank progress.

SECTION 4: TANK COMPLETION

No.	Description of Check	Comp (√) (x) (na)	Sign	Comment
1.	Strapping tables entered into level gauge system – if applicable			
2.	Final Tank painting complete.			
3.	All equipment/ debris/ construction materials removed from site.			
4.	Tank operations Data Sheet modified.			
5.	Foundations in good conditions.			
6.	MoC for any tank changes complete – if applicable			
7.	Summary of tank repairs including drawings of any repairs or modifications provided to Engineering.			
8.	Complete Project Closure Report			

	summarizing cost, site assessment and learning's.			
9.	Send copy of inspection and closeout reports to Tank Inspection Database administrator.			

All tank maintenance work has been completed.

Signed:_____ _____ _____

Terminal Operations Engineer/ Maintenance Date

WHO?	Operations & Maintenance
WHEN?	A Change of Service
WHY?	To review the reasons for the change and the required changes to enable to evaluate change of service is justified.

No.	Item	Comments	Budget Cost $
1.	What are the future product and usage requirements for this tank? What time frames are applicable to which product(s)?	Current • This Tank currently stores ADO Interim • ADO will be transferred into either tank 2 or 4. Future • JET A1 will be stored into the tank.	Refer to Project Schedule Cost
2.	What are the immediately apparent implications of these requirements for the tank in relation to design and capability (i.e. internal coating, fill & draw line diameter, instrumentation etc.)	The tank is design to store multi product and can be changed. This tank has just been approved with Fitness for Service Certificate from SGS after major repairs was done. **Internal** • New Floor and Strake 1 • Tank has been lined with epoxy coating on the floor and first strake including internal pipelines. **Internal Pipeline** • Fill Line – 6” • Outlet Line – 4” • Water Drain – 2” **External** • Tank has been abrasive blasted and epoxy coated. **Instrumentation** • Varec gauge to be replaced. • P&V and Emergency vents will be installed after the calculations has been confirmed by external engineers.	Refer to Project Schedule Cost
3.	What piping changes are required to connect this tank to relevant pumps for product change?	**Tank 1 Inlet** • New 6” line has been modified from the existing line for Tank 5 for Tank 1 receiving line.	Refer to Project Schedule Cost

		Tank 1 Outlet • New 4" line has been fabricated from Tank 1 to the aviation skid unit.	
4.	Review Regulatory licenses to ensure change is acceptable.	N/A	
5.	Is an IFR needed? We will store flammable in future or immediately. Can this be economically justified (we have a method for this calculation)	IFR is not required. The tank will be filled with ADO temporary while tank 5 will undergo OOSI and OOSR works. This tank will finally store ULP (flammable product), Internal Floating blanket could be installed to reduce vapour loss. Before the ULP is filled inside, the tank will be installed with P&V vents with Emergency vents. Vents sizing will be calculated by the external engineers. 1. Pressure & Vacuum Vent 2. Emergency Vent 3. Vent Size Calculation 4. Clearance & Installation	NA
6.	If existing IFR, should IFR seal material be replaced? This is for material compatibility with products proposed (particularly if Ethanol based)	N/A	
7.	If no IFR do vent capacity or type change? E.g. open vent or PV vent. Emergency venting required.	NA	
8.	Other		
		TOTAL	

Site:		**Tank No.**	
	Item	Reference Material	Tick when Complete
	PREPARATION		
	Forward NDT Inspector Bulk Tank Datasheet to allow estimating and planning	EF-P908	
	Notify NDT Inspector and Tank Inspector at least one week before decom. and confirm any special restrictions. Discuss OCTEL, Access/height limits, power requirements (usually 240V to within 30m of tank), scaffold if truss roof structure, etc.		
	Arrange for various companies and equipment to be on-call for potential use. Consider Waste Disposal, Sandblasting, Painting, Scaffolding, Welding (Minor Repairs only).	EW-P906	
	DECOMMISSIONING		
	Arrange with Maintenance Operator to empty tank including the following:-		
	• Ensure any floating roofs have legs in lowered position		
	• Pump out tank heel using stripping line		
	• Compile isolation list (must be documented)		
	• Complete all isolations, e.g. spading, blanks, electrical rack outs etc	Isolation List	
	• Isolated thermal relief lines are able to be directed elsewhere		
	• Open all manways and covers to ventilate atmosphere		
	Allow tank space to ventilate so it is 'gas free'. Install mechanical ventilation to manways if required (air powered equipment only). Ensure roof pillar drains are not blocked and roof pillars and floating suction, if fitted, are fully drained of product.		
	CLEANING		
	Verify if tank has ever contained leaded product, if so follow procedures in OCTEL "Leaded Gasoline Tank Cleaning and Disposal of Sludge"	OCTEL	
	Verify if any sludge is present & test it for level of contamination. (Refer to Waste Management Standard for endorsed laboratories)	ANZ-DIP-0004	
	Review Lead hazards and consider if Tank can be tested for "Lead Hazard Free"	MRAA-HEN-004	
	Tender sludge removal & cleaning. Obtain removal & disposal rates per m^3 if quantities are difficult to estimate.		
	Check if contractor has Safety Management Plan and has completed JSA's for their work		
	Progress sludge removal and cleaning of tank by Cleaning & Waste Disposal Contractors. Ensure waste is disposed of by an approved method.	ANZ-DIP-0004	
	Hydroblast (typically 10,000psi) floor and 1 m up the shell until free of all sludge, loose rust and paint	EW-P903	
	Inspect floor to see if grit blasting is required for effective floor scanning - consult with NDT company. Check floor welds are visible with no grim hiding defects.		
	Arrange grit blasting of floor and floor-to-shell weld if required		
	Ensure tank is thoroughly clean before NDT company is mobilised. Confirm access of minimum 1.6 metres for MFL floor scan.		

Tank Decommissioning, Gas Freeing & Cleaning now completed

Signed: _____ Date: _____

Cleaning Contractor (Name)

_____ Date: _____

Terminal Manager (Name)

Facility Name:	

REFERENCES: EM JIG2, Appendix AS

1. STORAGE TANK DETAILS

Item	Note						
Tank Number	1						
Product	2						
Date Constructed	3						
Date Installed	4						
Manufacturer	5						
Serial Number	6						
Standard	7						
Capacity (m3)	8						
Function	9						
Installation Type	10						
Tank Type	11						
Shell Type	12						
Roof Type	13						
Vent Type	14						
Floor Type	15						
Floor Slope	16						
Sump Type	17						
Flush Tank	18						
Sump Samplinq	19						
Lininq Extent	20						
Floatinq Suction	21						
rank Samplinq	22						
Hiqh Level Alarm	23						
HH Level Alarm	24						
Coolinq Water	25						
Foam System	26						
Leaded Service	27						

2. MAINTENANCE & INSPECTION SUMMARY

Item	Note						
Tank Number	1						
Last Inspected	2						
Inspection Due	3						
Last Cleaned	4						
Cleaning Due	5						
Mechanical Insp.	6						
Mechanical Due	7						
Last Integrity	8						
Integrity Due	9						
Last Calibration	10						

3. OTHER RELEVANT INFORMATION

Tank Number	Note	
	1	
	1	
	1	
	1	
	1	

1. NOTES ON COMPLETING STORAGE TANK DETAILS

General: Reasonable efforts should be made to collect the required data. If information is unknown then this should be written in the section, if the information is not applicable then NA should be written in the section.

1. Tank Number should be unique, tank numbers should not be re-issued to avoid confusion over historical tank records.
2. The inventory of tanks should not only include main storage tanks but also tanks used for own use fuel storage. Eg. Diesel storage tank for supplying fuelling equipment.
3. The date tank was constructed according to tank data plate.
4. The date the tank was installed at this location.
5. The manufacturer according to the tank data plate.
6. The serial number according to the tank data plate.
7. The standard the tank is constructed to according to the data plate. Eg. API 650.
8. The total useable capacity according to the data plate.
9. Function – Operating Tank, Product Recovery Tank, Defuel Tank etc.
10. Above Ground, Semi-Buried, Underground.
11. Horizontal or Vertical.
12. Single Skin or Double Walled.
13. Fixed, Internal Floating Roof (IFR), Floating Roof.
14. Free Vent, Pressure / Vacuum (PV) Vent.
15. Cone Down, Cone Up, Flat etc.
16. Slope regardless of floor type expressed as a ratio. Eg. 1:20.
17. Centre sump, multiple sump (identify number), sump at lowest point.
18. Identify capacity and if it serves several tanks.
19. Identify Type, in-line, enclosed etc.
20. Identify extent of lining, full, floor and first strake etc.
21. Yes or No, identify number of arm sections, single arm, double arm, triple arm.
22. Identify tank side sampling points. Eg. Upper, Middle, Lower.
23. Identify High Level Alarm system. Eg. Alarm on Tank Gauging etc.
24. Identify High High Level alarm system. Eg. Float Switch, Optical Probe etc.
25. Identify if cooling water is available and system type. Eg. Fixed or Monitor.
26. Identify if foam system is installed and type. Eg. Surface, Sub-Surface.
27. Identify if the tank is in leaded product services or if it has ever been in leaded product service.

2. NOTES ON COMPLETING MAINTENANCE & INSPECTION SUMMARY

General: Reasonable efforts should be made to collect the required data. If information is unknown then this should be written in the section, if the information is not applicable then NA should be written in the section.

1. Tank Numbers should be arranged in the same order as on previous list.
2. Identify date when tank was last inspected for cleanliness.
3. Identify date when tank is next due for inspection.
4. Identify date when tank was last cleaned.
5. Identify date when tank is next due for cleaning (even if this an estimation only).
6. Identify when tank was last had a major mechanical inspection. Eg. scanning of floors etc.
7. Identify when tank is next due for a major mechanical inspection.
8. Identify last tank integrity test was carried out if applicable. Eg. pressure test on underground tank.
9. Identify when next tank integrity test is due if applicable.
10. Identify date when tank was last calibrated. If last tank calibration > 10 years then, perform a calibration at first available maintenance opportunity.

3. NOTES ON COMPLETING OTHER RELEVANT INFORMATION

General: Reasonable efforts should be made to collect the required data. If information is unknown then this should be written in the section, if the information is not applicable then NA should be written in the section.

1. Information which is relevant to the tanks history and condition should be added to this section where it does not match with the categories in the previous two sections.

Facility Name			
Tank Number		Year	
Permit Number		Technician's Name	

1. FIXED TANK INSPECTION & MAINTENANCE

Smaller airports to record the Monthly checks listed below on AGD-F-Q062 and the Quarterly checks on AGD-F-Q064

Item	Note	Frequency	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Floating Suction	1	1m												
Jiggle Wire	2	1m												
Indicator Bonding	3	1m												
Tank integrity	4	1m												
General Condition	5	3m												
Paint Condition	6	3m												
Tank Number	7	3m												
Tank Capacity	8	3m												
Grade ID	9	3m												
Status Signs	10	3m												
Regulation Signs	11	3m												
Lead Warning	12	3m												
Vent Condition	13	3m												
Walkways	14	3m												
Stairs	15	3m												
Anti-Skid	16	3m												
Manhole covers, Gauge hatches and other fittings	17	3m												
Dewatering Equip	18	3m												
Flush Tank	19	3m												
Return Pump	20	3m												
Sampling Points	21	3m												
Shell Valves	22	3m												
Tank Gauging/ATG	23	3m												
Temper. Probe/ATT	24	3m												
Foam System	25	3m												
Cooling System	26	3m												
Collection Membrane	27	3m												
Inspection in date	28	3m												
Cleaning in date	29	3m												
Major Mechanical Inspection in date	30	3m												
Leak Detection	31	1y												
PV Vent Function	32	1y												
Foundations	33	1y												
Flame Arrestor	34	1y												
Dip Tape/Dip Stick	35	1y												

2. FIXED TANK COMPOUND INSPECTION & MAINTENANCE

Smaller airports to record the Quarterly checks listed below on AGD-F-Q064

Item	Note	Frequency	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Bund Integrity	*1*	3m												
Access to Bund	*2*	3m												
Drainage	*3*	3m												
Product Recovery Tank Inspection	*4*	3m												

Summary of specific actions arising from Routine Inspection & Maintenance

3. LEVEL ALARM TESTING

Smaller airports to record the Monthly checks on AGD-F-Q062

Item	Note	Frequency	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
High Level Alarm														
Function Test	1	1m												
Dynamic Test		1y												
High High Level Alarm														
Function Test	2	1m												
Dynamic Test		1y												
Alarm activation level		1y												
Level plus receipt volume "A"		1y												
Tank Maximum Safe Fill		1y												
Low Level Alarm														
Alarm set point:		1y												
Level alarmed at:		1y												
Shutdown in Response to Alarm														
Level alarm activated at:	3	1y												
Tank Level after complete shutdown:		1y												
Volume received between alarm activation and shutdown (A):		1y												

Facility Name			
Tank Number		Year	
Permit Number		Technician's Name	

1. FIXED TANK INSPECTION & MAINTENANCE

Smaller airports to record the Monthly checks listed below on AGD-F-Q062 and the Quarterly checks on AGD-F-Q064

Item	Note	Frequency	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Floating Suction	1	1m												
Jiggle Wire	2	1m												
Indicator Bonding	3	1m												
Tank integrity	4	1m												
General Condition	5	3m												
Paint Condition	6	3m												
Tank Number	7	3m												
Tank Capacity	8	3m												
Grade ID	9	3m												
Status Signs	10	3m												
Regulation Signs	11	3m												
Lead Warning	12	3m												
Vent Condition	13	3m												
Walkways	14	3m												
Stairs	15	3m												
Anti-Skid	16	3m												
Manhole covers, Gauge hatches and other fittings	17	3m												
Dewatering Equip	18	3m												
Flush Tank	19	3m												
Return Pump	20	3m												
Sampling Points	21	3m												
Shell Valves	22	3m												
Tank Gauging/ATG	23	3m												
Temper. Probe/ATT	24	3m												
Foam System	25	3m												
Cooling System	26	3m												
Collection Membrane	27	3m												
Inspection in date	28	3m												
Cleaning in date	29	3m												
Major Mechanical Inspection in date	30	3m												
Leak Detection	31	1y												
PV Vent Function	32	1y												
Foundations	33	1y												
Flame Arrestor	34	1y												
Dip Tape/Dip Stick	35	1y												

2. FIXED TANK COMPOUND INSPECTION & MAINTENANCE

Smaller airports to record the Quarterly checks listed below on AGD-F-Q064

Item	Note	Frequency	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Bund Integrity	*1*	3m												
Access to Bund	*2*	3m												
Drainage	*3*	3m												
Product Recovery Tank Inspection	*4*	3m												

Summary of specific actions arising from Routine Inspection & Maintenance

3. LEVEL ALARM TESTING
Smaller airports to record the Monthly checks on AGD-F-Q062

Item	Note	Frequency	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
High Level Alarm														
Function Test	1	1m												
Dynamic Test		1y												
High High Level Alarm														
Function Test	2	1m												
Dynamic Test		1y												
Alarm activation level		1y												
Level plus receipt volume "A"		1y												
Tank Maximum Safe Fill		1y												
Low Level Alarm														
Alarm set point:		1y												
Level alarmed at:		1y												
Shutdown in Response to Alarm														
Level alarm activated at:	3	1y												
Tank Level after complete shutdown:		1y												
Volume received between alarm activation and shutdown (A):		1y												

CATHODIC PROTECTION SYSTEM CHECKS RECORDS

Frequency (1) :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Date: _____ Site: _____

Contractor: _____ Tank ID: _____

Cathodic Protection (CP) systems shall be monitored as per the AGD-P-Z822 procedure by an experienced operator or a certified contractor.

In addition, a system check shall also be carried out by an inspection specialist, who will issue an inspection report. As this is a due diligence requirement, test should be carried out by a certified contractor.

Monitoring		*Select the applicable check for the type of CP installed* ☐ **Impressed current voltage readings** ☐ **Sacrificial anode voltage readings**					**Signature**	**System Check**	**Signature**
		1 Test Station	*2 Test Station*	*3 Test Station*	*4 Test Station*	*5 Test Station*			
JAN								DATE	
FEB								COMMENTS/FINDINGS:	
MAR									
APR									
MAY									
JUN									
JUL								DATE	
AUG								COMMENTS/FINDINGS:	
SEP									
OCT									
NOV									
DEC									

Comments & Details of Significant Findings: _____

Based on the work undertaken, the CP system IS / IS NOT (circle) fit to be returned to aviation service.

Based on the work undertaken the estimated date for next Inspection: _____

Technician/ Contractor: _____ (Name) _____ (Signature) Date: _____

ExxonMobil Representative: _____ (Name) _____ (Signature) Date: _____

1. NOTES ON FIXED TANK INSPECTION & MAINTENANCE

REFERENCES: EM JIG 2, EM JIG 4

General: Where checks identify deficiencies or problems these should be noted at the bottom of the section with adequate detail. When the issue is resolved the original comment should be annotated accordingly.

1. The floating suction should move freely, a slight tug on the cable should allow a bobbing motion to be felt as the floats settle back to their original position. Care should be taken when checking not to break suction and introduce air into the system.
2. The jiggle wire must be positively bonded to the tank shell. It must be directly connected and shall not rely on continuity through hinges of hatches etc.
3. Where float operated level indicators are fitted they must be positively bonded to the tank shell. Normally this is achieved by using a permanently attached bonding wire that allows the indicator to full travel.
4. A generally inspection of the tank should be carried out to ensure that it is free from leaks. Attention should be paid to manways and all connections and any blisters in paintwork.
5. Comment on general condition of the tank.
6. Comment on the condition of the paint, if repainting will be required in the foreseeable future identify the estimated repainting date in the summary section. Refer to AOM if deep corrosion defect is suspected
7. The tank number must be obvious and legible. Tank Number should be unique, tank numbers should not be re-issued to avoid confusion over historical tank records.
8. The tank capacity must be obvious and legible.
9. The tank grade identification must be obvious and legible.
10. The status signs for the tank, FILLING, SETTLING, IN SERVICE, must be legible and functional.
11. Signage required by local Regulations and Requirements must be in place and compliant.
12. If the tank has ever contained leaded product then the appropriate warning sign must be in place and legible.
13. The condition of free vents and mesh screens should be checked. Pressure/vacuum relief valves and flame arrestors, where fitted, shall be checked and serviced in accordance with manufacturer's recommendations.The vent must be in good condition with the mesh free from debris. In cold climates where there is the possibility of ice forming on the vent mesh and blocking it more frequent checks may be required.
14. Walkways should be in good condition, free from corrosion, damage or trip hazards and complaint with relevant standards.
15. Stairs should be in good condition, free from corrosion, damage or trip hazards and compliant with relevant standards.
16. Where anti-skid has been applied to roof walkways it must be in good condition and functional.
17. All tank top fittings must be in condition and should not allow water ingress into the tank under all conditions. Check manhole covers and gauge hatches to ensure seal and vapour tightness, respectively.
18. Dewatering equipment must be in good condition and valves in the flush system must operate effectively.
19. The Flush Tank must be clean, in good condition and fit for purpose. The tank lid should prevent the ingress of water under all conditions. An IATA endorsed microbial growth test (Microbmonitor 2, Merck ATP test kit) on a sump sample after flushing, may be carried out as an alternative to quarterly visual inspection.
20. The product return pump should be properly rated in all respects and must function safely and effectively, the pump must be fitted with a non-return valve on the discharge side to prevent draining of the main storage tank in the event of pump failure.
21. Sampling points should be clean and fitted with camlock caps. Valves should be self closing and free from leaks or faults.
22. Tank shell valves must be leak-tight, correctly colour coded and in good condition. Rising stem valve threads should be adequately lubricated with grease. The valve shaft must not be lubricated.
23. Verify that for Tank Gauging systems (ATGs) the max variation against reference tape is ±5mm. Errors must be rectified.
24. Verify that for Temperature probes (ATTs) the max variation against a reference thermometer is ±0.5oC. Errors must be rectified.
25. For surface foam systems the integrity of the frangible glass in the pourer should be checked. For sub-surface foam systems the tank side bleed valve should be opened to ensure that the bursting disc is tight and that they tank side check valve is tight.
26. The cooling water system should be operated to ensure that they function correctly and are free from blockage.
27. Where the tank is fitted with an under-floor membrane the collection point should be inspected to ensure that no product has been collected.
28. Is the last tank inspection still current?
29. Is the last tank cleaning still current?
30. Is the last major tank mechanical inspection still current?
31. Where there are integrity or leak detection systems in place these should also be checked.
32. Where the vent is of a pressure vacuum type its proper function must be checked and maintenance carried out as required.
33. The foundations of the tank should be checked to ensure that the tank is free from undermining or distortion due to settlement.
34. Flame arrestors, where fitted, shall be checked and serviced in accordance with the manufacturer's recommendations.
35. Dip tapes shall be inspected for kinking/deformation that would impact measurement accuracy and for security of the bottom weight. Quick sticks of volumetric measurement of horizontal tanks shall be checked for defects.

2. NOTES ON TANK COMPOUND INSPECTION & MAINTENANCE

General: Where checks identify deficiencies or problems these should be noted at the bottom of the section.

1. The condition of the bund should be checked. There should be no obvious integrity issues, it should be clean and free from debris. Walls should be at their original design height.
2. Walkways should be in good condition, free from corrosion, damage or trip hazards and complaint with relevant standards.
3. Bund drainage should be effective and should not be blocked with debris. Bund drain valves should be closed and fitted with signage identifying that they may only be opened under continuous supervision.
4. Product Recovery Tanks shall be inspected, without entry, quarterly for cleanliness and condition. An IATA endorsed microbial growth test (see 2.3.4 (i)) on a sump sample after flushing, may be carried out as an alternative to quarterly visual inspection. Cleaning and repairs to internal lining shall be carried out where there is cause. (See EM JIG 2 section 6.2.5, EM JIG 4 section 6.2.5)

3. NOTES ON LEVEL ALARM TESTING

General: Where checks identify deficiencies or problems these should be noted at the bottom of the section.

1. The High Level Alarm should be function- tested by either manually tripping it or utilizing its test function. Care should be taken to ensure that it is returned to a ready state following testing.
2. The High High Level Alarm should be function- tested by either manually tripping it or utilizing its test function. Care should be taken to ensure that it is returned to a ready state following testing.
3. Shutdown (Dynamic) tested at mid-range of tank level to ensure that test will not result in overfill should the test fail.

Facility Name			
Tank Number		Year	
Permit Number		Technician's Name	

1. FIXED TANK INSPECTION & MAINTENANCE

Smaller airports to record the Monthly checks listed below on AGD-F-Q062 and the Quarterly checks on AGD-F-Q064

Item	Note	Frequency	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Floating Suction	1	1m												
Jiggle Wire	2	1m												
Indicator Bonding	3	1m												
Tank integrity	4	1m												
General Condition	5	3m												
Paint Condition	6	3m												
Tank Number	7	3m												
Tank Capacity	8	3m												
Grade ID	9	3m												
Status Signs	10	3m												
Regulation Signs	11	3m												
Lead Warning	12	3m												
Vent Condition	13	3m												
Walkways	14	3m												
Stairs	15	3m												
Anti-Skid	16	3m												
Manhole covers, Gauge hatches and other fittings	17	3m												
Dewatering Equip	18	3m												
Flush Tank	19	3m												
Return Pump	20	3m												
Sampling Points	21	3m												
Shell Valves	22	3m												
Tank Gauging/ATG	23	3m												
Temper. Probe/ATT	24	3m												
Foam System	25	3m												
Cooling System	26	3m												
Collection Membrane	27	3m												
Inspection in date	28	3m												
Cleaning in date	29	3m												
Major Mechanical Inspection in date	30	3m												
Leak Detection	31	1y												
PV Vent Function	32	1y												
Foundations	33	1y												
Flame Arrestor	34	1y												
Dip Tape/Dip Stick	35	1y												

2. FIXED TANK COMPOUND INSPECTION & MAINTENANCE

Smaller airports to record the Quarterly checks listed below on AGD-F-Q064

Item	Note	Frequency	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Bund Integrity	*1*	3m												
Access to Bund	*2*	3m												
Drainage	*3*	3m												
Product Recovery Tank Inspection	*4*	3m												

Summary of specific actions arising from Routine Inspection & Maintenance

3. LEVEL ALARM TESTING
Smaller airports to record the Monthly checks on AGD-F-Q062

Item	Note	Frequency	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
High Level Alarm														
Function Test	1	1m												
Dynamic Test		1y												
High High Level Alarm														
Function Test	2	1m												
Dynamic Test		1y												
Alarm activation level		1y												
Level plus receipt volume "A"		1y												
Tank Maximum Safe Fill		1y												
Low Level Alarm														
Alarm set point:		1y												
Level alarmed at:		1y												
Shutdown in Response to Alarm														
Level alarm activated at:	3	1y												
Tank Level after complete shutdown:		1y												
Volume received between alarm activation and shutdown (A):		1y												

CATHODIC PROTECTION SYSTEM CHECKS RECORDS

Frequency [1] :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Date: _____ Site: _____

Contractor: _____ Tank ID: _____

Cathodic Protection (CP) systems shall be monitored as per the AGD-P-Z822 procedure by an experienced operator or a certified contractor.

In addition, a system check shall also be carried out by an inspection specialist, who will issue an inspection report. As this is a due diligence requirement, test should be carried out by a certified contractor.

Monitoring		*Select the applicable check for the type of CP installed* ☐ **Impressed current voltage readings** ☐ **Sacrificial anode voltage readings**					Signature	System Check	Signature
		1 Test Station	*2 Test Station*	*3 Test Station*	*4 Test Station*	*5 Test Station*			
JAN								DATE	
FEB								COMMENTS/FINDINGS:	
MAR									
APR									
MAY									
JUN									
JUL								DATE	
AUG								COMMENTS/FINDINGS:	
SEP									
OCT									
NOV									
DEC									

Comments & Details of Significant Findings: _____

Based on the work undertaken, the CP system IS / IS NOT (circle) fit to be returned to aviation service.

Based on the work undertaken the estimated date for next Inspection: _____

Technician/ Contractor: _____ (Name) _____ (Signature) Date: _____

ExxonMobil Representative: _____ (Name) _____ (Signature) Date: _____

1. NOTES ON FIXED TANK INSPECTION & MAINTENANCE

REFERENCES: EM JIG 2, EM JIG 4

General: Where checks identify deficiencies or problems these should be noted at the bottom of the section with adequate detail. When the issue is resolved the original comment should be annotated accordingly.

1. The floating suction should move freely, a slight tug on the cable should allow a bobbing motion to be felt as the floats settle back to their original position. Care should be taken when checking not to break suction and introduce air into the system.
2. The jiggle wire must be positively bonded to the tank shell. It must be directly connected and shall not rely on continuity through hinges of hatches etc.
3. Where float operated level indicators are fitted they must be positively bonded to the tank shell. Normally this is achieved by using a permanently attached bonding wire that allows the indicator to full travel.
4. A generally inspection of the tank should be carried out to ensure that it is free from leaks. Attention should be paid to manways and all connections and any blisters in paintwork.
5. Comment on general condition of the tank.
6. Comment on the condition of the paint, if repainting will be required in the foreseeable future identify the estimated repainting date in the summary section. Refer to AOM if deep corrosion defect is suspected
7. The tank number must be obvious and legible. Tank Number should be unique, tank numbers should not be re-issued to avoid confusion over historical tank records.
8. The tank capacity must be obvious and legible.
9. The tank grade identification must be obvious and legible.
10. The status signs for the tank, FILLING, SETTLING, IN SERVICE, must be legible and functional.
11. Signage required by local Regulations and Requirements must be in place and compliant.
12. If the tank has ever contained leaded product then the appropriate warning sign must be in place and legible.
13. The condition of free vents and mesh screens should be checked. Pressure/vacuum relief valves and flame arrestors, where fitted, shall be checked and serviced in accordance with manufacturer's recommendations.The vent must be in good condition with the mesh free from debris. In cold climates where there is the possibility of ice forming on the vent mesh and blocking it more frequent checks may be required.
14. Walkways should be in good condition, free from corrosion, damage or trip hazards and complaint with relevant standards.
15. Stairs should be in good condition, free from corrosion, damage or trip hazards and compliant with relevant standards.
16. Where anti-skid has been applied to roof walkways it must be in good condition and functional.
17. All tank top fittings must be in condition and should not allow water ingress into the tank under all conditions. Check manhole covers and gauge hatches to ensure seal and vapour tightness, respectively.
18. Dewatering equipment must be in good condition and valves in the flush system must operate effectively.
19. The Flush Tank must be clean, in good condition and fit for purpose. The tank lid should prevent the ingress of water under all conditions. An IATA endorsed microbial growth test (Microbmonitor 2, Merck ATP test kit) on a sump sample after flushing, may be carried out as an alternative to quarterly visual inspection.
20. The product return pump should be properly rated in all respects and must function safely and effectively, the pump must be fitted with a non-return valve on the discharge side to prevent draining of the main storage tank in the event of pump failure.
21. Sampling points should be clean and fitted with camlock caps. Valves should be self closing and free from leaks or faults.
22. Tank shell valves must be leak-tight, correctly colour coded and in good condition. Rising stem valve threads should be adequately lubricated with grease. The valve shaft must not be lubricated.
23. Verify that for Tank Gauging systems (ATGs) the max variation against reference tape is ±5mm. Errors must be rectified.
24. Verify that for Temperature probes (ATTs) the max variation against a reference thermometer is ±0.5oC. Errors must be rectified.
25. For surface foam systems the integrity of the frangible glass in the pourer should be checked. For sub-surface foam systems the tank side bleed valve should be opened to ensure that the bursting disc is tight and that they tank side check valve is tight.
26. The cooling water system should be operated to ensure that they function correctly and are free from blockage.
27. Where the tank is fitted with an under-floor membrane the collection point should be inspected to ensure that no product has been collected.
28. Is the last tank inspection still current?
29. Is the last tank cleaning still current?
30. Is the last major tank mechanical inspection still current?
31. Where there are integrity or leak detection systems in place these should also be checked.
32. Where the vent is of a pressure vacuum type its proper function must be checked and maintenance carried out as required.
33. The foundations of the tank should be checked to ensure that the tank is free from undermining or distortion due to settlement.
34. Flame arrestors, where fitted, shall be checked and serviced in accordance with the manufacturer's recommendations.
35. Dip tapes shall be inspected for kinking/deformation that would impact measurement accuracy and for security of the bottom weight. Quick sticks of volumetric measurement of horizontal tanks shall be checked for defects.

2. NOTES ON TANK COMPOUND INSPECTION & MAINTENANCE

General: Where checks identify deficiencies or problems these should be noted at the bottom of the section.

1. The condition of the bund should be checked. There should be no obvious integrity issues, it should be clean and free from debris. Walls should be at their original design height.
2. Walkways should be in good condition, free from corrosion, damage or trip hazards and complaint with relevant standards.
3. Bund drainage should be effective and should not be blocked with debris. Bund drain valves should be closed and fitted with signage identifying that they may only be opened under continuous supervision.
4. Product Recovery Tanks shall be inspected, without entry, quarterly for cleanliness and condition. An IATA endorsed microbial growth test (see 2.3.4 (i)) on a sump sample after flushing, may be carried out as an alternative to quarterly visual inspection. Cleaning and repairs to internal lining shall be carried out where there is cause. (See EM JIG 2 section 6.2.5, EM JIG 4 section 6.2.5)

3. NOTES ON LEVEL ALARM TESTING

General: Where checks identify deficiencies or problems these should be noted at the bottom of the section.

1. The High Level Alarm should be function- tested by either manually tripping it or utilizing its test function. Care should be taken to ensure that it is returned to a ready state following testing.
2. The High High Level Alarm should be function- tested by either manually tripping it or utilizing its test function. Care should be taken to ensure that it is returned to a ready state following testing.
3. Shutdown (Dynamic) tested at mid-range of tank level to ensure that test will not result in overfill should the test fail.

CATHODIC PROTECTION SYSTEM CHECKS RECORDS

Frequency (1) :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Date: _____ Site: _____

Contractor: _____ Tank ID: _____

Cathodic Protection (CP) systems shall be monitored as per the AGD-P-Z822 procedure by an experienced operator or a certified contractor.

In addition, a system check shall also be carried out by an inspection specialist, who will issue an inspection report. As this is a due diligence requirement, test should be carried out by a certified contractor.

Monitoring		*Select the applicable check for the type of CP installed* ☐ **Impressed current voltage readings** ☐ **Sacrificial anode voltage readings**					Signature	System Check	Signature
		1 Test Station	*2 Test Station*	*3 Test Station*	*4 Test Station*	*5 Test Station*			
JAN								DATE	
FEB								COMMENTS/FINDINGS:	
MAR									
APR									
MAY									
JUN									
JUL								DATE	
AUG								COMMENTS/FINDINGS:	
SEP									
OCT									
NOV									
DEC									

Comments & Details of Significant Findings: _____

Based on the work undertaken, the CP system IS / IS NOT (circle) fit to be returned to aviation service.

Based on the work undertaken the estimated date for next Inspection: _____

Technician/ Contractor: _____ (Name) _____ (Signature) Date: _____

ExxonMobil Representative: _____ (Name) _____ (Signature) Date: _____

1. NOTES ON FIXED TANK INSPECTION & MAINTENANCE

REFERENCES: EM JIG 2, EM JIG 4

General: Where checks identify deficiencies or problems these should be noted at the bottom of the section with adequate detail. When the issue is resolved the original comment should be annotated accordingly.

1. The floating suction should move freely, a slight tug on the cable should allow a bobbing motion to be felt as the floats settle back to their original position. Care should be taken when checking not to break suction and introduce air into the system.
2. The jiggle wire must be positively bonded to the tank shell. It must be directly connected and shall not rely on continuity through hinges of hatches etc.
3. Where float operated level indicators are fitted they must be positively bonded to the tank shell. Normally this is achieved by using a permanently attached bonding wire that allows the indicator to full travel.
4. A generally inspection of the tank should be carried out to ensure that it is free from leaks. Attention should be paid to manways and all connections and any blisters in paintwork.
5. Comment on general condition of the tank.
6. Comment on the condition of the paint, if repainting will be required in the foreseeable future identify the estimated repainting date in the summary section. Refer to AOM if deep corrosion defect is suspected
7. The tank number must be obvious and legible. Tank Number should be unique, tank numbers should not be re-issued to avoid confusion over historical tank records.
8. The tank capacity must be obvious and legible.
9. The tank grade identification must be obvious and legible.
10. The status signs for the tank, FILLING, SETTLING, IN SERVICE, must be legible and functional.
11. Signage required by local Regulations and Requirements must be in place and compliant.
12. If the tank has ever contained leaded product then the appropriate warning sign must be in place and legible.
13. The condition of free vents and mesh screens should be checked. Pressure/vacuum relief valves and flame arrestors, where fitted, shall be checked and serviced in accordance with manufacturer's recommendations.The vent must be in good condition with the mesh free from debris. In cold climates where there is the possibility of ice forming on the vent mesh and blocking it more frequent checks may be required.
14. Walkways should be in good condition, free from corrosion, damage or trip hazards and complaint with relevant standards.
15. Stairs should be in good condition, free from corrosion, damage or trip hazards and compliant with relevant standards.
16. Where anti-skid has been applied to roof walkways it must be in good condition and functional.
17. All tank top fittings must be in condition and should not allow water ingress into the tank under all conditions. Check manhole covers and gauge hatches to ensure seal and vapour tightness, respectively.
18. Dewatering equipment must be in good condition and valves in the flush system must operate effectively.
19. The Flush Tank must be clean, in good condition and fit for purpose. The tank lid should prevent the ingress of water under all conditions. An IATA endorsed microbial growth test (Microbmonitor 2, Merck ATP test kit) on a sump sample after flushing, may be carried out as an alternative to quarterly visual inspection.
20. The product return pump should be properly rated in all respects and must function safely and effectively, the pump must be fitted with a non-return valve on the discharge side to prevent draining of the main storage tank in the event of pump failure.
21. Sampling points should be clean and fitted with camlock caps. Valves should be self closing and free from leaks or faults.
22. Tank shell valves must be leak-tight, correctly colour coded and in good condition. Rising stem valve threads should be adequately lubricated with grease. The valve shaft must not be lubricated.
23. Verify that for Tank Gauging systems (ATGs) the max variation against reference tape is ±5mm. Errors must be rectified.
24. Verify that for Temperature probes (ATTs) the max variation against a reference thermometer is ±0.5oC. Errors must be rectified.
25. For surface foam systems the integrity of the frangible glass in the pourer should be checked. For sub-surface foam systems the tank side bleed valve should be opened to ensure that the bursting disc is tight and that they tank side check valve is tight.
26. The cooling water system should be operated to ensure that they function correctly and are free from blockage.
27. Where the tank is fitted with an under-floor membrane the collection point should be inspected to ensure that no product has been collected.
28. Is the last tank inspection still current?
29. Is the last tank cleaning still current?
30. Is the last major tank mechanical inspection still current?
31. Where there are integrity or leak detection systems in place these should also be checked.
32. Where the vent is of a pressure vacuum type its proper function must be checked and maintenance carried out as required.
33. The foundations of the tank should be checked to ensure that the tank is free from undermining or distortion due to settlement.
34. Flame arrestors, where fitted, shall be checked and serviced in accordance with the manufacturer's recommendations.
35. Dip tapes shall be inspected for kinking/deformation that would impact measurement accuracy and for security of the bottom weight. Quick sticks of volumetric measurement of horizontal tanks shall be checked for defects.

2. NOTES ON TANK COMPOUND INSPECTION & MAINTENANCE

General: Where checks identify deficiencies or problems these should be noted at the bottom of the section.

1. The condition of the bund should be checked. There should be no obvious integrity issues, it should be clean and free from debris. Walls should be at their original design height.
2. Walkways should be in good condition, free from corrosion, damage or trip hazards and complaint with relevant standards.
3. Bund drainage should be effective and should not be blocked with debris. Bund drain valves should be closed and fitted with signage identifying that they may only be opened under continuous supervision.
4. Product Recovery Tanks shall be inspected, without entry, quarterly for cleanliness and condition. An IATA endorsed microbial growth test (see 2.3.4 (i)) on a sump sample after flushing, may be carried out as an alternative to quarterly visual inspection. Cleaning and repairs to internal lining shall be carried out where there is cause. (See EM JIG 2 section 6.2.5, EM JIG 4 section 6.2.5)

3. NOTES ON LEVEL ALARM TESTING

General: Where checks identify deficiencies or problems these should be noted at the bottom of the section.

1. The High Level Alarm should be function- tested by either manually tripping it or utilizing its test function. Care should be taken to ensure that it is returned to a ready state following testing.
2. The High High Level Alarm should be function- tested by either manually tripping it or utilizing its test function. Care should be taken to ensure that it is returned to a ready state following testing.
3. Shutdown (Dynamic) tested at mid-range of tank level to ensure that test will not result in overfill should the test fail.

Facility Name			
Tank Number		Year	
Permit Number		Technician's Name	

1. FIXED TANK INSPECTION & MAINTENANCE

Smaller airports to record the Monthly checks listed below on AGD-F-Q062 and the Quarterly checks on AGD-F-Q064

Item	Note	*Frequency*	*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*
Floating Suction	1	1m												
Jiggle Wire	2	1m												
Indicator Bonding	3	1m												
Tank integrity	4	1m												
General Condition	5	3m												
Paint Condition	6	3m												
Tank Number	7	3m												
Tank Capacity	8	3m												
Grade ID	9	3m												
Status Signs	10	3m												
Regulation Signs	11	3m												
Lead Warning	12	3m												
Vent Condition	13	3m												
Walkways	14	3m												
Stairs	15	3m												
Anti-Skid	16	3m												
Manhole covers, Gauge hatches and other fittings	17	3m												
Dewatering Equip	18	3m												
Flush Tank	19	3m												
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Sampling Points	21	3m												
Shell Valves	22	3m												
Tank Gauging/ATG	23	3m												
Temper. Probe/ATT	24	3m												
Foam System	25	3m												
Cooling System	26	3m												
Collection Membrane	27	3m												
Inspection in date	28	3m												
Cleaning in date	29	3m												
Major Mechanical Inspection in date	30	3m												
Leak Detection	31	1y												
PV Vent Function	32	1y												
Foundations	33	1y												
Flame Arrestor	34	1y												
Dip Tape/Dip Stick	35	1y												

2. FIXED TANK COMPOUND INSPECTION & MAINTENANCE

Smaller airports to record the Quarterly checks listed below on AGD-F-Q064

Item	Note	*Frequency*	*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*
Bund Integrity	*1*	3m												
Access to Bund	*2*	3m												
Drainage	*3*	3m												
Product Recovery Tank Inspection	*4*	3m												

Summary of specific actions arising from Routine Inspection & Maintenance

3. LEVEL ALARM TESTING

Smaller airports to record the Monthly checks on AGD-F-Q062

Item	Note	Frequency	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
High Level Alarm														
Function Test	1	1m												
Dynamic Test		1y												
High High Level Alarm														
Function Test	2	1m												
Dynamic Test		1y												
Alarm activation level		1y												
Level plus receipt volume "A"		1y												
Tank Maximum Safe Fill		1y												
Low Level Alarm														
Alarm set point:		1y												
Level alarmed at:		1y												
Shutdown in Response to Alarm														
Level alarm activated at:	3	1y												
Tank Level after complete shutdown:		1y												
Volume received between alarm activation and shutdown (A):		1y												

CATHODIC PROTECTION SYSTEM CHECKS RECORDS

Frequency [1] :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Date: _____ Site: _____

Contractor: _____ Tank ID: _____

Cathodic Protection (CP) systems shall be monitored as per the AGD-P-Z822 procedure by an experienced operator or a certified contractor.

In addition, a system check shall also be carried out by an inspection specialist, who will issue an inspection report. As this is a due diligence requirement, test should be carried out by a certified contractor.

Monitoring		*Select the applicable check for the type of CP installed* ☐ **Impressed current voltage readings** ☐ **Sacrificial anode voltage readings**					Signature	System Check	Signature
		1 Test Station	*2 Test Station*	*3 Test Station*	*4 Test Station*	*5 Test Station*			
JAN								DATE	
FEB								COMMENTS/FINDINGS:	
MAR									
APR									
MAY									
JUN									
JUL								DATE	
AUG								COMMENTS/FINDINGS:	
SEP									
OCT									
NOV									
DEC									

Comments & Details of Significant Findings:

Based on the work undertaken, the CP system IS / IS NOT (circle) fit to be returned to aviation service.

Based on the work undertaken the estimated date for next Inspection: _____

Technician/ Contractor: _____ (Name) _____ (Signature) Date: _____

ExxonMobil Representative: _____ (Name) _____ (Signature) Date: _____

1. NOTES ON FIXED TANK INSPECTION & MAINTENANCE

REFERENCES: EM JIG 2, EM JIG 4

General: Where checks identify deficiencies or problems these should be noted at the bottom of the section with adequate detail. When the issue is resolved the original comment should be annotated accordingly.

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26. The cooling water system should be operated to ensure that they function correctly and are free from blockage.
27. Where the tank is fitted with an under-floor membrane the collection point should be inspected to ensure that no product has been collected.
28. Is the last tank inspection still current?
29. Is the last tank cleaning still current?
30. Is the last major tank mechanical inspection still current?
31. Where there are integrity or leak detection systems in place these should also be checked.
32. Where the vent is of a pressure vacuum type its proper function must be checked and maintenance carried out as required.
33. The foundations of the tank should be checked to ensure that the tank is free from undermining or distortion due to settlement.
34. Flame arrestors, where fitted, shall be checked and serviced in accordance with the manufacturer's recommendations.
35. Dip tapes shall be inspected for kinking/deformation that would impact measurement accuracy and for security of the bottom weight. Quick sticks of volumetric measurement of horizontal tanks shall be checked for defects.

2. NOTES ON TANK COMPOUND INSPECTION & MAINTENANCE

General: Where checks identify deficiencies or problems these should be noted at the bottom of the section.

1. The condition of the bund should be checked. There should be no obvious integrity issues, it should be clean and free from debris. Walls should be at their original design height.
2. Walkways should be in good condition, free from corrosion, damage or trip hazards and complaint with relevant standards.
3. Bund drainage should be effective and should not be blocked with debris. Bund drain valves should be closed and fitted with signage identifying that they may only be opened under continuous supervision.
4. Product Recovery Tanks shall be inspected, without entry, quarterly for cleanliness and condition. An IATA endorsed microbial growth test (see 2.3.4 (i)) on a sump sample after flushing, may be carried out as an alternative to quarterly visual inspection. Cleaning and repairs to internal lining shall be carried out where there is cause. (See EM JIG 2 section 6.2.5, EM JIG 4 section 6.2.5)

3. NOTES ON LEVEL ALARM TESTING

General: Where checks identify deficiencies or problems these should be noted at the bottom of the section.

1. The High Level Alarm should be function- tested by either manually tripping it or utilizing its test function. Care should be taken to ensure that it is returned to a ready state following testing.
2. The High High Level Alarm should be function- tested by either manually tripping it or utilizing its test function. Care should be taken to ensure that it is returned to a ready state following testing.
3. Shutdown (Dynamic) tested at mid-range of tank level to ensure that test will not result in overfill should the test fail.

4. CLEANLINESS ASSESSMENT

Frequency [1] :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of EM JIG 2 and local regulation*

Summary of Tank Sump Drain Results for Period.
Summary of Downstream Filter Records for Period.
Summary of Particle Counter Results (Alternative 1)
Top Hatch Visual Inspection or Inspection Following Drain Down & Gas Free (Alternative 2)
Sketch should show the following information: Location of sump Location of major fittings Location of dewatering equipment Location of floating suction Location and extent of staining Location and extend of sediment Location of areas of inadequate slope Location of any permanent staining
PLAN (North towards top of page)

4. CLEANLINESS ASSESSMENT (continued)

ELEVATION

Microbiological Check Result.
Maximum Allowable Cleaning Interval
Is tank within allowable period for type and service? Identify the allowable maximum and the reference (More stringent of EM JIG 2 or Local Regulation).
Summary of Cleanliness Assessment
Based on the data compiled and reviewed the Tank DOES / DOES NOT (circle) require cleaning at this time.
Based on the data compiled and reviewed the estimated date for next cleaning is:
Name: _____ Signature: _____ Date: _____

5. CLEANING INSPECTION BY ENTRY

Frequency [1] :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of EM JIG 2 and local regulation*

Assigned Supervisor:		*Permit Issuer:*	
Cleaning Contractor:		*Waste Contractor:*	

Description of Sludge / Sediment Removed.
Describe nature and quantity, sketch distribution in Cleaning Assessment if not already done.

Description of Water / Staining Removed.
Describe nature and quantity, sketch distribution in Cleaning Assessment if not already done.

Visual Inspection, Condition of Lining [2]
Identify failed areas in Cleaning Assessment sketch, detail repairs, estimate relining date.

Dewatering Effectiveness
Identify effectiveness of dewatering arrangements and any repairs / modifications undertaken.

Photographic Record
If possible photographs of the extent and nature of debris should be taken. Following completion of repair work photographs of repairs should be taken as well as photographs of other key features of the tank such as sump(s), internal drain pipes and inlet and draw off arrangements. All photographs should be attached to this cleaning record and clearly labeled.

Inspection of Internal Equipment	
Floating Suction	
Jiggle wire attachment & bonding:	
Restraining cable attachment:	
Float integrity:	
Float attachment:	
Suction pipe condition:	
Suction rest condition / adequacy:	
Tightness of studs & fasteners:	
Swivel free movement:	
Sample point connections:	
Gauging & Alarms	
Guide cables correctly tensioned:	
Floats free to move:	
Dewatering Connections	
Pipes not in contact with sump:	

Additional Comments

Summary of Cleaning & Inspection
Based on the work undertaken tank IS / IS NOT (circle) fit to be returned to Aviation Service.
Based on the data compiled and reviewed the estimated date for next cleaning is:
Name: _____ Signature: _____ Date: _____

6. MECHANICAL INSPECTION AND REPAIR

Frequency [1] :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Assigned Supervisor:		*Permit Issuer:*	
NDT Contractor:		*Mechanical Contractor:*	
Coating Consultant:		*Painting Contractor:*	
Calibration Contractor:			

Summary of NDT Results.

The NDT report should be available, key findings should be summarized:

Summary of Mechanical Repairs.

Repair documentation should be available, key works undertaken should be summarized:

Summary of Coating Repairs

Coating repair documentation should be available, key works undertaken should be summarized:

Summary of Calibration

Calibration documentation should be available, results of calibration should be summarised:

Summary of Mechanical Inspection and Repair

Based on the work undertaken tank IS / IS NOT (circle) fit to be returned to aviation service.

Based on the work undertaken the estimated date for next Mechanical Inspection:

Name: _____ Signature: _____ Date: _____

7. PRESSURE TESTING

Frequency (1) :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Date: _____ Site: _____

Contractor: _____ Tank ID: _____

Underground Fiberglass Reinforced Plastic tanks shall be pressure tested, as required in AGD-S-M100. As this is a due diligence requirement, test should be carried out by an experienced pressure tester or a certified contractor.

Comments & Details of Significant Findings: _____

Based on the work undertaken tank IS / IS NOT (circle) fit to be returned to aviation service.

Based on the work undertaken the estimated date for next Pressure Test: _____

Technician/ Contractor: _____ (Name) _____ (Signature) Date: _____

ExxonMobil Representative: _____ (Name) _____ (Signature) Date: _____

NOTES ON COMPLETING TANK INSPECTION & MAINTENANCE REPORT

REFERENCES: AGD-S-M100, EM JIG 2

The aim of this document is to provide a framework for collating relevant information on the condition of the tanl as well as to record decisions taken based on that information.

In general all sections of the document should be worked through methodically, even if for example there is already an intention to clean the tank.

In this case completion of the Cleanliness Assessment section ahead of Tank Cleaning will allow a correlation to be established between indicators of condition and the actual condition of the tank found following entry.

Tank cleaning intervals are subject to the maximums allowed by EM JIG 2, Industry Practices and Regulatory Requirements.

(1) The external condition of the tank shall include a visual inspection of the tank's exterior surfaces. Evidence of leaks; corrosion; paint coatings, and appurtenances shall be repaired. Shell distortions; signs of settlement; and condition of the foundation insulation systems shall be documented for follow-up action by an authorized inspector.

Guidance for external coating condition assessment:
Simple coating breakdown: Inspect any visible rust spots or paint bubbling on coating. Carefully inspect to assess if the defect is shallow or deep. If deep corrosion defect is suspected refer to AOM who will advise on further inspection to be performed when tank is emptied. If shallow corrosion defect is suspected, wire brush area to clear away loose paint and corrosion material. If pit depth is < 25%, record location of defect, spot prime and recoat to EM painting spec. If pit depth is >25%, refer to AOM who will advise on additional actions.
(iii) Blind corrosion / corrosion under insulation: Identify areas where blind corrosion could occur. Then look for tell-tail signs of corrosion actually occurring. For areas of concern, documented with photographic record and inform AOM

(2) Inspect for evidence of excessive internal corrosion and condition of all welding joints. Identify and evaluate any tank bottom settlement, evidence of deformation or damage.

1. SUMMARY

Tank Number	
Location	
Date of last Mechanical Inspection	
Date of next Mechanical Inspection (scheduled)	
Date of last MBG test	
Date of next MBG test	
Date of this Clean	
Date of this Inspection	
Date of last Clean	
Date of last Inspection	
Date of next Clean (est.)	
Date of next Inspection	

Summary of specific activities / checks for next Clean / Inspection

2. TANK DATA

Date Constructed	
Capacity (m3 or usg)	
Vertical or Horizontal	
Above Ground or Semi Buried or Buried	
Cone Down or Cone Up or Other	
Fixed Roof or Floating Pan or Floating Roof	
Extent of Lining	
Date Last Lined	
Suction Type	
Leaded or Unleaded	
Grade before Clean	
Grade after Clean	

Summary of History of Mechanical Repairs and Lining Repairs / Recoating

3. EXTERNAL VISUAL INSPECTION(1)

Frequency (1) :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Item	Comment / Condition:
Tank Gauging	
Temperature Gauging	
Level Alarms	
Floating Suction	
Sample Points	
Dewatering facilities	
Vents	
Top Hatches and Fittings	
Inlet Valve Integrity/Condition	
Outlet Valve Integrity/Condition	
Other Fittings	
Leak Detection System	
Floor membrane collection point	
Stairs and Walkways	
External Coating Condition (1)	
Condition of Foundation	

Summary of Actions arising from Inspection:

1. SUMMARY

Tank Number	
Location	
Date of last Mechanical Inspection	
Date of next Mechanical Inspection (scheduled)	
Date of last MBG test	
Date of next MBG test	
Date of this Clean	
Date of this Inspection	
Date of last Clean	
Date of last Inspection	
Date of next Clean (est.)	
Date of next Inspection	

Summary of specific activities / checks for next Clean / Inspection

2. TANK DATA

Date Constructed	
Capacity (m3 or usg)	
Vertical or Horizontal	
Above Ground or Semi Buried or Buried	
Cone Down or Cone Up or Other	
Fixed Roof or Floating Pan or Floating Roof	
Extent of Lining	
Date Last Lined	
Suction Type	
Leaded or Unleaded	
Grade before Clean	
Grade after Clean	

Summary of History of Mechanical Repairs and Lining Repairs / Recoating

3. EXTERNAL VISUAL INSPECTION(1)

Frequency (1) :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Item	Comment / Condition:
Tank Gauging	
Temperature Gauging	
Level Alarms	
Floating Suction	
Sample Points	
Dewatering facilities	
Vents	
Top Hatches and Fittings	
Inlet Valve Integrity/Condition	
Outlet Valve Integrity/Condition	
Other Fittings	
Leak Detection System	
Floor membrane collection point	
Stairs and Walkways	
External Coating Condition (1)	
Condition of Foundation	

Summary of Actions arising from Inspection:

4. CLEANLINESS ASSESSMENT

Frequency [1] :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of EM JIG 2 and local regulation*

Summary of Tank Sump Drain Results for Period.
Summary of Downstream Filter Records for Period.
Summary of Particle Counter Results (Alternative 1)
Top Hatch Visual Inspection or Inspection Following Drain Down & Gas Free (Alternative 2)
Sketch should show the following information: Location of sump Location of major fittings Location of dewatering equipment Location of floating suction Location and extent of staining Location and extend of sediment Location of areas of inadequate slope Location of any permanent staining
PLAN (North towards top of page)

4. CLEANLINESS ASSESSMENT (continued)

ELEVATION

Microbiological Check Result.
Maximum Allowable Cleaning Interval
Is tank within allowable period for type and service? Identify the allowable maximum and the reference (More stringent of EM JIG 2 or Local Regulation).
Summary of Cleanliness Assessment
Based on the data compiled and reviewed the Tank DOES / DOES NOT (circle) require cleaning at this time.
Based on the data compiled and reviewed the estimated date for next cleaning is:
Name: _____ Signature: _____ Date: _____

5. CLEANING INSPECTION BY ENTRY

Frequency [1] :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of EM JIG 2 and local regulation*

Assigned Supervisor:		*Permit Issuer:*	
Cleaning Contractor:		*Waste Contractor:*	

Description of Sludge / Sediment Removed.

Describe nature and quantity, sketch distribution in Cleaning Assessment if not already done.

Description of Water / Staining Removed.

Describe nature and quantity, sketch distribution in Cleaning Assessment if not already done.

Visual Inspection, Condition of Lining [2]

Identify failed areas in Cleaning Assessment sketch, detail repairs, estimate relining date.

Dewatering Effectiveness

Identify effectiveness of dewatering arrangements and any repairs / modifications undertaken.

Photographic Record

If possible photographs of the extent and nature of debris should be taken. Following completion of repair work photographs of repairs should be taken as well as photographs of other key features of the tank such as sump(s), internal drain pipes and inlet and draw off arrangements. All photographs should be attached to this cleaning record and clearly labeled.

Inspection of Internal Equipment

Floating Suction	
Jiggle wire attachment & bonding:	
Restraining cable attachment:	
Float integrity:	
Float attachment:	
Suction pipe condition:	
Suction rest condition / adequacy:	
Tightness of studs & fasteners:	
Swivel free movement:	
Sample point connections:	
Gauging & Alarms	
Guide cables correctly tensioned:	
Floats free to move:	
Dewatering Connections	
Pipes not in contact with sump:	

Additional Comments

Summary of Cleaning & Inspection

Based on the work undertaken tank IS / IS NOT (circle) fit to be returned to Aviation Service.

Based on the data compiled and reviewed the estimated date for next cleaning is:

Name: _____ Signature: _____ Date: _____

6. MECHANICAL INSPECTION AND REPAIR

Frequency (1) :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Assigned Supervisor:		*Permit Issuer:*	
NDT Contractor:		*Mechanical Contractor:*	
Coating Consultant:		*Painting Contractor:*	
Calibration Contractor:			

Summary of NDT Results.

The NDT report should be available, key findings should be summarized:

Summary of Mechanical Repairs.

Repair documentation should be available, key works undertaken should be summarized:

Summary of Coating Repairs

Coating repair documentation should be available, key works undertaken should be summarized:

Summary of Calibration

Calibration documentation should be available, results of calibration should be summarised:

Summary of Mechanical Inspection and Repair

Based on the work undertaken tank IS / IS NOT (circle) fit to be returned to aviation service.

Based on the work undertaken the estimated date for next Mechanical Inspection:

Name: _____ Signature: _____ Date: _____

7. PRESSURE TESTING

Frequency [1] :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Date: _____ Site: _____

Contractor: _____ Tank ID: _____

Underground Fiberglass Reinforced Plastic tanks shall be pressure tested, as required in AGD-S-M100. As this is a due diligence requirement, test should be carried out by an experienced pressure tester or a certified contractor.

Comments & Details of Significant Findings: _____

Based on the work undertaken tank IS / IS NOT (circle) fit to be returned to aviation service.

Based on the work undertaken the estimated date for next Pressure Test: _____

Technician/ Contractor: _____ (Name) _____ (Signature) Date: _____

ExxonMobil Representative: _____ (Name) _____ (Signature) Date: _____

NOTES ON COMPLETING TANK INSPECTION & MAINTENANCE REPORT

REFERENCES: AGD-S-M100, EM JIG 2

The aim of this document is to provide a framework for collating relevant information on the condition of the tanl as well as to record decisions taken based on that information.

In general all sections of the document should be worked through methodically, even if for example there is already an intention to clean the tank.

In this case completion of the Cleanliness Assessment section ahead of Tank Cleaning will allow a correlation to be established between indicators of condition and the actual condition of the tank found following entry.

Tank cleaning intervals are subject to the maximums allowed by EM JIG 2, Industry Practices and Regulatory Requirements.

(1) The external condition of the tank shall include a visual inspection of the tank's exterior surfaces. Evidence of leaks; corrosion; paint coatings, and appurtenances shall be repaired. Shell distortions; signs of settlement; and condition of the foundation insulation systems shall be documented for follow-up action by an authorized inspector.

Guidance for external coating condition assessment:
Simple coating breakdown: Inspect any visible rust spots or paint bubbling on coating. Carefully inspect to assess if the defect is shallow or deep. If deep corrosion defect is suspected refer to AOM who will advise on further inspection to be performed when tank is emptied. If shallow corrosion defect is suspected, wire brush area to clear away loose paint and corrosion material. If pit depth is < 25%, record location of defect, spot prime and recoat to EM painting spec. If pit depth is >25%, refer to AOM who will advise on additional actions.
(iii) Blind corrosion / corrosion under insulation: Identify areas where blind corrosion could occur. Then look for tell-tail signs of corrosion actually occurring. For areas of concern, documented with photographic record and inform AOM

(2) Inspect for evidence of excessive internal corrosion and condition of all welding joints. Identify and evaluate any tank bottom settlement, evidence of deformation or damage.

1. SUMMARY

Tank Number	
Location	
Date of last Mechanical Inspection	
Date of next Mechanical Inspection (scheduled)	
Date of last MBG test	
Date of next MBG test	
Date of this Clean	
Date of this Inspection	
Date of last Clean	
Date of last Inspection	
Date of next Clean (est.)	
Date of next Inspection	

Summary of specific activities / checks for next Clean / Inspection

2. TANK DATA

Date Constructed	
Capacity (m3 or usg)	
Vertical or Horizontal	
Above Ground or Semi Buried or Buried	
Cone Down or Cone Up or Other	
Fixed Roof or Floating Pan or Floating Roof	
Extent of Lining	
Date Last Lined	
Suction Type	
Leaded or Unleaded	
Grade before Clean	
Grade after Clean	

Summary of History of Mechanical Repairs and Lining Repairs / Recoating

3. EXTERNAL VISUAL INSPECTION(1)

Frequency (1) :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Item	Comment / Condition:
Tank Gauging	
Temperature Gauging	
Level Alarms	
Floating Suction	
Sample Points	
Dewatering facilities	
Vents	
Top Hatches and Fittings	
Inlet Valve Integrity/Condition	
Outlet Valve Integrity/Condition	
Other Fittings	
Leak Detection System	
Floor membrane collection point	
Stairs and Walkways	
External Coating Condition (1)	
Condition of Foundation	

Summary of Actions arising from Inspection:

4. CLEANLINESS ASSESSMENT

Frequency (1) :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of EM JIG 2 and local regulation*

Summary of Tank Sump Drain Results for Period.
Summary of Downstream Filter Records for Period.
Summary of Particle Counter Results (Alternative 1)
Top Hatch Visual Inspection or Inspection Following Drain Down & Gas Free (Alternative 2)
Sketch should show the following information: Location of sump Location of major fittings Location of dewatering equipment Location of floating suction Location and extent of staining Location and extend of sediment Location of areas of inadequate slope Location of any permanent staining
PLAN (North towards top of page)

4. CLEANLINESS ASSESSMENT (continued)

ELEVATION

Microbiological Check Result.
Maximum Allowable Cleaning Interval
Is tank within allowable period for type and service? Identify the allowable maximum and the reference (More stringent of EM JIG 2 or Local Regulation).
Summary of Cleanliness Assessment
Based on the data compiled and reviewed the Tank DOES / DOES NOT (circle) require cleaning at this time.
Based on the data compiled and reviewed the estimated date for next cleaning is:
Name: _____ Signature: _____ Date: _____

5. CLEANING INSPECTION BY ENTRY

Frequency [1] :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of EM JIG 2 and local regulation*

Assigned Supervisor:		*Permit Issuer:*	
Cleaning Contractor:		*Waste Contractor:*	

Description of Sludge / Sediment Removed.
Describe nature and quantity, sketch distribution in Cleaning Assessment if not already done.

Description of Water / Staining Removed.
Describe nature and quantity, sketch distribution in Cleaning Assessment if not already done.

Visual Inspection, Condition of Lining [2]
Identify failed areas in Cleaning Assessment sketch, detail repairs, estimate relining date.

Dewatering Effectiveness
Identify effectiveness of dewatering arrangements and any repairs / modifications undertaken.

Photographic Record
If possible photographs of the extent and nature of debris should be taken. Following completion of repair work photographs of repairs should be taken as well as photographs of other key features of the tank such as sump(s), internal drain pipes and inlet and draw off arrangements. All photographs should be attached to this cleaning record and clearly labeled.

Inspection of Internal Equipment	
Floating Suction	
Jiggle wire attachment & bonding:	
Restraining cable attachment:	
Float integrity:	
Float attachment:	
Suction pipe condition:	
Suction rest condition / adequacy:	
Tightness of studs & fasteners:	
Swivel free movement:	
Sample point connections:	
Gauging & Alarms	
Guide cables correctly tensioned:	
Floats free to move:	
Dewatering Connections	
Pipes not in contact with sump:	

Additional Comments

Summary of Cleaning & Inspection
Based on the work undertaken tank IS / IS NOT (circle) fit to be returned to Aviation Service.
Based on the data compiled and reviewed the estimated date for next cleaning is:
Name: _____ Signature: _____ Date: _____

6. MECHANICAL INSPECTION AND REPAIR

Frequency [1] :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Assigned Supervisor:		*Permit Issuer:*	
NDT Contractor:		*Mechanical Contractor:*	
Coating Consultant:		*Painting Contractor:*	
Calibration Contractor:			

Summary of NDT Results.

The NDT report should be available, key findings should be summarized:

Summary of Mechanical Repairs.

Repair documentation should be available, key works undertaken should be summarized:

Summary of Coating Repairs

Coating repair documentation should be available, key works undertaken should be summarized:

Summary of Calibration

Calibration documentation should be available, results of calibration should be summarised:

Summary of Mechanical Inspection and Repair

Based on the work undertaken tank IS / IS NOT (circle) fit to be returned to aviation service.

Based on the work undertaken the estimated date for next Mechanical Inspection:

Name: _____ Signature: _____ Date: _____

7. PRESSURE TESTING

Frequency [1] :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Date: _____ Site: _____

Contractor: _____ Tank ID: _____

Underground Fiberglass Reinforced Plastic tanks shall be pressure tested, as required in AGD-S-M100. As this is a due diligence requirement, test should be carried out by an experienced pressure tester or a certified contractor.

Comments & Details of Significant Findings:

Based on the work undertaken tank IS / IS NOT (circle) fit to be returned to aviation service.

Based on the work undertaken the estimated date for next Pressure Test: _____

Technician/ Contractor: _____ (Name) _____ (Signature) Date: _____

ExxonMobil Representative: _____ (Name) _____ (Signature) Date: _____

NOTES ON COMPLETING TANK INSPECTION & MAINTENANCE REPORT

REFERENCES: AGD-S-M100, EM JIG 2

The aim of this document is to provide a framework for collating relevant information on the condition of the tan, as well as to record decisions taken based on that information.

In general all sections of the document should be worked through methodically, even if for example there is already an intention to clean the tank.

In this case completion of the Cleanliness Assessment section ahead of Tank Cleaning will allow a correlation to be established between indicators of condition and the actual condition of the tank found following entry.

Tank cleaning intervals are subject to the maximums allowed by EM JIG 2, Industry Practices and Regulatory Requirements.

(1) The external condition of the tank shall include a visual inspection of the tank's exterior surfaces. Evidence of leaks; corrosion; paint coatings, and appurtenances shall be repaired. Shell distortions; signs of settlement; and condition of the foundation insulation systems shall be documented for follow-up action by an authorized inspector.

Guidance for external coating condition assessment:
Simple coating breakdown: Inspect any visible rust spots or paint bubbling on coating. Carefully inspect to assess if the defect is shallow or deep. If deep corrosion defect is suspected refer to AOM who will advise on further inspection to be performed when tank is emptied. If shallow corrosion defect is suspected, wire brush area to clear away loose paint and corrosion material. If pit depth is < 25%, record location of defect, spot prime and recoat to EM painting spec. If pit depth is >25%, refer to AOM who will advise on additional actions.
(iii) Blind corrosion / corrosion under insulation: Identify areas where blind corrosion could occur. Then look for tell-tail signs of corrosion actually occurring. For areas of concern, documented with photographic record and inform AOM

(2) Inspect for evidence of excessive internal corrosion and condition of all welding joints. Identify and evaluate any tank bottom settlement, evidence of deformation or damage.

1. SUMMARY

Tank Number	
Location	
Date of last Mechanical Inspection	
Date of next Mechanical Inspection (scheduled)	
Date of last MBG test	
Date of next MBG test	
Date of this Clean	
Date of this Inspection	
Date of last Clean	
Date of last Inspection	
Date of next Clean (est.)	
Date of next Inspection	

Summary of specific activities / checks for next Clean / Inspection

2. TANK DATA

Date Constructed	
Capacity (m3 or usg)	
Vertical or Horizontal	
Above Ground or Semi Buried or Buried	
Cone Down or Cone Up or Other	
Fixed Roof or Floating Pan or Floating Roof	
Extent of Lining	
Date Last Lined	
Suction Type	
Leaded or Unleaded	
Grade before Clean	
Grade after Clean	

Summary of History of Mechanical Repairs and Lining Repairs / Recoating

3. EXTERNAL VISUAL INSPECTION(1)

Frequency (1) :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Item	Comment / Condition:
Tank Gauging	
Temperature Gauging	
Level Alarms	
Floating Suction	
Sample Points	
Dewatering facilities	
Vents	
Top Hatches and Fittings	
Inlet Valve Integrity/Condition	
Outlet Valve Integrity/Condition	
Other Fittings	
Leak Detection System	
Floor membrane collection point	
Stairs and Walkways	
External Coating Condition (1)	
Condition of Foundation	

Summary of Actions arising from Inspection:

4. CLEANLINESS ASSESSMENT

Frequency [1] :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of EM JIG 2 and local regulation*

Summary of Tank Sump Drain Results for Period.
Summary of Downstream Filter Records for Period.
Summary of Particle Counter Results (Alternative 1)
Top Hatch Visual Inspection or Inspection Following Drain Down & Gas Free (Alternative 2)
Sketch should show the following information: Location of sump Location of major fittings Location of dewatering equipment Location of floating suction Location and extent of staining Location and extend of sediment Location of areas of inadequate slope Location of any permanent staining
PLAN (North towards top of page)

4. CLEANLINESS ASSESSMENT (continued)

ELEVATION

Microbiological Check Result.
Maximum Allowable Cleaning Interval
Is tank within allowable period for type and service? Identify the allowable maximum and the reference (More stringent of EM JIG 2 or Local Regulation).
Summary of Cleanliness Assessment
Based on the data compiled and reviewed the Tank DOES / DOES NOT (circle) require cleaning at this time.
Based on the data compiled and reviewed the estimated date for next cleaning is:
Name: _____ Signature: _____ Date: _____

5. CLEANING INSPECTION BY ENTRY

Frequency [1] :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of EM JIG 2 and local regulation*

Assigned Supervisor:		*Permit Issuer:*	
Cleaning Contractor:		*Waste Contractor:*	

Description of Sludge / Sediment Removed.

Describe nature and quantity, sketch distribution in Cleaning Assessment if not already done.

Description of Water / Staining Removed.

Describe nature and quantity, sketch distribution in Cleaning Assessment if not already done.

Visual Inspection, Condition of Lining [2]

Identify failed areas in Cleaning Assessment sketch, detail repairs, estimate relining date.

Dewatering Effectiveness

Identify effectiveness of dewatering arrangements and any repairs / modifications undertaken.

Photographic Record

If possible photographs of the extent and nature of debris should be taken. Following completion of repair work photographs of repairs should be taken as well as photographs of other key features of the tank such as sump(s), internal drain pipes and inlet and draw off arrangements. All photographs should be attached to this cleaning record and clearly labeled.

Inspection of Internal Equipment

Floating Suction	
Jiggle wire attachment & bonding:	
Restraining cable attachment:	
Float integrity:	
Float attachment:	
Suction pipe condition:	
Suction rest condition / adequacy:	
Tightness of studs & fasteners:	
Swivel free movement:	
Sample point connections:	
Gauging & Alarms	
Guide cables correctly tensioned:	
Floats free to move:	
Dewatering Connections	
Pipes not in contact with sump:	

Additional Comments

Summary of Cleaning & Inspection

Based on the work undertaken tank IS / IS NOT (circle) fit to be returned to Aviation Service.

Based on the data compiled and reviewed the estimated date for next cleaning is:

Name: _____ Signature: _____ Date: _____

6. MECHANICAL INSPECTION AND REPAIR

Frequency [1] :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Assigned Supervisor:		*Permit Issuer:*	
NDT Contractor:		*Mechanical Contractor:*	
Coating Consultant:		*Painting Contractor:*	
Calibration Contractor:			

Summary of NDT Results.

The NDT report should be available, key findings should be summarized:

Summary of Mechanical Repairs.

Repair documentation should be available, key works undertaken should be summarized:

Summary of Coating Repairs

Coating repair documentation should be available, key works undertaken should be summarized:

Summary of Calibration

Calibration documentation should be available, results of calibration should be summarised:

Summary of Mechanical Inspection and Repair

Based on the work undertaken tank IS / IS NOT (circle) fit to be returned to aviation service.

Based on the work undertaken the estimated date for next Mechanical Inspection:

Name: _____ Signature: _____ Date: _____

7. PRESSURE TESTING

Frequency (1) :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Date: _____ Site: _____

Contractor: _____ Tank ID: _____

Underground Fiberglass Reinforced Plastic tanks shall be pressure tested, as required in AGD-S-M100. As this is a due diligence requirement, test should be carried out by an experienced pressure tester or a certified contractor.

Comments & Details of Significant Findings:

Based on the work undertaken tank IS / IS NOT (circle) fit to be returned to aviation service.

Based on the work undertaken the estimated date for next Pressure Test: _____

Technician/ Contractor: _____ (Name) _____ (Signature) Date: _____

ExxonMobil Representative: _____ (Name) _____ (Signature) Date: _____

NOTES ON COMPLETING TANK INSPECTION & MAINTENANCE REPORT

REFERENCES: AGD-S-M100, EM JIG 2

The aim of this document is to provide a framework for collating relevant information on the condition of the tank as well as to record decisions taken based on that information.

In general all sections of the document should be worked through methodically, even if for example there is already an intention to clean the tank.

In this case completion of the Cleanliness Assessment section ahead of Tank Cleaning will allow a correlation to be established between indicators of condition and the actual condition of the tank found following entry.

Tank cleaning intervals are subject to the maximums allowed by EM JIG 2, Industry Practices and Regulatory Requirements.

(1) The external condition of the tank shall include a visual inspection of the tank's exterior surfaces. Evidence of leaks; corrosion; paint coatings, and appurtenances shall be repaired. Shell distortions; signs of settlement; and condition of the foundation insulation systems shall be documented for follow-up action by an authorized inspector.

Guidance for external coating condition assessment:
Simple coating breakdown: Inspect any visible rust spots or paint bubbling on coating. Carefully inspect to assess if the defect is shallow or deep. If deep corrosion defect is suspected refer to AOM who will advise on further inspection to be performed when tank is emptied. If shallow corrosion defect is suspected, wire brush area to clear away loose paint and corrosion material. If pit depth is < 25%, record location of defect, spot prime and recoat to EM painting spec. If pit depth is >25%, refer to AOM who will advise on additional actions.
(iii) Blind corrosion / corrosion under insulation: Identify areas where blind corrosion could occur. Then look for tell-tail signs of corrosion actually occurring. For areas of concern, documented with photographic record and inform AOM

(2) Inspect for evidence of excessive internal corrosion and condition of all welding joints. Identify and evaluate any tank bottom settlement, evidence of deformation or damage.

1. SUMMARY

Tan□ □□m□er	
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□ate of ne□t Me□□ani□al □n□□e□tion (□□ed□led)	
□ate of la□t MBG te□t	
□ate of ne□t MBG te□t	
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□ate of ne□t □n□□e□tion	

Summary of specific activities / checks for next Clean / Inspection

2. TANK DATA

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□a□a□it□ □m3 or usg)	
□erti□al or □ori□ontal	
Ab ɔv ə □ro□nd or Semi □□ried or □□ried	
□one □o□n or □one Up or □t□er	
Fi□ed □oof or Floatin□ □an or Floatin□ □oof	
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S□□tion T□□e	
□eaded or □nleaded	
□rade □efore □lean	
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Summary of History of Mechanical Repairs and Lining Repairs / Recoating

3. EXTERNAL VISUAL INSPECTION(1)

Frequency (1) :	

□□□*Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

□tem	□omment □□ondition□
Tan□ □a□□in□	
Tem□erat□re □a□□in□	
□e□el □larm□	
Floatin□ S□□tion	
Sam□le □oint□	
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Floor mem□rane □olle□tion □oint	
Stair□and □ al□□a□□	
□□ternal □oatin□ □ondition	
□ondition of Fo□ndation	
Summary of Actions arising from Inspection:	

4. CLEANLINESS ASSESSMENT

Frequency (1) :	

(1) *Frequency is the more stringent between EMA guidance from latest issue of EM JIG 2 and local regulation*

S□mmar□of Tan□S□m□ □rain □e□□lt□for □eriod.
S□mmar□of □o□n□tream Filter □e□ord□for □eriod.
S□mmar□of □arti□le □o□nter □e□□lt□ (□lternati□e 1)
To□ Hatch □i□□al □n□□e□tion or □n□□e□tion Follo□in□ □rain □o□n &G as Free (□lternati□e 2)
S□et□□ □□o□ld □□o□ t□e follo□in□ information: □o□ation of sump □o□ation of ma□or fittin□□ □o□ation of de□aterin□ e□□i□ment □o□ation and e□tent of □tainin□ □o□ation and e□tend of □ediment □o□ation of area□ of inade□□ate □lo□e □o□ation of an□ □ermanent □tainin□
PLAN (□ort□ to□ard□to□ of □a□e)

4. CLEANLINESS ASSESSMENT (continued)

ELEVA TION

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Ma□im□m □llo□a□le □leanin□ □nter□al

Is tan□ □it□in allo□a□le □eriod for t□□e and □er□i□e? □dentif□ t□e allo□a□le ma□im□m and t□e referen□e □More □trin□ent of □M JIG 2 or □o□al □e□□lation) □

Summary of Cleanliness Assessment

□a□ed on t□e data □om□iled and re□ie□ed t□e Tan□ DOE S / DOE S NO T (ir□le) re□□ire □leanin□ at t□i□ time.

□a□ed on t□e data □om□iled and re□ie□ed t□e e□timated date for ne□t □leanin□ i□:

□ame: _____ Si□nat□re: _____ □ate: _____

5. CLEANING INSPECTION BY ENTRY

Frequency (1) **:**	

□□□*Frequency is the more stringent between EMA guidance from latest issue of EM JIG 2 and local regulation*

Assigned Supervisor:		*Permit Issuer:*	
Cleaning Contractor:		*Waste Contractor:*	

Description of Sludge / Sediment Removed.
Describe nature and quantity, sketch distribution in Cleaning Assessment if not already done.

Description of Water / Staining Removed.
Describe nature and quantity, sketch distribution in Cleaning Assessment if not already done.

Visual Inspection, Condition of Lining (2)
Identify failed areas in Cleaning Assessment sketch, detail repairs, estimate relining date.

Dewatering Effectiveness
Identify effectiveness of dewatering arrangements and any repairs / modifications undertaken.

Photographic Record
If possible photographs of the extent and nature of debris should be taken. Following completion of repair work photographs of repairs should be taken as well as photographs of other key features of the tank such as sump(s), internal drain pipes and inlet and draw off arrangements. All photographs should be attached to this cleaning record and clearly labeled.

Inspection of Internal Equipment	
Floating Suction	
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□e□trainin□ □a□le atta□□ment□	
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Float□free to mo□e□	
Dewatering Connections	
□i□e□not in □onta□t □it□ □□m□□	

Additional Comments

Summary of Cleaning & Inspection
Based on the work undertaken tank IS / IS NOT (circle) fit to be returned to Aviation Service.
Based on the data compiled and reviewed the estimated date for next cleaning is:

□ame□ _____ Si□nat□re□ _____ □ate□ _____

6. MECHANICAL INSPECTION AND REPAIR

Frequency (1) :	

□□□*Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation*

Assigned Supervisor:		*Permit Issuer:*	
NDT Contractor:		*Mechanical Contractor:*	
Coating Consultant:		*Painting Contractor:*	
Calibration Contractor:			
Summary of NDT Results.			
The NDT report should be available, key findings should be summarized:			
Summary of Mechanical Repairs.			
Repair documentation should be available, key works undertaken should be summarized:			
Summary of Coating Repairs			
Coating repair documentation should be available, key works undertaken should be summarized:			
Summary of Calibration			
Calibration documentation should be available, results of calibration should be summarised:			
Summary of Mechanical Inspection and Repair			
Based on the work undertaken tank IS / IS NOT (circle) fit to be returned to aviation service. *Based on the work undertaken the estimated date for next Mechanical Inspection:*			
□ame□ _____ Si□nat□re□ _____ □ate□ _____			

7. PRESSURE TESTING

Frequency (1) :	

(1) Frequency is the more stringent between EMA guidance from latest issue of AGD-S-M100 and local regulation

Date: ______________________ Site: ______________________

Contractor: ______________________ Tank ID: ______________________

Underground Fiberglass Reinforced Plastic tanks shall be pressure tested, as required in AGD-S-M100. As this is a due diligence requirement, test should be carried out by an experienced pressure tester or a certified contractor.

Comments / Details of Significant Findings:

Based on the work undertaken tank IS / IS NOT (circle) fit to be returned to aviation service.

Based on the work undertaken the estimated date for next Pressure Test: ______________

Technician / Contractor: ______________ ______________ Date: ______________
Name Signature

ExxonMobil Representative: ______________ ______________ Date: ______________
Name Signature

NOTES ON COMPLETING TANK INSPECTION & MAINTENANCE REPORT

REFERENCES: AGD-S-M100, EM JIG 2

T□e aim of t□i□ do□□ment i□ to □ro□ide a frame□or□ for □ollatin□ rele□ant information on t□e □ondition of t□e tan□ a□ □ell a□ to re□ord de□i□ion□ ta□en □a□ed on t□at information□

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iii□□lind □orro□ion □□orro□ion □nder in□□lation□□dentif□area□ □□ere □lind □orro□ion □o□ld □o□□□r□T□en loo□for tell□tail □i□n□of □orro□ion a□t□all□o□□□rrin□□For area□of □on□ern, do□□mented □it□ □□oto□ra□□i□re□ord and inform □□M~~
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iii□□lind □orro□ion □□orro□ion □nder in□□lation□□dentif□area□ □□ere □lind □orro□ion □o□ld □o□□□r□T□en loo□for tell□tail □i□n□of □orro□ion a□t□all□o□□□rrin□□For area□of □on□ern, do□□mented □it□ □□oto□ra□□i□re□ord and inform □□M
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The purpose of this form is to allow the Inspection & Maintenance plans for an individual line to be documented. Testing intervals mentioned in this document are the minimums derived from the AGD-S-M100 standard. More frequent intervals may be appropriate depending on Risk Assessment results.

INSPECTION & MAINTENANCE OF PIPES

1. Line Information

Pipe ID	
Installation Date	
Age of Pipe	
Product normally carried	
Outside Diameter	
Length	
Initial wall thickness	
External Coating*	
Cathodic Protection	
Dead Legs?	
Buried Flanges?*	

**Note:* *If line does not have external coating then it must re-routed above ground or exposed and coated. If the line has buried flanges then it must be re-routed above ground or modified to eliminate flanges.*

2. Annual Endorsement (Airport Manager)

Name	Signature	Date

A. VISUAL INSPECTION RECORDS

Date: _____ Site: _____

Contractor: _____ Pipe ID: _____

Survey the route of the underground pipeline, looking for issues and indications of leakage.
Visually inspect the line for signs of leakage during the pressure test, while the system is under pressure.
As this is a due diligence requirement, test should be carried out by an experienced operator or a certified contractor.

Check Items	Comments	Signature
	ABOVE GROUND PIPEWORK	
Check no visible leaks at flanges etc[1]		
Check all bolts, studs & nuts in place and tight[2]		
Check pipe supports are sound[3]		
Check for corrosion at pipe supports		
Check pipeline markers legible		
Check vent pipes are clear		
Check all valves operate fully		
Grease all gate valve stems		
Line Strainers have been checked		
Check all camlocks have dust caps		
Check all caps have washers		
Check for spot rusting on pipework		
General paint condition sound		
Touch-up painting carried out		
Estimated repainting date		
Valves colour coded as per AIP-CP5		
PRV isolation valves wired open		
Line pitting at the bottom[4]		
Check Items	UNDERGROUND LINES	
No evidence of leaks along route		
Soft / Wet spots on the ground		
Discoloration of the soil		
Change in the surface contour of the ground / softening of paving asphalt		
Condition of the pipe at the soil/air interface at the into-ground point		
Signs of leakage from above-grade welds, flanges, valves (pressure test)		
Pipeline markers in place		
Entry / Exit point in good condition		
Major Mechanical Inspection in date		

Comments & Details of Significant Findings: _____

Notes

1. Ensure that joints are vapour and liquid tight. Check double gate valves for leakage by inspecting the drain between the valves. Any product collected there after depressurising and draining the pipe indicates valve leakage.
2. Maintain all connections involving studs, bolts and nuts with a full set of bolts/nuts of proper diameter and length which protrude 2 for full threads from the nut.
3. Check that pipe supports are in sound condition. If they have settled or become dislodged, repair or replace them.
4. If a line is found to be pitting just on the bottom, which often happens, it has been the practice to rotate the line 90° at timely intervals. These conditions should be carefully watched and recorded.

Based on the work undertaken line IS / IS NOT (circle) fit to be returned to aviation service.
Based on the work undertaken the estimated date for next Visual Inspection:

Technician/Contractor: _____ (Name) _____ (Signature) Date: _____

ExxonMobil Representative: _____ (Name) _____ (Signature) Date: _____

B. PRESSURE TEST RECORDS (p.1/3)

Date: _____ Site: _____

Contractor: _____ Pipe ID: _____

Underground pipelines (within facility boundaries) shall be tested in accordance with AGD-P-Z824. As this is a due diligence requirement, test should be carried out by an experienced pressure tester or a certified contractor. Test shall be performed with pipe completely filled with liquid (hydrostatic test). Test using a gas (Pneumatic test) are not permitted

The condition of the pipe at the soil/air interface at the into-ground point shall be inspected at the same frequency as the pressure test. Visually inspect all above-grade welds, flanges, valves, etc. for signs of leakage while the system is under pressure. Record the findings in section A.

Preparation for testing:

Step	Description	Yes/No	Signature
1.	Vents available at all high points	Y/N	
2.	Work permit in place	Y/N	
3.	Visual inspection complete	Y/N	
4.	Line volume in test section _____ litres Quantity to pressurise _____ litres Pressurising medium _____		
5.	Isolation in place	Y/N	
6.	Hazard zone around aboveground sections inspected, controlled, and safe.	Y/N	
7.	Equipment in place:		
	Pressure Gauge (_____Pa increment, _____ Pa rating) (_____ Gauge #, _____ last tested)	Y/N	
	Hand pump and valve assembly (for limited spaces a blind flange with side tapping for pump assembly may be inserted in line)	Y/N	
	Air bleed equipment at high point	Y/N	
	Continuous recording pressure measurement device	Y/N	
	Test medium temperature sensor (refer GP for type) - both ends of test section, if practical.	Y/N	
	Continuous recording temperature measurement device (where appropriate - can be combined with pressure measurement device)	Y/N	
	Ambient temperature measurement device	Y/N	
	Buckets with static clips for product collection	Y/N	
	For short lengths of line, periodic recording of medium pressure and temperature may be acceptable with engineering advice.		
8.	Precautions in place to ensure line does not overpressure due to thermal effects during the test period	Y/N	

B. PRESSURE TEST RECORDS (p.2/3)

Test Process:

Note: MOP stands for the maximum operating pressure limit of a pipeline segment established through pressur testing, maximum historical operating pressure, or equipment operating pressure limit(s).

Care should be taken to ensure the test does not overpressure the system. Test pressure shall never exceed the maximum pressure to which the piping can be subjected within the strength limits of the piping material. Also, equipment that may be unable to withstand test pressure shall be isolated from the test either by blanking or removal from the system during the test procedure.

Leak Test					
	Pressure Change	Time	Line Pressure (kPa)	Medium temperature (deg C.)	Ambient temperature
0min.	(1)(2)(3)				
5min.	(1)				
10 min.	(1)				
20 min.					
30 min.					
45 min.					
1 hr.	(1)(3)				
1 hr. 30 min.					
2 hr.	(2)				
3 hr.					
4 hr.					
5 hr.					
6 hr.					
7 hr.					
8 hr.	(3)				

Note: Any pressure variations should be calibrated against temperature variations to show that line is stable.

(1) Pressure levels for every pipes except hydrant pipes:

- At the beginning: pressurize to MOP = _____.
- At t=5min.: increase pressure to 1.2xMOP= _____.
- At t=10min.: increase pressure to 1.5xMOP= _____ .
- At t=1hr.: end the test

(2) Pressure level for hydrant pipes with no leak detection system, monthly test (ensure that no fuellings are in progress):

- At the beginning, pressurize to Normal Operating Pressure =_____.
- At t=2hr.: end the test.

Pressure levels for hydrant pipes with no leak detection system, annual test:

- With no history, pressurize to MOP=_____ for 8hr.
- If test results confirming the absence of leaks can be established positively, pressurize to MOP=_____ for 1hr.
- If test results suggest the possibility of a leak, pressurize to 110%xMAOP= _____ for 8hr. or if MAOP is not known, pressurize to 125%xMOP= _____ for 8hr. (MAOP stands for Maximum Allowable Operating Pressure)

B. PRESSURE TEST RECORDS (p.3/3)

Comments & Details of Significant Findings:

Based on the work undertaken line IS / IS NOT (circle) fit to be returned to aviation service.

Based on the work undertaken the estimated date for next Pressure Test: _____

Technician/
Contractor: _____ (Name) _____ (Signature) Date: _____

ExxonMobil
Representative: _____ (Name) _____ (Signature) Date: _____

C. MECHANICAL INSPECTION AND REPAIR RECORDS

Date: _____ Site: _____

Contractor: _____ Pipe ID: _____

NDE Method:
- ☐ Excavation with Ultra Sonic thickness test
- ☐ Intelligent pigging
- ☐ Guided waive
- ☐ DCVG / ECDA
- ☐ Other: _____

check all that apply

Underground pipelines (within facility boundaries) shall be thickness tested in accordance with AGD-S-M100. As this is a due diligence requirement, test should be carried out by a certified contractor.

Thickness Specifications

	Specification	Value	Signature
1.	Initial pipe thickness, $t_{initial}$, mm or in		
2.	Minimum measured pipe thickness from current test , t_{actual}, mm or in		
3.	Minimum required pipe thickness, $t_{required}$, mm or in		
4.	Corrosion Rate Determined from Equation 2, loss in mm/year or in/year		
5.	Remaining Life for Pipe Determined from Equation 1, years		
	Referenced equations:		
	Remaining Life (y) = $\frac{t_{actual} - t_{required}}{\textbf{Corrosion rate}\ [inches\ or\ mm\ per\ year]}$	[1]	
	Corrosion rate (mm/y or in/y)= $\frac{t_{initial} - t_{actual}}{\textbf{time in years between}\ t_{initial}\ \textbf{and}\ t_{actual}}$	[2]	

The NDE report and/or repair documentation should be available, key findings to be summarised below.

Comments & Details of Significant Findings: _____

Summary of NDT Results.

Summary of Mechanical Repairs.

Summary of Coating Repairs

Based on the work undertaken line IS / IS NOT (circle) fit to be returned to aviation service.
Based on the work undertaken the estimated date for next Mechanical Inspection
Date of next Mechanical Inspection shall not exceed 10years from current activity

Technician/ Contractor: _____ (Name) _____ (Signature) Date: _____

ExxonMobil Representative: _____ (Name) _____ (Signature) Date: _____

D. CATHODIC PROTECTION SYSTEM CHECK RECORDS

Date: _____ Site: _____

Contractor: _____ Pipe ID: _____

Type of CP: ☐ **Impressed current** ☐ **Sacrificial anode**

Cathodic protection systems shall be monitored as per the AGD-P-Z822 procedure by an experienced operator or a certified contractor. In addition, a system check shall also be carried out by an inspection specialist, who will issue an inspection report. As this is a due diligence requirement, test should be carried out by a certified contractor.
Enter the information required or a notation of "Yes", "No" or "OK" shall be entered into the following table, ticks are not acceptable.

General		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Date													
Technicians Name													
		INSULATING FLANGES											
Condition of flanges													
Condition of cables and connections													
Condition of pipe coating													
Condition of ground bed cable													
		IMPRESSED CURRENT											
Impressed Current reading													
Condition of ventilating screens													
Oil level and cleanliness of oil immersed rectifier units													
Condition of electrical protective devices													
Test Station:		SACRIFICIAL ANODE											
1	Anode output, Ammeter readings (40 to 50 mA)												
	Pipe to soil potential read. (–0.85 V to –1.5 V)												
	Voltage shift test reading (–0.50 V to –0.65 V)												
2	Anode output, Ammeter readings (40 to 50 mA)												
	Pipe to soil potential read. (–0.85 V to –1.5 V)												
	Voltage shift test reading (–0.50 V to –0.65 V)												
3	Anode output, Ammeter readings (40 to 50 mA)												
	Pipe to soil potential read. (–0.85 V to –1.5 V)												
	Voltage shift test reading (–0.50 V to –0.65 V)												

Comments & Details of Significant Findings: _____

Inspection, Main findings: Date: _____

Based on the work undertaken the estimated date for next Inspection: ☐

Based on the work undertaken, the CP system IS / IS NOT (circle) fit to be returned to aviation service.

Technician/ Contractor: _____ (Name) _____ (Signature) Date: _____

ExxonMobil Representative: _____ (Name) _____ (Signature) Date: _____

E. LEAK DETECTION SYSTEM TESTING RECORDS

Date: _____ Site: _____

Contractor: _____ Pipe ID: _____

Device ID: _____

Note: A Leak Detection System is deemed to be a Critical Safety Device

The Leak Detection System shall be checked annually for proper operation, as per manufacturer's recommendations.
As this is a due diligence requirement, test should be carried out by an experienced operator or a certified contractor.

Comments & Details of Significant Findings:

Based on the work undertaken, the Leak Detection system IS / IS NOT (circle) fit to be returned to aviation service.

Based on the work undertaken the estimated date for next Inspection: _____

Technician/ Contractor: _____ (Name) _____ (Signature) Date: _____

ExxonMobil Representative: _____ (Name) _____ (Signature) Date: _____

PRELIMINARY INFORMATION	
Subject	The procedure for visual inspection of storage tanks.
Objective	Define the principal steps required to carry out visual inspections of storage tanks to ensure all issues are identified, enable maintenance planning and ensure all product quality and environmental requirements are met.
Key Issues	Visual inspection covers both internal and external areas of the storage tank. Tank entry is not required and internal inspection will be from tank top. Check lists to be used.
Prerequisite Skills	Personnel involved in this procedure should be familiar with maintenance and inspection of storage tanks.
Procedure Sections	**1. Equipment & Conditions :** - Testing Equipment - Safety Equipment and Conditions **2. Procedure:** I: Inspection of bund area II: Tank Exterior. III: Ladders, Stairways and Platforms. IV: Tank Top Checks V: Valves, pipework and sample cones VI: Visual Internal Inspection from Tank Top Hatch VII: Tank Cleanliness Assessments VIII: Fire Protection. **3. Post Completion of activity** I: Documentation II: Records

1. Equipment & Conditions	
Testing Equipment	As this procedure primarily covers visual and standard checks no specialist testing equipment is required.
Safety Equipment and Conditions	The task shall not be carried out under conditions which would make it unsafe. Refer to the JSA for more information on unsafe conditions.

2. PROCEDURE

Step	Procedure	Explanations
Section I: Inspect bunded area		
1	Check bund to ensure area is free of: ➢ Loose combustible material. ➢ Drums or barrels. ➢ Tall grass or weeds.	Can cause a fire hazard, any items identified must be removed without delay.
2	Ensure base of tank is free of dirt build up.	Dirt build up could trap moisture and cause corrosion at the bottom to shell joint..
3	Where the tank sits on earth, check that there is no erosion under the tank shoulder.	Voids can cause dangerous stress on floor and shell plates. Replace any displaced earth from underneath the edge of the tank, then spray and tamp it with asphalt product.
4	Check condition of bund walls to ensure they are: ➢ In good repair ➢ At design height. ➢ Impervious and have not been pierced by pipes or cables.	Bunds are designed to ensure retention of any spillage, placing pipes or cables through the bund wall will compromise the bund, lowering the design height will reduce the bunds capacity. Earth bunds can erode with wind and rain and need extra care when inspecting so repairs can be scheduled.
Section II: Tank Exterior		
1	Ensure tanks are properly painted and clearly identified with tank number, capacity, name of product contained, status placards. Etc.	➢ Storage tanks should have a unique identification number, the number is assigned to the tank from new and should not be changed. ➢ A system to indicate the Status of the tank shall be used. This can be achieved by either; placarding, Receipt / Settling / In Service or In use. Alternatively, an industry recognised plant control system, with software interlocks to ensure that the valves remain closed until correct status has been defined, can be used. ➢ If the tank has ever contained leaded product then the appropriate warning signs must be in place and legible.

2	Check condition of tank for external corrosion, especially in salt water or corrosive environments.	Signs of pitting may indicate a leak is is imminent. If old riveted tanks are used, check for leakage at the lap joints. Repair all leaks immediately.
3	Ensure tops of tanks are liquid and vapour tight, with the exception of designated openings.	Water and other contaminants must not be allowed to enter the tank as this could result in off spec product and micro biological growth within the tank. Increased levels of water in sump drains could be an indicator of roof leakage in vertical tanks or shell leakage in underground tanks.
4	Check tank leak detection / containment systems for signs of leaks, including under-tank membrane collection points.	Immediately investigate and put in place plan to rectify / monitor situation. Review tank oil loss records.
Section III: Ladders, Stairways and Platforms		
Tank ladders, stairs, walkways, platforms and handrails shall be examined in line with approved operating unit inspection and maintenance programmes for corroded, loose or broken parts, use form AGD-F-M002. Ensure all local regulations are observed.		
1	Check for corrosion and tightness, all anchor / fixing bolts and nuts on walkways, steps, ladders and platforms.	Visual inspection is normally sufficient to determine condition, where doubt exists a sideways tap on the nut with a hammer may reveal complete corrosion of the bolt below the plate. Loose / faulty nuts and bolts must be tightened or replaced without delay.
2	Check welded joints for signs of corrosion on: ➢ Supports and steps on tank access stairways/ladders. ➢ Handrails on steps across pipelines and bund access walkways. ➢ Platforms.	 Staining of tank paintwork will indicate that there is some degree of corrosion. Regular inspections will help identify early stages of corrosion so remedial action can be programmed.
3	Check condition of paintwork.	Chipped or cracked paint will allow water and corrosive elements access to the underlying metal surfaces. Note any areas in need of repair. Remove any grease, snow or ice.
4	Check for bent or damaged rungs or treads or treads worn smooth.	Damaged and worn components that constitute a safety hazard, should be repaired or replaced immediately.

Section IV: Tank top Checks		
1	For Tanks with ATG, Dip tank, record and compare measurement with ATG reading.	Physical dip required as comparison against ATG. Refer to HCP requirements. Where required have the ATG adjusted by a competent service technician.
2	Check tank reference height is marked near the gauge hatch.	Tank reference height is used to determine the degree of tank shell distortion.
3	For Tanks with ATT, take temperature, record and compare with ATT reading.	Take temperature readings at required points to enable check of accuracy of ATT. Refer to HCP requirements. Where required have the ATG adjusted by a competent service technician.
4	Check manholes and gauge hatches for security, tightness and any missing nuts and bolts.	When not being used, all hatches and access point must be tightly closed to ensure no water or contaminant ingress.
5	Check movement of floating suction and security of jiggle wire, where fitted.	The floating suction should move freely. A slight movement of the jiggle wire should allow a bobbing motion to be felt. Take care not to break the suction as this will introduce air into the system. Check jiggle wire to ensure it is positively bonded to the tank shell.
6	Check condition, security and design of tank top handrails.	Tank top handrails should also be fitted with intermediate rails and kick plates.
7	Check condition of Tank top anti-slip surfaces and walkways..	Tank top access routes to operational equipment should be provided with anti-slip surfaces or equivalent measures, e.g. walkways

Section V: Valves, Pipework and Flush Tanks		
1	Check all valves for: ➢ Signs of leaks at the stem gland, bonnet to body flange and connecting flanges. ➢ Security of nuts and bolts and no excessive corrosion. ➢ Valve can be opened and closed without excessive effort. ➢ Rising stem valves are lubricated. ➢ Means in place to lock the valve in the correct position for the current tank operation. ➢ Valves not of the rising stem type have a means of indicating the valve status, open or closed. ➢ All sample valves should be clean and fitted with camlock caps. ➢ Where required valves are colour coded.	 As many valves are connected directly to the tank shell and in constant contact with the product in the tank any leak at the valve or flange will continue until rectified or the tank level falls below the valve.
2	Check all pipework and flanges for: ➢ Signs of leaks at flange connections. ➢ Security of nuts and bolts and no excessive corrosion. ➢ Walkways are in place to cross pipes that cross regularly used routes. ➢ Condition of paint. ➢ Condition of pipe support / corrosion between support & pipe. ➢ Directional and grade markings.	Replace any corroded bolts and nuts with correct grade and type. Paint is designed to protect the surface of the pipe, where the paint surface is damaged it must be repaired without delay.
3	Check the flush tank to ensure it is fit for purpose and: ➢ In good condition. ➢ The tank lid prevents the ingress of water under all conditions. ➢ The inside of the tank is clean and dry. ➢ Sample valves should be self-closing and free of leaks and defects.	As the flush tank is used to check the quality of the product in the storage tank, it is critical that the tank is clean and free of any contaminants and water before use.
Section VI: Internal Visual Inspection From Tank Top Hatch.		
For fixed roof tanks without internal floating roof, a top hatch inspection when product is at a low level can reveal if there is significant build-up of contaminants etc. Review JSA and ensure all safety precautions are in place.		
1	With the top hatch open, use an intrinsically safe light or a mirror to reflect light into the tank and check the condition of the tank wall and epoxy coatings.	Note any areas where lining has blistered or is flaking.
2	Shine a light on the bottom of the tank and note any obvious signs of contamination.	Should significant signs of contamination be found, the tank will need to be programmed out of service for tank entry and cleaning. Follow the EMA Tank Cleaning Procedure.

Section VII: Tank Cleanliness Assessments		
The principle of Tank Cleanliness Assessments is to clean on the basis of condition rather than on fixed time periods as was the previous practice. This principle is subject to industry allowable maximums, local regulatory requirements and opportunities to clean tank in conjunction with other work. Refer to EM JIG 2 section 6.2 for Tank inspection and cleaning requirement Refer to AGD-P-Z812 for Fixed Storage Tank Entry and Cleaning Approval Procedure.		
Section VIII: Fire Protection.		
1	Foam Systems: ➢ Check foam containers and fittings. ➢ For surface foam systems check the integrity of the frangible glass in the foam pourer. ➢ For sub surface foam systems, the tank side bleed valve should be opened to ensure the bursting disc is tight ant that the tank side check valve is tight.	All foam concentrate past its use by date must be replaced. Ensure valves move freely. All checks are visual only. Do not activate foam system as this will contaminate the product in the tank.
2	Operate the cooling water system.	Physically activate the cooling water system to check that it is functioning as designed. As the cooling water works on the outside of the tank, there is no risk of contaminating the stored product.

3. POST COMPLETION OF ACTIVITY

Step	Procedure	Explanations
Section I: documentation		
2	Complete and File Inspection Forms, AGD-F-M003 and AGD-F-M002	Ensure all required areas of the form have been completed and identified issues highlighted to management for action.
Section II: Records		
1	Update and file: ➢ Tank inspection records. ➢ ATG calibration check ➢ ATT calibration check	Accurate records provide traceability and evidence that all required processes have been carried out.
2	Review : ➢ Tank cleaning / inspection dates ➢ Date of last major mechanical inspection ➢ High level alarm testing. ➢ Date of last tank calibration	Ensure all dates are current, if not, programme relevant activities.

GLOBAL DOCUMENT INFORMATION		
Development Team	Antonis Christodoulakis, Brian Herbert, Guillaume Viallet	
Date of Development	**September 9, 2013**	
TABLE OF CHANGES		
REVISION/DATE	**SECTION(s)**	**DESCRIPTION OF CHANGES**
Rev.01 – Sept 9, 2013	None	Initial Publish
REFERENCES		
Standards	EM JIG2	
Referred Procedures	AGD-P-Z812 Fixed Storage Tank Entry and Cleaning Approval	
Forms	AGD-F-M002 Fixed Tank Maintenance, Section 1 AGD-F-M003 Fixed Tank Inspection & Cleaning & Maintenance, Section 3	
JSA	Local JSAs	
RETENTION MANAGEMENT GUIDELINES (RMG)		
Retention Code	TEC5000	Current version on airport. Original in head office + 10Y

Before performing this task, the operator should have carefully reviewed the respective JSA and any particular conditions that may apply onsite. If local procedures or regulations are more stringent they must be complied with. Although this document was developed for activities performed by EMA employees, it can be used as an example by contractors to develop their own Procedure at their responsibility and by site personnel to review contractor's Procedures.

DAILY COATING INSPECTION REPORT

Project/Client:	Date: / / M T W Th F S Su	Pg. Of
Location:	Project #:	COPY To: ☐ QC Mgr ☐ Owner ☐ Contr ☐ _____
Description:	Inspector:	Attachments: ☐ DFT Sheet ☐ NCR/CAR ☐ _____
Requirements:		
Contractor:	Spec #	Revision #

Description of Areas & Work Performed

Hold Point Inspections Performed

- ☐ 1 Pre Surface Pep/Condition & Cleanliness
- ☐ 2 Surface Preparation Monitoring
- ☐ 3 Post Surface Preparation/Cleanliness & Profile
- ☐ 4 Pre Application Prep/Surface Cleanliness
- ☐ 5 Application Monitoring/Wet Film Thickness (WFT)
- ☐ 6 Post Application/Application Defects
- ☐ 7 Post Cure/Dry Film Thickness (DFT)
- ☐ 8 Nonconformance/Corrective Actions Follow-up
- ☐ 9 Final Inspection

Approved By: _____

Surface Conditions

☐ New ☐ Maint ☐ Primer/Paint ☐ Age/Dry/Cure _____
☐ Steel ☐ Galvanize ☐ Concrete ☐ Other _____
☐ Hazard _____ ☐ Sample Report # _____
☐ Degree of contamination: _____
Test: ☐ Cl _____ µg/cm² / ppm ☐ Fe _____ ppm ☐ pH _____
☐ Degree of Corrosion: _____
☐ Scale ☐ Pitting/Holes ☐ Crevices ☐ Sharp Edges
☐ Weld _____ ☐ Moisture ☐ Oils ☐ Other _____
☐ Painted Surface Condition: _____
Dry to: ☐ Touch ☐ Handle ☐ Recoat
☐ Dry/Over Spray ☐ Runs/Sags ☐ Pinholes ☐ Holidays
☐ Abrasion ☐ Fall Out ☐ Other _____

Ambient Conditions

Time (Indicate AM or PM)	:	:	:	:
Dry Bulb Temp⁰ (C/F)	0	0	0	0
Wet Bulb Temp⁰ (C/F)	0	0	0	0
% Relative Humidity	%	%	%	%
Surface Temp⁰ (C/F) Min/Max	/ 0	/ 0	/ 0	/ 0
Dew Point Temp⁰ (C/F)	0	0	0	0
Wind Direction/Speed				
Weather Conditions:				

Surface Preparation

Start Time: Finish Time: Est Sq/ft:
☐ Solvent Clean ☐ Hand Tool ☐ Power Tool
☐ HP Wash PSI _____ ☐ Other _____
☐ Abrasive Blast ☐ Abrasive Type _____ ☐ Sample
☐ Blast Hose Size _____ ☐ Nozzle Size / PSI _____
☐ Air Supply CFM _____ ☐ Air Supply Cleanliness
☐ Water/Oil Trap Check ☐ Equipment Condition Check

Application

Start Time : Finish Time : Est. Sq/ft.
☐ Primer ☐ Intermediate ☐ Topcoat ☐ Touch-up

Generic Type:	Qty Mixed:
Manuf.:	Mix Ratio:
Prod Name:	Mix Method:
Prod #:	Strain/Screen:
Color:	Material Temp: 0F
Kit Size/Cond.:	Sweat-in Time: Min/Hrs
Shelf Life:	Pot Life: Min/Hrs

Batch #'s

(A)	Qty Added: Pt/Qt/Gal
(B)	% by Vol: %
(C)	Specified WFT Avg: Mils
Reducer:	Achieved WFT Avg: Mils

☐ Airless/Conv. Spray ☐ Brush ☐ Roller ☐ Other _____

Pump Pot	Hose Dia.	Air Check
Ratio/Size	Hose Lng.	SEP/Trap
GPM/CFM	Spray Gun	Filter
PSI	Tip Sz.	Agitator

Surface Cleanliness & Profile Measurement

☐ Job Specification ☐ SSPC/NACE - SP- _____
☐ SSPC/NACE Spec / Visual Stds ☐ _____
Profile Check: _____ ☐ Disc ☐ Tape ☐ Gauge
☐ Specified _____ mils avg. / Achieved _____ mils
☐ Surface effect on DFT Gauge/BMR _____ mils

Dry Film Thickness

Gage Type / Model	Gage Serial #	Gage Calib. Verified	Spec Avg. DFT	Total Avg DFT	DFT Last Coat	DFT This Coat

Inspector's Signature Date:

Daily Blasting & Coating Form

WELDING & INSPECTION RECORD FORM

Original : Project Manager

Copy : Site Supervisor

PROJECT NAME	PNI AVIATION UPGRADE - TANK 1 REGRADE
PROJECT LOCATION	POHNPEI TERMINAL
PROJECT ENGINEER	ABDUL SAHEEM
INSPECTION STANDARD	ASME B31.3
ACCEPTANCE CRITERIA	ASME B31.3

PROJECT ID	153
QA/QC INSPECTOR	ENERIKO VOLAU/ MALTRICK YAMAGUCHI
REPORT NUMBER	
DATE	
CONTRACTOR	

Drawing Group:
Drawing Number:

NOTE: Detail of welding shall be provided in the specific type inspection reports.

Weld I.D	Welder ID	Joint Dimensions	WPS #	Date Welded	Visual		RT			UT			MT			PT			HT			Material Type	Heat #	QA/QC Initial
					A	R	Report	A	R	Report	A	R	Report	A	R	Report	A	R	Report	A	R			

Legend: A- Accept; R-Reject; RT- Radiography Test; UT- Ultrasound Test; MT- Magentic Particle Test; PT- Penetrant Test; HT- Hydro Testing

	Vital Energy's QA/QC Inspector	Contractor's QA/QC Inspector
NAME		
SIGNATURE		
DATE		

SECTION 2.4

CONTRACTING

- Appendix T Contract Agreement
- Appendix U Particular Conditions of Contract
- Appendix V Tender and Price Submission Forms

Appendix T

Contract Agreement

LICENCE

for

AS 4920 : 2003 (Reusable-Single) : EN FILLPDFS

Licensee: Garry Garsain

Date: 12/01/2022

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Australian Standard™

General conditions of contract for the provision of asset maintenance and services (Principal's version)

STANDARDS AUSTRALIA

This Australian Standard was prepared by Committee OB-012, Service Contracts. It was approved on behalf of the Council of Standards Australia on 18 June 2003.
This Standard was published on 22 August 2003.

The following are represented on Committee OB-012:

Australian Building Services Association
Australian Local Government Association
AUSTROADS
Building Industry Specialists Contractors Organization of NSW Inc.
Civil Contractors Federation
Construction Industry Engineering Services Group Ltd
Hire and Rental Association of New Zealand
Institution of Engineers Australia
Law Council of Australia
Macquarie University
Masters Builders Australia Inc.
Snowy Mountains Hydro-Electric Authority

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Australian Standard™

General conditions of contract for the provision of asset maintenance and services (Principal's version)

First published as AS 4920—2003.
Reissued incorporating Amendment No. 1 (March 2005).

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Published by Standards Australia, GPO Box 5420, Sydney, NSW 2001, Australia

ISBN 0 7337 3767 6

Preface

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee, OB-012, Service Contracts.

*This Standard incorporates Amendment No. 1 (*March 2005*). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.*

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

AS 4920—2003 *General conditions of contract for the provision of asset maintenance and services (Principal's version)* is a part of the suite of conditions of contract based on AS 4000—1997 *General conditions of contract*.

These conditions of contract are intended to be used where services are generally performed on the premises of the Principal.

These conditions of contract are published in three versions. Where the Principal uses a Principal's representative and a Superintendent is not engaged, use this Standard AS 4920—2003. Where the Contract is administered through a Superintendent, use Standard AS 4919—2003. If a short version of the conditions of contract is required, use AS 4921—2003.

The objective of AS 4920—2003 *General conditions of contract for the provision of asset maintenance and services (Principal's version)* is to allocate the obligations and responsibilities between parties making formal agreements covering provision of periodical services between Principals (including government authorities and agencies) and Contractors.

These conditions of contract are not suitable for:

a) construction projects;

b) projects of a non-service nature;

c) professional consulting services;

d) records or systems management; or

e) supply of equipment.

Subclauses 6.5 and 25.2, prefixed by *, are optional, and may be omitted without making consequential amendments but such omission should be clearly shown on the face of the document by striking out these subclauses or indicating clearly in Annexure Part C or elsewhere that they are not to apply. See paragraph i) of clause 1 on page 3 for the effect of stating changes in Annexure Part C.

Warnings

1) **Users of this Australian Standard are warned that clause 12 (Damage to persons and property other than the Services) does not limit the liability of parties for special, indirect or consequential losses, notwithstanding any limitations or exclusions permitted under insurance clauses 14 (Insurance of the liability to reinstate) and 15 (Public liability insurance).**

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However, clause 13 (General limitations of liability) allows the parties to agree to limit the liability of parties in certain respects.

Parties wishing to limit their liability should seek legal and insurance advice before entering a Contract under this Standard.

2) Legislation has come into force in some jurisdictions dealing with security of payments. Parties intending to use this Standard should seek expert advice as to their rights and obligations under such legislation.

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1 Interpretation and construction of Contract

In the *Contract*, except where the context otherwise requires:

Item means an *Item* in Annexure Part A;

compensable cause means:

a) any act, default or omission of the *Principal* or its consultants, agents or other contractors (not being employed by the *Contractor*); or

b) those listed in *Item* 29;

Contract has the meaning in clause 4;

contract sum means:

a) where the *Principal* accepted a lump sum, the lump sum;

b) where the *Principal* accepted rates, the sum of the products ascertained by multiplying the rates and the corresponding quantities in the *schedule of rates*; or

c) where the *Principal* accepted a lump sum and rates, the aggregate of the sums referred to in paragraphs (a) and (b),

but excluding any additions or deductions which may be required to be made under the *Contract*;

Contractor means the person bound to perform and complete *the Services*;

date of acceptance of tender means the date which appears on the written notice of acceptance of the tender;

defects has the meaning in subclause 30.2 and includes omissions;

defects liability period has the meaning in subclause 30.2;

direction includes agreement, approval, assessment, authorisation, certificate, decision, demand, determination, explanation, instruction, notice, order, permission, rejection, request or requirement;

dispute has the meaning in clause 37;

EOT (from 'extension of time') has the meaning in subclause 29.3;

excepted risk has the meaning in subclause 11.3;

final payment claim means the final payment claim referred to in subclause 32.3;

intellectual property right means any patent, registered design, trademark or name, copyright or other protected right;

latent condition has the meaning in subclause 22.1;

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legislative requirement	includes: a) Acts, Ordinances, regulations, by-laws, orders, awards and proclamations of the jurisdiction where *the Services* or the particular part thereof are being performed; b) certificates, licences, consents, permits, approvals and requirements of organisations having jurisdiction in connection with the performance of *the Services*; and c) fees and charges payable in connection with the foregoing;
performance duration	means the duration stated in *Item* 7 for a *single performance;*
performance period cycle	means, where *the Services* are to be performed on more than one occasion during the *total performance period*, the frequency or occasions stated in *Item* 8 for a *single performance*;
performance program	has the meaning in clause 27;
premises	means the place where *the Services* are to be performed, and includes where the context so requires, anything on the premises;
prescribed notice	has the meaning in subclause 36.1;
Principal	means the Principal stated in *Item* 1;
public liability policy	has the meaning in clause 15;
qualifying cause of delay	means: a) any act, default or omission of the *Principal* or its consultants, agents or other contractors (not being employed by the *Contractor*); or b) other than: i) a breach or omission by the *Contractor*; and ii) stated in *Item* 25;
schedule of rates	means any schedule included in the *Contract* which, in respect of any section or item of *work* to be performed, shows the rate or respective rates of payment for the performance of that *work* and which may also include lump sums, provisional sums, other sums, quantities and prices;
security	means: a) cash; b) retention moneys; c) bonds or inscribed stock or their equivalent issued by a national, state or territory government; d) interest bearing deposit in a bank carrying on business at the place stated in *Item* 11(c); e) an approved unconditional undertaking (the form in Annexure Part B is approved) or an approved performance undertaking given by an approved financial institution or insurance company; or f) other form approved by the party having the benefit of the security;

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single performance means a performance of *the Services* on one occasion;

the Services means the whole of the *work* which the *Contractor* is required to perform and complete under the *Contract* and includes *variations*, remedial *work* and all other *work* reasonably necessary for the performance of the *Contract*;

total performance period means the period of time stated in *Item* 9 and as adjusted pursuant to the *Contract*;

variation has the meaning in clause 31;

work includes the provision of materials,

and like words have a similar meaning.

In the *Contract*:

a) references to days mean calendar days and references to a person include an individual, firm or a body, corporate or unincorporate;

b) unless otherwise stated, time for doing any act or thing under the *Contract* shall, if it ends on a Saturday, Sunday or Statutory or Public Holiday, be deemed to end on the day next following which is not a Saturday, Sunday or Statutory or Public Holiday;

c) clause headings and subclause headings shall not form part of, nor be used in the interpretation of, the *Contract*;

d) words in the singular include the plural and words in the plural include the singular, according to the requirements of the context. Words importing a gender include every gender;

e) communications between the *Principal* and the *Contractor* shall be in the English language;

f) measurements of physical quantities shall be in legal units of measurement of the jurisdiction in *Item* 10;

g) unless otherwise provided, prices are in the currency in *Item* 11(a) and payments shall be made in that currency at the place in *Item* 11(b);

h) the law governing the *Contract*, its interpretation and construction, and any agreement to arbitrate, is the law of the jurisdiction in *Item* 10; and

i) the changes in Annexure Part C shall be deemed to be part of these General Conditions.

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2 Performance and payment

The *Contractor* shall perform and complete *the Services* in accordance with the *Contract* and *directions* authorised by the *Contract.*

The *Principal* shall pay the *Contractor:*

a) for *the Services* for which the *Principal* accepted a lump sum, the lump sum; and

b) for *the Services* for which the *Principal* accepted rates, the sum of the products ascertained by multiplying the measured quantity of each section or item of *the Services* actually performed under the *Contract* by the rate accepted by the *Principal* for the section or item,

adjusted by any additions or deductions made pursuant to the *Contract.*

3 Security

3.1 Provision

Security shall be provided in accordance with *Item* 12 or 13. All delivered *security,* other than cash or retention moneys, shall be transferred in escrow.

3.2 Recourse

Security shall be subject to recourse by a party who remains unpaid after the time for payment where at least 5 days have elapsed since that party notified the other party of intention to have recourse.

3.3 Change of security

At any time a party providing retention moneys or cash *security* may substitute another form of *security.* To the extent that another form of *security* is provided, the other party shall not deduct, and shall promptly release and return, retention moneys and cash *security.*

3.4 Release

A party's entitlement to *security* shall cease 14 days after payment of the *final payment claim.*

Upon a party's entitlement to *security* ceasing, that party shall release and return forthwith the *security* to the other party.

3.5 Trusts and interest

Except where held by a government department or agency or a municipal, public or statutory authority, any portion of *security* (and interest earned thereon) which is cash or retention moneys, shall be held in trust for the party providing them until the *Principal* or the *Contractor* is entitled to receive them.

Interest earned on *security* not required to be held in trust shall belong to the party holding that *security.*

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4 Evidence of Contract

Until a formal instrument of agreement is executed by the parties, documents evidencing the parties' consensus shall constitute the *Contract.* If such *Contract* requires a formal instrument of agreement, the *Principal* shall, within 28 days of the *date of acceptance of tender,* send it in duplicate for execution by the *Contractor.* Within 14 days after receiving them, the *Contractor* shall (if they are correct) properly execute both copies and return them.

Within 14 days after receiving them, the *Principal* shall execute both copies, have them stamped as necessary and send one copy to the *Contractor.*

5 Service of notices

A notice (and other documents) shall be deemed to have been given and received:

a) if addressed or delivered to the relevant address in the *Contract* or last communicated in writing to the person giving the notice; and

b) on the earliest date of:

   i) actual receipt;

   ii) confirmation of correct transmission of fax; or

   iii) 3 days after posting.

6 Contract documents

6.1 Discrepancies

Figured shall prevail over scaled dimensions in a discrepancy. Otherwise, if either party discovers any inconsistency, ambiguity or discrepancy in any document prepared for the purpose of performing *the Services,* that party shall give the other written notice of it. The *Principal* thereupon, and after otherwise becoming aware, shall direct the *Contractor* as to the interpretation and construction to be followed.

If compliance with any such *direction* under this subclause causes the *Contractor* to incur more or less cost than otherwise would have been incurred had the *direction* not been given, the difference shall be assessed by the *Principal* and added to or deducted from the *contract sum.*

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6.2 Principal-supplied documents

The *Principal* shall supply to the *Contractor* the documents and number of copies thereof, both stated in *Item* 14.

They shall:

a) remain the *Principal's* property and be returned to the *Principal* on written demand; and

b) not be used, copied nor reproduced for any purpose other than performing *the Services.*

6.3 Contractor-supplied documents

The *Contractor* shall supply to the *Principal* the documents and number of copies thereof, both stated elsewhere in the *Contract.*

If the *Contractor* submits a document to the *Principal,* then except where the *Contract* otherwise provides:

a) the *Principal* shall not be required to check that document for errors, omissions, inconsistencies, ambiguities, discrepancies or compliance with the *Contract;*

b) notwithstanding clause 2, any *Principal's* acknowledgment or approval shall not prejudice the *Contractor's* obligations; and

c) if the *Contract* requires the *Contractor* to obtain the *Principal's direction* about that document, the *Principal* shall give, within the time stated in *Item* 15, the appropriate *direction,* including reasons if the document is not suitable.

Copies of documents supplied by the *Contractor* shall be the *Principal's* property but shall not be used nor copied otherwise than for the use, repair, maintenance or alteration of *the Services.*

6.4 Confidential information

The parties shall ensure that there are kept confidential such documents, samples, models, patterns and other information as are supplied and clearly identified as confidential.

If required in writing by a party, the other party shall enter into a separate agreement not to disclose to anyone else any confidential matter even after final payment or earlier termination of the *Contract.*

*6.5 Media

The *Contractor* shall not disclose any information concerning *the Services* for distribution through any communications media without the *Principal's* prior written approval (which shall not be unreasonably withheld). The *Contractor* shall refer to the *Principal* any enquiries from any media concerning *the Services.*

* See Preface on page (iii)

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7 Assignment and subcontracting

7.1 Assignment

Neither party shall, without the other's prior written approval (including terms) assign the *Contract* or any payment or any other right, benefit or interest thereunder.

7.2 Subcontracting generally

The *Contractor* shall not without the *Principal's* prior written approval (which shall not be unreasonably withheld):

a) subcontract or allow a subcontractor to subcontract any *work* described in *Item* 16; or

b) allow a subcontractor to assign a subcontract or any payment or any other right, benefit or interest thereunder.

With a request for approval, the *Contractor* shall give the *Principal* written particulars of the *work* to be subcontracted and the name and address of the proposed subcontractor. The *Contractor* shall give the *Principal* other information which the *Principal* reasonably requests, including the proposed subcontract documents without prices.

Within 14 days of the *Contractor's* request for approval, the *Principal* shall give the *Contractor* written notice of approval or of the reasons why approval is not given.

Approval may be conditional upon the subcontract including:

a) provision that the subcontractor shall not assign nor subcontract without the *Contractor's* written consent; and

b) provisions which may be reasonably necessary to enable the *Contractor* to fulfil the *Contractor's* obligations to the *Principal.*

7.3 Contractor's responsibility

Except where the *Contract* otherwise provides, the *Contractor* shall be liable to the *Principal* for the acts, defaults and omissions of subcontractors and employees and agents of subcontractors as if they were those of the *Contractor.*

Approval to subcontract shall not relieve the *Contractor* from any liability or obligation under the *Contract.*

8 Intellectual property rights

The *Principal* warrants that, unless otherwise provided in the *Contract,* design, materials, documents and methods of working, each specified in the *Contract* or provided or directed by the *Principal* shall not infringe any *intellectual property right.*

The *Contractor* warrants that any other design, materials, documents and methods of working, each provided by the *Contractor,* shall not infringe any *intellectual property right.*

Each party shall indemnify the other against such respective infringements.

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9 Legislative requirements

9.1 Compliance

The *Contractor* shall satisfy all *legislative requirements* except those in *Item* 17 or which can only be satisfied by the *Principal.*

The *Contractor,* upon finding that a *legislative requirement* is at variance with the *Contract,* shall promptly give the *Principal* written notice thereof.

9.2 Changes

If a *legislative requirement:*

a) necessitates a change;

   i) to *the Services,* or

   ii) in a fee or charge or payment of a new fee or charge;

b) comes into effect after the 14th day before the closing of tenders but could not reasonably then have been anticipated by a competent contractor; and

c) causes the *Contractor* to incur more or less cost than otherwise would have been incurred,

the difference shall be assessed by the *Principal* and added to or deducted from the *contract sum.*

10 Protection of people and property

10.1 Protection

Insofar as compliance with the *Contract* permits, the *Contractor* shall:

a) take measures necessary to protect people and property including complying with the *Principal's* requirements in respect thereof;

b) avoid unnecessary interference with the passage of people and vehicles; and

c) prevent nuisance and unreasonable noise and disturbance.

If the *Contractor* damages property, the *Contractor* shall promptly rectify the damage and pay any compensation which the law requires the *Contractor* to pay.

If the *Contractor* fails to comply with an obligation under this subclause, the *Principal,* after giving reasonable written notice to the *Contractor* and in addition to the *Principal's* other rights and remedies, may have the obligation performed by others. The cost thereby incurred shall be moneys due from the *Contractor* to the *Principal.*

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10.2 Urgent protection

If urgent action is necessary to protect *the Services,* other property or people and the *Contractor* fails to take the action, in addition to any other remedies of the *Principal,* the *Principal* may take the necessary action. If the action was action which the *Contractor* should have taken at the *Contractor's* cost, the cost incurred shall be moneys due from the *Contractor* to the *Principal.*

If time permits, the *Principal* shall give the *Contractor* prior written notice of the intention to take action pursuant to this subclause.

10.3 Occupational health and safety

The *Contractor* shall comply with all reasonable *directions* in regard to the application of the *Principal's* occupational health and safety policy and procedures for the *premises.*

If compliance with any *direction* given pursuant to the preceding paragraph causes the *Contractor* to incur more or less cost than a competent contractor could reasonably have anticipated at the date of the closing of tenders, then that compliance shall be a deemed *variation.*

If the *Contractor* fails to comply with an obligation under this subclause, the *Principal,* after the *Principal* has given reasonable written notice to the *Contractor* and in addition to the *Principal's* other rights and remedies, may have the obligation performed by others. The cost thereby incurred shall be moneys due from the *Contractor* to the *Principal.*

11 Care of the Services and reinstatement of damage

11.1 Care of the Services

Except as provided in subclause 11.3, whilst performing *the Services* the *Contractor* shall be responsible for the care of *the Services.*

11.2 Reinstatement

If loss or damage, other than that caused by an *excepted risk,* occurs to *the Services* during the period of the *Contractor's* care, the *Contractor* shall, at its cost, rectify such loss or damage.

In the event of loss or damage being caused by any of the *excepted risks* (whether or not in combination with other risks), the *Contractor* shall to the extent directed by the *Principal,* rectify the loss or damage and such rectification shall be a deemed *variation.* If loss or damage is caused by a combination of *excepted risks* and other risks, the *Principal* in pricing the *variation* shall assess the proportional responsibility of the parties.

11.3 Excepted risks

The *excepted risks* causing loss or damage, for which the *Principal* is liable, are:

a) any negligent act or omission of the *Principal* or its consultants, agents, employees or other contractors (not being employed by the *Contractor);*

b) any risk specifically excepted elsewhere in the *Contract;*

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c) war, invasion, act of foreign enemies, hostilities (whether war be declared or not), civil war, rebellion, revolution, insurrection or military or usurped power, martial law or confiscation by order of any Government or public authority;

d) ionising radiations or contamination by radioactivity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel not caused by the *Contractor* or its subcontractors or either's employees or agents;

e) use or occupation of any part of the *premises* by the *Principal* or its consultants, agents or other contractors (not being employed by the *Contractor);*

f) damage which is the unavoidable result of the performance of *the Services* directed by the *Principal* during an emergency;

g) the correction of anything discovered during the performance of *the Services,* not being part of *the Services* but required to be corrected due to a *legislative requirement;* and

h) defects in the design of *the Services,* other than design provided by the *Contractor.*

12 Damage to persons and property other than the Services

12.1 Indemnity by Contractor

Insofar as this subclause applies to property, it applies to property other than *the Services.*

The *Contractor* shall indemnify the *Principal* against:

a) loss of or damage to the *Principal's* property; and

b) claims in respect of personal injury or death or loss of, or damage to, any other property,

arising out of or as a consequence of the performance of *the Services,* but the indemnity shall be reduced proportionally to the extent that the act or omission of the *Principal* or its consultants, agents or other contractors (not being employed by the *Contractor)* may have contributed to the injury, death, loss or damage.

This subclause shall not apply to:

a) claims that may be made by any person for injury, death, loss or damage resulting from the performance of *the Services* directed by the *Principal* during an emergency;

b) the extent that the *Contractor's* liability is limited by another provision of the *Contract;*

c) exclude any other right of the *Principal* to be indemnified by the *Contractor;*

d) things for the care of which the *Contractor* is responsible under subclause 11.1;

e) damage which is the unavoidable result of the performance of *the Services* in accordance with the *Contract;*

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f) damage in respect of any part of the *premises* hidden or inaccessible, details of which have not been supplied by the *Principal* before the closing of tenders; and

g) claims in respect of the *Principal's* right to have *the Services* performed.

12.2 Indemnity by Principal

The *Principal* shall indemnify the *Contractor* in respect of claims referred to in the second-mentioned paragraph (a) of subclause 12.1 but the indemnity shall be reduced proportionately to the extent that the act or omission of the *Contractor* or its subcontractors or either's employees or agents may have contributed to the injury, death, loss or damage.

The *Principal* shall also indemnify the *Contractor* in respect of damage referred to in paragraphs (e) and (f) of subclause 12.1 and claims referred to in paragraph (g) of subclause 12.1.

13 General limitations of liability

13.1 Limitation of liability

Subject to subclause 13.2, the liability of each party arising in connection with the subject matter of the *Contract* including a claim:

a) in tort;

b) under statute; or

c) for rectification or frustration,

or like claim available under the law governing the *Contract,* is limited to the amounts stated in *Items* 18 and 19, as the case may be.

This limitation shall continue to apply notwithstanding fundamental breach, breach of a fundamental term, rescission, repudiation or termination for any reason or frustration, whether unintentional or by operation of law.

13.2 Exclusion of limitation of liability

The limitation of liability under subclause 13.1 shall not apply to:

a) liability to pay the *contract sum* as adjusted pursuant to the *Contract;*

b) liability to pay interest;

c) liability to account for *security;*

d) liability for infringement of *intellectual property rights;*

e) liability for liquidated damages and delay damages;

f) the extent that liability is otherwise limited by another provision of the *Contract;* and

g) liability out of which by law the party liable cannot contract.

Amounts payable in respect of paragraphs (a) to (g) of this subclause shall not be included in the limitation of liability under subclause 13.1.

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14 Insurance of the liability to reinstate

Before commencing the performance of *the Services,* the *Contractor* shall insure its liability under subclause 11.1 against loss or damage resulting from any cause until the *Contractor* ceases to be responsible for the care of *the Services.*

Without limiting the generality of the obligation to insure, such insurance shall cover the *Contractor's* liability under subclause 11.2 and things to form part of *the Services* but may exclude:

a) the cost of making good fair wear and tear or gradual deterioration, but shall not exclude the loss or damage resulting therefrom;

b) the cost of making good faulty design, workmanship and materials, but shall not exclude the loss or damage resulting therefrom;

c) consequential loss of any kind, but shall not exclude loss of or damage to *the Services;*

d) damages for delay in completing or for the failure to complete *the Services;*

e) loss or damage resulting from ionising radiations or contamination by radioactivity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel resulting from any cause;

f) loss or damage resulting from the *excepted risks* referred to in paragraphs (b) and (c) of subclause 11.3.

The insurance cover shall be for an amount not less than the amount stated in *Item* 20.

Insurance shall be in the joint names of the parties, shall cover the parties and all subcontractors whenever performing *the Services* for their respective rights, interests and liabilities and, except where the *Contract* otherwise provides, shall be with an insurer and in terms both approved in writing by the *Principal* (which approvals shall not be unreasonably withheld).

The insurance shall be maintained until the *Contractor* ceases to be responsible under subclause 11.1 for the care of *the Services.*

15 Public liability insurance

The Alternative in *Item* 21(a) applies.

Before commencing *the Services,* the *Contractor* shall effect and maintain for the duration of the *Contract,* a *public liability policy.*

The policy shall:

a) be in the joint names of the parties;

b) cover the:

   i) respective rights and interests; and

   ii) liabilities to third parties,

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of the parties and subcontractors from time to time, whenever performing *the Services;*

c) cover the parties' respective liability to each other for loss or damage to property (other than property required to be insured by clause 13) and the death of or injury to any person (other than liability which the law requires to be covered under a workers compensation insurance policy);

d) be endorsed to cover the use of any plant not covered under a comprehensive or third party motor vehicle insurance policy;

e) provide insurance cover for an amount in respect of any one occurrence of not less than the sum in *Item* 21(b); and

f) be with an insurer and otherwise in terms both approved in writing by the *Principal* (which approvals shall not be unreasonably withheld).

Before the *date of acceptance of tender,* the *Principal* shall effect in relation to *the Services,* a *public liability policy* in the terms of the policy included in the tender documents and nominating or stating the insurer. The *Principal* shall maintain such insurance for the duration of the *Contract.*

16 Insurance of employees

Before commencing *the Services,* the *Contractor* shall insure against statutory and common law liability for death of or injury to persons employed by the *Contractor.* The insurance cover shall be maintained for the duration of the *Contract.*

Where permitted by law, the insurance policy or policies shall be extended to provide indemnity for the *Principal's* statutory liability to the *Contractor's* employees.

The *Contractor* shall ensure that all subcontractors have similarly insured their employees.

17 Inspection and provisions of insurance policies

17.1 Proof of insurance

Before the *Contractor* commences *the Services* and whenever requested in writing by the other party, a party liable to insure shall provide satisfactory evidence of such insurance effected and maintained.

Insurance shall not limit liabilities or obligations under other provisions of the *Contract.*

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17.2 Failure to produce proof of insurance

If after being so requested, a party fails promptly to provide evidence of satisfactory compliance, then without prejudice to other rights or remedies, the other party may insure and the cost thereof shall be moneys due and payable from the party in default to the other party. Where the defaulting party is the *Contractor,* the *Principal* may refuse payment until such evidence is produced by the *Contractor.*

17.3 Notices of potential claims

A party shall, as soon as practicable, inform the other party in writing of any occurrence that may give rise to a claim under an insurance policy required by clause 14 or 15 and shall keep the other party informed of subsequent developments concerning the claim. The *Contractor* shall ensure that subcontractors in respect of their operations similarly inform the parties.

17.4 Settlement of claims

Upon settlement of a claim under the insurance required by clause 14:

a) to the extent that reinstatement has been the subject of a payment or allowance by the *Principal* to the *Contractor,* if the *Contractor* has not completed such reinstatement, insurance moneys received shall, if requested by either party, be paid into an agreed bank account in the joint names of the parties. As the *Contractor* reinstates the loss or damage, the *Principal* shall sign against the joint account for the reasonable cost of reinstatement; and

b) to the extent that reinstatement has not been the subject of a payment or allowance by the *Principal* to the *Contractor,* the *Contractor* shall be entitled immediately to receive from insurance moneys received, the amount of such moneys so paid in relation to any loss suffered by the *Contractor.*

17.5 Cross liability

Any insurance required to be effected in joint names in accordance with the *Contract* shall include a cross liability clause in which the insurer agrees to waive all rights of subrogation or action against any of the persons constituting the insured and for the purpose of which the insurer accepts the term ‘insured’ as applying to each of the persons constituting the insured as if a separate policy of insurance had been issued to each of them (subject always to the overall sum insured not being increased thereby).

18 Principal

18.1 Principal’s directions

Except where the *Contract* otherwise provides, the *Principal* may give a *direction* orally but shall as soon as practicable confirm it in writing. If the *Contractor* in writing requests the *Principal* to confirm in writing an oral *direction,* the *Contractor* shall not be bound to comply with the *direction* until the *Principal* does so.

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18.2 Principal's representative

The *Principal* may from time to time appoint individuals to exercise delegated *Principal's* functions, provided that:

a) no aspect of any function shall at any one time be the subject of delegation to more than one *Principal's* representative;

b) delegation shall not prevent the *Principal* exercising any function;

c) the *Principal* forthwith gives the *Contractor* written notice of respectively:

   i) the appointment, including the *Principal's* representative's name and delegated functions; and

   ii) the termination of each appointment; and

d) if the *Contractor* makes a reasonable objection to the appointment of a *Principal's* representative, the *Principal* shall terminate the appointment.

19 Contractor's representative

The *Contractor* shall superintend *the Services* personally or by a competent representative. Matters within a *Contractor's* representative's knowledge (including *directions* received) shall be deemed to be within the *Contractor's* knowledge.

The *Contractor* shall forthwith give the *Principal* written notice of the representative's name and any subsequent changes.

If the *Principal* makes a reasonable objection to the appointment of a representative, the *Contractor* shall terminate the appointment and appoint another representative.

20 Contractor's employees and subcontractors

The *Principal* may direct the *Contractor* to have removed, within a stated time, from the *premises* or from any activity of *the Services,* any person employed on *the Services* who, in the *Principal's* opinion, is incompetent, negligent or guilty of misconduct.

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21 Access to the premises

21.1 Principal's obligations

The *Principal* shall provide to the *Contractor:*

a) reasonable access to the *premises* or sufficient of the *premises* to enable the *Contractor* to perform *the Services;*

b) particulars of entrances and exits to and from the *premises,* available to the *Contractor* and subcontractors of the *Contractor;* and

c) a written notice as to:

   i) the times when the *premises* will be available; and

   ii) any security measures to be observed in connection with the *premises* or access to them.

If compliance therewith causes the *Contractor* to incur more or less cost than otherwise would have been incurred there shall be a deemed *variation.*

Subject to subclause 34.7, delay by the *Principal* in giving access shall not be a breach of the *Contract.*

21.2 Contractor's obligations

The *Contractor* shall ensure that in relation to the performance of *the Services* on the *premises,* the *Contractor* and subcontractors and either's employees or agents:

a) use entrances and exits provided by the *Principal;*

b) comply with access arrangements and the security measures directed by the *Principal;*

c) carry suitable identification;

d) do not examine, copy, remove or otherwise interfere with anything on the *premises* except for the purpose of the performance of *the Services;* and

e) regularly remove rubbish and surplus material which results from the performance of *the Services.*

22 Latent conditions

22.1 Scope

Latent conditions are physical conditions on the *premises* and its near surrounds, including artificial things but excluding weather conditions, which differ materially from the physical conditions which should reasonably have been anticipated by a competent contractor at the time of the *Contractor's* tender if the *Contractor* had inspected:

a) all written information made available by the *Principal* to the *Contractor* for the purpose of tendering;

b) all information influencing the risk allocation in the *Contractor's* tender and reasonably obtainable by the making of reasonable enquiries; and

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c) the *premises* and its near surrounds.

22.2 Notification

The *Contractor,* upon becoming aware of a *latent condition* while performing *the Services,* shall promptly, and where possible before the *latent condition* is disturbed, give the *Principal* written notice of the general nature thereof.

If required by the *Principal* promptly after receiving that notice, the *Contractor* shall, as soon as practicable, give the *Principal* a written statement of:

a) the *latent condition* encountered and the respects in which it differs materially;

b) the additional *work,* resources, time and cost which the *Contractor* estimates to be necessary to deal with the *latent condition;* and

c) other details reasonably required by the *Principal.*

22.3 Deemed variation

The effect of the *latent condition* shall be a deemed *variation,* priced having no regard to additional cost incurred more than 28 days before the date on which the *Contractor* gave the notice required by the first paragraph of subclause 22.2 but so as to include the *Contractor's* other costs for each compliance with subclause 22.2.

23 Plant, equipment and materials

The *Principal* shall provide and make available to the *Contractor* at the *premises* the facilities, utilities and items of plant, equipment and material stated in *Item* 22 necessary to perform *the Services.*

Except to the extent that the *Contract* otherwise provides, the *Contractor* shall supply everything else necessary for the proper performance of the *Contractor's* obligations and discharge of the *Contractor's* liabilities.

24 Repairs

If repairs to the *premises* or other property of the *Principal* are necessary from time to time to enable *the Services* to be performed, the *Contractor* shall promptly notify the *Principal* of the requirement for such repairs.

Except to the extent that *Item* 23 or the *Contract* elsewhere provides, the *Principal* shall promptly arrange for any such repairs as are necessary to enable *the Services* to be performed. The *Principal* may direct the *Contractor* to carry out such repairs (including replacement parts and components) whereupon there shall be a deemed *variation.*

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25 Quality

25.1 Quality of material and work

Unless otherwise provided, the *Contractor* shall use suitable new materials and proper and tradesmanlike workmanship.

*25.2 Quality assurance

If the *Contract* elsewhere requires further quality assurance, the *Contractor* shall:

a) plan, establish and maintain a conforming quality system; and

b) ensure that the *Principal* has reasonable access to the quality system of the *Contractor* and subcontractors so as to enable monitoring and quality auditing.

Any such quality system shall be used only as an aid to achieving compliance with the *Contract* and to document such compliance. Such system shall not discharge the *Contractor's* other obligations under the *Contract.*

25.3 Defective work

If the *Principal* becomes aware of *work* done (including material provided) by the *Contractor* which does not comply with the *Contract,* the *Principal* shall as soon as practicable give the *Contractor* written details thereof. If the subject *work* has not been rectified, the *Principal* may direct the *Contractor* to do any one or more of the following (including reasonable times for commencement and completion):

a) remove the material from the *premises*

b) demolish the *work;*

c) reconstruct, replace or correct the *work;* and

d) not deliver it to the *premises;*

If:

a) the *Contractor* fails to comply with such a *direction;* and

b) that failure has not been made good within a reasonable time after the *Contractor* receives written notice that the *Principal* intends to have the subject *work* rectified by others,

the *Principal* may have that *work* so rectified and the cost incurred shall be moneys due from the *Contractor* to the *Principal.*

25.4 Acceptance of defective work

Instead of a *direction* pursuant to subclause 25.3, the *Principal* may direct the *Contractor* that the *Principal* elects to accept the subject *work,* whereupon there shall be a deemed *variation.*

25.5 Timing

The *Principal* may give a *direction* pursuant to this clause at any time before the expiry of the *defects liability period.*

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26 Working hours

If the working hours and working days on the *premises* are not stated elsewhere in the *Contract,* they shall be as notified by the *Contractor* to the *Principal* before commencement of *work* on the *premises.* They shall not be varied without the *Principal's* prior written approval, except when, in the interests of safety of persons or property, the *Contractor* finds it necessary to perform *the Services* otherwise, whereupon the *Contractor* shall give the *Principal* written notice of those circumstances as early as possible.

27 Programming

The *Contractor* shall give the *Principal* reasonable advance notice of when the *Contractor* needs information, materials, documents or instructions from the *Principal.*

The *Principal* shall not be obliged to give any information, materials, documents or instructions earlier than the *Principal* should reasonably have anticipated at the *date of acceptance of tender.*

The *Principal* may direct in what order and at what dates and times the various stages or portions of *the Services* shall be performed. If the *Contractor* can reasonably comply with the *direction,* the *Contractor* shall do so. If the *Contractor* cannot reasonably comply, the *Contractor* shall give the *Principal* written notice of the reasons.

A *performance program* is a written statement showing the times and frequency of each *performance duration* and *performance period cycle* during the *total performance period.* It shall be deemed a *Contract* document.

The *Principal* may direct the *Contractor* to give the *Principal* a *performance program* within the time and in the form directed.

The *Contractor* shall not, without reasonable cause, depart from a *performance program.*

If compliance with any such *directions* under this clause, except those pursuant to the *Contractor's* default, causes the *Contractor* to incur more or less cost than otherwise would have been incurred had the *Contractor* not been given the *direction,* the difference shall be assessed by the *Principal* and added to or deducted from the *contract sum.*

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28 Suspension

28.1 Principal's suspension

The *Principal* may direct the *Contractor* to suspend the performance of the whole or part of *the Services* for such time as the *Principal* thinks fit, if the *Principal,* acting reasonably, forms the opinion that it is necessary:

a) because of an act, default or omission of:

   i) the *Principal* or its employees, consultants, agents or other contractors (not being employed by the *Contractor);* or

   ii) the *Contractor,* a subcontractor or either's employees or agents;

b) for the protection or safety of any person or property; or

c) to comply with a court order.

28.2 Contractor's suspension

If the *Contractor* wishes to suspend the performance of the whole or part of *the Services,* otherwise than pursuant to subclause 34.9, the *Contractor* shall obtain the *Principal's* prior written approval. The *Principal* may approve the suspension and may impose conditions of approval.

28.3 Recommencement

As soon as the *Principal* becomes aware that the reason for any suspension no longer exists, the *Principal* shall direct the *Contractor* to recommence suspended *Services* as soon as reasonably practicable.

The *Contractor* may recommence *the Services* suspended pursuant to subclause 28.2 or 34.9 at any time after reasonable notice to the *Principal.*

28.4 Cost

The *Contractor* shall bear the cost of suspension pursuant to paragraph (a)(ii) of subclause 28.1 and subclause 28.2. If the *Contractor* made the protection, safety or court order necessary, the *Contractor* shall bear the cost of suspension pursuant to paragraph (b) or (c) of subclause 28.1. If the *Contractor* otherwise incurs more or less cost than otherwise would have been incurred, the difference shall be assessed by the *Principal* and added to or deducted from the *contract sum.*

29 Time and progress

29.1 Commencement and progress

The *Contractor* shall commence the *Services* as stated in *Item* 24.

Subject to subclause 29.3, the *Contractor* shall ensure that each *single performance* of *the Services* is performed within the applicable *performance duration* stated in *Item* 7, that *the Services* are performed in accordance with the *performance period cycles* stated in *Item* 8 and that *the Services* are completed within the *total performance period* stated in *Item* 9.

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29.2 Notice of delay

A party becoming aware of anything which will probably cause delay to *the Services* shall promptly give the other party written notice of that cause and the estimated delay.

29.3 Claim

The *Contractor* shall be entitled to such extension of time for performing *the Services* or a *single performance,* as the *Principal,* acting reasonably, assesses *('EOT'),* if:

a) the *Contractor* is or will be delayed in either performing those *Services* or that *single performance,* as the case may be, by a *qualifying cause of delay;* and

b) the *Contractor* gives the *Principal,* within the time stated in *Item* 26 of when the *Contractor* should reasonably have become aware of that causation occurring, a written claim for an *EOT* evidencing the facts of causation and of the delay (including extent) to *the Services* or the *single performance,* as the case may be.

If further delay results from a *qualifying cause of delay* evidenced in a claim under paragraph (b) of this subclause, the *Contractor* shall claim an *EOT* for such delay by promptly giving the *Principal* a written claim evidencing the facts of that delay.

29.4 Assessment

When both non-qualifying and *qualifying causes of delay* overlap, the *Principal* shall apportion the resulting delay to *the Services* or the *single performance,* as the case may be, according to the respective causes' contribution.

In assessing each *EOT* the *Principal* shall disregard whether the *Contractor* can accelerate but shall have regard to what prevention and mitigation of the delay has not been effected by the *Contractor.*

29.5 Extension of time

Within the time stated in *Item* 27 after receiving the *Contractor's* claim for an *EOT,* the *Principal* shall give to the *Contractor* a written *direction* evidencing the *EOT* so assessed. If the *Principal* does not do so, there shall be a deemed assessment and *direction* for an *EOT* as claimed.

Notwithstanding that the *Contractor* is not entitled to or has not claimed an *EOT,* the *Principal* may at any time and from time to time before the final payment direct an *EOT.*

29.6 Liquidated damages for a single performance

If a *single performance* of *the Services* is delayed by a non-qualifying cause of delay, liquidated damages shall be due and payable to the *Principal* at the rate stated in *Item* 28 for every day that *single performance* is delayed.

If an *EOT* for that *single performance* is directed after the *Contractor* has paid or the *Principal* has set off liquidated damages, the *Principal* shall forthwith repay to the *Contractor* such of those liquidated damages as represent the days the subject of the *EOT.*

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29.7 Delay damages

For every day the subject of an *EOT* for a *compensable cause* and for which the *Contractor* gives the *Principal* a claim for delay damages pursuant to subclause 36.1, damages pursuant to *Item* 30 shall be due and payable to the *Contractor.*

30 Warranties and defects liability

30.1 Warranties

The *Contractor* shall obtain for the benefit of the *Principal,* the warranties specified elsewhere in the *Contract* on the items stated in *Item* 31, for the respective periods stated in *Item* 31, in relation to the materials, parts or components used in the performance of *the Services.*

30.2 Defects liability

The *defects liability period* stated in *Item* 32 shall commence at the expiration of the *total performance period* at 4.00 pm.

The *Contractor* shall carry out rectification at times and in a manner causing as little inconvenience to the occupants or users of the *premises* as is reasonably possible.

As soon as possible after the expiration of the *total performance period,* the *Contractor* shall rectify all *defects* existing at the end of the *total performance period.*

During the *defects liability period,* the *Principal* may give the *Contractor* a *direction* to rectify a *defect* arising out of the performance of *the Services* which *direction* shall identify the *defect* and reasonable times and dates for commencement and completion of its rectification.

If the rectification is not commenced or completed by the stated times and dates, the *Principal* may have the rectification carried out by others but without prejudice to any other rights or remedies the *Principal* may have. The cost thereby incurred shall be moneys due and payable to the *Principal.*

31 Variations

31.1 Directing variations

The *Contractor* shall not vary *the Services* except as directed in writing.

The *Principal,* before the expiration of the *total performance period,* may direct the *Contractor* to vary *the Services* or perform additional *Services* provided such are nevertheless of a character and extent contemplated by, and capable of being performed under, the provisions of the *Contract.*

The *Contractor* shall not be bound to perform a *variation* directed after the expiration of the *total performance period.*

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31.2 Proposed variations

The *Principal* may give the *Contractor* written notice of a proposed *variation.*

The *Contractor* shall as soon as practicable after receiving such notice, notify the *Principal* whether the proposed *variation* can be effected, together with, if it can be effected, the *Contractor's* estimate of the:

a) effect on the *performance program;* and

b) cost (including all time-related costs, if any) of the proposed *variation.*

The *Principal* may direct the *Contractor* to give a detailed quotation for the proposed *variation* supported by measurements or other evidence of cost.

The *Contractor's* costs for each compliance with this subclause shall be assessed by the *Principal* as moneys due to the *Contractor.*

31.3 Pricing

The *Principal* shall, as soon as possible, price each *variation* using the following order of precedence:

a) prior agreement;

b) applicable rates or prices in the *Contract;*

c) rates or prices in a *schedule of rates* or schedule of prices, even though not *Contract* documents, to the extent that it is reasonable to use them; and

d) reasonable rates or prices, which shall include a reasonable amount for profit and overheads,

and any deductions shall include a reasonable amount for profit but not overheads.

That price shall be added to or deducted from the *contract sum.*

32 Payment

32.1 Progress claims

The *Contractor* shall claim payment in accordance with *Item* 33.

An early progress claim shall be deemed to have been made on the date for making that claim.

Each progress claim shall be given in writing to the *Principal* and shall include details of the value of *the Services* performed and may include details of other moneys then due to the *Contractor* pursuant to the provisions of the *Contract.*

32.2 Payment

The *Principal* shall, within 14 days after receiving such a progress claim, pay the *Contractor* the amount due to the *Contractor* after deducting retention moneys and setting off such moneys as the *Principal* is entitled, pursuant to the *Contract,* to set off. If the *Principal* does not pay the amount claimed in the *Contractor's* progress claim, the *Principal* shall with the payment give the *Contractor* reasons for any difference.

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If the *Contractor* does not make a progress claim in accordance with *Item* 33, the *Principal* may at the *Principal's* discretion make a payment on account.

Neither a progress claim nor a payment of moneys shall be evidence that *the Services* have been performed satisfactorily. Payment other than final payment shall be payment on account only.

32.3 Final payment

Within 28 days after the expiry of the *defects liability period,* the *Contractor* shall give the *Principal* a written *final payment claim,* endorsed 'Final Payment Claim' being a progress claim together with all other claims whatsoever in connection with the subject matter of the *Contract.*

Within 42 days after the expiry of the *defects liability period,* the *Principal* shall pay to the *Contractor* or the *Contractor* shall pay to the *Principal,* as the case may be, the amount which is finally due and payable on any account whatsoever in connection with the subject matter of the *Contract.*

Payment of the amount due in respect of the *final payment claim* shall be conclusive evidence of accord and satisfaction, and in discharge of each party's obligations in connection with the subject matter of the *Contract* except for:

a) fraud or dishonesty relating to the performance of *the Services* or any part thereof;

b) any *defect* or omission in *the Services* which was not apparent at the end of the *defects liability period* or which would not have been disclosed upon reasonable inspection at the end of the *defects liability period;*

c) any accidental or erroneous inclusion or exclusion of any *work* or figures in any computation or an arithmetical error in any computation; or

d) unresolved issues the subject of any notice of *dispute* pursuant to clause 37, served before the 7th day after the payment by the *Principal* or by the *Contractor,* as the case may be, in respect of the *Contractor's final payment claim.*

32.4 Interest

Interest in *Item* 34 shall be due and payable after the date of default in payment.

32.5 Other moneys due

The *Principal* may elect that moneys due and owing otherwise than in connection with the subject matter of the *Contract* also be due to the *Principal* pursuant to the *Contract.*

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33 Payment of workers and subcontractors

This clause 33 shall not apply unless so stated in *Item* 35.

33.1 Workers and subcontractors

The *Contractor* shall give in respect of a progress claim, documentary evidence of the payment of moneys due and payable to:

a) workers of the *Contractor* and of the subcontractors; and

b) subcontractors,

in respect of the performance of *the Services* the subject of that claim.

If the *Contractor* is unable to give such documentary evidence, the *Contractor* shall give other documentary evidence of the moneys so due and payable to workers and subcontractors.

Documentary evidence, except where the *Contract* otherwise provides, shall be to the *Principal's* reasonable satisfaction.

33.2 Withholding payment

Subject to the next paragraph, the *Principal* may withhold moneys in respect of the progress claim until the *Contractor* complies with subclause 33.1.

The *Principal* shall not withhold payment of such moneys in excess of the moneys evidenced pursuant to subclause 33.1 as due and payable to workers and subcontractors.

33.3 Direct payment

Before final payment, the *Principal,* if not aware of a relevant relation-back day (as defined in the Corporations Law) may pay unpaid moneys the subject of subclause 33.1 directly to a worker or a subcontractor where:

a) permitted by law;

b) given a court order in favour of the worker or subcontractor; or

c) requested in writing by the *Contractor.*

Such payment and a payment made to a worker or subcontractor in compliance with a *legislative requirement* shall be deemed to be part-satisfaction of the *Principal's* obligation to pay pursuant to subclause 32.2 or 32.3, as the case may be.

34 Default or insolvency

34.1 Preservation of other rights

If a party breaches (including repudiates) the *Contract,* nothing in this clause shall prejudice the right of the other party to recover damages or exercise any other right or remedy.

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34.2 Contractor's default

If the *Contractor* commits a substantial breach of the *Contract,* the *Principal* may, by hand or by registered post, give the *Contractor* a written notice to show cause.

Substantial breaches include, but are not limited to:

a) failing to:

   i) provide *security;*

   ii) provide evidence of insurance;

   iii) comply with a *direction* of the *Principal* pursuant to subclause 25.3; or

   iv) use the materials or standards of *work* required by the *Contract;*

b) wrongful suspension of *work;*

c) substantial departure from a *performance program* without reasonable cause or the *Principal's* approval;

d) where there is no *performance program,* failing to proceed with due expedition and without delay; and

e) in respect of clause 33, knowingly providing documentary evidence containing an untrue statement.

34.3 Principal's notice to show cause

A notice under subclause 34.2 shall state:

a) that it is a notice under clause 34 of these General Conditions;

b) the alleged substantial breach;

c) that the *Contractor* is required to show cause in writing why the *Principal* should not exercise a right referred to in subclause 34.4;

d) the date and time by which the *Contractor* must show cause (which shall not be less than 7 clear days after the notice is received by the *Contractor);* and

e) the place at which cause must be shown.

34.4 Principal's rights

If the *Contractor* fails to show reasonable cause by the stated date and time, the *Principal* may by written notice to the *Contractor:*

a) take out of the *Contractor's* hands the whole or part of *the Services* remaining to be completed and suspend payment until it becomes due and payable pursuant to subclause 34.6; or

b) terminate the *Contract.*

34.5 Take out

The *Principal* shall complete *the Services* taken out of the *Contractor's* hands and may:

a) use materials, equipment and other things intended for *the Services;* and

b) without payment of compensation to the *Contractor:*

   i) take possession of, and use, such of the appliances and other things on or in the vicinity of the *premises* as were used by the *Contractor;* and

ii) contract with such of the *Contractor's* subcontractors and consultants,

as are reasonably required by the *Principal* to facilitate completion of *the Services.*

If the *Principal* takes possession of the appliances and other things, the *Principal* shall maintain them and, subject to subclause 34.6, on completion of *the Services,* shall return such of them as are surplus.

The *Principal* shall keep records of the cost of completing *the Services.*

34.6 Adjustment on completion of services taken out

When *the Services* taken out of the *Contractor's* hands have been completed, the *Principal* shall assess the cost thereby incurred and the difference between that cost (showing the calculations therefor) and the amount which would otherwise have been paid to the *Contractor* if *the Services* had been completed by the *Contractor* shall be moneys due and payable by the *Contractor* to the *Principal* or the *Principal* to the *Contractor,* as the case may be.

If the *Contractor* is indebted to the *Principal,* the *Principal* may retain appliances or other things taken under subclause 34.5 until the debt is satisfied. If after reasonable notice, the *Contractor* fails to pay the debt, the *Principal* may sell the appliances or other things and apply the proceeds to the satisfaction of the debt and the costs of sale. Any excess shall be paid to the *Contractor.*

34.7 Principal's default

If the *Principal* commits a substantial breach of the *Contract,* the *Contractor* may, by hand or by registered post, give the *Principal* a written notice to show cause.

Substantial breaches include, but are not limited to, failing to:

a) provide *security;*

b) produce evidence of insurance;

c) rectify inadequate *Contractor's* access to the *premises* if that failure continues for longer than the time stated in *Item* 36; and

d) make a payment due and payable pursuant to the *Contract.*

34.8 Contractor's notice to show cause

A notice given under subclause 34.7 shall state:

a) that it is a notice under clause 34 of these General Conditions;

b) the alleged substantial breach;

c) that the *Principal* is required to show cause in writing why the *Contractor* should not exercise a right referred to in subclause 34.9;

d) the date and time by which the *Principal* must show cause (which shall not be less than 7 clear days after the notice is received by the *Principal);* and

e) the place at which cause must be shown.

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34.9 Contractor's rights

If the *Principal* fails to show reasonable cause by the stated date and time, the *Contractor* may, by written notice to the *Principal,* suspend the whole or any part of *the Services.*

The *Contractor* shall remove the suspension if the *Principal* remedies the breach.

The *Contractor* may, by written notice to the *Principal,* terminate the *Contract,* if within 28 days of the date of suspension under this subclause the *Principal* fails:

a) to remedy the breach; or

b) if the breach is not capable of remedy, to make other arrangements to the reasonable satisfaction of the *Contractor.*

The *Contractor* may also be entitled to damages suffered by reason of the suspension.

34.10 Termination

If the *Contract* is terminated pursuant to subclause 34.4(b) or 34.9, the parties' remedies, rights and liabilities shall be the same as they would have been under the law governing the *Contract* had the defaulting party repudiated the *Contract* and the other party elected to treat the *Contract* as at an end and recover damages.

34.11 Insolvency

If:

a) a party informs the other in writing, or creditors generally, that the party is insolvent or is financially unable to proceed with the *Contract;*

b) execution is levied against a party by a creditor;

c) a party is an individual person or a partnership including an individual person, and if that person:

   i) commits an act of bankruptcy;

   ii) has a bankruptcy petition presented against him or her or presents his or her own petition;

   iii) is made bankrupt;

   iv) makes a proposal for a scheme of arrangement or a composition; or

   v) has a deed of assignment or deed of arrangement made, accepts a composition, is required to present a debtor's petition, or has a sequestration order made, under Part X of the Bankruptcy Act 1966 (Cwlth) or like provision under the law governing the *Contract;* or

d) in relation to a party being a corporation:

   i) notice is given of a meeting of creditors with a view to the corporation entering a deed of company arrangement;

   ii) it enters a deed of company arrangement with creditors;

   iii) a controller or administrator is appointed;

   iv) an application is made to a court for its winding up and not stayed within 14 days;

v) a winding up order is made in respect of it;

vi) it resolves by special resolution that it be wound up voluntarily (other than for a member's voluntary winding up); or

vii) a mortgagee of any of its property takes possession of that property,

then, where the other party is:

A) the *Principal,* the *Principal* may, without giving a notice to show cause, exercise the right under subclause 34.4(a); or

B) the *Contractor,* the *Contractor* may, without giving a notice to show cause, exercise the right under subclause 34.9.

The rights and remedies given by this subclause are additional to any other rights and remedies. They may be exercised notwithstanding that there has been no breach of contract.

35 Termination by frustration

If the *Contract* is frustrated:

a) the *Principal* shall assess the amount which would have been payable for *the Services* performed to the date of frustration had the *Contract* not been frustrated and had the *Contractor* been entitled to and made a progress claim on the date of frustration;

b) the *Principal* shall pay the *Contractor:*

i) the amount assessed under paragraph (a) together with all amounts due but unpaid;

ii) the cost of materials and equipment reasonably ordered by the *Contractor* for *the Services* and which the *Contractor* is liable to accept, but only if they will become the *Principal's* property upon payment; and

iii) the costs reasonably incurred:

A) removing the *Contractor's* equipment and appliances from the *premises;*

B) returning to their place of engagement the *Contractor,* subcontractors and their respective employees engaged in *the Services* at the date of frustration; and

C) by the *Contractor* in the expectation of completing the whole of *the Services* and not included in any other payment; and

c) each party shall promptly release and return all *security* provided by the other.

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36 Notification of claims

36.1 Communication of claims

The *prescribed notice* is a written notice of the general basis and quantum of the claim.

As soon as practicable after a party becomes aware of any claim in connection with the subject matter of the *Contract,* that party shall give to the other party the *prescribed notice* or a notice of *dispute* under subclause 37.1

This subclause and subclause 36.3 shall not apply to any claim, including a claim for payment (except for claims which would, other than for this subclause, have been included in the *final payment claim),* the communication of which is required by another provision of the *Contract.*

36.2 Liability for failure to communicate

The failure of a party to comply with the provisions of subclause 36.1 or to communicate a claim in accordance with the relevant provision of the *Contract,* shall, inter alia, entitle the other party to damages for breach of the *Contract* but shall neither bar nor invalidate the claim.

36.3 Liability for claims

If within 28 days of giving the *prescribed notice,* the claim has not been resolved the *prescribed notice* shall thereupon be deemed to be a notice of *dispute* given under subclause 37.1.

37 Dispute resolution

37.1 Notice of dispute

If a difference or dispute (together called a *'dispute')* between the parties arises in connection with the subject matter of the *Contract,* including a *dispute* concerning a claim:

a) in tort;

b) under statute;

c) for restitution based on unjust enrichment or other quantum meruit; or

d) for rectification or frustration,

or like claim available under the law governing the *Contract,*

then either party shall, by hand or by registered post, give the other a written notice of *dispute* adequately identifying and providing details of the *dispute.*

Notwithstanding the existence of a *dispute,* the parties shall, subject to clauses 34 and 35 and subclause 37.4, continue to perform the *Contract.*

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37.2 Conference

Within 14 days after receiving a notice of *dispute,* the parties shall confer at least once to resolve the *dispute* or to agree on methods of doing so. At every such conference each party shall be represented by a person having authority to agree to such resolution or methods. All aspects of every such conference except the fact of occurrence shall be privileged.

If the *dispute* has not been resolved within 28 days of service of the notice of *dispute,* that *dispute* shall be and is hereby referred to arbitration.

37.3 Arbitration

If within a further 14 days the parties have not agreed upon an arbitrator, the arbitrator shall be nominated by the person named in *Item* 37(a). The arbitration shall be conducted in accordance with the rules in *Item* 37(b).

37.4 Summary relief

Nothing herein shall prejudice the right of a party to institute proceedings to enforce payment due under the *Contract* or to seek injunctive or urgent declaratory relief.

38 Waiver of conditions

Except as provided at law or in equity or elsewhere in the *Contract,* none of the provisions of the *Contract* shall be varied, waived, discharged or released, except with the prior written consent of the parties.

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This Annexure shall be completed and issued as part of the tender documents and, subject to any amendments to be incorporated into the *Contract*, is to be attached to the General Conditions of Contract and shall be read as part of the *Contract*.

Item		
1	*Principal* (clause 1)	.... ACN ..... ABN .....
2	*Principal's* address	.... Phone ..... Fax .....
3	*Contractor* (clause 1)	.... ACN ..... ABN .....
4	*Contractor's* address	.... Phone ..... Fax .....
5	Superintendent	—not used
6	Superintendent's address	—not used
7	*Performance duration* (clause 1 and subclause 29.1)	..... *Hours / *Days / *Other OR between the hours of ..... am/pm and ..... am/pm
8	*Performance period cycle* (clause 1 and subclause 29.1)	*Daily / *Weekly / *Monthly / *Annually OR As follows: ....

* Delete as appropriate

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9	*Total performance period* (clause 1 and subclause 29.1)		
10	Governing law (page 3, clause 1(h))		If nothing stated, that of the jurisdiction where the *premises* are located
11	a) Currency (page 3, clause 1(g))		If nothing stated, that of the jurisdiction where the *premises* are located
	b) Place for payments (page 3, clause 1(g))		If nothing stated, the *Principal's* address
	c) Place of business of bank (page 2, clause 1(d))		If nothing stated, the place nearest to where the *premises* are located
12	*Contractor's security*		
	a) Form (clause 3)		
	b) Amount or maximum percentage of *contract sum* (clause 3)		If nothing stated, 5% of the *contract sum*
	c) If retention moneys, percentage to be retained from each progress payment (clause 3 and subclause 32.2)		..... %, until the limit in *Item* 12(b) If nothing stated, 10%, until the limit in *Item* 12(b)
	d) Time for provision (except for retention moneys) (clause 3)		within ..... days after *date of acceptance of tender* If nothing stated, 28 days
13	*Principal's security*		
	a) Form (clause 3)		
	b) Amount or maximum percentage of *contract sum* (clause 3)		If nothing stated, nil
	c) Time for provision (clause 3)		within ..... days after *date of acceptance of tender* If nothing stated, 28 days

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14	*Principal*-supplied documents (subclause 6.2)	Document	No. of copies
		1	.....
		2	.....
		3	.....
		4	.....
		5	.....
			If nothing stated, 5 copies
15	Time for *Principal's direction* about documents (subclause 6.3)	..... days If nothing stated, 14 days	
16	Subcontracting (subclause 7.2)	.....	
		.....	
		.....	
		.....	
		.....	
17	*Legislative requirements*, those excepted (subclause 9.1)	.....	
		.....	
		.....	
18	The *Contractor's* liability is limited as follows: (subclause 13.1)		
	a) For claims in respect or arising out of death or personal injury	Unlimited	
	b) For loss of rents, income (other than arising out of death or personal injury) and the opportunity to earn profits and indirect and consequential loss	$ ..... If no amount stated, $1	
	c) For all other claims whatsoever	$ ..... If no amount stated, the *contract sum* as adjusted pursuant to the *Contract*	
19	The *Principal's* liability is limited as follows (subclause 13.1)	$ ..... If no amount stated, the *contract sum* as adjusted pursuant to the *Contract*	

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20	Amount of the insurance of the liability to reinstate shall be not less than (clause 14)	..... $ ..... If nothing stated, then not less than the *contract sum*
21	Public liability insurance (clause 15)	
	a) Alternative applying	..... If nothing stated, Alternative 1 applies
	If Alternative 1 applies	
	b) Amount per occurrence shall be not less than	..... $ ..... If nothing stated, $10 000 000
22	Facilities, utilities and items of plant, equipment and material made available to the *Contractor* by the *Principal* at the *premises* (clause 23)	.....
23	Extent to which the *Principal* is not to be responsible for arranging repairs to enable *the Services* to be performed (clause 24)	.....
24	Date and time for commencing the first *single performance* of *the Services* (subclause 29.1)	..... day of ..... 20 ..... at ..... *am / *pm
25	*Qualifying causes of delay*, causes of delay for which *EOTs* will not be granted (page 2, paragraph (b)(ii) of clause 1 and subclause 29.3)	.....

* Delete as appropriate

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26	Time for the *Contractor* to give claim for an *EOT* (subclause 29.3)	..... days If nothing stated, 28 days
27	Time for the *Principal* to give a written *direction* for an *EOT* (subclause 29.5)	..... days If nothing stated, 28 days
28	Liquidated damages for a *single performance* of *the Services*, rate (subclause 29.6)	.... per day $ ..... per day
29	Other *compensable causes* (page 1, paragraph (b) of clause 1 and subclause 29.7)	....
30	Delay damages, rate (subclause 29.7)	.... per day $ ..... per day If nothing stated, then in accordance with clause 36
31	Warranties to be provided by *Contractor* (subclause 30.1)	Item ..... Period ....
32	*Defects liability period* (subclause 30.2)	..... If nothing stated, 30 days
33	Dates on which or times within which progress claims are to be given (subclause 32.1)	On the ..... day of each ..... OR Within .....days after completion of each *single performance* of *the Services* If nothing stated, 7 days after completion of each *single performance* of *the Services*
34	Interest rate on overdue payments (subclause 32.4)	..... % per annum If nothing stated, 18% per annum

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35	Payment of workers and subcontractors. Is clause 33 to apply? (clause 33)	*No / *Yes If neither deleted, the clause shall not apply
36	Time for *Principal* to remedy inadequate access to the *premises* (subclause 34.7(c))	..... days If nothing stated, 14 days
37	Arbitration (subclause 37.3)	
	a) Person to nominate an arbitrator	.... If no-one stated, the President of the Institute of Arbitrators & Mediators Australia
A1		
	b) Rules for arbitration	.... If nothing stated: a) Rules 5–18 of the Rules of The Institute of Arbitrators & Mediators Australia for the Conduct of Commercial Arbitrations; OR b) if one or more of the parties are nationals of and habitually resident in, incorporated in, or where the central management and control is exercised in, different countries as between the parties, then the UNCITRAL Arbitration Rules shall apply and the appointing authority shall be the person provided in *Item* 37(c)
	c) Appointing Authority under UNCITRAL Arbitration Rules	..... If no-one stated, the President of the Institute of Arbitrators & Mediators Australia
A1		

* Delete as appropriate

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Approved form of unconditional undertaking

(clause 1 — *security*)

At the request of .....

ACN ..... ABN .....(the *Contractor*) and in consideration of

.....

ACN ..... ABN .....(the *Principal*) accepting this undertaking in respect of the *Contract* for .....

.....

.....(the Project) .....

.....

ACN ..... ABN .....(the *Financial Institution*) unconditionally undertakes to pay on demand any sum or sums which may from time to time be demanded by the *Principal* to a maximum aggregate sum of .....

.....($ .....)

The undertaking is to continue until notification has been received from the *Principal* that the sum is no longer required by the *Principal* or until this undertaking is returned to the *Financial Institution* or until payment to the *Principal* by the *Financial Institution* of the whole of the sum or such part as the *Principal* may require.

Should the *Financial Institution* be notified in writing, purporting to be signed by .....

.....for and on behalf of the *Principal* that the *Principal* desires payment to be made of the whole or any part or parts of the sum, it is unconditionally agreed that the *Financial Institution* will make the payment or payments to the *Principal* forthwith without reference to the *Contractor* and notwithstanding any notice given by the *Contractor* not to pay same.

Provided always that the *Financial Institution* may at any time without being required so to do pay to the *Principal* the sum of .....

.....($ .....)

less any amount or amounts it may previously have paid under this undertaking or such lesser sum as may be required and specified by the *Principal* and thereupon the liability of the *Financial Institution* hereunder shall immediately cease.

Dated at ..... this ..... day of ..... 20.....

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Deletions, amendments and additions

The following changes have been made to AS 4920—2003

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AMENDMENT CONTROL SHEET

AS 4920—2003

Amendment No. 1 (2005)

REVISED TEXT

SUMMARY: This Amendment applies to Clause 37 (a) and (c) of Annexure Part A.

Published on 30 March 2005.

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ISBN 0 7337 3767 6

Printed in Australia

Appendix U

Particular Conditions of Contract

Particular Conditions

Definitions

1.1 Definitions

The Contract

In the Contract as defined below the words and expressions defined shall have the following meanings assigned to them except where the context requires otherwise:

1.1.1 ***"Hot Work"*** shall mean the performance of work where heat is used or generated and is of such intensity as to possibly ignite flammable liquids, gases or other flammable materials. Hot work is permitted only when and where specifically authorized in writing on the Work Permit.

1.1.2 "**Hazardous Areas**" are those areas where an accumulation of petroleum vapours might occur in sufficient concentration to form a flammable mixture. A hazardous area can be one that is normally safe, but has become hazardous due to some performance or operation. Hazardous Areas are classified in accordance with AS2430, Part 1, as Zone 0, Zone 1 or Zone 2.

1.1.3 "**Hazardous Work**" shall mean:

a) Any work that may require or generate a form of heat or ignition source carried out in an atmosphere that may contain flammable liquid vapours or gases or other flammable materials.

b) Any work carried out on materials contaminated by toxic products, or any work carried out in a Confined Space;

c) Work that will entail use of equipment and materials that may produce static electricity discharge.

1.1.4 "**Gas Free**" means non-explosive atmosphere, but not necessarily a lead-free atmosphere.

1.1.5 "**Restricted Area**" is that area in which the **Employer** exercises control over all movements and operations, e.g. the area within the boundary fence of sites owned or leased by the **Employer**.

1.1.6 "**Confined Space**" is the interior of any tank, or compartment of a tank, vessel, manhole, sewer pump, pit of any excavation all as defined in Australian Standard AS 2865 " Safe working in a confined space "

1.1.7 "**Entry**" shall refer to the entering of any Confined Space or working with any part of the body projecting into a manhole or opening of a tank or compartment of a tank or pit.

1.1.8 "**Authorized Equipment**" shall mean equipment which has had any ignition sources modified so that they will not ignite flammable vapors and which has been approved of in writing by the Issuing Authority It shall also mean equipment covered by a work permit or checklist which is considered in writing by the Issuing Authority not to constitute a hazard in the particular area which the work permit or checklist covers.

1.1.9 "**Checklist**" shall mean a written instruction of the conditions which must be observed by the Contractor when carrying out routine works for which he has been trained and approved by the Issuing Authority. When a checklist is issued it shall take the place of a work permit for that part of the work.

1.1.10 "**Work Permit**" shall mean the written instruction given by the Issuing Authority to the Contractor telling of the conditions under which each phase of all work described in the Contract or Purchase Order shall be done

1.1.11 "**Issuing Authority**" is the person with the authority delegated by **Employer** to issue a Work Permit and/or Gas Free Certificate.

1.1.12 "**Endorsing Authority**" is the person with the authority delegated by the by the Issuing Authority to re-endorse Work Permits and Checklists.

1.1.13 "**Gas Free Certificate**" shall mean the written certification given by the Issuing Authority that the equipment described on the form is free of flammable vapor and suitable for the work described on the form.

1.1.14 "**Site**" means the land and other places to be made available to the Contractor for the purpose of doing the work described in the Contract or Purchase Order. It may be fenced or un-fenced and may or may not be owned by **Employer**.

General Safety Policy

2.1 Provision of Site

It is a primary and continuing policy of the Employer that in the conduct of its activities it will endeavour to protect the health and safety of its employees, customers and others who may be affected by these activities and endeavour to limit adverse effects on the physical environment in which its activities are carried out.

These Conditions form part of the contract for work between the Employer and an approved contractor for work to be performed at any Employer property, or works under the control of the Employer. This includes works arranged by Purchase Order or Agreement.

2.2 Statutory Requirements

The Contractor shall comply with all Statutory Regulations governing the work area and work to be done. Where Codes of Practice apply to work, the Contractor shall be guided by these Codes of Practice.

2.3 Areas of Application

These Conditions shall apply at all times during which the Contractor is in connection with the works on the Site or within any of Employer premises or working on Employer facilities plant or fixtures whether or not within the boundaries of Employer premises.

The whole of the Employer premises within the boundary fence or wall shall constitute a Restricted Area (as herein defined) except where specifically exempted in work permit or checklist.

2.4 Clothing and Personal Protective Equipment (PPE)

All Contractors personnel shall be clearly identifiable in a distinct Uniform.

The minimum level of personal protection that Contractors and their employees shall wear:

a) Standards approved Head Protection, for all construction work. Approved bump caps may be worn as an alternative for maintenance work if there is no overhead work.

b) Appropriate eye protection.

c) Neck to Toe clothing (long trousers, and long sleeved shirt).

d) Standards Australia approved steel capped safety footwear.

e) Visibility safety vests must be worn for all work in all areas that may be trafficked or where mobile equipment is operating.

Protective clothing and equipment required to carry out the work and to meet the safety requirements of Employer (and may be specified in the permit(s)) shall be provided and maintained by the Contractor who shall be responsible for ensuring that his employees and sub-contractors wear or use the clothing and equipment.

The Contractor shall ensure that all persons using protective equipment are trained in their use.

To manage the safety of Site visitors to construction works the Contractor will be required to have on Site spare sets of protective clothing and safety equipment to an agreed level to allow visitor access to the works.

2.5 Incident/Accident Reporting

The Contractor will report to Employer any accident, injury, loss or damage to any person or any property of a third party and to the property of Employer, this is to be in a form compatible with Employer incident reporting requirements as defined in Attachment 1.

2.6 Entry into Corporation Premises

Persons shall not enter or attempt to enter the Site or other facilities otherwise than by recognized gates or other entrances as directed by the Employer's Representative. The Contractor must report to an authorized person before entering the premises.

At Sites such as service stations where there may not be defined entrances to work area, the Contractor must report to the Employer's Representative before commencing work or placing equipment on Site.

2.7 Alcohol and Drugs

No intoxicating liquor or drugs shall be brought onto the Site or other facilities. Any persons reporting for duty in an intoxicated condition and / or with intoxicating liquor or drugs will be refused admission or not permitted on the Site.

Likewise Contractor employees found under the influence of drugs, either for medical or other purposes and constituting a health/safety issue, will be refused admission and/or sent from the Site.

2.8 Access to Work Areas

Neither the Contractor nor any of his employees or sub-contractors shall enter nor be upon any part of the Site other than the permitted location of their work except with the prior permission of the Employer's Representative.

Access to Site shall be permitted Daily.

2.9 Ignition Sources

Equipment capable of generating any ignition sources are not permitted into work areas, except where approved by work permit.

Failure to comply with these requirements will result in removal from the Site.

Some examples of ignition sources that are capable of igniting flammable substances are as follows:

a) All naked flames, matches or lighters of any description, explosive powered tools or firearms.

b) Electric and gas welding torches and gas welding igniters.

c) Grit and sand blasting machines or spray painting equipment.

d) Power-operated grinders and cutting machines and portable electric tools.

e) Electrical equipment if industrial type, i.e. neither flameproof, intrinsically safe nor approved.

f) Portable radios, mobile telephones, cameras with batteries, photographic flash units, pocket paging units (not intrinsically safe), pocket calculators, hearing aids - unless certified by a qualified Electrical Engineer as inherently safe - evidence of this will be required in advance of the work commencing.

g) Hand-operated ferrous tools in contact with dry concrete, stone or masonry, aluminium in contact with corroded steel.

h) Internal combustion engines and diesel engines that are not provided with approved exhaust and inlet systems and ancillary electrical equipment;

i) Any other machine or equipment capable of producing a local source of ignition either by flame, static electricity, friction, heat, spark, exhaust temperature, etc.

2.10 Smoking

Smoking within the Site is prohibited except in declared areas which shall be nominated.

2.11 Motor Vehicles, Plant and Equipment including Motorcycles and Bicycles

Vehicles, plant and equipment other than required for the execution of the works are not permitted on the Site or work areas.

Vehicles, plant and equipment may be required to undergo a safety check by the Employer's Representative, who will reject any equipment found to be unsafe.

Operators of vehicles or equipment entering Site or works areas must ensure that their entry or exit is noted by the Employer's Representative, supervisor or other authorized persons.

a) Contractor's equipment within Employer's premises or on work sites must not:

b) Block any entry, gateway or access so as to prevent the free access of other vehicles.

c) Obstruct foam pump houses, fire hydrants, hose boxes or other safety equipment.

d) Contractor's vehicles must be parked facing the exit of the premises or Site with engines switched off and doors unlocked, but ignition / starter key left in the ignition / starter lock. This does not apply to vehicles on Retail Service Stations as vehicle should be secure.

2.12 Entry into Confined Spaces

Entry into a Confined Space is prohibited except as authorized by a current Work Permit.

2.13 Hazardous Work (Hot Work)

Hazardous, or Hot Work shall not be performed except as authorized by a current Work Permit or approved Checklist.

2.14 Authorized Equipment

Only authorized equipment is to be used by the Contractor, his employees and sub-contractor.

2.15 Gas Free

Before working on or in tanks or vessels or in excavations/open drains, sumps, etc., which have or may have contained hydrocarbon liquids or vapours, a Gas Free Certificate and work permit must be obtained by the Contractor from the Issuing Authority. The conditions shown on this Certificate or permit must be strictly adhered to.

2.16 Minimum requirements for Working at Heights

The following minimum requirements shall be applied when working at heights on Employer installations.

Employer defines “working at heights” as work performed above 2.0 meters (m) or approximately 6 feet (ft). This is further defined as the lowest part of the body is above 2m, or within 2.0m of an edge where a 2.0m or greater fall may occur.

In all cases where legislation or local requirements are more rigorous, the more rigorous rules shall be applied.

Before work is to occur at height a specific hazard identification and risk assessment of the work and specific task(s) must be conducted for each individual case. This is to address all safety aspects of the task and ensure that the correct procedures are applied and appropriate equipment is available. Any rescue methods must also be specified.

Note, where the term “fall arrest system” is used in this document it can be of several different types, a body harness and anchor points or static line, scaffolding (with hand rails) to within 600mm below the exposed edge or temporary handrails etc.

Any fall arrest system shall comply with OSHA, ANSI and CSA Requirements “Industrial fall-arrest systems and devices”.

A parapet or hand rail along an exposed edge must be at least 900mm high and in the case of a hand rail have fender boards and intermediate rails to stop a person from sliding underneath the top rail.

Access above 2.0m

Access can be gained via ladders or scaffolding. The following rules must be followed for accessing areas above 2.0m:

Ladders

a) may only be used for access to areas that are protected by a fall arrest system.
b) are required to be secured before using i.e. a ladder fixing point must be used.
c) the ladder must be tied off to the fixing point by the first user.
d) no work shall be performed from a ladder (over 2.0m) they are for access only.

Scaffolding

a) must be erected by competent persons in accordance with local OSHA requirements.
b) may be used for access to areas that are protected by a fall arrest system.
c) Note the scaffold may be part of the fall arrest system.

Cherry pickers may be used for access to roofs and canopies (excluding new Harmony solar canopies) where the basket is lowered onto the roof more than 2.0m from an edge. While in the basket of a cherry picker a body harness must be worn at all times.

Egress from a scissor lift at height is prohibited. OSHA, if specifically requested for a particular task, can waive this rule.

Working within 2 m of an exposed edge

A fall arrest system must be installed whenever work is to occur within 2m of an exposed edge i.e. working within 2m of the roof edge. An exposed edge is any edge that a fall of over 2m can occur.

2.17 Fall Arrest Systems

Fall arrest systems shall not be used as the main protection system unless there are no alternatives.

If fall arrest system is to be used, rescue must be assured within 10 to 15 minutes, In most of our applications that will mean that we have to have a full time safety watch

If we can't be assured that a rescue can be carried out within 10 to 15 minutes the fall arrest system must have a device that automatically lowers the person to ground safely

If we can't comply with the above an alternative safe working procedures must be used refer to local legislative requirements.

Scheduled Maintenance

Where a procedure is considered scheduled maintenance (e.g. a task that is repeated at regular intervals up to 12 months apart) a permanent fall arrest system must be installed if work is to occur within 2m of an exposed edge. Unscheduled tasks can be done from a temporary fall arrest system.

Site Security

3.1 Site Security

The Contractor shall provide security fencing to ensure the Site perimeter is cordoned off to prevent unauthorised public entry. The security fence shall be 1830mm high Cyclone wire mesh with steel posts to achieve a safe secure Site.

The work areas shall be cordoned off at all times to prevent accidental or unauthorized entry and shall carry signage identifying the area as a construction site with warning signs as appropriate. Arrangements for public/operator access across and around work area, trenches, construction materials and equipment storage areas shall be carefully considered to ensure safety to public is maintained at all times.

Additional warnings and / or barricades shall be used where vehicle movements present a risk to the work area.

All demolition areas shall be barricaded off to prevent accidental entry to the works area.

3.2 Site Safety Requirements

Electrical Leads

Only electrical leads equipped with earth leakage devices and inspection tags shall be used on Site. Electrical leads shall be kept clear of the ground at all times.

In the event a suspended lead obstructs access to a work area it shall be placed through a steel conduit on the ground.

Under no circumstances shall vehicles be driven over unprotected electrical leads.

Rubbish

The Contractor is responsible for maintaining the Site in a clean and safe condition.

During demolition or excavation activities a maximum of 1 (one) truck load of debris will be permitted to be held on Site. Prompt removal of all debris is required.

In the event it is necessary to hold more than one truck load of debris on Site, the debris will be mounded into a tidy heap and barricaded off, to prevent accidental access.

Signs

The Contractor shall install and maintain, as applicable to work scope, the following safety / warning signs on the Site – as approved by the Corporations Authorized Representative.

a) Safety Helmet Area - On barricades around tank excavation or overhead work.

b) Danger - Construction Site, Unauthorized Persons Keep Out - At entry to work area.

c) Danger - Flammable Liquids - on free standing frames or on barricades at hazardous work areas exposed to the public.

d) Danger - Keep Out No Access - free standing frames or on barricades on all visible public approaches to work areas.

e) Danger - Do Not Operate - tags with securing cord for all isolations of valving and electrics.

Angle Grinders

The maximum size angle grinder allowed on Site is 7 inch and must be fitted with a double acting switch. They shall only be used for grinding. Cutting with grinders is not allowed. Angle grinders must have all guards in place and current inspection and test tag attached.

During grinding all of the following Safety equipment is used at all times;

- Eye protection (full-face shield and glasses or goggles).
- Hearing protection (ear plugs or muffs).
- No loose fitting or flammable clothing is to be worn.

The use of welding shields alone is not permitted

3.3 Works Control

The construction will take place within the Restricted Area where the existing Office Building is situated.

Works shall be suspended within the area whenever a Tanker is in port for discharge.

At all other times works will be controlled under the Employer's Work Control Procedures.

Fire Watch

If the scope of work involves "naked flame" work in a hazardous area a Fire Watch will be required.

Provision of a fire watch for hot works will rest with contractor.

The Fire Watch will have to be trained in accordance with Employer's Fire Watch Procedures which involves reading and understanding the duties of a Fire Watch.

Control of the Site and Works will rest with the Contractor, and sub-contractors shall be required to work under their control whilst on Site.

Critical Path

Within 7 days of award of Contract, the Contractor shall present to the Employer's Representative a "Critical Path" network expanded from the Tendered time-chart.

Such expansion of the Tender time-chart shall not change the Starting or Completion Dates of the works, or separate sections of the works listed therein, but shall add greater detail and information such that a detailed "Critical Path" network is obtained.

Should the Contractor wish to vary any dates shown in his Tender time-chart, he shall obtain the Superintendent's approval in writing prior to including such a variation in the "Critical Path" network.

The Contractor shall allow in his scheduling anticipated delays due to days when no works may be permitted on W due to tankers or other operational activities within the terminal. The number of days allowed for such delays shall be clearly stated in the Contractors scheduling.

Project Management

4.1 Contractors Project Management

The Contractor shall appoint for this Contract a Project Manager who shall be responsible for the efficient management and control of the works, for the quality of the work and its performance in the manner specified. The Project Manager shall be suitably experienced in Contracts of this size or larger, and works of this nature and class.

4.2 Responsible Foreman

The Contractor shall have at the Works, from start to finish, a responsible Foreman with appropriate professional qualifications, experienced in all aspects of works in the Contract and who must be on duty or suitably and responsibly represented during all working hours.

A suitably qualified and experienced foreman shall be present at all times at each location of works, work front or item of works as appropriate.

The foreman shall be able to receive and carry out instructions from the Superintendent.

The foreman shall not be replaced by the Contractor without the approval of the Superintendent.

4.3 Appointment

The Employer's Representative reserves the right to approve the appointment of the Contractor's Project Manager and Foremen and to withdraw such approval at any time during the Contract for any cause whatsoever.

Should at any time the Contractor's representatives or project organization be adversely affecting the progress or standard of works, the Employer's Representative may direct the Contractor to take whatever measures are necessary to rectify the situation. Any measures shall be at no cost to the Contract.

Permits and Approvals

5.1 Safe Work Permit / Checklist

Unless otherwise agreed in writing between the Employer and the Contractor, each section of all work shall be covered by the issue of a safe work permit or checklist. All Contractors and persons under their control shall understand and comply with all instructions on the work permit and checklist.

5.2 Daily Endorsement

Work permits and checklists **must be re-endorsed at the beginning of each shift** or daily working period by the Endorsing Authority.

5.3 Safety Induction

All Contractors employees shall undergo a Safety Induction by the Employer's Representative. No employee is allowed onto the Site without the Safety Induction.

Safety Induction shall be carried out every four (4) weeks.

5.4 Gas Free Certificate Revalidation

If a gas free certificate has been issued in conjunction with the work permit or checklist it must be re-endorsed at the beginning of each shift or daily working period.

5.5 Site Safety Management Plan

Prior to any works beginning on Site, the contractor must supply to Employer's Representative a Site Safety Management Plan (SSMP) specific to the project. The SSMP shall include a detailed Inspection and Test Plan, and a Method Statement detailing the proposed risk control methods for stages of the Works.

5.6 Method Statement

The Method Statement must be accepted by the Employer's Representative before any works can commence, and will be referenced in Work Permits issued by the Site to carry out works. All work will be carried out according to the contractors Safety Health and Environmental Management plan and Quality Manual, copies are to be kept on Site at all times.

5.7 Other Permits

The contractor will be responsible for providing any other permits associated with the construction of the facilities, e.g. permits for tie in for wastewater and electrical inspection.

The Contractor assumes full and complete responsibility for any and all Subcontractors working under their direction in performing the scope of work as outlined herein. A list of all Subcontractors proposed by the Contractor shall be submitted to the Owner including a breakdown of the percentage of work to be performed by the subcontractor. Subcontractor(s) shall be subjected to the same safety requirements, verifications, and certifications as the Contractor.

Appendix V

Tender and Price Submission Forms

TENDER PRICE SUBMISSION FORM

MILESTONE	DESCRIPTION OF WORK PACKAGE	SUPPLY COST	INSTALLATION COST	TOTAL PRICE
M1	Contracting & Project Management			
M2	Mobilization			
M3	Tank Cleaning, Isolation, Sludge/Slops Treatment			
M4	API653 Out of Service Inspection			
M5	Tank Foundation Works			
M6	Floor Repairs			
M7	Nozzle & Apperatures			
M8	Shell Repairs			
M9	Tank Roof Repairs			
M10	Tank Handrails & Stairways			
M11	Tank Fittings & Equipment			
M12	Post Repair Inspections			
M13	Tank Inlet Pipeline Modifications			
M14	Tank Outlet Pipeline Modifications			
M15	Tank Water Drain & Quick Flash Tank Pipework			
M16	Tank Coating Internal			
M17	Tank Coating External			
M18	Tank Calibration			
M19	Tank Fitness for Service			
M20	Tank Commissioning			
	Contingency 5%			

SUB TOTAL _____

LUMP SUMP PRICING _____

ANY OTHER ITEMS not included above but for which the Contractor requires compensation to complete the work under the Contract shall be list in page 2 of this form

All Materials shall be approved by Vital appointed Tank Engineer's. Contractor bidding must have clear understanding of all relevant Tank and Aviation Standards for Bulk Fuel Storage.

TENDER PRICE SUBMISSION FORM

MILESTONE	DESCRIPTION OF WORK PACKAGE	SUPPLY COST	INSTALLATION COST	TOTAL PRICE

TENDER'S SIGNATURE: _____

DATE: _____

DESCRIPTION	SIZE	RATES	UOM
Blasting & Painting			
Internal Blasting – Tank Floor		$_____	/SQ.FT
Internal Blasting – Tank Shell		$_____	/SQ.FT
Internal Blasting – Tank Roof		$_____	/SQ.FT
Internal Coating Floor @ 300microns (2 coats)		$_____	/SQ.FT
Internal Coating Shell @ 300microns (2 coats)		$_____	/SQ.FT
Internal Coating Roof @ 300microns (2 coats)		$_____	/SQ.FT
External Blasting – Shell		$_____	/SQ.FT
External Blasting – Roof		$_____	/SQ.FT
External Blasting – Stairs & Handrails		$_____	/SQ.FT
External Coating Shell @ 450microns (3 coats)		$_____	/SQ.FT
External Coating Roof @ 450microns (3 coats)		$_____	/SQ.FT
External Coating Stairs & Handrails @ 450microns (3 coats)		$_____	/SQ.FT
Carbon Steel Pipe welding-			
butt , flange, fitting, including fabrication handling	**BUTT WELD**		
	NB25	$_____	/each Weld
	NB50	$_____	/each Weld
	NB80	$_____	/each Weld
	NB100	$_____	/each Weld
	NB150	$_____	/each Weld
	NB200	$_____	/each Weld
	FILLET WELD		
	NB25	$_____	/each Weld
	NB50	$_____	/each Weld
	NB80	$_____	/each Weld
	NB100	$_____	/each Weld
	NB150	$_____	/each Weld
	NB200	$_____	/each Weld
Carbon Steel Nozzle			
Removal & Installation with reinforcing plate	NB25	$_____	/each Nozzle
	NB50	$_____	/each Nozzle
	NB80	$_____	/each Nozzle
	NB100	$_____	/each Nozzle
	NB150	$_____	/each Nozzle
	NB200	$_____	/each Nozzle
	24'' Manway	$_____	/each Nozzle
Welding Rate – Carbon Steel Plates Down-hand Groove Weld Horizontal Groove Weld			
Vertical Groove Weld			
Plate, Stairs & Handrail Welding & Repairs		$_____	/SQ.FT
6mm Thick plate floor insertion replacement		$_____	/SQ.FT
8mm Thick plate floor insertion replacement		$_____	/SQ.FT

10mm Thick plate floor insertion replacement		$_____	/SQ.FT
6mm Thick floor patch plate		$_____	/SQ.FT
8mm Thick floor patch plate		$_____	/SQ.FT
10mm thick floor patch plate		$_____	/SQ.FT
6mm Thick plate Shell/Roof insertion replacement		$_____	/SQ.FT
8mm Thick plate Shell/Roof insertion replacement		$_____	/SQ.FT
10mm Thick plate Shell/Roof insertion replacement		$_____	/SQ.FT
6mm Thick Shell/Roof patch plate		$_____	/SQ.FT
8mm Thick Shell/Roof patch plate		$_____	/SQ.FT
10mm thick Shell/Roof patch plate		$_____	/SQ.FT
Stairs Replacement – MS Plate		$_____	/SQ.FT
Handrail replacement		$_____	/L.FT
Resources & Consumables			
Blasting Equipment (Wet Blasting system)		$_____	/Day
Welding Plant (Mobile Equipment)		$_____	/Day
Abrasive Blast operator		$_____	/Day
Oxy Cutting Set		$_____	/Day
General Hand Tools		$_____	/Day
Industrial Painter		$_____	/Hour
Trade Assistant		$_____	/Hour
Pipe Fitter		$_____	/Hour
Welder (ASME IX 6G Qualified)		$_____	/Hour
Welder (ASME IX 3G Qualified)		$_____	/Hour
On Site Supervisor		$_____	/Hour
Project Manager – On Site		$_____	/Hour
Project Manager – Off Site		$_____	/Hour
Off Site Administration & Management		$_____	/Hour
Stand- By Rate		$_____	/Day
Delay Rate		$_____	/Day

Add Items that many not be list above in a separate sheet

TENDER'S SIGNATURE: _____

DATE: _____

VITAL ENERGY SUPPLIED ITEMS

ITEM DESCRIPTION	QTY	SUPPLIER
Ground Level Indicater	01	Vital Energy
6" Aluminum Dip Hatch	01	Vital Energy
6" Aluminum Sample Hatch	01	Vital Energy
8mm Carbon Steel Grade A36 - Floor Plates	15 off - cut to size	Vital Energy
1800mm x 6000mm x 6mm A36 Grade CS Plate	04	Vital Energy
12" Sch 40 Carbon Steel Pipe	02	Vital Energy
1" Sch 80 Carbon Steel Pipe	01	Vital Energy
Amercoat 240 Buff	Garry to provide	Vital Energy
Amercoat 240 White	Garry to provide	Vital Energy
Thinner	Garry to provide	Vital Energy
Garnet	Garry to provide	Vital Energy
Tank Jacks	12 off	Vital Energy

Note:
No Equipment or Tools shall not be supplied by Vital Energy.
All tools and Equipments on site are for Vital Energy's own use and not for hire

TENDER'S SIGNATURE: _____

DATE: _____

SUMMARY OF PLANT EQUIPMENTS

DESCRIPTON/ MAKE/ MODEL	CAPACITY	# OF Units	AGE	OWNED (O) HIRED (H)

The Tenderer shall provide the list of equipments for the project for successful completion. Add additional sheets if required.

TENDER'S SIGNATURE: _____

DATE: _____

SUMMARY OF KEY PERSONNEL

NAME	QUALIFICATION	TRADE	EXPERIENCE

The Tenderer shall provide the list of personnel for the project with qualification and experience in similar projects, preferred tank works or similar works for Oil & Gas Industry would be an advantage.

TENDER'S SIGNATURE: _____

DATE: _____

EXCLUSION FORM

The Tenderer shall provide the list of of works that they will not be completing or items that they cannot furnish as per the scope of the applicable Standard

TENDER'S SIGNATURE: _____

DATE: _____

PROGRESS CLAIM FORM

CONTRACT NAME: _____ **CONTRACT NO:** _____

DATE: _____ **PROJECT #:** _____

PROGRESS CLIAM # _____ **PROJECT MANAGER:** _____

AUTHORISED CONTRACT VALUE			$
TOTAL PC SUMS			$
AUTHORISED VARIATIONS			$
VO#	**PO#**	**Description**	
			$
			$
			$
			$
			$

TOTAL CONTRACT VALUE

Total Completed To Date: $ _____

Claim #	Invoice #	Inv. Date	Milestone Description	Amount of Claim	Amount Remaining
001			Contracting & Project Management	$	$
002			Mobilization	$	$
003			Tank Cleaning, Isolation, Sludge Treatment	$	$
004			API653 Out of Service Inspection	$	$
005			Tank Foundation Works	$	$
006			Floor Repairs	$	$
007			Nozzle & Apperatures	$	$
008			Shell Repairs	$	$
009			Tank Roof Repairs	$	$
010			Tank Handrails & Stairways	$	$
011			Tank Fittings & Equipment	$	$
012			Post Repair Inspections	$	$
013			Tank Inlet Pipeline Modifications	$	$
014			Tank Outlet Pipeline Modifications	$	$
015			Tank Water Drain & Quick Flash Tank Pipework	$	$
016			Tank Coating Internal	$	$
017			Tank Coating External	$	$
018			Tank Calibration	$	$
019			Tank Fitness for Service	$	$
020			Tank Commissioning	$	$

Less Previous Claims $ _____

Less Previous Retentions $ _____

Retention from this Claim $ _____

Current Payment Due **$** _____

Contract Payment Remaining **$** _____

Total Retentions held To-Date **$** _____

PROJECT MANAGER'S CERTIFICATE FOR PAYMENT:

The Project Manager hereby confirms that based on site observations & to the best of his/her knowledge, this payment application accurately reflects the progression of work and that this work meets contract requirements sufficient enough to justify payment in the amount certified below:

AMOUNT CERTIFIED **$** _____

Project Manager _____ **Contract Manager** _____

Date _____ **Date** _____

CONTRACT VARIATION INSTRUCTION (CVI)

PROJECT NAME:	**CVI#:**
SUBCONTRACTOR:	**DATE :**
LOCATION:	**REF:**

You are instructed to proceed with the changes to the work described below. Unless otherwise stated all materials and workmanship are to be in accordance with the requirements of the Contract. The cost of the work described in the Contractor's Instruction shall be determined by the requirements and Conditions of the Contract

THIS CHANGE ORDER INSTRUCTION IS NOT VALID UNLESS SIGNED IN THE SPACE PROVIDED BY THE AUTHORISED REPRESENTATIVES OF THE MAIN CONTRACTOR. ALL CHANGE ORDER THAT HAS COST SHALL BE FOLLOWED UP BY VITAL ENERGY PURCHASE ORDER.

SUBJECT	

REASON FOR VARIATION ORDER

- ☐ Revised Design information
- ☐ Engineer Instruction
- ☐ Client Requirement
- ☐ Safety
- ☐ Quality
- ☐ Site Condition Change
- ☐ Deletion of Contract Works
- ☐ Addition to Contract Works
- ☐ Other

INSTRUCTION

DOCUMENTS ATTACHED

SIGNATURES: MAIN CONTRACTOR

Client	PRINT NAME	SINGATURE	/ /
Project Manager	PRINT NAME	SINGATURE	

CONFIRMATION OF RECEIPT

Sub-Contractor	PRINT NAME	SINGATURE	/ /

DISTRIBUTION:

Original: Contractor **Copies:** Contract Admin. / PMO / OSS /Accounts / File