

# **DRAFT SOW FOR RFI NRL-11-SL01**

## **NAVAL CENTER FOR SPACE TECHNOLOGY**

**TURNKEY INDOOR NEAR-FIELD ANTENNA MEASUREMENT SYSTEM  
STATEMENT OF WORK (SOW) FOR THE  
MICROWAVE IMAGER/SOUNDER (MIS) PROGRAM**

**(Preliminary SOW for RFI)**

# DRAFT SOW FOR RFI NRL-11-SL01

## TABLE OF CONTENTS

|  |           |
|--|-----------|
| <b>1. Introduction .....</b>   | <b>1</b>  |
| 1.1 Background.....  | 2         |
| 1.2 Scope .....  | 2         |
| 1.3 Deliverables.....  | 2         |
| <b>2. Applicable Documents.....</b>                                      | <b>3</b>  |
| 2.1 NRL Documents.....   | 3         |
| 2.2 Government Documents.....  | 3         |
| 2.3 Commercial Standards.....  | 3         |
| <b>3. Requirements .....</b>   | <b>5</b>  |
| 3.1 Requirement 1: General Requirements.....                             | 5         |
| 3.2 Requirement 2: Program Management .....                              | 5         |
| 3.3 Requirement 3: Chamber Provisions .....                              | 6         |
| 3.4 Requirement 4: Subsystems.....                                       | 6         |
| 3.5 Requirement 5: Reviews.....  | 6         |
| 3.6 Requirement 6: Reporting.....  | 9         |
| 3.7 Requirement 7: Verification and Testing.....                         | 9         |
| 3.8 Requirement 8: Delivery .....  | 9         |
| 3.9 Requirement 9: Deliverable Data, Documentation and Warranty .....    | 9         |
| 3.10 Requirement 10: Training.....                                       | 10        |
| <b>4. Appendices .....</b>   | <b>11</b> |
| 4.1 Appendix A: Contract Data Requirements List (CDRL) Summary .....     | 11        |
| 4.2 Appendix B: Building A59 Available Space .....                       | 12        |
| 4.3 Appendix C: Building A59 Existing Floor Condition .....              | 13        |
| 4.4 Appendix D: Building A59 Floor Profile .....                         | 14        |
| 4.5 Appendix E: Anticipated NFAMS Facility Layout .....                  | 15        |
| 4.6 Appendix F: AUT Orientation and Scan Plane Coordinate Reference..... | 16        |
| 4.7 Appendix G: Power Density Plots .....                                | 18        |
| 4.8 Appendix H: Dish Illumination Patterns .....                         | 21        |

# DRAFT SOW FOR RFI NRL-11-SL01

## 1. INTRODUCTION

This Statement of Work (SOW) establishes the contractor tasks, deliverables, organizational responsibilities, and schedule for the design, fabrication, installation, verification, and delivery of a complete turnkey indoor Near-Field Antenna Measurement System (NFAMS) to be installed at the Naval Research Laboratory (NRL), Washington, DC. The SOW will refer to the supplier of the items identified in the purchase order as the contractor.

### 1.1 Background

This SOW defines the scope of effort for a NFAMS capable of calibrating the NRL's Microwave Imager/Sounder (MIS) satellite payload to Government prescribed specifications. The MIS is a conical-scanning, multi-frequency, polarimetric microwave and millimeter-wave radiometer.

### 1.2 Scope

Contractor activities will include the design, construction, assembly, installation, performance verification, quality assurance, safety requirements, documentation, materials, and labor for a complete system and functional facility capable of planar and cylindrical near-field antenna testing over the frequency range of 6 GHz to 220 GHz.

The work site and parent facility to house the NFAMS provides the approximate available dimensions of 34'L x 42'W x 40'H, as shown in Appendix B. The floor of the parent facility is reinforced concrete.

This acquisition of a NFAMS includes the following major subsystems required for a complete turnkey facility:

- Anechoic Chamber
- RF Subsystem
- Positioning Subsystem (Near-Field Scanner, AUT Slide, Position Control)
- Workstation and Analysis Software
- Stand-Alone HVAC
- Fire Suppression and Alarm System

The NRL defines satisfactory performance of this effort as:

- Completing the activities in this SOW,
- The delivered system measuring and performing to the accompanying NFAMS specification, and
- Delivering the items specified in the Contract Data Requirements List (CDRL)

### 1.3 Deliverables

The contractor is responsible for the on-time delivery of one (1) complete NFAMS to include hardware, software, data, documentation, warranty, and calibration equipment as defined herein. The contractor's design, installation, and delivery schedule shall be consistent with this requirement.

# DRAFT SOW FOR RFI NRL-11-SL01

## 2. APPLICABLE DOCUMENTS

The following documents apply to this order to the extent specified herein. Commercial standards documents specified here represent only a subset of the acceptable civil, electrical, environmental, and safety guidelines that the contractor should follow. The NRL contracting office can supply copies of the internal NRL reports upon request. The contractor can acquire commercial or non-government documents from the appropriate standards body. The latest approved issues in effect on the date of the contract shall apply except when the NRL references specific revisions.

### 2.1 NRL Documents

**Table 2.1 NRL Documents**

| Number                  | Title  | Date      |
|-------------------------|--|-----------|
|                         | Specification for a Turnkey Indoor Near-Field Antenna Measurement System | 7/18/11   |
| NRL Instruction 5101.3C | Fire Safety In Anechoic Chamber Operations                               | 7/13/1998 |
| NRL Report 8093         | Modified Smoldering Test of Urethane Foams Used in Anechoic Chambers     | 3/9/1977  |

### 2.2 Government Documents

**Table 2.2 Government Documents**

| Number              | Title   | Date   |
|---------------------|---|--------|
| UFGS 01 14 00       | Unified Facilities Guide Specifications: Work Restrictions<br>( <a href="http://www.wbdg.org/ccb/browse_org.php?o=70">http://www.wbdg.org/ccb/browse_org.php?o=70</a> ) | 5/2011 |
| UFGS 01 35 26       | Unified Facilities Guide Specifications: Governmental Safety Requirements   | 2/2010 |
| UFGS 01 50 00       | Unified Facilities Guide Specifications: Temporary Construction Facilities and Controls   | 8/2009 |
| UFGS 01 57 19.00 20 | Unified Facilities Guide Specifications: Temporary Environmental Controls   | 2/2010 |
| UFGS 01 74 19       | Unified Facilities Guide Specifications: Construction and Demolition Waste Management   | 1/2007 |
| UFGS 02 41 00       | Unified Facilities Guide Specifications: Demolition and Construction  | 5/2010 |
| UFGS 21 22 00.00 40 | Unified Facilities Guide Specifications: Clean Agent Fire Extinguishing Systems   | 5/2010 |

### 2.3 Commercial Standards

**Table 2.3 Commercial Standards**

| Number           | Title   | Date |
|------------------|---|------|
| UBC 1997         | Uniform Building Code<br>( <a href="http://www.iccsafe.org/Store/Pages/Product.aspx?id=8705PU973_PD-X-UC-P-1997-000005">http://www.iccsafe.org/Store/Pages/Product.aspx?id=8705PU973_PD-X-UC-P-1997-000005</a> )  | 1997 |
| NFPA 70          | National Electrical Code<br>( <a href="http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=70">http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=70</a> )   | 2011 |
| NFPA 72          | National Fire Alarm and Signaling Code<br>( <a href="http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=72">http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=72</a> )   | 2010 |
| NFPA 2001        | Standard on Clean Agent Fire Extinguishing Systems<br>( <a href="http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=2001">http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=2001</a> )   | 2008 |
| NFPA 90A         | Standard for the Installation of Air-Conditioning and Ventilations Systems<br>( <a href="http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=90A">http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=90A</a> )   | 2009 |
| ANSI/AISC 360-10 | Specification for Structural Steel Buildings<br>( <a href="http://www.aisc.org/store/p-1644-specification-for-structural-steel-buildings-ansiaisc-36010.aspx">http://www.aisc.org/store/p-1644-specification-for-structural-steel-buildings-ansiaisc-36010.aspx</a> ) | 2010 |
| ASCE/SEI 7-10    | Minimum Design Loads for Buildings and Other Structures<br>( <a href="http://www.asce.org/Product.aspx?id=2147487569">http://www.asce.org/Product.aspx?id=2147487569</a> )  | 2010 |

# DRAFT SOW FOR RFI NRL-11-SL01

|              |  |           |
|--------------|--|-----------|
| FM 1-53      | FM Global Property Loss Prevention Data Sheet<br>( <a href="http://www.fmglobal.com/page.aspx?id=04010200">http://www.fmglobal.com/page.aspx?id=04010200</a> )   | 2010      |
| IEEE-STD-299 | IEEE Standard Method for Measuring the Effectiveness of Electromagnetic Shielding Enclosures<br>( <a href="http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&amp;arnumber=708260">http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&amp;arnumber=708260</a> )  | 12/9/1997 |
| CFR 29       | OSHA Safety and Health Regulations for Construction<br>( <a href="http://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&amp;p_toc_level=0&amp;p_keyvalue=&amp;p_status=CURRENT">http://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&amp;p_toc_level=0&amp;p_keyvalue=&amp;p_status=CURRENT</a> ) | 2010      |

# DRAFT SOW FOR RFI NRL-11-SL01

## 3. REQUIREMENTS

### 3.1 Requirement 1: General Requirements

- 3.1-1 The contractor shall design, construct, install, and deliver one (1) NFAMS in accordance with the accompanying Specification for a Turnkey Indoor Near-Field Antenna Measurement System, which will be referred to hereafter as the “NFAMS specification”.
- 3.1-2 The contractor shall provide all services, personnel, materials, equipment, and facilities for the design, construction, installation, performance verification, and delivery of the NFAMS. The NRL will provide the installation site and certain Government Furnished Equipment (GFE) listed in the NFAMS specification.
- 3.1-3 The contractor shall perform all tasks to proven and acceptable civil, electrical, environmental, and safety codes, specifications, and standards.
- 3.1-4 The contractor shall design the anechoic chamber facility to fit within the available floor space provided by the NRL and around existing obstructions as shown in Appendix B. A characterization of the floor flatness is provided in Appendices C and D.
- 3.1-5 The contractor shall maintain a clean work area at the end of each work day. The NRL will designate a storage area for materials and equipment.
- 3.1-6 The contractor shall establish a waste removal plan that meets the approval of the NRL.
- 3.1-7 The contractor shall identify at the beginning of the contract any special test equipment, handling, maintenance, and storage requirements that are necessary to operate or preserve the purchased items.
- 3.1-8 The contractor shall recognize the right of the NRL or its designated government representative to participate in or initiate reviews, audits, and inspections throughout the life of the contract.

### 3.2 Requirement 2: Program Management

- 3.2-1 The contractor shall actively manage all matters relating to the performance of this contract to ensure that all performance, schedule and quality objectives are fully met.
- 3.2-2 The contractor shall designate a Contract Administrator to interface with the government Contracting Office, and a Program Manager to act as a single point of interface with the government on all technical and programmatic matters.
- 3.2-3 The contractor shall report changes of their key personnel to the NRL within 48 hours of the change.
- 3.2-4 The contractor shall develop a Program Management Plan to include a milestone-driven schedule (**CDRL 005**) to be approved by the NRL prior to contract award.
- 3.2-5 Any issue that may cause technical or schedule difficulty shall be immediately brought to the attention of the government Contracting Office.

# DRAFT SOW FOR RFI NRL-11-SL01

## 3.3 Requirement 3: Chamber Provisions

- 3.3-1. The contractor shall build the anechoic chamber facility and any adjoining structure(s) in accordance with applicable federal, state, and local building and safety codes and to industry standards using best practices.
- 3.3-2. The contractor shall deliver a fully functional shielded anechoic chamber with features in accordance with the NFAMS specification.
- 3.3-3. The contractor shall ensure that all anechoic chamber absorber meets NRL Report 8093, Tests 1, 2, & 3.
- 3.3-4. The contractor shall ensure shielding effectiveness in accordance with IEEE-STD-299.
- 3.3-5. The contractor shall ensure that the chamber structure is capable of supporting the required loads.
- 3.3-6. The contractor shall provide, install, and test a stand-alone heating, ventilation, and air-conditioning (HVAC) system for the chamber facility. The HVAC system must be capable of maintaining verifiable humidity and temperature stability in accordance with the NFAMS specification. The HVAC system must use a digital programmable thermostat control and humidistat.
- 3.3-7. The contractor shall determine the HVAC system capacity required.
- 3.3-8. The contractor shall provide a 1-year HVAC service contract with a local HVAC contractor. The contractor shall provide 7 days per week response in the event that HVAC servicing is required.
- 3.3-9. The contractor shall provide, install, and test a clean agent fire suppression and alarm system. The fire suppression and alarm system must be capable of protecting the entire chamber facility and any adjoining control room(s). The fire suppression and alarm system must be configured to generate both visual and audible alarms in the chamber facility, any adjoining control room(s), and in the surrounding areas.
- 3.3-10. The contractor shall ensure that the fire suppression and alarm system meets NRL Instruction 5101.3C.
- 3.3-11. The contractor shall ensure that the fire suppression and alarm system is properly integrated into the appropriate host building system.
- 3.3-12. The contractor shall provide to the NRL corresponding manufacturer's fire protection plans (**CDRL 0010**), along with a manufacturers Material Safety Data Sheet (MSDS) (**CDRL 0015**) for all materials used in the fire suppression and alarm system.
- 3.3-13. The contractor shall develop and provide to the NRL a Quality Assurance Control Plan (**CDRL 0020**) and Safety Plan (**CDRL 0025**).

# DRAFT SOW FOR RFI NRL-11-SL01

3.3-14. The contractor shall provide to the NRL all special tooling, equipment, and controlling devices necessary to properly maintain and operate the chamber facility, HVAC, and fire suppression and alarm system.

## 3.4 Requirement 4: Subsystems

3.4-1 The contractor shall provide all necessary antenna measurement subsystems for a complete and verified turnkey system that meets all requirements of the NFAMS specification.

3.4-2 The contractor shall use proven analysis and design methods and techniques to meet the functional and performance requirements of the NFAMS specification.

## 3.5 Requirement 5: Meetings and Reviews

3.5-1. For all reviews, the contractor shall chair the review at the facility specified in this SOW.

3.5-2. The contractor shall document the Review Minutes to include a list of Action Items with responsibility and due dates assigned.

3.5-3. The NRL will generate Action Items during the meetings and reviews as needed.

3.5-4. The contractor shall track all Action Items to their successful closure. Closure of an Action Item must be agreed to by the NRL.

3.5-5. The contractor shall close all liens against any particular review prior to formal acceptance of the review; however, the NRL will give conditional approval of a review if the contractor and the NRL document and agree to a closure path and schedule for resolving the liens.

### 3.5.1 Kick-Off Meeting

3.5.1-1 The contractor shall hold a Kick-Off Meeting (**CDRL 0030**) at the NRL within two (2) weeks after contract award.

3.5.1-2 The purpose of the Kick-Off Meeting is for the contractor's program manager and key personnel to meet and open dialogue with the NRL's key technical, supervisory, and contractual personnel.

### 3.5.2 Preliminary Design Review (PDR)

3.5.2-1 The contractor program manager and key personnel shall chair a Preliminary Design Review (**CDRL 0035**) at the NRL six (6) to eight (8) weeks after contract award.

3.5.2-2 The purpose of the PDR is to ensure that the contractor understands the requirements, to evaluate the progress, technical adequacy and risk resolution (technical, cost, schedule) of the selected design approach, and to clarify any issues that may exist.

3.5.2-3 No less than three (3) days prior to the PDR, the contractor shall provide to the NRL the PDR Data Package (**CDRL 0040**), to consist of the following preliminary documents for review and approval:

- i. Facility and equipment design drawings
- ii. Construction schedule
- iii. RF system block diagram
- iv. RF system performance summary
- v. Outline of Quality Assurance Control Plan
- vi. Outline of Safety Plan
- vii. Disposition status of previously generated Action Items

3.5.2-4 The contractor shall satisfy the following PDR exit criteria prior to beginning detailed design:

# DRAFT SOW FOR RFI NRL-11-SL01

- i. All Action Items generated prior to PDR shall be closed or granted approval to carry forward by the NRL.
- ii. The contractor's selected design approach shall demonstrate acceptable progress, technical adequacy, and risk resolution (technical, cost, schedule).
- iii. The contractor shall demonstrate that the preliminary design and performance requirements satisfy the NFAMS specification.
- iv. The contractor's preliminary construction schedule, Quality Assurance Control Plan, and Safety Plan demonstrate acceptable maturity.

## 3.5.3 Critical Design Review (CDR)

3.5.3-1 The contractor program manager and key personnel shall chair a Critical Design Review (**CDRL 0045**) at the contractor's facility twelve (12) to sixteen (16) weeks after contract award.

3.5.3-2 The purpose of the CDR is to assess whether the contractor has fully interpreted the specified structural, mechanical, electrical, and performance requirements and that it is reflected in the design documentation.

3.5.3-3 No less than three (3) days prior to the CDR, the contractor shall provide to the NRL the CDR Data Package (**CDRL 0050**), to consist of the following detailed documents for review and approval:

- i. Facility and equipment design drawings
- ii. Construction schedule
- iii. RF system block diagram
- iv. RF system performance analysis
- v. Quality Assurance Control Plan
- vi. Safety Plan
- vii. Disposition status of previously generated Action Items
- viii. Electrical schematics
- ix. System Test & Verification Plan
- x. Bill of Materials and System Components

3.5.3-3 The contractor shall satisfy the following CDR exit criteria prior to beginning any substantial fabrication:

- i. All Action Items generated prior to CDR shall be closed or granted approval to carry forward by the NRL.
- ii. The contractor shall demonstrate that the detailed design and performance objectives satisfy all the requirements in the NFAMS specification.
- iii. The contractor shall demonstrate that the detailed design, performance objectives, and construction plans are completely documented.
- iv. The contractor shall demonstrate that the detailed design meets all applicable building, electrical, and safety codes, and is mature enough to fabricate.
- v. The contractor shall demonstrate that the construction schedule is consistent with the expected delivery requirement.
- vi. The contractor shall demonstrate that the project risks (technical, cost, schedule) are acceptably low.
- vii. The contractor shall demonstrate that procured hardware and system level components are completely documented and meet the required specifications.
- viii. The contractor shall demonstrate that they are capable of performing to their Quality Assurance Control Plan, Safety Plan, and System Test and Verification Plan.

## 3.5.4 Technical and Status Reviews (TSRs)

3.5.4-1 The contractor shall host monthly Technical and Status Reviews (**CDRL 0055**) via teleconference between the NRL and the contractor beginning after contract award.

3.5.4-2 The contractor shall host the TSRs at the NRL as deemed necessary by the NRL and the contractor's Program Manager.

# DRAFT SOW FOR RFI NRL-11-SL01

3.5.4-3 The purpose of TSRs is to provide the NRL visibility into the contractor's progress. The TSRs will provide a forum in which the NRL and the contractor can address concerns early and with minimum impact. TSRs will build a cooperative relationship and aid in program success.

3.5.4-4 The contractor shall cover the following at all TSRs:

- i. Schedule status and upcoming milestones
- ii. Financial status
- iii. Upcoming design, construction, fabrication, and installation tasks
- iv. Summary of technical progress since the last status review
- v. Summary of any technical, financial or schedule risks or issues
- vi. Summary of performance against the plan for Quality Assurance Control, Safety, and Test and Verification
- vii. Change in status of Action Items

## 3.5.5 Review Minutes

3.5.5-1 The contractor shall prepare and disseminate the Review Minutes of Design Reviews and TSRs (**CDRL 0060**).

3.5.5-2 The Review Minutes must include:

- i. Purpose and objectives of the meeting
- ii. Date and location
- iii. Attendees by name, organization and responsibility
- iv. Subsystem/equipment being reviewed
- v. Summary of discussions
- vi. A copy of all presentation material
- vii. Action Items generated and action item responses
- viii. Conclusions and recommendations

## 3.6 Requirement 6: Reporting

3.6-1. The contractor shall report any technical, financial, or schedule problems (**CDRL 0065**) that may affect successful performance of the effort described in this SOW.

3.6-2. The contractor shall report problems to the NRL within 24 hours of discovering the problem.

3.6-3. The contractor shall schedule a meeting to discuss the problem within five (5) business days of discovering the problem.

3.6-4. The contractor shall document, control, and report outstanding or unanticipated project actions.

3.6-5. The contractor shall provide monthly status reports (**CDRL 0070**) to the NRL in electronic document format.

## 3.7 Requirement 7: Verification and Testing

3.7-1 The contractor shall develop a System Test and Verification Plan (**CDRL 0075**).

3.7-2 The contractor shall use the System Test and Verification Plan to detail how the contractor plans to verify all system performance requirements defined in this SOW and in the NFAMS specification.

3.7-3 The System Test and Verification Plan must include all verification methodology including test, demonstration, analysis, and results.

3.7-4 The contractor shall plan, perform, and report on a Factory Performance Demonstration (**CDRL 0080**) that clearly demonstrates the system's capabilities (as much as possible at the factory) and explicitly states whether the system performance meets the NFAMS specification. This performance demonstration shall occur as early as possible to demonstrate the ability of the design and its implementation to meet the RF performance and scanner mechanical positioning requirements, so that, if necessary, corrective action can be taken as soon as

# DRAFT SOW FOR RFI NRL-11-SL01

possible to minimize schedule and cost impacts. Exact contents and timing of this demonstration shall be tentatively agreed upon at PDR, and determined and scheduled at CDR.

- 3.7-5 The contractor shall plan, perform, and report on a Final Acceptance Test (**CDRL 0085**) that clearly demonstrates the system's capabilities and explicitly states whether the system performance meets the NFAMS specification.

## 3.8 Requirement 8: Delivery

- 3.8-1 The contractor shall package, protect, ship, and track all deliverable items to the NRL.
- 3.8-2 The contractor shall ensure that all construction materials, parts, and assemblies used for installation are undamaged and without material defect.
- 3.8-3 The contractor shall list each hardware item delivered to the NRL in a Bill of Materials and System Components (**CDRL 0090**).

## 3.9 Requirement 9: Deliverable Data, Documentation and Warranty

- 3.9-1 The contractor shall prepare and maintain design data, build data, and test data records. All data records shall be retained by the contractor for ten (10) years following the conclusion of the contract and available for review by the government upon request.
- 3.9-2 The contractor shall provide the final as-built facility and system drawings (**CDRL 0095**) to the NRL on the final day of project completion and "hand-off of keys".
- 3.9-3 The contractor shall provide all documentation in both hard-copy and electronic format.
- 3.9-4 The contractor shall provide all drawings, schematics, and CAD models in their editable native format (**CDRL 00100**).
- 3.9-5 The contractor shall display on the cover or title page of all deliverable documentation, the following minimum information:
  - i. Document title
  - ii. Document identification number
  - iii. Document date of issue
  - iv. Purchase order number
  - v. Contractor name
  - vi. Revision status
  - vii. CDRL item number
- 3.9-6 The contractor shall provide a comprehensive user's manual (**CDRL 00105**) detailing operating guidelines and routine maintenance procedures.
- 3.9-7 The contractor shall describe in the user's manuals, in detail, the procedures to maintain the entire facility under the contractor's warranty. The manuals must include the standard user's manual for all commercial components used in the construction of the facility, along with their corresponding commercial warranty statements.
- 3.9-8 The contractor shall provide a standard commercial warranty (**CDRL 00110**) along with technical phone support.
- 3.9-9 The contractor shall provide all commercial warranty documentation as part of the user's manual package at the time of facility delivery.

# DRAFT SOW FOR RFI NRL-11-SL01

## 3.10 Requirement 10: Training

3.10-1 The contractor shall provide a minimum of 40 hrs (5 x 8-hr sessions) of orientation and training for eight (8) NRL employees.

3.10-2 The contractor shall provide training that includes the following:

- i. Orientation tour of the facility
- ii. Proper safety and facility maintenance procedures
- iii. Proper operating procedures of all chamber components and equipment (e.g. doors, ceiling hoist, AUT floor slide, HVAC, and fire suppression and alarm system)
- iv. Operation of the scanner controlling software and data analysis software package

# DRAFT SOW FOR RFI NRL-11-SL01

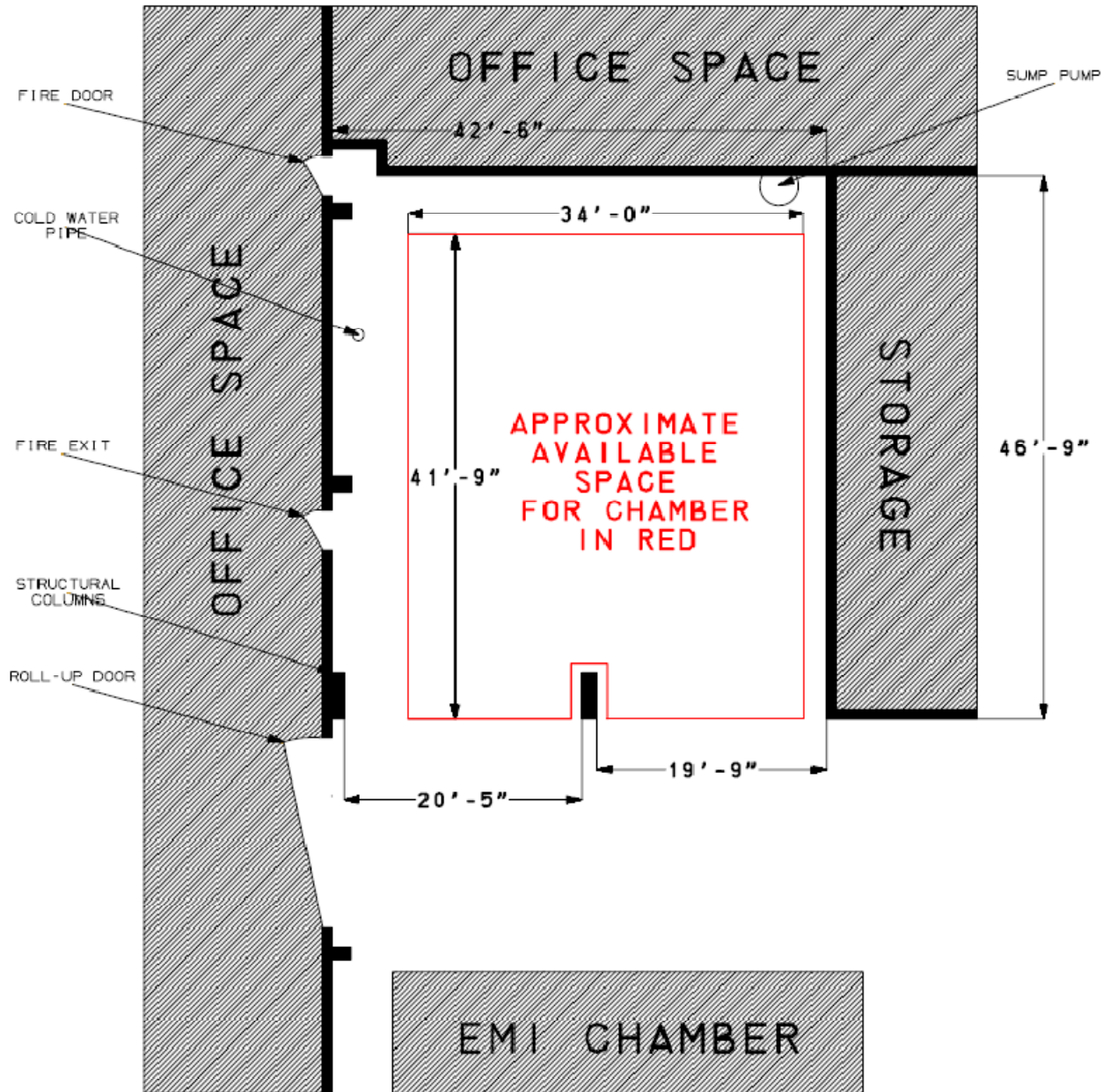
## 4. APPENDICES

### 4.1 Appendix A: Contract Data Requirements List (CDRL) Summary

| CDRL Number | Data Deliverable Name   | Time of Delivery                                    |
|-------------|---|---|
| CDRL 005    | Program Management Plan   | Prior to contract award                             |
| CDRL 0010   | Manufacturer's Fire Protection Plans                                    | At delivery   |
| CDRL 0015   | Material Data Safety Sheet (MSDS) for Fire Suppression and Alarm System | At delivery   |
| CDRL 0020   | Quality Assurance Control Plan  | At CDR  |
| CDRL 0025   | Safety Plan   | At CDR  |
| CDRL 0030   | Kick-Off Meeting  | Within 2 weeks after contract award                 |
| CDRL 0035   | Preliminary Design Review   | 6-8 weeks after contract award                      |
| CDRL 0040   | PDR Data Package  | No less than 3 days prior to PDR                    |
| CDRL 0045   | Critical Design Review  | 12-16 weeks after contract award                    |
| CDRL 0050   | CDR Data Package  | No less than 3 days prior to CDR                    |
| CDRL 0055   | Technical and Status Reviews  | Monthly, following contract award                   |
| CDRL 0060   | Review Minutes of Design Reviews and TSRs                               | 1 week after review                                 |
| CDRL 0065   | Problem Reports   | 24 hours after discovering problem                  |
| CDRL 0070   | Monthly Status Reports  | The first of each month, following Kick-Off Meeting |
| CDRL 0075   | System Test and Verification Plan                                       | At CDR  |
| CDRL 0080   | Factory Performance Demonstration                                       | TBD   |
| CDRL 0085   | Final Acceptance Test Report  | At delivery   |
| CDRL 0090   | Bill of Materials and System Components                                 | At delivery   |
| CDRL 0095   | As-Built Drawings & Schematics  | At delivery   |
| CDRL 00100  | CAD Models in Native Format   | At delivery   |
| CDRL 00105  | User's Operating & Maintenance Manuals                                  | At delivery   |
| CDRL 00110  | Warranty Statement  | At delivery   |

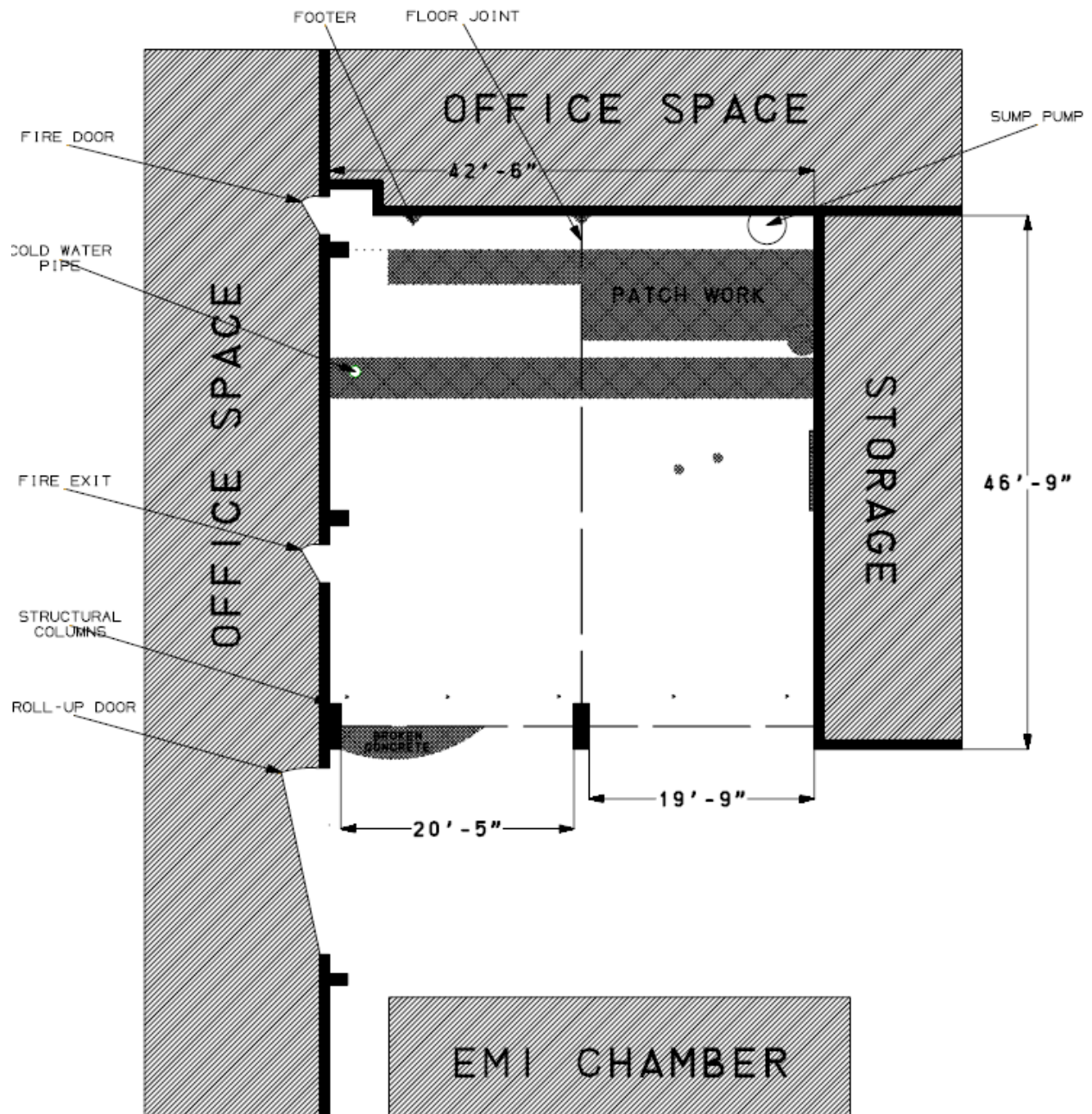
# DRAFT SOW FOR RFI NRL-11-SL01

## 4.2 Appendix B: Building A59 Available Space



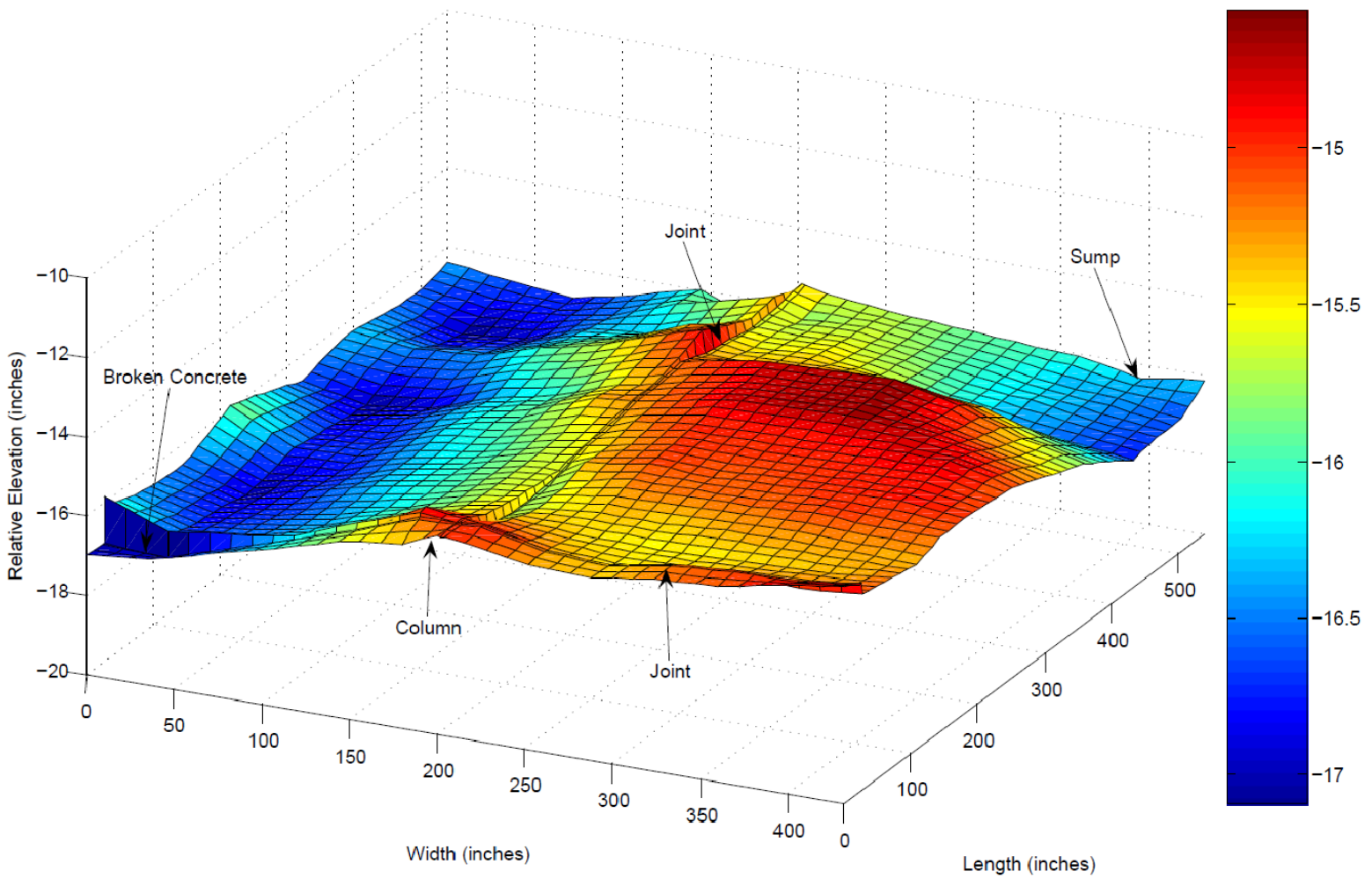
# DRAFT SOW FOR RFI NRL-11-SL01

## 4.3 Appendix C: Building A59 Existing Floor Condition



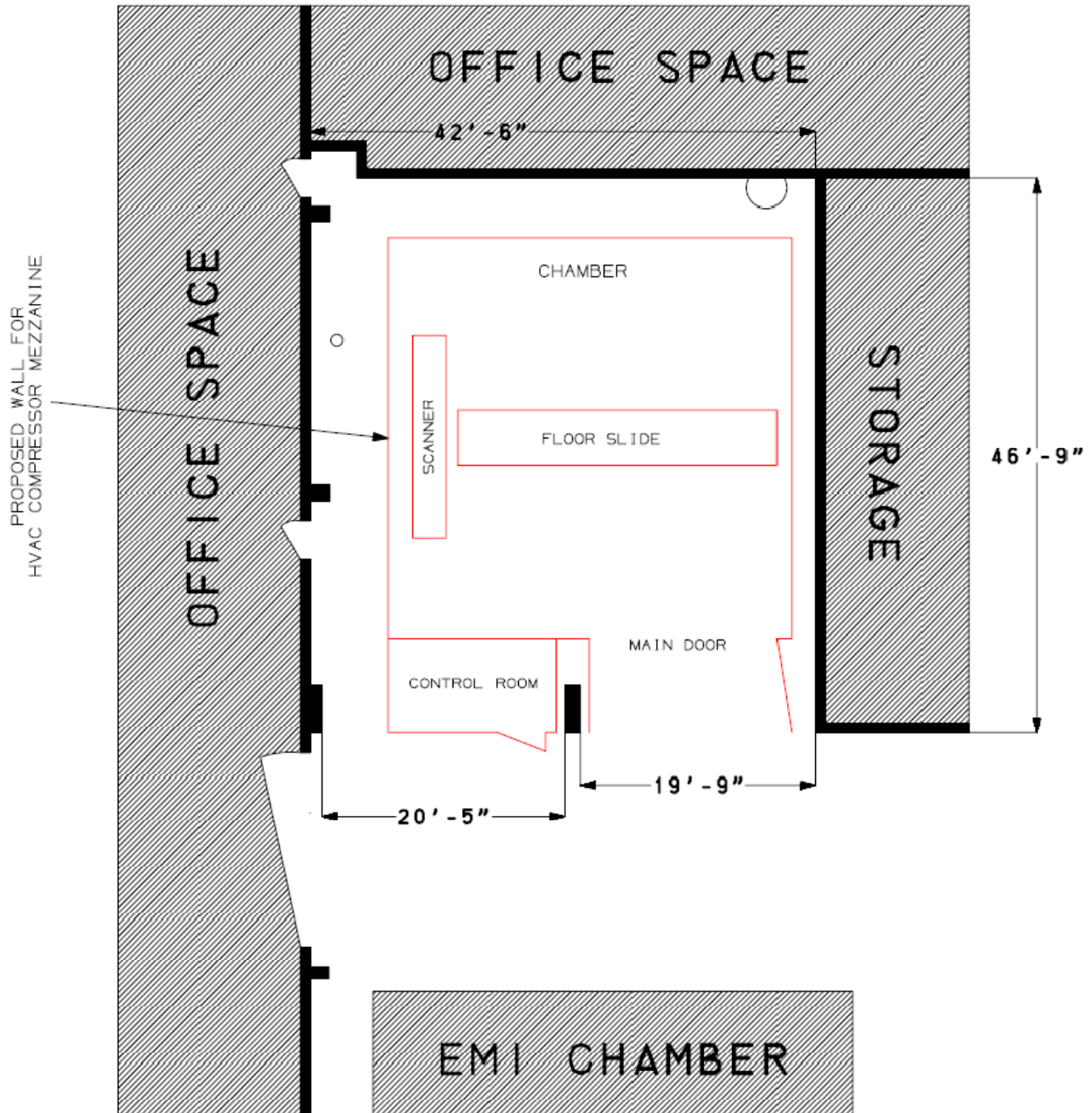
# DRAFT SOW FOR RFI NRL-11-SL01

## 4.4 Appendix D: Building A59 Floor Profile



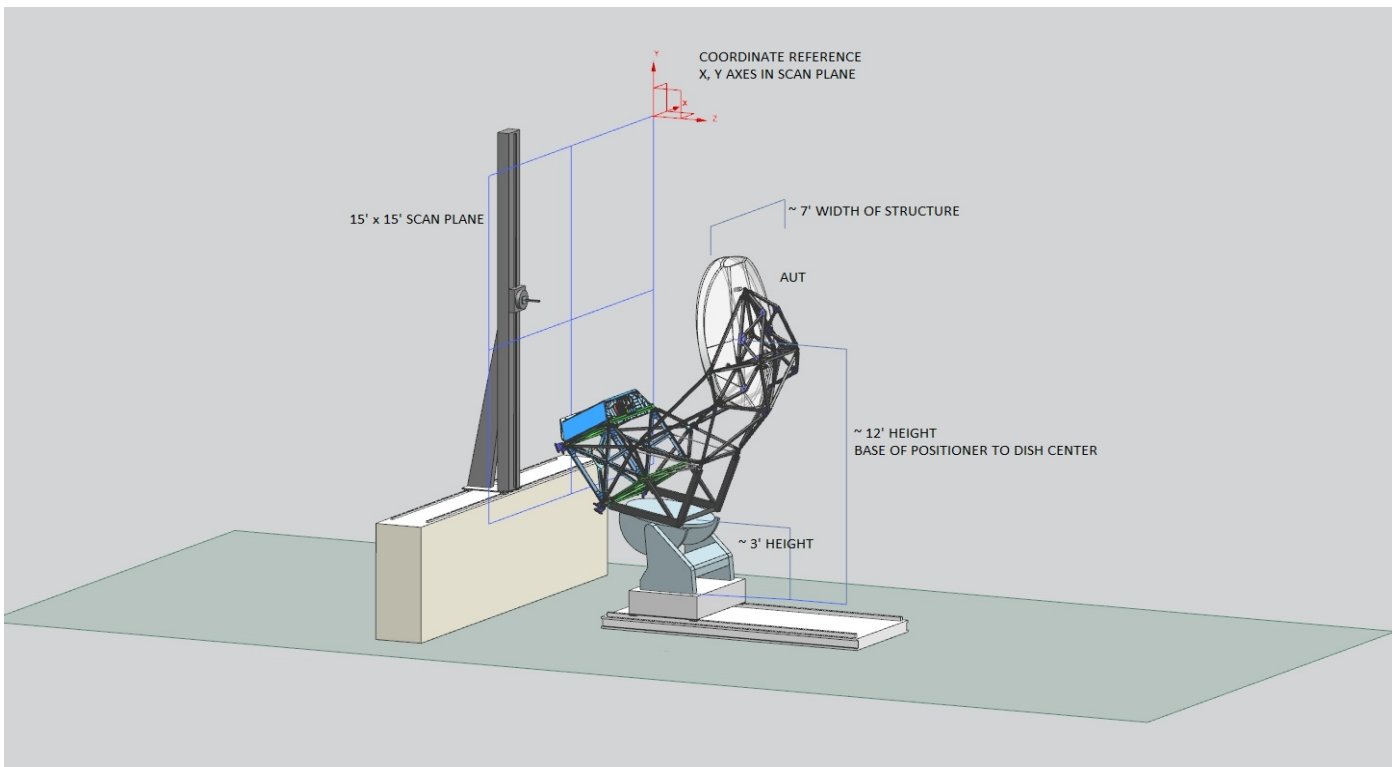
# DRAFT SOW FOR RFI NRL-11-SL01

## 4.5 Appendix E: Anticipated NFAMS Facility Layout

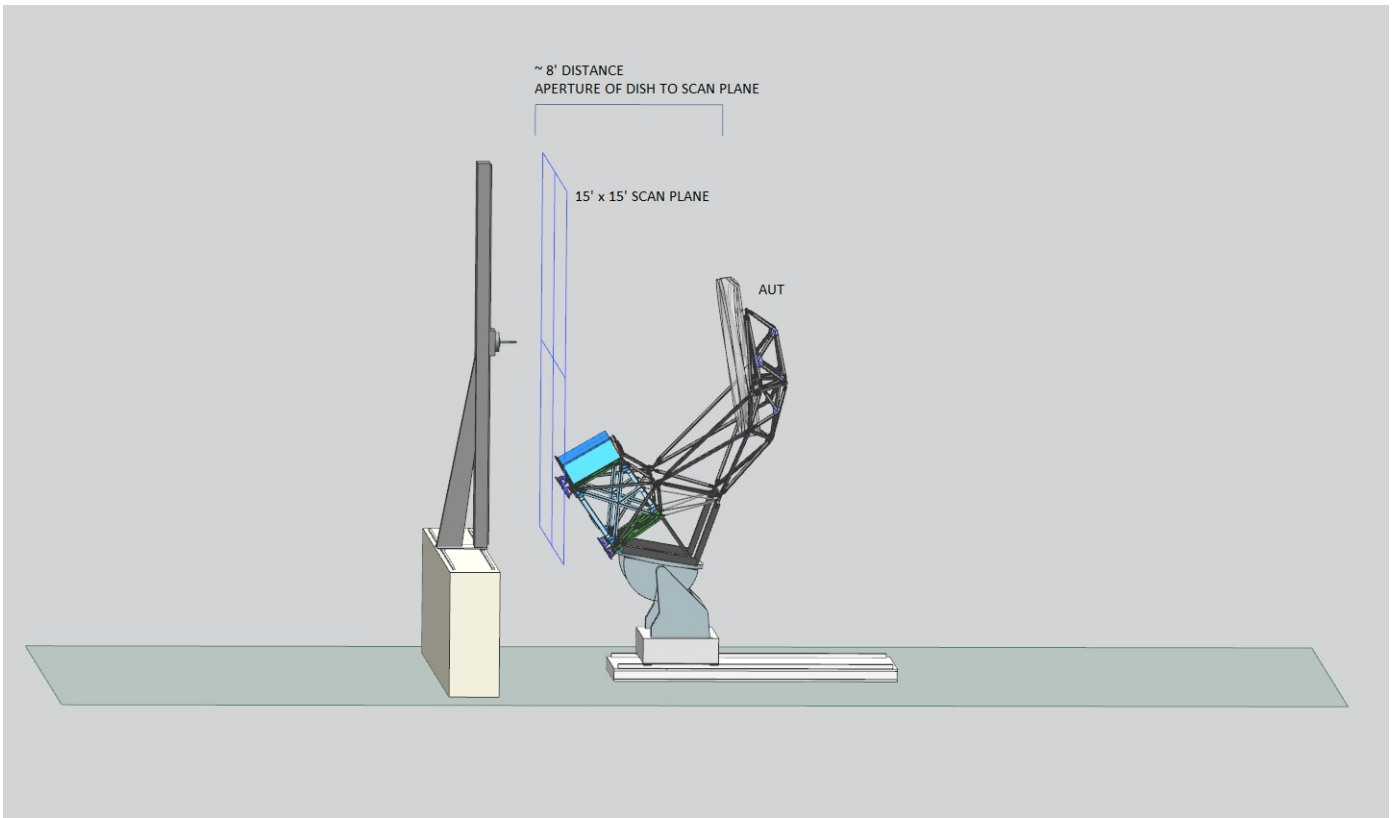


# DRAFT SOW FOR RFI NRL-11-SL01

## 4.6 Appendix F: AUT Orientation and Scan Plane Coordinate Reference



# DRAFT SOW FOR RFI NRL-11-SL01



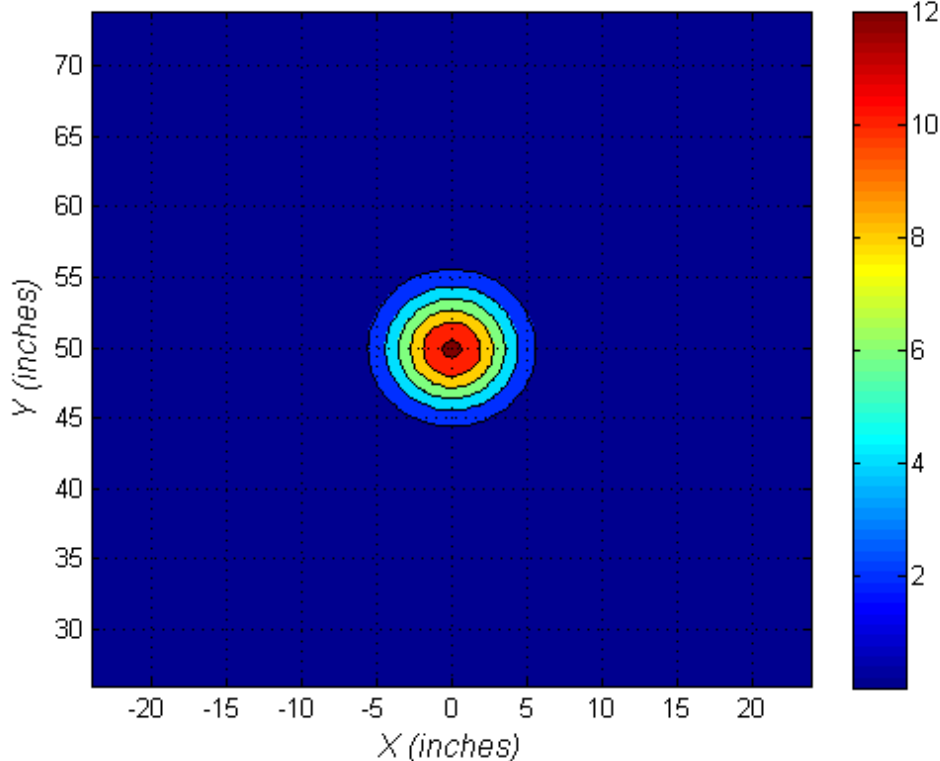
# DRAFT SOW FOR RFI NRL-11-SL01

## 4.7 Appendix G: Power Density Plots

The data files used to generate these plots are attached; Three files are attached for each frequency that a plot is generated: 1) power density (mw/sq meter), 2) x grid (inches), 3) y grid (inches). These files are titled by their appropriate frequency as indicated.

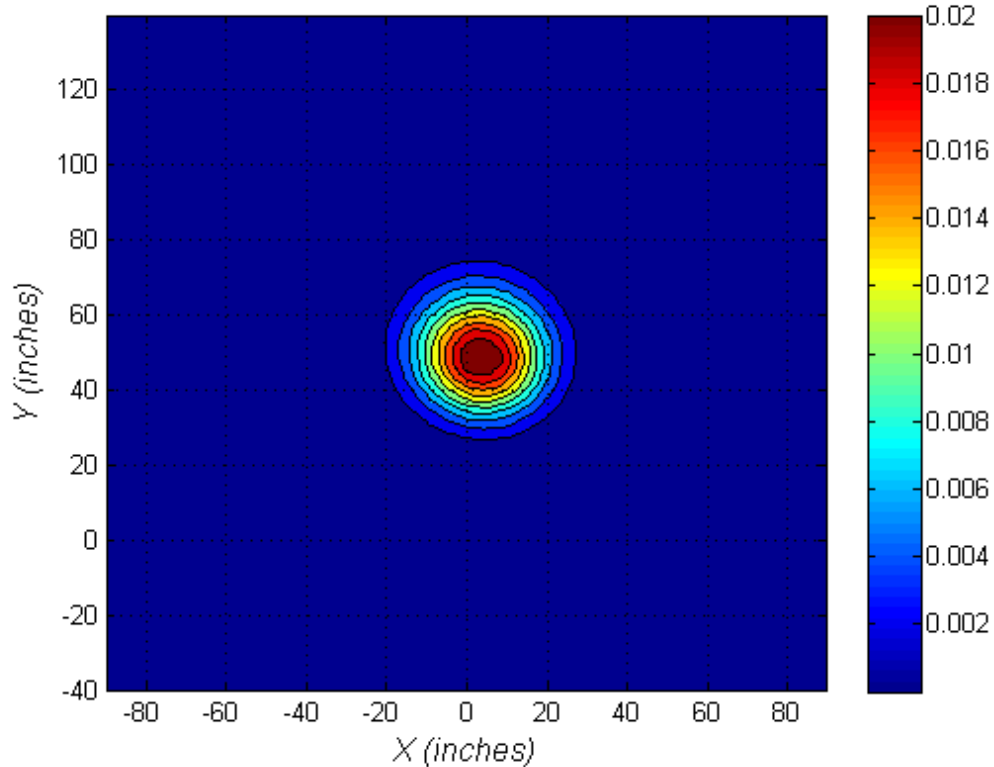
| Frequency (GHz) | File Names  |
|-----------------|---|
| 192             | X_192.csv<br>Y_192.csv<br>ScanPlanePower_192.csv    |
| 36.5            | X_365.csv<br>Y_365.csv<br>ScanPlanePower_365.csv    |
| 53.83           | X_5383.csv<br>Y_5383.csv<br>ScanPlanePower_5383.csv |
| 6.243           | X_6243.csv<br>Y_6243.csv<br>ScanPlanePower_6243.csv |

Magnitude of Poyntnig Vector - |S| (mW/m<sup>2</sup>): Frequency = 192 GHz,  $P_{in} = 4\pi \times 10^{-3}$

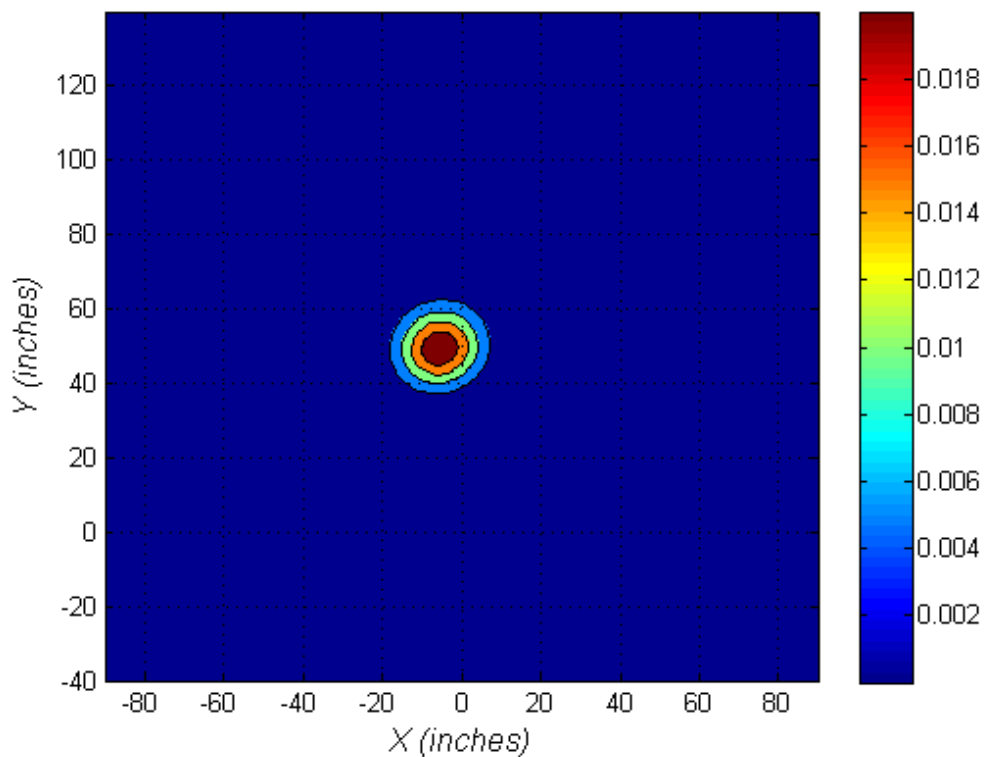


# DRAFT SOW FOR RFI NRL-11-SL01

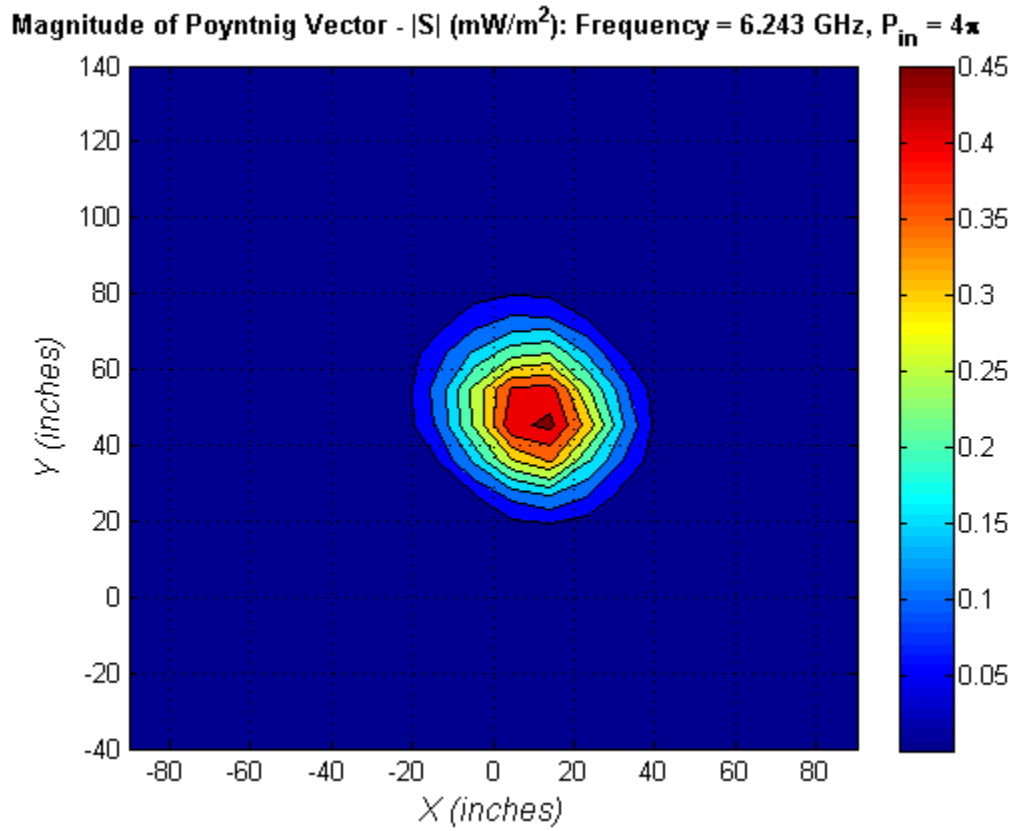
Magnitude of Poyntnig Vector -  $|S|$  (mW/m<sup>2</sup>): Frequency = 36.5 GHz,  $P_{in} = 4\pi$



Magnitude of Poyntnig Vector -  $|S|$  (mW/m<sup>2</sup>): Frequency = 53.83 GHz,  $P_{in} = 4\pi$

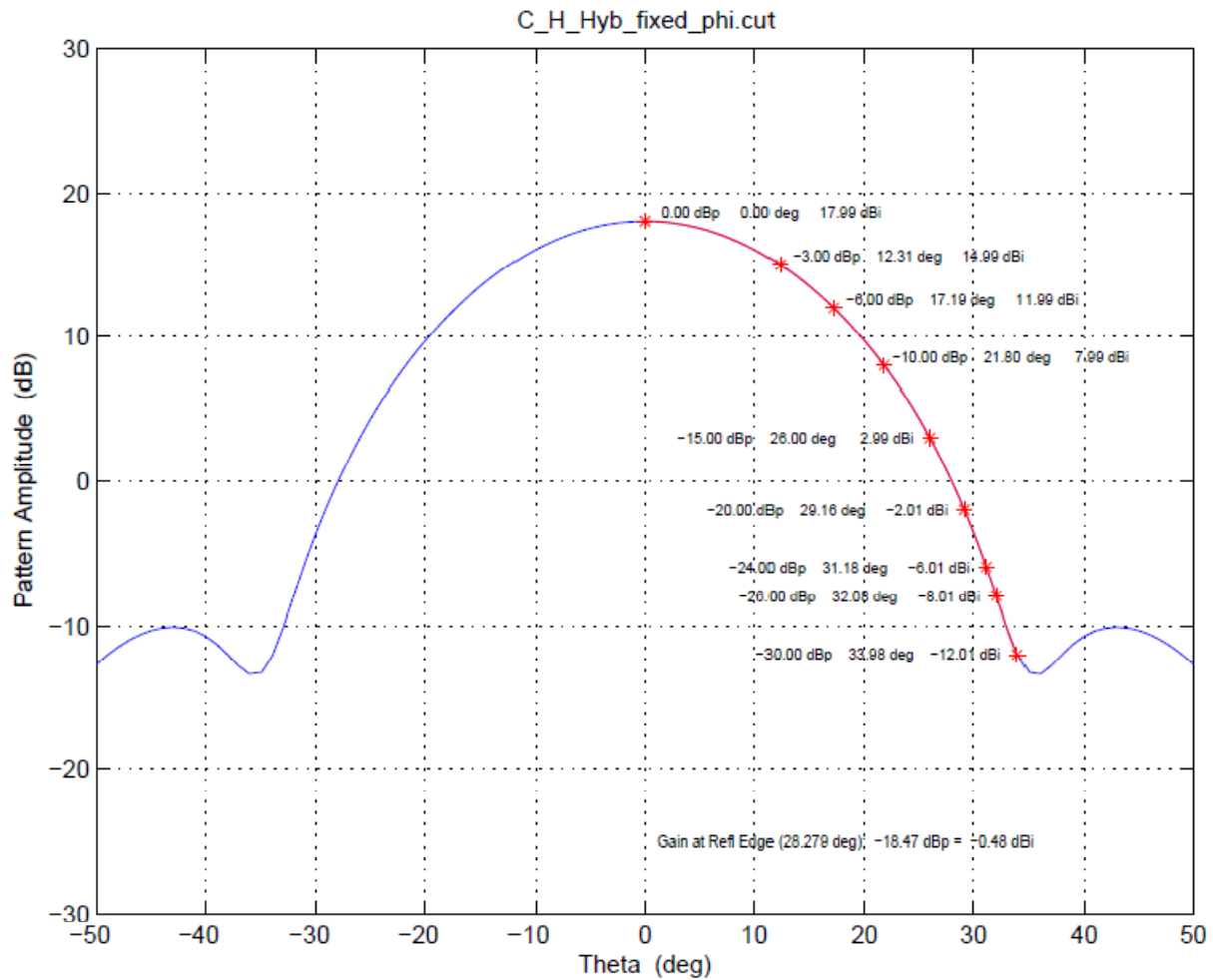


# DRAFT SOW FOR RFI NRL-11-SL01

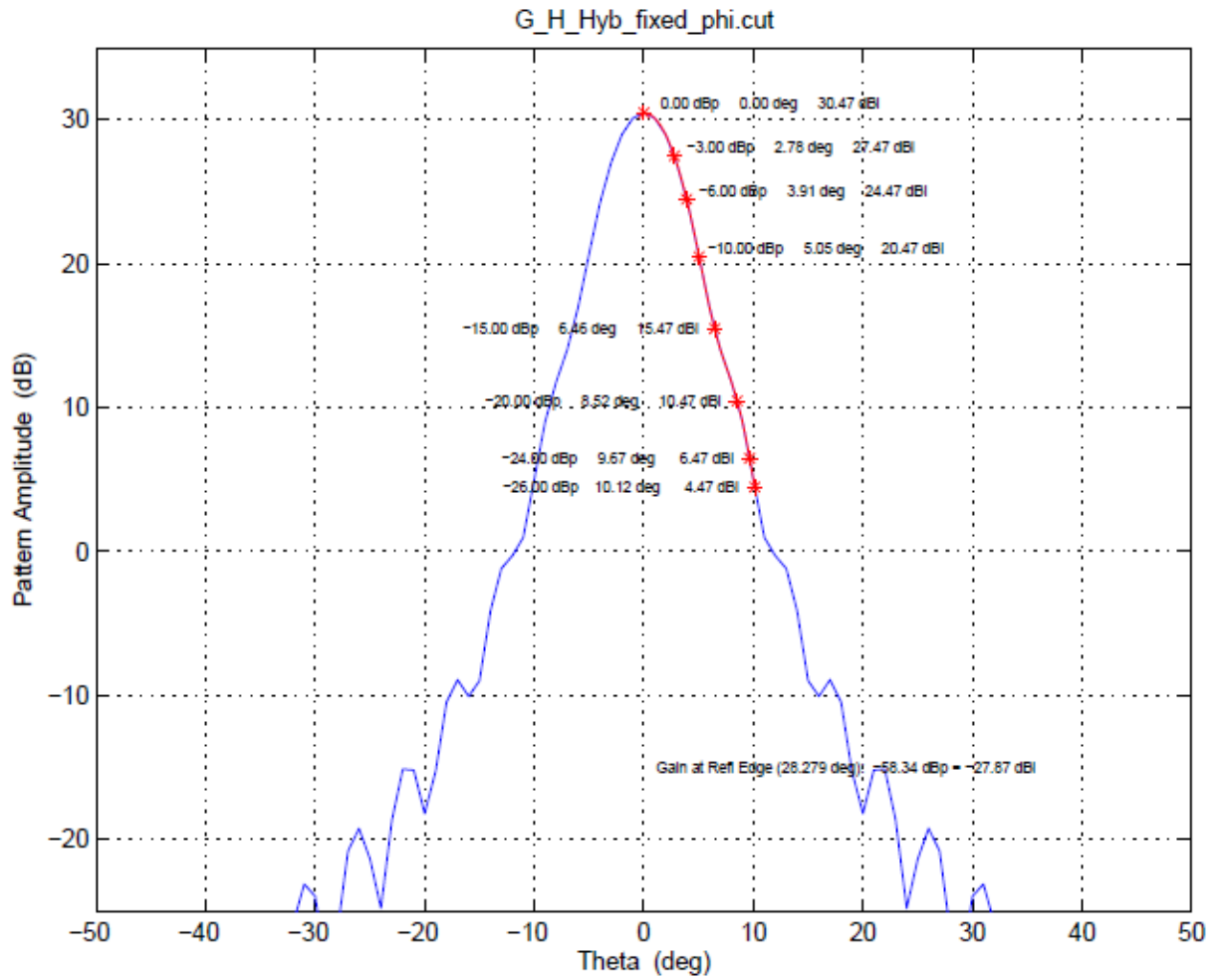


# DRAFT SOW FOR RFI NRL-11-SL01

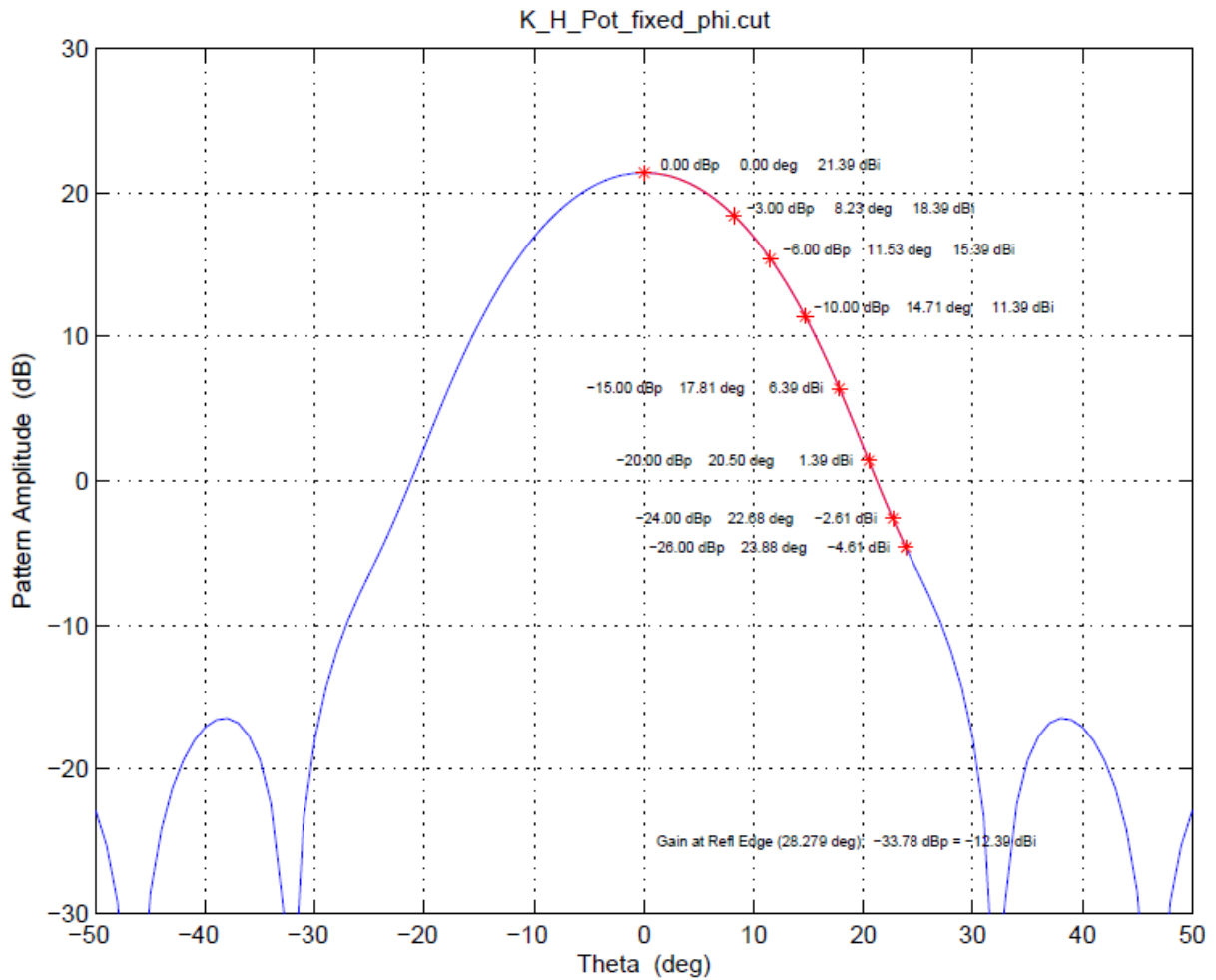
## 4.8 Appendix H: Dish Illumination Patterns



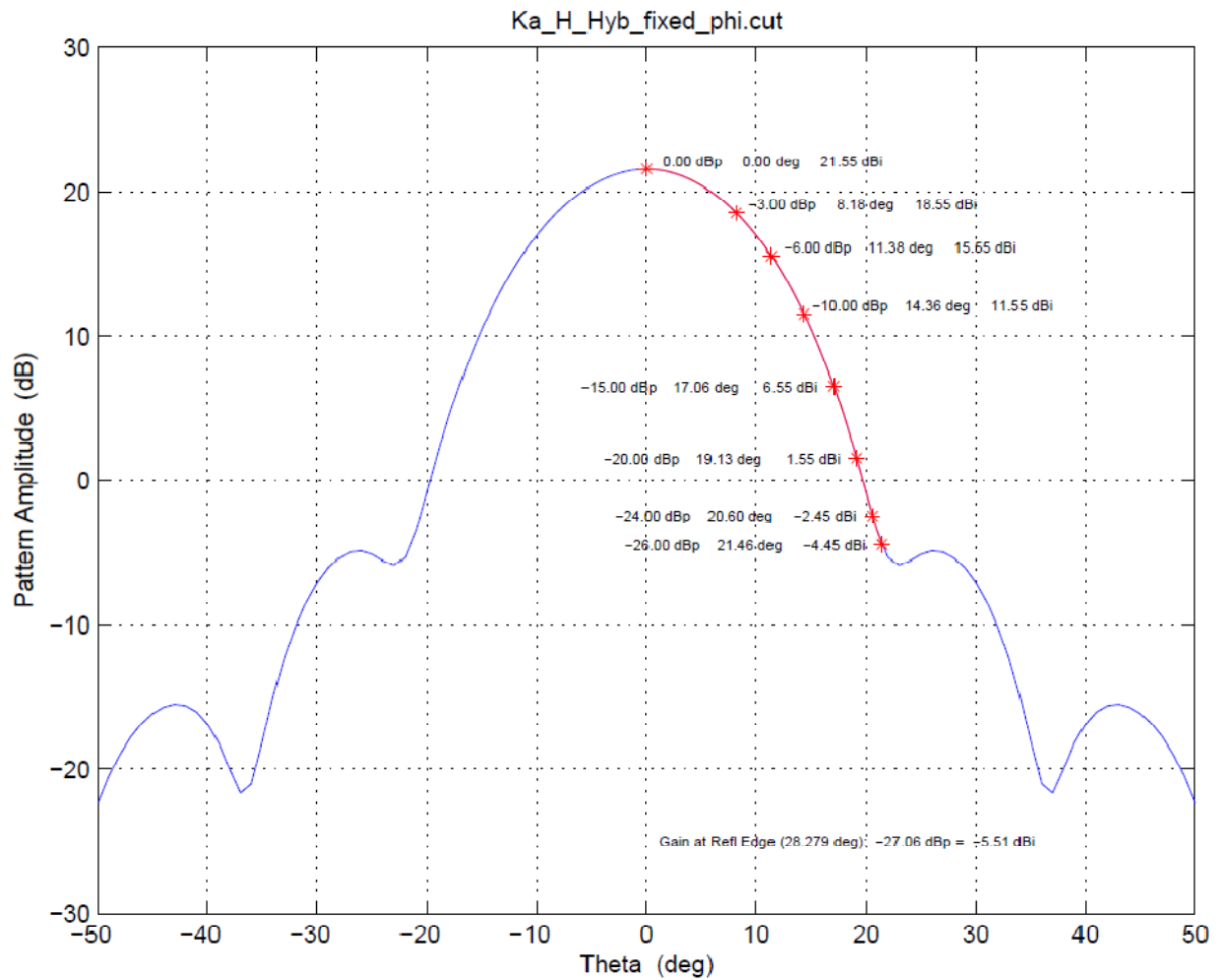
# DRAFT SOW FOR RFI NRL-11-SL01



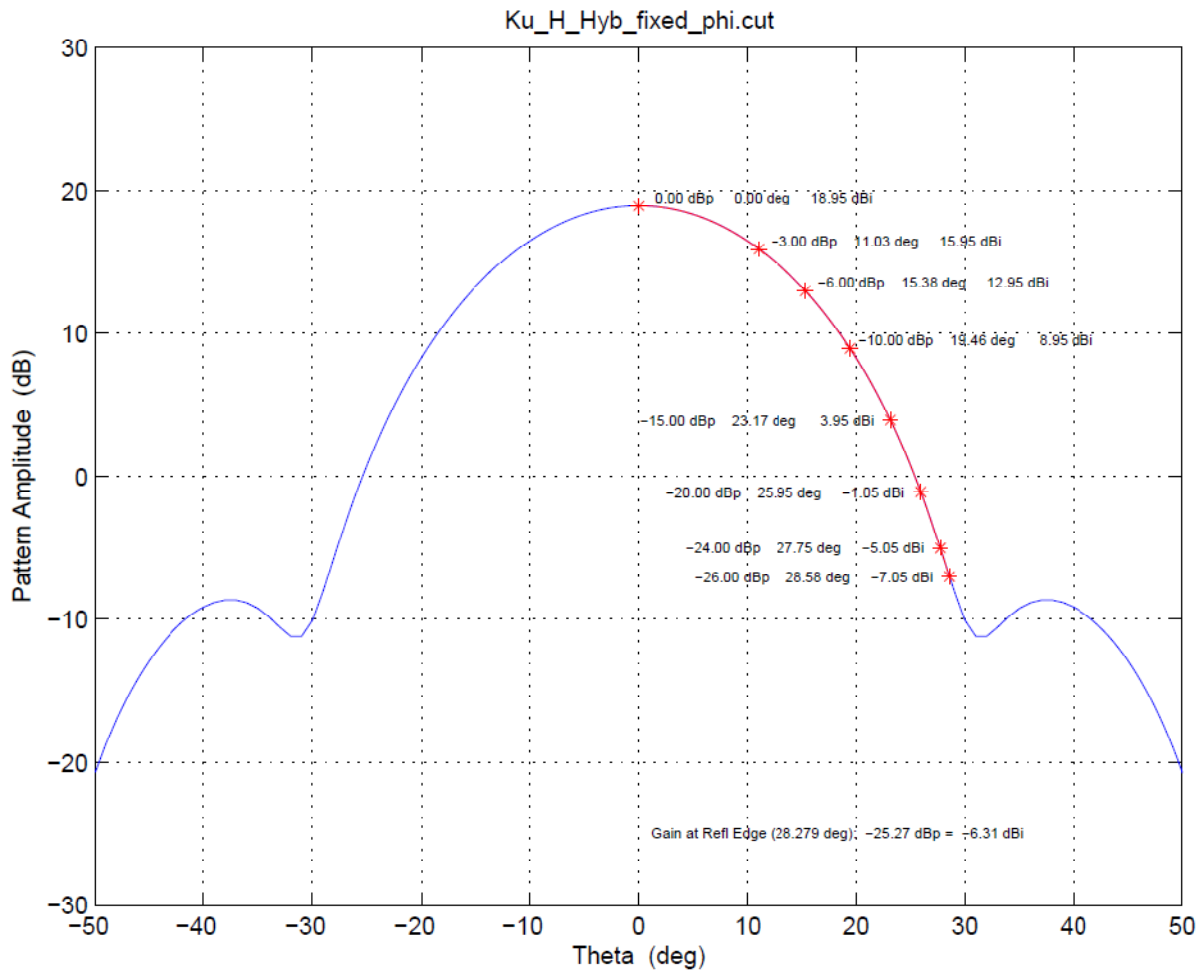
# DRAFT SOW FOR RFI NRL-11-SL01



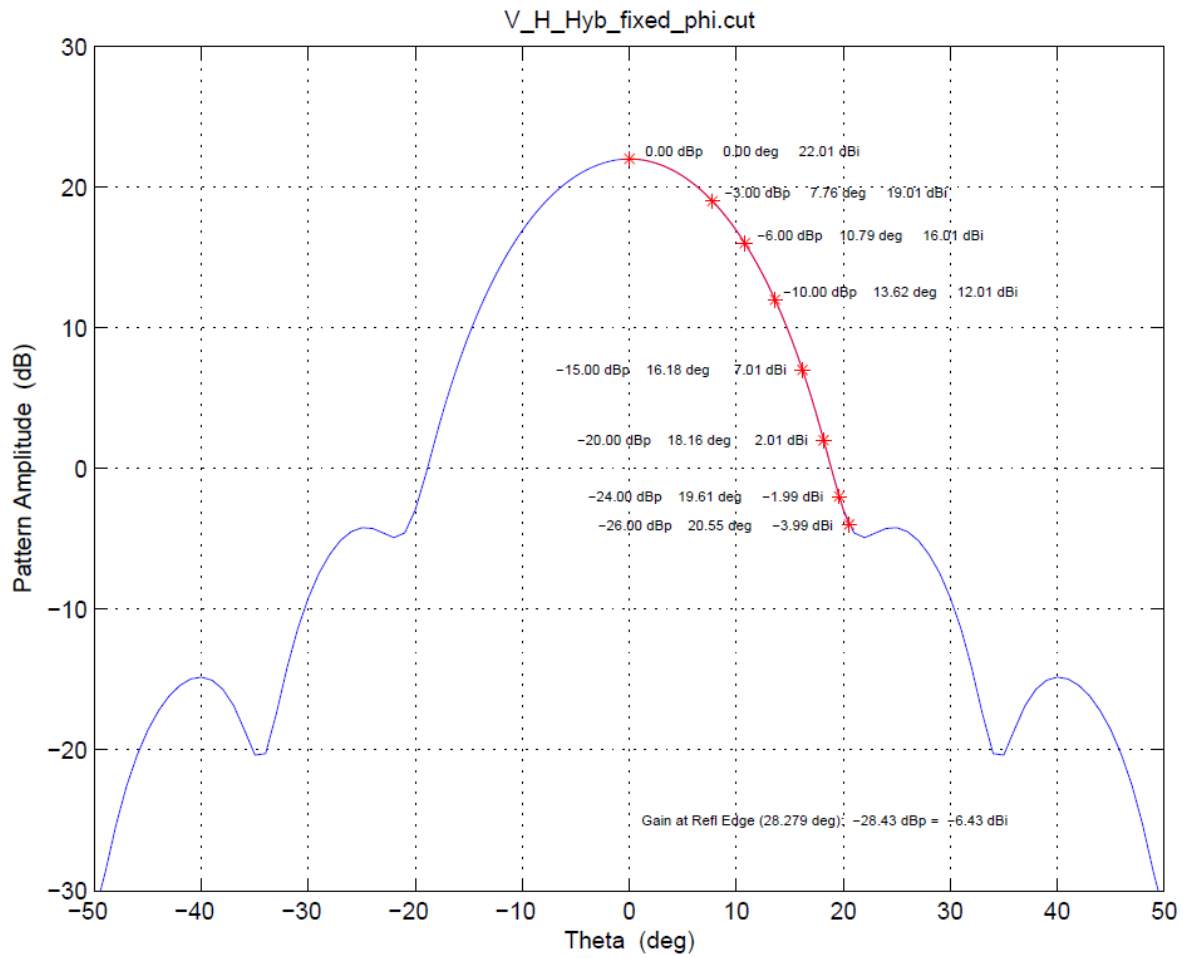
# DRAFT SOW FOR RFI NRL-11-SL01



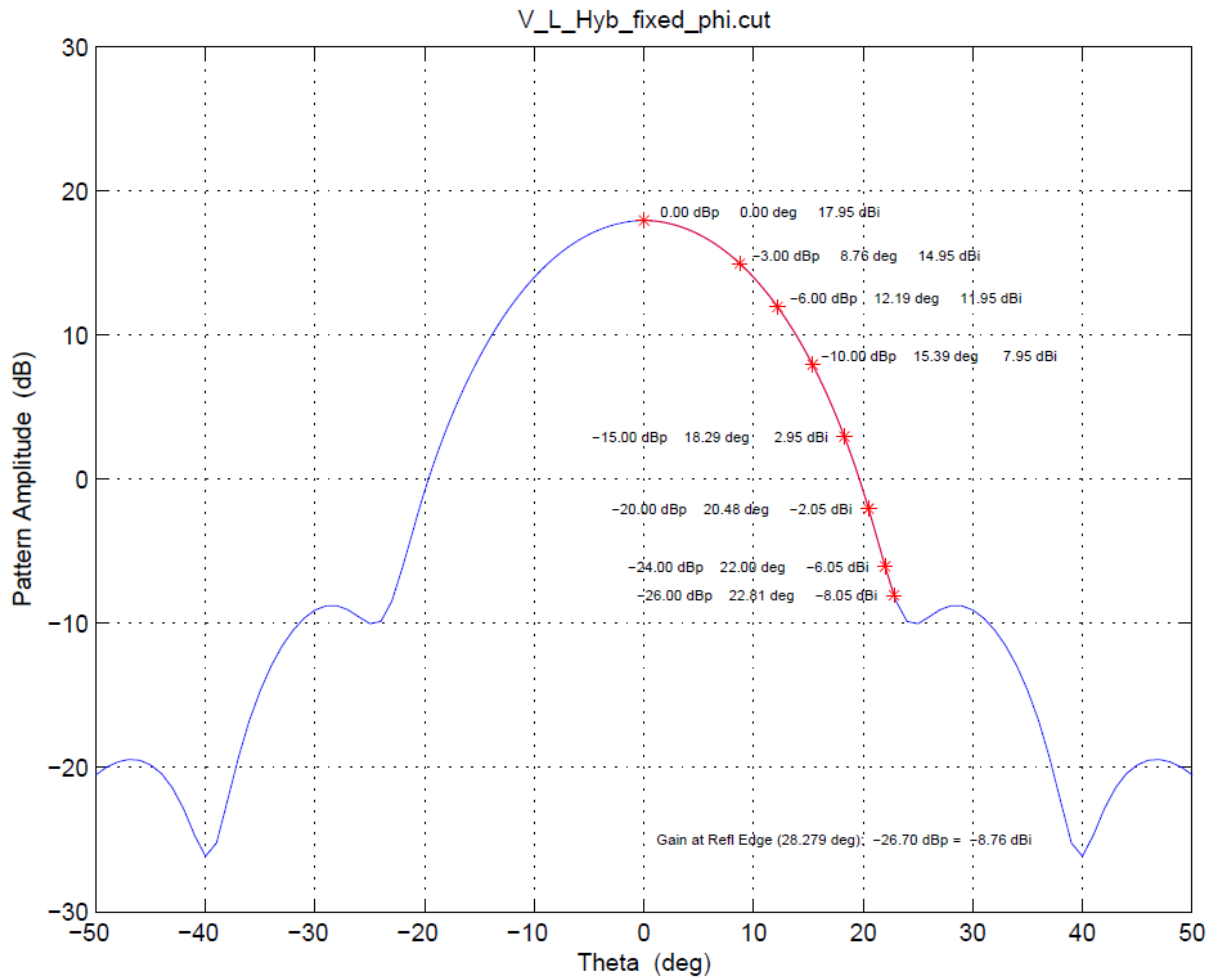
# DRAFT SOW FOR RFI NRL-11-SL01



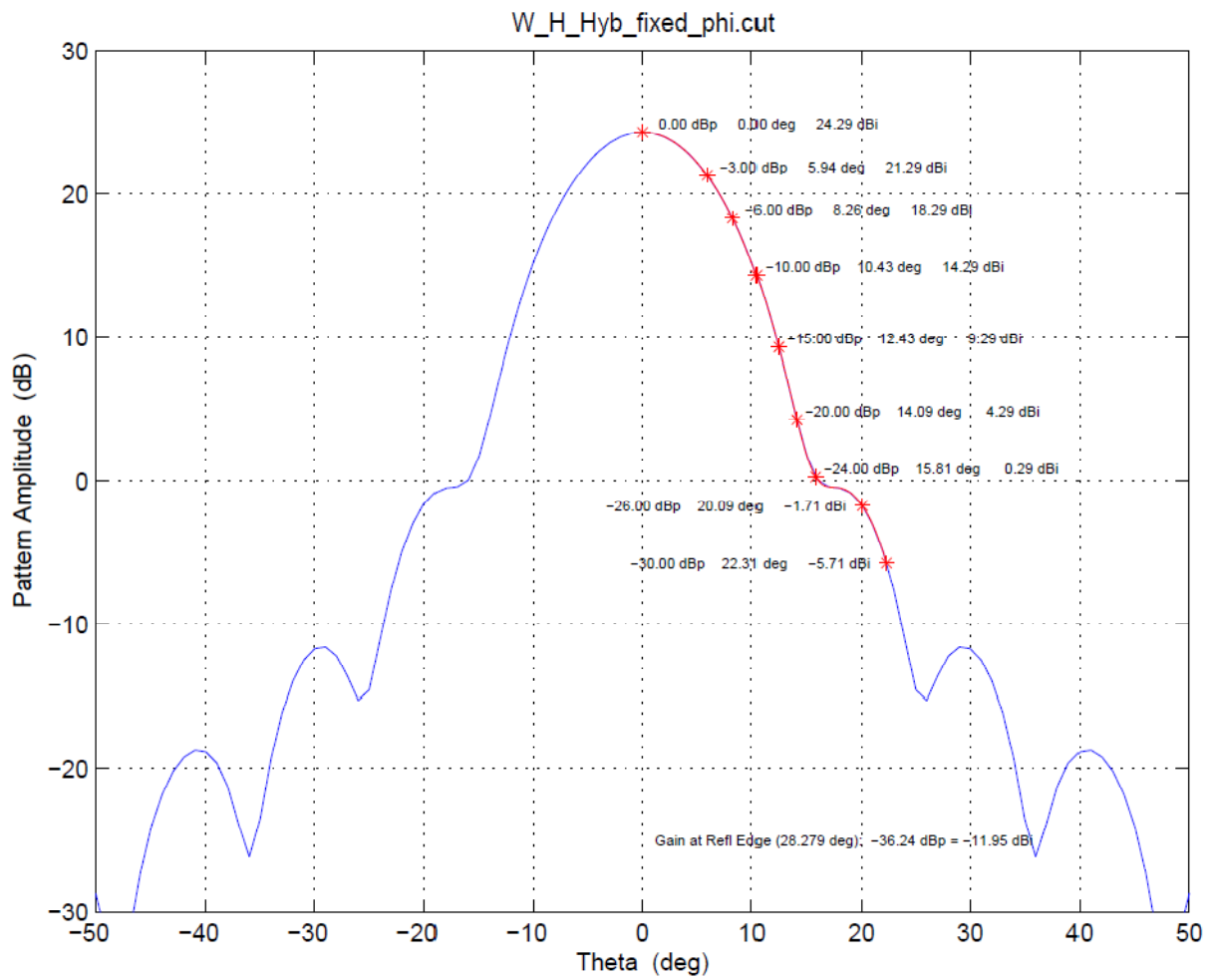
# DRAFT SOW FOR RFI NRL-11-SL01



# DRAFT SOW FOR RFI NRL-11-SL01



# DRAFT SOW FOR RFI NRL-11-SL01



# DRAFT SOW FOR RFI NRL-11-SL01

