

## **DATA ITEM DESCRIPTION**

**Title:** Geophysics

**Number:** MR-005-05.01

**Approval Date:** 20071220

**AMSC Number:**

**Limitation:**

**DTIC Applicable:** No

**GIDEP Applicable:** No

**Office of Primary Responsibility:** CEHNC-ED-CS-G

**Applicable Forms:** Attachment A – Field Data Sheet, Attachment B – DID\_Tables Access Database, Attachment C - Geophysical Submittals & Due Dates

**Use/Relationship:** This Data Item Description contains instructions for preparing Work Plan chapters and data requirements when addressing geophysical investigations for Munitions Response or other munitions related projects. This DID specifies naming and formatting conventions for data deliverables associated with geophysical activities. This DID shall be used in association with EM 1110-1-4009 Chapters 6-9. Additional references include the Ordnance and Explosives Digital Geophysical Mapping Guidance- Operational Procedures and Quality Control Manual (USAESCH, 2003).

### **Requirements:**

1. **Geophysical Investigation Plan.** The Contractor shall prepare a Geophysical Investigation Plan (GIP) that provides details of the approach, methods, and operational procedures to be employed to perform geophysical investigations at Munitions Response or other munitions related projects. The GIP shall describe how the geophysical investigation and related activities will meet the project's Data Quality Objectives (DQOs). The DQOs shall include statements identifying the specific MEC target objectives, their anticipated or expected burial depths, and the detection and removal objectives for the project. Geophysical data needs and operating procedure requirements shall be identified and specified to support all project DQOs. Additionally, the following topics shall be addressed in the GIP:

- a. Specific Area(s) to be investigated, including a Survey Mission Plan Map.
- b. Account for and address all known project specific constraints, adverse conditions or features potentially affecting geophysical investigations (i.e. vegetation, geology, soil type, background geophysical noise, man-made features, site accessibility, etc.)
- c. Geophysical Survey type(s), equipment and field procedures (required for both analog and digital detectors)
- d. Required field documentation (see Attachment A for a sample Field Data Sheet template)
- e. Data processing, corrections and advanced analysis (see EM 1110-1-4009 section 8-12)
- f. Anomaly identification and ranking/prioritization criteria, and dig selection criteria (see EM 1110-1-4009 section 8-6)
- g. Anomaly reacquisition and resolution procedures (see EM 1110-1-4009 section 8-7 & 8-8b)
- h. Descriptions of final data formats and final map formats.

2. **Geophysical Prove-out (GPO) Plan & Letter Report.** The Contractor shall prepare a GPO Plan to address those elements described in EM 1110-1-4009 sections 8-11 and 8-12. The PDT, including the contractor's and government's geophysicists, will define the GPO size and scope necessary to meet the project needs. After the GPO field effort, the Contractor shall prepare a GPO Letter Report to contain all information required by the PDT to support their selection decisions, including the following:

- a. As-built drawing of the GPO plot
- b. Pictures of all seed items
- c. Geophysical data maps
- d. Summary of the GPO results
- e. Proposed geophysical equipment, techniques, and methodologies
- f. Anomaly identification and ranking/prioritization criteria, and dig selection criteria (see EM 1110-1-4009 section 8-6), and
- g. Instrument specific and process specific criteria for defining the quality of the geophysical data.

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- h. Any other pertinent data/information used in decision making.

A CD shall be delivered with the letter report containing the following files:

- a. The GPO Letter Report (Microsoft Word format);
- b. All raw and processed geophysical data;
- c. Geophysical maps in their native format (Surfur®, Geosoft Oasis montaj™, Intergraph, or ESRI ArcView format) and as raster bit-map images such as BMP, JPEG, TIFF or GIF;
- d. Seed item location table (Microsoft Excel or Access format);
- e. Microsoft Access Tables in accordance with Attachment B (all are required except Intrusive\_Results\_Table). The Seed\_Item\_Table shall include entries for all corresponding Target\_IDs per dataset (i.e. GPO\_Dataset1\_TargetID, GPO\_Dataset2\_TargetID, etc.).
- f. Table (Microsoft Access format) of all control points, survey points and benchmarks established or used during the Location Surveying task.

The GPO Letter Report shall be included in future work plans and reports associated with the survey area. If the contractor proceeds with production geophysical mapping prior to the Government's acceptance of their GPO letter report, they will proceed at their own risk. If the Government rejects any portion of the Contractor's GPO letter report pertaining to geophysical mapping procedures, quality control or detection capabilities, all data collected by the Contractor at their own risk will be rejected and the Contractor shall re-collect the data at zero cost to the Government.

3. Quality Control (QC) Plan. The geophysics sections (digital and analog) of the QC plan shall be developed in accordance with EM 1110-1-4009 Chapter 9 (Quality Control of Geophysical Systems and Related Operations). The quality control plan shall identify meaningful and reasonable QC checking and testing procedures to define and document the quality achieved by the work processes performed and in the data generated. The QC plan shall include procedures for performing root-cause analyses when failures occur. Results of QC tests, numerical and pass/fail, shall be reported in an Access database or spreadsheet table, using the naming and formatting conventions found in the database template provided by USAESCH and as described in Attachment B. Contact the USAESCH Geotechnical Branch for the current database template. This database provides the format for reporting common QC tasks, it does not specify QC requirements. The tables are not all-inclusive and additions may be made to support project specific needs. Project specific QC metrics and QC requirements shall be defined and the QC Plan shall specify how they will be calculated and the frequency they will be calculated.

4. Data Format Requirements. The formats specified in this paragraph are REQUIRED to be exactly followed, although the Contractor may choose to submit the data in additional formats as well. All geophysical data shall be accompanied by metadata in the form of a read-me file or a database or spreadsheet table documenting the field activities associated with the data, the processing performed, and correlation of data file names to grid names used by other project personnel. Metadata shall be generated for each logical grouping of data (e.g., names and contents of all files generated to map a grid, or names and contents of all files generated from a towed platform during a mapping session.) Metadata shall fully describe all measurements recorded in each data file, and shall include all information necessary to successfully associate all geophysical system measurements to their correct geographical location. At the discretion of the PDT, the metadata can be limited to provide references to where this information is located. Appendix B identifies naming and reporting conventions that shall be used to deliver information associated with geophysical activities, such as function test results, QC assessment information and results, anomaly characteristics, dig lists, reacquisition information and intrusive investigation results. Separate reporting formats and conventions are provided for analog and digital geophysical activities. The appendix also provides templates for reporting metadata. Not all information described in Appendix B is mandatory, required fields are identified by solid circles (●) in front of the field name.

a. Raw Geophysical Field Data Format and Storage. Raw field data will be stored in a logical file directory (folder) structure to facilitate its management and dissemination to PDT members. Raw field data is defined as all digital data generated from the geophysical system, and includes geophysical, positioning, heading, tilt, and any other peripheral or instrument measurements collected or recorded during data acquisition. All raw field data shall have a time stamp associated with each measurement event. At the discretion of the PDT, raw field data may include geophysical system data that has been checked, corrected and processed into ASCII files, either individually

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by instrument or merged with positioning data. Metadata for raw geophysical data shall include instructions for generating ASCII formatted data from all raw data for use in computer processing systems.

b. Final Processed and Advanced Processed Data Format and Storage. Final and Advanced (as required) processed data shall be produced and presented in ASCII formatted files and native geophysical processing software formats (e.g. Geosoft GDB). Final processed data is defined as data that represents, to the best of the Contractor's ability, the true potential field that exists at each actual location measured by the geophysical system. Final processed data shall have all corrections applied needed to correct for positioning offsets, instrument bias (including instrument latency), instrument drift, roll-pitch-yaw-angle offsets, and diurnal magnetic variations. Advanced processed data is defined as Final Processed data that has been subjected to additional advanced processing (e.g. filtering) techniques and was used in the anomaly selection process. All corrections and processing steps will be documented. Metadata for final processed and advanced processed data shall include UTM zone and coordinate units (the PDT or PWS may require additional coordinate units and projections be included), and descriptions and units of all "z" values, which are the data associated with each measurement event. All measurement events shall have a time stamp. Unprocessed, interim-processed, final processed, and advanced processed (if used) "z" values shall be included in a single file. Data file size should be limited to 100 megabytes or less, and the file length should be limited to 600,000 lines or less. Each data file will be logically and sequentially named so that the file name can be easily correlated with the project-specific naming conventions used by the PDT.

c. Anomaly Table, Dig Selection Table, Reacquisition Table & Intrusive Results Table formats. The Anomaly, Dig Selection, & Intrusive Results Tables shall be submitted digitally in a Microsoft Access Database in accordance with Attachment B. The Anomaly Table shall include all anomalies above background or above a basic selection threshold, and shall include entries for all optional columns used in making dig decisions (e.g. Size, SNR, Fit\_MagneticMoment, etc). The Dig Selection Table shall include all anomalies from the Anomaly Table that have been selected for intrusive investigation. The Reacquisition and Intrusive Results Tables shall include all information tabulated for each target during those phases

d. Additional QC Table formats. The following tables are required with each DGM data submittal, and shall follow the Attachment B format: Background\_Noise\_Table, Coverage\_Table, Positioning\_Repeatability\_Table, Repeatability\_Table, Sample\_Separation\_Table, Speed\_Table, Seed\_Item\_Table, Static\_Background\_Table, and Static\_Response\_Table. The following tables are required for analog surveys, and shall follow the Attachment B format: Function\_Test\_Table, Coverage\_Seeding\_Table, Detection\_Seeding\_Table, and Grid\_QC\_Table.

e. Map Format. For submittals, the contractor shall provide maps in editable form if available (e.g. Geosoft .map) and map images in a common image format (e.g. JPEG) for viewing without the software used to produce the maps. Maps will include all the following basic map features in addition to any other necessary site information.

- (1) General: All selected anomalies and known features shall be marked with symbols on the map. Map scales should be even multiples of the base units presented in the map. Map sizes should be designed to fit standard printer or plotter sizes. Grid ticks or grid lines should be visible and labeled.
- (2) Title block: Include Figure number, the map Title and sub-title (e.g. instrument and type/component) and the location of the information being presented (e.g. site/area name and property/grid ID).
- (3) Legend: All objects/symbols shown on the map should be identified in the legend. Map Scale bar, coordinate system and North arrow shall be included. Color scale bars should use a color scheme that clearly differentiates between anomalies and background readings. Background values should be plotted in white or gray, so as not to distract the viewer. A classic "cold to hot" color scale should be used with negative values plotted in blue and high positive values plotted in red/pink. The range of values should be "fixed" so that the same color scale is utilized across the site. The region of major interest is almost always near the detection/background limit, not the maximum or minimum values of the data set.
- (4) Additional Project Information: minimum requirements are to have boxes for the following information: Client, Project, Contractor, Map creator, Map approver, Date created.

### 5. Data Submittals

The Contractor shall furnish all geophysical data, geophysical maps and dig sheets to USAESCH, via internet using FTP, E-mail attachment for small files under 5 Mb, CD/DVD or other approved method, for inspection. All geophysical data shall be accompanied by metadata as described in Section 4. The delivery schedule shall be in

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accordance with Attachment C, unless otherwise established by the PDT. The Contractor shall also provide a digital planimetric map in ESRI ArcView, Geosoft, or other approved format, and coincident with the location of the geophysical survey, so that each day's geophysical data set can be registered within the original mission plan survey map. Each data submittal shall include the Attachment B tables to identify the quality of the data and whether it is meeting project objectives. Any QC failures shall be identified and the corrective action that is being taken shall be described. The final report deliverable shall include two copies on CD/DVD of all project data.

6. End of DID MR-005-05.01.

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**Attachment A**

**Field Data Sheet**

**Project Name:** \_\_\_\_\_

**Project Location:** \_\_\_\_\_

**Geophysical Contractor:** \_\_\_\_\_

**Field Team:** \_\_\_\_\_

**Coordinate System (w/ units):** \_\_\_\_\_

**Survey Type:** \_\_\_\_\_

**Survey Area ID:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Raw Data File Name:** \_\_\_\_\_

**Repeat Data File Name:** \_\_\_\_\_

**Geophysical Instrumentation:** \_\_\_\_\_

**Serial Number:** \_\_\_\_\_

**Navigation Method:** \_\_\_\_\_

**Serial Number:** \_\_\_\_\_

**Additional Comments:** \_\_\_\_\_

Sketch of Survey Area- include North arrow, Approximate scale, brief description of terrain, site conditions, and any surface features potentially affecting the data quality or coverage.

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**Attachment B**

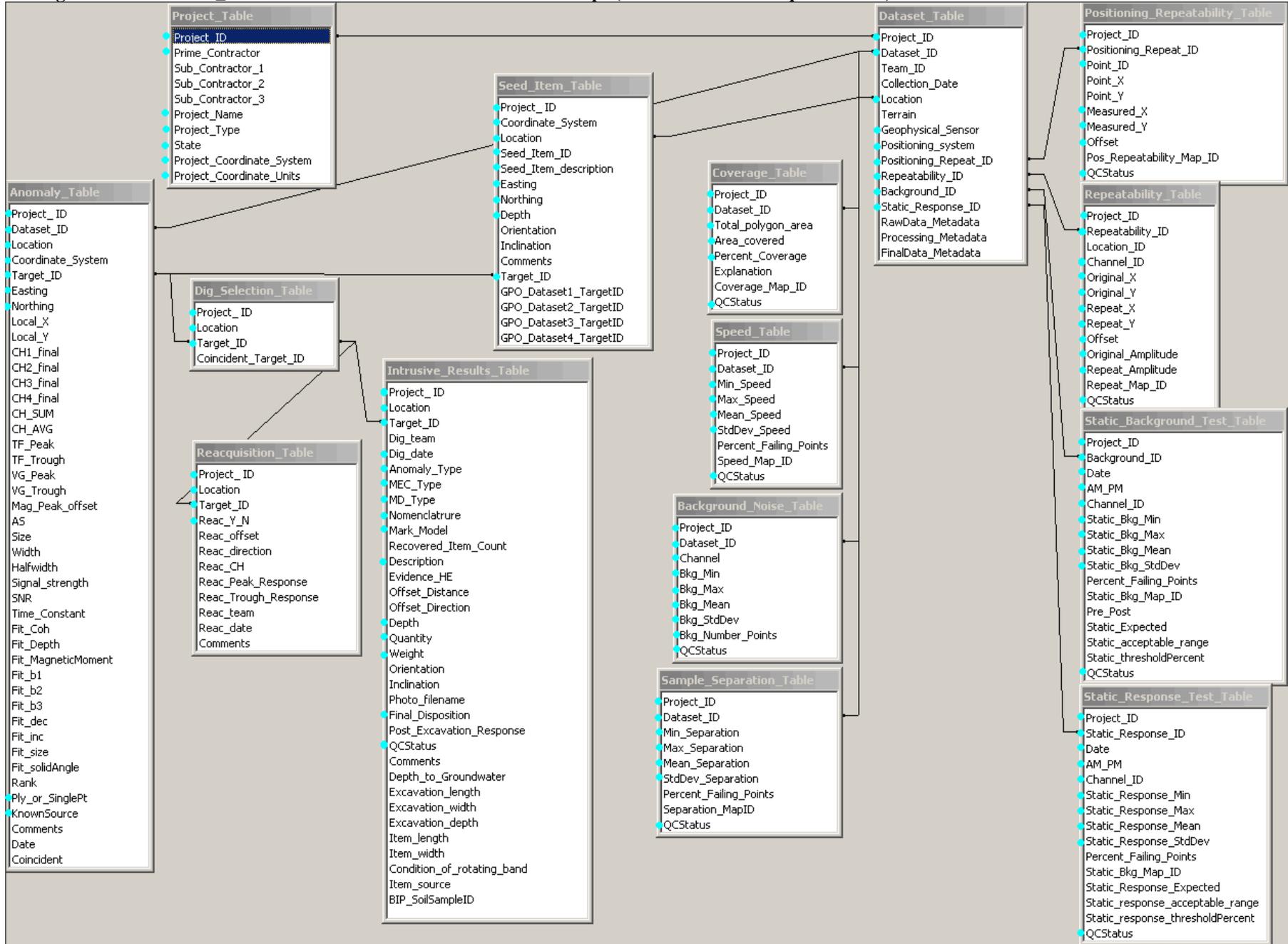
**DID\_Tables Access Database**

This Appendix identifies naming and reporting conventions that shall be used to deliver information associated with geophysical activities. Tables for reporting information are separated by common functions or activities and include reporting specification for function test results, QC assessment information and results, anomaly characteristics, dig lists, reacquisition information and intrusive investigation information. Separate reporting formats and conventions are provided for analog and digital geophysical activities in Figures B1 and B2, respectively. This appendix also provides templates for reporting metadata (Project\_Table and Dataset\_Table). Not all information described in this appendix is mandatory, required fields are identified by solid circles (●) in front of the field name. Refer to the field descriptions in the electronic version of each table to learn the intended contents and use of each table.

Where appropriate, a “QCStatus” field is included in a table to indicate whether all associated QC assessments and tests have been performed and accepted or rejected by QC personnel. Site specific QC metrics and requirements shall be developed by the PDT. Those metrics and requirements can be appended to these tables to simplify reporting and checking activities, and their format and use should be defined collaboratively by the PDT.

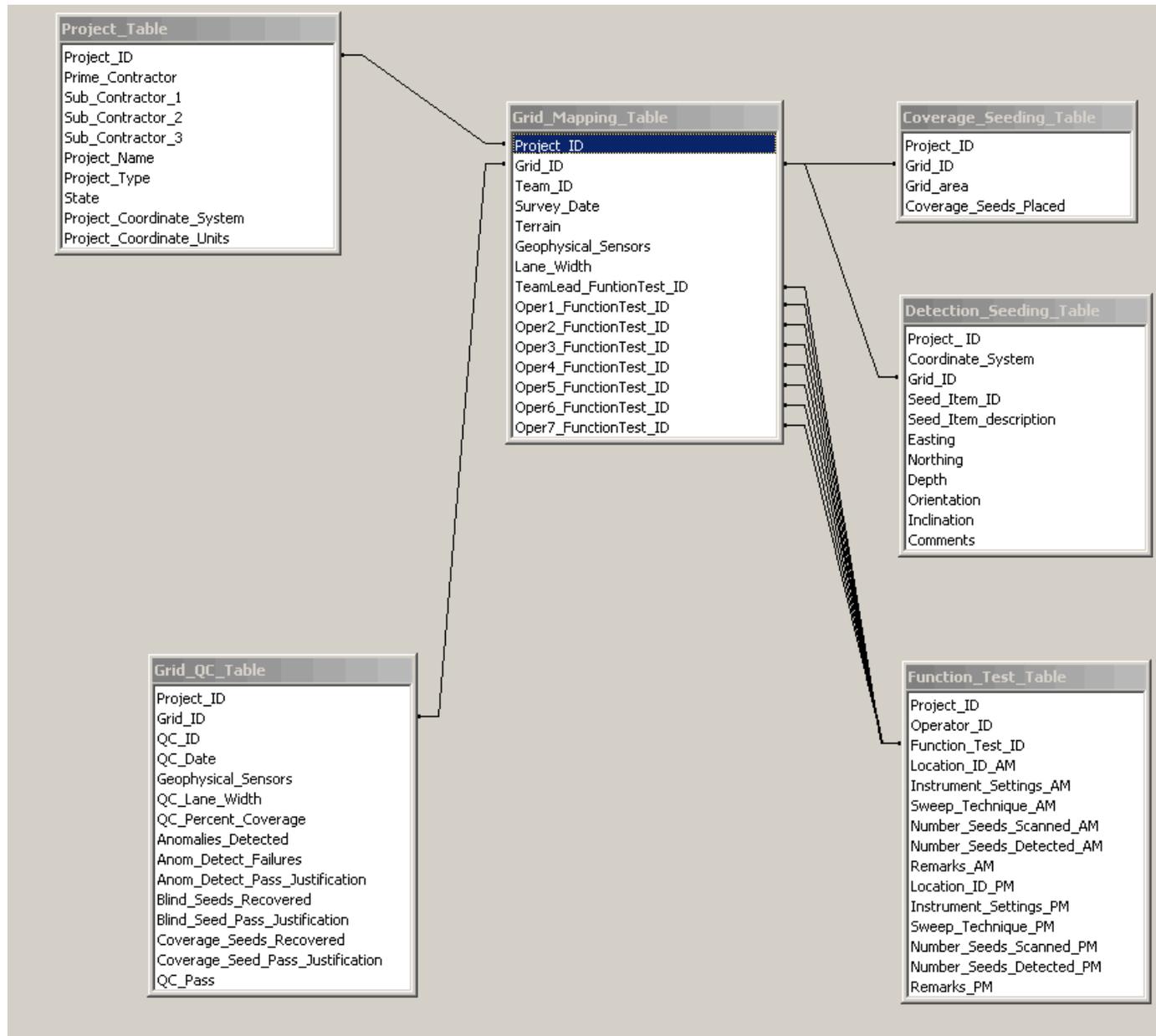
# DID MR-005-05.01 Attachment B

**Figure B1: DGM DID\_Tables Access Database Tables & Relationships (blue dots indicate required fields)**



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Attachment B

Figure B2: Analog DID\_Tables Access Database Tables & Relationships



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**Attachment C**

**Geophysical Submittals & Due Dates**

	With Each Submittal	24 hours after collection	24 hours after request by government representative	By the Following Friday	7 days after completed excavations of each grid	CD/DVD With Final Report
ReadMe File	X					
Index Map	X					
Updated DID_Tables Access Database	X					
First Week's mapping and QC data		X				
Special Request Draft Data			X			
DGM Data Package for each week's data collection (raw and final mapping & QC data, Maps, Field Data Sheets, & updated associated database tables)				X		
Intrusive Results Tables					X	
All Raw & Final Digital Data, Maps, Final Access Database, Final QC documentation						X