



NGS

Electronic Distance Measuring Instrumentation Calibration Base Line Program Participation Procedures

Procedures Document National Geodetic Survey National Ocean Service National Oceanic and Atmospheric Administration	
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Official Procedure Title: Electronic Distance Measuring Instrumentation Calibration Base Line Program Participation Procedures

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Internal or External: External

Associated Procedures/Policies:

NOS NGS-8 Establishment of Calibration Base Lines

NOS NGS-10 Use of Calibration Base Lines

NGS Electronic Distance Measuring Instrumentation Calibration Baseline Program Policy

Authority/Reference: n/a

Supersedes:

NGS Electronic Distances Measuring Instruments Calibration Base Line Program Participation Procedures, 2017-1208-01-A1

Review Schedule: Every year, or as needed

Responsible Office/Position: IMB Chief Kendall Fancher

Purpose/Scope:

The National Geodetic Survey's (NGS) Electronic Distance Measurement Instrumentation (EDMI) Calibration Base Line (CBL) Program, hereafter referred to as the CBL Program, assists the EDM user community in establishing accurate and conveniently located CBLs for efficient, routine testing of equipment. These high-accuracy CBLs provide local access to the national standard of length and a means to detect and quantify errors in EDM. The CBL Program includes three principal types of CBLs; 1) the NGS Primary CBL, 2) Federal CBLs and 3) Cooperative CBLs.

1. The NGS Primary CBL (Corbin Pier Calibration Base Line) is located at the NGS Training Center & Laboratory facility in Woodford, VA. This CBL is directly traceable to the national standard of length at the National Institute of Standards & Technology.
2. Federal CBLs (FCBL) are established with strict adherence to the procedures and specifications provided in NOAA Technical Memorandum NOS NGS 8 (NGS 8), using EDM whose accuracy has been demonstrated over the NGS Primary CBL. All CBLs established prior to May 2017 and not reported as being in disturbed condition are classified as FCBLs. NGS will provide direct support to maintain one FCBL in good condition in every state.
3. Cooperative CBLs are established with strict adherence to the procedures and specifications provided in NGS 8, using EDM whose accuracy has been demonstrated over a FCBL.

This document provides guidance on how to participate in the CBL program as a Contributing Partner. A Contributing Partner is any organization, company or individual that follows the

procedures and specifications provided in NGS 8 to establish, verify or re-measure a CBL with the intent of sharing their data and metadata with the CBL program.

Background:

Surveying and engineering professionals use CBLs to test their EDM before and/or after projects requiring accurate distance measurements. Not only is testing EDM good practice, in some cases testing is legally required by statute or contractual agreement. Since the mid-1970s, NGS has collaborated with Federal, State and Local government agencies and institutions to establish over 400 CBLs, with at least one CBL located in every state. NGS maintains these CBL data, available by download at the CBL Program webpage.

In 2016, the NGS State Geodetic Advisor Program transitioned into the NGS Regional Advisor Program. The NGS State Geodetic Advisor Program was an integral component of the previous CBL Program policy dated 10/02/2010. Additionally, NGS goals for making the CBL Program more useful for the EDM community and sustainable into the future necessitated changes to this policy. The CBL Program Policy was revised in 2017 to reflect these changes.

NGS provides technical procedures documents for establishing, re-measuring and using CBLs:

NOAA Technical Memorandum NOS NGS 8: Establishment of Calibration Base Lines, by Dracup, Fronczek, Tomlinson, Spofford, Wegenast, Fancher and Geoghegan, Revised 2019

NOAA Technical Memorandum NOS NGS 10: Use of Calibration Base Lines, by Fronczek, Revised 1980

Exceptions:

NGS reserves the right to refuse sharing of a CBL data submission.

Definition of Terms:

Calibration Base Line (CBL) – A locally accessible standard for length realized as a series of four or more very stable survey marks set in accordance with NGS 8. Distances between all combinations of marks are determined very accurately and traceable to the National Institute of Standards and Technology.

Good [condition] – applies to all CBLs shared at NGS's webpage where no users have raised legitimate concerns about the published distances; not classified as suspect or disturbed

Disturbed [condition] – applies to a CBL where one or more users have reported that 1) one or more marks have been dislodged (knocked or forced out of position), 2) a line-of-sight is permanently obstructed, or 3) verification of published distances have failed; refer to NGS 8 to restore a disturbed CBL to good condition through re-measurement

Establish [a CBL] – a process whereby a contributing partner submits rigorously observed distances and metadata of an unshared CBL for review and publication; refer to NGS 8 for details.

Verify [a CBL] – a process whereby newly observed distances are found to agree with an established CBL's shared distances. Verification inspires confidence in the accuracy of the CBL's distances and stability of the mark

Re-measure [a CBL] – the rigorous observations of the aforementioned “establish” process applied to a disturbed CBL to restore it to good condition; passing review, NGS will supersede the old values at the CBL website.

NGS Primary CBL – a CBL (Corbin Pier Calibration Base Line) located at the NGS Instrumentation & Methodologies Branch facility in Woodford, VA. It is directly traceable to the national standard of length at the National Institute of Standards & Technology.

Sharing – The act of releasing to NGS the observations, metadata and results (via the NGS CBL webpage) for the express purpose of the NGS evaluating the information and publishing if appropriate

Contributing Partner Rights and Responsibilities:

- Before establishing or re-measuring a CCBL or FCBL intended for sharing at the CBL Program website, a CBL Proposal Form must be submitted by Contributing Partners to NGS via email to NGS.CBL@NOAA.GOV. The form is available for download at the CBL Program webpage.
- Contributing Partners must adhere to the requirements and procedures provided in NGS 8 when establishing or re-measuring a FCBL or CCBL intended for sharing at the NGS EDMC CBL website. All associated data and metadata, identified in NGS 8, is to be submitted via email to NGS.CBL@NOAA.GOV.
- Contributing Partners must adhere to the requirements and procedures provided in NOS NGS 8 when verifying a FCBL or CCBL found at in the NGS EDMC CBL website. All associated data and metadata, identified in NOS NGS 8, is to be submitted via email to NGS.CBL@NOAA.GOV.
- CBL data submitted to NGS must meet requirements and tolerances, identified in NOS NGS 8, for a FCBL or CCBL. Any issues with the data received by NGS that would prevent sharing at the NGS EDMC CBL website will be provided to the Contributing Partner via email correspondence.

- Contributing Partners are encouraged to provide NGS with feedback concerning the condition or status of CBLs found at the NGS EDMC CBL Program website. All pertinent feedback will be incorporated into the information for that CBL for the benefit of all users. Feedback can be provided to the NGS by email at NGS.CBL@NOAA.GOV.
- When there are no longer any FCBLs in good condition remaining within a state, partners within that state may request NGS either establish a new FCBL or re-measure an existent CBL to FCBL specifications. NGS will work with the state CBL users to determine an acceptable location for this FCBL. This NGS-supported FCBL must be openly accessible to any CBL user. In advance of NGS's arrival, requesting partners will prepare the site by setting marks (as necessary), running levels and clearing lines-of-sight. At time of field measurements, partners may also be asked to provide a mark description file and one support person.

NGS Rights and Responsibilities:

- NGS will maintain traceability of the NGS Primary CBL to the National Institute of Standards & Technology.
- NGS will make the NGS Primary CBL available for EDMC testing by Contributing Partners during normal working hours.
- NGS will maintain accurate, publicly available distances on at least one FCBL per state, and continue to make data/metadata available for all CBLs included in the CBL Program through the CBL Program webpage.
- NGS will act upon the request of a consensus of partners within a state to ensure at least one FCBL, in good condition, has accurate, published distances. NGS reserves the right to reject proposed locations based on technical or logistical problems with the site.
- NGS will provide access to the CBL Program database, software, procedures and policy documents through the CBL Program website to support the testing of EDMCs and the establishment, verification and re-measurement of CBLs to the public at large.
- NGS will provide technical support to Contributing Partners.
- NGS will provide a quality review of CBL data shared by Contributing Partners.
- NGS will carefully review and follow-up on all user-submitted CBL feedback.

RECORD OF REVIEW AND CHANGES

This is a living document that is reviewed yearly. It will be updated, when appropriate, to reflect changes in controlling Federal policies, organizational strategic goals/objectives, technology, or other matters that may have an impact on these procedures. Modifications made to this document are recorded in the below table. This record shall be maintained throughout the life of the document.

Version Number	Date	Section/ Page Affected	Summary of Change or Annual Review	Author / Reviewer
1.0	03/27/2017	All	New Document	Kendall Fancher, Charles Geoghegan, Erika Little
1.0	1/19/2021	Page 3	Updated technical memorandum information included in background section	IMB/GSD