THIS CIRCULAR LETTER REQUIRES YOU TO VOTE

IHB File No. S3/1000

CIRCULAR LETTER 37/2000
4 September 2000

IHO MANUAL ON HYDROGRAPHY

Reference: 1. IHB CL 48/1998
2. IHB CL 5/1999

Dear Sir,

You may recall that the majority of Member States responded favourably to CL 48/1998 in which Member States were asked to indicate their general opinion with regard to the development of an IHO Manual on Hydrography (cf. CL 5/1999).

The drafts for the Table of Contents of the Manual, the Terms of Reference, and the Work Programme have been developed as indicated in CL 5/1999. They have been attached to this CL for your perusal. For the time being, please do refrain from sending detailed comments on these drafts to the Bureau, as such comments will only be required if the majority of Member States agrees to proceed with the project.

During the 2nd Extraordinary International Hydrographic Conference the IHO Strategic Plan and Work Programme (WP) were adopted by Member States subject to the inclusion of some changes. The revised documents were disseminated by CL 33/2000. The WP lists, under Element 3.2 "Hydrographic Surveying", the Task 3.2.8 "Prepare, for the approval of Member States, a project to compile an IHO Manual of Hydrographic Surveying".

Taking into consideration above points, the Bureau would now like to seek the approval of Member States to proceed with the project and establish a working group. If you are in favour of this project, please do nominate your representative for the working group keeping in mind that several meetings of the group will be necessary during the development of the Manual; provided Member States approve the project, the very first meeting will probably be held around mid-2001. The IHB understands that the Hydrographic and Oceanographic service of the Chilean Navy (SHOA) has a candidate to serve as Chairman in the person of Captain H. GORZIGLIA (International Advisor of the Hydrographic Service of Chile). Chile is kindly requested to confirm this availability. The other Member States are requested to indicate if their designated member of the Working Group is also available to act as Chairman.

You are kindly requested to fill in the attached Voting Paper and to return it to the Bureau by 15 December 2000.

On behalf of the Directing Committee,
Yours sincerely,

Rear Admiral Giuseppe ANGRISANO
President

Encl: - Annex A: Voting Paper
- Annex B: Draft Table of Contents
- Annex C: Draft Terms of Reference
- Annex D: Draft Terms of Procedure
- Annex E: Draft Work Programme

VOTING PAPER
(to be returned to the IHB, duly completed by 15 December 2000)

The Directing Committee
International Hydrographic Bureau
B.P. 445
MC 98011 Monaco CEDEX
Principality of Monaco
Telefax: +377 93 10 81 40
E-mail: info@ihb.mc

Member State _____

Date of reply _____

IHO MANUAL ON HYDROGRAPHY

I agree to proceed with the project to develop the Manual and to establish a working group.

YES* ☐

NO ☐

* If YES, do you intend to nominate a representative for the Working Group?

YES ☐

Name of representative: .....

NO ☐

* If YES, do you propose your representative as Chairman?

YES ☐

NO ☐

Comments:

.....

.....

.....

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.....

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Signature _____

IHO Manual on Hydrography

DRAFT

PREFACE

- *Justification of the publication*.
  Brief account on the justification and efforts made in order to prepare an IHO Hydrographic Manual, in other words, the aim is to justify the IHO needs to have a Manual of this general nature and scope, considering the existence of textbooks that refer to particular topics, with great detail.

- *Hydrographic Manual objective*.
  An identification of the General Objective and Specific Objectives are considered to be given, including a description of the purpose of the Manual and its applications and secondary effects, as for example, to be considered as a guide for Hydrographic courses.

- *Details of the Hydrographic Manual content*.
  In this part it should be described and explained the sequence being followed by the Chapters included in the Manual, as well as the Annexes, specially those referring to Terms and Acronyms used in the Manual.

- *Method to keep the publication up-dated*.
  In this part it should be identified the body responsible in keeping the Manual up-dated, as well as the mechanism and procedure that will be followed for its up-dating. The binding system of the manual is relevant to the up dating procedure.

TABLE OF CONTENTS

INTRODUCTION

- *Brief history of hydrography.*
  It is proposed to include some aspects associated with the origin of the hydrographic activity and a brief description of the evolution of this discipline.

- *Definitions of Hydrography.*
  It is proposed to include several definitions of hydrography, acknowledging their authors, in order to give a wide vision of its field of action.

- *Fields of competence associated to hydrography.*
  It is recommended to identify the areas of influence that hydrography has within diverse activities conducted and related to maritime field.

- *Hydrography importance.*
  This part should constitute an element to motivate future hydrographers, in which the contribution of hydrography in relation to safety to navigation and mankind social and economic development should be highlighted.

- *Related disciplines.*
  It is recommended to identify the principal disciplines related with hydrography and hydrographic practice.

CHAPTER I
"PREVIOUS FUNDAMENTAL KNOWLEDGE"

The objective of this Chapter is to recall and identify disciplines whose knowledge are considered to be fundamental to facilitate the understanding of the those matters related to the hydrographic activity. It is not intended to explore details, due to the existence of texts, specially designed to treat these specific matters. The intention is to identify the principal parts of wide usage in hydrography and to motivate the reader to deepen his knowledge.

This Draft Table of Content considers this Chapter as Chapter I, but it might be decided to have it as the last Chapter or even as an Annex, if considered more appropriated.

- *Mathematics*
  + Plane or two dimension geometry
    - Co-ordinate systems
      · Cartesian
      · Polar
    - Lineal equations
    - Quadratic equations
  + Three-dimensional geometry
    - Co-ordinate systems
    - Lines and planes equations
    - Lines and planes intersections
    - Distances
  + Plane trigonometry
    - Trigonometric functions
    - Plane triangles
  + Spherical trigonometry
    - The sphere
      · Maximum circles
      · Spherical angles
      · Spherical excess
    - Spherical triangles
    - Fundamental sine and cosine rules
    - Napier's rule

- *Statistics*
  + Theory of measurements
    - Continuous data sampling
    - Sampling distribution
    - Random sampling
  + Theory of errors
    - Error classification
    - Treatment of systematic and random errors
    - Standard deviation
    - Root mean square error
  + Practical statistic
    - Standard error estimation
    - Interpolation
    - Curves filtering and smoothing methods
    - Correlation and regression
    - Confidence intervals

- *Computation*
  + Computing terminology
    - Types of memories
    - Drivers, serial and parallel
  + PC's and Workstations

+ Operational systems
+ General application programmes
    - Word processor
    - Spread sheet
    - Data bases
+ Graphic programmes and geographic information systems (GIS)
+ Programming phases
+ Flow diagrams
+ Simple programming
+ Data bases systems
+ Computational Networks

- *Physics*
+ Measurement units and equivalents
+ Mmechanics
    - Vectors
    - Power
    - Cinematic
    - Relative movement
    - Oscillatory movement
+ Waves
    - Amplitude , frequency, longitude
    - Oscillatory movement
        · Surface waves on fluid
        · Doppler effect
        · Sound, acoustic
    - Electromagnetic waves
        · Propagation
        · Reflection y refraction
    - Waves geometry
        · Lenses
        · Prisms
        · Optical instruments
        · Lasers
    - Transducers
+ Electricity
    - Power, potential, electric field
    - Current
        · Continuous
        · Alternating
    - Static electromagnetic field
+ Electronic systems
    - Components
    - Signals
    - Amplifiers and filters
    - Circuits
        · Logic
        · Integrated

- *Cartography*
+ Cartographic projections
    - Types, properties, distortions
    - Mostly used projections
        · Mercator
        · UTM
    - Co-ordinate systems
        · Datum
        · Geographic, astronomic and geocentric
        · Transformations
        · Basic calculus

+ Nautical charts
    - Objective, content and symbols
    - Compilation process
        · Manual
        · Quasi-automatic
        · Computer assisted
    - Presentation
        · Paper
        · Digital
            · Raster
            · Vector

- *Photogrammetry*
  + Principles and application of aerial photographs
  + Elements
    - Cameras, lenses and others
    - Basic photo geometry
        · Scale
        · Coverage
    - Flight planning
    - Ground control
        · Horizontal
        · Vertical
    - Restitution
        · Principles and methods
    - Aerotriangulation
        · Principles and methods
    - Photo interpretation
        · Principles

- *Oceanography*
  + Sea water physical properties
  + Tides and currents
    - Origin and type of tides
    - Origin and type of currents
  + Waves
    - Type of waves
    - Propagation

- *Meteorology*
  + Composition and structure of the atmosphere
  + Meteorology elements
  + Climatology
  + Weather systems
  + Observation, recording and weather forecasting

CHAPTER II
"HYDROGRAPHIC SURVEYING"

- *Definition.*
  This definition should be conceptual, without going into details on different and particular hydrographic surveying applications.

- *Objective.*
  It is proposed to identify as the principal objective, the hydrographic survey in support to nautical charting. Nevertheless, it should also be indicated other objectives, providing the reader a clear picture of the diverse applications that a hydrographic survey could contribute with.
  .
- *Classifications*. (refer to S-44)

  + Special
    - Application
    - Conditions
  + Order 1
    - Application
    - Conditions
  + Order 2
    - Application
    - Conditions
  + Order 3
    - Application
    - Conditions

- *Conceptual specifications.*

  + Scale and coverage
  + Sounding
    - Lines
      · Leading lines and clearing lines
      · Interlines and cross lines
    - Depth
      · Accuracy and precision
  + Position
    - Accuracy
    - Speed
    - Fix interval
  + Quality control criteria
  + Quality assurance criteria
  + Equipment calibration specifications

CHAPTER III
"CONCEPTS OF POSITIONING"

- *Introduction*
  + The earth
    - A plane and planimetry concept
    - An sphere
    - An ellipsoid
    - A geoid and geodesy concepts
  + Co-ordinate systems
    - Plane
    - Geographic
    - Astronomic
    - Geodetic
    - Ggeocentric
  + Datum
    - Horizontal
      · Definition
      · Type
      · Comparisons
      · Transformations
    - Vertical
      · Definition
      · Type
      · Selection and establishment

- *Horizontal positioning fundamentals*
  + Types of horizontal control
    - Principal control
    - Secondary control
    - Sounding station control
  + Methodologies to extend horizontal control
    - Triangulation
      · Principles and specifications
      · Base and angles measurements
      · Quality control
      · Sources of error
      · Computation and compensation
    - Trilateration
      · Principles and specifications
      · Angles and distance measurements
      · Quality control
      · Sources of error
      · Computation and compensation
    - Traverse
      · Principles and specifications
      · Angles and distance measurements
      · Quality control
      · Sources of error
      · Computation and compensation
    - Aerotriangulation
      · Specifications
      · Applications
    - Global positioning systems (GNSS)
      · Principles and specifications
      · Methods and accuracy
      · Sources of error and correction

- *Vertical positioning fundamentals.*
  + Description
  + Methodologies to extend vertical control
    - Geometric levelling
      · Principles and specifications
      · Measurements and quality control
      · Sources of error
      · Computation and compensation
    - Trigonometric levelling
      · Principles and specifications
      · Measurements and quality control
      · Sources of error
      · Computation and compensation
    - Levelling with GNSS
      · Principles and specifications
      · Measurements and quality control
      · Sources of error
      · Computation and compensation
- *Instruments and equipment used to extend horizontal and vertical control*
    - Optic instruments
      · Sextant
      · Theodolite
      · Levels
      · Stadia
    - Electromagnetic instruments
      · Microwave, laser and infrared
      · EDM of short, medium and large range
      · GNSS
    - Mixed instruments
      · Total station
- *Sounding positioning*
  + Positioning methods and instruments
    - Visuals
      · Subtense bar, angles and distances, angles intersection, sextant
      · Measurement and recording procedures
      · Sources of error
      · Position determination accuracy, confidence
    - Electromagnetic
      · Range-range and hyperbolic. Low, medium and high frequency
      · Hybrid systems (distance-angle)
      · Calibration techniques and procedures
      · Measurement and recording procedures
      · Data filtering and cleaning
      · Sources of error
      · Position determination accuracy, confidence
    - GNSS (GPS/GLONASS)
      · DGPS
      · RTK
      · Measuring and recording procedures
      · Data filtering and cleaning
      · Sources of error
      · Processing, real time and post processing
      · Position determination accuracy, confidence
    - Acoustic
      · Long, short and very short lines configuration
      · Deployment and calibration
      · Measurement and recording procedures
      · Sources of error
      · Position determination accuracy, confidence

- *Topography: Coast line delineation and Aids to navigation positioning*
  + Specifications
  + Positioning methods and accuracy
    - Topographic
      · Traverse
      · Triangulation
      · Resection
      · Intersection
    - Satellite
      · GNSS

- *Criteria for selecting positioning methods*
  + For horizontal control extension
  + For vertical control extension
  + For sounding
  + For coast lining and aids to navigation positioning

CHAPTER IV
"CONCEPTS OF DEPTH DETERMINATION"

- *Introduction*
  + Depth measurement criteria

- *Acoustic fundamentals*
  + Sea water acoustic waves physical characteristics
    - Sonic field
    - Acoustic equation
    - Density
    - Temperature
    - Salinity
  + Sea water sound propagation
    - Divergence
    - Attenuation
    - Reflection
  + Acoustic parameters
    - Frequency
    - Width band
    - Pulse length

- *Transducers*
  + Characteristics
  + Classification with regard to beam
    - Narrow beam
    - Wide beam
    - Simple beam
    - Multi beam
  + Classification with regard to operation
    - Magnetostrictive
    - Electrostrictive
    - Piezoelectric
  + Classification with regard to installation
    - Keel mounted
    - Towed
    - Portable
  + Coverage and precision

- *Echosounders*
  + Principles of operation
    · Accuracy
    · Resolution
  + Installation and calibration

  + Operation and data recording
  + Data processing
    - Sources of error
    - Corrections
      · Due to sound velocity
      · Due to roll, pitch and heave
      · Due to draft, settlement, squat and relative position of transducer
    - Record reading and resolution
    - Interpretation
    - Depth reduction
  + Multi frequency echosounders

- *Sweeping systems*
  + Side scan sonar
    - Principles of operation
    - Sources of error and quality control techniques
    - Calibration
    - Operation and data recording
    - Data processing and interpretation
  + Multibeam sonar systems
    - Principles of operation
      · Associated sensors
      · System integrity
    - Sources of error and quality control techniques
    - Calibration of multibeam swath systems
      · Methods and procedures
    - Operation and data recording
      · Error components
      · Quantitative assessment of depth measurement accuracy
      · Effect of beam angle
    - Data processing and interpretation
      · Combined effect of positional error on depth

- *Mechanic systems*
  + Lead line and sounding pole
    - Description
    - Sources of error
    - Operation, data recording and processing
  + Bar sweep
    - Description
    - Operation methodology
  + Wire sweep
    - Description
    - Operation methodology

- *Airborne laser system*
  + Principles of operation
  + Capabilities and limitations

- *Remote systems*
  + Photobathymetry
    - Principles of operation
    - Capabilities and limitations

  + Magnetometry
    - Principles of operation
    - Capabilities and limitations

- *Other inspection systems*
  + Photographic cameras
  + Divers
  + ROV

- *Depth determination equipment selection criteria*
  + In relation to degree of accuracy expected
  + In relation to coverage expected
  + In relation to environmental conditions
  + In relation to objective of the hydrographic survey

CHAPTER V
"CONCEPTS OF OTHER ASSOCIATED MEASUREMENTS"

- *Tides*
  + Fundamentals
    - Principal generating forces
      · Moon and Sun influence
    - Types of tides
      · Diurnal
      · Semi-diurnal
      · Mixed
    - Referential levels (MSL and others)
  + Tide gauges
    - Principles of operation
    - Installation
    - Calibration
    - Recording
      · Digital
      · Analogue
  + Tide records processing
    - Harmonic analysis methods
    - Non harmonic analysis methods
    - Establishment of reference levels - datum
    - Harmonic constituents
    - Tide prediction
    - Cotidal charts
      · Construction
      · Use
  + Tide table
    - Content
    - Use

- *Tidal currents*
  + Fundamentals
    - Type of currents
      · Rectilinear
      · Rotary
  + Methods for current determination
    - Eulerian
      · Current meters
      · Principles of operation
        · Rotor
        · Doppler
        · Electromagnetic
      · Installation
      · Data recording
      · Data processing and analysis
    - Lagrangian
      · Drifter
      · Types of drifter
      · Path follow-up
      · Data recording
      · Data processing and analysis
      · Current tables and graphs
    - Tide and tidal current relationship
    - Tidal current prediction

- *Water level variation not associated to tides*
  + Elements of fluid mechanics and hydraulic
  + Generating forces
    - Barometric inversion
    - Wind, seiches and precipitation
  + River slopes
  + Lake levels

- *Sea bottom sampling*
  + Elements for bottom sampling
    - Dredges
    - Grabs
    - Piston corer
  + Sampling operations
    - Requirements
    - Relevant data recording
    - Sampling labelling
  + Samples classification

- *Water column sound velocity determination*
  + Salinity and temperature values determination
    - Instrumentation
    - Instrument operation
    - Data recording and processing
    - Sound velocity computation
  + CTD and other systems
    - Systems operation
    - Data recording and processing
    - Sound velocity computation

CHAPTER VI
"HYDROGRAPHIC PRACTICE"

- *Hydrographic survey planning.*
  + Studying the Hydrographic Project
  + Compilation, study and analysis of existing information
  + Coastline delineation planning
    - Method selection
  + Horizontal and vertical control planning
    - Connection to established network
    - New network development
  + Sounding and sweeping operation planning
    - Coverage
    - Route following
    - Depth determination method selection
    - Sweeping method selection
    - Positioning determination method selection
  + Tide and tidal current observation planning
    - Tide gauge sitting position determination
    - Current meter deployment position determination
    - Observing period determination
    - Data telemetry link
  + Other parameters observation planning
  + Instruments and equipment selection
    - For coastal delineation
    - For horizontal and vertical control
    - For depth determination
    - For sweeping
    - For surveying positioning
    - For tide and tidal current measurements
  + Surveying Team organization
  + Operation Duration and Cost estimates
  + Operation Programme development

- *Survey area recognition*
  + Inspecting surveying area
  + Confirming Operation Programme

- *Equipment test and calibration*
  + Positioning equipment
    - Angle measurement equipment
    - EDM equipment
    - Levelling equipment
    - GNSS
  + Echosounders and sonars
    - Bar check / target
    - Sound velocity adjustment
    - Patch test
  + Tide gauges
    - Tide scale check
    - Clock check
  + Current meter
    - Calibration certificates
  + Recording of corrections

- *Deployment and maintenance of self contained instruments*
  + GNSS base station
    - Siting place selection
    - Installation
    - Periodic inspection
  + Tide gauges
    - Siting place selection
    - Installation
    - Periodic inspection
  + Current meters
    - Mooring elements for deployment
    - Deployment
    - Periodic inspection

- *Coast line delineation operation*
  + Data acquisition and control
    - Visiting existing network
    - Sitting measuring instruments
      · Angular
      · Distance
      · GNSS positioning
    - Data measurements and control
    - Manual and automatic acquisition
  + Data recording
    - Paper forms
    - Handheld calculators
    - Data loggers
    - Instruments with inside memory
  + Data processing
    - Data manual processing
    - Computer assisted data processing
    - Different data processing software
    - Field and/or office processing

  + Data management and analysis
    - Visualization of information
      · Mmanual and/or automatic plotting
      · Quality control
      · Quality assurance
    - Application software
      · For selection
      · For filtering
      · For smoothing
      · For correlation with previous information
  + Report
    - Objectives
    - Methodology used
    - Measurements made
    - Results
    - Analysis and discussion
    - Conclusion
  + Products
    - Coastline representation
      · Paper format
      · Digital format
    - Files
      · Raw data files
      · Processed data files
    - Report

- *Horizontal and vertical control operation*
  + Data acquisition and control
    - Visiting existing horizontal and vertical network
    - Sitting measuring instruments
      · Angular
      · Distance
      · GNSS positioning
      · Levelling
      · Description of stations
    - Data measurements and control
    - Manual and automatic acquisition
  + Data recording
    - Paper forms
    - Handheld calculators
    - Data loggers
    - Instruments with inside memory
  + Data processing
    - Data manual processing
    - Computer assisted data processing
    - Different data processing software
    - Field and/or office processing

  + Data management and analysis
    - Visualization of information
      · Quality control
      · Quality assurance
  + Report
    - Objectives
    - Methodology used
    - Measurements made
    - Results
      · Control stations co-ordinates
      · Positional accuracy
    - Analysis and discussion
    - Conclusion
  + Products
    - List of co-ordinates
    - Control description sketch
    - Stations description
    - Raw data files
    - Processed data files
    - Report

- *Echosounding operation*
  + Data acquisition and control
    - Positioning
      · Calibration of positioning system acquisition data
      · Error correction determination
      · Data rate definition
    - Echosounding
      · Calibration of bathymetric system acquisition data
      · Error correction determination
      · Definition of data rate, scale and other parameters
      · Permanent adjustment
  + Data recording
    - Positioning
      · Manual
      · Automatic
      · Telemetric

- Echosounding
  · Analogue
  · Digital

+ Data processing
- Positioning
  · Manual
  · Computer assisted
  · Real time
  · Post position
- Echosounding
  · Echogram manual, tidal and sound velocity corrections
  · Echogram computer assisted, tidal and sound velocity corrections
  · Multifrequency data processing
  · Real time digital data processing
  · Digital data post processing
- Integrated systems
  · Real time systems
    · Different commercial processing software
  · Post processing systems
    · Different commercial processing software

+ Data management and analysis
- Spatial data selection, filtering, and smoothing
- Spatial data base
- Quality control and assurance

+ Data visualization
- Contouring
  · Manual
  · Software assisted contouring
- Correlation with previous existing data

+ Report
- Objectives
- Positioning and sounding methodology used
- Description of measurements made
- Results
  · Geo-referential soundings
  · Positional accuracy
  · Depth accuracy
- Analysis and discussion
- Conclusion

+ Products
- Sounding and contouring sheet
  · Paper
  · Digital
- Raw data files
- Processed data files
- Report

- *Sweeping operation*

+ Data acquisition and control
- Positioning
  · Calibration of positioning system acquisition data
  · Error correction determination
  · Data rate definition
- Mechanical sweeping
  · Calibration of wire or bar
- Sonar Sweeping
  · Calibration of sweeping system acquisition data
  · Error correction determination
  · Definition of data rate, scale and other parameters
  · Permanent adjustment

+ Data recording
  - Positioning
    · Manual
    · Automatic
    · Telemetric
  - Sweeping
    · Analogue
    · Digital
+ Data processing
  - Positioning
    · Manual
    · Computer assisted
    · Real time
    · Post position
  - Manual sweeping
    · Tide correction
  - Sonar sweeping
    · Sonogram manual reading and correction
    · Sonogram computer assisted reading and correction
    · Multibeam real time digital data processing
    · Multibeam digital data post processing
    · Sound velocity and tide corrections
  - Integrated systems
    · Real time systems
      · different commercial processing software
    · Post processing systems
      · different commercial processing software
+ Data management and analysis
  - Spatial data selection, filtering and smoothing
  - Spatial data base
  - Quality control and assurance
  - Correlation with previous existing data
+ Report
  - Objectives
  - Positioning and sweeping methodology used
  - Description of measurements made
  - Results
    · Geo-referential sweeps
    · Positional accuracy
    · Depth accuracy
  - Analysis and discussion
  - Conclusion
+ Products
  - Sweep sheet
    · Paper
    · Digital
  - Raw data files
  - Processed data files
  - Report

- *Tide observation operation*

+ Data acquisition and control
  - Tide pole vertical reference
  - Tide gauge sensor vertical reference
  - Tide benchmark levelling
+ Data recording
  - Manual
  - Analogue
  - Digital
  - Telemetric link

+ Data processing
  - Manual
  - Computer assisted
  - Software packages
    · Harmonic methods
    · Non harmonic methods
  - Field and/or office processing
+ Data management and analysis
  - Data input on integrated systems
  - Quality control and assurance
  - Correlation with previous existing data
+ Report
  - Objectives
  - Water level measurement methodology used
  - Description of measurements made
  - Results
    · Tidal heights
    · Tidal constituent
  - Analysis and discussion
  - Conclusion
+ Products
  - Sounding tidal corrections
  - Tidal prediction

- *Tidal Current observation operation*

+ Data acquisition and control
  - Current meters
    · Final position and depth location determination
    · Data rate, frequency and duration
  - Drifters
    · Deployment position
    · Follow-up positioning system
+ Data recording
  - Manual (drifters)
  - Analogue
  - Digital
  - Telemetric link
+ Data processing
  - Manual
  - Computer assisted
  - Software packages
  - Field and/or office processing
+ Data management and analysis
  - Quality control and assurance
  - Correlation with previous existing data
+ Report
  - Objectives
  - Tidal current measurement methodology used
  - Description of measurements made
  - Results
    · Drifting path
    · Direction v/s velocity
  - Analysis and discussion
  - Conclusion
+ Products
  - Direction v/s velocity tables
  - Tidal current diagrams

- *Hydrographic Surveying Final Report.*
  + General Identification of the Survey
    - Place, dates, vessel, and others
  + Background Information
    - Existing information used or considered
  + Objectives of the Hydrographic Survey
  + Planning
  + Programme followed
  + Field Activities
    - Measurements
    - Methodologies
    - Instruments
    - Field processing
  + Results
    - Field products
    - Special report for Notice to Mariners, Sailing Directions and others
  + Conclusions
  + Experiences and Recommendations
  + Annexes

CHAPTER VII
"SPECIAL HYDROGRAPHIC SURVEYS"

The following special hydrographic survey operations are just some of the various possibilities a hydrographer might face during his professional activity. The intention is just to highlight some very basic as well as specific topics considered to be of general interest to hydrographic surveyors.

- *Hydrographic survey associated with dredging operations*
  + Dredges and grabs platform/vessel
    - Types and characteristics
    - Operation
  + Positioning
    - Grid preparation
    - Sitting leading lines
    - Leading lines follow-up
  + Sediments
    - Types of sediments
    - Types of rocks
  + Sounding
    - Vertical control
    - Sitting of tide gauge
    - Real time processing and control
    - Visualization, 3D
    - Volume determination
    - GIS and specialized software

- *Hydrographic survey associated with hydraulic projects*
  + Hydraulic fundamental principles
    - Seasonal variations
  + Bottom profiles
    - Definition of number and position
    - Profile leading lines
    - Profiles follow up
  + Water volume computation
  + Water masses level differences and variations
  + Topography and bathymetry of water streams
  + Current flow measurements and monitoring
    - Discharge
    - Influx
  + Sediment transport

- *Hydrographic survey associated with offshore construction projects*
  + Drilling terminology
  + Drilling platform
    - Fixed
      · Gravity
      · Pile driven
      · Guyed
      · Bottom completion
      · Towing of fixed drilling platform
    - Mobile
      · Positioning techniques
  + Structure emplacement
    - Jacket
    - Template

+ Pipeline and cables
    - Laying vessel characteristic
    - Trenching and ploughing equipment
    - Lay down positioning
    - Layback and flop forward calculation
    - Leak and/or damage detection

- *Hydrographys survey associated with environmental monitoring*
  + Tracking pollutant
    - Tracer method
    - Dye method
  + Pattern distribution plotting
  + Data acquisition of:
    - Temperature, salinity, pH, suspended solids and dissolved oxigen
  + Data control and presentation

- *Hydrographic survey associated with naval operations*
  + Beach reconnaissance and survey
    - Profiles
    - Gradients
    - Back of beach
    - Obstruction positioning
    - Seabed classification
    - Land-marine vertical datum alignment
    - Horizontal positioning
      · Covert techniques
    - Depth measurement
      · Swimmer
      · Levelling
  + Route surveys
    - Planning
    - Special positioning control
    - Lead - through techniques
    - Data bases
  + Products
    - Beach profiles
    - Planimetric chart
    - Beach description report
    - Route description report

- *Hydrographic survey associated with maritime delimitation*
  + Shoreline
    - Definitions associated to shore line
    - High water line determination
    - Low water line determination
    - Land-sea common levelling reference
    - Mapping shore lines
  + Base lines concept
    - Normal base lines
    - Strait base lines
  + Outer limits of Territorial Sea and EEZ
    - Definitions
      · Charts to be used
      · Geodetic factors
      · Distances
    - Delimitation methodologies

+ Outer limit of the Continental shelf
  - Definitions
    · Shelf
    · Slope
    · Rise
    · Foot of the slope
    · Deep ocean floor
  - Scientific and Technical guidelines
+ Depth contour determination
  - Bathymetric data required
    · Density
    · Accuracy
    · Formats
  - Delineation methodologies
    · Manual
    · Automatic
  - Contour lines chart

- *River and Lake hydrographic survey*
  + Positioning
    - Local grids
    - Vertical reference levels
      · Statistics
      · Seasonal variability
      · Determination and adoption
  + Flood plane mapping
    - Historical references
    - Hydro-topographic survey
    - Survey under flood conditions
  + Sounding
    - Sound velocity determination and application

- *Offshore Geomagnetic and Seismic hydrographic survey*
  + Geomagnetic surveys
    - Definition and applications
    - Principles and instruments
    - Measuring procedures
    - Processing techniques
  + Gravity surveys
    - Definition and applications
    - Principles and instruments
    - Measuring procedures
    - Processing techniques
  + Seismic surveys
    - Definition and applications
    - Principles and instruments
      · Reflection, refraction, penetration
      · Acoustic sources, streamers, boomers, sparkers
      · Towing equipment
    - Data acquisition
    - Data processing techniques

ANNEXES:

The Annexes are to be developed while developing the Draft Table of Content. Following there is a list of some of them that have been identified as being necessary and useful for the reader of the Manual.

- **A: Terms (only those not considered in the Hydrographic Dictionary)**
- **B: Acronyms (all those used in the text as for example GNSS, GPS, etc.)**
- **C: Mathematics formulas of frequent use**
- **D: Statistic formulas of frequent use**
- **E: Physics formulas of frequent use**
- **F: to be further developed while developing the content of the Manual**
- **G: id.**
- **H: id. And so on.**

FIGURES:

The Figures are to be identified while developing the Draft Table of Content.

- **FIG 1:**
- **FIG 2:**
- **FIG 3: and so on**

TABLES:

The Tables are to be identified while developing the Draft Table of Content.

- **Table 1:**
- **Table 2:**
- **Table 3: and so on**

REFERENCES:

IHO Manual on Hydrography Working Group
Terms of Reference

DRAFT

Objectives

The principal objective of the Working Group is to compile the IHO Manual on Hydrography, following and developing the proposed Table of Contents.

In doing so, the WG might wish to widen the scope of the Table of Content, incorporating minor corrections to it, if found to be convenient, beneficial for and in line with the objective of the Manual.

As secondary objectives, the Working Group shall develop and submit a draft proposal on the way the IHO Manual on Hydrography should be kept up dated after being printed and edited, and shall recommend on the type of binding found to be appropriate.

Composition

Membership is open to the participation of all Member States of the IHO, willing to nominate adequately experienced staff members. It is envisaged that for practical and operational reasons no more than about 10 persons should constitute the WG, providing a wide spectrum of knowledge and experience principally in the field of practical hydrography; and from different geographical areas as far as feasible.

Chairman and Vice-Chairman

The Chairman and Vice-Chairman should be nominated by the IHB, from the representatives that are willing, to assume that responsibility.

Reporting

The Chairman of the WG should report on the progress of the work accomplished by the WG, on a yearly basis. A consolidated report should be submitted to the XVIth IHC

IHO Manual on Hydrography Working Group
Terms of Procedure
DRAFT

1.- The functioning of the WG will be regulated by these "Terms of Procedure".
2.- The WG Members should consider attending, at least, two meetings of the WG; the initial one for co-ordination and another one for the analysis and corrections of the final draft of the Manual, before printing.
3.- The work will be conducted and executed taking advantages of the communication by e-mail.
4.- The Chairman will assign all WG Members, partial tasks and a timetable to carry out them, taking into account Members personal skills, experience and interest, as far as possible.
5.- All WG Members should do their best to accomplish the Work Program attached.
6.- The WG may decide to invite contributions from academia and industry for the preparation of the Manual.
7.- Decisions within the WG should be taken by simple majority of all Members.
8.- The WG will have its permanent Secretariat at the IHB.

IHO Manual on Hydrography Working Group
Work Programme
DRAFT

Month	Activity
0	Official establishment of the WG (deadline for response to CL)
1	Chairman gets in touch with WG Members providing initial guidelines on procedure to be followed and co-ordinates date and place for start-up meeting.
2	Chairman circulates Agenda for start-up meeting
3	Start-up meeting takes place
9	WG Members exchange First Draft for comments within WG
10	WG Members exchange comments Chairman provide guidelines on comments
16	WG Members exchange Second Draft for comments within WG
17	WG Members exchange comments Chairman provide guidelines on comments
20	WG meets to agree on final corrections for final version of manual
23	WG provides IHB with final version
24	IHB in condition to initialize editing and printing