

The Role of HNHS in Preparing for the Olympic Games

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SUMMARY

The Olympic Games in Athens 2004 will consist an event of National promotion and interest with unique Historical meaning. It requires full collaboration of different National and International Organizations for their success. Within this framework the Hellenic Navy was requested to contribute with several means and services.

Among the various branches of the Hellenic Navy, the HNHS with appropriate Survey equipment and capable technical personnel, undertook Hydrographic Surveys as well as Topographic and Geodetic Surveys, in order to support the planning and development of coastal port works, which will be dedicated to the subject games. Additional Surveys undertaken in a coastal zone of Saronic Gulf using sophisticated Hydrographic Systems and appropriate techniques, which were aligned with IHO Standards, in order to ensure the safety of life and Navigation at sea at the areas of interest. The result of these Surveys was the production of three Paper Charts and one Electronic Nautical Chart (ENC) dedicated to the Olympic Games 2004.

Although the Hydrographic Techniques used during the above mentioned Surveys were well known, a lot of experience was gained and many lessons learnt due to the fact that, these Surveys contacted in a very difficult environment because of the construction of many Olympic Works simultaneously.

ΠΕΡΙΛΗΨΗ

Οι Ολυμπιακοί Αγώνες του 2004 αποτελούν διοργάνωση εθνικής σημασίας και προβολής με μοναδική ιστορική σημασία. Απαιτούν την πλήρη συνεργασία φορέων όσο και πολιτών για την επιτυχή οργάνωσή τους. Στο πνεύμα των Ολυμπιακών Αγώνων κλήθηκε να συνεισφέρει το Πολεμικό Ναυτικό με διάφορα μέσα και υπηρεσίες.

Μεταξύ αυτών είναι και η Υδρογραφική Υπηρεσία, η οποία με τον απαραίτητο εξοπλισμό και το κατάλληλο τεχνικό προσωπικό που διαθέτει, ανέλαβε Υδρογραφικές, καθώς και Τοπογραφικές και Γεωδαιτικές εργασίες με σκοπό την υποστήριξη του σχεδιασμού και ανάπτυξης παράκτιων και λιμενικών έργων για τις ανάγκες των Αγώνων. Πρόσθετες εργασίες έγιναν σε παράκτια ζώνη του Σαρωνικού Κόλπου με τη χρήση εξελιγμένων Υδρογραφικών συστημάτων και κατάλληλων τεχνικών, σύμφωνα και με τις προδιαγραφές

του ΙΗΟ, με σκοπό την εξασφάλιση της ασφάλειας της ζωής και των θαλάσσιων συγκοινωνιών στην περιοχή ενδιαφέροντος. Το αποτέλεσμα των εργασιών αυτών ήταν η παραγωγή τριών Ναυτικών Χαρτών και ενός Ηλεκτρονικού Ναυτικού Χάρτη (ENC) για τις ανάγκες των Ολυμπιακών Αγώνων 2004.

Αν και οι τεχνικές υδρογράφησης που χρησιμοποιήθηκαν ήταν γνωστές, ωστόσο μεγάλη εμπειρία αποκτήθηκε από το προσωπικό της Υδρογραφικής Υπηρεσίας, καθόσον οι εργασίες πραγματοποιήθηκαν σε αντίξοο περιβάλλον εργασίας, δεδομένου ότι πολλά Ολυμπιακά Έργα ήταν σε εξέλιξη κατά τη διάρκεια των Υδρογραφικών εργασιών.

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1. GENERAL PRESENTATION OF THE H.N.H.S.

1.1 Historic Overview

The history of hydrography in Greece begins over 100 years ago, with the publication of the first handbook in 1897 and the teaching of hydrography in the Hellenic Navy Academy. The first hydrographic surveys in Greek waters were made by the Hellenic Navy in Maliakos Gulf in 1906 and two years later in 1908 the first nautical chart was published by the H.N. From then up to today 252 naval maps have been published.

Greece participates as a founding member of International Hydrographic Organisation (I.H.O.) since its foundation in 1919.

The Hellenic Navy Hydrographic Service (H.N.H.S.) has been established as an independent service of the Hellenic Navy in 1921, depending directly to the deputy chief of Hellenic Navy Headquarters. Since 1930 a special law by the Greek government, refers to the operations and the organization.

Stage in history of H.N.H.S. constitutes the election in 2002 of its Commander, Vice-Admiral A. Maratos HN as President of International Hydrographic Organisation (I.H.O.), place that he possesses until today.

1.2 Mission and Organisation of the H.N.H.S.

The mission of the H.N.H.S. is:

- The support of navigation with the publication of national and international nautical charts and publications, as well as the 24 hour continuous benefit to mariners of information on navigational safety.
- The support of National Policy on issues of Hydrography, Cartography, Oceanography, International Sea Rights with the attendance in the works of International Organisations and the collaboration with various services of the interior and abroad.
- The support of operational requirements of the H.N.
- Technical Support of Public Services.

In order to show the amount of the H.N.H.S.'s mission, it is reported that Greece allocates 9835 islands, islets and rocks, more than 300 harbours, ports and marinas, 1545 gulfs and coves, total coastline development of roughly 18400 km, while the area of Territorial Waters of 6 NM is 112965 km² and the Greek Continental Shelf is 322077 km². In these new

harbours, ports and marinas should be added, as well as a lot of other works and investments that are made in the Sea Area and the Coastal Zone, for which the opinion of the H.N.H.S. is required.

For better performance of its mission, the H.N.H.S is organised in 8 Divisions:

- Hydrography and Operations Division
- Cartography Division
- Safety to Navigation Division
- Coastal Constructions Division
- Oceanography Division
- Digital Cartography Division
- Administrative and Technical Support Division
- Computer Centre

1.3 Instruments and Personnel

1.3.1 Personnel

30 military personnel and 132 political personnel form the H.N.H.S., apart from the vessels crew. This personnel is constituted by all the necessary technical specialities, as Surveying Engineers, Geometers, Designers, programmers and operators of Computers, Physician, Geologist and Chemical Oceanographers, as well as experienced Officers of Mercantile Marine.

1.3.2 Hydrographic Vessels

The H.N.H.S. allocates the following hydrographic vessels:

H/S/-O/S NAFTILOS

She is a sheet metal ship constructed in 1976, with 63 m in length, 11.6 m in width, and 4 m draught and has displacement 1400 t. Her propulsion consists of 2 diesel engines 1200 HP each one, giving her maximum speed of 13 kts and operational range 6500 nm.

6 Officers, 13 Petty Officers and 23 Enlisted men form her crew and she has the capability of carrying 12 passengers as hydrographic team members.

She is equipped with GPS for high precision real time positioning, Multi Beam Sonar system witch has range up to 800 m depth, Single Beam Sonar which has range up to 2500 m depth, Side Scan Sonar with sub bottom profiler, as well as permanently installed computers with the appropriate software for real time hydrographic data recording.

She has 2 hydrographic boats equipped with Single Beam Sonar, for working near the coastline and in shallow and dangerous waters.



H/S-O/S NAFTILOS



H/S-O/S PYTHEAS

H/S-O/S PYTHEAS

She is a sheet metal ship constructed in 1983, with 50 m in length, 9.6 m in width, and 3 m draught and has displacement 750 t. Her propulsion consists of 2 diesel engines 900 HP each one, giving her maximum speed of 13 kts and operational range 3500 nm.

7 Officers, 15 Petty Officers and 15 Enlisted men form her crew and she has capability of carrying 10 passengers as hydrographic team members.

She is equipped with GPS for high precision real time positioning, Single Beam Sonar, which has range up to 1800 m depth, Side Scan Sonar with sub, bottom profiler, as well as permanently installed computers with the appropriate software for real time hydrographic data recording.

She has 1 hydrographic boat equipped with Multi Beam Sonar system, witch has range up to 200 m depth, and Single Beam Sonar for working near the coastline and in shallow and dangerous waters.



H/S STRAVON



H/S BOAT 14

H/S STRAVON

She is a sheet metal ship constructed in 1989, with 33 m in length, 6 m in width, and 2.5 m draught and has displacement 250 t. Her propulsion consists of 2 diesel engines 660 HP each one, giving her maximum speed of 12.5 kts and operational range 2000 nm.

2 Officers, 13 Petty Officers and 13 Enlisted men form her crew and she has capability of carrying 4 passengers as hydrographic team members.

She is equipped with GPS for high precision real time positioning, digital Single Beam Sonar witch has range up to 1200 m depth, as well as permanently installed computer with the appropriate software for real time hydrographic data recording.

H/S BOAT 14

It is a wooden ship constructed in 1987, with 13.7 m in length, 4.1 m in width, and 1.2 m draught and has displacement 8 t. Her propulsion consists of 1 diesel engine, which gives it maximum speed of 12 kts and operational range 120 nm.

2 Petty Officers and 1 Enlisted man form her crew and she has capability of carrying 4 passengers as hydrographic team members.

It is equipped with GPS for high precision real time positioning, Single Beam Sonar witch has range up to 1200 m depth, and has capability of equipping with portable computer with the appropriate software for real time hydrographic data recording.

1.4 Collaborations – International presence

In the frames of her mission the H.N.H.S. collaborates with other Greek public services, as are Ministries, Public Utility Undertaking, the Hellenic National Meteorological Service, the Hellenic Military Geographical Service, the Hellenic Civil Aviation Authority, National Statistical Service of Greece, National Centre of Marine Research, the local Port Authorities and Prefectures, the Greek Universities, as well as the ATHENS 2004 Organisation.

Internationally there have been signed Memorandums of Understanding (M.O.U.) with the Hydrographic Services of France, Russia, Germany, Italy, Ukraine, United Kingdom, USA, Albania, Romania, Tunisia, Norway, and are also planned agreements of bilateral collaboration with the Hydrographic Services of other countries. There also exists exchange of marine information with Hydrographic Services of the Mediterranean Sea concerning updates of nautical charts and issue and distribution of navigation warnings, NAVTEX messages and notices to mariners.

It participates also in the activities of International Hydrographic Organisation (I.H.O.), of which is a founding member, the Intergovernmental Oceanographic Commission (I.O.C.) and the International Maritime Organisation (I.M.O.) and in relative committees and working groups of NATO. Finally it participates in Hydrographic and Cartographic pilot programs in the frames of Seapower Symposium.

2. PARTICIPATION OF THE H.N.H.S. CONCERNING OLYMPIC GAMES 2004

2.1 Generally

Since July 2000 an Olympic Games office was established among the H.N.H.S for better collaboration with the Hellenic Navy Headquarters Olympic Games office and the of

Olympic Games Sector of the Hellenic Armed Forces Headquarters, that constitutes the contact between the Armed Forces and ATHENS 2004 Organisation.

Since then there has been continuous attendance of representatives of H.N.H.S. in various deliberations, as her contribution was considered decisive about the completion and operational phase of constructions and works in sea and coastal zone. The role in the safety and security of the Olympic Games was considered also important. Finally personnel of the H.N.H.S. were detached to serve with ATHENS 2004 Security Military Force.

Generally the contribution of the H.N.H.S. is summarised in disposing of asked elements to various institutions, that are involved in preparation of the Games, in consulting about constructions, mainly concerning nautical sport, that were made in sea, fore and backshore area, and mainly to hydrographic works done in great part of the Saronic Gulf and in the areas of new constructions. These works led to the publication of new nautical charts and the update of older ones, as well as the completion of Electronic Nautical Chart of area of interest.

It should be noticed that, at these works new instruments and methods were successfully used for the first time, which happened to be bought and applied during the period of preparation for Olympic Games. It becomes therefore obvious that all the work made for the Olympic Games has been done using the most modern technology in the hydrography.

2.2 Hydrographic Support

It is obvious that the Hydrography Division executed the main part of attendance of the H.N.H.S. in preparing for Olympic Games. The mapping of parts of Saronic Gulf that had been selected for the conduct of Olympic sailing games had been asked already since 1999. It was also obvious and there was need of new hydrographic surveys because of many new harbour works and reformations of coastal foreheads that had been programmed. The whole work can be in two periods, before 2002 when were published for the first time the new nautical charts, and after 2002, therefore we are just in front of the Olympic Games.

2.2.1 Works until 2002

The first sailing test events have already realised in August 2002, therefore the first new charts are also already printed. In these frames was realised 9 hydrographic and Topographic works, that according to I.H.O. specifications that are classified as follows:

2nd order hydrographic surveys

The majority of the hydrographic surveys are classified in this order. The surveys were made from the H/S STRAVON and H/S BOAT 14, by automatic hydrography method, with real time data recording, via single beam sonar and DGPS receiver, with the using of a permanent land station.

The above-mentioned are adequate according to I.H.O. standards. The required precisions (secure level 95%) for average depth 50 m is 22.5 m in horizontal accuracy and 1.52 m in depth accuracy, with maximum distance of Hydrographic lines 200 m.

There was realised 3 works in this order, covering a total area of 92,200,250 m² and total length of hydrographic lines 1154 km, with a distance between them 80 m. These works covered the area of the Saronic Gulf offshore the coasts of Palaio Faliron up to Fleves Island, with maximum depth of about 100 m, up to the 5 m contour where it was needed.

For the realisation of this work, 84 days of fieldwork were required, plus 19 days in office processing while 10 individuals was occupied in fieldwork and 3 in office processing.

1st order hydrographic surveys

In this order are classified surveys that were realised in areas that were detected bottom elations from previous ones. The surveys were made from the H/S BOAT 14, by automatic hydrography method, with real time data recording, via single beam sonar and DGPS receiver, with the using of a permanent land station.

The above-mentioned are adequate according to I.H.O. standards. The required precisions (secure level 95%) for average depth 10 m is 5.5 m in horizontal accuracy and 0.52 m in depth accuracy, with maximum distance of Hydrographic lines 25 m.

This work covered a total area of 1,687,700 m² and total length of hydrographic lines 85 km, with a distance between them 20 m. The coverage was up to the 5 m contour where it was needed.

For the realisation of this work, 15 days of fieldwork were required, plus 4 days in office processing while 4 individuals was occupied in fieldwork and 3 in office processing.

Topographic Surveys

Topographic surveys were made for coastline update with changes that had been made since the last edition of the local maps. These surveys have been done by independent topographic teams with the use of total stations and using classic topographic methods (resections, traverses, tachometry).

First detailed ground recognition was done along the Saronic Gulf coastline from the Port of Piraeus until Varkiza bay, in total length of coastline 40 km roughly. 4 topographic surveys were realised that covered the above-mentioned region wherever changes were found.

For the realisation of these works, 48 days of fieldwork were required, plus 32 days in office processing while 12 individuals was occupied fieldwork and 5 in office processing.

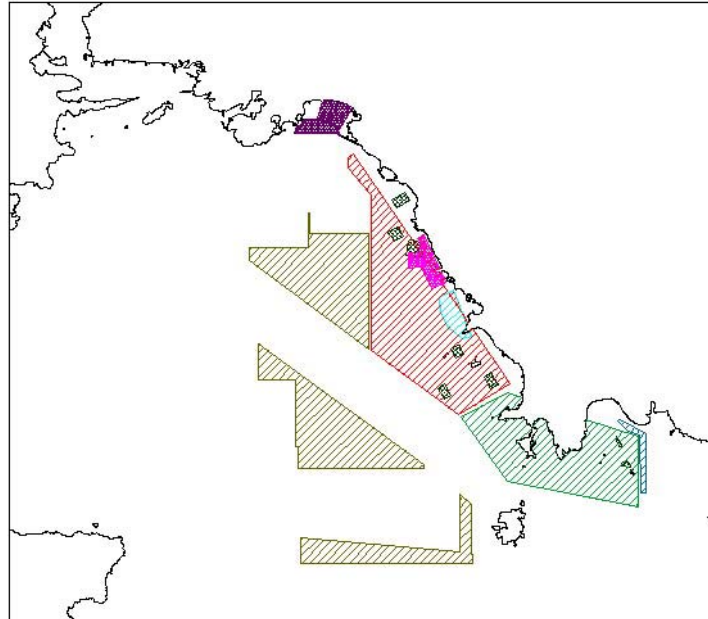
Bottom search

This work has been done from the H/S-O/S PYTHEAS using Side Scan Sonar, for the localisation of shipwrecks in specified points of mentioned before regions, where existed relative suspicion. This work is also required by the I.H.O. standards for 2nd order hydrographic surveys. Positioning of shipwrecks that were located was done via DGPS

receiver, with the using of a permanent land station, the same way as during Hydrographic survey.

For the realisation of this work, 15 days of fieldwork were required and 3 individuals were occupied.

The above-mentioned surveys were made in European Datum (ED50, International Ellipsoid), which is used by the H.N.H.S., in Universal Traverse Mercator (UTM) of 6° zone 34. As depth reference level was used the Lowest Low Water calculated by Piraeus tide gauge and altitudes reference level the Mean Sea Level.



Hydrographic surveys in the Saronic Gulf 2000-2003

2.2.2 Works after 2002

Since 2002 various work and constructions, which had been in sea and coastal zone, were concluded. So there was the need of new additional hydrographic surveys, correcting the already issued nautical charts. There were realised 5 hydrographic and topographic surveys, which according to I.H.O. standards are classified as follows:

2nd order hydrographic surveys

In this order are classified surveys that were realised in open sea in order to correct the already issued nautical charts. The surveys were made from the H/S STRAVON and H/S BOAT 14, by automatic hydrography method, with real time data recording, via single beam sonar and DGPS receiver, with the using of a permanent land station.

The above-mentioned are adequate according to I.H.O. standards as already mentioned.

There was realised 2 works in this order, covering a total area of 2,508,000 m² and total length of hydrographic lines 32 km, with a distance between them 80 m. These works covered the area of the Saronic Gulf offshore the coasts of Hellinikon-Glyfada up to Varkiza bay, with maximum depth of about 50 m, up to the 5 m contour where it was needed.

For the realisation of this work, 26 days of fieldwork were required, plus 8 days in office processing while 6 individuals was occupied in the fieldwork and 3 in office processing.

Special order hydrographic surveys

In this order are classified surveys that were realised in the areas of eminently Olympic Constructions that are judged of particular interest. The survey was made from the hydrographic boat of the H/S-O/S PYTHEAS, by automatic hydrography method, with real time data and corrections recording, via Multi Beam Sonar, which is a completed and highly sophisticated hydrographic system.

The required precisions (secure level 95%) for special order surveys, according to I.H.O. standards are 2 m in horizontal accuracy and 0.25 m in depth accuracy, with 100% bottom search, regardless of the average depth. These are fully covered by the Multi Beam Sonar specifications.

This work covered a total area of 2,800,000 m² and total length of hydrographic lines 186 km, which gave us 30% covering during bottom sweeping. In the area that it was not possible for the hydrographic boat to approach, sounding was made by portable single beam sonar and by hydrographic pitch in mooring places, providing 100% cover of soundings to areas of interest.

For the realisation of this work, 48 days of fieldwork were required, plus 60 days in office processing while 8 individuals was occupied in fieldwork and 5 in office processing. It deserves to be mentioned that in these surveys we had the first complete and essential use of Multi Beam Sonar systems, afterwards their test period.

Topographic surveys

2 topographic surveys in the coastal area were realised additionally to the special order hydrographic surveys, as it was shaped afterwards the completion of the works and constructions of interest. These surveys have been done with the use of total stations and using classic topographic methods (resections, traverses, tachometry).

For the realisation of these works, 48 days of fieldwork were required, plus 25 days in office processing while 12 individuals was occupied fieldwork and 5 in office processing.

The above-mentioned surveys were made in European Datum (ED50, International Ellipsoid), which is used by the H.N.H.S., in Universal Traverse Mercator (UTM) of 6° zone 34. As depth reference level was used the Lowest Low Water calculated by Piraeus tide gauge and altitudes reference level the Mean Sea Level.

At the time of writing of present article, special order hydrographic surveys are done in the Central Port of Piraeus and in the new marina of Peace and Friendship Stadium, using Multi Beam Sonar system.

2.3 Cartographic Support

The above mentioned surveys led to the publication of 3 new Nautical Charts, 2 of scale 1:15000 and 1 of scale 1:20000, in the area of Saronic Gulf, with the one them being international publication. These 3 charts are of particular importance, as it was mentioned before, as they cover the area where the Olympic Regatta will take place. They are used as well as for the approach in Piraeus port and the new marinas of Attica region, where many cruise ships, yachts and sailing boats will sail into during the Games.

These charts have already been published from the beginning of 2002, as they were essential for test events that took place successfully the previous years. Afterwards the completion of the Olympic constructions and the new hydrographic surveys that were made, they are already under update and reissue.

Beyond these, on the basis of the new hydrographic surveys, updates have been made to all the pre-existing nautical charts of the Saronic Gulf, which is the area with the highest maritime traffic in Greece, because of Piraeus Port.

2.4 Support to the Safety to Navigation

From the Safety to Navigation Division it has been done the delimitation of the sea area, where the test events took place and where also the Olympic Regatta 2004 will take place, in the sea area of Ayios Kosmas, Attica. Also it has been done the delimitation of navigation hazards in this area, by placing the appropriate light buoys according to navigational regulations.

The on the spot staking out of region limits of the Olympic Regatta and the placement the light buoys, has been done by a special team in the pre-selected places, using GPS and the method of guidance in the sea, for the first time in Greece.

Finally during the test events, as it will also be during the Olympic Games, they were made the appropriate notices to mariners and navigation warnings, informing them about the events taking place in the particular area.

2.5 Other support

The H.N.H.S. had to consult about all the Olympic constructions, that were done in sea and coastal zone. The new constructions did not only concern the naval sports, but also constructions for other sports that were done near the sea, coast modulations, as well as infrastructures for the reception and support of small and big ships, that will sail into Greek ports and harbours during the Games period.

2.5.1 Mainly Olympic Constructions

Ayios Kosmas Olympic sailing centre

A new model marina is created in the place of unformed coastline and a semi finished pier, together with a new model sea sport centre, where the Olympic Regatta will take place that is situated on the beach near the old International Airport.

The existing pier has been extended 600 m, a basin of 250,000 m² has been formed and the required buildings and infrastructures have been constructed.

The main basin will serve the athletes ships (roughly 275), which the required space is of roughly 75000 m², as well as other roughly 300 ships of the judges, trainers, team leaders, which should have a specified place each.

So it is created a unified sport complex of 450,000 m² roughly, in which must be added 5 sail tracks, diameter of 1.5-0.8 nm for sailboat racings of 11 type of sail boats.

Beach Volley Olympic installation and reformation of Faliro Bay area.

This is a work concerning the Faliro Bay marine forehead development and promotion, which was abandoned for the last decades. A new linear park is created from the Peace and Friendship Stadium up to Trokadero marina, with total area of 770,000 m², with marine forehead of 1050 m² total length. In this park there have been created:

- 1) Natural environment island for ecological and recreational activities.
- 2) An outdoor theatre for cultural and recreational activities, where the Beach Volley games will take place during the Olympic Games. This installation will have a capacity of 10,000 spectators.
- 3) A new marina for sea Scouts and sea sport clubs activities.
- 4) A city park indoor gym and museums, where the tae-kwon-do, handball and boxing games will take place during the Olympic Games.

The new marina will be a model sea sport centre for 5 clubs and the sea Scouts of Athens. It includes a main basin of 50,000 m² total area, with average depth of 2.50 up to 4.0 m, capable of servicing 230 boats of 10 m maximum length, as well as moreover 160 small boats in the shallow quays. There also exist moreover 16000 m² areas for maintenance of ships and 4200 m² of buildings and installations.

2.5.2 Constructions concerning reformations of coastal foreheads

Marine forehead reformation from Faliro Bay up to Vouliagmeni

This is a basic priority of the ecistical strategy of Athens aiming to the recreation of the basic exit of Athens to the nearby sea. In this area of total length of roughly 25 km, are the Olympic complexes of Hellinikon and Ayios Kosmas, the Floisvos, Trokadero and Glyfada marinas, while lead also important roads. This work will add apart from the success of Olympic Games, to the improvement of quality of life of Athenians and constituted one of the visions of the late professor of architecture A. Kandyllis.

Coastal road with a bikeway from Nea Makri to Marathon beach.

This work that is included in the general plan of reformation of the historical Marathon area, where the Rowing games will take place, will go through a big part of Marathon Run. In the same place a lot of journalists and visitors will stay.

A bike way is constructed in the coastal zone 7 km length and 3m wide and the existing paved way is shaped, creating a zone of recreation in the beach.

2.5.3 Constructions concerning ports and harbours upgrade

New quay construction in Palataki, Piraeus

This work that was done in the central port of Piraeus aiming at the complete transformation from commercial port to passenger port and the capability of service big cruise ships that are expected to sail into during the Olympic Games.

New quays were created of total length 750 m, with 4 new places of mooring space and beneficial depth of 12.5 m.

Peace and Friendship Stadium marina

It is a pre-existing port for small ships and boats that was upgraded near the Peace and Friendship Stadium.

A new windward pier of 188 m length was constructed and also an extension of the internal quay to 320 m length, with beneficial depth of 6 m, that gives the capability of mooring space for 4 daily cruise ships. Also after the installation of 3 traverse floating piers, there is capability of service 244 ships of 20 m length. It was constructed also a new protective pier of 100 m length 235 m away from the existing quays. Finally the work includes also lay of land of 21,000 m² area.

Modernisation works at Glyfada marina

It is a small marina that serves roughly 200 ships, most of 8 m maximum length. It includes 5500 m² of land area and 7400 m² of sea, with depths between 0.10 m and 2 m and port entrance opening is 45 m. These do not allow the serving of bigger ships.

There were reconstructed quays of 356 m length and deepening was also done, aiming the improvement of cruising conditions and the capability of servicing bigger ships, mainly yachts.

Floisvos marina

This is near the Olympic complexes of Hellinikon and Ayios Kosmas. It is a marina with an entirely artificial basin, which serves yachts, sailing ships and piscatorial boats. It has total capability of mooring space 1303 ships (28% of 10 m maximum).

With the new works a new floating pier of 70m length was installed, which gives the capability of servicing 20 moreover yachts of 20 m length maximum.

Trokadero marina

This is near the new Olympic complexes that were constructed in Faliro Bay. It is a marina with capability of servicing sailing ships, yachts and daily cruise ships, thanks to the depth of the main basin. There are moored 131 ships.

New quays of 480 m length were constructed for stern mooring of mega yachts and of 60 m length for servicing smaller ships. Totally there were created 56 new places of mooring.

2.5.4 Other constructions

Other construction mainly concerning reformation of coastal foreheads were also done in the other Olympic cities (Thessalonica, Heraklion, Patra, Volos) or in other areas in Athens and Piraeus. For the promotion of sea sport on the occasion of the Olympic Games there were also constructed sea sport marinas in various Greek towns.

2.5.5 Olympic Games Security

For the preparation of Olympic Games security force the H.N.H.S. undertook the topographic support of "Blue Odyssey" exercise in Anavyssos, Attica area. There was requirement for update of pre-existing topographic diagrams, using elements emanating from land topography and aerial photos.

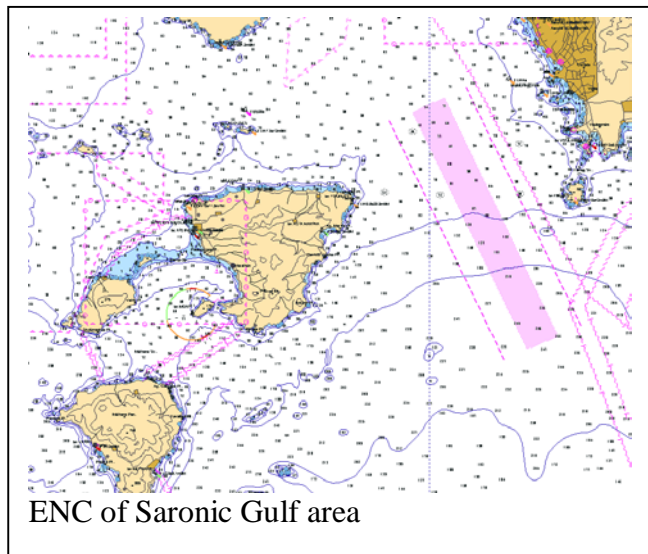
There was topographic survey of coastline of total length 4 km, points of minor control, as well as of new elements that did not exist on pre-existing topographic diagrams or on the aerial photos. During this survey the triangulation and the tachometry were done with the complete use of the GPS system via real time fast static method. For the realisation of this work, 2 days of fieldwork were required, plus 1 day in office processing while 3 individuals was occupied in the fieldwork and 1 in office processing.

2.6 Oceanographic Support

From the recordings that it maintains the Oceanography Division, were granted to the Hellenic National Meteorological Service tide and drift current elements and generally oceanographic elements for the meteorological support of the Olympic Games.

The appropriate tide elements were also granted to make the study for the construction of Olympic Rowing Centre in Marathon area.

2.7 Production of Electronic Nautical Charts (ENCs)



The ENCs production project is included among the contribution of H.N.H.S. in the preparation of the Olympic Games.

During the Olympic Games the maritime traffic will be increased in Greek Seas and particularly in the Saronic Gulf, where it is expected to sail into a lot of ships of all sizes. So safety to Navigation will be very important.

The ENCs are intended mainly for use in the ship's electronic navigation systems. They can also be used in the systems maritime traffic control systems and also in the security systems of the Olympic Games in the sea.

During the last decade the H.N.H.S.

participated actively in the syntax of S-57 standards of ENCs, as well as in the policy planning of the I.H.O. This helped considerably in the study and the planning of the ENCs production project.

The realization planning for the ENCs production project lasted about 3 years.

After an International Auction Competition the H.N.H.S. signed a collaboration agreement with a Norwegian Private Company for the production of Greek ENCs and their updates, that will cover the cartographic responsibility areas of Greece (Greek seas). The project that began in 1 March 2001 has a duration of 3 years and it is appreciated that will be completed by the end of 2004. However the disposal of ENCs begins before the beginning of the Olympic Games.

Among this project there will be completed:

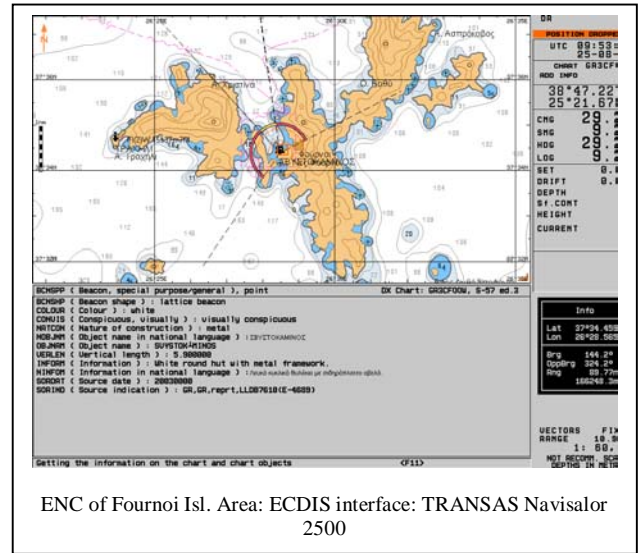
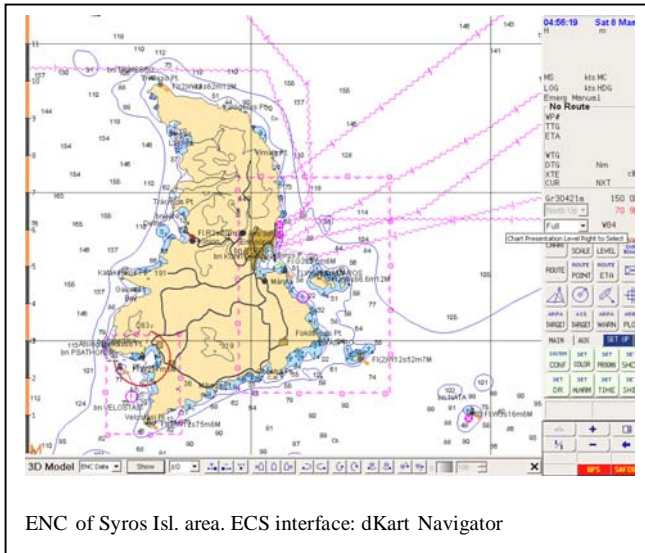
- The transformation/digitalisation of all the H.N.H.S.'s printed nautical charts in S-57 Ed.3.1 standards.
- The making up of ENC cells for all the usage bands in the Greek seas areas.
- The realisation of quality control and certification of the produced ENCs.
- The installation of the ENCs updates disposal system.

The first phase of the project that lasted roughly one year, included the installation of a completed system of management, quality control and maintenance of ENCs, as well as the education of personnel of the Digital Cartography Division. Besides, these personnel watched intensive courses/seminars of production and quality control of ENCs in Greece (180 hours) and in Norway (40 hours).

Nevertheless, the essential production of ENCs was not possible to begin because of the complexity of models and the lack of practical experience. It should then check and prepare the primary material to digitalisation and fix and standardise the processes.

The criteria of determination of priorities of ENC's production were:

- The basic navigation channels that they go through the Greek Seas as these are described in the Mediterranean Pilot of the British Admiralty (UKHO NP 48 Vol IV – Mediterranean Pilot)
- Usage bands 2 (General) and 3 (Coastal) basic coverage.
- Coverage of main Ports of Greece



2.7.1 Usage Bands

The production of ENC's follows the I.H.O. S-57 ed 3.1 standards, which says that according to navigational use (which is depending on the scale) the ENC's are categorised to 6 Usage Bands as follows:

	Usage Bands	Scale
1	Overview	< 1:2,250,000
2	General	1:2,250,000 – 1:300,001
3	Coastal	1:300,000 – 1:80,001
4	Approach	1:80,000 – 1:40,001
5	Harbour	1:40,000 – 1:10,001
6	Berthing	> 1:10,000

2.7.2 The making up of ENC's cells and their geographic coverage

According to IHO standards (S-57), the ENC's must cover strictly rectangular areas. ENC's of other form are not comprehended moreover that is fixed by two meridians and two parallels. These rectangular cover areas with ENC's data are named cells. The data that contain the ENC's cells when they are made up may come from various sources. These sources may be printed nautical charts or direct digital data from hydrographic surveys fieldwork. The final choice of data that will be used in cells is a responsibility of the maker. Thus an ENC cell may contain information from three, four or even more printed nautical chart.

The picture of the portfolio of a country's ENC's, that is to say the final form (cell scheming) that will have the ENC's cells in the various usage bands, is the subject of study for the Hydrographic Service that is involved in their production.

In a usage band, even if it is possible for ENC's cells to cover each other, it does not happen the same with the data. However in the area of their covering, the various information are allowed to be contained in one ENC cell only. The other or the others ENC's that covers it, must be characterized by the space object M_COVR with attribute CATCOV=2 (no coverage available), that is to say substantially to be "empty" in this area. This means that the data in adjoining cells does not cover, aiming at the creation of a single cartographic Data Base (Seamless Data Base), which is the operational base of system ECDIS system.

It is ideal when a ENC's portfolio in the various usage bands forms a grid, that is to say the cells are equal and do not have coverings. In this case however the making up of cells is difficult and requires more time.

When two neighbour countries produce ENC's, it is usual and acceptable to exist covering between cells that the countries select to make up. They are not however acceptable, according to the I.H.O. standards to exist covering data. For rejecting data covering it is adopted a delimitation line of data coverage, which should be acceptable by both countries.

2.7.3 Naming of ENC's files

Naming of ENC's files must follow a standardised way. An ENC is constituted by the basic file of the chart and the file updates. Each chart file has a name of the following form:

CCPXXXXX.EEE

The first 2 characters CC indicate the country. The characters GR correspond for the H.N.H.S.

The character P indicates the usage band of the ENC.

The following 5 characters XXXXX are used to name or numerate of the file according to the maker criteria.

The characters EEE are the extension of the ENC file. The basic ENC file has always extension .000 (e.g. GR300109.000). The first update file has extension .001 (it becomes GR300109.001), the second .002 (e.g. GR399109.002) and so on.

2.7.4 Cell Scheming of the Greek ENC's

After a special study, the H.N.H.S. adopted as a solution for the cell scheming of the ENC's for the usage bands General and Coastal, a grid system in which each cell gets his name from the geographic coordinates of the under left corner of each square.

The geographic coverage of the Greek ENC's cells in the usage bands 2 and 3 is not identified with that of the printed charts. The ENC's will not have any coverings between them.

2.7.5 Standardisation – Coding from XEE64/ INT1 to S-57 ed 3.1

An important role in the followed process played the handbook of Cartographic Characteristics coding from XEE64/INT1 to S -57 ed 3.1 standards that drew up the

personnel of the Digital Cartography Division. The syntax of this handbook (that was named Greek Coding Guide to S -57 ed 3.1) was essential, even if it was time-consuming and laborious, because with the strict standardisation that offers, it accelerates the processes of production and improves the final product.

2.7.6 ENCs update and their disposal

Each new ENC passes through strict Quality Control to become acceptable. The acceptable cells are recorded in an Archive Data Base System, through which they are corrected, reissued and suppressed. From this Data Base will be done also the final disengagement of the ENCs to the Regional ENC Centres (RENCs).

The process of ENCs production connected directly with the process of printed nautical charts production and it is guided completely by their changes from which it depends. The H.N.H.S. keep their ENCs updated with any change that is done, making up update files for the ENCs cells. These updates correspond precisely to the Notices to mariners, which are published in a monthly base.

This way, the ENCs production follows this of the printed nautical charts. Nevertheless, the need for complete timing and standardisation of Cartographic and Hydrographic products production remains an objective for the H.N.H.S.

The Greek ENCs will be promoted to the final users (mariners) via Regional ENCs Centres (RENCs). The RENCs are an international collaboration (consortium) of various Hydrographic Services aiming to the better-organised disposal of ENCs. They follow a strict process of quality and completeness control of ENCs that reaches the mariners, while they guarantee the safety of navigational and cartographic information with the capability of granting additional services and facilitations (updating, VALUE added CDs etc).

3. CONCLUSION – BENEFITS AFTER THE OLYMPIC GAMES

During surveys and works that were executed for the Olympic Games preparation, were used in full operational development new systems and methods, as Multi Beam Sonar systems, GPS receivers with long range real time kinematic and fast static recording capability (LRK, RTK, EDGPS). These systems had been acquired meanwhile by the H.N.H.S. Significant Experience was thus acquired by the H.N.H.S.'s personnel for future use.

A parameter that was faced with success from the personnel of the H.N.H.S. was the need of working in construction sites still working in the phase of completion, with the parallel work of various constructional teams. Meanwhile the time limits for the fieldwork, but also for the office processing were quite narrow.

The products, printed and electronic nautical charts, concerning the area of the Olympic Games, which has the highest maritime traffic in Greece, related to small and big ships, because of Piraeus Port and various marinas; at this area there is also a big number of yacht clubs and sailors. It is obvious therefore that these charts constitute a permanent and very useful navigational aid.

The Olympic Games are without any doubt, a challenge for many organisations and services in Greece. We hope that every visitor will have a pleasant experience during August and September 2004 in Athens.

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BIOGRAPHICAL NOTES

Commodore Anastasios SKLAVIDIS HN graduated from the Hellenic Naval Academy in 1973. He served in various surface vessels and submarines and specialised in the fields of

Hydrography and Oceanography. After serving the Hellenic Navy Hydrographic Service from various posts, since August 2002 holds the post of the Director.

He earned a Master Degree in Hydrography from the Naval Postgraduate School in Monterey CA, USA. He participates as national representative in matters concerning the H.N.H.S., in the International Hydrographic Organization, the International Maritime Organization and the Intergovernmental Oceanographic Committee

Lieutenant Commander Athanasios MAVRAEIDOPOULOS HN is the head of Hydrography and Operations Division of the H.N.H.S. He has been graduated from the Hellenic Naval Academy in 1987, afterwards got a Diploma degree in Marine Engineering from the National Technical University of Athens in 1996 and finally an MSc in Hydrography from Plymouth University UK in 1998.

He has served in the Hellenic Fleet on board several types of warships, during his career in the Navy.

Lieutenant Commander Dimitrios EVAGELIDIS HN graduated from the Hellenic Naval Academy in 1987. He has served in DD Themistoklis and Eagle and he is a specialised navigation officer. He has been graduated from the NATO School of Geographic Staff Officers. He has already got an MSc in Physical Oceanography from the Naval Postgraduate School in Monterey CA, USA. He has taught in various schools of the H.N. Since 1991 he serves in the H.N.H.S. and since March 2002 he is the head of Digital Cartography Division of H.N.H.S.

Lieutenant Junior Grade Andreas MICHPOULOS HN graduated from the National Technical University of Athens obtaining a Diploma degree in Rural & Surveying Engineering in 1996. He has participated in research projects seeking deformations of the Earth surface using GPS methods, conducted by the Globe Physics Institute of Paris. He has worked in various engineer companies as field surveying engineer, road constructing studies team member and National Cadastre studies team member. In 2003 he joined the Hellenic Navy as a specialised surveying engineer officer in the H.N.H.S. He serves in the Hydrography and Operations Division as a field engineer.

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