

DELIMITATION AND DEMARCATIION OF STATE BOUNDARIES: CHALLENGES AND SOLUTIONS

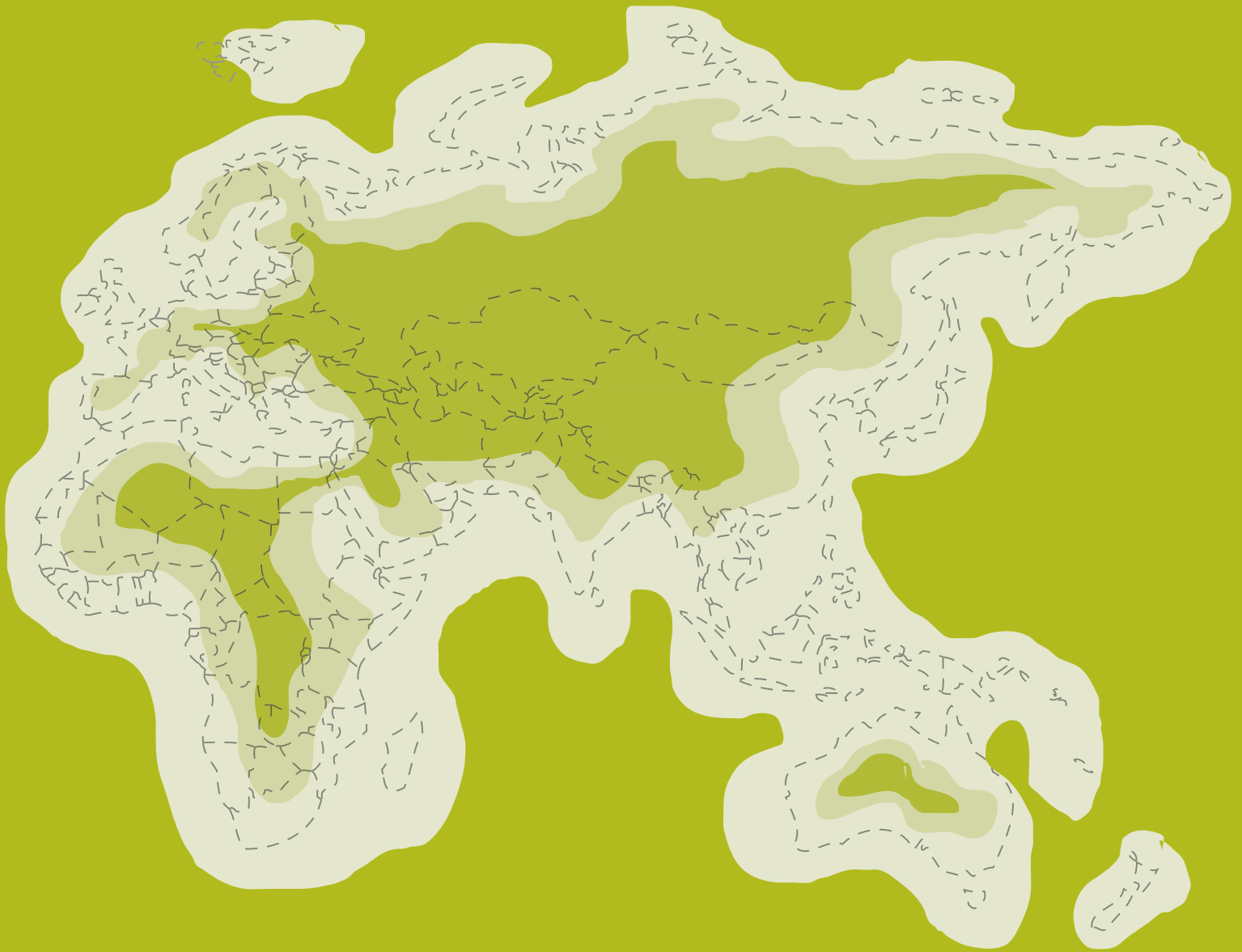


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INTRODUCTION

Nowadays, the activities of sovereign countries in the domain of delimitation and demarcation of state boundaries may well be considered one of the topical issues of the modern world politics. The presence of the state territory and state border still remains one of the main distinctive features of state sovereignty.

The main objective of the OSCE activity in the field of border security and border management is to assist 57 participating States and 11 Partners for Co-operation in implementing the focal points set out in the OSCE Border Security and Management Concept formulated in 2005.

In the years 2011-2016, the OSCE Secretariat, with the assistance of the OSCE field offices, organized area seminars, bilateral consultations and workshops on professional development, exchange of information and best practices for representatives of intergovernmental commissions on delimitation and demarcation of state boundaries of the OSCE participating States, with the engagement of international and national experts.

This practical Guidebook was prepared by the Border Security and Management Unit of the OSCE Secretariat's Transnational Threats Department, taking into consideration a keen interest of attendees to above-mentioned events. The Guidebook is based on positive bilateral experience of the Republic of Belarus and the Republic of Lithuania in the field of state boundary delimitation and demarcation, with due regard to best international practices and provisions of relevant international legal instruments.

The Guidebook gives examples of international legal practices in state boundary-making of newly formed states, outlines main stages in delimiting and demarcating state boundaries, and makes recommendations for organizing relevant work.

The main part of the Guidebook examines problems relating to the organization of delimitation and demarcation of the state boundary, as well as provides reasoned recommendations for the following issues:

- determining functions and tasks of public authorities; elaborating legal acts



and technical requirements; finding and selecting input data, analyzing them and working out a negotiating capacity in the pre-negotiation stage; formulating the principles that underlie the formation of delegations and determine their powers and sources of funding;

- conducting consultations and negotiations with adjoining states;
- preparing joint documents that regulate work;
- harmonizing the positions of parties and agreeing on the state boundary delimitation input data, comparing and analyzing them; determining and resolving cases of boundary line discrepancies on the cartographic material or those with lack of unified approaches in different stages of negotiations;
- solving complex cross-border problems;
- selecting methods of boundary demarcation, determining construction specifications for boundary markers, as well as working out the requirements for their erection;
- organizing work on demarcating the boundary on the ground;
- restricting the extent of latitude vested in the demarcation participants in cases of necessity to deviate from the delimited boundary line, and providing options for resolving typical cases;
- organizing and implementing works on updating / plotting delimitation or demarcation maps and preparing other final documents (such as a boundary position description, protocols of boundary markers, a catalogue of coordinates, etc.);
- elaborating and concluding international treaties on establishing the boundary, and having those treaties registered with the United Nations.

Particular attention in the Guidebook has been given to organizing cartographic and geodetic works that result in the final documents of delimitation and demarcation of the state boundary. The expertise in the specifics of organizing the cartographic and geodetic works and the ability to use the results obtained, above all graphic materials (a topographic map or an orthophoto, materials of the remote sensing of the Earth, a topographic survey, etc.), improves the quality of the negotiation process and the informative capacity of final documents.

The Guidebook contains a Glossary and standard samples of documents that regulate the procedure for executing delimitation and demarcation work, as well as samples of final documents; photographs and other figures of typical and specific boundary sections, boundary markers, etc.



Materials described in the Guidebook can equally be used by representatives of intergovernmental commissions on delimitation and demarcation of state boundaries, as well as in the process of training undergraduates, doctoral students and personnel of international organizations.

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GLOSSARY

Adjoining states – states that share a common section of the state boundary.

Administrative boundary – a boundary that separates administrative units of the same sovereign state and is duly formalized in accordance with the established procedure.

Advance / cadastral map – a specialized topographic map upon which an organization authorized by the government lays down all changes of state and administrative boundaries or names of cities, settlements and other toponyms after their due legalization.

Boundary marker – a construction consisting of one or more elements, designed to mark out the state boundary on the terrain.

Boundary pillar – an element of a boundary marker that has an established coloring, fitted with state symbols and a serial number.

Center zero-offset monument – an element of a boundary marker that is emplaced directly on the state boundary line.

Common geodetic network – a set of geodetic points located along the state boundary in the territories of adjoining states, whose coordinates and heights are determined in the systems of coordinates and heights used by the adjoining states to fix the spatial position of the state boundary during its demarcation.

Delimitation of the boundary – legal formalization in a treaty of the state boundary between adjoining states, whose position is graphically plotted on the topographic map and duly defined in its corresponding written description, whereupon the map and the description may become an integral part of the treaty or its annex.

Demarcation of the state boundary – marking out the course of the state boundary between adjoining states on the ground by means of state boundary markers, including compilation of demarcation documents.

Geodetic network – a network of fixed points on the surface of the earth, whose positions are located by the geodetic coordinates determined within a common reference frame.



Inland waterways – natural or artificially created sections of water reservoirs and stream flows, marked with navigation aids or otherwise, and used for the purposes of navigation.

Low water period – a phase in the water regimen of a river, characterized by the prolonged (seasonal) standing of low (low-flow) water levels and low water flow rates in the river.

Project for the arrangement of boundary markers – a decision of the joint commission on demarcation, graphically drawn up on the cartographic basis, on the sites of erection of boundary markers along the delimitation line of the state boundary.

State boundary* – a line and the vertical plane going along the line, determining the limits of a state's territory (its land, waters, subsoil and airspace).

State boundary strip – a lane of the terrain immediately adjacent to the state boundary, designated to mark the state boundary on the terrain and to ensure its proper maintenance.

Water body – natural waters concentrated on the surface of land, characterized by specific forms of their extension and the features pertinent to the water regimen.

Working map – a topographic map where a joint commission on delimitation of the state boundary draws up a draft position of the state boundary.

NB:

Here, one important remark holds. In contrast to the older democracies of the world, in the legal parlance and law-making of newly formed post-Soviet countries, the terms «state border» and «state boundary» have been given precedence over the widely accepted terms «national border/boundary» and «international border/boundary». Thus in the everyday life of these countries the terms «state border» and «state boundary» oftentimes are substituted for the state-of-the-art terms, and in some contexts even supersede them.



DELIMITATION OF THE STATE BOUNDARY

1. THEORETICAL AND LEGAL ASPECTS OF STATE BOUNDARY DELIMITATION

1.1 International and National Legal Environment

The formation of new states on the world political map occurs periodically and becomes the subject of political and theoretical discussions in the world community. The Montevideo Convention on the Rights and Duties of States, signed at the VII Pan-American Conference in 1933, is one of the few international instruments that list characteristic features of the legal personality of a new state from the standpoint of international public law. The Convention has established four main features of the state as a subject of international law:

1. a permanent indigenous population;
2. a defined territory;
3. a native government;
4. capacity to enter into civilized relations with other states.

The norms and distinctive features of a state as a subject of international law were regularly updated and improved. After the dissolution of the Soviet Union and political changes in Eastern Europe, on December 16, 1991, the European Community adopted the «Guidelines on the Recognition of New States in Eastern Europe and in the Soviet Union. » In accordance with this document, the states applying for recognition were required to provide guarantees of compliance with the following criteria:

- respect for the UN Charter;
- acceptance of the commitments made in accordance with the Helsinki Final Act and the Charter of Paris, especially concerning the rule of law, democracy and human rights;
- provision of guarantees for the observance of the rights of ethnic and national groups and minorities in accordance with the obligations undertaken within the framework of the Organization for Security and Cooperation in Europe (OSCE);
- respect for the inviolability of existing boundaries which can only be changed peacefully via the parties' agreement;
- acceptance of all relevant commitments with regard to disarmament, non-proliferation of nuclear weapons, security and regional stability;
- pledge to resolve all issues relating to state succession and regional disputes by concluding agreements that envisage, among other things, obligatory recourse



to international arbitration.

The international community has not yet reached a consensus on the mechanisms of international legal recognition. Some of the standards are being improved, but the provisions concerning boundaries are fundamental and no revision is possible. The territory in which the state was formed cannot be amorphous and should be framed by treaties on the state boundary with all neighboring states.

The issue of territorial boundaries is relevant for most of the new states. The state boundary is an obligatory attribute (a distinctive feature) of a sovereign state. In international practice, this issue is often addressed by applying the principle «uti possidetis ita possideatis» that was used as far back as in Roman law, which means: «may you continue to possess such as you do possess». In 1964, the Organization of African Unity (OAU) adopted a resolution where it was noted that the boundaries of a colony that persist at the date of formation in its place of an independent state – are a reality, and that all OAU member states pledge to respect these boundaries.

In 1986, The International Court of Justice in its judgment delivered on the dispute between Burkina Faso and Mali noted that the essence of the principle of uti possidetis juris is reflected in «its primary aim to secure respect for the territorial boundaries which existed at the time when independence was achieved. Those boundaries were no more than delimitations between different administrative divisions or colonies all subject to the same sovereign. In this case, the application of the principle of uti possidetis juris resulted in their being transformed into international frontiers». It is important to pay attention to the following main points of the Court's position:

1. The principle of uti possidetis applies not only to the territories of the former colonies, but also to the territories of any newly emerged independent states.
2. This principle is applied to ensure stability and prevent threats to new states.
3. It is not identical in content to the principle of territorial integrity. This assessment of the principle of uti possidetis was confirmed in the Court's judgment on the dispute over land and maritime boundaries between Honduras and El Salvador in 1992.

A regulated and harmonized state boundary is a guarantee of the good neighborly relations of a sovereign state.



1.2 Systemizing the Activities of Distinct State Administration Units in State Boundary Making

The newly formed state does not emerge on a «no-man's land». As a rule, it continues to occupy the former territory, but only in a different legal status. One of the fundamental tasks of a young state, among other things, is state boundary making resulting in the established state boundary.

Oftentimes these states, without having settled a boundary yet, proceed to organize its protection, which causes conflicts with neighboring states at different levels because of uncertainty in the location of the territory to be defended. At the same time, intensive work is in progress on establishing fundamental laws, some of which are directly or indirectly connected with the border in general and the boundary thereof in particular.

It is only when a complete package of legislative acts is available that it is possible to proceed to a preparatory stage in building a process that must ensure synchronicity in the functioning of distinct units of the state administration, assigned to establish the state boundary.

In accordance with national legislation, a political decision to start the formation of a process for boundary making is to be taken at the initiative of the president or parliament of the country. Alongside with the enunciated will, an instruction is given to the government to start implementing the decision of the top political leadership.

The government sets up a working group or a commission and instructs it to prepare a report on the legal, political, economic and technical situation with regard to the status quo of the boundary, and to make recommendations for setting the boundaries in the future. The report is submitted for political evaluation and further formation of an initial negotiating capacity. Ministries and state offices, academic and industry communities assign leading specialists and managers to the working group. The chief of the group is appointed from among the heads of state offices or deputy ministers. He is known for his political heft, experienced in foreign policy activities and / or border issues, and has access to the necessary administrative and financial resources needed for implementing the task at hand. The group must include without fail, representatives of the president's executive personnel, parliament and government, ministries concerned, including ministries of defense, foreign affairs, transport, communications, internal affairs, and state offices; international lawyers, cartographers, land surveyors and representatives of the border guard service. A tentative list of experts to be engaged includes without limitation geologists, geographers, specialists in land reclamation and / or irrigation, energy and communications, representatives of regions and municipalities, customs and other services, depending on the pending issues related to the projected boundary. It is desirable that the working group should include representatives of technical institutions for organizing and carrying out necessary work. Within the group, an optimal balance of representatives of political, managerial, scientific and technical institutions should be maintained.

2. FORMULATING THE NATIONAL POSITION

2.1 Preparatory Stage Preceding the State Boundary Delimitation

The working group shall look into:

- legal framework concerning the boundary;
- international practice of delimitation of boundaries;
- maps of different purposes that display the traced administrative boundary of a subject or the applied land-use boundary;
- historical heritage;
- possible versions of the allocation of territories;
- other materials that highlight the range of problems within border areas;
- degree of impact of the new state boundary on the economy of the country and viability of engineering infrastructure facilities and border population;
- statistics, cadastral information, a register of addresses, information on citizenship, property rights, residential addresses of border population, religious denominations, places of traditional land use and summer pastures, information on energy and water utilities and sanitation, postal and other services, as well as religious buildings and burials;
- other such information on border population and facilities as may prove to be necessary to ensure normal living conditions.

Based on the analysis of cartographic, cadastral, statistical and other information necessary to substantiate functioning of vital objects and ensure normal living conditions of border population, the working group or commission presents a report on the state of the situation with regard to the existing boundary, and comes up with proposals for setting the boundaries in the future to be further submitted for political evaluation and the approval of a negotiating position.

The negotiating position is based on two principles:

1. From the general to the particular. To make it more expressive, the principle may be figuratively rephrased as follows: firstly, find a house, and only then – buy furniture.
2. From the ultimate to the optimum. Negotiations shall begin with an ultimate position which may be reduced to the optimum one until it becomes acceptable to all parties.

2.2 Legal Regulation

The world community closely monitors not only the legitimacy of legal steps in the internal life of newly formed states, but also their attitude towards international law: the UN Charter, the Helsinki Final Act and the Charter of Paris, especially with regard to the rule of law, democracy, human rights and inviolability of all boundaries that can only be changed peacefully through the parties' agreement.

2.2.1 International Law on Boundaries

The International Court of Justice, when resolving disputes on boundaries, often applies in the international practice the principle of *uti possidetis juris*, whose essence is to ensure respect for territorial boundaries at a time when a state acquires its independence. They may be no more than boundaries between administrative units of the same former sovereign state. The principle *uti possidetis* provides the necessary prerequisites for up-grading the administrative boundaries to «state boundaries» in the full sense of the term. The court drew attention to the following: «the principle of *uti possidetis* is also applicable ... to the territories of any newly formed independent states, and in its content it is not identical to the principle of territorial integrity. »

2.2.2 National Law

Newly formed states try to protect their territory in their national legislation as well as in international treaties. Some selected provisions concerning the border or territory are usually recorded in the declaration of independence, constitution, boundary law, treaties of friendship, good-neighborliness and cooperation with adjoining states, etc.

2.2.3 Customary Law

The customary law is a set of unwritten rules, customs and modes of behavior that have prevailed in a society over a long period of time. This law (or the norms thereof) outlines accumulated experience passed down from generation to generation in settling social relationships. It is no coincidence that legal customs and traditions have survived to this day among peasants in Russia, and especially on the periphery of the former Soviet Union. Sometimes scholars undeservedly attribute customary law to archaic, obsolete forms in the evolution of law, forgetting or not knowing that a number of countries in the world (Great Britain, Canada, New Zealand, Japan, in part the USA and many others) still apply the norms even in the domain of further modernization of their constitutional legislation.

The supremacy of customary law is also enshrined in some articles of the UN Convention on the Law of the Sea. Art. 15 of the Convention states that the basic principle of delimitation of the territorial sea, whose boundary has the same status as the land boundary, “does not apply, however, where it is necessary by reason of historic title or other special circumstances to delimit the territorial seas of the two States in a way which is at variance therewith.” In the same Convention, Art. 70 prioritizes “the need to minimize detrimental effects on fishing communities and economic dislocation in States whose nationals have habitually fished in the zone.”

An example from the UN Convention on the Law of the Sea clearly demonstrates the compatibility of international and customary law with a view to protecting the



rights of fishermen, who traditionally carry out fisheries in this zone because of historical circumstances.

It is possible to draw a parallel between the given example of traditional fishing and the traditional live-stock breeding in the mountainous regions of Central Asia, which is the most important nutritive source for the population of this region. Here the need for the combinability of international and customary law is also evident.

The establishment of new boundaries radically changes the way of life of the local population. In this regard, the example of the Agreement between Russia and Finland, which regulates the procedure for Finnish reindeer herders as to their use of summer pastures in Karelia, may well be considered positive.

A new state, formed on the basis of generally accepted principles of self-determination of peoples, must respect the UN Charter and take into account judgments of the International Court of Justice and international practice. International law and practice, combined with customary law, provides various possibilities for resolving cross-border disputes. However, to this end, it is indispensable to identify, as early as possible and in full detail, the existing problems and prepare a reasonable approach.

2.3 The Map as One of the Basic Documents for Establishing the Boundary

A map depicts the situation of a terrain at a specific point in time. A map can be compared to a photograph of a definite scale with its conventional retouching. Any map has a feature of aging, because of the changing situation on the earth's surface due to anthropogenic and natural impact. The main working document in the preparatory stage of delimitation and during negotiations is a topographic map, where the administrative boundaries and the state boundary have been drawn up.

2.3.1 The Advance / Cadastral Map

Each state has an organization which, in accordance with the established procedure, is entrusted to administer maps, laying down upon them all changes of the state, union and autonomous republics; territorial, regional, district, municipal and urban district administrative boundaries; names of cities and localities and other toponyms, as well as to monitor the correctness of their further relocation on other maps.

In the Soviet Union, this work was carried out by the Territorial Inspectorates for State Geodetic Surveys (TISGS) of the Main Directorate of Geodesy and Cartography (MDGC), which were in charge of particular regions and used to register the changes to be plotted on the maps called an «advance map» (Fig. 1).

The information from these maps was used for updating the existing maps or compiling the new ones. The advance map had a cartographic records form which specified legal references with regard to each change, and was constructed at a scale of 1: 100,000. Maps of state boundaries, whose scale was determined by a boundary treaty with an adjoining state, remained deposited in the archives of the parties' foreign ministries together with the treaty.





Fig.1. Advance map of administrative boundaries of the Soviet period

In the countries of Middle Eastern Europe, there were similar institutions that kept cadastral maps updated. It should be noted that advance maps in the Soviet Union were filled in very diligently. After the dissolution of the Soviet Union, the administrative maps of some regions of Russia had not been issued at all for about ten years for lack of legally formalized boundaries.

The advance or cadastral map is a basic and primary tool in analyzing the situation and preparing for negotiations.

2.3.2 The Land-Use (Cadastral) Map

Being somewhat lighter in «weight» and lower in accuracy, a territorial land-use map was used in the Soviet Union to keep record of state land users, i.e. the land boundaries of collective farms, forestry enterprises; state farms, fish farms, etc. They were created by the All-Union Institute of Agricultural Aerial and Photogeodetic Research (AIAAGR). This institute carried out a full cycle of field and aerial photogeodetic works in order to obtain the planning and cartographic materials necessary for land management of collective and state farms. Since the Soviet Union did not entitle people to enjoy the right of the private ownership of land, land-use maps were the only source of information about land users. In Central Europe, the situation was different, and land use maps included information not only on administrative boundaries, but also on the boundaries of land users' plots of all forms of ownership and management. On land-use maps issued before 1995, land-use boundaries do not always coincide with administrative boundaries taken from advance maps. Espe-

cially confusing are the so-called outside plots within the border areas displayed on land-use maps, where they sometimes extend beyond the administrative boundary or, moreover, are located at a certain distance from it.

2.3.3 Maps of Border Territories for Different Purposes:

- maps of protected and wildlife areas;
- forest use maps;
- maps of peatlands, quarries and other deposits of minerals (geological maps);
- geographical maps of basins and watersheds of rivers and reservoirs;
- maps of roads and railways;
- plans for amelioration and irrigation systems;
- urban area plans for cities and settlements;
- maps and plans for other purposes;
- national atlases.

All these maps, with the exception of plans of urbanized territories, are inferior in accuracy to topographic maps, but are necessary for analyzing the situation in the border areas and modeling the position of the state boundary line. In national atlases, one can find a lot of useful information, including statistics, about residents, economy, industry, natural resources, etc.

2.4 The Historical Heritage

The historical heritage is an important factor that contributes a lot to understanding the dynamics and causes of the processes that brought a country to its present state of affairs. Historical documents that subsume to the category of historical heritage include historical maps, data on population censuses and, most importantly, administrative maps, which help to track the dynamics and trends of changes in boundaries. However, much of a paradox, too much history can spoil the talks. To use a metaphor, history is constantly staring in your face, but it is fallible, and more often than not does not facilitate negotiations. During the course of most tiresome talks, it does no good to get steeped in history. In the quest of strong and persuasive elaborations and arguments via historical excursions and statements, it is sufficient to fare the seas and reign in the realm of the last hundred years only.

While tracing back the previous changes or modifications of boundaries, it is necessary to pay special attention to their legal grounding and reasons for all of them. This expertise will strengthen negotiating positions and facilitate discussion, since the other party, during the talks, is also likely to come up with stark and real historical arguments. The historical heritage must keep pace with customary law, and it must be considered in conjunction with a traditional way of life, crafts of the cross-border population and other important economic factors, such as communication routes, land use, sources of water supply, etc.



2.5 International Practice of Delimitation Along Natural Objects

At the onset of the emergence of states, their territories were framed by natural frontiers – mountains, swamps, seas and lakes, forests and deserts. As internecine conflicts and wars erupted, the boundaries were gradually shifted to natural obstacles that were easier to defend. The very first borders, being in their essence mere fortifications, were constructed as far back as by Romans. Throughout history, the principle of defending natural frontiers, or border-lines, has stood the test of time and survived to this day, gaining a status of the most important and fundamental term – «defence of the state border». Today, in the international practice of delimitation of state boundaries, the importance of natural boundaries, which are cheaper to identify and easier to guard, is still evident. Thus most boundaries are contiguous with geographical objects and are called natural. The following types of natural boundaries are distinguished:

- mountain boundary (or a line of watershed) (Fig. 2);
- river boundary (or a line of waterways) (Fig. 3);
- lake boundary (Fig. 4);
- maritime boundary;
- contour boundary (a line running on the outline of such natural objects as a desert, forest, swamp, etc.) (Fig.5).

The mountain boundary is a watershed line that connects the peaks of mountains. It is the most stable boundary, but its demarcation and defence may prove to be complicated. On a relief map of Central Asia (Fig. 2), one can clearly see the difference between administrative lines of the former republics and the state boundary between the USSR and China. Another typical example of applying the method of delimiting along the watershed line is the boundary between Norway and its adjoining countries.

The river boundary, in most cases, passes along the middle of the river (Fig. 3), and if the river is navigable – along the middle of the main channel or thalweg. If there are islands, their national affiliation is determined, and the line runs between the island of one party and the bank of the other party. In the absence of any indisputable evidence of the national affiliation of islands, work on determining their origin can be postponed until the demarcation stage.

The most difficult task is to determine a river's main channel, especially in the delta of rivers, because of complexity of work and the intensive dynamics of the shoreline position. Oftentimes the solution of this task is also postponed until the stage of boundary demarcation.

River boundaries are easier to defend, but they require larger financial commitments and more human resources for maintenance. The total rate of erosion of banks depend on the speed of the current, topography of the bottom, and the shoreline



features. In the rivers, new islands and shoals are being constantly formed that change by the same token the position of the state boundary line relative to the river banks. These natural processes cause unnecessary friction between the parties and require additional negotiations. The actions of the parties, with a view to clarifying the position of the boundary line after a change in its situation, are regulated by a separate agreement on the boundary regime.

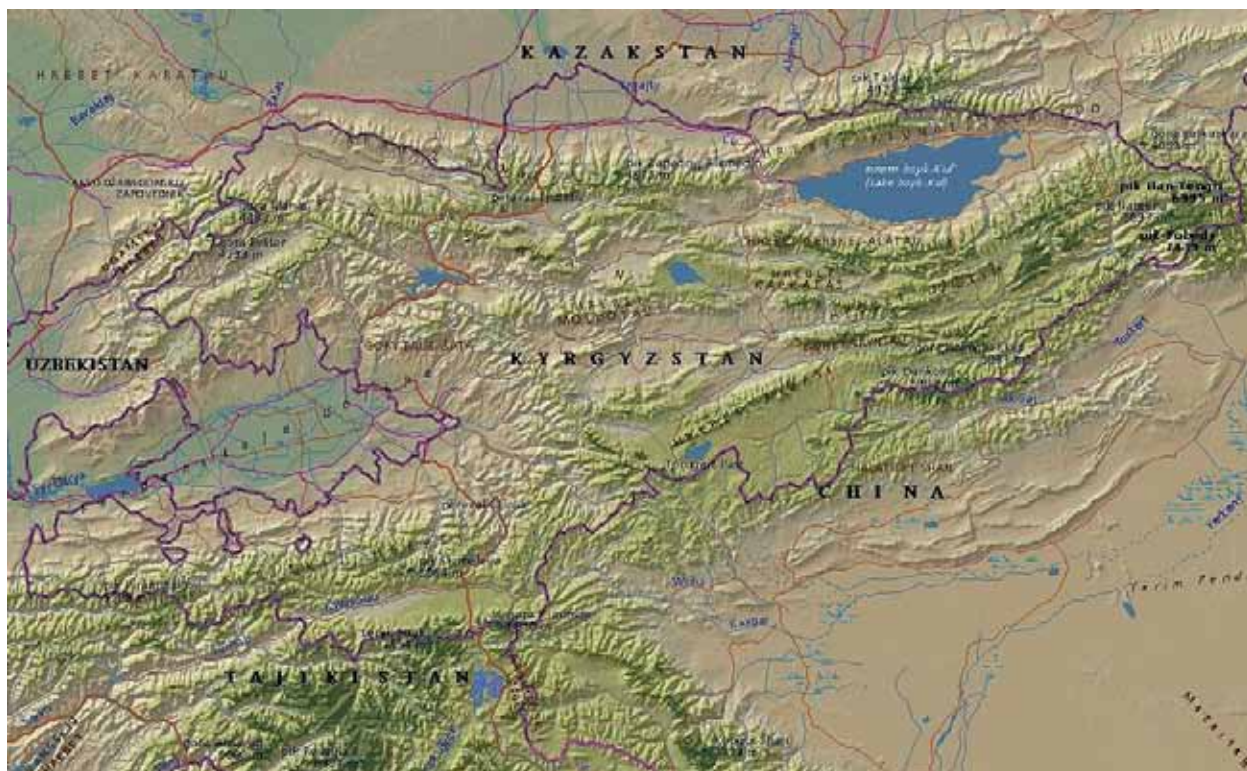


Fig.2. Tile of a relief map of Central Asia with states' boundaries

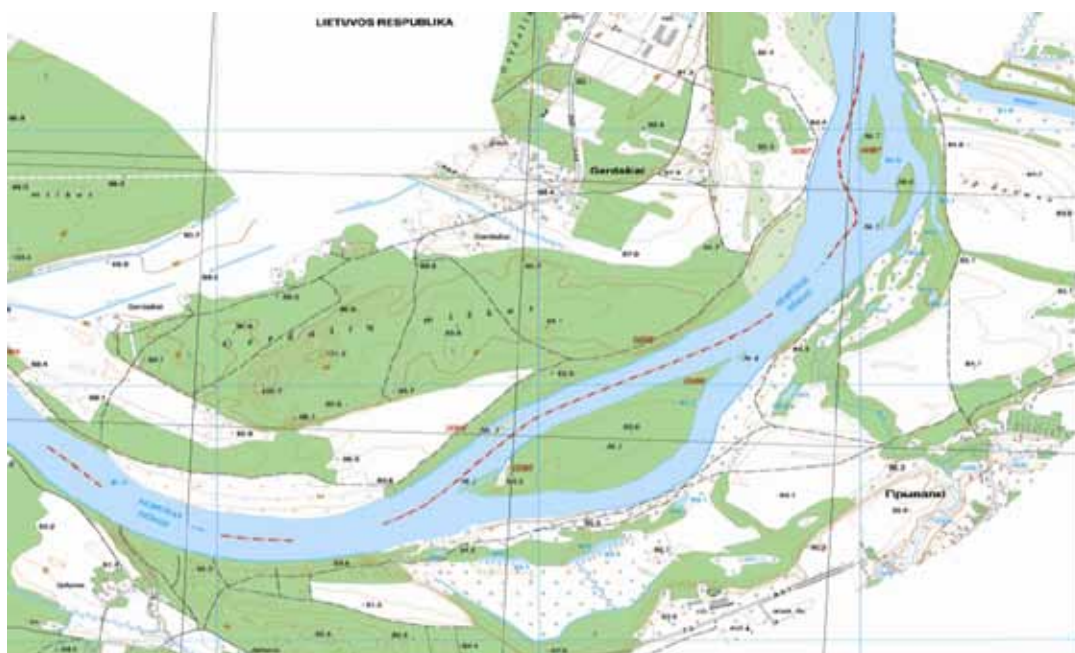


Fig.3. Boundary along the middle of a river

There are cases when the boundary passes along the bank of a river or reservoir. Such a method does not comply with the international practice as it infringes a natural and inalienable right of man to utilize natural resources.

The lake boundaries are projected to run in lakes and other artificial and natural water bodies. The position of the boundary within its lake section is determined by a specific treaty. The methods of delimitation of the water surface depend on the position of the boundary alongside the shoreline, the configuration of the shoreline and the bathymetric map of lake, i.e. on lake depths. In practice, various methods are used:

- along a straight line connecting the shoreline points of the boundary;
- mirror surface of lake is divided in half;
- along a line equidistant from opposite shores (Fig. 4). This method is applicable for lakes and reservoirs of elongated shape;



Fig.4. Boundary in the middle of a lake

- along an isobath of a certain value;
- along a line dividing the surface of the lake as per the proportions of the surface agreed by the parties.

To calculate the proportions, various criteria can be used: a degree of development of the lake's resources, contribution of countries to the conservation of fisheries and the environment, impact of lake resources on the economy and lifestyle of the local population. The most common method is a ratio of shoreline lengths of neighboring states. Here below, formulas are given for calculating the division of the lake mirror surface in proportion to the length of the lake's shoreline:

$$L_1 + L_2 = L, \text{ where } L_1 - \text{length of the shoreline (waterfront) of one party};$$

$$L_2 - \text{length of the shoreline of the other party};$$

$$L - \text{perimeter of the shoreline of the reservoir.}$$

$$\times L_1; \times L_2, \text{ where } S - \text{total area of the reservoir};$$

$$S_1 \text{ and } S_2 - \text{areas of the reservoir's parts, calculated in}$$

$$\text{proportion to the length of the shoreline.}$$

$$\text{Control} - S_1 + S_2 = S$$

Having calculated the size of the area, experts of the parties simulate the salient points that would ensure the most optimal division of the reservoir.



Fig.5. Diagram of dividing the lake surface as per conventional proportions.

The maritime boundary of the territorial sea is an integral part of the state boundary. Methods of delimiting maritime spaces of the territorial sea and determining internal waters of the seas are addressed in the UN Convention on the Law of the Sea.

Most of the boundaries in the world are overland. The ratio of land and sea boundaries depends on the geographical location of a state. For example, in Lithuania, the length of land boundaries is less than 50%.

The position of the projected state boundary is significantly influenced by the existing administrative boundary, whose position in many respects does not meet the requirements imposed on the state boundary. It should also be taken into account that the situation around the administrative line changes over time due to natural impacts and human intervention. Keeping in mind these and some other significant circumstances, it is desirable that the position of the projected state boundary should coincide with the **contour boundaries** of artificial (man-made civil-works and artefacts) or natural objects such as a desert, forest, swamp, etc. In this connection, numerous controversies arise as to the definition of some specific terms. For example, – the «contour of a forest». Experts of different disciplines attribute different definitions to this term. For example, cartographers in an aerial photograph, define the contour of a forest, based on tree canopy, foresters – along the outline of tree trunks, and land surveyors – as per a legally allotted plot for the forest, although there may be no trees on a part of this plot. This example demonstrates a problem of double (or multiple) definitions, occurring even with established terms. It is equally difficult to define the

contour of a swamp, boggy lake or a river bank. The most reliable geographical source is an orthophotographic survey, while the cadastral map is based on a legal plan with geographic reference. These sources complement each other, and they should be treated as a single cartographic document. There are cases when the lineaments of the same object do not coincide on the cartographic documents of the parties. To clarify the reasons for the discrepancies, thorough datum reconciliation must be performed. When determining the shoreline of hydrographic objects, it is obligatory that a level of the water surface encroachment line should be taken into account.

In other numerous cases, the administrative line, coinciding with a **land use boundary**, is characterized as a crooked alignment with a number of kinks on account of the size of land plots, which can at times, be minute in their area. Apparently, such a line can not be up-graded to the status of a state boundary, which has significantly higher standards. The noble task of the working group is to identify such areas and prepare proposals that would predetermine prerequisites for straightening the broken lines, based on earlier detailed arguments during difficult negotiations with landowners.



Fig.6. Boundary along the Contour of a Forest

Another equally important problem is that an administrative line is fairly formal and plays a secondary role not only in land use, but also in the design and construction of various facilities of infrastructure, communications and other vital projects. The working group faces a difficult task – to prepare proposals for resolving these problems with minimal losses incurred.

2.6 Delimiting State Boundary along Artificial Objects

Following are some of the types of artificial (man-made civil-works and artefacts) objects that are crossed by the state boundary or extend along it:

- roads and railways;
- bridges and other structures;
- power lines;
- pipelines;
- land reclamation and irrigation facilities;
- dams.

At the preparatory stage of negotiations, it is necessary to take an inventory of all facilities that are crossed by the boundary to determine their affiliation and significance not only for the home state, but also for the neighboring state in general, and for cross-border population in particular.

Motorways and railroads are vital thoroughfares of a country, for moving goods, cargo and passengers. Taking a look at the map is enough to identify communication lines that run alongside the administrative line, frequently crossing it, and in some individual sections, coinciding with it. The simplest case is when the road crosses the boundary and moves away from it. In other cases, the problem shall be solved as follows: in order not to leave populated areas in isolation, it is necessary to decide as to which road is more important to one or the other state so that during the talks it would be possible to plan the exchange of road sections. The sections with the administrative line passing on them are transferrable to one side or the other, depending on whose money was spent on the road's construction and to which side it is more important. Eventually, this is always a matter of negotiations. Should the boundary pass precisely along the road, the latter will be closed right away for lack of adequate control over the movement of goods and people. When transferring a section of the road to one of the side, the state boundary line must be additionally displaced by the width of the road's right-of-way. Besides, the width of the boundary strip must be added. All this should be reflected in the boundary description. All transferred areas are subject to accounting.

In the presence of bridges and other structures, the boundary is brought into coincidence with their middle or technological axis, irrespective of the property title of the facility and the position of the boundary on the water surface.

The boundary intersects power lines and pipelines by its vertical plane, and their maintenance or repair is regulated by separate agreements.

In a case when the administrative line goes along land reclamation and irrigation facilities, priority is given to the issues of ownership. In the presence of documents confirming the ownership of the facility, the latter is transferred to the side of the owner with a reserve strip (right-of-way) necessary for its maintenance. In the absence of the property title or in the case of construction of the facility from



the funds of both sides, the boundary line is normally projected in the middle.

In the presence of dams across the border rivers, the same ownership issue is relevant. Regardless of the form of ownership, the boundary at the dam should be projected in the middle of the main neck, whose position usually coincides with the deepest point of the dammed river. Usually one of the parties makes a claim that a part of its territory has been flooded. Then a discussion begins on how to properly divide the reservoir.

There are two main methods:

1. Draw a straight line from the point in the middle of the river, where the flood zone begins, or in the middle of the river to the middle of the main neck. This method is applicable when the reservoir has a right shape, both banks of the river have similar shoreline features and slope gradients, and the delimiting line divides it roughly in half.

2. A more equitable method is to use the largest isobath, which, as a rule, coincides with the middle of the flooded river. This isobath, as in the first case, connects the point of the middle of the river with the neck of the dam.

2.7 Report of a Working Group

Based on the analysis of the above-mentioned activities, the working group:

- submits to the higher authorities proposals for selecting an initial negotiating position;
- proposes models for further actions in establishing a boundary;
- provides a list of problem areas and recommendations for their elimination;
- estimates the consequences of the steps taken, with regard to political, legal, economic, defense and other interests indispensable for the normal functioning of the state.

The prepared report with the elaborated initial position is to be presented for evaluation at the political and government levels in general, and, as far as problem areas are concerned, in particular.

After having been evaluated and appropriately amended, the corrected report becomes the negotiating position of the country. This procedure is necessary for negotiations, since it serves as a starting point for the commission, and in the future will facilitate the process of ratifying the boundary treaty.

Beside the legal and technical aspects of establishing the boundaries, the report should address the concerns of compatriots who, after the delimitation of the boundary, may well remain abroad.

This applies not only to the border population living in close proximity to the boundary, but also to remote areas called enclaves. Many states face similar problems and proclaim their ambitions to annex these territories. If these territories were ethnically homogeneous, both countries would have to stipulate terms of exchange, and thus the problem would be resolved. In practice, there are no such «pure territories» in ethnic and religious terms; which causes conflicts at different levels, and the solution of the problem is still not found.

It is recommended that the issues of setting a boundary and the problems of border population not related to the technical and legal subtleties of delimitation should be divided and resolved separately, under different commissions.



3. ORGANIZING AND IMPLEMENTING WORK ON STATE BOUNDARY DELIMITATION

3.1 Regulations on Joint Boundary Commission and its Funding

After approval of the negotiating position, the government of the country creates a delegation to work in a joint commission and appoints a leader. The principles of forming a commission are similar to the principles underlying the creation of a working group. The best case is when the delegation is headed by a diplomat with ample experience in negotiations and sufficient powers to carry out the task. A status asymmetry in the chairmanship level can create preconditions for a party with the «inferior status of diplomacy» to blame their chairman on the undesirable outcome of negotiations due to the excess of powers.

To make the delegation's composition optimal, it should include the representatives of:

- ministries and offices of state that have control over administrative and financial resources;
- managerial staff of technical enterprises directly involved in the work, deeply acquainted with the professional expertise and the specifics of the border areas;
- experts of specific professions from academic, scientific and research institutions and / or production facilities.

The party initiating the negotiations informs the neighboring state by filing a note on the desire to proceed to negotiations on the boundary, and proposes to hold consultations on the approval of the Regulations on the joint commission (hereinafter – the Regulations) and the rules for organizing meetings and works. This is necessary for further work so that both delegations of the commission could have approximately equal powers, numerical composition, the agreed frequency of meetings and a list of meeting locations. After the preliminary agreement on the Regulations the governments of the parties approve its national version with a note that the commission should have the right to make amendments that do not change the essence of the Regulations.

In the Regulations, it is desirable to approve the duties of the commission members. The members of the commission are assigned to:

- negotiate on the delimitation of boundaries with a definite state or with all neighboring states;
- prepare the drafts of treaties and agreements and, having performed mandatory legal procedures, initial them;
- organize the execution of work mandatory for the commission's activities;



- create working and expert groups for the preparation of the technical and legal drafts of instructions, regulations, feasibility studies and agreements;
- prepare layouts of areas subject to optimization within particular sections of the boundary;
- conduct reconnaissance of the terrain in problem areas;
- carry out control over the executed works;
- create commissions within the border self-governments, directed by local administrators, to provide all-round assistance to the state commission and its working and expert groups.

The Regulations should stipulate the appointment of a chairman and executive secretary, as well as specify a list of ministries and offices of state that delegate their representatives to the commission. The nominal structure of the commission is approved by the government or the minister of a leading ministry. The Regulations should reflect accountability of the chairman or of the entire commission.

To ensure due funding for the commission's expenses and ongoing work, it is practicable to choose from several models. Among them:

- a centralized model, when all costs are covered by one institution, for example: the ministry of defense, the ministry of foreign affairs, the border guard service or others;
- a decentralized one, when all expenses are covered by the institutions that delegated representatives to the commission, while the works are financed by those responsible for performing certain types of work.

The second model relieves the commission of additional work on financial accounting and quality control of the accomplished specific works. Besides, such a financing structure relieves the commission of the extra burden of responsibility, which speeds up the negotiation process.

It should be noted that the range of emerging issues and problems, from political to technical, is very broad. Members of delegations do not have the opportunity to become familiarized in full detail with the specific professional know-how in solving border problems. That is why it is advisable for the joint commission to allocate most of the labor-intensive special works to working groups consisting of specialists and experts of a certain discipline. In this case, the working groups will perform their tasks with the utmost of quality, and the commission will only have to evaluate the work and approve it, or recommit the experts to implement it fully and faithfully, and then approve it.

3.2 Arranging Negotiations

In arranging and holding negotiations, there can be no trifles. The following formal circumstances should be taken into account:

- number of members in the delegations should be symmetrical;
- form of the table, the heraldry of the states on it, the number of seats at the



table for members of the commission should ensure parity and symmetry;

- allocating to the incoming party a separate accommodation for consultations;
- providing the received delegation with means of office equipment, and if necessary – with transport;
- safety of members and experts, safekeeping and integrity of their property.

Beside the above-mentioned protocol formalities, delegations may agree on additional conditions, such as provision of hotels, food, etc.

The negotiations are usually led by the chairman of the host party or by his deputy. The language of negotiations can be an acceptable and well-known language for both parties, for example English, Russian, Arabic, etc. The minutes of meetings, in accordance with the laws of the parties, can be taken in both national languages or in a common language. Conducting negotiations and minutes in one language significantly reduces the time taken for translations, and helps to avoid ambiguity in the transcripts and during discussions. The diverse and specific terminology of the negotiations greatly complicates the translation process, reduces its quality. If it appears necessary to communicate in different languages, each delegation should provide for the necessary number of translators / interpreters.

3.3 The Minutes of Meetings

Drawing on the vast experience of negotiations, several methods of taking the minutes can be distinguished:

- full minutes («maxi»), when the minutes very much resemble the transcript of a meeting, when even the statements of commission members and experts are taken in;
- medium-size minutes («midi») that only contain the agreed positions and disagreements of the parties;
- concise minutes («mini»), where only the agreed issues and completed tasks are recorded.

Besides, in all the minutes, the following general provisions are also fixed:

- time and place of a meeting;
- list of participants;
- issues on the meeting's agenda;
- pronouncements and declarations of the parties;
- reports of delegations, working groups and experts on carrying out the tasks and work assigned at the previous meeting;
- tasks of working groups and experts for the next meeting;
- agenda of the next meeting, time and place of its holding.

3.4 Tactics and Principles of Negotiations

The negotiations begin with an exchange of delegation powers and their reconciliation. Then the discussion tackles the protocol matters:

- traditional agenda of a meeting, and its duration;



- frequency and places of meetings;
- procedure for keeping the minutes and their form;
- language of negotiations and minutes;
- publicity of documents, forms of communication with the press, the presence of journalists and other media representatives at the meetings.

Negotiations on establishing the boundary are a very sensitive topic, being in the focus of attention not only of the press and politicians, but also of public at large, and especially of the border population. Everyone closely follows progress in them, and every cheerful exclamation on the one side may arouse animosity on the other. Any premature, and, moreover, uncoordinated or unverified information about any decision regarding a border facility can cause unnecessary unrest and suspend or even interrupt negotiations. Opponents sometimes enjoy the support of people's diplomacy, which is not always constructive.

The fundamental factor for success in the negotiations is political will of both parties to arrive at an agreement.

The negotiation as such is not a sport game, where two teams compete, but the creative work of a common team, consisting of two delegations, assigned to draft the basic document that is fundamental for the relations between states in general and the tranquil and comfortable life of the cross-border population in particular. This underlying premise should become the motto for the negotiating parties.

The negotiation is a constant quest for compromises, where there are no winners or losers; otherwise this is not a negotiation, but surrender.

The negotiation is a tool of cooperation between countries, based on mutual trust that is indispensable for making a high quality and effective border.

3.5 The Twelve Commandments of Negotiation:

- look into negotiable variables of your party's negotiation strategy, staying unbiased and impartial, so that to maintain a power equation in the course of negotiations;
- avoid the perils of showing off your negotiating position as the only one that is reasonable, feasible, veritable and steadfast;
- try to grasp the root motives of the opponent's stance, however irreceivable or repugnant it might be;
- gain deeper insight into the mindset of the opposing partners, which will bespeak their next steps, their likelihood of giving in, and probable arguments to be used for substantiating their stance;
- realize that it is not only you who tackle your counterparts, for they might be exposed to the pressure exerted by their party's inside opponents;
- give in and give away just a little. The opponent is sure to appreciate it, and in return, you might gain twice as much;



- keep cool and be patient. The precious hurry and rush in negotiations may well lead to irredeemable concessions, when you might give away too much in return to a little; or it may shatter your confidence, which will cause you to waver and retreat;

- maintain your dignity and pride intact, leave withdrawal routes not only to yourself, but also for your adversary;

- never resort to ultimatums or extreme slogans, such as «not an inch of ground»;

- do not use patently false, misleading or unverified information, which can harm trust and mutual respect;

- manage the emotions: yours and theirs. In the course of negotiations, rejoice discretely when you win or have a break-through, and disguise your unilateral delight, especially with the press, because this may be misinterpreted and negatively perceived by the other party;

- remember the following: only mutual efforts from both sides will eventually lead to a successful outcome.

During negotiations, it is very important to consider all the factors and circumstances related to the boundary area, so that even seemingly insignificant trifles could not ruin mutual confidence; as well as, admittedly, any attempt on behalf of each side to dissemble some facts, let alone – sell inaccurate or fake information.

Success in negotiations depends to a large extent on the relations and the level of trust between chairmen. Negotiations consist of two parts: the formal and the informal. The formal part is held at the negotiation table, where the position of a country, its statements, claims, reports, etc. are officially pronounced. However, an important part of the work is carried out not at the negotiation table, but in an informal atmosphere or even «face to face». In such a relaxed ambience, in a state of mutual trust, it is possible, during a friendly conversation, to exchange the negotiating commitments of the leadership of the parties and seek an acceptable solution through common efforts. Similar tactics should be applied at the technical level between the leaders of the working groups or leading experts in order to agree on specific, professional issues.

3.6 Key Stages in Negotiations

After the completion of the preparatory procedures, the negotiations commence. Sometimes, in an effort to quickly finalize the mission, a joint commission rashly takes a cavalier approach, starts the direct collation of the situation on the maps and seems to make its way quite successfully; but, alas, it does not last long, because everything comes to a standstill once the first problem area is encountered. Then it may appear that there are so many problem areas, that not any single issue can



be resolved without a pondered systemic interaction of the parties. Therefore, first off, delegations must agree on common principles and rules.

3.7 Describing a Platform for Negotiations

1. The principle «from general to particular» is also a priority here: first the joint commission approves general rules and considers distinct precedents from international practice relating to specific types of sites that must be applied along the entire length of the line, regardless of whether this or that party likes them in each particular case or not.

2. The choice of the fiducial baseline and its coordination with the negotiating partner is the key to success. In accordance with international law, precedence should be given to the administrative boundary, unless otherwise agreed by the parties. Thus international law respects the right of each state to decide and use a delimiting line acceptable to both sides. In order to avoid arbitrariness in plotting the position of the administrative line by one of the parties, it is desirable to use maps on which the position of the line is based on legal documents. The choice of the fiducial baseline and its approval in a protocol predetermines successful negotiations. As a matter of course, this line may not suit one or the other side in some problematic sites, however, the solution approved by the parties provides for steady progress. Any agreed line is better than the absence of it, just because it allows the parties to build on it, taking alternate decisions, profitable for one side or the other, while respecting a zero balance of the exchanged areas.

3. The map is the basic working tool in establishing boundaries. The negotiating parties need to decide on the type and scale of the map. As to accuracy, it is preferable that topographic maps should be used. In this case, it is important that the following significant factors should be kept in mind:

- all maps are prone to becoming outdated. The larger the scale of the map, the faster the information becomes outdated, especially for maps of urbanized terrain;
- maps, like other documents, sometimes contain errors;
- the paradox of Heraclitus: « You cannot step into the same river twice» is also applicable in cartography. Even if a map has been produced or updated this year, the situation on the ground at the time of negotiations may not correspond to the date of issue of the map.

Now that the common rules for both parties have been approved, and the baseline of delimitation has been agreed, which will serve as a basis for further work, the joint commission may delve into the numerous and very important particulars, i.e. to consider options for a possible displacement of the line due to all types of artificial and natural objects. Each object should be examined, based on the positive experience of known precedents of international practice, which, however, does not exclude the possibility for the parties to agree on a different approach. Prior to agreeing on a displacement of the boundary line on account of impeding artificial or natural objects, it is important to discuss one more question:



should the areas resulting from the displacement of lines be included in the area balance? The heart of the matter lies in the agreement to apply a unified approach for all cases. Using sports terminology, the rules of the game can be changed only before the game, but during the game, you need to abide by the rules.

3.8 General Information on Maps and Their Use in Work

In order to start talking more or less professionally about the map as one of the most important working and legal negotiating documents, let us trace back its evolution and application in boundary making.

At the very onset of the map's creation as far back as in the Middle Ages, everything started from astronomical observations and the mathematical framework of a map sheet that used to be filled in by a cartographer, drawing on materials of a descriptive content (rough sketches, legends, etc.). Thus the primary map source was a description of terrain. Accuracy, details and design of a map depended on its author. In addition to its direct purpose, the map performed a representative function, glorifying the role of states, kings or princes. The map could also be appreciated as a masterpiece of art.

In the twentieth century, maps started to be created, based on aerial and space imagery. From a piece of art, the map turned into a large-scale photograph of landscape. With the advent of new technologies, the description of terrain, once fundamental for creating a map, has already lost its leading role, but for some states, a «Boundary Description» still remains one of the basic documents of boundary delimitation, as a relic of map evolution. Let us emphasize that today it is a description as such which is made based on a map, and not vice versa, which means that the description can contain erroneous information if the map has been incorrectly annotated or misinterpreted.

The map, as a primary vehicle of graphic spatial information, is one of the main documents of delimitation, if not the major one. The rest of information (distances, coordinates, elements of the situation, characteristic points, etc.) that complements or specifies the position of objects, must be contemporaneous with the date of the map issue and consistent with the layout of objects on it. In practice, there have been cases when, during the reconnaissance of terrain, control survey measurements to locate objects were taken without collating them with the situation on the map. The information was further entered in the description of the state boundary and, in some places, proved inevitably inconsistent with the map. Thus all field measurements should be checked against the situation on the map, and if there is a discrepancy, the situation on the map must be updated.

The reverse process of reconciling information is also very important. Turning points of the projected boundary line should be referenced to stable features on the terrain. In places where there are no such features, the geographic coordinates of the



turning points should be taken from a working map and entered in the description of the boundary. In this case, it is mandatory that the location of geographic coordinates should be checked on the ground. All the measurements laid down upon the map, including coordinates, must be checked against the situation on the terrain, and if they do not match, the situation on the map must be updated. After that, survey measurements should be repeated again.

To use another metaphor, constant work with a map is tedious, but undoubtedly useful for a successful delimitation «to-and-fro recurrent rhythmical and even rhyming exercise»: «from map to terrain, then back to the map» :). Collation of situations on the spot and on the map should be exercised on a regular basis for all measurements without exception. Only this will ensure that the map is not outdated, and the situation on the map roughly corresponds to the situation on the terrain to date.

It is recommended that the situation on the terrain nearby rivers and reservoirs should be verified even more thoroughly: at least once a year, after floods and upon the completion of delimitation works, as the negotiations on establishing the boundary may well linger on and on ad infinitum. Only through such recurring verifications, it will be legitimate to eventually assert that the situation on the map approximates the situation on the terrain at the date of signing the boundary treaty.

For the sake of clarity, an instance of a real delimitation point on the water surface is given in the diagram (Fig. 7), whose location in the description is characterized by three distinctive description definitions: the middle of the river, the middle of the river mouth and the coordinates.





Fig.7. Time Factor Impact on Water Boundary Position*

NB*: Legend: delimitation points:
 ° point №16 – delimited in 1997
 ° point №16' – location of point 16 in 2011
 - - - - - boundary course line
 ° – satellite observations' points in 2011
 ~~~~~ shoreline as per 2011 survey  
 Scale 1: 1 000

It is impossible to reliably determine the offset value of a displacement that has occurred during the intervening time due to the lack of reliable cartographic information by the time the boundary treaty is signed. In delimitation documents, point No. 16, according to the description, is in the middle of the mouth of the river.

Fifteen years after the signing and ratification of the boundary treaty, before the commencement of demarcation work, it was established that, according to the description, this point had shifted to point 16' and was located, as per the given coordinates, near the shore.

This fact put the joint boundary commission on demarcation into a difficult position. In order to avoid such a situation, it is necessary that the period preceding demarcation work should be as short as possible.

With the advent of innovative digital mapping and GPS technologies, another dangerous trend has emerged: obtaining exceedingly precise values of technical data that do not exist in the real world. Digital technologies allow instantly determining the coordinates of points, distances, azimuths and other quantitative values. Computers are not programmed to discern physical quantities of an object measured and keep on computing with an operator-specified precision. As a rule, for such purposes, calculations are performed with a precision of  $\pm 1$  cm. With such a precision, field

survey measurements can locate only artificial objects, but not natural ones. When locating natural objects, map accuracy characteristics furnished in Table 1 should be referred to. According to the rules of calculations, and to provide for their reliability, it is agreed to use a redundant precision value to the decimal place a sequence higher than map accuracy. For example, if an object has been located on the map with an accuracy of 10 meters, then calculations must be made with a precision of one meter; with a map accuracy of several meters, the calculations with decimeter precision should be performed.

There exists a persistently spreading wrong belief among numerous map users that modern technologies not only allow making calculations with much greater precision, but also allegedly guarantee the utmost accuracy of maps. But accuracy of the map is not determined by the precision of reading the information from the map, but only by how accurately an object had been laid down upon the map, or how accurately aerial photographs of the object have been rectified and topographically identified. The only exception constitutes numerical values obtained from the databases of registers and cadastres. Thus the advent of innovative precise calculations does not beg the question whether the description of the boundary still retains its importance in boundary making.

### **3.8.1 Selecting a Map Scale**

In order to determine the position of a demarcation line, it is necessary that the optimal scale of the map should be selected, which basically depends on the nature of the terrain and the population of the area. For a plain area – a scale of 1:50 000, 1: 100 000, for a mountainous area – 1: 100 000, 1: 200 000 or 1: 250 000, for a densely populated area, maps at the scale 1:10 000 or larger may be used. For the entire boundary, a map of the same scale should be used, but for certain complex sections, if so agreed by the parties, maps of a different required accuracy and scale could be used. On such a map, the basic elements of the terrain needed to establish the boundary should be indicated. An increase in scale of a map narrows the range along the width of marking the object in situ based on geodetic survey data. On maps of a smaller scale, the degree of generalization of information is higher and accuracy is lower, which gives more flexibility in choosing the optimal position of the state boundary line in the process of demarcation. Thus it is necessary that an accuracy range width should be determined, within which the joint commission has the opportunity to rectify the position of the administrative line on the terrain, without formally violating the legal rationale of the administrative line established between the parties. The width of accuracy range at a scale of 1:10 000 is 15 meters, at a scale of 1:50 000 – 70 meters, and for the scale 1: 100 000 – 140 meters. These tolerances can reduce or even relieve tension during discussions about the location of the line of demarcation and provide greater latitude in choosing the optimum position.



| Scale                                                                                        | M 1:10 000       | M 1:50 000       | M 1:100 000      |
|----------------------------------------------------------------------------------------------|------------------|------------------|------------------|
| Positioning Accuracy on a Map:<br>- for stable contours;<br>- for hydrographic contours.     | 0,2 mm<br>0,7 mm | 0,2 mm<br>0,7 mm | 0,2 mm<br>0,7 mm |
| Corresponding Value on the Ground:<br>- for stable contours;<br>- for hydrographic contours. | 2 m<br>7 m       | 10 m<br>35 m     | 20 m<br>70 m     |
| Positioning Accuracy Limit on a Map:                                                         | 1,5 mm           | 1,5 mm           | 1,5 mm           |
| Corresponding Value on the Ground:                                                           | 15 m             | 75 m             | 150 m            |

Table1. Accuracy Characteristics of Map

### 3.8.2 Coordinating the Position of the Delimiting Line between States

Having agreed on the scale of the map and the delimiting baseline, delegations get down to compiling necessary cartographic material. The pivotal thing consists in the date of issue or updating of the map used to establish the boundary. According to international standards, maps of an urbanized area are updated in 5-10 years, others – in 10-20 years. Naturally, maps with administrative boundaries in most cases do not fall into the category of frequently updated ones. For this reason, delegations should agree on the timing of updating a map for the borderline area which usually has a width of 1 km on either side of the administrative line. With the improvement of mapping technologies, the interval for map updates is decreasing. The work of the commission should be performed, based only on homogeneous maps of the parties, which have a common cartographic framework, approximately the same date of issue or updating, and the same accuracy characteristics.

Delegations make a thorough comparison of the line's position on the maps of the parties, analyze legal documents underpinning its position and identify areas where discrepancies in the position of the delimiting line have occurred. This work is meticulously laborious and requires appropriate qualification. Costs of the work, when it is carried out by the commission on its own, are astronomical, but the result still leaves much to be desired. To optimize the work, the commission is entitled to create working groups whose purpose is to carry out preliminary work and make recommendations. The commission, based on the conclusions and recommendations of a working group, is given an opportunity to look in full detail into the very heart of the issues and ways to solve them. With such organization of work, the main

professional burden is carried by working groups that execute, within the intervening times between meetings, all kinds of special work assigned to them on the ground. This «unties the hands» of the commission for the in-depth study of the essence of phenomena in constant quest for the optimal solution. Heads of the working groups are usually appointed from among members of delegations responsible for a particular area of work.

When ascertaining the equivalence of positions of delimiting lines on the maps of the parties, there may be revealed instances of mismatch of these lines between each other and / or with a line of actual land use. Each such case should be articulated at a meeting of the commission by the leaders of working groups, and variations for the boundary course, acceptable to both sides, should be proposed. In order to study the reasons for the arisen differences, the joint commission can organize field visits to the site for a more detailed analysis of the issue, based on the survey of the terrain.

### **3.8.3 Optimizing the Boundary**

The Commission should discuss a possibility and principles for applying optimization procedure to the state boundary. When a material consent on optimization is reached, the following fundamental issues arise.

Cases when optimization should be applied:

- creating the conditions for the residents of borderline territories, favorable for their traditional economic activities;
- maintaining smooth functioning of the existing road network to ensure transport communication between settlements and other economic entities;
- maintaining functioning of transboundary and national facilities of engineering, energy, transport, amelioration and municipal infrastructure, reserves, national parks;
- preserving objects of public worship;
- shifting boundaries towards natural terrain lines, which reduces the cost of framing the boundary and optimizes its surveillance;
- creating legal and technical prerequisites for up-grading an administrative line to the status of a state boundary.

Criteria for evaluating optimization:

1. Value of an optimized / compensated area in absolute magnitude and as per the maximum distance from the boundary line.
2. Criteria for evaluating exchangeable areas.
3. Technical parameters needed to calculate a balance of areas.





Fig.8. Maintaining the integrity of a road

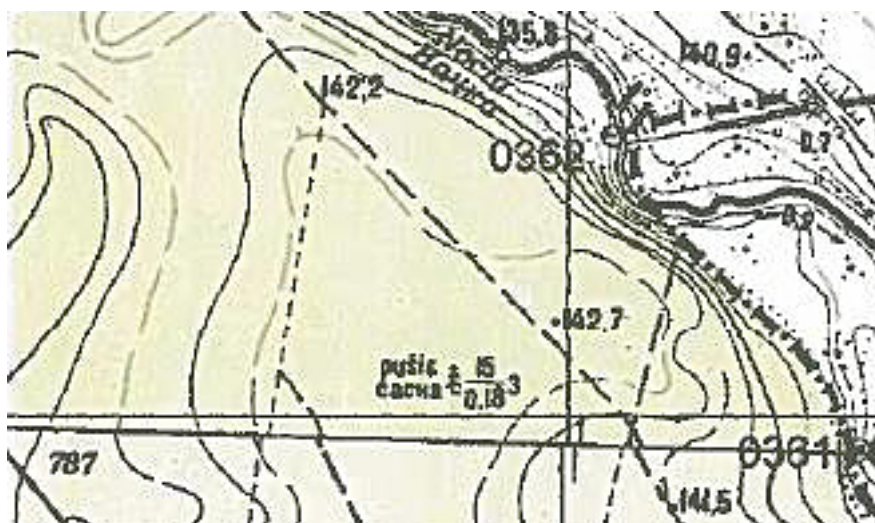


Fig.9. Shift of the boundary towards a river, providing an opportunity for residents and border guards to optimally use natural terrain lines



Fig.10. Inconsistencies of the administrative line course with requirements to the state boundary

Any value of an optimized area can be determined only after political testing of the project for each proposed site. Such a scheme is an exceptional case and does not fit into the standard framework of negotiations. As a matter of course, any compensated or optimized territory should not exceed in its area the minimum administrative unit, such as a farm, a mountain village or a village. It is only to the extent of these units that optimization can be carried out provided an optimized area should not exceed a necessary extent specified for implementing the goal in view. The configuration of an object under optimization should not infringe upon vital interests of residents in an adjoining state.

When exchanging areas, it is necessary that the criteria for assessing these areas should be agreed upon. In practice, different models are used:

- homolographic areas, regardless of land holdings and price, i.e. a hectare – for a hectare;
- homolographic areas at a market or base price;
- exchange of same areas for all types of land holdings;
- exchange of facilities' parts of transport and engineering infrastructure or other facilities that are equivalent in value or price, for example the exchange of parts of roads, which allows preserving functionality of a facility.

The decision on choosing the criteria for assessing exchangeable areas, due to a wide range and different specific weight, is not subject to unification and remains within the competence of the commission. Proposals for exchangeable areas, as well as criteria for assessing areas, must be agreed upon in advance in accordance with the laws of the parties, before their approval.

The main parameter for calculating a balance is area, which is measured in hectares. Accuracy of calculations depends on the scale of a map. The minimum area measured on the map is  $0.3 \text{ mm}^2$ . Based on this value, it is possible to calculate the corresponding area on the terrain. Sometimes technical experts, in an attempt to increase accuracy in measuring areas, use maps of a larger scale. This method to increase accuracy is only acceptable in exceptional cases for urbanized territories, but to this end, it is necessary that the maps on both sides of the boundary should be homogeneous as per their accuracy and date of updating.

After the state boundary line has been optimized along the whole perimeter of the boundary, a table of compensated areas should be compiled.

| Table for Balance of Areas of Land Plots Changing Their National Affiliation due to Optimizing of an Administrative Boundary Line |                         |                                              |             |              |             |                                              |             |              |             |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------------------------------|-------------|--------------|-------------|----------------------------------------------|-------------|--------------|-------------|
| Nº                                                                                                                                | Land Plot Located among | Transferred under Jurisdiction of Republic X |             |              |             | Transferred under Jurisdiction of Republic Y |             |              |             |
|                                                                                                                                   |                         | Total Area (ha)                              | Including   |              |             | Total Area (ha)                              | Including   |              |             |
|                                                                                                                                   |                         |                                              | Rural Lands | Forest Lands | Other Lands |                                              | Rural Lands | Forest Lands | Other Lands |
| 1                                                                                                                                 |                         | xyz                                          | x           | y            | z           | xyz                                          | x           | y            | z           |
|                                                                                                                                   |                         | z                                            | -           | -            | z           | xy                                           | x           | y            | -           |
| n                                                                                                                                 |                         | xy                                           | x           | y            | -           | z                                            | -           | -            | z           |
| Total                                                                                                                             |                         | XYZ                                          | X           | Y            | Z           | XYZ                                          | X           | Y            | Z           |
| Imbalance                                                                                                                         |                         | 0                                            | 0           | 0            | 0           | 0                                            | 0           | 0            | 0           |

Table2. Model for Calculating Compensated Areas

In the presence of imbalance of areas, one of the parties transfers to the other an area that should compensate the imbalance, whose location has been agreed upon. After the position of the boundary line along the entire perimeter has been agreed on the whole, the uncoordinated sections, together with arguments of the parties, should be submitted for additional consideration within each state in order to bring the differences between both states closer together and receive further instructions.

## 4. SUMMARY DELIMITATION DOCUMENTS

### 4.1 Delimitation Map

Keeping in mind the purpose and requirements for a demarcation map, let's familiarize ourselves with its distinctive features. The main element of a delimitation map is the state boundary, which, if possible, should pass within the central part of the map and should be displayed with the corresponding red symbol. The agreed line should be relocated from the working map to copies of updated maps to be used as a basis for generating a delimitation map.

Due to the secrecy restrictions imposed on maps in some countries, delimitation maps usually display a border belt of a limited width of one to two kilometers on either side of the boundary, depending on the scale of a map.

In international and national practice, a system of map division is used, where maps are divided into separate sheets. In order to reduce the number of standard sheets of topographic maps, a non-standard map division for delimitation maps is used, which is developed by a specialized working group on cartography. Below is a sample of the inter-sheet relationship of a delimitation map (Fig.11).

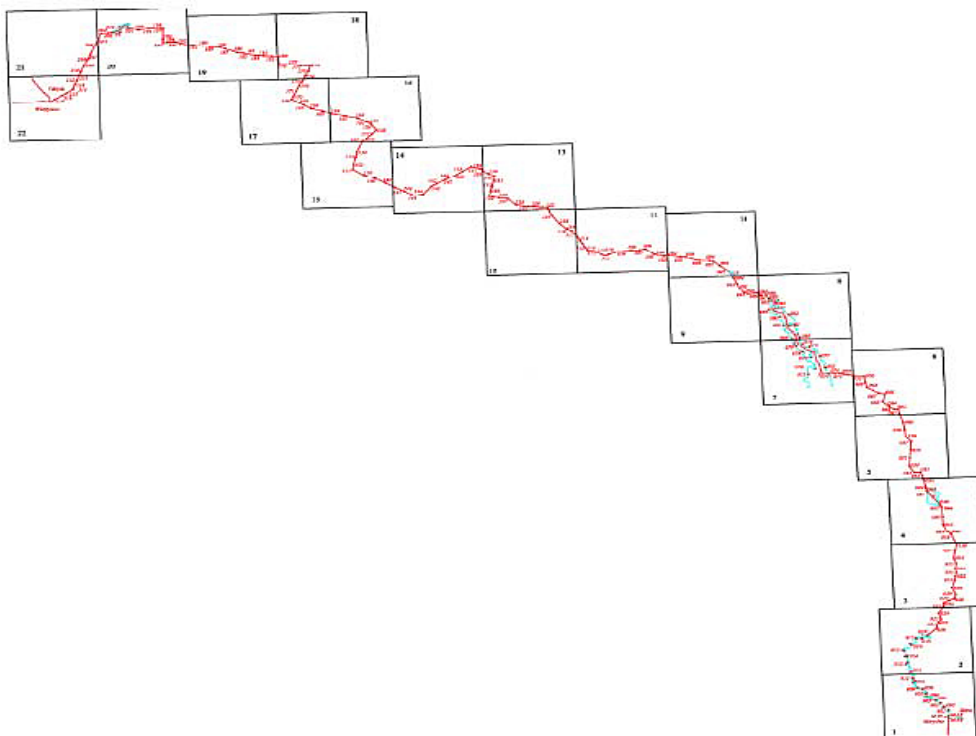


Fig.11. Sample of inter-sheet relationship of a delimitation map



An important element that determines the accuracy of a map is a geodetic grid. According to national legislation, most countries use national systems of coordinates which must be reflected on maps. To avoid non-homogeneity in recalculating coordinate systems, it is required that a special common geodetic network should be created, or generally accepted international coordinate systems should be used, for example: WGS or ETRS (Fig. 12).

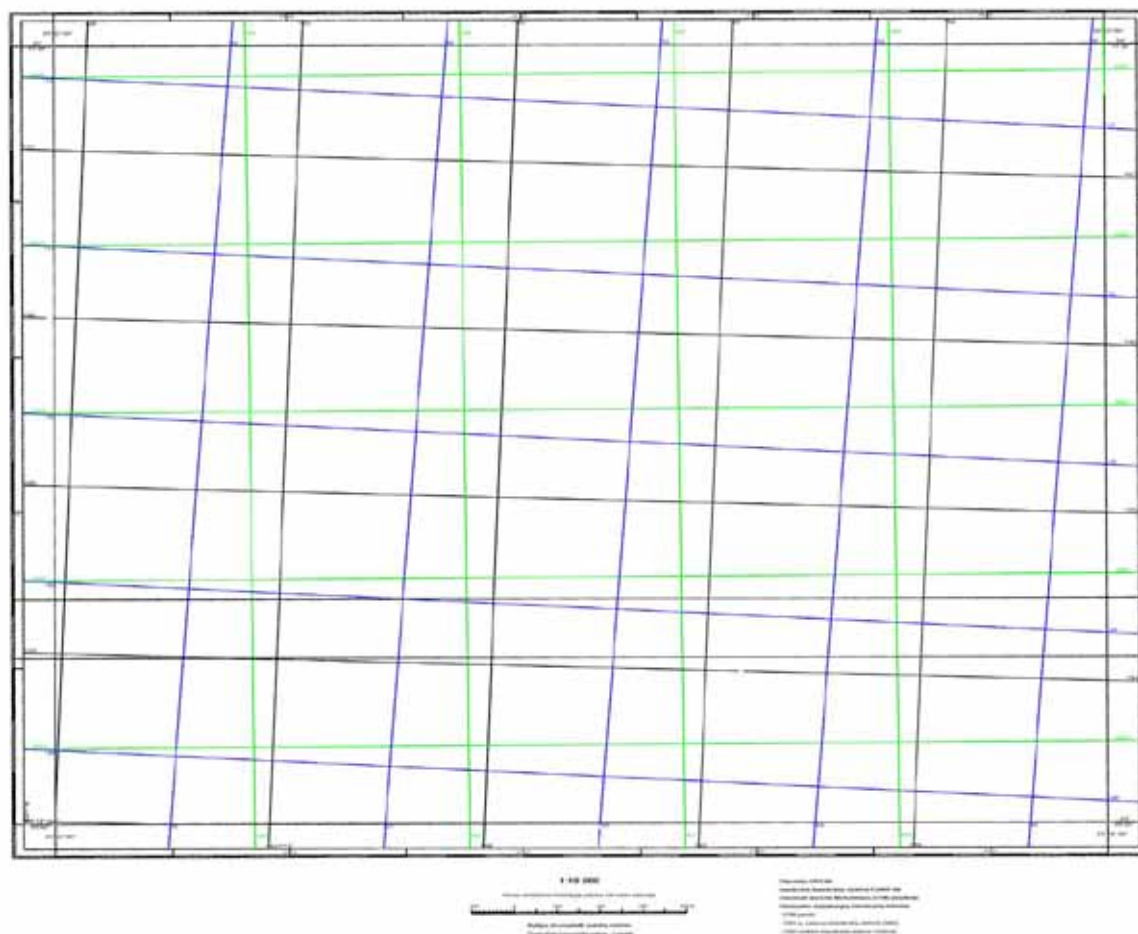


Fig.12. Sample of coordinate grids on a delimitation map

As a rule, if no other agreements are reached, the parties individually prepare a part of the map for their territory, according to international cartographic standards, and then join together geographic information on the boundary line.

Oftentimes, cartographers also face other specific problems, such as:

- discrepancy of topographic symbols in the countries;
- different names of the same geographical objects.

The issue of inconsistency of national topographic symbols is not difficult to solve. Usually the number of discrepant symbols is not significant. It is necessary that an additional Legend of Discrepant Topographic Symbols in tabular form should be printed out and attached to the delimitation map.

A lot of misunderstanding arises between adjoining states due to different names

of the same geographical objects, whose modifications are not agreed to by either side. A way around this situation can be found if each side applies, on the map of its territory, generally accepted geographical names without using alternates. Names of objects along which the boundary passes (rivers, lakes, etc.) should be specified in alternates: on one side of the boundary the name of the object used in one country is applied, on the other – the name of the same object used in the adjoining country.

When making alternates of delimitation maps, it is desirable that the rules of an alternate should be used only for titles, names of documents, names of the officials that sign the documents, but without applying them on the map as such.

The United Nations encourages all countries with non-Latin script to develop a uniform system of Romanization, i.e. translation from a non-Latin script into the Latin one. Through Romanization, a non-Latin script can be transliterated by means of other writing systems for internal and international use.

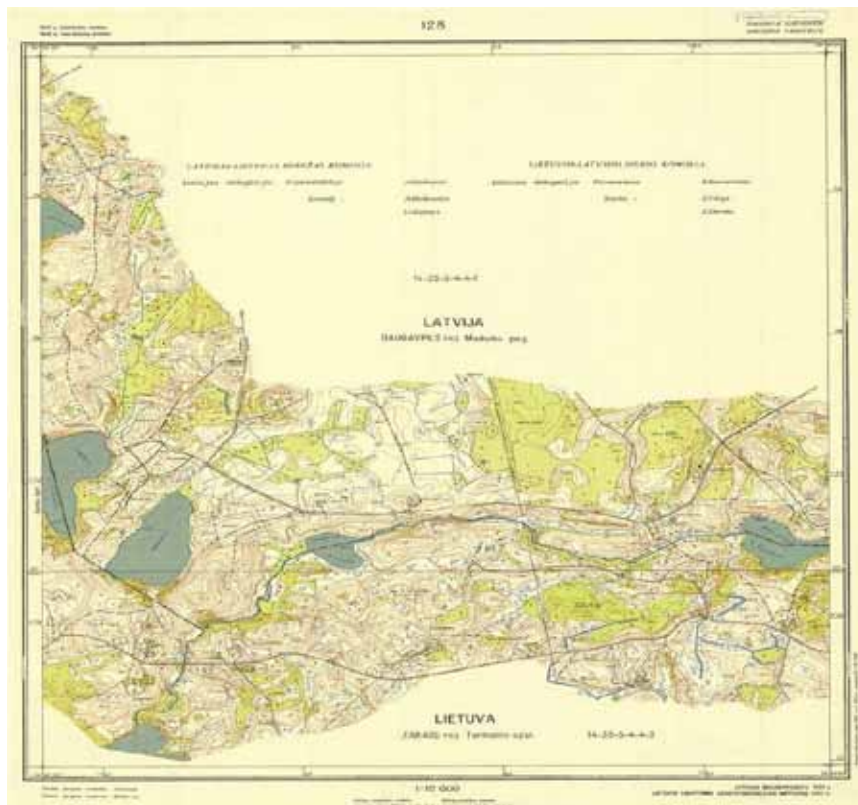


Fig.13. Sample of a delimitation map

Delimitation maps are bound together into an album, whose sheets are numbered, tied together and sealed by the seals of both parties.

The album of the state boundary delimitation map contains:

- mathematical framework of the map sheet and its scale;
- diagram for inter-sheet relationship along the perimeter of the boundary (map division of a delimitation map);
- conventional symbols;

- tie-in inserts for urbanized and «complex» territories;
- table of discrepant topographic symbols;
- contents.

#### 4.2 State Boundary Description

The description of the state boundary (hereinafter – the Description) has been one of the most archaic documents known since the onset of the procedure for delimiting boundaries between states. It goes without saying that, over the long years of history, its significance has notably decreased. If in the Middle Ages the description was by definition the main document that was compiled on the terrain, and maps were further drawn on it; today the description is drawn up based on the map, and it has lost some of its original weight. No matter what, the description did not retire to the archive of historical documents in view of a persistent need to use digital values for accurately referencing the boundary position to stable objects of the terrain or for generalizing the boundary course, especially in the delimitation stage.

Oftentimes, during negotiations on delimitation, problems or issues regarding the position of the boundary in water bodies do not have an unambiguous answer or solution because of insufficient information which requires a long time to be obtained. In this case, if possible, a generalized position of the boundary line should be articulated in the Description, and the disputed issue should be redirected to be addressed and resolved at the level of boundary demarcation.

For example:

- when the boundary follows a river and it is uncertain where the boundary line should be drawn, along the main ship channel or along the middle of the river, the wording «in the river» may well be appropriate in the Description, which means: if the parties agree on the use of the river for navigational purposes, the boundary in the demarcation documents will be located in the middle of the main channel; if not, – then the boundary will necessarily pass in the middle of the river, but in no case on the shore;

- when the boundary follows a river, and the river has islands of an indeterminate national affiliation, the islands may well be deliberately ignored in the Description before the demarcation of the boundary, and the treaty will stipulate the requirement to determine the national affiliation of the islands when demarcating the boundary;

- in the presence of several branches in the river, which is especially typical in river deltas, and in the absence of reliable information on hydrographic measurements, the Description may contain the wording – «along the main channel».

In all above-mentioned cases, the boundary on delimitation maps will be designated by a conventional symbol «in the middle».



Due to insufficient accuracy of delimitation maps, when describing the boundary, the parties can use agreed numerical values from national registers or cadastres, including servitudes that ensure not only the necessary accuracy of the boundary position, but also normal functioning and operation of transboundary and national facilities of the engineering, energy, transport and communal infrastructure.

In specifying the position of the state boundary's course, the Description provides all salient points of the boundary with their references (distances) to stable contours or landmarks. In the absence of such contours near a turning point, the graphic coordinates of the point are determined. If such a turning point is on the water surface of an object, the Description sometimes provides two or even three characteristics of the point. For example: a digital characteristic – the coordinates and a verbal one – «middle of the river», which are often complementary, but sometimes contradict each other, especially in rivers with unstable shorelines. Such dualism of a situation in the Description manifests when the boundary is being demarcated, especially when demarcation works are performed after a long period of time as of the date of the boundary treaty's signing. There are cases when a point located by the coordinates after a certain period of time may shift to the shore or even further overland. In order to avoid such collisions, it is advisory that the coordinates of points located in the territories unstable as to their planimetric position should only be used in exceptional cases lest some probable pre-staged discussions, frictions or a negative political context uncondusive to successful demarcation should arise. Once the use of the coordinates of points in a geographically unstable environment proves to be inevitable, it is advisable that the location of these points should be additionally specified before signing the boundary treaty, and the date of reconnaissance should be fixed in the protocol. The specified locations of these points should be recorded in the description of the boundary.

Let us cite an example of one of the articles of a model boundary treaty: «In the event of a discrepancy between the said Description and the maps used during demarcation, the Parties shall give precedence to the Description. » However much of a paradox, the Description has also been drawn on the map, and to the same extent, the coordinates of the point in the Description have also been defined from the map! This contradiction should be avoided in legal documents.

When drawing up delimitation documents and working with, the following circumstances should be taken into account:

1. A map has accuracy characteristics, which should not be exceeded in demarcation documents.
2. A map may contain errors as other documents do.



3. All documents should be considered in the aggregate of one package, without giving supremacy to any of them, and in case of their inconsistency, the primary sources should be referred to. This provision is mandatory and should be included in a boundary treaty.

4. It is desirable that duplication of information characterizing the location of a point should be avoided (i.e. no double definitions), which is also true for a digital point which can be reflected in documents.

If necessary, the description of the boundary is completed with a Table of national affiliation for islands and shoals in boundary rivers and reservoirs. In the process of delimitation, only the islands with unambiguous affiliation are entered in the table. In order to determine the affiliation of the islands, it is necessary that bathymetric studies of a reservoir be carried out, which are performed in the process of delimitation or demarcation.

#### **4.3 International Treaty on the State Boundary**

In the Middle Ages, such treaties were called «eternal peace» treaties, and only in the twentieth century did they acquire the modern form and name of a «Boundary Treaty» (hereinafter the “Treaty”). The standard text of the Treaty contains a preamble stating the adherence of the parties to the universally recognized principles and norms of international law, and in particular to the principles of territorial integrity and inviolability of borders, as well as an aspiration of the parties to solving the issues of the state boundary line position. The text of the Treaty contains the following important provisions:

1. General explanation of the term «state boundary» as a limit of jurisdiction of each party not only horizontally, but also vertically.

2. Starting endpoint of the state boundary (its initial geodetic mark), which usually constitutes a junction point (a tripoint) of state boundaries, whose location will be determined with the participation of a third party.

3. Position of the state boundary between the countries is given in the Description of the state boundary (Annex x) which was compiled based on the delimitation map of a 1:1xxxx scale agreed between adjoining countries.

4. All directions, distances and coordinates indicated in the Description are determined as per the mentioned map or specified by survey measurements (before signing the Treaty) on the terrain, in the coordinate system agreed upon by the adjoining countries (dates of measurements should also be specified).

5. The delimitation boundary is displayed with a solid red line on the Delimitation map of the state boundary between adjoining countries (Annex y).

6. The above mentioned annexes form an integral part of the current Treaty.

7. In the event of a discrepancy between the said Description and maps during demarcation, the Parties shall give precedence to the Description where updated data are taken into account.



8. Any natural changes in the channels of boundary rivers, streams, as well as in the shorelines of water bodies, shall not entail any changes in the position of the state boundary line defined by the Treaty, unless the Parties agree otherwise. This postulate emphasizes precedence of the state boundary initial position at the date of signing the Treaty.

The delimitation map is the main document of the Treaty. The long process of preparing and approving the map is divided into the following indicative stages:

- aerial photography;
- compiling or updating a topographic map;
- preparing and publishing a working map;
- publishing a delimitation map;
- coordinating and initialing the delimitation documents;
- signing the Treaty;
- ratifying the Treaty.

On average, the negotiations on establishing boundaries last at least 10 years, during which the maps used, were updated at best five years previously. As a matter of fact, the delimitation maps, used on the date of signing a Treaty, are about 15 years old. The ratification of the Treaty takes another two years. To create the Joint Demarcation Commission and start its real work will still take about five years. In the general case, making the most optimistic forecast, the Joint Demarcation Commission will begin to work based on the critically obsolete delimitation maps constructed twenty years ago! One can only guess how old the map is, especially in the area of hydrographic objects, and what challenges the joint demarcation commission will face.

NB: According to national and international standards, frequency of updating topographic maps is 10-15 years, and for territories with a low population density – up to 20 years.

How do we get around this? Modern mapping technologies, digital photography of terrain from space and / or unmanned craft (drones) to automatic methods for processing and rectifying aerial photographs, can significantly reduce the time of producing or updating maps. In order to reduce the impact of a map becoming outdated, it is advisable that, approximately a year before signing the Treaty, the parts of the map where a change in the situation has been observed should be updated. This step will minimize the time period of map aging to a legally grounded date – that of signing the Treaty.

9. Issues related to the excavation of mineral deposits, operation of engineering structures, utility lines and other infrastructure facilities intersected by the state boundary or extending along it, as well as the issues of conservation and use of biological resources, water use and environmental protection are regulated by separate agreements.

If one of the parties intends and the other one consents, a provision that regulates one or more of the above-mentioned problems may be included in the text of the Treaty.

10. The regime of the state border is determined by a separate agreement between the Parties.

11. The state boundary on bridges, dams and other structures extending over rivers, streams, lakes and other water bodies; follows the middle of these structures or along their technological axis regardless of the position of the state boundary in the water.

12. In order to establish and demarcate the state boundary on the terrain in accordance with the Treaty, as well as to draw up appropriate demarcation documents, the parties shall form a joint XXP-YYP demarcation commission on an equal footing as soon as possible.

#### **4.4 Stages of Coming into Force of Summary Documents**

After having reconciled working and summary delimitation documents, the working documents are signed by members of the joint commission and experts responsible for preparing a relevant document, and the delimitation documents – by the chairmen of the joint commission, and, if so specified in the Regulations on the joint commission, – by members of the commission. Before signing the Boundary Treaty between the states, it is initialed by authorized representatives of the states. In practice, the right of initialing documents is entitled to chairmen of delegations in the joint commission. After the Treaty has been signed, it is subject to ratification in accordance with the legislation of the parties and comes into force as of the date of exchange of the instruments of ratification, or at such other time that the Treaty may specify. Registration of an international treaty with the UN finalizes the establishment thereof. The depositary registers an international treaty with the UN Secretariat. Currently, a requirement to register international treaties is stipulated in Art. 102 of the UN Charter that prescribes that any international agreement concluded by any UN member must be registered with the UN Secretariat and published by it. The fact of registration of a treaty with the Secretariat does not affect the coming into force of the treaty. All international treaties registered with the United Nations are published in special UN collections.

#### **4.5 Correction of Errors**

It is not uncommon that errors may occur in an international treaty on the state boundary or in annexes that constitute an integral and voluminous part of the treaty. In this case, they are corrected, guided by the 1969 Vienna Convention on the Law of Treaties. If the contracting parties agree that there has been an error in the text of a treaty or in its annexes, Article 79 of the Convention applies, which regulates error correction as per a simplified algorithm.



*Article 79: Correction of errors in texts or in certified copies of treaties*

*1. Where, after the authentication of the text of a treaty, the signatory States and the contracting States are agreed that it contains an error, the error shall, unless they decide upon some other means of correction, be corrected:*

*a) by having the appropriate correction made in the text and causing the correction to be initialed by duly authorized representatives;*

*b) by executing or exchanging an instrument or instruments setting out the correction which it has been agreed to make.*

Sub-paragraphs (a) and (b) of Paragraph 1 of Article 79 provide an error correction algorithm. If an error has been found in the text of a treaty, it is corrected in signed alternates and is initialed by authorized representatives of the parties. If errors are detected in annexes, they are corrected in a similar manner, but an error correction protocol is added, which is attached to the treaty.



## 5. METHODS FOR RESOLVING COMPLEX CROSS-BORDER ISSUES

A boundary treaty, like any state boundary itself, does not solve cross-border issues, but only creates a legal framework for activities of a state whose sovereignty is recognized by an adjoining state. A working group established by the government submits to the government a report on the work performed. The report, among other things, sets out the state of the situation within the border area with regard to its status quo and residents, makes recommendations for boundary making, lists the issues that require urgent solutions, which the residents of the border area have encountered with or will face in the future. As a matter of course, after the delimitation of the boundary, the list of problem areas may be reduced, but it may well also be replenished with newly emerged or previously unidentified issues.

Summarizing the work performed, it would be possible to assess it as positive, if the boundary did not create inconveniences at all to the states in general and to the cross-border population in particular. To tell the truth, in practice, there are no such ideal solutions. How then, is it possible to minimize the list of problem areas and inconveniences for the cross-border population?

### 5.1 Package of Treaties and Agreements

To solve the emerged problems relating to boundary making, a package of treaties and agreements (hereinafter – the Package) is used, which are signed together with a boundary treaty. The Package may include treaties and agreements on:

- state border regime;
- simplified border crossing procedures for the cross-border population;
- checkpoints for local traffic;
- joint use of transboundary waters, roads, pastures, engineering and other infrastructure facilities;
- shipping.

This list is not exhaustive and can be completed with other treaties and agreements on most important domains for joint legal regulation.

If there is political will, the package of treaties and agreements can help significantly in resolving most of the problems that arise. The treaties and agreements included in the Package shall be signed together with a Boundary Treaty and shall come into force upon its ratification, unless the parties agree otherwise.

### 5.2 Delimitation of the Boundary in Parts

In a situation when it is not possible to form boundaries along the entire perimeter, there is an «alternate exit».

In the absence of any opportunity for the successful completion of negotiations on establishing boundaries along the entire perimeter, it is recommended that the



uncoordinated section should be «excised» from the treaty and a «gray area» should be formed along the outline thereof, whose width could cover a zone of mutual claims. This area should be attributed a special regime provided by the parties, which will be in effect until the position of a delimiting line is agreed upon and legally formalized.

Such precedents in making boundaries or delimiting maritime space have been known not only in world practice, but also with the countries of the European Union.

### 5.3 Mediation and Arbitration

If there is political will, even if the negotiating positions are incompatible, there must always be a hope that some third party will help overcome this compelling circumstance.

In order to involve a third party in the negotiation process, the contracting powers should agree to have recourse to any such third power, based on their voluntary agreement. The recourse should be made to a competent international organization, including the UN, or to a neutral state which both parties confide in.

Firstly, a method of **traditional mediation** may be used. It is applicable if during negotiations, it was not possible to resolve problems independently or unblock the stalemate that arose during negotiations. To this end, it is necessary that both negotiating parties should not reject a possibility of stepping back from their former stances and should show flexibility and readiness to solve a problem. Negotiations via an intermediary are more effective and do not require large material costs normally incurred when appealing to arbitration. A mediator can help the parties develop an optimal and acceptable negotiation platform to reach an agreement.

In order to perform his functions, a mediator must conclude an agreement with both negotiating states on the rights and obligations of all parties. The mediator has ample rights and can influence the negotiation process. The duties of mediation must be set out in a tripartite agreement. The main functions and duties of a mediator are as follows:

- clarifying main problematic issues of the parties and the order of their priority;
- participating in negotiations and making motions;
- making motions to the point of negotiations;
- making motions on the details of negotiations, including those on revising positions or advancing new proposals;
- maintaining neutrality in relation to the parties;
- abstaining from helping one party to the detriment of another;
- respecting the dignity, honor and sovereign rights of the parties;
- convincing the parties of the need for cooperation and avoiding confrontation;
- making recommendations for resolving an issue under discussion.

In traditional mediation, the final decision on the point of substance is taken by the negotiating parties.



In **consultative mediation**, compared to traditional mediation, there is one distinctive feature related to the duties of all parties. If the parties can not find a solution to a problem, a mediator, with the prior consent of the parties, articulates his position on the issue in question through a consultation. The opinion of the mediator is not binding for the parties, but should be taken into consideration if the negotiations reach a deadlock. The parties can use the mediator's position as a platform for solving the problem, if this has been stipulated in the trilateral agreement.

Beside the traditional and consultative mediation methods and their various modifications, a method of **mediation with arbitration elements** has recently taken place. In order to implement this method, the tripartite agreement should contain a statement that if the negotiations reach a deadlock, the mediator will come up with a binding decision on the issue in question. This ensures that, within the framework of such mediation, an agreement between the parties will be reached in any case without fail.

The main difference between the above mentioned mediation methods consists in the role of the mediator as a third party during negotiations, in making a final decision on a problem issue and reaching an agreement.

Despite the participation of a third party, responsibility for decision-making stays with the negotiating parties, with their ability to profoundly substantiate the reasons for certain positions. The role of a mediator is to engage the parties in cooperation on seeking a mutually beneficial solution to a problem, irrespective of the context of seemingly uncompromising parity of justifications and case-based reasoning of the parties, each defending its own stance.

#### 5.4 International Arbitration

The competence, procedure and order for arranging arbitration are enshrined in the Hague Convention for the Pacific Settlement of International Disputes. In accordance with the Convention, the Permanent Court of Arbitration was established in the Hague, whose purpose is to facilitate recourse of disputant states to an arbitral tribunal in the event that a problem situation arises between them. The Court appoints experts in the field of international law for a period of six years. Each state participating in the Convention appoints four of its representatives. The appointed persons are entered in a special list (a register) which is sent to the states.

International arbitration implies handling of a particular dispute, carried out by a third party (an arbitrator), whose decisions are binding on the disputant parties.

This is a temporary judicial body characterized with the following distinctive features:

- consent of both parties to adjudication of a dispute;
- appointment (selection) of an arbitrator by the parties to the dispute;
- procedure for considering a dispute, which is determined by the parties to the dispute;
- decision of the arbitration binding for the parties.



In international theory and practice, the advantages of arbitration court over a trial court have been emphasized:

- arbitration court is more flexible and less formal;
- parties enjoy almost unlimited latitude in selecting judges and establishing the rules for arbitration.

The international practice of resolving disputes, including the most difficult situations relating to establishing boundaries, has the widest range of legal instruments for peaceful settlement of emerged problems. The above-mentioned methods constitute only a part of the main modifications within international mediation and arbitration used to resolve disputes.

If the negotiating positions as to establishing state boundaries are incompatible and there is mutual political will to eventually settle in a civilized way the issue that has become escalated and remained inconclusive after being tackled by the joint commission, the parties should start consultations on possible involvement of a third party.

Before consultations, each of the parties must do the following homework:

- to critically examine their negotiating positions and any possibility of their correction;
- to study in detail international practices (decisions of international mediation and arbitration) in handling similar boundary-making cases;
- based on the analysis of their negotiating position and the decisions on similar cases taken by third parties, to conduct a realistic process modeling study of the hypothetical conclusions of international mediation or arbitration and, if necessary, adjust the national position accordingly.

With the mutual consent of the parties to have the recourse to third parties, it is recommended that the parties should agree on the choice of one of the tools and organizations for immediate adjudication of the dispute. The choice of this or that method of handling a dispute is determined by the sovereign right of the negotiating states.

### **5.5 The Showcase of Lithuania**

Since the XIV century, Lithuania has had a centuries-old history and ample experience in boundary making. The first precedent of a peaceful settlement of the border dispute between the Grand Duchy of Lithuania and the Teutonic Order, involving (in modern terms) international arbitration, occurred in 1412. The arbitrator Benedict Makrai, appointed by the Roman emperor, mediated in the negotiations on the borders and sovereignty of a part of Samogitia's territory.

In establishing the boundary between Lithuania and Latvia, the main stumbling block consisted in Lithuania's claim to seize a part of the sea coast. In 1819, under the tsarist empire, Latvian dukes desired to ensure better communication routes

for trade with Prussia, and for this purpose the administrative boundaries between the Kaunas and the Courland provinces were changed. As a result, Lithuania was practically deprived of the sea coast. Because of the peremptory «all or nothing» position of Lithuania that claimed a part of the Baltic Sea coast suitable for building a seaport, the negotiations reached an impasse.

After the demise of the tsarist empire and the restoration of Lithuania's independence, the issues pertaining to national borders were given particular consideration.

On September 28, 1920, the representatives of Lithuania and Latvia, with the mediation of Steven Talens, head of the British mission in the Baltic States, signed an agreement on transferring to the Arbitration Commission, consisting of 4 members (2 representatives from each side) and the chairman, the issue on establishing a boundary. A national of Great Britain was to be assigned Chairman of the Commission. The Chairman was authorized to take a final and conclusive decision without the right for the both parties to appeal if the parties would fail to reach a mutually beneficial agreement. It was also stipulated that in case of necessity to organize a plebiscite in the disputed areas, it should be held according to the rules approved by the Commission in order to avoid administrative pressure on the local population.

In order to perform this mission, the UK government delegated to the Commission Professor of Edinburgh University, Lord J. Y. Simpson.



*Photo: James H. Smith & Sons, Ltd.*

*J. Y. Simpson*

Fig.14. Photo of the arbitrator Lord J.Y. Simpson

According to the extant minutes of the meetings, the arbitrator Sir J.Y. Simpson managed to maintain impeccable absolute neutrality with regard to the negotiating parties, and most researchers persist in their beliefs that the parties reached an agreement without any pressure on the behalf of the arbitrator. On March 21, 1921 after three months of intensive work of the Commission Prof. J.Y Simpson, Chairman of the Court of Arbitration, enunciated the final decision on the boundaries established.

On May 14 of the same year, the foreign ministers of both sides signed the Convention on establishing the state boundary between Lithuania and Latvia: «Convention between Latvia and Lithuania regarding the Delimitation on the spot of the frontier between the two states and also regarding the rights of the citizens in the frontier zone, and the status of immovable property intersected by the frontier line». The Convention also stipulated the requirements for marking out the boundary on the ground. The Convention is available at the Internet address:

<http://www.forost.ungarisches-institut.de/pdf/19210514-1.pdf>.



Fig.15. Diagram of land plots' reallocation under the decision of international arbitration

The total value of exchanged areas accounted for 500 km<sup>2</sup> with a ratio of 4/6. How can we evaluate this agreement through the prism of the century?

It is true that oftentimes the opposing parties are supposed to come up with diametrically opposite stances, but a treaty is an entirety of compromises. This entirety may work wonders, gradually turning cultural alienation into peaceful co-existence and, eventually, into harmonized interdependent, but integrated development and interaction.

In any case, any treaty is better than uncertainties which, on the contrary, hinder the development of border regions, and, by the same token, ruin the good-neighbourly relations between states.

Let us dwell on the main provisions of the Convention on establishing the boundary between Lithuania and Latvia on the ground and ordaining the rights of citizens in the border zone and the status of immovable property (real estate) intersected by the boundary. Among other things, the provisions stipulated the following:

- border checkpoints;
- procedure for crossing the boundary by landowners whose land plots were intersected by the state boundary, as well as for moving across the boundary property, animals, equipment, seeds, etc.;
- role and place of the state administration and local government bodies in this process;
- optimization of the land plots intersected by the boundary;
- possibility of using pastures and forests abandoned on the other side of the boundary;
- procedure for the purchase of land from private landowners whose land remained on the other side of the boundary;
- procedure for paying compensations to owners in connection with relocation;
- procedure for drawing up plans and preparing documents for land plots and other immovable property;
- legal registration of immovable property;
- issues of citizenship;
- demobilization of the cross-border population, etc.

Ten years later, i.e. on January 25, 1931, after the completion of demarcation of the state boundary, a new Convention was signed between Lithuania and Latvia on the inventory and abolition of real estate divided by the state boundary. The Convention is available at the Internet address:

<http://www.worldlii.org/int/other/LNTSer/1931/143.pdf>.

This Convention has modified some of the previous provisions related to the movement of property across the boundary from sites intersected by the state boundary, provided a detailed description of the activities of government bodies, reinstated the rights of owners, elaborated an algorithm for consolidating or liquidating land plots intersected by the boundary, determined a deadline term for finalizing the ordering of the rights and real estate of the border population.

The given example can serve as a visual aid demonstrating the procedure for applying to international arbitration and provides a list of potential problems that the border population may face in the event of an exchange of border territories.



## 6. AGREEMENTS ON THE JUNCTION POINTS OF STATE BOUNDARIES

Each boundary has the beginning and the end. Usually, in these junction points (tripoints), the boundaries of several states concur. The point of the boundaries' intersection is defined by a tripartite or multilateral agreement concluded between the parties concerned. The agreement shall contain a reference to the relevant boundary treaties if the treaties are available. If the related boundary treaties have not been signed, the agreement shall provide approximate graphic coordinates of the junction point.

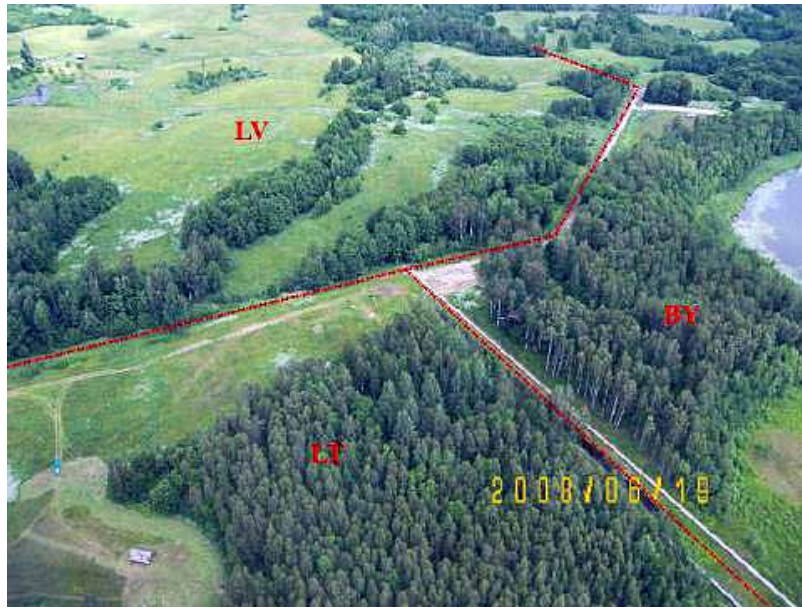


Fig.16. Diagram of a state boundaries' tripoint



## 7. CONCLUSIONS

The International Court of Justice and international practice unambiguously emphasize:

- «the supremacy of a boundary between administrative units of the same former sovereign state», unless the parties agree otherwise;
- the principle of *uti possidetis juris* (may you continue to possess such as you do possess) is applicable not only to the territories of the former colonies, but also to the territories of any newly emerged independent states.

The advance or cadastral map is a basic and primary document in preparing and conducting negotiations, while the legally grounded administrative boundary, traced on it, is a starting position for both parties.

The delegations of both countries can suggest modifications in the position of an administrative line in the areas significant for them, provided that as a result, a zero balance of the exchanged areas should be preserved.

The international law provides supremacy to the principle «if the parties do not agree otherwise».

The main strategy during negotiations, first and foremost, consists in the approval of the general rules on application of agreed solutions to typical situations and objects at the boundary and within the border zone, and only after that – negotiations on some particular matters can be started.

In international law and practice, there are ample instruments for mutually beneficial resolution of cross-border problems. To this end, it is only necessary that the existing and potential problems that affect the border population should be clearly identified, and a reasoned justification should be provided.

It is recommended that the activities of delegations in the negotiation process should be organized at three distinct levels of organization of work: in a joint commission, in working groups and in expert groups. With such an organization, the negotiation time notably decreases, and the main burden is carried by working or expert groups as the specialists proceed into the borderland and perform most of the technical and drafting tasks assigned to them during the time intervening between meetings and encounters. This allows the commission to take time and grasp the very essence of problems in search of the most optimal solutions.

During optimization, any compensated or optimized territory should not exceed in its area a clearly defined minimum administrative unit, such as a farm, a mountain village or a village. It is only to the extent of these units that optimization can be carried out provided the optimized area should not exceed a necessary extent specified for implementing the goal in view. The configuration of an object under optimization should not infringe upon vital interests of residents in an adjoining state.



The accuracy of a map is determined not by the precision of reading information from the map, but by the accuracy of its creation.

In order to avoid non-homogeneity in recalculation of national coordinate systems, it is necessary that only generally accepted international coordinate systems should be used in delimitation maps.

All delimitation documents shall be considered in the aggregate of one package, without giving precedence to any of them, and if divergent interpretations occur, the original sources shall be referred to.

In the written description of the boundary, it is desirable that duplication of information (or double definition) that locates a point, including a digital one, should not be admitted as in such a case the description may prove to be inconsistent.



## DEMARCATION OF THE STATE BOUNDARY

The term «State Border Demarcation» stands for explicit marking of a state boundary course all along its entirety on the ground by distinctly visible boundary markers emplaced in-situ, based on the developed demarcation documents.

Boundary demarcation includes cartographic and geodesy, design and survey, construction and installation, hydrography, aerial photography, land management and other types of work. However, demarcation is not just a technical process of making a delimitation line conspicuous on location; it also implies the activities of state bodies and national delegations in the domain of foreign policy and international law.

Demarcation works result in a well-defined harmonized state boundary demarcated on the terrain in accordance with a treaty on the state border (a boundary treaty) and demarcation documents that fix the position of the state boundary on the landscape and confirm the consent of adjoining states as to its position.

The main goal of boundary demarcation is to provide unambiguous identification of the state boundary course on the ground by use of clearly visible boundary markers and undisputed documentation of the state boundary on the ground if they have been lost.

However, the boundary demarcation also allows:

- creating appropriate conditions for maintaining law and order at the state border;
- giving rise to cross-border population's awareness of the presence and importance of state boundary due to its demarcation on the terrain;
- increasing the effectiveness of counteracting against cross-border illegal activities due to the availability of well-grounded evidence of border violations;
- preventing border incidents and conflicts between local population and state services operating at the border and in its vicinity that might arise for lack of clear identification of the state boundary on the terrain;
- strengthening protection of the state border in accordance with generally recognized standards of integrated border management.

Boundary demarcation is carried out by a joint demarcation commission that consists of delegations formed, as a rule, by the governments of adjoining countries. However, for instance in Ukraine, the delegations are composed directly by the president.



A demarcation commission is set up based on the treaty on the state border between adjoining states, which envisages its creation in order to lay out the state boundary line on the ground.

According to international practice, there have also been cases when the formation of joint commissions is not envisaged in the treaty on the state border, but the adjoining states conclude an international agreement on state boundary demarcation. In this agreement, as a rule, the adjoining states undertake to demarcate the boundary and, to this end, set up a joint demarcation commission. However, this approach can delay the start of boundary demarcation.

If the date of the first meeting of a demarcation commission or that of the approval of regulations on state boundary demarcation may well be considered the onset of demarcation works, then the coming into force of final demarcation documents is considered the end of the process.

The boundary demarcation, as a rule, falls into the following stages:

- creating a system for ensuring a state's activity in state boundary demarcation (distribution of powers among government bodies, preparation of a legal regulatory framework, formation of a delegation for negotiations, creation of inter-ministerial commissions and definition of their powers, etc.);
- selecting a model for marking the position of the boundary on the ground and developing the documents that regulate implementation of demarcation works by a demarcation commission;
- transferring a delimited line in-situ and demarcating it by boundary markers;
- performing geodetic, hydrographic, cartographic and other works in preparing the input data for draft final documents of boundary demarcation;
- preparing draft summary documents of boundary demarcation and accepting the demarcated boundary;
- preparing summary demarcation documents and conducting domestic procedures necessary for their coming into force.



## 8. SYSTEM ENSURING THE STATE'S ACTIVITIES IN BOUNDARY DEMARCATION

The system that ensures the state's activity in demarcating the boundary rests on:

- bodies of state power and administration, interdepartmental commissions and national delegations (or the parts thereof) that participate in negotiations;
- regulatory legal acts that define the functions and tasks of public authorities and administrations, as well as of other organizations involved in boundary demarcation.

The system can also include regulatory acts that determine the composition and order of works, requirements for quality control, as well as other acts that are of a technical nature.

Each state has its own structure of state administration bodies, or they can have different names. However, the system should include the bodies that perform tasks on the foreign policy support for boundary demarcation, as well as on organizing cartography, geodetic and construction design and installation works (manufacturing, delivery and erection of boundary markers, clearing the landscape from trees, shrubbery and other vegetation) and other related works.

### 8.1 Structure of System for Organizing State Boundary Demarcation

The structure of the system for organizing boundary demarcation may be described from the examples of Belarus and Lithuania. For the Belarusian system, a high concentration of powers staying with the border guard service is inherent, while the Lithuanian system resides in a more decentralized distribution of powers among state administration bodies with a leading role from the Ministry of Foreign Affairs (hereinafter – the MFA).

The system for organizing boundary demarcation in Belarus includes: the MFA, the State Border Committee, the State Property Committee (including cartographic, geodetic and land management services), the Commission on Delimitation, Demarcation and Verification of the State Boundary of the Republic of Belarus, and delegations in joint commissions with adjoining states.

The system also includes the Representative of the Republic of Belarus on delimitation, demarcation and verification of the course of the State boundary of the Republic of Belarus (hereinafter referred to as the Representative of Belarus on Border Issues) appointed by the decree of the President of Belarus from among ambassadors at large of the MFA. The Representative is charged with:

- coordinating in general and facilitating agreed implementation of the tasks



on delimitation, demarcation and verification of the course of the boundary by state bodies and other organizations;

- supervising activities of the Commission on state boundary delimitation, demarcation and verification;

- participating in organizing the foreign policy support and conducting negotiations with respective officials or state bodies (organizations) of adjoining states;

- providing the Minister of Foreign Affairs with analytical and other information on the progress in delimitation, demarcation and verification of the course of the boundary;

- making proposals on improving the work of the Commission, as well as on its composition.

Powers among republican state administration bodies are distributed as follows.

The MFA is responsible for:

- foreign policy support in state boundary delimitation, demarcation and verification;

- coordinating the activities of the Representative of Belarus on Border Issues, as well as providing him with organizational, information and other types of support;

- providing organizational, technical and information support for the Commission's work.

In order to fulfill the tasks assigned to the MFA, in its structure, there has been established a department of international legal formalization of the state border responsible for:

- organizing and implementing boundary demarcation, coordinating the activities of state bodies and other organizations in this field;

- organizing and maintaining the activities of Belarusian delegations in joint commissions with adjoining states on boundary demarcation.

The State Border Committee also acts as the state contacting authority for boundary demarcation works. It earmarks funds for all demarcation works, including cartographic and geodetic works, land management, etc., reimburses expenses on receiving foreign delegations and sending Belarusian delegations on official trips within Belarus and abroad.

In order to fulfill these tasks, the State Border Committee has established a department on delimitation and demarcation of the state boundary.



The State Property Committee is responsible for carrying out the land management, topographic, geodetic and cartographic works necessary for state boundary demarcation.

The Commission on Delimitation, Demarcation and Verification of the Course of State Boundary of the Republic of Belarus is a permanent interdepartmental body. The Commission is charged with the tasks of coordinating the interaction of state bodies and other organizations with a view to solving challenging issues, whose settlement procedure is not established by law; coordinating and controlling the activities of Belarusian representatives within commissions on state boundary delimitation, demarcation and joint verification. The Commission' staff is approved by a decree of the President of the Republic of Belarus and consists of representatives of the MFA, the State Border Committee, the State Property Committee, the Ministry of Transport and Communications, the Ministry of Forestry, border regional executive committees, etc.

The system for organizing boundary demarcation in Lithuania includes: the State Commission on Delimitation and Demarcation of State Boundary and Establishing an Economic Zone in the Baltic Sea (hereinafter – the State Commission of Lithuania); national delegations with each adjoining state; republican bodies of state administration. The State Commission of Lithuania is assigned the following tasks of:

- negotiating the boundary delimitation and demarcation; coordinating the activities of Lithuanian delegations;
- preparing and considering draft international treaties and, after having performed the necessary verifications, initialing them;
- preparing draft normative and technical documentation;
- preparing proposals on changing the course of the boundary;
- considering draft international treaties, public and other initiatives affecting the state border issues.

The State Commission of Lithuania includes three representatives from the MFA (the head, deputy head and executive secretary); two representatives from each of the following bodies: the Ministry of Defense, the Border Guard Service and the National Land Service, and one representative from each of the following: the Geological Service and the Ministry of Environmental Protection. The personal composition of the Commission is approved by the Minister of Foreign Affairs.

The delegation on boundary demarcation includes representatives of the MFA, the Border Guard Service and the National Land Service of the Ministry of Agriculture. The MFA exercises overall management and coordination of the activities of the



delegation. The Border Guard Service of Lithuania is responsible for organizing construction and installation works. The Ministry of Agriculture is charged with organizing cartographic and geodetic works. The head of the delegation reports to the Chairman of the State Commission of Lithuania on the works performed. In order to ensure competent works on boundary demarcation, a department within the central apparatus of the Border Guard Service has been established. The remaining officials of this body participate in boundary demarcation in addition to their other official duties.

In the Belarusian system, functions among republican state administration bodies are distributed, based on the appointment of a single integrated office, which allows, on the one hand, to exercise the functions flexibly and purposefully (through efficient management) and, on the other hand, to facilitate control of public authorities' activities.

In the Lithuanian system, distribution of functions allows the government to coordinate and monitor the activities of delegations in the commissions charged with the establishment, maintenance and verification of the boundary course, to promptly compose delegations and change the personnel of the State Commission and delegations. This ensures unified approaches to state boundary demarcation and maintenance.

Each of the variants has its advantages and can be used as a model.

## **8.2 Normative Legal Acts Regulating Organization and Implementation of Demarcation Work**

Before the start of works on boundary demarcation, it is advisable that normative legal acts should be adopted that specify:

- functions and tasks of republican state administration bodies on boundary demarcation;
- functions, tasks and issues related to organizing the delegation's activities within the joint demarcation commission formed with an adjoining state;
- procedure for marking state boundary on the terrain;
- specific procedures in organizing state boundary demarcation works: allocation of land for boundary demarcation; work in especially protected natural areas (reserves, wildlife areas, etc).

In the course of demarcation works, other documents may be developed. For example, those that outline specifications for cartographic, geodetic and hydrographic works, the procedure for manufacturing, quality control, storage and transportation





of boundary markers, etc..

The adoption of such documents can significantly facilitate competitive bidding processes for procuring works and services related to boundary demarcation, as well as their subsequent implementation.

Examples of distribution of functions and tasks among state administration bodies on boundary demarcation are set out in paragraph 8.1. The type of regulatory legal act that will determine functions and tasks of state administration bodies depends on the political structure of a state and its legislation.

### **8.2.1 Formation of Delegation and Legal Regulation of its Activities**

The delegation in a joint demarcation commission set up with an adjoining state is usually formed by the government from among representatives of state administration bodies and organizations subordinate to the government that are directly involved in works' implementation.

The quantitative composition of the delegation, as a rule, is determined in international treaties. During advance consultations, it is also advisable that adjoining states exchange view-points on possible composition of delegations and a rank of their leaders.

The delegation should include representatives of the MFA, geodetic and land management services, border guard service, and local authorities. Depending on the specific features of a state border, representatives of other state administration bodies and organizations may also be included in the delegation (i.e. the forest management service, the Ministry of Transport and Communications, etc.).

There is no single approach as to the rank of an official who should lead the delegation. An approximately equal level of representation should be aimed for, but in most the cases, one should be guided by the international political environment during demarcation, common sense and the laws of each respective state. Assigning the position of head of the delegation to senior officials such as vice prime ministers, ministers or deputy ministers will most likely turn the process of boundary demarcation into an arena of political disputes, focused on solving complex issues of cooperation between adjoining states.



The activities of the delegation in a joint demarcation commission with an adjoining state should be guided the Regulations or by another similar document.

The following tasks should be specified in the Regulations:

- arranging the procedure for marking the state boundary on the terrain;
- preparing final documents of boundary demarcation and submitting them for approval;
- coordinating the activities of state administration bodies in boundary demarcation.

In addition, the Regulations should identify other functions of the delegation as:

- developing instructions and technical conditions for performing work related to boundary demarcation;
- determining the types of boundary markers and sites of their erection along the boundary;
- determining the order and timing of works related to boundary demarcation;
- organizing control over the quality and accuracy of aerial, cadastral, geodetic, topographic, and hydrographic works; clearing and leveling the boundary strip, works on erecting and fitting boundary markers, and arranging compilation and preparation of final demarcation documents;
- creating working groups, including joint ones with an adjoining state, for demarcating the boundary with the involvement of experts and technical personnel; controlling their work; considering and approving the documents drawn up by them, as well as resolving the issues arising during the course of their work;
- considering, within the limits of its competence, incoming applications related to boundary demarcation, and adopting decisions on them;
- preparing, if necessary, proposals on modifying the position of the demarcation line of the state boundary with respect to the delimited boundary;
- concluding international treaties on operation of transboundary communication routes, engineering facilities, and border watercourses;
- carrying on correspondence and negotiations on state boundary demarcation with members and experts of commissions, international organizations and representations of foreign states, etc.

It is also recommended that the Regulations should specify:

- procedures for formation of the delegation and its work (rights and duties of the head and members of the delegation, procedure for making decisions, monitoring the activities of the delegation by the government);
- financial support of the delegation (travel expenses of delegation members, experts and technical personnel involved in its work; office, postal, telegraph, telephone and other expenses; expenses for receiving and servicing the delegation of an adjoining state, experts and technical personnel involved in its work, as well as delegations of international organizations on state boundary demarcation; remuneration of members, experts and technical personnel of working groups set up by the commission).



It is unacceptable that a delegation member should participate in the meeting of the demarcation commission without preparing in advance the position on all issues on the agenda of the meeting, as well as expressing his personal opinion, which is contrary to the opinion of the delegation or the decision of the entire demarcation commission. At the same time, one should not allow concentration of absolute power in the hands of the head of the delegation. To this end, it is essential that the Regulations guiding the delegation should specify:

- meetings of the delegation must be attended by all members without the right of substitution. If it is not possible for a member to attend the meeting, he should express his opinion on issues in question, having reduced it to writing, to the chairman;
- before the meeting of the commission on the issues under discussion, each member of the delegation has the right to express a separate opinion, which is reflected in the minutes of the delegation's meeting. In this case, the final decision is made by the head of the delegation that informs the interested state administration bodies and carries out the coordination of the position.

### **8.2.2 Legal Regulation of Procedure for Marking out State Boundary on the Ground**

In order to formulate a negotiating position of the delegation and organize further work on state boundary demarcation, it is necessary that basic requirements should be determined for erecting boundary markers on the state boundary.

It is essential that the relevant regulatory legal act, formerly adopted by government, should outline:

- the types of boundary markers (main, river, transitional, lake, tripoint, intermediate, special (ad hoc), etc.), their design features and the procedure for their installation, depending on terrain conditions;
- procedure for fitting boundary markers with state symbols (shields with an image of the state emblem, coloring, etc.);
- specifications for marking the state boundary on highways, bridges, hydraulic and engineering works and other facilities intersecting the state boundary, in waterways (the shoreline or floating aids of navigation situation);
- requirements for a terrain strip where boundary markers are to be erected;
- the procedure for assigning ordinal numbers or particular names to the boundary markers, etc.;

The legislation should also provide definitions for such terms as "boundary marker", "boundary pillar", "center zero-offset monument", etc. The use of uniform terminology will also facilitate further organization of demarcation works.

### **8.2.3 Legal Regulation for Organizing Demarcation Work**

In each state, there exist certain requirements for organizing demarcation works. First and foremost are the works relating to clearing a state boundary strip from trees, shrubbery and other vegetation, and erecting boundary markers. As a rule, these works pertain to construction and installation works and fall under the requirements of various building codes and regulations.

Before starting the demarcation work, it is advisable to study the conditions of the landscape in which the forthcoming works will take place. To this effect, it is necessary to determine:

- physical, geographical, natural and climatic conditions;
- the presence of specially protected natural territories (reserves, wildlife areas, etc., including transboundary ones;
- the presence of transboundary facilities (railroads and motorways, bridges, reclamation facilities, pipelines, etc.), identifying organizations (owners) that operate them.

As a result of the analysis of the data obtained, it is necessary to clarify the possible restrictions to be imposed on work, what type of permits and approvals will be required, and from which institutions (organizations). It should be determined which normative legal or technical acts need to be amended in order to eliminate problems associated with the coordination of forthcoming works.

It is strongly recommended that a separate regulatory legal act be adopted that will stipulate all the derogations necessary for implementing forthcoming works.

For example:

- while drafting documentation for boundary demarcation, an environmental impact assessment shall not be carried out, with the exception of boundary areas impacted by the presence of habitats of wild plant species included in the Red Book;
- preparation of materials on the withdrawal and allotment of land plots for boundary demarcation shall be carried out without prior approval;
- state registration of land plots granted to a state recognized stakeholder for boundary demarcation, and the emergence of rights, restrictions (encumbrances) of rights to them shall be carried out after the approval of demarcation documents;
- it is not mandatory to obtain a prior opinion on the presence (or absence) of mineral deposits within the boundaries of land plots requested for boundary demarcation;
- removal of flora resources from the land plots granted for boundary demarcation shall be carried out without reparation implantations and compensation payments for the cost of the resources being removed;
- for the period of boundary demarcation, the stakeholder shall be released from:
  - a) payment of funds that are levied when issuing permits mandatory for elaboration of draft documentation for state boundary demarcation;
  - b) reimbursement of losses of the agricultural and / or forestry productions caused by their withdrawal or temporary occupation in the capacity of quarries, temporary access routes, construction camps, sites for storing soil and building materials, as well as from compensation payments for any harmful impact on fauna and / or its habitat.

## 9. ORGANIZING STATE BOUNDARY DEMARCATION

The arrangement procedure of state boundary demarcation falls into the following key stages:

- activities of adjoining countries in composing a joint demarcation commission and organizing its work;
- determining a model for marking out the state boundary, and preparing documents regulating the execution of demarcation works by the demarcation commission.

### 9.1 Activities of Adjoining States in Legal Regulation for Execution of Demarcation Work

With a view to legal regulation of demarcation works, adjoining states usually conclude an international treaty that determines the procedure for a joint demarcation commission, as well as basic organizational issues of boundary demarcation.

The organization of demarcation works largely depends on the length of a demarcated boundary, physical and geographical conditions of terrain, a level of mutual relations between adjoining states, established traditions and many other factors.

The present Guidelines examine approaches to boundary demarcation, based on the practical experience of demarcation of boundaries with a length of up to 1500 kilometres. Demarcation of the boundary with a greater length may differ in the scope of the tasks and functions entrusted to working groups formed by a demarcation commission, their latitude of action, etc. However, key stages and their content are common for all sections of the boundary.

It is expedient that an international treaty at the intergovernmental level should be concluded that approves within the framework thereof a provision on state boundary demarcation. Sometimes adjoining states elaborate the Regulations on a joint demarcation commission. However, the Regulations will not allow covering all the issues connected with arranging boundary demarcation, which in the future may complicate its process, including the coordination of boundary demarcation issues within the states.

#### 9.1.1 The Regulations on Demarcation

The Regulations on demarcation should stipulate the following sections:

- general provisions;
- activities of the joint demarcation commission;
- organizing state boundary demarcation.



In the section containing general provisions, it is necessary that the main terms and definitions that will be used during state boundary demarcation should be defined. This includes such terms as the «state boundary», «state boundary demarcation», «boundary marker», «boundary pillar», «center zero-offset monument», «boundary strip», etc.

In addition, it is advisable that the official name of the demarcation commission should be provided. For example: «Joint Commission on Demarcation of the State Boundary between ... ..» or «Belarusian-Latvian Mixed Demarcation Commission».

It is recommended that the section regulating the procedure for operation of the demarcation commission should begin with general information on the formation of the demarcation commission, specifying the purpose of its creation, legal grounds for its activities (a treaty on the state border, Regulations on demarcation, etc.), etc.

It is necessary to determine the structure of the demarcation commission (whether it consists of «delegations» or «parts thereof»), who exercises leadership («chief of delegation», «head of delegation», «chairman of its part» or others), and also consider the positions of a deputy head of delegation and its secretary.

There are no established rules regarding the number of members of the delegation. In this respect the adjoining states should be guided by the principle of reasonable sufficiency. The larger the composition of the delegation (15-20 or more people), the more complex the organization of the delegation's activities will be. Based on ample experience, the preferred number of members in a delegation is 5-7 people, while expert representatives from other organizations should be engaged when necessary.

There are two approaches in determining the number of members of a delegation: the first approach is when the parties stipulate an identical number of members on each delegation, for example three, five or more people;

the second approach is when the parties agree that the maintenance of parity in the quantitative composition of delegations is not necessary, and each side independently determines the number of members of its delegation.

Each state determines its personal composition of delegations independently; however, it is advisable that the parties should notify each other about their personal composition through diplomatic channels, which will constitute the confirmation of the delegation members' authority to participate in the commission's activities, and will allow avoiding misunderstandings in case of disputes.

The Regulations should also provide for the possibility of engaging experts and technical staff within the delegation's activities.



### 9.1.2 Functions and Tasks of Demarcation Commission

The main tasks of a demarcation commission are as follows:

- preparing documents necessary for the implementation of state boundary demarcation;
- organizing works on state boundary demarcation;
- drawing up final demarcation documents.

Based on these tasks, the following functions of a demarcation commission should be formulated:

- elaborating instructions, technical conditions and other guidance documents for executing demarcation works, ensuring the safety from damage of boundary markers and operation of equipment prior to the coming into force of documents on state boundary demarcation;

- specifying types and designs of boundary markers, as well as the locations for their erection on the state boundary;

- determining the procedure and timing for the implementation of demarcation works, as well as controlling their quality;

- forming joint working groups, while evaluating and approving the documents prepared by them;

- developing, if necessary, proposals for modifying the state boundary demarcation line's location on the ground in relation to the delimitation line;

- organizing acceptance of demarcation works;

- compiling and releasing demarcation documents;

- considering applications of natural and legal persons related to the demarcation of state boundary and adopting corresponding decisions;

- preparing, if necessary, proposals on operation of transboundary facilities (engineering and technical facilities, land reclamation systems, etc.);

- addressing other issues related to the state boundary demarcation.

In the Regulations, it is essential to indicate that the demarcation commission should develop instructions, rules, and technical conditions such as:

- on the procedure for marking out the state boundary;

- on the procedure for transferring the state boundary from a map to the terrain (field survey);

- on executing hydrographic works;

- on preparing demarcation documents;

- on the procedure for maintaining boundary markers and the boundary strip for the entire period until a treaty on the state border regime (a boundary treaty) is concluded.

It should also be stipulated that the demarcation commission may, within its



competence, develop and approve other documents.

It is advisable that the Regulations should outline the organization of the demarcation commission's meetings, including preparations, scheduling, official and working languages, and procedures for signing the minutes of meetings (e.g. by all members of delegations, only by heads of delegations or by leaders and secretaries, etc.);

The Regulations should also outline the procedure for covering meeting expenses, including accommodations for delegates as well as procedures for communicating the demarcation commission's activities through mass media etc.

### **9.1.3 Organizing State Boundary Demarcation**

It is necessary to determine the order of marking the boundary on the terrain, what boundary markers shall be used to mark the state boundary on the terrain, and what design features these markers shall have. To mark the boundary, it is advisable that the following types of boundary markers should be considered:

- main boundary marker (for the boundary on land);
- river boundary marker (when the boundary intersects watercourses);
- transitional boundary marker (when the boundary leaves land and continues out onto the water and vice versa, as well as when it transits from one water body to another);
- lake boundary marker (on border lakes or water reservoirs);
- intermediate boundary marker (to ensure visibility between main boundary markers along straight sections of the boundary).

Images of the listed boundary markers and boundary pillars of the two adjoining states should be included as annexes to the Regulations. It should be expected that, with any change in the coloring of boundary pillars, and in the number of the boundary markers on them, the parties should inform each other about this through diplomatic channels.

Furthermore, the demarcation commission should be given an opportunity to use special (ad hoc) boundary markers which are to be erected in the places where, due to the characteristics of the terrain, marking of the boundary's position by other types of boundary markers is impractical, or in places where existing structures on the state boundary should be preserved. The design of such markers should be determined by the demarcation commission independently.

The Regulations should not consider the issues related to marking out the state boundary's tripartite junctions as these are regulated by tripartite international treaties.

The Regulations should also define the requirements for the state boundary strip. For example:

- in the land sections of the boundary, the boundary strip is to be cleared of trees, bushes and other natural objects that obstruct the line of sight between adjacent boundary markers;
- in the water areas of the boundary, a strip of terrain five meters wide on either



side of a boundary pillar should be cleared, as well as vistas between the boundary pillars that constitute the same boundary mark.

In a separate provision, it is worth pointing out that each delegation carries out demarcation work within its own territory, while general works are shared on an equal basis, including the expenses for the performance of the works.

Identifying the actual costs of doing the same type of work in each state is often difficult, so it is advisable that the amount of works should be divided equally, rather than trying to determine if expenditures were shared equally.

Delegations should also be able to exchange free of charge, aerial photography, geodetic and cartographic data, as well as other materials used to demarcate the state boundary.

In the Regulations, it is necessary to compile a list of documents prepared by the demarcation commission following the results of demarcation, including;

- demarcation maps;
- protocols of boundary markers;
- catalogue of boundary markers' coordinates;
- description of the state boundary;
- a list of islands' national affiliation;
- final protocol of state boundary demarcation.

It is also worth considering the possibility of clarifying names and modifying the list of demarcation documents in the course of their processing.

In some countries, large-scale maps are sometimes classified as «secret», or «for official use only» for showing objects of the terrain and relief. Therefore, it is preferable that the scale of the map to be used should be determined as quickly as possible.

When deciding on the scale of a map, it is necessary to take into account physical and geographical conditions of a terrain along which the boundary runs, the availability of geographic objects near the boundary, population density, intensity of economic activities, etc. For the European model, it is expedient that a scale no smaller than 1:10 000 should be used, and, if necessary, in some parts of the boundary (small rivers, densely populated areas, etc.), – even larger.

The map should be constructed in full facility-based composition, based on the requirements for creating a map of a selected scale.

With the advent of remote sensing technologies and due to a higher quality and accuracy of the data sets, the use of an orthophoto as a demarcation map should also be considered (Appendix 1). However, in a case where the boundary is being



demarcated for the first time, we consider it preferable to use a topographic map (Appendix 2).

The Regulations should contain a notification that the demarcation documents are compiled without restrictive classifications and that any ambiguities and uncertainties in final demarcation documents should be excluded.

The Regulations should also determine who will sign demarcation documents and what will be the procedure for their coming into force (usually from the date of receipt of the last written notification on implementation of a domestic procedure necessary for their coming into force).

It should be emphasized that, of particular importance, are the issues relating to the crossing the state border away from the checkpoints by the personnel performing demarcation works, as well as the procedures for movement of instruments, tools and materials necessary for executing the works. Providing such opportunities will greatly facilitate the demarcation work, reduce labor costs and time, and help eliminate the risk of committing violations of the border regime, while performing the works.

It is recommended that the issues pertaining to organizing the state boundary demarcation should be further detailed in the instructions, rules, technical conditions and other governing documents to be developed by the demarcation commission.

## **9.2 Determining a Model for Marking out State Boundary and Developing Instructions on the Procedure for its Marking**

The determination of a model of state boundary demarcation and development of an Instruction on the procedure for marking out the state boundary are of the very last importance for demarcation works.

After the approval of the aforesaid Instruction, the demarcation commission can begin to develop such basic documents as a procedure for arranging boundary markers on the state boundary and the rules for transferring the state boundary line (survey grid stationing) from the delimitation map to the terrain. The development of these documents will allow for the beginning practical work on the ground.

Depending on the character of a landscape through which the boundary passes, it may be necessary to develop other documents, such as an guidelines for conducting hydrographic works, etc.

The number of guidelines required will depend on the environment that affects the implementation of demarcation work, and by the number of emerging problem situations; therefore it is not possible to determine in advance the exhaustive list of the required documents.



### 9.2.1 Determining a Model for Marking out the State Boundary

When choosing a model for marking out the boundary, it should be understood that the course of the boundary on the terrain must be indicated by clearly visible boundary markers; their design should ensure their safety from damage and ease of use (including the ease of repair, restoration, etc.).

In general, boundary markers should provide unambiguous understanding of the course of the boundary on the terrain.

The model of boundary marking should give a clear idea of what types of boundary markers will be used to mark the boundary on the terrain, determine their design features, appearance, possible locations of their erection, etc.

The adjoining states can choose different models of boundary marking.

For example:

- in land sections, one can use boundary markers consisting of one element (to be erected right on the boundary) or of three elements (a center zero-offset monument, or a ZOM, erected directly on the boundary line and boundary pillars erected at some distance on both sides of the boundary) (Fig. 17);

a) by a boundary marker comprising one element



b) by a boundary marker comprising three elements

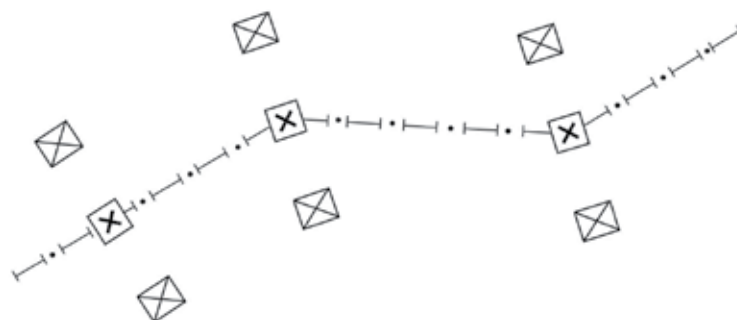


Fig.17. Options of marking the boundary course on land

- near river sections, the boundary may be demarcated with boundary markers consisting of one element, erected alternately in the territory of one state or the other one (a staggered pattern), or with the boundary markers consisting of two pillars placed opposite each other on opposite banks (Fig. 18).

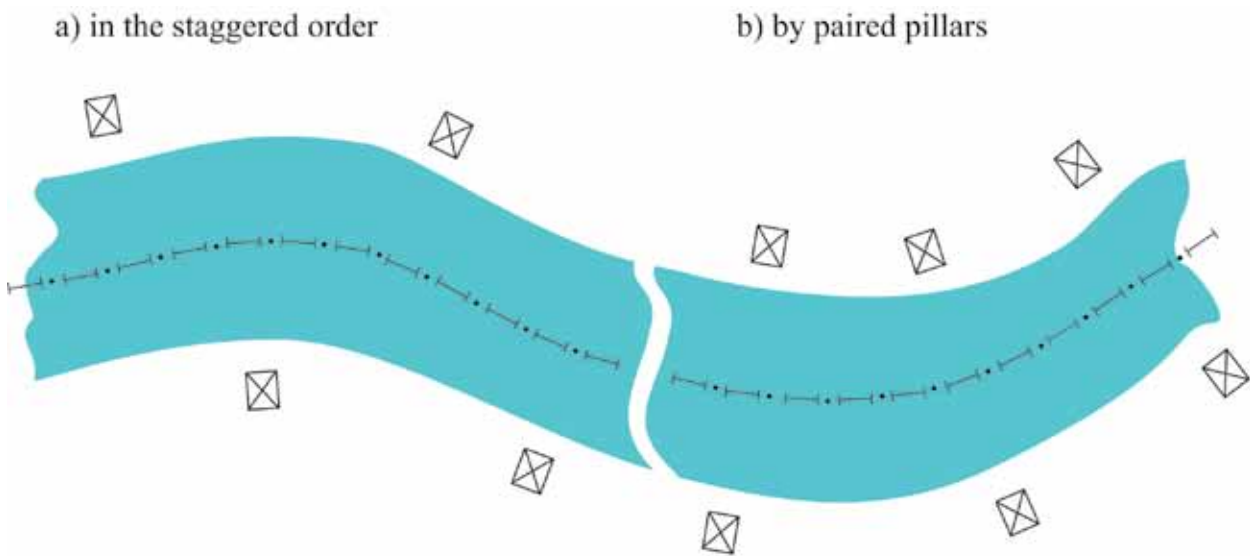


Рис. 18. Варианты обозначения прохождения границы на водном участке

As a rule, in order to demarcate the state boundary, boundary markers are erected in the following places:

- at turning points where the course of the state boundary changes its direction;
- where the state boundary is crossed by motorways and railways (bridges), dams and other structures;
- in areas of influx of inland waters of adjoining states into boundary water bodies, as well as in island areas;
- at transition points of the state boundary from a land section to a water one and vice versa, as well as from one water body to another;
- within zones of active economic and other activities of the cross-border population;
- where visual identification of the state boundary on the terrain is hindered.

Depending on conditions of a terrain, the following types of boundary markers are suggested for marking out the state boundary: main, transitional, river, lake, intermediate and special (ad hoc).

The main boundary marker is erected on land sections of the state boundary and can consist of:

- a) three elements (Fig. 19), including:
  - center zero-offset monument (ZOM) (Fig. 20) erected on the state boundary;
  - boundary pillars of adjoining states (Appendix 3), which are located opposite each other 2.5 meters from the center ZOM each (Fig. 21a).

In places where the boundary changes its direction, a distance is usually measured from a boundary pillar to the center ZOM (along the bisector of the angle).

However, in boundary demarcation practices, there have been cases when a distance has been measured from the boundary line (along a perpendicular) to the location of a boundary pillar (Fig. 21b). Such an approach seems inexpedient, since at an acute turning angle of the boundary (less than 45°), the distance from a center monument to a boundary pillar can be up to several tenths of a metre.

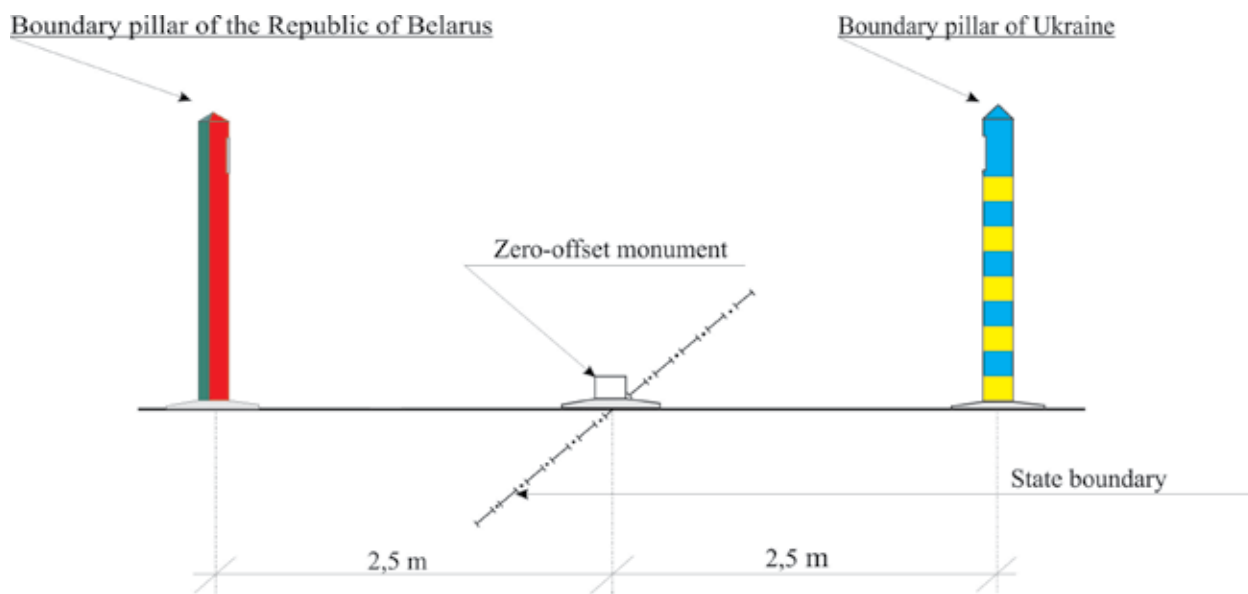


Fig.19. Boundary marker consisting of three elements

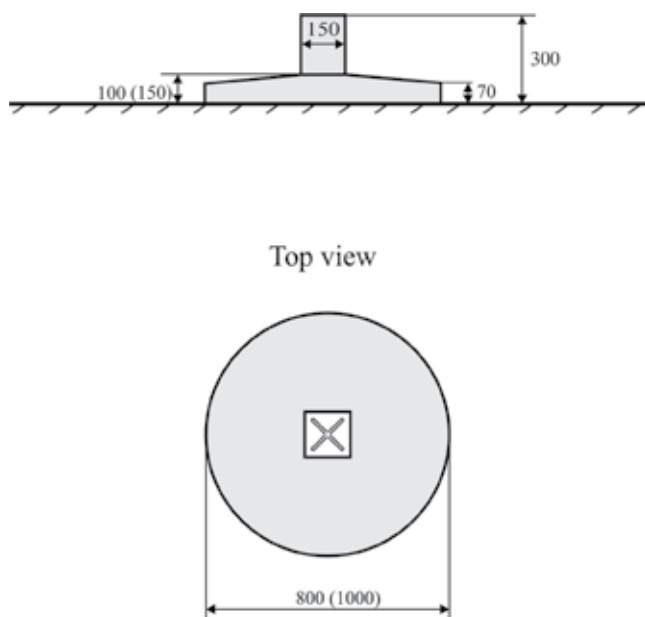
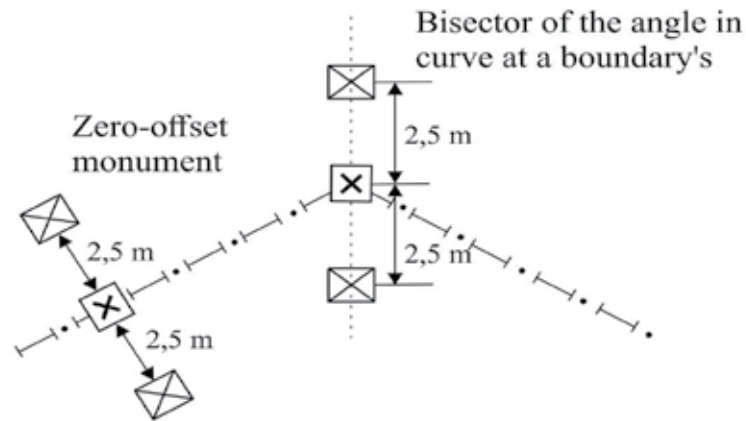


Рис. 20. Центральной столбик

a) a boundary pillar is erected at a distance of 2.5 m, regardless of the angle in curve at a boundary's turning point



b) a boundary pillar is erected from the zero-offset monument at a distance determined by the magnitude of the angle in curve at a boundary's turning point

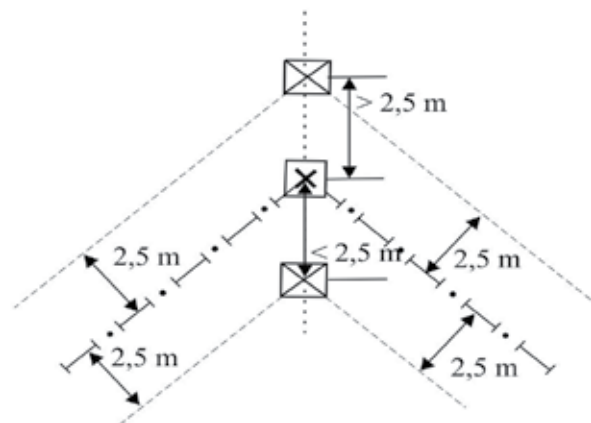


Fig.21. Options for determining the location of boundary pillars in places where the boundary changes its direction

b) one element (Fig. 22). It is a boundary pillar with images of the state arms of adjoining states and numbers of the boundary marker on its front faces.

For example, the front face with the state symbol of the Republic of Belarus is facing Ukraine, and the front face with the state symbols of Ukraine is oriented towards the Republic of Belarus. When facing the coat of arms of the Republic of Belarus, the left side face is painted in the colors of the symbols of the Republic of Belarus, and when facing the coat of arms of Ukraine – the left side face is painted in the colors of the symbols of Ukraine.

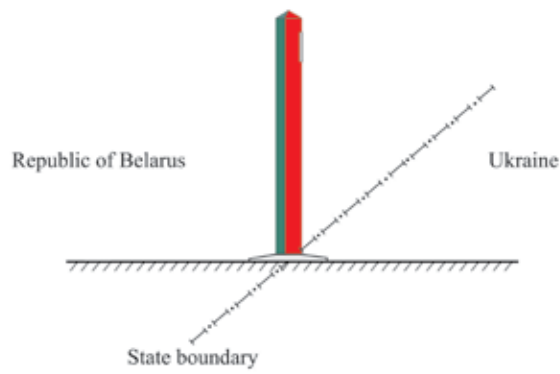
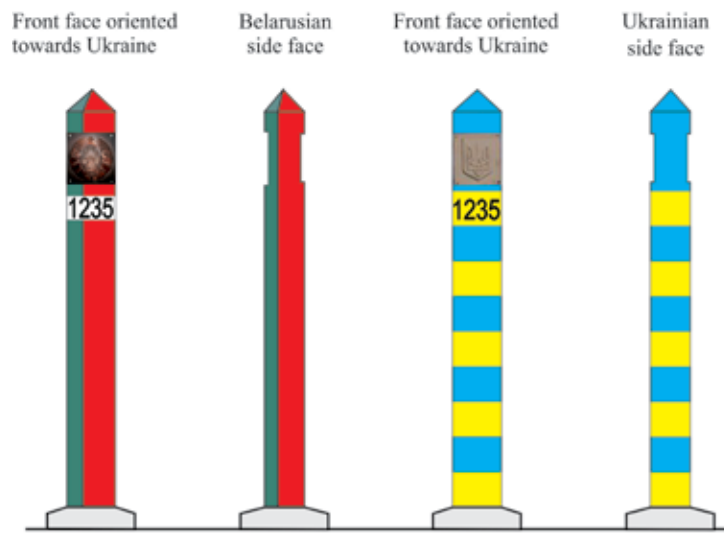


Fig. 22. Boundary marker consisting of one element

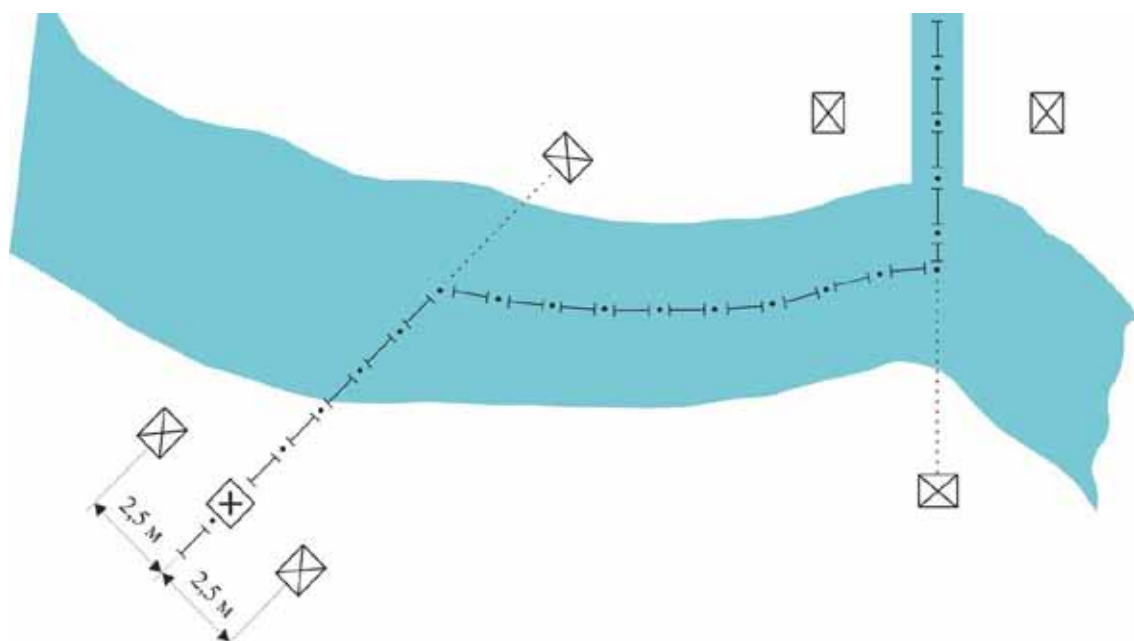


Fig.23. Transitional boundary marker

**The transitional boundary marker** (Fig. 23) is erected to indicate turning points of the state boundary at its transition from a land section to a water one and vice versa, as well as, from one water body to another:

a) a transitional boundary marker from a land section to water and vice versa consists of three boundary pillars and a center monument. Two boundary pillars and the center monument between them are erected in a manner similar to the main boundary marker on one shore of the water body, and the third boundary pillar (a meeting/leading one) is erected on the opposite shore of the water body within the alignment (range) of the state boundary.

It is also possible to apply a transitional boundary marker that comprises two elements: a main boundary marker, consisting of one element, and a meeting boundary pillar on the opposite shore of the water body within the alignment (range) of the state boundary.

b) a transitional boundary marker from one water body to another water body consists of three boundary pillars. Two boundary pillars are placed opposite each other on both shores of one water body, and the third boundary pillar (a meeting one) is erected on the opposite shore of another water body within the alignment (range) of the state boundary.

In the capacity of a meeting pillar, only a boundary pillar of the state in whose territory it is erected must be used.

A river boundary marker (Fig. 24) is erected in water sections of the state boundary and consists of two boundary pillars located opposite each other on opposite shores. The boundary pillars can be erected on the shore belonging to one state and on an island belonging to another state, as well as – on adjacent islands. In some cases, a river boundary marker may be erected in combination with lake boundary markers to indicate the course of the boundary in lakes (reservoirs) that are narrow in width and extended in length.

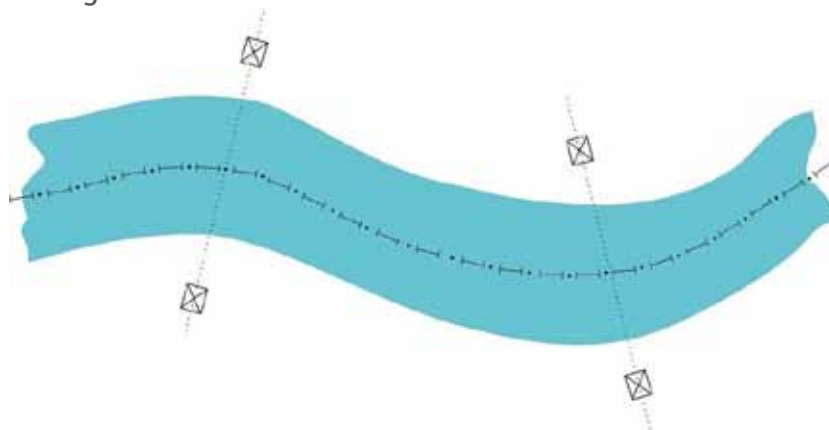


Fig.24. River boundary marker





**The lake boundary marker** (Fig. 25) is emplaced in water bodies (except rivers, canals and streams) and represents a buoy moored on the state boundary (Appendix 4), located at the state boundary's turning points, as well as in its straight sections at a distance providing a line of sight between adjoining boundary markers.

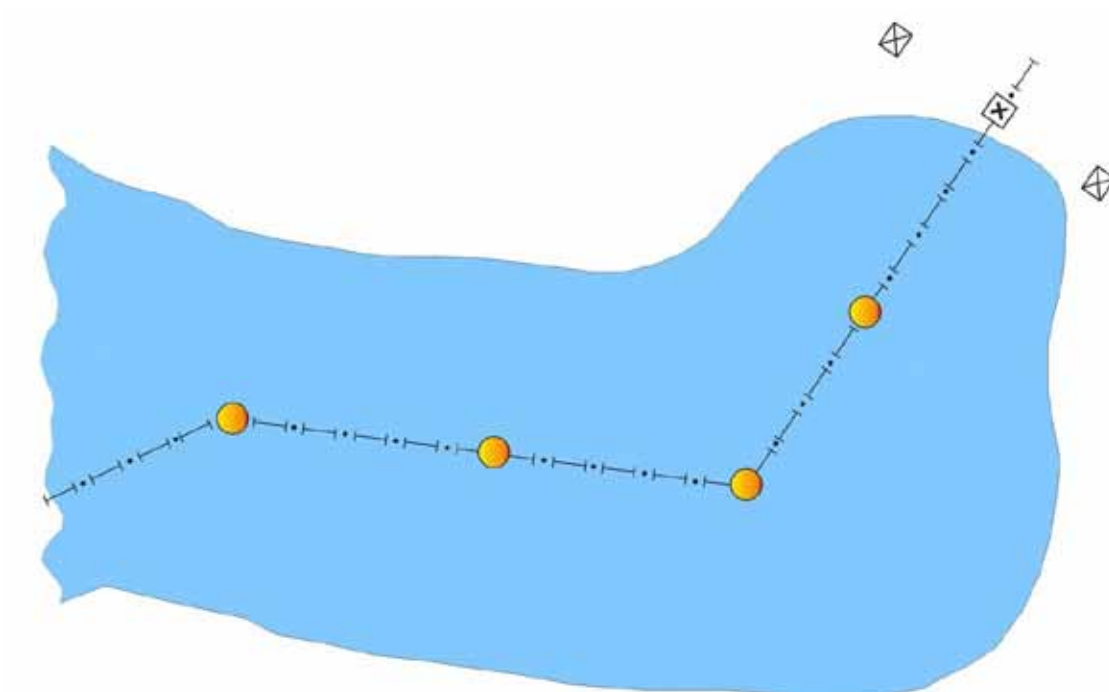


Fig.25. Lake boundary marker

**The intermediate boundary marker** is erected between main boundary markers in straight sections of the state boundary to ensure visibility between them. Intermediate boundary markers, as a rule, are not coordinated, but allow for sustaining mathematically the boundary line between main boundary markers in the form of a straight line. The use of intermediate boundary markers is not mandatory; instead, standard main boundary markers may be used to demarcate the boundary. The practice of applying intermediate boundary markers shows different approaches: their height varies from 1 to 2 meters, they may be fitted with shields bearing images of the state arms of adjoining states or not, may be painted in the colors of state symbols or painted white (Appendix 5).

**The special (ad hoc) boundary marker** is erected on the state boundary in places where, due to peculiarities of the terrain, marking out the course of the boundary by other types of boundary markers is impractical or with a view to preserving structures that have been earlier emplaced on the state boundary. The design of an ad hoc boundary marker is determined by the demarcation commission. The natural objects or structures already existing on the boundary can be used as indicating markers (Appendix 6).

When determining a model for demarcating the boundary, it is advisable that the procedure should provide for marking the state boundary on motorway and railway bridges, dams, motorways and other structures intersected by the state boundary. As a rule, in places where the state boundary intersects motorways and railways, main boundary markers are erected on both sides of the crossing, and on the motorways, an additional stripe of white color 0.2 meters wide is applied (Appendix 7).

### **9.2.2 Developing Instructions on the Procedure for Marking out the State Boundary**

The agreements reached in determining a model for marking out the boundary on the terrain are set out in the Instructions on the procedure for marking the state boundary.

The Instructions, as a rule, consist of narrative and graphic parts. The narrative part of the Instructions provides a verbal description of boundary markers, lists typical locations for the emplacement of boundary markers and specifies a distance at which they are emplaced as well as requirements as to their visibility and other such requirements as may be necessary for the organization of work. The graphic part contains drawings of boundary markers and their elements, plates with the images of the state arms and numbers of boundary markers, coloring of boundary pillars, etc.

The narrative part of the Instructions should specify:

a) the maximum distance between adjoining boundary markers.

When erected on a land boundary section, the distance between boundary markers may be up to 1000 m, in water sections, when erecting boundary markers on the shores of water bodies – more than 1000 m, and when positioning them on the water surface – not more than 500 m.

b) the requirements for inter-visibility between boundary markers are determined by the demarcation commission.

In the land section of the boundary, on the water surface of lakes and other reservoirs, inter-visibility should apply for no less than 1/3 or 1/2 of one of the boundary pillars with adjoining neighboring boundary markers, and in other water areas, it is sufficient to provide inter-visibility between the boundary pillars adjoining the same boundary marker.

It is also recommended that the Instruction should determine the rules for the numbering of boundary markers, and locate the boundaries' junction point, from which the numbering will begin. Depending on the quantity of boundary markers, one should determine the quantity of digits within a number, for example three or

four. It should also be determined beforehand whether meeting boundary markers will be taken into account when assigning numbers to boundary markers. There is no single approach to solving this problem; there are cases of different practices.

For example, at the Belarus-Lithuania border, the boundary marker following the meeting marker is assigned number 0002, and at the Belarus-Latvia border – 001.

The adjoining states can agree on peculiarities in assigning numbers to some types of boundary markers (e.g. lake, intermediate or ad hoc, Fig. 26).

For example:

- lake boundary markers are assigned a number of the previous boundary marker with the serial number of the lake boundary marker added to it in a hyphen. An alphanumeric numbering can also be used, such as on the Lithuania-Russia state border in Lake Vishtynets, while on the Lepona River reservoir, there are boundary markers with numbers No. B-7 and No. L-2, respectively;

- intermediate and ad hoc boundary markers are assigned fractional numbers, where the numerator consist of the number of the previous main boundary marker, and the denominator consist of the serial number of the intermediate or ad hoc boundary marker;



Fig.26. Variants of numbering boundary markers

- serial numbers for lake, intermediate and ad hoc markers are assigned in each separate section of the state boundary between main (river) boundary markers or, in the reservoir, in the direction of increasing numbers of the remaining boundary markers.

Drawing on previous experience of the use of boundary markers, it is advisable that the number of a boundary marker should be indicated not only on the front face

of a boundary pillar, but also on its rear face. This will facilitate border guards to orient themselves, especially in river sections.

It is advisable that the Instruction should specify requirements for clearing the state boundary strip.

For example:

- in land sections, the strip should be cleared of trees, shrubs and other objects that hinder a line of sight between adjoining boundary markers (Fig. 27a);
- in river sections, a strip of terrain five meters wide in either direction of a boundary pillar as well as vistas between the boundary pillars that constitute one boundary marker should be cleared (Fig. 27b).

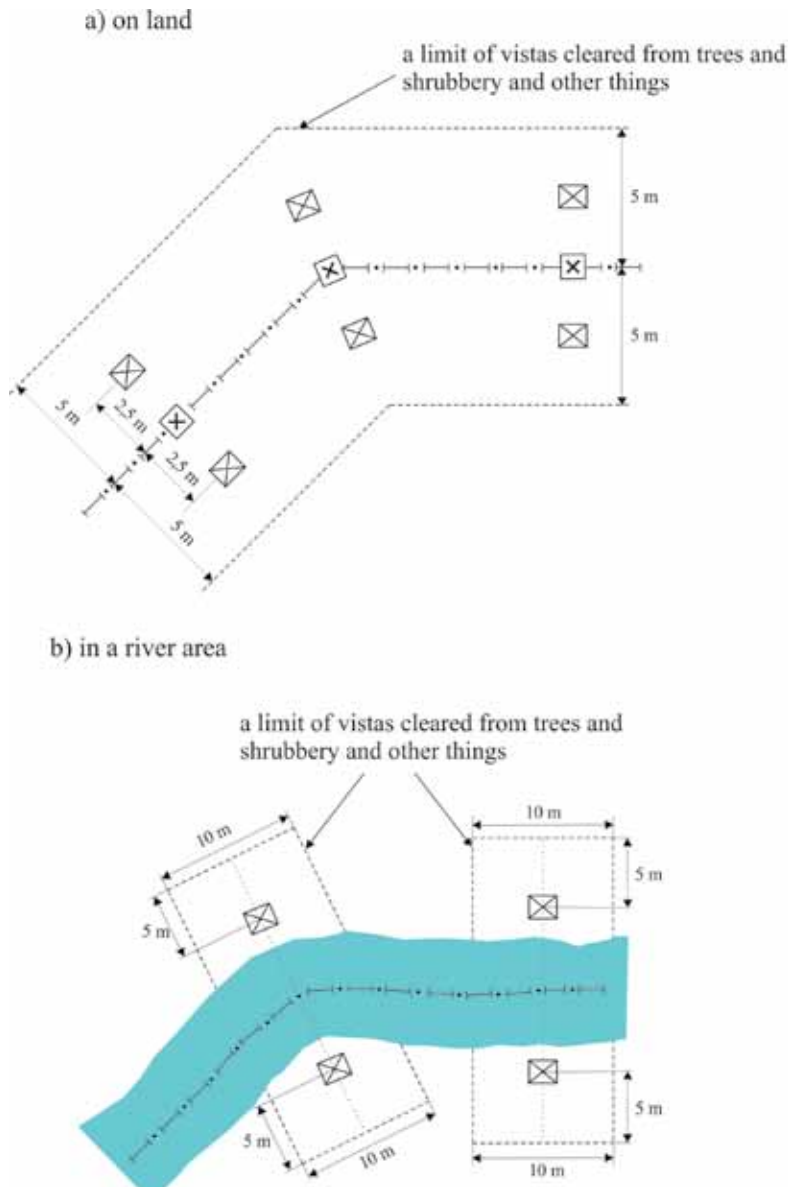


Fig.27. The state boundary strip

In order to protect boundary markers near waterways from damage during ice-out or flooding, it is also advisable to provide for the use of elements composed of a removable (above-ground) part and a permanent (underground) part.

## 10. TRANSFERRING STATE BOUNDARY LINE FROM DELIMITATION MAP TO TERRAIN

The transfer of the state boundary line from a delimitation map to the terrain (field survey) (hereinafter – the transfer of the boundary to the terrain) is the most important stage of state boundary demarcation. It is during this stage that all decisions that were inappropriately adopted within the delimitation stage of the boundary, errors, mistakes, an unclear plotting of the boundary line or discrepancy between a map and a boundary description create intractable problems.

The transfer of the boundary to the terrain is carried out by joint working groups formed by the demarcation commission, each group consisting of two national parts.

It is advisable that each national part should include representatives of geodetic, land management, forestry management, water management and local authorities.

If necessary, representatives of organizations operating transboundary facilities (motorways and railways, power lines, communication lines, etc.) may be engaged in the work. In necessary cases, landowners (land users) and other persons able to give reliable reasoning with regard to the course of the boundary are to be involved, too.

When transferring the boundary to the terrain, joint working groups should be guided by:

- the treaty on the state border, the state boundary description (hereinafter – the Description) and a delimitation map;
- project for arranging boundary markers.

The land and forestry inventory documents, updated topographic and geodetic data, cartography and aerial photographs can be used as reference materials.

The tasks of joint working groups are as follows:

- transferring the state boundary to the terrain together with locating the emplacement sites of boundary markers and fixing them by temporary markers (hereinafter – tM, not to be confused with TM denoting «transitional marker»);
- ascertaining the presence of line of sight between adjoining boundary markers. When ascertaining the presence of line-of-sight, it should be taken into account that the human height of specialists may differ, therefore, it is necessary to foresee in advance that such visibility is determined from a certain height, for example, from a height of 160 cm;
- drawing up a statement for determining emplacement sites of boundary markers (hereinafter – the Statement);
- specifying national affiliation and geographical names of islands in water bodies, numbering the islands and drafting a table of the islands' national affiliation, working out proposals on the need for hydrological surveys;



- preparing, if necessary, proposals on introducing modifications and supplements to the project for arranging boundary markers.

### **10.1 Developing a Project for Arranging Boundary Markers**

A project for arranging boundary markers (hereinafter – the layout project) is developed to determine locations of boundary markers' emplacement on the state boundary. The layout project consists of a graphic part (a topographic map) and a narrative part (a list of boundary markers to be erected on the state boundary). To provide for the preparation of the project, the demarcation commission, based on the Instruction on the procedure for marking out the state boundary, should work out and approve rules for developing the layout project. The presence of such rules will greatly facilitate the work of technical personnel in developing the layout project, as well as its approval by the demarcation commission.

When developing the project, a copy of the delimitation map and a description of the state boundary are used. However, it is also advisable to utilize updated cartography, aerial photographs and other data as reference materials.

The layout project should be developed on a copy of the delimitation map. If the delimitation map is of a scale 1: 100,000 or 1: 50,000, then it is advisable that a map of a larger scale – 1:10 000 should be used. If necessary, in certain sections of the state boundary, an insert of a larger scale is allowed.

Boundary markers are arranged in accordance with the Instruction on the procedure for marking out the state boundary. Main requirements of the Instruction are set out in subsection 9.2.2.

Projecting the arrangement of boundary markers in land sections of the state boundary should be carried out based on a landscape relief in places that provide a line of sight between adjoining boundary markers.

When developing the layout project, it is necessary to point out possible cases of ambiguous course of the state boundary (curved sections on land, indistinctly defined turns, uncertainty in determining national affiliation of islands, etc.) with a view of further adjustment of its position on the terrain.

Prior to the final approval of the arrangement and the number of boundary markers, it is advisable that all the markers should be assigned conventional serial numbers that include a map sheet number and a serial number of the boundary marker plotted on a given map sheet.

For example, in the serial no. 37-8 – the figure 37 denotes a delimitation map sheet number, and the figure 8 represents a serial number of the boundary marker on this map sheet.



The location, number and type of boundary markers as per the project for their arrangement are verified on the terrain when transferring the delimiting line from the map to the terrain, taking into account landscape relief, geology and provision of visibility between them. Therefore, the number of boundary markers in the layout project may change, and conventional numbering will facilitate the organization of the work.

It is advisable that the layout project should have the form of a manual. Depending on the length of the boundary, there can be several volumes which should include:

- cover;
- subtitle page;
- title page;
- contents;
- general information;
- layout diagram of topographic map sheets;
- list of topographic map nomenclatures;
- copies of the delimitation map with designated emplacement sites of boundary markers (Fig. 28);
- table of boundary markers arrangement (Fig. 29);
- table of islands' national affiliation (Fig. 30);
- topographic map at a scale of 1:10 000.

The demarcation commission may also decide on other materials to be included in the album.

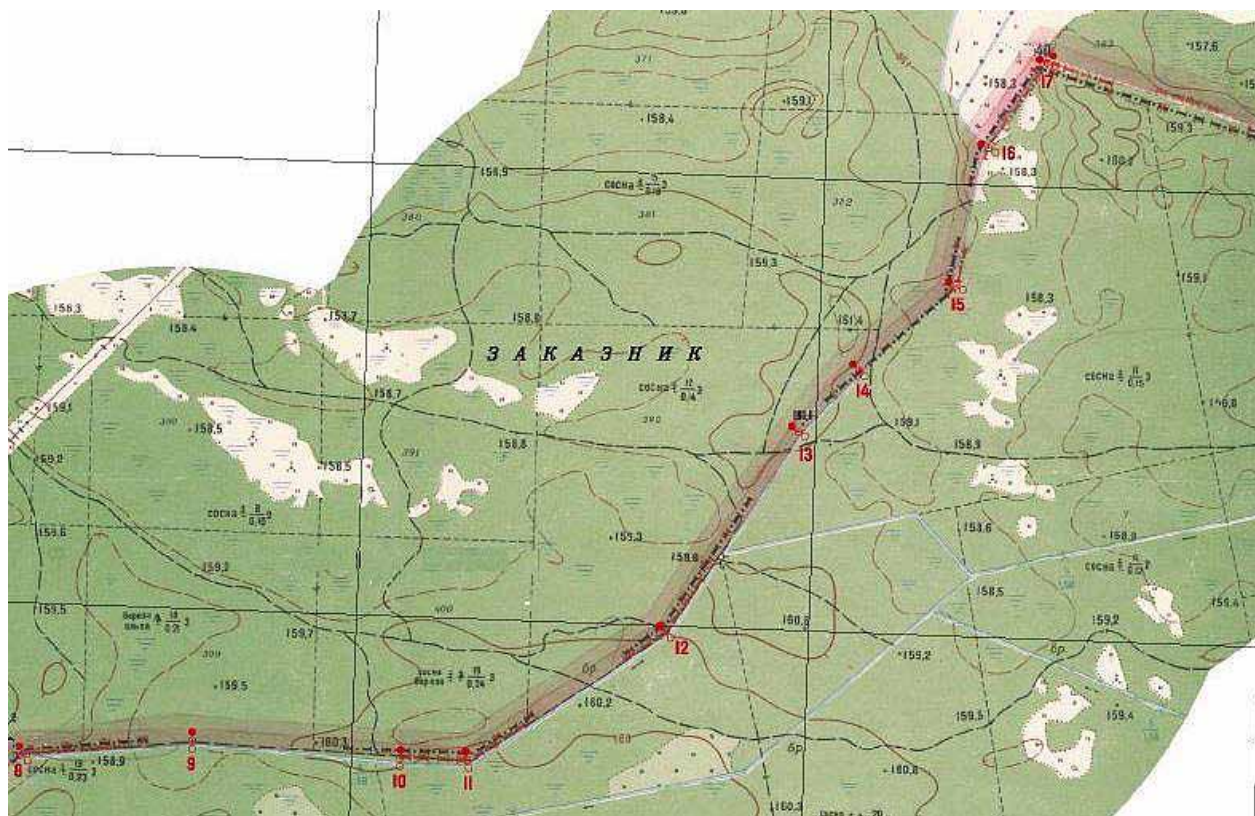


Fig.28. Tile of a delimitation map sheet with plotted emplacement sites of boundary markers

| Map Sheet №            | TM №                   | Type of BM | Boundary Marker's Elements |          |          |          |          |          |   | Delimitation Point № | Description of State Boundary Course                                      |
|------------------------|------------------------|------------|----------------------------|----------|----------|----------|----------|----------|---|----------------------|---------------------------------------------------------------------------|
|                        |                        |            | ZOM                        | BP A     | BP B     | MBP A    | MBP B    | L        | A |                      |                                                                           |
| 1                      | 1                      | M          | 1                          | 1        | 1        | -        | -        |          |   | №1                   | <i>Excerpts from Description of state boundary course to be furnished</i> |
|                        | 2                      | M          | 1                          | 1        | 1        | -        | -        |          |   |                      |                                                                           |
|                        | 3                      | T          | 1                          | 1        | 1        | 1        | -        |          |   |                      |                                                                           |
|                        | 4                      | R          | -                          | 1        | 1        | -        | -        |          |   |                      |                                                                           |
|                        | 5                      | T          | 1                          | 1        | 1        | -        | -        |          |   |                      |                                                                           |
|                        | 6                      | M          | 1                          | 1        | 1        | -        | 1        |          |   |                      |                                                                           |
| <b>Total per Sheet</b> |                        |            | <b>5</b>                   | <b>6</b> | <b>6</b> | <b>1</b> | <b>1</b> |          |   |                      |                                                                           |
| 2                      | 1                      | M          | 1                          | 1        | 1        | -        | -        |          |   | №3                   |                                                                           |
|                        | 2                      | T          | 1                          | 1        | 1        | 1        | -        |          |   |                      |                                                                           |
|                        | 3                      | R          | -                          | 1        | 1        | -        | -        |          |   |                      |                                                                           |
|                        | 4                      | T          | -                          | 1        | 1        | -        | 1        |          |   |                      |                                                                           |
|                        | 5                      | R          | -                          | 1        | 1        | -        | -        |          |   |                      |                                                                           |
|                        | <b>Total per Sheet</b> |            |                            | <b>2</b> | <b>5</b> | <b>5</b> | <b>1</b> | <b>1</b> |   |                      |                                                                           |

List of Used Abbreviations

|   |                              |     |                         |
|---|------------------------------|-----|-------------------------|
| M | Main boundary marker         | MBP | Meeting boundary pillar |
| T | Transitional boundary marker | ZOM | Zero-offset monument    |
| R | Riverine boundary marker     | BM  | Boundary marker         |
| L | Lake boundary marker (buoy)  | TM  | Temporary marker        |
| I | Intermediate boundary marker | A   | State A                 |
| A | Ad hoc boundary marker       | B   | State B                 |

Fig.29. Table of boundary markers' arrangement

| №                      | Island's Name or № | Island's State Affiliation | Delimitation Map Sheet № | Numbers of Boundary Markers Among which Island is Located | Remark                                                                                                 |
|------------------------|--------------------|----------------------------|--------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <b>The River Blue</b>  |                    |                            |                          |                                                           |                                                                                                        |
|                        | 1                  | state A                    | 3                        | 002-004                                                   | On the island, a boundary pillar of boundary marker №003 of state A to be erected                      |
|                        | 2                  | state B                    | 20                       | 087-088                                                   | On the island, no boundary pillars to be erected                                                       |
|                        | 3                  | state B                    | 63                       | 144-145                                                   | On the island, a boundary pillar of boundary marker №145 of state B to be erected                      |
| <b>The River Black</b> |                    |                            |                          |                                                           |                                                                                                        |
|                        | 1                  | state A                    | 69                       | 652-654                                                   | On the island, a meeting boundary pillar of transitional boundary marker №653 of state A to be erected |
| <b>The River White</b> |                    |                            |                          |                                                           |                                                                                                        |
|                        | 1                  | state B                    | 81                       | 715-716                                                   | On the island, no boundary pillars to be erected                                                       |

Fig.30. Table of islands' national affiliation

## 10.2 Determining Emplacement Sites for Boundary Markers on the Terrain

The boundary is usually transferred to the terrain as follows:

- along distinct linear features that define the course of the boundary (vistas, canals, rivers, streams, etc.);
- using distinct features located from the delimitation line at a distance of not more than 500 m by measuring surveys from them;
- along existing public and private boundaries that determine the land use, or based on forestry management beacons;
- in the absence of distinct features – by running a survey traverse or by coordinates taken from the project.



Depending on terrain conditions, emplacement sites of boundary markers can be determined in the following way:

a) when the state boundary passes in the middle of a vista. 3-4 measurements of the vista's width are taken every 15-20 m, and the results obtained are compared with data shown on the delimitation map. Typically, the state boundary runs in the middle between the leading lines of indigenous forest. If measurements on the terrain deviate from the data shown on the map by more than 2-3 m, distinctive features of the vista's extension should be examined (felling remnants of stumps, second growth, etc.) and the direction in which the felling of trees was performed should be determined. In this case, the middle of the vista must be determined from the leading line of indigenous forest, where the felling was not performed. In case of the vista's extension in both directions, its middle is determined from prominent landmarks plotted on the delimitation map. In all cases of mismatch of the vista's width, the transfer of the boundary (survey grid stationing) should be carried out in the presence of representatives of forestry institutions and only after having studied available documentation (forestry management plans, copies of felling tickets, etc.). In the absence of prominent landmarks or forestry management documents, the middle thereof can be located by coordinates or based on a new width of the vista.

b) when the state boundary follows along a canal (Fig. 31). It is expedient that boundary markers' emplacement sites should be determined by receding from the upper edge of the canal a distance that will ensure the canal's maintenance (canal's reserve area or right-of-way) and protection from damaging the boundary markers. As a rule, not less than 8 m must be receded (5 m for a state boundary strip and 3 m for a haul road).

c) when the state boundary runs in the middle of a river (a stream) or a canal (a ditch). The emplacement sites of boundary pillars near river boundary markers are determined on a straight line perpendicular to the state boundary line in locations that ensure their safety from damage during ice drift and floods. Beds of natural watercourses can get arid, and canals dry up, but even in such cases it is advisable that the boundary should be marked out by river boundary markers.

d) when the state boundary goes in the middle of a road. The road axis and boundary markers' location in rectilinear sections of the road axis should be determined. At the same time, the demarcation commission should set a permissible deviation of the road axis from a straight line (up to 3 m) connecting the boundary marker locations. (i.e. from the future line of the state boundary).

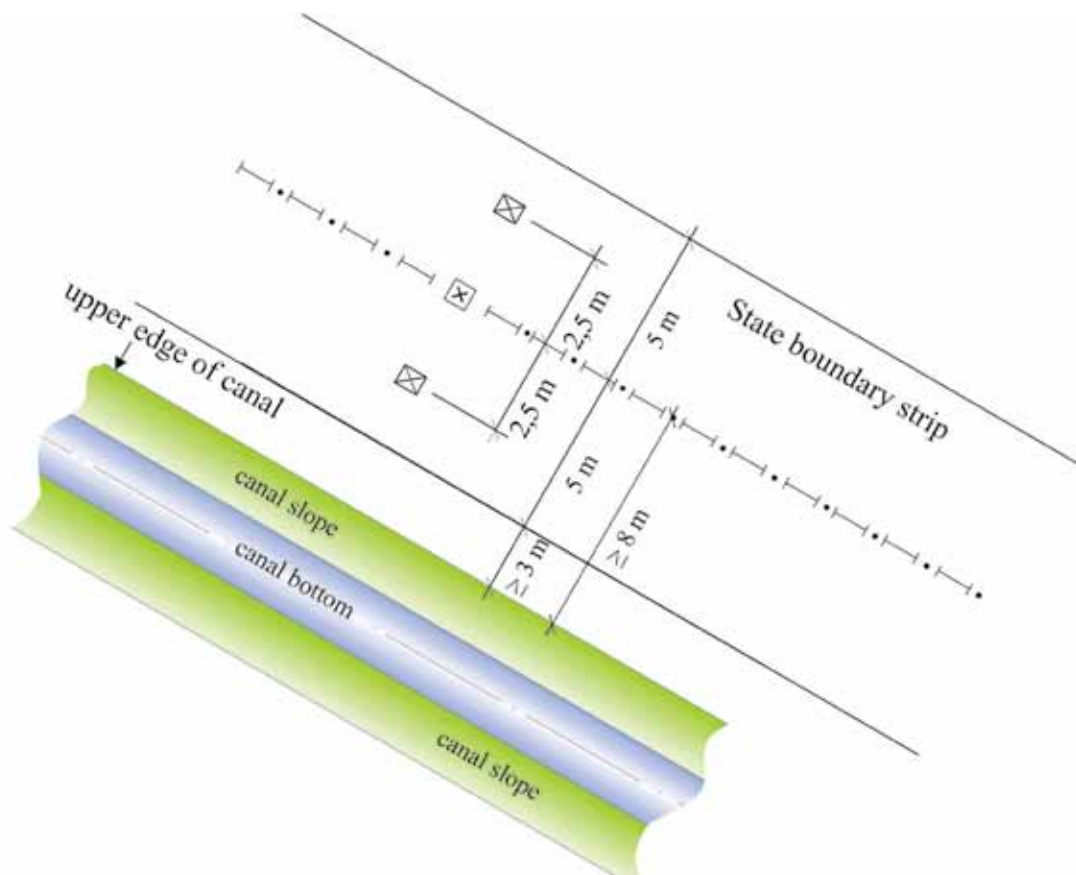


Fig.31. Determining locations of boundary markers' emplacement along a reclamation canal

e) when the state boundary follows a road or other linear object (Fig. 32). The boundary of the right-of-way (as per the facility certificate, land management materials or based on the road class) is determined. Locations for erecting boundary markers are determined in rectilinear sections of a right-of-way limit, receding 5 m from it (the width of state boundary strip). At the same time, it is advisable that the demarcation commission should establish a permissible deviation of the right-of-way boundary (up to 3 m) from a straight line connecting the locations of erected boundary markers ( i.e. from the future line of the state boundary).

f) when the state boundary passes in places where there are no distinct features (a forest, swamp, meadow). Locations for the erection of boundary markers are identified by the coordinates obtained with the help of a cartometric method (with an accuracy of 0.1 mm from the nearest lines of a coordinate grid) based on the arrangement project.

If necessary, when transferring the boundary line to the terrain, a 1 metre-wide sight line is cut through (0.5 m in each direction).

In cases when the available cartographic material and visual inspection of the terrain do not allow for identifying unambiguously the course of the boundary

on the terrain, a large-scale topographic survey (1: 1000, 1: 500 and larger) or drone-based aerial photography of the terrain should be launched under authority of the demarcation commission. A state boundary line delineated on the delimitation map, as well as projected sites for the boundary markers should be transferred to the materials obtained, and proposals on the boundary's location and a procedure for its demarcation should be outlined. These proposals must be approved by the demarcation commission.

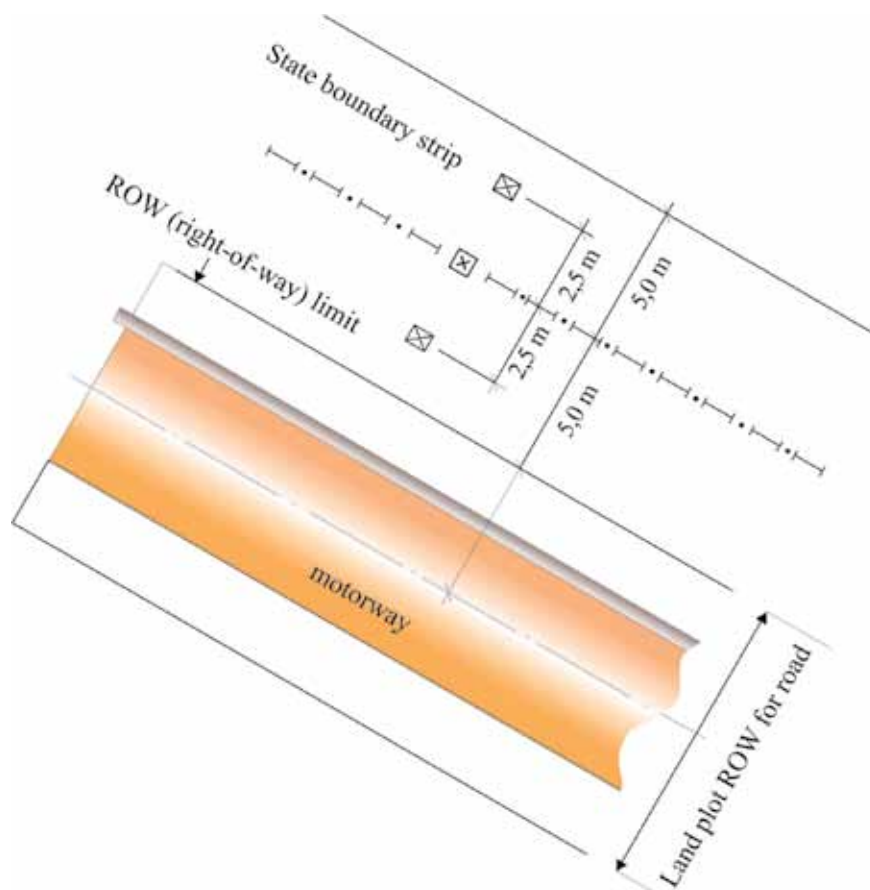


Fig.32. Determining locations of boundary markers' emplacement sites along a road

### 10.3 Peculiarities in Determining Lake Boundary Markers Emplacement Sites

The state boundary in water bodies (lakes and reservoirs), as a rule, is marked out by lake boundary markers in the form of buoys or floating beacons.

The emplacement of lake boundary markers is performed by their transfer on the water surface as per the fixed coordinates on the delimitation map. In so doing, only the locations of the turning points of the boundary are stationed; if additional markers are necessary, they are emplaced on alignment between the turning points. As a rule, the distance between lake boundary markers is not more than 500 m.

Stationing the emplacement sites of the lake boundary markers should be performed in the winter over the ice surface, which allows for ensuring high accuracy

of work. The average error in determining the coordinates locating lake boundary markers' emplacement sites should not be more than 0.5 mm on the scale of the map from which they are taken.

In the presence of distinct features, it is also advisable that the accuracy of stationing the locations of the lake boundary markers should be monitored by taking measurement surveys from them. If it is impossible to carry out work from the ice surface, stationing of the emplacement sites is carried out using safely moored floating craft (boats, cutters, etc.).

In places where lake boundary markers are stationed, it is necessary that the depths of the water bodies should be determined. The most reliable and accurate method for determining water depths is by taking measurements from the ice surface during winter. Depth measurements are performed at the location of the lake boundary markers, as well as in four additional locations, forming a square at a distance of 5-10 m from the emplacement station. The measurements obtained will define the bottom relief and, if necessary, confirm if a different marker location needs to be selected.

Depth measurements can be performed with the use of a metal roulette with a load, a sounder or other devices.

#### **10.4 Fixing Emplacement Sites of Boundary Markers on the Terrain**

The locations of boundary markers on the terrain are fixed by temporary markers (tM) (Fig. 33). The design of a tM and the technical conditions for its emplacement on the ground should ensure its safety from damage and stable serviceability before substituting a boundary marker in its place, as well as restoration of a tM on the ground in the event of its destruction in the course of work, and possibility of verifying the validity of a boundary marker emplaced instead of a tM. In the overland section of the boundary, tM's are erected at the site of a center ZOM, in the river section – on the site of a boundary pillar to be erected. Within transitional boundary markers, tM's are also emplaced on the site of a leading (meeting) boundary pillar.

A tM constitutes a wooden or plastic post with a cross-section of 5 cm X 5 cm, not less than 1 m in length, or another composite with approximately the same parameters. A tM must be securely fixed in the ground.

From tM's, at least three survey measurements must be performed to nearby landmarks located at a distance that ensures the tM's safety from damage during clearing and planning the state boundary strip (at least 7-10 m from a tM). The angle between landmarks in open areas can be 30-150 °, and in a closed area or in the one with a complex relief – 20-160 °. All landmarks to which measurements from a tM are made must be flagged and protected until a boundary marker is accepted by the demarcation commission.



The distance from a tM to landmarks is measured with an accuracy of 0.01 m if it is not more than 25 m away, 0.1 m – for distances of 25 m to 100 m and with an accuracy of 1 m for distances exceeding 100 m.

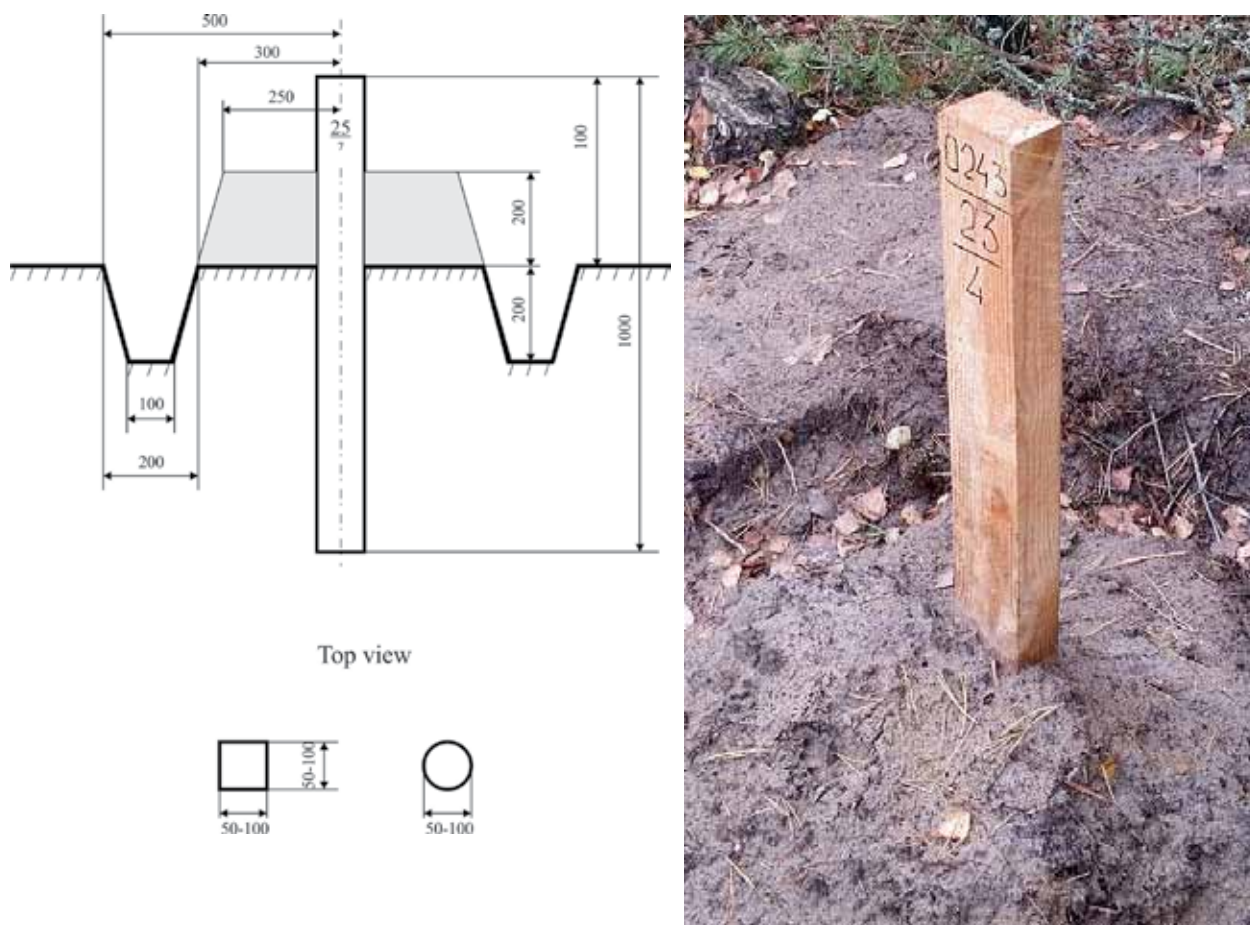


Fig.33. Temporary marker

Each tM is assigned a number in accordance with the layout project. Numbers of tM's are inscribed with paint on post edges that face adjoining states.

For each tM location, a Statement or a Diagram (a location sketch) of its location is executed in duplicate (Appendix 8). The Statement can be drawn by hand or with the use of computer graphics. The latter option is preferable, as it facilitates subsequent work with Statements, particularly during the final approval stage.

The Statement graphically shows the course of the state boundary and names of states; the location of a tM, at least three distinctly observed landmarks reliably fixed on the terrain (beyond the state boundary strip), and specifies distances from the center of a tM to a landmark, and the direction of cardinal points (north-south).

The Statement also describes the location of the tM. The narrative part specifies the following: the number of the delimitation map sheet, numbers of the nearest delimitation points, type of boundary marker, description of the location site

georeferenced to the terrain landmarks indicated in the delimitation documents and type of soil.

Sample narrative statement:

Number of a delimitation map sheet: 7.

Numbers of delimitation points: 6-7.

Type of the boundary marker – main.

Description of the location site – at the edge of the forest 30 m to the south of the intersection of forest roads, 11 m to the south-east of a blazed spruce, 10.5 m to the south of a blazed birch, 12.4 m to the south-west of a blazed pine.

Type of soil – sandy.

The Statement is signed by the heads of each section of the joint working group and approved by the demarcation commission..

### **10.5 Control of Transferring the State Boundary to the Terrain**

In order to verify the correctness of state boundary positioning on the terrain and to locate boundary markers' emplacement sites, each particular location is photographed along the state boundary line and perpendicularly to the state boundary line; locations of boundary markers' emplacement can also be coordinated.

It is mandatory to coordinate tM's within problem areas of the boundary, as well as when working in hard-to-reach areas in order to subsequently reach the exact site where the boundary marker is to be emplaced. However, the observed data should be treated with caution, and it is not intended to be used as official data in the work of the demarcation commission (they should not be approved). The intention is to use them as reference data only. This is due to the fact that after the emplacement of boundary markers, their locations will be measured more accurately, based on a common geodetic network. As a rule, it is quite difficult to explain discrepancies in the coordinates between the positions of a tM and a boundary marker erected in its place.

Coordinates derived from the emplacement of boundary markers can be determined by dual-frequency satellite receivers, by each section of the working group independently.

Based on the derived coordinates, a tM can be plotted on a duplicate of the delimitation map so that the position of the tM can be assessed. If there displacement discrepancy of the point locating a tM relative to the delimitation line by more than an error value permitted for the measurement of coordinates and the accuracy of the map, this may indicate:

- an error in determining the location of a boundary marker;
- an error in determining the coordinates of a tM;



- inconsistency of the delimitation map with the required planned accuracy in displaying features and objects of the terrain.

The causes of the discrepancy are analyzed, with the involvement of a representative of the land survey and geodetic service. Discrepancies are verified by ground measurements with the subsequent drawing up of an expert findings report on the results of the work performed. The final decision on eliminating the discrepancies and inconsistencies is taken by the demarcation commission.

### **10.6 Actions of Joint Working Groups in the Event of Problematic Situations**

When the boundary is positioned on the terrain, the following should be determined and reflected in the layout project:

- location of boundary markers in the sections of the state boundary that are ambiguously plotted on the delimitation map;
- locations where there is no inter-visibility between the projected sites for the erection of boundary markers;
- areas of the territory adjacent to the state boundary, where there have occurred changes in the terrain that prevent the implementation of the decisions adopted during delimitation;
- sections of the state boundary where the delimitation line of the boundary does not allow (hinders) operation of capital structures (buildings, constructions), motorways, hydro-technical and other facilities, or does not coincide with a land use (land tenure) boundary, which will not allow for the use of a land plot for its intended purpose after demarcation;
- sections of the state boundary where geological and other natural factors do not allow for emplacement of boundary markers in accordance with the layout project.

In the above-mentioned cases, it is advisable that the boundary should be positioned on the terrain and fixed by tM's after the commission has taken decisions on each particular case. Any changes adopted by the demarcation commission during the demarcation work should be reflected in the layout project.

In case of any ambiguities (uncertainties) revealed with regard to the course of the state boundary on the terrain, or in the presence of diverging opinions as to its course, the joint working groups should:

- collect available materials, study and document the discrepancies found;
- develop proposals on the demarcation of the state boundary in these sections and document them;
- submit proposals for the commission's approval;
- transfer to the terrain the variations of the state boundary's course, approved by the commission.

## 11. ORGANIZING WORK ON ERECTING BOUNDARY MARKERS ON THE STATE BOUNDARY

The organization of work for erecting boundary markers includes issues regulated by the demarcation commission, and issues that each state solves on its own.

The demarcation commission, within its authority, distributes the work on erecting boundary markers, determines requirements for the accuracy of their erection and elaborates requirements for the state boundary strip. Each state determines a model for demarcating the boundary, selects contractors, implements the design and survey work, allocates land for demarcation, etc.

As a rule, the beginning of erection of boundary markers is preceded by an official ceremony of launching the emplacement of the first boundary marker. It is also advisable that a similar ceremony should be held at the emplacement of the last boundary marker. The ceremonies should involve high-ranking officials of both states, heads of missions of foreign countries and international organizations. Such events are given a broad coverage in the media, attract wide public attention, promote the popularization of the implemented works and underscore the importance of state boundary demarcation for both states.

The decision on the commencement of boundary markers' emplacement is taken by the demarcation commission. Work can commence after the demarcation commission has approved Statements for determining emplacement sites of boundary markers in certain sections of the boundary or after they have been approved for the entire length of the state boundary. When making a decision, the presence or absence of disputes over the course of the boundary on the terrain, as well as the character of relations between states are important factors.

In order to ensure parity of costs for demarcating the boundary and streamlining the work, it is necessary to divide types and volumes of work before they start. For this purpose, the demarcation commission allocates to each state sections of the state boundary and defines the types and scope of work that each state should perform.

There are cases when the work is fully performed by one of the parties in the territories of both states. In our opinion, such an approach can create a lot of problems regarding the accounting of consumable material resources, secondary materials received (e.g. wood in the forest area), the performance of works in the territory of the adjoining state (compliance with environmental legislation, labour safety, etc.).

We believe it expedient that following principles of work distribution should be adhered to:

- a strip of land for the erection of boundary markers is cleared of trees and





vegetation, stones and other objects by each state independently within its own territory;

- each of the states erects boundary pillars independently within its territory;
- emplacement of common elements of boundary markers (center zero-offset monuments, or boundary markers made of one element) is split into responsibility areas based on an equal total number of elements for each state.

After having prepared a draft layout project of markers' arrangement, types and number of boundary markers to be erected on the boundary will be known with fairly high degree of certainty. This will make it possible to divide the works on a parity basis. The parity can be achieved in various ways, such as:

- during demarcation of the Belarus-Latvia boundary, all the ad hoc, intermediate and lake boundary markers were manufactured and emplaced by the Belarusian side, while the center ZOMs in the Belarusian zone of responsibility were manufactured by the Belarusian side, but erected – by the Latvian one;
- in the course of demarcation of the Belarus-Lithuania boundary, the intermediate boundary markers were made, painted and delivered to the boundary (at five agreed locations) by the Lithuanian side, and the Belarusian side provided for their delivery to the emplacement sites and erection.

In determining areas of responsibility, it is necessary to take into account the availability of access roads in the territory of a state responsible for erecting common elements of boundary markers, conditions of the terrain where the work will be performed, etc.

It is advisable that the demarcation commission should approve a plan of distribution of works on the state boundary. The plan can consist of a graphic (Fig. 34) part and a narrative part.

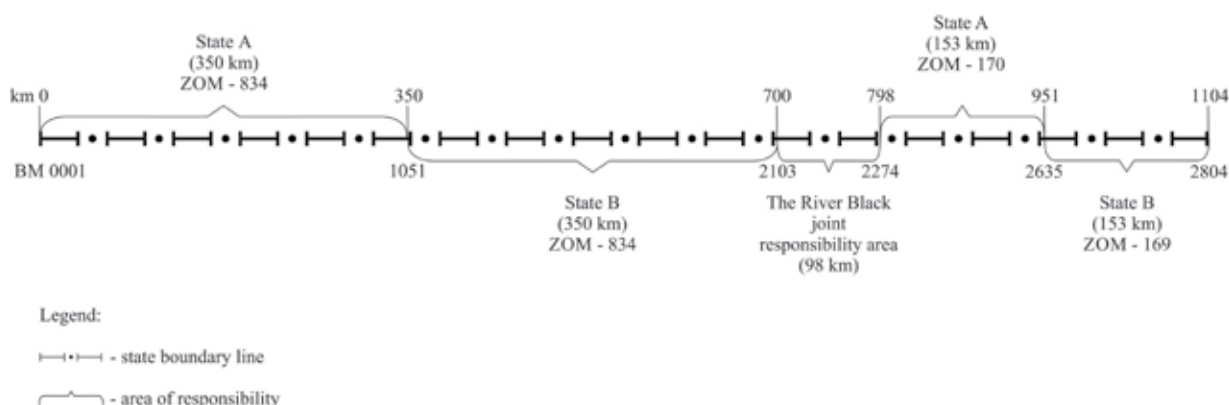


Fig.34.Graphical part of work distribution plan

Works on the erection of boundary markers are carried out in accordance with the Instruction on the procedure for demarcating the state boundary, the layout project for arranging the boundary markers, as well as other documents of the demarcation commission.

Prior to the commencement of work, it is also expedient that permissible deviations from the parameters of erection of boundary markers, specified in the Instruction on the procedure for demarcating the state boundary, should be outlined (Appendix 9). The development of such parameters will allow for the assessment of whether or not completed works meet the requirements of the demarcation commission, and which of them must be redone.

The Demarcation Commission also needs to reach an agreement on the materials which the common elements of boundary markers will be made of (reinforced concrete, plastics, etc.); on the requirements for paintwork; as well as to identify (if necessary) places where the channels of watercourses should be reinforced to prevent a change in their location, etc.

Oftentimes, work is carried out under poorly developed road conditions, difficult soils and in hard-to-reach areas. These circumstances impact the erection of boundary markers made of traditional materials (reinforced concrete) and lead to significant costs during the preparatory work phase, including transporting a boundary marker's elements, providing an access road towards the place of erection of the boundary marker, preparing a site for its erection, etc.

In places where erection of a boundary marker made of reinforced concrete products is economically inexpedient, boundary pillars made of plastics should be used. In some cases, boundary markers can be made of available local materials (rubble stone) on location.

The emplacement of boundary markers in swampy areas or in loose soils will be significantly easier if bored piles are used (Fig. 35).



Fig.35. Bored pile

When positioning lake boundary markers in the form of a buoy, it is recommended that a float painted in bright color should be attached to the anchor. The float must be fixed 0.5-0.7 m below the water surface (Fig. 36).

The use of such floats at the Belarus-Lithuania and Belarus-Latvia boundaries allows easy location of the emplacement site of a boundary marker and its feasible restoration if a buoy has been damaged (due to ice drifting, storms or human impact). In case of emplacing boundary markers in shallow water, it is recommended that bored piles or other devices should be used.

In the process of marking out the boundary, it is advisable that the demarcation commission should periodically perform selective field monitoring of boundary markers' erection works as to their compliance with the decisions of the demarcation commission, and reporting the results of the verification in the minutes of meetings.



Fig.36. Emplacing a lake boundary marker (a buoy) with a float.

## 12. ORGANIZING CARTOGRAPHIC, GEODETIC, HYDROGRAPHIC AND OTHER RELATED WORK

A combination of cartographic and geodetic, hydrographic and related works should ensure:

- transferring the state boundary line from the delimitation map to the terrain, positioning it and fixing it with boundary markers;
- obtaining reliable information on a spatial position of the state boundary on the terrain;
- preparing summary documents of the state boundary demarcation.
- checking by the instrumental methods the correctness of transferring the state boundary line from the delimitation map to the terrain;
- creating a common geodetic network that allows performing topographic, geodetic and cartographic work in the systems of coordinates and heights accepted in adjoining states;
- determining the coordinates of boundary markers and verifying the correctness of their erection;
- carrying out hydrographic works (if necessary);
- preparing geodetic, topographical and cartographic materials and data for creating the summary documents of the state boundary demarcation.

When organizing the work, it should be noted that the following factors have a certain effect on performance:

- requirements for the organization and performance of work in adjoining countries may differ;
- field work is performed at the state boundary, which requires compliance of the working groups with the state border regime and imposes restricted time limits on the execution of works, requires accompanying the works with the border guards details of adjoining countries, hinders the movement of the working groups near the boundary, etc .;
- field works and their control, as a rule, are carried out jointly by specialists from both adjoining countries.

The implementation of cartographic, geodetic and related works constitutes basically a set of standard techniques and rules, approaches and methods for organizing and performing such types of work.

As a matter of priority, delegations should reach agreements on:

- systems of coordinates and heights that will be used for demarcating the state boundary and preparing the summary documents for the state boundary demarcation;
- mandatory accuracy requirements for measurements, as well as the admissible errors;



- procedures and methods for re-calculating coordinates from one system to another if several systems are used;
- a control system and the order of reporting on the work performed. A variety of coordinate systems used, that of physical and geographical conditions of the boundary's course on the terrain, as well as of requirements for accuracy of measurements taken in adjoining countries, etc., is so large that the authors deliberately do not furnish any particular examples in this Guidebook.

Transferring the state boundary line from the delimitation map to the terrain and fixing it with temporary markers, as well as control over the correctness of its positioning are highlighted in full detail in Chapter 10 of the Demarcation Part. In the current chapter, the issues of creating a common geodetic network, determining the coordinates and heights of boundary markers, as well as the specifics of organizing work in the border water bodies are considered.

### **12.1 Common Geodetic Network**

To perform cartographic, geodetic and related works and to firstly determine the coordinates and elevations of boundary markers, it is expedient that a common geodetic network should be created.

The common geodetic network is designed to ensure the uniformity of geodetic definitions and correlation of systems of coordinates and elevations adopted in adjoining countries.

The initial base stations for creating a common geodetic network are, as a rule, the stations of state geodetic networks of adjoining states of the 1st order (for main stations) and 2nd order (for secondary stations), located on either side of the state boundary, or equivalent stations to them in terms of their parameters.

Recently, reference stations (ASG-EUPOS permanent transmitting stations) have also been actively used. If there are not enough of them near the boundary, then the existing geodetic datum stations are used on the terrain.

To create a common geodetic network, delegations should exchange lists of coordinates and elevations of initial base stations. It should be mentioned that in a number of countries such data may have restrictions on public use («secret» or «for official use»), so delegations need to comply with the procedure established by law.

The creation of a common geodetic network includes:

- developing a technical project for the creation of a common geodetic network,



approved by the demarcation commission;

- examining stations of a common geodetic network.

The examination consists in finding initial base stations on the ground, ascertaining their condition, witness marks, reference marks, and clarifying the description of their locations. When surveying the initial base stations of the geodetic network, a visual inspection is carried out for their condition and an examination of the suitability of the station's location for satellite observations (attention is drawn to the location of stations relative to large trees, metal fences, and other structures capable of interfering with radio signals from satellites);

- reconnaissance and, if necessary, installation of stations for a common geodetic network.

The main purpose of reconnaissance is the final selection of stations for a common geodetic network. The location of the network stations should ensure the long-term stability of the network, the stability of its spatial position, possibility of unhindered access to the station, convenient access for motorized equipment and favorable conditions for GNSS satellites observation;

- measurement work.

The ideal option consists in simultaneously carrying out measurements by specialists from adjoining states at initial base stations of both adjoining countries. For the performance of satellite observations, it is advisable that dual-frequency geodetic satellite receivers should be used that operate on signals from GNSS GPS and GLONASS satellites. To monitor the measurements taken, delegations should subsequently exchange the full results of their observations.

Field observations can be performed taking into account the following recommendations:

- observations should be performed in static mode for two sessions at an increment of 15° with a minimum permissible elevation angle of 15° for satellites;
- the duration of one session is not less than 3 hours;
- between sessions of observations, the antenna at each station should be reinstalled if its height is changed by at least 10 cm;
- processing the results of satellite observations and creating a common geodetic network;
- creating a catalogue of coordinates and elevations of common geodetic network stations and its approval.

Based on the results of creating a common geodetic network, a technical report is prepared, which is subject to approval by the demarcation commission.



## 12.2 Determining Coordinates and Elevations of Boundary Markers

The coordinates and elevations of boundary markers are determined by geodetic methods of triangulation, polygonometric works, cross-bearings, and adjustments, with the help of GPS technology with a precision established by the demarcation commission.

To ensure uniformity in determining the coordinates and elevations of boundary markers, it is expedient that the demarcation commission should locate reference points (places) on the elements of boundary markers, which will be referred to during measurements observations.

For example, at the Belarus-Lithuania state boundary, the coordinates of boundary markers were determined:

- in land sections of the boundary – on the center of the cross mark on the upper plane of a center (polygonometric) column (a ZOM);
- in sections where the boundary passes over waterways – on the geometric center of boundary pillars and a reference point on the water surface (a demarcation point that marks the position of the state boundary on the water surface within the alignment (range) of the boundary pillars of one boundary marker);
- in places where the boundary transits from an overland section of the boundary to a water body and vice versa, as well as from one water body to another – on the geometric center of a meeting boundary pillar.

The elevations of boundary markers were derived from the Baltic sea level datum of 1977. The values of elevations of boundary pillars above sea level are referred to the upper part of the skirting area, and those of center zero-offset monuments – to the center of a cross mark on the upper plane of a center monument.

When determining the coordinates and elevations of boundary markers in three dimensions, the maximum errors relative to horizontal and vertical control survey networks should not exceed the parameters set by the demarcation commission.

For example, at the Belarus-Lithuania boundary, the error should not exceed 0.3 m.

It is advisable that error parameters not exceed those in measuring the boundaries of land plots. Data on the spatial position of the state boundary are used in the land cadastre, and different parameters of errors can lead to overlapping of land plots onto each other or the creation of gaps between land plots.



As a rule, the coordinates of the planned position of a boundary marker and its elevation are expressed in metres accurate to the second decimal place, while computation of rectangular coordinates into geodetic ones is carried out with an accuracy of 1/10 000 parts of a second.

Verification of the correctness of determining coordinates and elevations of boundary markers in the adopted systems of coordinates and elevations is performed by mutual transformation of their values. The discrepancy between computed values and those obtained by transformation of the coordinates and elevations of boundary markers must not exceed a specified limiting error in the determination of coordinates and elevations relative to the geodetic stations of a common geodetic network.

The work on determining the coordinates and elevations of boundary markers (measurement and processing) should be split on a parity basis by areas of responsibility. Basic measurements in the area of responsibility are carried out by representatives of one state, and control measurements, by another one.

Control can be carried out in full or selectively. For example, measurements of elements of boundary markers, whose coordinates influence the course of the state boundary, should be checked. In carrying out mutual control, the discrepancy between the values of the coordinates and the elevations of a boundary marker, obtained from the basic/primary and control/reference measurements, shall not exceed the value established by the demarcation commission.

For example, at the Belarus-Lithuania boundary, the maximum discrepancy could be up to 42 cm. The allowable discrepancy is calculated by the formula  $\Delta s = \Delta \max * \sqrt{2}$ , where,  $\Delta \max$  is the maximum (limiting) error in determining the coordinates of boundary markers relative to the points of the common geodetic network, equal to 30 cm;

$\Delta s$  is the permissible discrepancy between the coordinates of boundary markers from two measurements (the basic and control ones).

As final data, it was originally intended to take the arithmetic mean of the two measurements (the basic and control ones), but with this approach, a probability of worsening the accuracy of measurements was initially predetermined. The reconciliation of basic and control measurements of the coordinates of boundary markers revealed that the discrepancy between the measurements in rare cases exceeded 5-7 cm. It was considered expedient that the coordinates and elevations of basic measurements should be accepted as final data. Both approaches have their



drawbacks, but it is important that the chosen option be applied to all boundary markers.

Based on the results of determining the coordinates and elevations, a technical report is prepared, with its form and contents established by the demarcation commission.

The requirements for carrying out work to determine the coordinates and elevations of boundary markers can be formulated in instructions (rules), technical tasks approved by the demarcation commission, or in the texts of minutes of the demarcation commission's meetings.

### **12.3 Peculiarities of Organizing Work on Boundary Water Bodies**

When demarcating the state boundary on boundary water bodies, it is necessary to take into account that:

- the cartographic materials used, given the timelines of their creation, do not fully reflect the actual situation on the ground;
- watercourses are natural objects that are dynamically changing. In this regard, meandering of river beds, formation and cessation of existence of islands and shoals, changes in water level are constantly occurring;
- all hydrographic measurements in watercourses are carried out in the most stable period of the water level – the low water period.

The state boundary in water bodies, as a rule, passes:

- in navigable rivers, – in the middle of the channel or in the thalweg of a river;
- in non-navigable rivers or streams, – in their middle or in the middle of the main branch of a river;
- in lakes, – in an equidistant, median, straight or other line that connects the state boundary's exits to the shores of a lake;
- in reservoirs and other artificial water bodies – in accordance with the line of the state boundary that passed through the area before they were filled with water.

Adjoining states can adopt other principles for establishing the state boundary's course.

Establishing the state boundary in the middle of the main channel is in most cases the least successful way of determining the course of the state boundary. With minimal vessel traffic, maintaining a stable, unchanged position of the main channel is a very costly exercise. The best option is when the state boundary follows

the middle of rivers, and vessels can move regardless of the state boundary's course. Relevant legal grounds can be settled by an international treaty between adjoining states on the regime of the state border, on navigation within inland waterways or on navigation in the state boundary section of a particular watercourse, etc.

It should be noted that during the stage of demarcation of the state boundary, conceptual decisions on the boundary's course should not be taken, but the course of the state boundary is being determined more accurately than during delimitation with due regard to islands' state affiliation, a channel's position, shorelines' position etc.

To this end, the demarcation commission compiles a complete set of cartographic, geodetic, and if necessary, hydrographic works on determining the state boundary's course and national affiliation of islands.

### **12.3.1 Cartographic and Geodetic Works at Boundary Water Bodies**

The main goal of cartographic and geodetic work at boundary water bodies consists in determining the position of shorelines of a water body (a water-and-land line or a water level) and its median line.

Determining a shoreline of boundary water bodies is carried out while creating a demarcation map with the use of a stereotopographic or a combined method based on aerial photography or satellite imagery. The shoreline of area water bodies (reservoirs, lakes and navigable rivers) is easily identifiable in aerial photographs or satellite survey materials and practically does not require a field survey.

If the shoreline is not identified in aerial photographs, it may be necessary to conduct a field survey of the shoreline, and median line. In such cases, their positions are determined on the basis of the results of the survey as of the date of measurement. The survey is carried out by coordinating fixed points of the shoreline. At the same time, points mutually opposite on both shores are coordinated.

Coordinating the shoreline should be carried out at such a frequency and in such a way that the sag between two adjoining survey marks would be not more than 2 meters (the demarcation commission should establish the requirements depending on the width of the river). In straight sections of a shoreline, the distance between the points, as a rule, should not exceed 30-50 m. The topographic survey of a shoreline should be carried out with an average error not exceeding the error accepted for the selected survey scale.

In places of entry and exit of the state boundary from land to water and from water to land, it is necessary to further coordinate:

- entry or exit points from land to water;
- a point located on the clearing (range) line of the land boundary section;



- points of the shoreline, which are located up to 20-50 meters deep into the state' territory, wherefrom or whereto the river flows.

When determining on the terrain the boundary line that follows in the middle of a river (stream, canal), the existing shallow bays are not taken into account. The middle is defined as a straightened line, which is equally distant from the straightened lines of both banks. In areas, where the shoreline can not be determined accurately, the middle is defined as the middle of the water surface at an average year-to-year water level.

Based on the results of the topographic and geodetic work performed, a technical report is prepared, which reflects:

- survey dates;
- data on the organization executing the works;
- data on initial base stations;
- data on instruments and methods of measurement;
- processing techniques and accuracy evaluation;
- lists of coordinates;
- sketches of topographic and geodetic surveys.

### 12.3.2 Organizing and Implementing Hydrographic Work

If the topographic and geodetic measurements are not sufficient to determine the state boundary course, the demarcation commission should organize hydrographic works.

Hydrographic works often include:

- in navigable rivers – determining a navigable channel;
- in non-navigable rivers (streams) – determining a water flow rate in each of a river's branches to identify its main branch in the locations of islands;
- in water bodies – determining depths in places where lake boundary markers are positioned.

The hydrographic works comprise:

- collection, study and analysis of materials and data characterizing water bodies;
- drawing up a technical task and a technical project for the execution of work;
- performance of necessary engineering and hydrographic works;
- preparation of a report on the work performed.

Surveying (restoring) the stations of a geodetic network, as well as creating a survey geodetic network along waterways are carried out if necessary and are an integral part of the work when creating a common geodetic network.

With a view to organizing and carrying out the hydrographic work, it is expedient that the demarcation commission should form a working group of specialists from both countries to develop an instruction on the procedure for carrying out these works and organizing hydrographic work after its approval.

The demarcation commission should also decide on the procedure for determining an average low-water period, i.e. the period when hydrographic work can be performed. For example, an average low-water level shall be the value of the average water level for the period from the end of spring high water (but not later than June 1st) to November 30th, taken as a calculated level with a 50% probability variance. It is quite rare that there are water gauges installed at boundary water bodies, therefore, at the unexamined boundary water bodies, calculated average low-water levels are determined hydraulically, based on the measurement of water flow and water surface slopes during a hydrographic survey.

Preparation for the work must begin with the study of the following materials and data:

- delimitation map;
- description of the state boundary;
- topographic maps and plans, including the available topographic plans for surveying the bottom of water bodies;
- aerial and satellite imagery materials;
- pilot maps;
- land management materials;
- water gauges data.

Based on the collected materials and data, an analysis of the topographic maps used for demarcating the state boundary is carried out to determine the following:

- completeness and reliability of the imagery of water bodies and existing islands;
- necessity to perform hydrographic work (depth measurement, determination of water flow rate and bottom slopes) in order to identify main channels of waterways and national affiliation of islands.

Based on the results of the analysis, a list of detected inconsistencies is compiled for each water body, completed with topographic maps or their tiles that contain the detected discrepancies in the display of water bodies and the boundary on them. The results of the analysis provide the demarcation commission with a basis for outlining a technical task on the performance of engineering and hydrographic works and drawing up a technical design.



The technology for performing engineering and hydrographic works depends on the landscape relief (flat, mountainous, etc.), characteristics of the river bed and floodplains (flow conditions), the technical means, measuring instruments and tools used, and the objectives of the work.

Works can be performed with the use of a bathymetric laser-location system mounted on an airplane (air laser scanner) or multi-beam sonar mounted on a ship. Smaller projects can be carried out using conventional measuring instruments and tools (tacheometer, theodolite, etc.).

Geodetic works and hydrographic measurements are only required if there is no reliable datum on the position of the main branch of a waterway channel, and on the national affiliation of the islands.

Determining the main branch of a watercourse is carried out by indirect indicators using topographic maps and materials of aerial photography (satellite imagery) or by determining the flow of water in the branches of the watercourse that cover the islands.

The definition of the main branch of a watercourse by indirect indicators is possible only on the watercourses that are expressed in terms of their width at the scale of the map. Materials of aerial photography or satellite imagery allow determining a relative depth of the branches (shallow areas of the watercourse in the pictures are displayed in a lighter tone) and estimating with a sufficient reliability the water-transmitting capability (water flow) of each of the branches.

In the absence of the possibility of carrying out such an analysis or when a need arises for a more accurate determination of the main branch of a watercourse, the work on determining the water flow in each branch consists of:

- laying out the water gauging site and fixing it on the ground;
- referencing the water gauging site to base stations of a common geodetic network or points of a geodetic survey grid;
- measuring the area of the transverse (live) cross-section of the water flow ( $\omega$  (m<sup>2</sup>)) of an average gauging site;
- determining height of the water level;
- measuring water flow rate;
- processing the results of measurements and observations and preparing conclusions.

The main branch of a watercourse is a branch with the highest water flow.



The water flow rate for each branch of the watercourse  $Q$ ,  $m^3/c$ , is determined by the formula  $Q = \omega v_{av}$ , Where

$\omega$  is the area of the live section of the flow,  $m^2$ ;

$v_{av}$  – average flow velocity,  $m/s$ .

Based on the results of the performed work, a technical report is prepared, containing a description of the technology for performing the work and the results obtained.

The technical report should include the following attachments:

- cartographic diagrams of locations of the areas of work performed;
- sketches of the geodetic network used;
- copies of diagrams of inland waterways (pilot maps);
- list of islands for each water body, cartographic diagrams of their location indicating the main branches of watercourses;
- cartographic diagrams of depths measurements in emplacement sites of lake boundary markers;
- copies of topographic survey data of the shoreline of water bodies;
- certificates of control over the work performed.

The technical report is subject to approval by the demarcation commission.

## 13. PREPARING SUMMARY DOCUMENTS AND ACCEPTING DEMARCATED BOUNDARY

Preparing demarcation documents, as a rule, falls into two stages:

the first stage constitutes preparing draft summary demarcation documents in the language agreed upon by the states and their verification during the acceptance of the demarcated boundary;

the second stage is creating summary demarcation documents in the states' official languages, their verification, binding and sealing.

Preparing draft summary documents of state boundary demarcation includes geodetic, cartographic, printing and other types of work, as well as measures for their acceptance by the demarcation commission.

As a rule, based on the state border demarcation, the following documents are to be developed:

- demarcation map;
- protocols of boundary markers;
- catalogue of coordinates of boundary markers;
- description of the state boundary;
- summary protocol of the state boundary demarcation (summary protocol of the demarcation commission).

Pursuant to the decision of the demarcation commission (depending on the conditions of the boundary's course, established traditions, etc.), other documents can be developed.

Following boundary demarcation, it is also advisable that additional documents should be prepared that are not included in the summary documents of demarcation, but will have practical value in the course of maintaining the state boundary. Such documents include:

- report of the demarcation commission;
- technical report on the performed topographic, geodetic and cartographic works;
- documents that substantiate introduction of modifications to the state boundary's position on the terrain (if any) in comparison with its position determined as a result of delimitation.



### 13.1 Preparing Draft Summary Documents of Boundary Demarcation

Preparing draft summary documents can be carried out immediately in the languages of adjoining countries or in the working language of the demarcation commission (translation into the languages of neighboring states is carried out after the documents have been agreed).

The second option, in our opinion, is more preferable, since it will avoid a lengthy process of coordinating the documents with the help of translators.

#### 13.1.1 Compiling the Demarcation Map

The demarcation map (Appendix 10) should provide:

- mapping of the territory in which the state boundary passes, as well as of landscape objects that ensure the referencing of boundary markers;
- mapping of physical and geographical conditions of the terrain where the state boundary passes;
- geometric accuracy sufficient for carrying out cartometric works (determining coordinates, distances and areas) at the accepted scale;
- correspondence of the situation depicted on the demarcation map to the actual situation on the ground.

Of particular importance, the demarcation maps should display:

- state boundary line;
- boundary markers;
- elements of the terrain in which or along which the state boundary passes (rivers, streams, ravines, ditches, trenches, ridges of boulders and stones, etc.).

The scale of the demarcation map should allow an unambiguous identification of the boundary's course on the terrain. Drawing on ample experience, this scale should not be smaller than 1: 10000, while a displayed strip of terrain 1 km wide in both directions from the state boundary, will be sufficient.

Separately, one should determine a scale for the map sheets where rivers (streams) will be displayed. For rivers (streams), whose channel width is up to 10-15 m, it is advisable that a scale of 1: 5000 or 1: 2000 should be used. Such a scale, within classical understanding of cartographic science, is already a plan, but the demarcation map is a special map, and the demarcation commission has the right to deviate from classical requirements for constructing maps.

It is expedient that a demarcation map should be constructed, based on materials of a specially executed aerial survey that is carried out along the state boundary in





straight flight lines with the necessary longitudinal and transverse overlaps, that allow carrying out stereoscopic measurements with a resolution of not less than 0.3 m. In creating the map, the latest innovative cartographic and other materials may be used as additional materials.

Oftentimes the neighboring countries have different requirements for creating topographic maps. In this regard, the preparation of a demarcation map should be started with the development of technical specifications for the creation of an album of the demarcation map and requirements for conducting aerial photographs.

The main requirement for the aerial photographs used in the creation of the demarcation map is the provision of high measuring capabilities and visual properties of aerial photography materials that allow the most complete identification and characterization of the terrain along the state boundary.

Depending on the capabilities of neighboring states, aerial photography can be obtained by aerial photographic cameras that use photographic film or by digital aerial cameras.

Beyond any doubt, digital aerial photography with simultaneous laser scanning is preferable. The simultaneous use of a digital aerial camera and an airborne laser scanner (LIDAR) for aerial photography of the earth's surface is the most effective way of obtaining high-precision spatial data and reduces the time of work execution.

Requirements for aerial survey work do not differ from the standard requirements for the creation of conventional topographic maps. For example, for aerial photography using photographic film, the following requirements should be met:

- absence of snow cover when surveying overland areas of the terrain;
- absence of foliage, height of the grass cover and grain crops being minimal;
- compliance of the water level in large rivers and lakes with the low-water period;
- water level in the reservoir zone should be retained within the normal headwater elevation;
- absence of clouds with the height of the sun above the horizon not less than 20 °;
- direction of the aerial survey lines must coincide with the boundary line on the terrain;
- aerial photography should provide a survey of the terrain in order to create a map of boundary demarcation within the 2 km (1 km in both directions from the

boundary line);

- deviation of the axes of flight lines from the given position should not exceed 1.0 cm in the photographs;
- limits of photogrammetric processing should fall into the working area of an image (no closer than 2.5 cm from the edge);
- non-rectilinear aerial imagery lines, defined as the ratio of the deflection arrow to the length of a flight line, should not be more than 3%;
- longitudinal overlapping of images should be 80%, the transverse one – 40%;
- for single-line aerial photography, lines at junctions should overlap by at least 2 photo bases;
- non-parallelism of the photographing base to the side of the image should not exceed 5 °;
- magnitude of the linear image shift in aerial photographs should not exceed 0.05 mm;
- longitudinal and mutual transverse angles of the inclination of aerial photographs should not exceed 3 ° (the allowed number of aerial photographs with an angle of inclination of 3 ° being not more than 10% of the total number), etc.

The photographic quality of aerial photography materials is regulated by the following requirements:

- all aerial negatives, in the center and at the edges, should have a well-processed image of both illuminated and dark areas of the terrain;
- all aerial negatives should clearly display the readings of the service information instruments, imprinted in the inter-frame interval, as well as the coordinates marks and the grid of reticules;
- the sensitometric and gradational characteristics of aerial negatives should meet the following standards:
  - contrast ratio ( $\gamma$ ) =  $1,4 \pm 0,2$ ;
  - integral density ( $D_{int}$ ) = 0.7-1.1;
  - veil density ( $D_o$ ) not more than 0.3;
  - minimum density ( $D_{min}$ ) = 0.2-0.6;
  - maximum density ( $D_{max}$ ) = 1.5-1.8;
- contact prints from negatives should have a well-processed image across the entire surface of the aerial photo;
- quality of reproduction of the uncontrolled mosaic should ensure good readability of the main contours of the terrain and numbering of aerial photographs.

The peculiarity of aerial photography is that in order to ensure a high quality of shooting, it is advisable that an aircraft should use the airspace of both states, and at state boundaries' junctions, enter the airspace of third countries. Entry into

the airspace of neighboring states to carry out such work is a normal procedure. For example, aerial photography of the Belarus-Poland boundary was carried out by the Polish side and that of the Belarus-Latvia and the Belarus-Lithuania boundaries, by the Belarusian side. It should be noted that the procedure for obtaining permission to enter the airspace of a neighboring state can take a long period of time.

Therefore, in the requirements for carrying out aerial photography, it should be specially noted that aerial photography works should be coordinated with the competent authorities of neighboring countries before they are undertaken.

Technical specifications for compiling a demarcation map album include:

- scale of the created map, the content and basic requirements for creating a map;
- geodetic datum and projection, a system of coordinates and elevations, a section of the relief;
- source material and a technological scheme for creating the map;
- width of the terrain displayed on the map (on either side of the boundary line);
- rules for translating and registering geographical names;
- list of conventional symbols;
- fonts and a color scale of paints used to create the map;
- coordinates of the frames' corners of the map sheets;
- requirements for marginal representation of the map sheets;
- samples of the title page;
- layout charts of the map sheets;
- format of exchanging the map sheets in digital form, etc.

It is characteristic of the post-Soviet states to create demarcation maps on the Gaussian-Kruger conformal transverse-cylindrical projection, calculated in the six-degree region along the elements of the Krasovsky ellipsoid. The size of the album sheet is determined by the demarcation commission based on the configuration of the boundary line, the conditions of the terrain, etc. For example, a 54.5 X 63 cm album sheet was used at the Belarus-Lithuania boundary, the inner frame size being 2'30" in latitude, and 3'45" – in longitude.

The breakdown of the sheets of the demarcation map should ensure the least number of them with the optimal display of the state boundary line and the territory of both states.

The numbering of sheets is given in accordance with cartographic rules from left to right (given the map is oriented to "North"); the numbering of boundary markers

should follow in the same manner. In practice, there are cases of counter-numbering of boundary markers. For example in 1998, at the Belarus-Latvia boundary, the demarcation commission decided to preserve the historical direction of numbering of boundary markers as of the year 1940.

State systems of coordinates used in neighboring states may differ. If no agreement is reached on the use of a uniform coordinates system, the demarcation commission should decide on the number of grids of rectangular coordinates applied to the sheets of the demarcation map. There are cases when two or three grids are applied.

Geographical names and characteristics of the terrain on the map may be recorded in the languages of both neighboring countries or only in the language of the state where the object is located. For the marginal representation, it is advisable to use the language of the state that is opposite to the language used in the demarcation map.

To display the terrain, it is advisable to use topographic surveys of previous years, a new stereotopographic survey, or airborne laser scanning (LIDAR) materials.

When preparing a map, particular attention should be paid to filling in such conventional symbols as «state boundary» and «boundary marker».

The outline of a conventional symbol «state boundary» should provide an unambiguous understanding of the state boundary's course. The width and length of a conventional symbol «state boundary» must be determined based on the features of the terrain displayed on the map and the specificity of the boundary's passage in it. In the land sections of the boundary, the conventional sign «state boundary» can be applied to the demarcation map with a dash-dotted line of red color up to 1 mm thick and up to 3 mm long. When the state boundary passes in the middle of rivers or canals depicted in the same line, and also in the sections of rivers depicted in two lines with a width of the gap between them less than 3 mm, it is advisable that the conventional symbol «state boundary» should be applied in the form of links of the dash-dot line, one after another on the one side of the river (stream, canal) and on the other one.

The symbol «boundary marker» can be represented on the map as a circle, an equilateral triangle or other geometric figure with a dot in the center (a letter punch). In a land section of the boundary, the conventional symbol «boundary marker» denotes the location of a center ZOM or a boundary marker consisting of one element.



In a water section of the boundary, the conventional symbol «boundary marker» is represented by two circles marked at the location sites of boundary pillars. In a case when a boundary marker is not coordinated as it is in the instance of intermediate or lake markers, it is advisable that the punch in the center of the symbol of a boundary marker (or pillar) should not be applied. In this case, when reading the map it will be understood that this boundary marker has no coordinates and serves to provide visibility between boundary markers.

The serial number of a boundary marker on the demarcation map should be specified with Arabic numerals alternately in the territories of both states. If need be (based on a topographic framework), numbers can be applied in the territory of one state. In the case where a meeting boundary pillar is shown on the map more than 5 mm away from the main group of a transitional marker, it is advisable that the number of the boundary marker should be repeated next to the meeting pillar. Such an approach will allow for better orientation in the location of elements of a boundary marker and in the course of the state boundary.

### 13.1.2 Preparing Boundary Markers Protocols

Requirements for the content of boundary markers protocols (hereinafter – the Protocols), their format and layout, procedure for the exchange of graphic and narrative information, order of replication and design for binding volumes should be stated in the technical specifications on preparing the Protocols.

For the Protocols, it is advisable that a standard A4 sheet (210 mm in width and 297 mm in height) should be used. At the same time, all information should be placed on one sheet, preferably on the face thereof. The size of the margins at the edges of a sheet depends on the method of subsequent binding into volumes and can constitute: for the left margin – 40 mm, for the rest of them – 20 mm. The size of the font used depends on the amount of information that the demarcation commission intends to specify in the Protocol.

Protocols of boundary markers are created for all erected boundary markers, regardless of their type (Appendix 11). Each Protocol contains:

- header indicating the number of a boundary marker;
- narrative description of a boundary marker: type, number of elements and material they are made of. For example:

The main boundary marker consists of three elements: a center zero-offset monument, a reinforced concrete boundary pillar of the Republic of Lithuania and a reinforced concrete boundary pillar of the Republic of Belarus.



The river boundary marker consists of two elements: a reinforced concrete boundary pillar of the Republic of Lithuania and a fiberglass boundary pillar of the Republic of Belarus.

The intermediate boundary marker consists of a solitary reinforced concrete boundary pillar.

- tile of the demarcation map showing the location of a boundary marker. The tile of the demarcation map is a "cut-out" from the demarcation map. It is important that in the center of a tile, depending on the type of a boundary marker, there should be a center monument, a demarcated point or a lake boundary marker.

For transitional boundary markers from an overland section to a water section and back, the center should be understood as the middle of a line between the center monument and the related boundary pillar, and in transitional boundary markers from one water body to another, – the middle of a line between demarcation points. On each tile of the map, names of the states should be placed. The scale of the map is indicated in the lower right corner of a map tile;

- layout of elements of a boundary marker.

The elements of a boundary marker shown on a diagram are drawn at an arbitrary scale while preserving mutual positional relationships of adjacent boundary markers and terrain elements shown in the diagram. Diagrams indicate a distance (in metres) between the elements of a boundary marker and neighboring boundary markers. The diagrams should not show the elements of the terrain situation, unless they provide additional information on the location of boundary markers' elements relative to the boundary line. Conventional symbols on a diagram locating the elements of boundary markers must correspond to the conventional symbols of boundary markers used on the demarcation map;

- table of coordinates and elevations of elements of boundary markers. The table indicates:

- elements of boundary markers, whose coordinates were obtained during demarcation;

- geodetic (B and L) and planimetric rectangular (x and y) coordinates within applied coordinate systems;

- altitude above sea level in a system of elevations determined by the demarcation commission.

Geodetic coordinates are specified up to a ten-thousandth of a second and planimetric rectangular coordinates and elevations – to the nearest centimetre;

- narrative part on the number of copies of the Protocol indicating the languages in which they are compiled;

- narrative part as to the place and date of signing the Protocol;

- names of delegations and commissions;



- surnames and names of signatories of the Protocol;
- signature block.

In some states, Protocols contain photographs of a boundary marker (Appendix 12).

Taking into account that the Protocols will be prepared in both states, a procedure for the exchange of graphic and narrative information should be provided. It is advisable, for example, that the following should be specified:

- narrative part of Protocols is to be transmitted as a document created in the WORD program, using the Times New Roman font;
- layout diagram of elements of a boundary marker is to be transmitted electronically in the format \* .bmp or \* .dgn;
- for each boundary marker, a separate file with a name including its number.

Protocols of boundary markers can be prepared immediately in the languages to be used during their signing. However, the best option seems to be that they should be prepared, coordinated and verified when accepting a demarcated boundary in a language convenient for both delegations. For example, at the Belarus-Latvia and Belarus-Lithuania boundaries, draft Protocols were prepared in Russian, but when preparing them for publishing, they were translated into the Belarusian and the Latvian languages, Belarusian and Lithuanian, respectively.

### 13.1.3 Preparing a Catalogue of Boundary Markers' Coordinates

The preparation of a Catalogue of Boundary Markers' Coordinates (hereinafter – the Catalogue) is the final stage of geodetic work, and its content largely depends on the decisions of the demarcation commission that determined the requirements for geodetic work.

The contents of the Catalogue, a procedure for its design, software products used in its preparation, a procedure for the exchange of graphic and textual information, its replication and a design of bound volumes should be determined in the technical specifications for its preparation.

The catalogue is created for all erected boundary markers and contains coordinates and elevations of main, river, transitional and lake boundary markers, their elements and demarcation (analytical, mathematical) points on the water surface. In addition, the Catalogue should specify numbers of boundary markers, whose coordinates



were not determined. Coordinates and elevations of intermediate boundary markers and coordinates of lake boundary markers emplaced within the range of alignment between boundary markers should not be entered in the Catalogue. Elevations of lake boundary markers and those of demarcation points are not specified.

The catalogue consists of a textual section and a graphic one. The textual section contains a list of coordinates and elevations of boundary markers, a list of coordinates of geodetic points, and the graphic section provides diagrams of locations of boundary markers and that of a geodetic network, as well as diagrams of transitional boundary markers.

With the advent of digital technologies, a new practice has gained momentum in determining the coordinates of demarcation (analytical, mathematical) points for establishing the course of the state boundary in boundary water bodies. There are several options for doing this:

-first, demarcation points are determined only within the range of the boundary pillars of a river boundary marker;

-secondly, the demarcation commission specifies the maximum distance between two successive demarcation points to be determined, for example not less than 30-50 meters;

-thirdly, demarcation points are determined in such a way that the boundary line should pass in maximally straight sections with minimal deviation from a bending of the median line of the river bed.

Depending on the length of a water body and the option selected, there may be several thousands of demarcation points. Enumeration of such a number of coordinates in the Catalogue in a tabular form will lead to a significant increase in the number of pages in it and will complicate the work with other data. The best option is to list the coordinates of such points separately for each water body, in a table, after the list of coordinates and elevations of boundary markers. The list of coordinates and elevations of boundary markers should specify the demarcation points located within the alignment of boundary pillars of river boundary markers.

The list of coordinates and elevations of boundary markers constitutes a table which specifies:

- numbers of boundary markers;
- elements of boundary markers (BM), whose coordinates were obtained during demarcation;
- geodetic (B and L) and planimetric rectangular (x and y) coordinates;
- elevation above sea level.





Geodetic coordinates are specified up to a ten thousandth of a second and planimetric rectangular coordinates and elevations – to the nearest centimetre. For boundary markers whose coordinates were not defined in the table, their number is provided, but coordinates and elevations are not given, with dashes shown instead. The table of coordinates and elevations contains values that are approved by the demarcation commission. Particular attention should be paid to the fact that coordinates and elevations in the Catalogue and those in Protocols of boundary markers should not have any discrepancies.

The list of coordinates of geodetic stations is provide in a table which should specify:

- consecutive number;
- name or number of a geodetic station;
- class (order) of a geodetic station;
- geodetic (B and L) and planimetric rectangular (x and y) coordinates;
- elevation above sea level.

In the Catalogue, names of stations of state geodetic networks can be given in the language of the state in whose territory it is located, or in the languages of both adjoining states.

On each sheet of layout diagrams of boundary markers or a geodetic network, names of the states should be present. Below titles of diagrams, information on the site displayed on the diagram should be provided: «Site from BM No. \_\_\_ to BM No. \_\_\_», and in the upper right corner – a reference to sheets of the demarcation map: «Sheets of the demarcation map No. \_\_». The scale of diagrams is determined depending on configuration and length of the boundary, the number of boundary markers and that of stations of a geodetic network and their positional relationship, etc. For example, a geodetic network diagram can be drawn at a scale of 1: 200,000, and a layout diagram of boundary markers – at a scale of 1: 50, 000.

Each boundary marker on a layout diagram of boundary markers is denoted by one conventional symbol, regardless of the number of elements. The number of a boundary marker is accompanied with a conventional symbol of the type of the boundary sign given in parentheses. On adjacent sheets of a layout diagram of boundary markers, one boundary marker must be duplicated. On a layout diagram of boundary markers in river sections, the state boundary line delineates the contour of a water body, generalized for a scale of 1: 50,000. On a diagram of a geodetic network, the state boundary line delineates the contour of a water body (excluding lakes and



reservoirs), generalized for a scale of 1: 200,000.

The need for diagrams of transitional boundary markers is derived from the peculiarities of the boundary's passage in places of their erection, namely from different options for the number of boundary markers' elements and their locations on the terrain, and also by the possible presence of two or more demarcation points in which the direction of the boundary is changed.

#### **13.1.4 Preparing the State Boundary Description**

The State Boundary Description (hereinafter – the Description) contains information on the passage of the state boundary between adjoining states, types of boundary markers, distances between boundary markers and the total length of the state boundary.

The need to describe the state boundary largely originates from a traditional approach to the preparation of final demarcation documents. When the description of the boundary was compiled in the field, and the cartographic material used could be irrelevant and sometimes unreliable, the description of the boundary was of paramount importance. The transition to digital technologies, as well as the ability to use various methods of remote sensing of the Earth (from unmanned aerial vehicles (drones) to space craft) allow obtaining cartographic materials with high accuracy, reliability and relevance. Taking into account that the Description is drawn up based on the demarcation map and actually describes the boundary line laid down on the map, the degree of significance that is traditionally attached to the Description gives rise to doubt.

In a number of countries, the Description is drawn up in the form of a main outcome document of boundary demarcation under the title «Protocol- Description of the State Boundary Course». The rest of demarcation documents are attached to the «Protocol-Description».

If a decision has been taken by the adjoining states to compile a Description, then an appropriate instruction (rules, technical conditions) should be developed.

The Description is composed based on a demarcation map, a Catalogue of boundary coordinates and boundary markers' Protocols. If necessary, additional information can be used.

In order to facilitate the subsequent use of the Description in geographical information systems, it is advisable that it should be prepared in a tabular-textual form (Appendix 13).



In the practice of boundary demarcation, there have been cases when the Description of a state boundary course and the Catalogue of coordinates of boundary markers are combined into one document (Appendix 14).

The demarcation commission must determine the rules for drawing up a description. It may stipulate that:

- the Description is carried out in a general direction from west to east (from south to north) and is compiled, following the ascending order of boundary markers' serial numbers, in blocks for each land and water section of the state boundary;
- in land sections, the direction of the boundary course is determined with respect to the cardinal points by sectors (for example equal to 22.5 °), any change in direction being reflected in the Description;
- in water sections, the Description is drawn up, specifying the direction of the state boundary course downstream of rivers or upstream;
- large geographic landmarks (rivers, roads and railways, large forest tracts or natural ecological sites, denominated settlements, etc.) within the limits of a demarcation map should be included in the description of the state boundary, whereupon distances to local landmarks should be given up to 0.01 km (all names being furnished in the official languages of adjoining states);
- when the state boundary passes in river sections, its position should be described with respect to the nearest islands, their state affiliation being expressly identified, etc.

Depending on the types of boundary markers and their design features, different options of the boundary course from one boundary marker to another can be selected. For example, the Description is based on the conditions that the state boundary passes on the terrain between:

- adjacent main boundary markers – from a center monument to another center monument;
- a main boundary marker and a transitional boundary marker – from a center monument to a demarcation point in the water;
- adjacent transitional boundary markers (when the boundary transits from one water body to another) – from a demarcation point to another demarcation point;
- a main boundary marker and a river boundary marker (in a case when a land section from a main boundary marker passes into a river section or a river section passes to a main boundary marker) – from a center monument to a demarcation point in the water;
- a lake boundary marker and a main boundary marker – from a buoy to a center

monument;

- a lake boundary marker and a river boundary marker – from a buoy to a demarcation point;- adjacent lake boundary markers – between adjacent demarcation points, adjacent lake boundary markers, a demarcation point and an adjacent lake boundary marker or a lake boundary marker and an adjacent demarcation point;
- river boundary markers – in the middle of a waterway channel, from a demarcation point to another demarcation point, etc.

The Description uses geographical names of the objects displayed on the demarcation map, along which or alongside which the state boundary runs. For objects located on the state boundary, geographical names should be indicated in two languages, and exits of motorways and railways that cross the state boundary – in the language of the state in whose territory they are located.

The demarcation commission should define the precision with which a distance between boundary markers is measured, as well as the manner to measure distances between them. For example, a distance between boundary markers can be defined as a horizontal equivalent and should be calculated from coordinates with regard to correction factors for a distance from the axial meridian and for a difference of elevation above sea level.

In the technical conditions on preparing the Description, the order of exchanging textual and graphic information, software products used, data formats, etc. should be also specified.

### **13.2 Accepting the Demarcated Boundary**

The acceptance of the demarcated boundary is carried out by the demarcation commission after clearing the state boundary strip, erecting and coordinating boundary markers and preparing draft final documents of boundary demarcation within a section under acceptance.

It is advisable that the acceptance of the boundary should be carried out in two stages:

in the first stage – by expert groups that include representatives of interested services of adjoining states (participation of local representatives of such services is especially important). It is advisable that the working groups should include representatives of a regional land management service and organizations responsible for transboundary civil works (railway and automobile bridges and roads, dams, floodgates, etc.);

in the second stage, the acceptance is carried out by the demarcation commission. Taking into account expert evaluation of a section's readiness for acceptance, it takes one of the following options:

- approves the expert evaluation report for the state boundary demarcated section and accepts the specified section of the boundary, having executed the certificate of its acceptance;
- performs selective acceptance of the section on the terrain or throughout the entire length of the section with the subsequent execution of the certificate of its acceptance.

It is expedient that acceptance of the boundary should be carried out along the sections, whose length should be determined depending on terrain conditions, the number of boundary markers, transboundary civil works and facilities, etc. As a rule, the length of a section does not exceed 30-50 km.

Initially, the demarcation commission, together with the leaders of groups that will perform expert evaluation of the boundary, is advised to consider approving one individual section at a time. Such an approach will provide for checking acceptance rules in practice and, if necessary, making changes, as well as demonstrating a uniform acceptance method for all the groups.

During the acceptance, it is recommended that the following main points should be checked:

- compliance of the demarcated boundary's course with the delimitation line of the boundary and the decisions of the demarcation commission;
- compliance of the position of boundary markers with the Project for Arranging Boundary Markers at the State Boundary;
- ensuring visibility between boundary markers, as well as visibility between boundary pillars in transitional and river boundary markers, compliance with other technological specifications for erecting boundary markers;
- accuracy of determining the coordinates and elevations of boundary markers, as well as distances between them;
- quality of drafting boundary demarcation final documents, for the section under acceptance;
- availability of an Expert Evaluation Report for the demarcated section of the state boundary, if such expert evaluation was carried out, and of a report on eliminating the identified shortcomings.

Based on the results of the acceptance, a Certificate of Acceptance of a Demarcated Section of the State Boundary (hereinafter – the Acceptance Certificate) is to be drawn up in duplicate that reflects the results of acceptance with the obligatory listing of

accepted works, facilities, documents, etc.

The Certificate of Acceptance shall specify:

-the total length of the accepted section of the boundary, including land, river and lake sections separately;

-number and types of boundary markers;

-a list of boundary demarcation final documents prepared for the section under acceptance;

- civil works for tapping and passing water, bridges, dams and other facilities within the state boundary strip.

-In the Certificate of Acceptance, it is necessary that the following characteristic features be specified:

a) when accepting the state boundary strip:

- limits of a boundary section to be accepted from a boundary marker to another boundary marker;

- compliance of the state boundary strip's width with the regulation measurement;

- presence within the state boundary strip of natural objects (trees, shrubs, overhanging crowns of trees, etc.) and structures that prevent visibility between boundary markers on land or between boundary pillars within river and transitional boundary markers, as well as of large erosion scours of soil and deep pits;

- deadline for the elimination of revealed shortcomings and a procedure for verifying their elimination.

b) when accepting boundary markers:

- correlation of boundary markers' emplacement sites on the terrain, as well as of their types, to the project for arranging boundary markers;

- accuracy of transferring and positioning in-situ emplacement sites for boundary markers from the map to the terrain (survey grid stationing);

- compliance of boundary markers' construction with the established requirements (height of boundary pillars and center zero-offset monuments (ZOM), distance between a boundary pillar and a ZOM, and other parameters stipulated by permissible deviations);

-presence of line-of-sight between adjacent boundary markers in land sections of the boundary, and in each river and transitional boundary marker, – between boundary pillars within these markers;

- availability on boundary pillars of state symbols (plates depicting the state arms, appropriate coloring of boundary pillars) and numbers of boundary markers;

- deadline for eliminating the revealed drawbacks and a procedure for verifying their elimination.

c) when accepting protocols of boundary markers:

- existence of a protocol for each boundary marker within the section under acceptance;
- compliance in form and substance of each boundary marker protocol with technical conditions on preparing boundary markers' protocols;
- total number of accepted boundary markers' protocol, by types of boundary markers;
- numbers of boundary markers, whose protocols proved inconsistent during the course of their compilation and timing for submitting corrected protocols and a procedure for their verification.

d) when accepting a description of the state boundary:

- completeness of the state boundary description, including availability, if necessary, of a table of national affiliation for islands;
- compliance in form and substance of the description of the boundary line's course with the requirements of technical specifications on preparing a description.

e) when accepting a catalogue of coordinates for boundary markers – correspondence of the catalogue data to the data specified in protocols of boundary markers, as well as obtained during measurements on the terrain.

It is advisable that a check of draft final documents should be carried out that falls into three stages:

- in the course of the first stage – by each delegation independently;
- in the second one – during acceptance of a section;
- during the third stage – at a meeting of the demarcation commission after having eliminated the revealed shortcomings.

Based on the results of the acceptance, an acceptance certificate is drawn up, completed with the original document of an expert evaluation report for the demarcated section of the state boundary, if evaluation as such was carried out.

If there are any shortcomings that prevent acceptance of the boundary, the acceptance shall be performed after their elimination.

When accepting the boundary, the necessary technical means and measuring instruments are to be provided by the state, in whose area of responsibility the acceptance is carried out. The corresponding measuring work is also carried out by its technical staff with the participation of representatives of the adjoining state.

The procedure for accepting the boundary and sample acceptance certificates should be expressly defined in appropriate rules and regulations.

## 14. PREPARING SUMMARY DOCUMENTS OF STATE BOUNDARY DEMARCATION AND THEIR COMING INTO FORCE

Alongside with acceptance of the state boundary, the demarcation commission shall prepare the state boundary demarcation summary documents.

As a rule, demarcation documents are executed in duplicate, each consisting of a set of documents in the languages of the two adjoining states. Variations are possible when documents can be prepared in one of the languages or even in three languages (in this case the set of documents in the third language will be given precedence in the event of disagreements in the documents' interpretation). It is also recommended that copies of summary documents should be prepared in the interests of geodetic, border and land management services and other interested bodies of state administration.

Demarcation documents should be securely bound, while each bound package, as a rule, consists of the following:

- front cover;
- half-title;
- title page;
- contents;
- introduction;
- list of conventional notations (if any);
- summary sheet that contains information about the number of sheets in a volume, the date of its being bound and officially sealed.

The rest of sections may be added to, depending on the type of the documents bound.

The number of sheets in a bound volume is determined by paper weight of the sheets used in preparing demarcation documents and by the convenience of subsequently working with them. The optimal size of a volume is 200-250 sheets. Each sheet in a bound package is numbered, and the package itself is sealed with seals of the foreign ministries of both adjoining states.

The use of a different color for the front cover of each adjoining state will make it convenient for subsequent work with the documents. The cover of each volume specifies the type of document, a volume's number and a language in which it is executed.





The title page replicates the information displayed on the cover; in addition, the arms of both states may be depicted on the title page.

A table of contents includes a list of bound documents, indicating page numbers on which they are presented.

An introduction to each summary demarcation document should reflect general information on the prepared document.

On the inside of the cover, depressions may be provided for placing the stamped seals of the Foreign Ministries, bearing the coat of arms of both states, providing sealing is wax based. When sealing with special marks, there is no need for such depressions.

### **14.1 Demarcation Map**

The demarcation map, as a rule, consists of sheets of a topographic map, and its replication is carried out with the use of offset printing. To ensure authenticity and uniform color reproduction in all sets of documents, duplication of the demarcation map must be carried out at the same publishing enterprise.

In order to accept the demarcation map, it is advisable that a joint commission of representatives of geodetic services of the two adjoining states should be set up. The main task of the joint commission is to check the accuracy of laying the state boundary line upon the demarcation map. Firstly, plotter printing of the demarcation map's sheets should be verified, and then the entire print run after the offset printing of the demarcation map sheets should be checked. Before starting the replication, one should also perform a color offset printing test. Each stage of verification should be completed by drawing up a corresponding statement.

The sheets of the demarcation map are bound together in an album, which, alongside with the information specified in Chapter 13, includes:

- sheet layout diagram;
- conventional symbols;
- sheets of the demarcation map.

In some states, an electronic version of the demarcation map on a magnetic optical disc can be added to the album of the demarcation map.

A layout diagram for the sheets of the demarcation map should contain, at least, an inter-sheet relationship of demarcation map sheets, the state boundary line laid down upon the map and the names of the adjoining states. On the diagram, it is also expedient that boundaries of the units of administrative and territorial division should be shown in the territory of each adjoining state, as well as their names and



the conventional symbols used in drawing up the diagram. The informative value of the diagram will be significantly improved if it also displays major roads, large settlements, and hydrographic features; the map sheets should be numbered and should specify numbers of boundary markers. The scale of the diagram mainly depends on the length of the boundary and on the number of sheets which it will be laid down upon. For example, the scale of a diagram at the Belarus-Lithuania border was 1: 400,000, and at the Belarus-Latvian border – 1: 300,000.

Oftentimes, the adjoining states can use different conventional symbols to compose topographic maps; therefore, the demarcation commission has to develop a list of conventional symbols that meets the requirements of both states. The album should specify the symbols used and their denominations, as well as the abbreviations used and their full meanings. All information must be provided in the languages of the two adjoining states. If different conventional symbols were used to designate the same object in the territories of adjoining states, such conventional symbols should bear a note on which state's territory they are used.

The final stage in preparing a demarcation map album is the compilation of its introduction. In the introduction, it is necessary to provide information on the types of materials used to compile the map, the dates of the works done (aerial photography, field survey), the executors of the works, as well as how the works were distributed among adjoining states and on which map sheets there are inserts of a larger scale (if any), and other general information regarding the map.

#### **14.2 Protocols of Boundary Markers and a Catalogue of Boundary Markers' Coordinates**

Protocols of boundary markers are, if necessary, bound together into several volumes. Each volume, aside from the sections common for all summary documents, includes:

- conventional symbols;
- protocols of boundary markers.

The section of conventional symbols includes the symbols used to denote boundary markers and explanatory inscriptions to them.

The introduction provides the total number of boundary markers (including their type) for the entire state boundary, and in particular for each volume, the number of Protocols' volumes and other information.

In the Catalogue of Coordinates of Boundary Markers, aside from the sections common for all summary documents, the following is specified:

- list of coordinates and elevations of boundary markers;
- list of coordinates of baseline geodetic stations;
- layout diagrams of boundary markers;



- diagram of a geodetic network;
- diagrams of transitional boundary markers.

In the introduction to the Catalogue, it is advisable that the following be indicated:

- period of time during which work was carried out to determine coordinates and elevations of boundary markers;
- instruments used to perform geodetic measurements;
- information on baseline geodetic stations, a common geodetic network and the methodology of performing geodetic work, as well as on errors obtained in the result of processing measurements;
- explanations on the elements of boundary markers, to which the coordinates and elevations determined in geodetic or analytical methods relate;
- peculiarities of determining the coordinates of demarcated points in water bodies;
- information about the systems of coordinates and elevations used.

The textual part of the Catalogue, as a rule, is printed within a sheet of A4 format, and the graphic part – within a sheet of A3 format. The definition of margins at the edges of the sheet depends on the order of their binding into volumes.

### **14.3 State Boundary Description**

The state boundary description can consist of several volumes, especially if the boundary is long. Each volume, beside the sections common to all demarcation documents, includes:

- list of conventional abbreviations;
- state boundary description;
- data on the length of the state boundary;
- table of the state affiliation of islands (if any).

In the introduction to the Description, it is necessary to specify:

- number of volumes in the Description;
- total length of the state boundary (including the length on land, in rivers, streams, canals, lakes and reservoirs);
- total number of boundary markers (including main, river, transitional, intermediate, lake, special and junction);
- principles for drawing up a description of the state boundary.

In order to prevent the appearance of contradicting data on the length of the state boundary (depending on the metric criteria used) in the official documents, it is advisable that the length of the state boundary in km, m and cm should be specified.



The list of islands located in the border water bodies near the state boundary should specify the following information:

- name of a water body where the island is located;
- number of a demarcation map sheet;
- island's number and the numbers of boundary markers between which it is located;
- island's state affiliation and its name (if any) and area.

The numbering of islands is determined separately for each water body. In some cases, the adjoining states can agree to enumerate, and include in the list, the shoals available. Bear in mind that shoals are less stable geographical objects than the islands, and before making a decision as to take them into account, the hydrological regimen of water bodies and the duration of the existence of the shoals should be carefully studied.

#### **14.4 Summary Protocol of the State Boundary Demarcation**

In the Summary Protocol of the state boundary demarcation, as a rule, the following main points shall be specified:

- dates of commencement and completion of work, lists of members of delegations (dates of their work and legal grounds), number of meetings, encounters, etc. held by the demarcation commission;
- general data on the length of the state boundary, the number and types of erected boundary markers;
- responsibility areas for works' execution into which the boundary was divided;
- general information on the summary documents of the state boundary demarcation (which documents were prepared, in how many volumes each document is bound up, etc.).

In the Summary Protocol, it is necessary to provide a statement that the summary demarcation documents do not contain ambiguity and uncertainty, and all works stipulated in the State Border Treaty are fully implemented, consistent with its objectives and the requirements of the Regulations on the state boundary demarcation.

The Summary Protocol also reflects the main events of demarcation work and the decisions taken by the demarcation commission. For example, decisions relating to a modification of the course of the boundary or to cases of derogations from the rules and principles adopted by the demarcation commission. It is also advisable that an instruction on the procedure for marking out the state boundary should be

attached to the Summary Protocol.

The Summary Protocol should not only sum up the demarcation of the state boundary, but also should contain the information that will contribute to the effective maintenance of the boundary and subsequent checks of its course.

#### **14.5 Reconciling Summary Demarcation Documents and Their Signing**

An essential problem in the preparation of final documents is ensuring the authenticity of all copies of the summary documents, as well as preventing any discrepancies with working projects. The solution to this problem is achieved by reconciling the summary documents with one another and with the working projects after their replication, as well as by re-checking them after the documents have been bound together.

In order to carry out these works, the demarcation commission forms a joint working group from among the members of delegations and experts from the geodetic services of both adjoining states.

The joint working group when reconciling:

- the protocols of boundary markers and the catalogue of boundary markers' coordinates, compares the data specified in all copies of the boundary markers' protocols and their respective catalogue of coordinates with similar data in the working draft protocols and their respective catalogue of the boundary markers, as well as with the demarcation map;
- the Description of the state boundary, paying special attention to comparing numerical indicators and geographical names of objects with the similar data in the draft description, as well as with the demarcation map.

Upon completion of reconciliation of executed summary demarcation documents, the officials specified in the Regulations on State Boundary Demarcation sign each sheet of the demarcation map, each protocol of a boundary marker, and only the title page of the Catalogue of boundary markers' coordinates and that of the State Boundary Description.

After signing the summary documents, the joint working group binds the summary documents and reconciles them once again. Experience shows that during the stage of signing or binding the documents, technical errors are possible.

Each stage of reconciliation of summary documents is completed with signing a relevant statement or protocol.

The summary documents should be sealed after reconciliation of previously bound summary documents has been finalized, as a rule, at a meeting of the demarcation commission.

#### **14. 6 Coming into Force of the Summary Documents of State Boundary Demarcation**

After signing the summary protocol, the summary documents of the state boundary demarcation are subject to a domestic procedure of agreement and approval.

Drawing on the experience of Belarus, Lithuania and Latvia, the summary documents should be coordinated with all state administration bodies and local authorities and should be approved by the governments.

The summary documents on the state boundary demarcation, as a rule, come into force as of the date of exchange of notifications about the completion of necessary domestic procedures mandatory for their approval, or as of the date of receipt of the last such notification.

## 15. PECULIARITIES OF DEMARCATION OF STATE BOUNDARY JUNCTION POINTS (TRIPPOINTS)

The main feature of the demarcation process for state boundaries' junction points is that more than two states are involved in it. At the same time, organization and execution of works on demarcation of the state boundaries' junction points are similar to the state boundary demarcation between two states. The participation of three delegations within the demarcation commission somewhat complicates the process of reaching agreements that could satisfy the negotiating positions of delegations, but does not introduce conceptual changes in the process of demarcation.

One of the peculiarities of state boundary junction points is that they are attractive for tourists, as a rather rare sightseeing. The boundary markers placed at the state boundary junction points differ in their construction from standard boundary markers, and the landscape in the vicinity of the state boundary junction points is completed with recreation sites, installations, and other amenities. (Appendix15).

After the demarcation of a state boundary junction point, the following documents should be developed:

- demarcation map of an area of a boundaries' junction point;
- protocol of a boundary marker;
- summary protocol of the demarcation commission.

The demarcation map is typically drawn on a large scale, sometimes with the enlarged insert of topographic survey of the state boundaries' junction point, and should be constructed based on the updated survey of the terrain. On the map sheet, beside the topographic base and other attributes inherent in the demarcation map, the conventional symbols and abbreviations used should be specified.

The protocol of the boundary marker, in addition to standard data, can contain as appendices:

- drawings of a boundary marker's elements;
- photos of a boundary marker from the territory of adjoining states;
- list of coordinates and elevations of common geodetic network stations;
- diagram of a common geodetic network.

If a junction point of state boundaries occurs on the water surface, then it is advisable that the methodology (rules) for determining the coordinates of the state boundaries' junction point should be agreed upon.



The summary protocol should reflect key stages of demarcation works and decisions taken by the demarcation commission. It should specify:

- dates of commencement and completion of works, lists of members of delegations (dates of their work and credentials), number of meetings, encounters, etc. held by the demarcation commission;
- general data on the works performed, information on the summary documents of the state boundary demarcation.

The summary protocol should confirm that the summary demarcation documents do not contain ambiguities and uncertainties, and all necessary works are accomplished in full.

In the final protocol, it is also advisable that the maintenance of a junction point (tripoint) boundary marker should be specified as well as that for scheduled inspections of its state of repair, organization of its repair, its restoration, etc.

In practice, there have been cases of developing a protocol-description of a state boundaries' junction point. If, following the results of the state boundaries' junction point demarcation, a protocol-description of the state boundary has been developed, the summary protocol may not be required, and all other documents may be attached to the protocol-description.



## 16. CONCLUSIONS

1. The state boundary demarcation is a creative and proactive process within the activities of adjoining states, and there can be no single scientific methodology for organizing and successfully finalizing the process of demarcation.

2. The study of successful practices in state boundary demarcation is important for training specialists involved in demarcation, but the recommendations based on the positive experience of other states should be applied with discretion and due account of regional peculiarities.

3. The state boundary demarcation completes the process of allocation of territories between adjoining states; therefore, after demarcation of the state boundary, there should be no vagueness, ambiguities, or uncertainties as to the state boundary's position or course.

4. During the state boundary delimitation stage, it is of paramount importance to involve the specialists who, in the future, will proceed to work during the state boundary demarcation stage.

5. The participants in the state boundary demarcation seem to become «hostages» to the decisions taken in the state boundary delimitation stage, since it is in the delimitation stage that the boundary, being an abstract and imaginary line laid down upon topographic maps, evolves into a concrete and material state boundary line explicitly marked out on the ground. Therefore, during the delimitation stage, the parties to the negotiation process should not leave any issue unresolved or allow any strong assertions that could imply a double definition of the state boundary position or course.

6. The demarcation commissions, when marking the course of the state boundary on the terrain, should proceed, on the basis of the delimiting line of the boundary. At the same time, they should be able, in reasonably grounded cases, to change the position of the demarcation boundary line relative to the delimiting line, in order to contribute to the proper operation of transboundary facilities and the creation of favorable social and economic conditions for the cross-border population.

7. The successful demarcation of the state boundary is only possible if mutual interests of adjoining states are taken into account, and mutual respect for each other's negotiating positions is unconditional for them. It is unforgivable to manipulate facts, or to use unverified or knowingly false, materials and data.



## THE TWELVE COMMANDMENTS OF NEGOTIATION:

- Look into negotiable variables of your party's negotiation strategy, staying unbiased and impartial, to maintain a power equation in the course of negotiations.
- Avoid the perils of showing off your negotiating position as the only one that is reasonable, feasible, veritable and steadfast.
- Try to grasp the root motives of the opponent's stance, however unacceptable or repugnant it might be.
- Gain deeper insight into the mindset of the opposing partners, which will bespeak their next steps, their chances for giving in, and probable versions to be used for substantiating their stance.
- Realize that it is not only you who tackle your adversaries, for they are supposed to treat you by the same token.
- Give in and give away just a little. The opponent is sure to appreciate it, and in return you might gain twice as much.
- Keep cool and be patient. The precious hurry and rush in negotiations may well lead to irredeemable concessions, when you might give away too much in return for too little; or it may shatter your confidence, which will make you waver and retreat.
- Maintain your dignity and pride intact, leaving withdrawal routes not only for yourself, but also for your adversary.
- Never resort to ultimatums or extreme slogans, such as «not an inch of ground».
- Do not use patently false, misleading or unverified information, which can harm trust and mutual respect.
- Manage emotions, yours and theirs. In the course of negotiations, rejoice discretely, when you win or have a break-through, and disguise your unilateral delight, especially with the press, because this may be misinterpreted and negatively perceived by the other party;
- Remember, only mutual efforts from both sides will eventually lead to a successful outcome.

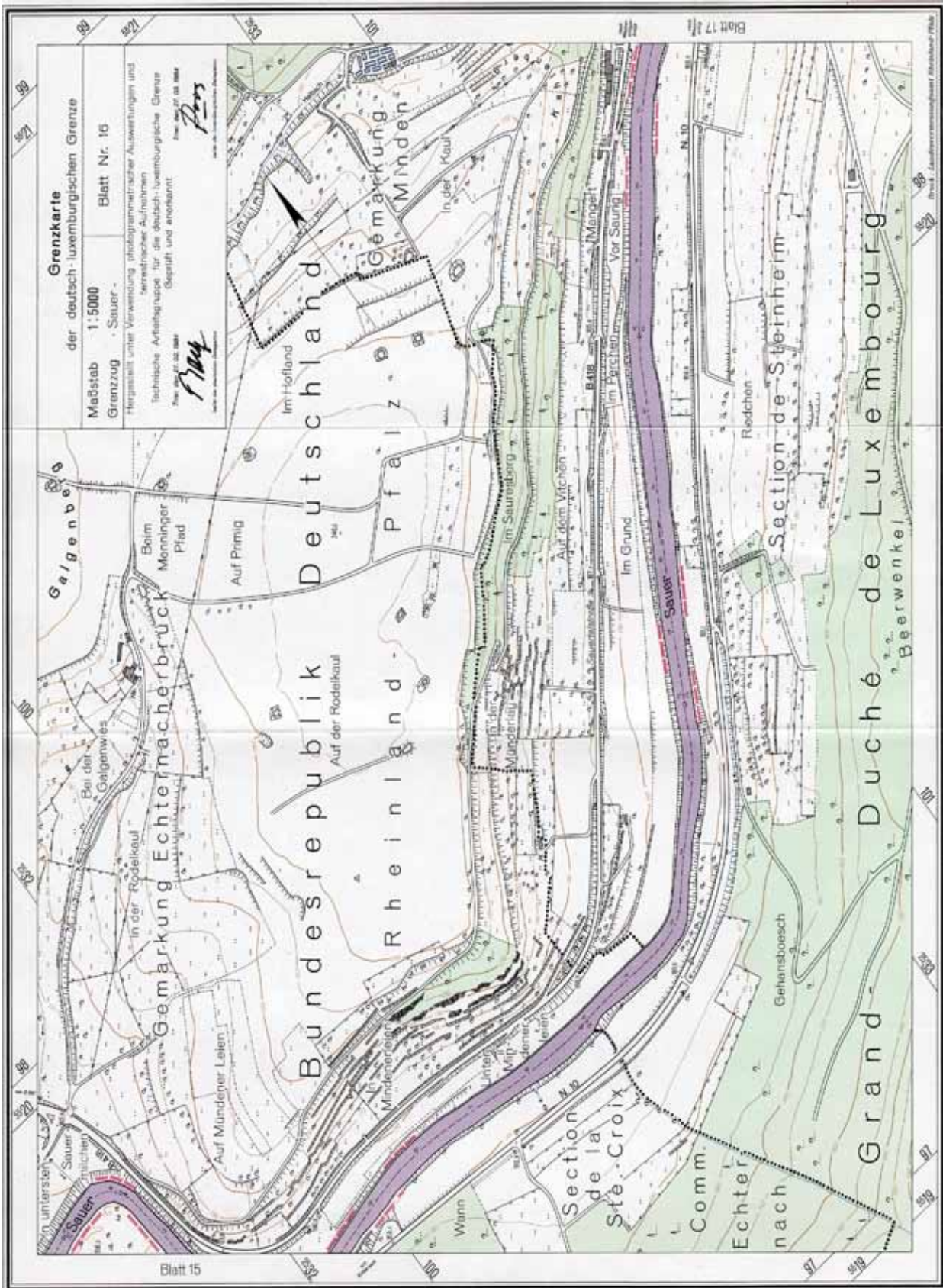
**By Dr. Zenonas Kumetaitis (Lithuania)**

*(excerpt from the Guidebook «Delimitation and Demarcation of State Boundaries: Challenges and Solutions»)*



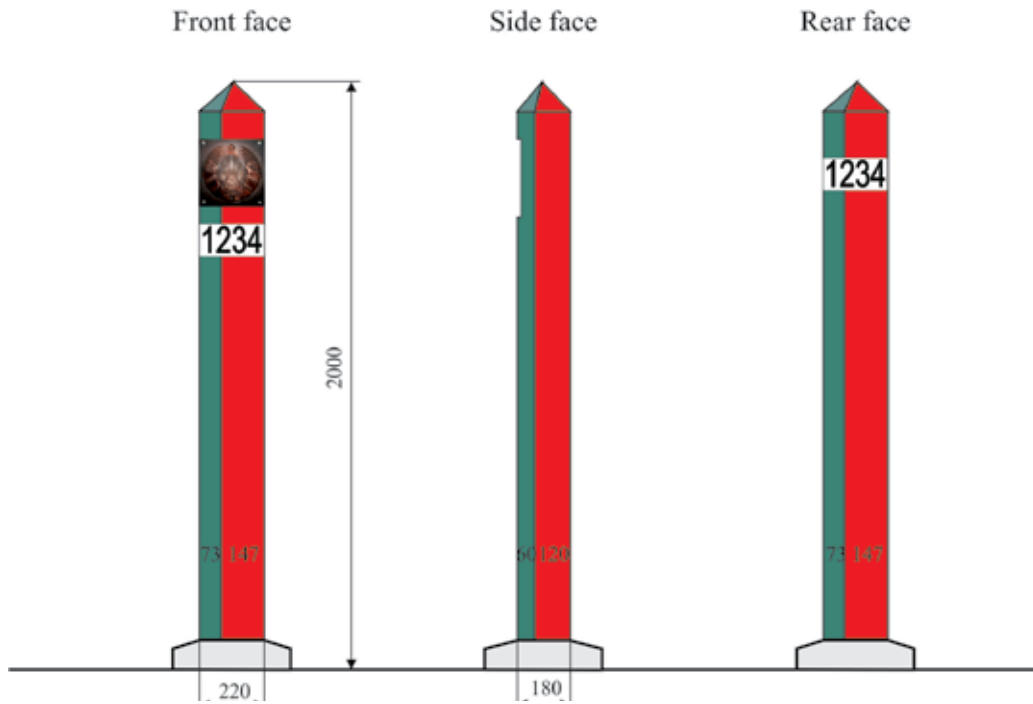
## Appendix 2

Sheet of a Demarcation Map for the Germany-Luxemburg  
State Boundary (1982)

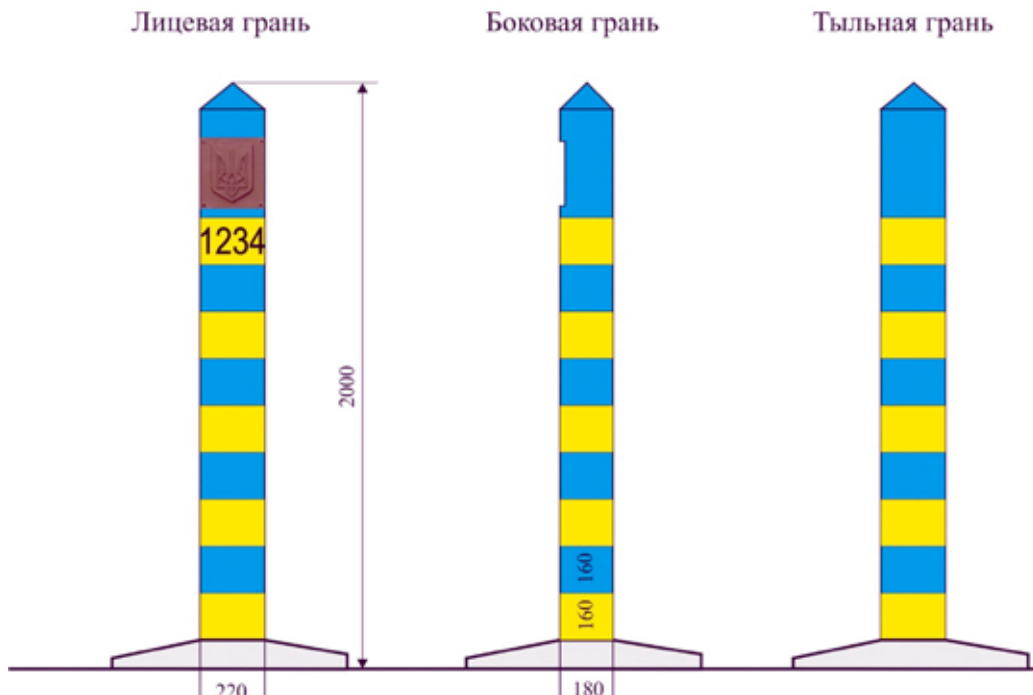


## Appendix 3

### Boundary Pillar of the Republic of Belarus

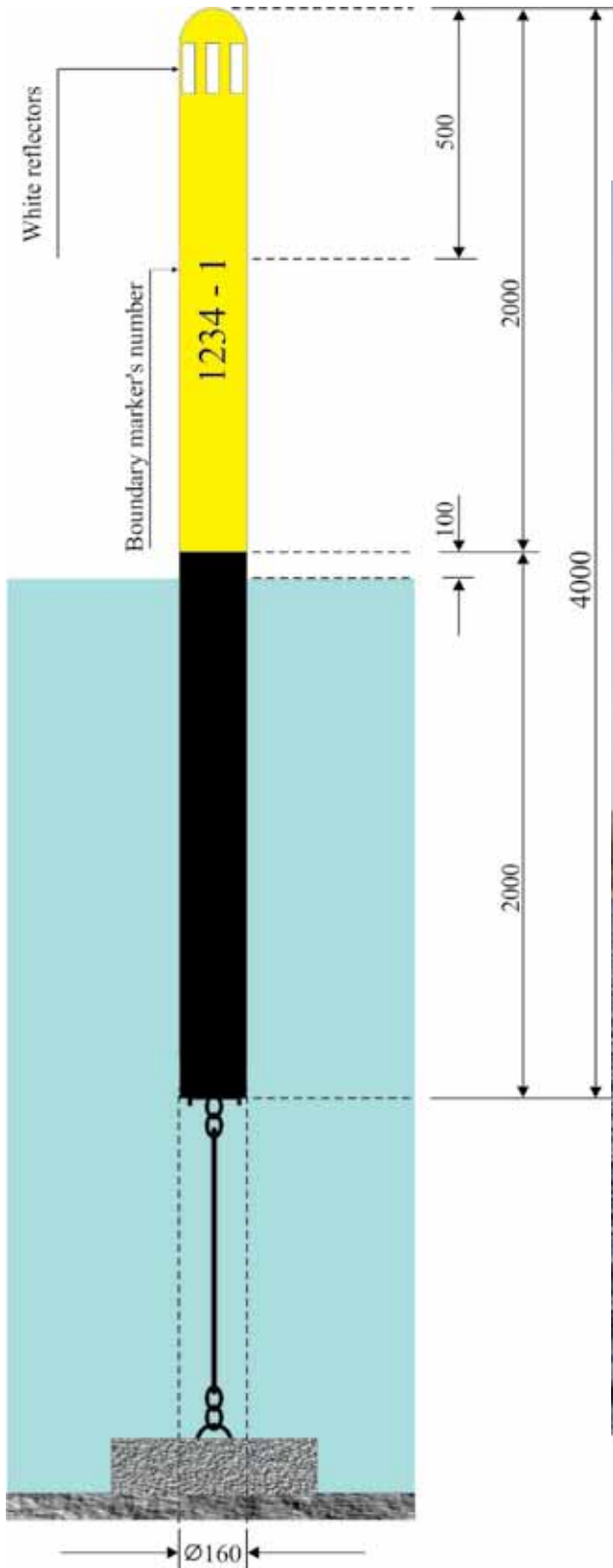


### Boundary Pillar of Ukraine



## Appendix 4

### Spar Buoy Construction as a Lake Boundary Marker



## Appendix 5

### Intermediate Boundary Marker



a) on the Belarus-Lithuania state border:



b) on the Russia-Ukraine state border:

## Appendix 6

### Special (Ad Hoc) Boundary Marker Construction



a) based on a natural object:



b) based on structures available on the boundary line:



## Appendix 7

### Marking the Position of the Belarus-Lithuania State Border on a motorway



## Appendix 8

Option 1

### STATEMENT for determining the emplacement site of boundary marker № \_\_\_\_\_

Location sketch



o - Emplacement site of boundary marker

Type of boundary marker, emplacement site's description \_\_\_\_\_

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Type of soil \_\_\_\_\_

The Statement is made \_\_\_\_\_ (date) in duplicate in the Russian language.

Chief of \_\_\_\_\_ (name of the  
country) part of Joint Working Group

Chief of \_\_\_\_\_ (name of the  
country) part of Joint Working Group

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Surname, First Name)

\_\_\_\_\_  
(Signature)

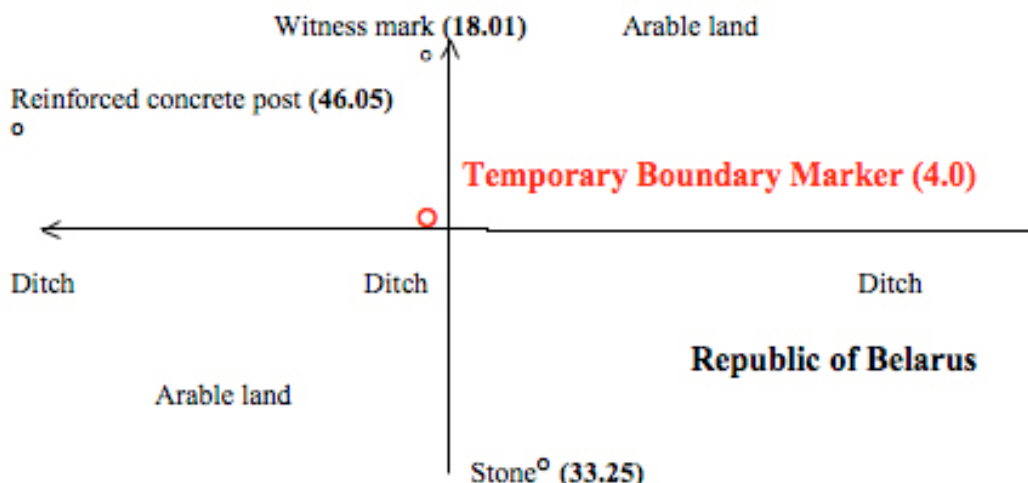
\_\_\_\_\_  
(Surname, First Name)



Option 2

**DIAGRAM (LOCATION SKETCH) OF EMPLACEMENT SITE FOR  
TEMPORARY BOUNDARY MARKER  
№ 98-16**

**Republic of Lithuania**



**Brief description of the terrain:**

The temporary boundary marker is erected 4.0 m from the endpoint of the ditch's tail southwesterly from the isolated farm yard of Kalvyai (Lithuania).

**PROTOCOL**

These are presently made in duplicate in the Russian language. The Protocol is signed in the Voronovsky district on 22 September 2005:

*The location of the temporary boundary marker as per Project of Arrangement for Boundary Markers approved by the Joint Demarcation Commission of the Republic of Belarus and the Republic of Lithuania.*

Expert of Technical Working Group of the Republic of Belarus on Demarcation of the Belarus-Lithuania State Boundary

Representative of the Republic of Lithuania in the Technical Working Group of the Republic of Belarus on Demarcation of the Belarus-Lithuania State Boundary

Signature \_\_\_\_\_ Name / Surname

Signature \_\_\_\_\_ Name / Surname

The Belarusian-Lithuanian Joint Commission on Demarcation approved **Protocol №33 of temporary boundary marker №98-16** in the settlement of Komarovo on **29 September 2005**

Chief of the Belarusian part of the Joint Commission on Demarcation

Chief of the Lithuanian part of the Joint Commission on demarcation

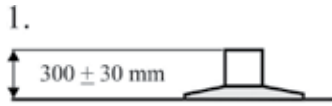
Signature \_\_\_\_\_ Name / Surname

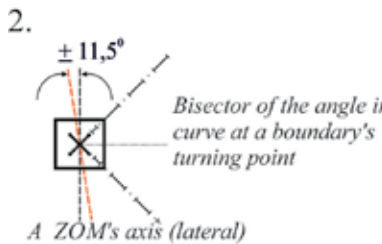
Signature \_\_\_\_\_ Name / Surname

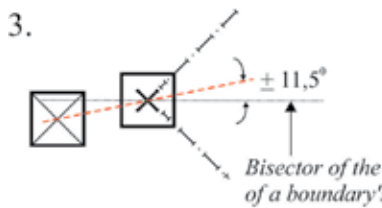


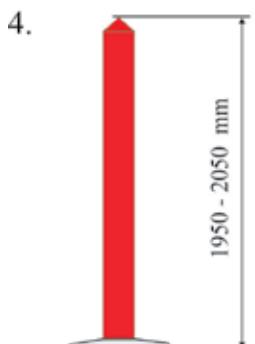
## Appendix 9

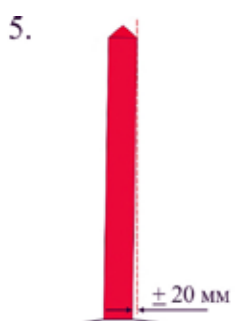
### Допустимые отклонения от параметров установки пограничных знаков

1.  Height of a zero-offset monument (ZOM) above the earth's surface available in a natural or artificial state, at the point of its emplacement, is 300 mm, tolerance is  $\pm 30$  mm.

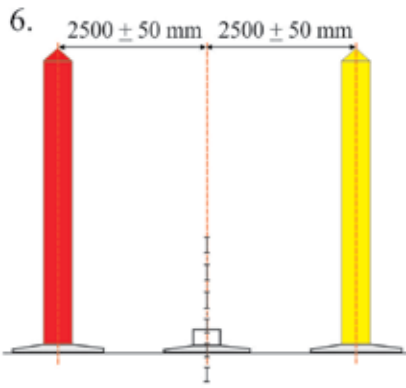
2.  Deviation of a ZOM's axis brought to the horizon through the middle of its lateral faces, from the boundary line within straight sections is  $0^\circ$ , and at angles in curves  $-90^\circ$  from the bisector, tolerance is  $\pm 11.5^\circ$ .
- Bisector of the angle in curve at a boundary's turning point*
- A ZOM's axis (lateral)*

3.  Deviation of boundary pillars' emplacement location from the bisector of an angle in curve of the boundary's turning point is  $0^\circ$ , tolerance is  $\pm 11.5^\circ$ .
- Bisector of the angle in curve of a boundary's turning point*

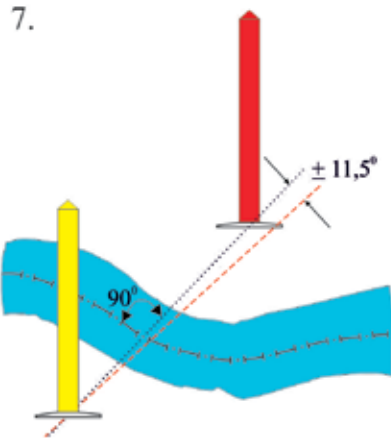
4.  Height of a boundary pillar above the earth's surface (in a natural or artificial state) at the site of its emplacement, is 2000 mm, tolerance is  $\pm 50$  mm.

5.  Отклонение вертикальной геометрической оси пограничного столба от прямого угла к земной поверхности в месте его установки 0 мм, допуск  $\pm 20$  мм.

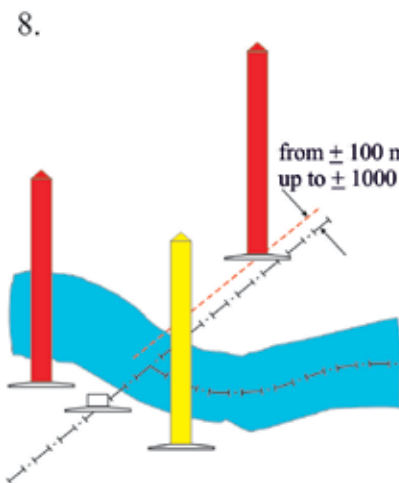




6. Distance between the vertical geometric axis of a ZOM and the vertical geometric axis of a boundary pillar is 2 500 mm, tolerance is  $\pm 50$  mm.

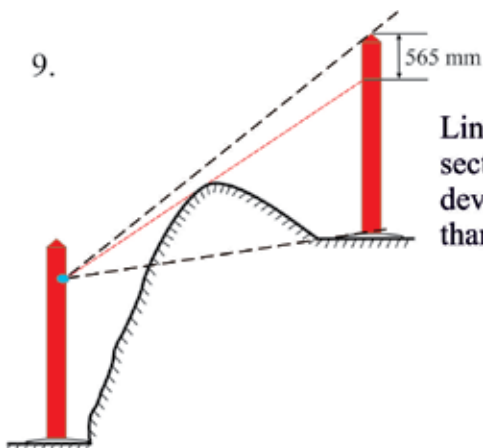


7. Deviation of the straight line connecting the centers of pillars of a riverine boundary marker from the axis of this boundary marker (i.e. a perpendicular to the line of the state border, drawn to the demarcated point from the center of one of the pillars) is  $0^\circ$ , tolerance is  $\pm 11.5^\circ$ .



8. Deviation of an axis of the meeting boundary pillar within a transitional boundary marker from the axis of boundary's conventional prolongation is 0 mm, tolerance for the width of a water obstacle:

|                     |         |                  |
|---------------------|---------|------------------|
| from $\pm 100$ mm   | <15 m   | - $\pm 100$ mm,  |
| up to $\pm 1000$ mm | 15-50 m | - $\pm 500$ mm,  |
|                     | >50 m   | - $\pm 1000$ mm. |



9. Line of sight between adjacent boundary markers (in a land section of boundary) from the height of the observation device's stand (1600 mm) is 2000 mm, tolerance is not less than 565 mm down from the top point of the boundary pillar.

# Appendix 10

## Demarcation Map Sheet for the Belarus-Lithuania State Border (2008)



## Appendix 11

### Samples of Boundary Marker Protocols

**ROBEŽZĪMES NR.0001 ABRISS**

*ROBEŽKARTES NR.1*

**ROBEŽZĪMES TIPS**

*Izmēri doti metros*

**PUNKTA ATRAŠANĀS VIETAS APRAKSTS** Latvijas Republika, Liepājas rajons, Rucavas pagasts.  
Lietuvas Republika, Klaipēdas apriņķis,  
Palangas pilsēta.

**PIEZĪMES** 1. Direktoriālie leņķi un malu garumi uzrādīti LKS 92 TM projekcijā.  
2. Robežpunkta atrašanās vieta sakrīt ar 1927. gadā ierīkotā lielā robežpunkta Nr.1 vietu uz Latvijas-Lietuvas valsts robežas.

**KOORDINĀTAS**

| ELIPSOĪDS GRS-80 |               | LKS 92     |            | LKS 94     |            | Baltijas augstumu sistēma |
|------------------|---------------|------------|------------|------------|------------|---------------------------|
| <i>B</i>         | <i>L</i>      | <i>X</i>   | <i>Y</i>   | <i>X</i>   | <i>Y</i>   | <i>H</i>                  |
| (° ' ")          | (° ' ")       | (m)        | (m)        | (m)        | (m)        | (m)                       |
| 00 00 00.0000    | 00 00 00.0000 | 0000000.00 | 0000000.00 | 0000000.00 | 0000000.00 | 0.00                      |

Sastādīja: Bronislovas Pyragas \_\_\_\_\_ 1998.09.05  
*(vārds, uzvārds)* *(paraksts)* *(datums)*

Izzīmēja: Vilija Daukšytė \_\_\_\_\_ 1999.04.14  
*(vārds, uzvārds)* *(paraksts)* *(datums)*

Pārbaudīja: Svajūnas Stankius \_\_\_\_\_ 1999.05.18  
*(Lietuvas puses pārstāvis)* *(vārds, uzvārds)* *(paraksts)* *(datums)*

Pārbaudīja: Jurijs Zabolotnijs \_\_\_\_\_ 2000.06.01  
*(Latvijas puses pārstāvis)* *(vārds, uzvārds)* *(paraksts)* *(datums)*

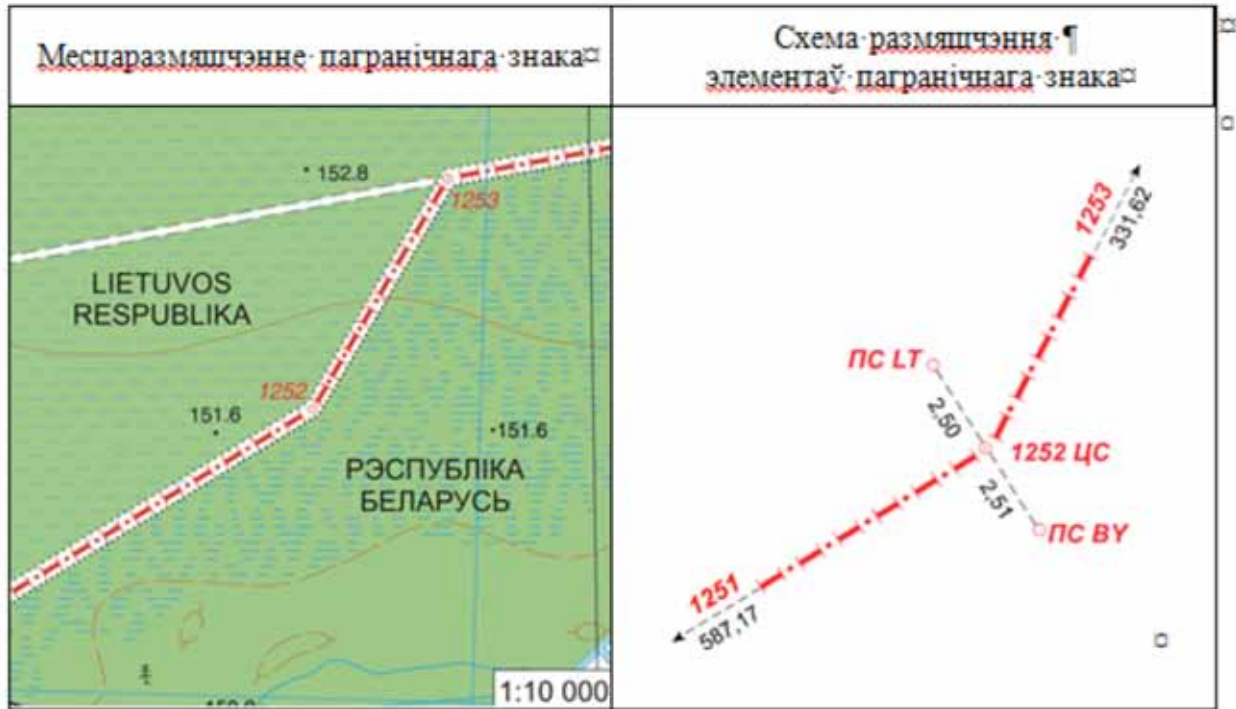
*Abrisu apstiprināja Latvijas Republikas un Lietuvas Republikas Jauktās valsts robežas atjaunošanas komisijas sēdē 2000. gada \_\_\_\_\_ Protokols Nr. \_\_\_\_\_*

a) at the Latvia-Lithuania state border:



## ПРАТАКОЛ ПАГРАНІЧНАГА ЗНАКА №0000

Асноўны пагранічны знак складаецца з трох элементаў: жалезабетоннага цэнтравага (палігонаметрычнага) слупка, жалезабетоннага пагранічнага слупа Рэспублікі Беларусь і жалезабетоннага пагранічнага слупа Літоўскай Рэспублікі.



| Элемент пагранічнага знака | Каардынаты                |              |                          |              | Вышыня                    |
|----------------------------|---------------------------|--------------|--------------------------|--------------|---------------------------|
|                            | Сістэма каардынат 1942 г. |              | Сістэма каардынат LKS-94 |              | Балтыйская сістэма вышынь |
|                            | В/Л (°..′..″)             | х/у (м)      | В/Л (°..′..″)            | х/у (м)      | Н (м)                     |
| ЦС                         | 00-00-00,0000             | 0-000-000,00 | 00-00-00,0000            | 0-000-000,00 | 000,00                    |
|                            | 00-00-00,0000             | 0-000-000,00 | 00-00-00,0000            | 0-000-000,00 |                           |

Дадзены пратакол складзены ў двух экзэмплярах, кожны на беларускай і літоўскай мовах.

Праатакол падпісаны ў г. Каўнасе 12 ліпеня 2006 года.

|                                                                                                                                                                                  |                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Беларуская частка</p> <p>Змешанай дэмаркацыйнай камісіі</p> <p>Старшыня</p> <p>_____ А. АРХІПАЎ</p> <p>Намеснік старшыні</p> <p>_____ В. КАЗАКЕВІЧ</p> <p>_____ Я. КАПЧАН</p> | <p>Літоўская частка</p> <p>Змешанай дэмаркацыйнай камісіі</p> <p>Старшыня</p> <p>_____ З. КУМЕТАЙЦС</p> <p>Намеснік старшыні</p> <p>_____ В. СТАСЮНАЙТЕ</p> <p>_____ Э. ШЛЕЙТЕРІС</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

b) at the Belarus-Lithuania state boundary:





## Appendix 12

### Sample of a Protocol with Inserted Photographs


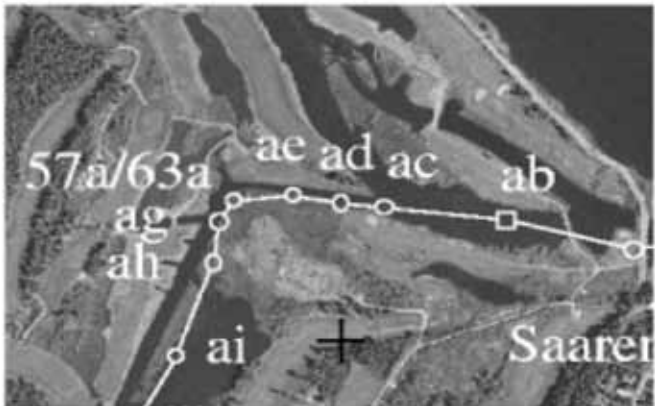
SUOMEN-RUOTSIN VALTAKUNNANRAJANKÄYNTI 2006

Rajamerkkipöytäkirja

110

RIKSGRÄNSÖVERSYNEN SVERIGE-FINLAND 2006

Gränsmärkesbeskrivning

| Rajamerkin nro<br>Gränsmärke nr                                                     | ag                                                                                                                                                                                                                                                 | Valtakunnanpyykki<br>Riksrose | Rakennusvuosi<br>Byggt år                                                            | 1937                                                         | Rajakartta nro<br>Gränskarta nr | 44, 48 |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------|--------|
| Koord.<br>Datum ETRS89                                                              | X / N                                                                                                                                                                                                                                              | Y / E                         | H<br>N2000                                                                           | Huom. / Anmärk.                                              |                                 |        |
| UTM 34 -<br>Kaista / zone                                                           | 7 308 187, 448                                                                                                                                                                                                                                     | 642 825, 389                  | 3,3                                                                                  | Korkeus lieriön yläpintaan.<br>Höjden på upperytan av konen. |                                 |        |
| Maantieteelliset<br>Geografiska                                                     | 65° 51' 46",3197                                                                                                                                                                                                                                   | 24° 07' 51",9728              |                                                                                      |                                                              |                                 |        |
| Etäisyys, m<br>Avstånd, m                                                           | 57a/63a                                                                                                                                                                                                                                            | 39,3 m                        | ah                                                                                   | 64,7 m                                                       |                                 |        |
| Suunta, gon<br>Riktning, gon                                                        |                                                                                                                                                                                                                                                    | 038,28 (ggg,dd)               |                                                                                      | 207,24 (ggg,dd)                                              |                                 |        |
| Sijainti<br>Läge                                                                    | Suensaaren luoteispuolella.<br>Nordväst om Suensaari.                                                                                                                                                                                              |                               |                                                                                      |                                                              |                                 |        |
| Tehtävä<br>Uppgift                                                                  | Osoittaa valtakunnanrajan taitepisteen ag.<br>Bestämmer riksgrensens brytningspunkt ag.                                                                                                                                                            |                               |                                                                                      |                                                              |                                 |        |
| Laatu<br>Beskaffenhet                                                               | Betoniperustalla rautabetoninen lieriö, jonka yläosa kavennettu kartioksi. Kartion päällä 2 m pitkä teräsputki.<br>Cylinder av armerad betong, upptill avfasad till en stympad kon och stående på betongfundament. Ovanpå konen 2 m långt järnrör. |                               |                                                                                      |                                                              |                                 |        |
|                                                                                     | Ruotsin puolella<br>På svenska sidan                                                                                                                                                                                                               |                               |                                                                                      | Suomen puolella<br>På finska sidan                           |                                 |        |
| Merkinät<br>Inskriptioner                                                           |                                                                                                                                                                                                                                                    |                               |                                                                                      |                                                              |                                 |        |
| Valokuva Foto                                                                       | Ote rajakartasta Utdrag av gränskarta                                                                                                                                                                                                              |                               |                                                                                      |                                                              |                                 |        |
|  |                                                                                                                                                                                                                                                    |                               |  |                                                              |                                 |        |

## Appendix 13

### State Boundary Description

| Boundary Marker № (Name) | Type of Boundary Marker | Demarcation Map Sheet № | Boundary Line Length (m) |            |                                |                         | State Boundary Description                                                                                                                                                                                                                                        |
|--------------------------|-------------------------|-------------------------|--------------------------|------------|--------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          |                         |                         | Total                    | including: |                                |                         |                                                                                                                                                                                                                                                                   |
|                          |                         |                         |                          | On Land    | In Rivers, Streams and Ditches | In Lakes and Reservoirs |                                                                                                                                                                                                                                                                   |
| 1                        | 2                       | 3                       | 4                        | 5          | 6                              | 7                       | 8                                                                                                                                                                                                                                                                 |
| 375                      | R                       | 3                       | 474.41                   | -          | 474.41                         | -                       | The boundary goes along the middle of the Black River, up the stream, in a general southeasterly direction, crossing in its way the Petrovka-Sidorovka motorway, and from boundary marker 378 continues overland, leaving the Black River to the south of itself. |
| 376                      | R                       | 3                       | 649.82                   | -          | 649.82                         | -                       |                                                                                                                                                                                                                                                                   |
| 377                      | R                       | 3                       | 7.00                     | -          | 7.00                           | -                       |                                                                                                                                                                                                                                                                   |
| 378                      | T                       | 3                       | 221.64                   | -          | 221.64                         | -                       |                                                                                                                                                                                                                                                                   |
| 379                      | M                       | 3                       | 456.43                   | 456.43     | -                              | -                       | The boundary follows in a general easterly direction and enters a drainage ditch located 0.54 km to the southeast of the locality of Luchayi.                                                                                                                     |
| 380                      | M                       | 3                       | 391.28                   | 391.28     | -                              | -                       |                                                                                                                                                                                                                                                                   |
| 381                      | M                       | 3                       | 361.46                   | 361.46     | -                              | -                       |                                                                                                                                                                                                                                                                   |
| 382                      | M                       | 4                       | 578.24                   | 578.24     | -                              | -                       |                                                                                                                                                                                                                                                                   |
| 383                      | M                       | 4                       | 391.31                   | 391.31     | -                              | -                       |                                                                                                                                                                                                                                                                   |
| 384                      | T                       | 4                       | 365.71                   | 365.71     | -                              | -                       |                                                                                                                                                                                                                                                                   |
| 385                      | R                       | 4                       | 452.10                   | -          | 452.10                         | -                       | The boundary follows along the middle of the drainage ditch in a general southeasterly direction up to the Yellow River and enters it.                                                                                                                            |
| 386                      | R                       | 4                       | 244.70                   | -          | 244.70                         | -                       |                                                                                                                                                                                                                                                                   |
|                          |                         |                         | 426.41                   | -          | 426.41                         | -                       |                                                                                                                                                                                                                                                                   |

## Appendix 14

### State Boundary Description Combined with Catalogue of Co-ordinates for Boundary Markers

| Map Sheet № | Number or Name of BM | Type of BM | Coordinates                 |               |                             |               | The Baltic Sea Level Datum (m) | Distance from Preceding BM (m) |        |                |                 | State Boundary Description |  |
|-------------|----------------------|------------|-----------------------------|---------------|-----------------------------|---------------|--------------------------------|--------------------------------|--------|----------------|-----------------|----------------------------|--|
|             |                      |            | System of Coordinates LKS94 |               | System of Coordinates CK-42 |               |                                | Total                          | Land   | Running Waters | Standing Waters |                            |  |
|             |                      |            | B/L (° ' ")                 | x/y (m)       | B/L (° ' ")                 | x/y (m)       |                                |                                |        |                |                 |                            |  |
| 1           |                      | 3          | 4                           | 5             | 6                           | 7             | 8                              | 9                              | 10     | 11             | 12              | 13                         |  |
| 10          | 25                   | R          | BP A                        | 00 00 00,0000 | 000 000,00                  | 00 00 00,0000 | 0 000 000,00                   | 000,00                         | 000,00 |                |                 |                            |  |
|             |                      |            |                             | 00 00 00,0000 | 000 000,00                  | 00 00 00,0000 | 0 000 000,00                   | 000,00                         |        |                |                 |                            |  |
|             |                      |            | BP B                        | 00 00 00,0000 | 000 000,00                  | 00 00 00,0000 | 0 000 000,00                   | 000,00                         |        |                |                 |                            |  |
|             |                      |            |                             | 00 00 00,0000 | 000 000,00                  | 00 00 00,0000 | 0 000 000,00                   | 000,00                         |        |                |                 |                            |  |
|             | 26                   | ZOM        | T                           |               | 00 00 00,0000               | 000 000,00    | 00 00 00,0000                  | 0 000 000,00                   | 000,00 | 000,00         |                 |                            |  |
|             |                      |            |                             |               | 00 00 00,0000               | 000 000,00    | 00 00 00,0000                  | 0 000 000,00                   | 000,00 |                |                 |                            |  |
|             |                      | MBP A      | T                           |               | 00 00 00,0000               | 000 000,00    | 00 00 00,0000                  | 0 000 000,00                   | 000,00 | 000,00         |                 |                            |  |
|             |                      |            |                             |               | 00 00 00,0000               | 000 000,00    | 00 00 00,0000                  | 0 000 000,00                   | 000,00 |                |                 |                            |  |
|             |                      | DP         | T                           |               | 00 00 00,0000               | 000 000,00    | 00 00 00,0000                  | 0 000 000,00                   |        |                |                 |                            |  |
|             |                      |            |                             |               | 00 00 00,0000               | 000 000,00    | 00 00 00,0000                  | 0 000 000,00                   |        |                |                 |                            |  |
|             | 27                   | ZOM        | M                           |               | 00 00 00,0000               | 000 000,00    | 00 00 00,0000                  | 0 000 000,00                   | 000,00 | 000,00         |                 |                            |  |
|             |                      |            |                             |               | 00 00 00,0000               | 000 000,00    | 00 00 00,0000                  | 0 000 000,00                   | 000,00 |                |                 |                            |  |

## Appendix 15

### Options for Marking out State Borders' Tripoints



a) Tripoint of State Borders of the Republic of Belarus, the Republic of Lithuania and the Republic of Latvia:



b) Tripoint of State Borders of the Republic of Belarus, the Republic of Lithuania and the Republic of Poland



c) Tripoint of State Borders of the Republic of Belarus, the Republic of Latvia and the Russian Federation

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