

Chapter 2

Project Planning

Survey operations, whether under combat conditions or not, are like any other military operation. They must be carefully planned. Enthusiasm, technical proficiency, and dedication will not by themselves make up for poor planning. All plans must be dynamic in nature. They must be constantly evaluated and updated to remain current. This chapter will address project planning primarily from a logistics and administrative standpoint. Most of the information contained in this chapter is concerned with prebattle operations. Some general technical planning will be addressed but only as it impacts on administrative and logistics support. Project planning can be broken down into the following phases:

1. **Receipt of Project Directive.** This includes the initial project evaluation, determining the project requirements, assessing the unit's ability to accomplish the project, drafting the preliminary plan and milestone schedule, and coordinating the needed administrative and logistical support.
2. **Trips.** Trips are used to gather information to be used in the conduct of the project and to evaluate project progress. The information gathered will be logistical, administrative, or technical depending on the type of trip. Information obtained during these trips is used to refine the project plans and milestone schedules.
3. **Project Execution.** This is the actual conduct of the project – putting the project plans into effect. Unexpected or unusual circumstances will make additional plan modification necessary.

Section I

EVALUATING AND SCHEDULING

After receipt of a project directive, planning the project begins. This preliminary planning will involve evaluating the directive, assessing unit capability, and determining a preliminary schedule of events. It is important that all estimates, including time and funds, be labeled **preliminary** for all reports or briefings. If this is not done, the customer, supported units, or higher headquarters may not get an accurate picture of the true extent of the project.

PROJECT REQUIREMENTS

The first step in project planning involves evaluating the requirements as stated in the project directive. In many instances, requests will come from offices or units that have no real knowledge of survey requirements. When this happens, the support request must be carefully evaluated to ensure that what the customer has ordered is, in fact, what the customer needs. This evaluation is based on past experience and is usually done by the survey technician. Generally, there are three cases of requirement versus need:

- 1 The customer has requested more accurate work than is really needed.
- 2 The customer has requested work that is less accurate than is needed.
- 3 The customer has requested work that matches the need.

In the first case, the customer is typically not survey-oriented and only sees the **orders and classes of accuracy** as words and numbers on a page. The customer simply does not understand the differences and the cost implications of each. Generally, telephonic explanation of the differences in orders of accuracies will resolve most potential conflicts. In those cases where the customer cannot be swayed from an erroneous perception of orders of accuracy, demonstrating the cost differences will generally change the customer's mind. If the customer remains adamant in the request, then planning to accomplish the request should begin. In those cases where the request is for less accuracy than is needed, the customer must also be contacted. The differences in orders of accuracy must be explained. Since funding costs usually go up in more or less direct proportion to the order or class of accuracy, it may be even more difficult to change the customer's attitude about the request. Again, if the customer cannot be swayed, then planning to accomplish the request as is must begin. In both these instances, careful documentation of all contacts and conversations with the customer should be kept. At some future date, the customer may realize that the survey unit gave good advice and wish to change the initial request. If the recommendations for change are not accurately documented, the unit may be liable to correct the project.

In the third case, where it is determined that the customer has requested work that matches the need, planning can begin. Fortunately, this is usually the case, particularly in dealing with other military units that are routine survey users.

CAPABILITIES

Assessing the ability of the unit to conduct any type of survey is perhaps one of the most difficult tasks to be undertaken. Fortunately, many mechanisms exist to assist in this evaluation. The single best indicator is the commander's and survey technician's personal familiarity with their soldiers. Since this is not always accurate, a number of systems have been established to help in this evaluation.

Among these are the Army Training and Evaluation Program (ARTEP) and the skill qualification test (SQT). The ARTEP contains the mission training plan, battle drills, and evaluation guides for assessing the unit's ability to conduct various team tasks. The SQT is used to evaluate the technical abilities of individual soldiers. This annual evaluation of each soldier's technical ability can be used as an indicator of both weak and strong areas. Another tool that can be used is the unit's files. These records contain information on the unit's past performance on similar projects. They contain the names of personnel who conducted the project and the duration time. Also, any problems that arose are listed and explained in great detail. This information can prove to be very valuable not only for assessing the unit's ability to conduct the project, but in planning the project as a whole. The result of this assessment is a listing of the unit's training deficiencies. The survey technician will then develop a training program to address these shortcomings. Obviously, this program will be designed around the time constraint of the projected project start date. The tendency to always assign the most qualified personnel should be avoided. Usually, a mix of highly qualified and entry-level soldiers should be assigned to any project to ensure new people get the experience they need.

CONSTRAINTS ON ACCURACY

The Standards and Specifications for Geodetic Control Networks (SSGCN) were established by the Federal Geodetic Control Committee. These standards define the orders of accuracy for all geodetic quality work conducted in the United States. These SSGCN are used to ensure uniformity of all work conducted to support and extend the National Network. The United States Army, through the Corps of Engineers, is a member of the Federal Geodetic Control

Committee and has signed the basic document agreeing to comply with the SSGCN. All Army survey activities conducted within the United States should be in compliance with these standards.

When possible, surveys in other nations should also be in compliance. Due to military necessity, there will be occasions when compliance is not possible due to mission requirements. Some of these situations are –

- Projects conducted in time of war.
-] Projects conducted as training exercises designed as realistic war training exercises.
- Projects not intended for inclusion in the National Network.
- Projects conducted to support consumer requests that specifically exempt compliance.
- At the discretion of the survey technician in charge.

When feasible, all field activities should conform to the SSGCN. At some later date, it maybe determined that any given project should have been included in the National Network. If the field work was in total compliance, only the computations will need to be refined.

MILESTONES

Milestone schedules are developed to allow for estimating project duration and costs and managing personnel and resources. A milestone schedule generally takes the form of a time line, with events noted as they should occur. This time line allows a commander or customer to see at a glance how a project is proceeding. It is impossible for this manual to give specific guidance on the development of time lines for all types of survey activities. Therefore, general tips will be discussed. Under combat conditions, it may not be feasible to develop precise time lines. The flow of battle will dictate dramatic changes to any milestone schedule and most work will have to be accomplished on very short suspenses. In these situations, developing a time line will be time-consuming and in many cases counterproductive. Under normal prebattle operations, it is feasible and advisable to develop milestone schedules. Care should be taken to ensure that the resulting time line is not overly ambitious. There are a number of variables associated with anytime line. These include but are not limited to –

- Availability and type of equipment.
- Experience of party personnel.
- Terrain, vegetation, and weather.
- Extent or area of project.
- Priority of other projects.
- Enemy or adversary intervention.

Table 2-1 shows typical rates of progress for various types of survey operations. These are **rule-of-thumb** estimates. Each unit must develop its own rate of

Table 2-1. Typical rates of progress for third-order surveys using the survey section

Method of survey	Basic figure	Average distance per setup or figure			Daily progress (10-hour day)			Monthly progress			% Rerun		
		A	Terrain B	C*	A	Terrain B	C*	A	Terrain B	C*	A	Terrain B	C*
(1) Triangulation	Quad Triangle	9 6	9 6	15 10	3 7	Figures 3 7	2 4	40 100	Figures 40 100	20 40	5 5	5 5	5 5
(7) Traverse (2) Microwave (1) (EDME)	Linear	2	2	0.5 to 2	24	Kilometers 24	6 to 12	480	Kilometers 480	160	5	5	5
(6) (3) Leveling, differential (3-wire, looped)	Linear	Meters			Kilometers			Kilometers					
(4) Astronomic azimuth	Station	250	150	100	6	6	4.5 3	120	90	60	10	10	15
(4) Baseline measurement microwave	Base	1 per traverse every 30 to 50 stations, 1 per 12- to 15-figure triangulation			2-hour per observation								
(5) (8) Modular tower erection	Tower	Every 10 figures of triangulation			1-hour per base								
* In dense jungle areas, clearing parties of large size are required.													
(1) Includes movement between stations—vehicle or helicopter.													
(2) In planning microwave traversing, it must be realized that much depends on the transportation provided for moving equipment. Helicopter-supported, and with 10,000 meter observations, a rate of progress in excess of 100 kilometers per day is possible.													
(3) Requires 1/2 survey section, foot travel.													
(4) Requires 1/3 survey section, travel time not included.													
(5) Requires 1/2 survey section, travel time not included.													
(6) For single run levels, double the daily progress.													
(7) Three EDMs available per section.													
(8) Number of towers required by triangulation or traverse is unpredictable without prior reconnaissance.													

progress table based on the equipment and level of expertise of assigned personnel.

Project schedules can be established by several different approaches. The two most common are establishment based on a firm start date or on a firm end date. The techniques are similar in both cases, with some rather obvious differences. If the start date has been firmly established, then the project is laid out from beginning to end with each event occurring as it will happen. If the end date has been established, then the project must be reverse planned. That is, events that occur last must be programmed from the end of the project backward until the start time is established. In all cases, schedules must be realistic but not overly ambitious. Delays due to weather, equipment and personnel shortcomings, or any other problems must be built into the schedule. In most cases, it is better to estimate a longer duration time and finish early than to underestimate and miss a scheduled end date.

ADMINISTRATIVE SUPPORT

Administrative support is normally concerned with documentation, both technical and nontechnical. The technical support is usually the typing of reports, tabulating and preparing technical data, or preparing briefing materials. Technical administrative actions are often accomplished by the survey team itself with limited help from clerical personnel. Nontechnical support usually involves personnel actions. These actions are normally handled by specialists in administrative actions such as Personnel and Administration Center (PAC) or Adjutant General (AG) clerks. It is not the intent of this manual to outline specific methods of accomplishing these tasks. Rather, this section will deal with general guidance as to what should be accomplished and when. It deals primarily with peacetime operations conducted elsewhere than at the unit's installation. Wartime requirements are addressed in the various SOPs of the unit, parent unit, and major Army commands (MACOM),

Prior to Deployment

Before a survey unit deploys to another installation or area, a number of administrative actions should be accomplished. Basically, all routine personnel actions of all survey party members should be accomplished before departing. This ensures that there will be minimal actions to be accomplished while deployed. All soldiers should make sure that their pay portions, allotments, insurance statements, and other financial requirements are correct and up to date. Other actions that may be required are powers of attorney and routine medical checks such as physicals and dental

checks. If a long duration time is anticipated, it is advisable that all personnel be scheduled for and complete a records review, to include promotion packets, personnel and finance records, and emergency data cards.

After all these actions have been completed, there will theoretically be no need for nontechnical administrative support. In reality, however, new actions will be required from time to time. Therefore, the party chief should make arrangements for handling any actions that may be required during the project. The local installation PAC or AG should provide this information. Depending on the nature of the required action, the party chief may be able to simply submit the paperwork through the mail. If these actions cannot be done through the mail or through telephonic contact, a visit to the AG at the project installation or the nearest military facility may be required.

During a Project

From the preceding paragraph, it is obvious that there will be times when the party chief or the individual is not able to complete some required action. The home installation should provide guidance to the party chief on how to overcome these problems. If the project is being conducted on a military installation, the party chief should check in with the local AG. This visit should be made before any problems are encountered. It is recommended that the project installation AG be contacted during the reconnaissance phase and a point of contact (POC) established. When this is done, this AG will know the survey unit is in the area and will usually give any assistance they can. As is often the case, the project may be in an area other than on a military reservation. In the United States, there will usually be a military representative of some type who can assist. It may be possible to arrange for limited support from the local office of the Army Recruiting Command. In other instances, Army Reserve or National Guard units may be able to offer assistance.

Regardless of the source of assistance, it must be established before it is needed. Nothing is more frustrating to a soldier than to have a personal problem and not have a ready solution. This hurts the soldier's performance and ultimately degrades the survey team's capability. Technical administrative support will usually be nonexistent and will be the responsibility of the survey team. Such actions will normally be restricted to typing technical reports and compiling/consolidating technical data.

After a Project

Nontechnical administrative support after the project is identical to prior support. The home installation PAC, AG, and finance and accounting office (FAO) will handle these actions. Among these actions are filing travel vouchers, initiating new personnel actions, and reviewing personnel and finance records. The parent unit will be able to assist in technical administrative support. This normally involves no more than a clerk typist to finalize the technical reports and information.

LOGISTICS

This section will give general guidance on the types of logistics arrangements and planning that should be accomplished. Many of these topics will be covered in very general terms. Because of the requirements of the various MACOMS and general support units, it is not possible for this section to be all-encompassing.

Preparation for Movement

Much of the specific information concerning preparation for moving a survey section or unit will be contained in the unit's or parent organization's SOP. It goes without saying that moving a unit of any size takes careful and thorough planning. When a unit moves, it is imperative that all equipment and personnel that will be required move as cohesively as possible. These movement plans should be developed to cover all contingencies and developed well in advance of any anticipated moves. They should address moving any size element of the unit or the entire unit. Most of the requirements for movement are described in *FM55-10*. This concise reference manual should be on hand when preparing any movement plans. The information contained is applicable to most situations, wartime or peacetime. In some cases, it may be necessary to supplement the basic manual. The supplement will normally be drafted by the MACOM.

Communications

One of the most important and often overlooked aspect of any successful operation is communications. During movement, regardless of the mode of transportation, the unit will normally be dispersed in serials. During survey field procedures, the field teams will be located throughout the corps area. In all situations, it is imperative that the elements of the unit have the ability to communicate with the command and control section.

Planning communications support requires the same careful attention to detail as any other aspect. Depending upon the nature of the operation, it must first be determined how much and what type of com-

munications equipment will be required. Normally, there will be some type of mix of hard-wire, land-line, and portable radios. After the number of devices is established for optimum use, the unit must determine how much of its own equipment is available to handle the load. If the unit does not have adequate equipment, there are two courses of action that can be taken. The first is to arrange for support from the customer or other organization. This is often a very satisfactory solution to the problem when it is possible. However, the unit will often have to operate within its own equipment limitations. In this case, it will be necessary to reevaluate the planned communications network and eliminate some nice-to-have communications elements. Another solution is the local purchase of hand-held portable radios. The devices will normally be added to the unit's table of distribution and allowances (TDA) account. If this solution is used, it will probably be necessary to check with the communications center to ensure that there are no frequency conflicts as a result of nonstandard communications equipment. One of the best means of communication is the standard military radios available in all units. These devices give instant, usually reliable access to all users. However, there are a number of problems associated with these radios. Some major problem areas are –

- The lack of adherence to approved radio procedures.
- The potential of enemy exploitation of nonsecure communications. This exploitation can take the form of obtaining intelligence information, deception, radio direction finding, or jamming.
- Power supply or poor maintenance of the radios.
- Atmospheric conditions that render the radios inoperative.
- The range of single receivers without radio relay equipment.

The first two areas are directly related and the solutions are similar. All units have CEOs that provide frequency and call sign allocations as well as security measures. Strict adherence to these procedures is mandatory. Training all personnel and radio telephone operators (RTO) in the proper procedures will ensure the denial of intelligence information to the enemy. It will also help prevent the other exploitation techniques any adversary may employ.

Power supply and maintenance problems must be addressed before the equipment is to be used. Proper maintenance procedures on all equipment can eliminate most problems. The entire communications system should be checked occasionally to ensure that

it is functioning as designed. Batteries for battery-operated systems should be stored in an approved fashion and checked/replaced as needed.

Atmospheric conditions are a major problem for which there are only limited solutions. It maybe necessary to establish land-line communications to overcome atmospheric problems. If this is the best solution, a series of communications checkpoints will have to be developed along routes of travel and throughout the area of operation. This system is often cumbersome, particularly if a move is over great distances or into undeveloped areas. The establishment of radio relays will in some cases overcome these difficulties. When required, the same techniques described in Chapter 3 for line of sight determination maybe used to establish radio relay positions. This method will require additional radio equipment and personnel. In a combat environment, it may be possible to contact the communications officer in the corps and arrange for radio repeater access. Once all problems have been resolved, the only aspect remaining is the use of the equipment that has been selected. The importance of proper radio procedures as specified in the CEOIs cannot be overemphasized. Communications security procedures must be strictly adhered to.

Material Support

It is not the intent of this manual to provide specific details on how to procure required materials or material support. This information is generally spelled out in the various SOPs of the units involved. Rather, the intention is to emphasize the importance of prior arrangements for these resources. As part of the planning process, an estimate of the time and materials will be developed. This estimate is based on previous experience with similar projects and the known requirements of the present project. These requirements should be originally developed with no regard to costs or difficulty of procurement. Determine what is needed, then figure out how to get it. Normally, most of the material support will be the responsibility of the customer. However, this cannot be assumed to be true. It should be clearly documented in the reports from the various trips mentioned above. In particular, the initial site visitation trip (ISVT) and reconnaissance trips should result in clear POCs for acquiring necessary materials. Technical supplies should be supplied by the unit through normal supply channels.

Section II

INFORMATION-GATHERING TRIPS

This section will describe trips as they apply to normal prebattle operations. In some instances, some of these trips can be consolidated or eliminated. The overall need for the various described trips will depend on a number of variables, including –

- The unit's familiarity with the area concerned.
- The amount of information already on hand concerning the project or supported unit.
- The anticipated duration of the project.
- The amount of problems encountered by the unit.

INITIAL SITE VISITATION TRIP

The ISVT is basically a fact-finding mission. This trip is normally conducted by the survey technician, the project noncommissioned officer in charge (NCOIC), and sometimes the unit commander or representative. The primary function of this trip is to gather information that will be used to plan the project and to establish POCs for the various support functions that will be required.

All project directives will identify an overall POC. This individual or office is normally concerned with the results of the project and may not be able to provide the types of assistance that will be required to

work on and complete the project. Often, the overall POC will be able to assist in establishing POCs for all administrative and logistics requirements.

The types of support that must be arranged prior to any field activities include maintenance, medical and dental, personnel actions, supplies, billeting, messing and mail, and additional personnel. These arrangements must be geared specifically to meet the needs of the reconnaissance party and generally to support the project execution party.

For successful completion of the reconnaissance phase, all arrangements must be made with respect to care of personnel and equipment during the ISVT. Careful records should be maintained, with Memorandums of Agreement (MOA) being drafted as required. The types of documentation that must be prepared as a result of the ISVT are listed in Chapter 8, Section I.

RECONNAISSANCE TRIP

The purpose of the reconnaissance (recon) trip is to finalize arrangements for the project and specifically to lay out the field work. The conduct of the reconnaissance is discussed in Chapter 3. During the recon,

it is imperative that all arrangements made during the ISVT be checked to ensure that they are correct and viable. There may be a delay between the recon and project execution that causes some previously established POCs to be lost or changed. If this occurs, a replacement POC must be established. Any events which occur that have not been anticipated should be carefully documented. The documentation required as a result of the reconnaissance is discussed in Chapter 8.

PROJECT VISITATION

Project visitation trips are generally conducted by the survey technician or command representative. Their primary purpose is twofold. The first is to check on the progress of the project. This is the responsibility of the survey technician. Any recurring technical problems will be discussed at length and resolved in

such a manner as to preclude recurrences. Obviously, if problems have been occurring prior to a visitation trip, contact with the parent unit should have been made previously. Technical difficulties that need resolution should not be left unresolved until a scheduled project visitation trip. The second function of the project visitation is to check on the health, welfare, and morale of the troops. This cannot be ignored. It is imperative that the commander knows how the troops are doing with respect to the job and as individuals. If numerous technical problems have been occurring, it is possible that some personal problems might be overlooked. The project visitation can often resolve these problems before they become major limiting factors on the project execution. The documentation for this trip is normally in the form of a trip report and should be included in the final project folder for historical purposes.

Section III

PROJECT EXECUTION

Project execution is merely executing the plans that have been laid. If all planning has been correctly done, the survey team should arrive and go straight to work with no delays. As problems occur, the POCs that have been previously established should be contacted and the problems resolved as expeditiously as possible.

Specific details on project execution are covered in the chapters concerning specific survey activities. The documentation required for all phases of project planning and execution is contained in Chapter 8.