

## ADMINISTRATIVE PROCEDURES AND METHODS

### PRODUCTION PROCEDURES

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#### 1. GENERAL

1.01 This section describes work procedures necessary in the accomplishment of the basic production functions of the outside plant engineering force. The material is directly related to the functional force arrangement outlined in Section AG11.410.

1.02 The arrangements proposed herein are considered to be very significant in the successful operation of the outside plant engineering job. They provide a way to accomplish essential planning through the use of a study force. They offer the opportunity to develop and work toward mechanization and progress in other System objective areas such as dedicated outside plant (DOP) and the Exchange Feeder Route Analysis Program (EFRAP). Instruction is provided in this section for the establishment of an outside plant monitoring system that will improve the service provision

capabilities of the engineering force. These procedures replace haphazard processes now in use in many plant engineering offices with a systematic operation efficiently and completely controlled by local managers.

1.03 This section stresses the importance of coordination, suggests means of implementation, and also defines continuing maintenance procedures.

1.04 The recommendations will provide descriptions of work operations such as the development of cable fill data and building activity reports, the establishment of study tools, the issuance of specific estimates, and other associated tasks. These items will be organized and included under the appropriate study or facility units.

1.05 The major portion of the procedures performed by the support force is described in Section AG11.413; however, a number of the clerical functions done in the study and facility groups are included in this section. Training responsibility for these tasks may be assigned to clerical supervisors in the office supervisor's force.

1.06 Field engineering procedures are covered in Section AG11.414.

#### 2. COORDINATION AND RESPONSIBILITY DEFINITIONS

2.01 The district engineer has the primary responsibility of providing constant coordination between the study, facility, and office support groups. A condition of complete harmony must prevail in a functional organization if maximum efficiency is to be accomplished. The individual must recognize his part as a member of a team and be shown how the effort of an organized functional unit will achieve more than many individuals working ineffectively in small geographical areas.

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**2.02** The study engineers are responsible for the preparation of all long-range plans and the production of specific estimates, and they should develop an attitude of service to the facility groups. They must be ready to change schedules in accordance with the needs of the facility unit requirements. The study engineers should produce all estimate authorizations in time to avoid cable congestion and should provide adequate facilities for customer service demands without delay. The study group's responsibility for construction program items increases as the mechanization process develops.

**2.03** The facility engineers have the important responsibility of providing facilities for customer service when and where needed. Since the preparation of specific estimates has been assigned to the study group, facility engineering groups can concentrate on service and coordination. Facility engineering groups have a right to expect projects to be produced on time, but they also have the responsibility to furnish activity reports and forecast assistance when needed.

**2.04** The success of any district operation depends heavily on the performance of the office support groups. Their production and accuracy is vital to the production and accuracy of the engineer. Confidence in the office support group advances the productivity of the entire office, with resultant cost savings. Service consciousness should be an integral part of the training of the support group.

**2.05** The linear functional responsibility chart shown in Fig. 1 describes group participation in the major tasks performed in the outside plant engineering district. It does not include support items such as record maintenance provided entirely by the office supervisor's group.

### 3. IMPLEMENTATION

**3.01 Training:** The outside plant engineer's staff should provide necessary training in any new art not currently in use in the district. Training sessions will probably include selected personnel from a number of districts but they should be directed to those ready for job application. Initial emphasis should be given to training in dedicated outside plant and the Exchange Feeder Route Analysis Program. Other sessions might include preparation of the master route layout and the detail route layout sheets, cable facility charts, and application of BISCUS coding to the exchange

route cable record. Clerical personnel will be involved in the latter group. Subsequent training could be provided in the Air Pressurization Analysis Program (AIRPAP), the Construction Program Administration System (CPAS), and other fields as company managements adopt such undertakings.

**3.02 Arranging Estimate Schedules:** During initial organization, a district team composed of the facility manager, the study manager, the office supervisor, and the district engineer must prepare a schedule of projects for the study manager to begin engineering. This schedule will have to give top priority to wire center routes requiring immediate relief. A second consideration should be those locations programmed for dedication. Route relief and dedication can often be efficiently combined. It may be necessary for districts with heavy estimate loads to complete some authorization preparations in the facility groups during the transition period.

**3.03 Assignment Recommendations:** One engineer in the study group should be given complete training in the EFRAP process and be prepared to apply the technique to essentially all jobs in the construction program. His assignment should be continued for a sustained period. For projects that involve dedication, it is a good practice to transfer an engineer from the geographical area involved into the study group for the length of the Dedicated Plant Plan study. Once this work is completed, he may be returned to the facility group to provide future maintenance of the plant on a dedicated basis. This type of rotational procedure will facilitate thorough training of all engineering personnel in the dedicated plant concepts.

### 4. STUDY TOOLS

**4.01** The creation of proper study tools is the first prerequisite in updating office procedures. Certain of these items are best prepared and maintained in the study group. Others should be created in the study group but maintained and given extensive utilization in the facility unit. A third type would be built and maintained by the facility force. In Parts 5 and 6 of this practice brief descriptions of these study tools are provided in the respective functional outlines for the study and facility groups.

**4.02** The clerical unit under the management of the office supervisor provides important

TASK	STUDY MANAGER'S GROUP	FACILITY MANAGER'S GROUP	OFFICE SUPERVISOR'S GROUP
Development of Outside Plant Plans and the production of specific estimate authorizations.	Provide planning tools and develop Outside Plant Plan. Execute EFRAP procedure. Prepare and submit estimates, with certain assistance from the facility manager.	Assist with forecast and cost recommendations. Prepare detail plans. Review estimate proposals.	Assist in the preparation of cable fill summaries, forms, maps, and other study tools.
Meeting customer service demands through cable plant monitoring and the routine estimate.	Make reference use of activity reports, etc.	Do all facility work on either estimate work prints or routine orders. Maintain a building activity record to provide customer service and to obtain necessary design information. Coordinate construction schedules with both plant service and construction forces.	Provide job drawings, fill data, and other assistance to the facility manager in the facility provision job.
Construction program.	Make view summaries as appropriate, using EFRAP predictions for the 3- to 5-year program.	At the direction of the district engineer, assist in the program development by contributing miscellaneous projects, such as road moves, etc.	Assist with reports and summaries.
Liaison effort with other utilities and public groups, including state highway and other road agencies.	Make reference use only.	Establish contacts and make all negotiations in this field.	Prepare paper work resulting from negotiations.
Coordination efforts with other departments: <ul style="list-style-type: none"> <li>Outside plant job scheduling</li> <li>Maintenance problems</li> <li>Construction cost problems</li> <li>Sale of facilities</li> <li>Timing of cutovers</li> <li>Other interdepartmental efforts</li> </ul>	Make reference use only.	Participate in interdepartmental coordination of all kinds.	Assist with reports and transmittal items.

Fig. 1 — Group Responsibility in the Execution of Major Tasks in the Outside Plant Engineering District

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assistance in both the creation and maintenance of current study tools. Working under the direction of the engineer, the clerk should be able to accomplish essentially all of the cable fill counting, drawing, and other form completion work.

**4.03** The records and tools described should be filed in centralized locations for use by all forces. The office supervisor of the support force has the primary responsibility for the completeness and accuracy of all records; however, *all personnel having access to these records must be charged with the availability, completeness, and accuracy of all office records and study tools.*

**4.04** Assignment of clerical personnel between the office supervisor's group and the study and facility engineering sections is discussed in detail in Section AG11.413. The latter also provides information on the maintenance of plant location records.

### 5. FUNCTIONS OF THE STUDY GROUP

**5.01 *Development of Plans:*** The study engineer is responsible for the development, recording, and recentness of all plans. Much of this planning may have to be developed concurrently with the updating of study tools and cable fill data. This planning may include:

- (a) Long- and short-range plans for the specific estimates on the schedule.
- (b) A complete appraisal of all routes in accordance with Section AG50.200, which defines main and branch feeder and distribution route geometry, covers an evaluation of the various plant item selections, and suggests consideration of changing economic criteria that affect most of the investments currently being made in the Bell System.

**5.02 *Preparation of Planning Maps:*** The basic tool of the outside plant engineer is a good map that shows the geographical layout and plant items within the wire center boundaries. It is recommended that each district have accurate geographical maps for these areas and develop a system of overlays to show appropriate types of plant. The base map should have a scale of 1 inch equal to 1000 feet. The map should be of sufficient size to permit adequate detail and ease of posting information and should also be convenient to use

on a standard desk. Several maps may be required in some of the larger wire centers to cover the outside plant system. Wire centers with large rural sections require additional maps with a smaller scale for the outer portions of the area. A system of precise overlays should be developed to apply to the road system of the base map. It is important that the base map be accurate. Existing maps should be carefully examined to determine whether they are accurate enough for the overlay system. If these maps are not adequate, outside agencies are available to provide the desired base map. Some of the overlays which are appropriate for use with the base map are as follows:

Basic feeder plant including the wire center

Main and branch feeder route boundaries

Distribution plant

Wire center, exchange, and base rate boundaries

Commercial forecast sections

Real estate zoning and land usage

CATV systems

Air pressurization pipe systems

Tax districts

Transmission zones

Key maps for exchange route cable records

Desired combinations of the preceding overlays can be developed to facilitate the various uses in the engineering office, and when requested can be made available to other departments. The engineers can use prints for studies, specific estimate presentations, and construction program displays. In addition to the geographical planning map system, a set of EFRAP schematics should also be prepared. A typical wire center requires from two to four of this kind of plan to cover the plant in adequate detail. These should display main and branch feeder route configurations, EFRAP (and BISCUS) code numbers, and notes listing cable size and gauge and conduit availability. The EFRAP schematic drawing is recommended as a presentation item

for specific estimates. The maps referred to in this section are described in detail in the AG50.200 series.

**5.03 Development of an Outside Plant Monitoring System:** To improve customer serving ability it is imperative that good cable monitoring be developed. A good monitoring arrangement should:

- (a) Enable the engineer to analyze cable congestion quickly and determine a course of action.
- (b) Facilitate summaries of cable pair usage so that they may be done easily by inexperienced clerical forces.

The basis of cable monitoring now and in the future is to be built on a code applied to the cable system. This coding system developed for BISCUS operations is to be used to improve systemization of the manual cable fill counting procedure and is later to be applied to computers in facility analysis work. Figure 2 is an example of code application to a section of outside plant. The figure includes a contemplated manual summary form. Complete instructions for preparing a cable monitoring system and related summary forms will be provided in Section AG11.200.

**5.04 Design Procedures:** To obtain the most economical plant design the use of the Exchange Feeder Route Analysis Program, described in Section AG50.500, is recommended for use in essentially all cable and conduit estimate work. The recommendation is not confined to the more complex path selection problems but includes the numerous ordinary types of "straight" underground cable reinforcement projects and others where economic analysis is required to assist in sizing, gauging, and removal considerations. The intent of modern outside plant engineering design procedures is to apply EFRAP sectionalization to all feeder plant in each wire center. A further step integrated with this process is the application of BISCUS coding (see 5.03) to the entire telephone plant. Since the EFRAP section number is now a part of the coding process, both the manual and computer summaries of cable fill counts will provide data for direct application to the EFRAP input forms. The study engineers should lay out and develop EFRAP sectionalization along with BISCUS coding. The latter will be applied to the exchange route cable record. A file of schematics described in

5.02 should also be prepared for each wire center. Cable facility charts should be updated or new ones prepared as appropriate at the time of each study.

**5.05 Dedicated Plant Design:** With the present level of dedicated plant conversion work in the system covering about one-fifth of the dedicatable stations, many operating district specific estimate programs will continue to include this type of work for a number of years. Dedicated plant design procedures require the extensive analysis of facility conditions in the distribution network, complete studies of feeder cable copper utilization, and a thorough review of main and branch feeder cable serving arrangements to attain permanency in circuit assignment. Each plan should be developed concomitantly with the EFRAP and BISCUS coding systems. As suggested in 3.03, an engineer from a facility group should be assigned to the study engineer's section for the development of the project. Upon completion of the basic design elements and submission of the estimate, the individual could be returned to the facility section to prepare detail plans and continue in the maintenance of facility work. Dedicated plant conversion work should be designed in accordance with Section AG13.365, which provides complete instruction in all facets of the work and detailed descriptions of the proper study tools. These tools should be prepared during the initial stages of the project in the study engineer's section and made available for continuing use and maintenance by the facility engineer. The main study tools required in DOP conversions are as follows:

- (a) **DOP Plan:** This geographical portrayal of sections of branch feeder and distribution plant is derived from a print of the exchange route cable record. Fill boxes are provided on a master tracing and at the time of a study, current fills can be placed by the clerk in the appropriate box on a work copy of the tracing. The master tracings should be filed and be available for any subsequent studies required in the area.
- (b) **Route Layout Sheets:** Detail route layout sheets should be prepared by clerical forces at the direction of the engineer developing the dedicated plans. Considerable judgment should be applied in the spreading and/or combining of complements to preclude subsequent redrawing work and to minimize the number of charts per

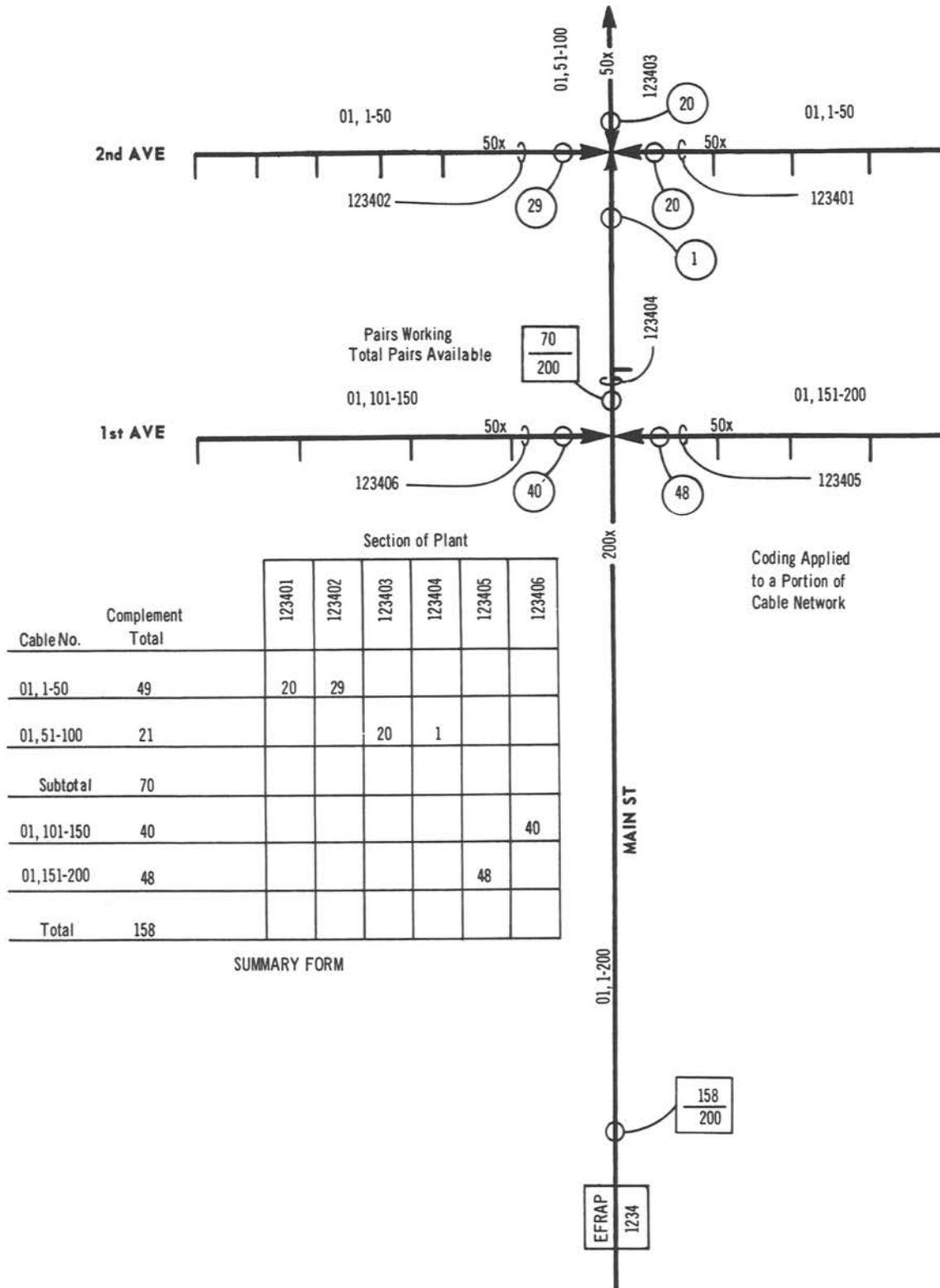


Fig. 2—Outside Plant Monitoring

cross section to facilitate engineering analysis. Cable fills should be posted by the clerk using data from the terminal record described in 5.03. The master route layout is a summary form that assists in the analysis of spare copper in the feeder route. This chart facilitates the allocation and commitment of spare pairs to the various allocation areas and to the laterals within those areas.

**5.06 Commercial Forecast Coordination:** The study manager has the responsibility of requesting commercial forecasts from the forecast and development supervisor. This function includes the provision of working line and/or assigned pair data as a basis for the forecast. The study manager and the development supervisor will work together in the establishment of boundaries for forecast sections. These should be designed in accordance with main and branch feeder area considerations as well as homogeneity of the neighborhoods. When sections of plant require forecast area breakdown, the study manager should work with the forecast group in apportioning lines to the smaller sections. In the development of all plans, he should consult with the facility manager as to the propriety of line load allocations. With the daily service responsibility and the maintenance of activity records, the facility manager has important factual information necessary in the preparation of growth forecasts.

**5.07 Specific Estimate Preparation:** The study manager is responsible for the issuance of the basic type of cable and conduit estimates. He should complete the estimate authorization since his other work routines include the preparation of studies, cable fill data, and planning tools. Cost development should also be accomplished in the study section with the maximum use of broad gauge units and clerical help. The facility manager should furnish advice as required when involved splicing or other field problems are present. All specific estimates prepared in the study section should have the concurrence of the facility engineer. The district engineer may wish to designate the preparation of certain special estimates to a facility engineer or to a special task force group. Such special estimates may include the preparation of a large rural development job, the installation of toll cable equipment, carrier manholes, etc. CATV projects should be afforded similar treatment. The study group should be furnished file information for these cases to complete the construction program

summaries. Final completion reports and monthly reviews of all specific estimates should be jointly analyzed by the study and facility managers. Specific estimate preparation recommendations are described in Section AG11.430.

**5.08 Construction Program Development:** The study manager is responsible for the development of annual and 3- to 5-year construction programs required by his company. As the use of EFRAP becomes more widespread geographically, more of the construction program will be identified, especially in the subsequent years 2, 3, 4, and 5. Extensions of plant into new areas require maximum coordination between the study and facility managers for construction program completeness. The two groups should have a joint review of all items when programs are updated. Budgets often become fixed after the issuance of initial programs, and forgotten items must be either left out or issued at the expense of another important project. The study manager should prepare a long-range map showing all construction program features. The format described in 5.02 is recommended for such a document. Construction Program Administration System (CPAS), formerly known as Engineering Administration System (EAS), data should be developed in the study group. CPAS documents should be prepared for new items that become available from EFRAP solutions and other sources. The operation will have to be coordinated carefully with the facility manager since he is responsible for schedule modifications. Preparation of the outside plant construction program is further discussed in Section AG11.420.

## 6. FUNCTIONS OF THE FACILITY GROUP

**6.01 Facility Provision Responsibility:** The facility manager has the complete responsibility of administering facilities within a geographical area. These operations should always conform to the objectives of the long-range plan. This includes the detail work print design of all estimates plus the preparation of all routine authorizations. The task includes the important customer service provision responsibility. The facility group's goal should be to plan the work in advance in order to hold service delays to an absolute minimum. The vast majority of service requests should be anticipated by the engineer through awareness of current growth and other activity. This, coupled with a knowledge of existing facility levels, should equip the engineer with all that is required to complete

plant designs with proper timing. Rush jobs should be confined to a very low percentage of all work items generated. This type of work is usually uneconomical and as the proportion increases, the inefficiency is compounded and affects all departments. A well planned program constructed prior to the receipt of service requests provides benefits for both the customer and the company. The two functions to be administered by the facility manager in the facility provision job are described in the following material:

(a) **Cable Facility Analysis:** The facility manager must have current and complete knowledge of the fill levels in all sections of plant. The fills provided in the section terminal record are the main source of this information. This record, described in 5.03, shows the multiple fill condition in any complement and points out problem areas. The manual form of the section terminal record is to be developed at this time. If further detail is required, copies of the exchange cable customer record must be used to determine final distribution of pairs. When the mechanized process becomes available, fill information will be provided on a very short notice. A limited amount of information such as a complement or terminal fill may be provided with a cathode-ray tube display on an "on-line" request basis. Larger amounts of data such as a total route fill will be furnished in paper printout form probably on an overnight arrangement. These formats are currently under study to determine the most preferable output to serve the needs of the outside plant engineer. The facility manager is responsible for maintenance of route layout sheet fill information. These permit analysis of feeder cable complements that are required in many plant extensions or rearrangements. The introduction of new fills on a DOP plan may be in order, on occasion, to analyze relief requirements. As growth occurs and congestion increases, the facility manager should make maximum use of reports from the plant service center. Of particular importance are the spare pair depletion notices in dedicated plant complements. In multiple plant the Facility Control Plan activity should be a major factor in relief determinations. This plan, described in Section AG11.310, provides line and station transfer activity reports monthly and is a good barometer for use in facility planning. The engineer of outside plant should acknowledge all facility congestion notices from the plant service

center. Both groups should agree on the dispatch and response routines in handling facility reports. A coordinated interdepartmental approach to facility problems is a prerequisite in the provision of good service for customers.

(b) **Maintenance of an Activity Record:** The facility group often becomes cognizant of growth activity within its domain as a part of field visits and other routines. The clerk in the section should be made responsible for the recording of such activity. An activity map of each wire center is recommended as the best means to display such work potential. New subdivisions, apartment complexes, commercial centers, major highways, etc., are examples of items that should be noted. Some of the sources that may be used regularly as input for such a document are as follows:

- (1) F.W. Dodge Reports (or equivalent)
- (2) City and county building permits
- (3) Newspaper items including any available trade publications
- (4) Notifications from the Building Industry Consultants Service
- (5) Information comments received from marketing, commercial, or other departments
- (6) Highway and other road department change bulletins.

Building data should be posted showing in-service dates and line requirements where known. The activity is removed from the map when facilities are provided and connected. The map should be maintained in the facility section but made available to the study group when necessary for assistance in estimate and forecast preparation. A good arrangement is to provide a duplicate copy for the study group during a current analysis.

#### **6.02 Construction Coordination and Scheduling:**

The facility manager must inform the construction forces as to the proper scheduling of all job items to meet service requests. This includes specific estimates in addition to routine orders. Section AG11.440 describes a plan for job scheduling. This procedure will provide a substantial improvement

in information furnished customers regarding in-service dates. When specific estimates are approved for ordering materials, the facility manager should proceed with the order preparations or with instructions to construction forces to handle the preparations. The facility group should work closely with the construction forces in the design of new items. This includes the use of proper tools and the determination of the most economical construction methods. *Safety* considerations are important in this function.

**6.03 Plant Service Department Coordination:**

The facility manager is responsible for coordinating cable pair rearrangement activities with the plant assignment forces. This is best accomplished in conferences with construction, assignment, and engineering groups. Plant maintenance condition reports should be referred to the facility manager for prompt handling.

**6.04 Highway Department Coordination:**

The facility manager is responsible to inform himself of highway changes in time to prepare detail plans for clearance of telephone plant. The responsibility includes determination of billing arrangements where appropriate, although policies for billing are usually determined at the company level. When plant rearrangements require estimate preparation, the facility manager should work with the study manager to accomplish the proposals. In some cases the study manager will need to make an analysis and in others he will not be involved. As increasing amounts of buried and underground plant are placed in the System, more coordination is required with highway and other road department officials. The facility manager should develop cordial relationships with these officials so that telephone company interests may be promoted and protected.

**6.05 Handling Public Requests for Plant Rearrangements:**

The facility manager must handle all requests from public groups and private individuals in the rearrangements of telephone plant. Determination of billing arrangements will be the facility manager's responsibility, although policies for billing are usually determined at company level.

**6.06 Joint Utility Coordination:** Members of the facility group must coordinate many joint utility arrangements. These include pole activities as well as joint trenching efforts that are developing as a result of buried plant programs. The facility

force is also responsible for arrangements with CATV operators using telephone plant.

**6.07 Sale of Service:** The facility manager should work with local commercial and/or marketing forces in the sale of improved services to the customers. When plant facilities are available, it is often good management to market upgrade services to improve revenues without additional investment. The higher residential service level will facilitate dedicating plant in addition to reducing customer complaints. Such programs must be administered carefully so as to minimize cable congestion and resultant delayed order problems.

**7. UNIFIED FACILITY MONITORING PROCEDURES**

**7.01** The foregoing material has described the development of the cable fill counting process (see 5.03), along with cable facility analysis and maintenance of building activity (see 6.01). These two functions must be supported by good scheduling of facility reviews in order to complete the monitoring job. Each office should prepare a document that shows the schedule for counting each route as well as smaller sections where congestion requires a current analysis. A typical schedule is shown in Fig. 3. This should be prepared jointly by the study and facility managers. The study manager will probably require counts for several cables in a wire center route, whereas, the facility manager will only request a few complements in a small region. However, the latter may request counts on short notice due to an unexpected growth item. When a large load is imposed on the schedule at one time, the study and facility managers should meet with the office supervisor to determine priority. The importance of maintaining regular fill counting on a continued planned program basis cannot be overestimated. The System recommends that district managers provide a constant control of the process.

**8. SUMMARY**

**8.01** The procedures outlined in this section are designed to increase the planning performance while providing good control of cable system monitoring in outside plant engineering districts. These procedures are also intended to improve progress in new programs such as DOP and EFRAP. The procedures outlined in this section are set forth in anticipation of the new mechanization process that the Bell System intends to apply to current programs.

