SECTION 4 –THE PLANNING SEQUENCE

23. The first essential is to make certain what type of road is required, e.g. Jeep track, one-way temporary fair weather track for light traffic, two-way all weather road for heavy vehicles.

24. Detailed procedure will vary with the type of road, the tactical situation, and the time available. Table 1 is a guide to the action required in different circumstances, but reconnaissance and location procedure should always be as through as is practicable.

TABLE 1.1
SEQUENCE OF ACTION IN PLANNING AND DESIGN OF ROADS AND TRACK

Ser No	Stage	Hasty construction of temporary roads and tracks	Deliberate construction of all-weather roads	Improvement of existing roads
(a)	(b)	(c)	(d)	(e)
1	Preliminary	(a) Ensure that user requirements are clearly specified, especially:- (i) Ruling points both tactical and administrative. (ii) Load class of vehicles. (iii) No of traffic lanes. (iv) Permissible relaxation of normal standard. (v) Life of road. (b) Study existing maps, air photographs, and available	As for column (c) and, in addition:- (a) Study geological maps and metrological information. (b) Obtain hydrological data and local information about floods and frost effects. (c) Ask for additional air photo coverage, including oblique of apparent obstacles, steep side-hill slops, and potentially difficult areas. (d) Select alternative routes requiring least possible earthwork,	(a) Determine the aim, e.g., removal of bottlenecks, increase of capacity, increase of load class, improvement of weather resistance. (b) Study road-plan 11 available and existing maps and air photographs, in order, to locate bottlenecks, major damage, badly, drained areas, and possible detours. (c) Obtain any

		information. (c) Determine the engineering ruling points. (d) Select, in order of merit, general locations; which fit all the ruling points and estimate No. of bridges/culverts required in each case. (e) Check availability of:- (i) Plant. (ii) Labor. (iii) Bridging equipment, culvert materials, prefabricated surfacing. (f) Obtain any available information about sources of road stone, timber, or other local resources. (g) Determine time available	heavy clearing and drainage. (e) Determine availability of special engineer stores and plant for concrete, cement-bound, or bituminous construction.	available information about present load class or individual bridges and culverts. (d) Ask for additional aerial recce and/or air photo coverage to clear up doubts or to confirm deduction.
2.	Initial recce	(a) Map recce, satellite information, GIS data, Air recce (preferably by helicopter) of alternative routes.	As for column (c), but all alternatives should be investigated and more detailed ground recce should include:-	Air recce, preferably by helicopter:- (i) To check traffic flow and bottlenecks. (ii) To establish

		(b) Hasty ground recce of first choice of alignment, to check:- (i) Nature of earthwork. (ii) Soil strength (field tests). (iii) Gradients. (iv) Siting of culverts and main drainage plan. (v) Potential quarries, gravel pits, and borrow areas. (c) Select access routes for plant. (d) Seek approval for some relaxation of normal standards only if this will greatly reduce the task and hasten completion	(a) Take soil samples where any doubt of suitability exists. (b) Prepare estimates of the earthwork involved on each practicable alignment. (c) Investigate local sources of material, sample available road stone, and estimate quantities of stone gravel, sand, timber and other engineer materials.	priorities. (iii) To locate detours. (iv) To find access routes for plant. (b) Hasty ground recce to study surface condition, to determine most urgent tasks and to assess the over-all scale of plant, labor, and materials required on unsurfaced roads soil samples should be taken as a basis for pavement design.
3.	Route selection	In hasty work, this is normally done at Stage 2, as comparison of alternatives is impracticable	(c) Compare effort required on different routes for:- (i) Earthwork. (ii) Work in rock. (iii) Heavy clearing. (iv) Bridges and culverts. (v) Drainage. (vi) Improvement of subgrade. (vii) Select the	(a) Select detours to bypass obstacles or reconstruction work. (b) If necessary, re-align the road where bad bends or steep gradients must be eliminated. (c) Give consideration to

			alignment requiring the least over-all time and effort.	one way traffic circuits.
4.	Detailed recce and soil survey	Nil, unless the road is scheduled for later. Work is normally combined with field location or setting out, but some re-alignment may be necessary to avoid unexpected bad areas. If future development is pro-posed, take soil samples	(a) Prepare recce report and map (see Section-48) (b) Check gradients and curves (c) Obtain details of bridge sites and estimate equipment and stores required. (d) Investigate natural drainage and locate outfalls to conform. (e) Estimate requirements for culverts and structures. (f) Estimate cleaning work, by types. (g) Make preliminary estimate of earthwork quantities to balance out and fill, and determine haul lengths and borrow pit areas. (h) Select dumping sites for waste soil. (j) Confirm availability of road stone and estimate local materials available. (k) Check suitability of soil by field tests, and take samples for soil laboratory.	(a) Proposed re-alignments and detours must be examined in detail, to establish feasibility and to determine requirements in plant materials, labor and time. (b) Check width and strength of bridges and culverts and estimate requirements for any necessary reconstruction. (c) Examine the route in detail and prepare a schedule of work required, showing priorities with estimates of requirements for- (i) Widening. (ii) Drainage improvement. (iii) Pavement repair. (iv) Resurfacing (d) Select access and haul routes, stores dumping

			(l) Adjust general alignment in detail, for economy of effort in construction. (m) Select access and haul routes, stores dumping areas, construction camp and investigate water supply.	areas, and construction camp.
5.	Design	(a) (i) Based on the Casagrande system of classification decide on the total thickness of pavements required. (ii) Choose the type of base and surface courses, depending on materials, plant and time available or (b) Select the type of prefabricated or improvised surfacing to be used as a temporary expedient (c) (i) Calculate volume of water	(a) (i) Carry out preliminary survey. (ii) Prepare profile and cross sections of proposed alignment. (iii) Adjust alignments to reduce earthwork. (a) (i) pavement design may be specified by soils laboratory or be based one in situ CRR test. (ii) Type and thickness of base and surface courses depend upon nature of subgrade in each section and upon materials and plant available. Minimum thickness may be detected by the need for insulating frost active subgrade.	(a) For methods of carrying out improvements and repairs (see chapter 25). (b) The restoration or strengthening of the road pavement may involve:- (i) Patching. (ii) Surface dressing. (iii) Laying a new surfacing course. (iv) Complete redesign and construction of a new pavement

		to be discharged from each catchment area for unsurfaced roads provide sufficient waterway for double this quantity. (ii) Determine sizes and shape of side drains. (iii) Determine sizes of culverts and outfalls	(c) All drainage works and road structures must be designed to meet maximum likely requirements and to remain effective throughout the anticipated life of the road.	
6.	Planning	(a) As far as time permits plan execution of work on the lines of column (d). (b) The essentials are:- (i) Clear-cut allocation of responsibility. (ii) Phasing of plant and transport to avoid mutual interference and to prevent unnecessary delays. (iii) Good	(a) Prepare job table and job priority list. (b) From (a) construct detailed work program. (c) From (b) prepare:- (i) Plant Schedule. (ii) Labor schedule. (iii) Phasing Programed for stores and materials. (iv) Quarrying program. (v) Transport schedules. (d) On large-scale works re-responsibility and supervision must be decentralized.	(a) Prepare work programed for all major tasks. (b) Allot units or sub-units with necessary plant to:- (i) Each major task. (ii) Sections of the alignment requiring general repair or improvement. (c) Arrange for strict traffic control and signposting, preferably by RMP.

		communications, preferably by wireless between a central control point and all subordinate commanders.	Organize by road-sections or by similar task and allot resources accordingly. (e) Locate and stock stores dumps to suit work program and detailed organization. (f) Plan administrative arrangements. (g) Allot wireless links. (h) Specify records and progress charts required to facilitate revision of priorities or re-allotment of sources.	(d) Arrange for breakdown and recovery organization by REME.