4　日本における研修カリキュラム例

(1)　日本においては農業土木技術者（かんがい排水技術者）の技術力向上を図るため，中央研修（農業土木試験場）と地方研修（各地方農政局土地改良技術事務所）が行なわれている。中央及び地方ともかんがい排水技術の動向等を背景にして，毎年その内容等について反省を加えながら，改良及び変更がなされている。

(2)　中央研修（農業土木試験場）

・中央研修の概要を次に記述する。なお，詳細な内容については，構造改善局施工企画調整室及び農業土木試験場に問い合わせられたい。

1　中央研修（農業土木試験場）概要　昭和５５年度　農業土木技術研修の実施について

(1)　農業土木技術者の技術力向上のため，次の事項について今後とも一層の充実をはかる。

1）農業土木試験場（中央）研修と土地改良技術事務所研修との相互の連携

2）職場研修の推進

3）技術行政推進のための広い視野と意志力のかん養

4）技術的体験

5）研修生間あるいは研修生と講師の間の意見交換

(2)　昭和５５年度の研修計画について

1）基本的には従来と同様とする。

2)）十分な研修成果を期待することとして次のことを行なう。

①　各研修における農政論の講義，また適宜に講話等

②　研修目的に対応した演習，実習，事例研究，討論会等

3）専門技術研修について，第１回は地域全体の総合的な開発計画が要請されていることに対応して「土地改良事業計画」を，第２回は農村社会環境の充実が要請されていることに対応して「農地の高度利用及び農村整備」を，第３回は農業の水需要に応えた水利用技術の向上のために「農業水利」を主題にする。

(3)　研修受講資格の暫定運用について

下表のとおり。

農業土木技術研修受講資格の暫定運用について

コース名	要　　綱	暫　定　運　用	備　　考
一般技術研修	高卒後実務経験３年以上で２７才以下の者	高卒後実務経験が３年から６年までの者	都道府県，公団等は要綱のとおりであるが，国の暫定基準を参考にする
中堅技術研修	大卒後実務経験５年以上の者またはこれと同等以上の学力を有する者	地方農政局の係長および事務所，調査事務所の係長（大卒除く）	
専門技術研修	現に指導監督する職務に従事している者	地方農政局の課長，課長補佐，専門官ならびに事業所，調査事務所の次長課長，支所長	
施工管理技術研修	中堅研修と同じ	事業所の工務官，調査事務所の課長補佐	

(4) 昭和５５年度 農業土木技術者研修計画(案)

研修コース		期間	研修生員数(農政局等)	4月	5月	6月	7月	8月	9月	10月	11月	12月	1月	2月	3月	備考
農業土木一般技術研修	第1回	147日	48人(21)	15日(火)					19日(金)							夏期休講 8月8日～8月18日
	第2回	150日	47人(23)							3日(金)					20日(金)	冬期休講 12月20日～1月7日
農業土木中堅技術研修	第1回	20日	52人(30)			27日(金)	16日(火)									
	第2回	21日	52人(30)								7日(金)	27日(火)				
農業土木専門技術研修	第1回	7日	50人(23)				24日(火)	30日(火)	〔土地改良事業計画〕							計画担当者を主体とする
	第2回	9日	55人(29)					28日(火)	5日(金)	〔農地の高度利用及び農村整備〕						
	第3回	7日	55人(21)							16日(火)	22日(火)	〔農業水利〕				
農業土木施工管理技術研修	第1回	11日	32人(16)		27日(火)	6日(金)										土地改良事務所係長を主体とする
	第2回	11日	52人(28)										20日(火)	30日(金)		
技術管理システム化研修(上級コース)	第1回	60日	9人		27日(火)		25日(金)									局所管
	第2回	60日	9人							30日(火)	28日(金)					
土地改良施設機械研修		30日	9人							21日(金)	19日(火)					局所管

(5) 昭和５５年度　農業土木一般技術研修講義科目および講義時間数(案)

科　目	内　容	時間数
専門科目		
①数　学	数学（高校数学の復習，論理，線形代数学，微分，積分，微分方程式，偏微分）	114
	応用数学（誤差，高次代数方程式の数値解，補間法，数値積分，資料整理，回帰と相関，確率分布）	
②水　理	水の物理的性質，静水力学，流水の基礎原理，オリフィスと水門，セキ，管水路，用水路，動水圧水力機械，流砂，波動，地下水の運動，水理模型実験	84
③構造力学	総説，断面の諸量，力学的性質，トラス，静定ばり，エネルギーに関する定理，不静定ばり柱，ラーメン，コンクリート工学	78
④農業水利	気象，水文，かんがい計画，排水計画，水資源開発	51
⑤土質地質	土質工学，土木地質，土質試験実習	57
⑥土木材料	歴青材料，セメント，コンクリート試験実習	56
⑦施設工学	ダム，頭首工，地下水工，ポンプ，水路工	69
⑧農村計画	農村計画，環境保全	9
⑨農学一般	土壌，作物	6
⑩農用地整備	圃場整備，農道整備	6
⑪農用地開発	開墾，草地造成，干拓	6
⑫設計演習	農業土木施設の設計演習	78
⑬特別講義		12
⑭その他	見学等	52
計		678

(6) 昭和５５年度第１回農業土木中堅技術研修時間割及び講師名(次)

月/日	曜日	講義課目	時間数	講師 所属	講師 氏名	備考
6/27	金	開講式	0.5	農業土木試験場	高須俊行	講義外に
		日本の農業と農業土木	2.5	構造改善局	森本茂俊	①事例研究
		三全総と農林業	3	国土庁	保坂修	②その他
28	土	農業土木技術と試験研究	1	農業土木試験場	岸本良次郎	
		場内見学	2			
29	日					
30	月	農用地開発の設計と施工	6	農用地開発公団	小出剛	
7/1	火	圃場整備特論	3	農業土木試験場	根岸久雄	
		水田用排水量の調査と計画	3	同上	古木敏也	
2	水	畑地かんがいの調査と計画	3	同上	河野広	
		パイプラインの水理設計	3	同上	久保七郎	
3	木	農業用排水機械	3	筑波大学	鈴木光剛	
		地質概論（農用適地について）	2	構造改善局	徳崎幾正	
		体育	2			
4	金	作物と土壌	3	農事試験場	吉田健	
		農村地域における水質汚濁とその対策	3	茨城大学	田渕俊雄	
5	土	農村計画概論（その１）	3	農業土木試験場	笹野伸治	

月/日	曜日	講義科目	時間数	講師 所属	講師 氏名	備考
7/6	日					
7	月	農村計画概論（その２）	3	農業土木試験場	笹野伸治	
		水管理制御技術（畑地かんがい編）	3	同上	久保七郎	
8	火	道路工（農道の設計と施工）	6	日本舗道	鈴木康一	
9	水	流出解析（単位図法他－その１）	3	農業土木試験場	渋谷勤治郎	
		事例研究	3			
10	木	流出解析（単位図法他－その２）	3	農業土木試験場	渋谷勤治郎	
		同上（タンクモデル）	3	東京大学	中村良太	
11	金	土質工学，最近の話題	6	東京大学生産工学研究所	三木五三郎	
12	土	土質試験結果の利用法	3	農業土木試験場	川口徳忠	
13	日					
14	月	コンクリートの問題点	6	農業土木試験場	海老名芳郎	
15	火	討論会	6			
16	水	地すべり防止対策	2.5	農業土木試験場	岸本良次郎	
		閉講式	0.5	同上	高須俊行	

(7) 昭和５５年度第２回農業土木中堅技術研修時間割及び講師名（案）

月／日	曜日	講義科目	時間数	講師 所属	講師 氏名	備考
11／7	金	開講式	0.5	農業土木試験場	高須俊行	講義外は
		日本の農業と農業土木	2.5	構造改善局	森本茂俊	①事例研究
		水資源開発について	3	同上	森川正雄	②その他
8	土	農業土木技術と試験研究	1	農業土木試験場	岩本良次郎	
		場内見学	2			
9	日					
10	月	流出解析（単位図法－その１）	3	農業土木試験場	渋谷勤治郎	
		応用地質	3	関東農政局	根倉克幹	
11	火	河川及び取水施設の水理（その１）	3	農業土木試験場	川合亨	
		開水路の水理（その１）	3	同上	石野捷治	
12	水	流出解析（単位図法－その２）	3	同上	渋谷勤治郎	
		同上（タンクモデル）	3	東京大学	中村良太	
13	木	地下水学、最近の話題	5	農業土木試験場	木村重彦	
		体育	2			
14	金	河川及び取水施設の水理（その２）	3	農業土木試験場	川合亨	
		開水路の水理	3	同上	石野捷治	
15	土	水管理制御技術（ダム、頭首Ⅰ編）	3	同上	久保七郎	

月／日	曜日	講義科目	時間数	講師 所属	講師 氏名	備考
11/16	日					
17	月	フィルダム技術の現状と問題点	3	農業土木試験場	仲野良紀	
		同上	3	同上	同上	
18	火	水管理制御技術（バルブ編）	3	農業土木試験場	久保七郎	
		事例研究	3			
19	水	水路工（水路施設のシステム設計）	6	水資源開発公団	早乙女昭三	
20	木	コンクリートの問題点（その1）	3	農業土木試験場	海老名芳郎	
		水利施設の管理	3	構造改善局	西出定雄	
21	金	土質工学，最近の話題	6	東京大学生産技術研究所	三木五三郎	
22	土	コンクリートの問題点（その2）	3	農業土木試験場	海老名芳郎	
23	日					
24	月	（振替休日）				
25	火	施設工	6	問組	藤田圭一	
26	水	討論会				
27	木	地すべり防止対策	2.5	農業土木試験場	坪本良次郎	
		閉講式	0.5	同上	高須俊行	

(8) 昭和５５年度第１回農業土木専門技術研修時間割及び講師名（土地改良事業計画）(案)

月／日	曜日	講義科目	時間数	講師 所属	講師 氏名	備考
7/24	木	開講式	0.5	農業土木試験場	高須俊行	
		農業政策の方向	2.5	大臣官房企画室	上床一義	
		土地改良事業計画について	2	構造改善局	中村和也	
		地域計画と農業基盤整備	2	東京工業大学	鈴木忠義	
25	金	社会・経済指標の見方、まとめ方	3	構造改善局	平子祥朗	
		土質調査の手引、まとめ方	3	農業土木試験場	中山照之	
		事例研究（グループ別討議）	1	同上		
26	土	営農計画のたて方	3	構造改善局	川合勝	
27	日					
28	月	経済効果の測定／コストアロケーション(1)	3	構造改善局	清水行男	
		事例研究（グループ別討議）	4	同上		
29	火	経済効果の測定／コストアロケーション(2)	3	同上	清水行男	
		環境評価の手法	3	同上	矢名清文	
		事例研究（グループ別討議）	1	同上		
30	水	同上（全体討議及びレポートまとめ）	6.5	同上		
		閉講式	0.5	農業土木試験場	高須俊行	

(9) 昭和５５年度第２回農業土木施工管理技術研修時間割及び講師名(案)

月／日	曜日	講義科目	時間数	講師 所属	講師 氏名	備考
1/20	火	開講式	0.5	農業土木試験場	高須俊行	講義外に
		農業土木施工について	2.5	構造改善局	島畑一成	①スライド
		場内見学	3			②演習
21	水	材料と検査（コンクリート）	3	農業土木試験場	海老名芳郎	
		同上（アスファルト）	3	日本舗道	鈴木康一	
22	木	同上（土）	3	農業土木試験場	川口徳忠	
		安全施工と安全管理	3	建設業労働災害防止協会	野沢秀之	
23	金	品質管理	6	鹿島道路	斉藤安司	
24	土	施工管理法	3	関東農政局土地改良技術事務所	斉藤健	
25	日					
26	月	品質管理	6	鹿島道路	斉藤安司	
27	火	施工計画	6	東京農工大学	岩井重久治	
28	水	同上	6	同上	同上	
29	木	討論会	6			
30	金	機械施工における諸問題	2.5	構造改善局		
		閉講式	0.5	農業土木試験場	高須俊行	

(3) 地方研修（各地方農政局土地改良技術事務所）

地方研修の概要を次に記述する。なお詳細な内容については，構造改善局施工企画調整室に問い合わせられたい。

1. 昭和５５年度技術研修（地方研修）計画

研修名	目的	対象者	期間	内容	人員
技術管理システム化研修（初級コース）	土地改良事業実施の省力化に資するために技術職員を対象にソフトウェア技術の基礎的知識を習得させるものである。	農業土木技術職員で過去にこの種の研修を受講しない者	基礎６日間 実習３日間	標準カリキュラムを基に実施する	２０名
技術管理システム化研修（中級コース）	土地改良事業実施の省力化に資するため技術職員を対象にソフトウェア技術及び機械操作技術の基礎的知識を習得させシステム化における中堅的技術者を養成する。	①技術管理システム化研修初級コース終了者 ②①以外でソフトウェア技術の基礎的事項を既に習得している者	１３日間	〃	６名
土木施工管理研修（初級コース）	土木施工技術の高度化に対処すべく，土木施工管理等の実務に必要な基礎知識を習得させ，農業基盤整備事業に携わる技術職員の資質の向上を図り，土木施工管理業務の実効をあげるものとする。	農業土木に関係する国県公団職員のうち係員	６日間	〃	１０名
土木施工管理研修（中級コース）	土木施工技術の高度化に対処すべく，土木施工管理等の実務に必要な応用技術を習得させ農業基盤整備事業に携わる技術職員の資質の向上を図り併せて土木施工管理の実効をあげるものとする。	農業土木に関係する国県公団職員のうち係長及び初級研修を修了した係員	６日間	〃	５名
土地改良施設機械研修（地方研修）	土地改良施設機械の計画，設計，施工及び保守管理等に亘って基礎的知識を習得させ能力の向上を図り施設機械に係る業務の円滑な推進に資する技術職員の養成を図るものである。	施設機械業務に係る技術職員	６日間	〃	１０名

2. 昭和５５年度技術研修日程（近畿農政局土地改良技術事務所の例）

	研修名	実施場所	実施期間												人員
			4月	5	6	7	8	9	10	11	12	1	2	3	
1	一般技術研修	農土試	═══	═══	═══	═══	═══	═══	═══	═══	═══	═══	═══	═══	
2	中堅 〃	〃			═══	═══					═══	═══			
3	専門 〃	〃			═══		═══		═══						
4	施工管理技術研修	〃	═══									═══			
5	システム化研修（初級）	土改技			═══										22
6	〃 （中級）	〃					═══								5
7	〃 （上級）	農土試		═══	═══	═══			═══	═══					2
8	土木施工管理研修（初級）	土改技				═══									9
9	〃 （中級）	〃								═══					4
10	施設機械研修（地方）	〃								═══					9
11	〃 （中央）	本省								═══	═══				1
12	上級入省者研修	本省													
13	本省係員研修	〃													
14	システム化中堅技術研修	本省			═══										4
15	〃 工事課長研修	〃						═══							4
16	〃 所長研修	〃							═══						2

3－(1)　土木施工管理研修（初級コース）

標準カリキュラムと各土地改良技術事務所カリキュラム対比表

標準カリキュラム	東　北	関　東	北　陸	東　海	近　畿	中　四　国	九　州
土木施工管理の基礎知識	土木施工管理の基礎知識	土木施工管理の基礎知識	土木施工管理基準の運用方法 現場における施工管理の問題点	土木施工管理の基礎知識 工程管理	施工管理について 施工管理試験，スライド・テープ学習及び一部実習	土木施工管理の基礎知識	土木施工管理の基礎知識
土質力学の基礎知識及び演習			土の締固め管理試験 土の密度管理と力学的性質	土質力学の基礎知識		土質工学の基礎知識及び演習	土質力学の基礎知識
土質試験実習	土質試験の実習	土質試験実習	土のセン断とＣＢＲ試験	土質試験法及び演習 土質試験実習		土質試験実習	土質試験実習
コンクリート工学の基礎知識及び演習	コンクリート工における品質管理		コンクリートの性質と品質管理	コンクリート工学の基礎知識及び演習		コンクリート工学の基礎知識及び演習	コンクリート工学の基礎知識及び演習
コンクリート試験実習	コンクリート試験実習	コンクリート試験実習	実施コンクリートの強度と品質測定試験	コンクリート試験実習		コンクリート試験実習	
コンクリート試験実習及びレポート作成		レポート作成		コンクリート試験実習及びレポート作成	レポート・アンケート等の作成	レポート作成	レポート作成
	農政の動向 パネルディスカッション	コンクリート工学及び土質工学一般	北陸における土地改良事業の概要 アスファルト舗装の施工管理 フレッシュコンクリート品質判定 施工管理に関する質疑応答 現場における施工管理の実例		土地改良技術事務所の概要 調査設計施工の留意点について 積算上の留意点について 現場監督のあり方について 施工管理試験実習	討論会 品質管理と工程管理 工事関係記録映画 道路舗装	アスファルトの基礎知識 アスファルト試験実習 最近の土地改良事業について

3 −(2)　土木施工管理研修（初級コース）

標準テキストと各局テキストの対比表(A)

標準カリキュラム	東　　北	関　　東	北　　陸
○土木施工管理の基礎知識	○土木施工管理テキスト（局独自の印刷物） ○品質管理の手引(案)　（　〃　）		○土木工事における施工管理の概要 （土木工事，管理に関する全体的説明，ゼロックス） ○低ダムと施工管理（盛土部の概要）
○土質力学の基礎知識及び演習	○土質概論（日本技研テキストを編集しゼロックス）	○研修テキスト（独自の印刷物 p−111）	○現場における土の工学的概念 （土の分類，性質，圧密，せん断，締固めについてゼロックス） ○土の工学的分類（日本統一土質分類法）
○土質試験実習	○物理，突固め，一軸圧縮，透水試験	○物理，力学試験(一軸，突固め現場密度試験)	○土の物理，力学試験
○コンクリート工学の基礎知識及び演習	○コンクリート配合設計（手書きのゼロックス） ○混和剤の知識（建築生産学会誌のゼロックス）	○研修テキスト（独自の印刷物 p−57）	○コンクリート工学（p158の独自の印刷物） ○コンクリートの品質管理（ゼロックス） ○コンクリート品質の目標（ゼロックス）
○コンクリート試験実習	○物理，スランプ，エア，テストピースによる圧縮試験	○骨材，配合，スランプ，空気量，圧縮強度試験	○コンクリートに生じる欠陥の原因と対策 ○生コンのＪＩＳ改正に伴う諸問題 ○コンクリートの試験練り，強度試験
○コンクリート試験実習及びレポート作成	○試験のＪＩＳ記録用紙 ○土木材料（参考図書のゼロックス）	○Ｗ／Ｃより圧縮強度推定式の演習	○仕様書の位置付けと現場検査 ○関係法規，工事請負契約書，土木工事共通仕様書，特別仕様書，監督要領，監督の手引及び工事仕様書をテキストとした。

標準テキストと各局テキストとの対比表(B)

標準カリキュラム	東　海	近　畿	中　四　国	九　州
土木施工管理の基礎知識	○土木施工管理研修テキスト：工程計画基礎編（独自テキスト，ゼロックス　p−28） ○研修テキスト：施工管理の基礎編（独自テキスト，ゼロックス　P−21）	○研修テキスト：工事現場監督について（独自テキスト，ゼロックス　p−20） ○研修テキスト：土木施工管理の基礎（独自テキスト，ゼロックス　p−11）	○研修テキスト（独自の印刷物　p−260） ○施工管理基準 ○研修テキストに含む	○研修テキスト （独自の印刷物　p−50）
土質力学の基礎知識及び演習	○研修テキスト：土質編（土質調査施工管理試験について，独自テキスト，ゼロックス　p−60）	○土の試験・調査実習書 （土質学会　p−48） ○研修テキスト：土質力学 （独自の印刷物　p−111）	○上記研修テキストに含む ○「演習土質工学」オーム社から抜粋，ゼロックス ○土地改良事業標準設計解説編	○研修テキスト：土質編 （独自の印刷物　p−43） （スライド３０分使用）
土質試験実習		○試験用データーシート ○シュミットハンマーの使い方 （独自テキスト，ゼロックスp−5） ○現場強度，支持力測定，物理及び力学試験	○含水量，単位体積，一面セン断，突固め試験	○物理，突固め，一軸圧縮試験
コンクリート工学の基礎知識及び演習	○研修テキスト：コンクリート編 （独自資料，ゼロックスp−89）	○研修テキスト：コンクリート工 （局独自印刷物　p−57） ○建設工事標準仕様書・同解説 （建築学会） ○レデーミクストコンクリート （日本工業標準調査会　p−43） ○生コンの配合（京都生コンクリート工業組合　p−11）	○上記研修テキストに含む ○生コンＪＩＳ改正点（独自資料，参考資料をゼロックスp−74）	○研修テキスト：コンクリート編 （独自印刷物　p−83） （スライド３０分） ○研修テキスト：アスファルト編 （独自印刷物　p−83）
コンクリート試験実習		○骨材試験，試験練り，圧縮強度，シュミット，鉄筋引張試験	○コンクリート配合，スランプ，エアー試験，圧縮強度試験	○試験練り，スランプ，エアー試験ただ固まらないコンクリートW／C測定
コンクリート試験実習及びレポート作成	○請負工事監督実務	○討論会資料，レポート作成 ○工事請負契約書 ○工事監督の手引 ○初級研修，練習問題集	○記録映画，レポート作成，討論会	○レポート作成

4. 土木施工管理研修（中級）

標準テキストと各局テキストの対比表(A)

標準カリキュラム	東　　北	関　　東	北　　陸
施工管理原論	○労働安全衛生法 ○土木施工管理テキスト（独自の印刷々子） ○ポンプ施行工事施工管理基準(案)（機改局）		○土木工事施工管理基準の解説 （ゼロックス　p６） ○施工計画概論（参考図書のゼロックスp２２） ○労働安全衛生関係法令
工　程　管　理	○ネットワーク・プランニングの使い方 〔ＰＥＲＴ〕（大成建設K.K. 39.6） ○日中ダム工程管理	○研修テキスト （独自の印刷物　ネットワークｐ－７６）	○ネットワークプランニングの使い方 （東北に同じ）
工程管理演習		○ＰＥＲＴ演習	
品　質　管　理	○品質管理（独自の印刷物） ○アスファルトコアダムの概要と品質管理 （５４年２月大成建設K）	○研修テキスト（独自の印刷物　ｐ－４４）	○品質管理の概要（参考図書のゼロックスｐ－6）
品質管理演習	○盛記試験		○演習問題データ表（ヒストグラフ）
討　論　会　及　び レ　ポ　ー　ト　作　成	○国際協力とインドネシア農業 ○ゲート施行工事施工管理基準（案） ○水門扉検査要領（案）（水門鉄管協会） ○ダム付帯道路に係る覚書		

標準テキストと各局テキストの対比表(B)

標準カリキュラム	東　　海	近　　畿	中　四　国	九　　州
施工管理序論	○研修テキスト：土木施工管理の基礎編（独自テキスト，初中同じ，ゼロックス　p−21） ○　〃　：土質編（独自テキスト，初中同じ　p−60	○土木工事の施工管理計画 （竹焼，大成建設以　p−161） ○施工管理（土木施工管理研究会．ゼロックス　p−85）	○土木技術者のための施工管理 （土木施工管理技術研究会の抜粋） ○研修テキスト （独自の印刷物　p−260）	（スライド・工事写真の撮り方）
工程管理		○工程管理（ＰＥＲＴ法） （独自印刷物　p−73）	○工程管理（参考書の抜粋）	○ネットワークによる工程管理 （独自資料ゼロックス　p−76） ○ネットワーク・プランニング （大成建設以東北に同じ） （ＰＥＲＴ基礎編）
工程管理演習	○中里ダム工程管理表 （実際の管理表）		○工程管理演習問題（問−７）	○ＰＥＲＴ演習
品質管理		○生コンの配合の並び方 （京都生コン協会　p−10） ○レヂーミクストコンクリート （日本工業標準調査会 p−18）	○アスファルト舗装要綱 （道路協会を抜粋　p−　）	○研修テキスト （独自資料ゼロックス　p−44）
品質管理演習			○土木工事施工管理基準 ○品質管理演習問題（問−３）	○ＣＢＲ，コンクリート試験練り土の締固め
討論会及びレポート作成	○実施農業の概況 （独自テキストゼロックス p−14） ○請負工事の監督概要 ○会検結果について （本省会議資料）	○農業基盤整備事業について （ゼロックス　p−18） ○研修テキスト：土質力学 （独自印刷物　p−111） ○研修テキスト：コンクリート工 （独自印刷物　p−57） ○中国の治水用ダム建設レポート （竹焼　p−31） ○建築工事標準仕様書・同解説 （日本建築学会） ○会検における問題点 （ゼロックス　p−34）	○記録映画，レポート作成，討論会 ○土地改良事業標準設計	○討論会，レポート作成 ○安全管理テキスト （労働衛生　や事故例の抜粋　p−14） ○工事関係諸法規集

5　かんがい局バンドンの組織及びコロンボプラン専門家等

1）組　　織

公共事業省かんがい局には次の技術関係５部がある。

(1)　計画技術部：かんがい計画事業の調査計画設計に関する業務

(2)　建設第一部：外国の融資をうけたかんがい計画事業の建設に関する業務

(3)　建設第二部：国内の中小規模かんがい計画事業の建設に関する業務

(4)　修　復　部：現在機能しているかんがい組織の修復工事に関する業務

(5)　末端組織開発部：第３次水路以下の末端組織の開発に関する業務

以上のうち，計画技術部だけがバンドンに置かれている。部長は Ir. Sadeli Wiramihardga 氏で，所属技術者は約９０名におよぶ大組織で他のジャカルタの４部の総技術者数よりも多い。

計画技術部には技術関係４課がある。課は班に分れる。

調査課：測量，基礎及び土質，水文調査・調査一般の４班

第一課：アチエ・スマトラ北部・スマトラ西部・ジャンビ・リマウ担当班

スマトラ南部・ランポン・カリマンタン担当班

スラウエシ担当班

技術管理・報告班の４班

第二課：ジャワ西部・ジャワ中部・ジャワ東部・ヨクジャカルタ班

バリ・ヌーサンタラ西部，東部班

マルクウ・イリアン・チイモール班の３班

製図課：製図，印刷，資料保管の３班

がある。

Colombo Plan Experts は Ir Sadeli 氏に対する技術顧問，Advisor の立場にある。本組織を表にまとめると第一表のとおりである。

2）Colombo Plan Expert と Counterpart

１９７１年９月以降バンドン計画技術部に勤務を命じられた Colombo Plan Expert は総計１２名，また，Daily Counterpart として同室し，専門家の技術移転をうけた技術者は総計１２名で現在中央及び各地方の水資源部にて活躍中である。

開発途上国であるので，毎年続々と新しいかんがい事業が着手され，技術者の需要は非常に多い。バンドンから毎年１０名位の技術者が転出していく。その穴うめは新卒採用によって行われている。当部は技術者の訓練をしては送り出すという一種のリクルートセンターの役割をも果している。

近年外国のコンサルタントが契約で，特定の Project の計画設計業務を行うようになって来ている。その Chief Counterpart は Ir. Sadeli 氏である。以下コンサルタントに

はりつけられるべきCounterpartの需要もまた増大している。これらのCounterpartの養成も行われている。

Colombo Plan Expertは Daily に接触するCounterpart の他に，各州におけるかんがい事業の計画設計上の問題に関与することが要請される。このときは各班担当の技術者がCounterpart となる。従って広い意味では，技術計画部の技術者全般がCounter - part とも云える。

Daily Counterpartのうち JICAの研修に参加した技術者は Group Training 農地水資源コース1名，個人研修2名である。

1980年8月26日現在でColombo Plan Expert とCounterpart のListは第二表のとおりである。

以 上

Table 1

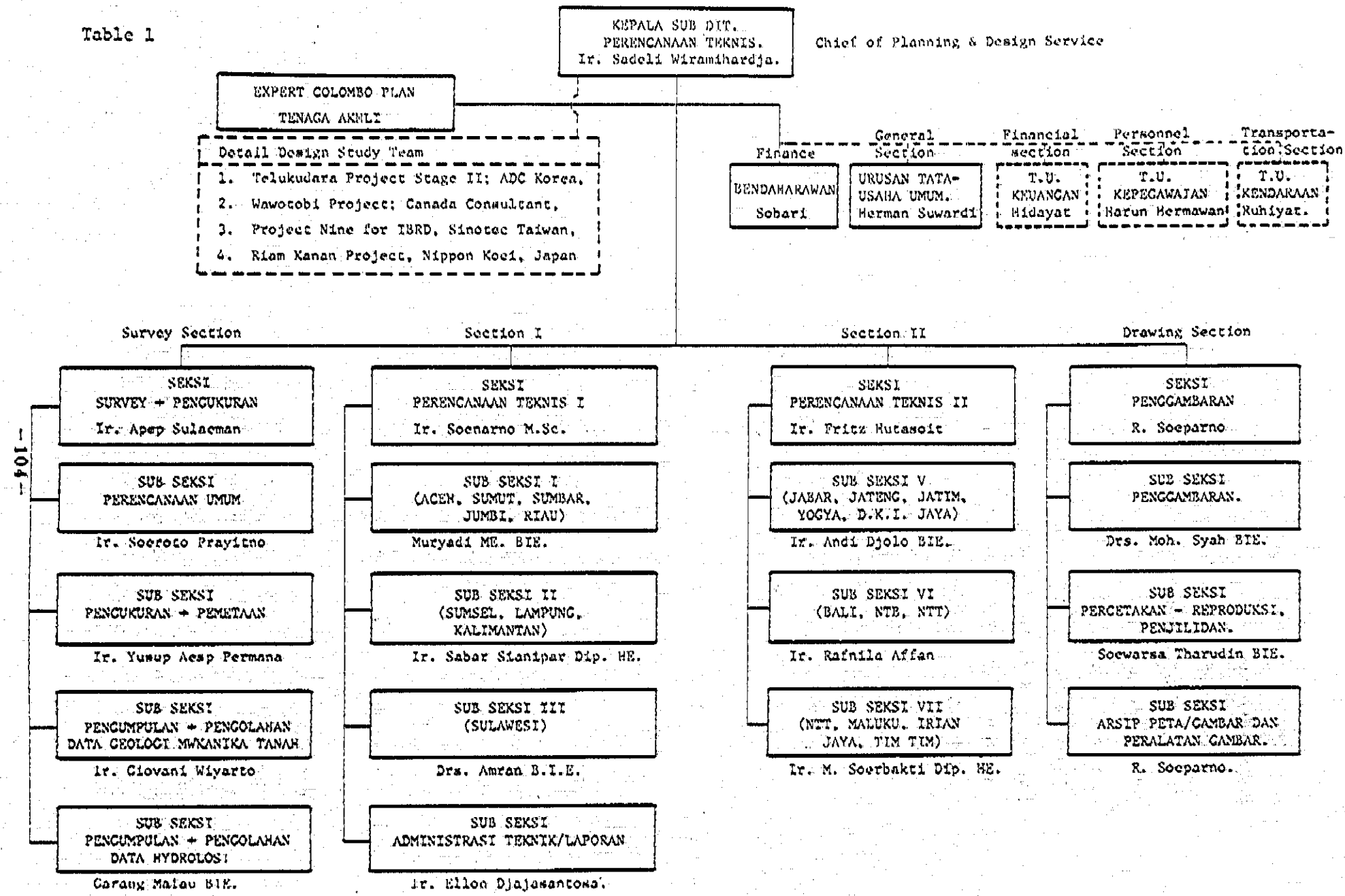

KEPALA SUB DIT. PERENCANAAN TEKNIS. Ir. Sadeli Wiramihardja.
Chief of Planning & Design Service
EXPERT COLOMBO PLAN
TENAGA AKHLI
Detail Design Study Team
1. Telukudara Project Stage II; ADC Korea,
2. Wawotobi Project; Canada Consultant,
3. Project Nine for IBRD, Sinotec Taiwan,
4. Riam Kanan Project, Nippon Koei, Japan
Finance
BENDAHARAWAN
Sobari
General Section
URUSAN TATA-USAHA UMUM.
Herman Suwardi
Financial section
T.U. KEUANGAN
Hidayat
Personnel Section
T.U. KEPEGAWAIAN
Harun Hermawan
Transportation Section
T.U. KENDARAAN
Ruhiyat.
Survey Section
Section I
Section II
Drawing Section
SEKSI SURVEY + PENGUKURAN
Ir. Apep Sulaeman
SUB SEKSI PERENCANAAN UMUM
Ir. Soeroto Prayitno
SUB SEKSI PENGUKURAN + PEMETAAN
Ir. Yusup Aesp Permana
SUB SEKSI PENGUMPULAN + PENGOLAHAN DATA GEOLOGI MWKANIKA TANAH
Ir. Giovani Wiyarto
SUB SEKSI PENGUMPULAN + PENGOLAHAN DATA HYDROLOGI
Caraux Malau BIE.
SEKSI PERENCANAAN TEKNIS I
Ir. Soenarno M.Sc.
SUB SEKSI I (ACEH, SUMUT, SUMBAR, JUMBI, RIAU)
Muryadi ME. BIE.
SUB SEKSI II (SUMSEL, LAMPUNG, KALIMANTAN)
Ir. Sabar Sianipar Dip. HE.
SUB SEKSI III (SULAWESI)
Drs. Amran B.I.E.
SUB SEKSI ADMINISTRASI TEKNIK/LAPORAN
Ir. Elion Djajasantosa.
SEKSI PERENCANAAN TEKNIS II
Ir. Fritz Hutasoit
SUB SEKSI V (JABAR, JATENG, JATIM, YOGYA, D.K.I. JAYA)
Ir. Andi Djolo BIE.
SUB SEKSI VI (BALI, NTB, NTT)
Ir. Rafnila Affan
SUB SEKSI VII (NTT, MALUKU, IRIAN JAYA, TIM TIM)
Ir. M. Soerbakti Dip. HE.
SEKSI PENGGAMBARAN
R. Soeparno
SUB SEKSI PENGGAMBARAN.
Drs. Moh. Syah BIE.
SUB SEKSI PERCETAKAN - REPRODUKSI, PENJILIDAN.
Soewarsa Tharudin BIE.
SUB SEKSI ARSIP PETA/GAMBAR DAN PERALATAN GAMBAR.
R. Soeparno.

Table 2 IRRIGATION EXPERTS ASSIGNED AT DIRECTORATE IRRIGATION (AS OF 26 AUGUST 1980)

No.	Assigned Period	No.	Expert (Speciality)	Daily Counter-part.	Present Position	JICA Training.
1	Sep. 1971 Nov. 1973	: 24	Mr. K. Kimura (Plan & Design)	Drs. Amran BIE	Chief of Sub Section Sulawesi of Planning Section I. DOI, Bandung.	
2	Sep. 1971 Sep. 1974	: 36	Mr. K. Ueda (Plan & Design)	Ir. Suroto Prayitno. Ir. Hartono	Chief of Sub Section General Planning of Survey Section. DOI, Bandung. Chief of Water Resources in Nusa Tenggara Timur Province.	
3	Oct. 1973 Oct. 1974	: 12	Mr. T. Hayashi (Plan & Design)	Drs. Amran BIE	Chief of Sub Section Sulawesi of Planning Section I. DOI, Bandung.	
4	Mar. 1972 Mar. 1974	: 24	Mr. T. Nomoto (Plan & Design)	Mr. Muryadi ME. BIE.	Chief of Sub Section Sumatra of Planning Section I, DOI, Bandung.	
5	Mar. 1972 Jun. 1973	: 15	Mr. Sakai (Agr. Economics)	Ir. Ellon D.	Chief of Sub Section Report and Budget of Planning Section, DOI, Bandung.	
6	Oct. 1973 Oct. 1976	: 36	Mr. T. Ishida (Hydrology)	Ir. Totong Hartiwarman	Deputy Planning of Project Way Seputih and Way Sekampung in Lampung Province.	
7	Jul. 1974 Jul. 1980	: 72	Dr. K. Uno (Geology & Soil Me-Mechanics)	Mr. Sumaryono Mr. Wahyu	Staff of Sub Section Geology and Soil Mechanics DOI, Bandung. - do -	
8	Nov. 1974 Nov. 1977	: 36	Mr. T. Sakai (Dam)	Mr. Omay Komarudin BIE	Staff of Section II, DOI, Bandung.	Group Training 1979.
9	Oct. 1974 Oct. 1976	: 24	Mr. Y. Suzuki (Water Requirements)	Mr. Busra	Counterpart Colombo Plan	
10	Aug. 1975 Aug. 1978	: 36	Mr. I. Fujimori (Computer)	Mr. Sancoyo	Staff of Section I, DOI, Bandung. Training Course in Netherland.	Individual Feb. 1978.
11	Nov. 1977 Nov. 1980	: 36	Mr. N. Yamada (Dam)	Mr. Busra	Counterpart Colombo Plan	Individual Jul. 1980.
12	May. 1978 May. 1982	: 48	Mr. M. Matsui (General, Project Elevation, Water Requirements, Hydraulic Model Test)	Mr. Busra	Counterpart Colombo Plan	- do -
Σ	339 Man-month		12 persons	12 persons		Group 1 Ind. 2

6. インドネシア国公共事業省における研修の現状と必要性

MPW TRAINING DEMAND AND EXISTING TRAINING CAPACITY

The analysis of manpower requirements for the critical jobs yielded salient findings calling for certain adjustments in the training system of MPW. The findings concern additional load over and above current training activities and the types of training programs that are to be developed, improved, or offered more frequently than usual. Consistent with the strategic approach postulated in the Study, the training priorities defined by administrators were incorporated throughout the various phases of the analysis. Specific problems and related issues were extensively discussed with MPW officials concerned to arrive at a clearer perception of training needs and projected training resource gaps.

4.1 Identification of Training Requirements Based on Training Priorities and Job Summaries of Critical Jobs

Interviews with the Director General of Bina Marga and the Directors under him reveal that in the training of Bina Marga personnel as well as personnel of its contractors and consultants high priority is placed in project management, foremanship, equipment management (allocation, utilization, operation, and maintenance), project design, and tehnical supervision of construction.

The management view of the Directorate General of Pengairan and its respective Directorates indicates training priorities in the areas of planning, survey work, mapping, and design. Also expressed in particular was the need for training in technical supervision of construction (especially for consultants), irrigation planning and programming, construction cost accounting (especially for loan assisted projects, project management, and project monitoring).

Cipta Karya officials single out the lack of planners and sanitary engineers as their most pressing need. The Director General of Cipta Karya mentioned the following as their inservice training priorities: project management, field project supervision and foremanship, planning and communication (for rural housing improvement projects).

Ministry-wide, management's perception of training needs closely approximates the qualitative requirements of the identified critical jobs (See Appendix D). There has been explicit recognition of the value of overseas training for highly technical, post-graduate level type of specializa-

tions needed; the need for retraining or upgrading the capability of current manpower stock; and the importance of extending training programs for MPW personnel to include contractors and consultants engaged in ongoing MPW projects.

All the three Directorates General have expressed the desire to have a computerized system for monitoring. As such, the need for training of computer systems analysts and programmers is apparent.

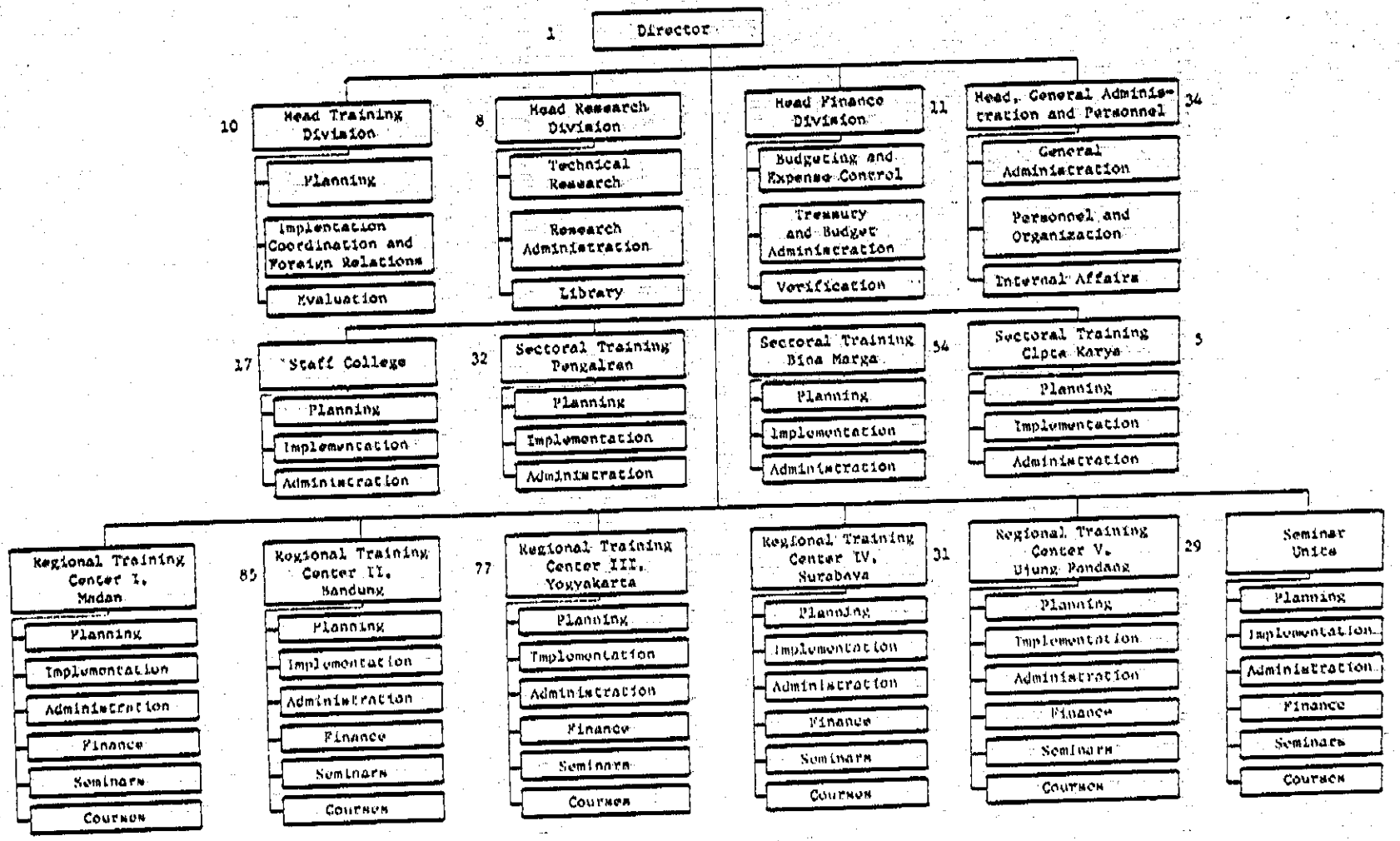
Because of the requirements of the approach to the Study, training in technical and supportive activities for the establishment of an MPW integrated management information system is perceived to be necessary undertaking for MPW central staff. Furthermore, there is widespread agreement among all sectors on the need for a training of trainors program to enhance training effectiveness.

The views of training administrators as collectively reflected in the course offerings of the various MPW training centers point out a relatively comprehensive attempt to cover MPW's training needs (See Appendix E). It should be noted however that MPW training organizations must not only develop the appropriate and needed courses but must set up implementation systems that would accommodate all prospective trainee participants.

4.2 Existing Training Capacity

The organization responsible for the training function of MPW consists of a central coordinating body called the "Pusat Pendidikan dan Latihan" (Pusdiklat) or Center for Education and Training, which is structurally placed in direct line relationship under the Office of the Minister, although its day to day supervision is performed by the MPW Secretary General. The Pusdiklat (See Figure 4.1) exercises administrative and supervisory control over a central training center (Bidang Diklat Tatalaksana), five regional training centers (Diklats Wilayah), and three Sectoral Training Units of each Directorate General (Bidang[2] Diklat Bina Marga, Pengairan, and Cipta Karya). This training network is further augmented by training sections within some directorates such as Direktorat Teknik Penyehatan or DSE, Direktorat Perumahau, Direktorat Penyelidikan Masalah Tanah dan Jalan, Direktorat Penyelidikan Masalah Air, Direktorat Penyelidikan Masalah Bangunan, Prosida's Pusat Latihan Audio-Visual, and Pusat Pembinaan Peralatan (Pusbinal).

FIGURE 4.1 MPW's Organization



Note: Numbers indicate regular staffing levels.

The MPW training network is characterized by various interrelationships and operational activities. Direct managerial control is exercised by Pusdiklat over Bidang Diklat Tatalaksana and the five regional training centers (Diklats Wilayah). With respect to the other training centers, Pusdiklat's control in actual practice diminishes in degree; that is, supervision is confined to a reporting relationship covering program monitoring and training documentation activities. This situation is conceivably due to the fact that Pusdiklat has practically no power over their budgets; yet, even if Pusdiklat were to have such power, its closer supervision of the sectoral training centers would be hampered by the sheer magnitude of the span of control vis-a-vis Pusdiklat's present staff capability.

The regional training centers, or Diklats Wilayah, obtain most of the funds they need from Pusdiklat. In some instances they also receive special funds from certain Directorates General to implement special training programs. The sectoral training centers on the other hand are funded directly by their respective Directorate General. Managerial control and accountability therefore tend to be exercised more by the Directorate General rather than by Pusdiklat. This situation is more pronounced in the case of training sections structured in some directorates.

The Bidang Diklat Tatalaksana, considered the training component of Pusdiklat, is located in Jakarta. It implements training programs that are Ministry-wide in scope (such as general management courses), or benefiting essential support services and specific needs of central staff.

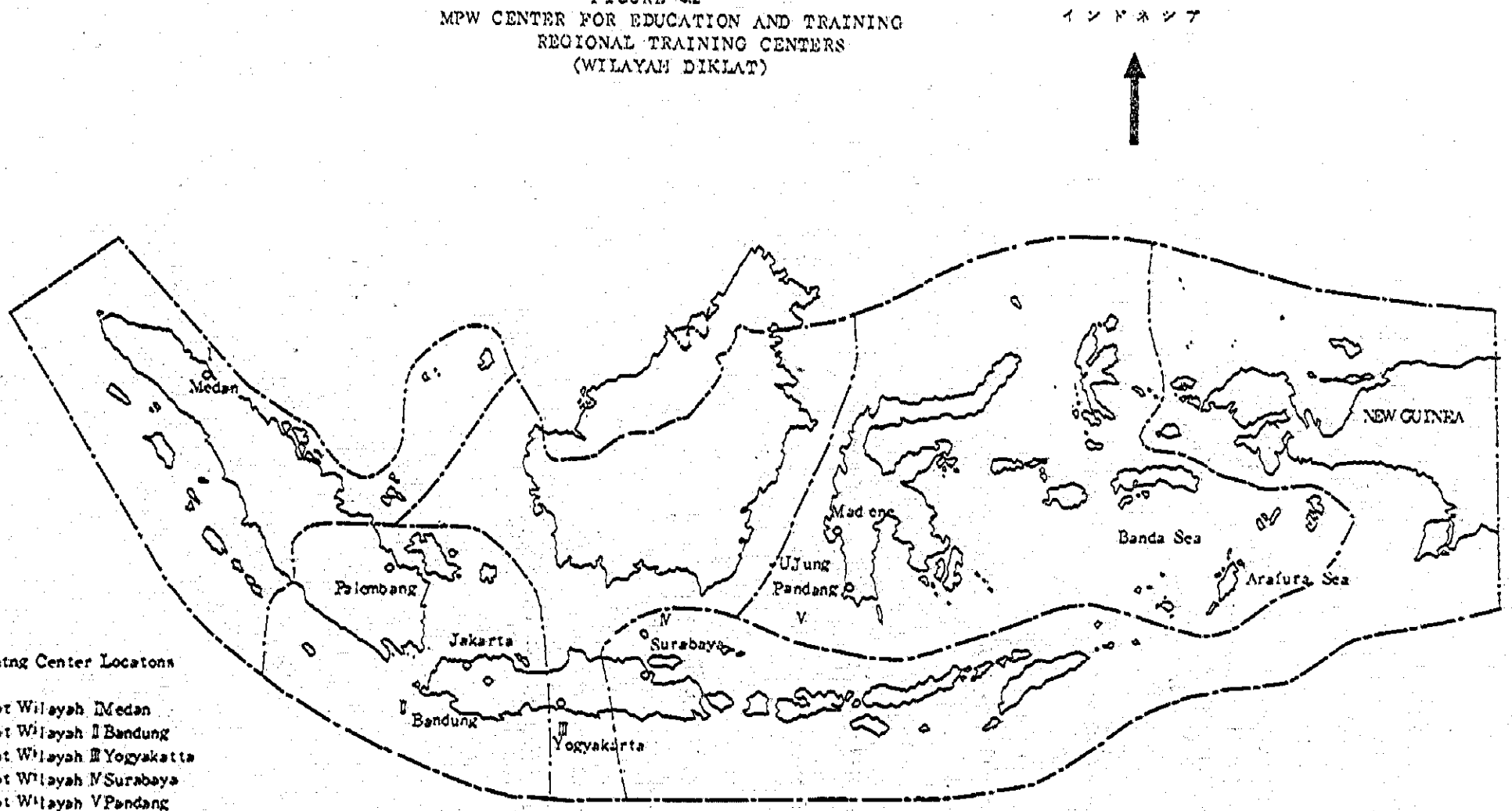
The five Diklats Wilayah are strategically located in various parts of the country to provide better coverage of all the provinces. Their specific location and service coverage are presented in Table 4.1 below. A diagram of the location is provided in Figure 4.2.

Table 4.1
MPW Regional Training Centers
(Diklats Wilayah)

Training Center	Location	Areas Covered
Diklat Wilayah I	Medan	Banda Aceh, Sumatera Utara, Sumatera Barat, Riau, and Jambi
Diklat Wilayah II	Bandung	Sumatera Selatan, Bengkulu, Lampung, D.K.I. Jakarta Raya, and Jawa Barat
Diklat Wilayah III	Yogyakarta	Jawa Tengah, D.I. Yogyakarta, Kalimantan Barat, Kalimantan Tengah, Kalimantan Selatan, and Kalimantan Timur
Diklat Wilayah IV	Surabaya	Jawa Timur, Bali, Nusa Tenggara Barat, Nusa Tenggara Timur, Timor-Timur and Kalimantan Timur, and Irian Jaya
Diklat Wilayah V	Ujung Pandang	Sulawesi Utara, Sulawesi Tengah, Sulawesi Tenggara, Sulawesi Selatan, and Maluku

Source: MPW Center for Education and Training (Pusdiklat)

FIGURE 4.2
MPW CENTER FOR EDUCATION AND TRAINING
REGIONAL TRAINING CENTERS
(WILAYAH DIKLAT)



Training Center Locations

Diklat Wilayah I Medan
Diklat Wilayah II Bandung
Diklat Wilayah III Yogyakatta
Diklat Wilayah IV Surabaya
Diklat Wilayah V Pandang

In the case of Sectoral Training Units, the Bidang Diklat Bina Marga implements its own training activities principally geared toward the specific needs of the Directorate General of Bina Marga and the provincial (DPUP) Bina Marga operations. Its headquarters is located in Jakarta although it is developing major training center in Bandung (presently under renovation). Both Bidang Diklat Pengairan and Bidang Diklat Cipta Karya rely mainly on the Pusdiklat and its subsidiary regional training centers for course implementation of their training needs. However, Bidang Diklat Cipta Karya maintains under its auspices some training facilities of its own, such as that of Werdhapura in Denpasar Bali (one classroom of 30-trainee capacity and dormitory accommodations for 40 to 80 trainees); Buddoka in Ujung Pandang (one classroom of 25-trainee capacity and dormitory accommodations for 24 trainees); Pusido Bukit Tinggi in Gulai Bancah Bukit Tinggi (one classroom of 30-trainee capacity); and the DSE training center in Pejompongan, Jakarta (three classrooms and one laboratory for a total trainee capacity of 100).

It should be emphasized that Pusdiklat, especially its subordinate regional training centers, has inevitably directed its efforts toward the increasing training needs of DPUP rather than toward those of MPW central or project staff. This commitment constitutes a major axis in the analytical framework for assessing MPW's training capability to cope with the projected training load derived from the demand/supply analysis of MPW's manpower requirements and training needs.

The Study focuses on the essential components of the training process: existing facilities, current training programs, and instructional staff.

4.2.1 Existing Training Facilities

The adequacy and relative condition of existing basic facilities vary from one training center to another. As the aggregate figures in Table 4.2 indicate, Diklat Wilayah II shows the most number of classrooms and trainee capacity. A distorted picture emerges, however, in the matter of utilization. Of the total classrooms, 14 of them situated in the Cikadut campus are neither fully utilized nor adequately maintained because of the solid waste disposal site in the adjacent property. In view of the increasing demand for training from the provinces they service, some regional training centers resort to renting additional training facilities. Diklat Wilayah I and Diklat Wilayah IV (which is currently renting five classrooms with a

TABLE 4.2
TRAINING RESOURCES AND CAPABILITIES OF VARIOUS MPW TRAINING ORGANIZATIONS

	P U S D I K L A T											
	Diklat Wilayah I (Medan)	Diklat Wilayah II (Bandung)	Diklat Wilayah III (Yogyakarta)	Diklat Wilayah IV (Surabaya)	Diklat Wilayah V (Ujung Pandang)	Bidang Diklat Tatalaksana[a/] (Jakarta)	Bidang Diklat Bina Marga[b/] (Jakarta)	DSE Training Center (Jakarta)	Pusat Latihan Perumahan (Yogyakarta)	Pushinal[c/] (Jakarta)	DPMB (Bandung)	DPM[d/] (Bandung)
I BASIC FACILITIES												
A Learning Space												
1 No. of Classrooms	5	19	9	2	3	2	5	3	3	5	4	5
2 Total Trainee Capacity	150	790	225	60	90	78	105	100	90	100	100	100
3 Laboratory (20-30 capacity)			1			1		1	1	7	1	4
4 Auditorium Capacity		200					150					150
B Accommodations												
1 Dormitory rooms	5[e/]	29	2[f/]	12	10		22	15	24		9	
2 Total Trainee Capacity	70	141	90	72	40		70	30	60		27	
II TRAINING PERSONNEL												
A Operational Staff												
1 Supervisory	4	5	17	6	1	4	10	3	4	3	6	6
2 Rank and File	60	79	79	17	4	11	42	8	12	9	15	10
3 Total No. of Training Staff	64[g/]	84	96	23	5	15	52	11	16	12	21	16
4 Ratio of Max. No. of Trainees to Operational Staff[h/]	2.34	13.63	4.47	14.34	18.00	5.20	2.01	9.09	5.62	8.33	4.76	6.25
B Instructors												
1 Training Center Staff	4	5	27	3	5	4		8	4	40	10	
2 From MPW	17	55	15	42	6	45	90	2	4	10	15	70
3 From Other Agencies	34	22	18	17	4	35	10	5	10	10	15	30
4 Total No. of Instructors	55	82	60	62	15	84	100	15	18	60	40	100
III TRAINEE POPULATION[i/]												
For Center Programs												
1 One Year or more			126									
2 6 months or more		30	45		20							
3 3 months or more	50	20	278	24	85						50	
4 One month or more	219	102		184	20	29	600	105				194
5 Less than 1 month	1,030	643		891	20	653	60	140	270	167	120	402
6 Total No. of Trainees	1,299	797	449	1,099	145	682	660	245	270	167	170	596

(Footnotes on reverse side)

Footnotes to Table 4.2

a/ Bidang Diklat Tatalaksana does not operate any dormitories as housing is readily available in Jakarta.

b/ Although Bidang Diklat Bina Marga offices are located in Jakarta, its training facilities are located in Jalan Riau, Bandung and are now under renovation.

c/ Pusbinal does not maintain any dormitory facilities. Trainee accommodations are rented elsewhere.

d/ DPMJ utilizes the dormitory facilities of Bidang Diklat Bina Marga in Japan Riau and/or rents other places.

e/ Total floorspace is estimated at 358 sq. meters. Double beds are used for the trainees.

f/ Total floorspace is estimated at 672 sq. meters. The stated two rooms are actually halls where double beds are utilized and cabinets or lockers are arranged to have at least some partition within these halls.

g/ Total number of operational staff includes casuals and DPUP personnel assigned to assist the training center.

h/ For Diklats Wilayah II, III, IV, maximum number of trainees that could be accommodated considered use of all rented facilities. It should be noted that for Bidang Diklat Tatalaksana the operational staff carry out other Pusdiklat functions. For Bidang Diklat Bina Marga, DPMB, and DPMJ, the stated maximum number of trainees does not include trainees accommodated through rented facilities.

i/ Data of fiscal year 1980/81.

total capacity of 270 trainees) will each be adding two classrooms in 1981/82 bringing their total trainee capacity to over 60. Diklat Wilayah III presently rents eight classrooms and two laboratories to accommodate its trainees. Its own classrooms need substantial improvement. It is reported that it will acquire six additional classrooms and one laboratory in the next fiscal year, to accommodate 150 more trainees. It should be noted that the longer duration courses are predominantly offered in this regional training center.

o Dormitories

Dormitory accommodation for the trainees is emphatically regarded by the training administrators as crucial to the expansion and intensification of training activities. In general, existing dormitory facilities, which include dining facilities and toilet/bath, leave much to be desired. Stated capacity figures were evaluated relative to floorspace in determining congestion. By and large, and in Diklat Wilayah III particularly, facilities are substandard. To accommodate influx of trainees, Diklat Wilayah II has from time to time availed of external facilities. Likewise, Diklat Wilayah III rents non-MPW dormitory facilities for 225 trainees.

The capacity and relative condition of dormitory facilities have emerged to be decisive limiting factors restraining the endeavor to implement more course offerings and to increase trainee output. Indeed, certain considerations can be made such as determining the availability of boarding facilities in the locality, the potential increase of these, their proximity to the training center, and so on. However, the case in point illustrates an inevitable lag, investmentwise particularly, between the development of training programs on the one hand and the building up of dormitories to match the incremental rise in trainee population on the other.

Definitely, the anticipated rapid increase in frequency and number of program offerings tend to aggravate the trainee accommodation problem. The traditional concept of ideally having dormitory capacity at par with training capacity carries serious implications not only in terms of the large financial outlays to be invested in civil works but also the corresponding increasing burden on the operational staff for effective dormitory management. This is therefore a situation where new policies can impinge to secure an efficient resolution.

To the extent that maintaining dormitory facilities are deemed essential, the training centers can keep an optimal number of dormitory facilities. It should be emphasized that in forthcoming budgetary allocations for investment in trainee accommodations higher priority should be assigned to the renovation and upgrading of existing facilities earlier discussed.

Other alternatives can be fully explored for which the trainee accommodation aspect can be resolved without incurring heavy financial commitments. Where the training center is located in areas where external board-

ing facilities are available, the trainees can be given living allowances to cover these needs.

o Instructional Facilities

An adequare and updated library is expressedly needed by all training centers. There is also a marked shortage of essential equipment needed such as those required for surveying and drafting courses. Training centers offering such courses usually have to require more students to share the limited number of drafting sets available - a situation which adversely affects the quality of instruction. Furthermore, the insufficiency of audiovisual equipment/materials, reproduction facilities for student hand-outs, and other aids for effective teaching has confined the presentation to the more traditional approaches which relies heavily on the instructor's expertise. At this point, quality of instructors is considered a major area of concern.

In the interim period, the gradual buildup of instructional facilities will continue to be autonomously handled by the respective training centers. This system suffices in the current situation where course offerings are rather limited. But with expected rapid expansion of training programs and course offerings to cope with urgent and escalating training needs, a more efficient facilities management system has to be adopted. The corresponding buildup of training hardware for optimum utilization follows the broader integrated training plan. It is therefore apparent that the allocation and traffic of instructional facilities, in the larger scale, call for centralized operations.

4.2.2 Current Training Programs

The type of programs or course offerings likewise vary among the training centers. It should be understood that the historical development topography of the region, and availability of instructors have significantly led to the specialization of training in specific programs for some regional training centers. Diklat Wilayah III in Yogyakarta has developed expertise in basic surveying courses while Diklat Wilayah IV is Surabaya carries a heavy concentration of irrigation courses. Such being the case, the services of the training centers actually extend beyond their regional bounderies to accommodate trainees from all other provinces.

In view of the objective of pursuing balanced regional development, the

prevailing situation in which some training centers have to cater to the needs of trainees from provinces far outside their regional bounderies should not continue. For the particular training center involved, this creates a disorientation in terms of capacity buildup to meet the specific needs of the region. The root causes underlying this deficiency in the system can be overcome by bolder measures aimed at directly strengthening each regional center's inadequate instructional facilities and professional talent. Greater access to training should be provided to the field people who need it.

In view of the limited capacity of the training centers as indicated by shortage of output relative to demand, MPW's training network has exploited the utilization of external resources. A major development in this regard was the establishment of tieup with academic institutions. Under mutual arrangements, universities and technical institutes conduct longterm courses for MPW personnel which otherwise existing training centers would find great difficulty to offer. Diklat Wilayah II coordinates the Lembaga Politeknik Pekerjaan Umum - Institut Teknologi Bandung (LPPU-ITB) program which now covers eight types of three and a half year engineering courses leading to a Bachelor's degree. Over 800 trainees are in this program and the average output is over 200 graduates per year. Diklat Wilayah III coordinates with the LPPU-Universitas Diponegoro in the conduct of a three-year River Engineering Course (Bachelor's degree) and a one-year upgrading, graduate level course in River Engineering. Now on its second year of operation, the former involves 99 trainees, the latter course has already yielded 23 graduates. Diklat Wilayah III also coordinates the Ahli Ukur Brevet C Pekerjaan Umum - Universitas Gadjah Mada two - year subprofessional program in Surveying. Trainee population for this program is 253 and the average output is 40 graduates per year. Diklat Wilayah IV coordinates the LPPU-Institut Teknologi Surabaya for the three-year Bachelor of Engineering programs in Hydrotechniques and in Construction and Road Building. The former course involves 129 trainees and expects an output of 40 graduates per year; the latter has 124 trainees and expects to graduate also about 40 per year.

The impact LPPU programs have on alleviating MPW's manpower training needs is significant. A review of this arrangement indicated further options to maximize this resource. One area is the requirements for entry into the program, particularly the requirement of five years' experience. This gives the impression that the program is more of a reward than a

responsive means to reduce the skills shortage. In view of the dynamic changes that are occurring in the training function, more practicable screening procedures should be instituted. A second important area for expansion is in the restructuring of schedule or course format. Learning goals and content restricted to traditional knowledge and skills needed for a particular occupation does not give sufficient attention to actual job oriented behavioral goals. A modular type of approach can be contemplated that would permit trainees to spend shorter time blocks in school and a wider and more immediate on-the-job applications. Although the overall duration is spread across longer period of time of alternate schoolwook and fieldwork, the curriculum structure is not only reinforced in terms of closer job orientation but is also made flexible to allow more trainees to participate.

It should be noted that course offerings of each regional training center is referred to an advisory board known as the Badan Pembina Pendidikan (BPP). This body does not interfere with training management but acts as a forum in which a consensus can be obtained of training needs especially at the provincial level and kabupaten public works. Evidently attention to the needs related to MPW projects is found wanting in this set up. Right now, the BPP composition includes DPUP heads assisted by their provincial Bina Marga, Pengairan, and Cipta Karya officers, a representative of Pusdiklat, and occessionally project managers and representatives of sectoral training units. The BPP and the Head of the Regional Training Center meet at least twice a year to discuss priorities in course offerings and subsequently to evaluate the training activities. At this stage it is virtually the training organization that takes the initiative in actually defining course offerings for the region. The training evaluation is not quite systematized yet.

4.2.3 Instructional Staff

Training centers hire their teaching staff on part-time basis. As shown in Table 4.2, a considerable percentage of the teaching staff comes from various MPW units and from other agencies such as universities, other government units or from the private sector. Also, some operational staff, mostly the administrators, undertake teaching duties on the side.

In the past and even at present, getting instructors on part-time basis has not been difficult. However, as more trainees are anticipated and as new skills are called for, training programs of a wider variety have to be

offered. Evidently, the existing roster of instructors has to be sufficiently expanded not only in terms of increasing numbers but also in improving the quality of academic and technical expertise to match specialized training needs. The specific measures designed to provide for this are further discussed in later sections of this Study.

4.3 Projected Training Load and Approaches to Filling the Resource Gaps

The "Final Set of Training Needs" (Appendix F) developed for this Study encompasses the training needs of MPW critical jobs, the training priorities expressed by MPW top management, and the views of MPW training administrators.

An analysis of the training needs shows that a greater variety exists for technical skills upgrading programs and for professional specialization programs. Undoubtedly, this variety reflects the demands for multidisciplinary skills in the technician, subprofessional, and professional levels.

On one hand, the degree oriented training needs highlight the fact that generalized training is associated with middle management tasks. On the other hand, management training needs focus on specific functional areas aimed at developing managerial skills for greater operational efficiency. Moreover, the basic skills program needs represent frontline requirements encompassing essential craft expertise; construction; maintenance and repair; operation: control and inspection; workshop operations and the like. Finally, the essential services training needs provide the necessary support for various line management operations.

The analysis of training needs for critical jobs draws attention to qualification requirements and number of required personnel. It implies more than just a review of the roster of courses, but an evaluation of course orientation and frequency of offerings.

Some major considerations are as follows:

a. The design of courses has to be geared towards upgrading personnel capabilities for specific tasks stated in the job descriptions.

b. The incremental demand as projected in the Study over and above training demands of other sectors (for example, DPUP, kabupaten) necessitates crucial determination of the training load and its subsequent allocation to the various MPW training centers.

c. The effort to upgrade the capability of existing manpower stock will involve training to improve individual abilities and additional training to prepare certain existing staff for new tasks and responsibilities.

d. The determination of training load has to be further adjusted to provide the MPW oriented technical training needs of personnel of contractors and consultants.

Up to this time, training as implemented by the Pusdiklat regional training centers focuses mainly on DPUP needs in a more or less organized manner. The bulk of their activity has been concentrated on basic skills and technical skills upgrading and to a relatively limited extent on the other program types. The Staff College handles non engineering courses for higher management levels as well as for administrative support staff needs. The LPPU programs, which are tied in with local academic institutions, cater to degree oriented general training. Bidang Diklat Bina Marga and other training units of certain Directorates, such as the Directorate of Road Research, Directorate of Sanitary Engineering, and others conduct training courses to meet specific needs of their respective organizational units. There are ongoing overseas training programs, foremost of which is the International Institute for Hydraulic and Environmental Engineering (Delft, Netherlands) Specialization Program for the Directorate General of Water Resources Development.

Existing training programs also center to the needs of MPW agencies outside the present scope of the Study and thereby cover a host of subjects that are not directly associated with the requirements of critical jobs. This is not to say that existing commitments and programs will be set aside, rather than training planning should be systematized in such manner that course offerings are developed and so directed as to adequately meet the priority needs of the critical jobs.

The Study has drawn up specific relevant courses of types that bear direct relationship with the critical jobs (See Table 4.3). They are courses on planning; survey and design; logistics; project management, supervision, and monitoring; equipment management; operation and maintenance of completed projects; and essential support programs. (Appendix G presents more detailed topical description of these courses.)

The courses were drawn up to augment current training endeavors and to direct training activities toward specific task requirements. The set of courses presents and desirable content coverage to facilitate the identification and subsequent scheduling of target trainee populations. To maintain a responsive training system, the set of courses should be viewed as dynamic and therefore should be subject to constant updating and revision. Further-

more, sound judgment dictates that these courses must be completed with observation tours and fellowship studies abroad especially for broadening of outlook, keeping abreast with technological developments and innovative endeavors specific to conditions in Indonesia. Examples of these are stated needs regarding familiarization of road building practices in other countries, peat soil management, tidal irrigation, and the like.

Table 4.3
TRAINING PROGRAMS TO MEET MPW'S TRAINING
NEEDS OF PERSONNEL IN CRITICAL JOBS

Work Area / Target Group	Training Porgrams Common to all Three Directorates General	Training Programs Specific to the Directorate General of Bina Marga	Training Programs Specific to the Directorate General of Pengairan	Training Programs Specific to the Directorate General of Cipta Karya
PLANNING	Strategic Planning for National Development	Transport Planning and Traffic Engineering	Water Resources Planning	Urban and Regional Planning
	Quantitative Methods for Planning and Control		Irrigation Planning	City Planning Principles
	Project Feasibility Study			Housing Planning and Policy
	Supervision of Consultants for Master Planning and Feasibility Studies			
	Urban and Rural Sociology			
SURVEY AND DESIGN	Surveying Methods	Highway Engineering	Design of Irrigation Infrastructures	Housing Design and Technology
	Mapping and Interpretation	Materials and Soil Engineering	Reclamation and Polders	Utilities Design
	Foundation Engineering	Highway Structural Engineering	Design of Irrigation Systems	Water Supply Engineering
	Engineering Drawing		Hydraulics of Control Structures	Water Distribution and Treatment Plant Design
	Earthquake Engineering		Surface Water Hydrology	Environmental Sanitation
	Earthworks		Groundwater Hydrology	Sewerage and Sewage Disposal
	Soil Properties and Mechanics		Hydraulic Engineering	Solid Waste Treatment and Disposal
			Advanced Hydrology	

Work Area / Target Group	Training Programs Common to all Three Directorates General	Training Programs Specific to the Directorate General of Bina Marga	Training Programs Specific to the Directorate General of Pengairan	Training Programs Specific to the Directorate General of Cipta Karya
			Engineering Geology and Geotechnics	
			Sediment Transport and River Engineering	
			Irrigation and Drainage	
LOGISTICS	Contracts			
	Logistics			
PROJECT MANAGEMENT, SUPERVISION, AND MONITORING	Management Development Perspectives			Building Construction
	Project Management			
	Field Supervision for Efficiency and Control			
	Supervisor Development: Effective Cummunications and Employee Relations			
	Project Reporting Systems			
	Computer Programming			
EQUIPMENT MANAGEMENT	Mechanical Engineering			
	Earth Moving Equipment			
	Parts Administration			
	Equipment Maintenance and Safety			
	Equipment Operator's Course			

Work Area / Target Group	Training Programs Common to all Three Directorates General	Training Programs Specific to the Directorate General of Bina Marga	Training Programs Specific to the Directorate General of Pengairan	Training Programs Specific to the Directorate General of Cipta Karya
OPERATION AMD MAINTENANCE OF COMPLETED FACILITIES		Road Maintenance Training Program	Irrigation Water Management Maintenance of Irrigation Structures	Management of Water Supply System Operations Water Supply Operation and Maintenance Course Sanitary Chemistry; Laboratory Analysis
ESSENTIAL SUPPORT SERVICES	Training of Trainers Training Administration and Management Manpower Planning and Control MPW Manpower Information System Management of Instructional Television Production Unit Instructional Television Production Training Television Teaching			

Despite the fact that the parameters for the Study concentrated mainly on the training needs of MPW critical jobs, the overall assessment and basis for future strategies and plans incorporate a broader set of considerations inherent in a Ministry-wide manpower development and training program covering all other MPW offices and MPW related agencies in the level I and level II regional governments. For while it is extremely difficult to determine in exact terms the extent of the training resource gap, the Study has strategically focused on the important dimensions of the gap to arrive at immediately implementable measures which a reinforced training network can undertake.

The dimension of number of personnel that must be trained is a most essential aspect. The projected trainee population determines the training load, which in the ultimate analysis spells out the required resources. The annual breakdown of expected trainee population consisting of new and existing MPW personnel in critical jobs and staff of MPW contractors and consultants is shown in Table 4.4. In addition to this, the MPW training system must cover essential training needs of MPW personnel in non-critical jobs as well as DPUP and Kabupaten Public Works staff.

In view of the magnitude of the anticipated training load, the Study approaches this aspect conservatively so that training capacity buildup is kept at optimal levels. The stated number of personnel to undergo training cannot be absolute in the light of uncertainty factors inevitably tied in with budgetary considerations of recruitment; pressures of work that hinder release of staff for training; and increased onsite or on-the-job training activities that tend to compensate for formal training. Corresponding adjustments are envisioned in the sectoral mix of the training population and thereby allowing flexibility in training programming. The proposed centralized decision making on training load allocation fits in to systematize fluctuations in the actual attendance of expected trainees from the various organizational groups.

In times of peak loads or periods when MPW training facilities are just not adequate to meet the training demand, the use or rental of outside training facilities should be resorted to. In this way, not only is the utilization rate of training center facilities kept high, but investments therein would be optimized.

The duration of course offerings is another important dimension to contend with in estimating the required training capacity. The duration factor is inversely related to trainee population that can be inputed, that

Table 4.4
NUMBER OF PERSONNEL[a/]
TO UNDERGO TRAINING

		1981/ 1982	1982/ 1983	1983/ 1984	Total
1	New MPW Personnel in Critical Jobs[b/]				
	Bina Marga	1,276	726	496	2,498
	Pengairan	4,852	2,929	2,629	10,410
	Cipta Karya	4,033	2,981	636	7,650
	Subtotal	10,161	6,636	3,761	20,558
2	Existing MPW Personnel in Critical Jobs[c/] (Retraining)				
	Bina Marga	951	1,331	1,521	3,803
	Pengairan	4,866	6,812	7,786	19,464
	Cipta Karya	334	468	534	1,336
	Subtotal	6,151	8,611	9,841	24,603
3	MPW Contractor and Consultants Staff (technical training only)[d/]	21,000[e/]	15,000	17,400	53,400
	TOTAL	37,312	30,247	31,002	98,561

a/ Excludes MPW personnel in non-critical jobs, and DPUP and kabupaten Public Works personnel.

b/ Assumed equal to the shortages in the same year, except 1981/82 during which it is assumed that recruitment will cover the combined shortages of 1980/81 and 1981/82.

c/ Assuming 25% of the existing personnel will be retained in 1981/82, and progressively increasing to 35% and 40% for 1982/83 and 1983/84, respectively.

d/ About 96% from Bina Marga.

e/ Includes Bina Marga trainee population for 1980/81 and 1981/82.

is, the longer the duration of training, the less the number of trainees that can be accommodated in any given training center. Experience suggests an appropriate training span of three months (continuous or staggered) on the average, for technical programs of a specific nature. This point out the possibility of modularizing the necessarily longer courses on generalized types of training. The objective is not only to provide a more immediate application of expertise acquired through training but to allow increased trainee population for these courses as well. Reducing the training period by condensing courses to optimal duration contributes to reducing the capacity gap.

The analysis of existing training resources as discussed earlier gives clear indication of sorely needed training facilities, software, hardware, improvements, renovations and expansion requirements to cope with present commitments. Definitely, the training endeavors directed at the critical jobs shifts the weight of training load to a higher plane, hence a more pronounced, compounded training resource gap.

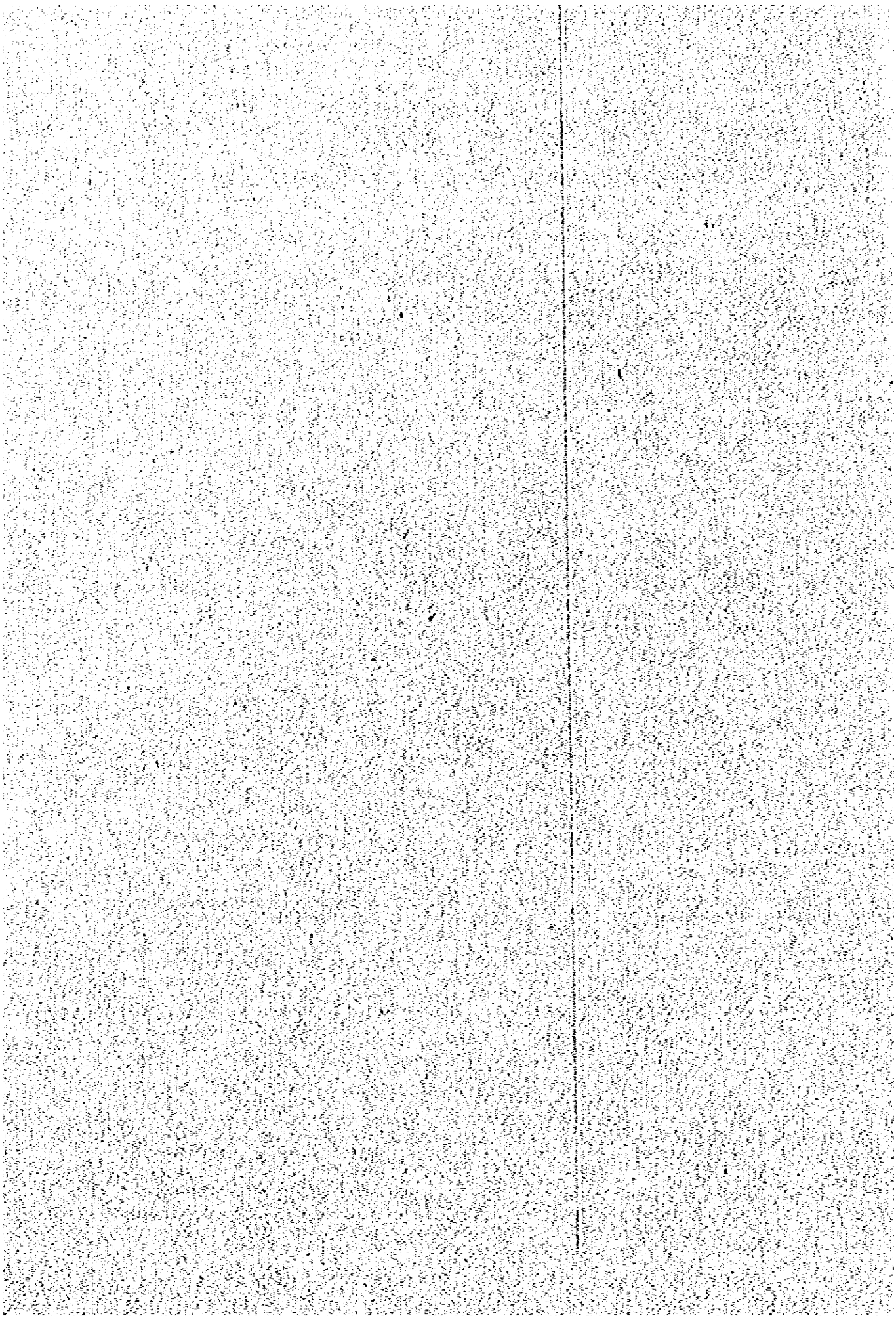
The Study strongly advocates the renovation of existing facilities and construction of new civil works in the effort to resolve this problem. It is apparent that investments in training capacity are to be based on a longer term perspective. The planners should relay not only on absolute demand figures but should also consider the feasibility of innovative training, management support mechanisms designed to maximize facilities utilization.

For the prospective periods, the Study has opted for a minimum capacity build-up of 250 trainees for each regional training center and for Bidang Tatalaksana. This would at the very least ensure a projected accommodation of 6,000 trainees per year, assuming an average three-month training duration. In terms of classes of 30 students per batch, this means 200 classes available annually. It should be noted that these do not include the existing capacities of other MPW training units, in particular, those under certain Directorates. In view of the magnitude of the forseeable training load (that is, subsequent intensification of training for other MPW sectors), the continued operation of these training units is deemed essential to the endeavor of narrowing the overall training resource gap.

In the context of the anticipated sharp increase of trainee population as well as course offerings, the Study views the training resource gap as implying not only the required additional training capacity, but also the accompanying requirements for instructional facilities (hardware and software), instructors, and training operations staff. In addition to these are trainee accommodations and associated training administration requirements such as office space, storage rooms, vehicles, office equipment. These requirements were translated into financial terms and are discussed in Sec. 6.3.1 on Investments in Fixed Assets.

Contingent to the progress of implementation of targeted training capacities, the dimension of the training operational staff becomes significant. The need is apparent for more instructors and a proportionate increase in the number of training officers and in support staff. In this regard, the Study stresses the implementation of training of trainers program for both existing and prospective instructors. The scenario in terms of available supply from traditional sources appears to be promising and attention is focused more at reinforcing measures intended to ensure the quality of instructional staff. Along the same line, the Study acknowledges the relevance of a Training Management and Administration Program to upgrade the qualifications of current staff as well as to prepare new entrants for the greater responsibilities arising from a revitalized training organization. The Study foresees the need for at least 12 additional professional staff for Pusdiklat's Training Division and 5 for the Technical Research Division.

Indeed, the overall endeavor to reduce the training resource gap raises new challenges in training administration and supervision with regard to the scheduling of courses, facilities management, and allocation of training load among the various training centers. The approach adopted in the Study has been to initially establish an order in the existing practices of training planning and programming so that development of training resources will be based on identified priorities within a broader context. This redirection of effort is perceived to be the key to an integrated and highly responsive manpower development and training effort to achieve the program targets of Repelita III.



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