Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
Bonifacio Drive, Port Area, Manila

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28 February 1989

DEPARTMENT ORDER)
No. 27)
Series of 1989)

SUBJECT: Project Implementation Guidelines-Comprehensive Agrarian Reform Program

In connection with the implementation of the infrastructure support component of the Comprehensive Agrarian Reform Program (CARP) for the country, the Department of Public Works and Highways has been tasked to implement roads, small water impounding dams, water supply, and ports projects nationwide over the 1989-1997 period.

In this regard, all CARP-implementing offices of this Department, specifically Regional and District Offices, shall comply with the attached project implementation guidelines in order to provide a common framework, rationale, and objective approach for the implementation of the DPWH infrastructure component.

All Department officials concerned are enjoined to extend their wholehearted support and assistance to the project identification, preparation, inter-agency integrated planning, and implementation activities to ensure the success of this major Government program.

FIORELLO R. ESTUAR
Secretary

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
Manila

COMPREHENSIVE AGRARIAN REFORM PROGRAM

PROJECT IMPLEMENTING GUIDELINES

February 28, 1989

The following general implementing guidelines are being issued for the purpose of providing a common framework, rationale, and objective approach in the implementation of DPWH projects under the purview of CARP.

1.0 General Guidelines

1.1 In general, to ensure responsive and cost-effective utilization of CARP investments in the light of constraints, DPWH CARP projects should take into consideration the following:

a) Projects should make minimum use of land and minimum use of engineering expenses, and should optimize results and benefits to their clientele.

b) Project/s should be located in contiguous and homogeneous CARP areas.

c) Project/s should serve the greatest number of farmer-benefeciaries on a per capita, per km, and/or per project basis.

d) Project/s should be located where the greatest returns to investment are expected to be generated in terms of incremental value to agricultural production from factors such as improvement and opening of new lands to cultivation, improvement of agricultural practices (e.g. use of improved techniques, inputs, increased cropping intensities, machines, diversification), reduction of spoilage, improved marketing practices, reduction of perishability/spoilage, etc.

e) Project/s should provide and have all-weather and good access to credit, extension services, agricultural facilities such as marketing centers and post-production facilities, seed/plant nurseries, social services such as health and education, political/administrative, and socio-cultural centers.

f) Project/s should interface with the development activities of other CARP implementing agencies on an integrated basis and interlink wherever possible with DPWH projects being implemented under its regular Medium Term Implementation Program.

g) Project/s should be integrated to the the overall transport network and/or existing facilities/structures already in place in the province for cost-effective implementation, and ensure the long term productivity and growth in the area, the province, and the economy, in general.

I M P L E M E N T I N G G U I D E L I N E S

DPWH INFRASTRUCTURE SUPPORT SERVICES COMPONENT

In October, 1988, the DPWH prepared a P 9 Billion DPWH infrastructure support program component under the Comprehensive Agrarian Reform Program (CARP) of the Philippines which is targetted to be implemented in 1988-1997. Last February 14, 1989, the program was increased to P 12.165 Billion with the reinclusion of water supply and ports components. CARP funding, which is over and above the regular medium term infrastructure program of the DPWH, had been recently released for 1988 and first quarter of 1989 and will periodically be made available thereafter up to 1997 to the Department for the provision of vitally needed support infrastructure facilities in CARP areas to be identified by the Department of Agrarian Reform (DAR) and the Presidential Agrarian Reform Council (PARC).

Over the 10 year period, 1988-1997, DPWH envisages to implement in CARP areas nationwide the construction of about 3,000 km of new roads comprised of 470 km of barangay roads and 2,600 km of indigenous roads; rehabilitation/improvement of about 4,400 km of existing roads; construction of about 800 km of multi-purpose pavements; the improvement and rehabilitation of about 150 ports nationwide; the implementation of about 330 small water impounding management (SWIM) projects; and the construction of about 27,690 Level I water supply facilities comprised of about 10,522 shallow wells, 15,000 deep wells, and 2,200 spring development projects.

During the preparation stage, very broad assumptions had been utilized by the DPWH in developing the proposed program since project areas for CARP are still subject to identification, registration, acquisition, and distribution activities and its concomittant funding prerequisites under DAR and PARC. The real basis for CARP support activities are the inventory of actual landholdings rather than the forecast land distribution and farmer beneficiary targets on which program estimates had been based.

It is in this context that the operational arrangement for DPWH CARP implementation would involve close coordination with other agencies and decentralized operations. Specifically, the DPWH field offices particularly DPWH Regional Directors shall immediately and on a continuing basis coordinate, consult, and undertake integrated planning activities together with their respective DAR, Department of Agriculture (DA), other CARP-implementing agencies, and Regional Development Council (RDC) counterparts to identify, select, prioritize, prepare the necesary work programs, implement, and monitor the conduct of these under the framework of "bottom up" planning.

h) Project/s should be indorsed by DAR, RDCs, and/or PARC as a priority undertaking.

1.2 In support of the employment generation and rural productivity thrusts of Government, labor-based equipment-supported methods should be used whenever technically and economically feasible provided that:

a) The estimated cost of the labor-based construction does not exceed the best equipment alternative by more than 10 per cent;

b) The estimated duration of labor-based construction does not exceed the best alternative by more than 50 per cent;

c) The employment of workers for labor-based construction will not unduly impair agricultural production (i.e. shifting available labor supply to construction from agriculture sector); and

d) The technical quality meets engineering standards;

1.3 Project/s should in all instances inform the general public through appropriate signs (e.g. at the start and termini of road projects) and information dissemination activities that these are being undertaken by the Government under the CARP through the PARC, DAR, and the DPWH. The project name, cost, starting date, and expected completion should also be included. The recommended format for these project signs is presented in Annex A.

2.0 Rural Roads Component

2.1 General

In addition to the aformentioned factors, road rehabilitation, improvement and construction activities should, where applicable, observe the following:

a) The area to be occupied by a project road should be minimized.

b) Drainage facilities should be separate from irrigation facilities for proper water management and control.

c) The maximum possible number of farm lots should be made accessible by locating CARP roads at right angles with the short side of lot parcels.

d) Design and location of roads should consider good operation and efficiency of agricultural machines (i.e. turning of machines), farm access (supplying and carrying of materials and produce), etc.

e) Where applicable, there should exist a desirable level of difference between the road and the neighbouring paddy fields of at least 0.3 meter or above the expected flood water level.

f) Road right-of-way must be fully acquired. Implementation priority should be given to recipient communities donating the needed road right-of-way.

g) Attention should be given to longitudinal and cross-drainage structures of these facilities due to the intense storms and typhoons in the Philippines.

h) For all major road projects, detailed design activities should be carried out according to accepted DPWH practice for major and minor roads following existing technical guidelines for flat, rolling, and mountainous terrain.

2.2 Rehabilitation/Improvement of Existing Roads

2.2.1 In general, rehabilitation and improvement of existing road transport infrastructure facilities in CARP areas into all-weather facilities should be given preference over new construction activities. Existing roads on reasonably satisfactory alignments should be improved by restoring the formation of the specified width, compaction of the subgrade to a suitable California Bearing Ratio (CBR) of at least 7%, and provision of a gravel running surface for existing gravel roads. Existing roads with unsatisfactory sub-soil conditions, steep gradients, and sharp curvatures should be replaced with new suitable alignments where economically and for reasons of public safety are deemed viable.

2.2.2 The field offices concerned shall adopt the appropriate pavement type and width corresponding to the estimated traffic volume, in vehicles per day (VPD), as follows:

Pavement Type & Width	Minimum VPD in Opening Year
Indigenous Road to 4M Gravel	50
4M Gravel to 6M Gravel	160
6M Gravel to 6M AC	360
6M AC to 7M PCC	1,200 or in conditions adverse for AC construction

2.2.3 Reinforced concrete bridges should be provided across major rivers and stream crossings. Piles used for the foundation of these structures should have a minimum bearing capacity of 50 tons. Bridges and culverts should be permanent concrete structures. Drainage structures should have a free board of 1.0 m above the maximum estimated water level (flood of 10-year frequency). Drainage ditches along the side of the road should be designed to carry flows of 5-year frequency. Where traffic is still deemed minimal, single lane 4M wide structures should be installed with provision for future expansion/widening. Annex B shows the recommended minimum traffic (AADT) in opening year required to justify two-lane RCDG construction/widening.

2.2.4 In mountainous terrain, a minimum of 4M gravel road should be provided with meeting bays in the horizontal curves for project roads with AADT traffic volume up to about 300 in the opening year. In cases where gradients should exceed 8%, asphaltic surfacing should be considered as gravel surface materials are expected to be lost from the combined impact of rain, gradient, and traffic.

2.2.5 DPWH improvement and rehabilitation program is envisaged to be implemented in 1988-1992 entailing a total physical target of 4,453 km and an investment requirement of about P 1.691 Billion, in current prices. The schedule is as follows:

Year	Investment Requirements	Physical Targets
1988	P 154.95 M	517 km
1989	245.52	744
1990	327.79	903
1991	424.26	1,063
1992	538.50	1,226
	P 1,691.02 M	4,453 km

2.3 New Construction

2.3.1 For the construction of new roads under CARP, the following criteria (allowable VPD traffic range) should be adopted:

Indigenous Road	less than 50 vehicles
4M Gravel (regular)	less than 160,
6M Gravel (regular)	160 - 360
6M AC (regular)	361 - 1,200
7M PCC (regular)	should be used only under very special situations where conditions are adverse for asphalt concrete construction

2.3.2 The new roads program of the DPWH is envisaged to be implemented in 1988-1997 with the construction of indigenous roads in 1988-1994 followed with the construction of regular roads in 1995-1997. A total investment requirement of about P 2.100 Billion, in current prices, is targetted to be allocated the Department. For the new regular roads, the schedule of physical targets and investments are as follows:

Year	Investment Requirements	Physical Targets
1995	P 311.79 M	200 km
1996	342.97	100
1997	319.74	170
	P 974.50 M	470 km

2.3.3 Construction of Indigenous Roads

2.3.2.1 The provision/establishment of indigenous roads in CARP areas nationwide should take into cinsideration the following:

a. The location of the indigenous road shall be selected in consultation with the recepient community through the Barangay Captain/Council, the DAR field office, and Barangay, Municipal, Provincial, and Regional Development Councils concerned.

b. The indigenous road shall be built in contiguous and CARP areas serving the greatest number of CARP farmer-beneficiaries, greatest return in incremental values of production, and where service area traffic is expected to be no more than 50 vehicles per day.

c. Indigenous roads shall be provided in cases where new construction or penetration roads are required

in areas which are: (i) marginal in nature, e.g. hinterlands, social forestry areas, and uplands with slopes 7 to 10 %; (ii) sparsely populated; and (iii) areas currently served by earth trails linking farms to barangay centers.

d. The indigenous road shall be integrated into the overall road network of the municipality and province to provide adequate access of farms to transport facilities, extension services, credit, markets, post-production facilities, seed/plant nurseries, social facilities such as health and education, administrative facilites, and socio-cultural centers.

2.3.3.2 Indigenous roads shall generally have a one-lane travelway with a minimum width of 2.5 m. A shoulder of 0.5 m shall be provided on each side of the road. The travelway shall have a gravel layer 150 mm thick which may be increased depending on the strength ogf the subgrade material. For added protection, gravel layer shall be "feather edged" over the width of the shoulder. The maximum grade of the road shall be 7-10% on a 200 m longitudinal section. The indigenous road shall generally follow the guiding design configuration of the DPWH as shown in Annex C.

2.3.3.3 The Construction of about 2,600 km of indigenous roads shall be undertaken from 1988-1994 entailing an estimated project cost of P 1.125 B, in current prices, as follows:

Year	Investment Requirements	Physical Targets
1988	P 40.00 M	133 km
1989	88.80	267
1990	121.00	333
1991	159.72	400
1992	175.69	400
1993	257.68	533
1994	283.45	533
	P 1,125.54 M	2,600 km

2.4 Construction of Multi-Purpose Pavements

2.4.1 Under CARP, concrete multi-purpose pavements shall be provided to CARP-beneficiary barangays and municipal areas to serve as solar dryers for palay and as areas for sports, socio-economic and socio-cultural activities of these areas. These 4 m wide pavements shall be provided in the following lengths:

a. 100 m for small barangays with 50 to 99 households;

b. 200 m for medium-sized barangays with 100-150 households; and

c. 300 m for large barangays/municipalities with more than 150 households.

The pavement may, however, be broken up in sections of 50 meters in length provided that the clear distance between the ends of the sections is not less than 500 m.

2.4.2 The establishment/provision of concrete multi-purpose pavements shall further take into consideration the following:

a. The location of the concrete multi-purposae pavements shall be selected in consultation with the recipient community through the Barangay Chairman/Council in the CARP project areas. Preferably, the facility shall be situated at the center of the barangay and/or major clusters of population (sitios or puroks) therein traversed by the barangay road.

b. The plans of the multi-purpose pavements shall follow the design standards and specifications set by the Bureau of Design of the DPWH. This calls for an average width of 4 m portland cement concrete pavement with a thickness of 15 cm for the travelway on 15 cm thick aggregate subbase. Alternatively, if drainage conditions in the area will permit, an equivalent design using a 5 cm thich aggregate base course on top of a minimum of 10 cm aggregate subbase may be used.

c. The right-of-way needed for the construction of the multi-purpose pavement should be donated by the recipient community.

2.4.3 Under CARP, about 800 km are is targetted to be undertaken in 1989-1992 entailing a total estimated cost of P 1,012.63 M, in current prices, as follows:

Year	Investment Requirements	Physical Targets
1989	P 206.07 M	187 km
1990	272.25	225
1991	332.75	250
1992	201.56	138
	P 1,012.63 M	800 km

3.0 Small Water Impounding Management Dams

3.1 The Small Water Impounding Management (SWIM) component under CARP, in support the agricultural production in CARP areas, seeks to provide irrigation water, mitigate flooding in traditionally flood-stricken areas, provide erosion control, provide a source for water supply, develop inland fisheries, and/or provide mini-hydro power where these are deemed feasible. The DPWH shall basically construct multi-purpose SWIM dams in CARP areas, except Integrated Social Forestry (ISF) areas and uplands which shall be served by the Department of Environment and Natural Resources. These facilities are envisaged to ideally serve an area of about 2 square kilometers per project.

3.2 In the selection and development of SWIM sites in CARP areas nationwide, the following factors should be taken into consideration:

a. The dam should be as much as possible multi-purpose in nature serving as many of the aforecited thrusts as possible.

b. Dam should be located on a suitable foundation with good surface and sub-surface conditions.

c. There must be a suitable point source of water considering rainflow, streamflow, evapotranspiration, water quality and sediment load, and flood and peak discharge and flow characteristics of such floods.

d. There must be cost-effective and appropriate sources of suitable construction materials within or near the site.

e. There must be a suitable and good size of impounding or reservoir area with preference to narrow sites as this will facilitate a greater volume of water at a lower effective dam cost.

f. The existing land use and potential land use should be taken into account especially economic resources which may be affected/submerged.

g. Environmental aspects, such as aesthetics and natural habitats of flora and fauna, which may be affected in the long run by the facility shoulf be duly considered.

h. Acceptance by the affected population is deemed important in the establishment of the facility.

i. The project must interface with the existing and planned development activities in the area such as irrigation, water supply, and agricultural development.

3.3 Feasibility studies and detailed design activities should be undertaken to define the most cost-effective location and design, boundary conditions, project purpose, and layout prior to construction.

3.4 After the completion of construction, projects are to be turned over to either the National Irrigation Administration, through its irrigation associations, or the Department Of Agriculture, through farmer associations in the area. Operation and maintenance of these facilities shall be taken over by these organizations upon turn-over.

3.5 The DPWH targets to implement 334 SWIM projects in 1989-1997 nationwide at an average cost of P 6 Million per project, in 1988 constant prices, and to serve an area of about 108,600 hectares.

4.0 Ports

4.1 General

In the assessment of ports for establishing their relative priorities, possible new locations, and formulating proposals for port improvement/rehabilitation, the following general guidelines should be observed:

a) Adequate space must be available for vessel movements. The adaptability and safety of the port facility against natural conditions should be properly considered.

b) The port site must be far from fish breeding and spawning areas, aquaculture, and other natural preserves that could be adversely affected.

c) There should preferably be a smooth transition from the shallow to the deep portion of the water, with adequate depth to accomodate the maximum size vessels calling at the port.

d) There should preferably be no likely occurence of siltation and/or scouring phenomena at the designated site.

e) The soil profile at the port site must contain appropriate strength of "N" values within the range of 20 to 50 to sustain the force inflicted to and by the proposed port facility.

f) Port sites with wave condition of more than 2.00 m should be discarded because of their high construction and maintenance costs and risk to damage in the long run.

g) The major causes of damages of the existing port facilities relative to port site selection and layout should be thoroughly analyzed.

h) The proximity to main markets for goods and services, other transportation systems/modes, and consumption centers to effect greater savings in transportation costs and convenience of the end users should be given major importance.

i) The existing land use and land use plans within the vicinity of the port in consonance with CARP, as well as future regional and provincial development should be considered. The planned port should not be in conflict with other development plans in the area.

j) The port site and planned facility should be commensurate with the types, characteristics, and frequency of vessels that will be calling at the port, as well as the traffic volume of cargo, passenger, stay time, service time, and handling time at the port.

k) The income potential of the port and its long term requirements for maintenance and operations should also be considered.

l) The port site should provide enough space to allow easy approach and berth departure.

4.2 A comparative analysis of all alternative port sites and final selection and prioritization should be based on the above mentioned considerations/criteria.

4.3 After the selection of potential port sites, site investigations and surveys should be undertaken thru thorough and comprehensive studies and evaluation of existing port sites to determine the most suitable economical design, and define the engineering and design conditions, physical and socio-economic aspects of the port site, and its concomittant environmental impact. This should also include the layout of the port facilities. During the conduct of this phase, the existing DPWH Port Planning Guidelines prepared under the Nationwide Feeder Ports Development Program should be adopted.

4.4 The Ports Program under the CARP, which will be carried out in 1990-1997, shall essentially involve three components: (i) major improvement of ports or Type III projects, with an allocation of P 10 million pesos (1988 constant prices) per project; (ii) minor improvement of ports or Type II projects, with an allocation of P 5 Million pesos (1988 constant prices); and (iii) rehabilitation of ports or Type I projects, with an allocation of P 500,000 per project. The types of feeder ports development activities are as follows:

a. Type III projects essentially in nature ordinary scale feeder ports which function as a big distribution center to/from other isolated islands and area ports, say of the Type II type, and used by every kind of vessel. Such ports are similar to an independent port with a far distance from other ports and serves a big hinterland. Facilities normally require a causeway, pier (11m x 33 m or more), stairlanding, transit shed, and supporting land.

b. Type II projects also mainly ordinary scale feeder ports similar to an isolated island port with a small hinterland and normally serving small and medium sized vessels. Facilities typically comprise a causeway, pier (11 m x 33 m), stairlanding, and transit shed.

c. Type I activities basically involve minimal scale feeder ports which function as (i) a distribution/collection center to/from nearby isolated coastal barangays, and (ii) serve as a fishery port. Such ports are normally used only by small vessels usually less than 5 GT. Facilities normally comprise a causeway, stairlanding, and transit-shed.

4.5 The Ports activities from 1990-1997 would cover about 33 Type III, 49 Type II, and 72 Type I prijects involving a total cost of about P 1.096.28 M.

5.0 Rural Water Supply

5.1 Within the context of the overall water supply plan, the DPWH shall construct Level I facilities in CARP areas nationwide to be identified by DAR. A Level I facility shall basically comprise a developed water source, usually a protected deep or shallow well or spring with an outlet but with no distribution system. It is generally adopted in rural areas where houses are thinly scattered, and the source not more than 250 meters from the farthest user. A facility usually serves 15-50 households.

5.2 In the selection of project sites, the following factors should be considered:

a. The existing "water gap" in the CARP area, representing the level and clustering of population still not adequately served by adequate water supply and not covered under the present medium term infrastructure program of the Department and other Government agencies such as the Local Water Utilities Administration (LWUA) and the Department of Agrarian Reform.

b. The "water gap" can be estimated by getting the existing population in a project area and subtracting from this the population served by water supply, i.e.,

the existing number of facilities multiplied by 150, which is the average service population per facility (25 households). The difference shall represent the level of unserved population in an area.

c. The number of Level I systems needed can be estimated by dividing the unserved population by 150.

d. In determining the type of the required project activity, thorough assessments of the existing hydrological conditions in the area should be undertaken as to whether the most economic type of improvement would require a shallow well or deep well or spring development depending on the available groundwater and the proximity and abundance of water of nearby springs or water impounding facilities. Projects should interface with the existing development projects being undertaken by the various CARP-implementing agencies in the area.

5.3 Ideally, all of the unserved population should be served with adequate water supply. A target rate of at least 80% of the targetted CARP beneficiaries, however, is deemed acceptable.

5.4 Generally, for CARP resettlement areas, the water supply requirement in these areas shall be the responsibility of the DAR under its Water Supply for CARP Resettlement Areas component as development of such areas are under its mandate.

5.5 The DPWH targets to construct 34,100 Level I systems in 1990-1997, specifically about 10,500 shallow wells, 14,900 deep wells, and 2,200 spring development projects in CARP areas nationwide.

6.0 Reporting and Control

6.1 To monitor performance and measure progress against programmed targets, all DPWH CARP-implementing offices shall regularly submit to DPWH management reports on the accomplishments and expenditures on a monthly basis to the DPWH Central Office through their respective Regional Directors. The reports shall utilize standard DPWH target-setting and monitoring system, based on the S-curve format. Furthermore, CARP implementation shall be included in the agenda of monthly one on one meetings and quarterly performance review of the DPWH. CARP-implementing agencies of the DPWH shall likewise submit monthly and quarterly accomplishment reports required by the PARC, using the monitoring form presented in Annex D. Furthermore, CARP being an important endeavor to the rural population, monitoring non-government organizations is being highly encouraged.

6.2 Inasmuch as the CARP is one of the top priority undertakings of the Government, all Department officials are expected to render their utmost cooperation and enthusiasm to its endeavors, exercise sound engineering and proper management and control of their respective CARP activities. Spot checks on CARP implementation progress shall be carried out by Central Office teams and other CARP-implementing agencies/institutions.

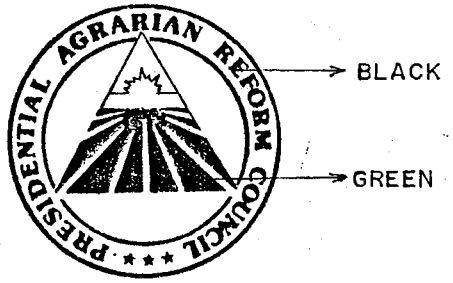
RECOMMENDED PROJECT SIGN FORMAT

This Project is
being undertaken under the

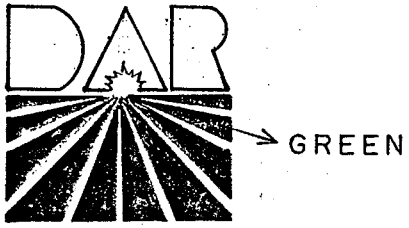
BLACK

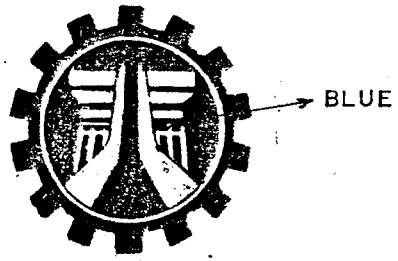
COMPREHENSIVE AGRARIAN REFORM PROGRAM (CARP)

RED



PARC





DPWH

Name of Project :

Cost :

Start of Project :

Expected Completion :

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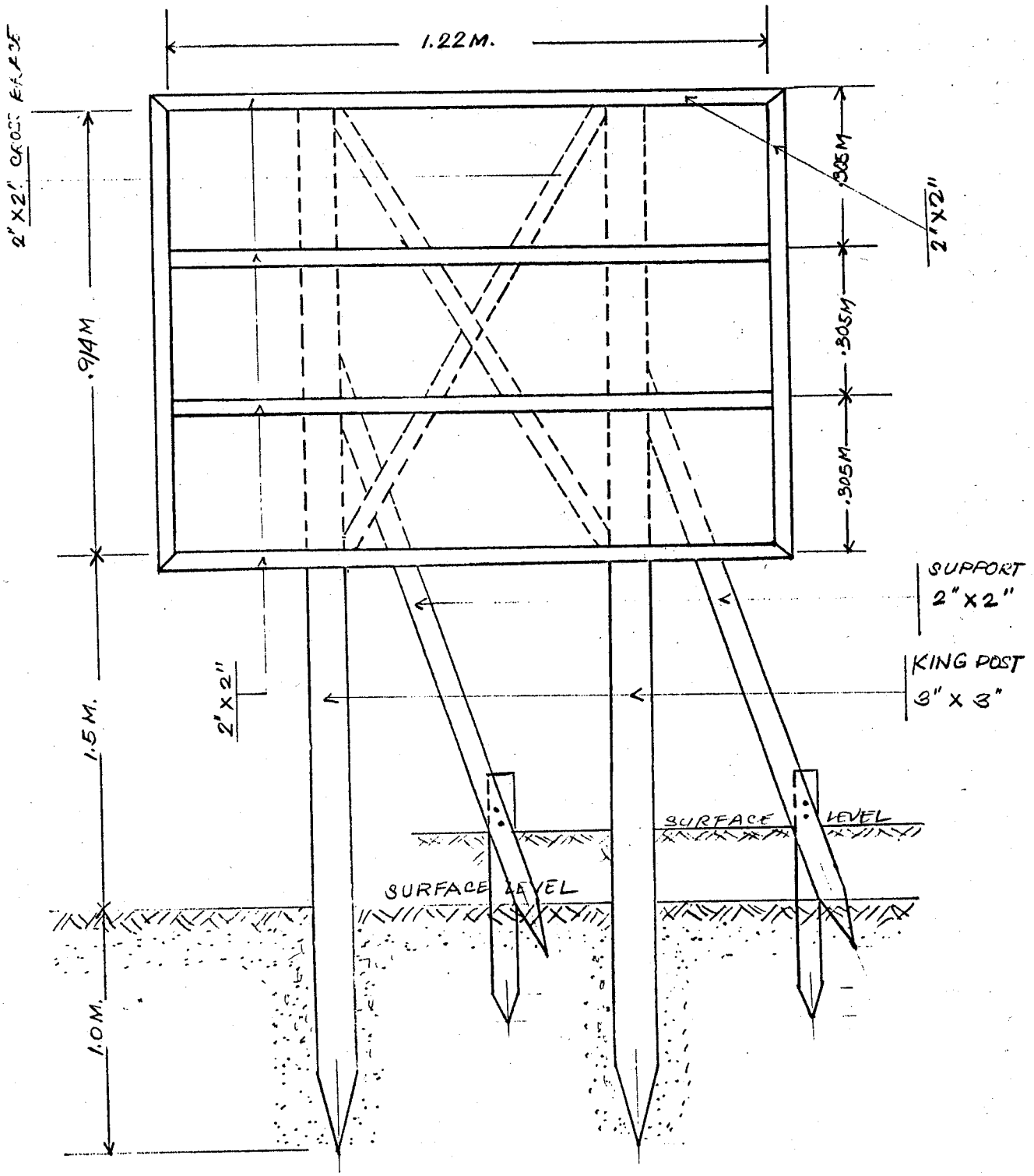
ESTIMATE ROAD SIGN (PLACARD)

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE (P)	TOTAL COST (P)
A. MATERIALS				
1. Plain G.I. Sheet Gauge 24 4' x 8' Standard Size	1	Pcs.	260.00	260.00
2. King Post 2-3" x 3" x 12'	18	Bd./Ft.	11.00	198.00
3. Bracing 2-2" x 2" x 6'	4	Bd./Ft.	10.50	42.00
4. Framing 2-2" x 2" x 8'	5.5	Bd./Ft.	10.50	57.75
2-2" x 2" x 6'	4	Bd./Ft.	10.50	42.00
5. Horizontal Studs 2-2" x 2" x 8'	5.5	Bd./Ft.	10.50	57.75
6. Vertical Studs 2-2" x 2" x 6'	4	Bd./Ft.	10.50	42.00
7. G.I. Cleat 2-1" x 2" x 6'	1	Bd./Ft.	10.50	10.50
2-1" x 2" x 8'	1.5	Bd./Ft.	10.50	15.75
8. CWN # 2"	1	Kilo	16.00	16.00
# 3"	1	Kilo	16.00	16.00
9. Paint	1	Gal.	180.00	180.00
TOTAL MATERIAL COST				937.75
B. LABOR *				
1 Painter	8	Hr.	10.50	84.00
TOTAL LABOR COST				84.00
TOTAL COST OF MATERIALS AND LABOR				1021.75

NOTE: * Carpenter and Laborer provided from project construction team



PLAN

DRAWN NOT TO SCALE

RECOMMENDED BRIDGE/WIDENING/ IMPROVEMENT CRITERIA

DPWH CONCEPT PAPER ON INDIGENOUS ROADS

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
Manila

CONCEPT PAPER

ON

INDIGENOUS ROADS

January 1989

CONCEPT PAPER

CONSTRUCTION OF INDIGENOUS ROADS UNDER CARP

Background

Philippine development efforts in the medium term period 1987-1992 are principally directed towards the attainment of: (i) alleviation of poverty, (ii) generation of more productive employment, (iii) promotion of equity and social justice, and (iv) the attainment of sustainable economic growth. An employment-oriented rural-based strategy is being pursued to directly address these goals.

The Government aims to reinforce the physical foundation of the economy to support these development thrusts. Specifically, the DPWH seeks to install and improve the essential transport, water resources, and other social overhead facilities, especially in the rural areas. This is being carried out through an infrastructure program focused on a dual role: first, in a supportive capacity, to dovetail with and provide the basic overhead facilities needed to facilitate the activities of the leading production sectors; and second, in an active capacity, to induce and direct development to take place in the desired areas.

A major component of this infrastructure program is highways or road improvement. Road transport has been, and will continue to be, the dominant mode of transportation in the Philippines, accounting for about 22 billion ton-kilometres per year or 60 percent of the total domestic freight traffic, and around 53 billion passenger-kilometres per year or 80 percent of the total domestic passenger traffic. Almost all intra-island traffic is carried by the road network.

The Philippines has a total road network of 157,810 kilometres (km) of which 26,082 km are national roads, 28,928 km are provincial roads, 3,984 km are city roads, 12,875 km are municipal roads, and 85,941 km are barangay roads. Less than 50 % of the total road network is all-weather. With an overall road density of 0.54 km per square km of land area, access roads are scarce in remote and depressed areas. As a result, transport costs are high, production is restricted, and living standards are low.

The DPWH seeks to eliminate the major physical constraints to the targetted agricultural and industrial production areas and to make basic social and economic services more accessible to the widest segment of the population. Accordingly, among the priority areas in its infrastructure program is the provision of rural-based,

production-supportive infrastructure to spur rural and agricultural development, assist agrarian reform, and generate employment - notably thru more and better roads.

Under the medium-term infrastructure program, therefore, the DPWH seeks to improve all national roads and the three-functions of the entire road network with all-weather facilities, and to increase road density to at least 0.57 km per square km of land area, by 1992. In the agrarian reform areas, a density of 0.60 km per square km of land is targetted.

On June 10, 1988, the Comprehensive Agrarian Reform Law (CARL) was approved under Republic Act No. 6657. Essentially, the agrarian reform is founded on the rights of the farmers who are landless to own the lands they till through a redisribution and reallocation of land to support greater economic progress and productivity, with farmers asuming a new status of landowners and individual entrepreneurs. The Government has decided to undertake a comprehensive approach to program implementation in recognition that land reform measures alone would not be effective if not accompanied by adequate support services such as infrastructure, agricultural extension, credit, marketing assistance, and post-harvest facilities.

In the preparation of the proposed DPWH component of the Comprehensive Agrarian Reform Program (CARP), the inadequacy of the present rural road network in the agricultural areas to be served by the CARP has been recognized. The Department has therefore given priority to the following: (a) rehabilitation and improvement of existing roads to all-weather standard, (b) construction of new indigenous roads, and (c) provision of multi-purpose pavements along barangay roads in the rural barangays of the country.

Concept of Indigenous Roads

Since a significant part of the area covered by the CARP are isolated areas not served by roads coupled with a need to effect economy and serve more farmer-beneficiaries with the limited CARP resources, a massive program to construct "indigenous" roads in these areas is being proposed.

The principal objective of indigenous roads is to provide immediate and basic access to otherwise isolated agrarian reform areas. These are, therefore, roads which are low cost, easy and quick to build. Indigenous roads should be built according to according to basic engineering features, without being constrained by the rigid design specifications intended for "regular" roads. As much as possible, they should follow the existing terrain and provide for the most direct link to the area.

The main engineering considerations of an indigenous road are a slope of as much as 7 to 10 %, drainage, and gravel surfacing. The road is essentially a one lane facility with meeting bays sufficient to meet the requirements of light traffic such as jeepneys and tricycles, and the initial socio-economic activities in the service area, with provision for future stage construction upon future development of the area.

In the construction of these roads, the main equipment needed is a bulldozer to open up the road. This is augmented by labor-intensive methods for shaping the road and the ditches, compacting and spreading gravel. This will provide employment opportunities are to the rural populace and promote the "bayanihan" spirit in development projects.

Objectives

Basically, the Project Component seeks to provide about 2,600 km of indigenous roads in the rural areas of the country. Specifically the Project seeks to:

(i) provide, in a short period low-cost basic road infrastructure support facilities to serve a large number of CARP farmer-beneficiaries;

(ii) open and provide adequate access in CARP areas identified nationwide;

(iii) effect economy and greater coverage of CARP infrastructure outlays; and

(iv) provide employment opportunities to the rural population within and in the vicinity of CARP areas.

Selection, Prioritization, and Construction

The establishment/provision of indigenous roads is envisaged to take into consideration the following:

1. The location of the indigenous road shall be selected in consultation with the recipient community through the Barangay Captain/Council, the Department of Agrarian Reform field office, and the Barangay, Municipal, Provincial, and Regional Development Councils concerned.

2. The indigenous road shall be built in contiguous and homogenous CARP areas serving the greatest number of CARP farmer-beneficiaries on a per capita investment or per km basis and where the greatest returns on investment are expected to be generated in terms of

incremental value of agricultural production from factors such as programmed and potential areas for new cultivation, improvement of agricultural practices, and other facilities including infrastructure; where existing road network facilities link farms to a level of minor barangay roads only, with service area traffic of less than 50 vehicles per day; and where budgetary constraints limit the provision of a standard barangay road and there is an immediate need to open the area.

3. Indigenous roads shall be provided in cases where new construction or penetration roads are required in areas which are: (i) marginal in nature, e.g. hinterlands, social forestry areas, and uplands with slopes 7 to 10 %; (ii) sparsely populated; (iii) currently served by earth trails linking farms to barangay centers.

4. The indigenous roads shall be integrated into the overall road network of the municipality and province to provide adequate access of farms to transport facilities, extension services, credit, markets, post-production facilities, seed/plant nurseries, social facilities such as health and education, administrative facilities, and socio-cultural centers.

Design Guidelines

The indigenous roads shall generally follow the guiding design configuration of the DPWH shown in Annex B.

In general, the road should have a one-lane travelway with a minimum width of 2.5 m. A shoulder of 0.5 M shall be provided on each side of the road. The travelway shall have a gravel layer which is 150 mm thick which may be increased depending on the strength of the subgrade material. For added protection, gravel layer shall be "feather edged" over the width of the shoulder. The maximum grade of the road shall be a 7-10% on a 200 m longitudinal section. Other design guiudelines are as follows:

1. Cross Section

   a. The finished profile should have a continous crossfall of 3% over the carriageway and shoulder (Please refer to Figure 1 of Annex B).

   b. The gravel surface course should be a minimum of 150 mm compacted thickness at no less than 95% compaction. Shoulders shall be feather-edged with surfacing similar to the travelway. Allowance should be made for increasing the gravel thickness to 200 mm for sections constructed on weak soils (Soils Index 16-20 or CBR less than 3%).

c. The side ditch should be trapezoidal in section to facilitate easy excavation and clearing by hand shovel (Please refer to Figure 2).

d. In sections of high fill (fill height more than 1.0 m), shoulder widths should be increased to 1.0 m (Please refer to Figure 3). Similarly for sections through rock deep cut (cut height more than 2 m), the formation width should be as shown in Figure 4 of Annex B. Superelevation should not be applied.

2. Drainage

a. Particular attention must be given to preventing scour and soil erosion, which can best be achieved by discharging runoff into existing water courses or by the provision of mitre/outlet ditches at frequent intervals, say every 10 m for slopes greater than 1 in 10, thereby reducing the volume of water to be discharged through a single outlet. Further, slopes shall be grassed to protect against erosion.

b. In the likelihood of serious erosion scouring, scour-checks should be provided or ditches lined (Please refer to Figure 6).

3. Alignment

a. Horizontal and vertical geometric standards are not considered critical for road construction of this type. In exceptional cases, however, such as in areas of difficult terrain, long sections, and where appropriate, cross sections should be prepared.

b. Normally, the road should be located on the alignment of an existing track and major realignment should be avoided unless absolutely necessary.

c. Curves should be set out with the largest practicable radius and the vertical alignment should follow the existing ground level in order to minimize earthworks.

d. Particular attention should be given to the location of a stream and river crossings, and to avoid, where possible, areas subject to flooding and areas of outcropping rocks.

e. In hilly areas, areas involving deep cut and high embankment, which necessitates the hauling of materials longitudinally, should as much possible be avoided.

f. As vehicle operating speeds are not likely to exceed 30 kph, superelevation is not required. Sections on steep gradients, however, should be constructed with a single crossfall (Please refer to Figure 4).

g. The basic design guidelines for horizontal and vertical alignment are as follows:

	Terrain	
	Flat/Rolling	Hilly
Horizontal Curves:		
Minimum Radius	40 m	15 m
Gradients:		
Minimum	2 %	2 %
Maximum	10 %	15 %

h. Alignments failing to meet these criteria should be considered to be not technically feasible for construction using labor-based methods.

4. Passing Bays or Turnouts

Turnouts shall be provided for passing for passing on a single lane road when two-way traffic is anticipated. These should be located on blind vertical and horizontal curves and spaced so that the minimum distance between passing bays is 300 m or more often when necessary to provide adequate line of sight. These should be intervisible wherever possible (Please refer to Figures 4 and 5).

Construction Method and Other Technical Aspects

In the construction of indigenous roads, labor-based equipment-supported methods should be adopted. Essentially, bulldozers of the D-7, D-8, D65, D80, and/or D85 category shall be utilized in the process. Such pieces of equipment are available from the respective Regional and Area Shops of DPWH field units and, ideally, provinces should have a complement of at least one unit for each DPWH district. This is readily realizable if down time or probability that bulldozers are undergoing repair is minimized. Should these be not available for ready deployment, or are facing transport problems; then field units may rent such equipment from the private sector or else utilize alternate labor-based methods using locally available labor with equipment/tools, such as pedestrian operated vibrating rollers, vibrating plate compactors, animal-drawn steel drum roller, etc. augmented by manual construction techniques.

On a typical 1 km indigenous road project, it is

estimated that a minimum of 25 to 30 laborers will be needed. This estimate already includes a foreman, an equipment operator, 3 to 5 masons/carpenters, and about 19 to 24 semi-skilled or unskilled laborers.

Road design and construction activities should further consider the following:

a. The use of land, as well as engineering expenses should be minimized.

b. The greatest number of farm lots should be made accessible by locating such roads as much as possible at right angles with the short side of lot parcels.

c. The design and location of such roads should consider good operation and efficiency of agricultural machines and farm access (supply of inputs and carrying out of produce).

d. Where applicable, there should exist a desirable level of difference between the road and neighboring paddy fields of at least 0.3 m.

e. Attention should be given to design and construction of drainage ditches due to intense storms and typhoons in the area.

f. Road right-of-way must be fully acquired.

g. The affected community must be willing and capable of providing sufficient number of laborers whose employment will not unduly impair agricultural production.

Implementation and Investment Plan

The Project is envisaged to be undertaken under a six (6) year period starting in 1989 to 1994 and will entail an estimated total Project cost of about P 1,125.54 Million or about 100 % of the CARP's estimated requirements in 1988-1994 for the construction of new roads in CARP areas nationwide as identified by the Department of Agrarian Reform (DAR) and the Presidential Agrarian Reform Council (PARC). The envisaged annual investment requirements, costing assumptions, and physical targets in kms and barangays is presented in Annex A.

ANNEX A

Work and Investment Plan

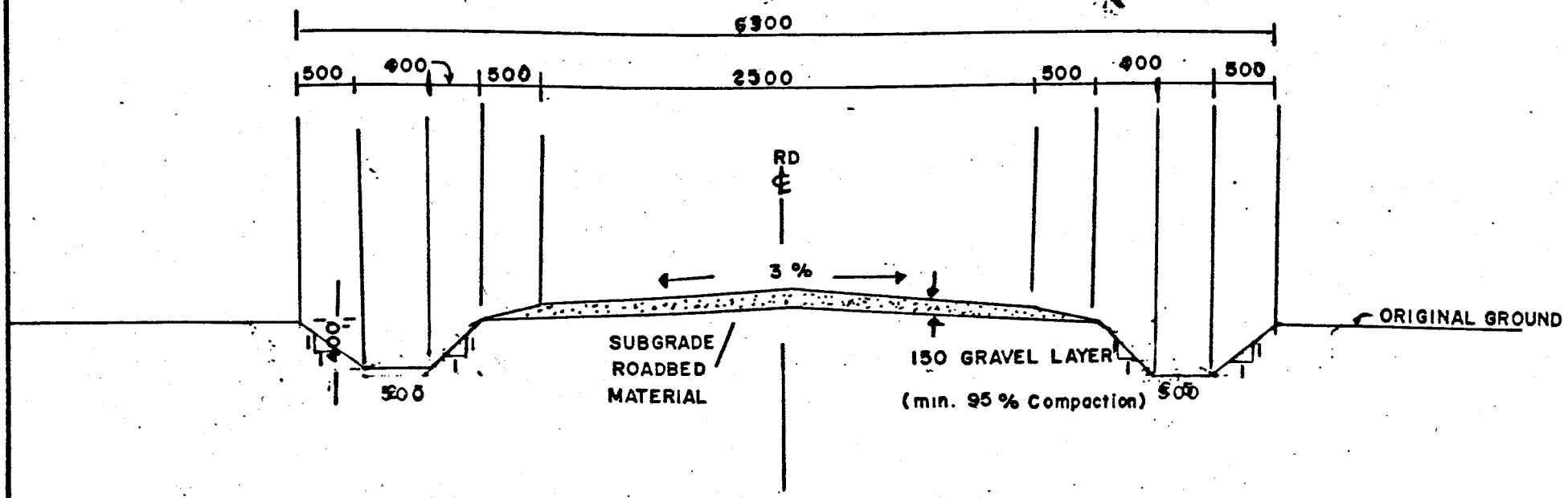
Year	Investment Requirements	Physical Targets kms
1988	P 40.00 M	133 kms
1989	88.80	267
1990	121.00	333
1991	159.72	400
1992	175.69	400
1993	257.68	533
1994	283.45	533
TOTAL	P 1,125.54 M	2,600 kms.

Assumptions:

1. Per km cost of P 300,000 in 1988 prices (See Annex B).
2. 10 % provision for inflation and price escalation per annum from 1989 onwards.
3. Component for indigenous roads set at 100% of the 1988-1994 CARP allocation for construction of new roads. Other component comprises construction of about 470 km of new all-weather gravel roads (barangay road standard costing about P 800,000 per km in 1988 prices) in 1995-1997 and requiring an investment outlay of about P 974.51 Million in current prices.

FIG. 1 TYPICAL CROSS SECTION (NORMAL)

SCALE: Not to Scale



NOTE:

A) MINIMUM COMPACTED THICKNESS OF GRAVEL LAYER 150 mm. THICKNESS MAY BE INCREASED. DEPENDING ON STRENGTH OF SUBGRADE MATERIAL.

B) FOR ADDED PROTECTION, GRAVEL LAYER SHOULD BE "FEATHERED EDGED" OVER WIDTH OF SHOULDER.

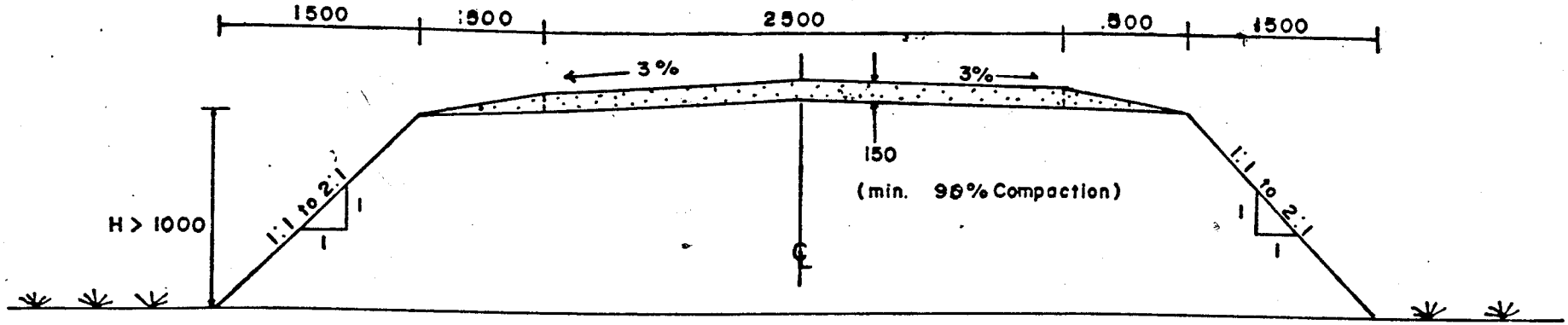
C) ALL DIMENSIONS IN MILLIMETERS (mm).

DRAWN:	PREPARED:	SUBMITTED:	REVIEWED:	RECOMMENDED:	APPROVED:
MILAGROS C. NUQUE	WINIFREDO B. OLORES	DANTE B. POTANTE	SEVERINO B. ABESAMIS	FRANCISCO N. PASCUAL	TEODORO T. ENCARNACION
SENIOR CE DRAFTSMAN	SUPERVISING CE I	HEAD CE	CHIEF CIVIL ENGINEER II	DIRECTOR, BOD	UNDERSECRETARY

1/13

FIG. 2 – TYPICAL CROSS SECTION IN EMBANKMENT

NOT TO SCALE



NOTE:

A) MINIMUM COMPACTED THICKNESS OF GRAVEL LAYER 150 mm THICKNESS MAY BE INCREASED DEPENDING ON STRENGTH OF SUB-GRADE MATERIAL.

B) FOR ADDED PROTECTION, GRAVEL LAYER SHOULD BE "FEATHERED EDGED' OVER WIDTH OF SHOULDER.

C) ALL SLOPE SHOULD BE GRASSED TO PROTECT AGAINST EROSION.

D) IN AREAS PRONE TO FLOODING RELIEF CULVERTS THROUGH EMBANKMENT SHOULD BE INSTALLED.

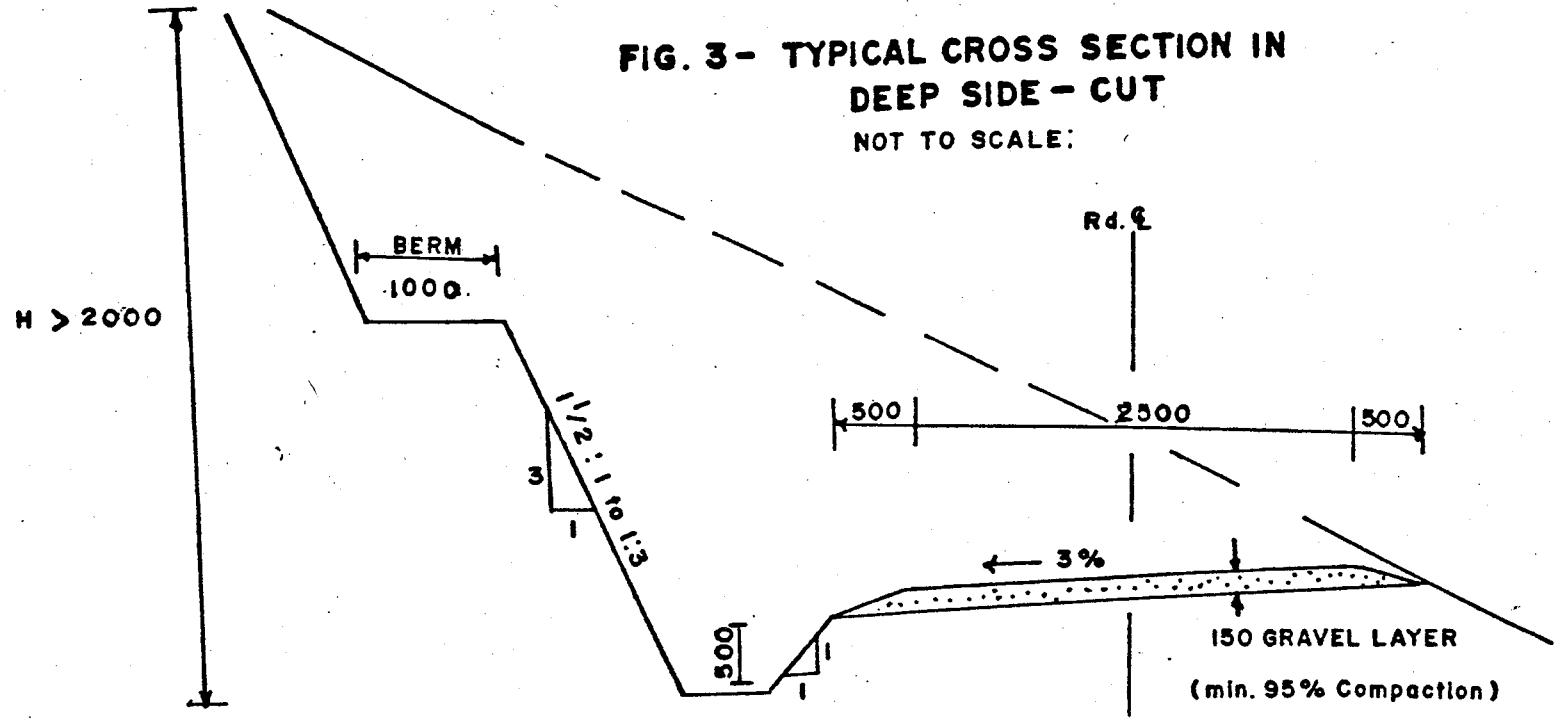
E) ALL DIMENSIONS IN MILLIMETERS (mm).

DRAWN:	PREPARED:	SUBMITTED:	REVIEWED:	RECOMMENDED:	APPROVED:
ALLAN T. TATLONGHARI CE AIDE II	WINIFREDO B. OLORES SUPERVISING CE I	DANTE B. POTANTE HEAD CE	SEVERINO B. ABESAMIS CHIEF CIVIL ENGINEER II	FRANCISCO N. PASCUAL DIRECTOR, BOD	TEODORO T. ENCARNACION UNDERSECRETARY

4/1/13

FIG. 3- TYPICAL CROSS SECTION IN DEEP SIDE-CUT

NOT TO SCALE:



NOTE:

A) WHEN "H" EXCEEDS 2m., BERMS TO BE INCLUDED AT 2m. CENTRES VERTICALLY.

B) DEPENDING ON SIGHT DISTANCE, PASSING-BAYS SHOULD BE PROVIDED AT MAXIMUM OF 50m.

C) MINIMUM COMPACTED THICKNESS OF GRAVEL LAYER 150mm ALL AS BEFORE.

D) FOR ADDED PROTECTION, GRAVEL LAYER SHOULD BE "FEATHERED EDGED" OVER WIDTH OF SHOULDER.

E) ALL DIMENSIONS IN MILLIMETERS (mm).

WN: LORDELIZA B. GAMBOA SENIOR C.E. DRAFTSMAN	PREPARED: WINIFREDO B. OLORES SUPERVISING C.E. I	SUBMITTED: DANTE B. POTANTE HEAD C.E.	REVIEWED: SEVERINO B. ABESAMIS CHIEF CIVIL ENGINEER II	RECOMMENDED: FRANCISCO N. PASCUAL DIRECTOR, BOD.	APPROVED: TEODORO T. ENCARNACION UNDERSECRETARY

Annex B

ARP INDIGENEOUS ROAD

NOT TO SCALE

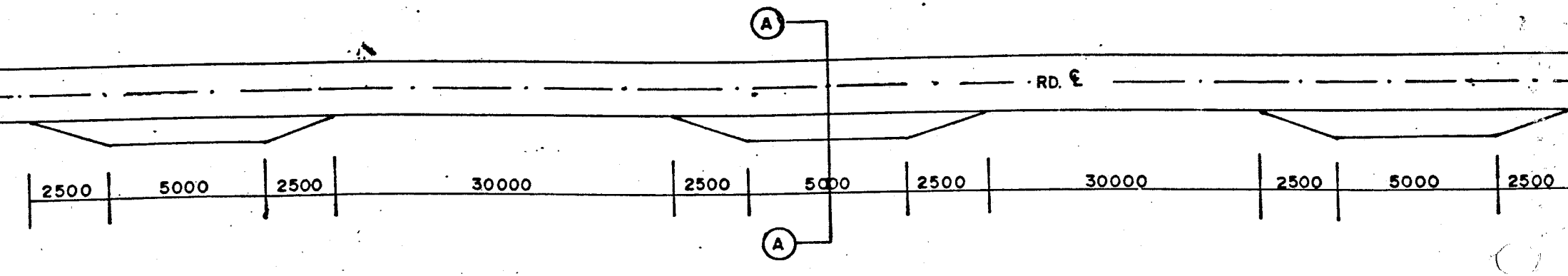


FIG. 4 - STRAIGHT LINE DIAGRAM SHOWING THE PASSING-BAYS
PROVIDE BAYS EVERY 300 m FOR TURNING OR WAITING AREA FOR OTHER VEHICLES TO PASS
NOTE: ALL DIMENSIONS IN MILLIMETRES (mm).

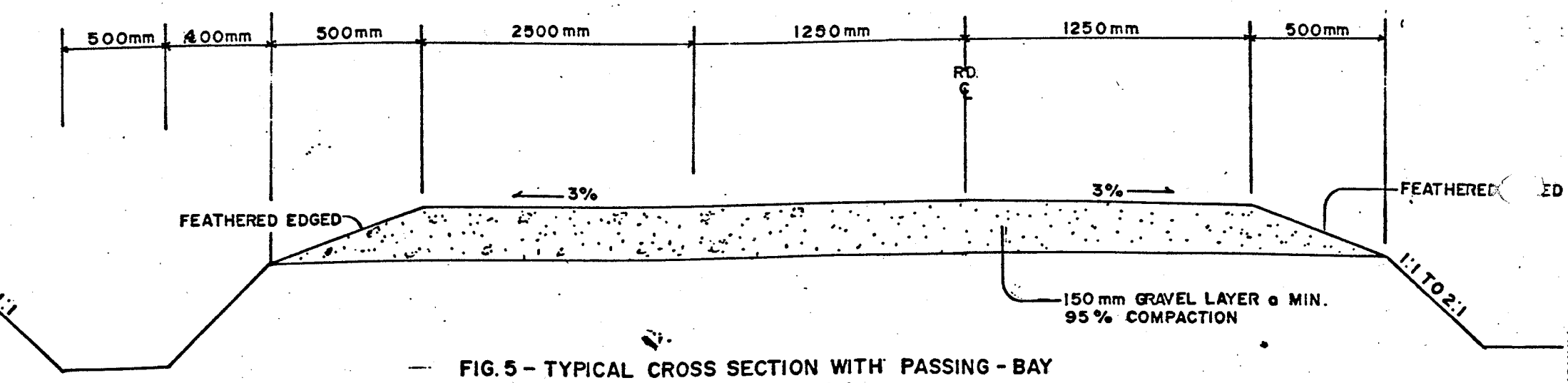


FIG. 5 - TYPICAL CROSS SECTION WITH PASSING - BAY
(SECTION A - A)

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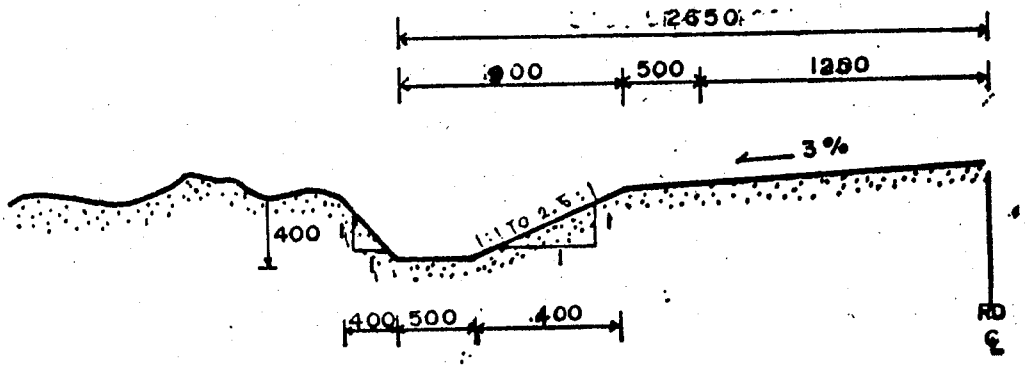
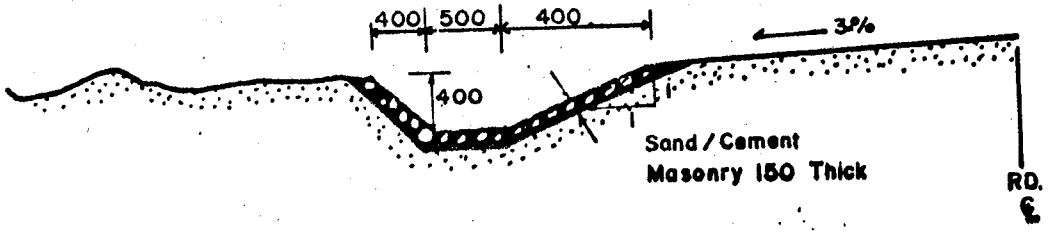
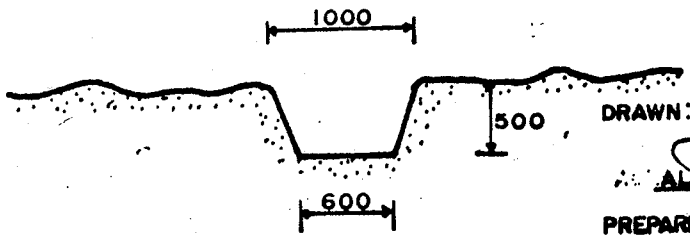
FIG. 6 – TYPICAL DITCH DETAILS
NOT TO SCALE



A) STANDARD SIDE DITCH



B) LINED DITCH IN STEEP GRADIENTS



C) OUTLET DITCH (MITRE)

NOTE: ALL DIMENSIONS IN MILLIMETRES (mm)

DRAWN:
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DIRECTOR, C

APPROVED:
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UNDER RETARY

TYPICAL COST PER KILOMETER
(NORMAL)

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT COST ECO. COST	UNIT COST FIN. COST	TOTAL COST ECO. COST	TOTAL COST FIN. COST
1.11	Clearing & Grubbing	m.sq.	6,300	1.23	1.54	7749	9,702
1.22	Common Earth Excavation	cu.m.	1,050	30.91	42.91	32,455.50	45,055.50
2.11	Sub-Grade Preparation	m.sq.	3,500	2.35	3.36	8,225.00	11,760
2.15	Base Course	cu.m.	525	190.80	260.82	99,960.00	136,930.50
6.11	Passing Bays	unit	3	1,901.73	2,606.64	5,705.19	7,819.92
					Sub Total	154,094.69	211,267.92
				Contigencies	10%	15,409.47	21,126.79
						169,504.16	232,394.71
				Detailed Engineering	4%	6,780.17	9,295.79
				Construction & Supervision	8%	13,560.33	18,591.58
				Total Project Cost		189,844.66	260,282.08

TYPICAL COST PER KILOMETER
(IN DEEP SIDE-CUT)

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT COST ECO. COST	UNIT COST FIN. COST	TOTAL COST ECO. COST	TOTAL COST FIN. COST
1.11	Clearing & Grubbing	m.sq.	3,500	1.23	1.54	4305	5,390
1.22	Common Earth Excavation	cu.m.	3,500	30.91	42.91	109,730.50	152,330.50
1.52	Rock Excavation	cu.m.	80	68.61	93.99	5,488.80	7,519.20
2.11	Sub-Grade Preparation	m.sq.	3,500	2.35	3.36	8,225.00	11,760
2.15	Base Course	cu.m.	525	190.40	260.82	99,960.00	136,930.50
6.11	Passing Bays	unit	10	2,258.93	3,102.76	22,589.93	31,027.60
5.00	Grouted Riprap	cu.m.	300	605.78	689.29	181,734.00	206,787
					Sub Total	432,033.23	551,744.80
				Contigencies	10%	4,320.33	55,174.42
						475,236.55	606,918.62
				Detailed Engineering	4%	19,009.46	24,276.75
				Construction & Supervision	8%	38,018.92	48,553.50
				Total Project Cost		532,264.93	679,748.87

TYPICAL COST PER KILOMETER
(IN EMBANKMENT)

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT COST ECO. COST	UNIT COST FIN. COST	TOTAL COST ECO. COST	TOTAL COST FIN. COST
1.11	Clearing & Grubbing	m.sq.	6,500	1.23	1.54	7,995	10,010
1.6	Fill from Barrow	cu.m.	4,500	34.86	43.04	156,870	193,680
2.11	Sub-Grade Preparation	m.sq.	3,500	2.35	3.36	8,225.00	11,760
2.15	Base Course	cu.m.	525	190.40	260.82	99,960.00	136,930.50
6.11	Passing Bays	unit	3	3,136.38	4,090.58	9,409.14	12,271.74
					Sub Total	282,459.14	364,652.24
				Contigencies	10%	28,245.91	36,465.24
						310,705.05	401,117.46
				Detailed Engineering	4%	12,428.20	16,044.70
				Construction & Supervision	8%	24,856.40	32,089.40
				Total Project Cost		347,989.65	449,251.56

ANNEX D

PARC AND DAR PROJECT MONITORING FORMS FOR CARP IMPLEMENTATION

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
Accomplishment Report
For the Period Covering _____

Region: _____
DPWH Office: _____

Activity/Output/Indicators (Concerned Agency)	PHYSICAL						Expense Class	FINANCIAL						Remarks
	This Month/Quarter			Year to Date				This Month/Quarter			Year to Date			
	Actual	Target	Variance	Actual	Target	Variance		Actual	Target *	Variance	Actual	Target	Variance	
A. Beginning Balance														
B. Releases for this Quarter														
C. Collections and Income														
Total Cash Available														
D. Less: Disbursements														
1. Support to Farmer-Beneficiaries														
Infrastructure Support														
a. Farm Related Infrastructure														
- Communal Irrigation System														
New Construction														
o No. of Projects														
o Area (ha)														

* - Refers to the amount released per funding warrant issued.

Activity/Output/Indicators (Concerned Agency)	PHYSICAL						Expense Class	FINANCIAL						Remarks
	This Month/Quarter			Year to Date				This Month/Quarter			Year to Date			
	Actual	Target	Variance	Actual	Target	Variance		Actual	Target	Variance	Actual	Target	Variance	
Rehabilitation														
o No. of Projects														
o Area (ha)														
- Small Water Impounding Dams														
o No. of Projects														
o Area (ha) Served														
- Rural Roads														
New Construction														
o No. of Kilometers														
Indigenous Roads														
o No. of Kilometers														
Rehabilitation/Improvement of Existing Roads														
o No. of Kilometers														
Construction of Multi-Purpose Pavements														
o No. of Kilometers														

Activity/Output/Indicators (Concerned Agency)	PHYSICAL						Expense Class	FINANCIAL						Remarks
	This Month/Quarter			Year to Date				This Month/Quarter			Year to Date			
	Actual	Target	Variance	Actual	Target	Variance		Actual	Target	Variance	Actual	Target	Variance	
- Rural Water Supply														
Construction of Shallow Wells														
o No. of Shallow Well Projects														
o No. of Agrarian Reform Beneficiaries served														
Construction of Deep Wells														
o No. of Deep Well Projects														
o No. of Agrarian Reform Beneficiaries served														
Spring Development														
o No. of Spring Dev. Projects														
o No. of Agrarian Reform Beneficiaries served														
- Ports														
Major Improvement of Ports														
o No. of Projects														

Activity/Output/Indicators (Concerned Agency)	PHYSICAL						Expense Class	FINANCIAL						Remarks
	This Month/Quarter			Year to Date				This Month/Quarter			Year to Date			
	Actual	Target	Variance	Actual	Target	Variance		Actual	Target	Variance	Actual	Target	Variance	
Minor Improvement of Ports														
o No. of Projects														
Rehabilitation of Ports														
o No. of Projects														

Prepared by :

Signature
Name
Position Title

Reviewed by:

Signature
Name
District Engineer/
Div. Chief

Approved:

Signature
Name
Regional Director