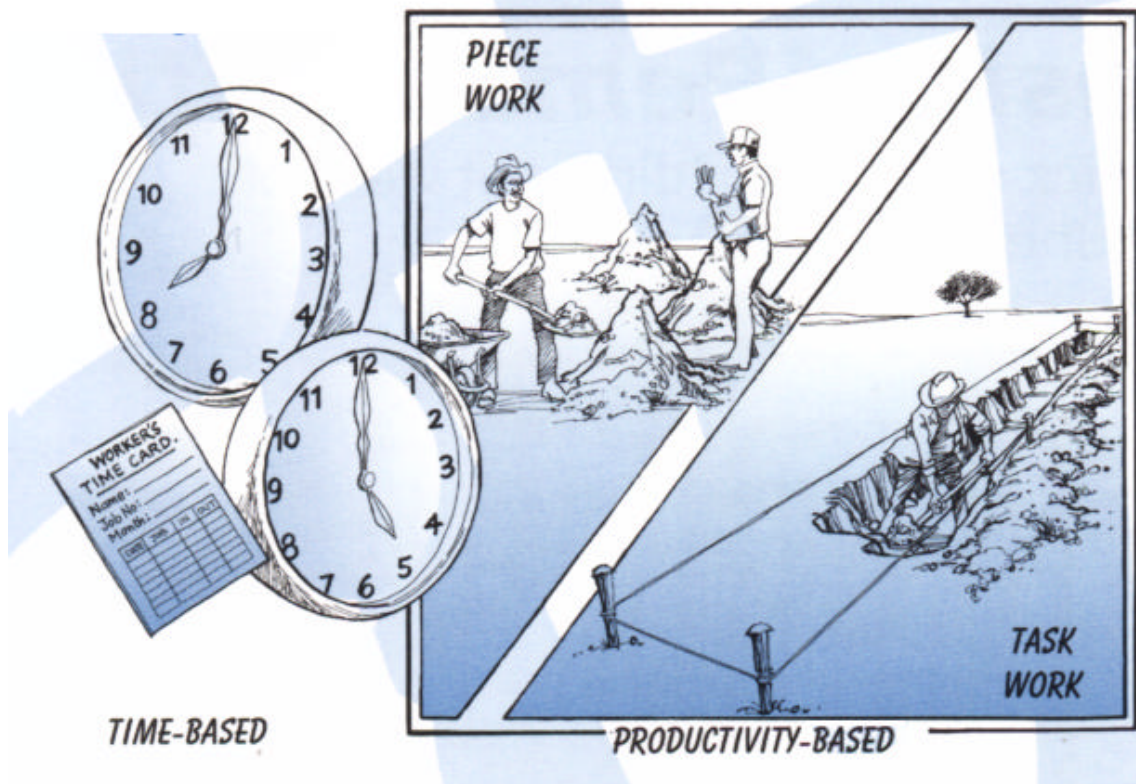




Department of Agriculture
**UPLAND DEVELOPMENT
PROGRAMME in
Southern Mindanao**
ALA/97/68

**AGRICULTURE INFRASTRUCTURE SUPPORT COMPONENT
MAINTENANCE & OPERATION MANUAL**



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I. General Information and Rationale.

The Upland Development Programme [UDP] in Southern Mindanao is a seven [7] year program [1999-2006] and is a special project of the Government of the Philippines executed by the Department of Agriculture and supported by grants from the European Union.

The overall objective of the program is to develop a replicable methodology for sustaining the Upland resource base and improving the living standards and prosperity of communities who derive most of their income from upland farming.

The programme follows a participatory community- based approach in Upland Development. This approach involves the active participation of partner agencies such as the Local Government Units [LGUs], People's Organizations [POs], Partner Financial Institutions [PFIs], Non Government Organizations [NGOs], Line Agencies [LAs], and other Community Development Partners in Watershed Management.

The primary beneficiaries of the programme are the upland communities of the different covered municipalities, subsistence farmers, indigenous people, women's group and community associations and cooperatives. The secondary beneficiaries are the Local Government Units of the five [5] provinces , covering thirty [30] municipalities and 120 Barangays and other participating institutions like financing institutions, Department of Trade and Industry, National Commission for Indigenous People, Department of Environment and Natural Resources, and the Department of Agrarian Reform.

To fully realized the objective of the programme, UDP undertakes six major project components in an integrated manner, each component having a defined and specific objective to wit;

1. **Community Institutional Development and Extension** geared towards the strengthening of communities and community based organizations capable of implementing sustainable resource management systems, establishing linkages and institutionalizing the use of sustainable resource management plans.
2. **Rural Financial Services** aims at the establishment of savings- base credit delivery system, providing production and providential loans and savings services on

reasonable terms to upland farmers, enterprises and communities through the establishment of provincial and community level revolving loan funds.

3. **Resource Management** focuses on the development of a model for sustainable management of the natural resources, adopted and supported by the Local Government Units and actively participated in by communities in small watershed areas. It facilitates the awarding of tenurial instruments to would be beneficiaries in the upland areas.
4. **Marketing and Enterprise Development** establishes marketing information systems, improve market linkages and promote off farm enterprises such as agro-processing, handicraft production and trading.
5. **Sustainable Agricultural Production** secures food production and increase income of upland farmers through diversified integrated farming systems while safeguarding and improving the watershed areas.
6. **Agricultural Infrastructure Support Component** shall respond to the infrastructure needs for resource management and market led production in beneficiary communities by providing structures that are appropriate and sustainable and that can be replicated in the upland situation.

UDP has considerably attain so much milestone in terms of beneficiary trainings, institutionalization of various organizations, project development and implementation and operation. One of the important concerns of the program is how to ensure project sustainability.

II. The Agricultural Infrastructure Support Projects.

The agricultural infrastructure support component of the UDP is designed to construct, provide, improve and rehabilitate Upland rural infrastructure such as Roads, Trails, Water System, Irrigation and Erosion Control Measures as may be planned, designed, implemented, operated and maintained by the beneficiary communities or the concerned Local government Units.

a. Road Rehabilitation Project.

In support to the agricultural development of watershed areas, UDP provides for the improvement of road access to farmers for greater mobility in transporting their agricultural products to the markets and trading centers, as well as the transport of their farm inputs.

Generally, all farm to market roads of UDP have a minimum of 10 meter road right of way, a

minimum roadway of 4 meters and 1 meter shoulders on both sides. The specification of UDP roads must have the following standard and characteristics.

- ❖ Efficient Drainage System
- ❖ Good and stabilized foundation [subgrade]
- ❖ Wearing surface such as item 200- Aggregate Subbase Course and Item 201 Aggregate Base Course, shall be smooth and well compacted to avoid stagnant water.
- ❖ Adequate Cross Drainage and constructed to the approved plans and specifications for Reinforced Concrete Box Culverts [RCBC] and Reinforced Concrete Pipe Culverts [RCPC].
- ❖ Adequate road slope protection works, to support the embankment and avoid erosion.

b. Trail Improvement

As minor access by farmers, improvement of existing trails is included in the program as an economical link from the road access to the watershed areas. Trails are usually adequate for motorcycles, pedestrian and animal traffic, and are very easy to maintain by the community. Caution should be exercised when considering the upgrading of a trail to a road.

Traffic is generally limited to users on foot and in most instances motorcycles are allowed. As a general rule the specification for trails should have at least a minimum of two [2] meter pathway and 0.50 meter shoulders on both sides. The construction and improvement of the trails should have the following characteristics;

- ❖ Efficient Drainage System.
- ❖ Good and Stabilized Foundation
- ❖ Provided for a wearing surface of at least item 200
- ❖ Adequate Cross Drainage in accordance with the plans and specifications
- ❖ Adequate Trail slope protection

c. Water Supply System

Most of the UDP water supply System projects implemented fall under the level II category. Level II Water Supply System consists of intake boxes at the point source normally springs, a ground water reservoir, distribution pipes, communal faucets and washtubs. The following specification should be complied with.

- ❖ All water coming from the source shall be potable
- ❖ Certification from the Department of Health as to its water potability shall be required. Pipe joints shall have no leaks, including the distribution pipes and its faucets
- ❖ Reinforced Concrete elevated water tanks shall be free from thermal and structural cracks.
- ❖ Appropriate drainage shall be provided at the periphery of the wash tubs and faucets such that waste or excess water are conveyed to the discharge point, canals, streams and rivers.

4. Irrigation System [Agri-Water System]

An upland Irrigation system will be provided in selected watershed areas in the provinces or municipalities. Considering the character and terrain of the uplands, the system shall be limited to cover a minimum of 2.5 hectares of land. Among the characteristic of the system are.

- ❖ The point source of water shall be separate and distinct from that of the water supply source.
- ❖ The capacity of the source shall be adequate enough to be able to irrigate the 2.5 has. of land all year round.
- ❖ And is gravity driven

5. Erosion Control Measures

Erosion control Works is a special measure to protect the natural resource base in the upland areas.

III. The Need For Sustainable System

One of the important concerns that has to be addressed squarely, is the sustainability of the infrastructure support projects at the time of its inception up to the time when it should have been completed and be able to serve its purpose through out its designed lifetime.

Sustainability can be encouraged in a number of ways:

- By using a design which is appropriate for the conditions
- By demanding high standard of construction
- by developing the maintenance capabilities of the beneficiary communities
- by making long term arrangements with local government units for periodic maintenance

Proper maintenance is the immediate concern of the program and the communities within the barangay, being the direct beneficiary of the project. All efforts will be in vain unless timely maintenance is undertaken for the specific projects. Even if the projects are well designed, quality and standards observed during construction, without proper maintenance and upkeep they are doomed to deteriorate and eventually become ineffective and useless.

It is towards this context that greater emphasis should be given to the maintenance of the completed facility in order to keep the project as much as possible within its original state or under a renewed condition. The development of an appropriate maintenance manual that shall guide the maintenance organization in the execution of the required maintenance works becomes imperative. There are many possible alternative systems of organizing rural infrastructure maintenance. Principally, we are looking for the system, which make the maximum use of the available human and physical resources. Such a system would also aim to provide a minimum level of maintenance services to derive a maximum benefits that shall accrue to the project, keeping in mind that the system must be realistic.

Merely putting work resources into maintenance is not sufficient to solve the maintenance problems., because funding requirements will continue to be insufficient. The relevant reasons are:

- There is a very limited amount of money available for maintenance purposes.
- There are other priority projects
- There are choices to be made as regards to the level of maintenance i.e. the frequency and nature of the maintenance operation.
- There are other maintenance approaches that can be utilized for example, equipment intensive, labor- intensive, an intermediate technology using a combination of labor and equipment,by maintenance contract through local institutions or barangay.

IV. Objectives of the Manual

The manual has been developed with some degree of flexibility and as simple as possible in order for the end users to be able to use the manual wherever it is practicable and applicable. Various maintenance options are presented to meet situations and conditions obtaining in a given area. The manual embraces the concept of labor- based and/or equipment supported approach in the maintenance of completed UDP projects. This system envisions to enhance the working partnership between the participating LGUs and the beneficiary community and promote the

cooperative spirit of the barangay residents to be actively involved and be committed towards the quest for project sustainability.

Premised on the financial constraints besetting the community associations(UCO/ UBA), the barangay and the local government units, it is the objective of this manual to;

- Institute the community and/or barangay based labor intensive and/or equipment supported repair and maintenance schemes that is adoptable and acceptable to the LGUs and beneficiary communities such as
 1. Maintenance by Pakyaw Contract
 2. By barangay and/or community administration through hiring of individual or group of laborers on a piece meal work.
 3. by Pintakasi or Bayanihan System (free labor)
 4. Force Account Work or By administration by either or both the municipal government and the barangay. This particular arrangement would apply on periodic maintenance of the roads, where equipment support becomes necessary or when the repair of certain infrastructure requires major repair works and are already beyond the capacity of the community/barangay.
- Strengthen monitoring of completed UDP Projects
- Institute road based and other revenue generating measures to help finance the labor/equipment cost for maintaining the project
- Integrate infrastructure repair and maintenance in cooperative development and institutionalize strengthening aspect of project activities.

The memorandum of Agreement between the UDP, the provinces and the municipalities requires the barangay and the beneficiary communities to undertake repair and maintenance of the completed facilities partially funded by UDP. While the municipalities , barangays and the communities are aware of their respective responsibilities, they are not financially capable to immediately undertake such responsibility. Unless innovative community efforts are initiated, it appears that the responsibility for repairs and maintenance will not be met. It is against this background that this manual is evolved in consultation with the local government units from the beneficiary level up to the municipal and provincial level.

Further, the manual has been evolved for the purpose of providing a working knowledge and common reference of the LGU and the barangay end users towards the realization of the projects

goal. The UDP seeks to develop and test options for institutionalizing the system which the municipalities can eventually adopt municipality wide.

V. Limitation of the Manual

This manual applies only to the rural infrastructure component of UDP. This shall not in any way encroach on the operation and maintenance activities prescribed by other government agencies that are implementing similar or related projects.

VI. Operation and Maintenance Responsibility

Under the Upland Development Program, it is encouraged that the communities initiate, identify, plan, implement, operate, manage and maintain its agricultural infrastructure support projects assisted by the barangay and the municipal government. This would provide a greater sense of commitment and ownership to the project.

Operation and maintenance (O & M) of the completed project shall therefore be the responsibility of the barangay and the municipal government and/or the proponent organization depending upon the type of their infrastructure project.

The LGU, particularly the Barangay, shall take the lead in maintaining the Roads, Trail Improvements and Erosion Control Works as these are common public service facility. A Barangay Water Association (BAWASA) or UCO or any similar organization shall operate and maintain the potable Water system while the Irrigators Association shall be responsible for its own irrigation project, being the direct beneficiary of the project.

A. Strategy

Under the concept of Development partnership, operation, management and maintenance of the upland infrastructure projects should be a joint effort of the beneficiary communities, the barangay and the higher level of government irrespective of the type of the project. Certainly there are level or stages of development of the project where they are affordable and within the capability and capacity of an organization. However in the long run they may need assistance specially that any infrastructure projects are vulnerable and susceptible to elements such as weather or force majeure causing failure and major repair works. On these instances, works and cost are beyond the capability of the lone organization. Such works would entail the active participation of various stakeholders such as the higher level of governance, the municipality or the province.

B. Supervision and Monitoring

The supervision and monitoring of the completed project should start from the time the road segment is turned over to and accepted by the barangay officials and/or the concerned beneficiary community. It is of extreme importance that the project be assessed and evaluated to determine whether or not the project has been completed in accordance with the plans, specification and program of works. If the deficiencies noted in the project are not rectified prior to acceptance, the barangay and /or the community organization (UCO & UBA) will be burdened for the remaining lifespan of the project. A well constructed / improve project with timely maintenance will be less costly and easier to maintain.

C. Trainings

Prior to project completion and the start of the maintenance activities, all persons involved in the operation and maintenance of the completed project shall undergo a training course to familiarize the operation and maintenance manual. The training shall be undertaken in coordination with the provincial project offices, the municipal project teams and the project management office. All training courses shall focus on the concepts, methods and strategies on the operation and maintenance of rural infrastructure as stipulated in the manual. Participants to the training program shall include the municipal engineers, the barangay councils and the officers of the upland community organizations as well as its designated maintenance crew. It becomes extremely necessary that a hands on training be conducted among the actual workers in the field more particularly on the labor intensive activities.

Source of funds and the financial requirements for the conduct of such training shall be funded by the UDP

VII. Maintenance of Roads

Gravel/ earth roads require regular maintenance whose frequency will depend on site conditions, climate, traffic characteristics, workmanship, etc. The gravel wearing surface will rapidly deteriorate if the road loses its (crowned) shape and/or ruts become established. Under these conditions, water flows or ponds on the road surface, eroding fine material out of the surface, and wetting and weakening the lower layers of the road, Under upland conditions, with high and steep slopes, subsequent deterioration will be rapid.

This deterioration can be prevented if routine maintenance is carried out. Preventive maintenance can be carried out using manual labor- but the need must be identified at the early stage. Simple

reshaping, filling of ruts and potholes, and clearing drains should be done with a regular work party, perhaps quarterly during the dry season, and immediately after the wet season.

If the road has already deteriorated, and ruts are already established, then the necessary materials will be required. Without preventive (manual) maintenance, it will probably be necessary to dress, reshape and compact roads annually, using construction machinery.

A. Regular Road Management

The useful life of a gravel/ earth road can be extended if some restriction and other innovative measures can be placed on their use and adoption of road management schemes. The

Community can enforce such restrictions by placing notices at the beginning of the road.

Gravel roads can sometimes become effectively impassable for short periods during very wet weather. If vehicles attempt to use the road, by using chains, or 4- wheel drive, the surface will be seriously damaged and major work will be necessary. Communities are advised to close the road during such conditions; it is better to lose access for a few days during the wet weather, than to lose it until the road can be repaired.

Traffic on UDP roads should be limited to a speed of 30 km. per hour. Above this speed, fine material is removed from the road surface, usually visible as a dust behind the vehicle. This fine material is essential for binding gravel matrix; without the fines, the larger gravel particles loosen and the road quickly loses its shape. Speed bumps may be installed for the purpose.

Proper use and care of rural roads should be undertaken like prohibitions on the passage of heavily loaded trucks during the rainy season when deterioration is maximum, the use of spikes and chains, towing of logs/ bamboo by dragging along the road right of way and passage of carabao sleds on the roadway.

It may also be advisable to install earth bunds or humps perpendicular to the longitudinal axis of the roadway at certain intervals on steep portions to deflect surface water run off to the side ditches during rainy days.

B. Road Maintenance Activities

a. Type of Road Deficiencies/ Deteriorations.

To be able to fully appreciate the required maintenance activities that should be done, it becomes imperative that one must have a good working knowledge of the various deficiencies on a road section brought about by several factors as climate, run off, steep slopes , traffic etc. Several of these deficiencies are enumerated herein;

1. Ruts

Ruts will tend to form particularly if the road is trafficked during wet conditions, when the base of the road has weakened. Ruts must not become established- if they do a preferential flow path is established along the rut, and deterioration will be rapid. Ruts can easily be smoothed out by a work party, using shovels and simple compaction equipment.

2. Berms

Berms are the ridges of loose material at the roadsides. Berms are sometimes deliberately constructed to contain stream flow on the out slope side, but more often berms are unintentionally formed during other maintenance operations. Unintentional berms can prevent water from entering the side drains and where this is the case, the berm must be removed. Berm material can be spread on the road surface, used to repair potholes, fill ruts, etc.

3. Potholes

Potholes form where water is allowed to pond, and without maintenance will develop rapidly. Potholes should be filled with surfacing material, compacted carefully.

4. Blocked/Clogged Drains and Landslips

Drains should be kept clear of all debris. On side cut roads, upslope erosion will often cause minor slips and blockages, which can divert run off flow onto the road surface, causing serious damage. Culverts and inlet boxes must be kept free of sediment and debris.

Weed growth in drains often helps to trap sediment and reduce flow velocities. This may be advantageous, where the drain has an adequate cross section, but weed growth is controlled by frequent cutting. In other cases, it may be desirable to remove all weeds.

5. Rills

Rills are slight longitudinal depressions along the roadways created by surface runoff on soft spots of the road sections. The longitudinal marks created by carabao sleds and dragging logs may eventually turn into rills with the action of water run off. Rills when not corrected immediately may turn into gulleys. Rills and Gullies are evident on steeper slopes on the roadway.

b. Types of Maintenance Activities

There are three different types of maintenance and one support operation (Materials Production). Each type covers a variety of work activities. The following definition of terms is provided to have a uniform and consistent understanding of these activities.

1. Routine Maintenance

Routine maintenance is undertaken for the upkeep of the original shape and condition of the road. It is labor intensive and does not require the use of heavy construction equipments and the community can supply the labor requirements. It may consist of those work activities regularly performed by the maintenance workers through out the year on schedule basis.

For road and trail Improvement, manual work activities such as vegetation control, cleaning and reshaping of ditches, restoring road surface, removal of corrugations, patching potholes, ruts and other depressions, erosion control etc. are considered routine maintenance activities.

The routine maintenance activities are either performed by a group of workers, barangay maintenance crew or an individual assigned to a specific section on a pakyaw or daily rate basis. The location of the scheduled routine maintenance work should be base on daily or weekly inspection of the project and the identification of the particular section where the work is needed and the estimation of the quantity and amount for the works.

Table 1 : List of Routine Maintenance Activities [Labor base]

Activity No.	Title/ Description	Recommended Method of Undertaking	Suggested Frequency
1	Vegetation Control	Pakyaw Agreement/ Bayanihan/ Hired labor	Quarterly
2	Manual Cleaning and Reshaping of Ditches	-do-	Quarterly or after heavy rain

3	Patching potholes and depression	-do-	Quarterly or when necessary
4	Erosion Control	-do-	When necessary
5	Cleaning of Culverts and other structures	-do-	
6	Install/maintain bunds or humps perpendicular to the axis of the road to deflect run off along the road.	-do-	Upon request

Refer to appendix 1 for a more detailed description of the routine/ preventive maintenance activities.

1.1 Type of Work Arrangements

The main focus of routine maintenance is the utilization of the available manpower resources within the locality / barangay given the limited funds that are available. Various type of work arrangements are presented.

1.1.1 Bayanihan or Pintakasi

A group of household undertakes routine maintenance activities voluntarily without any compensation except on some instances where food for work are provided. Each member of a household living proximate to the road contributes one labor to do specific activity on a recommended frequency as agreed with the Barangay. The system are normally implemented during off peak seasons as households would be busy tending to their respective farms during planting and harvest seasons.

1.1.2 By Administration/Force Account Work.

Routine maintenance activities is either performed by an individual or group of individuals hired to do specific routine works and are paid by the barangay, either out

of its internal revenue allotment (IRA) from the national government or from any other sources. Normally the worker/ group of workers is hired on a daily basis for a specific period of time depending upon the magnitude of the works to be done and the availability of funds. It is a good practice to hire workers who are living within the vicinity of the road segment to be maintained, not only as an augmentation to their family income but also that the worker is already familiar of the situation obtaining in that given area and the works to be done.

1.1.3 By Pakyaw Agreement

This type of arrangement may be executed by an individual or group of individuals commissioned by the Barangay Captain to undertake repair and routine maintenance activities /works on a predetermined productive output such as number of kilometers of vegetation control, or length of side ditches clean and cleared, etc. at a fixed negotiated and agreed lump sum price. Sometimes, payments are made based on the number of units of measurement accomplished at an agreed fixed unit cost. The total remuneration being paid computed as the product of the number of units accomplished multiplied by the unit price. It is further important that a specific timeframe for the works to be completed be stipulated in the contract. A Pakyaw contract agreement would therefore be entered into between the individual/ pakyaw group and the Barangay Captain as authorized by its Barangay Council. Refer to Appendix 3 for a pro forma Pakyaw Agreement.

1.1.4 Combination of the above.

Simply put, a combination of the above arrangements may be implemented depending upon the availability of the manpower, the skills required on the works and the financial circumstances of the Barangay.

1.2 Hand tools for the Workforce

Effective, efficient and appropriate hand tools are required for proper and good routine maintenance works involving manual labor. The following hand tools are to be provided and issued to the laborers depending on the maintenance activities undertaken.

1 unit - Wheel borrow	2 units – Pick/ Mattock
4 units – Shovels	2 units – Crowbars
4 units – Bolos/ Scythes	2 units – Steel Tampers

2 units – Axes

2 units – Rakes

Ropes/ Cable/ Cleaning Rods

The Barangay, thru its designated property Custodian shall be responsible for the safekeeping and issuance of the appropriate hand tools. At the completion of the pakyaw agreement or end of each undertaking, all tools whether serviceable or not, shall be returned to the Custodian. Any loss or damage to the tools attributable to the negligence of the laborer shall be replaced by the concerned laborer or in the case of Pakyaw agreement, the replacement cost shall be deducted from the monies that may be due the contract. The amount recovered will be used for the replacement of tools loss or damaged.

2. Periodic Maintenance

Periodic maintenance is the upgrading of a road to its original condition after a number of years.

It involves a more extensive work involving the used of equipments and may be required only every year or every several years. Resurfacing with gravel to replace the lost materials and reshaping of unpaved roadway are example of periodic maintenance activities. Since periodic maintenance operation is costlier than most routine maintenance, it is understood that this type of maintenance activities shall be a joint efforts of the barangay , the municipal and/or the provincial government.

Upon the necessary representation by the Barangay Captain, planning, scheduling of periodic maintenance activities and preparation of program of works and its corresponding budgetary requirement shall be prepared by the concerned staff of the LGU, normally the municipal Engineer and the budget Officer of the LGU.

The Municipal Engineer is responsible in monitoring the periodic maintenance activities of every completed UDP project in their locality. It is imperative that their involvement in the interim years of the operation and maintenance will enable them to carry out an effective and efficient management of the system.

Table II. List of Periodic Maintenance Activities

Activity No	Title/ Description	Recommended Method of Undertaking	Suggested Frequency
1	Reshaping of Unpaved Roadways	Force Account/ By Administration	Twice a year or when necessary
2	Resurfacing of Unpaved Road	Force Account/ By Administration	Once every two years or when necessary

Refer to appendix 2 for a more detailed description of the above enumerated activities.

2.1 Types of Work Arrangement

Given the extensive nature of the works, whereupon equipment utilization becomes necessary, there are at least three available work options for the undertaking of periodic maintenance works.

2.1.1 Maintenance by Contract

This particular arrangement may resemble the system of a pakyaw contract except that the party to the contract is a legitimate contractor with sufficient and appropriate equipments, financial capacity and experience in undertaking the required works. Depending on the magnitude of the works, the activities to be undertaken and the amount of the proposed works the contractor is chosen through either bidding or by negotiation process. The contract may either be lump sum or unit price contract.

2.1.2 Through Rental of Equipments.

Generally, the maintenance works on the upland roads may consists only of grading and resurfacing using a grader, dump trucks and roller. In the absence of the necessary equipments within the local governments, the Barangay may opt to rent equipments from private contractors or equipment lessors either on operated rental basis or bare rental rates. In the latter, the barangay provides for the fuel, oil and wages of the operator. It is important that the works is supervised by an experienced foreman and/or Engineer.

2.1.3 Force Account Work / by Administration

Given the limited funds, periodic maintenance is mostly carried out by force account work or by administration by the barangay with financial assistance and/ or equipment support from the municipal and/or the provincial government. It is the customary practice that the municipal/ provincial government allow the barangay use of their equipments, provided the barangay shoulder the cost of fuel, oil and operators wages. In some instances, where the equipments of the LGUs are loan from lending institutions, rental for the equipments are being charge at a very minimal rate.

Supervision of the works is done jointly by the barangay council and the municipal engineer.

3. Special Maintenance

This covers unplanned maintenance works that may be needed as a result of landslides, flash floods, embankment slips, etc., such as repairs of specific failures and the reconstruction of the road to prevent the occurrence of another similar failure.

4. Materials Production

It relates to the production of materials to be incorporated in the maintenance works such as quarrying of aggregate materials and fabrication of concrete culverts.

VIII. Operation and Maintenance of Water Supply System

Basically, the construction and rehabilitation of water Supply system under the Upland Development Program falls within the level II category and consists of the development of the spring source, the construction of reservoirs, laying of pipelines and construction of wash tubs and communal faucets. The operation and maintenance of the completed facility will be relatively simple and that the main consideration is the assurance of the continued, adequate flow of safe, potable water at the faucet.

The management, operation and maintenance of the water supply system shall be the responsibility of the Upland community organization or a water association, whose members are the direct beneficiary of the project. An infrastructure committee within the organization is created with the main task of operating and maintaining the system in an efficient manner. It is suggested that the maintenance crew shall come from within the organization, and the membership and task shall be rotated among its member- beneficiaries. This will ensure the individuals attachment to the project , a sense of commitment and ownership towards the project.

A. Record Keeping and Other management aspects.

a. Record Keeping

In order to sustain a well managed water system, the water association management shall maintain a record book and files, which shall contain the following;

- a. Barangay Site map showing the location of the entire system as well as the built up areas served by the system.
- b. List of member beneficiaries
- c. Inventory of all the existing facilities
- d. Inspection Checklist
- e. Proposed Expansion of the facilities, if any
- f. Inventory of Supplies, tools and materials
- g. Cash book/ Record of Collections and/or donations
- h. Logbook on Groupings of the maintenance crew and Records of Daily Attendance
- i. Records of monthly meetings and proceedings

b. Fund Generation thru monthly dues.

Being the direct beneficiary of the system and to be able to keep the system in a good working condition at all times, it is suggested that immediate funds be available in the event of system failure or repairs becomes necessary. It is common practice that individual users of the system is assessed monthly dues to be used exclusively to fund the operating cost as well as the purchase of materials required during repair. This is a major policy that has to be approved unanimously by all member beneficiary in a general assembly called for the purpose.

The association treasure shall undertake the collection of the monthly dues and shall maintain an account with banking institution in the name of the association.

c. Operation and Maintenance Activities

Constant and daily monitoring on the whole system must be undertaken to check and assess its efficiency. There should be a continuous inspection on the spring source, the tank/ reservoir washtubs and the pipelines. Defects and deficiencies should be immediate repaired as this will affect the water flow and efficiency.

a. At Spring Source/ Intake Box

a.1 Operation

Activity Number	Description of Activities	Suggested Frequency
1	Continuous opening of the gate valve going to the distribution line. Gate valve shall be closed if reservoir is full or when reservoir/intake box will be cleaned.	Daily
2	Checking the continuous flow / yield inside the intake box/ reservoir	Weekly
3	Testing the water potability	Annually
4	Checking pipes and fittings for any leakages	Monthly

a.2 Maintenance

Activity Number	Description of Activities	Suggested Frequency
1	Cleaning and disinfecting of the intake box/reservoir	Quarterly
2	Cleaning and removal of vegetation roots inside the intake box and the immediate surroundings	Monthly or when necessary
3	Sealing of leakages in the pipes and fittings	When necessary

b. Reservoir

b.1 Operation

Activity Number	Description of Activities	Suggested Frequency
1	Checking of full water level inside the reservoir	Weekly
2	Draining of the reservoir for cleaning purposes	When necessary
3	Disinfecting against bacteria	When necessary

b.2 Maintenance

Activity Number	Description of Activities	Suggested Frequency
1	Cleaning of the reservoir	Weekly
2	Sealing of all leaking parts	When necessary
3	Disinfecting	Quarterly
4	Checking of water level indicator	Weekly
5	Cleaning of reservoir surroundings	Monthly

c. Washtubs/Standpipes

c.1 Operation

Activity Number	Description of Activities	Suggested Frequency
1	Check and monitor flow of water from faucets whether adequate	Weekly
2	Repair Damaged portions of wash tub slabs	When necessary

c.2 Maintenance

Activity Number	Description of Activities	Suggested Frequency
1	Cleaning of the washtubs and the immediate surroundings	Quarterly
2	Checking of faucet leaks and replacement of washer. Replacement of faucets	When necessary
3	Cleaning and clearing of ditches and canals to prevent water stagnation within the immediate periphery of the washtubs.	Quarterly

d. Distribution Lines

d.1 Maintenance

Activity Number	Description of Activities	Suggested Frequency
1	Check, inspect and repair pipelines and fitting leaks	Monthly
2	Check Stagnant water along the path of the line	After heavy rain
3	Replace worn out pipes and fittings	When necessary

4	Check illegal taps and connection	Quarterly
5	Control vegetation and undertake remedial measures for signs of soil failures along the pipeline	Quarterly

IX. Maintenance of Foot Trails and Footbridges

A. Foot Trails

Basically, the routine labor intensive maintenance work activities for roads apply to the maintenance of foot trails. Hence, it is suggested that the reader refer to the section on road maintenance of this manual.

B. Footbridges.

The footbridges constructed under the UDP are of two types, Steel Deck and Suspended Cable footbridges. Ample protection of the footbridges' abutments should be given due consideration as these are susceptible to flooding action of streams and rivers where these footbridges are constructed. Normally stone ripraps are provided at the time of construction. However, constant action of flood water and run off from upslopes may tend to loosen the riprap and ultimately collapsed, thus threatening the entire bridge superstructure itself.

Table I.2 List of Footbridges' Maintenance Activities

Activity Number	Description of Activities	Suggested Frequency
1	Repair of Stone riprap at the side slopes of abutments	When necessary
2	Rust proofing and repainting of steel deck and railings	Annually
3	Application of oil/ lubricants on bolts and sleeve cable. Includes tightening of nuts	When necessary
4	Check cables and accessories for damaged and defects	Quarterly
5	Maintain tree planted along the side slopes	Monthly

X. Financial and Other Management Aspects

A. General

It has been established that one of the problems in the implementation of maintenance works of the infrastructure facilities to sustain its serviceability and functionality is financial constraint. Irrespective of the type of maintenance work undertaken, this will definitely entail expenses on the part of the various stakeholders. Undertaking the bayanihan system for example, will require funds for snacks as well as the food for work. The municipal government, the barangay and the community beneficiaries are now challenged to take innovative measures on how to deal with and remedy the problem.

As an aid in the formulation of the remedial measures, the following guidelines are suggested:

- Develop an annual work program and budget
- Determine the resources required and the possible sources
- Organize the manpower resources incorporating the incentive schemes
- Secure the legal requirements to implement the system
- Supervise and monitor the implementation of the system

B. Annual Work Program and Budget

Developing annual maintenance work program and budget involves identifying the types and amounts of maintenance work to provide the desired level of maintenance service to the end users.

The following are the suggested steps to be performed:

- Define maintenance work activities
- Obtain maintenance activity needed
- Established activity standards
- Define level of maintenance service
- Calculate work program and budget

C. Funding Requirement and Sources

a. Budget Requirement

After the work activities are defined and work standards are established, work program and budget requirements are determined.

Funding requirement can be computed based on:

- Productivity based on the standard output per activity
- Daily rate basis based on the agreed or prevailing rate in the barangay or purok.

b.Funding Sources

Strategies in generating fund requirements will depend on the innovative ideas and strategies of the municipal and barangay officials and the cooperatives or community organizations. It is suggested that the barangay pursue the following strategies to wit:

1. Influencing the municipal government for incorporating in their yearly budget an allocation for the barangay maintenance program. In order to do this, the Barangay should know the system of budgeting at the municipal level, the system of priorities, the present thrust of the budget, when the budget is prepared and making representations with the municipal council during the budget deliberation.
2. Solicitation of assistance from the province or make representation with their district congressman for allocation under the Countrywide Development Fund.
3. Setting up of a Barangay initiated income generating activities, such as the toll System. See Appendix 4 for the suggested process on the installation of a Toll System.

On the barangay level, the following are the suggested fund generation activities;

- Collection of toll fees from road users for maintenance fund
- Imposition of fines for non compliance with the Pintakasi schedule
- Contributions from barangay residents/ cooperatives/civic organizations
- Imposition of fines for non compliance with ordinances and rules on the proper use and care of the rural roads.
- For Water Supply Projects; Imposition of monthly dues from the members of the association.

D. Manpower organization and Incentive schemes

a. Farmers Cooperatives

In order to integrate capital build up with infrastructure, cooperative members should be given top priority in the organization of the Barangay Maintenance Crew. Whenever

possible, the cooperatives may be the one to contract the routine maintenance in case there are no interested workers within the vicinity of the road section.

Purok organizations like youth and other civic organizations can also be tapped, specially for pintakasi.

b. Incentive Scheme

The barangay can initiate/ organize a contest for the best maintained road section among the puroks/ NGOs, given that the type of work arrangement will be on bayanihan system. Each Purok/ NGO can adopt a road section to be maintained for a period of 6 or 12 months.

As an incentive, cash awards or prizes in form of projects beneficial to the purok or NGO can be solicited from possible sources shown below;

Table 2- Possible Sources of Incentives for the Best Maintained Roads

Source	Period	Form of Incentive
National Government	Annual	Road Improvement or other projects of interest to winning group
Provincial Government	Annual	Asphalting / Concreting of Barangay road or other project of interest to winning group
Municipal Government	Annual or semi-Annual	Cash Award or project of interest to winning group
Barangay Government	Semi- Annual	Cash award or projects to the best purok/NGO in the form of sports facility or paraphernalia
Purok/ BMC Level	Monthly	Bigger Salary/ Share for most diligent Worker
Cooperatives/ NGO Level	Semi- Annual	Cash Award or in Kind

Selection must be based on the evaluation of the monitoring Team composed of staff from MPT, Municipal Engineer’s Office, Barangay Captains and Cooperative/NGO Leaders. Evaluation must be documented and published in the Barangay/ Municipal Bulletins. The Incentive award may be in addition to the payment of labor to workers under Pakyaw agreement.

E. Compliance with all Legal Requirements.

Appropriate Memorandum of Agreements/ Ordinances/ Resolutions complying with all existing government rules should be secured to avoid legal impediments during implementation. Whenever necessary or appropriate, public hearing should be conducted.

Appendix 1

Routine Road Maintenance Activities

Table of Contents

- 1. Activity no. 1 Vegetation Control**
- 2. Activity no.2 Cleaning, Repair and Reshaping of Ditches**
- 3. Activity no. 3 Restoring road surface/ Reshaping by hand and providing soil binding materials to compact loose gravel surface.**
- 4. Activity no 4..... Patching of rills, potholes, ruts and other depressions**
- 5. Activity no 5 Erosion Control**
- 6. Activity no.6 Cleaning Culverts, and Other Structures**

Activity No. 1 - Vegetation Control

Description:

Cutting of roadside vegetation with hand tools within the road right of way. Includes proper disposal of cut materials by stacking and burning or other approved method. The purpose is to maintain adequate sight distances and prevent obscuring the road signs, prevent clogging of the drainage, and maintain the roadway appearances.

Handtools and Materials

<u>Handtools</u>	<u>Materials</u>
Crow Bar	None
Bolo/ Axe/ Scythe	
Wheel borrow	
Rake	

Procedure:

1. With hand tools, cut vegetation, grass and tree branches from the area to be cleared; Scythe for grass cutting; bolo/ axe and crewbar for bush clearing. Normally, this includes the shoulders, side slopes, ditches, and the area within the road right of way obscuring the road signs and bridge approaches. The area should be slightly wider at the road intersections and on the inside of the curves where sight distance is an important factor.
2. Remove material cut from ditches and shoulders and pile outside the ditches using rake and wheelborrow.
3. After drying, the pile material should be properly disposed of.

Estimated Productivity:

50 - 200 lin.m.. of road per man-day (both sides cleaned)- depending on situation

Suggested frequency: Monthly

Method of Undertaking: Suitable for Bayanihan

Activity No. 2**Cleaning, Repairing and Reshaping of Ditch****Description;**

Cleaning and shaping of roadside ditches, using hand tools, to restore gradients and assure efficient surface water run off. Includes removal and disposal of debris and waste materials.

Hand tools and Materials**Hand tools****Materials**

Pick/mattock

None

Axe

Shovel

Wheel borrow

Tamper

Procedure:

1. Remove rocks, logs and other obstruction from the ditches.
2. Excavate silt or sand to make the bottom of the ditch flat or slightly rounded.
3. Shape the sides of the ditches as flat as possible. This will provide better water flow and minimize future erosion.
4. Dispose of excess materials by spreading it out to fill low areas well clear of the ditch. Do not pile the materials or make a ridge along the roadway that prevents surface water from flowing to the ditch.

Estimated Productivity:

2 kms. Per Crew-Day (5 man crew)

Suggested frequency: Twice a month or after heavy rain

Method of Undertaking: Experienced paid labor

Activity No. 3

Restoring road surface/ Reshaping by hand and providing soil binding materials to compact loose gravel surface.

Description;

Returning gravel that has been removed by traffic from the roadway surfaces or using gravel previously spot dumped on one shoulder. Reshaping road surface using camber boards/ tampers and providing soil binding materials to compact loose gravel surface.

Handtools and Materials

Handtools	Materials
Shovel	
Wheelborrow	Aggregates
Camber Boards	Binding materials
Rakes/ Spreaders	
Tampers	

Procedure:

1. Side drain all standing water
2. Return gravel from the shoulders and/or ditches to the roadway surface.
3. Add aggregates and binding materials when necessary.
4. Spread materials with rakes and shovels.
5. Reshape the road surface using camber boards
6. Compact road surface with hand tampers.

Estimated Productivity:

0.3 km.per man-day or 5 cu.m. per man-day

Suggested frequency

Method of Undertaking: Experienced paid labor

Activity No. 4

Patching of rills, potholes, ruts and other depressions

Description:

Filling isolated potholes and other depressions in unpaved roads with aggregate materials and compacting the patches with hand tampers. The purpose is to prevent the ponding of water and to improve the surface smoothness.

Handtools and Materials

Hand tools

Wheelborrow

Shovels

Rakes/ Spreaders

Tampers

Pick axe/ hoe

Materials

Aggregates

Aggregates are either obtained by excavating soil and gravel along the side of the road using shovel/pickaxe/hoe or taken from gravel sources and spot dumped on the shoulder. Over sized materials should be removed from the aggregate manually.

Procedure:

1. Remove water and soft materials from the patch area. This should be done immediately when ponding of water is observed.
2. Clean loose materials from the edges of potholes, making the sides of the holes as vertically as possible.
3. Place aggregate in several layers, hand tamping each layer.
4. Rake final layer so the top of the patch is slightly above the surrounding road surface.

Where long rills have formed down on the steeper sections, steps 2-4 should be followed.

Where cross berms have been installed on the steeper sections, these should be repacked, so that the flow of water does not break through and flow down the road.

Estimated Productivity:

0.80 cu. m. per man- day 5 cu. m. per crew- day

Suggested frequency: Twice monthly or after heavy rain

Method of Undertaking; Experienced paid labor

Activity No. 5**Erosion Control****Description:**

Repairing of minor erosion of shoulders, slopes and ditches with handtools, and correction of conditions which cause erosion. Includes installation and repair of rock riprap, rock ditch lining, ditch checks, headwalls and other erosion control practices.

Handtools and Materials**Handtools**

Mattock
Shocvels
Axe
Wheelborrow
Ropes

Materials

Rock/Boulders

Procedure:

1. Repair eroded areas by filling with gravelly soil/boulders well compacted in place.
2. Correct conditions causing erosion, with actions such as:
 - widening and flattening of ditches
 - providing new outlet ditches to reduce concentration of water;
 - placing sod or vegetation over eroded areas;
 - lining ditch channels with rock;
 - placing riprap at ends of culverts and bridges; and
 - constructing a series of ditch checks to reduce the velocity of water on steep gradients.
 - Repairing smaller embankment slips with stakes, rocks and planting materials.

Estimated Productivity:

0.50 cu.m. per man-day

Suggested frequency: Monthly or when necessary

Method of Undertaking: Paid labor and/ or Bayanihan

Activity No. 6

Cleaning Culverts, and Other Structures

Description:

Removing silt and debris from ditches, pipe culverts and from culvert inlets and outlets so as to provide unobstructed flow of water, and making minor repairs of ditch/culvert structures.

Handtools and Materials

Handtools	Materials
Shovels	Minor
Buckets	
Wheelborrows	
Ropes/Cables/Cleaning Rods.	

Procedure:

1. Remove logs, limbs, stalks and other obstructions from the ditches/culvert inlet.
2. Excavate silt or sand by hand if accessible or a cable is passed through the culvert and a drag or bucket may be pulled through to remove silty materials and debris.
3. If water is available, the silt can be flushed from culvert in large volumes or at high pressure. The outlet ditch must be cleaned first so the water can flow easily.
4. Patching of minor damage to cracked or broken culverts and headwalls.
5. Severely damaged sections must reported for replacement or repair.
6. Load away all debris and surplus material and dispose of by approved means.

Estimated Productivity;

Depending on condition and situation

Suggested frequency: Twice monthly or when necessary

Method of Undertaking: Experienced paid labor

Appendix no II

Periodic Road Maintenance Activities

Table of Contents

- 1. Activity no.1 Reshaping Unpaved Roads**
- 2. Activity no. 2 Resurfacing of Unpaved Road**
- 3. Activity no.3..... Remoal of Corrugations/Dragging
and Brushings**
- 4. Activity no.4..... Hauling of Materials (Material
Production)**

Activity No. 1**Reshaping Unpaved Roads****Description:**

Use this activity to maintain surface condition and correct defects on unpaved surfaces by removing high spots and drawing aggregates from the roadside back across the roadway. This is also to restore a free draining shape to the roadway and to re-cut and clean side ditches.

Schedule this activity when the roadway has adequate natural moisture for proper compaction.

Equipment/ Hand Tools:

Equipment/ Hand Tools	Materials	Crew
1- Road Grader	None	1- Working Foreman
1- Road Roller		2- Equipment Operator
2- Shovel		2- Laborers
1- Wheel Borrow		

Procedure:

1. Make one pass with the grader to reclaim loose road surface materials from the side of the road and form a windrow.
2. Evenly spread the materials lightly over the road surface.
3. Remove oversized and foreign materials
4. Compact when necessary.

Suggested Productivity:

Twice a year or when necessary

Estimated Productivity:

2 to 5 kms. of graded roadway per crew day

Activity No. 2**Resurfacing of Unpaved Road****Description:**

Use the activity for resurfacing long, continuous sections of the paved roads by reshaping and placing aggregate on the existing roadway. This is to provide a durable, free draining and all weather surface to the unpaved roads. Thickness will depend on the existing road condition.

Equipment/ Hand Tools:

Equipment/ Hand Tools	Materials	Crew
1- Road Grader	Surface aggregate	1- Working Foreman
1- Road Roller		3- Equipment Operators
1- Payloader		
4- Dump Trucks		4- Drivers
4- Shovel		4- Laborers

Procedure:

1. Clear and remove vegetation and obstruction
2. Re-cut and clean ditches and outlets
3. Cut and scarify where necessary, the existing road surface to full depth of the defects.
4. Reshape formation to final cross sectional shape.
5. Hauling of aggregate materials.
6. Spreading of aggregate materials.
7. Compact surface aggregate and water if needed.
8. Finish grading to produce a smooth even surface

Estimated Productivity: 200 to 300 lin, m. resurfaced per day

Suggested Frequency: Once every 2-years or when necessary

Activity No. 3**Removal of corrugations/Dragging and brushing****Description:**

Shaping, reshaping and blading unpaved road and shoulder surfaces with a motor grader to restore side drainage, surface drainage, roadway width, surface smoothness and crown with or without additional aggregates. Includes machine smoothing of side slopes and ditches, reshaping and compaction of the surface through out the length of continuous road sections.

Handtools /Equipment and Materials;**Materials**

Aggregate

Equipment

Dump Truck or equivalent

Grader

Roller

Procedure and Illustration:

1. Remove debris from the road and the shoulder /ditch
2. Blade the surface to form a windrow
3. Spread the windrow
4. Check the surface cross slopes
5. Compact after the desired cross-section is attained.

Estimated Productivity:

2 kms. Per equipment day

Suggested frequency : Once a year**Method of Undertaking:** Equipment Supported

Activity No.4**Hauling of materials-Material Production****Description:**

Hauling of materials by dump truck or tractor trailer from stockpiles or material sources to the roadway and spot dumping them on shoulders for later spreading.

This should be scheduled only if no appropriate aggregate material is available within the road right of way and if hauling distance is greater than one km.

Materials and Equipment;**Materials**

Aggregate

Equipment

Dump Trucks

Payloader

Procedure:

1. Load dump Truck at aggregate source
2. Dump small amount of aggregate at locations near to be patched or to stockpiles.

Appendix no. 3

Pro Forma Pakyaw Agreement and Its Attendant Attachments

Republic of the Philippines
Office of the Barangay Captain
Barangay of _____

**Pakyaw Agreement
(Labor Only)**

This **agreement** , made and executed this ____ day of _____ 20__, by and between the Barangay of _____, _____, represented herein by Barangay Captain _____ ant the _____(Pakyaw Group) represented in this undertaking by its Pakyaw Leader_____.

Witnesseth, that for and in consideration of the works contemplated to be undertaken the Parties hereto covenant and agree as follows:

1. That the Pakyaw Group shall provide the necessary labor for the proper and faithful performance of the maintenance works described in the attached program of works at the total contract amount of _____,
2. That the Pakyaw Group shall commence work within ten(10) days upon signing of this agreement and complete the works within _____ calendar days , in accordance with the plans and specifications under the direct supervision of the Barangay or its duly desinated works engineer,
3. That the pakyaw group shall comply with all the terms and conditions of the this agreement , more specifally those contained in the following documents, to wit;

Annex 1 - General Conditions of the Pakyaw Agreement

Annex 2 - Program of Works

4. That the Barangay shall pay the contract amount upon completion of the project as may be certified completed by the works engineer in accordance with the terms and conditions of the contract.

In witness hereof, the parties hereto signed this agreement on the date indicated above.

Availability of Funds:

Barangay Treasurer

Approved by:

Conforme:

Barangay Captain

Pakyaw Representative

Republic of the Philippines
Office of the Barangay Captain

General Conditions of the Pakyaw Contract
Labor Only

1. All work contemplated under the contract shall be performed in accordance with the plans and specifications. Any deviation, the works shall not be accepted and considered invalid unless the same has an official approval of the Barangay Captain.
2. The work shall be carried out using labor based methods under the direct supervision of the works Engineer as designated by the Barangay Captain.
3. The Pakyaw Group shall composed of laborers from the Barangay where the project is located. Where skilled labor is not available, the Pakyaw group may recruit from the municipality or province where the Barangay is situated.
4. The work shall commenced ten (10) days upon signing of the agreement and shall be completed within ____ calendar days.
5. The Pakyaw Group shall work at least six (6) days a week until such time as the work is completed.
6. The Barangay Captain, thru its works Engineer, may suspend the works upon unsatisfactory performance of the works or as he deems necessary by informing the Pakyaw Group in writing.
7. The quantities and amounts entered in the schedule of Works are estimates only. Payment will be based on the actual accomplishment of the works as accepted by the Barangay Captain.
8. Interim payments may be allowed, at the description of the Barangay Captain, and shall be based on partial accomplishment. Ten(10) percent of the amount that may be due shall be retained as “Retention Money” pending completion of the works and acceptance by the Inspectorate Team composed of the Barangay Captain, The Barangay Treasurer and The Barangay Cairman on the Committee of Infrastructure.
9. If in the opinion of the majority of the Inspectorate Team, the work is not performed in accordance with the plans and specifications and is unreasonably delayed, then the contract may be terminated and claims for partial payment shall be based on completed works acceptable to the Inspectorate Team.
10. The Pakyaw Group shall undertake all reasonable precautions to prevent any disorderly conduct by or among the members. The Barangay Captain may require the Pakyaw Group Leader to remove from the works any member who in the opinion of the works Engineer misconducts himself or is incompetent.

11. Upon completion of the works, the designated works Engineer shall proceed promptly with the measurement of the work and prepare the estimate and certificate of acceptance. The Barangay Treasurer shall prepare the necessary payment voucher, deducting therein such sums as may be lawfully retained.
12. The Barangay Captain, thru its property custodian shall issue the requisite hand tools to the Pakyaw Group for the duration of the works and shall properly account such tools after project completion. The replacement cost of any lost tools shall be deducted from the contract payment.
13. Under this Pakyaw contract, the Pakyaw leader shall ensure that at least 80% of the required laborers, working tools and equipment for the project are available at the site at any stage of the work.
14. The Barangay shall not be held liable for any obligation arising from injury, sickness, disability or death of any of the group member.

Appendix 4
Suggested Process on the Installation of a Toll Fee System

Suggested Process on the Installation of a Toll Fee System

To be initiated by the Barangay Council

1. Drafting of the Policy Statement and Proposal for the Installation of a Toll System at a particular Barangay Road.
2. Holding of a General Assembly within the Barangay. All interested and concerned parties should be invited such as landowners, businessmen/Traders, vehicle owners/operators/Drivers and the community as a whole.

The discussion should focus on the following;

- a. The reason for the imposition of the toll system i.e. the generation of additional funds for used solely for the maintenance of the road.
- b. The types of vehicle and the goods or products to be taxed.
- c. The proposed schedule of fees

It is important that the proceedings of the general assembly be recorded as this will become the basis in the promulgation of the requisite Barangay Ordinance. The general assembly shall serve as the public hearing conducted, which is a requirement on any taxation as may be imposed by local government units.

3. Drafting and Passage of the Resolution/ Ordinance by the Barangay Council. The Resolution/ordinance should contain;
 - a. the toll system as a Barangay revenue tax measure
 - b. the schedule of fees
 - c. sanctions/penalty for non payment of the required fees
 - d. statement that the revenue from toll fees shall be exclusively used for the maintenance of the road
 - e. approval of the barangay council subject to the confirmation of the concerned municipal council.
4. Confirmation of the Ordinance by the Municipal Council
5. Posting of the confirmed ordinance in the Barangay bulletin board for at least fifteen(15) days prior to implementation
6. Construction of Toll Gates at strategic place and hiring of individual collector under the Barangay Treasurer.
7. Purchase of Cash Tickets from the municipal Treasurer for issuance to road users.
8. Simple audit and Accounting procedures.

Action Plan
Maintenance of Gravel Roads

Activities	Timeframe	Logistics Needed	Responsible person/Agency
1. General Assembly/ Information/ Education Campaign			
2. Training & Field Tour			
3. Vegetation Control			
4. Cleaning & Reshaping of Ditches			
5. Restoring road surface/Reshaping by hand and providing soil binding materials to compact loose gravel surface			
6. Patching of Potholes, Ruts and other depression			
7. Cleaning Culverts and other structures			
8. Erosion Control Measures			
9. Supervision & Monitoring			

Types of Work Arrangements;

1.Maintenance by Pakyaw Contract

In the Philippines, the pakyaw system is widely used in the construction industry(and is likewise recommended for use in the maintenance of completed facilities under the UDP) by both government and private sector to undertake jobs in which manual labor is a major component. The system should be readily acceptable to a rural workforce with little or no experience in road construction and maintenance or of working for any implementing agency of the government. For the labor based construction and maintenance projects, the use of pakyaw system seems to be ideal.

The pakyaw agreement serves as the contract between the LGU and the Barangay Maintenance Workers. The pakyaw agreement stipulates that payments can only be made if the section has been maintained in good condition.

a. Organization of Pakyaw Groups

1. The formation of the pakyaw groups should have the involvement of barangay leaders, the local community, people's organization.
2. The maintenance activities should be scheduled so as not to be in conflict with the agricultural peak season.
3. The municipal engineer in coordination with the barangay captain convenes community meetings and encourages the attendance of unemployed and underemployed members of

the barangay for the purpose of providing accurate information about the maintenance activities.

4. A pakyaw leader shall be elected and shall be the signatory to the contract and other documents pertaining to the work in behalf of the pakyaw group. The group may replace the pakyaw leader at any time but this should not invalidate any previous agreements
5. The municipal engineer shall assist the pakyaw groups in preparing their application for pakyaw agreement.
6. Interested pakyaw groups shall apply for registration to the LGU thru the municipal engineer and shall be evaluated in terms of accuracy of information provided and base proximity to the completed facilities.
7. The municipal engineer in coordination with the provincial project office Engineer shall provide orientation course to qualified pakyaw groups on the nature of the works, their roles and responsibilities, the adoption of the length man system within the group and the LGUs program on maintenance in general.
8. In case of two or more qualified pakyaw groups, the LGU may opt to equitably divide the work to the groups or conduct public bidding where the lowest bidder is given preference subject to the bid within the allocated budget.
9. The municipal engineer finalizes the arrangement and prepares the modified agreement for awarding and
10. Winning pakyaw groups execute the arrangement within the specified period.

b. Workforce

1. Labor should be drawn from the vicinity of the project and should belong to the various barangays contiguous to the sub project

2. Unskilled labor should be drawn from the barangay where the subproject is located; semi-skilled labor shall be recruited within the municipality preferably within the barangay; skilled labor shall be recruited within the province and preferably within the barangay and/or municipality.
3. The workforce should be formed into groups of workers, the number of which shall be based on the magnitude of the work to be done.
4. Each pakyaw group will elect its own group leader, who will also participate in the maintenance work.

c. Award of Pakyaw Agreement.

1. The maximum value of the individual pakyaw contract shall be based on the existing accounting and auditing rules of the participating LGU.
2. A pakyaw group may be awarded to a regular licensed small scale contractor but not to any government official or employee.
3. The agreement would be normally for labor supply only. Tools, equipment and materials will be supplied by the LGU as provided for in the program of works.
4. A subproject may be subdivided into several pakyaw agreement with the objective of employing as many groups of workers as possible
5. Pakyaw contracts may be awarded thru negotiation and should be within the project estimate subject however to the approval of appropriate LGU officials.
6. Where there is competition for the award of pakyaw agreement, they shall be open to public bidding with at least three (3) labor groups and the pakyaw group offering the lowest bid shall be given preference subject to the bid within the project estimate.

Government estimate may be open to interested bidders to ensure that bids are within the project estimate.

7. No contract should be awarded without a certification of the availability of funds from the municipal treasurer's office , noted as to pprogram by the municipal engineer and approved by the Municipal Mayor.
8. All contract awards shall be made and signed by the Pakyaw leader and the Municipal Mayor, witnessed by the Municipal Engineer. Work will only commenced after the award has been formalized .
9. Any pakyaw group, who performs satisfactorily may be awarded another pakyaw contract after completion of 80% of its previous contract. Commencement of the new contract will be subject to the satisfactory completion of the previous contract.
10. The pakyaw group undertaking any work under the agreement shall be exempted from the payment of any contractor's tax and other local taxes that are imposed on registered companies or profit oriented organizations.
11. Bidding for pakyaew contracts shall be conducted in the municipality where the project is located. The biding and award shall be under the supervision of the Prequalification, Bids and Awards Committee, where the municipal mayor is the chairman..

d. Pakyaw Agreement

1. Before commencing the work ,the MTO has to certify to the availability of funds yo pay the pakyaw agreement.
2. The pakyaw agreement should be designed to ensure that the workers be paid at least once a month.

3. A certificate of work accomplishment shall be prepared by the municipal engineer after a joint inspection with the municipal Treasurer and Auditor or their authorized representative on a monthly basis.
4. In some cases more frequent payments may be requested and, provided it is agreed with the LGU, a compromise payment halfway thru and on the completion of the contract may be made. However, with mid contract payments some retention say 10% should be withheld to ensure completion of the work..
5. The pakyaw agreement estimate will assume normal productivity rates and the prevailing wage rates shall be as those adopted by the LGU. The pakyaw group should be given incentives of working harder or longer in order to be paid early on the completion of the work.
6. Payment will be withheld if the condition of the road being maintained is unsatisfactory. The municipal Engineer orders the pakyaw contractor to rectify the deficiencies.
7. No payment to a pakyaw contractor of the last 10% of the contract price may be made until the work shall have been accepted and the tools shall have been returned.
8. Payment for pakyaw agreement is subject to existing accounting and auditing rules.

e. Pakyaw Contract Documents

1. Invitation to Pakyaw Groups (Notice of Bidding)
2. Application to undertake work by Pakyaw System
3. Pakyaw Agreement
4. List of Tools to be provided to the Pakyaw group
5. General Conditions of the Pakyaw Agreement

These annexes to the agreement shall be prepared by the municipal engineer. He enters the quality of the tools to be issued to the pakyaw group leader who signs the receipts and receives the tools for and on behalf of the pakyaw group. Once the work has been completed and the tools returned the municipal engineer certifies its return. The replacement value of any tools not returned on completion of the work shall be deducted from the agreed amount.

f. Handtools for the Pakyaw Group.

1. Handtools will be supplied by the LGU as included in the program of works of every road project. They shall be to the specifications required and of sufficient quantity.
2. The LGU through the municipal engineer will be responsible for keeping the tools in working order by sharpening/ repairing them.
3. Tools will be issued to the workforce and the issuance will be documented in the pakyaw contract.
4. Worn out tools should be returned to the storekeeper for replacement. These should then be returned to the from the project site to the custodian for write off or replacement.
5. On the completion of the pakyaw agreement, all tools and implements, whether serviceable or not , shall be returned to the storekeeper. This shall be a condition for pakyaw payment of the agreement. Any loss must be deducted at replacement value from the contract sum and the amount recovered will be used for the purpose of replacement for the tools lost.
6. No tools shall be offered or sold to the worker.

g. Materials

1. Materials for use (e.g. aggregate base course) shall be provided by the LGU. It is either purchase from private haulers/contractors or by force account/ administration using their own available equipment.

2. The barangay shall provide fuel and oil for the hauling of materials if done by force account work.
3. Funding source for the purchase of fuel and oil shall be source from the internal Revenue allotment of the baarangay or any funding sources.
4. Materials to be used(e.g. patching holes) shall be of the same quality as the existiing roadway.
5. The municipal engineer or his duly authorized representative shall be responsible in the distribution of materials at the site.
6. Volume of materials to be delivered to the jobsite shall be based on the Program of Works as prepared by the municipal engineer.

h. Execution

1. The municipal engineer shall be responsible for the proper execution of the different routine maintenance activities.

2. Length man Scheme

- a. One worker is assigned to a fixed length of road through a pakyaw agreement. All labor based maintenance activities specified in the pakyaw agreement as per program of works are undertaken within a specified period for an agreed fixed rate. Number of workers assigned assigned to a fixed length of road depends upon the total length of the completed road. One worker for every kilometer of road is recommended depending upon the type of work.
- b. Workforce
 1. The person resides in the immediate vicinity of the road section he is to maintain.
 2. The person has shown responsibility and diligence toward the work to be done

3. The person is willing to work or maintain the section of the road assigned to him and is capable of doing such activities.

c. Payment

4. Before commencing the work , the municipal treasurer's office has to certify the availability of funds to pay this scheme
5. Payment is through pakyaw contract agreement with an agreed amount based on the program of work.
6. The barangay Captain in coordination with the municipal engineer will negotiate the worker on the nature of the work and the estimated amount to be paid.
7. The worker has to be paid if the roadsection has been maintained in good condition after a joint inspection of the work accomplished with the barangay catain, municipal engineer,municipal tresurer and auditor or their authorized representatives.
8. If the condition of the road is unsatisfactory due to the neglect of the maintenance worker, payment shall be withheld until the deficiencies are rectified.
9. Failure to do so will result to the non payment of the worker and immediate termination of the contract and, thus another worker would immediately be hired
10. Payment is subject to the existing accounting and auditing rules of the LGU.

d. Document

1. Invitation to Pakyaw Groups
2. Application to undertakwe works by pakyaw sytem.
3. Program of Works
4. List of tools to be provided to the pakyaw groups

5. General conditions of the pakyaw agreement.

These annexes to the agreement shall be prepared by the municipal engineer in coordination with the head of the municipal project team thru the municipal mayor. The municipal engineer enters the quality of tools to be issued to the workers who signs the receipts and receives the tools. Once the work has been completed and the tools returned. The municipal in coordination with the MPT leader certifies its return by signing the appropriate space. The replacement value of any tools not returned on completion of the work shall be deducted from the agreed payment.

e. Hand Tools For the Workers.

1. Hand tools will be supplied by the LGU as included in the POW of every road project.
2. The LGU through the municipal engineer will be responsible for the safekeeping of the tools and keeping them in working order by sharpening and repairing them.
3. Tools will be issued to the worker and the issuance will be documented in the pakyaw contract agreement.
4. Worn out tools should be returned to the storekeeper for replacement. These should be returned from the project site to the custodian for write off or replacement.
5. On the completion of the pakyaw agreement, all tools and implements, whether serviceable or not, shall be returned to the storekeeper. This shall be made as a condition for the payment of the pakyaw agreement. Any loss must be deducted at replacement value from the contract sum and the amount recovered will be used for the purpose of replacement for tools lost.
6. The municipal engineer certifies its return by signing the appropriate space.
7. No tools shall be offered or sold to the worker.

f. Materials

1. Materials for use(e.g. aggregate base course) shall be provided by the LGU. It is either purchase from private haulers/ contractors or by force account /administration using their own equipment.
2. Barangay provides fuel and oil for 5the hauling of materials if done by force account / administrariion.
3. Funding source for the purchase of fuel and oil shall be source from the IRA of the barangay or any other funding source.
4. Materials to be used shall be of the samew quality as of the existing roadway.
5. The municipalm engineer shall be responsible for the distribtution of materials at the site.
6. Volume of materials delivered to the project site shall be based on the approved program of works as prepared by the municipal enguineer.

g. Execution.

1. The Municipal Engineer shall be responsible for the execution of the different routine maintenance activities.

3. ATNA (As the Need Arises) Scheme

a. Description

A Barangay Maintenance Crew (BMC) is organized and specialized in specific routine maintenance activity and hired as the need arises. There is no specific section assigned and payment is based on the output or rate per activity. This scheme is almost the same as with the pakyaw group agreement, however, the BMC is a permanent crew as organized and to be hired as the need arises. The Barangay Captain has the option to replace any members of the BMC anytime if they are not anymore efficient with their assigned tasks.

b. Selection of the BMC.

The Barangay Captain shall conduct a barangay meeting with the assistance of the Municipal Engineer and organized the BMC prior to actual maintenance work. The names of the workers living within the vicinity of the road are to be identified. One BMC is composed of four (4) laborers and working foreman, who will be the signatory to the Pakyaw Agreement. It is recommended that one BMC shall be organized for every five (5) km. of road. However, the length of the road section to be maintained by one BMC varies depending on the number and size of the vehicle using the road segment, soil type, type of vegetation on the shoulders and ditch slopes, gradient of the road section, type of cross section and the number of structures such as culverts, spillways and bridges.

c. Payment of the BMC.

1. Before commencing the works, the Municipal Treasurer has to certify the availability of funds to pay the BMC.
2. Payment of the BMC is thru pakyaw contract agreement with an agreed amount based on the program of works.
3. The Barangay Captain in coordination with the Municipal Engineer will negotiate with the BMC on the nature of the work and the estimated amount to be paid.
4. The BMC shall be paid if the road section has been maintained in good condition after a joint inspection of the work accomplished with the municipal Engineer, Treasurer and Auditor or their duly authorized representatives.
5. If the condition of the road section is unsatisfactory due to the neglect of the maintenance crew, payment shall be withheld until the deficiencies are rectified.

6. Failure to do so will result to the immediate termination of the pakyaw agreement, and thus, another BMC would be immediately organized to replace them.
7. Payment to the BMC is subject to the existing auditing and accounting rules and regulations.

d. Recommended Set of Hand Tools.

Effective and efficient hand tools are required for proper and good maintenance using the system. The following recommended hand tools shall be provided for each BMC by the LGU as included in the program of work.

1 unit	Wheel borrow	2 units	pick mattock
4 units	Shovel	2 units	French fence bar
5 units	Bolo/ Scythe	2 units	Steel Tamper
5 units	Raincoat	2 units	Rake

e. Distribution and Custody of Hand tools.

1. Each BMC shall be issued a set of hand tools by the LGU thru the Municipal Engineer. This hand tools shall be deposited to the Barangay Treasurer for custody after completion of the work.
2. After LGU acquires the hand tools, these will be distributed to the barangay Captains through the Municipal Engineer.
3. The Barangay Captain issues the hand tools to the BMC workers thru the BMC foreman with the corresponding receipts.
4. Any losses/damages will be deducted from the payment of the work or replaced and be subject to appropriate sanctions to be asgred upon by the barangay council.
5. No hand tools shall be offered or sold to the workers.

6. Hand tools should be exclusively for operation and maintenance purposes.

f. Materials

1. Materials for use shall be provided by the LGU either purchase from private haulers / contractors or by force account / administration using their own available equipments.
2. The barangay shall provide for fuel and oil for the equipments if done by force account.
3. Funding source for the purchase of fuel and oil shall be from the IRA or any other funding sources.
4. Materials to be used shall be of the same quality as the existing roadway.
5. The municipal engineer shall be responsible for the distribution of the materials in the project site.
6. Volume of materials delivered to the site shall be based on the program of works as prepared by the municipal engineer.

d. Methodologies for Income Generation:

Given the scarce/ limited funds of the barangay to finance the road maintenance activities, it is suggested that innovative ideas be pursued through|:

1. Influencing the municipal government for incorporating in the their yearly budget an allocation for the barangay maintenance program. In order to do this , the barangay should know the system of budgeting at the municipal level, the system of priorities, the present thrust of the budget, when the budget is prepared and making

representations with the municipal council for incorporation of their requirement during the budget deliberation .

2. As the participating municipalities belong to the 3rd and 4th class municipalities sometimes the funds may be too scarce for some accommodation that could be accorded the barangay. The barangay may solicit the assistance of the province or make representations with the congressman of their district for allocation under the Countrywide Development fund. (Congressman's pork barrel).
3. Setting up of a barangay initiated income generating activities such as the toll system.

Processes involve in the installation /setting up of a Toll System.

1. **Policy Statement;** Reason for the imposition of toll system
 - income generation for maintenance purposes
 - limited funds for the purpose
2. General Assembly : Discussion on the installation of the Toll System
 - What types of vehicle are to be taxed.
 - What dues may be imposed upon landowners
 - What are the goods to be taxed . For example. Pigs/cows /goats
 - what agricultural products are to be imposed fees
 - Schedule of fees

The minutes of the meeting should be properly recorded as this will become the basis on the promulgation of the requisite ordinances. The general assembly will serve as the public hearing conducted, which is a requirement on any taxation that may be imposed by the any local government unit.

3. Drafting of the proposed Ordinances;
 - Whereas Clauses. Statement of the reason for the toll system
 - As a barangay revenue tax measure
 - Schedule of fees
 - Sanctions/ penalty for non payment of the required fees

- Statement in the ordinance that revenues from fees shall be used exclusively for the maintenance of the road. Under a trust fund?
 - Approval of the ordinance by the barangay council subject to the confirmation of the concerned municipal government. Will this need approval from the Department of Finance?
4. Confirmation of the Ordinance by the municipal Council.
 5. Posting of the confirmed ordinance in the barangay bulletin Board for at least fifteen(15) days prior to implementation.
 6. Construction of Toll gates at strategic place and hiring of individual Collector under the barangay treasurer.
 7. Purchase of cash tickets from the municipal treasurer for issuance to road users imposed fees.
 8. Simple audit and Accounting procedures.
 9. Revenues generated deposited in a bank under trust account?