5. Manual for Preparation and Utilization of Maintenance Plan (Road)

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MANUAL FOR PREPARATION AND UTILIZATION OF MAINTENANCE PLAN (ROAD)

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MANUAL FOR PREPARATION AND UTILIZATION OF MAINTENANCE PLAN (ROAD)



This manual was developed in the framework of The Project for Capacity Development for Road and Bridge Maintenance Management in Madagascar.

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ACKNOWLEGDEMENT

Background :

The Manual for Preparation and Utilizing of Maintenance Plan (ROAD) (hereinafter referred to as “the Manual) was developed for standardizing in preparation of planning road maintenance plans and implementation of the maintenance plan for MTP and other related organization in road operation and maintenance. It shall be utilized when MTP prepares and implement the maintenance plan for their road network. It can also be referred to by other road operation and maintenance organizations when they need to. This manual is prepared in the Projet de Développement des Capacités de Gestion de l’Entretien des Routes et des Ponts (F3LTM) and approved by its Joint Coordination Committee.

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LIST OF ABBREVIATIONS

BMU	:	Bridge Maintenance Unit
BIP		Budget d'Investissement Publics (Public Investment Budget)
BOQ	:	Bill of Quantities
CBR	:	California Bearing Ratio
COA	:	Conseil d'Orientation et d'Administration (Administration and Orientation Committee)
CP	:	Convention du Programme (Convention of Program)
CT	:	Comité de Tutelle (Trustee Committee of FR)
DAO	:	Dossier D'Appel D'Offres (Tender Documents)
DAU	:	Direction des Appuis aux Urgences (Directorate of Emergency Support)
DEN	:	Direction des Etudes et des Normes (Directorate of Studies and Standards)
DER	:	Direction de l'Entretien Routier (Directorate of Road Maintenance)
DGTP	:	Directeur general des Travaux Publics (General Director of MTP)
DINFRA	:	Direction des Infrastructures (Directorate of Infrastructure)
DPSE	:	Direction de la Planification et du Suivi-Evaluation (Directorate of Planning and Monitoring-Evaluation)
DRIMS	:	Dynamic Response Intelligent Monitoring System
DRTP	:	Direction Régionale des Travaux Publics (Regional Directorate of Public Works)
F3LTM	:	Fampivoarana ny Fahaiza-mitantana amin'ny Fikojakojana ny Lalana sy ny Tetezana eto Madagasikara
FWD	:	Falling Weight Deflectometer
TOR	:	Terms of Reference
FR	:	Fonds Routier (Road Fund)
GPR	:	Ground Penetrating Radar
GR	:	Gestionnaire de Réseau Routier (Road Network Manager)
IRI	:	International Roughness Index
ISO	:	International Organization for Standardization
ITS	:	Intelligent Transportation Systems
JICA	:	Japan International Cooperation Agency

LCMS	:	Laser Crack Measurement System
LNTPB	:	Laboratoire National des Travaux Publics et du Bâtiment
MCI	:	Maintenance Condition Index
MTP	:	Ministère des Travaux Publics (Ministry of Public Works)
NDL	:	Non-Destructive Testing
NEF	:	Ministère de l'Economie et des Finances (Ministry of Economy and Finance)
PCI	:	Pavement Condition Index
PCM	:	Pairwise Comparison Method
PDCA	:	Plan, Do, Check, Acti
PEC	:	Programme d'Entretien Courant (Routine Maintenance Program)
PMS	:	Pavement Management System
PoP	:	Project of the Program (Projet du Programme: PdP)
PPP	:	Public-Private Partnership
PRMP	:	Personne Responsable des Marchés Publics (Responsible Person for Public Procurement)
RNM	:	Road Network Manager (Gestionnaire de Réseau Routier)
RNP	:	Route Nationale Primaire (Primary National Road)
RNS	:	Route Nationale Secondaire (Primary National Road)
RNT	:	Route Nationale Temporaire (Temporary National Road)
PRMP	:	Personne Responsable des Marchés Publics
SIA	:	Schema d'Itineraire et d'Amenagement (Route and Development Plan)
SOA		Service Operationnel des Activités (Operational Activities Service)
SN	:	Structural Number
TEA	:	Travaux d'Entretien Ameliorant (Improvement Maintenance Work)
TEC	:	Travaux d'Entretien Courant (Routine Maintenance Work)
TER	:	Travaux d'Entretien de Routine (Regular Maintenance Work)
TES	:	Travaux d'Entretien Spécialisé (Specialized Maintenance Work)
WG	:	Working Group

GLOSSARY OF TERMS

Annual Maintenance Plan	Annual maintenance plan is a implementation plan for MTP to execute in the following year. It is limited to the works which are defined in PEC.
Mid-long Term Maintenance Plan	Mid-long term maintenance plan is a set of annual maintenance plan for longer period. Mid is from 3 to 5 years and Long is more than 10 years usually.
Damage/Distress/ Defect	The terms, damage/distress, used as the collective term of the deterioration phenomenon of the road surface in the manual, including Cracks, Rutting, Pothole, etc.
Repair	Repair is limited to the countermeasure to fix the damage/distress directly and individually, such as patching, sealing, etc.
Diagnosis	Diagnosis of road surface damages involves assessing distress types, severity, and causes to determine maintenance needs and ensure safe, durable pavement.
Evaluation	Evaluation is the systematic assessment of road surface conditions, including distress, roughness, skid resistance, and structural integrity, with the output indicating the overall condition level to guide maintenance and rehabilitation planning.
Rehabilitation	Rehabilitation is types of improvement works of road surface which covers the entire area of the section. It is mostly overlay and repavement in this manual. It should include repavement with base coarse/subbase improvement works as well.
Scenario	Scenario is defined as the group of the maintenance strategies by road category which are executed simultaneously for all the road categories.
Maintenance Policy	Maintenance policy for road surface defines strategies, schedules, and resources to preserve pavement quality, ensuring safety, durability, and cost-effectiveness. It is set to the entire road network which the road management organization manages
Target Level	Target level is the level which the road management organization sets for the road by the category, It describes the optimal conditions of the routes by the road category.
Longlist	Longlist refers to an initial, broad list of potential options, ideas, or solutions, which are later refined through evaluation to create a shortlist. The longlist consists of sections which requires the repair/rehabilitation works with types of works, quantity, and cost, generally
Shortlist	Shortlist refers to a refined selection of the most viable or suitable options from a longlist, narrowed down for further consideration or decision-making. The shortlist consists of sections with high priority in longlist.
Periodic Inspection	This inspection is an inspection activity which is executed periodically in a certain period, such as once a year, 3 years, or 5 years, etc. MTP regulates that the inspection for the routine maintenance works shall be executed once every year.
Prioritization	Prioritization is executed to the sections in the longlist with various criteria. The output is the list of sections which are reordered with the result of prioritization. This list is the base of shortlist, and with the boundary it will be a shortlist.
Left Behind Sections	Left behind section is defined as the sections which requires a certain kind of repair/rehabilitation works but are not able to implement due to constraints, such as lack of budget etc.
Patrol	It is done more frequently than periodic inspection to secure the safety of the road. If the damage/distress/defect which can harm the road users etc., countermeasure shall be executed immediately.

Road management organization	Road management organization is the organization which operates the maintenance proactively. MTP is the organization in this manual.
Management Level	Management level is defined as the limit of the road surface condition level when the maintenance work is going to be executed.
Road Category	Road category classifies roads based on usage, importance, traffic volume, and function, It is defined as 5 categories in this project
Management Strategy	Management strategy is the actions to take when the road section requires repair/rehabilitation works. The most basic strategy is to perfume Routine maintenance.
Aggregation	Aggregation is a step of "multi-criteria analysis". It sums up the weighted scores for each criterion to derive an overall score for each alternative.

1 INTRODUCTION

1.1 General

1.1.1 Background

The Ministère des Travaux Publics (MTP) has periodically operationalized a road inspection for the planning and budgeting of road maintenance. Data on road inventory and road condition is collected by the inspection, and necessary road repair works are proposed based on the results of the inspection. The results of the inspection are stored in the database system on road and bridge management. The data is then used to determine the average condition of each homogenous road section or subsection in the network.

1.1.2 Purpose

The objectives of the Manual are as follows.

- To provide a uniform basis and guidelines for the planning of repair works corresponding to road deteriorations of paved road based on the road inventory and condition survey. (It presents the most common ratable distresses found on road surfaces and appurtenances in Madagascar.)
- To provide technical key considerations for specific sites such as a road with sharp curves and steep gradient, longitudinal sag section, and etc.
- To provide outline of an efficient road maintenance practice, Preventive Maintenance.

1.1.3 Scope

This manual covers the aspects in various phases of planning the maintenance plan, not only the planning the annual maintenance plan, but also precondition setting of maintenance plan, requesting and allocating the budget, preparing the mid/long term maintenance plan.

The manual addresses to prepare the maintenance plan of the national highways which are operated and managed by MTP, which are primary, secondary, and tertiary national highways. The main target routes of this manual are RNP1 and RNP2 which are the target routes of F3LTM.

1.1.4 Target

This manual targets to improve the level of preparing pavement maintenance manual both annual and for longer term of the engineers of MTP to improve the pavement condition of the road network which they manage. It will reduce the maintenance/repair cost of the pavement as well as improve the efficiency of the transportation of the vehicles. It contributes to enhance the regional economy by making the average speed faster, reducing the damage of loaded goods and securing the road safety for the road users.

It also targets to apply and establish the Road Asset Management in the national highway network in Madagascar with higher quality of road conditions in the future.

1.1.5 Application

This manual is prepared for the engineers, officials, consultants, and other related personnel so that these individuals would be able to prepare the maintenance plan from the results of the inspection/diagnosis/evaluation. It also helps them to understand and utilize the maintenance plan which are prepared, approved and implemented to improve the road surface conditions of the National Highway Network in Madagascar with efficiency and effectivity.

1.1.6 Structure

Chapter 2 explains the current conditions and issues of the road repair works and planning procedure of preparing the maintenance plan. Two different procedures are separately described, the first is for the routine maintenance program, such as PEC (Programme D'entretien Courant) and the other is for the rehabilitation projects.

Chapter 3 explains the concept of road asset maintenance and its maintenance cycle.

Chapter 4 describes what and how to do in setting the precondition of maintenance plans.

Chapter 5 explains the details of general procedure of planning annual maintenance plan

Chapter 6, 7 and 8 demonstrate the procedure of preparing the maintenance plan of three road categories, such as primary, secondary and temporary based on the inspection results of the road network.

Chapter 9 instructs how to utilize the annual maintenance plan which is prepared by MTP. It includes budget requesting, budget allocation, finalization of annual maintenance plan, implementation of the maintenance works, and reference to the maintenance plan of the following years.

Chapter 10 demonstrate the procedure of preparing the mid-long maintenance plan with different scenarios.

Chapter 11 instructs how to utilize the mid-long term maintenance plan with the procedure of Chapter 10.

Chapter 12 describes remaining issues and future challenges after this project, F3LTM is completed.

2 CURRENT CONDITION AND ISSUES

2.1 General

There are two budget forming procedure in road maintenance by MTP in Madagascar. The first is called PEC (Programme D'Entretien Courant) which means routine maintenance programme. This is equivalent to Annual Maintenance Plan, and it is prepared every year for the entire road network which are managed by MTP. The other is the procedure to plan the rehabilitation projects which cannot be treated by PEC, such as repavement of the existing asphalt pavement including the improvement of the base course/sub-base. The following subchapters describe the findings of planning procedure of both budgets and projects. The description in this subchapter is based on the discussion in WG5 in the F3LTM from 2022 to 2023.

2.2 Current Road Classification and Repair Works in Madagascar

(1) Road Classification in Madagascar

Roads in Madagascar are broadly classified into the three categories presented in Table 2-1, based on Ordinance 2019-001 relating to road heritage and Decree No. 2020-1355 classifying National Roads and Decree No. 2020-1356 classifying Regional Roads.

Table 2-1 Road Classification and Length in Madagascar

Road Class		Length (km)
National Road	Primary	2,564
	Secondary	4,813
	Tertiary	4,532
State Road		22,137
Municipal Road		7,500
Total		***41,546***

Source: MTP

(2) Road Repair Works in Madagascar

Road maintenance works in Madagascar are defined in "Dossier D'Appel D'Offres" (hereinafter referred to as "DAO") as shown in Table 2-2. Definitions of the road maintenance works are as follows.

Table 2-2 Road Maintenance Works in Madagascar

Road Maintenance Work	Type of Work	Paved Road	Unpaved Road
A) Regular Maintenance (TER)	1) Cantonnage	✓	✓
	2) Levelling and Small Emergency Works	✓	✓
	3) Mechanized Maintenance		✓
B) Improvement Maintenance (TEA)	4) Earth Works		✓
	5) Other Structure Works	✓	✓
	6) Carriageway Works	✓	✓
C) Specialized Maintenance (TES)	7) Bridge Maintenance	✓	✓
	8) Surface Treatment on Paved Road	✓	
	9) Ferry Boat	✓	✓

Source: Prepared by JICA Expert Team based on "Dossier D'Appel D'Offres Ouvert (DAO)"

1) Regular Maintenance (TER)

The routine maintenance mainly consists of 1) Cantonnage for carriageway, off-carriageway, drainage and related works, 2) levelling and small emergency works and 3) mechanized maintenance.

Cantonnage includes filling of potholes for unpaved roads, recovery and overlaying of gullies with a depth of less than 30cm for unpaved roads, limited overlaying of the part of the shoulder, pruning, clearing and mowing of the roadside, removal of deposits and various debris, clearing of ditches, and etc. Levelling and small emergency works, and mechanized maintenance include as part of the preliminary restauration during the maintenance phase such as removal of debris due to landslides with a volume greater than $5m^3$ that disrupt the circulation or drainage flow, removal of tree trunks with a diameter greater than 25cm that have fallen across the roadway, backfill gullies on pavements with a depth greater than 30cm for unpaved roads, and etc.

2) Improvement Maintenance (TEA)

The objective of the improvement maintenance is to gradually rehabilitate sections of unpaved or paved roads, related road structures. The improvement maintenance consists of earth works, related road structure works, and carriageway works.

Earth works include embankment and cut works, installation of geotextile, grassing of embankment, and etc. Related road structure works include demolition of existing road structures such as masonry wall, concrete structures, gabions, construction of masonry wall, concrete ditches, box culverts, and etc., backfilling of structures, installation of drainage ditches, and etc. Carriageway works are divided into 2 types, for unpaved road and paved road. For unpaved road, including construction of wearing course with selected materials, soil treatment on site with stabilizing products and stonework, macadam and paving. For paved road, construction of shoulder, leveling and resurfacing of shoulder, grassing of the shoulder, construction of basecourse and pavement, application of cold mix, installation of curbs, road marking and sign boards, and etc.

3) Specialized Maintenance (TES)

The specialized maintenance consists of bridge maintenance, surface treatment on paved road and ferry/canoes.

Bridge maintenance includes repair or replacement of wooden parts and metal parts, repair of railing, accessories, and etc. Surface treatment on paved road includes pothole patching, sealing of tiled areas, crack sealing, surface dressing, and etc. Ferry/canoes includes repair of various metal parts, rehabilitation of seals and stern tube, repainting, and etc.

2.3 Formulation of PEC (Programme D'Entretien Courant: Routine Maintenance Program)

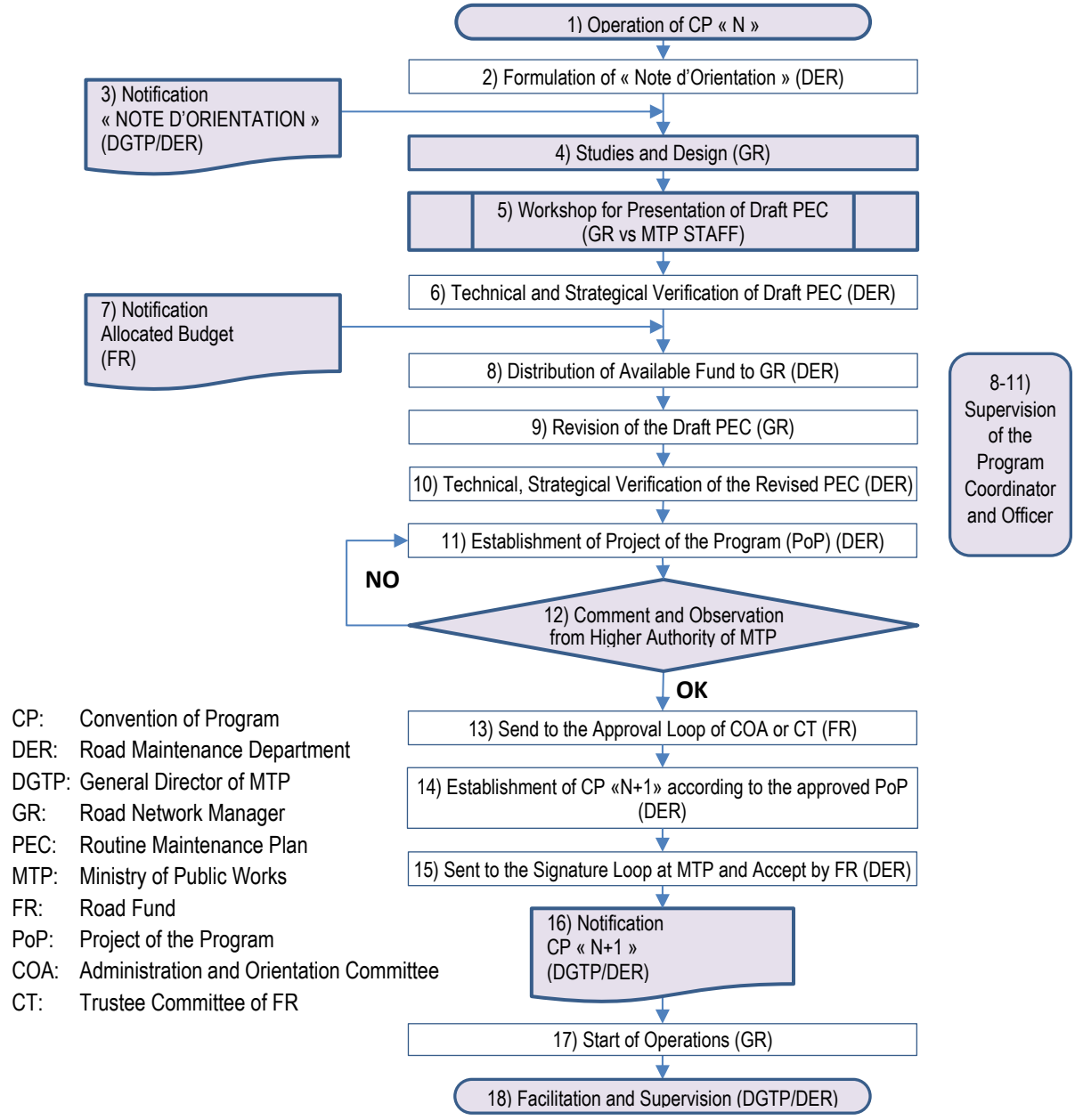
Most of the maintenance activities are, or supposed to be, under this budget. It covers DOA (Dossier D'Appel D'Offres) and it plans to execute three types of repair works, such as TER, TEA, and TES. The plan is prepared based on the results of field inspection which has the damage data of the road surface including the pavement. The inspection is done by DRTP (Direction Régionale des Travaux Publics) and results are prepared by GR (Gestionnaire de Réseau). This maintenance plan has the basis of the contents of the maintenance plan of the following year. It is prepared by following Note D'orientation (pour l'élaboration du programme d'entretien courant des routes nationales) which is published by MTP every year.

PEC includes routine maintenance works, and it doesn't include rehabilitation works, mainly overlay, and repavement, also base stabilization.

2.3.1 Current Condition

(1) Procedure of Preparation

Figure 2-1 shows the flowchart of formulating PEC of the following year.



Source: F3LTM

Figure 2-1 Flowchart of Formulation of PEC (Routine Maintenance Plan)

The followings are the explanation of the steps in the flowchart.

1) Operation of CP « N »

Here, the CP (Convention of Program) is operated to repair the road network which was decided by PEC of Year « N ». CP is the contract between MTP and FR to execute the budget. The executers are DER, and Reginal Offices of MTP, and FR.

2) Formulation of « Note d'Orientation »

DER of MTP prepares the « Note d'Orientation » based on the « Note d'Orientation » of the previous year. This document will be the justification of MTP and other organizations to perform the series activities to prepare the PEC.

3) Notification « NOTE D'ORIENTATION »

NOTE D'ORIENTATION is issued by General Director of MTP based on the draft version which is prepared in the step 2). Staff of related organizations justifies to start the series of the activities to prepare the PEC. The first activity is the road surface condition survey and prepare the SIAs by regional offices of MTP.

4) Studies and Design

Staff of each regional office start the visual inspection of the road network which they manage. They prepare the SIAs based on the results of the inspection. The GR of each regional office is responsible for this activity.

Ones the SIAs of each regional office is prepared, the GRs plan the draft PEC based on the SIAs. Draft PEC includes location, kinds of repair works, and quantity of works. It excludes the sections which are heavily damaged because these sections are to be rehabilitated.

5) Workshop for Presentation of Draft PEC

GRs of all regional offices submit the draft SIA to MTP headquarters. All of them have an opportunity to explain the draft PEC to the MTP and GRs of other reginal offices. MTP staff and GRs gather and execute a workshop so that MTP staff can verify the draft PEC technically, strategically.

6) Technical and Strategical Verification of Draft PEC

DER verify (revise, modify, and approve) the draft PECs presented in 5) by all the GRs technically and strategically. These PECs are based on the SIAs, which means it is based on the inspection results. Each draft PEC follows the maintenance objectives and strategy which are set by the GRs. Any budget constraints are not considered. This indicates that the draft PEC is the required maintenance plan to do all necessary routine maintenance work.

7) Notification Allocated Budget

FR announces the budget amount for the road maintenance (limited to routine maintenance work) for following year.

8) Distribution of Available Fund to GR

DER allocates the maintenance budget to all the reginal offices. The amounts are basically calculated by the ratio of the national highways of the region to the total length of the national highway network. The region's economy, traffic, higher development plan, importance of the routes are also taken into account. However, many stakeholders request to increase the budget of related regions and is adjusted accordingly.

The allocated amount is notified to GRs of all the reginal offices. This amount will be the sealing amount of the maintenance budget of the regions of the following year.

9) Revision of the Draft PEC

All GRs revise their draft PEC which are approved in 6) considering the allocated budget amount in 8). Most of the time the budget is much less than the amount required to execute the draft PEC,

therefore, actual work for them is to reduce the amount of the works to fit the budget into the allocated amount. GRs submit revised PEC to MTP headquarters.

10) Technical and Strategical Verification of the Revised PEC

DER verify (revise, modify, and approve) the revised PECs submitted in 9) by all the GRs technically and strategically. It is done by reviewing the revised PEC and attached report.

11) Establishment of Project of the Program (PoP)

DER establishes Project of the Program. Project of the Program includes the maintenance plan of all the regions of the following year. It is done by compiling the all the approved PECs in 10) with adjustment and modification.

12) Comment and Observation from Higher Authority of MTP

PoP is circulated among the related departments in MTP. Most of the times, the coordination process becomes very complicated and consumes long time. Final approval is done by the minster.

13) Send to the Approval Loop of COA and CT

MTP send PoP to COA and CT for approval. COA receives and approves first and CT follows next. The program is approved by COA and the budget by CT at last.

14) Establishment of CP « N+1 » according to the approved PoP

DER establishes CP of year « N+1 » (following year) from the approved PoP in 13). The maintenance work programme of the following year is finalised in this step.

15) Sent to the Signature Loop at MTP and Accept by FR

CP established in 14) is signed by the minster and the related departments.

16) Notification CP « N+1 »

General Director of MTP notifies CP of year « N+1 » (following year)

17) Start of Operations

Approved and notified CP is commenced in all regions by its GR.

18) Facilitation and Supervision

Facilitation and supervision are executed by DER.

(2) Annual Timeline of the Procedure

Annual Timeline Formulation of PEC (Routine Maintenance Plan) is shown in the following page as Figure 2-2. Explanation of each step is demonstrated below. The number of the explanation refers to the number in the Figure 2-1.

3) Note d'orientation

It is scheduled that NOTE D'ORIENTATION is issued by General Director of MTP. However, it is usually delayed for up to few months. The delay effects to the road inspection period. It is very usual that road inspections are executed in rush,

4) Road Inspection (Creation of SIA)

After the notification of "Note d'orientation" is done, all the regional offices start executing the road inspection and prepare the SIA for the national highways in their region under the GRs management.

Draft PEC of each regional office is prepared based on the SIA and submitted to the DER, MTP.

The period of this work is scheduled from August to October. The period is shortened if the notification of "Note d'orientation" is delayed.

5), 6), 8)-11) Projet de Programme de Travaux d'Entretien Courant des Routes Nationals Deleguees

Verification process of draft PEC is done by DER, based on the submitted report explaining the draft PEC. GRs has an opportunity to present the draft PEC. This verified PEC is the needs of repair of the national highway without budget constraint.

It is scheduled that the allocated budget to road maintenance, routine maintenance works, is announced in end of October. DER, MTP allocates the budget by regional offices. These amount are the sealing of the maintenance budget of each office. All the GRs of the regional offices adjust their draft PEC with the allocated budget as a budget constraint. GRs re-submit the revised PEC to DER, MTP after the adjustment, and DER, MTP verify and approves the adjusted PEC.

All the approved adjusted PEC is compiled as PoP (Project of the Programme), [Programme de Travaux d'Entretien Courant, *Routine Maintenance Work Programme*].

7) Budget amount from FR

The schedule for FR to announce the allocated budget including the budget for the road maintenance is end of October. However, it is usually delayed to the end of November. Therefore, it is usual that the adjusting work period for PEC with budget constraints is very short.

12) PEC

PoP is verified and the amount of the budget needs to be approved finally within December.

13) Approval of COA (FR) and CT (MEF/MTP)

PoP is submitted to COA and CT in January for approval. COA approves the program and it is usually done fairly quick. CT approves the budget, and it takes quite of time for the final approval. This procedure normally takes till end of April. However, there are countermeasure to this issue by enabling the draft budget for quick commencement.

14)-16) CP (PEC)

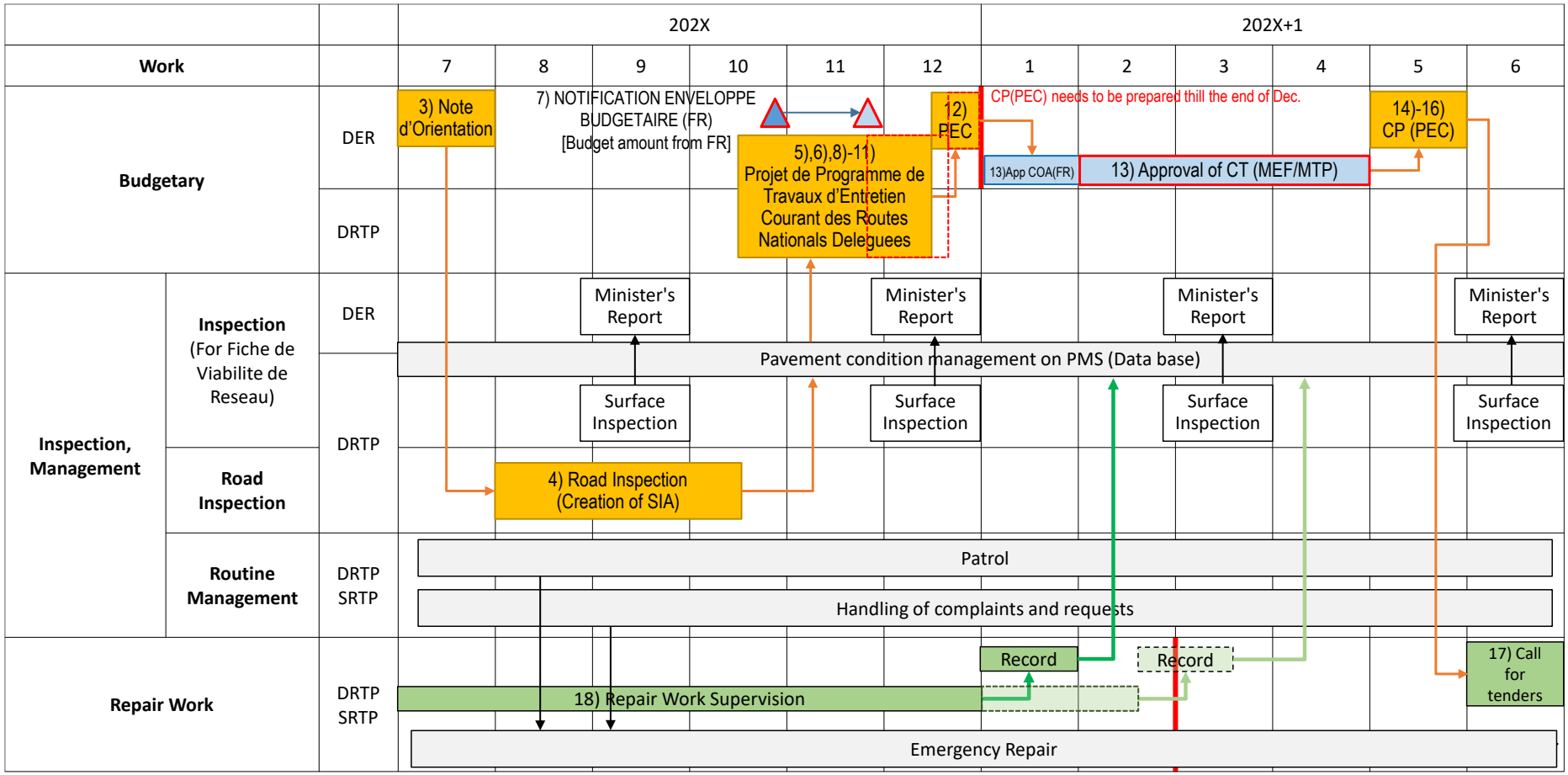
New CP (PEC) of the following year is finalized in MTP and notified by General Director of MTP. It is done in the following month after the approval by CT and COA is done. It is usually in May every year.

17) Call for tenders

PEC is executed in all the regions after the notification by the General Director of MTP. Regional offices call for tenders and select the contractor to conduct the works.

18) Repair Work Supervision

Regional offices supervise the repair works during the execution of PEC to secure the quality of the works.



Source: F3LTM

Figure 2-2 Annual Time Schedule of Formulation of PEC (Routine Maintenance Plan)

2.3.2 Issues

There are remarkable issues in the procedure of preparing PEC of the following year as follows,

- There is not practical policy or strategy to follow for the GRs of the regional offices when they prepare the draft PEC based on the inspection result. It results to the different level of road surface after the completion of PEC. [Step 4)]
- There is not a specific updated manual to guide the inspectors on defects/distress on the pavement/road surface. It is resolved by the manual which is prepared in the F3LTM.
- It does not demonstrate the level after the completion of PEC. Therefore, DER, MTP cannot predict the road surface condition not only after the completion of PEC but also several years later. It should be demonstrated quantitively so that DER, MTP can predict the progress of the maintenance activities.
- The target maintenance level of the routes is not defined due to the lack of maintenance policy and strategy. This target level can lead GRs in same direction in preparing the draft PEC.
- The biggest issue is that DER, MTP does not have a method to foresee what their maintenance activities will produce. They would not know even if they were planning the repair works which worsen the road network conditions. They would not know the quantity of works/cost/period which needs to be added to improve the road network conditions.
- There is not a system to reflect DER's maintenance policy to the draft PEC which is prepared by regional offices.

2.4 Planning Procedure of Rehabilitation Projects

2.4.1 Current Condition

Rehabilitation and Repavement works are planned in other procedure than the one of PEC. This procedure is shown in Figure 2-3. Figure 2-3 is not only the flowchart but also the timeline of the procedure. The explanation of each step is as follows,

1) Road Inspection (Creation of SIA)

Regional offices conduct road inspection according to the Note D'orientation. This procedure is same with the planning procedure of preparing PEC which is explained in the previous subchapter 2.3.1.

2) Proposal of Rehabilitation Projects (RNM, DRTP)

Select the sections with severe defects/distress as the sections which requires rehabilitation or repavement works. The basic criteria are as follows,

- Defects/distress of the wearing course are evaluated as defects/distress which must be repaired under the PEC program.
- Defects/distress in the binder course or deeper layers are considered as defects/distress requiring rehabilitation works. The judgment is carried out by the GRs of the regional offices .

Roads requiring an intervention will be submitted to the DGTP, which Directorate refers the projects to the relevant technical departments for studies, planning, programming and sends a notice of conformity.

3) Longlist (DPSE)

From the outset, it should be recalled that the DPSE's missions are to

(i) develop and program the entire budget for the various programs under the Ministry
(ii) develop and consolidate the Annual Work Program
(iii) develop the various reports required within the framework of budget execution
(iv) ensure the monitoring and evaluation of the programs under the Ministry

The list of projects from the Technical Directorates are sent to the DPSE with the respective project sheets, following the format issued by the Ministry of Economy and Finance, in view of the request for compliance with the Planning Directorate at the MEF level. Once compliance has been obtained, the DPSE proceeds with the Technical Team to multi-criteria prioritization and following the prioritization at the highest level of the projects in order to present it to the Council of Ministers for Budgeting (Finance Law). The technical studies are carried out by the Directorate concerned in accordance with the standards in force. The DPSE does not modify the technical dimensions of the projects in any way. On the other hand, the DPSE ensures the amount and programming of the work likely to be carried out during the year. Multi-year programming is necessary in the event that the work overlaps two or more financial years

4) Budgeting Conference (MEF)

MEF organizes budgeting conference among all ministries and fix the draft budget for the following year. It is usually held in September.

5) Draft Financial Law (MEF)

The result of 4) Budgeting Conference is compiled as Draft Financial Law and submitted to Parliament’s deliberations.

6) Approval (Parliament)

Parliament finalizes and approves the Financial Law through deliberations. This must be done within the end of year. The budget is usually reduced considerably.

7) Budgeting Allocation, Shortlisting (DPSE)

The budget approved by Parliament is allocated to each ministry, including the MTP. MTP’s budget is divided by SOA (Service Operationnel des Activités), usually directorates or projects.

Projects are grouped in a program, generally identified during the preparation of the finance law. Projects approved by the Council of Ministers are included in the finance law and executed as soon as the budget execution circular is issued. As the State Budget is always insufficient, the Ministry prepares a program agreement with the Road Fund for the execution of scheduled works not covered by the BIP (Budget d’Investissement Publics).

Approved budget by Parliament is allocated to each ministry including MTP. The budget of MTP is divided into Directions or Projects. The approved rehabilitation project is shortlisted with other projects which will be implemented within the fiscal year. Budget for emergency repair projects is also included in this allocated budget.

8) Call for tenders (PRMP)

The Personne Responsable des Marchés Publics calls for tender for the rehabilitation projects which is shortlisted in 7).

9) Rehabilitation Work Management and Supervision (DINFRA, DRTP)

The rehabilitation projects of 8) are managed by DINFRA and supervised by regional offices.

10) Emergency Budget (DPSE)

The Finance Act provides for an "Emergency Works" envelope which includes the various emergency works relating to the restoration of traffic and the prevention of limiting the damage caused by climate change and natural disasters. In the event that the budget is insufficient, the shift of the projects in question could be made to other sources of financing.

11) Financing Road Projects

The search for fund for investment projects is the responsibility of the sectoral Ministry and the Ministry of Finance. The fund obtained is subject to ratification by parliaments before inclusion in the State budget. The financing agreement defines the activities to be carried out.

In the event that the budget allocated is insufficient, the Ministry prepares a letter of support, to be decided by the Council of Ministers, in order to mobilize the resources available from other sources of financing (Road Fund, MEF, etc.).

12) Emergency Repair (PRMP, DINFRA)

If the emergency budget is allocated to certain projects, these project will be tendered by the call by PRMP and managed by DIFRA or DAU during the implementation.

13) Negotiation and Preparation of related Documents (Projects which are funded by Donors) (DINFRA)

If an overseas donor, such as WB (World Bank), JICA, and etc., has an interest on funding to the rehabilitation listed in the longlist in 3), separate procedure is applied. DINFRA is the window of the negotiation process of these rehabilitation projects with donors.

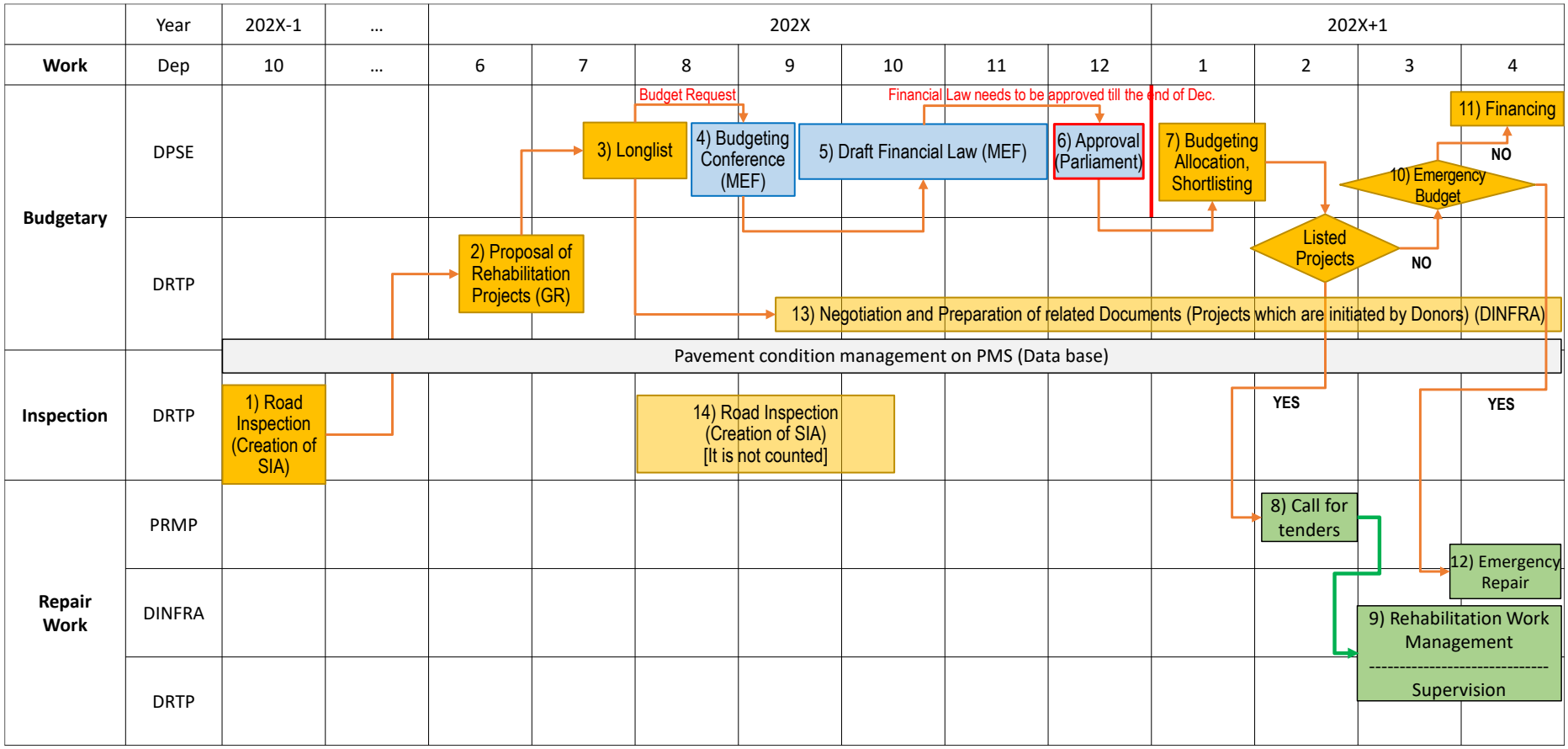
14) Road Inspection (Creation of SIA) (RNM, DRTP)

Road inspection of the following year which follows the road inspection of the previous year in 1) is executed during the budgeting procedure. This indicates that the heavily deteriorated sections which require rehabilitation are left without significant treatment. There should be other flow of executing rehabilitation project with quick response.

2.4.2 Issues

There are remarkable issues in the planning procedure of rehabilitation projects as follows,

- There is not practical policy or strategy to follow for the GRs of the regional offices for selecting the sections which require rehabilitation works. It would leave some section with severe conditions outside of the longlist and allows the continuous deterioration.
- It takes more than 1 year and a half to execute the rehabilitation projects after the execution of the inspection. It allows the defects/distress to deteriorate considerably during the period from the inspection to the rehabilitation project's commencement. It can cause lack in BOQ (Bill of Quantities) of rehabilitation project. Contingency cost shall be considered in preparing the tender of these projects.
- Rehabilitation project is highly dependent on overseas donor's fund. Specific revenue for road maintenance shall be utilized more for road rehabilitation projects.



Source: F3LTM

Figure 2-3 Annual Time Schedule of Formulation of Rehabilitation Projects

3 ROAD ASSET MANAGEMENT AND MAINTENANCE CYCLE

3.1 Road Asset Management

3.1.1 Asset Management

Asset management refers to the systematic process of developing, operating, maintaining, upgrading, and disposing of assets in the most cost-effective manner (including all costs, risks, and performance attributes). It is a coordinated activity of an organization to realize value from assets, which can include both tangible assets (like property, buildings, equipment) and intangible assets (like intellectual property, goodwill, financial assets).

There is ISO 55000 series which defines a framework for the management of assets. The ISO 55000 series consist of three main standards:

(1) ISO 55000:2014 - Overview, Principles and Terminology:

- This standard provides an overview of asset management, its principles, and terminology. It helps organizations understand the fundamentals of asset management and its benefits.

(2) ISO 55001:2014 - Management Systems - Requirements:

- This standard specifies the requirements for an asset management system within the context of the organization. It provides a framework for establishing, implementing, maintaining, and improving an asset management system.

(3) ISO 55002:2018 - Management Systems - Guidelines for the Application of ISO 55001:

- This standard offers guidelines for the application of ISO 55001, providing more detailed advice on implementing an asset management system in accordance with ISO 55001.

These standards are designed to help organizations manage their assets effectively, ensuring that they can achieve their objectives and derive maximum value from their assets.

3.1.2 Road Asset Management

"Road Asset Management" refers to a systematic process for managing road infrastructure assets efficiently and effectively throughout their lifecycle. This includes planning, acquisition, operation, maintenance, rehabilitation, and disposal of road assets to optimize their performance, extend their useful life, and ensure safety and sustainability.

Key components of Road Asset Management include:

(1) Inventory and Assessment:

- Identifying and documenting all road assets, such as pavements, bridges, signs, and drainage systems, and assessing their current condition.

(2) Lifecycle Management:

- Planning and implementing maintenance, rehabilitation, and replacement activities to ensure road assets meet performance and safety standards over their entire lifecycle.

(3) Performance Monitoring:

- Continuously monitoring the performance of road assets using metrics like ride quality, structural integrity, and traffic safety to identify issues and prioritize interventions.

(4) Data Management:

- Collecting, storing, and analyzing data on road assets to support decision-making and resource allocation.

(5) Risk Management:

- Identifying and mitigating risks associated with road asset failure, such as accidents, natural disasters, and economic impacts.

(6) Financial Planning:

- Allocating financial resources efficiently to maintain and improve road assets, considering budget constraints and long-term cost-effectiveness.

Effective road asset management helps maintain safe, reliable, and sustainable road networks, ultimately enhancing mobility, economic growth, and quality of life.

3.1.3 Road Assets

Road assets refer to the various components that make up the road infrastructure. These assets are critical for the safe and efficient operation of road networks. Key road assets include:

(1) Pavements:

- The surface layers of roads, including asphalt, concrete, and other materials that provide a smooth and durable driving surface.

(2) Embankment

- Embankment is a raised earthen or rock structure supporting a roadway, providing stability, drainage, and protection against erosion and flooding. It consists of base course, subbase course, subgrade. It lay on top of the natural ground which are also called subgrade (natural).

(3) Bridges and Culverts:

- Structures that allow roads to cross over obstacles such as rivers, valleys, and other roads, as well as small channels for water drainage under the road.

(4) Tunnels:

- Underground or underwater passages that allow roads to pass through mountains, under rivers, or through urban areas.

(5) Slopes:

- Slopes include both natural and constructed inclines and declines along roadways, which need to be managed to ensure the stability and safety of the road infrastructure.

(6) Drainage Systems:

- Infrastructure that manages water runoff, including gutters, ditches, storm drains, and culverts, to prevent flooding and water damage to the road.

(7) Road Facilities:

- Road facilities include, Roadway Lighting, Traffic Signals and Signs, Guardrails and Barriers, Sidewalks and Pedestrian Crossings, Road Markings, Rest Areas and Service Areas, Roadside

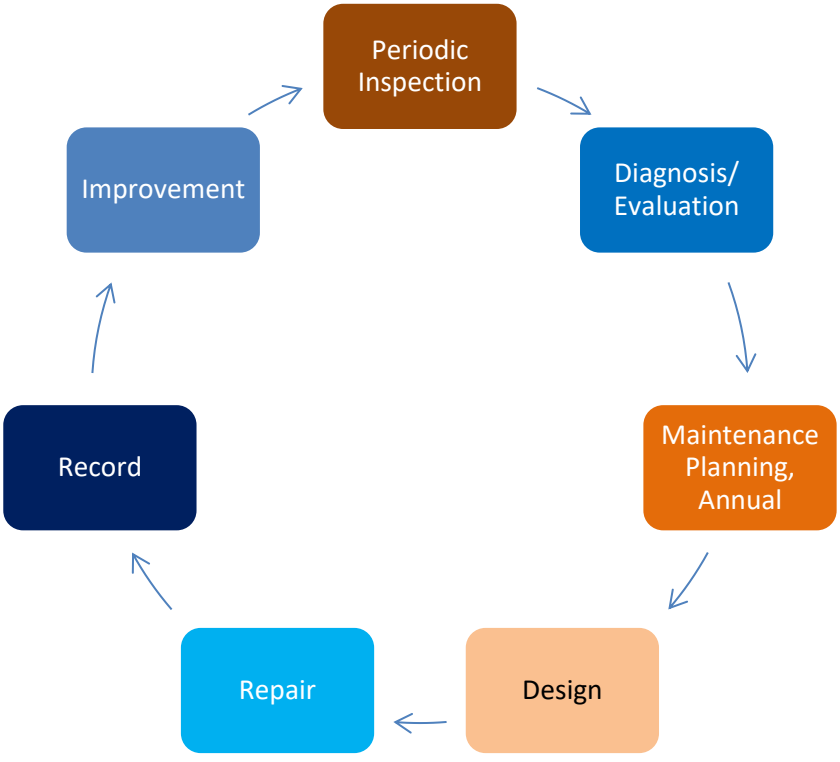
Vegetation, Pavement Markings and Reflectors, Intelligent Transportation Systems (ITS), and etc.

3.2 Maintenance Cycle of Pavement (based on periodic inspection)

The maintenance cycle of pavement based on periodic inspection consists of the following procedure, Periodic Inspection, Diagnosis/Evaluation, Planning (Annual Maintenance Plan), Design, Repair, and Record. There is brief description of each step in the following subchapters.

The cycle is usually nearly 2 years including the execution period of maintenance works. It starts in June of year 1 and ends March/April of year 3 (See Figure 2-2). The preparation is in the first year and the execution is in the second year. It means that the maintenance work does not start for a quite long period after the defects/distress are recognized in the periodic inspection. This time gap ranges from 8 months to 18 months. It depends on the timing of inspection and execution of maintenance works and also the period of budgeting process. If the sections with defects/distress is not included in the maintenance plan of the following year, the timing of the execution of the maintenance works will be delayed accordingly.

It is important to keep in mind that there is time gap between the timing of defects/distress recognition and the timing of the execution of the maintenance works. A lot of defects/distress which are found in the periodic inspection keeps on deteriorating during the time gap period. The difference between the defects/distress conditions shall be investigated before the execution of the maintenance works.



Source: F3LTM

Figure 3-1 Maintenance Cycle of Pavement (based on periodic inspection)

3.2.1 Periodic Inspection

Pavement inspection involves assessing the condition of pavement surfaces to ensure safety, longevity, and cost-effectiveness. This process includes visual inspections to identify cracks, potholes, drainage issues, and surface texture, as well as non-destructive testing (NDL) methods like Falling Weight Deflectometer (FWD) to measure load response, Ground Penetrating Radar (GPR) to image subsurface

conditions, and laser scanning for surface profiles, if needed. Destructive testing, such as core sampling, analyses pavement layers. These NDL methods are not always necessary, but it can be done if necessary. The results of these inspections are used to calculate Pavement Condition Index (PCI), Structural Number (SN), and help determine overall condition and structural capacity. It also gives an index of surface smoothness as International Roughness Index (IRI).

The steps in pavement inspection include planning the objectives and methods, conducting field surveys and tests, analysing data to determine condition indices, compiling findings and recommendations into a report. This regular inspection process is crucial for maintaining road safety, extending pavement life, ensuring cost-effectiveness, and maintaining optimal performance.

The details of the routine maintenance works are explained in detail in the "Manual on Road Inspection and Diagnosis" by F3TLM for reference.

3.2.2 Diagnosis and Evaluation

The diagnosis of pavement distress involves a detailed analysis of collected data to understand the condition and underlying issues of the pavement. This process starts with reviewing visual inspection data, where surface distresses such as cracks, potholes, rutting, ravelling are documented.

Non-destructive testing methods, like the Falling Weight Deflectometer (FWD) and Ground Penetrating Radar (GPR), provide insights into subsurface conditions and structural integrity. Destructive testing, such as core sampling, further reveals material properties and layer composition.

Identifying the types and severity of distresses is crucial. Distresses are classified and their severity (low, medium, high, for instance) and extent (localized, widespread) are assessed. Causes of distresses are then analysed, considering factors such as inadequate structural support, environmental impacts like bad drainage, and over-weighted traffic loads of heavy vehicles and overall traffic volume.

The condition of the pavement is quantified using the Pavement Condition Index (PCI), which provides a numerical rating of its overall state, and the International Roughness Index (IRI), which measures surface smoothness and ride quality.

Based on the diagnosis results, the condition of pavement is evaluated using the index(ces) which represent(s) the road conditions, such as PCI, and/or IRI, for instance. In F3LTM, it is concluded to use the following criteria by IRI to evaluate the road conditions of the sections.

Table 3-1 Evaluation Criteria of Road Surface Condition

LEVEL	Description	IRI
A	Good	0.0 – 3.0
B	Fair	3.0 – 5.0
C	Bad	5.0 – 10.0
D	Very Bad	More than 10.0

Source: "Manual on Road Inspection and Diagnosis, F3LTM"

The details of the routine maintenance works are explained in detail in the "Manual on Road Inspection and Diagnosis" by F3TLM for reference.

3.2.3 Maintenance Planning (Annual)

Pavement maintenance planning involves creating a maintenance policy and strategies of approaching how to deal with the distress found in the inspection. Maintenance policy and strategies shall also include to ensure road safety, extend pavement life, and optimize costs. It is practical to set the maintenance strategy by the level of the road surface defined in the Table 3-1.

After the maintenance strategy is set, the road network management organization can select the sections which require the treatment to the deflects/distress. The treatments to the defects/distress are routine maintenance, such as sealing the cracks, periodic maintenance, surface dressing, rehabilitation, overlay, and repavement. The sections are planned to execute one of these treatment above according to the maintenance strategy. These sections shall be compiled to the longlist of pavement repair/rehabilitation.

However, it is possible that there are many sections which require same treatment in the longlist. These sections shall be compared to prioritize the more important sections to realize the execution despite multiple constraints. The prioritization process requires the criteria to evaluate and compare the sections. One of the methods to evaluate the sections is Multi-Criteria Analysis Method which has multiple criteria to evaluate. Multi-Criteria Analysis Method can quantify the evaluation results with weighted value of the evaluation results by each criterion. Road network management organization now can prepare the shortlist of the repair/rehabilitation projects, and this is the draft implementation plan of the maintenance plan.

To execute the prioritization process, the implementation cost of each section of the longlist shall be roughly calculated, so that it can also be used in preparing the shortlist considering the budget constraints. It is recommended that the cost shall include the cost of detailed inspection, detailed design, and supervision of the repair/rehabilitation projects.

The shortlist prepared above is used for the budgeting purposes, it is the evidence document of the requested budget for the pavement maintenance. It is usually submitted to Ministry of Finance for the budget request. The allocated budget is approved by the Ministry of Finance, the prioritization process shall be applied again with the allocated budget constraint. This process gives the maintenance plan of the following year.

The left behind sections by the budget constraints in the longlist, are planned to be executed a year later or even more. This can be a draft mid-term plan without considering the deterioration process of the pavement of the road network.

3.2.4 Design of Repair/Rehabilitation

Design of the routine maintenance are very simple which only requires the quantity of the works. Periodic maintenance, Rehabilitation, and Repavement are also simple by assuming the area of the works in the sections. However, it is better to perform site inspection of the sections and shall include the extra work to prevent the deterioration after the completion of the work. If the bearing capacity seems to be insufficient, detailed inspection as FWD or CBR (California Bearing Ratio) test shall be conducted to pavement design to prevent the rapid deterioration after the completion of the works.

If the deterioration of the section seems more rapid than other sections, there must be certain causes of the rapid deterioration. The causes shall be investigated, identified and reflected to the design. It is necessary and very important to conduct appropriate detailed inspection to identify the causes. Core sampling is appropriate to recognize the pavement structure and materials, and useful when the redesigning of the pavement is necessary. The selection of the materials shall also be considered based on the causes of rapid deterioration and results of detailed design, if the rapid deterioration is remarkable.

3.2.5 Repair/Rehabilitation Works

Repair/Rehabilitation works shall be done by experienced contractor of the repair/rehabilitation method. However, there are works that it does not require so much experience, such as routine maintenance works. The specification of the material, work procedure, monitoring indexes, and etc. shall be clearly mentioned in the TOR (Terms of Reference) of the bidding documents to secure the quality of the works.

The details of the routine maintenance works are explained in detail in the “Road Repair Manual” by F3TLM for reference.

3.2.6 Record

This step is defined to update the road surface condition and record the log of the treatment done to the sections which are included in the implementation of the maintenance plan. The condition is improved after the completion of the works, specifically rehabilitation and repavement works. The updated condition level and the detail of the work shall be recorded and input to the database.

The effect of the maintenance work shall be evaluated by comparing with the initial target of the maintenance work in the maintenance plan. The target shall be satisfied but countermeasure is required if it not good enough. It is necessary to check the condition of the road network after the maintenance plan is completed.

3.2.7 Improvement

This step is to improve the quality of the maintenance cycle. If the road network condition is improved more than the target, there isn't much to improve in short period. It can be considered to reset the target more difficult to achieve. This significates that precondition of the maintenance planning (maintenance policy, strategies) shall be revised.

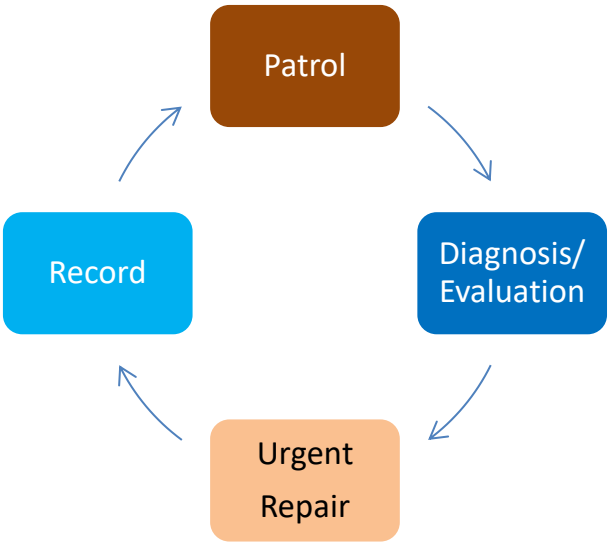
Moreover, it is always necessary to evaluate and improve the preciseness of the inspection, diagnosis, and evaluation. This activity is not rapidly completed, and requires continuous action, such as training of inspectors and engineers who execute inspections, diagnosis, and evaluation, for instance. Upgrading the manual/guidelines is one of the activities included in the step.

On the other hand, preventive materials of maintenance works can be applied to the maintenance works by upgrading the specifications. Specifically, once the target is achieved, it is a great opportunity to change the specifications of maintenance works.

3.3 Maintenance Cycle of Pavement (based on Patrol)

The maintenance cycle of pavement based on patrol consists of the following procedure, Inspection, Diagnosis/Evaluation, Urgent Repair, and Record. This cycle is to fill the time gap of the maintenance cycle based on the periodic inspection, which is explained in the previous subchapter, 3.2. There is brief description of each step in the following subchapters.

There are defects/distress that deteriorates very rapidly due to several/multiple causes. These defects/distress cannot be left untreated during the time gap between the timing of the periodic inspection and the timing of the execution of the maintenance works. If these defects/distress are left untreated, the damage would become very severe and increases the maintenance cost and impacts the road safety very significantly.



Source: F3LTM

Figure 3-2 Maintenance Cycle of Pavement (based on Patrol)

3.3.1 Patrol

Patrol is done to monitor and observe the condition of road and is usually done by driving the route with vehicles. If there are unusual incidents, the inspector shall stop the car and check and record the incident. The incident not only include defects/distress but also debris, droppings, dead animals, illegal occupation, plants coming into the carriageway, malfunctioning of drainage systems, etc.

Patrol should be done in very frequent cycle, for example it is done daily in the Expressways in Japan. Therefore, daily patrol is ideal for the main arterial roads, especially after a rainy day or cyclone. The other routes can be done with less frequency but not less than once a month.

The incidents should be removed as quick as possible. If the inspector can remove it during the patrol activity, it shall be removed and reported that the incident is already solved. It shall be reported in other cases.

3.3.2 Diagnosis and Evaluation

The report of patrol is diagnosed and evaluated rapidly after the patrol activity is done. If the incidents can harm the road user's safety, of rapid increasing defects/distress, urgent treatment shall be executed as quickly as possible. If not, the treatment shall be planned and executed accordingly. If the section is close to the section of maintenance works, it can be included to the TOR of the maintenance works.

There shall be a criteria of judgement whether to execute the urgent repair or not by defects/distress.

3.3.3 Urgent Repair

The defects/distress which harms the road user's safety are broken manholes, big gaps, or obstacle in the carriageway, such as debris, droppings, dead animals, illegal occupation, plants, and etc. These shall be removed as quickly as possible. If the incident cannot be removed during the patrol activity, the road management organization shall prepare the equipment and remove it as quickly as possible.

Rapid increasing defects/distress are potholes, broken expansion joint with wide gap, specifically in heavy traffic routes. If the traffic volume of heavy vehicles is large, the potholes could enlarge very rapidly. It shall be taken account that the urgent repair is highly necessary.

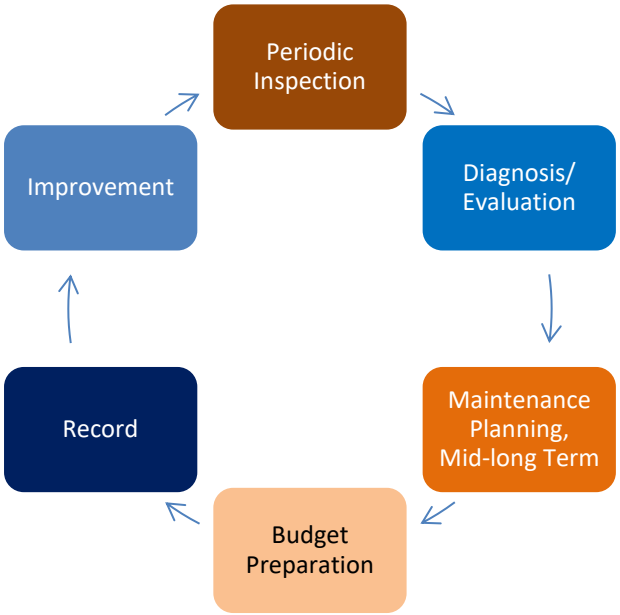
3.3.4 Record

The treatment to the incident shall be recorded right after the execution. If the temporary repair is done to it, proper repair shall be done before it is damaged again. If the section is close to the maintenance works, the executed treatment shall be excluded from TOR of the maintenance works.

3.4 Maintenance Cycle of Pavement (mid-long term)

Mid-long term maintenance cycle is the longest cycle of three cycles which are explained in this manual. It usually has the period from 3 to 10 years. It depends on how often the road management organization updates the mid-long term maintenance plan.

Mid-long term maintenance cycle of pavement consists of the following procedure, Periodic Inspection, Diagnosis/Evaluation, Planning (Mid-long Term Maintenance Plan), Budget Preparation, Record, and Improvement. There aren't any actual maintenance works in this cycle. The brief description of each step in the following subchapters.



Source: F3LTM

Figure 3-3 Maintenance Cycle of Pavement (mid-long term)

3.4.1 Periodic Inspection

This step has same procedure with the step in the maintenance cycle based on periodic inspection explained in 3.2.1. If the periodic inspection of the road network is executed once every several years, the cycle period of Mid-long Term Maintenance Cycle could be set as the same numbers of years, for instance 5 years. And also, the result of the Periodic Maintenance is utilized once every several years which is the period of Mid-long Term Maintenance Cycle.

3.4.2 Diagnosis and Evaluation

This step has same procedure with the step in the maintenance cycle based on periodic inspection explained in 3.2.2.

3.4.3 Maintenance Planning (Mid-long Term)

As it is explained in 3.2.3., the left behind sections by the budget constraints in the longlist, are planned to be executed a year later or even more. This can be a draft mid-term plan without considering the deterioration process of the pavement of the road network.

If the management system can analyse the deterioration progress in future, the maintenance works can be planned several times during the planning period depending on the deterioration speed.

3.4.4 Budget Preparation

This step is for preparation of budget for the following years starting from 2years later. If the mid-long term maintenance plan is for 3 years, the budge estimation of 2nd and 3rd year is calculated, so the road management organization can prepare the budget in advanced. However, the section which was not approved to execute in the annual maintenance plan of the subchapter 3.2.3, it shall be considered as the sections which shall be treated in the following years. The budget for these section shall be taken into account for the budget preparation of the following years as well.

3.4.5 Record

This step has same procedure with the step in the maintenance cycle based on periodic inspection explained in 3.2.6. The updated condition and the logs of maintenance works shall be recorded and input to database.

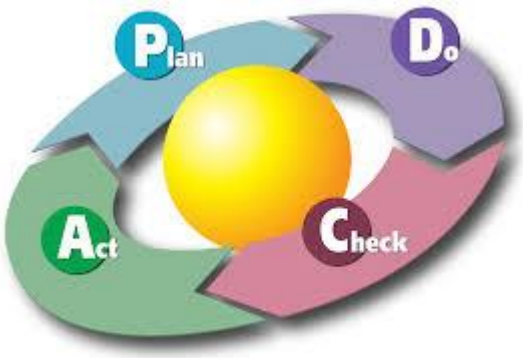
3.4.6 Improvement

This step has same procedure with the step in the maintenance cycle based on periodic inspection explained in 3.2.7. The mid-long term maintenance plan is evaluated by the actual implementation of the maintenance works, which is recorded in subchapter 3.4.5. It is also for evaluation and improvement of the preciseness of the inspection, diagnosis, and evaluation, precondition of the maintenance planning (maintenance policy, strategies), maintenance methods and its specification, and etc.

3.5 PDCA Cycle

PDCA Cycle stands for Plan-Do-Check-Act (PDCA) Cycle. It is a four-step model for carrying out change and continuous improvement. It is widely used in business and management processes and applied to road asset management. The four steps are Plan, Do, Check, and Act as described below.

All three maintenance cycles explained above (subchapter 3.2 to 3.4) can be fitted to the PDCA Cycle and improve the efficiency and effectiveness of the maintenance cycle.



Source: F3LTM

Figure 3-4 PDCA Cycle

(1) Plan:

- Identify a problem or an area for improvement.
- Develop hypotheses about what the issues might be and create a plan to address them.
- Set objectives and define the steps needed to achieve them.
- This step includes "Periodic Inspection (Patrol)", "Diagnosis/Evaluation", "Maintenance Planning" of the pavement maintenance cycles mentioned in the subchapter 3.2 to 3.4.

(2) Do:

- Implement the plan on a small scale to test its effectiveness.
- Carry out the steps as outlined in the plan.
- Collect data and document the process.
- This step includes "Design", "Repair (Urgent Repair)", "Budget Preparation" of the pavement maintenance cycles mentioned in the subchapter 3.2 to 3.4.

(3) Check:

- Analyse the data collected during the Do phase.
- Compare the results against the expected outcomes.
- Identify any differences or deviations and understand their causes.
- This step includes "Record" of the pavement maintenance cycles mentioned in the subchapter 3.2 to 3.4.

(4) Act:

- Based on the analysis, determine whether the plan should be continued or improved.
- If the plan was successful and target is achieved, implement it with harder target.
- If the plan needs adjustments, refine it and repeat the PDCA cycle.
- Institutionalize the changes that have been proven effective.
- This step includes "Improvement" of the pavement maintenance cycles mentioned in the subchapter 3.2 to 3.4.

3.6 Multi-layer Maintenance Cycle

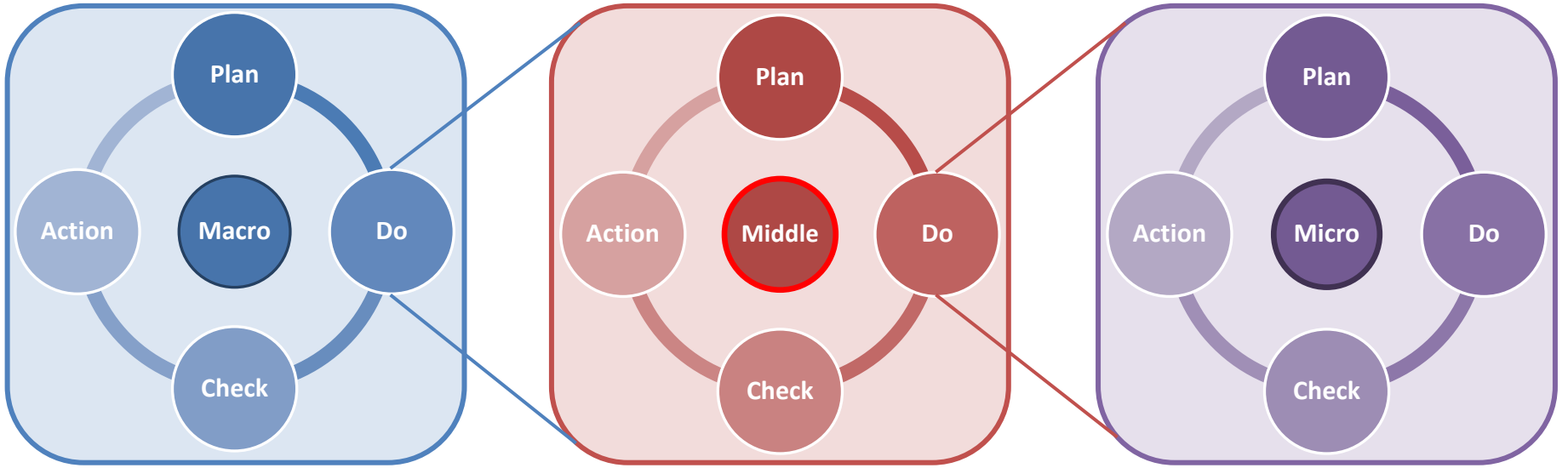
Pavement Asset Management consists of 3 major layers, such as (1) Mid-long term [Macro], (2) Periodic Inspection based [Middle], and (3) Patrol based [Micro], which corresponds to (1) 3.4 Maintenance Cycle of Pavement (mid-long term), (2) 3.2 Maintenance Cycle of Pavement (based on periodic inspection), and (3) 3.3 Maintenance Cycle of Pavement (based on Patrol). The cycle periods are (1) 3 to 10 years, (2) 2 years, (3) 1 to 3 months. PDCA cycle can be fitted to all the maintenance cycles, and it can be continuously improved if the road management organization can run the cycle sustainably.

Table 3-2 Multi-layer Maintenance Management

No.	Name	Subchapter/ Maintenance Cycle	Period
(1)	Mid-long term [Macro]	3.4, Mid-long term	3 to 10 years
(2)	Periodic Inspection based [Middle]	3.2, based on periodic inspection	2 years
(3)	Patrol based [Micro]	3.3, based on Patrol	1 to 3 months

Source: F3LTM

Road management organization has the task to run 3 cycles of maintenance cycle which have different cycle period continuously. Therefore, the management is done in different layer simultaneously and affect each other. It is not easy to manage these management cycles, but improvement can be achieved though sustainable/continuous activity of maintenance.



	Macro	Middle	Micro
Plan	**Periodic Inspection** Diagnosis/Evaluation Maintenance Planning	**Periodic Inspection** Diagnosis/Evaluation Maintenance Planning	**Patrol** Diagnosis/Evaluation (Maintenance Planning)
Do	Budget Preparation	Design Repair	Urgent Repair
Check	Record	Record	Record
Action	Improvement	Improvement	(Improvement)

Source: F3LTM

Figure 3-5 Maintenance Cycle of Pavement (short term to long term)

4 PRECONDITION SETTING OF MAINTENANCE PLAN

There are certain preconditions which planner should set before starting the planning procedure. It can be revised/modified if it does not fit to the maintenance plan. There are opinions of stakeholders as well which has big impact to the planning procedure.

It is the most important to understand the current condition of the road network. This is one of the most crucial step which should be done prior to planning the maintenance plan. The other is to understand the social demand to the road maintenance. The citizens along the route always request to remain the routes which are in their living area be good condition. However, the level of the condition differs by routes and group of people. These two are external conditions which shall be collected by road management organization.

Other preconditions are very much related to planning procedure, such as maintenance policy, road categorization, maintenance target, management level, and etc. These conditions make the plan very different, and it means that the road network condition would differ very much. However, considering the constraints, budget for instance, these condition cannot be set as the road management organization wishes to. One of the solutions are to set a pair of conditions, one is the ideal and the other is practical.

4.1 Study/Evaluation of the Current Condition of the Road Network

Recognizing the current condition of the road network is the starting point of maintenance activities. The road management organization can recognize the technical needs and the level of needs by understanding the current condition. Direct observation is necessary to know the conditions by routes, regions, and sections. Periodic Inspection and Patrol is considered as observation activities to collect the data to analyse the condition in this manual.

If both activities are very difficult to conduct on time, the data can be collected from the road users. Videos and photos are very good data for the road condition analysis. Most of the data has location coordinates and it is very easy to identify the location by engineers/inspectors of road organization. This is a very useful source of information. Road management organization should consider of opening the window to collect the road data from road users to understand the most current condition of roads.

4.2 Survey of the Social Demand to Road Maintenance

This step is very significant for setting the preconditions of the maintenance activities, such as maintenance policy, maintenance target, management level, and even the repair methods. Social demand for road management differs by region, routes, and users. Therefore, it is practical to set the maintenance target and maintenance level according to the characteristics of the routes or regions. This can be done by studying the existing documents on desk, but it is more justified with the specific public opinions. There should be a method to collect the demand of region, routes, and users, such as interview, questionnaire, inquiry window, and etc. Doing some quick interview to the residents along the route in executing the patrol and record in Patrol record is a method to execute the data collection.

There are also considerable demands from the stakeholders, such as political representatives/party of the region, ethnic groups, and several industry segments. The segments include logistics, agriculture, trading, manufacturing, and etc. This could be collects by regular conversation with local government, their association or randomly selected companies.

Ideally speaking, these demands shall be included in the upper development plan of the nation/regions. Therefore, referring to the mid-long term development plan of other ministries and local governments are very effective sources of data/information collection of social demands.

4.3 Policy Setting

Policy setting is done by the following procedure,

i) Study of the current condition of the road network (see subchapter 4.1)

ii) Collection social demand information (see subchapter 4.2)

iii) Setting the optimal maintenance policy

iv) Consideration of main constraints to realise the optimal policy

v) Setting the practical maintenance policy

The following is an example of how to set the optimal maintenance policy.

Based on the results of step i) and ii), it is very helpful to see the other road management organizations' policy in considering their own policy. Nowadays, many road management organizations disclose their maintenance policies on their website and is very easy to find good practices. There are many road organizations worldwide that are quite difficult for MTP, the road management organization of national road network in Madagascar, to look at the success of these good practices. Therefore, it is better to look for the size of the road network, economic level or the region, to set good policy.

There are many kinds of road management organizations, such as national, state, regional, municipal level. There are also private companies which manage certain road networks, such as expressway management companies, contractors of PPP project, for instance. Also, these organizations are located in different countries, terrain, climate, economy, and etc, which means that it is not easy to encounter the best example for the policy making organization. However, internal discussion among the organization and also with external stakeholders can converge the discussion.

One more effective method of setting the policy is that consider the target year of the policy, such as considering the long-term policy, and short-term policy, mid-term is also possible to consider. Long term is often considered around 10 years, however there isn't any specific rules for it so it can be set as long as 20-25 years. In this case, road management organization can set the policy very optical for the long-term and quite practical for the short-term.

MTP DER set the maintenance policy as the result of the activity of WG5 as follows:

I. Solve the issues of the current situation

II. Satisfy the social demand

These polices are very practical, feasible and directly related to step i) and ii) respectively. However, it is also very difficult and challenging policies to achieve because the contents of policies change over time. Updating the results of step i) and ii) is indispensable to achieve this policy.

One more very important precondition of policy settings is that policies should be reviewed and revised regularly in trial-and-error method. It can be revised for every mid-long term maintenance plans every time it is updated to shrink the gap between the optimum and the reality.

4.4 Categorization of the Routes

There are 3 categories of the routes for national roads in Madagascar. They are called RNP (Route nationale primaire), RNS (Route nationale secondaire), and RNT (Route nationale temporaire). However, WG5 proposed to add 2 categories and make it with 5 categories so that it can be managed in more correspondingly and reflect the actual conditions. The description of each category is as follows,

Table 4-1 Proposal of New Categories of National Routes

Category	Description	Example of Routes	Remarks
I	Main road (arterial road)	RNP 2, 4, 6, 7	Selected former RNP
II	Economical and touristic roads	RNS 1, and more	The rest of former RNP and selected former RNS
III	Urban section of National Roads	RNs in Antananarivo urban area	New proposal
IV	Other national roads with more traffic, AADT > 500	RNT 8, and more	The rest of former RNS and Former RNT divided by traffic volume
V	Other national roads with less traffic, AADT ≦ 500	RNT 19, and more	

Source: F3LTM

Following preconditions such as maintenance target, management level are set by category.

4.5 Target Setting

WG5 set targets by road category in F3LTM. The short-term target is controlled by Road Surface Condition Level which are set by WG1 as below,

Table 4-2 Criteria for assessing road surface conditions (repost)

LEVEL	Description	IRI
A	Good	0.0 – 3.0
B	Fair	3.0 – 5.0
C	Bad	5.0 – 10.0
D	Very Bad	More than 10.0

Source: "Manual on Road Inspection and Diagnosis, F3LTM

The target levels by road category are as follows:

Table 4-3 Target Level by New Category of National Routes (short-term)

Category	Target Level	Description	Example of Routes
I	A	Good	RNP 2, 4, 6, 7
II	A	Good	RNS 1, and more
III	B	Fair	RNs in Antananarivo urban area
IV	B	Fair	RNT 8, and more
V	C	Bad	RNT 19, and more

Source: F3LTM

4.6 Management Level Setting

The term "Management Level" is defined as the limit of the road surface condition level when the maintenance work is going to be executed. It means that when the road surface condition level gets worse than the "Management Level", maintenance work shall be done as quickly as possible.

WG5 set to 2 management level, such as short-term management level and long-term management level. The short-term management level is very simple corresponding to the target levels. The maintenance works shall be planned immediately when the road surface condition level fails to the next worse level. The short-term management level is applied from the maintenance level of 2025 which WG5 has been preparing throughout the WG activity in F3LTM project. The short-term management level is shown below,

Table 4-4 Management Level by New Category of National Routes (short-term)

Category	Management Level	Target Level	Example of Routes
I	B: Fair	A: Good	RNP 2, 4, 6, 7
II	B: Fair	A: Good	RNS 1, and more
III	C: Bad	B: Fair	RNs in Antananarivo urban area
IV	C: Bad	B: Fair	RNT 8, and more
V	D: Very Bad	C: Bad	RNT 19, and more
Source: F3LTM			

Long-term management level is more complicated with more technical indices. WG5 proposed and visualises the optimal management level which they should pursuit. WG5 decided to use 5 indices, such as IRI, Cracking Ratio, Rutting Depth, Pothole Ratio, and Travel Speed. The first 3 indices were referred to Japanese evaluation criteria. MCI (Maintenance Condition Index) is calculated with these 3 indices and evaluate the current condition. However, these 3 indices are set individually in the definitions of these categories. Pothole Ratio was added to the first 3 indices considering the pavement condition in Madagascar. It is suffering from enlarging potholes in many places. The last index is Travel Speed which road users pay most attention in their users' experience.

WG5 also proposes how to collect the data to judge the road surface conditions. IRI, Cracking Ratio, and Pothole Ratio, it is possible to use smartphone applications, such as DRIMS. Rutting Depth requires vehicle with LCMS (Laser Crack Measurement System), for instance. It is not handy and cannot purchase with reasonable price. However, there should be technology development and would be able to measure by smartphone or there would be very handy tools to inspect it. Travel speed is collected by inspector on the vehicle.

WG5 also proposed the frequence of periodic inspection by categories. It is ideal to inspect the entire road network once a year, but practical method was applied to category V roads considering their traffic volume and importance.

Table 4-5 Management Level by New Category of National Routes (long-term)

Category	Target Level	Management Level	Frequence of Inspection	Example of Routes
I	A: Good	IRI: ≤ 3 mm/m Crack Ratio: ≤ 5% Rutting Depth: ≤ 25 mm Pothole Ratio: 0.05‰ (1 potholes/km) Travel Speed: 1h/60km	Once a year	RNP 2, 4, 6, 7
II	A: Good	IRI: ≤ 5 mm/m Crack Ratio: ≤ 20% Rutting Depth: ≤ 30 mm Pothole Ratio: 2 potholes/km Travel Speed: 1h/50km	Once a year	RNS 1, and more
III	B: Fair	IRI: ≤ 5 mm/m Crack Ratio: ≤ 20% Rutting Depth: ≤ 35 mm Pothole Ratio: 2 potholes/km Travel Speed: not applicable	Once a year	RNs in Antananarivo urban area

Category	Target Level	Management Level	Frequence of Inspection	Example of Routes
IV	B: Fair	IRI: ≤ 10 mm/m Crack Ratio: ≤ 50% Rutting Depth: ≤ 40 mm Pothole Ratio: 4 potholes/km Travel Speed: 1h/40km	Once a year	RNT 8, and more
V	C: Bad	IRI: ≤ 10 mm/m Crack Ratio: ≤ 50% Rutting Depth: ≤ 50 mm Pothole Ratio: 8 potholes/km Travel Speed: 1h/30km	Once every 3 years	RNT 19, and more

Source: F3LTM

These targets (both target and management level) should be reviewed and revised regularly in trial-and-error method. It can be revised when mid-long term maintenance plan is updated to shrink the gap between the optimum and the reality. However, road users' demand changes time after time. Therefore, not only to improve the maintenance plans but also to improve the road user experience, it is necessary to review and revise the target and maintenance levels.

4.7 Management Strategy

Now that the timing to execute the maintenance work is set in the previous subchapter, this subchapter explains the procedure to set the Maintenance Strategy, which indicates the road management organization what to do for the maintenance works.

The following table shows the basic management strategy of the road sections. WG5 prepared 2 strategies, such as short-term and long term. The detailed explanation will follow after the table.

Table 4-6 Management Strategy by Road Category (short-term)

	Level A	Level B	Level C	Level D
Cat. I	TEC (RM)	Overlay	Rehabilitation	Rehabilitation
Cat. II	TEC (RM)	TEC (SD)	Rehabilitation	Rehabilitation
Cat. III	TEC (RM)	TEC (RM)	Rehabilitation	Rehabilitation
Cat. IV	TEC (RM)	TEC (RM)	Rehabilitation	Rehabilitation
Cat. V	TEC (RM)	TEC (RM)	TEC (RM)	Rehabilitation

RM: Routine Maintenance, SD: Surface Dressing, Rehabilitation: Overlay or Repavement
Source: F3LTM

Basically, all the road sections are always maintained and planned to execute the routine maintenance even if the section has road surface level of Level A. Therefore, all the sections with sufficient road surface condition (above the Management Level described in subchapter 4.6) are maintained with Routine Maintenance which is defined in TEC.

If the sections have the road surface condition level as same as the Management Level, the surface condition of the sections shall be improved by executing the overlay, so that the section remains above the target level (See subchapter 4.5). However, considering the lack of maintenance budget of MTP, WG5 set the strategy for Category II road to execute surface dressing instead of overlay to the sections with road surface condition B.

Rehabilitation (whether Overlay or Repavement) is done for other sections with road surface condition as same as or worse than Management Level. The details of the works are decided in each project when it starts its execution.

Table 4-7 Management Strategy by Road Category (long-term)

	Level A	Level B	Level C	Level D
Cat. I	TEC (RM)	Overlay	Repavement	Repavement
Cat. II	TEC (RM)	Overlay	Repavement	Repavement
Cat. III	TEC (RM)	TEC (RM)	Overlay	Repavement
Cat. IV	TEC (RM)	TEC (RM)	Overlay	Repavement
Cat. V	TEC (RM)	TEC (RM)	TEC (RM)	Overlay

RM: Routine Maintenance
Source: F3LTM

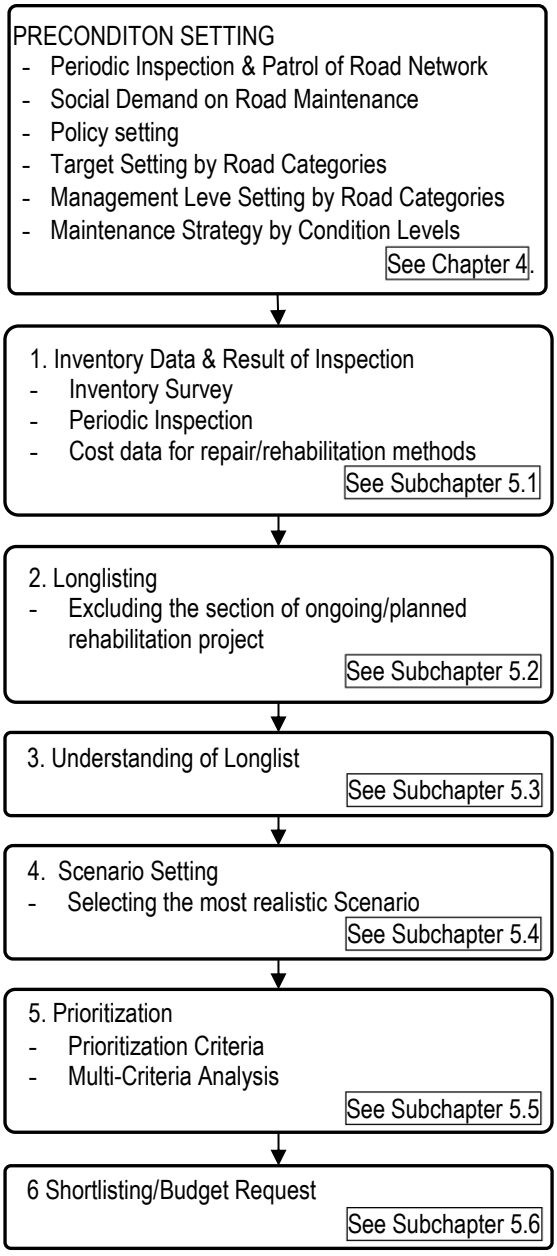
The long-term Management Strategy is set following the basic method of selecting the maintenance works as follows,

- All the road sections are always maintained and planned to execute the routine maintenance even if the section has road surface level is Level A.
- When sections have the road surface condition level as same as the Management Level, the surface condition of the sections shall be improved by executing the overlay, so that the section remains above the target level
- Repavement is selected when the road surface condition of the section is worse than the Management Level, Level C of Category I and Level D of Category IV, for instance.
- If there is any remarkable damage in the section above the target level, it shall be planned to execute the maintenance works other than routine maintenance.

These strategies (both short-term and long-term) should be reviewed and revised regularly in trial-and-error method. It can be revised when mid-long term maintenance plan is updated to shrink the gap between the optimum and the reality. However, road users' demand changes time after time. Therefore, not only to improve the maintenance plans but also to improve the road user experience, it is necessary to review and revise the target and maintenance levels.

5 GENERAL PROCEDURE OF PLANNING ANNUAL MAINTENANCE PLAN

This chapter explains the procedure to plan the annual maintenance plan, for specific routes, regions, or sections. It can be extended to the entire network. It explains from obtaining the inventory data and inspection results from the database to shortlisting/Budget request. The basic flow of the procedure is as follows.



Source: F3LTM

Figure 5-1 Flow of the Procedure of Planning Annual Maintenance Plan.

5.1 Inventory Data and the Result of Inspection

Inventory data was usually saved in the SIA which is prepared in the PEC activity. After the completion of F3LTM project, the data of RNS1, RNP2, RNP4 and RNP7 is saved in PMS (Pavement Management

System). The other routes of the road network remain having their inventory data in SIA. Inventory data of other routes shall be input to PMS.

Inventory data shall be updated continuously if there are improvements in certain sections. Rehabilitation projects often include the improvement of the cross section, drainage, structure of pavement, and etc. Completion of the rehabilitation project is a certain timing to update the inventory data.

Inspection results were also in same device, RNS1, RNP2, RNP4 and RNP7 is in PMS and the rest in SIA format. The last inspection activity of PEC was conducted in 2018 and hasn't conducted since then. On the other hand, F3LTM conducted the survey by DRIMS and prepared SIA. Now that the tool to collect the inspection result is provided other than site inspection by inspectors, it is easier to collect the data of defects/distress of the pavement and save in the PMS.

Output data of PMS and SIA has road surface condition level, numbers of certain defects/distress of each section in the file. The planner selects the maintenance works by section following the short-term Management Strategy described in the subchapter 4.7. Before you start defining the maintenance works by section, there are the following items which should be defined.

- Unit cost of each maintenance work
  This can be obtained from the latest Catalogue de Prix, issued by DEN.
- Quantity of the maintenance works by defects/distress
  This is recorded in SIA automatically by importing the inspection data from DRIMS.
- Conversion formulae of quantity by number of each defects/distress.
  WG3 of F3LTM assumed the quantity of each defects/distress which are listed in SIA. This assumed quantity shall be managed by DER with close communication of DRTP, which is the implementation organization of TEC (routine maintenance).

There are maintenance/rehabilitation works which correspond to the road categories (I-V) and to the surface condition level (A-D). Periodic inspection result gives the information of damage type and its quantity. The required types and quantity of the maintenance/rehabilitation works is automatically calculated by using the maintenance strategy which are mentioned in the previous subchapter 4.7. However, the cost cannot be calculated unless the unit cost of the maintenance/rehabilitation works are provided. These unit cost data are prepared in the "Catalogue de Prix" prepared by DEN (Direction des Etudes et des Normes) every year. This Catalogue has the unit cost data of works which are defined in the PEC (Programme D'entretien Courant). There are 9 "tâches réelles" (real task) which are grouped into 3 groups, Travaux d'Entretien de Routine (TER), Travaux d'Entretien Améliorant (TEA), and Travaux d'Entretien Spécialisé (TES). It covers most of the maintenance/rehabilitation related works but does not include the works which are only related to new implementation of road including bridges or other structures.

If the section is to be treated with TEC, the cost of the maintenance works will be calculated multiply the unit cost, numbers of defects/distress, and assumed quantity of each defects/distress.

If the section is to be rehabilitated or treated with surface dressing, unit cost shall be calculated by the area of the section (width calculated by length).

The very 1st version of maintenance plan is prepared with the cost data using the unit cost from "Catalogue de Prix" and types and quantities of the corresponding maintenance/rehabilitation works to the types and quantities of the damages which are collected in the periodic inspection. This 1st version is called as Longlist.

5.2 Longlisting

Longlist is prepared by listing the maintenance works in a sequential manner. The list should have the inventory data, defects/distress data, type(s) and quantity of maintenance work, and estimated implementation cost. The order can be by route along the chainage as same as the order of SIA.

Summary of the longlist should by applied. Summary should be by route, region, and etc. Summary should have the ratios, such as of maintenance sections, rehabilitation sections, number and ratio of road surface condition levels, etc., apart from sum of the maintenance costs.

IRI of the route or region, subregion can be added to the summary because it can be calculated by simple mean value when the length of all section is same. If section have different length, it can be calculated by calculating weighted mean value.

5.3 Understanding of Longlist

Longlist indicates many aspects of maintenance needs. First of all, it tells the road management organization the required cost of maintenance works to maintain the target level. It also indicates the cost of rehabilitation cost to recover the road surface condition level to the target level. It also tells the location of the group of sections with high needs of rehabilitation, which is equivalent to sections very bad conditions. The residents along these sections and road users of these sections tends to have low satisfaction of current road condition and strong request of executing the maintenance works.

The needs can be compared among routes, regions, subregions, or among the set of the sections within a certain route or section. Comparison tells the strong and weak point of road network management much more than identifying them by human communication. It can also indicate where to allocate more/less budget to even the road surface condition level, which minimizes extremely bad regions without recognizing.

One more important thing that the longlist indicates is that if a road management organization has unlimited budget and resources, this will be the annual maintenance plan of the following fiscal year.

5.4 Scenario Setting

5.4.1 Scenario Setting

WG5 set the management strategy by categories of routes as is shown in Table 4-6 for short term and Table 4-7 for long term. This strategy is the most ideal scenario for the route by category. However, it is very usual that the road management organization cannot apply the ideal scenario due to many constraints, one of the biggest constraints is the budget constraint. Therefore, several scenario shall be considered before the prioritization activity.

There are 4 scenarios in Table 4-6. The most effective scenario is the one of Category I. Therefore, if the scenario of Category I is difficult to implement, scenarios of other categories can be set as alternative scenarios to compare.

For the routes of Category II, the scenario of Category III & IV or of Category V can be considered as alternative scenarios.

If it is still difficult to implement setting the alternative scenarios from Table 4-6, other scenarios can be set by the road management organization, MTP in Madagascar.

5.4.2 Selecting the most realistic Scenario

Road management organization shall select the most realistic scenario from the alternative scenarios which are set in the previous subchapter before the prioritization. It can be done by calculating the cost of all the scenarios and compare with the actual budget amount which are already allocated in the past.

If the budget is sufficient for some of the scenarios, the closest scenario from the ideal scenario shall be selected as the scenario for the maintenance plan for the following year for the route. If the budget is not sufficient for all of the alternative scenarios, the scenario with lowest cost amount will be the selected scenario.

If the scenario with the lowest cost amount exceeds way over from the possible budget, there shall be another alternative scenario which are realistic to implement.

The longlist of selected realistic scenarios is the selected longlist, and the sections will be prioritised in the next subchapter.

5.5 Prioritization

It is usual that the all the maintenance works which is listed in the longlist cannot be executed due to several constraints. Therefore, the road management organization has to decide which sections should be selected to execute the maintenance works. This step explains the procedure to prioritize the section in the longlist and reorder the list so that the planner can select the sections which are included in the annual maintenance plan systematically.

5.5.1 Prioritization Criteria

The basic theory of road surface maintenance is that the worse the section is, the earlier it should be recovered. Therefore, the primary prioritization criterion is the road surface condition level. List the sections with road surface condition level D on the top and the section with Level C follows. It is followed by Level B and the sections with Level A come last.

The second step is to apply other criteria to compare and prioritise among the sections with same road surface condition level. This criteria can be set by the road management organization without any condition. If the criterion is good enough to get agreement from the stakeholders, any criterion is sufficient.

Next step of ordinary prioritization is to set the 3rd criterion to those sections with same level in basic and 2nd prioritization process. This repetition of prioritization is continued until most of the sections are prioritized separately and doesn't leave the groups of same prioritized order.

The longlist after the prioritization steps mentioned above is able to limit with any constraint, specifically the sealing amount of budget. However, the difficulty is that it is difficult to set the prioritization criteria in order which is able to obtain the stakeholders agreement.

5.5.2 Multi-Criteria Analysis

There is other and also better way to do the prioritization with several criteria. It is called Multi-Criteria Analysis. It is a decision-making tool to evaluate and prioritize the alternative options with multiple competing criteria when making complex decisions. It helps decision-makers consider and balance various factors that may be quantitative or qualitative in nature. This method is applied in prioritization procedure in planning the annual maintenance plan. The process involves the following steps:

i) **Criteria Selection:** Identify and select the criteria that will be used to evaluate the alternatives. These criteria should reflect the important aspects of the decision.

ii) **Criteria Weighting:** Assign weights to each criterion based on their relative importance. This step often involves stakeholder input to ensure that the weighting reflects the values and priorities of those involved.

iii) **Scoring:** Evaluate each alternative against each criterion. This can be done using various methods, such as scoring scales, utility functions, or performance matrices.

iv) **Aggregation:** Combine the weighted scores for each criterion to derive an overall score for each alternative. This often involves mathematical methods to ensure a fair and balanced aggregation.

v) **Analysis and Ranking:** Analyse the results to rank the alternatives from most to least preferred based on their overall scores.

The prioritized longlist still remains as the shortlist of the annual maintenance plan without any constraints for the following year. However, the sections are listed in order as the top priority at the top of the list and the least priority at the bottom.

ii) is the most crucial step in this analysis. It should be considered that the weights refer the requests of the stakeholders and obtain the agreement from them. Sensitivity Analysis can be done by varying the weights and scores to see how changes affect the rankings.

There are several methods to set the weights, either of the following can be applied,

- **Pairwise Comparison Method (PCM)**
- Rank Order Centroid (ROC) Method
- Weighted Sum Model (WSM)
- Best-Worst Method (BWM)
- SMART (Simple Multi-Attribute Rating Technique)

The followings show an example of setting the weighs by PCM. This method involves comparing each pair of criteria, assigning points to the superior criterion in each comparison, summing up the points for each criterion, and then normalizing the points to determine the weights.

(1) Step 1: Identify Criteria

Let's consider four criteria for evaluating job offers:

1. Salary
2. Work Environment
3. Location
4. Growth Opportunities

(2) Step 2: Pairwise Comparisons

Compare each pair of criteria and assign a point to the superior criterion.

Table 5-1 Example of Pairwise Comparisons Method (1)

Criteria	Salary	Work Environment	Location	Growth Opportunities	Points
Salary	X	1	1	1	3
Work Environment	0	X	1	1	2
Location	0	0	X	1	1
Growth Opportunities	0	0	0	X	0

Source: F3LTM

In this example:

- Salary is compared with Work Environment, Location, and Growth Opportunities and it is considered more important than all three criteria. It gets 3 points.
- Work Environment is compared with Salary, Location and Growth Opportunities and it is considered more important than Location and Growth Opportunities. It gets 2 points
- Location is also compared with other 3 criteria and it is considered more important than Growth Opportunities. It gets 1 point.
- Growth Opportunities is not considered superior to other 3 criteria, so it gets 0 points.

(3) Step 3: Sum the Points

Sum the points for each criterion and add 1 point to each so that all 4 criteria are considered in the comparison study.

Table 5-2 Example of Pairwise Comparisons (2)

Criteria	Total Points
Salary	4
Work Environment	3
Location	2
Growth Opportunities	1

Source: F3LTM

(4) Step 4: Normalize the Points

Normalize the points so that their sum equals 1. This is done by dividing each criterion's points by the total sum of all points.

1. Calculate the total sum of points:

   Total Points = 4 + 3 + 2 + 1 = 10

2. Normalize each point:

   - *Salary:* $w_1 = 4/10 = 0.40$
   - *Work Environment:* $w_2 = 3/10 = 0.30$
   - *Location:* $w_3 = 2/10 = 0.20$
   - *Growth Opportunities:* $w_4 = 1/10 = 0.10$

(5) Final Weights

Table 5-3 Result of Pairwise Comparisons (2)

Criteria	Final Weights
Salary	**0.40**
Work Environment	**0.30**
Location	**0.20**
Growth Opportunities	**0.10**

Source: F3LTM

(6) Summary

- **Identify Criteria:** List all criteria to be compared.
- Pairwise Comparisons: Compare each pair of criteria and assign points to the superior criterion.
- Sum the Points: Total the points for each criterion.
- Normalize the Points: Divide each criterion's points by the total points to get the weights.

This method is useful for simplifying the process of determining weights through direct comparison and ensures that the weights reflect the relative importance of each criterion based on these comparisons.

5.6 Shortlisting/Budget Request

To determine the draft annual maintenance plan, it is required to set the boundary with implementation constraints and prepare the shortlist. This shortlist is the basis of the initial budget request, and it is used to obtain mutual understanding among the stakeholders. Once it is obtained, it can be used as an evidence of budget request for the annual maintenance plan of the following year.

i) **Consideration of the implementation constraints:** There are always constraints for implementing all the longlisted maintenance works, mainly the budget constraints. Other constraints such as environmental, social and etc., can also be defined if there are.

ii) **Defining the range of the implementation:** Apply the constraints defined above and set the limit in the longlist. This limit demonstrates the boundary of the sections which will be included in the draft (1st version) annual maintenance plan of the following year. The sections above this boundary will be considered as the shortlist of the annual maintenance plan of the following year.

iii) **Coordination to obtain mutual understanding among stakeholders:** Once the very draft version is prepared, planning direction shall explain the shortlist to the main stakeholders among directions in the ministry. The boundary can be shifted through the discussion to obtain the mutual understanding. The agreed shortlist is an evidence of budget request for the annual maintenance plan of the following year.

iv) **Budget request:** Use the shortlist prepared in iii) step as evidence of budget request for the annual maintenance plan of the following year to MEF and other related organizations.

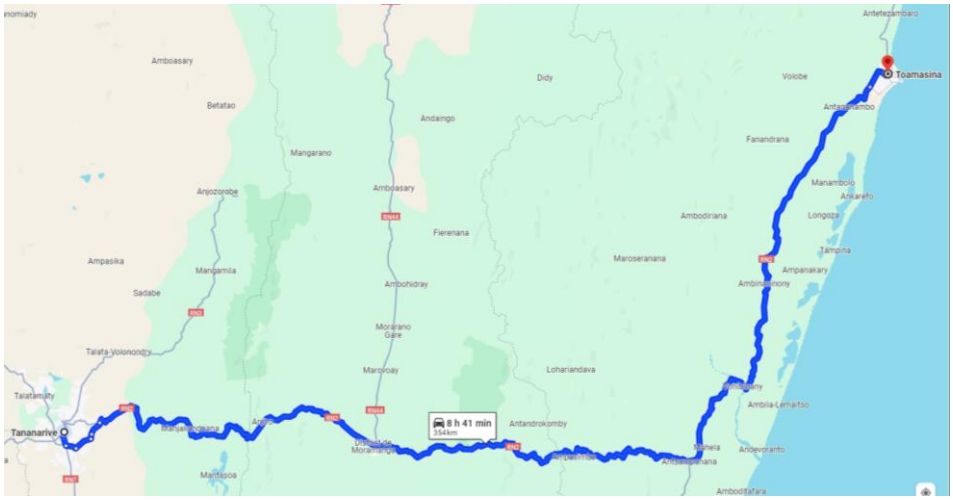
6 PREPARATION OF ANNUAL MAINTENANCE PLAN ON MODEL ROUTE (RNP2, Category I)

This chapter explains the procedure to plan the annual maintenance plan for a route of Category I. RNP2 is selected to be an example of it since RNP2 is one of 2 Model Roads of F3LTM project. It can be referred to plan the maintenance plan of the routes in the same category, such as RNP4, RNP6, and RNP7

6.1 Target Route

Category I of National Highway consists of 4 arterial routes which are very significant to Madagascar in many aspects, such as RNP2, 4, 6, and 7. This chapter is to explain the procedure of planning the annual maintenance plan of RNP2 since it is one of 2 Model Roads of F3LTM project. The following are the outline of the RHP2.

- Origin & Destination: Antananarivo, Toamasina
- Length: 352km
- Cross section: single lane (both direction)
- Terrain: hilly from Antananarivo to Antsampanana (Origin of RNT11A), flat from Antsampanana to Toamasina
- Characteristics: Main and only route to connect the capital city and the biggest trading port of the country. It is the most important route economically and logistically in Madagascar.
- Surface Condition: There are many heavily damaged sections along the entire route due to heavy traffic of heavy vehicles. The most seriously damaged sections are located in the flat terrain from Antsampanana to Toamasina. There are big potholes which are not repaired rapidly and the size of them are growing in the sections.
- Others: There is an ongoing rehabilitation project funded by World Bank. The main maintenance work is overlaying the existing pavement. The project location is in the hilly terrain from Antananarivo to Antsampanana.



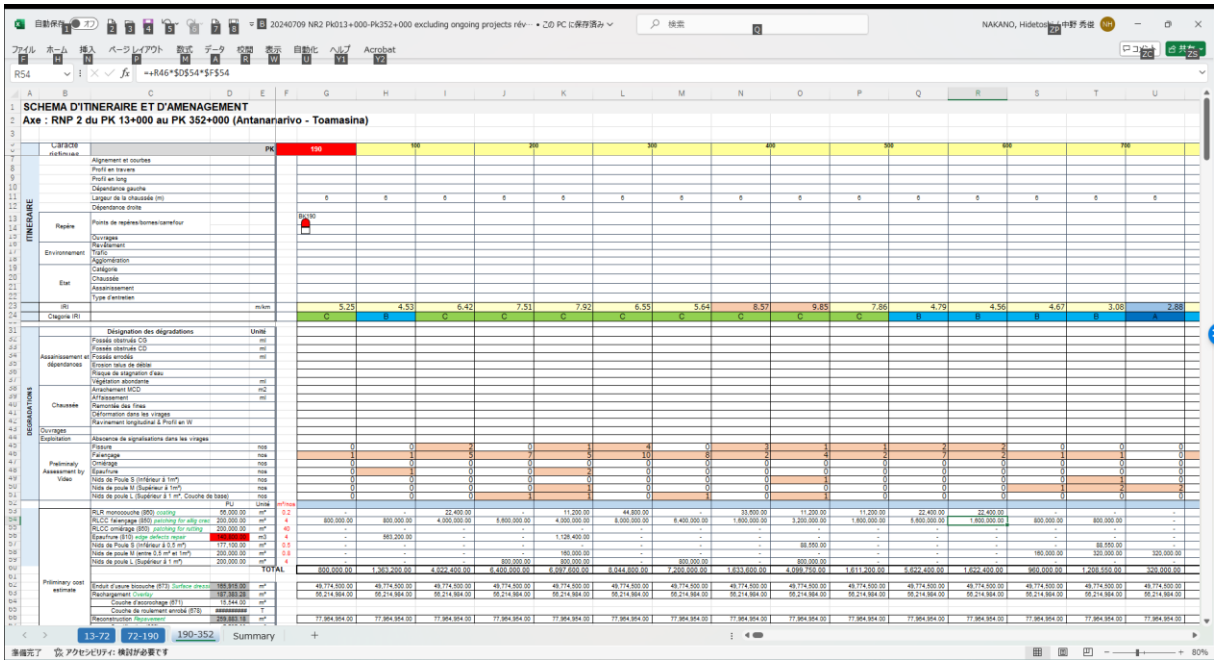
Source: Google Map

Figure 6-1 National Road No.2 (RNP2)

6.2 Inventory Data and the Result of Inspection

There are WB rehabilitation project ongoing and also maintenance project apart from PEC maintenance works. If any improvements on inventory data, it shall be updated.

The inspection of road surface condition shall be updated every year with DRIMS since this route is the most important route in the country. Updating the road surface condition is the most fundamental activity in the maintenance cycle. The planning was done with the result of DRIMS which are collected in Dec 2024 in this project.



Source: SIA

Figure 6-2 SIA of National Road No.2 (RNP2)

6.3 Excluding the sections of ongoing/planned Rehabilitation Projects

If the route has ongoing/planned rehabilitation projects, the sections in those projects shall be excluded from the plan. NR2 is under a rehabilitation project funded by WB and the section from 13 to 190 km is excluded from the plan. Moreover, the sections from 0 to 13 km are also excluded since the inspection by DRIMS were not executed.

6.4 Longlisting

Maintenance work of each section in the very draft of annual maintenance plan is defined by applying the management strategy of Category I road in Table 4-6, such as TEC (RM) for Level A road surface condition level, Overlay for Level B, Rehabilitation for Lavel C and D. It is set as Overlay for Level C, and Repavement for Lavel D in the WG5 in F3LTM.

Longlist is prepared by extracting the PEC (Routine Maintenance) from the SIA above. The remaining sections can be listed as longlist of rehabilitation works. These longlists have the plan of the maintenance works of each section and rough estimates of quantity and implementation cost. Total sum of the implementation cost in the longlist is the required cost of maintenance works to maintain the target level. It also tells the location of the group of sections with high needs of rehabilitation, which is equivalent to sections with very bad conditions. MTP shall collect the opinions and requests from the residents and road users of these sections and reflect them in the maintenance plan. The longlist contains the types of repair/rehabilitation works, the quantity of the works, the rough cost estimate of the works of each section.

6.5 Scenario Setting

6.5.1 Scenario Setting

If the longlist which is prepared in the previous subchapter 6.4 is too unrealistic, scenario can be adjusted so that more sections can be treated with maintenance works. WG5 of F3LTM has set the following 4 scenarios as alternatives for the annual maintenance plan of RNP2 as follows:

Table 6-1 Alternative Scenario of the annual maintenance plan of RNP2

	Maintenance Level	Level A	Level B	Level C	Level D
Scenario 1	Cat. I	TEC (RM)	Overlay	Overlay	Repavement
Scenario 2	Cat. II	TEC (RM)	TEC (SD)	Overlay	Repavement
Scenario 3	Cat. III & IV	TEC (RM)	TEC (RM)	Overlay	Repavement
Scenario 4	Compensation of Cat. III & IV	Do nothing	TEC (RM)	Overlay	Repavement

RM: Routine Maintenance, SD: Surface Dressing
Source: F3LTM

Scenario 1 is based on the maintenance strategy of Category I routes. TEC (RM) is applied to Level A sections, Overlay to Level B & C sections, and repavement is applied to Level D sections. It means that Level A will remain in Level A, Level B, C & D will be improved to Level A. Therefore, this scenario is the ideal scenario for NR2.

Scenario 2 is based on the maintenance strategy of Category II routes. TEC (RM) is applied to Level A sections, TEC (SD) to Level C sections, Overlay to Level C sections, and repavement is applied to Level D sections. It also means that Level A will remain in Level A, Level B, C & D will be improved to Level A.

Scenario 3 is based on the maintenance strategy of Category III & IV routes. TEC (RM) is applied to Level A & B sections, Overlay to Level C sections, and repavement is applied to Level D sections. It means that Level A will remain in Level A, Level B in Level B, and Level C & D will be improved to Level A.

Scenario 4 is a compensation plan of scenario 3 to reduce the volume and budget of the maintenance plan. Level A is not treated anything, TEC (RM) is applied to Level B sections, Overlay to Level C sections, and repavement is applied to Level D sections. It means that Level A will be deteriorated as it is damaged, Level B in Level B, and Level C & D will be improved to Level A.

However, comparing these scenarios, DER shall set the realistic scenario for the annual maintenance plan of the following year. DER shall compare the result of calculation of the scenarios and select the most feasible scenario, which is the most realistic scenario. It is usually the scenario with the lowest budget required.

6.5.2 Selecting the most realistic Scenario

The result of the cost calculation is demonstrated in the table below.

Table 6-2 Result of Cost Calculation by Scenarios (RN2, Cat I)

	SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4
PEC	552,849,600.00	49,978,928,100.00	3,213,431,450.00	2,660,581,850.00
REHAB	107,208,011,772.00	51,386,532,660.00	51,386,532,660.00	51,386,532,660.00
Ratio	1	90.40	5.81	4.81

Source: F3LTM

The least amount of the cost among 4 scenarios is Scenario 1, TEC (RM) is applied to Level A sections, Overlay to Level B & C sections, and repavement is applied to Level D sections. It is because only Level A sections are included in the maintenance plan. Other sections with Level B, C, & D will be repaired/rehabilitated in rehabilitation project with other budget resources.

The other scenarios require much more budget, such as around 5 times more for Scenario 3 & 4, and 90 times more for Scenario 2. Therefore, it can be concluded that Scenario 1 is the most realistic.

Now, let's compare with the actual maintenance budget which is allocated to NR2. The allocated budget for 2024 was 261,956,000.00 Ar. The comparison with the required budget for each scenario is demonstrated in the following table.

Table 6-3 Comparison with actual allocated budget, 2024 (RN2, Cat II)

	SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4
PEC	552,849,600.00	49,978,928,100.00	3,213,431,450.00	2,660,581,850.00
Ratio	0.47	0.01	0.08	0.10
Gap	290,893,600.00	49,716,972,100.00	2,951,475,450.00	2,398,625,850.00

Source: F3LTM

The comparison result also shows that Scenario 1 is the most realistic scenario. However, the gap between the allocated and require budget is huge and it is less than a half of the required budget (47%). Therefore, about half of the section can only be repaired with actual budget. Therefore, DER needs to select the sections which will be repaired with the budget of the following year.

Prioritization process is required to select the sections which are included in the maintenance plan of the following year. It will be described in the following subchapter.

6.6 Prioritization

6.6.1 Prioritization

Prioritization is conducted as follows: setting up the prioritization criteria, set the weight for each criterion, conduct multi-criteria analysis, and shortlisting. The basic methodology of the prioritization is described in subchapter 5.5. Here, this manual describes the process of how WG5 studied and considered to set the realistic prioritization criteria to plan the maintenance plan of the pilot routes for the following year.

6.6.2 Prioritization Criteria

Since Scenario 1 is selected to plan the maintenance plan for the following year, target sections are only of Level A. Therefore, the first step of the prioritization, prioritize the section with worse level, does not apply in this case.

Second step to compare the section with same surface condition level, which is Level A in this case, is applied and the planner shall set the prioritization criteria to execute the second step. However, WG5 applied multi-criteria analysis which are explained in subchapter 5.5.2 instead of multi-step analysis which are explained in subchapter 5.5.1. The process of multi-criteria analysis in the planning of NR2's maintenance plan for the following year is explained the following subchapter.

6.6.3 Multi-Criteria Analysis

(1) Criteria Selection

1) General Method of Setting Criteria

WG5 started the brainstorming among the members how to compare the sections to prioritize for the maintenance works. WG5 selected following 10 criteria.

- Traffic volume
- Population served
- Tourism
- Airport infrastructure
- Port infrastructure
- Production (agriculture, fishing, factories, mines, etc.)
- Vulnerability (climate)
- Social (school, health, public services, etc.)
- Cost
- Diversion (dual access)

WG5 has set 4 levels of each criterion to evaluate the sections as follows,

Table 6-4 First Draft of Prioritization Criteria

	Level 1	Level 2	Level 3	Level 4
Traffic volume	AADT<50	50<AADT<500	500<AADT<1500	AADT>1500
Service population	< 100,000	100,001 to 300,000	300,001 to 1,000,000	> 1,000,000
Tourism	no tourist site	existence tourist site	existence of national park or nature reserve	international/world heritage
Airport infrastructure	No airport	Aerodrome / Airfield	National Airport	International Airport
Port infrastructure	No port	Coastal port and others	Secondary haul ports (Antsiranana, Mahajanga, Toliara)	Main haul port (Toamasina)
Production (agriculture, fishing, factories, mines, etc.)	no production	local production	national production	international production
Vulnerability (climate)	desert climate (south and southwest)	highlands climate (highlands)	tropical climate (west and northwest)	humid climate (eastern coast)
Social (school, health, public services, etc.)	0	up to 5	up to 20	more than 20
Cost	> 500,000 USD	$200,001 to $500,000	$10,001 to $200,000	<10,000 USD
Diversion (double access)	existing detour	-	Possibility of creating a diversion	no deviation possible

Source: F3LTM

This is very ideal and understandable criteria since road is very essential infrastructure for the regional economy and also serves as emergency route in disaster occasions. However, there are several valid reasons not to apply these criteria.

The fist reason is that the sections in the same route would have the same value for the majority of the criteria. Collected traffic volume would be the same for certain length of the route since the survey is conducted at the representative location for the route, for instance. Moreover, if the route has airport access, the entire route would be evaluated as the same.

The other is that there are criteria that is not easy to collect data for comparison. MTP does not collect traffic data for every route either very frequently. There would be many sections without any data or with outdated data, for instance.

The last is that it is not easy to define the parameters for criteria. How do you count the service population of the route, how to count the production, or social facilities, for instance.

Considering the above situation of the management of MTP, WG5 decided not to apply these general criteria in planning of the maintenance plan for the following year. However, these criteria are very easy to understand the importance and to obtain mutual understanding among stakeholders. It is recommended that MTP keeps on seeking how to realize these prioritization criteria.

2) Realistic Method of Setting Criteria

WG5 reselected the criteria with the data easier to collect as follows,

- Vertical Alignment (sag point area, high gradient, etc.)
- Horizontal Alignment (curve radius)
- Terrain (mountain, hill, plain)
- Sub-surface ground condition (swampy, soft ground, sand, rock, etc.)
- Drainage conditions
- IRI
- Social condition
- Cost

WG5 studied how to use above criteria as the following table.

Table 6-5 Study of Alternative Prioritization Criteria

Criteria	Indicator	Availability	Comparison Method	Judgment
Vertical Alignment	Gradient, Up/Down or Flat	Gradient: No Up/Down or Flat: Yes	Up/Down or Flat	**Apply,** **Up/Down or Flat**
Horizontal Alignment	Curve/Straight, Radius of Curve	Curve/Straight: Yes Radius of Curve: No	Curve/Straight	**Apply,** **Curve/Straight**
Terrain	Geographical information	Yes, but not in SIA	None	Exclude, Not related to damage occurrence
Sub-surface ground condition	Geographical info, CBR, FWD, SN, etc.	Geographical info: No CBR, FWD, SN, etc: No	None	Not now, Not enough data
Drainage conditions	General information	General information: YES	Good/Bad	**Apply,** **Good/Bad**
IRI	IRI	IRI: Yes	Surveyed value	Exclude, Small difference is not valuable to compere
Social conditions	General information	General information: YES	Urban, Suburb, Rural	**Apply,** **Urban, Suburb, Rural**
Cost	Cost amount	Cost amount: Yes	Cost amount	Exclude, Difficult to prioritize by cost amount

Source: F3LTM

WG5 selected 4 criteria considering the above study as follows,

I. Vertical Alignment: Up/Down or Flat
II. Horizontal Alignment: Curve or Straight
III. Drainage conditions: Good or Bad
IV. Social conditions: Urban, Suburb, and Rural

(2) Criteria Weighting

WG2 conducted "Pairwise Comparison Method (PCM)" and set the weights of the criteria above following the description in subchapter 5.5.2.

Table 6-6 Pairwise Comparisons Method Calculation (1)

Criteria	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Points
Vertical alignment	X	1	0	0	1
Horizontal alignment	0	X	0	0	0
Drainage conditions	1	1	X	1	3
Social condition	1	1	0	X	2
Source: F3LTM					

- Vertical alignment is compared with Horizontal alignment, Drainage conditions, Social condition. It is considered more important to road surface damage than Horizontal Alignment. It gets 1 point each time it is superior.
- Horizontal alignment is not considered superior to other 3 criteria, so it gets 0 points.
- Drainage conditions are considered more important than 4 other criteria. It gets 3 points.
- Social conditions are compared with Vertical alignment, Horizontal alignment, and Drainage conditions. It is considered more important than Vertical alignment, Horizontal alignment. It gets 2 points

Sum the points for each criterion and add 1 point to each so that all 4 criteria are considered in the comparison study and calculate weight for each criterion.

Table 6-7 Example of Pairwise Comparisons (2)

Criteria	Total Points	Weights
Vertical alignment	2	0.20
Horizontal alignment	1	0.10
Drainage conditions	4	0.40
Social condition	3	0.30
Source: F3LTM		

(3) Scoring

WG5 decided the levels of each criterion mentioned above as follows,

Table 6-8 Scouring of Criteria

	Criterion	Points			Weights
		0	10	20	
I	Vertical Alignment	Flat	Up/Down	Sag	0.20
II	Horizontal Alignment	Straight	-	Curve	0.10
III	Drainage conditions	Good	-	Bad	0.40
IV	Social condition	Rural	Suburb	Urban	0.30
Source: F3LTM					

The score range is from 0 to 20 and higher is more vulnerable to damage. It can be used as an indicator for the prioritization for needs to repair. There are 36 ranks of the score with the criteria above which are shown in the table below.

Table 6-9 Possible Scores by Rank

Rank	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score
1	Sag	Curve	Bad	Urban	**20**
2	Up/Down	Curve	Bad	Urban	**18**
2	Sag	Straight	Bad	Urban	**18**
3	Sag	Curve	Bad	Suburb	**17**
4	Flat	Curve	Bad	Urban	**16**
4	Up/Down	Straight	Bad	Urban	**16**
5	Up/Down	Curve	Bad	Suburb	**15**
5	Sag	Straight	Bad	Suburb	**15**
6	Flat	Straight	Bad	Urban	**14**
6	Sag	Curve	Bad	Rural	**14**
7	Flat	Curve	Bad	Suburb	**13**
7	Up/Down	Straight	Bad	Suburb	**13**
8	Up/Down	Curve	Bad	Rural	**12**
8	Sag	Straight	Bad	Rural	**12**
8	Sag	Curve	Good	Urban	**12**
9	Flat	Straight	Bad	Suburb	**11**
10	Flat	Curve	Bad	Rural	**10**
10	Up/Down	Straight	Bad	Rural	**10**
10	Up/Down	Curve	Good	Urban	**10**
10	Sag	Straight	Good	Urban	**10**
11	Sag	Curve	Good	Suburb	**9**
12	Flat	Straight	Bad	Rural	**8**
12	Flat	Curve	Good	Urban	**8**
12	Up/Down	Straight	Good	Urban	**8**
13	Up/Down	Curve	Good	Suburb	**7**
13	Sag	Straight	Good	Suburb	**7**
14	Flat	Straight	Good	Urban	**6**
14	Sag	Curve	Good	Rural	**6**
15	Flat	Curve	Good	Suburb	**5**
15	Up/Down	Straight	Good	Suburb	**5**
16	Up/Down	Curve	Good	Rural	**4**
16	Sag	Straight	Good	Rural	**4**
17	Flat	Straight	Good	Suburb	**3**
18	Flat	Curve	Good	Rural	**2**
18	Up/Down	Straight	Good	Rural	**2**
19	Flat	Straight	Good	Rural	**0**

Source: F3LTM

(4) Aggregation

WG5 selected the sections with Level A and made the list for prioritization. The sections are evaluated by the multi-criteria analysis method mentioned above and each section has own score.

There are 190 sections with Leve A in this list for prioritization. The score of all the sections with Level A is shown in the table below.

Table 6-10 Score of the Sections with Level A in NR2

PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score
110.900	110.950	A	10	0	0	20	8
110.950	111.000	A	10	0	0	20	8
112.100	112.150	A	0	0	0	10	3
112.400	112.450	A	0	0	0	10	3
113.350	113.400	A	0	0	0	10	3
113.700	113.750	A	0	0	0	10	3
113.850	113.900	A	0	0	0	10	3
113.900	113.950	A	0	0	0	10	3
114.050	114.100	A	10	0	0	10	5
114.100	114.150	A	10	0	0	10	5
114.800	114.850	A	10	0	0	10	5
115.050	115.100	A	10	0	0	10	5
115.100	115.150	A	10	0	0	10	5
115.500	115.550	A	10	0	0	10	5
116.050	116.100	A	10	0	0	10	5
116.650	116.700	A	10	0	0	10	5
116.700	116.750	A	10	0	0	10	5
116.750	116.800	A	10	0	0	0	2
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
209.150	209.200	A	10	0	0	10	5
209.200	209.250	A	10	0	0	10	5
209.750	209.800	A	0	0	0	10	3

Source: F3LTM

(5) Analysis and Ranking

The list of the sections with Level A is accommodated in descending order as the table below.

Table 6-11 Score of the Sections with Level A in NR2 in Descending Order

PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score
143.100	143.150	A	10	0	20	0	10
110.900	110.950	A	10	0	0	20	8
110.950	111.000	A	10	0	0	20	8
190.900	190.950	A	10	0	0	20	8
190.950	191.000	A	10	0	0	20	8
193.400	193.450	A	10	0	0	20	8
193.450	193.500	A	10	0	0	20	8
193.650	193.700	A	10	0	0	20	8
193.700	193.750	A	10	0	0	20	8
193.750	193.800	A	10	0	0	20	8
193.800	193.850	A	10	0	0	20	8
193.850	193.900	A	10	0	0	20	8
204.300	204.350	A	10	0	0	20	8
204.350	204.400	A	10	0	0	20	8
204.400	204.450	A	10	0	0	20	8
204.450	204.500	A	10	0	0	20	8

PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score
192.000	192.050	A	20	0	0	10	7
114.050	114.100	A	10	0	0	10	5
180.950	181.000	A	0	0	0	0	0
181.000	181.050	A	0	0	0	0	0
181.050	181.100	A	0	0	0	0	0
Source: F3LTM							

6.7 Shortlisting

There shall be cost, work types and quantity added to the Table 6-11 for shortlisting. The cost shall be accumulated up to the limit of the estimated budget of the following year, or target request budget. WG5 set the condition of shortlisting from the actual allocated budget of 2024. It is set 50% more than the allocated budget of 2024, which is 392,934,000 Ar. The shortlist includes the sections till the condition of shortlisting, which is shown as the RED LINE in the table below.

Table 6-12 Shortlisting Tabel (RNP2)

PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
143.100	143.150	A	10	0	20	0	10	2,760,550	2,760,550
110.900	110.950	A	10	0	0	20	8	800,000	3,560,550
110.950	111.000	A	10	0	0	20	8	800,000	4,360,550
190.900	190.950	A	10	0	0	20	8	4,000,000	8,360,550
190.950	191.000	A	10	0	0	20	8	4,342,400	12,702,950
193.400	193.450	A	10	0	0	20	8	2,268,300	14,971,250
193.450	193.500	A	10	0	0	20	8	331,200	15,302,450
193.650	193.700	A	10	0	0	20	8	922,150	16,224,600
193.700	193.750	A	10	0	0	20	8	480,000	16,704,600
193.750	193.800	A	10	0	0	20	8	833,600	17,538,200
193.800	193.850	A	10	0	0	20	8	1,848,550	19,386,750
193.850	193.900	A	10	0	0	20	8	2,411,200	21,797,950
204.300	204.350	A	10	0	0	20	8	7,108,800	28,906,750
204.350	204.400	A	10	0	0	20	8	7,539,200	36,445,950
204.400	204.450	A	10	0	0	20	8	3,553,600	39,999,550
204.450	204.500	A	10	0	0	20	8	8,494,400	48,493,950
192.000	192.050	A	20	0	0	10	7	5,142,400	53,636,350
114.050	114.100	A	10	0	0	10	5	2,456,000	56,092,350
114.100	114.150	A	10	0	0	10	5	3,211,200	59,303,550
114.800	114.850	A	10	0	0	10	5	33,600	59,337,150
115.050	115.100	A	10	0	0	10	5	2,533,350	61,870,500
115.100	115.150	A	10	0	0	10	5	6,593,600	68,464,100
115.500	115.550	A	10	0	0	10	5	3,278,400	71,742,500
116.050	116.100	A	10	0	0	10	5	5,142,400	76,884,900
116.650	116.700	A	10	0	0	10	5	1,644,800	78,529,700
116.700	116.750	A	10	0	0	10	5	5,667,200	84,196,900
188.250	188.300	A	10	0	0	10	5	1,590,400	85,787,300
188.600	188.650	A	10	0	0	10	5	33,600	85,820,900
189.050	189.100	A	10	0	0	10	5	22,400	85,843,300
190.700	190.750	A	10	0	0	10	5	320,000	86,163,300
191.650	191.700	A	10	0	0	10	5	11,200	86,174,500
191.700	191.750	A	10	0	0	10	5	8,011,200	94,185,700
191.900	191.950	A	10	0	0	10	5	56,000	94,241,700
191.950	192.000	A	10	0	0	10	5	33,600	94,275,300
192.450	192.500	A	10	0	0	10	5	2,274,150	96,549,450
192.700	192.750	A	10	0	0	10	5	4,900,800	101,450,250

PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
193.200	193.250	A	10	0	0	10	5	579,750	102,030,000
193.250	193.300	A	10	0	0	10	5	1,865,650	103,895,650
193.300	193.350	A	10	0	0	10	5	1,457,100	105,352,750
193.350	193.400	A	10	0	0	10	5	1,059,750	106,412,500
195.750	195.800	A	10	0	0	10	5	9,600,000	116,012,500
195.800	195.850	A	10	0	0	10	5	2,571,200	118,583,700
196.900	196.950	A	10	0	0	10	5	1,611,200	120,194,900
196.950	197.000	A	10	0	0	10	5	800,000	120,994,900
197.200	197.250	A	10	0	0	10	5	2,560,000	123,554,900
197.250	197.300	A	10	0	0	10	5	1,462,400	125,017,300
197.500	197.550	A	10	0	0	10	5	845,400	125,862,700
197.550	197.600	A	10	0	0	10	5	282,150	126,144,850
197.600	197.650	A	10	0	0	10	5	1,374,950	127,519,800
197.650	197.700	A	10	0	0	10	5	11,200	127,531,000
198.250	198.300	A	10	0	0	10	5	160,000	127,691,000
198.300	198.350	A	10	0	0	10	5	8,000,000	135,691,000
198.400	198.450	A	10	0	0	10	5	3,553,600	139,244,600
201.700	201.750	A	10	0	0	10	5	883,200	140,127,800
201.750	201.800	A	10	0	0	10	5	1,870,950	141,998,750
201.800	201.850	A	10	0	0	10	5	1,760,000	143,758,750
201.850	201.900	A	10	0	0	10	5	6,483,200	150,241,950
209.150	209.200	A	10	0	0	10	5	12,306,150	162,548,100
209.200	209.250	A	10	0	0	10	5	11,058,750	173,606,850
184.000	184.050	A	20	0	0	0	4	4,883,200	178,490,050
112.100	112.150	A	0	0	0	10	3	1,556,800	180,046,850
112.400	112.450	A	0	0	0	10	3	160,000	180,206,850
113.350	113.400	A	0	0	0	10	3	182,400	180,389,250
113.700	113.750	A	0	0	0	10	3	4,033,600	184,422,850
113.850	113.900	A	0	0	0	10	3	2,411,200	186,834,050
113.900	113.950	A	0	0	0	10	3	2,512,000	189,346,050
186.400	186.450	A	0	0	0	10	3	2,400,000	191,746,050
194.400	194.450	A	0	0	0	10	3	2,488,550	194,234,600
194.450	194.500	A	0	0	0	10	3	811,200	195,045,800
194.750	194.800	A	0	0	0	10	3	1,131,200	196,177,000
209.750	209.800	A	0	0	0	10	3	3,720,550	199,897,550
116.750	116.800	A	10	0	0	0	2	171,200	200,068,750
116.800	116.850	A	10	0	0	0	2	2,174,400	202,243,150
116.850	116.900	A	10	0	0	0	2	3,299,750	205,542,900
119.650	119.700	A	10	0	0	0	2	1,363,200	206,906,100
119.800	119.850	A	10	0	0	0	2	2,753,600	209,659,700
119.850	119.900	A	10	0	0	0	2	4,508,300	214,168,000
119.900	119.950	A	10	0	0	0	2	9,953,600	224,121,600
119.950	120.000	A	10	0	0	0	2	6,963,200	231,084,800
124.950	125.000	A	10	0	0	0	2	155,750	231,240,550
125.000	125.050	A	10	0	0	0	2	11,200	231,251,750
125.050	125.100	A	10	0	0	0	2	112,000	231,363,750
125.700	125.750	A	10	0	0	0	2	8,160,000	239,523,750
126.200	126.250	A	10	0	0	0	2	33,600	239,557,350
126.250	126.300	A	10	0	0	0	2	56,000	239,613,350
126.300	126.350	A	10	0	0	0	2	11,200	239,624,550
126.750	126.800	A	10	0	0	0	2	1,171,200	240,795,750
126.800	126.850	A	10	0	0	0	2	8,089,600	248,885,350
128.750	128.800	A	10	0	0	0	2	740,300	249,625,650
142.650	142.700	A	10	0	0	0	2	1,633,600	251,259,250
142.800	142.850	A	10	0	0	0	2	3,526,400	254,785,650
143.000	143.050	A	10	0	0	0	2	22,400	254,808,050

PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
143.050	143.100	A	10	0	0	0	2	182,400	254,990,450
143.950	144.000	A	10	0	0	0	2	44,800	255,035,250
147.550	147.600	A	10	0	0	0	2	16,933,350	271,968,600
148.200	148.250	A	10	0	0	0	2	1,137,600	273,106,200
152.800	152.850	A	10	0	0	0	2	1,600,000	274,706,200
152.850	152.900	A	10	0	0	0	2	1,622,400	276,328,600
152.950	153.000	A	10	0	0	0	2	22,400	276,351,000
153.550	153.600	A	10	0	0	0	2	8,110,950	284,461,950
153.600	153.650	A	10	0	0	0	2	5,750,400	290,212,350
153.650	153.700	A	10	0	0	0	2	2,604,800	292,817,150
158.750	158.800	A	10	0	0	0	2	971,200	293,788,350
168.400	168.450	A	10	0	0	0	2	3,222,400	297,010,750
176.500	176.550	A	10	0	0	0	2	11,200	297,021,950
176.800	176.850	A	10	0	0	0	2	1,600,000	298,621,950
177.050	177.100	A	10	0	0	0	2	800,000	299,421,950
177.550	177.600	A	10	0	0	0	2	1,126,400	300,548,350
177.600	177.650	A	10	0	0	0	2	1,948,800	302,497,150
177.800	177.850	A	10	0	0	0	2	11,200	302,508,350
177.850	177.900	A	10	0	0	0	2	56,000	302,564,350
177.900	177.950	A	10	0	0	0	2	1,600,000	304,164,350
183.100	183.150	A	10	0	0	0	2	2,400,000	306,564,350
183.150	183.200	A	10	0	0	0	2	1,600,000	308,164,350
184.100	184.150	A	10	0	0	0	2	800,000	308,964,350
184.150	184.200	A	10	0	0	0	2	4,800,000	313,764,350
117.100	117.150	A	0	0	0	0	0	1,611,200	315,375,550
117.150	117.200	A	0	0	0	0	0	282,150	315,657,700
117.850	117.900	A	0	0	0	0	0	2,400,000	318,057,700
117.900	117.950	A	0	0	0	0	0	342,400	318,400,100
118.350	118.400	A	0	0	0	0	0	160,000	318,560,100
118.400	118.450	A	0	0	0	0	0	2,489,600	321,049,700
118.700	118.750	A	0	0	0	0	0	5,942,400	326,992,100
118.850	118.900	A	0	0	0	0	0	353,600	327,345,700
118.900	118.950	A	0	0	0	0	0	3,942,400	331,288,100
119.050	119.100	A	0	0	0	0	0	4,171,750	335,459,850
119.150	119.200	A	0	0	0	0	0	734,400	336,194,250
119.200	119.250	A	0	0	0	0	0	44,800	336,239,050
119.250	119.300	A	0	0	0	0	0	193,600	336,432,650
120.150	120.200	A	0	0	0	0	0	2,433,600	338,866,250
120.200	120.250	A	0	0	0	0	0	4,265,600	343,131,850
120.800	120.850	A	0	0	0	0	0	5,070,950	348,202,800
121.200	121.250	A	0	0	0	0	0	11,136,100	359,338,900
121.250	121.300	A	0	0	0	0	0	14,991,500	374,330,400
121.300	121.350	A	0	0	0	0	0	11,962,150	386,292,550
121.600	121.650	A	0	0	0	0	0	17,386,700	403,679,250
121.900	121.950	A	0	0	0	0	0	5,633,600	409,312,850
121.950	122.000	A	0	0	0	0	0	3,222,400	412,535,250
122.000	122.050	A	0	0	0	0	0	10,582,400	423,117,650
123.250	123.300	A	0	0	0	0	0	22,400	423,140,050
123.750	123.800	A	0	0	0	0	0	5,181,900	428,321,950
124.050	124.100	A	0	0	0	0	0	88,550	428,410,500
124.200	124.250	A	0	0	0	0	0	1,633,600	430,044,100
124.250	124.300	A	0	0	0	0	0	3,520,000	433,564,100
124.300	124.350	A	0	0	0	0	0	11,068,300	444,632,400
124.350	124.400	A	0	0	0	0	0	8,811,200	453,443,600
124.400	124.450	A	0	0	0	0	0	7,233,600	460,677,200
124.450	124.500	A	0	0	0	0	0	88,550	460,765,750

PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
124.500	124.550	A	0	0	0	0	0	2,604,800	463,370,550
124.550	124.600	A	0	0	0	0	0	44,800	463,415,350
124.600	124.650	A	0	0	0	0	0	5,700,800	469,116,150
124.650	124.700	A	0	0	0	0	0	2,456,000	471,572,150
125.150	125.200	A	0	0	0	0	0	22,400	471,594,550
125.300	125.350	A	0	0	0	0	0	4,430,950	476,025,500
132.950	133.000	A	0	0	0	0	0	22,400	476,047,900
133.150	133.200	A	0	0	0	0	0	14,174,400	490,222,300
133.200	133.250	A	0	0	0	0	0	4,326,400	494,548,700
140.000	140.050	A	0	0	0	0	0	160,000	494,708,700
140.050	140.100	A	0	0	0	0	0	2,826,150	497,534,850
144.000	144.050	A	0	0	0	0	0	304,550	497,839,400
144.050	144.100	A	0	0	0	0	0	2,064,550	499,903,950
144.650	144.700	A	0	0	0	0	0	7,638,400	507,542,350
149.350	149.400	A	0	0	0	0	0	182,400	507,724,750
149.400	149.450	A	0	0	0	0	0	11,200	507,735,950
150.100	150.150	A	0	0	0	0	0	2,726,400	510,462,350
150.150	150.200	A	0	0	0	0	0	88,550	510,550,900
150.200	150.250	A	0	0	0	0	0	33,600	510,584,500
150.250	150.300	A	0	0	0	0	0	977,100	511,561,600
150.500	150.550	A	0	0	0	0	0	811,200	512,372,800
150.550	150.600	A	0	0	0	0	0	801,600	513,174,400
151.550	151.600	A	0	0	0	0	0	179,200	513,353,600
151.800	151.850	A	0	0	0	0	0	3,606,400	516,960,000
153.200	153.250	A	0	0	0	0	0	11,200	516,971,200
153.250	153.300	A	0	0	0	0	0	2,489,600	519,460,800
156.000	156.050	A	0	0	0	0	0	960,000	520,420,800
159.900	159.950	A	0	0	0	0	0	2,400,000	522,820,800
162.850	162.900	A	0	0	0	0	0	8,867,200	531,688,000
163.300	163.350	A	0	0	0	0	0	822,400	532,510,400
164.850	164.900	A	0	0	0	0	0	1,600,000	534,110,400
165.250	165.300	A	0	0	0	0	0	800,000	534,910,400
173.950	174.000	A	0	0	0	0	0	5,926,400	540,836,800
174.000	174.050	A	0	0	0	0	0	3,200,000	544,036,800
180.350	180.400	A	0	0	0	0	0	22,400	544,059,200
180.550	180.600	A	0	0	0	0	0	2,400,000	546,459,200
180.600	180.650	A	0	0	0	0	0	800,000	547,259,200
180.650	180.700	A	0	0	0	0	0	1,600,000	548,859,200
180.750	180.800	A	0	0	0	0	0	574,400	549,433,600
180.950	181.000	A	0	0	0	0	0	800,000	550,233,600
181.000	181.050	A	0	0	0	0	0	56,000	550,289,600
181.050	181.100	A	0	0	0	0	0	2,560,000	552,849,600

Source: F3LTM

BLACK line: Budget amount set 100% of actual allocated budget in 2024
RED line: Budget amount set 150% of actual allocated budget in 2024
BLUE line: Budget amount set 200% of actual allocated budget in 2024
GREEN line: Budget amount set 400 million Ar.

There can be another conditions of shortlisting, such as BLUE and GREEN line shown in the table above. These conditions can be set by MTP though discussion among the related departments or external stakeholders. There isn't any specific methodology to apply to optimize this condition. If the government has an austerity policy, it can be decrease, if the regional economy needs to be boosted or there is strong claim from the public, it can be increased. Therefore, it is important to conduct social demand survey in aspects as is explained in subchapter 4.2.

The maintenance plan (1st version) is the list with the condition which is agreed among the stakeholders. If the condition is **"Budget amount set 150% of actual allocated budget in 2024"**, the plan is the table above from the top to the RED line. It is as same as the draft PEC which is shown as 5) in the Figure 2-1.

6.8 Verification, Coordination, and Finalization of Budget Request Documents

The 1st version of the maintenance plan is the base of the detailed discussion among the stakeholders. It should be verified by the GRs of the DRTPs. However, GRs shall understand the management strategy which was applied to the NRP2 (see Table 4-6.) and also the scenario which was selected for the 1st version of the maintenance plan (see subchapter 6.5.2.). And also, GRs should also see the prioritization result which is described in Table 6-12. Once GRs understand the process of planning, They should verify the plan if it reflects the real situation/condition of the route. There might be some sections which are already repaired due to the emergency needs. These sections don't need same repair methods to be executed so it should be excluded. There might be some sections which the deterioration progressed rapidly, and it should be treated by rehabilitation methods. These also need to be excluded. This is the step 6) in the Figure 2-1.

Coordination with the engineers and official who are in the higher positions of the ministries, head of province or prefectures can be in this coordination progress. However, the process of planning shall also be explained to the key stakeholders prior to the discussion as it is done with GRs of DRTPs. The maintenance plan for budget request is finally done and it shall be submitted Ministry of Finance and other related organizations.

6.9 Annual Maintenance Plan of RNP2, 2025

The 1st draft of the annual maintenance plan of RNP2, 2025 is demonstrated in the following table.

Table 6-13 Annual Maintenance Plan of RNP2, 2025 (Ar)

PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
143.100	143.150	112 000	2 400 000	0	0	248 550	2,760,550	2,760,550
110.900	110.950	0	800 000	0	0	0	800,000	3,560,550
110.950	111.000	0	0	0	0	800 000	800,000	4,360,550
190.900	190.950	0	4 000 000	0	0	0	4,000,000	8,360,550
190.950	191.000	22 400	4 000 000	0	0	320 000	4,342,400	12,702,950
193.400	193.450	11 200	1 600 000	0	0	657 100	2,268,300	14,971,250
193.450	193.500	11 200	0	0	0	320 000	331,200	15,302,450
193.650	193.700	33 600	800 000	0	0	88 550	922,150	16,224,600
193.700	193.750	0	0	0	0	480 000	480,000	16,704,600
193.750	193.800	33 600	800 000	0	0	0	833,600	17,538,200
193.800	193.850	0	800 000	0	0	1 048 550	1,848,550	19,386,750
193.850	193.900	11 200	2 400 000	0	0	0	2,411,200	21,797,950
204.300	204.350	56 000	2 400 000	0	2 252 800	2 400 000	7,108,800	28,906,750
204.350	204.400	89 600	4 800 000	0	1 689 600	960 000	7,539,200	36,445,950
204.400	204.450	33 600	2 400 000	0	0	1 120 000	3,553,600	39,999,550
204.450	204.500	168 000	7 200 000	0	1 126 400	0	8,494,400	48,493,950
192.000	192.050	22 400	4 000 000	0	0	1 120 000	5,142,400	53,636,350
114.050	114.100	56 000	2 400 000	0	0	0	2,456,000	56,092,350
114.100	114.150	11 200	3 200 000	0	0	0	3,211,200	59,303,550
114.800	114.850	33 600	0	0	0	0	33,600	59,337,150
115.050	115.100	44 800	2 400 000	0	0	88 550	2,533,350	61,870,500
115.100	115.150	33 600	5 600 000	0	0	960 000	6,593,600	68,464,100
115.500	115.550	78 400	2 400 000	0	0	800 000	3,278,400	71,742,500
116.050	116.100	22 400	3 200 000	0	0	1 920 000	5,142,400	76,884,900
116.650	116.700	44 800	1 600 000	0	0	0	1,644,800	78,529,700
116.700	116.750	67 200	4 800 000	0	0	800 000	5,667,200	84,196,900
188.250	188.300	67 200	800 000	0	563 200	160 000	1,590,400	85,787,300

PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
188.600	188.650	33 600	0	0	0	0	33,600	85,820,900
189.050	189.100	22 400	0	0	0	0	22,400	85,843,300
190.700	190.750	0	0	0	0	320 000	320,000	86,163,300
191.650	191.700	11 200	0	0	0	0	11,200	86,174,500
191.700	191.750	11 200	0	8 000 000	0	0	8,011,200	94,185,700
191.900	191.950	56 000	0	0	0	0	56,000	94,241,700
191.950	192.000	33 600	0	0	0	0	33,600	94,275,300
192.450	192.500	22 400	0	0	563 200	1 688 550	2,274,150	96,549,450
192.700	192.750	11 200	3 200 000	0	1 689 600	0	4,900,800	101,450,250
193.200	193.250	11 200	0	0	0	568 550	579,750	102,030,000
193.250	193.300	0	800 000	0	0	1 065 650	1,865,650	103,895,650
193.300	193.350	0	800 000	0	0	657 100	1,457,100	105,352,750
193.350	193.400	11 200	800 000	0	0	248 550	1,059,750	106,412,500
195.750	195.800	0	800 000	8 000 000	0	800 000	9,600,000	116,012,500
195.800	195.850	11 200	0	0	0	2 560 000	2,571,200	118,583,700
196.900	196.950	11 200	1 600 000	0	0	0	1,611,200	120,194,900
196.950	197.000	0	800 000	0	0	0	800,000	120,994,900
197.200	197.250	0	1 600 000	0	0	960 000	2,560,000	123,554,900
197.250	197.300	22 400	800 000	0	0	640 000	1,462,400	125,017,300
197.500	197.550	11 200	0	0	0	834 200	845,400	125,862,700
197.550	197.600	33 600	0	0	0	248 550	282,150	126,144,850
197.600	197.650	0	0	0	1 126 400	248 550	1,374,950	127,519,800
197.650	197.700	11 200	0	0	0	0	11,200	127,531,000
198.250	198.300	0	0	0	0	160 000	160,000	127,691,000
198.300	198.350	0	0	8 000 000	0	0	8,000,000	135,691,000
198.400	198.450	33 600	2 400 000	0	0	1 120 000	3,553,600	139,244,600
201.700	201.750	0	0	0	563 200	320 000	883,200	140,127,800
201.750	201.800	22 400	1 600 000	0	0	248 550	1,870,950	141,998,750
201.800	201.850	0	1 600 000	0	0	160 000	1,760,000	143,758,750
201.850	201.900	0	4 800 000	0	563 200	1 120 000	6,483,200	150,241,950
209.150	209.200	44 800	8 000 000	0	2 252 800	2 008 550	12,306,150	162,548,100
209.200	209.250	56 000	8 800 000	0	0	2 202 750	11,058,750	173,606,850
184.000	184.050	0	3 200 000	0	563 200	1 120 000	4,883,200	178,490,050
112.100	112.150	33 600	800 000	0	563 200	160 000	1,556,800	180,046,850
112.400	112.450	0	0	0	0	160 000	160,000	180,206,850
113.350	113.400	22 400	0	0	0	160 000	182,400	180,389,250
113.700	113.750	33 600	4 000 000	0	0	0	4,033,600	184,422,850
113.850	113.900	11 200	800 000	0	0	1 600 000	2,411,200	186,834,050
113.900	113.950	112 000	2 400 000	0	0	0	2,512,000	189,346,050
186.400	186.450	0	2 400 000	0	0	0	2,400,000	191,746,050
194.400	194.450	0	800 000	0	0	1 688 550	2,488,550	194,234,600
194.450	194.500	11 200	800 000	0	0	0	811,200	195,045,800
194.750	194.800	11 200	800 000	0	0	320 000	1,131,200	196,177,000
209.750	209.800	112 000	3 200 000	0	0	408 550	3,720,550	199,897,550
116.750	116.800	11 200	0	0	0	160 000	171,200	200,068,750
116.800	116.850	11 200	1 600 000	0	563 200	0	2,174,400	202,243,150
116.850	116.900	11 200	3 200 000	0	0	88 550	3,299,750	205,542,900
119.650	119.700	0	0	0	563 200	800 000	1,363,200	206,906,100
119.800	119.850	33 600	1 600 000	0	0	1 120 000	2,753,600	209,659,700
119.850	119.900	11 200	3 200 000	0	0	1 297 100	4,508,300	214,168,000
119.900	119.950	33 600	1 600 000	8 000 000	0	320 000	9,953,600	224,121,600
119.950	120.000	0	6 400 000	0	563 200	0	6,963,200	231,084,800
124.950	125.000	67 200	0	0	0	88 550	155,750	231,240,550
125.000	125.050	11 200	0	0	0	0	11,200	231,251,750
125.050	125.100	112 000	0	0	0	0	112,000	231,363,750
125.700	125.750	0	5 600 000	0	0	2 560 000	8,160,000	239,523,750
126.200	126.250	33 600	0	0	0	0	33,600	239,557,350
126.250	126.300	56 000	0	0	0	0	56,000	239,613,350
126.300	126.350	11 200	0	0	0	0	11,200	239,624,550
126.750	126.800	44 800	0	0	1 126 400	0	1,171,200	240,795,750
126.800	126.850	89 600	8 000 000	0	0	0	8,089,600	248,885,350
128.750	128.800	0	0	0	563 200	177 100	740,300	249,625,650
142.650	142.700	33 600	1 600 000	0	0	0	1,633,600	251,259,250
142.800	142.850	0	2 400 000	0	1 126 400	0	3,526,400	254,785,650
143.000	143.050	22 400	0	0	0	0	22,400	254,808,050
143.050	143.100	22 400	0	0	0	160 000	182,400	254,990,450
143.950	144.000	44 800	0	0	0	0	44,800	255,035,250
147.550	147.600	44 800	800 000	16 000 000	0	88 550	16,933,350	271,968,600
148.200	148.250	11 200	0	0	1 126 400	0	1,137,600	273,106,200
152.800	152.850	0	1 600 000	0	0	0	1,600,000	274,706,200

PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
152.850	152.900	22 400	1 600 000	0	0	0	1,622,400	276,328,600
152.950	153.000	22 400	0	0	0	0	22,400	276,351,000
153.550	153.600	22 400	0	8 000 000	0	88 550	8,110,950	284,461,950
153.600	153.650	67 200	4 000 000	0	563 200	1 120 000	5,750,400	290,212,350
153.650	153.700	44 800	2 400 000	0	0	160 000	2,604,800	292,817,150
158.750	158.800	11 200	0	0	0	960 000	971,200	293,788,350
168.400	168.450	22 400	3 200 000	0	0	0	3,222,400	297,010,750
176.500	176.550	11 200	0	0	0	0	11,200	297,021,950
176.800	176.850	0	1 600 000	0	0	0	1,600,000	298,621,950
177.050	177.100	0	800 000	0	0	0	800,000	299,421,950
177.550	177.600	0	0	0	1 126 400	0	1,126,400	300,548,350
177.600	177.650	22 400	800 000	0	1 126 400	0	1,948,800	302,497,150
177.800	177.850	11 200	0	0	0	0	11,200	302,508,350
177.850	177.900	56 000	0	0	0	0	56,000	302,564,350
177.900	177.950	0	1 600 000	0	0	0	1,600,000	304,164,350
183.100	183.150	0	2 400 000	0	0	0	2,400,000	306,564,350
183.150	183.200	0	1 600 000	0	0	0	1,600,000	308,164,350
184.100	184.150	0	800 000	0	0	0	800,000	308,964,350
184.150	184.200	0	4 800 000	0	0	0	4,800,000	313,764,350
117.100	117.150	11 200	1 600 000	0	0	0	1,611,200	315,375,550
117.150	117.200	33 600	0	0	0	248 550	282,150	315,657,700
117.850	117.900	0	1 600 000	0	0	800 000	2,400,000	318,057,700
117.900	117.950	22 400	0	0	0	320 000	342,400	318,400,100
118.350	118.400	0	0	0	0	160 000	160,000	318,560,100
118.400	118.450	0	0	0	1 689 600	800 000	2,489,600	321,049,700
118.700	118.750	22 400	2 400 000	0	0	3 520 000	5,942,400	326,992,100
118.850	118.900	33 600	0	0	0	320 000	353,600	327,345,700
118.900	118.950	0	0	0	3 942 400	0	3,942,400	331,288,100
119.050	119.100	0	1 600 000	0	563 200	2 008 550	4,171,750	335,459,850
119.150	119.200	11 200	0	0	563 200	160 000	734,400	336,194,250
119.200	119.250	44 800	0	0	0	0	44,800	336,239,050
119.250	119.300	33 600	0	0	0	160 000	193,600	336,432,650
120.150	120.200	33 600	2 400 000	0	0	0	2,433,600	338,866,250
120.200	120.250	22 400	1 600 000	0	563 200	2 080 000	4,265,600	343,131,850
120.800	120.850	22 400	4 000 000	0	0	1 048 550	5,070,950	348,202,800
121.200	121.250	44 800	9 600 000	0	0	1 491 300	11,136,100	359,338,900
121.250	121.300	11 200	13 600 000	0	563 200	817 100	14,991,500	374,330,400
121.300	121.350	33 600	9 600 000	0	0	2 328 550	11,962,150	386,292,550

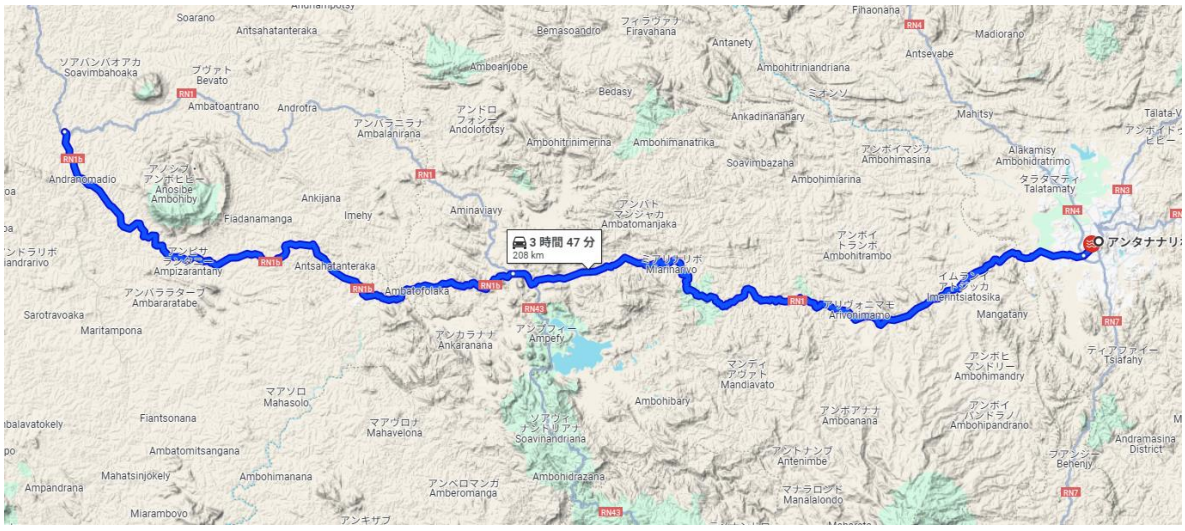
7 PREPARATION OF ANNUAL MAINTENANCE PLAN ON MODEL ROUTE (RNS1, Category II)

This chapter explains the procedure to plan the annual maintenance plan for a route of Category II. RNS1 is selected to be an example of it since RNS1 is one of 2 Model Roads of F3LTM project. It can be referred to plan the maintenance plan of the routes in the same category, such as RNS3, RNS5, and RN44, and etc.

7.1 Target Routes

Category II of National Highway consists of main routes of national road network which are important to the regions along the route, such as PNS1, 3, 5 and 44 and others. This chapter is to explain the procedure of planning the annual maintenance plan of RNS1 since it is one of 2 Model Roads of F3LTM project. The following are the outline of the RHS2.

- Origin & Destination: Antananarivo, Tsiroanomandidy
- Length: 220km
- Cross section: single lane (both direction)
- Terrain: hilly from Antananarivo to Tsiroanomandidy, but the longitudinal gradient is not so steep except for some sections.
- Characteristics: Main route to connect the capital city and the western regions of the country. The route stretches to the town called Tsiroanomandidy. The route continues westward and reaches to the Maintirano which is a coastal city with domestic airport and a small river port. The coast is mainly beach and the geographic condition is not for deep seaport.
- The route diverges into 2 routes at Analavory, which is approximately at 115km from the beginning point. This point is about 4km west of the diverging point of RN1 and RN43 in Analavory urban area. One route takes northern route and the other takes southern route. The northern route is called RN1 and the other is called RN1b. Nowadays, RN1b is utilized as the main route and F3LTM takes the southern route as a target route.
- Surface Condition: There are not so many heavily damaged sections as RNP2 since there are not so heavy traffic volume specifically of the heavy vehicles.

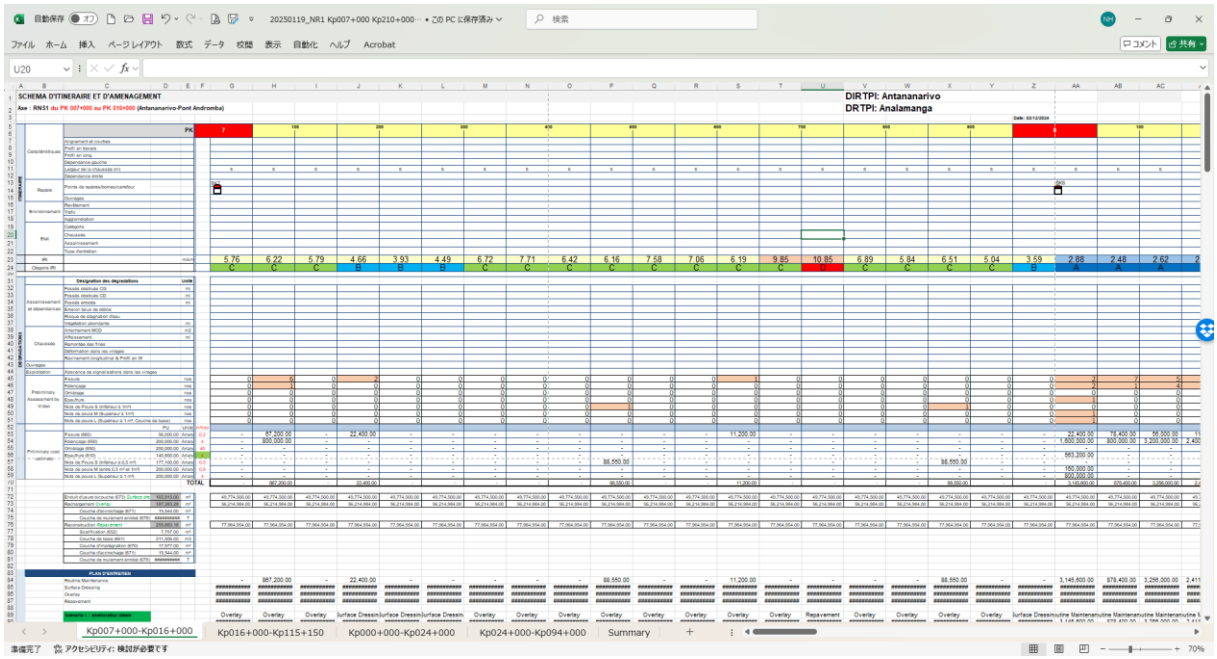


Source: Google Map

Figure 7-1 National Road No.1 (RNS1)

7.2 Inventory Data and the Result of Inspection

The inspection of road surface condition shall be updated frequently with DRIMS. It can be done once in 2 or 3 years since this route is secondary route. The frequency can be set as the result of the discussion in the DER. WG1 set the frequency as 3 years in F3LTM in the inspection manual. Updating the road surface condition is the most fundamental activity in the maintenance cycle. The planning was done with the result of DRIMS which are collected Oct 2024 in this project.



Source: SIA

Figure 7-2 SIA of National Road No.1 (RNS1)

7.3 Excluding the sections of ongoing/planned Rehabilitation Projects

There is not any ongoing rehabilitation or reconstruction project along the RNS1, so this step shall be excluded in planning the maintenance plan of RNS1.

7.4 Longlisting

Maintenance work of each section in the very draft of annual maintenance plan is defined by applying the management strategy of Category II road in Table 4-6, such as TEC (RM) for Level A road surface condition level, TEC (Surface dressing) for Level B, Rehabilitation for Lavel C and D. It is set as Overlay for Level C, and Repavement for Lavel D in the WG5 in F3LTM.

Longlist is prepared by extracting the PEC (Routine Maintenance) from the SIA above. The remaining sections can be listed as longlist of rehabilitation works. These longlists have the plan of the maintenance works of each section and rough estimates of quantity and implementation cost. Total sum of the implementation cost in the longlist is the required cost of maintenance works to maintain the target level. It also tells the location of the group of sections with high needs of rehabilitation, which is equivalent to sections with very bad conditions. MTP shall collect the opinions and requests from the residents and road users of these sections and reflect them in the maintenance plan. The longlist contains the types of repair/rehabilitation works, the quantity of the works, the rough cost estimate of the works of each section.

7.5 Scenario Setting

7.5.1 Scenario Setting

WG5 selected scenario 2 for RNS1 since it is a route of category II as is described in Table 6-1. The description is referred to subchapter 6.5. However, the comparison study is conducted to select the most realistic scenarios

7.5.2 Selecting the most realistic Scenario

The result of the cost calculation is demonstrated in the table below.

Table 7-1 Result of Cost Calculation by Scenarios (RN1, Cat II)

	SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4
PEC	2,838,801,500.00	58,835,114,000.00	4,347,918,500.00	1,509,117,000.00
REHAB	86,140,769,292.00	22,898,912,292.00	22,898,912,292.00	22,898,912,292.00
Ratio	1.88	38.99	2.88	1.00
Source: F3LTM				

The least amount of the cost among 4 scenarios is Scenario 4, “Do nothing” is applied to Level A sections, TEC (RM) to Level B, overlay to C sections, and repavement is applied to Level D sections. It is because Level A sections is left untouched and scenario 4 only repairs with routine maintenance of sections with Level B. Other sections with Level C, & D will be repaired/rehabilitated in rehabilitation project with other budget resources. However, it is not good to leave sections untouched even if the sections are in good condition, such as Level A.

The second cheapest scenario is Scenario 1, TEC (RM) is applied to Level A sections, overlay to Level B & C sections, and repavement is applied to Level D sections. It is because only Level A sections are included in the maintenance plan with routine maintenance. Other sections with Level B, C, & D will be repaired/rehabilitated in rehabilitation project with other budget resources. Moreover, this is scenario is based on the maintenance scenario for the routes of category I. Therefore, This can be considered as over specification scenario for RNS1, since it is a route of category II.

Scenario 2, TEC (RM) is applied to Level A sections, TEC (Surface Dressing) to Level B, overlay to Level C sections, and repavement is applied to Level D sections, is the scenario of management strategy of the routes of category II. However, it the most expensive because surface dressing is planned for sections with Level B. This is the most ideal scenario, but it is the most difficult plan to implement due to budget constraint.

Scenario 3, TEC (RM) is applied to Level A & B sections, overlay to Level C sections, and repavement is applied to Level D sections, is the scenario of management strategy of the routes of category III. It is a compensating scenario of scenario 2 if it is applied to a route of category II. It is difficult to say that this scenario is the most realistic scenario since this is the second expensive scenario.

Considering 4 alternative scenarios, whether scenario 1 or 4 is the most realistic scenario. The difference is scenario 1 implements the routine maintenance works in sections with Level A and scenario 4 in sections with Level B. Scenario 1 plans to do the rehabilitation work for the sections with Level B but scenario 4 doesn’t plan to implement any works in the sections with Level A. As it is mentioned above, scenario 4 is not good plan because it leaves the sections with Level A untouched. It is better to select scenario 1 rather than scenario 4 if other conditions permit.

Now, let’s compare with the actual maintenance budget which is allocated to NR1. The allocated budget for 2024 was 1,284,751,616.00 Ar. The comparison with the required budget for each scenario is demonstrated in the following table.

Table 7-2 Comparison with actual allocated budget, 2024 (RN1, Cat II)

	SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4
PEC	2,838,801,500.00	58,835,114,000.00	4,347,918,500.00	1,509,117,000.00
Ratio	0.45	0.02	0.30	0.85
Gap	1,554,049,884.00	57,550,362,384.00	3,063,166,884.00	224,365,384.00

Source: F3LTM

The comparison result shows that Scenario 4 is the easiest scenario to implement even though it is not very good strategy. The allocated budget is about 85% of the required budget. Only 17% of increase of the allocated budget can realise the implementation of this scenario.

Selecting scenario 1 requires more than twice amount of budget compared to the allocated budget of 2024. The allocated budget is 45% of the required budget. You need to increase the budget for 122% to complete the plan.

This is because the number of section which are in those 2 scenarios are different. Scenario 1 includes 1,416 sections which are 70.8km, scenario 4 includes 727 sections, 36.35km. The contents of the works of these scenarios do not differ very much since both of them implement routine maintenance works. It is better to implement the routine maintenance as in many sections as possible. Scenario 1 is better because it has the potential of implementing the routine maintenance works in 70.8km but scenario 4 has only for 36.35km. Moreover scenario 4 is not very good scenario because it does nothing to the sections with Level A. Therefore, WG5 selected scenario 1 as the most realistic scenario for RNS1.

Prioritization process is required to select the sections which are included in the maintenance plan of the following year. It will be described in the following subchapter.

7.6 Prioritization

7.6.1 Prioritization

The details are same as with RNP2. See subchapter 6.6.1.

7.6.2 Prioritization Criteria

The details are same as with RNP2. See subchapter 6.6.2.

7.6.3 Multi-Criteria Analysis

The details are same as with RNP2 up to (3) Scoring. See subchapter 6.6.3.

(4) Aggregation

WG5 selected the scenario 4 in F3LTM and extracted sections with Level B and made the list for prioritization. The sections are evaluated by the multi-criteria method mentioned above and each section has own score.

There are 1,416 sections with Leve A in this list for prioritization. The score of all the sections with Level A is shown in the table below.

Table 7-3 Score of the Sections with Level A in NR1

Route	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score
RN1	8.000	8.050	A	0	0	0	20	6
RN1	8.050	8.100	A	0	0	0	20	6
RN1	8.100	8.150	A	0	0	0	20	6
RN1	9.600	9.650	A	0	0	0	20	6
RN1	9.650	9.700	A	0	0	0	20	6
RN1	9.700	9.750	A	0	0	0	20	6
RN1	9.750	9.800	A	0	0	0	20	6
RN1	17.450	17.500	A	10	0	0	10	5
RN1	17.500	17.550	A	10	0	0	10	5
RN1	17.550	17.600	A	10	0	0	10	5
RN1	17.600	17.650	A	10	0	0	20	8
RN1	17.800	17.850	A	10	0	0	20	8
RN1	18.350	18.400	A	10	0	0	10	5
RN1	18.400	18.450	A	10	0	0	10	5
RN1	20.100	20.150	A	10	0	0	10	5
RN1	20.150	20.200	A	10	0	0	10	5
RN1	21.250	21.300	A	10	0	0	10	5
RN1	21.300	21.350	A	10	0	0	10	5
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
RN1BIS	93.850	93.900	A	0	0	0	20	6
RN1BIS	93.950	94.000	A	0	0	0	20	6
RN1BIS	94.000	94.050	A	0	0	0	20	6

Source: F3LTM

(5) Analysis and Ranking

The list of the sections with Level A is accommodated in descending order as the table below.

Table 7-4 Score of the Sections with Level A in NR1 in Descending Order

Route	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score
RN1	92.800	92.850	A	20	0	0	20	10
RN1	17.600	17.650	A	10	0	0	20	8
RN1	17.800	17.850	A	10	0	0	20	8
RN1	24.800	24.850	A	10	0	0	20	8
RN1	24.850	24.900	A	10	0	0	20	8
RN1	25.500	25.550	A	10	0	0	20	8
RN1	30.250	30.300	A	10	0	0	20	8
RN1	30.350	30.400	A	10	0	0	20	8
RN1	31.700	31.750	A	10	0	0	20	8
RN1	31.750	31.800	A	10	0	0	20	8
RN1	31.800	31.850	A	10	0	0	20	8
RN1	31.850	31.900	A	10	0	0	20	8
RN1	31.900	31.950	A	10	0	0	20	8
RN1	41.850	41.900	A	10	0	0	20	8
RN1	41.900	41.950	A	10	0	0	20	8
RN1	45.350	45.400	A	10	0	0	20	8

Route	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score
RN1	49.800	49.850	A	10	0	0	20	8
RN1	49.900	49.950	A	10	0	0	20	8
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
RN1BIS	22.800	22.850	A	10	0	0	10	5
RN1BIS	23.500	23.550	A	10	0	0	10	5
RN1BIS	23.550	23.600	A	10	0	0	10	5
Source: F3LTM								

7.7 Shortlisting

There shall be cost, work types and quantity added to the Table 7-4 for shortlisting. The cost shall be accumulated up to the limit of the estimated budget of the following year, or target request budget. WG5 set the condition of shortlisting from the actual allocated budget of 2024. It is set 50% more than the allocated budget of 2024, which is 1,927,127,424.00 Ar. The shortlist includes the sections till the condition of shortlisting, which is shown as the RED LINE in the table below.

Table 7-5 Shortlisting Tabel (RNS1)

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1BIS	92.800	92.850	A	20	0	0	20	10	33,600	33,600
RN1	17.600	17.650	A	10	0	0	20	8	800,000	833,600
RN1	17.800	17.850	A	10	0	0	20	8	11,200	844,800
RN1	24.800	24.850	A	10	0	0	20	8	1,600,000	2,444,800
RN1	24.850	24.900	A	10	0	0	20	8	3,200,000	5,644,800
RN1	25.500	25.550	A	10	0	0	20	8	7,704,550	13,349,350
RN1	30.250	30.300	A	10	0	0	20	8	800,000	14,149,350
RN1	30.350	30.400	A	10	0	0	20	8	1,137,600	15,286,950
RN1	31.700	31.750	A	10	0	0	20	8	2,963,200	18,250,150
RN1	31.750	31.800	A	10	0	0	20	8	2,252,800	20,502,950
RN1	31.800	31.850	A	10	0	0	20	8	1,689,600	22,192,550
RN1	31.850	31.900	A	10	0	0	20	8	1,938,150	24,130,700
RN1	31.900	31.950	A	10	0	0	20	8	1,126,400	25,257,100
RN1	41.850	41.900	A	10	0	0	20	8	160,000	25,417,100
RN1	41.900	41.950	A	10	0	0	20	8	800,000	26,217,100
RN1	45.350	45.400	A	10	0	0	20	8	4,000,000	30,217,100
RN1	49.800	49.850	A	10	0	0	20	8	11,200	30,228,300
RN1	49.900	49.950	A	10	0	0	20	8	888,550	31,116,850
RN1	49.950	50.000	A	10	0	0	20	8	1,600,000	32,716,850
RN1	52.750	52.800	A	10	0	0	20	8	2,422,400	35,139,250
RN1	54.050	54.100	A	10	0	0	20	8	563,200	35,702,450
RN1	54.100	54.150	A	10	0	0	20	8	800,000	36,502,450
RN1	57.900	57.950	A	10	0	0	20	8	800,000	37,302,450
RN1	58.000	58.050	A	10	0	0	20	8	1,600,000	38,902,450
RN1	60.700	60.750	A	10	0	0	20	8	2,400,000	41,302,450
RN1	64.650	64.700	A	10	0	0	20	8	1,600,000	42,902,450
RN1	64.700	64.750	A	10	0	0	20	8	7,200,000	50,102,450
RN1	65.850	65.900	A	10	0	0	20	8	22,400	50,124,850
RN1	65.950	66.000	A	10	0	0	20	8	5,760,000	55,884,850
RN1	68.400	68.450	A	10	0	0	20	8	99,750	55,984,600
RN1	68.450	68.500	A	10	0	0	20	8	11,200	55,995,800
RN1	72.700	72.750	A	10	0	0	20	8	1,600,000	57,595,800
RN1	79.900	79.950	A	10	0	0	20	8	9,600,000	67,195,800
RN1	87.400	87.450	A	10	0	0	20	8	408,550	67,604,350
RN1	97.300	97.350	A	10	0	0	20	8	5,600,000	73,204,350
RN1	97.350	97.400	A	10	0	0	20	8	7,200,000	80,404,350
RN1	97.400	97.450	A	10	0	0	20	8	8,000,000	88,404,350
RN1	105.500	105.550	A	10	0	0	20	8	800,000	89,204,350
RN1	105.550	105.600	A	10	0	0	20	8	563,200	89,767,550

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1	105.600	105.650	A	10	0	0	20	8	11,200	89,778,750
RN1BIS	11.700	11.750	A	10	0	0	20	8	1,600,000	91,378,750
RN1BIS	11.750	11.800	A	10	0	0	20	8	2,422,400	93,801,150
RN1BIS	11.800	11.850	A	10	0	0	20	8	960,000	94,761,150
RN1BIS	12.850	12.900	A	10	0	0	20	8	822,400	95,583,550
RN1BIS	18.700	18.750	A	10	0	0	20	8	2,163,200	97,746,750
RN1BIS	18.800	18.850	A	10	0	0	20	8	88,550	97,835,300
RN1BIS	22.350	22.400	A	10	0	0	20	8	4,088,550	101,923,850
RN1BIS	27.150	27.200	A	10	0	0	20	8	4,000,000	105,923,850
RN1BIS	27.900	27.950	A	10	0	0	20	8	563,200	106,487,050
RN1BIS	27.950	28.000	A	10	0	0	20	8	811,200	107,298,250
RN1BIS	28.150	28.200	A	10	0	0	20	8	22,400	107,320,650
RN1BIS	28.200	28.250	A	10	0	0	20	8	800,000	108,120,650
RN1BIS	28.400	28.450	A	10	0	0	20	8	3,222,400	111,343,050
RN1BIS	28.450	28.500	A	10	0	0	20	8	822,400	112,165,450
RN1BIS	28.500	28.550	A	10	0	0	20	8	800,000	112,965,450
RN1BIS	28.550	28.600	A	10	0	0	20	8	99,750	113,065,200
RN1BIS	28.600	28.650	A	10	0	0	20	8	811,200	113,876,400
RN1BIS	28.650	28.700	A	10	0	0	20	8	800,000	114,676,400
RN1BIS	47.900	47.950	A	10	0	0	20	8	800,000	115,476,400
RN1BIS	50.600	50.650	A	10	0	0	20	8	800,000	116,276,400
RN1BIS	50.650	50.700	A	10	0	0	20	8	22,400	116,298,800
RN1BIS	50.700	50.750	A	10	0	0	20	8	22,400	116,321,200
RN1BIS	56.000	56.050	A	10	0	0	20	8	2,411,200	118,732,400
RN1BIS	56.050	56.100	A	10	0	0	20	8	1,760,000	120,492,400
RN1BIS	56.100	56.150	A	10	0	0	20	8	2,411,200	122,903,600
RN1BIS	56.150	56.200	A	10	0	0	20	8	3,940,300	126,843,900
RN1BIS	56.900	56.950	A	10	0	0	20	8	1,778,150	128,622,050
RN1BIS	56.950	57.000	A	10	0	0	20	8	88,550	128,710,600
RN1BIS	57.000	57.050	A	10	0	0	20	8	265,650	128,976,250
RN1BIS	57.050	57.100	A	10	0	0	20	8	1,214,950	130,191,200
RN1BIS	65.500	65.550	A	10	0	0	20	8	88,550	130,279,750
RN1BIS	65.550	65.600	A	10	0	0	20	8	11,200	130,290,950
RN1BIS	65.900	65.950	A	10	0	0	20	8	563,200	130,854,150
RN1BIS	65.950	66.000	A	10	0	0	20	8	88,550	130,942,700
RN1BIS	66.200	66.250	A	10	0	0	20	8	2,411,200	133,353,900
RN1BIS	66.250	66.300	A	10	0	0	20	8	22,400	133,376,300
RN1BIS	66.300	66.350	A	10	0	0	20	8	833,600	134,209,900
RN1BIS	66.350	66.400	A	10	0	0	20	8	800,000	135,009,900
RN1BIS	66.400	66.450	A	10	0	0	20	8	2,411,200	137,421,100
RN1BIS	69.050	69.100	A	10	0	0	20	8	88,550	137,509,650
RN1BIS	75.800	75.850	A	10	0	0	20	8	800,000	138,309,650
RN1BIS	75.850	75.900	A	10	0	0	20	8	1,600,000	139,909,650
RN1BIS	75.900	75.950	A	10	0	0	20	8	9,611,200	149,520,850
RN1BIS	77.200	77.250	A	10	0	0	20	8	2,400,000	151,920,850
RN1BIS	77.250	77.300	A	10	0	0	20	8	1,385,600	153,306,450
RN1BIS	77.300	77.350	A	10	0	0	20	8	1,600,000	154,906,450
RN1BIS	77.350	77.400	A	10	0	0	20	8	800,000	155,706,450
RN1BIS	77.400	77.450	A	10	0	0	20	8	800,000	156,506,450
RN1BIS	77.500	77.550	A	10	0	0	20	8	800,000	157,306,450
RN1BIS	80.950	81.000	A	10	0	0	20	8	5,600,000	162,906,450
RN1BIS	81.000	81.050	A	10	0	0	20	8	2,400,000	165,306,450
RN1BIS	87.150	87.200	A	10	0	0	20	8	800,000	166,106,450
RN1BIS	87.250	87.300	A	10	0	0	20	8	2,400,000	168,506,450
RN1BIS	91.300	91.350	A	10	0	0	20	8	320,000	168,826,450
RN1BIS	91.350	91.400	A	10	0	0	20	8	4,088,550	172,915,000
RN1BIS	91.400	91.450	A	10	0	0	20	8	6,411,200	179,326,200
RN1BIS	91.850	91.900	A	10	0	0	20	8	11,200	179,337,400
RN1BIS	91.900	91.950	A	10	0	0	20	8	44,800	179,382,200
RN1BIS	91.950	92.000	A	10	0	0	20	8	22,400	179,404,600
RN1BIS	92.000	92.050	A	10	0	0	20	8	11,200	179,415,800
RN1BIS	92.400	92.450	A	10	0	0	20	8	800,000	180,215,800

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1BIS	92.500	92.550	A	10	0	0	20	8	11,200	180,227,000
RN1BIS	92.550	92.600	A	10	0	0	20	8	22,400	180,249,400
RN1BIS	92.600	92.650	A	10	0	0	20	8	2,478,400	182,727,800
RN1BIS	92.650	92.700	A	10	0	0	20	8	11,200	182,739,000
RN1BIS	92.700	92.750	A	10	0	0	20	8	1,622,400	184,361,400
RN1BIS	92.750	92.800	A	10	0	0	20	8	33,600	184,395,000
RN1BIS	92.850	92.900	A	10	0	0	20	8	22,400	184,417,400
RN1BIS	92.900	92.950	A	10	0	0	20	8	67,200	184,484,600
RN1BIS	92.950	93.000	A	10	0	0	20	8	11,200	184,495,800
RN1BIS	93.000	93.050	A	10	0	0	20	8	574,400	185,070,200
RN1BIS	93.050	93.100	A	10	0	0	20	8	563,200	185,633,400
RN1	59.000	59.050	A	20	0	0	10	7	811,200	186,444,600
RN1	68.750	68.800	A	20	0	0	10	7	7,211,200	193,655,800
RN1	78.300	78.350	A	20	0	0	10	7	3,200,000	196,855,800
RN1	114.000	114.050	A	20	0	0	10	7	888,550	197,744,350
RN1BIS	7.800	7.850	A	20	0	0	10	7	1,688,550	199,432,900
RN1BIS	8.200	8.250	A	20	0	0	10	7	2,400,000	201,832,900
RN1BIS	13.450	13.500	A	20	0	0	10	7	22,400	201,855,300
RN1BIS	33.850	33.900	A	20	0	0	10	7	199,500	202,054,800
RN1BIS	35.400	35.450	A	20	0	0	10	7	800,000	202,854,800
RN1BIS	68.600	68.650	A	20	0	0	10	7	800,000	203,654,800
RN1BIS	77.700	77.750	A	20	0	0	10	7	8,000,000	211,654,800
RN1BIS	80.650	80.700	A	20	0	0	10	7	9,611,200	221,266,000
RN1BIS	83.750	83.800	A	20	0	0	10	7	5,600,000	226,866,000
RN1BIS	84.600	84.650	A	20	0	0	10	7	7,200,000	234,066,000
RN1BIS	87.700	87.750	A	20	0	0	10	7	800,000	234,866,000
RN1BIS	90.100	90.150	A	20	0	0	10	7	7,288,550	242,154,550
RN1BIS	91.100	91.150	A	20	0	0	10	7	5,363,200	247,517,750
RN1	8.000	8.050	A	0	0	0	20	6	3,145,600	250,663,350
RN1	8.050	8.100	A	0	0	0	20	6	878,400	251,541,750
RN1	8.100	8.150	A	0	0	0	20	6	3,256,000	254,797,750
RN1	9.600	9.650	A	0	0	0	20	6	844,800	255,642,550
RN1	9.650	9.700	A	0	0	0	20	6	245,350	255,887,900
RN1	9.700	9.750	A	0	0	0	20	6	878,400	256,766,300
RN1	9.750	9.800	A	0	0	0	20	6	4,123,200	260,889,500
RN1	24.900	24.950	A	0	0	0	20	6	800,000	261,689,500
RN1	25.450	25.500	A	0	0	0	20	6	3,371,200	265,060,700
RN1	39.950	40.000	A	0	0	0	20	6	160,000	265,220,700
RN1	40.050	40.100	A	0	0	0	20	6	11,200	265,231,900
RN1	54.300	54.350	A	0	0	0	20	6	1,600,000	266,831,900
RN1	65.700	65.750	A	0	0	0	20	6	4,000,000	270,831,900
RN1	65.750	65.800	A	0	0	0	20	6	8,000,000	278,831,900
RN1	65.800	65.850	A	0	0	0	20	6	7,211,200	286,043,100
RN1	73.850	73.900	A	0	0	0	20	6	1,600,000	287,643,100
RN1	73.900	73.950	A	0	0	0	20	6	3,200,000	290,843,100
RN1	73.950	74.000	A	0	0	0	20	6	2,400,000	293,243,100
RN1	74.000	74.050	A	0	0	0	20	6	88,550	293,331,650
RN1	87.450	87.500	A	0	0	0	20	6	22,400	293,354,050
RN1	87.500	87.550	A	0	0	0	20	6	22,400	293,376,450
RN1	88.700	88.750	A	0	0	0	20	6	2,400,000	295,776,450
RN1	88.800	88.850	A	0	0	0	20	6	2,400,000	298,176,450
RN1	88.850	88.900	A	0	0	0	20	6	88,550	298,265,000
RN1	93.800	93.850	A	0	0	0	20	6	177,100	298,442,100
RN1	93.900	93.950	A	0	0	0	20	6	800,000	299,242,100
RN1	109.550	109.600	A	0	0	0	20	6	11,200	299,253,300
RN1	112.350	112.400	A	0	0	0	20	6	800,000	300,053,300
RN1	112.400	112.450	A	0	0	0	20	6	5,600,000	305,653,300
RN1	114.600	114.650	A	0	0	0	20	6	4,270,950	309,924,250
RN1	114.650	114.700	A	0	0	0	20	6	2,411,200	312,335,450
RN1	114.700	114.750	A	0	0	0	20	6	977,100	313,312,550
RN1	114.750	114.800	A	0	0	0	20	6	5,600,000	318,912,550
RN1	114.800	114.850	A	0	0	0	20	6	4,800,000	323,712,550

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1	114.850	114.900	A	0	0	0	20	6	5,600,000	329,312,550
RN1	114.900	114.950	A	0	0	0	20	6	3,211,200	332,523,750
RN1BIS	27.200	27.250	A	0	0	0	20	6	800,000	333,323,750
RN1BIS	27.250	27.300	A	0	0	0	20	6	563,200	333,886,950
RN1BIS	27.350	27.400	A	0	0	0	20	6	5,305,600	339,192,550
RN1BIS	27.400	27.450	A	0	0	0	20	6	585,600	339,778,150
RN1BIS	27.800	27.850	A	0	0	0	20	6	833,600	340,611,750
RN1BIS	28.250	28.300	A	0	0	0	20	6	22,400	340,634,150
RN1BIS	28.300	28.350	A	0	0	0	20	6	585,600	341,219,750
RN1BIS	36.900	36.950	A	0	0	0	20	6	888,550	342,108,300
RN1BIS	36.950	37.000	A	0	0	0	20	6	800,000	342,908,300
RN1BIS	37.250	37.300	A	0	0	0	20	6	730,800	343,639,100
RN1BIS	46.600	46.650	A	0	0	0	20	6	1,611,200	345,250,300
RN1BIS	46.700	46.750	A	0	0	0	20	6	4,000,000	349,250,300
RN1BIS	46.750	46.800	A	0	0	0	20	6	800,000	350,050,300
RN1BIS	46.800	46.850	A	0	0	0	20	6	11,200	350,061,500
RN1BIS	46.850	46.900	A	0	0	0	20	6	22,400	350,083,900
RN1BIS	56.200	56.250	A	0	0	0	20	6	11,200	350,095,100
RN1BIS	56.250	56.300	A	0	0	0	20	6	4,000,000	354,095,100
RN1BIS	56.350	56.400	A	0	0	0	20	6	2,400,000	356,495,100
RN1BIS	56.700	56.750	A	0	0	0	20	6	88,550	356,583,650
RN1BIS	56.750	56.800	A	0	0	0	20	6	265,650	356,849,300
RN1BIS	56.800	56.850	A	0	0	0	20	6	800,000	357,649,300
RN1BIS	56.850	56.900	A	0	0	0	20	6	2,577,100	360,226,400
RN1BIS	62.250	62.300	A	0	0	0	20	6	11,200	360,237,600
RN1BIS	62.300	62.350	A	0	0	0	20	6	44,800	360,282,400
RN1BIS	63.800	63.850	A	0	0	0	20	6	160,000	360,442,400
RN1BIS	64.000	64.050	A	0	0	0	20	6	1,600,000	362,042,400
RN1BIS	64.050	64.100	A	0	0	0	20	6	88,550	362,130,950
RN1BIS	66.000	66.050	A	0	0	0	20	6	160,000	362,290,950
RN1BIS	66.050	66.100	A	0	0	0	20	6	563,200	362,854,150
RN1BIS	66.100	66.150	A	0	0	0	20	6	608,000	363,462,150
RN1BIS	66.150	66.200	A	0	0	0	20	6	1,148,800	364,610,950
RN1BIS	73.850	73.900	A	0	0	0	20	6	22,400	364,633,350
RN1BIS	73.900	73.950	A	0	0	0	20	6	563,200	365,196,550
RN1BIS	74.200	74.250	A	0	0	0	20	6	800,000	365,996,550
RN1BIS	74.250	74.300	A	0	0	0	20	6	1,600,000	367,596,550
RN1BIS	74.300	74.350	A	0	0	0	20	6	11,200	367,607,750
RN1BIS	74.350	74.400	A	0	0	0	20	6	574,400	368,182,150
RN1BIS	81.100	81.150	A	0	0	0	20	6	1,600,000	369,782,150
RN1BIS	81.150	81.200	A	0	0	0	20	6	811,200	370,593,350
RN1BIS	81.350	81.400	A	0	0	0	20	6	5,600,000	376,193,350
RN1BIS	81.400	81.450	A	0	0	0	20	6	800,000	376,993,350
RN1BIS	81.450	81.500	A	0	0	0	20	6	1,600,000	378,593,350
RN1BIS	81.500	81.550	A	0	0	0	20	6	5,633,600	384,226,950
RN1BIS	81.550	81.600	A	0	0	0	20	6	3,200,000	387,426,950
RN1BIS	81.600	81.650	A	0	0	0	20	6	800,000	388,226,950
RN1BIS	81.800	81.850	A	0	0	0	20	6	1,600,000	389,826,950
RN1BIS	81.850	81.900	A	0	0	0	20	6	2,163,200	391,990,150
RN1BIS	81.900	81.950	A	0	0	0	20	6	800,000	392,790,150
RN1BIS	81.950	82.000	A	0	0	0	20	6	1,600,000	394,390,150
RN1BIS	82.000	82.050	A	0	0	0	20	6	2,400,000	396,790,150
RN1BIS	86.300	86.350	A	0	0	0	20	6	811,200	397,601,350
RN1BIS	86.350	86.400	A	0	0	0	20	6	800,000	398,401,350
RN1BIS	86.400	86.450	A	0	0	0	20	6	800,000	399,201,350
RN1BIS	86.600	86.650	A	0	0	0	20	6	177,100	399,378,450
RN1BIS	86.650	86.700	A	0	0	0	20	6	88,550	399,467,000
RN1BIS	86.750	86.800	A	0	0	0	20	6	800,000	400,267,000
RN1BIS	86.800	86.850	A	0	0	0	20	6	1,600,000	401,867,000
RN1BIS	86.850	86.900	A	0	0	0	20	6	1,600,000	403,467,000
RN1BIS	86.950	87.000	A	0	0	0	20	6	2,400,000	405,867,000
RN1BIS	87.000	87.050	A	0	0	0	20	6	276,850	406,143,850

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1BIS	87.050	87.100	A	0	0	0	20	6	960,000	407,103,850
RN1BIS	87.100	87.150	A	0	0	0	20	6	160,000	407,263,850
RN1BIS	89.350	89.400	A	0	0	0	20	6	11,200	407,275,050
RN1BIS	89.400	89.450	A	0	0	0	20	6	563,200	407,838,250
RN1BIS	89.450	89.500	A	0	0	0	20	6	8,000,000	415,838,250
RN1BIS	89.500	89.550	A	0	0	0	20	6	5,600,000	421,438,250
RN1BIS	89.550	89.600	A	0	0	0	20	6	2,400,000	423,838,250
RN1BIS	91.450	91.500	A	0	0	0	20	6	4,563,200	428,401,450
RN1BIS	91.750	91.800	A	0	0	0	20	6	204,800	428,606,250
RN1BIS	93.250	93.300	A	0	0	0	20	6	11,200	428,617,450
RN1BIS	93.850	93.900	A	0	0	0	20	6	1,137,600	429,755,050
RN1BIS	93.950	94.000	A	0	0	0	20	6	563,200	430,318,250
RN1BIS	94.000	94.050	A	0	0	0	20	6	1,126,400	431,444,650
RN1	17.450	17.500	A	10	0	0	10	5	1,948,800	433,393,450
RN1	17.500	17.550	A	10	0	0	10	5	1,689,600	435,083,050
RN1	17.550	17.600	A	10	0	0	10	5	88,550	435,171,600
RN1	18.350	18.400	A	10	0	0	10	5	1,926,400	437,098,000
RN1	18.400	18.450	A	10	0	0	10	5	160,000	437,258,000
RN1	20.100	20.150	A	10	0	0	10	5	1,600,000	438,858,000
RN1	20.150	20.200	A	10	0	0	10	5	563,200	439,421,200
RN1	21.250	21.300	A	10	0	0	10	5	88,550	439,509,750
RN1	21.300	21.350	A	10	0	0	10	5	188,300	439,698,050
RN1	21.350	21.400	A	10	0	0	10	5	3,200,000	442,898,050
RN1	22.350	22.400	A	10	0	0	10	5	800,000	443,698,050
RN1	22.950	23.000	A	10	0	0	10	5	88,550	443,786,600
RN1	23.000	23.050	A	10	0	0	10	5	2,400,000	446,186,600
RN1	23.200	23.250	A	10	0	0	10	5	800,000	446,986,600
RN1	23.250	23.300	A	10	0	0	10	5	1,600,000	448,586,600
RN1	23.300	23.350	A	10	0	0	10	5	1,363,200	449,949,800
RN1	23.550	23.600	A	10	0	0	10	5	11,200	449,961,000
RN1	25.000	25.050	A	10	0	0	10	5	1,622,400	451,583,400
RN1	25.050	25.100	A	10	0	0	10	5	723,200	452,306,600
RN1	25.100	25.150	A	10	0	0	10	5	2,904,550	455,211,150
RN1	25.150	25.200	A	10	0	0	10	5	182,400	455,393,550
RN1	25.550	25.600	A	10	0	0	10	5	2,512,000	457,905,550
RN1	25.600	25.650	A	10	0	0	10	5	3,141,350	461,046,900
RN1	25.650	25.700	A	10	0	0	10	5	354,200	461,401,100
RN1	26.050	26.100	A	10	0	0	10	5	740,300	462,141,400
RN1	26.100	26.150	A	10	0	0	10	5	1,955,250	464,096,650
RN1	26.150	26.200	A	10	0	0	10	5	1,700,800	465,797,450
RN1	26.200	26.250	A	10	0	0	10	5	1,849,600	467,647,050
RN1	27.100	27.150	A	10	0	0	10	5	11,200	467,658,250
RN1	29.350	29.400	A	10	0	0	10	5	585,600	468,243,850
RN1	29.500	29.550	A	10	0	0	10	5	8,326,400	476,570,250
RN1	29.800	29.850	A	10	0	0	10	5	1,788,300	478,358,550
RN1	30.400	30.450	A	10	0	0	10	5	651,750	479,010,300
RN1	30.500	30.550	A	10	0	0	10	5	651,750	479,662,050
RN1	30.700	30.750	A	10	0	0	10	5	1,600,000	481,262,050
RN1	30.800	30.850	A	10	0	0	10	5	651,750	481,913,800
RN1	30.950	31.000	A	10	0	0	10	5	800,000	482,713,800
RN1	31.300	31.350	A	10	0	0	10	5	1,623,500	484,337,300
RN1	31.600	31.650	A	10	0	0	10	5	1,126,400	485,463,700
RN1	31.650	31.700	A	10	0	0	10	5	1,137,600	486,601,300
RN1	31.950	32.000	A	10	0	0	10	5	1,363,200	487,964,500
RN1	32.000	32.050	A	10	0	0	10	5	2,578,150	490,542,650
RN1	32.050	32.100	A	10	0	0	10	5	4,000,000	494,542,650
RN1	32.100	32.150	A	10	0	0	10	5	574,400	495,117,050
RN1	32.150	32.200	A	10	0	0	10	5	800,000	495,917,050
RN1	32.200	32.250	A	10	0	0	10	5	3,200,000	499,117,050
RN1	32.250	32.300	A	10	0	0	10	5	1,600,000	500,717,050
RN1	32.300	32.350	A	10	0	0	10	5	3,200,000	503,917,050
RN1	32.350	32.400	A	10	0	0	10	5	1,600,000	505,517,050

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1	32.400	32.450	A	10	0	0	10	5	800,000	506,317,050
RN1	32.450	32.500	A	10	0	0	10	5	6,400,000	512,717,050
RN1	32.500	32.550	A	10	0	0	10	5	7,200,000	519,917,050
RN1	32.550	32.600	A	10	0	0	10	5	5,154,200	525,071,250
RN1	32.600	32.650	A	10	0	0	10	5	1,363,200	526,434,450
RN1	32.650	32.700	A	10	0	0	10	5	2,163,200	528,597,650
RN1	32.700	32.750	A	10	0	0	10	5	563,200	529,160,850
RN1	32.750	32.800	A	10	0	0	10	5	3,123,200	532,284,050
RN1	32.800	32.850	A	10	0	0	10	5	3,200,000	535,484,050
RN1	32.850	32.900	A	10	0	0	10	5	3,200,000	538,684,050
RN1	32.900	32.950	A	10	0	0	10	5	3,211,200	541,895,250
RN1	33.100	33.150	A	10	0	0	10	5	2,808,550	544,703,800
RN1	33.150	33.200	A	10	0	0	10	5	5,600,000	550,303,800
RN1	33.200	33.250	A	10	0	0	10	5	2,422,400	552,726,200
RN1	33.250	33.300	A	10	0	0	10	5	3,211,200	555,937,400
RN1	34.900	34.950	A	10	0	0	10	5	11,200	555,948,600
RN1	34.950	35.000	A	10	0	0	10	5	800,000	556,748,600
RN1	35.000	35.050	A	10	0	0	10	5	1,611,200	558,359,800
RN1	35.050	35.100	A	10	0	0	10	5	11,200	558,371,000
RN1	35.100	35.150	A	10	0	0	10	5	811,200	559,182,200
RN1	35.150	35.200	A	10	0	0	10	5	99,750	559,281,950
RN1	35.250	35.300	A	10	0	0	10	5	800,000	560,081,950
RN1	35.600	35.650	A	10	0	0	10	5	2,665,650	562,747,600
RN1	35.750	35.800	A	10	0	0	10	5	800,000	563,547,600
RN1	35.950	36.000	A	10	0	0	10	5	3,200,000	566,747,600
RN1	36.000	36.050	A	10	0	0	10	5	800,000	567,547,600
RN1	36.100	36.150	A	10	0	0	10	5	800,000	568,347,600
RN1	36.150	36.200	A	10	0	0	10	5	800,000	569,147,600
RN1	36.450	36.500	A	10	0	0	10	5	1,600,000	570,747,600
RN1	36.500	36.550	A	10	0	0	10	5	88,550	570,836,150
RN1	36.600	36.650	A	10	0	0	10	5	2,014,950	572,851,100
RN1	36.650	36.700	A	10	0	0	10	5	3,200,000	576,051,100
RN1	36.700	36.750	A	10	0	0	10	5	1,689,600	577,740,700
RN1	36.750	36.800	A	10	0	0	10	5	1,926,400	579,667,100
RN1	36.800	36.850	A	10	0	0	10	5	2,400,000	582,067,100
RN1	37.450	37.500	A	10	0	0	10	5	4,000,000	586,067,100
RN1	37.650	37.700	A	10	0	0	10	5	2,488,550	588,555,650
RN1	40.150	40.200	A	10	0	0	10	5	800,000	589,355,650
RN1	40.400	40.450	A	10	0	0	10	5	2,252,800	591,608,450
RN1	40.450	40.500	A	10	0	0	10	5	2,560,000	594,168,450
RN1	40.500	40.550	A	10	0	0	10	5	960,000	595,128,450
RN1	40.550	40.600	A	10	0	0	10	5	2,400,000	597,528,450
RN1	40.600	40.650	A	10	0	0	10	5	2,488,550	600,017,000
RN1	40.650	40.700	A	10	0	0	10	5	800,000	600,817,000
RN1	41.100	41.150	A	10	0	0	10	5	1,600,000	602,417,000
RN1	41.150	41.200	A	10	0	0	10	5	800,000	603,217,000
RN1	41.200	41.250	A	10	0	0	10	5	800,000	604,017,000
RN1	41.250	41.300	A	10	0	0	10	5	88,550	604,105,550
RN1	41.400	41.450	A	10	0	0	10	5	563,200	604,668,750
RN1	41.450	41.500	A	10	0	0	10	5	1,689,600	606,358,350
RN1	41.550	41.600	A	10	0	0	10	5	3,200,000	609,558,350
RN1	41.600	41.650	A	10	0	0	10	5	88,550	609,646,900
RN1	42.000	42.050	A	10	0	0	10	5	1,689,600	611,336,500
RN1	43.500	43.550	A	10	0	0	10	5	3,763,200	615,099,700
RN1	43.550	43.600	A	10	0	0	10	5	2,163,200	617,262,900
RN1	43.600	43.650	A	10	0	0	10	5	800,000	618,062,900
RN1	43.650	43.700	A	10	0	0	10	5	563,200	618,626,100
RN1	43.700	43.750	A	10	0	0	10	5	800,000	619,426,100
RN1	43.750	43.800	A	10	0	0	10	5	1,126,400	620,552,500
RN1	43.800	43.850	A	10	0	0	10	5	563,200	621,115,700
RN1	43.850	43.900	A	10	0	0	10	5	563,200	621,678,900
RN1	43.950	44.000	A	10	0	0	10	5	563,200	622,242,100

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1	45.100	45.150	A	10	0	0	10	5	1,126,400	623,368,500
RN1	47.600	47.650	A	10	0	0	10	5	811,200	624,179,700
RN1	48.250	48.300	A	10	0	0	10	5	11,200	624,190,900
RN1	48.400	48.450	A	10	0	0	10	5	800,000	624,990,900
RN1	48.900	48.950	A	10	0	0	10	5	811,200	625,802,100
RN1	49.600	49.650	A	10	0	0	10	5	800,000	626,602,100
RN1	50.500	50.550	A	10	0	0	10	5	745,600	627,347,700
RN1	50.800	50.850	A	10	0	0	10	5	1,600,000	628,947,700
RN1	50.950	51.000	A	10	0	0	10	5	11,200	628,958,900
RN1	51.700	51.750	A	10	0	0	10	5	2,411,200	631,370,100
RN1	51.800	51.850	A	10	0	0	10	5	800,000	632,170,100
RN1	51.950	52.000	A	10	0	0	10	5	1,611,200	633,781,300
RN1	52.000	52.050	A	10	0	0	10	5	800,000	634,581,300
RN1	52.100	52.150	A	10	0	0	10	5	4,000,000	638,581,300
RN1	52.350	52.400	A	10	0	0	10	5	9,688,550	648,269,850
RN1	52.400	52.450	A	10	0	0	10	5	1,611,200	649,881,050
RN1	52.500	52.550	A	10	0	0	10	5	800,000	650,681,050
RN1	52.550	52.600	A	10	0	0	10	5	1,611,200	652,292,250
RN1	53.300	53.350	A	10	0	0	10	5	563,200	652,855,450
RN1	53.500	53.550	A	10	0	0	10	5	4,800,000	657,655,450
RN1	53.550	53.600	A	10	0	0	10	5	4,800,000	662,455,450
RN1	53.600	53.650	A	10	0	0	10	5	2,400,000	664,855,450
RN1	54.850	54.900	A	10	0	0	10	5	1,600,000	666,455,450
RN1	54.900	54.950	A	10	0	0	10	5	4,800,000	671,255,450
RN1	54.950	55.000	A	10	0	0	10	5	4,000,000	675,255,450
RN1	55.050	55.100	A	10	0	0	10	5	3,200,000	678,455,450
RN1	55.100	55.150	A	10	0	0	10	5	1,600,000	680,055,450
RN1	55.150	55.200	A	10	0	0	10	5	2,400,000	682,455,450
RN1	55.750	55.800	A	10	0	0	10	5	1,600,000	684,055,450
RN1	55.850	55.900	A	10	0	0	10	5	4,000,000	688,055,450
RN1	55.900	55.950	A	10	0	0	10	5	3,200,000	691,255,450
RN1	55.950	56.000	A	10	0	0	10	5	6,400,000	697,655,450
RN1	56.000	56.050	A	10	0	0	10	5	8,000,000	705,655,450
RN1	56.050	56.100	A	10	0	0	10	5	6,400,000	712,055,450
RN1	56.100	56.150	A	10	0	0	10	5	1,600,000	713,655,450
RN1	56.550	56.600	A	10	0	0	10	5	888,550	714,544,000
RN1	56.600	56.650	A	10	0	0	10	5	2,400,000	716,944,000
RN1	56.700	56.750	A	10	0	0	10	5	800,000	717,744,000
RN1	57.300	57.350	A	10	0	0	10	5	800,000	718,544,000
RN1	57.400	57.450	A	10	0	0	10	5	354,200	718,898,200
RN1	57.500	57.550	A	10	0	0	10	5	265,650	719,163,850
RN1	57.550	57.600	A	10	0	0	10	5	3,200,000	722,363,850
RN1	58.150	58.200	A	10	0	0	10	5	563,200	722,927,050
RN1	58.400	58.450	A	10	0	0	10	5	800,000	723,727,050
RN1	58.900	58.950	A	10	0	0	10	5	88,550	723,815,600
RN1	59.100	59.150	A	10	0	0	10	5	11,200	723,826,800
RN1	59.150	59.200	A	10	0	0	10	5	888,550	724,715,350
RN1	59.250	59.300	A	10	0	0	10	5	1,600,000	726,315,350
RN1	59.350	59.400	A	10	0	0	10	5	1,622,400	727,937,750
RN1	59.450	59.500	A	10	0	0	10	5	8,800,000	736,737,750
RN1	59.500	59.550	A	10	0	0	10	5	10,411,200	747,148,950
RN1	59.800	59.850	A	10	0	0	10	5	22,400	747,171,350
RN1	60.150	60.200	A	10	0	0	10	5	1,076,850	748,248,200
RN1	60.250	60.300	A	10	0	0	10	5	988,300	749,236,500
RN1	60.300	60.350	A	10	0	0	10	5	3,200,000	752,436,500
RN1	60.350	60.400	A	10	0	0	10	5	4,800,000	757,236,500
RN1	60.400	60.450	A	10	0	0	10	5	4,800,000	762,036,500
RN1	60.450	60.500	A	10	0	0	10	5	800,000	762,836,500
RN1	60.500	60.550	A	10	0	0	10	5	1,600,000	764,436,500
RN1	60.850	60.900	A	10	0	0	10	5	563,200	764,999,700
RN1	61.300	61.350	A	10	0	0	10	5	811,200	765,810,900
RN1	62.100	62.150	A	10	0	0	10	5	800,000	766,610,900

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1	62.250	62.300	A	10	0	0	10	5	99,750	766,710,650
RN1	66.150	66.200	A	10	0	0	10	5	811,200	767,521,850
RN1	66.200	66.250	A	10	0	0	10	5	977,100	768,498,950
RN1	66.400	66.450	A	10	0	0	10	5	4,977,100	773,476,050
RN1	66.450	66.500	A	10	0	0	10	5	3,200,000	776,676,050
RN1	66.500	66.550	A	10	0	0	10	5	4,000,000	780,676,050
RN1	67.750	67.800	A	10	0	0	10	5	811,200	781,487,250
RN1	67.800	67.850	A	10	0	0	10	5	1,363,200	782,850,450
RN1	68.500	68.550	A	10	0	0	10	5	800,000	783,650,450
RN1	68.550	68.600	A	10	0	0	10	5	833,600	784,484,050
RN1	68.600	68.650	A	10	0	0	10	5	811,200	785,295,250
RN1	69.200	69.250	A	10	0	0	10	5	2,400,000	787,695,250
RN1	69.250	69.300	A	10	0	0	10	5	800,000	788,495,250
RN1	69.400	69.450	A	10	0	0	10	5	4,000,000	792,495,250
RN1	69.750	69.800	A	10	0	0	10	5	899,750	793,395,000
RN1	70.600	70.650	A	10	0	0	10	5	3,200,000	796,595,000
RN1	70.650	70.700	A	10	0	0	10	5	1,126,400	797,721,400
RN1	70.700	70.750	A	10	0	0	10	5	4,000,000	801,721,400
RN1	70.750	70.800	A	10	0	0	10	5	177,100	801,898,500
RN1	70.800	70.850	A	10	0	0	10	5	2,488,550	804,387,050
RN1	70.850	70.900	A	10	0	0	10	5	800,000	805,187,050
RN1	71.000	71.050	A	10	0	0	10	5	1,600,000	806,787,050
RN1	71.400	71.450	A	10	0	0	10	5	800,000	807,587,050
RN1	71.750	71.800	A	10	0	0	10	5	88,550	807,675,600
RN1	71.800	71.850	A	10	0	0	10	5	888,550	808,564,150
RN1	71.850	71.900	A	10	0	0	10	5	800,000	809,364,150
RN1	72.050	72.100	A	10	0	0	10	5	88,550	809,452,700
RN1	72.150	72.200	A	10	0	0	10	5	844,800	810,297,500
RN1	72.750	72.800	A	10	0	0	10	5	1,600,000	811,897,500
RN1	72.900	72.950	A	10	0	0	10	5	800,000	812,697,500
RN1	72.950	73.000	A	10	0	0	10	5	3,200,000	815,897,500
RN1	73.000	73.050	A	10	0	0	10	5	6,163,200	822,060,700
RN1	74.800	74.850	A	10	0	0	10	5	800,000	822,860,700
RN1	75.250	75.300	A	10	0	0	10	5	1,611,200	824,471,900
RN1	75.300	75.350	A	10	0	0	10	5	3,200,000	827,671,900
RN1	75.350	75.400	A	10	0	0	10	5	88,550	827,760,450
RN1	75.400	75.450	A	10	0	0	10	5	88,550	827,849,000
RN1	77.200	77.250	A	10	0	0	10	5	2,163,200	830,012,200
RN1	77.250	77.300	A	10	0	0	10	5	800,000	830,812,200
RN1	77.300	77.350	A	10	0	0	10	5	1,126,400	831,938,600
RN1	77.350	77.400	A	10	0	0	10	5	651,750	832,590,350
RN1	77.400	77.450	A	10	0	0	10	5	2,488,550	835,078,900
RN1	77.450	77.500	A	10	0	0	10	5	2,400,000	837,478,900
RN1	77.500	77.550	A	10	0	0	10	5	1,926,400	839,405,300
RN1	77.800	77.850	A	10	0	0	10	5	563,200	839,968,500
RN1	77.950	78.000	A	10	0	0	10	5	822,400	840,790,900
RN1	78.200	78.250	A	10	0	0	10	5	3,200,000	843,990,900
RN1	78.250	78.300	A	10	0	0	10	5	2,400,000	846,390,900
RN1	78.350	78.400	A	10	0	0	10	5	3,200,000	849,590,900
RN1	78.400	78.450	A	10	0	0	10	5	177,100	849,768,000
RN1	78.450	78.500	A	10	0	0	10	5	977,100	850,745,100
RN1	78.650	78.700	A	10	0	0	10	5	5,374,400	856,119,500
RN1	79.950	80.000	A	10	0	0	10	5	5,600,000	861,719,500
RN1	80.550	80.600	A	10	0	0	10	5	2,400,000	864,119,500
RN1	80.850	80.900	A	10	0	0	10	5	3,211,200	867,330,700
RN1	80.900	80.950	A	10	0	0	10	5	800,000	868,130,700
RN1	82.900	82.950	A	10	0	0	10	5	563,200	868,693,900
RN1	83.100	83.150	A	10	0	0	10	5	337,100	869,031,000
RN1	83.350	83.400	A	10	0	0	10	5	800,000	869,831,000
RN1	83.600	83.650	A	10	0	0	10	5	4,800,000	874,631,000
RN1	83.650	83.700	A	10	0	0	10	5	800,000	875,431,000
RN1	83.950	84.000	A	10	0	0	10	5	1,600,000	877,031,000

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1	84.350	84.400	A	10	0	0	10	5	800,000	877,831,000
RN1	84.450	84.500	A	10	0	0	10	5	800,000	878,631,000
RN1	84.600	84.650	A	10	0	0	10	5	11,200	878,642,200
RN1	84.650	84.700	A	10	0	0	10	5	160,000	878,802,200
RN1	84.800	84.850	A	10	0	0	10	5	888,550	879,690,750
RN1	85.100	85.150	A	10	0	0	10	5	4,800,000	884,490,750
RN1	85.150	85.200	A	10	0	0	10	5	8,811,200	893,301,950
RN1	85.350	85.400	A	10	0	0	10	5	4,800,000	898,101,950
RN1	85.400	85.450	A	10	0	0	10	5	7,200,000	905,301,950
RN1	85.450	85.500	A	10	0	0	10	5	2,400,000	907,701,950
RN1	85.750	85.800	A	10	0	0	10	5	4,011,200	911,713,150
RN1	86.100	86.150	A	10	0	0	10	5	800,000	912,513,150
RN1	86.400	86.450	A	10	0	0	10	5	800,000	913,313,150
RN1	86.450	86.500	A	10	0	0	10	5	5,600,000	918,913,150
RN1	86.700	86.750	A	10	0	0	10	5	7,200,000	926,113,150
RN1	86.750	86.800	A	10	0	0	10	5	7,200,000	933,313,150
RN1	88.000	88.050	A	10	0	0	10	5	1,606,400	934,919,550
RN1	88.550	88.600	A	10	0	0	10	5	912,000	935,831,550
RN1	88.600	88.650	A	10	0	0	10	5	1,771,200	937,602,750
RN1	88.650	88.700	A	10	0	0	10	5	1,656,000	939,258,750
RN1	89.150	89.200	A	10	0	0	10	5	1,600,000	940,858,750
RN1	89.250	89.300	A	10	0	0	10	5	833,600	941,692,350
RN1	89.300	89.350	A	10	0	0	10	5	1,600,000	943,292,350
RN1	89.450	89.500	A	10	0	0	10	5	1,600,000	944,892,350
RN1	89.950	90.000	A	10	0	0	10	5	1,600,000	946,492,350
RN1	90.150	90.200	A	10	0	0	10	5	3,322,150	949,814,500
RN1	91.950	92.000	A	10	0	0	10	5	2,489,600	952,304,100
RN1	93.500	93.550	A	10	0	0	10	5	1,600,000	953,904,100
RN1	93.550	93.600	A	10	0	0	10	5	2,411,200	956,315,300
RN1	97.450	97.500	A	10	0	0	10	5	7,288,550	963,603,850
RN1	98.200	98.250	A	10	0	0	10	5	2,400,000	966,003,850
RN1	98.250	98.300	A	10	0	0	10	5	5,600,000	971,603,850
RN1	98.300	98.350	A	10	0	0	10	5	5,600,000	977,203,850
RN1	98.350	98.400	A	10	0	0	10	5	11,200,000	988,403,850
RN1	98.400	98.450	A	10	0	0	10	5	8,000,000	996,403,850
RN1	98.450	98.500	A	10	0	0	10	5	10,400,000	1,006,803,850
RN1	99.100	99.150	A	10	0	0	10	5	4,800,000	1,011,603,850
RN1	99.300	99.350	A	10	0	0	10	5	5,611,200	1,017,215,050
RN1	99.350	99.400	A	10	0	0	10	5	3,288,550	1,020,503,600
RN1	99.400	99.450	A	10	0	0	10	5	800,000	1,021,303,600
RN1	99.800	99.850	A	10	0	0	10	5	22,400	1,021,326,000
RN1	99.850	99.900	A	10	0	0	10	5	88,550	1,021,414,550
RN1	99.900	99.950	A	10	0	0	10	5	99,750	1,021,514,300
RN1	100.300	100.350	A	10	0	0	10	5	800,000	1,022,314,300
RN1	111.250	111.300	A	10	0	0	10	5	160,000	1,022,474,300
RN1	113.800	113.850	A	10	0	0	10	5	1,611,200	1,024,085,500
RN1	113.850	113.900	A	10	0	0	10	5	800,000	1,024,885,500
RN1	113.900	113.950	A	10	0	0	10	5	800,000	1,025,685,500
RN1	114.100	114.150	A	10	0	0	10	5	2,400,000	1,028,085,500
RN1	114.150	114.200	A	10	0	0	10	5	4,800,000	1,032,885,500
RN1	114.250	114.300	A	10	0	0	10	5	3,200,000	1,036,085,500
RN1	114.400	114.450	A	10	0	0	10	5	88,550	1,036,174,050
RN1	114.450	114.500	A	10	0	0	10	5	1,600,000	1,037,774,050
RN1	114.500	114.550	A	10	0	0	10	5	800,000	1,038,574,050
RN1BIS	0.250	0.300	A	10	0	0	10	5	7,200,000	1,045,774,050
RN1BIS	0.300	0.350	A	10	0	0	10	5	3,200,000	1,048,974,050
RN1BIS	0.350	0.400	A	10	0	0	10	5	2,571,200	1,051,545,250
RN1BIS	0.800	0.850	A	10	0	0	10	5	4,000,000	1,055,545,250
RN1BIS	0.850	0.900	A	10	0	0	10	5	6,411,200	1,061,956,450
RN1BIS	0.900	0.950	A	10	0	0	10	5	8,000,000	1,069,956,450
RN1BIS	0.950	1.000	A	10	0	0	10	5	11,288,550	1,081,245,000
RN1BIS	1.000	1.050	A	10	0	0	10	5	3,288,550	1,084,533,550

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1BIS	1.100	1.150	A	10	0	0	10	5	4,000,000	1,088,533,550
RN1BIS	1.150	1.200	A	10	0	0	10	5	822,400	1,089,355,950
RN1BIS	1.300	1.350	A	10	0	0	10	5	11,200	1,089,367,150
RN1BIS	1.350	1.400	A	10	0	0	10	5	4,800,000	1,094,167,150
RN1BIS	1.400	1.450	A	10	0	0	10	5	1,777,100	1,095,944,250
RN1BIS	1.450	1.500	A	10	0	0	10	5	1,363,200	1,097,307,450
RN1BIS	1.500	1.550	A	10	0	0	10	5	4,800,000	1,102,107,450
RN1BIS	1.550	1.600	A	10	0	0	10	5	2,400,000	1,104,507,450
RN1BIS	1.700	1.750	A	10	0	0	10	5	11,200	1,104,518,650
RN1BIS	1.850	1.900	A	10	0	0	10	5	800,000	1,105,318,650
RN1BIS	1.900	1.950	A	10	0	0	10	5	800,000	1,106,118,650
RN1BIS	1.950	2.000	A	10	0	0	10	5	1,600,000	1,107,718,650
RN1BIS	2.000	2.050	A	10	0	0	10	5	4,000,000	1,111,718,650
RN1BIS	2.050	2.100	A	10	0	0	10	5	3,200,000	1,114,918,650
RN1BIS	2.100	2.150	A	10	0	0	10	5	1,600,000	1,116,518,650
RN1BIS	2.500	2.550	A	10	0	0	10	5	11,200	1,116,529,850
RN1BIS	2.850	2.900	A	10	0	0	10	5	811,200	1,117,341,050
RN1BIS	3.000	3.050	A	10	0	0	10	5	800,000	1,118,141,050
RN1BIS	3.050	3.100	A	10	0	0	10	5	800,000	1,118,941,050
RN1BIS	3.100	3.150	A	10	0	0	10	5	4,088,550	1,123,029,600
RN1BIS	3.150	3.200	A	10	0	0	10	5	3,200,000	1,126,229,600
RN1BIS	3.700	3.750	A	10	0	0	10	5	4,800,000	1,131,029,600
RN1BIS	4.250	4.300	A	10	0	0	10	5	800,000	1,131,829,600
RN1BIS	4.300	4.350	A	10	0	0	10	5	4,800,000	1,136,629,600
RN1BIS	4.350	4.400	A	10	0	0	10	5	3,200,000	1,139,829,600
RN1BIS	6.200	6.250	A	10	0	0	10	5	800,000	1,140,629,600
RN1BIS	6.250	6.300	A	10	0	0	10	5	248,550	1,140,878,150
RN1BIS	6.300	6.350	A	10	0	0	10	5	88,550	1,140,966,700
RN1BIS	6.450	6.500	A	10	0	0	10	5	11,200	1,140,977,900
RN1BIS	6.550	6.600	A	10	0	0	10	5	88,550	1,141,066,450
RN1BIS	6.750	6.800	A	10	0	0	10	5	88,550	1,141,155,000
RN1BIS	6.900	6.950	A	10	0	0	10	5	4,800,000	1,145,955,000
RN1BIS	6.950	7.000	A	10	0	0	10	5	6,400,000	1,152,355,000
RN1BIS	7.200	7.250	A	10	0	0	10	5	811,200	1,153,166,200
RN1BIS	7.250	7.300	A	10	0	0	10	5	2,422,400	1,155,588,600
RN1BIS	7.300	7.350	A	10	0	0	10	5	2,411,200	1,157,999,800
RN1BIS	7.350	7.400	A	10	0	0	10	5	2,577,100	1,160,576,900
RN1BIS	7.500	7.550	A	10	0	0	10	5	133,350	1,160,710,250
RN1BIS	7.900	7.950	A	10	0	0	10	5	1,600,000	1,162,310,250
RN1BIS	8.050	8.100	A	10	0	0	10	5	1,600,000	1,163,910,250
RN1BIS	8.300	8.350	A	10	0	0	10	5	22,400	1,163,932,650
RN1BIS	8.350	8.400	A	10	0	0	10	5	22,400	1,163,955,050
RN1BIS	8.600	8.650	A	10	0	0	10	5	160,000	1,164,115,050
RN1BIS	8.650	8.700	A	10	0	0	10	5	822,400	1,164,937,450
RN1BIS	8.700	8.750	A	10	0	0	10	5	856,000	1,165,793,450
RN1BIS	9.000	9.050	A	10	0	0	10	5	44,800	1,165,838,250
RN1BIS	9.050	9.100	A	10	0	0	10	5	110,950	1,165,949,200
RN1BIS	9.100	9.150	A	10	0	0	10	5	1,611,200	1,167,560,400
RN1BIS	9.150	9.200	A	10	0	0	10	5	800,000	1,168,360,400
RN1BIS	9.300	9.350	A	10	0	0	10	5	11,200	1,168,371,600
RN1BIS	9.450	9.500	A	10	0	0	10	5	4,800,000	1,173,171,600
RN1BIS	9.600	9.650	A	10	0	0	10	5	800,000	1,173,971,600
RN1BIS	9.650	9.700	A	10	0	0	10	5	2,488,550	1,176,460,150
RN1BIS	9.700	9.750	A	10	0	0	10	5	11,200	1,176,471,350
RN1BIS	10.300	10.350	A	10	0	0	10	5	1,600,000	1,178,071,350
RN1BIS	10.450	10.500	A	10	0	0	10	5	1,600,000	1,179,671,350
RN1BIS	10.950	11.000	A	10	0	0	10	5	2,411,200	1,182,082,550
RN1BIS	11.300	11.350	A	10	0	0	10	5	22,400	1,182,104,950
RN1BIS	11.500	11.550	A	10	0	0	10	5	800,000	1,182,904,950
RN1BIS	11.550	11.600	A	10	0	0	10	5	4,800,000	1,187,704,950
RN1BIS	11.600	11.650	A	10	0	0	10	5	5,600,000	1,193,304,950
RN1BIS	11.650	11.700	A	10	0	0	10	5	1,699,750	1,195,004,700

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1BIS	11.850	11.900	A	10	0	0	10	5	11,200	1,195,015,900
RN1BIS	12.050	12.100	A	10	0	0	10	5	11,200	1,195,027,100
RN1BIS	12.600	12.650	A	10	0	0	10	5	1,600,000	1,196,627,100
RN1BIS	12.650	12.700	A	10	0	0	10	5	811,200	1,197,438,300
RN1BIS	13.350	13.400	A	10	0	0	10	5	2,036,850	1,199,475,150
RN1BIS	13.400	13.450	A	10	0	0	10	5	1,865,650	1,201,340,800
RN1BIS	13.500	13.550	A	10	0	0	10	5	574,400	1,201,915,200
RN1BIS	13.550	13.600	A	10	0	0	10	5	3,377,100	1,205,292,300
RN1BIS	13.600	13.650	A	10	0	0	10	5	4,833,600	1,210,125,900
RN1BIS	13.650	13.700	A	10	0	0	10	5	2,444,800	1,212,570,700
RN1BIS	13.700	13.750	A	10	0	0	10	5	822,400	1,213,393,100
RN1BIS	14.100	14.150	A	10	0	0	10	5	4,011,200	1,217,404,300
RN1BIS	14.200	14.250	A	10	0	0	10	5	11,200	1,217,415,500
RN1BIS	14.250	14.300	A	10	0	0	10	5	11,200	1,217,426,700
RN1BIS	14.400	14.450	A	10	0	0	10	5	33,600	1,217,460,300
RN1BIS	14.550	14.600	A	10	0	0	10	5	811,200	1,218,271,500
RN1BIS	14.600	14.650	A	10	0	0	10	5	11,200	1,218,282,700
RN1BIS	14.950	15.000	A	10	0	0	10	5	563,200	1,218,845,900
RN1BIS	15.000	15.050	A	10	0	0	10	5	22,400	1,218,868,300
RN1BIS	15.350	15.400	A	10	0	0	10	5	11,200	1,218,879,500
RN1BIS	15.400	15.450	A	10	0	0	10	5	99,750	1,218,979,250
RN1BIS	15.500	15.550	A	10	0	0	10	5	11,200	1,218,990,450
RN1BIS	15.550	15.600	A	10	0	0	10	5	22,400	1,219,012,850
RN1BIS	15.600	15.650	A	10	0	0	10	5	99,750	1,219,112,600
RN1BIS	15.650	15.700	A	10	0	0	10	5	11,200	1,219,123,800
RN1BIS	15.800	15.850	A	10	0	0	10	5	11,200	1,219,135,000
RN1BIS	15.850	15.900	A	10	0	0	10	5	11,200	1,219,146,200
RN1BIS	15.900	15.950	A	10	0	0	10	5	3,211,200	1,222,357,400
RN1BIS	15.950	16.000	A	10	0	0	10	5	1,600,000	1,223,957,400
RN1BIS	16.000	16.050	A	10	0	0	10	5	1,363,200	1,225,320,600
RN1BIS	16.150	16.200	A	10	0	0	10	5	2,400,000	1,227,720,600
RN1BIS	16.600	16.650	A	10	0	0	10	5	800,000	1,228,520,600
RN1BIS	17.250	17.300	A	10	0	0	10	5	88,550	1,228,609,150
RN1BIS	17.450	17.500	A	10	0	0	10	5	4,000,000	1,232,609,150
RN1BIS	17.500	17.550	A	10	0	0	10	5	2,400,000	1,235,009,150
RN1BIS	18.000	18.050	A	10	0	0	10	5	1,600,000	1,236,609,150
RN1BIS	18.450	18.500	A	10	0	0	10	5	922,150	1,237,531,300
RN1BIS	18.500	18.550	A	10	0	0	10	5	1,374,400	1,238,905,700
RN1BIS	18.600	18.650	A	10	0	0	10	5	1,710,950	1,240,616,650
RN1BIS	18.650	18.700	A	10	0	0	10	5	811,200	1,241,427,850
RN1BIS	19.050	19.100	A	10	0	0	10	5	2,422,400	1,243,850,250
RN1BIS	19.100	19.150	A	10	0	0	10	5	22,400	1,243,872,650
RN1BIS	19.150	19.200	A	10	0	0	10	5	800,000	1,244,672,650
RN1BIS	19.250	19.300	A	10	0	0	10	5	811,200	1,245,483,850
RN1BIS	19.350	19.400	A	10	0	0	10	5	11,200	1,245,495,050
RN1BIS	19.700	19.750	A	10	0	0	10	5	4,011,200	1,249,506,250
RN1BIS	19.750	19.800	A	10	0	0	10	5	11,200	1,249,517,450
RN1BIS	19.800	19.850	A	10	0	0	10	5	800,000	1,250,317,450
RN1BIS	20.100	20.150	A	10	0	0	10	5	822,400	1,251,139,850
RN1BIS	20.150	20.200	A	10	0	0	10	5	8,833,600	1,259,973,450
RN1BIS	20.400	20.450	A	10	0	0	10	5	33,600	1,260,007,050
RN1BIS	20.500	20.550	A	10	0	0	10	5	800,000	1,260,807,050
RN1BIS	20.550	20.600	A	10	0	0	10	5	1,600,000	1,262,407,050
RN1BIS	20.600	20.650	A	10	0	0	10	5	1,622,400	1,264,029,450
RN1BIS	20.700	20.750	A	10	0	0	10	5	800,000	1,264,829,450
RN1BIS	20.850	20.900	A	10	0	0	10	5	3,200,000	1,268,029,450
RN1BIS	20.900	20.950	A	10	0	0	10	5	3,200,000	1,271,229,450
RN1BIS	21.000	21.050	A	10	0	0	10	5	800,000	1,272,029,450
RN1BIS	21.300	21.350	A	10	0	0	10	5	3,200,000	1,275,229,450
RN1BIS	21.350	21.400	A	10	0	0	10	5	33,600	1,275,263,050
RN1BIS	21.400	21.450	A	10	0	0	10	5	11,200	1,275,274,250
RN1BIS	21.500	21.550	A	10	0	0	10	5	888,550	1,276,162,800

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1BIS	21.550	21.600	A	10	0	0	10	5	574,400	1,276,737,200
RN1BIS	21.600	21.650	A	10	0	0	10	5	22,400	1,276,759,600
RN1BIS	21.650	21.700	A	10	0	0	10	5	11,200	1,276,770,800
RN1BIS	21.700	21.750	A	10	0	0	10	5	88,550	1,276,859,350
RN1BIS	21.800	21.850	A	10	0	0	10	5	4,000,000	1,280,859,350
RN1BIS	21.950	22.000	A	10	0	0	10	5	33,600	1,280,892,950
RN1BIS	22.050	22.100	A	10	0	0	10	5	800,000	1,281,692,950
RN1BIS	22.150	22.200	A	10	0	0	10	5	88,550	1,281,781,500
RN1BIS	22.200	22.250	A	10	0	0	10	5	833,600	1,282,615,100
RN1BIS	22.700	22.750	A	10	0	0	10	5	56,000	1,282,671,100
RN1BIS	22.750	22.800	A	10	0	0	10	5	44,800	1,282,715,900
RN1BIS	22.800	22.850	A	10	0	0	10	5	22,400	1,282,738,300
RN1BIS	23.500	23.550	A	10	0	0	10	5	1,622,400	1,284,360,700
RN1BIS	23.550	23.600	A	10	0	0	10	5	56,000	1,284,416,700
RN1BIS	24.100	24.150	A	10	0	0	10	5	822,400	1,285,239,100
RN1BIS	24.200	24.250	A	10	0	0	10	5	4,811,200	1,290,050,300
RN1BIS	24.250	24.300	A	10	0	0	10	5	1,208,550	1,291,258,850
RN1BIS	24.300	24.350	A	10	0	0	10	5	800,000	1,292,058,850
RN1BIS	24.400	24.450	A	10	0	0	10	5	811,200	1,292,870,050
RN1BIS	24.450	24.500	A	10	0	0	10	5	88,550	1,292,958,600
RN1BIS	24.500	24.550	A	10	0	0	10	5	11,200	1,292,969,800
RN1BIS	24.550	24.600	A	10	0	0	10	5	2,411,200	1,295,381,000
RN1BIS	24.750	24.800	A	10	0	0	10	5	4,033,600	1,299,414,600
RN1BIS	25.250	25.300	A	10	0	0	10	5	359,500	1,299,774,100
RN1BIS	25.300	25.350	A	10	0	0	10	5	888,550	1,300,662,650
RN1BIS	25.350	25.400	A	10	0	0	10	5	11,200	1,300,673,850
RN1BIS	25.400	25.450	A	10	0	0	10	5	1,600,000	1,302,273,850
RN1BIS	26.000	26.050	A	10	0	0	10	5	160,000	1,302,433,850
RN1BIS	26.050	26.100	A	10	0	0	10	5	22,400	1,302,456,250
RN1BIS	26.100	26.150	A	10	0	0	10	5	33,600	1,302,489,850
RN1BIS	26.400	26.450	A	10	0	0	10	5	11,200	1,302,501,050
RN1BIS	26.800	26.850	A	10	0	0	10	5	11,200	1,302,512,250
RN1BIS	29.000	29.050	A	10	0	0	10	5	11,200	1,302,523,450
RN1BIS	29.050	29.100	A	10	0	0	10	5	22,400	1,302,545,850
RN1BIS	29.200	29.250	A	10	0	0	10	5	11,200	1,302,557,050
RN1BIS	29.350	29.400	A	10	0	0	10	5	1,600,000	1,304,157,050
RN1BIS	29.400	29.450	A	10	0	0	10	5	1,600,000	1,305,757,050
RN1BIS	29.450	29.500	A	10	0	0	10	5	188,300	1,305,945,350
RN1BIS	29.500	29.550	A	10	0	0	10	5	833,600	1,306,778,950
RN1BIS	29.700	29.750	A	10	0	0	10	5	1,611,200	1,308,390,150
RN1BIS	30.150	30.200	A	10	0	0	10	5	1,600,000	1,309,990,150
RN1BIS	30.200	30.250	A	10	0	0	10	5	22,400	1,310,012,550
RN1BIS	30.250	30.300	A	10	0	0	10	5	4,811,200	1,314,823,750
RN1BIS	30.300	30.350	A	10	0	0	10	5	4,900,800	1,319,724,550
RN1BIS	30.350	30.400	A	10	0	0	10	5	833,600	1,320,558,150
RN1BIS	30.750	30.800	A	10	0	0	10	5	2,411,200	1,322,969,350
RN1BIS	30.900	30.950	A	10	0	0	10	5	188,300	1,323,157,650
RN1BIS	30.950	31.000	A	10	0	0	10	5	1,462,950	1,324,620,600
RN1BIS	32.000	32.050	A	10	0	0	10	5	800,000	1,325,420,600
RN1BIS	32.050	32.100	A	10	0	0	10	5	811,200	1,326,231,800
RN1BIS	32.100	32.150	A	10	0	0	10	5	11,200	1,326,243,000
RN1BIS	32.150	32.200	A	10	0	0	10	5	56,000	1,326,299,000
RN1BIS	32.350	32.400	A	10	0	0	10	5	822,400	1,327,121,400
RN1BIS	32.400	32.450	A	10	0	0	10	5	822,400	1,327,943,800
RN1BIS	32.700	32.750	A	10	0	0	10	5	99,750	1,328,043,550
RN1BIS	33.550	33.600	A	10	0	0	10	5	4,044,800	1,332,088,350
RN1BIS	33.750	33.800	A	10	0	0	10	5	56,000	1,332,144,350
RN1BIS	33.800	33.850	A	10	0	0	10	5	11,200	1,332,155,550
RN1BIS	34.150	34.200	A	10	0	0	10	5	408,550	1,332,564,100
RN1BIS	34.200	34.250	A	10	0	0	10	5	977,100	1,333,541,200
RN1BIS	34.250	34.300	A	10	0	0	10	5	22,400	1,333,563,600
RN1BIS	34.550	34.600	A	10	0	0	10	5	1,600,000	1,335,163,600

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1BIS	34.600	34.650	A	10	0	0	10	5	248,550	1,335,412,150
RN1BIS	34.650	34.700	A	10	0	0	10	5	977,100	1,336,389,250
RN1BIS	34.800	34.850	A	10	0	0	10	5	2,577,100	1,338,966,350
RN1BIS	34.850	34.900	A	10	0	0	10	5	1,600,000	1,340,566,350
RN1BIS	34.900	34.950	A	10	0	0	10	5	811,200	1,341,377,550
RN1BIS	35.000	35.050	A	10	0	0	10	5	11,200	1,341,388,750
RN1BIS	35.100	35.150	A	10	0	0	10	5	11,200	1,341,399,950
RN1BIS	35.150	35.200	A	10	0	0	10	5	1,600,000	1,342,999,950
RN1BIS	35.200	35.250	A	10	0	0	10	5	888,550	1,343,888,500
RN1BIS	35.250	35.300	A	10	0	0	10	5	265,650	1,344,154,150
RN1BIS	35.300	35.350	A	10	0	0	10	5	1,622,400	1,345,776,550
RN1BIS	35.450	35.500	A	10	0	0	10	5	800,000	1,346,576,550
RN1BIS	35.500	35.550	A	10	0	0	10	5	1,600,000	1,348,176,550
RN1BIS	35.550	35.600	A	10	0	0	10	5	800,000	1,348,976,550
RN1BIS	35.600	35.650	A	10	0	0	10	5	800,000	1,349,776,550
RN1BIS	35.700	35.750	A	10	0	0	10	5	11,200	1,349,787,750
RN1BIS	35.750	35.800	A	10	0	0	10	5	977,100	1,350,764,850
RN1BIS	35.800	35.850	A	10	0	0	10	5	2,411,200	1,353,176,050
RN1BIS	36.050	36.100	A	10	0	0	10	5	22,400	1,353,198,450
RN1BIS	36.100	36.150	A	10	0	0	10	5	11,200	1,353,209,650
RN1BIS	36.200	36.250	A	10	0	0	10	5	11,200	1,353,220,850
RN1BIS	36.250	36.300	A	10	0	0	10	5	33,600	1,353,254,450
RN1BIS	36.350	36.400	A	10	0	0	10	5	11,200	1,353,265,650
RN1BIS	36.450	36.500	A	10	0	0	10	5	88,550	1,353,354,200
RN1BIS	36.650	36.700	A	10	0	0	10	5	22,400	1,353,376,600
RN1BIS	37.700	37.750	A	10	0	0	10	5	2,400,000	1,355,776,600
RN1BIS	38.000	38.050	A	10	0	0	10	5	5,848,550	1,361,625,150
RN1BIS	38.650	38.700	A	10	0	0	10	5	78,400	1,361,703,550
RN1BIS	38.800	38.850	A	10	0	0	10	5	1,600,000	1,363,303,550
RN1BIS	38.950	39.000	A	10	0	0	10	5	6,400,000	1,369,703,550
RN1BIS	39.000	39.050	A	10	0	0	10	5	2,400,000	1,372,103,550
RN1BIS	39.100	39.150	A	10	0	0	10	5	3,200,000	1,375,303,550
RN1BIS	41.100	41.150	A	10	0	0	10	5	800,000	1,376,103,550
RN1BIS	41.750	41.800	A	10	0	0	10	5	88,550	1,376,192,100
RN1BIS	41.950	42.000	A	10	0	0	10	5	11,200	1,376,203,300
RN1BIS	42.550	42.600	A	10	0	0	10	5	177,100	1,376,380,400
RN1BIS	42.600	42.650	A	10	0	0	10	5	4,800,000	1,381,180,400
RN1BIS	42.700	42.750	A	10	0	0	10	5	800,000	1,381,980,400
RN1BIS	42.950	43.000	A	10	0	0	10	5	188,300	1,382,168,700
RN1BIS	43.500	43.550	A	10	0	0	10	5	22,400	1,382,191,100
RN1BIS	43.550	43.600	A	10	0	0	10	5	11,200	1,382,202,300
RN1BIS	43.800	43.850	A	10	0	0	10	5	800,000	1,383,002,300
RN1BIS	43.850	43.900	A	10	0	0	10	5	800,000	1,383,802,300
RN1BIS	43.900	43.950	A	10	0	0	10	5	1,600,000	1,385,402,300
RN1BIS	44.950	45.000	A	10	0	0	10	5	88,550	1,385,490,850
RN1BIS	45.000	45.050	A	10	0	0	10	5	800,000	1,386,290,850
RN1BIS	45.750	45.800	A	10	0	0	10	5	22,400	1,386,313,250
RN1BIS	45.900	45.950	A	10	0	0	10	5	33,600	1,386,346,850
RN1BIS	45.950	46.000	A	10	0	0	10	5	1,600,000	1,387,946,850
RN1BIS	46.050	46.100	A	10	0	0	10	5	11,200	1,387,958,050
RN1BIS	46.250	46.300	A	10	0	0	10	5	177,100	1,388,135,150
RN1BIS	46.950	47.000	A	10	0	0	10	5	3,200,000	1,391,335,150
RN1BIS	47.000	47.050	A	10	0	0	10	5	11,200	1,391,346,350
RN1BIS	47.250	47.300	A	10	0	0	10	5	88,550	1,391,434,900
RN1BIS	47.750	47.800	A	10	0	0	10	5	1,363,200	1,392,798,100
RN1BIS	47.800	47.850	A	10	0	0	10	5	11,200	1,392,809,300
RN1BIS	48.100	48.150	A	10	0	0	10	5	11,200	1,392,820,500
RN1BIS	48.250	48.300	A	10	0	0	10	5	888,550	1,393,709,050
RN1BIS	48.300	48.350	A	10	0	0	10	5	182,400	1,393,891,450
RN1BIS	48.550	48.600	A	10	0	0	10	5	337,100	1,394,228,550
RN1BIS	48.650	48.700	A	10	0	0	10	5	800,000	1,395,028,550
RN1BIS	48.900	48.950	A	10	0	0	10	5	88,550	1,395,117,100

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1BIS	49.050	49.100	A	10	0	0	10	5	1,126,400	1,396,243,500
RN1BIS	50.950	51.000	A	10	0	0	10	5	2,478,400	1,398,721,900
RN1BIS	51.400	51.450	A	10	0	0	10	5	11,200	1,398,733,100
RN1BIS	51.450	51.500	A	10	0	0	10	5	811,200	1,399,544,300
RN1BIS	51.550	51.600	A	10	0	0	10	5	160,000	1,399,704,300
RN1BIS	51.650	51.700	A	10	0	0	10	5	800,000	1,400,504,300
RN1BIS	52.650	52.700	A	10	0	0	10	5	33,600	1,400,537,900
RN1BIS	52.850	52.900	A	10	0	0	10	5	11,200	1,400,549,100
RN1BIS	52.900	52.950	A	10	0	0	10	5	11,200	1,400,560,300
RN1BIS	52.950	53.000	A	10	0	0	10	5	811,200	1,401,371,500
RN1BIS	53.400	53.450	A	10	0	0	10	5	11,200	1,401,382,700
RN1BIS	54.950	55.000	A	10	0	0	10	5	33,600	1,401,416,300
RN1BIS	55.000	55.050	A	10	0	0	10	5	1,611,200	1,403,027,500
RN1BIS	55.400	55.450	A	10	0	0	10	5	99,750	1,403,127,250
RN1BIS	55.650	55.700	A	10	0	0	10	5	800,000	1,403,927,250
RN1BIS	55.700	55.750	A	10	0	0	10	5	11,200	1,403,938,450
RN1BIS	57.150	57.200	A	10	0	0	10	5	248,550	1,404,187,000
RN1BIS	58.600	58.650	A	10	0	0	10	5	88,550	1,404,275,550
RN1BIS	58.800	58.850	A	10	0	0	10	5	177,100	1,404,452,650
RN1BIS	59.350	59.400	A	10	0	0	10	5	563,200	1,405,015,850
RN1BIS	61.450	61.500	A	10	0	0	10	5	88,550	1,405,104,400
RN1BIS	61.700	61.750	A	10	0	0	10	5	1,363,200	1,406,467,600
RN1BIS	61.800	61.850	A	10	0	0	10	5	88,550	1,406,556,150
RN1BIS	61.850	61.900	A	10	0	0	10	5	3,288,550	1,409,844,700
RN1BIS	62.500	62.550	A	10	0	0	10	5	800,000	1,410,644,700
RN1BIS	62.550	62.600	A	10	0	0	10	5	11,200	1,410,655,900
RN1BIS	64.100	64.150	A	10	0	0	10	5	800,000	1,411,455,900
RN1BIS	64.150	64.200	A	10	0	0	10	5	800,000	1,412,255,900
RN1BIS	64.400	64.450	A	10	0	0	10	5	22,400	1,412,278,300
RN1BIS	64.450	64.500	A	10	0	0	10	5	22,400	1,412,300,700
RN1BIS	64.500	64.550	A	10	0	0	10	5	88,550	1,412,389,250
RN1BIS	64.800	64.850	A	10	0	0	10	5	1,600,000	1,413,989,250
RN1BIS	64.850	64.900	A	10	0	0	10	5	1,600,000	1,415,589,250
RN1BIS	65.100	65.150	A	10	0	0	10	5	22,400	1,415,611,650
RN1BIS	65.300	65.350	A	10	0	0	10	5	1,126,400	1,416,738,050
RN1BIS	66.500	66.550	A	10	0	0	10	5	5,600,000	1,422,338,050
RN1BIS	66.550	66.600	A	10	0	0	10	5	3,200,000	1,425,538,050
RN1BIS	66.600	66.650	A	10	0	0	10	5	3,200,000	1,428,738,050
RN1BIS	66.650	66.700	A	10	0	0	10	5	1,600,000	1,430,338,050
RN1BIS	66.950	67.000	A	10	0	0	10	5	1,600,000	1,431,938,050
RN1BIS	67.050	67.100	A	10	0	0	10	5	33,600	1,431,971,650
RN1BIS	67.850	67.900	A	10	0	0	10	5	2,400,000	1,434,371,650
RN1BIS	67.900	67.950	A	10	0	0	10	5	800,000	1,435,171,650
RN1BIS	68.400	68.450	A	10	0	0	10	5	88,550	1,435,260,200
RN1BIS	68.550	68.600	A	10	0	0	10	5	88,550	1,435,348,750
RN1BIS	68.750	68.800	A	10	0	0	10	5	563,200	1,435,911,950
RN1BIS	69.200	69.250	A	10	0	0	10	5	11,200	1,435,923,150
RN1BIS	69.650	69.700	A	10	0	0	10	5	2,400,000	1,438,323,150
RN1BIS	69.750	69.800	A	10	0	0	10	5	11,200	1,438,334,350
RN1BIS	69.800	69.850	A	10	0	0	10	5	22,400	1,438,356,750
RN1BIS	70.050	70.100	A	10	0	0	10	5	88,550	1,438,445,300
RN1BIS	70.850	70.900	A	10	0	0	10	5	11,200	1,438,456,500
RN1BIS	70.900	70.950	A	10	0	0	10	5	22,400	1,438,478,900
RN1BIS	76.050	76.100	A	10	0	0	10	5	8,000,000	1,446,478,900
RN1BIS	76.100	76.150	A	10	0	0	10	5	6,400,000	1,452,878,900
RN1BIS	76.150	76.200	A	10	0	0	10	5	8,000,000	1,460,878,900
RN1BIS	76.200	76.250	A	10	0	0	10	5	1,600,000	1,462,478,900
RN1BIS	76.650	76.700	A	10	0	0	10	5	10,400,000	1,472,878,900
RN1BIS	76.750	76.800	A	10	0	0	10	5	9,600,000	1,482,478,900
RN1BIS	76.800	76.850	A	10	0	0	10	5	5,688,550	1,488,167,450
RN1BIS	76.850	76.900	A	10	0	0	10	5	4,000,000	1,492,167,450
RN1BIS	76.900	76.950	A	10	0	0	10	5	7,200,000	1,499,367,450

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1BIS	77.050	77.100	A	10	0	0	10	5	3,288,550	1,502,656,000
RN1BIS	77.650	77.700	A	10	0	0	10	5	7,200,000	1,509,856,000
RN1BIS	77.750	77.800	A	10	0	0	10	5	9,600,000	1,519,456,000
RN1BIS	77.900	77.950	A	10	0	0	10	5	10,400,000	1,529,856,000
RN1BIS	77.950	78.000	A	10	0	0	10	5	7,200,000	1,537,056,000
RN1BIS	78.000	78.050	A	10	0	0	10	5	8,800,000	1,545,856,000
RN1BIS	78.050	78.100	A	10	0	0	10	5	6,400,000	1,552,256,000
RN1BIS	80.200	80.250	A	10	0	0	10	5	7,200,000	1,559,456,000
RN1BIS	80.250	80.300	A	10	0	0	10	5	4,888,550	1,564,344,550
RN1BIS	80.300	80.350	A	10	0	0	10	5	4,000,000	1,568,344,550
RN1BIS	80.400	80.450	A	10	0	0	10	5	4,000,000	1,572,344,550
RN1BIS	80.450	80.500	A	10	0	0	10	5	1,600,000	1,573,944,550
RN1BIS	80.500	80.550	A	10	0	0	10	5	4,011,200	1,577,955,750
RN1BIS	80.550	80.600	A	10	0	0	10	5	5,363,200	1,583,318,950
RN1BIS	80.700	80.750	A	10	0	0	10	5	4,800,000	1,588,118,950
RN1BIS	80.750	80.800	A	10	0	0	10	5	5,600,000	1,593,718,950
RN1BIS	80.800	80.850	A	10	0	0	10	5	1,600,000	1,595,318,950
RN1BIS	80.850	80.900	A	10	0	0	10	5	1,600,000	1,596,918,950
RN1BIS	80.900	80.950	A	10	0	0	10	5	1,600,000	1,598,518,950
RN1BIS	82.400	82.450	A	10	0	0	10	5	8,337,100	1,606,856,050
RN1BIS	82.700	82.750	A	10	0	0	10	5	8,000,000	1,614,856,050
RN1BIS	82.750	82.800	A	10	0	0	10	5	8,800,000	1,623,656,050
RN1BIS	82.800	82.850	A	10	0	0	10	5	9,600,000	1,633,256,050
RN1BIS	82.850	82.900	A	10	0	0	10	5	6,400,000	1,639,656,050
RN1BIS	82.900	82.950	A	10	0	0	10	5	7,200,000	1,646,856,050
RN1BIS	82.950	83.000	A	10	0	0	10	5	4,000,000	1,650,856,050
RN1BIS	83.400	83.450	A	10	0	0	10	5	5,600,000	1,656,456,050
RN1BIS	83.450	83.500	A	10	0	0	10	5	9,600,000	1,666,056,050
RN1BIS	83.500	83.550	A	10	0	0	10	5	7,200,000	1,673,256,050
RN1BIS	83.550	83.600	A	10	0	0	10	5	6,400,000	1,679,656,050
RN1BIS	83.600	83.650	A	10	0	0	10	5	6,400,000	1,686,056,050
RN1BIS	83.650	83.700	A	10	0	0	10	5	5,600,000	1,691,656,050
RN1BIS	83.700	83.750	A	10	0	0	10	5	7,200,000	1,698,856,050
RN1BIS	83.800	83.850	A	10	0	0	10	5	5,600,000	1,704,456,050
RN1BIS	83.850	83.900	A	10	0	0	10	5	9,688,550	1,714,144,600
RN1BIS	83.900	83.950	A	10	0	0	10	5	6,400,000	1,720,544,600
RN1BIS	83.950	84.000	A	10	0	0	10	5	5,600,000	1,726,144,600
RN1BIS	84.000	84.050	A	10	0	0	10	5	7,200,000	1,733,344,600
RN1BIS	84.050	84.100	A	10	0	0	10	5	8,800,000	1,742,144,600
RN1BIS	84.100	84.150	A	10	0	0	10	5	9,600,000	1,751,744,600
RN1BIS	84.150	84.200	A	10	0	0	10	5	6,400,000	1,758,144,600
RN1BIS	84.200	84.250	A	10	0	0	10	5	6,400,000	1,764,544,600
RN1BIS	84.250	84.300	A	10	0	0	10	5	4,000,000	1,768,544,600
RN1BIS	84.350	84.400	A	10	0	0	10	5	800,000	1,769,344,600
RN1BIS	84.400	84.450	A	10	0	0	10	5	800,000	1,770,144,600
RN1BIS	84.550	84.600	A	10	0	0	10	5	4,000,000	1,774,144,600
RN1BIS	84.650	84.700	A	10	0	0	10	5	12,800,000	1,786,944,600
RN1BIS	84.750	84.800	A	10	0	0	10	5	1,600,000	1,788,544,600
RN1BIS	84.800	84.850	A	10	0	0	10	5	2,400,000	1,790,944,600
RN1BIS	84.850	84.900	A	10	0	0	10	5	4,800,000	1,795,744,600
RN1BIS	84.950	85.000	A	10	0	0	10	5	5,600,000	1,801,344,600
RN1BIS	85.150	85.200	A	10	0	0	10	5	11,200	1,801,355,800
RN1BIS	85.350	85.400	A	10	0	0	10	5	7,299,750	1,808,655,550
RN1BIS	85.400	85.450	A	10	0	0	10	5	7,211,200	1,815,866,750
RN1BIS	85.450	85.500	A	10	0	0	10	5	8,000,000	1,823,866,750
RN1BIS	85.900	85.950	A	10	0	0	10	5	888,550	1,824,755,300
RN1BIS	85.950	86.000	A	10	0	0	10	5	4,800,000	1,829,555,300
RN1BIS	86.000	86.050	A	10	0	0	10	5	8,800,000	1,838,355,300
RN1BIS	86.050	86.100	A	10	0	0	10	5	5,600,000	1,843,955,300
RN1BIS	86.100	86.150	A	10	0	0	10	5	6,488,550	1,850,443,850
RN1BIS	86.150	86.200	A	10	0	0	10	5	2,400,000	1,852,843,850
RN1BIS	87.350	87.400	A	10	0	0	10	5	2,163,200	1,855,007,050

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1BIS	87.750	87.800	A	10	0	0	10	5	800,000	1,855,807,050
RN1BIS	87.850	87.900	A	10	0	0	10	5	2,400,000	1,858,207,050
RN1BIS	89.650	89.700	A	10	0	0	10	5	5,600,000	1,863,807,050
RN1BIS	89.700	89.750	A	10	0	0	10	5	5,600,000	1,869,407,050
RN1BIS	89.750	89.800	A	10	0	0	10	5	2,963,200	1,872,370,250
RN1BIS	89.800	89.850	A	10	0	0	10	5	2,578,150	1,874,948,400
RN1BIS	89.900	89.950	A	10	0	0	10	5	22,400	1,874,970,800
RN1BIS	89.950	90.000	A	10	0	0	10	5	723,200	1,875,694,000
RN1BIS	90.000	90.050	A	10	0	0	10	5	800,000	1,876,494,000
RN1BIS	90.050	90.100	A	10	0	0	10	5	9,600,000	1,886,094,000
RN1BIS	90.150	90.200	A	10	0	0	10	5	9,600,000	1,895,694,000
RN1BIS	90.200	90.250	A	10	0	0	10	5	7,288,550	1,902,982,550
RN1BIS	90.250	90.300	A	10	0	0	10	5	888,550	1,903,871,100
RN1BIS	90.300	90.350	A	10	0	0	10	5	5,363,200	1,909,234,300
RN1BIS	90.350	90.400	A	10	0	0	10	5	800,000	1,910,034,300
RN1BIS	90.400	90.450	A	10	0	0	10	5	88,550	1,910,122,850
RN1BIS	90.450	90.500	A	10	0	0	10	5	2,400,000	1,912,522,850
RN1BIS	90.750	90.800	A	10	0	0	10	5	800,000	1,913,322,850
RN1BIS	90.800	90.850	A	10	0	0	10	5	800,000	1,914,122,850
RN1BIS	90.850	90.900	A	10	0	0	10	5	11,200	1,914,134,050
RN1BIS	90.900	90.950	A	10	0	0	10	5	33,600	1,914,167,650
RN1BIS	91.050	91.100	A	10	0	0	10	5	800,000	1,914,967,650
RN1BIS	91.150	91.200	A	10	0	0	10	5	2,400,000	1,917,367,650
RN1	8.150	8.200	A	0	0	0	10	3	2,411,200	1,919,778,850
RN1	8.200	8.250	A	0	0	0	10	3	67,200	1,919,846,050
RN1	8.250	8.300	A	0	0	0	10	3	2,433,600	1,922,279,650
RN1	8.300	8.350	A	0	0	0	10	3	856,000	1,923,135,650
RN1	8.350	8.400	A	0	0	0	10	3	22,400	1,923,158,050
RN1	8.400	8.450	A	0	0	0	10	3	1,744,550	1,924,902,600
RN1	8.450	8.500	A	0	0	0	10	3	22,400	1,924,925,000
RN1	8.500	8.550	A	0	0	0	10	3	889,600	1,925,814,600
RN1	8.550	8.600	A	0	0	0	10	3	1,678,400	1,927,493,000
RN1	8.600	8.650	A	0	0	0	10	3	2,422,400	1,929,915,400
RN1	8.750	8.800	A	0	0	0	10	3	67,200	1,929,982,600
RN1	8.800	8.850	A	0	0	0	10	3	100,800	1,930,083,400
RN1	8.900	8.950	A	0	0	0	10	3	664,000	1,930,747,400
RN1	8.950	9.000	A	0	0	0	10	3	900,800	1,931,648,200
RN1	9.000	9.050	A	0	0	0	10	3	2,523,200	1,934,171,400
RN1	9.050	9.100	A	0	0	0	10	3	6,478,400	1,940,649,800
RN1	9.250	9.300	A	0	0	0	10	3	4,844,800	1,945,494,600
RN1	9.300	9.350	A	0	0	0	10	3	2,456,000	1,947,950,600
RN1	9.350	9.400	A	0	0	0	10	3	56,000	1,948,006,600
RN1	9.400	9.450	A	0	0	0	10	3	1,622,400	1,949,629,000
RN1	9.450	9.500	A	0	0	0	10	3	2,400,000	1,952,029,000
RN1	9.500	9.550	A	0	0	0	10	3	8,033,600	1,960,062,600
RN1	9.550	9.600	A	0	0	0	10	3	1,656,000	1,961,718,600
RN1	9.800	9.850	A	0	0	0	10	3	22,400	1,961,741,000
RN1	9.850	9.900	A	0	0	0	10	3	177,100	1,961,918,100
RN1	10.050	10.100	A	0	0	0	10	3	800,000	1,962,718,100
RN1	10.100	10.150	A	0	0	0	10	3	2,411,200	1,965,129,300
RN1	10.150	10.200	A	0	0	0	10	3	44,800	1,965,174,100
RN1	10.200	10.250	A	0	0	0	10	3	1,920,000	1,967,094,100
RN1	10.300	10.350	A	0	0	0	10	3	1,088,050	1,968,182,150
RN1	10.500	10.550	A	0	0	0	10	3	11,200	1,968,193,350
RN1	10.550	10.600	A	0	0	0	10	3	1,848,550	1,970,041,900
RN1	10.600	10.650	A	0	0	0	10	3	3,200,000	1,973,241,900
RN1	10.650	10.700	A	0	0	0	10	3	22,400	1,973,264,300
RN1	10.700	10.750	A	0	0	0	10	3	2,400,000	1,975,664,300
RN1	10.950	11.000	A	0	0	0	10	3	800,000	1,976,464,300
RN1	11.000	11.050	A	0	0	0	10	3	1,611,200	1,978,075,500
RN1	11.100	11.150	A	0	0	0	10	3	800,000	1,978,875,500
RN1	11.150	11.200	A	0	0	0	10	3	723,200	1,979,598,700

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1	11.200	11.250	A	0	0	0	10	3	2,985,600	1,982,584,300
RN1	11.250	11.300	A	0	0	0	10	3	3,244,800	1,985,829,100
RN1	11.300	11.350	A	0	0	0	10	3	67,200	1,985,896,300
RN1	11.450	11.500	A	0	0	0	10	3	1,622,400	1,987,518,700
RN1	11.500	11.550	A	0	0	0	10	3	574,400	1,988,093,100
RN1	11.550	11.600	A	0	0	0	10	3	662,950	1,988,756,050
RN1	11.650	11.700	A	0	0	0	10	3	22,400	1,988,778,450
RN1	12.050	12.100	A	0	0	0	10	3	8,326,400	1,997,104,850
RN1	12.100	12.150	A	0	0	0	10	3	4,741,350	2,001,846,200
RN1	13.500	13.550	A	0	0	0	10	3	3,493,350	2,005,339,550
RN1	13.550	13.600	A	0	0	0	10	3	4,912,550	2,010,252,100
RN1	13.700	13.750	A	0	0	0	10	3	2,422,400	2,012,674,500
RN1	13.750	13.800	A	0	0	0	10	3	851,300	2,013,525,800
RN1	13.800	13.850	A	0	0	0	10	3	1,363,200	2,014,889,000
RN1	13.850	13.900	A	0	0	0	10	3	3,312,000	2,018,201,000
RN1	13.950	14.000	A	0	0	0	10	3	110,950	2,018,311,950
RN1	14.400	14.450	A	0	0	0	10	3	11,200	2,018,323,150
RN1	14.450	14.500	A	0	0	0	10	3	888,550	2,019,211,700
RN1	14.600	14.650	A	0	0	0	10	3	563,200	2,019,774,900
RN1	14.650	14.700	A	0	0	0	10	3	745,600	2,020,520,500
RN1	14.800	14.850	A	0	0	0	10	3	89,600	2,020,610,100
RN1	14.850	14.900	A	0	0	0	10	3	811,200	2,021,421,300
RN1	14.900	14.950	A	0	0	0	10	3	88,550	2,021,509,850
RN1	16.100	16.150	A	0	0	0	10	3	674,150	2,022,184,000
RN1	16.200	16.250	A	0	0	0	10	3	88,550	2,022,272,550
RN1	16.250	16.300	A	0	0	0	10	3	1,689,600	2,023,962,150
RN1	16.300	16.350	A	0	0	0	10	3	1,126,400	2,025,088,550
RN1	16.350	16.400	A	0	0	0	10	3	1,126,400	2,026,214,950
RN1	16.450	16.500	A	0	0	0	10	3	99,750	2,026,314,700
RN1	16.500	16.550	A	0	0	0	10	3	811,200	2,027,125,900
RN1	16.750	16.800	A	0	0	0	10	3	800,000	2,027,925,900
RN1	17.100	17.150	A	0	0	0	10	3	1,600,000	2,029,525,900
RN1	17.300	17.350	A	0	0	0	10	3	1,523,200	2,031,049,100
RN1	20.600	20.650	A	0	0	0	10	3	11,200	2,031,060,300
RN1	20.650	20.700	A	0	0	0	10	3	2,163,200	2,033,223,500
RN1	23.950	24.000	A	0	0	0	10	3	662,950	2,033,886,450
RN1	24.000	24.050	A	0	0	0	10	3	2,352,550	2,036,239,000
RN1	24.550	24.600	A	0	0	0	10	3	800,000	2,037,039,000
RN1	24.600	24.650	A	0	0	0	10	3	7,200,000	2,044,239,000
RN1	24.700	24.750	A	0	0	0	10	3	11,200	2,044,250,200
RN1	24.950	25.000	A	0	0	0	10	3	1,474,150	2,045,724,350
RN1	25.700	25.750	A	0	0	0	10	3	2,412,800	2,048,137,150
RN1	25.750	25.800	A	0	0	0	10	3	2,915,250	2,051,052,400
RN1	25.800	25.850	A	0	0	0	10	3	2,163,200	2,053,215,600
RN1	25.850	25.900	A	0	0	0	10	3	160,000	2,053,375,600
RN1	25.900	25.950	A	0	0	0	10	3	1,600,000	2,054,975,600
RN1	27.050	27.100	A	0	0	0	10	3	265,650	2,055,241,250
RN1	27.600	27.650	A	0	0	0	10	3	11,200	2,055,252,450
RN1	27.650	27.700	A	0	0	0	10	3	265,650	2,055,518,100
RN1	29.000	29.050	A	0	0	0	10	3	563,200	2,056,081,300
RN1	29.050	29.100	A	0	0	0	10	3	1,600,000	2,057,681,300
RN1	29.150	29.200	A	0	0	0	10	3	22,400	2,057,703,700
RN1	29.200	29.250	A	0	0	0	10	3	1,600,000	2,059,303,700
RN1	29.250	29.300	A	0	0	0	10	3	574,400	2,059,878,100
RN1	33.050	33.100	A	0	0	0	10	3	888,550	2,060,766,650
RN1	33.400	33.450	A	0	0	0	10	3	3,200,000	2,063,966,650
RN1	33.500	33.550	A	0	0	0	10	3	1,600,000	2,065,566,650
RN1	33.550	33.600	A	0	0	0	10	3	3,200,000	2,068,766,650
RN1	33.600	33.650	A	0	0	0	10	3	4,811,750	2,073,578,400
RN1	33.650	33.700	A	0	0	0	10	3	425,650	2,074,004,050
RN1	33.700	33.750	A	0	0	0	10	3	4,811,200	2,078,815,250
RN1	33.750	33.800	A	0	0	0	10	3	3,448,550	2,082,263,800

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1	33.800	33.850	A	0	0	0	10	3	88,550	2,082,352,350
RN1	33.850	33.900	A	0	0	0	10	3	723,200	2,083,075,550
RN1	33.900	33.950	A	0	0	0	10	3	1,600,000	2,084,675,550
RN1	33.950	34.000	A	0	0	0	10	3	2,422,400	2,087,097,950
RN1	34.000	34.050	A	0	0	0	10	3	5,600,000	2,092,697,950
RN1	34.050	34.100	A	0	0	0	10	3	800,000	2,093,497,950
RN1	34.450	34.500	A	0	0	0	10	3	3,211,200	2,096,709,150
RN1	34.500	34.550	A	0	0	0	10	3	1,600,000	2,098,309,150
RN1	34.550	34.600	A	0	0	0	10	3	1,688,550	2,099,997,700
RN1	34.600	34.650	A	0	0	0	10	3	1,699,750	2,101,697,450
RN1	38.100	38.150	A	0	0	0	10	3	800,000	2,102,497,450
RN1	38.200	38.250	A	0	0	0	10	3	800,000	2,103,297,450
RN1	38.300	38.350	A	0	0	0	10	3	563,200	2,103,860,650
RN1	38.450	38.500	A	0	0	0	10	3	2,433,600	2,106,294,250
RN1	38.500	38.550	A	0	0	0	10	3	800,000	2,107,094,250
RN1	38.850	38.900	A	0	0	0	10	3	1,363,200	2,108,457,450
RN1	39.300	39.350	A	0	0	0	10	3	1,611,200	2,110,068,650
RN1	39.350	39.400	A	0	0	0	10	3	1,926,400	2,111,995,050
RN1	40.950	41.000	A	0	0	0	10	3	3,852,800	2,115,847,850
RN1	41.000	41.050	A	0	0	0	10	3	563,200	2,116,411,050
RN1	41.050	41.100	A	0	0	0	10	3	2,726,400	2,119,137,450
RN1	42.900	42.950	A	0	0	0	10	3	11,200	2,119,148,650
RN1	43.000	43.050	A	0	0	0	10	3	563,200	2,119,711,850
RN1	43.100	43.150	A	0	0	0	10	3	811,200	2,120,523,050
RN1	43.150	43.200	A	0	0	0	10	3	88,550	2,120,611,600
RN1	43.400	43.450	A	0	0	0	10	3	563,200	2,121,174,800
RN1	46.650	46.700	A	0	0	0	10	3	800,000	2,121,974,800
RN1	46.750	46.800	A	0	0	0	10	3	563,200	2,122,538,000
RN1	46.850	46.900	A	0	0	0	10	3	11,200	2,122,549,200
RN1	47.000	47.050	A	0	0	0	10	3	88,550	2,122,637,750
RN1	47.250	47.300	A	0	0	0	10	3	11,200	2,122,648,950
RN1	47.450	47.500	A	0	0	0	10	3	11,200	2,122,660,150
RN1	48.450	48.500	A	0	0	0	10	3	1,955,250	2,124,615,400
RN1	48.500	48.550	A	0	0	0	10	3	3,200,000	2,127,815,400
RN1	48.550	48.600	A	0	0	0	10	3	1,600,000	2,129,415,400
RN1	51.050	51.100	A	0	0	0	10	3	88,550	2,129,503,950
RN1	51.200	51.250	A	0	0	0	10	3	11,200	2,129,515,150
RN1	51.300	51.350	A	0	0	0	10	3	11,200	2,129,526,350
RN1	51.450	51.500	A	0	0	0	10	3	11,200	2,129,537,550
RN1	51.500	51.550	A	0	0	0	10	3	2,400,000	2,131,937,550
RN1	51.550	51.600	A	0	0	0	10	3	800,000	2,132,737,550
RN1	51.650	51.700	A	0	0	0	10	3	1,611,200	2,134,348,750
RN1	55.650	55.700	A	0	0	0	10	3	1,600,000	2,135,948,750
RN1	60.100	60.150	A	0	0	0	10	3	3,200,000	2,139,148,750
RN1	61.450	61.500	A	0	0	0	10	3	800,000	2,139,948,750
RN1	61.500	61.550	A	0	0	0	10	3	88,550	2,140,037,300
RN1	61.650	61.700	A	0	0	0	10	3	1,600,000	2,141,637,300
RN1	61.750	61.800	A	0	0	0	10	3	800,000	2,142,437,300
RN1	62.350	62.400	A	0	0	0	10	3	1,600,000	2,144,037,300
RN1	62.400	62.450	A	0	0	0	10	3	800,000	2,144,837,300
RN1	63.150	63.200	A	0	0	0	10	3	4,800,000	2,149,637,300
RN1	63.550	63.600	A	0	0	0	10	3	2,400,000	2,152,037,300
RN1	65.000	65.050	A	0	0	0	10	3	11,200	2,152,048,500
RN1	65.250	65.300	A	0	0	0	10	3	177,100	2,152,225,600
RN1	65.500	65.550	A	0	0	0	10	3	888,550	2,153,114,150
RN1	65.550	65.600	A	0	0	0	10	3	800,000	2,153,914,150
RN1	69.950	70.000	A	0	0	0	10	3	800,000	2,154,714,150
RN1	70.050	70.100	A	0	0	0	10	3	88,550	2,154,802,700
RN1	70.100	70.150	A	0	0	0	10	3	800,000	2,155,602,700
RN1	70.150	70.200	A	0	0	0	10	3	11,200	2,155,613,900
RN1	73.050	73.100	A	0	0	0	10	3	2,400,000	2,158,013,900
RN1	73.100	73.150	A	0	0	0	10	3	4,993,600	2,163,007,500

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1	73.400	73.450	A	0	0	0	10	3	800,000	2,163,807,500
RN1	73.600	73.650	A	0	0	0	10	3	1,600,000	2,165,407,500
RN1	73.700	73.750	A	0	0	0	10	3	5,600,000	2,171,007,500
RN1	73.750	73.800	A	0	0	0	10	3	2,456,000	2,173,463,500
RN1	73.800	73.850	A	0	0	0	10	3	800,000	2,174,263,500
RN1	74.200	74.250	A	0	0	0	10	3	1,600,000	2,175,863,500
RN1	74.300	74.350	A	0	0	0	10	3	2,400,000	2,178,263,500
RN1	74.450	74.500	A	0	0	0	10	3	888,550	2,179,152,050
RN1	75.800	75.850	A	0	0	0	10	3	2,560,000	2,181,712,050
RN1	76.150	76.200	A	0	0	0	10	3	2,400,000	2,184,112,050
RN1	76.200	76.250	A	0	0	0	10	3	811,200	2,184,923,250
RN1	76.250	76.300	A	0	0	0	10	3	2,251,750	2,187,175,000
RN1	76.450	76.500	A	0	0	0	10	3	800,000	2,187,975,000
RN1	76.500	76.550	A	0	0	0	10	3	4,000,000	2,191,975,000
RN1	76.700	76.750	A	0	0	0	10	3	800,000	2,192,775,000
RN1	76.750	76.800	A	0	0	0	10	3	1,600,000	2,194,375,000
RN1	76.900	76.950	A	0	0	0	10	3	177,100	2,194,552,100
RN1	79.000	79.050	A	0	0	0	10	3	2,488,550	2,197,040,650
RN1	79.350	79.400	A	0	0	0	10	3	811,200	2,197,851,850
RN1	81.450	81.500	A	0	0	0	10	3	3,200,000	2,201,051,850
RN1	81.500	81.550	A	0	0	0	10	3	4,022,400	2,205,074,250
RN1	81.550	81.600	A	0	0	0	10	3	6,400,000	2,211,474,250
RN1	81.600	81.650	A	0	0	0	10	3	2,571,200	2,214,045,450
RN1	81.700	81.750	A	0	0	0	10	3	88,550	2,214,134,000
RN1	81.900	81.950	A	0	0	0	10	3	800,000	2,214,934,000
RN1	82.050	82.100	A	0	0	0	10	3	800,000	2,215,734,000
RN1	83.250	83.300	A	0	0	0	10	3	1,600,000	2,217,334,000
RN1	84.850	84.900	A	0	0	0	10	3	800,000	2,218,134,000
RN1	85.000	85.050	A	0	0	0	10	3	3,211,200	2,221,345,200
RN1	85.050	85.100	A	0	0	0	10	3	3,200,000	2,224,545,200
RN1	86.950	87.000	A	0	0	0	10	3	800,000	2,225,345,200
RN1	87.000	87.050	A	0	0	0	10	3	3,360,000	2,228,705,200
RN1	87.100	87.150	A	0	0	0	10	3	88,550	2,228,793,750
RN1	87.200	87.250	A	0	0	0	10	3	800,000	2,229,593,750
RN1	89.100	89.150	A	0	0	0	10	3	3,222,400	2,232,816,150
RN1	89.350	89.400	A	0	0	0	10	3	2,411,200	2,235,227,350
RN1	89.400	89.450	A	0	0	0	10	3	99,750	2,235,327,100
RN1	90.900	90.950	A	0	0	0	10	3	1,611,200	2,236,938,300
RN1	92.450	92.500	A	0	0	0	10	3	99,750	2,237,038,050
RN1	92.500	92.550	A	0	0	0	10	3	800,000	2,237,838,050
RN1	92.550	92.600	A	0	0	0	10	3	844,800	2,238,682,850
RN1	92.600	92.650	A	0	0	0	10	3	3,416,000	2,242,098,850
RN1	92.750	92.800	A	0	0	0	10	3	110,950	2,242,209,800
RN1	92.800	92.850	A	0	0	0	10	3	1,688,550	2,243,898,350
RN1	92.850	92.900	A	0	0	0	10	3	99,750	2,243,998,100
RN1	92.900	92.950	A	0	0	0	10	3	11,200	2,244,009,300
RN1	93.150	93.200	A	0	0	0	10	3	22,400	2,244,031,700
RN1	93.300	93.350	A	0	0	0	10	3	160,000	2,244,191,700
RN1	93.350	93.400	A	0	0	0	10	3	800,000	2,244,991,700
RN1	93.600	93.650	A	0	0	0	10	3	4,822,400	2,249,814,100
RN1	94.050	94.100	A	0	0	0	10	3	11,200	2,249,825,300
RN1	94.100	94.150	A	0	0	0	10	3	2,411,200	2,252,236,500
RN1	94.350	94.400	A	0	0	0	10	3	4,888,550	2,257,125,050
RN1	94.400	94.450	A	0	0	0	10	3	5,600,000	2,262,725,050
RN1	95.000	95.050	A	0	0	0	10	3	4,888,550	2,267,613,600
RN1	95.200	95.250	A	0	0	0	10	3	800,000	2,268,413,600
RN1	95.400	95.450	A	0	0	0	10	3	4,800,000	2,273,213,600
RN1	95.450	95.500	A	0	0	0	10	3	1,699,750	2,274,913,350
RN1	95.500	95.550	A	0	0	0	10	3	1,600,000	2,276,513,350
RN1	95.550	95.600	A	0	0	0	10	3	2,400,000	2,278,913,350
RN1	95.600	95.650	A	0	0	0	10	3	4,888,550	2,283,801,900
RN1	96.700	96.750	A	0	0	0	10	3	800,000	2,284,601,900

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1	96.850	96.900	A	0	0	0	10	3	1,523,200	2,286,125,100
RN1	98.900	98.950	A	0	0	0	10	3	265,650	2,286,390,750
RN1	98.950	99.000	A	0	0	0	10	3	811,200	2,287,201,950
RN1	99.000	99.050	A	0	0	0	10	3	2,400,000	2,289,601,950
RN1	99.050	99.100	A	0	0	0	10	3	5,600,000	2,295,201,950
RN1	100.600	100.650	A	0	0	0	10	3	11,200	2,295,213,150
RN1	100.650	100.700	A	0	0	0	10	3	563,200	2,295,776,350
RN1	100.800	100.850	A	0	0	0	10	3	11,200	2,295,787,550
RN1	100.850	100.900	A	0	0	0	10	3	11,200	2,295,798,750
RN1	100.900	100.950	A	0	0	0	10	3	88,550	2,295,887,300
RN1	100.950	101.000	A	0	0	0	10	3	982,400	2,296,869,700
RN1	101.050	101.100	A	0	0	0	10	3	800,000	2,297,669,700
RN1	101.600	101.650	A	0	0	0	10	3	800,000	2,298,469,700
RN1	101.650	101.700	A	0	0	0	10	3	88,550	2,298,558,250
RN1	101.750	101.800	A	0	0	0	10	3	88,550	2,298,646,800
RN1	101.950	102.000	A	0	0	0	10	3	88,550	2,298,735,350
RN1	102.200	102.250	A	0	0	0	10	3	1,457,100	2,300,192,450
RN1	102.250	102.300	A	0	0	0	10	3	425,650	2,300,618,100
RN1	102.400	102.450	A	0	0	0	10	3	177,100	2,300,795,200
RN1	102.450	102.500	A	0	0	0	10	3	11,200	2,300,806,400
RN1	102.500	102.550	A	0	0	0	10	3	88,550	2,300,894,950
RN1	102.750	102.800	A	0	0	0	10	3	88,550	2,300,983,500
RN1	102.800	102.850	A	0	0	0	10	3	800,000	2,301,783,500
RN1	102.850	102.900	A	0	0	0	10	3	1,865,650	2,303,649,150
RN1	103.000	103.050	A	0	0	0	10	3	265,650	2,303,914,800
RN1	103.100	103.150	A	0	0	0	10	3	177,100	2,304,091,900
RN1	103.150	103.200	A	0	0	0	10	3	337,100	2,304,429,000
RN1	103.200	103.250	A	0	0	0	10	3	11,200	2,304,440,200
RN1	103.300	103.350	A	0	0	0	10	3	188,300	2,304,628,500
RN1	103.950	104.000	A	0	0	0	10	3	177,100	2,304,805,600
RN1	104.100	104.150	A	0	0	0	10	3	265,650	2,305,071,250
RN1	104.300	104.350	A	0	0	0	10	3	88,550	2,305,159,800
RN1	104.500	104.550	A	0	0	0	10	3	1,431,600	2,306,591,400
RN1	104.550	104.600	A	0	0	0	10	3	88,550	2,306,679,950
RN1	104.600	104.650	A	0	0	0	10	3	88,550	2,306,768,500
RN1	104.650	104.700	A	0	0	0	10	3	563,200	2,307,331,700
RN1	104.800	104.850	A	0	0	0	10	3	11,200	2,307,342,900
RN1	105.450	105.500	A	0	0	0	10	3	977,100	2,308,320,000
RN1	106.200	106.250	A	0	0	0	10	3	1,600,000	2,309,920,000
RN1	106.450	106.500	A	0	0	0	10	3	88,550	2,310,008,550
RN1	106.550	106.600	A	0	0	0	10	3	11,200	2,310,019,750
RN1	106.600	106.650	A	0	0	0	10	3	2,400,000	2,312,419,750
RN1	106.850	106.900	A	0	0	0	10	3	110,950	2,312,530,700
RN1	107.200	107.250	A	0	0	0	10	3	1,600,000	2,314,130,700
RN1	107.350	107.400	A	0	0	0	10	3	563,200	2,314,693,900
RN1	107.800	107.850	A	0	0	0	10	3	88,550	2,314,782,450
RN1	107.850	107.900	A	0	0	0	10	3	11,200	2,314,793,650
RN1	107.900	107.950	A	0	0	0	10	3	177,100	2,314,970,750
RN1	108.000	108.050	A	0	0	0	10	3	11,200	2,314,981,950
RN1	108.350	108.400	A	0	0	0	10	3	1,600,000	2,316,581,950
RN1	108.400	108.450	A	0	0	0	10	3	11,200	2,316,593,150
RN1	108.550	108.600	A	0	0	0	10	3	33,600	2,316,626,750
RN1	108.600	108.650	A	0	0	0	10	3	33,600	2,316,660,350
RN1	108.750	108.800	A	0	0	0	10	3	11,200	2,316,671,550
RN1	108.800	108.850	A	0	0	0	10	3	88,550	2,316,760,100
RN1	108.950	109.000	A	0	0	0	10	3	177,100	2,316,937,200
RN1	109.000	109.050	A	0	0	0	10	3	88,550	2,317,025,750
RN1	109.050	109.100	A	0	0	0	10	3	651,750	2,317,677,500
RN1	109.850	109.900	A	0	0	0	10	3	11,200	2,317,688,700
RN1	111.150	111.200	A	0	0	0	10	3	265,650	2,317,954,350
RN1	111.450	111.500	A	0	0	0	10	3	822,400	2,318,776,750
RN1	111.500	111.550	A	0	0	0	10	3	11,200	2,318,787,950

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1	111.550	111.600	A	0	0	0	10	3	800,000	2,319,587,950
RN1	111.650	111.700	A	0	0	0	10	3	1,611,200	2,321,199,150
RN1	111.700	111.750	A	0	0	0	10	3	4,563,200	2,325,762,350
RN1	111.750	111.800	A	0	0	0	10	3	1,688,550	2,327,450,900
RN1	111.800	111.850	A	0	0	0	10	3	4,199,500	2,331,650,400
RN1	111.850	111.900	A	0	0	0	10	3	171,200	2,331,821,600
RN1	112.000	112.050	A	0	0	0	10	3	4,022,400	2,335,844,000
RN1	112.050	112.100	A	0	0	0	10	3	2,963,200	2,338,807,200
RN1	112.100	112.150	A	0	0	0	10	3	822,400	2,339,629,600
RN1	112.150	112.200	A	0	0	0	10	3	3,211,200	2,342,840,800
RN1	112.450	112.500	A	0	0	0	10	3	5,611,200	2,348,452,000
RN1	112.500	112.550	A	0	0	0	10	3	800,000	2,349,252,000
RN1	112.650	112.700	A	0	0	0	10	3	11,200	2,349,263,200
RN1	112.700	112.750	A	0	0	0	10	3	11,200	2,349,274,400
RN1	112.750	112.800	A	0	0	0	10	3	811,200	2,350,085,600
RN1	112.800	112.850	A	0	0	0	10	3	2,963,200	2,353,048,800
RN1	112.850	112.900	A	0	0	0	10	3	563,200	2,353,612,000
RN1	113.050	113.100	A	0	0	0	10	3	1,600,000	2,355,212,000
RN1	113.100	113.150	A	0	0	0	10	3	1,600,000	2,356,812,000
RN1	113.150	113.200	A	0	0	0	10	3	5,688,550	2,362,500,550
RN1	113.200	113.250	A	0	0	0	10	3	6,400,000	2,368,900,550
RN1	113.250	113.300	A	0	0	0	10	3	3,288,550	2,372,189,100
RN1	113.300	113.350	A	0	0	0	10	3	4,800,000	2,376,989,100
RN1	113.350	113.400	A	0	0	0	10	3	4,000,000	2,380,989,100
RN1	113.400	113.450	A	0	0	0	10	3	822,400	2,381,811,500
RN1	113.450	113.500	A	0	0	0	10	3	800,000	2,382,611,500
RN1	113.650	113.700	A	0	0	0	10	3	800,000	2,383,411,500
RN1	114.950	115.000	A	0	0	0	10	3	5,611,200	2,389,022,700
RN1	115.000	115.050	A	0	0	0	10	3	8,000,000	2,397,022,700
RN1	115.050	115.100	A	0	0	0	10	3	5,600,000	2,402,622,700
RN1BIS	4.900	4.950	A	0	0	0	10	3	11,200	2,402,633,900
RN1BIS	4.950	5.000	A	0	0	0	10	3	11,200	2,402,645,100
RN1BIS	5.000	5.050	A	0	0	0	10	3	88,550	2,402,733,650
RN1BIS	5.100	5.150	A	0	0	0	10	3	11,200	2,402,744,850
RN1BIS	5.300	5.350	A	0	0	0	10	3	22,400	2,402,767,250
RN1BIS	5.350	5.400	A	0	0	0	10	3	800,000	2,403,567,250
RN1BIS	5.500	5.550	A	0	0	0	10	3	2,400,000	2,405,967,250
RN1BIS	5.550	5.600	A	0	0	0	10	3	1,600,000	2,407,567,250
RN1BIS	5.600	5.650	A	0	0	0	10	3	5,600,000	2,413,167,250
RN1BIS	5.650	5.700	A	0	0	0	10	3	800,000	2,413,967,250
RN1BIS	9.350	9.400	A	0	0	0	10	3	11,200	2,413,978,450
RN1BIS	10.750	10.800	A	0	0	0	10	3	800,000	2,414,778,450
RN1BIS	10.800	10.850	A	0	0	0	10	3	88,550	2,414,867,000
RN1BIS	12.550	12.600	A	0	0	0	10	3	11,200	2,414,878,200
RN1BIS	14.300	14.350	A	0	0	0	10	3	563,200	2,415,441,400
RN1BIS	14.350	14.400	A	0	0	0	10	3	662,950	2,416,104,350
RN1BIS	16.200	16.250	A	0	0	0	10	3	3,382,400	2,419,486,750
RN1BIS	17.900	17.950	A	0	0	0	10	3	800,000	2,420,286,750
RN1BIS	18.400	18.450	A	0	0	0	10	3	22,400	2,420,309,150
RN1BIS	19.450	19.500	A	0	0	0	10	3	899,750	2,421,208,900
RN1BIS	19.850	19.900	A	0	0	0	10	3	11,200	2,421,220,100
RN1BIS	22.400	22.450	A	0	0	0	10	3	1,611,200	2,422,831,300
RN1BIS	24.800	24.850	A	0	0	0	10	3	1,689,600	2,424,520,900
RN1BIS	25.700	25.750	A	0	0	0	10	3	800,000	2,425,320,900
RN1BIS	25.800	25.850	A	0	0	0	10	3	408,550	2,425,729,450
RN1BIS	27.450	27.500	A	0	0	0	10	3	11,200	2,425,740,650
RN1BIS	27.500	27.550	A	0	0	0	10	3	22,400	2,425,763,050
RN1BIS	27.550	27.600	A	0	0	0	10	3	11,200	2,425,774,250
RN1BIS	27.600	27.650	A	0	0	0	10	3	22,400	2,425,796,650
RN1BIS	27.650	27.700	A	0	0	0	10	3	800,000	2,426,596,650
RN1BIS	27.700	27.750	A	0	0	0	10	3	563,200	2,427,159,850
RN1BIS	29.750	29.800	A	0	0	0	10	3	844,800	2,428,004,650

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1BIS	31.000	31.050	A	0	0	0	10	3	11,200	2,428,015,850
RN1BIS	31.050	31.100	A	0	0	0	10	3	888,550	2,428,904,400
RN1BIS	31.150	31.200	A	0	0	0	10	3	800,000	2,429,704,400
RN1BIS	31.200	31.250	A	0	0	0	10	3	888,550	2,430,592,950
RN1BIS	31.250	31.300	A	0	0	0	10	3	811,200	2,431,404,150
RN1BIS	31.300	31.350	A	0	0	0	10	3	1,688,550	2,433,092,700
RN1BIS	31.350	31.400	A	0	0	0	10	3	3,222,400	2,436,315,100
RN1BIS	31.400	31.450	A	0	0	0	10	3	22,400	2,436,337,500
RN1BIS	31.450	31.500	A	0	0	0	10	3	1,777,100	2,438,114,600
RN1BIS	31.600	31.650	A	0	0	0	10	3	11,200	2,438,125,800
RN1BIS	31.700	31.750	A	0	0	0	10	3	248,550	2,438,374,350
RN1BIS	31.750	31.800	A	0	0	0	10	3	276,850	2,438,651,200
RN1BIS	32.550	32.600	A	0	0	0	10	3	2,400,000	2,441,051,200
RN1BIS	34.300	34.350	A	0	0	0	10	3	1,600,000	2,442,651,200
RN1BIS	34.400	34.450	A	0	0	0	10	3	800,000	2,443,451,200
RN1BIS	36.750	36.800	A	0	0	0	10	3	11,200	2,443,462,400
RN1BIS	36.800	36.850	A	0	0	0	10	3	3,200,000	2,446,662,400
RN1BIS	36.850	36.900	A	0	0	0	10	3	800,000	2,447,462,400
RN1BIS	39.200	39.250	A	0	0	0	10	3	1,600,000	2,449,062,400
RN1BIS	39.250	39.300	A	0	0	0	10	3	2,400,000	2,451,462,400
RN1BIS	39.300	39.350	A	0	0	0	10	3	2,400,000	2,453,862,400
RN1BIS	39.350	39.400	A	0	0	0	10	3	3,200,000	2,457,062,400
RN1BIS	41.150	41.200	A	0	0	0	10	3	1,600,000	2,458,662,400
RN1BIS	42.450	42.500	A	0	0	0	10	3	899,750	2,459,562,150
RN1BIS	43.000	43.050	A	0	0	0	10	3	11,200	2,459,573,350
RN1BIS	43.050	43.100	A	0	0	0	10	3	811,200	2,460,384,550
RN1BIS	43.100	43.150	A	0	0	0	10	3	11,200	2,460,395,750
RN1BIS	43.150	43.200	A	0	0	0	10	3	22,400	2,460,418,150
RN1BIS	43.200	43.250	A	0	0	0	10	3	11,200	2,460,429,350
RN1BIS	43.250	43.300	A	0	0	0	10	3	11,200	2,460,440,550
RN1BIS	44.450	44.500	A	0	0	0	10	3	88,550	2,460,529,100
RN1BIS	44.750	44.800	A	0	0	0	10	3	88,550	2,460,617,650
RN1BIS	45.600	45.650	A	0	0	0	10	3	88,550	2,460,706,200
RN1BIS	52.550	52.600	A	0	0	0	10	3	800,000	2,461,506,200
RN1BIS	53.050	53.100	A	0	0	0	10	3	11,200	2,461,517,400
RN1BIS	54.800	54.850	A	0	0	0	10	3	210,700	2,461,728,100
RN1BIS	55.350	55.400	A	0	0	0	10	3	11,200	2,461,739,300
RN1BIS	57.300	57.350	A	0	0	0	10	3	88,550	2,461,827,850
RN1BIS	57.350	57.400	A	0	0	0	10	3	800,000	2,462,627,850
RN1BIS	57.400	57.450	A	0	0	0	10	3	11,200	2,462,639,050
RN1BIS	58.100	58.150	A	0	0	0	10	3	11,200	2,462,650,250
RN1BIS	58.500	58.550	A	0	0	0	10	3	11,200	2,462,661,450
RN1BIS	59.900	59.950	A	0	0	0	10	3	88,550	2,462,750,000
RN1BIS	60.300	60.350	A	0	0	0	10	3	88,550	2,462,838,550
RN1BIS	61.900	61.950	A	0	0	0	10	3	977,100	2,463,815,650
RN1BIS	62.850	62.900	A	0	0	0	10	3	177,100	2,463,992,750
RN1BIS	70.600	70.650	A	0	0	0	10	3	88,550	2,464,081,300
RN1BIS	70.650	70.700	A	0	0	0	10	3	1,600,000	2,465,681,300
RN1BIS	73.100	73.150	A	0	0	0	10	3	800,000	2,466,481,300
RN1BIS	73.150	73.200	A	0	0	0	10	3	22,400	2,466,503,700
RN1BIS	74.750	74.800	A	0	0	0	10	3	88,550	2,466,592,250
RN1BIS	75.150	75.200	A	0	0	0	10	3	800,000	2,467,392,250
RN1BIS	75.500	75.550	A	0	0	0	10	3	11,200	2,467,403,450
RN1BIS	78.100	78.150	A	0	0	0	10	3	8,800,000	2,476,203,450
RN1BIS	78.150	78.200	A	0	0	0	10	3	4,000,000	2,480,203,450
RN1BIS	78.200	78.250	A	0	0	0	10	3	4,000,000	2,484,203,450
RN1BIS	78.250	78.300	A	0	0	0	10	3	8,800,000	2,493,003,450
RN1BIS	78.300	78.350	A	0	0	0	10	3	9,600,000	2,502,603,450
RN1BIS	78.350	78.400	A	0	0	0	10	3	10,400,000	2,513,003,450
RN1BIS	78.400	78.450	A	0	0	0	10	3	1,600,000	2,514,603,450
RN1BIS	78.450	78.500	A	0	0	0	10	3	1,600,000	2,516,203,450
RN1BIS	78.500	78.550	A	0	0	0	10	3	888,550	2,517,092,000

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1BIS	78.550	78.600	A	0	0	0	10	3	2,042,750	2,519,134,750
RN1BIS	78.600	78.650	A	0	0	0	10	3	6,400,000	2,525,534,750
RN1BIS	78.650	78.700	A	0	0	0	10	3	7,200,000	2,532,734,750
RN1BIS	78.700	78.750	A	0	0	0	10	3	800,000	2,533,534,750
RN1BIS	78.800	78.850	A	0	0	0	10	3	1,600,000	2,535,134,750
RN1BIS	78.850	78.900	A	0	0	0	10	3	4,811,200	2,539,945,950
RN1BIS	78.900	78.950	A	0	0	0	10	3	7,200,000	2,547,145,950
RN1BIS	78.950	79.000	A	0	0	0	10	3	7,200,000	2,554,345,950
RN1BIS	79.000	79.050	A	0	0	0	10	3	10,400,000	2,564,745,950
RN1BIS	79.050	79.100	A	0	0	0	10	3	6,400,000	2,571,145,950
RN1BIS	79.100	79.150	A	0	0	0	10	3	7,200,000	2,578,345,950
RN1BIS	79.150	79.200	A	0	0	0	10	3	5,600,000	2,583,945,950
RN1BIS	79.200	79.250	A	0	0	0	10	3	7,200,000	2,591,145,950
RN1BIS	79.250	79.300	A	0	0	0	10	3	6,400,000	2,597,545,950
RN1BIS	79.300	79.350	A	0	0	0	10	3	10,400,000	2,607,945,950
RN1BIS	79.350	79.400	A	0	0	0	10	3	12,000,000	2,619,945,950
RN1BIS	79.400	79.450	A	0	0	0	10	3	5,611,200	2,625,557,150
RN1BIS	79.450	79.500	A	0	0	0	10	3	4,000,000	2,629,557,150
RN1BIS	79.500	79.550	A	0	0	0	10	3	800,000	2,630,357,150
RN1BIS	79.550	79.600	A	0	0	0	10	3	800,000	2,631,157,150
RN1BIS	79.600	79.650	A	0	0	0	10	3	3,200,000	2,634,357,150
RN1BIS	79.650	79.700	A	0	0	0	10	3	4,800,000	2,639,157,150
RN1BIS	79.700	79.750	A	0	0	0	10	3	3,200,000	2,642,357,150
RN1BIS	79.750	79.800	A	0	0	0	10	3	5,688,550	2,648,045,700
RN1BIS	79.800	79.850	A	0	0	0	10	3	2,411,200	2,650,456,900
RN1BIS	79.850	79.900	A	0	0	0	10	3	7,200,000	2,657,656,900
RN1BIS	79.900	79.950	A	0	0	0	10	3	4,800,000	2,662,456,900
RN1BIS	79.950	80.000	A	0	0	0	10	3	1,600,000	2,664,056,900
RN1BIS	80.000	80.050	A	0	0	0	10	3	3,200,000	2,667,256,900
RN1BIS	80.050	80.100	A	0	0	0	10	3	6,400,000	2,673,656,900
RN1BIS	80.100	80.150	A	0	0	0	10	3	8,099,750	2,681,756,650
RN1BIS	80.150	80.200	A	0	0	0	10	3	5,600,000	2,687,356,650
RN1BIS	82.200	82.250	A	0	0	0	10	3	4,000,000	2,691,356,650
RN1BIS	82.250	82.300	A	0	0	0	10	3	4,000,000	2,695,356,650
RN1BIS	82.300	82.350	A	0	0	0	10	3	5,600,000	2,700,956,650
RN1BIS	82.350	82.400	A	0	0	0	10	3	5,600,000	2,706,556,650
RN1BIS	83.000	83.050	A	0	0	0	10	3	3,200,000	2,709,756,650
RN1BIS	83.050	83.100	A	0	0	0	10	3	3,200,000	2,712,956,650
RN1BIS	83.100	83.150	A	0	0	0	10	3	4,000,000	2,716,956,650
RN1BIS	83.150	83.200	A	0	0	0	10	3	800,000	2,717,756,650
RN1BIS	83.200	83.250	A	0	0	0	10	3	1,600,000	2,719,356,650
RN1BIS	83.250	83.300	A	0	0	0	10	3	1,600,000	2,720,956,650
RN1BIS	83.300	83.350	A	0	0	0	10	3	8,800,000	2,729,756,650
RN1BIS	83.350	83.400	A	0	0	0	10	3	8,000,000	2,737,756,650
RN1BIS	85.000	85.050	A	0	0	0	10	3	7,200,000	2,744,956,650
RN1BIS	85.050	85.100	A	0	0	0	10	3	6,400,000	2,751,356,650
RN1BIS	85.100	85.150	A	0	0	0	10	3	11,200	2,751,367,850
RN1BIS	85.500	85.550	A	0	0	0	10	3	6,400,000	2,757,767,850
RN1BIS	85.550	85.600	A	0	0	0	10	3	4,800,000	2,762,567,850
RN1BIS	86.200	86.250	A	0	0	0	10	3	1,688,550	2,764,256,400
RN1BIS	86.250	86.300	A	0	0	0	10	3	800,000	2,765,056,400
RN1BIS	88.200	88.250	A	0	0	0	10	3	4,088,550	2,769,144,950
RN1BIS	88.250	88.300	A	0	0	0	10	3	4,022,400	2,773,167,350
RN1BIS	88.300	88.350	A	0	0	0	10	3	3,200,000	2,776,367,350
RN1BIS	88.400	88.450	A	0	0	0	10	3	800,000	2,777,167,350
RN1BIS	88.450	88.500	A	0	0	0	10	3	2,400,000	2,779,567,350
RN1BIS	88.500	88.550	A	0	0	0	10	3	160,000	2,779,727,350
RN1BIS	88.550	88.600	A	0	0	0	10	3	4,000,000	2,783,727,350
RN1BIS	88.600	88.650	A	0	0	0	10	3	800,000	2,784,527,350
RN1BIS	88.700	88.750	A	0	0	0	10	3	3,200,000	2,787,727,350
RN1BIS	88.750	88.800	A	0	0	0	10	3	1,600,000	2,789,327,350
RN1BIS	88.800	88.850	A	0	0	0	10	3	1,688,550	2,791,015,900

RN	PK (beginning)	PK (Ending)	Surface Condition	Vertical alignment	Horizontal alignment	Drainage conditions	Social condition	Score	Cost Estimate	Accumulated Cost
RN1BIS	88.850	88.900	A	0	0	0	10	3	2,411,200	2,793,427,100
RN1BIS	88.900	88.950	A	0	0	0	10	3	4,800,000	2,798,227,100
RN1BIS	88.950	89.000	A	0	0	0	10	3	5,600,000	2,803,827,100
RN1BIS	89.000	89.050	A	0	0	0	10	3	5,600,000	2,809,427,100
RN1BIS	89.050	89.100	A	0	0	0	10	3	4,800,000	2,814,227,100
RN1BIS	89.100	89.150	A	0	0	0	10	3	3,200,000	2,817,427,100
RN1BIS	89.150	89.200	A	0	0	0	10	3	6,400,000	2,823,827,100
RN1BIS	89.200	89.250	A	0	0	0	10	3	4,000,000	2,827,827,100
RN1BIS	89.250	89.300	A	0	0	0	10	3	811,200	2,828,638,300
RN1BIS	89.300	89.350	A	0	0	0	10	3	1,600,000	2,830,238,300
RN1BIS	89.600	89.650	A	0	0	0	10	3	7,200,000	2,837,438,300
RN1BIS	90.500	90.550	A	0	0	0	10	3	800,000	2,838,238,300
RN1BIS	90.550	90.600	A	0	0	0	10	3	563,200	2,838,801,500
RN	*Source: F3LTM*									

BLACK line: Budget amount set 100% of actual allocated budget in 2024
RED line: Budget amount set 150% of actual allocated budget in 2024
GREEN line: Budget amount set 2,200 million Ar.
BLUE line: Budget amount set 200% of actual allocated budget in 2024

There can be another conditions of shortlisting, such as GREEN and BLUE line shown in the table above. These conditions can be set by MTP though discussion among the related departments or external stakeholders. There isn't any specific methodology to apply to optimize this condition. If the government has an austerity policy, it can be decrease, if the regional economy needs to be boosted or there is strong claim from the public, it can be increased. Therefore, it is important to conduct social demand survey in aspects as is explained in subchapter 4.2.

The maintenance plan (1st version) is the list with the condition which is agreed among the stakeholders. If the condition is **"Budget amount set 150% of actual allocated budget in 2024"**, the plan is the table above from the top to the RED line. It is as same as the draft PEC which is shown as 5) in the Figure 2-1.

7.8 Verification, Coordination, and Finalization of Budget Request Documents

The details are same as with RNP2. See subchapter 6.8.

7.9 Annual Maintenance Plan of RNS1, 2025

The 1st draft of the annual maintenance plan of RNS1, 2025 is demonstrated in the following table.

Table 7-6 Annual Maintenance Plan of RNS1, 2025 (Ar)

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1BIS	92.800	92.850	33 600	0	0	0	0	33,600	33,600
RN1	17.600	17.650	0	800 000	0	0	0	800,000	833,600
RN1	17.800	17.850	11 200	0	0	0	0	11,200	844,800
RN1	24.800	24.850	0	1 600 000	0	0	0	1,600,000	2,444,800
RN1	24.850	24.900	0	3 200 000	0	0	0	3,200,000	5,644,800
RN1	25.500	25.550	0	4 800 000	0	2 816 000	88 550	7,704,550	13,349,350
RN1	30.250	30.300	0	800 000	0	0	0	800,000	14,149,350
RN1	30.350	30.400	11 200	0	0	1 126 400	0	1,137,600	15,286,950
RN1	31.700	31.750	0	2 400 000	0	563 200	0	2,963,200	18,250,150
RN1	31.750	31.800	0	0	0	2 252 800	0	2,252,800	20,502,950
RN1	31.800	31.850	0	0	0	1 689 600	0	1,689,600	22,192,550
RN1	31.850	31.900	0	0	0	1 689 600	248 550	1,938,150	24,130,700
RN1	31.900	31.950	0	0	0	1 126 400	0	1,126,400	25,257,100

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1	41.850	41.900	0	0	0	0	160 000	160,000	25,417,100
RN1	41.900	41.950	0	800 000	0	0	0	800,000	26,217,100
RN1	45.350	45.400	0	4 000 000	0	0	0	4,000,000	30,217,100
RN1	49.800	49.850	11 200	0	0	0	0	11,200	30,228,300
RN1	49.900	49.950	0	800 000	0	0	88 550	888,550	31,116,850
RN1	49.950	50.000	0	1 600 000	0	0	0	1,600,000	32,716,850
RN1	52.750	52.800	22 400	2 400 000	0	0	0	2,422,400	35,139,250
RN1	54.050	54.100	0	0	0	563 200	0	563,200	35,702,450
RN1	54.100	54.150	0	800 000	0	0	0	800,000	36,502,450
RN1	57.900	57.950	0	800 000	0	0	0	800,000	37,302,450
RN1	58.000	58.050	0	1 600 000	0	0	0	1,600,000	38,902,450
RN1	60.700	60.750	0	2 400 000	0	0	0	2,400,000	41,302,450
RN1	64.650	64.700	0	1 600 000	0	0	0	1,600,000	42,902,450
RN1	64.700	64.750	0	7 200 000	0	0	0	7,200,000	50,102,450
RN1	65.850	65.900	22 400	0	0	0	0	22,400	50,124,850
RN1	65.950	66.000	0	5 600 000	0	0	160 000	5,760,000	55,884,850
RN1	68.400	68.450	11 200	0	0	0	88 550	99,750	55,984,600
RN1	68.450	68.500	11 200	0	0	0	0	11,200	55,995,800
RN1	72.700	72.750	0	1 600 000	0	0	0	1,600,000	57,595,800
RN1	79.900	79.950	0	9 600 000	0	0	0	9,600,000	67,195,800
RN1	87.400	87.450	0	0	0	0	408 550	408,550	67,604,350
RN1	97.300	97.350	0	5 600 000	0	0	0	5,600,000	73,204,350
RN1	97.350	97.400	0	7 200 000	0	0	0	7,200,000	80,404,350
RN1	97.400	97.450	0	8 000 000	0	0	0	8,000,000	88,404,350
RN1	105.500	105.550	0	800 000	0	0	0	800,000	89,204,350
RN1	105.550	105.600	0	0	0	563 200	0	563,200	89,767,550
RN1	105.600	105.650	11 200	0	0	0	0	11,200	89,778,750
RN1BIS	11.700	11.750	0	1 600 000	0	0	0	1,600,000	91,378,750
RN1BIS	11.750	11.800	22 400	2 400 000	0	0	0	2,422,400	93,801,150
RN1BIS	11.800	11.850	0	800 000	0	0	160 000	960,000	94,761,150
RN1BIS	12.850	12.900	22 400	800 000	0	0	0	822,400	95,583,550
RN1BIS	18.700	18.750	0	1 600 000	0	563 200	0	2,163,200	97,746,750
RN1BIS	18.800	18.850	0	0	0	0	88 550	88,550	97,835,300
RN1BIS	22.350	22.400	0	4 000 000	0	0	88 550	4,088,550	101,923,850
RN1BIS	27.150	27.200	0	4 000 000	0	0	0	4,000,000	105,923,850
RN1BIS	27.900	27.950	0	0	0	563 200	0	563,200	106,487,050
RN1BIS	27.950	28.000	11 200	800 000	0	0	0	811,200	107,298,250
RN1BIS	28.150	28.200	22 400	0	0	0	0	22,400	107,320,650
RN1BIS	28.200	28.250	0	800 000	0	0	0	800,000	108,120,650
RN1BIS	28.400	28.450	22 400	3 200 000	0	0	0	3,222,400	111,343,050
RN1BIS	28.450	28.500	22 400	800 000	0	0	0	822,400	112,165,450
RN1BIS	28.500	28.550	0	0	0	0	800 000	800,000	112,965,450
RN1BIS	28.550	28.600	11 200	0	0	0	88 550	99,750	113,065,200
RN1BIS	28.600	28.650	11 200	800 000	0	0	0	811,200	113,876,400
RN1BIS	28.650	28.700	0	800 000	0	0	0	800,000	114,676,400
RN1BIS	47.900	47.950	0	800 000	0	0	0	800,000	115,476,400
RN1BIS	50.600	50.650	0	800 000	0	0	0	800,000	116,276,400
RN1BIS	50.650	50.700	22 400	0	0	0	0	22,400	116,298,800
RN1BIS	50.700	50.750	22 400	0	0	0	0	22,400	116,321,200
RN1BIS	56.000	56.050	11 200	2 400 000	0	0	0	2,411,200	118,732,400
RN1BIS	56.050	56.100	0	1 600 000	0	0	160 000	1,760,000	120,492,400
RN1BIS	56.100	56.150	11 200	2 400 000	0	0	0	2,411,200	122,903,600
RN1BIS	56.150	56.200	0	3 200 000	0	563 200	177 100	3,940,300	126,843,900
RN1BIS	56.900	56.950	0	0	0	1 689 600	88 550	1,778,150	128,622,050
RN1BIS	56.950	57.000	0	0	0	0	88 550	88,550	128,710,600
RN1BIS	57.000	57.050	0	0	0	0	265 650	265,650	128,976,250
RN1BIS	57.050	57.100	0	0	0	1 126 400	88 550	1,214,950	130,191,200
RN1BIS	65.500	65.550	0	0	0	0	88 550	88,550	130,279,750
RN1BIS	65.550	65.600	11 200	0	0	0	0	11,200	130,290,950
RN1BIS	65.900	65.950	0	0	0	563 200	0	563,200	130,854,150
RN1BIS	65.950	66.000	0	0	0	0	88 550	88,550	130,942,700
RN1BIS	66.200	66.250	11 200	2 400 000	0	0	0	2,411,200	133,353,900

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1BIS	66.250	66.300	22 400	0	0	0	0	22,400	133,376,300
RN1BIS	66.300	66.350	33 600	800 000	0	0	0	833,600	134,209,900
RN1BIS	66.350	66.400	0	800 000	0	0	0	800,000	135,009,900
RN1BIS	66.400	66.450	11 200	2 400 000	0	0	0	2,411,200	137,421,100
RN1BIS	69.050	69.100	0	0	0	0	88 550	88,550	137,509,650
RN1BIS	75.800	75.850	0	800 000	0	0	0	800,000	138,309,650
RN1BIS	75.850	75.900	0	1 600 000	0	0	0	1,600,000	139,909,650
RN1BIS	75.900	75.950	11 200	9 600 000	0	0	0	9,611,200	149,520,850
RN1BIS	77.200	77.250	0	2 400 000	0	0	0	2,400,000	151,920,850
RN1BIS	77.250	77.300	22 400	800 000	0	563 200	0	1,385,600	153,306,450
RN1BIS	77.300	77.350	0	1 600 000	0	0	0	1,600,000	154,906,450
RN1BIS	77.350	77.400	0	800 000	0	0	0	800,000	155,706,450
RN1BIS	77.400	77.450	0	800 000	0	0	0	800,000	156,506,450
RN1BIS	77.500	77.550	0	800 000	0	0	0	800,000	157,306,450
RN1BIS	80.950	81.000	0	5 600 000	0	0	0	5,600,000	162,906,450
RN1BIS	81.000	81.050	0	2 400 000	0	0	0	2,400,000	165,306,450
RN1BIS	87.150	87.200	0	800 000	0	0	0	800,000	166,106,450
RN1BIS	87.250	87.300	0	2 400 000	0	0	0	2,400,000	168,506,450
RN1BIS	91.300	91.350	0	0	0	0	320 000	320,000	168,826,450
RN1BIS	91.350	91.400	0	4 000 000	0	0	88 550	4,088,550	172,915,000
RN1BIS	91.400	91.450	11 200	6 400 000	0	0	0	6,411,200	179,326,200
RN1BIS	91.850	91.900	11 200	0	0	0	0	11,200	179,337,400
RN1BIS	91.900	91.950	44 800	0	0	0	0	44,800	179,382,200
RN1BIS	91.950	92.000	22 400	0	0	0	0	22,400	179,404,600
RN1BIS	92.000	92.050	11 200	0	0	0	0	11,200	179,415,800
RN1BIS	92.400	92.450	0	800 000	0	0	0	800,000	180,215,800
RN1BIS	92.500	92.550	11 200	0	0	0	0	11,200	180,227,000
RN1BIS	92.550	92.600	22 400	0	0	0	0	22,400	180,249,400
RN1BIS	92.600	92.650	78 400	2 400 000	0	0	0	2,478,400	182,727,800
RN1BIS	92.650	92.700	11 200	0	0	0	0	11,200	182,739,000
RN1BIS	92.700	92.750	22 400	1 600 000	0	0	0	1,622,400	184,361,400
RN1BIS	92.750	92.800	33 600	0	0	0	0	33,600	184,395,000
RN1BIS	92.850	92.900	22 400	0	0	0	0	22,400	184,417,400
RN1BIS	92.900	92.950	67 200	0	0	0	0	67,200	184,484,600
RN1BIS	92.950	93.000	11 200	0	0	0	0	11,200	184,495,800
RN1BIS	93.000	93.050	11 200	0	0	563 200	0	574,400	185,070,200
RN1BIS	93.050	93.100	0	0	0	563 200	0	563,200	185,633,400
RN1	59.000	59.050	11 200	800 000	0	0	0	811,200	186,444,600
RN1	68.750	68.800	11 200	7 200 000	0	0	0	7,211,200	193,655,800
RN1	78.300	78.350	0	3 200 000	0	0	0	3,200,000	196,855,800
RN1	114.000	114.050	0	800 000	0	0	88 550	888,550	197,744,350
RN1BIS	7.800	7.850	0	1 600 000	0	0	88 550	1,688,550	199,432,900
RN1BIS	8.200	8.250	0	2 400 000	0	0	0	2,400,000	201,832,900
RN1BIS	13.450	13.500	22 400	0	0	0	0	22,400	201,855,300
RN1BIS	33.850	33.900	22 400	0	0	0	177 100	199,500	202,054,800
RN1BIS	35.400	35.450	0	800 000	0	0	0	800,000	202,854,800
RN1BIS	68.600	68.650	0	800 000	0	0	0	800,000	203,654,800
RN1BIS	77.700	77.750	0	8 000 000	0	0	0	8,000,000	211,654,800
RN1BIS	80.650	80.700	11 200	9 600 000	0	0	0	9,611,200	221,266,000
RN1BIS	83.750	83.800	0	5 600 000	0	0	0	5,600,000	226,866,000
RN1BIS	84.600	84.650	0	7 200 000	0	0	0	7,200,000	234,066,000
RN1BIS	87.700	87.750	0	800 000	0	0	0	800,000	234,866,000
RN1BIS	90.100	90.150	0	7 200 000	0	0	88 550	7,288,550	242,154,550
RN1BIS	91.100	91.150	0	4 800 000	0	563 200	0	5,363,200	247,517,750
RN1	8.000	8.050	22 400	1 600 000	0	563 200	960 000	3,145,600	250,663,350
RN1	8.050	8.100	78 400	800 000	0	0	0	878,400	251,541,750
RN1	8.100	8.150	56 000	3 200 000	0	0	0	3,256,000	254,797,750
RN1	9.600	9.650	44 800	800 000	0	0	0	844,800	255,642,550
RN1	9.650	9.700	156 800	0	0	0	88 550	245,350	255,887,900
RN1	9.700	9.750	78 400	800 000	0	0	0	878,400	256,766,300
RN1	9.750	9.800	123 200	4 000 000	0	0	0	4,123,200	260,889,500
RN1	24.900	24.950	0	800 000	0	0	0	800,000	261,689,500

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1	25.450	25.500	11 200	2 400 000	0	0	960 000	3,371,200	265,060,700
RN1	39.950	40.000	0	0	0	0	160 000	160,000	265,220,700
RN1	40.050	40.100	11 200	0	0	0	0	11,200	265,231,900
RN1	54.300	54.350	0	1 600 000	0	0	0	1,600,000	266,831,900
RN1	65.700	65.750	0	4 000 000	0	0	0	4,000,000	270,831,900
RN1	65.750	65.800	0	8 000 000	0	0	0	8,000,000	278,831,900
RN1	65.800	65.850	11 200	7 200 000	0	0	0	7,211,200	286,043,100
RN1	73.850	73.900	0	1 600 000	0	0	0	1,600,000	287,643,100
RN1	73.900	73.950	0	3 200 000	0	0	0	3,200,000	290,843,100
RN1	73.950	74.000	0	2 400 000	0	0	0	2,400,000	293,243,100
RN1	74.000	74.050	0	0	0	0	88 550	88,550	293,331,650
RN1	87.450	87.500	22 400	0	0	0	0	22,400	293,354,050
RN1	87.500	87.550	22 400	0	0	0	0	22,400	293,376,450
RN1	88.700	88.750	0	2 400 000	0	0	0	2,400,000	295,776,450
RN1	88.800	88.850	0	2 400 000	0	0	0	2,400,000	298,176,450
RN1	88.850	88.900	0	0	0	0	88 550	88,550	298,265,000
RN1	93.800	93.850	0	0	0	0	177 100	177,100	298,442,100
RN1	93.900	93.950	0	800 000	0	0	0	800,000	299,242,100
RN1	109.550	109.600	11 200	0	0	0	0	11,200	299,253,300
RN1	112.350	112.400	0	800 000	0	0	0	800,000	300,053,300
RN1	112.400	112.450	0	5 600 000	0	0	0	5,600,000	305,653,300
RN1	114.600	114.650	22 400	4 000 000	0	0	248 550	4,270,950	309,924,250
RN1	114.650	114.700	11 200	2 400 000	0	0	0	2,411,200	312,335,450
RN1	114.700	114.750	0	800 000	0	0	177 100	977,100	313,312,550
RN1	114.750	114.800	0	5 600 000	0	0	0	5,600,000	318,912,550
RN1	114.800	114.850	0	4 800 000	0	0	0	4,800,000	323,712,550
RN1	114.850	114.900	0	5 600 000	0	0	0	5,600,000	329,312,550
RN1	114.900	114.950	11 200	3 200 000	0	0	0	3,211,200	332,523,750
RN1BIS	27.200	27.250	0	800 000	0	0	0	800,000	333,323,750
RN1BIS	27.250	27.300	0	0	0	563 200	0	563,200	333,886,950
RN1BIS	27.350	27.400	0	800 000	0	4 505 600	0	5,305,600	339,192,550
RN1BIS	27.400	27.450	22 400	0	0	563 200	0	585,600	339,778,150
RN1BIS	27.800	27.850	33 600	800 000	0	0	0	833,600	340,611,750
RN1BIS	28.250	28.300	22 400	0	0	0	0	22,400	340,634,150
RN1BIS	28.300	28.350	22 400	0	0	563 200	0	585,600	341,219,750
RN1BIS	36.900	36.950	0	800 000	0	0	88 550	888,550	342,108,300
RN1BIS	36.950	37.000	0	800 000	0	0	0	800,000	342,908,300
RN1BIS	37.250	37.300	22 400	0	0	0	708 400	730,800	343,639,100
RN1BIS	46.600	46.650	11 200	1 600 000	0	0	0	1,611,200	345,250,300
RN1BIS	46.700	46.750	0	4 000 000	0	0	0	4,000,000	349,250,300
RN1BIS	46.750	46.800	0	800 000	0	0	0	800,000	350,050,300
RN1BIS	46.800	46.850	11 200	0	0	0	0	11,200	350,061,500
RN1BIS	46.850	46.900	22 400	0	0	0	0	22,400	350,083,900
RN1BIS	56.200	56.250	11 200	0	0	0	0	11,200	350,095,100
RN1BIS	56.250	56.300	0	4 000 000	0	0	0	4,000,000	354,095,100
RN1BIS	56.350	56.400	0	2 400 000	0	0	0	2,400,000	356,495,100
RN1BIS	56.700	56.750	0	0	0	0	88 550	88,550	356,583,650
RN1BIS	56.750	56.800	0	0	0	0	265 650	265,650	356,849,300
RN1BIS	56.800	56.850	0	800 000	0	0	0	800,000	357,649,300
RN1BIS	56.850	56.900	0	2 400 000	0	0	177 100	2,577,100	360,226,400
RN1BIS	62.250	62.300	11 200	0	0	0	0	11,200	360,237,600
RN1BIS	62.300	62.350	44 800	0	0	0	0	44,800	360,282,400
RN1BIS	63.800	63.850	0	0	0	0	160 000	160,000	360,442,400
RN1BIS	64.000	64.050	0	1 600 000	0	0	0	1,600,000	362,042,400
RN1BIS	64.050	64.100	0	0	0	0	88 550	88,550	362,130,950
RN1BIS	66.000	66.050	0	0	0	0	160 000	160,000	362,290,950
RN1BIS	66.050	66.100	0	0	0	563 200	0	563,200	362,854,150
RN1BIS	66.100	66.150	44 800	0	0	563 200	0	608,000	363,462,150
RN1BIS	66.150	66.200	22 400	0	0	1 126 400	0	1,148,800	364,610,950
RN1BIS	73.850	73.900	22 400	0	0	0	0	22,400	364,633,350
RN1BIS	73.900	73.950	0	0	0	563 200	0	563,200	365,196,550
RN1BIS	74.200	74.250	0	800 000	0	0	0	800,000	365,996,550

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1BIS	74.250	74.300	0	1 600 000	0	0	0	1,600,000	367,596,550
RN1BIS	74.300	74.350	11 200	0	0	0	0	11,200	367,607,750
RN1BIS	74.350	74.400	11 200	0	0	563 200	0	574,400	368,182,150
RN1BIS	81.100	81.150	0	1 600 000	0	0	0	1,600,000	369,782,150
RN1BIS	81.150	81.200	11 200	800 000	0	0	0	811,200	370,593,350
RN1BIS	81.350	81.400	0	5 600 000	0	0	0	5,600,000	376,193,350
RN1BIS	81.400	81.450	0	800 000	0	0	0	800,000	376,993,350
RN1BIS	81.450	81.500	0	1 600 000	0	0	0	1,600,000	378,593,350
RN1BIS	81.500	81.550	33 600	5 600 000	0	0	0	5,633,600	384,226,950
RN1BIS	81.550	81.600	0	3 200 000	0	0	0	3,200,000	387,426,950
RN1BIS	81.600	81.650	0	800 000	0	0	0	800,000	388,226,950
RN1BIS	81.800	81.850	0	1 600 000	0	0	0	1,600,000	389,826,950
RN1BIS	81.850	81.900	0	1 600 000	0	563 200	0	2,163,200	391,990,150
RN1BIS	81.900	81.950	0	800 000	0	0	0	800,000	392,790,150
RN1BIS	81.950	82.000	0	1 600 000	0	0	0	1,600,000	394,390,150
RN1BIS	82.000	82.050	0	2 400 000	0	0	0	2,400,000	396,790,150
RN1BIS	86.300	86.350	11 200	800 000	0	0	0	811,200	397,601,350
RN1BIS	86.350	86.400	0	800 000	0	0	0	800,000	398,401,350
RN1BIS	86.400	86.450	0	800 000	0	0	0	800,000	399,201,350
RN1BIS	86.600	86.650	0	0	0	0	177 100	177,100	399,378,450
RN1BIS	86.650	86.700	0	0	0	0	88 550	88,550	399,467,000
RN1BIS	86.750	86.800	0	800 000	0	0	0	800,000	400,267,000
RN1BIS	86.800	86.850	0	1 600 000	0	0	0	1,600,000	401,867,000
RN1BIS	86.850	86.900	0	1 600 000	0	0	0	1,600,000	403,467,000
RN1BIS	86.950	87.000	0	2 400 000	0	0	0	2,400,000	405,867,000
RN1BIS	87.000	87.050	11 200	0	0	0	265 650	276,850	406,143,850
RN1BIS	87.050	87.100	0	800 000	0	0	160 000	960,000	407,103,850
RN1BIS	87.100	87.150	0	0	0	0	160 000	160,000	407,263,850
RN1BIS	89.350	89.400	11 200	0	0	0	0	11,200	407,275,050
RN1BIS	89.400	89.450	0	0	0	563 200	0	563,200	407,838,250
RN1BIS	89.450	89.500	0	8 000 000	0	0	0	8,000,000	415,838,250
RN1BIS	89.500	89.550	0	5 600 000	0	0	0	5,600,000	421,438,250
RN1BIS	89.550	89.600	0	2 400 000	0	0	0	2,400,000	423,838,250
RN1BIS	91.450	91.500	0	4 000 000	0	563 200	0	4,563,200	428,401,450
RN1BIS	91.750	91.800	44 800	0	0	0	160 000	204,800	428,606,250
RN1BIS	93.250	93.300	11 200	0	0	0	0	11,200	428,617,450
RN1BIS	93.850	93.900	11 200	0	0	1 126 400	0	1,137,600	429,755,050
RN1BIS	93.950	94.000	0	0	0	563 200	0	563,200	430,318,250
RN1BIS	94.000	94.050	0	0	0	1 126 400	0	1,126,400	431,444,650
RN1	17.450	17.500	22 400	800 000	0	1 126 400	0	1,948,800	433,393,450
RN1	17.500	17.550	0	0	0	1 689 600	0	1,689,600	435,083,050
RN1	17.550	17.600	0	0	0	0	88 550	88,550	435,171,600
RN1	18.350	18.400	0	800 000	0	1 126 400	0	1,926,400	437,098,000
RN1	18.400	18.450	0	0	0	0	160 000	160,000	437,258,000
RN1	20.100	20.150	0	1 600 000	0	0	0	1,600,000	438,858,000
RN1	20.150	20.200	0	0	0	563 200	0	563,200	439,421,200
RN1	21.250	21.300	0	0	0	0	88 550	88,550	439,509,750
RN1	21.300	21.350	11 200	0	0	0	177 100	188,300	439,698,050
RN1	21.350	21.400	0	3 200 000	0	0	0	3,200,000	442,898,050
RN1	22.350	22.400	0	800 000	0	0	0	800,000	443,698,050
RN1	22.950	23.000	0	0	0	0	88 550	88,550	443,786,600
RN1	23.000	23.050	0	2 400 000	0	0	0	2,400,000	446,186,600
RN1	23.200	23.250	0	800 000	0	0	0	800,000	446,986,600
RN1	23.250	23.300	0	1 600 000	0	0	0	1,600,000	448,586,600
RN1	23.300	23.350	0	800 000	0	563 200	0	1,363,200	449,949,800
RN1	23.550	23.600	11 200	0	0	0	0	11,200	449,961,000
RN1	25.000	25.050	22 400	1 600 000	0	0	0	1,622,400	451,583,400
RN1	25.050	25.100	0	0	0	563 200	160 000	723,200	452,306,600
RN1	25.100	25.150	0	0	0	2 816 000	88 550	2,904,550	455,211,150
RN1	25.150	25.200	22 400	0	0	0	160 000	182,400	455,393,550
RN1	25.550	25.600	22 400	800 000	0	1 689 600	0	2,512,000	457,905,550
RN1	25.600	25.650	0	800 000	0	2 252 800	88 550	3,141,350	461,046,900

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1	25.650	25.700	0	0	0	0	354 200	354,200	461,401,100
RN1	26.050	26.100	0	0	0	563 200	177 100	740,300	462,141,400
RN1	26.100	26.150	0	0	0	1 689 600	265 650	1,955,250	464,096,650
RN1	26.150	26.200	11 200	0	0	1 689 600	0	1,700,800	465,797,450
RN1	26.200	26.250	0	0	0	1 689 600	160 000	1,849,600	467,647,050
RN1	27.100	27.150	11 200	0	0	0	0	11,200	467,658,250
RN1	29.350	29.400	22 400	0	0	563 200	0	585,600	468,243,850
RN1	29.500	29.550	0	7 200 000	0	1 126 400	0	8,326,400	476,570,250
RN1	29.800	29.850	11 200	1 600 000	0	0	177 100	1,788,300	478,358,550
RN1	30.400	30.450	0	0	0	563 200	88 550	651,750	479,010,300
RN1	30.500	30.550	0	0	0	563 200	88 550	651,750	479,662,050
RN1	30.700	30.750	0	1 600 000	0	0	0	1,600,000	481,262,050
RN1	30.800	30.850	0	0	0	563 200	88 550	651,750	481,913,800
RN1	30.950	31.000	0	0	0	0	800 000	800,000	482,713,800
RN1	31.300	31.350	0	0	0	1 126 400	497 100	1,623,500	484,337,300
RN1	31.600	31.650	0	0	0	1 126 400	0	1,126,400	485,463,700
RN1	31.650	31.700	11 200	0	0	1 126 400	0	1,137,600	486,601,300
RN1	31.950	32.000	0	800 000	0	563 200	0	1,363,200	487,964,500
RN1	32.000	32.050	0	800 000	0	1 689 600	88 550	2,578,150	490,542,650
RN1	32.050	32.100	0	4 000 000	0	0	0	4,000,000	494,542,650
RN1	32.100	32.150	11 200	0	0	563 200	0	574,400	495,117,050
RN1	32.150	32.200	0	800 000	0	0	0	800,000	495,917,050
RN1	32.200	32.250	0	3 200 000	0	0	0	3,200,000	499,117,050
RN1	32.250	32.300	0	1 600 000	0	0	0	1,600,000	500,717,050
RN1	32.300	32.350	0	3 200 000	0	0	0	3,200,000	503,917,050
RN1	32.350	32.400	0	1 600 000	0	0	0	1,600,000	505,517,050
RN1	32.400	32.450	0	800 000	0	0	0	800,000	506,317,050
RN1	32.450	32.500	0	6 400 000	0	0	0	6,400,000	512,717,050
RN1	32.500	32.550	0	7 200 000	0	0	0	7,200,000	519,917,050
RN1	32.550	32.600	0	4 800 000	0	0	354 200	5,154,200	525,071,250
RN1	32.600	32.650	0	800 000	0	563 200	0	1,363,200	526,434,450
RN1	32.650	32.700	0	1 600 000	0	563 200	0	2,163,200	528,597,650
RN1	32.700	32.750	0	0	0	563 200	0	563,200	529,160,850
RN1	32.750	32.800	0	2 400 000	0	563 200	160 000	3,123,200	532,284,050
RN1	32.800	32.850	0	3 200 000	0	0	0	3,200,000	535,484,050
RN1	32.850	32.900	0	3 200 000	0	0	0	3,200,000	538,684,050
RN1	32.900	32.950	11 200	3 200 000	0	0	0	3,211,200	541,895,250
RN1	33.100	33.150	0	2 400 000	0	0	408 550	2,808,550	544,703,800
RN1	33.150	33.200	0	5 600 000	0	0	0	5,600,000	550,303,800
RN1	33.200	33.250	22 400	2 400 000	0	0	0	2,422,400	552,726,200
RN1	33.250	33.300	11 200	3 200 000	0	0	0	3,211,200	555,937,400
RN1	34.900	34.950	11 200	0	0	0	0	11,200	555,948,600
RN1	34.950	35.000	0	800 000	0	0	0	800,000	556,748,600
RN1	35.000	35.050	11 200	1 600 000	0	0	0	1,611,200	558,359,800
RN1	35.050	35.100	11 200	0	0	0	0	11,200	558,371,000
RN1	35.100	35.150	11 200	800 000	0	0	0	811,200	559,182,200
RN1	35.150	35.200	11 200	0	0	0	88 550	99,750	559,281,950
RN1	35.250	35.300	0	800 000	0	0	0	800,000	560,081,950
RN1	35.600	35.650	0	2 400 000	0	0	265 650	2,665,650	562,747,600
RN1	35.750	35.800	0	800 000	0	0	0	800,000	563,547,600
RN1	35.950	36.000	0	3 200 000	0	0	0	3,200,000	566,747,600
RN1	36.000	36.050	0	800 000	0	0	0	800,000	567,547,600
RN1	36.100	36.150	0	800 000	0	0	0	800,000	568,347,600
RN1	36.150	36.200	0	800 000	0	0	0	800,000	569,147,600
RN1	36.450	36.500	0	1 600 000	0	0	0	1,600,000	570,747,600
RN1	36.500	36.550	0	0	0	0	88 550	88,550	570,836,150
RN1	36.600	36.650	0	800 000	0	1 126 400	88 550	2,014,950	572,851,100
RN1	36.650	36.700	0	3 200 000	0	0	0	3,200,000	576,051,100
RN1	36.700	36.750	0	0	0	1 689 600	0	1,689,600	577,740,700
RN1	36.750	36.800	0	800 000	0	1 126 400	0	1,926,400	579,667,100
RN1	36.800	36.850	0	2 400 000	0	0	0	2,400,000	582,067,100
RN1	37.450	37.500	0	4 000 000	0	0	0	4,000,000	586,067,100

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1	37.650	37.700	0	2 400 000	0	0	88 550	2,488,550	588,555,650
RN1	40.150	40.200	0	800 000	0	0	0	800,000	589,355,650
RN1	40.400	40.450	0	0	0	2 252 800	0	2,252,800	591,608,450
RN1	40.450	40.500	0	2 400 000	0	0	160 000	2,560,000	594,168,450
RN1	40.500	40.550	0	800 000	0	0	160 000	960,000	595,128,450
RN1	40.550	40.600	0	2 400 000	0	0	0	2,400,000	597,528,450
RN1	40.600	40.650	0	2 400 000	0	0	88 550	2,488,550	600,017,000
RN1	40.650	40.700	0	800 000	0	0	0	800,000	600,817,000
RN1	41.100	41.150	0	1 600 000	0	0	0	1,600,000	602,417,000
RN1	41.150	41.200	0	800 000	0	0	0	800,000	603,217,000
RN1	41.200	41.250	0	800 000	0	0	0	800,000	604,017,000
RN1	41.250	41.300	0	0	0	0	88 550	88,550	604,105,550
RN1	41.400	41.450	0	0	0	563 200	0	563,200	604,668,750
RN1	41.450	41.500	0	0	0	1 689 600	0	1,689,600	606,358,350
RN1	41.550	41.600	0	3 200 000	0	0	0	3,200,000	609,558,350
RN1	41.600	41.650	0	0	0	0	88 550	88,550	609,646,900
RN1	42.000	42.050	0	0	0	1 689 600	0	1,689,600	611,336,500
RN1	43.500	43.550	0	3 200 000	0	563 200	0	3,763,200	615,099,700
RN1	43.550	43.600	0	1 600 000	0	563 200	0	2,163,200	617,262,900
RN1	43.600	43.650	0	800 000	0	0	0	800,000	618,062,900
RN1	43.650	43.700	0	0	0	563 200	0	563,200	618,626,100
RN1	43.700	43.750	0	800 000	0	0	0	800,000	619,426,100
RN1	43.750	43.800	0	0	0	1 126 400	0	1,126,400	620,552,500
RN1	43.800	43.850	0	0	0	563 200	0	563,200	621,115,700
RN1	43.850	43.900	0	0	0	563 200	0	563,200	621,678,900
RN1	43.950	44.000	0	0	0	563 200	0	563,200	622,242,100
RN1	45.100	45.150	0	0	0	1 126 400	0	1,126,400	623,368,500
RN1	47.600	47.650	11 200	800 000	0	0	0	811,200	624,179,700
RN1	48.250	48.300	11 200	0	0	0	0	11,200	624,190,900
RN1	48.400	48.450	0	800 000	0	0	0	800,000	624,990,900
RN1	48.900	48.950	11 200	800 000	0	0	0	811,200	625,802,100
RN1	49.600	49.650	0	800 000	0	0	0	800,000	626,602,100
RN1	50.500	50.550	22 400	0	0	563 200	160 000	745,600	627,347,700
RN1	50.800	50.850	0	1 600 000	0	0	0	1,600,000	628,947,700
RN1	50.950	51.000	11 200	0	0	0	0	11,200	628,958,900
RN1	51.700	51.750	11 200	2 400 000	0	0	0	2,411,200	631,370,100
RN1	51.800	51.850	0	800 000	0	0	0	800,000	632,170,100
RN1	51.950	52.000	11 200	1 600 000	0	0	0	1,611,200	633,781,300
RN1	52.000	52.050	0	800 000	0	0	0	800,000	634,581,300
RN1	52.100	52.150	0	4 000 000	0	0	0	4,000,000	638,581,300
RN1	52.350	52.400	0	9 600 000	0	0	88 550	9,688,550	648,269,850
RN1	52.400	52.450	11 200	1 600 000	0	0	0	1,611,200	649,881,050
RN1	52.500	52.550	0	800 000	0	0	0	800,000	650,681,050
RN1	52.550	52.600	11 200	1 600 000	0	0	0	1,611,200	652,292,250
RN1	53.300	53.350	0	0	0	563 200	0	563,200	652,855,450
RN1	53.500	53.550	0	4 800 000	0	0	0	4,800,000	657,655,450
RN1	53.550	53.600	0	4 800 000	0	0	0	4,800,000	662,455,450
RN1	53.600	53.650	0	2 400 000	0	0	0	2,400,000	664,855,450
RN1	54.850	54.900	0	1 600 000	0	0	0	1,600,000	666,455,450
RN1	54.900	54.950	0	4 800 000	0	0	0	4,800,000	671,255,450
RN1	54.950	55.000	0	4 000 000	0	0	0	4,000,000	675,255,450
RN1	55.050	55.100	0	3 200 000	0	0	0	3,200,000	678,455,450
RN1	55.100	55.150	0	1 600 000	0	0	0	1,600,000	680,055,450
RN1	55.150	55.200	0	2 400 000	0	0	0	2,400,000	682,455,450
RN1	55.750	55.800	0	1 600 000	0	0	0	1,600,000	684,055,450
RN1	55.850	55.900	0	4 000 000	0	0	0	4,000,000	688,055,450
RN1	55.900	55.950	0	3 200 000	0	0	0	3,200,000	691,255,450
RN1	55.950	56.000	0	6 400 000	0	0	0	6,400,000	697,655,450
RN1	56.000	56.050	0	8 000 000	0	0	0	8,000,000	705,655,450
RN1	56.050	56.100	0	6 400 000	0	0	0	6,400,000	712,055,450
RN1	56.100	56.150	0	1 600 000	0	0	0	1,600,000	713,655,450
RN1	56.550	56.600	0	800 000	0	0	88 550	888,550	714,544,000

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1	56.600	56.650	0	2 400 000	0	0	0	2,400,000	716,944,000
RN1	56.700	56.750	0	800 000	0	0	0	800,000	717,744,000
RN1	57.300	57.350	0	800 000	0	0	0	800,000	718,544,000
RN1	57.400	57.450	0	0	0	0	354 200	354,200	718,898,200
RN1	57.500	57.550	0	0	0	0	265 650	265,650	719,163,850
RN1	57.550	57.600	0	3 200 000	0	0	0	3,200,000	722,363,850
RN1	58.150	58.200	0	0	0	563 200	0	563,200	722,927,050
RN1	58.400	58.450	0	800 000	0	0	0	800,000	723,727,050
RN1	58.900	58.950	0	0	0	0	88 550	88,550	723,815,600
RN1	59.100	59.150	11 200	0	0	0	0	11,200	723,826,800
RN1	59.150	59.200	0	800 000	0	0	88 550	888,550	724,715,350
RN1	59.250	59.300	0	1 600 000	0	0	0	1,600,000	726,315,350
RN1	59.350	59.400	22 400	1 600 000	0	0	0	1,622,400	727,937,750
RN1	59.450	59.500	0	8 800 000	0	0	0	8,800,000	736,737,750
RN1	59.500	59.550	11 200	10 400 000	0	0	0	10,411,200	747,148,950
RN1	59.800	59.850	22 400	0	0	0	0	22,400	747,171,350
RN1	60.150	60.200	11 200	800 000	0	0	265 650	1,076,850	748,248,200
RN1	60.250	60.300	11 200	800 000	0	0	177 100	988,300	749,236,500
RN1	60.300	60.350	0	3 200 000	0	0	0	3,200,000	752,436,500
RN1	60.350	60.400	0	4 800 000	0	0	0	4,800,000	757,236,500
RN1	60.400	60.450	0	4 800 000	0	0	0	4,800,000	762,036,500
RN1	60.450	60.500	0	800 000	0	0	0	800,000	762,836,500
RN1	60.500	60.550	0	1 600 000	0	0	0	1,600,000	764,436,500
RN1	60.850	60.900	0	0	0	563 200	0	563,200	764,999,700
RN1	61.300	61.350	11 200	800 000	0	0	0	811,200	765,810,900
RN1	62.100	62.150	0	800 000	0	0	0	800,000	766,610,900
RN1	62.250	62.300	11 200	0	0	0	88 550	99,750	766,710,650
RN1	66.150	66.200	11 200	800 000	0	0	0	811,200	767,521,850
RN1	66.200	66.250	0	800 000	0	0	177 100	977,100	768,498,950
RN1	66.400	66.450	0	4 800 000	0	0	177 100	4,977,100	773,476,050
RN1	66.450	66.500	0	3 200 000	0	0	0	3,200,000	776,676,050
RN1	66.500	66.550	0	4 000 000	0	0	0	4,000,000	780,676,050
RN1	67.750	67.800	11 200	800 000	0	0	0	811,200	781,487,250
RN1	67.800	67.850	0	800 000	0	563 200	0	1,363,200	782,850,450
RN1	68.500	68.550	0	800 000	0	0	0	800,000	783,650,450
RN1	68.550	68.600	33 600	800 000	0	0	0	833,600	784,484,050
RN1	68.600	68.650	11 200	800 000	0	0	0	811,200	785,295,250
RN1	69.200	69.250	0	2 400 000	0	0	0	2,400,000	787,695,250
RN1	69.250	69.300	0	800 000	0	0	0	800,000	788,495,250
RN1	69.400	69.450	0	4 000 000	0	0	0	4,000,000	792,495,250
RN1	69.750	69.800	11 200	800 000	0	0	88 550	899,750	793,395,000
RN1	70.600	70.650	0	3 200 000	0	0	0	3,200,000	796,595,000
RN1	70.650	70.700	0	0	0	1 126 400	0	1,126,400	797,721,400
RN1	70.700	70.750	0	4 000 000	0	0	0	4,000,000	801,721,400
RN1	70.750	70.800	0	0	0	0	177 100	177,100	801,898,500
RN1	70.800	70.850	0	2 400 000	0	0	88 550	2,488,550	804,387,050
RN1	70.850	70.900	0	800 000	0	0	0	800,000	805,187,050
RN1	71.000	71.050	0	1 600 000	0	0	0	1,600,000	806,787,050
RN1	71.400	71.450	0	800 000	0	0	0	800,000	807,587,050
RN1	71.750	71.800	0	0	0	0	88 550	88,550	807,675,600
RN1	71.800	71.850	0	800 000	0	0	88 550	888,550	808,564,150
RN1	71.850	71.900	0	800 000	0	0	0	800,000	809,364,150
RN1	72.050	72.100	0	0	0	0	88 550	88,550	809,452,700
RN1	72.150	72.200	44 800	800 000	0	0	0	844,800	810,297,500
RN1	72.750	72.800	0	1 600 000	0	0	0	1,600,000	811,897,500
RN1	72.900	72.950	0	800 000	0	0	0	800,000	812,697,500
RN1	72.950	73.000	0	3 200 000	0	0	0	3,200,000	815,897,500
RN1	73.000	73.050	0	5 600 000	0	563 200	0	6,163,200	822,060,700
RN1	74.800	74.850	0	800 000	0	0	0	800,000	822,860,700
RN1	75.250	75.300	11 200	1 600 000	0	0	0	1,611,200	824,471,900
RN1	75.300	75.350	0	3 200 000	0	0	0	3,200,000	827,671,900
RN1	75.350	75.400	0	0	0	0	88 550	88,550	827,760,450

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1	75.400	75.450	0	0	0	0	88 550	88,550	827,849,000
RN1	77.200	77.250	0	1 600 000	0	563 200	0	2,163,200	830,012,200
RN1	77.250	77.300	0	800 000	0	0	0	800,000	830,812,200
RN1	77.300	77.350	0	0	0	1 126 400	0	1,126,400	831,938,600
RN1	77.350	77.400	0	0	0	563 200	88 550	651,750	832,590,350
RN1	77.400	77.450	0	2 400 000	0	0	88 550	2,488,550	835,078,900
RN1	77.450	77.500	0	2 400 000	0	0	0	2,400,000	837,478,900
RN1	77.500	77.550	0	800 000	0	1 126 400	0	1,926,400	839,405,300
RN1	77.800	77.850	0	0	0	563 200	0	563,200	839,968,500
RN1	77.950	78.000	22 400	800 000	0	0	0	822,400	840,790,900
RN1	78.200	78.250	0	3 200 000	0	0	0	3,200,000	843,990,900
RN1	78.250	78.300	0	2 400 000	0	0	0	2,400,000	846,390,900
RN1	78.350	78.400	0	3 200 000	0	0	0	3,200,000	849,590,900
RN1	78.400	78.450	0	0	0	0	177 100	177,100	849,768,000
RN1	78.450	78.500	0	800 000	0	0	177 100	977,100	850,745,100
RN1	78.650	78.700	11 200	4 800 000	0	563 200	0	5,374,400	856,119,500
RN1	79.950	80.000	0	5 600 000	0	0	0	5,600,000	861,719,500
RN1	80.550	80.600	0	2 400 000	0	0	0	2,400,000	864,119,500
RN1	80.850	80.900	11 200	3 200 000	0	0	0	3,211,200	867,330,700
RN1	80.900	80.950	0	800 000	0	0	0	800,000	868,130,700
RN1	82.900	82.950	0	0	0	563 200	0	563,200	868,693,900
RN1	83.100	83.150	0	0	0	0	337 100	337,100	869,031,000
RN1	83.350	83.400	0	800 000	0	0	0	800,000	869,831,000
RN1	83.600	83.650	0	4 800 000	0	0	0	4,800,000	874,631,000
RN1	83.650	83.700	0	800 000	0	0	0	800,000	875,431,000
RN1	83.950	84.000	0	1 600 000	0	0	0	1,600,000	877,031,000
RN1	84.350	84.400	0	800 000	0	0	0	800,000	877,831,000
RN1	84.450	84.500	0	800 000	0	0	0	800,000	878,631,000
RN1	84.600	84.650	11 200	0	0	0	0	11,200	878,642,200
RN1	84.650	84.700	0	0	0	0	160 000	160,000	878,802,200
RN1	84.800	84.850	0	0	0	0	888 550	888,550	879,690,750
RN1	85.100	85.150	0	4 800 000	0	0	0	4,800,000	884,490,750
RN1	85.150	85.200	11 200	8 800 000	0	0	0	8,811,200	893,301,950
RN1	85.350	85.400	0	4 800 000	0	0	0	4,800,000	898,101,950
RN1	85.400	85.450	0	7 200 000	0	0	0	7,200,000	905,301,950
RN1	85.450	85.500	0	2 400 000	0	0	0	2,400,000	907,701,950
RN1	85.750	85.800	11 200	4 000 000	0	0	0	4,011,200	911,713,150
RN1	86.100	86.150	0	800 000	0	0	0	800,000	912,513,150
RN1	86.400	86.450	0	800 000	0	0	0	800,000	913,313,150
RN1	86.450	86.500	0	5 600 000	0	0	0	5,600,000	918,913,150
RN1	86.700	86.750	0	7 200 000	0	0	0	7,200,000	926,113,150
RN1	86.750	86.800	0	7 200 000	0	0	0	7,200,000	933,313,150
RN1	88.000	88.050	0	0	0	1 126 400	480 000	1,606,400	934,919,550
RN1	88.550	88.600	112 000	800 000	0	0	0	912,000	935,831,550
RN1	88.600	88.650	11 200	1 600 000	0	0	160 000	1,771,200	937,602,750
RN1	88.650	88.700	56 000	1 600 000	0	0	0	1,656,000	939,258,750
RN1	89.150	89.200	0	1 600 000	0	0	0	1,600,000	940,858,750
RN1	89.250	89.300	33 600	800 000	0	0	0	833,600	941,692,350
RN1	89.300	89.350	0	1 600 000	0	0	0	1,600,000	943,292,350
RN1	89.450	89.500	0	1 600 000	0	0	0	1,600,000	944,892,350
RN1	89.950	90.000	0	1 600 000	0	0	0	1,600,000	946,492,350
RN1	90.150	90.200	33 600	3 200 000	0	0	88 550	3,322,150	949,814,500
RN1	91.950	92.000	89 600	2 400 000	0	0	0	2,489,600	952,304,100
RN1	93.500	93.550	0	1 600 000	0	0	0	1,600,000	953,904,100
RN1	93.550	93.600	11 200	2 400 000	0	0	0	2,411,200	956,315,300
RN1	97.450	97.500	0	7 200 000	0	0	88 550	7,288,550	963,603,850
RN1	98.200	98.250	0	2 400 000	0	0	0	2,400,000	966,003,850
RN1	98.250	98.300	0	5 600 000	0	0	0	5,600,000	971,603,850
RN1	98.300	98.350	0	5 600 000	0	0	0	5,600,000	977,203,850
RN1	98.350	98.400	0	11 200 000	0	0	0	11,200,000	988,403,850
RN1	98.400	98.450	0	8 000 000	0	0	0	8,000,000	996,403,850
RN1	98.450	98.500	0	10 400 000	0	0	0	10,400,000	1,006,803,850

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1	99.100	99.150	0	4 800 000	0	0	0	4,800,000	1,011,603,850
RN1	99.300	99.350	11 200	5 600 000	0	0	0	5,611,200	1,017,215,050
RN1	99.350	99.400	0	3 200 000	0	0	88 550	3,288,550	1,020,503,600
RN1	99.400	99.450	0	800 000	0	0	0	800,000	1,021,303,600
RN1	99.800	99.850	22 400	0	0	0	0	22,400	1,021,326,000
RN1	99.850	99.900	0	0	0	0	88 550	88,550	1,021,414,550
RN1	99.900	99.950	11 200	0	0	0	88 550	99,750	1,021,514,300
RN1	100.300	100.350	0	800 000	0	0	0	800,000	1,022,314,300
RN1	111.250	111.300	0	0	0	0	160 000	160,000	1,022,474,300
RN1	113.800	113.850	11 200	1 600 000	0	0	0	1,611,200	1,024,085,500
RN1	113.850	113.900	0	800 000	0	0	0	800,000	1,024,885,500
RN1	113.900	113.950	0	800 000	0	0	0	800,000	1,025,685,500
RN1	114.100	114.150	0	2 400 000	0	0	0	2,400,000	1,028,085,500
RN1	114.150	114.200	0	4 800 000	0	0	0	4,800,000	1,032,885,500
RN1	114.250	114.300	0	3 200 000	0	0	0	3,200,000	1,036,085,500
RN1	114.400	114.450	0	0	0	0	88 550	88,550	1,036,174,050
RN1	114.450	114.500	0	1 600 000	0	0	0	1,600,000	1,037,774,050
RN1	114.500	114.550	0	800 000	0	0	0	800,000	1,038,574,050
RN1BIS	0.250	0.300	0	7 200 000	0	0	0	7,200,000	1,045,774,050
RN1BIS	0.300	0.350	0	3 200 000	0	0	0	3,200,000	1,048,974,050
RN1BIS	0.350	0.400	11 200	2 400 000	0	0	160 000	2,571,200	1,051,545,250
RN1BIS	0.800	0.850	0	4 000 000	0	0	0	4,000,000	1,055,545,250
RN1BIS	0.850	0.900	11 200	6 400 000	0	0	0	6,411,200	1,061,956,450
RN1BIS	0.900	0.950	0	8 000 000	0	0	0	8,000,000	1,069,956,450
RN1BIS	0.950	1.000	0	11 200 000	0	0	88 550	11,288,550	1,081,245,000
RN1BIS	1.000	1.050	0	3 200 000	0	0	88 550	3,288,550	1,084,533,550
RN1BIS	1.100	1.150	0	4 000 000	0	0	0	4,000,000	1,088,533,550
RN1BIS	1.150	1.200	22 400	800 000	0	0	0	822,400	1,089,355,950
RN1BIS	1.300	1.350	11 200	0	0	0	0	11,200	1,089,367,150
RN1BIS	1.350	1.400	0	4 800 000	0	0	0	4,800,000	1,094,167,150
RN1BIS	1.400	1.450	0	1 600 000	0	0	177 100	1,777,100	1,095,944,250
RN1BIS	1.450	1.500	0	800 000	0	563 200	0	1,363,200	1,097,307,450
RN1BIS	1.500	1.550	0	4 800 000	0	0	0	4,800,000	1,102,107,450
RN1BIS	1.550	1.600	0	2 400 000	0	0	0	2,400,000	1,104,507,450
RN1BIS	1.700	1.750	11 200	0	0	0	0	11,200	1,104,518,650
RN1BIS	1.850	1.900	0	800 000	0	0	0	800,000	1,105,318,650
RN1BIS	1.900	1.950	0	800 000	0	0	0	800,000	1,106,118,650
RN1BIS	1.950	2.000	0	1 600 000	0	0	0	1,600,000	1,107,718,650
RN1BIS	2.000	2.050	0	4 000 000	0	0	0	4,000,000	1,111,718,650
RN1BIS	2.050	2.100	0	3 200 000	0	0	0	3,200,000	1,114,918,650
RN1BIS	2.100	2.150	0	1 600 000	0	0	0	1,600,000	1,116,518,650
RN1BIS	2.500	2.550	11 200	0	0	0	0	11,200	1,116,529,850
RN1BIS	2.850	2.900	11 200	800 000	0	0	0	811,200	1,117,341,050
RN1BIS	3.000	3.050	0	800 000	0	0	0	800,000	1,118,141,050
RN1BIS	3.050	3.100	0	800 000	0	0	0	800,000	1,118,941,050
RN1BIS	3.100	3.150	0	4 000 000	0	0	88 550	4,088,550	1,123,029,600
RN1BIS	3.150	3.200	0	3 200 000	0	0	0	3,200,000	1,126,229,600
RN1BIS	3.700	3.750	0	4 800 000	0	0	0	4,800,000	1,131,029,600
RN1BIS	4.250	4.300	0	800 000	0	0	0	800,000	1,131,829,600
RN1BIS	4.300	4.350	0	4 800 000	0	0	0	4,800,000	1,136,629,600
RN1BIS	4.350	4.400	0	3 200 000	0	0	0	3,200,000	1,139,829,600
RN1BIS	6.200	6.250	0	800 000	0	0	0	800,000	1,140,629,600
RN1BIS	6.250	6.300	0	0	0	0	248 550	248,550	1,140,878,150
RN1BIS	6.300	6.350	0	0	0	0	88 550	88,550	1,140,966,700
RN1BIS	6.450	6.500	11 200	0	0	0	0	11,200	1,140,977,900
RN1BIS	6.550	6.600	0	0	0	0	88 550	88,550	1,141,066,450
RN1BIS	6.750	6.800	0	0	0	0	88 550	88,550	1,141,155,000
RN1BIS	6.900	6.950	0	4 800 000	0	0	0	4,800,000	1,145,955,000
RN1BIS	6.950	7.000	0	6 400 000	0	0	0	6,400,000	1,152,355,000
RN1BIS	7.200	7.250	11 200	800 000	0	0	0	811,200	1,153,166,200
RN1BIS	7.250	7.300	22 400	2 400 000	0	0	0	2,422,400	1,155,588,600
RN1BIS	7.300	7.350	11 200	2 400 000	0	0	0	2,411,200	1,157,999,800

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1BIS	7.350	7.400	0	2 400 000	0	0	177 100	2,577,100	1,160,576,900
RN1BIS	7.500	7.550	44 800	0	0	0	88 550	133,350	1,160,710,250
RN1BIS	7.900	7.950	0	1 600 000	0	0	0	1,600,000	1,162,310,250
RN1BIS	8.050	8.100	0	1 600 000	0	0	0	1,600,000	1,163,910,250
RN1BIS	8.300	8.350	22 400	0	0	0	0	22,400	1,163,932,650
RN1BIS	8.350	8.400	22 400	0	0	0	0	22,400	1,163,955,050
RN1BIS	8.600	8.650	0	0	0	0	160 000	160,000	1,164,115,050
RN1BIS	8.650	8.700	22 400	800 000	0	0	0	822,400	1,164,937,450
RN1BIS	8.700	8.750	56 000	800 000	0	0	0	856,000	1,165,793,450
RN1BIS	9.000	9.050	44 800	0	0	0	0	44,800	1,165,838,250
RN1BIS	9.050	9.100	22 400	0	0	0	88 550	110,950	1,165,949,200
RN1BIS	9.100	9.150	11 200	1 600 000	0	0	0	1,611,200	1,167,560,400
RN1BIS	9.150	9.200	0	800 000	0	0	0	800,000	1,168,360,400
RN1BIS	9.300	9.350	11 200	0	0	0	0	11,200	1,168,371,600
RN1BIS	9.450	9.500	0	4 800 000	0	0	0	4,800,000	1,173,171,600
RN1BIS	9.600	9.650	0	800 000	0	0	0	800,000	1,173,971,600
RN1BIS	9.650	9.700	0	2 400 000	0	0	88 550	2,488,550	1,176,460,150
RN1BIS	9.700	9.750	11 200	0	0	0	0	11,200	1,176,471,350
RN1BIS	10.300	10.350	0	1 600 000	0	0	0	1,600,000	1,178,071,350
RN1BIS	10.450	10.500	0	1 600 000	0	0	0	1,600,000	1,179,671,350
RN1BIS	10.950	11.000	11 200	2 400 000	0	0	0	2,411,200	1,182,082,550
RN1BIS	11.300	11.350	22 400	0	0	0	0	22,400	1,182,104,950
RN1BIS	11.500	11.550	0	800 000	0	0	0	800,000	1,182,904,950
RN1BIS	11.550	11.600	0	4 800 000	0	0	0	4,800,000	1,187,704,950
RN1BIS	11.600	11.650	0	5 600 000	0	0	0	5,600,000	1,193,304,950
RN1BIS	11.650	11.700	11 200	1 600 000	0	0	88 550	1,699,750	1,195,004,700
RN1BIS	11.850	11.900	11 200	0	0	0	0	11,200	1,195,015,900
RN1BIS	12.050	12.100	11 200	0	0	0	0	11,200	1,195,027,100
RN1BIS	12.600	12.650	0	1 600 000	0	0	0	1,600,000	1,196,627,100
RN1BIS	12.650	12.700	11 200	800 000	0	0	0	811,200	1,197,438,300
RN1BIS	13.350	13.400	11 200	1 600 000	0	0	425 650	2,036,850	1,199,475,150
RN1BIS	13.400	13.450	0	1 600 000	0	0	265 650	1,865,650	1,201,340,800
RN1BIS	13.500	13.550	11 200	0	0	563 200	0	574,400	1,201,915,200
RN1BIS	13.550	13.600	0	3 200 000	0	0	177 100	3,377,100	1,205,292,300
RN1BIS	13.600	13.650	33 600	4 800 000	0	0	0	4,833,600	1,210,125,900
RN1BIS	13.650	13.700	44 800	2 400 000	0	0	0	2,444,800	1,212,570,700
RN1BIS	13.700	13.750	22 400	800 000	0	0	0	822,400	1,213,393,100
RN1BIS	14.100	14.150	11 200	4 000 000	0	0	0	4,011,200	1,217,404,300
RN1BIS	14.200	14.250	11 200	0	0	0	0	11,200	1,217,415,500
RN1BIS	14.250	14.300	11 200	0	0	0	0	11,200	1,217,426,700
RN1BIS	14.400	14.450	33 600	0	0	0	0	33,600	1,217,460,300
RN1BIS	14.550	14.600	11 200	800 000	0	0	0	811,200	1,218,271,500
RN1BIS	14.600	14.650	11 200	0	0	0	0	11,200	1,218,282,700
RN1BIS	14.950	15.000	0	0	0	563 200	0	563,200	1,218,845,900
RN1BIS	15.000	15.050	22 400	0	0	0	0	22,400	1,218,868,300
RN1BIS	15.350	15.400	11 200	0	0	0	0	11,200	1,218,879,500
RN1BIS	15.400	15.450	11 200	0	0	0	88 550	99,750	1,218,979,250
RN1BIS	15.500	15.550	11 200	0	0	0	0	11,200	1,218,990,450
RN1BIS	15.550	15.600	22 400	0	0	0	0	22,400	1,219,012,850
RN1BIS	15.600	15.650	11 200	0	0	0	88 550	99,750	1,219,112,600
RN1BIS	15.650	15.700	11 200	0	0	0	0	11,200	1,219,123,800
RN1BIS	15.800	15.850	11 200	0	0	0	0	11,200	1,219,135,000
RN1BIS	15.850	15.900	11 200	0	0	0	0	11,200	1,219,146,200
RN1BIS	15.900	15.950	11 200	3 200 000	0	0	0	3,211,200	1,222,357,400
RN1BIS	15.950	16.000	0	1 600 000	0	0	0	1,600,000	1,223,957,400
RN1BIS	16.000	16.050	0	800 000	0	563 200	0	1,363,200	1,225,320,600
RN1BIS	16.150	16.200	0	2 400 000	0	0	0	2,400,000	1,227,720,600
RN1BIS	16.600	16.650	0	800 000	0	0	0	800,000	1,228,520,600
RN1BIS	17.250	17.300	0	0	0	0	88 550	88,550	1,228,609,150
RN1BIS	17.450	17.500	0	4 000 000	0	0	0	4,000,000	1,232,609,150
RN1BIS	17.500	17.550	0	2 400 000	0	0	0	2,400,000	1,235,009,150
RN1BIS	18.000	18.050	0	0	0	0	1 600 000	1,600,000	1,236,609,150

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1BIS	18.450	18.500	33 600	800 000	0	0	88 550	922,150	1,237,531,300
RN1BIS	18.500	18.550	11 200	800 000	0	563 200	0	1,374,400	1,238,905,700
RN1BIS	18.600	18.650	22 400	1 600 000	0	0	88 550	1,710,950	1,240,616,650
RN1BIS	18.650	18.700	11 200	800 000	0	0	0	811,200	1,241,427,850
RN1BIS	19.050	19.100	22 400	2 400 000	0	0	0	2,422,400	1,243,850,250
RN1BIS	19.100	19.150	22 400	0	0	0	0	22,400	1,243,872,650
RN1BIS	19.150	19.200	0	800 000	0	0	0	800,000	1,244,672,650
RN1BIS	19.250	19.300	11 200	800 000	0	0	0	811,200	1,245,483,850
RN1BIS	19.350	19.400	11 200	0	0	0	0	11,200	1,245,495,050
RN1BIS	19.700	19.750	11 200	4 000 000	0	0	0	4,011,200	1,249,506,250
RN1BIS	19.750	19.800	11 200	0	0	0	0	11,200	1,249,517,450
RN1BIS	19.800	19.850	0	800 000	0	0	0	800,000	1,250,317,450
RN1BIS	20.100	20.150	22 400	800 000	0	0	0	822,400	1,251,139,850
RN1BIS	20.150	20.200	33 600	8 800 000	0	0	0	8,833,600	1,259,973,450
RN1BIS	20.400	20.450	33 600	0	0	0	0	33,600	1,260,007,050
RN1BIS	20.500	20.550	0	800 000	0	0	0	800,000	1,260,807,050
RN1BIS	20.550	20.600	0	1 600 000	0	0	0	1,600,000	1,262,407,050
RN1BIS	20.600	20.650	22 400	1 600 000	0	0	0	1,622,400	1,264,029,450
RN1BIS	20.700	20.750	0	800 000	0	0	0	800,000	1,264,829,450
RN1BIS	20.850	20.900	0	3 200 000	0	0	0	3,200,000	1,268,029,450
RN1BIS	20.900	20.950	0	3 200 000	0	0	0	3,200,000	1,271,229,450
RN1BIS	21.000	21.050	0	800 000	0	0	0	800,000	1,272,029,450
RN1BIS	21.300	21.350	0	3 200 000	0	0	0	3,200,000	1,275,229,450
RN1BIS	21.350	21.400	33 600	0	0	0	0	33,600	1,275,263,050
RN1BIS	21.400	21.450	11 200	0	0	0	0	11,200	1,275,274,250
RN1BIS	21.500	21.550	0	800 000	0	0	88 550	888,550	1,276,162,800
RN1BIS	21.550	21.600	11 200	0	0	563 200	0	574,400	1,276,737,200
RN1BIS	21.600	21.650	22 400	0	0	0	0	22,400	1,276,759,600
RN1BIS	21.650	21.700	11 200	0	0	0	0	11,200	1,276,770,800
RN1BIS	21.700	21.750	0	0	0	0	88 550	88,550	1,276,859,350
RN1BIS	21.800	21.850	0	4 000 000	0	0	0	4,000,000	1,280,859,350
RN1BIS	21.950	22.000	33 600	0	0	0	0	33,600	1,280,892,950
RN1BIS	22.050	22.100	0	800 000	0	0	0	800,000	1,281,692,950
RN1BIS	22.150	22.200	0	0	0	0	88 550	88,550	1,281,781,500
RN1BIS	22.200	22.250	33 600	800 000	0	0	0	833,600	1,282,615,100
RN1BIS	22.700	22.750	56 000	0	0	0	0	56,000	1,282,671,100
RN1BIS	22.750	22.800	44 800	0	0	0	0	44,800	1,282,715,900
RN1BIS	22.800	22.850	22 400	0	0	0	0	22,400	1,282,738,300
RN1BIS	23.500	23.550	22 400	1 600 000	0	0	0	1,622,400	1,284,360,700
RN1BIS	23.550	23.600	56 000	0	0	0	0	56,000	1,284,416,700
RN1BIS	24.100	24.150	22 400	800 000	0	0	0	822,400	1,285,239,100
RN1BIS	24.200	24.250	11 200	4 800 000	0	0	0	4,811,200	1,290,050,300
RN1BIS	24.250	24.300	0	800 000	0	0	408 550	1,208,550	1,291,258,850
RN1BIS	24.300	24.350	0	800 000	0	0	0	800,000	1,292,058,850
RN1BIS	24.400	24.450	11 200	800 000	0	0	0	811,200	1,292,870,050
RN1BIS	24.450	24.500	0	0	0	0	88 550	88,550	1,292,958,600
RN1BIS	24.500	24.550	11 200	0	0	0	0	11,200	1,292,969,800
RN1BIS	24.550	24.600	11 200	2 400 000	0	0	0	2,411,200	1,295,381,000
RN1BIS	24.750	24.800	33 600	4 000 000	0	0	0	4,033,600	1,299,414,600
RN1BIS	25.250	25.300	22 400	0	0	0	337 100	359,500	1,299,774,100
RN1BIS	25.300	25.350	0	800 000	0	0	88 550	888,550	1,300,662,650
RN1BIS	25.350	25.400	11 200	0	0	0	0	11,200	1,300,673,850
RN1BIS	25.400	25.450	0	1 600 000	0	0	0	1,600,000	1,302,273,850
RN1BIS	26.000	26.050	0	0	0	0	160 000	160,000	1,302,433,850
RN1BIS	26.050	26.100	22 400	0	0	0	0	22,400	1,302,456,250
RN1BIS	26.100	26.150	33 600	0	0	0	0	33,600	1,302,489,850
RN1BIS	26.400	26.450	11 200	0	0	0	0	11,200	1,302,501,050
RN1BIS	26.800	26.850	11 200	0	0	0	0	11,200	1,302,512,250
RN1BIS	29.000	29.050	11 200	0	0	0	0	11,200	1,302,523,450
RN1BIS	29.050	29.100	22 400	0	0	0	0	22,400	1,302,545,850
RN1BIS	29.200	29.250	11 200	0	0	0	0	11,200	1,302,557,050
RN1BIS	29.350	29.400	0	1 600 000	0	0	0	1,600,000	1,304,157,050

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1BIS	29.400	29.450	0	1 600 000	0	0	0	1,600,000	1,305,757,050
RN1BIS	29.450	29.500	11 200	0	0	0	177 100	188,300	1,305,945,350
RN1BIS	29.500	29.550	33 600	800 000	0	0	0	833,600	1,306,778,950
RN1BIS	29.700	29.750	11 200	1 600 000	0	0	0	1,611,200	1,308,390,150
RN1BIS	30.150	30.200	0	1 600 000	0	0	0	1,600,000	1,309,990,150
RN1BIS	30.200	30.250	22 400	0	0	0	0	22,400	1,310,012,550
RN1BIS	30.250	30.300	11 200	4 800 000	0	0	0	4,811,200	1,314,823,750
RN1BIS	30.300	30.350	100 800	4 800 000	0	0	0	4,900,800	1,319,724,550
RN1BIS	30.350	30.400	33 600	800 000	0	0	0	833,600	1,320,558,150
RN1BIS	30.750	30.800	11 200	2 400 000	0	0	0	2,411,200	1,322,969,350
RN1BIS	30.900	30.950	11 200	0	0	0	177 100	188,300	1,323,157,650
RN1BIS	30.950	31.000	11 200	800 000	0	563 200	88 550	1,462,950	1,324,620,600
RN1BIS	32.000	32.050	0	800 000	0	0	0	800,000	1,325,420,600
RN1BIS	32.050	32.100	11 200	800 000	0	0	0	811,200	1,326,231,800
RN1BIS	32.100	32.150	11 200	0	0	0	0	11,200	1,326,243,000
RN1BIS	32.150	32.200	56 000	0	0	0	0	56,000	1,326,299,000
RN1BIS	32.350	32.400	22 400	0	0	0	800 000	822,400	1,327,121,400
RN1BIS	32.400	32.450	22 400	800 000	0	0	0	822,400	1,327,943,800
RN1BIS	32.700	32.750	11 200	0	0	0	88 550	99,750	1,328,043,550
RN1BIS	33.550	33.600	44 800	4 000 000	0	0	0	4,044,800	1,332,088,350
RN1BIS	33.750	33.800	56 000	0	0	0	0	56,000	1,332,144,350
RN1BIS	33.800	33.850	11 200	0	0	0	0	11,200	1,332,155,550
RN1BIS	34.150	34.200	0	0	0	0	408 550	408,550	1,332,564,100
RN1BIS	34.200	34.250	0	800 000	0	0	177 100	977,100	1,333,541,200
RN1BIS	34.250	34.300	22 400	0	0	0	0	22,400	1,333,563,600
RN1BIS	34.550	34.600	0	1 600 000	0	0	0	1,600,000	1,335,163,600
RN1BIS	34.600	34.650	0	0	0	0	248 550	248,550	1,335,412,150
RN1BIS	34.650	34.700	0	800 000	0	0	177 100	977,100	1,336,389,250
RN1BIS	34.800	34.850	0	2 400 000	0	0	177 100	2,577,100	1,338,966,350
RN1BIS	34.850	34.900	0	1 600 000	0	0	0	1,600,000	1,340,566,350
RN1BIS	34.900	34.950	11 200	800 000	0	0	0	811,200	1,341,377,550
RN1BIS	35.000	35.050	11 200	0	0	0	0	11,200	1,341,388,750
RN1BIS	35.100	35.150	11 200	0	0	0	0	11,200	1,341,399,950
RN1BIS	35.150	35.200	0	1 600 000	0	0	0	1,600,000	1,342,999,950
RN1BIS	35.200	35.250	0	800 000	0	0	88 550	888,550	1,343,888,500
RN1BIS	35.250	35.300	0	0	0	0	265 650	265,650	1,344,154,150
RN1BIS	35.300	35.350	22 400	1 600 000	0	0	0	1,622,400	1,345,776,550
RN1BIS	35.450	35.500	0	800 000	0	0	0	800,000	1,346,576,550
RN1BIS	35.500	35.550	0	1 600 000	0	0	0	1,600,000	1,348,176,550
RN1BIS	35.550	35.600	0	800 000	0	0	0	800,000	1,348,976,550
RN1BIS	35.600	35.650	0	800 000	0	0	0	800,000	1,349,776,550
RN1BIS	35.700	35.750	11 200	0	0	0	0	11,200	1,349,787,750
RN1BIS	35.750	35.800	0	800 000	0	0	177 100	977,100	1,350,764,850
RN1BIS	35.800	35.850	11 200	2 400 000	0	0	0	2,411,200	1,353,176,050
RN1BIS	36.050	36.100	22 400	0	0	0	0	22,400	1,353,198,450
RN1BIS	36.100	36.150	11 200	0	0	0	0	11,200	1,353,209,650
RN1BIS	36.200	36.250	11 200	0	0	0	0	11,200	1,353,220,850
RN1BIS	36.250	36.300	33 600	0	0	0	0	33,600	1,353,254,450
RN1BIS	36.350	36.400	11 200	0	0	0	0	11,200	1,353,265,650
RN1BIS	36.450	36.500	0	0	0	0	88 550	88,550	1,353,354,200
RN1BIS	36.650	36.700	22 400	0	0	0	0	22,400	1,353,376,600
RN1BIS	37.700	37.750	0	2 400 000	0	0	0	2,400,000	1,355,776,600
RN1BIS	38.000	38.050	0	5 600 000	0	0	248 550	5,848,550	1,361,625,150
RN1BIS	38.650	38.700	78 400	0	0	0	0	78,400	1,361,703,550
RN1BIS	38.800	38.850	0	1 600 000	0	0	0	1,600,000	1,363,303,550
RN1BIS	38.950	39.000	0	6 400 000	0	0	0	6,400,000	1,369,703,550
RN1BIS	39.000	39.050	0	2 400 000	0	0	0	2,400,000	1,372,103,550
RN1BIS	39.100	39.150	0	3 200 000	0	0	0	3,200,000	1,375,303,550
RN1BIS	41.100	41.150	0	800 000	0	0	0	800,000	1,376,103,550
RN1BIS	41.750	41.800	0	0	0	0	88 550	88,550	1,376,192,100
RN1BIS	41.950	42.000	11 200	0	0	0	0	11,200	1,376,203,300
RN1BIS	42.550	42.600	0	0	0	0	177 100	177,100	1,376,380,400

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1BIS	42.600	42.650	0	4 800 000	0	0	0	4,800,000	1,381,180,400
RN1BIS	42.700	42.750	0	800 000	0	0	0	800,000	1,381,980,400
RN1BIS	42.950	43.000	11 200	0	0	0	177 100	188,300	1,382,168,700
RN1BIS	43.500	43.550	22 400	0	0	0	0	22,400	1,382,191,100
RN1BIS	43.550	43.600	11 200	0	0	0	0	11,200	1,382,202,300
RN1BIS	43.800	43.850	0	800 000	0	0	0	800,000	1,383,002,300
RN1BIS	43.850	43.900	0	800 000	0	0	0	800,000	1,383,802,300
RN1BIS	43.900	43.950	0	1 600 000	0	0	0	1,600,000	1,385,402,300
RN1BIS	44.950	45.000	0	0	0	0	88 550	88,550	1,385,490,850
RN1BIS	45.000	45.050	0	800 000	0	0	0	800,000	1,386,290,850
RN1BIS	45.750	45.800	22 400	0	0	0	0	22,400	1,386,313,250
RN1BIS	45.900	45.950	33 600	0	0	0	0	33,600	1,386,346,850
RN1BIS	45.950	46.000	0	1 600 000	0	0	0	1,600,000	1,387,946,850
RN1BIS	46.050	46.100	11 200	0	0	0	0	11,200	1,387,958,050
RN1BIS	46.250	46.300	0	0	0	0	177 100	177,100	1,388,135,150
RN1BIS	46.950	47.000	0	3 200 000	0	0	0	3,200,000	1,391,335,150
RN1BIS	47.000	47.050	11 200	0	0	0	0	11,200	1,391,346,350
RN1BIS	47.250	47.300	0	0	0	0	88 550	88,550	1,391,434,900
RN1BIS	47.750	47.800	0	800 000	0	563 200	0	1,363,200	1,392,798,100
RN1BIS	47.800	47.850	11 200	0	0	0	0	11,200	1,392,809,300
RN1BIS	48.100	48.150	11 200	0	0	0	0	11,200	1,392,820,500
RN1BIS	48.250	48.300	0	800 000	0	0	88 550	888,550	1,393,709,050
RN1BIS	48.300	48.350	22 400	0	0	0	160 000	182,400	1,393,891,450
RN1BIS	48.550	48.600	0	0	0	0	337 100	337,100	1,394,228,550
RN1BIS	48.650	48.700	0	800 000	0	0	0	800,000	1,395,028,550
RN1BIS	48.900	48.950	0	0	0	0	88 550	88,550	1,395,117,100
RN1BIS	49.050	49.100	0	0	0	1 126 400	0	1,126,400	1,396,243,500
RN1BIS	50.950	51.000	78 400	2 400 000	0	0	0	2,478,400	1,398,721,900
RN1BIS	51.400	51.450	11 200	0	0	0	0	11,200	1,398,733,100
RN1BIS	51.450	51.500	11 200	800 000	0	0	0	811,200	1,399,544,300
RN1BIS	51.550	51.600	0	0	0	0	160 000	160,000	1,399,704,300
RN1BIS	51.650	51.700	0	800 000	0	0	0	800,000	1,400,504,300
RN1BIS	52.650	52.700	33 600	0	0	0	0	33,600	1,400,537,900
RN1BIS	52.850	52.900	11 200	0	0	0	0	11,200	1,400,549,100
RN1BIS	52.900	52.950	11 200	0	0	0	0	11,200	1,400,560,300
RN1BIS	52.950	53.000	11 200	800 000	0	0	0	811,200	1,401,371,500
RN1BIS	53.400	53.450	11 200	0	0	0	0	11,200	1,401,382,700
RN1BIS	54.950	55.000	33 600	0	0	0	0	33,600	1,401,416,300
RN1BIS	55.000	55.050	11 200	1 600 000	0	0	0	1,611,200	1,403,027,500
RN1BIS	55.400	55.450	11 200	0	0	0	88 550	99,750	1,403,127,250
RN1BIS	55.650	55.700	0	800 000	0	0	0	800,000	1,403,927,250
RN1BIS	55.700	55.750	11 200	0	0	0	0	11,200	1,403,938,450
RN1BIS	57.150	57.200	0	0	0	0	248 550	248,550	1,404,187,000
RN1BIS	58.600	58.650	0	0	0	0	88 550	88,550	1,404,275,550
RN1BIS	58.800	58.850	0	0	0	0	177 100	177,100	1,404,452,650
RN1BIS	59.350	59.400	0	0	0	563 200	0	563,200	1,405,015,850
RN1BIS	61.450	61.500	0	0	0	0	88 550	88,550	1,405,104,400
RN1BIS	61.700	61.750	0	800 000	0	563 200	0	1,363,200	1,406,467,600
RN1BIS	61.800	61.850	0	0	0	0	88 550	88,550	1,406,556,150
RN1BIS	61.850	61.900	0	3 200 000	0	0	88 550	3,288,550	1,409,844,700
RN1BIS	62.500	62.550	0	800 000	0	0	0	800,000	1,410,644,700
RN1BIS	62.550	62.600	11 200	0	0	0	0	11,200	1,410,655,900
RN1BIS	64.100	64.150	0	800 000	0	0	0	800,000	1,411,455,900
RN1BIS	64.150	64.200	0	800 000	0	0	0	800,000	1,412,255,900
RN1BIS	64.400	64.450	22 400	0	0	0	0	22,400	1,412,278,300
RN1BIS	64.450	64.500	22 400	0	0	0	0	22,400	1,412,300,700
RN1BIS	64.500	64.550	0	0	0	0	88 550	88,550	1,412,389,250
RN1BIS	64.800	64.850	0	1 600 000	0	0	0	1,600,000	1,413,989,250
RN1BIS	64.850	64.900	0	1 600 000	0	0	0	1,600,000	1,415,589,250
RN1BIS	65.100	65.150	22 400	0	0	0	0	22,400	1,415,611,650
RN1BIS	65.300	65.350	0	0	0	1 126 400	0	1,126,400	1,416,738,050
RN1BIS	66.500	66.550	0	5 600 000	0	0	0	5,600,000	1,422,338,050

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1BIS	66.550	66.600	0	3 200 000	0	0	0	3,200,000	1,425,538,050
RN1BIS	66.600	66.650	0	3 200 000	0	0	0	3,200,000	1,428,738,050
RN1BIS	66.650	66.700	0	1 600 000	0	0	0	1,600,000	1,430,338,050
RN1BIS	66.950	67.000	0	1 600 000	0	0	0	1,600,000	1,431,938,050
RN1BIS	67.050	67.100	33 600	0	0	0	0	33,600	1,431,971,650
RN1BIS	67.850	67.900	0	2 400 000	0	0	0	2,400,000	1,434,371,650
RN1BIS	67.900	67.950	0	800 000	0	0	0	800,000	1,435,171,650
RN1BIS	68.400	68.450	0	0	0	0	88 550	88,550	1,435,260,200
RN1BIS	68.550	68.600	0	0	0	0	88 550	88,550	1,435,348,750
RN1BIS	68.750	68.800	0	0	0	563 200	0	563,200	1,435,911,950
RN1BIS	69.200	69.250	11 200	0	0	0	0	11,200	1,435,923,150
RN1BIS	69.650	69.700	0	2 400 000	0	0	0	2,400,000	1,438,323,150
RN1BIS	69.750	69.800	11 200	0	0	0	0	11,200	1,438,334,350
RN1BIS	69.800	69.850	22 400	0	0	0	0	22,400	1,438,356,750
RN1BIS	70.050	70.100	0	0	0	0	88 550	88,550	1,438,445,300
RN1BIS	70.850	70.900	11 200	0	0	0	0	11,200	1,438,456,500
RN1BIS	70.900	70.950	22 400	0	0	0	0	22,400	1,438,478,900
RN1BIS	76.050	76.100	0	8 000 000	0	0	0	8,000,000	1,446,478,900
RN1BIS	76.100	76.150	0	6 400 000	0	0	0	6,400,000	1,452,878,900
RN1BIS	76.150	76.200	0	8 000 000	0	0	0	8,000,000	1,460,878,900
RN1BIS	76.200	76.250	0	1 600 000	0	0	0	1,600,000	1,462,478,900
RN1BIS	76.650	76.700	0	10 400 000	0	0	0	10,400,000	1,472,878,900
RN1BIS	76.750	76.800	0	9 600 000	0	0	0	9,600,000	1,482,478,900
RN1BIS	76.800	76.850	0	5 600 000	0	0	88 550	5,688,550	1,488,167,450
RN1BIS	76.850	76.900	0	4 000 000	0	0	0	4,000,000	1,492,167,450
RN1BIS	76.900	76.950	0	7 200 000	0	0	0	7,200,000	1,499,367,450
RN1BIS	77.050	77.100	0	3 200 000	0	0	88 550	3,288,550	1,502,656,000
RN1BIS	77.650	77.700	0	7 200 000	0	0	0	7,200,000	1,509,856,000
RN1BIS	77.750	77.800	0	9 600 000	0	0	0	9,600,000	1,519,456,000
RN1BIS	77.900	77.950	0	10 400 000	0	0	0	10,400,000	1,529,856,000
RN1BIS	77.950	78.000	0	7 200 000	0	0	0	7,200,000	1,537,056,000
RN1BIS	78.000	78.050	0	8 800 000	0	0	0	8,800,000	1,545,856,000
RN1BIS	78.050	78.100	0	6 400 000	0	0	0	6,400,000	1,552,256,000
RN1BIS	80.200	80.250	0	7 200 000	0	0	0	7,200,000	1,559,456,000
RN1BIS	80.250	80.300	0	4 800 000	0	0	88 550	4,888,550	1,564,344,550
RN1BIS	80.300	80.350	0	4 000 000	0	0	0	4,000,000	1,568,344,550
RN1BIS	80.400	80.450	0	4 000 000	0	0	0	4,000,000	1,572,344,550
RN1BIS	80.450	80.500	0	1 600 000	0	0	0	1,600,000	1,573,944,550
RN1BIS	80.500	80.550	11 200	4 000 000	0	0	0	4,011,200	1,577,955,750
RN1BIS	80.550	80.600	0	4 800 000	0	563 200	0	5,363,200	1,583,318,950
RN1BIS	80.700	80.750	0	4 800 000	0	0	0	4,800,000	1,588,118,950
RN1BIS	80.750	80.800	0	5 600 000	0	0	0	5,600,000	1,593,718,950
RN1BIS	80.800	80.850	0	1 600 000	0	0	0	1,600,000	1,595,318,950
RN1BIS	80.850	80.900	0	1 600 000	0	0	0	1,600,000	1,596,918,950
RN1BIS	80.900	80.950	0	1 600 000	0	0	0	1,600,000	1,598,518,950
RN1BIS	82.400	82.450	0	8 000 000	0	0	337 100	8,337,100	1,606,856,050
RN1BIS	82.700	82.750	0	8 000 000	0	0	0	8,000,000	1,614,856,050
RN1BIS	82.750	82.800	0	8 800 000	0	0	0	8,800,000	1,623,656,050
RN1BIS	82.800	82.850	0	9 600 000	0	0	0	9,600,000	1,633,256,050
RN1BIS	82.850	82.900	0	6 400 000	0	0	0	6,400,000	1,639,656,050
RN1BIS	82.900	82.950	0	7 200 000	0	0	0	7,200,000	1,646,856,050
RN1BIS	82.950	83.000	0	4 000 000	0	0	0	4,000,000	1,650,856,050
RN1BIS	83.400	83.450	0	5 600 000	0	0	0	5,600,000	1,656,456,050
RN1BIS	83.450	83.500	0	9 600 000	0	0	0	9,600,000	1,666,056,050
RN1BIS	83.500	83.550	0	7 200 000	0	0	0	7,200,000	1,673,256,050
RN1BIS	83.550	83.600	0	6 400 000	0	0	0	6,400,000	1,679,656,050
RN1BIS	83.600	83.650	0	6 400 000	0	0	0	6,400,000	1,686,056,050
RN1BIS	83.650	83.700	0	5 600 000	0	0	0	5,600,000	1,691,656,050
RN1BIS	83.700	83.750	0	7 200 000	0	0	0	7,200,000	1,698,856,050
RN1BIS	83.800	83.850	0	5 600 000	0	0	0	5,600,000	1,704,456,050
RN1BIS	83.850	83.900	0	9 600 000	0	0	88 550	9,688,550	1,714,144,600
RN1BIS	83.900	83.950	0	6 400 000	0	0	0	6,400,000	1,720,544,600

RN	PK (beginning)	PK (Ending)	Linear Crack	Alligator Cracking	Rutting	Splashing	Potholes S, M, L	Cost Estimate	Accumulated Cost
RN1BIS	83.950	84.000	0	5 600 000	0	0	0	5,600,000	1,726,144,600
RN1BIS	84.000	84.050	0	7 200 000	0	0	0	7,200,000	1,733,344,600
RN1BIS	84.050	84.100	0	8 800 000	0	0	0	8,800,000	1,742,144,600
RN1BIS	84.100	84.150	0	9 600 000	0	0	0	9,600,000	1,751,744,600
RN1BIS	84.150	84.200	0	6 400 000	0	0	0	6,400,000	1,758,144,600
RN1BIS	84.200	84.250	0	6 400 000	0	0	0	6,400,000	1,764,544,600
RN1BIS	84.250	84.300	0	4 000 000	0	0	0	4,000,000	1,768,544,600
RN1BIS	84.350	84.400	0	800 000	0	0	0	800,000	1,769,344,600
RN1BIS	84.400	84.450	0	800 000	0	0	0	800,000	1,770,144,600
RN1BIS	84.550	84.600	0	4 000 000	0	0	0	4,000,000	1,774,144,600
RN1BIS	84.650	84.700	0	12 800 000	0	0	0	12,800,000	1,786,944,600
RN1BIS	84.750	84.800	0	1 600 000	0	0	0	1,600,000	1,788,544,600
RN1BIS	84.800	84.850	0	2 400 000	0	0	0	2,400,000	1,790,944,600
RN1BIS	84.850	84.900	0	4 800 000	0	0	0	4,800,000	1,795,744,600
RN1BIS	84.950	85.000	0	5 600 000	0	0	0	5,600,000	1,801,344,600
RN1BIS	85.150	85.200	11 200	0	0	0	0	11,200	1,801,355,800
RN1BIS	85.350	85.400	11 200	7 200 000	0	0	88 550	7,299,750	1,808,655,550
RN1BIS	85.400	85.450	11 200	7 200 000	0	0	0	7,211,200	1,815,866,750
RN1BIS	85.450	85.500	0	8 000 000	0	0	0	8,000,000	1,823,866,750
RN1BIS	85.900	85.950	0	800 000	0	0	88 550	888,550	1,824,755,300
RN1BIS	85.950	86.000	0	4 800 000	0	0	0	4,800,000	1,829,555,300
RN1BIS	86.000	86.050	0	8 800 000	0	0	0	8,800,000	1,838,355,300
RN1BIS	86.050	86.100	0	5 600 000	0	0	0	5,600,000	1,843,955,300
RN1BIS	86.100	86.150	0	6 400 000	0	0	88 550	6,488,550	1,850,443,850
RN1BIS	86.150	86.200	0	2 400 000	0	0	0	2,400,000	1,852,843,850
RN1BIS	87.350	87.400	0	1 600 000	0	563 200	0	2,163,200	1,855,007,050
RN1BIS	87.750	87.800	0	800 000	0	0	0	800,000	1,855,807,050
RN1BIS	87.850	87.900	0	2 400 000	0	0	0	2,400,000	1,858,207,050
RN1BIS	89.650	89.700	0	5 600 000	0	0	0	5,600,000	1,863,807,050
RN1BIS	89.700	89.750	0	5 600 000	0	0	0	5,600,000	1,869,407,050
RN1BIS	89.750	89.800	0	2 400 000	0	563 200	0	2,963,200	1,872,370,250
RN1BIS	89.800	89.850	0	800 000	0	1 689 600	88 550	2,578,150	1,874,948,400
RN1BIS	89.900	89.950	22 400	0	0	0	0	22,400	1,874,970,800
RN1BIS	89.950	90.000	0	0	0	563 200	160 000	723,200	1,875,694,000
RN1BIS	90.000	90.050	0	800 000	0	0	0	800,000	1,876,494,000
RN1BIS	90.050	90.100	0	9 600 000	0	0	0	9,600,000	1,886,094,000
RN1BIS	90.150	90.200	0	9 600 000	0	0	0	9,600,000	1,895,694,000
RN1BIS	90.200	90.250	0	7 200 000	0	0	88 550	7,288,550	1,902,982,550
RN1BIS	90.250	90.300	0	800 000	0	0	88 550	888,550	1,903,871,100
RN1BIS	90.300	90.350	0	4 800 000	0	563 200	0	5,363,200	1,909,234,300
RN1BIS	90.350	90.400	0	800 000	0	0	0	800,000	1,910,034,300
RN1BIS	90.400	90.450	0	0	0	0	88 550	88,550	1,910,122,850
RN1BIS	90.450	90.500	0	2 400 000	0	0	0	2,400,000	1,912,522,850
RN1BIS	90.750	90.800	0	800 000	0	0	0	800,000	1,913,322,850
RN1BIS	90.800	90.850	0	800 000	0	0	0	800,000	1,914,122,850
RN1BIS	90.850	90.900	11 200	0	0	0	0	11,200	1,914,134,050
RN1BIS	90.900	90.950	33 600	0	0	0	0	33,600	1,914,167,650
RN1BIS	91.050	91.100	0	800 000	0	0	0	800,000	1,914,967,650
RN1BIS	91.150	91.200	0	2 400 000	0	0	0	2,400,000	1,917,367,650
RN1	8.150	8.200	11 200	2 400 000	0	0	0	2,411,200	1,919,778,850
RN1	8.200	8.250	67 200	0	0	0	0	67,200	1,919,846,050
RN1	8.250	8.300	33 600	2 400 000	0	0	0	2,433,600	1,922,279,650
RN1	8.300	8.350	56 000	800 000	0	0	0	856,000	1,923,135,650
RN1	8.350	8.400	22 400	0	0	0	0	22,400	1,923,158,050
RN1	8.400	8.450	56 000	1 600 000	0	0	88 550	1,744,550	1,924,902,600
RN1	8.450	8.500	22 400	0	0	0	0	22,400	1,924,925,000
RN1	8.500	8.550	89 600	800 000	0	0	0	889,600	1,925,814,600
RN1	8.550	8.600	78 400	1 600 000	0	0	0	1,678,400	1,927,493,000

8 PREPARATION OF ANNUAL MAINTENANCE PLAN (Other Categories, III, IV, and V)

WG5 did not plan the maintenance plan of the routes of category III, IV, and V since these routes are not considered as the target routes of the project, F3LTM. However, the planning procedure of planning these routes, route of category III, IV, and V, is nearly as same as the procedure of routes of category I and II which are described in chapter 6 and 7. The only step which requires individual consideration is "Scenario Setting". Also, "Realistic Method of Setting Criteria" can be done independently since the road characteristics are very different among categories and the availability of the information is also limited for the routes of lower categories.

This chapter explains the key points in "Scenario Setting" and "Selecting the most realistic Scenario".

8.1 Scenario Setting

Ideal scenario for the routes of category III, IV and V is shown in the Table 4-6. However, these scenarios are derived from low quality of management target level so there aren't many options available in the Table 4-6 to set the alternative scenarios for comparison. In this case, the road management organization compensate the management target level and set alternative scenarios which are easy to implement, which means with lower cost. One of the example is the Scenario 4 in the Table 6-1. This scenario has the strategy of "Do nothing" to the sections with Level A to decrease the required cost. However, it is recommended that the road management organization shall be aware that these scenarios with compensations worsen the condition level of the route gradually. The other funding shall be obtained to improve the condition of the route.

8.2 Selecting the most realistic Scenario

Some of the routes does not have allocated budget every year or even through there is allocated budget, it lacks very big amount compared to the required amount. Therefore, it would be difficult to compare the amount of the actual allocated budget with the required budget as is explained the method in subchapter 6.5.2 and 7.5.2. The required cost can be compared in this case and the scenario with lowest cost can be selected as the most realistic scenario.

9 UTILIZATION OF ANNUAL MAINTENANCE PLAN

This chapter describes the situations and example when the annual maintenance plan prepared in Chapter 6, 7, and 8 is utilized in the maintenance cycle of the pavement.

9.1 Shortlisting/Budget Request

This step is already explained in previous chapter 6, and 7, specifically subchapter 6.7, 6.8, 7.7, and 7.8. The maintenance plan is still draft version and the base of the discussion among the stakeholders, specifically between DER, and DRTP for verification of the draft plan. The verified version is sent to the official of higher position who are the decision makers and approved for the budget request to external ministries and other governmental organizations.

9.2 Budget Allocation

When the budget amount is decided, it is very usual that the decided amount is lower than the requested amount. Therefore, the budget has to be allocated to appropriate region or routes based on the previous plan for budget request by considering the entire network. This should be done by prioritizing the regions or routes. WG5 did not prepare or simulate this procedure in F3LTM because this section was done by selecting the model routes.

The prioritization process is quite similar to the process which were done in Chapter 6, 7, and 8, specifically subchapter 6.6, 6.7, 7.6, and 7.7. The criteria for prioritisation can be same or modified/revised, it depends on the demands of stakeholders specifically the local community of the region or along the route.

However, the method of shortlisting should be different. There should not be any region or route without any budget for maintenance. All the sections shall be repaired with very basic routine maintenance methods. Therefore, there are 2 major methods of allocating the budget, one is allocating the base budget depending on the length of the road in the region or the route and allocate the rest of the budget based on the prioritization. The other method is that decide the ratio of budget allocation based on the prioritization. It could done by 2 of the methods and form a hybrid method. The annual maintenance plan is still a draft version, but it is very close the final version.

9.3 Finalization of Annual Maintenance Plan

Once the allocation of budget is drafted by the procedure of the previous subchapter, there shall be discussion with GRs of DRTP, higher position officials of MTP, and other keypersons of external organizations, such as mayor of the local government. Through this process, the annual maintenance plan is finalized, and the final version is released after the minster’s approval

9.4 Implementation/Monitoring

The final version of the maintenance plan includes the data of route, location, repair method, work quantity and the cost. However, it is not unusual that the actual implementation doesn’t go exactly as is in the plan. There shall be modifications in actual implementation considering the conditions of the region/route. Even if the sections which should be repaired with the annual maintenance plan was excluded from the actual implementation, damage would not be repaired, and it is often deteriorated

worse. The revised plan should mention the countermeasure how to deal with these left behind sections. The most common countermeasure is to postpone the implementation to the following year.

Once the implementation is started, progress of the plan shall be monitored in the context of actual work, quality, and budget execution. The allocated budget shall be spent as long as the road surface requires the treatment. It shall not be left unutilized till the expiration date and returned. The budget consumption rate shall be collected and summarized every year to secure the implementation of the annual maintenance plan.

9.5 Recording/Referring to the Maintenance Plan of the Following Year

The implementation of repair/rehabilitation works shall be recorded in the pavement management system (PMS) which was developed by WG4 with the results. The input data should be as follows,

- Location (Province, prefecture, DRTP, route number, chainage)
- Type of works executed with quantity and cost
- Results of repair/rehabilitation works (IRI, numbers of pothole, length/area of crack, etc)
- Timing of the completion of repair/rehabilitation works
- Name of the contractor who did the implementation of repair/rehabilitation works.

10 PREPARATION OF MID-LONG TERM MAINTENANCE PLAN

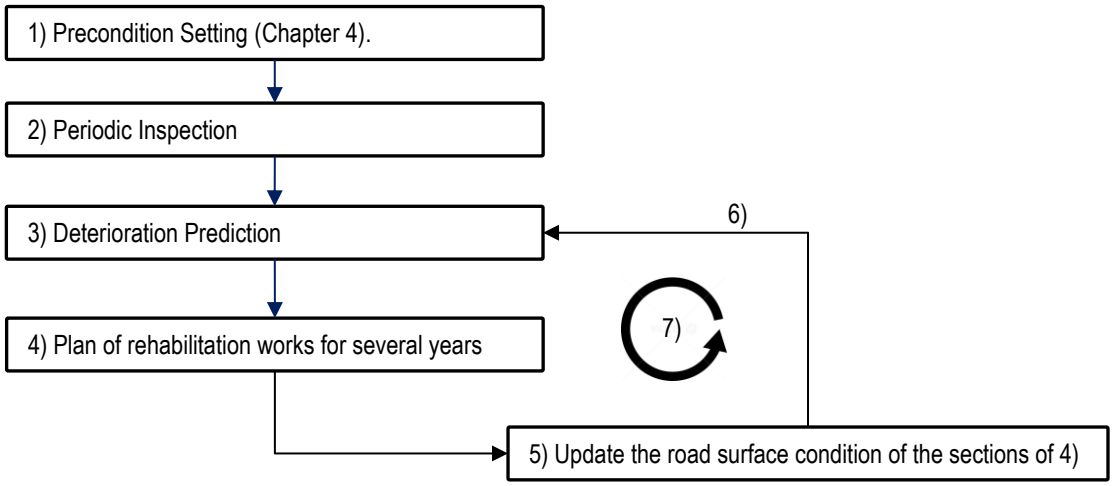
This chapter explains the methodology and the method to prepare the mid-long term maintenance plan.

10.1 Methodology

There should be several information to collect to plan the mid-long term plan, specifically long term plan. Most of the required information is not available yet for MTP. Therefore, it is very limited for MTP to apply in the methodology of planning mid-long term plan.

To plan the maintenance works in future, the future conditions of the road surface, in other words damage condition, is necessary to determine the timing of the required works. The timing of implementation of repair/rehabilitation works is determined by WG5 as in Table 4-4 (short term) and Table 4-5 (long term). Therefore, road management organization, in this case DER, shall know when the sections exceed the management level by categories of route. For example, when the IRI value exceeds 3.0 in sections on a route of category I, specified repair work shall be implemented to those sections. However, It is not possible to determine the timing that the road surface condition exceeds the target/management level at present due to lack of data and analysis modules. Theoretically, the following procedure shall be taken to determine the timing of the repair/rehabilitation works in future.

1) Execute the procedure which are described in Chapter 4.
2) Execute the periodic inspection of road surface.
3) Study the deterioration prediction of road surface based on the result of the periodic inspection done in 2).
4) Plan the repair/rehabilitation works based on the results of the deterioration predictions for the first several years.
5) Update the road surface condition of the sections of 4) with repair/rehabilitation works
6) Go to 4) and plan for the following year
7) repeat 3) 4) 5) until it reaches the end of the planning period.



Source: F3LTM

Figure 10-1 Procedure of Planning Med-long Term Plan

10.2 Method

Deterioration prediction is not very easy to study and require many kinds and volume of data. However, if there is accumulated data of periodic inspection, the model or formula can be derived as approximation formula from observed data.

(1) Method with Deterioration Prediction

There are many methods of deterioration prediction. Deriving the approximation formulae by groups of road surface is the one of the easiest methods. The section shall be grouped by pavement structure, subbase and subgrade condition, traffic condition, environmental condition, road category etc. It is easy but requires several years of observation to obtain the first version of the approximation formulae. Moreover, it shall be updated by the new collected data semi permanently. The indicator can be IRI, crack ratio, rutting depth, MCI, etc. IRI is the easiest to handle and applied in many countries.

Other method is to derive the approximation formulae of the deterioration by lab research. Experiment the change of pavement in different environment, say different moisture of pavement for instance, with wheel tracking testing equipment.

There is other method which utilize the formulae which are obtained by research institute of other countries and adjust with Malagasy environment. It is easy to apply and could be cost efficient and reliable since the study has long history and actual performance.

(2) Method without Deterioration Prediction

If there is not any data of deterioration prediction, there is a method to plan mid-term plan by delaying the timing of the implementation of the section which cannot be executed in the following year due to budget constraints. The sections with high priority are included in the plan of the following year but the sections with low priority are not. So, these sections are included in the plan of the year 2 year later, or 3 year later, or more until the very last section in prioritized list is included. This method tells you how many years will be required to implement the repair/rehabilitation works with current budget conditions.

Other method is to predict deterioration with certain years, routes of category I as 5 years, category II as 10 years, category III, and IV as 15 years, category V as 20 years. This helps how much budget the road management organization requires to procure.

This is the only method which can be applied in planning maintenance plan by DER at present.

10.3 Setting the Scenarios

Mid-long term plan will differ if the maintenance scenario is different because the quantity of the repair/rehabilitation works is different by scenario. Therefore, several scenarios can be selected for comparison study. This indicates how much budget the road management organization requires to procure. It helps road management organization to judge which scenario they should select.

10.4 Evaluation

Evaluating the mid-long term maintenance plan gives the road management organization the information of the required budget in the future but also what kind of the road surface condition they realize. The cost performance can be compared by comparing the results of different management scenarios.

11 UTILIZATION OF MID-LONG TERM MAINTENANCE PLAN

Mid-long term maintenance plan can be utilized in understanding many situations of future of road network and road management organization. The followings are the examples of them

11.1 Longlisting of Left Behind Sections

The required repair/rehabilitation works usually cannot be completed by annual maintenance plan. It is very common that many sections remain untouched or insufficiently managed due to budget constraints. However, these left behind sections are in the list of plan for 2nd, 3rd and 4th years maintenance plan.

11.2 Forecast of Future Condition of the Pavement

The road management organization can forecast of the future condition setting the condition of the sections after the repair/rehabilitation works. It shows not only the condition by sections but also the condition of routes/regions buy analysing the sections statistically.

11.3 Forecast of Required Budget

It helps the road management organization to foresee the needs of maintenance budget as is explained in the previous Chapter. This result can be used in budget request and setting long term policy on maintenance.

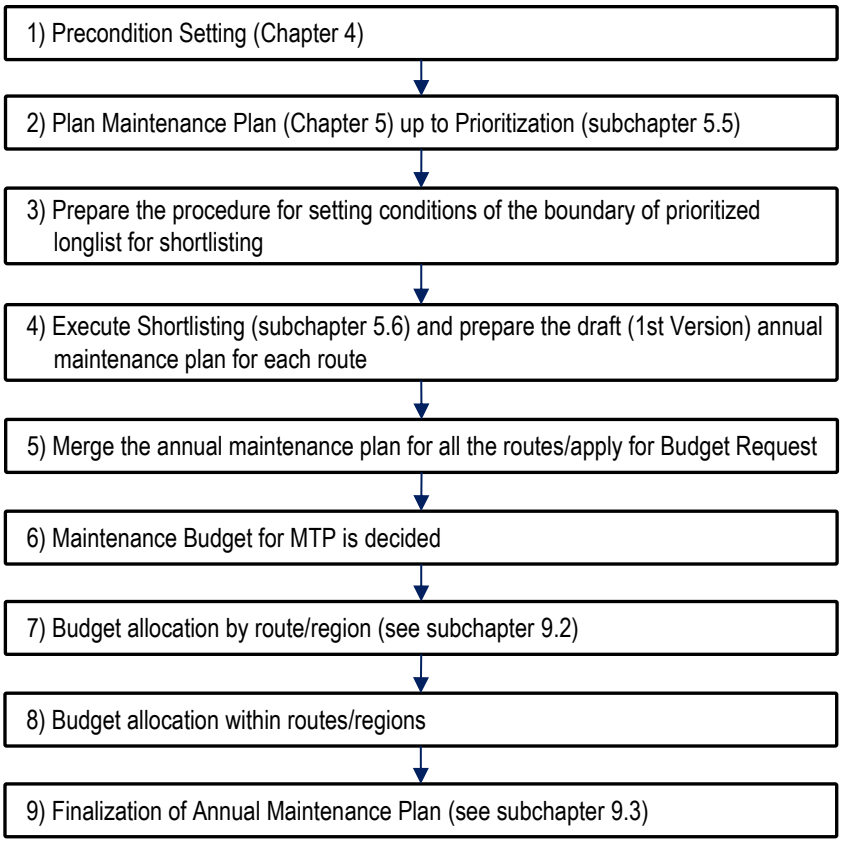
12 REMAINING ISSUES IN PREPARING/UTILIZING THE MAINTENANCE PLAN

WG5 did not consider the following issues which must be addressed due to the scope of the project. This chapter explains and guides the tip how to deal with these issues.

12.1 Budget Allocation by Regions and Routes

F3LTM focused on the Model Routes which are RNP1 and RNS2 and made the maintenance plan of these routes for the following year. However, MTP does not only manages these routes and there are many other routes to be managed. Therefore, the procedure of planning the maintenance plan should have procedure to study on the remaining routes as well. The procedure shall be as follows:

1) Execute the procedure which are described in Chapter 4.
2) Execute the procedure which are described in Chapter 5 up to Prioritization (subchapter 5.5).
3) Prepare the procedure for setting conditions of the boundary of prioritized longlist for shortlisting for each route which MTP manages.
4) Execute Shortlisting (subchapter 5.6) and prepare the draft (1st Version) annual maintenance plan for each route including the coordination among the main stakeholders.
5) Merge the annual maintenance plan for all the routes which MTP manages and apply for the Budget request.
6) Amount of the maintenance budget of MTP is decided and announced by the external government organisation (Ministry of Finance, Road Fund, etc.).
7) Budget allocation by route/region (see subchapter 9.2).
8) Budget allocation within routes/regions.
9) Finalization of Annual Maintenance Plan (see subchapter 9.3).



Source: F3LTM

Figure 12-1 Procedure of Budget Allocation by Regions and Routes

"7) Budget allocation by route/region (see subchapter 9.2)" should be done in different method with the method of shortlisting of the sections within a route, which are explained in subchapter 6.7 and 7.7. Refer to subchapter 9.2 for details.

12.2 Preparation of Maintenance Plan of Region (DRTP)

F3LTM focused on the Model Routes due to the scope of the project. However, the actual budget allocation is done by DRTP and not by routes. Therefore, the maintenance plan by DRTP should be prepared for the actual allocation and implementation. The tasks (management routes and sections) of each DRTP shall be clearly defined in detail. Maintenance plan of each DRTP shall be prepared based on the tasks of each DRTP.

12.3 Evaluation of Pavement Condition Level by Region/Route

It is important to have indicators so that the road management organization can compare the current condition of the road surface by region/route. It could be representative IRI value of the region/route, ratio of the condition level on the sections within region/route, etc. MTP should prepare the indicator and calculate them so that they can quickly understand the current conditions of their road network by region/route. It indicates where the budget is sufficient or insufficient and could be referred to the budget allocation.

12.4 Evaluation of Pavement Condition Level of Road Network

It is important to have indicators so that the road management organization can understand and demonstrate the current condition of their entire road network. There are many challenging issues to be solved in Madagascar in pavement management, and MTP is aware of their road network is not in good condition. However, nobody knows how bad their road network is or how much progress they have achieved in their activities if there is not any indicator to show the condition. It indicates the sufficiency of the budgets as well, such as if the indicator is improving the budget is enough to improve the condition, and if it is worsening the budget should be increased.

12.5 PDCA cycle

MTP should form PDCA cycle of the maintenance plan so that they can evaluate their activities and improve them based on the evaluation results. The importance of PDCA cycle is explained in the subchapter 3.5. See it for details.

12.6 Utilizing Pavement Management System

WG4 of F3LTM developed MS-access based Pavement Management System (PMS). Input data is the collected data of DRIMS, such as IRI, crack, pothole with quantity data. It analyses the defects data and gives corresponding repair methods of routine maintenance. It also calculates the estimated cost of routine maintenance multiplying the unit cost and quantity of each routine maintenance methods.

However, the current usage of PMS is limited as a database of the collected data and corresponding repair methods. The output data is pasted to SIA format by the WG3 members and handed to WG5 members. WG5 shall receive the data of routine maintenance data directly from PMS in a procedure of planning the maintenance plan.


MTP

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6. Manual for Making the Bridge Long List

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MINISTERE DES TRAVAUX PUBLICS

MANUAL FOR MAKING THE BRIDGE LONG LIST

EDITION 1
(March 2025)

JICA

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

MANUAL FOR MAKING THE BRIDGE LONG LIST



This manual was developed in the framework of The Project for Capacity Development for Road and Bridge Maintenance Management in Madagascar.

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ACKNOWLEDGEMENT

Background

The Manual For The Establishment Of The Exhaustive List Of Bridges By Intervention Category (hereinafter referred to as "the Manual") has been developed to standardize the preparation of the exhaustive list of bridges to be replaced / repaired. The preparation of this list involves the categorization of bridges on the basis of DPW inspection data, resulting in a list of bridge categories by type of intervention. This Manual is to be used when DPW is preparing for bridge maintenance.

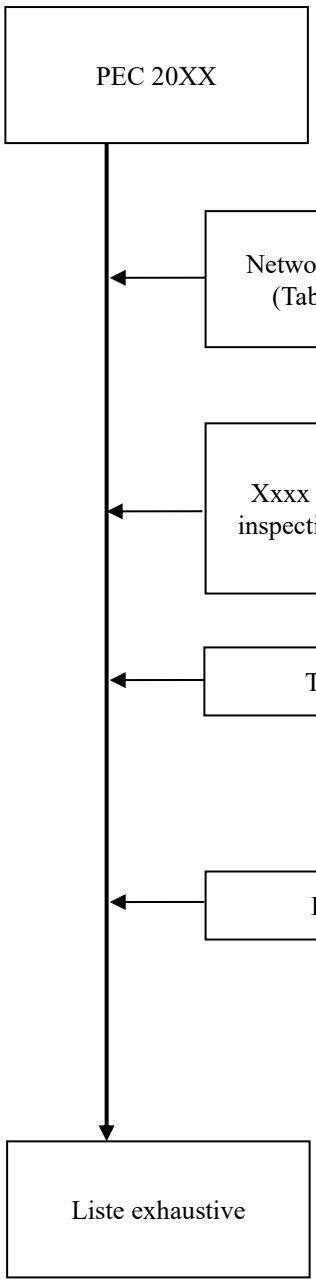
It can also be used as a reference by other road operation and maintenance organizations where necessary, or by international bodies seeking to invest in the road sector. This manual was prepared within the framework of the Road and Bridge Maintenance Management Capacity Development Project (F3LTM) and approved by its Joint Coordination Committee.

The members who participated in the preparation of the manual are mentioned below, while praising their contributions.

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1 FLOW CHART FOR MAKING A LONG LIST

Originally, the following flowchart was used to update information.



(1) Inspection results are used as a basis for updating the long list.
In principle, all bridges will be inspected annually in accordance with the Bridge Inspection and Diagnostic Manual.

(2) Complementary inspection to select bridges for inspection.
Patrols will be carried out approximately once a month to select bridges for intensive inspection by PEC.

(3) Reference data
Use of other available survey/inspection data.

(4)-1 Other factor
Information on bridges that will become bottleneck in the future, such as an insufficient number of lanes for the volume of traffic.

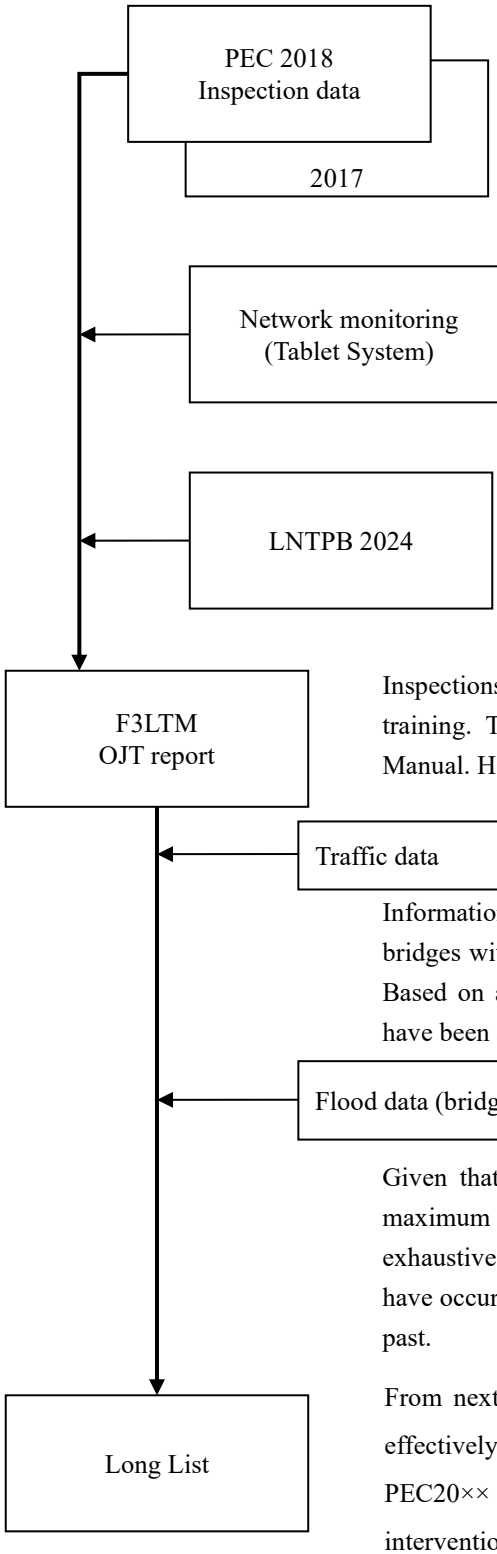
(4)-2 Other factor
Information on bridges at risk of being submerged or collapsing in future floods due to insufficient cross-sectional area under the bridge.

The data accumulated in the annual PEC 20 x x and BMS and the above information will be compiled and prioritized to promote efficiency in the maintenance cycle, including bridge renewal, thus enabling proper planning. In addition, budget allocation will be carried out.

Source : F3LTM

Figure 1-1 : Original flowchart for longlist preparation

As there is not enough data to compile a complete list, the flow chart below has been used to compile a long list based on some existing data.



(1) Inspection used as a basis for updating the long list.
Bridges deemed as priority for inspection will be inspected in detail each year. The inspection conducted by MTP in 2017 and 2018 will serve as the basis for this year's inspection.

(2) Complementary inspection to select inspection targets.
All RN1, RN1 bis and RN2 bridges were inspected as part of a baseline inspection. This inspection was used as the basis for selecting the bridges to be inspected for the project's OJT.

(3) Other inspections
Available survey and inspection data will also be used. The results of inspections carried out by LNTPB on RNP2 in 2024 are also used.

Inspections are currently carried out by WG-2 as part of on-the-job training. These inspections use the Bridge Inspection and Diagnostic Manual. Here, the data compiled above has been carefully reviewed.

Information on bridges that will become bottleneck in the future, such as bridges with an insufficient number of lanes for the volume of traffic, etc. Based on annual average daily traffic data, bridges considered as targets have been added to the list.

Given that sometimes the cross-section under the bridge cannot absorb the maximum flow of the river. These bridges should be identified and added to the exhaustive list. These are generally bridges where obstructions to the river's flow have occurred, particularly in cases where overflows have been observed in the past.

From next time onwards, we will continue to manage bridge maintenance effectively by updating replacement and repair lists using data accumulated in PEC20×× and BMS, which is done once a year, and by calculating the cost of interventions based on construction data.

Source : F3LTM

Figure 1-2 : Flowchart for longlist preparation

2 CLASSIFICATION BY DEGREE OF DAMAGE

Cleaning is the first step in bridge maintenance. The bridges are considered to require periodic cleaning, inspection, and repair (improvement).

Bridges are structures, and as time passes, they deteriorate and in some areas become damaged. However, it is believed that the life of bridges can be extended by continuing effective maintenance in Japan.

The first step in bridge maintenance and management is to keep bridges clean at all times.

When bridges are kept clean, it is easy to see from a distance the condition of the structure and to immediately notice any damage or other irregularities.

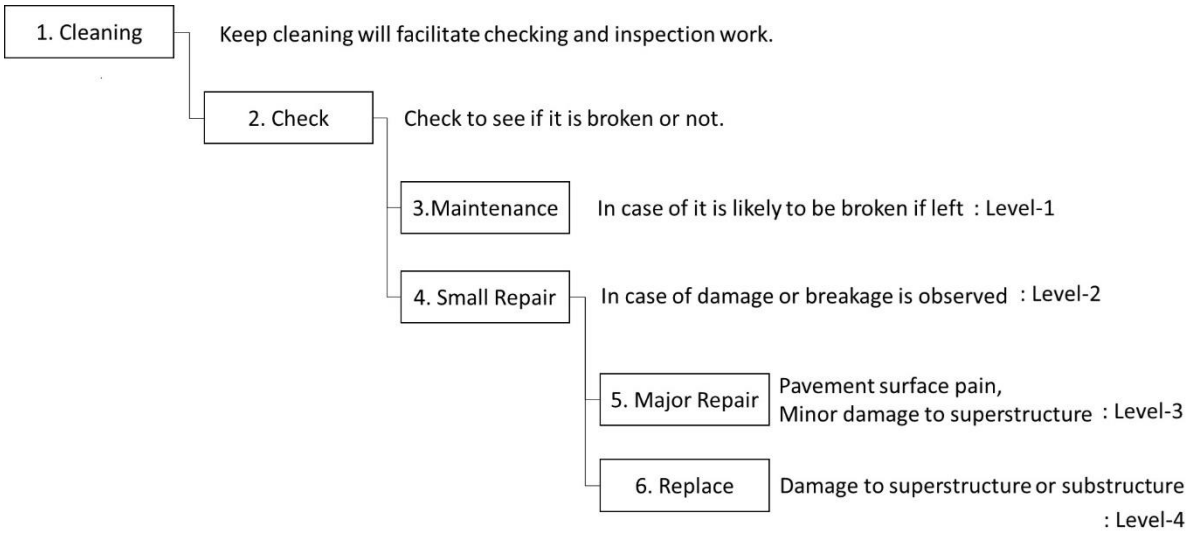
Therefore, by cleaning bridges on a regular basis, inspections can be performed at the same time, and bridges can be maintained in better condition.

The following section describes how to classify bridges according to their condition in order to effectively maintain and manage them.

The process of sorting bridges according to their damage status for the preparation of the LONG list is described below.

Prioritization by damage status

Bridge managers will check the condition of bridges to determine the degree of deterioration and damage, and then categorize the measures taken to deal with the damage into classes as shown in the tree below. The most severely damaged bridges will then be narrowed down to a long list (Replacement and Major Repair List).



Source : F3LTM

Figure 2-1 : Category of bridge by countermeasure

"5. Major Repair" is set to 'Level-3'; however, if it is a long bridge or considered difficult to construct such as construction in close proximity to a structure such as a residence, it shall be treated as 'Level-4'.

2.1 Cleaning

Regular cleaning and maintenance of the clean condition by the bridge manager facilitates the next stage of inspection work.

Cleaning includes not only the removal of sand and weeds accumulated on the bridge superstructure and bearing areas, improvement of drainage pipe clogging, and removal of moss and weeds on the substructure, but also removal of weeds and cutting of trees in the bridge periphery.

It is important to maintain the bridge in a condition that allows drainage, as moisture from rainwater and other sources stays in the bridge structure and causes deterioration.

In addition, the removal of weeds and cutting of trees in the bridge perimeter area will help monitor the health of the bridge by keeping the bridge piers bare and exposed to the public at all times, rather than allowing the bridge to be buried in the trees.

In addition, the process of cleaning by staff can lead to the discovery of deterioration, damage, or abnormalities occurring on the bridge, which is a very important task.





Source : F3LTM

Photo 2-1 : SOKAMBANA Bridge

Photo 2-2 : FANANDRANA Bridge

The following is a list of objects to be cleaned.

Table 2-1 : List objects to be cleaned

Pavement, surface	Sediment, weeds, clogged drains and drainage pipes, and debris accumulated at both ends of the pavement surface., etc.
Superstructure(Steel)	Sediment, weeds, ground cover, and other vegetation on the structure
Superstructure(PC)	Moss, ground cover, and other vegetation on the structure
Bearing section	Sediment, weeds, ground cover, and other vegetation on the structure
Substructure	Moss, ground cover, and other vegetation on the structure, Dumped garbage

2.2 Check

Periodic inspections are performed to check the health of the bridge in the condition it is being cleaned by the bridge manager. The staff can use the Tablet System and PEC to inspect the bridges.

The frequency of inspection by Tablet System depends on the condition of the bridge, traffic volume, surrounding conditions, and climate, but at least once a month is recommended.

Based on the results, we will narrow down the bridges that should be intensively inspected and conduct PEC survey once a year.

It is desirable that several staff members take turns conducting inspections at the time of the survey to avoid bias in the content of the inspection.



Photo 2-3 : Inspection works (Japan)



Photo 2-4 : Inspection from river (Japan)

2.3 Maintenance

If the structure is found to be broken or damaged, the bridge manager will determine if it can be easily fixed or if it is serious.

Maintenance is performed as a preventive measure when the structure itself is not currently damaged and repair work is not required, but deterioration is likely to progress if left unchecked, i.e., as something that can be easily fixed.





Source : F3LTM

Photo 2-5 : Pont FANANDRANA

Photo 2-6 : Pont BRICKAVILLE

The following are examples of maintenance targets

Table 2-2 : Examples of maintenance targets

Pavement, surface	Pavement surface on bridge: repair of minor damage to pavement surface (including overlay), improvement of clogging of drains and drainage pipes, repair of high railings, etc.
Superstructure(Steel)	Repair paint, remove rust and repaint if corroded
Superstructure(PC)	Repair small cracks
Bearing section	Repair paint, remove rust and repaint if corroded
Substructure	Repair small cracks

Performing the above work will prevent the bridge from deteriorating and extend its service life.

2.4 Small Repair

Small Repair is damage to the structure that requires repair work.

It is assumed to be more serious than the maintenance mentioned above, but one that can be fixed in a few days to a few weeks of repair work.

The work is assumed to be able to be handled while the bridge is in use, although there will be times when traffic is temporarily restricted or blocked.





Source : F3LTM

Photo 2-7 : BRICKAVILLE bridge
Old concrete pavement damaged and rebar exposed.

Photo 2-8 : ANTANANDRANO bridge

The following are examples of Small Repair coverage

Table 2-3 : Examples of small repair

Pavement, surface	Partial replacement due to deterioration of the pavement surface. Partial repair of the floor plate under the pavement surface.
Superstructure(Steel)	Repair of corrosion, replacement of damaged parts, and other repairs that require traffic control using simple scaffolding, etc.
Superstructure(PC)	Repair of large cracks, wheel guard, and other defects
Bearing section	Repair of rust removal, corrosion, replacement of damaged parts, etc. using simple scaffolding, etc.
Substructure	Partial repair of relatively large cracks and defects
Ancillary facilities	Partial repair or replacement of guardrails, railings, road signs, and lighting facilities.

Source : F3LTM

Although the above work will postpone the replacement of bridges, it is not an essential measure, and there is a high possibility that deterioration and damage will occur again in the repaired areas.

2.5 Major Repair

Major Repair refers to damage to a structure that is expected to be restored to functionality by repairing the damaged parts and does not require replacement work at this time.

Repairing is a work that would result in serious damage if the structure were to continue to be used without repair and could lead to large-scale work such as replacing the structure. The image refers to something that would require a period of several months.

The work is assumed to be at a level where the bridge can be used while the work is being performed

by placing some restrictions on traffic.

Although the above work will postpone the bridge replacement period, it is not an essential measure, and there is a high possibility that deterioration and damage will occur again in the repaired areas. Cases where similar deterioration and damage are likely to occur in the future should be added to the list of drastic measures (Long List), such as bridge replacement.



Source : F3LTM

Photo 2-9 : FANANDRANA bridge *Overlaid without removal of old asphalt pavement*



Photo 2-10 : Crack on superstructure (Japan)

The following are examples of Major Repair targets

Table 2-4 : Examples of major repair

Pavement, surface	Full repaving, construction of waterproofing, reinforcement and replacement of floor plates under the pavement surface, replacement of elastic devices, cutting and overlay, and other conditions requiring drastic measures.
Superstructure(Steel)	Full repainting, installation of bridge fall prevention devices, installation of displacement limiting devices, and conditions requiring drastic measures.
Superstructure(PC)	Repair and reinforcement of main members using carbon fiber, etc., requiring drastic measures
Bearing section	Replacement of the parts that may have lost their function due to damage, etc.
Substructure	In need of drastic measures such as steel plate winding, concrete winding, carbon fiber winding, etc.
Ancillary facilities	Full replacement and installation of guardrails and handrails.

Source : F3LTM

Although the above work will postpone the bridge replacement period, it is not an essential measure, and since there is a high possibility that deterioration and damage will occur again in the repaired areas, there is a high probability that similar deterioration and damage will occur in the future. Therefore, it is

desirable to consider adding the bridge replacement to the list of drastic measures (Long List).

2.6 Replace

Replace is a structure that has been damaged and needs to be replaced.

The replacement work is urgent and may take from one month to several years to complete because of the danger of the bridge falling or collapsing if it continues to be used as is.

The work must be done by blocking traffic and installing Detour.



Source : F3LTM

Photo 2-11 : Damaged Superstructure (another country)



Photo 2-12 : Damage on abutment (Japan)

The following are examples of Replace targets

Tableau 2-5 : Examples of replacement

Pavement, surface	Bridge girder replacement
Superstructure(Steel)	Corroded or damaged areas that cannot be replaced and need to be replaced.
Superstructure(PC)	Severely damaged or deformed.
Bearing section	Not functioning due to damage, etc.
Substructure	Those showing serious defects or displacement such as tilting, settlement, etc.
Ancillary facilities	Not functioning due to damage, etc.

Source : F3LTM

In addition "5. Major Repair" is set to 'Level-3'; however, if it is a long bridge or considered difficult to construct such as construction in close proximity to a structure such as a residence, it shall be treated as 'Level-4'.

3 PROCESS FOR MAKING A LONG LIST

3.1 Establishment of reference data

In this long list preparation work, bridges that were considered to have significant damage were intensively surveyed by F3LTM with reference to the results of PEC2017/2018, Network Monitaring (Tablet System), and LNTPB2024, and classified into Level-1 to Level-4 based on the results of these surveys. （Table「⓪ F3LTM Investigation (OJT)」）

The damage levels were then quantified and used as criteria to determine the degree of damage to each bridge.

Level-1 =1

Level-2 =2

Level-3 =3

Level-4 =4

※Table "⓪ F3LTM Investigation (OJT)"

After assigning points to items ① through ④ below according to importance, coefficients were set and totaled according to the condition of the relevant bridge, and the total was multiplied by the damage level value to determine the bridges to be replaced or repaired from those with the highest points.

Tableau 3-1 : Weight of each criterion

Item	Coefficient
① Traffic Volume	1.25（50%）
② Deterioration in progress	0.25（10%）
③ Drivability（One Lane Bridge）	0.50（20%）
③ Drivability（Flatness）	0.25（10%）
④ River flow Obstruction	0.25（10%）

Source : F3LTM

① Traffic Volume

Traffic volume coefficients were set for each route.

The table below is for vehicles and freight vehicles such as fuel haulers, where the coefficients are set by daily traffic volume of freight and other large hauling vehicles as they have a significant impact on bridge damage.

Tableau 3-2 : Coefficient by traffic volume

Traffic Volume(Freight Vehicles)	Traffic Volume Coefficient
Number of units ≧1000 vehicles/day	1.0
1000>Nous≧800 vehicles/day	0.9
800>Nous≧600 vehicles/day	0.8
600>Nous≧400 vehicles/day	0.7
400>Nous≧300 vehicles/day	0.6
300>Nous≧200 vehicles/day	0.5
Nous<200 vehicles/day	0.4

Source : F3LTM

② Deterioration in progress

Coefficient were added for bridges that have deteriorated significantly and require immediate action.

③ Drivability

i) One Lane Bridge

For bridges that have only 1 to 1.5 lanes of width on the bridge and are expected to become traffic bottlenecks in the future, a coefficient that takes the bridge length into account was added.

Table 3-3 : Drivability of One Lane Bridge

Drivability of One Lane Bridge	Drivability of One Lane Coefficient
L ≧ 100m	1.0
100m > L ≧ 50m	0.8
L < 50m	0.5

Source : F3LTM

ii) Flatness

The coefficients were added for bridges with large vertical runout in terms of travelability on the bridge.

④ River flow Obstruction

Since the cross-sectional area under the bridge is not able to handle the maximum flow of the river, a coefficient was added to determine that River flow obstruction has occurred on bridges where overflow has occurred in the past.

3.2 Examination Results

As a result of multiplying the Levels set in the previous section (1) by the sum of the coefficients from ① to ④, 19 bridges were recorded as requiring replacement or major repair.

Table 3-4 : Evaluation result

	RN	Chainage		Bridge Name	Evaluation
		PK (km)	PK (m)		
1	RN2	108	800		5.00
2	RN1 bis	024	000	Sakay	5.00
3	RN2	108	750	Entrée Moramanga	4.00
4	RN2	166	598	Saragnina	3.00
5	RN2	249	750	Brikaville	3.00
6	RN2	326	883	Fanandrana	3.00
7	RN1	021	150	Andranomaitso	2.64
8	RN2	029	900	Mahavoky(1)	2.25
9	RN2	030	460	Mahavoky(2)	2.25
10	RN2	112	383	Ranomafana(3)	2.25
11	RN2	113	381		2.25
12	RN2	130	800	Amparafara	2.25
13	RN2	160	156	Savonorana	2.25
14	RN2	199	867	Marovola	2.25
15	RN2	209	410	Ampasina	2.25
16	RN2	212	907	Ranomafana(3)	2.25
17	RN2	216	771	Manambonitra(2)	2.25
18	RN2	256	573	Rianala	2.25
19	RN2	082	848	Manambolo	2.00

Source : F3LTM

Appendix : The bridge Longlist (March 2025)

	RN	Chainage PK (km)	Chainage PK (m)	Bridge Spec Name	Bridge Spec Type	Bridge Spec Length (m)	Bridge Spec Width (m)	Span	Reference data PEC 2017/2018	Reference data Tablet System	Reference data LNTPB 2024	⓪ F3LTM Investigation (OJT)	① Traffic Volume	② Deterioration in progress	③ Drivability One Lane	③ Drivability Flatness	④ River flow Obstruction	⑤ Total ①+②+③+④	Evaluation Evaluation ⓪×⑤
1	RN2	108	800		Bailey bridg	24.0	3.5	1	4		4	4	0.75		0.25	0.25		1.25	5.00
2	RN1 bis	024	000	Sakay	Bailey bridg	75.0(16.0)	3.6	7(1)	4	3		4	0.50		0.50	0.25		1.25	5.00
3	RN2	108	750	Entrée Moramanga		30.0	7.0	1	4		4	4	0.75	0.25				1.00	4.00
4	RN2	166	598	Saragnina		16.1	7.6	1	3			3	0.75				0.25	1.00	3.00
5	RN2	249	750	Brikaville	Steel Truss	240.6	10.9	3	3	2	2	3	0.75	0.25				1.00	3.00
6	RN2	326	883	Fanandrana	Steel Truss	257.4	5.2	2	3	3	1	3	0.75	0.25				1.00	3.00
7	RN1	021	150	Andranomaitso		5.6	8.0	1	3	1		3	0.88					0.88	2.64
8	RN2	029	900	Mahavoky(1)		8.5	7.0	1			2	3	0.75					0.75	2.25
9	RN2	030	460	Mahavoky(2)		8.0	6.0	1	3	3	3	3	0.75					0.75	2.25
10	RN2	112	383	Ranomafana(3)		6.0	6.9	1	2		3	3	0.75					0.75	2.25
11	RN2	113	381			5.0	6.5	1	3		3	3	0.75					0.75	2.25
12	RN2	130	800	Amparafara		6.0	7.0	1	1	2	3	3	0.75					0.75	2.25
13	RN2	160	156	Savonorana		5.0	7.0	1	2	3	3	3	0.75					0.75	2.25
14	RN2	199	867	Marovola		36.8	7.0	3	3	3	3	3	0.75					0.75	2.25
15	RN2	209	410	Ampasina		5.4	7.0	1	2		3	3	0.75					0.75	2.25
16	RN2	212	907	Ranomafana(3)		7.0	6.0	1	2	3	3	3	0.75					0.75	2.25
17	RN2	216	771	Manambonitra(2)		8.0	7.0	1	1	1	3	3	0.75					0.75	2.25
18	RN2	256	573	Rianala		8.5	6.5	2	3	3	3	3	0.75					0.75	2.25
19	RN2	082	848	Manambolo		24.1	3.5	1	2	3.5		2	0.75		0.25			1.00	2.00
20	RN1	006	000	Ikopa Anosizato		84.6	8.5	3	3	1		2	0.88					0.88	1.76
21	RN1	007	800	Sisaony Ampitatafika		80.0	9.5		3			2	0.88					0.88	1.76
22	RN1	015	850	Andromba		44.0	9.5	2	3	1		2	0.88					0.88	1.76
23	RN1	033	090	Avaradriana		5.0	7.5		2			2	0.88					0.88	1.76
24	RN1	034	900	Ambatohety		9.8	9.1	1	3	1		2	0.88					0.88	1.76
25	RN1	039	800	Iombifotsy		24.0	9.3		1	2		2	0.88					0.88	1.76
26	RN1	039	960	Andranomena		10.0	8.2		2	1		2	0.88					0.88	1.76
27	RN1	044	540	Maharefo		7.0	8.5	1	3	2		2	0.88					0.88	1.76
28	RN1	052	980	Anonibe		32.0	8.0	1	3			2	0.88					0.88	1.76
29	RN1	055	670	Amorndrihitra		36.2	8.0	2	3	3		2	0.88					0.88	1.76
30	RN1	096	500	Kelitiana		10.1	8.0	1	2	1		2	0.88					0.88	1.76
31	RN1	101	720	Makongaha		26.0	9.1	1	1	2		2	0.88					0.88	1.76
32	RN1	105	830	Mandrevo		26.0	8.0	1	2	2		2	0.88					0.88	1.76
33	RN1 bis	038	290	Ihazomay		62.0	5.1	2	3	3		2	0.50		0.38			0.88	1.76
1	RN2	020	200	Ambatomihorona (2)		7.9	7.5	1	3			2	0.75					0.75	1.50
2	RN2	021	100	Ambatolampy		7.0	6.5	1	3			2	0.75					0.75	1.50
3	RN2	058	100	Décharge Mantasoa(1)		4.9	9.1	1	2	1	1	2	0.75					0.75	1.50
4	RN2	165	456	Soakambana/Lazaina droite		67.0	5.0	3	3	3.5	2	2	0.75					0.75	1.50
5	RN2	165	456	Soakambana/Lazaina gauche		22.6	5.0	4	3	3	2	2	0.75					0.75	1.50
6	RN2	111	816	Tunnel		21.5	4.9	1	2		2	1	0.75		0.25			1.00	1.00
7	RN1 bis	054	700	Imanga		72.5	9.0	4	1			2	0.50					0.50	1.00
8	RN1 bis	067	460	Mandaheloka		32.0	9.0		1	1		2	0.50					0.50	1.00
9	RN1 bis	071	920	Keliandrandraina		40.6	9.0		2	3.5		2	0.50					0.50	1.00
10	RN1 bis	076	460	Ampararano		60.5	9.0		1	2		2	0.50					0.50	1.00
11	RN2	030	950	Mahavoky(3)		6.8	7.3	1	3	1	1	1	0.75					0.75	0.75
12	RN2	094	200	Mangoro	PC Box	—	—	2	1	3.5(Old)	1	1	0.75					0.75	0.75
13	RN2	105	850	Antsapazana	Hollow Slab	—	—	1	1	3.5(Old)	1	1	0.75					0.75	0.75
14	RN2	117	050			7.0	9.0	1	1			1	0.75					0.75	0.75
15	RN2	334	368	Antanandrano		66.0	9.3	3	2	3	2	1	0.75					0.75	0.75
16	RN2	339	024	Ampasimbola		45.0	9.3	2	3	2	2	1	0.75					0.75	0.75


MTP


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7. Training Curriculum, Syllabus and Materials of Road and Bridge Maintenance

REPOBLIKAN'I MADAGASIKARA
Fitiavana - Tanindrazana - Fandrosoana

MINISTERE DES TRAVAUX PUBLICS

AGREEMENT BETWEEN THE MINISTRY OF PUBLIC WORKS (MTP) AND THE NATIONAL INSTITUTE OF INFRASTRUCTURE (ININFRA)

SUBJECT:

TRAINING OF THE MINISTRY OF PUBLIC WORKS TECHNICAL STAFF ON ROAD AND BRIDGE MAINTENANCE MANAGEMENT IN MADAGASCAR

AGREEMENT SUPPORT DOCUMENT

EDITION 1
(March 2025)

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

AGREEMENT SUPPORT DOCUMENT



This document has been developed within the framework of the Project for Capacity Development for Road and Bridge Maintenance Management in Madagascar.

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ACKNOWLEDGEMENTS

Background

This Program has been prepared within the framework of the Project for Capacity Development for Road and Bridge Maintenance Management in Madagascar as a supporting material for the training courses to be implemented by ININFRA for the capacity building of the Ministry of Public Works staff.

The members who participated in the development of the manual are presented below, with praise for their contributions.

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Executive summary of the training program

As part of JICA's Technical Cooperation Project for Capacity Development for Road and Bridge Maintenance Management, the MTP is organizing a training program on techniques and methods adapted to the political and technical contexts of road network maintenance management in Madagascar.

In this context, the training courses aim to build the capacity of engineers and technicians from the Ministry of Public Works and its related bodies in road and bridge maintenance management.

To achieve this, the five training modules listed below are scheduled in order to present the manuals that have been developed so as to standardize road and bridge inspection work :

- NM1- Road inspection and diagnosis method ;
- NM2- Bridge inspection and diagnosis method ;
- NM3- Road repair works ;
- NM4- Management of road databases ;
- NM5- Road and bridge maintenance planning.

The training courses will start in the first half of 2025 and last 6 months each time. Initially, they will be delivered over 3 years, in 2025, 2026, and 2027. They will be divided into 18 sessions for all modules. Theoretical courses will take place at ININFRA, while the sites for field practice will be defined in the implementation document. This document will be proposed after notification of the agreement between MTP and ININFRA.

Twenty-two (22) trainers from JICA's technical cooperation project working groups will be in charge of transferring the JAPANESE technology that they have acquired during the various training sessions. They will follow training courses in andragogy scheduled to take place in 2024.

This program will be the cornerstone of the training on road and bridge maintenance management, and will enable the sustainable implementation of the related modules. It will be used as a resource for future Conventions de Maîtrise d'Ouvrage Déléguée (CMODs, Delegated Project Management Agreement) between the Ministry of Public Works (MTP) and the National Institute of Infrastructure (ININFRA). The program will be improved by incorporating the results and lessons learned from each year's modules.

List of modules, and their objectives, summary, target participants, and duration

Tableau 0-1 : List of New Module

N°NM	Title	Objective	Module summary	Target participants	Duration
1	**Road inspection and diagnosis method**	The aim of the module is to train participants in the DRIMS method of road inspection and diagnosis, which is used by Japanese expressway companies and local authorities to intensively and cost-effectively collect road surface data using a simple smartphone installed in the vehicle..	The module addresses the field assessment procedures for collecting data on the road network, as well the detailed investigation of certain types of damage. The criteria contained in the manual will serve as a guide for teams from Regional Public Works Directorates.	Technicians/Civil engineers within the MTP and related organizations	04 days

N°NM	Title	Objective	Module summary	Target participants	Duration
2	**Bridge inspection and diagnosis method**	-Understand the need to inspect bridges, and be able to adequately plan bridge inspections ; -Understand, classify, and record damages on bridge components; -Determine and record the severity of damages on bridge components as per the indicators described in the bridge inspection and diagnosis manual; -Basic ability to estimate the causes of the deterioration and degradation of bridges; -Ability to recommend necessary actions after the inspection, such as further investigations, emergency repairs, etc.	- Classroom courses on the following topics: general information on bridges, principles of bridge inspection, types of deterioration and their assessment, inspection of metal bridges, inspection of concrete bridges, inspection of elevated bearings and foundations, guidance on the use of the tablet, instructions for filling in the periodic inspection sheet; - Field practice on how to use the tablet ; - Field practice on periodic inspection	Technicians/Civil engineers within the MTP and related organizations	07 days

N°NM	Title	Objective	Module summary	Target participants	Duration
3	**Road repair works method**	- Detect and identify damages (reminder) ; - Analyze causes and study their evolution ; - Acquire project management skills, encompassing not only work supervision, but also the ability to guarantee that schedules, quality and safety are respected.	Maintenance strategy needs to be translated into a concrete maintenance program. Once planned, this program specifies in detail the work to be carried out by the road manager. This training will enable participants to identify the works to be carried out on a paved road section, and to develop a thorough understanding of the essential control points and considerations involved in supervising repair projects. By providing a solid foundation for the training of engineers and technicians, this manual will equip them with the knowledge and skills needed to effectively maintain paved roads and ensure the safety of road users.	Technicians/Civil engineers within the MTP and related organizations	03 days

N°NM	Title	Objective	Module summary	Target participants	Duration
4	**Road and bridge database management system**	The training course provides participants with the skills needed to effectively use the road and bridge database management system. Participants will gain an in-depth understanding of the system, learn how to optimally input and manage data, and be able to generate relevant reports to support decision-making. The road and bridge database management system is not only a data collection tool, but it also enables us to know the history of existing infrastructures, so as to provide a reference for the improvement of future projects.	Whether for PMS (Pavement Management System) or BMS (Bridge Management System), the training should be divided into several modules, covering aspects such as system navigation, data entry, database management, report generation, and data security best practices.	Technicians/Civil engineers within the MTP and related organizations	03 days

N°NM	Title	Objective	Module summary	Target participants	Duration
5	**Road and bridge maintenance planning**	It is very important that road and bridge maintenance managers have a mutual understanding of "maintenance policy", "maintenance target level", "maintenance strategy" and "priority criteria" to make road and bridge management effective and efficient. This training will help managers understand the policy, target level, strategy and priority criteria, and introduce them to the planning of annual/mid-term/long-term road/bridge maintenance.	At the end of the training, participants will have the knowledge and skills to : - Prepare the draft annual maintenance plan for budget requests. - Organize the implementation plan for the following year according to the approved budget. - Anticipate the consequences of management work and the road network's level of service.	Engineers from DER (Road Maintenance Directorate), DRTP (Regional Public Works Directorates), SRTP (Regional Public Works Departments), and DPSE (Programming and Monitoring & Evaluation Directorate) involved in maintenance planning, especially network managers (regional road network managers) and DER.	3 days

Source : F3LTM Project

Curricula of modules

NM1 :« Road inspection and diagnosis method»

OBJECTIVES

Knowledge of road condition is the basis for optimal maintenance management. Rational management of the road network requires the implementation and mastery of methods and tools for assessing road condition.

This training course will enable participants to master inspection methods and tools needed to describe pavement condition and obtain the most objective assessments possible to meet the needs of maintenance managers.

On completion of the course, participants will be able to :

- Recognize each type of road damage ;
- Master the methods and equipment used to inspect and measure damages ;
- Describe pavement condition ;
- Propose solutions and maintenance work ;
- Present the corresponding draft inspection sheet (SIA).

PROGRAM

I- PRESENTATION OF THE MANUAL

- Manual framework ;
- Work processes and key points ;
- How it works.

II- INFORMATION RELATED TO INSPECTIONS

- Network knowledge : road category, identification system, traffic, ... ;
- Detailed description of damages ;
- Probable causes of damages, symptoms and consequences ;
- Factors influencing the development of damages ;
- Categories and types of road maintenance work.

III- ROAD INSPECTION AND DIAGNOSIS

- General ;
- Patrol ;
- Qualification criteria and assessment :
  - ✓ International roughness index ;
  - ✓ Pavement condition and IRI range ;
  - ✓ Deflection value ;
  - ✓ Ground bearing capacity ;
- Outils d’inspection :
  - ✓ DRIMS :

- IRI : Méthode standard d'évaluation ;
- AI : Intelligence Artificielle ;

✓ Clegg hammer Test ;

IV- PRESENTATION OF RESULTS

- Components of the inspection sheet
- Different development steps of the inspection sheet

V- FIELD PRACTICE

PARTICIPANT PROFILES

Technicians/Civil engineers from MTP and related organizations

DURATION

4 days

LOCATION

Theory in classroom ;
Practice in the field.

NUMBER OF PARTICIPANTS

20 maximums

TRANSFER METHODS

- Self-assessment questionnaire (prerequisites, experience, expectations) ;
- Presentation/ methodological input/ exchange and discussion ;
- Case studies ;
- Knowledge assessments .

TEACHING MATERIALS

- IRI measuring tools (iPhone+ cover+ power cable+ USB charger + double-sided adhesive tape + black carpet + tape measure + masking tape) ;
- Automatic damage survey tools (iPhone+ power cable+ USB charger + stand for iPhone) ;
- MOBILE internet connection ;
- Licenses for "iDRIMS Measurement" and "Shooting app for AI" applications ;
- Clegg hammer test + Calculator ;
- Documents (instructions or user manual) ;
- Vehicle for field visit ;
- Teaching aids (laptop, video projector, whiteboard, …).

TRAINERS

F3LTM Project counterparts

SCHEDULE

Date	Time	Theme
Day 1	Morning	Presentation of the manual
		INFORMATION RELATED TO INSPECTIONS: • Network knowledge (1h) • Detailed description of damages (1h) • Probable causes of damages, symptoms and consequences (1h)
	Afternoon	Lunch break
		• Factors influencing the development of damages
		• Categories and types of road maintenance work
Day 2	Morning	ROAD INSPECTION AND DIAGNOSIS • General • Patrol • Qualification criteria and assessment
	Afternoon	Lunch break
		• Inspection tools - Briefing session on fieldwork
Day 3	Morning	- Field practice: - Operation of the iDRIMS system (IRI measurement and identification of damages by AI) - Load bearing capacity test of the ground using CLEGG Hammer - Sending data to the server
	Afternoon	
Day 4	Morning	PRESENTATION OF RESULTS • Components of the inspection sheet • Interpretation of results if available or from a previous degradation survey on the same axis
	Afternoon	Lunch break
		Interpretation of results (continued)
		Discussion and comments on the iDRIMS system

NM2 : « Bridge inspection and diagnosis method»

OBJECTIVES

The bridges in Madagascar's road network continue to age. The cycle of maintenance, inspection, diagnosis, treatment and recording of bridges must be carried out by technicians with the appropriate skills to ensure a healthy and functional set of bridges in Madagascar. This course is the result of the renewal of an existing ININFRA module focusing on the inspection of bridges in Madagascar, in conjunction with the new bridge inspection and diagnosis manual. The course enables participants to acquire the following skills :

- Understand the need for bridge inspections and be able to properly plan bridge inspections ;
- Understand, classify and record damages on bridge components ;
- Determine and record the severity of damages on bridge components based on the indicators described in the bridge inspection and diagnosis manual ;
- Basic ability to estimate the causes of deterioration and degradation of bridges ;
- Ability to recommend necessary actions after the inspection, such as further investigations, emergency repairs, etc.

PROGRAM

I- Introduction

a. General ;
b. Bridge classification ;
c. Terminology.

II- Principles of bridge inspection

a. Importance and purpose of the inspection ;
b. The key points of inspection ;
c. The key points of an effective inspection ;
d. Inspection system.

III- Type of damage and criteria for assessing severity

a. Assessing the degree of deterioration ;
b. Type of damage and assessment criteria ;
c. Determining the action plan :
d. General description, characteristics and assessment category of damages.

IV- Steel bridges

a. Damages on steel bridges ;
b. Inspection of steel bridges and their critical points.

V- Reinforced concrete bridges

a. Damages on reinforced concrete bridges ;
b. Inspection of reinforced concrete bridges and their critical points.

VI- Appuis en élévation et fondations

VII- Guides pour l'utilisation d'un système de tablettes pour la surveillance du réseau

VIII- Directives pour remplir la fiche d'inspection périodique des ponts

PARTICIPANT PROFILES

- Technicians/Civil engineers from MTP and related organizations.

DURATION

- 7 days

LOCATION

- See Schedule

NOMBRE DE PARTICIPANTS

- 20 people maximum

TRANSFER METHODS

- Self-assessment questionnaire (prerequisites, experience, expectations) ;
- Presentation/ methodological input/ exchange and discussion ;
- Case studies ;
- Knowledge assessments.

REQUIRED TEACHING MATERIALS

- Inspection tools (tablet, smartphone, …) ;
- Teaching aids (laptop, video projector, whiteboard, …).

TRAINERS

- At least 2 trainers needed for the classroom session, and 4 trainers (including an assistant) for on-site training.

SCHEDULE

Date	Place	Time	Theme
Day 1	Classroom	Morning	I- Introduction II- Principles of bridge inspection
		Afternoon	III- Type of damages and criteria for assessing severity

Date	Place	Time	Theme
Day 2	Classroom	Morning	IV- Steel bridges
		Afternoon	V- Reinforced concrete bridges
Day 3	Classroom	Morning	VI- Elevated bearings and foundations
		Afternoon	VII- Guides for using a tablet system for network monitoring VIII- Instructions for completing the periodic inspection sheet
Day 4	Sur terrain : Pont métallique	All day long	Bridge inventory and inspection using tablets Bridge inspection using the bridge periodic inspection sheet
Day 5	Sur terrain : Pont en béton armé	All day long	Bridge inventory and inspection using tablets Bridge inspection using the bridge periodic inspection sheet
Day 6	Salle de classe	All day long	Reports and discussions Corrections Questions / Answers
Day 7	Salle de classe	Morning	Knowledge assessment

NM3 :« Road repair works method»

OBJECTIVES

The maintenance strategy must be translated into a maintenance program. After planning, the road manager specifies the details of the work to be carried out.

This course will enable participants to define the works to be carried out on a road section. This course will enable participants to define the works to be carried out on a paved road section, and to gain a full understanding of the essential control points and considerations involved in supervising repair projects.

- Detect and identify damages. Analyze causes and study their evolution ;
- Provide efficient and appropriate technical solutions for damage repairs ;
- Acquire management skills, encompassing not only work supervision, but also the ability to ensure compliance with schedules, quality and safety.

PROGRAM

I- Presentation of the manual ;
II- Repair works ;
III- Special considerations for specific sites ;
IV- Preventive maintenance ;
V- Recommendations for road maintenance and repair works ;
VI- Field practice (assessment of pavement condition and repair works).

PARTICIPANT PROFILES

Technicians/Civil engineers from MTP and related organizations

DURATION

Three days (3 days)

LOCATION

- Classroom for theoretical courses ;
- On site for field practice.

NUMBER OF PARTICIPANTS

- 20 participants maximum (depending on training room capacity and transport availability) ;
- At least 2 trainers for theoretical courses and 4 trainers (including an assistant) for field practice.

TRANSFER METHODS

- Self-assessment questionnaire (prerequisites, experience, expectations) ;
- Presentation/ methodological input/ exchange and discussion ;
- Case studies ;

- Knowledge assessments.

TEACHING MATERIALS

Teaching aids (laptop, video projector, whiteboard, …)

TRAINERS

At least 2 trainers for classroom sessions and 4 trainers (including an assistant) for field

SCHEDULE

<table>
<tr><th>Date</th><th>Place</th><th>Time</th><th>Theme</th></tr>
<tr><td colspan="4">One-day course (if the site is not far from the classroom and only if damages can be observed)</td></tr>
<tr><td rowspan="2">Day 1</td><td>Classroom</td><td>Morning</td><td>- Presentation of the manual
- Comprehension test</td></tr>
<tr><td>On site</td><td>After noon</td><td>- Assessment of road damages</td></tr>
<tr><td colspan="4">2-day course (if the site is far from the classroom or if there is repair work in progress on the available site)</td></tr>
<tr><td>Day 1</td><td>Classroom</td><td>All the day</td><td>- Presentation of the manual
- Comprehension test</td></tr>
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<tr><td>After noon</td><td>- Assessment of repair works</td></tr>
<tr><td>Day 3</td><td>Classroom</td><td>All the day</td><td>- Feedback after field practice</td></tr>
</table>

NM4 :« Road and bridge database management system »

OBJECTIVES

Public property needs to be properly maintained after it has been built. Continuous implementation of appropriate management ensures personal safety. Maintenance work is carried out according to a cycle of inspection, assessment, planning and maintenance. The database system is a tool that facilitates this maintenance and management work. This training course aims to enable participants to acquire the following skills and knowledge.

For the PMS (Pavement Management System) :

- Data processing using PMS;
- Recording of repair data.

For the BMS (Bridge Management System) :

- Data processing using BMS;
- Recording of repair data.

Common core :

- Data management.

PROGRAM

I. PRESENTATION OF THE MANUAL

II. ANNUAL SCHEDULE OF PMS IMPLEMENTATION

III. PAVEMENT MANAGEMENT SYSTEM (PMS)

- Purpose of the PMS ;
- Structure of PMS ;
- The different tasks in PMS ;
- Using PMS results.

IV. BASIC RULES FOR PMS IMPLEMENTATION

- Operating environment and data ;
- Management structure ;
- PMS user environment ;
- PMS database structure ;
- Data backup.

V. BMS ANNUAL SCHEDULE

VI. BRIDGE MANAGEMENT SYSTEM (BMS)

(same content as for PMS)

VII. BASIC RULES FOR BMS IMPLEMENTATION

(same content as for PMS)

VIII. KEY POINTS FOR ONGOING PMS/BMS IMPLEMENTATION

- System management ;
- Data management ;
- Updating the database.

PARTICIPANT PROFILES

Technicians/Civil engineers from MTP and related organizations

DURATION

3 days

LOCATION

NUMBER OF PARTICIPANTS

TRANSFER METHODS

- Self-assessment questionnaire (prerequisites, experience, expectations) ;
- Presentation/ methodological input/ exchange and discussion ;
- Knowledge assessments.

TEACHING MATERIALS

Database system (PMS/BMS) and user manual and teaching aids (laptop, MS Access, video projector, external hard drive, whiteboard, …)

TRAINERS

F3LTM Project counterparts

CALENDRIER

Date	Place	Time	Theme
Day 1	Classroom	Morning	I. PRESENTATION OF THE MANUAL II. PMS ANNUAL SCHEDULE III. BASIC RULES FOR PMS IMPLEMENTATION
		After noon	PRACTICAL TRAINING ON IMPLEMENTING PMS (exercises)
Day 2	Classroom	Morning	IV. BMS ANNUAL CALENDAR V. BASIC RULES FOR BMS VI. training in use of the PMS
		Afternoon	PRACTICAL WORK ON IMPLEMENTING THE BMS (exercises)
Day 3	Classroom	Morning	PARTICIPANT EVALUATION
		Afternoon	PRESENTATION OF CERTIFICATES

NM5 :« Road and bridge maintenance planning »

OBJECTIVES

It is very important that road and bridge maintenance managers have a mutual understanding of "maintenance policy", "maintenance target level", "maintenance strategy" and "priority criteria" in order to make road and bridge management effective and efficient.

This training will help managers understand the policy, target level, strategy and priority criteria, and introduce them to planning annual/mid-term/long-term maintenance of roads/bridges.

The main objective is to objectively plan road/bridge maintenance.

At the end of the course, participants will have the knowledge and skills needed to :

- Prepare the draft annual maintenance plan for budget requests ;
- Organize the implementation plan for the following year according to the approved budget ;
- Anticipate the consequences of management works and the road network's level of service.

PROGRAM

I. Presentation of the manual ;
II. Maintenance planning procedure ;
III. Understanding of "maintenance policy", "maintenance target level", "maintenance strategy" and "priority criteria" ;
IV. Maintenance planning training ;
V. Discussion.

PARTICIPANT PROFILES

Engineers from DER (Road Maintenance Directorate), DRTP (Regional Public Works Directorates), SRTP (Regional Public Works Departments), and DPSE (Programming and Monitoring & Evaluation Directorate) involved in maintenance planning, especially network managers (regional road network managers) and DER.

DURATION

3 days

LOCATION

To be specified

NOMBRE DE PARTICIPANTS

20 participants maximum

TRANSFER METHODS

- Self-evaluation questionnaire (Before and after) ;
- Presentation (Course) ;
- Case studies ;
- Discussion.

MATERIELS DIDACTIQUES

Teaching aids (laptop, video projector, whiteboard, …)

TRAINERS

Homologues du Projet F3LTM

SCHEDULE

Date	Place	Time	Theme
Day 1	Classroom	Morning	Self-assessment and introduction Current situation: current conditions and challenges
		Afternoon	I. Presentation of the manual
Day 2	Classroom	Morning	II. Maintenance planning procedure
		Afternoon	III. Understanding of "maintenance policy", "maintenance target level", "maintenance strategy" and "priority criteria"
Day 3	Classroom	Morning	IV. Maintenance planning training: Case study in MS Office Excel
		Afternoon	V. Discussion and evaluation

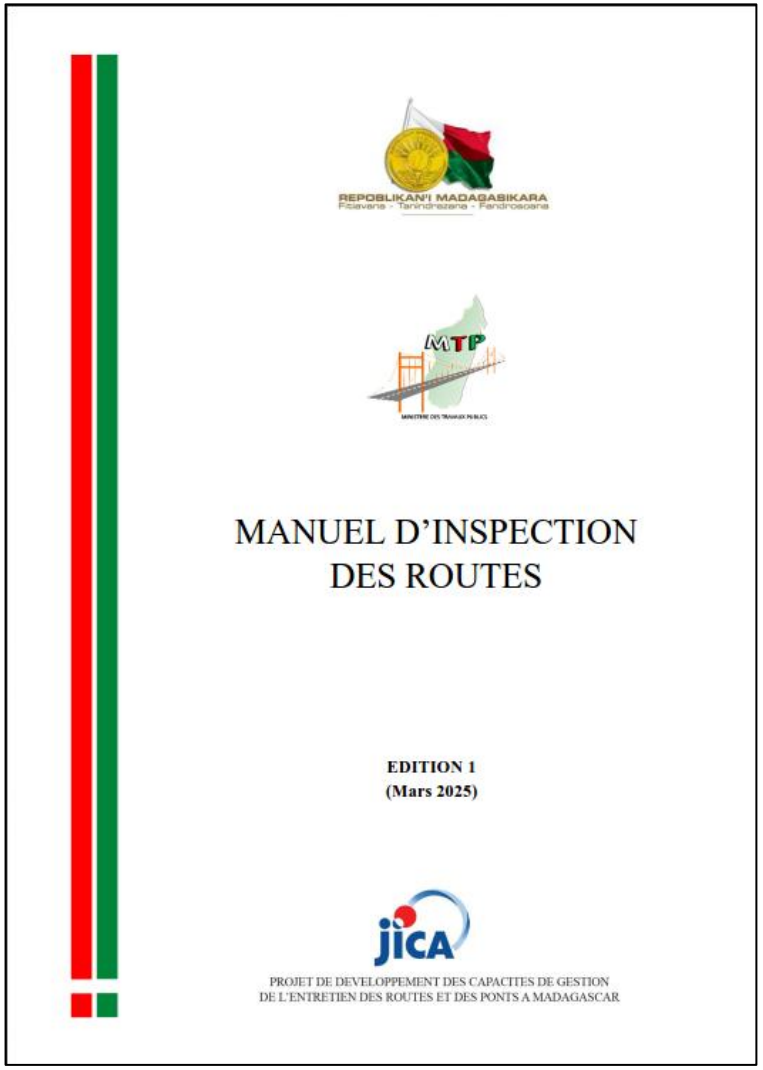
Teaching aids: Manuals (ready), VIDEO, lessons learned from training in Japan

NM	Title	Manuals	VIDEO	Lessons learned from training in Japan
1	Road inspection and diagnosis method	Ready	Not ready	Data on the status of each axis is useful for budget planning decisions.
2	Bridge inspection and diagnosis method	Ready	Not ready	Need for full-scale models to facilitate knowledge transfer
3	Road repair works method	Ready	Not ready	
4	Road and bridge database management system	Ready	Not ready	The training will provide the skills needed to effectively create and manage a road database system
5	Road and bridge maintenance planning	Ready	None	Road and bridge maintenance must be planned in an objective and automatic way, and using the latest advanced technologies.



Figure 0-1 Facilitation manuals for each Module

1.1 Manual for Road Inspection and Diagnosis



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MTP
MINISTERE DES TRAVAUX PUBLICS

MANUEL D'INSPECTION DES ROUTES

EDITION 1
(Mars 2025)

JICA

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

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1.2 Manual for Bridge Inspection & Diagnosis



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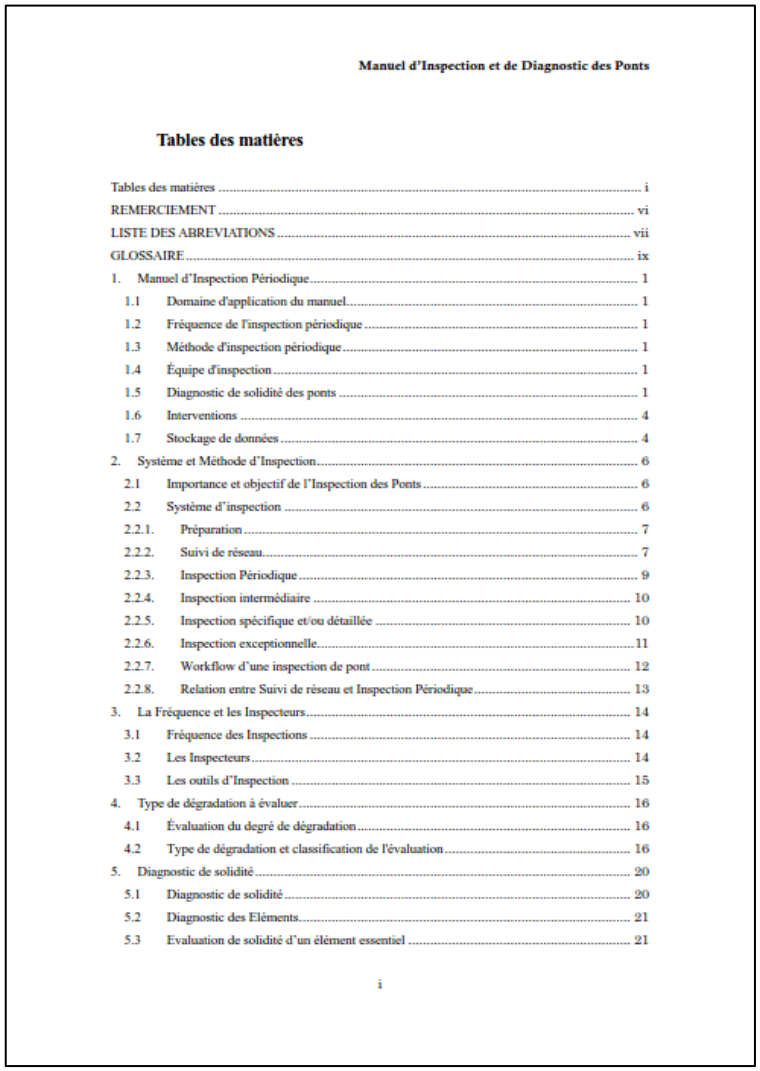
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MANUEL D'INSPECTION ET
DE DIAGNOSTIC DES PONTS

EDITION 1
(Mars 2025)

JICA

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR



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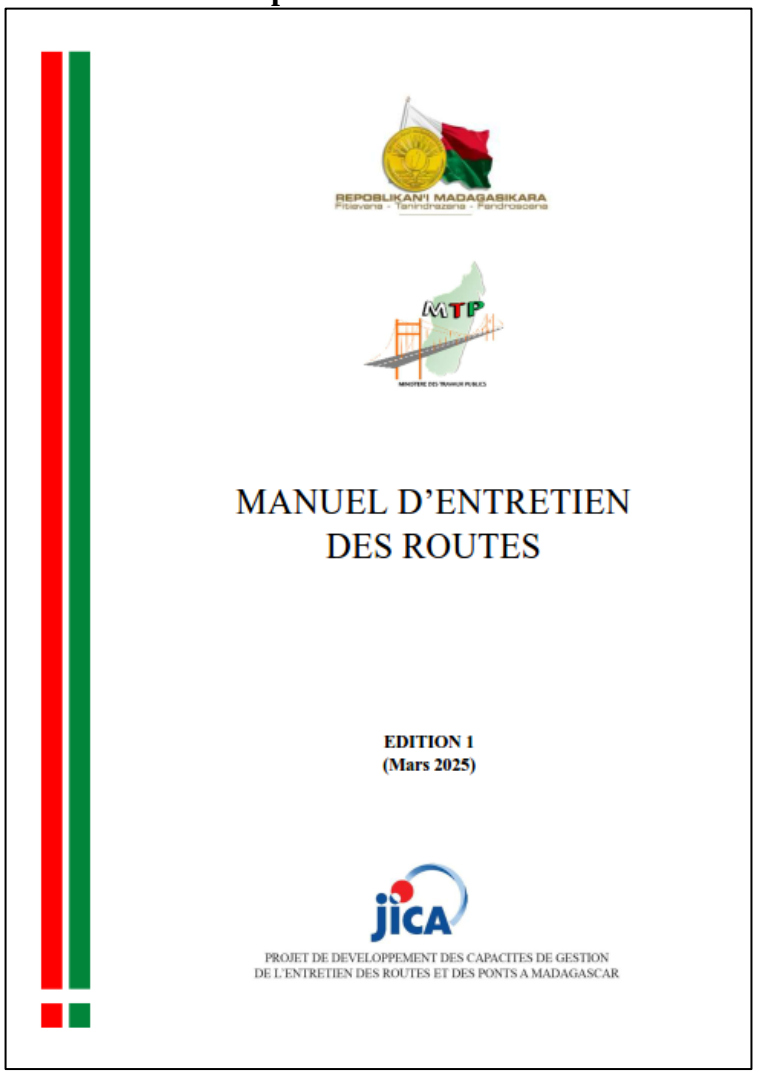
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1.3 Manual for Road Repair



REPOBLIKAN'I MADAGASIKARA
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MINISTERE DES TRAVAUX PUBLICS

MANUEL D'ENTRETIEN
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PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

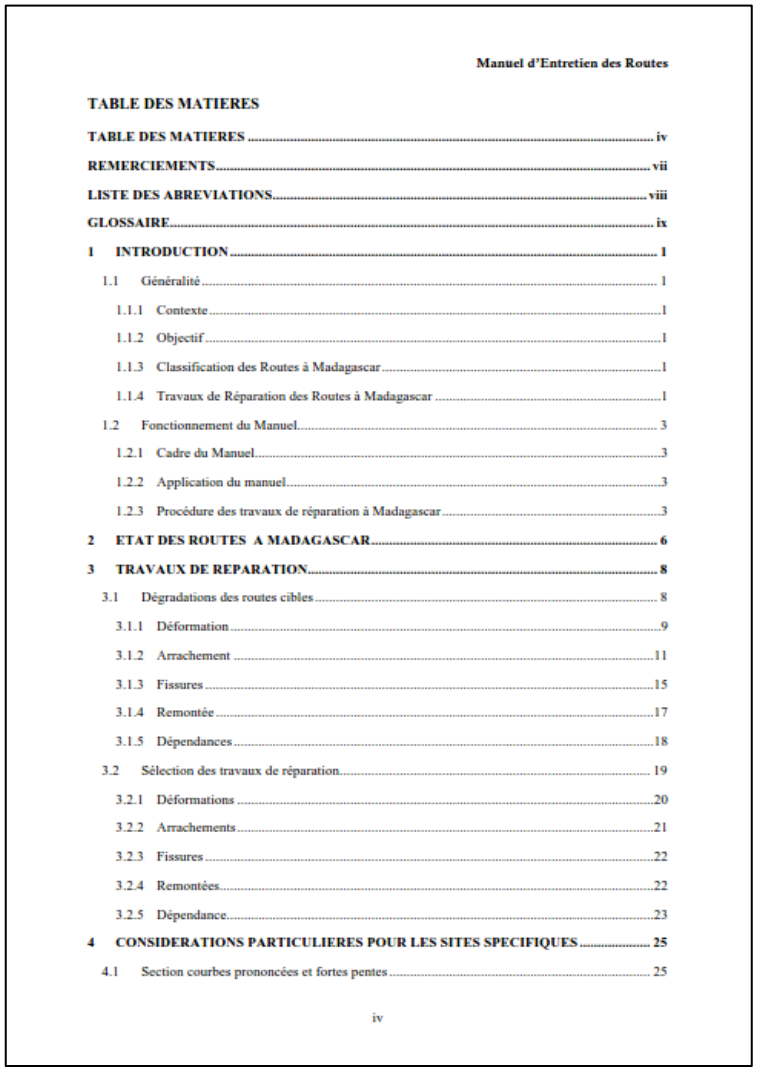


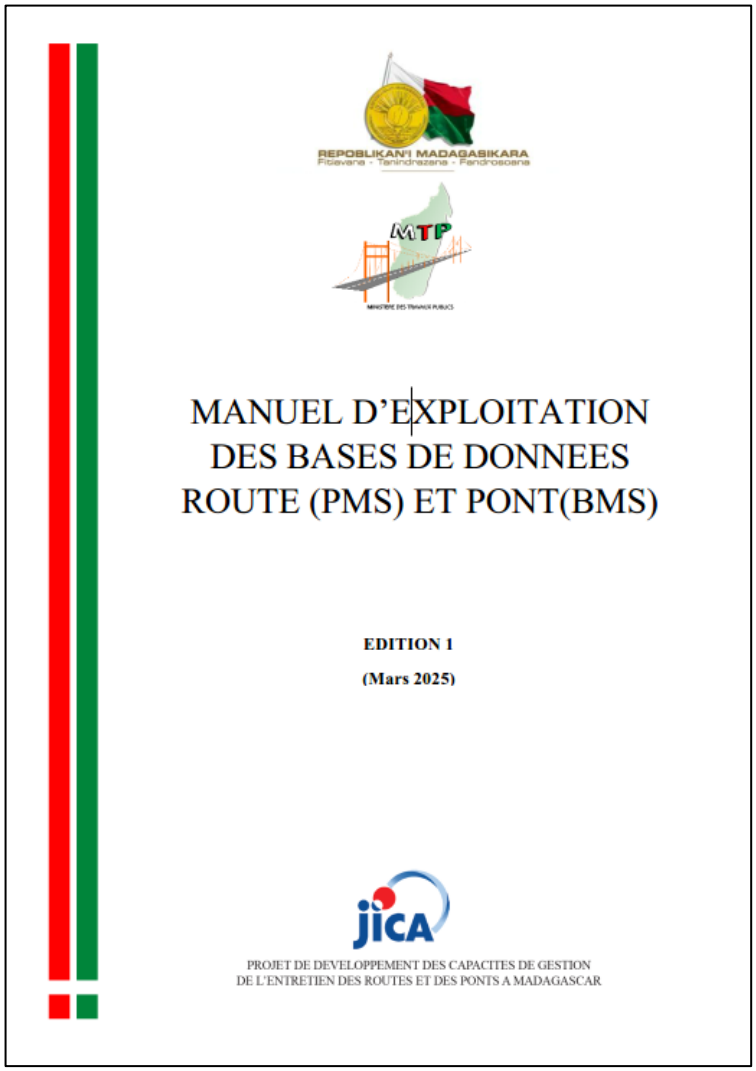
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1.4 User Manual for PMS & BMS



REPOBLIKAN'I MADAGASIKARA
Fitiavana - Tanindrazana - Fandrosoana

MTP
MINISTERE DES TRAVAUX PUBLICS

MANUEL D'EXPLOITATION DES BASES DE DONNEES ROUTE (PMS) ET PONT(BMS)

EDITION 1

(Mars 2025)

JICA

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

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REPOBLIKAN'I MADAGASIKARA
Fitiavana - Tanindrazana - Fandrosoana

MTP
MINISTERE DES TRAVAUX PUBLICS

MANUEL D'ELABORATION DU PLAN D'ENTRETIEN ROUTIER

EDITION 1

(Mars 2025)

JICA

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

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1.6 Bridge Replacement Plan (Long List) on Model Roads



REPOBLIKAN'I MADAGASIKARA
Fitiavana - Tanindrazana - Fandrosoana

MTP

MANUEL POUR
L'ÉTABLISSEMENT DE LA LISTE
EXHAUSTIVE DES PONTS PAR
CATEGORIE D'INTERVENTION

EDITION 1
(Mars 2025)

JICA

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

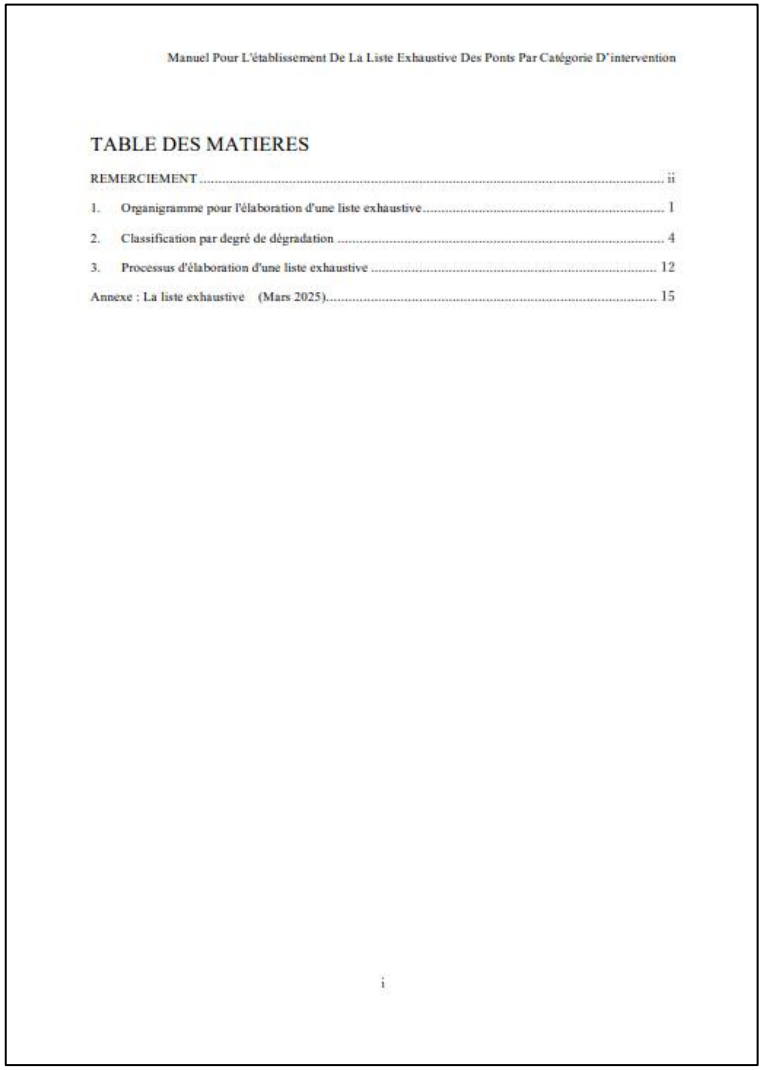


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List of trainers

Table 0-1 List of traniers

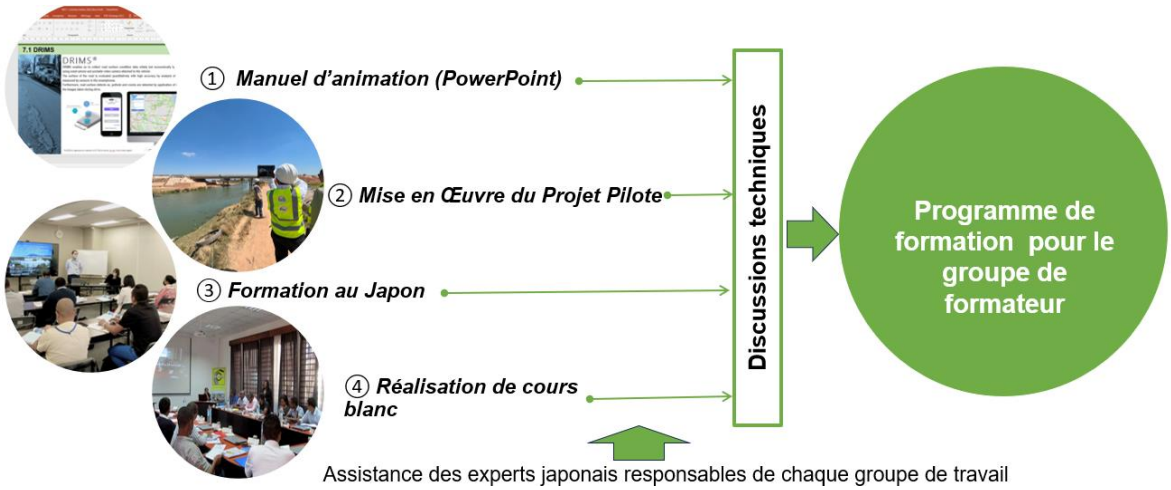
NEW MODULE	TRAINERS	Working group	Organization	Position
NM 1 : Road inspection and Diagnosis Method	-Mr RAKOTOVAO Andriatiana Marcellin (JICA contact person)	WG1 leader	MTP	Design engineer (DINFRA)
	-Mrs RAZAFINDRIANILANA Hoby,	WG1	MTP	Ingénieur d'études (DINFRA)
	- Mme ANDRIANARIVELO Safidy Nirina	WG1	MTP	Head of Design Department (DEN
	- Mr ANDRIAMARO Ny Fiadanantsoa	WG6	LNTPB	Project Manager
NM 2: Bridge Inspection and Diagnosis Method	- Mr RAZAFIMANDIMBY Rico, head of department, WG2 leader (JICA contact person)	WG2 leader	MTP	Head of the maintenance planning department
	- Mr RAZEFASON Ando, DER, Deputy Project Manager (JICA contact person)	WG1, WG2, WG3, WG4, WG5 and GT6 (Deputy Project Manager)	MTP	Director of Road maintenance
	- Mr RABEARIVELO Andry Avotriniaina	WG2 and WG6	AR	Project Management Department Manager
NM 3 : road repair works	- Mr RANDRIAKOTO Hery Patrick (JICA contact person)	WG3 leader	MTP	Design engineer (DEN)
	- Mr RABIALAHY Andréas	WG3	MTP	Design engineer (DINFRA)
	- Mr RAMBOLAMANANA Maminiaina	WG3	AR	Head of Maintenance unit - MEROR and EP components
	- Mr RAZAFITSIALONINA Andry Tahiry	WG6	MTP	Design engineer
NM 4 : Road and bridge Database Management System)	- Mrs RAMANJAKARIMANGA Dina, (JICA contact person)	WG4 leader	MTP	Head of Design Department (DEN)
	- Mrs RANDIMBINDRAIBE Misa Hery Zo (JICA contact person)	WG6	ININFRA	Director of Design
	- Mr. RAZANAKOTO Andry Nirina	WG6	MTP	Head of road maintenance supervision department

NEW MODULE	TRAINERS	Working group	Organization	Position
	- Mr BOTOMANOVATSARA Fils	WG6	MTP	DINFRA
	- Mr RAMAHATAFANDRANA Joro Manorintsoa	WG6	MTP	Design Engineer (DINFRA)
	- Mrs RAKOTONDRAVELO Maminiaina	WG4	MTP	Design engineer (DINFRA/SR)
NM 5 : Road and Bridge Maintenance Planning	- Mr RAHARIFERA Mamitiana (JICA contact person)	WG5 leader	MTP	Design Engineer (DINFRA)
	- Mrs RASOLONDRAIBE Elza Hantasoa	WG6	MTP	SG attaché (MTP)/Trainer
	- Mr RATSIMAVO Didier Marius	WG6	MTP	(ININFRA)
	- Mr RAKOTOARINOSY Rina	WG5	MTP	DGTP attaché/Trainer (ININFRA)

Source : F3LTM Project

Training program for trainer groups

1.7 Concept for preparing the training program



Source : F3LTM Project

Figure 0-1 : Training Programme

1.7.1 Facilitation manual

The creation of this supporting material is a good way of training trainers. Groups of trainers will carry out the following activities :

- Group discussion to understand the manual ;
- Preparing and checking the manual ;
- Updating the manual based on lessons learned from the module.

1.7.2 Pilot project implementation

Trainers are expected to take part in ongoing training courses as part of the pilot project for road repair, inspection and diagnosis, and bridge inspection and diagnosis.

Trainers will share their field experience in each module and guide the training of other trainers.

1.7.3 Training in Japan

The trainers will present each module, highlighting new discoveries and case studies from the training in Japan.

In preparation, group discussions will be held with training participants in Japan so that trainees can benefit from their opinions and suggestions.

Training materials used in Japan will also be incorporated.

1.7.4 Mock courses

Trainers will organize several mock classes for training purposes.

Trainers will evaluate each other's course simulations and discuss how to improve them.

1.8 Curricula of the Module

« TRAINING OF TRAINERS ON ANDRAGOGY»

OBJECTIVES

To train trainers to design and facilitate effective training programs for adults [officials from the Ministry of Public Works] using the principles of andragogy.

Expected results :

- Clear understanding of the principles of andragogy and their application to adult education ;
- Ability to design training programs adapted to adults, emphasizing autonomy, experience and relevance of content ;
- Skills in facilitating training sessions for adults, using pedagogical methods adapted to andragogy ;
- Ability to effectively assess adult learners' progress and provide constructive feedback.

PROGRAM

- Introductory session on the principles of andragogy and the specificities of adult learning ;
- Practical workshops to design training programs for adults, based on case studies and concrete examples ;
- Training sessions on teaching methods adapted to andragogy, with role-playing and simulations ;
- Case studies and practical exercises on assessing the progress of adult learners and providing feedback.

PARTICIPANT PROFILES

Civil engineers from MTP and related organizations

DURATION

5 Days

LOCATION

Theoretical training in classroom

Practice

NUMBER OF PARTICIPANTS

20 maximum

SUCCESS INDICATORS

- Satisfaction rate of trainers who have completed the training module ;
- Number of adult training programs designed and facilitated using andragogy principles ;
- Rate of retention and engagement of adult participants in programs designed by trained trainers.

TEACHING MATERIALS

- Teaching materials on andragogy and adult teaching methods (laptop, video projector, whiteboard, …) ;
- Interactive, participative training materials ;
- Adequate training rooms for small-group activities and role-playing.

TRAINERS

Andragogy experts for specific sessions

SCHEDULE

Date	Theme
Day 1	1. Understanding andragogy : It is crucial to present a clear introduction to andragogy, emphasizing the fundamental principles of adult learning, such as autonomy, experience, motivation, and relevance of content.
	2. Teaching methods : Explain the various pedagogical [teaching] methods adapted to andragogy, such as experiential learning, participatory approaches, problem-solving, and project-based learning.
Day 2	3. Program design : Train trainers to design training programs adapted to adults, with an emphasis on personalization, self-directed learning and the integration of learners' experience.
Day 3	4. Group management : Address group management techniques specific to andragogy, with an emphasis on engaging learners, facilitating discussions, and managing different learning styles.
Day 4	5. Evaluation and feedback : Explain how to effectively assess the progress of adult learners, focusing on assessment methods adapted to andragogy, as well as the provision of constructive feedback.
Day 5	TRAINER CERTIFICATION Evaluation and Final test

Teaching material (PowerPoint) (see Appendix)

Table 0-1 : List of teaching materials

NM	Title	Teaching Materials
1	Road inspection and diagnosis method and iDRIMS user guide	Prêt
2	Bridge inspection and diagnosis method	Prêt
3	Road repair works	Prêt
4	Road and bridge database management system	Prêt
5	Road and bridge maintenance planning	Prêt

Source : F3LTM Project

Trainers' training implementation schedule

PLANNING PRÉVISIONNEL DE LA FORMATION DES FORMATEURS

N°	COMPOSANTES	Durée (J)	2024											
			M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
I	**PREPARATION**													
	Elaboration des documents pédagogiques :													
1-2	Syllabus (Curricula, calendrier,…)	1												
1-3	Validation auprès du Projet (5e CCC)	1												
1-4	Manuel de formation pour les participants	10												
1-5	Manuel d'animation	10												
1-6	Validation auprès du Projet (6e CCC?)	1												
II	**EXECUTION DE LA FORMATION DES FORMATEURS**													
2-1	Convocation des participants	5												
2-2	Exécuton de la formation													
2-3	Simulation d'animation de chaque formateur formé													
2-4	Renforcement pédagogique	1												

Other equipment and materials required

1.9 Teaching equipment

Table 0-1 : List of teaching equipment

NM	Title	Educational equipment
1	Road inspection and diagnosis Method	Laptop, video projector, whiteboard
2	Bridge inspection and diagnosis	Laptop, video projector, whiteboard
3	Road repair works	Laptop, video projector, whiteboard
4	Road and bridge database management system	Laptop (MS Access), hard drive, video projector, whiteboard, ...
5	Road and bridge maintenance planning	Software with license (if required)

Source : F3LTM Project

1.10 Specific equipment

Table 0-2 : List of specific materials

NM	Titre	Matériels spécifiques
1	Road inspection and diagnosis	iDRIMS (iPhones for IRI and Internet connection) Clegg Hammer
2	Bridge inspection and diagnosis	Binocular, inspection hammer (Approx. 230g), convex measure , crack gauge, spirit level, plum-bob, pole, etc. Recording form, as built drawings, daily log, maps, documents, etc. Cleaning tools, traffic regulators, rope, saw, and packaging tape Inspection mirror, flashlight, ladder, boat or barge Safety vest, helmet, safety full harness, work shoes, work gloves, life jacket (for operation onboard or water), ropes, etc.
3	Road repair works	
4	Road and bridge database management system	
5	Road and bridge maintenance planning	

Source : F3LTM Project

Schedule and work plan for training implementation in 2025, including agreement between ININFRA and MTP

Projet de Développement des Capacités de Gestion de l'entretien des Routes et des Ponts (Phase 2)

The Project for Capacity Development for Road and Bridge Maintenance Management (Phase 2)

PLANNING PRÉVISIONNEL DU PROGRAMME DE FORMATION

N°	COMPOSANTES	Nombre de Stagiaires	Nombre de jour	2024 M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	2025 M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
I	**ACTIONS PREALABLES**																										
1-1	Formation de formateurs																										
1-2	Simulation d'animation de chaque formateur formé																										
1-3	Elaboration du budget au niveau de l'ININFRA																										
II	**CADRE CONTRACTUEL MTP-ININFRA**																										
2-1	Elaboration de la CMOD avec l'équipe de la DER/MTP																										
2-2	Signature de la CMOD																										
2-3	Visa par le FR de la CMOD																										
2-4	Notification de la CMOD																										
III	**RENFORCEMENT DE CAPACITÉ DES AGENTS DU MTP ET SES ORGANISMES RATTACHÉS**																										
3.1	**NM1 "Méthode d'inspection et diagnostic des routes"**																										
	06 Sessions	20	5																								
3.2	**NM2 "Méthode d'inspection et diagnostic des ponts"**																										
	06 Sessions	20	7																								
3.3	**NM3 "Travaux de réparation des Routier"**																										
	02 Sessions	20	3																								
3.4	**NM4 "Système de bases de données des routes et des ponts"**																										
	02 Sessions	20	3																								
3.5	**NM5 "Plannification d'entretien des routes et des ponts"**																										
	03 Sessions	20	2																								

Schedule for training implementation in 2026

Projet de Développement des Capacités de Gestion de l'Entretien des Routes et des Ponts (Phase 2)

The Project for Capacity Development for Road and Bridge Maintenance Management (Phase 2)

N°	COMPOSANTES	Nombre de		2026											
		Participants	jours	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
I	**ACTIONS PREALABLES**														
1-1	Formation de formateurs														
1-2	Simulation d'animation de chaque formateur formé														
1-3	Elaboration du budget au nieau de l'ININFRA														
II	**CADRE CONTRACTUEL MTP-ININFRA**														
2-1	Elaboration de la CMOD avec l'équipe de la DER/MTP														
2-2	Signature de la CMOD														
2-3	Visa du FR														
2-4	Notification de la CMOD														
	préparation pédagogique														
III	**RENFORCEMENT DE CAPACITE DES AGENTS DU MTP ET SES ORGRANISMES RATTACHES**														
3.1	**NM1 "Méthode d'inspection et diagnostic des routes"**														
	06 Sessions	**20**	**5**												
3.2	**NM2 "Méthode d'inspection et diagnostic des ponts"**														
	06 Sessions	**20**	**7**												
3.3	**NM3 "Travaux de réparation des Routier"**														
	02 Sessions	**20**	**3**												
3.4	**NM4 "Système de bases de données des routes et des ponts"**														
	02 Sessions	**20**	**3**												
3.5	**NM5 "Plannification d'entretien des routes et des ponts"**														
	03 Sessions	**20**	**2**												

Schedule for training implementation in 2027

Projet de Développement des Capacités de Gestion de l'Entretien des Routes et des Ponts (Phase 2)

The Project for Capacity Development for Road and Bridge Maintenance Management (Phase 2)

N°	COMPOSANTES	Nombre de		2027											
		Participants	jours	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
I	**ACTIONS PREALABLES**														
1-1	Formation de formateurs														
1-2	Simulation d'animation de chaque formateur formé														
1-3	Elaboration du budget au nieau de l'ININFRA														
II	**CADRE CONTRACTUEL MTP-ININFRA**														
2-1	Elaboration de la CMOD avec l'équipe de la DER/MTP														
2-2	Signature de la CMOD														
2-3	Visa du FR														
2-4	Notification de la CMOD														
	préparation pédagogique														
III	**RENFORCEMENT DE CAPACITE DES AGENTS DU MTP ET SES ORGRANISMES RATTACHES**														
3.1	**NM1 "Méthode d'inspection et diagnostic des routes"**														
	06 Sessions	**20**	**5**												
3.2	**NM2 "Méthode d'inspection et diagnostic des ponts"**														
	06 Sessions	**20**	**7**												
3.3	**NM3 "Travaux de réparation des Routier"**														
	02 Sessions	**20**	**3**												
3.4	**NM4 "Système de bases de données des routes et des ponts"**														
	02 Sessions	**20**	**3**												
3.5	**NM5 "Plannification d'entretien des routes et des ponts"**														
	03 Sessions	**20**	**2**												

APPENDICES

APPENDIX 1 : ROAD INSPECTION AND DIAGNOSIS METHOD

Projet de Développement des Capacités de Gestion de l'entretien des Routes et des Ponts (Phase 2)

The Project for Capacity Development for Road and Bridge Maintenance Management (Phase 2)

Cours d'Animation
Inspection et Diagnostic des Routes

Préparé par le GT1

CTI Engineering International Co., Ltd.

OC GLOBAL

CHODAI CO.,LTD. CONSULTANT & SERVICE PROVIDER

A. Présentation du Manuel

I. Introduction

1. Objectifs du Manuel

- Facilitation des opérations d'inspections routières dans le cadre d'un entretien courant;
- Etablissement plus rapide et plus efficace d'un Schéma d'Itinéraire et d'Aménagement (SIA);
- Introduction de l'utilisation de nouvelles technologies tels que le DRIMS, l'Intelligence artificielle et d'autres équipements d'investigation;
- Mise en place de bases uniformes et de lignes directrices pour la planification et la collecte de données;
- Présentation des dégradations de la chaussée et des dépendances les plus fréquentes.

2. Fonctionnement du manuel

1) Cadre du Manuel

- Documentation des procédures d'évaluation pour la collecte des données;
- Description de l'investigation détaillée de certaines dégradations;
- Guide et manuel de formation.

2) Processus de travail

- Etude au niveau du réseau lors de l'inspection visuelle afin de décrire l'état de la surface des routes ainsi que de ses dépendances;
- Etudes/Investigations au niveau du projet permettant de fournir des informations sur l'état de la structure des routes (pressenties à l'entretien) issues de l'étude au niveau du réseau.

A. Présentation du Manuel

I. Introduction

2. *Fonctionnement du manuel*

2) Processus de travail

Etudes au niveau du réseau	Etudes/Investigations au niveau du projet
• Evaluation de l'état général du réseau routier • Identification des sections ou des sous-sections du réseau routier qui sont dans un état critique et celles qui nécessitent un entretien ou un renforcement dans un avenir proche. • Détection des défauts sur les routes et localisation des sections où de graves dommages se sont produits ou se produisent et qui nécessitent une action d'entretien immédiate. • Utilisation des résultats de l'inspection pour préparer le SIA (SCHEMA D'ITINERAIRES ET D'AMENAGEMENT).	
	• Estimation des quantités de travail pour la préparation de l'appel d'offres

3) Fonctionnement

Conforme aux documents officiels du MTP

- Note d'orientation;
- SIA.

A. Présentation du Manuel

II. Patrouille et Inspection des Routes

1. Généralités

1) Patrouille de sécurité

- Patrouille de sécurité de jour effectuée par le responsable du réseau au niveau régionale;
- Identification des dégradations de catégorie 1 (à définir auparavant la catégorisation de la dégradation) et contrôle des équipements routiers par l'intermédiaire de véhicule;
- Au moins deux fois par an et en dehors des heures de pointes.

2) Etudes au niveau du réseau

- Mise en œuvre au moins une fois par an au cours du premier trimestre de chaque année;
- Collecte de données par inspection visuelle afin de déterminer le type et la gravité des dégradations de la chaussée et de ses dépendances. Par la suite des solutions correctives seront proposées;
- Collecte de données par le mesure de la rugosité.

3) Etudes/investigation au niveau Projet

(1) L'inspection détaillée

- menée à pied par chaque DRTP afin de proposer des programmes de tâches d'entretien courant et des projets et d'en estimer les coûts. Les données collectés seront enregistrés dans le système de base de données.

A. Présentation du Manuel

II. Patrouille et Inspection des Routes

1. Généralités

3) Etudes/investigation au niveau Projet

(1) L'inspection détaillée

- Effectuée au moins tous les 12 mois, après la grande saison des pluies et avant la saison sèche. Les dommages causés par les pluies doivent être enregistrés lors de l'enquête au niveau du projet ;

(2) Etude du site

- Inspection et investigation techniques;
- Afin de proposer des solutions ingénieux aux problèmes et de fournir des informations pour les travaux de conception;
- Durant l'étude, minimiser les perturbations de la circulation tout en assurant la sécurité des usagers ainsi que des agents d'inspections.

A. Présentation du Manuel

II. Patrouille et Inspection des Routes

2. Processus d'inspection routière
   1) Inspection préliminaire et identification des dégradations au niveau de la chaussée par iDRIMS et l'IA
   2) Détermination des sections en mauvais états
   3) Inspection visuelle des sections cibles pour l'élaboration du SIA
3. Mesure d'IRI
   - Indice de Rugosité Internationale de la Chaussée;
   - Obtenue par l'utilisation d'une application installée sur un smartphone;
   - Permet d'apprécier l'étendue et l'ampleur des dégradations superficielles de la chaussée;
   - Plus la valeur de l'IRI est élevée, plus le niveau de confort ressenti par les usagers est faible.
4. Inspection détaillée
5. Investigation sur site

A. Présentation du Manuel

III. Investigation sur terrain

1. Mesure de déflexion de la chaussée
   - Mesure de déformabilité de la chaussée avec une poutre Benkelman;
   - Si D98 < 100 : rechargement de la chaussée ;
   - Si 100 < D98 < 150 : renforcement de la chaussée (selon les dégradations) ;
   - Si D98> 150 : Reconstruction de la route.
2. Dynamic Cone Penetrometer (DCP)
   - Méthode normalement utilisée lors de l'étude de la construction d'une nouvelle route;
   - Détermination de la portance du sol de plateforme à partir du CBR immédiat

Valeur CBR	0 - 10	10 - 20	20 - 30	Au-delà de 30
Observation	Sol à faible portance	Sol à portance moyenne	Sol à bonne portance	Sol à très bonne portance

A. Présentation du Manuel

III. Investigation sur terrain

3. Testeur de sol à impact Clegg
   - Le testeur se compose d'un marteau de compactage de 4,5 kg dans un cathéter vertical. Lorsque le marteau est relâché d'une hauteur fixe, il tombe à travers le tube et heurte la surface mesurée, ralentissant à une vitesse déterminée par la rigidité du matériau à l'intérieur du zone d'impact. Un accéléromètre de précision monté sur le marteau génère une charge qui est transmise via un câble à un lecteur numérique portatif. Le microcontrôleur rapide dans le lecteur scanne et filtre le signal et enregistre la décélération en valeur d'impact (IV). Cette valeur d'impact est un indicateur de la résistance du sol et affiche une bonne corrélation avec les résultats des tests CBR.
   - La bonne corrélation entre IV et CBR représente une plage importante, entre 10% et 100% de CBR.
   - Trois formules sont utilisées pour la corrélation

   1) Objectifs
      - Permet de mesurer et de contrôler la résistance du sol et des niveaux de consolidation pendant la restauration des tranchées;
      - Les données obtenues en utilisant le testeur de sol à impact peuvent être utilisées de la même manière que les résultats des tests CBR effectués en laboratoire et sur le terrain;

A. Présentation du Manuel

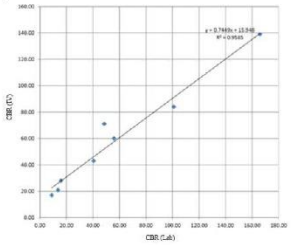
III. Investigation sur terrain

3. Testeur de sol à impact Clegg

2) Corrélation avec le CBR laboratoire

a) Trois formules peuvent être utiliser pour la corrélation:

- ✓ %CBR = (0,24(CIV)+1)² (r = 0.957)
- ✓ %CBR = 0,07 (CIV)²
- ✓ %CBR = 0,1691 (IV4)^{1,695}



Corrélation avec CBR (LAB)

A. Présentation du Manuel

III. Investigation sur terrain

3. Testeur de sol à impact Clegg

2) Corrélation avec le CBR laboratoire

b) Procédure pour le calibrage:

i. Préparation des moules



ii. CBR laboratoire



iii. Testeur de sol à impact Clegg utilisant les mêmes moules



A. Présentation du Manuel

III. Investigation sur terrain

3. Testeur de sol à impact Clegg

4) Procédure du test sur terrain

a) Léger nettoyage de la surface pour enlever les matériaux lâches (peut être effectué par frottement avec le pied);

b) Mise en position du tube de guidage;

c) Mise en marche de l'afficheur numérique en s'assurant de bien le tenir en main;

d) Soulèvement du marteau jusqu'à une hauteur de 450 mm, suivant l'indication sur la tête du marteau;

e) Puis on le laisse retomber librement.

➢ Cette procédure est répétée quatre fois, la valeur obtenue lors de la dernière chute étant enregistrée comme valeur d'impact.

A. Présentation du Manuel

III. Investigation sur terrain

4. Système de surveillance intelligent de type réponse dynamique (DRIMS)

Le Système a été inventé par le « Laboratoire des ponts et des ouvrages d'art de l'Université de Tokyo au Japon.

1) Objectifs

- Estimation des valeurs de l'IRI d'une route ;
- Détermination de la dégradation d'une route par l'analyse d'images à l'aide de l'apprentissage automatique (IA) ;

2) Système de mesure de l'IRI

- 4 classes de dispositifs selon la norme ASTM E 950-94 (Tableau 3-1 exemples d'équipements de mesure de la rugosité, Road Inspection Manual). L'iDRIMS est de classe II ;
- L'IRI fournit des indices standardisés en termes de rugosité de la surface toutefois il ne fournit pas d'informations sur les dégradations réels de la route ;
- L'identification des dégradations de la chaussée se fait à l'aide d'une caméra placée sur un véhicule d'inspection. Les images collectées sont traitées par l'IA afin de fournir le type, la localisation et la taille approximative ;
- Evaluation préliminaire de la route permettant la réduction de la charge et du temps de travail ;
- Le Méthode est à combiner avec la méthode d'inspection actuelle.

A. Présentation du Manuel

III. Investigation sur terrain

4. Système de surveillance intelligent de type réponse dynamique (DRIMS)

3) Identification des dégradations de la surface de la route par l'IA

- Identification des dégradations effectuée à l'aide d'une caméra installée à l'intérieur du véhicule de patrouille;
- Traitement et interprétation des images par l'intelligence artificielle après apprentissage;
- A combiner avec l'IRI et les méthodes d'inspection actuelles.

1. Fissures 

2. Faïençage 

3. Nids de poule 

4. Ornièrage 

5. Epaufrure 

A. Présentation du Manuel

IV. Catégorisation et catalogue des dégradations

1. Catégorisation des dégradations

1) Généralités

Lorsqu'une dégradation est identifiée, les DRTP sont tenues d'utiliser les directifs décrits dans ce manuel et de tenir compte des réglementations applicables et des jugements techniques pour décider si une action corrective est nécessaire afin de formuler des recommandations sur le type de travaux requis.

Dans le manuel, l'état de la Route est représenté par l'état de la chaussée. Deux catégories de dégradation sont définies, à savoir la catégorie « exploitation routière » et la catégorie « structurelle ».

2) Catégorie exploitation de la route

a) Dégradations critiques

- Dégradations représentant des dangers pour les usagers de la route;
- Décision pour une action d'urgence requise.

b) Dégradations non critiques

- Dégradation n'ayant pas d'incidence grave pour l'utilisation de la route;
- Action planifiée en fonction de la priorité structurelle.

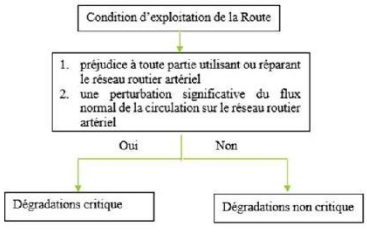


Figure 4-1 Catégorie exploitation de la route

A. Présentation du Manuel

IV. Catégorisation et catalogue des dégradations

1. Catégorisation des dégradations

3) Catégorie Structurelle

a) Dégradations structurelles de classe 1

- Dégradation touchant la structure de la chaussée: fissure de fatigue, déformation

b) Dégradations structurelles de classe 2

- Dégradations superficielles: Fissure, remontée, arrachement

2. Catalogue des dégradations

1) Code

Les dégradations de la route sont définies par trois types:

a) Dégradations des chaussée revêtues (Type A)

b) Dégradations des chaussées non revêtues (Type B)

c) Dégradations des dépendance de la chaussée (Autres type)

A. Présentation du Manuel

IV. Catégorisation et catalogue des dégradations

2. Catalogue des dégradations

1) Code

Tableau 4-1 Dégradation superficielles de la Route et codification

Nature	Revêtue (A)	Code	Non revêtue (B)	Code
Déformation	Flaches	A-FLC	Flaches	B-FLC
	Ornière	A-ORN	Ornière	B-ORN
	Affaissement	A-AFF	Tôle ondulée	B-TOO
	Bourrelet	A-BOR		
	Fluage	A-FLU		
	Tôle ondulée	A-TOO		
Fissures	Longitudinale	A-FLO		
	Transversale	A-FTR		
	Faïençage/ maillées	A-FFM		
Arrachement	Nid de poule	A-NDP	Nids de poule	B-NDP
	Désenrobage	A-DES	Ravinement	B-RAV
	Pelade	A-PEL		
	Plumage	A-PLU		
	Épaufrure	A-EPA		
	Peignage	A-PEI		
	Glaçage	A-GLA		
Remontée	Ressuage	A-RES		
	Remontée des fines	A-REF		

Tableau 4-2 Dégradation des dépendance de la chaussée et codification

Dépendances	Code	Remarque
Drainage : Avaloire, trou d'homme	C-AVT	
Drainage : Caniveau	C-CAN	
Drainage : Buse	C-TUY	
Drainage : Fossé	C-FOS	
Drainage : Dalot	C-DAL	
Drainage : Murs de tête	C-MUT	
Clôtures et glissières	D-CLT	
Talus de remblai	E-RBL	
Talus de déblai	E-DBL	
Mur de soutènement	F-MST	
Bordure	G-BD	
Aménagement pour les piétons	H-AMP	
Eclairage routier	I-ECR	
Feux de circulation	I-FC	
Marquages routiers	J-MR	
Panneaux de signalisation	J-PS	

A. Présentation du Manuel

IV. Catégorisation et catalogue des dégradations

2. Catalogue des dégradations

2) Catégorisation et codification des dégradations sur les chaussées revêtues (Type A)

- Il y a 4 catégories de dégradation de type A:
  - (1) Déformations: Flaches, Orniérages, Affaissements bourrelet, Fluage et Tôles ondulée ;
  - (2) Fissures ;
  - (3) Arrachements ;
  - (4) Remontée .
- Cette partie décrit les dégradations de chaque catégories en les illustrant avec leurs codes, photos, causes, évolutions si non traités, solution, la classe de dégradation structurelle et catégorie d'exploitation.

A. Présentation du Manuel

IV. Catégorisation et catalogue des dégradations

2. Catalogue des dégradations

2) Exemple de catégorisation et de codification des dégradations sur les chaussées revêtues (Type A)

Nature	Déformations					
Codification	A-FCL	A-ORN	A-AFF	A-BOR	A-FLU	A-TOO
Dégradation	Flaches	Ornière	Affaissement	Bourrelet	Fluage	Tôle ondulée
Illustrations						0
Unité	m²	m²	m²	Mètre linéaire		
Causes	• Sous dimensionnement localisé • Faible compacité • Flaches d'adaptation	• Sous-dimensionnement de la couche d'assise • Défaut de drainage	• Epaisseur de matériaux insuffisants en rive de chaussée • Problème de drainage • Infiltration des eaux stagnantes	• Mise en compression de la couche de roulement • Fissure transversale de la couche de roulement • Soulèvement superficiel de la couche de roulement	• Collage défectueux de la couche de base • Epaisseur insuffisante pour les charges supportées	• Action du trafic sur des couches instables et peu homogènes • Défaut de guidage du finisseur lors de mise en œuvre de la couche de surface • Instabilité de la couverture bitumineuse, bitumes trop mous, bitume à densité insuffisante • Zones fortement sollicitées par les efforts tangentiels du trafic, fortes rampes avec trafic lourd, zones de freinage et d'accélération
Evolution	• Approfondissement de l'affaissement • Faïençage à mailles fines • Fissure d'adaptation	• Approfondissement de l'ornière • Fissure longitudinale • Faïençage	• Faïençage • Arrachement de la couche de surface • Nid de poule	• Fissuration et/ou arrachements de la couche de surface • Défaut d'uni longitudinal	Ornière	Les vagues créées par la déformation d'une ou plusieurs couches sous les sollicitations horizontales évoluent avec des amplitudes et des fréquences croissantes.
Solutions	Déflachage (faible ampleur)	Rapiéçage	• Réfection localisée du corps de la chaussée	• Réfection localisée du corps de la chaussée	Réfection localisée du revêtement	Réfection localisée du corps de la chaussée
Catégorie SI	1	1	1	2	1	1
Catégorie OR	Non critique	Non critique	Non critique	Non critique	Non critique	Non critique

A. Présentation du Manuel

IV. Catégorisation et catalogue des dégradations

2. Catalogue des dégradations

3) Exemple de catégorisation et de codification dégradations sur les chaussées non revêtues (Type B)

- Cette partie décrit les dégradations au niveau des chaussées non revêtues avec leurs codes, photos, causes, évolutions si non traités, solution, la classe de dégradation structurelle et catégorie d'exploitation.

Nature	DEFORMATIONS				
Codification	B-TLC	B-ORN	B-TOO	B-NRP	B-RAV
Dégradation	Flaches :	Ornière :	Tôle ondulée :	Nids de poule :	Ravinement :
	Déformation longitudinale en dehors de la trace des pneus	Déformation longitudinale sur la trace des pneus	Suite d'ondulation de faible longueur perpendiculaire à l'axe de la route	Cuvete de forme arrondie à la surface de la couche de roulement	Saignee de plus ou moins grandes dimensions, longitudinales ou transversales
Illustrations					
Unité					
Causes	• Augmentation de l'humidité dans les couches inférieures de la chaussée • Début de drainage de la chaussée • Contact des pneus sur des materiaux présentant une insuffisance de cohésion • Vitesse élevée		• Manque de stabilité de la couche de roulement • Cohésion insuffisante des matériaux • Pression trop élevée des pneus des véhicules	• Arrachement localisé des matériaux • Qualité insuffisante de la couche de fondation • Irrégularité et mauvais compactage de la couche de surface	• Érosion de la surface de roulement par les eaux de ruissellement • Forte pente du profil en long • Insuffisance ou manque de drainage
Evolution	• Formation de nids de poule • Ravinements longitudinaux • Aggravation en profondeur • Accélération de l'érosion transversale dans la zone en courbe • Augmentation des risques d'accidents à cause de la concentration de la circulation vers le centre de la route (cas des déformations dans les virages) • Affaissement de la chaussée			• Approfondissement et élargissement des trous (bourbier) • Accumulation d'eau pendant la saison de pluies • Fragilisation du corps de la chaussée	• Transitions infranchissables pour la circulation
Solutions	Bouchage des trous	Reprofilage avec apport de matériaux	Reprofilage léger	Réfection localisée (Point à temps route en terre)	• Réfection localisée (Point à temps route en terre) • Reprofilage
Catégorie ST	1	1	2	1	2
Catégorie OR	Critique	Critique	Non critique	Critique	Non Critique

A. Présentation du Manuel

IV. Catégorisation et catalogue des dégradations

2. Catalogue des dégradations

4) Exemple de catégorisation et de codification dégradations des dépendances de la chaussée (Autres types)

- Cette partie décrit les dégradations au niveau des dépendances de la chaussée avec leurs codes, photos, causes, évolutions si non traités, solution, la classe de dégradation structurelle et catégorie d'exploitation.

Codification	C-AVT	C-CAN	C-TUY	C-FOS
Ouvrages	Avaloire, trou d'homme :	Caniveau :	Drainage Pipe Canalisation d'évacuation	Drainage, fossé
	L'évaluation de l'état est fonction du couvercle, de la grille et du cadre et est déterminé pour chaque point.	L'évaluation de l'état est basée sur une évaluation globale tous les 100m de long.		L'évaluation de l'état est basée sur une évaluation globale tous les 100m de long.
Illustrations				
Unité	Localisation (nombre)	mètre linéaire	Mètre linéaire	Mètre linéaire
Causes	Absence, fissuration ou endommagement du couvercle. Grille ou couvercle basculant engendrant un bruit intrusif dans les zones urbaines. Corrosion majeur de la ferronnerie. Effondrement de la chambre, avaloire, cadre et/ou détérioration de la surface autour du couvercle.	Fissuration/déformations sévères ou alignement des composants affectant de manière négative les performances structurelles ou hydrauliques ou la durabilité des composants ou système de drainage. Corrosion sévère de la grille métallique (si utilisée). Défaillance ou dysfonctionnement des équipement de déversoir. Défaillance de la surfaces environnantes.	Sévère Fissuration/ déformation/ alignements du système de drainage par canalisation affectant négativement les performances structurelles ou hydraulique ou la durabilité des composantes du système. Défaillance ou déformation des surfaces environnantes. Obstructions importants de l'écoulement des eaux de drainage, entraînant des eaux stagnantes sur la chaussée environnante.	Envahissement, débris et déchets provoquant des obstructions, des stagnations d'eau. Défectuosité des fossés engendrant des nuisances aux terrains environnants. Effondrement des berges provoquant l'interruption complète de l'écoulement de l'eau. Sévère fissuration des béton ou des fossés revêtus.
Evolution	• Différence du niveau avec la chaussée • Bouchage et vides Danger pour les usagers	Obstruction de l'écoulement de l'eau Différence du niveau avec la chaussée, vides	• Inondation • Eau stagnante sur la chaussée	Inondation Eau stagnantes sur la chaussée
Solutions	• Entretien courant et nettoyage • Désenvasement • Remplacement du couvercle endommagé	Entretien courant et nettoyage Désenvasement Réparation ou emplacement de la section endommagée	• Entretien courant • Désenvasement et reconnexion du drainage • Remplacement des canalisation endommagées	• Entretien courant • Désenvasement et reconnexion du drainage • Remplacement des fossés endommagés
Catégorie ST	1	2	2	1
Catégorie OR	Critique	Non Critique	Non Critique	Critique

A. Présentation du Manuel

V. Inspection visuelle pour le SIA

1. Activités préliminaires
   1) Sélection et formation des équipes chargées de la collecte des données
   2) Planification et allocation de la logistique nécessaire à l'exercice
   3) Planification du calendrier de collecte des données
2. Préparation pour la collecte des données
   1) Liste des routes
      - Disponibilité de toutes les sections de routes à étudier
      - Descente sur terrain avec une registre d'inspection
      - Préparation de plan à l'aide d'une carte routière du réseau
   2) Sélection des équipes d'étude
      - Aux moins deux agents d'inspection ayant bénéficiés de formation
      - Un chauffeur capable de transporter l' équipe en toute sécurité en gênant le moins possible la circulation

A. Présentation du Manuel

V. Inspection visuelle pour le SIA

3. Attribution des équipes de terrain
   1) Au moins une équipe par région pour réaliser l'étude en se munissant des documents mentionnées dans la liste des routes
   2) Au moins un agent familier avec le réseau à inspecter dans chaque équipe
   3) Entraide possible entre les équipes de chaque région pour réduire la durée de l'inspection
4. Procédure d'évaluation
   - Collecte de données en identifiant et quantifiant chaque rubrique depuis le véhicule d'inspection roulant à moins de 30km/h. Possibilité d'inspecter environ 80 à 100 kilomètres de sections de route par équipe par jour.
   - Les agents d'inspection ont pour rôle de:
     a) guider le chauffeur à l'aide d'une carte, d'une liste de routes et d'un instrument de mesure de la distance ou d'un odomètre de véhicule;
     b) Recenser les types de dégradation de la surface de la route et déterminer leur étendue et leur gravité.
     c) Enregistrer les évaluations de l'état et les informations sur les équipements de la route.

A. Présentation du Manuel

V. Inspection visuelle pour le SIA

4. Procédure d'évaluation

- Le chauffeur assure:
  a) La conduite prudente et sécuritaire de l'équipe et faire attention au riverain;
  b) La circulation lors de la prise de mesure et observation des dégradations;
- Les étapes à suivre lors de la réalisation des travaux d'inspection:
  a) S'assurer que tous les matériels nécessaires pour la journée sont en bon état.
  b) Les formulaires d'inspections doivent être placés sur un porte-bloc. Lorsqu'un formulaire est rempli, retirez-le du porte-bloc et mettez-le dans une chemise.
  c) Rouler lentement, évaluer section par section. Les sections sont divisées en sous-sections à la discrétion de l'évaluateur en fonction de l'état de la surface.
  d) Les sections de caractéristiques homogènes sont basées sur l'état de la route, l'inventaire ou le trafic.
  e) S'arrêter aussi souvent que possible pour améliorer la précision de l'évaluation. Sortir de la voiture lorsqu'une section présente des dégradations importantes et variables.

A. Présentation du Manuel

V. Inspection visuelle pour le SIA

5. Matériels et personnel

Les moyens à mettre à la disposition de la mission:

a) 2 agents (au moins un Ingénieur et un Technicien expérimentés en suivi de réseau)
b) Équipements de couchage
c) Véhicule tout terrain avec chauffeur
d) Ordres de mission
e) Viatique
f) Machine à calculer
g) 1 lot d'équipements manuels : marteau, angady, pelle, aiguille de maçon, brosse métallique, etc.
h) Fiche de relevé des dégradations en rapport avec la longueur de l'itinéraire
i) Schéma d'itinéraire renseigné et dernier diagramme d'aménagement si possible
j) Appareil photo numérique, GPS
k) Micro-ordinateur portable si possible
l) Cyclomètre ou double ou quintuple décamètre
m) Mètre ou double ou triple mètre
n) Piquets en bois en quantité suffisante suivant la longueur de l'itinéraire et des dégradations attendues
o) Peinture blanche et rouge, diluant, pinceaux
p) Parapluie, imperméable, bottes, etc.

A. Présentation du Manuel

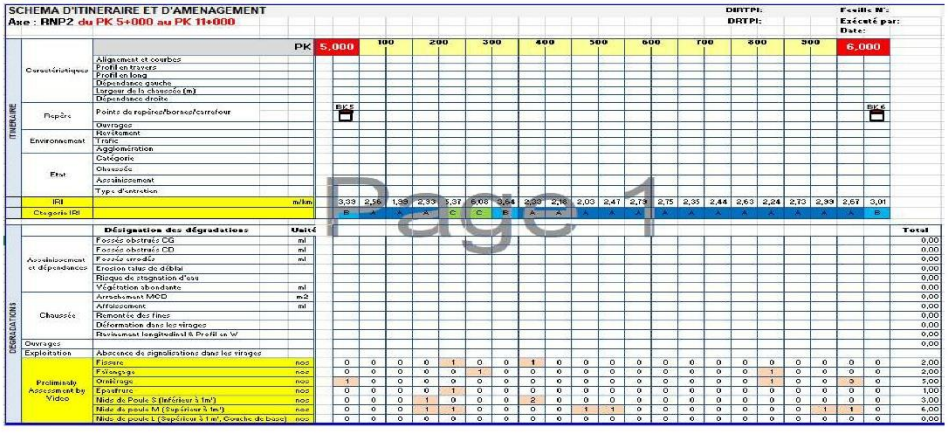
V. Inspection visuelle pour le SIA

6. Fiche d'étude
   - Fiches utilisées pour évaluer l'état des routes revêtues et non revêtues ainsi que des équipements durant l'étude.
   - Se référer au chapitre 4 pour l'identification et l'évaluation de chaque dégradation
7. Rubrique du SIA
   - Les rubriques IRI, catégorie d'IRI et l'évaluation préliminaire par vidéo ont été ajoutées aux rubriques habituelles du SIA.
     - ✓ IRI: valeurs d'IRI tout les 50 mètres ;
     - ✓ Catégorie d'IRI: catégorie d'IRI correspondant au degré de dégradation de la chaussée (*cf Tableau 6-1 Etat de la Route et plage de données de l'IRI)* ;
     - ✓ Evaluation préliminaire par vidéo: identification des dégradations avec leurs nombre.

A. Presentation of the Manual

V. Inspection visuelle pour le SIA

7. SIA



A. Présentation du Manuel

VI. Evaluation des dégradation

Catégories	définition	intervention
Structurelle	• Classe 1 ✓ Dégradations touchant l'ensemble ou l'une des couches de la chaussée et portant atteinte à l'état structurel de la chaussée (déformations et fissurations par fatigue)	planifié
	• Classe 2 ✓ Dégradations superficielles de la chaussée	
Opérationnelle	• Dégradations critiques ✓ Risques immédiats ou imminents pour les usagers ou les tiers ✓ Risques pouvant interrompre la circulation	Au plus tard quatre semaines
	• Dégradation non critiques ✓ Pas de risques immédiats ou imminents pour les usagers de la routes ✓ Pas de risque d'interruption du trafic.	Dans le cadre du programme prévu

A. Présentation du Manuel

VI. Evaluation des dégradation

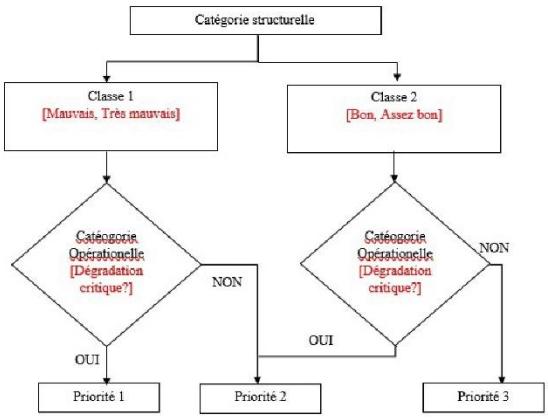
Tableau 6-1 Etat de la Route et plage de données de l'IRI

Etat		Route revêtue				Route non revêtue	
		Dégradations			IRI	Dégradations	IRI
A	Bon		Aucun	Route entretenable avec quelques fissures pas plus de 5%	0.0-3.0	Route entretenable avec les cambrure et drainage intactes	Inférieur à 5.0
B	Assez bon		Couche de roulement	Route entretenable avec faïençage, fissure longitudinale, fissure transversal et délaminages pas plus de 20%	3.0-5.0	Route entretenable dont les cambrure et drainage nécessitent un léger entretien. Ou route sablonneuse plate.	5.0-8.0
C	Mauvais		Couche de roulement et couche de base	Route entretenable dont 20% à 50% de la surface de la route est dégradée.	5.0-10.0	Route entretenable dont les cambrure et drainage nécessite quelque reprofilage.	8.0-12.0
D	Très mauvais		Déformation de la chaussée	Route non entretenable dont plus de 50% de la surface dégradée.	Plus de 10.0 ou non mesurable	Praticable mais non maintenable. Pas de cambrure. Nécessite un rétablissement.	Plus de 12.0 ou non mesurable

A. Présentation du Manuel

VI. **Evaluation des dégradation**

Figure 6-1 Combinaison de la catégorie de structure et de la priorité avec la catégorie d'exploitation de la route



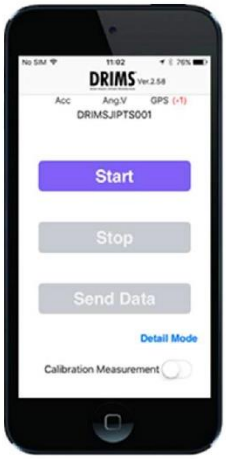
F3LTM
FAMPIVOARANA NY FAHAIZA-MITANTANA AMIN'NY FIKOJAKOJANA NY LALANA SY NY TETEZANA ETO MADAGASIKARA

Merci de votre Attention

Thank you very much for your attention

APPENDIX 2 : iDRIMS USER GUIDE

GUIDE D'UTILISATION DU SYSTEME DE SUIVI INTELLIGENT A REPONSE DYNAMIQUE (iDRIMS)



PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

C'est quoi iDRIMS?

Dynamic Response Intelligent Monitoring System
Traduit par « Système d'observation intelligent de type réponse dynamique »

À quoi ça sert?

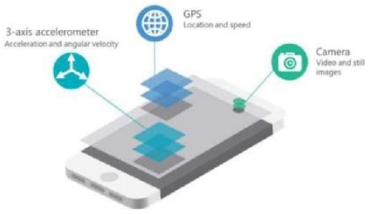
iDRIMS peut collecter des données sur la surface de la route de manière intensive et économique avec un simple smartphone installé dans le véhicule.

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Comment fonctionne iDrims

En analysant les données mesurées par le capteur installé dans le smartphone, il est possible d'évaluer de manière précise et quantitative l'état de la surface de la route.

En appliquant l'IA aux images pendant la conduite, il est possible de détecter les déformations de la surface de la route telles que les nids-de-poule et les fissures.

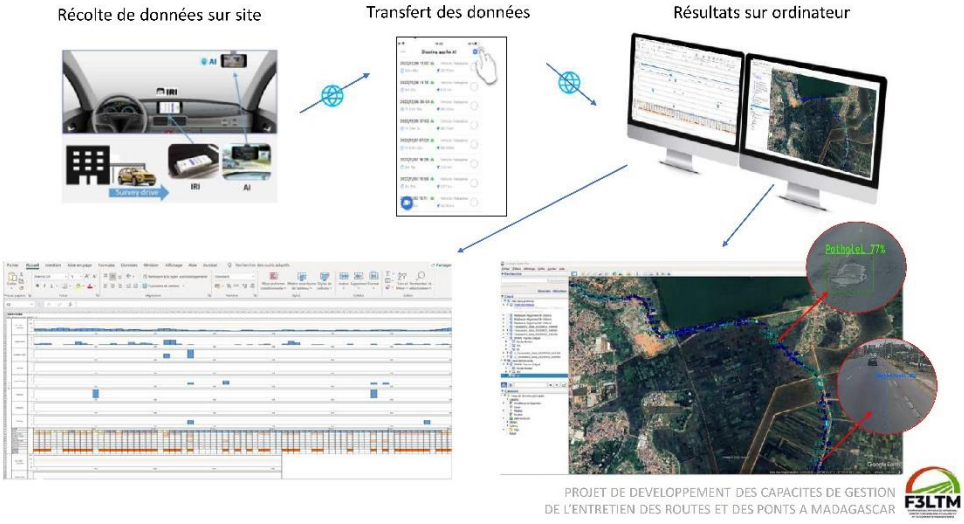


PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Récolte de données sur site

Transfert des données

Résultats sur ordinateur



PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Indice international de rugosité (IRI)

par iDRIMS Measurement

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Installation de l'application sur Smartphone



L'application appelé "iDRIMS Measurement" peut être installé sur un appareil iOS à travers App Store (utilisation gratuite).

Ouvrir l'App Store dans le smartphone

Taper "iDRIMS Measurement" dans la barre de recherche et sélectionner



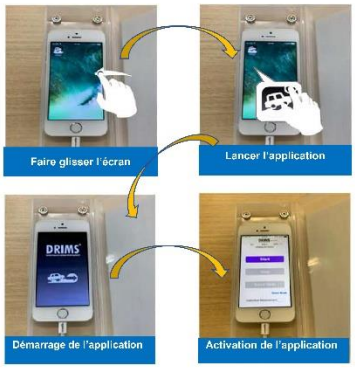
Appuyer sur obtenir



Attendre le chargement

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Activation de l'application



PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Réglage initial

ETAPE 1 :
Définir le "ID" pour identifier le véhicule

1) Touchez "Detail mode" sur l'iPhone

2) Lorsque l'écran bascule, appuyez sur "Configuration",



PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

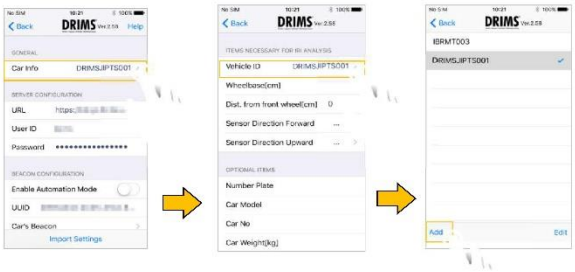
Réglage initial

ETAPE 2 :
Définir le "ID" pour identifier le véhicule

1) Lorsque l'écran de réglage est affiché, appuyer sur "Car info".

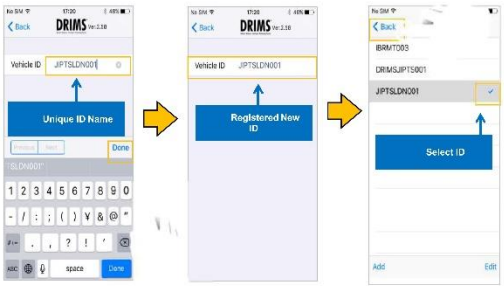
2) Lorsque l'écran bascule, appuyer sur "Vehicle ID".

3) Si vous avez auparavant enregistré un autre « Vehicle ID », touchez "Add" comme indiqué.



PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Réglage initial



ETAPE 2 :
Définir l' "ID" pour identifier le véhicule

Sur cet écran, enregistrer un identifiant unique (exemple : RN2_JUIN_2024) et appuyer sur « Done »



Vérifier l'identifiant avec la marque "✓" inscrite dans le registre des résultats de mesure.

Lorsque l'enregistrement de l'ID est terminé, veuillez appuyer sur "Back".



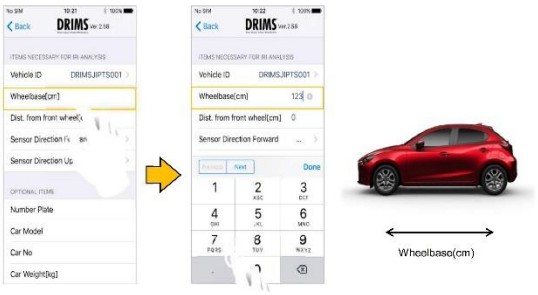
PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Réglage initial

ETAPE 3 :
Enregistrer les informations de spécification du véhicule

Wheelbase = Empattement

Distance, en centimètres, entre les axes de l' essieu avant et de l'essieu arrière



PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Réglage initial

ETAPE 3 :
Enregistrer les informations de spécification du véhicule

Choix de l'emplacement de l'iPhone sur une surface plane du véhicule.

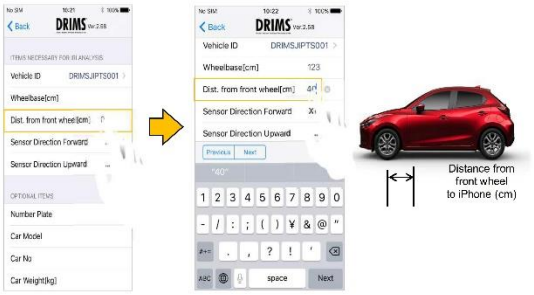


PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Réglage initial

ETAPE 3 :
Enregistrer les informations de spécification du véhicule

Distance from front wheel
=
Distance, en centimètres, entre l'axe de l'essieu avant et l'emplacement de l'iPhone dans la voiture



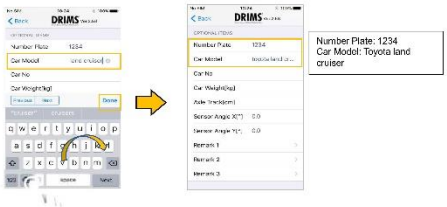
Réglage initial

ETAPE 4 :
Enregistrer les informations concernant le véhicule

Number plate
=
Plaque d'immatriculation

Car Model
=
Modèle de la voiture





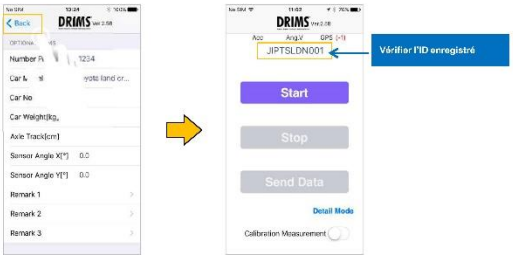
Réglage initial

ETAPE 5 :
Sélection de l'ID du vehicule enregistré

Après avoir terminé l'enregistrement:

Appuyer sur Back plusieurs fois et revenir à l'écran d'accueil de l'application.

Vérifier si l'ID enregistré est affiché à l'écran.



Installation de l'iDRIMS à l'intérieur du véhicule

Installer l'iPhone sur une surface plane de votre véhicule

Vérifier que l'iPhone est installé horizontalement ou verticalement avec une fixation ferme sur une surface plane.

Vérifier que le port de recharge soit facilement accessible

a) Fixer l'iPhone directement



b) Fixer l'iPhone via un boitier



Installation de l'iDRIMS à l'intérieur du véhicule



Lorsque iDRIMS est utilisé sous une forte insolation solaire pendant une longue période, l'iPhone peut surchauffer et s'arrêter. Lorsqu'il est utilisé en été ou dans les zones tropicales, les emplacements d'installation hors du tableau de bord sont recommandés



Vous pouvez utiliser les emplacements 1 et 2 si vous pouvez mettre des dispositifs d'ombrage couvrant l'iPhone et/ou si vous en disposez



Les emplacements 3, 4 , 5 le coffre ou le plancher des sièges passagers sont d'autres possibilités, tandis que la réception du signal GPS doit être examinée attentivement

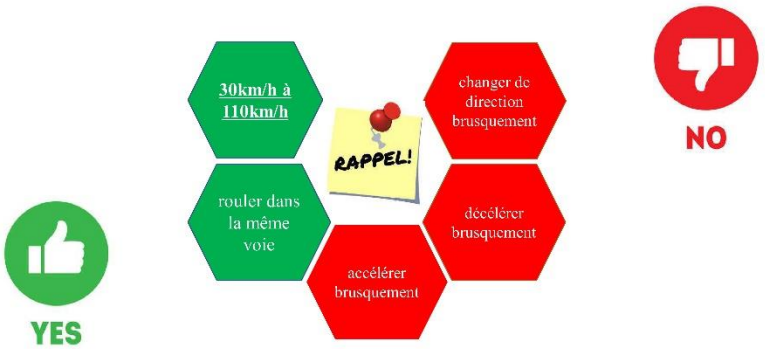
Mesure de l'IRI

ETAPE 1 :

Avant de passer à la mesure de l'IRI:

- désactiver le bouton de mesure de l'étalonnage
- vérifier que la couleur de tous les boutons passe au bleu





S'il y a des nids de poule ou des déformations sur la voie à inspecter, ralentir et conduire à travers au lieu de changer de voie.

Mesure de l'IRI

ETAPE 2 :

- Aller ou point de départ et appuyer sur "Start" et conduire



ETAPE 3 :

- Quand la mesure est finie, appuyer sur « Stop »



PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR
F3LTM

Mesure de l'IRI

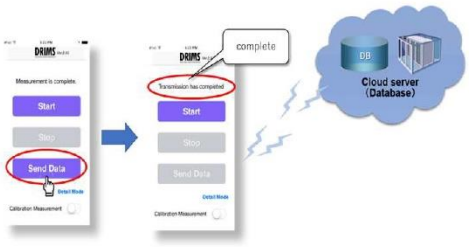
ETAPE 4 :

Envoyer les données sur le serveur

cliquer sur
→ "Detailed Mode "
→ "Data Management "
→ "Measurement Data"
→ puis sélectionner les données de mesure à analyser.

De cette façon, les données originales seront **conservées** dans l'iPhone

Tandis que les données seront **supprimées** en utilisant **"Send Data".**



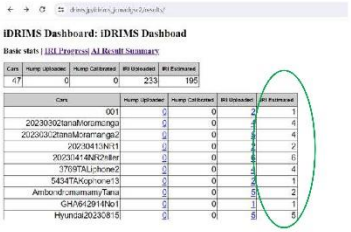
Confirmation des résultats des données de mesure de l'IRI

ETAPE 4 :

Envoyer les données sur le serveur

- visiter « iDRIMS Dashboard » sur https://www.drims.jp/idrims_jcmadgsc2/results/
- entrer l'identifiant et le mot de passe





- confirmer le téléchargement des données

s'il y a un nombre sous la colonne « IRI Estimated » du tableau, cela signifie que les données de mesure de l'IRI, correspondant au modèle de voiture utilisé pour la mesure préalablement étalonnée par le dos d'âne, envoyées sur le serveur ont été estimées et peuvent être téléchargées

Confirmation des résultats des données de mesure de l'IRI

Cars	Hump Uploaded	Hump Calibrated	IRI Uploaded	IRI Estimated
001	0	0	2	1
20230302tanaMoramanga	0	0	4	4
20230302tanaMoramanga2	0	0	5	4
20230413NR1	0	0	4	2
20230414NR2aller	0	0	6	6

En cliquant sur le numéro de l'IRI téléchargé, vous accéderez à une page (page de progression de l'IRI).

Car ID	Date	Time	Download	IRI progress
20230302tanaMoramanga	2023/03/02	15:22:50	Download	log|csv|kml|kmld
20230302tanaMoramanga	2023/03/02	12:21:42	Download	log|csv|kml|kmld
20230302tanaMoramanga	2023/03/02	08:43:56	Download	log|csv|kml|kmld
20230302tanaMoramanga	2023/03/02	07:17:13	Download	log|csv|kml|kmld

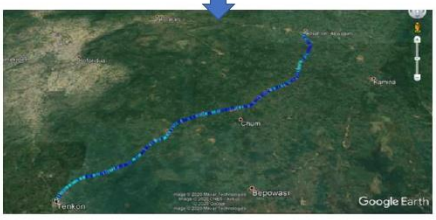
Les données de l'IRI sont disponibles en différents formats sous la colonne « IRI Progress ».

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Analyses et visualisation de l'IRI

Car ID	Date	Time	Download	IRI progress
20230302tanaMoramanga	2023/03/02	15:22:50	Download	log|csv|kml|kmld
20230302tanaMoramanga	2023/03/02	12:21:42	Download	log|csv|kml|kmld
20230302tanaMoramanga	2023/03/02	08:43:56	Download	log|csv|kml|kmld
20230302tanaMoramanga	2023/03/02	07:17:13	Download	log|csv|kml|kmld

Format de fichier KML : qui aide à visualiser et à analyser les données estimées de l'IRI .





PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Identification des dégradations

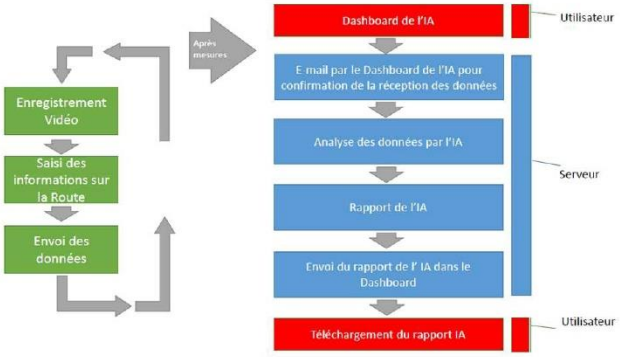


par Shooting app for AI

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

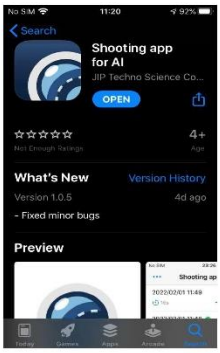
IA Identification des dégradations

Organigramme de préparation du rapport de l'IA



PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Installation de l'application sur Smartphone



Ouvrir l'App Store dans le smartphone

Taper "Shooting app for AI" dans la barre de recherche et sélectionner



Appuyer sur obtenir



Attendre le chargement

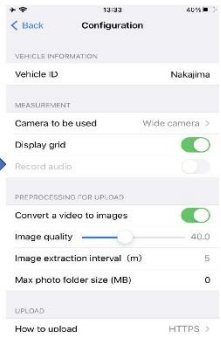
PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

F3LTM

Paramétrage initial

1) Allez au paramètre pour l'encodage des informations URL





Vehicle ID : enregistrer les informations sur le véhicule

Measurement : pas nécessaire de modifier

Convert a video to image : ON

Image quality : 40 par défaut. 100 pour une qualité élevée. Si la connexion Internet est faible, la qualité de l'image peut être réduite jusqu'à 20.

Image extraction interval : 5 (m) par défaut.

Max photo folder size (MB) : 0 par défaut, pas nécessaire de modifier

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

F3LTM

Préparation à l'avance



Recouvrir le tableau de bord d'un tissu non brillant pour éviter les reflets



Régler l'accessoire de manière à ce qu'il soit immobile

Attachez l'iPhone avec le support indiqué

Bien fixer pour que l'iPhone ne vibre ni ne bouge pendant la prise de vidéo

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR F3LTM

Préparation à l'avance





Dans le cas où la rotation de l'iPhone est verrouillée, un message d'avertissement apparaîtra, l'interface ne pivotera pas, le bouton d'enregistrement apparaîtra sur le côté droit pour que l'utilisateur le trouve.

VERIFIER QUE L'ORIENTATION AUTOMATIQUE EST ACTIVEE

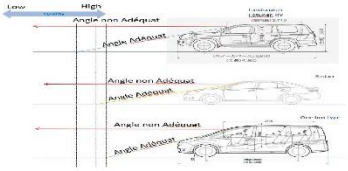
PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR F3LTM

Préparation à l'avance



1 Bien cadrer la surface à analyser

Ajuster l'angle de sorte que la cible (+) prenne la surface de la route. La caméra est normalement légèrement orientée vers le bas de manière à ce que le centre de la croix soit sur la chaussée et non sur la voiture qui précède





L'IA détecte les dégradations qui entrent dans la zone en rouge délimitée par le cadre pointillée jaune.

Vérifier également que des objets inutiles ne se trouvent dans le champ de vision de la caméra, tels que les autocollants sur la vitre avant, les objets sur le tableau de bord qui réfléchissent la lumière du soleil

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Prise de vidéo (démarrage)



1 Après avoir activé la caméra, attendez que les informations GPS soient acquises



2 Appuyer sur la cible (+) pour activer l'autofocus



3 Appuyer sur le bouton rouge pour commencer la prise de vue

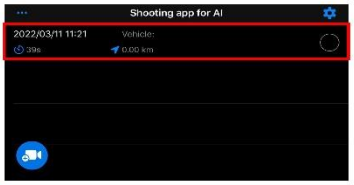


PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Prise de vidéo (terminée)



1 Appuyer sur le bouton rouge pour arrêter la prise de vidéo



3 Lorsque les historiques de date et d'heure s'affichent, l'enregistrement vidéo est terminé

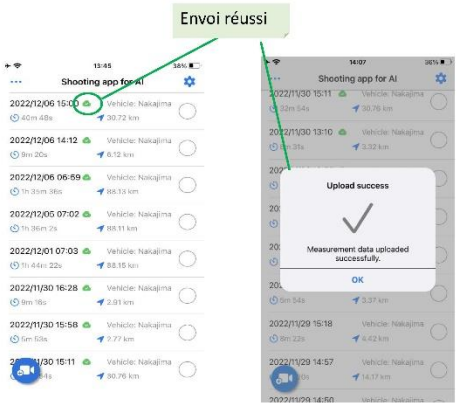


2 Lorsque la boîte de dialogue de confirmation de la fin de la prise de vidéo s'affiche, appuyez sur "Yes"

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Envoi des données

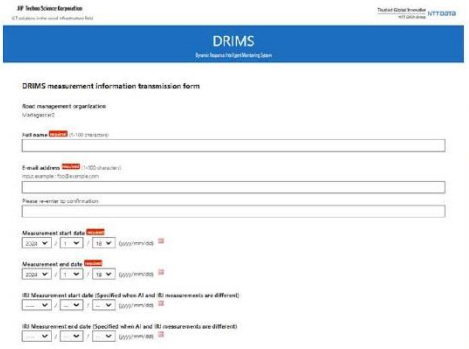




PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Dashboard de l'IA

Project	URL
Madagascar phase 2	https://www.jip-ts.co.jp/en/drims/mesurement_form.html?org=Madagascar2



Entrer les données :

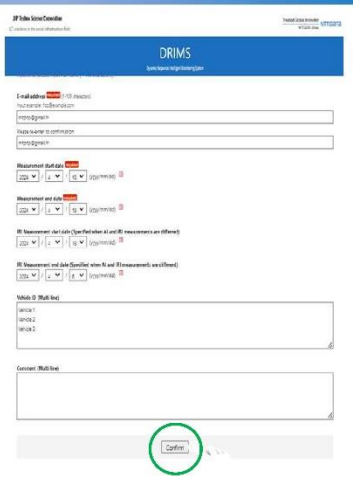
- Nom
- Adresse e-Mail
- Date de mesure (début, fin)

Si la date de mesure de l'IRI et de l'IA est différente :

- Date de mesure de l'IRI
- Information sur le véhicule (une selection multiple est possible)
- Commentaires

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Dashboard de l'IA



Confirmer [Confirm]

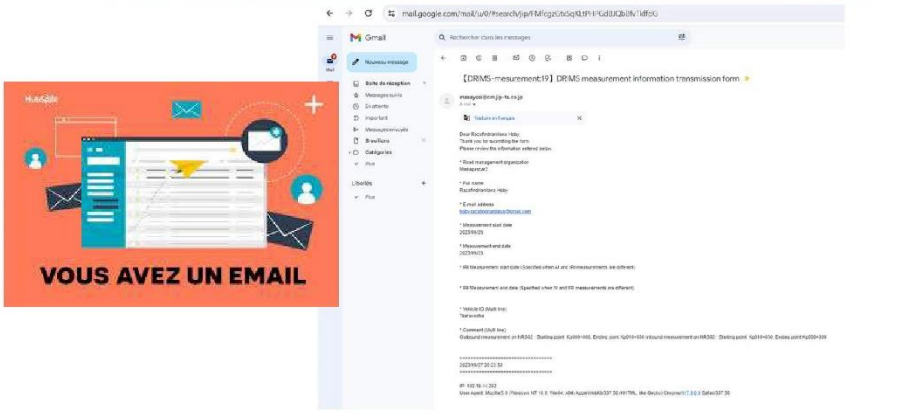
puis

Soumettre [Submit]



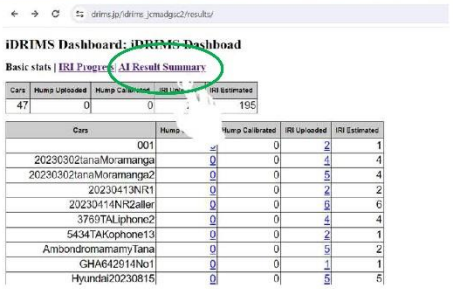
PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Dashboard de l'IA



PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Dashboard de l'IA



Cars	Hump Uploaded	Hump Calibrated	IRI Uploaded	IRI Estimated
47	0	0	1	195

Cars	Hump	Hump Calibrated	IRI Uploaded	IRI Estimated
001	4	0	2	1
20230302tanaMoramanga	0	0	4	4
20230302tanaMoramanga2	0	0	5	4
20230413NR1	0	0	2	2
20230414NR2aller	0	0	6	6
3760TALiphone2	0	0	4	4
5434TAKophone13	0	0	2	1
AmbondromamamyTana	0	0	5	2
GHA642914No1	0	0	1	1
Hyundai20230815	0	0	5	5

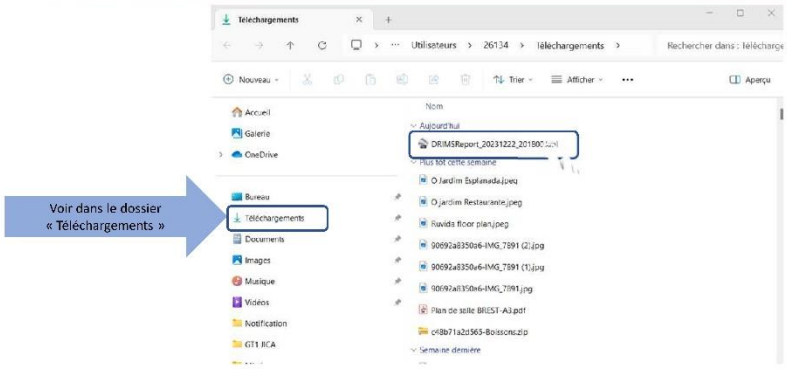


Report group	Summary	Visualization	Photos
20231222_201800	xlsx	kml	zip
20230927_202400	xlsx	kml	zip
20230824_211800	xlsx	kml	zip

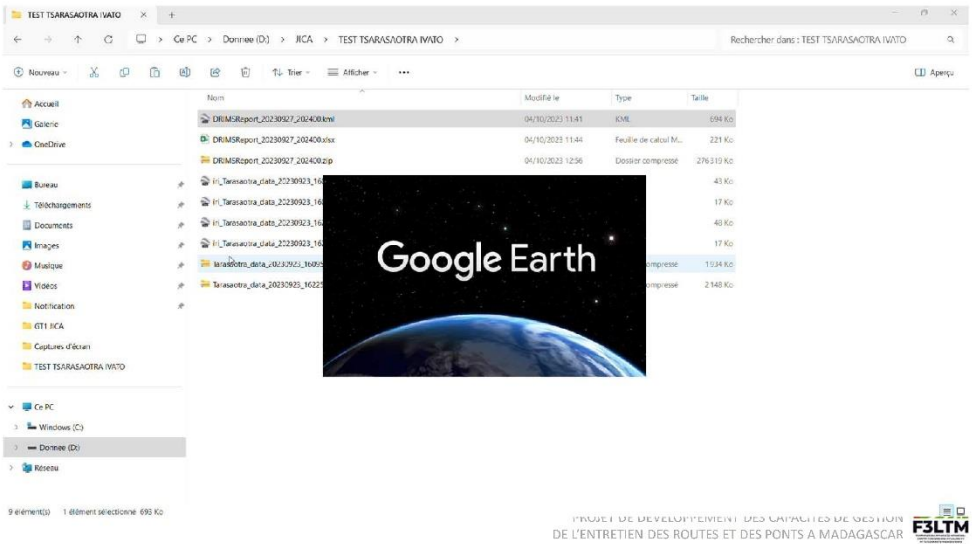
LIEN de téléchargement

PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

Dashboard de l'IA



PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR



PROJET DE DEVELOPPEMENT DES CAPACITES DE GESTION
DE L'ENTRETIEN DES ROUTES ET DES PONTS A MADAGASCAR

APPENDIX 3 : BRIDGE INSPECTION AND DIAGNOSIS METHOD

PROJET DE DEVELOPPEMENT DE CAPACITE DE GESTION DE L'ENTRETIEN DES ROUTES ET DES PONTS
(Phase 2)

Cours d'Animation
Inspection et Diagnostic des Ponts
Préparé par GT2

Février 2024

CTI Engineering International Co., Ltd.
OCGLOBAL
CHODAI CO.,LTD.

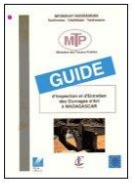
1. Contenu de la présentation
Presentation contents

Page-2

- **Présentation du Manuel** (Presentation of the Manuel)
- **Systèmes d'inspection de pont** (Bridge inspection system)
- **Equipements requis pour une inspection** (Inspection tools)
- **Diagnostic de solidité** (Soundness diagnosis)
- **Evaluation du degré de dégradation et Plan d'Action y afférent** (Evaluation of degree of damage and related Action Plan)
- **Type de dégradation et classification de l'évaluation** (Damage type and classification of the evaluation)

1. Présentation du Manuel
Presentation of the Manuel





F3LTM

JICA



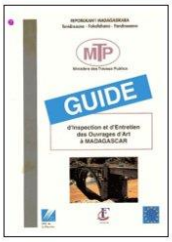
1. Présentation du Manuel
Presentation of the Manuel

- **Le concept de l'IT88 a été suivi comme base pour la préparation du Manuel**
  The idea of IT88 is followed as a standard for preparation of the Manual
- **Les dispositions générales du Manuel ont été préparées en tenant compte de celles du Guide existant**
  General arrangement of the Manual are prepared taking into account the existing Guideline

Ex : règles générales, terminologie, définition des éléments à enregistrer, etc…

Eg: General rules, terminology, definition of item to be recorded, …





Mis à jour et améliorés par le savoir-faire et l'expérience du Japon
Updated and improved with the Japanese know-how and experience

1. Présentation du Manuel
Presentation of the Manuel



07 CHAPITRES : 07 CHAPTERS

1) **INTRODUCTION** / Introduction
2) **SYSTÈME D'INSPECTION** / System of inspection
3) **TYPES DE DEGRADATION ET CRITERE D'EVALUATION DU DEGRE DE DEGRADATION**
   Type of Damage and evaluation criteria for degree of damage
4) **GUIDE POUR REMPLIR LES FICHES D'INSPECTION PERIODIQUE**
   Guideline for filling in periodic inspection results
5) **PONTS EN ACIER** / Steel bridges
6) **PONTS EN BETON** / Concrete bridges
7) **INFRASTRUCTURE ET FONDATIONS**
   Substructure and Foundations

2) Systèmes d'inspection de pont
Bridge inspection system

Page-6

Type d'Inspection *(Inspection type)*	Description *(Description)*	Objectifs *(Objectives)*
Suivi de réseau Network monitoring	Inspection visuelle depuis un véhicule de patrouille Visual inspection from inside the road patrol vehicle	S'assurer que le pont est fonctionnel et détecter les menaces de coupure ou d'atteinte à la sécurité des usagers To ensure that the bridge is functional and to detect threats of traffic cuts or user safety
Inspection périodique Periodic inspection	Inspection visuelle minutieuse utilisant le test au marteau et jauge de fissures Closely visual inspection using hammer tapping test and crack width ruler	Diagnostiquer le degré de solidité, relever toutes les anomalies et dégradations Diagnosis of soundness, record all anomalies and damages
Inspection intermédiaire Interim inspection	Inspection visuelle depuis les installations d'inspection, effectuée entre deux inspections périodiques en complément de ces dernières Visual inspection from existing inspection facilities, conducted between two periodic inspections to supplement of periodic inspection	Apprécier l'évolution de l'état du pont depuis la dernière inspection périodique To assess the evolution of the condition of the bridge since the last periodic inspection
Inspection spécifique Specific inspection	Inspection ciblée, pour des dégradations spécifiques utilisant des tests non-destructifs Targeted inspection, for specific damages with non-destructive testing	Suivre l'évolution d'une dégradation spécifique pour déterminer la solution adéquate To assess the evolution of the damage in order to identify the appropriate solution
Inspection inopinée Abnormal inspection	Inspection effectuée après catastrophe ou accident majeur (tremblement de terre, cyclone,…) Inspection conducted in case of disaster or major accident (earthquake, cyclone…)	Vérifier l'état du pont pour prendre les mesures nécessaires Check the condition of the bridge in order to take the necessary measures

2) Systèmes d'inspection de pont
Bridge inspection system

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Redynamisation du système d'inspection des ponts :
Revitalization of the bridge inspection system

- **Suivi de réseau**
  Network monitoring
- **Inspection périodique**
  Periodic Inspection
- **Inspection intermédiaire**
  Interim Inspection
- **Inspection spécifique**
  Specific Inspection
- **Inspection inopinée**
  Abnormal Inspection

Tablette / Smartphone
Tablet / Smartphone

Cible du Manuel
Manual Target

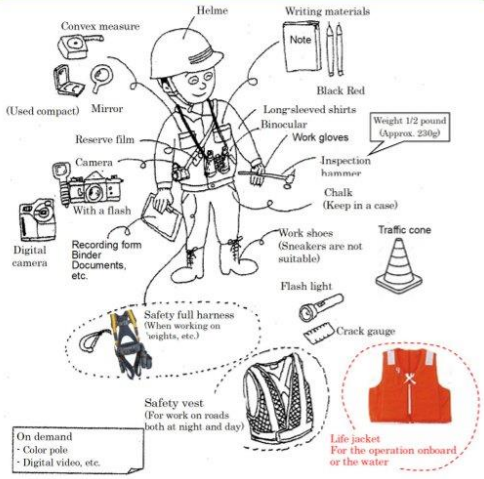




Amélioration de la gestion des ponts
Improvement of bridge management

3) Equipements requis pour une inspection
Inspection tools

Page-8



- **Soyez bien préparé pour une inspection efficace et sûre.**
- **Outils permettant d'effectuer des inspections visuelles de près.**
- **Des outils pour contrôler le trafic.**

Outils d'inspection	Jumelles, marteau d'inspection (environ 230 g), mètre ruban, jauge de fissure, niveau à bulle, plum-bob, perche, etc.
Documents	Fiche de relevé, plans de construction, journal de bord, cartes, documents, etc.
Outils de relevé	Appareil photo numérique, caméra vidéo, craie, tableau noir, marqueur, échelle, stylos et crayons.
Outils d'inspection supplémentaires	Outils de nettoyage, régulateurs de trafic, corde, scie et ruban adhesif
Outils d'accès	Miroir d'inspection, lampe de poche, échelle, bateau ou barge
Sécurité	Gilet de sécurité, casque, harnais complet de sécurité, chaussures de chantier, gants, gilet de sauvetage (pour les opérations à bord ou dans l'eau), cordes, etc.

4) Diagnostic de solidité
Soundness diagnosis

Page-9

Diagnostic de la solidité du pont :
Classification du jugement en 04 catégories

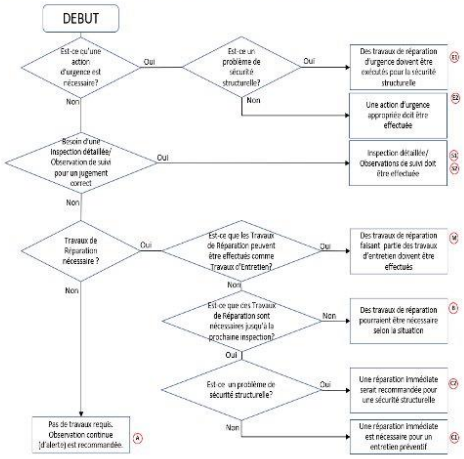
Soundness Diagnosis :
04 soundness judgment classification

Outil de décision et de programmation
Decision and planning tool

Classification		Etat
I	Solide	État du pont dont la fonctionnalité n'est pas altéré.
II	Phase d'entretien préventif	Fonctionnalité du pont non altéré. Cependant, il est préférable de prendre des mesures relatives à un entretien préventif.
III	Phase d'anticipation de solution	Il est possible que l'état du pont soit inquiétant. Des mesures doivent être prises dès que possible.
IV	Phase d'intervention d'urgence	Le pont est dans un état critique. Des mesures urgentes doivent être prises.

5) Evaluation du degré de dégradation et Plan d'Action y afférent
Evaluation of degree of damage and related Action Plan

Page-10



Evaluation du degré de dégradation et Plan d'Action y afférent
Evaluation of degree of damage and related Action Plan

Outil de décision et de programmation
Decision and planning tool

5) Evaluation du degré de dégradation et Plan d'Action y afférent

Evaluation of degree of damage and related Action Plan

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Action	Descriptions
A (No action)	• Aucun travail n'est nécessaire parce qu'il n'y a pas de dégradation ou qu'il y a des dégradations mineures.
B (Damaged but No Action)	• La cause et l'étendue des dégradations sont évidentes, et même si on les laisse en l'état, la sécurité structurelle ne sera pas compromise de manière significative jusqu'au prochain contrôle périodique ; cependant, des travaux de réparation sont nécessaires.
C1 (Repair for Preventive Maintenance)	• La dégradation est en évolution, et du point de vue de la durabilité (entretien préventif), le pont doit être réparé au moins avant la prochaine inspection périodique. • Du point de vue de la sécurité de la structure du pont, il n'est pas assez urgent de le réparer immédiatement..
C2 (Repair for progressed damage)	• Les dégradations ont progressé à un degré considérable et la fonction et la sécurité du composant ou de l'élément en question ont été fortement réduites, et la réparation est nécessaire au moins avant la prochaine inspection périodique du point de vue de la sécurité de la structure du pont. • Si une seule dégradation s'applique à la fois à C1 et à C2, classer C2. Si une enquête sur la cause de la dégradation est nécessaire, classer la dans la catégorie S1. Si l'ampleur des travaux de réparation peut être gérée par des travaux d'entretien, la dégradation est classée M.

5) Evaluation du degré de dégradation et Plan d'Action y afférent

Evaluation of degree of damage and related Action Plan

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Action	Descriptions
E1 (Emergency)	• La sécurité structurelle du pont est gravement compromise et des mesures d'urgence sont nécessaires.
E2 (Emergency)	• Des mesures d'urgence sont nécessaires du point de vue de la prévention des dégradations causés aux tiers.
M (Maintenance)	• Des dégradations sont présentes et doivent être traitées dans le cadre de travaux d'entretien de routine afin de maintenir la fonction de l'élément ou du composant en bon état.
S1 (Supplemental Investigation)	• Dégradation nécessitant une enquête détaillée pour déterminer sa cause et évaluer la nécessité d'une réparation. • Pour les dégradations autres que C1 et M, il est préférable de recourir à S1, à moins que la cause ou l'ampleur de la dégradation ne soit connue.
S2 (Supplemental Monitoring)	• Les dégradations qui ne sont pas éligibles à une enquête détaillée, mais qui nécessitent une surveillance. (par exemple, développement d'une fissure de retrait de séchage).

6) Type de dégradation et classification de l'évaluation

Damage type and classification of the evaluation

Page-13

- La détérioration et l'endommagement des ponts sont consignés sur des fiches d'inspection dans 26 catégories.

Matériau	No.	Type de Dégradation	Classe				
			a	b	c	d	e
Elément métallique	①	Corrosion	•	•	•	•	•
	②	Fissure	•		•		•
	③	Desserrage, perte de boulon	•		•		•
	④	Fracture	•				•
	⑤	Détérioration du système anti-corrosion	•		•		•
Elément en béton	⑥	Fissure	•	•	•	•	•
	⑦	Effritement, Exposition des armatures	•		•	•	•
	⑧	Infiltration d'eau, Carbonatation	•		•	•	•
	⑨	Chute	•				•
	⑪	Fissuration de la dalle du tablier	•	•	•	•	•
	⑫	Délamination	•				•
Autres	⑬	Espacement latéral anormal	•		•		•
	⑭	Surface de la route irrégulière	•		•		•
	⑮	Défaillance au niveau de la chaussée	•		•		•
	⑯	Disfonctionnement des appareils d'appuis	•				•
	⑰	Autres facteurs	•				•

Matériau	No.	Type de Dégradation	Classe				
			a	b	c	d	e
Commun	⑩	Défaillance d'un élément réparé ou renforcé	•		•		•
	⑱	Anomalie au niveau de l'ancrage	•		•		•
	⑲	Décoloration, Détérioration	•				•
	⑳	Infiltration d'eau, Flaque d'eau	•				•
	㉑	Bruit bizarre, Vibration inhabituelle	•				•
	㉒	Flèche inhabituelle	•				•
	㉓	Déformation, Cassure	•		•		•
	㉔	Accumulation des Sédiments	•				•
	㉕	Tassement, Déplacement, Inclinaison	•				•
	㉖	Affouillement	•				•

Dégradation de l'élément en acier

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① Corrosion
② Fissure
③ Desserrage, perte de boulon
④ Fracture
⑤ Détérioration du système anti-corrosion

(1) Corrosion

1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Classe	Etat général	
	Profondeur de la dégradation	Surface de la dégradation
a	Pas de dégradation	
b	Faible	Faible
c	Faible	considérable
d	considérable	Faible
e	considérable	considérable

2) Etat général de chaque facteur

Degré	Etat général
Elevé	Il y a un gonflement important de la surface de l'acier ou une diminution importante de l'épaisseur de la plaque par inspection visuelle.
Faible	La rouille n'apparaît qu'en surface et l'inspection visuelle ne révèle pas de diminution significative de l'épaisseur de la tôle.

3) Surface de la dégradation

Degré	Etat général
Elevé	La corrosion se produit sur l'ensemble de la pièce focalisée, ou bien il y a des surfaces considérables corrodées.
Faible	La zone endommagée est faible et locale

2. Des causes de dégradations

- Fuite d'eau au niveau dalle fissurée
- Pas de couche imperméable installée
- Fuite d'eau au niveau du système de drainage
- Fuite d'eau au niveau de la partie endommagée du joint de dilatation
- Environnement naturel (adhésion des sels)

3. Des préoccupations

- Dépassement de la contrainte admissible due à la dégradation de section transversale
- Apparition et progression des fissures dûes à une concentration de contraintes
- La corrosion des poutres principales et des points de raccordement des dalles de pont entraîne une réduction de la rigidité et de la capacité portante.

(1) Corrosion

Type de dégradation	:① Corrosion
l'élément d'objet	:Poutre Principale
Degré de dégradation	: b (Faible, Petite)
Dégradations associés	:⑤
Observations	• Il y a une corrosion localisée sur la poutre principale. La diminution significative de l'épaisseur de la plaque n'est pas reconnue.



Type de dégradations	: ① Corrosion
l'élément d'objet	: Poutre Principale
Degré de dégradation	: c (Faible, considérable)
Dégradations associés	: ⑤
Observations	• Il y a de multiples corrosions élargies sur l'ensemble de la poutre principale. La diminution significative de l'épaisseur de la plaque n'est pas reconnue.



(2) Fissure

1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Classe	Etat général
a	Pas de dégradation
b	-
c	Une fissure de la surface de la peinture est observée sur un joint de changement brusque de section et sur la partie soudée. Il ne s'agit pas d'une fissure de type linéaire. Ou, il s'agit d'une fissure de ligne courte.
d	-
e	Les fissures sont de type longue. La surface de la peinture se brise, ce qui laisse supposer que la fissure s'étend sous le revêtement.

2. Des causes de dégradations

- État des appareils d'appuis (changement dans le système structurel dû à un trouble fonctionnel de l'appareil d'appuis)
- Impact dû à la rugosité de la surface de la route
- Progression de la corrosion
- Limitation de la différence de flèche entre les poutres principales
- Qualité de la construction et concentration des contraintes au niveau des parties soudées

3. Des préoccupations

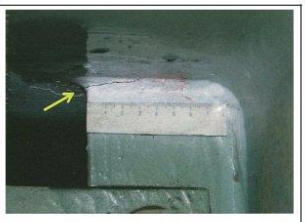
- Dépassement de la contrainte admissible due à une fissure
- Rupture de l'élément due à la progression rapide des fissures

(2) Fissure

Type de dégradations	: ② Fissure de l'acier
l'élément d'objet	: Poutre Principale
Degré de dégradation	: c
Dégradations associés	: N/A
Observations	• Il y a une fissure de peinture sur la partie soudée entre le raidisseur vertical de la poutre principale et la semelle supérieure.



Type de dégradations	: ② Fissure de l'acier
l'élément d'objet	: Poutre Principale
Degré de dégradation	: e
Dégradations associés	: N/A
Observations	• Une fissure du revêtement est apparue sur la partie soudée entre le raidisseur vertical de la poutre principale et la semelle supérieure.



(3) Desserrage, perte de boulon

1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Classe	Etat général
a	Pas de dégradation
b	-
c	Le boulon se desserre et se perd. Le nombre de boulons endommagés est faible. (moins de 5% d'un lot)
d	-
e	Le boulon se desserre et se perd. Le nombre de boulons endommagés est élevé. (plus de 5% d'un lot)

2. Des causes de dégradations

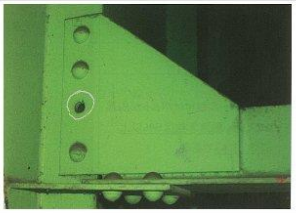
- Corrosion au niveau de la jonction des boulons.
- Vibrations dues au passage des véhicules au vent
- Fracture retardée du boulon à haute résistance (F11)
- Percussion par des véhicules

3. Des préoccupations

- Déformation anormale de la poutre due au glissement de la partie de jonction du boulon.
- Rupture des fixations des supports en raison d'une insuffisance des boulons

(3) Desserrage, perte de boulon

Type de dégradations	: ③ Desserrage, chute d'élément
l'élément d'objet	: Contreventement
Degré de dégradation	: e
Dégradations associés	: N/A
Observations	• Le rivet du contreventement est en train de tomber. Le nombre de rivets tombants pour un groupe est supérieur à 5 %.



Type de dégradations	: ③ Desserrage, chute d'élément
l'élément d'objet	: Boulon d'ancrage
Degré de dégradation	: e
Dégradations associés	: ⑯
Observations	• L'écrou du boulon d'ancrage du roulement est desserré. Le nombre de boulons de desserrement est supérieur à 5 %.



(4) Fracture

1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Classe	Etat général
a	Pas de dégradation
b	-
c	-
d	-
e	Fracture

2. Des causes de dégradations

- Fatigue due à l'effet du vent et à la charge de trafic.
- Progression de la corrosion
- Vibration
- Concentration des contraintes

3. Des préoccupations

- Déformation anormale de la poutre due à la rupture d'un élément

(4) Fracture

Type de dégradations	: ④ Fracture
l'élément d'objet	: Diagonale d'un treillis
Degré de dégradation	: e
Dégradations associés	: N/A
Observations	• La diagonale du treillis s'est fracturé lors d'une collision d'une voiture. C'est une situation où des mesures d'urgence s'impose.



Type de dégradations	: ④ Fracture
l'élément d'objet	: Garde-corps
Degré de dégradation	: e
Dégradations associés	: ①⑤
Observations	• La fracture est due à la progression de la corrosion du garde-corps.



(5) Détérioration du système anti-corrosion

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1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Classe	Etat général
a	Pas de dégradation
b	-
c	Un changement de couleur se produit sur la couche extérieure de la peinture. Il y a un gonflement local.
d	Le décollement se produit sur le revêtement local de peinture, et la couche inférieure au revêtement est exposée.
e	La zone détériorée de la couche de peinture est considérable.

2. Des causes de dégradations

- Infiltration d'eau provenant d'une dalle fissurée.
- Infiltration d'eau de la partie d'installation du dispositif de drainage
- Infiltration d'eau de la partie endommagée du joint de dilatation
- Environnement naturel (adhérence du sel)

3. Des préoccupations

- Possibilité d'évoluer en corrosion

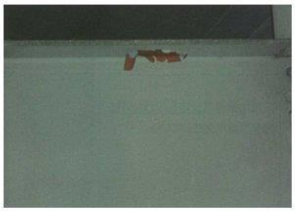
(5) Détérioration du système anti-corrosion

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Type de dégradations	: ⑤Détérioration de la protection anti-corrosion
l'élément d'objet	: Poutre Principale
Degré de dégradation	: c
Dégradations associés	: N/A
Observations	• Un écaillage localisé se produit sur la couche finale de peinture de la poutre principale.



Type de dégradations	: ⑤Détérioration de la protection anti-corrosion
l'élément d'objet	: Poutre Principale
Degré de dégradation	: d
Dégradations associés	: N/A
Observations	• Le revêtement s'est localement écaillé et la sous-couche est exposée sur la semelle supérieure de la poutre transversale.



Dégradation de l'élément en béton

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⑥ Fissure
⑦ Effritement, Exposition des armatures
⑧ Infiltration d'eau, Carbonatation
⑨ Chute d'element
⑪ Fissuration de la dalle du tablier
⑫ Délamination

(6) Fissure

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1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Classe	Degré de dégradation axé sur la largeur maximale de la fissure	Degré de dégradation axé sur l'espacement minimal entre les fissures
a	Pas de dégradation	
b	Faible	Faible
c	Faible	considérable
	moyen	considérable
d	considérable	Faible
	moyen	considérable
e	considérable	considérable

2) Degré de dégradation axé sur la largeur maximale de la fissure

Degré	Etat général
considérable	La largeur de la fissure est considérable. (Structure BA : plus de 0,3 mm, structure BP : plus de 0,2 mm)
Moyen	La largeur de la fissure est moyenne (structure BA: plus de 0,2 mm , moins de 0,3 mm, structure BP: plus de 0,1 mm , moins de 0,2 mm).
Faible	La largeur de la fissure est faible. (Structure BA : moins de 0,2 mm, structure BP : moins de 0,1 mm)

2. Des causes de dégradations

- Résistance caractéristique insuffisante
- Disfonctionnement des appareils d'appuis
- Fissure de cisaillement due à un tremblement de terre
- Insuffisance de la précontrainte
- Insuffisante de la compacité
- Contrainte thermique
- Retrait de séchage
- Défaut de qualité du béton
- Joint de reprise dû au post-coulage
- Tassement du support
- Démoulage précoce
- Tassement irrégulier
- Neutralisation du béton, attaque des chlorures, réaction alcali-silice, réaction chimique

(6) Fissure

3) Degré de dégradation axé sur l'espacement minimal entre les fissures

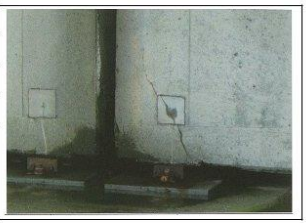
Degré	Etat général
considérable	L'intervalle entre les fissures est faible. (L'intervalle minimal entre les fissures est inférieur à 0,5 mm).
Faible	L'intervalle entre les fissures est important. (L'intervalle minimum entre les fissures est d'environ plus de 0,5 mm).

3. Des préoccupations

- Progression de la fissure due à une surcharge, réduction de la capacité de charge
- Corrosion de l'acier d'armature due à la fissure
- Infiltration d'eau, carbonatation

(6) Fissure

Type de dégradations	: ⑥ Fissure
l'élément d'objet	: Poutre Principale
Degré de dégradation	: c
Dégradations associés	: ⑱
Observations	• Une fissure diagonale d'une largeur de 0,1 mm s'est produite à partir de l'appareil d'appui jusqu'à l'extrémité de la poutre en T du béton précontraint.



Type de dégradations	: ⑥ Fissure
l'élément d'objet	: Poutre Principale
Degré de dégradation	: c
Dégradations associés	: N/A
Observations	• Une fissure de 0,15 mm de large s'est produite dans la direction longitudinale de la poutre en dalle creuse en béton précontraint.



(7) Effritement, Exposition des armatures

1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	Il n'y a que des épaufrures
d	La barre d'armature est exposée et sa corrosion est légère.
e	La barre d'armature est exposée et sa corrosion est sévère.

2. Des causes de dégradations

- Dilatation accompagnée d'une corrosion de l'acier d'armature en raison d'une couverture insuffisante, d'un nid de gravier, des joints et de l'eau de percolation
- Neutralisation du béton, attaque des chlorures, réaction alcali-agrégat, réaction chimique
- Accident de véhicule
- Défaillance du ciment

3. Des préoccupations

- Diminution de la capacité de charge due à une section transversale défectueuse
- Diminution de la capacité de charge due à la corrosion de l'armature
- Extension des dégradations par la répétition de la charge des roues et perte de la fonction de la dalle de pont

(7) Effritement, Exposition des armatures

Type de dégradations	: ⑦Effritement/Exposition des aciers d'armatures
l'élément d'objet	: poutre de pile
Degré de dégradation	: d
Dégradations associés	: N/A
Observations	• Le béton de la partie en porte-à-faux du pilier en forme de T s'est effrité et les barres d'armature sont exposées. La corrosion des barres d'armature est mineure.



Type de dégradations	: ⑦Effritement/Exposition des aciers d'armatures
l'élément d'objet	: poutre de pile
Degré de dégradation	: e
Dégradations associés	: ⑩
Observations	• Le béton de la semelle inférieure de la poutre principale en Béton Précontraint s'est effrité et les barres d'armature sont exposées. La corrosion des barres d'armature est assez



(8) Infiltration d'eau, Carbonatation

1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	Fuite d'eau observée au niveau de la fissure. Les liquides de rouille et la chaux libérée ne sont pas observés.
d	De la chaux est observée dans la fissure. Le liquide de rouille n'est pas observé.
e	Une fuite d'eau et de la chaux sont observées de manière significative dans la fissure. La boue et le liquide de rouille sont mélangés à l'eau qui fuit de la fissure.

2. Des causes de dégradations

- Progression des infiltrations d'eau
- Compactage insuffisant
- Progression de la fissuration
- Non-exécution de la couche d'étanchéité
- Défaillance du joint de construction

3. Des préoccupations

- Corrosion de la barre d'armature due à une fissure
- Dégradations au joint de dilatation
- Diminution de la rigidité de la poutre principale
- Perte de l'action composite dans une poutre non composite
- Perte de la fonction de la dalle de pont
- Dégradations au béton

(8) Infiltration d'eau, Carbonatation

Type de dégradations	: ⑧ Infiltration d'eau / Chaux libre
l'élément d'objet	: poutre principale
Degré de dégradation	: e
Dégradations associés	: ⑥
Observations	• La chaux libre s'échappe de la fissure de la poutre principale.



Type de dégradations	: ⑧ Infiltration d'eau / Chaux libre
l'élément d'objet	: poutre principale
Degré de dégradation	: e
Dégradations associés	: ⑥
Observations	• Le chaux libre et de liquide de rouille s'échappe d'une fissure le long de la gaine de la poutre principale.



(9) Chute d'element

1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	-
d	-
e	Il y a des chutes de blocs de béton.

2. Des causes de dégradations

- Progression de la fissure, infiltration d'eau et chaux libre

3. Des préoccupations

- Extension de dégradation par répétition de la charge des roues et perte de la fonction de la dalle de pont.

(9) Chute d'element

Type de dégradations	: ⑨ Chute d'élément
l'élément d'objet	: Dalle du tablier
Degré de dégradation	: e
Dégradations associés	: ⑮
Observations	• La chute s'est produite sur une poutre en dalle creuse en Béton Précontraint. Une réparation rapide s'impose.



Type de dégradations	: ⑨ Chute d'élément
l'élément d'objet	: Dalle du tablier
Degré de dégradation	: e
Dégradations associés	: ⑦⑧⑫
Observations	• La chute s'est produite au niveau du béton de remplissage de la poutre en T en BP.



(11) Fissuration de la dalle du tablier

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1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	Une seule direction de petite fissure
c	Petite fissure bidirectionnelle
d	Fissure bidirectionnelle (largeur de la fissure : moins de 0,2 mm)
e	Fissure bidirectionnelle (largeur de la fissure : plus de 0,2 mm)

2. Des causes de dégradations

- Résistance caractéristique inadéquate
- Action de la contrainte de traction due à l'action de la poutre principale
- Retrait de séchage
- Barre de répartition insuffisante
- Tassement inégal de la poutre de support

3. Des préoccupations

- Progression des infiltrations d'eau et des chaux libre
- Extension des fissures due aux charges roulantes

(11) Fissuration de la dalle du tablier

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Type de dégradations	: ⑪ Fissure de la dalle du tablier
l'élément d'objet	: dalle du tablier
Degré de dégradation	: d
Dégradations associés	: ⑧
Observations	• Il y a une fissure unidirectionnelle avec de la chaux libre sur la dalle du pont en BA entre les poutres principales. L'épaisseur de la fissure est inférieure à 0,2 mm.



Type de dégradations	: ⑪ Fissure de la dalle du tablier
l'élément d'objet	: dalle du tablier
Degré de dégradation	: e
Dégradations associés	: ⑧
Observations	• Il y a une fissure unidirectionnelle avec de la chaux libre sur la partie saillante de la dalle du pont en BA. L'intervalle de la fissure est d'environ 0,5m et son épaisseur est de 0,3 mm.



(12) Délamination

1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	-
d	-
e	Il y a une délamination.

2. Des causes de dégradations

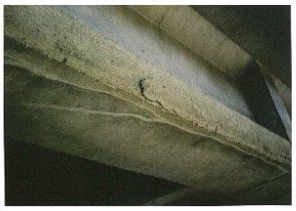
- Se référer à (7) Effritement, Exposition des armatures

3. Des préoccupations

- Se référer à (7) Effritement, Exposition des armatures

(12) Délamination

Type de dégradations	: ⑫ Délamination
l'élément d'objet	: Poutre Principale
Degré de dégradation	: e
Dégradations associés	: ⑦
Observations	• La délamination s'est produite sur la surface latérale de la poutre principale en BP.



Type de dégradations	: ⑫ Délamination
l'élément d'objet	: Poutre Principale
Degré de dégradation	: e
Dégradations associés	: ⑦⑥⑩
Observations	• La délamination s'est produite sur la surface inférieure de la poutre principale en BP.



Autres dégradations

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⑬ Ecartement / espacement anormal (espacement au niveau du joint de dilatation)
⑭ Chaussée irrégulière
⑮ Défaillance de la chaussée
⑯ Dysfonctionnement de l'appareil d'appui
⑰ Autres facteurs

(13) Ecartement / espacement anormal (espacement au niveau du joint de dilatation)

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1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	Il y a une différence d'écart entre les deux côtés
d	-
e	L'espacement latéral est si important que le joint de dilatation est complètement séparé. Ou encore, la poutre entre en contact avec le parapet.

2. Des causes de dégradations

- Affaissement de la sous-structure Mouvement / Inclinaison

3. Des préoccupations

- Action de la force de liaison sur la structure supérieure

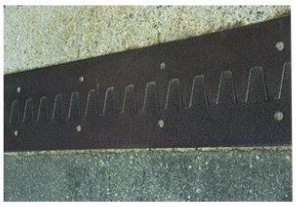
(13) Ecartement / espacement anormal (espacement au niveau du joint de dilatation)

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Type de dégradations	: ⑬ Espacement anormal (Espace au niveau des joints de dilatation)
l'élément d'objet	: Poutre principale, appareil d'appui
Degré de dégradation	: e
Dégradations associés	: ⑯㉕
Observations	• La poutre principale et l'appareil d'appui sont en contact avec le parapet.



Type de dégradations	: ⑬ Espacement anormal (Espace au niveau des joints de dilatation)
l'élément d'objet	: joint de dilatation
Degré de dégradation	: e
Dégradations associés	: ㉕
Observations	• Les dents du joint de dilatation sont complètement en contact.



(14) Chaussée irrégulière

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1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	La difference de niveau est faible (moins de 20 mm)
d	-
e	La difference de niveau est important (plus de 20mm)

2. Des causes de dégradations

【Joint de dilatation】

- Tassement du support
- dégradation du boulon de réglage du joint de dilatation

【Approches du pont】

- Affaissement du sol de remblai de la culée en raison de l'affouillement du sol autour de la fondation de la culée du pont

3. Des préoccupations

【Joint de dilatation】

- Action de la force résultante sur la structure principale
- Obstacles à la circulation

【Approches du pont】

- Obstacles à la circulation dus à l'affaissement de la surface de la route.

(14) Chaussée irrégulière

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Type de dégradations	: ⑭ Chaussée irrégulière
l'élément d'objet	: Joint de dilatation
Degré de dégradation	: c
Dégradations associés	: ㉕
Observations	• Il y a une irrégularité au niveau du joint de dilatation. (10mm)



Type de dégradations	: ⑭ Chaussée irrégulière
l'élément d'objet	: chaussée
Degré de dégradation	: e
Dégradations associés	: ⑮
Observations	• Il y a des irrégularités (environ 20 cm) et des fissures sur la chaussée de la surface d'accès.



(15) Défaillance de la chaussée

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1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	L'ouverture de la fissure de la chaussée est inférieure à 5 mm.
d	-
e	L'ouverture de la fissure de la chaussée est plus de 5 mm.

2. Des causes de dégradations

【Dalle de pont en béton】
- Fissure, infiltration d'eau, progression de la chaux libre

【Dalle de pont en acier】
- Fissure dans l'acier

3. Des préoccupations

【Dalle de pont en béton】
- Extension de la dégradation par la charge répétée des essieux.
- Perte de la fonction de la dalle de tablier

【Dalle de pont en acier】
- Extension de la dégradation par la charge répétée des essieux.
- Perte de la fonction de la dalle de plancher
- Affaissement local

(15) Défaillance de la chaussée

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Type de dégradations	: ⑮ Défaillance de la chaussée
l'élément d'objet	: chaussée
Degré de dégradation	: c
Dégradations associés	: ⑪
Observations	• Il y a des fissures de moins de 5mm sur la chaussée.



Type de dégradations	: ⑮ Défaillance de la chaussée
l'élément d'objet	: chaussée
Degré de dégradation	: e
Dégradations associés	: ⑧⑪
Observations	• Il y a des fissures de type maillé avec des infiltration d'eau. On suppose que le béton supérieur de la dalle est passé en phase de contamination.



(16) Dysfonctionnement de l'appareil d'appui

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1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	-
d	-
e	L'appareil d'appui ne fonctionne plus

2. Des causes de dégradations

- Concentration de la charge à proximité de l'appui
- Affaissement de l'appui, action de la force de liaison par perte de la fonction de rotation.
- Déformation excessive due à un tremblement de terre

3. Des préoccupations

- Apparition d'une force de liaison par perte des fonctions de mouvement et de rotation
- Diminution de la résistance à la charge horizontale du vent et du tremblement de terre
- Perte de la fonction de transfert de charge
- Progression de la fissure vers les éléments principaux

(16) Dysfonctionnement de l'appareil d'appui

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Type de dégradations	: ⑯ Disfonctionnement de l'appareil d'appui
l'élément d'objet	: Appareil d'appui
Degré de dégradation	: e
Dégradations associés	: N/A
Observations	• Le rouleau de l'appareil d'appui est perdu. La fonction d'appui et de mouvement sont perdus.



Type de dégradations	: ⑯ Disfonctionnement de l'appareil d'appui
l'élément d'objet	: Appareil d'appui
Degré de dégradation	: e
Dégradations associés	: ①⑤
Observations	• Une corrosion importante s'est produite sur l'appareil d'appui. La fonction d'appui et de mouvement sont perdus.



(17) Autres facteurs

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1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	-
d	-
e	Existence de dégradation

2. Des causes de dégradations

- Dégradation artificiel
- Catastrophes naturelles
- Dégâts causés par les bêtes et les oiseaux

3. Des préoccupations

- Dégradation du pont

(17) Autres facteurs

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Type de dégradations	: ⑰ Autres	Non
l'élément d'objet	: Pile et Culée	
Degré de dégradation	: e (Occupation illégale)	
Dégradations associés	: N/A	
Observations	• Une petite maison est construite près de la pile	

Type de dégradations	: ⑰ Autres	
l'élément d'objet	: Poutre principale	
Degré de dégradation	: e	
Dégradations associés	: N/A	
Observations	• Des plantes poussent le long de la poutre principale. Elles vont gêner le travail d'inspection.	

Commun

Page-50

⑩ Défaut d'armature / matériau de réparation / renforcement
⑱ Défaut d'ancrage
⑲ Décoloration, détérioration des matériaux
⑳ Fuite d'eau / flaque d'eau
㉑ Bruit extraordinaire / Vibration inhabituelle
㉒ Flèche anormale
㉓ Déformation / Rupture
㉔ Dépôt de sédiments / Accumulation de débris
㉕ Tassement / Mouvement / Inclinaison
㉖ Affouillement

(10) Défaut d'armature / matériau de réparation / renforcement

Page-51

1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	Il n'y a pas de gonflement de la plaque d'acier, mais on observe un gonflement du revêtement, de la corrosion ou une fuite d'eau.
d	-
e	

2. Des causes de dégradations

【De renforcement en béton】

- Infiltration d'eau par la fissure de la dalle du pont.
- Absence de couche d'étanchéité

【 Renforcement en acier】

- Concentration des contraintes
- Environnement de réticulation

3. Des préoccupations

【De renforcement en béton】

- Réduction de la fonction de la dalle de béton par la réduction de l'épaisseur de la plaque d'acier
- Progression de la corrosion de la structure principale

【Renforcement en acier】

- Progression vers la corrosion de la structure principale
- Re-progression de la fissure de la structure principale

(18) Défaut d'ancrage

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1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	Des dégradations de l'ancrage du tendon de BP, ou des dégradations de l'ancrage du câble sont observées.
d	-
e	L'ancrage du tendon BP est gravement endommagé ou l'ancrage du câble est gravement endommagé.

2. Des causes de dégradations

- Corrosion de l'acier du béton précontraint
- Rupture de l'acier du béton précontraint (coulis défectueux)
- Corrosion de la partie extérieure de la fixation du câble

3. Des préoccupations

- Réduction de la capacité portante

(18) Défaut d'ancrage

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Type de dégradations	: ⑱ Défaut d'ancrage
l'élément d'objet	: Ancrage du BP
Degré de dégradation	: e
Dégradations associés	: ①⑤⑦
Observations	• L'effritement s'est produit sur le béton d'ancrage de tension transversale du BP, et l'acier BP est endommagé par la corrosion et la fracture.



(19) Décoloration, détérioration des matériaux

Page-54

1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	-
d	-
e	Etat inhabituel

2. Des causes de dégradations

- Méthode de mis en œuvre inadéquate (méthode de compactage)
- Défaut de qualité (Défaut de combinaison, produit ne respectant pas la norme)
- Incendie
- Action chimique (défaillance des agrégats, pluies acides, gaz nocifs)
- Gel et dégel
- Attaque au chlorure
- Carbonatation
- Infiltration et rétention d'eau à l'intérieur du béton

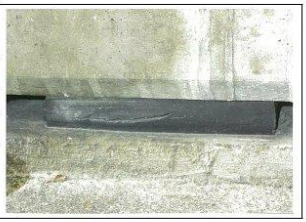
3. Des préoccupations

- Diminution de la capacité portante
- Corrosion des barres d'armature

(19) Décoloration, détérioration des matériaux

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Type de dégradations	: ⑲ Décoloration, détérioration des matériaux
l'élément d'objet	: Appareil d'appui
Degré de dégradation	: e
Dégradations associés	: ⑯
Observations	• The bearing become deteriorated and the crack is occurred side surface.



Type de dégradations	: ⑲ Décoloration, détérioration des matériaux
l'élément d'objet	: Gargouille
Degré de dégradation	: e
Dégradations associés	: ⑳
Observations	• Le gargouille présente quelques fissures.



(20) Fuite d'eau / flaque d'eau

Page-56

1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	-
d	-
e	Fuite d'eau du joint de dilatation et du bassin de drainage, accumulation d'eau près de l'appui et à l'intérieur de la poutre-caisson.

2. Des causes de dégradations

- Progression de la fissure
- Absence de la couche d'étanchéité
- Défaut de remplissage des joints
- Défaillance du traitement des eaux de surface du pont
- Corrosion, bouchage par des sédiments
- Infiltration d'eau de pluie à la limite entre la dalle et l'entrée d'eau

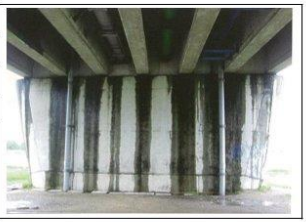
3. Des préoccupations

- Corrosion des barres d'armature
- Diminution de la rigidité de la poutre principale dans les poutres mixtes
- Baisse de la capacité portante
- Dégradations dus au gel et au dégel
- Apparition de chaux libre
- Corrosion de la structure principale
- Dégradations de la dalle du tablier

(20) Fuite d'eau / flaque d'eau

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Type de dégradations	: ⑳ Infiltration d'eau/ Flaque d'eau
l'élément d'objet	: joint de dilatation, pile
Degré de dégradation	: e
Dégradations associés	: N/A
Observations	• L'eau infiltrée s'écoule du haut de la pile par défaut du joint de dilatation..



(21) Bruit extraordinaire / Vibration inhabituelle

Page-58

1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	-
d	-
e	Bruits et vibrations anormaux provenant du joint de dilatation, de l'appareil d'appui, de la poutre et de la nacelle d'inspection

2. Des causes de dégradations

- Vibration due au passage de véhicule

3. Des préoccupations

- Progression de la fissure vers l'élément principal
- Progression de la fissure due à une concentration de contraintes

(22) Flèche anormale

Page-59

1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	-
d	-
e	Flèche anormale de la poutre principale

2. Des causes de dégradations

- Affouillement / Inclinaison / Mouvement des piles.
- Fluage et rétrécissement de la poutre en béton précontraint
- Tassement/dysfonctionnement des appareils d'appui

3. Des préoccupations

- Diminution de la capacité portante
- Dysfonctionnement des appareils d'appui
- Espacement anormal au niveau des joints de dilatation
- Irrégularité anormale de surface

(23) Déformation / Rupture

Page-60

1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	Déformation locale de l'élément de pont
d	-
e	Déformation locale importante d'un élément du pont

2. Des causes de dégradations

- Revêtement insuffisant
- Concentration de contraintes locales
- Choc ou frôlement

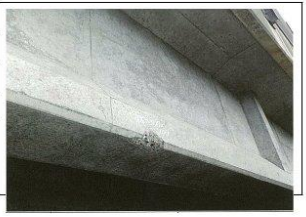
3. Des préoccupations

- Catastrophe secondaire
- Réduction de la capacité portante due à une section transversale défectueuse.
- Corrosion de l'élément en acier

(23) Déformation / Rupture

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Type de dégradations	: ㉓ Déformation / Cassure
l'élément d'objet	: poutre principale
Degré de dégradation	: c
Dégradations associés	: ⑦
Observations	• L'angle de la poutre principale BP est défectueux.



Type de dégradations	: ㉓ Déformation / Cassure
l'élément d'objet	: Mortier du support de l'appareil d'appui
Degré de dégradation	: c
Dégradations associés	: ⑦
Observations	• La partie du mortier du support de l'appareil d'appui est défectueuse.



(24) Dépôt de sédiments / Accumulation de débris

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1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	-
d	-
e	Sédimentation du sol dans le système de drainage et autour de l'appareil d'appui

2. Des causes de dégradations

- Corrosion, bouchage par des sédiments
- Fissures dues au gel
- Infiltration d'eau de pluie à la limite entre la dalle et l'entrée d'eau
- Accumulation d'eau de pluie et de sédiments due à l'endégradationment de la dalle et du joint de dilatation

3. Des préoccupations

- Corrosion de la structure principale
- dégradations de la dalle du tablier
- Déplacement de l'appareil d'appui, apparition d'une force de liaison par perte de la fonction de mouvement et de rotation

(24) Dépôt de sédiments / Accumulation de débris

Page-63

Type de dégradations	: ㉔ Sedimentation / Accumulation des débris
l'élément d'objet	: Bassin de Drainage
Degré de dégradation	: e
Dégradations associés	: N/A
Observations	• Il y a une accumulation de sédiment dans le bassin de drainage.



(25) Tassement / Mouvement / Inclinaison

Page-64

1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	-
d	-
e	Tassement, mouvement et basculement des appareils d'appui ou de l'infrastructure

2. Des causes de dégradations

- Action de la force d'impact due à l'irrégularité de la route
- Écoulement latéral
- Affouillement par le courant d'eau
- Consolidation et tassement du sol
- Déformation du talus, des culées construites sur un remblai et s'appuient sur des pieux
- Déformation du remblai du mur de soutènement, de la culée
- Inclinaison

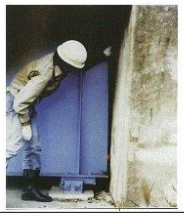
3. Des préoccupations

- Affaissement, déplacement, apparition d'une force de liaison sur d'autres éléments par inclinaison.
- Détérioration de la force de soutien des culées construites sur un remblai et s'appuient sur des pieux

(25) Tassement / Mouvement / Inclinaison

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Type de dégradations	: ㉕ Tassement / Mouvement / Inclinaison
l'élément d'objet	: Fondation
Degré de dégradation	: e
Dégradations associés	: ⑬⑭⑯
Observations	• Une inclinaison se produit sur la culée. Le mouvement et le l'inclinaison des fondations sont suspectés.



Type de dégradations	: ㉕ Tassement / Mouvement / Inclinaison
l'élément d'objet	: Fondation
Degré de dégradation	: e
Dégradations associés	: ㉖
Observations	• Le tassement et l'inclinaison sont dus à l'affouillement des fondations.



(26) Affouillement

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1. Appréciation du degré de dégradation

1) Classification du degré de dégradation

Class	Etat général
a	Pas de dégradation
b	-
c	Affouillement
d	-
e	Affouillement important

2. Des causes de dégradations

- Changement du courant d'eau
- Abaissement général du lit du cours d'eau

3. Des préoccupations

- Si l'affouillement progresse, il est possible que l'inclinaison de l'infrastructure se produise.

(26) Affouillement

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Type de dégradations	: ㉖ Affouillement
l'élément d'objet	: Fondation
Degré de dégradation	: c
Dégradations associés	: ㉕
Observations	• L'affouillement est provoqué à cause du courant d'eau



APPENDIX 4 : ROAD REPAIR WORKS METHOD

Projet de Développement des Capacités de Gestion de l'entretien des Routes et des Ponts (Phase 2)

The Project for Capacity Development for Road and Bridge Maintenance Management (Phase 2)

Cours d'Animation
Réparation des Routes

Préparé par le GT3

CTI Engineering International Co., Ltd.

OC GLOBAL

CHODAI CO.,LTD. CONSULTANT & SERVICE PROVIDER

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1) Exemple de fiche de contrôle pour la supervision de la construction (Example of Check Sheet for Construction Supervision)
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CHAPITRE 1: INTRODUCTION
Chapter-1: Introduction

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Cadre du Manuel (Scope of the Manual)

- Le manuel fournit la procédure et la méthodologie, des travaux de reparation des chaussées revêtues, correspondant aux dégradations spécifique des chaussées et autres. Le manuel n'inclut pas la procedure et méthodologie pour les route en terre.

The Manual provides the procedure and methodology of road repair works on paved roads corresponding to specific road defects and others. The Manual does not include procedure and methodology of unpaved roads.

- Le Manuel traite les questions techniques sur les travaux de réparation des chaussées revêtues. Le manuel devrait être utilize pour completer les rubriques, 1) Cantonnage, 6) Chaussées et 8) Traitement de la surface des chaussées revêtues dans le DAO

The Manual mainly covers technical issues on repair works for paved roads. The Manual should be used to technically supplement the items, 1) Cantonnage, 6) Carriageway Works and 8) Surface Treatment on Paved Road in "Dossier D'Appel D'Offres (DAO).

CHAPITRE 1: INTRODUCTION
Chapter-1: Introduction

Cadre du Manuel (Scope of the Manual)

Travaux d'Entretien Routiers Road Maintenance Work	Types de travaux Type of Work	Chaussées revêtues Paved Road	Chaussées non revêtues Unpaved Road
A) Travaux d'Entretien de Routine (Regular Maintenance (TER))	1) Cantonnage (Cantonnage)	✔	✔
	2) Mise à niveau et petits travaux d'Urgence (Leveling and Small Emergency Works)	✔	✔
	3) Entretien mécanisé (Mechanized Maintenance)		✔
B) Travaux d'Entretien Améliorant (Improvement Maintenance (TEA))	4) Terrassement (Earth Works)		✔
	5) Ouvrages divers (Other Structure Works)	✔	✔
	6) Travaux sur la Chaussées (Carriageway Works)	✔	✔
C) Travaux d'Entretien Spécialisés (Specialized Maintenance (TES))	7) Entretien des Ponts (Bridges Maintenance)	✔	✔
	8) Traitement de la surface des chaussées revêtues (Surface Treatment on Paved Road)	✔	
	9) Pirogues de bacs (Ferry Boat)	✔	✔

: Cadre du Projet (Scope of the Manual)

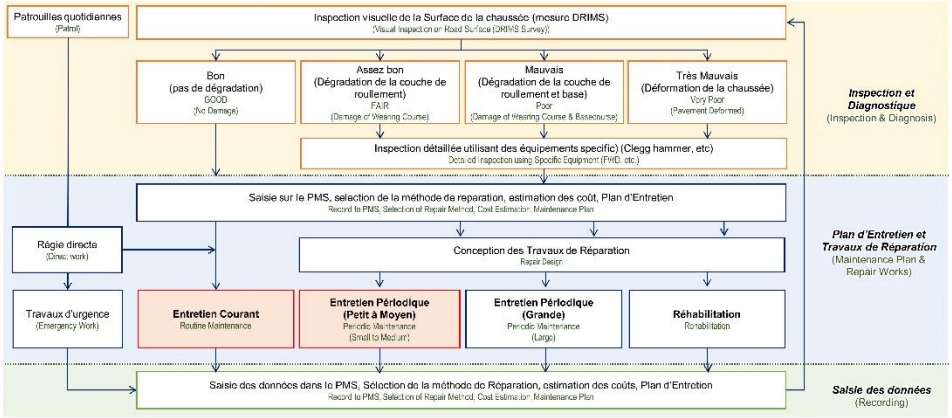
CHAPITRE 1: INTRODUCTION
Chapter-1: Introduction

Application du Manuel (Application of the Manual)

- Le Manual doit s'appliqué à l'Entretien Courant et à l'Entretien Périodique.
  The Manual should be applied for the routine maintenance and periodic maintenance.
- Dans l'Entretien Courant et l'Entretien Périodique, les travaux de reparation doivent être sélectionnés et mise en place correctement en considérant les facteurs de dégradations, l'echelle de degradation, les conditions géométriques, les conditions environnantes, les principales considérations relatives aux travaux de réparation, etc.
  In the routine maintenance and periodic maintenance, the repair works should be selected and implemented adequately in consideration of damage factor, damage scale, geometric condition, surrounding environment, key considerations for repair works, etc.

CHAPITRE 1: INTRODUCTION
Chapter-1: Introduction

Application du Manuel (Application of the Manual)



: **Cadre du Manuel** (Scope of the Manual)

CHAPITRE 3: TRAVAUX DE REPARATIO
Chapter-3: Road Repair Works

3.1 Dégradations des routes cibles (Target Road Defects)

- Dans ce manuel, les dégradations ciblées sont les dégradations du type A et une partie des dégradations au niveau des dépendances. (In the manual, the target damages is damages type A and damages to the off-carriageway.)

- Les grandes lignes de ces dégradations ainsi que les critères de la sélection des travaux de réparation sont présentées et décrits ci-après. (The outlines of these type of damages and the criteria of selecting repair work are presented and described below)

Tableau: Dégradations de la route et codification

	Revêtue (A)	Code	Non revêtue (B)	Code	Dépendance	Code
Déformation	Flaches	A-FLC	Flaches	B-FLC	Drainage (Avaloire, trou d'homme)	C-AVT
	Ornière	A-ORN	Ornière	B-ORN	Drainage (Caniveau)	C-CAN
	Affaissement	A-AFF	Tôle ondulée	B-TOO	Drainage (Tuyau)	C-TUY
	Bourrelet	A-BOR			Drainage (Fossé)	C-FOS
	Fluage	A-FLU			Drainage (Dalot)	C-DAL
	Tôle ondulée	A-TOO			Drainage (Murs de tête)	C-MUT
Fissures	Longitudinale	A-FLO			Clôtures et glissières	D-CLT
	Transversale	A-FTR			Talus (Remblai)	E-RBL
	Faïençage/ maillées	A-FFM			Talus (Déblai)	E-DBL
Arrachement	Nid de poule	A-NDP	Nid de poule	B-NDP	Mur de soutènement	F-MST
	Désenrobage	A-DES	Ravinement	B-RAV	Bordure	G-BD
	Pelade	A-PEL			Aménagement pour les piétons	H-AMP
	Plumage	A-PLU			Eclairage routier	I-ECR
	Épaufrure	A-EPA			Feux de circulation	I-FC
	Peignage	A-PEI			Marquages routier	J-MR
	Glaçage	A-GLA			Panneaux de signalisation	J-PS
Remontée	Ressuage	A-RES				
	Remontée des fines	A-REF				

CHAPITRE 3: TRAVAUX DE REPARATIO
Chapter-3: Road Repair Works

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3.2 Sélection des Travaux de Réparation (selection of repair works)

- Il est conseillé d'essayer de sélectionner les travaux de réparation les plus appropriés pour chaque site/section sur la base d'inspection et de diagnostic et en tenant compte de la cause des dégradations et de l'historique des réparations antérieures, etc. (It is recommended to select the most appropriate repair works for each site/section based on inspection and diagnosis and taking into account the cause of damages and the history of previous repairs, etc.)

- Des exemples des principales méthodes de réparation pour chaque type de défaut, en fonction de sa portée et de son degré, sont présentés ci-dessous.

Tableau: État de la chaussée et du système de drainage

(Examples of main repair methods for each type damage, depending on its extent and severity, are shown below)

Etat		Dégradation		
		Chaussée		Assainissement
A	Bon		Pas de déformation	
B	Assez bon		Déformation seulement au niveau de la surface de la route	
C	Mauvais		Déformation au niveau de la surface et de la couche de base de la route	
D	Très mauvais		Chaussée déformé	

CHAPITRE 3: TRAVAUX DE REPARATIO
Chapter-3: Road Repair Works

Page-10

3.2 Sélection des Travaux de Réparation (selection of repair works)

3.2.1 Déformations (Distortions)

Etat	Solutions		Travaux et Numéro.	Remarques
B	Déflachage		Déflachage par enduit d'usure (Prix N°830)	Pour une petite surface - Il faut, si possible, reconstituer la couche de revêtement
			Déflachage par enrobé à chaud ou à froid (Prix N°831)	
B	Remplacement des couches	Réfection localisée du revêtement	Réfection localisée de revêtement par enduit d'usure monocouche (Prix N°860)	Pour une surface large - Il faut, si possible, reconstituer la couche de revêtement
			Réfection localisée de revêtement par enduit d'usure bicouche (Prix N°861)	
			Réfection localisée de revêtement en enrobé à froid ou à chaud (Prix N°862)	
C/D		Réfection localisée du de corps de chaussée	Réfection localisée de corps de la chaussée (Prix N°850)	- Si la dégradation affecte en même temps le corps de la chaussée et sur une grande surface - Il faut, si possible, reconstituer la couche de revêtement






CHAPITRE 3: TRAVAUX DE REPARATIO
Chapter-3: Road Repair Works

3.2 Sélection des Travaux de Réparation (selection of repair works)

3.2.2 Arrachements (Surface Texture Deficiencies)

Arrachements : désenrobage, glaçage, peignage, pelade et plumage

Etat	Solutions	Travaux et Numéro.	Remarques
B	Enrichissement en liant par Enduit	Réfection localisée de revêtement par enduit d'usure monocouche (Prix N°860)	- Si la dégradation n'affecte que la couche de roulement - Il faut, si possible, reconstituer la couche de revêtement identique à celle existante
		Réfection localisée de revêtement par enduit d'usure bicouche (Prix N°861)	
		Réfection localisée de revêtement en enrobé à froid ou à chaud (Prix N°862)	

Arrachements : Nids de poule, épaufrures, tôles ondulées

Etat	Solutions	Travaux et Numéro.	Remarques
B	Point à temps	Réfection localisée de revêtement par enduit d'usure monocouche (Prix N° 860)	- Si la dégradation n'affecte que la couche de roulement - Il faut, si possible, reconstituer la couche de revêtement identique à celle existante
		Réfection localisée de revêtement par enduit d'usure bicouche (Prix N° 861)	
		Réfection localisée de revêtement en enrobé à froid ou à chaud (Prix N° 862)	
C/D		Réparation de nids de poule par enduit d'usure (Prix N° 840)	- Si la dégradation n'affecte que la couche de roulement - Il faut, si possible, reconstituer la couche de revêtement identique à celle existante
		Réparation de nids de poule par enrobé à froid ou à chaud (Prix N° 841)	
		Epaufrures (Prix N° 810)	
		Réfection localisée de corps de la chaussée (Prix N° 850)	

CHAPITRE 3: TRAVAUX DE REPARATIO
Chapter-3: Road Repair Works

3.2 Sélection des Travaux de Réparation (selection of repair works)

3.2.3 Fissures (Cracks)

Etat	Solutions	Travaux et Numéro.	Remarques
B	Scellement par un coulis bitumineux	Scellement des fissures isolées (Prix N° 821)	- Ouverture des fissures de quelques millimètres ou si les fissure sont parallèles - Fissures isolées
		Colmatage des zones faïencées (Prix N° 822)	- Ouverture des fissures de quelques millimètres ou si les fissure sont parallèles - Zones faïencées
B	Enduit superficiel multicouche pour réfection localisée de revêtement	Réfection localisée de revêtement par enduit d'usure monocouche (Prix N° 860)	- Ouverture des fissures trop importante ou si les fissures sont maillées - Zone fissurée très étendue - Il faut, si possible, reconstituer la couche de revêtement identique à celle existantes
		Réfection localisée de revêtement par enduit d'usure bicouche (Prix N° 861)	
		Réfection localisée de revêtement en enrobé à froid ou à chaud (Prix N° 862)	
C/D	Enduit superficiel multicouche pour réfection localisée de corps de chaussée	Réfection localisée de corps de la chaussée (Prix N° 850)	- Zone fissurée affecte en même temps le corps de la chaussée et sur une grande surface - Il faut, si possible, reconstituer la couche de revêtement identique à celle existantes

3.2.4 Remontées (Upward Migration)

Etat	Solutions	Travaux et Numéro.	Remarques
B	Sablage	Cloutage de zones de ressuage (Prix N°820)	- Affecte une petite surface de la chaussé
B	Réfection localisée de revêtement	Réfection localisée de revêtement par enduit d'usure monocouche (Prix N°860)	- Affecte une grande surface de la chaussée - Il faut, si possible, reconstituer la couche de revêtement identique à celle existantes
		Réfection localisée de revêtement par enduit d'usure bicouche (Prix N°861)	
		Réfection localisée de revêtement en enrobé à froid ou à chaud (Prix N°862)	

CHAPITRE 3: TRAVAUX DE REPARATIO
Chapter-3: Road Repair Works

3.2 Sélection des Travaux de Réparation (selection of repair works)

3.2.5 Dépendance (Off-carriageway)

Type de dégradation	Solutions	Travaux et Numéro.	Remarks
Dépendance	Travaux de remise en état préalable	Travaux de remise en état préalable (Prix N° 102)	
	Cantonnage permanent en section rurale sur routes revêtues	Cantonnage permanent en section rurale sur routes revêtues (Prix N° 130)	
	Cantonnage permanent en section urbaine sur routes revêtues	Cantonnage permanent en section urbaine sur routes revêtues (Prix N° 131)	
Assainissement	Curage générale des ouvrages d'assainissements	Curage générale des assainissements (Prix N° 120)	
	Réfection fossé maçonné	Réfection fossé maçonné (Prix N° 533)	Réparation des ouvrages existants
	Fossé maçonné	Fossé maçonné de 40 x 40 cm avec radier en béton (Prix N° 550) Fossé maçonné de 40 x 40 cm avec radier en maçonnerie de moellons (Prix N° 551) Fossé maçonné de 40*40 cm en butée de chaussée avec radier en béton (Prix N° 552) ...etc.	Nouvelle construction Le choix de l'ouvrage à adopter dépend du besoin du projet
Talus	Engazonnement de talus	Engazonnement de talus (Prix N° 233)	
	Clayonnage de talus	Clayonnage de talus (Prix N° 234)	
Accotement	Engazonnement d'accotement	Engazonnement d'accotement (Prix N° 233)	Les types de réparation dépendent du matériau constituant l'accotement
	Ressouflage pavés	Ressouflage pavés (Prix N° 628)	
	Arasement d'accotement	Arasement d'accotement (Prix N° 656)	
	Rechargement ou exécution d'accotement	Rechargement ou exécution d'accotement (Prix N° 657)	
	Enduit d'usure monocouche au cut back 400/600	Enduit d'usure monocouche au cut back 400/600 (Prix N° 672)	

Chapitre 4: Considérations particulières pour les sites spécifiques
Chapter 4: Special Consideration For The Specific Sites

4.1 Section courbes prononcées et fortes pentes (Sharp curves and steep gradients section)

4.1.2 Solutions (Solutions)

(1) Garantir la qualité initiale (Ensuring initial quality)

- La qualité de l'Enrobé doit être garantie par la formulation (Quantité du liant, granulométrie des granulats, etc.) The quality of the asphalt mix shall be ensured by the mix design (quantity of asphalt, grading of aggregate, etc.).
- Durant les travaux d'exécution, il faut veiller à ce que l'adhérence entre les couches soit suffisante (ex. application excessive ou non homogène de l'émulsion bitumineuse, etc.). During construction, care shall be taken to avoid inadequate adhesion between layers (e.g. excessive or uneven application of bitumen emulsion, etc.).

(2) Amélioration de l'adhérence. (Improvement of skid resistance)

(i) Méthode d'amélioration de l'adhérence de l'Enrobé lui même. Methods of improving the skid resistance of the asphalt mix itself

- Les granulats sont utilisés pour conférer une rugosité à la surface , ex. avec une granulométrie discontinue. Aggregates are used to impart a surface roughness, e.g. with gap grading.

(ii) Méthodes par enduit résineux (Resin binder methods)

- Un liant à base de résine est appliqué comme adhésif sur la surface de la chaussée et des granulats durs sont répandus et collés à ce liant. A resin binder is applied as an adhesive to the pavement surface and hard aggregate is spread and bonded to it.

(iii) Méthode de rainurage de la surface (Surface roughening method)

- La surface de la chaussée est rendue rugueuse par le rainurage, etc. Le rainurage a pour but d'améliorer l'adhérence et le drainage de la chaussée. Les rainures longitudinales sont utilisées dans les courbes et les rainures transversales dans les fortes pentes. The pavement surface is roughened by grooving, etc. The purpose of grooving is to improve the skid resistance and drainage of the pavement. Longitudinal grooves are used in curves, and transverse grooves are used in steep slopes.

(3) Mesure d'évacuation des eaux (Drainage measures)

La chaussée doit être correctement drainée, car l'eau stagnante sur la chaussée réduit l'adhérence. The pavement should be properly drained, as standing water on the pavement reduces skid resistance.

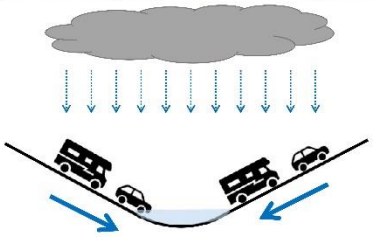
Chapitre 4: Considérations particulières pour les sites spécifiques Page-15
Chapter 4: Special Consideration For The Specific Sites

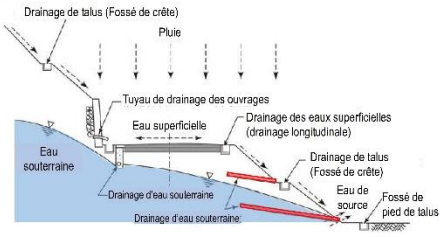
4.2 Sections point bas longitudinal (Longitudinal sag section)

4.2.2 Solutions (Solutions)

En matière de drainage des chaussées, la première priorité est d'empêcher l'eau provenant de la surface de s'infiltrer à l'intérieur de la chaussée. Si l'eau pénètre dans la chaussée, elle doit être drainée rapidement pour éviter la stagnation et l'abaissement de la nappe phréatique. En particulier dans une section affaissée, il est nécessaire d'évacuer l'eau provenant du côté supérieur de la route vers l'extérieur de la route en installant des buses ou dalots ou d'autres moyens dans une direction transversale. Il est également important d'intercepter les infiltrations d'eau provenant des zones adjacentes à la route en revêtant les accotements et en construisant et nettoyant les fossés.

When it comes to pavement drainage, the first priority is to prevent water from the road surface from entering the pavement. If water does enter the pavement, it should be drained quickly to avoid stagnation and lowering of the water table. Particularly in a sag section, it is necessary to drain water comes from the upper side of the road to outside of the road installing culverts or other means in a transverse direction. It is also important to intercept water infiltration from areas adjacent to the road by paving shoulders and constructing and cleaning ditches.





Chapitre 4: Considérations particulières pour les sites spécifiques Page-16
Chapter 4: Special Consideration For The Specific Sites

4.3 Routes à fort trafic de poids lourds et régions subtropicales (High Heavy vehicle routes and subtropical regions)

4.3.2 Solutions (Solutions)

Les facteurs externes, tels que le passage de véhicules lourds et les températures élevées, sont difficiles à contrôler et doivent être traités en ajustant les matériaux et les formulations de l'enrobé bitumineux utilisé pour améliorer la résistance à l'écoulement.

External factors, such as heavy vehicle traffic and high temperature, are difficult to control and should be addressed by adjusting the materials and formulations of the asphalt mix used to improve flow resistance.

- Pénétration de l'aiguille dans l'enrobe bitumineux: plus c'est dur, mieux c'est (40/60 >80/100)
  Asphalt needle penetration: the harder the better (40/60 > 80/100).
- Volume de l'Enrobé bitumineux: moins il y en aura, mieux ce sera. Asphalt volume: the less the better.
- Bitume modifié: Préférable à utiliser. Modified bitumen: better to use.
- Gros granulat: plus c'est dur, mieux c'est. Coarse aggregate stoniness: the harder the better.
- Forme des gros granulats: moins c'est plat et carré, mieux c'est.
  Coarse aggregate shape: the less flat and square the better
- Quantité d'agrégats fins : moins il y en a, mieux c'est. Amount of fine aggregate: the less the better.
- Type et forme des agrégats fins : le sable artificiel en forme angulaire est meilleur que le sable naturel arrondi.
  Type and shape of fine aggregate: ridge-shaped artificial sand is better than rounded natural sand.
- Type de fine: la poudre de pierre à gros grains est préférable au ciment ou à la poussière.
  Type of filler: coarse-grained stone powder is better than cement or dust.





Source: road pavement handbook for JICA grant aid projects, JICA, 2020.02

Chapitre 4: Considérations particulières pour les sites spécifiques Page-17
Chapter 4: Special Consideration For The Specific Sites

4.4 Zones à forte pluviométrie (High rainfall areas)

4.4.2 Solutions (Solutions)

1) Mise en place d'ouvrages d'assainissement appropriées. (Development of appropriate drainage facilities)

Recueillir les données pluviométriques pour la zone cible, et concevoir et installer des ouvrages de d'assainissement (fossés, ponceaux, etc.) de dimension appropriée. Les méthodes de drainage pour (i) la surface de la route, (ii) le sous-sol et (iii) les talus doivent être conçues de manière à pouvoir faire face aux eaux de pluie de manière adéquate.

Collect rainfall data for the target area, and design and install drainage facilities (ditches, culverts, etc.) of appropriate size. The drainage methods for (i) road surface, (ii) underground, and (iii) slope should be planned to cope with rainwater adequately.

2) Planification de l'altitude des routes (Planning of road level)

Sur la base des résultats de l'enquête sur l'élévation des crues sur le site et des cartes des niveaux d'eau de pluie, planifier la hauteur de la route de manière à ce qu'elle soit au-dessus de l'élévation des crues.

Based on the results of interview survey on flood elevation at the site and the rainfall water level maps, plan the road height to be above the flood elevation.

3) Introduction de la chaussée drainante (Introduction of drainage pavement)

La chaussée drainante est une chaussée dans laquelle un mélange d'asphalte poreux à haute porosité (mélange d'asphalte poreux) est utilisé pour la couche de surface, et une couche imperméable est placée sous la couche de surface. L'eau qui pénètre dans la couche de surface s'écoule sur la couche imperméable et se déverse rapidement dans les fossés, etc., empêchant ainsi l'eau de s'infiltrer dans les couches inférieures. Sans une sélection appropriée des matériaux et un contrôle de la qualité, des dégradations physiques telles que la dispersion des agrégats et des dégradations fonctionnelles telles que l'obstruction des vides sont susceptibles de se produire. En outre, il existe des problèmes de production et d'approvisionnement en granulats, d'approvisionnement en asphalte modifié par des polymères pour les mélanges d'asphalte poreux, et d'entretien après service.

Drainage pavement is pavement in which a porous asphalt mixture with high porosity (porous asphalt mixture) is used for the surface layer, and an impermeable layer is placed under the surface layer. Water that permeates the surface layer flows over the impermeable layer and drains quickly into ditches, etc., preventing water from permeating into the roadbed and below. Without proper material selection and quality supervision, physical damage such as aggregate scattering and functional damage such as clogged voids are likely to occur. In addition, there are issues of aggregate production and procurement, procurement of polymer-modified asphalt for porous asphalt mixtures, and post-service maintenance.

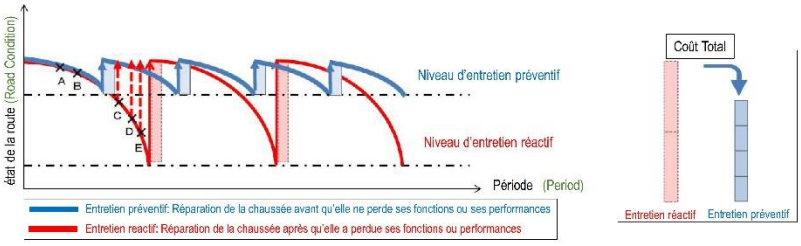
Chapitre 5: Entretien Préventif Page-18
Chapter 5: Preventive Maintenance

5.1 Généralité (General)

Afin de minimiser le coût de l'entretien et du renouvellement de la chaussée à l'avenir, dans le cadre d'un budget limité, l'entretien préventif peut prolonger la durée de vie de la chaussée et réduire les coûts du cycle de vie (CCV). In order to minimize pavement maintenance and renewal costs in the future within a limited budget, preventive maintenance can extend the service life of pavement and reduce Life Cycle Costs (LCC) is required.

5.2 Concept et Approche (Concept and Approach)

- Réparation en temps opportun de la couche de surface pour maintenir la fonction de la couche de base et des couches inférieures. Timely repair of surface layer to maintain function of the base course and more below layers.
- L'objectif est d'augmenter l'intervalle entre les réhabilitations et de prolonger la durée de vie de la chaussée. To aim increasing the time between rehabilitations and extend the life of the pavement.
- Au Japon, la réparation de la couche de base est plus de trois fois plus coûteuse et prend quatre fois plus de temps que la réparation de la seule couche de surface.In Japan, repairing the base course is more than three times more expensive and takes four times longer than repairing only the surface layer.



Chapitre 5: Entretien Preventif
Chapter 5: Preventive Maintenance

5.3 Procédure (Procedure)

Établir un cycle d'entretien des routes et effectuer des travaux de réparation effectives pour prolonger la durée de vie des chaussées.
(Establish a road maintenance cycle and carry out efficient road repair works to extend the life of pavements).

1) Inspection (Inspection):

Effectuer des inspections régulières et obtenir en permanence des données unifiées pour toutes les routes. Examiner l'état antérieur et actuel des routes, identifier les zones où la couche de base peut être endommagée et réaliser des études détaillées de manière efficace. (Carry out inspections regularly and obtain unified data for all routes continuously. Review past and present road conditions, identify areas where the base course may be damaged and carry out detailed surveys efficiently.)

2) Diagnostic (Diagnosis):

Les résultats de l'inspection sont utilisés pour évaluer la fonction de la chaussée. Les méthodes de réparation sont déterminées en tenant compte de la cause de la dégradation de la chaussée. (Inspection results are used to assess pavement function. Repair methods are considered taking into account the cause of the pavement damage.)

3) Réparation (Repair):

Les priorités sont établies sur la base de données objectives de diagnostiques. Les dégradations de la couche de base doivent être traitées dans les plus brefs délais. L'état de la couche de surface est régulièrement inspecté et réparé de manière opportune et appropriée afin d'éviter la dégradation des couches situées sous la couche de base. (Priorities are considered based on objective diagnostic data. Damage to base course layer should be repaired as soon as possible. The condition of the surface layer is regularly inspected and repaired in a timely and appropriate manner to prevent damage to the layers under base course.)

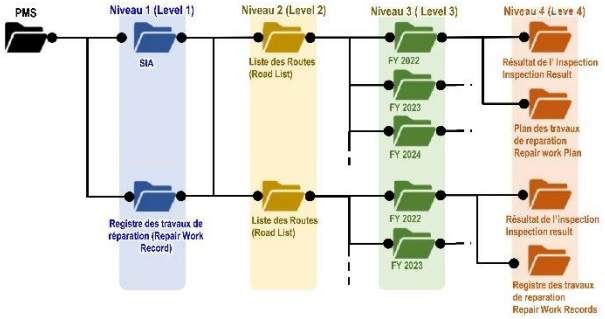
4) Registres (Records):

Les registres d'inspection, de diagnostic et de travaux de réparation sont conservés de manière centralisée afin d'éviter leur dispersion et de faciliter leur utilisation. Les détails des travaux de réparation et le résultat des enquêtes détaillées sont également enregistrés car ils fournissent des informations précieuses pour l'inspection suivante. (Records of inspections, diagnosis and repair works are kept centrally to prevent their dispersal and to facilitate their use. Details of repair works and the results of detailed investigations are also recorded as they provide valuable information for the next inspection.)

Chapitre 6: Recommandations Pour Les Travaux D'entretien Et De Réparation Des Routes
Chapter 6: Recommendations For Road Maintenance And Repair Work

6.2.3 Base de données (Database)

- Enregistrer et analyser les données routières pour les travaux d'entretien et la prise de décision (budget). (Record and analyze the road data for maintenance work and decision making (budget)).
- Les coûts du cycle de vie peuvent être minimisés en utilisant la base de données des routes (PMS) à chaque étape du cycle de gestion des chaussées routières. (Life cycle costs can be minimized by utilizing the Road Pavement DB (PMS) at each stage of the road pavement management cycle.)
- Pour plus de détails, se référer au manuel de la base de données. (Referee the Database Manual for details.)



APPENDIX 5 : ROAD AND BRIDGE DATABASE MANAGEMENT SYSTEM

GESTION DE SYSTÈME DE BASE DES DONNEES

CALENDRIER DE FORMATION

Jour 1 : PMS (SYSTEME DE GESTION DE PATRIMOINE ROUTIER)

Jour 2 : BMS (SYSTEME DE GESTION DES PONTS)

Jour 3 : EVALUATION

INTRODUCTION
PMS : SYSTEME DE GESTION DE PATRIMOINE ROUTIER

C'est quoi le PMS ?
Le système de gestion du Patrimoine Routier (PMS) est un logiciel de gestion des données d'inspection (par véhicule et visuelle) de la chaussée, des informations sur les travaux d'entretien et des données d'inventaire des routes.

Objectifs ?
Le PMS a été élaboré pour faciliter la gestion des routes au sein du MTP dans le cadre du Projet de développement des capacités de gestion de l'entretien des routes et des ponts à Madagascar.

Il permet également de créer des plans de gestion de l'entretien, des plans budgétaires et des informations sur les travaux d'entretien

INTRODUCTION
PMS : SYSTEME DE GESTION DE PATRIMOINE ROUTIER

- Fonctionnalité du PMS

- Le PMS est un système autonome.

PMS	- Les données d'inspection sont gérees par exercice financier - Les données de reparation gérées. - Les données d'inspection sont combines avec les informations de reparation et le volume de trafic, etc… .

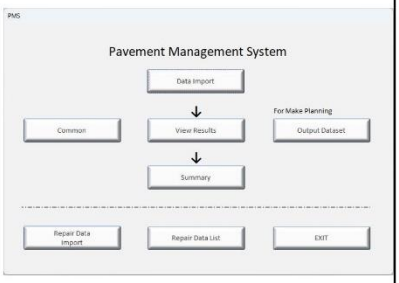
INTRODUCTION
PMS : SYSTEME DE GESTION DE PATRIMOINE ROUTIER

- PMS : configuration requise du PC

OS	Windows 10 ou plus
CPU	Intel® Core i5 ou plus
RAM	8 GB (nécessaire)
Affichage	Résolution 1024✕768 ou plus, Réglage DPI en taille normale (96DPI)
Mémoire interne	1TB ou plus
MS Access	2016 ou plus recent
MS Excel	2016 ou plus recent

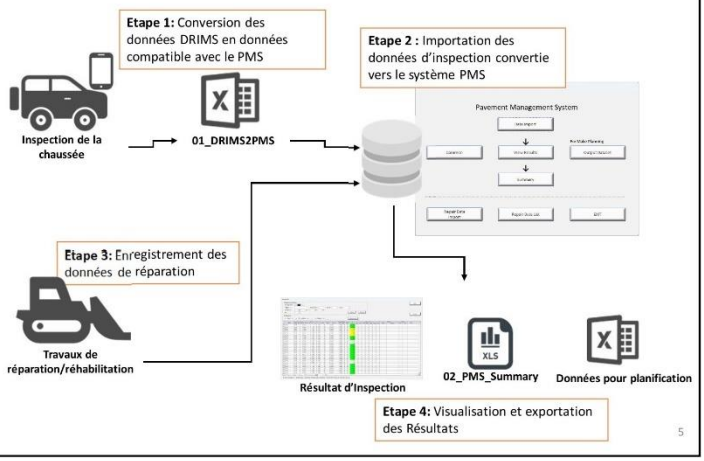
PMS : SYSTEME DE GESTION DU PATRIMOINE ROUTIER

1. Processus de travail
2. Configuration (Aperçu)
3. Commencer à utiliser le PMS
4. Importer les données
5. Visualiser les résultats
6. Résumé (presentation graphique)
7. Importer les données de réparation
8. Liste de données de réparation
9. Exporter les données résultantes
10. Common (autres données) ex: trafics



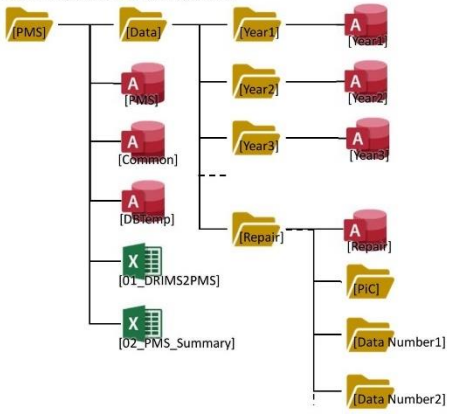
1. Processus de travail

Le PMS est exécuté en suivant les étapes ci-dessous :



2. Configuration

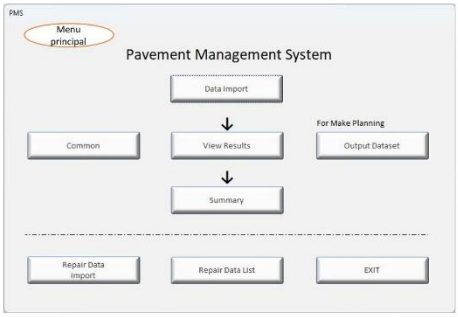
1. Copier le dossier "PMS" sur votre ordinateur (il n'y a pas de spécification sur l'emplacement).
2. Le structure du dossier PMS est comme suit (Certains dossiers sont créés automatiquement dans le système).



6

3. Commencer à utiliser le PMS

1. Double cliquer sur le fichier [PMS.accdb] dans le dossier PMS.
2. La fenêtre du [PMS] va s'ouvrir comme suit.



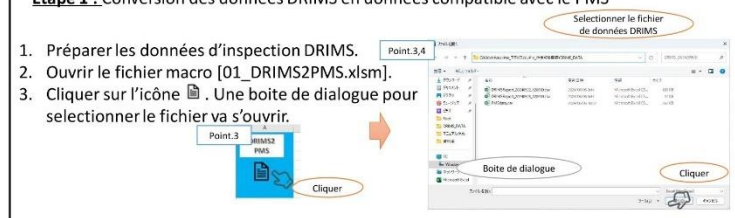
※ Si message d'alerte de sécurité apparait, cliquer sur [Autoriser].

7

3. Commencer à utiliser le PMS

Etape 1 : Conversion des données DRIMS en données compatible avec le PMS

1. Préparer les données d'inspection DRIMS.
2. Ouvrir le fichier macro [01_DRIMS2PMS.xlsm].
3. Cliquer sur l'icône . Une boite de dialogue pour selectionner le fichier va s'ouvrir.



4. Selectionner le fichier préparé dans 1. Cliquer sur le bouton [Ouvrir].
5. Un fichier [PMSdata.csv] va être créé dans le même emplacement.

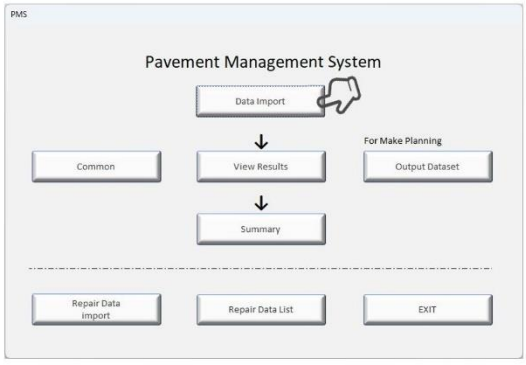


8

4. Importation des données (Données d'inspection de chaussée)

Etape 2 : Importation des données d'inspection de la chaussée vers le PMS

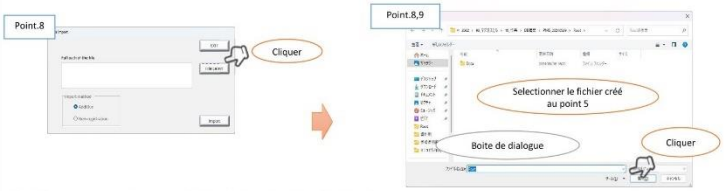
6. Exécuter le "PMS" et cliquer sur le bouton [Data Import]
7. La fenêtre [Data Import] va s'ouvrir.



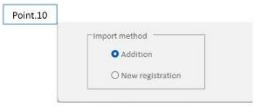
9

4. Importation des données (Données d'inspection de chaussée)

Etape 2 : Importation des données d'inspection de la chaussée vers le PMS



8. Cliquer sur le bouton [File Select] . Une boite de dialogue pour selectionner le fichier va s'ouvrir.
9. Selectionner le fichier créé au point 5. Cliquer sur le bouton [Ouvrir].
10. Selectionner la méthode d'importation puis cliquer sur le bouton [Import].

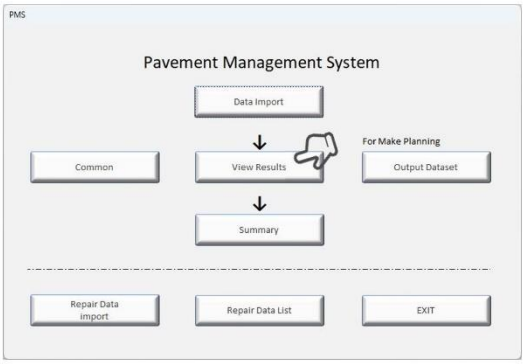


Addition: Garder les données existantes et ajouter de nouvelles données.
New registration: Supprimer les données existantes et importer de nouvelles données.

10

5. Visualiser les résultats

Etape 4: Visualiser et exporter les résultats

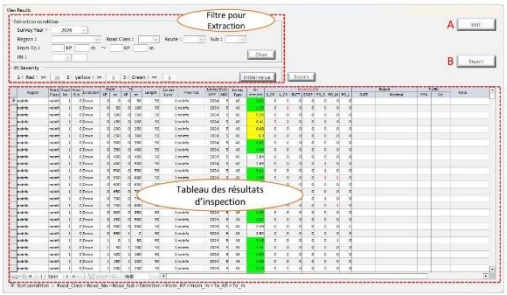


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5. Visualiser les résultats

Etape 4: Visualiser et exporter les résultats

1. Cliquer sur le bouton [View Results].
2. Une fenêtre contenant les résultats va s'ouvrir.



A) Bouton [Exit] : Revenir au Menu Principal
B) Bouton [Export] : Exporter le tableau des résultats d'inspection. Le fichier est enregistré dans le *Bureau* de votre ordinateur.

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5. Visualiser les résultats

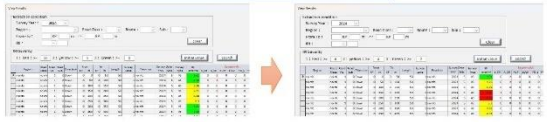
Etape 4: Visualiser et exporter les résultats

◆ Filtre pour l'extraction



A) Survey Year : Selectionner la date de l'inspection (Année).
B) Region, Road Class, Route, Sub : Selectionner les informations concernant la route.
C) From-To : Entrer les informations sur les Points Kilométriques des sections à visualiser.
D) IRI : Spécifier la valeur d'IRI .
E) IRI severity : Modifier les code-couleurs correspondant aux valeurs d'IRI .
F) Bouton **[Clear]** : Réinitialiser/vider les cases du filtre.
G) Bouton **[Initial value]** : Recharger les valeurs par défaut de "IRI severity".
H) Bouton **[Search]** : Rechercher les données correspondant au filtre.

Exemple : Modification des code-couleurs correspondant aux valeurs d'IRI

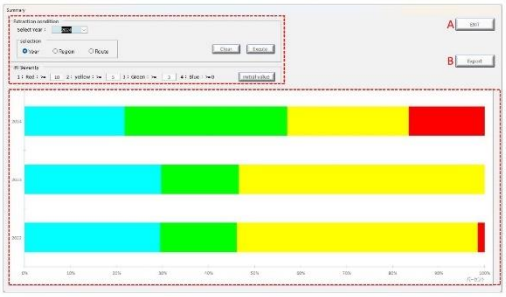


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6. Résumé (Presentation graphique)

Etape 4: Visualiser et exporter les résultats

1. Cliquer sur le bouton [Summary] . La fenêtre des résumé va s'ouvrir.



A) Bouton [Exit] : Revenir au menu principal
B) Bouton[Export] : Exporter le fichier "PMS_Summary". Le fichier est enregistré dans le *Bureau* de votre ordinateur.

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6. Résumé (Presentation graphique)

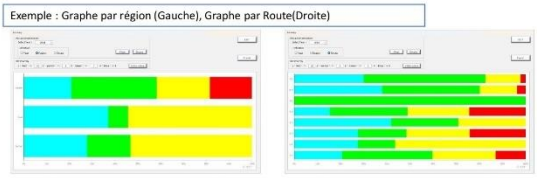
Etape 4: Visualiser et exporter les résultats

◆ Filtre pour l'extraction



A) Select Year : Selectionner l'année à calculer.
B) Selection : Selectionner la méthode de calcul.
C) IRI severity : Modifier les code-couleurs correspondant aux valeurs d'IRI .
D) Bouton **[Clear]** : Réinitialiser/vider toutes les cases du filtre .
E) Bouton **[Execute]** : Exécuter l'operation et le calcul.
F) Bouton **[Initial value]** : Recharger les valeurs par défaut de "IRI severity".

Exemple : Graphe par région (Gauche), Graphe par Route(Droite)



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6. Résumé (données de sortie)

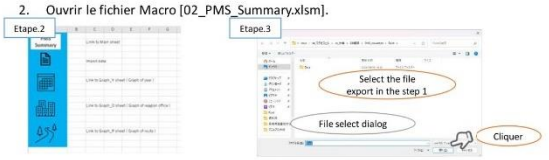
Etape 4: Visualiser et exporter les résultats

◆ Comment créer un résumé en utilisant les données du PMS.

1. Cliquer sur le bouton [Export] pour exporter le fichier de calcul. Le fichier est enregistré dans le *Bureau* de votre ordinateur.



2. Ouvrir le fichier Macro [02_PMS_Summary.xlsm].



3. Cliquer sur l'icône .Une boite de dialogue pour selectionner le fichier va s'ouvrir.
   (Quand de nouvelles données sont chargées, le graphe existant sera supprimé).
4. Selectionner le fichier exporté à l'étape 1. Cliquer sur [Open].
5. Cliquer sur les icônes pour visualiser les graphes.
   : Par année : Par région : Par Route



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7. Importation des données de réparation

Etape 3: Saisir des données de réparation

1. Cliquer sur le bouton [Repair Data Import].
2. La fenêtre de saisie des données de réparation va s'ouvrir.



A) **Project name** : Saisir le titre du Projet
B) **Location information** : Saisir la classe de la Route, le PK, etc.
C) **Repair work period** : Saisir la période d'exécution.
D) **Pavement condition** : Saisir l'état de la route avant tous travaux de réparation
E) **Repair information** : Entrer la méthode de réparation, les information sur les couches de la chaussée, etc
F) **Other information** : Entrer le nom de l'entreprise, le montant du contrat, etc
G) **Photos** : Télécharger les photos
H) **Bouton de contrôle** : Revenir au menu principal, enregistrer les données, Supprimer les données, etc.

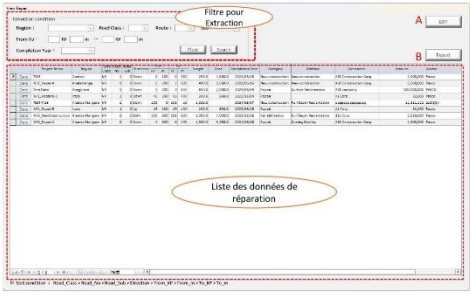
3. Remplir au moins les cases obligatoires, puis cliquer sur le bouton [Save].

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8. Liste de données de réparation

Etape 4: Visualiser et exporter les résultats

1. Cliquer sur le bouton [Repair Data List].
2. La fenêtre contenant la liste des données de réparation va s'ouvrir.



A) Bouton [Exit] : Revenir au menu principal
B) Bouton [Export] : Exporter le fichier contenant les données de réparation. Le fichier est exporté dans le *Bureau* de votre ordinateur.

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8. Liste de données de réparation

Etape 4: Visualiser et exporter les résultats

◆ Filtre d'Extraction



A) Region, Road Class, Route, Sub : Selectionner les informations concernant la route.
B) From-To : Entrer les informations sur les Points Kilométriques des sections à visualiser.
C) Completion Year : Entrer la date de fin des travaux (année)
D) Bouton **[Clear]** : Réinitialiser/vider les cases du filtre.
E) Bouton **[Search]** : Rechercher les données correspondant au filtre.

◆ Liste de données de réparation



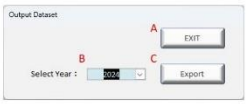
A) Bouton [Data] : Ouvrir la fenêtre de saisie des données de réparation. On peut confirmer les informations détaillées et les modifier.

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9. Exporter les données résultantes

Etape 4: Visualiser et exporter les résultats

1. Cliquer sur le bouton [Output Dataset] .
2. La fenêtre [Output Dataset] va s'ouvrir.



A) Bouton [Exit] : Revenir au menu principal
B) Select Year : Choisir l'année
C) Bouton [Export] : Exporter le fichier contenant la liste des travaux de réparation. Le fichier est exporté dans le *Bureau* de votre ordinateur.

3. Selectionner l'année des données à exporter.
4. Cliquer sur le bouton [Export] .
5. Partager le fichier exporté "D4P_***" avec l'équipe de planification.

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10. Common

"Common" est pour gérer et mettre à jour les données communes utilisées par le système.

1. Cliquer sur le bouton [Output Dataset] .
2. La fenêtre [Output Dataset] va s'ouvrir.



A) Bouton **[Exit]** : Revenir au menu principal
B) Bouton **[File Select]** : Une boite de dialogue pour selectionner le fichier va s'ouvrir.
C) Bouton **[Import]** : Importer les données communes vers la BD.
D) Bouton **[Export]** : Exporter le fichier contenant les données communes. Le fichier est exporté vers le *Bureau* de votre ordinateur.
E) Types de données communes : Selectionner le type.

3. Mettre à jour le fichier contenant les donnés communes
4. Selectionner le type de données communes.
5. Cliquer sur le bouton [Export].
6. Mettre à jour les données. (pour la mise à jour, il faut se référer au "Manuel d'exploitation des Systèmes de Bases de Données PMS/BMS" afin d'avoir les instructions détaillées .)
7. Cliquer sur le bouton [File select] . Selectionner le fichier mis à jour.
8. Cliquer sur le bouton [Import].

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11. CALENDRIER ANNUEL DE MISE EN OEUVRE DU PMS

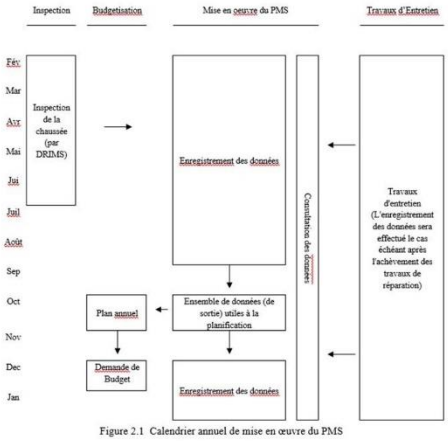


Figure 2.1 Calendrier annuel de mise en œuvre du PMS

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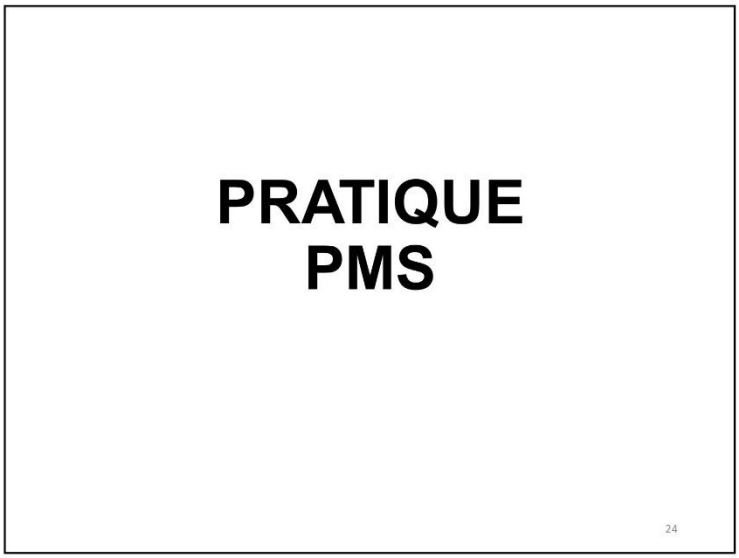
11. CALENDRIER ANNUEL DE MISE EN OEUVRE DU PMS

Les données du PMS doivent être sauvegardées au moins une fois par an par le gestionnaire.

Les données du dossier "System pass（Modify after complete developing PMS/BMS）" sont copiées sur le disque dur externe.

Le disque dur externe doit être conservé dans un endroit hautement sécurisé du bureau.

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PRATIQUE
PMS
24

INTRODUCTION
BMS : SYSTEME DE GESTION DES OUVRAGES D'ART

C'est quoi le BMS?
Le système de gestion des Ouvrages d'arts (BMS) est un logiciel de gestion des données d'inspection des ponts, des informations sur les travaux d'entretien et la liste exhaustive des ponts.

Objectifs ?
Le BMS a été élaboré pour faciliter la gestion des ponts au sein du MTP dans le cadre du Projet de développement des capacités de gestion de l'entretien des routes et des ponts à Madagascar.

- ✓ Gérer les données d'inventaire des ponts
- ✓ Les données d'inspection sont liées aux données d'inventaire
- ✓ D'autres données tells que fichier CAD, les photos et autres fichiers sont archives et liées aux données du pont

BMS : SYSTÈME DE GESTION DES OUVRAGES D'ART

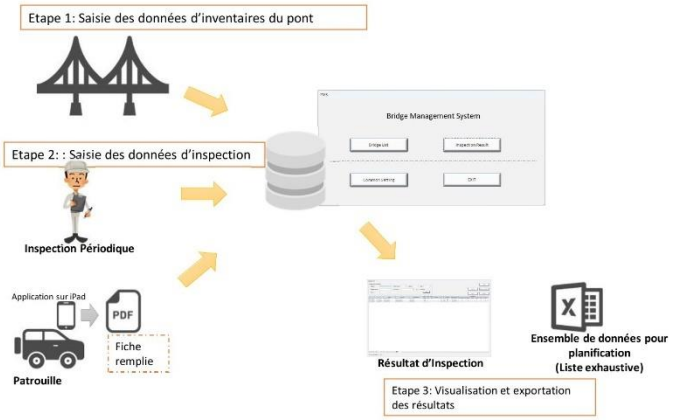
CONTENU

1. Processus à suivre
2. Configuration
3. Commencer à utiliser le BMS
4. Inventaire des Ponts
5. Données d'inspection des Ponts
6. Commun



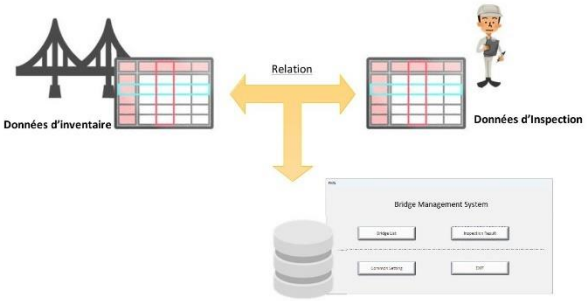
1. Processus de travail

Le BMS est exécuté en suivant les étapes ci-dessous :



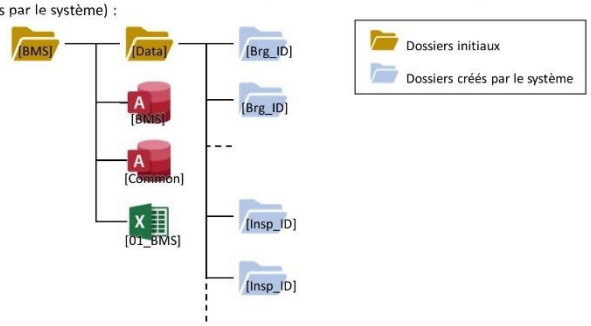
1. Processus de travail

Dans le BMS, les données d'inspection sont liées aux données d'inventaire.
Avant d'enregistrer toutes **données d'inspection** d'un pont, il est **impératif** de saisir et **d'enregistrer au préalable** les **données d'inventaire** correspondantes.



2. Configuration

1. Copier le dossier “BMS” dans votre ordinateur (il n’y pas de spécification sur l’emplacement).
2. Le structure du dossier BMS est comme suit (Certains dossiers sont automatiquement créés par le système) :



4

3. Commencer à utiliser le BMS

1. Double cliquer sur le fichier [PMS.accdb] dans le dossier BMS.
2. La fenêtre du [BMS] va s’ouvrir comme l’image qui suit,



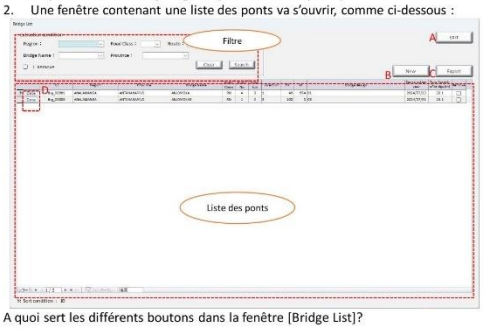
※ Si un message d’alerte de sécurité apparaît, cliquez sur [Autoriser]

5

4. Inventaire des ponts

Etape 1: Saisir et enrégistrer les données d'inventaire d'un pont

1. Cliquer sur le bouton ***[Bridge list]*** *dans le* menu principal.
2. Une fenêtre contenant une liste des ponts va s'ouvrir, comme ci-dessous :



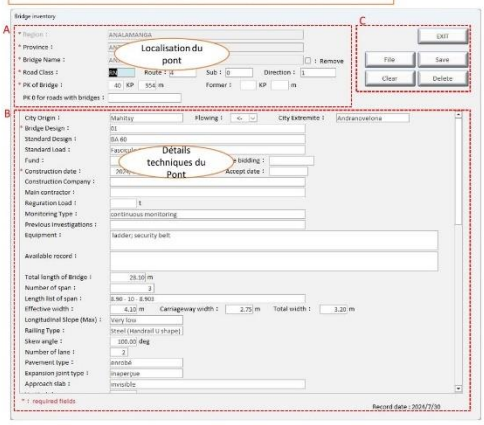
A quoi sert les différents boutons dans la fenêtre [Bridge List]?

A) Bouton **[Exit]** : Revenir au menu principal
B) Bouton **[Export]** : Exporter les données d'inventaire apparu dans la liste des ponts. Le fichier est automatiquement enregistré dans le *Bureau* de votre ordinateur.
C) Bouton **[New]** : Ouvrir la fenêtre de saisie de données d'inventaire d'un nouveau Pont. Saisir des nouvelles données d'inventaire.
D) Bouton**[Data]** : Ouvrir la fenêtre de saisie de données d'inventaire d'un pont déjà enregistré. Modifier les données d'inventaire.

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4. Inventaire des Ponts

Etape 1: Saisir et enrégistrer les données d'inventaire d'un pont



A) Localisation du Pont : Saisie des info sur la classe de la route, PK, etc.

※Pendant la modification des données, certaines ne pourront pas être modifiées.

B) Détails techniques du Pont : Saisir les details techniques du pont dans cette partie.

C) Bouton de contrôle : Revenir dans le menu principal, Enregistrer des données, supprimer des données, etc.

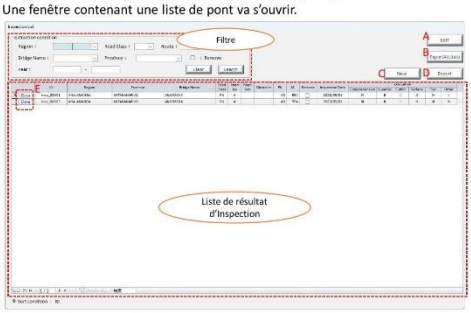
※Les boutons [Delete] et [File] fonctionnent seulement dans l'aperçu détaillé.

7

5. Données d'Inspection des Ponts

Etape 2: Saisir et Enregistrer les données d'inspection de Pont

1. Cliquer le bouton **[Inspection Result]** dans le menu principal.
2. Une fenêtre contenant une liste de pont va s'ouvrir.



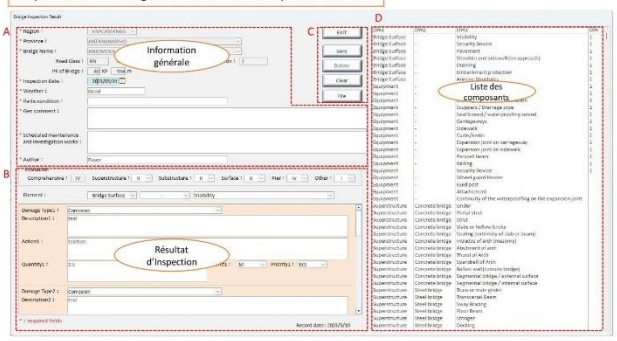
A quoi sert les différents boutons dans la fenêtre [Inspection List]?

A) Bouton **[Exit]** : Revenir au menu principal
B) Bouton **[Export all data]** : Exporter toutes données d'inspection avec toutes les informations. Le fichier est automatiquement enregistré dans le *Bureau* de votre ordinateur.
C) Bouton **[New]** : Ouvrir la fenêtre pour saisir de nouvelles données d'inspection d'un Pont.
D) Bouton **[Export]** : Exporter les données d'inspection avec des informations non-détaillées. Le fichier est automatiquement enregistré dans le *Bureau* de votre ordinateur.
E) Bouton **[Data]** : Ouvrir la fenêtre de saisie de données d'inspection contenant déjà des informations. Modifier les données d'inspection.

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5. Données d'Inspection des Ponts

Etape 2: Saisir et Enregistrer les données d'inspection de Pont



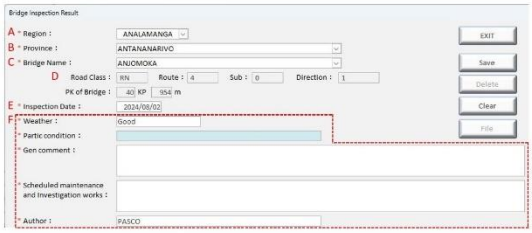
A) Information Générale : Selectionner ou saisir les informations sur le pont, la date d'inspection, etc.
※Pendant la modification des données, certaines ne pourront pas être modifiées.
B) Résultat d'Inspection : Entrer les résultats d'inspection pour chaque élément dans cette partie.
C) Boutons de contrôle : Revenir dans le menu principal, Enregistrer des données, supprimer des données, etc.
※Les boutons [Delete] et [File] fonctionnent seulement dans l'aperçu détaillé.
D) Liste des composants : Montrer l'état de chaque éléments.

9

5. Données d'Inspection des Ponts

Etape 2: Saisir et Enregistrer les données d'inspection de Pont

◆ Information générale



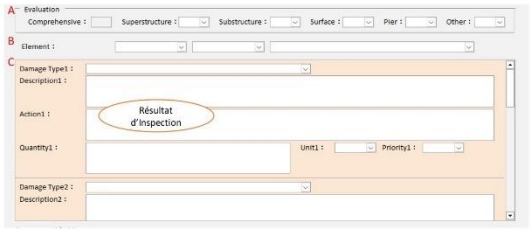
A) ***Region***: Selectionner dans la liste.
B) ***Province***: Selectionner dans la liste.
C) ***Bridge Name***: Selectionner dans la liste.
D) ***Road class, Route, Sub, Direction, PK of Bridge***: Ce sera automatiquement remplis sur la base des informations dans l'inventaire, le système se réfère aux données (**A)*Region, B)Province,* et C)*Bridge name***) précedemment selectionnées. Au cas où, il n'y a pas de données correspondant aux informations selectionnées (**A)*Region, B)Province,* et C)*Bridge name***), il est requis d'enregistrer d'abord les données d'inventaires dans [Bridge List].
E) **Inspection Date**: Entrer la date d'achèvement des travaux d'Inspection.
F) **Weather, Partic condition, etc**: Entrer d'autres informations d'inspection.

10

5. Données d'Inspection des Ponts

Etape 2: Saisir et Enregistrer les données d'inspection de Pont

◆ Information commune



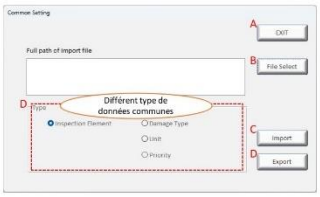
A) **Evaluation:** Selectionner une notation pour *superstructure* jusqu'à *other*. *Comprehensive* sera généré automatiquement selon les notations précédemment sélectionnées, elle correspond à la pire notation sélectionnée.
B) **Element:** Selectionner l'élément à saisir.
C) **Résultat d'Inspection :** Entrer les information d'inspection pour chaque élément (jusqu'à cinq types d'information par élément est possible) . Quand vous voulez passer au prochain élément, cliquer sur le bouton "Save" pour enregistrer, puis selectionner un autre élément.

11

6. Commun

"Commun" pour gérer et mettre à jour les données communes utilisées dans le système.

1. Cliquer sur le bouton [Output Dataset].
2. La fenêtre [Output Dataset] va s'ouvrir.



A) Bouton **[Exit]** : Revenir au menu principal
B) Bouton **[File Select]** : Une fenêtre de dialogue pour choisir un fichier va apparaitre.
C) Bouton **[Import]** : Importer des données communes dans la base de donnée.
D) Bouton **[Export]** : Exporter un fichier contenant les données communes. Le fichier est enregistré sur le *bureau* de votre ordinateur.
E) Différent type de données communes : Selectionner le type de données qui vous intéressent ici.

3. Selectionner un type de données communes.
4. Cliquer sur le bouton [Export] .
5. Mettre à jour les données dans le fichier importé. (Pour la mise à jour, il faut se référer au "Manuel d'exploitation des Systèmes de Bases de Données PMS/BMS" afin d'avoir les instructions détaillées .)
6. Cliquer sur le bouton [File select] . Selectionner le fichier mis à jour.
7. Cliquer sur le bouton [Importer].

12

7. CALENDRIER ANNUEL DE MISE EN OEUVRE DU BMS

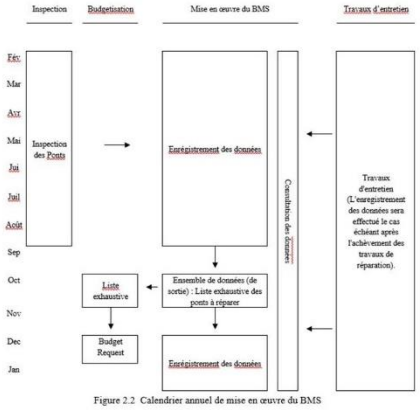


Figure 2.2 Calendrier annuel de mise en œuvre du BMS

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7. CALENDRIER ANNUEL DE MISE EN OEUVRE DU PMS

Les données du BMS doivent être sauvegardées au moins une fois par an par le gestionnaire.

Les données du dossier "System pass（Modify after complete developing PMS/BMS）" sont copiées sur le disque dur externe.

Le disque dur externe doit être conservé dans un endroit hautement sécurisé du bureau.

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PRATIQUE BMS

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APPENDIX 6 : ROAD AND BRIDGE MAINTENANCE PLANNING

Projet de Développement des Capacités de Gestion de l'entretien des Routes et des Ponts (Phase 2)

GT5
Manuel de Préparation et d'Utilisation d'un Plan d'Entretien de ROUTE

Manuel pour l'établissement de la Liste Exhaustive des PONTS par Catégorie d'Intervention

CTI Engineering International Co., Ltd.
OC GLOBAL
CHODAI CO.,LTD. CONSULTANT & SERVICE PROVIDER

Contenu de la formation

Page-2

1. Présentation du manuel
2. Procédure de planification de l'entretien
3. Compréhension de la "politique d'entretien", du "niveau cible d'entretien", de la "stratégie d'entretien" et des "critères de priorité"
4. Formation pratique à la planification de l'entretien routier
5. Etablissement de la Liste Exhaustive des ponts
6. Discussion et évaluation

Programme de la formation

Page-3

Jour 1	Salle de classe	Matin	Auto-évaluation et introduction Etat des lieux : conditions actuelles et enjeux
		Après midi	Présentation du manuel Procédure de planification de l'entretien
Jour 2	Salle de classe	Matin	Compréhension de la "politique d'entretien", du "niveau cible d'entretien", de la "stratégie d'entretien" et des "critères de priorité"
		Après midi	Formation à la planification de l'entretien routier
Jour 3	Salle de classe	Matin	Etablissement de la Liste Exhaustive des ponts
		Après midi	Discussion et évaluation

1- PRESENTATION DU MANUEL

1. Présentation du manuel

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Objectifs du manuel

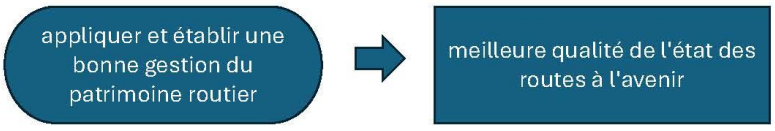
- Fournir une approche **uniforme** et des lignes directrices pour la planification des travaux de réparation correspondant aux détériorations des routes revêtues, sur la base de l'inventaire et l'étude des états de la route
- Fournir des considérations techniques clés pour des sites spécifiques tels qu'une route avec des courbes prononcées, de forte pente, ou une section longitudinale en zone basse, etc.
- Fournir les principes d'une pratique d'entretien routier efficace, comme l'**entretien préventif**.

1. Présentation du manuel

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But final

- améliorer le niveau de préparation du plan d'entretien des chaussées
- réduire les coûts d'entretien et de réparation des chaussées (optimisation)
- améliorer l'efficacité du transport routier
- renforcer l'économie régionale en
  - accélérant la vitesse moyenne de circulation des véhicules
  - réduisant les dommages causés par les poids lourds
  - assurant la sécurité des usagers de la route



1. Présentation du manuel

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Domaines d'application

- planification du plan d'entretien annuel
- établissement des conditions préalables du plan d'entretien
- demande et l'allocation du budget
- préparation du plan d'entretien à moyen/long terme

Routes concernées

- routes nationales exploitées et gérées par le MTP **(RNP, RNS, RNT)**
- les principales routes ciblés par ce manuel sont les **RN1 et RN2**, qui sont les routes pilotes ciblées par le projet F3LTM

1. Présentation du manuel

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Structure et contenu du manuel

Chapitre	Titre
2	Conditions et les problèmes actuels des travaux de réparation des routes et la procédure de planification de l'élaboration du plan d'entretien
3	Concept d'entretien du patrimoine routier et son cycle d'entretien
4	Conditions préalables des plans d'entretien
5	Procédures de préparation du plan d'entretien
6, 7, 8	Préparation du plan d'entretien annuel sur la route modèle (RNP2, catégorie I) Préparation du plan d'Entretien annuel (RNS1, Catégorie II) Préparation du plan d'Entretien annuel (autres catégories, III, IV et V)
9	Utilités du plan d'entretien (demande de budget, l'allocation du budget, la mise en œuvre des travaux d'entretien et une référence au plan d'entretien des années suivantes)
10	Préparation du plan d'entretien à moyen et long terme
	Utilisation du plan d'entretien à moyen et long terme
11	Enjeux restants dans la préparation/l'utilisation du plan d'entretien

1. Présentation du manuel

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Situation actuelle (chapitre 2)

- Il existe deux procédures de budgétisation pour l'entretien des routes par le MTP à Madagascar. La première est appelée PEC, qui signifie Programme d'Entretien Courant. C'est l'équivalent du plan d'entretien annuel, et il est préparé chaque année pour l'ensemble du réseau routier géré par le MTP.
- L'autre est la procédure de planification des projets de réhabilitation qui ne peuvent pas être traités par le PEC, tels que la réfection des chaussées revêtues, y compris l'amélioration de la couche de base/forme.

1. Présentation du manuel

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Classification des routes - situation actuelle (chapitre 3)

Tableau 2-1 Classification des routes à Madagascar avec leur longueur

Classe		Longueur (km)
Route Nationale	Primaire	2 564
	Secondaire	4 813
	Tertiaire	4 532
Route Régionale		22 137
Route Communale		7 500
Total		***41 546***

Source: MTP

1. Présentation du manuel

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Conditions préalables à l'élaboration du plan d'entretien (chapitre 4)

- Comprendre l'état actuel du réseau routier
- Comprendre la demande sociale en matière d'entretien des routes.
- Définir la politique d'entretien
- Définir une catégorisation des itinéraires
- Définir les objectifs ou niveaux cibles, ainsi que le niveau de gestion
- Définir la stratégie de gestion (grille de décision)

1. Présentation du manuel

Page-12

Utilisation du plan d'entretien annuel (chapitre 9)

- Définition d'une liste exhaustive de travaux pour **demande de budget**
- **Allocation budgétaire**
- Finalisation d'un **plan d'entretien** en fonction du budget alloué
- **Mise en œuvre et suivi**
- **Enregistrement**/référence au plan d'entretien de l'année suivante

1. Présentation du manuel

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Enjeux restants (chapitre 12)

- Répartition du budget par région et itinéraire
- Préparation du plan d'entretien de chaque région
- Évaluation du niveau de dégradation de la chaussée par région/route
- Le cycle PDCA
- Utilisation du Cycle de gestion de la chaussée

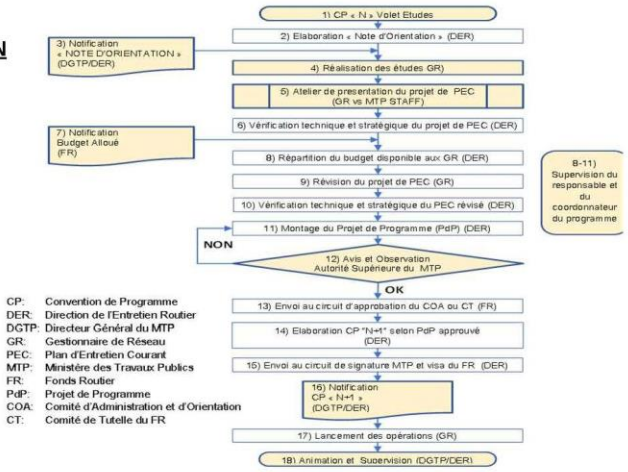
2- PROCEDURES DE PLANIFICATION DE L'ENTRETIEN

2. Procédure de planification de l'entretien

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Organigramme de formulation du PLAN D'ENTRETIEN COURANT

Situation actuelle



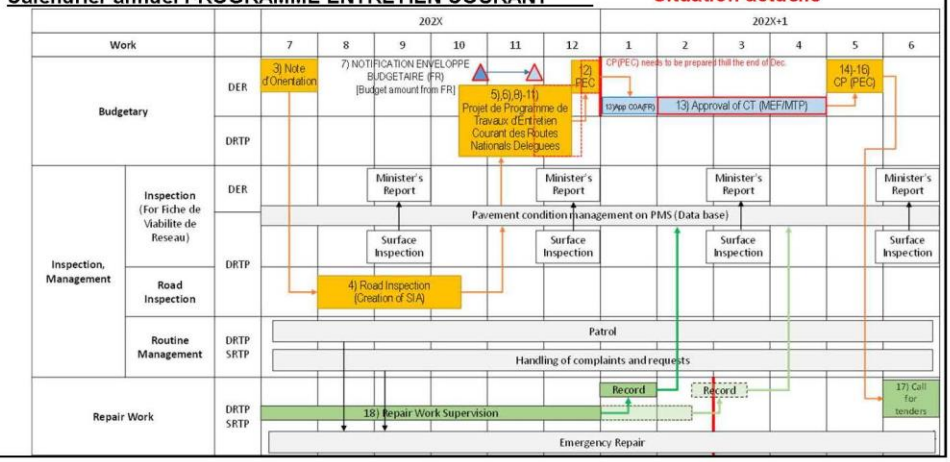
CP: Convention de Programme
DER: Direction de l'Entretien Routier
DGTP: Directeur Général du MTP
GR: Gestionnaire de Réseau
PEC: Plan d'Entretien Courant
MTP: Ministère des Travaux Publics
FR: Fonds Routier
PdP: Projet de Programme
COA: Comité d'Administration et d'Orientation
CT: Comité de Tutelle du FR

2. Procédure de planification de l'entretien

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Calendrier annuel PROGRAMME ENTRETIEN COURANT

Situation actuelle



2. Procédure de planification de l'entretien

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Enjeux PROGRAMME ENTRETIEN — **Situation actuelle**

- **Il n'existe pas de politique ou de stratégie pratique** à suivre pour les GR des bureaux régionaux lorsqu'ils préparent le projet de PEC sur la base du résultat de l'inspection. Il en résulte un niveau différent de la surface de la route après l'achèvement du PEC.
- Il n'existe pas de **manuel spécifique mis à jour** pour guider les inspecteurs en ce qui concerne les défaillances et les dégradations de la chaussée ou du revêtement. Ce problème est résolu par le manuel préparé par le F3LTM.
- Il ne démontre pas le **niveau de dégradation après l'achèvement de la PEC**. Par conséquent, le planificateur au sein du MTP ne peut pas prédire l'état de la surface de la route non seulement après l'achèvement de la PEC, mais aussi plusieurs années plus tard. Il devrait être démontré de manière quantitative afin que le planificateur au sein du MTP puisse prévoir les activités d'entretien.

2. Procédure de planification de l'entretien

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Enjeux PROGRAMME ENTRETIEN — **Situation actuelle**

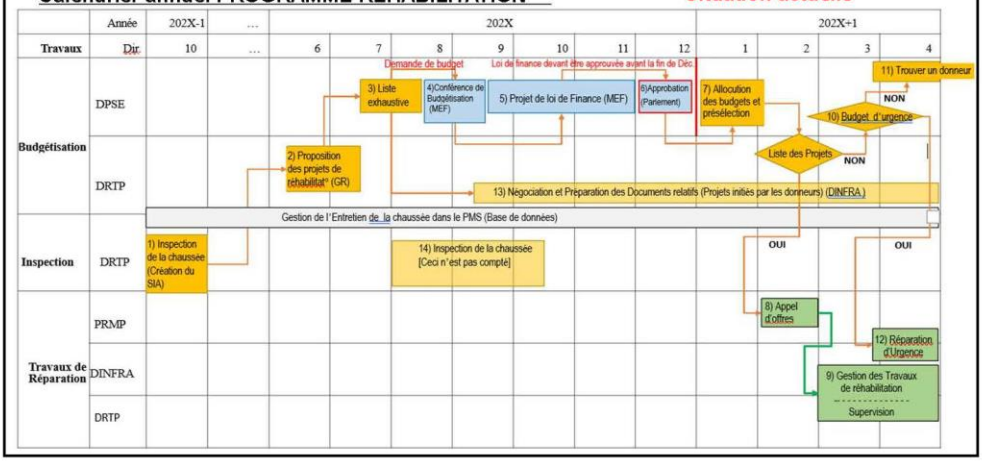
- Le **niveau d'entretien à atteindre** pour l'itinéraire n'est pas défini en raison de l'absence de politique et de stratégie d'entretien. Alors que la connaissance de ce niveau peut conduire tous les GR dans la même direction (même idée) lors de la préparation du projet de PEC.
- Le principal problème est que le **MTP n'a pas de méthode à jour pour prévoir ce que ses activités d'entretien produiront.** Ils ne sauraient même pas s'ils planifient des travaux de réparation qui aggraveraient l'état du réseau routier. Ils ne connaissent pas la quantité de travaux/le coût/la période qui doivent être ajoutés pour vraiment améliorer l'état du réseau routier.
- Il n'existe pas de **système permettant de refléter la politique d'entretien** du MTP dans le projet de PEC préparé par les bureaux régionaux.

2. Procédure de planification de l'entretien

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Calendrier annuel PROGRAMME REHABILITATION

Situation actuelle



2. Procédure de planification de l'entretien

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Enjeux PROGRAMME REHABILITATION

Situation actuelle

- Il **n'existe pas de politique ou de stratégie pratique** à suivre par les GR des bureaux régionaux pour **sélectionner les sections** qui nécessitent des travaux de réhabilitation. Cela laisserait certaines sections présentant des conditions sévères en dehors de la liste exhaustive et permettrait une **détérioration continue**.

- Il faut **plus d'un an et demi** pour exécuter les projets de réhabilitation après l'exécution de l'inspection. Cela permet aux dégradations de se détériorer considérablement entre le moment de l'inspection et le début du projet de réhabilitation. Ce qui entraînera une **insuffisance du montant estimé** dans le devis quantitatif de la réhabilitation. Par conséquent, un budget pour les imprévus doit être pris en compte lors de la préparation de l'appel d'offres de ces projets.

- Le projet de réhabilitation **dépend fortement des fonds extérieurs (Bailleur de fonds)** . Les recettes spécifiques destinées à l'entretien des routes devraient être davantage utilisées pour les projets de réhabilitation des routes.

2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Définition de la GESTION DU PATRIMOINE ROUTIER

La "gestion du patrimoine routier" désigne un processus systématique de gestion efficace et effective du patrimoine routier tout au long de son cycle de vie.

Ce processus comprend la planification, l'acquisition, l'exploitation, l'entretien, la réhabilitation et le remplacement du patrimoine routier afin d'optimiser ses performances, de prolonger sa durée d'utilisation et d'assurer la sécurité et la résilience.

2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Eléments du patrimoine routier

(1) Chaussées :

La couche superficielle de la route, comprenant le bitume, le béton , et d'autres matériaux assurant la fluidité de la circulation et la durabilité de la surface de la route.



2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Eléments du patrimoine routier

(2) Ponts et ponceaux :

Structures permettant aux routes de franchir des obstacles tels que des rivières, des vallées et d'autres routes, ainsi que de petits canaux pour l'évacuation de l'eau sous la route.





2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Eléments du patrimoine routier

(3) Tunnels :

Passages souterrains ou sous-marins qui permettent aux routes de traverser des montagnes, des rivières ou des zones urbaines.



2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Eléments du patrimoine routier

(4) Talus :

Les talus comprennent les inclinaisons et les déclivités naturelles et construites le long des routes, qui doivent être gérées pour assurer la stabilité et la sécurité de l'infrastructure routière.



2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Eléments du patrimoine routier

(5) Ouvrages d'assainissement :

Infrastructure qui gère l'écoulement de l'eau, notamment les caniveaux, les fossés, les avaloirs et les dalots, afin de prévenir les inondations et les dégâts causés par l'eau sur la route.





2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Eléments du patrimoine routier

(6) Les dépendances :

Les dépendances comprennent l'éclairage de la chaussée, la signalisation routière, les glissières de sécurité et les garde-corps, les trottoirs et les passages pour piétons, les marquages au sol, les aires de repos et les aires de service, la végétation en bordure de route, les réflecteurs, les systèmes de transport intelligents (STI), etc.





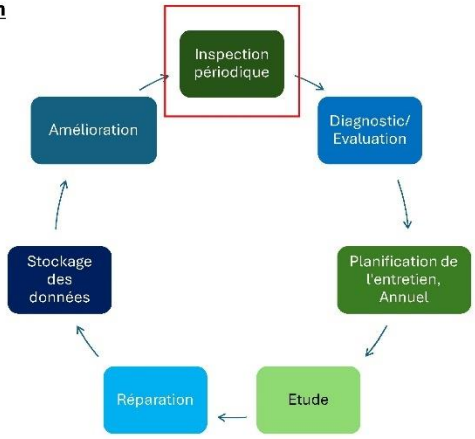
2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle d'entretien

(sur la base d'inspection périodique)



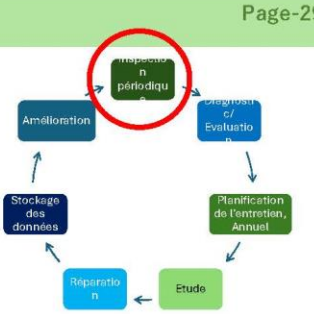
2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle d'entretien

(sur la base d'inspection périodique)



L'inspection des chaussées consiste à évaluer l'état de la surface de chaussée

Méthodes :

- Inspections visuelles pour identifier les fissures, les nids-de-poule, les problèmes de drainage et la texture de la surface,
- Essai non destructif telles que le déflectomètre à poids tombant (FWD), le radar à pénétration de sol (GPR), et le balayage laser pour les profils de surface, le cas échéant.
- Essais destructifs, tels que les carottages

Les résultats de ces inspections sont utilisés pour calculer l'indice d'état de la chaussée (PCI), l'indice structurel (SN), et aident à déterminer l'état général et la capacité structurelle. Ils donnent également un indice de lissage de la surface sous la forme d'un indice de rugosité international (IRI).

2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle d'entretien

(sur la base d'inspection périodique)

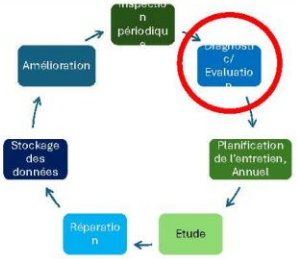


Tableau 3-1 Critères d'évaluation de l'état superficiel des routes

NIVEAU	Description	IRI
A	Bon	0.0 – 3.0
B	Moyen	3.0 – 5.0
C	Mauvais	5.0 – 10.0
D	Très mauvais	Plus de 10.0

Source : "Manuel d'inspection et de diagnostic des routes, F3LTM".

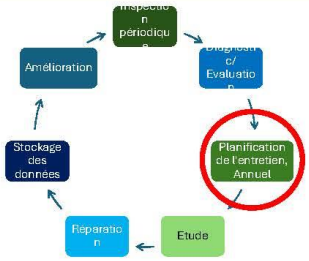
2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle d'entretien

(sur la base d'inspection périodique)



- Définition de la politique et stratégies d'entretien
- Sélection des tronçons nécessitant des interventions
- Priorisation des tronçons
- Préparation du plan d'entretien

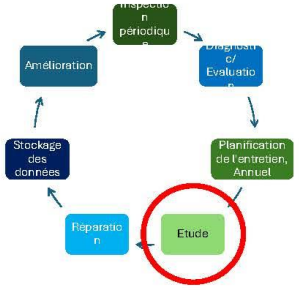
2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle d'entretien

(sur la base d'inspection périodique)



- Évaluation des quantités des travaux
- Étude de prix
- Évaluation des sections nécessitant des études approfondies et essais spécifiques

2. Procédure de planification de l'entretien

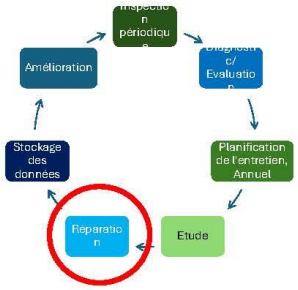
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Cycle de gestion et d'entretien

Cycle d'entretien

(sur la base d'inspection périodique)

Réalisation des travaux



2. Procédure de planification de l'entretien

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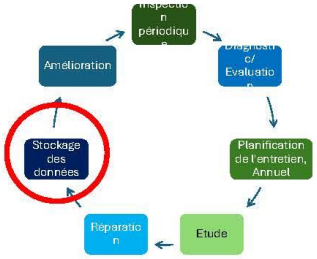
Cycle de gestion et d'entretien

Cycle d'entretien

(sur la base d'inspection périodique)

Dans la base de données :

- Mise à jour de l'état de la surface de la route
- Enregistrement de l'historique des traitements effectués sur les sections incluses dans la mise en œuvre du plan d'entretien
- Mise à jour du niveau de dégradation
- Saisie et enregistrement des détails et quantités des travaux



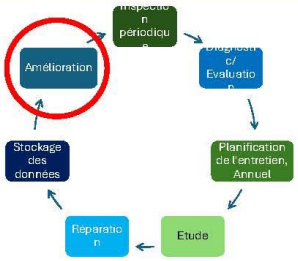
2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle d'entretien

(sur la base d'inspection périodique)



- Comparaison entre l'objectif initial et le résultat des travaux
- Redéfinition d'objectifs si nécessaire
- Évaluer la précision, efficacité des inspections réalisées
- Identifier les besoins en renforcement de capacités des acteurs
- Mise à jour des manuels si nécessaire
- Amélioration des spécifications des travaux d'entretien après amélioration de l'état de la route

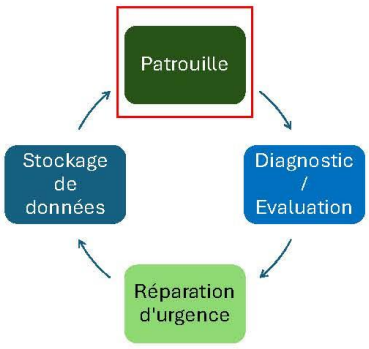
2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle d'entretien

(sur la base de patrouille)



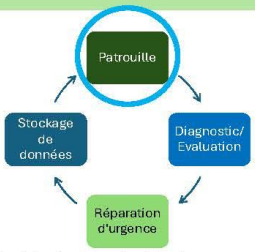
2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle d'entretien

(sur la base de patrouille)



- Patrouille = surveillance permanente
- Méthode : parcours fréquents et réguliers de l'itinéraire avec un véhicule
- En cas d'incidents inhabituels, l'inspecteur s'arrête, vérifie et enregistre l'incident. Les incidents ne comprennent pas seulement les défauts ou les dégradations, mais aussi les débris, les excréments, les animaux morts, les occupations illégales, les plantes qui pénètrent sur la chaussée, etc
- Fréquence : au moins une fois par mois (idéalement tous les jours)
- Si l'inspecteur peut l'éliminer au cours de sa patrouille, il doit le faire et signaler que l'incident est déjà résolu. Autrement, il doit le signaler aux autorités supérieures.

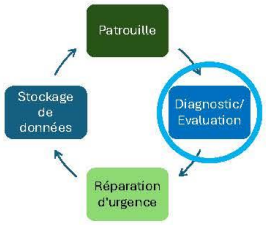
2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle d'entretien

(sur la base de patrouille)



- Définition du type de traitement adapté

(traitement d'urgence si nuisible à la sécurité des usagers, ou évolution rapide de dégradations)

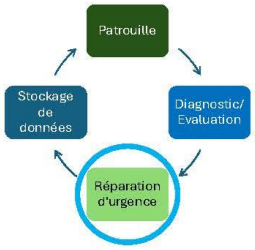
2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle d'entretien

(sur la base de patrouille)



- Réalisation des travaux de réparation

2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle d'entretien

(sur la base de patrouille)



- Enregistrement immédiat des traitements effectués, la nature des travaux, la nécessité de réparation adéquate si une réparation temporaire a été effectuée

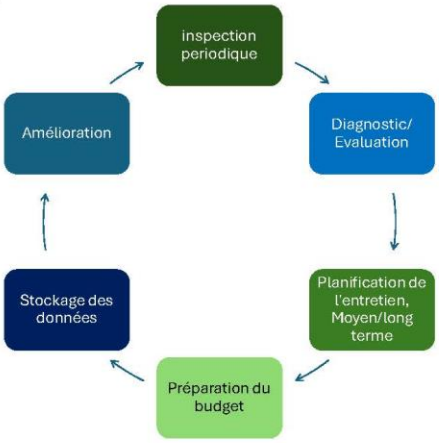
2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle d'entretien

(moyen / long terme)

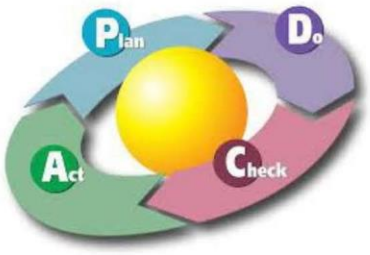


2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle PDCA

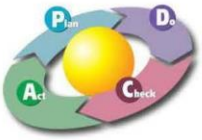


2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle PDCA



(1) Planifier (PLAN) :

· Identifier un problème ou un domaine à améliorer.

· Élaborer des hypothèses sur la nature des problèmes et créer un plan pour les résoudre.

· Fixer des objectifs et définir les étapes nécessaires pour les atteindre.

· Cette étape comprend l'inspection périodique (ou patrouille), le diagnostic/évaluation

2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle PDCA



(2) Faire (DO) :

· Mettre en oeuvre le plan à petite échelle pour en tester l'efficacité.

· Exécuter les étapes décrites dans le plan.

· Collecter des données et des documents pour le processus.

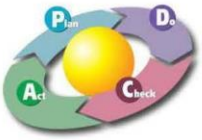
· Cette étape comprend la "conception", la "réparation (réparation urgente)", la "préparation du budget"

2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle PDCA



(3) Vérifier (CHECK) :

· Analyser les données collectées au cours de la phase « Do ».

· Comparez les résultats obtenus aux résultats attendus.

· Identifier les différences ou les écarts et en comprendre les causes.

· Cette étape comprend l'enregistrement des cycles d'entretien de la chaussée

2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Cycle PDCA



(4) Agir (ACT):

· Sur la base de l'analyse, déterminer si le plan doit être poursuivi ou amélioré.

· Si le plan a été couronné de succès et que l'objectif est atteint, le mettre en oeuvre avec un objectif

plus ambitieux.

· Si le plan nécessite des ajustements, il faut l'affiner et répéter le cycle PDCA. · Institutionnaliser les changements qui se sont avérés efficaces.

· Cette étape comprend l'"amélioration" des cycles d'entretien

2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Gestion à plusieurs niveaux

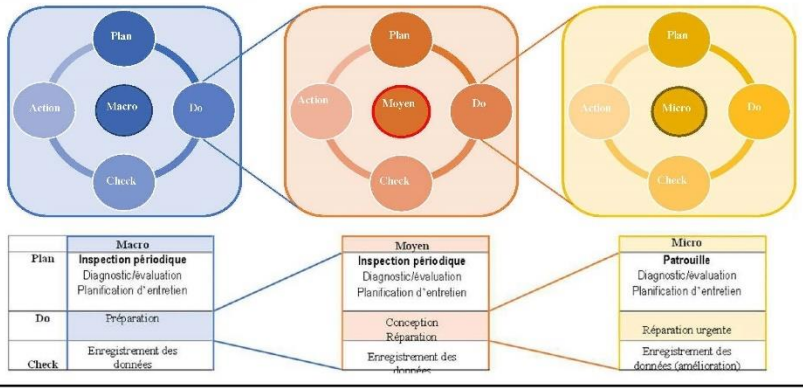
No.	Nom	Sous-chapitre/ Cycle d'entretien	Période
(1)	Moyen-long terme [Macro]	3.4.Moyen/long terme	3 à 10 ans
(2)	Inspection périodique [Moyen]	3.2.sur la base d'une inspection périodique	2 ans
(3)	patrouille [Micro]	3.3.basé sur la Patrouille	1 à 3 mois

2. Procédure de planification de l'entretien

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Cycle de gestion et d'entretien

Gestion à plusieurs niveaux



3- COMPRÉHENSION DE LA "POLITIQUE D'ENTRETIEN", DU "NIVEAU CIBLE D'ENTRETIEN", DE LA "STRATÉGIE D'ENTRETIEN" ET DES "CRITÈRES DE PRIORITÉ"

3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité"

Page-50

Définition de la politique d'entretien

Procédure de définition de la politique :

- Étude de l'état actuel du réseau routier (voir le sous-chapitre 4.1)
- Collecte d'informations sur la demande sociale (voir le sous-chapitre 4.2)
- Définition de la politique d'entretien optimale
- Prise en compte des principales contraintes pour réaliser la politique optimale
- Définition de la politique pratique d'entretien

3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-51

Définition de la politique d'entretien

MTP a défini comme suit la politique d'entretien résultant de l'activité du GT5 :

I. Résoudre les problèmes de la situation actuelle

II. Satisfaire la demande sociale

3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-52

Catégorisation des RN

Catégorie	Description	Exemple d'itinéraires	Remarques
I	Route principale (Réseau structurant)	RNP 2, 4, 6, 7	Ancienne RNP sélectionnée
II	Routes à vocation économiques et touristiques	RNS 1, et plus	certains anciennes RNS
III	Section urbaine des routes nationales	Dans la zone urbaine d'Antananarivo	Nouvelle proposition
IV	Autres routes nationales avec plus de trafic, TMJA > 500		Le reste de l'ancienne RNS et de l'ancienne RNT différencié par le nombre de trafic
V	Autres routes nationales moins fréquentées, TMJA ≦ 500		

Source : F3LTM.

3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-53

NIVEAU CIBLE = OBJECTIFS

Catégorie	Description	NIVEAU CIBLE
I	Route principale (Réseau structurant)	A
II	Routes à vocation économiques et touristiques	A
III	Section urbaine des routes nationales	B
IV	Autres routes nationales avec plus de trafic, TMJA > 500	B
V	Autres routes nationales moins fréquentées, TMJA ≦ 500	C

Source : F3LTM.

NIVEAU	Description	IRI
A	Bon	0.0 - 3.0
B	Moyen	3.0 - 5.0
C	Mauvais	5.0 - 10.0
D	Très mauvais	Plus de 10.0

Source : "Manuel d'inspection et de diagnostic des routes, F3LTM

3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-54

NIVEAU DE GESTION = LIMITE

A court terme

Catégorie	Description	NIVEAU DE GESTION
I	Route principale (Réseau structurant)	B
II	Routes à vocation économiques et touristiques	B
III	Section urbaine des routes nationales	C
IV	Autres routes nationales avec plus de trafic, TMJA > 500	C
V	Autres routes nationales moins fréquentées, TMJA ≦ 500	D

Source : F3LTM.

3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-55

NIVEAU DE GESTION = LIMITE

A long terme

Catégorie	Description	NIVEAU DE GESTION
I	Route principale (Réseau structurant)	IRI : ≤ 3 mm/m Taux de fissuration : ≤ 5% Profondeur d'ornière : ≤ 25 mm Ratio de nids de poule : 0,05‰ (1 nid-de-poule/Km) Vitesse de déplacement : 1h/60km
II	Routes à vocation économiques et touristiques	IRI : ≤ 5 mm/m Taux de fissuration : ≤ 20% Profondeur de l'ornière : ≤ 30 mm Ratio de nids de poule : 0,1‰ (2 nids de poule/Km) Vitesse de déplacement : 1h/50km
III	Section urbaine des routes nationales	IRI : ≤ 5 mm/m Taux de fissuration : ≤ 20% Profondeur d'ornière : ≤ 35 mm Ratio de nids de poule : 0,1‰ (2 nids de poule/Km) Vitesse de déplacement : non applicable
IV	Autres routes nationales avec plus de trafic, TMJA > 500	IRI : ≤ 10 mm/m Taux de fissuration : ≤ 50% Profondeur d'ornière : ≤ 40 mm Ratio de nids de poule : 0,2‰ (4 nids de poule/Km) Vitesse de déplacement : 1h/40km
V	Autres routes nationales moins fréquentées, TMJA ≦ 500	IRI : ≤ 10 mm/m Taux de fissuration : ≤ 50% Profondeur d'ornière : ≤ 50 mm Ratio de nids-de-poule : 0,1‰ (6 nids de poule/Km) Vitesse de déplacement : 1h/30km

Source : F3LTM.

3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-56

Ces objectifs (tant au niveau de l'objectif que de la gestion) doivent être **réexaminés et révisés régulièrement** selon la méthode Test-Erreur.

Ils peuvent être révisés lors de la mise à jour du plan d'entretien à moyen et long terme afin de réduire l'écart entre l'optimum et la réalité.

3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-57

STRATEGIE D'ENTRETIEN = GRILLE DE DECISION **A court terme**

	Niveau A	Niveau B	Niveau C	Niveau D
Cat. I	TEC (EC)	TEC (ES)	Réhabilitation	Réhabilitation
Cat. II	TEC (EC)	TEC (ES)	Réhabilitation	Réhabilitation
Cat. III	TEC (EC)	TEC (EC)	Réhabilitation	Réhabilitation
Cat. IV	TEC (EC)	TEC (EC)	Réhabilitation	Réhabilitation
Cat. V	TEC (EC)	TEC (EC)	TEC (EC)	Réhabilitation

EC: Entretien Courant,
ES: Réparation par Enduit Superficielle,
Réhabilitation: Rechargement ou remplacement des couches de la chaussée.

Source: F3LTM

3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-58

STRATEGIE D'ENTRETIEN = GRILLE DE DECISION **A long terme**

	Niveau A	Niveau B	Niveau C	Niveau D
Cat. I	TEC (EC)	Rechargement	RCC	RCC
Cat. II	TEC (EC)	Rechargement	RCC	RCC
Cat. III	TEC (EC)	TEC (EC)	Rechargement	RCC
Cat. IV	TEC (EC)	TEC (EC)	Rechargement	RCC
Cat. V	TEC (EC)	TEC (EC)	TEC (EC)	Rechargement

EC : Entretien Courant ,
RCC : Remplacement des couches de la chaussée.

Source: F3LTM

3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-59



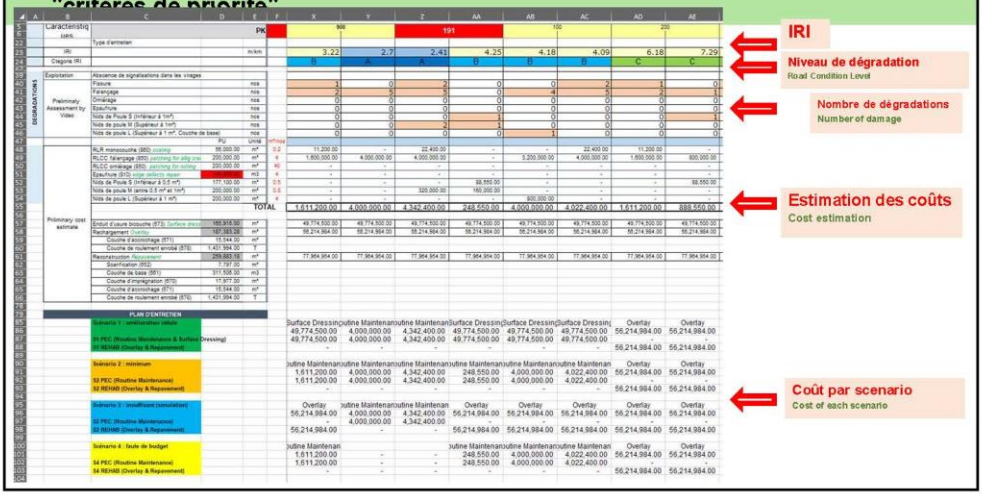
3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-60

Différentes scenarii sur le plan d'entretien

Several scenarios for the maintenance plan

Niveau de degradation Road condition level	A	B	C	D
Scenario 1 IDEALE	TEC Entretien courant /Routine maintenance	TEC : Enduit d'usure bicouche /Surface Dressing	REHABILITATION	REHABILITATION
Scenario 2 MINIMUM	TEC Entretien courant /Routine maintenance	TEC Entretien courant /Routine maintenance	REHABILITATION	REHABILITATION
Scenario 3 INSUFFISANT Insufficient (SIMULATION)	TEC Entretien courant /Routine maintenance	REHABILITATION	REHABILITATION	REHABILITATION
Scenario 4 INSUFFISANT (SIMULATION)		TEC Entretien courant /Routine maintenance	REHABILITATION	REHABILITATION

3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-61



3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-62

Exemple de résumé des coûts par scénario et choix du scénario optimal

	SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4
PEC	58 835 114 000,00	4 347 918 500,00	2 838 801 500,00	1 509 117 000,00
REHAB	22 898 912 292,00	22 898 912 292,00	86 140 769 292,00	22 898 912 292,00
Budget alloué 2024	1 284 751 616,00	1 284 751 616,00	1 284 751 616,00	1 284 751 616,00
Ratio	45,79	3,38	2,21	1,17
Gap	57 550 362 384,00	3 063 166 884,00	1 554 049 884,00	224 365 384,00

Budget encore insuffisant
Quelles sections prioriser ?

3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-63

Critères de priorisation

Première méthode

Constat :

- Non applicable pour les petites sections de 50m
- A abandonner pour la priorisation des sections **mais peut être utilisé pour le classement des routes nationales, la répartition de budget**



Critères	0	1	2	3
Volume de trafic	TMJA<50	50< TMJA <500	500< TMJA <1500	TMJA >1500
Population desservie	< 100,000	100,001 to 300,000	300,001 to 1,000,000	> 1,000,000
Tourisme	Aucun site touristique	existence de site touristique	existence parc national , réserve naturel	Patrimoine mondial/ international
Infrastructure aéroportuaire	Aucun aéroport	Aérodrome / terrain d'aviation	Aéroport national	Aéroport International
Infrastructure portuaire	Aucun port	Port de cabotage et autres	Port long courrier secondaires (Antsiranana, Mahajanga , Toliara)	Port long courrier principal (Toamasina)
Production (agriculture, pêche, usines, mines, etc.)	Aucune production	Production locale	Production nationale	Production internationale
Vulnérabilité (climat)	Climat désertique (Sud et sud-ouest)	Climat tempéré (haute plateau)	Climat tropical (Ouest et nord-ouest)	Climat humide (côte orientale)
Social (nombre d'école, santé, services publics, etc.)	0	Moins de 5	Moins de 20	Plus de 20
Coût	> 500,000 USD	$200,001 to $500,000	$10,001 to $200,000	<10,000 USD
Déviation (double accès)	Déviation existante	-	Possibilité de créer une déviation	Pas de déviation possible

Source: F3LTM

3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-64

Critères de priorisation

Deuxième méthode

Constat :

- Applicable pour les petites sections de 50m
- À utiliser



Critère	Indicateur	Disponibilité des données	Méthode de comparaison	Décision
Alignement vertical	Gradient, En pente ou plat	Gradient: NON En pente ou plat: OUI	En pente ou plat	**Appliquer, En pente ou plat**
Alignement horizontal	Courbé/droite, rayon de courbure	Courbé/droite: OUI rayon de courbure: NON	Courbé/droite	**Appliquer, Courbé/droite**
Type du Terrain	Informations géographiques	OUI, mais pas dans le SIA	Néant	Exclure, Sans rapport avec la survenance des dégradations
Nature du terrain	Informations géographiques, CBR, FWD, SN, etc.	Informations géographiques: NON CBR, FWD, SN, etc: NON	Néant	Pas maintenant, Pas assez de données
Système d'assainissement	Informations générales	Informations générales: OUI	Bon/ Mauvais	**Appliquer, Bon/ Mauvais**
IRI	IRI	IRI: OUI	Valeur mesurée	Exclure, Les petites différences ne valent pas la peine d'être comparées
Conditions sociales	Informations générales	Informations générales: OUI	Centre-ville , Entrée ou sortie de vile , Rase campagne	**Appliquer, Centre-ville , Entrée ou sortie de vile , Rase campagne**
Coût	Montant	Montant: OUI	Valeur du montant	Exclure, Difficile d'établir un ordre de priorité en fonction du montant

Source: F3LTM

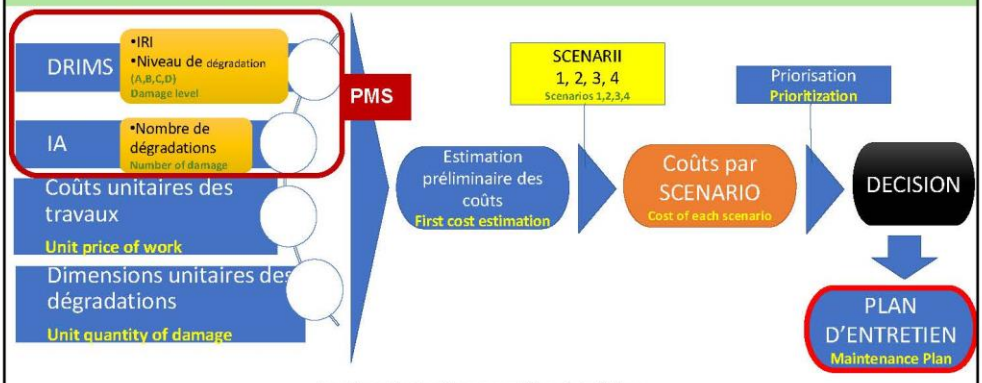
3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-65

Résultat final du plan d'entretien = liste restreinte ou exhaustive

PK (Debut)	PK (Fin)	Niveau de dégradation	Alignement vertical	Alignement Horizontal	Conditions d'assainissement	Condition sociale	Note	Prix estimé	Prix cumulé
19.800	19.850	A	10	0	0	10	5	800,000	1,250,317,450
20.100	20.150	A	10	0	0	10	5	822,400	1,251,139,850
20.150	20.200	A	10	0	0	10	5	8,833,600	1,259,973,450
20.400	20.450	A	10	0	0	10	5	33,600	1,260,007,050
20.500	20.550	A	10	0	0	10	5	800,000	1,260,807,050
20.550	20.600	A	10	0	0	10	5	1,600,000	1,262,407,050
20.600	20.650	A	10	0	0	10	5	1,622,400	1,264,029,450
20.700	20.750	A	10	0	0	10	5	800,000	1,264,829,450
20.850	20.900	A	10	0	0	10	5	3,200,000	1,268,029,450
20.900	20.950	A	10	0	0	10	5	3,200,000	1,271,229,450
21.000	21.050	A	10	0	0	10	5	800,000	1,272,029,450
21.300	21.350	A	10	0	0	10	5	3,200,000	1,275,229,450
21.350	21.400	A	10	0	0	10	5	33,600	1,275,263,050
21.400	21.450	A	10	0	0	10	5	11,200	1,275,274,250
21.500	21.550	A	10	0	0	10	5	888,550	1,276,162,800
21.550	21.600	A	10	0	0	10	5	574,400	1,276,737,200
21.600	21.650	A	10	0	0	10	5	22,400	1,276,759,600
21.650	21.700	A	10	0	0	10	5	11,200	1,276,770,800
21.700	21.750	A	10	0	0	10	5	88,550	1,276,859,350
21.800	21.850	A	10	0	0	10	5	4,000,000	1,280,859,350
21.950	22.000	A	10	0	0	10	5	33,600	1,280,892,950
22.050	22.100	A	10	0	0	10	5	800,000	1,281,692,950
22.150	22.200	A	10	0	0	10	5	88,550	1,281,781,500
22.200	22.250	A	10	0	0	10	5	833,600	1,282,615,100
22.700	22.750	A	10	0	0	10	5	56,000	1,282,671,100
22.750	22.800	A	10	0	0	10	5	44,800	1,282,715,900
22.800	22.850	A	10	0	0	10	5	22,400	1,282,738,300
23.500	23.550	A	10	0	0	10	5	1,622,400	1,284,360,700
23.550	23.600	A	10	0	0	10	5	56,000	1,284,416,700
24.100	24.150	A	10	0	0	10	5	822,400	1,285,239,100
24.200	24.250	A	10	0	0	10	5	4,811,200	1,290,050,300
24.250	24.300	A	10	0	0	10	5	1,208,550	1,291,258,850
24.300	24.350	A	10	0	0	10	5	800,000	1,292,058,850
24.400	24.450	A	10	0	0	10	5	811,200	1,292,870,050
24.450	24.500	A	10	0	0	10	5	88,550	1,292,958,600
24.500	24.550	A	10	0	0	10	5	11,200	1,292,969,800
24.550	24.600	A	10	0	0	10	5	2,411,200	1,295,381,000
24.750	24.800	A	10	0	0	10	5	4,033,600	1,299,414,600
25.250	25.300	A	10	0	0	10	5	359,500	1,299,774,100
25.300	25.350	A	10	0	0	10	5	888,550	1,300,662,650
25.350	25.400	A	10	0	0	10	5	11,200	1,300,673,850
25.400	25.450	A	10	0	0	10	5	1,600,000	1,302,273,850
26.000	26.050	A	10	0	0	10	5	160,000	1,302,433,850

Limite du budget disponible

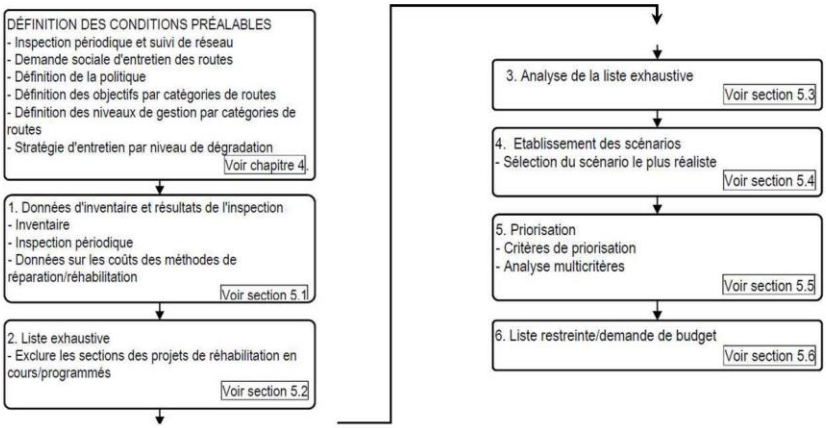
3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité" Page-66



Le plan d'entretien constitue à la fois :
Un outil de décision pour la planification et un outil de budgétisation pour les années prochaines

3. "politique d'entretien", "niveau cible d'entretien", "stratégie d'entretien" et "critères de priorité"

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4- FORMATION PRATIQUE À LA PLANIFICATION DE L'ENTRETIEN ROUTIER

4. Formation pratique à la planification de l'entretien routier Page-69



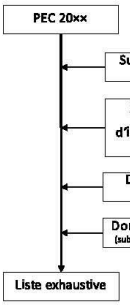
5- ETABLISSEMENT DE LA LISTE EXHAUSTIVE DES PONTS

Concept d'établissement de la LISTE EXHAUSTIVE

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1. Concept de base pour l'élaboration d'une liste exhaustive

Organigramme de base pour l'établissement de la liste exhaustive.
À partir de l'année fiscale suivante, l'organigramme suivant sera utilisé pour mettre à jour les informations



(1) Les résultats d'inspections sont utilisés comme base pour la mise à jour de la liste exhaustive.
En principe, tous les ponts seront inspectés chaque année conformément au manuel d'inspection et de diagnostic des ponts.

(2) Inspection complémentaire pour sélectionner les ponts à inspecter.
Des suivis de réseau seront effectuées environ une fois par mois pour sélectionner les ponts qui feront l'objet d'une inspection intensive par le PEC.

(3) Données de référence
Utiliser également les autres données d'enquête/inspection disponibles.

(4)-1 Autre facteur
Informations sur les ponts qui deviendront des blocus à l'avenir, tels que le nombre insuffisant de voies par rapport au volume du trafic.

(4)-2 Autre facteur
Informations sur les ponts qui risquent d'être submergés ou de s'effondrer lors de futures inondations en raison d'une section transversale insuffisante pour la rivière.

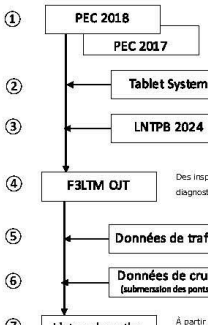
Les données accumulées annuellement dans le PEC 20 x x et le BMS et les informations ci-dessus seront compilées et répertoriées avec l'ordre de priorisation pour promouvoir l'efficacité dans le cycle d'entretien, y compris le renouvellement des ponts, permettant ainsi une bonne planification. En outre, la répartition du budget sera réalisée.

Concept d'établissement de la LISTE EXHAUSTIVE

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1. Concept de base pour l'élaboration d'une liste exhaustive

Etant donné qu'il n'y a pas suffisamment de données à notre disposition pour la préparation de la liste exhaustive de cette année, sur la base des documents disponibles, l'organigramme suivant sera utilisé pour la préparer.



(1) Inspection servant de base à la mise à jour de la liste exhaustive.
Les ponts jugés comme prioritaire pour une inspection seront inspectés en detail chaque année. L'inspection menée par le MTP en 2017 et 2018 servira de base pour l'inspection de cette année.

(2) Inspection complémentaire pour sélectionner les cibles de l'inspection.
Tous les ponts des RN1, RN1 bis et RN2 ont été inspectés dans le cadre d'une inspection de référence. Cette inspection a été utilisée pour base de selection des ponts à inspecter pour l' OJT du projet.

(3) Autres inspections
D'autres données d'études et d'inspection disponibles seront également utilisées. Les résultats des inspections menées par le MTP sur la RNP2 en 2024 sont aussi utilisés.

Des inspections sont actuellement menées par le GT-2 dans le cadre de la formation sur le tas. Ces inspections utilisent le manuel d'inspection et de diagnostic. Ici, les données compilées ci-dessus ont été soigneusement examinées.

Informations sur les ponts qui deviendront des blocus à l'avenir, tels que les ponts dont le nombre de voies est insuffisant par rapport au volume de trafic, etc. Sur la base des données de trafic moyen journalier annuel, les ponts considérés comme cibles ont été ajoutés à la liste.

Informations sur les ponts qui deviendront des blocus à l'avenir, tels que les ponts susceptible d'être submergés pendant les crues d'inondation, les ponts concernés ont été ajoutés à la liste.

À partir de la prochaine fois, nous continuerons à gérer efficacement l'entretien des ponts en mettant à jour les listes de remplacement et de réparation à l'aide des données accumulées dans le PEC20××et le BMS, ce qui se fait une fois par an, et en calculant le coût des interventions sur la base des données de construction.

Concept d'établissement de la LISTE EXHAUSTIVE

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2. Priorisation selon l'état des dégradations

Le processus de classement des ponts en fonction de leur état de dégradation en vue de la préparation de la liste EXHAUSTIVE est décrit ci-dessous.

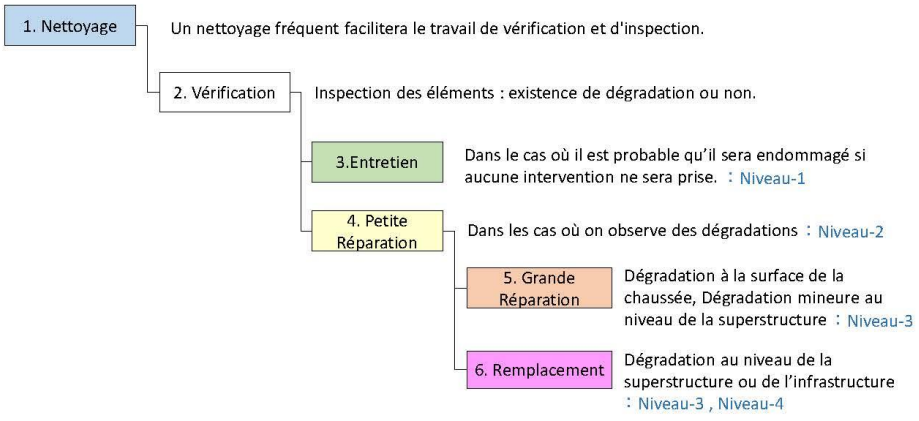
Priorisation selon l'état des dégradations

Les gestionnaires de ponts vérifieront l'état des ponts pour déterminer le degré de détérioration et de dégradation, puis classeront les ponts dans des catégories, selon les mesures adoptées pour remédier aux dégradations, comme le montre le diagramme ci-après. Les ponts les plus endommagés seront ensuite réduits à une liste exhaustive (liste de remplacement et de majeures réparations).

Concept d'établissement de la LISTE EXHAUSTIVE

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2. Priorisation selon l'état des dégradations



Concept d'établissement de la LISTE EXHAUSTIVE

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Une "5.Grande réparation" est fixée au "niveau 3" ; toutefois, s'il s'agit d'un pont de longue portée ou considéré comme difficile à accéder pour l'entretien, par exemple à proximité d'une structure ou d'une résidence, il sera traité comme "niveau 4".

Concept d'établissement de la LISTE EXHAUSTIVE

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Examen minutieux de chaque série de données

Guide et niveau de classification

Classer les ponts comme suit et placer les ponts de niveau 3, niveau 4 et plus dans la liste exhaustive des ponts à réparer ou à remplacer.

	Classe	Guide de Classification
Niveau-1	Nettoyage	Nettoyage, enlèvement débris, etc.
Niveau-2	Entretien	Peinture, entretien, et réparation des accessoires qui peuvent se faire facilement.
Niveau-3	Petite réparation	Réparation à petite et moyenne échelle qui peuvent se faire en quelques jours ou quelques semaines.
Niveau-4	Grande Réparation	Réparation à grande échelle dont la durée des travaux varie de quelques mois en quelques années
Niveau-4	Remplacement	Remplacement

Concept d'établissement de la LISTE EXHAUSTIVE

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(1) Nettoyage

Le maintien de la propreté d'un pont facilitera le travail de vérification et d'inspection, permettant ainsi de détecter toute anomalie.



PONT DE SOKAMBANA



PONT DE FANANDRANA

Concept d'établissement de la LISTE EXHAUSTIVE

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(2) Vérification

Vérifiez si l'élément est endommagé ou non.

À titre d'exemple, ci-dessous sont des photos prises lors d'une séance d'inspection d'un pont au Japon.



Inspection des éléments (Japon)



Inspection à partir de la rivière (Japon)

Concept d'établissement de la LISTE EXHAUSTIVE

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(3) Entretien

On procède à un entretien, dans les cas où il est probable qu'il sera endommagé si aucune intervention ne sera prise. Ainsi, l'élimination de la rouille et l'application d'une couche de peinture prolongeront la durée de vie du pont.



PONT DE FANANDRANA



PONT BRICKAVILLE

Concept d'établissement de la LISTE EXHAUSTIVE

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(4) Petite réparation

Dans le cas où l'on observe des dégradations.

Il faut déterminer si la dégradation est sévère ou peut être réparée facilement.



PONT ANTANANDRANO



PONT BRICKAVILLE

Ancienne chaussée en béton endommagée et barres d'armature exposées.

Concept d'établissement de la LISTE EXHAUSTIVE

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(5) Réparation

Dégradation de la surface de la chaussée, dégradation mineure de la superstructure. Il est probable que le pont continuera à être utilisé s'il y a une réparation de la poutre principale.



PONT FANANDRANA

Rechargement sans enlèvement de l'ancienne chaussée en asphalte



Fissures dans la superstructure (Japon)

Concept d'établissement de la LISTE EXHAUSTIVE

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(6) Remplacement

Dégradation au niveau de la superstructure ou de l'infrastructure.

Nécessité de remplacer le pont dès que possible.



Superstructure endommagée (autre pays)



Dégradation de la culée (Japon)

Concept d'établissement de la LISTE EXHAUSTIVE

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3. Processus d'élaboration d'une liste exhaustive

(1) Établissement de données de référence

Dans le cadre de la préparation de la liste exhaustive, les ponts considérés comme présentant des dégradations importantes ont fait l'objet d'une étude approfondie par les experts du projet F3LTM. Cette étude se réfère des résultats de PEC2017/2018, des suivis de réseau (Système d'inspection par Tablette), et de l'inspection non ordinaire par le LNTPB en 2024, et résulte d'un classement des ponts dans de niveau 1 au niveau 4. （cf. Tableau「⓪ Etude des données-F3LTM (OJT)」）

A l'issue de cette étude, pour chaque type d'inspection cité précédemment, à chaque pont a été attribué un niveau de dégradation, ces niveaux ont ensuite été quantifiés et utilisés comme critères pour déterminer le degré de dégradation du pont.

Niveau -1 =1
Niveau -2 =2
Niveau -3 =3
Niveau -4 =4

	RN	Kilométrage PK (km)	PK (m)	Nom	Caractéristiques du pont: Type	Longueur (m)	Largeur (m)	Travée	Données de référence PEC 2017/2018	Inspection par tablette	LNTPB 2024	⓪ F3LTM Investigation (OJT)	① Trafic Volume	② Dégradation en évolution	③ Praticabilité Uni-voie	③ Praticabilité Déformation	④ Cross Obstruction	⑤ Total ①+②+③+④	Evaluation Evaluation ⑤=④
1	RN2	108	800		Pont Bailey	24.0	3.5	1	4		4	4	0.75		0.25	0.25		1.25	5.00
2	RN1 bis	024	000	Sahay	Pont Bailey	75.0(16.0)	3.6	7(1)	4	3		4	0.50		0.50	0.25		1.25	5.00
3	RN2	108	750	Entrée Morarango		30.0	7.0	1	4		4	4	0.75	0.25				1.00	4.00
4	RN2	166	598	Serapine		16.1	7.6	1	3			3	0.75				0.25	1.00	3.00
5	RN2	249	750	Entrevile	Treillis métal	240.6	10.9	3	3	2	2	3	0.75	0.25				1.00	3.00
6	RN2	336	883	Fasandrano	Treillis métal	257.4	5.2	2	3	3	1	3	0.75	0.25				1.00	3.00
7	RN1	021	150	Andresimaitso		5.6	8.0	1	3	1		3	0.88					0.88	2.64
8	RN2	029	900	Melavoty(1)		8.5	7.0	1			2	3	0.75					0.75	2.25
9	RN2	030	463	Melavoty(2)		8.0	6.0	1	3	3	3	3	0.75					0.75	2.25
10	RN2	112	383	Ranomafana(3)		6.0	6.9	1	2		3	3	0.75					0.75	2.25
11	RN2	113	381			5.0	6.5	1	3		3	3	0.75					0.75	2.25
12	RN2	130	800	Amparafara		6.0	7.0	1	1	2	3	3	0.75					0.75	2.25
13	RN2	160	156	Savoraraza		5.0	7.0	1	2	3	3	3	0.75					0.75	2.25
14	RN2	199	867	Mahavole		36.8	7.0	3	3	3	3	3	0.75					0.75	2.25
15	RN2	209	410	Ampasina		5.4	7.0	1	2		3	3	0.75					0.75	2.25
16	RN2	212	907	Ranomafana(3)		7.0	6.0	1	2	3	3	3	0.75					0.75	2.25
17	RN2	216	771	Masamborika(2)		8.0	7.0	1	1	1	3	3	0.75					0.75	2.25
18	RN2	256	573	Ranala		8.5	6.5	2	3	3	3	3	0.75					0.75	2.25
19	RN2	082	848	Masambola		34.1	3.5	1	2	3.5		2	0.75		0.25			1.00	2.00
20	RN1	006	000	Stope Anosizato		84.6	8.5	3	3	1		2	0.88					0.88	1.76

※Tableau "⓪ Etude des données -F3LTM (OJT)"

Concept d'établissement de la LISTE EXHAUSTIVE

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3. Processus d'élaboration d'une liste exhaustive

Les quatre critères ① à ④ données ci-dessous sont utilisés pour identifier les ponts à prioriser pour le remplacement ou la réparation. En fonction de leur importance et selon la situation du pont un coefficient est attribué à chaque critère (détaillé dans les slides suivants). Pour un pont donné, les coefficients seront totalisés et multipliés par la valeur du niveau de dégradation.

Critère	Coefficient
①Volume de trafic	1.25 （50%）
②Détérioration en évolution	0.25 （10%）
③Praticabilité （Pont à voie unique）	0.50 （20%）
③Praticabilité （Irrégularité de surface）	0.25 （10%）
④Obstruction du tirant d'eau	0.25 （10%）

	RN	Kilométrage PK (km)	PK (m)	Nom	Caractéristiques du pont: Type	Longueur (m)	Largeur (m)	Travée	Données de référence PEC 2017/2018	Inspection par tablette	LNTPB 2024	⓪ F3LTM Investigation (OJT)	① Trafic Volume	② Dégradation en évolution	③ Praticabilité Uni-voie	③ Praticabilité Déformation	④ Cross Obstruction	⑤ Total ①+②+③+④	Evaluation Evaluation ⑤=④
1	RN2	108	800		Pont Bailey	24.0	3.5	1	4		4	4	0.75		0.25	0.25		1.25	5.00
2	RN1 bis	024	000	Sahay	Pont Bailey	75.0(16.0)	3.6	7(1)	4	3		4	0.50		0.50	0.25		1.25	5.00
3	RN2	108	750	Entrée Morarango		30.0	7.0	1	4		4	4	0.75	0.25				1.00	4.00
4	RN2	166	598	Serapine		16.1	7.6	1	3			3	0.75				0.25	1.00	3.00
5	RN2	249	750	Entrevile	Treillis métal	240.6	10.9	3	3	2	2	3	0.75	0.25				1.00	3.00
6	RN2	336	883	Fasandrano	Treillis métal	257.4	5.2	2	3	3	1	3	0.75	0.25				1.00	3.00
7	RN1	021	150	Andresimaitso		5.6	8.0	1	3	1		3	0.88					0.88	2.64
8	RN2	029	900	Melavoty(1)		8.5	7.0	1			2	3	0.75					0.75	2.25
9	RN2	030	463	Melavoty(2)		8.0	6.0	1	3	3	3	3	0.75					0.75	2.25
10	RN2	112	383	Ranomafana(3)		6.0	6.9	1	2		3	3	0.75					0.75	2.25
11	RN2	113	381			5.0	6.5	1	3		3	3	0.75					0.75	2.25
12	RN2	130	800	Amparafara		6.0	7.0	1	1	2	3	3	0.75					0.75	2.25
13	RN2	160	156	Savoraraza		5.0	7.0	1	2	3	3	3	0.75					0.75	2.25
14	RN2	199	867	Mahavole		36.8	7.0	3	3	3	3	3	0.75					0.75	2.25
15	RN2	209	410	Ampasina		5.4	7.0	1	2		3	3	0.75					0.75	2.25
16	RN2	212	907	Ranomafana(3)		7.0	6.0	1	2	3	3	3	0.75					0.75	2.25
17	RN2	216	771	Masamborika(2)		8.0	7.0	1	1	1	3	3	0.75					0.75	2.25
18	RN2	256	573	Ranala		8.5	6.5	2	3	3	3	3	0.75					0.75	2.25
19	RN2	082	848	Masambola		34.1	3.5	1	2	3.5		2	0.75		0.25			1.00	2.00
20	RN1	006	000	Stope Anosizato		84.6	8.5	3	3	1		2	0.88					0.88	1.76

Concept d'établissement de la LISTE EXHAUSTIVE

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3. Processus d'élaboration d'une liste exhaustive

①Volume de trafic

Des coefficients de volume de trafic sont fixés pour chaque itinéraire.Le tableau ci-dessous donne les coefficients fixés selon les volumes de trafic journalier des poids lourds.

Volume de Trafic (Poids Lourds)	Coefficient de Volume de Trafic
Nombre de véhicules≧1000 vehicules/jour	1.0
1000>Nombre de véhicules≧800 vehicules/jour	0.9
800>Nombre de véhicules≧600 vehicules/jour	0.8
600>Nombre de véhicules≧400 vehicules/jour	0.7
400>Nombre de véhicules≧300 vehicules/jour	0.6
300>Nombre de véhicules≧200 vehicules/jour	0.5
Nombre de véhicules<200 vehicules/jour	0.4

※ Les valeurs du tableau ci-dessous sont calculés en multipliant les valeurs du tableau de gauche par le facteur de la page 16.

	RN	Kilométrage PK (hm)	PK (m)	Nom	Caractéristiques du pont Type	Longueur (m)	Largeur (m)	Travée	Données de référence PRC 2017/2018	Inspection au tablette	LMTPB 2024	⑤ F3LTP Investigation (D/T)	① Trafic Volume	② Dégradation en évolution	③ Praticabilité Uniy-vrai	Dénivellation	④ Crue Oschwitzen	⑤ Total ①+②+③+④	Evaluation ⑤ ≥8
1	RN2	108	800		Pont Bailey	34.9	3.5	1	4		4	4	0.75		0.25	0.25		1.25	5.00
2	RN1 bis	024	900	Sahay	Pont Bailey	75.0(16.0)	3.6	7(1)	4	3		4	0.50		0.50	0.25		1.25	5.00
3	RN2	108	750	Ebelek Moramanga		30.0	7.0	1	4		4	4	0.75	0.25				1.00	4.00
4	RN2	166	598	Sarageine		16.1	7.6	1	3			3	0.75				0.25	1.00	3.00
5	RN2	249	750	Ecteville	Treillis métal	240.4	10.9	3	3	2	2	3	0.75	0.25				1.00	3.00
6	RN2	326	883	Fasendrana	Treillis métal	257.4	5.2	2	3	3	1	3	0.75	0.25				1.00	3.00
7	RN1	021	150	Andreamotso		5.6	8.0	1	3	1		3	0.88					0.88	2.64
8	RN2	029	900	Malavaty(1)		8.5	7.0	1			2	3	0.75					0.75	2.25
9	RN2	030	465	Malavaty(2)		8.0	6.0	1	3	3	3	3	0.75					0.75	2.25
10	RN2	112	383	Ranomafana(3)		6.0	6.9	1	2		3	3	0.75					0.75	2.25
11	RN2	113	381			5.0	6.5	1	3		3	3	0.75					0.75	2.25
12	RN2	130	800	Ampanefana		6.0	7.0	1	1	2	3	3	0.75					0.75	2.25
13	RN2	160	156	Sevoronone		5.0	7.0	1	2	3	3	3	0.75					0.75	2.25
14	RN2	199	867	Mandrale		36.8	7.0	3	3	3	3	3	0.75					0.75	2.25
15	RN2	209	410	Ampasine		5.4	7.0	1	2	3	3	3	0.75					0.75	2.25
16	RN2	212	907	Ranomafana(3)		7.0	6.0	1	2	3	3	3	0.75					0.75	2.25
17	RN2	216	771	Ranomafana(2)		8.0	7.0	1	1	1	3	3	0.75					0.75	2.25
18	RN2	256	573	Ranala		8.5	6.5	2	3	3	3	3	0.75					0.75	2.25
19	RN2	082	848	Ranambato		34.1	3.5	1	2	3.5		2	0.75		0.25			1.00	2.00
20	RN1	096	900	Stope Anosizato		84.6	8.5	3	3	1		2	0.88					0.88	1.76

Concept d'établissement de la LISTE EXHAUSTIVE

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3. Processus d'élaboration d'une liste exhaustive

② Dégradation en évolution

Des coefficients ont été ajoutés pour les ponts dont la détérioration est importante et qui nécessitent une action immédiate.

	RN	Kilométrage PK (hm)	PK (m)	Nom	Caractéristiques du pont Type	Longueur (m)	Largeur (m)	Travée	Données de référence PRC 2017/2018	Inspection au tablette	LMTPB 2024	⑤ F3LTP Investigation (D/T)	① Trafic Volume	② Dégradation en évolution	③ Praticabilité Uniy-vrai	Dénivellation	④ Crue Oschwitzen	⑤ Total ①+②+③+④	Evaluation ⑤ ≥8
1	RN2	108	800		Pont Bailey	34.9	3.5	1	4		4	4	0.75		0.25	0.25		1.25	5.00
2	RN1 bis	024	900	Sahay	Pont Bailey	75.0(16.0)	3.6	7(1)	4	3		4	0.50		0.50	0.25		1.25	5.00
3	RN2	108	750	Ebelek Moramanga		30.0	7.0	1	4		4	4	0.75	0.25				1.00	4.00
4	RN2	166	598	Sarageine		16.1	7.6	1	3			3	0.75				0.25	1.00	3.00
5	RN2	249	750	Ecteville	Treillis métal	240.4	10.9	3	3	2	2	3	0.75	0.25				1.00	3.00
6	RN2	326	883	Fasendrana	Treillis métal	257.4	5.2	2	3	3	1	3	0.75	0.25				1.00	3.00
7	RN1	021	150	Andreamotso		5.6	8.0	1	3	1		3	0.88					0.88	2.64
8	RN2	029	900	Malavaty(1)		8.5	7.0	1			2	3	0.75					0.75	2.25
9	RN2	030	465	Malavaty(2)		8.0	6.0	1	3	3	3	3	0.75					0.75	2.25
10	RN2	112	383	Ranomafana(3)		6.0	6.9	1	2		3	3	0.75					0.75	2.25
11	RN2	113	381			5.0	6.5	1	3		3	3	0.75					0.75	2.25
12	RN2	130	800	Ampanefana		6.0	7.0	1	1	2	3	3	0.75					0.75	2.25
13	RN2	160	156	Sevoronone		5.0	7.0	1	2	3	3	3	0.75					0.75	2.25
14	RN2	199	867	Mandrale		36.8	7.0	3	3	3	3	3	0.75					0.75	2.25
15	RN2	209	410	Ampasine		5.4	7.0	1	2	3	3	3	0.75					0.75	2.25
16	RN2	212	907	Ranomafana(3)		7.0	6.0	1	2	3	3	3	0.75					0.75	2.25
17	RN2	216	771	Ranomafana(2)		8.0	7.0	1	1	1	3	3	0.75					0.75	2.25
18	RN2	256	573	Ranala		8.5	6.5	2	3	3	3	3	0.75					0.75	2.25
19	RN2	082	848	Ranambato		34.1	3.5	1	2	3.5		2	0.75		0.25			1.00	2.00
20	RN1	096	900	Stope Anosizato		84.6	8.5	3	3	1		2	0.88					0.88	1.76

Concept d'établissement de la LISTE EXHAUSTIVE

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3. Processus d'élaboration d'une liste exhaustive

③Praticabilité

ⅰ)Pont à voie unique (Une voie)

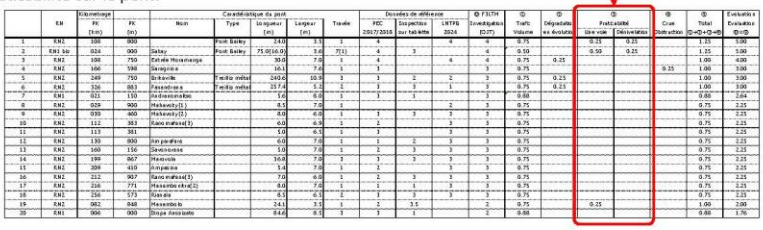
Pour les ponts qui n'ont qu'une largeur de 1 à 1,5 voie et qui sont susceptibles de devenir des points d'étranglement de la circulation à l'avenir, un coefficient tenant compte de la portée du pont a été ajouté.

Praticabilité du Pont à voie unique	Coefficient du Praticabilité du Pont à voie unique
L ≧ 100m	1.0
100m > L ≧ 50m	0.8
L < 50m	0.5

※ Les valeurs du tableau ci-dessous sont calculés en multipliant les valeurs du tableau de gauche par le facteur de la **page 16**.

ⅱ)Irrégularité de surface (Dénivelation)

Les coefficients ont été ajoutés pour les ponts dont le battement vertical est important en termes de praticabilité sur le pont.



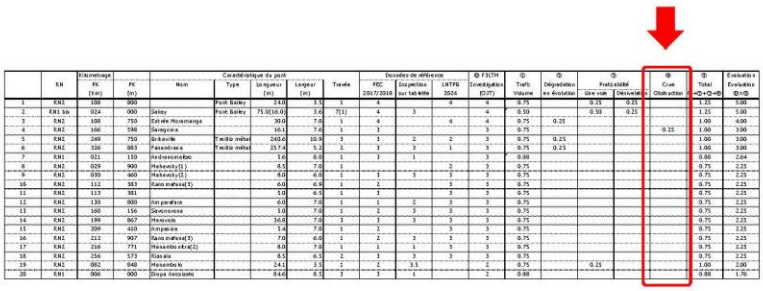
Concept d'établissement de la LISTE EXHAUSTIVE

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3. Processus d'élaboration d'une liste exhaustive

④Obstruction du tirant d'eau (insuffisant pour la crue)

Étant donné que parfois la section transversale sous le pont ne peut pas absorber le débit maximal de la rivière, un coefficient a été ajouté pour identifier les ponts où des obstructions à l'écoulement de la rivière se sont produites, notamment dans les cas où des débordements ont été observés dans le passé.



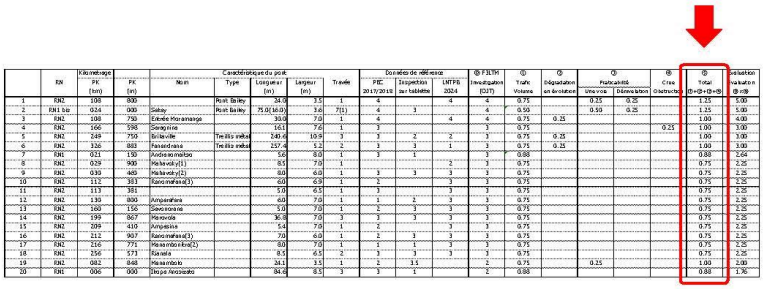
Concept d'établissement de la LISTE EXHAUSTIVE

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3. Processus d'élaboration d'une liste exhaustive

(2) Résultats des évaluations

En multipliant les niveaux définis dans la section précédente (1) par la somme des coefficients de ① à ④,
19 ponts ont été enregistrés comme devant être remplacés ou faire l'objet d'une réparation importante.



	RN	Kilométrage PK (km)	PK (m)	Nom	Caractéristiques du pont Type	Longueur (m)	Largeur (m)	Travée	Données de référence PEC 2017/2018	Inspection sur tablette	LMTPB 2024	③ P3LTH Investigation (OUT)	① Trafic Volume	② Dégradation en évolution	③ Fonctionnalité Une voie	Fonctionnalité Déviation	⑤ Coût Destruction	⑥ Total ①+②+③+⑤	Evaluation Evaluation ⑥ x ④
1	RN2	108	800		Pont Bailey	34.0	3.5	1	4		4	4	0.75		0.25	0.25		1.25	5.00
2	RN1 bis	024	900	Sakay	Pont Bailey	75.0(16.0)	3.6	7(1)	4	3		4	0.50		0.50	0.25		1.25	5.00
3	RN1	100	750	Entrée Moramanga		30.0	7.0	1	4		4	4	0.75	0.25				1.00	4.00
4	RN2	166	598	Sarogninia		16.1	7.6	1	3			3	0.75				0.25	1.00	3.00
5	RN2	169	759	Sciaudle	Treillis métal	240.4	10.9	3	3	2	2	3	0.75	0.25				1.00	3.00
6	RN2	326	883	Fasandriana	Treillis métal	257.4	5.2	2	3	3	1	3	0.75	0.25				1.00	3.00
7	RN1	021	150	Andreamalao		5.6	8.0	1	3	1		3	0.88					0.88	2.64
8	RN1	029	900	Malavoly(1)		8.5	7.0	1			2	3	0.75					0.75	2.25
9	RN2	030	465	Malavoly(2)		8.0	6.0	1	3	3	3	3	0.75					0.75	2.25
10	RN2	112	383	Ranomafana(3)		6.0	6.9	1	2		3	3	0.75					0.75	2.25
11	RN2	113	381			5.0	6.5	1	3		3	3	0.75					0.75	2.25
12	RN2	130	800	Ampanefana		6.0	7.0	1	1	2	3	3	0.75					0.75	2.25
13	RN2	160	156	Savoronona		5.0	7.0	1	2	3	3	3	0.75					0.75	2.25
14	RN2	199	867	Maroala		36.8	7.0	3	3	3	3	3	0.75					0.75	2.25
15	RN2	209	410	Ampasina		5.4	7.0	1	2		3	3	0.75					0.75	2.25
16	RN2	212	907	Ranomafana(2)		7.0	6.0	1	2	3	3	3	0.75					0.75	2.25
17	RN2	216	771	Ranomafana(1)		8.0	7.0	1	1	1	3	3	0.75					0.75	2.25
18	RN2	256	573	Rianala		8.5	6.5	2	3	3	3	3	0.75					0.75	2.25
19	RN2	082	848	Maserribola		34.1	3.5	1	2	3.5		2	0.75		0.25			1.00	2.00
20	RN1	006	900	Bepe Ambatolo		84.6	8.5	3	3	1		2	0.88					0.88	1.76

Concept d'établissement de la LISTE EXHAUSTIVE

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(3) LA LISTE EXHAUSTIVE

	RN	Kilométrage PK (km)	PK (m)	Nom	Caractéristiques du pont Type	Longueur (m)	Largeur (m)	Travée	Données de référence PEC 2017/2018	Inspection sur tablette	LMTPB 2024	③ P3LTH Investigation (OUT)	① Trafic Volume	② Dégradation en évolution	③ Fonctionnalité Une voie	Fonctionnalité Déviation	⑤ Coût Destruction	⑥ Total ①+②+③+⑤	Evaluation Evaluation ⑥ x ④
1	RN2	108	800		Pont Bailey	34.0	3.5	1	4		4	4	0.75		0.25	0.25		1.25	5.00
2	RN1 bis	024	900	Sakay	Pont Bailey	75.0(16.0)	3.6	7(1)	4	3		4	0.50		0.50	0.25		1.25	5.00
3	RN1	100	750	Entrée Moramanga		30.0	7.0	1	4		4	4	0.75	0.25				1.00	4.00
4	RN2	166	598	Sarogninia		16.1	7.6	1	3			3	0.75				0.25	1.00	3.00
5	RN2	169	759	Tréfilis métal	Treillis métal	240.4	10.9	3	3	2	2	3	0.75	0.25				1.00	3.00
6	RN2	326	883	Fasandriana	Treillis métal	257.4	5.2	2	3	3	1	3	0.75	0.25				1.00	3.00
7	RN1	021	150	Andreamalao		5.6	8.0	1	3	1		3	0.88					0.88	2.64
8	RN2	029	900	Malavoly(1)		8.5	7.0	1			2	3	0.75					0.75	2.25
9	RN2	030	465	Malavoly(2)		8.0	6.0	1	3	3	3	3	0.75					0.75	2.25
10	RN2	112	383	Ranomafana(3)		6.0	6.9	1	2		3	3	0.75					0.75	2.25
11	RN2	113	381			5.0	6.5	1	3		3	3	0.75					0.75	2.25
12	RN2	130	800	Ampanefana		6.0	7.0	1	1	2	3	3	0.75					0.75	2.25
13	RN2	160	156	Savoronona		5.0	7.0	1	2	3	3	3	0.75					0.75	2.25
14	RN2	199	867	Maroala		36.8	7.0	3	3	3	3	3	0.75					0.75	2.25
15	RN2	209	410	Ampasina		5.4	7.0	1	2		3	3	0.75					0.75	2.25
16	RN2	212	907	Ranomafana(2)		7.0	6.0	1	2	3	3	3	0.75					0.75	2.25
17	RN2	216	771	Ranomafana(1)		8.0	7.0	1	1	1	3	3	0.75					0.75	2.25
18	RN2	256	573	Rianala		8.5	6.5	2	3	3	3	3	0.75					0.75	2.25
19	RN2	082	848	Maserribola		34.1	3.5	1	2	3.5		2	0.75		0.25			1.00	2.00
20	RN1	006	900	Bepe Ambatolo		84.6	8.5	3	3	1		2	0.88					0.88	1.76
21	RN1	007	800	Bisaro ny Ambatofinina		80.0	9.5		3			2	0.88					0.88	1.76
22	RN1	015	850	Andromba		44.0	9.5	3	3	1		2	0.88					0.88	1.76
23	RN1	023	080	Avaratsena		5.0	7.5		1			2	0.88					0.88	1.76
24	RN1	024	900	Amasakoavy		9.8	9.1	1	1	1		2	0.88					0.88	1.76
25	RN1	029	800	Lohe Pont		34.0	9.2		1	2	4	2	0.88					0.88	1.76
26	RN1	029	900	Andrakomena		10.0	8.2		1	1		2	0.88					0.88	1.76
27	RN1	044	340	Manandry		7.0	8.5	1	1	2		2	0.88					0.88	1.76
28	RN1	053	980	Avonoa		32.0	8.0	1	1			2	0.88					0.88	1.76
29	RN1	055	670	Amparonimia		36.2	8.0	2	1	1		2	0.88					0.88	1.76
30	RN1	095	900	Fetsena		10.1	8.0	1	1	1		2	0.88					0.88	1.76
31	RN1	101	720	Manongana		36.0	9.1	1	1	2		2	0.88					0.88	1.76
32	RN1	103	630	Manakara		36.0	8.0	1	1	2		2	0.88					0.88	1.76
33	RN1 bis	038	280	Ihazo Nay		62.0	5.1	2	3	3		2	0.90		0.38			0.88	1.76
1	RN2	030	300	Amasamonona (2)		7.9	7.5	1	3			2	0.75					0.75	1.50
2	RN2	031	900	Amasakoavy		7.0	6.5	1	3			2	0.75					0.75	1.50
3	RN2	038	900	Décharge Mahasoa(1)		4.0	9.1	1	1	1		2	0.75					0.75	1.50
4	RN2	165	696	Soanamaharivatsena droite		67.0	9.0	3	3	3.5	2	2	0.75					0.75	1.50
5	RN2	165	696	Soanamaharivatsena gauche		22.6	9.0	4	3	3	2	2	0.75					0.75	1.50
6	RN2	111	816	Tunnel		31.5	4.9	1	2		2	1	0.75		0.25			1.00	1.00
7	RN1 bis	014	700	Imanga		72.3	9.0	4	1	1		2	0.50					0.50	1.00
8	RN1 bis	067	460	Manandeloka		32.0	9.0		1	1		2	0.50					0.50	1.00
9	RN1 bis	071	830	Vatsimandrakana		40.6	9.0	1	1	3.5		2	0.50					0.50	1.00
10	RN1 bis	076	460	Amparanana		60.1	9.0		1	2		2	0.50					0.50	1.00
11	RN2	030	950	Manavoky(3)		6.8	7.3	1	3	1	1	1	0.75					0.75	0.75
12	RN2	094	300	Mangoro	Cession BF	–	–	2	1	3.5(ON)	1	1	0.75					0.75	0.75
13	RN2	105	850	Amazaotsara	Aval-ø BF	–	–	1	1	3.5(ON)	1	1	0.75					0.75	0.75
14	RN2	117	050			7.0	9.0	1	1			1	0.75					0.75	0.75
15	RN2	134	868	Amparanavaka		66.0	9.3	3	1	3	1	1	0.75					0.75	0.75
16	RN2	139	034	Amasamonona		45.0	9.3	2	1	2	1	1	0.75					0.75	0.75

Concept d'établissement de la LISTE EXHAUSTIVE

(3) LA LISTE EXHAUSTIVE

19 ponts avec un résultat d'évaluation de valeur égal à 2 ou plus sont inclus dans la LISTE EXHAUSTIVE.

- Les deux premières places sont actuellement attribuées à des ponts Bailey et ponts temporaires.
  Le pont à la troisième place est également très endommagé, par conséquent, ces trois ponts doivent être reconstruits ou remplacés.
- Nous avons déduit que les ponts de Brickaville et de Fanandrana sont les prioritaires pour un entretien préventif.
- Revérifier l'état de chaque pont avant de prendre des décisions sur le remplacement, la réparation, etc.
- Les priorités en matière de remplacement ou de réparation des ponts sont déterminées de manière exhaustive en fonction des dommages subis par le pont, du volume du trafic routier, des conditions locales et des conditions budgétaires.
- Pour les éventuelles questions, veuillez contacter votre consultant.

6- DISCUSSIONS et EVALUATION


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FAMPIVOARANA NY FAHAIZA-MITANTANA
AMIN'NY FIKOJAKOJANA NY LALANA SY
NY TETEZANA ETO MADAGASIKARA
Merci de votre Attention


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