

Jilin-Sadbhav Joint Venture
Gagodhar-Radhanpur Road Project Package – V, NH – 15, Gujarat.
PROJECT QUALITY PLAN

SCOPE

The project quality plan has been prepared and formulated as a summary of the quality related activities required meeting the terms of the contract. This manual sets out the management Practices and describes the Quality Management for this Project and its relationships with Jilin-Sadbhav Road work Quality system. The contents of this document are applicable to procurement construction, inspection, testing and commissioning in an environmentally safe manner which are being carried out by Jilin-Sadbhav Joint Venture for the work of East-West Corridor Project Rehabilitation upgrading and four lining Gagodhar-Radhanpur Section (Package - V) Km. 245.000 to Km. 138.800 in the state of Gujarat. In preparation of this document due regard has been paid to the requirements series of codes of practices, drawing and specifications issued for this Project.

REFERENCES AND APPLICABLE DOCUMENTS (specification standards)

The following documents have been used as a source of reference for the preparation of this quality assurance plan.

1. Drawing and specifications of the contract.
2. IS code of practice as applicable?
3. IRC SP-Guide for Project quality plan.

MORTH specification for Roads & Bridges REV-04.

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<u>DEFINITIONS</u>	
Employer	NATIONAL HIGHWAY AUTHORITY OF INDIA.
Engineer	
Contractor	Jilin-Sadbhav Joint Venture.
Vendor	Any company or person contractor to provide the material or services to the project.
Quality	Total characteristics of a product / service which conforms to the required standards.
Quality Assurance	All those planned activities or systems, which are necessary to generate confidence that the product conforms to the required standards.
Quality Control	Operational techniques / activities used to verify the quality requirement as per the specification.
Quality Audit	A systematic approach to examine whether the system followed is effectively implemented or not.
Quality Plan	A document outlining all the systems, procedure and sequence of activities related to the project.
Procedure	A method statement provides guidelines to the steps in performing a specific task as per the standards.
Inspection & testing	A series of activities to check the quality of the product of service to the prescribe standards.
NCR	Non-Conformances Report –A report, which describes a product of service that does not conform to the standards.
Corrective Action	An activity, which is intended to correct the Non Conformed activity to the required standard limits. This also covers the action to prevent the re-occurrence of the Non Conformity.

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Deviation	An appropriate approval from authorized agency to change from the prescribed standards without affecting the Quality of the final product.
Repair	A process to rectify a Non Conformed product into acceptable limits.
Witness	An Inspector from third party or contractor or company representative who witnesses an activity for its acceptance for further work.
Calibration	The comparisons of two instruments for there accuracy against a standard & known instrument to the standards prescribe.
N.D.T.	The test perform to check for the conformity / acceptability without destructive analytical methods.
Check	A stage in the construction when an inspector from third party or contractor or client inspects a piece of work for the acceptability for further work.
Review	A stage in the construction when an inspector from third party or contractor or client reviews a piece of work for acceptability for further work.
Test certificate	A document from the manufacture giving the authenticity of the material supplied by producing the test result.
Lab Test Report	A document from the external / internal laboratory giving the test result.

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ABBREVIATIONS

Abbreviations	Description
ACE	Accepted Cost Estimate.
BC	Bituminous Concrete.
CBR	California Bearing Ratio.
CD	Cross Drainage.
Ch. Hand	Charge Hand.
CM	Construction Manager.
DBM	Dense Bituminous Macadam.
DLC	Dry Lean Concrete.
EXE	Execution.
FDD TEST	Field Dry Density Test.
GL	Ground Level.
GSB	Granular Sub Base.
ID	Identification.
IRC	Indian Road Congress.
ITP	Inspection test Plan.
HO	Head Office
MDD	Maximum Dry Density.
MORTH	Ministry of Surface Transport.
MTC	Manufacturer Test Certificate.
MTN	Materials Transit Note.
NCR	Non-Conformance Report.
NDT	Non Destructive Test.
NHAI	National Highway Authority of India.
NMC	Natural moisture content.
OMC	Optimum moisture content.
P&M	Plant & Machineries.
PF	Provident Fund.
PM	Project Manager.
PO	Purchase Order.
PQC	Pavement Quality Concrete.
PQP	Project Quality Plan.
MATERIAL ENGINEER	Quality Assurance Engineer.
QCE	Quality Control Engineer.

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RE	Resident Engineer.
REV	Revision.
SBC	Soil Bearing Capacity.
SD	Standard Deviation.
SPME	Senior Pavement cum Material Engineer.
SSE	Site Safety Engineer.
TC	Test Certificate.
WMM	Wet Mix Macadam.

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DUTIES AND RESPONSIBILITIES OF KEY PERSONNEL

Project Manager

- Reports to the HO. & Site Directors.
- Administers the contract till completions conforms to the quality, time schedule and cost requirements Implements to the Project as per Project quality plan.
- Responsible for providing timely resources including trained personnel for specialized activities.
- Approves purchases requisitions, and ensures delivery schedules.
- Approves sub contract rate, ensure mobilization and execution as required.
- Monitor progress with respect to planning report to client on progress, quality and any constraints.
- Conducts daily / weekly site meeting with staff.
- Liaison with HO.
- Liaison with local authority and Govt. bodies.

Construction Manager

- Reports to the Project Manager.
- Prepare daily plans of work from every weekly/monthly plans.
- Organizes manpower, materials, and equipments to achieve plans.
- Complies to all procedures drawing while execution (PQP).
- Checks all works done by sub-ordinates.
- Co-ordinates with other agencies when required.
- Ensures safety in the works place as per project safety plan.
- Inculcates good house keeping practices.
- Prepares S/C bills in time and submits to the billing Engineer.
- Affords all facilities to quality audit.
- Reports any errors to Project Manager endeavors to improve.

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Planning Engineer

- Report to the Project Manager.
- Preparation updation and revision of the construction program schedules, Preparation of daily progress report, weekly progress report and monthly progress report for submission to client and managements.
- Check short-term work programs from section Engineers to match with over all program requirements and backlog coverage.
- Initiate bulk material, work order/purchase order after reviewing the site requirements.
- Process inquiry, analysis rates, negotiates with prospective S/C recommends S/C or supplier agencies for approval by authorised personnel (Managements).
- Preparation of cross sections of earth works cut and fills training Jr. staff and overseeing the preparation of cross sections and quantities of cut and fill liaison with the Engineer for approval of the cross sections.

Material Engineer

- Report to the Project Manager & Construction Manager.
- Responsible for material selection and mix combination to meet the specification requirement with in the overall cost provision.
- Identifies all material requirement, sources.
- Conducts qualification test for source approval.
- Conducts tests on materials as per test and inspection plan.
- Indents all laboratory equipment, commission and conducts calibration exercises as per plans.
- Documents all tests in standard formats.
- Liaison with external labs, third party agency labs.
- Conducts laboratory activities independently and reports any potential problems to the Project Manager.
- Checks and approves work procedures of section Engineers based on mock up results.
- Monitors implementation of procedures, record keeping by section through weekly audit.

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- Reports non-compliance and proposes remedial action to site staff and senior Management.
- Follows up through remedial measures.
- Conducts himself articulately and impartially with all section.
- File monthly reports to H.O & Site Directors.

Surveyor

- Reports to the Construction Manager & Planning Engineer.
- Understand client's requirements, prepare project survey plan and survey scheme (sketches).
- Locates grid control stations, bench marks etc. in consultation with the section Engineer responsible.
- Construction of survey features through the section Engineers.
- Provides Survey Assistance for sections.
- Maintains daily survey records.
- Ensures calibration of measuring equipments as per calibration plan.
- Safe keeps all equipments under his scope.
- Conducts post construction checks – reports deficiencies to Planning Engineer and QA.

Billing Engineer

- Reports to the planning Engineer.
- Receives checks fortnightly measurements from site Engineers.
- Prepare sub contractor bill in time.
- Prepares clients bill.
- Conducts monthly physical stock verification with stores and prepare bulk material reconciliation on 25th of each month.
- Reconciles quantities paid by client and though to S/C.

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Section Engineers. / Sr. Engineers.

- Reports to the section in charges.
- Checks all works done by sub-ordinates and maintains checks records applicable to each activity.
- Ensure safety in the works places as per Project Safety plan
- Inculcates good house keeping practices.
- Reports any errors and endeavors to improve.

Plant & Machinery Engineer

- Reports to the Project Manager & G.M. P&M At Main Workshop Ognaj functionally.
- Co-ordinates with planning Engineer & site Engineers for daily development of plant to various sections (Planning Engineer allots to section as per priority).
- Conduct all preventive maintenance as per equipments manual.
- Ensures adequate stoke of fast moving spares.
- Allots duty quota to operators.
- Administrates fuels oil supply, reconcile usage in consultation with stores departments, submit reconciliation statements as on 25th of each month to planning department.
- Conducts repairs, breakdown maintenance arrange alternative equipments when required economically.

Foremen / Charge Hand.

- Reports to the section Engineer.
- Executes work through sub contract / own labour economically as per drawing “Always correct first time”.
- Check work done on regular basis especially lines, levels etc.
- Safe keep all tools in good condition.
- Conduct regular house keeping practice.
- Ensure safety procedures co-operates with safety stewards.

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Safety Engineer

- Reports to the Project Manager.
- Prepare Project safety plan gets approval from clients.
- Implements safety practice through section Engineers.
- Inculcates safe practices in work force. Conducts workshop / seminar on good practice.
- Supervises work of safety stewards.

Safety stewards

- Reports to the Safety Engineer. Implements procedures checks as per the safety plan.

Account / Administration Officer

- Reports to the Directors & H.O A/c. Dept. functionally.
- Preparation of cost statements / ledger reconciliation and other accounts related activities.
- Process local purchases sub contractor payments and other payments to suppliers.
- Follows of with client for realization of running bills.
- Liaisons with all local bodies and ensure administrative support to Project Manager (i.e. communication, transport etc.).
- Ensure conforms to statutory regulations.
- Staff welfare activities.

Time office

- Reports to accounts and administration officer.
- Attends to labour recruitment, accommodation, hygiene at colonies, sites etc.
- Staff transportation.
- Labour attendance first aid administration.
- Liaison with local bodies as required.

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Store In charge

- Reports to accounts and administration.
- Process of all local purchases requirements and bulk purchase through H.O.
- Receipt, storage of bulk material, equipments.
- Arrange LAB. checks of incoming product in consultation with Material Engineer.
- Issue of material to works as per indents.
- Keeping status of inspected / not inspected / rejected material and stack in different location.
- Material reconciliation and all accounting matter are associated with stores.
- Arrange LAB. Check of incoming product (if necessary) in consultation with Material Engineer.
- Keeping status of inspected not inspected / rejected material and stack in different location.

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MANAGEMENT REVIEW

As per the fourth objective of management policy, management review shall be conducted monthly once

THE SITE PROJECT MANAGER HAS TO ORGANISE MONTHLY REVIEW MEETINGS AND DISCUSS THE FOLLOWING ASPECTS.

AGENDA

- a) PREVIOUS NCR's.
- b) CORRECTIVE AND PREVENTATIVE ACTIONS.
- c) SYSTEM ADHERENCE AND CRITICAL NCR's.
- d) EXPENSES ON CORRECTIVE ACTIONS TAKEN AND CONTROL MEASURES OVER THEM.
- e) RESOURCES REQUIREMENTS.
- f) LEARNING FROM OTHER DEPARTMENTS.
- g) WORK SATISFACTION.
- h) SUGGESTIONS AND COMPLAINTS FROM CLIENT & CONSULTANTS.

THE MINUTES OF MEETING HAS TO BE RECORDED AND SENT TO THE PARTICIPANTS WITH A COPY TO CONCERN DIRECTORS & H.O.

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DESIGN CONTROL

General

This is a construction contracts. The work scope involves execution as per good for Construction Drawing issued by the Engineer. Working drawing are required to be prepared for structures, cross section drawing are to be prepared for earthwork for quantity calculations, bar bending schedules and formwork scheme are to be prepared for approval of the Engineer. As built drawing are to be prepared for final submission after completion of works.

The project design of civil works is done by RITES LTD. INDIA.

Preparation

The Working Drawing is prepared based on Good For Construction Drawing and actual filed data.

Design Input

Not applicable

Design Output

Not applicable.

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DATA & DOCUMENT CONTROL

General

All documentation prepared for the project would be identified and controlled in a manner that will enable easy identification and retrieval of the document when required, similarly, any revisions or changes to documents would be controlled to ensure that only the latest issue in use.

The following major documents identified for the project will be controlled by procedure as below.

Sl. No	Document	Action	Record	Responsibility
1	Incoming Letters	Put Date stamp & Distribution stamp & put to P.M. & H.O.	Incoming register with action took column	RECEIVING AUTHORITY
2.	Action to letters (out going)	Reply, Distribution, file	Outgoing register	Planning Engineer To keep in allotted files.
3	New drawing receipt	Date stamp, distribute to section & withdraw old drawing.	Update drawing register as per format.	Planning Engineer.
4	Old drawings	Stamps SUPERSEDED	Old drawing file.	Planning Engineer.
5	Record control.	List quality records Dept. wise and take sign of concern.	Maintain master list in file.	Material Engineer.
6	Material Test Report	Review by Material Er.	Test Record files.	MATERIAL ENGINEER.
7	Bills to client running.	Submission copy to H.O.	Bills	Planning in charge to maintain file.

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Sl. No	Document	Action	Record	Responsibility
8	Document generated by section i.e. work, procedures etc.	Sections or as appropriate.	Documents in files.	Respective section head.
9	Monthly Reports & photograph of progress.	Sub mission to client.	Report month wise.	Planning & Billing Engineer.
10	MOM	PREPARE AGENDA & PARTICIPATE.	MOM FILE	Planning Engineer.
11	IS CODES and standards	List requirements and mobilize at site.	Master list of codes / standards as controlled copies.	MATERIAL ENGINEER / Planning Engineer.

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Record Control

1. Project Manager controls all the records mentioned in Record Control List.
2. After approval by the PM / Engineer, the control copy shall be issued to the concern Engineer or Dept. using record control format.
3. A copy of the signed record copy of each Dept. has to be filled as master list of quality records.
4. Amended drawing shall be kept with drawing amendment sheet and the same shall be distributed to the site. Superseded drawing shall be marked with Superseded stamp and status shall be maintained by entering into construction drawing status register in the technical office.

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Procurements

Scope: - All materials mentioned in Bill of quantity and classified as given below:

1. Materials of natural origin as per bill of quantity.
2. Manufactured Materials as per bill of quantity.

General:

Objective: To establish a system for selection of material, approve vendor and monitor procurement of material at site.

Responsibility for procurement of Materials or Services rests with the Concern engineer With Project Manager & Site Directors. The HO Procurement Departments takes action on procurement of high value not within the scope of site, or if the said material is not available nearby location of the site with competitive price. However initiation for procurement action with proper specifications, tests in advance of placing Purchase Requisition is the responsibility of Site Planning Engineer. The Section In charge / P & M In-charge, Planning Engineer has to ensure right quality materials are available at economical prices to the site. The Planning Engineer and PM decide who will take the procurement action viz.

The Project Manager will prepare a list of materials and allot procurement responsibilities as per Format. The list will be updated as required Basis.

The Approved Material Source List & VENDORS LIST has to be displayed at STORES, PLANNING, LABORATORY Depts. Respectively.

The store has to inform to planning office for the material received at site store.

THE VENDORS LIST SHOULD HAVE THE DETAILS OF APPROVED MATERIAL.

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LIST OF MAJOR ITEMS INVOLVED IN THE PROJECT:

- REINFORCEMENT AND STRUCTURAL STEELS
- CEMENT
- AGGREGATES
- BRICKS
- PAINTS
- BITUMEN
- FURNACE OIL
- BEARINGS
- DIESEL
- LUBRICANTS
- P& M & SPARES.
- WATER
- SAND
- ADMIXTURES
- SHUTTERING MATERIALS

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Method statement for construction of Road works

Objective: To establish the construction procedure, equipment required, Contractor role and Specification requirements of road construction for the following activities:

Scope: As per below mentioned activities.

1. Survey
2. Fixing of center line & toe line fixing (road alignment)
3. Road way – clearing & grubbing
4. Excavation if required.
5. Base preparation
6. Embankment filling
7. Sub grade construction
8. GSB construction
9. WMM construction
10. DBM
11. BC
12. CONCRETING

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SURVEY

Objective: To set out the structure in accordance with drawings from the reference points provided by the Project Consultants. To provide permanent gridlines and construct benchmarks for level control. Carry out routine survey work, identify errors, distribute errors and maintain survey records.

Scope - Working benchmarks for road alignment.

Procedure - As mentioned in table.

SI No.	Activity	Responsibility	Check by	Remarks Records	File Ref.
1	Obtain Clients drgs, prepare site survey drgs. Locating the positions of grid stations, benchmarks, etc. Locate stations such that they will not be disturbed during construction. Construct Control Stations, BM Stations as per Sketch.	Surveyor		Site: Drg. / Sketch	
2	Mark grid intersection with steel rod embedded in concrete block.	Section Engineer	Surveyor		
3	Paint grid references and fence	Surveyor			
4	"Stations" Designate value to benchmarks, close traverse.	Surveyor	Planning Engineer		
5	Obtain daily survey requirements of Section Engineers during Site Meeting. Carry out routine requirements.	Surveyor	Surveyor		

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Setting out

Objective:- Fixing of working bench mark ,traverse pillars, center lines/ setting of curves & spot levels drawing in co-ordination with site in charge and getting it checked with clients in co-ordination with site in charge.

Sl. No.	Activity	Responsibility	Checked by	Remarks / Records	File / REF
1.	Working Bench marks control points		Project team / once every month project team	Established Reference benchmark in survey file.	
2.	Temporary bench mark	Surveyor	Engineer	Reference to working benchmark / record in survey file Format.	
3.	Setting out center line & toe line	Contractor as per MORTH 109.3	Engineer as per MORTH 902.2 Engineer	Approved by engineer on stage passing format.	
4.	Profile Survey	Contractor /at interval as required by engineer		W.r.t. center line & cross section/ records in survey file	

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Methodology for road works

Objective: To establish the construction procedure, equipment requirement, contractor role & specification requirements for the following activities.

- ii. Fixing of road alignment (fixing of center line & toe line)

Equipment Required

Theodolite, ranging rod, auto level, staff, EDM

Execution Procedure

Sl. No	Procedure	Responsibility	Checked by	Remarks /Records	File Ref.
1.	The centerline & toe line fixing.	Surveyor	Engineer as per MORTH 902.2 for horizontal alignment.	Interval of 50 mm c/c longitudinally and shifted beyond toe line in right of way on both side.	

Role of Contractor

The contractors have to maintain the centerline pillar on both side and will be responsible for shifting it as and when required to main carriageway during construction of embankment/sub grade. More over in every layer of filling the contractor have to mark the toe line.

Before field testing starts which would be checked by our sector in charge to avoid any extra laying done & also to check the maintenance of required toe.

ii. Road way – clearing & grubbing

Equipment Required – Dozer, excavator, dumpers

Execution Procedure: After fixing of centerline & toe line the clearing & grubbing activity is to be taken up. The formation width has to be made clear of any vegetation

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in present. The procedure adopted will be dozer have to completely doze about 150mm and make the stretch completely clear of material like bushes, shrubs, stumps, grass, weeds, top organic soil etc. The dozed material have to be cleared from toe width extent completely, wherever the roots stumps are located and are unremoved by dozer will have to be excavated out and disposed off. All excavation below general ground level arising out of removal of trees stumps required to be filled with suitable material and compacted thoroughly so as to make the surface at this point confirm to surrounding area. If area is water logged it has to be dewatered and made to expose to sun till it dry out. After stretch is made clear, the base preparation activity follows.

Role of contractor: whole activity as discussed above will be part of contractor scope.

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Excavation

Objective – Excavate for construction of roadway to require dimension and level as per drawing, removing excavated earth, storing for reused or disposal at place agreed by clients.

SI No	Procedure	Responsibility	Checked by	Remarks / Records	File ref.
1	Set out Excavation limits at every 50-meter interval in plain terrain and at 20-meter intervals in all curve points true to lines, curves, slopes, grades and sections.	Ch Hand.	Project Manager	Note in site order book with sketches.	
2	Agree with clients for disposal area; inform client quantity of reusable material. It may be stacked 10 - 15m away from excavation.	Section Engineer	Project Manger	Record to be maintained for location of disposable area.	
3	Check ground water levels and induct dewatering systems if req. Keep standby DW Systems during Monsoon.	Ch Hand.	Constriction Manager		
4	Excavate manually or mechanically to required sizes and depth. Make sure depths are not exceeded beyond requirement.	Ch Hand.			
5	Trim and Level manually at final level (tolerance + 20mm)	Ch hand.	Surveyor		

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Base preparation

Objective: The base is to be prepared and to be graded and rolled properly over which embankment construction will start.

Equipment required: Grader, Roller, and water tanker

Role of contractor: The above said activity is to be carried out by contractor and our scope will be testing part only. (The subcontractor part of work and total operation under the scope of Jilin-Sadbhav Joint Venture will be the responsibility of joint venture.

SI No	Procedure	Responsibility	Checked by	Remarks / Records	File ref.
1	The base sample is taken and given to Lab Dept. to determine the modify proctor density	Lab Dept.		Lab. density test record.	
2	After bed preparation, field density test should be carried out for degree of compaction.	LAB. Dept.	Density of 95% For Natural Ground Level	Lab. density test record.	

CORRECTIVE ACTIONS FOR NON-CONFORMITY / STUDY

The ground will be scarified; water will be sprinkled uniformly with a controllable rate and thoroughly mixed in soil by balding, disking or harrowing to obtain uniform moisture content throughout the depth of the area.

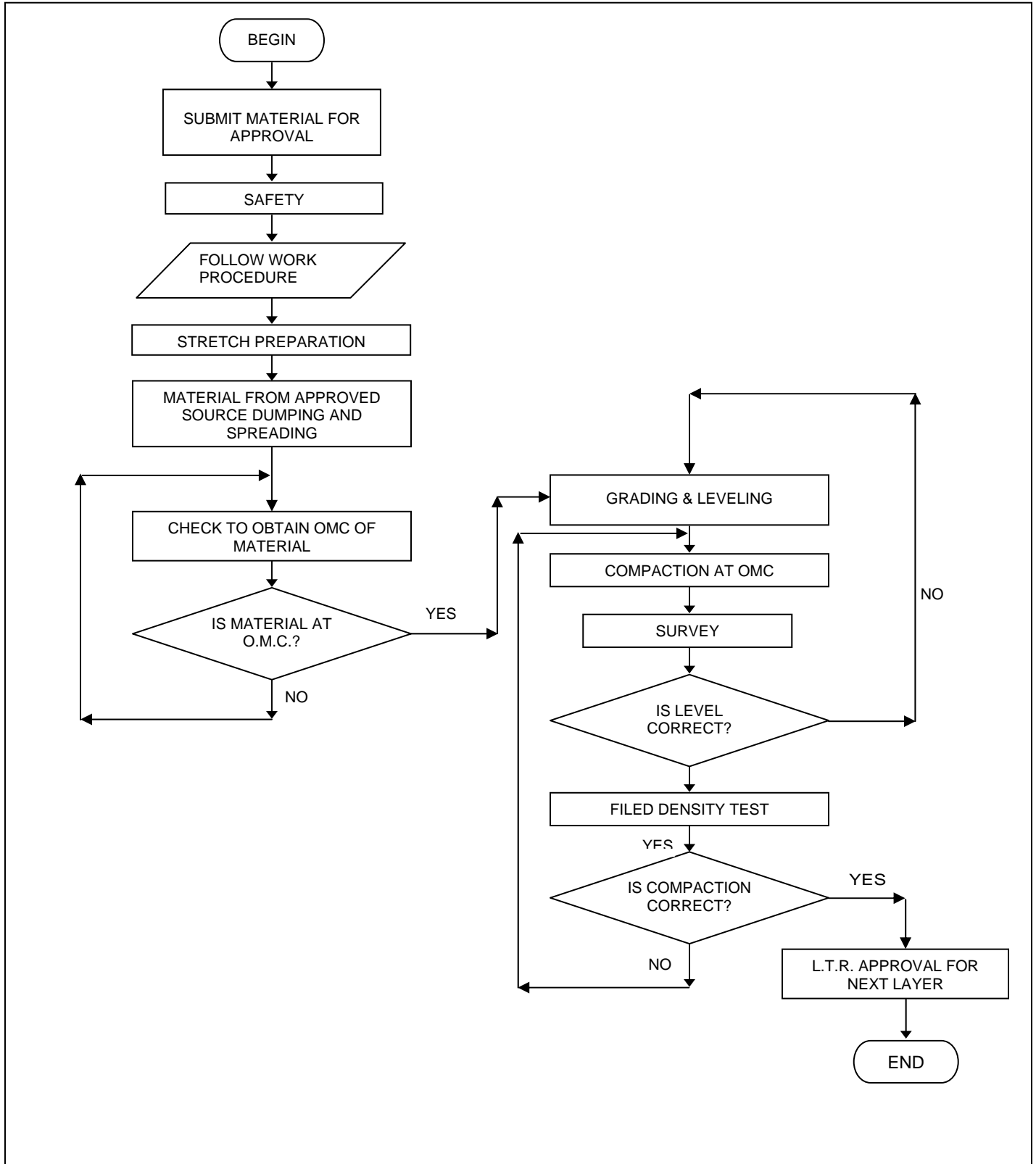
Then the soil will be compacted by vibratory roller.

Rapid moisture meter will do control of moisture after calibration with Documentation:

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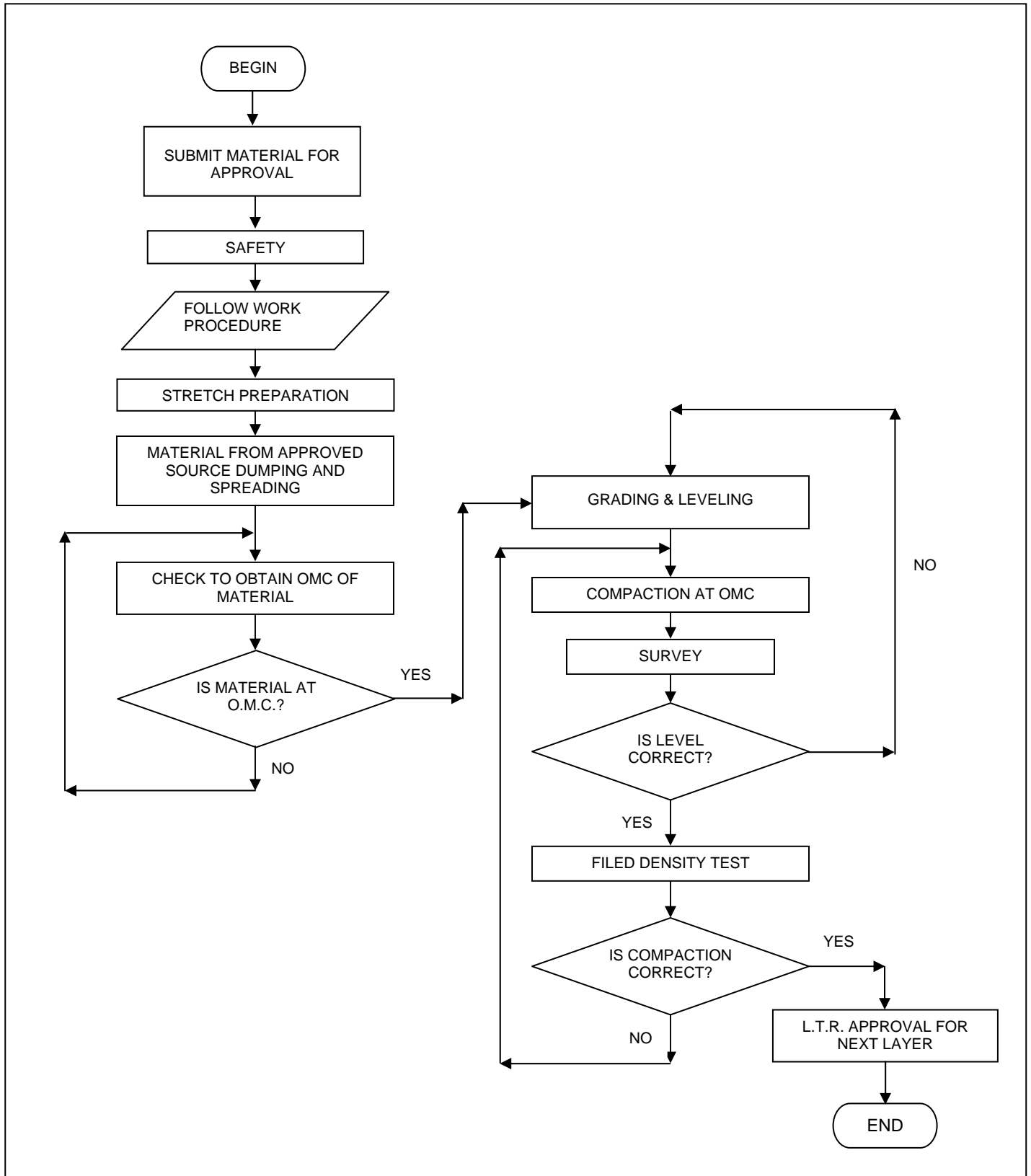
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**METHOD STATEMENT: Embankment Construction by Non Plastic Material
(SAND/SANDY SOIL)**



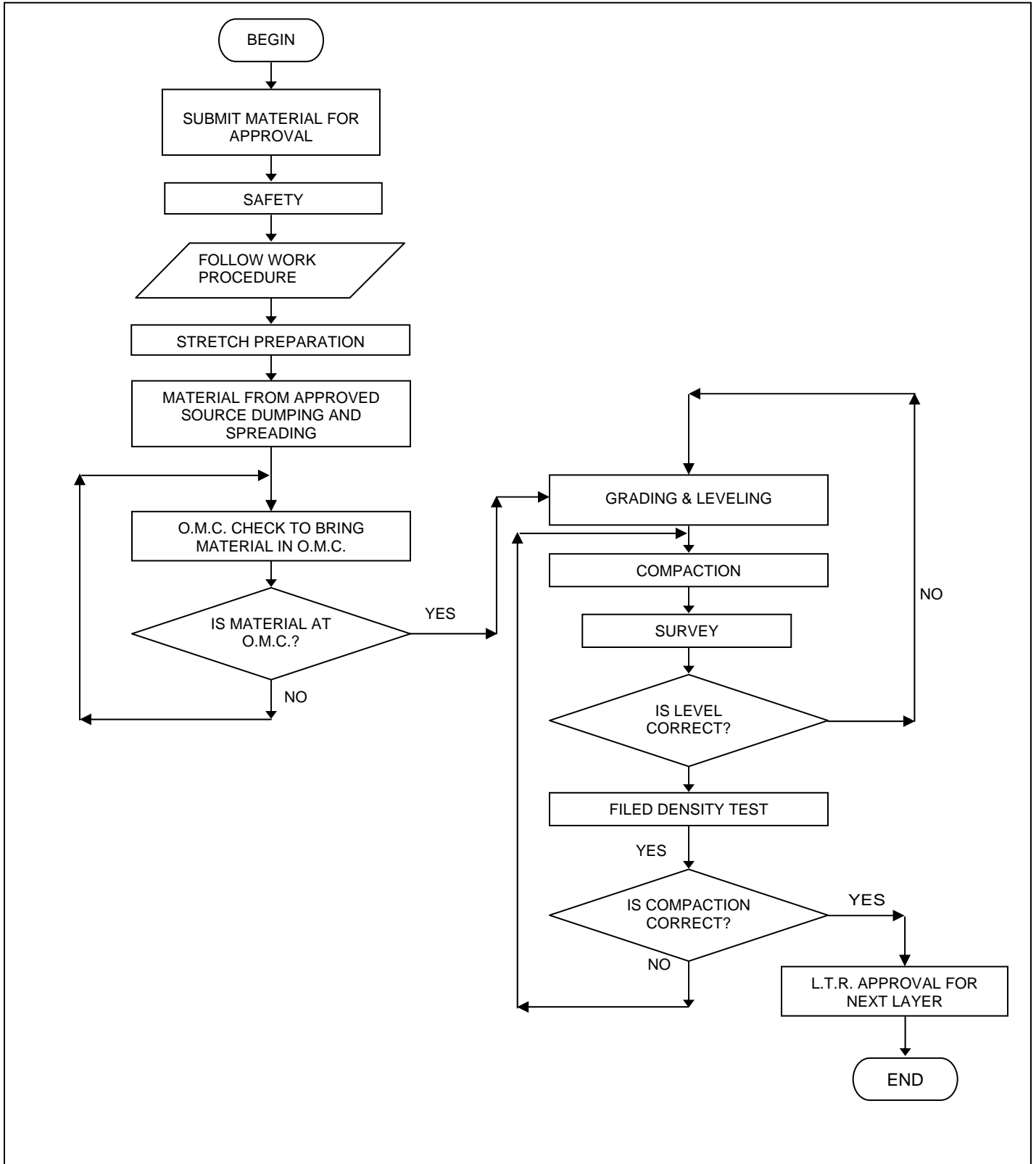
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METHOD STATEMENT: Embankment Construction by Soil



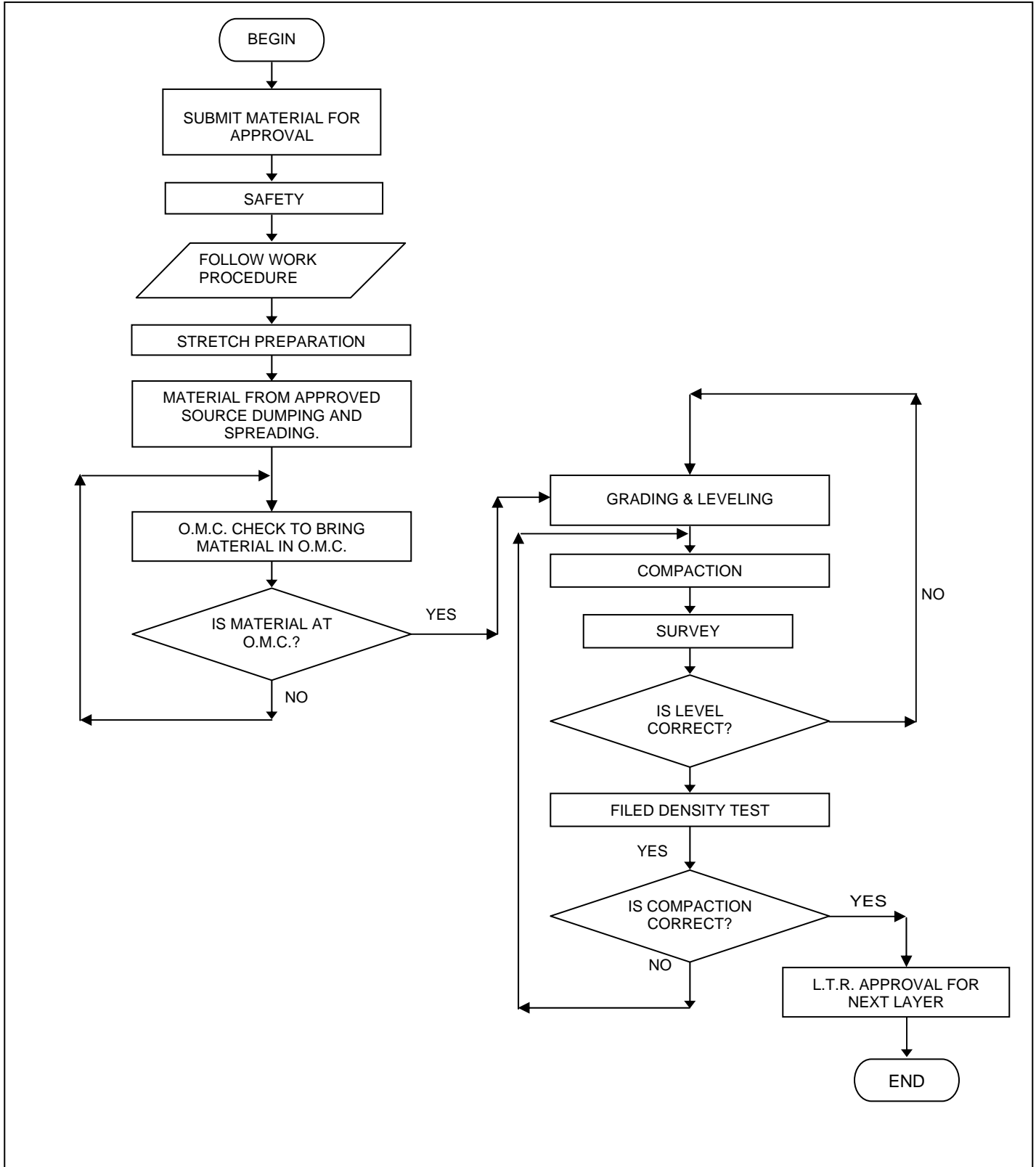
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METHOD STATEMENT: Subgrade Construction



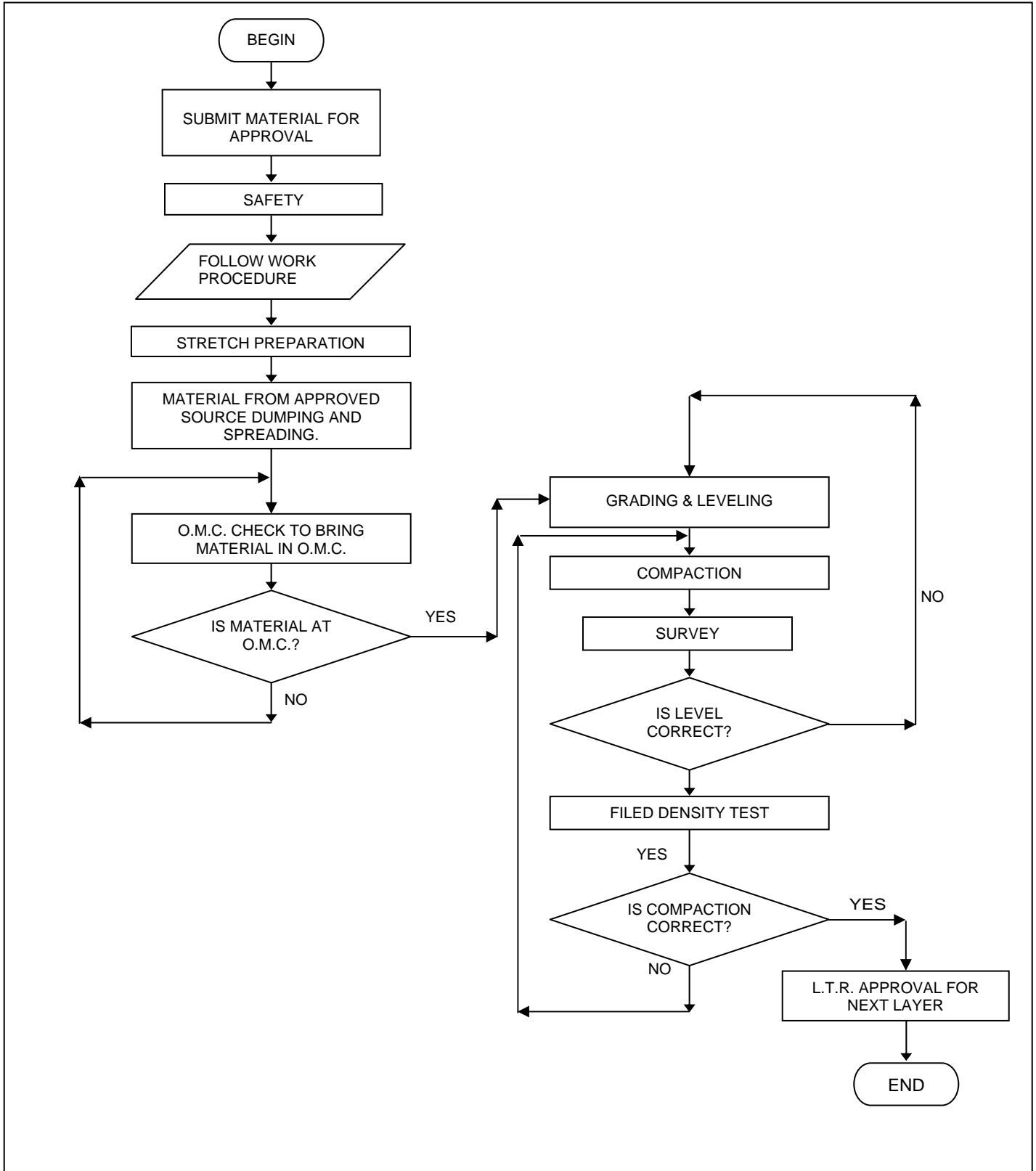
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METHOD STATEMENT: Subgrade Construction



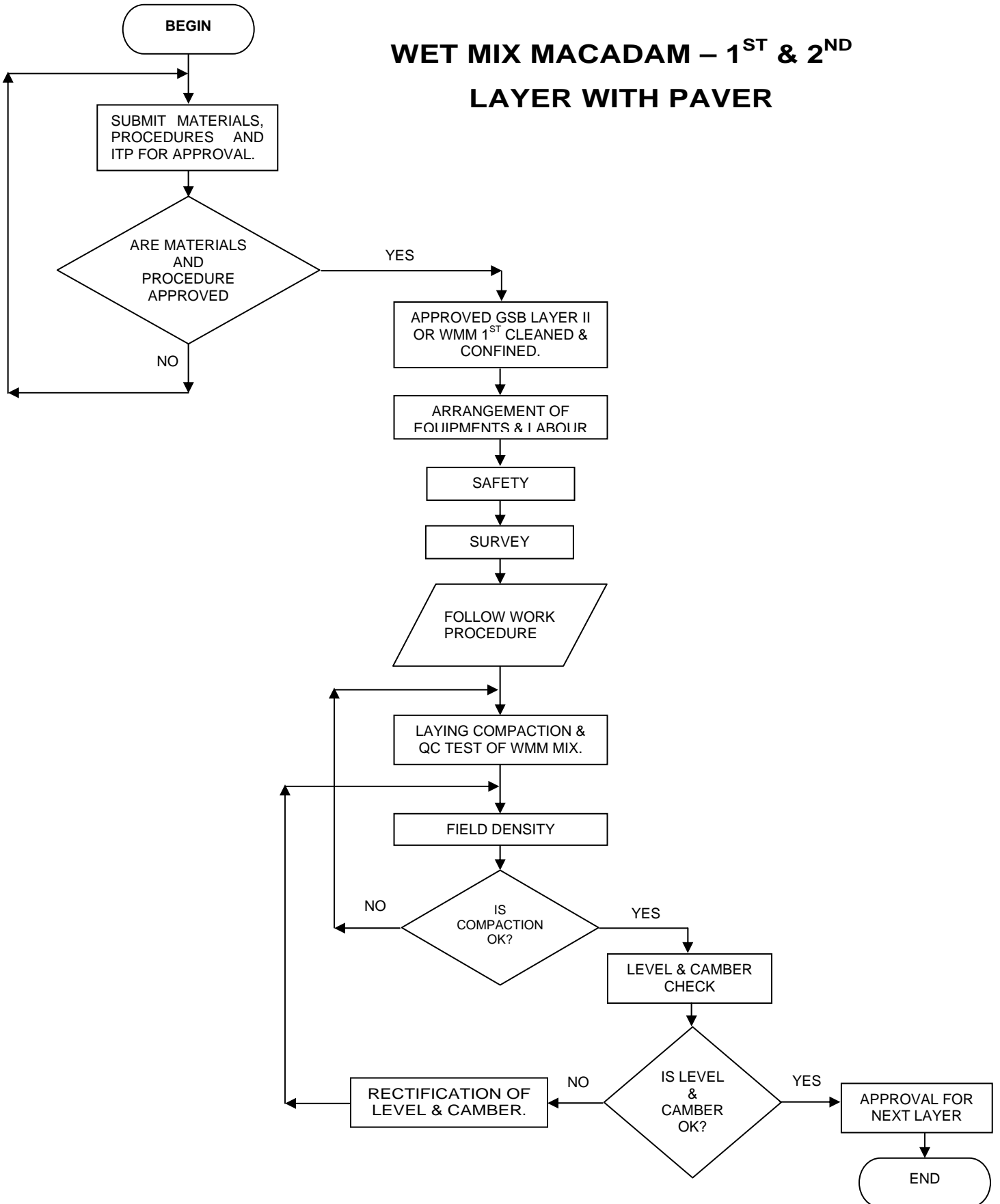
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METHOD STATEMENT: Granular Sub Base (GSB)

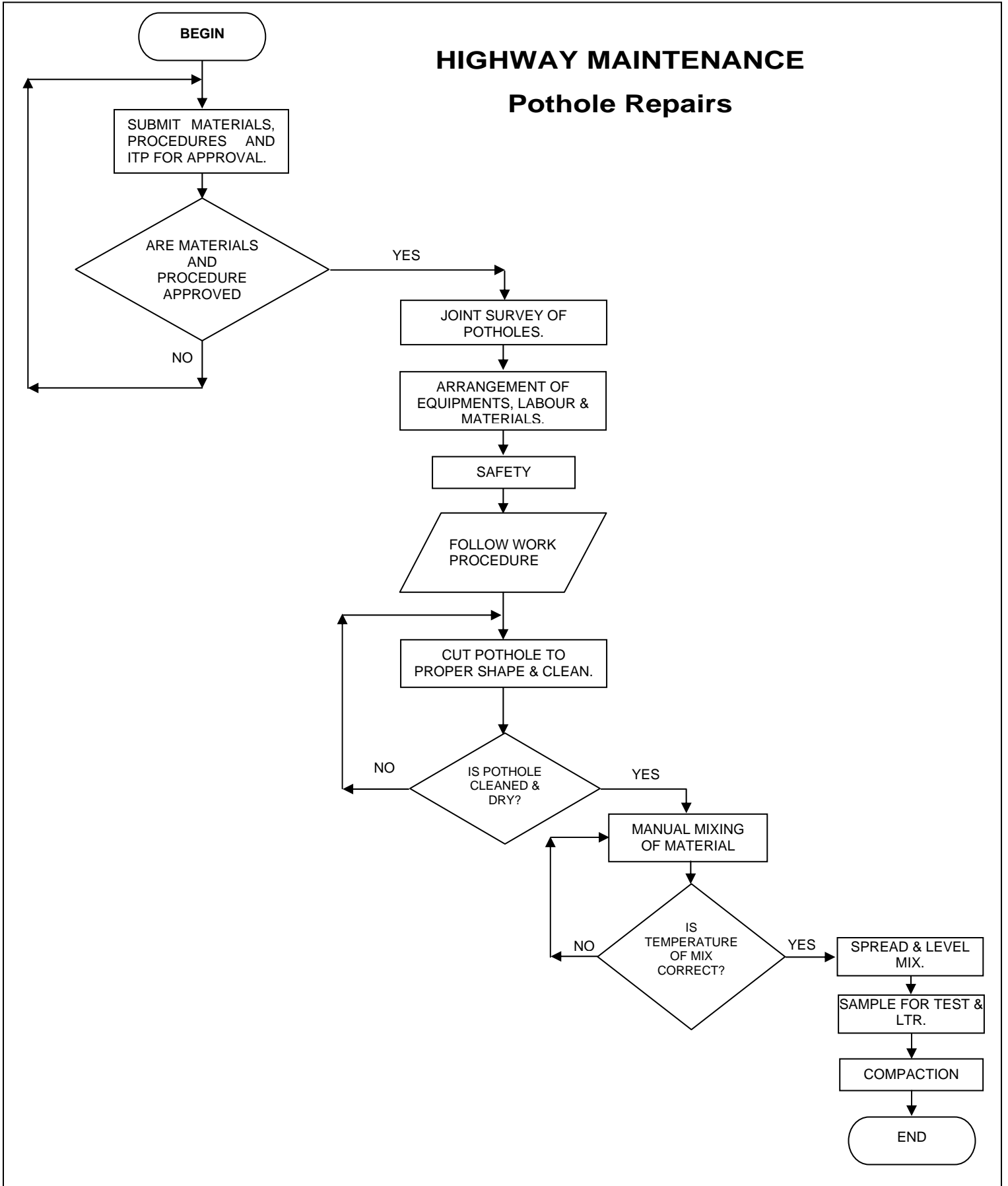


PROJECT QUALITY PLAN

**WET MIX MACADAM – 1ST & 2ND
LAYER WITH PAVER**



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Embankment Construction By Non Plastic Material Sand/Sandy Soil.

SI No	PROCEDURE	Contractor's Responsibility.
1	From the GFC drg, Working BM, Alignment pins and the original G.L shall be surveyed before the commencement of work. Based on such actual ground level records, the profiles & cross section drawing shall be prepared.	Site Engineer
2	The area of embankment filling to be carried out shall be identified and marked at site.	Site Engineer
3	The embankment material viz. Sand, moorum/soil shall be tested and approved with reference to IRB.	Site Engineer
4	From the assesed scope of work within the marked area, requirement of resurces shall be determined and arranged.	Site Engineer
5	Following Plants shall be arranged: Excavator, Dumper, Water tanker, Roller, Dozer, and Motor Grader.	Site Engineer
6	The soil in the ground that is to receive embankment fill shall be tested for suitability as per MORTH Clause 305.3.4	Site Engineer
7	If the foundation of the embankment is in an area with stagnant water and it is feaszble to remove the shall be removed by bailing out or pumping as directed by the engineer. If such dewatering process is not found to be feasible on account of deep and uncertain slush depth, Clause 305.4.6 shall be applied. Non-Plastic granular material (sand) shall be placed in such area in open water and deposited by end tipping without compaction.	Site Engineer
8	For dry area rior to stand dumping, cleaning & grubbing shall be done as per MORTH Clause 201.The original ground shall be tested for compaction as MORTH Clause 305.3.4. Over prepared bed sand shall be dumped and spread by mechanical means with moorum/soil confinement as shown in enclosed sketch. Rain cut if any shall be cleared of loose material and benched minimum 300 mm wide and depth 150-300mm and	Site Engineer

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	shall be filled with approved material as per MORTH CI.305.2 and compacted with vibratory roller or rammer at OMC.	
9	The embankment and confinement material shall be tested for water content and brought to OMC.	Site Engineer
11.	The material shall then be graded to required level and camber by motor grader and compacted to 95% compaction by 8-10 ton vibratory roller to a maximum compacted thickness of 250mm.	
12.	The compacted layer shall be tested for achieving the 95% compaction as per MORTH CI305.3.6. If their required compaction is found to be achieved the work shall be commenced on dumping material for the next layer.	

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Embankment Construction By Soil.

SI No	PROCEDURE	Contractor's Responsibility.
1	From the GFC drg, 'Working BM, Alignment pins and the original G.L shall be surveyed before the commencement of work. Based on such actual ground level records, the profiles & cross section drawing shall be prepared.	Site Engineer
2	The area of embankment filling to be carried out shall be identified and marked at site.	Site Engineer
3	The embankment material shall be tested and approved with references to IRB.	Site Engineer
4	From the assessed scope of work within the marked area, requirement of resources shall be determined and arrange	Site Engineer
5	Following Machinery shall be arranged: Excavator, Dumper, Water tanker, Roller, Dozer, and Motor Grader.	Site Engineer
6	The soil in the ground that is to receive embankment fill shall be tested for suitability as per MORTH Clause 305.3.4	Site Engineer
7	The approved soil shall be spread in layers and compacted with vibratory roller to a maximum compacted thickness of 250mm.	Site Engineer
8	The embankment material shall be tested for OMC and water added if required to bring it to OMC.	Site Engineer
9	The material shall then be graded to required level and camber by motor grader and compacted to 95% compaction by 8-10 ton vibratory roller to a maximum compacted thickness of 250mm.	Site Engineer
10	The compacted layer shall be tested for achieving the 95% compaction as per MORTH Cl. 305.3.6. If the required compaction is found to be achieved the work shall be commence4d on dumping material for the next layer.	Site Engineer

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Sub grade Construction

SI No	PROCEDURE	Contractor's Responsibility.
1	The embankment area for Subgrade construction shall be identified and marked out at site.	Site Engineer
2	Following equipments shall be deployed: Grader, Vibratory Roller, Water Tanker, Rotovator, Disc. Harrow	Site Engineer
3	The safety checklist is to be followed by the Site Engineer.	Site Engineer
4	The borrow area material proposed shall be tested and approved for minimum CBR value of 8% as per MORTH CI.305.7	Site Engineer
5	Approved Subgrade material spread for Subgrade 1 st & 2nd Layer 250mm thick	Site Engineer
6	Moisture content shall be checked and water shall be added if required to bring it to OMC. If soil is wet and found more than OMC range then it shall be exposed to sunlight for drying.	Site Engineer
7	The calculated amount of water to be added to the soil so as to achieve OMC.	Site Engineer
8	After adding the required amount of water, the soil shall be mixed by means of Grader, Disc. Harrow or Rotary Mixer (Rotovator), until the layer is uniformly mixed. Clods and hard lumps shall be broken down upto 50mm or below.	Site Engineer
9	Each layer of the material shall be compacted to 97% with a vibratory roller having a static weight of 8-10 tons.	Site Engineer
10	Level shall be taken on top layer to check level and camber. The compacted layer shall be tested for required compaction 97%. If the required compaction is achieved, work shall be commenced for next layer after getting the approval from Engineer's representative.	Site Engineer

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Granular Sub Base (GSB)

SI No	PROCEDURE	Contractor's Responsibly.
1	The Area for GSB shall be identified and marked out at site.	Site Engineer
2	Following plant shall be arranged: Vibratory roller, Water tanker, Wheel loader, Grader, Rotavator / Disc harrow.	Site Engineer
3	The proposed GSB I, II & shoulder material as shown in sketch shall be tested and approved as per MORTH Cl. 401.2.	Material Engineer
4	Site Engineer shall follow safety Checklist.	Site Engineer
5	<p>GSB Material:</p> <ol style="list-style-type: none"> 1. Natural foothill material shall be directly used after all required parameters should be full fill As a GSB Material Located At Various Places Nr. Kheduka Quarry And Other Approved Source 2. If required screening plant will be installed Near Natural Foothill material. And material shall feed to GSB Screening Plant (located Nr. Natural Source Material) through conveyor – hopper arrangement wherein material passing 75mm and retaining on 6mm sieve shall be stockpiled nearby. 3. Further If Required the balance Requirement of grading and other Parameter shall be fulfilled with adding Natural sand Or Dust. 	Site Engineer
7	Sub base material shall be spread (thickness determined by trial) on the prepared with the help of Motor grader so as to give compacted thickness of 150mm.	Site Engineer
8	Moisture content of the material shall be checked and suitably adjusted by sprinkling water from a water tanker. After adding water the material shall be processed by mechanical means like Disc harrows or Rotavator until the layer is uniformly wet.	Site Engineer
9	GSB material shall be compacted to 98% compaction with 8-10 Vibratory roller.	Site Engineer

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10	Grade and camber shall be checked & corrected.	Site Engineer
11	The compacted layer shall be tested for 98% compaction. If required compaction is achieved work shall be commenced on next layer after clearing the stage pass.	Site Engineer

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WET MIX MACADAM – 1ST & 2ND LAYER WITH PAVER

SI No	PROCEDURE	Contractor's Responsibility.
1	Selected stretch: Confined and cleaned stretch for laying WMM 1 st or 2 nd layer should be sprinkled with water if require.	Site Engineer
2	<p>Arrangement of Labour, Material & Equipment:</p> <p>a) Laborers (4/5 Nos)</p> <p>b) Tools & Tackles</p> <p style="padding-left: 40px;">Spade 2 Nos. Shovel 2 Nos. Wire Brush 2 Nos. Coir Brush 2 Nos. Censer wire & Steel pegs</p> <p>c) Equipment</p> <p style="padding-left: 40px;">Vibratory Roller 01 No. Paver / Motor Grader 01 No Tipper to transport WMM mix from plant to site appropriate nos. Water Tanker 01 Nos.</p> <p>d) Materials</p> <p style="padding-left: 40px;">WMM ready mix from plant (as per MORTH Clause 406.3.3).</p>	Site Engineer
3	Safety: At the identified area for laying WMM, one person with red flag is to be kept to control the construction traffic as well as to give way to high way traffic.	Site Engineer
4	Preparation of Stretch: Survey arrangement is to be made by fixing survey pegs (If censor Paver is in use then censor wire with censor pegs are to be fixed.) For using part width of carriageway, one line is to be marked on the GSB surface at a distance 4.670mtr. Away from median edge to stagger the longitudinal joint of WMM layer, and remaining 4.800 Mtr. Width shall be taken up in the next lane of pave width up to shoulder, while executing the 1 st layer of WMM. Similarly for 2 nd layer of WMM, the line is to be marked on WMM surface at a distance of 4.020mtr away from median edge, and remaining 5.15mtr. Width	Site Engineer

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	shoulder side shall be taken up as a 2nd lane of carriageway.	
5	Preparation of Mix and Transportation: The mix shall be prepared in the plant and transported in the appropriate no. Of tippers to the site depending upon the quantity per trip and lead considerations to feed the Paver continuously. The material shall be considered as approved design mix with approved material from Engineer (as per MORTH Clauses.	Site Engineer
6	Laying and compaction: The Paver shall be kept ready at median side marked lane to take the mix, before giving the order to dispatch the mix from plant. After completing the median side part width first up to 100mtr. With compaction, then next 100mtr 2 nd part width is to be taken up for 2 nd lane of carriageway, abutting to the already laid fresh layer. While executing 2 nd lane, the joint of previously laid fresh lane is to be matched by manual cutting vertically up to full height and leveling the mix to assure the segregation free and uniform joint, with a prospective of compaction and level as well. (For the satisfaction of the Engineer the trial stretch is to be demonstrated, prior to the commencement of work). The process is to be continued till the completion of stretch (as per MORTH Clause 406.3.4). The camber profile is to be checked during course of laying with the help of camber board. Paver shall be used for spreading the wt mix and wherever it is not feasible to use Paver, Grader shall be used with permission from Engineer.	Site Engineer
7	Field Density Test: On the compacted stretch toe line and survey points are to be marked for level and camber checking. The density of the WMM is to be checked by sand replacement or nuclear gauge method. After the approval from Engineer, for compaction and profile check (as per MORTH clause 902.3& 903.2.2) next activity can be taken up.	Site Engineer
8	Work Measurement Record: WMR is to be prepared for the payment of the WMM quantity and shall be signed by Jilin-Sadbhav Joint Venture and SI Engineer both.	Site Engineer

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9	Testing of Mix: The sample of the WMM mix shall be taken from plant or site jointly to carry out the lab test. The test results shall be prepared and recorded with LTR in the laboratory separately (as per MORTH Clause 903.3.1 & table 900-3).	Site Engineer
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PROJECT QUALITY PLAN

HIGHWAY MAINTENANCE – Pothole Repairs

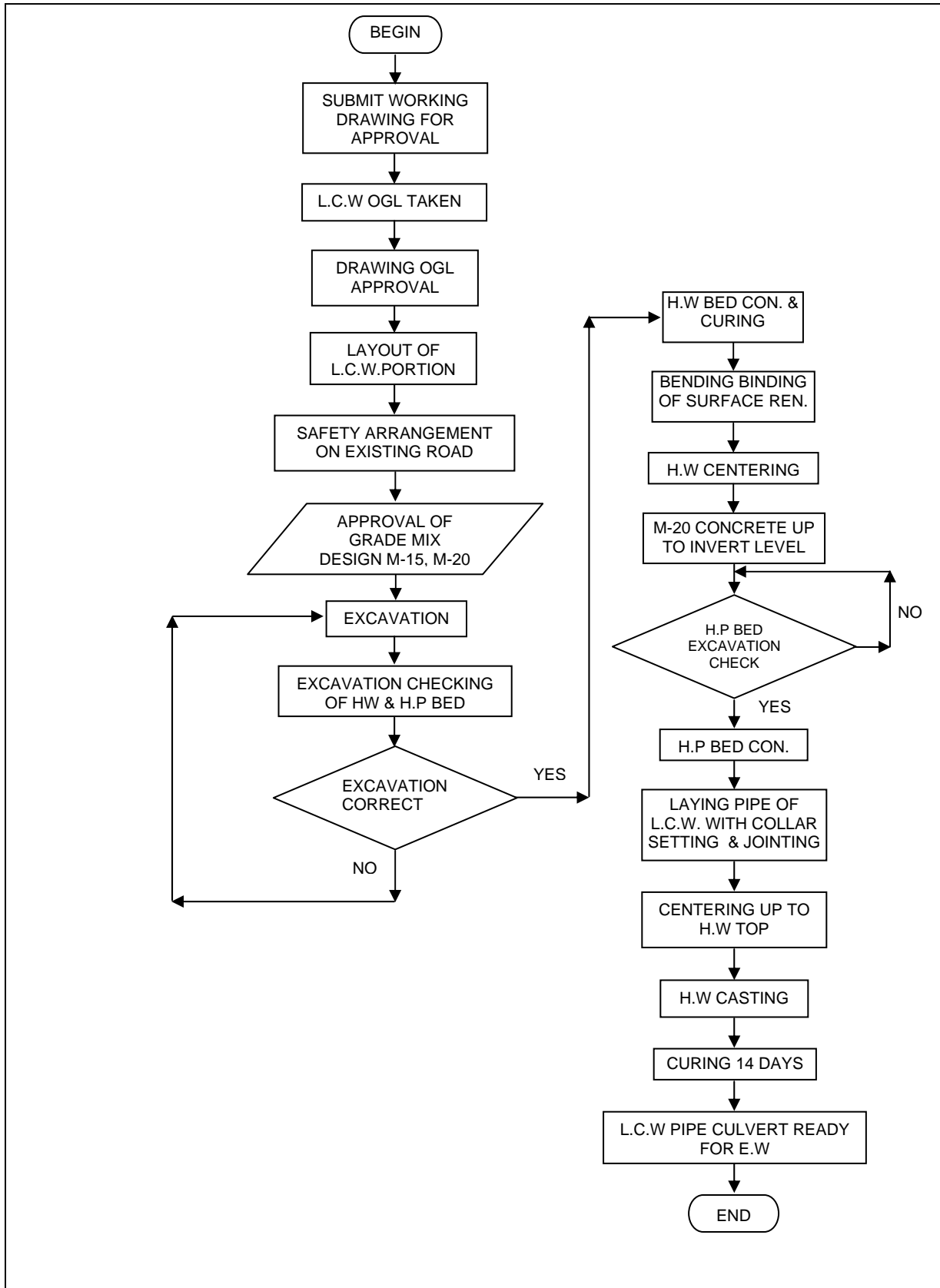
SI No	PROCEDURE	Contractor's Responsibly.
1	Joint Survey: Number and approximate size (sq. m) of potholes to be identified jointly and recorded on a daily basis.	Site Engineer
2	<p>Arrangement of Labour, Material & Equipment:</p> <p>a) Laborers (6-10 Nos)</p> <p>b) Tools & Tackles</p> <ol style="list-style-type: none"> 1. Pickaxe 04 Nos. 2. Shovel 02 Nos. 3. Wire Brush 04 Nos. 4. Coir Brush 04 Nos. <p>c) Equipment</p> <ol style="list-style-type: none"> 1. Vibratory Roller 01 No. <p>d) Materials</p> <p>Straight run Bitumen/Emulsion/Aggregate 20mm, 10mm & Dust. (From approved source).</p>	Site Engineer
3	Safety: Identified area for repairs is to be barricaded with help of safety cones, safety ribbon or rope. The two persons with red flag and safety jackets are to be kept on either end of barricaded area 20m, away from work to control the traffic. Movable pictorial caution sign to be placed near flagmen.	Site Engineer
4	Preparation of Potholes: Identified potholes are to be brought in proper shape by cutting edges vertically. All loose and damaged areas are also to be cut and removed, as per MORTH specification 3004.1.3 All the loose materials to be cleaned, brushed	Site Engineer
5	<p>Preparation of Mix: There will be types of mixes depending upon weather conditions. The procedure type shall be adopted manually after approval from Engineer.</p> <p>a) Hot mix: Aggregate and bitumen should be heated with the local arrangements on the spot separately. Proportion of aggregates is: 20mm – 40%, 10mm – 30% shall be mixed properly by manual means. Bitumen</p>	Site Engineer

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	<p>should be added 4-5%.</p> <p>b) Cold Mix: Aforesaid proportion of aggregate shall be mix with Rapid setting bituminous emulsion. No heating is required.</p>	
6	<p>Tack Coat: On the prepared surface of the potholes, tack coat should be applied @ 0.2 to 0.25 kg/m² with emulsion or hot bitumen manually as per MORTH Clause 503.</p>	Site Engineer
7	<p>Spreading and Leveling: The prepared mix can be filled over the tack-coated surface. The top surface is to be kept higher by 20% of the required level. The filling in each layer should be maximum 100mm (MORTH clause 3004.1.4</p>	Site Engineer
8	<p>Testing: The sample of the mix shall be taken jointly to carry out the lab test. For the surface approval, visual inspection can be made. LTR shall be submitted separately.</p>	Site Engineer
9	<p>Compaction: On depositing and spreading of hot mix or cold mix the area shall be rolled immediately with the help of Vibratory Roller. After compaction of the particular portion (as per MORTH clause 3004.1.4). The area shall be opened to traffic.</p>	Site Engineer

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METHOD STATEMENT OF H.P. CULVERT CONSTRUCTION



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H.P CULVERT CONSTRUCTION (NEW CARRIAGE WAY)

SI No	PROCEDURE	PERSON RESPONSIBILITY
1	The area for culvert construction shall be cleaned and leveled so as to provide sufficient space for construction & storing material.	Site Engineer
2	A temporary shed shall be constructed with furniture as per site requirement with arrangement for drinking water.	Site Engineer
3	Safety arrangement will be made on the existing carriageway for smooth movement of traffic with cautionary signs & lighting arrangement at night.	Site Engineer
4	Following equipment will be deployed. JCB/Poclain, Transit Mixer, Vibrater, Centering materials, Batch mix plant, Water tanker, Polythine etc.	Sr. Engineer
5	Following workmen will be engaged in the work. Manson, Vibrater, operator, Labour, Rod binder, Binding wires, Supervisors, Curing man, Jute sacks etc.	Site Engineer
6	Layout of Head wall & Cradle Concrete will be done through Surveyor and checked by Consultant as per layout plan and O.G.L. of working area taken .	Site Engineer
7	Excavation as per layout plan is done and dressed to required level and size for Head wall and cradle Concrete bed and catch pit.	Site Engineer
8	Foundation beds shall be checked by Engineer of the Consultant & passed for laying concrete.	Sr. Engineer
9	If not passed redressing will be done and passed by Consultant.	Sr. Engineer
10	M15 bed concrete shall be done on Head Wall, Hume pipe bed & catch pit upto 75 mm. As per design mix approved with proper water, cement ratio and required slum. Material Engineer will collect concrete cubes.	Site Engineer as per direction of Sr. Engineer
11	Curing will be done for 14 days.	Site Engineer as per direction of Sr. Engineer

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SI No	PROCEDURE	PERSON RESPONSIBILITY
12	Surface reinforcement and reinforcement of catch pit will be binded with tested rods as per B.B.S. and will be measured and checked by Consultant.	Sr. Engineer
13	Centering done upto bed level and passed by Consultant.	Sr. Engineer
14	M20 concrete done up to HP bed on head wall & M25 concrete done in catch pit & Concrete cubes collected by Material Engineer. Proper Quality Control measure at Batching plant, work site as per design mix will be adhere too. Test results will be communicated to Consultant.	Site Engineer and organized by Sr. Engineer.
15	H.P of required dia. laid with collar joints in position & M15 concreting done up to the required level, Concrete cubes collected for test, Quality control measures taken during consist.	Site Engineer
16	Centering done for H.W and Catch pit.	Site Engineer
17	M20 concrete on HW up to top and R.C.C. walls of catch pit with M25 concrete will be casted with proper Quality Control Measures & cubes collected for testing	Site Engineer & Sr. Engineer
18	Curing continued for 14 days by covering the structure with Jute sacks thrice a day. The foundation trench will be filled with earth and compacted.	Site Engineer & Supervisor
19	Now the HP on new carriageway ready for E.W & H.P on existing carriage way will be laid after the new carriage way is fit for traffic in 2 nd place.	

**SIGNATURE
(DIRECTOR)**

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CONCRETING GENERAL

OBJECTIVE: To ensures, right quality of mix is manufactured, placed and vibrated such that the structures achieves the desired finished, strength and thereby durability. The procedure ensures quality of shutter, equipment's used and provision for stand by Equipment / Crew.

SI No	PROCEDURE	PERSON RESPONSIBILITY
1	Prepare concreting program for the following week every Saturday. Obtain inputs from all sections Engineers.	Planning Engineer / Engineer in Charge for structure.
2	Aggregates, Sand, Cements, Admixtures etc. to meet the program. If raw materials are deficient, initiate action.	Stores.
3	Ensures Batching plant, Transit Mix, Pump is maintained on the holiday as per schedule.	Stores.
4	If problems are anticipated, provide for stand by or alternate supply. For bigger Pours, stand by is mandatory.	P&M Engineer.
5	Contemplate emergency stop end procedures in addition to step – 5.	P&M Engineer.
6	Check pour Car has been approved.	Engineer In-charge (structure).
7.	Notify batching plant through note for delivery of concrete.	Engineer In-charge (structure).
8.	Site Engineer to set up crane or Pump in position, Check all equipments (Vibrator, Compresor, etc.). Keep stand by available. Confirm mix instruction of material Engineer by wireless/intercom or any mode.	Section Engineer.

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REINFORCEMENT CUTTING, BENDING, FIXING

OBJECTIVE - Receive, stack diametrewise, approved quality of reinforcement, cut, bend as per prepared bar schedules, Ensure minimum wastage and generation or Scrap.

SI No	PROCEDURE	PERSON RESPONSIBILITY
1.	Obtain construction drgs, prepare bar list placement drgs. And stretch. Work out concrete.	Section Engineer
2.	Consolidated diametrewise requirement including delivery schedules. If bar list are prepared by consultant check by site Engineers.	Planning Engineer
3.	Quality Reinforcement Suppliers by independent tests or reviewing Test Certificates. Place order	Material Engineer.
4.	Receive Consignment, stock diametrewise on sleeper's min. 300 above ground.	Planning Engineer
5.	Tarpaulin covers the lot. Stack to be in line with cutting Machine.	Reinforcement Engineer / Stores
6.	If steel is not tested before delivery, collect samples and send for test.	Reinforcement Engineer
7.	Receive bar Schedule and site priority from planning Engineer.	Reinforcement Engineer
8.	Cut, Bend, Bundle tag reinforcement check with Section Engineer and dispatch to site.	Reinforcement Engineer
9.	Receive reinforcement site, count number, tally with tag and BBS.	Ch.Hand
10.	Mark spacing using chalk, place bar for both directions and fix. Place cover. Beams are generally fixed in advanced of slabs, columns can be prefabricated, etc.	Ch.Hand
11.	Check for Cover, Spacers, Use format CGWP.	Ch.Hand

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FORM WORK

OBJECTIVE –To construct Formwork for Retaining walls, Columns, Beams, Slabs, etc.true to dimensional requirements, water tightness, rigidity, etc. as per design / Standard Practices.

SL NO	PROCEDURE	PERSON RESPONSIBILITY
1.	Review construction drg., design system formwork, prepare formwork drawing /sketches.	Planning Engineer
2.	Calculate material requirement based on drg., consider possible repetitions, etc.	Formwork Engineer
3.	Indent material to Regional formwork Co-ordinate.	Planning Engineer
4.	Indent plywood etc.through regional purchase.	Planning Engineer
5.	Fabricate standard panels for Ret. walls, columns, Beam sides, etc as per drawings.	Carp. Ch. Hand
6.	For insitu forms – place props over solid bases PCC or Timber over compacted ground, Brace props, place U heads, Timber beams etc. as per spacing, levels, etc.	Carp. Ch. Hand
7.	Level system, check all crossfalls.jointsetc. are as per day.	Carp. Ch. Hand
8.	Clean apply mould release, place reinforcement, Concrete.	
9.	Deshutter at specified time and strength without shock, stack all components neatly for reuse.	Carp. Ch. Hand