WORK PROGRAM REPORT

CONSTRUCTION OF ACCESS ROAD (CUT-AND-FILL FORMATION WITH GRAVEL WEARING COURSE)

Rural Site Access — Republic of Ghana

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Prepared for internal planning and contractor tendering purposes.

1. INTRODUCTION AND PURPOSE

This Work Program sets out the planning, methodology, resourcing, and schedule for the construction of a rural access road, comprising cut-and-fill earthworks formation and a compacted gravel (laterite) wearing course, in accordance with Ghana Highway Authority (GHA) and Department of Feeder Roads (DFR) standards for unpaved feeder/access roads. The document is intended to guide site mobilization, contractor scoping, budgeting, and supervision, and may be adapted once final survey and geotechnical data are available.

It is prepared on the assumption of a single-lane, gravel-surfaced access road of approximately 5.0 km connecting an existing trunk/feeder road to the project site, in typical rural Ghanaian terrain (gently undulating land, seasonal streams, laterite subgrade). Assumed parameters are flagged throughout and should be confirmed against the specific site once a topographic survey is available.

2. SCOPE OF WORKS

The scope covers the following principal work packages:

- Site mobilization, establishment of contractor's camp/laydown area, and access permitting.
- Route survey, setting-out, and geotechnical investigation of borrow pits and subgrade.
- Bush clearing, grubbing, and topsoil stripping along the road corridor and borrow areas.
- Cut-and-fill earthworks to form the road subgrade to design line, level, and camber.
- Construction of drainage structures: side drains, miter/turnout drains, scour checks, and culvert crossings at drainage lines and streams.
- Placement, watering, and compaction of a gravel (laterite) sub-base and wearing course.
- Ancillary works: signage, speed calming, erosion protection, and where required, low-level causeways at minor crossings.
- Quality control testing, as-built survey, and handover documentation.

Excluded from this scope (unless separately instructed): bridge structures over major rivers, bituminous surfacing/sealing, land acquisition/compensation negotiations, and utility relocation, each of which would be addressed under a separate work package if required.

3. APPLICABLE STANDARDS AND REFERENCES

- Ghana Highway Authority (GHA) -- Standard Specification for Road and Bridge Works.
- Department of Feeder Roads (DFR) -- Guidelines and specifications for feeder/access roads and gravel surfacing.
- Environmental Protection Agency (EPA) Ghana -- Environmental Assessment Regulations, 1999 (LI 1652), where an Environmental Permit or EIA screening applies.
- Ghana Standards Authority (GSA) material and testing standards; AASHTO/ASTM test methods where GSA equivalents do not exist (e.g., CBR, Proctor compaction, Atterberg limits, sieve analysis).
- Factories, Offices and Shops Act / relevant Ghana OSH guidance for site health and safety.

4. SITE CONDITIONS AND SURVEY

4.1 Preliminary Site Assessment

Rural access roads in Ghana typically traverse a mix of cleared farmland, secondary bush, and seasonal watercourses. Subgrade soils are commonly lateritic gravels or gravelly clays, which perform well as road-building material when properly selected, but lose strength markedly when saturated. The work program therefore prioritizes drainage, and timing works outside the peak rainy season wherever practicable.

4.2 Survey and Investigation Tasks

1. Topographic strip survey along the proposed centerline (typically 30–50 m corridor width) to establish existing ground levels, drainage crossings, and obstructions.
2. Identification and testing of borrow pits/quarries within an economic haul distance (target: under 10 km) for subgrade fill and gravel wearing-course material.
3. Geotechnical sampling of subgrade and borrow material: particle size distribution, Atterberg limits, Proctor compaction (MDD/OMC), and soaked CBR.
4. Hydrological assessment of stream/drainage crossings to size culverts and determine flood levels.
5. Stakeholder and land-use consultation with the District Assembly, chiefs/landowners, and any affected farmers along the alignment.

5. DESIGN CRITERIA

5.1 Geometric Design (typical, to be confirmed by survey)

Parameter	Adopted Value (typical DFR standard)
Design classification	Rural access / feeder road, single lane with passing bays
Formation (carriageway) width	5.0–6.0 m
Wearing course width	4.0–4.5 m
Shoulder width (each side)	0.5–0.75 m
Camber / crossfall	4–6% (crowned), draining to side drains
Maximum gradient	10% desirable, 12–15% short sections only
Minimum horizontal curve radius	30–45 m depending on terrain
Design speed	40–50 km/h (rural, unpaved)
Side drain invert below formation	0.6–0.9 m

5.2 Pavement / Gravel Structure (typical section, subject to CBR results)

- Subgrade: compacted in-situ or selected fill, min. 95% MDD (BS heavy/AASHTO T180), CBR ≥ 7% (soaked).
- Sub-base (where subgrade CBR is low): 150–200 mm compacted lateritic gravel, CBR ≥ 30%.
- Gravel wearing course: 150 mm compacted layer of well-graded lateritic gravel, CBR ≥ 60–80%, plasticity index 6–20%, compacted to ≥ 100% MDD.
- Total compacted gravel thickness (typical): 150–300 mm depending on subgrade strength and traffic loading.

5.3 Drainage Structures

- Side drains: trapezoidal, min. 0.3 m depth, lined/turfed on erosive gradients.
- Cross drainage: reinforced concrete or corrugated steel pipe culverts, minimum 600 mm diameter, sized per catchment hydrology; scour aprons at outlets.
- Miter drains at approximately 30–50 m spacing on gradients to divert water off the formation before it concentrates.

6. CONSTRUCTION METHODOLOGY

6.1 Phase 1 — Mobilization and Setting-Out

6. Mobilize equipment and plants, site office/camp, and materials testing facilities to site.
7. Re-establish survey control points and set out the road centerline, formation edges, and drainage structure locations with pegs/batter boards.
8. Confirm borrow pit locations, obtain quarry/extraction permits, and open haul routes.

6.2 Phase 2 — Clearing, Grubbing, and Stripping

9. Clear bush, trees, and vegetation within the formation corridor; grub out stumps and roots.
10. Strip topsoil (typically 150–200 mm) and stockpile separately for later reinstatement/erosion control.
11. Remove unsuitable material (organic soil, soft/wet spots) and backfill with selected fill where encountered.

6.3 Phase 3 — Earthworks (Cut-and-Fill Formation)

12. Excavate cut sections to design formation level, using excavated suitable material for adjacent fill sections to minimize haul (mass-haul balancing).
13. Place and compact fill in layers not exceeding 200–250 mm loose thickness, compacted to specified density before the next layer is placed.
14. Trim and shape the formation to design camber and crossfall; construct side drains and miter drain concurrently with formation works to avoid ponding.
15. Construct culvert crossings and scour protection at identified drainage points before overlaying with sub-base/gravel.

6.4 Phase 4 — Gravelling (Sub-base and Wearing Course)

16. Haul selected gravel from approved borrow source; spread in uniform loose layers using a motor grader.
17. Water and compact each layer with a vibratory roller to specified density, testing at regular intervals (see Section 10).
18. Place and compact the wearing course to final camber, ensuring positive drainage to side drains along the full length.

6.5 Phase 5 — Ancillary Works and Finishing

19. Turf or seed exposed batter slopes and drain lines prone to erosion; reinstate stripped topsoil where appropriate.
20. Install signage, chainage markers, and speed-calming features near settlements or crossings.
21. Carry out final trimming, dust-proofing measures (if required), and site clean-up.

6.6 Phase 6 — Testing, As-Built Survey, and Handover

22. Conduct final compaction and level checks against design tolerances.
23. Prepare as-built drawings, materials test certificates, and a maintenance manual.
24. Formal handover to the client/asset owner with a defect's liability period (typically 3–6 months, covering one rainy season).

7. PLANT, EQUIPMENT, AND MATERIALS

Category	Typical Resources
Earthmoving	Excavator, bulldozer/dozer, motor grader
Compaction	Vibratory smooth-drum roller, padfoot roller (fill), water bowser/tanker
Haulage	Tipper trucks (10–15 t), articulated dump trucks for borrow haul
Drainage/culvert works	Concrete mixer, RCP/CSP pipe sections, formwork, vibrating poker
Survey	Total station / GNSS RTK, dumpy level, drone (optional, for corridor survey)
Materials testing	Field CBR/DCP kit, sand cone/nuclear density gauge, sieve set, Proctor mound
Site support	Site office/container, fuel storage (bunded), first-aid station, signage

8. MANPOWER AND ORGANIZATION

- Project Manager -- overall responsibility for program, budget, and client liaison.
- Site Engineer(s) -- day-to-day supervision of earthworks, drainage, and gravelling.
- Surveyor -- setting-out, level control, and as-built survey.
- Materials/QA Technician -- field testing and compliance certification.
- HSE Officer -- site safety, environmental compliance, and community liaison.
- Plant operators, drivers, and general labor -- scaled to phase (indicatively 15–30 personnel at peak earthworks/gravelling activity).
- Community liaison -- coordination with the District Assembly and local chiefs on land access, local labor engagement, and grievance handling.

9. WORK PROGRAM / INDICATIVE SCHEDULE

Based on an assumed 5.0 km alignment, the following indicative schedule allows for an approximate 12–14-week program, excluding permitting lead-time and adverse weather contingency. Durations should be recalibrated once actual chainage, terrain, and borrow-haul distances are confirmed.

#	Activity	Duration	Dependency
1	Mobilization, permits, and setting-out	Weeks 1–2	Survey & permits complete
2	Clearing, grubbing, and topsoil stripping	Weeks 2–4	Setting-out complete

#	Activity	Duration	Dependency
3	Cut-and-fill earthworks (formation)	Weeks 3–7	Progressive, follows clearing
4	Drainage structures & culvert crossings	Weeks 4–8	Concurrent with earthworks
5	Gravel sub-base placement & compaction	Weeks 6–10	Formation substantially complete
6	Wearing course placement & compaction	Weeks 8–12	Sub-base complete on that section
7	Ancillary works, signage, erosion control	Weeks 10–13	Follows gravelling
8	Testing, as-built survey, and handover	Weeks 13–14	All physical works complete

Note: Activities 3–6 are shown overlapping in a rolling-front sequence (i.e., earthworks, drainage, and gravelling advance progressively along the alignment rather than fully completing before the next phase starts), which is standard practice for linear road works and shortens overall duration relative to a strictly sequential program.

10. QUALITY CONTROL AND TESTING

Test	Purpose	Indicative Frequency
Particle size distribution / Atterberg limits	Confirm gravel/subgrade material suitability	Per borrow source, and every 500–1000 m³ extracted
Proctor compaction (MDD/OMC)	Establish target density for compaction control	Per material source/change
Field density (sand cone or nuclear gauge)	Verify compacted density meets specification	Every 100–150 m of formation/layer, each lift
CBR (lab or DCP in-situ)	Confirm subgrade and gravel layer strength	At representative intervals along alignment
Level and camber check	Confirm formation/wearing course to design tolerance	Every 50–100 m, and at all drainage structures

All test results should be logged against chainage and retained in a materials/QA register, with non-conforming sections reworked before the next layer is placed.

11. HEALTH, SAFETY, AND ENVIRONMENT (HSE)

- Site-specific HSE plan and risk assessments (traffic management, plant-pedestrian interaction, excavation, borrow pit slope stability).
- Daily toolbox talks; PPE mandatory in active work zones; certified plant operators only.
- Dust control (watering) near settlements and during dry-season gravelling.
- Erosion and sediment control at stream crossings during and after culvert works; avoid works in flowing water where possible.
- Community safety: signage and flag-persons at any temporary road closures or diversions; coordination with local authorities on haul-route traffic.

- Incident reporting and emergency response procedure, including nearest medical facility identification.

12. ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

- Screening against EPA Ghana requirements to confirm whether a full Environmental Impact Statement or a lighter Environmental Permit applies, based on road length and sensitivity of the corridor (e.g., proximity to forest reserves or water bodies).
- Borrow pits to be rehabilitated (backfilled/graded and revegetated) on completion, in line with DFR/EPA borrow pit closure guidance.
- Land access and any crop/asset compensation to be agreed with affected landowners/farmers prior to clearing, through the District Assembly and local chiefs.
- Local labor and, where feasible, local subcontracting (haulage, catering) to be prioritized to support community relations.
- Grievance mechanism to be established for the duration of works.

13. KEY RISKS AND MITIGATIONS

Risk	Mitigation
Rainy-season delays / subgrade saturation	Sequence earthworks and gravelling for dry-season windows; prioritize drainage works early
Borrow material shortfall or poor quality	Confirm multiple borrow sources during survey phase; test before committing haul routes
Land access / community disputes	Early and continuous engagement with District Assembly, chiefs, and landowners
Plant/equipment breakdown in remote area	Maintain on-site spares, a maintenance contract, and buffer time in the schedule
Culvert under sizing / flash flooding	Base culvert sizing on hydrological assessment, not assumption; include headroom in design

14. HANDOVER AND MAINTENANCE

On completion, the road will be handed over with as-built drawings, materials test certificates, and a maintenance manual covering routine grading, drain clearing, and gravel top-up (typically required annually or after severe rainy seasons). A defects liability period of 3–6 months (spanning at least one full rainy season) is recommended before final acceptance, during which the contractor remains responsible for rectifying any settlement, erosion, or drainage failure.

15. ASSUMPTIONS AND NEXT STEPS

- This program assumes an indicative 5.0 km single-lane alignment; actual chainage, terrain, and crossing count should be confirmed by topographic survey and used to recalibrate quantities, cost, and duration.
- Borrow pit locations and haul distances are assumed to be within 10 km; this materially affects gravelling cost and duration and should be confirmed early.

- Recommended immediate next steps: (i) commission topographic/geotechnical survey, (ii) confirm borrowing sources, (iii) engage the District Assembly on land access, and (iv) convert this Work Program into a priced Bill of Quantities for contractor tendering.

END PROGRAM REPORT