

**GEOTECHNICAL GUIDELINES FOR CONSTRUCTION CONSENT
APPLICATIONS ON DEVELOPMENT ROADS**

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General Over the last few years, problems have arisen as to the quality, content and extent of information to be supplied and regarded as acceptable in support of Construction Consent Applications for Development Roads.

These roads, which will in due course, be maintained by the Roads and Transportation Service are subject to the same design criteria as roads constructed by the Service.

In order to avoid further confusion, the enclosed Notes for Guidance are given to assist Developers in their obligation to ensure long term serviceability of the roads they construct and the Area Engineers in ensuring that appropriate information accompanies the Application.

These "Notes" should be used, where applicable, as a supplement to "Guidelines For Development Roads" and made available to the Developer.

NOTES FOR GUIDANCE

- 1) **A factual Ground Investigation Report** (s) should be provided to include the following:
 - (a) borehole/trial pit logs to BS 5930: 2015 + A1:2020 - typically boreholes/trial pits should be sunk at a maximum spacing of 25 metres, offset along the highway alignment or closer where changing conditions demand clarification.
 - (b) laboratory test data to BS 5930: 2015 + A1:2020 relevant to the proposed form of highway construction.
 - (c) A location plan of the site with the proposed highway superimposed.
 - (d) A plan showing the accurate location of all exploratory holes.

- 2) **An Interpretative/Geotechnical Design Report** on all the factual information should be provided, specifically in relation to the proposed road construction, and should include the following:
 - (a) details of the geology of the site which should include a report/letter from the British Geological Survey.
 - (b) details of the mining/quarrying history of the site which should include a report/letter from The Coal Authority..
 - (c) Details of the former land use of the site.

NB. The information referred to in a, b & c would normally be necessary in order to plan the form and extent of the main ground investigation (refer 1) to be used in the design of the project.

 - (d) a discussion section interpreting all the factual information obtained from the exploratory holes, describing ground conditions encountered at the site. This should not simply take the form of a list of soil types from the exploratory holes.
 - (e) a discussion section interpreting the engineering properties of the soils and/or rock where appropriate.
 - (f) A discussion section with interpretation of the mineral stability of the site. Where mining/quarrying has been carried out or is suspected of having been carried out, sufficient factual information should be available to enable a conclusion to be reached with regard to the mineral stability. Unsubstantiated subjective comments are not acceptable.
 - (g) a discussion section interpreting the proposed highway construction giving recommendations on the design of the road.
 - (i) where roads are supported on embankment or formed in cut, engineering recommendations are required.
 - (ii) where roads are to be constructed at the crest of existing or modified slopes engineering recommendations are required.
 - (iii) where construction of the road might influence the integrity of existing structures/roads engineering recommendations are required.
 - (iv) where roads are to be constructed at-grade or in cut recommendations are required for pavement design.
 - (h) where the proposed road is not at-grade or if general ground raising forms part of the construction, a geotechnical design discussion section/report will be required. This should include comprehensive design calculations to clearly demonstrate the following, where appropriate:
 - (i) the proposed slopes are stable, and/or.

- (ii) there will be no long-term settlement/differential settlement problems and/or.
- (iii) retaining structures are stable.
- (iv) the proposed construction will have no detrimental effect on existing structures/roads.
- (i) Where structural works involving geotextiles/reinforced earth are recommended and incorporated in the development, comprehensive design calculations with supporting factual and theoretical analysis together with independent design check certificates, will be required. See also (6).
- (j) Where structural works are recommended and incorporated in the development, comprehensive design calculations with independent structural design certificates will be required.
- (k) A plan showing the proposed development with accompanying longitudinal sections along the line of the road.
- (l) Cross-sections of the proposed development at critical locations.

3) Minerally Suspect Sites — Points for Construction Consent.

- (a) Mine Shafts Where a mineshaft lies within the site it is not acceptable to locate the road over the shaft, irrespective of how it has been or will be treated.

If the location of a shaft is unknown it must be searched for, located and proved. If the shaft cannot be found after extensive probing and trenching or other geophysical search method, then the search area should normally be treated as an area of potential mineral instability and the road located out with this zone.

Where a road is being located within the potential zone of collapse of a shaft appropriate treatment will be required (See Appendix A Figures 1 and 2).

NOTE

Figures 1 and 2 are indicative only. For example, circular and rectangular shaped shafts are shown. However, each shaft and the surrounding ground conditions should be considered on an individual basis.

- (b) Mine workings

It should be noted that shallow underground workings are not restricted to coal horizons. In North Lanarkshire there is a history and evidence of ironstone, fireclay, limestone and sandstone having been mined in the past. Reports should therefore be checked to ensure that all potential sources of instability have been investigated and examined in the Interpretive Report.

If shallow mineworkings underlie the site the Interpretative report should either conclude that the site or areas of the site is/are minerally stable or not, giving the criteria and analysis on which, this conclusion is based. If not minerally stable recommendations should either restrict the development or appropriate treatment should be advocated.

Plans and sections should be provided indicating those areas to be treated to include the relative position of the workings, rockhead, existing and proposed ground levels.

4) Miscellaneous Points for Construction Consent

- (a) Brownfield Sites - Where a site has formerly been developed it will likely be covered in fill material. The nature, depth and extent of this material should be defined.

Where a site has formerly been a chemical works, bleaching works, iron or steel works, gas works or other industrial or chemical development, where there is the risk of chemical contamination, the investigation must be designed to specifically examine and define the levels of pollutants likely to be encountered.

Similarly, at domestic or industrial landfill sites, comprehensive investigation, testing and monitoring is essential to fully define the extent and distribution of methane and other landfill gases. The investigation should include details of the thickness of the landfill and the nature of the underlying soils even where the proposed road is to be constructed at-grade. Where gas is encountered, details of how it will be controlled or treated must be supplied.

NB. Landfill gases can be difficult to detect at the site investigation stage. However, it is expected that during these explorations, some form of monitoring will be introduced to the site to enable a record to be compiled which will assist in the evaluation of the problem for discussion in the Interpretive Report.

- (b) Peat - Where a proposed development road is to be constructed over peat, it will be necessary to excavate and replace the peat in virtually all cases.

Where a proposed development road is to be constructed over buried peat (covered by inert fill), excavation and replacement of the peat will be necessary if the existing ground level is to be raised as part of the development.

Surcharging or other means of ground improvement may be an alternative, but this will require field monitoring and analysis to determine the period of loading and proof that future settlement would not lead to long-term settlement problems and distress to the highway.

5) Pavement Design

The Department has adopted Technical Memorandum SH6/87 for the design of all roads in North Lanarkshire.

Table 12 of the Guidelines for Development of Roads is only applicable for short lengths of road where the CBR value is > 5%.

Where the CBR value is < or = to 5% Technical Memorandum SH6/87 is applicable.

NB. CBR testing is only relevant in natural soils and cannot be used for pavement design in fill materials. By their nature fills are random and highly variable in density and CBR testing in them only assesses the quality of the material at the locus of the test. Therefore, for pavement construction on fill materials a full capping layer is required.

Where the combined thickness of bituminous materials and sub-base is less than 450mm the underlying subgrade material must be non-frost susceptible.

If the sub-grade is frost-susceptible it must be removed and replaced with non-frost-susceptible material so that no frost-susceptible material is within 450mm of the running surface.

It is possible for residential access roads to have a total bituminous thickness of 155mm and, with a CBR value < or = to 2%, a 150mm sub-base and 600mm capping layer. In such circumstances the upper 150mm of the capping layer should be non-frost susceptible. In practical terms this effectively means that the sub-base becomes 300mm with a capping layer of 450mm.

For a 2% <CBR< or = 5% where the total bituminous thickness and sub-base thickness together are less than 450mm the same principle applies. i.e., the subbase is increased to achieve 450mm of non-frost susceptible material and the capping layer can be correspondingly reduced. This need not be done if the capping layer is non frost susceptible.

6) Geotextiles

- (a) Geogrid will not be used as a substitute for a capping layer or as a means of reducing subbase thickness in normal road construction. It can be used in addition to a capping layer and/or normal road construction to resolve a particular problem.
- (b) Geogrid should not be used as an alternative to grouting in an area where shallow mine workings are present. If the workings are at a depth where the normal criteria as applied to roads would require grouting, then the developer should be required to treat the workings.
- (c) Geogrid should not be used as a method of dealing with soft material (e.g., peat) as an alternative to replacement unless the excavation of the soft material threatens to destabilise adjacent construction.
- (d) Geogrid may be useful in spreading the influence of differential settlement e.g., at the boundary of infilled areas and natural well consolidated ground.

The use of geogrid may solve problems for the developers, but its use can make demands upon this Service both now and in the future in the form of much closer supervision. On installation it must be placed according to the maker's instructions and the Engineer's requirements and, if in the future, its integrity is broken by service trenches its effectiveness can only be maintained if repair/replacement is properly done. Only if these operations are properly supervised can you be sure that the work has been properly done, once buried it is no longer available for inspection.

It is necessary, therefore, that any application to use the material should be supported by design calculations with the designer, Consultant or Contractor's Design Engineer, accepting full responsibility.

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