GEOLOGY AND SOILS REPORT REQUIREMENTS

The geology and soils report shall be prepared by, or under the direction of, a professional geologist as defined by CRS 34-1-201(3), or a Professional Engineer as defined by Board Policy Statement 50.2 - "Engineering in Natural Hazard Areas" of the Colorado State Board of Registration for Professional Engineers and Professional Surveyors.

This checklist provides a general overview of required submittal items. Additional submittal standards, procedures, and technical requirements are contained within the County's Land Development Code (LDC) and must also be met. The County reserves the right to request supplemental information, studies, or documents as needed to ensure compliance with applicable regulations and to adequately evaluate the proposed development.

SUBMITTAL CHECKLIST

REPORT CONTENT

- ☐ A detailed map, drawn to scale, is required for soil and geology reports.
- ☐ Where 3-dimensional relationships are significant but cannot be described satisfactorily in words alone, the geology and soils report should be accompanied by 1 or more appropriately positioned structure sections.
- ☐ The locations of test holes, percolation tests, soil investigation test pit excavations, and other specific sources
- ☐ The geology and soils report shall include definite statements concerning the following matters:
    - Location and size of subject area and its general setting with respect to major geographic and geologic features.

- Who prepared the geologic mapping on which the report is based and when the mapping was done.
- Other kinds of investigations made by the geologist and, where pertinent, reasons for doing the work.
- Topography and drainage in the subject area.
- Abundance, distribution, and general nature of exposures of earth materials within the area.
- Nature and source of available surface information. Suitable explanations should provide any technical reviewer with the means for assessing the probable reliability of the data. Subsurface relationships can be variously determined or inferred, for example, by projection of surface features from adjacent areas, using test hole logs, and by interpretation of geophysical data. It is evident that different sources of information can differ markedly from one another in degree of detail and reliability according to the method used. The relative reliability of the methods used shall be discussed in the report.

☐ The geology and soils report should contain brief but complete descriptions of all natural and man-made materials and structural features recognized or inferred within the subject area. Where interpretations are added to the recording of direct observations, the basis for the interpretations should be clearly stated. The following checklist may be useful as a general, though not necessarily complete, guide for descriptions.

☐ Bedrock (Igneous, Sedimentary, Metamorphic Types)

- Identification as to rock type (e.g. granite, silty sandstone, mica schist)
- Relative age, and where possible correlations with named formations.
- Distribution.
- Dimension features (e.g. thickness, outcrop breadth, vertical extent).
- Physical characteristics (e.g. color, grain size, nature of stratification, foliation, or schistosity, hardness, coherence).
- Special physical or chemical features (e.g. calcareous or siliceous cement, concretions,

mineral deposits, alteration other than weathering).

- Distribution and extent of weather zones; significant differences between fresh and weathered rock.
- Response to natural surface and near surface processes (e.g. raveling, gullying, and mass movement).

STRUCTURAL FEATURES

☐ The geology and soils report should contain brief descriptions of the structural features, stratification, foliation, schistosity, folds and zones of contortion or crushing joints, shear zones, faults, etc., including information about:

- Occurrence and distribution.
- Dimensional characteristics.
- Orientation and shifts in orientation.
- Relative ages (where pertinent).
- Special effects on the bedrock (Describe conditions of planar surfaces).
- Special features of faults (e.g. zones of gouge and breccia, nature of offsets, timing of movements) and whether faults are active in either the geological sense or the historical sense.

SURFICIAL (UNCONSOLIDATED) DEPOSITS

☐ The geology and soils report should contain brief description of surficial deposits include artificial (man-made) fill, topsoil, stream-laid alluvium, beach sands and gravels, residual debris, lake and pond sediments, swamp accumulations, dune sands, marine and non-marine terrace deposits, talus accumulations, creep and slope wash materials, various kinds of slump and slide debris, etc., including the following information:

- Distribution, occurrence, and relative age.
- Relationships with present topography.
- Identification of material as to general type.

- Dimensional characteristics (e.g. thickness, variations in thickness, shape)
- Surface expressions and correlation with features such as terraces, dunes, undrained depressions, anomalous protuberances.
- Physical or chemical features (e.g. moisture content, mineral deposits, content of expansible clay minerals, alteration, cracks and fissures, fractures).
- Physical characteristics (e.g. color, grain size, hardness, compactness, coherence, cementation).
- Distribution and extent of weathered zones
- Significant differences between fresh and weathered material
- Response to natural surface and near-surface processes (e.g. raveling, gullying, subsidence, creep, slope-washing, slumping and sliding).

DRAINAGE OF SURFACE WATER AND GROUNDWATER

☐ The geology and soils report shall contain information about surface and groundwater, as applicable, including:

- Distribution and occurrence (e.g. streams, ponds, swamps, springs, seeps, subsurface basins).
- Relationship to topography.
- Relations to geologic features (e.g., previous strata, fractures, faults).
- Sources and permanence.
- Variations in amounts of water (e.g. intermittent spring and seeps, floods).
- Evidence for earlier occurrence of water at localities is now dry.
- Occurrence or conveyance of water into or within man-made features.
- The effect of water on the properties of the in-place materials.

FEATURES OF SPECIAL SIGNIFICANCE

☐ The geology and soils report should describe features of special significance including:

- Distribution and occurrence (e.g. streams, ponds, swamps, springs, seeps, subsurface basins).
- Relationship to topography.
- Relations to geologic features (e.g., previous strata, fractures, faults).
- Sources and permanence.
- Variations in amounts of water (e.g. intermittent spring and seeps, floods).
- Evidence for earlier occurrence of water at localities is now dry.
- Occurrence or conveyance of water into or within man-made features.
- The effect of water on the properties of the in-place materials.

MINERAL RESOURCES

☐ The geology and soils report shall contain brief description of mineral resources including the identification of the types, location and value of mineral resources within the land to be subdivided. These include, but are not limited to, limestone used for construction, coal, sand, gravel, and quarry aggregate, for which extraction by an extractor is or will be commercially feasible, or which is a deposit having significant economic or strategic value to the County, state, or nation. Any area known to contain a commercial mineral deposit shall not be subdivided until the deposit is extracted, unless the BoCC finds that extraordinary environmental damage or public hazard results from the extraction.

☐ Treatment of this general topic, whether presented as a separate section or integrated in some manner with geologic descriptions, normally constitutes the principal contribution of the geologic and soils report. It involves: (1) the effects of geologic features on the proposed grading, construction, and land use; and (2) the effects of these proposed modifications on future geological processes in the area. The following checklist includes the topics that ordinarily should be considered in submitting discussion, conclusions, and recommendations in the geologic reports.

COMPATIBILITY WITH PROPOSAL

☐ General compatibility of natural features with proposed land use related to:

- Topography
- Lateral stability of earth materials.

- Problems of flood inundation, erosion, and deposition.
- Problems caused by features or conditions in adjacent properties.
- Other General Problems.

PROPOSED CUTS

- ☐ Prediction of what materials and structural features will be encountered.
- ☐ Prediction of stability based on geologic factors.
- ☐ Problems of excavation (e.g. unusually hard or massive rock, excessive flow of groundwater)
- ☐ Recommendations for reorientation or repositioning of cuts, reduction of cut slopes, development of compound cut slopes, special stripping above daylight lines, buttressing, protection against erosion, handling of seepage water, setbacks for structures above cuts, etc.

PROPOSED MASSES OF FILL

- ☐ General evaluation of planning with respect to canyon-filling and sidehill masses of fill.
- ☐ Comment on suitability of existing natural materials for fill.
- ☐ Recommendations for positioning of fill masses, provision for underdrainage, buttressing, special.

ONSITE WASTEWATER TREATMENT SYSTEM (IF APPLICABLE)

- ☐ Soil types, depths, distributions and relationship to bedrock.
- ☐ General slope conditions and limitations of slope to building sites and disposal sites.
- ☐ Present and expected percolation rates.
- ☐ Recommendations for subsurface testing and exploration.
- ☐ Cuts and test holes are needed for additional geologic information.
- ☐ Program of subsurface exploration and testing, based on geologic considerations that are most likely to provide data needed by the soils engineer.
- ☐ Special recommendations.
- ☐ Areas to be left as natural ground.

- ☐ Removal of buttressing of existing slide masses.
- ☐ Flood Protection.
- ☐ Problems with groundwater circulation.
- ☐ Position of structures, with respect to active faults.