HP Geotech
HEPWORTH-PAWLAK GEOTECHNICAL

Hepworth-Pawlak Geotechnical, Inc.
P. O. Drawer 1887
Silverthorne, Colorado 80498
Phone: 970-468-1989

Fax: 970-468-5891
email: hpgeo4@hpgeotech.com

SUBSOIL STUDY
FOR FOUNDATION DESIGN
PROPOSED ADDITION
COLORADO MOUNTAIN CAMPUS – DILLON CAMPUS
333 FIEDLER AVENUE
DILLON, COLORADO

JOB NO. 408 274A

SEPTEMBER 2, 2008

PREPARED FOR:

COLORADO MOUNTAIN COLLEGE
ATTN: SAM SKRAMSTAD
CENTRAL SERVICES OFFICE
831 GRAND AVENUE
GLENWOOD SPRINGS, COLORADO 81601

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PURPOSE AND SCOPE OF STUDY

This report presents the results of a subsoil study for addition to the Colorado Mountain College – Dillon Campus located in Dillon, Colorado. The project site is shown on Figure 1. The purpose of the study was to develop recommendations for the foundation design. The study was conducted in accordance with our agreement for geotechnical engineering services to Colorado Mountain College dated July 30, 2008.

A field exploration program consisting of exploratory borings was conducted to obtain information on the subsurface conditions. Samples of the subsoils obtained during the field exploration were tested in the laboratory to determine their classification and other engineering characteristics. The results of the field exploration and laboratory testing were analyzed to develop recommendations for foundation types, depths and allowable pressures for the proposed building foundation. This report summarizes the data obtained during this study and presents our conclusions, design recommendations and other geotechnical engineering considerations based on the proposed construction and the subsoil conditions encountered.

PROPOSED CONSTRUCTION

The proposed addition to the existing campus building will be a one story structure. We understand that the existing drive thru canopy will remain and new exterior walls will be built along the existing perimeter steel beams. The new exterior walls will have a stone veneer. Conventional wood frame construction will be used above grade with cast-in-place concrete foundation stem walls below grade. Ground floor will be slab-on-grade. Grading for the structure is assumed to be relatively minor with cut depths to about 4 feet. We assume relatively light foundation loadings, typical of the proposed type of construction.

If building loadings, location or grading plans change significantly from those described above, we should be notified to re-evaluate the recommendations contained in this report.

SITE CONDITIONS

The site is located at 333 Fiedler Avenue. The site is occupied by the existing Westar bank building and parking lot which has a drive thru canopy located on the north side of the building. The building is currently being used by the Colorado Mountain College. The ground surface is relatively flat with a gentle slope down towards the south and west. Parking areas exist on the north, east and south sides of the building. The site is bounded by Fiedler Avenue to the west, a developed commercial lot to the north, and open space and West La Bonte Street to the east and south. Vegetation generally consists of grass and scattered pine trees.

FIELD EXPLORATION

The field exploration for the project was conducted on August 19, 2008. Three exploratory borings were drilled at the locations shown on Figure 1 to evaluate the subsurface conditions. The borings were advanced with 4 inch diameter continuous flight augers powered by a truck-mounted Longyear BK-51HD drill rig. The borings were logged by a representative of Hepworth-Pawlak Geotechnical, Inc.

Samples of the subsoils were taken with a 2 inch I.D. spoon sampler. The sampler was driven into the subsoils at various depths with blows from a 140 pound hammer falling 30 inches. This test is similar to the standard penetration test described by ASTM Method D-1586. The penetration resistance values are an indication of the relative density or consistency of the subsoils. Depths at which the samples were taken and the penetration resistance values are shown on the Logs of Exploratory Borings, Figure 2. The samples were returned to our laboratory for review by the project engineer and testing.

SUBSURFACE CONDITIONS

Graphic logs of the subsurface conditions encountered at the site are shown on Figure 2. An explanation of the notes and symbols used on the logs is shown on Figure 3. The subsoils generally consist of medium dense to dense, slightly silty, sandy to very sandy gravel with scattered cobbles to the depths explored.

Laboratory testing performed on samples obtained from the borings consisted of natural moisture content and percent passing the No. 200 sieve. The laboratory test results are summarized on Figure 2.

No free water was encountered in the borings at the time of drilling. The subsoils were generally moist.

DESIGN RECOMMENDATIONS

FOUNDATIONS

Considering the subsoil conditions encountered in the exploratory borings and the nature of the proposed construction, we recommend the addition be founded with spread footings bearing on the natural granular soils. Care should be taken not to disturb the bearing soils beneath the existing foundation during excavation.

The design and construction criteria presented below should be observed for a spread footing foundation system.

1) Footings placed on the undisturbed natural granular soils should be designed for an allowable soil bearing pressure of 3,000 pounds per square foot. Based on experience, we expect settlement of footings designed and constructed as discussed in this section will be up to about 1 inch or less. Some differential settlement between the existing building and addition may occur.

2) The footings should have a minimum width of 18 inches for continuous walls and 2 feet for isolated pads.

3) Exterior footings and footings beneath unheated areas should be provided with adequate soil cover above their bearing elevation for frost protection. Placement of foundations at least 40 inches below exterior grade is typically used in this area. Concrete should not be placed on frost, frozen soil, snow or ice.

4) Continuous foundation walls should be reinforced top and bottom to span local anomalies such as by assuming an unsupported length of at least 10 feet. Foundation walls acting as retaining structures should also be designed to resist lateral earth pressures as discussed in the "Foundation and Retaining Walls" section of this report.

5) All existing fill, topsoil and any loose or disturbed soils should be removed and the footing bearing level extended down to the relatively dense natural granular soils. The exposed soils in footing area should then be moistened, if necessary, and compacted. If water seepage is encountered, the footing areas should be dewatered before concrete placement and we should be contacted for further evaluation.

6) A representative of the geotechnical engineer should observe all footing excavations prior to concrete placement to evaluate bearing conditions.

FOUNDATION AND RETAINING WALLS

Foundation walls and retaining structures which are laterally supported and can be expected to undergo only a slight amount of deflection should be designed for a lateral earth pressure computed on the basis of an equivalent fluid unit weight of at least 45 pounds per cubic foot (pcf) for backfill consisting of the on-site granular soils. Cantilevered retaining structures which are separate from the addition and can be expected to deflect sufficiently to mobilize the full active earth pressure condition should be designed for a lateral earth pressure computed on the basis of an equivalent fluid unit weight of at least 35 pcf for backfill consisting of the on-site granular soils. The backfill should not contain rock larger than about 6 inches in diameter.

All foundation and retaining structures should be designed for appropriate hydrostatic and surcharge pressures such as adjacent footings, traffic, construction materials and equipment. The pressures recommended above assume drained conditions behind the walls and a horizontal backfill surface. The buildup of water behind a wall or an upward sloping backfill surface will increase the lateral pressure imposed on a foundation wall or retaining structure. An underdrain should be provided to prevent hydrostatic pressure buildup behind walls.

Backfill in pavement and walkway areas should be placed in uniform lifts and compacted to at least 95% of the maximum standard Proctor (ASTM D-698) dry density at a moisture content within 2% of optimum. Backfill in landscape areas should be compacted to at least 90% of the maximum standard Proctor dry density at a moisture content near optimum. Care should be taken not to overcompact the backfill or use large equipment near the wall, since this could cause excessive lateral pressure on the wall. Some settlement of deep foundation wall backfill should be expected, even if the material is placed correctly, and could result in distress to facilities constructed on the backfill.

The lateral resistance of foundation or retaining wall footings will be a combination of the sliding resistance of the footing on the foundation materials and passive earth pressure against the side of the footing. Resistance to sliding at the bottoms of the footings can be calculated based on a coefficient of friction of 0.45. Passive pressure of compacted backfill against the sides of the footings can be calculated using an equivalent fluid unit weight of 400 pcf. The coefficient of friction and passive pressure values recommended above assume ultimate soil strength. Suitable factors of safety should be included in the design to limit the strain which will occur at the ultimate strength, particularly in the case of passive resistance. Fill placed against the sides of the footings to resist lateral loads should be a granular material compacted to at least 95% of the maximum standard Proctor dry density at a moisture content near optimum.

FLOOR SLABS

The natural on-site soils, exclusive of topsoil, are suitable to support lightly loaded slab-on-grade construction. To reduce the effects of some differential movement, floor slabs should be separated from all bearing walls and columns with expansion joints which allow unrestrained vertical movement. Floor slab control joints should be used to reduce damage due to shrinkage cracking. The requirements for joint spacing and slab reinforcement should be established by the designer based on experience and the intended slab use. A minimum 4 inch layer of free-draining gravel should be placed beneath basement level slabs to facilitate drainage. This material should consist of minus 2 inch aggregate with at least 50% retained on the No. 4 sieve and less than 2% passing the No. 200 sieve.

Structural fill placed for support of floor slabs should be compacted to at least 95% of maximum standard Proctor dry density at a moisture content within 2% of optimum. Required fill can consist of the on-site granular soils devoid of vegetation, topsoil and oversized rock.

UNDERDRAIN SYSTEM

Although free water was not encountered during our exploration, it has been our experience in mountainous areas that local perched groundwater can develop during times of heavy precipitation or seasonal runoff. Frozen ground during spring runoff can create a perched condition. We recommend below-grade construction, such as retaining walls, crawlspace and basement areas, be protected from wetting and hydrostatic pressure buildup by an underdrain and wall drain system. We understand that the finished ground floor elevation will be at least 6 inches above the existing grade; therefore, it is our opinion that an underdrain system is not warranted. If below-grade construction will occur, we should be contacted to provide underdrain system recommendations.

SITE GRADING

The risk of construction-induced slope instability at the site appears low provided cut and fill depths are limited. We assume the cut depths for the addition will not exceed about 4 feet. Fills should be limited to about 4 to 6 feet deep. Temporary excavation cut slopes should be made in accordance with OSHA requirements. A Type C soil may be assumed for temporary cuts and should be verified by the contractor's competent person. Embankment fills should be compacted to at least 95% of the maximum standard Proctor dry density within 2% of optimum moisture content. Prior to fill placement, the subgrade should be carefully prepared by removing all vegetation and topsoil and compacting to at least 95% of the maximum standard Proctor dry density. The fill should be benched into the portions of the hillside exceeding 20% grade.

Permanent unretained cut and fill slopes should be graded at 2 horizontal to 1 vertical or flatter and protected against erosion by revegetation or other means. The risk of slope instability will be increased if seepage is encountered in cuts and flatter slopes may be necessary. If seepage is encountered in permanent cuts, an investigation should be conducted to determine if the seepage will adversely affect the cut stability. This office should review site grading plans for the project prior to construction.

SURFACE DRAINAGE

The following drainage precautions should be observed during construction and maintained at all times after the addition has been completed:

1) Inundation of the foundation excavations and underslab areas should be avoided during construction.
2) Backfill in pavement and slab areas should be compacted to at least 95% of the maximum standard Proctor dry density at a moisture content within 2% of optimum. Exterior backfill placed in landscape areas should be compacted to at least 90% of the maximum standard Proctor dry density at a moisture content near optimum.
3) The ground surface surrounding the exterior of the building should be sloped to drain away from the foundation in all directions. We

recommend a minimum slope of 12 inches in the first 10 feet in unpaved areas and a minimum slope of 3 inches in the first 10 feet in paved areas. The upper 2 feet of the wall backfill should be a relatively impervious on-site soil, or a pavement structure should be provided, to prevent surface water infiltration into the backfill.

4) Roof downspouts and drains should discharge well beyond the limits of all backfill.

LIMITATIONS

This study has been conducted in accordance with generally accepted geotechnical engineering principles and practices in this area at this time. We make no warranty either express or implied. The conclusions and recommendations submitted in this report are based upon the data obtained from the exploratory borings drilled at the locations indicated on Figure 1, the proposed type of construction and our experience in the area. Our services do not include determining the presence, prevention or possibility of mold or other biological contaminants (MOBC) developing in the future. If the client is concerned about MOBC, then a professional in this special field of practice should be consulted. Our findings include interpolation and extrapolation of the subsurface conditions identified at the exploratory borings and variations in the subsurface conditions may not become evident until excavation is performed. If conditions encountered during construction appear different from those described in this report, we should be notified so that re-evaluation of the recommendations may be made.

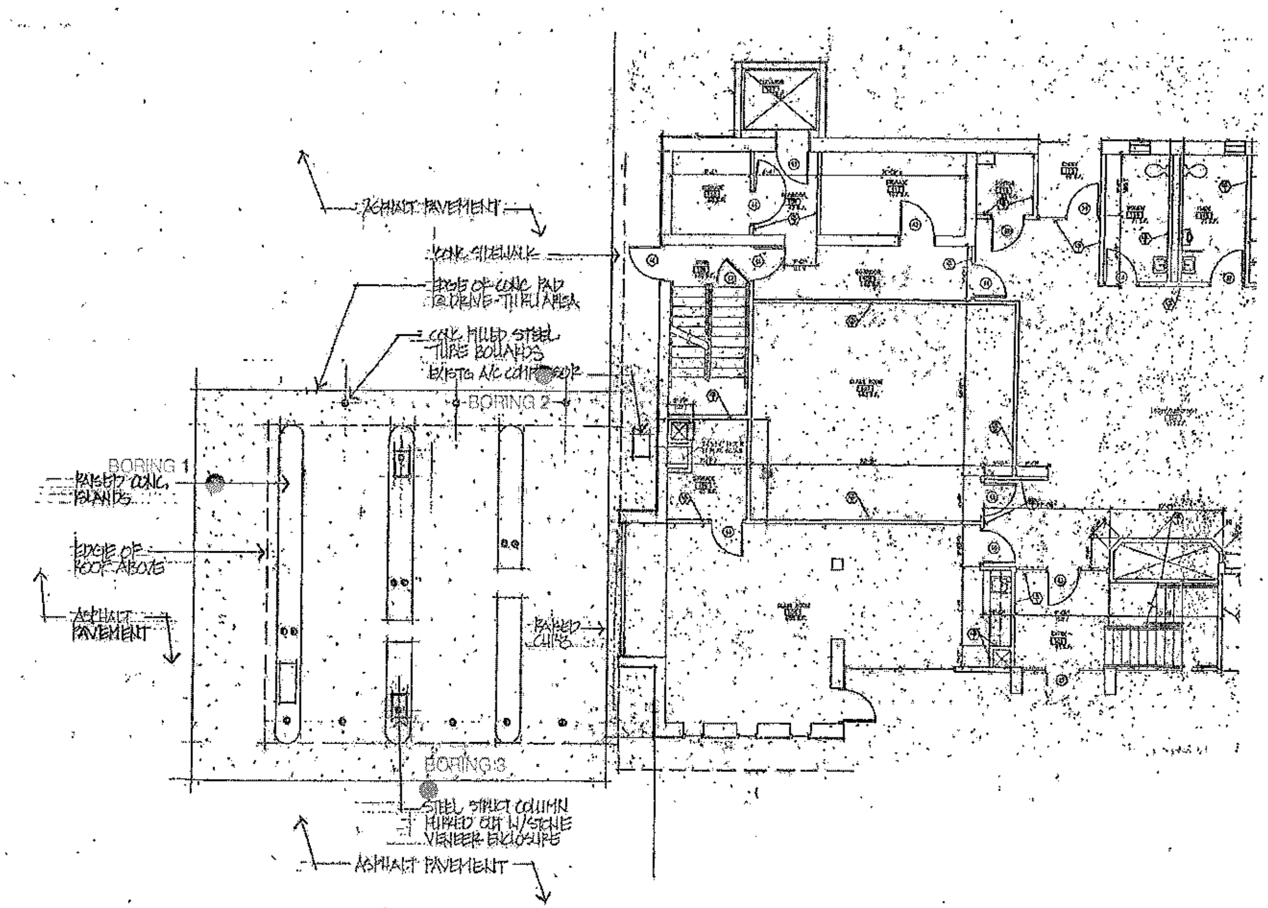
This report has been prepared for the exclusive use by our client for design purposes. We are not responsible for technical interpretations by others of our information. As the project evolves, we should provide continued consultation and field services during construction to review and monitor the implementation of our recommendations, and to verify that the recommendations have been appropriately interpreted. Significant design changes may require additional analysis or modifications to the recommendations presented herein. We recommend on-site observation of excavations and foundation bearing strata and testing of structural fill by a representative of the geotechnical engineer.

Respectfully Submitted,

HEPWORTH - PAWLAK GEOTECHNICAL, INC.

Ronald J. Uhle, P.E., C.C.E.
Associate

Reviewed by: GWB



COLORADO MOUNTAIN COLLEGE - DILLON CAMPUS

LOCATIONS OF EXPLORATORY BORINGS

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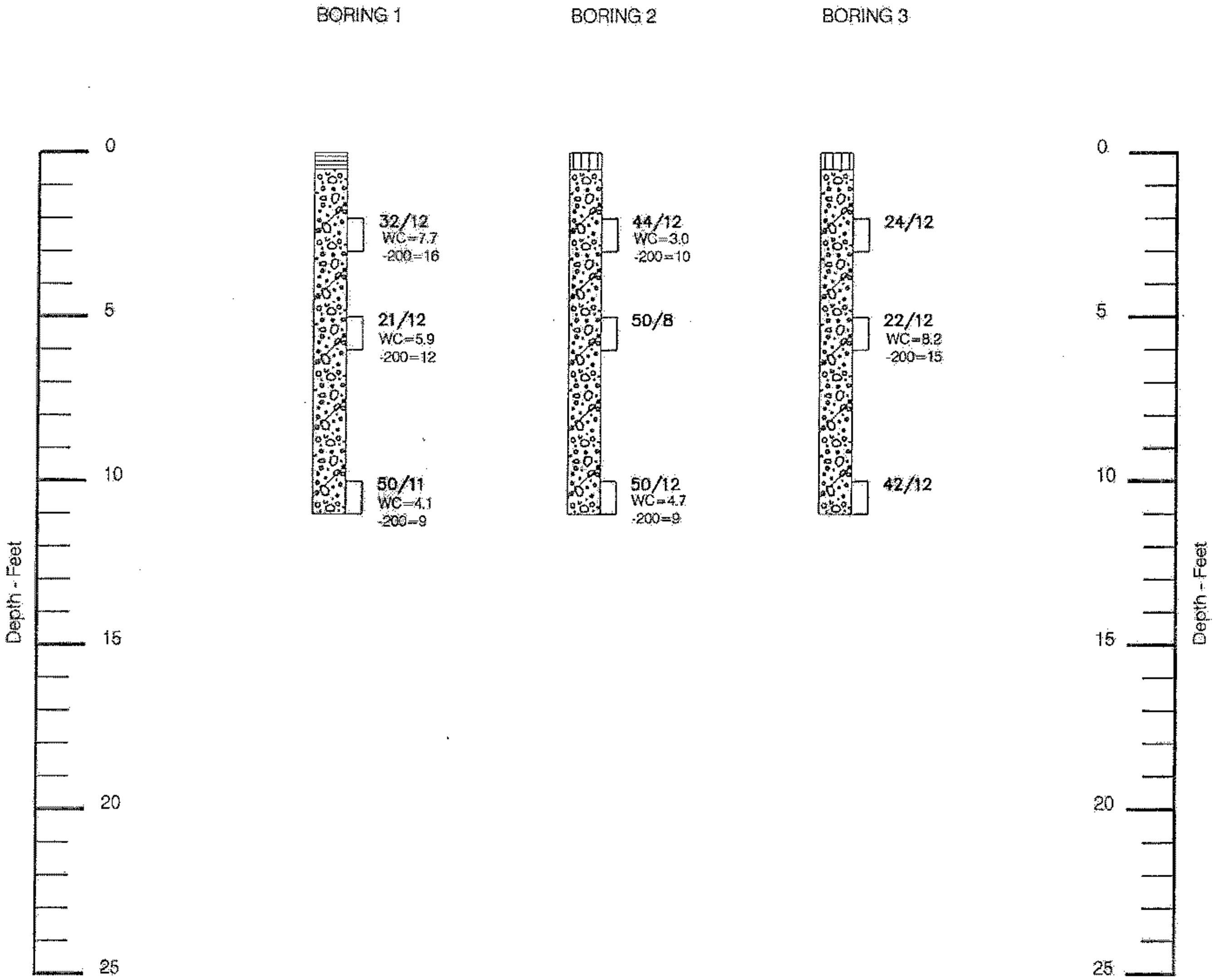
FIGURE 1



Note: Explanation of symbols is shown on Figure 3.

408 274A	HP Geotech HEPWORTH-PAWLAK GEOTECHNICAL	COLORADO MOUNTAIN COLLEGE - DILLON CAMPUS LOGS OF EXPLORATORY BORINGS	FIGURE 2

LEGEND:

CONCRETE

ASPHALT

GRAVEL (GP-GM); slightly silty, sandy to very sandy, with scattered cobbles, moist, medium dense to dense, brown.

Relatively undisturbed drive sample; 2-inch I.D. California liner sample.

32/12 Drive sample blow count; indicates that 32 blows of a 140 pound hammer falling 30 inches were required to drive the California sampler 12 inches.

NOTES:

1. Exploratory borings were drilled on August 19, 2008 with 4 inch diameter continous flight auger powered by a truck-mounted BK-51HD.

2. Locations of exploratory borings were measured approximately by pacing from features shown on the site plan provided.

3. Elevations of exploratory borings were not measured and the logs are drawn to depth.

4. The exploratory boring locations should be considered accurate only to the degree implied by the method used.

5. The lines between materials shown on the exploratory boring logs represent the approximate boundaries between material types and transition may be gradual.

6. No free water was encountered in the borings at the time of excavation. Fluctuation in water level may occur with time.

7. Laboratory Testing Results:
   WC = Water Content (%)
   -200 = Percent passing the No. 200 sieve

Jerry,

The inspections/observations are just the typical stuff: we want the opportunity to observe the forms and reinforcing before they pour concrete, and the structural welds and bolts must be inspected per the general structural notes on S2.

J.R. Whipple
RMG Engineers Group
Avon office: 970-949-1970
Frisco office: 970-668-4530
Cell: 970-904-6219
www.rmg-engineers.com