The Riley Group, Inc.

GEOTECHNICAL ENGINEERING REPORT

PREPARED BY:

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PREPARED FOR:

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RGI PROJECT NO. 2012-565

GEOTECHNICAL ENGINEERING REPORT

GRAND MOUND MCDONALD'S
LOCATION CODE 46-1082
SOUTH OF 19704 OLD HIGHWAY 99 SOUTHWEST
ROCHESTER, WASHINGTON 98579

DECEMBER 14, 2012

The Riley Group, Inc.

December 14, 2012

Mr. Brian Mattson
McDonald's USA, LLC
12131 113th Avenue Northeast, Suite 103
Kirkland, Washington 98034

Subject: **Geotechnical Engineering Report**
Grand Mound McDonald's 46-1082
South of 19704 Old Highway 99 Southwest
Rochester, Washington 98579
RGI Project No. 2012-565

Dear Mr. Mattson:

As requested, The Riley Group, Inc. (RGI) has performed a Geotechnical Engineering Report (GER) for the above-referenced site. Our services were completed in accordance with our proposal PRP2012-391 dated November 21, 2012 and authorized by McDonald's USA, LLC on November 26, 2012. The information in this GER is based on our understanding of the proposed construction and the soil and groundwater conditions encountered in the borings completed by RGI on the site on December 4, 2012.

RGI recommends that you submit the project plans and specifications for a general review so that we may confirm that the recommendations in this GER are interpreted and implemented properly in the construction documents. RGI also recommends that a representative of our firm be on site during the earthwork portions of the project construction to confirm that the soil and groundwater conditions are consistent with those that form the basis for the engineering recommendations in this GER.

If you have any questions or require additional information, please contact us.

Respectfully submitted,

THE RILEY GROUP, INC.

RICKY RUNQI WANG
STATE OF WASHINGTON
35013
REGISTERED
PROFESSIONAL ENGINEER

12/14/12

Kristina M. Weller, PE
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TABLE OF CONTENTS

EXECECUTIVE SUMMARY ..... **iii**

1.0 INTRODUCTION **1**

2.0 PROJECT DESCRIPTION **1**

3.0 FIELD EXPLORATION AND LABORATORY TESTING **1**
3.1 FIELD EXPLORATION 1
3.2 LABORATORY TESTING 2

4.0 SITE CONDITIONS **2**
4.1 SURFACE 2
4.2 GEOLOGY 2
4.3 SOILS 2
4.4 GROUNDWATER 2
4.5 SEISMIC CONSIDERATIONS 3
4.6 GEOLOGIC HAZARD AREAS 3

5.0 DISCUSSION AND RECOMMENDATIONS **4**
5.1 GEOTECHNICAL CONSIDERATIONS 4
5.2 EARTHWORK 4
5.2.1 Erosion and Sediment Control 4
5.2.2 Stripping 5
5.2.3 Excavations 5
5.2.4 Site Preparation 5
5.2.5 Structural Fill 6
5.3 FOUNDATIONS 7
5.4 SLAB-ON-GRADE CONSTRUCTION 8
5.5 DRAINAGE 9
5.5.1 Surface 9
5.5.2 Subsurface 9
5.6 UTILITIES 9
5.7 PAVEMENTS 9

6.0 ADDITIONAL SERVICES **10**

7.0 LIMITATIONS **11**

LIST OF APPENDICES

Figure 1 ..... *Site Vicinity Map*
Figure 2 ..... *Geotechnical Exploration Plan*
Figure 3 ..... *Typical Footing Drain Detail*

Appendix A ..... *Field Exploration and Laboratory Testing*

Executive Summary

This Executive Summary should be used in conjunction with the entire Geotechnical Engineering Report (GER) for design and/or construction purposes. It should be recognized that specific details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. Section 7.0 should be read for an understanding of the report limitations.

RGI's geotechnical scope of work included the advancement of seven borings to depths of 8 to 11.5 feet below ground surface (bgs).

Based on the information obtained from our subsurface exploration, the site is suitable for development of the proposed project. The following geotechnical considerations were identified:

Soil Conditions: The soil encountered in the proposed building footprint area includes loose to very dense sandy gravel. Boring B-1 in the northwest corner encountered 5 feet of medium dense fill consisting of silty sandy gravel. The native soil outside the proposed building area includes very dense sandy gravel.

Groundwater: No groundwater seepage was encountered during our subsurface explorations.

Foundations: Foundations for the proposed building can be supported on conventional spread footings bearing on 12 inches structural fill over native soil.

Slab-on-grade: Slab-on-grade floors and slabs for the proposed building can be supported on 12 inches of structural fill.

Pavements: The following pavement sections are recommended:

- **For heavy truck traffic areas**: 3 inches of asphalt concrete (AC) over 8 inches of crushed rock base (CRB)
- **For general parking areas**: 2 inches of AC over 6 inches of CRB
- **For drive-thru areas**: 5 inches of concrete over 6 inches of CRB

1.0 Introduction

This Geotechnical Engineering Report (GER) presents the results of the geotechnical engineering services provided for the proposed Grand Mound McDonald's 46-1082 in Rochester, Washington. The purpose of this GER is to assess subsurface conditions and provide geotechnical recommendations for the construction of a new McDonald's restaurant. Our scope of services included field explorations, laboratory testing, engineering analyses, and preparation of this GER.

The recommendations in the following sections of this GER are based upon our current understanding of the proposed site development as outlined below. If actual features vary or changes are made, RGI should review them in order to modify our recommendations as required. In addition, RGI requests to review the site grading plan, final design drawings, and specifications, when available, to verify that our project understanding is correct and that our recommendations have been properly interpreted and incorporated into the project design and construction.

2.0 Project description

The site is located to the south of 19704 Old Highway 99 Southwest in Rochester, Washington. The approximate location of the site is shown on Figure 1. The site is currently occupied by a drive-thru coffee stand on the western portion of the site. The eastern portion of the site is vacant.

RGI understands that the existing coffee stand will be removed and a new McDonald's building will be constructed in the northwest portion of the site. The remainder of the site will be developed with asphalt-surfaced parking and drive-thru areas.

At the time of preparing this GER, detailed site grading and building plans were not available for our review. Based on our experience with similar construction, RGI anticipates that the proposed building will be supported on perimeter walls with bearing loads of 1 to 2 kips per linear foot, and a series of columns with a maximum load up to 50 kips. Slab-on-grade floor loading of 250 pounds per square foot (psf) are expected.

3.0 Field Exploration and Laboratory Testing

3.1 Field Exploration

On December 4, 2012, RGI observed the drilling of seven test borings. Borings B-1 to B-4 were drilled in the proposed building footprint. Borings B-6 through B-7 were drilled in the drive-thru and parking area. The boring depths are generally terminated shallower than proposed due to refusal. The approximate exploration locations are shown on Figure 2.

Field logs of each exploration were prepared by a geologist who continuously observed the drilling. These logs included visual classifications of the materials encountered during drilling as well as our interpretation of the subsurface conditions between samples. The boring logs included in Appendix A represent an interpretation of the field logs and include modifications based on laboratory observation and analysis of the samples.

3.2 LABORATORY TESTING

During the field investigation, a representative portion of each recovered sample was sealed in containers and transported to our laboratory for further visual and laboratory examination. Selected samples retrieved from the borings were tested for moisture content and grain-size analysis to aid in soil classification and provide input for the recommendations provided in this GER. The results and descriptions of the laboratory tests are enclosed in Appendix A.

4.0 Site Conditions

4.1 SURFACE

The site is a rectangular-shaped parcel of land approximately 0.97 acre in size. The site is located the south of an existing Shell gas station, which is located at 19704 Old Highway 99 Southwest in Rochester, Washington. The site is bound to the north by Shell station, to the east and south commercial properties, and to the west by Old Highway 99 Southwest.

The site is currently occupied by a drive-thru coffee stand building with an asphalt-paved parking in the western portion of the site. The eastern portion of the site is vacant and unpaved. The site is relatively flat with an overall elevation difference of less than 5 feet.

4.2 GEOLOGY

Review of the *Geologic Map of Washington – Southwest Quadrant,* by Timothy J. Walsh, et al (1987) indicates that the soil in the project vicinity consists of outwash gravel (Map Unit Qgog). The deposits include recessional and proglacial, stratified pebble, cobble, and boulder deposited in meltwater streams and their deltas; locally contains ice-contact deposits that include Steilacoom gravel and part of Vashon drift. These descriptions are generally similar to the native soils encountered in borings at the site.

4.3 SOILS

The soils encountered at the site vary significantly across the site. The soil encountered in the proposed building footprint area includes loose to very dense sandy gravel. Boring B-1 in the northwest corner encountered 5 feet of medium dense fill consisting of silty sandy gravel. The native soil outside the proposed building area includes very dense sandy gravel.

More detailed descriptions of the subsurface conditions encountered are presented in the borings included in Appendix A. Sieve analysis was performed on three selected soil samples. Grain-size distribution curves are included in Appendix A.

4.4 GROUNDWATER

Groundwater seepage was not encountered during our subsurface investigation. The groundwater level appears to be deeper than the termination depth of borings.

It should be recognized that fluctuations of the groundwater table will occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the explorations were performed. In addition, perched water can develop within seams and layers contained in fill soils or higher permeability soils overlying less permeable soils following periods of heavy or prolonged precipitation. Therefore, groundwater levels

during construction or at other times in the future may be higher or lower than the levels indicated on the logs. Groundwater level fluctuations should be considered when developing the design and construction plans for the project.

4.5 SEISMIC CONSIDERATIONS

Based on the 2009 International Building Code (IBC), RGI recommends the following seismic parameters for design:

Table 1 IBC Seismic Parameters

Parameter	Value
Site Soil Class[1]	D[2]
Site Latitude	46.8018519 N
Site Longitude	-123.011339 W
Short Period Spectral Response Acceleration, S_s (percent g)	107.4
1-Second Period Spectral Response Acceleration, S_1 (percent g)	42.2
Seismic Coefficient, F_A	1.074
Seismic Coefficient, F_V	1.578

1. Note: In general accordance with the 2009 IBC, Table 1613.5.2. IBC Site Class is based on the average characteristics of the upper 100 feet of the subsurface profile.

2. Note: The 2009 IBC requires a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope of our services does not include the required 100-foot soil profile determination. Borings extended to a maximum depth of 11.5 feet, and this seismic site class definition considers that similar soil continues below the maximum depth of the subsurface exploration. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration.

Liquefaction is a phenomenon where there is a reduction or complete loss of soil strength due to an increase in water pressure induced by vibrations from a seismic event. Liquefaction mainly affects geologically recent deposits of fine-grained sands that are below the groundwater table. Soils of this nature derive their strength from intergranular friction. The generated water pressure or pore pressure essentially separates the soil grains and eliminates this intergranular friction, thus reducing or eliminating the soil's strength.

RGI reviewed the soil conditions encountered during field exploration and assessed the potential for liquefaction of the site's soil during an earthquake. Since the native is relatively dense and the groundwater level is deep, in our opinion the potential of soil liquefaction during a seismic event is low.

4.6 GEOLOGIC HAZARD AREAS

Regulated geologically hazardous areas include erosion, landslide, earthquake, or other geological hazards. Based on our site observations and review of related codes, the site does not meet the classification of a geologically hazardous area.

5.0 Discussion and Recommendations

5.1 GEOTECHNICAL CONSIDERATIONS

Based on our explorations, the site is suitable for the proposed construction from a geotechnical standpoint. The fill and loose native soil is not suitable for direct support of the building foundation in its existing condition. Foundations for the proposed building can be supported on conventional spread footings bearing on 12 inches of structural fill over competent native soil. Slab-on-grade can be similarly supported. Pavements can be directly supported on native soil after proofrolling.

Detailed recommendations regarding the above issues and other geotechnical design considerations are provided in the following sections. These recommendations should be incorporated into the final design drawings and construction specifications.

5.2 EARTHWORK

RGI expects that minor site grading would be needed for the proposed development. Earthwork is expected to included overexcavating the loose native soils and the existing fill underlying the building, placing structural fill to subgrade elevations, installation of underground utilities and stormwater facilities.

5.2.1 EROSION AND SEDIMENT CONTROL

Potential sources or causes of erosion and sedimentation depend on construction methods, slope length and gradient, amount of soil exposed and/or disturbed, soil type, construction sequencing, and weather. The impacts on erosion-prone areas can be reduced by implementing an erosion and sedimentation control plan. The plan should be designed in accordance with applicable city and/or county standards.

RGI recommends the following erosion control Best Management Practices (BMPs):

- Scheduling site preparation and grading for the drier summer and early fall months and undertaking activities that expose soil during periods of little or no rainfall
- Establishing a quarry spall construction entrance
- Installing siltation control fencing or anchored straw or coir wattles on the downhill side of work areas
- Covering soil stockpiles with anchored plastic sheeting
- Revegetating or mulching exposed soils if surfaces will be left undisturbed for more than five days during wet weather or ten days in dry weather
- Directing runoff away from exposed soils and slopes
- Decreasing runoff velocities with check dams, straw bales or coir wattles
- Confining sediment to the project site
- Inspecting and maintaining erosion and sediment control measures frequently (The contractor should be aware that inspection and maintenance of erosion control BMPs is critical toward their satisfactory performance. Repair and/or replacement of dysfunctional erosion control elements should be anticipated.)

Permanent erosion protection should be provided by reestablishing vegetation using hydroseeding and/or landscape planting. Until the permanent erosion protection is established, site monitoring should be performed by qualified personnel to evaluate the effectiveness of the erosion control measures. Provisions for modifications to the erosion control system based on monitoring observations should be included in the erosion and sedimentation control plan.

5.2.2 STRIPPING

Stripping efforts should include removal of pavements, vegetation, organic materials, and deleterious debris from areas slated for building, pavement, and utility construction. The boring locations encountered up to 4 inches of asphalt concrete. The asphalt should be removed under the proposed building or ground in place for new pavement areas. Deeper areas of stripping or excavation may be necessary.

5.2.3 EXCAVATIONS

All temporary cut slopes associated with the site and utility excavations should be adequately inclined to prevent sloughing and collapse. The site soils consist of fills and granular native soils.

Accordingly, for excavations more than 4 feet but less than 20 feet in depth, the temporary side slopes should be laid back with a minimum slope inclination of 1½H:1V (Horizontal:Vertical). If there is insufficient room to complete the excavations in this manner, or excavations greater than 20 feet in depth are planned, using temporary shoring to support the excavations should be considered. For open cuts at the site, RGI recommends:

- No traffic, construction equipment, stockpiles, or building supplies are allowed at the top of cut slopes within a distance of at least 5 feet from the top of the cut
- Exposed soil along the slope is protected from surface erosion using waterproof tarps and/or plastic sheeting
- Construction activities are scheduled so that the length of time the temporary cut is left open is minimized
- Surface water is diverted away from the excavation
- The general condition of slopes should be observed periodically by a geotechnical engineer to confirm adequate stability and erosion control measures

In all cases, however, appropriate inclinations will depend on the actual soil and groundwater conditions encountered during earthwork. Ultimately, the site contractor must be responsible for maintaining safe excavation slopes that comply with applicable OSHA or WISHA guidelines.

5.2.4 SITE PREPARATION

RGI anticipates that some areas of loose soil may be exposed upon completion of stripping and grubbing. Proofrolling and subgrade verification should be considered an essential step in site preparation. After stripping, grubbing, and prior to placement of structural fill, RGI recommends proofrolling building and pavement subgrades and areas to receive structural fill under the observation of RGI. These areas should be compacted to a firm and unyielding condition in order to achieve a minimum compaction level of 95 percent of the

maximum dry density as determined by the American Society of Testing and Materials D1557-09 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (ASTM D1557).

Proofrolling and adequate subgrade compaction can only be achieved when the soils are within approximately ± 2 percent moisture content of the optimum moisture content. Soils that appear firm after stripping and grubbing may be proofrolled with a heavy compactor, loaded double-axle dump truck, or other heavy equipment under the observation of an RGI representative. This observer will assess the subgrade conditions prior to filling. The need for or advisability of proofrolling due to soil moisture conditions should be determined at the time of construction. In wet areas it may be necessary to hand probe the exposed subgrades in lieu of proofrolling with mechanical equipment.

Subgrade soils that become disturbed due to elevated moisture conditions should be overexcavated to reveal firm, non-yielding, non-organic soils and backfilled with compacted structural fill. In order to maximize utilization of site soils as structural fill, RGI recommends that the earthwork portion of this project be completed during extended periods of warm and dry weather if possible. If earthwork is completed during the wet season (typically November through April) it will be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork will require additional mitigative measures beyond what would be expected during the drier months.

5.2.5 STRUCTURAL FILL

Once stripping, clearing and other preparing operations are complete, cuts and fills can be made to establish desired building grades. Prior to placing fill, RGI recommends proofrolling as described above.

RGI recommends fill below the foundation and floor slab, behind retaining walls, and below pavement and hardscape surfaces be placed in accordance with the following recommendations for structural fill. The structural fill should be placed after completion of site preparation procedures as described above.

RGI recommends placing structural fill in lifts not exceeding 10 inches in loose thickness and thoroughly compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557. The suitability of excavated site soils and import soils for compacted structural fill use will depend on the gradation and moisture content of the soil when it is placed. As the amount of fines (that portion passing the U.S. No. 200 sieve) increases, soil becomes increasingly sensitive to small changes in moisture content and adequate compaction becomes more difficult or impossible to achieve. Soils containing more than about 5 percent fines cannot be consistently compacted to a dense, non-yielding condition when the moisture content is more than 2 percent above or below optimum. Optimum moisture content is moisture that results in the greatest compacted dry density with a specified compactive effort.

Non-organic site soils are only considered suitable for structural fill provided that their moisture content is within about 2 percent of the optimum moisture level as determined by ASTM D1557. Excavated site soils may not be suitable for re-use as structural fill depending on the moisture content and weather conditions at the time of construction. If soils are stockpiled for future reuse and wet weather is anticipated, the stockpile should be

protected with plastic sheeting that is securely anchored. Even during dry weather, moisture conditioning (for example windrowing and drying) of site soils to be reused as structural fill may be required. Even during the summer, delays in grading can occur due to excessively high moisture conditions of the soils or due to precipitation. If wet weather occurs, the upper wetted portion of the site soils may need to be scarified and allowed to dry prior to further earthwork or may need to be wasted from the site.

If on-site soils become unusable, it may become necessary to import clean, granular soils to complete site work that meet the grading requirements listed in Table 2 to be used as structural fill.

Table 2 Structural Fill Gradation

U.S. Sieve Size	Percent Passing
3 inches	100
No. 4 sieve	75 percent
No. 200 sieve	5 percent *

*Based on minus 3/4 inch fraction.

Prior to use, an RGI representative should observe and test all materials imported to the site for use as structural fill. Structural fill materials should be placed in uniform loose layers not exceeding 10 inches and compacted as specified in Table 3. The soil's maximum density and optimum moisture should be determined by ASTM D1557.

Table 3 Structural Fill Compaction ASTM D1557

Location	Material Type	Minimum Compaction Percentage	Moisture Content Range	
Foundations	On-site granular or approved imported fill soils	95	+2	-2
Retaining Wall Backfill	On-site granular or approved imported fill soils	92	+2	-2
Slab-on-grade	On-site granular or approved imported fill soils	95	+2	-2
General Fill (non-structural areas)	On-site granular or approved imported fill soils	90	+3	-2
Pavement – Subgrade and Base Course	On-site granular or approved imported fill soils	95	+2	-2

Placement and compaction of structural fill should be observed by RGI. A representative number of in-place density tests should be performed as the fill is being placed to confirm that the recommended level of compaction is achieved.

5.3 FOUNDATIONS

Following site preparation and grading, the proposed building may be supported on conventional spread footings bearing on 12 inches of structural fill. Loose fill in the

proposed building area should be overexcavated at least 12 inches and replaced with structural fill. The exposed surface should be moisture conditioned and compacted to the requirements of structural fill. Structural fill should then be placed to foundation subgrade elevations. RGI expects the soils removed may be reused for structural fill provided they can be moisture conditioned.

Perimeter foundations exposed to weather should be at a minimum depth of 24 inches below final exterior grades. Interior foundations can be constructed at any convenient depth below the floor slab. Finished grade is defined as the lowest adjacent grade within 5 feet of the foundation for perimeter (or exterior) footings and finished floor level for interior footings.

Table 4 Foundation Design

Design Parameter	Value
Allowable Bearing Capacity	2,500 psf[1]
Friction Coefficient	0.25
Passive pressure (equivalent fluid pressure)	250 pcf[2]
Minimum foundation dimensions	Columns: 24 inches Walls: 16 inches

1 psf = pounds per square foot
2 pcf = pounds per cubic foot

The allowable foundation bearing pressures apply to dead loads plus design live load conditions. For short-term loads, such as wind and seismic, a 1/3 increase in this allowable capacity may be used. At perimeter locations, RGI recommends not including the upper 12 inches of soil in the computation of passive pressures because they can be affected by weather or disturbed by future grading activity. The passive pressure value assumes the foundation will be constructed neat against competent soil or backfilled with structural fill as described in Section 5.2.5 of this GER The recommended base friction and passive resistance value includes a safety factor of about 1.5.

With spread footing foundations designed in accordance with the recommendations in this section, maximum total and differential post-construction settlements of 1 inch and 1/2 inch, respectively, should be expected.

5.4 SLAB-ON-GRADE CONSTRUCTION

Once site preparation has been completed as described in Section 5.2, suitable support for slab-on-grade construction should be provided. RGI recommends that the concrete slab be placed on 12 inches of structural fill.

Immediately below the floor slab, RGI recommends placing a 4-inch-thick capillary break layer of clean, free-draining pea gravel, washed rock, or crushed rock that has less than 5 percent passing the U.S. No. 200 sieve. This material will reduce the potential for upward capillary movement of water through the underlying soil and subsequent wetting of the floor slab. Where moisture by vapor transmission is undesirable, an 8- to 10-millimeter-thick plastic membrane should be placed on the 4-inch-thick layer of clean gravel or rock.

For the anticipated floor slab loading, RGI estimates post-construction floor settlements of 1/4- to 1/2-inch. For thickness design of the slab subjected to point loading from storage racks, RGI recommends using a subgrade modulus (K_S) of 150 pounds per square inch per inch of deflection.

5.5 DRAINAGE

5.5.1 SURFACE

Final exterior grades should promote free and positive drainage away from the building area. Water must not be allowed to pond or collect adjacent to foundations or within the immediate building area. For non-pavement locations, RGI recommends providing a minimum drainage gradient of 3 percent for a minimum distance of 10 feet from the building perimeter. In paved locations, a minimum gradient of 1 percent should be provided unless provisions are included for collection and disposal of surface water adjacent to the structure.

5.5.2 SUBSURFACE

RGI recommends installing perimeter foundation drains. Typical footing drain construction details are shown on Figure 3. The foundation drains and roof downspouts should be tightlined separately to an approved discharge facility. Subsurface drains must be laid with a gradient sufficient to promote positive flow to a controlled point of approved discharge.

5.5.3 INFILTRATION

RGI understands that an infiltration system is being considered for the on-site disposal of stormwater run-off in the parking area. Based on the test exploration, the native soil at shallow depth contains a lot of fines and is relatively impermeable. The native soil below 5 feet should be suitable for supporting the proposed infiltration system.

RGI performed two infiltration tests in Borings B-6 and B-7 at 5 feet bgs. The measured field infiltration rates are approximately 20 inches per hour. The field rates cannot be used directly for system support. RGI recommends that an infiltration rate of 6 inches per hour be used for system design. The system should be located approximately 5 feet below the existing ground surface. This infiltration rate should be verified prior to construction.

5.6 UTILITIES

Utility pipes should be bedded and backfilled in accordance with American Public Works Association (APWA) specifications. For site utilities located within the right-of-ways, bedding and backfill should be completed in accordance with City of Rochester specifications. At a minimum, trench backfill should be placed and compacted as structural fill, as described in Section 5.2.5. Where utilities occur below unimproved areas, the degree of compaction can be reduced to a minimum of 90 percent of the soil's maximum density as determined by ASTM D1557. As noted, onsite excavated soils may be used as backfill only if the soil is near the optimum moisture content.

5.7 PAVEMENTS

Pavement subgrades should be prepared as described in Section 5.2 and as discussed below. Regardless of the relative compaction achieved, the subgrade must be firm and

relatively unyielding before paving. This condition should be verified by proofrolling with heavy construction equipment.

With the pavement subgrade prepared as described above, RGI recommends the following pavement sections for parking and drive areas paved with flexible asphalt concrete surfacing.

- **For heavy truck traffic areas**: 3 inches of asphalt concrete (AC) over 8 inches of crushed rock base (CRB)
- **For general parking areas**: 2 inches of AC over 6 inches of CRB

The asphalt paving materials used should conform to the Washington State Department of Transportation (WSDOT) specifications for Hot Mix Asphalt Class 1/2 inch and CRB surfacing:

- **For drive-thru areas**: 5 inches of concrete over 6 inches of CRB

Long-term pavement performance will depend on surface drainage. A poorly-drained pavement section will be subject to premature failure as a result of surface water infiltrating into the subgrade soils and reducing their supporting capability.

For optimum pavement performance, surface drainage gradients of no less than 2 percent are recommended. Also, some degree of longitudinal and transverse cracking of the pavement surface should be expected over time. Regular maintenance should be planned to seal cracks when they occur.

6.0 Additional Services

RGI is available to provide further geotechnical consultation throughout the design phase of the project. RGI should review the final design and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and incorporated into the project design and construction.

RGI is also available to provide geotechnical engineering and construction monitoring services during construction. The integrity of the earthwork and construction depends on proper site preparation and procedures. In addition, engineering decisions may arise in the field in the event that variations in subsurface conditions become apparent. Construction monitoring services are not part of this scope of work. If these services are desired, please let us know and we will prepare a proposal.

7.0 Limitations

This GER is the property of RGI, McDonald's USA, LLC, and their designated agents. Within the limits of the scope and budget, this GER was prepared in accordance with generally accepted geotechnical engineering practices in the area at the time this GER was issued. This GER is intended for specific application to the proposed Grand Mound McDonald's 46-1082 project to the south of 19704 Old Highway 99 Southwest in Rochester, Washington, and for the exclusive use of McDonald's USA, LLC and its authorized representatives. No other warranty, expressed or implied, is made. Site safety, excavation support, and dewatering requirements are the responsibility of others.

The scope of services for this GER does not include either specifically or by implication any environmental or biological (for example, mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials, or conditions. RGI completed a Phase I Environmental Site Assessment for the site and a Pre-Demolition Hazardous Materials Survey for the existing building. The results of these assessments are provided under separate cover.

The analyses and recommendations presented in this report are based upon data obtained from the test exploration performed onsite. Variations in soil conditions can occur, the nature and extent of which may not become evident until construction. If variations appear evident, RGI should be requested to reevaluate the recommendations in this GER prior to proceeding with construction.

It is McDonald's USA, LLC's responsibility to see that all parties to the project, including the designers, contractors, subcontractors are made aware of this GER in its entirety. The use of information contained in this GER for bidding purposes should be done at the contractor's option and risk.

USGS, 1993, Rochester, Washington
USGS, 1990, Violet Prairie, Washington
7.5-Minute Quadrangle

Approximate Scale: 1"=1000'

0 500 1000 2000

N

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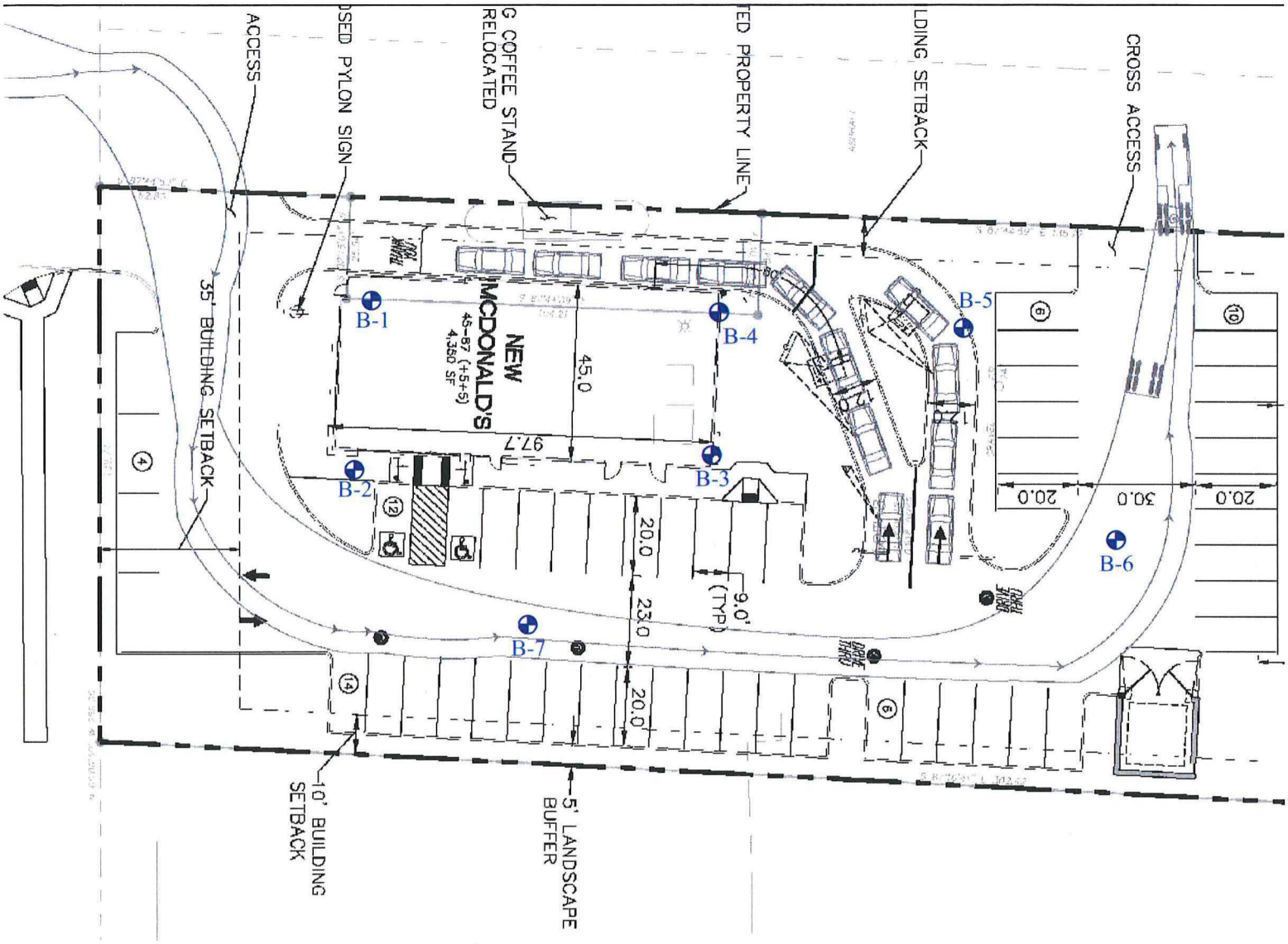
Grand Mound McDonald's, Location Code 46-1082		Figure 1
RGI Project Number 2012-565	Site Vicinity Map	Date Drawn: 12/2012
Address: South of 19704 Old Highway 99 Southwest, Rochester, Washington 98579		



to B-4 15' bgs
to B-7 10' bgs
:ration tests were performed in B-6 and B-7 at 2.5' bgs
ıcLand, Conceptual Site Sketch CC-04, 04/10/12.

Approximate Scale: 1"=40'

0 20 40

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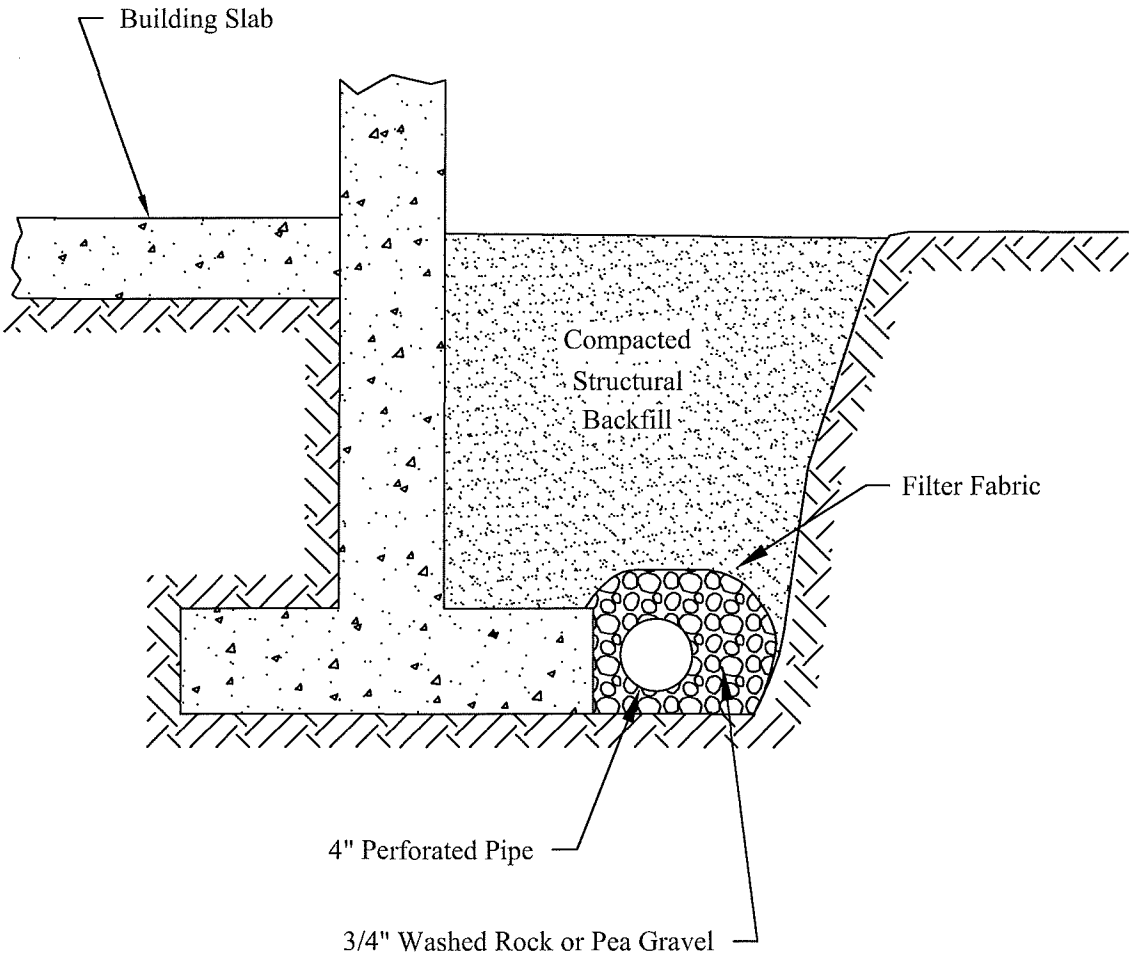
Grand Mound McDonald's, Location Code 46-1082	
RGI Project Number 2012-565	Geotechnical Exploration Plan
Address: South of 19704 Old Highway 99 Southwest, Rochester, Was	



Not to Scale

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Grand Mound McDonald's, Location Code 46-1082		Figure 3
RGI Project Number 2012-565	Typical Footing Drain Detail	Date Drawn: 12/2012
Address: South of 19704 Old Highway 99 Southwest, Rochester, Washington 98579		

APPENDIX A

FIELD EXPLORATION AND LABORATORY TESTING

On December 4, 2012, RGI performed field explorations using a trailer-mounted drill rig. RGI explored subsurface soil conditions at the site by observing the drilling of seven borings to a maximum depth of 11.5 feet below existing grade. The boring locations are shown on Figure 2. The boring locations were approximately determined by measurements from existing property lines and paved roads.

A geologist from our office conducted the field exploration and classified the soil conditions encountered, maintained a log of each test exploration, obtained representative soil samples, and observed pertinent site features. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS).

Representative soil samples obtained from the explorations were placed in closed containers and taken to our laboratory for further examination and testing. As a part of the laboratory testing program, the soil samples were classified in our in-house laboratory based on visual observation, texture, plasticity, and the limited laboratory testing described below.

Moisture Content Determinations

Moisture content determinations were performed in accordance with ASTM D2216-10 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass (ASTM D2216) on representative samples obtained from the exploration in order to aid in identification and correlation of soil types. The moisture content of a typical sample was measured and is reported on the boring logs.

Grain Size Analysis

A grain size analysis indicates the range in diameter of soil particles included in a particular sample. Grain-size analyses for the greater than 75 micrometer portion of the samples were performed in accordance with ASTM D422 Standard Test Methods for Particle-Size Analysis of Soils (ASTM D422) on three of the samples.

Project Name: **Grand Mound McDonald's 46-1082**
Project Number: **2012-565**
Client: **McDonald's USA, LLC**

Key to Log of Boring
Sheet 1 of 1

Elevation (feet)	Depth (feet)	Sample Type	Sample ID	Sampling Resistance, blows/ft	Recovery (%)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Moisture (%)
1	2	3	4	5	6	7	8	9	10

COLUMN DESCRIPTIONS

1 Elevation (feet): Elevation (MSL, feet).
2 Depth (feet): Depth in feet below the ground surface.
3 Sample Type: Type of soil sample collected at the depth interval shown.
4 Sample ID: Sample identification number.
5 Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
6 Recovery (%): Core Recovery Percentage is determined based on a ratio of the length of core sample recovered compared to the cored interval length.
7 USCS Symbol: USCS symbol of the subsurface material.
8 Graphic Log: Graphic depiction of the subsurface material encountered.
9 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
10 Moisture (%): Moisture, expressed as a water content.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

Asphaltic Concrete (AC)
AF
Poorly graded GRAVEL (GP)
Poorly graded SAND with Silt (SP-SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Grab Sample
2.5-inch-OD Modified California w/ brass liners
Pitcher Sample
2-inch-OD unlined split spoon (SPT)
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

Project Name: **Grand Mound McDonald's 46-1082** Project Number: **2012-565** Client: **McDonald's USA, LLC**	Boring No.: **B-1** **Sheet 1 of 1**

Date(s) Drilled: **12/4/12**	Logged By: **PL**	Surface Conditions: **Asphalt**
Drilling Method(s): **Hollow Stem Auger**	Drill Bit Size/Type: **4"**	Total Depth of Borehole: **11.5 feet bgs**
Drill Rig Type: **Trailer-Mounted**	Drilling Contractor: **Boretec**	Approximate Surface Elevation: **N/A**
Groundwater Level and Date Measured: **Not encountered**	Sampling Method(s): **SPT**	Hammer Data :
Borehole Backfill: **Bentonite Chips**	Location: **South of 19704 Old Hwy 99 SW, Rochester, WA 98579**	

Elevation (feet)	Depth (feet)	Sample Type	Sample ID	Sampling Resistance, blows/ft	Recovery (%)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Moisture (%)
	0					Asphalt		1" Asphalt	
						Fill		Dark brown to black silty sandy GRAVEL, medium dense, moist (FILL)	
				11					15
	5					SP-SM		Light brown gravelly fine to medium sand with some silt, medium dense, moist	
				19					10
								Becomes loose	
				9					8
						GP		Gray sandy GRAVEL, loose, moist	
	10							Becomes very dense	
				75/11"					5
								Boring terminated at 11.5'	
	15								
	20								
	25								
	30								

Project Name: **Grand Mound McDonald's 46-1082** Project Number: **2012-565** Client: **McDonald's USA, LLC**	Boring No.: **B-2** **Sheet 1 of 1**

Date(s) Drilled: **12/4/12**	Logged By: **PL**	Surface Conditions: **Asphalt**
Drilling Method(s): **Hollow Stem Auger**	Drill Bit Size/Type: **4"**	Total Depth of Borehole: **8 feet bgs**
Drill Rig Type: **Trailer-Mounted**	Drilling Contractor: **Boretec**	Approximate Surface Elevation: **N/A**
Groundwater Level and Date Measured: **Not encountered**	Sampling Method(s): **SPT**	Hammer Data :
Borehole Backfill: **Bentonite Chips**	Location: **South of 19704 Old Hwy 99 SW, Rochester, WA 98579**	

Elevation (feet)	Depth (feet)	Sample Type	Sample ID	Sampling Resistance, blows/ft	Recovery (%)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Moisture (%)
	0					Asphalt		4" Asphalt	
						GP		Light brown to gray sandy GRAVEL, very dense, moist	
				69					6
	5							Becomes gray	
				89/12"					3
				50/3"				No recovery	
								Boring terminated at 8'	
	10								
	15								
	20								
	25								
	30								

Project Name: **Grand Mound McDonald's 46-1082** Project Number: **2012-565** Client: **McDonald's USA, LLC**	Boring No.: **B-3** **Sheet 1 of 1**

Date(s) Drilled: **12/4/12**	Logged By: **PL**	Surface Conditions: **Gravel**
Drilling Method(s): **Hollow Stem Auger**	Drill Bit Size/Type: **4"**	Total Depth of Borehole: **11.5 feet bgs**
Drill Rig Type: **Trailer-Mounted**	Drilling Contractor: **Boretec**	Approximate Surface Elevation: **N/A**
Groundwater Level and Date Measured: **Not encountered**	Sampling Method(s): **SPT**	Hammer Data :
Borehole Backfill: **Bentonite Chips**	Location: **South of 19704 Old Hwy 99 SW, Rochester, WA 98579**	

Elevation (feet)	Depth (feet)	Sample Type	Sample ID	Sampling Resistance, blows/ft	Recovery (%)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Moisture (%)
	0					GP		Gray sandy GRAVEL, medium dense, moist	
				14					4
	5							Becomes loose	
				5					4
						GP		Gray GRAVEL with trace sand, loose, moist	
				4					4
	10							Becomes medium dense	
				21					5
								Boring terminated at 11.5'	
	15								
	20								
	25								
	30								

Project Name: **Grand Mound McDonald's 46-1082** Project Number: **2012-565** Client: **McDonald's USA, LLC**	Boring No.: **B-4** **Sheet 1 of 1**

Date(s) Drilled: **12/4/12**	Logged By: **PL**	Surface Conditions: **Asphalt**
Drilling Method(s): **Hollow Stem Auger**	Drill Bit Size/Type: **4"**	Total Depth of Borehole: **11.5 feet bgs**
Drill Rig Type: **Trailer-Mounted**	Drilling Contractor: **Boretec**	Approximate Surface Elevation: **N/A**
Groundwater Level and Date Measured: **Not encountered**	Sampling Method(s): **SPT**	Hammer Data :
Borehole Backfill: **Bentonite Chips**	Location: **South of 19704 Old Hwy 99 SW, Rochester, WA 98579**	

Elevation (feet)	Depth (feet)	Sample Type	Sample ID	Sampling Resistance, blows/ft	Recovery (%)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Moisture (%)
	0					Asphalt		3" Asphalt	
						GM		Dark brown silty sandy GRAVEL, loose, moist	
				6					20
	5					SM		Dark brown silty gravelly SAND, loose, moist	
				7					16
						GP		Light brown to gray sandy GRAVEL, loose, moist Becomes very dense	
				55					5
	10								
				61					7
								Boring terminated at 11.5'	
	15								
	20								
	25								
	30								

The Riley Group, Inc.
17522 Bothell Way NE, Bothell, WA 98011
1838 South Washington Street, Kennewick, WA 99337

Project Name: **Grand Mound McDonald's 46-1082** Project Number: **2012-565** Client: **McDonald's USA, LLC**	Boring No.: **B-5** **Sheet 1 of 1**

Date(s) Drilled: **12/4/12**	Logged By: **PL**	Surface Conditions: **Gravel**
Drilling Method(s): **Hollow Stem Auger**	Drill Bit Size/Type: **4"**	Total Depth of Borehole: **9 feet bgs**
Drill Rig Type: **Trailer-Mounted**	Drilling Contractor: **Boretec**	Approximate Surface Elevation: **N/A**
Groundwater Level and Date Measured: **Not encountered**	Sampling Method(s): **SPT**	Hammer Data :
Borehole Backfill: **Bentonite Chips**	Location: **South of 19704 Old Hwy 99 SW, Rochester, WA 98579**	

Elevation (feet)	Depth (feet)	Sample Type	Sample ID	Sampling Resistance, blows/ft	Recovery (%)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Moisture (%)
	0					GP-GM		Brown to gray sandy GRAVEL with some silt, very dense, moist	
				76					5
	5			50/3"		GP		Gray sandy GRAVEL with trace silt, very dense, moist	4
				95/11"					3
								Boring terminated at 9'	
	10								
	15								
	20								
	25								
	30								

Project Name: **Grand Mound McDonald's 46-1082** Project Number: **2012-565** Client: **McDonald's USA, LLC**	Boring No.: **B-6** **Sheet 1 of 1**

Date(s) Drilled: **12/4/12**	Logged By: **PL**	Surface Conditions: **Gravel**
Drilling Method(s): **Hollow Stem Auger**	Drill Bit Size/Type: **4"**	Total Depth of Borehole: **8 feet bgs**
Drill Rig Type: **Trailer-Mounted**	Drilling Contractor: **Boretec**	Approximate Surface Elevation: **N/A**
Groundwater Level and Date Measured: **Not encountered**	Sampling Method(s): **SPT**	Hammer Data :
Borehole Backfill: **Bentonite Chips**	Location: **South of 19704 Old Hwy 99 SW, Rochester, WA 98579**	

Elevation (feet)	Depth (feet)	Sample Type	Sample ID	Sampling Resistance, blows/ft	Recovery (%)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Moisture (%)
	0					SM		Dark brown silty gravelly SAND, medium dense, moist	
				50/6"		GM		Dark brown silty sandy GRAVEL, very dense, moist	10
						GP		Brown to gray sandy GRAVEL with trace silt, very dense, moist	
	5			77/10"					6
				50/5"		GP-GM		Dark brown sandy GRAVEL with some silt, very dense, moist	11
								Boring terminated at 8'	
	10								
	15								
	20								
	25								
	30								

Project Name: **Grand Mound McDonald's 46-1082** Project Number: **2012-565** Client: **McDonald's USA, LLC**	Boring No.: **B-7** **Sheet 1 of 1**

Date(s) Drilled: **12/4/12**	Logged By: **PL**	Surface Conditions: **Gravel**
Drilling Method(s): **Hollow Stem Auger**	Drill Bit Size/Type: **4"**	Total Depth of Borehole: **11.5 feet bgs**
Drill Rig Type: **Trailer-Mounted**	Drilling Contractor: **Boretec**	Approximate Surface Elevation: **N/A**
Groundwater Level and Date Measured: **Not encountered**	Sampling Method(s): **SPT**	Hammer Data :
Borehole Backfill: **Bentonite Chips**	Location: **South of 19704 Old Hwy 99 SW, Rochester, WA 98579**	

Elevation (feet)	Depth (feet)	Sample Type	Sample ID	Sampling Resistance, blows/ft	Recovery (%)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Moisture (%)
	0					GM		Brown silty sandy GRAVEL, very dense, moist	
				74					9
						GP		Gray sandy GRAVEL with trace silt, very dense, moist	
	5			90/9"					3
				50/3"				No recovery	3
	10			75					3
								Boring terminated at 11.5'	
	15								
	20								
	25								
	30								

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GRAIN SIZE ANALYSIS
ASTM D 421, D 2217, D 1140, C 117, D 422, C 136

PROJECT TITLE	Grand Mound McDonald's		SAMPLE ID/TYPE	B-6
PROJECT NO.	2012-565		SAMPLE DEPTH	I sample
TECH/DATE	PL/HR	12/11/12		

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	451.60
Wt Dry Soil & Tare (gm)	(w2)	407.20
Weight of Tare (gm)	(w3)	13.70
Weight of Water (gm)	(w4=w1-w2)	44.40
Weight of Dry Soil (gm)	(w5=w2-w3)	393.50
Moisture Content (%)	(w4/w5)*100	11.28

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

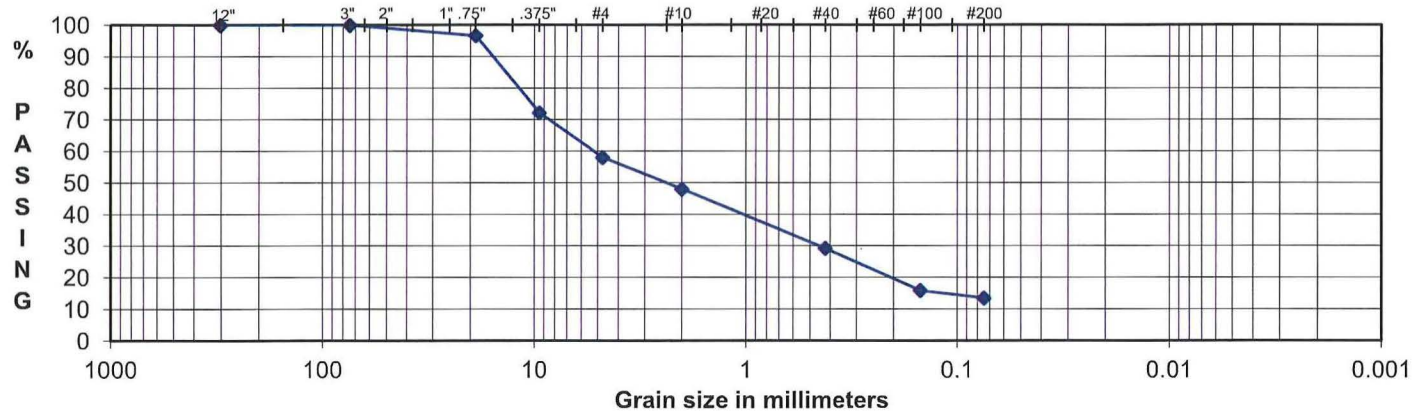
	Weight Of Sample (gm)	407.20
	Tare Weight (gm)	13.70
(W6)	Total Dry Weight (gm)	393.50

% COBBLES	0.00
% C GRAVEL	3.30
% F GRAVEL	38.65
% C SAND	10.01
% M SAND	18.81
% F SAND	15.76
% FINES	13.47
% TOTAL	100.00

D10 (mm)	NA
D30 (mm)	0.44
D60 (mm)	5.3
Cu	NA
Cc	NA

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	13.70	0.00	0.00	100.00	cobbles
3.0"	13.70	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	13.70	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	26.70	13.00	3.30	96.70	fine gravel
0.50"					fine gravel
0.375"	122.90	109.20	27.75	72.25	fine gravel
#4	178.80	165.10	41.96	58.04	coarse sand
#10	218.20	204.50	51.97	48.03	medium sand
#20					medium sand
#40	292.20	278.50	70.78	29.22	fine sand
#60					fine sand
#100	344.70	331.00	84.12	15.88	fine sand
#200	354.20	340.50	86.53	13.47	fines
PAN	407.20	393.50	100.00	0.00	silt/clay



DESCRIPTION	Silty gravelly SAND
USCS	SM

Descriptive Terms

trace	0 to 5%
little	5 to 12%
some	12 to 30%
and	30 to 50%

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GRAIN SIZE ANALYSIS
ASTM D 421, D 2217, D 1140, C 117, D 422, C 136

PROJECT TITLE	Grand Mound McDonald's		SAMPLE ID/TYPE	B-1
PROJECT NO.	2012-565		SAMPLE DEPTH	5 feet
TECH/DATE	PL/HR	12/11/12		

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	328.30
Wt Dry Soil & Tare (gm)	(w2)	300.80
Weight of Tare (gm)	(w3)	14.20
Weight of Water (gm)	(w4=w1-w2)	27.50
Weight of Dry Soil (gm)	(w5=w2-w3)	286.60
Moisture Content (%)	(w4/w5)*100	9.60

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

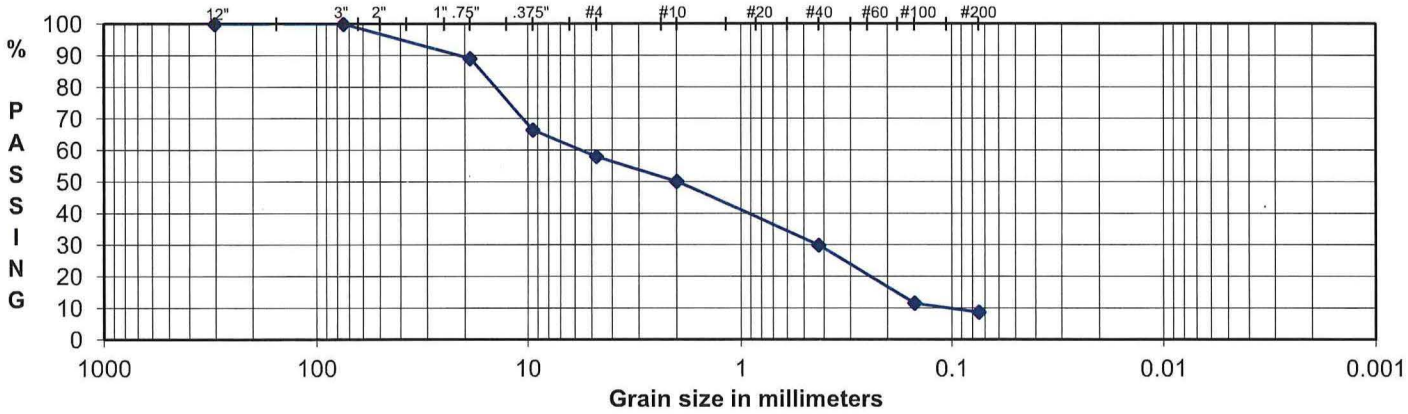
	Weight Of Sample (gm)	300.80
	Tare Weight (gm)	14.20
(W6)	Total Dry Weight (gm)	286.60

% COBBLES	0.00
% C GRAVEL	10.96
% F GRAVEL	31.05
% C SAND	7.89
% M SAND	20.20
% F SAND	21.21
% FINES	8.69
% TOTAL	100.00

D10 (mm)	0.12
D30 (mm)	0.42
D60 (mm)	4.6
Cu	38.3
Cc	0.3

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	14.20	0.00	0.00	100.00	cobbles
3.0"	14.20	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	14.20	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	45.60	31.40	10.96	89.04	fine gravel
0.50"					fine gravel
0.375"	110.40	96.20	33.57	66.43	fine gravel
#4	134.60	120.40	42.01	57.99	coarse sand
#10	157.20	143.00	49.90	50.10	medium sand
#20					medium sand
#40	215.10	200.90	70.10	29.90	fine sand
#60					fine sand
#100	267.80	253.60	88.49	11.51	fine sand
#200	275.90	261.70	91.31	8.69	fines
PAN	300.80	286.60	100.00	0.00	silt/clay



DESCRIPTION	Poorly graded gravelly fine to medium SAND with silt
USCS	SP-SM

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GRAIN SIZE ANALYSIS
ASTM D 421, D 2217, D 1140, C 117, D 422, C 136

PROJECT TITLE	Grand Mound McDonald's		SAMPLE ID/TYPE	B-4
PROJECT NO.	2012-565		SAMPLE DEPTH	5 feet
TECH/DATE	PL/HR	12/11/12		

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	390.40
Wt Dry Soil & Tare (gm)	(w2)	339.00
Weight of Tare (gm)	(w3)	14.10
Weight of Water (gm)	(w4=w1-w2)	51.40
Weight of Dry Soil (gm)	(w5=w2-w3)	324.90
Moisture Content (%)	(w4/w5)*100	15.82

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

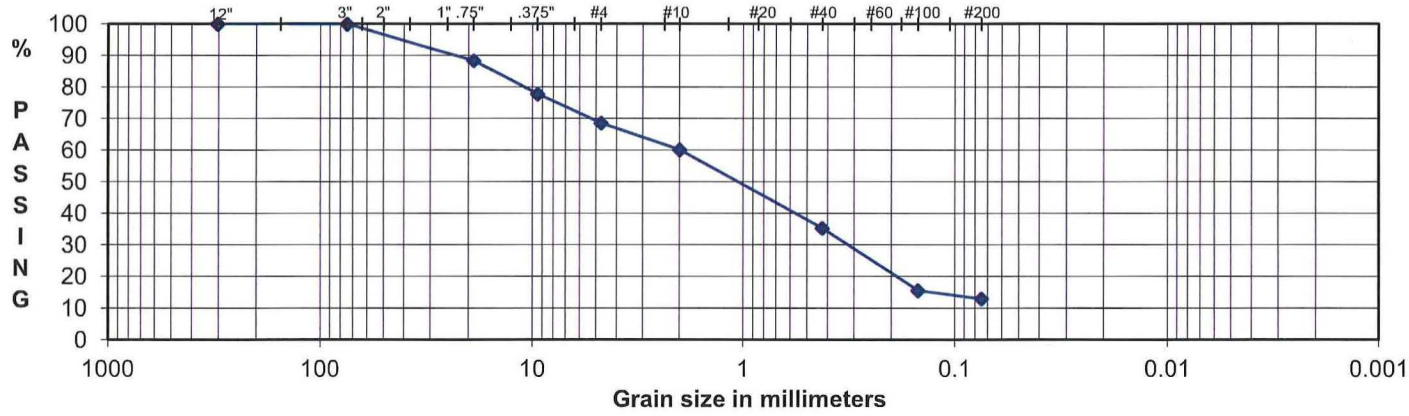
	Weight Of Sample (gm)	339.00
	Tare Weight (gm)	14.10
(W6)	Total Dry Weight (gm)	324.90

% COBBLES	0.00
% C GRAVEL	11.63
% F GRAVEL	19.76
% C SAND	8.43
% M SAND	24.90
% F SAND	22.38
% FINES	12.90
% TOTAL	100.00

D10 (mm)	NA
D30 (mm)	0.33
D60 (mm)	0.95
Cu	NA
Cc	NA

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	14.10	0.00	0.00	100.00	cobbles
3.0"	14.10	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	14.10	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	51.90	37.80	11.63	88.37	fine gravel
0.50"					fine gravel
0.375"	86.20	72.10	22.19	77.81	fine gravel
#4	116.10	102.00	31.39	68.61	coarse sand
#10	143.50	129.40	39.83	60.17	medium sand
#20					medium sand
#40	224.40	210.30	64.73	35.27	fine sand
#60					fine sand
#100	288.60	274.50	84.49	15.51	fine sand
#200	297.10	283.00	87.10	12.90	fines
PAN	339.00	324.90	100.00	0.00	silt/clay



DESCRIPTION	Silty gravelly SAND
USCS	SM

Descriptive Terms

trace	0 to 5%
little	5 to 12%
some	12 to 30%
and	30 to 50%