7950 NW 64th Street.
Miami, FL 33166
phone: 305.471.7725
fax: 305.593.1915
intertek.com/building
psiusa.com

September 23, 2016

Mr. Julian H. Falgons
Construction Manager
Taco Bell of America, Inc.
17775 S.W. 82nd Avenue
Palmetto Bay, FL 33157

Re: Phase II Level II Investigation
Proposed Taco Bell No. 309797
20711 South Dixie Highway
Cutler Bay, Miami, Florida
PSI Project No. 0397-1109

Dear Mr. Falgons:

PSI has conducted a Phase II Level II investigation for the above referenced property. The work has been carried out in general accordance with the scope and limitations of Yum! Brands, Inc.'s Guidelines for Environmental Assessments and Geotechnical Engineering Studies, dated August 2006, to comply with the Project Agreement for Architectural/Engineering/Consultant Services (No. 16-050) between PSI and Taco Bell of America, Inc., dated August 24, 2016. The authorization to proceed was given on August 25, 2016.

Thank you for choosing PSI as your consultant for this project. If you have any questions, or if we can be of additional service, please contact us at your earliest convenience.

Respectfully Submitted,
Professional Service Industries, Inc.
Certificate of Authorization No. 3684

Julio De Blas, P.E.
Regional Engineer
FL License No. 64653

Ian Kinnear, P.E.
Chief Engineer
FL License No. 32614

Copy: Addressee (PDF)
Ms. Julie Reese, Site Design/EPM – Taco Bell Corporation (PDF)
Mr. Eduardo Carcache – CKE Group (PDF)
Mr. Billy N. Mitchell – PSI, Inc. – Kennesaw, GA (PDF)
File (1)

PHASE II LEVEL II
INVESTIGATION

For

PROPOSED TACO BELL NO. 309797
20711 SOUTH DIXIE HIGHWAY
CUTLER BAY, MIAMI, FLORIDA

Prepared for

TACO BELL OF AMERICA, INC.
17775 S.W. 82ND AVENUE
PALMETTO BAY, FLORIDA, 33157

Prepared by

PROFESSIONAL SERVICE INDUSTRIES, INC.
7950 N.W. 64TH STREET
MIAMI, FLORIDA, 33166
TELEPHONE 305-471-7725

PSI PROJECT NO. 0397-1109

September 23, 2016

Julio De Blas, P.E.
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Ian Kinnear, P.E.
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EXECUTIVE SUMMARY

PSI has completed a Phase II Level II Investigation for the proposed Taco Bell (Site No. 309797) located in Cutler Bay, Miami-Dade County, Florida. The assessment was performed in general accordance with the scope and limitations of Yum! Brands, Inc.'s Guidelines for Environmental Assessments and Geotechnical Engineering Studies, dated August 2006, to comply with the Project Agreement for Architectural / Engineering / Consultant Services (No. 16-050) between PSI and Taco Bell of America, Inc., dated August 24, 2016.

This summary does not contain all the information that is found in the full report. The report should be read in its entirety to obtain a more complete understanding of the information provided and to aid in any decisions made or actions taken based on this information.

1. The site is located at 20711 South Dixie Highway in Cutler Bay, Miami-Dade County, Florida.
2. Five 20-ft deep SPT borings and two percolation tests were performed for this project.
3. The results of our borings performed for this project generally indicated granular fill material consisting of varying amounts of sand and limerock that persisted to depths ranging from 1 foot to 4 feet below grade followed by natural limestone to the boring termination depth of 20 feet below existing grade.
4. The groundwater table was encountered at depths ranging from 6.8 to 7.2 feet below existing ground surface.
5. Based on the results of the borings, we consider the site suitable for the planned construction provided the site preparation recommendations presented in this report are implemented prior to foundation and pavement construction.
6. Shallow foundations and a slab-on-grade bearing on compacted approved structural fill material, compacted native soils, or the natural limestone formation will be suitable for the support of the building provided the site preparation recommendations presented herein are implemented. The foundations may be sized for a net allowable bearing pressure of 3,000 psf.

Detailed analyses of subsurface conditions, alternate foundation types and pertinent design recommendations are included herein. The final decision as to which foundation type will be used should be based on the design parameters provided, costs, risk of foundation movement, and other factors beyond the scope of this study. PSI cannot be responsible for the interpretation or implementation of this report by others. PSI should be retained to perform services sufficient to determine compliance with its recommendations. If PSI is not so retained, it will not accept any responsibility for the performance of the structure.

SUMMARY OF RECOMMENDATIONS

SUMMARY OF RECOMMENDATIONS		
Design Item	**Recommended Parameter**	**Reference Page No.**
Foundations:		
Allowable Bearing Pressure Spread Footing on compacted fill or limestone	3,000 psf	1 & 7
Foundation Type	Spread footing	1 & 7
Bearing Materials	Engineered Fill, Existing Sand/Fill or Natural Limestone Formation	1 & 7
Passive Lateral Resistance (EFP)	N/A	
Coefficient of Friction	0.5 (sand)	7
Soil Expansion Potential	Not a concern	
Geologic Hazards:		
Liquefaction Potential	N/A	
Nearest Fault and Magnitude	N/A	
Fault Type	N/A	
Seismic Zone	N/A	
Soil Profile Type	N/A	
Near-Source Distance	N/A	
Seismic Coefficient, N_A	N/A	
Seismic Coefficient, N_V	N/A	
Subsidence Potential	N/A	
Pavement:		
Asphalt Concrete Pavement Structural Sections:		9 9
Light Traffic (Parking)	1.5” Type SP-12.5 Asphaltic Concrete 6” Base (Min. LBR=100) 12” Stabilized Subgrade (Min. LBR= 40)	
Medium Traffic (Drives)	2” Type SP-12.5 Asphaltic Concrete 8” Base (Min. LBR=100) 12” Stabilized Subgrade (Min. LBR= 40)	
Lime Stabilization	No	
Slabs:		
Building Floor Slabs	Engineered Fill, Existing Sand/Fill	8
Modulus of Subgrade Reaction	150 pci	8
Existing Site Conditions:		
Existing Fill	Yes	1, 6 & 7
Groundwater Depth (feet)	6.8 – 7.2	1 & 7
Near-Surface Corrosivity	N/A	
Estimated Cut and Fill	To be determined	
Is the site in a 100 or 500-year Flood Plan	Yes	
Existing Underground Structures	No	
Existing Aboveground Structures	No	3

1. INTRODUCTION

1.1 Authorization

Authorization to perform this assessment was given by Mr. Julian H. Falgons, Taco Bell Construction Manager, on August 25, 2016 and the work has been performed in general accordance with the Project Agreement For Architectural / Engineering / Consultant Services Form No. 16-050 between PSI and Taco Bell of America, Inc., dated August 24, 2016.

1.2 Purpose and Scope of Work

The purpose of this study was to determine the geotechnical engineering parameters of the site. All work was conducted in accordance with Yum! Brands, Inc. Guidelines for Environmental Assessments and Geotechnical Engineering Studies, dated August 2006.

The scope of the geotechnical exploration and analysis included subsurface exploration, field testing, and an engineering analysis and evaluation of the foundation materials.

1.3 Site Location

The site is located at 20711 South Dixie Highway in Cutler Bay, Miami-Dade County, Florida. A site vicinity map identifying the general project location with respect to existing streets and features is presented on **Figure 1** of the **Attachment**.

1.4 Site Description and Conditions

At the time of our study the site was a paved parking lot with grass areas. Our truck mounted drilling equipment used for the subsurface exploration did not experience any difficulty in moving around the site. **Photographs** taken during our field visit are presented on **Figure 2** of the **Attachment.** A proposed site plan of the property is presented on **Figure 3** of the **Attachment**.

1.5 Previous Geotechnical Data

None provided to PSI.

2. PROJECT DESIGN DATA

2.1 Development Plans

Based upon the information provided, it is understood that the site will be developed for a Taco Bell restaurant building, associated parking/drive areas, and trash enclosure. The new building type will be an Explore Lite-Med 40 with an area of approximately 2170 square feet. We understand that a new sign will not be constructed and an existing sign will be shared for this site.

2.2 Structure Type

We understand that the building will be a single story, wood frame or masonry structure with a truss roof system supported on the exterior foundation only. The trusses span the transverse (short) direction of the building. At the front of the building, columns, which support beams and headers, are concealed within longitudinal exterior walls.

2.3 Foundation Loads

The maximum structural loads on longitudinal (side) bearing walls are on the order of 3,600 pounds per linear foot (plf). Maximum column loads are approximately 20 kips. Maximum loads to the transverse (front and rear) non-bearing walls are about 300 plf (dead load only). The floor slab will carry a maximum design live load of 100 pounds per square foot (psf).

2.4 Grading and Slopes

At the time of this evaluation, we were not provided with the final grading plan.

2.5 Pavement

Depending on the site conditions, either of two types of pavements may be used: Flexible Asphalt Concrete (AC) surfaced pavement; or Rigid Portland Cement (PC) Concrete pavement. It is anticipated that the parking lot is divided into two areas: 1) driving lanes, 2) parking stalls. The driving lanes will be subjected to a minimum daily traffic of 1,000 cars and five 18,000 pounds single axle load from heavy trucks. The parking stalls will experience 100 cars per day. Parking stall pavements will only be used where there are portions of lots that will not receive truck traffic.

The structural section design shall be based on a ten-year design period to determine pavement thickness and subgrade preparation requirements. Pavement structural sections are to be designed according to American Association of State Transportation and Highway Official Standards, Portland Cement Association procedures, or applicable design procedures used by local government or State Transportation Department. Repeated stopping and starting motions will be taken into account during the design.

3. SUBSURFACE INVESTIGATION

3.1 Soil Borings

3.1.1 Standard Penetration Test (SPT) Borings

Five (5) SPT borings (B-1 to B-5) were performed at the project site. These borings were advanced to depths of 20 feet below the existing grade. The borings were performed with a truck mounted drill rig equipped with an automatic hammer. A 3-inch diameter casing was used to advance the boreholes to the next sampling depth.

Standard Penetration Tests were performed in general accordance with ASTM designation D 1586. Split spoon samples were collected in the field at the surface, at 2-foot intervals in the top 10 feet, and on five-foot centers thereafter. An automatic hammer was used to drive the sample spoon. The samples were transported to our laboratory for visual classification. The samples were identified according to boring number and depth, and sealed in glass jars to protect against moisture loss.

3.1.2 Percolation Tests

PSI performed two (2) percolation tests at depths of 15 feet below grade within SPT borings B-4 and B-5. The percolation tests were performed in general accordance with the South Florida Water Management District (SFWMD) procedures for the "Usual Condition Constant Head" Percolation Test. SPT sampling was performed simultaneously as the boreholes were advanced using a 6-inch diameter casing. A 4-inch diameter perforated PVC pipe was placed in the borehole prior to retrieving the casing. Water was then pumped into the borehole in order to raise the water level as close to the ground surface as possible. Once the inflow equalized with the outflow rate, the average pumping rate and level of the water for this stabilized flow rate was recorded.

The hydraulic conductivity values determined from the tests are presented in **Table 1** of the **Attachment**. The values are in units of cubic feet of flow per second, per square foot of seepage area, per foot of head (cfs/ft^2-ft). The tabulated values are ultimate values. The designer should apply an appropriate factor of safety to the reported values.

3.2 Field Testing

3.2.1 Strength Tests

During the field boring operations, Standard Penetration Tests were performed to a maximum depth of 20 feet, as noted herein.

3.2.2 Water Level Measurements

Water level depths were obtained during the boring operations. They are noted on the test boring logs presented in the **Attachment**. In relatively pervious soils, such as sandy soils, the indicated depths are usually reliable groundwater levels. Seasonal variations, temperature, land-use, and recent rainfall conditions may influence the depths to the groundwater.

3.2.3 Ground Surface Elevations

Ground surface elevations at the boring locations were not provided. Therefore, references to depth of the various strata encountered are from existing grade at the time of our drilling operations, (i.e. September 2016).

4. FINDINGS AND INTERPRETATION

4.1 Regional and Local Geology

The Dade County area of southern Florida is underlain by an alternating sequence of cemented and uncemented Pleistocene sedimentary deposits (Pleistocene Epoch, deposited 10,000 to 2 million years before the present). In descending order by occurrence, the deposits include a near surface layer of oolitic limestone (Miami Limestone), a wide variety of loose to dense quartz sands and coarse to fine grained limestone and sandstone (Ft. Thompson Formation). The limestone and sandstone found in this area are much softer than the hard rock formations found elsewhere in the United States.

Although the limestone in this area can be very porous and have a sponge-like, open interconnected network of vugs and small voids, large cavities do not exist, and there is no potential for sinkhole activity. One of the most important characteristics of the near surface limestone is its degree of solutioning. Solutioning in past geologic times has resulted in a formation called "pinnacle rock". In some cases, vertical or nearly vertical cylindrical-shaped solution features exist in the carbonate rock formation that is filled with fine sands that extend below the groundwater level.

In order to review readily available site specific literature, the USDA Soil Survey of Miami-Dade County, Florida, was reviewed for this project. The predominant soil mapping unit in the project area is Urban Land.

4.2 Seismicity

Based on our review of the Uniform Building Code (UBC), this site is located in a zone of zero seismic probability. Therefore, no liquefaction potential or site acceleration coefficients are given for this project.

4.3 Subsurface Soil Conditions

4.3.1 General

The types of foundation bearing materials encountered in the borings have been visually classified. They are described in detail on the attached boring logs presented in the **Attachment**. The results of the field penetration tests and water level observations are presented on the boring records in numerical form. Representative samples of the soils are now stored in the laboratory for further evaluation, if desired. Unless notified to the contrary, all samples will be disposed of after three months.

The stratification of the soil as shown on the boring records represents the soil conditions at the actual boring locations. Variations may occur between, or beyond, the borings. Lines of demarcation represent the approximate boundary between the soil types, but the transition may be gradual, or not clearly defined. While the borings are drilled and sampled by experienced drillers, it is sometimes difficult to record changes in stratification within narrow limits, especially at depth. In the absence of foreign substances, it is also difficult to distinguish between discolored soils and clean soil fill.

4.3.2 Soil Conditions

The site was explored by drilling five SPT borings. The following summarizes the boring locations:

Boring Number	Existing Location	Proposed Location
B-1	Grass Area	Building Corner
B-2	Grass Area	Building Corner
B-3	Grass Area	Trash Enclosure
B-4	Grass Area	Parking/Drive Area
B-5	Parking/Drive Area	Parking/Drive Area

The results of our borings performed for this project generally indicated granular fill material consisting of varying amounts of sand and limerock that persisted to depths ranging from 1 foot to 4 feet below grade followed by natural limestone to the boring termination depth of 20 feet below existing grade.

4.4 Groundwater Conditions

Groundwater was encountered at depths ranging from 6.8 to 7.2 feet in the borings at the time of drilling (September 2016). It should be noted that water levels in the boreholes might require additional time to stabilize depending on the permeability of the soils. However, due to the project schedule and for safety reasons, the boreholes were backfilled at the end of drilling. The borings were backfilled with soil cuttings. In addition, it should be noted that groundwater levels at this site will be subject to seasonal fluctuations or possible mechanical control as a result of nearby construction activities.

5. ENGINEERING RECOMMENDATIONS

5.1 Special Conditions and Mitigating Measures

Based on the results of our field work and evaluations, we do not anticipate any special conditions or mitigating measures being required from a geotechnical engineering perspective.

5.2 Foundation Design

5.2.1 Proposed Structure

We understand that shallow foundations are the preferred foundation type for the proposed structure. After completion of site preparation procedures as noted in Section 5.9 of the report, the proposed structure can be supported on shallow foundations that are designed using a maximum net allowable bearing pressure of 3,000 pounds per square foot (psf), resting on compacted approved structural fill material, compacted existing granular soils, or on the natural limestone formation.

The bottom of the footings should be at least 18 inches below the finished exterior grade in order to provide confinement. We further recommend that the footings supporting isolated columns have a minimum width of 36 inches and that continuous footings have a minimum width of at least 18 inches, even if those dimensions produce a bearing pressure less than the allowable. The purpose of limiting the minimum footing size is to prevent a "punching" shear failure and to reduce the possibility of bearing on an isolated weak zone.

Foundations subject to transient lateral loads will resist these forces through a combination of base shearing resistance mobilized at the footing-subgrade interface and earth pressure acting on the vertical faces of the footings at right angles to the direction of applied load. Base shearing resistance (concrete/soil interface) may be determined using a friction factor of 0.5. Passive earth pressure resistance should be computed using an equivalent fluid pressure of

180 pounds per square foot per foot of depth, for granular backfill material. Resistance to sliding determined in accordance with the noted parameters should be considered ultimate resistance. Accordingly, the design for sliding resistance should include a factor of safety. We recommend that a factor of safety of at least 1.5 be used.

To calculate the resistance of a footing to uplift forces, a prismatic failure block with vertical faces should be assumed above the footing base. The resisting forces will be provided by the combination of footing weight, overburden soil weight in the failure block, and shearing resistance along the faces of the soil block. The weight of the soil above the water table should be taken as 110 pounds per cubic foot (pcf). For submerged soil, a buoyant weight of 48 pcf should be used. The factor of safety against uplift should not be less than 1.5.

Foundations designed and constructed as discussed herein are estimated to experience a total settlement of less than one inch. Differential settlements are not expected to exceed one-half inch.

5.2.2 Proposed Sign

We understand that an existing sign will be shared and a new sign will not be required. If required, the following recommendations can be followed. We understand that the sign pole foundation typically consists of a shallow spread footing or drilled pier. The recommendations presented in the previous Section 5.2.1 should be used for shallow foundation design. Alternatively, for the drilled pier option, an allowable bearing vertical and lateral pressure of 2000 psf and 150 psf/ft, respectively, can be used in accordance with Table 1806.2 of the Florida Building Code.

5.2.3 Proposed Trash Enclosure

The recommendations presented in the previous Section 5.2.1 can be used for shallow foundation design of the trash enclosure.

5.3 Concrete Slabs-on-Grade

We recommend the procedures described in Section 5.9 of this report be used to prepare the floor slab subgrade. Slab-on-grade construction may be employed for the ground floor of the building. Proper joints should be provided at the junctions of the slabs with the building walls and columns so that a small amount of independent movement can occur without causing damage. Ground floor slabs can bear directly on top of the compacted structural fill materials. A modulus of subgrade reaction value of 150 pounds per cubic inch (pci) may be used for ground floor slab design.

To avoid potential moisture problems, we recommend that floor slab subgrade soils be covered with a vapor barrier (such as visqueen, normally 6 mil thick) prior to constructing the slab-on-grade floors. The floor slabs should be reinforced to make them as rigid as practical. Proper joints should be provided at the junctions of the slabs and foundation system so that a small amount of independent movement can occur without causing structural damage. A friction factor of 0.21 should be used for the vapor barrier-soil interface.

5.4 Expansive Soils

Expansive soils were not encountered in any boreholes.

5.5 Lateral Earth Pressures

This site does not require the design of geotechnical systems for lateral earth pressures.

5.6 Slopes

No slopes are anticipated to be a part of the final design for this site and therefore no information is provided.

5.7 Excavation De-Watering

Groundwater control will potentially be required at the site for either excavation dewatering or removal of temporarily perched water from a rain event. Such water can be controlled by pumping from sumps located in ditches or pits. Groundwater should be maintained at the following levels:

1. At least one foot below the bottom of any excavation made during construction operations.
2. At least two feet below the surface of any compaction operations.

Some of the deeper foundations may require dewatering with well points to facilitate construction. Dewatering systems should be designed and operated so as not to impact adjacent construction. Additionally, the discharge from dewatering systems should be handled in accordance with current regulatory criteria as related to the same.

5.8 Pavement Design

Flexible pavement sections to meet current Yum! Brands standards include the following:

- Heavy Duty: 6 inches hot mix asphalt (HMA) pavement over 3-inch aggregate sub base
- Light Duty: 3 inches HMA over 6 inches of aggregate sub base

However, based on our experience with similar projects and our understanding of the traffic loads, we suggest the following flexible pavement sections be considered. It should be noted that the following pavement section recommendations are not meant to replace or supersede the Yum! Brands requirement, but are simply meant to provide the designer and the owner with a pavement section that is generally considered acceptable based on local practice with similar facilities.

PAVEMENT RECOMMENDATIONS		
Material	**Minimum Thickness (inches)**	
	Light Traffic (Parking)	**Medium Traffic (Drives)**
Type SP-12.5 (Asphaltic Concrete)	1 ½	2
Base (Minimum LBR = 100)	6	8
Stabilized Subgrade (Minimum LBR = 40)	12	12

The base course materials should consist of limerock having a minimum Limerock Bearing Ratio (LBR) of 100. Base materials should meet the requirements presented in the latest revisions of the Florida Department of Transportation (FDOT) "Specifications for Road and Bridge Construction", Section 911 (limestone).
The base course should be compacted to at least 98 percent of the material's maximum dry density (ASTM D-1557). The subgrade should be compacted to 95 percent of the materials ASTM D-1557 maximum dry density.

Based on the results of our evaluation, it is recommended that the total asphaltic concrete thickness consist of Type SP-12.5 material with a minimum of 1½ inches for parking and 2 inches for driveway areas. The asphaltic concrete should meet standard FDOT material requirements and placement procedures as outlined in the current FDOT Standard Specifications for Road and Bridge Construction. The asphaltic concrete should be compacted to a minimum of 96% of the Marshall maximum laboratory unit weight (or 93% of the maximum theoretical specific gravity [G_{mm}], when using type SP-12.5).

Rigid (concrete) pavements could also be used. The concrete should have a minimum compressive strength of 4,000 psi at 28 days when tested in accordance with ASTM C-39. Based on our experience, a minimum thickness of 5 inches and 7 inches should be utilized for light duty and medium-duty applications, respectively. The steel reinforcement within the concrete pavement should be designed by the civil engineer, typically in accordance with FDOT Standard Index 305. This standard typically requires reinforcement between concrete joints. The subgrade soils below concrete pavements should be compacted to a minimum density of 98% of the modified Proctor maximum dry density (ASTM D-1557).

If the alternate sections are used on the project, then all pavement materials and construction procedures should conform to FDOT or appropriate city and/or county requirements. Actual pavement section thickness should be provided by the design civil engineer based on traffic loads, volume and the owners design life requirements.

Where dumpsters are to be parked on the pavement, so that a considerable load is transferred from relatively small steel supports, it is recommended that rigid concrete pavement be constructed. In addition, the area utilized for unloading the dumpsters by heavy duty-trucks should also be provided with a rigid pavement. A minimum portland concrete pavement thickness of 7 inches is recommended for the project if a rigid pavement is employed in areas subject to medium duty use. The concrete should be reinforced as necessary to withstand the traffic loadings anticipated and jointed to reduce the potential for crack development. The minimum rigid pavement thickness recommended herein is based upon concrete with an unconfined compressive strength of 4,000 psi (ACI, Design and Construction of Concrete Parking Lots, 330R-7) and a modulus of rupture of 450 psi.

Fill that may be required to raise grades in pavement areas should be compacted to at least 95 percent of the material's maximum dry density (ASTM D-1557). Site preparation for the pavement areas should also be as per Section 5.9 of the report. All pavement materials and construction procedures should conform to FDOT, American Concrete Institute (ACI), or appropriate city/county requirements.

5.9 Site Grading

Based on the results of our field exploration, we anticipate site preparation procedures to include the steps listed below. All work should be carried out in accordance with current regulatory criteria with the site preparation work and construction activities being carried out with care so as not to impact the adjacent existing construction that is to remain. The earthwork and testing required herein should be performed under the supervision of PSI personnel.

1. If not already done, provisions should be made to relocate any interfering utility lines within the construction area. Excavations resulting from the removal of unwanted pipes should be infilled with suitable granular soils that are thoroughly compacted.
2. Site preparation for the proposed development should include removal of any unwanted ground cover such as topsoil/grass and asphalt to expose clean granular soils. Any construction debris and unwanted ground cover should be completely removed from the

site and properly disposed of. Excavations resulting from the removal of buried unwanted utilities should be backfilled with compacted approved structural fill material.

3. The cleared exposed subgrade should be densified using a self-propelled vibratory roller which imparts a dynamic force of not less than 10 tons. Densification of the soils should be performed within the proposed development areas plus a 5-foot wide perimeter extending beyond the outside edge of the same, where practical. Densification operations should continue until the subgrade soils are firm and unyielding. Any area of the exposed surface that deflects excessively under the weight of the compaction equipment should be excavated approximately 24 inches and be replaced with compacted structural fill. Soils in this interval should be compacted to at least 95 percent of the Modified Proctor maximum dry density determined per ASTM D-1557.

4. Structural fill material may be composed of either clean sands or limerock. The fill should consist of an inorganic, non-plastic material, free of any man-made debris and limerock with a three inch maximum particle size. Proper control of the placement and compaction of new fills for the project should be exercised by a representative of the geotechnical engineer. The fill materials should be placed in lifts not exceeding 12 inches in loose thickness. Each lift should be compacted to at least 95 percent of the Modified Proctor maximum dry density near the optimum moisture content as determined by ASTM D-1557. Fill to be compacted with a vibratory plate tamper or a small walk behind vibratory roller should be placed in lifts not exceeding six inches in loose thickness.

    A) The structural fill to be used above the water table should have a Unified Soil Classification System designation of GP, GW, SP, SW, GP-GM, GW-GM, SW-SM, or SP-SM containing less than 12 percent material passing the No. 200 sieve.

    B) The structural fill or backfill to be placed below the water table and to a height of one foot above it should consist of a combination of FDOT 57 Stone and structural fill material mixed in an approximate 50% proportion by volume. Density testing will not be required within this layer, however the subgrade preparation work should be observed by a representative from our office to confirm that the material is in a stable and unyielding condition.

    C) The use of a commercially available fill material by the name “Cyclone sand” should not be permitted for the project. Cyclone sand contains large amounts of fines and is therefore very sensitive to moisture. The moisture sensitivity of the material makes it difficult to compact and achieve the desired densities.

5. The footings for the proposed restaurant structure should be placed on compacted approved structural fill material, compacted native soils, or the natural limestone formation.
    A) It is recommended that the soils exposed at the bottom of the footing excavations be compacted to at least 95 percent of the Modified Proctor maximum dry density just before pouring concrete. If the footing bearing materials become disturbed due to surface water resulting from precipitation and runoff, the disturbed soils should be overexcavated and replaced with compacted limerock which is densified to at least 95 percent of the materials Modified Proctor maximum dry density as determined by ASTM designation D-1557.

B) If the footings rest on the natural limestone formation, in lieu of compaction, the bottom of excavation should be observed by a geotechnical engineer from this office to verify the integrity of the limestone.

C) All open foundation excavations should be observed and approved by a licensed geotechnical engineer or his representative prior to pouring concrete.

6. Groundwater control may be required at this site for either excavation dewatering or removal of temporarily perched water from a rain event. Such water can be controlled by pumping from sumps located in ditches or pits. Groundwater should be maintained at least one foot below the bottom of any excavation made during construction operations, or, at least two feet below the surface of any compaction operations.

6. REPORT LIMITATIONS

The recommendations submitted in this report are based on the available subsurface information obtained by PSI and design details furnished by Taco Bell of America, Inc. for the purpose of this project. If there are any revisions to the plans for this project, or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the foundation recommendations are required. If PSI is not notified of such changes, PSI will not be responsible for the impact of those changes on the project.

Subsurface conditions may vary between boring locations. We recommend that the contract specifications include the following clause:

"The contractor will, upon becoming aware of subsurface or latent physical conditions differing from those disclosed by the original soil exploration work, promptly notify the owner verbally to permit verification of the conditions, and in writing, as to the nature of the differing conditions. No claim by the contractor for any conditions differing from those anticipated in the plans and specifications and disclosed by the soil studies will be allowed unless the contractor has so notified the owner, verbally and in writing, as required above, of such differing conditions."

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed. After the plans and specifications are more complete, the geotechnical engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At this time, it may be necessary to submit supplementary recommendations. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the project. This report has been prepared for the exclusive use of Taco Bell of America, Inc. for the specific application to the proposed Taco Bell No. 309797 to be located in Cutler Bay, Miami-Dade County, Florida.

ATTACHMENTS

SITE VICINITY MAP

GEOTECHNICAL ENGINEERING SERVICES
Taco Bell #309797
20711 S. Dixie Hwy
Cutler Bay, Miami, Florida

DATE: 09/22/2016

DRAWN: CA

CHKD:: JD

FIGURE No.: 1

PSI PROJECT No.: 0397-1109

SITE PHOTOGRAPHS

GEOTECHNICAL ENGINEERING SERVICES
Taco Bell #309797
20711 S. Dixie Hwy
Cutler Bay, Miami, Florida

DATE: 09/22/2016

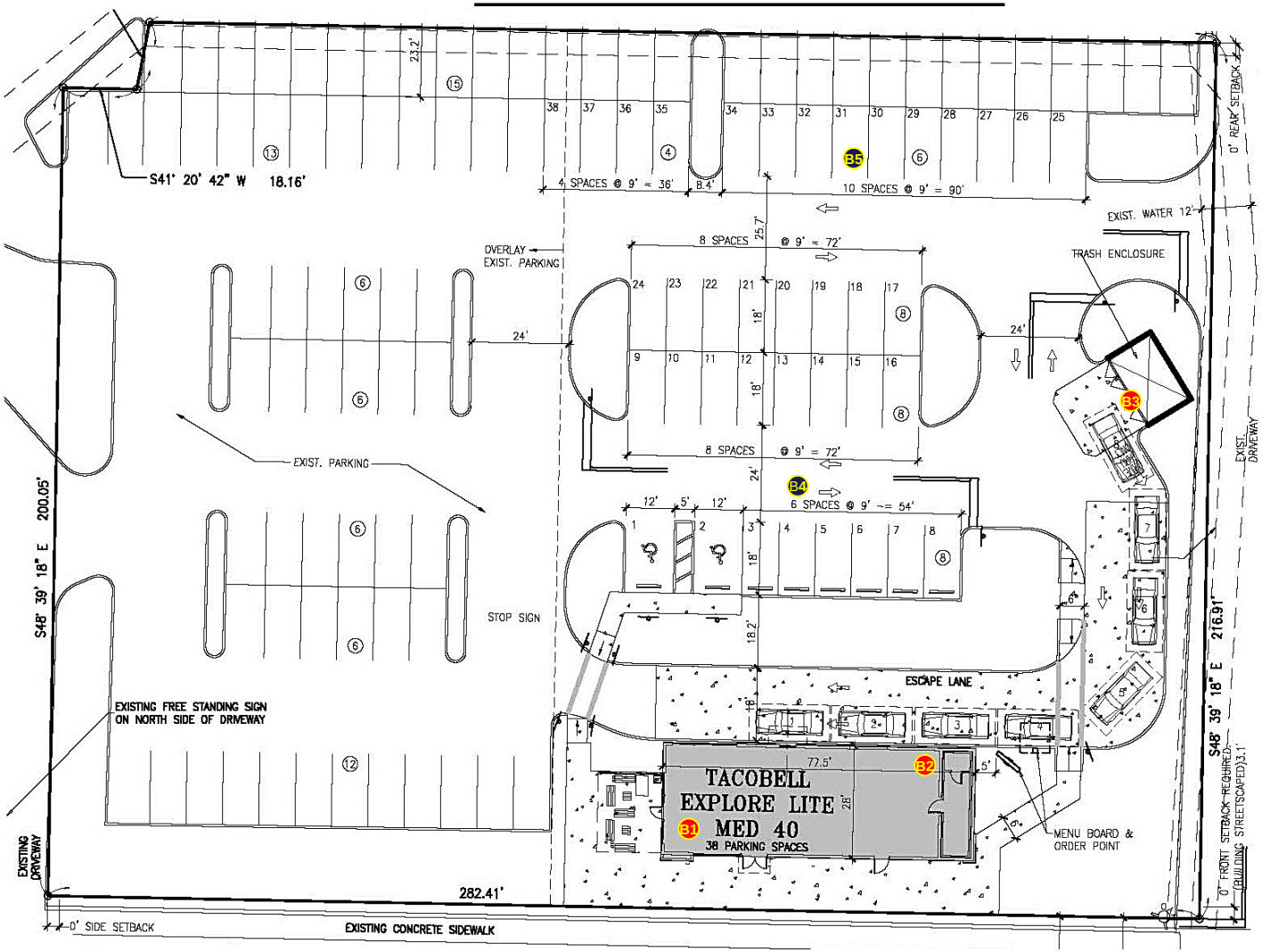
DRAWN: CA

CHKD:: JD

FIGURE No.: 2

PSI PROJECT No.: 0397-1109

BORING LOCATION PLAN



- Approximate Percolation/SPT Boring Location
- Approximate SPT Boring Location

GEOTECHNICAL ENGINEERING SERVICES
Taco Bell #309797
20711 S. Dixie Hwy
Cutler Bay, Miami, Florida

DATE: 09/22/2016

DRAWN: CA

CHKD:: JD

FIGURE No.: 3

PSI PROJECT No.: 0397-1109

Professional Service Industries, Inc.
7950 N.W. 64th Street
Miami, FL 33166
Telephone: (305) 471-7725
Fax: (305) 593-1915

LOG OF BORING B-1

PSI Job No.: 0397-1109
Project: Taco Bell #309797
Location: 20711 S. Dixie Hwy
Miami (Cutler Bay), Florida

Drilling Method: SPT
Sampling Method: 2" O.D. split spoon
Hammer Type: Automatic
Boring Location: Refer to Figure 3

WATER LEVELS

While Drilling	6.8 feet
Upon Completion	6.8 feet
Delay	N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification		Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					(TOPSOIL) Dark Brown Organic Fine SAND with Traces of Roots	OL				
				1		Light Brown/Gray LIMEROCK with Fine Sand	GP-GM	14-10-10-10 N=20			
						Light Brown/Gray LIMESTONE with Fine Sand					
				2				10-13-10-9 N=23			
	5			3				11-11-9-10 N=20			
				4				8-8-8-9 N=16			
				5				7-8-7-8 N=15			
	10										
				6				8-7-7 N=14			
	15										
				7				7-7-7 N=14			
	20										

Completion Depth: 20.0 ft
Date Boring Started: 9/12/16
Date Boring Completed: 9/12/16
Logged By: LR
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig: CME-55
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
7950 N.W. 64th Street
Miami, FL 33166
Telephone: (305) 471-7725
Fax: (305) 593-1915

LOG OF BORING B-2

PSI Job No.: 0397-1109
Project: Taco Bell #309797
Location: 20711 S. Dixie Hwy
Miami (Cutler Bay), Florida

Drilling Method: SPT
Sampling Method: 2" O.D. split spoon
Hammer Type: Automatic
Boring Location: Refer to Figure 3

WATER LEVELS

While Drilling	7.1 feet
Upon Completion	7.1 feet
Delay	N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification		Moisture, %	Additional Remarks
	0			(TOPSOIL) Dark Brown Organic Fine SAND with Traces of Roots	OL			
		1		Light Brown/Gray LIMEROCK with Slightly Silty Fine Sand	GP-GM	9-16-11-10 N=27		
				Light Brown/Gray LIMESTONE with Fine Sand				
		2				5-4-7-8 N=11		
	5	3				12-10-7-7 N=17		
		4				8-7-7-6 N=14		
		5				9-7-8-6 N=15		
	10							
		6				5-6-8 N=14		
	15							
		7				10-8-8 N=16		
	20							

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50

STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Completion Depth: 20.0 ft
Date Boring Started: 9/12/16
Date Boring Completed: 9/12/16
Logged By: LR
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig: CME-55
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
7950 N.W. 64th Street
Miami, FL 33166
Telephone: (305) 471-7725
Fax: (305) 593-1915

LOG OF BORING B-3

PSI Job No.: 0397-1109
Project: Taco Bell #309797
Location: 20711 S. Dixie Hwy
Miami (Cutler Bay), Florida

Drilling Method: SPT
Sampling Method: 2" O.D. split spoon
Hammer Type: Automatic
Boring Location: Refer to Figure 3

WATER LEVELS	
While Drilling	7.2 feet
Upon Completion	7.2 feet
Delay	N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification		Moisture, %	Additional Remarks
	0			(TOPSOIL) Dark Brown Organic Fine SAND with Traces of Roots	OL			
		1		Light Brown/Gray LIMEROCK with Slightly Silty Fine Sand	GP-GM	10-20-14-9 N=34		
		2				9-9-4-3 N=13		
	5	3		Light Brown/Gray LIMESTONE with Fine Sand		1-1-2-3 N=3		
		4				3-4-4-5 N=8		
		5				7-6-7-6 N=13		
	10							
	15	6				6-9-8 N=17		
		7				8-10-10 N=20		
	20							

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Completion Depth: 20.0 ft
Date Boring Started: 9/12/16
Date Boring Completed: 9/12/16
Logged By: LR
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig: CME-55
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
7950 N.W. 64th Street
Miami, FL 33166
Telephone: (305) 471-7725
Fax: (305) 593-1915

LOG OF BORING B-4

PSI Job No.: 0397-1109
Project: Taco Bell #309797
Location: 20711 S. Dixie Hwy
Miami (Cutler Bay), Florida

Drilling Method: SPT
Sampling Method: 2" O.D. split spoon
Hammer Type: Automatic
Boring Location: Refer to Figure 3

WATER LEVELS	
While Drilling	6.9 feet
Upon Completion	6.9 feet
Delay	N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft	Additional Remarks
	0			(TOPSOIL) Dark Brown Organic Fine SAND with Traces of Roots	OL			
	1	1		Light Brown/Gray LIMEROCK with Slightly Silty Fine Sand	GP-GM	15-15-12-12 N=27		
				Light Brown/Gray LIMESTONE with Fine Sand				
	2	2				13-12-14-15 N=26		
	5	3				10-6-5-4 N=11		
		4				5-6-4-5 N=10		
		5				6-6-5-5 N=11		
	10							
		6				6-6-5 N=11		
	15			Note: Percolation Test Performed at 15 Feet Below the Ground Surface				
		7				9-8-7 N=15		
	20							

Moisture: × Moisture, ◪ PL, ✚ LL (0, 25, 50)
STRENGTH, tsf: ▲ Qu, ✳ Qp (0, 2.0, 4.0)

Completion Depth: 20.0 ft
Date Boring Started: 9/12/16
Date Boring Completed: 9/12/16
Logged By: LR
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig: CME-55
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
7950 N.W. 64th Street
Miami, FL 33166
Telephone: (305) 471-7725
Fax: (305) 593-1915

LOG OF BORING B-5

PSI Job No.: 0397-1109
Project: Taco Bell #309797
Location: 20711 S. Dixie Hwy
Miami (Cutler Bay), Florida

Drilling Method: SPT
Sampling Method: 2" O.D. split spoon
Hammer Type: Automatic
Boring Location: Refer to Figure 3

WATER LEVELS

While Drilling	6.9 feet
Upon Completion	6.9 feet
Delay	N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification		Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ / STRENGTH, tsf	Additional Remarks
	0					Aspahlt (3" Thick)					
				1		Light Brown/Gray LIMEROCK with Slightly Silty Fine Sand	GP-GM	24-13-7-8 N=20			
						Light Brown/Gray LIMESTONE with Fine Sand					
				2				12-8-8-6 N=16			
	5			3				9-8-6-6 N=14			
				4				8-9-8-9 N=17			
				5				6-5-6-7 N=11			
	10										
				6				7-5-5 N=10			
	15					Note: Percolation Test Performed at 15 Feet Below the Ground Surface					
				7				8-8-8 N=16			
	20										

Moisture × PL ◪ LL ✚
0 25 50
Qu ▲ Qp ✳
0 2.0 4.0

Completion Depth: 20.0 ft
Date Boring Started: 9/12/16
Date Boring Completed: 9/12/16
Logged By: LR
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig: CME-55
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

TABLE 1: SUMMARY OF PERCOLATION TEST RESULTS
PROPOSED TACO BELL #309797
20711 S. DIXIE HIGHWAY, CUTLER BAY
MIAMI, FLORIDA
PSI PROJECT No.: 0397-1109

Test No.	Date Performed	Diameter		Depth of Hole	Depth to Groundwater Level Below Ground Surface (Feet)		Hydraulic Head, H2	Saturated Hole Depth, Ds	Average Flow Rate, Q	K, Hydraulic Conductivity
		Casing (Inches)	Perforated PVC (Inches)	(Feet)	Prior to Test	During Test	(Feet)	(Feet)	(gpm)	cfs/ft^2-ft
B-4	12-Sep-16	6	4	15.0	6.9	0.0	6.9	8.1	39.0	6.9E-04
B-5	12-Sep-16	6	4	15.0	6.9	0.0	6.9	8.1	36.0	6.3E-04

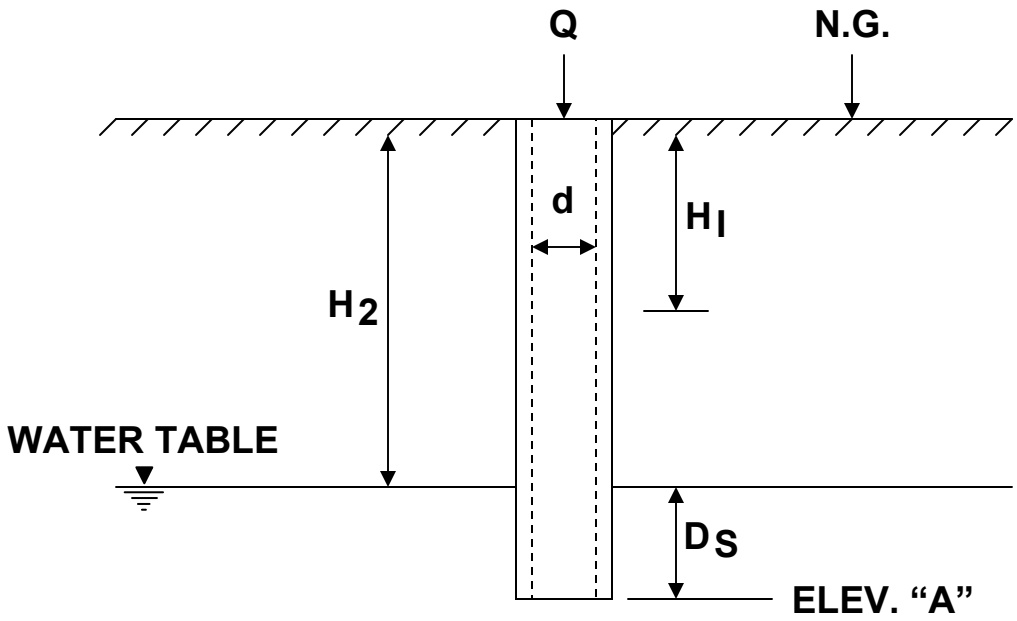
Note:

(1) The above hydraulic conductivity values are for a french drain installed to the same depth as the borehole tests. The values represent an ultimate value. The designer should apply the appropriate factor of safety.

(2) The hydraulic conductivity values were calculated based on the South Florida Water Management District's USUAL OPEN HOLE CONSTANT HEAD percolation test procedure as shown on the following page.

(3) A diameter of six inches was used in the computation of the Hydraulic Conductivity value presented in the above table.

USUAL OPEN – HOLE TEST



$$K = \frac{4Q}{\pi d (2H_2^2 + 4H_2D_S + H_2d)}$$

K= HYDRAULIC CONDUCTIVITY (CFS/FT.^{2} - FT.HEAD)

Q= "STABILIZED" FLOW RATE (CFS)

d= DIAMETER OF TEST HOLE (FEET)

H_2 = DEPTH TO WATER TABLE (FEET)

D_S = SATURATED HOLE DEPTH (FEET)

ELEV. "A"= PROPOSED TRENCH BOTTOM ELEV.

H_I = AVERAGE HEAD ON UNSATURATED HOLE SURFACE (FT.HEAD)

DRILLING AND SAMPLING PROCEDURES, FIELD TESTS, AND MEASUREMENTS

DRILLING AND SAMPLING PROCEDURES

The borings were performed with a drill rig equipped with a rotary head. The drill holes were advanced by the use of a high speed rollercone bit, with bentonite drilling fluid being pumped through the drill rods to remove the cuttings and to stabilize the side walls and bottom of the hole. Representative samples were obtained by the use of split-barrel sampling procedures in general accordance with the procedures for "Penetration Test and Split-Barrel Sampling of Soils" (ASTM D-1586).

FIELD TESTS AND MEASUREMENTS

Penetration Tests - During the sampling procedure, Standard Penetration Tests (SPT) were performed at pre-determined intervals to obtain the standard penetration value (N) of the soil. The standard penetration value (N) is defined as the number of blows of a 140 pound hammer, falling thirty (30) inches, required to advance the split-barrel sampler one (1) foot into the soil. The sampler is lowered to the bottom of the previously cleaned drill hole and advanced by blows from the hammer. The number of blows is recorded for each of three (3) successive increments of six (6) inches penetration. The "N" value is obtained by adding the second and third incremental numbers.

Water Level Measurements - Water level depths were obtained during the boring operations. In relatively pervious soils, such as sandy soils, the indicated depths are usually reliable groundwater levels. Seasonal variations, tidal conditions, temperature, land-use, and recent rainfall conditions may influence the depths to the groundwater.

Ground Surface Elevations - Ground surface elevations at the boring locations were not provided. Therefore, all references to depth of the various strata and materials encountered are from existing grade at the time of drilling.

YUM SITE STANDARD PAVING CLARIFICATIONS

Field Communication "OFI # 1778"

Issued: 28 February, 2008

"YUM Site Standard Paving Clarifications"

For these plan sets:

This Field Communication shall be applied to:
All YUM Concepts

ISSUE SUMMARY:

This communication is intended only to bring specific light to the current Yum Site Standard Hot Mix Asphalt Paving Specifications.

Please refer to attached specification section 02743 Hot Mix Asphalt Paving and to the enclosed YUM Standard Site Paving Plan for additional information / direction.

ACTION:

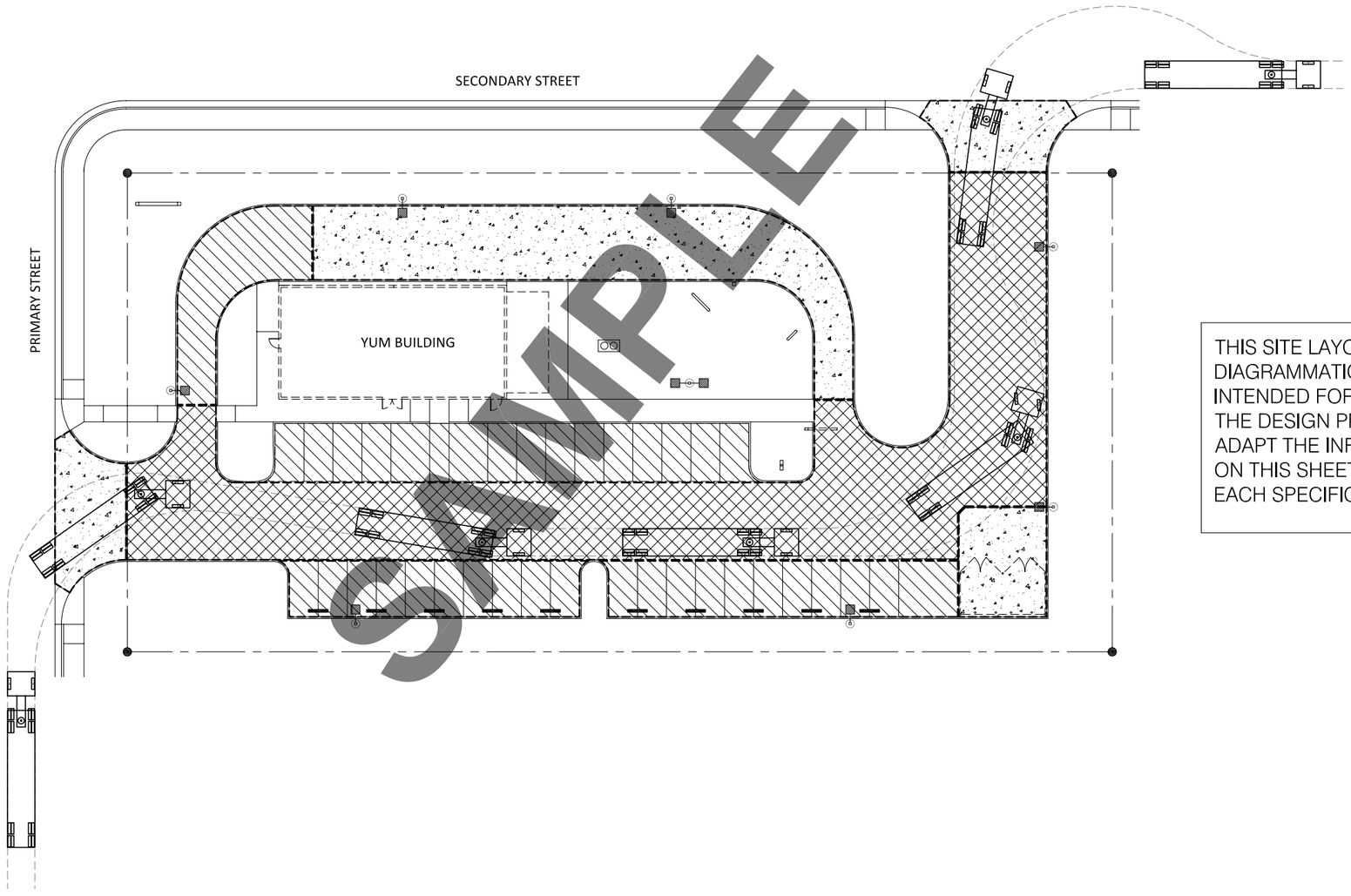
- Construction Managers: Please ensure that the bidding General Contractors are made aware of the Hot Mix Asphalt Specification during all pre-bid conferences / pre-construction conferences.
- Brand Architects: Please ensure the Site-Adapt Consultants are provided with and made aware of the applicable specification sections and Site Design Guidelines for use in preparation of the site-adapt plan sets. Please note that it is encouraged that the site-adapt civil engineers incorporate a paving plan specifically with the corresponding "hatch patterns" indicated on the enclosed YUM Standard Site Paving Plan / Legend; this will offer a quick point of reference when reviewing the site-adapt plans against the standard specification.

IMPACT TO COSTS:

There is no cost impact associated with this Field Communication.

For site specific questions please contact your Brand Architect. For questions regarding this communication, feel free to reply to this note or contact me by phone.

Frank Leist
Yum Standards Architect
Ph: 502.874.2605
frank.leist@yum.com



THIS SITE LAYOUT IS OF A DIAGRAMMATIC NATURE AND IS NOT INTENDED FOR CONSTRUCTION. THE DESIGN PROFESSIONAL MUST ADAPT THE INFORMATION PROVIDED ON THIS SHEET INTO THE DESIGN OF EACH SPECIFIC SITE.

NORTH

SITE PAVING PLAN 1" = 20'-0" | **B**

CONCRETE PAVING

TYPICAL AT SITE ENTRANCE / EXIT, TRASH ENCLOSURE PAD AND THROUGHOUT DRIVE-THRU LANE.
REFER TO SPECIFICATIONS MANUAL.

HEAVY-DUTY ASPHALT PAVING

TYPICAL AT PATH OF TRAVEL FOR ALL HEAVY TRUCKS ON SITE.
MINIMUM REQUIREMENTS:
6" HOT MIX ASPHALT PAVEMENT OVER 3" AGGREGATE SUB-BASE.
REFER TO SPECIFICATIONS MANUAL.

LIGHT-DUTY ASPHALT PAVING

TYPICAL AT PARKING AREAS AND AT DRIVE AISLES THAT WILL NOT ACCOMMODATE HEAVY TRUCK TRAFFIC.
MINIMUM REQUIREMENTS:
3" HOT MIX ASPHALT PAVEMENT OVER 6" AGGREGATE SUB-BASE.
REFER TO SPECIFICATIONS MANUAL.

PAVING LEGEND | **C**

A. HOT MIX ASPHALT PAVING:

- SURFACE COARSE SHALL BE A MINIMUM 1-1/2" COMPACTED THICKNESS.
- INTERMEDIATE / BASE COARSE SHALL BE PER SITE-SPECIFIC SOILS CONDITIONS AND LOADING.

B. CRUSHED STONE SUB-BASE:

- AASHTO #53: TYPICAL.
- MINIMUM 3" -to- MAXIMUM 6" COMPACTED THICKNESS.

GENERAL NOTES | **A**

CONSULTANT'S SEAL

CONTRACT DATE:	XX.XX.XX
BUILDING TYPE:	X-XXXX
PLAN VERSION:	XXXX
SITE NUMBER:	XXX-XXX
STORE NUMBER:	XXXXX

YUM

123 MAIN STREET
ANYTOWN, USA 98765

SITE PAVING PLAN

C0.0

PLOT DATE: XX.XX.XX

SECTION 02743

HOT MIX ASPHALT PAVEMENT

PART 1 GENERAL

1.1 DESIGN REQUIREMENTS

A. Comply with applicable provisions for design, materials, fabrication, and installation (construction) of component parts in addition to requirements shown or specified herein.

B. Install pavement thicknesses, quantities, and locations of heavy duty and light duty asphalt pavements as recommended by the soils investigation report and as shown on the plan sheets.

1.2 REGULATORY REQUIREMENTS

A. Conform to all local standards and applicable codes and requirements for paving work on public and private property during the execution of this work.

B. Manufacture Hot Mix Asphalt (HMA) shall be manufactured from a state approved / certified HMA manufacturing facility.

1.3 TESTS REQUIRED of GENERAL CONTRACTOR

A. Test materials during production to validate and / or control the mix supplied and shall be included in the bid cost for providing these HMA items.

B. Submit Recent Quality Control testing of the mixture proposed to be used on the project to the Owner prior to acceptance of the proposed mix design.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Place HMA in acceptable weather conditions; avoid inclement weather.

B. Adhere to local requirements for temperature constraints however in no case shall the base asphalt be placed when the temperature is below 40^{o} and the surface asphalt when the temperature is below 45^{o}. Additionally, the forecast shall be for rising temperatures for both efforts.

1.5 SUBMITTALS

A. Approved vendor certificate for the state where work is being done.

B. Provide Quality Control manual for material production over-site and testing measures being performed both at the asphalt plant as well as on the job site.

C. List / Organizational Chart showing personnel responsible for use of equipment and actions of the crew on the grade while paving and compacting asphalt.

Mix Design Submittal Checklist

Project: _____ **Date:** _____

Supplier: _____ **Mix Design:** _____ Surface / Leveling / Base

Included	Missing	N/A	Required Information
			Contractor to select mix design method: (design shall be less than 24 months old)
			50 Blow Marshall
			50-Gyration Superpave
			Hveem, Low Volume
			Other, Engineers Approval Req'd Before Bidding
			Proper Authorizating Signature for Mix Design
			All Aggregate Types, Gradations & % Crush
			FAA >= 40%
			Plot (0.45 Power Graph) of Final Aggregate Blend
			Bulk Specific Gravity of All Aggregates and Final Blend (Gsb), **Include All Worksheets**
			Optimum Binder Content (Pb)
			Mix Voids at Optimum (Va)
			VMA at Optimum
			Bulk Specific Gravity of Mix at Optimum (Gmb)
			Theoretical Maximum Specific Gravity at Optimum (Gmm)
			Dust to Total AC Ratio
			All Design Data and Associated Design Curves
			Recent Quality Control Production Charts
			Other Information per Specifications

1.6 DEFINITIONS

A. Surface Course – The surface / wearing course shall be installed uniformly, to all finished lines and grades, smooth, durable, skid-resistant, impervious thus protecting lower layers, and stable. Workmanship of the finished surface course shall be of the highest industry standards possible prior to acceptance by the Owner. The surface course shall be built with a maximum aggregate particle size of between ½" and ¾". Surface course shall be a nominal 1-½" compacted thickness with no thickness less than 2-times the maximum aggregate particle size (MAS).

B. Leveling Course – The course and location of the parking area that requires placement of a variable thickness of HMA to 'true up' the lot prior to placement of the surface course. This course has an 'MAS' no greater than that of the surface course.

C. Base Course – The lower courses of the pavement structure below the surface and leveling course with an 'MAS' of between ¾" and 1".

D. Tacking / Priming – The process of applying one coat of emulsified asphalt to all horizontal and vertical surfaces of either an existing pavement for an overlay or between lifts while building an improved or new structure (tacking), or upon the aggregate base (priming).

PART 2 PRODUCTS

2.1 MATERIALS

A. Tack Coat and Prime Coat: AASHTO M140 or M208 (Reference the Asphalt Institute MS-19 for Handling, Storage and Application criteria).

1. Prime Coat: Prime Coat materials of MS-2, CMS-2, or HFMS-2s.
2. Tack Coat: SS-1, SS-1h, CSS-1 or CSS-1h diluted with an equal amount of water, or agency acceptable product.

D. Performance Graded binder shall meet typical agency specification for low to medium volume roadways.

E. Aggregates, mineral filler, and asphalt binder shall meet or exceed the requirements of local specifications for asphalt pavements placed under this contract for qualities and types.

F. The coarse aggregate shall be sound, angular crushed stone, crushed gravel, or crushed slag as allowed by the local state agency. Coarse Aggregate fraction shall have a minimum of 75% crushed faces.

G. The fine aggregate shall be well graded, moderately sharp to sharp sands that will prevent tender mixes and scuffing from occurring. Fine Aggregate Angularity (AASHTO T-304, Method A), shall be >= 40%.

H. Base mixes shall have a minimum of 45% passing the #4 sieve.

I. Surface and leveling mixes shall have a minimum of 45% passing the #8 sieve.

L. Mix Designs shall include a breakdown factor, increase to minus #200, introduced during the design stage to mimic production values.

M. VMA is based on the aggregate bulk (dry) specific gravity, G_{sb}, as determined by AASHTO T-84 & T-85.

N. RAP may be used up to 20% in the HMA Binder and Surface Courses without approval by the engineer; mixes greater than 20% require engineer's approval. Use a softer grade of PG Binder per local requirements when using RAP.

2.2 HOT MIX ASPHALT (HMA)

A. All HMA mix designs shall be performed in accordance with the Asphalt Institute MS-2 and SP-2, current edition. The HMA mix designs developed shall meet the requirements of one of the following for compactive effort:

1. Marshall, 50-Blow,
2. Superpave, 50-Gyration, or
3. Hveem, Low Volume Mix.
4. Alternate design with the Engineers approval prior to time of bidding.

B. HMA Mix Designs shall be performed by qualified personnel with proven past experience and successes in the mix design and quality control of asphalt production. Resumes of the signing 'individual-in-charge' may be required by the Owner and shall be supplied if requested. The design shall meet the following requirements and be less than 24-months old. However, the mix design method used shall be the Contractors option, as stated previously, based on various methods which currently exist around the nation. A completed design shall require submittal of documentation as detailed, requested by the Owner in order for the producer to demonstrate knowledge of design and production criterion.

C. Bidding documents shall include the Contractors proposed Asphalt Mixture Design sheets. Ref. Mix Design Submittal Checklist sheet at the end of this document. Designs will be for HMA to be placed for each of the uses anticipated on each project; patching, base, leveling, and / or surface course. Different asphalt suppliers shall require different design submittals.

D. All submitted HMA mix designs shall contain at a minimum the following information:

1. All Aggregate Gradations
2. Plot (0.45 power graph) of Final Aggregate Blend
3. Bulk Specific Gravity of All Aggregates and Final Blend (Gsb) including Work sheets for natural as well as reclaimed asphalt pavement (RAP).
4. Optimum % Asphalt Binder (Pb)
5. Mix Air Voids at Optimum (Va)
6. Bulk Specific Gravity of Mix at Optimum (Gmb)
7. Theoretical Maximum Specific Gravity at Optimum (Gmm)
8. Voids in the Mineral Aggregate (VMA) and Voids Filled with Asphalt (VFA)
9. Dust to total AC Ratio
10. All Design Data and associated Design Curves

E. Mix Design Method Requirements Table:

Measures	**Superpave**	**Marshall**	**Hveem**
Stability, lbs.	n/a	1,200 min.	30 min.
Flow, 0.01 in.	n/a	8 to 16	n/a
Swell, in.	n/a	n/a	0.030 max.
Air Voids @ optimum AC	3.5%	3.5%	3.5%
VMA (base mix)	13.0 min.	13.0 min.	13.0 min.
VMA (surface mix)	14.5 min.	14.5 min.	14.5 min.
VFA	70 to 80	70 to 80	70 to 80
Dust to total AC (design)	0.6 to 1.0	0.6 to 1.0	0.6 to 1.0
Dust to total AC (production)	0.8 to 1.2	0.8 to 1.2	0.8 to 1.2

PART 3 EXECUTION

3.1 INSPECTION

A. Verify compacted sub-grade or granular base is dry and ready to support paving equipment and imposed loads. Proof roll to check for unstable areas and remove and replace loose material.

B. Verify gradients and elevations of base are correct.

3.2 PREPARATION

A. Repair pavement failures and perform crack repair according to their respective specification requirements prior to installation of any HMA surface course.

B. Cold-milling and/or grinding may be necessary to ensure that the asphalt edges at concrete abutments such as approaches, sidewalks, curbing, and drainage basins have smooth transitions.

C. After site review, detail whether wedge milling is necessary to assure positive drainage and transition. Install leveling course, if required, on the project per the site details and quantities shown on the plan sheets.

D. Existing surfaces to receive HMA must be clean prior to the installation of any portion of the work. Clean the surface on which the asphalt concrete is to be placed, and keep it free of accumulations of materials that would, in the judgment of the Owner, contaminate the mixture, prevent bonding, or interfere with spreading operations. Methods used may include but not be limited to the use of a sweeper that can wet and vacuum the area free of dirt and debris, clay, and dust, or any other foreign material.

E. Any oil or grease spots shall be scraped and treated to prevent bleeding through the tack coat. Bad oil spills may require removal with a wire brush or other suitable tool. Maintain clean pavements prior to applying emulsified tack coat. When approved sub-grade or pavement courses previously constructed under the Contract become loosened, rutted, or otherwise defective, the Contractor must correct the deficiency according to the contract item or items involved before the spreading of a subsequent pavement course.

F. If shown on the plans, apply prime coat at the diluted rate of 0.30 gal / sy over newly placed aggregate base course prior to the installation of the base asphalt. Blotter sand may be used if the prime is applied at too heavy of an application rate to dry up the excess prime coat material.

G. Tack / Prime Coat Distributor Truck must have an insulated tank, heating system and a distributor capable of maintaining a uniform application of emulsified asphalt under pressure throughout the area to be paved. This requires a pump in good working order, full circulating spray bars, and free flowing nozzles. Small, isolated areas may be tacked with a wand.

H. Install tack / prime coat during appropriate weather conditions and protect the tack / prime coat from traffic so as not to wear and track. Allow each installation of the tack / prime coat to 'break', i.e. turn from brown to black prior to installation of the HMA.

3.3 PLACING ASPHALT PAVING

A. Placement shall not occur when weather is inclement. Adhere to local requirements for temperature constraints however in no case shall the base asphalt be placed when the temperature is below 40^{o} and the surface asphalt when the temperature is below 45^{o}. Additionally, the forecast shall be for rising temperatures for both efforts.

B. Detail and submit to the Owner a paving plan on the site plan sheet prior to placement of asphalt.

C. Apply tack coat at the diluted rate of 0.05 gal / sy over newly constructed asphalt leveling or base mixes, 0.10 gal / sy over existing asphalt pavements and 0.15 gal / sy over milled surfaces. The higher rate shall be used on dry and brittle surfaces. All vertical edges abutting proposed asphalt surfaces shall receive a tack coat. Excessive asphalt applications, drooling, or pooling shall be swept with a broom to ensure proper bonding of the HMA. Immediately install the HMA after the asphalt emulsion has 'broken'.

D. Trucks shall have smooth, clean and tight metal beds that do not have mixture sticking to the truck bed and from which the entire quantity of HMA can be discharged smoothly into the spreading equipment. Trucks shall have a tarp and insulation as needed to protect the asphalt mixture from wind, rain and cold temperatures. Trucks for hauling asphalt mixture shall be in good, safe working condition.

E. Surface course longitudinal joints shall run with the traffic pattern. Therefore, pulling across the driving lanes shall not be allowed unless express permission is given by the Owner.

F. The entire parking lot surface course shall be paved on the same day. The timing and process should be discussed with and approved by the Owner before proceeding with the work.

G. Paving Equipment must be capable of placing, spreading and finishing courses of HMA to the specified thicknesses. HMA shall be free of marks, segregation and be placed to the required uniform elevation with a smooth texture not showing tearing, shoving, or gouging. Auger extensions are required if segregation occurs while pavers are extended beyond the basic screed width. Paving Equipment shall be LeeBoy or ProPaver type or the equivalent. Hand work shall be minimized to ensure the best possible finished surface.

H. Place Hot Mix Asphalt at a minimum temperature of 250 degrees F.

I. Rolling shall start as soon as the HMA can be compacted without displacement. Rolling shall continue until the HMA is thoroughly compacted and all roller marks have disappeared. Compact the HMA to a minimum in-place density of 92.0% of the Theoretical Maximum Specific Gravity, G_{mm}.

J. Rollers shall conform to the manufacturer's specifications for all ballasting. At least one vibratory roller shall be required for each project. Rollers shall be of good condition and capable of compacting the HMA to the minimum in-place density required by this specification.

K. For asphalt repairs work at an existing site, Work in such a manner as to not unduly limit parking or access to the site by customers or employees. Maintain access to at least 50% of usable parking spaces during paving.

3.4 CONSTRUCTION JOINTS

A. Minimize construction, longitudinal and transverse joints left open for an extended period of time.

B. Construct parking swale longitudinal joint by paving in a hot fashion with a temperature of not less than 180^{o}F to ensure maximum performance.

C. Compact all joints to provide for a neat, uniform and tightly bonded joint that will meet both surface tolerances and density requirements.

D. Cut true construction or transverse joints if the material has cooled to less than 180^{o}F prior to the placement of the next pass to ensure the best performing joint possible.

3.5 TOLERANCES

A. Smoothness shall meet the requirements of no greater than 1/4" in 10 ft. for base and leveling courses and 3/16" in 10 ft. for surface course.

B. Thickness of the overall mat shall be within 1/4" of the specified compacted plan thickness at all locations. The average thickness shall meet the plan thickness shown. The yield for the day and for the entire site shall meet calculated theoretical based on 92% of G_{mm} supplied from the Contractors mix design and daily test values. This item shall be calculated by the Contractor and supplied to YUM as final parking lot documentation prior to final payment.

C. Deficient areas shall be defined, removed and replaced, or adjusted to the Design Thickness, by methods approved by the Owner's Representative.

D. Completed HMA placement must be laid in order to allow positive drainage away from buildings and towards drainage outlets. Any ponding of water is not acceptable and shall require replacement at the Contractor's expense. Flood the lot as directed by the Owner to determine positive drainage acceptability.

3.6 FIELD QUALITY CONTROL

A. Hot Mix Asphalt (HMA) shall be manufactured from a state approved / certified HMA manufacturing facility. Work consists of one or more courses of HMA constructed on a prepared foundation. The asphalt concrete consists of a mixture of uniformly graded aggregate and specified type and grade of asphalt binder. The manufacturing facility shall be capable of producing HMA in accordance with the following requirements and all applicable local agency specifications on an ongoing and consistent basis.

B. Ensuring uniform material is produced and selecting the vendor for these asphalt projects will require timely submittal of documents and qualifications to the satisfaction of the Owner. Contractor / material supplier shall demonstrate the existence of the following documents:

1. Approved vendor certificate for the state where work is being done.
2. Quality Control manual for material production over-site and testing measures being performed both at the asphalt plant as well as on the job site.
3. List / Organizational Chart showing personnel responsible for use of equipment and actions of the crew on the grade while paving and compacting asphalt.

C. Calibrated equipment and qualified personnel must be accessible at all times during the construction of this HMA. The Contractor shall provide the necessary equipment, materials, and labor to complete the job acceptable to the Owner. Variations in the size and amount of equipment will depend on the size of the area being paved.

D. It is imperative that all documents list a 'Person-in-Charge' who is responsible for the over-site of the previously listed activities. This individual will be the point of contact for the Owner and they shall work with the Owner to ensure timely project completion and specification compliance. This individual shall be knowledgeable in all aspects of asphalt design, production, and installation and shall be an employee of the company holding the contract with the Owner, even if the HMA is being produced and supplied by a separate vendor.

E. Daily maximum theoretical specific gravity values must be made available to the Contractors density technician for verifying in-place density within four hours of start of production.

F. Asphalt content, gradation, and bulk specific gravity (G_{mb}) testing shall be done a minimum of once every 400 tons of HMA supplied or every third day for low tonnages that when added together successively do not equal 400 tons.

G. Acceptable average measures are made by use of a correlated nuclear density gauge, Pavement Quality Indicator or PaveTracker (non-nuclear) or by cutting (4) cores per lift, per day and testing per AASHTO T-166, Method C. Additional testing shall be performed on any given day once 400 tons of asphalt is placed.

H. Any average in-place density measure for surface course mixtures that is less than required for the day will result in a reduction in HMA pay equal to the following chart. After reaching the 30% reduction mark the pavement shall be removed and replaced by the Contractor or left in place with no compensation due the Contractor. Base and leveling installation of asphalt shall meet local DOT specifications for in-place density measures. Surface course longitudinal joints shall be measured 6" from the joint, centered upon core or density gauge, and shall meet the mat density requirements minus 2.0% at a minimum. Base and leveling course longitudinal joint density measures shall achieve between 95% - 102% of maximum achievable individually, with an average of 98% on any given day.

In-Place Density Pay Schedule, Surface Course Mat Density

Pay Factors, % (percent)	In-Place Density, % Maximum Theoretical Specific Gravity, G_{mm}
100	> 92.0%
100 – 0.5 for each 0.1% below 92.0%	91.0% to 92.0%
95 – 1.0 for each 0.1% below 91.0%	90.0% to 91.0%
85 – 1.5 for each 0.1% below 90.0%	89.0% to 90.0%

I. Process Control testing shall be in accordance with state standards for frequency and methods where the work being performed is done with a minimum of testing meeting the above QC requirements.

J. Protect the HMA until such time that traffic can be placed upon the properly compacted asphalt and show no signs of deformation.

K. If excessive segregation is occurring during placement operations, the Contractor will investigate the cause(s) and make appropriate changes to the satisfaction of the Owner.

3.7 WORK TIMELINES

A. HMA Full-depth pavements: After placing base asphalt and immediately prior to placing the surface asphalt inspect the entire pavement for low spots, damaged areas, segregated materials, and testing measures taken. Remove and replace any and all deficient sections to meet these specification requirements prior to continuing with work. These efforts shall not delay the overall progress of construction nor delay the opening of the facility.

B. Overlays (a/k/a Resurfacing): The pavement repairs, overlay, and striping shall be accomplished in such a manner as not to unduly limit parking or access to the site by customers or employees.

1. There shall never be less than 50% of the usable parking spaces available unless work is performed during off hours or when completion of work is possible prior to hours of operation.

2. Every attempt should be made to complete the surface course placement process in one continuous placement with no cold joints.
3. The timing and process should be discussed with the Owner before proceeding with the work.

3.8 SITE SPECIFIC IDENTIFICATION

A. Remove and store bumper blocks and other lot accessories during operations, reinstall after work is completed, and replace any and all broken bumper blocks.

B. Remove all waste materials from the site and dispose of according to local ordinances.

C. Complete all work in compliance with ADA requirements.

D. Notify Owner and Store Manager when store traffic can return to lot.

E. Supply Owner with Notarized Certificate of Compliance and total (tons, cu. yds., number) used for all products supplied to the project for each pay item.

F. Supply Owner with yield calculations for all products used on the project. (Example: placement of 1,300 sq. yds. of Hot Mix Asphalt,1-3/4" compacted thickness will require 128 tons when the unit weight = 150 pcf.)

References:
Asphalt Institute, Lexington, KY
National Asphalt Pavement Association, Lantham, MD

END OF SECTION