October 26, 2016

DAVENPORT
305 West Fourth Street, Suite 2A
Winston-Salem, NC 27101

Attn: Mr. Charles Boecker, P.E.
Office: (336) 829-4833
Email: cboecker@davenportworld.com

Re: Pavement Recommendation Report
Meadowlark Drive Road Widening
Winston-Salem, North Carolina
Terracon Project No. 75155109

Dear Mr. Boecker,

Terracon Consultants, Inc. (Terracon) has performed geotechnical engineering and laboratory testing services for the above referenced project and presents the following recommendations for pavement section thickness. Our services were performed in general accordance with Terracon Proposal No. P75150040R2 dated March 11, 2015. We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

1.0 PROJECT INFORMATION

The project is located on Meadowlark Drive from Country Club Road to Robinhood Road Winston-Salem, North Carolina. The work areas consist of a two-lane roadway with turn lanes at the majority of cross streets. Construction will consist of the widening of the two-lane sections to three lane width, and the addition of curb and gutter on either or both sides, and sidewalks on the east side of the roadway. The project is approximately 2.1 miles in length. We assume that cut and fill for the roadway will be minimal, less than 10 feet. We also assume that retaining walls will not be used on this project. We understand property owner contact will be handled by the City of Winston-Salem.

2.0 RECOMMENDATIONS FOR PAVEMENT SECTION THICKNESS

We recommend the pavement areas be proofrolled and undercut as needed. For budgeting purposes, we suggest considering that approximately 50 percent of the pavement areas will require undercutting and replacement. We anticipate an undercut depth of 1.5 feet below ground surface. A geogrid and additional stone may be needed in these areas to create a stable subgrade. Depending on the stability of the subgrade during a proofroll, undercut depths may range from 8 to 18 inches. We recommend that the geogrid consist of Tensar BX-1100 or equivalent.

When prepared as described above, the subsurface materials appear to be suitable for support of the planned pavement sections. Pavement thickness design is dependent upon:

- the anticipated traffic conditions during the life of the pavement;
- subgrade and paving material characteristics; and
- climatic conditions of the region.

Projected to the current year, the average annual daily traffic (AADT) is approximately 15,900 vehicles/day with 2% (approx. 318 trucks) of traffic consisting of truck traffic.

Recommended pavement sections are listed in the table below. For areas subject to concentrated and repetitive loading conditions, i.e. dumpster pads and ingress/egress aprons, or in areas where vehicles will turn at low speeds, we recommend using a Portland cement concrete pavement with a thickness of at least 7 inches underlain by at least 4 inches of crushed stone. For dumpster pads, the concrete pavement area should be large enough to support the container and tipping axle of the refuse truck.

Pavement Type	Material	Layer Thickness (inches)
OPTION 1 Flexible (Superpave)	Asphalt Surface NCDOT S 9.5C Note: * - Placed in two, 1.5-inch lifts.	3.0*
	Asphalt Binder NCDOT I 19.0C	4.0
	Crushed Aggregate Base Course (NCDOT CABC Type 1 or Type 2)	14.0
OPTION 2 Flexible (Superpave)	Asphalt Surface NCDOT S 9.5C Note: * - Placed in two, 1.5-inch lifts.	3.0*
	Asphalt Binder NCDOT I 19.0C	4.0
	Asphalt Base NCDOT B 25.0C Note: ** - Placed in two, 4.0-inch lifts.	8.0**

OPTION 3 Flexible (Superpave)	Asphalt Surface NCDOT S 9.5C Note: * - Placed in two, 1.5-inch lifts.	3.0*
	Asphalt Binder NCDOT I 19.0C	4.0
	Crushed Aggregate Base Course (NCDOT CABC Type 1 or Type 2)	4.0
	Geogrid	AllianceGeo BX2525

1. Pavement thicknesses were calculated using AllianceGeo ALL-Road© Design Tool software. AASHTO design input parameters were identical to those used for the non-reinforced pavement section listed in the previous table.
2. Aggregate base reinforced with 1 layer of, AllianceGeo BX-2525, or approved equivalent geogrid located at the bottom of the aggregate base. Alternative grid materials are not acceptable unless documented with applicable design procedure and appropriate performance-based specification and/or post construction validation.

The placement of a partial pavement thickness for use during construction is not suggested without a detailed pavement analysis incorporating construction traffic. In addition, we should be contacted to confirm the traffic assumptions outlined above. If the actual traffic varies from the assumptions outlined above, modification of the pavement section thickness will be required. Recommendations for pavement construction presented depend upon compliance with recommended material specifications. To assess compliance, observation and testing should be performed under the direction of the geotechnical engineer.

Asphalt concrete aggregates and base course materials should conform to the North Carolina Department of Transportation (NCDOT) "Standard Specifications for Roads and Structures." Concrete pavement should be air-entrained and have a minimum compressive strength of 4,000 psi after 28 days of laboratory curing per ASTM C-31.

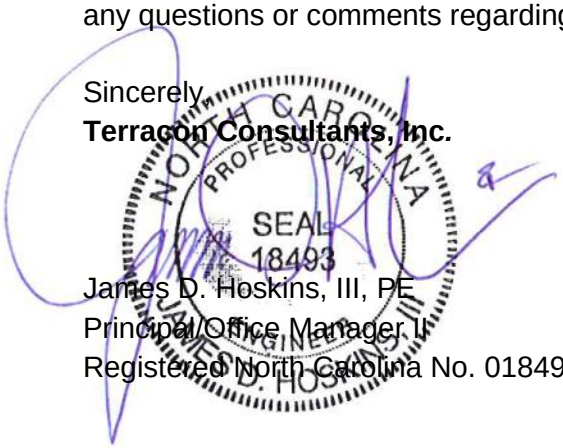
The performance of all pavements can be enhanced by minimizing excess moisture which can reach the subgrade soils. The following recommendations should be considered a minimum:

- site grading at a minimum 2 percent grade away from the pavements;
- subgrade and pavement surface with a minimum 1/4 inch per foot slope to promote proper surface drainage; and
- installation of joint sealant to seal cracks immediately.
- Seal all landscaped areas in, or adjacent to pavements to reduce moisture migration to subgrade soils;
- Place compacted, low permeability backfill against the exterior side of curb and gutter; and,
- Place curb, gutter and/or sidewalk directly on low permeability subgrade soils rather than on unbound granular base course materials.

Preventative maintenance should be planned and provided for through an ongoing pavement management program to enhance future pavement performance. Preventative maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Preventative maintenance, which consists of both localized maintenance (e.g. crack and joint sealing and patching) and global maintenance (e.g. surface sealing), is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements.

Terracon appreciates the opportunity to work with you and Davenport on this project. If you have any questions or comments regarding this report, please contact our office at (336) 852-3496.

Sincerely,
Terracon Consultants, Inc.



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