Rolland Engineering  
405 Ridges Boulevard  
Grand Junction, Colorado 81507  

Attention: Mr. Kent Shaffer  

Subject: Alternative Pavement Recommendations  
Orchard Avenue Improvements  
Grand Junction, Colorado  

Reference: *Geotechnical and Geologic Hazards Investigation, Orchard Avenue Improvements, Normandy Dr. to 29 Rd., Grand Junction, Colorado* by Huddleston-Berry Engineering & Testing, LLC for Rolland Engineering, October 30, 2018.

Dear Mr. Shaffer,

At your request, Huddleston-Berry Engineering and Testing, LLC (HBET) prepared this letter regarding the Orchard Avenue Improvements project in Grand Junction, Colorado. The referenced report includes pavement recommendations based upon ESAL calculations generated using an assumed truck traffic value of 10%. However, HBET understands that the City of Grand Junction believes that a truck traffic value of 3% is more appropriate for Orchard Avenue in the project area.

The ESAL calculations attached indicate that for 3% truck traffic, a design ESAL value of 876,000 should be used. Based upon this ESAL value, the following pavement section alternatives are recommended:

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>PAVEMENT SECTION (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hot-Mix Asphalt Pavement</td>
</tr>
<tr>
<td>A</td>
<td>5.0</td>
</tr>
<tr>
<td>B</td>
<td>6.0</td>
</tr>
<tr>
<td>C</td>
<td>4.0</td>
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<tr>
<td>D</td>
<td>5.0</td>
</tr>
<tr>
<td>E</td>
<td>6.0</td>
</tr>
</tbody>
</table>
**Geogrid Reinforced**

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>PAVEMENT SECTION (Inches)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hot-Mix Asphalt Pavement</td>
<td>CDOT Class 6 Base Course</td>
<td>TOTAL</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>4.0</td>
<td>12.0</td>
<td></td>
<td>16.0</td>
</tr>
<tr>
<td>B</td>
<td>5.0</td>
<td>9.0</td>
<td></td>
<td>14.0</td>
</tr>
<tr>
<td>C</td>
<td>6.0</td>
<td>6.0</td>
<td></td>
<td>12.0</td>
</tr>
</tbody>
</table>

*Geogrid should consist of Tensar TX5, or equivalent, and be placed immediately below the base course.

The recommendations included above are based upon information in the referenced report, information provided, and on our local experience. These conclusions and recommendations are valid only for the proposed construction.

We are pleased to be of service to your project. Please contact us if you have any questions or comments regarding the contents of this report.

Respectfully Submitted:

**Huddleston-Berry Engineering and Testing, LLC**

Michael A. Berry, P.E.
Vice President of Engineering
Project No.: 10142-0011
Project Name: Orchard Avenue Improvements
Client Name: Rolland Engineering
Completed By: MAB
Date: 12/18/2018
Current Year: 2018

GIVEN INFORMATION:
Source: City of Grand Junction GIS
Year: 2015 ADT: 8153
Year: ADT:

ASSUMPTIONS:
Growth Rate (%): 2.2
Design Life (yr): 20
Truck Traffic (%): 3
Single Axle (%): 70
Combination (%): 30

DEFINED EQUIVALENCY FACTORS:
Automobiles Flexible: 0.003
Automobiles Rigid: 0.003
Single Unit Flexible: 0.249
Single Unit Rigid: 0.285
Combination Flexible: 1.087
Combination Rigid: 1.692

CALCULATIONS:
ADT at Beginning of Design Life
ADT: 8704

ADT at End of Design Life
ADT: 13451

ADT at Midpoint of Design Life
ADT: 11078

Breakdown of Vehicles Multiplied by Equivalency Factors for Flexible Pavemen
Automobiles: 33
Single Unit: 58
Combination: 109

Breakdown of Vehicles Multiplied by Equivalency Factors for Rigid Pavement
Automobiles: 33
Single Unit: 67
Combination: 169

Flexible Pavement ESAL's
ESAL's: 876000

Rigid Pavement ESAL's
ESAL's: 1178220