CTL | THOMPSON INCORPORATED

August 15, 2018

Willow Brook Metropolitan District
7995 East Prentice Ave., Suite 103E
Greenwood Village, Colorado 80111

Attn: Sue Blair

Subject: Preliminary Pavement Thickness Recommendations
Ruby Ranch Subdivision
Silverthorne, Colorado
Project No. SU01457.000-135

As requested, we are providing preliminary pavement section thickness recommendations for the Ruby Ranch Subdivision (see Figure 1). We drilled 20 exploratory borings at the site on August 8, 2018 with a truck-mounted drill rig. The locations of the borings are shown on Figure 2. The current wearing surface of the roads is recycled asphalt. The subsoils encountered in the borings were variable and consisted of varying amounts of clay, silt, sand and gravel. Field testing for consistency of the soils during our exploration was also variable. Laboratory testing of the soil samples is currently underway and results will be provided in our final report.

Preliminary Pavement Section Thicknesses:

Based on our field testing results and conditions encountered, our preliminary recommendations for asphalt thickness are as follows. Our recommendations assume a properly prepared subgrade.

Collector Roads, which includes Ruby Road (from entrance to Topaz Road) Emerald Road (from Ruby Road to beyond Agate Road):

- 5 inches of asphalt over 2 inches of aggregate base course.

Local Roads, which includes Topaz Road, Ruby Road south of Topaz, Jade Road (from Ruby Road to Garnet Road), Pearl Road, Opal Road, and Emerald Road west of Agate Road).

- 4 inches of asphalt over 2 inches of aggregate base course.

Driveways, which includes Jade Road (south of Garnet Road), Garnet Road and Agate Road.

- 3 inches asphalt over 2 inches of aggregate base course.

Subgrade Preparation and Aggregate Base Course:

The existing roadways should be compacted with a smooth drum roller and then be proof-rolled with a fully loaded tandem dump truck with a gross weight of at least 50,000 pounds. Proof-rolls should occur in each lane and down the centerline of each

road. Areas which deform excessively should be scarified and brought to within 2 percent of optimum moisture content and recompacted. Another proof-roll of the area should be conducted. If excessive deflection occurs, the soils should removed and replaced with structural fill to achieve a stable subgrade prior to placing pavement materials. The depth of sub-excavation should be determined on a case by case basis at the time of construction. Normally, sub-excavations to stabilize subgrade are 1 to 2 feet in depth. In some cases, geogrid reinforcement can be used to reduce subexcavation depths. Based on the conditions encountered, we do not expect many areas that will require subexcavation.

Structural fill placed beneath pavements should consist of CDOT Class 6 aggregate base course. The subgrade and structural fill should be compacted to at least 95% of the maximum Modified Proctor (ASTM D-1557) dry density at a moisture content within 2 percent of optimum.

Aggregate base course should have a minimum 'R' value of 84 and meet CDOT Class 6 gradation specifications. The aggregate base course should be compacted to at least 95% of the maximum Modified Proctor (ASTM D-1557) dry density at a moisture content within 2 percent of optimum.

Asphalt Pavement:

The asphalt should consist of a mixture of aggregate, filler and asphalt cement. The asphalt mixture should meet the Summit County or Colorado Department of Transportation (CDOT) grading requirements for an asphalt mix. The asphalt should be a batched hot mix, approved by the engineer, and placed and compacted to a density of 92% to 96% of the maximum theoretical density, determined according to Colorado Procedure 51. The asphalt should be placed in lifts not exceeding 3 inches thick or less than 1.5 inches thick. We recommend State Highway Grading SX.

Surface Drainage:

Surface drainage is critical to the performance of pavements. Recommendations in this report are based on effective drainage for the life of the improvements and cannot be relied upon if effective drainage is not maintained. The collection and diversion of surface water away from paved areas is extremely important to the satisfactory performance of the pavement. Drainage design should provide for the removal of water from the paved areas and prevent wetting of the subgrade soils. Water was observed in the road ditches near borings TH-12 (Pearl Rd), TH-14 (Opal Rd) and TH-20 (Emerald Rd).

Limitations:

Our recommendations submitted in this preliminary report are based on the

conditions observed in the test borings and our experience in the area. Laboratory testing is currently underway. Once we have the test results, we will re-evaluate our recommendations.

We appreciate the opportunity to work with you on this project. If you have questions or we can be of further service, please call.

Very truly yours,
CTL | THOMPSON, INC.

George W. Benecke III, P. E.
Division Manager, Summit County

Attachments: Figures 1 and 2

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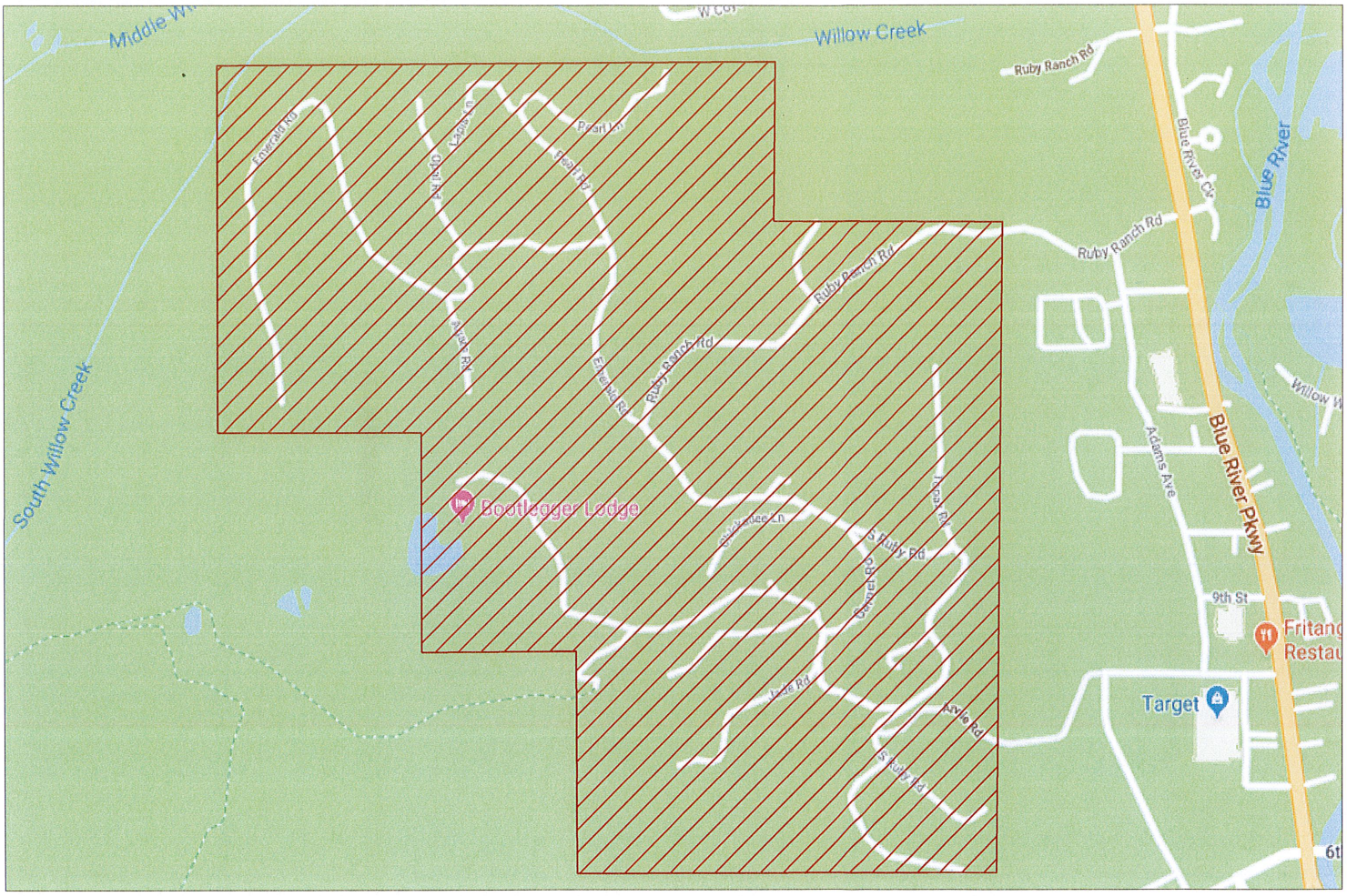
Not to scale



VICINITY MAP

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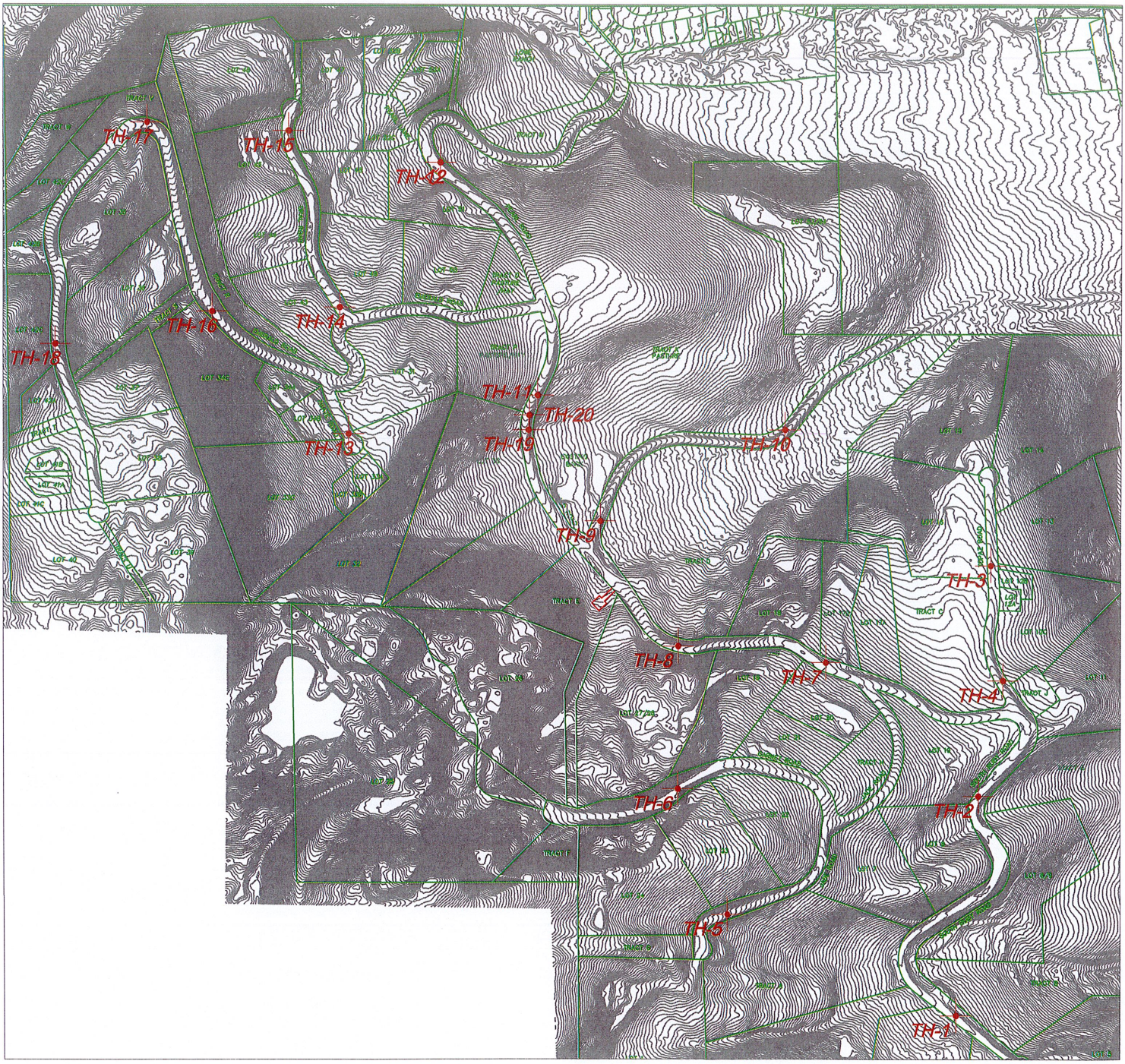
Figure 1

Scale: 1 inch = 350 feet



LOCATIONS OF EXPLORATORY BORINGS

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Figure 2