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Geotechnical Engineering Investigation
Altamont Speedway
Livermore, California

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Prepared For:

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1.0 INTRODUCTION

This report presents the results and recommendations of a focused geotechnical engineering investigation performed by Northgate Geotechnical Environmental Management, Inc. (Northgate) of portions of the Altamont Speedway property located at 17001 Midway Road in Livermore, California (the "Site"). The Site consists of approximately 82 acres of land developed as a racing and outdoor recreation facility. A Site Location Map is shown on Figure 1 and a Site Plan is shown on Figure 2.

A regional map showing earthquake faults is shown on Figure 3. The existing surface drainage facilities are shown on Figure 4. Proposed improvements to the existing surface drainage facilities are shown on Figure 5. Soil boring logs are provided in Appendix A, and laboratory results from samples collected during the investigation are included in Appendix B.

The objectives of this investigation were to:

- Explore the Site and subsurface conditions at the locations of the eastern racetrack fill slope and the grandstand slope area;
- Collect soil samples from the Site for inspection and laboratory testing;
- Perform appropriate geotechnical laboratory testing;
- Evaluate the geotechnical data and perform slope stability analyses; and
- Evaluate the existing surface water drainage system and provide recommendation for improvements to facilitate drainage, minimize ponding and reduce the potential for saturation of the existing valley fill.

2.0 PROJECT DESCRIPTION

The proposed drainage improvement project consists of moving existing drainage inlets and adding drainage inlets at appropriate locations to facilitate drainage and minimize ponding of surface water. An additional goal for the drainage improvements is to reduce the potential for generation of subsurface water that might enter the valley fill.

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3.0 SCOPE OF SERVICES

Based on our discussions and correspondence with Riverside Motorsports – Altamont LLC, the following scope of services was formulated and completed:

- Review of available geologic information;
- Field investigation to assess pertinent subsurface data for portions of the Site;
- Laboratory testing to measure geotechnical engineering subsurface soil characteristics;
- Engineering analyses to assess the stability of existing slopes; and
- Preparation of an engineering report to summarize the results of our investigation and present recommended drainage design improvements.

4.0 SITE SETTING

4.1 Site Location

The Site consists of an approximate 82-acre raceway and outdoor recreation facility located at 17001 Midway Road in Livermore, California. The Site is located approximately 12 miles east-northeast of Livermore in unincorporated Alameda County. The site is bordered on the north by Interstate 580, on the west and south by residential properties, and on the east by the California Aqueduct.

4.2 Geologic Setting

The Site is located in the Coast Ranges geomorphic province of California, which is dominated by nonmarine deposits of Plesistocene to early Pleistocene age. Borings advanced at the Site during Northgate's Phase II Investigation indicate that the Site is underlain by clay, silty clay, and sands to depths ranging from 15 to greater than 24 feet below ground surface (bgs), below which lies siltstone bedrock.

The Site was built by cutting and filling of the pre-development ground surface. The northern and southern portions of the Site were cut and the central portion of the Site was filled. The central portion was a gently sloped valley prior to filling. The fill thickness range is estimated from zero feet in the southwest area to 32 feet in the northeast central area.

Surface water ponds during and shortly after rainfall events in numerous locations in the racetrack area. The ground surface in these areas is flat or improperly sloped and does not carry the surface water to the drainage facilities.

Groundwater was encountered in three of the borings advanced during Northgate's investigation. Groundwater was encountered at depths varying from 17.5 to 19 feet bgs in a topographically low area on the northeastern portion of the Site, to a depth of 37 feet bgs in a boring drilled on the northeastern portion of the racetrack oval. Groundwater flow is likely to the northeast, based on local topography. Surface water is present in a small pond (detention basin) located on the northern portion of the site.

No active earthquake faults are known to pass through the Site. The nearest fault is the Greenville Fault, which is located about 10.3 kilometers (km) away. The Site is not located within the State of California's designated Special Fault Study Zone (Alquist-Priolo Earthquake Fault Zones Act).

4.3 Current Land Use

The site is developed as an operating racetrack. Two paved, banked racetracks of ½- and ¼- mile lengths are present in the center of the Site. A raised grandstand and concession building are located on the northwest side of the racetracks. A caretaker lives on-Site in a small mobile home adjacent to the grandstand building. A pit/service area is located on the southeast side of the tracks, including a Quonset hut, several sheds. Two water wells are located on the Site, north of the concession building and one in a low-lying area on the north-northeast of the Site. In addition, a septic system is located at the Site, associated with the concession building. General features of the site are shown on Figure 2.

5.0 SUBSURFACE EXPLORATION AND LABORATORY TESTING

5.1 Exploratory Soil Boring

As part of this investigation, two exploratory soil borings were completed at the Site on January 25, 2006. The borings is located within the proposed project area, as shown on Figure 2. The soil borings were drilled to depths ranging from 36.25 feet to 50 feet below the ground surface (bgs) with truck-mounted hollow-stem auger drilling equipment. During drilling, soil samples were collected from the borehole using modified California split-spoon and Standard Penetration Test samplers. A CME 75 drill rig with an automatic trip-type 140-pound hammer falling 30-inches was used to drive the sampler into the soil, and the number of blows required (blow count) was recorded on the boring log. Soil samples and soil cuttings brought to the ground surface as drilling proceeded were logged and classified according to the Unified Soil Classification System. The soil boring logs are presented in Appendix A. A Northgate geologist located the boring and observed the drilling.

5.2 Laboratory Testing

Selected samples were tested for the following geotechnical engineering characteristics:

- Dry density;
- Moisture content;
- Consolidated Undrained Triaxial Testing; and
- Unconfined compression.

All tests were performed in accordance with ASTM, procedures at the URS Testing Laboratory in Pleasant Hill, California. Selected analytical data are shown on the boring logs in Appendix A, and laboratory data sheets are presented in Appendix B.

6.0 SUBSURFACE CONDITIONS

For discussion purposes, subsurface lithology encountered in the boring can be categorized, as fill soils, native Silty clay, native, native clayey sand and siltstone bedrock. A description of each of these soil types is listed below.

- *Fill Soil* consists generally of stiff and very stiff silty clay. The fill soil layer is very is approximately 24 feet thick at the northeastern end of the racetrack and 9 feet thick at the location of the boring in the grandstand area.
- *Native Clayey Sand soils* encountered were very dense and in the lower portion were interbedded with sandy and silty clay. The sand is fine-grained. This layer extends from to the top of the bedrock at a depth of 35 feet.
- *Bedrock* encountered in Boring NG-7 consisted of soft to medium hard Siltstone.

The boring logs in Appendix A present the detailed descriptions of the subsurface soil conditions encountered in the exploratory borings.

Groundwater was encountered in Boring NG-6 25 minutes after drilling at a depth of 37 feet.

7.0 FINDINGS AND CONCLUSIONS

7.1 Stability Analyses

We completed a slope stability analysis to evaluate the stability of the existing slopes in the fill area at the northeast end of the racetrack and the bleacher area using the STABL for Windows computer program. The program is capable of searching for circular and non-circular failure surfaces having the lowest factors of safety against movement. A factor of safety of 1.0 indicates that the slope is barely stable against movement. Factors of safety less than 1.0 indicate a potential unstable condition. Considering the variability of the soil strengths, slope geometry, and groundwater conditions, slopes with factors of safety above 1.5 are generally considered to have enough strength to be stable under static conditions and to possess some reserve to resist other loading conditions.

For static (non-earthquake) conditions, Bishop's modified method of slope stability analysis was used to search for the most critical (lowest factor of safety) circular failure surface at both of the slopes of interest.

For the pseudostatic analyses, a horizontal coefficient of 0.15g was applied. The 0.15g coefficient was selected for analysis.

We analyzed using both effective and total strength parameters. Effective strength parameters are typically thought to model long-term conditions, while total stress analyses model short-term conditions.

Computer output from selected stability runs are included in Appendix E.

The results of our analyses are discussed below.

Northeast Racetrack Section

This section is located in the northeastern end of the racetrack and passes through the a portion of the track and the fill slope to the northeast.

Stability modeling at the northeast section indicates the following results:

Factor of Safety		
Short-Term (Total Stress)	**Short-Term Seismic (K=0.15)**	**Long-Term (Effective Stress)**
3.2	2.5	1.5

In addition to these analyses, an analysis was performed to model water rising up 10 feet into the fill. The results of that analysis indicated that the factor of safety dipped slightly below 1.0.

Bandstand Section

We analyzed the bandstand section. Analysis results are presented below.

Factor of Safety		
Short-Term (Total Stress)	**Short-Term Seismic (K=0.15)**	**Long-Term (Effective Stress)**
1.9	1.2	1.9

These results indicate that the slopes are stable under the modeled conditions.

It was noted in the field that both of the slopes analyzed show some minor signs of slope creep. This can be seen as longitudinal cracking in the racetrack pavement at the northeastern end of the track and in the grandstand area as concrete cracking at the far northeastern end of the concrete walkway pavement. This very slight movement is likely periodic and is related to changes in the water levels in the slope due to seasons changes. For continued stability, preventing the fill from becoming saturated is a major factor.

7.2 Surface Drainage Facility Findings

The existing drainage system was viewed in the field and water testing was performed to assess it condition and function. The existing system in the grandstand area was observed but no testing was performed. The outlet to this system is clearly visible and is separate from the systems in the racetrack and pit areas. Two separate systems are present in the racetrack and pit areas. The systems are shown on Figure 4. The continuity of the pit system was field verified.

The racetrack system was only checked for continuity with the northeastern most catch basin. This catch basin is connected to the outlet in the center of the northeastern fill slope. The pit area drains are connected to the outlet at the southeast end of the fill slope.

8.0 RECOMMENDATIONS

8.1 Slope Stability

Although the existing slopes are stable in there current configuration, the stability could be maintained and or improved by incorporating the following recommendations:

- Improve the site drainage to reduce the potential for ponding of water and infiltration of surface water into the existing valley fill;
- Reduce the amount and or nature of landscaping watering to reduce water infiltration;
- Construct a fill buttress at the northeastern end of the racetrack outside the toe of the slope to effectively flatten the slope inclination. If requested, further recommendations can be provided; and
- If cracking does appear fill the cracks periodically to prevent water from entering them.

8.2 Site Drainage Facilities

The existing drainage systems in the racetrack and pit areas should be improved to more effectively carry the surface water away from the valley fill. The measures recommended are presented below and are shown on Figure 5.

- Complete the assessment of the existing system in the center of the racetrack. It is not yet known if the existing system is continuous through the valley fill. Additional investigation is required. The existing catch basin west of the track should be cleaned to unplug the catch basin and the outlet should be identified. Other catch basins may also be covered with soil these should also be located and cleaned. An underground locator might be helpful in finding these;
- Add additional catch basins, as appropriate, to collect and move surface water quickly off the Site; Some suggested locations are shown on Figure 5;

- In the area at the southwest end of the pit drainage system the pipe has been turned down to create a detention basin; we recommend that the area be raised in grade as necessary to remove the detention basin and install one of the new catch basins;

- The area southwest of the entry road to the pit area acts as a dam to surface water flow from the adjacent area; this area is the head of the former valley; we recommend that a catch basin be installed in this area to carry water under the road section to the pit drainage system.

Areas between catch basins should be sloped to drain to the catch basins or if appropriate to sheet flow away from the fill.

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9.0 LIMITATIONS

The recommendations in this report are based on the assumption that soil conditions encountered in this investigation are representative of the soils in the project Site area. If conditions encountered during construction differ from those assumed in design and found in the exploratory borings, the Geotechnical Engineer should be contacted to review the conditions and provide additional recommendations, if appropriate.

In order to conform with the geotechnical recommendations contained in this report, we recommend that a Geotechnical Engineer be retained to review the appropriate portions of the project plans and specifications prior to bidding to verify that the recommendations made in this report and their intent have been incorporated.

FIGURES

APPENDIX A
BORING LOGS

APPENDIX B
RESULTS OF LABORATORY TESTING

(To be provided with final report)