SOILS STUDIES & OPINION REPORTS

Rollins, Brown and Gunnell	June 8, 1977
William Lund	May 1979
SHB Agra	April 22, 1994

ROLLINS, BROWN AND GUNNELL

June 8 ,1997

SOILS INVESTIGATION

NORFOLK AVENUE
PARK CITY, UTAH

JUNE 1977

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June 8, 1977

J. J. Johnson and Associates
1515 Park Avenue
Park City, UT 84060

Gentlemen:

In accordance with your request, a soils investigation has been completed at the site of the proposed development known as Norfolk Avenue. This investigation was performed for the purpose of defining the subsurface soil and rock conditions throughout the project development so that satisfactory substructures and slope protection could be designed for the proposed facilities in this area.

Access to the hillside above the actual development area was limited because of the disturbing effects which the subsurface investigation would have on the natural vegetative growth on the hillside.

The conclusions and recommendations presented in the report are necessarily based upon the subsurface conditions throughout the development site. The results of the investigation along with pertinent recommendations relative to slope stability, foundation design and lateral earth pressures are discussed in the following sections of this report.

1. Site Geology and the Subsurface Soil Conditions

The characteristics of the subsurface soils throughout the development area were investigated by excavating 11 test pits varying in depth from approximately 6 feet to 15 feet below the existing ground surface. The location of the test pits is presented in Figure No. 1 while the logs are presented in Figures No. 2 through No. 7.

In most of the test pits, bedrock was encountered at a depth of between 7 and 8 feet below ground surface. However, some exceptions to this general pattern are noted. In test boring No. 2, the overburden extended to a depth of nearly 15 feet while in test boring No. 6, bedrock was encountered at a depth of 2 feet below the ground surface.

The subsurface profile throughout the development site can generally be described in terms of 4 zones. Zone No. 1 consists of a black silty topsoil which extends to a depth of between 1.5 and 3 feet below the existing ground surface. The surface zone is underlain by a granular zone varying in depth from 2 to 7 feet. The granular zone is composed of angular fragments in a matrix of silt. The angular fragments vary all the way from sand-size particles through gravels and cobbles. Zone No. 2 is underlain by a medium plastic clay of variable thickness which extends to the bedrock surface.

At all locations encountered during this investigation, the clay was in a medium to stiff condition. It should be noted that the clay zone is absent in test holes No. 1, 3, 4, 6, 8 and 9. However, the clay exists in a sufficient number of test holes throughout the site that its presence in the area cannot be neglected.

The bedrock underlying the overburden material is known as the Weber Quartzite Formation. In general, the Weber Quartzite Formation is a pale gray to tan quartzite and limey sandstone with some interbedded gray and white limestone and dolemite layers. At the proposed development, the Weber Quartzite Formation exposed in the trenches all showed the bedrock to be a light gray quartzite. From a structural standpoint, the development site is located on the northwest limb of the Park City anticline. The Park City anticline plunges to the northeast with the northwest limb having a stratigraphic dip to the northwest. The strike of the Weber Quartzite varies between North 30° West to North 45° West with a dip between 5° and 20° to the northwest. All joint sets observed throughout the development area essentially have high dip angles into the mountain. One joint set, however, was observed which has a low angle dip toward the mountain.

The results of this investigation indicate that there is no apparent joint set which will cause slippage down the slope of the mountain. However, the high angle joints will cause some fallout on any vertical wall cut perpendicular to the face of the mountain. The joint pattern exposed in the adit above Norfolk Avenue is presented in Figure No. 8. The symbols designating the strike and the dip of the joint sets are separated on the diagram for illustration purposes.

During the excavation of the test pits throughout the development area, in-place density tests were performed at three-foot intervals and miniature vane shear tests were performed in the clay materials. The results of the in-place density tests are presented on the boring logs, and it will be observed that the in-place dry density of the granular material varied from 112 pounds per cubic foot to 119 pounds per cubic foot, while the clay material varied from 93 to 95 pounds per cubic foot.

The miniature vane shear tests provide an indication of the undrained shearing strength of the clay materials. The miniature vane shear tests are designated as the torvane value on the test pit logs and are specified in terms of tons per square foot. The results of the miniature vane shear tests indicate that the subsurface clays are in a medium to stiff condition.

Each sample obtained in the field was subsequently classified in the laboratory according to the Unified Soil Classification System. The symbol designating the soil type according to this system is presented on the boring logs. A description of the Unified Soil Classification System is presented in Figure No. 9 and the full meaning of the various soil symbols can be obtained from this figure.

2. Slope Stability Considerations

Based upon the topographic map furnished our organization, the average slope throughout the development area is approximately 2 horizontal to 1 vertical. In order to perform a rigorous stability analysis at this site, it would be necessary to determine the soil profile of the entire hillside above the development area. Since it was not possible to excavate test pits up the hillside due to environmental considerations, the statements made in this section of the report are of necessity based upon the conditions which exist in the development area.

The results of the geological investigation indicate that there is no tendency for any slide to occur within the rock mass along the face of the slope in this area and that any failure that may occur will take place in the overburden material.

In attempting to obtain an estimate of the stability conditions for the overburden material at the site, two cases have been considered. Case No. 1 assumes an infinite slope with a depth of cohesionless soil equal to approximately 8 feet. Soil parameters obtained during the field and laboratory investigation have been used in the stability analysis for this case. A friction angle of 34° and a saturated unit weight of 133 pounds per cubic foot have been used in the analysis. If the entire mass of granular material above the bedrock is assumed to be saturated with seepage occurring parallel to the slope, the results of our analysis indicate that a factor of safety of 0.70 would occur for this site. Failure conditions would obviously occur under the stipulated conditions.

If the overburden material is less than saturated with no seepage occurring parallel to the slope, the results of the stability analysis indicate a factor of safety of 1.40. It is also apparent that the hillside would be stable under these conditions.

Case No. 2 considers the overburden material to consist of clay having the characteristics of the clay material observed in the lower portion of the soil profile at the site. The results of a stability analysis performed for this condition assuming the clay to be near saturated, but with no seepage parallel to the hillside, indicates a factor of safety of greater than 2. It is apparent from the above considerations that the stability of the overburden material at this location is a sensitive function of seepage parallel to the slope. If seepage conditions parallel to the slope can be restricted, the calculations indicate that the overburden material throughout the area would be stable. Our study of the entire area throughout the development site indicates that no slides or slumps exist throughout the overburden material and that the hillside is stable under its existing conditions.

In order to insure stability throughout the development area, we recommend that adequate subsurface and surface drainage be provided throughout the development area and that all disturbance of existing shrubs and overburden material be minimized as much as possible. We recommend that an interceptor drain be constructed uphill from the proposed development area to restrict downhill seepage. Such a facility will not only prevent water from flowing into the development area, but it will provide a means whereby water uphill from the proposed development can be readily intercepted and removed from the site.

In constructing roads and houses throughout the area, care should be taken to minimize the disturbance of the existing vegetative cover. We also recommend that adequate lateral support be provided in all areas where the overburden material is under cut.

If the above precautions are taken, it is our opinion that the slopes at this location will remain stable during the development of this site.

3. Foundation Considerations

In accordance with our recommendations outlined above, to minimize the disturbance of the existing materials throughout the development area, we recommend that the structures erected at this site be stepped up the hillside in such a way that the maximum cut at any location does not exceed 10 feet and that all foundations supporting the structures be located on bedrock. The normal cut for the proposed facility would expose bedrock over a portion of the building area; however, piers extending to bedrock may be required at other locations. Allowable soil bearing pressures of 3 to 4 tons would be very conservative for the rock existing at this location.

It is recognized that there may be some areas in which minor structural foundations would be located on the overburden material above the bedrock. In order to provide basic information in which foundations in these areas can be proportioned, bearing capacity recommendations are provided in Table No. 1. In providing the bearing capacity recommendations, it has been assumed that the foundations would be located on the existing slopes and that the depth below the existing ground surface may vary considerably. It is apparent from Table No. 1 that the allowable soil bearing pressures for footings placed on the slope is a function of the width of the footing and the depth at which the footing is placed below the actual ground surface.

In preparing Table No. 1, consideration has also been given to differential settlement. If the proposed facilities are designed in accordance with Table No. 1,

the maximum settlement of any footing will not exceed one inch and differential settlements will not likely exceed one-half inch which should be tolerable for the proposed facility.

4. Excavation Procedures and Lateral Earth Pressures

It is our understanding that Norfolk Avenue will be constructed by widening an existing trail throughout the proposed development area. We recommend that the depth of the cut into the hillside along the roadway alignment be minimized by filling downhill for a portion of the roadway. The natural angle of repose for the quartzite rock to be excavated along the roadway alignment will be approximately 1.5 horizontal to 1 vertical. If the rock excavation is performed in such a manner that the cut and fill is balanced, the dump rock should provide a stable roadway on the downhill side of the cross-section.

Prior to the placement of any rock along the alignment, we recommend that all of the topsoil existing throughout the area be removed to eliminate the possibility of slippage along this plane of weakness. It is also recommended in placement of the rock fill that it be densified by rolling the material with at least 4 passes of a D8 cat or with 5 to 6 passes with a vibratory roller having a 10-ton vibratory force.

We also recommend that lateral restraint be provided for the overburden material located above the bedrock surface.

As indicated earlier in the report, the bedrock throughout the site is competent rock and will stand at a near vertical slope. It is our understanding that the retaining facility to be used in providing the lateral restraint for the overburden materials will consist of 4 by 6 woodpiles imbedded into the rock on the innerside of the roadway alignment and that lagging will be placed between the wood piles to provide the necessary lateral support.

In designing the proposed earth retaining facility, we recommend that an earth pressure coefficient of 0.4 be used to determine the lateral earth pressures. We also recommend that the bedrock surface be inclined slightly in order to provide a more aesthetical and efficient design for the pile sections. It may be necessary to anchor the pile sections at the top of the pile in order to resist the applied moment. This could be performed in a relatively simple manner by extending a cable from the pile supports to the bedrock in the hillside.

5. The Results of Field and Laboratory Tests

A number of field and laboratory tests have been performed during this investigation to define the characteristics of the subsurface material throughout the

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area. These tests include: in-place unit weight, natural moisture content, Atterberg limits, mechanical analysis, and unconfined compressive strength. A summary of all test data performed during the investigation is presented in Table No. 2, Summary of Test Data. It will be observed that the unconfined compressive strength of the clay layer underlying the granular material in the soil profile varies from 2738 pounds per square foot to 3435 pounds per square foot.

As indicated earlier in the report, the clay is in a relatively stiff condition and is capable of supporting moderate load intensities.

Atterberg limits performed on the clay material indicate that it classified generally as a CL-2 material according to the Unified Soil Classification System. This means that the material has medium plastic characteristics and may possess some slight swell potential if it is permitted to absorb moisture. This material is sufficiently plastic that it should not be used for any kind of backfilling operations behind retaining facilities.

In areas where the natural material will exist adjacent to earth retaining structures, we recommend that it be excavated and replaced with granular material.

The in-place density of the natural granular material is relatively high, and the strength characteristics of this materialarereasonably good.

The conclusions and recommendations presented in this report are based upon the results of the field and laboratory tests which, in our opinion, define the characteristics of the subsurface material in the development area in a reasonable manner. The characteristics of the overburden material, however, uphill from the development area are unknown.

Please advise us if there are any questions relative to the information contained herein.

Yours truly,

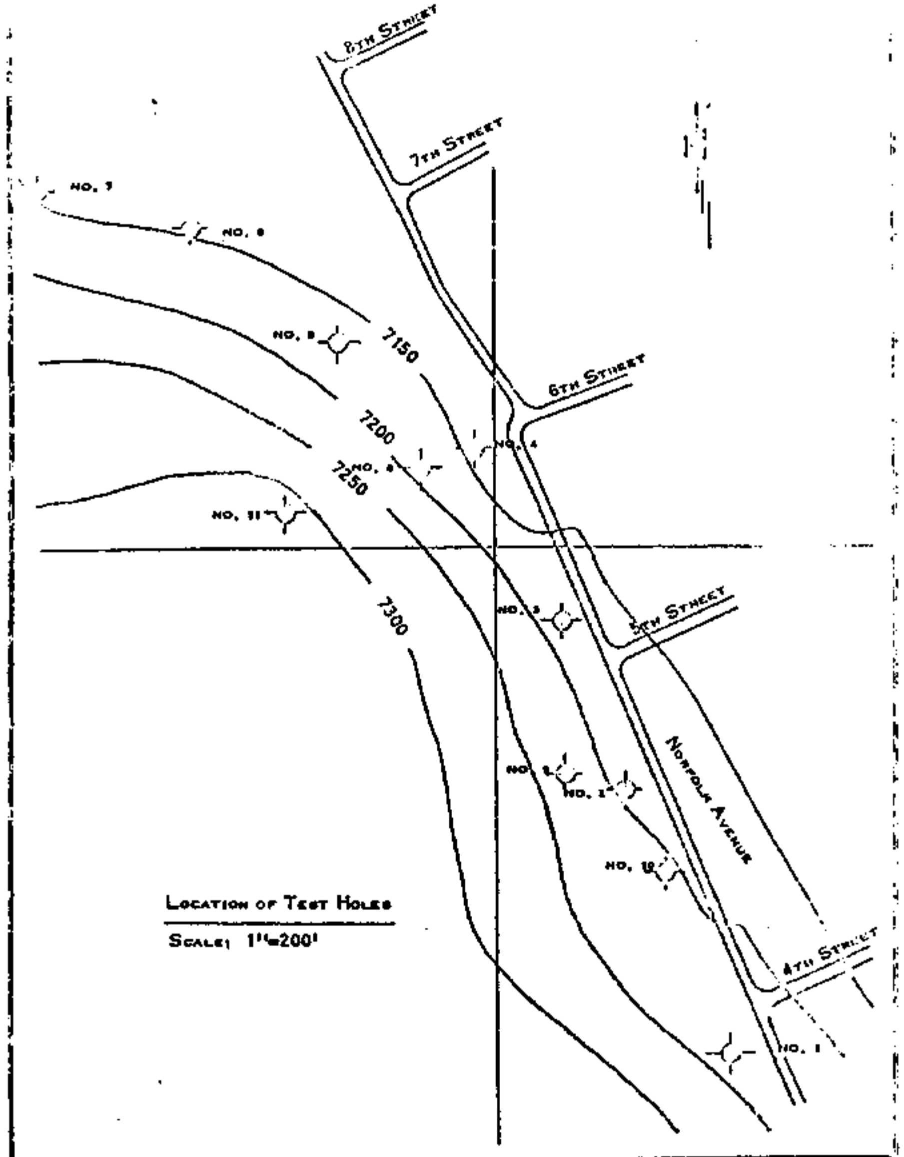
ROLLINS, BROWN AND GUNNELL, INC.

Ralph L Rollins

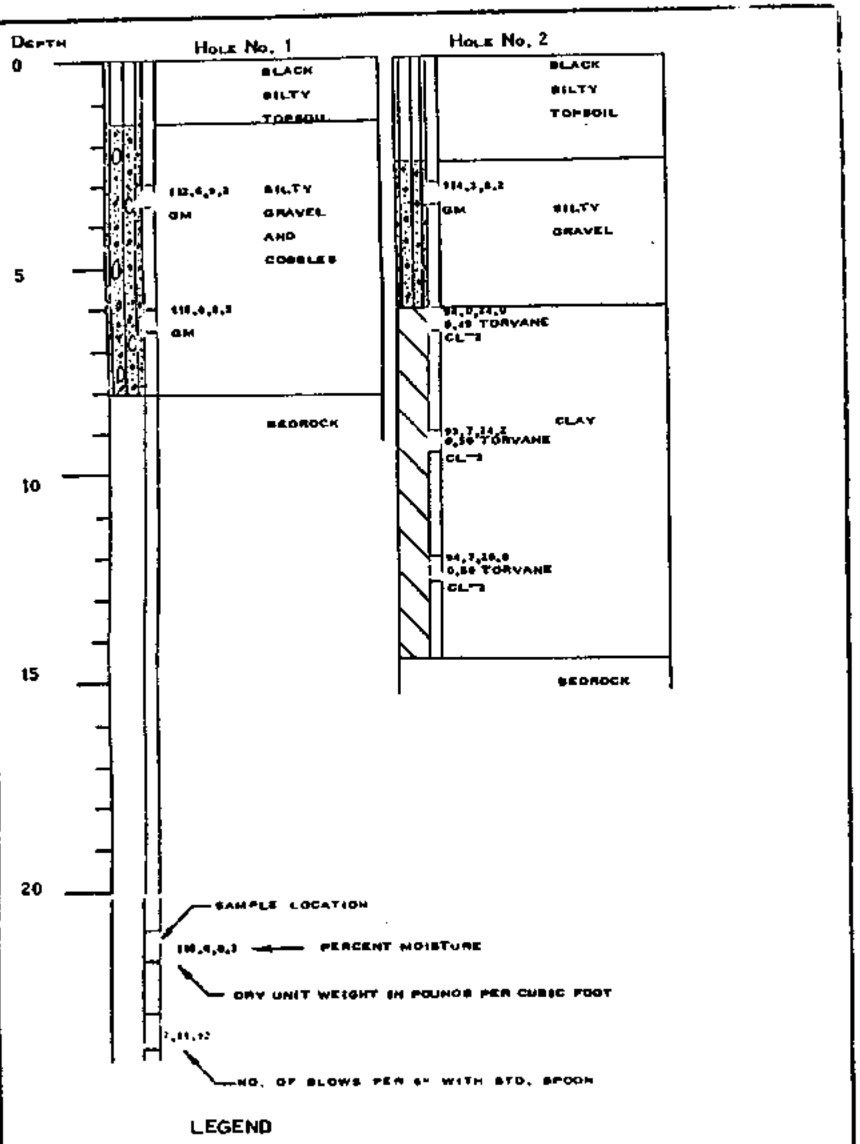
Ralph L. Rollins

dm

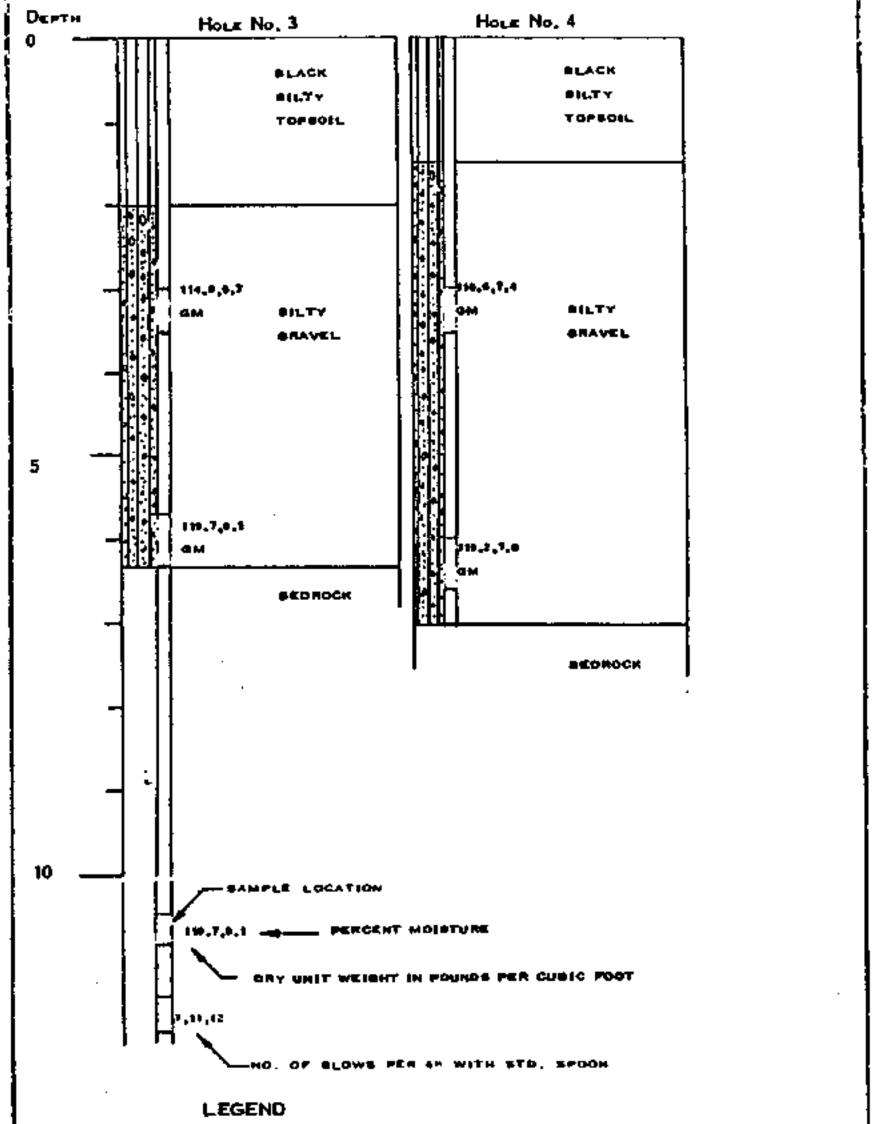
Enclosures



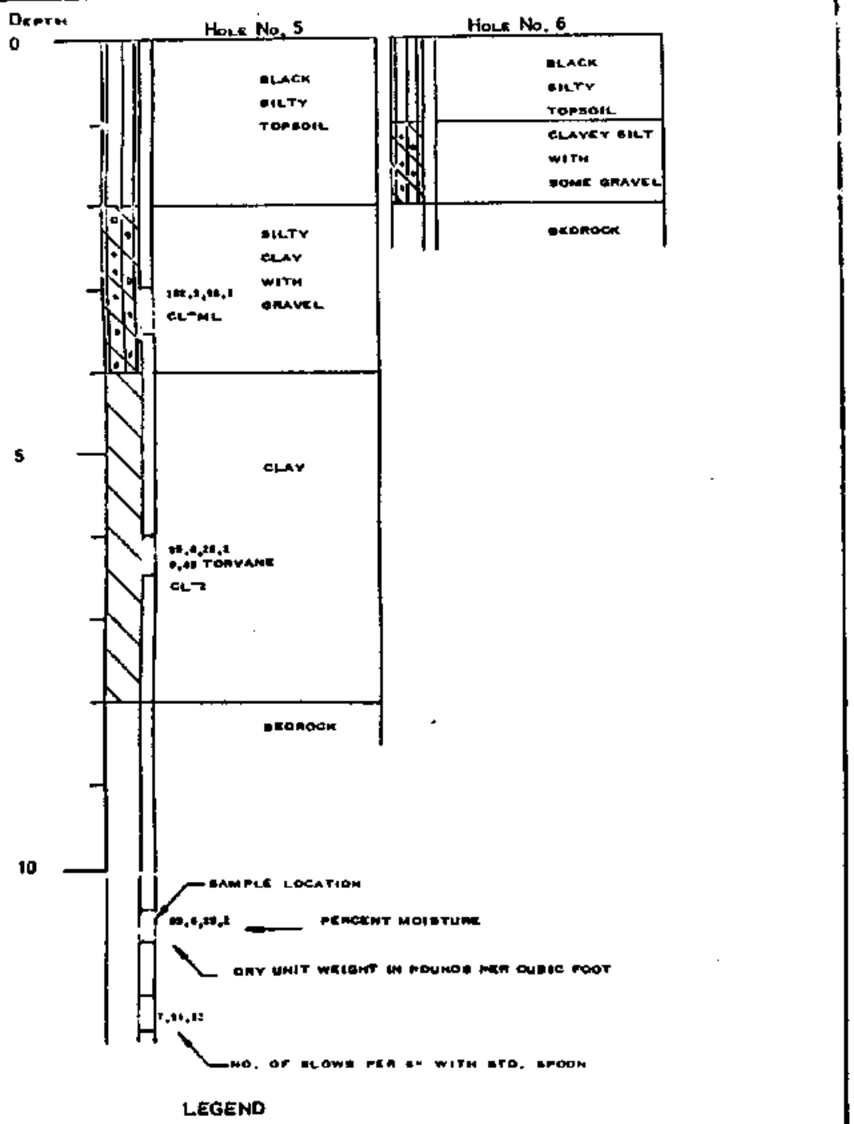
ROLLINS, BROWN & GUNNELL, INC. CONSULTING ENGINEERS	Location of Test Holes For Norfolk Avenue Located In Park City, Utah	Figure No. 1



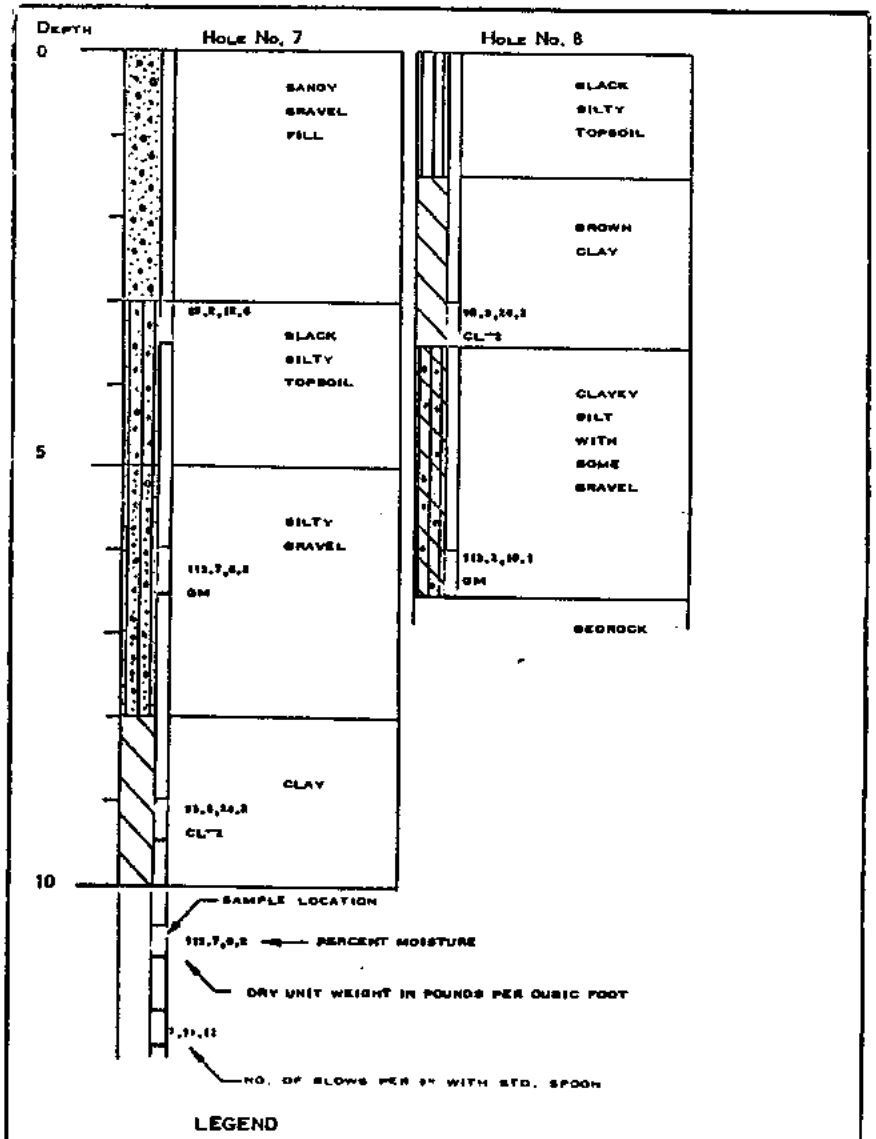
Log of Borings for: Norfolk Avenue in Park City, Utah	ROLLINS, BROWN AND GUNNELL, INC. Consulting Engineers	Figure No. 2



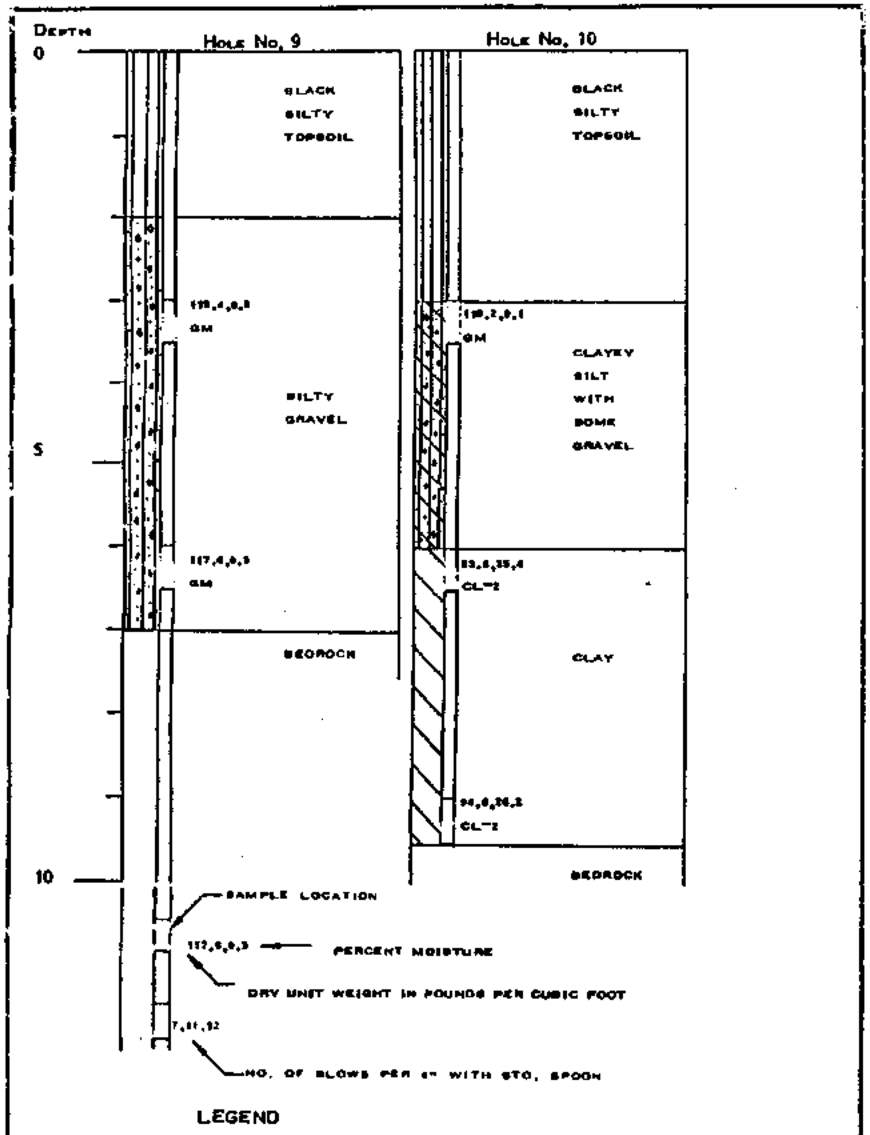
Log of Borings for: Norfolk Avenue in Park City, Utah	ROLLINS, BROWN AND GUNNELL, INC. Consulting Engineers	Figure No. 3



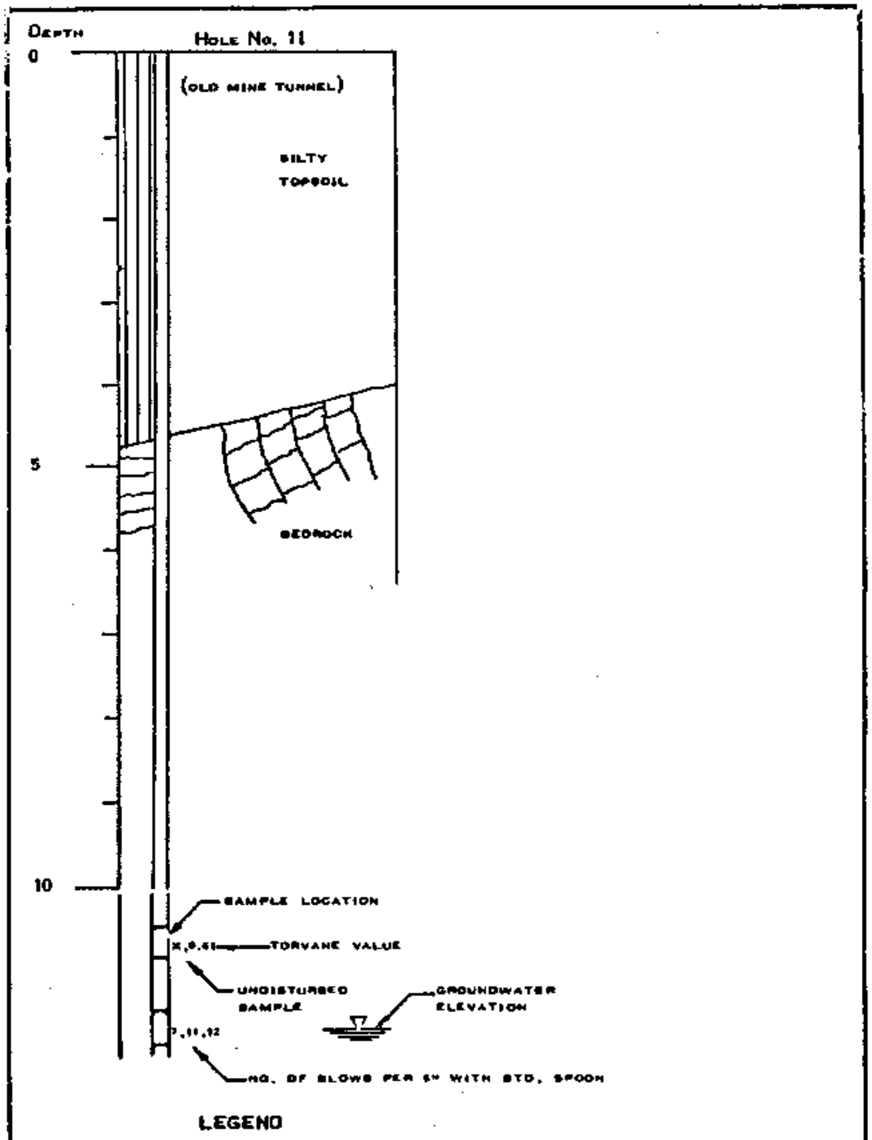
Log of Borings for: Norfolk Avenue in Park City, Utah	ROLLINS, BROWN AND GUNNELL, INC. Consulting Engineers	Figure No. 4



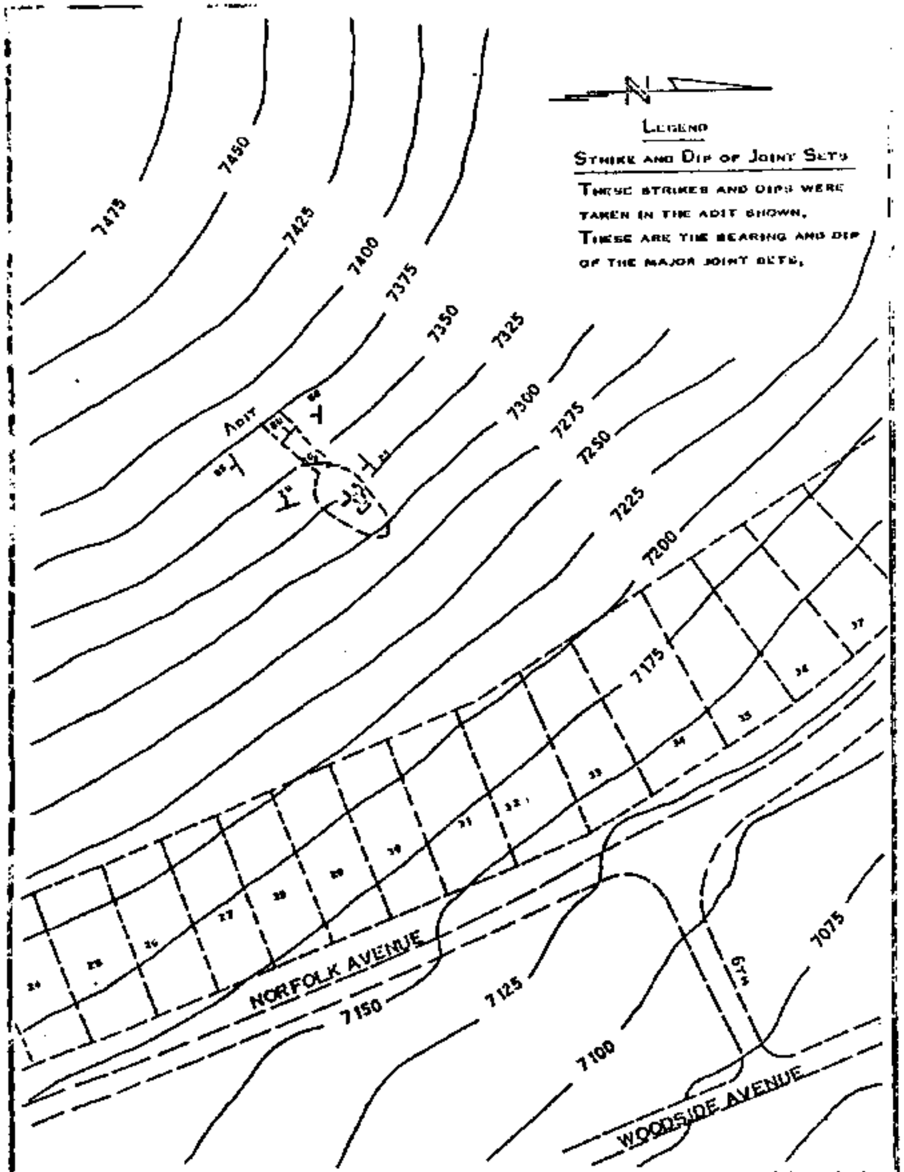
Log of Borings for: Norfolk Avenue in Park City, Utah	ROLLINS, BROWN AND GUNNELL, INC. Consulting Engineers	Figure No. 5



Log of Borings for: Norfolk Avenue In Park City, Utah	ROLLINS, BROWN AND GUNNELL, INC. Consulting Engineers	Figure No. 6



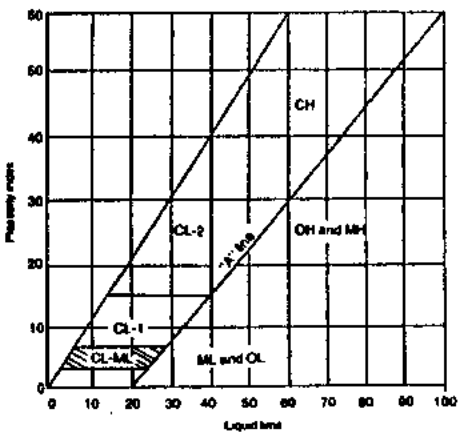
Log of Borings for: Norfolk Avenue In Park City, Utah	ROLLINS, BROWN AND GUNNELL, INC. Consulting Engineers	Figure No. 7



ROLLINS, BROWN & GUNNELL, INC. CONSULTING ENGINEERS	Bearing and Dip of Joint Sets in Weber Quartzite Above Proposed Development	Figure No. 8

FIGURE NO. 9
Unified Soil Classification System

Major divisions			Group symbols	Typical names	Laboratory classification criteria		
Coarse-grained soils (More than half of material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 percent ... GW, GP, SW, SP; More than 12 percent ... GM, GC, SM, SC; 5 to 12 percent ... Borderline cases requiring dual symbols**	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW	
		Gravels with fines (Appreciable amount of fines)	GM* d/u	Silty gravels, gravel-sand-silt mixtures		Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures		Atterberg limits above "A" line with P.I. greater than 7	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines		$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
			SP	Poorly graded sands, gravelly sands, little or no fines		Not meeting all gradation requirements for SW	
		Sands with fines (Appreciable amount of fines)	SM* d/u	Silty sands, sand-silt mixtures		Atterberg limits below "A" line or P.I. less than 4	Limits plotting in hatched zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
			SC	Clayey sands, sand-clay mixtures		Atterberg limits above "A" line with P.I. less than 7	
Fine-grained soils (More than half of material is smaller than No. 200 sieve)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	Plasticity Chart		
			CL 1/2	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
			OL	Organic silts and organic silty clays of low plasticity			
	Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts			
			CH	Inorganic clays of high plasticity, fat clays			
			OH	Organic clays of medium to high plasticity, organic silts			
	Highly organic soils		Pt	Peat and other highly organic soils			



Plasticity Chart

*Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.

** Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example GW-GC, well-graded gravel-sand mixture with clay binder.

TABLE NO. 1

RECOMMENDED ALLOWABLE SOIL BEARING PRESSURES FOR SPREAD FOOTINGS ON GRANULAR SLOPES (2 HORIZONTAL TO 1 VERTICAL)

B	D	D/B	Q(PSF)
2	0	0	544
2	2	1	1824
3	0	0	820
3	3	1	2736
4	0	0	1094
4	4	1	3648
5	0	0	1368
5	5	1	4460

B = Width of Footing. Applicable for rectangular or strip footings.

D = Depth of Footing Below Ground Surface

Q = Allowable Soil Bearing Pressure

Note: For D/B ratios between 0 and 1 interpolate allowable soil bearing pressures linearly between 0 and 1.

TABLE 2 SUMMARY OF TEST DATA

PROJECT NORFOLK AVENUE FEATURE FOUNDATIONS LOCATION PARK CITY, UTAH

HOLE NO.	DEPTH BELOW GROUND SURFACE	STANDARD PENETRA. BLOWS PER FT.	IN-PLACE			UNCONFINED COMPRESSIVE STRENGTH LB/FT²	FRICTION ANGLE ϕ	CONSISTENCY LIMITS			MECHANICAL ANALYSIS			SOIL CLASSIFICATION UNIFIED SYSTEM
			UNIT WEIGHT LB/FT³	MOISTURE PERCENT	VOID RATIO			L.L. %	P.L. %	P.I. %	% GRAVEL	% SAND	% SILT & CLAY	
1	3		112.6	9.2							65.0	8.7	26.3	GM
	6		115.8	8.3							58.8	7.0	34.2	GM
2	3		114.3	8.2							82.3	7.0	10.7	GM
	6		94.0	24.0		3435		40.1	19.8	20.3				CL-2
	9		93.7	24.2		3153		40.4	19.3	21.1				CL-2
	12		94.7	26.8		2987		38.5	17.8	20.7				CL-2
3	3		114.6	8.7							64.0	9.5	26.5	GM
	5.5		119.7	9.1							60.0	10.5	29.5	GM
4	3		118.6	7.4							66.2	7.8	26.0	GM
	6		119.2	7.8							62.2	10.8	27.0	GM
5	3		102.3	18.1				23.2	16.8	6.4				CL-ML
	6		95.6	25.2		2997		38.7	17.8	20.9				CL-2

TABLE 2 SUMMARY OF TEST DATA

PROJECT NORFOLK AVENUE FEATURE FOUNDATIONS LOCATION PARK CITY, UTAH

HOLE NO.	DEPTH BELOW GROUND SURFACE	STANDARD PENETRA. BLOWS PER FT.	INPLACE			UNCONFINED COMPRESSIVE STRENGTH LB/FT²	FRICTION ANGLE	CONSISTENCY LIMITS			MECHANICAL ANALYSIS			SOIL CLASSIFICATION UNIFIED SYSTEM
			UNIT WEIGHT LB/FT³	MOISTURE PERCENT	VOID RATIO		ϕ	L.L. %	P.L. %	P.I. %	% GRAVEL	% SAND	% SILT & CLAY	
7	3		85.2	12.6				20.3	15.7	4.6				ML
	6		113.7	8.2							58.6	13.9	27.5	GM
	9		93.8	24.2		2919		37.9	17.6	20.3				CL-2
8	3		95.3	26.2		3299		35.6	19.2	16.4				CL-2
	6		113.2	16.1							54.6	10.4	35.0	GM
9	3		115.4	8.2							62.1	11.1	26.8	GM
	6		117.6	9.3							46.2	31.4	22.4	GM
10	3		115.2	9.1							44.8	31.2	24.0	GM
	6		93.8	25.4		2637		37.5	19.4	18.1				CL-2
	9		94.6	26.2		2738		39.6	19.0	20.6				CL-2

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WILLIAM LUND

May 1979

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Utah Geological and Mineral Survey
Salt Lake City, Utah 84108

PRELIMINARY ENGINEERING GEOLOGIC REPORT TO PARK CITY ON THE PROPOSED QUITTIN TIME DEVELOPMENT

by
William Lund, Geologist

Done at the request of the Park City planner.
May 1979

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PRELIMINARY ENGINEERING GEOLOGIC REPORT TO PARK CITY ON THE PROPOSED QUITTIN TIME DEVELOPMENT

INTRODUCTION

This report presents the results of a geologic reconnaissance of the proposed Quittin Time residential and recreational complex located in Park City, Utah. This is to be a hillside development which includes both single family dwellings and condominiums. A ski run and other associated recreational facilities are also planned. The purpose of this reconnaissance was to determine what impact the geologic and hydrologic conditions of the site might have on the proposed development. This study was performed at the request of Mr. David Preece, Park City Planner.

SITE CONDITIONS

Location and Physiography

The proposed development encompasses about 352 acres of ground located on the west side of Park City southwest of Woodside Avenue (Figure 1). This is an area characterized by steep slopes and broad, shallow drainages. Elevations across the site range from about 7110 feet on the east edge of the property to an estimated 7600 feet on the west edge. Vegetative cover is moderate to thick and consists of buckbrush at the lower elevations and evergreens further upslope. There has been no previous residential development on the property, but two municipal waterlines and an abandoned aerial tramway cross the site, and numerous mineral prospects and old mine tunnels dot

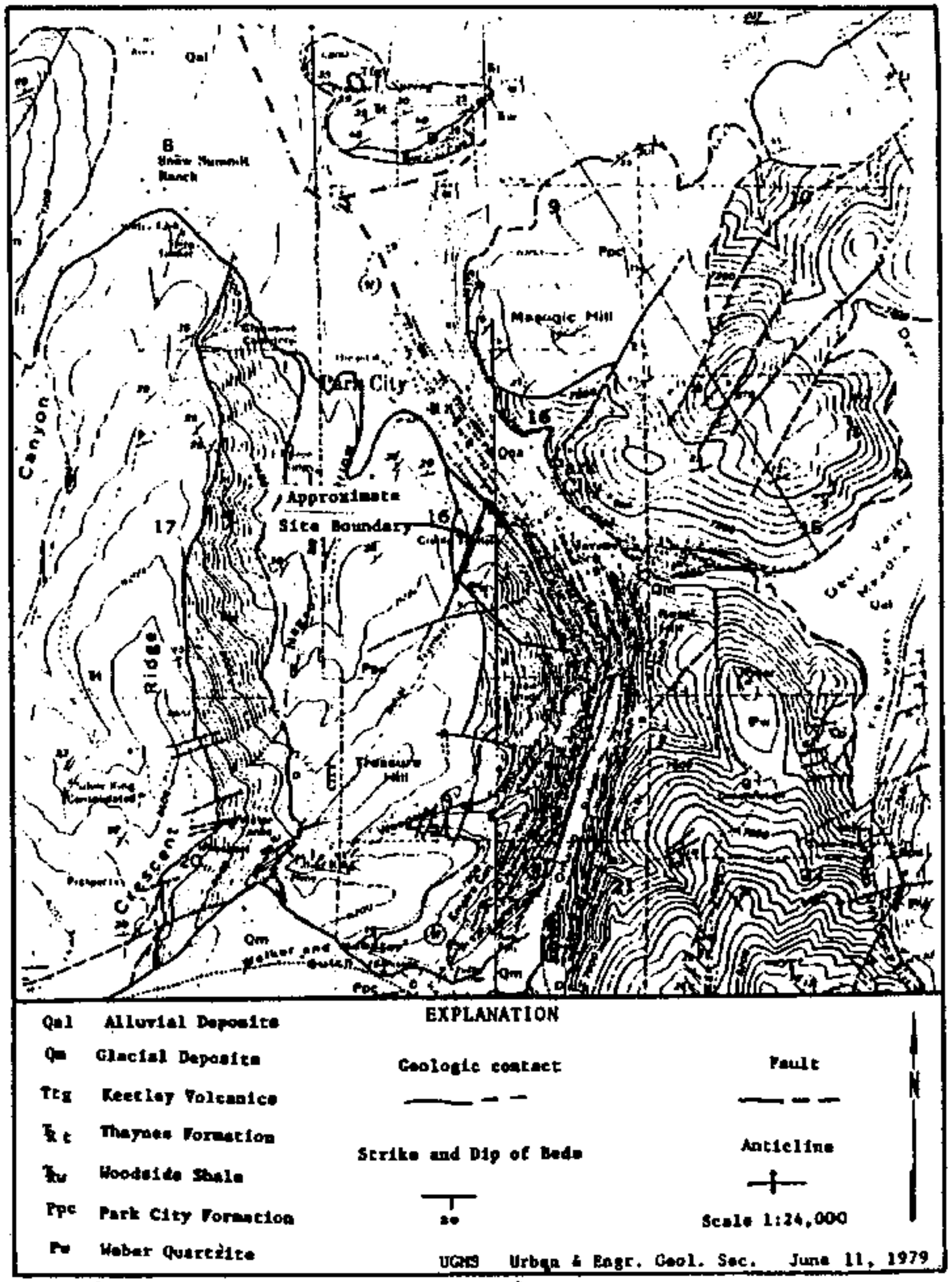

Figure 1 General Location and Geologic Map

the hillside.

Geology and Soils

Lying as it does near the intersection of two major structural lineaments, the Wasatch Front and the Uinta Mountains, the geology of the Park City District has undergone a long and complex history. The major structural features and geologic units in the vicinity of the proposed development are summarized in Figure 1. The ridge upon which the development would be built is underlain by the Weber Quartzite, a pale gray and tan formation of quartzite and limey sandstone with interbedded horizons of limestone and dolomite. The major structural feature in the area is the Park City anticline which lies southeast of the site (Figure 1). Two faults have been mapped by Bromfield and Crittenden (1971) as extending onto the site from the west; however, during the field investigation no surface evidence of these or any other faults was observed.

Bedrock exposures on site are limited to one small, highly weathered, outcrop high on the hillside along the proposed ski run, and to rock exposed in old mine workings. At these localities the quartzite was observed to be hard and durable but fractured and containing numerous, well-developed joint sets. Due to the limited extent of the exposures and to the numerous joints present it was not possible to obtain a reliable strike and dip on a bedding surface, but Bromfield and Crittenden show the quartzite in adjacent areas to be striking to the northeast and dipping 10 to 20 degrees to the northwest. The following table lists the joints observed at the surface outcrop and also

those measured during the site reconnaissance inside a mine tunnel located on the property (Figure 2).

Strike	Dip	Spacing	Fillings or Coatings	Class	Location
N10E	43NW	2-3'	none	major	surface outcrop
N85W	Vert	2-3'	none	major	surface outcrop
N22E	Vert	2-3'	none	major	surface outcrop
N47E	80SE	3"-1'	iron stain	major	mine adit
N52E to N65E	80NW	3"-1'	none	major	mine adit
N10W	83SW	1'-5'	none	*	mine adit
N80W	73NE	1'-5'	iron stain	*	mine adit
N20E to N40E	80SE to Vert	1"-6"	none	minor	mine adit
N50W	Vert	6"-1'	none	minor	mine adit
N-S	21W	1'-5'	none	**	mine adit

* Due to limited size of outcrop and width of joint spacing unable to determine if this is a major or minor joint set.
**Possibly a bedding plane

During this investigation nine of ten backhoe pits excavated by a private consulting firm which had previously prepared a report on this property were examined (Figure 2). Prior to the field reconnaissance, four of these test holes were cleaned out by the Park City backhoe. The five remaining holes were not cleaned, either because they were inaccessible due to installation of a new municipal waterline across the site, or because they could not be located by the equipment operator. The four test holes which were cleaned, nos. 1, 4, 5, and 10 of the consultant's

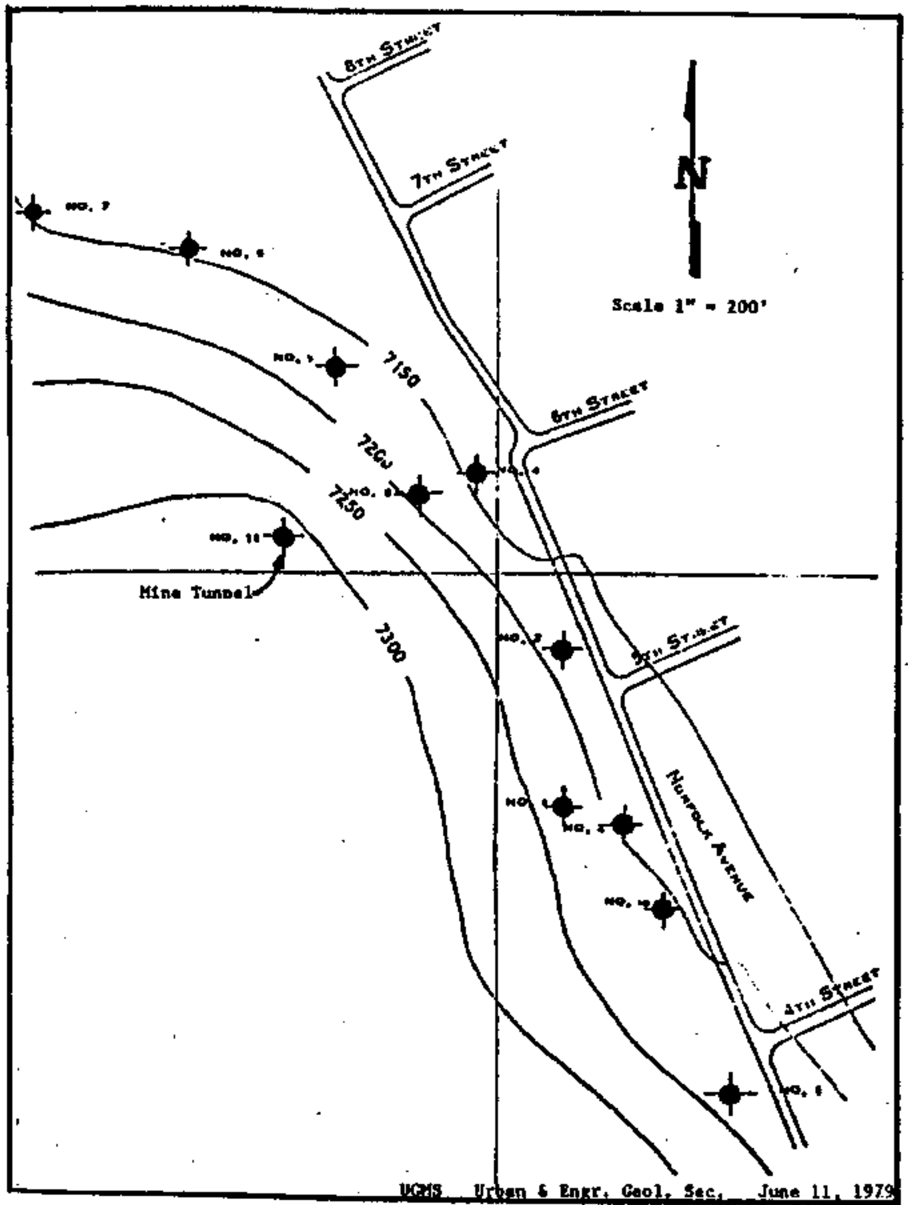

Figure 2 Location of Test Holes (Modified from consultants report)

report, were all reported to have reached bedrock at depths ranging from seven to nine feet below the ground surface. Groundwater was encountered at a depth of eight feet in test hole no.10, and this prevented the excavation from being adequately cleaned. As a result no determination could be made regarding the presence of bedrock. Test holes 1 and 4 were both cleaned to their original depths, but an inspection showed that neither of the two had reached solid, in place rock. Instead, both excavations stopped at a dense, closely packed layer of quartzite cobbles and boulders in a clay matrix. This material appears to be sufficiently compact to resist excavation by all but the largest of backhoes, and may represent the zone of broken and weathered material that commonly mantles in place bedrock. However, since the excavations did not penetrate this horizon, its true thickness and relationship to the underlying bedrock is not known. Test Hole No. 5 was excavated one foot below original grade and bedrock was not encountered. The walls of the five remaining test holes had all sluffed to some degree, consequently, bedrock could be positively identified only in test hole no. 6. The tenth test hole, no. 3 of the consultant's report, had been backfilled and could not be located.

The soils exposed in the test holes generally conform to the descriptions provided in the consultant's report (Apprendix A). The only significant difference concerns the description of the Zone 2 soils. This soil horizon is described in the consultant's report as a granular zone composed of angular fragments in a silt matrix, and is classified in their logs in accordance with the

United Soil Classification System as a silty gravel. Such a description implies that the material is non- to only slightly-cohesive and possesses no or only very low plasticity. The soils which correspond to Zone No. 2 observed in the test holes were found to contain a considerable amount of clay and as a group are probably better classified as a clayey gravel and in some localities even a gravelly clay.

Hydrology

The hillside upon which the proposed site is located receives between 25 and 30 inches of precipitation annually (Baker, 1969). Despite the relatively generous amount of moisture available, a near surface groundwater table exists beneath the site for only a short period of time each year, if it is present at all. The reason for this is the result of a combination of factors which include the manner in which the precipitation occurs at the site, the permeability of the clay-rich soils, and the steep mountain slopes. The majority of precipitation which falls on the site each year accumulates as a thick snow-pack during the winter months. In the spring, the snow melts quickly and releases a large quantity of water to the environment. A portion of this melt water infiltrates into the soil while the remainder flows downslope as surface runoff. The amount of water which soil can absorb is dependent upon its' permeability and the rate at which the water is made available to it. The clayey soils beneath the proposed development have moderate to low permeabilities. Therefore, during periods of warm temperatures and rapid snow melt near surface soils quickly become saturated and can accept no more water. This results in a marked increase in the amount of water which takes the

form of surface runoff. During a cold spring the snow melt proceeds more slowly and the soil has more time to accept the water made available to it. Regardless of whether the melt-water runs off across the surface of the ground or infiltrates into the soil it is immediately acted upon by gravity and moves rapidly downslope. In a normal year the amount and duration of the surface runoff closely parallels the rate at which the snow pack melts and is usually complete by mid- to late-spring. The downslope movement of the water which infiltrated the soil is slower, but it also travels relatively quickly so that by midsummer the soils have drained and there is no near surface groundwater remaining.

The Weber Quartzite which underlies the site is recognized as a major water producing formation in the mines surrounding Park City, however, it should be remembered that these mines drain many square miles of rock. An existing mine tunnel (Figure 2) on the property which has been advanced approximately 60 feet into the Weber Quartzite was found to be dry in mid-May.

Seismicity

Park City is located along the southern portion of the Intermountain Seismic Belt, a north trending zone of earthquakes extending from the Montana-Canada border to Arizona, and historically the second most active seismic area in the continental United States. In Utah earthquake activity associated with the ISB occurs along a complex series of steeply dipping faults having a generally north-south trend. The Wasatch Fault, which at its closest point lies about 16 miles due west of Park City, is one of the largest and most seismically active of these faults.

Although many faults have been recognized in the Park City Mining District none are known to show evidence of recent activity. A compilation of earthquake epicenters, prepared by the University of Utah Seismograph Station, covering the period from 1962 to 1978 lists a total of 22 earthquakes with magntiudes of 1.5 or greater occurring within a 13 mile radius of Park City (Figure 3). The largest of these was the Heber Valley earthquake which occurred in October of 1972 with a magnitude of 4.2. The other 22 events all had magnitudes of 3.9 or less.

ENGINEERING GEOLOGIC CONSIDERATIONS

As a part of this study, a review was made of a geotechnical report previously prepared on this property by a private consulting firm. While overall a good report, the results of our own field investigation are at odds with certain of the consultant's findings. These differences are pointed out in the text. In addition, some other geologic and hydrologic aspects of this site which were not covered in the consultant's report are discussed here.

Foundation Considerations

As previously mentioned in this report (page 6) the granular materials grouped together by the consultant as Zone 2 soils and identified as silty gravels were found to contain a considerably higher percentage of clay than is normally associated with a silty soil. For this reason, it is felt that they are better classified as clayey gravels and locally as gravelly clays. Clay bearing soils may possess a considerable shrink-swell capacity which is primarily related to their ability to adsorb or release water. In addition, many soils are susceptible to compaction and differential settlement with loading. For these reasons, it is recommended that for any

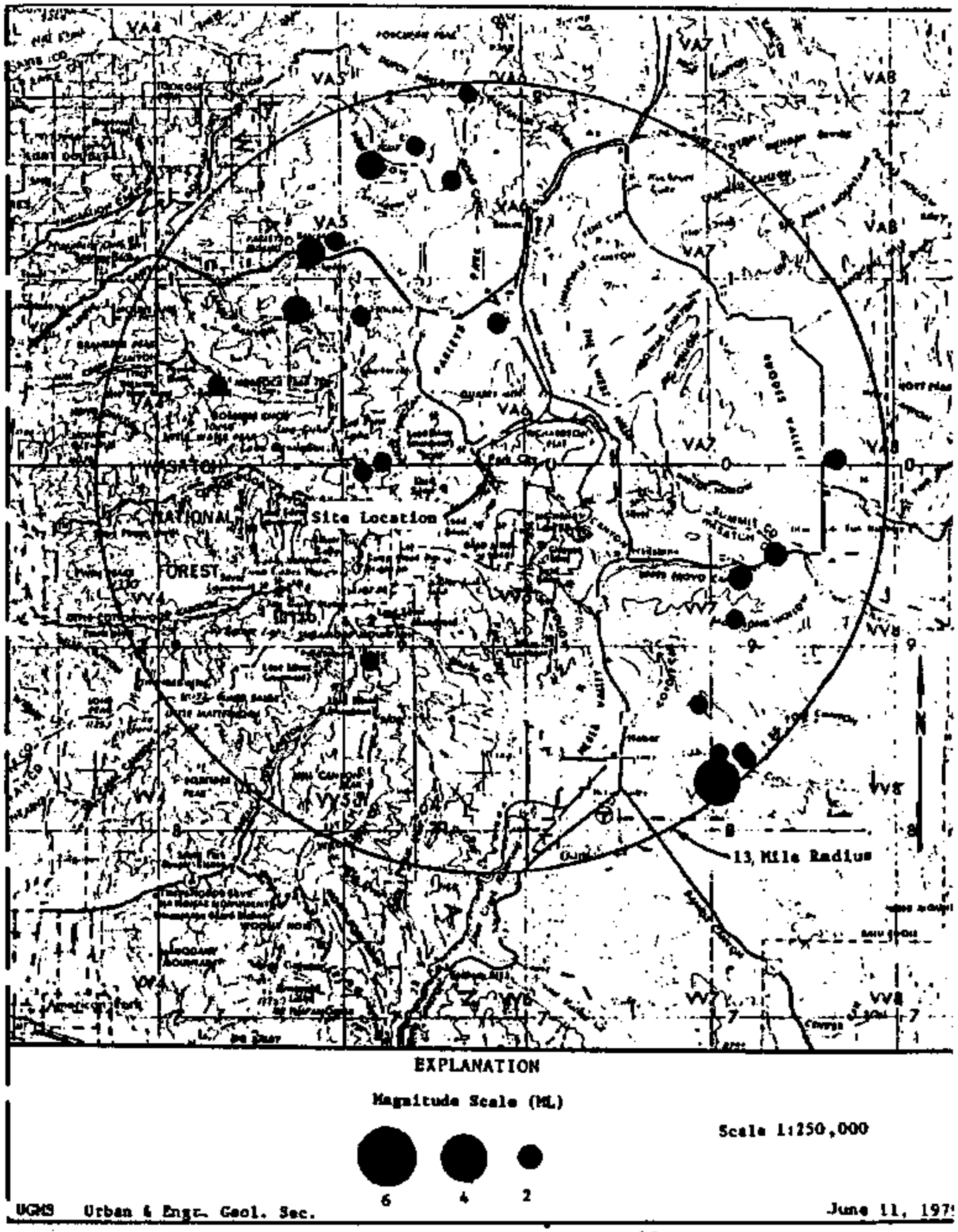

Figure 3 Location of Earthquake Epicenters, 1962 to 1978

structure which will be supported in whole or in a substantial part by a Zone 2 or Zone 3 soil (Appendix A) additional tests be performed to determine the engineering characteristics of the particular soil horizons involved, and that all foundations or retaining walls be designed accordingly. The consultant's report recommends that all structures in the development be founded on bedrock, thereby avoiding a number of foundation and slope stability problems. Based upon our inspection of the consultant's test holes and a comparison with their test hole logs it appears that in at least two instances closely packed quartzite cobbles and boulders were mistakenly indentified as bedrock. Care should be exercised during construction to insure that foundations designed to rest on solid inplace rock do so, and that the zone of broken and weathered material which commonly mantles bedrock is completely removed before the foundations are laid. Observations made at the entrances to several adits and tunnels on the property indicate that this weathered zone is from two to about six feet thick. The depth of the excavations required to reach bedrock can be expected to vary across the site; ranging from only a few feet on the steeper slopes and the high ground between drainages to greater than ten feet along stream channels and on gentle slopes.

In a hillside development of this type, numerous fills will be required both to prepare construction pads and roadbeds, and to backfill behind retaining walls. To prevent excessive settlement and failure of these fill sections it is recommended that a code of minimum construction specifications be adopted which

clearly outline the acceptable gradation limits and compaction requirements for all catagories of fill material. In this regard, it should be noted that the crushed quartzite found in the numerous small mine waste dumps on site would make a very good source of granular, nonplastic fill material. This would seem to be an excellent use for this material since the dumps are too small to provide a foundation for a house or condominium and would probably be considered unsightly in this type of development.

Slope Stability

Natural slopes on site are steep, averaging between 44 and 57 percent gradient (20 to 26 degrees), but appear to be stable under the existing conditions of landuse and vegetative cover. No indications of landsliding or slumping were observed, but there was considerable evidence to indicate that soil creep is occurring. Soil creep is the slow, nearly continuous movement of soil and broken rock downslope under the influence of gravity. It is manifested by the tipping of fence posts and similar rigid objects embedded in the ground. One of the best indicators that creep is occurring is the gentle curving of the base of trees with the convex side pointed downhill in the direction of movement. Generally, creep is confined to the upper 10 to 15 feet of the soil or broken rock mass, and is most rapid close to the ground surface. Soil creep should be considered an indicator of possible problems since it represents a quasi-equilibrium state that can be upset and turned into a much more serious slope failure by unwise construction practices. Ample evidence of this can be seen just to the north of the proposed development in an area of new construction above Lowell Avenue where over-steep cuts in unconsolidated materials are undergoing extensive sluffing and where at least one landslide/mudflow is reported to have occurred (David Preece, oral communication).

Usually, soil creep cannot be stopped, but its rate of movement can be decreased by providing ample drainage, thereby increasing soil strength and preventing periodic swelling and shrinking of the soil mass. To help insure post construction slope stability of the unconsolidated materials on site it is recommended that cut and fill slopes be designed in accordance with the recommendations of a qualified soils engineer following a detailed stability analysis of the materials involved.

The stability of a bedrock cut is highly dependent upon the orientation of any bedding planes or joints which may be present in the rock mass. Obviously, the critical relationship is one in which a joint or bedding plane strikes in a direction parallel to the cut and dips toward the open slope face. When such a situation exists, blocks of rock, the size of which are determined by the spacing of the joints, can become detached and slide or fall, producing a hazard to both buildings and people. A somewhat less critical situation occurs when joints or bedding are present, but with orientations different from those described above. In such cases there is a tendency for the slope to ravel and produce some fallout of blocks. Rock fall problems can be reduced by establishing slope angles which do not allow potentially troublesome joints or bedding planes to daylinght.

Numerous joints with various orientations (table, page 4) were measured in the bedrock at the site. Again the findings of our field reconnaissance disagree with the consultant's report, in that a joint was found that strikes more or less parallel to the hillside and dips toward the valley (N80W, 73NE). This orientation was measured in the wall of the mine tunnel (Figure 2). The joint was not strongly developed, and the spacing was such that it was difficult to determine from such a small outcrop whether or not it represents a major set of discontinuities in the rock mass. If it does, serious rockfall problems could develop in any steep bedrock cuts which parallel the mountain face. For this reason, and because the orientation of other bedrock cuts made during construction may daylight some of the rêmaining joint sets, it is recommended that as construction proceeds all rock cuts be inspected by a qualified engineering geologist, and that based upon his recommendations slope designs be modified as necessary to prevent daylighting of joints or bedding.

The material comprising the mine dumps on site is at or near its angle of repose. For that reason, during construction care should be taken not to undercut any dump slopes. If the slopes are undercut they could fail rapidly and at best would probably provide an almost continuous maintenance problem with raveling slopes.

A short term slope stability problem which deserves consideration here is the hazard to the homes along Woodside Avenue from rocks which become dislodged by construction activities and roll downhill. A system should be devised to catch and stop these rocks before they can cause any property damage or injure anyone.

Site Drainage

Some of the most severe problems associated with hillside developments are related to water. This is nowhere more evident than in Park City where each Spring the homes built on the surrounding hillsides suffer from erosion, sedimentation, localized flooding and water related slope stability problems. Due to the steepness of the slopes upon which it would be built, the proposed development would also be susceptible to such hazards. The number and severity of these problems can be reduced by installation of an adequate site drainage system. Such a drainage system is necessary not only to prevent problems in the new development, but also to protect the homes already in existence along Woodside Avenue from the increased runoff that can be expected to result from construction upslope.

It is recommended that interceptor drains be established both above and below the development, and that site grading be accomplished in such a manner that all surface runoff is collected and funnelled to those drains. In addition, the existing vegetation should be left undisburbed whenever possible and septic tanks are definitely not recommended.

Avalanches

Whenever a hillside is being considered for development at the higher elevations in the Wasatch Mountains, its potential for avalanche hazard must be evaluated. At least one destructive avalanche is known to have occurred on the hillsdie where the proposed development would be built. It is reported to have destroyed a large shed and damaged a house on Woodside Avenue

about 1910 or 1911 (Mrs. Bea Kunner, oral communcation). Photographs dating from the same era show that most of the vegetation on the hillside had been cut down to fire the old steam driven hoists and pumps in the surrounding mines. There has not been a large avalanche on the hillside for at least 40 years (Mr. Mel Flecher, oral communication), a period of time that more or less coincides with the reestablishment of vegetation on the slope. Since slopes with gradients steeper than 35% (approximating 16 degrees) can generate avalanches it must be assumed that if large areas of the hillside are again stripped of their vegetative cover avalanches could occur.

It is recommended that a map be prepared by the developer which shows the areas from which the vegetation will be removed. A comparison can then be made with a topographic map to determine if an avalanche hazard would be created; if it is, appropriate control methods should be implemented.

Ground Subsidence

Ground subsidence is not normally associated with a site where bedrock lies as close to the surface as it does at this one. However, the extent of past mining activity in the area raises the possibility of ground collapse over old mine workings. A number of the old prospects and tunnels observed on site during the reconnaissance have caved or collapsed near their entrances, and around others a small circular zone of subsidence has developed. No structures of any type should be built over or directly adjacent to caved, collapsed, or subsided ground nor should heavy structures be permitted directly upslope from shallow mine workings until it can be proven that no danger from ground collapse exists.

Regardless of whether or not construction activity occurs on or near old mine workings, they all should be located and sealed to protect the residents of the property from injury.

Seismic Response

The absence of active faults in close proximity to Park City means that seismic response in the area would most probably be limited to some degree of ground shaking and possible ground failure associated with a large seismic event located along the Wasatch Fault. The intensity and duration of the shaking would depend upon the location of the epicenter and the magnitude of the event. The shallow depth to bedrock at the site would act in its favor, since during an earthquake seismic effects are usually somewhat less severe at bedrock localities. However, the steep slopes upon which the development would be built represent a negative factor in terms of site safety. During strong ground shaking such slopes would be susceptible to both landslides and rock fall. If a seismic event were to occur in the winter months during a period of deep snow pack, avalanches could result.

Park City has experienced a remarkably low level of seismic activity, at least in the 100 years or so since the area has been settled. Nevertheless, because of the town's location relative to a number of active earthquake faults it lies in an area classified as Seismic Zone 3 by the Uniform Building Code, and all structures should be designed accordingly.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Based upon the results of our field investigation, a review of the published literature pertaining to the site, and the consultant's report, the following conclusions and recommendations

are made.

Conclusions

1. Zone 2 soils should be reclassified as clayey gravels and locally as gravelly clays to reflect their cohesive nature and high clay content.
2. A dense layer of quartzite cobbles and boulders in a clay matrix exposed at the bottom of test holes 1 and 4 appears to have been erroneously identified in the consultant's report as bedrock. Bedrock could be positively identified in only one of the nine test holes examined, but five of the pits had not been adequately cleared and therefore a determination as to whether bedrock was present or not couldn't be made. Bedrock was also reported in test hole No. 5, however, the excavation was cleaned a foot below original grade and no sign of any rock was observed (see note test hole No. 5 in Appendix A)
3. A joint orientation was measured in the bedrock which strikes more or less parallel to the hillside and dips toward the valley. Due to the limited size of the exposure no determination could be made concerning the continuity or size of this joint set. However, if itis well developed across the site slope stability problems could develop in rock cuts.
4. A number of other potential geologic hazards have been identified at this site. The extent to which they will prove to be a problem depends in large measure on the degree to which they are recognized and compensated for in the developments design. The list of potential geologic hazards includes:
   a. Foundation and backfill problems associated with clayey soils.

b. Slope stability problems in the unconsolidated materials on site due to the steep hillside on which the development would be built.

c. Potential for property damage and personal injury resulting from rocks rolling down slope during construction.

d. Erosion, sedimentation, and localized flooding during the Spring snow melt.

e. Avalanche hazard, especially if vegetative cover is removed from large areas of the hillside.

f. Ground subsidence and collapse over shallow mine workings.

g. Site sensitivity to landslide, rockfall, and avalanche hazard in the event of a large earthquake along the Wasatch Fault.

Recommendations

1. Foundations of structures to be supported in whole or in a substantial part by Zone 2 and Zone 3 soils should be designed on the basis of the engineering parameters determined for the particular soil horizons involved by laboratory testing.

2. Care should be exercised during construction to insure that those foundations designed to rest on bedrock actually do so, and that the mantle of broken and weathered material lying just above bedrock is completely removed before the foundation is laid.

3. If not already in existence a code of minimum construction standards should be adopted which clearly outlines the acceptable gradation limits and compaction requirements for various catagories of backfill.

4. Cut and fill slopes in unconsolidated materials should be designed by a qualified soils engineer on the basis of detailed stability analyses.

5. As construction proceeds all rock cuts should be inspected by a qualified engineering geologist and based upon his recommendations the cuts should be modified as necessary to prevent daylighting of joints and bedding.

6. Homes located along Woodside Avenue should be protected from rolling and falling rock dislodged by construction activity.

7. Interceptor drains should be installed both above and below the development and site grading should be accomplished in such a manner that all surface runoff is collected and channelled to the drains.

8. A map should be prepared by the developer showing those areas of the site where vegetation will be removed. If, upon comparison of that map with a topographic map it is found that an avalanche hazard will be created appropriate control measures should be taken.

9. Structures should not be built over or adjacent to caved, collapsed or subsided ground, and heavy structures should not be permitted directly upslope of shallow mine workings until it can be proven that no danger from ground collapse exists.

10. All old mine tunnels, shafts, or adits on site should be located and permanently sealed to prevent injury to residents of the development.

11. Numerous small mine dumps exist on site, of these only the old Creole dump appears to be of sufficient size to support a large building. Due to the potential for creating unstable slope

conditions, it is recommended that the smaller dumps be left undisturbed, especially the side slopes, unless they are to be completely removed, possibly for use as backfill material. From a geologic standpoint there is no reason why the Creole dump could not be used as a construction site provided that the foundations for any structures errected on the dump are designed in accordance with the recommendations of a qualified soils engineer.

APPENDIX A

PART I: Summary of Subsurface Soil Conditions as Reported in the Consultants Report

Zone	Thickness	Description	Location (Test Hol
1	1.5' to 3.0'	Black Silty Top Soil	all
2	3.0' to 6.5'	Sand through Cobbles in a silt matrix	1,2,3,4,7,9
*3	1.5' to 8.5'	Medium plasticity clay and clayey silt	2,5,6,7,8,10
4	—	Weber Quartzite	1,2,3,4,5,6, 8,9,10

*Soils reported as clayey silts also placed in this group.

Part II: Logs of Test Holes Examined by UGMS Personnel during May, 1979

Test Hole No.1

0.0-1.7'	Silty Sand-Sandy Silt; (SM-ML), black, loose to medium dense, non- to slightly-plastic, moist, abundant organics.
1.7-8.0'	Silty Clayey Gravel with Boulders; (GM-GC), brown, dense, low plasticity fines, moist.
8.0-9.0'	Quartzite cobbles and boulders in a clay matrix, very dense.

Bedrock was not encountered in test hole.

Test Hole No.2

0.0-2.1'	Silt with fine sand; (ML), black, soft to firm, non- to slightly-plastic, wet, abundant organics, some cobbles and boulders.
2.1-5.7'	Clayey Gravel; (GC), yellowish brown, medium dense to dense, low to moderately plastic fines, wet.
5.7-8.5	Clay; (CL), yellowish brown, stiff, medium plasticity, wet.

Backhoe did not clean test hole below 8.5 feet.

Test Hole No.3

Unable to locate, possibly destroyed during installation of waterline across site.

Test Hole No.4

0.0-1.8'	Silt with sand and clay; (ML), black, firm to stiff, low plasticity, moist, abundant organics, some cobbles and boulders.
1.8-7.0'	Clayey Gravel: (GC), yellowish brown, dense, low plasticity fines, wet, boulders to 1.5' diameter.

Bedrock was not encountered in test hole. Floor consists of densely packed quartzite cobbles and boulders in a clav matrix.

Test Hole No.5

0.0-2.0'	Silt with sand and clay; (ML), black, firm, slightly plastic, moist, abundant organics.
2.0-6.2'	Clayey Gravel; (GC), yellowish brown, dense, low plasticity, moist, boulders to 1.0' diameter.
6.2-9.0'	Clay; (CL), yellowish brown, stiff to very stiff, moderately plastic, moist.

Test hole carried 1' below original grade, did not encounter bedrock. A second backhoe pit was discovered in the vicinity of Test Hole No.5, it had not been cleaned and the soils exposed did not come close to matching the consultant's original log, so it is assumed that the log of the test hole presented here is the correct one.

Test Hole No.6

Inspection showed that this test hole encountered bedrock at depth of about 2.0 feet. Rock exposed was highly fractured.

Test Hole No.7

0.0-3.0'	Sandy Gravel; (GM), fill, portion of old Creole Mine dump.
3.0-5.0'	Silt with Sand; (ML), black, top soil material similar to that described in other borings.

Test Hole No.7 (continued)

5.0-7.5'	Clayey Gravel; (GC), yellowish brown.

Hole sluffed below 7.5'

Thickness of soil horizons approximated in this test hole due to unstable condition of mine dump material above the excavation.

Test Hole No.8

0.0-1.5'	Sandy Silt; (ML), black, firm, slight plasticity, moist, abundant organics, boulders and cobbles.
1.5-5.0'	Clay; (CL), brown, stiff to very stiff, low to moderately plastic.

Test hole has sluffed below 5.0 feet.

Test Hole No.9

0.0-1.5'	Sandy Silt; (ML), black, firm to stiff, non- to slightly-plastic, moist, abundant organics, some cobbles and boulders.
1.5-6.0	Clayey Gravel; (GC), yellowish brown, dense, low to moderately plastic fines, boulders to 1½' diameter.

Test hole has sluffed below 6.0 feet.

Test Hole No.10

0.0-2.0'	Silt with sand and clay; (ML), black, soft, non- to slightly-plastic, wet, abundant organics.
2.0-6.0'	Clayey Silt and Silty Clay; (ML & CL), yellowish brown, firm, low plasticity, wet, some gravel.
6.0-8.0'	Clay; (CL), yellowish brown, firm to stiff, moderately plastic, wet.

Water sanding in test hole at 8.0 feet.

SOILS STUDIES & OPINION REPORTS

Rollins, Brown and Gunnell	**June 8, 1977**
William Lund	**May 1979**
SHB Agra	**April 22, 1994**

SHBA AGRA

April 27, 1994

REPORT
ENGINEERING GEOLOGY RECONNAISSANCE
SWEENEY PROPERTIES
WEST OF "OLD TOWN AREA"
PARK CITY, UTAH

Prepared For:

Sweeney Properties
115 Woodside
Park City, Utah 84060

SHB AGRA Job No. E93-2267

SHB AGRA, INC.
Engineering & Environmental Services

AGRA
Earth & Environmental Group

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April 22, 1994

Sweeney Properties
115 Woodside
Park City, Utah 84060

SHB AGRA Job No. E93-2267

Attention: Dr. Patrick Sweeney

Re: Report
Engineering Geology Reconnaissance
Sweeney Properties
West of "Old Town Area"
Park City, Utah

Gentlemen:

1. INTRODUCTION

1.1. General

Presented in this report are the results of our engineering geology reconnaissance of the Sweeney Properties site which is located west of the Old Town portion of Park City, Utah. The general location of the site with respect to major topographic features and existing facilities, as of 1975, is shown on Figure 1, Vicinity Map. A more detailed layout of the site showing general topography, ski trails, major outcrops, and mine workings, are presented on Figure 2, Site Plan.

1.2. Objectives and Scope

The objectives and scope of this study were planned in discussions between Dr. Patrick Sweeney of Sweeney Properties, and Dr. Jeffrey R. Keaton of SHB AGRA, Inc. The objectives of this study were to:

1. Inventory and evaluate the engineering geology parameters of bedrock exposed at abandoned mine openings and primary bedrock outcrops at the site.
2. Provide initial discussions pertaining to the engineering geology characteristics of the site.

In accomplishing these objectives, our scope has included the following:

1. An initial office program including a review of the geologic literature, existing mine opening inventories, geologic maps, and the examination of stereoscopic aerial photographs.
2. A field program consisting of an engineering geologic reconnaissance of mine openings and outcrops.
3. Preparation of this summary report.

1.3. Authorization

Authorization was provided by Dr. Patrick Sweeney by signing a copy of our Professional Services Agreement dated June 28, 1993.

1.4. Professional Statements

Supporting data upon which our recommendations are based are presented in subsequent sections of this report. Recommendations presented herein are governed by the geologic conditions encountered at the mine openings and outcrops, and our other reconnaissance data.

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted engineering principles and practices used at this time.

If additional information is found at the site during the construction phase of the project, we need to be notified immediately so that our recommendations can be reviewed and modifications can be made to this report, if necessary.

2. SITE DESCRIPTION

The site is a moderately to moderately steeply sloping trapezoidal-shaped parcel of land having an area of approximately 125 acres. The boundaries of the site and existing site topography are shown on Figure 1. Elevations on the property range from 7040 feet on the northeast side of the site, to 7800 feet on the southwest side. Vegetation consists of scrub oak, aspen, fir, and spruce, with open areas occupied by sagebrush and grasses. An operating ski-lift and an abandoned mine gondola cross the northern portion of the site. A loading platform for the ski lift and three ski trails are also present on the site. Scattered on the site are several abandoned mine openings.

3. PROPOSED DEVELOPMENT

At the time of this study, overall detailed site development plans had not been finalized. It is our understanding that 15 acres within the northeast portion of the site will be developed for residential home sites, with lots ranging from one-quarter to over one-half acre in size. In other areas, clusters of two to three level condominium structures and possibly high density four to six level resort type structures have been considered.

Homes and two to three level condominium structures will generally be of wood-frame construction above grade, and reinforced concrete construction below grade. Loads imposed by bearing walls and columns will generally be light to moderately light.

The four to six level structure could be of wood-frame or possibly reinforced concrete construction, and would impose moderate to moderately high loads.

Site development will require the construction of primary access and secondary roads. Everything will be done to minimize cuts and fills associated with the roadway. However, in many areas, cuts and fills of 15 to 20 feet may be required. Similar cuts and fills may be required in the higher density building development areas.

4. INVESTIGATIONS

4.1. Field Program

Prior to our field program, a detailed review of literature, inventory reports, and aerial photography were performed. This was followed by a general site reconnaissance of mine openings and rock outcrops. The mine openings and rock outcrops examined during our reconnaissance were selected on the basis of proximity to the portion of the site that will be developed. These locations are shown on Figure 2.

5. SITE GEOLOGY

The prominent rock type of the site area is the Weber Quartzite. This formation has been described as "pale gray and tan weathering quartzite and limy sandstone; some interbedded gray to white limestone and dolomite" (Bromfield and Crittenden, 1971). The Weber Quartzite is estimated to be from 1,300 to 1,500 feet thick and comprises the oldest exposed rocks in the area. Overlying the Weber Quartzite is the Park City Formation, which is comprised of limestones, cherts, sandstone, and shale, that ranges from 550 to 650 feet in thickness. The Weber formation was deposited during the late Pennsylvanian, and the Park City formation consists of Permian age rocks.

The area of the site has been subject to anticlinal folding and thrust faulting (Bromfield, 1968). The most prominent structural feature in the area is the Park City anticline, which runs on a northeast plunging axis. The axis of the anticline is located approximately 700 feet to the west of the site (Bromfield and Crittenden, 1971; Crittenden, Calkins, and Sharp, 1966).

The nearest know active faults are associated with the Wasatch fault zone which lies approximately 12 miles west of the site.

The geology exposed in the mine openings and outcrops consisted of massive bedded quartzite containing some interbeds of fine-grained sandstone laminae. The beds were found to be near horizontal, generally dipping gently to the southwest. Vertical to near vertical joints spaced 1 to 3.5 feet apart were observed in the exposures. Two joint orientation trends appear to have developed in the quartzite beds. A primary trend is oriented at roughly 230 degrees, and a secondary trend is oriented at about 70 degrees. Near the surface, the quartzite was observed to be more highly fractured from weathering and spalling processes.

A tabulation of the engineering geology parameters of the exposures is presented on Table 1, Engineering Geology Parameters of Mine Openings and Outcrops. Additional information with respect to observations taken at the exposures is presented in Appendix A, Site Exposure Inventory. The bedrock exhibits high strength and low compressibility characteristics, and is not moisture sensitive. The bedrock is overlain by colluvial soils, which can best be described as mixtures of silt; some clay; and angular sand, gravel, rubble, and boulder sized pieces of quartzite.

The soils are not moisture sensitive and generally exhibit moderately high strength and low compressibility characteristics.

The true static groundwater table is at significant depth and should not affect design, construction, or performance of the proposed facilities. Near surface perched groundwater conditions which will be most prevalent during the late spring and summer months will, however, be significant.

The combination of fairly steep slopes, colluvial soils, and near surface perched groundwater, has resulted in some relatively shallow soil slope instability in the area of the proposed development.

6. DISCUSSIONS AND RECOMMENDATIONS

6.1. Discussions of Findings

By far, the most significant geotechnical aspects of the site which will affect design and development, are 1) cuts and fills, 2) slope stability and 3) groundwater. All attempts must be made in the layout of the primary and secondary roadways to minimize the amounts of cuts and fills which will be required. However, considering the magnitude of the site and the overall slopes, even with very careful alignment detailing moderate cuts and fills will be required in some areas. To minimize areas of disturbance and thus make the development most aesthetically pleasing, we strongly recommend the utilization of reinforced earth systems, retain downslope fills.

Some instability has been noted within and immediately adjacent to the site. The slope instability, in all cases, has been related to the movement of the surficial colluvial soils over the underlying bedrock. In all cases, to our knowledge, the movement has been associated with either long time or seasonal near surface groundwater conditions. Therefore, in conjunction with overall site development, it will be necessary to install subdrains.

In all anticipated conditions, the proposed structures may be supported upon conventional spread and continuous wall foundations established upon suitable colluvial soils, bedrock, and/or structural fill extending to suitable materials. Foundation conditions should generally not have any significant affect on overall site development.

There are numerous abandoned mine workings in the site area. Obviously, the structures should not be established over these workings, unless the workings are at extreme depth. Individual workings will have to be evaluated on a site specific basis, when they fall within the area of the proposed structure.

In the following sections, detailed discussions pertaining to stability, subdrains, earthwork, foundations, and other geotechnical aspects which will effect initial site development, are presented.

6.2. Slope Stability

6.2.1. General

Instability, where it has been observed within or adjacent to the site, and in the general geologic setting, has been related to the colluvial soils overlying bedrock. To the best of our knowledge, no mass instability within the quartzite bedrock has occurred at this site or in other immediate areas in the same geologic setting.

The instability of the colluvial soils is also generally related to near surface groundwater conditions. A combination of groundwater colluvial soils, and steep slopes, has and can lead to "natural" instability. Extensive earthwork operations, especially cutting soils out of the toe of these potentially unstable areas, loading the heads of slide areas, or directing water to these areas, significantly increases the potential for instability. Overall stability in these conditions is best maintained or improved by 1) the installation, in some cases, of some very extensive and deep subdrains, and 2) very cautious earthwork operations. From an overall site development standpoint, even though the stability of these potentially unstable areas, can be improved. Our strongest recommendation for site development is to avoid these areas. The site is large enough, and the number of potentially unstable areas few enough, that this should not drastically affect site development plans. Areas of potentially unstable colluvial soils can best be identified and related to areas of major or even shallow natural drainages.

6.2.2. Bedrock

Both deep seated (mass) and shallow or erosional-type stability must be considered. The quartzite bedrock found at the site, based upon our field observations, seems to be of higher quality, that is less fractured, then typically encountered in other portions of Park City.

Mass, that is deep seated instability, has not been a problem in quartzite in the Park City area, and is not anticipated at this site for the maximum depths of cuts projected. The greatest concern is related to surficial instability, that is erosion, sloughing, etc. Highly fractured quartzite of the type encountered in other portions of Park City, can be cut to very steep slopes, even near vertical, and will remain stable in a mass stability standpoint, indefinitely. However, highly fractured bedrock will ravel and within a few years, will result in erosional slopes on the order of 1.2 to 1.4 horizontal to 1 vertical. This is essentially the angle of repose of the angular fractured pieces of quartzite bedrock. Generally from an overall highway maintenance standpoint, slopes in highly fractured quartzite bedrock are generally designed to be cut at one horizontal to one vertical, with the understanding that some clean-up of ravelled materials will be periodically required. Park City's philosophy has, however, been that final grading should be such as to minimize the amount of long-term maintenance. If this philosophy prevails, cuts in these highly fractured soils will generally have to be 1.3 to 1.4 horizontal to 1 vertical. As stated previously, the bedrock at this site does not appear to be as highly fractured as others. Still, even though Park City might recommend flatter slopes, we will, from a planning standpoint, recommend that the final cut slopes in fractured bedrock be one horizontal to one vertical.

Much steeper slopes, on the order of one-quarter to one-half horizontal to one vertical, to heights of 15 to 20 feet, may be utilized in the more massive quartzite bedrock. If cuts greater than these depths are required, then benches sloping slightly back into the overall slope, and at least four feet wide, are required every 15 feet in total vertical height. Some chain netting, or other precautions may be required to catch and retain small to moderately sized bedrock particles from spalling off at steep cut slopes.

6.2.3. Soils

In natural colluvial soils, where groundwater is not a problem, excavations of as much as six feet in height can be constructed at slopes of one-half horizontal to one vertical, and maintain mass stability. However, these slopes are extremely susceptible to erosion and sloughing, and would, therefore, have to be covered by rock walls or other similar type structures. Cuts in excess of six feet in height, should generally be no steeper than one and one-half horizontal to one vertical. Again, the surface must be protected against erosion. Where groundwater is encountered, similar type construction can be employed, only after the groundwater conditions have been controlled by extensive subsurface drainage. Any kind of cut activities in colluvial soils with uncontrolled groundwater most likely will lead to some long-term instability.

Fill slopes should be held to a minimum whenever possible. Where angular pieces of quartzite bedrock are utilized, the fill slopes can be constructed at one and one-half horizontal to one vertical and provide both mass and surficial stability. In soils, the fill slopes would generally have to be constructed at least two horizontal to one vertical to provide mass and surficial stability. Because of the steepness of the site, these slopes would essentially "chase" the natural slopes, and would result in extensive disruption to natural terrain and vegetation. Therefore, whenever substantial fills are required, we strongly recommend the consideration be given to reinforced soil structures. These structures can range from rough finish wire wall or reinforced timber crib walls, to structures faced with reinforced concrete panels of different types. Numerous examples are present within the Park City area. The general soils available are suitable to construct reinforced earth structures, provided that appropriate drainage is part of the overall design. Costs, assuming that fairly substantial amounts of reinforced earth structures will be utilized, could range anywhere from approximately $13.00 per face foot, to $30.00 per face foot, considering the type of facing. Considering the mining heritage, the rustic-look of properly engineered and designed treated timber-facing might be quite acceptable.

6.3. Earthwork

6.3.1. Excavations

Excavations of surficial highly fractured bedrock, generally to depths of no more than three to four feet and the colluvial soil, can be carried out utilizing heavy track-mounted equipment. Excavations of more than a few feet into the bedrock, will in nearly all cases, require drilling and blasting.

Temporary construction excavations not exceeding four feet in depth in cohesive soils above the water table, may be constructed with near vertical sideslopes. Deeper excavations up to 10 to 12 feet, again within predominantly cohesive soils above the water table, should be constructed with sideslopes on the order of one-half to three-quarters horizontal to one vertical. If groundwater is encountered in any excavations, significantly flatter sideslopes will be required.

Temporary construction excavations up to 10 to 15 feet in bedrock can generally be constructed with near vertical to one-quarter horizontal to one vertical sideslopes. Deeper excavations should incorporate minimum of 4-foot wide benches on 15-foot vertical increments. For temporary excavations, proper control of spall of the rock off the steep walls must be provided.

All excavations must be inspected periodically be qualified personnel. If any signs of instability are noted, immediate remedial action must be initiated.

6.3.2. Fill Material

Structural fill will be required as backfill over foundations and utilities, and site grading fill. All structural fill must be free of sod, rubbish, construction debris, frozen soils, and other deleterious materials. Structural site grading fill is defined as fill which is placed over fairly large open areas to raise overall site grade. Generally, for this type of fill, we recommend that the maximum particle size generally not exceed four inches, although occasional larger particles of up to six to eight inches may be incorporated provided that they do not result in "honeycombing" or preclude the obtainment of the desired degree of compaction. In confined areas, we recommend that the maximum particle size generally not exceed two and one-half inches. For fairly substantial structural site grading fills in parking or roadway areas, larger particles can be incorporated into the structural fill with the understanding that these types of fills would be subjected to totally unacceptable settlements for structures, but acceptable settlements for roadways and parking areas.

6.3.3. Fill Placement and Compaction

Soil meeting the fairly stringent maximum particle size requirements, as stated above, should be placed in lifts not exceeding eight inches in loose thickness. Under buildings, we generally recommend that the fills be compacted to at least 95 percent of the maximum dry density as determined by the AASHTO[1] T-180 (ASTM[2] D-1557) compaction criteria. As backfill over foundations and utilities, compaction of at least 90 percent of the above defined criteria is recommended. The 90 percent criteria is also applicable for roadways and parking areas.

Where materials with large particle sizes and thicker lifts are utilized, procedural specifications will be developed.

6.4. Subdrains

From a geotechnical standpoint, that the most cost effective systems or facilities which can be utilized are subdrains. Wherever there is any concern with regard to significant near surface groundwater flows in cut and fill areas, and upgradient of below grade structures, it is essential that extensive subdrain systems be employed. The subdrains generally will consist of a minimum four to six inch diameter slotted or perforated plastic or other durable material pipe encased in a free-draining granular materials, such as "pea" gravel or three-quarter to one inch minus clean gap-graded gravel. The gravel will generally extend 2 inches below and laterally, and at least 12 to 18 inches above the pipe. To reduce the possibility of long-term plugging, the gravel should be wrapped in a geotextile fabric such as Mirafi 140N or equivalent. The slope of the subdrain pipe should generally be at least 0.5 percent, to a suitable point of gravity discharge.

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1 American Association of State Highway and Transportation Officials

2 American Society for Testing and Materials

The backfill, in most cases, will act as a chimney drain portion of the overall system, and must consist of a free-draining sand and gravel extending to within two feet of final grade. The subdrains must be installed as far in advance of other construction as possible.

6.5. Spread and Continuous Wall Foundations

6.5.1. Design Data

All indications are that the structures, as proposed, can be supported upon conventional spread and continuous wall foundations established upon suitable natural soils, bedrock, and/or structural fill extending to suitable natural soils or bedrock. All footings exposed to the full effects of frost and established upon soils or highly fractured bedrock, should be established at a minimum of three and one-half feet below lowest adjacent final grade. Footings protected from the full effects of frost may be established at a higher elevation, although a minimum depth of embedment of 18 inches is recommended for confinement purposes. Floor slabs and pavements may be considered equivalent to soil in determining depth of embedment. Minimum recommended width for footings established upon soils is 18 inches for continuous wall footings, and 24 inches for isolated spread footings.

Where sound, that is only slightly fractured bedrock is encountered, the footings may be established directly upon the bedrock without any specific depths of embedment. To resist lateral loading, and to provide passive resistance, however, we do recommend that the footings be tied with anchors to the bedrock, and that some outside backfill be utilized to minimum thicknesses of approximately 18 inches. Minimum recommended widths for footings established on massive bedrock are 12 inches for continuous wall foundations, and 18 inches for isolated spread footings.

For preliminary design, the following bearing pressures for real vertical loads may be utilized:

Suitable soils	-	3,000 psf
Highly fractured bedrock	-	5,000 psf
Massive bedrock	-	12,000 psf

The above bearing pressures for footings established on soils may be increased by 50 percent for total load conditions. Real loads are defined as the total of all dead plus frequently applied (reduced) live loads. The term "net bearing pressure" refers to the pressure imposed by the portion of the structure above lowest adjacent final grade. Therefore, the weight of the footing and backfill to lowest adjacent grade, need not be considered. For bedrock, the real load pressure may be increased by 100 percent for total load conditions. Maximum edge bearing pressures which can be utilized must be evaluated depending upon the type of loading, and the materials upon which the footings are established.

6.5.2. Settlements

Settlements of foundations designed and installed in accordance with the above recommendations, will ultimately be designed and selected to induce settlements generally no more than five-eighths to three-quarters of an inch.

6.6. Lateral Resistance

Lateral loads imposed upon foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and friction between the base of the footings and the supporting soils. In determining frictional resistance, a coefficient of friction of 0.40 should be utilized. Passive resistance provided by properly placed and compacted granular structural fill above the water table may be considered equivalent to a fluid with a density of 300 pounds per cubic foot. Below the water table, this granular soil should be considered equivalent to a fluid with a density of 150 pounds per cubic foot.

A combination of passive earth resistance and friction may be utilized provided that the friction component of the total is divided by 1.5.

6.7. Lateral Pressures

The lateral pressure parameters, as presented within this section, assume that the backfill will consist of a drained granular soil placed and compacted in accordance with the recommendations presented herein. The lateral pressures imposed upon subgrade facilities will, therefore, be basically dependent upon the relative rigidity and movement of the backfilled structure. For active walls, such as retaining walls which can move outward (away from the backfill), granular backfill may be considered equivalent to a fluid with a density of 35 pounds per cubic foot in computing lateral pressures. For more rigid basement walls that are not more than 10 inches thick and 12 feet or less in height, granular backfill may be considered equivalent to a fluid with a density of 45 pounds per cubic foot. For very rigid nonyielding walls, granular backfill should be considered equivalent to a fluid with a density of at least 60 pounds per cubic foot. The above values assume that the surface of the soil slope behind the wall is horizontal, that the granular fill has been placed and lightly compacted, not as a structural fill. If the fill is placed as a structural fill, the values should be increased to 45 pounds per cubic foot, 60 pounds per cubic foot, and 120 pounds per cubic foot, respectively. If the slope behind the wall is two horizontal to one vertical, the values for purely active walls and basement walls should increase to 57 pounds per cubic foot and 67 pounds per cubic foot, respectively.

The above equivalent fluid pressures are for static loading conditions. All of the equivalent fluid pressures should be increased by 18 pounds per cubic foot for dynamic lateral pressures which would be imposed during a moderately severe earthquake. It should be noted that the lateral pressures, as quoted, assume that the backfill materials will not become saturated.

6.8. Additional Studies

The primary purpose of this report was to provide general geotechnical parameters which can be utilized in overall site development planning. Obviously, for any significant structure, whether building, roadway, retaining wall, etc., site specific studies will be required.

We appreciate the opportunity of providing this service for you. If you have any questions, or desire additional information, please do not hesitate to contact the undersigned.

Respectfully submitted,
SHB AGRA, Inc.

By

William J. Gordon
Professional Engineer No. 3457
State of Utah

WJG/sp (94-4-6)

Copies: Addressee (3)

Attachments:
References
Table 1, Engineering Geology Parameters of Mine Openings and Outcrops
Figure 1, Vicinity Map
Figure 2, Site Plan
Appendix A1 through A8, Site Exposure Inventory

REFERENCES

Bromfield, C.S., 1968, General geology of the Park City Region, Utah, in Erickson, A.J., Phillips, W.R., and Garmoe, W.J., eds., Guidebook to the Geology of Utah, No. 22, Park City District, Utah: Utah Geological Society, Salt Lake City, Utah, p.11-29.

Bromfield, C.S., and Crittenden, M.D. Jr., 1971, Geologic map of the Park City East Quadrangle, Summit and Wasatch Counties, Utah: U.S. Geological Survey, Geologic Quadrangle Map GQ-852, Scale 1:24,000.

Crittenden, M.D. Jr., Calkins, F.C., and Sharp, B.J., 1966, Geologic map of the Park City West Quadrangle, Utah: U.S. Geological Survey, Geologic Quadrangle Map GQ-535, Scale 1:24,000.

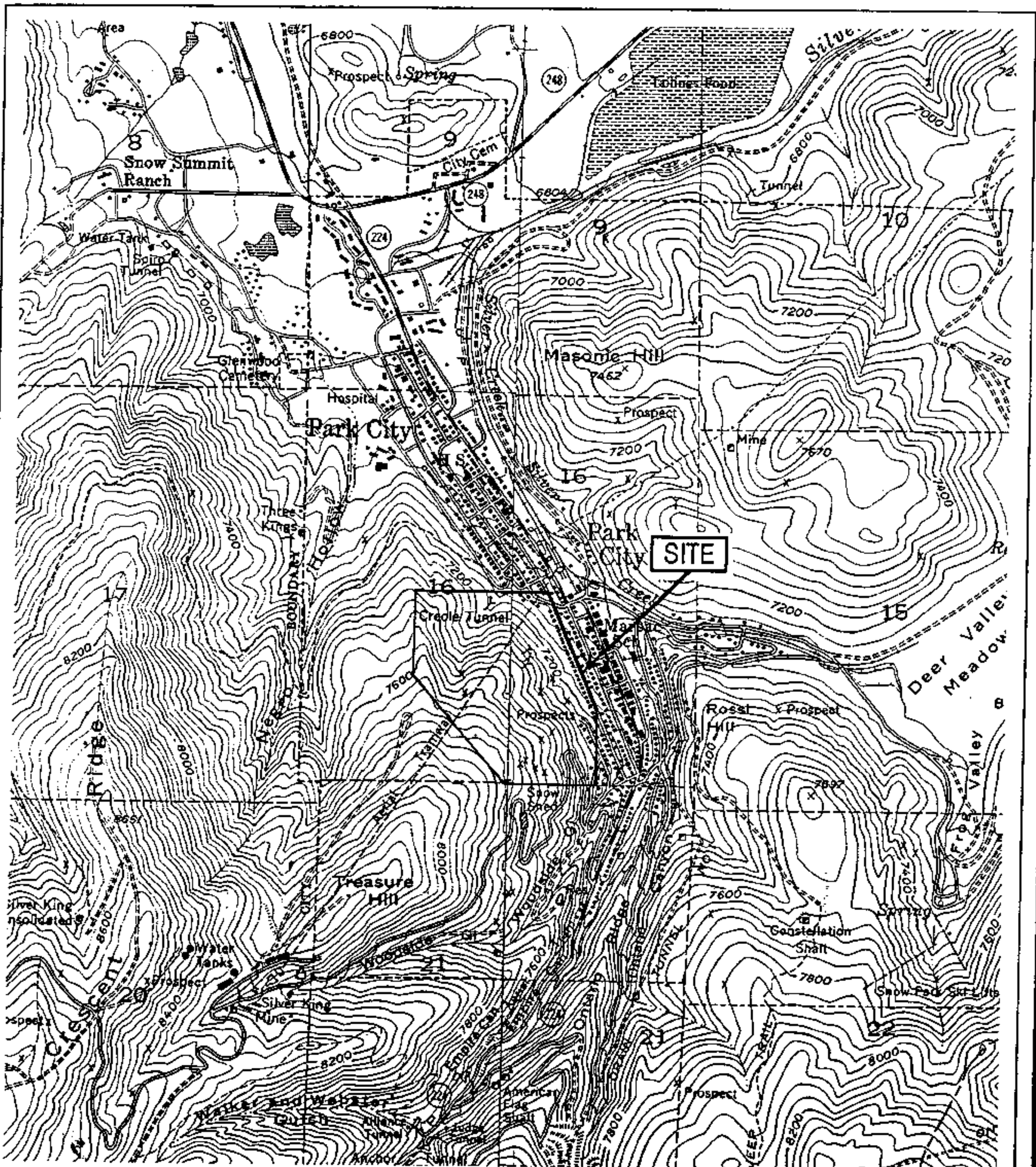
Table 1
Engineering Geology Parameters of Mine Openings and Outcrops

Exposure	Adit Orientation	Rock Type	Bedding Stike	Bedding Dip	Joint-set 1	Joint-set 2	Joint Spacing
Adit HO30	273°	Quartzite	255°	16°	317°	235°	1.5'
Adit HO31	207°	Quartzite	109°	22°	249°	190°	3.5 - 2.0'
Adit HO32	252°	Quartzite	28°	17°	252°	214°	*
Adit HC13	137°	Quartzite	250°	13°	290°	*	*
Outcrop 1	*	Quartzite	258°	5°	334°	200°	*
Outcrop 2	*	Quartzite	213°	10°	244°	182°	*
Outcrop 3	*	Quartzite	245°	10°	273°	210°	*

* Not observed

SWEENEY PROPERTIES
SHB AGRA JOB NO. E93-2267

NORTH



SCALE IN FEET
1000 0 1000 2000

FIGURE 1
VICINITY MAP

REFERENCE:
USGS TOPOGRAPHIC MAPS TITLED "PARK CITY EAST, UTAH", 1955;
AND "PARK CITY WEST, UTAH", 1955, PHOTOREVISED 1975

SHB AGRA, INC.
Engineering & Environmental Services

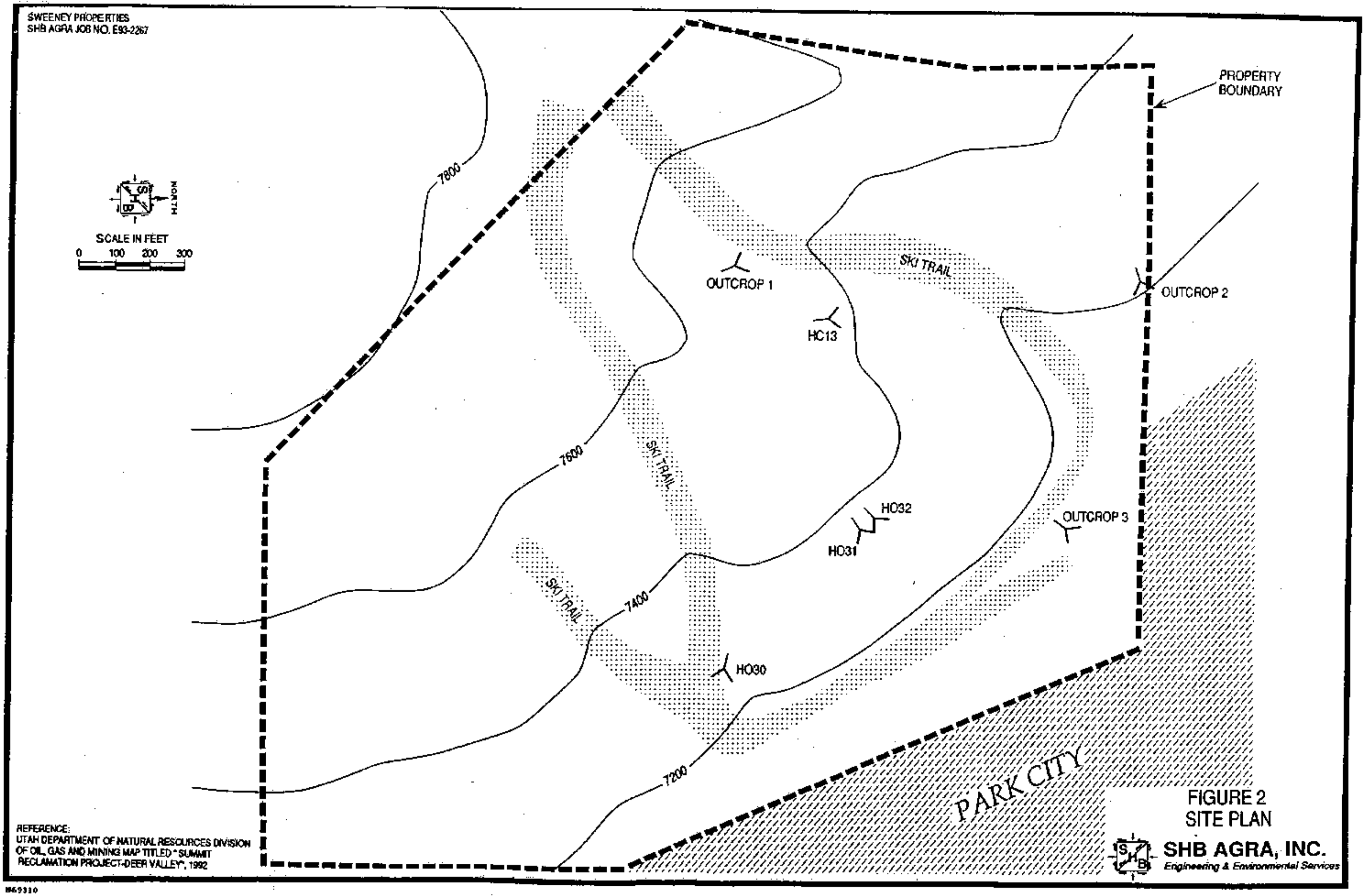


FIGURE 2
SITE PLAN

M69310

APPENDIX A

Site Exposure Inventory A1

Exposure: HO30

Location: SW1/4, NW1/4, SE1/4; Sec. 16; T. 2 S., R.4 E.,

Exposure Type: Shaft

Exposure dimensions:

Width 5' Height 6' Length 54'

Orientation 273° Inclination 3°

Rock Type: Quartzite

Description of Rocks: Massive pale-colored quartzite with interbedded fine-grained sandstone laminations, and near vertical joints spaced 1.5 to 3 feet apart

Bedding:

Bed form Massive-Laminated

Bedding strike 255°

Bedding dip 16°

Jointing:

Joint strike 317° & 235°

Joint angle 69° & 81°

Joint spacing 1.5' & 1.5'

Remarks: No signs of groundwater seepage; no timbering observed

Site Exposure Inventory A2

Exposure: HO31

Location: SW1/4, NW1/4, SE1/4; Sec. 16; T. 2 S., R.4 E.,

Exposure Type: Shaft

Exposure dimensions:

Width 4.5'   Height 5.5'   Length +100'

Orientation 207°   Inclination 7°-32°

Rock Type: Quartzite

Description of Rocks: Massive pale-colored quartzite with interbedded fine-grained sandstone laminations, and near vertical joints spaced 2.0 to 3 feet apart

Bedding:

Bed form Massive-Laminated

Bedding strike 109°

Bedding dip 22°

Jointing:

Joint strike 249° & 190°

Joint angle 87° & 79°

Joint spacing 3.5' & 2.0'

Remarks: No signs of groundwater seepage; no timbering observed; Depth to bedrock 2.0' to 3.0'

Site Exposure Inventory A3

Exposure: HO31

Location: SW1/4, NW1/4, SE1/4; Sec. 16; T. 2 S., R.4 E.,

Exposure Type: Shaft

Exposure dimensions:

Width 4.5' Height 5.5' Length +100'

Orientation 207° Inclination 7°-32°

Rock Type: Quartzite

Description of Rocks: Massive pale-colored quartzite with interbedded fine-grained sandstone laminations, and near vertical joints spaced 2.0 to 3 feet apart

Bedding:

Bed form Massive-Laminated

Bedding strike 109°

Bedding dip 22°

Jointing:

Joint strike 249° & 190°

Joint angle 87° & 79°

Joint spacing 3.5' & 2.0'

Remarks: No signs of groundwater seepage; no timbering observed; entrance partially collapsed; Depth to bedrock 0.5' to 1.0'

Site Exposure Inventory A4

Exposure: HO32

Location: SW1/4, NW1/4, SE1/4; Sec. 16; T. 2 S., R.4 E.,

Exposure Type: Shaft

Exposure dimensions:

Width 4.5' Height 4.0' Length 15'

Orientation 252° Inclination 23°

Rock Type: Quartzite

Description of Rocks: Massive pale-colored quartzite with near vertical joints

Bedding:

Bed form Massive

Bedding strike 28°

Bedding dip 17°

Jointing:

Joint strike 252° & 214°

Joint angle 66° & 84°

Joint spacing 3.5' & 2.0'

Remarks: No signs of groundwater seepage; no timbering observed; entrance nearly closed; Depth to bedrock 0.5'

Site Exposure Inventory A5

Exposure: HC13

Location: SW1/4, NW1/4, SE1/4; Sec. 16; T. 2 S., R.4 E.,

Exposure Type: Adit

Exposure dimensions:

Width 6.5' Height 5.0' Length 14'

Orientation 137° Inclination 21°

Rock Type: Quartzite

Description of Rocks: Massive pale-colored quartzite with near vertical joints

Bedding:

Bed form Massive

Bedding strike 250°

Bedding dip 13°

Jointing:

Joint strike 290°

Joint angle 77°

Joint spacing NA

Remarks: No signs of groundwater seepage; No timbering observed; Entrance nearly closed; Depth to bedrock 0.5'

Site Exposure Inventory A6

Exposure: Outcrop 1

Location: SW1/4, NW1/4, SE1/4; Sec. 16; T. 2 S., R.4 E.; On south side of Town Run ski trail

Exposure Type: Outcrop

Exposure dimensions:

Width 30.0' Height 30.0' Length NA

Orientation NA° Inclination NA°

Rock Type: Quartzite

Description of Rocks: Massive pale-colored quartzite with near vertical joints

Bedding:

Bed form Massive

Bedding strike 258°

Bedding dip 13°

Jointing:

Joint strike 334 ° &200

Joint angle 74° & 79°

Joint spacing NA

Remarks: Roughly triangular shaped outcrop

Site Exposure Inventory A7

Exposure: Outcrop 2

Location: SW1/4, NW1/4, SE1/4; Sec. 16; T. 2 S., R.4 E.; North of ski-lift loading platform

Exposure Type: Outcrop

Exposure dimensions:

Width 30.0' Height 7.0' Length NA

Orientation NA° Inclination NA°

Rock Type: Quartzite

Description of Rocks: Massive pale-colored quartzite with near vertical joints

Bedding:

Bed form Massive

Bedding strike 213°

Bedding dip 10°

Jointing:

Joint strike 244 ° & 182

Joint angle 84° & 88°

Joint spacing NA & 2.0'

Remarks: Road cut outcrop

Site Exposure Inventory A8

Exposure: Outcrop 3

Location: SE1/4, SE1/4, SE1/4; Sec. 16; T. 2 S., R.4 E.; Below power-line

Exposure Type: Outcrop

Exposure dimensions:

Width 8.0' Height 3.0' Length NA

Orientation NA° Inclination NA°

Rock Type: Quartzite

Description of Rocks: Massive pale-colored quartzite with near vertical joints

Bedding:

Bed form Massive

Bedding strike 245°

Bedding dip 10°

Jointing:

Joint strike 273 ° & 210

Joint angle 84° & 89°

Joint spacing NA

Remarks: Road cut outcrop; Depth to bedrock 1.0"

Applied Geotechnical Engineering Consultants, P.C.

PHASE I ENVIRONMENTAL SITE ASSESSMENT

TREASURE HILL SUBDIVISION, PHASE 4

PARK CITY, UTAH

PREPARED FOR:

MPE, INC.
P.O. BOX 2429
PARK CITY, UTAH 84060

ATTENTION: PAT SWEENEY

PROJECT NO. 1051008

NOVEMBER 14, 2005

TABLE OF CONTENTS

SUMMARY

1. Based on a historical review of government records, aerial photographs and interviews, the majority of the subject property has been undeveloped since at least the 1960s. A mine shaft and three adits were mined on the property in the late 1800s through the early 1900s when mining activities stopped with the exception of the Silver King aerial tramway. The native rock mined from the adits and mine shaft was dumped down slope of the shaft and adits (mine dumps). The openings of the shaft and adits have since been closed off. Buildings for the mine have long been removed from the property. By the 1920s the Creole mine dump was used for ski jumping. The Silver King aerial tramway was built across the property in 1901 and was abandoned in approximately 1951. The Kings Crown ski run was built on the west edge in the 1970s. The Quitting Time and Creole ski runs and the Mid Town ski lift were built across the property in the mid 1980s. With the exception of the towers for the ski lift and tramway, there are no structures on the property.

2. The majority of the property is covered with scrub oak, aspen, fir, spruce and maple trees. The ski runs are covered with tall grass, weeds and brush. Significantly stained soils or stressed vegetation was not observed on the property. Our site visit, interviews and records research indicate no evidence of underground storage tanks on the property. Debris on the property was limited to scattered lumber and loose trash. Overhead power lines cross the northwest corner of the property. Electrical transformers were not observed on the property.

3. The on-site native rock contains silver/lead/zinc mineralization the miners were exploring to find. The rock outcroppings by the Southeast Adit and Northwest Adit indicated that there was a potential for veins or fissures that contained ore grade silver, lead and zinc minerals. Because these two adits did not contain ore grade mineralization, the adits were abandoned after being extended into Treasure Hill less than 200 feet. The Creole Adit extended into Treasure Hill several thousand feet and was part of the Creole Mine underground workings. Samples obtained from the mine dumps associated with the Creole Mine shaft and the three adits contain significant concentrations of lead and arsenic. The native rock was not milled or processed on site. The mine dump samples contain lead and arsenic above the residential action levels as set by the PCMC, and the mine dumps will need to be capped in place with clean soil or excavated and capped elsewhere on site in a manner consistent with the guidelines as set by the PCMC building code.

4. Government agency inquiry indicates there are no NPL, RCRA TSD or CORRACTS sites within 1 mile of the subject property. There is one CERCLIS site within ½ mile of the property at the Marsac Mill site approximately 600 feet to the northeast and down gradient. An ore mill operated on the Marsac Mill site from the mid 1870s to the early 1900s. Some tailings and ore fragments from the mill remain in the Marsac Mill site soils. Most of the site is covered with building or pavement. Soils with elevated metals were scheduled to be removed during the construction of the Old Town Intermodal Transit Center on the property with oversight by the Utah DERR Voluntary Cleanup Program.

5. There are no LUST sites or landfills within ½ mile of the property. There are no UST, RCRA generators, NRC or DERR incident sites on or adjacent to the property.

6. With the exception of the elevated metals in the mine dumps, there do not appear to be current or past property conditions that would be a significant environmental concern on the subject property. A reconnaissance and data base search of properties in the vicinity of the subject property finds no evidence of off-site facilities or environmental conditions that have adversely impacted the subject property.

7. We have performed a Phase I Environmental Site Assessment in general conformance with the scope and limitations of ASTM Practice E 1527-00 of the property described in the Property Location and Legal Description section of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the property with the following exception:

   Samples obtained from the four mine dumps on site contain significant concentrations of lead and arsenic due to naturally occurring elevated metal concentrations in the native rock. The elevated lead and arsenic concentrations in the mine dumps (unprocessed mine waste) is not unexpected given that the Park City Mining District was one of the richest silver mining districts in the United States. These mine dumps should be capped in place with clean soil or excavated and capped elsewhere on site in a manner consistent with the guidelines as set by the PCMC building code.

SCOPE

Applied Geotechnical Engineering Consultants, P.C. (AGEC) was retained by MPE, Inc. to conduct a site specific Phase I Environmental Site Assessment for 63.9 acres of property located west of Park City, Utah. The site location is shown on Figures 1 to 5. The study was conducted in general accordance with our proposal dated October 5, 2005.

The purpose of a Phase I Environmental Site Assessment (ESA) is to address the potential environmental liabilities on a specific parcel of commercial real estate in order to qualify with the due diligence property inspection requirements of the Comprehensive Environmental Response, Compensation and Liability Act's (CERCLA) "Innocent Purchaser (Landowner) Defense" of 1980 and subsequent amendments. This legislation, amended in 1986 by the Superfund Amendment and Reauthorization Act (SARA), requires that "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice" is performed. This Phase I ESA, as performed by AGEC, is in general conformance with the 2000 American Society for Testing and Materials (ASTM) standard for environmental assessments (E 1527-00).

A review of the site was conducted to identify *recognized environmental conditions* on the property due to present or previous activities or land uses. ASTM E 1527-00 defines recognized environmental conditions as the presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with the law. The term is not intended to include de minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

Our study includes a site reconnaissance of the subject and adjoining properties to identify recognized environmental conditions in connection with the property including a reasonable observation of the property and structures, the perimeter of the property and the interior common areas of the structures when accessible. A historical review of the site is performed dating back to the first obvious developed use or back to 1940, whichever is earlier (where practical) via a combination of reasonably ascertainable records and sources such as aerial photographs, USGS maps, fire insurance maps, historical city directories and county tax and recorder records when available. A records review of local, state and federal government records including the following: Federal NPL, CERCLIS, RCRA TSD, RCRA CORRACTS, RCRA Generator and NRC lists; State spill incidents, landfill, LUST and UST lists is performed. Interviews are conducted with past and present owners, occupants, neighbors or persons familiar with the site history when available. Interviews with local government officials such as fire marshals and environmental personnel are conducted.

This assessment does not address other issues (not all-inclusive) including the presence of asbestos containing materials, lead-based paint, radon, "toxic" mold and lead in the drinking water. Liability/risk evaluations, wetland studies or remediation techniques are not within the scope of this report. No sampling or chemical analysis of structural materials, soil, water or air was performed unless specifically stated.

This report has been prepared to summarize the data obtained during the study and to present our conclusions. Results of the environmental site assessment are summarized and findings and conclusions relating to the apparent environmental conditions at the site are discussed.

<u>Related Geological Investigations</u>

An engineering geology reconnaissance for the subject property was conducted by SHB AGRA, Inc for Sweeney Properties. The findings of the study were reported under Project No. E93-2267, dated April 22, 1994.

SITE DESCRIPTION

<u>Location and Legal Description</u>

The subject property is located in the south half of Section 16, Township 2 South, Range 4 East, Salt Lake Base and Meridian on the west side of Park City, Utah. See Figure 1.

According to the Summit County Recorder's Office, the subject property is located on seven parcels. The legal description for the subject property is included in Appendix B of this report.

Site Conditions, Uses and Characteristics

At the time of our field reconnaissance on Thursday, October 6, 2005, the majority of the subject property was an undeveloped tree and oak brush covered mountainside. The Kings Crown ski run extends along the west edge of the property. The Quitting Time ski run (Photograph 1) extends along the south edge and the Creole ski run crosses the middle of the property in a generally southwest to northeast direction (Photographs 2 to 4). The Town Lift ski lift crosses the property from near the northeast corner to the southwest corner (Photographs 5 and 6). Steel towers for the abandoned Aerial Tramway extend along the south side of the ski lift. A road/ski run extends along the east edge in a north-south direction. A hairpin curved road between Lowell Avenue and Empire Avenue crosses the north edge of the property. Numerous narrow bike trails cross the property.

There is the historic Creole Mine shaft in the west center of the property and three adits (Creole Adit, Northwest Adit and Southeast Adit) on the east side of the property (Figure 4). Unprocessed rock from the mining was dumped down slope of the shaft and adits (Photographs 7 to 13). The openings of the shaft and adits have been closed off. Several smaller prospect workings are scattered across the site.

The majority of the property is covered with scrub oak, aspen, fir, spruce and maple trees. The ski runs are covered with tall grass, weeds and brush. Significantly stained soils or stressed vegetation was not observed on the property. Our site visit, interviews and records research indicate no evidence of underground storage tanks on the property. Debris on the property was limited to scattered lumber and loose trash. Overhead power lines cross the northwest corner of the property (Photograph 14). Electrical transformers were not observed on the property.

The majority of the site is relatively steep mountainside sloping down to the northeast. The U.S. Geological Survey quadrangle map indicates the elevation for the site ranges from approximately 7,760 feet above mean sea level on the southwest corner to 7,080 feet on the northeast corner. Photographs of the site were taken in various locations and are included in Appendix A.

Adjacent Property Conditions and Uses

South, north and west of the property is a continuation of the tree-covered mountain slope with several Park City Mountain ski resort ski runs to the west. Several houses are to the southeast. East of the property are houses along Woodside Avenue.

Physiographic Site Conditions

Geologic Conditions

The Geologic Map of the Park City West Quadrangle by Calvin S. Bromfield and Max Crittenden, Jr. published in 1971 was reviewed. The majority of the west side of the property is mapped as Permian Park City Formation (Ppc) consisting of pale-gray-weathered fossiliferous and cherty limestone containing a medial phosphatic shale member. The east side of the property is mapped as Pennsylvanian Weber Quartzite consisting of pale-gray, tan-weathered quartzite and limy sandstone with some interbedded gray to white limestone and dolomite. The Weber Quartzite is the geological rock formation that was mined and the source of the rock contained in the mine dumps.

Hydrogeological Setting

Based on the geological study by SHB AGRA, static groundwater is at a significant depth. Near surface perched groundwater is likely present in the spring and summer months. Based on the topography of the area, the groundwater is expected to flow to the northeast.

A search of the Utah Division of Water Rights database was conducted to determine the location of water rights diversions within ½ mile of the center of the property. There are no water right points of diversion within ½ mile of the center of the property. There are no water rights listed on the subject property.

Surface Water

Surface water was not observed on the property.

Flood Hazard Potential

The on-line Federal Emergency Management Agency (FEMA) flood insurance rate map for the surrounding area (Map Panel 4901390005B, dated July 16, 1987) was reviewed. The subject property is not located within a 100 or 500-year flood plain area.

Wetlands Map Review

The on-line National Wetlands Inventory map provided by the US Fish and Wildlife Service indicates that the property is not located in a mapped wetland area.

Soil Survey Characterization

The US Department of Agriculture soil survey map of Summit County was not available for review.

SAMPLING RESULTS

The on-site native rock contains silver/lead/zinc mineralization the miners were exploring to find. The rock outcroppings by the Southeast Adit and Northwest Adit indicated that there was a potential for veins or fissures that contained ore grade silver, lead and zinc minerals. Because these two adits did not contain ore grade mineralization, the adits were abandoned after being extended into Treasure Hill less than 200 feet. The Creole Adit extended into Treasure Hill several thousand feet and was part of the Creole Mine underground workings. The resulting native rock in the mine dumps at the openings of the adits and shaft was not milled or processed on site.

Eight composite samples were obtained from the surface of the mine dumps by the Creole Mine shaft and the three adits on site (Figure 4). The indigenous soil is covered by the mine dumps in these areas. The sampling is intended to comply with the Park City Municipal Corporation (PCMC) "Landscaping and Maintenance of Soil Cover Ordinance" within the Park City building code. Jeff Schoenbacher, the environmental coordinator with PCMC, requested that representative samples of the mine dumps be obtained for laboratory analyses for total lead and arsenic. The action level for residential development is 200 parts per million (ppm) lead in the ordinance.

Two samples were obtained from each of the four sites to help provide a representative indication of the lead and arsenic concentrations at these sites. Each sample is a composite of two or three smaller subsamples. The composite samples were collected by hand from the upper several inches of the mine dumps and were placed in labeled plastic resealable bags by a Utah Certified Groundwater and Soil Sampler (Certification Number GS1083) in general accordance with the sampling protocol as set by Utah State and the Environmental Protection Agency. The samples were returned to AGEC's laboratory and screened through a No. 8 mesh screen (particle size less than 0.093 inches in diameter) to remove the gravel particles and to help mix the subsamples into a relatively homogeneous sample. The particle size collected is the same as in a soil sample consistent with the guidelines as set by the PCMC building code. The sample was returned to the original sample bag for submission to the analytical laboratory. Chain of Custody forms supplied by the analytical laboratory were used.

The samples were submitted to American West Analytical Laboratories for analysis of total lead and arsenic. The laboratory results for the eight samples are as follows:

Location	Total Lead (ppm)	Total Arsenic (ppm)
Southeast Adit - SS#1	30,000	6,200
Southeast Adit - SS#2	380,000	8,800
Northwest Adit - SS#3	290	27
Northwest Adit - SS#4	350	36
Creole Shaft - SS#5	2,200	290
Creole Shaft - SS#6	1,500	200
Creole Adit - SS#7	11,000	1,700
Creole Adit - SS#8	11,000	1,800

As the lead concentrations in all four sample locations are above the residential action levels as set by the PCMC, the Northwest Adit and Southeast Adit mine dumps should be capped in place with clean soil or excavated and capped elsewhere on site in a manner consistent with the guidelines as set by the PCMC building code. The Creole Mine dump should be capped in place and the Creole Adit mine dump should be excavated (as set forth below) and capped in a manner consistent with the guidelines as set by the PCMC building code.

We understand that during the site grading operations for Treasure Hill Phase 4, approximately 500,000 cubic yards of soil and native rock will be excavated and moved to the open space areas in the vicinity of the Creole ski run. The Creole Mine shaft and the Creole Adit mine dump rock should be capped by the excavated material. AGEC recommends the mine dump near the Creole Adit first be excavated and moved to and stabilized in the Creole gulch area. Subsequent placement of the mass grading soil on top of the mine dump rock should significantly exceed the required 6-inch clean soil cap. Confirmation soil samples should be required after the mine dump rock has been moved to ensure that the Creole Adit mine dump has been adequately excavated. Additionally, soil samples should be obtained from the proposed "clean" soil area to indicate that this material will meet the "approved topsoil" standard of 200 ppm lead prior to its use as soil cover. The PCMC ordinance is included in Appendix C with the laboratory test results.

With respect to the Southeast Adit and Northwest Adit mine dumps, AGEC recommends that these mine dumps be covered in place with a minimum 6-inch clean soil cap. This will reduce the impact to the surrounding trees and vegetation that would be necessary during the construction of a haul road between the current mine dump locations and the alternative final repository location on site. Due to the slope of the mine dumps by these adits, the soil cap in these areas should be secured with a geogrid or other anchoring devices until the soil cap can be vegetated and stabilized.

The PCMC ordinance requires that the current locations of the mine dumps and proposed moved locations of the mine dumps' material be identified and the estimated quantities calculated before the material is moved.

HISTORICAL REVIEW

A historical review of the property and surrounding properties was conducted by reviewing aerial photographs, topographic maps and performing interviews. Historical fire insurance maps (Sanborn), county tax records and local street directories in the vicinity of the property were not available.

Past Uses of the Property

The first mine claims for the Creole Mine were located in 1880. By 1902 the Creole Mine shaft was approximately 265 feet deep and was extended to a depth of 600 feet after a more efficient hoist was built. The Creole Adit extended several thousand feet to the west into the mountain side. The Southeast and Northwest Adits likely only extended less than 200 feet into Treasure Hill. Buildings for the mine have long been removed from the property. The mining activities likely ended by the early 1900s. By the 1920s the Creole mine dump was used for ski jumping. The Silver King aerial tramway was built in 1901 and was abandoned in approximately 1951. The Kings Crown ski run was built in the 1970s. The Quitting Time and Creole ski runs and the Mid Town ski lift were built in the mid 1980s.

Past Uses of the Adjoining Properties

Most of the adjacent properties to the south, west and north have been undeveloped or used for mining and skiing. The houses to the southeast were built in the 1980s and 1990s.

Aerial Photograph Review

Aerial photographs taken of the property and surrounding areas in 1962, 1967, 1978, 1987, 1993, 1997 and 2004, were reviewed for the study. The photographs reviewed indicate that the majority of the property has been undeveloped since the 1960s.

A brief description of conditions and changes observed on and adjacent to the site, based on our review of photographs is given below.

> <u>August 2, 1962</u> - Photograph No. 3BB-176 - The majority of the property appears to be a tree-covered mountain side. The mine dumps for the Creole Mine and the three adits are visible. The aerial tramway towers are present on the property. The surrounding properties to the north, west and south are tree-covered mountain sides. Houses along Woodside Avenue are to the northeast.

> <u>July 11, 1967</u> - Photograph 3HH-145 - The property and surrounding property conditions are similar to those of 1962.

August 24, 1978 - Photograph No. 178-176 - The hairpin curve between Lowell and Empire Avenues has been built. The Kings Crown (formerly Nastar) ski run has been built on the west edge. A trail or ski run is present near the location of the Quitting Time run.

September 2, 1987 - Photograph No. 312-31 - The Town Lift ski lift, Quitting Time and Creole ski runs have been built. Additional ski runs are to the west.

August 23, 1993 - Photograph No. 5911-124 - The property and surrounding property conditions are similar to those of 1987.

September 12, 1997 - Photograph No. 10095-35 (Figure 3) - The houses are under construction to the southeast.

August 2004 - Figure 4 - The property and surrounding property conditions are similar to those of 1997.

PROPERTY TAX FILES

A review of the Summit County Tax Assessor records indicates that the subject property is located on seven parcels. Parcel No. PC-338A contains 0.05 acres. Parcel No. PC-351 contains 0.19 acres. Parcel No. PC-321 contains 0.01 acres. Parcel No. PC-325B contains 0.13 acres. Parcel No. PC-364A contains 20.05 acres. Parcel No. PC-800-1 contains 40.29 acres. Parcel No. PC-800-1A contains 1.68 acres. All seven parcels are owned by Sweeney Land Company.

ENVIRONMENTAL RECORDS REVIEW

1. **Federal NPL Site List**

   The National Priorities List (NPL) of November 30, 2004, was reviewed for sites listed within 1 mile of the property. The NPL is an information and management tool of the Superfund site cleanup process. The NPL sites are those considered by EPA to have the highest priority for cleanup pursuant to the EPA's Hazard Ranking System and have been targeted for long term remediation under the Superfund program. The NPL serves primarily informational purposes, identifying for the States and the public those sites or other releases that appear to warrant remedial actions.

There are no NPL sites within 1 mile of the subject site. The nearest NPL site is the Richardson Flat Tailing site located approximately 2½ miles to the northeast and not up gradient.

2. **Federal CERCLIS Site List**

The EPA Comprehensive Environmental Response, Compensation and Liability Act Information System (CERCLIS) site listing of September 8, 2005, was examined for sites located within ½ mile of the subject property. CERCLIS is the Superfund database which is used to support management in all phases of the Superfund program. This list reports facilities with potential to cause human health or safety problems or significant ecological or environmental damage.

There is one CERCLIS site within ½ mile of the property being investigated at the Marsac Mill site at Marsac Avenue and Herber Avenue 600 feet to the northeast and down gradient. The ore mill operated on the site from the mid 1870s to the early 1900s. An elementary school was built on the property in the early 1900s and is now used as an office building. Tailings and ore fragments remained in the Marsac Mill site soils. Most of this site is covered with building or pavement. Soils with elevated metals were scheduled to be removed during the construction of the Old Town Intermodal Transit Center on the property with oversight by the Utah DERR Voluntary Cleanup Program.

3. **Federal RCRA TSD Facility List**

The EPA Resource Conservation and Recovery Act (RCRA) Treatment, Storage and Disposal (TSD) Master Facility List of September 22, 2005, was reviewed for facilities within one mile of the site. Facilities are listed if they treat, store or dispose of hazardous waste as defined and regulated by RCRA. This list does not infer that the facility has released any hazardous substance to the environment.

There are no RCRA TSD sites listed within one mile of the property. There are no TSD facilities in Summit County.

4. **Federal RCRA CORRACTS Facility List**

The EPA RCRA CORRACTS List of September 22, 2005, was reviewed for facilities within one mile of the site. Facilities are listed if they are hazardous waste handlers who have been notified by the EPA to undertake corrective action under RCRA.

There are no RCRA CORRACTS sites listed within one mile of the property. There are no CORRACTS sites in Summit County.

5. **Federal RCRA Generators List**

The EPA RCRA Master Facilities List dated September 22, 2005, was reviewed for facilities on or adjacent to the subject property. Facilities are listed if they generate, transport or store hazardous materials as defined and regulated by RCRA. The list does not infer that the facility has released any hazardous substance to the environment.

There are no RCRA generator facilities listed on or adjoining the property. The nearest RCRA generator is Albertsons at 1760 North Park Avenue, greater than 1 mile to the northwest.

6. **Federal NRC List**

The US Coast Guard National Response Center (NRC) list dated October 2, 2005, was reviewed for sites located on or adjacent to the subject property. The list was formerly maintained by the EPA as the Emergency Response Notification System (ERNS) and was redesigned in 2000 with the data now residing at the NRC. The primary function of the National Response Center is to serve as the sole national point of contact for reporting all oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories. In addition to gathering and distributing spill data for Federal On-Scene Coordinators and serving as the communications and operations center for the National Response Team, the NRC maintains agreements with a variety of federal entities to make additional notifications regarding incidents meeting established trigger criteria.

There are no NRC sites listed on or adjacent to the property being investigated. The nearest NRC site is located at 2105 Prospector Avenue, greater than 1 mile to the north.

7. **DERR Incident Notification Summary List**

The Utah DERR Incident Notification Summary list dated April 30, 2005, was reviewed for sites on or adjacent to the subject property. This list is a compilation of phone calls to the Utah DERR concerning potentially hazardous materials that may have been accidentally or negligently released, including spills, leaks, illegal dumping, fish kills and fires.

There are no DERR Incident sites listed on or adjacent to the property being investigated. The nearest DERR incident site is a gas spill at 5th Avenue and Swede Alley, approximately 800 feet to the east and not up gradient.

8. **State Landfill and/or Solid Waste Disposal Site List**

The Utah State Landfill and Solid Waste Disposal Site list of March 2004, was reviewed for landfills or disposal sites within ½ mile of the subject property.

The closest landfill to the property being investigated is the closed Park City landfill located approximately 4,500 feet to the north and not up gradient.

9. **Utah Department of Environmental Quality Leaking Underground Storage Tank (LUST) Sites**

The Utah Department of Environmental Quality Leaking Underground Storage Tank (LUST) list dated July 5, 2005, was reviewed for sites within ½ mile of the subject property. The list identifies only those facilities that have been reported to the DERR as potential leaking underground storage tank sites. The list is limited to information in the data base at the time the list was printed.

There is one site listed on the LUST list within ½ mile of the property being investigated at the Park City Fire Service District at 1353 Park Avenue, approximately 2,300 feet to the north and not up gradient. This facility has been sufficiently remediated to the satisfaction of the DERR and the LUST case file was closed with no further remedial action in October 1998. No registered tanks remain at this facility.

10. Utah Department of Environmental Quality Underground Storage Tank (UST) Sites

The DERR UST list of July 5, 2005, was reviewed for sites on or adjacent to the subject property. This is a list of registered USTs in the State of Utah. The list is limited to information in the database at the time the list was printed.

There are no UST sites located on or adjacent to the subject property. The nearest UST site is the Kimball Arts Center at 638 Park Avenue, approximately 400 feet to the northeast and not up gradient. There are no registered tanks remaining at this facility.

11. Utah Power and Light

Utah Power and Light (UP&L) was contacted in regards to transformers in the area. They indicate that all UP&L high hazard transformers (>500 ppm of PCBs) in the State of Utah have been replaced with PCB "free" transformers with less than one ppm PCBs.

12. Park City Fire Department

Scott Adams, the assistant fire marshal for the Park City Fire Department, was contacted by telephone. He indicated that he was not aware of fire department calls to the subject property.

INTERVIEWS

Interviews were conducted in order to obtain information indicating recognized environmental conditions in connection with the property.

Patrick Sweeney, a property owner representative, was interviewed on site. He indicated that he was not aware of milling of the mined rock on site. The ski lift and several runs were built across the property in the mid 1980s. The aerial tramway operated across the property from the early 1900s to the early 1950s. He was not aware of underground storage tanks or hazardous materials on the property.

FINDINGS

The majority of the subject property has been undeveloped since at least the 1960s. A mine shaft and three adits were excavated on the property in the late 1800s and early 1900s. The mining activities likely ended by the early 1900s. Unprocessed native rock from mining was dumped down slope of the shaft and adits. The openings of the shaft and adits have since been closed off. Buildings for the mine have long been removed from the property. By the 1920s the Creole mine dump was used for ski jumping. The Silver King aerial tramway was built across the property in 1901 and was abandoned in approximately 1951. The Kings Crown ski run was built on the west edge in the 1970s. The Quitting Time and Creole ski runs and the Mid Town ski lift were built across the property in the mid 1980s. With the exception of the towers for the ski lift and tramway, there are no structures on the property.

The majority of the property is covered with scrub oak, aspen, fir, spruce, maple and other trees. The ski runs are covered with tall grass, weeds and brush. Significantly stained soils or stressed vegetation was not observed on the property. Our site visit, interviews and records research indicate no evidence of underground storage tanks on the property. Debris on the property was limited to scattered lumber and loose trash. Overhead power lines cross the northwest corner of the property. Electrical transformers were not observed on the property.

The on-site native rock contains silver/lead/zinc mineralization the miners were exploring to find. The rock outcroppings by the Southeast Adit and Northwest Adit indicated that there was a potential for veins or fissures that contained ore grade silver, lead and zinc minerals. Because these two adits did not contain ore grade mineralization, the adits were abandoned after being extended into Treasure Hill less than 200 feet. The Creole Adit extended into Treasure Hill several thousand feet and was part of the Creole Mine underground workings. The resulting native rock in the mine dumps at the openings of the adits and shaft was not milled or processed on site.

Government agency inquiry indicates there are no NPL, RCRA TSD or CORRACTS sites within 1 mile of the subject property. There is one CERCLIS site within ½ mile of the property at the Marsac Mill site approximately 600 feet to the northeast and down gradient. An ore mill operated on the site from the mid 1870s to the early 1900s. Some tailings and ore fragments from the mill remain in the Marsac Mill site soils. Most of the mill site is covered with building or pavement. Soils with elevated metals were scheduled to be removed during the construction of the Old Town Intermodal Transit Center on the property with oversight by the Utah DERR Voluntary Cleanup Program.

There are no LUST sites or landfills within ½ mile of the property. There are no UST, RCRA generators, NRC or DERR incident sites on or adjacent to the property.

OPINION

The unprocessed native mine rock dumped near the Creole Mine shaft and the three adits contain significant concentrations of lead and arsenic. The elevated metals detected in the mine dumps are commonly found in mine workings in the Park City area. These mine dumps contain lead and/or arsenic above the residential action levels as set by the PCMC, and should be capped in place with clean soil or excavated and capped elsewhere on site in a manner consistent with the guidelines as set by the PCMC building code.

With the exception of the elevated metals in the mine dumps, there do not appear to be current or past property conditions that would be a significant environmental concern on the subject property. A reconnaissance and data base search of properties in the vicinity of the subject property finds no evidence of off-site facilities or environmental conditions that have adversely impacted the subject property.

CONCLUSIONS

We have performed a Phase I Environmental Site Assessment in general conformance with the scope and limitations of ASTM Practice E 1527-00 of the property described in the Property Location and Legal Description section of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the property with the following exception:

Samples obtained from the four mine dumps on site contain significant concentrations of lead and arsenic due to naturally occurring elevated metal concentrations in the native rock. The elevated lead and arsenic concentrations in the mine dumps (unprocessed mine waste) is not unexpected given that the Park City Mining District was one of the richest silver mining districts in the United States. These mine dumps should be capped in place with clean soil or excavated and capped elsewhere on site in a manner consistent with the guidelines as set by the PCMC building code.

LIMITATIONS

This Phase I Environmental Site Assessment has been prepared in general conformance with the scope and limitations of ASTM E 1527-00 and generally accepted practices in this area for the use of the client. The conclusions of the report are based on the information obtained from site visits, a review of government records, aerial photographs and interviews with government officials and a property owner as described in the report. Except as described in this report, we have made no independent investigation as to the accuracy or completeness of the information derived from these sources. We have assumed that the information provided by these sources is accurate and complete.

The findings and conclusions presented in this report are intended only for the purpose, site specific location and client as indicated. As per ASTM E 1527-00, this report is valid for 180 days after the date of the report. An evaluation of the subsurface soil and groundwater conditions was not performed and therefore is not a definitive study of the potential for contamination on the subject property. No sampling or chemical analysis of structural materials, soil, water or air was performed unless specifically stated.

Applied Geotechnical Engineering Consultants, P.C. does not represent that the site contains no hazardous materials or other latent conditions beyond that observed during the site assessment. Changes in the environmental conditions on this property may occur with the passage of time due to natural processes or human activities on or adjacent to this property. In addition, changes in applicable or appropriate standards and regulations may occur, whether the result of legislation, from the broadening of knowledge, or from other reasons. Therefore, the findings and conclusions in this report may be partially or completely invalid due to changes outside of our control. Our findings and conclusions are not presented as scientific certainties, but rather as professional opinions based on the limited data obtained by the assessment.

Applied Geotechnical Engineering Consultants, P.C. has no present or contemplated future ownership interest or financial interest in the real estate that is the subject of this Phase I Environmental Site Assessment report; and Applied Geotechnical Engineering Consultants, P.C. has no personal interest with respect to the subject matter of the Phase I Environmental Site Assessment report or the parties involved and Applied Geotechnical Engineering Consultants, P.C. has no relationship with the property or the owners thereof which would prevent an independent analysis of the environmental or other conditions of the property.

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, P.C.

Prepared by Thomas R. Atkinson, REPA

Reviewed by Douglas R. Hawkes, P.E., P.G.

QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS

THOMAS R. ATKINSON

Manager / Environmental Professional Services

PROJECT RESPONSIBILITY: Project Manager, Environmental Services

As the AGEC Environmental Services Manager, Mr. Atkinson will be responsible for environmental site assessments and environmental sampling in support of AGEC investigations. He will be responsible to complete assigned projects on time and within budget.

EDUCATION:

B.S. Geography, Minor, Geology, Northern Arizona University, 1987.
OSHA Hazardous Waste Training Program - 40 hours, 1989.
ASTM Environmental Site Assessment Course, 1996.
Utah UST - Groundwater and Soil Sampler (GS-1083), 1997
NREP Registered Environmental Property Assessor, 2000.
State of Nevada Certified Environmental Manager (EM-1711), 2000.

PROFESSIONAL EXPERIENCE:

ENVIRONMENTAL PROFESSIONAL - Applied Geotechnical Engineering Consultants, P.C. Sandy, Utah, 1994 to Present

Completed over 600 Phase I and Phase II Environmental Site Assessments for apartment complexes, commercial strip malls, office complexes, industrial and manufacturing facilities, communication towers, and an entire downtown block of Salt Lake City. Prepared sampling/analysis plans and conducted investigations of soil contamination for projects in western Salt Lake County.

SPECIAL PROJECTS MANAGER - Applied Geotechnical Engineering Consultants, P.C. Sandy, Utah, 1995 to Present

Managed construction quality control personnel for large earthwork construction projects by interviewing, training and supervising technicians, writing and reviewing daily construction reports and writing final construction reports. Major projects supervised included the Micron facility in Lehi, Utah; Juniper Tailing Expansion at the Santa Fe - Twin Creeks Mine; and Landfill Cell 7 and Pond Closure 3 at the Safety-Kleen Grassy Mountain Facility.

ENGINEERING TECHNICIAN - Applied Geotechnical Engineering Consultants, P.C. Sandy, Utah, 1990 to Present

Performed construction quality control and construction quality assurance testing for major earthwork construction projects by supervising technicians and observing earthwork operations. Major projects include earth embankments for hazardous waste disposal facilities, leach pads and tailings dams; clay liners for ponds, hazardous waste disposal facilities, heap leach pads and tailings dams; and foundations for small and large buildings located in Utah, Wyoming, Oklahoma, Nevada and Minnesota. Office work included preparing daily construction reports, compiling and reviewing field and laboratory test data, writing final construction reports, and scheduling technicians.

DOUGLAS R. HAWKES, P.E., P.G.

Senior Engineering Geologist/Geotechnical Engineer
Manager, Engineering Services Group (Sandy)

PROJECT RESPONSIBILITY: Project/Review Engineer

As Engineering Services Manager, Mr. Hawkes, P.E., P.G. is responsible for all AGEC geotechnical/geological engineering consultation projects. He holds responsibilities to designate appropriate resources to bring the projects in on time and within budget. In his capacity as Project/Review Engineer, he is responsible for geotechnical/geologic engineering aspects of assigned projects.

EDUCATION: Bachelor of Science in Engineering Geology.
Brigham Young University, April 1981

PROFESSIONAL REGISTRATION: Professional Engineer, Utah
Professional Geologist, Utah and Wyoming

PROFESSIONAL EXPERIENCE:

ENGINEERING GEOLOGIST/GEOTECHNICAL ENGINEER - Applied Geotechnical Engineering Consultants, P.C. Sandy, Utah - 1991 to present.

Supervise the field exploration, laboratory testing, field observation and testing, engineering analysis and report preparation of geologic and geotechnical investigations. Performs the review of environmental site assessments. Projects include the evaluation of earthquake related hazards, landslide and slope stability, debris flow, rockfall and other geologic hazards in areas of proposed development. Geotechnical studies have been completed for commercial, retail and residential buildings, roads, highways, utilities, bridges, dams and other development projects.

ENGINEERING GEOLOGIST - Chen-Northern, Inc., Salt Lake City, Utah - 1981 to 1991

Supervised the field exploration, laboratory testing, field engineering and report preparation for the engineering geology section. Supervised drilling operations at the Salt Lake City office. Projects included an investigation for tunnel and large rock cuts through Provo Canyon, evaluation of rock cuts for various highway projects, geologic hazard studies for a major pipeline and residential and commercial developments, landslide studies, slope stability and earth embankment studies.

PROFESSIONAL SOCIETIES:

Association of Engineering Geologists

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FIGURES

APPENDIX A

PHOTOGRAPHS OF SITE

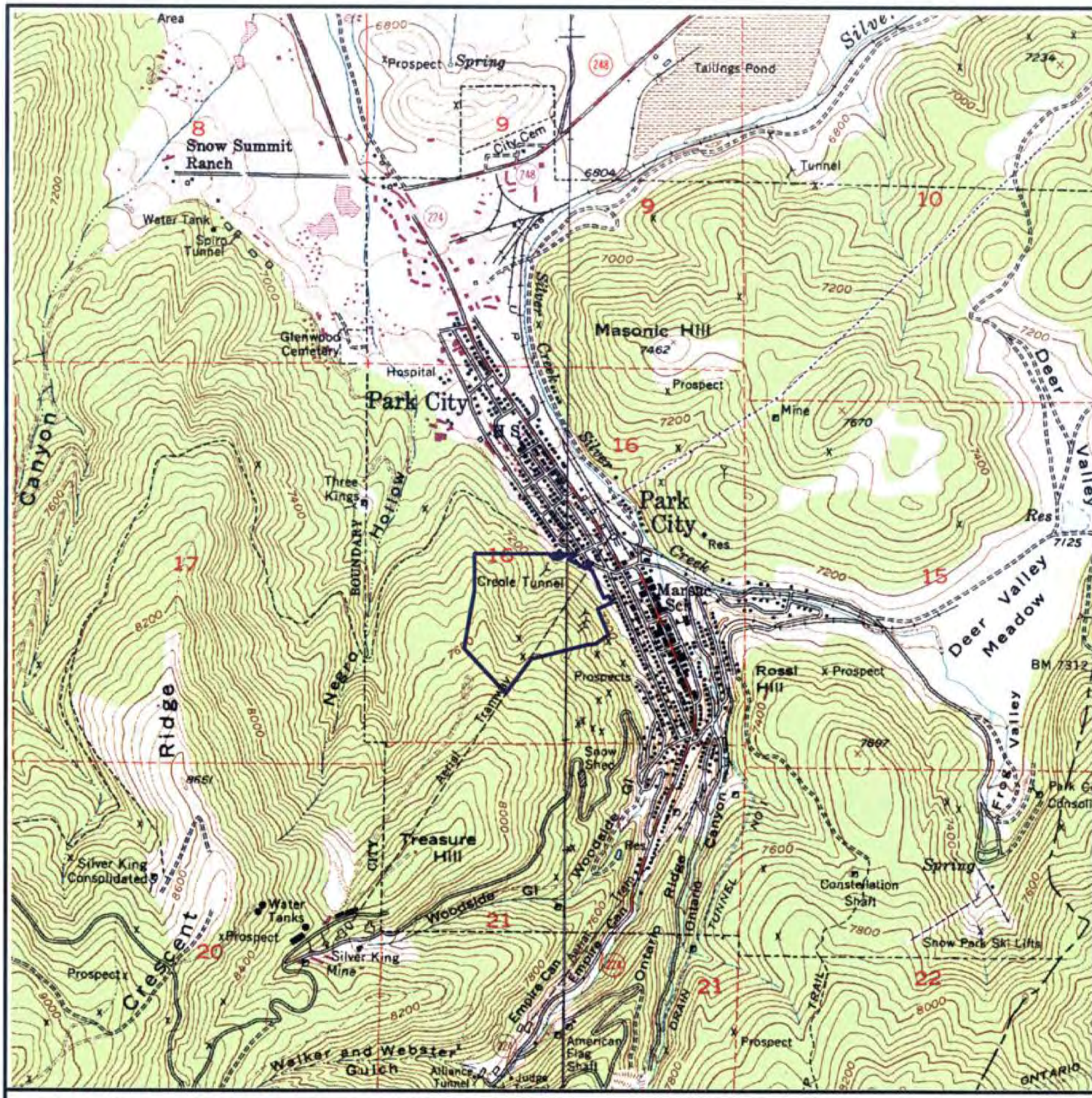
APPENDIX B

LEGAL DESCRIPTION

APPENDIX C

SAMPLING TEST RESULTS AND PCMC "LANDSCAPING AND MAINTENANCE OF SOIL COVER ORDINANCE"

FIGURES



Section 16, T2S, R4E

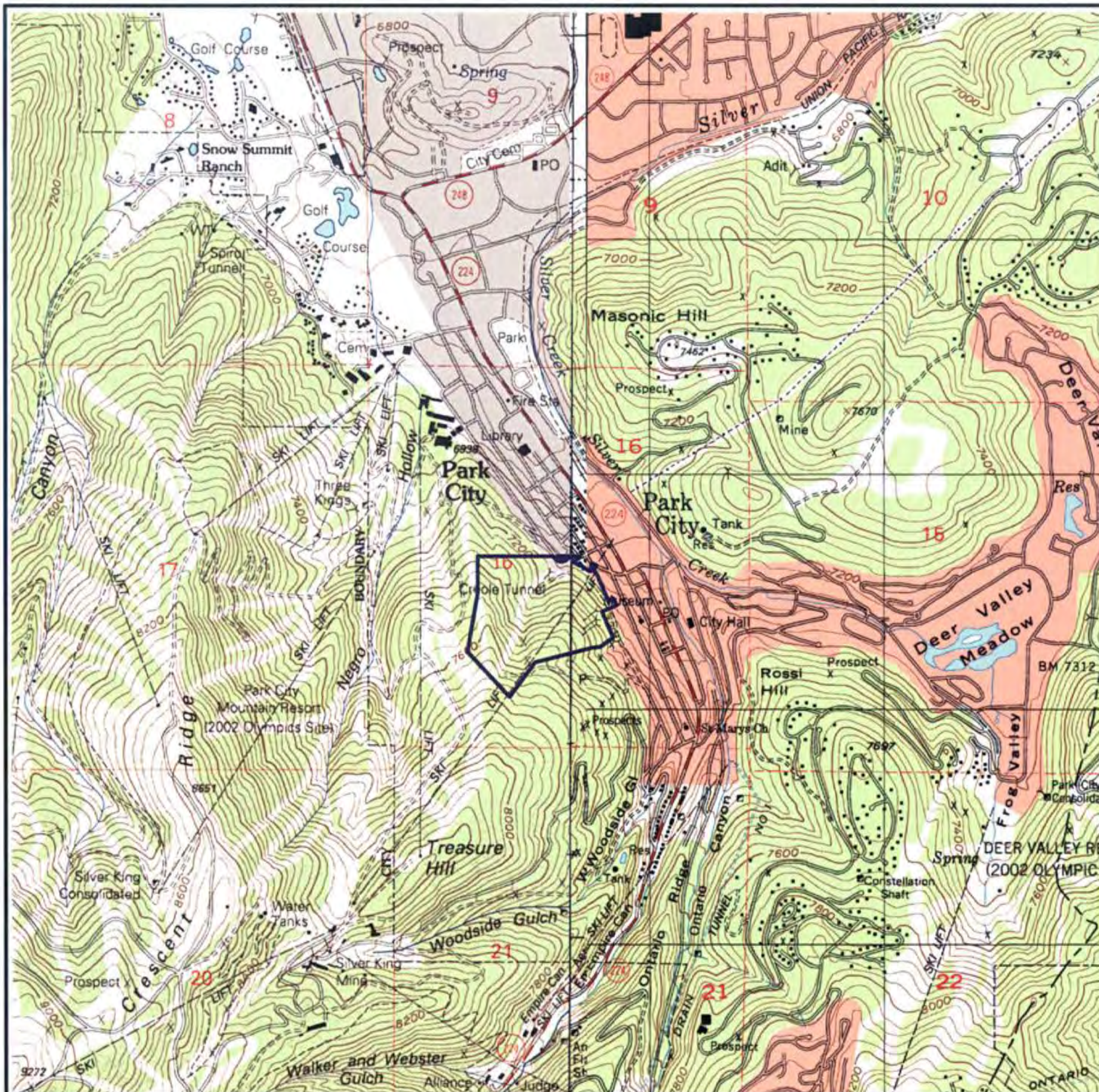
From USGS Park City East and Park City West Quadrangles (1955 and 1975) and GDT Dynamap (January 2000)

TREASURE HILL SUBDIVISION PHASE 4
PARK CITY, UTAH

N

Approximate Scale
1 inch = 2,000 feet

1051008	AGEC	Approximate Site Location	Figure 1



Section 16, T2S, R4E

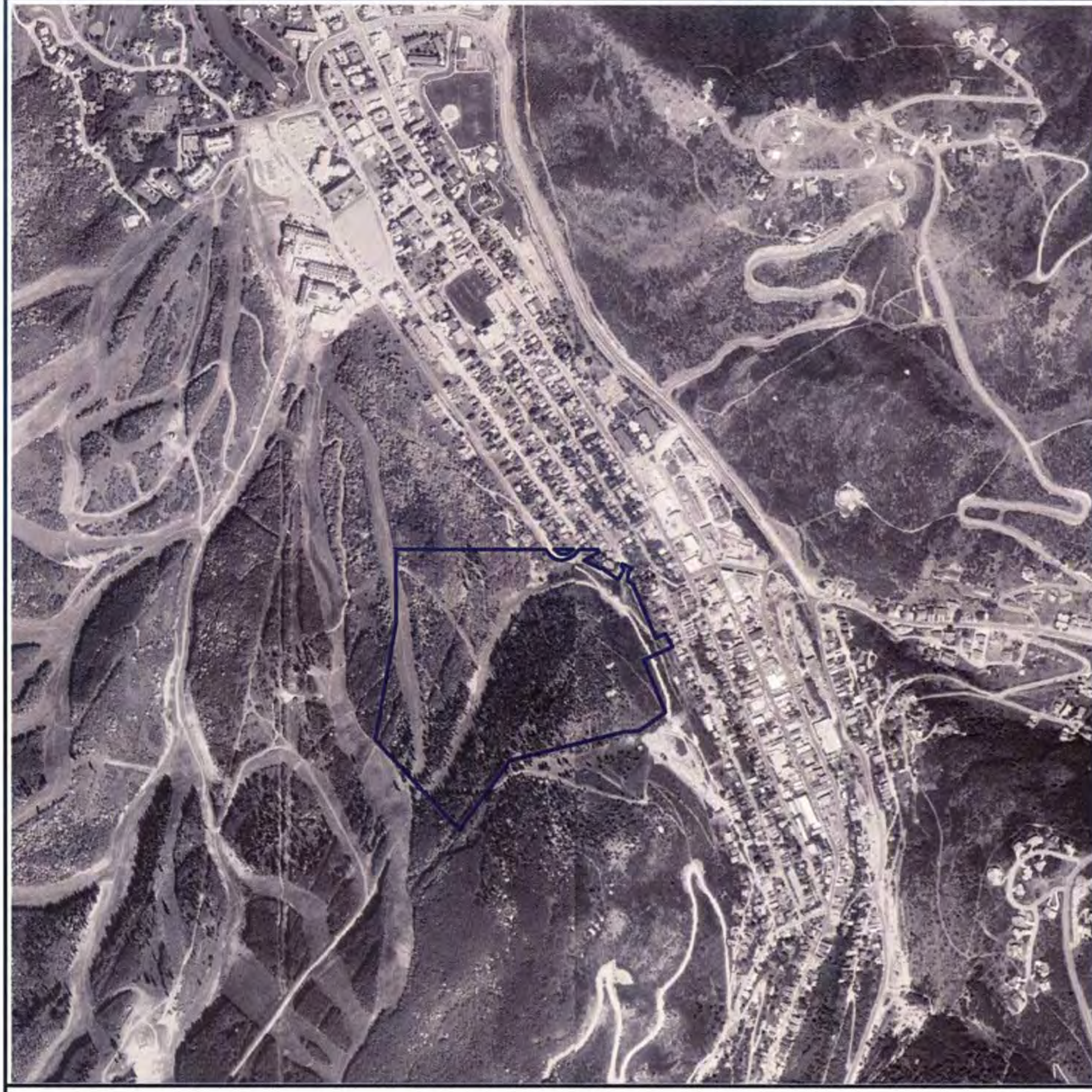
From USGS Park City East and Park City West Quadrangles (1999 and 1998) and GDT Dynamap (January 2000)

TREASURE HILL SUBDIVISION PHASE 4
PARK CITY, UTAH

N

Approximate Scale
1 inch = 2,000 feet

1051008	AGEC	1999 and 1998 USGS Quadrangle Maps	Figure 2



USGS Aerial Photograph
September 12, 1997

TREASURE HILL SUBDIVISION PHASE 4
PARK CITY, UTAH

N

Approximate Scale
1 inch = 1,000 feet

1051008	AGEC	1997 Aerial Photograph of Site	Figure 3

© 2005 GlobeXplorer, Air Photo USA
August 2004

TREASURE HILL SUBDIVISION PHASE 4

PARK CITY, UTAH

North

Approximate Scale

1" = 460'

1051008	AGEC	2004 Aerial Photograph of Site	Figure 4

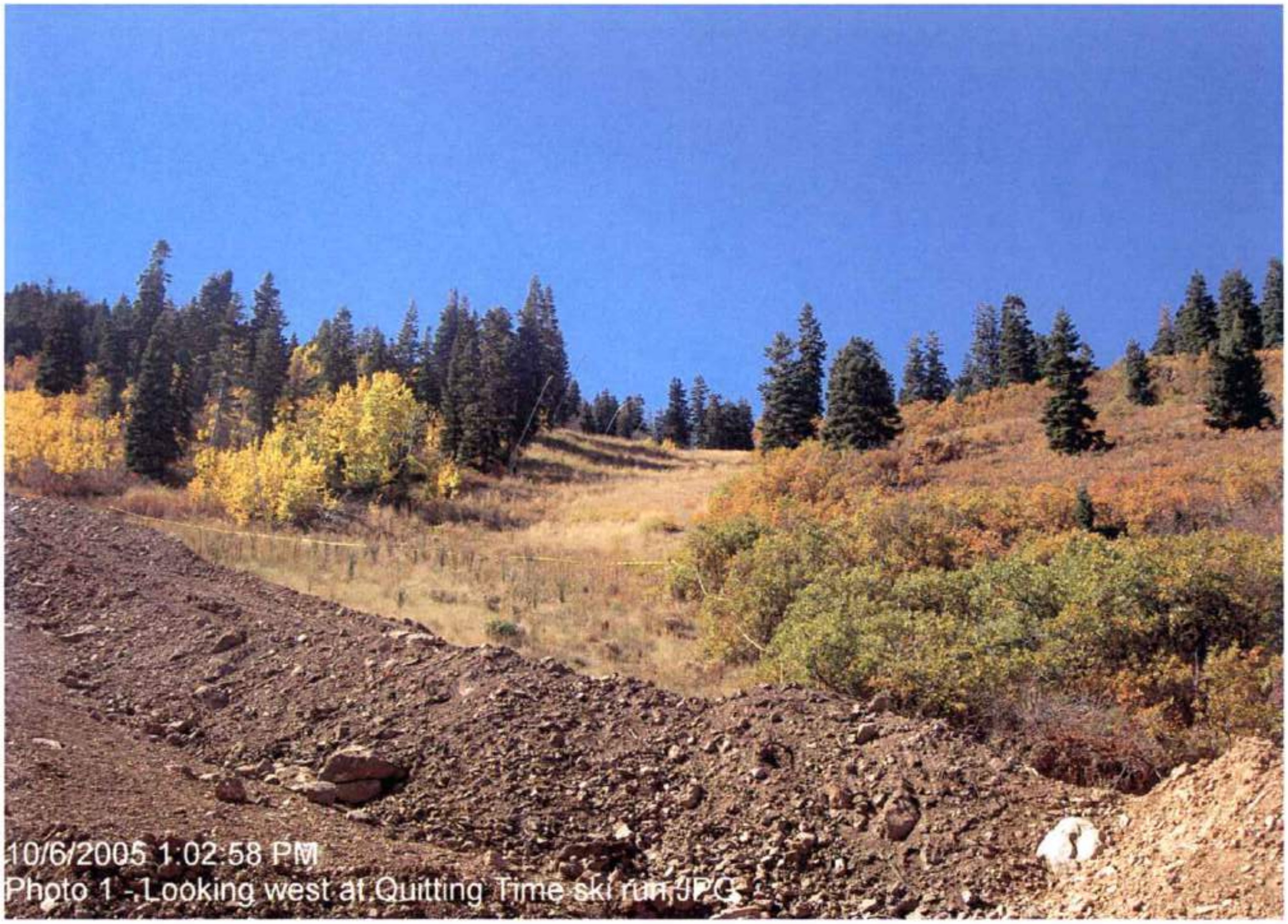
SHEET NO. EC.1	SCALE: NOT TO SCALE NORTH	SDI 614 Main Street, Suite 404 P.O. Box 4560, Park City, Utah 84060 435-649-4499	ELDREDGE & NICHOLSON ARCHITECTS	EXISTING CONDITIONS TREASURE HILL PHASE 4 Presented by: MPE INC.	P.O. Box 2429 Park City, Ut. 84060 (435) 649-7077 (435) 649-6215 Fax

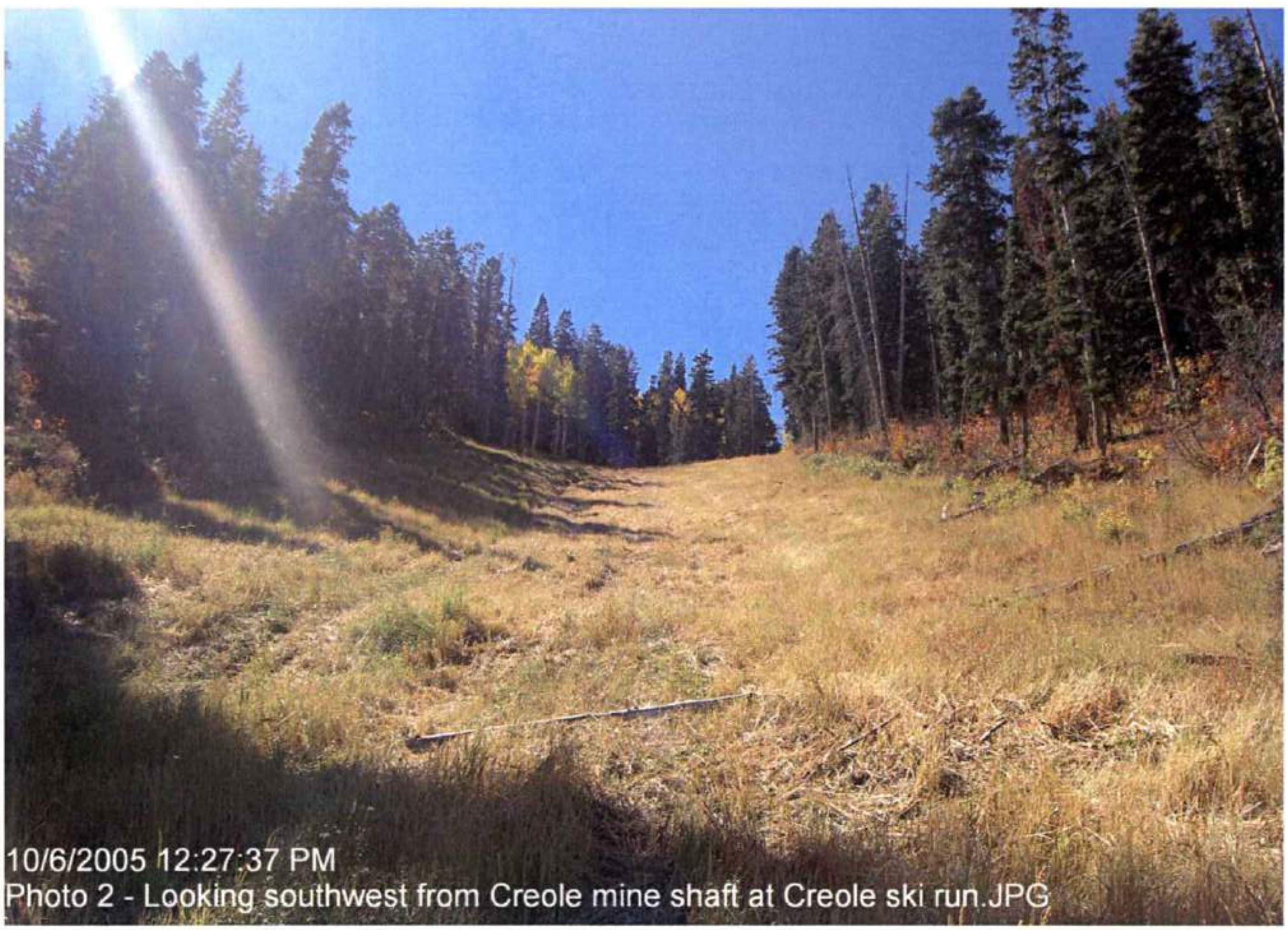
REVISED:
09-22-03
10-31-03
01-21-04

Figure 5

APPENDIX A

PHOTOGRAPHS OF SITE

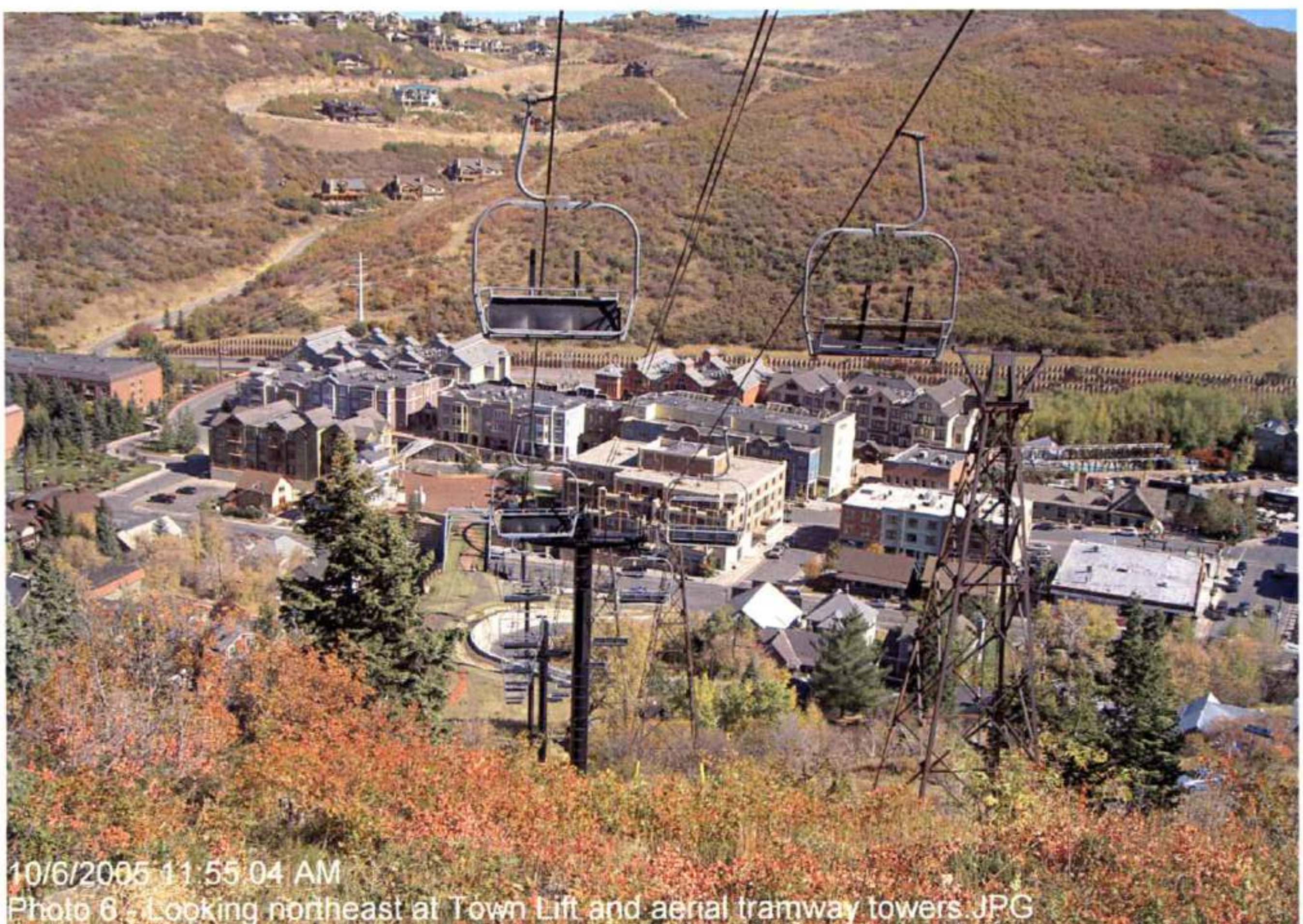

10/6/2005 1:02:58 PM
Photo 1 - Looking west at Quitting Time ski run.JPG

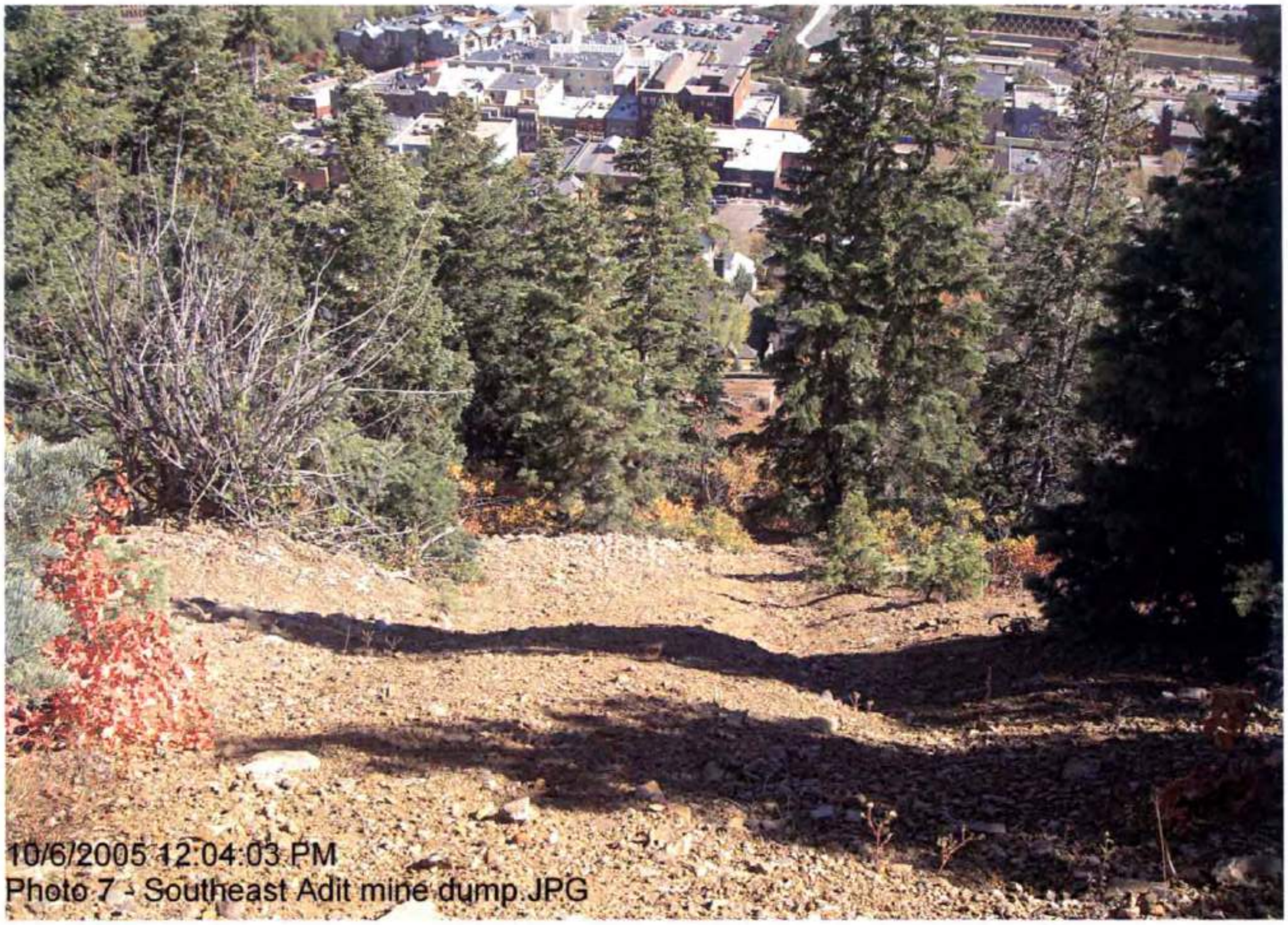

10/6/2005 12:27:37 PM
Photo 2 - Looking southwest from Creole mine shaft at Creole ski run.JPG

10/6/2005 12:27:46 PM
Photo 3 - Looking northeast down Creole ski run.JPG

10/6/2005 12:50:56 PM
Photo 4 - Looking southwest at Creole ski run from bottom of run.JPG


10/6/2005 11:55:12 AM
Photo 5 - Looking southwest at Town Lift.JPG


10/6/2005 11:55:04 AM
Photo 6 - Looking northeast at Town Lift and aerial tramway towers.JPG

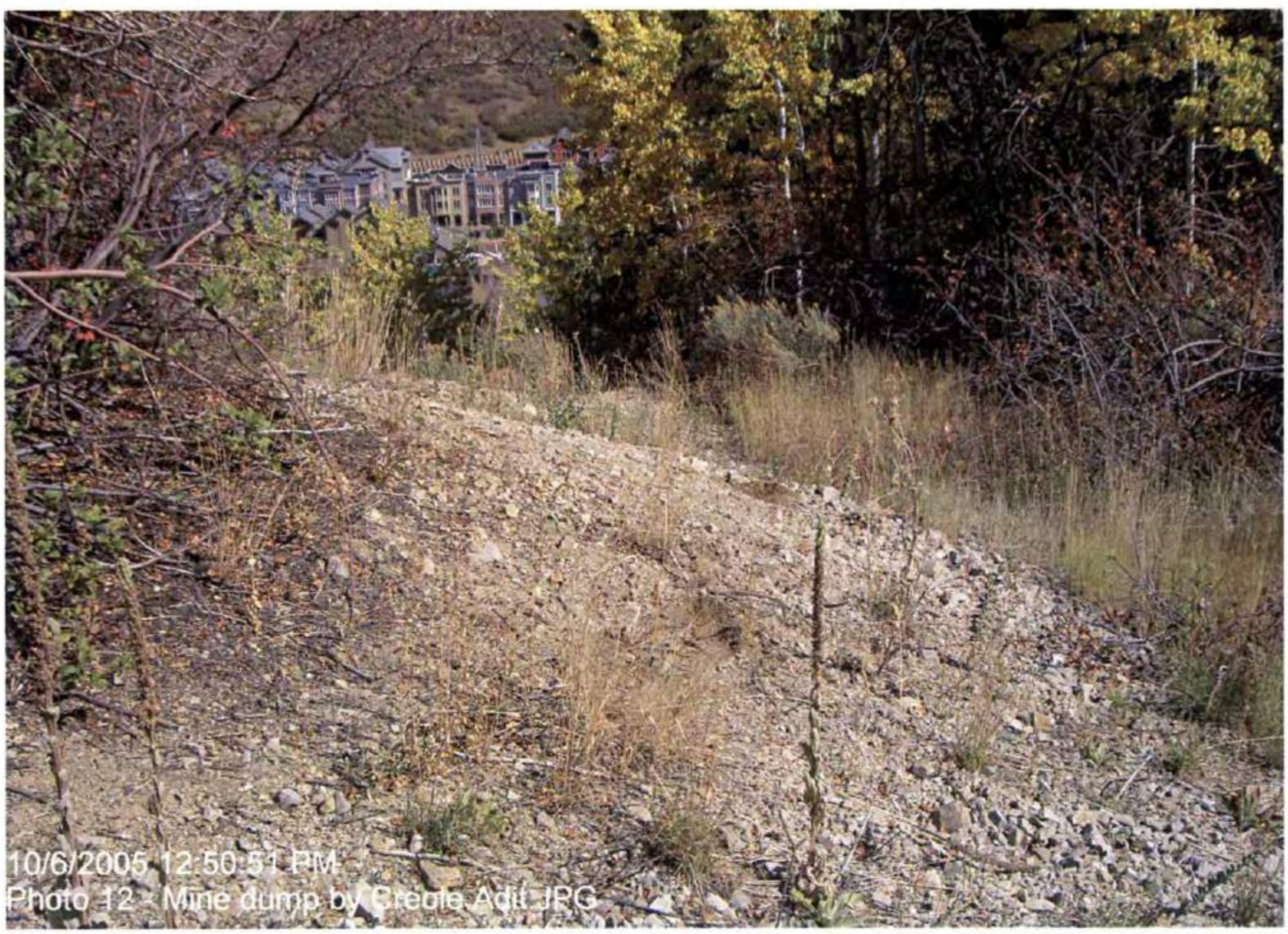

10/6/2005 12:04:03 PM
Photo 7 - Southeast Adit mine dump.JPG

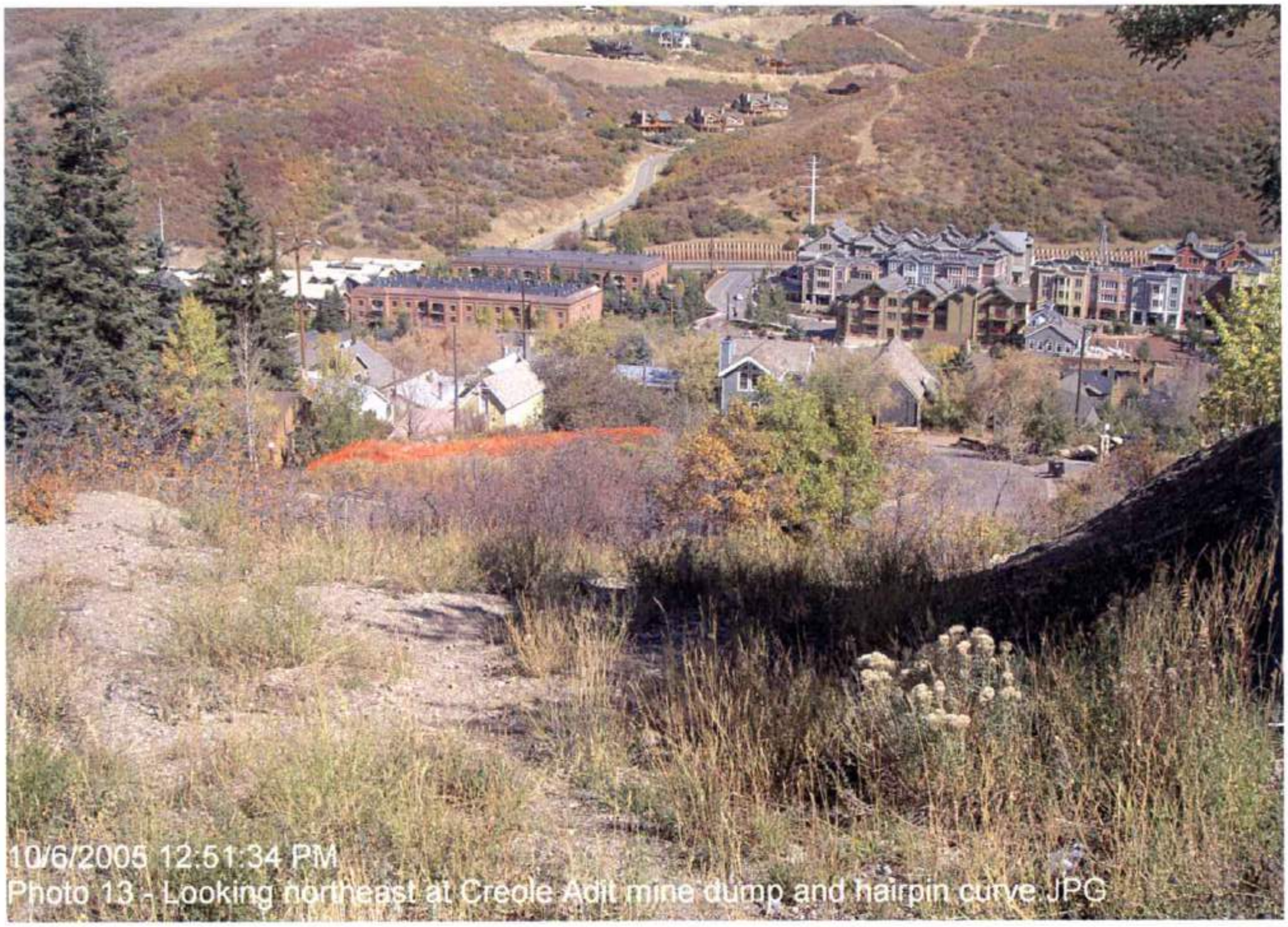

10/6/2005 12:16:27 PM
Photo 8 - Northwest Adit mine dump.JPG


10/6/2005 12:16:31 PM
Photo 9 - Northwest Adit mine dump.JPG

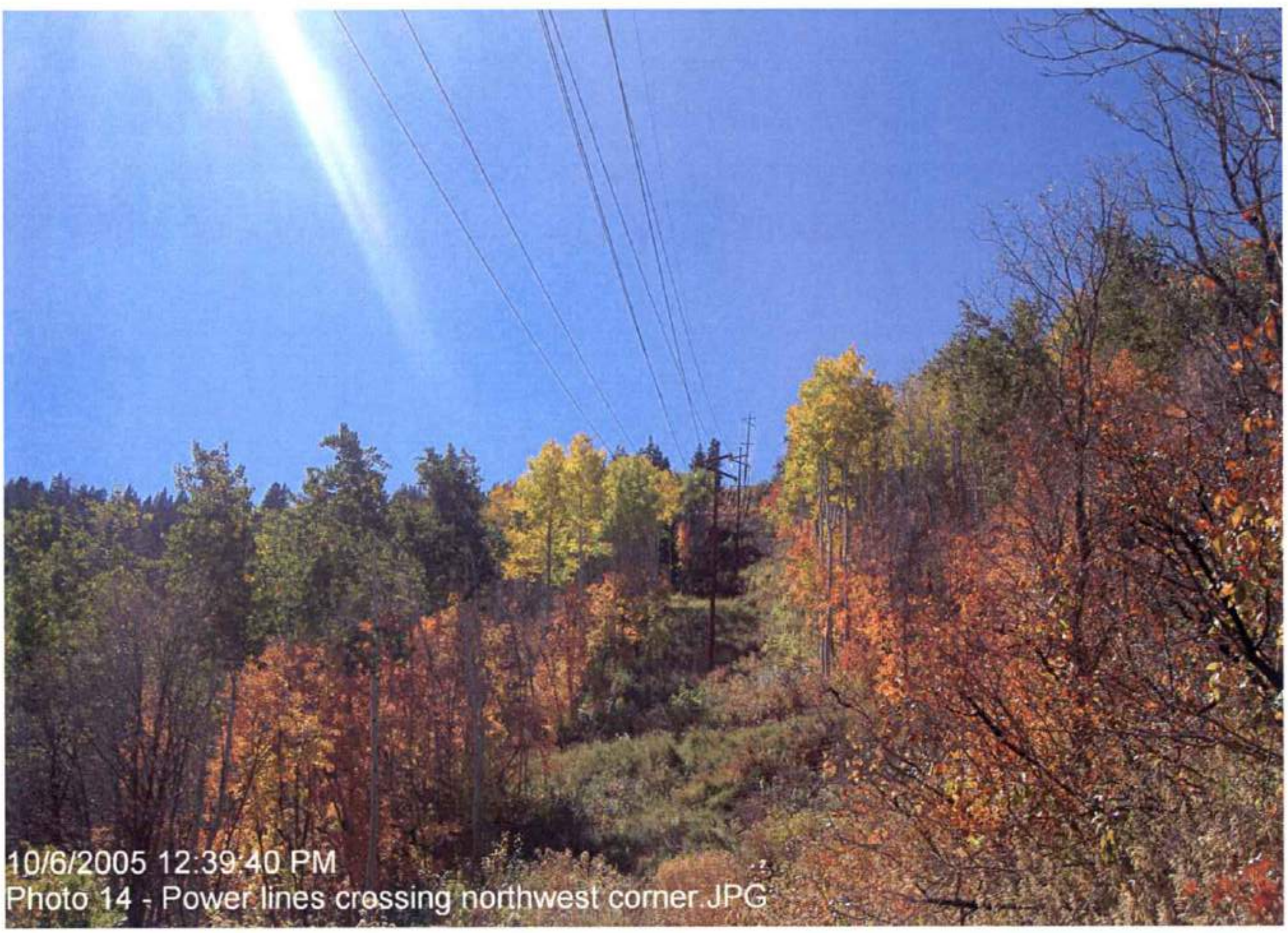

10/6/2005 12:35:03 PM
Photo 10 - Mine dump by Creole Mine shaft.JPG


10/6/2005 12:51:14 PM
Photo 11 - Creole Adit mine dump.JPG


10/6/2005 12:50:51 PM
Photo 12 - Mine dump by Creole Adit.JPG



10/6/2005 12:51:34 PM
Photo 13 - Looking northeast at Creole Adit mine dump and hairpin curve.JPG



10/6/2005 12:39:40 PM
Photo 14 - Power lines crossing northwest corner.JPG

APPENDIX B

LEGAL DESCRIPTION

Exhibit ____

TREASURE HILL SUBDIVISION, PHASE 4 DESCRIPTION

A boundary consisting of two (2) parcels of land located in Section 16, Township 2 South, Range 4 East, Salt Lake Base and Meridian, said boundary being more particularly described as follows:

Parcel 1

Beginning at the center of Section 16, Township 2 South, Range 4 East, Salt Lake Base and Meridian, said point also being South 16°50'13" East, 74.98 feet, more or less from a Park City Monument at the intersection of Lowell Avenue and Shepard Street as shown on the Silver Hill ALTA Property Survey recorded December 29, 1994, as survey No. S-1870 on file and of record in the office of the County Recorder, Summit County, Utah, thence South 35°16'39" East, 42.58 feet to a point on a non tangent curve to the left, of which the radius point lies North 54°04'32" East, a radial distance of 125.00 feet; thence easterly along the arc of said curve a distance of 275.37 feet, through a central angle of 126°13'13" to a point on the quarter section line of said Section 16; thence along said quarter section line North 89°56'24" East, 141.17 feet; thence South 27°00'12" East, 15.89 feet; thence South 42°57'14" East, 3.40 feet; thence South 55°53'00" West, 93.90 feet; thence South 57°40'08" East, 109.20 feet; thence North 60°08'27" East, 11.21 feet; thence South 38°06'27" East, 39.16 feet; thence South 57°40'08" East, 94.35 feet; thence North 33°32'19" East, 86.59 feet; thence North 23°38'00" West, 40.92 feet; thence South 66°22'00" West, 10.00 feet; thence North 20°02'58" East, 14.48 feet; thence South 69°44'50" East, 41.63 feet; thence South 70°15'52" East, 48.98 feet; thence South 66°22'00" West, 18.75 feet; thence South 32°43'26" West, 24.33 feet; thence South 14°07'38" West, 27.12 feet; thence South 23°38'00" East, 17.00 feet; thence South 45°11'38" East, 54.42 feet; thence South 23°38'00" East, 404.45 feet; thence North 66°52'00" East, 75.00 feet to the Northwest corner of Lot 14, Block 28 of the Park City Survey Amended Plat; thence South 23°38'00" East, 103.87 feet; to a point on the North boundary of the Treasure Hill Subdivision Phase 2 according to the official plat thereof recorded on August 20, 2003 as entry No. 669916 in the office of the recorder, Summit County, Utah, thence along said boundary the following two (2) courses: 1) South 66°22'00" West, 224.99 feet; thence 2) South 23°38'00" East, 395.57 feet to the North boundary of the Treasure

Hill Subdivision Phase 1 according to the official plat thereof recorded on April 15, 1996 as Entry No. 452295 in the office of the recorder, Summit County, Utah; thence along said boundary the following four (4) courses: 1) South 52°00'00" West, 223.20 feet; thence 2) South 84°00'00" West, 112.53 feet; thence 3) South 79°00'00" West, 825.00 feet; thence 4) South 33°32'19" West, 600.01 feet; thence North 47°25'46" West, 856.74 feet; thence North 08°56'27" East, 845.30 feet; thence North 02°31'24" West, 503.18 feet more or less to a point on the quarter section line of Section 16; thence along said section line North 89°56'30" East, 1,081.16 feet to the point of beginning.

Containing 63.828 acres, more or less.

Parcel 2

Beginning at the center of Section 16, Township 2 South, Range 4 East, Salt Lake Base and Meridian, said point also being South 16°50'13" East, 74.98 feet, more or less from a Park City Monument at the intersection of Lowell Avenue and Shepard Street as shown on the Silver Hill ALTA Property Survey recorded December 29, 1994, as survey No. S-1870 on file and of record in the office of the County Recorder, Summit County, Utah; thence North 89°56'24" East, 129.05 feet to a point on a non tangent curve to the right, of which the radius point lies North 59°13'03" West, a radial distance of 75.00 feet; thence westerly along the arc of said curve a distance of 148.30 feet, through a central angle of 113°17'34"; thence North 35°16'39" West, 6.72 feet to the POINT OF BEGINNING.

Containing 0.076 acres, more or less.

The basis of bearing for the above described parcels is South 23°38'00" East between the Park City Monuments located at the intersection of Park Avenue and Fourth Street and the intersection of Park Avenue and Sixth Street as shown on the Park City Monument Control Map prepared by Bush & Gudgell Inc. dated June 1981.

Tax Serial Numbers: PC-364-A, PC 800-1, PC-800-1-A, PC-325-B, PC-338-A, PC-351, PC-321.

APPENDIX C

SAMPLING TEST RESULTS AND
PCMC "LANDSCAPING AND MAINTENANCE OF SOIL COVER ORDINANCE"

INORGANIC ANALYSIS REPORT

AMERICAN WEST ANALYTICAL LABORATORIES

Client: Applied Geotechnical | Contact: Thomas Atkinson

Date Sampled: October 6, 2005 | Date Received: October 6, 2005

Project: Treasure Hill / 1051008

Lab Sample ID: L68131-01A

Field Sample ID: Southeast Adit SS#1

TOTAL METALS

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Results	
Arsenic	mg/kg-dry	10/10/2005 10:56:11 AM	6020	55	**6200**	2
Lead	mg/kg-dry	10/7/2005 2:43:48 PM	6010B	55	**30000**	2

[2] Analyte concentration is too high for accurate spike recovery.

463 West 3600 South
Salt Lake City, Utah
84115

(801) 263-8686
Toll Free (888) 263-8686
Fax (801) 263-8687
e-mail: awal@awal-labs.com

Kyle F. Gross
Laboratory Director

Peggy McNicol
QA Officer

Released by:

Laboratory Supervisor

Report Date: October 10, 2005

INORGANIC ANALYSIS REPORT

AMERICAN WEST ANALYTICAL LABORATORIES

Client: Applied Geotechnical

Contact: Thomas Atkinson

Date Sampled: October 6, 2005

Date Received: October 6, 2005

Project: Treasure Hill / 1051008

Lab Sample ID: L68131-02A

Field Sample ID: Southeast Adit SS#2

TOTAL METALS

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Results
Arsenic	mg/kg-dry	10/10/2005 11:16:31 AM	6020	56	**8800**
Lead	mg/kg-dry	10/7/2005 2:59:44 PM	6010B	56	**380000**

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e-mail: awal@awal-labs.com

Kyle F. Gross
Laboratory Director

Peggy McNicol
QA Officer

Released by: [signature]
Laboratory Supervisor

Report Date: October 10, 2005

INORGANIC ANALYSIS REPORT

AMERICAN WEST ANALYTICAL LABORATORIES

Client: Applied Geotechnical
Contact: Thomas Atkinson
Date Sampled: October 6, 2005
Date Received: October 6, 2005
Project: Treasure Hill / 1051008

Lab Sample ID: L68131-03A
Field Sample ID: Northwest Adit SS#3

463 West 3600 South
Salt Lake City, Utah
84115

TOTAL METALS

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Results
Arsenic	mg/kg-dry	10/10/2005 11:22:20 AM	6020	0.56	**27**
Lead	mg/kg-dry	10/7/2005 3:03:39 PM	6010B	5.6	**290**

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Kyle F. Gross
Laboratory Director

Peggy McNicol
QA Officer

Released by:
Laboratory Supervisor

Report Date: October 10, 2005

INORGANIC ANALYSIS REPORT

AMERICAN
WEST
ANALYTICAL
LABORATORIES

Client: Applied Geotechnical

Contact: Thomas Atkinson

Date Sampled: October 6, 2005

Date Received: October 6, 2005

Project: Treasure Hill / 1051008

Lab Sample ID: L68131-04A

Field Sample ID: Northwest Adit SS#4

463 West 3600 South
Salt Lake City, Utah
84115

TOTAL METALS

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Results
Arsenic	mg/kg-dry	10/10/2005 11:28:09 AM	6020	0.54	**36**
Lead	mg/kg-dry	10/7/2005 3:07:36 PM	6010B	5.4	**350**

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e-mail: awal@awal-labs.com

Kyle F. Gross
Laboratory Director

Peggy McNicol
QA Officer

Released by:

Laboratory Supervisor

Report Date: October 10, 2005

INORGANIC ANALYSIS REPORT

AMERICAN WEST ANALYTICAL LABORATORIES

Client: Applied Geotechnical
Contact: Thomas Atkinsor
Date Sampled: October 6, 2005
Date Received: October 6, 2005
Project: Treasure Hill / 1051008

Lab Sample ID: L68131-05A
Field Sample ID: Creole Shaft SS#5

463 West 3600 South
Salt Lake City, Utah
84115

TOTAL METALS

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Results
Arsenic	mg/kg-dry	10/10/2005 12:13:20 PM	6020	5.3	**290**
Lead	mg/kg-dry	10/7/2005 3:25:29 PM	6010B	5.3	**2200**

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Kyle F. Gross
Laboratory Director

Peggy McNicol
QA Officer

Released by: [signature]
Laboratory Supervisor

Report Date: October 10, 2005

INORGANIC ANALYSIS REPORT

AMERICAN
WEST
ANALYTICAL
LABORATORIES

Client: Applied Geotechnical | Contact: Thomas Atkinson
Date Sampled: October 6, 2005 | Date Received: October 6, 2005
Project: Treasure Hill / 1051008

Lab Sample ID: L68131-06A

Field Sample ID: Creole Shaft SS#6

463 West 3600 South
Salt Lake City, Utah
84115

TOTAL METALS

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Results
Arsenic	mg/kg-dry	10/10/2005 12:19:10 PM	6020	5.2	**200**
Lead	mg/kg-dry	10/7/2005 3:29:35 PM	6010B	5.2	**1500**

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Kyle F. Gross
Laboratory Director

Peggy McNicol
QA Officer

Released by: ______
Laboratory Supervisor

Report Date: October 10, 2005

INORGANIC ANALYSIS REPORT

AMERICAN WEST ANALYTICAL LABORATORIES

Client: Applied Geotechnical
Contact: Thomas Atkinson
Date Sampled: October 6, 2005
Date Received: October 6, 2005
Project: Treasure Hill / 1051008

Lab Sample ID: L68131-07A
Field Sample ID: Creole Adit SS#7

463 West 3600 South
Salt Lake City, Utah
84115

TOTAL METALS

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Results
Arsenic	mg/kg-dry	10/10/2005 12:24:56 PM	6020	53	**1700**
Lead	mg/kg-dry	10/7/2005 3:33:55 PM	6010B	53	**11000**

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e-mail: awal@awal-labs.com

Kyle F. Gross
Laboratory Director

Peggy McNicol
QA Officer

Released by: [signature]
Laboratory Supervisor

Report Date: October 10, 2005

INORGANIC ANALYSIS REPORT

AMERICAN WEST ANALYTICAL LABORATORIES

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Salt Lake City, Utah
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Toll Free (888) 263-8686
Fax (801) 263-8687
e-mail: awal@awal-labs.com

Kyle F. Gross
Laboratory Director

Peggy McNicol
QA Officer

Client: Applied Geotechnical
Contact: Thomas Atkinson
Date Sampled: October 6, 2005
Date Received: October 6, 2005
Project: Treasure Hill / 1051008

Lab Sample ID: L68131-08A
Field Sample ID: Creole Adit SS#8

TOTAL METALS

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Results
Arsenic	mg/kg-dry	10/10/2005 12:30:46 PM	6020	54	**1800**
Lead	mg/kg-dry	10/7/2005 3:39:06 PM	6010B	54	**11000**

Released by: [signature]
Laboratory Supervisor

Report Date: October 10, 2005

American West Analytical Labs

WORK ORDER Summary

06-Oct-05

Work Order L68131

Client ID: APP100
Project: Treasure Hill / 1051008
Comments: Rush Level 3; QCLevel: 1

QC Level: 1
Location: HOKSB

RUSH

68131

Sample ID	Client Sample ID	Collection Date	Date Received	Date Due	Matrix	Test Code	Storage	
L68131-01A	Southeast Adit SS#1	10/6/2005 12:00:00 PM	10/6/2005	10/11/2005	Soil	3051A-ICPMS	oct 6 - metals	1
				10/11/2005		6020-S	oct 6 - metals	1
				10/11/2005		ICP-S	oct 6 - metals	1
				10/11/2005		PMOIST	oct 6 - metals	1
L68131-02A	Southeast Adit SS#2			10/11/2005		3051A-ICPMS	oct 6 - metals	1
				10/11/2005		6020-S	oct 6 - metals	1
				10/11/2005		ICP-S	oct 6 - metals	1
				10/11/2005		PMOIST	oct 6 - metals	1
L68131-03A	Northwest Adit SS#3	10/6/2005 12:15:00 PM		10/11/2005		3051A-ICPMS	oct 6 - metals	1
				10/11/2005		6020-S	oct 6 - metals	1
				10/11/2005		ICP-S	oct 6 - metals	1
				10/11/2005		PMOIST	oct 6 - metals	1
L68131-04A	Northwest Adit SS#4			10/11/2005		3051A-ICPMS	oct 6 - metals	1
				10/11/2005		6020-S	oct 6 - metals	1
				10/11/2005		ICP-S	oct 6 - metals	1
				10/11/2005		PMOIST	oct 6 - metals	1
L68131-05A	Creole Shaft SS#5	10/6/2005 12:30:00 PM		10/11/2005		3051A-ICPMS	oct 6 - metals	1
				10/11/2005		6020-S	oct 6 - metals	1
				10/11/2005		ICP-S	oct 6 - metals	1
				10/11/2005		PMOIST	oct 6 - metals	1
L68131-06A	Creole Shaft SS#6			10/11/2005		3051A-ICPMS	oct 6 - metals	1
				10/11/2005		6020-S	oct 6 - metals	1
				10/11/2005		ICP-S	oct 6 - metals	1
				10/11/2005		PMOIST	oct 6 - metals	1
L68131-07A	Creole Adit SS#7	10/6/2005 12:45:00 PM		10/11/2005		3051A-ICPMS	oct 6 - metals	1
				10/11/2005		6020-S	oct 6 - metals	1
				10/11/2005		ICP-S	oct 6 - metals	1

WORK ORDER Summary

06-Oct-05

Work Order L68131

Client ID: APP100
Project: Treasure Hill / 1051008
Comments: Rush Level 3; QCLevel: 1

QC Level: 1
Location:

RUSH

Sample ID	Client Sample ID	Collection Date	Date Received	Date Due	Matrix	Test Code	Storage	
L68131-07A	Creole Adit SS#7	10/6/2005 12:45:00 PM	10/6/2005	10/11/2005	Soil	PMOIST	oct 6 - metals	1
L68131-08A	Creole Adit SS#8			10/11/2005		3051A-ICPMS	oct 6 - metals	1
				10/11/2005		6020-S	oct 6 - metals	1
				10/11/2005		ICP-S	oct 6 - metals	1
				10/11/2005		PMOIST	oct 6 - metals	1

Client Ablee
Address 660 West Sandy Parkway
Sandy UT 84070
City State Zip
Phone 566-6399 Fax 566-6493
Contact Tom Atkinson
E-mail atkinson @ ageciinc.com
Project Name Treasure Hill
Project Number/P.O.# 051008
Sampler Name Tom Atkinson

AMERICAN WEST ANALYTICAL LABORATORIES
463 West 3600 South
Salt Lake City, Utah 84115

CHAIN OF CUSTODY

(801) 263-8686
(888) 263-8686
Fax (801) 263-8687
Email:awal@awal-labs.com

Lab Sample Set # 68131
Page 1 of 1
Turn Around Time (Circle One)
1 day 2 day 3 day 4 day 5 day Standard
QC 1 2 2+ 3 3+ 4

Please indicate tests needed below

Sample ID	Date/Time Collected	Matrix	Number of Containers (Total)	Total lead	Total Arsenic								COMMENTS
Southeast Adit SS#1	10/6/05 12:00	S	1	X	X								
Southeast Adit SS#2	12:00												
Northwest Adit SS#3	12:15												
Northwest Adit SS#4	12:15												
Creole Shaft SS#5	12:30												
Creole Shaft SS#6	12:30												
Creole Adit SS#7	12:45												
Creole Adit SS#8	12:45												

Relinquished By: Signature	Date	Received By: Signature
Relinquished By: Signature [signature]	Date 10/6/05	Received By: Signature [signature]
PRINT NAME Thomas Atkinson	Time 3:40	PRINT NAME Rebecah Winkler
Relinquished By: Signature	Date	Received By: Signature
PRINT NAME	Time	PRINT NAME
Relinquished By: Signature	Date	Received By: Signature
PRINT NAME	Time	PRINT NAME
Relinquished By: Signature	Date	Received By: Signature
PRINT NAME	Time	PRINT NAME

Special Instructions:

LABORATORY USE ONLY

SAMPLES WERE:
1 Shipped or hand delivered
Notes:
2 Ambient or Chilled
Notes:
3 Temperature 22°C
4 Received Broken/Leaking (Improperly Sealed)
Y N
Notes:
5 Properly Preserved
Y N
Notes:
6 Received Within Holding Times
Y N
Notes:

COC Tape Was:
1 Present on Outer Package Y N NA
2 Unbroken on Outer Package Y N NA
3 Present on Sample Y N NA
4 Unbroken on Sample Y N NA
Notes:

Discrepancies Between Sample Labels and COC Record?
Y N
Notes:

PARK CITY
1884

Building Department • City Engineer • Planning and Zoning

February 4, 2005

Sweeny Land Development Company
P.O. Box 2429
Park City, Utah 84060

Attention: Mike Sweeny

Subject: Treasure Hill Development

Dear Mr. Sweeny:

The purpose of this correspondence is to thank you for meeting with Ron Ivie and me, February 3rd and providing Park City Municipal Corporation (PCMC) with an overview of previous environmental assessments that have been completed within the Treasure Hill Development parcel.

As discussed during our meeting, last year USEPA and UDEQ approved PCMC Environmental Management System (EMS) as the program to oversee the management of historic environmental mining impacts. A component of that program is areas that are planned for development and are known to have mining impacts will be assessed to determine environmental and human health risks. In the event there is discovery, PCMC has agreed to integrate these properties into the "Landscaping and Maintenance of Soil Cover Ordinance" found within the building code under Chapter 11-15. As agreed upon at the conclusion of our meeting, PCMC request the following information for the Treasure Hill proposed developed areas:

- Identification of areas or structures that have historic hard rock mining impacts.
- Identification of mine workings, tailings, or other suspected waste types.
- Estimated volumes discovered.
- Sample results for discovered waste that reflect the "total" concentration for lead analyzed under lab Method 160.3 SW-846 6010.
- Proposed location that will contain material exhibiting elevated lead levels when excavated.

For your convenience, I have enclosed a copy of the ordinance for your reference. Should you have any question please do not hesitate to contact me at 435-615-5058 or email jschoenbacher@parkcity.org. Until then, I thank you for your time and consideration.

Sincerely,

Jeff Schoenbacher
Environmental Coordinator

CC: Ron Ivie
Pat Putt
Kirsten Whetstone

JTS:

Park City Municipal Corporation • 445 Marsac Avenue • P.O. Box 1480 • Park City, UT 84060-1480
Building Department • (435) 615-5100 • FAX (435) 615-4900
City Engineer • (435) 615-5055 • FAX (435) 615-4906
Planning and Zoning • (435) 615-5060 • FAX (435) 615-4906

MAP OF AREA SUBJECT TO LANDSCAPING AND TOPSOIL REQUIREMENTS (ORIGINAL MAP ON FILE IN THE CITY RECORDER'S OFFICE) and as described as follows:

Beginning at the West 1/4 Corner of Section 10, Township 2 South, Range 4 East, Salt Lake Base & Meridian; running thence east along the center section line to the center of Section 10, T2S, R4E; thence north along the center section line to a point on the easterly Park City limit line, said point being South 00°04'16" West 564.84 feet from the north 1/4 corner of Section 10, T2S, R4E; thence along the easterly Park City limit line for the following thirteen (13) courses: North 60°11'00" East 508.36'; thence North 62°56' East 1500.00'; thence North 41°00' West 30.60 feet; thence North 75°55' East 1431.27'; thence North 78°12'40" East 44.69 feet; thence North 53°45'47" East 917.79 feet; thence South 89°18'31" East 47.22 feet; thence North 00°01'06" East 1324.11 feet; thence North 89°49'09" West 195.80 feet; thence South 22°00'47" West 432.52'; thence South 89°40'28" West 829.07 feet; thence North 00°09'00" West 199.12 feet; thence West 154.34 feet to a point on the west line of Section 2, T2S, R4E; thence south on the section line to the southerly right-of-way line of State Route 248; thence westerly along said southerly right-of-way line to the easterly right-of-way line of State Route 224, also known as Park Avenue; thence southerly along the easterly line of Park Avenue to the west line of Main Street; thence southerly along the westerly line of Main Street to the northerly line of Hillside Avenue; thence easterly along the northerly line of Hillside Avenue to the westerly line of Marsac Avenue, also known as State Route 224; thence northerly along the westerly line of Marsac Avenue to the westerly line of Deer Valley Drive; thence northerly along the westerly line of Deer Valley Drive, also known as State Route 224, to the southerly line of Section 9, T2S, R4E; thence easterly to the west line of Section 10, T2S, R4E; thence northerly to the point of beginning.

EXCEPTING THEREFROM all lots and parcels platted as Chatham Crossing Subdivision, Hearthstone Subdivision, Aerie Subdivision and Aerie Subdivision Phase 2, according to the official plats thereof recorded in the office of the Summit County Recorder.

(Amended by Ord. No. 03-50)

11-15- 2. MINIMUM COVERAGE WITH TOPSOIL OR OTHER ACCEPTABLE MEDIA.

(A) All real property within the Soils Ordinance Boundary must be covered and maintained with a minimum cover of six inches (6") of approved topsoil and acceptable cover described in Section 11-15-3 over soils exceeding the lead levels specified in Section 11-15-7, except where such real property is covered by asphalt, concrete, permanent structures or paving materials.

(B) As used in this Chapter, "approved topsoil" is soil that does not exceed 200 mg/Kg (total) lead representatively sampled and analyzed under method SW-846 6010.

(Amended by Ord. No. 03-50)

11-15- 3. ACEPTABLE COVER.

(A) All areas within the Soils Ordinance Boundary where real property is covered with six inches (6") or more of "approved topsoil" defined in Section 11-15-2 (B) must be vegetated with grass or other suitable vegetation to prevent erosion of the 6" topsoil layer as determined by the Building Department.

(B) Owners that practice xeriscape are allowed to employ a weed barrier fabric if the property is covered with six inches (6") of rock or bark and maintained to prevent soil break through.

(C) As used in this Chapter, "soil break through" is defined as soil migrating through the fabric and cover in a manner that exposes the public and shall be deemed in violation of this Chapter.

(D) As used in this Chapter, "xeriscape" is defined as a landscaping practice that uses plants that grow successfully in arid climates and a landscaping design intended to conserve City water resources.

(Amended by Ord. No. 03-50)

11-15- 4. ADDITIONAL LANDSCAPING REQUIREMENTS.

In addition to the minimum coverage of topsoil requirements set forth in Section 11-15-2 and the vegetation requirements set forth in Section 11-15-3, the following additional requirements shall apply:

(A) **FLOWER OR VEGETABLE PLANTING BED AT GRADE**. All flower or vegetable planting beds at grade shall be clearly defined with edging material to prevent edge drift and shall have a minimum depth of twenty-four inches (24") of approved topsoil so that tailings are not mixed with the soil through normal tilling procedures. Such topsoil shall extend twelve inches (12") beyond the edge of the flower or vegetable planting bed.

(B) **FLOWER OR VEGETABLE PLANTING BED ABOVE GRADE**. All flower or vegetable planting beds above grade shall extend a minimum of sixteen inches (16") above the grade of the six inches (6") of approved topsoil cover and shall contain only approved topsoil.

(C) **SHRUBS AND TREES**. All shrubs planted after the passage of this Chapter shall be surrounded by approved topsoil for an area, which is three times bigger than the rootball and extends six inches (6") below the lowest root of the shrub at planting. All trees planted after the passage of this Chapter shall have a minimum of eighteen inches (18") of approved topsoil around the rootball with a minimum of twelve inches (12") of approved topsoil below the lowest root of the tree.

(Amended by Ord. No. 03-50)

11-15- 5. DISPOSAL OR REMOVAL OF AREA SOIL.

(A) Following any work causing the disturbance of soils within the Soils Ordinance Boundary, such as digging, landscaping, and tilling soils, all disturbed soils must be collected and reintroduced onsite by either onsite soil capping specified in Section 11-15-2 or off-site disposal as required by this Chapter and/or State and/or Federal law.

(B) All soil generated from the Soils Ordinance Boundary that cannot be reintroduced within the Soils Ordinance Boundary and are destined for off-site disposal must be sampled and characterized with representative sampling and tested at a State Certified Laboratory.

(C) Soils exhibiting a hazardous characteristic exceeding the following Toxic Characteristic Leaching Procedure (TCLP) standards, must be managed as a hazardous waste and disposed of within a Utah Department of Environmental Quality permitted facility:

Arsenic – 5.0 mg/L (TCLP) Method 6010 B

Lead – 5.0 mg/L (TCLP) Method 6010 B

(D) Soils not failing the TCLP standards may be disposed within a non-hazardous landfill facility providing a "Disposal Acceptance Letter" to the Building Department is issued by the disposal facility.

(E) No soils generated within the Soils Ordinance Boundary are allowed to be exported for use as fill outside the Soils Ordinance Boundary.

(F) Reuse of generated soils within the Soils Ordinance Boundary is acceptable provided the receiving property is covered with six inches (6") of clean topsoil or covered with an acceptable media, i.e. vegetation, bark, rock, as required by this Chapter.

(G) Soils that are relocated within the Soils Ordinance Boundary must be pre-approved by the Building Department before being relocated and reused.

(Amended by Ord. No. 03-50)

11-15- 6. DUST CONTROL.

Contractor or owner is responsible for controlling dust during the time between beginning of construction activity and the establishment of plant growth sufficient to control the emissions of dust from any site. Due care shall be taken by the contractor or owner, to protect workmen while working within the site from any exposure to dust emissions during construction activity by providing suitable breathing apparatus or other appropriate control.

11-15- 7. CERTIFICATE OF COMPLIANCE.

(A) Upon application by the owner of record or agent to the Park City Building Department and payment of the fee established by the department, the Park City Building Department shall inspect the applicant's property for compliance with this Chapter. When the property inspected complies with this Chapter, a Certificate of Compliance shall be issued to the owner by the Park City Building Department.

(B) Verifying soil cap depth and representative samples results that are equal to or below the following standards will result in full compliance and eligibility for the certificate:

Occupied Property – Lead 200 mg/Kg (Total) Method SW-846 6010

Vacant Property – Lead 1000 mg/Kg (Total) Method SW-846 6010

(Amended by Ord. No. 03-50)

11-15- 8. TRANSIT CENTER DISTURBANCE

All construction activity, utility modification, and landscaping that results in the breach of the installed protective cap or the generation of soils must be conducted in accordance to the implemented Site Management Plan, which is retained within the Building Department.

(Amended by Ord. No. 02-32; 03-50)

11-15- 9. PROPERTY WITH KNOWN NON-COMPLIANT LEVELS OF LEAD

(A) Property exceeding the lead levels defined in Section 11-15-7 that have been representatively sampled and have not been capped per Section 11-15-2 are required to comply with this Chapter by December 31, 2004.

(B) Non-compliant lots exceeding the criteria within Section 11-15-7 will be sent two (2) warning notices in an effort to correct the non-compliance issue.

(Amended by Ord. No. 03-50)

11-15- 10. WELLS.

All wells for culinary irrigation or stock watering use are prohibited in the Area (Soils Ordinance Boundary).

11-15- 11. NON-SAMPLED AND UNCHARACTERIZED LOTS.

(A) Lots that have not been characterized through representative sampling and are within the original Soils Ordinance Boundary are required to be sampled by the year 2006.

(B) After the property has been sampled, lots exceeding the lead levels within Section 11-15-7 are required to comply with this Chapter within a 12-month period.

11-15- 12. FAILURE TO COMPLY WITH CHAPTER.

Any person failing to landscape, maintain landscaping, control dust or dispose of tailings as required by this Chapter and/or comply with the provisions of this Chapter, shall be guilty of a Class B misdemeanor. Any person failing to comply with the provisions of this Chapter may be found to have caused a public nuisance as determined by the City Council of Park City, and appropriate legal action may be taken against that person.

(Amended by Ord. No. 03-50)

CHAPTER 15 - PARK CITY LANDSCAPING AND MAINTENANCE OF SOIL COVER

11-15- 1. AREA.

This Chapter shall be in full force and effect only in that area of Park City, Utah, which is depicted in the map below and accompanied legal description, hereinafter referred to as the Soils Ordinance Boundary.

(Amended by Ord. No. 03-50)

TREASURE
EXCAVATION
MANAGEMENT PLAN

PREPARED FOR:
MPE INC.
PO BOX 2429
PARK CITY, UTAH 84060
psbro23@mac.com

December 15, 2008

ALTA
ENGINEERING
INC.
LAND PLANNING · CIVIL ENGINEERING
SURVEYING · PROJECT MANAGEMENT
PO BOX 2864 PARK CITY, UTAH 84060 435-649-8191

ALTA ENGINEERING INC.
CIVIL ENGINEERING . LAND PLANNING
SURVEYING . PROJECT MANAGEMENT

December 15, 2008

Park City Municipal Corporation
Planning Commission
P.O. Box
Park City, Utah 84060

RE: Treasure
Excavation Management Plan

Planning Commission and Staff:

This Excavation Management Plan includes the results of the excavation assessment study conducted on pre-development, construction phase, and post-development conditions of the proposed Treasure project. The overall concept of the excavation operations is to manage all excavated materials on site. The excess excavation material will be transported to material placement sites higher on the Sweeney Master Plan open space and adjacent Park City Mountain Resort property via a conveyance system. The conveyance system is a flexible low impact methodology that eliminates transporting excess material over the streets of Park City to remote disposal sites.

Three primary material placement zones have been identified on exhibit E-2.0. The three zones have capacity to accept some of the estimated excess excavated material that will be generated by the construction of the Treasure buildings including parking garages and landscape features. Additional secondary placements zones need to be developed to accept the remaining excess excavated material. The fill placement zones should be chosen carefully to minimize impacts on existing vegetation, preserve important vistas, and to improve and enhance ski run grades.

A material placement protocol is presented that addresses the fill placement, geotechnical design, and placement control measures that will be incorporated into the construction process. The protocol outlines proposed final grading and revegetation methods that are planned for the material placement zones.

____
Rob McMahon PE

1685 Bonanza Drive
Park City, Utah 84060
Suite 200B
(435)649-8191
P.O. Box 2864
www.alta-engr.com

SUMMARY

Predevelopment Site:

A geologic reconnaissance study was conducted on the subject property dated April 22, 1994 prepared by SHB Agra under Project No. E 93-22-67. A Phase 1 Environmental Site Assessment was conducted on the subject property dated October 12, 2005 by AGEC Inc. under Project No. 1051008. The site is comprised of approximately 63.9 acres mostly covered in aspen, fir, oak, and mountain maple. The site is primarily undeveloped with ski runs and lifts traversing the property and evidence for prior minor mining activities. Elevation of the site ranges between 7,080 feet above mean sea level at the Northeast corner to 7,760 feet at the Southwest corner.

The site is characterized as consisting of Permian Park City Formation consisting of pale grey weathered fossiliferous and cherty limestone containing a medial phosphatic shale member and Pennsylvanian Weber Quartzite consisting of pale gray tan weathered quartzite and limy sandstone with some inter bedded gray to white limestone and dolomite.

The majority of the excavation materials from the site are expected to be the weathered quartzite and white limestone and dolomite. These materials are generally easy to process into compactable and workable fill material through the use of conventional earthmoving equipment.

Construction Phase:

The site can be divided into four main excavation operations as shown on exhibit E-1.0. Listed below are the estimated quantities of total excess excavation material to be exported to the four material placement zones.

Entry Level Site	Buildings 3A,3B3C, 4A	240,000 cy
Mid Level Site	Building 4B	270,000 cy
Upper Level Site	Buildings 5A,5B,5C,5D	275,000 cy
Midstation Site	Buildings 1A,1B,1C	175,000 cy
	Estimated Total	960,000 cy

The four sites can be isolated as separate excavation operations or can operate concurrently. The initial phase would be to establish the entry level site adjacent to Lowell and Empire avenues. This site would serve as the initial staging area and contain the erosion control structures that will be utilized for the subsequent phases. This initial area would implement landscaping and other screening measures to mitigate the excavation impacts on the surrounding neighborhood. Each subsequent excavation operation could follow different phasing schemes.

Three primary material placement zones are identified on exhibit E-2.0. The primary zones will be prioritized and managed to work in conjunction with the project phasing. Secondary potential placement zones have also been identified as potential deposit sites. These secondary sites are generally defined on Exhibit E-2.0. Placement of the material in these secondary sites provides the opportunity to make a number of terrain improvements. Listed below are the placement zones and the estimated capacities.

	Area	Capacity (CY)
Kings Crown Zone	4.9 Acres	145,000
Creole Zone	5.0 Acres	125,000
Payday Zone	4.5 Acres	145,000
Secondary Zones Combined	Varies	+ 625,000

Storm Water Pollution Prevention and Erosion Control:

A comprehensive Storm Water Pollution Prevention Plan (SWPPP) will be incorporated into each phase and excavation site. Erosion control of the excavation sites will be managed as the excavation progresses. Storm water will be controlled through a series of conveyance channels that feed into a detention basin to be located in the entry level site. Revegetation will be aggressive and take place together with and along side the excavation operations.

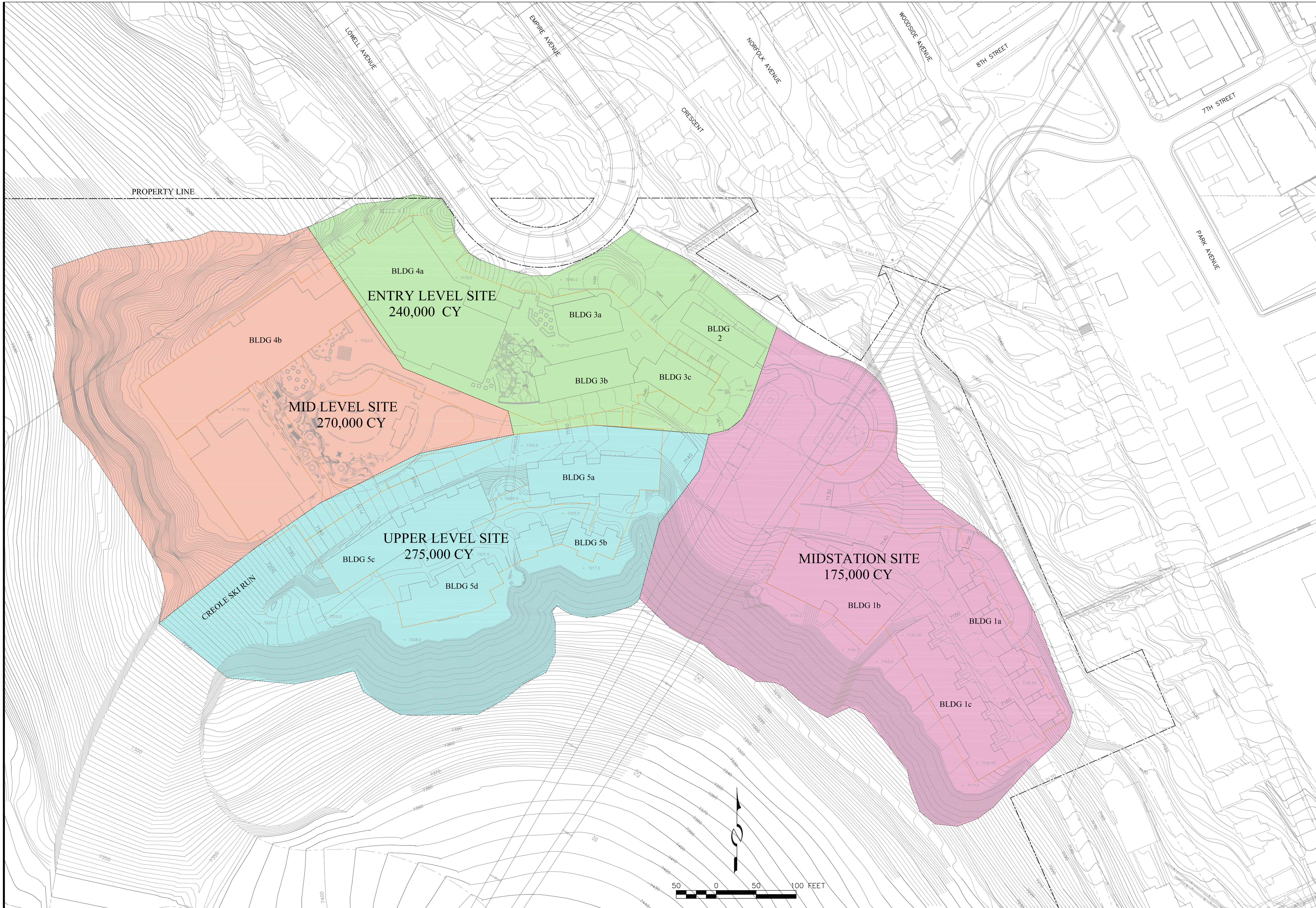
Stockpiled material will be contained within the smallest area feasible. Best management practices will be employed to prevent erosion and the generation of airborne dust. Surface water will be diverted around the stockpiling operations to the detention basin. The stockpiles will be kept small and managed to be transported to the material disposal sites as the excess material is produced.

Material Placement Protocol & Post Development Mitigation:

A study of the placement of the excavated material was conducted by AGEC Geotechnical consultants summarized in an opinion letter dated October 7, 2003 under project No. 1030820. From the geotechnical and geological perspective, Placement of the excess material in the placement zones can be successful and will be managed with practical engineering solutions resulting in stable disposal areas.

The transporting of the excess excavated material will employ a conveyor system. The location of the conveyance operations can be moved to be close to the source of the excavation thus eliminating unnecessary handling of the materials and dust generation.

Placement of the excavated material in the waste area zones will be done in accordance and under supervision of geotechnical consultants. On site inspection will be provided to assure fill placement will be an engineered stabilized area. Revegetation and erosion control measures will utilize current industry standards and follow methods that are to be outlined in the comprehensive SWPPP. The stabilization methods will proceed as the fill areas are constructed with aggressive revegetation efforts to promote rapid growth of vegetative mats. The primary focus of the erosion control effort on the fill areas will be to prevent unprotected fill areas to exist and become exposed to the erosion elements.



DATE:
DEC.15, 2008
PROJECT NO.:
01-01-01
FILE:
TREASURE HILL

	REVISIONS	DATE
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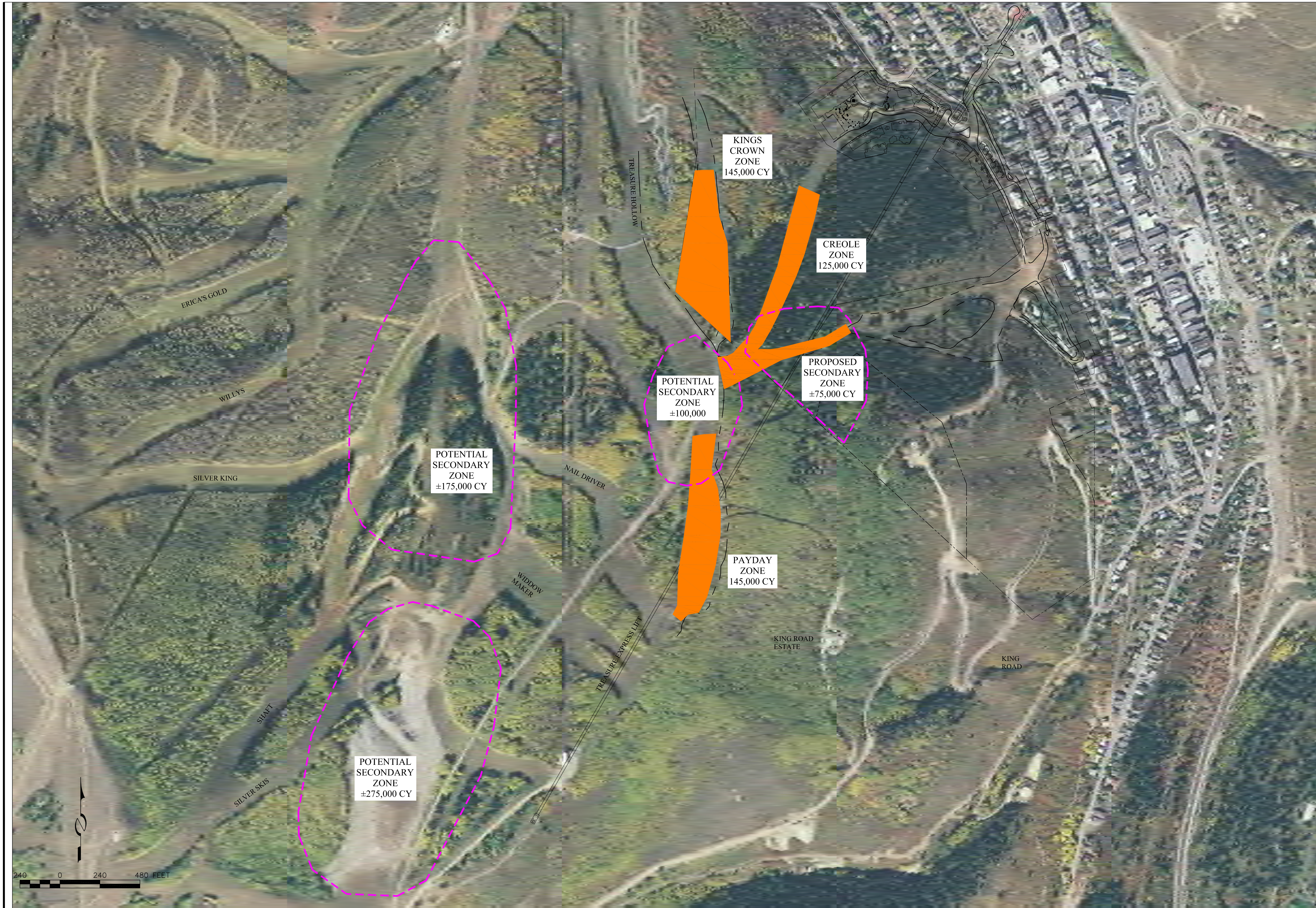
REGISTERED PROFESSIONAL ENGINEER
No. 349961
ROBERT J. McMAHON
STATE OF UTAH

ALTA ENGINEERING INC.
CIVIL ENGINEERING • LAND PLANNING
SURVEYING • PROJECT MANAGEMENT
PO BOX 2864 PARK CITY, UTAH 84060 435-649-8191

FOR: MPE INC.

TREASURE
EXCAVATION MANAGEMENT PLAN
EXCAVATION SITES & VOLUMES

SHEET NO:
E1.0



DATE:
DEC.15, 2008

PROJECT NO.:
01-01-01

FILE:
TREASURE HILL

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REGISTERED PROFESSIONAL ENGINEER
No. 349961
ROBERT J. McMAHON
STATE OF UTAH

ALTA ENGINEERING INC.
CIVIL ENGINEERING • LAND PLANNING
SURVEYING • PROJECT MANAGEMENT
PO BOX 2864 PARK CITY, UTAH 84060 435-649-8191

FOR: MPE INC.

TREASURE
EXCAVATION MANAGEMENT PLAN
MATERIAL PALCEMENT ZONES

SHEET NO:
E2.0

May 15, 2017

MPE Incorporated
P.O. Box 2429
Park City, Utah 84060

Attention: Pat Sweeney
EMAIL: psbro23@mac.com or psbro3@comcast.net

Subject: Geotechnical/ Geological Consultation
Proposed Treasure Hill Project
Park City, Utah
Project No. 1160503

Gentlemen:

Applied Geotechnical Engineering Consultants, Inc. (AGEC) is pleased to be providing geotechnical and geologic consultation in regards to the planning and design of the proposed Treasure Hill project to be located near the Town Lift and west of Lowell Avenue in Park City, Utah.

AGEC previously provided information on the anticipated bedrock conditions along with cut slope guidance for the proposed development. Preliminary information has been provided in the documents listed below:

	Date of Letter	Topic
•	October 7, 2003	Geotechnical/geologic feasability
•	September 28, 2016	Preliminary bedrock cut slope guidance
•	January 10, 2017	Updated bedrock cut slope guidance

Based on our current understanding of the proposed construction and the subsurface conditions at the site, it is our professional opinion that the site is suitable for the proposed development. Design and construction recommendations for the geotechnical and geologic aspects of design and construction will be provided to address the site specific conditions.

AGEC has been requested to proceed with our recommended scope of work to conduct the geotechnical investigation as described in our letter dated January 10, 2017. The scope of work was recommended in order to further understand, define and characterize the subsurface conditions in the area proposed for the development and in the area proposed to deposit the anticipated excess excavated material.

Our investigation will include providing our professional opinions and recommendations on the following items for design and construction:

1. Temporary construction slopes
2. Long-term slopes and "cliff" like landscaping
3. Foundation support
4. Lateral support for the deep cuts, if needed
5. Excavated material placement

We plan on beginning the exploration portion of our study once the ground conditions have improved in order to gain access without excess damage to the ground surface.

If you have any questions, please call.

Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

5/15/17

James E. Nordquist, P.E., G.E.
JEN/rs

Applied Geotechnical Engineering Consultants, Inc.

October 7, 2003

MPE Incorporated
P.O. Box 2429
Park City, Utah 84060

Attention: Pat Sweeney
FAX (435) 649-6215

Subject: Geotechnical/Geological Consultation
Treasure Hill, Phase 3
Park City, Utah
AGEC Project No. 1030820

Gentlemen:

Applied Geotechnical Engineering Consultants, Inc. (AGEC) has been requested to provide geotechnical and geologic consultation in regards to the design and construction of the Treasure Hill, Phase 3 development to be located near the town lift and west of Lowell Avenue in Park City, Utah.

AGEC is currently in the process of reviewing the geologic reports that have been developed in the area along with reviewing published geologic literature. Our preliminary review to date indicates that:

> The stratigraphy of the site generally consists of Pennsylvanian age Weber Quartzite and Permian age Park City Formations. The Weber Quartzite consists of medium- to thin-bedded, pale gray to tan, fine-grained quartzite and sandstone while the Park City Formation consists largely of pale-gray fossiliferous limestone with some chert and sandstone.
>
> Bedrock exposed at localized areas of the site in road cuts, along the hillside and in abandoned mine workings consist predominately of massively bedded Weber Quartzite. Vertical to near vertical joints were observed and measured in the exposures. Two dominant orientations are apparent in the data (although more data is necessary for a good statistical sample) with trends of roughly 220 and 330 degrees.
>
> The Weber Quartzite is the dominant unit in the area proposed for development. The northwest portion of the property is largely underlain by Park City Formation. This includes some of the area proposed for fill placement. Quaternary age colluvial soils composed of clay, silt, sand, gravel, cobbles, and boulders overly the bedrock units over most of the site.

Based on the information currently available, it is our professional opinion that the proposed development is feasible from a geologic and geotechnical perspective. We anticipate that practical engineering solutions will be developed to provide:

- stable construction slopes,
- stable long term slopes and "cliff" like landscaping,
- suitable foundation support,
- stable lateral support for the deep cuts,
- stable excavation waste disposal area.

Once the available information has been reviewed, an exploration program will be proposed to investigate the subsurface conditions in the area for the proposed development. The investigation will provide information for us to develop appropriate design parameters for design and construction of the proposed facility.

We look forward to working with you on this project. If you have any questions, please call.

Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
No. 143916
JAMES E.
NORDQUIST
STATE OF UTAH

James E. Nordquist, P.E.

JEN/sc
cc: Rob McMahon (Alliance Engineering, FAX (435) 649-9475)

AGEC
Applied GeoTech

September 28, 2016

MPE Incorporated
P.O. Box 2429
Park City, Utah 84060

Attention: Pat Sweeney
EMAIL: psbro3@comcast.net

Subject: Proposal for Professional Geotechnical Services
Proposed Treasure Hill Resort
Park City, Utah
Proposal No. 1160503

Gentlemen:

Applied Geotechnical Engineering Consultants, Inc. (AGEC) is pleased to provide a proposal for conducting a preliminary geotechnical investigation for the proposed Treasure Hill Resort development to be located near the town lift and west of Lowell Avenue in Park City, Utah.

PROPOSED CONSTRUCTION

We understand that the site is being considered for construction of a combination of residential and commercial development. Excavation to a depth of up to 100 feet is being considered for the proposed development. We understand that material from the cuts will remain on site and be placed above the area proposed for development.

GEOLOGIC CONDITIONS

AGEC is currently in the process of performing site geologic reconnaissance in the area along with reviewing geologic literature and reports. Our preliminary review to date indicates that:

The stratigraphy of the site generally consists of Pennsylvanian age Weber Quartzite and Permian age Park City Formations. The Weber Quartzite consists of medium- to thin-bedded, pale gray to tan, fine-grained quartzite and sandstone while the Park City Formation consists largely of pale-gray fossiliferous limestone with some chert and sandstone.

The Weber Quartzite is the dominant unit in the area proposed for development. The northwest portion of the property is largely underlain by Park City Formation. This includes some of the area proposed for fill placement. Quaternary age colluvial soils composed of clay, silt, sand, gravel, cobbles, and boulders overly the bedrock units over most of the site.

AGEC performed approximate bedrock jointing measurements on the site from exposed bedrock at outcrops, mine adits, and road cuts on June 28, 2016. The measurements showed three predominant joint sets at the following orientations (more data is necessary for a good statistical sample):

Strike (±30°)	Dip (±30°)
N 70° E	10° SE
N 15° W	85° NE
N 80° W	70° NE

PROPOSED STUDY

Based on the our experience in the area, the subsurface conditions anticipated and our understanding of the proposed construction, we propose to perform a preliminary subsurface exploration, laboratory testing and geological and engineering analysis to assist in developing conceptual design recommendations for the proposed development. A summary of our Scope of Services is included in Exhibit A. We realize, however, that the scope of work at this time will likely be limited by access difficulty due to the weather.

FEE

We propose to provide the services based on hourly and unit costs in accordance with the attached fee schedule (Exhibit B). We estimate that our fee will fall within the ranges described below.

Task	Estimated Fee
3 Borings	$16,000 - $20,000
Creole Drainage Test Pit (TP-1)	$1,000-$2,000
2 Additional Cut-Feasability Test Pits (TP-2 & 3)	$5,000-$8,000
Laboratory Testing	$500 - $1,000
Analysis	$4,000 - $6,000

The fee estimate assumes that the client will provide access to the site for a track mounted drill rig and support vehicles, as well as access to water for drilling. We also realize that the scope of work at this time will likely be limited by access difficulties and the weather.

We appreciate the opportunity of providing this proposal to you and look forward to working with you on the project. If this proposal meets with your approval, please sign both copies of the Engineering Services Agreement and return one copy to this office. Issuance of our report is dependant on our receiving an executed copy of this agreement.

Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

Taylor J. Nordquist, E.I.T.

Reviewed by JEN, P.E.
Enclosures

EXHIBIT A - SCOPE OF SERVICES
APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

Based on the anticipated subsurface conditions and the proposed construction, we propose the following Scope of Work.

1. Field Investigation

Drill three borings in the area of the proposed development. The proposed boring locations are shown in Figure 1 and will be drilled to depths of up to 100 feet below the existing ground surface. Borehole videography will be taken to further define the subsurface jointing in the bedrock. In the event that logistics or weather limit the number of borings that can be drilled, B-2 and B-3 will be drilled first.

Excavate one test pit in the Creole drainage in the area proposed for significant fill.

Optionally, dig two additional test pits in the proposed cut areas behind proposed building 1B and 5D. This would provide valuable information on bedrock jointing and excavatability at the locations of the large proposed cuts. However, it would require extensive tree removal and the creation of access roads on the mountainside.

Subsurface conditions will be logged and samples obtained for laboratory and engineering analysis.

2. Laboratory Testing

Conduct a laboratory testing program to determine the following characteristics of the subsurface soil and rock:

- Classification
- Moisture Content
- Dry Density
- Strength

3. Engineering and Geological Analysis

Analyze the results of the field and laboratory investigations to determine the following:

- Characterize the subsurface conditions with respect to the proposed construction.
- Provide cut and fill recommendations, based on slope stability analysis.

4. Report

Prepare a report which summarizes the information obtained from the study and presents our preliminary conclusions and recommendations. The study will be conducted under the supervision of a registered professional engineer and a registered professional geologist.

EXHIBIT B - PROFESSIONAL SERVICES FEE SCHEDULE
GEOTECHNICAL / GEOLOGIC / ENVIRONMENTAL ENGINEERING
APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

ENGINEERING/GEOLOGY/TECHNICIANS

Principal	$200.00-$300.00/hour
Senior Professional (Engineer / Geologist / Environmental / Materials)	$125.00-$200.00/hour
Project Professional (Engineer / Geologist / Environmental / Materials)	$100.00-$175.00/hour
Staff Professional (Engineer / Geologist / Environmental / Materials)	$85.00-$165.00/hour
Engineering Technician	$55.00-$95.00/hour
Laboratory Technician	$45.00-$65.00/hour
Materials Technician	$45.00-$85.00/hour
Special Inspector	$65.00-$95.00/hour
Typist/Draftsperson	$75.00/hour

FIELD OBSERVATION AND TESTING

Construction Observation and Field Testing	on request

FIELD INVESTIGATION

Drill Rig - Track Mounted (Mobilization / Drilling / Standby)	$225.00/hour
Drill Rig - Balloon Tire (Mobilization / Drilling / Standby)	$250.00/hour
Drill Rig - Truck Mounted (Mobilization / Drilling /Standby)	$200.00/hour
Drill Rig Crew Travel	$100.00/hour
Backhoe	$90.00/hour
PVC Pipe	$1.00/foot
Hand Auger Equipment	$100.00/day
Inclinometer	$100.00/day
Manometer	$100.00/day
Other Materials & Equipment	Cost + 15%

LABORATORY TESTING

Moisture Content	$15.00
Natural Density & Moisture Content	$25.00
Atterberg Limit (ASTM D-4318)	$70.00
Specific Gravity (ASTM D-854)	$75.00
Gradation Analysis (ASTM D-422)	
All standard sieves to #200	$85.00
Less than 1½" to #200	$65.00
Percent less than #200 sieve	$40.00
Hydrometer Analysis	$90.00
pH	$25.00
Water Soluble Sulfates	$60.00
Resistivity	
At existing moisture content	$60.00
Moisture conditioned to 4 moisture contents	$125.00
Consolidation	$150.00
with Time Readings	$300.00
Unconfined Compression (ASTM D-2166)	$75.00
Direct Shear, soil to soil or soil to any client-supplied material (per point)	
Consolidated Undrained	$100.00
Consolidated Drained (ASTM D-3080)	$150.00
Triaxial Shear (per point)	
Unconsolidated Undrained (unsaturated)	$100.00
Consolidated Undrained w/pore pressure	$350.00
Consolidated Drained	$450.00
Multi Staged: Consolidated Undrained w/pore pressure (3 stages)	$900.00
Ring Shear (per point)	$300.00
Permeability	
Rigid Wall – Undisturbed	$125.00
Flexible Wall	
Samples up to 4" in diameter	$300.00
Per day after initial 4 days	$50.00
Additional confining pressures	$100.00
12" diameter samples	$750.00
Per day after initial 4 days	$75.00
Additional confining pressures	$100.00
Client-supplied permeant add	$300.00
Permeant damaged Equipment	cost + 20%
Gradient Ratio	$500.00
Pinhole Dispersion	$200.00
Moisture-Density Relationships	
ASTM D-698 / D-1557 (std./mod. Proctor)	$150.00
Check Point	$75.00
Relative Density	$200.00
California Bearing Ratio (ASTM D-1883)	
One Point	$150.00
Three Points	$400.00
Chemical Testing	on request
Rock Testing	on request
Sample Preparation	at rates listed above

DIRECT CHARGES

Auto or 2-wheel drive Pickup	$50.00/day + $0.75/mile
4-wheel drive Pickup	$60.00/day + $0.85/mile
Out-of-Town Living Expenses	Cost + 15%
Photocopies/binding	Cost + 15%
INTEREST CHARGE AFTER 30 DAYS FROM INVOICE DATE	1.5% per month

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.
GEOTECHNICAL ENGINEERING SERVICES AGREEMENT

THIS GEOTECHNICAL ENGINEERING SERVICES AGREEMENT (this "AGREEMENT") is made and entered into as of September 28, 2016, by and between MPE INCORPORATED ("CLIENT"), and APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC., a Utah professional corporation ("AGEC"), who agree as follows:

1. PROJECT. CLIENT desires to engage AGEC to provide geotechnical engineering, technical services, and other services as described below in connection with CLIENT'S project (the "PROJECT"). The PROJECT is described as follows: Proposed Treasure Hill, Phase 3, Proposal No.1030820

   The site of the PROJECT (the "PROJECT SITE") is located as follows: Park City, Utah

2. FEES. Specific fees for the PROJECT are as follows:

   ■ Hourly Billing Rates plus Reimbursable Expenses — Estimated Fee: $26,500 - $37,000
   ☐ Lump Sum
   ☐ Other (Attach Addendum specifying compensation) — Lump Sum Amount:

   The AGEC fee schedule (the "FEE SCHEDULE") has been provided to and received by CLIENT. A copy of the FEE SCHEDULE is attached hereto within the standard proposal as Exhibit A. This Agreement may be withdrawn by AGEC if not signed by client within 90 days from the date of this Agreement. CLIENT hereby agrees that all fees and charges set forth in the FEE SCHEDULE are acceptable to CLIENT, and CLIENT further agrees to pay all fees and charges to AGEC in accordance with this AGREEMENT and the FEE SCHEDULE. A FEE SCHEDULE is not attached for a Lump Sum.

3. SCOPE OF SERVICES. AGEC shall provide certain specified services (the "SERVICES") on the PROJECT in accordance with this AGREEMENT, the Applied Geotechnical Engineering Consultants, Inc. Standard Terms and Conditions ("STANDARD TERMS") attached hereto, and the Scope of Services ("SCOPE OF SERVICES") attached hereto as Exhibit B or as described in the cover letter. AGEC shall not be responsible to provide any services not expressly contained in the SCOPE OF SERVICES or the STANDARD TERMS.

4. HAZARDOUS SUBSTANCES AND HAZARDOUS CONDITIONS. CLIENT hereby represents, warrants, and covenants to and with AGEC that:

   a. No HAZARDOUS SUBSTANCES (as defined in the STANDARD TERMS) or HAZARDOUS CONDITIONS (as defined in the STANDARD TERMS) exist on the PROJECT or at the PROJECT SITE, except as specified as follows:____________________

   b. AGEC is entitled to rely upon the above-stated representations, warranties and covenants in performing the SERVICES.

   CLIENT acknowledges and confirms that AGEC is relying upon the above warranties in undertaking to perform the services described in this AGREEMENT.

5. ATTACHMENTS AND EXHIBITS. All attachments and exhibits referenced in or attached to this AGREEMENT are incorporated herein and are made a part of this AGREEMENT.

6. CLIENT has read and understood the terms and conditions set forth on this and the reverse side hereof and agrees that such items are hereby incorporated into and made a part of this agreement.

   IN WITNESS WHEREOF, CLIENT and AGEC have executed this AGREEMENT as of the date first-above written.

CLIENT: ____________________

By: ____________________

Its: ____________________

____
Federal ID No. or Social Security No.

AGEC: Applied Geotechnical Engineering Consultants, Inc.
600 West Sandy Parkway
Sandy, Utah 84070
Phone: (801) 566-6399
Fax: (801) 566-6493

By: ____________________

Its: ____________________

The standard terms and conditions set forth herein are attached to and made a part of the Geotechnical Engineering Services Agreement (the "AGREEMENT") between Applied Geotechnical Engineering Consultants, Inc. ("AGEC"), a Utah corporation and CLIENT (as defined in the AGREEMENT).

All capitalized terms which are not specifically defined herein shall have the meanings assigned to such terms in the AGREEMENT.

ARTICLE 1. SERVICES. The SERVICES to be provided by AGEC are limited to and shall be as set forth in the SCOPE OF SERVICES attached to the AGREEMENT as Exhibit A.

ARTICLE 2. STANDARD OF CARE--LIMITATION OF DAMAGES. The SERVICES will be performed in accordance with generally accepted engineering principles and practices existing at the time of performance for the locality where the SERVICES were performed. AGEC will re-perform, without additional charge, any SERVICE which does not meet this standard. EXCEPT AS EXPRESSLY PROVIDED IN THIS ARTICLE 2, AGEC MAKES NO GUARANTEES OR WARRANTIES CONCERNING SERVICES, AND NO OTHER GUARANTEES OR WARRANTIES MAY BE IMPLIED. IN ADDITION, NOTWITHSTANDING ANY AGREEMENT TO THE CONTRARY, AGEC SHALL NOT BE LIABLE, UNDER ANY CIRCUMSTANCES, FOR CONSEQUENTIAL OR SPECIAL DAMAGES.

ARTICLE 3. RIGHT OF ENTRY. CLIENT grants a right of entry to the PROJECT SITE to AGEC, its employees, agents, consultants, contractors, and subcontractors, for the purpose of performing SERVICES, and all acts, studies, and research in connection therewith, including without limitation the obtaining of samples and the performance of tests and evaluations.

ARTICLE 4. PERMITS AND LICENSES. CLIENT represents and warrants that it possesses all necessary permits and licenses required for the performance of the SERVICES and the continuation of CLIENT and AGEC's activities at the PROJECT SITE.

ARTICLE 5. SAMPLING AND TESTING. Field tests or boring locations described by AGEC in any reports or shown on sketches are based on information furnished by others or estimates made in the field by AGEC. Any dimensions, depths or elevations in connection therewith are approximations and are not warranted to be exact.

ARTICLE 6. DOCUMENTS. CLIENT shall furnish, or cause to be furnished, such reports, data, studies, plans, specifications, documents and other information deemed necessary by AGEC for the proper performance of the SERVICES. AGEC shall be entitled to rely upon documents provided by the CLIENT in performing the SERVICES. All documents provided by CLIENT shall remain the property of CLIENT; provided, that AGEC shall be permitted at AGEC's discretion to retain copies of such documents for AGEC's files. All documents prepared by AGEC in connection with the performance of the SERVICES, including but not limited to drawings, specifications, reports, boring logs, field notes, laboratory test data calculations and estimates, shall remain the exclusive property of AGEC. CLIENT agrees that all documents of any nature furnished to CLIENT or CLIENT's agents or designees, if not paid for by CLIENT, will be returned to AGEC upon demand and will not be used by CLIENT for any purpose whatsoever. CLIENT further agrees that under no circumstances shall any documents produced by AGEC pursuant to this AGREEMENT be used at any location or for any project not expressly provided for in this AGREEMENT without AGEC's prior written permission. If CLIENT has used or uses any portion of AGEC's work without AGEC's consent, CLIENT shall indemnify and save AGEC harmless from any and all claims arising from or relating to, in any way, such unauthorized use. No part of any document AGEC delivers to CLIENT shall be reproduced or distributed, whether for advertising or any other purpose, without AGEC's prior written consent.

ARTICLE 7. AGEC PERSONNEL. AGEC'S personnel shall be present either full or part-time as determined by AGEC to provide observation and field testing of specific parts of the PROJECT (in accordance with the SCOPE OF SERVICES).

ARTICLE 8. CONTRACTORS. If contractor(s) are involved in the PROJECT, AGEC shall not be responsible for the supervision or direction of any contractor or its employees or agents, and CLIENT shall so advise the contractor(s). Neither the presence of AGEC's personnel nor any observation or testing by AGEC shall excuse any contractor in any way for the acts or omissions of the contractor. AGEC shall not be responsible for job or site safety on the PROJECT or at the PROJECT SITE, and AGEC shall not have the right or obligation to stop the work of any contractor or other person at the PROJECT SITE.

ARTICLE 9. PUBLIC LIABILITY. AGEC maintains workers' compensation and employer's liability insurance for AGEC personnel, as may be required by state law. AGEC also maintains liability and auto liability insurance as required by state law. A Certificate of Insurance evidencing the coverage currently held by AGEC may be supplied upon written request by CLIENT.

Notwithstanding any provision of the AGREEMENT to the contrary, AGEC shall not be liable or responsible for any costs, expenses, losses, damages, or liability beyond the amounts, limits, coverage, or conditions of the insurance held by AGEC. In the event any third party brings suit or claim against AGEC for any matter relating to or arising from the SERVICES, the PROJECT, or the PROJECT SITE (including, without limitation any suit alleging exposure to or damage from material, elements or constituents at or from the PROJECT or the PROJECT SITE or which is alleged to have resulted in or caused disease or any adverse health condition to any third party, or resulted in costs for remedial action, uninhabitability of the property, or other property damage), before, during or after the performance of the SERVICES, CLIENT agrees, at its sole cost and expense, to indemnify, defend and hold AGEC and its officers, employees, contractors, and representatives harmless from all costs (including without limitation attorneys fees, witness costs and court costs), expenses, losses and judgements. CLIENT shall have the right to investigate, negotiate and settle, with AGEC's concurrence, any such suit or claim, and AGEC shall cooperate in the defense of any such suit or claim.

ARTICLE 10. PROFESSIONAL LIABILITY. Unless otherwise agreed in writing by CLIENT and AGEC, AGEC liability to CLIENT or any third party in connection with or arising from any act, omission or error (including negligent or other acts, omissions or errors) for any cause and based upon any legal theory (including without limitation strict liability) shall not exceed, in the aggregate, $50,000 or the total fee received by AGEC pursuant to this AGREEMENT, whichever is greater.

ARTICLE 11. SAMPLE HANDLING AND RETENTION. Test samples or specimens ("SAMPLES") obtained by AGEC may be consumed or substantially altered during testing and AGEC, at its sole discretion, shall dispose of any remaining residue immediately upon completion of tests, subject to the following:

a. NON-HAZARDOUS SAMPLES. At CLIENT's written request, AGEC shall maintain preservable SAMPLES for 30 days after the report date, free of storage charges. After the initial 30 days, upon written request AGEC will retain SAMPLES for a storage charge and time period reasonably established by AGEC. AGEC shall not be responsible or liable for the loss of any SAMPLES retained in storage.

b. HAZARDOUS OR POTENTIALLY HAZARDOUS SAMPLES. In the event that SAMPLES contain substances or constituents deemed hazardous or detrimental to health, safety, or the environment as defined by federal, state or local statutes, regulations or ordinances ("HAZARDOUS SUBSTANCES"), AGEC (i) shall after completion of testing and at client's expense return such SAMPLES to CLIENT, or (ii) using a manifest signed by CLIENT as generator, AGEC shall have such SAMPLES transported to a location selected by CLIENT for final disposal. CLIENT agrees to pay all costs associated with the storage, transport, and disposal of such SAMPLES, plus a reasonable handling charge to AGEC. CLIENT recognizes and agrees that AGEC is acting only as a bailee of SAMPLES in possession of AGEC, and AGEC has not and shall not at any time assume title to any SAMPLES, including without limitation SAMPLES containing HAZARDOUS SUBSTANCES.

ARTICLE 12. HAZARDOUS SUBSTANCES AND HAZARDOUS CONDITIONS. CLIENT represents and warrants that upon or prior to the execution of the AGREEMENT, it has advised AGEC of any and all i) HAZARDOUS SUBSTANCES and (ii) conditions existing in, on or near the PROJECT SITE which pose a potential danger to human health, the environment, or equipment ("HAZARDOUS CONDITIONS"). CLIENT agrees to immediately advise AGEC of the existence of any HAZARDOUS SUBSTANCES or HAZARDOUS CONDITIONS of which it becomes aware during or after the performance of the SERVICES. To the maximum extent permitted by law, CLIENT shall indemnify, defend and hold AGEC harmless from and against any and all claims and liabilities resultin from:

a. the violation by CLIENT or any other party of any federal, state or local statute, regulation or ordinanc relating to the disposal or handling of HAZARDOUS SUBSTANCES;

b. the undertaking by CLIENT or any other party of, or the arrangement for, the handling, remova treatment, storage, transportation or disposal of HAZARDOUS SUBSTANCES;

c. changed conditions, HAZARDOUS SUBSTANCES or HAZARDOUS CONDITIONS introduced at th PROJECT SITE by CLIENT or any other party before, during or after the performance of the SERVICES

d. any allegation(s) that AGEC is a handler, generator, operator, treater, storer, transporter, or disposer unde the Resources Conservation and Recovery Act of 1976, as amended, the Comprehensive Environment Response Compensation and Liability Act, or any other similar federal, state or local regulation or law

e. any costs, losses, damages, claims, causes of action or liability which may be asserted against AGE or which may arise out of any environmental clean up or response, including without limitation a attorneys fees, witness costs and court costs;

f. any claims, causes of action or liability which may be asserted against AGEC or which may arise out c any alleged contamination of any aquifer (including without limitation any such claim which may aris as a result of contamination of certain subsurface areas, as for example when a probe, boring device c well device moves through a contaminated area, linking it to an aquifer, underground stream, or othe hydrous body not previously contaminated and which allegedly results in the spreading of HAZARDOU SUBSTANCES to any other areas or hydrous bodies).

ARTICLE 13. NO SUPERVISION OR REPORTING DUTIES. AGEC shall not, under any circumstances, assume contr of or responsibility for the PROJECT SITE or the persons operating on the PROJECT SITE nor shall AGEC b responsible for reporting to any federal, state or local agencies any conditions at the PROJECT SITE that may presen potential dangers to public health, safety or the environment. CLIENT shall promptly notify the appropriate federal state or local agencies, or otherwise disclose, any information that may be necessary to prevent any danger t health, safety or the environment, in accordance with applicable law and in a timely manner.

ARTICLE 14. CONTAMINATED EQUIPMENT. Upon notification by AGEC to CLIENT, all laboratory and fiel equipment used in performing the SERVICES which, at any time and in AGEC's sole discretion, is determined to b contaminated and which, in AGEC's sole discretion, cannot be reasonably decontaminated (the "CONTAMINATE EQUIPMENT") shall become the property and responsibility of CLIENT. Upon notification, AGEC shall deliver a CONTAMINATED EQUIPMENT to CLIENT, and CLIENT shall be solely responsible for the disposal, in accordance wit law, of the CONTAMINATED EQUIPMENT. CLIENT shall pay AGEC for the fair market value to AGEC of an CONTAMINATED EQUIPMENT within 45 days from the date of the notice provided in this ARTICLE 14.

ARTICLE 15. UNFORSEEN OCCURRENCES. If, during the performance of services, any unforseen HAZARDOU SUBSTANCES or other unforseen conditions or occurrences ("UNFORSEEN CONDITIONS") are encountered which in AGEC's sole judgement significantly affect or may affect the SERVICES, the risk involved in providing th SERVICES, or the SCOPE of SERVICES, CLIENT and AGEC hereby agree to reasonably modify the AGREEMENT including the SCOPE OF SERVICES and the FEE SCHEDULE. AGEC further agrees to provide an estimate of additiona charges relating to the UNFORSEEN CONDITIONS. Any modification of the AGREEMENT shall be in writing and shal be signed by CLIENT and AGEC. If CLIENT and AGEC cannot come to a reasonable agreement with respect to a modification of the AGREEMENT as provided in this ARTICLE 15, AGEC shall have the right to terminate thi AGREEMENT and to receive payment from CLIENT for all SERVICES performed by AGEC prior to the date of suc termination.

ARTICLE 16. DAMAGE AT PROJECT SITE. AGEC shall not be liable for any property damage or bodily injury arisin from damage to or interference with surface or subterranean structures (including without limitation pipes, tanks, telephone cables, and the like) which are not called to AGEC's attention in writing and correctly shown on the plan furnished by CLIENT in connection with the SERVICES. CLIENT acknowledges and accepts that the performance of the SERVICES, including without limitation the use of exploration and test equipment, may unavoidably affect, alter, or damage the terrain and affect subsurface, vegetation, buildings, structures and equipment at or under the PROJECT SITE. CLIENT accepts and agrees to bear all risks inherent with the performance of the SERVICES and shall not hold AGEC liable or responsible for any such effect, alteration or damage.

ARTICLE 17. FORCE MAJEURE. AGEC is not responsible for damages or delays in performance caused by acts of God, strikes, lockouts, accidents, or other events beyond the control of AGEC.

ARTICLE 18. LITIGATION ASSISTANCE. The SCOPE OF SERVICES does not include costs of AGEC for required or requested assistance to support, prepare, document, bring, defend, or assist in litigation undertaken or defended by the CLIENT. All such services required or requested of AGEC except for suits or claims between the parties to the AGREEMENT will be reimbursed as mutually agreed, and payment for such services shall be in accordance with this AGREEMENT, unless and until otherwise required by a court or arbitrator.

ARTICLE 19. CHANGES. CLIENT may make or approve changes within the SCOPE OF SERVICES. CLIENT shall pay any additional costs of such changes at the rates set forth in the FEE SCHEDULE.

ARTICLE 20. NO THIRD PARTY BENEFICIARIES. No rights or benefits are provided by the AGREEMENT to any person other than the CLIENT and AGEC and the AGREEMENT has no third-party beneficiaries.

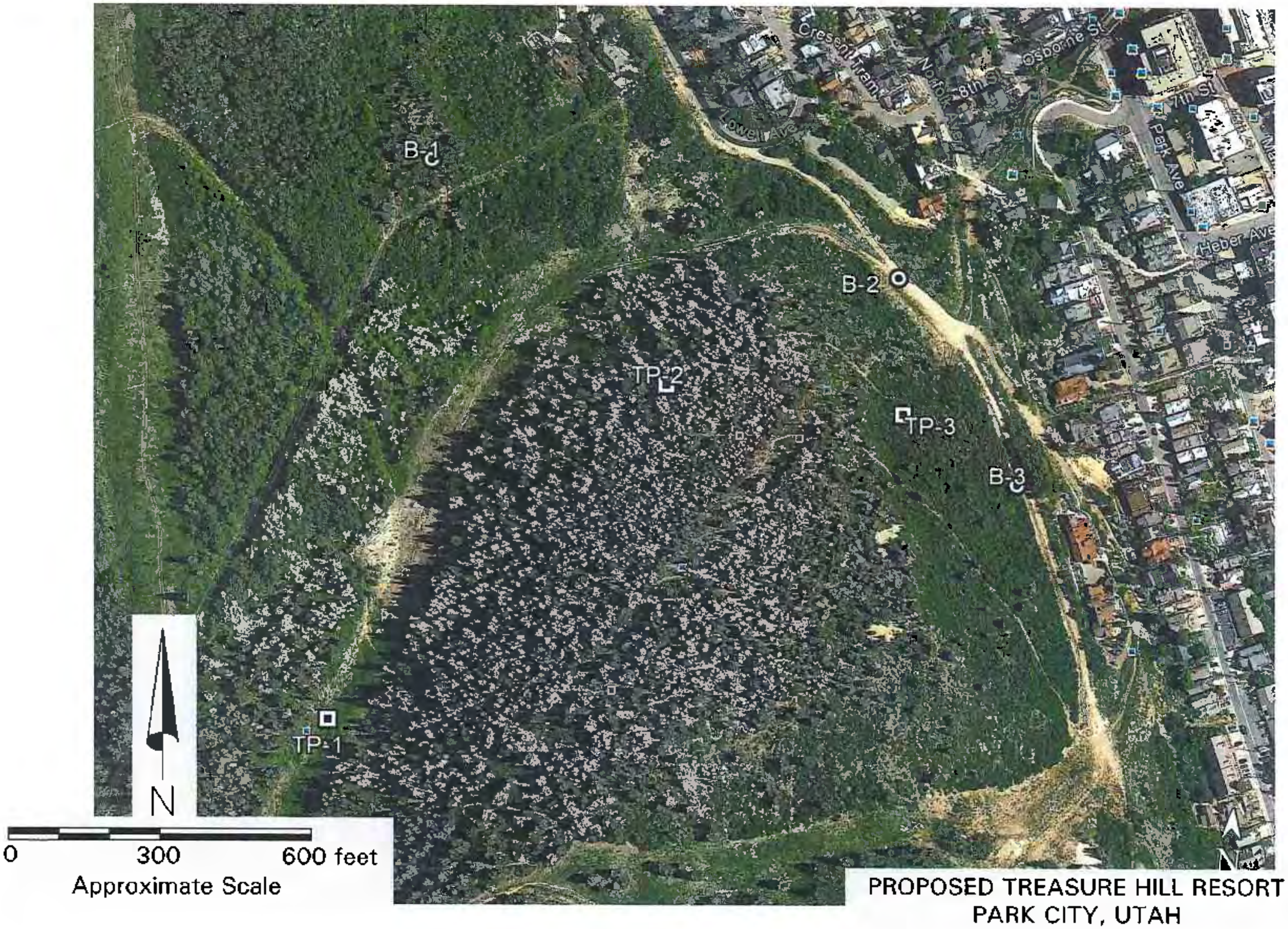
ARTICLE 21. LEGAL ACTION. All legal actions by either party against the other arising from the AGREEMENT, or for the failure to perform in accordance with the applicable standards of care provided in the AGREEMENT, or for any other cause of action, shall be barred 2 years from the date the claimant knew or should have known of its claim; provided, however, no legal actions shall be asserted by CLIENT or AGEC after 4 years from the date of substantial completion of the SERVICES.

ARTICLE 22. BILLING. Unless otherwise expressly provided in the AGREEMENT, billings will be based on actual accrued time, test costs and expenses. CLIENT agrees to pay invoices upon receipt. If payment is not received by AGEC within 30 days of the invoice date, the amount due shall bear interest at a rate of 1.5 percent per month (18 percent per annum), before and after judgement and CLIENT shall pay all costs of collection, including without limitation reasonable attorneys' fees (provided, however, if interest provided in this ARTICLE 22 exceeds the maximum interest allowable under any applicable law, such interest shall automatically be reduced to the maximum interest allowable by applicable law). If CLIENT has any objection to any invoice or part thereof submitted by AGEC, CLIENT shall so advise AGEC in writing, giving CLIENT's reasons, within 14 days of receipt of such invoice. Payment of the invoice shall constitute final approval of all aspects of the work performed to date as well as the necessity thereof. If the PROJECT or the AGREEMENT is terminated in whole or part prior to the completion of the SERVICES, then AGEC shall be paid for work performed prior to AGEC's receiving or issuing written notice of such termination and in addition AGEC shall be reimbursed for any and all expenses associated with the termination of the PROJECT or the AGREEMENT, including without limitation any "shut-down" costs.

ARTICLE 23. SURVIVAL. All obligations arising prior to the termination of the AGREEMENT and all provisions of the AGREEMENT allocating the responsibility or liability between CLIENT and AGEC shall survive the completion of the SERVICES and the termination of the AGREEMENT.

ARTICLE 24. INTEGRATION. The AGREEMENT and all the exhibits and attachments thereto constitute the entire agreement between the parties and cannot be changed except by a written instrument signed by all parties thereto.

ARTICLE 25. GOVERNING LAW. The AGREEMENT shall be governed in all respect by the laws of the State of Utah unless otherwise agreed in writing between the parties.



1160503	AGEC	Proposed Test Pit and Exploratory Boring Locations	Figure 1

January 10, 2017

MPE Incorporated
P.O. Box 2429
Park City, Utah 84060

Attention: Pat Sweeney
EMAIL: psbro3@comcast.net

Subject: Preliminary Slope Guidance and Revised Proposal
Proposed Treasure Hill Resort
Park City, Utah
Project No. 1160503

Gentlemen:

Applied Geotechnical Engineering Consultants, Inc. (AGEC) is pleased to provide updated preliminary slope guidance and a revised proposal for a preliminary geotechnical investigation for the proposed Treasure Hill Resort development to be located near the town lift and west of Lowell Avenue in Park City, Utah.

AGEC previously delivered preliminary bedrock cut slope guidance in an email to Pat Sweeney dated August 30, 2016, and a proposal for a preliminary geotechnical investigation dated September 28, 2016 under project No. 1160503. Additional analysis has allowed us to refine our preliminary cut slope guidance as well as our proposed exploration plan.

PROPOSED CONSTRUCTION

We understand that the site is being considered for construction of a combination of residential and commercial development. Excavation to a depth of up to approximately 100 feet is being considered for the proposed development. We understand that material from the excavation will remain on site and be placed above the area proposed for development.

GEOLOGIC CONDITIONS

AGEC has performed preliminary site geologic reconnaissance in the area and reviewed geologic literature and reports. Our preliminary review to date indicates that:

> The stratigraphy of the site generally consists of Pennsylvanian age Weber Quartzite and Permian age Park City Formations. The Weber Quartzite consists of medium- to thin-bedded, pale gray to tan, fine-grained quartzite and sandstone while the Park City Formation consists largely of pale-gray fossiliferous limestone with some chert and sandstone.

The Weber Quartzite is the dominant unit in the area proposed for development. The northwest portion of the property is largely underlain by Park City Formation. This includes some of the area proposed for fill placement. Quaternary age colluvial soils composed of clay, silt, sand, gravel, cobbles, and boulders overly the bedrock units over most of the site.

AGEC performed approximate bedrock jointing measurements on the site from exposed bedrock on outcrops, mine adits, and road cuts on June 28 and October 18, 2016. The measurements showed three predominant joint sets at the following orientations (more data is necessary for a good statistical sample):

Strike (± 30°)	**Dip (± 30°)**
N 10° W	15° E
Due N	70° W
Due W	85° N

PRELIMINARY BEDROCK CUT SLOPE GUIDANCE

Based on information obtained from a literature review, our bedrock jointing measurements at the surface, the proposed construction and our experience in the area, a preliminary slope stability analysis has been performed. Several cut profiles were analyzed by projecting the measured joint sets onto them. The cut profiles with the projected joint sets are attached.

Using the measurements we have and assuming that they represent the site, the following maximum cut slope suggestions are given. These suggestions are a revision of the guidance given in the above-referenced email.

Slope Direction	Slope (vertical to horizontal)
N	4:1
NE	2:1
E	2:1
SE	2:1
S	4:1
SW	4:1
W	2:1
NW	2:1

These values are preliminary and are based on the limited data we have been able to gather thus far. With additional exploration and investigation we can better define these recommendations.

PROPOSED STUDY

Based on the our experience in the area and additional analysis, the subsurface conditions anticipated and our understanding of the proposed construction, we propose to perform a preliminary subsurface exploration, laboratory testing and geological and engineering analysis to assist in developing conceptual design recommendations for the proposed development.

In order to better define the subsurface conditions of the site, we would like to make a slight adjustment to the above-referenced proposal by proposing to excavate an additional six to eight shallow test pits into the bedrock along the roadways at the lower Creole and Quit-n-Time ski runs to measure bedrock jointing. The proposed approximate locations for these test pits are shown on Figure 1, labeled as Test Pits TP-2 through TP-9. We anticipate that the added scope will add approximately $2,000 to $3,000 to the geotechnical fee.

A summary of our Scope of Services is included in Exhibit A.

FEE

We propose to provide the services based on hourly and unit costs in accordance with the

attached fee schedule (Exhibit B). We estimate that our fee will fall within the ranges described below.

Task	Estimated Fee
3 Borings	$16,000 - $20,000
6 to 8 Creole and Quit-n-Time Shallow Test Pits (TP-2 through TP-9)	$2,000 - $3,000
Creole Drainage Test Pit (TP-1)	$1,000-$2,000
2 Additional Cut-Feasability Test Pits (TP-10 & 11)	$5,000-$8,000
Laboratory Testing	$500 - $1,000
Analysis	$4,000 - $6,000
Estimated Total	**$28,500 - $40,000**

The fee estimate assumes that the client will provide access to the site for a track mounted drill rig and support vehicles, as well as access to water for drilling.

We appreciate the opportunity of providing this proposal to you and look forward to working with you on the project. If this proposal meets with your approval, please sign both copies of the Engineering Services Agreement and return one copy to this office. Issuance of our report is dependant on our receiving an executed copy of this agreement.

Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

Taylor J. Nordquist, E.I.T.

1/10/17

Reviewed by James E. Nordquist, P.E., G.E.
Enclosures

EXHIBIT A - SCOPE OF SERVICES
APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

Based on the anticipated subsurface conditions and the proposed construction, we propose the following Scope of Work.

1. Field Investigation

Drill three borings in the area of the proposed development. The proposed boring locations are shown in Figure 1 and will be drilled to depths of up to 100 feet below the existing ground surface. Borehole videography will be used to further define the subsurface jointing in the bedrock. In the event that logistics or weather limit the number of borings that can be drilled, B-2 and B-3 will be drilled first.

Excavate six to eight shallow test pits into the bedrock along the roadways at the lower creole and Quit-n-Time ski runs (TP-2 through TP-9. This would provide valuable information on surface bedrock jointing at an area that would create minimal disturbance to the site.

Excavate one test pit in the Creole drainage (TP-1) in the area proposed for significant fill.

Optionally, dig two additional test pits in the proposed cut areas behind proposed building 1B and 5D (TP-10 and TP-11). This would provide valuable information on bedrock jointing and excavatability at the locations of the large proposed cuts. However, it would require extensive tree removal and the creation of access roads on the mountainside.

Subsurface conditions will be logged and samples obtained for laboratory and engineering analysis.

2. Laboratory Testing

Conduct a laboratory testing program to determine the following characteristics of the subsurface soil and rock:

- Classification
- Moisture Content
- Dry Density
- Strength

3. Engineering and Geological Analysis

Analyze the results of the field and laboratory investigations to determine the following:

- Characterize the subsurface conditions with respect to the proposed construction.
- Provide cut and fill recommendations, based on slope stability analysis.

4. Report

Prepare a report which summarizes the information obtained from the study and presents our preliminary conclusions and recommendations. The study will be conducted under the supervision of a registered professional engineer and a registered professional geologist.

EXHIBIT B - PROFESSIONAL SERVICES FEE SCHEDULE
GEOTECHNICAL / GEOLOGIC / ENVIRONMENTAL ENGINEERING
APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

ENGINEERING/GEOLOGY/TECHNICIANS

Principal	$200.00-$300.00/hour
Senior Professional (Engineer / Geologist / Environmental / Materials)	$125.00-$200.00/hour
Project Professional (Engineer / Geologist / Environmental / Materials)	$100.00-$175.00/hour
Staff Professional (Engineer / Geologist / Environmental / Materials)	$85.00-$165.00/hour
Engineering Technician	$55.00-$95.00/hour
Laboratory Technician	$45.00-$65.00/hour
Materials Technician	$45.00-$85.00/hour
Special Inspector	$65.00-$95.00/hour
Typist/Draftsperson	$75.00/hour

FIELD OBSERVATION AND TESTING

Construction Observation and Field Testing	on request

FIELD INVESTIGATION

Drill Rig - Track Mounted (Mobilization / Drilling / Standby)	$225.00/hour
Drill Rig - Balloon Tire (Mobilization / Drilling / Standby)	$250.00/hour
Drill Rig - Truck Mounted (Mobilization / Drilling /Standby)	$200.00/hour
Drill Rig Crew Travel	$100.00/hour
Backhoe	$90.00/hour
PVC Pipe	$1.00/foot
Hand Auger Equipment	$100.00/day
Inclinometer	$100.00/day
Manometer	$100.00/day
Other Materials & Equipment	Cost + 15%

LABORATORY TESTING

Moisture Content	$15.00
Natural Density & Moisture Content	$25.00
Atterberg Limit (ASTM D-4318)	$70.00
Specific Gravity (ASTM D-854)	$75.00
Gradation Analysis (ASTM D-422)	
All standard sieves to #200	$85.00
Less than 1½" to #200	$65.00
Percent less than #200 sieve	$40.00
Hydrometer Analysis	$90.00
pH	$25.00
Water Soluble Sulfates	$60.00
Resistivity	
At existing moisture content	$60.00
Moisture conditioned to 4 moisture contents	$125.00
Consolidation	$150.00
with Time Readings	$300.00
Unconfined Compression (ASTM D-2166)	$75.00
Direct Shear, soil to soil or soil to any client-supplied material (per point)	
Consolidated Undrained	$100.00
Consolidated Drained (ASTM D-3080)	$150.00
Triaxial Shear (per point)	
Unconsolidated Undrained (unsaturated)	$100.00
Consolidated Undrained w/pore pressure	$350.00
Consolidated Drained	$450.00
Multi Staged: Consolidated Undrained w/pore pressure (3 stages)	$900.00
Ring Shear (per point)	$300.00
Permeability	
Rigid Wall – Undisturbed	$125.00
Flexible Wall	
Samples up to 4" in diameter	$300.00
Per day after initial 4 days	$50.00
Additional confining pressures	$100.00
12" diameter samples	$750.00
Per day after initial 4 days	$75.00
Additional confining pressures	$100.00
Client-supplied permeant add	$300.00
Permeant damaged Equipment	cost + 20%
Gradient Ratio	$500.00
Pinhole Dispersion	$200.00
Moisture-Density Relationships	
ASTM D-698 / D-1557 (std./mod. Proctor)	$150.00
Check Point	$75.00
Relative Density	$200.00
California Bearing Ratio (ASTM D-1883)	
One Point	$150.00
Three Points	$400.00
Chemical Testing	on request
Rock Testing	on request
Sample Preparation	at rates listed above

DIRECT CHARGES

Auto or 2-wheel drive Pickup	$50.00/day + $0.75/mile
4-wheel drive Pickup	$60.00/day + $0.85/mile
Out-of-Town Living Expenses	Cost + 15%
Photocopies/binding	Cost + 15%
INTEREST CHARGE AFTER 30 DAYS FROM INVOICE DATE	1.5% per month

January, 2014

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.
GEOTECHNICAL ENGINEERING SERVICES AGREEMENT

THIS GEOTECHNICAL ENGINEERING SERVICES AGREEMENT (this "AGREEMENT") is made and entered into as of January 10, 2017, by and between MPE INCORPORATED ("CLIENT"), and APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC., a Utah professional corporation ("AGEC"), who agree as follows:

1. PROJECT. CLIENT desires to engage AGEC to provide geotechnical engineering, technical services, and other services as described below in connection with CLIENT'S project (the "PROJECT"). The PROJECT is described as follows: Proposed Treasure Hill, Phase 3, Proposal No.1160503.

   The site of the PROJECT (the "PROJECT SITE") is located as follows: Park City, Utah

2. FEES. Specific fees for the PROJECT are as follows:

   ■ Hourly Billing Rates plus Reimbursable Expenses — Estimated Fee: $28,500 - $40,000
   ☐ Lump Sum
   ☐ Other (Attach Addendum specifying compensation) — Lump Sum Amount:

   The AGEC fee schedule (the "FEE SCHEDULE") has been provided to and received by CLIENT. A copy of the FEE SCHEDULE is attached hereto within the standard proposal as Exhibit A. This Agreement may be withdrawn by AGEC if not signed by client within 90 days from the date of this Agreement. CLIENT hereby agrees that all fees and charges set forth in the FEE SCHEDULE are acceptable to CLIENT, and CLIENT further agrees to pay all fees and charges to AGEC in accordance with this AGREEMENT and the FEE SCHEDULE. A FEE SCHEDULE is not attached for a Lump Sum.

3. SCOPE OF SERVICES. AGEC shall provide certain specified services (the "SERVICES") on the PROJECT in accordance with this AGREEMENT, the Applied Geotechnical Engineering Consultants, Inc. Standard Terms and Conditions ("STANDARD TERMS") attached hereto, and the Scope of Services ("SCOPE OF SERVICES") attached hereto as Exhibit B or as described in the cover letter. AGEC shall not be responsible to provide any services not expressly contained in the SCOPE OF SERVICES or the STANDARD TERMS.

4. HAZARDOUS SUBSTANCES AND HAZARDOUS CONDITIONS. CLIENT hereby represents, warrants, and covenants to and with AGEC that:

   a. No HAZARDOUS SUBSTANCES (as defined in the STANDARD TERMS) or HAZARDOUS CONDITIONS (as defined in the STANDARD TERMS) exist on the PROJECT or at the PROJECT SITE, except as specified as follows:____________________

   b. AGEC is entitled to rely upon the above-stated representations, warranties and covenants in performing the SERVICES.

   CLIENT acknowledges and confirms that AGEC is relying upon the above warranties in undertaking to perform the services described in this AGREEMENT.

5. ATTACHMENTS AND EXHIBITS. All attachments and exhibits referenced in or attached to this AGREEMENT are incorporated herein and are made a part of this AGREEMENT.

6. CLIENT has read and understood the terms and conditions set forth on this and the reverse side hereof and agrees that such items are hereby incorporated into and made a part of this agreement.

   IN WITNESS WHEREOF, CLIENT and AGEC have executed this AGREEMENT as of the date first-above written.

CLIENT: ____________________

By: ____________________

Its: ____________________ ____________________

Federal ID No. or Social Security No.

AGEC: Applied Geotechnical Engineering Consultants, Inc.
600 West Sandy Parkway
Sandy, Utah 84070
Phone: (801) 566-6399
Fax: (801) 566-6493

By: [signature]

Its: ENGINEER

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.
GEOTECHNICAL STANDARD TERMS AND CONDITIONS

The standard terms and conditions set forth herein are attached to and made a part of the Geotechnical Engineering Services Agreement (the "AGREEMENT") between Applied Geotechnical Engineering Consultants, Inc. ("AGEC"), a Utah corporation and CLIENT (as defined in the AGREEMENT).

All capitalized terms which are not specifically defined herein shall have the meanings assigned to such terms in the AGREEMENT.

ARTICLE 1. SERVICES. The SERVICES to be provided by AGEC are limited to and shall be as set forth in the SCOPE OF SERVICES attached to the AGREEMENT as Exhibit A.

ARTICLE 2. STANDARD OF CARE--LIMITATION OF DAMAGES. The SERVICES will be performed in accordance with generally accepted engineering principles and practices existing at the time of performance for the locality where the SERVICES were performed. AGEC will re-perform, without additional charge, any SERVICE which does not meet this standard. EXCEPT AS EXPRESSLY PROVIDED IN THIS ARTICLE 2, AGEC MAKES NO GUARANTEES OR WARRANTIES CONCERNING SERVICES, AND NO OTHER GUARANTEES OR WARRANTIES MAY BE IMPLIED. IN ADDITION, NOTWITHSTANDING ANY AGREEMENT TO THE CONTRARY, AGEC SHALL NOT BE LIABLE, UNDER ANY CIRCUMSTANCES, FOR CONSEQUENTIAL OR SPECIAL DAMAGES.

ARTICLE 3. RIGHT OF ENTRY. CLIENT grants a right of entry to the PROJECT SITE to AGEC, its employees, agents, consultants, contractors, and subcontractors, for the purpose of performing SERVICES, and all acts, studies, and research in connection therewith, including without limitation the obtaining of samples and the performance of tests and evaluations.

ARTICLE 4. PERMITS AND LICENSES. CLIENT represents and warrants that it possesses all necessary permits and licenses required for the performance of the SERVICES and the continuation of CLIENT and AGEC's activities at the PROJECT SITE.

ARTICLE 5. SAMPLING AND TESTING. Field tests or boring locations described by AGEC in any reports or shown on sketches are based on information furnished by others or estimates made in the field by AGEC. Any dimensions, depths or elevations in connection therewith are approximations and are not warranted to be exact.

ARTICLE 6. DOCUMENTS. CLIENT shall furnish, or cause to be furnished, such reports, data, studies, plans, specifications, documents and other information deemed necessary by AGEC for the proper performance of the SERVICES. AGEC shall be entitled to rely upon documents provided by the CLIENT in performing the SERVICES. All documents provided by CLIENT shall remain the property of CLIENT; provided, that AGEC shall be permitted at AGEC's discretion to retain copies of such documents for AGEC's files. All documents prepared by AGEC in connection with the performance of the SERVICES, including but not limited to drawings, specifications, reports, boring logs, field notes, laboratory test data calculations and estimates, shall remain the exclusive property of AGEC. CLIENT agrees that all documents of any nature furnished to CLIENT or CLIENT's agents or designees, if not paid for by CLIENT, will be returned to AGEC upon demand and will not be used by CLIENT for any purpose whatsoever. CLIENT further agrees that under no circumstances shall any documents produced by AGEC pursuant to this AGREEMENT be used at any location or for any project not expressly provided for in this AGREEMENT without AGEC's prior written permission. If CLIENT has used or uses any portion of AGEC's work without AGEC's consent, CLIENT shall indemnify and save AGEC harmless from any and all claims arising from or relating to, in any way, such unauthorized use. No part of any document AGEC delivers to CLIENT shall be reproduced or distributed, whether for advertising or any other purpose, without AGEC's prior written consent.

ARTICLE 7. AGEC PERSONNEL. AGEC'S personnel shall be present either full or part-time as determined by AGEC to provide observation and field testing of specific parts of the PROJECT (in accordance with the SCOPE OF SERVICES).

ARTICLE 8. CONTRACTORS. If contractor(s) are involved in the PROJECT, AGEC shall not be responsible for the supervision or direction of any contractor or its employees or agents, and CLIENT shall so advise the contractor(s). Neither the presence of AGEC's personnel nor any observation or testing by AGEC shall excuse any contractor in any way for the acts or omissions of the contractor. AGEC shall not be responsible for job or site safety on the PROJECT or at the PROJECT SITE, and AGEC shall not have the right or obligation to stop the work of any contractor or other person at the PROJECT SITE.

ARTICLE 9. PUBLIC LIABILITY. AGEC maintains workers' compensation and employer's liability insurance for AGEC personnel, as may be required by state law. AGEC also maintains liability and auto liability insurance as required by state law. A Certificate of Insurance evidencing the coverage currently held by AGEC may be supplied upon written request by CLIENT.

Notwithstanding any provision of the AGREEMENT to the contrary, AGEC shall not be liable or responsible for any costs, expenses, losses, damages, or liability beyond the amounts, limits, coverage, or conditions of the insurance held by AGEC. In the event any third party brings suit or claim against AGEC for any matter relating to or arising from the SERVICES, the PROJECT, or the PROJECT SITE (including, without limitation any suit alleging exposure to or damage from material, elements or constituents at or from the PROJECT or the PROJECT SITE or which is alleged to have resulted in or caused disease or any adverse health condition to any third party, or resulted in costs for remedial action, uninhabitability of the property, or other property damage), before, during or after the performance of the SERVICES, CLIENT agrees, at its sole cost and expense, to indemnify, defend and hold AGEC and its officers, employees, contractors, and representatives harmless from all costs (including without limitation attorneys fees, witness costs and court costs), expenses, losses and judgements. CLIENT shall have the right to investigate, negotiate and settle, with AGEC's concurrence, any such suit or claim, and AGEC shall cooperate in the defense of any such suit or claim.

ARTICLE 10. PROFESSIONAL LIABILITY. Unless otherwise agreed in writing by CLIENT and AGEC, AGEC liability to CLIENT or any third party in connection with or arising from any act, omission or error (including negligent or other acts, omissions or errors) for any cause and based upon any legal theory (including without limitation strict liability) shall not exceed, in the aggregate, $50,000 or the total fee received by AGEC pursuant to this AGREEMENT, whichever is greater.

ARTICLE 11. SAMPLE HANDLING AND RETENTION. Test samples or specimens ("SAMPLES") obtained by AGEC may be consumed or substantially altered during testing and AGEC, at its sole discretion, shall dispose of any remaining residue immediately upon completion of tests, subject to the following:

a. NON-HAZARDOUS SAMPLES. At CLIENT's written request, AGEC shall maintain preservable SAMPLES for 30 days after the report date, free of storage charges. After the initial 30 days, upon written request AGEC will retain SAMPLES for a storage charge and time period reasonably established by AGEC. AGEC shall not be responsible or liable for the loss of any SAMPLES retained in storage.

b. HAZARDOUS OR POTENTIALLY HAZARDOUS SAMPLES. In the event that SAMPLES contain substances or constituents deemed hazardous or detrimental to health, safety, or the environment as defined by federal, state or local statutes, regulations or ordinances ("HAZARDOUS SUBSTANCES"), AGEC (i) shall after completion of testing and at client's expense return such SAMPLES to CLIENT, or (ii) using a manifest signed by CLIENT as generator, AGEC shall have such SAMPLES transported to a location selected by CLIENT for final disposal. CLIENT agrees to pay all costs associated with the storage, transport, and disposal of such SAMPLES, plus a reasonable handling charge to AGEC. CLIENT recognizes and agrees that AGEC is acting only as a bailee of SAMPLES in possession of AGEC, and AGEC has not and shall not at any time assume title to any SAMPLES, including without limitation SAMPLES containing HAZARDOUS SUBSTANCES.

ARTICLE 12. HAZARDOUS SUBSTANCES AND HAZARDOUS CONDITIONS. CLIENT represents and warrants that upon or prior to the execution of the AGREEMENT, it has advised AGEC of any and all i) HAZARDOUS SUBSTANCES and (ii) conditions existing in, on or near the PROJECT SITE which pose a potential danger to human health, the environment, or equipment ("HAZARDOUS CONDITIONS"). CLIENT agrees to immediately advise AGEC of the existence of any HAZARDOUS SUBSTANCES or HAZARDOUS CONDITIONS of which it becomes aware during or after the performance of the SERVICES. To the maximum extent permitted by law, CLIENT shall indemnify, defend and hold AGEC harmless from and against any and all claims and liabilities resulting from:

a. the violation by CLIENT or any other party of any federal, state or local statute, regulation or ordinance relating to the disposal or handling of HAZARDOUS SUBSTANCES;

b. the undertaking by CLIENT or any other party of, or the arrangement for, the handling, removal treatment, storage, transportation or disposal of HAZARDOUS SUBSTANCES;

c. changed conditions, HAZARDOUS SUBSTANCES or HAZARDOUS CONDITIONS introduced at the PROJECT SITE by CLIENT or any other party before, during or after the performance of the SERVICES

d. any allegation(s) that AGEC is a handler, generator, operator, treater, storer, transporter, or disposer under the Resources Conservation and Recovery Act of 1976, as amended, the Comprehensive Environmental Response Compensation and Liability Act, or any other similar federal, state or local regulation or law,

e. any costs, losses, damages, claims, causes of action or liability which may be asserted against AGEC or which may arise out of any environmental clean up or response, including without limitation all attorneys fees, witness costs and court costs;

f. any claims, causes of action or liability which may be asserted against AGEC or which may arise out of any alleged contamination of any aquifer (including without limitation any such claim which may arise as a result of contamination of certain subsurface areas, as for example when a probe, boring device or well device moves through a contaminated area, linking it to an aquifer, underground stream, or other hydrous body not previously contaminated and which allegedly results in the spreading of HAZARDOUS SUBSTANCES to any other areas or hydrous bodies).

ARTICLE 13. NO SUPERVISION OR REPORTING DUTIES. AGEC shall not, under any circumstances, assume control of or responsibility for the PROJECT SITE or the persons operating on the PROJECT SITE nor shall AGEC be responsible for reporting to any federal, state or local agencies any conditions at the PROJECT SITE that may present potential dangers to public health, safety or the environment. CLIENT shall promptly notify the appropriate federal state or local agencies, or otherwise disclose, any information that may be necessary to prevent any danger to health, safety or the environment, in accordance with applicable law and in a timely manner.

ARTICLE 14. CONTAMINATED EQUIPMENT. Upon notification by AGEC to CLIENT, all laboratory and field equipment used in performing the SERVICES which, at any time and in AGEC's sole discretion, is determined to be contaminated and which, in AGEC's sole discretion, cannot be reasonably decontaminated (the "CONTAMINATED EQUIPMENT") shall become the property and responsibility of CLIENT. Upon notification, AGEC shall deliver all CONTAMINATED EQUIPMENT to CLIENT, and CLIENT shall be solely responsible for the disposal, in accordance with law, of the CONTAMINATED EQUIPMENT. CLIENT shall pay AGEC for the fair market value to AGEC of any CONTAMINATED EQUIPMENT within 45 days from the date of the notice provided in this ARTICLE 14.

ARTICLE 15. UNFORSEEN OCCURRENCES. If, during the performance of services, any unforseen HAZARDOUS SUBSTANCES or other unforseen conditions or occurrences ("UNFORSEEN CONDITIONS") are encountered which in AGEC's sole judgement significantly affect or may affect the SERVICES, the risk involved in providing the SERVICES, or the SCOPE of SERVICES, CLIENT and AGEC hereby agree to reasonably modify the AGREEMENT including the SCOPE OF SERVICES and the FEE SCHEDULE. AGEC further agrees to provide an estimate of additional charges relating to the UNFORSEEN CONDITIONS. Any modification of the AGREEMENT shall be in writing and shall be signed by CLIENT and AGEC. If CLIENT and AGEC cannot come to a reasonable agreement with respect to a modification of the AGREEMENT as provided in this ARTICLE 15, AGEC shall have the right to terminate this AGREEMENT and to receive payment from CLIENT for all SERVICES performed by AGEC prior to the date of such termination.

ARTICLE 16. DAMAGE AT PROJECT SITE. AGEC shall not be liable for any property damage or bodily injury arising from damage to or interference with surface or subterranean structures (including without limitation pipes, tanks telephone cables, and the like) which are not called to AGEC's attention in writing and correctly shown on the plans furnished by CLIENT in connection with the SERVICES. CLIENT acknowledges and accepts that the performance of the SERVICES, including without limitation the use of exploration and test equipment, may unavoidably affect alter, or damage the terrain and affect subsurface, vegetation, buildings, structures and equipment at or under the PROJECT SITE. CLIENT accepts and agrees to bear all risks inherent with the performance of the SERVICES and shall not hold AGEC liable or responsible for any such effect, alteration or damage.

ARTICLE 17. FORCE MAJEURE. AGEC is not responsible for damages or delays in performance caused by acts of God, strikes, lockouts, accidents, or other events beyond the control of AGEC.

ARTICLE 18. LITIGATION ASSISTANCE. The SCOPE OF SERVICES does not include costs of AGEC for required or requested assistance to support, prepare, document, bring, defend, or assist in litigation undertaken or defended by the CLIENT. All such services required or requested of AGEC except for suits or claims between the parties to the AGREEMENT will be reimbursed as mutually agreed, and payment for such services shall be in accordance with this AGREEMENT, unless and until otherwise required by a court or arbitrator.

ARTICLE 19. CHANGES. CLIENT may make or approve changes within the SCOPE OF SERVICES. CLIENT shall pay any additional costs of such changes at the rates set forth in the FEE SCHEDULE.

ARTICLE 20. NO THIRD PARTY BENEFICIARIES. No rights or benefits are provided by the AGREEMENT to any person other than the CLIENT and AGEC and the AGREEMENT has no third-party beneficiaries.

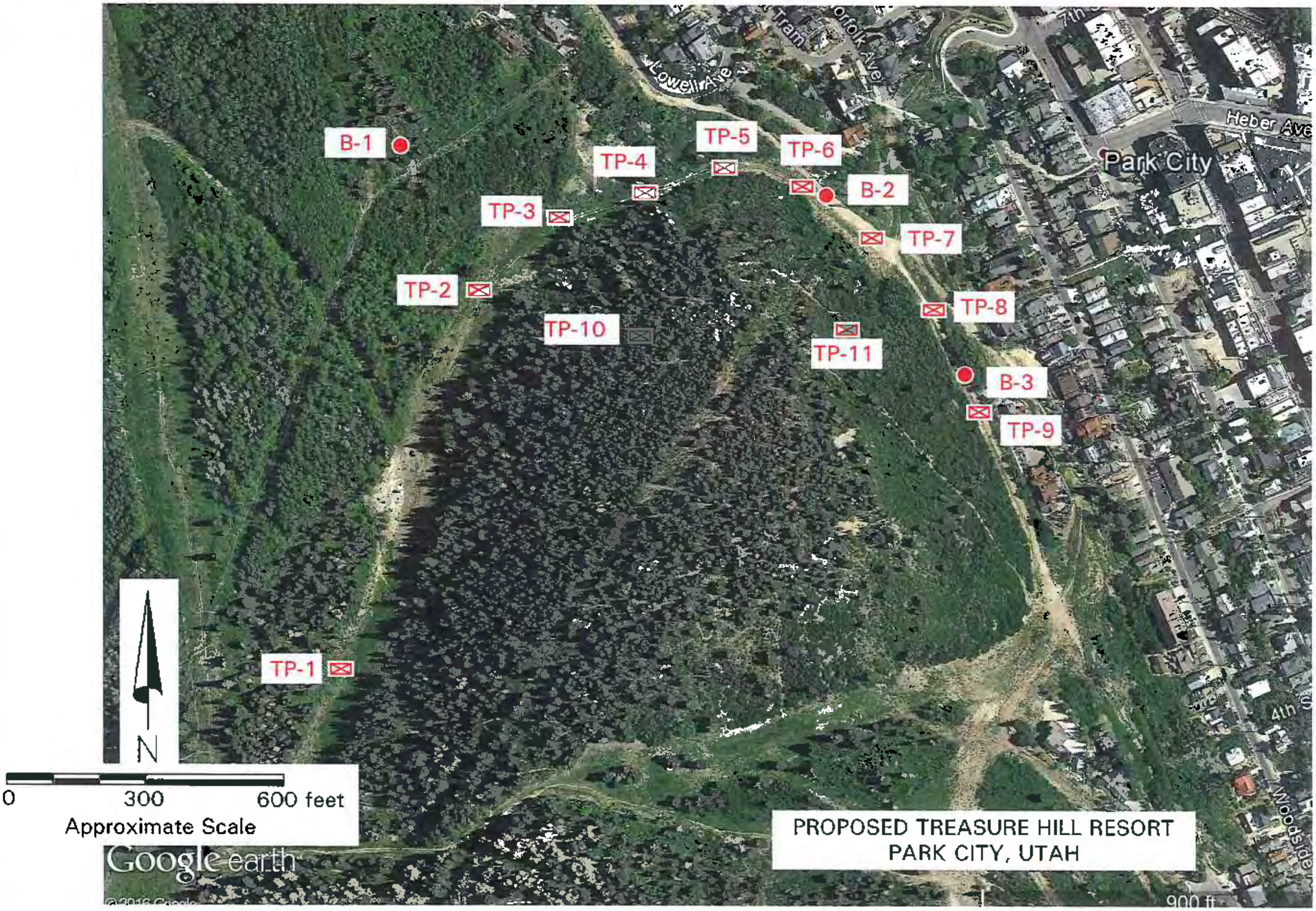
ARTICLE 21. LEGAL ACTION. All legal actions by either party against the other arising from the AGREEMENT, or for the failure to perform in accordance with the applicable standards of care provided in the AGREEMENT, or for any other cause of action, shall be barred 2 years from the date the claimant knew or should have known of its claim; provided, however, no legal actions shall be asserted by CLIENT or AGEC after 4 years from the date of substantial completion of the SERVICES.

ARTICLE 22. BILLING. Unless otherwise expressly provided in the AGREEMENT, billings will be based on actual accrued time, test costs and expenses. CLIENT agrees to pay invoices upon receipt. If payment is not received by AGEC within 30 days of the invoice date, the amount due shall bear interest at a rate of 1.5 percent per month (18 percent per annum), before and after judgement and CLIENT shall pay all costs of collection, including without limitation reasonable attorneys' fees (provided, however, if interest provided in this ARTICLE 22 exceeds the maximum interest allowable under any applicable law, such interest shall automatically be reduced to the maximum interest allowable by applicable law). If CLIENT has any objection to any invoice or part thereof submitted by AGEC, CLIENT shall so advise AGEC in writing, giving CLIENT's reasons, within 14 days of receipt of such invoice. Payment of the invoice shall constitute final approval of all aspects of the work performed to date as well as the necessity thereof. If the PROJECT or the AGREEMENT is terminated in whole or part prior to the completion of the SERVICES, then AGEC shall be paid for work performed prior to AGEC's receiving or issuing written notice of such termination and in addition AGEC shall be reimbursed for any and all expenses associated with the termination of the PROJECT or the AGREEMENT, including without limitation any "shut-down" costs.

ARTICLE 23. SURVIVAL. All obligations arising prior to the termination of the AGREEMENT and all provisions of the AGREEMENT allocating the responsibility or liability between CLIENT and AGEC shall survive the completion of the SERVICES and the termination of the AGREEMENT.

ARTICLE 24. INTEGRATION. The AGREEMENT and all the exhibits and attachments thereto constitute the entire agreement between the parties and cannot be changed except by a written instrument signed by all parties thereto.

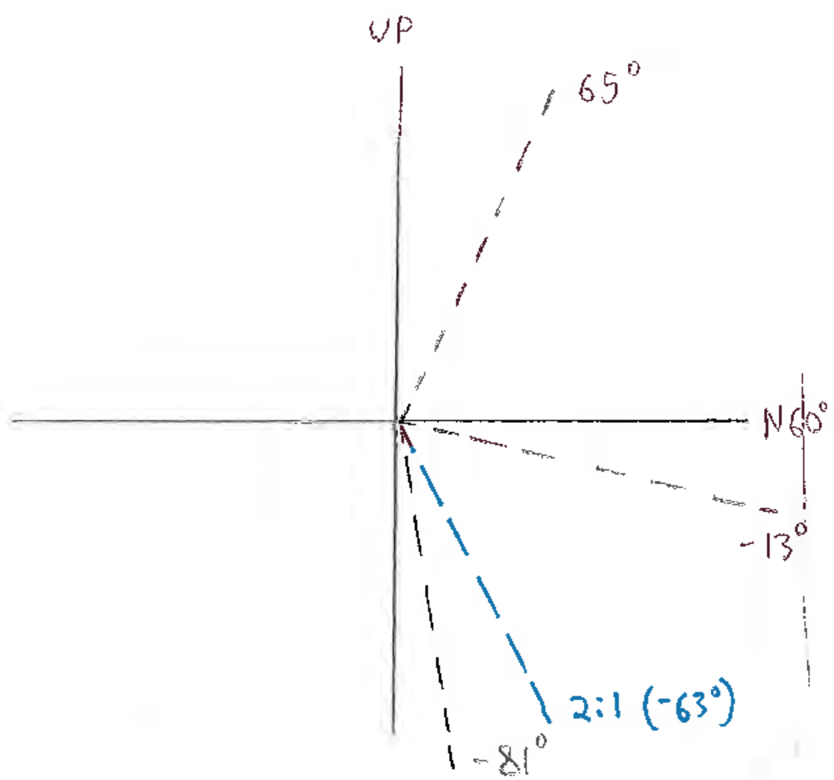
ARTICLE 25. GOVERNING LAW. The AGREEMENT shall be governed in all respect by the laws of the State of Utah unless otherwise agreed in writing between the parties.

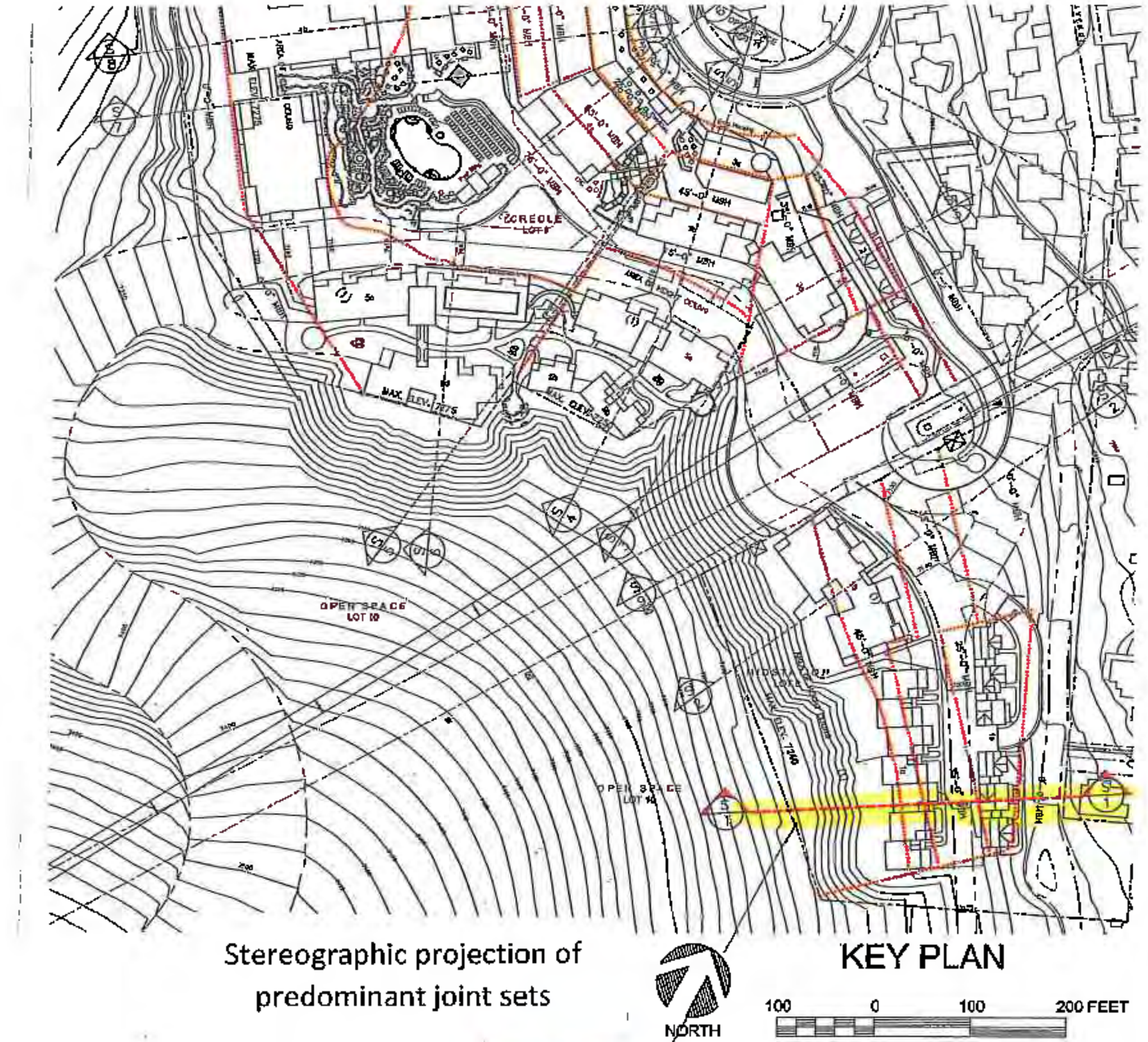


1160503	AGEC	Proposed Test Pit and Exploratory Boring Locations	Figure 1

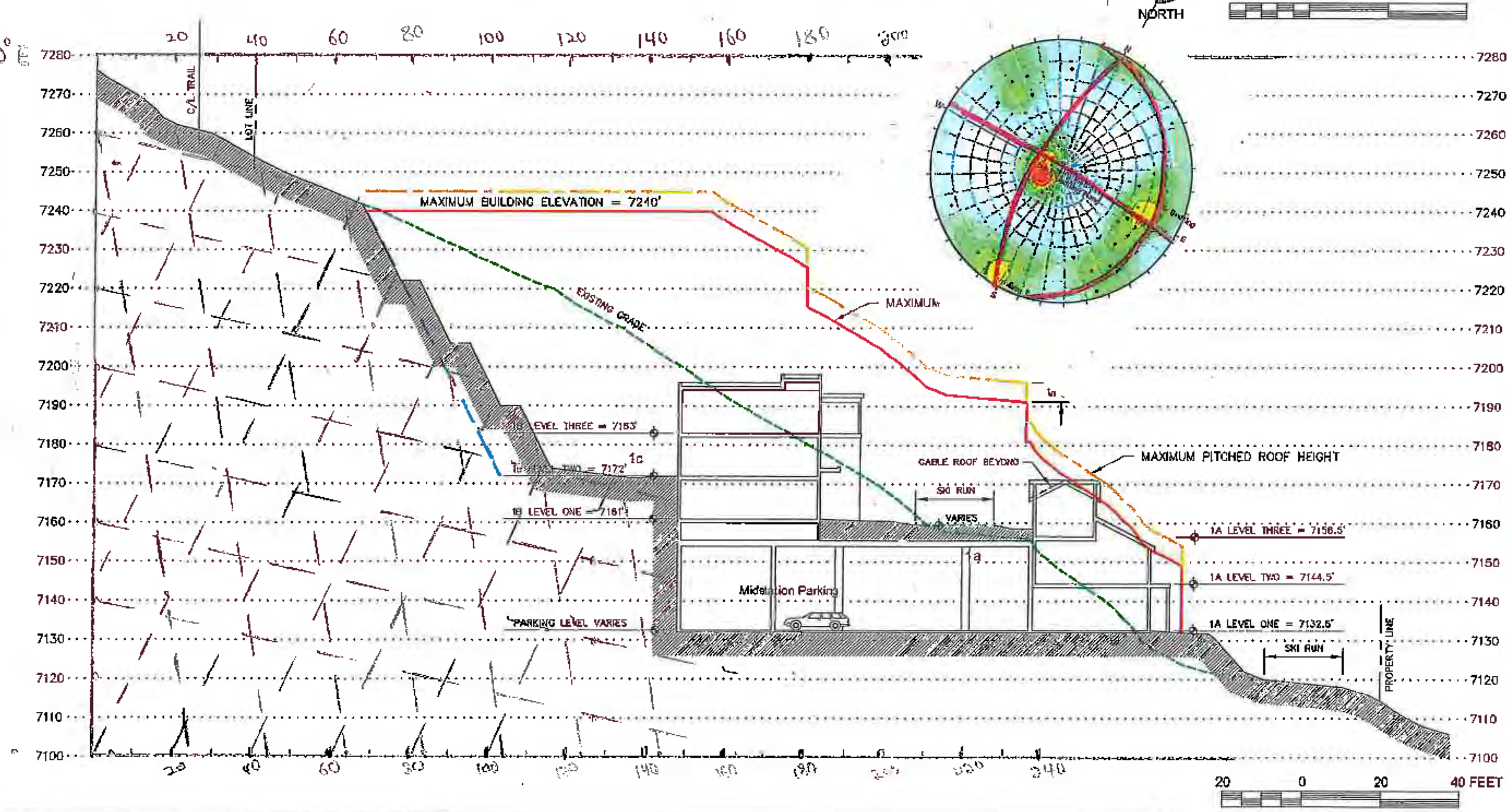
Predominant Joint Set Projection on Profile S.1

Slope Direction of Cut Face:	N 60° E
Strike of Cut Face:	N 30° W
Cut Face Dip:	55° NE
Maximum Cut Slope Recommendation:	2:1 (63°)





Stereographic projection of predominant joint sets



Legend:

Predominant Joint Sets
(JOINT SPACING IS NOT REPRESENTATIVE)

Maximum Cut Slope Recommendation

Cross Section

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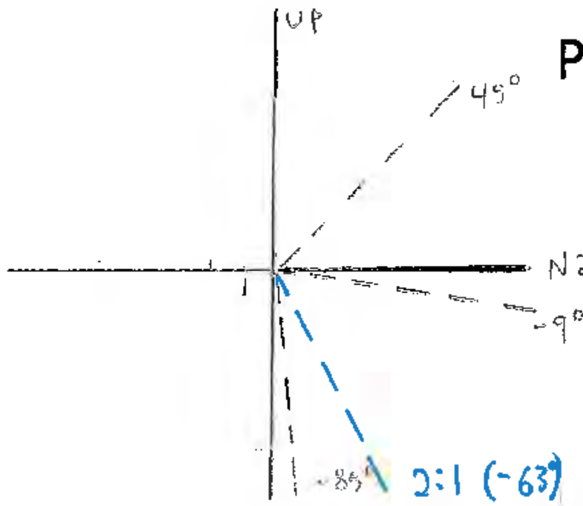
eMail: info@treasureparkcity.com

treasure
PARK CITY, UTAH

MPE
INCORPORATED

SHEET NUMBER
S.1
6/12/2008



Predominant Joint Set Projection on Profile S.2

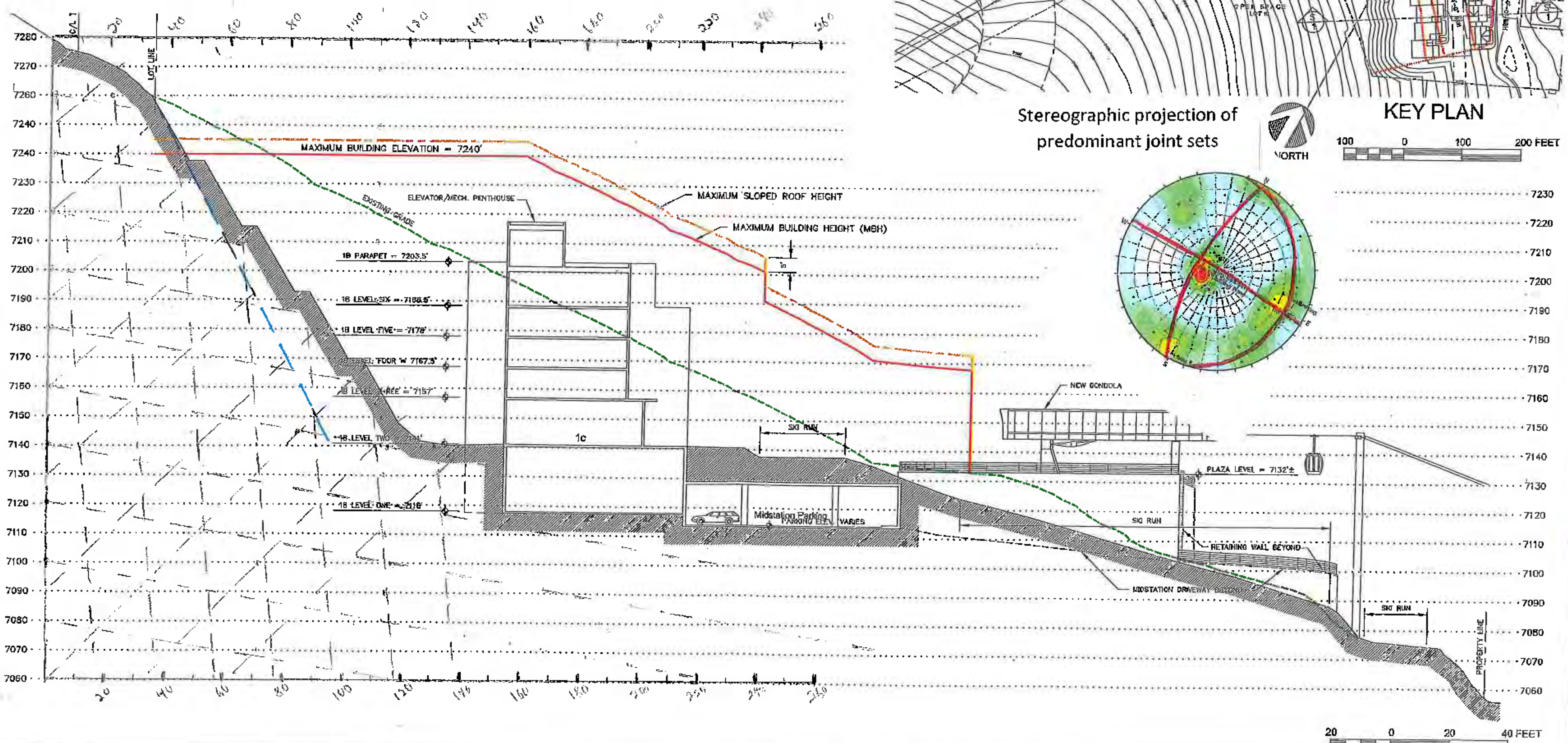
Slope Direction of Cut Face:	N 25° E
Strike of Cut Face:	N 65° W
Cut Face Dip:	52° NE
Maximum Cut Slope Recommendation:	2:1 (63°)

Legend:

Predominant Joint Sets — — — —
(JOINT SPACING IS NOT REPRESENTATIVE)

Maximum Cut Slope Recommendation — — — —

Stereographic projection of predominant joint sets



ELDREDGE & NICHOLSON ARCHITECTS
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SHEET NUMBER
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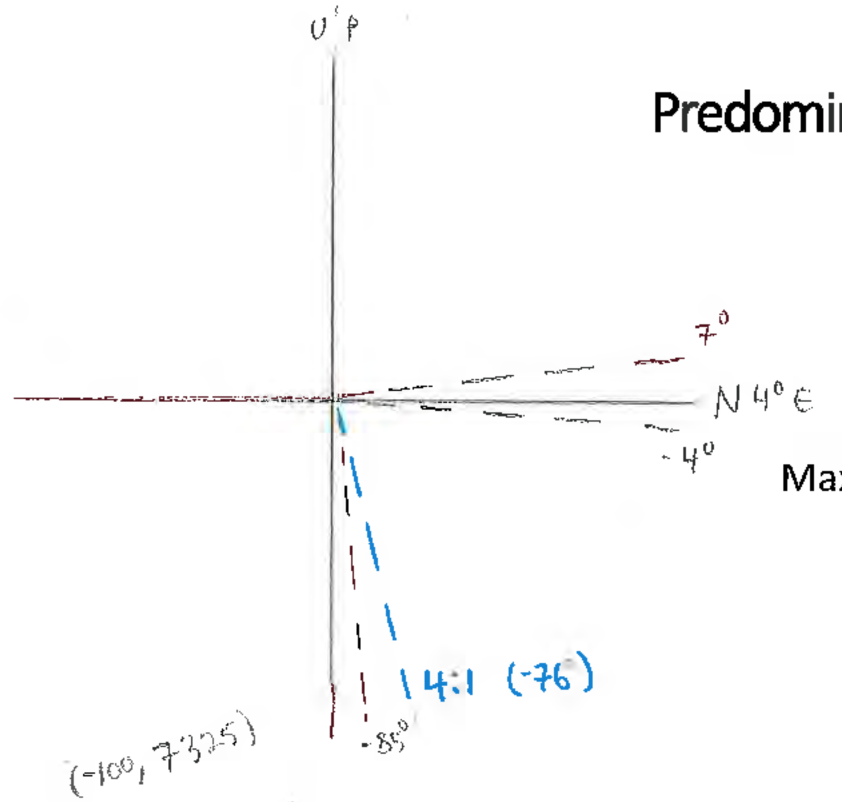


Predominant Joint Set Projection on Profile S.3

Slope Direction of Cut Face: N 4° E

Strike of Cut Face: N 86° W

Cut Face Dip: 44° NE

Maximum Cut Slope Recommendation: 4:1 (76°)

Legend:

Predominant Joint Sets
(JOINT SPACING IS NOT REPRESENTATIVE)

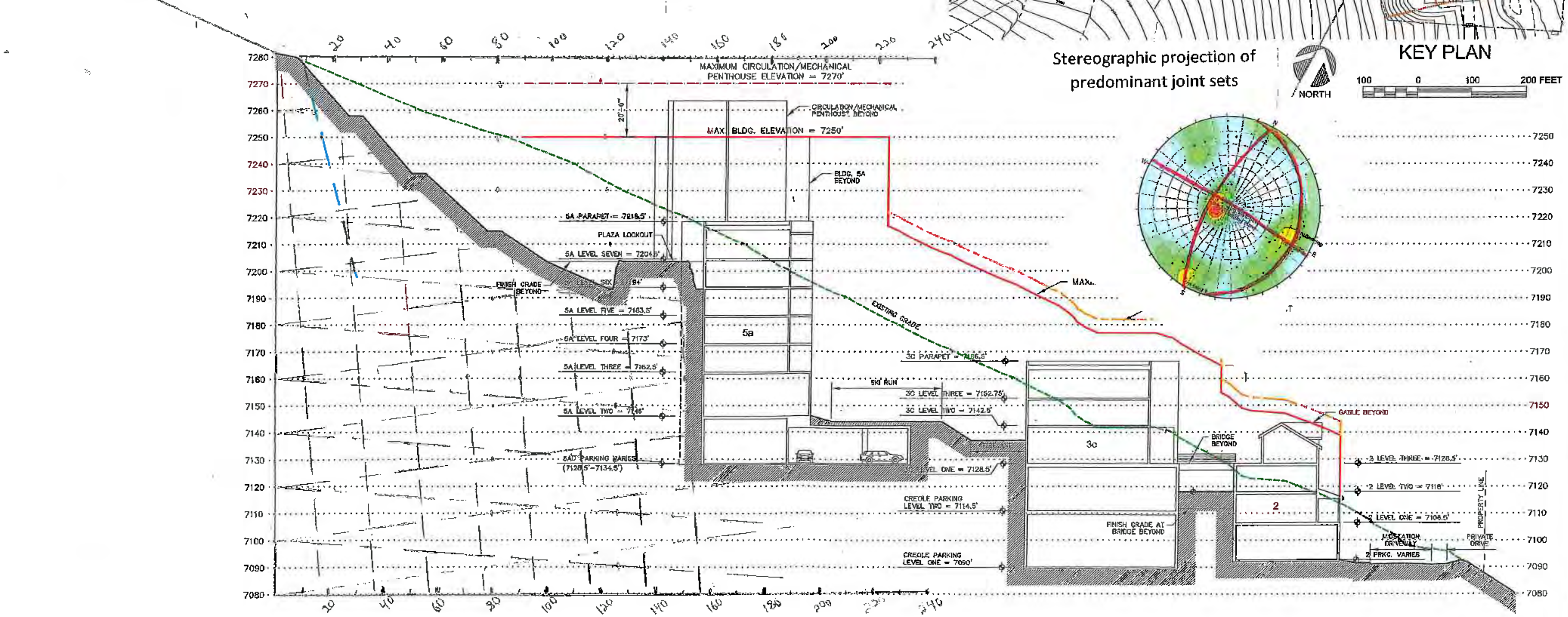
Maximum Cut Slope Recommendation

KEY PLAN

NORTH

100 0 100 200 FEET

Stereographic projection of predominant joint sets



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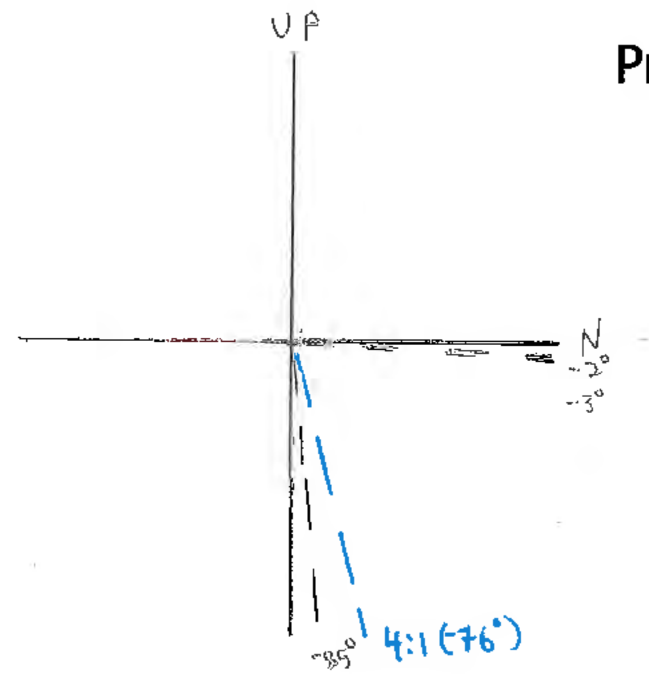
S.3



Predominant Joint Set Projection on Profile S.4

Slope Direction of Cut Face: Due North

Strike of Cut Face: Due West

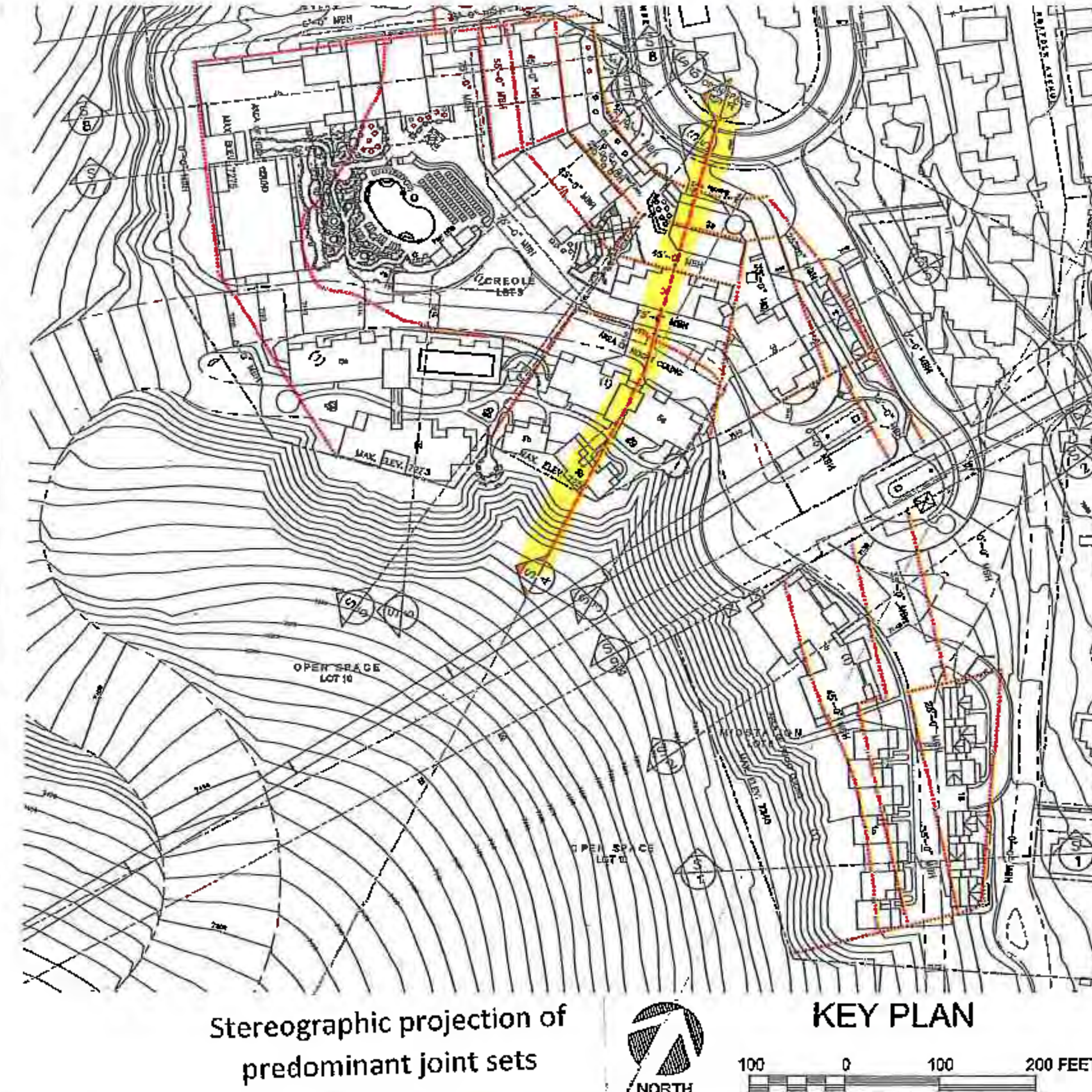
Cut Face Dip: 54° N

Maximum Cut Slope Recommendation: 4:1 (76°)

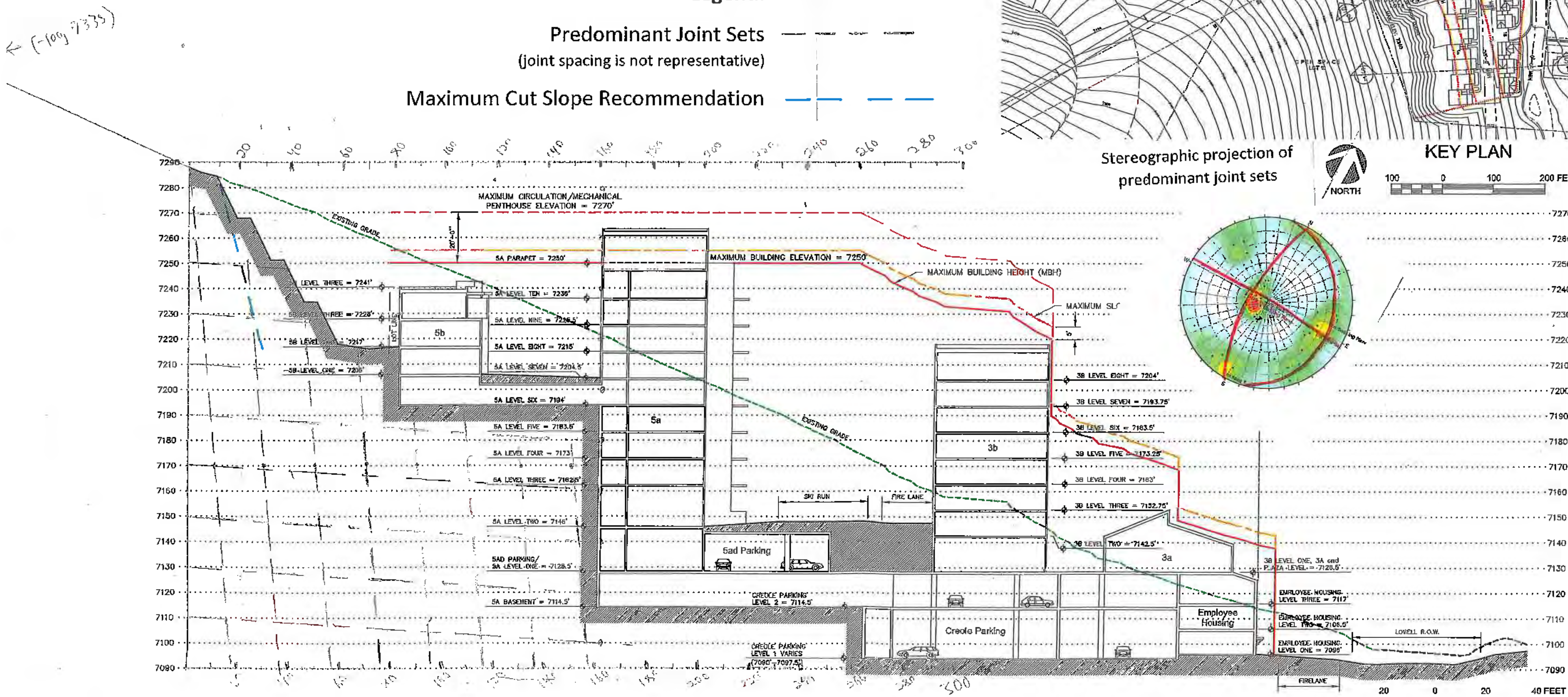
Legend:

Predominant Joint Sets
(joint spacing is not representative)

Maximum Cut Slope Recommendation



Stereographic projection of predominant joint sets



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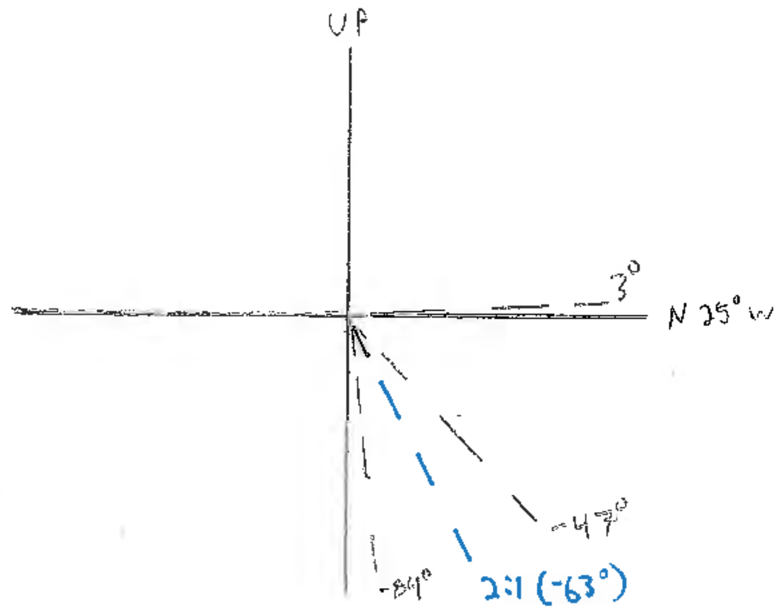
treasure
PARK CITY, UTAH

SHEET NUMBER
S.4

Predominant Joint Set Projection on Profile S.6



Slope Direction of Cut Face: N 25° W

Strike of Cut Face: S 65° W

Cut Face Dip: 55° NW

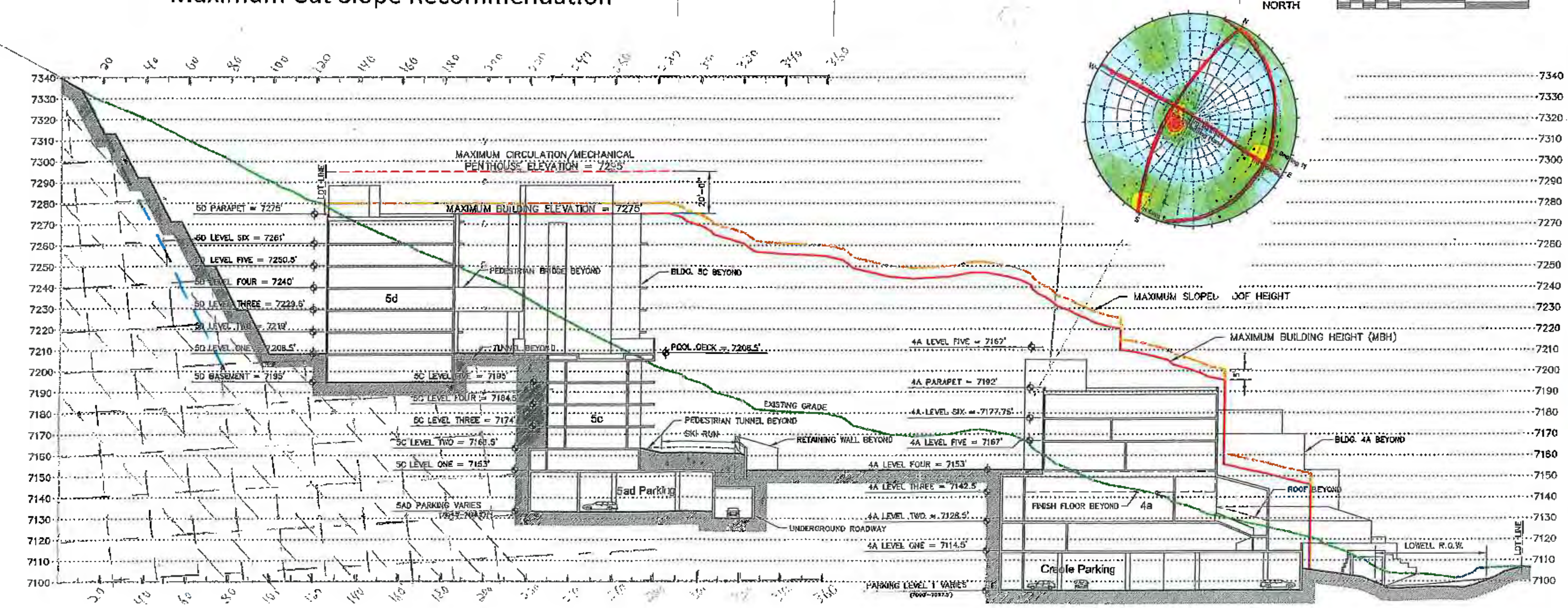
Maximum Cut Slope Recommendation: 2:1 (63°)

Legend:

Predominant Joint Sets
(joint spacing is not representative)

Maximum Cut Slope Recommendation

Stereographic projection of predominant joint sets



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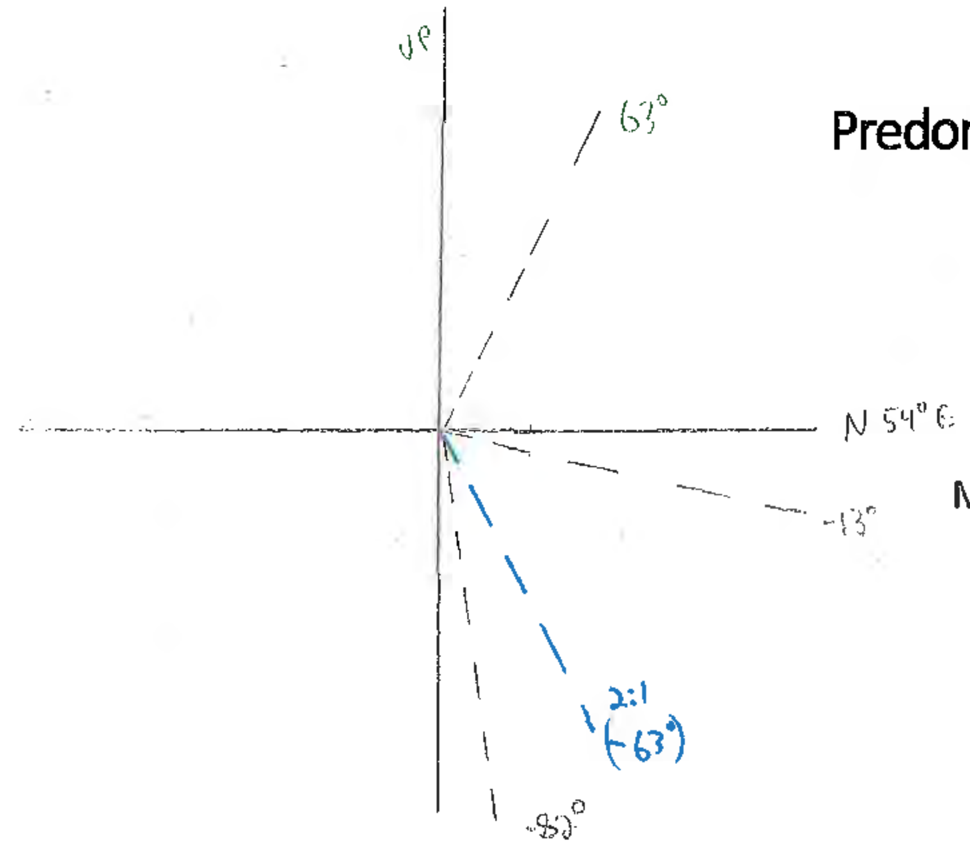
SHEET NUMBER
S.6



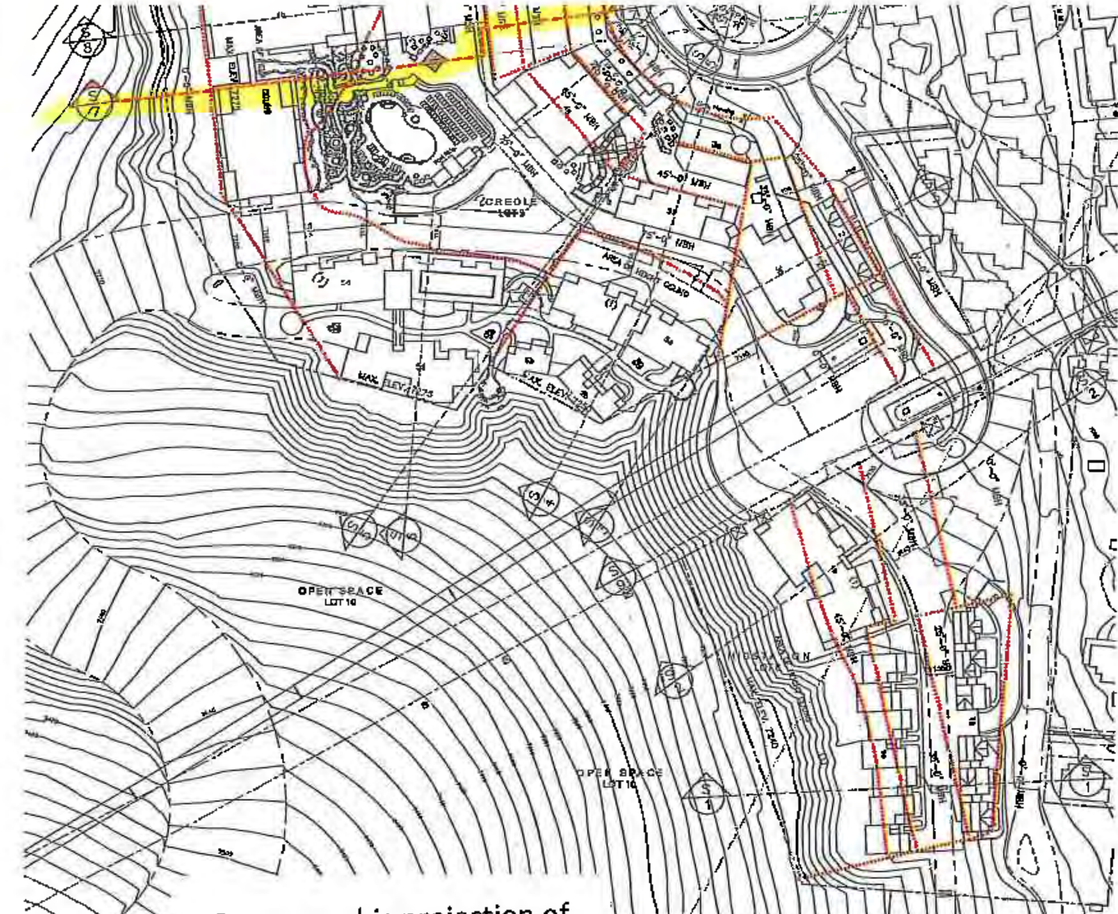
Predominant Joint Set Projection on Profile S.7

Slope Direction of Cut Face:	N 54° E
Strike of Cut Face:	N 36° W
Cut Face Dip:	61° NE
Maximum Cut Slope Recommendation:	2:1 (63°)

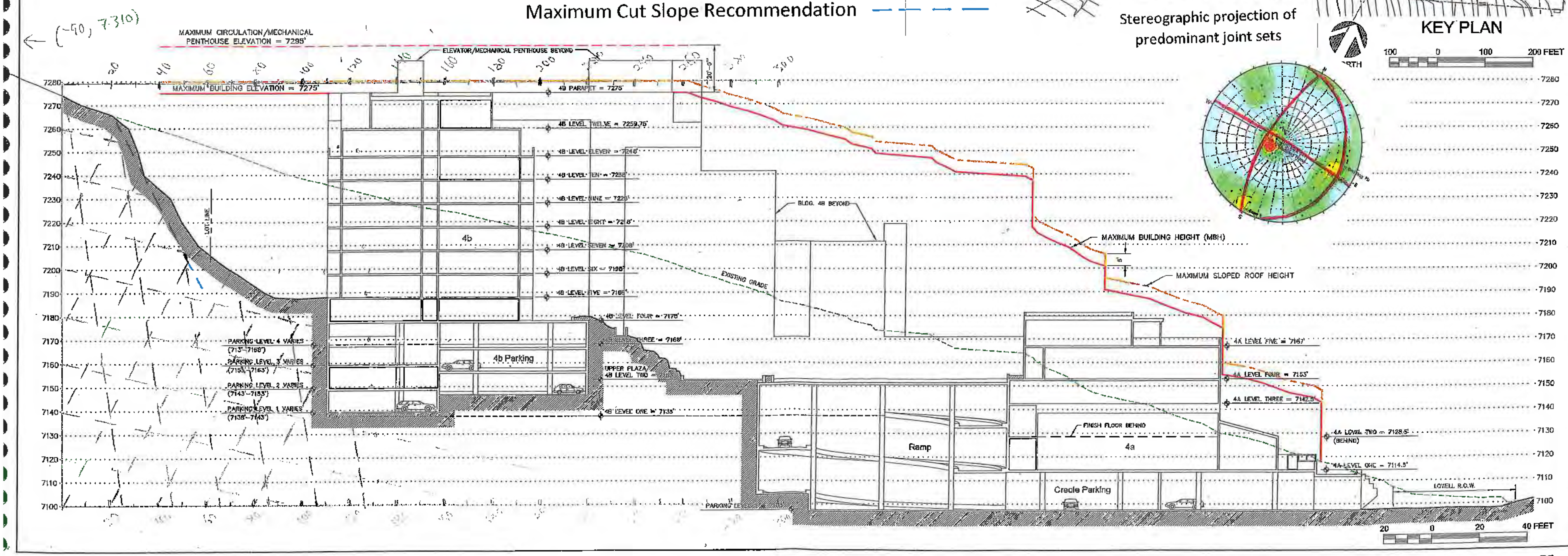
Legend:

Predominant Joint Sets (joint spacing is not representative)

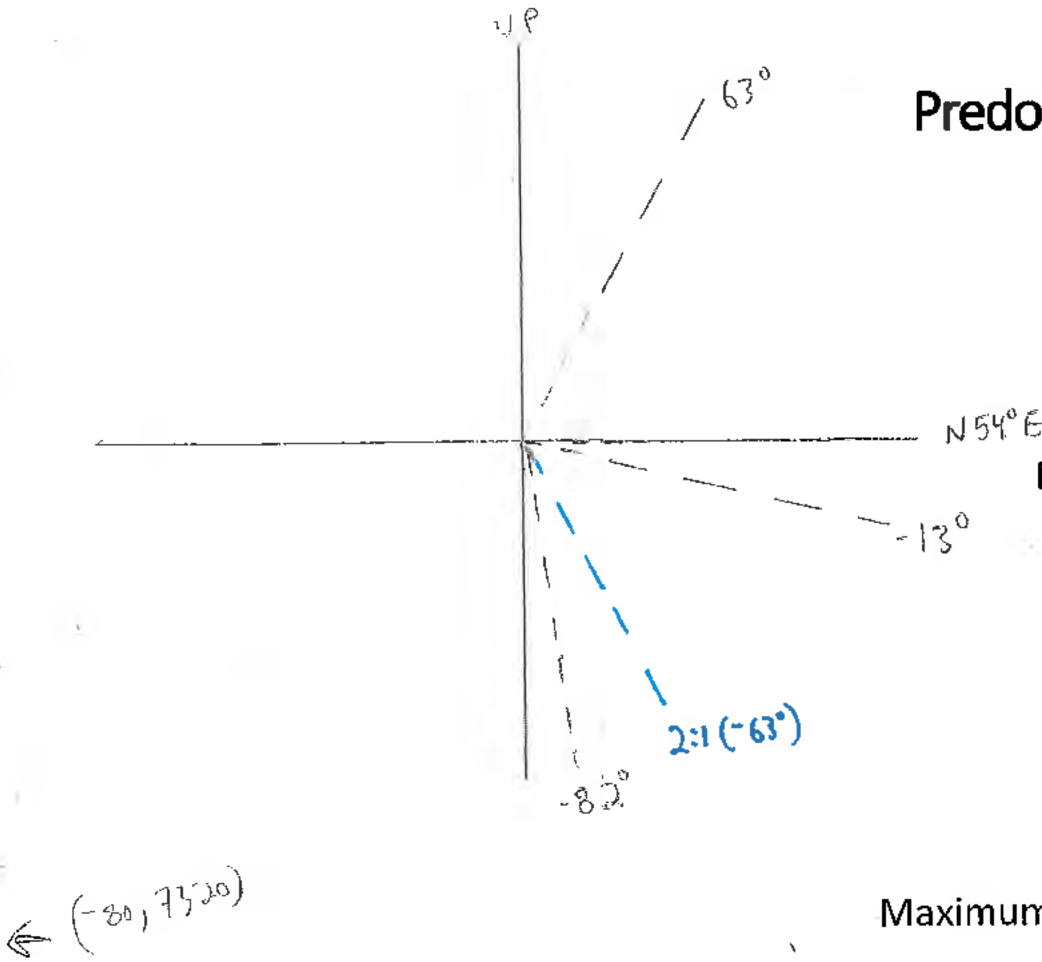
Maximum Cut Slope Recommendation



Stereographic projection of predominant joint sets



S-7



Predominant Joint Set Projection on Profile S.8

Slope Direction of Cut Face: N 54° E

Strike of Cut Face: N 36° W

Cut Face Dip: 52° NE

Maximum Cut Slope Recommendation: 2:1 (63°)

Legend:

Predominant Joint Sets
(joint spacing is not representative)

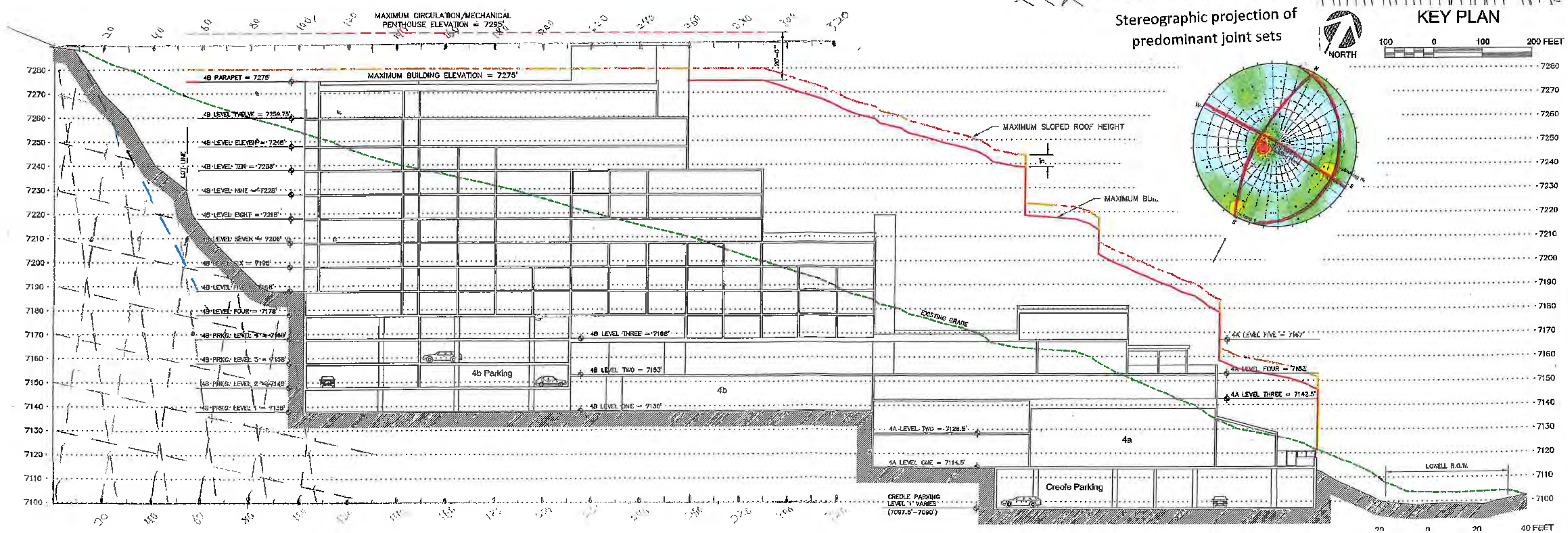
Maximum Cut Slope Recommendation

KEY PLAN

NORTH

100 0 100 200 FEET

Stereographic projection of predominant joint sets



ELDREDGE & NICHOLSON

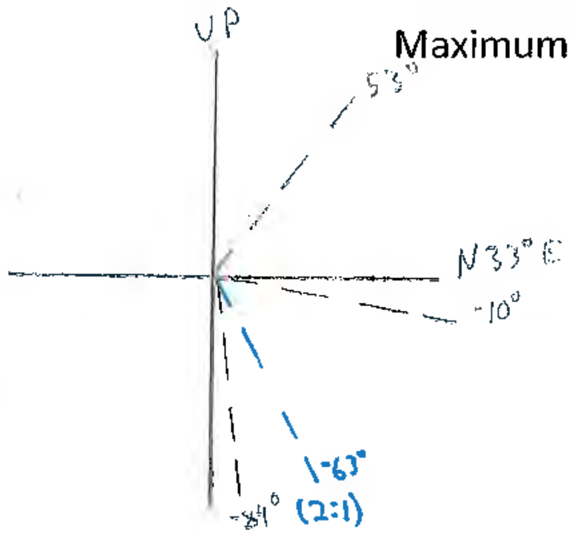
Cross Section

S-8

SHEET

Predominant Joint Set Projection on Profile S.9

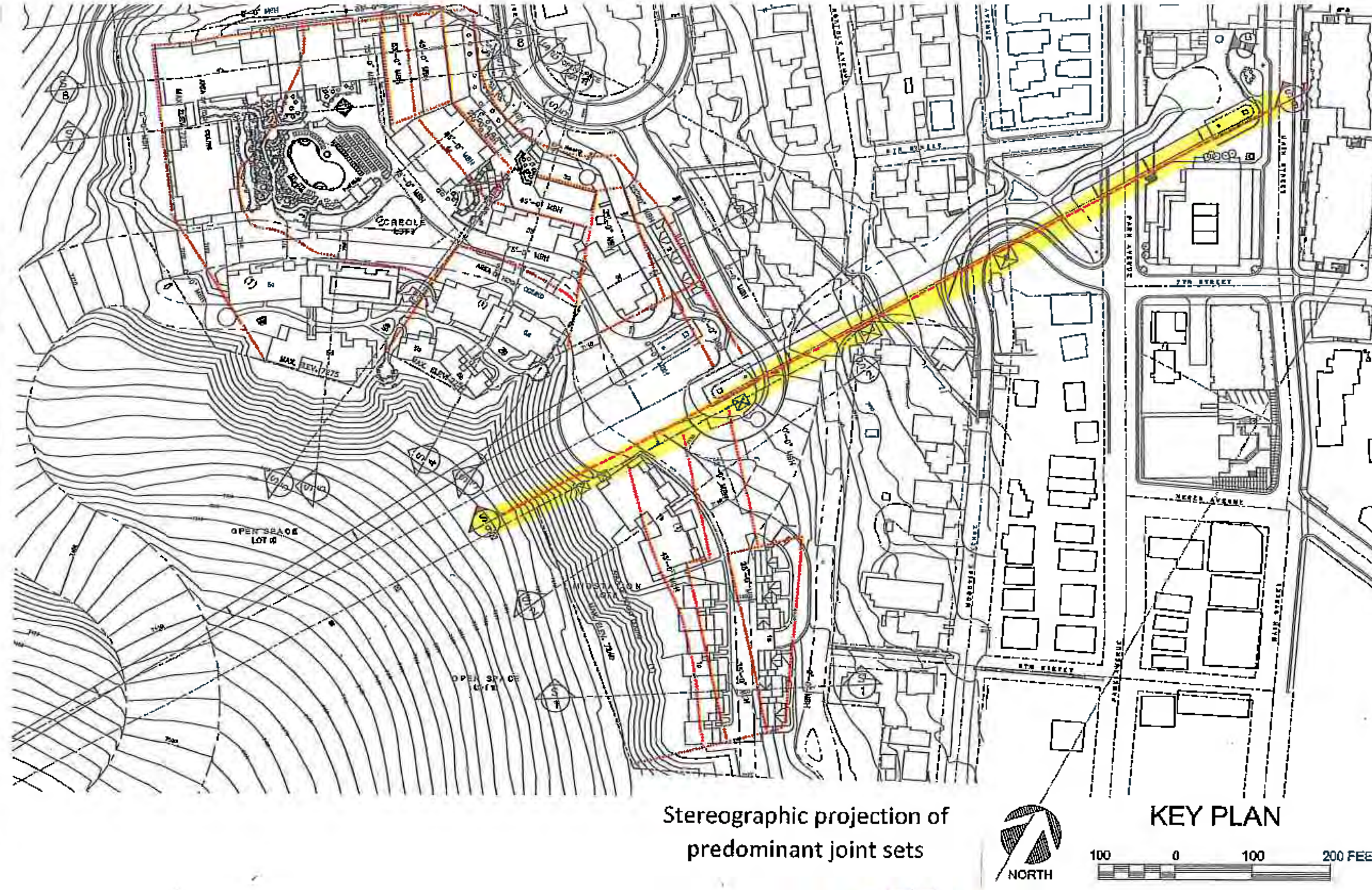
Slope Direction of Cut Face:	N 33° E
Strike of Cut Face:	N 57° W
Cut Face Dip:	53° NE
Maximum Cut Slope Recommendation:	2:1 (63°)



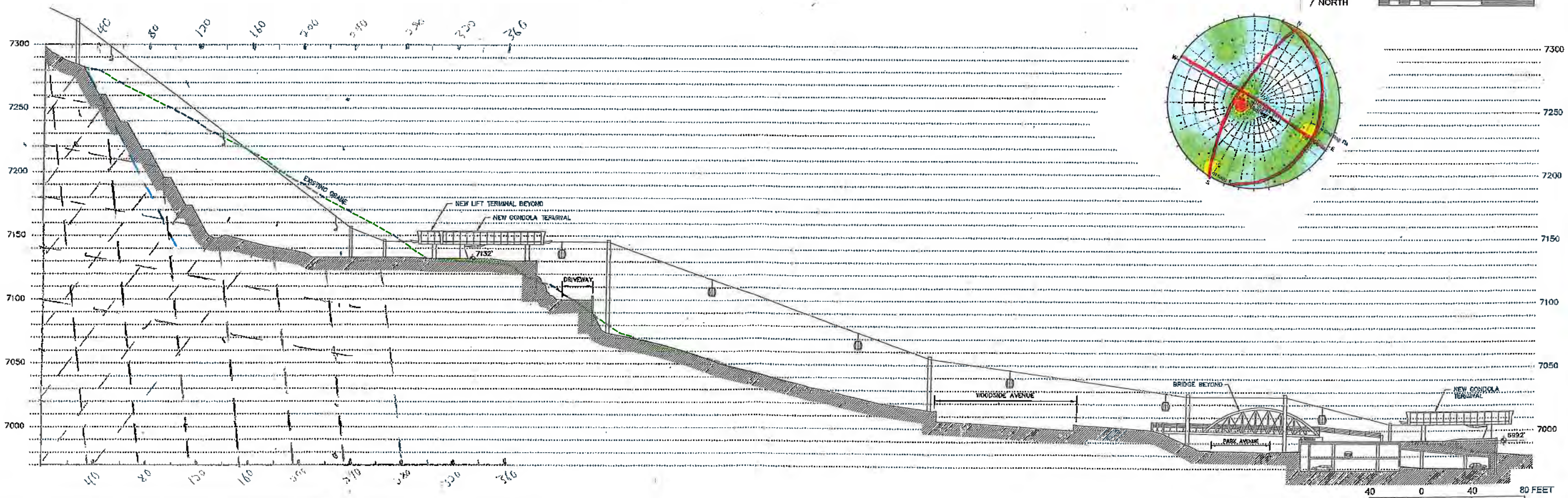
Legend:

Predominant Joint Sets
(joint spacing is not representative)

Maximum Cut Slope Recommendation



Stereographic projection of predominant joint sets



UTAH WYOMING NEVADA COLORADO TEXAS

May 24th, 2017

Attention: Pat Sweeney
President, MPE Inc.
P.O. Box 2429
Park City, UT 84060

RE: Construction Feasibility for the Treasure Project

After careful review of the proposed Treasure Project in Park City, we are of the opinion that the excavation operation of the Project can feasibly be completed within two to two and a half years.

If blasting is required, mats and seismic monitoring will be utilized to safely perform blasting operations and to keep vibration within acceptable levels..

A water system utilizing Big Water Gun sprinkler (or similar) heads will be used to control any fugitive dust.

It is our opinion that the Project can be completed safely and within acceptable levels of disturbance while adhering to all OSHA and Park City ordinances.

Like many large projects we have been involved in, we feel this project will cause some inconvenience, but will provide a great upside to the city and its residents for years to come.

Sincerely

Eric R Robinson
Tim T Jones
Robinson Construction Group LLC

Orem, UT

www.robinsonconstructiongroup.com

Corporate Office
801-225-5222
532 E. 770 N.
Orem, UT 84097

January 27, 2006

Mr. Thomas Atkinson
Applied Geotechnical Engineering Consultants, P.C.
600 West Sandy Parkway
Sandy, UT 84070

RE: Phase 1 Environmental Site Assessment
Treasure Hill Subdivision, Phase 3

Dear Tom:

This letter is to provide you with the locations and the estimated quantities of the overburden waste rock dumps you studied in your Phase 1 Environmental Site Assessment for the above referenced project.

	Location	Estimated Quantity
Creole Shaft	Lat: 40° 38’ 38.4” N Long: 111° 30’ 12.6” W	1,880 CY
Creole Adit	Lat: 40° 38’ 45.5” N Long: 111° 30’ 07.1” W	1,225 CY
South East Adit	Lat: 40° 38’ 37.6” N Long: 111° 29’ 59.7” W	200 CY
North West Adit	Lat: 40° 38’ 39.5” N Long: 111° 29’ 59.8” W	35 CY

Attached are cross sections of the overburden sites showing the quantity calculations.

Sincerely,

Rob McMahon P.E.
Alliance Engineering, Inc.

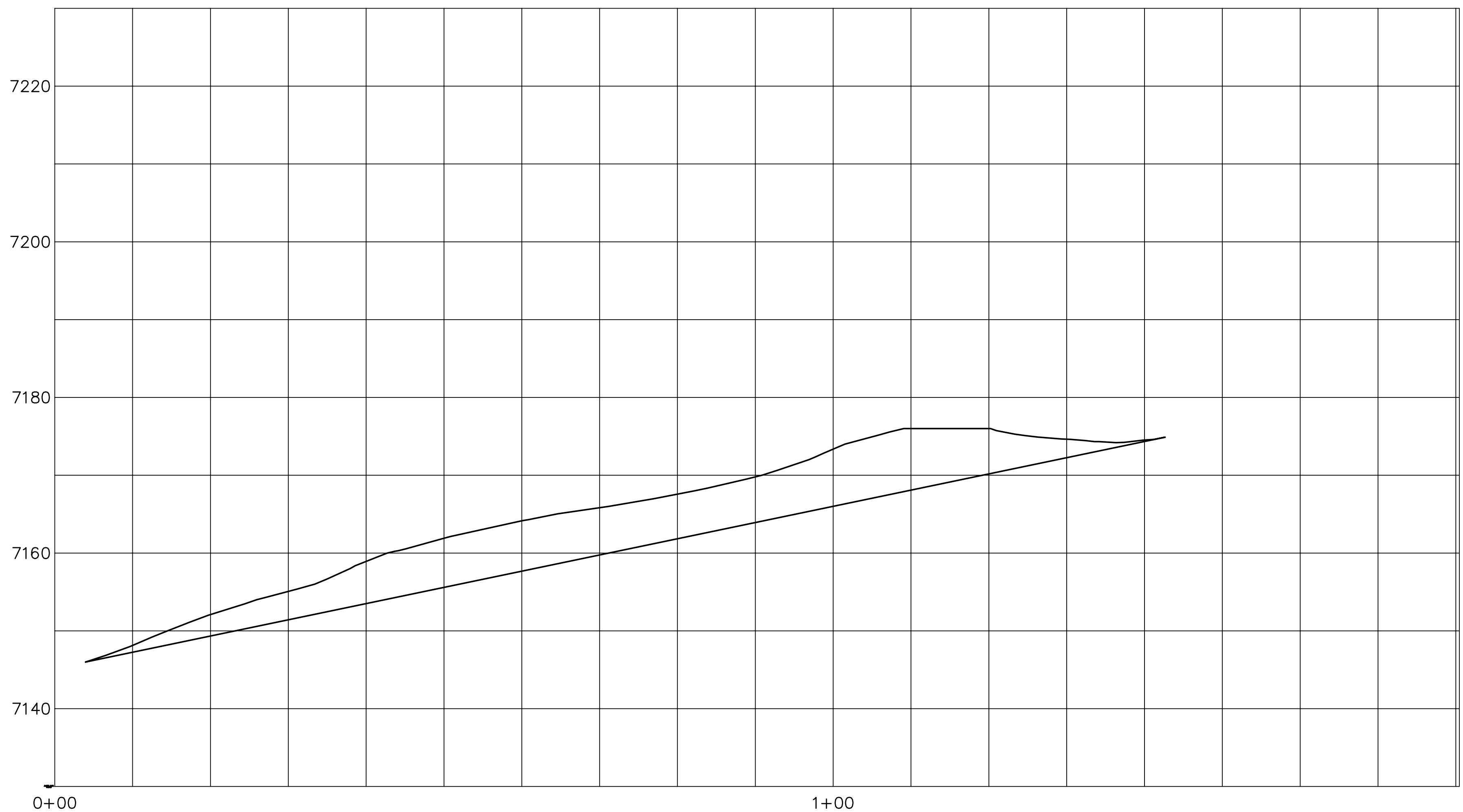
Copy: Pat Sweeney; Sweeney Land Co.
Jeff Schoenbacher; Park City Municipal Corp.

CREOLE SHAFT

AREA 845 SF
AVG WIDTH 60 FT
EST. VOLUME 1878 CY

LAT: 40°38'38.4" N

LONG: 111°30'12.6" W

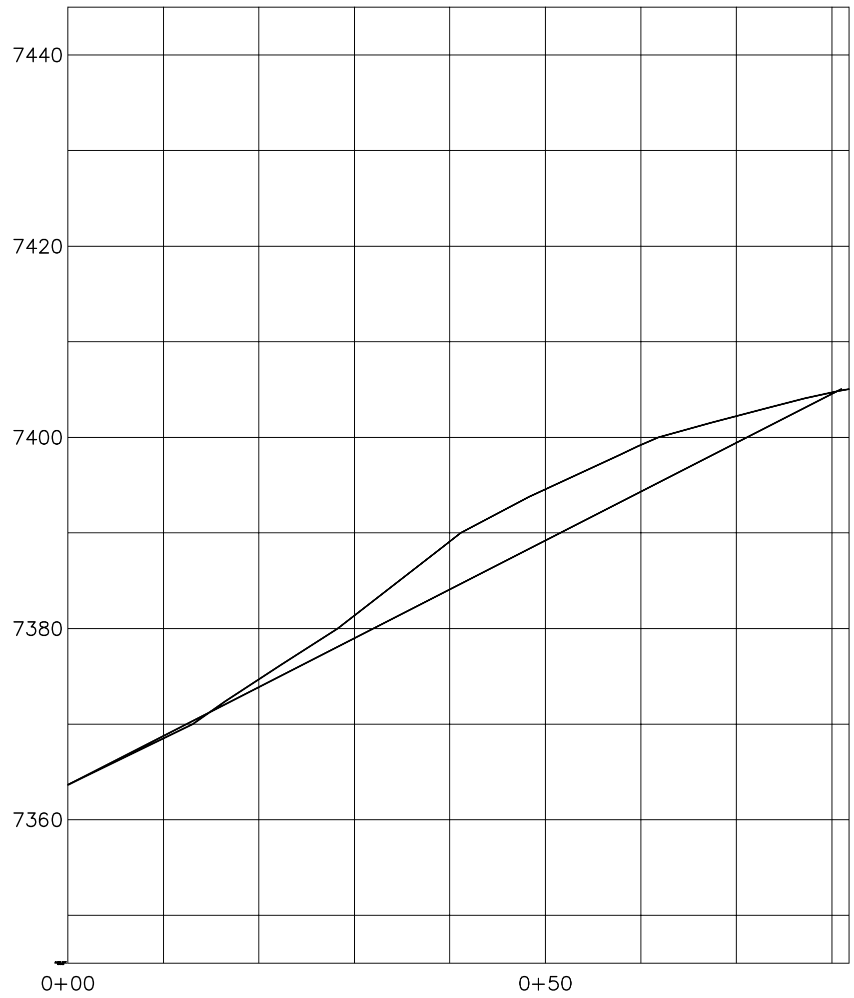


CREOLE ADIT

AREA 662 SF
AVG WIDTH 50 FT
EST VOLUME 1225 CY

LAT: 40°38'45.5" N

LONG: 111°30'07.1" W

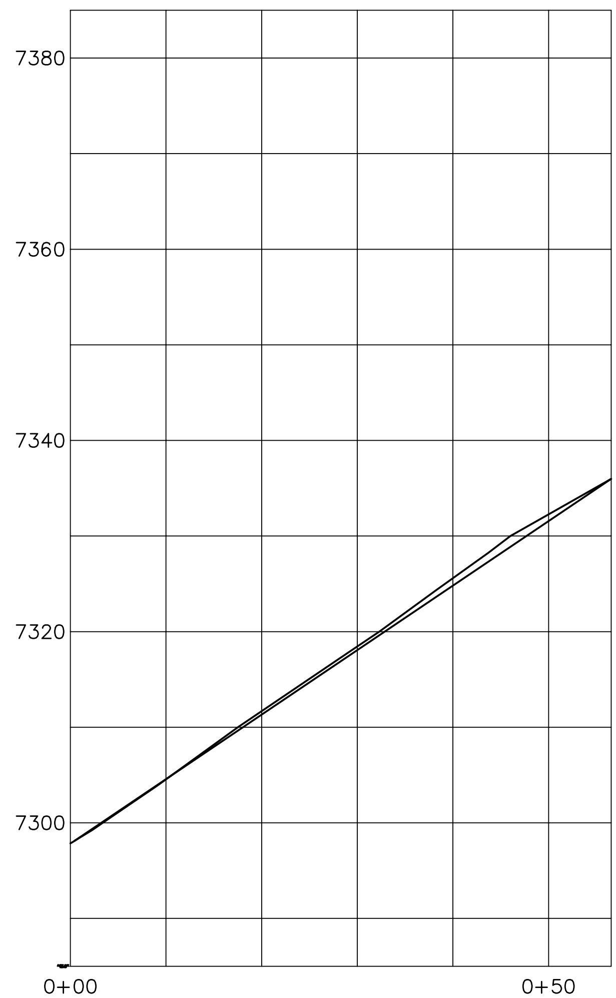


SOUTH EAST ADIT

AREA 215 SF
AVG WIDTH 25 FT
EST VOLUME 200 CY

LAT: 40°38'37.6" N

LONG: 111°29'59.7" W



NORTH WEST ADIT

AREA	30 SF	LAT:	40°38'39.5" N
AVG WIDTH	30 FT		
EST VOLUME	35 CY	LONG:	111°29'59.8" W

HANSEN ALLEN & LUCE INC ENGINEERS

MEMORANDUM

DATE:	May 25, 2017
TO:	Pat Sweeney, President MPE Incorporated PO Box 2429 Park City, Utah 84060
FROM:	J. Lance Nielsen, P.E. Hansen, Allen & Luce, Inc. (HAL) 859 W. South Jordan Pkwy, Ste 200 South Jordan, Utah 84095
SUBJECT:	Treasure Project Interference Evaluation
PROJECT NO.:	344.150.100

PROFESSIONAL ENGINEER
5/25/2017
No. 354085-2202
J LANCE
NIELSEN
STATE OF UTAH

BACKGROUND

MPE Incorporated is developing a destination resort in Park City, Utah at the south end of Lowell Avenue. One component of the proposed development includes excavation of approximately 1 million cubic yards of material at the base of the hill southwest of Lowell Avenue and spreading it over three placement zones located up the hill from the development. The placement zones are shown on Figure 1.

The Treasure Project excavation area and placement zones are located within the current Drinking Water Source Protection (DWSP) zones for Park City's Spiro Tunnel (see Figure 1). Because of the historical mining activities in the area, concern has been expressed that placement of the excavated material may result in leaching of heavy metals into the groundwater and contamination of Park City's Spiro Tunnel drinking water source. The proposed excavation and placement zones are on the east side of Negro Hollow and the Spiro Tunnel is located within Thaynes Canyon as shown on Figure 1.

HAL was asked to evaluate the potential for the Treasure Project to interfere with Park City's Spiro Tunnel. This memorandum summarizes the results of the evaluation.

DATA SOURCES

Information for this evaluation was obtained from the following data sources.

1. AGEC. 2017. Email correspondence with Jim Nordquist on April 26, 2017 regarding geology near Treasure Project.
2. Baker, C.H. and D.L. Peterson. 1970. *Water Resources of the Heber-Kamas-Park City Area, North-Central, Utah.* Technical Publication No. 27. U.S. Geological Survey.
3. Bromfield, C.S. and M.D. Crittenden. 1971. *Geologic Map of the Park City East Quadrangle, Summit and Wasatch Counties, Utah.* Map GQ-852. U.S. Geological Survey.
4. Crittenden, M.D., F.C. Calkins, and B.J. Sharp. 1966. *Geologic Map of the Park City West Quadrangle, Utah.* Map GQ-535. U.S. Geological Survey.

5. Daly, Chris and George Taylor. 2009. *United States Average Annual Precipitation, 1961-1990*. Spacial Climate Analysis Service at Oregon State University. GIS dataset obtained from Utah AGRC website: www.agrc.utah.gov
6. Holmes, Walter F., Kendall R. Thompson, and Michael Enright. 1986. *Water Resources of the Park City Area, Utah with Emphasis on Ground Water*. Technical Publication No. 85. U.S. Geological Survey.
7. Utah Division of Water Rights. 2017. Well driller's logs for local wells. Online Water Rights Database. waterrights.utah.gov

HYDROGEOLOGIC EVALUATION

Bedrock formations in the vicinity of the Treasure Project and the Spiro Tunnel include the following, listed in relative age order from more recent to less recent. Descriptions are based on Bromfield and Crittenden (1971) and Crittenden et al (1966).

- Thaynes Formation (TRt) – Sandstone interbedded with shale and limestone
- Woodside Shale (TRw) – Shale with siltstone and very fine grained sandstone
- Park City Formation (Ppc) – Limestone and sandstone with a middle member consisting of shale.
- Weber Quartzite (IPw) – Quartzite and sandstone with some interbedded limestone and dolomite.
- Round Valley Formation (IPrv) – Limestone with sparse chert nodules.

In the area between the Treasure Project and the Spiro Tunnel, the bedrock formations dip to the north toward the Dutch Draw Syncline which plunges to the northeast. The Dutch Draw Syncline is located a couple of miles north of the map shown on Figure 1. There are multiple faults and folds in the overall area and the bedrock formations are significantly fractured and jointed. AGEC (2017) reports perpendicular joint systems in the Weber Quartzite that strike to the north and west. Groundwater flow through bedrock formations is likely primarily through joint systems. Joint systems in formations such as sandstone, limestone, and quartzite tend to remain open and provide for significant secondary porosity to convey groundwater flow. However, joints in mudstone and shale formations tend to heal over time and have a much lower ability to transmit water.

Based on information provided by AGEC (2017), the Treasure Project excavation area is located over the Weber Quartzite and material excavated for the project would be from this formation. The three placement zones are located primarily over the outcroppings for the lower portions of the Park City Formation which includes a middle shale member (see Figure 2).

Based on the underground water claim for the Spiro Tunnel, the first half-mile of the tunnel penetrates the Thaynes Formation. The following approximately one mile penetrates the Woodside Shale. The next approximately one mile of tunnel is through the various members of the Park City formation (see Figure 3).

Based on HAL experience, groundwater flow through bedrock formations typically moves from areas of high recharge to low recharge through fracture and joint systems unless there is a barrier to groundwater flow. Examples of groundwater flow barriers include fault gouge zones or confining formations such as mudstones or shales. Based on Daly and Taylor (2009), average annual precipitation in the area is highest at the top of the mountains to the southwest from the Treasure Project and drops to the northeast toward Park City. Geologic mapping in the area does not show any barriers to groundwater flow that would prevent water from flowing to the northeast. Therefore, the groundwater flow direction in the bedrock formations is primarily from southwest to northeast. This is supported by information provided in water resources publications by Baker and Peterson (1970) and Holmes et al (1986).

Cross-sections were developed to show the relationship of the placement zones relative to the bedrock formations and the Spiro Tunnel. The cross-section locations are included on Figure 1 with the actual cross-sections shown on Figures 2 and 3. Figure 2 demonstrates that the entire Woodside Shale formation is located between the placement zones for the Treasure Project and the tunnel. This formation primarily consists of shale which would act as a barrier to groundwater flow. Therefore, it is unlikely that groundwater from the Treasure Project placement zones could travel through the Woodside Formation perpendicular to the groundwater flow direction.

The Spiro Tunnel does penetrate the Park City Formation at least a mile and a half southwest of the tunnel opening. However, in order for groundwater from the Treasure Project placement areas to enter the tunnel through this formation, it would have to travel more than a mile upgradient which is not hydraulically possible.

Although the DWSP zone delineated for the Spiro Tunnel includes the Treasure Project placement areas, there is compelling hydrogeologic evidence that groundwater from this area could never reach the tunnel. It is believed that the zone boundary was expanded to the south in an effort to be conservative and maximize protection of groundwater. From a hydrogeologic standpoint, HAL believes the eastern boundary of the DWSP zone should be moved west to the outcropping of the Woodside Shale as shown on Figure 1.

WATER QUALITY

Concern has been expressed that placement of excavated material will result in a higher leaching rate of heavy metals as precipitation infiltrates through the placed material. Technically, there will be an increase in surface area exposure to water from this placed material. However, the excavated and placed material will only undergo mechanical breaking and crushing and heavy metals will still be chemically bound within the rock formation. The excavated materials will be from the Weber Quartzite formation. Generally, quartzite is relatively inert and does not leach large amounts of heavy metals into groundwater. An increase in surface area exposure may slightly increase the potential for leaching, but the increase would be expected to be negligible. Additionally, the placed material will be unsaturated and the exposure time to water as it moves through the placed material will be relatively short. This would also limit the potential for leaching.

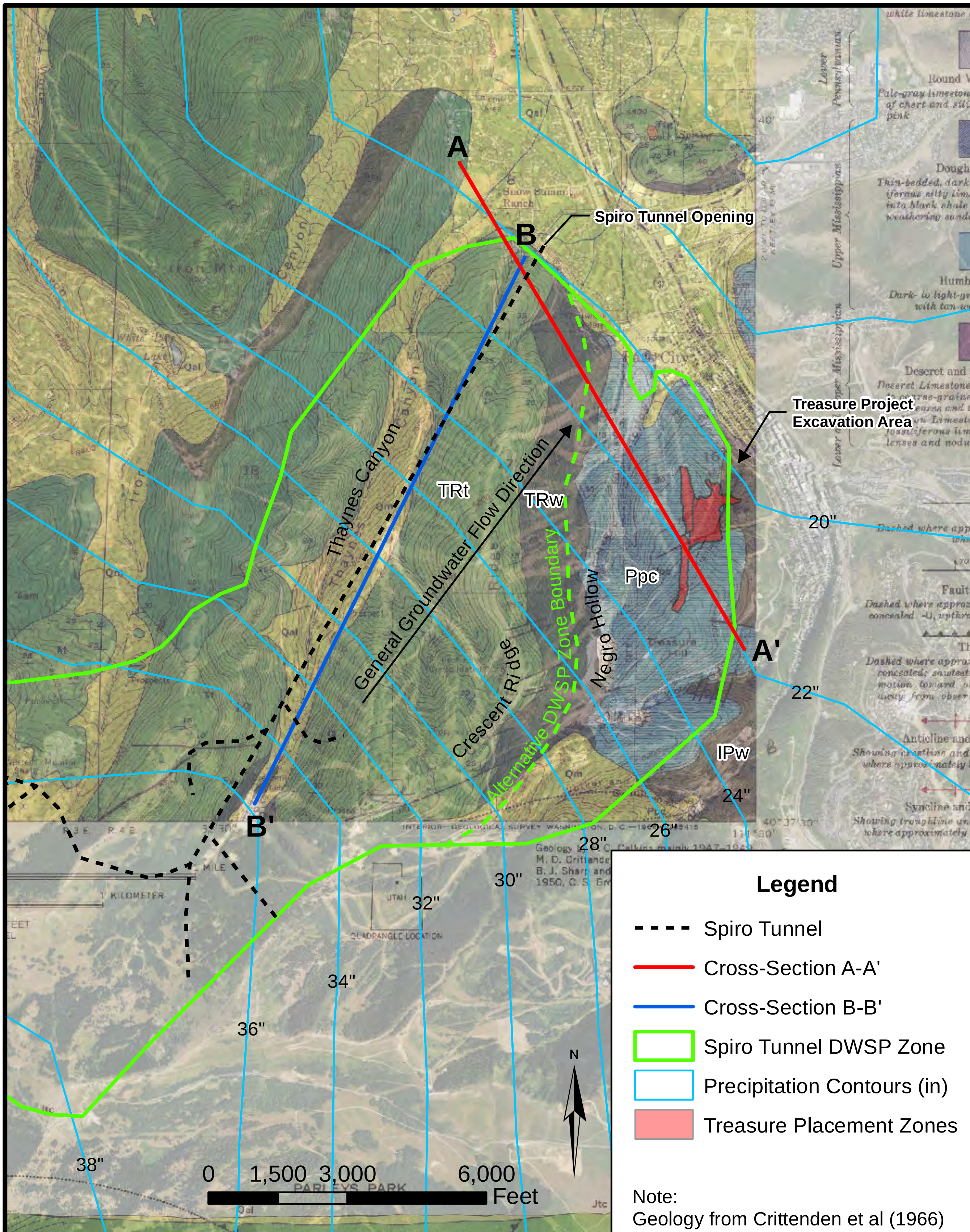
In the case of mine tailings, where the rock has undergone chemical alterations through mine processing, the chemical bond between the metals and the rock has been broken, which frees the metals to rapidly dissolve into water as it passes through the tailings. This will not be the case for the Treasure Project. Therefore, placing excavated quartzite material at the proposed placement zones is not likely to have a significant effect on groundwater quality and is not likely to affect any of Park City's other drinking water sources.

CONCLUSIONS

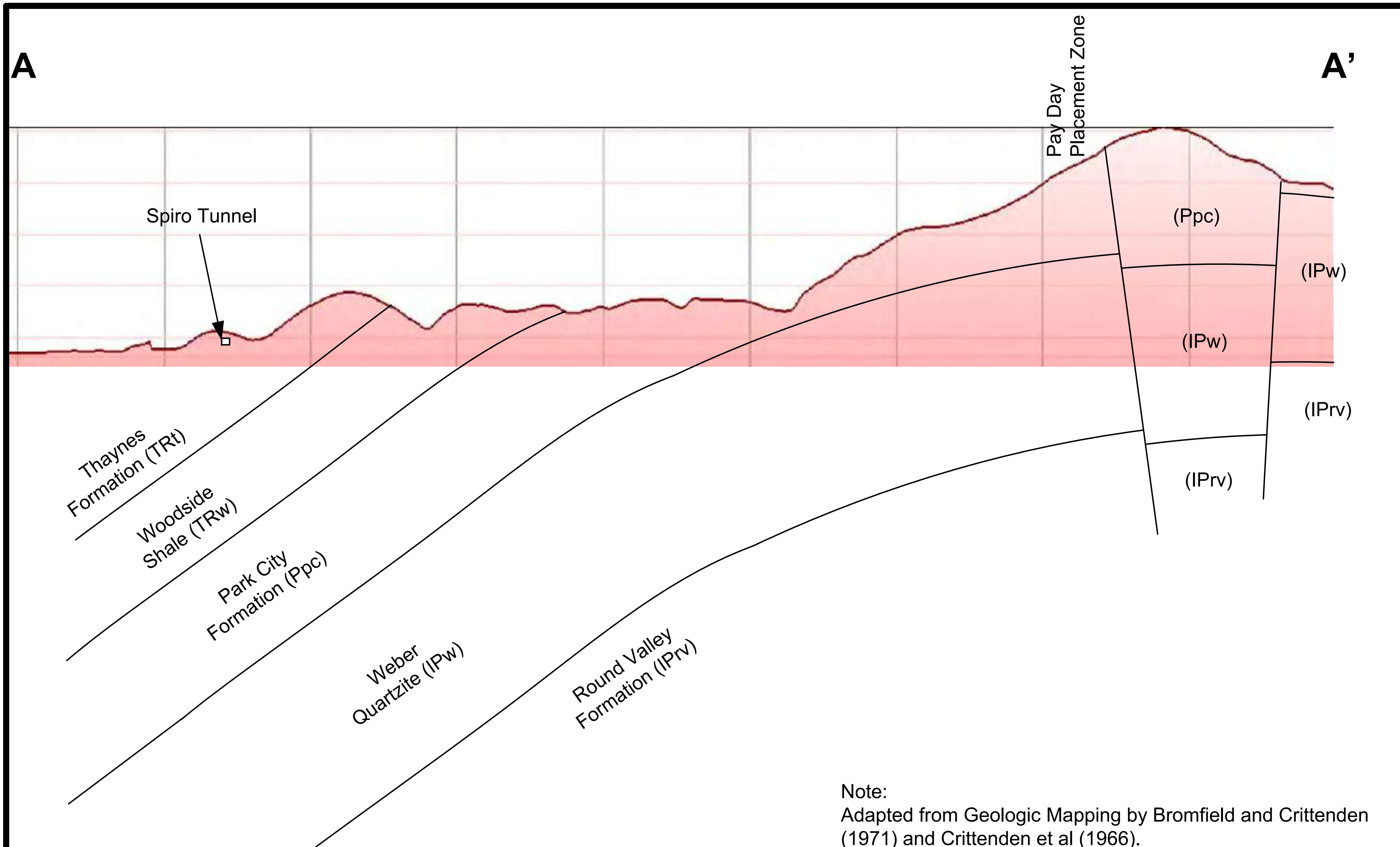
Based on the available data, it is our opinion that the Treasure Project will have no hydrologic or water quality impact on the Spiro Tunnel for the following reasons:

- High recharge volume at the top of the mountains to the southwest of the Treasure Project causes a groundwater flow gradient from southwest to northeast.
- There are no barriers to groundwater flow moving from southwest to northeast.
- Groundwater flows unimpeded to the northeast toward Park City.
- The location of the Treasure Project is more than a mile southeast from the opening of the Spiro Tunnel which is lateral to the groundwater flow gradient.
- There is a thick shale formation (Woodside Shale) that separates the Treasure Project from the Spiro Tunnel.
- Excavated and placed quartzite material will only undergo mechanical breaking and crushing and metals will still be chemically bound to rock materials.
- Placed material will not undergo chemical processing.
- Placed material will be unsaturated limiting the exposure time to groundwater which reduces the potential for leaching.
- Quartzite material is relatively inert to groundwater and is unlikely to result in dissolution of large amounts of metals.

Therefore, excavation of quartzite material from the Treasure Project and placement of this material at the proposed placement zones poses no risk to Park City's public drinking water supplies.



HANSEN ALLEN & LUCE INC ENGINEERS	MPE INCORPORATED TREASURE PROJECT INTERFERENCE EVALUATION	Study Area Map	FIGURE 1



Note:
Adapted from Geologic Mapping by Bromfield and Crittenden (1971) and Crittenden et al (1966).

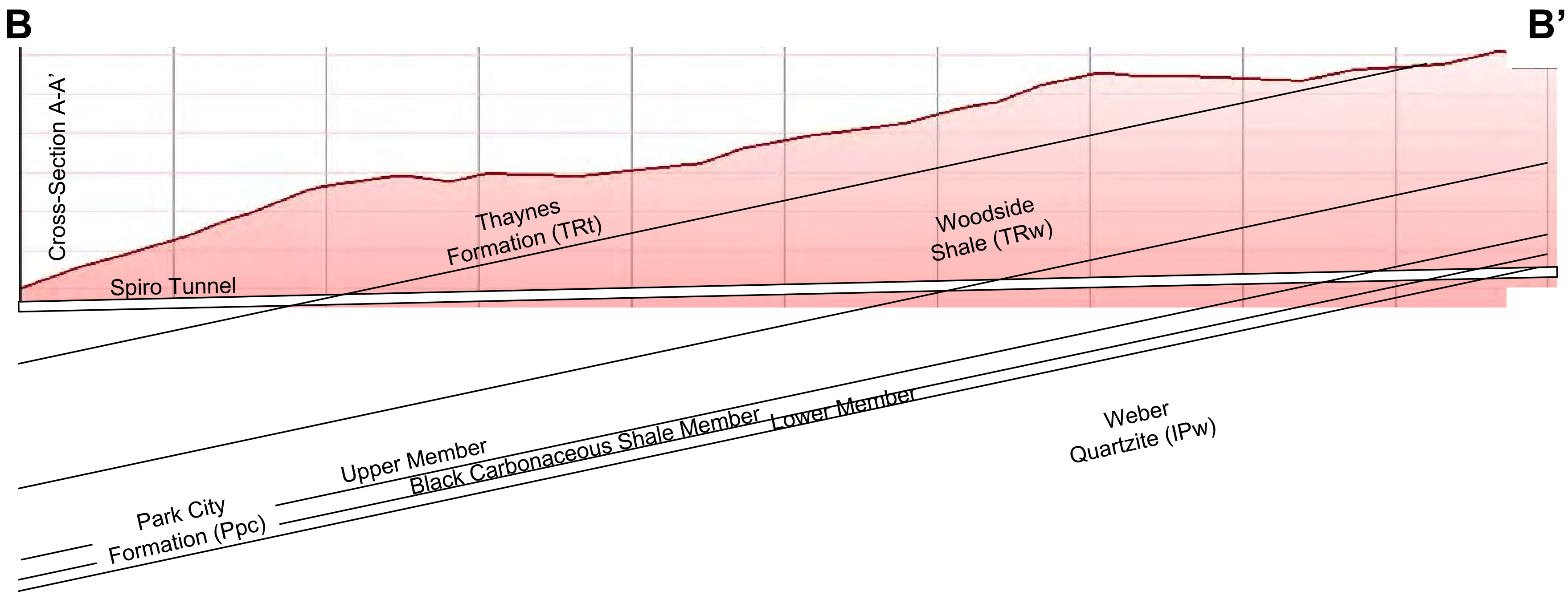
HANSEN ALLEN & LUCE INC
ENGINEERS

MPE Incorporated

Treasure Project Interference Evaluation

Conceptual Geologic Cross-Section A-A’

Figure
2



Note:
Adapted from Geologic Mapping by Bromfield and Crittenden (1971) and Crittenden et al (1966) and based on bedrock formation information listed on the Underground water claim for the Spiro Tunnel.

HANSEN ALLEN & LUCE INC ENGINEERS	MPE Incorporated Treasure Project Interference Evaluation	Conceptual Geologic Cross-Section B-B'	Figure 3

SNYDERVILLE BASIN
WATER RECLAMATION DISTRICT
2800 HOMESTEAD RD, PARK CITY, UT 84098 WWW.SBWRD.ORG T 435-649-7993 F 435-649-8040

June 14, 2017

Rob McMahon
Alta Engineering, Inc.
P.O. Box 2864
Park City, UT 84060

Subject: Treasure Hill Development
Service Provider Letter

Dear Mr. McMahon;

This is to respond to a request we received from you regarding wastewater service for the referenced project in the Snyderville Basin.

The proposed project is within the Snyderville Basin Water Reclamation District (SBWRD). The SBWRD can provide wastewater service to the project provided the established procedures for obtaining said wastewater service are followed as outlined the SBWRD standards. The Developer is encouraged to contact our office to begin the SBWRD development process.

Wastewater service is not committed by SBWRD until SBWRD receives full payment of all required fees including SBWRD impact fees.

Please contact Kevin Berkley with any questions.

Sincerely,

Bryan D. Atwood, P.E.
District Engineer

Cc: Patrick Sweeney
Project File

May 30, 2017

Rob McMahon
Alta Engineering Inc.
435-640-8777

To whom it may Concern,

This letter is to verify that Comcast service is available to Treasure Hill Subdivision in Park City Utah. Comcast will generally provide all materials and labor to provide broadband services from the property line to the point of service, in a trench provided by the property owner.

The cost of installation, construction and provision of cable service will be part of the contract negotiations with the Owner of the Property or a designated representative. **This letter is not to be considered a contract or guarantee of service.** Furthermore, all permits, licenses and rights of access must be provided by the Owner prior to any provision of services.

Please be advised that we require a minimum of 90 days for project approvals and construction **after we receive a signed contract.** If this is a private development.

Please contact Elysia Valdez at 801-401-3017 before opening utility trenches.
We look forward to working with you on this Project; please feel free to contact me with any questions or concerns.

Sincerely,

E Valdez

Elysia Valdez
Comcast Cable
801 401-3017 office
801 255-2711 fax
1350 E Miller Avenue
Salt Lake City, Utah 84106

ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

June 7, 2017

6280 N. SILVER CREEK DR. PARK CITY, UTAH 84098 (435) 655-7806

Park City Corporation
Planning Department
Attn: Kirsten Whetstone
PO Box 1480
Park City, UT 84060

Re: Availability of Utilities for: Treasure Hill

This is to verify that **PacifiCorp** d.b.a. **Rocky Mountain Power**:

1) Has sufficient capacity at the present time to provide Three phase power, (12,470 volt) to the above titled development / project.

2) I will review the development plans, when they're submitted by: MPE, INC.
Electric service will be provided under the prevailing "Rates and Regulations", as filed with the "Public Utilities Commission of Utah".

3) Adequate rights-of-way or easements either presently exists or will be provided by the developer to supply the requested services(s).

Sincerely,

Bryan Millward

Bryan Millward
Estimator
(435) 655-7806

QUESTAR

Questar Gas Company
6445 Silver Creek Dr.
Park City, Ut 84060
Tel 800-323-5517

May 31, 2017

MPE/Rob McMahn
PO Box 2429
Park City Ut. 84060

Dear Developer:

Re: Natural Gas Service Availability Letter

Natural gas can be made available to serve the Treasure Hill development when the following requirements are met:

1. Developer provides plat maps, drawings, construction schedules, average size of homes, units, and/or buildings that will be served by natural gas, and any and all other relevant information regarding commercial and residential uses, including but no limited to, proposed natural gas appliances (number and type of appliances per unit, homes, building).

2. Review and analysis by Questar Gas' Engineering and/or Pre-Construction Department to determine load requirements. System reinforcement requirements and estimated costs to bring natural gas to the development.

Upon completion of Questar Gas' review of the development's natural gas requirements, agreements will be prepared, as necessary, for high pressure, intermediate high pressure and/or service line extensions required to serve the development. These service extensions must be paid in advance.

To accommodate your construction schedule and provide cost estimates to you, please contact me at your earliest convenience.

Sincerely,

Whit Sargent
Pre-Construction Representative

Treasure Hill

Park City, Utah

BIG-D
CONSTRUCTION
www.Big-D.com

AGENDA

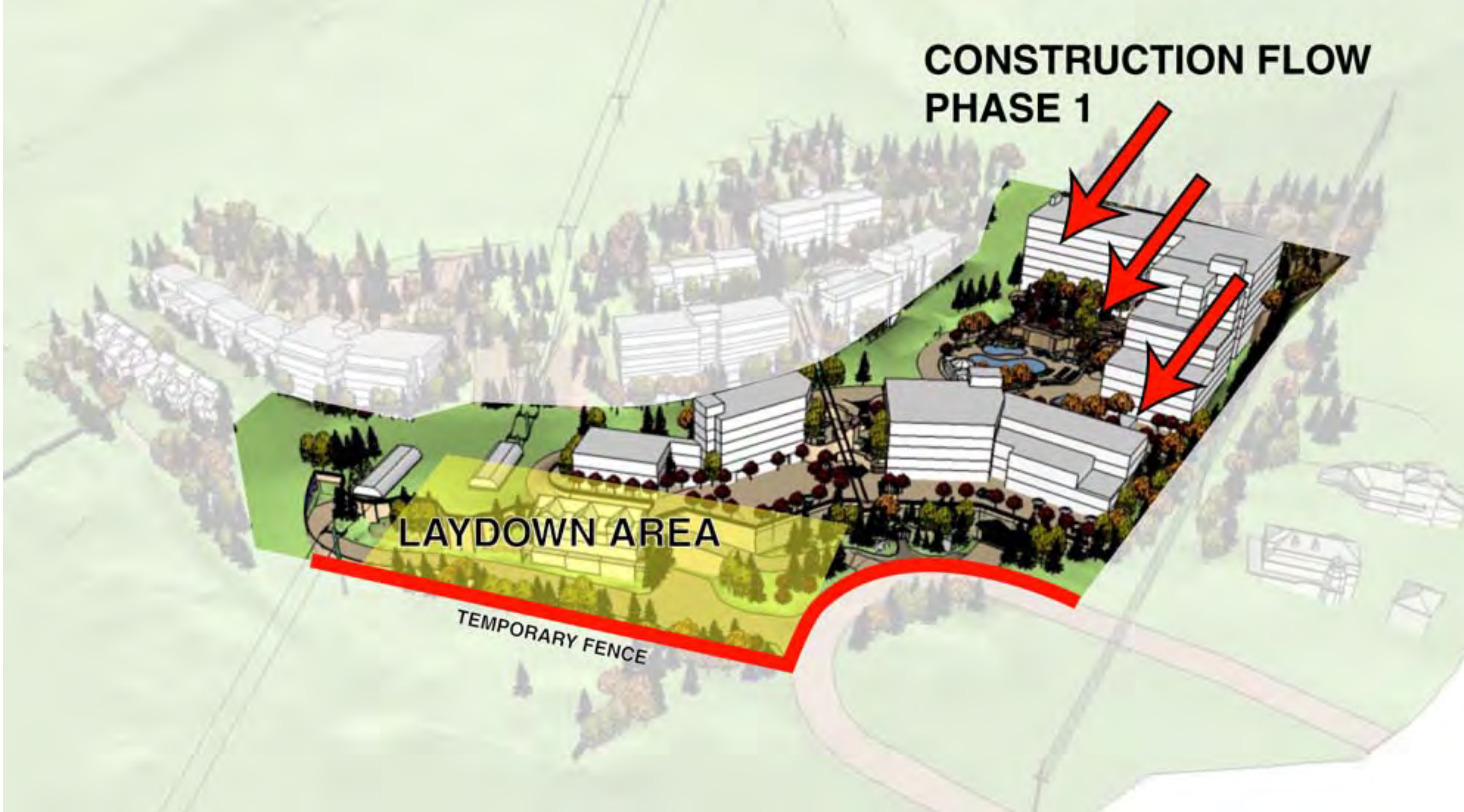
- Project Phasing Plan
- Construction Staging
- Traffic Control, Patterns and Parking
- Seasonal Events Analysis
- Environmental Control

PHASING PLAN

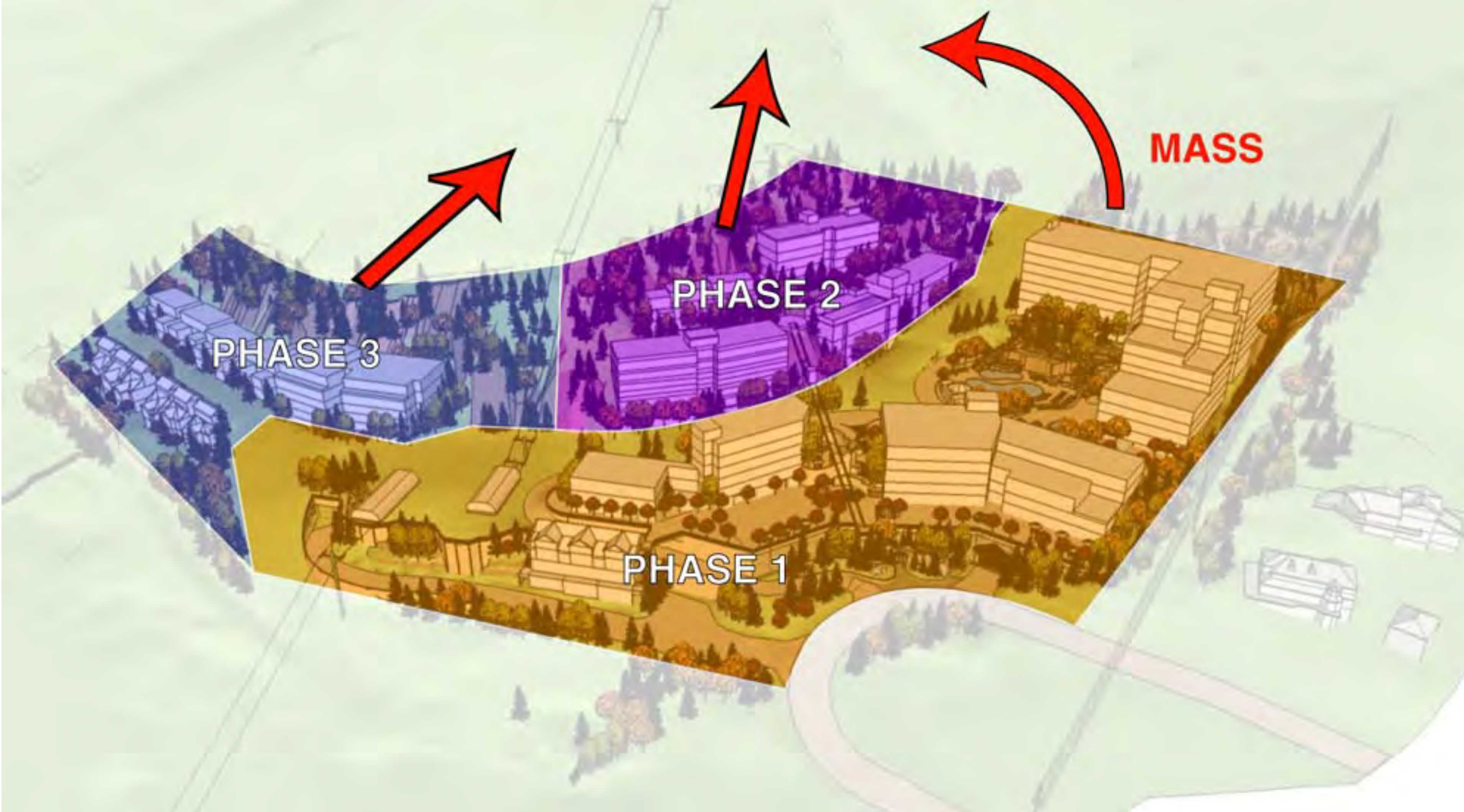
Phasing Plan

CONSTRUCTION STAGING

Construction Staging
Trailers & Materials

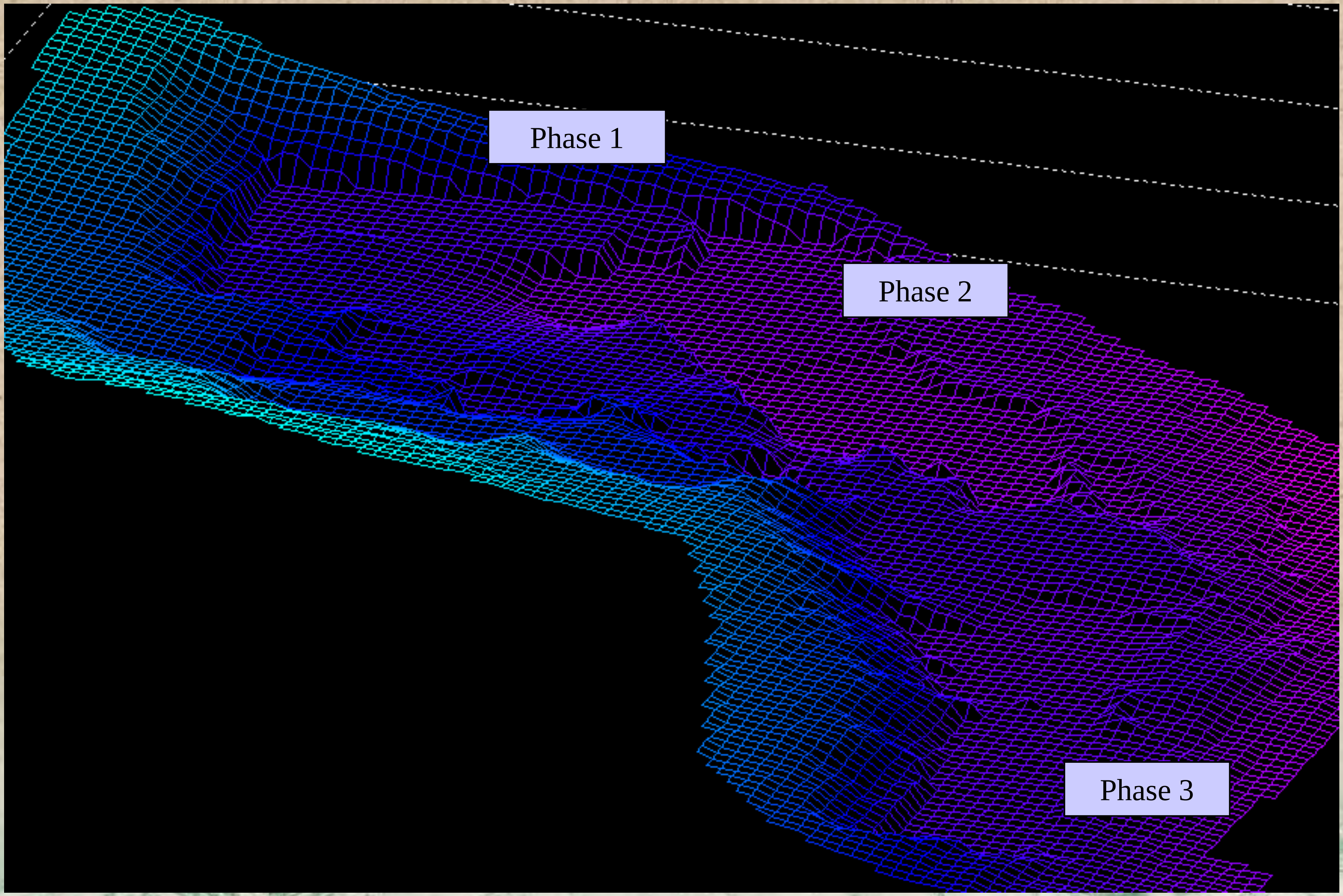


Construction Staging
Site Excavation & Layering of Mass



Site Excavation

3D Cut Magnified



Construction Staging
Ski-able Area Each Season

TRAFFIC CONTROL & PATTERNS

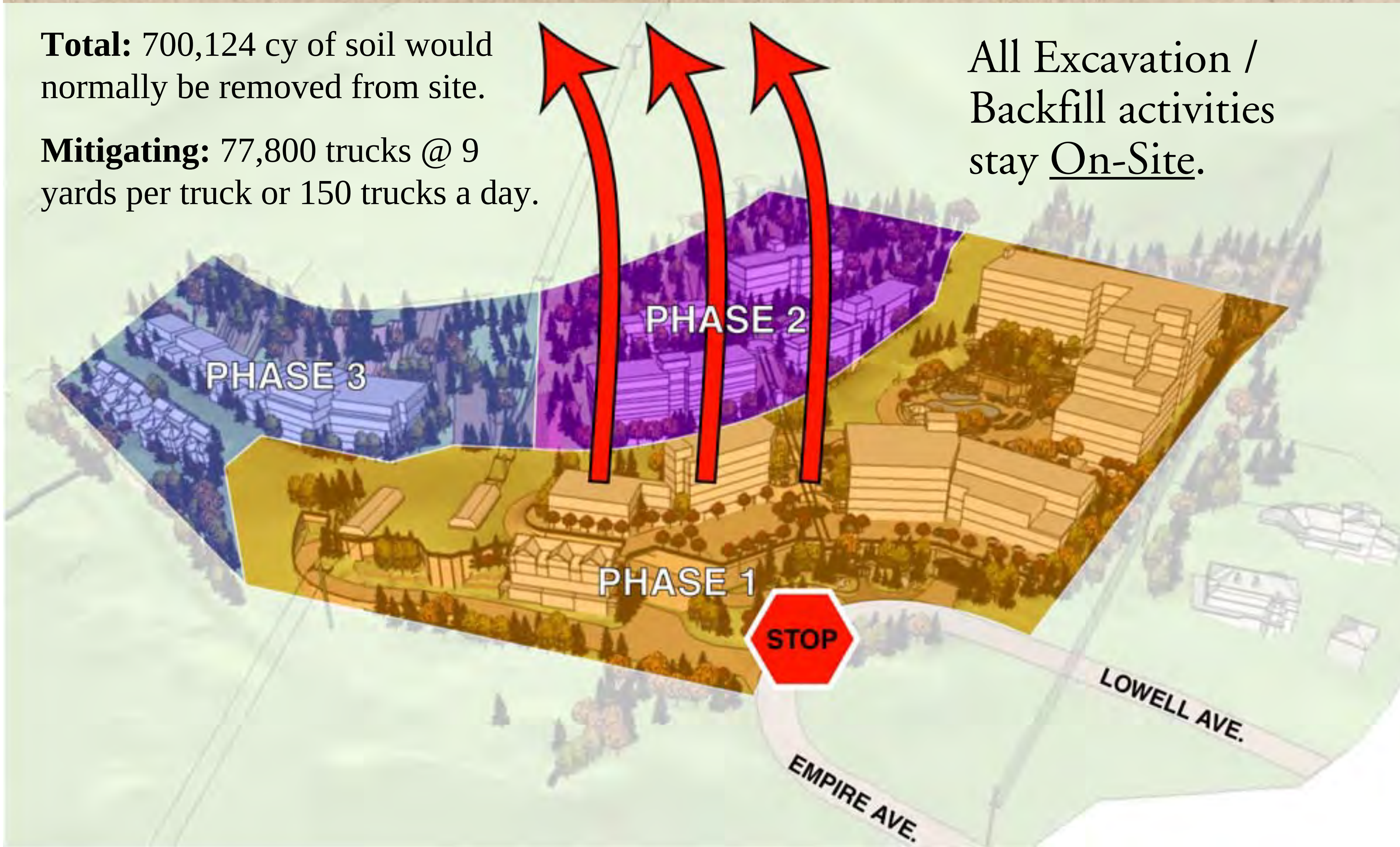
Traffic Control & Patterns

- Major Project Benefit

Total: 700,124 cy of soil would normally be removed from site.

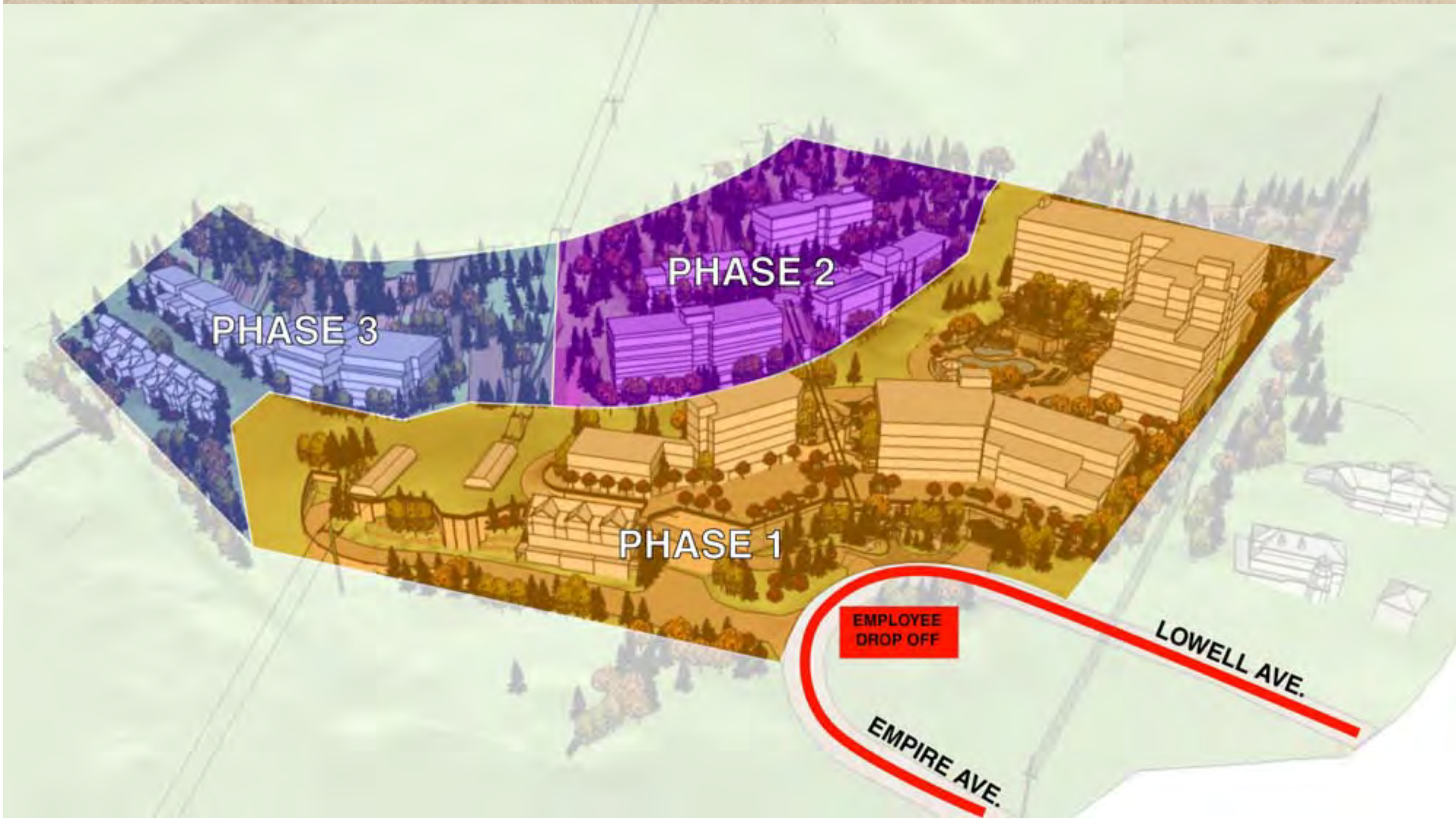
Mitigating: 77,800 trucks @ 9 yards per truck or 150 trucks a day.

All Excavation / Backfill activities stay <u>On-Site</u>.



Traffic Control & Patterns

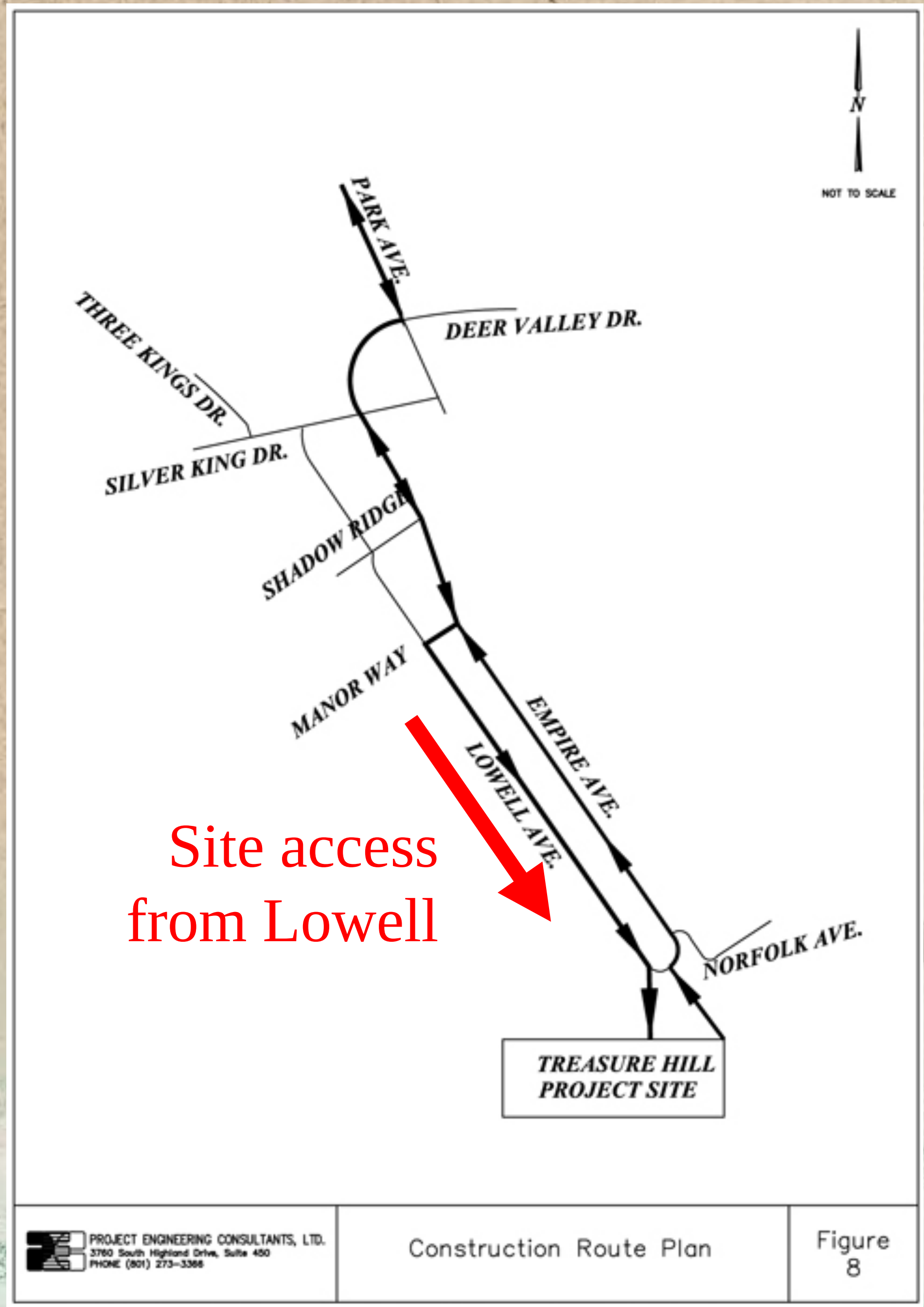
- 2nd Major Project Benefit
  - <u>Off-Site</u> parking.



Traffic Control & Patterns

- To & From Site
  - Maintain neighborhood newsletter
  - "Just in time" scheduled deliveries
  - Coordination with local traffic demands
  - Traffic signage & traffic direction will be provided

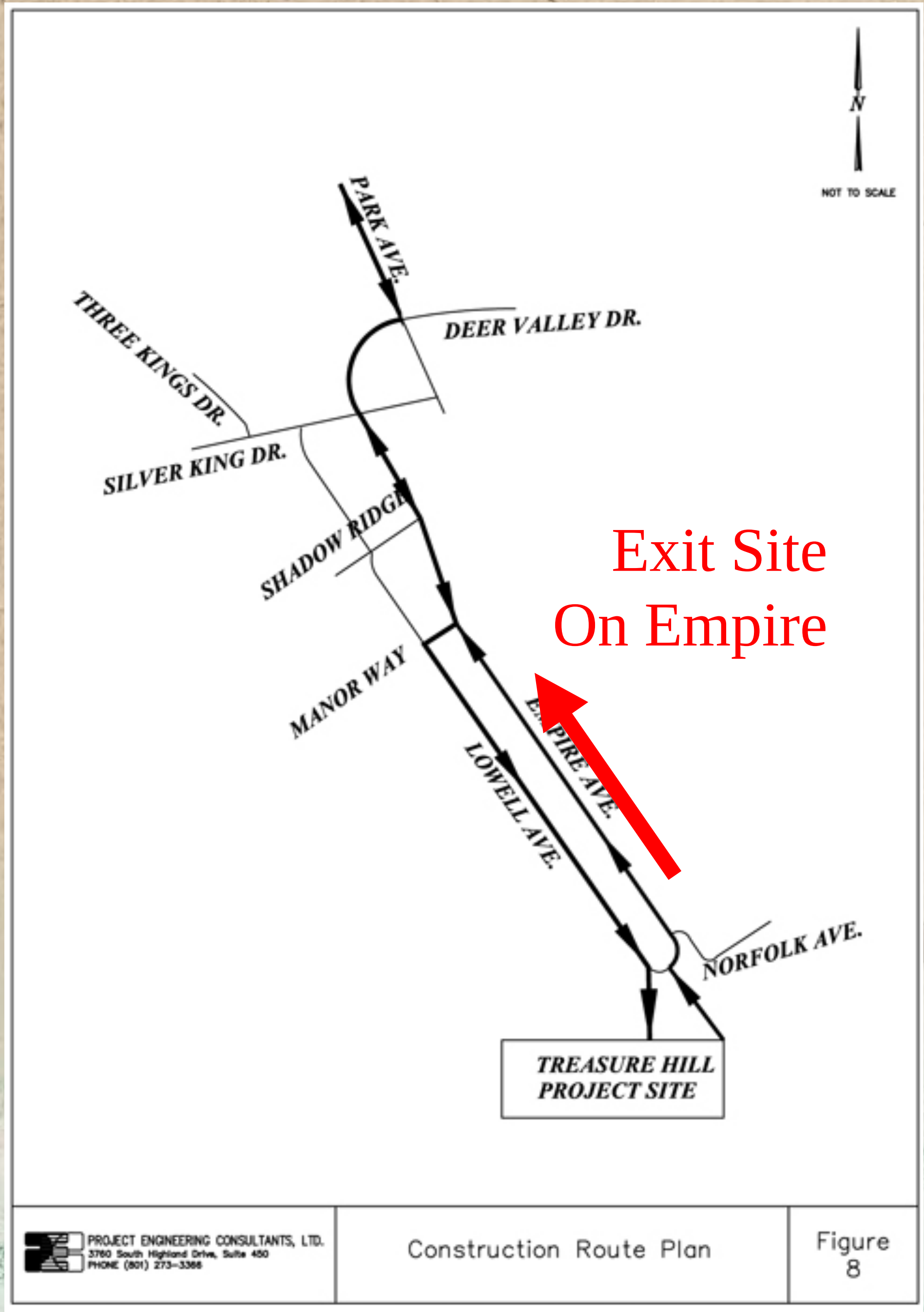
Clearly Defined Traffic Routes




BFI


SUBURBAN
CURVES

Clearly Defined Traffic Routes




PARKING
DODGE

A few Examples

WORKING AROUND MAJOR SEASONAL EVENTS

Major Area Events

<u>Sundance Film Festival</u>

January 20-30

<u>Park City Arts Festival</u>

August 6-7

<u>Park City Jazz Festival</u>

August 26-28

ENVRIOMENTAL CONTROL

Environmental Control Best Management Practices

- Erosion – all eroded soil stays on site
  - Cliffscaping as early as possible
  - Sediment burms
  - Silt fences
  - Street sweeping
  - Storm water pollution prevention plan
  - Road vacuum

Environmental Control Best Management Practices

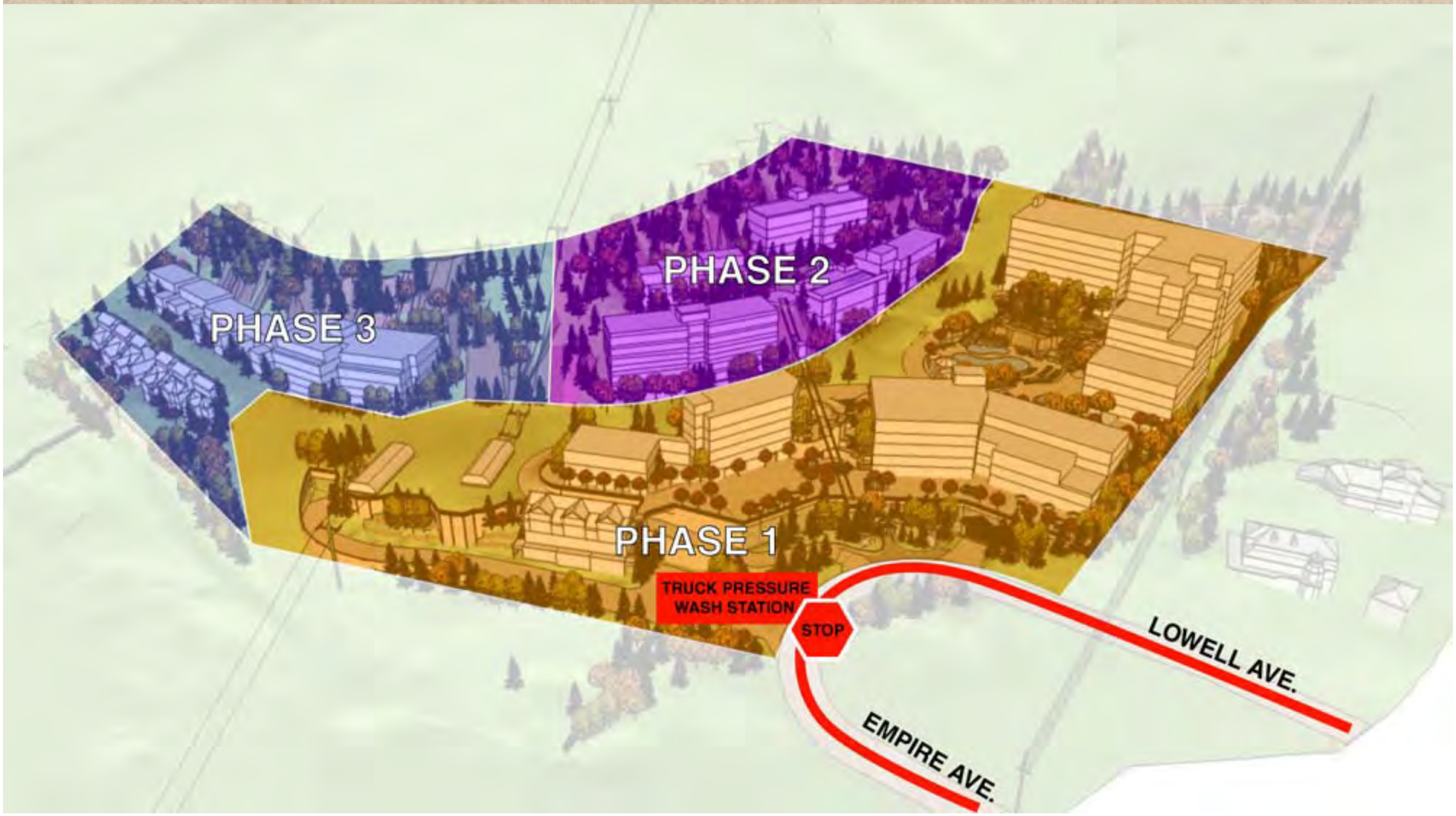
- Dust Reduction
  - Truck wash down
  - Rock barrier entrance
  - Water trucks
  - Air monitoring system

Environmental Control
Best Management Practices

- Noise Impact
  - Noise monitoring system
  - Defined hours of work

Environmental Control

- Truck Wash Station



Questions and Comments

- Project Phasing Plan
- Construction Staging
- Traffic Control, Patterns and Parking
- Seasonal Events Analysis
- Environmental Control

Treasure Hill

Park City, Utah

BIG-D CONSTRUCTION
www.Big-D.com

Treasure Hill

Park City, Utah

BIG-D CONSTRUCTION
www.Big-D.com

Big-D Construction Agenda

- Overall Circulation Plan
- Construction Personnel Shuttle Plan
- Communication with Neighbors
- Project Duration & Sequencing
- Site Fencing & Clean-up
- Keeping the Roads Clean
- SWPPP
- Safety

Overall Circulation Plan

- **One-way** construction traffic
- All construction traffic waiting areas will be **contained on-site**
- All materials to be **staged on-site**
- Visible **signage**
- On-site **Traffic Control Manager**

Overall Circulation Plan

Construction Personnel Shuttle

- **All** construction personnel will be shuttled to the site via bus
- **No** construction personnel will be allowed to park on Lowell or Empire
- **No tolerance policy**: Violators **will** be towed

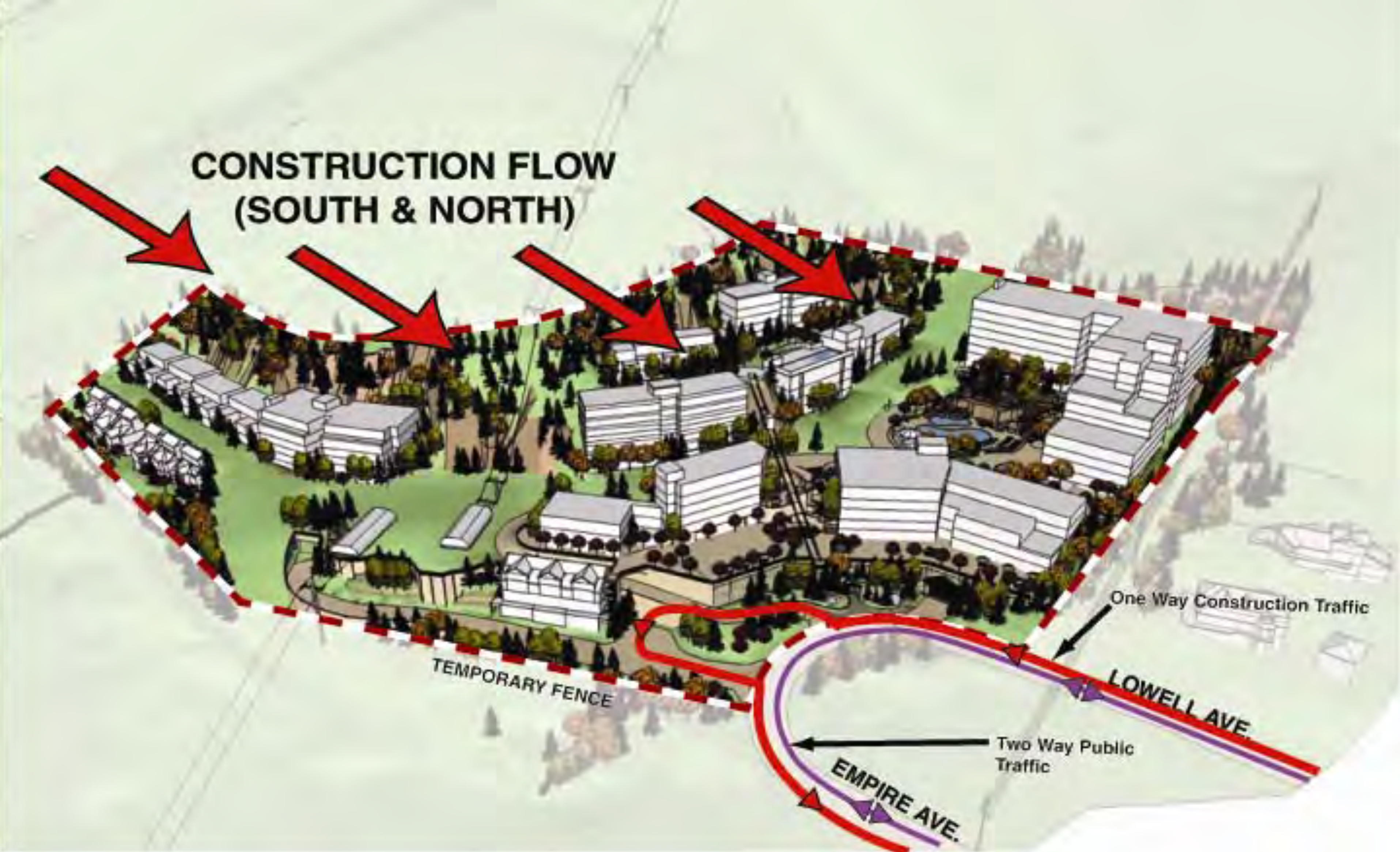
Communication with Neighbors

- **Newsletter**
- **Published** access plan
- Maintain online system **(Website)**
- Will establish **limited delivery hours**

Project Duration & Sequencing

- **Accelerated** construction schedule
- To begin at southeast side of the project site and **build our way** out of the site
- **Least impact** on neighbors possible

Construction Sequencing



Site Fencing & Clean-up

- **Aesthetically sensitive** site fencing
- **Secure** site
- Full-time **“Clean-up” crew** on-site

Keeping the Roads Clean

- Dust Control
- Truck wash down
- Gravel construction entry
- Water trucks
- Air monitoring system


CONCO
SAFETY PAYS
5687
SOAKER
WHEEL WASH
WW-02

SWPPP

- Big-D has adopted the **SWPPP program** to its protocol
- Sediment berms
- Run-off filtering
- **Site specific** mitigation plan

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SWPPP

Storm Water Pollution Prevention Plan

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Safety First

- **100%** hardhat policy
- Develop site specific **safety plan**
- **Weekly** site inspections
- Weekly toolbox **safety meetings** with subcontractors

Treasure Hill

Park City, Utah

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TREASURE HILL

PARK CITY, UTAH

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BIG-D CONSTRUCTION MITIGATION OUTLINE

- Overall **circulation**
- **Construction traffic**
- Construction **personnel**
- **Noise, hours, staging & deliveries**
- Communication with **neighbors**
- **Duration, sequencing & buffering**
- Site **fencing & clean-up**

OVERALL CIRCULATION PLAN

- **One-way** construction traffic
- Visible **signage**
- **Safe** pedestrian access
- Full time on-site **Traffic Control Manager**
- Close **coordination** with PCMR

PCMR COORDINATION PRINCIPLES

- **Contact** between PCMR Parking Manager & Site Traffic Control Manager.
- Delivery adjustments for time of year, time of day, weather & special events. **In general:**
  - Christmas – March:
    - No deliveries between 8:30 – 10:30 a.m.
    - No deliveries after 3:00 p.m.
  - Shoulder seasons more flexibility

OVERALL CIRCULATION PLAN

ESTIMATED CONSTRUCTION TRAFFIC

Count below represents the estimated PEAK construction activity

- 10 trucks/cars per hour including major deliveries and concrete pours.
- Big-D will command a just-in-time delivery schedule and **orchestrate** all major deliveries and concrete pours.
- During peak delivery periods, trucks will travel in sets of twos and be staged within the site, **NOT** on Lowell or Empire.
- Major deliveries will also require street flagging from the Park Avenue stoplight to the site.

CONSTRUCTION TRAFFIC THOROUGHFARE

TREASURE HILL
PARK CITY, UTAH

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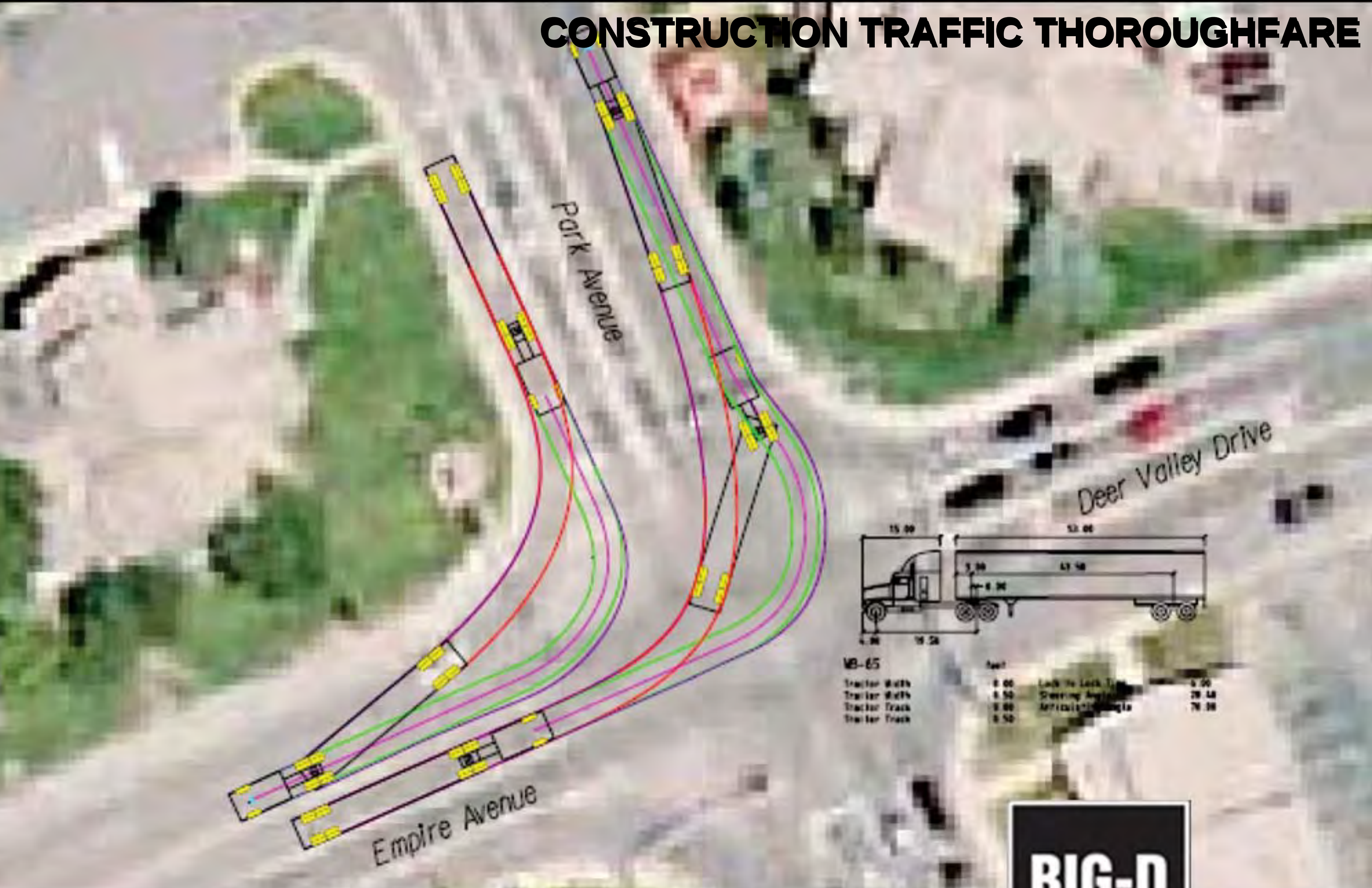
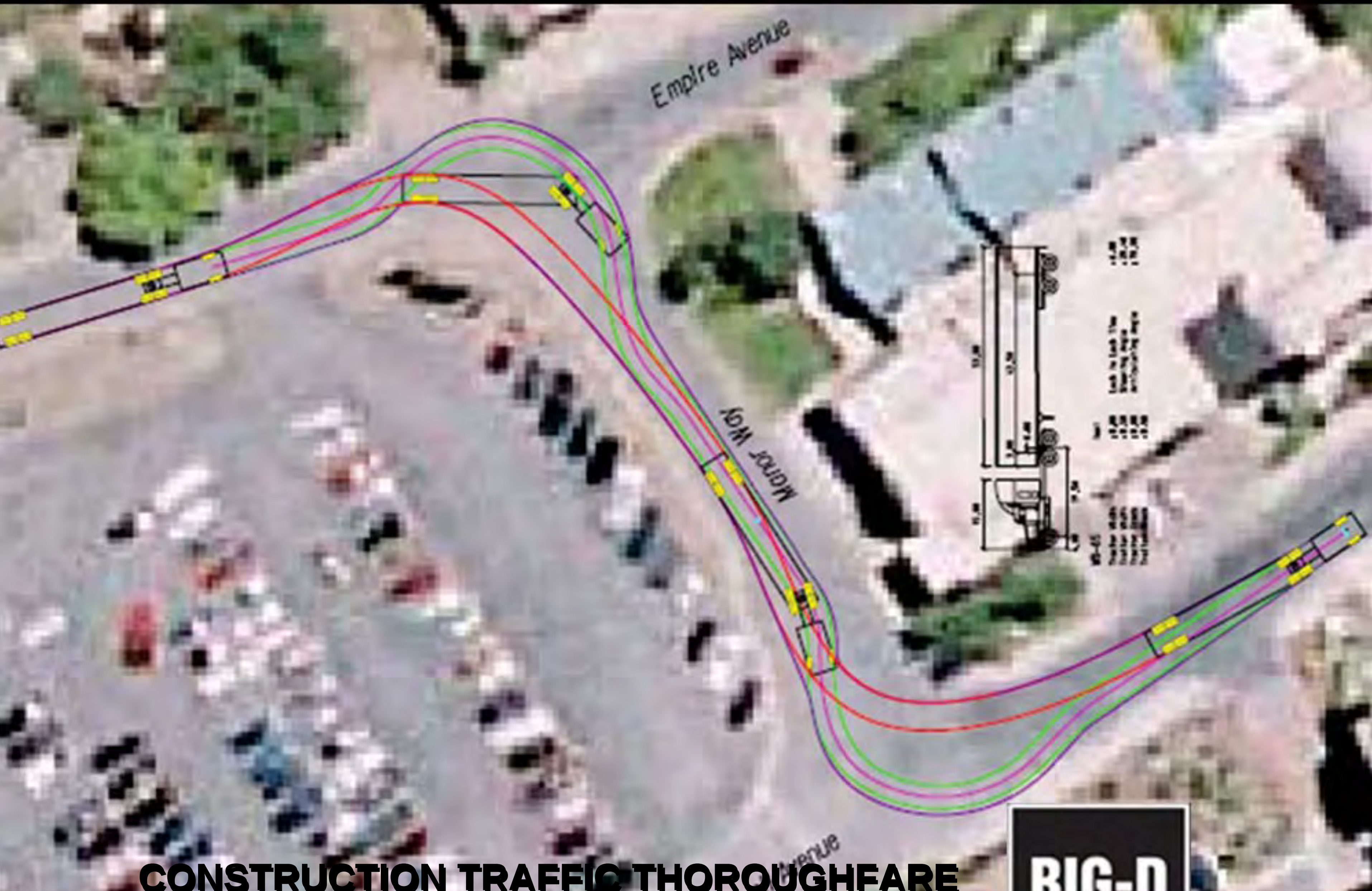
CONSTRUCTION TRAFFIC THOROUGHFARE





CONSTRUCTION TRAFFIC THOROUGHFARE

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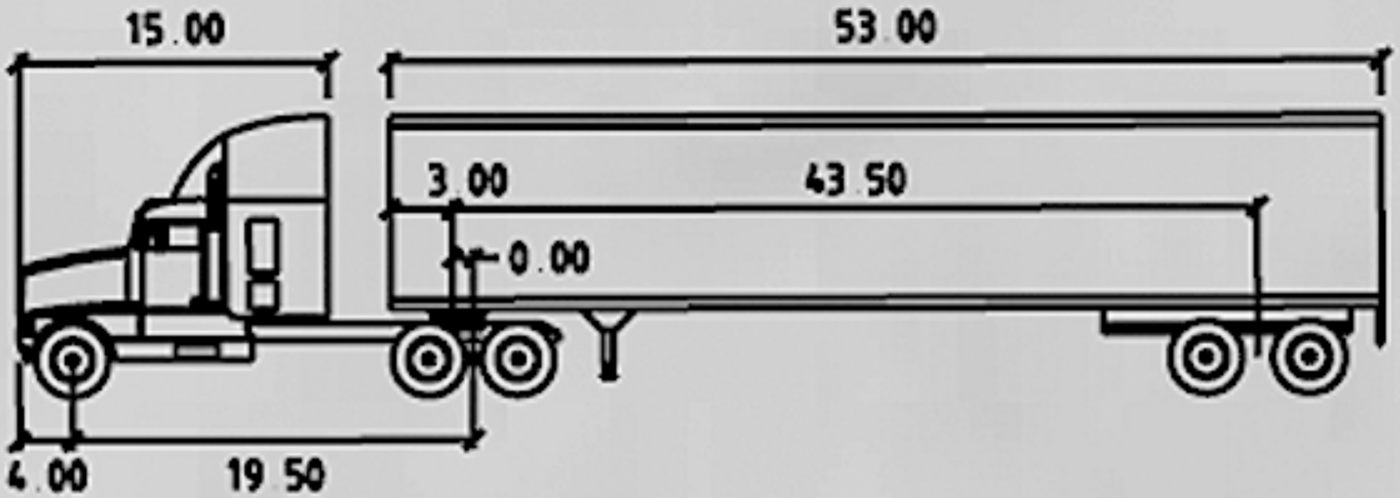
MAXIMUM TRUCK SIZE



WB-65 feet

Tractor Width	: 8.00	Lock to Lock Time	: 6.00
Trailer Width	: 8.50	Steering Angle	: 28.40
Tractor Track	: 8.00	Articulating Angle	: 70.00
Trailer Track	: 8.50		

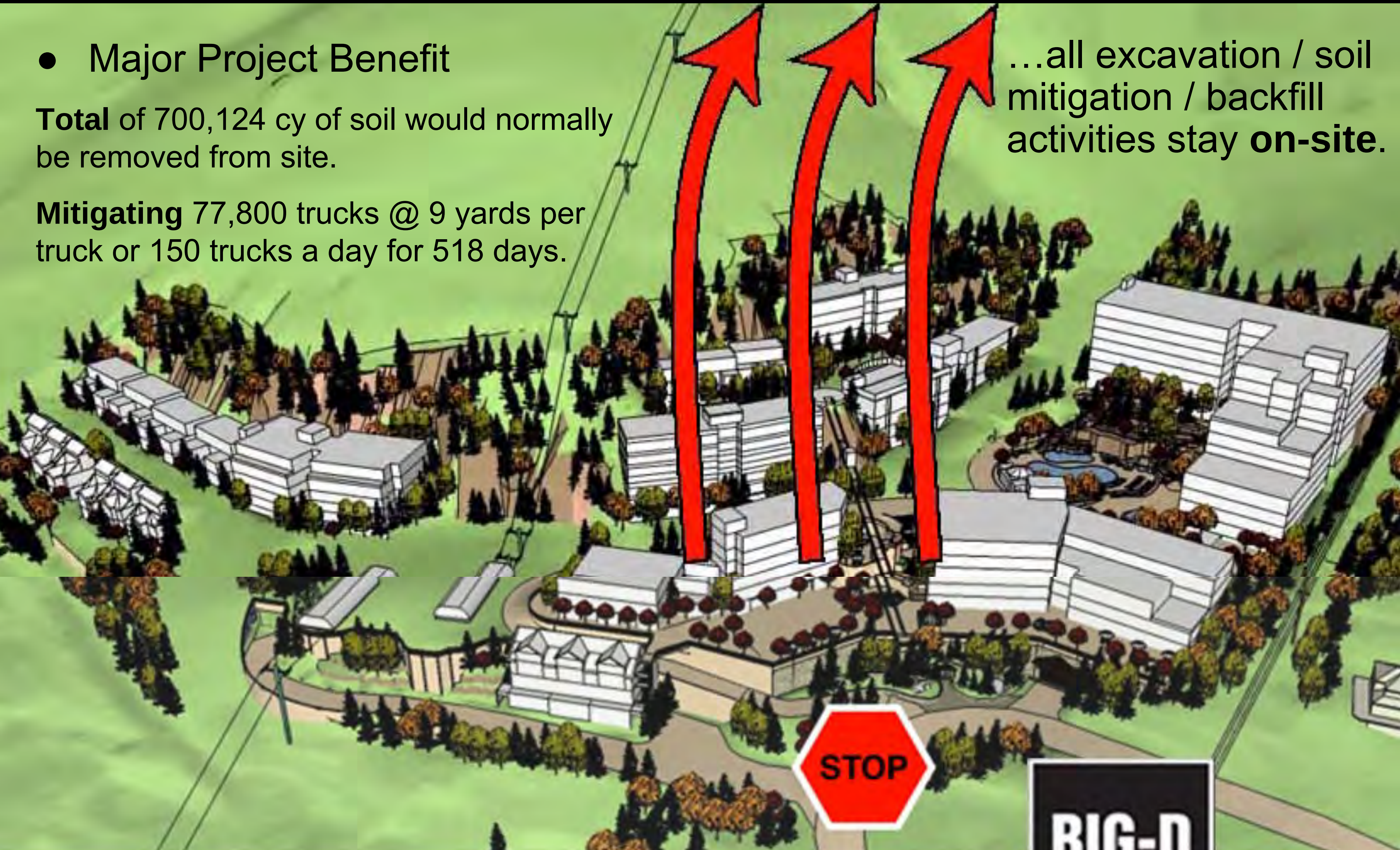
ELIMINATING CONSTRUCTION TRAFFIC

- Major Project Benefit

Total of 700,124 cy of soil would normally be removed from site.

Mitigating 77,800 trucks @ 9 yards per truck or 150 trucks a day for 518 days.

…all excavation / soil mitigation / backfill activities stay **on-site**.



TREASURE HILL
PARK CITY, UTAH

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PERSONNEL SHUTTLE – TRAFFIC MITIGATION

- *All construction personnel will be shuttled to the site via buses.*

No construction personnel allowed to park on **Lowell or Empire.**
No tolerance policy: Violators **will** be towed.

- Buses will hold an estimated 30 passengers.
- 6:30 – 8:30 am shuttles from remote parking locations to site.
- 3:00 – 5:00 pm end of day shuttles.
- Heaviest worker volume equal to 300 on site / summer months.
- Shuttling eliminates 300 potential vehicles per day to the area.
- Shuttles are included in 10 per hour PEAK count shown earlier.

MAJOR AREA EVENTS

SKI SEASON MAJOR HOLIDAYS

Limited deliveries

PARK CITY ARTS FESTIVAL

No deliveries

SUNDANCE FILM FESTIVAL

Limited deliveries

NOISE, HOURS, STAGING & DELIVERIES

Park City Codes & Policies

- **Noise** – Will comply with construction noise ordinance.

- **Hours of Operation** - The hours of operation are 7AM to 9PM, Monday thru Saturday, and 9AM to 6PM on Sunday.

- **Staging** - Construction vehicle staging will be restricted to the site so as not to block reasonable public and safety vehicle access along the streets and sidewalks.

- **Deliveries** - Deliveries of construction materials and supplies, including concrete, will be regulated as to time (hours of operation) and routing.

COMMUNICATION WITH NEIGHBORS

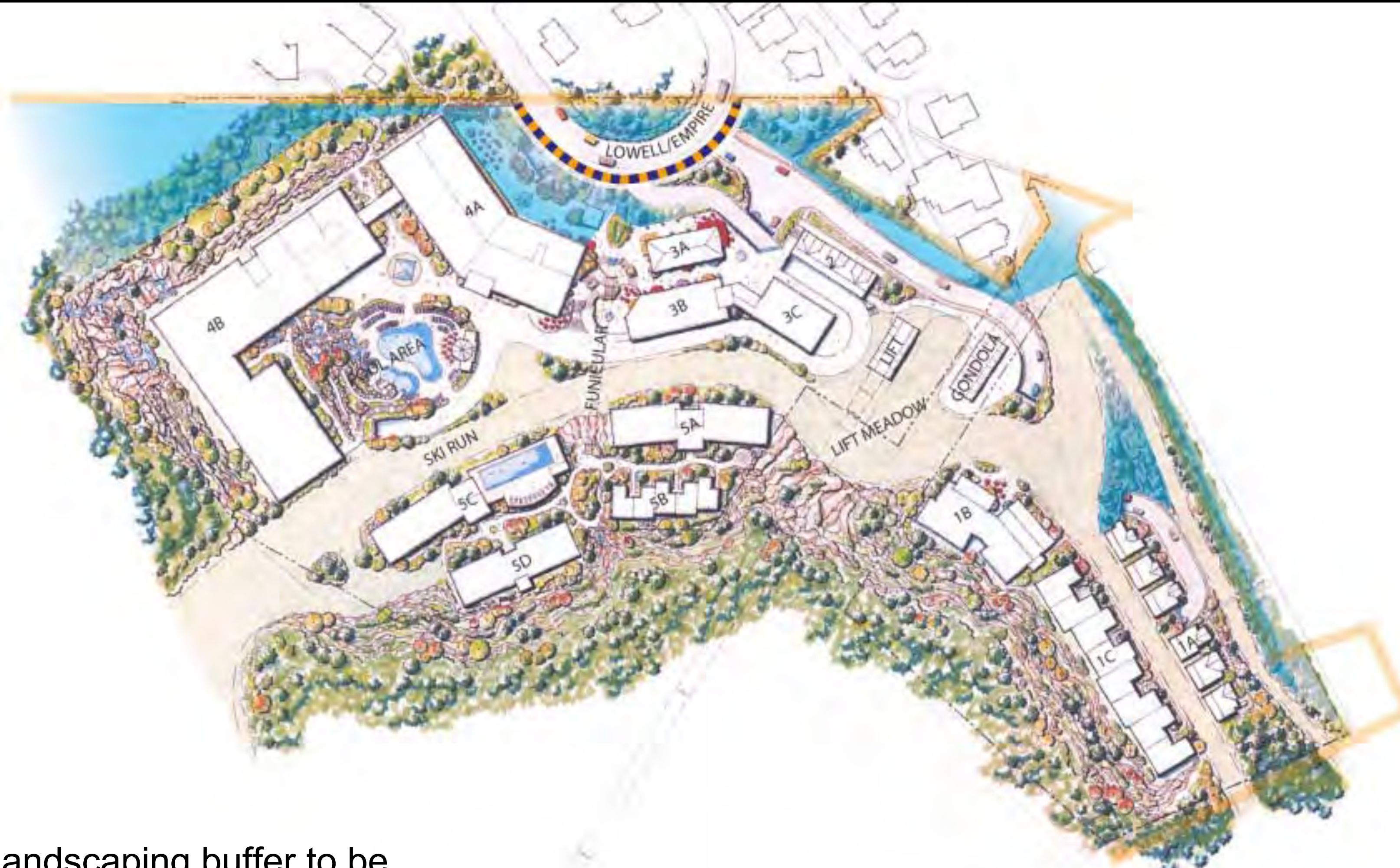
- **Newsletter** | monthly
- **Published** access plan
- **Website** | updated daily
- **Limited** delivery hours
- **Communication** Tree

DURATION, SEQUENCING & BUFFERING

- **4-5** year project duration
- **Accelerated** construction schedule
- **Orderly** construction sequence

The **sequencing** concept is preliminary and is expected to change based on final design, City approvals, and other factors that are yet to be determined. However, the goal of providing a finished landscape buffer on site for adjacent properties early on in the construction process is achievable. The required work should be done as quickly as possible to segregate the neighbors from on going construction. Road improvements around the Lowell and Empire switchback and the driveway to Building 1 should be completed including sidewalks, utilities, and public improvements, such as stairs, on a first priority basis.

CONSTRUCTION BUFFERING



Landscaping buffer to be entirely located on the Treasure Hill CUP property.

SITE FENCING & CLEAN-UP

- **Aesthetically sensitive** site fencing
- **Secure** site
- Full-time **“Clean-up”** crew on-site & off-site
  - Dust Control
  - Truck Wash-Down
  - Gravel Construction Entry
  - Water Trucks
  - Air Monitoring System


CONCO
SAFETY PAYS
THE
SOAKER
WHEEL WASH
5687
WW-02

TREASURE HILL

PARK CITY, UTAH

BIG-D
CONSTRUCTION

May 30th, 2017

Attention: Pat Sweeney
President, MPE Inc.
P.O. Box 2429
Park City, UT 84060

RE: Treasure Hill Construction Feasibility and Mitigation

At your request Big-D has reviewed the most recent Treasure CUP application materials. To recap, Big-D has been working with MPE Inc. on the Treasure Project located in Park City, Utah, since 2004 regarding its feasibility and mitigation of impacts on surrounding neighbors. We made detailed presentations before the Planning Commission on January 26, 2005, and January 11, 2006. These presentations addressed the topics of project phasing, staging, traffic, seasonal scheduling, environmental impacts, circulation, personnel management, communication with neighbors, project duration and sequencing, fencing and cleanup, SWPPP, safety, and other matters.

Big-D has extensive experience in constructing large complex projects similar to the Treasure Project. As part of analysis of these projects we employ a methodology of constructability, time frame, and impact estimation. Taking all of this into account, we conclude that the Treasure Project is buildable with an estimated timeline of 3-5 years in the general configuration of its present form.

A big part of what Big-D does centers around managing and decreasing the impact of construction on neighbors. The following are measures that can be implemented towards this goal in connection with the Treasure Project.

- Placement of excavated material on site (or above the site on the Park City Mountain) significantly reducing construction traffic.
- Construction fencing/screening/berming to maximize safety and minimize visual and noise impacts of construction on nearby neighbors.
- Aggressive revegetation and landscaping of areas closest to neighbors and relocation of the construction fence away from neighbors as the landscape improvements are completed.
- A controlled construction entrance.
- Construction staging and parking on site including a plan for material storage and laydown areas.
- Assignment and management of parking for construction vehicles and workers; depending on circumstances and working in line with City directed initiatives, parking workers off-site to be bussed in; prohibiting workers and construction vehicles from parking on nearby streets.
- Planned material delivery and truck travel routes with heavy construction traffic limited to Lowell Avenue in consideration of the recently enhanced road section engineered

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and constructed for this purpose; deliveries coordinated and scheduled for times that minimize disruption to neighbors and pedestrians.

- Scheduling of construction work hours and associated noise to ensure compliance with Park City ordinances and implementation of reduced hours and/or skeleton crews during busy holidays periods and special events.
- Employment of safety-certified flaggers for activities within public rights-of-ways that may interfere with normal flow of pedestrians or vehicle movement.
- Installation and maintenance of environmental protection (temporary erosion and sedimentation control facilities) in accordance with Best Management Practices.
- Employment of approved DEQ fugitive dust control measures including attentive watering of the work areas and other and dust control measures.
- If necessary, installation of a construction wash station on site to decrease tracking of mud and dirt onto City streets; removal of dirt and debris carried from the construction site on tires of vehicles to the street at the end of each working day.
- A project website to communicate schedules to neighbors as well as receive input from neighbors; availability of the construction superintendent to communicate directly with neighbors.

Big-D fully recognizes the forgoing measures will be part of an approved Construction Mitigation Plan which will be collaboratively developed in concert with the Park City Building Department based on final design and in advance of receiving a building permit as part of a detailed permitting review process. This plan will be monitored, improved as necessary, and employed during all phases of construction.

In summary, after careful evaluation of the Treasure CUP application materials, we are confident the Treasure Project can be constructed in a timely and safe manor while effectively mitigating impacts on surrounding neighbors and the City.

We look forward to further involvement in the Project.

Sincerely,

Cory R. Moore
Executive Vice President
Big-D Construction

TREASURE HILL

Blasting Analysis & Concrete Batch Plant – March 8, 2006

Blasting Analysis Conclusions

- *Blasting projects can be conducted safely and without causing harm to your home.*
- *Where appropriate, blast mats will be used to reduce fly rock, the surface wetted to reduce dust, and the latest noise reduction techniques used.*

- Any form of adverse affect to nearby homes from blasting activity is a very rare occurrence.
- Good communications with the neighbors living near blasting operations is of up most importance to the Applicant who also strives to be a good neighbor.

- *The best way to safeguard your home is with well designed blasts that reduce vibration potential. This includes monitoring vibration levels during every blasting event with a seismograph and by strictly enforcing all local and State blasting regulations.*

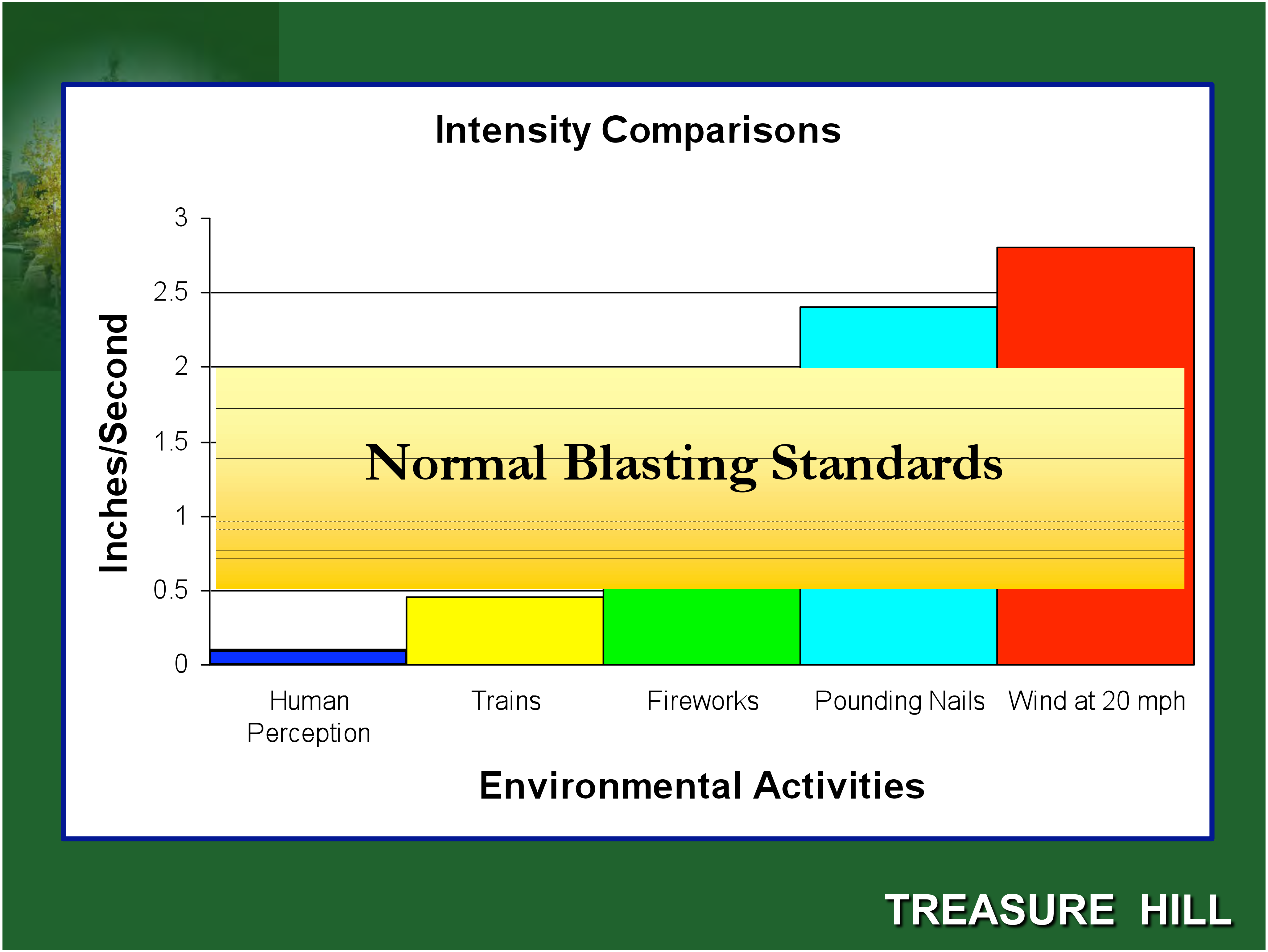
Blasting Analysis
Proposed Standards

- *Treasure Hill proposes limiting blasting to the hours of 10:00 a.m. to 4:00 p.m., Monday through Friday (excepting holidays) conforming to the following standards:*

- *Blast vibration shall not exceed 0.5 inches/ second peak particle velocity (ppv) (intensity of vibration), measured at or adjacent to the residential structure nearest the blast.*

- *Air-blast shall not exceed 0.007 psi (pounds per square inch) (linear, unweighted peak air-overpressure, 127dB), measured at or adjacent to the residential structure nearest the blast.*

- *Nearby residences will be offered a pre-blasting inspection free of charge to record the condition of their structure prior and post blasting.*



Intensity Comparisons
Inches/Second
3
2.5
2
1.5
1
0.5
0
Normal Blasting Standards
Human Perception
Trains
Fireworks
Pounding Nails
Wind at 20 mph
Environmental Activities
TREASURE HILL

Examples of Blasting

TREASURE HILL

Examples of Blasting

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Concrete Batch Plant Conclusion

- *An on-site concrete batch plant is not feasible nor is it in the best interest of area residents.*

- *See letter from Norm Anderson, area manager of Jack B. Parson Companies*

Hopper Bin

Loading Concrete Mixer Truck

Loading Hopper Bin

Conparison of Cement Delivery Truck
Versus Concrete Mixer Truck

TREASURE HILL

Bulk cement delivery, sand and gravel delivery trucks are 50 feet long, and with pup are 85 feet long, versus concrete mixer trucks which are 34 feet long. Batch plant building and silos approximately 40 feet high.

www.treasurehillpc.com

PLANNING COMMISSION
Staff Report

PLANNING DEPARTMENT

Planner: Patrick J. Putt
Subject: TREASURE HILL CONDITIONAL USE PERMIT
Date: March 8, 2006
Type of Item: Administrative

A large number of Planning Commission and public comments and questions were generated during the January 11 and February 8, 2006 Planning Commission public hearings on the Treasure Hill Conditional Use Permit. The comments and question were broad in topic and ranged from traffic circulation, street design and capacity, pedestrian safety, and construction mitigation. The applicant's and their project engineers, Project Engineering Consultants, have prepared formal responses to the questions/comments from the previous two Planning Commission meetings. The responses are attached.

The Planning Department recommends that the Planning Commission hold a public hearing to review and discuss the applicant's responses. Staff asks that the Planning Commission provide direction on the following matters:

1. Is there any additional information related to the previously submitted trip generation analysis that will be necessary for the Planning Commission to develop findings related to traffic considerations?
2. Are there additional off-site improvements beyond those proposed by the applicant that should be considered to mitigate project impacts?
3. Are there additional Construction Mitigation Plan impacts that have not been addressed? Staff met with the applicant on February 21, 2006 to review soils issues and the related impacts on the CMP. The applicants are expected to initiate a voluntary clean-up with the State Department of Environmental Quality. Pending finalization of that plan, the applicants will attempt to characterize related truck traffic in the "worst case" removal scenario.

Staff will return at an upcoming meeting with a formal analysis in the context of draft findings of the project's conformance to the project's approved Master Planned Development Parameters and Land Management Code—Conditional Use Permit Standards of Review for Planning Commission review and public hearing.

Attachments:

Responses to January 11, 2006 Planning Commission Meeting Questions and Comments

Responses to February 8, 2006 Planning Commission Meeting Questions and Comments

Project Engineering Consultants' Responses to Planning Commission Questions

Treasure Hill

Response to January 11th, 2006 Planning Commission Meeting Questions and Comments

Question or Comment:

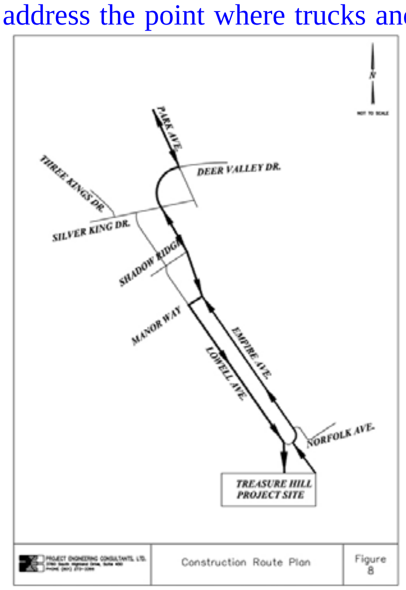
Commissioner Wintzer requested that the applicants address hours of construction and the days of the week they plan to work. He noted that the construction period is estimated to be five or ten years and he would like to understand what that means for the neighborhood in terms of lighting, gravel, or other things that might spill into the neighborhood. Commissioner Wintzer felt that construction mitigation is a bigger issue than traffic or fencing the project.

Response:

Hours of operation will be 7:00 AM to 9:00 PM (Monday thru Saturday) and 9:00 AM to 6:00 PM on Sunday (as required by Park City). Lighting, gravel, and debris from construction activities will be monitored and cleaned as appropriate. Neighbors will be able to communicate with the construction team in order to mitigate disruption. Construction period is estimated to be less than 5 years.

Question or Comment:

Commissioner Sletten asked that the construction traffic plan address the point where trucks and other vehicles will enter Lowell and the impacts it will have on the Resort and traffic in and out of the Resort.



Response:

Construction vehicles will travel upward along Empire (from Park Avenue), turn right on Manor Way, and then left onto Lowell (at which point construction traffic will become one way). The impact to the Resort will be fairly minimal, considering at the peak of construction (note this will not happen every day and every working hour per day) only an estimated 10-vehicles-an-hour will be introduced into existing traffic. Deliveries will be scheduled to avoid delivering during peak congestion hours related to resort traffic. Delivery hours will also be adjusted according to weather and other factors. The Big-D traffic manager will stay in close contact with the Park City Mountain parking manager. Based on the proposed construction mitigation plan and Park City Mountain Resorts past experience, Park City Mountain Resort does not see any major conflicts.

PUBLIC HEARING

Question or Comment:

Brian Van Hecke did not believe that anything presented showed the scope or scale of the project. Other developers show a streetscape with everything drawn to scale in relation to existing surroundings. Mr. Van Hecke requested that the applicant provide a streetscape and that it be published in the paper and other places for the public to see. With regards to construction traffic and traffic in general, Mr. Van Hecke stated that the roads are not safe and it gets worse each year. He believes the City has a legal responsibility to provide safe pedestrian access. Mr. Van Hecke noted that the meeting on January 25 is right in the middle of Sundance. He requested that Treasure Hill be re-scheduled to the following meeting since many people who would like to comment prefer to stay away from Old Town during Sundance.

Response:

The applicant disagrees. Applicant has provided cross sections (computer and hand drawn), photo renderings, computer 3D stills and computer animations all to scale of the Project. Applicant will revise and augment these with the latest proposed elevations, grades, and volumetrics and with an additional section along the northwest edge of the Project and additional photo viewpoints and computer animations. These materials will be made available for viewing and downloading at www.treasurehillpc.com and quality copies will be provided to the City. Construction mitigation is addressed elsewhere.

Question or Comment:

John Helton, a resident on Norfolk, felt it was logical to put all the tallest buildings towards the back and away from the small houses in the neighborhood. Mr. Helton noted that everyone, not just the neighbors, will be impacted by construction of this project. Because it is in a canyon, everyone in town will be hearing beep, beep, beep for five to ten years. Mr. Helton remarked that the roads are narrow and steep and he cannot imagine construction trucks maneuvering those roads during the winter. Once the project is completed, there will be bumper to bumper traffic on Lowell and Empire Avenues. Mr. Helton felt it was not a good gesture for the applicant to refuse to let them buy down the density. He believed that somewhere there must be a precedent set for keeping something that was approved twenty years ago from going into a town where it would never be approved today.

Response:

"Beep! Beep! Beep!" *It's a sound that saves lives. Unfortunately, it can also be annoying. Therefore, we will ensure that this noise is only produced — and more importantly, heard — during accepted working hours (per Park City ordinances). Big-D is also taking every precaution to make construction vehicles less obtrusive. Measures include: establishing a one-way road, flagging, providing traffic control personnel at every major intersection during substantial delivery periods, and limiting the* *amount of vehicles to (two at a time) driving up Lowell and Empire and the number of deliveries to ten per hour. There will be no bumper to bumper traffic after the Project is completed. All of the traffic studies done on the site concluded there will not be a degradation of level of road service during or after construction. This is due to significant traffic mitigation factors including the cabriolet, walkways, ski-to-ski from, etc. and Treasure Hill Project designed to be pedestrian orientated to Main Street as opposed to PCMR Base.*

As part of the 1986 Master Plan approval Applicant cut its density by 50 percent. In addition it is giving the City 97 percent open space on the property. Applicant believes it has done more than its fair share of reducing density and providing quality open space for the City.

The master planning process with extended time periods and approval criteria is a time tested process used by municipalities throughout the country. Park City is no exception. Applicant was given an extended period of time to develop its property under very specific guidelines. Applicant has complied 100 percent with every aspect of that master plan approval process to date. It is similar to the master plan approval process for Deer Valley.

Over the years there have never been any bona-fided <u>offers to buy</u> density from this project even during times when the Sweeneys were actively pursuing such offers. At the present time the applicant does not have any obligation to sell density. Furthermore the project approved density is necessary to construct and maintain the proposed infrastructure. Most importantly the project's bed base is critical to Main Street. One City major goal is to maintain Park City as a destination resort community of which Treasure Hill is an integral part. City codes and goals encourage long term planning.

<u>Question or Comment</u>:

Bret Fox, a resident at 1226 Lowell Avenue, realized that the development rights have been granted for twenty years, but he felt a lot has been done on false premise. He noted that throughout the 1990's the plan being promoted by the Sweeney's was a much smaller scale project. It did not include any of the large buildings and the density was less. Mr. Fox felt it was a slap in the face for the Sweeney's to hand out plans for one project in the 1990's and try to pass off this project now. He felt it put the City in a bad position because if that was what everyone was expecting, Empire and Lowell Avenues were not built to support this type of structure. Mr. Fox presented photos of traffic jams every time delivery or construction trucks try to go up the road. He stated that Big D is a great construction contractor but they are not a great neighbor. Mr. Fox noted that Big D is building a 6,000 square foot structure one house away from his and he outlined a number of impacts and issues related to constructing this building. It is a noisy dirty construction site and they will experience the same issues with the Treasure Hill project for five or ten years. Mr. Fox stated that if the Sweeney's were building what they proposed throughout the '90's it would not be a problem and they would not be attending so many meetings.

Response:

As part of the Town Lift Bridge approval process in the mid 1990's, the Applicant was asked by the City if there was an acceptable alternative to the approved Treasure Hill portion of the Master Plan. The Applicant provided an alternative plan for discussion showing less density consisting of a number of single family homes spread out over the hillside on a road system with a cluster development at road's end. At that time there was zero support from the City Staff, Planning Commission or City Council for this alternative. They made it crystal clear that they preferred the existing Master Plan. Therefore the Applicant did not pursue the idea. Mr. Fox's *allegation that the Applicant acted in bad faith and on false premise is simply not true. The approved master plan with respect to this Project has not changed since its approval.*

In 1986 City Council determined that Empire and Lowell Avenues would be the access to Treasure Hill. All of the traffic studies done to date confirm that the existing roads at their current widths are sufficient to accommodate the additional traffic from Treasure Hill with no degradation in traffic service.

Big-D strives to be a good neighbor. The project mentioned above has extremely limited space (no lay down areas, no access, no construction traffic waiting areas, no space between neighbors). Treasure Hill is completely different in that it has ***none*** *of these problems. Therefore, the impacts and issues related to noise, dirt, and general nuisance are more easily managed and mitigated.*

Question or Comment:

Kyra Parkhurst, a resident on Empire Avenue, stated that just this week she witnessed a pedestrian being hit by a car and it happened to be on garbage day. Ms. Parkhurst noted that no one has considered the fact that on Thursday all the garbage cans sit on the road. She wondered where the traffic will go on garbage day. She asked if Big D Construction would give hard hats to all the neighborhood kids who have to play in the streets because they do not have yards. Ms. Parkhurst wanted to see an estimate of how many dump trucks, concrete trucks, etc. are expected each day once they begin construction. She expressed concern about traffic, parking, pedestrians and all other safety issues and suggested that the project be re-considered.

Response:

The residences and others who drive Lowell and Empire Avenues on Thursday will continue to use Lowell and Empire Avenues notwithstanding Thursday trash pickup. There are small yards in that neighborhood and large play areas nearby (Library and City Park). Although Big-D will be always on the look out for children in the street, there are better alternative play areas. As detailed above, the very peak of construction (peak construction does not occur every day during the construction of Treasure Hill Project) will only introduce up to an estimated additional 10 vehicles per hour into traffic (including dump trucks, concrete trucks, cars, etc). Average traffic-per-hour will be significantly less than this. The highest priority will be the safety of children, pedestrians, and employees working and living around the site. A detailed safety plan will be discussed with neighbors and formally implemented.

Question or Comment:

Peter Barnes agreed that everyone could benefit by seeing the project from a streetscape perspective. They might find that the large buildings towards the ridge disappear because they are blocked from the street level by the smaller buildings in front. Mr. Barnes stated that he is building a house for a client who will be the nearest neighbor. He was concerned about their ideas for the first 20 feet of height and how it relates to the pedestrians and the neighborhood. He felt it should be treated as the front of the building and he wanted to see an illustration that addresses their intention for that portion. Mr. Barnes believes they intend to make it the front; however it would help if the neighbors could be reassured with evidence to that fact. Regarding construction mitigation, Mr. Barnes stated that information contained in the Staff report and on the website indicate a red dot marked employee drop-off. They have always been concerned that the crescent shaped property on the opposite side of the road would become a bus stop and he will do everything possible to make sure that does not happen. Mr. Barnes remarked that in addition to hearing beep, beep, beep, they will also be hearing bang, bang, bang when they begin blasting through solid rock. He asked the applicant to acknowledge that this would happen and to explain whether or not it will be an issue. Mr. Barnes stated that while he was looking at the excavation, he was sure that the drawings showing the excavation of the tallest building showed grading off-site and crossing over the property lines. He was curious as to whether or not that was the case.

Response:

Mr. Barnes client will not be the nearest neighbor. Nonetheless, we agree everyone will benefit from more work on the streetscape perspective. As noted above, more material will be provided to address the height and it relates to pedestrians and the neighborhoods. As shown the employee drop off label has been moved to more accurately reflect the location for employee drop off. As stated in various Planning Commission meetings, all traffic, drop-off, material delivery and staging takes place within the confines of the jobsite; no construction drop-offs or deliveries will be allowed off-site.

With respect to the crescent shaped property, it is a buffer zone to the Project and the Applicant is not planning on nor requesting it to become a bus stop.

It is anticipated that it will be necessary to blast. Per the Park City code, neighbors will be notified of blasting times, and will be informed of planned blasting. With today's explosive technology, blasting can be done safely, quietly and not damage surrounding property or near by structures. Please see the attached blasting analysis.

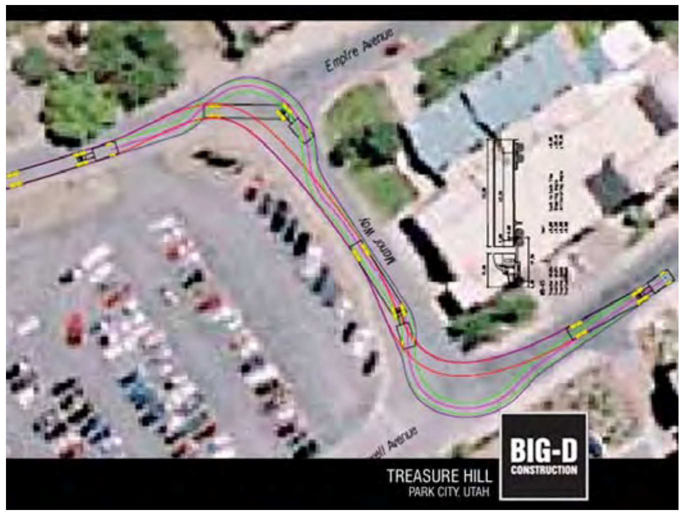
Mr. Barnes is mistaken with respect to excavation going off-site and crossing over the property lines. The development of the Project is confined to the Project's property boundaries.

Question or Comment:

Mike Allred, a resident on Empire Avenue, echoed his support for all the previous comments. Mr. Allred referred to an isometric of the project that the applicant presented this evening. Projects he has built in Old Town were critically reviewed by Staff and it took months to achieve the appropriate height, architecture, colors, etc. to make everything consistent with the feeling of Old Town. Mr. Allred did not believe this project could be approved without reviewing a significant amount of architectural work way beyond the showing of the volumetrics. He felt it was critical for the Sweeney's to present the actual architecture of the structure prior to approval to show how this enormous development will keep with the feeling and the texture of historic Old Town. Mr. Allred noted that construction traffic was shown coming up Lowell Avenue and leaving on Empire Avenue. The reality is that Lowell Avenue in front of the Park City Mountain Resort is unavailable. This means that all the traffic entering this construction site has to enter initially on

Empire Avenue and turn on tiny Manor Way before going up Lowell Avenue. Mr. Allred felt that Park City Mountain Resort needs to put Lowell Avenue back on the table so it can be used as an access to this project. He has the greatest respect for Big D Construction and he has watched their projects throughout his years as a general contractor. He believes the safety issues are not on-site. Their concern for safety and everyone's liability should be on the street. Mr. Allred referred to a previous comment from Commissioner Thomas and agreed that no one has yet shown how they intend to separate the vehicles from the pedestrians. He felt that Big D Construction's major concern should be what happens to the pedestrians when construction vehicles leave the site.

Response:



This Project has been critically reviewed by Staff and the Planning Commission for the past three years and is into the fourth year. We agree that architecture needs to be reviewed in more depth. However, we disagree that it has to be now. We have requested that as a part of the CUP approval the architecture be reviewed in depth and approved by the Planning Commission at a later date.

The possibility of construction traffic on Manor Way has been studied by the traffic engineers, and is compliant with City code and will be managed appropriately. As previously addressed, Big-D will deploy a full-time traffic control manager and a full-time safety director onsite. All major deliveries will be planned and prepared with an emphasis on safety. By way of repetition; major deliveries will receive flaggers and traffic control personnel at each intersection from Park Avenue to the site, and incoming and outgoing traffic will be controlled. Vehicles and pedestrians will be handled the same way they are handled throughout all of Park City. The City is responsible for overseeing management of pedestrian and vehicular traffic. Citizens are responsible for obeying the City ordnances and codes with respect to traffic and use of City roads.

<u>Question or Comment</u>:

Mary Whitesides, a resident at 812 Empire Avenue, stated that she is within 125 feet of this project and it will be right behind her house. She echoed Mr. Van Hecke's comment about seeing schematics that show the scale of the project to the neighborhood and to Old Town. She felt it was important for these drawings to be made public and published. Ms. Whitesides addressed a comment made by the developers in an article by Ann Bloom. In that article they called the neighbors selfish and said they were jumping on the traffic issue and preventing the Sweeney's from enjoying their property. She believes it is much more than traffic. The concerns are about density, environment, compatible architecture, view sheds, light pollution, noise pollution, safety, traffic, and inconvenience. Ms. Whitesides stated that this commercial project is not being built in downtown Old Town or at the Resort where commercial projects exist. It is being built in a neighborhood where people live and work everyday. She works at home and is very concerned about the noise and dirt in her backyard that will go on from five to ten years. In addition, without a plan to make the streets wider, she was unsure how they could handle the increased traffic.

Response:

See response to Mr. Van Hecke above. We agree with Ms. Whitesides. There are concerns, in addition to traffic, including density, environment, compatible architecture, view sheds, light pollution, noise pollution, safety, and inconvenience. We have spent over three years reviewing these. We disagree with Ms. Whitesides with respect to the Project "is not being built in downtown Old Town". The Project is an important part of the Old Town Resort Base. Most of the homes that abut up to the Project are not primary residences. Please, see responses above concerning noise, dirt, built out time of Project and traffic concerns.

Comments from Commissioners and Staff:

Planner Whetstone remarked that the applicant has requested a separate architectural review of this project as a conditional use to be considered by the Planning Commission. The applicant has valid concerns that if they do a detailed architectural design of this project and there is an appeal process, the process could be lengthy and by the end the hotel operator could change and the plans may be outdated. They have had this experience with Deer Crest and the Staff has reviewed the architecture four times. Planner Whetstone named a number of projects that were given an approval on volumetrics, site planning, and general massing and bulk. She noted that the architecture is usually specific to a hotel operator. Planner Whetstone suggested that language could be drafted to guide the architecture for compatibility surrounding structures. The Staff recommended that the Planning Commission consider this as a separate conditional use permit to address architecture, materials, landscaping, retaining walls, and other details. Planner Whetstone agreed with Mr. Barnes that it would be good to see the streetscapes from the perspective of massing and volumetrics.

Planner Whetstone requested that the Planning Commission provide input on separating the architectural component, as well as massing, the heights, and the volumetrics based on the presentation. After reviewing the revised plans presented, the Staff is confident that the plans are in compliance with the master plan in terms of height and massing. In response to comments about making the plans available to the public, Planner Whetstone recommended having a notebook with the all the plans and various information available at a general location such as the library. Plans are always available at the Planning Department, but construction around the Marsac Building makes it difficult to get there.

Commissioner O'Hara felt that conceptually it is a good idea to separate the architectural review but he was having a hard time understanding how this could be done. Mass and scale by themselves are out of context and architecture brings them into context. Commissioner O'Hara did not want to establish mass and height in a way that would prohibit the architect from coming in with a better architectural design. He believed that architecture will drive this project more than anything else. He did not oppose having the architectural review as a separate CUP as long as they can find a way to give the architectural review some leeway with height and mass to achieve the best design possible. As a part of discussing the mass and height issues, Commissioner O'Hara felt they should set new vantage points in town to judge this project. It is the largest project they have ever looked at and it deserves the same kind of review that smaller projects have undergone.

Planner Whetstone recalled that during the Town Lift project, the City Council formed the Town Lift Design Review Task Force consisting of representatives from the Historic District

Commission, the Planning Commission, and architects. The task force drafted design guidelines specific to the project and she suggested that the same could be done for the Treasure Hill project.

Commissioner Sletten favored bifurcating the architectural review, but he did not want it distanced so far that they could not take into account the relationship of the architecture to the volumetrics when the final plan is submitted. Commissioner Sletten remarked that ultimately it may not be the same hotel operator or the same general contractor who builds this project. Therefore, they need to make sure that construction mitigation issues and other things are absolutely tied down so whoever builds this project is tied to the same requirements.

Commissioner Volkman was not opposed to architectural separation and believed it deserves that kind of attention. He was still not satisfied with the volumetrics and intended to address those later in the discussion.

Vice-Chair Thomas was comfortable with separating the architectural review.

Commissioner Wintzer agreed that separating the architecture is a good idea. However his pet peeve with most of these large projects is that as they get further along the developers find that they cannot always deliver on their promises. He felt this issue needs to be addressed to make sure the promises made are realistic.

Commissioner Wintzer commented on volumetric and massing. He felt it was hard to get an idea of the massing without having the existing buildings drawn to scale. He assumed that based on the Staff report, the applicant is within the guidelines of what has already been approved. Commissioner Wintzer appreciated the fact that the Sweeney's tried to move the massing around and step back the buildings. He wanted to see a more accurate relationship of the project to the existing height of the trees or the surrounding buildings.

Vice-Chair Thomas stated that he was still uncomfortable with the northwest corner where the largest massing occurs adjacent to the residential neighborhood. This is a very brutal edge and he was uncomfortable with the impact is has on the quality and scale of the adjacent neighborhood. Vice-Chair Thomas felt the applicant had made positive steps towards mitigating the mass; however it is still a very vertical and contrasting form next to the scale of the residences. He requested that massing be looked at from massing above grade and below grade because it has ramifications to the excavation. That same corner has ten stories of underground structure below grade which is a substantial cut into the earth. Chasing that cut up the mountainside was a grave concern to him. Vice-Chair Thomas understood that the master planned development supports pushing the massing into the corner; however he thinks they need to look at the conditional use permit and how it impacts the neighborhood. He is still looking at the criteria in the conditional use permit that suggests doing a comparative analysis to the immediate neighborhood. Vice-Chair Thomas felt that massing throughout the rest of the project works well. If he could re-wind the MPD he would put more of the massing towards the center and step the building up from the sides.

Commissioner Volkman felt they could run into the same issue with volumetrics and massing that Commissioner O'Hara worried about with architecture. He hated to set the volumetrics and massing in stone when the hotel operator will probably want to do something different. Commissioner Volkman wondered if there is a way to recognize a certain amount of density, height, and volume to buildings without being too specific.

Director Putt stated that because they are in a conditional use permit process, which is based on identifying whether or not the particular aspects of a project work, they have to specify the volumetrics, keeping in mind that volumetrics and the building envelopes represent the maximum extent that a building can be built. Director Putt felt there was certain wisdom in coming back for final details once they have a known hotelier who will be building a known product. Director Putt asked the Planning Commission if there are other ways that the Staff and the applicant could convey the necessary information to help them address the context question.

Commissioner Volkman did not believe that the massing and volumetrics presented was the best for the site. He was also concerned about the height on the upper north side. It is too tall for being so close to single family residences in the Old Town neighborhood. Commissioner Volkman wanted to see pedestrian vantage points that could provide a better idea of how this will fit into the context of the neighborhood.

Commissioner Sletten agreed that it is hard to make decisions without having the drawings in scale with the surrounding community. He stated that without having the volumetrics set in stone, it is impossible to judge the relationship of the proposed buildings and its impacts on the neighborhood. Commissioner Sletten concurred that the volumetrics needs to be specific and he encouraged the applicant to come up with models that show to scale the impacts of those buildings to the streetscape and the surrounding neighborhood.

Commissioner O'Hara believed that the height and massing conforms to the MPD. Given the constraints of the MPD, he felt that most of the layout is as good as they can get with the exception of the northwest corner where they have a shear wall. Commissioner O'Hara hoped to see another iteration that demonstrates some kind of scale to the neighborhood. Based on his reading of the Land Management Code, he interprets "neighborhood" to mean the neighborhood of Old Town and the incorporated zones rather than the homes.

Director Putt summarized that the Planning Commission is willing to separate the specific project architecture to come back for own its review for approval. The Planning Commission still has lingering concerns about the building massing, particularly those areas on the north and west side adjacent to the existing homes. Director Putt clarified that the Planning Commission would like the Staff to work with the design team and the applicant to look at other possibilities to convey the modeling of the project. This should include key vantage points to show what the project will look like at the street level. Director Putt agreed that the parking situation on January 25 could present a problem for the public and it may not be the ideal meeting to continue discussion of the Treasure Hill project.

Commissioner Volkman suggested that the Commissioners email their ideas for key vantage points to Director Putt.

Commissioner Wintzer remarked that if they choose to separate the architecture from the volumetrics, they should include language that addresses architectural guidelines. Director Putt agreed and explained how this was done for other projects that separated the architectural review.

Vice-Chair Thomas called for discussion on construction mitigation.

Comments:

Commissioner Volkman felt that the public who spoke this evening offered great ideas. The applicant showed an example of what Big D Construction does during construction, but he wanted more specific details in terms of anticipated trip generation each day from large delivery vehicles and whether there is any seasonality to their plan. Commissioner Volkman needed a better idea of how constructing this project will impact the neighborhood.

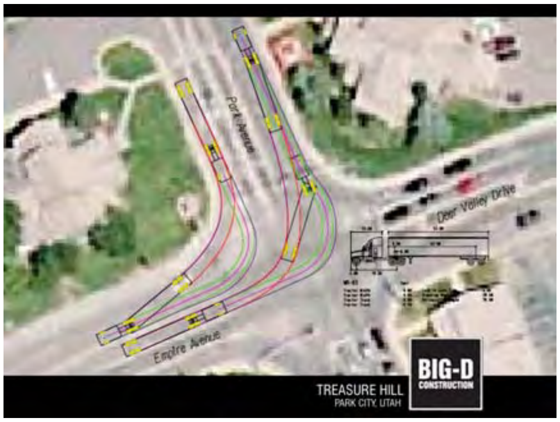
Commissioner Sletten reiterated his earlier comment that access issues with the Resort need to be resolved before this could work.

Commissioner Wintzer stated that the construction mitigation plan needs to start on Park Avenue and work all the way up. It is a safety issue that goes way outside of the construction area and it needs to be addressed with the City. Commissioner Wintzer remarked that he would also like to know the number of trucks per day, the size of the trucks, whether they can make the turns, etc.

General Response to Discussion on Construction Mitigation:

Big-D is taking numerous measures to reduce annoyances and to increase public safety with regard to construction traffic. In review, construction traffic will flow one-way on Lowell and Empire, reducing overall congestion. Signage will be installed for pedestrians, local traffic, and construction traffic to ensure smooth traffic thoroughfares. A full-time safety and traffic control manager will be assigned to the project, on and off-site. Employee drop-off and material deliveries will be conducted within the jobsite; and at the height of construction, this will include an estimated 10-trucks-an-hour (although far less are expected on average). All construction will be planned and orchestrated; if road congestion emerges due to regular traffic, construction traffic will be suspended until the congestion is relieved. Traffic controllers and flaggers will accompany major deliveries from Park Avenue to the site. All construction personnel will be dropped-off by bus, which eliminates hundreds of vehicles and reduces the employee traffic tremendously.

There will be seasonality to construction. For example, reduced traffic during winter months and construction deliveries limited during major events such as Sundance Film Festival, Arts Festival and a few key holidays. Constant communication with neighbors will occur to ensure that their concerns are addressed. This includes publishing a newsletter, as well as clearly designating the available lines-of-communication. In addition, cleanliness will remain a top priority, especially with regard to mud, dust and debris that may affect neighbors. (With such a large site, this will be much easier than some other projects in town.)



(Please see construction-turning radius for Manor Way and Park Avenue included.)

MOTION: Commissioner Volkman moved to CONTINUE this item to the first meeting in February. Commissioner O'Hara seconded the motion.

VOTE: The motion passed unanimously. Commissioner Zimney abstained from the vote.

Mr. Sweeney asked if it would be possible to discuss traffic issues and construction mitigation at the January 25 meeting. After further consideration, the majority of the Commissioners stated their willingness to discuss construction mitigation on January 25. Mr. Sweeney offered to post information on the website in advance of the meeting so the public can review it and comment in writing if they cannot attend the meeting that evening. Mr. Sletten requested that Mr. Sweeney obtain a statement from the Resort on how they intend to deal with construction traffic and skiers at the same time. Vice-Chair Thomas favored the idea of making drawings and information available at the library for public review.

February 20, 2006

To: Mike Sweeney & The Sweeney Brothers, Park City Planning Commission and Other Interested Parties

Subject: Possibility of placing an on-site concrete batch plant at the new Treasure Hill project

Hello, my name is Norm Anderson and I am the Area Manager for Jack B. Parson Companies who produces and delivers ready mix concrete in the Greater Park City and Heber City areas. I have 26 years of experience with ready mix concrete, having moved to Park City ten years ago from Seattle where I was President and General Manager of Lakeside Sand and Gravel, who was a major producer of concrete.

We have looked at the feasibility of installing a portable concrete production plant at the top of Empire Pass. We started reviewing the impacts on the community of locating a portable, on-site concrete batch at this location. We determined that it would be less of an impact on the community to supply concrete to the various major projects at Empire Pass using ready mix concrete mixer trucks, rather than having a production plant on-site. The impacts of getting cement, sand, gravel and add mixtures to the site at Empire Pass was not in the best interest of our community. Given the small size of the Treasure Hill foot print compared to Empire Pass, the impact of an on-site concrete batch plant in Historic Old Town would be even less desirable. Of particular concern would be noise management of operations, including additional equipment backing up (beep, beep, beep), dust management, water management, potential impacts to the DWSP Plan, building and taking down the concrete batch plant, and additional land that would have to be disturbed. This would have a more detrimental effect on the neighbors than concrete mixer trucks.

Bulk cement delivery, sand and gravel delivery trucks are 50 feet long, and with pup are 85 feet long, versus concrete mixer trucks which are 34 feet. Yes, we would need to send two or three more mixer trucks to the job site, but they would be under our control, not contracted and much shorter than bulk cement, sand and gravel delivery trucks. In addition, the concrete produced using an on-site batch plant would cost more per yard than being produced at our Park City Plant and delivered using mixer trucks due to the increased costs of installing a portable, on-site concrete batch plant.

An on-site concrete batch plant would require a building to protect the plant against our harsh winter weather. Stock piles of sand and concrete would have to be stored at the site. They would be loaded into a hopper bin that would require conveyors to feed the sand and gravel into the plant. Cement and fly ash would require silos to store these materials, which are gravity fed to scales. In addition, a water storage facility would need to be on-site, as well as a method of heating the water. Once inside the plant, the sand, gravel, cement, fly ash, water and additives are weighed by a special computer. When the batch person hits load, the materials are conveyed to a concrete drum where they are pre-mixed and then loaded into a mixer truck.

In conclusion, an on-site concrete batch plant is not feasible nor is it in the best interest of area residents. If you have questions, please call me at 435-731-0266.

Please reference the pictures.

Sincerely,

Norm Anderson

Norm Anderson
Area Manager

Sand & Rock Products • Concrete • Asphalt • Paving • Construction • Earthwork • Hauling
6657 West 5400 South • Salt Lake City Utah, 84118 • P.O. Box 18009
Phone (801) 508-9934 • Fax (801) 495-0437
www.jbparson.com

Hopper Bin

Loading Concrete Mixer Truck

Loading Hopper Bin

Conparison of Cement Delivery Truck
Versus Concrete Mixer Truck

Bulk cement delivery, sand and gravel delivery trucks are 50 feet long, and with pup are 85 feet long, versus concrete mixer trucks which are 34 feet long. Batch plant building and silos approximately 40 feet high.

BLASTING ANALYSIS

Prepared by: Michael E. Sweeney, MS, Geologist and Mineral Economist
Reviewed by: Michael K. McCarter, PhD, P.E., Professor and Chairman of the Mining Engineering Department, University of Utah

SUMMARY

The excavation of the Treasure Hill site will require some blasting, as was the case during the development of the Town Lift Plaza. The actual number of blasting events for Treasure Hill is unknown, at this time. However, each blast will average about 1.3 second in duration. The limits for ground vibration and airblast standards, proposed below, will adequately protect all residential structures from damage. The Federal blasting standard typically applied to protect structures can be as high as 1.25 inches/second peak particle velocity (ppv or "intensity of vibration"). The peak particle velocity proposed here is not to exceed 0.5 inches/second ppv, which is 2.5 times lower than the Federal limit. Also, where appropriate, blast mats will be used to reduce fly rock, the surface wetted to reduce dust, and the latest noise reduction techniques used.

The company performing the blasting will comply with all Utah State and Federal safety requirements, i.e. no-one will be walking around with dynamite (which will not actually be used) and all explosive materials and blasting agents will be transported to and stored on-site pursuant to State and Federal regulations. Nearby residences will also be offered a pre-blasting inspection free of charge to record the condition of their structure prior and post blasting.

This report also, provides less technical responses to typical questions a homeowner might ask, such as:

- Will blasting affect your home?
- How will I respond to these vibrations?
- How is my house affected by these vibrations?
- Can repeat blasting affect my house?
- How might man made forces affect your house?
- How might environmental forces affect your house?

The conclusions from these questions are:

- Blasting projects can be conducted safely and without causing harm to your home.
- The best way to safeguard your home is with well designed blasts that reduce vibration potential. This includes monitoring vibration levels during every blasting event with a seismograph and by strictly enforcing all local and State blasting regulations.

- Any form of adverse affect to near by homes from blasting activity is a very rare occurrence.
- Good communications with the neighbors living near blasting operations is of up most importance to the Applicant who also strives to be a good neighbor.

Important points covered:

(1) Blasting can produce vibrations.
(2) Blasting noise levels can be controlled.
(3) People feel vibrations at very low levels – that may cause apprehensions and lead to concerns that such vibrations may cause damage to their home.
(4) Strict regulations are in place that controls the level of vibrations well below those levels that might damage your home.
(5) Your home is not damaged by repeated blasting over an extended period of time.
(6) Vibrations from man-made forces can exceed blasting vibrations.
(7) Vibrations from environmental forces can reach dangerously high levels.

Location and Volume Metric Sketch-up of Project

PROPOSED STANDARDS

Treasure Hill proposes limiting blasting to the hours of 10:00 a.m. to 4:00 p.m. (blasting hours), Monday through Friday (excepting holidays) conforming to the following standards:

- Blast vibration shall not exceed 0.5 inches/second peak particle velocity (ppv) (intensity of vibration), measured at or adjacent to the residential structure nearest the blast.

- Air-blast shall not exceed 0.007 psi (pounds per square inch) (linear, unweighted peak air-overpressure, 127dB), measured at or adjacent to the residential structure nearest the blast.

- Nearby residences will be offered a pre-blasting inspection free of charge to record the condition of their structure prior and post blasting.

Structure Protection

- These limits protect all residential structures. Airblast shall not exceed 0.007 psi (linear, unweighted peak air-overpressure, 127dB) and blast vibration shall not exceed 0.5 ppv, measured at or adjacent to the nearest residential structure. This airblast limit is under the maximum safe overpressure for residential structures recommended by the Bureau of Mines Report of Investigations 8485 (1980), "Structure Response and Damage Produced by Airblast From Surface Mining" and Surface Blast Design (1990) by Calvin J. Konya and Edward J. Walter; Prentice Hall, Englewood Cliffs, New Jersey 07632. In addition, the blast vibration limit is three times lower than the Federal standard.

Blasting Standards

- Park City has no blasting limits measured at the nearest structure.

- Numerous studies in the U.S., Canada, and Australia have demonstrated that ground vibration of less than 2 inches/second ppv would result in a low probability of structural damage to residential dwellings.

- The US Office of Surface Mining has established regulation for the control of ground vibrations from blasting. The regulations allow a maximum ppv of 1.25 inches/second from 0 to 300 feet from the blast site, 1.00 inches/second from 301 to 5000 feet from the blast site, and 0.75 inches/second for 5001 feet and beyond from the blast site. The reason the inches/second decrease with distance results from the frequency of the seismic wave and energy released at a particular frequency.

TREASURE HILL BLASTING

Blasting at Treasure Hill Project will consist primarily of fracturing (breaking) the native rock (Weber Formation and Park City Formation) to allow the excavation of the rock. The size of the blasts can be varied to meet excavation requirements. The number of blast periods will average less than two per day. Each blast will average 1.3 seconds in duration, for a daily maximum average of 2.6 seconds of blasting per day.

Background

Commercial explosives are the hardest working power tool of all. Over 5 billion pounds of commercial explosives are used in the United States annually. Without explosives, our country would come to a halt. Explosives are controlled to safely do the work precisely and accurately, with incredible strength, in a small package. Explosives do their job quickly, economically, and safely.

Storage

Explosives are stored until used; most explosives are delivered to site in bulk quantities using tank trucks or in trucks that have explosive products in bags or boxes. Transfer of explosives is carefully regulated by US Department of Transportation. Blasters store explosives in secure magazines until ready for use. Detonators are stored separately form explosives. Storage is regulated by Bureau of Alcohol, Tobacco and Firearms.

Improvements

Over the past 20 years there have been numerous scientific developments to improve explosives and techniques for precision breakage and extraction of rock and soil. Explosive consequences to the environment are negligible due to these improvements and State and Federal requirements. Blast vibrations can be controlled to have less impact than a passing truck driving a local road.

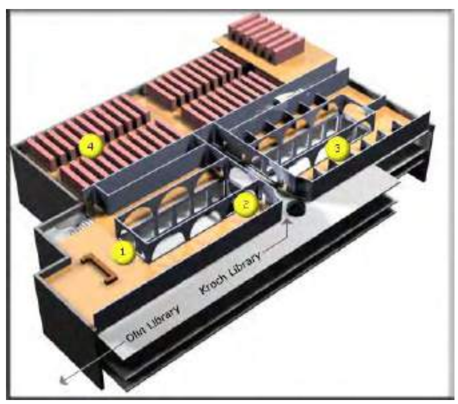
Description of Blasting Operation

Geologists, civil engineers, surveyors and explosive engineers work together as a team to determine the amount of explosive needed to do the job. The team determines location of each hole, depth, and overall drill pattern. Distance of the active face, or property boundary, to the bore hole, rock type and ground structure determines the amount and type of explosive used to prevent fly rock from leaving the property and vibration and air-overpressure for causing structural and property damage. Steps are taken to ensure air-blast (noise), vibration, and dust does not create problems for neighbors. The blast is designed to provide consistent and optimized energy distribution so that the rock is broken in segments of desired size and fragments are easy to reach.

Before loading the bore hole, each hole is checked for location, depth and water content. Next, primers are loaded into the hole and finely the explosive is loaded. Each hole has an initiator or detonating coil to provide a delaying interval. The delaying sequence helps keep the vibration within safe limits, controls movement, and ensures proper breakage of the rock. Each hole is stemmed with crushed stone (helps reduce noise) and blasting mats are applied when necessary to hold down fly rock. Water may be applied to dampen the ground to reduce dust. Monitoring equipment is manned to ensure noise and vibrations from the explosion are within established limits. Finally, the site is cleared, the blasting area is secured, an alarm is sounded to signal the blast, and the blaster yells “fire in the hole”. The blaster steps on the detonator that initiates the blast. Today, most explosive companies use “shock tube” (a blast tube that transmits low energy signal at 6.500 ft/sec). Shock tube uses a non electric igniter (NONEL) that can not be accidentally set off by electrical energy and helps reduce surface noise.

Precision Blasting

The following is an example of precision blasting. Cornell University’s “dream” was to develop an underground library to house $500 million worth of rare books and historic manuscripts. The addition required it to be built 50 feet below the existing library and a historic quadrangle. Though underground, the addition would be adjacent to buildings more than 100 years old and still used daily for classes and research. Some 25 feet of bedrock would have to be removed. Carefully controlled blasts were set off as close as two feet from existing structures. Because of explosive engineer’s experience, training, and skill, nothing was damaged during this process. The library treasures now have a new home above the deck greens and across the quadrangle, which has remained unchanged for a hundred years.



Cornell University’s Dream

TYPICAL QUESTIONS A HOMEOWNER MIGHT ASK

To better understand the answers to the below questions, you need to know how blasting professionals are able to measure, predict and control ground and air vibration levels. The following three primary vibration factors (“intensity, frequency, and duration) are defined and explanations are provided on how these factors relate to ground and airwave vibrations.

- **Intensity** of ground vibration is the speed of a particle movement in the earth and blasting professionals refer to the speed of ground vibration as particle velocity (pv) and is measured in inches per second, and in airwaves, intensity is measured in units called decibels.
- **Frequency** of vibration is the number of ground waves passing a particle of earth in a one second time frame and is measured in cycles per second, and in airwaves, the number of pressure waves per second passing a defined point is known as frequency.
- **Duration** is the length of time the particle of earth or airwave may vibrate and is measured in seconds or fraction of seconds.

Blasters measure the intensity, frequency, and duration of blast vibration levels and airwave intensity levels so that the speed of the particle movement is maintained at or below legal limits, and can be thought of as "speed limits". These measurements provide blasting experts with data they need to keep vibration levels within the speed limit. Blasts are designed to protect surrounding homes from the effects of both ground and airwave vibrations. The point is, the control of ground vibrations and airwaves is a sophisticated process, accomplished by experts. They combine science, technology, and experience to use explosives in such a manner that vibrations and airwaves remain below regulator limits.

It is interesting to point out that not all blasts can be heard. This is because blasts are typically low frequency events, which the human ear can not detect. A familiar example of a low frequency event is a gust of wind, which a person can feel but may not be able to hear. The intensity of the ground vibrations and airwaves that eventually reach surrounding homes or other structures depend on a number of factors. These factors include the type of blasting being conducted, such as quarrying or construction, and the distance between the blasting activity and surrounding homes or structures. As a result, some blasts may be more noticeable to some home owners than others. A professional explosive engineer will place a detection device know as a seismograph at surrounding homes to measure these vibrations. A seismograph is a device that measures both ground and air vibration levels. It is the primary tool used by blasting professionals to evaluate the performance of these blasting activities. The data record by a seismograph and interpretation by a blasting professional ensures that the vibrations being generated are below the levels that may affect neighborhood homes.

Will Blasting Affect Your Home?

Your home is subject to vibrations form many potential sources. There are vibrations that occur naturally and are part of the environment, those that are man made, and those resulting from blasting. If a blast sequence is engineered properly, then vibrations from blasting will not harm your home. Most of the energy from a blast that is created is used in breaking the rock. Almost 96% percent of the energy is absorbed inside of the blast area itself and only 4% to 5% of the energy travels away from the blast in the form of ground waves that travel through the earth or airwaves that travel above the ground in all directions and diminish rapidly.

How Will I Respond to These Vibrations?

As the ground waves and airwaves (air-blast – overpressure waves) reach your home after a detonation, they may cause your windows to rattle and your house to vibrate slightly. What you feel or perceive immediately following a nearby denotation is depended on where you are when the blast occurs. It is important where you are. Human bodies are very sensitive to vibrations. People can feel vibrations in their home at a mere 2% of the levels normally allowed by law. This human sensitivity to extremely low levels of vibrations is important to keep in mind as we learn more about how we perceive blasting vibrations. When standing outside your home vibrations are not as noticeable. This is because the ground is vibrating less, than let's say, the cups and saucers inside your home. Plus most of the airwaves traveling above the ground are below our range of hearing. However, when standing inside your house, vibrations are typically more noticeable to you, because some of the things around you might be vibrating or rattling. Like a gust of wind, blast vibrations might cause the walls in your home to creek a little and might cause dishes, nick knacks, or windows to rattle. Also effecting your perception of a nearby blast is how much you are surprised by a detonation. If you are expecting a detonation from a nearby blasting project, you will perceive it as being less of a concern than a blast you do not anticipate. This is no different than how we perceive a clap of thunder during a summer storm. If you see lightening, and expect a clap of thunder to occur shortly thereafter, it will not seem as loud as a comparable clap of thunder when there is no warning.

How Is My House Affected By These Vibrations?

How vibrations waves may affect your home. Let's begin by discussing your home and how it is built. All building materials used to construct your home are flexible. Some materials are more flexible than others. As a result, your whole house can flex from ground vibrations or airwaves. The components of your house will not crack as they flex unless they are pushed too far, for example, when tornadoes, hurricanes or earthquakes occur. Blasting regulations and the limits they place on vibration levels are designed to ensure homeowners that nearby blasting projects will not result in any damages to their home. The specific ground vibrations and airwaves limits established by law often depend on the following factors: the type of structures being protected, the distance of your home from the blasting project, and the nature of the vibrations when they arrive at the structure.

To better understand the reasoning behind these legal limits, let's use the example of the posted speed limits along our nation's highways. Cars are easier to control and are less affected by higher speeds than are larger vehicles such as trucks. Consequently, different speed limits are often posted for cars and trucks. Similarly, vibration limits may differ depending on whether those limits are designed to protect a house or different type of structure, how far the structure is from the blasting project and the nature of the vibrations when they reach the structure being protected, such as, the intensity, frequency, and the duration of the vibration wave. Even in instances where an airwave level is considered high (over 133 decibels), the primary effect of the detonation is to startle occupants of the house, not damage the structure. To help you better understand high airwave levels let's take a moment and consider these examples. When you hear someone operating a power tool outside, the decibels typically reach 110. The sounds you hear when watching a jet airplane taking off or landing at an airport can reach 120 decibels. It may also be interesting to note that as startling and loud as thunder and fireworks can be, the high decibels they generate almost never cause harm to nearby homes. In fact, for a structure to be adversely affected, an airwave would have to exceed 140 decibels. Blasting regulations mandate that blasters keep airwave decibels well below such levels.

Can Repeat Blasting Affect My House?

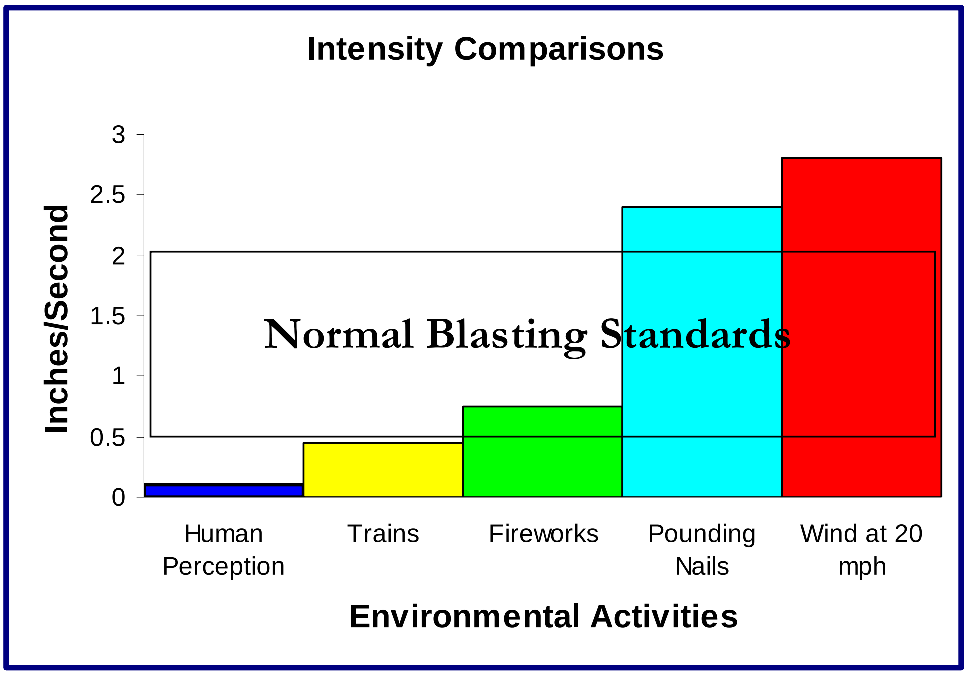
This question relates to the concept of structural fatigue. Cracking in houses due to fatigue may occur when a building material is flexed repeatedly over 10's of thousand of times at vibrations levels below failure points. For most blasting projects, the total number of significant vibration cycles a house is subjected to is less than a few thousands. This is nowhere near the repetitious flexing that could cause damage to a home. In Treasure Hill's case, it should be less than 100 events.

How Might Man-Made Forces Affect Your House?

Homes are continually exposed to a wide range of forces that are completely unrelated to blasting projects. Now let's review forces that are man made and learn about the impact they have on structures such as your home. Man made activities both indoors and outdoors can cause a house or a portion of it to vibrate. Indoor activities causing vibrations include walking across floors, slamming doors, pounding nails, children playing actively, use of some power tools, day speakers from a stereo and running up and down stairways. These activities can produce localized motions in a structure that is equal to or greater than the vibrations caused by blasting. Outdoor activities that cause a house to vibrate include airplanes flying low overhead, trains rumbling down nearby train tracks, automobiles traveling on nearby roadways, construction equipment operating in a neighborhood, large trucks moving over bumps in a road, fireworks displays, heavy day sounds from stereos in passing cars, and trucks using their engines to slow down. If positioned close enough to your house, these activities can produce ground vibrations and airblast levels similar to those produced by near by blasting activities.

How Might Environmental Forces Affect Your House?

Environmental forces can also impose significant forces on your home. Unlike man made activities, environmental forces can not be controlled or limited. They occur naturally. Environmental forces include thunder storms, and earthquakes and even those that are many many miles away, wind gust, temperature changes, and changes in humidity. Earthquakes and thunderstorms cause a house to vibrate similar to the way blast vibrations affect structures, but sometimes can far exceed vibration levels from blasting. Changes in humidity or temperatures, on the other hand, cause more subtle movements as the house expands and contracts. These subtle movements can cause hairline cracks in plasterboard and masonry. In combinations, these environmental factors exert a continual threat on structures 24 hours a day, each day of the year. In fact, environmental forces can easily create strains in a structure that exceed those caused by any blasting activity. To illustrate this point, just a 10 percent change in humidity (60% to 66%) is capable of producing the same amount of strain on a house as ground vibrations. The following chart compares typical blasting standards with vibrations caused by man made and environmental activities.



Notice within the chart data, that humans can feel vibrations that are well below levels produced by all of the other sources shown. Now it is important to keep in mind, that regardless of the source of the vibrations or even the age and compositions of a structure, your house will not be nearly as sensitive to vibrations as your body. There are also several non-vibratory environmental forces that can not be felt or heard, but nevertheless can impose powerful forces on housing. An excellent example of this is soil pressures on the foundation walls. It is a naturally occurring force that can be aggravated by surface drainage problems, such as low spots in your yard, blocked or missing gutters and down spouts. Other vibratory examples are soil settlement, frequent watering of landscaped areas near foundations, and freeze thaw cycles that can even crack concrete. These non-vibratory environmental forces have a significant impact on houses.

In summary, your home continuously experiences various types of forces throughout its life. Most often, a combination of several of these forces is necessary to cause a crack to form within a structure such as your home. In comparison, vibrations from nearby blasting projects that are within recommend or legal limits are not likely to cause or contribute to any form of structural problem.

CONCLUSIONS

Blasting projects can be conducted safely and without causing harm to your home. The best way to safe guard your home is with well designed blasts that reduce vibrations potential. This includes monitoring vibrations levels with the regular use of a seismograph and by strictly enforcing all local and State blasting regulations. Any form of adverse affect to near by homes from blasting activity is a very rear occurrence. Good communications with the neighbors living near blasting operations is of up most importance to the Applicant who also strives to be a good neighbor.

Important points covered:

(1) Blasting can produce vibrations.
(2) Blasting noise levels can be controlled.
(3) People feel vibrations at very low levels – that may cause apprehensions and lead to concerns that such vibrations may cause damage to their home.
(4) Strict regulations are in place that controls the level of vibrations well below those levels that might damage your home.
(5) Your home is not damaged by repeated blasting over an extend period of time.
(6) Vibration from man-made forces can exceed blasting vibrations.
(7) Vibrations from environmental forces can reach dangerously high levels.

BLASING APPENDIX

Prepared by: Michael E. Sweeney, MS, Geologist and Mineral Economist
Reviewed by: Michael K. McCarter, PhD, P.E. Professor and Chairman of the Mining Engineering Department, University of Utah

Human Response

Human response to blast vibration and airblast is difficult to quantify. Vibration and airblast levels can be felt that are well below those required to produce any damage. Duration of the event has an effect on human response as does the frequency. Events are of relatively short duration, on the order of one or two seconds for millisecond-delayed blasts. Typically, the longer the event and the higher the frequency, the more adverse effect there is on human response. Factors such as frequency of occurrence, fright or the "startle factor", level of activity at the time of the event, health of the individual, time of day, the perceived importance of the blasting operation and other political and economic considerations also have an effect on human response.

Sound-level meters (seismograph) measure the actual pressure fluctuations caused by sound waves (minute air pressure fluctuations caused by some type of vibration), with separate measurements made for different sound frequency ranges. These measurements are reported in a logarithmic decibel (dB) scale. Most sounds consist of a broad range of sound frequencies. Because the human ear is not equally sensitive to all frequencies, several different frequency-weighing schemes have been used to develop composite dB scales that approximate the way the human ear responds to noise levels. The A-weighted dB scale (dBA) is the most widely used for this purpose. Decibels used to describe airblast should not be confused with or compared directly to dBA used to describe relatively steady-state noise. An airblast with a peak overpressure of 130 dB can be described as being mildly unpleasant; however, exposure to jet aircraft noise at a level of 130 dBA would be painful and deafening. The average individual would probably experience the same response to a noise that measures 60 dB using an unweighted sound meter as compared to 40 dBA using a weighted sound meter. The average human response to airblast that may be anticipated when a person is at rest and situated in a quiet surrounding is summarized below.

	PPV (In/sec)	Airblast (dB)
Barely to distinctly perceptible	0.02 - 0.10	50 - 70
Distinctly to strongly perceptible	0.10 - 0.50	70 - 90
Strongly perceptible to mildly unpleasant	0.50 - 1.00	90 -120
Mildly to distinctly unpleasant	1.00 - 2.00	120 -140
Distinctly unpleasant to intolerable	2.00 - 10.00	140 - 170

(Please note that the listing of both vibration and airblast in the above table is done solely for the presentation of human response data and does not infer that there is any direct relationship between vibration and airblast other than as it applies to the human response factor. For example it is possible to have a 0.50 inches/second ppv with a corresponding 120 dB at one blast event and at another blast event have a 0.50 inches/second ppv with a corresponding 70 dB.)

It is important to understand that the above responses are those of "average individuals." There will be individuals who will be at the extreme ends of the human response spectrum. At one end are persons who receive some tangible benefit from the blasting operation and would probably not be disturbed by vibration and airblast so long as it does not damage their property. At the opposite end are those who are opposed to the blasting operation (for any number of reasons) and who will say they are disturbed if they can barely detect any vibration or hear any airblast or, in some cases, imagine they can detect vibrations or hear airblasts. Neither of these groups should be considered "average" and their response factors should not be used in determining limits or regulatory standards for vibration and airblast.

Additional information

For those interested in obtaining further information on the subjects of blast vibration, airblast, and the monitoring of blast effects, a list of reference materials is attached as Exhibit 1.

Vibration, Airblast, Fly Rock, and Nitrates

There are four environmental effects of blasting, they are: vibration, airblast, fly rock and nitrates.

Vibration

As the seismic waves travel outward from the blast, they excite the particles of rock and soil through which they pass and cause them to oscillate. Spherical spreading and imperfect coupling, among other factors, cause these seismic waves to dissipate quite rapidly with distance. When blast vibration is recorded, it is the motion of these particles at a given point in the earth that is measured. This motion is less than the thickness of a piece of 24 bond weight paper.

Blast vibrations are described using the following terms:

Displacement - This is the distance that the particles move, usually only a few ten-thousandths to a few thousands of an inch, the thickness of a standard piece of letter paper.

Particle Velocity - How fast the particles move (frequency). Since the velocity is continually changing, the maximum, or peak particle velocity (ppv), expressed in inches per second.

Acceleration - The rate at which the particle velocity changes, measured in inches/sec^2 or in G=s.

Frequency - The number of oscillations per second that a particle makes when under the influence of seismic waves, measured in Hertz (cycles per second).

Propagation Velocity - The speed at which a seismic wave travels away from the blast, measured in feet per second. (Note that propagation velocity is several orders of magnitude faster than particle velocity.)

When blast vibration is recorded by a seismograph, three mutually perpendicular sensors record particle velocities in longitudinal (radial), transverse and vertical axes. The peaks recorded on each axis are the main items of interest. In addition, because the data is recorded against a time base other data such as frequency, displacement, acceleration and true vector sum (or the resultant) may be obtained.

Peak Particle Velocity (PPV) Levels

The effects that various levels of blast vibration have on structures and materials have been documented by numerous researchers and organizations. To provide some idea of what a particular ppv level represents, a listing of levels and associated effects is included in Exhibit 2.

The peak particle velocity of ground motion can be related to distance from the blast site and explosive charge weight per delay, by the following formula: $ppv = K(D/w^{1/2})^{-n}$, where D is distance from the blast site, w is the explosive charge weight per delay, and K and n are site specific constants.

The initial blast at Treasure Hill Project will be monitored using engineering seismographs to establish site parameters (K, n). The resulting data will be used to design blasts not to exceed 0.5 ppv at surrounding structures.

The expression $D/w^{1/2}$ is also called the Scaled Distance. Increasing the Scaled Distance, by either increasing the distance from the blast site to the nearest structure, or decreasing the explosive charge weight per delay, is the most effective way to reduce ground vibrations from blasting to a particular structure.

Properly engineered structures such as dams, newer large buildings, bridges, pipelines, freeway overpasses and massive concrete structures are capable of withstanding much higher levels of vibration. Limits for these are best established following individual evaluation.

Factors other than vibration must be considered when blasting in close proximity to any structure. For example, blasting within several feet of a structure is quite possible if certain precautions are taken. Vibration usually ceases to be the controlling factor. Rock block movement or blast-generated gasses penetrating the rock under the structure become the major concerns.

Airblast

Airblast is an air-overpressure wave that results primarily from detonation cord, rock movement, surface displacement and escaping gas and is best measured as overpressure in pounds per square inch (psi) or in Pascal (metric); see Exhibit 3. Modern blast monitoring equipment provides overpressure data in both psi and decibels (dB). Blasting operators will use NONEL (non-electric) or electric initiation to reduce overpressure to a minimum.

A chart relating the two scales and providing some examples of what the levels involve is included in Exhibit 3. When comparing airblast with other noise sources, one must bear in mind that airblast is an impulse of very short duration and is not repeated continuously. For this reason, airblast limits are usually established that are well above the limits set for continuous noise sources. Also, due to the short duration, airblast makes a negligible contribution to recorded average daily noise levels.

That part of the air-overpressure wave that is in the audible range (above 20 Hz) can be startling in an otherwise quiet surrounding. The energy level, however, is usually very small and does not normally contribute to actual damage. The lower frequency portion of the pressure wave, rather than being heard, is felt as concussion. This concussion tends to excite structures and cause windows and doors to rattle. Damage from this concussion at higher levels is possible, but the major contribution is to human response, a subject covered later. If a nearby blast causes windows to rattle, the average person cannot tell whether it was airblast or vibration that caused it, although they will generally assume that it was vibration.

When recording airblast, the results should not be weighted as is custom in recording continuous noise sources. Such weighting results in systems that do not properly record the lower frequencies. Proper airblast recording is done with linear non-weighted measuring devices, such as the airblast channel provided on modern blast monitoring seismographs. Treasure Hill will contract with a blasting consulting company who will monitor all blasts and who will perform pre-blasting inspection at nearest residences free of charge and subject to property owner's permission.

Fly Rock & Noise

Containing the blast energy within the rock mass for milliseconds longer than normal will reduce the fly rock, airblast, stemming ejection, dust, noise and oversized rock. There are products that help to accomplish this task, such as VARI-STEM plugs. Also, blasting mats help reduce fly rock and use of NONEL, electric initiation, and covering or stemming drill holes help reduce noise.

Nitrates in Ground Water

Nitrates are a fertilizer and if introduced into surface waters in excessive amounts can cause algae. The nitrates from blasting, if not properly taken care of, can be a contributing source of nitrates in surface waters. Fertilizers, livestock manure, and atmospheric sources (from industrial and automobile emissions) are among the top contributors to nitrate contamination of surface and underground water supplies. Nitrate is more commonly found in the groundwater of rural and agricultural regions, due to heavy fertilizer use in these areas. In Treasure Hill’s case the blasting events do not pose a nitrate risk to the surface waters for two reasons: minimal number of blasting events and, the area is very dry (no water springs).

Exhibit 1

List of References:

(a) Bauer, A., & Calder, P.N. (1978), Open Pit and Blast Seminar, Kingston, Ontario, Canada.

(b) Langefors, ULF, Kihlstrom, B., &Westerberg, H. (1948), Ground Vibrations in Blasting.

(c) Oriard, L.L., (1970), Dynamic Effect on Rock Masses From Blasting Operations, Slope Stability Seminar, Univ. of Nevada.

(d) Canmet, Bauer, A., & Calder, P.N., (1977), Pit Slope Manual, Canmet Report 77-14.

(e) Nicholls, H.R., Johnson, C.F. & Duvall, W.I., (1971) Blasting Vibrations and Their Effects on Structures, Bureau of Mines Bulletin 656.

(f) Edwards, A.T., & Northwood, T.D., (1960), Experimental Studies of the Effects of Blasting on Structures. The Engineer, September 1960.

(g) Blasters' Handbook, (1977), E. I. du Pont De Nemours & Co.

(h) Northwood, T.D. Crawford, R., & Edwards, A.T., (1963), Blasting Vibrations and Building Damage. The Engineer, May 1963.

(i) Stagg, M.S., Siskind, D.E., Stevens, M.G., & Dowding, C.H., (1980), Effects of Repeated Blasting on a Wood Frame House. Bureau of Mines R. I. 8896.

(j) Tart, R.G., Oriard, L.L., & Plump, (1980), Blast Damage Criteria for Massive Concrete Structure. ASCE National Meeting, Specialty Session on Minimizing Detrimental Construction Vibrations, Portland, OR, April 1980.

(k) Robertson, D.A., Gould, J.A., Straw, J.A., & Dayton, M.A., (1980), Survey of Blasting Effects on Ground Water Supplies in Appalachia: Volumes I and II. Bureau of Mines open field report 8(1) – 82.

(l) Oriard, L.L., & Coulson, J.H., (1980), TVA Blast Vibration Criteria for Mass Concrete. ASCE.

(m) Rose, R., Bowles, B. & Bender, W., (1991), Results of blasting in close Proximity to Water Wells at the Sleeper Mine. Proceedings of the Seventeenth Conference on Explosives and Blasting Technique. Society of Explosives Engineers.

(n) Oriard, L.L., (1994), Vibration and Ground Rupture Criteria for Buried Pipelines. Proceedings of the Twentieth Annual Conference on Explosives and Blasting Technique. S.S.E.

(o) Siskind, D.E. & Stagg, M.S., (1993), Response of Pressurized Pipelines to Production-Size Mine Blasting. Proceedings of the Ninth Annual Symposium on Explosives and Blasting Research. Society of Explosives Engineers.

Exhibit 1

List of Publications Pertinent to Blast Vibration and Airblast:

1. Dowding, C.H. (1996), “Construction Vibrations”, Prentice-Hall, Inc., Englewood Cliffs, N. J.

2. Dowding, C.H. (1985), “Blast Vibration Monitoring and Control”, Prentice-Hall, Inc., Englewood Cliffs, N. J.

3. Langefors, U., and Kihlstrom, B. (1976), “The Modern Technique of Rock Blasting”, John Wiley & Sons, Inc., New York.

4. Medearis, K. (1976), “The Development of Rational Damage Criteria for Low-Rise Structures Subjected to Blasting Vibrations”, Report to the National Crushed Stone Association, Washington, D.C.

5. Nicholls, H.R., Johnson, C.F., and Duvall, W.I. (1971), “Blasting Vibrations and Their Effects on Structures”, U.S. Bureau of Mines Bulletin 656.

6. Siskind, D.E., Stagg, M.S., Kopp, J.W., and Dowding, C.H. (1980), “Structure Response and Damage Produced by Ground Vibration from Surface Mine Blasting”, U.S. Bureau of Mines Report of Investigations 8507.

7. Siskind, D.E., Stachura, V.J., Stagg, M.S., and Kopp, J.W. (1980), “Structure Response and Damage Produced by Airblast from Surface Mining”, U.S. Bureau of Mines Report of Investigations 8485.

8. Snodgrass, J.J., and Siskind, D.E., (1974), “Vibrations from Underground Blasting”, U.S. Bureau of Mines Report of Investigations 7937.

9. Stachura, V.J., Siskind, D.E. and Engler, A.J., (1981), “Airblast Instrumentation and Measurement Techniques for Surface Mine Blasting”, U.S. Bureau of Mines Report of Investigations 8508.

10. Stagg, M.F., Siskind, D.E., Stevens, M.G., and Dowding, C.H. (1984), “Effects of Repeated Blasting on a Wood-Frame House”, U.S. Bureau of Mines Report of Investigations 8896.

11. Department of the Interior, Office of Surface Mining Reclamation and Enforcement, 30 CFR parts 715, 816 and 817. (Although these regulations technically apply only to coal mining operations, the limits applying to airblast and vibration have occasionally been adopted for other mines and construction sites.)

12. In addition to the above, there are numerous case histories and papers on the subject of blast vibration and airblast contained in the Proceedings of the Annual Conferences(s) of the International Society of Explosives Engineers. Address: 29100 Aurora Rd., Cleveland, OH 44139. Phone: (216) 349-4004.

Exhibit 2

PPV	Application	Effect	Reference
7.0 - 8.0	Water Wells	No Adverse effect on well	(n)
> 7.0	Residence	Major damage possible	(e)
4.0 – 7.0	Residence	Minor damage possible	(e)
6.3	Residence	Plaster & masonry walls crack	(b)
5.44	Water Wells	No change in well performance	(l)
5.4	Plaster	50% probability of minor damage	(h)
4.5	Plaster	Minor cracking	(i)
4.3	Residence	Fine cracks in plaster	(b)
> 4.0	Residence	Probable damage	(f)
2.0 – 4.0	Residence	Plaster cracking (cosmetic)	(e)
2.0 – 4.0	Residence	Caution range	(f)
2.8 – 3.3	Plaster	Threshold of damage (close-in)	(h)
3.0	Plaster	Threshold of cosmetic cracking	(i)
1.2 – 3.0	Residence	Equivalent daily environmental changes	(j)
2.8	Residence	No damage	(b)
2.0	Residence	Plaster can start to crack	(d)
2.0	Plaster	Safe level of vibration	(h)
< 2.0	Residence	No damage	(e)
< 2.0	Residence	No damage	(f)
0.9	Residence	Equivalent to nail driving	(j)
0.5	Mercury Switch	Trips switch	(d)
0.5	Residence	Equivalent to door slamming	(j)
0.1 – 0.5	Residence	Equivalent daily family activity	(j)
0.3	Residence	Equivalent to jumping	(j)
0.03	Residence	Equivalent to walking on floor	(j)

TOWN Treasure Hill

Exhibit 3

AIRBLAST LEVELS

The following chart relates decibels and air overpressure in pounds per square inch and gives some examples of the probable result of the levels indicated.

When comparing airblast with other noise sources, it is extremely important to understand that airblast is an impulse of very short duration and is not repeated continuously. As a consequence, limits on airblast are set considerably higher than limits placed upon continuous noise sources.

Overpressure Level (dB)	Overpressure Level (psi)	Probable Results of Impulsive Airblast
180	3.00	structural damage possible
170	.95	many windows break
160	.30	
150	.095	poorly-mounted windows may break
140	.030	
130	.0095	
120	.0030	more human complaints (OSM limit: 133 db)
110	.00095	
100	.00030	
90	.000095	
80	.000030	
70	.0000095	airblast becomes noticeable to sensitive individuals
60	.0000030	
50	.00000095	

$$dB = 20 \log \frac{psi}{2.9 \times 10^{-9}}$$

Exhibit 3

SOUND LEVEL LIMITS

Use Linear Scale Sound Level Meter to Measure Blast Overpressure				
	Linear Peak		C-peak or C-fast	A-peak or A-fast
	dB	psi	dB	dB
Safe	128	0.007	120	95
Caution	128 to 136	0.007 to 0.018	120 to 130	95 to 115
Limit	136	0.018	130	115
	Recommended		Not Recommended	

February 24, 2006

Park City Planning Commission
Park City Municipal Corporation
PO Box 1480, 445 Marsac Avenue
Park City, Utah

RE: Treasure Hill – Response to Park City Planning Commission Questions

Dear Planning Commission;

PEC response to Planning Commission questions concerning Treasure Hill traffic are:

Planning Commission request #1 – The traffic study stated several things that need to make it work such as widen the road, add sidewalks, provide snow storage area, etc. Someone will need to show us we can do these things.

Response: There are some improvements that could improve peak hour traffic flow. These improvements are confined to the Park Ave./Deer Valley Dr. intersection and Empire Ave./Silver King Dr. intersection. Detailed response is discussed below. Other improvements have been mentioned but do not need to be added; however the road right-of-ways can accommodate these improvements if the City determines this is necessary.

From my understanding the Applicant is responsible for upgrading the pavement, road base, and repairs to curbs and gutters along Empire Ave. and Lowell Ave. from Manor Way. For the traffic to function efficiently snow removal needs to be improved as well as parking enforcement – these are a City function and, I believe, City Staff can best address snow removal and parking enforcement. These items and others will be discussed in greater detail in response to the specific question.

Planning Commission request # 2- We would like to see a scaled aerial photo showing the area with all the improvements talked about in the traffic study.

Response: Our detailed responses below will answer this question. In general a scaled aerial photo has been used to assist in describing potential improvements.

Planning Commission request # 3- Show the turning radius for the biggest truck that will be allowed on the street at each intersection.

Response: The attached Figures 1 through 5 demonstrate that the expected trucks during construction and after will have the ability to make the necessary turning movements.

Project Engineering Consultants
Transportation • Traffic • Roadway • Structural • Geotechnical • Environmental • Water & Sewer • GIS
8819 South Redwood Rd, Suite C West Jordan, Utah 84088 (801) 495-4240 Fax (801) 495-4244

Planning Commission request # 4- Show how traffic will be handled at the Resort Center and if we need any easements and will they grant them to the City? (Response provided by Jenni Smith PCMR)

Response: PCMR's parking manager will coordinate closely with the Treasure Hill on-site traffic control manager. PCMR has requested that no deliveries occur during the hours of 8:30 a.m. and 10:30 a.m. and also no deliveries after 3:00 p.m. during the ski season, with further restrictions during the holidays and city-wide special events. More flexibility during the shoulder and summer seasons is possible. PCMR will work with the City and the potential developer of the Main Lot to grant easements that may be necessary to increase the turning radius capability on the Manor/Empire corner and the Manor/Lowell corner.

Planning Commission request # 5- Show if there is enough land in the right-of-way by Cole's and Jan's to widen the road. Since this road falls under UDOT can we change the roads?

Response: In response to this question it is important to note that the Park Ave/Deer Valley Dr. intersection functions adequately to service the traffic outside peak hours of the ski season and seasonal events. This is also the case for the Empire Ave./Silver King Dr. intersection. As displayed in Figure 6 the land is available, but Right-of-Way would need to be purchased to make the necessary improvements.

Figures 7 and 8 are two alternatives for improving the traffic condition at the Empire Ave./Silver King Dr. intersection. Figure 7 is a roundabout alternative while Figure 8 is a traffic signal. Park City currently does not maintain any traffic signals and therefore both alternatives were presented.

Planning Commission request # 6- Show how and where we would put walking traffic.

Response: The pedestrians could be accommodated on sidewalks. Appropriate street crossings would need to be provided as part of a new signal or roundabout. On Empire Ave. and Lowell Ave. pedestrian traffic could be accommodated and will be discussed in response to question # 7.

Planning Commission request # 7- If we widen Lowell and Empire what will this do to existing off street parking?

Response: Figures 9 through 13 present various alternatives for Lowell and Empire. Depending on which alternative is being looked at, existing parking can either be maintained, increased or decreased. Attached are aerial photos. Lowell/Empire Alternate 1 (Figure 9 and 11): Reduce travel lane widths and add sidewalk on one side of roadway. Lowell/Empire Alternate 2 (Figure 9 and 12): Widen road to add one parking lane. Lowell/Empire Alternate 3 (Figure 9 and 13): Widen road to add one parking lane as well as a sidewalk.

While these alternatives are presented it is my understanding the Applicant is responsible for upgrading the pavement, road base, and repairs to curbs and gutters along Empire Ave. and Lowell Ave. from Manor Way (Figure 9 and 10).

Planning Commission request # 8- The study says that the City will need to step up snow removal and parking enforcement, can the City make this commitment?

Response: These are a City function and, I believe, City Staff are the best individuals to respond to these issues.

Planning Commission request # 9- The human impact part of the traffic issues has really not been talked about. We would like to know how we are impacting the traffic compared to what is on the streets today.

Response: This issue has been discussed and addressed at the Planning Commission Meetings of: January 12, 2005, January 26, 2005, September 14, 2005 and December 14, 2005.

The table below shows traffic count at various intersections at peak periods. The important point to note is that Treasure Hill traffic (during and after construction) will not degrade the level of service of Lowell Ave. or Empire Ave. or at any of the intersections listed in the table.

Roadway Summary

	Project Generated		Existing (Counted February 19th)		Percent Increase		Average Percent Increase
Intersection	*AM	*PM	*AM	*PM	*AM	*PM	
Park Ave. / Deer Valley	87	122	2302	3503	3.78	3.48	3.63
Deer Valley Dr. / Silver King Dr.	113	156	314	438	35.99	35.62	35.80
Empire Ave. / Shadow Ridge	120	149	188	303	63.83	49.17	56.50
Empire Ave. / Manor Way	117	145	120	190	97.50	76.32	86.91**
Lowell Ave. / Shadow Ridge	17	19	82	101	20.73	18.81	19.77
Lowell Ave. / Manor Way	85	101	74	139	114.86	72.66	93.76**

*Note: AM and PM refer to one peak hour of travel at the intersection between 7 AM and 9 AM or 4 PM and 6 PM.

**During these peak times the total traffic (including Treasure Hill's traffic) will utilize only 10% to 12% of traffic capacity along Lowell and Empire, therefore the intersections still maintain a Level of Service of A (the best condition possible).

Planning Commission request #10- If we are talking about a 10 year build out, what will the traffic be during this period? Will this add 3, 4, or more times the traffic to the streets?

Response: The build out period should be less than 5 years as reported by the Applicant. The amount of traffic as a percentage of total traffic capacity on Lowell and Empire should not exceed 15% to 18%. The total Project traffic in the various traffic studies used peak maximum number of trips in and out of the Project. Actual annual traffic numbers should be less because estimates used are very conservative. Again, the important point to note is that Treasure Hill traffic will not degrade the level of service of Lowell or Empire or at any of the above intersections.

Respectfully,
Project Engineering Consultants

Gary Horton, PE
Transportation Manager

cc: Eric DeHaan and Pat Putt – Park City Municipal Corporation
Pat Sweeney, Mike Sweeney and Ed Sweeney

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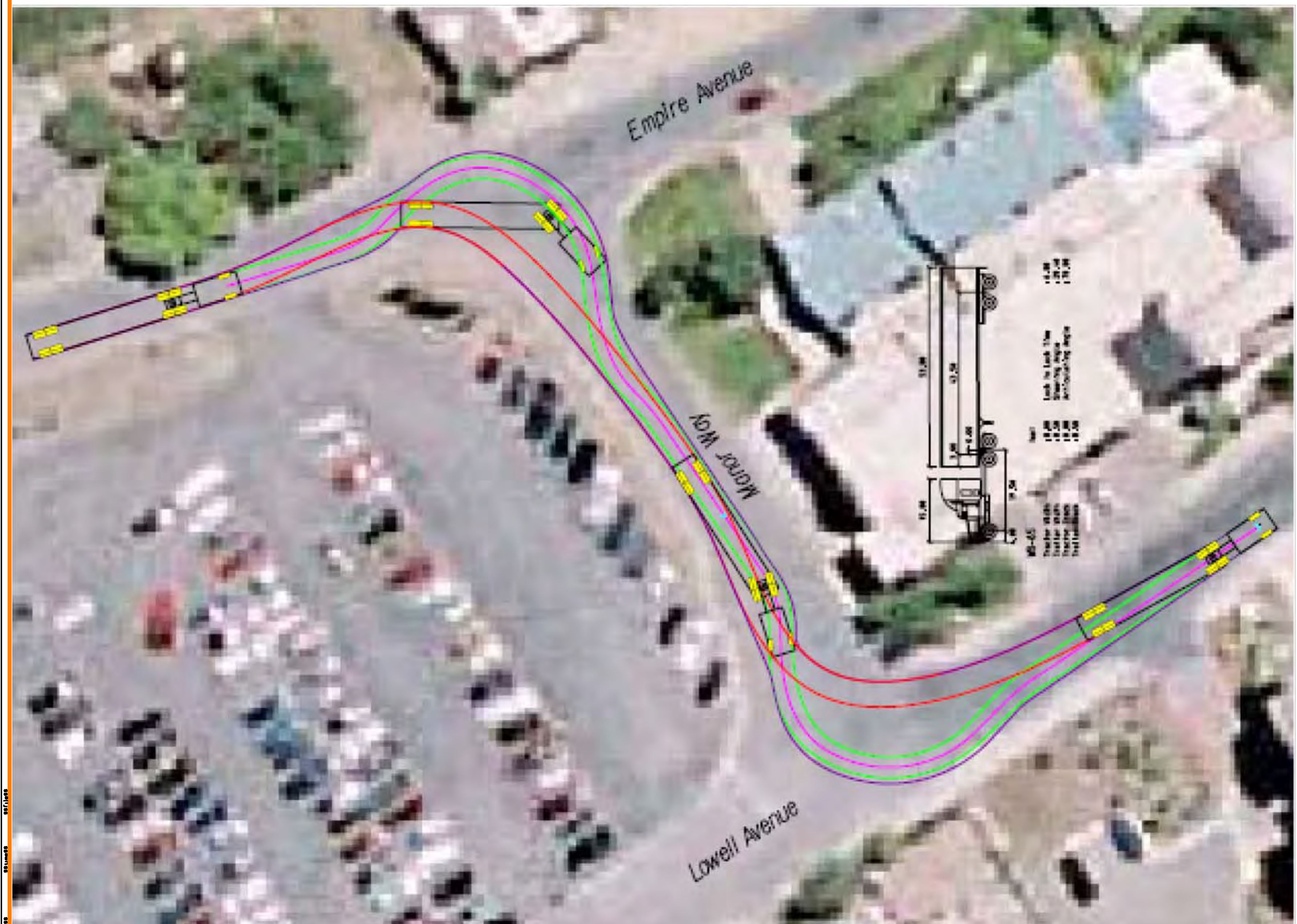
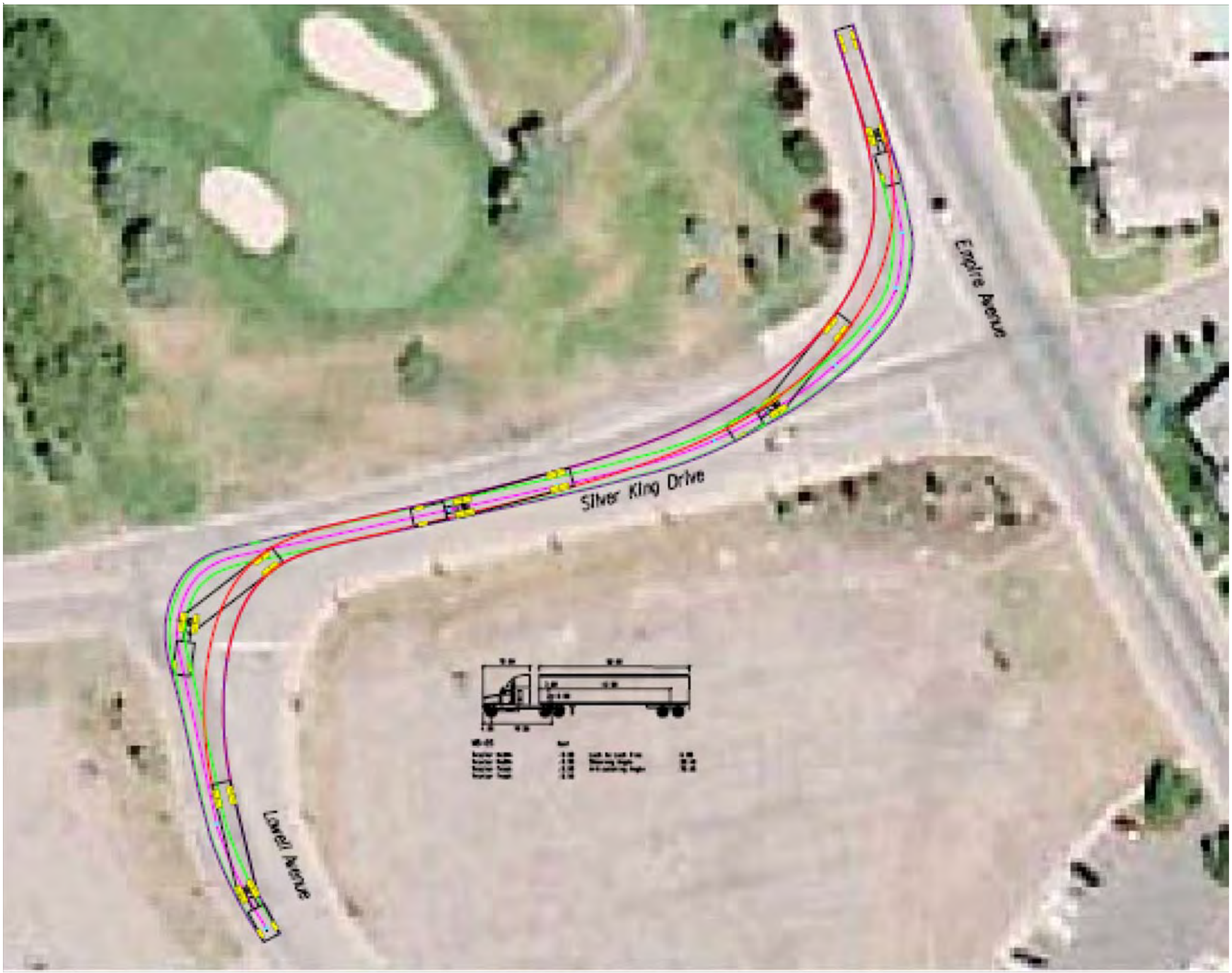


PROJECT ENGINEERING CONSULTANTS
8819 SOUTH REDWOOD RD., SUITE C, WEST JORDAN, UTAH 84088
PHONE (801) 495-4240

TREASURE HILL
AUTOTURN
EMPIRE, MANOR, & LOWELL

Figure 1



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TREASURE HILL
AUTOTURN
EMPIRE, SILVER KING, & LOWELL

Figure 2

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TREASURE HILL
AUTOTURN
LOWELL & SHADOW RIDGE

Figure 3

FIGURE

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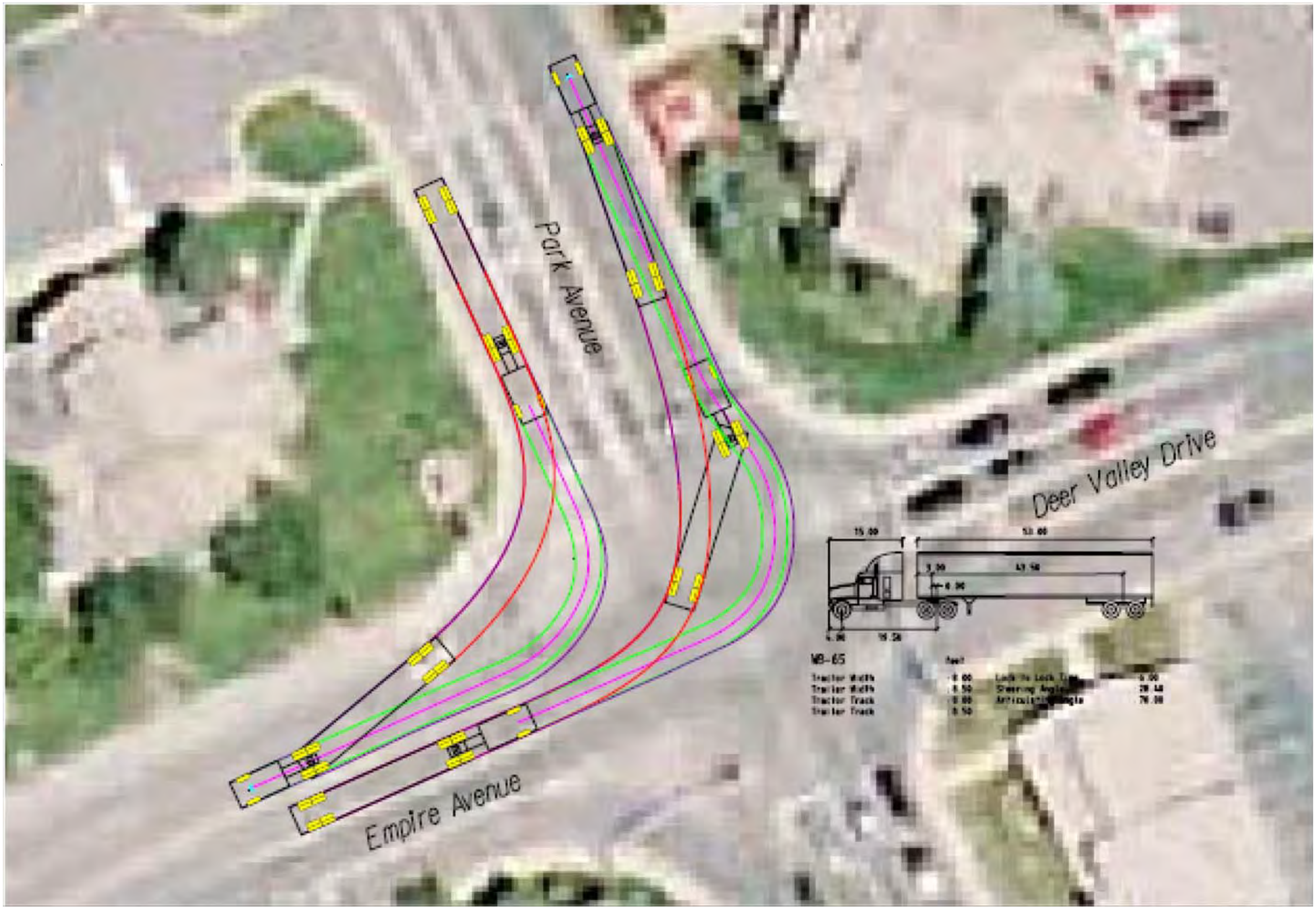
TREASURE HILL
AUTOTURN
OVERALL

Figure 4

FIGURE

...\1-11-06\sheet 4.dgn 1/20/2006 9:57:13 AM



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TREASURE HILL
AUTOTURN
PARK, EMPIRE, & DEER VALLEY

Figure 5

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TREASURE HILL
DEER VALLEY DRIVE/ PARK AVENUE

FIGURE 6

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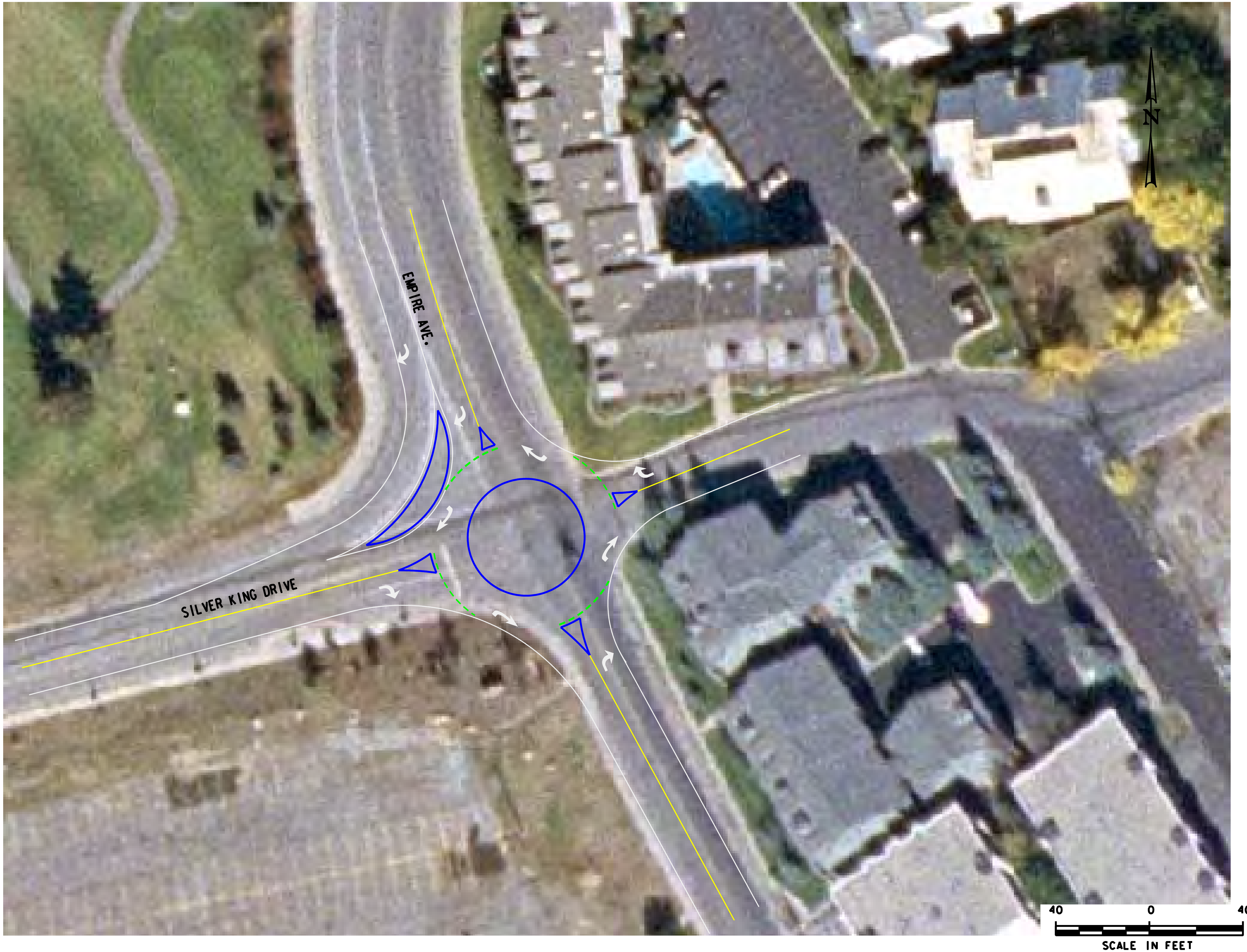

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TREASURE HILL
EMPIRE AVENUE /SILVER KING DRIVE
ROUNDABOUT ALTERNATIVE
FIGURE 7

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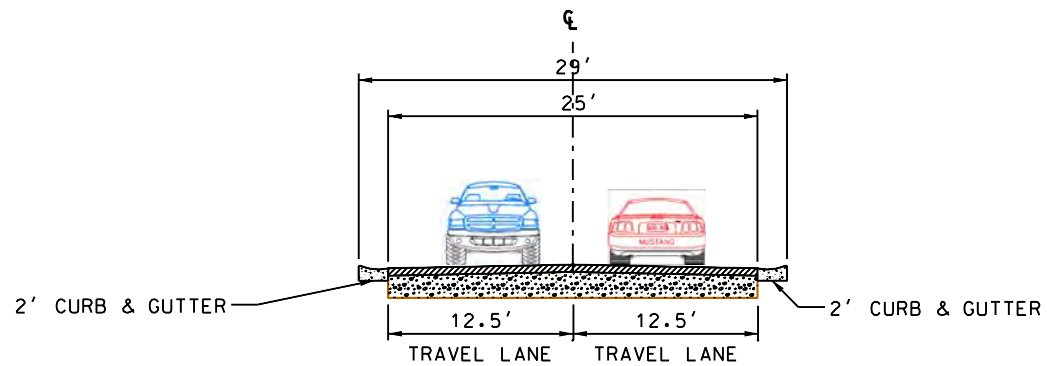
TREASURE HILL

SILVER KING DRIVE / EMPIRE AVE.

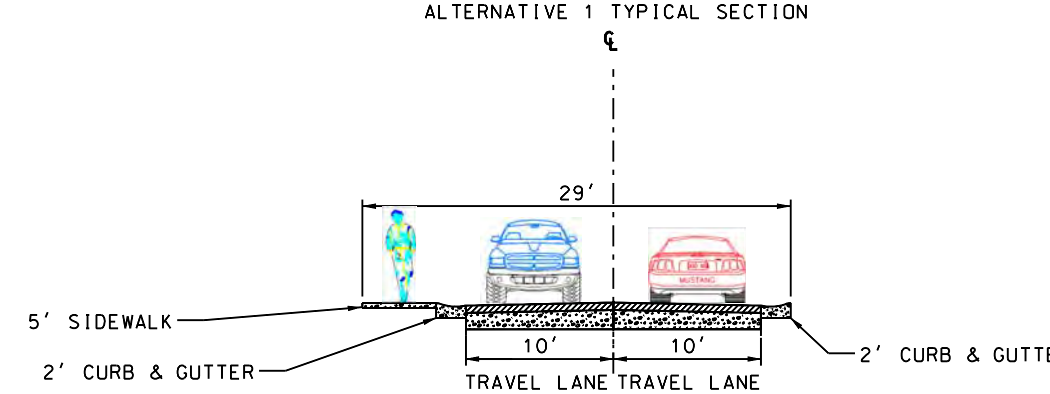
SIGNAL ALTERNATIVE

FIGURE 8

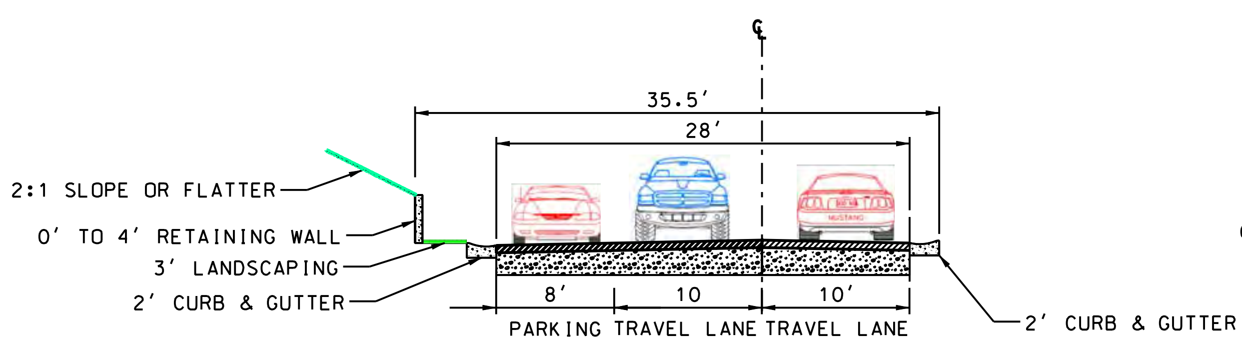
EXISTING TYPICAL SECTION



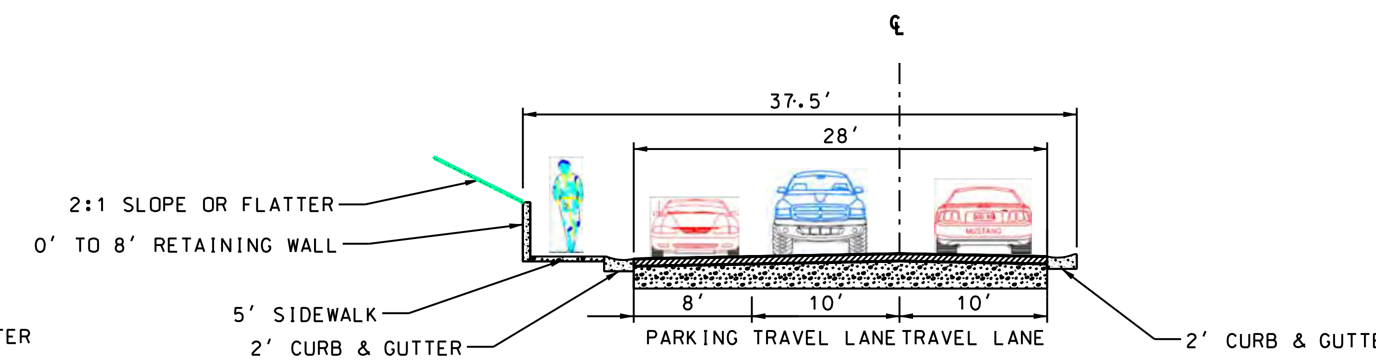
ALTERNATIVE 1 TYPICAL SECTION



ALTERNATIVE 2 TYPICAL SECTION



ALTERNATIVE 3 TYPICAL SECTION



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TREASURE HILL
LOWELL AVE./EMPIRE AVE.
TYPICAL SECTIONS
FIGURE 9

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TREASURE HILL
LOWELL AVE./EMPIRE AVE.
EXISTING
FIGURE 10

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sheet_10exlowell_empire lnwrk.dgn 2/24/2006 5:07:16 PM

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TREASURE HILL
LOWELL AVE/EMPIRE
ALTERNATE 1
FIGURE 11

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sheet_11lowell alt 1.dgn 2/24/2006 5:06:46 PM

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TREASURE HILL
LOWELL AVE/EMPIRE
ALTERNATE 2
FIGURE 12

2/24/2006 5:05:23 PM U:\2005\UT 5004 Treasure Hill Phase 4\Drawings\Feb 06 Presentation\sheet_13lowell_empire alt 3 lnwrk.dgn

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TREASURE HILL
LOWELL AVE/EMPIRE
ALTERNATE 3
FIGURE 13

sheet_13lowell_empire alt 3 lnwrk.dgn 2/24/2006 5:05:23 PM

Treasure Hill Conditional Use Permit - Construction Mitigation

Due to a conflict of interest, Commissioner Zimney recused herself from this item.

Planner Kirsten Whetstone remarked that the objective this evening was to allow the applicants the opportunity to address the Planning Commission and the public on the construction mitigation plan and to respond to questions that were raised when this plan was presented at the January 11 meeting.

Planner Whetstone reviewed the list of vantage points outlined in the Staff report, noting that these vantage points were discussed at the work session on January 25. These vantage points will be used for the visual analysis, the modeling, and the volumetric studies. Planner Whetstone anticipated that this information would be presented to the Planning Commission at the end of March or early April, after the applicants have had the opportunity to revise their drawings based on Planning Commission input. Planner Whetstone reported that on January 25, Commissioner Wintzer provided the Staff with a list of traffic questions and the Staff and the applicants are working towards answering those questions. In addition, the applicant's traffic engineer is preparing additional information that will be presented to the Planning Commission on March 1st. Planner Whetstone remarked that this item will be re-noticed and re-posted in an effort to notify any property owners new to the area. She commented on input she received about notifying everyone on Empire and Lowell, in addition to the requirement to notify property owners within 300 feet.

Chair Barth read a list of 10 items submitted by Commissioner Wintzer regarding the traffic study. 1) Commissioner Wintzer requested that someone show him that the recommendations contained in the traffic study could physically work. 2) He requested a scaled aerial photo showing the area with all the improvements recommended in the traffic study, starting at Park Avenue going up to the project. 3) He wanted to see the turning radius for the largest truck that would be allowed on the street at each intersection. 4) He requested that the applicant show how traffic will be handled at the Resort Center and whether any easements will be granted to the City. 5) He wanted to make sure there is enough land in the right-of-way by Cole's and Jan's to widen the road and whether UDOT would allow them to change the road. 6) He wanted to know how and where they would put walking traffic. 7) He wanted to know what widening Lowell and Empire would do to the existing off street parking. 8) He wanted to know if the City could make the commitment suggested in the traffic study for stepping up snow removal and parking enforcement. 9) He wanted to know how this project will impact the traffic compared to what exists today and to what degree the traffic will be increased. 10) He wanted to know how much additional traffic would be added to the streets during the 10 year build out period.

Pat Sweeney, the applicant, referred to the list of vantage points contained in the Staff report. He understood the Planning Commission had wanted to use the top of 6th Street as a vantage point as if they had built the stairs. He was willing to do 5th Street but he felt the view of the project would be obstructed by the Meadows home. Chair Barth understood Mr. Sweeney's point and requested that he do both vantage points.

Mr. Sweeney remarked that the scope this evening would be limited to construction mitigation and a presentation by Big D Construction. He noted that Jenny Smith with Park City Mountain Resort would talk about coordination with the Resort in terms of deliveries. Mr. Sweeney stated that their basic plan is to provide written answers to the comments and concerns raised by the public and the Planning Commission at the January meetings and to have this ready prior to the March meeting. In addition, Gary Horton, of PEC will answer Commissioner Wintzer's questions about the possibility of future improvements to the road system.

Jim Allison, representing Big D Construction, commented on one-way construction traffic. All deliveries to the project will go up Lowell and down Empire to help mitigate the risk of accidents and minimize the impacts on the surrounding neighborhood. This traffic pattern will also include the shuttles for construction personnel. Mr. Allison stated that there will be visible safety signage around the site so everyone will be aware of the pedestrian areas and where traffic comes into the site. He noted that fencing will be placed around the site to keep the construction separate from the public areas. There will be additional fencing along the frontage of the site to block views of the construction. Mr. Allison stated that a full-time traffic manager will be on-site at the entry way to monitor the safety of the pedestrians.

Chair Barth wanted to know what type of enforcement is planned to ensure that people follow the suggested plan. Chris Grzybowski replied that Big D Construction will know what is being delivered to the project so they will be able to control it. A road map will be included in the packet issued to vendors. Every delivery to this project will run on a specific delivery schedule and nothing will come to the site unless the delivery has been approved. This plan will also be coordinated with the Park City Mountain Resort activities. Jenny Smith, representing Park City Mountain Resort, explained that they are willing to coordinate with the Resort's parking manager and Big D Construction's site traffic control manager on a daily basis if necessary. They will coordinate delivery adjustments for time of year, time of day, weather, and special events. During Christmas through March, they have asked that no deliveries be made from 8:30 a.m. to 10:30 a.m. and no deliveries after 3:00 p.m. More flexibility will be allowed during the shoulder season and during the summer.

Mr. Allison presented a slide showing how the construction traffic will flow. He indicated how construction traffic will be moved off the road as soon as possible to avoid stopping on Lowell Avenue. The trucks are moved completely off the road and out of the way. A parking area offsite will be designated for employees and they will be shuttled to the site.

Commissioner Wintzer assumed that the parking area would be outside of the City. He was told that employee parking has been staged at Kimball Junction in the past but parking for this project has not yet been determined. Mr. Allison estimated the proposed materials for the site and added the number of truckloads which averaged 10 vehicles per hour. They plan on using a regular 5 day work week from 7:00 a.m. to 3:30 p.m. during the summer and 7:30 a.m. to 4:00 p.m. during the winter. Mr. Allison remarked that deliveries can be flexible with the exception of concrete pours which have to be delivered at certain times. Those would be limited to large deck pours which need to be early morning pours. He understood that the noise ordinance allows work to begin at 7:00 a.m. Mr. Allison stated that major deliveries will also require street flagging on Park Avenue to the stop light. He indicated the areas where they would stage flag men if special deliveries were being made, such as extra long or extra wide loads.

Corey Moore, with Big D Construction, reviewed an overlay showing the turning radius of a 70 foot semi-truck from Park Avenue to Empire Avenue, as well as both turns from Empire onto Manor and from Manor onto Lowell. The traffic engineer believes these turning radius are adequate and he will address this issue at the March 1 meeting. Mr. Moore remarked that Big D is proposing to do some major things that most construction sites do not offer in the way of traffic control. One is to eliminate construction traffic altogether by keeping all excavation material on-site. This should save 150 trucks per day. Mr. Grzybowski stated that this site is totally self-contained. They will schedule the haul-in of all major equipment, dump trucks, and conveying equipment and those trucks will stay on-site until the site has been completely excavated. He felt it was important to note that the Sweeney's have a soils mitigation plan.

Mr. Grzybowski noted that two employee shuttle buses will run in continuous cycles in the morning from 6:30-8:30 a.m. and 3-5 p.m. in the afternoon. This is a general time frame that can be adjusted based on the season. Mr. Grzybowski remarked that using shuttles will significantly reduce traffic impacts.

Mr. Grzybowski provided an overview of codes and policies, including noise levels. He noted that they will offer a monthly newsletter outlining constructions plans for the upcoming month, they will publish an access plan so people in the neighborhood will know how things will be going in and out of the site, and they will update their website daily to inform people of what is happening and let them know of any schedule changes, etc. Mr. Grzybowski commented on a communication tree which is a methodology for communicating with the neighbors, the City, and other stake holders around the project. Mr. Moore noted that previous meeting minutes mentioned a 10 years project duration, however they have accelerated this project and the actual duration is four to five years, with an orderly construction sequence. He explained how they intend to set up the construction site so it will be buffered and less intrusive to the neighborhood. Mr. Grzybowski presented a slide showing a truck wash for trucks leaving the site to keep construction debris from spilling onto the road. The site will be watered several times daily to mitigate excessive dust through the neighborhood.

Commissioner Wintzer recalled that the traffic mitigation plan talked about widening Lowell and Empire. He wanted to know how this would work with their plan for construction traffic since they would be tearing up the road they propose to use as an entrance. Mr. Sweeney was not prepared to respond and offered to find answers to this question. He stated that for a significant amount of time they would only be doing site excavation and moving dirt and material on-site and this could be a good time to re-build the roads. Mr. Sweeney noted that Ron Ivie and Eric DeHaan may have another perspective which would trump any other ideas. Mr. Moore pointed out that there is at least a year of design time left on this project which would allow lead time for planning and executing the road work. Commissioner Wintzer was unsure if the road could take five years of construction traffic in its present condition and he wanted to make sure this issue is addressed.

<u>RESPONSE: The Applicant will coordinate with and follow the lead of the City Engineer with respect to road improvements and timing.</u>

Commissioner Wintzer asked if they were willing to commit to working hours and a working schedule. Mr. Grzybowski replied that Big D Construction has worked in residential neighbors where they have had to commit to a working schedule. With the exception of some necessary unique pours that may require a special permit, he was comfortable committing to a work schedule.

Commissioner Wintzer asked if it is possible to leave excavated material on-site during the spring and fall when the ground is muddy. Mr. Grzybowski felt there would be some limitations and the engineers will help them determine the right approach based on conditions and what can and cannot be done with certain soils. Commissioner Wintzer asked if the materials would have to be removed from the site. Mr. Grzybowski reiterated that nothing would be taken offsite. Planner Whetstone explained that a study has been done on some of the mining adits and that study will be discussed with the applicants, an environmental specialist, and Ron Ivie. There are some mines and they need to find out whether that material can be capped on site or if it needs to be removed. She clarified that the City and the applicant may need to allow for flexibility if it becomes necessary to remove some material from the site. Planner Whetstone suggested that the Planning Commission highlight any points offered in the construction mitigation plan that they would like to see occur regardless of what construction company would do this project.

RESPONSE: The Applicant will meet all federal, state, and local standards with respect to mine waste mitigation. To the extent allowable by law, all material will remain on-site. There is an estimated 3,340 cubic yards of material some of which contains elevated levels of metals. This material was removed from the mines and dumped because it did not contain ore that was worth milling. No milling took place on-site. If necessary, any such mineralized material will be removed from the site in trucks importing material, for example gravel, thus not creating additional truck trips.

Commissioner Wintzer believed they would need to extend the hauling delivery dates to include Christmas, President's Birthday, and other peak days. He assumed they would be required to have hydrants and other fire protection measures in place before beginning construction.

RESPONSE: The intent of the Applicant is to avoid all major holiday peaks.

Chair Barth opened the public hearing.

Brian Van Hecke stated that the roads are not safe now and he did not understand how they could be safe for the future. He wondered why an alternate road above Lowell Avenue has not been considered as an option. Mr. Van Hecke was particularly concerned about Empire Avenue and he could not understand how construction traffic would get through when cars and pedestrians are also moving up and down the road. Mr. Van Hecke wanted to see the graphic display drawn to scale with the Old Town buildings and from different vantage points. He encouraged each Commissioner to visit the area after a snow fall to appreciate what the local people are facing. Mr. Van Hecke understood that when a house is being built the neighbors are notified via mail and he wondered why this is not being done with for this project since it affects all of Old Town.

RESPONSE: Treasure Hill is not responsible for existing traffic. Treasure Hill will cooperate with the City and neighbors to improve upon the existing traffic situation. Treasure Hill will provide hard improvements, impact fees, and additional tax base. Treasure Hill traffic will not diminish the current level of service according to two independent experts. A number of access alternatives were considered in the master plan process. It was determined that Lowell-Empire would be the access to the main element of the hillside portion of the Sweeney Master Plan. The City has provided the notice required by code and, in addition, Treasure Hill is providing a website. A revised graphic presentation is being prepared.

Chair Barth noted that a courtesy notice is mailed to people within 300 feet of the project per the Land Management Code. He felt this was a good question and he did not disagree. Planner Whetstone noted that there are other methods of noticing which include posting the property, radio announcements, posting agendas around town, and the newspaper.

Mr. Van Hecke believed that most residents were unaware that this meeting was taking place because they do not read the newspapers or listen to the radio. People always read their mail and he believed this was the best way to notify the public. RESPONSE: There are statutory requirements set forth in the City Code related to notification. If the City follows those requirements notice is sufficient. Mr. Van Hecke is not an expert on what people read or not read or what people do and don't listen to.

Mike Allred asked to see the slide showing delivery traffic circulation. He keeps bringing up the issue that no plan will be more safe than its weakest point but that issue has not yet been addressed. He explained why he did not believe the proposed traffic circulation would work and pointed out the weakest link in their delivery schedule plan. Mr. Allred remarked that until PCMR opens Lowell Avenue for the use of this project, this situation will not be remedied. He believed that the applicants should plan their construction deliveries with the understanding that there has to be two-way traffic at a certain point. If they cannot figure it out they will not be able to make deliveries successfully. Mr. Allred noted that one of Commissioner Wintzer's ten questions related to the impacts of this development on the human resources of this neighborhood. He felt the presentation this evening demonstrated his previous comment that Big D Construction is a good general contractor but not a good neighbor. They are saying that for four to five years ten trucks an hour or 80 trucks a day will be going up and down Lowell and Empire, along with 20 additional trips for shuttles. The excavation will take 518 days which means the neighbors will be listening to excavation equipment for at least that long. Mr. Allred remarked that the key component of a conditional use permit is that the project is compatible with the surrounding area and he believes the presentation this evening shows that this project is not compatible in any way. The traffic that the neighbors are being asked to deal with is very significant and the streets are incapable of handling the current traffic. Mr. Allred asked the Planning Commission to consider this as they continue on with the project.

RESPONSE: A one-way construction traffic pattern is proposed and has been shown as part of a number of presentations, copies of which are found on the website: www.treasurehillpc.com. Where the construction traffic becomes two-way at Manor and Empire human traffic control will be used. There will be an estimated peak of ten trucks per hour not necessarily 80 trucks a day. The excavation Mr. Allred refers to is a hypothetical used to demonstrate the impact if we were to export the material off-site. Since we are keeping the material on-site, we anticipate a much shorter excavation period and accordingly much less impact. PCMR has not closed the portion of Lowell Avenue in front of the Resort Center to construction traffic, however PCMR does feel it is important to retain the one-way use of the this section of road. PCMR will work with the developers on accessing Lowell Avenue via Empire to Silver King, traveling south (uphill) along Lowell to the project during the shoulder and summer seasons. PCMR feels this route would be difficult if not impossible during the busy period of the ski season because of the extremely heavy pedestrian use along the route as well as the increased bus traffic. Please be aware that at some point over the next several years the First Time and Silver King lots will be under development and further discussion regarding traffic mitigation will need to occur depending on the timing of construction activities. Treasure Hill's on-site traffic manager will be responsible for any impacts that may arise from use of this Empire/Silver King/Lowell route. The PCMR parking manager will assist as needed. From November 15th through April 15th PCMR requests that construction traffic use the Empire/Manor/Lowell avenue route.

Peter Barnes asked if on-site concrete batching has been considered to reduce the number of concrete deliveries. Mr. Barnes felt they needed to address the issue of blasting. Blasting can be done safely but it is noisy and the noise will impact the neighborhood. He suggested that blasting be addressed in the construction mitigation plan. Mr. Barnes favored the truck washing. He remarked that road construction and lowering the road to five feet will be the bigger impact to the neighborhood. He referred to the applicant's comment that the project was modified based on the assumption that

Lowell Avenue would be lowered by 5 feet and he wondered if that has already been decided. He referred to a drawing at the last meeting which showed a reduction in height. He noticed an 8'4" floor to floor height on one of the interior levels of the multi-story parking structure and assumed that was an error since you cannot build a multi-story with an 8 foot floor to floor height. He referred to Building 4B, Level 45, noting that if you read across that level it reads different heights from one side of the building to the other. He was looking forward to the next set of drawings in hopes that it would clear up the confusion. <u>RESPONSE: On-site batching is not practical and would increase the environmental impacts on the neighborhood. Please see attached letter from Norm Anderson Manager of Jack B. Parson Companies. Blasting itself does not have to be noisy. There is drilling noise involved but this is comparable to conventional ripping. Ultimately, if needed, blasting will shorten the excavation process and therefore lessen the impact. Please see attached blasting analyses report.</u>

Gary Knudsen, a resident at the corner of Manor Way and Empire, stated that on Saturday, around 10:00 a.m., cars are parked on both sides of the street and after a storm, you are lucky to move one-way traffic through there. There are no parking signs and parking is wide open. Mr. Knudsen understood that development is planned for the lower parking lot and he was unsure what will happen with parking if that occurs. Mr. Knudsen encouraged the Commissioners to drive through that area on Saturday so they can see how parked cars overflow on to the streets. He has expressed his concerns at several meetings and he has not seen any improvement in the traffic pattern. Mr. Knudsen was not against development but he believes they need to come up with an alternate plan for traffic. <u>RESPONSE: Mr. Knudsen’s concern is an enforcement issue. Any road without appropriate enforcement of parking restrictions would fail.</u>

Annie Lewis Garda, a resident at 923 Lowell Avenue, noted that one slide presented showed the fencing going across Creole One and the access to it. She recalled that when she spoke with Mr. Sweeney several years ago he felt that the run would be placed in a different location. She wondered if that had changed.

Mr. Sweeney replied that it is important for the lift to run every season and that factor is built into their understanding with the ski area. He noted that other people who depend on that lift have also helped make it possible. Mr. Sweeney did not anticipate closing any of the runs coming down Creole for more than one year. He used the two houses built on Upper Norfolk as an example of not having to close the trail. The houses on 5th Street are another example where the construction is on-going and the ski run goes right through it. Their objective is to maintain the current ski runs or alternative ski runs so the system works reasonably well.

Ms. Garda remarked that this is the first time she has heard the four to five year project time. She recalled that the applicant had requested that the architectural portion of the larger buildings not be defined right now because they do know who is going to build it. She wondered if this meant they would not begin the project until someone is lined up and they know the project can be completed in four to five years. In anticipation of the next meeting, Ms. Garda requested that a traffic count be done at Crescent Tram and Empire. Currently, the traffic study recommends that there be no right turns on to Crescent Tram or on to Empire coming down from Lowell and no left turns off of Crescent Tram. She could understand that recommendation but she did not think any consideration has been given to the fact that all of those cars will be going down Empire which will increase the traffic in that area. She noted that the residents do not have mail delivery which requires all of them to make one round trip per day to the Post Office. Ms. Garda stated that another recommendation is that Empire and Lowell become first priority snow removal streets. She reported that the residents received a brochure in the fall which indicated that they are already a first priority snow removal street. She was curious to know what difference this would be from the current situation and for any future situations. Ms. Garda commented on the issue of notification and felt it was reasonable to notify all the residents on Empire Avenue about meetings that deal with widening those streets. <u>RESPONSE: A traffic count was performed at Crescent and Empire on February 19th, 2005 and summarized in a letter dated April 6, 2005 to the Park City Engineer. Ultimately, it will be up to the City Engineer through the appropriate process to determine the necessary restrictions with respect to Crescent. Treasure Hill is doing everything possible to limit its contribution to traffic on Crescent, most importantly on-site amenities and the cabriolet connection to Main Street and the City bus system.</u>

Chair Barth agreed and asked Planner Whetstone if this could be done. Planner Whetstone stated that she has had numerous discussions with the City Engineer and changes to Empire and Lowell or many other City streets has a separate process which includes neighborhood workshops and public meetings. Planner Whetstone clarified that the City does not anticipate widening Empire and Lowell for this project. If there were to be specific changes to those streets the City would follow the proper process. Chair Barth offered to talk with the Legal Department regarding noticing.

Ms. Garda was confused because the spread sheet previously presented had specific cross sections showing how much is needed for pedestrians, for snow, and for the street. Now they are saying that the streets will not be made wider and she was unsure how they could reconcile those two things. If the plan that comes back on March 1 does not have a plan for pedestrian safety on Empire it will be a failure.

RESPONSE: There will be opportunities to widen Lowell. Whether or not this is the best thing for the community is a decision that will not be made in this CUP process but rather by the City through the appropriate process.

Gary Knudsen stated that when people cannot find parking on the lower parking lot they will park by the Town Lift. He was unsure how they could control that situation and felt this needed to be considered. RESPONSE: The necessary parking restrictions are in place and are enforced; in addition there is covered parking (Town Lift Plaza) that can accommodate 100 plus vehicles.

Jeff Love, a resident on Woodside, referred to Commissioner Wintzer's comment about restricting work hours on the project. He wondered if restricting the hours would cause the project to extend beyond four or five years. Mr. Love noted that the City has set guidelines for times and days when work can begin and end and he felt it was inappropriate to restrict this project beyond what the City has established as a guideline. RESPONSE: We agree.

Chair Barth continued the public hearing.

Director Putt asked the applicant about a time frame for when the materials will be available for the Staff to review prior to scheduling this on an agenda. Mr. Sweeney remarked that their plan is to take public comments and Commissioners comments from the minutes of this meeting and address each one in writing. He believed they could have a comprehensive written document well in advance of the March 1 meeting for the Staff and Planning Commission to review. Any additional questions or comments can be addressed at the next meeting. Director Putt suggested that they schedule a public hearing on March 1, assuming that the information can be coordinated between Staff and the applicant in a timely submittal. He remarked that the applicants have done a good job in outlining the frame work of where they are going with construction mitigation and he believes the Staff owes the public their response to that plan. If they can work with the applicant on a reasonable time frame, he recommended that they continue to March l. Director Putt requested clear direction on what the Planning Commission would like to discuss at the next meeting so they can work with the applicants on specific items. Chair Barth felt that the questions raised during the public hearing were well thought out and he would like responses to those questions and the questions submitted by Commission Wintzer.

Commissioner Wintzer noted that the conclusions of the traffic study are based on the fact that the road will be widened. If the road is not widened he was unsure if the traffic study would work. <u>RESPONSE: Commissioner Wintzer is misinformed; the conclusions of the traffic studies where base on existing road widths.</u> He requested that the City Engineer address what the City plans to do regarding this matter. Mr. Sweeney stated that the work will be done by PEC Engineering Consultants and they will present some of the possibilities at the next meeting. Planner Whetstone requested that the traffic engineers present their material well in advance of the March 1 meeting so Eric DeHaan can review it and plan to attend the meeting to make comment and answer questions.

Director Putt summarized that the public hearing will be continued to March 1, at which time they will address the questions submitted by Commissioner Wintzer and questions raised by the public this evening. The minutes will be given to Mr. Sweeney in a timely manner and specific questions contained in the minutes will be used as their points of discussion. The applicants will continue to work on some of the exhibits that show the most recent and refined site plan and the massing for review and discussion at a subsequent meeting.

Chair Barth worried about a heavy agenda on March 1 and whether applicants would be given proper time considerations for their projects. Director Putt remarked that there are a number of items that were rolled over from the February 22 meeting; however most of the applications should not be time consuming. He offered to organize the agenda so those applicants can be heard first.

Planner Whetstone offered to provide additional input from other City Departments to address some of the questions raised this evening. Commissioner Wintzer remarked that snow removal is a huge issue that needs to be addressed.

Commissioner Sletten stated that he has had an office at the Park City Mountain Resort since 1992 and has driven those streets in everything from Suburus to Suburbans. He remarked that the issues articulated by the public this evening are real concerns and he has personally experienced some of the problems mentioned. Commissioner Sletten stated that traffic issues related to the existing parking and the existing pedestrian access for the residents are extraordinary and mitigation for the on-street parking that exists needs to be addressed for all weather conditions, not just snow. This is a major issue and he was unsure how it could be mitigated.

MOTION: Commissioner Wintzer moved to CONTINUE this item to March 1, 2006. Commissioner Sletten seconded the motion.

VOTE: The motion passed unanimously.