HALES ENGINEERING
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Park City Heights

Traffic Impact Study

June 7, 2007

UT06-002

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I. INTRODUCTION

A. Purpose

This study addresses the traffic impacts associated with the proposed development of approximately 200 acres of land contiguous to the current Park City municipal boundary. The project is located east of SR 248, west of US-40 and both north and south of the old Landfill Road. The property to the north of the old landfill road (approximately 24 acres) is proposed to remain as open space and the property south of the old landfill road (approximately 176 acres) is proposed to become 110 acres of Open Space, 55 acres of residential development, and 10 acres of roads, etc. see the Conceptual Master Plan located in the Appendix A.

This study analyzed the traffic operations for existing conditions and plus project conditions (conditions after development of the proposed project) at key intersections and roadways in the vicinity of the site.

B. Scope

The study area was defined based on conversations with Park City staff. This study was scoped to evaluate the traffic operation performance impacts of the project on the following intersections:

- SR-248 / IHC intersection
- SR-248 / old landfill road
- old landfill road / West US-40 Frontage Road
- West US-40 Frontage Road / proposed North project access
- West US-40 Frontage Road / proposed South project access

At a Park City Heights task force meeting on September 26, 2006, a combined development review committee consisting of elected officials, appointed officials and staff members had been convened to review the traffic analysis for the proposed project, and recommended that an expanded scope should be evaluated to consider the following items:

1. Evaluate the need for a new signal at the Old Landfill Road intersection with SR-248 vs. a single traffic signal at the IHC intersection with SR-248
2. Evaluate the impacts of a future park and ride lot to be located at Richardson Flats
3. Identify the cut through traffic impacts on the Old Landfill Road (future analyses)
4. Look at the need for additional trail connections
5. Consider the impact of school buses

A follow up meeting was scheduled and held on October 4, 2006, between the Park City Heights development Team and Park City Staff members to discuss the expanded evaluation. It was determined at this meeting that Hales Engineering would address the first

three issues and that Park City Staff would evaluate the last two items. The original report has been modified to include discussion on the three topics previously identified.

C. Analysis Methodology

Level of service (LOS) is a term that describes the operating performance of an intersection or roadway. LOS is measured quantitatively and reported on a scale from A to F, with A representing the best performance and F the worst. Table 1 provides a brief description of each LOS letter designation and an accompanying average delay per vehicle for both signalized and unsignalized intersections.

The Highway Capacity Manual 2000 (HCM 2000) methodology was used in this study to remain consistent with "state-of-the-practice" professional standards. This methodology has different quantitative evaluations for signalized and unsignalized intersections. For signalized intersections, the LOS is provided for the overall intersection (weighted average of all approach delays). For unsignalized intersections LOS is reported based on the worst approach. Hales Engineering has also calculated overall delay values for unsignalized intersections, which provides additional information and represents the overall intersection conditions rather than just the worst approach.

D. Level of Service Standards

For the purposes of this study, a minimum overall intersection performance for each of the study intersections was set at LOS D. However, if LOS E or F for an individual approach at an intersection exists, explanation and / or mitigation measures will be presented.

An LOS D threshold is consistent with "state-of-the-practice" traffic engineering principles for suburban and non-CBD urbanized intersections.

Table 1

Level of Service Descriptions

Level of Service	Description of Traffic Conditions	Average Delay (seconds / vehicle)
SIGNALIZED INTERSECTIONS[1]		
A	Extremely favorable progression and a very low level of control delay. Individual users are virtually unaffected by others in the traffic stream.	0 ≤ 10.0
B	Good progression and a low level of control delay. The presence of other users in the traffic stream becomes noticeable.	> 10.0 and ≤ 20.0
C	Fair progression and a moderate level of control delay. The operation of individual users becomes somewhat affected by interactions with others in the traffic stream.	>20.0 and ≤ 35.0
D	Marginal progression with relatively high levels of control delay. Operating conditions are noticeably more constrained.	> 35.0 and ≤ 55.0
E	Poor progression with unacceptably high levels of control delay. Operating conditions are at or near capacity.	> 55.0 and ≤ 80.0
F	Unacceptable progression with forced or breakdown operating conditions.	> 80.0
UNSIGNALIZED INTERSECTIONS[2]		**Worst Approach Delay (seconds / vehicle)**
A	Free Flow / Insignificant Delay	0 ≤ 10.0
B	Stable Operations / Minimum Delays	>10.0 and ≤ 15.0
C	Stable Operations / Acceptable Delays	>15.0 and ≤ 25.0
D	Approaching Unstable Flows / Tolerable Delays	>25.0 and ≤ 35.0
E	Unstable Operations / Significant Delays Can Occur	>35.0 and ≤ 50.0
F	Forced Flows / Unpredictable Flows / Excessive Delays Occur	> 50.0

Source:

1. Hales Engineering Descriptions, based on *Highway Capacity Manual, 2000 Methodology* (Transportation Research Board, 2000).
2. Hales Engineering Descriptions, based on *Highway Capacity Manual, 2000 Methodology* (Transportation Research Board, 2000).

II. EXISTING (2006) BACKGROUND CONDITIONS

A. Purpose

The purpose of the existing (2006) background analysis is to study the intersections and roadways during the peak travel periods of the day under background traffic and geometric conditions. Through this analysis, background traffic operational deficiencies can be identified and potential mitigation measures recommended.

B. Roadway System

The primary roadways that will provide access to the project site are described below:

- SR-248 – is a state-operated roadway (classified as an, "other Principal Arterial") that provides direct access to Park City from US-40. This roadway is currently composed of a three-lane cross section with one travel lane in each direction and a center two-way left turn lane in the vicinity of the project. UDOT has classified SR-248 in the vicinity of the project as a Category 4, Regional Rural Corridor, which identifies minimum signalized intersection spacing at 1/2-mile (2,640 feet), minimum street spacing at 1/8-mile (660 feet) spacing, and minimum access spacing at 500 feet. In the vicinity of the project, SR-248 has a posted speed limit of 50 mph.

- old landfill road – is a county-operated roadway that will provide indirect access to the proposed Park City Heights project. This street currently has a two-lane cross section with one travel lane in each direction, and little to no shoulders. This road does not have a posted speed limit, but due to the current pavement conditions vehicles are traveling at relatively low speeds (20-25 mph). This road is paved near SR-248 and intermittently to the proposed project site.

- West Frontage Road – is a county-operated gravel roadway that will provide direct access to the proposed Park City Heights project. On the north end of this road near the old landfill road, the gravel cross-section is approximately 20 feet wide, however, as you go south this road narrows to approximately 12-14 feet in width. This road does not have a posted speed limit.

C. Traffic Volumes

Hales Engineering performed weekday a.m. (7:00 to 9:00) and p.m. (4:00 to 6:00) peak period traffic counts at the following intersection(s):

- SR-248 / old landfill road

These counts were performed on Tuesday, August 22, 2006. Based on the combination of current (2006) intersection volumes and traffic generated by the site, the weekday p.m. peak hour was the critical time period identified for analysis. Detailed count data is included in Appendix B.

The traffic counts were adjusted to represent volumes for an average day of the year using UDOT's permanent count station information on SR-248 (Station 606). The traffic volume adjustments were based on monthly adjustment factors published by Utah Department of Transportation (UDOT). As requested by Park City staff, Hales Engineering incorporated the IHC information (e.g. projected site related traffic, projected signalization, etc.). The combination of the 2006 adjusted traffic counts collected by Hales Engineering, balanced with the IHC data created a cumulative background condition for analyses. See supporting information in Appendix C.

D. Level of Service Analysis

Using Synchro and the Highway Capacity Software (HCS) which follow the Highway Capacity Manual (HCM) 2000 methodology introduced in Chapter I, the p.m. peak hour LOS was computed for each study intersection as well as the proposed relocation of the intersection to the north servicing the proposed IHC Hospital, the Quinn's Recreation Center and several existing land uses. The results of this analysis are reported in Table 2 (see Appendix D for the detailed LOS reports). Synchro was used for the signalized SR-248 intersections to provide a direct correlation between the previous work completed in the vicinity of the interchange / IHC access. HCS was used for the stop controlled intersections on the old landfill road since each of these study intersections function as isolated intersections under current and plus project conditions. These results serve as a baseline condition for the impact analysis of the proposed development. As shown in Table 2, based on overall intersection averages, all of the study intersections experience acceptable levels of delay.

E. Mitigation Measures

Although the overall SR-248 / old landfill road intersection performs acceptably, the westbound left turn movement experiences high levels of delay during the peak hours. A Quinn's Junction / SR-248 Access Study dated December 6, 2006 prepared by Horrocks Engineers, stated that the SR-248 / old landfill road should be signalized in the future.

Hales Engineering recommends that although this intersection does not meet the peak hour traffic volume signal warrant located in the Manual on Uniform Traffic Control Devices (MUTCD), it could qualify for a systems warrant provided that this location has been identified for signal controlled access in a signed and executed Corridor Agreement between UDOT, Park City and/or Summit County. If signalized, this intersection could function at an overall LOS C or better, a detailed analysis is included in Appendix D.

Table 2

Existing (2006)
p.m. Peak Hour Level of Service

Intersection			Worst Approach			Overall Intersection	
ID	Description	Control	Approach[1]	Aver. Delay (Sec / Veh)[1]	LOS[1]	Aver. Delay (Sec / Veh)[2]	LOS
1	SR-248 / IHC Access Road	Proposed Signal[3]	N/A	N/A	N/A	17.7	B
2	SR-248 / old landfill road	Unsignalized	WB Left	31.2	D	<1.0	A

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).
3. All intersections were evaluated using Synchro software.

Source: Hales Engineering, August 2006

III. PROJECT CONDITIONS

A. Purpose

The project conditions analysis explains the type and intensity of development. This provides the basis for trip generation, distribution, and assignment of project trips to the surrounding study intersections defined in the Introduction.

B. Project Description

This study addresses the traffic impacts associated with the proposed development of approximately 200 acres of land contiguous to the current Park City municipal boundary. The project is located east of SR 248, west of US-40 and both north and south of the old Landfill Road. The property to the north of the old landfill road (approximately 24 acres) is proposed to remain as open space and the property south of the old landfill road (approximately 176 acres) is proposed to become 110 acres of Open Space, 55 acres of residential development, and 10 acres of roads, etc. see the Conceptual Master Plan located in the Appendix A.

The proposed cumulative land use for Park City Heights (including the Talisker and IHC affordable housing) will be as follows:

- Residential: **317 Units**
  - 207 single family dwelling units
  - 110 townhomes / condominiums

At a meeting on September 26, 2006, it was requested that Hales Engineering include:

- An evaluation of the need for a new signal at the Old Landfill Road intersection with SR-248 vs a single traffic signal at the IHC intersection with SR-248
- An evaluation of the impacts of a future park and ride lot to be located at Richardson Flats
  - It was determined that 100 stalls would be added to the existing 2006 analyses and that an additional 650 stalls (750 total stalls) would be added to the future 2020 conditions analyses
- Identify the cut through traffic impacts on the Old Landfill Road
  - This will be completed for the future 2020 analyses

C. Trip Generation

Trip generation for the project was computed using trip generation rates published in the Institute of Transportation Engineers (ITE) *Trip Generation, 7th Edition*, 2003. Trips were generated using the land use intensity previously described and are summarized in Table 3 for the cumulative Park City Heights development at full build-out conditions.

Table 3
Park City Heights
Trip Generation

Land Use[1]	Number of Units	Unit Type	Daily Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	**Total Daily Trips**
Condominium (230)	110	Dwelling Unit	696	50%	50%	348	348	**696**
Single Family Detached (210)	207	Dwelling Unit	2,031	50%	50%	1,015	1,015	**2,030**
Project Total Daily Trips						**1,363**	**1,363**	**2,726**
Land Use[1]	Number of Units	Unit Type	a.m. Peak Hour Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	**Total a.m. Trips**
Condominium (230)	110	Dwelling Unit	56	17%	83%	9	46	**55**
Single Family Detached (210)	207	Dwelling Unit	154	25%	75%	39	116	**155**
Project Total Daily Trips						**48**	**162**	**210**
Land Use[1]	Number of Units	Unit Type	p.m. Peak Hour Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	**Total p.m. Trips**
Condominium (230)	110	Dwelling Unit	65	67%	33%	44	21	**65**
Single Family Detached (210)	207	Dwelling Unit	206	63%	37%	130	76	**206**
Project Total Daily Trips						**174**	**97**	**271**
Land Use[1]	Number of Units	Unit Type	Sat. Daily Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	**Total Sat. Daily Trips**
Condominium (230)	110	Dwelling Unit	826	50%	50%	413	413	**826**
Single Family Detached (210)	207	Dwelling Unit	2,085	50%	50%	1,043	1,043	**2,086**
Project Total Daily Trips						**1,456**	**1,456**	**2,912**
Land Use[1]	Number of Units	Unit Type	Sat. Peak Hour Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	**Total Sat. Peak Hour Trips**
Condominium (230)	110	Dwelling Unit	75	54%	46%	40	34	**74**
Single Family Detached (210)	207	Dwelling Unit	195	54%	46%	105	90	**195**
Project Total Daily Trips						**145**	**124**	**269**

1. Land Use Code from the *Institute of Transportation Engineers - 7th Edition Trip Generation Manual (ITE Manual)*

SOURCE: Hales Engineering, June 2007

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The ITE trip generation rates identify gross trips to and from a facility as if it were a stand-alone activity. Gross ITE trip generation rates do not account for trips already on adjacent roadways or for internal capture. Hales Engineering did not adjust the gross trip generation to account for pass-by or internal capture trips that are already on the adjacent roadway and trips that are internal to the project site because this site functions as an independent land use.

D. Trip Distribution and Assignment

Project traffic was assigned to the roadway network based on the proximity of project access points to major streets, high population densities, and regional trip attractions. Existing travel patterns observed during data collection also provided helpful guidance to establishing these distribution percentages, especially in close proximity to the site. The resulting overall distribution of project generated trips is as follows:

From the project site:
- 70% North on West US-40 Frontage Road
- 30% North on west project access

From the West US-40 Frontage Road:
- 95% West on the old landfill road
- 5% East on the old landfill road

From the old landfill road:
- 52% South on SR-248
- 43% North on SR-248

These trip distribution assumptions were distributed to the study intersections to estimate the p.m. peak hour project generated trips.

E. Access Spacing

SR-248

As proposed in the Quinn's Junction / SR-248 Access Study dated December 6, 2006 and prepared by Horrocks Engineers, the access spacing selected for implementation was Option 3, see figure in Appendix E. Option 3 identifies the relocated IHC access located 0.32 miles (1,700 feet) south of the US-40 southbound ramps. The next intersection to the south, old landfill road, is located 0.36 miles (1,900 feet) south of the relocated IHC intersection. UDOT has classified SR-248 in the vicinity of the project as a Category 4, Regional Rural Corridor, which identifies minimum signalized intersection spacing at 1/2-mile (2,640 feet), minimum street spacing at 1/8-mile (660 feet) spacing, and minimum access spacing at 500 feet. This information was obtained from UDOT's web site in their publication titled, "State Highway Access Category Inventory" and dated May 2006.

EXECUTIVE SUMMARY

This study addresses the traffic impacts associated with the proposed development of approximately 200 acres of land contiguous to the current Park City municipal boundary. The project is located east of SR 248, west of US-40 and both north and south of the old Landfill Road. The property to the north of the old landfill road (approximately 24 acres) is proposed to remain as open space and the property south of the old landfill road (approximately 176 acres) is proposed to become 110 acres of Open Space, 55 acres of residential development, and 10 acres of roads, etc. see the Conceptual Master Plan located in the Appendix A.

At a Park City Heights task force meeting on September 26, 2006, a combined development review committee consisting of elected officials, appointed officials and staff members had been convened to review the traffic analysis for the proposed project, and recommended that an expanded scope should be evaluated to consider the following items:

1. Evaluate the need for a new signal at the Old Landfill Road intersection with SR-248 vs a single traffic signal at the IHC intersection with SR-248
2. Evaluate the impacts of a future park and ride lot to be located at Richardson Flats
3. Identify the cut through traffic impacts on the Old Landfill Road (future analyses)
4. Look at the need for additional trail connections
5. Consider the impact of school buses

A follow up meeting was scheduled and held on October 4, 2006, between the Park City Heights development Team and Park City Staff members to discuss the expanded evaluation. It was determined at this meeting that Hales Engineering would address the first three issues and that Park City Staff would evaluate the last two items. The original report has been modified to include discussion on the three topics previously identified.

This study analyzed the traffic operations for existing conditions and plus project conditions (conditions after development of the proposed project) at key intersections and roadways in the vicinity of the site. In addition, future 2020 conditions were also evaluated for background and plus project scenarios.

TRAFFIC ANALYSIS

The following is an outline of the traffic analysis performed by Hales Engineering for the respective traffic conditions of this project.

Existing (2006) Background Conditions Analysis

- Hales Engineering collected a.m. and p.m. peak period counts at the following intersection(s):

In locations where existing roads intersect state highways, it is not always feasible to comply with the new access management standards retroactively, therefore, a variance process exists that will allow deviation from the new standards. The relocated IHC access will not meet the current UDOT access management standards (½ mile), however, in urbanizing areas signalized access spacing at ¼ mile (1,320 feet) intervals is acceptable. Since the old landfill road will not be relocated, it is not likely that a variance request will be necessary, however, the relocated IHC access will need to apply for a variance from the currently published UDOT access management standards.

Access management standards should not be a problem on either the West US-40 Frontage Road or the old landfill road in the vicinity of the proposed Park City Heights project.

IV. EXISTING (2006) PLUS PROJECT CONDITIONS

A. Purpose

This section of the report examines the traffic impacts of the proposed project at each of the study intersections. The trips generated by the proposed cumulative Park City Heights development, and the proposed park and ride lot with 100 stalls were combined with the existing background traffic volumes to create the existing plus project conditions. The existing plus project scenario evaluates the impacts of the project traffic on the existing roadway network assuming full build out of each project. This scenario provides valuable insight into the potential impacts of the proposed project on background traffic conditions.

As requested by the Park City Heights Task Force committee, Hales Engineering evaluated two scenarios, the one previously identified and another assuming realignment of the old landfill road into the IHC access creating a single signalized intersection.

B. Traffic Volumes

Project trips were assigned to the study intersections based on the trip distribution percentages discussed in Chapter III and permitted intersection turning movements. Generally, project trips are layered directly onto existing background traffic conditions and this traffic study will not be an exception. The accesses, parking, and internal circulation of this project will be reviewed and discussed in more detail following annexation.

The existing (2006) plus project p.m. peak hour volumes were generated for the study intersections and are shown in Appendix C and were large enough to meet Warrant 3 – Peak Hour Volume as identified in the Manual on Uniform Traffic Control Devices (MUTCD), therefore, it was assumed that the old landfill road was signalized for the two signal scenario. Also included in Appendix C are the Park City Heights, UPCM and IHC attainable housing combined trip assignments.

C. Level of Service Analysis

Using Synchro which follows the Highway Capacity Manual (HCM) 2000 methodology introduced in Chapter I, the p.m. peak hour LOS was computed for each study intersection as well as the proposed relocation of the intersection to the north servicing the proposed IHC Hospital, the Quinn's Recreation Center and several existing land uses. The results of this analysis are reported in Table 4 (see Appendix D for the detailed LOS reports).

As shown in Table 4, based on overall intersection averages, all of the study intersections experience acceptable levels of delay.

Table 4

Existing (2006) Plus Project – Two Traffic Signals
p.m. Peak Hour Level of Service

Intersection			Worst Approach			Overall Intersection	
ID	Description	Control	Approach[1]	Aver. Delay (Sec / Veh)[1]	LOS[1]	Aver. Delay (Sec / Veh)[2]	LOS[2]
1	SR-248 / IHC Access Road	Proposed Signal[3]	N/A	N/A	N/A	16.0	B
2	SR-248 / old landfill road	Proposed Signal[3]	N/A	N/A	N/A	21.0	C
3	old landfill road / West Project Access	Unsignalized	NB Left	11.1	B	1.0	A
4	old landfill road / West US-40 Frontage Road	Unsignalized	NB Left	10.2	B	2.6	A

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).
3. All intersections were evaluated using Synchro software.

Source: Hales Engineering, June 2007

The results of the single signalized intersection analysis are reported in Table 5 (see Appendix D for the detailed LOS reports). Synchro / SimTraffic were used for the signalized SR-248 intersections to provide a statistical evaluation of the interaction between the intersections. HCS was used for the stop controlled intersections on the old landfill road since each of these study intersections function as isolated intersections under current and plus project conditions. As shown in Table 5, based on overall intersection averages, all of the study intersections experience acceptable levels of delay. However, it should be noted that the reserve capacity of the single signalized intersection is not large and will quickly be overwhelmed with background traffic growth.

D. Mitigation Measures

Old landfill road traffic signal

- The existing (2006) plus project p.m. peak hour volumes were generated for the study intersections were large enough to meet Warrant 3 – Peak Hour Volume as identified in the Manual on Uniform Traffic Control Devices (MUTCD), therefore, it was assumed that the old landfill road was signalized for two signal scenario.

- The westbound movements should be separated into a shared left / through lane and a right turn pocket of 150-feet in length.
- The north and southbound left turn lanes should be on a permissive / protected phase.
- A northbound right turn pocket should be added (150-feet).

Table 5

Existing (2006) Plus Project – One Traffic Signal
p.m. Peak Hour Level of Service

Intersection			Worst Approach			Overall Intersection	
ID	Description	Control	Approach[1]	Aver. Delay (Sec / Veh)[1]	LOS[1]	Aver. Delay (Sec / Veh)[2]	LOS[2]
1	SR-248 / IHC Access Road	Proposed Signal[3]	N/A	N/A	N/A	34.9	C
2	SR-248 / old landfill road	N/A	N/A	N/A	N/A	N/A	N/A
3	old landfill road / West Project Access.	Unsignalized	NB Left	11.1	B	1.0	A
4	old landfill road / West US-40 Frontage Road	Unsignalized	NB Left	10.2	B	2.6	A

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).
3. All signalized intersections were evaluated using Synchro / SimTraffic stochastic software.
4. All unsignalized intersections were evaluated using HCS deterministic software.

Source: Hales Engineering, June 2007

According to UDOT's *Administrative Rule 930-6, Accommodation of Utilities and the Control and Protection of State Highway Rights of Way,* a Category 4 classified roadway, SR-248 at its intersection with old landfill road requires:

1. a southbound left turn lane, deceleration lane and taper to accommodate more than 10 vehicles per hour making this movement
2. a northbound right turn pocket, deceleration lane and taper to accommodate more than 25 vehicles per hour making this movement
3. a westbound to northbound right turn acceleration lane and taper to accommodate more than 50 vehicles per hour on roadways with speed limits greater than 40 mph

V. Future (2020) BACKGROUND CONDITIONS

A. Purpose

The purpose of the future 2020 background analysis is to study the intersections and roadways during the peak travel periods of the day during future background traffic and geometric conditions. Through this analysis, background traffic operational deficiencies can be identified and potential mitigation measures recommended.

B. Traffic Volumes

In order to project the future traffic conditions on SR-248 a review of the 20-year historical growth patterns was completed. This review shows that there have been fluctuations in the growth over the last twenty years but the most recent trend (2001 – 2005) has been an upward growth of approximately 6.7%. Projecting this same trend line from 2005 to year 2020 (the planning horizon chosen by Park City Staff), the future traffic volumes would be approximately 24,800 vehicles a day. The future 2020 analyses were completed using the 24,800 vehicles a day as a base line condition.

C. Level of Service Analysis

Using Synchro and the Highway Capacity Software (HCS) which follow the Highway Capacity Manual (HCM) 2000 methodology introduced in Chapter I, the p.m. peak hour LOS was computed for each study intersection as well as the proposed relocation of the intersection to the north servicing the proposed IHC Hospital, the Quinn's Recreation Center and several existing land uses. The results of this analysis are reported in Table 6 (see Appendix D for the detailed LOS reports). Synchro was used for the signalized SR-248 intersections to remain consistent with the methodologies from previous studies completed on the corridor. These results serve as a baseline condition for the impact analysis of the proposed development. As shown in Table 6, based on overall intersection averages, each of the study intersections experience unacceptable levels of delay.

D. Mitigation Measures

Although the overall SR-248 / old landfill road intersection performs acceptably, the east and westbound left turn movements experience high levels of delay during the peak hours. A Quinn's Junction / SR-248 Access Study dated December 6, 2006 prepared by Horrocks Engineers, stated that the SR-248 / old landfill road should be signalized in the future.

Hales Engineering recommends that although this intersection does not meet the peak hour traffic volume signal warrant located in the Manual on Uniform Traffic Control Devices (MUTCD), it could qualify for a systems warrant provided that this location has been identified for signal controlled access in a signed and executed Corridor Agreement between UDOT, Park City and/or Summit County. If signalized, this intersection could function at an overall LOS C or better, a detailed analysis is included in Appendix D.

Table 6

Future (2020)
p.m. Peak Hour Level of Service

Intersection			Worst Approach			Overall Intersection	
ID	Description	Control	Approach[1]	Aver. Delay (Sec / Veh)[1]	LOS[1]	Aver. Delay (Sec / Veh)[2]	LOS
1	SR-248 / IHC Access Road	Proposed Signal[3]	N/A	N/A	N/A	76.1	E
2	SR-248 / old landfill road	Unsignalized	E&WB Left	>50.0	F	8.8	A

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).
3. All intersections were evaluated using Synchro software.

Source: Hales Engineering, November 2006

The future 2020 traffic volumes are projected to increase to the point that two north and southbound through lanes will be necessary in order to maintain reasonable levels of service along SR-248. Table 7 shows the anticipated LOS for the study intersections with the mitigated cross section.

Table 7

Future (2020) - Mitigated
p.m. Peak Hour Level of Service

Intersection			Worst Approach			Overall Intersection	
ID	Description	Control	Approach[1]	Aver. Delay (Sec / Veh)[1]	LOS[1]	Aver. Delay (Sec / Veh)[2]	LOS
1	SR-248 / IHC Access Road	Proposed Signal[3]	N/A	N/A	N/A	21.5	C
2	SR-248 / old landfill road	Unsignalized	E&WB Left	>50.0	F	1.6	A

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).
3. All intersections were evaluated using Synchro software.

Source: Hales Engineering, November 2006

E. Park City Heights Task Force Analyses

This section of the report examines the traffic impacts created by layering known potential projects on top of the future 2020 background traffic conditions. The known projects are as follows:

- the proposed park and ride lot with 750 total stalls (build-out conditions)
- the potential Brown's Park cut through traffic on the old landfill road

Each potential project will be discussed briefly:

The proposed park and ride lot with 750 total stalls will generate approximately 270 vehicle trips during the peak hour (36%), plus the busses needed to move people back and forth. Current headways on the Kimball Junction route are 30 minutes with two buses per hour. In order to service this lot and the 270 person peak hour demand, approximately 8 buses will be needed which means a 7 to 8 minute headway during this peak hour. The total vehicular demand will be 270 passenger cars and 8 buses or 278 vehicles.

The potential Brown's Park cut through traffic was evaluated based on existing travel demands and future roadway connectivity. Currently, 41% of the traffic on SR-248 east of US-40 is either going to or coming from Park City during the p.m. peak period of the day. Growth projections on east SR-248 show that the future (2020) average daily traffic will be approximately 26,570 daily trips including the development of Iroquois and Tuhaye projects. With 2,660 trips occurring during the p.m. peak hour and 41% of those trips headed to/from Park City, the demand will be approximately 1,090 vehicles. If 50% of these vehicles use the back door route into Park City, there would be an additional 545 new vehicles on the old landfill road during the peak hour. See Table 8 for Iroquois and Tuhaye trip generation totals.

This scenario evaluates the impacts of each of these potential neighboring projects on the mitigated roadway network assuming full build out and 100% occupancy of each project. This scenario provides valuable insight into the potential impacts of the proposed projects on future 2020 background mitigated traffic conditions.

As requested by the Park City Heights Task Force committee, Hales Engineering evaluated two scenarios; one with new traffic signals at the IHC entrance and on the old landfill road and the other scenario assumes realignment of the old landfill road into the IHC access creating a single signalized intersection.

Table 9 shows that when the traffic from the various developments is dispersed through two traffic signals, each intersection will maintain a lower overall delay per vehicle value and associated level of service. In contrast, Table 10 shows that when the traffic is concentrated at a single intersection, the results are a higher delay per vehicle value and associated level of service.

Table 8
Wasatch County Projects
Trip Generation

Land Use[1]	Number of Units	Unit Type	Daily Trip Generation	Internal Capture	% Entering	% Exiting	Trips Entering	Trips Exiting	**Total Daily Trips**
SFDU (210) - Iroquois North	300	Dwelling Unit	2,857	0%	50%	50%	1,428	1,428	**2,857**
SFDU (210) - Iroquois South	225	Dwelling Unit	2,193	10%	50%	50%	987	987	**1,973**
Village Center (820)	100	1,000 Sq. Ft. GLA	6,791	10%	50%	50%	3,056	3,056	**6,112**
SFDU (210) - Tuhaye	900	Dwelling Unit	7,849	0%	50%	50%	3,925	3,925	**7,849**
Project Total Daily Trips							9,396	9,396	18,792
Passby Trips (25% of commercial)							764	764	1,528
Net Project Total Daily Trips							**8,632**	**8,632**	**17,264**
Land Use[1]	Units	Type	a.m. Peak Hour Trip Generation	Internal Capture	Entering	Exiting	Entering	Exiting	**Trips**
SFDU (210) - Iroquois North	300	Dwelling Unit	219	0%	25%	75%	55	165	**219**
SFDU (210) - Iroquois South	225	Dwelling Unit	167	10%	25%	75%	38	113	**150**
Village Center (820)	100	1,000 Sq. Ft. GLA	103	10%	61%	39%	57	36	**93**
SFDU (210) - Tuhaye	900	Dwelling Unit	639	0%	25%	75%	160	480	**639**
Project Total Daily Trips							309	793	1,102
Passby Trips (25% of commercial)							14	9	23
Net Project Total Daily Trips							**295**	**784**	**1,079**
Land Use[1]	Number of Units	Unit Type	p.m. Peak Hour Trip Generation	Internal Capture	% Entering	% Exiting	Trips Entering	Trips Exiting	**Total p.m. Trips**
SFDU (210) - Iroquois North	300	Dwelling Unit	288	0%	63%	37%	182	107	**288**
SFDU (210) - Iroquois South	225	Dwelling Unit	222	10%	63%	37%	126	74	**200**
Village Center (820)	100	1,000 Sq. Ft. GLA	626	10%	48%	52%	270	293	**563**
SFDU (210) - Tuhaye	900	Dwelling Unit	774	0%	63%	37%	488	287	**774**
Project Total Daily Trips							1,066	760	1,826
Passby Trips (25% of commercial)							68	73	141
Net Project Total Daily Trips							**998**	**687**	**1,685**
Land Use[1]	Number of Units	Unit Type	Sat. Daily Trip Generation	Internal Capture	% Entering	% Exiting	Trips Entering	Trips Exiting	**Total Sat. Daily Trips**
SFDU (210) - Iroquois North	300	Dwelling Unit	2,956	0%	50%	50%	1,478	1,478	**2,956**
SFDU (210) - Iroquois South	225	Dwelling Unit	2,256	10%	50%	50%	1,015	1,015	**2,030**
Village Center (820)	100	1,000 Sq. Ft. GLA	9,240	10%	50%	50%	4,158	4,158	**8,316**
SFDU (210) - Tuhaye	900	Dwelling Unit	8,302	0%	50%	50%	4,151	4,151	**8,302**
Project Total Daily Trips							10,802	10,802	21,604
Passby Trips (25% of commercial)							1039	1,039	2,079
Net Project Total Daily Trips							**9,762**	**9,762**	**19,525**
Land Use[1]	Number of Units	Unit Type	Sat. Peak Hour Trip Generation	Internal Capture	% Entering	% Exiting	Trips Entering	Trips Exiting	**Total Sat. Peak Hour Trips**
SFDU (210) - Iroquois North	300	Dwelling Unit	275	0%	54%	46%	148	126	**275**
SFDU (210) - Iroquois South	225	Dwelling Unit	209	10%	54%	46%	102	86	**188**
Village Center (820)	100	1,000 Sq. Ft. GLA	866	10%	52%	48%	405	374	**779**
SFDU (210) - Tuhaye	900	Dwelling Unit	803	0%	54%	46%	434	369	**803**
Project Total Daily Trips							1,089	956	2,045
Passby Trips (25% of commercial)							101	93	195
Net Project Total Daily Trips							**987**	**863**	**1,850**

1. Land Use Code from the *Institute of Transportation Engineers - 7th Edition Trip Generation Manual (ITE Manual)*

SOURCE: Hales Engineering, November 2006

Table 9

Future (2020) – Two Traffic Signals
p.m. Peak Hour Cumulative Conditions Level of Service

Intersection			Worst Approach			Overall Intersection	
ID	Description	Control	Approach[1]	Aver. Delay (Sec / Veh)[1]	LOS[1]	Aver. Delay (Sec / Veh)[2]	LOS
1	SR-248 / IHC Access Road	Proposed Signal[3]	N/A	N/A	N/A	18.1	B
2	SR-248 / old landfill road	Proposed Signal[3]	N/A	N/A	N/A	16.5	B

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).
3. All intersections were evaluated using Synchro software.

Source: Hales Engineering, June 2007

Table 10

Future (2020) – One Traffic Signal
p.m. Peak Hour Cumulative Level of Service

Intersection			Worst Approach			Overall Intersection	
ID	Description	Control	Approach[1]	Aver. Delay (Sec / Veh)[1]	LOS[1]	Aver. Delay (Sec / Veh)[2]	LOS
1	SR-248 / IHC Access Road	Proposed Signal[3]	N/A	N/A	N/A	36.5	D
2	SR-248 / old landfill road	Unsignalized	N/A	N/A	N/A	N/A	N/A

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).
3. All intersections were evaluated using Synchro software.

Source: Hales Engineering, June 2007

VI. Future (2020) PLUS PROJECT CONDITIONS

A. Purpose

This section of the report examines the traffic impacts of the proposed project at each of the study intersections. The trips generated by the proposed cumulative Park City Heights development were combined with the future 2020 background cumulative traffic volumes to create the future 2020 plus project conditions. This scenario provides valuable insight into the potential impacts of the proposed project on future 2020 background traffic conditions.

As requested by the Park City Heights Task Force committee, Hales Engineering evaluated two scenarios, one with two intersections and another assuming realignment of the old landfill road into the IHC access creating a single signalized intersection.

B. Traffic Volumes

Project trips were assigned to the study intersections based on the trip distribution percentages discussed in Chapter III and permitted intersection turning movements. Generally, project trips are layered directly onto future background traffic conditions and this traffic study will not be an exception. The accesses, parking, and internal circulation of this project will be reviewed and discussed in more detail following annexation.

C. Level of Service Analysis

Using Synchro which follows the Highway Capacity Manual (HCM) 2000 methodology introduced in Chapter I, the future 2020 p.m. peak hour LOS was computed for each study intersection as well as the proposed relocation of the intersection to the north servicing the proposed IHC Hospital, the Quinn's Recreation Center and several existing land uses. The results of this analysis are reported in Table 11 (see Appendix D for the detailed LOS reports). Synchro was used to remain consistent with previous SR-248 corridor analyses. As shown in Table 11, based on overall intersection averages, all of the study intersections experience acceptable levels of delay.

The results of the single signalized intersection analysis are reported in Table 12 (see Appendix D for the detailed LOS reports). Synchro was used to remain consistent with previous SR-248 corridor analyses. As shown in Table 12, based on overall intersection averages, all of the study intersections experience acceptable levels of delay. However, it should be noted that the reserve capacity of the single signalized intersection is not large and will quickly be overwhelmed with background traffic growth. The LOS category changes from LOS D to E at 55.0 seconds of delay per vehicle.

- SR-248 / old landfill road

- All of the intersections are expected to perform adequately under p.m. peak hour traffic conditions. Table ES-1 reports the overall intersection delay and LOS for the existing cumulative (assuming completion of the IHC hospital and surrounding development) background conditions analysis.

Project Conditions Analysis

The proposed cumulative land use for Park City Heights (including the Talisker and IHC affordable housing) will be as follows:

- Residential: **317 Units**
  - 207 single family dwelling units
  - 110 townhomes / condominiums

At a meeting on September 26, 2006, it was requested that Hales Engineering include:

- An evaluation of the impacts of a future park and ride lot to be located at Richardson Flats
  - It was determined that 100 stalls would be added to the existing 2006 analyses and that an additional 650 stalls (750 total stalls) would be added to the future 2020 conditions analyses
- Identify the cut through traffic impacts on the Old Landfill Road
  - This will be completed for the future 2020 analyses
- Trip generation for the project was computed using rates published in the Institute of Transportation Engineers (ITE), Trip *Generation, 7th Edition, 2003.* The projected net trip generation for the development is as follows:

  - Daily Trips: **2,726 vehicles per day**
  - Morning Peak Hour Trips: **210 vehicles per hour**
  - Evening Peak Hour Trips: **271 vehicles per hour**
  - Saturday Daily Trips: **2,912 vehicles per day**
  - Saturday Peak Hour Trips: **269 vehicles per hour**

Weekday evening peak hour project generated trips were assigned to study intersections to assess impacts of the project.

Existing (2006) Plus Project Conditions Analysis

- The project-generated trips for the cumulative Park City Heights project and 100 stalls at the proposed Richardson Flats park and ride lot were combined with cumulative (assuming completion of the IHC hospital and surrounding development) background traffic volumes to create an existing (2006) plus project scenario.

Table 11

Future (2020) Plus Project – Two Traffic Signals
p.m. Peak Hour Level of Service

Intersection			Worst Approach			Overall Intersection	
ID	Description	Control	Approach[1]	Aver. Delay (Sec / Veh)[1]	LOS[1]	Aver. Delay (Sec / Veh)[2]	LOS[2]
1	SR-248 / IHC Access Road	Proposed Signal[3]	N/A	N/A	N/A	20.1	C
2	SR-248 / old landfill road	Proposed Signal[3]	N/A	N/A	N/A	20.7	C
3	old landfill road / West Project Access	Unsignalized[4]	NB	24.9	C	1.0	A
4	old landfill road / West US-40 Frontage Road	Unsignalized[4]	NB	23.0	C	1.7	A

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).
3. All intersections were evaluated using Synchro software.

Source: Hales Engineering, June 2007

D. Mitigation Measures

Old landfill road traffic signal

The future (2020) plus project p.m. peak hour volumes were generated for the study intersections and were large enough to meet Warrant 3 – Peak Hour Volume as identified in the Manual on Uniform Traffic Control Devices (MUTCD), therefore, it was assumed that the old landfill road was signalized for two signal scenario.

Independent of the one versus two signal scenarios, the old landfill road in its current location or realigned to the IHC access, will need to have both the westbound left (250-feet) and right turn (250-feet) pockets developed at either location to allow sufficient storage capacity and queuing.

Table 12

Future (2020) Plus Project – One Traffic Signal
p.m. Peak Hour Level of Service

Intersection			Worst Approach			Overall Intersection	
ID	Description	Control	Approach[1]	Aver. Delay (Sec / Veh)[1]	LOS[1]	Aver. Delay (Sec / Veh)[2]	LOS[2]
1	SR-248 / IHC Access Road	Proposed Signal[3]	N/A	N/A	N/A	41.4	D
2	SR-248 / old landfill road	Proposed Signal[3]	N/A	N/A	N/A	N/A	N/A
3	old landfill road / West Project Access	Unsignalized[4]	NB	24.9	C	1.0	A
4	old landfill road / West US-40 Frontage Road	Unsignalized[4]	NB	23.0	C	1.7	A

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).
3. All intersections were evaluated using Synchro software.

Source: Hales Engineering, June 2007

According to UDOT's *Administrative Rule 930-6, Accommodation of Utilities and the Control and Protection of State Highway Rights of Way,* a Category 4 classified roadway, SR-248 at its intersection with old landfill road requires:

1. a southbound left turn lane, deceleration lane and taper to accommodate more than 10 vehicles per hour making this movement
2. a northbound right turn pocket, deceleration lane and taper to accommodate more than 25 vehicles per hour making this movement
3. a westbound to northbound right turn acceleration lane and taper to accommodate more than 50 vehicles per hour on roadways with speed limits greater than 40 mph

VII. ADDITIONAL INFORMATION REQUESTED BY STAFF

A. Average Daily Traffic Volumes

SR-248

The most recent count information published by UDOT indicates that as of 2005, SR-248 is carrying approximately 13,830 vehicles on an average day. A typically 3-lane roadway has a capacity of approximately 15,000 – 17,000 ADT at LOS C conditions. Based on turning movement counts collected by Traffic Counts on Tuesday, August 22, 2006, and using a typical non-CBD k-factor, the current and unofficial ADT on SR-248 could be approximately 14,300. With the addition of the IHC, etc., Park City Heights and the UPC Mines project, ADT's could increase to approximately 17,900 vehicles.

Future 2020 traffic projections for SR-248 are for 24,800 vehicles per day, based on historical trends. When the cumulative traffic volumes are added on top of the projected ADT's (Park & Ride lot, cut through traffic, and the cumulative Park City Heights) the ADT could surpass 32,000 ADT.

old landfill road

Based on turning movement counts collected by Traffic Counts on Tuesday, August 22, 2006, and using a typical non-CBD k-factor, the current and unofficial ADT on old landfill road could be approximately 520. A typical 2-lane roadway with low speeds can handle up to 5,000-7,000 ADT comfortably at LOS C. With the addition of the Park City Heights and the UPC Mines project, ADT's could increase to approximately 2,570 vehicles.

Future 2020 traffic projects for this road could be as high as 10,000 trips per day, which can be handled on a moderate speed two lane road with an improved cross section. This higher functioning road would need turn pockets at the intersections to minimize disruptions to the through traffic movements.

West US-40 Frontage Road

Current traffic volumes on this road are negligible and therefore, it was not counted during the peak study hour, however, with development being planned along this road, ADT's could be approximately 2,000 vehicles. A typical 2-lane minor collector road with low speeds can handle up to 4,000-6,000 ADT comfortably at LOS C.

B. Necessary Roadway Geometry (Park City Roads)

old landfill road

Based on the projected ADT's for this road and the type of traffic that is currently using old landfill road (heavy vehicles and shuttle buses), 12-foot traffic lanes should be constructed. Although there were many pedestrians and bicyclists crossing old landfill road on the Rail Trail alignment, none were observed using old landfill road, therefore, shoulder size should be determined by Park City's ordinances. The development of the full roadway cross section

will be determined by Park City ordinances for shoulder widths, curb and gutter sizes, park strips and sidewalk and/or trail widths. Due to the additional traffic from the proposed park and ride lot and the cut through traffic from the Browns Park development, this road should be posted for 30-35 mph.

West US-40 Frontage Road

Based on projected ADT's for this road and in the absence of future development plans south of the Park City Heights project, this roadway could be constructed with 11-foot traffic lanes and minimal shoulders as pedestrians and bicyclists are encouraged by the interconnectedness of the projects internal trail system to not use the West US-40 Frontage Road. It should be noted that the internal trail system is connected to the Rail Trail north and west of the Park City Heights project.

C. Acquisition of Right-of-way

This will be addressed by the development team at some point in this process and is beyond the scope of this traffic impact study.

D. Impact of Construction Traffic

As is the case with every development project, construction traffic will impact the surrounding roadway network. The typical impacts that are felt by adjacent land owners will be minimized due to the location of this project and the absence of residential neighbors. The impact of the construction traffic will be manifest at the SR-248 / old landfill road intersection where long side street delays will be incurred by vehicles waiting to enter the SR-248 traffic stream during peak hours of the day. In order to minimize the impacts of construction related traffic, it is suggested that:

1. On site storage of construction materials occur as much as is feasible
2. Off peak period deliveries should be encouraged
3. During mass grading and construction, minimize the off-site removal of excavated material as much as is possible
4. Provide adequate on-site parking for construction vehicles (e.g. staging areas for delivery vehicles, parking for construction workers, etc.
5. Encourage construction workers to carpool to the site as much as is possible

E. Traffic Calming

Traffic calming has been passively addressed throughout these suggestions. Reviewing for convenience and discussing additional traffic calming measures will help identify potential solutions for a safer roadway:

1. old landfill road: Due to the number of heavy vehicles using this road, 12-foot lanes are necessary, however, minimal to no shoulders will discourage bicyclists from riding on this road or parking along this road for convenient trail access. Park City should look for opportunities to construct a park and ride lot if this is a problematic

area for trail access. A field visit did not identify this as a problem. However, the Rail Trail crossing does have a few issues that could be solved quickly. See photograph on the following page.

a. Vegetation approaching the Rail Trail crossing from the west has overgrown and almost occluded the crosswalk signs. **Solution:** cut back the vegetation surrounding the signing and the Rail Trail Crossing
b. Visibility of the crossing is difficult. **Solution:** provide textured crosswalk for the width of the crossing and add crosswalk pavement makings
c. Exposure of bicyclists and pedestrians to vehicular traffic is not minimized due to the relatively large shoulder areas on both sides of the crossing. **Solution:** provide bulbouts/chokers at the crossing to minimize bicycle and

pedestrian exposure time in the crosswalk, which will force traffic to travel closer together and therefore calm the traffic while drawing attention to the crossing by the vehicle operators. See photograph of Winter Park, FL (left) and from the FHWA guide (right) which shows a bulbout condition.

d. Trail connectivity from the project to the Rail Trail should minimize the number of mid-block crosswalks on the old landfill road. **Solution:** if possible, when the trail out of the Park City Heights project intersects the old landfill road, it should bend toward the west and parallel old landfill road on the south side of the road until it connects to the Rail Trail west of the development. By consolidating and concentrating the bicycle and pedestrian crossings to one location, at the Rail Trail crossing, it will be safer and more efficient for trail users and vehicle operators.

2. West US-40 Frontage Road: By constructing this road with lane widths smaller than the HCM 12-foot standard lane width will move the vehicles physically closer together and therefore encourage slower speeds as vehicles are less comfortable driving in confined spaces. Minimizing the shoulder width because an interconnected trail system is in place limiting the need for pedestrian or bicycle access to the Frontage Road will draw the curb line or pavement edge closer to the vehicles, again reinforcing to the drives that they are traveling on a narrow roadway and that they should slow down.

- Based on overall intersection averages, all of the study intersections experience acceptable levels of delay (see Table ES-1).

Future (2020) Background Conditions Analysis

- The project-generated trips for the Talisker project, the IHC attainable housing, 750 stalls at the proposed Richardson Flats park and ride lot, and cut through traffic from Browns Park were combined with cumulative (assuming completion of the IHC hospital and surrounding development) and future background traffic volumes to create a future (2020) scenario.

- As shown in Table ES-1, based on overall intersection averages, each of the study intersections experience unacceptable levels of delay.

Future (2020) Plus Project Conditions Analysis

- The project-generated trips for the cumulative Park City Heights project was combined with cumulative 2020 background traffic volumes to create a future (2020) plus project scenario.

- As shown in Table ES-1, based on overall intersection averages, each of the study intersections experience unacceptable levels of delay.

RECOMMENDATIONS

Hales Engineering recommends the following mitigations:

Existing (2006) Cumulative Background Conditions

- Although the overall SR-248 / old landfill road intersection performs acceptably, the westbound left turn movement experiences high levels of delay during the peak hours. A Quinn's Junction / SR-248 Access Study dated December 6, 2006 prepared by Horrocks Engineers, stated that the SR-248 / old landfill road should be signalized in the future.

  Hales Engineering recommends that although this intersection does not meet the peak hour traffic volume signal warrant located in the Manual on Uniform Traffic Control Devices (MUTCD), it could qualify for a systems warrant provided that this location has been identified for signal controlled access in a signed and executed Corridor Agreement between UDOT, Park City and/or Summit County. If signalized, this intersection could function at an overall LOS C or better.

Existing (2006) Cumulative Plus Project Conditions

- The existing (2006) plus project p.m. peak hour volumes were generated for the study intersections were large enough to meet Warrant 3 – Peak Hour Volume as identified in the Manual on Uniform Traffic Control Devices (MUTCD), therefore, it was assumed that the old landfill road was signalized for two signal scenario.

- The westbound movements should be separated into a shared left / through lane and a right turn pocket of 150-feet in length.

- A northbound right turn pocket should be added (150-feet).

According to UDOT's *Administrative Rule 930-6, Accommodation of Utilities and the Control and Protection of State Highway Rights of Way,* a Category 4 classified roadway, SR-248 at its intersection with old landfill road requires:

1. a southbound left turn lane, deceleration lane and taper to accommodate more than 10 vehicles per hour making this movement
2. a northbound right turn pocket, deceleration lane and taper to accommodate more than 25 vehicles per hour making this movement
3. a westbound to northbound right turn acceleration lane and taper to accommodate more than 50 vehicles per hour on roadways with speed limits greater than 40 mph

Future (2020) Background Conditions Analysis

Although the overall SR-248 / old landfill road intersection performs acceptably, the east and westbound left turn movements experience high levels of delay during the peak hours. A Quinn's Junction / SR-248 Access Study dated December 6, 2006 prepared by Horrocks Engineers, stated that the SR-248 / old landfill road should be signalized in the future.

Hales Engineering recommends that although this intersection does not meet the peak hour traffic volume signal warrant located in the Manual on Uniform Traffic Control Devices (MUTCD), it could qualify for a systems warrant provided that this location has been identified for signal controlled access in a signed and executed Corridor Agreement between UDOT, Park City and/or Summit County. If signalized, this intersection could function at an overall LOS C or better, a detailed analysis is included in Appendix D.

The future 2020 traffic volumes are projected to increase to the point that two north and southbound through lanes will be necessary in order to maintain reasonable levels of service along SR-248. Table ES-1 shows the anticipated LOS for the study intersections with the mitigated cross section.

As requested by the Park City Heights Task Force committee, Hales Engineering evaluated two scenarios, one with new traffic signals at the IHC entrance and on the old

landfill road and the other scenario assumes realignment of the old landfill road into the IHC access creating a single signalized intersection.

Table ES-1 shows that when the traffic from the various developments is dispersed through two traffic signals, each intersection will maintain a lower overall delay per vehicle value and associated level of service. In contrast, Table ES-1 shows that when the traffic is concentrated at a single intersection, the results are a higher delay per vehicle value and associated level of service.

Future (2020) Plus Project Conditions Analysis

The future (2020) plus project p.m. peak hour volumes were generated for the study intersections and were large enough to meet Warrant 3 – Peak Hour Volume as identified in the Manual on Uniform Traffic Control Devices (MUTCD), therefore, it was assumed that the old landfill road was signalized for two signal scenario.

Independent of the one versus two signal scenarios, the old landfill road in its current location or realigned to the IHC access, will need to have both the westbound left (250-feet) and right turn (250-feet) pockets developed at either location to allow sufficient storage capacity and queuing.

According to UDOT's *Administrative Rule 930-6, Accommodation of Utilities and the Control and Protection of State Highway Rights of Way,* a Category 4 classified roadway, SR-248 at its intersection with old landfill road requires:

1. a southbound left turn lane, deceleration lane and taper to accommodate more than 10 vehicles per hour making this movement
2. a northbound right turn pocket, deceleration lane and taper to accommodate more than 25 vehicles per hour making this movement
3. a westbound to northbound right turn acceleration lane and taper to accommodate more than 50 vehicles per hour on roadways with speed limits greater than 40 mph

TABLE-1
Mode Split
PC Heights TIS

ID	Intersection Description	Existing 2006 Background	Existing 2006 plus Project - 2 Signals	Existing 2006 Plus Project - 1 Signal	Future 2020 Background	Future 2020 Background Mitigated	Future 2020 Background - 2 Signals	Future 2020 Background - 1 Signal	Future 2020 plus Project - 2 Signals	Future 2020 plus Project - 1 Signal
		LOS (Sec/Veh[1])	LOS (Sec/Veh[1])	LOS (Sec/Veh[1])	LOS (Sec/Veh[1])	LOS (Sec/Veh[1])	LOS (Sec/Veh[1])	LOS (Sec/Veh[1])	LOS (Sec/Veh[1])	LOS (Sec/Veh[1])
1	SR-248 / IHC Access Road	B (17.7)	B (16.0)	C (34.9)	E (76.1)	C (21.5)	B (18.1)	D (36.5)	C (20.1)	D (41.4)
2	SR-248 / old landfill road	A (1.0)	C (21.0)	N/A	A (8.8)	A (1.6)	B (16.5)	N/A	C (20.7)	N/A
3	old landfill road / West Project Access	N/A	A (1.0)	A (1.0)	N/A	N/A	N/A	N/A	A (1.0)	A (1.0)
4	old landfill road / West US-40 Frontage Road[2]	N/A	A (2.6)	A (2.6)	N/A	N/A	N/A	N/A	A (1.7)	A (1.7)

1. Intersection LOS and delay (seconds/vehicle) values represent the overall intersection average. LOS and Delay details for the worst movement of unsignalized intersections are reported in the main body of the report.
2. This intersection is a project access and was only analyzed in "plus project" scenarios.

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