PLANNING COMMISSION
Staff Report

PARK CITY 1884

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:

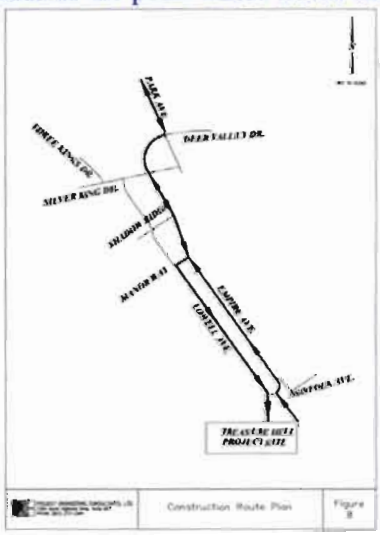
Commissioner Wintzer requested that the applicants address hours of construction and the days of the week they plan to work. He noted that the construction period is estimated to be five or ten years and he would like to understand what that means for the neighborhood in terms of lighting, gravel, or 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 offers to buy 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.

Question or Comment:

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.

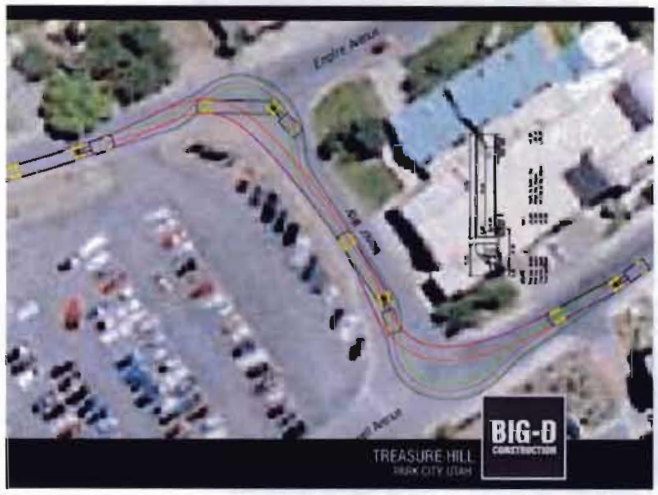
Mr. Barnes is mistaken with respect to excavation going off-site and crossing over the property lines. The development of the Project is confined to the Project's property boundaries.

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.

Question or Comment:

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
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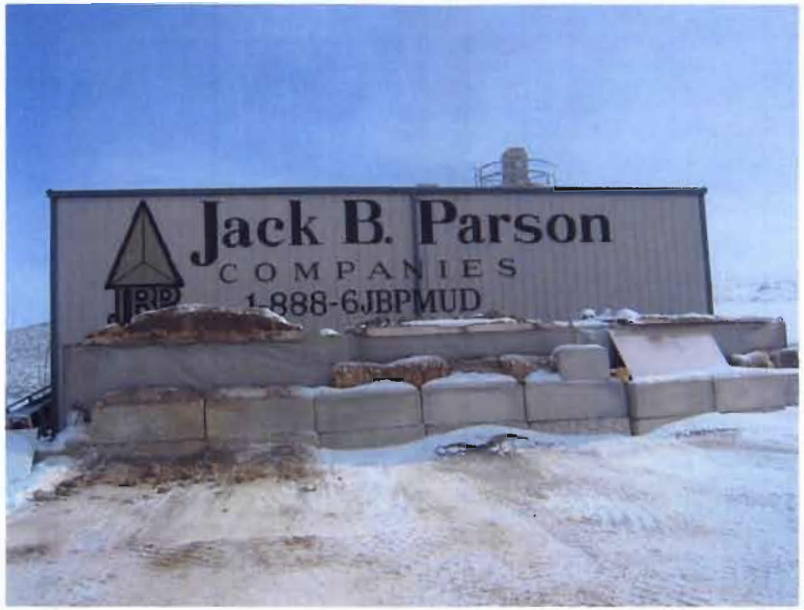


Hopper Bin

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

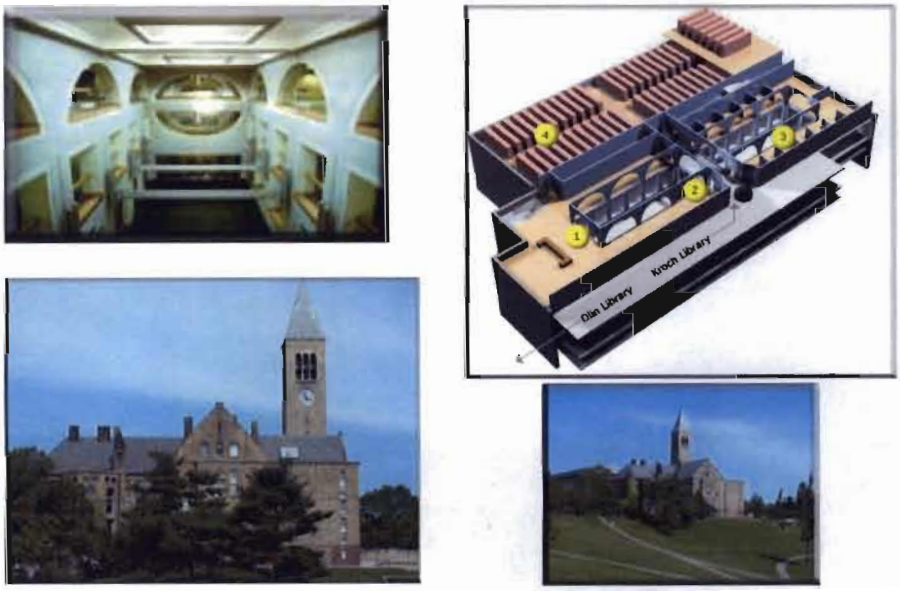
Geologists, civil engineers, surveyors and explosive engineers work together as a team to determine the amount of explosive needed to do the job. The team determines location of each hole, depth, and overall drill pattern. Distance of the active face, or property boundary, to the bore hole, rock type 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.

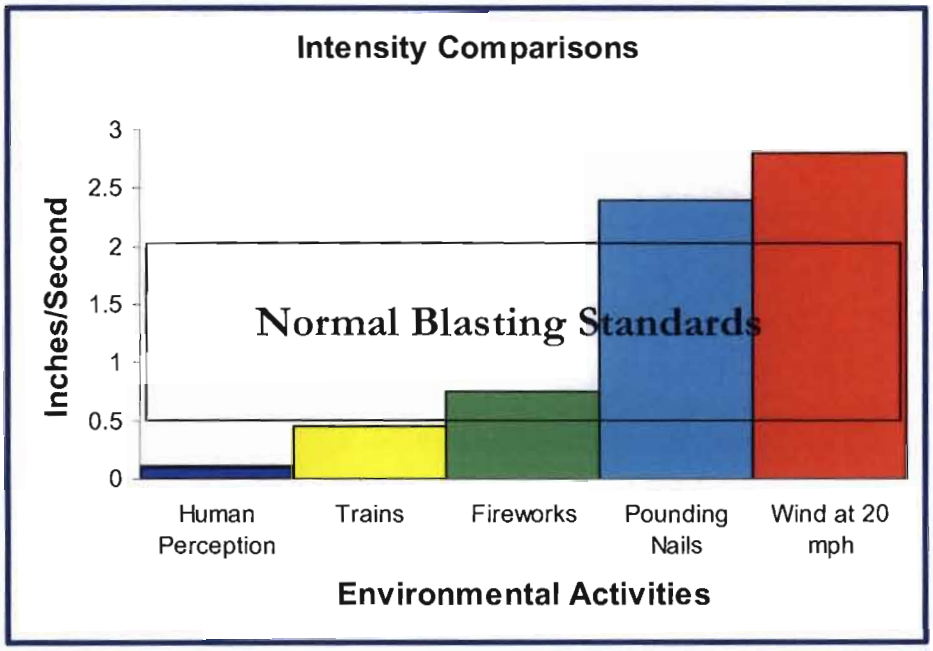
How Might Man-Made Forces Affect Your House?

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:

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(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.

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(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.

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(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.

Treasure Hill

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)

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)	(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	
110	.00095	- more human complaints (OSM limit: 133 db)
100	.00030	
90	.000095	
80	.000030	
70	.0000095	- airblast becomes noticeable to sensitive individuals
60	.0000030	
50	.00000095	

$$dB = 20 \log \frac{psi}{2.9 \times 10^{-9}}$$

Treasure Hill

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	

Project Engineering Consultants

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.

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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TREASURE HILL
AUTOTURN
EMPIRE, MANOR, & LOWELL
Figure 1

PROJECT ENGINEERING CONSULTANTS
8819 SOUTH REDWOOD RD., SUITE C, WEST JORDAN, UTAH 84088
PHONE (801) 495-4240

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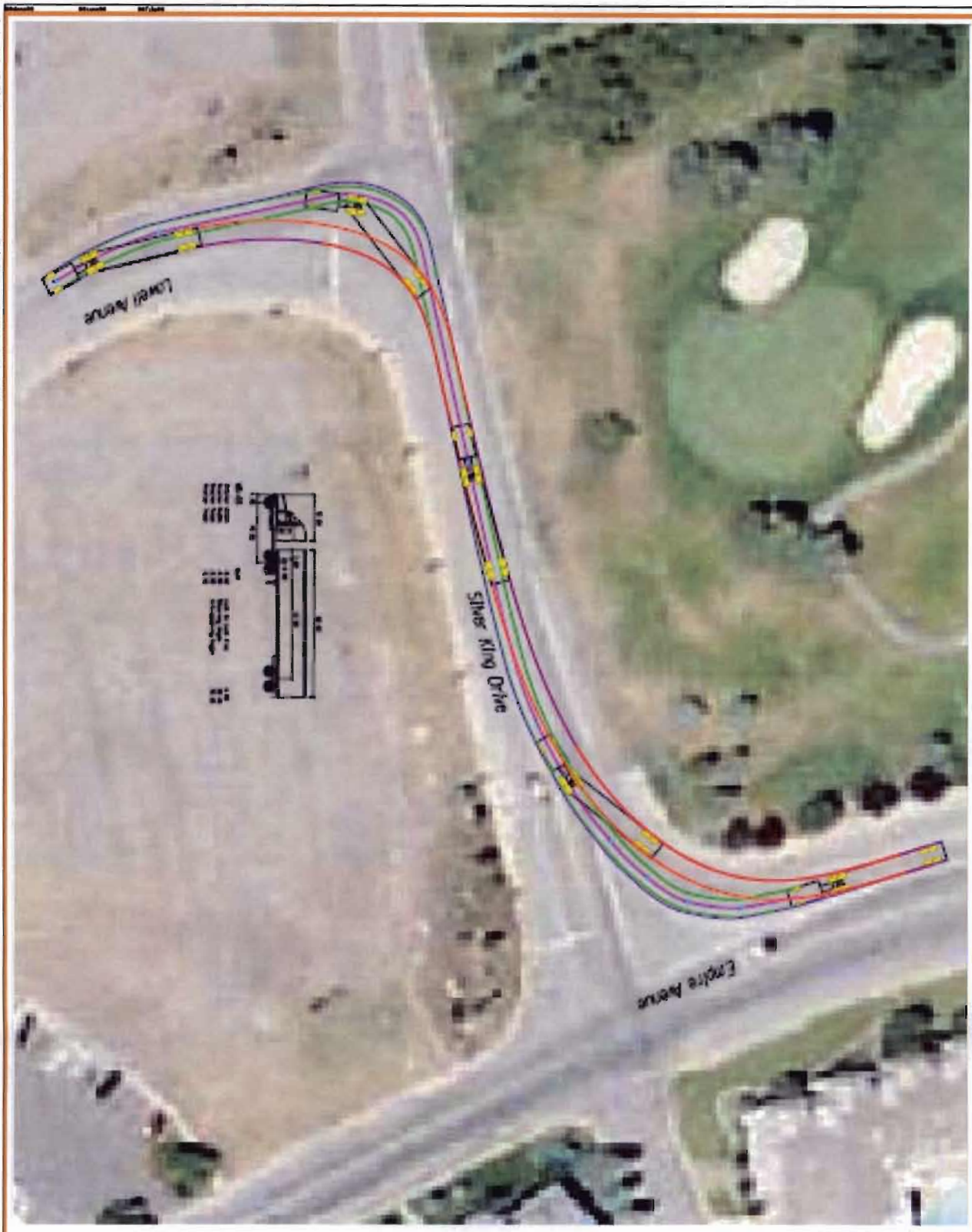

TREASURE HILL
AUTOTURN
EMPIRE, SILVER KING, & LOWELL
Figure 2

PROJECT ENGINEERING CONSULTANTS
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PHONE (801) 495-4240

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TREASURE HILL
AUTOTURN
LOWELL & SHADOW RIDGE
Figure 3

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PHONE (801) 495-4240

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TREASURE HILL
AUTOTURN
OVERALL

FIGURE
Figure 4

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PHONE (801) 495-4240

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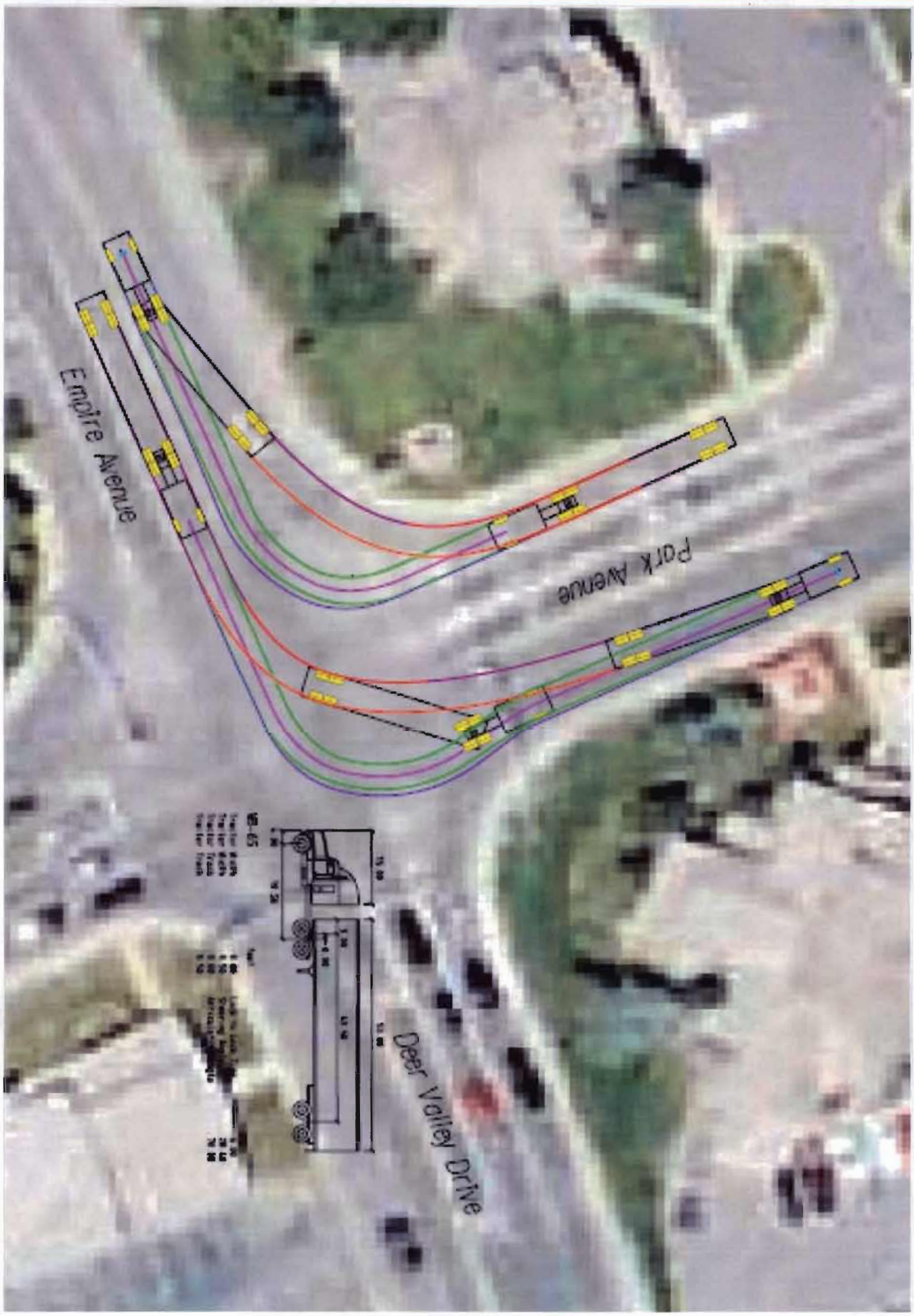

TREASURE HILL
AUTOTURN
PARK, EMPIRE, & DEER VALLEY
Figure 5

PROJECT ENGINEERING CONSULTANTS
8819 SOUTH REDWOOD RD., SUITE C, WEST JORDAN, UTAH 84088
PHONE (801) 495-4240

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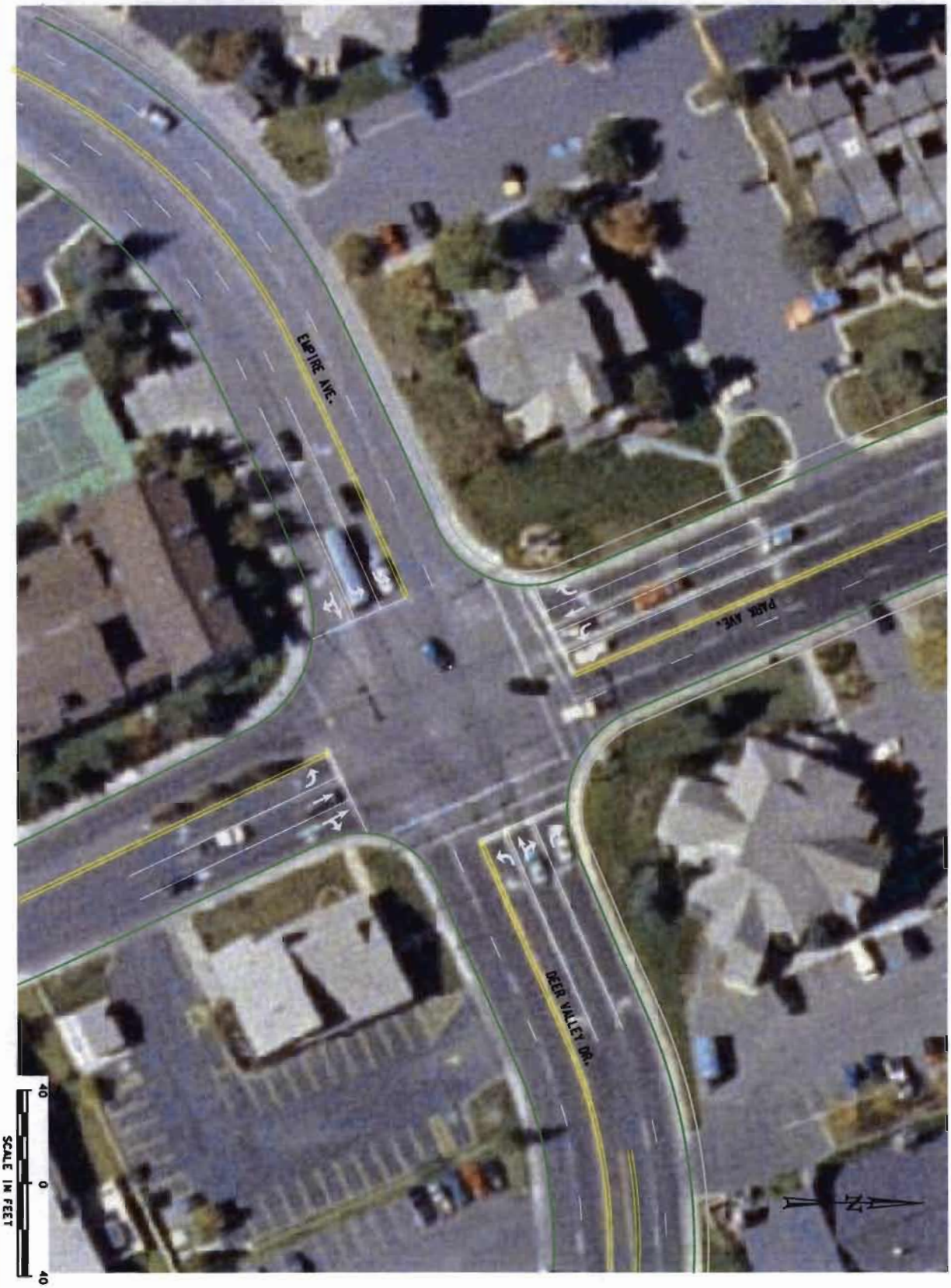

TREASURE HILL

DEER VALLEY DRIVE/ PARK AVENUE

FIGURE 6

PROJECT ENGINEERING CONSULTANTS
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PHONE (801) 495-4240

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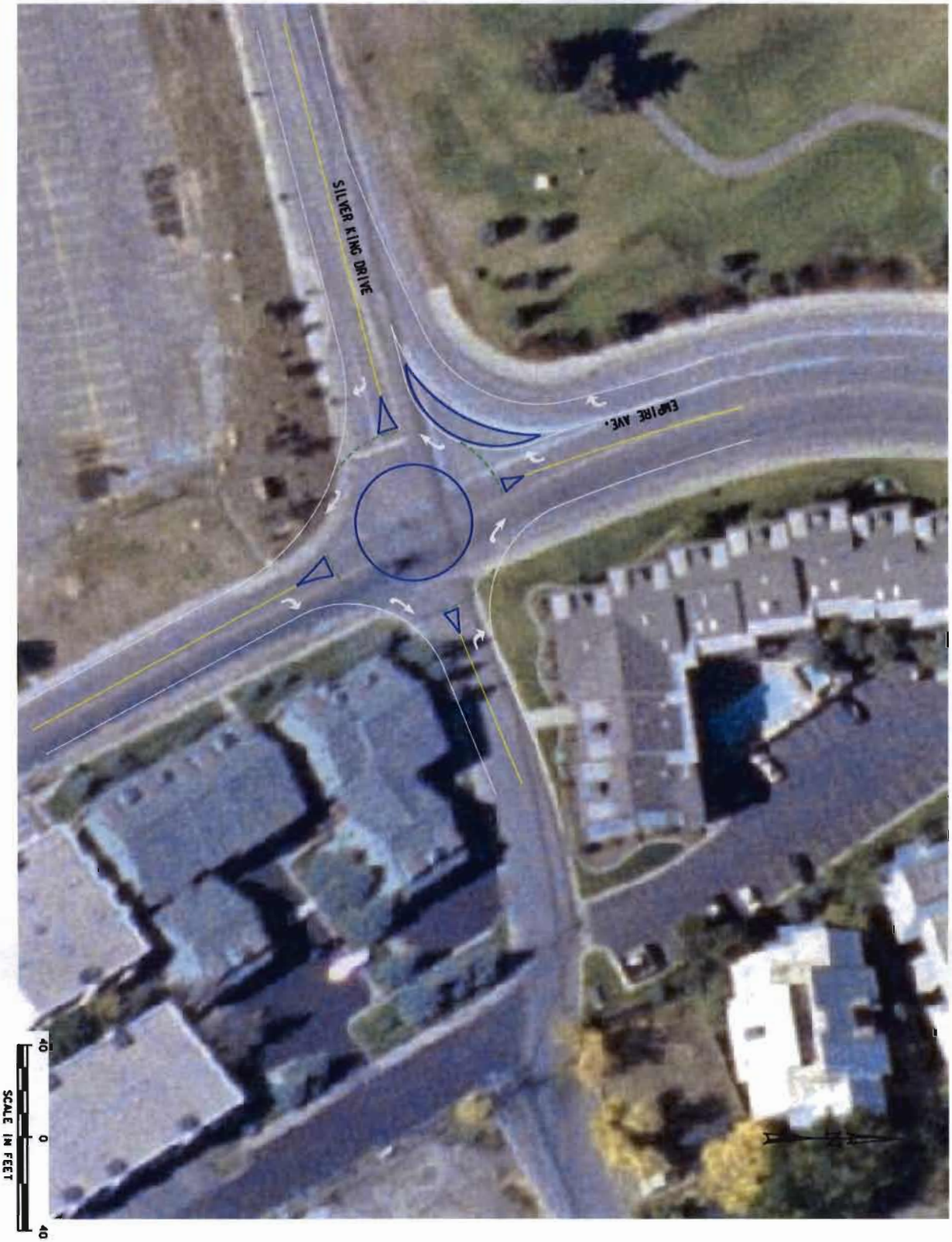

TREASURE HILL
EMPIRE AVENUE /SILVER KING DRIVE
ROUNDABOUT ALTERNATIVE
FIGURE 7

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PHONE (801) 495-4240

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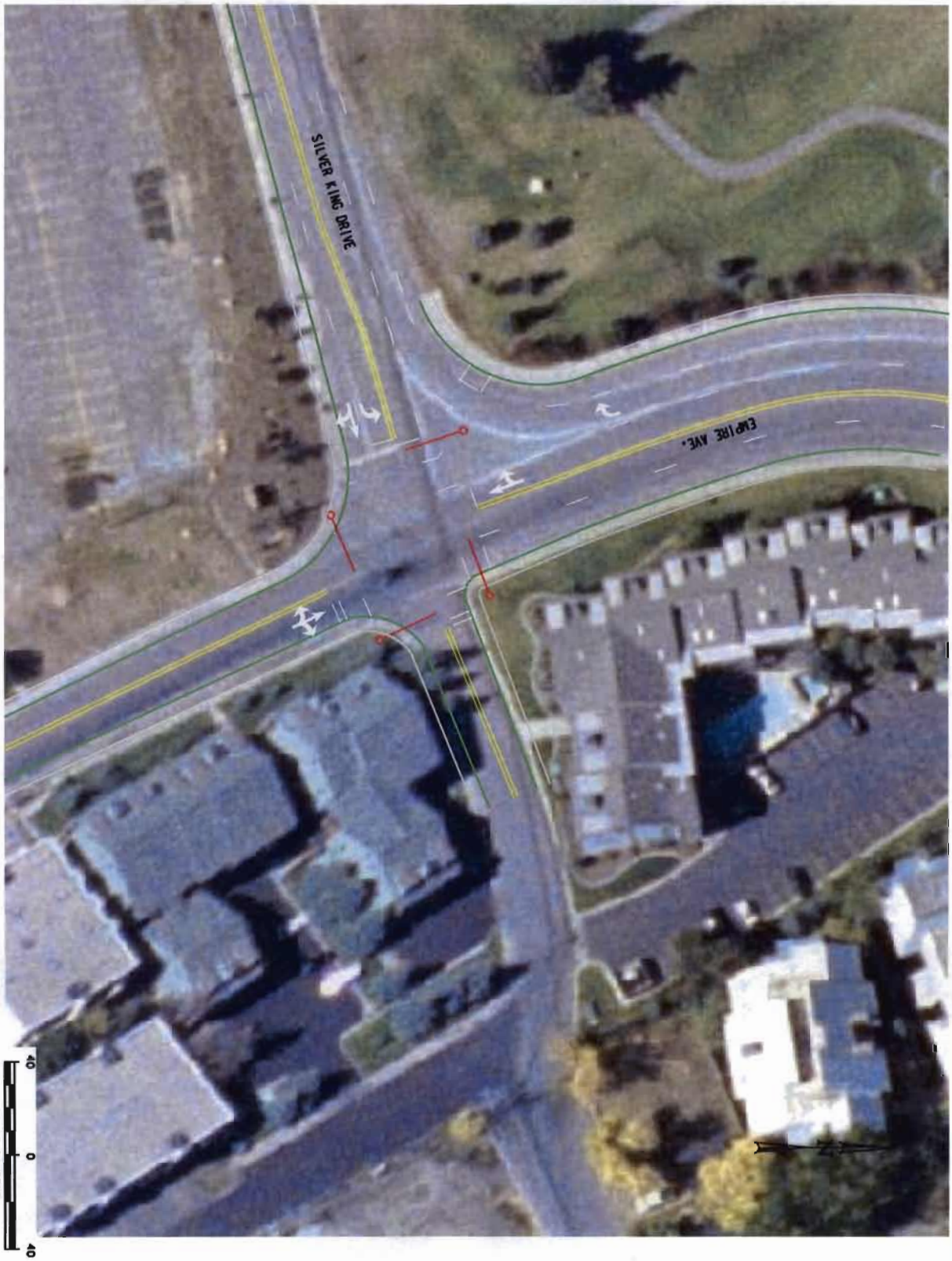

TREASURE HILL
SILVER KING DRIVE / EMPIRE AVE.
SIGNAL ALTERNATIVE
FIGURE 8

PROJECT ENGINEERING CONSULTANTS
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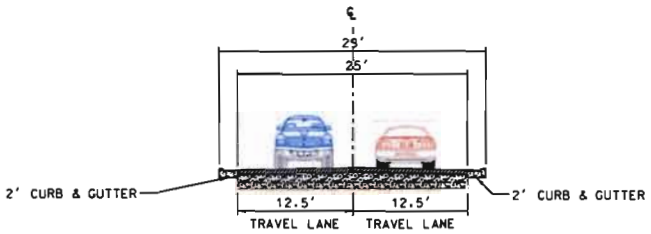
EXISTING TYPICAL SECTION



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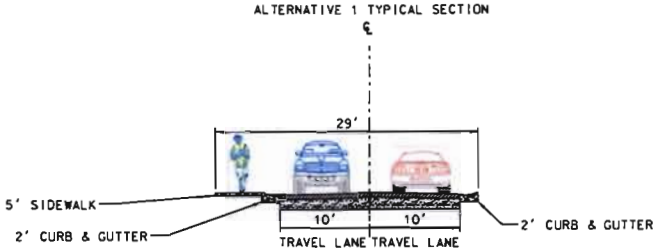

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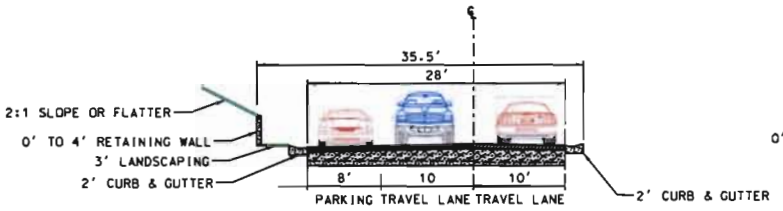

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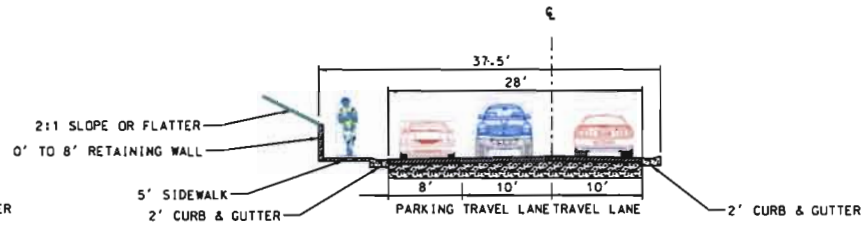

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PHONE (801) 495-4240

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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TREASURE HILL
LOWELL AVE/EMPIRE
ALTERNATE 1
FIGURE 11

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TREASURE HILL
LOWELL AVE/EMPIRE
ALTERNATE 2
FIGURE 12

PROJECT ENGINEERING CONSULTANTS
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TREASURE HILL
LOWELL AVE/EMPIRE
ALTERNATE 3
FIGURE 13

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