REFERENCE DESIGN DOCUMENT

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Cordilleras Health Facility

Feasibility Study Review

UNGER
CONSTRUCTION CO.

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Executive Summary

Unger Construction Co. (UCC) has been engaged to provide a construction review of the Cordilleras Health Facility campus expansion feasibility plan. This review will focus on the subjects listed below, as requested by HGA and the County of San Mateo and discussed in our 10/27/14 meeting on site:

1) Review of the project phasing plan, which is currently proposed to start in the South and develop to the North.
2) Comment on the project phasing for construction accessibility during each phase of construction.
3) Mitigation of noise, dust, and vibrations during the different phases of construction.
4) Approach to site safety.
5) Demolition methods to reduce disturbance to patients and staff.
6) Ideas to expedite construction of the new buildings.
7) Construction access plan to maintain access to the Canyon Oaks Center and the Fire Station.
8) Review offsite laydown area and the value it would provide to the construction team.

Contents

Project Phasing

Consideration Request from HGA:

We are proposing that the project be built in multiple phases starting from the south and moving north. Construction begins with the major excavation to create the large retaining wall behind the south side access road. In your evaluation, is the phasing as we've defined it feasible from a construction standpoint? Would you recommend any revisions or variations?

UCC Review:

The current approach described above makes the most sense because the goal is to complete the first two (or three) MHRC and the ARF buildings as quickly as possible. Here is a simplified outlook to compress the schedule as much as possible. This varies slightly from the phasing contained in the study in order increase crew productivity:

Phase 1 – Sequence 1

- Clear and grub the site moving from the South to the North in order to start the South retaining wall first. From that point on, construct the South and North retaining walls at the same time. This will lend itself well to the incremental approach necessary to build these walls as the equipment will move back and forth between the two areas as they work down in elevation
- Completion of building pad for first two (or three) MHRC structures.
- Construction Access to the site during this Phase will utilize the existing North service road and wrap around the existing dirt road to the West to access the South retaining wall area.

Phase 1 – Sequence 2

- Building construction of first two (or three) MHRC's begins with foundations and underground utilities in the building pad.
- North retaining wall and rough grade of the adjacent road completed (prior to South retaining wall being complete).
- Begin the underground utility installation on the North road, starting on the West side and moving clockwise.
- Pave the North road as soon as the utility work is complete.
- Construction Access would be moved to the South road for this phase of the project to allow the utility and paving on the North road.

Phase 1 – Sequence 3

- MHRC building construction continues.
- As soon as the North road is complete, construction site access can be moved back to the North road.

- Underground utility installation will continue around the site in a clockwise fashion all the way to the new MHRC buildings.
- Ingress and Egress to the existing buildings can be managed during this installation with coordination and trench plating.
- Final patching of the existing road and paving of the South road can be completed after the fire loop is tested.

Phase 1 – Sequence 4

- MHRC building construction continues.
- ARF building pad begins and the building is constructed and completed.
- The ARF will cut off construction access to the MHRC area, so Construction Access will shift back down to the South road for this work.

  This process will produce the building pads quickly and allow the construction of the new buildings to begin as soon as possible. It also creates a stagger in the work flow allowing crews to move from one building to the other. The focus on the underground utilities brings the fire protection system on-line so the fire department can grant the project "staff and stock" of the buildings.

Phase 2 – Sequence 1

- Demolition of existing building.
- Installation of the underground utilities and new creek diversions.
- Construction of remaining MHRC building pads and South road continuation through the old hospital footprint.
- Completion of underground utility trench along this new portion of the South road.
- Construction Access can be handled immediately at the main entrance to the campus and utilizing the North road.

Phase 2 – Sequence 2

- Construction of remaining three (or two) MHRC buildings along South road.
- Construction Access focused immediately at the main entrance to the campus.

Construction Access

Consideration Request from HGA:

Is there sufficient room during each phase for construction access? We're most concerned about the access to build the phase 1 buildings, while the existing building is still in place. This is a question of both the horizontal clearance to move trucks and equipment in and out, as well as an issue of slope stability. We realize we may need some temporary retaining walls.

UCC Review:

The phasing and sequencing discussed in the previous section will allow for the adequate construction access to the project site.

During the 1st Phase - The existing dirt road that surrounds the site will provide access back and forth between the South and North construction areas. This road will need to be maintained and reconfigured to provide access to the PG&E easement and the water tank, but that will be controlled by the sitework contractor building the retaining walls and roads.

During the 2nd Phase – The access will be focused into the site at the location of the existing building and be adequate for this work

Note – The ability to park construction or Cordilleras staff down the street at the possible leased Redwood Center property will provide additional room around the campus and reduce congestion for site access.

Expedited Construction

Consideration Request from HGA:

Speed of construction will be important here to minimize the amount of time that some of the residents need to be temporarily located off site. We discussed the idea of refabricating parts of the buildings (particularly the repetitive MHRC's). Please give us your opinion of this potential approach. Do you have other ideas for speeding up construction?

UCC Review:

Prefabrication is a common topic that is brought up on new projects these days and is gaining real traction in the construction industry. We are just starting to experience some success with this practice, but there are some areas where we still experience some loss of value depending on the building type and occupancy. This can be pursued by the design team, just review the risk and reward benefits of the following:

- Review the system with the authority having jurisdiction prior to starting design. Make sure they are comfortable with the portions of the work that will be fabricated off-site and not directly under their observation.
- Verify that the smoke barriers and rated construction details necessary for the I-3, Condition 2 requirements are available from the manufacturer that you choose.
- The hybrid approach to this prefabrication process that is mentioned in the Study is a great option. There are companies in Northern California that will prefabricate bathrooms and main walls for assembly on-site. Then carpenters will connect and complete remaining work in the field. This also helps you with local materials and your LEED goals.
- Single story timber construction fabricated on-site is simple and fast construction. There may not be a large schedule savings based on the small size of the new buildings.

We understand that the County requires new projects to utilize BIM. Employing current BIM standards, it is possible to assemble the building in a virtual space, work out the conflicts, and then build the project in real life with very little re-work.

Focusing the design on standardizing room layouts and building details will allow the construction team to prefabricate as much as possible. An example would be plumbing for a toilet can be fabricated in a large section off site then shipped for Just-In-Time installation.

Dust and Noise Mitigation

Consideration Request from HGA:

We will have existing residents remaining on site during construction, in both the existing Cordilleras building and the Canyon Oaks Youth Center. Some of these residents are highly sensitive to their environment and might be easily disturbed. How noisy will the construction be? Are there measures or construction techniques to minimize noise that we may want to define in our feasibility study (particularly if they add cost)?

UCC Review:

The most effective way to control noise, dust, and vibration levels is to establish criteria for the construction team during the proposal/bid stage. Included below are some ideas for some of the requirements that can be considered.

Dust and Pollution

Dust and pollution can be irritating to inhabitants surrounding a construction zone. Many of the following items assist with erosion control in the winter and dust control in the summer. We have used these successfully on projects in the past to mitigate these issues:

- Signs shall be posted that indicate diesel-powered equipment standing idle for more than five minutes shall be turned off or operators would be subject to fines. This would include trucks waiting to deliver or receive soil, aggregate, or other bulk materials. Rotating drum concrete trucks may keep their engines running continuously as long as they were onsite.
- The project shall ensure that emissions from all off-road diesel powered equipment used on the project site do not exceed 40 percent opacity for more than three minutes in any one hour. Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) shall be repaired immediately. This measure means that equipment with continuous dark emissions is in violation of the requirement.
- A visual survey of all in-operation equipment shall be made at least weekly throughout the duration of the project construction. A record of the inspection shall be maintained on-site.
- The contractor shall install temporary electrical service whenever possible to avoid the need for independently powered equipment (e.g., compressors, generators, etc...).
- Properly tune and maintain all equipment for low emissions.
- Water all active construction areas at least twice daily and more often during windy periods. Active areas adjacent to occupied buildings should be kept damp at all times.
- Cover trucks or maintain at least two feet of freeboard. Dust-proof chutes shall be used to load debris onto trucks during the demolition phase of the project.

- Pave as early in the construction schedule as possible. Apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas.
- Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas and sweep streets daily (with water sweepers) if visible soil material is deposited onto the adjacent roads.
- Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (i.e., within 10 days for previously-graded areas where final grading has occurred and for other construction areas that have been inactive for 30 days or more).
- Enclose, cover, water twice daily, or apply (non-toxic) soil binders to exposed stockpiles.
- Limit traffic speeds on any unpaved roads to 15 mph.
- Replant vegetation in disturbed areas as quickly as possible.
- Suspend construction activities that cause visible dust plumes to extend beyond the construction site.

Noise

Use Temporary Noise Barriers and Limit Hours of Construction. The following mitigation measures are commonly used to reduce noise generated by construction:

- Construct temporary noise barriers with a minimum height of 12 feet, such as a solid plywood construction barrier with sound blankets between the construction activity and occupied buildings within 400 feet before site grading, earthwork, and retaining wall work begins. Openings for site access between the project site and adjacent occupied buildings during these phases of construction must be minimized. These noise barriers may be removed once all ground level work is complete and upper floor construction is underway.
- Construct temporary noise barriers with a minimum height of 12 feet, such as a solid plywood construction barrier with sound blankets, between the construction activity and occupied buildings within 400 feet before demolition work begins. These noise barriers may be removed once all demolition work is complete.
- Limit significant noise-generating construction activities, including truck traffic coming to and from the site for any purpose, to daytime, Monday through Saturday, non-holiday hours (7:00 AM to 6:00 PM). NOTE: These times should be adjusted based on your residents' and staff's routines.
- Properly muffle and maintain all construction equipment powered by internal combustion engines.
- Locate all stationary noise-generating construction equipment, such as air compressors, as far as practical from existing nearby residences and other noise-sensitive land uses. Acoustically shield such equipment by using piles of aggregate, project trailers, other non-noise generating equipment, or with temporary portable noise barriers.

- Select quiet construction equipment, particularly air compressors, whenever possible. Fit motorized equipment with proper mufflers in good working order.
- Incorporate sound insulation treatments and building upgrades into the buildings so as to achieve an interior Ldn of 45 dBA or less with windows closed. Such treatments may include, but would not be limited to, acoustically rated windows and doors, acoustical caulking at all exterior wall penetrations and noise control treatments for all air transmission paths associated with mechanical ventilation systems.
- During the demolition of the existing facility, plan the demolition so the main walls adjacent to the occupied structures on the campus remain intact as long as possible. These will act as additional sound barriers and provide extra protection. Sound blankets can be attached to the outside wall of the building itself and windows can be covered with plywood to increase the sound "absorption" capacity.

Below is an example of a Table that may be included in your proposal/bid documents. You can put this together with the help of an Acoustical Engineer to relay your expectations to the General Contractor.

TABLE ##: Maximum Allowable Exterior Noise Exposures

Hourly Noise Metric[1], dBA	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
L50 (30 minutes in any hour)	50	45
L25 (15 minutes in any hour)	55	50
L08 (5 minutes in any hour)	60	55
L02 (1 minute in any hour)	65	60

[1] The sound level exceeded n% of the time in any hour. For example, the L50 is the value exceeded 50% of the time or 30 minutes in any hour; this is the median noise level. The L02 is the sound level exceeded 1 minute in any hour.

Site Safety

Consideration Request from HGA:

We'd like to discuss construction site safety. As most residents of the facility have serious mental illness, and some are able to come and go freely from the Center, we will need to have a robust and disciplined approach to site safety.

UCC Review:

Based on the layout of the site, it appears that it will be manageable to isolate the construction area with fencing and keep people from casually entering the project site. If there is a concern that residents may attempt to enter the site, it would be worthwhile engaging a private security company to patrol the fenced area off hours and observe the entrance gates during operations.

The requirements for the General Contractor should be:

- Provide a written site security plan depicting the fencing plan, for review during the proposal/bid process
- Require them to submit a revised plan for review for each phase of construction or major changed condition
- Limit the amount of entrances to the project site so access is easier to control
- Outline your expected level of protection and the GC's responsibilities so they are understood at proposal/bid time

Keep in mind that it is the General Contractor's responsibility to maintain a safe project site.

Demolition Disturbance Reduction

Consideration Request from HGA:

Are there methods for the demolition of the existing cast concrete structure that we may want to define to minimize noise and dust?

UCC Review:

There are multiple ways to demolish concrete and they are typically a balance between cost and disturbance. This also depends on the concrete material itself and if it contains asbestos.

Pneumatic Breaking

The most cost efficient method for a building of this type would be the use of pneumatic and hydraulic breakers that hammer and crush the concrete apart. This will generate a considerable amount of noise, but may be at an allowable level based on the type of sound protection that is put in place between the work area and the occupied buildings.

Dismantling

The next best option, but more expensive is utilizing the dismantling method. This involves a lot of sawcutting to create large pieces that can be lifted from the building and loaded on a truck. The sawcutting generates less noise then the breaking, but the positioning of sound blankets and barriers can mitigate the sound.

Water Jetting / Thermic Lance

These demo techniques are not as widely used, but utilize high pressure water or extremely focused heat to cut the concrete. While more expensive they offer great noise reduction and minimal dust. The negative aspects are containing the water on-site and the potential hazardous waste issue if there is asbestos. The Thermic process creates heat and fire watch is an extremely important necessity.

Expansive Grouts (Chemical) or Mechanical Cracking

This is a great method for demolition when vibration and noise is an issue. The general idea is the contractor drills 1-2" holes to a depth of about 80% thickness, in a line at about 8" on center. The holes are then filled with a pneumatic spreader that will use pressure to break the concrete along that line. The same methodology is used for expansive grout, the grout is poured into the holes, and as it sets, it expands and will create up to 20,000psi of expansive force.

Our recommendation is that you further investigate the demolition options with a specialty company that can help you decide on the instructions and criteria you place on the General Contractors. You can then request a demolition plan from the prospective contractors for

review during the bid/proposal time. You will want to establish a threshold for sound levels that you expect them to adhere to during this phase of construction. Sound levels can be mitigated, not only by the type of method selected, but with the use of sound barriers as well. Examples:

- The phasing of the demolition is also critical to noise mitigation. Starting demolition on the opposite side of the building from the occupied MHRC's and ARF allows the existing building being demolished to act as its own "noise barrier" during the majority of the demolition activity.
- Temporary sound barriers can be installed adjacent to the new buildings. Large timber walls draped with sound blankets can reduce noise significantly.
- It may also be worth the added cost to include acoustical construction systems in the new buildings on the walls that are facing the demolition. This would be especially valuable on the East MHRC since the protection would also help mitigate the noise generated when the additional three MHRC's are built.

Access to Existing Buildings

Consideration Request from HGA:

We need to maintain access to the Canyon Oaks Center and the Fire Station on the site. We have therefore presumed that construction access would occur from the north access road, leaving the area of Edmonds Road in front of the Fire Station un-impacted. Is this feasible? Do you see any challenges to this approach?

UCC Review:

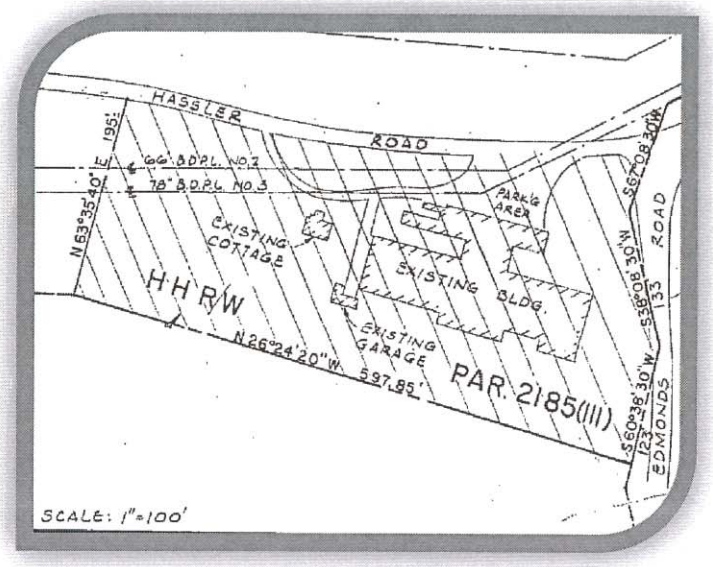
The access to the existing buildings can be maintained utilizing fairly routine construction practices. There will be some traffic on the road in front of these buildings, but only during the period of constructing the North retaining wall and access road

The other impact will be the installation of the underground utilities in front of these buildings Include in the bid/proposal instructions that the contractor is required to maintain access to the existing buildings during this work. Require a written plan that demonstrates how this work will be installed and trench plated to allow for this access at all times. They should include verifications that the proposed system will be designed to hold the weight of a fire truck.

Offsite Laydown Value

Consideration Request from HGA:

The County may be able to gain a temporary lease on an abandoned property, owned by San Francisco, approximately ½ mile from the site. I've attached a site plan for the property below. It's about 2.75 acres with an existing single story building. Please consider how this property might be useful for construction of this potential project (construction offices, staging, etc). We are trying to assess the value of this property for the project. There are two large SFPUC water lines running beneath the site.



UCC Review:

We feel that this space and its close proximity to the project site will be very valuable to the construction team. During certain phases of the construction the site will be very congested, so using this space for contractor or Cordilleras staff parking alone may be worth the lease cost. An all-weather parking and laydown area could be created that would last the life of the project.

This site will also be valuable if there is easy connection at the street to AT&T, Comcast, PG&E, etc...to create a very productive office trailer environment. Even if there is space for a "big room" in the basement of the existing campus, it is nice to have this area as a back-up in case that space becomes unavailable.