

ANALYSIS 3| SITE LOGISTICS

BACKGROUND

The ability for a construction manager to effectively plan and utilize a site can impact how efficiently a project progresses and, ultimately, how successful the project will be with its schedule and overall costs. If a contractor is brought onboard very early in a project, they may be given the opportunity to impact the site selection based on site logistics, but this is seldom the case. For the vast majority of projects, the contractor is not able to affect site selection, but must be able to make the best of the site they are given.

Site logistics can have a large impact on any construction project. If contractors are forced to double handle materials due to the location of storage areas, have long hauls to retrieve materials, or do not have enough space to perform their tasks, the trades will work inefficiently and this can push out the schedule and add to the total cost of the project.

For many construction projects, DCH included, the constraints imposed by the site are generally known when the projects are bid by the contractors. One of the largest constraints at DCH is the access on the east side of the expansion, which is highlighted in Figure 17- DCH Site Plan Excerpt. It is only 25' wide and immediately adjacent to the construction.

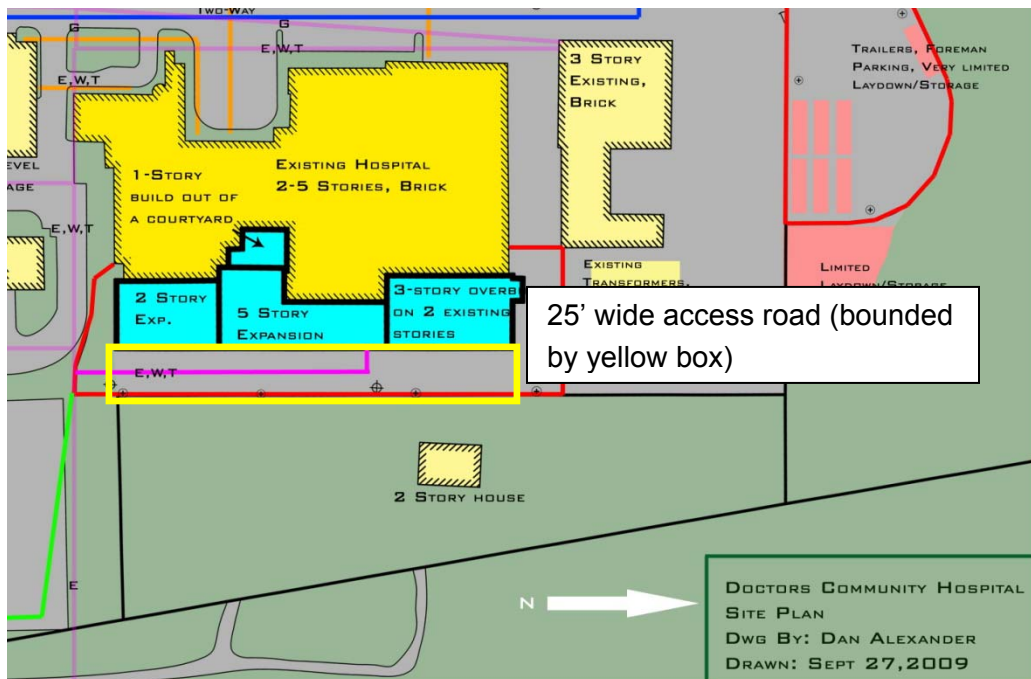


FIGURE 17-DCH SITE PLAN EXCERPT

Additionally, the narrow road was the location of the new ductbank that needed to be installed to feed the expansion. The location is shown above in Figure 17 by the purple line directly below the expansion footprint. Figure 18-Ground Perspective of Ductbank Location, shows another view of the location and illustrates how its installation would occupy almost all of this lone access road to the site.



FIGURE 18-GROUND LEVEL PERSPECTIVE OF DUCTBANK LOCATION

The owner of the hospital passed on the opportunity to purchase the adjoining property, outlined in Figure 6 by the black line around the 2 story structure to the east (bottom) of the picture. It is also shown in Figure 7 at the left side. Purchasing this property would have expanded the site and would have increased the site size which would help to ease the congestion. The effects of this purchase, and if the purchase would have been a sound investment, will be an area of focus for this analysis.

Assessing impacts from a hypothetical situation is not easy. In order to identify affects on the trades, interviews were conducted with the trades that were most affected by this site access issue : MEP, Masonry, Steel, and Concrete. Conversations were held with project managers and based on their intimate knowledge of the project and years of real world experience, they made assessments of possible impacts from additional site space.

GOAL

The goal of this analysis is to:

1. Assess if there is any impact from the congested site on the trades
2. Quantify this impact, if it exists, in terms of affect on the schedule and cost
3. Determine if purchasing adjacent property would have been a sound investment

EFFECTS OF SITE CONGESTION

Construction projects are usually driven by two main factors, schedule and cost. Project managers and superintendents often spend countless hours figuring out how to keep a project on schedule while managing their costs and cash flow. A congested site can sometimes be the culprit behind an expanding schedule, and in turn, added costs.

Conveniently located space is in short supply on the DCH project. During the steel erection, the crane was placed in locations one and two as marked in Figure 19-Crane Placement. These spots are on the sole access road for the site and there is not significant space for laydown adjacent to the crane locations. Steel was delivered directly to the crane by backing the tractor trailers up down the access road and placing steel directly from the trucks when possible, but the narrow road was impassible by other trades when this was the case.

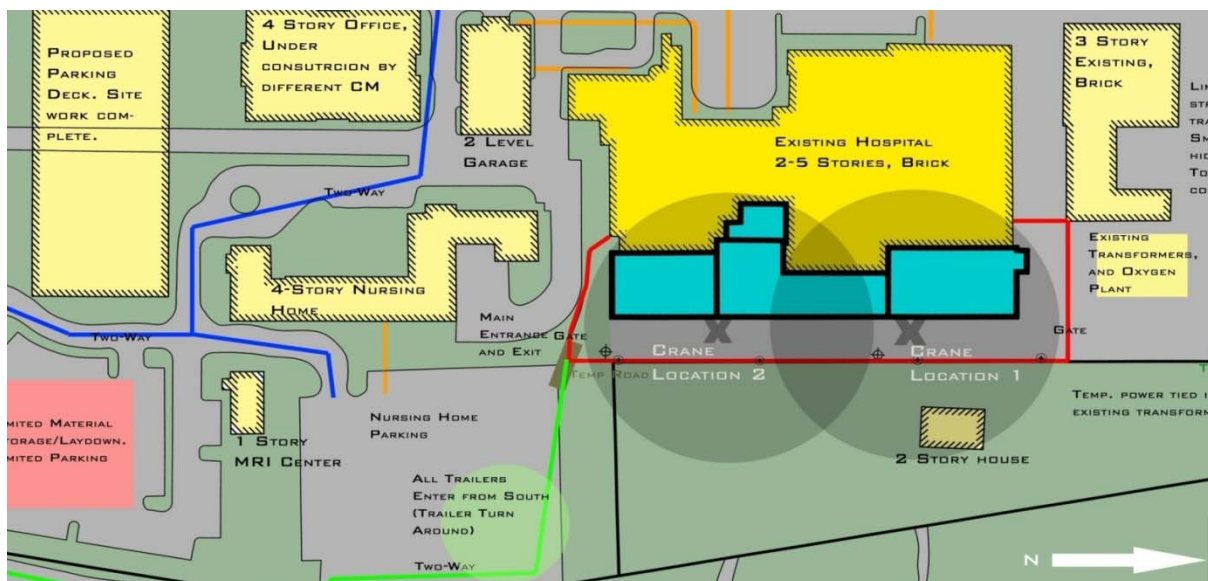


FIGURE 19-CRANE PLACEMENT

The already narrow access road was being restricted by a 130 ton mobile crane for the erection process. Furthermore, when trucks had to be unloaded, but could not be placed directly, the sides of the road were used as storage, further constricting the already narrow passage. There

were times when steel erection had to be suspended to allow other trades use of the access road, again impeding progress

The steel trade was not the only one affected by the lack of space. Underground MEP was also impacted by the lack of space on the east side of the project. Since DCH did not own the property, the only location for the new ductbank that did not interfere with the building footprint forced it to run right down the middle of the access road as shown previously in Figures 17 and 18. Since there was not enough room for both the ductbank to be installed and the crane to occupy the space it needed, one task had to be bumped. The ductbank installation was scheduled later and this required the electrical trade to end up having multiple mobilizations. If there had been enough space (the adjacent property had been purchased), the ductbank could have been run 20' further to the east, allowing simultaneous installation of the bank and the steel.

A problem that plagues all trades is manpower inefficiency due to the location of storage areas. While storage areas are not always in the best location, at DCH they are a considerable distance away, depending on where you start and where you go, almost 4 football fields, further if you need to get to the parking areas. This affected two items: retrieval of needed materials, and amount of time taken on breaks.

Materials are generally not stored immediately adjacent to the place where they will be installed, but rather at some central location for the trade to farm out as needed. Unfortunately, at the DCH project, these locations are not very close to the building because the west side is blocked off by the existing structure and the east side has only 25 feet which is the only access road for the site. During the interviews, several trades noted that they are losing time having to haul materials much further than usual. Steel had to be double handled. Masons were waiting for mortar and brick that has to be hauled twice as far as usual. These impacts are on necessary work, and doesn't even account for when tools, materials, or drawings are forgotten and more time is spent walking long distances to retrieve the items. A person can lose up to 15 minutes in travel time from their location on site, to the trailer/material storage area and back when they are located as far away as they are at DCH. While this is not significant by itself, sum this up over the course of a project, and it can become quite an appreciable number

Secondly, break times get extended, much to the dismay of foreman and superintendents everywhere. Workers will start their break when they reach their truck, not when they start walking from the site, which can add almost 20 minutes of lost labor per man. On a 6 man crew, this works out to be 10 man hours lost per week. When trades are in full swing, and upwards of 60+ workers are taking these breaks, 100 man hours per week are being lost.

SCHEDULE AND COST IMPACT

As previously mentioned, hypothetical situations are hard to quantify on a construction site. In this case, the expertise of the project participants is the basis for the durations and costs used in this subsection. Table 18-Response to Schedule and Cost Impacts is a consolidation of the responses to a series of questions posed that pertains to the site and its congested nature and how this has impacted the respondents' trade. Project managers were the target group for the interviews. Based on these conversations, a common theme that emerged was that schedule improvements were driven by improved efficiency, and the cost savings stemmed from this and resulted in savings in labor costs.

TABLE 18-RESPONSES TO SCHEDULE AND COST IMPACTS

Trade	Schedule Impact	Impact in Days on CPM	Cost Impact
Steel	Shorten 15-20%	9	Save 5-10%
Mechanical/Plumbing	Shorten 25% (Underground)	15	Save \$150,000
Electrical	Shorten 15%	4	Save 5%
Masonry	Shorten 10-15%	5	Save 10%
Concrete	Shorten 5-10%	7	Save \$15,000

While not all activities of all of the trades listed above lie on the critical path, a schedule savings can be realized on the overall project. By looking at the activities in the CPM schedule in Appendix I that lie on the critical path, and accounting for the percentages indicated above, roughly totaled, about 40 days, can be shaved off of the schedule. The bulk of this comes early on in the project when the site has the most effect on the trades, especially in underground MEP and the sub and superstructure of the building.

The savings indicated above are only looking at items that are on the critical path, and will thus directly impact the over head costs of the project in a positive manner. Additional costs savings can be attributed to the improved efficiency of the trades. The total savings attributed to more space are outlined in Table 19-Overall Cost Savings Possible from improved Site Logistics, and include the savings in reduced overhead.

TABLE 19-OVERALL COST SAVINGS POSSIBLE FROM IMPROVED SITE LOGISTICS

Source of Savings	Approx. Contract	Savings %	Savings \$
Steel	\$1,550,000	5%	\$ 77,500.00
Mech/Plumbing	\$9,200,000	-	\$ 150,000.00
Electrical	\$3,000,000	5%	\$ 150,000.00
Masonry	\$1,000,000	10%	\$ 100,000.00
Concrete	\$1,000,000	-	\$ 15,000.00
GC's	\$14,430/wk	8 wks	\$ 115,440.00
Total Savings			\$607,940

Based on the above information, Doctors Community Hospital would have to make the final decision on whether the purchase of the adjacent land is indeed worth it. DCH has passed on several opportunities to purchase the land in the past. Two to three years ago, they passed on the chance to buy the property from the owner for roughly \$500,000, which would have ended up benefiting them in the long run with a more than \$100,000 return. Most recently however, the owner, seeing the value of his land and based on input from his family, has upped his price to roughly \$2.0 million when DCH approached him again at the onset of this expansion project.

A point of consideration is how would the added land impacted the design of the building had the land been available at the start of the project. The architects could have used a more stand-alone structure that tied in with pedestrian bridges. This design would have eliminated much of the demolition work and would have reduced many of the construction problems that have arisen from building next to, and on top of, an operating hospital.

CONCLUSIONS AND RECOMMENDATIONS

Any contractor would be appreciative to have more space for site planning and to have additional room for storage and laydown, especially in a convenient location. The adjacent property at DCH can give exactly that. However, it would appear as though the cost/benefit analysis does not represent a solid investment opportunity at this time. If DCH had moved on the purchase 2-3 years ago, it would have been a sound investment. Based on the current situation, with the current asking price, it would not have been a worthwhile business venture.