

11. Analysis 3 – Site Logistics Plan for Drywall Deliveries

11.1 Introduction

Every construction project requires a site logistics plan that enables the building to be built. The site logistics plan for this project utilizes one road on the north side of the site for most of the site deliveries, as well as the access road for all of the concrete trucks to stage. During certain times of the week while deliveries and trucks are trying to move around, traffic around the site was slowed down which caused law enforcement in the area to get involved. Stop work orders by the county were threatened a few times.

11.2 Problem Statement

There were always problems with drywall deliveries. The drywall deliveries would always need to be planned to occur around the concrete deliveries. This was due to the fact that there was so much drywall on this project; many of the deliveries had to occur outside the normal work day. This caused overtime to be paid to the workers that were forced to work during night and weekend deliveries.

11.3 Goal

I would like to research why the site logistics plan was created the way it was and explore other options that would allow for drywall to deliveries to occur simultaneously while concrete is being delivered. Utilizing the other parts of the site should allow for this to be possible.

11.4 Research Steps

1. Speak to the superintendent who created the site logistics plan and learn about their logic.
2. Talk to Arlington County in Virginia and learn about local ordinances and requirements for construction sites and see if another loading dock would be allowed.
3. Propose another site plan that would help deliveries for the drywall subcontractor.
4. Compile the research and compare the new site plan to the existing site plan and see if it would help to reduce overtime costs.
5. Conclusion & Recommendation

11.5 Tools

1. General Contractor Personnel
2. Drywall Subcontractor
3. Arlington County Code Officials
4. Microsoft Powerpoint
5. Adobe Fireworks

11.6 Expected Outcome

After working on the project site for two summers and seeing how congested the delivery lane was because of all the deliveries, I believe re-evaluating the site logistics plan would increase material delivery during the normal work day. Utilizing the other main road that surrounds the site, another site logistics plan can be developed that allows for more deliveries including the drywall, which would then reduce the need for deliveries on the weekends and reduce the cost of overtime.

11.7 Understanding the Existing Site Plan

To better understand the area, below in *Figure 11.1* is an image from googlemaps.com that shows the surrounding Rosslyn area of Arlington Virginia.

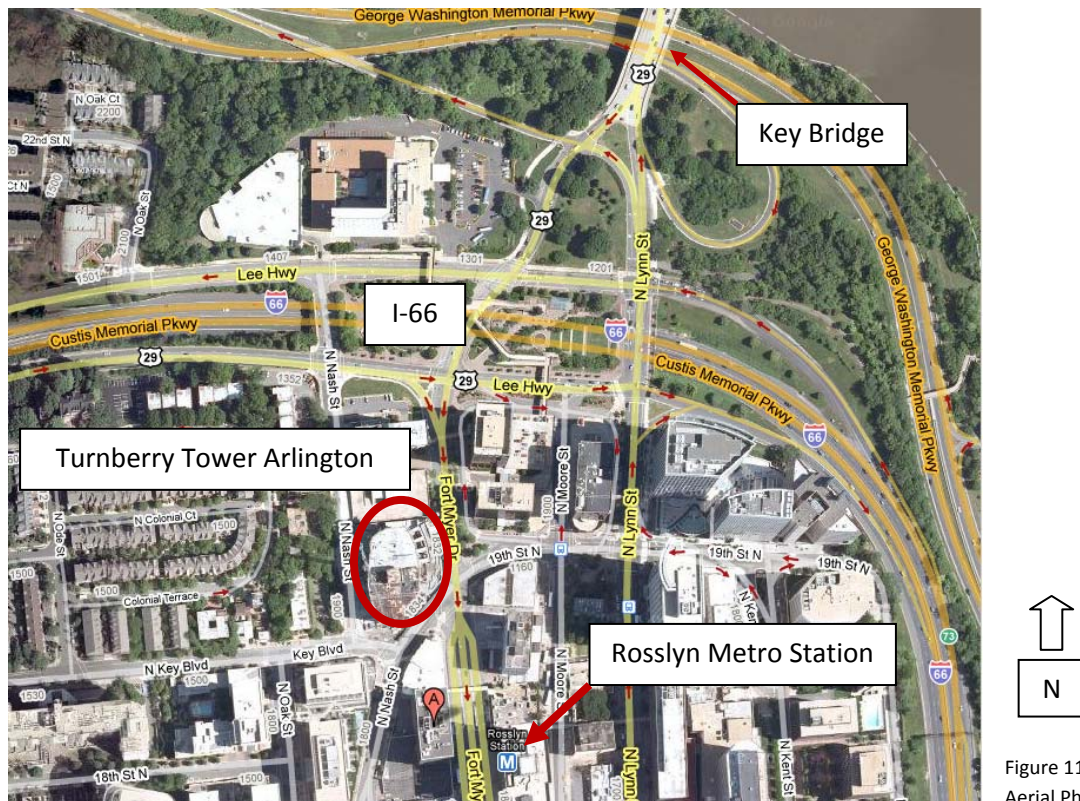


Figure 11.1 – Aerial Photo

Below in *Figure 11.2* is the site plan that was used for the construction of Turnberry Tower Arlington. (An enlarged version of the site plan below can be found in Appendix F.)

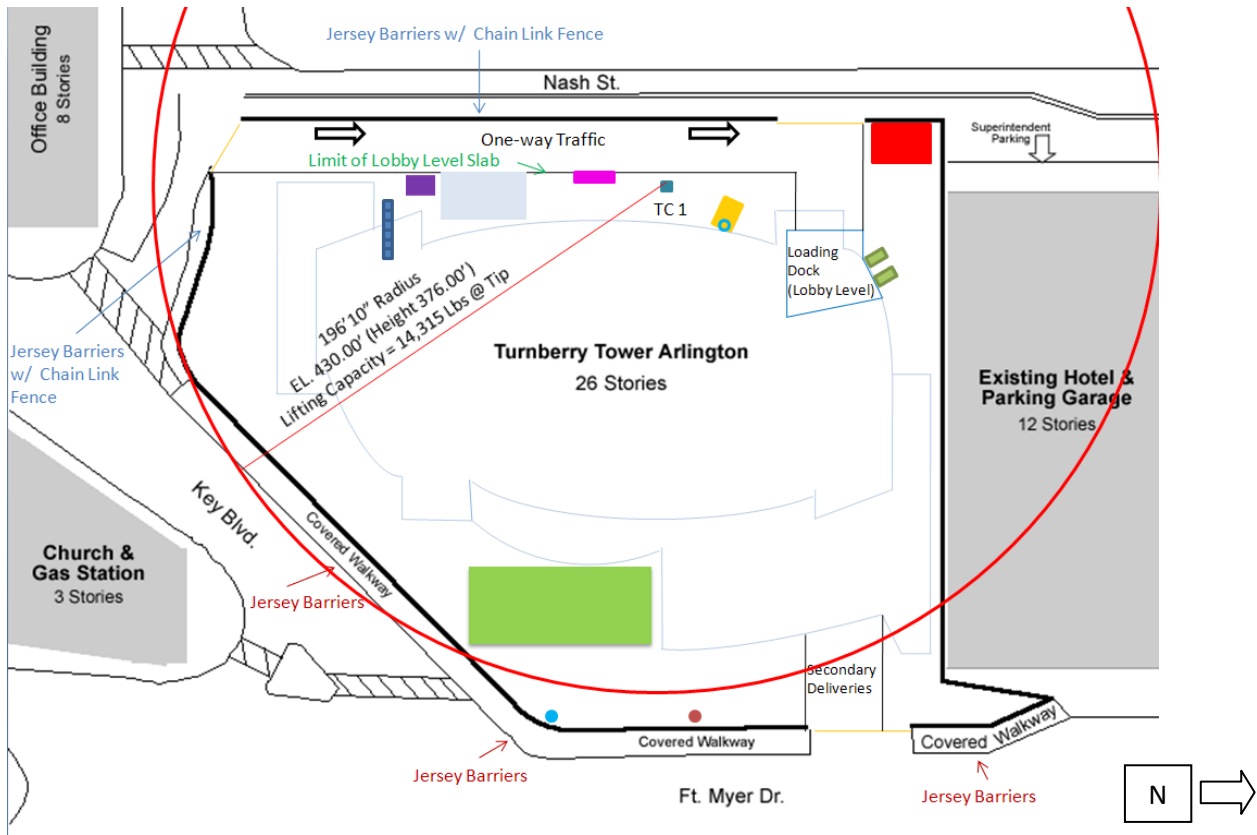


Figure 11.2 – Existing Site Plan

Looking at the satellite image and the site plan, it is easy to see that this site is in a very congested neighborhood with tall buildings and main roads that help connect this area directly to Washington, D.C. The ability to close roads and sidewalks in the area required constant communication with traffic officials working for the County of Arlington at a hefty cost.

In order to maximize productivity around the site and allow for the least disturbance to traffic flow around the site, the sidewalk on the construction site side of Fort Myer Drive was covered over and included behind the temporary covered sidewalk. Additionally, one lane of traffic was closed on Fort Myer Drive and the temporary covered sidewalk was built to allow for undisturbed pedestrian flow around the construction site.

Since Fort Myer Drive is a heavily traveled road, the covered sidewalk was built with jersey barriers and 4x4's place 18 inches on center with a 20 year built up roof, which you can see below in *Figure 11.3*.



Figure 11.3 – Covered Walkway

On the west side of the site there were three lanes, one lane of parking and two travel lanes. The general contractor decided to rent out the lane of parking meters on a renewable one year lease and then rerouted the traffic into the other two lanes that were available. The rented out parking meters allowed for the material delivery lane that can be seen in Figure 11.2.

The site was secured completely around the perimeter. On the north side was an existing parking garage that belonged to the hotel next door. On the east and south of the site was the covered walkway that can be seen in *Figure 11.3* above. On the west of the site, where the material delivery lane was located, jersey barriers were installed which contained 12 foot high chain link fence with barbed wire on top.

The site plan that is seen in Figure 11.2 was used for two primary reasons. The county was very strict with enforcing that vehicular traffic could not be impacted, especially during rush hour. That eliminated the use of Fort Myer Drive as a main point of access because deliveries would need to be brought to site starting early in the day. Losing two hours during the designated rush hour would greatly affect the schedule. By using Nash Street on the west side of the site, deliveries would be allowed to begin earlier.

The second reason that this site plan was used was because of the location of the building on the west side of the site. This side led directly into the building's main lobby without having to deal with the slope of the land and gave access to the building's loading dock. If you were to stand on grade on the Fort Myer Drive side of the building, you would actually be 3 levels below the lobby as seen below in Figure 11.4.

Lobby Level

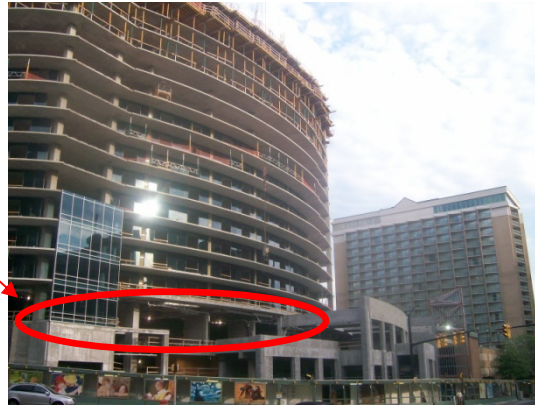


Figure 11.4 – Standing on Fort Myer Drive

Using Nash Street was the best way to utilize the lay of the land and the features of the building being constructed. The loading dock was used to take deliveries that semi-trucks were able to back into the loading dock. The material hoist was located on top of the material hoist. As you can see from the site plan above in Figure 11.2, all of the necessary services for material deliveries were located around this material delivery lane.

11.8 Referring to Arlington County About Logistic Changes

Fort Myer Drive is deemed by Arlington County as a main access road because it leads directly from Key Bridge into Arlington County. This road is heavily used at all times of the day and backed up during peak hours which include rush hour in both the morning and afternoon.

In order to be able to use Fort Myer Drive to accept any deliveries on a regular basis, a plan would need to be developed that would assure county officials that more vehicular traffic would not be created. The county was very upset during excavation of the site because the Fort Myer Drive side of the site was used as the main access point for all dump trucks entering and exiting the site.

These dump trucks would start early in the morning, during rush hour, and would cause delays that would extend back all the way over Key Bridge. This brought law enforcement on the site who threatened to shut down the site with a stop work order. Thus, any logistic plan would be very carefully reviewed by the county and would be subject to suspension if any problems occurred that caused traffic.

11.9 Modifying the Site Plan for the Drywall Subcontractor

After studying the site plan used and noticing how much overtime was being put in by some of the trades to stock materials, especially the drywall subcontractor, I have come up with a modification of the existing site plan that utilizes the space on Fort Myer Drive more efficiently.

Below in *Figure 11.5* is the proposed modification to the existing site plan. As you can see, the Fort Myer Drive section has been modified with 2 swing gates that will allow semi-trucks to enter and exit the site with no problems. This site plan can also be found in Appendix F.

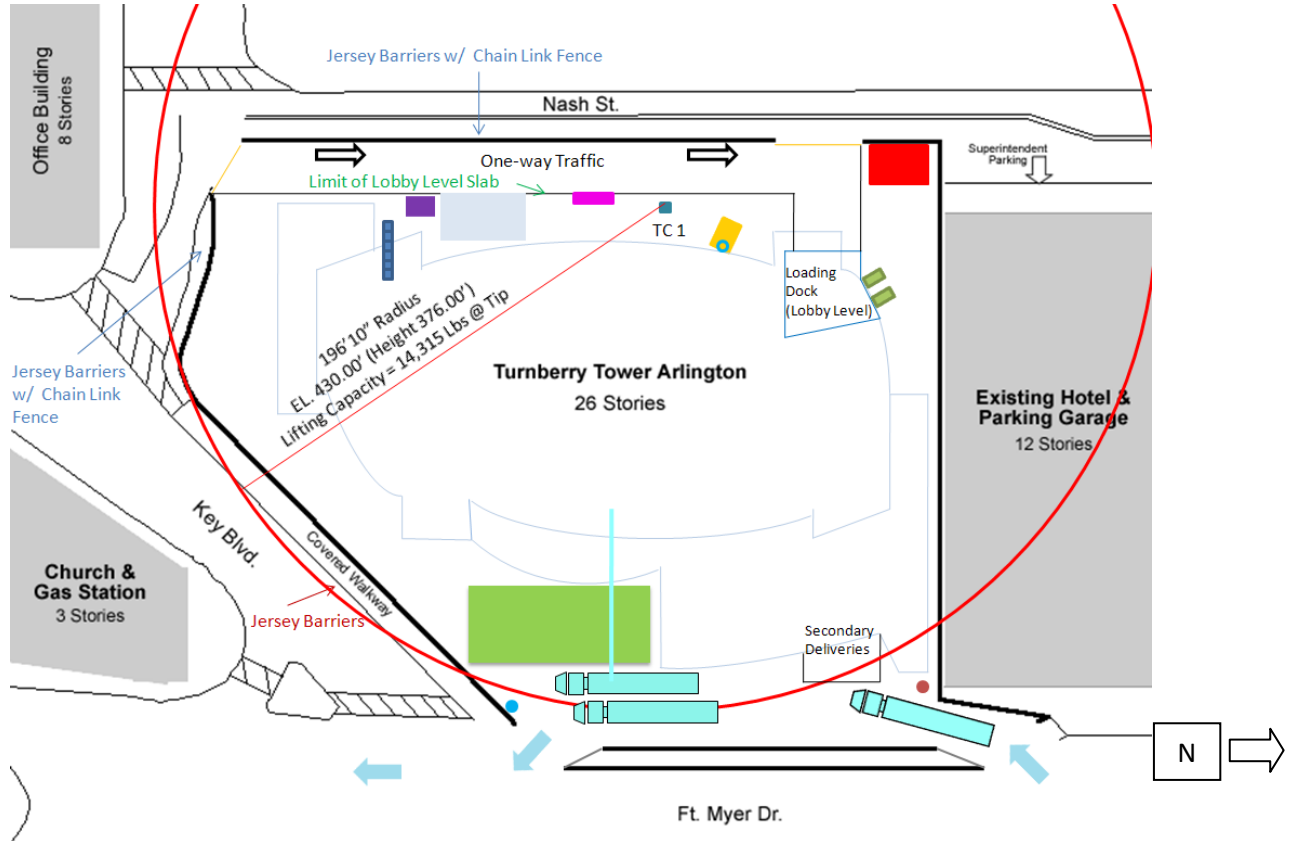


Figure 11.5 – Modification to Existing Site Plan

The material hoists are located on the other side of the building so there is no way to load the drywall directly into the building at this level. The solution to this problem is to load the drywall on the crane on the back of a 42' drywall truck. As you can see in the above Figure 11.5, the drywall truck will stay stationed on site while drywall is being delivered via other flatbed trucks.

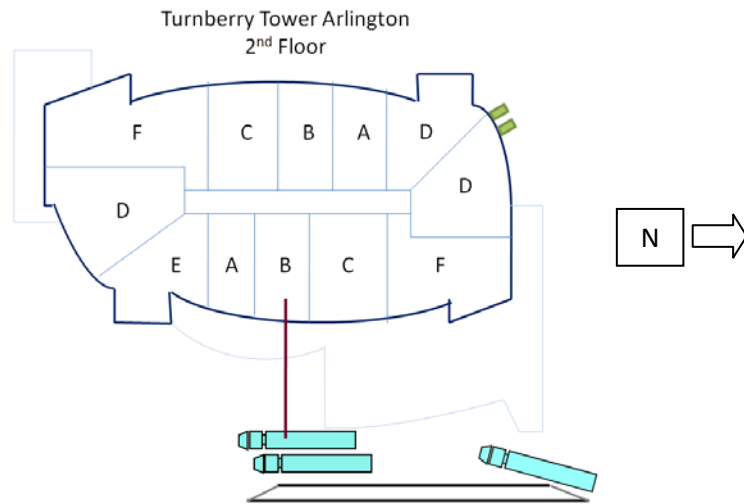


Figure 11.6 – 2nd Floor of Turnberry Tower Arlington

As can be seen in *Figure 11.6* above, the materials will be lifted up to the 2nd floor of the building into residential unit B East. To allow for the materials to be loaded through this unit, the exterior railing and the window wall for this unit will not be installed until after the concrete erection is complete and the drywall can be delivered to site via the material delivery lane. In place of the window wall, heavy plastic will be hung to keep out moisture from the inside of the building and OSHA certified rope will be hung in the place of the railing.

Above in *Figure 11.6*, it shows where the material will be brought into the 2nd floor of the building, but there exists a problem in being able to get the drywall from the access point to the material hoists. The material hoists are in the upper right hand corner and colored green. Below, *Figure 11.7* shows how I plan to get the drywall to the material hoists.

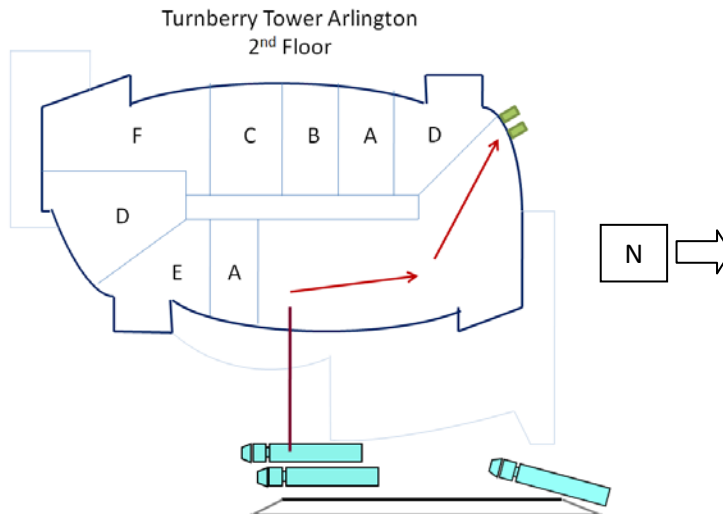


Figure 11.7 – Propose 2nd Floor of Turnberry Tower Arlington during Drywall Delivery

By not framing out and completing some of the units on the 2nd floor, it will allow for the drywall to be carted from the point where it is dropped off from the crane to the access point for the material hoists. Once the concrete erection is complete and the drywall can be delivered via the material delivery lane, the 2nd floor can be finished. Both *Figure 11.6 and 11.7* can be found in Appendix F.

11.10 Comparing Site Plans

The existing site plan that was used for construction of the building only allowed for one main delivery lane. Concrete had the primary use over this lane to erect the concrete decks. When the concrete was not being brought to site, other trades could bring in their materials. While concrete was being erected and other trades needed to bring in materials to keep up with the schedule, trades like the drywall subcontractor resorted to stocking the building with drywall after normal working hours or during the weekends. This resulted in having to pay out overtime in some cases.

If the proposed site logistics plan is used by the drywall subcontractor and helps to reduce the amount of overtime needed, it will help save money. Below in *Table 11.1* is an example of how the proposed site logistics plan would help this project for stocking a certain amount of drywall boards. A standard labor rate of \$22 per person per hour is used and time and half is used for overtime. It is assumed that the modified site logistics plan only increases the productivity of stocking materials by 200 drywall boards during a regular 40 hour week and the remainder of the work is done in an overtime period. In this example, the overtime for the proposed site logistics plan would be 1/3 less based on the productivity done during the 40 hour work week.

Existing Site Logistics Plan			
# of Boards Stocked During 40 Hour Week	Cost for 4 Man Crew (Standard Wage)	# of Boards Stocked During Overtime	Cost for 4 Man Crew (1.5 Standard Wage)
400	\$22 per person per hour	600	\$33 per person per hour
Total Cost for 4 Man Crew for 1000 Boards:			\$5,632
Proposed Site Logistics Plan			
# of Boards Stocked During 40 Hour Week	Cost for 4 Man Crew (Standard Wage)	# of Boards Stocked During Overtime	Cost for 4 Man Crew (1.5 Standard Wage)
600	\$22 per person per hour	400	\$33 per person per hour
Total Cost for 4 Man Crew for 1000 Boards:			\$4,880

Table 11.1 - Existing vs. Proposed Site Plan (OT needed for Proposed Site Plan)

Assuming the productivity only increases by 20% during the 40 hour work week, a savings on labor over \$750 will be credited to the project per 1000 boards. This project has 91,000 sheets of drywall to load into the building.

If the site logistics plan works and can save the project from having to pay any overtime to stock drywall, the results can be seen below in *Table 11.2*.

Existing Site Logistics Plan			
# of Boards Stocked During 40 Hour Week	Cost for 4 Man Crew (Standard Wage)	# of Boards Stocked During Overtime	Cost for 4 Man Crew (1.5 Standard Wage)
400	\$22 per person per hour	600	\$33 per person per hour
Total Cost for 4 Man Crew for 1000 Boards:			\$5,632
Proposed Site Logistics Plan			
# of Boards Stocked During 40 Hour Week	Cost for 4 Man Crew (Standard Wage)	# of Boards Stocked During Overtime	Cost for 4 Man Crew (1.5 Standard Wage)
1000	\$22 per person per hour	0	\$33 per person per hour
Total Cost for 4 Man Crew for 1000 Boards:			\$3,520

Table 11.2 – Existing vs. Proposed Site Plan (No OT for Proposed Site Plan)

A savings can be seen in this example of a little more than \$2000 per 1000 drywall boards. This project has 91,000 sheets of drywall to load into the building.

It is seen in the above examples that on a building such as Turnberry Tower Arlington that requires drywall to be constantly stocked that if another access point is created to deliver drywall during the normal 40 hour week that it will save the project overtime costs tremendously.

The biggest comparison to the two site plans is that the proposed site plan, seen in Figure 11.5, requires 2 new access points to allow these drywall trucks to enter and exit the site. This will require the need for a flagman to help these trucks exit the site onto the heavily trafficked Fort Myer Drive.

10.11 Conclusion & Recommendation

The biggest hurdle to overcome that would make it possible to modify the existing site logistics plan would be to get Arlington County to approve the plan and agree that it would not create any more traffic around the site than there already is. Once the county is satisfied with the modified plan, the analysis shows how another delivery point for drywall would help.

Not completing part of the 2nd level of the building will make the 3rd level of the building all that much more important. The 2nd level was going to be used as the mock up to identify and MEP clashes and have them corrected on the upper floors. If the modified site plan is used, the third floor would have to be the first floor completed on the SIP Schedule.

The SIPS was created so that concrete erection was above a few floors above the deck that was to be roughed in with drywall tracks. Even though risers were attached, this process eliminated the chance that reshores would be in the way of drywall studs and MEP could be installed with nothing in the way.

Since the reshores only had to be placed 3 floors below the working deck, the existing SIPS has the first activity occurring on the 2nd floor when the 7th floor is being erected. If instead work began on the 3rd floor during this week, the 2nd floor could be complete later on in the project and no time will be lost on the SIPS. This would allow the modified site plan to be used with no schedule impact.

The material hoist time would need to be divided up a little more thoroughly. With the existing site plan, whichever trade is in the loading dock would have access to the material hoist. If there are two points where materials are being delivered, the time on the hoist would need to be divided, or since there are two hoists each material would get only one hoist instead of two. Luckily for the drywall, if this modified site plan is used, the second floor will remain relatively empty which will allow for some material storage. This can allow for use of the material hoist while concrete erection is occurring and there are no other deliveries.

Looking at the examples that show money could be saved, and showing that the schedule would not be impacted from this modified site plan, I recommend that this site plan be implemented on this project if Arlington County approves the plan.