Community Healthcare

Mid-Atlantic

Technical Assignment II

Kenna Markel

The Pennsylvania State University
Architectural Engineering
Construction Option

FRAUENSHUH
Commercial Real Estate Group

PERKINS
+ WILL

DPR
CONSTRUCTION

2015
2016

Table of contents

Executive Summary

The following report for Technical Assignment II outlines the findings of the critical analysis done on the façade system of the Community Healthcare project. This report will summarize the means and methods of the building façade, the production schedule, cost estimate, and site logistics techniques. Following this summary, the findings from the critical analysis of these topics will be reviewed and will provide potential alternatives that could improve constructability or accelerate the schedule.

The Community Healthcare's building façade is comprised of three major systems including brick veneer, curtain wall, ribbon windows, and architectural metal panels. Upon completing the production plan phase of Tech II, the installation of the façade had a total duration of fifteen weeks from the end of May 2015 to midway through September 2015. The Timberline cost estimate for the system totaled at $2,821,352, which was only 0.5% over the actual cost of the façade. This cost variation was assumed to be from the difference in labor costs on Timberline versus the contractor's historical database. The site logistic plan clearly illustrates the flow of work and movement of equipment onsite from the west façade clockwise to the north side, east then south side. Table 1 below summaries these findings.

Table 1 Summary of findings

Façade System Summary	
Duration	15 Weeks
Timberline Estimate	$2,821,352

Following these investigations, there where areas that with changes or added of resources have the potential to accelerate the schedule or improve constructability. The manpower loaded schedule showed a major drop-off of manpower when transitioning from the west and north elevations to the east and south elevations awaiting the move of scaffolding from one elevation to the next. Further analysis of using another form of scaffolding or additional scaffolding could potentially help to maintain manpower and accelerate the schedule. Additionally the simplicity of the façade system, the size of the site, and site access, make this project an ideal candidate for prefabricated assemblies. While there would be more cost added to accomplish this, the owners could benefit from opening their outpatient center several months earlier.

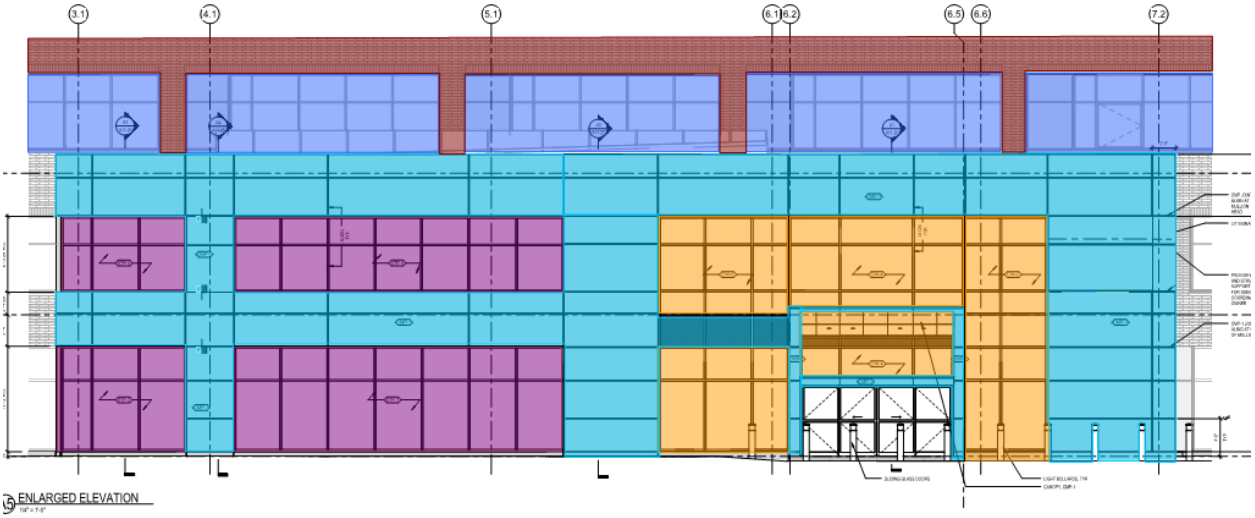
The project team has faced several constructability issues centered mostly from design issues. Following a face-to-face interview with key members of the project team, these design flaws were highlighted as areas that could have been spotted earlier with a constructability survey. This technical report serves as an opportunity to further investigate alternative construction means and methods if the project team had different resources.

Production Plan

System Construction Means and Methods –

The system being analyzed for the Community Healthcare project is the exterior façade system. The exterior façade system is comprised of three major architectural features including a brick veneer, curtain system, storefront and ribbon windows, and decorative metal panels. The brick veneer system is the first to be installed on the project following the exterior metal framing of the building. The brick follows a common construction assembly of brick sitting on steel lintels spaced every 10-12 rows or in this case spanning generally from top of window to top of window and top of window to bottom of window. The brick veneer is backed by purple board and a spray on vapor barrier. The curtain wall system, windows, and metal panels follow after the installation of the brick veneer is complete. The double glazed curtain wall system primarily is found at major entrances including the main entrance atrium and the outpatient cancer center entrance. This system is a combination of mostly curtainwall glazing and some metal panels. The storefront glazing systems can be found on the west elevation and first floor. The remaining floors and elevations mostly only have ribbon windows with metal panels for an architectural feature and reference to the curtain wall. Major areas of constructability concerns occur where these systems meet. Mockups were done for the curtain wall to brick veneer and one for the ribbon windows to brick veneer. Figure 1 shows all of the systems on the West Elevation

Figure 1 West Elevation



The façade is being installed from the west elevation clockwise to the north then east then south facades. Before beginning to install the façade, a major issue was discovered. It was found that while the design called for six inch metal framing, the gap between the slab and building edge on the west and east sides was only five inches. The solution was to use four inch metal framing for the west and east side while using six inch framing everywhere else including the north and south side. So instead of beginning framing on the west elevation, the carpenters had to begin on the north elevation then backtrack to the west side once submittals were approved and material delivered. The framing, sheathing, and spray on vapor barrier was installed by way of lifts to prepare for the installation of the brick veneer.

The brick veneer followed since it would take the longest out of all the façade activities, and it would prevent the possibility of damage to other façade materials such as the glazing systems and metal panels. The brick veneer was installed via the use of either tube scaffolding on the short sides (north and south) or hydraulic scaffolding on the long sides (west and east). When manpower allowed, the brick veneer could start from both sides of the elevation to help reduce the amount of total time per side. Since the work moved clockwise without opposite sides of the building overlapping, the equipment was able to be shared between the north and south and east and west sides. This can seen in the site logistics plan in Appendix B.

Following the completion of each elevation, the curtain wall glazing, windows, and metal panels could be placed. As mentioned, the installation of these items were held off until after the masons finished in order to reduce the possibility of damage especially since these items have long lead times that could jeopardize completion. These materials are primarily placed by means of lifts of which two to four could be found onsite. Lifts were used to place these items considering that the scaffolding had been already been moved and generally lifts are better for this work since there are less restrictions on access and space.

Being that this a building façade system, the system performance is critical to project success. Waterproofing and water tightness are major areas for quality control. Creating a continuous vapor barrier between different waterproofing products was discussed on several occasions by Perkins +Will, DPR Construction, and various subcontractors. Additionally, Perkins +Will were especially critical of this system being that it is the first thing users will see.

Production Schedule –

The overall duration for the installation of the façade system is to run from the end of May 2015 to midway through September 2015. This schedule includes the installation duration for the metal framing, wall sheathing, vapor barrier, brick, windows, curtain wall, metal panels, and final caulking. The schedule begins at the west elevation and moves clockwise from the north to the east to the south. While the façade is not on the critical path, this installation would be most effective during spring, summer, or fall to avoid having to use cold weather masonry techniques. Additionally, the façade currently does not affect the interior finishes because there is enough float built into the schedule; however, if the façade is delayed or falls behind, interior finishes cannot begin until the façade is finished or temporary protection installed. So while the façade is currently not on the critical path, its completion is necessary for activities to follow. The production schedule can be found in Appendix B.

The crews began on the west side and were able to flow through the remaining elevations about every two weeks. So the framers were scheduled to begin on the west side on June 11, 2015 and would move onto the north side in two weeks, June 25, 2015. The remaining trades would follow the framers. In terms of manpower, the framers had about ten carpenters on a side at a given time both framing and hanging wall sheathing. Far fewer waterproofers were needed only about two to three on a side. The waterproofing material was both sprayed and dried within a week of time. The masons followed bringing up to fifteen masons onsite per side. The remaining activities used less workers with five to

eight workers per side for the curtain wall and windows. The subcontractors who installed metal panels had a range of workers as well with many workers for the curtain wall and only up to five maximum for the remaining sides.

Detailed Cost –

The final detailed Timberline estimate came out to be $2,821,352. Refer to Appendix B for the detailed Timberline cost estimate.

Site Plans and Logistics –

There are two major site logistic sequences for the installation of the façade. The brick veneer begins on the west side and moves clockwise overlapping with each of the following sides. The site logistics plans show the sequence of the flow of work from west and north side followed by the east and south side. However, there is a period of lag between the north and east sides, where there is a limited about of manpower on the façade. These overlaps help to redistribute manpower and keep laborers on this project. This flow of work also allowed for the project to move the scaffolding equipment in between the elevations. The west and east elevations could use the same hydraulic scaffold and the north and south could use the same tube scaffolding since the opposite facades were never worked on simultaneously. The schedule is a major driver of this shared equipment opportunity; if the building elevations are not completed on time, then the equipment will not be able to be shared. This will in turn, either drive up the cost of equipment by ordering more scaffolding or delay the schedule waiting for the equipment to be moved to the other side. Lifts are also being used on this project to install most of the activities that follow the brick veneer completion including the curtain wall system, windows, and metal panels.

The site has plenty of laydown area, and therefore had the majority of the materials for the façade delivered to the site all at once. During the west and north facades, the metal framing and brick veneer were placed closer to the elevations that were installing the materials. As the north side of the building begins to be completed, most of the material deliveries will be stocked in the laydown area on the south side of the building. This provides better access to materials for the east and south elevations. The site logistics plan can be found in Appendix B.

Production Analysis

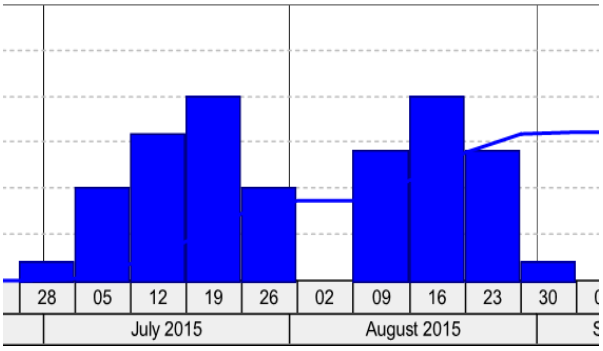
Production Schedule –

The production schedule for the project flows pretty efficiently from each side of the building to the next. The initial start of the framing on the west side could have begun as early as April 9, 2015 once the final under slab was poured. However, this was delayed up to a month due to design issues with the framing on the west and east side. Until this issue was resolved and the new product was approved and delivered to site, the project was held up for over a month.

With only two scaffolding systems, the west and north sides of the building need to have the brick veneer completed before the moving onto the other sides since the scaffolding equipment has to be

moved from one side to the next. This creates a manpower drop off between the construction of the west and north façade and the east and south side at the beginning of August 2015 (as seen in Figure 2); however, this correlates with only have one side's worth of tube scaffolding and one side of hydraulic scaffolding. Fortunately, the site allows for the materials to be delivered long before they are needed for installation, which causes no delays waiting on materials. The site has the workers during the installation of brick up to thirty masons, which seems to be a lot, including the support crews, foreman, and a full-time quality control manager.

Figure 2 Manpower Gap



Despite these challenges with equipment and design issues, the schedule efficiently maintains a flow of manpower with a tight schedule. Some considerations could be given to pulling the installation of glazing back into the brick placement schedule, however, the project team ultimately decided that the risk of damaging the glazing systems was far more critical than extending the schedule.

Cost –

While the initial SF estimate for the exterior enclosure came out below the actual project costs, the Timberline estimate came in over the actual project cost. As seen in Table 2, the Timberline estimate was much closer to the actual estimate within 0.5% of the actual cost while the SF estimate was under by around 9%.

Table 2 Cost Comparison

Estimate	Cost
Actual Project	$2,807,113
SF Estimate	$2,553,710
Timberline	$2,821,352

In a more detailed cost comparison between the Timberline estimate and the actual project estimate, some of the major inconsistencies in the estimate were for systems and materials that have a large range of quality standards. These major inconsistencies can be found in Table 3. Specifically the metal panels and glazing systems were far less in Timberline than in the actual project cost. Assuming that the project has specified a higher quality product, Timberline could have underestimated the project costs. With this being said, the Timberline cost was still over the actual project cost.

This variation could have come from the pricing of Timberline versus DPR Construction's historical data. The estimate came up so close that most of the variation would come from differences in cost of the actual systems and the Timberline systems selected for the estimate. However, some differences in cost

also came from the variation in the RS Means costs in Timberline and the historical data DPR Construction uses. Especially labor costs are going to vary between Timberline and the actual estimate.

Table 3 Comparison of assemblies with largest cost variation

	Timberline	Actual	Difference
Masonry Veneer	599,593	534,600	64,993
Framing	156,300	246,050	-89,750
Waterproofing	142,500	51,500	91,000
Metal Panels	80,900	614,188	-533,288
Storefront Windows	1,087,800	980,050	107,750
Curtain Wall	194,250	incl. in windows	incl. in windows
Ribbon Windows	211,000	997,550	-592,300

These costs would vary because the labor costs are general and not specific to the different types of workers. Additionally, the labor costs on Timberline are outdated and not specific to the geographic region unlike the actual estimate which are based on subcontractor bids.

Site Logistics –

Fortunately, this site does not have a problem with laydown area. With such a large and flat site, delivery, material storage, and equipment placement are not major issues for construction. The project does utilize additional property on the site by delivering all the material at once and storing it. Additionally there is plenty of room for equipment to move around site and be stored. Therefore, the project team is storing lifts onsite at all times for whenever a subcontractor needs to use the equipment. Currently the project team is only using one set of tube scaffolding and one hydraulic scaffold for the installation of the brick veneer; however, the team could potentially use more scaffolding or other forms of scaffolding to complete this same work. For example, the masons could use suspended scaffolding instead of other forms of scaffolding. These supports could be helpful in the future for cleaning the curtain wall system. One major consider since the project has so much laydown area would to prefabricate more assemblies that could be stored onsite.

Interview Feedback

Schedule Acceleration Scenarios –

Overall the building exterior is not on the critical path; however, it was important to the start of interior finishes. There was enough built in float for the skin to be completed before drywall was hung. Interior framing and other activities were being installed simultaneously with the façade, but finishes that could be damaged by water and weather penetration had to be held off until the façade was close to completion. Framing was installed while the façade was going up both since the manpower was already onsite for the exterior wall framing and also because top track installation was critical for the MEP rough-in, which is on the critical path. In terms of the production schedule for the façade, the installation of the west and north elevations drive the schedule even though they are not on the critical path because the east and south sides cannot begin construction until the other two sides having been completed.

The façade completion is based on finishing the east and south elevations, which can only begin after the west and north sides' scaffolding are transferred to the other sides. One possibility for reducing this schedule would be to work on all four sides simultaneously assuming that the masons can provide the manpower. This would involve renting more equipment at a given time, so another set of tub scaffolding and another hydraulic scaffold. While the cost would be more to rent more equipment and staff more workers, there could be cost savings from renting the equipment for less time. By working on all sides at the same time, the long west and east sides would drive the completion schedule, but this most likely only reduce the total production schedule by a month.

Additionally another area for potentially accelerating the schedule would be to install the glazing and metal panels simultaneously with the brick veneer. This has the potential to also shorten the production schedule by about a month. However, as mentioned earlier this method was entertained, but not considered worth the risk of damaging long lead items including the glazing.

One method that could pose potential for really accelerating the schedule would be using prefabrication for many of the façade components. Most of the assemblies of this façade system are fairly standard systems. By prefabricating all of the brick veneer into sections, the installation time onsite for veneer would be drastically be reduced with potentially less onsite manpower. The curtain wall and ribbon windows could also be assembled offsite in sections and shipped. While the façade installation time could be reduced, this acceleration would only be worth the cost if other systems in the building could be accelerated as well since the façade is not driving the schedule. This site is ideal for prefabrication because not only does the site have ample laydown area for large assemblies, but it also has the area and terrain to bring large trucks with oversized loads and larger cranes for lifting and setting assembles. Additional, costs would incur for assembling these components offsite and from the additional equipment; however, prefabricating the assemblies could be considered an option not only to accelerate the schedule but also to increase safety and quality.

Constructability and Logistical Challenges –

Most of the major constructability issues were a product of poor design and lack of prior constructability surveying. The first major issue discovered when constructing the façade was during framing. The standard framing specified for the project was a 6 inch metal stud, however, when it came to installing the exterior framing the west and east sides only had a 5 inch space for the framing to fit from the slab to the building edge. This issue is show in Figure 3 (right). Since this 5 inch gap will not accommodate a 6 inch stud, the project team had to submit an alternative solution for approval to the design team. Since the framing design was delegated to the drywall subcontractor, the framers submitted a design to install 4 inch studs on the exterior of the west and east façade in place of the 6 inch stud. While this solution was ultimately approved by Perkins +Will, the additional time needed to determine the solution,

Figure 3 Shows 5 inch gap

submit the alternative, get an approved submittal, and delivery the new material delayed the installation of the façade on the west side by a month.

Another issue that arouse during the framing of the curtain wall system was that the waterproofers found that the caulking specified for the bottom seal of the wall to the slab is not compatible with the slab's vapor barrier. This would break the continuous water seal between the different systems and would ultimately lead to water leakage under the curtain wall. While this issue is still be resolved, a submittal for an alternative product that would be compatible with the vapor barrier was submitted by the waterproofing subcontractor. Fortunately, since the curtain wall on the west side does not fall on the critical path, the additional time needed to get the new submittal approved should take no more than two weeks, and the waterproofer only needs about a week to procure this product following approval. Once again this was an original design issue that was not picked up until it got to field installation.

Figure 4 Mockup

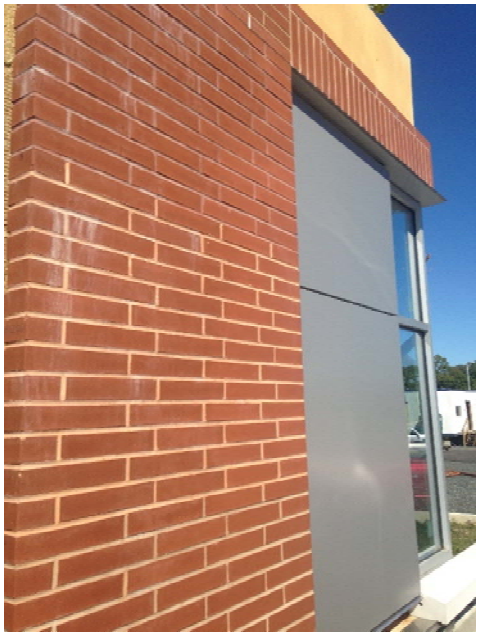


Figure 5 Brick hangover on lintel

Once the masons were brought on another issue was discovered. When building the two exterior mockups (shown in Figure 4), the masons discovered that there were two different conditions for the brick lintels depending on if the lintel was at the top or bottom of the window. The brick lintels at the top of the windows lined up and the lintels at the bottom of the windows were lined up, but they were not aligned up with each other. This would mean that if the brick veneer sat on the lintels the way they were designed, the brick wall would not be plumb the entire way up the building. To correct this problem the mason had to pull the brick off to the edge of the lintel at the tops of the windows to ensure that the brick was plumb (as seen in Figure 5). However, pulling the brick that far off the edge of the lintel jeopardized the structural integrity of the brick veneer and could potentially cause the brick to fall right off of the façade. Especially since the top row of brick were a soldier row of bricks, making them even more unstable, the masons had to add temporary wood supports off of the lintels to hold the bricks in place until the mortar hardened and could support the bricks.

APPENDIX A

The interview below was conducted Tuesday, October 6, 2015 with Tim Minor and Ryan Audy of DPR Construction for Community Healthcare Project. The answers below are paraphrased from the responses of the DPR team and are not directly quoted from the subjects, however, they do reflect the intended content of their answers.

DATE: Tuesday, October 6, 2015 1:00 PM
NAME: Tim Minor & Ryan Audy
LOCATION: Community Healthcare Project Site

Q1: Which systems do you believe are most relevant to the critical path?

A1: The two major systems that are critical to the project completion date are the building enclosure and the completion of the rooms that hold the major owner furnished equipment (MRI, CT, CT Simulator, and LINAC)

Q2: What are some of your biggest risks that would interfere with completing this system on time?

A2: The brick veneer drives the building façade installation since it needs to be placed before the curtain wall and metal panels. One of the issues that could risk completing the system on time would be a lack of manpower for the masons. The mason subcontractor is union and could only get five guys onsite for the first elevation when they need about fifteen.

Q3: Could you address the means and methods, equipment, and quality or performance outcomes for this system?

A3: The exterior faming is being installed from the interior of the building. Purple board, vapor barrier, and rick accessories including the brick ties and lintels are all being installed via aerial and boom lifts. The masons then lay the brick with the use of hydraulic scaffolding on the west and east elevations and tube scaffolding on the north and south sides. The windows and metal panels are also being installed by any combination of equipment based on what is available and most convenient including the aerial lifts, boom lifts, or tube scaffolding.

In terms of quality and/or performance. Waterproofing critical for the performance outcome of the building. Ensuring that the vapor barrier in continuous from the slab to curtain wall

assembly was one that drew some attention considering the slab vapor barrier was not compatible with the specified product for the curtain wall.

Quality of the brick installation is also of high importance for this project. The masons of the project just closed a several year lawsuit involving debate over whether or not the brick veneer system of another project was installed correctly. Therefore, the masons have a quality control manager onsite at all times for this project.

Q4: What are some of the major constructability issues for this system, and how did your team overcome them?

A4: As addressed earlier, the vapor barrier from the slab to the caulking of the curtain wall system had to be redesigned using another product to ensure that the water barrier was maintained.

Another issue that was discovered was that the west and east floor slab edges only had a 5 inch gap to the building edge despite the design calling for a typical 6 inch stud. Therefore to resolve this issue, the framers provided a delegated design that called for the use of at 4 inch stud over a typical 6 inch stud in order of the framing to fit within the 5 inch gap. The 6 inch stud was then used everywhere else including the north and south elevations where the gap allowed.

The project has two exterior mockups which showed additional design issues for the masons. The issue found was that the brick lintels for the various brick courses did not line up based on the different design conditions throughout the elevation. The brick lintels located at the bottom of the windows where aligned while the brick lintels at the top of the windows were aligned but they were not aligned with each other. To correct this problem, the masons had to pull the brick further off the lintel in certain locations to ensure the wall was plum. This created temporary structural instability of the bricks placed off the lintels. Temporary wood supports were used to stabilize the bricks until the mortar dried.

Q5: If you had additional resources, what lessons learned do you have for this system or how would you improve it in the future?

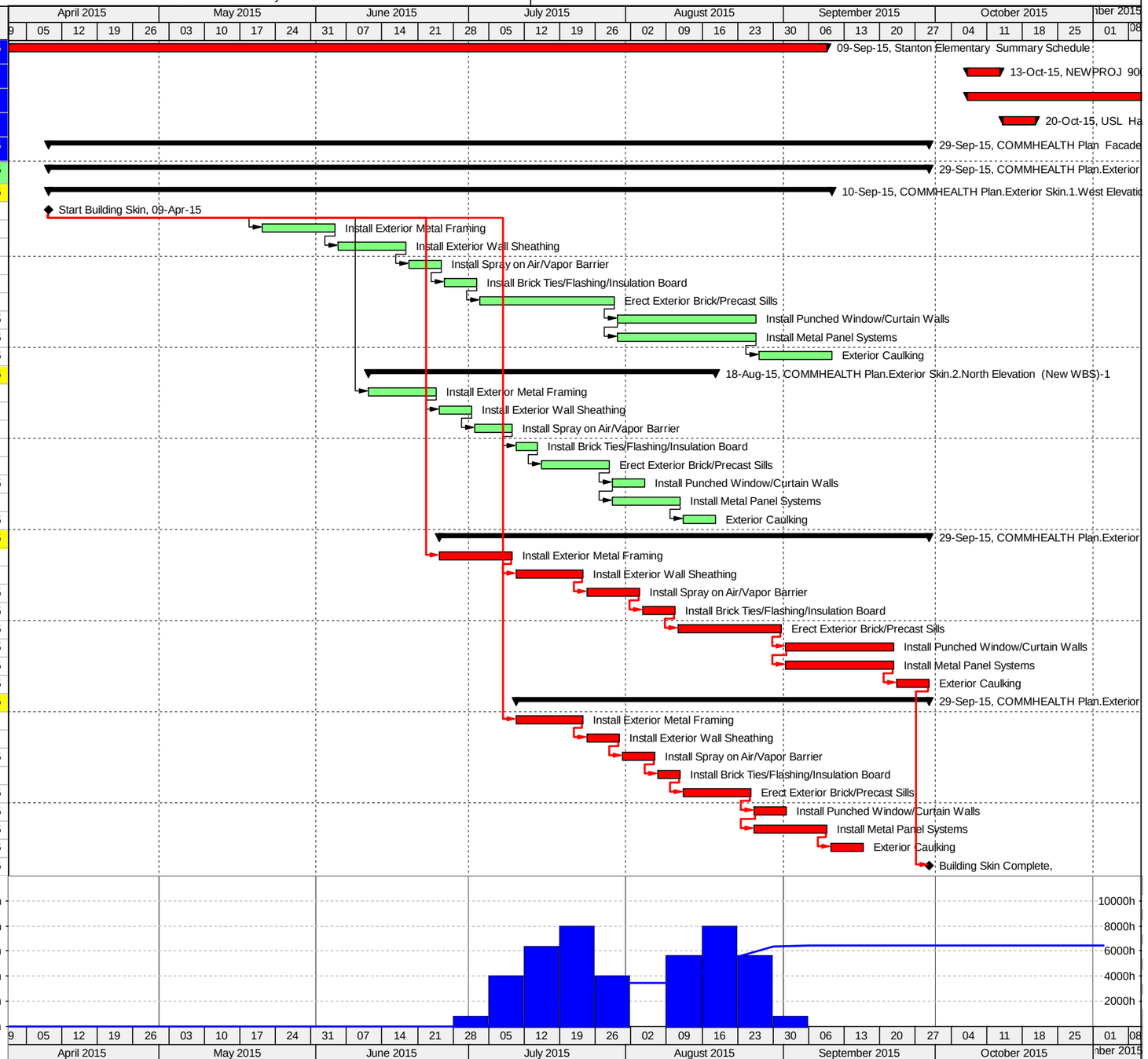
A5: In general, many of the issues resulting from poor design. Possible areas to investigate would be different delivery methods to catch these issues earlier on. Additionally, the owner chose not to pay for a constructability survey which also could have caught many of these issues.

Q6: What key areas have the potential to accelerate the schedule?

A6: The sequencing of the project along with the initial project delay resulting in having to delay work due to inclimate weather. With a total of weather days added up to almost a full month, resequencing the project could potentially reduce delays from bad weather

APPENDIX B

Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish
Stanton Elementary Summary Schedule		358	358	28-Apr-14	09-Sep-15
NEWPROJ 900 16th Street		5	5	07-Oct-15	13-Oct-15
Tech 2 900 16th Street		130	130	07-Oct-15	05-Apr-16
USL Hambro System		5	5	14-Oct-15	20-Oct-15
COMMHEALTH Plan Facade		124	124	09-Apr-15	29-Sep-15
COMMHEALTH Plan.Exterior Skin (New WBS		124	124	09-Apr-15	29-Sep-15
COMMHEALTH Plan.Exterior Skin.1.West Elevation (N		111	111	09-Apr-15	10-Sep-15
A1000	Start Building Skin	0	0	09-Apr-15	
A1010	Install Exterior Metal Framing	11	11	21-May-15	04-Jun-15
A1020	Install Exterior Wall Sheathing	10	10	05-Jun-15	18-Jun-15
A1030	Install Spray on Air/Vapor Barrier	5	5	19-Jun-15	25-Jun-15
A1040	Install Brick Ties/Flashing/Insulation Board	5	5	26-Jun-15	02-Jul-15
A1050	Erect Exterior Brick/Precast Sills	19	19	03-Jul-15	29-Jul-15
A1060	Install Punched Window/Curtain Walls	20	20	30-Jul-15	26-Aug-15
A1070	Install Metal Panel Systems	20	20	30-Jul-15	26-Aug-15
A1080	Exterior Caulking	11	11	27-Aug-15	10-Sep-15
COMMHEALTH Plan.Exterior Skin.2.North Elevation (I		49	49	11-Jun-15	18-Aug-15
A1090	Install Exterior Metal Framing	10	10	11-Jun-15	24-Jun-15
A1100	Install Exterior Wall Sheathing	5	5	25-Jun-15	01-Jul-15
A1110	Install Spray on Air/Vapor Barrier	6	6	02-Jul-15	09-Jul-15
A1120	Install Brick Ties/Flashing/Insulation Board	3	3	10-Jul-15	14-Jul-15
A1130	Erect Exterior Brick/Precast Sills	10	10	15-Jul-15	28-Jul-15
A1140	Install Punched Window/Curtain Walls	5	5	29-Jul-15	04-Aug-15
A1150	Install Metal Panel Systems	10	10	29-Jul-15	11-Aug-15
A1160	Exterior Caulking	5	5	12-Aug-15	18-Aug-15
COMMHEALTH Plan.Exterior Skin.3.East Elevation (N		69	69	25-Jun-15	29-Sep-15
A1170	Install Exterior Metal Framing	11	11	25-Jun-15	09-Jul-15
A1180	Install Exterior Wall Sheathing	10	10	10-Jul-15	23-Jul-15
A1190	Install Spray on Air/Vapor Barrier	7	7	24-Jul-15	03-Aug-15
A1200	Install Brick Ties/Flashing/Insulation Board	5	5	04-Aug-15	10-Aug-15
A1210	Erect Exterior Brick/Precast Sills	15	15	11-Aug-15	31-Aug-15
A1220	Install Punched Window/Curtain Walls	16	16	01-Sep-15	22-Sep-15
A1230	Install Metal Panel Systems	16	16	01-Sep-15	22-Sep-15
A1240	Exterior Caulking	5	5	23-Sep-15	29-Sep-15
COMMHEALTH Plan.Exterior Skin.4.South Elevation (I		58	58	10-Jul-15	29-Sep-15
A1250	Install Exterior Metal Framing	10	10	10-Jul-15	23-Jul-15
A1260	Install Exterior Wall Sheathing	5	5	24-Jul-15	30-Jul-15
A1270	Install Spray on Air/Vapor Barrier	5	5	31-Jul-15	06-Aug-15
A1280	Install Brick Ties/Flashing/Insulation Board	3	3	07-Aug-15	11-Aug-15
A1290	Erect Exterior Brick/Precast Sills	10	10	12-Aug-15	25-Aug-15
A1300	Install Punched Window/Curtain Walls	5	5	26-Aug-15	01-Sep-15
A1310	Install Metal Panel Systems	11	11	26-Aug-15	09-Sep-15
A1320	Exterior Caulking	5	5	10-Sep-15	16-Sep-15
A1330	Building Skin Complete	0	0		29-Sep-15



Actual Level of Effort | Actual Work | Remaining Work | Critical Remaining Work | Milestone | summary

TASK filter: All Activities
Resource Profile Filter:Current Project's Resources

Project name	COMMHealthcare Facade
Report format	Sorted by 'Group phase/Phase' 'Detail' summary

Item		Description	Takeoff Qty		Labor Unit Cost	Labor Amount	Material Unit Cost	Material Amount	Equipment Unit Cost	Equipment Amount	Other Amount	Total Amount
01-54-23.00		***Temporary Scaffolding And Platforms***										
01-54-23.70		**Scaffolding**										
	4150	Scaffolding, steel tubular, regular, labor only to setup & dismantle, buillding ext, 6' -4" x 5' frames, 4 stories, excludes planks	80.00	csf	155.10 /csf	12,408	-	-	-	-	-	12,408
		Scaffolding				**12,408**						**12,408**
01-54-23.75		**Scaffolding Specialties**										
	5050	Scaffolding specialties, mast climber, 50' wide, less than 100' tall, rent per month	4.00	ea	-	-	2,900.00 /ea	11,600	-	-	-	11,600
		Scaffolding Specialties						**11,600**				**11,600**
		Temporary Scaffolding And Platforms				***12,408***		***11,600***		***0***	***0***	***24,008***
04-05-13.00		***Masonry Mortaring***										
04-05-13.30		**Mortar**										
	0100	Mortar, masonry cement, 1:1:6 mix, type M	2,367.00	cf	2.13 /cf	5,042	5.25 /cf	12,427	-	-	-	17,468
		Mortar				**5,042**		**12,427**				**17,468**
		Masonry Mortaring				***5,042***		***12,427***		***0***	***0***	***17,468***
04-05-23.00		***Masonry Accessories***										
04-05-23.13		**Masonry Control And Expansion Joints**										
	0020	Control joint, rubber, for double wythe 8" minimum wall (Brick/CMU)	10,000.00	lf	0.92 /lf	9,200	2.07 /lf	20,700	-	-	-	29,900
		Masonry Control And Expansion Joints				**9,200**		**20,700**				**29,900**
04-05-23.19		**Masonry Cavity Drainage, Weepholes, And Vents**										
	0020	Vent box, extruded aluminum, 4" deep, 2-3/8" x 8-1/8"	750.00	ea	12.30 /ea	9,225	34.00 /ea	25,500	-	-	-	34,725
		Masonry Cavity Drainage, Weepholes, And Vents				**9,225**		**25,500**				**34,725**
		Masonry Accessories				***18,425***		***46,200***		***0***	***0***	***64,625***
04-21-13.00		***Brick Masonry***										
04-21-13.13		**Brick Veneer Masonry**										
n	0250	Brck venr msnr,red brck,flmsh,altrn headr every 6th cours,trckl lots,7.13/,4"x2-2/3"8",incld 3% brick and 25% mortr waste,excld scffl,grout and rnfrcn	300.00	m	1,175.00 /m	352,500	550.00 /m	165,000	-	-	-	517,500
		Brick Veneer Masonry				**352,500**		**165,000**				**517,500**
		Brick Masonry				***352,500***		***165,000***		***0***	***0***	***517,500***
05-41-13.00		***Load-Bearing Metal Stud Framing***										

Item		Description	Takeoff Qty		Labor Unit Cost	Labor Amount	Material Unit Cost	Material Amount	Equipment Unit Cost	Equipment Amount	Other Amount	Total Amount
05-41-13.30		**Framing, Stud Walls**										
n	4160	Partition, galvanized studs, 18 ga x 4" w studs 12" o.c. x 8' h, incl galvanized top & bottom track, excl openings, headers, beams, bracing & bridging	4,000.00	lf	14.45 /lf	57,800	10.55 /lf	42,200	-	-	-	100,000
n	4190	Partition, galvanized studs, 18 ga x 6" w studs 12" o.c. x 8' h, incl galvanized top & bottom track, excl openings, headers, beams, bracing & bridging	2,000.00	lf	14.75 /lf	29,500	13.40 /lf	26,800	-	-	-	56,300
		Framing, Stud Walls				**87,300**		**69,000**				**156,300**
		Load-Bearing Metal Stud Framing				***87,300***		***69,000***		***0***	***0***	***156,300***
07-12-00.00		***Built-Up Bituminous Waterproofing***										
07-12-13.20		**Membrane Waterproofing**										
	0305	Membrane waterproofing, on walls, felt, 2 ply, mopped	75,000.00	sf	0.84 /sf	63,000	0.83 /sf	62,250	0.23 /sf	17,250	-	142,500
		Membrane Waterproofing				**63,000**		**62,250**		**17,250**		**142,500**
		Built-Up Bituminous Waterproofing				***63,000***		***62,250***		***17,250***	***0***	***142,500***
07-24-00.00		***Exterior Insulation And Finish Systems***										
07-24-13.10		**Exterior Insulation And Finish Systems**										
	0130	Polymer based exterior insulation and finish system, field applied, 4" EPS insulation, with 1/2" cement board sheathing	15,000.00	sf	6.10 /sf	91,500	4.14 /sf	62,100	0.52 /sf	7,800	-	161,400
		Exterior Insulation And Finish Systems				**91,500**		**62,100**		**7,800**		**161,400**
		Exterior Insulation And Finish Systems				***91,500***		***62,100***		***7,800***	***0***	***161,400***
07-44-00.00		***Faced Panels***										
07-44-73.10		**Metal Faced Panels And Accessories**										
	1400	Metal faced panels, textured aluminum, double face, structural, 1" EPS insulation	10,000.00	sf	2.39 /sf	23,900	5.70 /sf	57,000	-	-	-	80,900
		Metal Faced Panels And Accessories				**23,900**		**57,000**				**80,900**
		Faced Panels				***23,900***		***57,000***		***0***	***0***	***80,900***
07-92-13.00		***Elastomeric Joint Sealants***										
07-92-13.20		**Caulking And Sealant Options**										
	0075	Joint sealants, caulking and sealants, bulk acrylic latex, 3/8" x 3/8", in place	30,000.00	lf	1.30 /lf	39,000	0.21 /lf	6,300	-	-	-	45,300
		Caulking And Sealant Options				**39,000**		**6,300**				**45,300**
		Elastomeric Joint Sealants				***39,000***		***6,300***		***0***	***0***	***45,300***

Item		Description	Takeoff Qty		Labor Unit Cost	Labor Amount	Material Unit Cost	Material Amount	Equipment Unit Cost	Equipment Amount	Other Amount	Total Amount
08-41-00.00		***Entrances And Storefronts***										
08-41-13.10		**Aluminum Swing Doors**										
	0015	Doors, swing, aluminum entrance, 6' x 7', incl. hardware and operator	14.00	opng	1,200.00 /opng	16,800	7,250.00 /opng	101,500	-	-	-	118,300
		Aluminum Swing Doors				**16,800**		**101,500**				**118,300**
		Entrances And Storefronts				***16,800***		***101,500***		***0***	***0***	***118,300***
08-41-26.00		***All-Glass Entrances And Storefronts***										
08-41-26.10		**Window Walls Aluminum, Stock**										
	0100	Window wall, aluminum, stock, including glazing, maximum	6,000.00	sf	9.30 /sf	55,800	172.00 /sf	1,032,000	-	-	-	1,087,800
		Window Walls Aluminum, Stock				**55,800**		**1,032,000**				**1,087,800**
		All-Glass Entrances And Storefronts				***55,800***		***1,032,000***		***0***	***0***	***1,087,800***
08-44-00.00		***Curtain Wall And Glazed Assemblies***										
08-44-13.10		**Glazed Curtain Walls**										
	0150	Curtain wall, aluminum, stock, double glazed, including glazing, average	2,500.00	sf	8.70 /sf	21,750	69.00 /sf	172,500	-	-	-	194,250
		Glazed Curtain Walls				**21,750**		**172,500**				**194,250**
		Curtain Wall And Glazed Assemblies				***21,750***		***172,500***		***0***	***0***	***194,250***
08-51-13.00		***Aluminum Windows***										
08-51-13.10		**Aluminum Sash**										
	0151	Windows, aluminum sash, stock, grade C, picture window, excl. glazing and trim, L4 crew	10,000.00	sf	2.60 /sf	26,000	18.50 /sf	185,000	-	-	-	211,000
		Aluminum Sash				**26,000**		**185,000**				**211,000**
		Aluminum Windows				***26,000***		***185,000***		***0***	***0***	***211,000***

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	813,425						28.83%	
Material	1,982,877						70.28%	
Subcontract								
Equipment	25,050						0.89%	
Other								
	2,821,352	**2,821,352**					**100.00**	**100.00%**
Total		***2,821,352***						

SITE LOGISTICS PLAN | COMMUNITY HEALTHCARE
FACADE - WEST & NORTH ELEVATION | *MAY 2015 & AUGUST 2015*

NORTH

LEGEND

ENTRANCE PATH

EXIT PATH

LIFT

HYDRAULIC SCAFFOLD

TUBE SCAFFOLD

EAST

BUILDING FOOTPRINT

MEDSTAR AMBULATORY CARE CAMPUS

FFE 356.50

SF ± 35,501

NORTH

SOUTH

WEST

CONTRACTOR PARKING

BATHROOMS

FACADE MOCKUPS

TRASH SHOOT

DUMPSTER

TRAILER COMPLEX

GC & VISTOR PARKING AREA

OTHER LAYDOWN/STAGING AREA

BRICK LAYDOWN AREA

METAL FRAMING LAYDOWN AREA

GLAZING & METAL PANEL LAYDOWN AREA

OTHER LAYDOWN AREA

FUTURE PHASE

PROP ASPHALT PAVING (SEE SHEET C01)

PROP CONCRETE SIDEWALK (SEE SHEET C01)

PROP 40' PUBLIC DRAINAGE & UTILITY EASEMENT

EX TREE LINE TO BE REMOVED

EX 30' TEMPORARY WORK EASEMENT CGH 3314/352

EX NON-TIDAL WETLANDS

25' WETLAND BUFFER

EX TREE LINE

FOREST CONSERVATION EASEMENT CGH 1023/17 DEED CGH 3360/604

PROP DUMPSTER PAD (SEE SHEET C01)

PROP GENERATOR PAD

PROP NO PARKING PAVEMENT STRIPING

PROP BOLLARDS (SEE SHEET C01)

PROP HANDICAP RAMP (SEE SHEET C01)

PROP HANDICAP SIGNS (SEE SHEET C01)

PROP SIDEWALK FLUSH WITH PAVING

PROP LIGHT BOLLARDS (SEE SHEET C01)

PROP HANDICAP RAMP (SEE SHEET C01)

PROP HANDICAP SPACES (SEE SHEET C01)

PROP LANDSCAPE AREA (SEE LANDSCAPE PLANS)

PROP 6" CURB & GUTTER

PROP 6" CURB TRANSITION

PROP 5' CURB OPENING

PROP WATER METER VAULT (SEE SHEET C01)

EX 24' SHM ACCESS DRIVE

EX 30' PRIVATE INGRESS/EGRESS EASEMENT & PRIVATE DRAINAGE & UTILITY EASEMENT

EX 30' PRIVATE DRAINAGE & UTILITY EASEMENT

EX 30' PUBLIC DRAINAGE & UTILITY EASEMENT & PRIVATE INGRESS/EGRESS EASEMENT PLAT JJR 131/83

EX 25' PUBLIC DRAINAGE & UTILITY EASEMENT & CGH 1108/179

EX 12" WAT (CONTRACT # 193712)

REMOVE EX PARKING SPACES (6) & PAVEMENT (5)

REMOVE EX 6" CURB & GUTTER

TIE INTO EX 6" CURB & GUTTER

LIMIT OF PUBLIC DRAINAGE & UTILITY EASEMENT

25' BLDG SETBACK

NEIGHBOORING BUILDING

ENTRANCE GATE

EXIT ONLY GATE

(1) #1804 ZONING: B2 REVISED FINAL PLAT LOTS: 1 JAMES D. STONE, TRUSTEE CHARITABLE REMAINDER UNITRUST JJR 131/84

(2) #1421 ZONING: B2 REVISED FINAL PLAT LOTS: 2, 3, & 7 PARK AVENUE AT BEL AIR JJR 137/71

(5) #2017 ZONING: B2 REVISED FINAL PLAT PARK AVENUE AT BEL AIR CGH 105/94

SITE PLAN

40' 0' 40' 80' 120'

SCALE: 1" = 40'

SITE LOGISTICS PLAN | COMMUNITY HEALTHCARE
FACADE - EAST & SOUTH ELEVATION | JUNE 2015 & SEPTEMBER 2015

EAST
BUILDING FOOTPRINT
MEDSTAR AMBULATORY CARE CAMPUS
FFE 356.50
SF ± 35,501
NORTH
SOUTH
WEST

CONTRACTOR PARKING
BATHROOMS
TRAILER COMPLEX
GC & VISTOR PARKING AREA
FACADE MOCKUPS
TRASH SHOOT
DUMPSTER
FUTURE PHASE
LAYDOWN/STAGING AREA
BRICK LAYDOWN AREA
METAL FRAMING LAYDOWN AREA
GLAZING & METAL PANEL LAYDOWN AREA
OTHER LAYDOWN AREA
ENTRANCE GATE
EXIT ONLY GATE
NEIGHBOORING BUILDING
NEIGHBOORING BUILDING

PROP 4" BITUMINOUS EXTRUDED CURB
EX 24' SHM ACCESS DRIVE
PROP 40' PUBLIC DRAINAGE & UTILITY EASEMENT
EX TREE LINE TO BE REMOVED
75' WETLAND BUFFER
EX 30' TEMPORARY WORK EASEMENT CGH 9314/352
EX NON-TIDAL WETLANDS
EX TREE LINE
FOREST CONSERVATION EASEMENT - CGH 1021/17 DEED CGH 9360/604
PROP ASPHALT PAVING (SEE SHEET C01)
PROP CONCRETE SIDEWALK (SEE SHEET C01)
PROP DUMPSTER PAD (SEE SHEET C01)
PROP 6" CURB & GUTTER
PROP BOLLARDS (SEE SHEET C01)
PROP HANDICAP RAMP (SEE SHEET C01)
PROP HANDICAP SIGNS (SEE SHEET C01)
PROP SIDEWALK FLUSH WITH PAVING
PROP LIGHT BOLLARDS (SEE SHEET C01)
PROP NO PARKING PAVEMENT STRIPING
PROP 6" CURB TRANSITION
PROP LANDSCAPE AREA (SEE LANDSCAPE PLANS)
PROP HANDICAP SPACES (SEE SHEET C01)
PROP 5' CURB OPENING
EX 20' PRIVATE DRAINAGE & UTILITY EASEMENT
REMOVE EX PARKING SPACES (6) & PAVEMENT (5)
#2017 ZONING: B2 REVISED FINAL PLAT PARK AVENUE AT BEL AIR CGH 105/94
EX 30' PRIVATE INGRESS/EGRESS EASEMENT & PRIVATE DRAINAGE & UTILITY EASEMENT
REMOVE EX 6" CURB & GUTTER
PROP 6" CURB & GUTTER
PROP WATER METER VAULT (SEE SHEET C01)
TIE INTO EX 6" CURB & GUTTER
LIMIT OF PUBLIC DRAINAGE & UTILITY EASEMENT (3) #1921 ZONING: B2 REVISED FINAL PLAT LOTS: 2, 3, & 7 PARK AVENUE AT BEL AIR J.J.R. 137/71
25' BLDG SETBACK
EX 30' PUBLIC DRAINAGE & UTILITY EASEMENT & PRIVATE INGRESS/EGRESS EASEMENT PLAT J.J.R. 131/83
EX 25' PUBLIC DRAINAGE & UTILITY EASEMENT & CGH 1081/74
EX 12" WAT (CONTRACT # 1937-1)
EX 12" WAT (CONTRACT # 1937-2)
(1) #1909 ZONING: B2 REVISED FINAL PLAT LOTS: 1 JAMES D. STONE TRUSTEE, CHARITABLE REMAINDER UNITRUST J.J.R. 131/84

N11° 28' 44.54"E 912.28'
N11° 28' 44.54"E 204.00'
N11° 28' 44.54"E 141.70'
S11° 28' 44.54"W 534.74'
S65° 34' 46.54"W 240.17'
S20° 26' 17.78"E 118.61'
S18° 31' 09"E 339.45'
S18° 31' 10.46"E 45.67'
S18° 31' 10.46"E 181.03'
N18° 31' 09.46"W 1140.98'
N18° 31' 09.46"W 1140.98'
S11° 28' 44.54"W 710.39'
N11° 28' 50"E 124.00'

SITE PLAN
40' 0' 40' 80' 120'
SCALE: 1" = 40'

NORTH

LIFT
ENTRANCE PATH
EXIT PATH

LEGEND
HYDRAULIC SCAFFOLD
TUBE SCAFFOLD