Science and Technology Center

Coppin State University
Baltimore, MD

Technical Report I

Nicholas Zitterbart
Construction Management
Faculty Advisor: Dr. Messner

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EXECUTIVE SUMMARY

This report is intended to be a thorough analysis of the existing conditions that influenced the design and construction criteria of the Science and Technology Center at Coppin State University. Located in Baltimore, MD, this 135,000 SF building was designed by Cannon Design and contracted to Barton Malow Company to construct. It will be the new home to the Departments of Mathematics and Computer Science and Natural Sciences.

The $76.2M GMP contract for Barton Malow includes two bid packages including a large scope of work to demolish 210 row homes where the building footprint lies. The project was bid as a CM at Risk delivery system with Barton Malow assisting through the schematic design and design development phases.

As part of this technical report, a cost analysis of the building was performed. The results revealed that both the square foot estimate ($20,308,500) and the MEP assemblies estimate ($17,404,000) were under the actual cost of construction ($76,200,000). The square foot estimate breakdown shows parts of the bid packages that were either not reasonably accounted for or left out completely. These include demolition, earthwork, mechanical, and exterior glazing (windows/curtain wall). The assemblies estimate for the MEP systems was believed to be lower due to system limitations and specialty fixtures not included in cost books.

Through the entirety of this report, there is a project schedule summary showing key sequencing, a building system summary, site layout plans, local conditions, client information, a project delivery system overview and a staffing plan.

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PROJECT SUMMARY SCHEDULE

The project schedule includes a summary of the major construction activities occurring at the Science and Technology Center on the Coppin State University campus. This includes the design, procurement and construction phases. The construction phase is then broken down further into major activities such as site work, foundations, superstructure, enclosure, finishes, and final completion.

Barton Malow was granted notice to proceed on August 13, 2013. This gave way to the building demolition necessary to gain access to the new construction area. There were approximately 210 row homes on the existing site, and after a zoning change, the University of Maryland was given permission to proceed with this project.

An outlook of major milestones and dates are given on the schedule and give a brief understanding of the time period necessary to construct this building. The construction dates are set from November 2012 through November 2014, when Barton Malow has set their goal for substantial completion.

***See Appendix A for the project summary schedule**

| FOUNDATIONS PHASE |

The new Science and Technology Center will have spread footing foundations supported in two different ways due to subsurface conditions differing from the North to South end of the building. The first support type is a "Rammed Aggregate Pier" (Geopier) Soil Improvement System. Stratum B represents the Residual subsurface material which is classified as sandy silt/clay/silty clay. This stratum was located on the south end of the building and has been recommended to install the Geopier Soil Improvement System from column lines 1-4. All spread footing foundations north of column line 4 will bear directly on bedrock or disintegrated rock.

The foundation sequence begins with the Geopiers being installed on the south end immediately after excavation and rough grading of the site. At the same time as the Geopier installation, the north end foundation walls are being formed, reinforced, and poured. This begins the two sequences for foundations/structural concrete. As the schedule progresses, the south end progress lags behind the north foundations by about a month.

STRUCTURAL PHASE

Structural cast-in-place concrete serves as the superstructure in this new construction and follows the sequence set by the foundations. Roughly two-thirds of the building to the north makes up the first sequence. This segment of construction proceeds from the lower level to penthouse as walls, columns, and slabs are continuously placed from the bottom up. The remaining one-third of the construction to the south starts a month after the north end and progress in the same manner from the bottom to top.

The penthouse level is composed of structural steel and metal decking. This erection progresses from the north end moving towards the south end. Once this is topped out, the slab-on-grade at the lower level can be poured and finally the reshores are removed.

FINISHES PHASE

As shown in the schedule, the finishes are outlined as single activities with single durations. This is to depict the overall sequence of work and to show the progression of the building from broad perspective. Each of these activities (i.e Mechanical, Electrical, or Plumbing) has multiple tasks within the one line item. In general the finished progress from north to south starting at the lower level and proceeding up to the fourth level. This will then transfer to final commissioning and eventually substantial completion of the building.

BUILDING SYSTEMS SUMMARY

Table 1 – Required Building Systems

Yes	No	Work Scope
X		Demolition Required
X		Structural Steel Frame
X		Cast-In-Place Concrete
	X	Precast Concrete
X		Mechanical System
X		Electrical System
X		Masonry
X		Curtain Wall
	X	Support of Excavation

| DEMOLITION |

The site demolition scope of work includes the demolition of approximately 210 row homes on the project site before construction can begin. This part of the bid package will be performed by P&J Contracting and will take just over 3 months to finish, including all abatement and clearing. Arc Environmental, Inc. was responsible for pre-demolition inspections and found that 80 of the 148 properties in the first mobilization phase contained asbestos-containing building material (ACBMs). The lead-based paint (LBP) survey revealed lead-based paint in various components throughout the entire site area. The toxicity characteristic leaching procedure (TCLP) sampling was negative; therefore all non-regulated waste generated from the demolition can be disposed of as regular debris.

| STRUCTURAL STEEL FRAME |

The structural steel package is valued at approximately $750,000 and represents a relatively small portion of the total GMP contract value. With that, the amount of structural steel necessary for this building is limited to the penthouse framing. This bid package is still being currently bid out, so precise figures and equipment size could not be obtained.

The type of bracing includes angle braces into a slotted end connection on a gusset plate. There will be a composite metal roof deck on top of this steel framing. As far as erection, the size and type of crane can be speculated using the building information. The crane is believed to be based roughly on a 100’ max height with a reach of 100’.

| CAST-IN-PLACE-CONCRETE |

Cast-in-place concrete is the main component of the structural system for the Science and Technology Center. This is included from the foundations and spread footings to structural walls and floor slabs. It is believed that wooden formwork will be used for all spread footings and foundation walls. A reshore system will be used to support the floor formwork when the structure is being constructed until proper curing can occur. The same formwork should be used throughout the building structure as much of the walls are of similar.

With this amount of structural concrete being placed, a concrete pump truck would be the best method for all cast-in-place quantities. Although very expensive to maintain and operate, this method can place a higher quantity of concrete and it much more maneuverable than other means and methods.

| MECHANICAL SYSTEM |

This building is supported by 6 different VAV Trane air handling units (AHUs), 4 cooling towers and multiple boilers, lab exhaust fans, and computer room air condition units. This is due to the mixed-used of this facility and has many requirements to fulfill. There are three large AHUs with total CFM ranges from 23,500-44,500 that serve the building's main floors. The remaining 3 AHUs with total CFM ranges from 3,200-4,500 serve the lower levels and the lecture hall area. Being that a large portion of this building is represented by laboratories, there are a major number of exhaust fans to serve each of these areas.

| ELECTRICAL SYSTEM |

The main building switchboard is rated for 4000A, 480/277V at 3 Phase. It is with this that 6 transformers supply power to the building. The lower level main transformer is a general duty dry type transformer with an integral USS rated at 2500kVA. From this branch, four other transformers supply each of the floors 1-4. The remaining transformer is located at the lower level. The main building load was designed for 3,066,675 VA and 3690 amps. In addition, the emergency power system is supplied by two generators (750kW and 500kW).

MASONRY

The exterior building enclosure is comprised of a brick veneer inset with glass curtain walls. The main brick are made up of Extruded Tuscan Red Cliff brick with a Manganese Ironspot accent brick. The majority of buildings are of brick facades, so the architecture of this building will tie to current elements. The typical air cavity, rigid insulation, and vapor barrier comprise the wall section types. The installation of this system includes using free standing scaffolding.

CURTAIN WALL

The major architectural feature of the Science and Technology Center is the offset, cubicle-shaped curtain wall on the north end. The connection includes a 2" HSS Tube at each mullion covered by an aluminum curtain wall frame. This 1" thick, Low-E Glazing is either made up of heat strengthened, laminated, tempered, or pattern fritted glass depending on the location in the building. The pattern-fritted glazing provides for lighting control within the interior space and can eliminate excess building heat loads. The Low-E glass will also reduce building heat loads and earns LEED credits. Furthermore, there are integrated sun shades and insulated backings in the curtain wall as a sustainable means to also control buildings loads ad minimize thermal bridging.

PROJECT COST EVALUATION

ACTUAL BUILDING COSTS

Construction Cost: **$76,200,000**

Total Area: **135,000 SF**

Construction Cost per SF: **$564.44**

TOTAL PROJECT COSTS

Cost information was not able to be obtained from the Owner or Architect.

MAJOR BUILDING SYSTEMS COSTS

Table 2 – Building Systems Costs

Building System	Actual Cost	Cost/SF
Building Demolition	$3,100,000	$22.96
Earthwork	$3,300,000	$24.44
Structural Concrete	$7,500,000	$55.55
Structural Steel	$750,000	$5.55
Masonry	$2,500,000	$18.52
Mechanical	$15,750,000	$167.67
Electrical	$10,000,000	$74.07
Fire Protection	$750,000	$5.55
Windows/Curtain Wall	$6,500,000	$48.15
Interior Partitions	$4,000,000	$29.63

SQUARE FOOT ESTIMATE

A square foot estimate of the new construction was conducted using RSMeans CostWorks software. This software utilizes various pieces of building information in conjunction with construction data to provide an as accurate estimate as possible given the criteria. The location was set to Baltimore, MD while the building type was set to a 5-10 story office building (STC is zoned as Business B and

5-stories was chosen to properly represent the penthouse). In addition, 2012 Quarter 3 Cost book data was referenced for pricing and units. Table 3 below shows a brief overview of the results.

***See Appendix B for the full RSMeans CostWorks Square Cost Foot Estimate**

Table 3 – RSMeans CostWorks Square Foot Cost Estimate Summary

Square Foot Cost Estimate Report		
Estimate Name:	**Science and Technology Center**	
Building Type:	**Office, 5-10 Story with Face Brick with Concrete Block Back-up / R/Conc. Frame**	
Location:	**BALTIMORE, MD**	
Story Count:	**5 (4+ penthouse)**	
Story Height (L.F.):	**17 (average)**	
Floor Area (S.F.):	**135,000**	
Labor Type:	**Union**	
Basement Included:	**Yes**	
Data Release:	**Year 2012 Quarter 3**	Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly.
Cost Per Square Foot:	**$150.43**	
Building Cost:	**$20,308,500**	

| ASSEMBLIES ESTIMATE |

The same RSMeans CostWorks software was also utilized to obtain an assemblies estimate for this building. Location settings and cost book information also remained the same for this process. This estimate is to gain further cost detail with the Mechanical, Electrical, and Plumbing systems. In analyzing both the square foot and assemblies estimates, a more accurate cost estimate can be achieved. Table 4 on the next page shows a brief overview of the results.

***See Appendix B for the full RSMeans CostWorks Assemblies Cost Estimate**

Table 4 – RSMeans CostWorks Assemblies Cost Estimate Summary

Assemblies Cost Estimate Report	
Subtotal	
D20 Plumbing	**$313,999**
D30 Mechanical	**$13,867,632**
D50 Electrical	**$3,222,370**
Total	**$17,404,000**

| COST ESTIMATE COMPARISON NARRATIVE |

Square Foot Estimate

In analyzing both the square foot and assemblies estimate in comparison with the actual costs, there are some differences in the figures. Overall, the actual building cost is $76.2M and the SF Estimate comes in at $20.3M. The structural concrete is represented at about half the allowance with the foundations, slab on grade, basement walls, and floor construction. These categories subtotal to be about $4.13M as shown in Table 5 on the next page. Typically a square foot estimate is accurate to within 20%; however, when looking directly at the square foot estimate break downs, some numbers stand out as seemingly too low. As referenced in Table 5, the only line item within reason to the square foot estimate limitations is masonry.

The reason for these discrepancies can be due too many factors. This building is mixed-use and will contain classrooms, laboratories, and computer rooms. The square foot estimate was chosen to be based on a 5-10 story office building due to its similar size and zoning classifications. However, the square foot estimate is short of many intricate systems of the building including extra piping for laboratory fixtures, and multiple types of exterior enclosures. The square foot estimate is limited to a generic building with a typical single façade. This Science and Technology Center includes large brick veneer facades with inset curtain wall windows and a large curtain wall on the north end. Also, some quantities such as demolition and structural steel are not included in the SF estimate. To remedy this without creating a detailed estimate with every contract quantity cost, a combined estimate was created using the differences in building systems. As shown in Table 6 on the next page, the differences from the actual costs were recorded and then added to the base SF estimate. With these additions, the new estimate totals at $62.3M with an accuracy of 18.3%. This satisfies the limits of a 20% accurate square foot estimate and is a more reasonable estimate.

Table 5 – Cost Comparison

Building System	Actual Cost	Cost/SF	SF Estimate Cost	Cost/SF	Difference
Building Demolition	$3,100,000	$22.96	--	--	--
Earthwork	$3,300,000	$24.44	$78,500	$0.58	(97.62%)
Structural Concrete	$7,500,000	$55.55	$4,126,500	$30.57	(44.97%)
Structural Steel	$750,000	$5.55	--	--	--
Masonry	$2,500,000	$18.52	$1,942,000	$14.39	(22.30%)
Mechanical	$15,750,000	$167.67	$2,088,500	$15.47	(90.77%)
Electrical	$10,000,000	$74.07	$2,433,500	$18.03	(75.65%)
Fire Protection	$750,000	$5.55	$482,000	$3.57	(35.67%)
Windows/Curtain Wall	$6,500,000	$48.15	$644,500	$4.77	(90.09%)
Interior Partitions	$4,000,000	$29.63	$406,000	$3.01	(89.84%)

Table 6 – Combined Estimate

Building System	Actual Cost	SF Estimate Cost	Actual – SF Estimate	Difference
Building Demolition	$3,100,000	--	$3,100,000	--
Earthwork	$3,300,000	$78,500	$3,221,500	(97.62%)
Structural Concrete	$7,500,000	$4,126,500	$3,373,500	(44.97%)
Structural Steel	$750,000	--	$750,000	--
Masonry	$2,500,000	$1,942,000	$558,000	(22.30%)
Mechanical	$15,750,000	$2,088,500	$13,661,500	(90.77%)
Electrical	$10,000,000	$2,433,500	$7,566,500	(75.65%)
Fire Protection	$750,000	$482,000	$268,000	(35.67%)
Windows/Curtain Wall	$6,500,000	$644,500	$5,855,500	(90.09%)
Interior Partitions	$4,000,000	$406,000	$3,594,000	(89.84%)
Base SF Estimate	--	--	$20,308,500	--
Combined Estimate	**($76.2M actual)**		**$62,257,000**	**(18.30%)**

Assemblies Estimate

Now analyzing the assemblies estimate, it totals at $17.4M and includes the MEP systems. When breaking it down into each category, the mechanical package was closest in estimate. Much of the equipment included in contract documents and estimates were available in the RSMeans CostWorks data books thus yielding in a closer estimate in comparison to other systems. The difference in estimates ($15.75M actual & $13.88M) is calculated to be 11.95%. With an assemblies estimate being within 10% accuracy, this difference is within understanding. A plumbing contract value was not able to be obtained, but the system and fixtures were accounted for in this estimate.

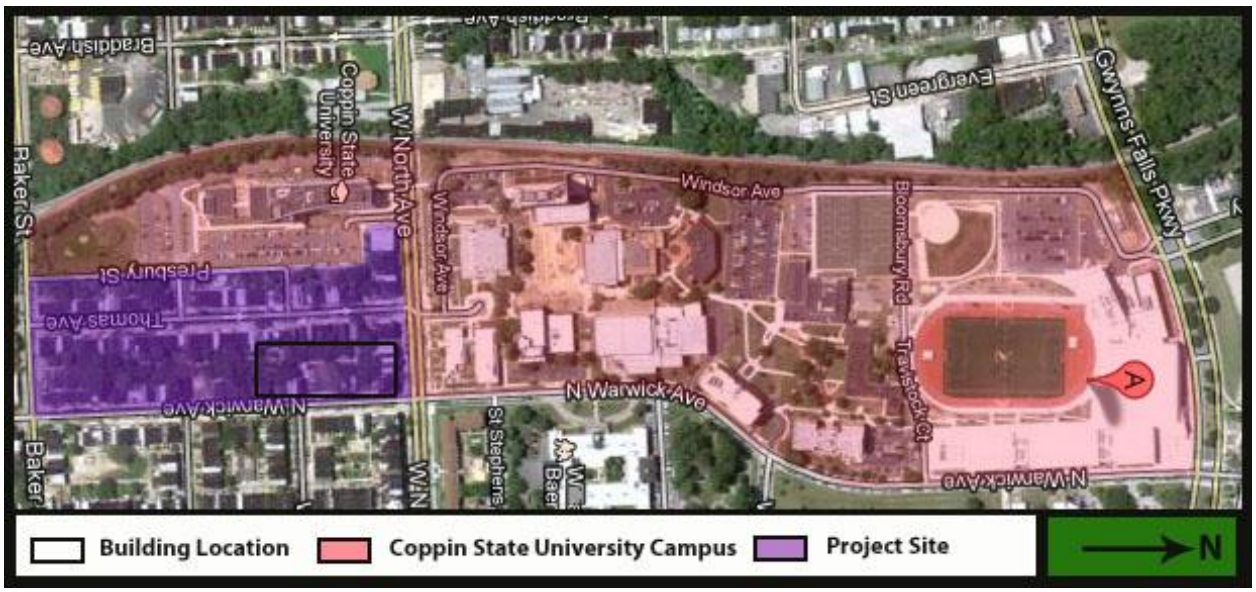
The electrical estimate totals at $3.2M in comparison to the actual of $10M. These inaccuracies can be accounted for through system limitations and specialty fixtures. The cost data book includes generic information and is difficult to apply to multiple systems. Within these limitations, these estimates are believed to be within reason of the actual cost values.

SITE PLANS

| EXISTING CONDITIONS |

As seen below in Figure 1, the building is located on the southeast side of campus. The site is limited to these boundaries due to neighborhoods and major roads on the perimeter.

***See Appendix C for a further detail of the existing conditions plan**



Map Image Courtesy of Google Maps

Figure 1 – Project Site Location

| DEMOLITION PHASE |

The demolition phase is the current major activity on site and requires much attention to the sheer scale of work. The approximate 210 row houses located in the purple shaded region of Figure 1 above were necessary to demolish before any earthwork or site utilities improvements could occur. A phased demolition plan can be seen in Appendix C and shows the progression of demolition in regards to site logistics.

The major issue is the site access and being able to dispose of the construction waste while being mindful of recycling methods. Dumpsters can be located on the site foot print with pick up and drop off regulated through two site access gates. This will keep traffic flowing in one direction and help manage to keep traffic to one route through the local area.

In looking at the demolition plan, there are three phases that occur. A possible three crews can be progressing simultaneously to complete demolition more efficiently. By beginning at the split in the middle, this will create the traffic route for trucks in and out of the site. Demolition at Phase 3 is divided by Thomas Road and is the temporary area of construction traffic. This road will eventually be demolished making a clear site from N. Warwick Ave. to the parking lot of the HHS Building on campus.

Barton Malow can manage the demo to create as much recycled material possible to earn more LEED credit for the building. A goal of 75% recycled waste was created and this demolition phase is a major part of that goal. Once this phase has been successfully completed, the site can be rough graded in preparation for site utilities, foundations and the Geopier system.

***See Appendix C for a further detail of the demolition plan**

| FOUNDATIONS PHASE |

With demolition completed, site mobilization can occur and Barton Malow can set up the site trailers. Referencing Appendix B, the site logistics during this phase include the location of a soil stock pile at the south end, temporary site parking, and the beginning of site excavation.

The major activity here includes the rammed aggregate pier system on the south side of the building perimeter. Also, the smaller footprint requires less excavation so excavated soils can be stored on site. This space is available due to a future parking garage being built in the south corner. Once the spread footings have been poured and the foundations start to reach grade, more focus can be put on the structural concrete and the logistics plan required to place the significant amount of concrete.

***See Appendix C for a further detail of the foundations plan**

| SUPERSTRUCTURE PHASE |

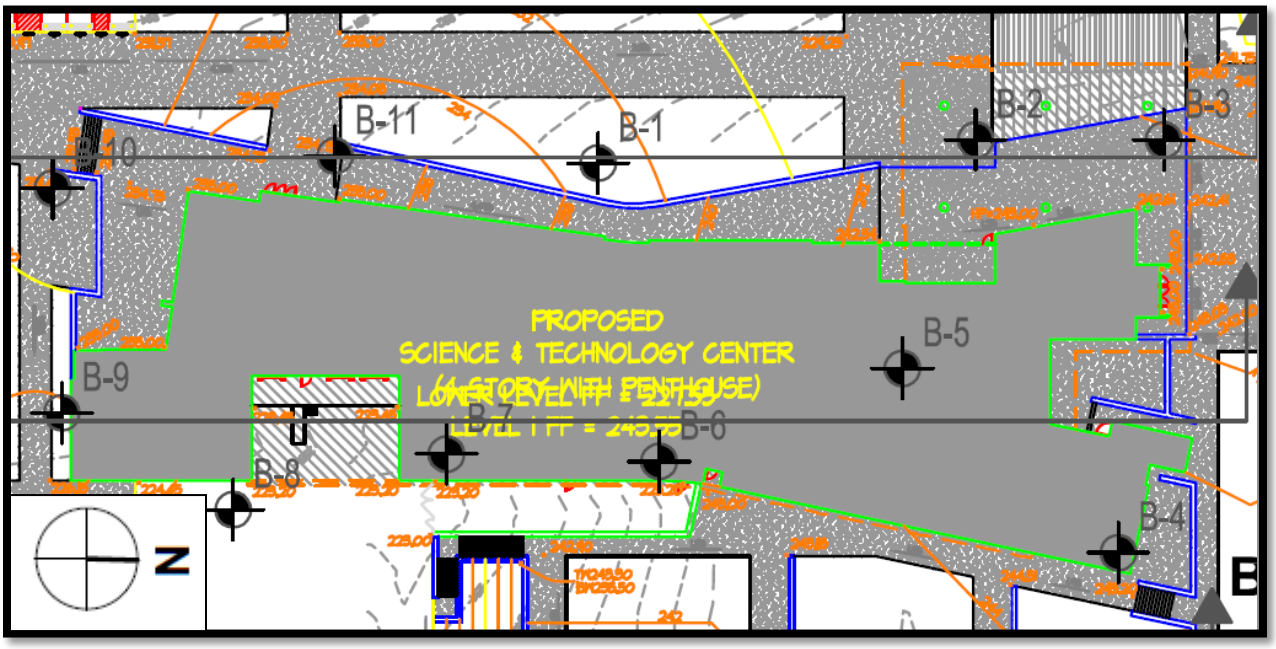
The final site layout phase detailed includes the superstructure. Logistically, this will add more equipment on site to manage the formwork, re-steel, concrete, and structural steel necessary to erect the superstructure. Starting at the bottom, the floors can be poured segment by segment working on both the south and north ends, as detailed in the summary schedule. With two areas of construction at the same time, this doubles the amount of traffic thus management is very important. As the floors climb, more assistance is needed to move materials to the upper floors to form and place the structural concrete. A rough terrain mobile crane can be utilized to assist in

material and equipment placement. Also, concrete pump trucks will be utilized to increase the productivity of placement. After the two sequences of structural walls and floors are built, the penthouse structural steel can be erected. This completes the superstructure and the building enclosure can begin.

LOCAL CONDITIONS

| GEOTECHNICAL REPORT |

As stated earlier, the soil profiles impacted the type of foundation system used. A rammed aggregate pier system was necessary to install due to non-bearing soils near the south end of the site. Three borings (B-08 to B-10) revealed a max bearing of 2ksf which is deemed not enough to support building loads. Borings B02 to B-05 revealed deep rock excavations where spread footings supporting 35ksf would be suitable. Finally, Borings B-01, B-06, B-07, and B-11, showed disintegrated rock where spread footings should be designed to 14ksf. These locations can be seen in Figure 2 below.



(*not intended for graphical scale)

Figure 2 – Soil Boring Locations

Groundwater was observed in three of the borings at different elevations. Boring B-09 showed groundwater roughly 18 ft (Elev. 212.5') below the surface, Boring B-07at roughly 17 ft (Elev. 219.5'), and Boring B-01 at roughly 11 ft (Elev. 223.5'). Per the Geotechnical Report recommendations, there are no foreseen issues with groundwater in the lower level. However, Boring B-09 reveals conditions that may need dewatering during sub grade construction.

Due to the roughly 210 existing row homes along W. North Ave. and N. Warwick Ave., there are many subsurface conditions of concerns with regards to site utilities. The site utilities contract is rather substantial coming in around $2M. Before beginning foundations, major relocation work for the existing sanitary lines on the project footprint must occur. The corner of these two streets is the

divider between the southeast side of campus and local neighborhoods. All of this can make for a congested site when this amount of work needs to be completed before building construction can begin.

BUILDING METHODS & CONSTRUCTION PARKING

Coppin State University is made up of many masonry buildings and cast-in-place concrete structures are relatively common in the surrounding area. This type of construction will most resemble buildings on campus to fit with the architecture and building methods. Being located between a college campus and neighborhoods, the temporary parking situation for workers has to be located on the project site to eliminate congestion. The area to the west of the building footprint will serve as temporary parking for workers.

RECYCLING AND TIPPING FEES

Considering the building is in early stages of demolition, the recycling efforts for the new building are still being organized. It is the goal of Coppin State University to recycle up to 75% of construction waste which can help in LEED certification. Currently, separate or combined dumpsters for recycling are still being considered. Separated recycling dumpsters can lead to higher costs, but can also recycle more materials due to better organization. According to the Baltimore County Department of Public Works, there is a tipping charge of $80 per ton[1].

CLIENT INFORMATION

| MISSION AND STRATEGIC PLAN |

Coppin State University, in association with the University of Maryland, will be the inhabitant of the new Science and Technology Center. This procurement is just a small part of Coppin State's strategic plan and their master plan for the future. As part of the facility development, Coppin State has accomplished many property acquisitions and funding requests—one of which includes the plan for the Science and Technology Center. The main reason for building this facility is to update the deteriorating infrastructure of technology. This building will house computer science, math and management science. It is the third building to be constructed since the new capital plan has been addressed. This will make CSU much more competitive within the Maryland school system with the ability to provide better services to its students.

The Health and Human Services building just west of the Science and Technology Center site was recently completed. Coppin State has also built a new Physical Education Center in the middle of campus. This is all part of the future master plan for Coppin State.

***The above information references CSU's Strategic Plan for 2010 which has been published for public review. See reference 2 in Appendix D.**

| KEYS TO SATISFACTION |

Keeping the building to a tight schedule is of concern to the owner and the client. This is a publicly funded project and its use relies heavily on the beginning of class sessions. The original schedule forecasted the building to be complete for Fall Semester of 2014. With the project delays thus far, it is now forecasted to complete late Fall of 2014. The schedule is crucial due to the occupancy and use of the end product. The full services of this building will dramatically increase the value of campus services and the ability of Coppin State to stay on the leading edge of universities in Maryland. Student enrollment is very important to any university and this building could have a great effect on the enrollment rates for future semesters.

PROJECT DELIVERY SYSTEM

The Science and Technology Center Project utilizes a CM at Risk delivery method with Barton Malow Company (in association with Commercial Interiors) acting as the Construction Manager. The reason for this delivery approach was due to a set budget by the University of Maryland, thus allowing risk to be passed to the CM if the project goes over budget. Barton Malow won this project by being shortlisted based on technical abilities. After a fee percentage was submitted, Barton Malow combined for a total score higher than the competition thus winning the project.

In regards to Barton Malow's subcontractors, there is a process involved to select each contractor. Barton Malow strives to select reliable contractors with an Experience Modification Rate (EMR) of less than 1.00. This ratio provides information of past costs of injuries and future risk involved with that specific company. With these requirements, Barton Malow can then enroll each of these contractors into its own bonding program. By doing so, Barton Malow can absorb the cost of bonding on the project and claim the profits that would've otherwise been claimed by a bonding agency. Each of these subcontractors bids their scope as a lump sum contract on this project.

The organization chart on the following page details the first bid package team members. The designers, engineers, contractor, and subs are all shown for Bid Package #1 and include demolition, site work, and utilities. The subcontractors for Bid Package #2 (includes all other scopes of work with constructing building) are currently being selected by Barton Malow. Due to the early stages of construction, no further detail can be provided with other subcontractors.

***See the Organizational Chart on the following page for more detail**

PROJECT ORGANIZATIONAL CHART

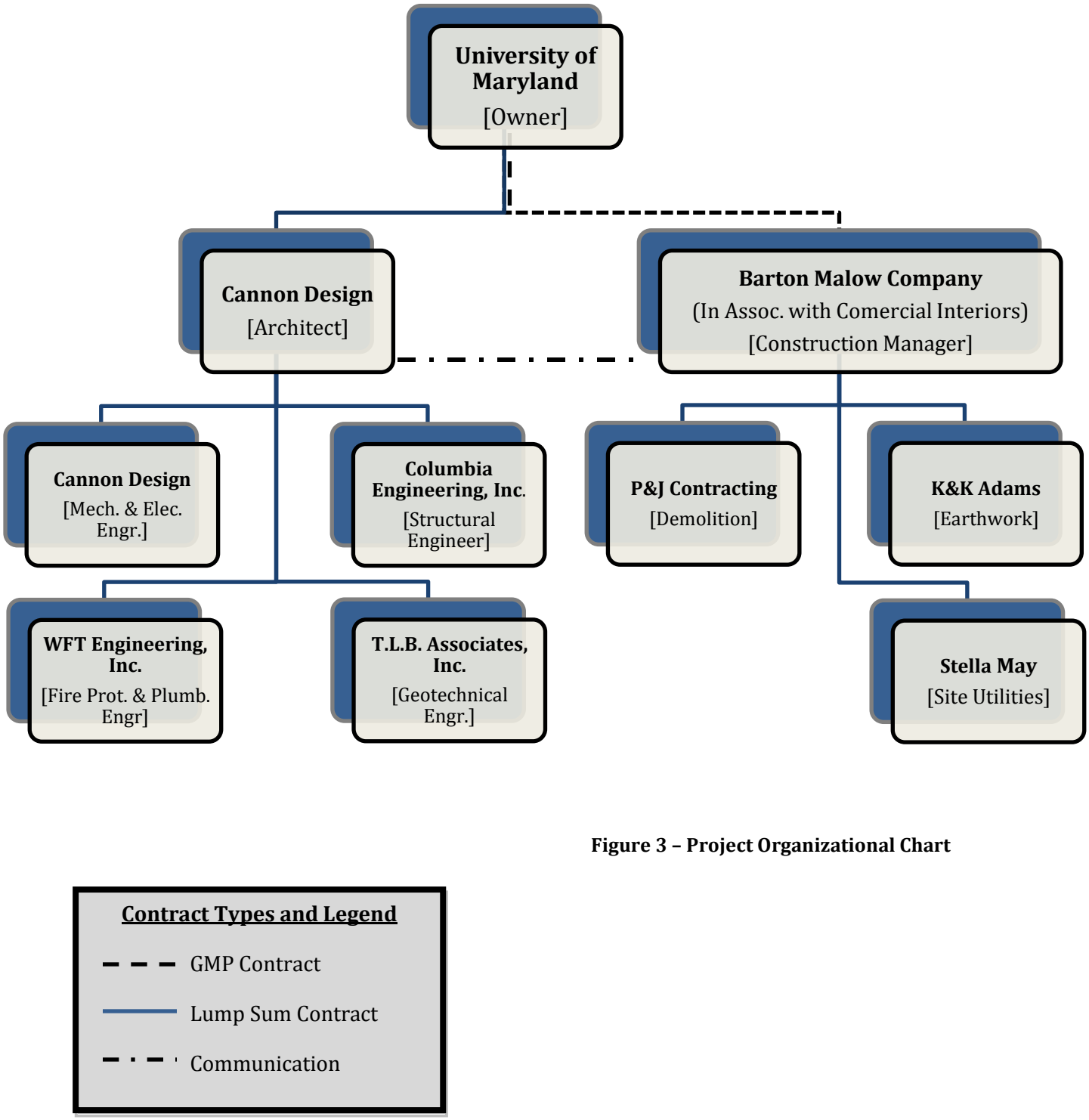


Figure 3 – Project Organizational Chart

STAFFING PLAN

| STAFFING ORGANIZATIONAL CHART |

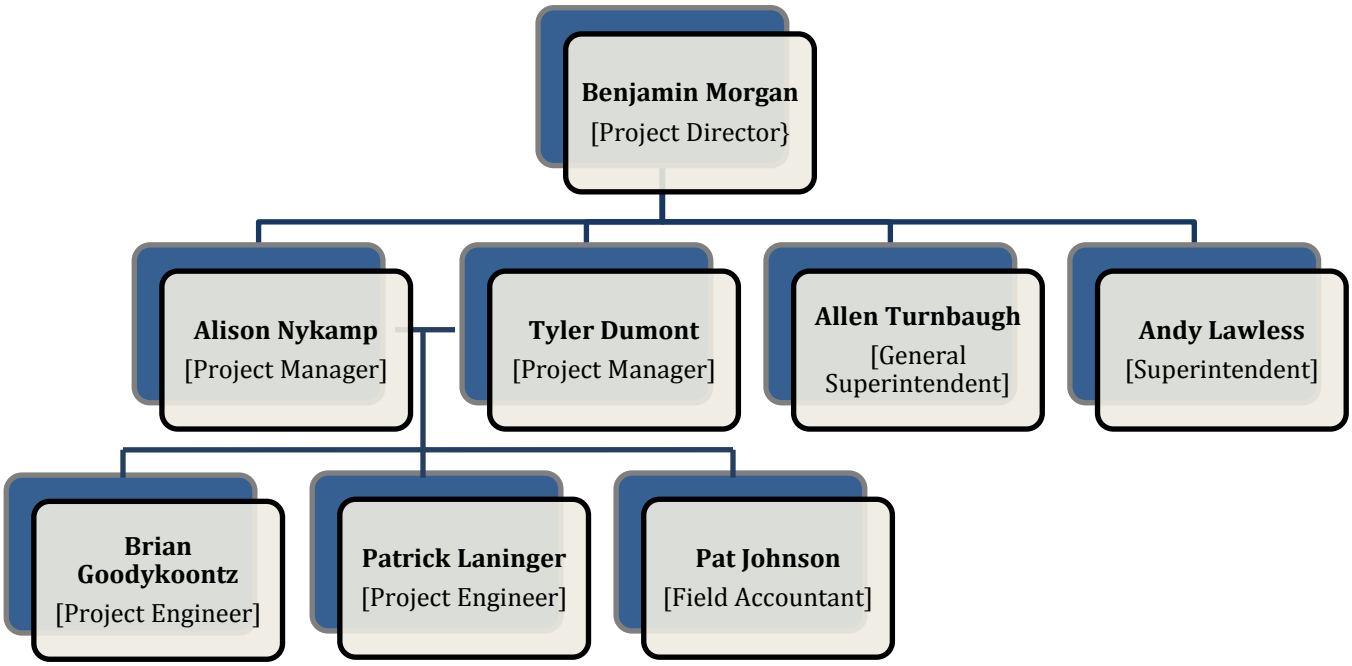


Figure 4 – Staffing Organizational Chart

The staffing chart, as shown above, details the structure of the Barton Malow project team responsible for the Science and Technology Center. The project team works under the management of the Baltimore, MD Regional Office, with the main headquarters of the company in Southfield, MI.

In looking at the organizational chart further, Ben Morgan serves as the Project Director in the Baltimore Office and manages this specific project team. Heading the Project Manager side, there is Alison Nykamp and Tyler Dumont. Reporting to them are the Project Engineers, Brian Goodykoontz and Pat Laninger, and Field Accountant Pat Johnson. On the field side of operations, Allen Turnbaugh directs activities as General Superintendent in a team effort with Superintendent Andy Lawless.

As with the project organizational chart, this chart reflects the staffing for Bid Package #1. When the building construction begins, Commercial Interiors (MBE association contract with Barton Malow) will provide an additional project engineer for the management team. The hierarchy will remain in the same fashion as shown above.

This staffing structure is very typical of any project bid out by Barton Malow, and by the construction industry in general. The staffing may scale to a larger size with a larger and more design-intense project, however this size project team is very typical of the Baltimore Office.

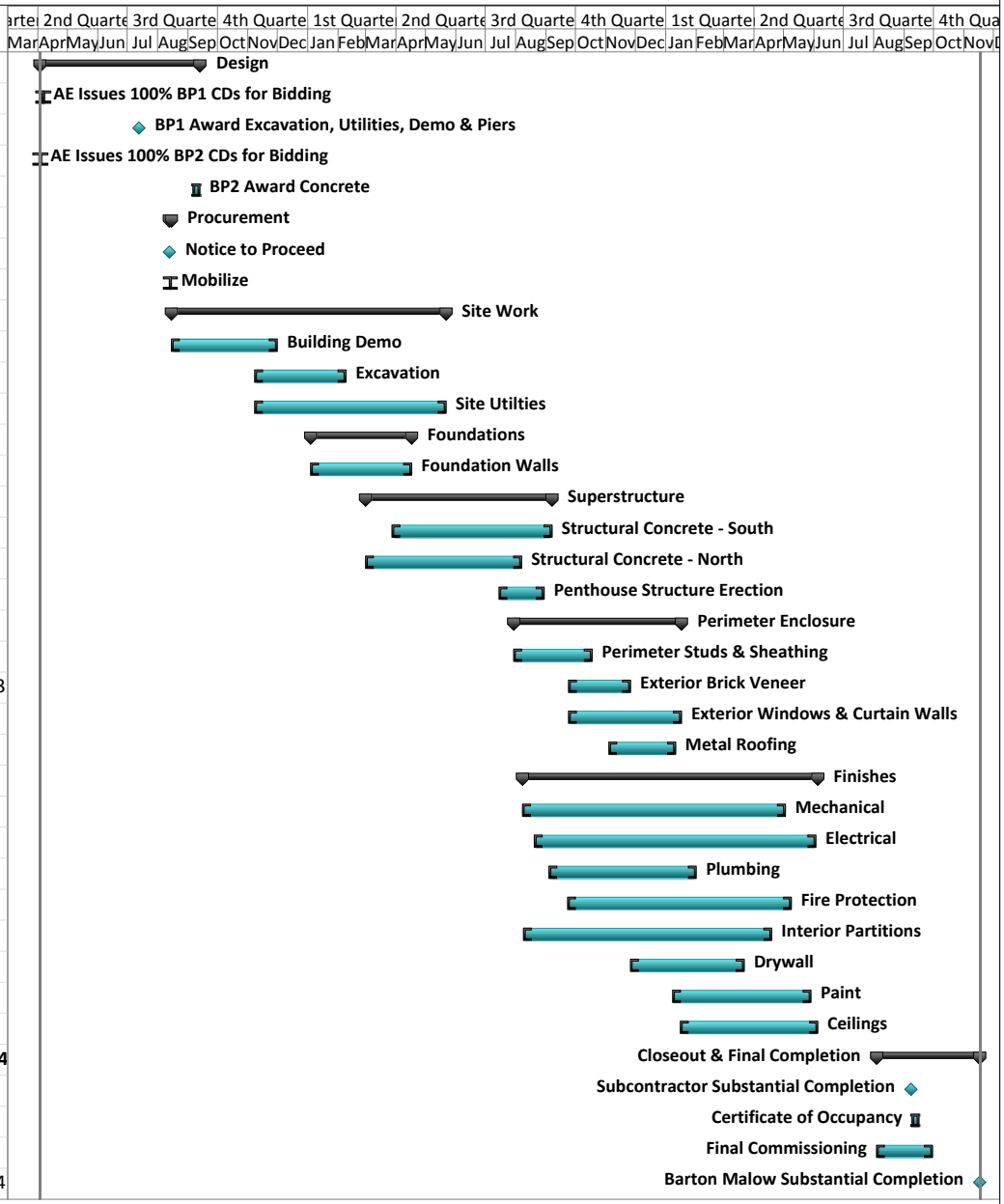
APPENDIX A – PROJECT SCHEDULE SUMMARY

2012 AE Senior Thesis

Nicholas Zitterbart
Construction Management

Project Schedule Summary
September 21, 2012

ID	Task Name	Duration	Start	Finish
1	**Design**	**117 days**	**Tue 4/3/12**	**Wed 9/12/12**
2	AE Issues 100% BP1 CDs for Bidding	1 day	Fri 4/6/12	Fri 4/6/12
3	BP1 Award Excavation, Utilities, Demo & Piers	0 days	Fri 7/13/12	Fri 7/13/12
4	AE Issues 100% BP2 CDs for Bidding	1 day	Tue 4/3/12	Tue 4/3/12
5	BP2 Award Concrete	5 days	Thu 9/6/12	Wed 9/12/12
6	**Procurement**	**2 days**	**Mon 8/13/12**	**Tue 8/14/12**
7	Notice to Proceed	0 days	Mon 8/13/12	Mon 8/13/12
8	Mobilize	2 days	Mon 8/13/12	Tue 8/14/12
9	**Site Work**	**200 days**	**Wed 8/15/12**	**Tue 5/21/13**
10	Building Demo	78 days	Wed 8/15/12	Fri 11/30/12
11	Excavation	67 days	Thu 11/8/12	Fri 2/8/13
12	Site Utilties	139 days	Thu 11/8/12	Tue 5/21/13
13	**Foundations**	**73 days**	**Fri 1/4/13**	**Tue 4/16/13**
14	Foundation Walls	73 days	Fri 1/4/13	Tue 4/16/13
15	**Superstructure**	**136 days**	**Fri 3/1/13**	**Fri 9/6/13**
16	Structural Concrete - South	117 days	Thu 3/28/13	Fri 9/6/13
17	Structural Concrete - North	113 days	Fri 3/1/13	Tue 8/6/13
18	Penthouse Structure Erection	34 days	Mon 7/15/13	Thu 8/29/13
19	**Perimeter Enclosure**	**123 days**	**Tue 7/30/13**	**Thu 1/16/14**
20	Perimeter Studs & Sheathing	58 days	Tue 7/30/13	Thu 10/17/13
21	Exterior Brick Veneer	45 days	Tue 9/24/13	Mon 11/25/13
22	Exterior Windows & Curtain Walls	83 days	Tue 9/24/13	Thu 1/16/14
23	Metal Roofing	50 days	Mon 11/4/13	Fri 1/10/14
24	**Finishes**	**215 days**	**Thu 8/8/13**	**Wed 6/4/14**
25	Mechanical	192 days	Thu 8/8/13	Fri 5/2/14
26	Electrical	205 days	Tue 8/20/13	Mon 6/2/14
27	Plumbing	108 days	Wed 9/4/13	Fri 1/31/14
28	Fire Protection	164 days	Mon 9/23/13	Thu 5/8/14
29	Interior Partitions	181 days	Fri 8/9/13	Fri 4/18/14
30	Drywall	84 days	Tue 11/26/13	Fri 3/21/14
31	Paint	101 days	Wed 1/8/14	Wed 5/28/14
32	Ceilings	100 days	Thu 1/16/14	Wed 6/4/14
33	**Closeout & Final Completion**	**75 days**	**Mon 8/4/14**	**Mon 11/17/14**
34	Subcontractor Substantial Completion	0 days	Mon 9/8/14	Mon 9/8/14
35	Certificate of Occupancy	5 days	Tue 9/9/14	Mon 9/15/14
36	Final Commissioning	41 days	Mon 8/4/14	Mon 9/29/14
37	Barton Malow Substantial Completion	0 days	Mon 11/17/14	Mon 11/17/14



Project: Schedule | Manual Task | Manual Milestone | Manual Summary

APPENDIX B – PROJECT COST EVALUATION

Square Foot Cost Estimate Report	
Estimate Name:	**Science and Technology Center**
Building Type:	**Office, 5-10 Story with Face Brick with Concrete Block Back-up / R/Conc. Frame**
Location:	**BALTIMORE, MD**
Story Count:	**5 (4+ penthouse)**
Story Height (L.F.):	**17 (average)**
Floor Area (S.F.):	**135,000**
Labor Type:	**Union**
Basement Included:	**Yes**
Data Release:	**Year 2012 Quarter 3**
Cost Per Square Foot:	**$150.43**
Building Cost:	**$20,308,500**

Costs are derived from a building model with basic components.

Scope differences and market conditions can cause costs to vary significantly.

		% of Total	Cost Per S.F.	Cost
A Substructure		**7.00%**	**$9.35**	**$1,262,500**
A1010	**Standard Foundations**		**$5.97**	**$805,500**
	KSF, 12" deep x 32" wide			
	9' - 6" square x 30" deep			
A1030	**Slab on Grade**		**$0.96**	**$130,000**
	Slab on grade, 4" thick, non industrial, reinforced			
A2010	**Basement Excavation**		**$0.58**	**$78,500**
	site storage			
A2020	**Basement Walls**		**$1.84**	**$248,500**
	thick			
B Shell		**33.60%**	**$44.99**	**$6,073,000**
B1010	**Floor Construction**		**$21.80**	**$2,942,500**
	height, 394 lbs/LF, 4000PSI			
	height, 394 lbs/LF, 6000PSI			
	height, 394 lbs/LF, 6000PSI			
	500K load, 10'-14' story height, 375 lbs/LF, 4000PSI			
	15'x15' bay, 75 PSF superimposed load, 153 PSF total load			
	superimposed load, 188 PSF total load			
B1020	**Roof Construction**		**$2.77**	**$373,500**
	18" deep beam, 8.5" slab, 146 PSF total load			
B2010	**Exterior Walls**		**$14.39**	**$1,942,000**
	perlite core fill			
B2020	**Exterior Windows**		**$4.77**	**$644,500**
	Windows, aluminum, sliding, insulated glass, 5' x 3'			
B2030	**Exterior Doors**		**$0.24**	**$33,000**
	hardware, 6'-0" x 10'-0" opening			
	0" opening			
B3010	**Roof Coverings**		**$1.02**	**$137,500**
	mopped			
	Insulation, rigid, roof deck, composite with 2" EPS, 1" perlite			
	Roof edges, aluminum, duranodic, .050" thick, 6" face			
	Flashing, aluminum, no backing sides, .019"			

C Interiors		**17.90%**	**$23.99**	**$3,238,500**
C1010	**Partitions**		**$3.01**	**$406,000**
	5/8" @ 24" OC framing ,same opposite face, no insulation			
	1/2" fire ratedgypsum board, taped & finished, painted on metal furring			
C1020	**Interior Doors**		**$2.84**	**$384,000**
	3'-0" x 7'-0" x 1-3/8"			
C1030	**Fittings**		**$0.64**	**$86,500**
	Toilet partitions, cubicles, ceiling hung, plastic laminate			
C2010	**Stair Construction**		**$2.79**	**$376,500**
	Stairs, steel, cement filled metal pan & picket rail, 16 risers, with landing			
C3010	**Wall Finishes**		**$0.86**	**$116,500**
	primer & 2 coats			
	Vinyl wall covering, fabric back, medium weight			
C3020	**Floor Finishes**		**$7.95**	**$1,073,000**
	Carpet, tufted, nylon, roll goods, 12' wide, 36 oz			
	Carpet, padding, add to above, minimum			
	Vinyl, composition tile, maximum			
	Tile, ceramic natural clay			
C3030	**Ceiling Finishes**		**$5.90**	**$796,000**
	channel grid, suspended support			
D Services		**41.50%**	**$55.56**	**$7,500,500**
D1010	**Elevators and Lifts**		**$15.25**	**$2,059,000**
	200 FPM			
D2010	**Plumbing Fixtures**		**$2.46**	**$332,500**
	Water closet, vitreous china, bowl only with flush valve, wall hung			
	Urinal, vitreous china, wall hung			
	Lavatory w/trim, vanity top, PE on CI, 20" x 18"			
	Service sink w/trim, PE on CI,wall hung w/rim guard, 24" x 20"			
	Water cooler, electric, wall hung, 8.2 GPH			
	Water cooler, electric, wall hung, wheelchair type, 7.5 GPH			
D2020	**Domestic Water Distribution**		**$0.52**	**$70,500**
	Gas fired water heater, commercial, 100< F rise, 200 MBH input, 192 GPH			
D2040	**Rain Water Drainage**		**$0.26**	**$34,500**
	Roof drain, CI, soil,single hub, 5" diam, 10' high			
	Roof drain, CI, soil,single hub, 5" diam, for each additional foot add			
D3050	**Terminal & Package Units**		**$15.47**	**$2,088,500**
	Rooftop, multizone, air conditioner, offices, 25,000 SF, 79.16 ton			
D4010	**Sprinklers**		**$2.74**	**$370,000**
	Wet pipe sprinkler systems, steel, light hazard, 1 floor, 10,000 SF			
	10,000 SF			
	Standard High Rise Accessory Package 8 story			
D4020	**Standpipes**		**$0.83**	**$112,000**
	Wet standpipe risers, class III, steel, black, sch 40, 4" diam pipe, 1 floor			
	floors			
	Fire pump, electric, with controller, 5" pump, 100 HP, 1000 GPM			
	Fire pump, electric, for jockey pump system, add			
D5010	**Electrical Service/Distribution**		**$1.17**	**$157,500**

	phase, 4 wire, 120/208 V, 1600 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 60 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 200 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 1600 A			
	Switchgear installation, incl switchboard, panels & circuit breaker, 1600 A			
D5020	**Lighting and Branch Wiring**		**$11.44**	**$1,544,500**
	with transformer			
	Miscellaneous power, 1.2 watts			
	Central air conditioning power, 4 watts			
	Motor installation, three phase, 460 V, 15 HP motor size			
	V 15 HP, 575 V 20 HP			
	Motor connections, three phase, 200/230/460/575 V, up to 5 HP			
	Motor connections, three phase, 200/230/460/575 V, up to 100 HP			
	fixtures @32watt per 1000 SF			
D5030	**Communications and Security**		**$4.30**	**$581,000**
	Telephone wiring for offices & laboratories, 8 jacks/MSF			
	detectors, includes outlets, boxes, conduit and wire			
	Fire alarm command center, addressable with voice, excl. wire & conduit			
	Internet wiring, 8 data/voice outlets per 1000 S.F.			
D5090	**Other Electrical Systems**		**$1.11**	**$150,500**
	engine with fuel tank, 100 kW			
	kW			
E Equipment & Furnishings		**0.00%**	**$0.00**	**$0**
E1090	**Other Equipment**		**$0.00**	**$0**
F Special Construction		**0.00%**	**$0.00**	**$0**
G Building Sitework		**0.00%**	**$0.00**	**$0**
SubTotal		**100%**	**$133.89**	**$18,074,500**
Contractor Fees (General Conditions,Overhead,Profit)		**6.00%**	**$8.03**	**$1,084,500**
Architectural Fees		**6.00%**	**$8.51**	**$1,149,500**
User Fees		**0.00%**	**$0.00**	**$0**
Total Building Cost			**$150.43**	**$20,308,500**

Science and Technology Center Assembly Estimate					
Data Release :Year 2012 Quarter 3					
Quantity	**Assembly Number**	**Description**	**Unit**	**Total O&P**	**Ext. Total O&P**
4	D20101201760	Water closets, battery mount, wall hung, side by side, first closet	Ea.	$ 2,564.86	$ 10,259.44
14	D20101201800	Water closetss, battery mount, wall hung, side by side, each additional water closet, add	Ea.	$ 2,452.03	$ 34,328.42
4	D20101203000	Water closets, battery mount, wall hung, back to back, first pair of closets	Ea.	$ 3,980.01	$ 15,920.04
2	D20101203100	Water closets, battery mount, wall hung, each additional pair of closets, back to back	Ea.	$ 3,929.96	$ 7,859.92
4	D20102201760	Urinals, battery mount, side by side, first urinal	Ea.	$ 1,415.62	$ 5,662.48
6	D20102201800	Urinals, battery mount, side by side, each additional urinal, add	Ea.	$ 1,394.65	$ 8,367.90
2	D20103201760	Lavatories, battery mount, side by side, first lavatory	Ea.	$ 1,977.14	$ 3,954.28
10	D20103201800	Lavatories, battery mount, side by side, each additional lavatory, add	Ea.	$ 1,596.26	$ 15,962.60
3	D20103202000	Lavatories, battery mount, back to back, first pair of lavatories	Ea.	$ 3,172.56	$ 9,517.68
6	D20103202100	Lavatories, battery mount, back to back, each additional pair of lavatories	Ea.	$ 2,862.71	$ 17,176.26
1	D20107101600	Shower, stall, baked enamel, molded stone receptor, 32" square	Ea.	$ 2,010.12	$ 2,010.12
20	D20104301640	Lab sink w/trim, polyethylene, single bowl, single drainboard, 47" x 24"OD	Ea.	$ 2,553.15	$ 51,063.00
4	D20202502140	Gas fired water heater, commercial, 100< F rise, 300 MBH input, 278 GPH	Ea.	$ 15,597.70	$ 62,390.80
1	D20202401980	Electric water heater, commercial, 100< F rise, 150 gal, 120 KW 490 GPH	Ea.	$ 30,017.73	$ 30,017.73
1	D20202401940	Electric water heater, commercial, 100< F rise, 120 gal, 36 KW 147 GPH	Ea.	$ 11,219.18	$ 11,219.18
20	D20402102040	Roof drain, DWV PVC, 4" diam, diam, 10' high	Ea.	$ 1,146.97	$ 22,939.40
180	D20402102080	Roof drain, DWV PVC, 4" diam, for each additional foot add	Ea.	$ 29.72	$ 5,349.60
1	D30401161040	AHU, rooftop, cool/heat coils, VAV, filters, 20,000 CFM	Ea.	$ 152,528.80	$ 152,528.80

1	D30401161050	AHU, rooftop, cool/heat coils, VAV, filters, 30,000 CFM	Ea.	$ 206,012.90	$ 206,012.90
1	D30401161050	AHU, rooftop, cool/heat coils, VAV, filters, 30,000 CFM	Ea.	$ 206,012.90	$ 206,012.90
3	D30401121020	AHU, central station, cool/heat coils, VAV, filters, 10,000 CFM	Ea.	$ 58,019.80	$ 174,059.40
20000	D30301103480	Packaged chiller, air cooled, with fan coil unit, offices, 20,000 SF, 63.33 ton	S.F.	$ 11.95	$ 239,000.00
35000	D30301103520	Packaged chiller, air cooled, with fan coil unit, offices, 40,000 SF, 126.66 ton	S.F.	$ 10.37	$ 362,950.00
35000	D30301103520	Packaged chiller, air cooled, with fan coil unit, offices, 40,000 SF, 126.66 ton	S.F.	$ 10.37	$ 362,950.00
35000	D30301103520	Packaged chiller, air cooled, with fan coil unit, offices, 40,000 SF, 126.66 ton	S.F.	$ 10.37	$ 362,950.00
35000	D30301103520	Packaged chiller, air cooled, with fan coil unit, offices, 40,000 SF, 126.66 ton	S.F.	$ 10.37	$ 362,950.00
35000	D30301154000	Packaged chiller, water cooled, with fan coil unit, offices, 40,000 SF, 126.66 ton	S.F.	$ 13.33	$ 466,550.00
35000	D30301154000	Packaged chiller, water cooled, with fan coil unit, offices, 40,000 SF, 126.66 ton	S.F.	$ 13.33	$ 466,550.00
35000	D30301154000	Packaged chiller, water cooled, with fan coil unit, offices, 40,000 SF, 126.66 ton	S.F.	$ 13.33	$ 466,550.00
35000	D30301154000	Packaged chiller, water cooled, with fan coil unit, offices, 40,000 SF, 126.66 ton	S.F.	$ 13.33	$ 466,550.00
8	D30201301110	Boiler, cast iron, gas, hot water, 3808 MBH	Ea.	$ 77,895.80	$ 623,166.40
1	D30201301040	Boiler, cast iron, gas, hot water, 440 MBH	Ea.	$ 20,535.35	$ 20,535.35
40000	D30201103360	Heating systems, CI boiler, gas, fin tube radiation, 1,088 MBH, 14,500 SF bldg	S.F.	$ 13.52	$ 540,800.00
40000	D30201103360	Heating systems, CI boiler, gas, fin tube radiation, 1,088 MBH, 14,500 SF bldg	S.F.	$ 13.52	$ 540,800.00
20000	D30201103280	Heating systems, CI boiler, gas, fin tube radiation, 169 MBH, 2,140 SF bldg	S.F.	$ 16.75	$ 335,000.00
2	D30402401080	Roof vent. system, power, centrifugal, aluminum, galvanized curb, back draft damper, 13,800 CFM	Ea.	$ 59,773.10	$ 119,546.20
1	D30402401060	Roof vent. system, power, centrifugal, aluminum, galvanized curb, back draft damper, 5000 CFM	Ea.	$ 32,048.85	$ 32,048.85
6	D30402401020	Roof vent. system, power, centrifugal, aluminum, galvanized curb, back draft damper, 800 CFM	Ea.	$ 5,222.18	$ 31,333.08

1	D30402401060	Roof vent. system, power, centrifugal, aluminum, galvanized curb, back draft damper, 5000 CFM	Ea.	$	32,048.85	$	32,048.85
3	D30402401040	Roof vent. system, power, centrifugal, aluminum, galvanized curb, back draft damper, 2750 CFM	Ea.	$	15,652.80	$	46,958.40
1	D30402401050	Roof vent. system, power, centrifugal, aluminum, galvanized curb, back draft damper, 3500 CFM	Ea.	$	19,977.40	$	19,977.40
1	D30402401030	Roof vent. system, power, centrifugal, aluminum, galvanized curb, back draft damper, 1500 CFM	Ea.	$	7,755.80	$	7,755.80
5	D30401201050	Fan coil A/C system, cabinet mounted, electric heat, controls, 2 pipe, 3 ton	Ea.	$	7,966.65	$	39,833.25
6	D30401201020	Fan coil A/C system, cabinet mounted, electric heat, controls, 2 pipe, 1 ton	Ea.	$	3,401.83	$	20,410.98
11	D30501850860	Computer room unit, chilled water, for connection to existing chiller system, 10 ton	Ea.	$	17,391.83	$	191,310.13
20000	D30501703680	Split system, air cooled condensing unit, offices, 20,000 SF, 63.32 ton	S.F.	$	10.41	$	208,200.00
20000	D30501703680	Split system, air cooled condensing unit, offices, 20,000 SF, 63.32 ton	S.F.	$	10.41	$	208,200.00
20000	D30501703680	Split system, air cooled condensing unit, offices, 20,000 SF, 63.32 ton	S.F.	$	10.41	$	208,200.00
20000	D30501703680	Split system, air cooled condensing unit, offices, 20,000 SF, 63.32 ton	S.F.	$	10.41	$	208,200.00
20000	D30501703680	Split system, air cooled condensing unit, offices, 20,000 SF, 63.32 ton	S.F.	$	10.41	$	208,200.00
20000	D30501703680	Split system, air cooled condensing unit, offices, 20,000 SF, 63.32 ton	S.F.	$	10.41	$	208,200.00
20000	D30501703680	Split system, air cooled condensing unit, offices, 20,000 SF, 63.32 ton	S.F.	$	10.41	$	208,200.00
2	D30501401020	Unit heater, cabinet type, horizontal blower, hot water, 60 MBH	Ea.	$	4,724.83	$	9,449.66
3	D30501201070	Space heater, suspended, gas fired, propeller fan, 320 MBH	Ea.	$	6,350.30	$	19,050.90
10	D30502301040	Heat pump, central station, water source, constant volume, 30 ton	Ea.	$	38,146.90	$	381,469.00
7	D30401381040	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 800 CFM	Ea.	$	7,747.10	$	54,229.70
4	D30401381020	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 400 CFM	Ea.	$	5,745.23	$	22,980.92
17	D30401381010	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 200 CFM	Ea.	$	4,727.73	$	80,371.41

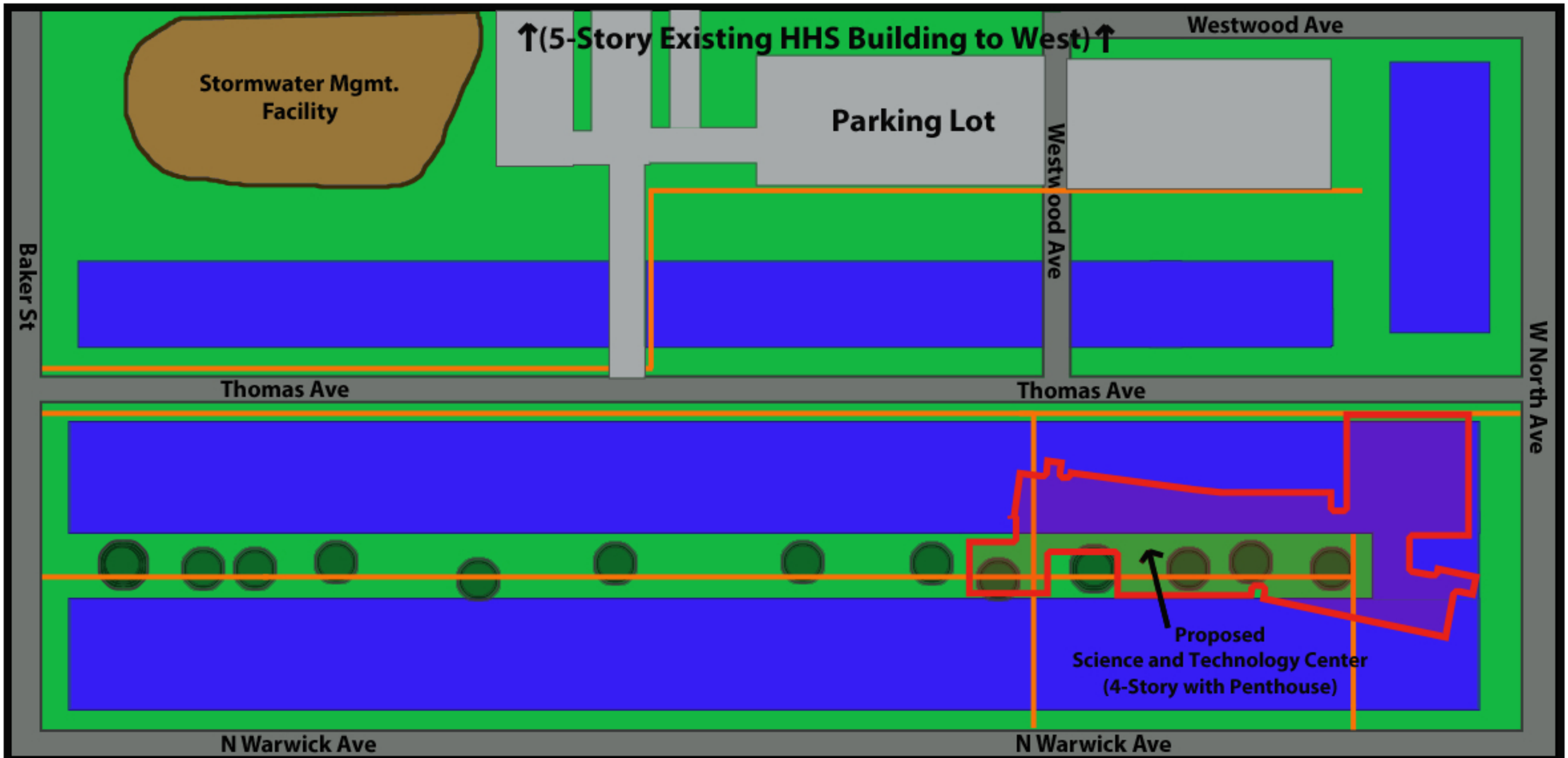
5	D30401381030	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 600 CFM	Ea.	$ 7,068.53	$ 35,342.65
1	D30401381050	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 1000 CFM	Ea.	$ 8,529.83	$ 8,529.83
7	D30401381060	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 1250 CFM	Ea.	$ 10,217.08	$ 71,519.56
2	D30401381080	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 2000 CFM	Ea.	$ 15,226.18	$ 30,452.36
9	D30401381010	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 200 CFM	Ea.	$ 4,727.73	$ 42,549.57
11	D30401381020	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 400 CFM	Ea.	$ 5,745.23	$ 63,197.53
9	D30401381030	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 600 CFM	Ea.	$ 7,068.53	$ 63,616.77
5	D30401381040	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 800 CFM	Ea.	$ 7,747.10	$ 38,735.50
1	D30401381060	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 1250 CFM	Ea.	$ 10,217.08	$ 10,217.08
3	D30401381010	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 200 CFM	Ea.	$ 4,727.73	$ 14,183.19
11	D30401381020	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 400 CFM	Ea.	$ 5,745.23	$ 63,197.53
4	D30401381030	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 600 CFM	Ea.	$ 7,068.53	$ 28,274.12
1	D30401381040	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 800 CFM	Ea.	$ 7,747.10	$ 7,747.10
1	D30401381050	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 1000 CFM	Ea.	$ 8,529.83	$ 8,529.83
2	D30401381010	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 200 CFM	Ea.	$ 4,727.73	$ 9,455.46
2	D30401381020	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 400 CFM	Ea.	$ 5,745.23	$ 11,490.46
2	D30401381040	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 800 CFM	Ea.	$ 7,747.10	$ 15,494.20
3	D30401381060	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 1250 CFM	Ea.	$ 10,217.08	$ 30,651.24
2	D30401381080	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 2000 CFM	Ea.	$ 15,226.18	$ 30,452.36
7	D30401381010	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 200 CFM	Ea.	$ 4,727.73	$ 33,094.11

8	D30401381020	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 400 CFM	Ea.	$	5,745.23	$	45,961.84
8	D30401381030	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 600 CFM	Ea.	$	7,068.53	$	56,548.24
3	D30401381040	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 800 CFM	Ea.	$	7,747.10	$	23,241.30
2	D30401381050	VAV terminal, cool, hot water reheat, fan powered, with actuator/controls, 1000 CFM	Ea.	$	8,529.83	$	17,059.66
35000	D30105201960	Commercial building heating systems, fin tube radiation, forced hot water, 1,000 SF bldg, 1 floor	S.F.	$	29.90	$	1,046,500.00
35000	D30105201960	Commercial building heating systems, fin tube radiation, forced hot water, 1,000 SF bldg, 1 floor	S.F.	$	29.90	$	1,046,500.00
35000	D30105201960	Commercial building heating systems, fin tube radiation, forced hot water, 1,000 SF bldg, 1 floor	S.F.	$	29.90	$	1,046,500.00
35000	D30105201960	Commercial building heating systems, fin tube radiation, forced hot water, 1,000 SF bldg, 1 floor	S.F.	$	29.90	$	1,046,500.00
26000	D50202080600	Fluorescent fixtures, type A, 17 fixtures per 1000 SF	S.F.	$	7.87	$	204,620.00
15000	D50202080600	Fluorescent fixtures, type A, 17 fixtures per 1000 SF	S.F.	$	7.87	$	118,050.00
10000	D50202140400	Incandescent fixtures recess mounted, 100 FC, type A, 34 fixtures per 400 SF	S.F.	$	33.16	$	331,600.00
26000	D50202080600	Fluorescent fixtures, type A, 17 fixtures per 1000 SF	S.F.	$	7.87	$	204,620.00
26000	D50202080600	Fluorescent fixtures, type A, 17 fixtures per 1000 SF	S.F.	$	7.87	$	204,620.00
26000	D50202080600	Fluorescent fixtures, type A, 17 fixtures per 1000 SF	S.F.	$	7.87	$	204,620.00
26000	D50201150200	Receptacle systems, underfloor duct, 5' on center, low density	S.F.	$	9.79	$	254,540.00
26000	D50201150200	Receptacle systems, underfloor duct, 5' on center, low density	S.F.	$	9.79	$	254,540.00
26000	D50201150200	Receptacle systems, underfloor duct, 5' on center, low density	S.F.	$	9.79	$	254,540.00
26000	D50201150200	Receptacle systems, underfloor duct, 5' on center, low density	S.F.	$	9.79	$	254,540.00
26000	D50201150200	Receptacle systems, underfloor duct, 5' on center, low density	S.F.	$	9.79	$	254,540.00
13000	D50201150200	Receptacle systems, underfloor duct, 5' on center, low density	S.F.	$	9.79	$	127,270.00

4	D50309100454	Communication and alarm systems, fire detection, addressable, 50 detectors, includes outlets, boxes, conduit and wire	Ea.	$ 37,926.70	$ 151,706.80
1	D50309100452	Communication and alarm systems, fire detection, addressable, 25 detectors, includes outlets, boxes, conduit and wire	Ea.	$ 19,427.10	$ 19,427.10
3	D50101200320	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 400 A	Ea.	$ 7,512.98	$ 22,538.94
3	D50101200280	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 200 A	Ea.	$ 3,589.93	$ 10,769.79
50000	D50201300360	Wall switches, 5.0 per 1000 SF	S.F.	$ 1.20	$ 60,000.00
60	D50102300400	Feeder installation 600 V, including RGS conduit and XHHW wire, 800 A	L.F.	$ 264.34	$ 15,860.40
2	D50102400400	Switchgear installation, incl switchboard, panels & circuit breaker, 2000 A	Ea.	$ 54,961.00	$ 109,922.00
1	D50102300440	Feeder installation 600 V, including RGS conduit and XHHW wire, 1000 A	L.F.	$ 308.87	$ 308.87
1	D50102300520	Feeder installation 600 V, including RGS conduit and XHHW wire, 1600 A	L.F.	$ 530.66	$ 530.66
1	D50102300440	Feeder installation 600 V, including RGS conduit and XHHW wire, 1000 A	L.F.	$ 308.87	$ 308.87
135	D50309200104	Internet wiring, 4 data/voice outlets per 1000 S.F.	M.S.F.	$ 1,206.64	$ 162,896.40

Subtotal		
D20 Plumbing	$	313,999
D30 Mechanical	$	13,867,632
D50 Electrical	$	3,222,370
Total	**$**	**17,404,000**

APPENDIX C – SITE PLANS



Legend

N

- Roads
- Parking Lots
- Ex. Row Homes
- Trees/Shrubs
- Ex. Sanitary Lines
- Proposed Building Perimeter

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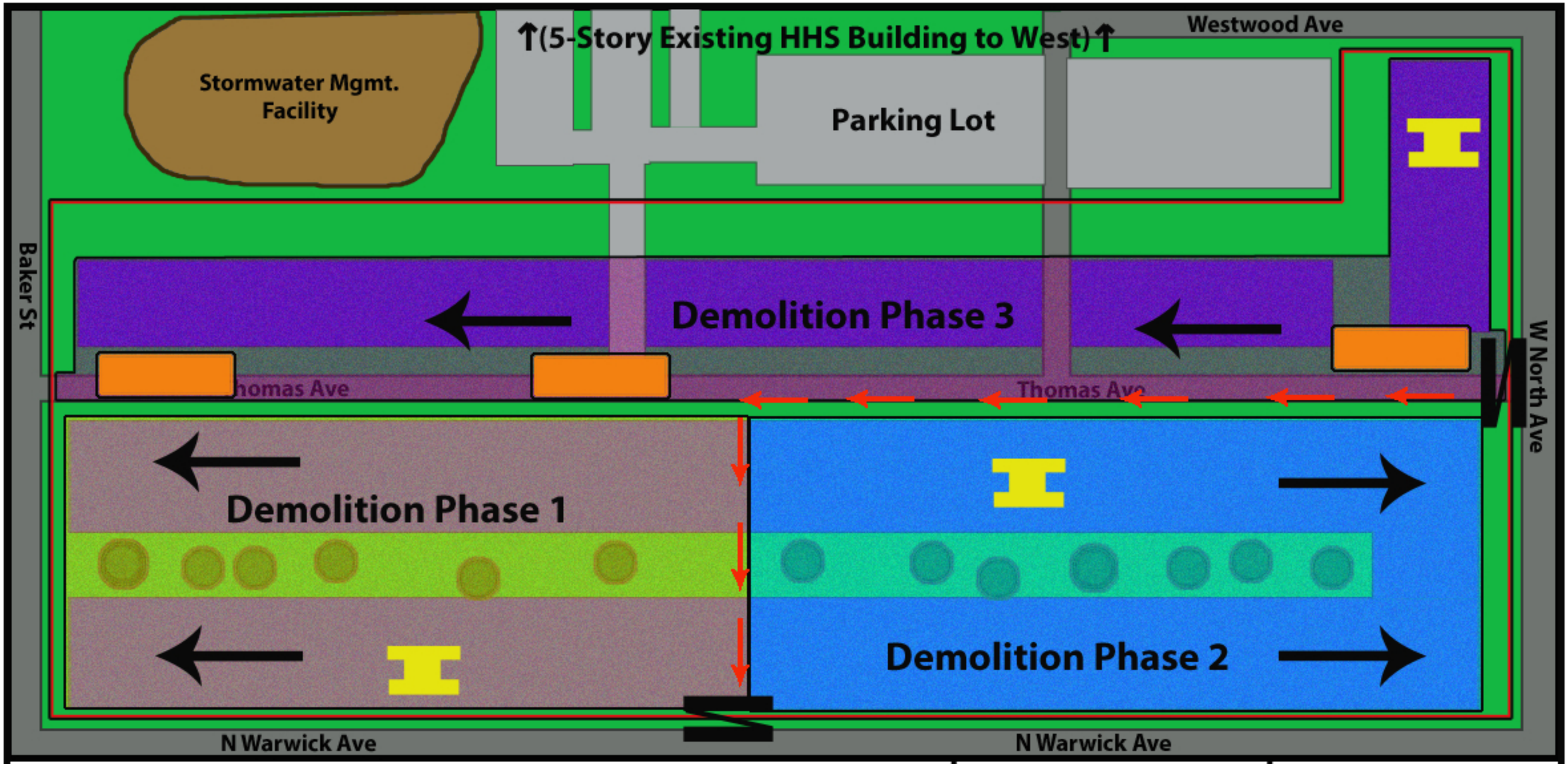
Existing Conditions



Legend

N

- Roads
- Parking Lots
- Dumpsters
- Site Access
- Demo Equipment/Excavator
- Site Traffic Flow
- Site Fence w. Lighting

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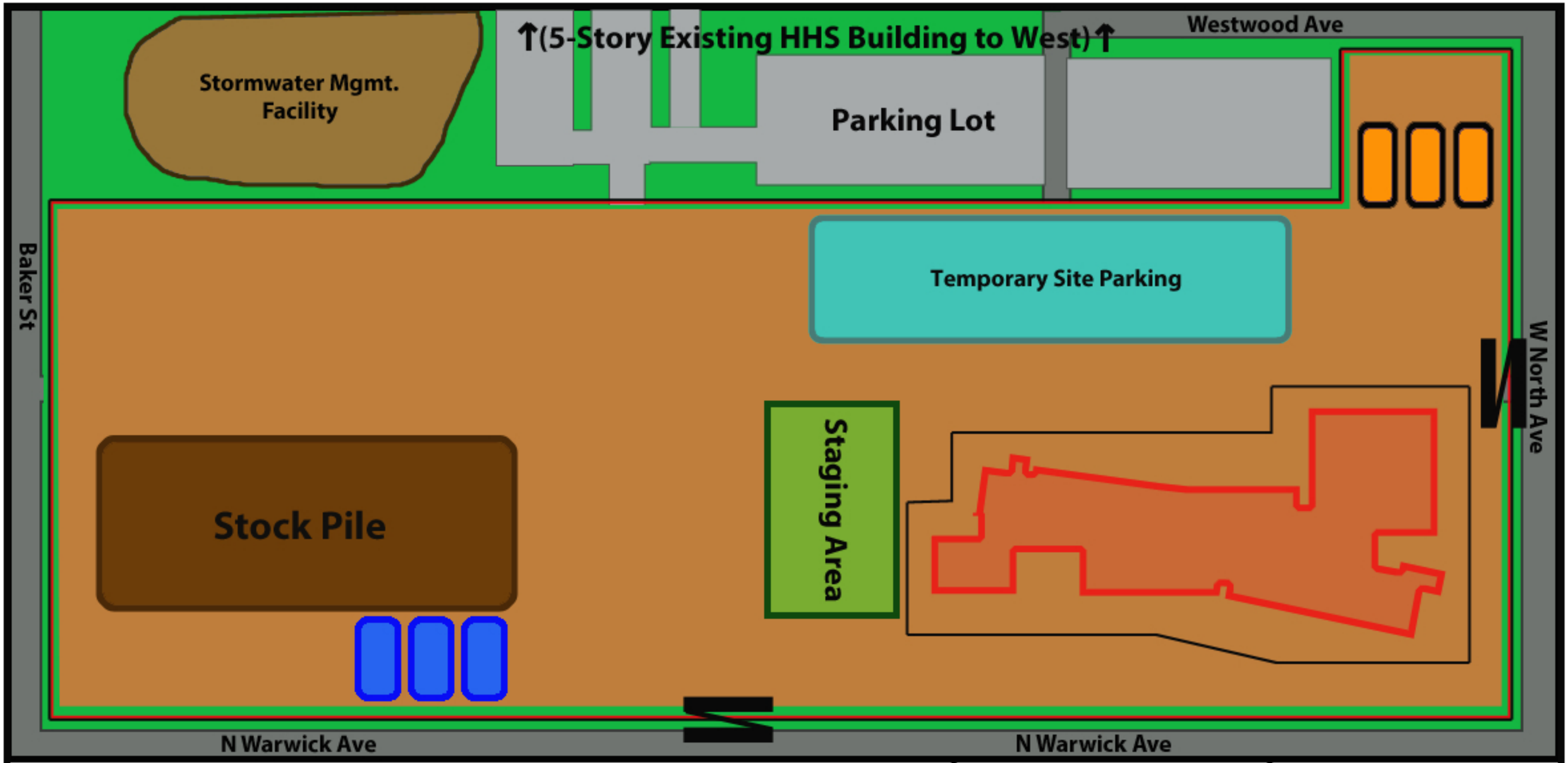
Demolition Plan



Legend

N

- Roads
- Parking Lots
- Dumpsters
- Site Access
- Contractor Trailers
- Building Perimeter
- Site Fence w. Lighting
- Excavation Setback

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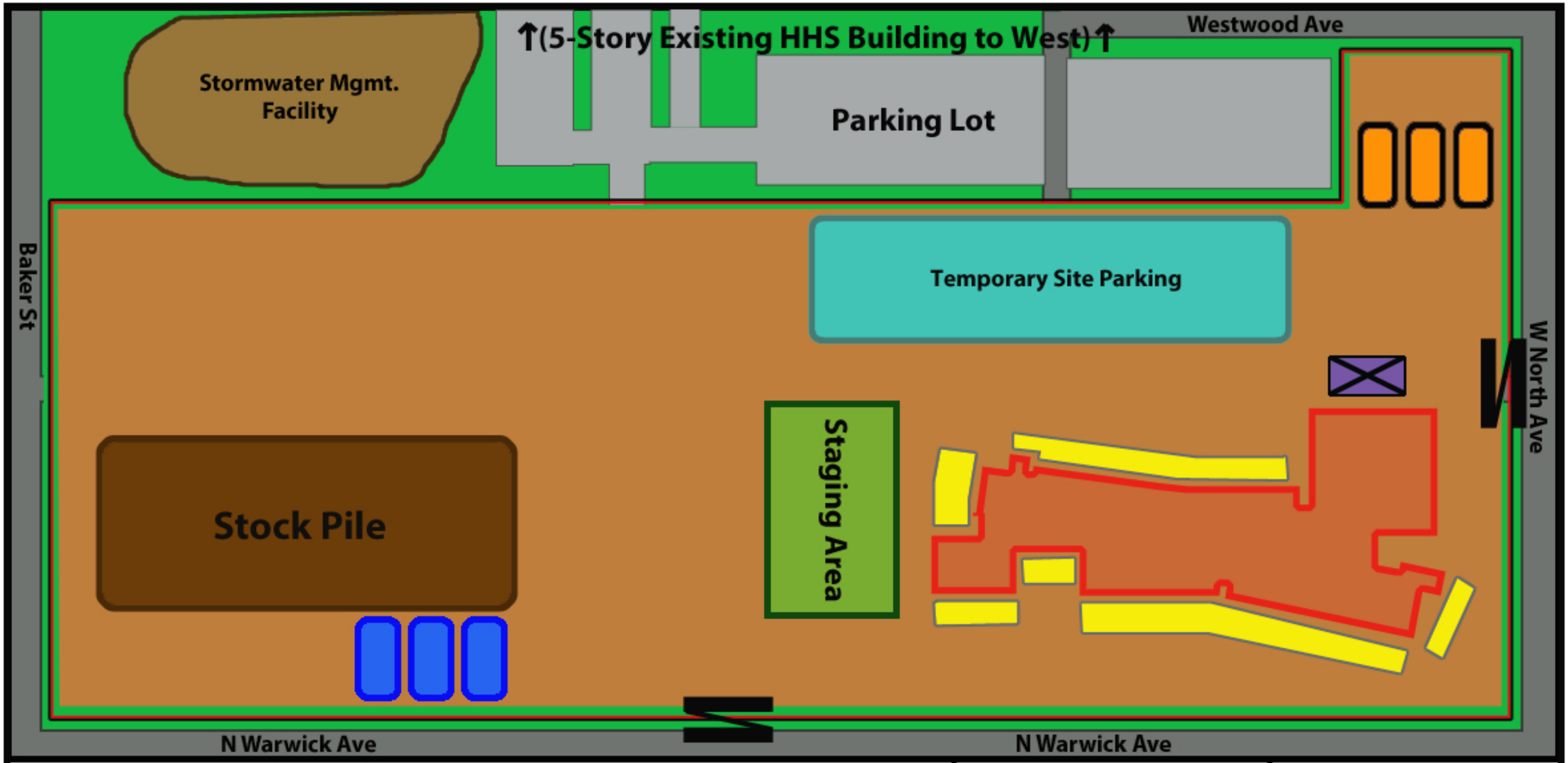
Foundations Plan



Legend

N

- Roads
- Parking Lots
- Dumpsters
- Site Access
- Scaffolding
- Contractor Trailers
- Building Perimeter
- Site Fence w. Lighting
- Mobile Crane

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Superstructure Plan

APPENDIX D – REFERENCES

1. http://www.baltimorecountymd.gov/Agencies/publicworks

2. Coppin State University – Strategic Plan 2010

   http://131.118.128.52/Assessment/2007-2010StrategicPlanCSU.pdf

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