GOVERNMENT OFFICE CENTER
MID-ATLANTIC U.S.

TECHNICAL ASSIGNMENT 1

23 September 2011

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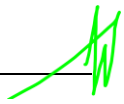
Construction Management
Dr. Craig Dubler

EXECUTIVE SUMMARY

Technical Assignment 1 is designed to provide a detailed background on the Government Office Center renovation and modernization project by identifying the opportunities and constraints that affect the design and construction process. This project involves major systems upgrades, most importantly the extensive curtain wall and mechanical systems which make up more than half of the GMP value combined. A key concern for the construction management team on the project is the need to maintain occupancy during the entire construction period.

Discussion and depiction of the six major phases of the project schedule are included in this report to provide the necessary background for understanding how work will be performed to achieve a completion date of January 31, 2014. Demolition work on this project is regulated by substantial requirements laid out in the specifications, and the replacement of the curtain wall system on the North and South elevations of the Government Office Center will require construction of temporary engineered weather walls to isolate the construction work from ongoing office activities. Cost estimates using R.S. Means CostWorks illustrate the weaknesses of relying on the accuracy of such a tool without an understanding of what items are accounted for by the estimate as well as what aspects of a specific project may make it unique. The existing conditions and site layout plans included demonstrate the site restrictions impacting the construction process, as well as how the construction management team has chosen to handle these challenges. As the owner of this building, the General Services Administration determined that it was more financially feasible to modernize the existing Government Office Center to meet LEED and other goals than to replace the Government Office Center with a new building.

Due to the intriguing complexity of the demolition and construction process for the curtain wall systems used in the Government Office Center, future research will likely be based on the phasing and construction processes employed for this renovation, as well as the technical performance of the curtain wall and how other opportunities and alternatives would impact the project and building lifecycle.



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PROJECT SCHEDULE SUMMARY

*See Appendix A for the Project Schedule Summary

Since this project is a fairly complex renovation of a government building, design and preconstruction services were critical in determining the feasibility of this project before commitment of substantial federal spending was made. Preconstruction services were awarded to the construction manager in late November 2009 and limited to a period of one year. Notice to proceed was given on August 1, 2011. The renovation and modernization of the Government Office Center is scheduled for completion on January 31, 2014.

The project schedule is divided into six phases of work, which often overlap over the course of the renovation. The critical aspects of the renovation of the Government Office Center include the demolition of existing curtain wall and mechanical systems, followed by installation of new, more energy efficient systems to replace them. Construction activities begin with demolition of a section of curtain wall on the South building elevation to allow for installation of a temporary material hoist. Truss reinforcement on levels 9-13 will take place in October 2011. In late November 2011, renovation of mechanical rooms in levels 1 and 14 will begin. Demolition and replacement of the curtain wall on the North façade of the Government Office Center will take place between November 2011 and April 2012, while corresponding work on the South façade will take place between December 2012 and May 2013. Finishes in the North and South building areas will be installed during the five months following completion of their respective curtain wall renovations. The final major phase of construction work for the Government Office Center involves roofing renovation in August of 2013, reinforcement of the CMU walls in level 2 during October 2013, and installation of a photovoltaic panel array in September and October 2013.

A key scheduling concern for this project is the need to maintain occupancy during the entire construction period. Significant coordination must be in place in order to ensure that building occupants, files, and furniture are appropriately relocated to allow demolition and construction activities to take place while minimizing the impact on ongoing functions within the building.

BUILDING SYSTEMS SUMMARY

Demolition

Demolition makes up a critical portion of the renovation of the Government Office Center. However, due to the ongoing occupation of the building during the demolition activities, as well as the salvage and recycling goals of the owner, there are specific instructions for how to handle many aspects of the demolition. For example, demolition of existing built-up roofing must be performed outside normal working hours. Also, particulate discharge resulting from demolition, cutting, grinding, and sandblasting operations must be controlled, and water sprinkling must be used, where relevant, as a means to control dust generation.

Before beginning demolition work, photographs must be taken of the existing conditions, including each window wall interior and exterior, each roof including existing items to remain during construction, and mechanical rooms from a variety of different vantage points.

The project specifications call for very specific descriptions regarding the conditions that must be met for a variety of materials being removed from their existing locations as part of the demolition process. These specific guidelines illustrate one of the goals of the owner for this project, which is to salvage and recycle as much non-hazardous demolition waste as possible. Concrete demolition requires the removal of reinforcement and other metals from the concrete and pulverization of the concrete to a maximum 1½ inch size, while masonry must be pulverized to a maximum ¾ inch size. Wood materials and structural steel to be recycled must be sorted and stacked according to size, type, and length. Large, clean pieces of gypsum board and acoustical ceiling panels and tile must be stacked and stored in a dry location. Large pieces of carpet and pad must be tightly rolled and stored in a closed container. Equipment, tanks, and fixtures must be drained, have their openings sealed, and be protected from exposure to weather. Piping and conduit must be reduced to straight lengths and stored by type and size. Lamps should be separated by type and protected from breakage.

The extensive existing aluminum and glass curtain wall system must be demolished, along with partitions and finishes within the perimeter zone of the building adjacent to the curtain wall. Also, certain existing HVAC systems within the building will be removed and replaced as part of the scope of work of this project. The existing systems to be removed include a cooling tower and chillers, boilers, air handling units, and perimeter electric baseboard heating system.

Asbestos is known to be on this project site, and will affect the demolition work to be performed. All work involving the contact, disturbance, dismantling, and/or disposal of hazardous materials must comply with the applicable requirements of 29 CFR 1926/1910 and 40 CFR 761, particularly (in the case of asbestos) 40 CFR, Part 61, Subparts A and M. Work must also comply with applicable state and municipal safety and health requirements. Specifically, existing built-up roofing systems, including membranes, felts, asphalt, tar, sealant, or adhesive on the roof and flashing system contain asbestos. Therefore, during the demolition of the existing lower and upper roof areas, all roofing materials and components are to be handled as Asbestos Containing Roofing Material (ACRM).

Structural Steel

The existing structural steel frame supports the building, with a middle bay of open space spanning from the East to West sides of the Government Office Center. This middle bay is flanked on either side with narrower bays of equal width which connect to the curtain wall frame. Floor loads are handled by one-way slab-on-deck before being transferred to trusses. Existing W-Shape steel columns transfer loads vertically into the foundations of the building.

New Hollow Structural Section steel members will be installed on the North and South facades to support the load of the new curtain wall. No crane will be used on site, instead this need will be handled by the use of davits.

Cast-in-Place Concrete

Cast-in-place concrete exists on this site in the form of foundations and slab-on-deck flooring. This renovation project will require the addition of a new level slab for a new revolving door on the foundation level, as well as filling in gaps where it was necessary to chip away existing concrete.

Mechanical System

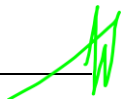
Mechanical rooms are located on the 1st and 14th floors. Air handling units present in the Government Office Center will be replaced and improved through the addition of variable flow valves. Existing perimeter electric baseboard heating will be replaced with VAV boxes with hot-water reheat that will distribute to new perimeter slot diffusers. The existing cooling tower and chillers will be replaced and converted to variable primary flow. Also, existing boilers will be replaced with more energy-efficient natural gas-fired boilers.

All ductwork existing in the Government Office Center that is not removed and replaced is scheduled to be cleaned as part of the scope of this renovation project. Sub-metering will be installed to help the building facilities management team to monitor and control energy use within the Government Office Center. The air filtration system will also be upgraded as part of the renovation and modernization of this building.

Existing fire sprinklers within the workspaces surrounding the curtain wall will be partially demolished and adjusted to serve as fire protection between the weather wall and building exterior during the construction phase. Substantial sections of existing fire protection systems will be demolished and replaced with new, NFPA 13 compliant sprinkler coverage that is fully coordinated with the new ceiling layout.

Electrical System

The Government Office Center is currently powered by an existing 480/277, 3 phase, 4 wire system that is backed up by a 175 kW, 219 kVA emergency generator. As part of this project, some electrical panels will be replaced to handle the renovated lighting system. Other new electrical work includes the necessary connections for two new chillers.



Masonry

Existing concrete masonry unit walls in the South area of Level 2 will be rebuilt with greater reinforcement to act as part of the lateral load resisting system. Large existing expanses of masonry on the East and West facades will not be involved in the scope of the renovation of the Government Office Center.

Curtain Wall

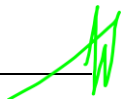
The existing curtain wall on the North and South facades will be replaced with a unitized, aluminum-framed curtain wall assembly. The intent of this portion of the renovation is to offer drastic improvement to the thermal performance of the building envelope, which in turn reduces the demand on the mechanical systems of the Government Office Center. Structural properties for this curtain wall system include the ability to withstand a basic wind speed of 90 miles per hour, while thermal movements should not cause undue stress on any building element that connects to or is part of the curtain wall system. The system is designed such that water drains to the exterior face of the curtain wall without any harm to neighboring surfaces or insulation.

During this project, a temporary engineered weather wall will separate the work zone from the occupied building areas. The existing system will then be removed on a specific floor, working from top to bottom. A material hoist on the Northwest corner of the building will allow for the transfer of materials and large waste products into and out of the building.

A single firm is required by the project specifications to assume undivided responsibility for fabrication, installation, and coordination of all elements of the building enclosure renovation. Responsibility for the design is in the hands of a design entity with extensive international experience in engineering, project management, fabrication, and installation of curtain wall systems.

LEED Certification Goals

The Government Office Center renovation and modernization project must achieve a minimum LEED Silver Certification. The cost of the initial application is carried by the A/E, while all other costs are the responsibility of the CM. Recycling and salvage of demolition waste as well as recycling of construction waste is an important part of this effort. Since the renovation of the curtain wall and mechanical systems will greatly improve the energy performance of the Government Office Center, several LEED points will also be earned from the Energy and Atmosphere credits.



PROJECT COST EVALUATION

The actual costs for this project are provided by Balfour Beatty Construction and shown below. These costs are not intended to represent actual bid costs for the project, and have been rounded slightly for inclusion in this technical assignment.

Actual Building Construction Cost

Total:	$40,226,000
Per SF:	$127.30

Total Project Cost

Total:	$42,476,000
Per SF:	$134.42

Major Building Systems Costs

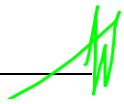
System	Total Actual Cost	Cost / SF
Curtain wall	$9,507,000	$190.14
Mechanical/Electrical	$12,100,000	$38.29
Steel	$450,000	$1.42
Demolition	$647,000	$2.05
Fire Sprinkler	$442,000	$1.40
Drywall	$2,084,000	$6.59
Roof	$1,085,000	$46.92

For the purposes of this assignment, cost estimates were developed using R.S. Means CostWorks as a comparison benchmark. Estimates produced include a Square Foot Estimate for the cost of the entire project, as well as Assemblies cost estimates for the mechanical, electrical, plumbing, fire sprinkler, and curtain wall systems employed in the renovation of the Government Office Center.

Square Foot Estimate

*See Appendix B for R.S. Means CostWorks 2011 Square Foot Cost Estimate Report

Because the R.S. Means CostWorks Square Foot Estimator is intended for new construction, the results are not entirely relevant for comparison to actual costs. However, given the added complexities in a typical government office building over a typical commercial office building, the costs of a major systems renovation and modernization of a government office building may approach the costs of building a new commercial office building of equal size. Therefore, it is assumed that the total building cost estimated by this system should approximate the total actual cost of the renovation of the Government Office Center. When using the Square Foot Estimator,



an additional cost line item of $286,125 was added to the standard estimate for the 175kW uninterruptible power supply that protects the systems and functions of the building. As a result, the Square Foot Estimator produced a total cost of $36,054,500, with a cost per square foot of $114.10.

For the Assemblies cost estimates below, the indented content includes the line item number from the R.S. Means 2011 Commercial Renovation Cost Data on the CostWorks website, as well as the unit cost and total cost of the system for the Government Office Center. Each line item represents a full assembly, including necessary supporting components.

Mechanical System Assembly Cost Estimate

The mechanical system of the Government Office Center includes a cooling tower and water cooled chillers that will be replaced.

D30301154040: $11.53/SF, Total cost of $3,643,480

There are six (6) air handling units to be replaced, along with perimeter electric baseboard heating that will be replaced with VAV boxes with hot-water reheat. The AHUs called for have an average cooling capacity near 80 tons, so it is assumed that each AHU has a capacity of 80 tons for this estimate.

D30501801060: $114,800 Ea, Total cost of $688,800

The five (5) natural gas-fired boilers called to replace existing boilers all have a rated output of 1800 MBH. For this estimate, it is assumed that the average cost of a 1275 and 2675 MBH boiler approximates the cost of the boilers in the Government Office Center renovation.

D30201341060&70: $54501 Ea, Total cost of $272,505

The subtotal cost of the mechanical system assemblies estimates above is $4,604,785.

Electrical System Assembly Cost Estimate

The electrical work involved in this renovation consists primarily of the installation of a new lighting system, which assumed to be fifteen (15) 32W fluorescent fixtures per 1000SF, producing 60fc and an electricity usage of 2.4 watts per square foot.

D50202100580: $7.10/SF, Total cost of $2,243,600.

The subtotal cost of the mechanical and electrical system assemblies estimates above is $6,848,385.

Plumbing System Assembly Cost Estimate

A column of bathrooms extending through twelve (12) levels and includes one (1) urinal, three (3) water closets, and three (3) lavatories per floor. The water closet is a wall-hung, elongated bowl with flush valve, and the urinals and lavatories are wall hung as well.

D20101102080 Water Closet: $2275 Ea, Total cost of $81,900.

D20102102000 Urinal: $1205 Ea, Total cost of $14,460.

D20103102300 Lavatory systems: $1645 Ea, Total cost of $59,220.

The subtotal cost of the plumbing assemblies estimates above is $155,580.

Fire Sprinkler System Assembly Cost Estimate

The sprinkler system will be modernized to meet NFPA 13. The system will be a wet pipe fire protection system for space rated at the ordinary hazard level.

D40104101220: $3.13/SF, Total cost of $989,080.

Curtain Wall System Assembly Cost Estimate

The unitized aluminum and glass curtain wall system is estimated below.

B20201241500: $41.85/SF, Total cost of $2,092,500.

Comparisons

The Square Foot Estimator produced a total cost of $36,054,500, with a cost per square foot of $114.10. This estimate is approximately 10% lower than the actual cost of construction (a GMP). Therefore, based on the assumptions included above, this estimate is reasonably accurate, given its limitations.

The subtotal cost of the mechanical and electrical system assemblies estimates above is $6,848,385, which is substantially lower than the $12,100,000 contract that covers this scope of work. Cleaning of existing ductwork is missing from the estimate, but it will not cover the difference of approximately $5 million. The curtain wall estimate of $2,092,500 is also significantly lower than the actual cost of $9,507,000. These differences show how R.S. Means can be a good baseline, but often do not include the unique aspects of a project.

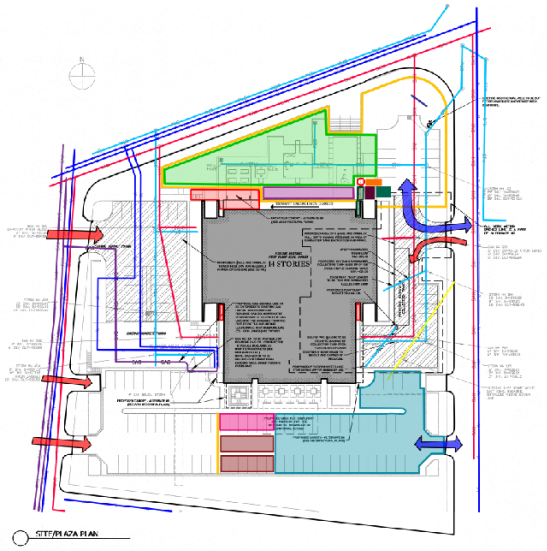
Other assembly estimates, such as the fire sprinkler system assembly cost estimate, are inaccurate because they include portions of the system that are not being installed during the renovation at hand. The estimate suggests that the fire sprinkler system will cost $989,080, whereas the actual cost is $442,000. This discrepancy can be explained by the fact that the major components of the existing system will remain, while only the branches and sprinkler heads will be replaced. Once again, the limits of R.S. Means square foot and assemblies estimates must not be ignored. The unique aspects of a construction project can render the results of these estimates almost useless, so care must be taken to ensure all details are accounted for.

SITE PLANS SUMMARY

*See Appendix C for Site Plans

Existing Conditions

Given that this project is a major systems renovation of an existing structure, it is critical to note that the important aspects of the existing conditions of this project differ substantially from those of the construction of a new building. For example, the building is to remain fully operational during the demolition and construction phases of the project. As a result, a certain level of available parking is required on site, limiting available space for the construction management team to work with. Furthermore, there are existing roads that surround the project site, under which the majority of the existing utilities are located. Any connections to these utilities as part of the scope of work will require consideration of how to handle resulting traffic issues.



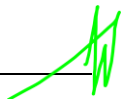
Also, it is important to note that the site plans do not distinguish between existing and proposed gas lines, but these lines can be distinguished due to the fact that the building currently has no natural gas connection. Therefore, the gas line connecting the building to the utilities under the road should be taken as the proposed gas line.

Site Layout Planning

This renovation project is being performed on a fairly constrained site. Using parts of the existing parking areas on site, the construction management team will place trailers, temporary air handlers, and material laydown and storage areas according to the needs of the project. The space is limited to the extent that there is no on-site parking available to the construction management team or the subcontractors.

A potential issue with the current layout is that the construction staging area is placed somewhat inconveniently in relation to the location of the material hoist. However, since space is limited, it is preferable to have the curtain wall laydown area near the material hoist. Site entrances may also prove to be an issue for the construction management team, as larger trucks may have difficulty with the turning radius demanded by the Northwest construction site entry.

Note that the work involved in each phase presented is highlighted in orange to indicate demolition and replacement of existing building features, such as mechanical rooms (Phase 0), curtain walls (Phase 1A), and roofing (Phase 3).

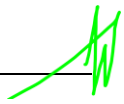


LOCAL CONDITIONS

The Government Office Center is located in the Mid-Atlantic U.S., where no clear preferred methods of construction exist. However, as a renovation of a large public building that must maintain operability of the occupants within the Government Office Center, there are challenges for the construction management team regarding more specific local conditions. For example, since substantial on-site parking will be blocked from tenant access during the life of the renovation project, alternative parking locations must be established for displaced building occupants as well as contractor and subcontractor parking needs. The construction manager has identified various parking lots and garages near the site that are available for use, and plans to rent out the parking lot closest to the Government Office Center.

Due to the requirement of recycling at least 50% of construction waste for the Government Office Center, as well as salvaging or recycling as much demolition waste as possible, a well-defined waste removal plan has been developed for use on this project. Limited available space on site led the construction management team to place a single dumpster on site, into which all demolition and construction waste is placed. Waste Management replaces the dumpster as needed, and sorts, weighs, and records statistics on the contents of each dumpster, allowing a designated A/E to track whether the project is meeting its LEED requirements by earning points for specific anticipated credits. However, the fees for this service are not defined, as there is no signed contract between Waste Management and Balfour Beatty Construction.

The nature of this renovation project is such that soil and subsurface water conditions are not directly relevant. Instead, a more relevant concern is whether the existing parking lots and parking structure on site can support the temporary loads that construction activities will burden them with. According to the structural engineer, there should be no cause for concern based on the site layout plans described in the previous section of this report.



CLIENT INFORMATION

The General Services Administration is an agency of the U.S. government that is responsible for the management of federal property across the country. GSA has a limited budget to handle operations, maintenance, renovations and new construction work, so it must evaluate its options carefully before choosing to undertake a major project like the Government Office Center in the Mid-Atlantic U.S.

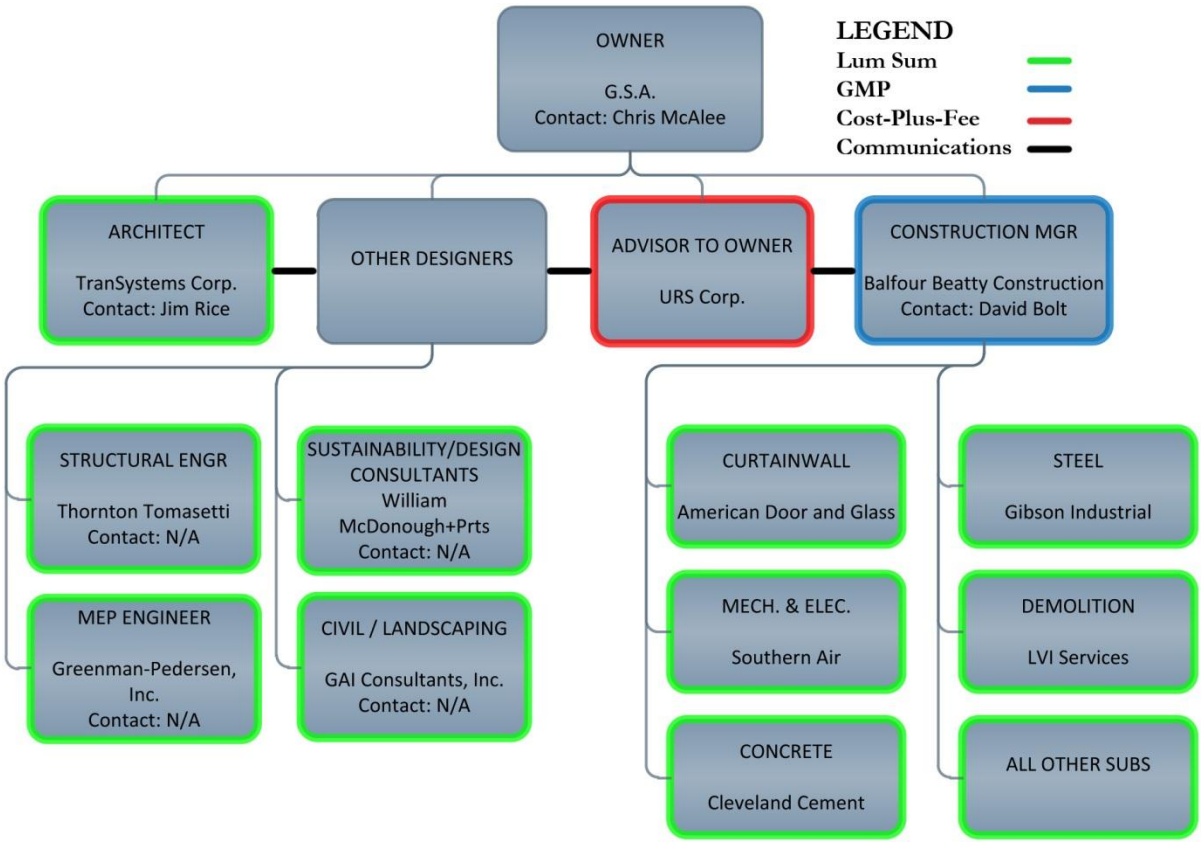
This renovation project was set in motion for a variety of reasons. First, GSA is receiving funding from the American Recovery and Reinvestment Act of 2009 for the project. Part of the purpose of the American Recovery and Reinvestment Act is to stimulate the economy by funding a large number of public projects, and GSA is receiving approximately $750 million from the ARRA for its share in this effort.

Second, GSA and their consultants for this project determined that it would be less expensive to modernize the Government Office Center than to construct a new building to replace it. Thus, the savings generated by choosing to renovate rather than rebuild enable GSA to use funds on additional cases in need of critical maintenance.

Another reason for this renovation is to meet federal government demands for LEED accreditation in its buildings. Through improvement of the façade and mechanical systems performance of the Government Office Center, this renovation and modernization seeks to achieve a LEED Silver rating. In addition, this improved performance will reduce its dependence on ever-rising energy costs and improve environmental air quality by switching to natural gas-fired boilers and adding an array of photovoltaic panels to the lower roof of the building.

Because the building will be occupied for the entirety of the demolition and construction sequence, GSA stresses that proper occupant relocation during these activities is key defining factor of the success of this project. As part of its original effort to win this renovation project, Balfour Beatty Construction developed an animated visualization of how groups of building tenants will be relocated within the building as work progresses. This animation helped the construction management team to demonstrate its understanding of how building occupancy would impact the phasing of demolition and construction activities.

PROJECT DELIVERY SYSTEM

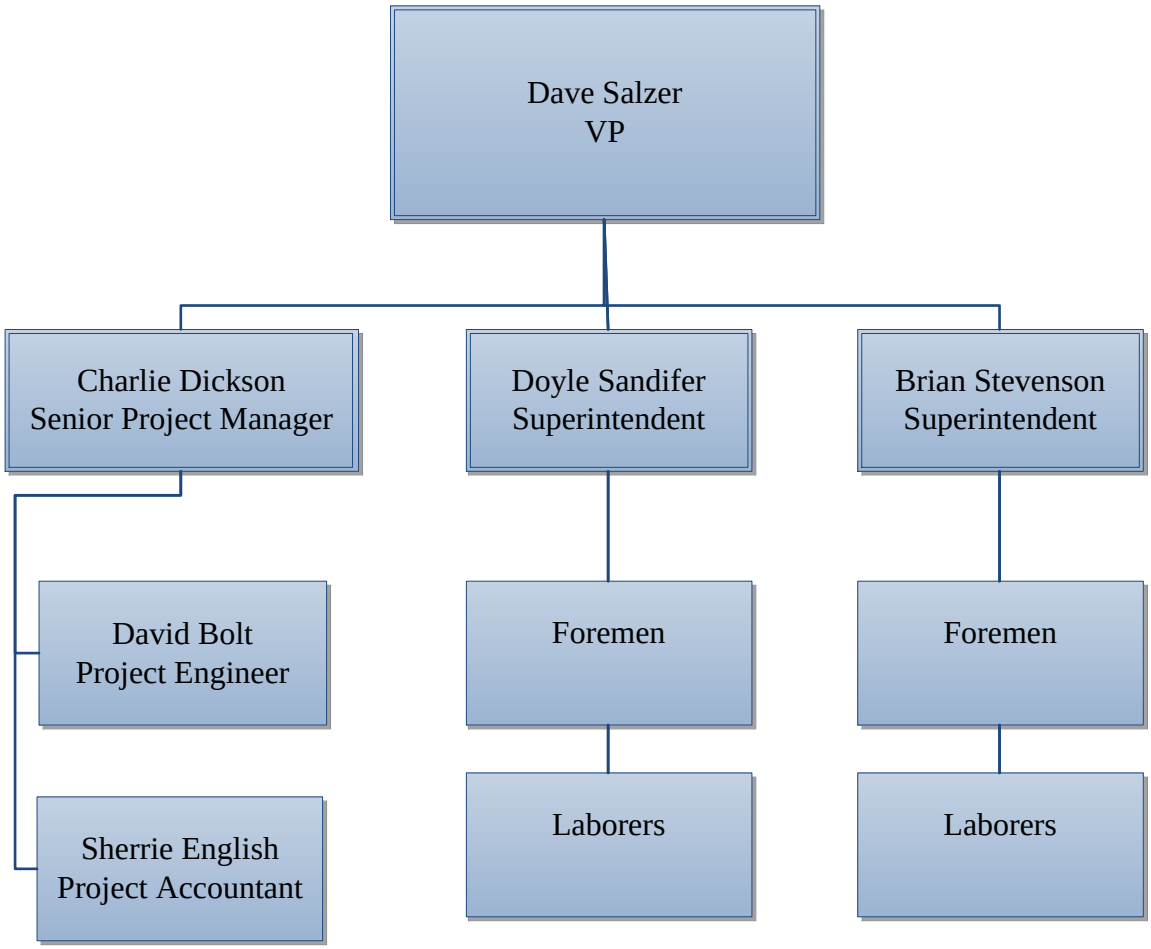


The Government Office Center renovation and modernization project is being delivered under a Design-Build system with an Advisor to the Owner and a Construction Management Contractor. Balfour Beatty Construction was selected for preconstruction services with the option for GSA to extend the scope of the project to include the renovation work itself. After this option was activated, Balfour Beatty Construction began awarding lump sum contracts to a variety of subcontractors to handle the scope of work involved in the Government Office Center renovation project. Perhaps most significant among these subcontracts, based on scope of work, are the curtain wall contract, mechanical and electrical contract, and demolition contract.

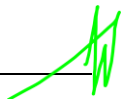
The Guaranteed Maximum Price contract is appropriate for the construction management team because of its involvement in the preconstruction phase of this project, giving Balfour Beatty Construction a fair opportunity for reward while holding them accountable to some degree for proper performance of the renovation work. Lump sum contracts are logical for subcontracts and for design and consulting efforts on a renovation project like this. The cost-plus-fee contract with the Advisor to the Owner is also appropriate, since the cost of work is limited already by the GMP with the Construction Management Contractor.

Payment and performance bonds are required for this project, as well as Owner's insurance to protect the Owner and project team from liability for major damages to the Owner's property during the demolition and renovation work.

STAFFING PLAN



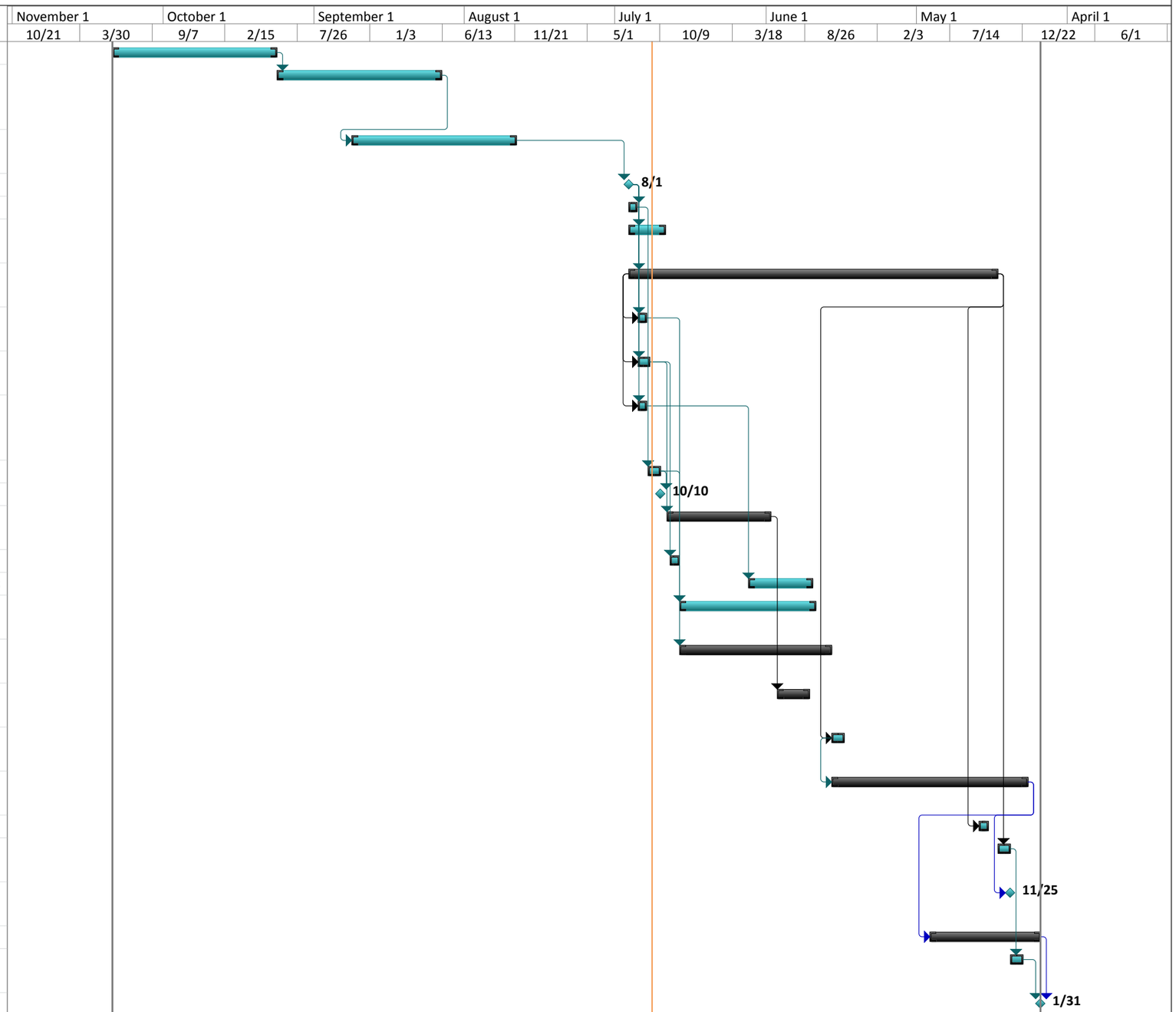
The Government Office Center renovation project is managed by the roles indicated in the diagram above. Given the size of this project, a senior project manager supervises and controls overall project flow, while two superintendents manage on-site crew operations on a day-to-day basis. The senior project manager is supported by a project engineer and project accountant, and reports to a vice president who typically oversees several projects at any given time. Aside from the vice president, all project management staff members are stationed on site and work out of a job trailer.



APPENDIX A – PROJECT SCHEDULE SUMMARY

Technical Assignment 1

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors
1		Design Phase	261 days	Wed 6/11/08	Wed 6/10/09	
2		Procurement of Construction Services	262 days	Thu 6/11/09	Fri 6/11/10	1
3		Preconstruction Services	262 days	Tue 11/24/09	Wed 11/24/10	2FS-144 days
4		NTP	0 days	Mon 8/1/11	Mon 8/1/11	3FS+177 days
5		Mobilize	15 days	Mon 8/1/11	Fri 8/19/11	4
6		Material Procurement	60 days	Mon 8/1/11	Fri 10/21/11	4
7		**Phase 1A - North Curtain Wall**	586 days	Mon 8/1/11	Mon 10/28/13	4
8		Site Demo & Protection	15 days	Mon 8/22/11	Fri 9/9/11	4FS+15 days,7SS+15
9		Furniture Relocation Level 6-13	20 days	Mon 8/22/11	Fri 9/16/11	4FS+15 days,7SS+15
10		Ceiling Demo at Truss Reinforcement Level 9-13	15 days	Mon 8/22/11	Fri 9/9/11	4FS+15 days,7SS+15 days
11		Hoist/Chute Erection	20 days	Tue 9/13/11	Mon 10/10/11	5FS+16 days
12		Hoist Available	0 days	Mon 10/10/11	Mon 10/10/11	11FS-1 day
13		**Phase 0 - Mechanical Rooms**	165 days	Tue 10/25/11	Mon 6/11/12	9FS+26 days
14		Relocate Files	15 days	Tue 11/1/11	Mon 11/21/11	9FS+31 days
15		Finishes Level 3-13	103 days	Mon 4/23/12	Wed 9/12/12	10FS+160 days
16		Demo / Renovate West Toilet Stack	217 days	Tue 11/22/11	Wed 9/19/12	11FS+30 days
17		**Phase 1C - Exterior Work Levels 1 and 2**	242 days	Tue 11/22/11	Wed 10/24/12	8FS+51 days
18		**Phase 1B - MEP Work Levels 4 and 5**	52 days	Tue 6/26/12	Wed 9/5/12	13FS+10 days
19		North Site Restoration	20 days	Thu 10/25/12	Wed 11/21/12	7FS-263 days
20		**Phase 2 - South Curtain Wall**	312 days	Thu 10/25/12	Fri 1/3/14	19SS
21		Remove Hoist	15 days	Tue 9/17/13	Mon 10/7/13	7FS-30 days
22		Curtainwall Punchlist / Final Clean	20 days	Tue 10/29/13	Mon 11/25/13	7
23		Curtainwall Complete	0 days	Mon 11/25/13	Mon 11/25/13	20FS-30 days
24		**Phase 3 - Lower Roof**	176 days	Fri 5/31/13	Fri 1/31/14	20FS-156 days
25		Northeast Site Restoration	20 days	Tue 11/26/13	Mon 12/23/13	22
26		Project Complete	0 days	Fri 1/31/14	Fri 1/31/14	24FS-1 day,25



Project: Tech 1 Project Schedule S
Date: Thu 9/22/11

Task
Split
Milestone
Summary
Project Summary
External Tasks
External Milestone
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Deadline
Progress

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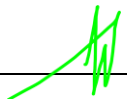


APPENDIX B – R.S. MEANS COSTWORKS 2011 SQUARE FOOT COST ESTIMATE REPORT

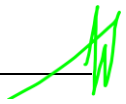
Square Foot Cost Estimate Report

Estimate Name:	**Thesis**
Building Type:	**Office, 11-20 Story with Double Glazed Heat Absorbing Tinted Plate Glass Panels / Steel Frame**
Location:	**National Average**
Story Count:	**14**
Story Height (L.F.):	**13.33**
Floor Area (S.F.):	**316000**
Labor Type:	**Open Shop**
Basement Included:	**No**
Data Release:	**Year 2011**
Cost Per Square Foot:	**$114.10**
Building Cost:	**$36,054,500**

Costs are derived from a building model with basic components.

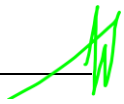
Scope differences and market conditions can cause costs to vary significantly.

		% of Total	Cost Per S.F.	Cost
A Substructure		**4.60%**	**$4.81**	**$1,521,500**
A1010	Standard Foundations		$0.54	$171,500
A1020	Special Foundations		$3.65	$1,153,000
A1030	Slab on Grade		$0.32	$102,000
A2010	Basement Excavation		$0.02	$5,500
A2020	Basement Walls		$0.28	$89,500
B Shell		**34.80%**	**$36.75**	**$11,613,000**
B1010	Floor Construction		$21.41	$6,767,000
B1020	Roof Construction		$0.48	$151,500
B2020	Exterior Windows		$13.92	$4,398,500
B2030	Exterior Doors		$0.60	$191,000
B3010	Roof Coverings		$0.33	$105,000
C Interiors		**17.30%**	**$18.28**	**$5,777,500**
C1010	Partitions		$2.44	$772,500
C1020	Interior Doors		$2.56	$807,500
C1030	Fittings		$0.39	$124,500
C2010	Stair Construction		$1.61	$509,500
C3010	Wall Finishes		$0.69	$219,000
C3020	Floor Finishes		$4.60	$1,455,000
C3030	Ceiling Finishes		$5.98	$1,889,500
D Services		**43.30%**	**$45.78**	**$14,467,500**
D1010	Elevators and Lifts		$7.05	$2,226,500
D2010	Plumbing Fixtures		$3.41	$1,078,500
D2020	Domestic Water Distribution		$0.28	$89,000

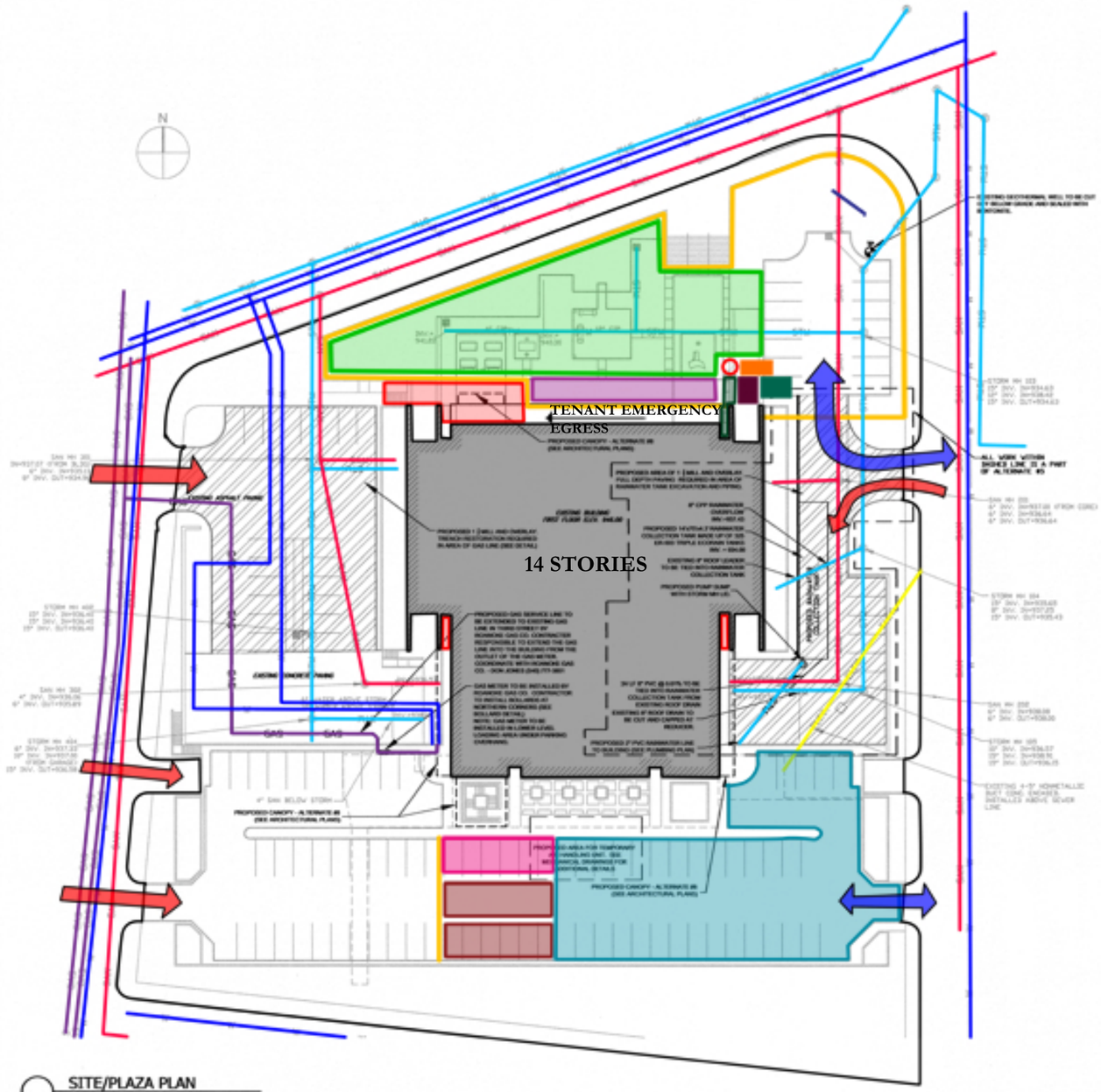


D2040	Rain Water Drainage		$0.15	$46,000
D3020	Heat Generating Systems		$2.11	$666,000
D3030	Cooling Generating Systems		$12.71	$4,015,000
D4010	Sprinklers		$2.37	$748,000
D4020	Standpipes		$0.41	$128,500
D5010	Electrical Service/Distribution		$0.83	$263,000
D5020	Lighting and Branch Wiring		$10.33	$3,263,500
D5030	Communications and Security		$4.70	$1,485,500
D5090	Other Electrical Systems		$1.45	$458,000
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%	$105.63	$33,379,500
Contractor Fees (General Conditions,Overhead,Profit)	1.90%	$2.01	$634,000
Architectural Fees	6.00%	$6.46	$2,041,000
User Fees	0.00%	$0.00	$0
Total Building Cost		$114.10	$36,054,500



APPENDIX C – SITE PLANS



SITE/PLAZA PLAN

LEGEND

- WATER LINE
- STORM SEWER
- SANITARY SEWER
- ELECTRICAL LINE
- GAS LINE
- PROPOSED GAS LINE
- EX. GEOTHERMAL WELL
- PROTECTED HARDSCAPE
- CONSTRUCTION STAGING
- CURTAIN WALL LAYDOWN
- TRAILERS
- TEMP. HVAC UNIT
- LOADING PLATFORM
- MATERIAL HOIST
- DUMPSTER
- TRASH CHUTE
- SCAFFOLD
- COVERED WALKWAY
- PROJECT SIGN
- SITE FENCE
- TENANT ACCESS
- CONSTRUCTION ENTRANCE/EXIT

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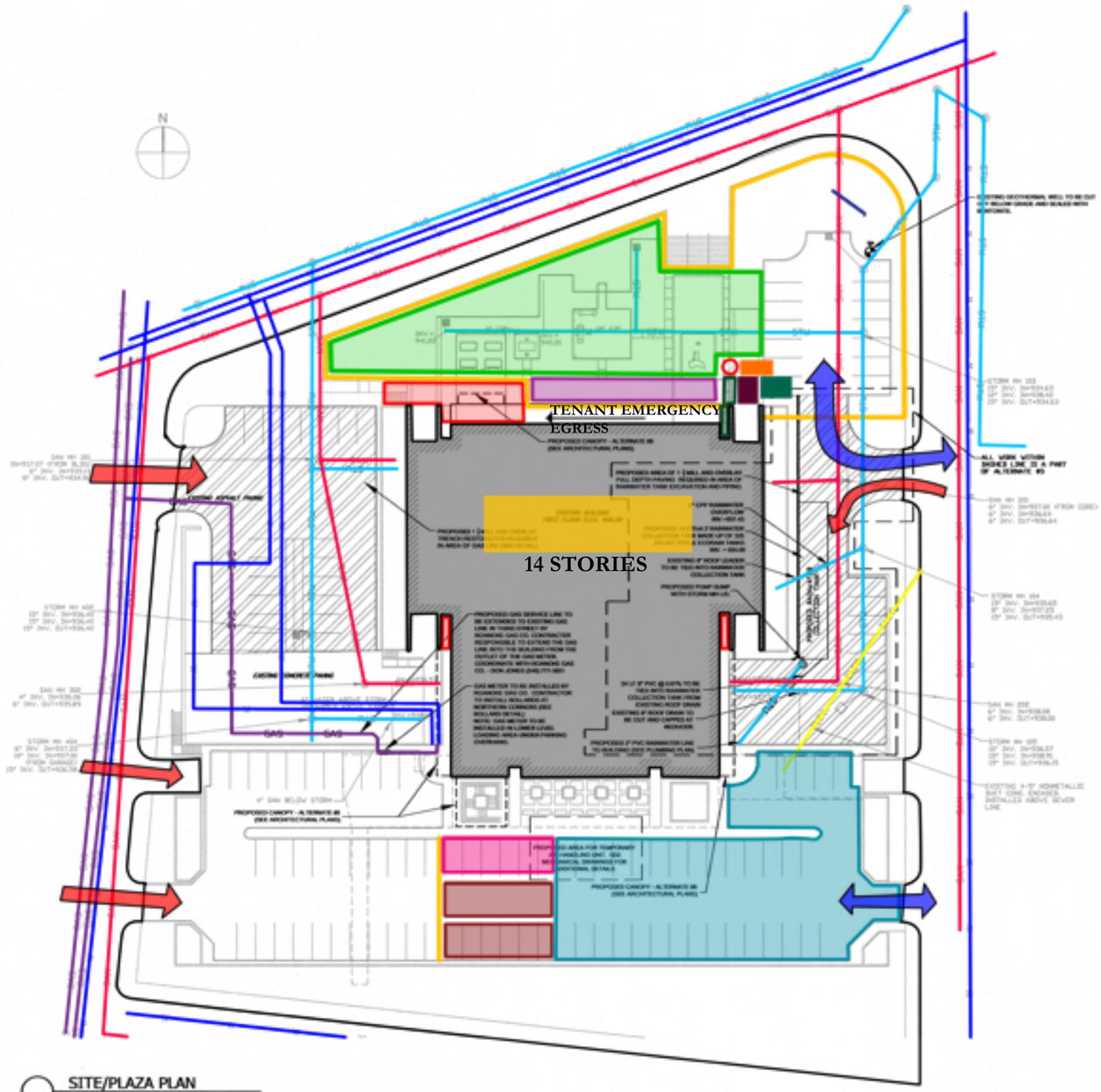
Existing Conditions



SITE/PLAZA PLAN

LEGEND

- WATER LINE
- STORM SEWER
- SANITARY SEWER
- ELECTRICAL LINE
- GAS LINE
- PROPOSED GAS LINE
- EX. GEOTHERMAL WELL
- PROTECTED HARDSCAPE
- CONSTRUCTION STAGING
- CURTAIN WALL LAYDOWN
- TRAILERS
- TEMP. HVAC UNIT
- LOADING PLATFORM
- MATERIAL HOIST
- DUMPSTER
- TRASH CHUTE
- SCAFFOLD
- COVERED WALKWAY
- PROJECT SIGN
- SITE FENCE
- TENANT ACCESS
- CONSTRUCTION ENTRANCE/EXIT
- MECHANICAL ROOMS LEVELS 1 & 14

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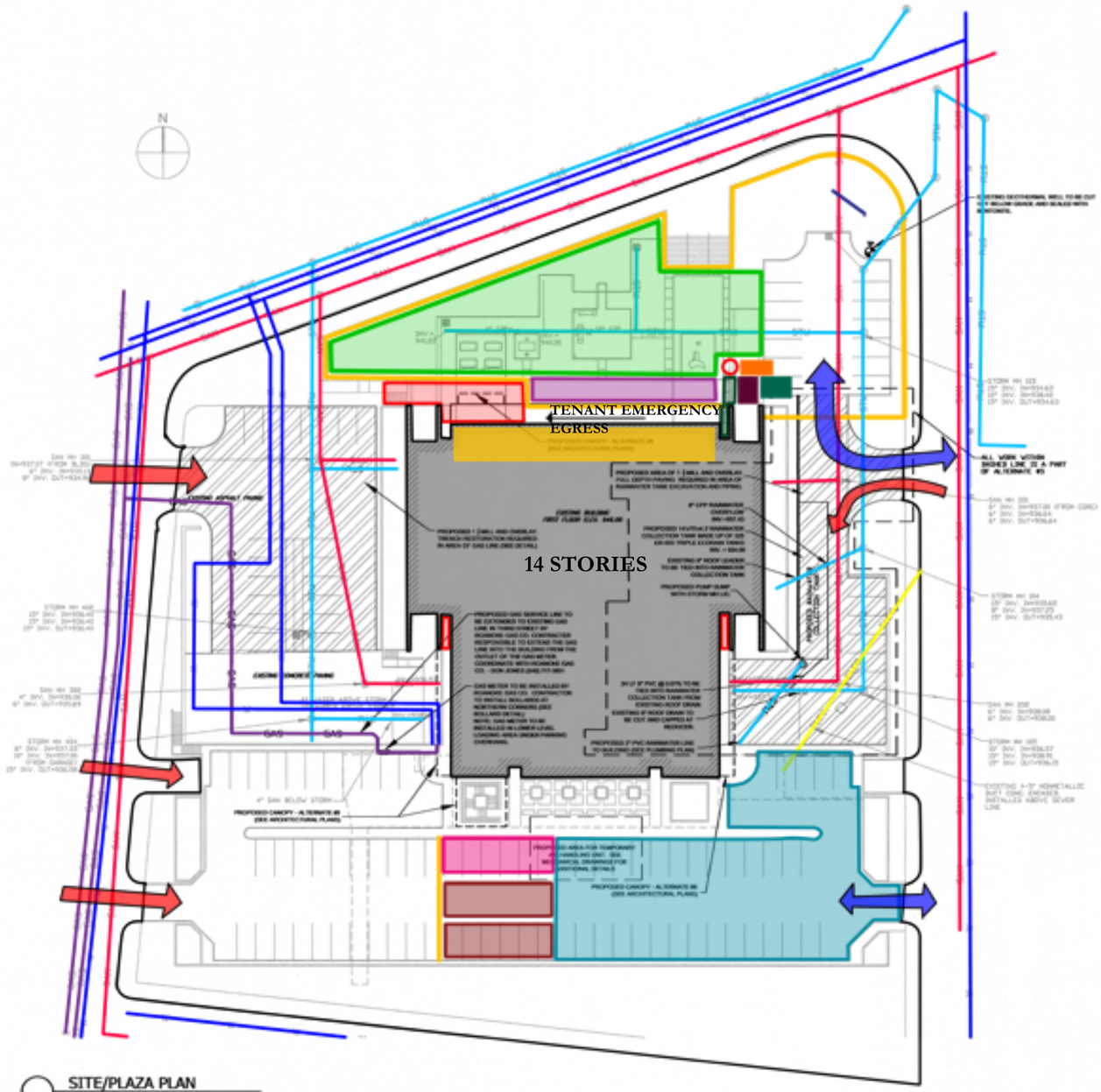
Phase 0 - Mechanical Rooms, Levels 1 and 14



SITE/PLAZA PLAN

LEGEND

- WATER LINE
- STORM SEWER
- SANITARY SEWER
- ELECTRICAL LINE
- GAS LINE
- PROPOSED GAS LINE
- EX. GEOTHERMAL WELL
- PROTECTED HARDSCAPE
- CONSTRUCTION STAGING
- CURTAIN WALL LAYDOWN
- TRAILERS
- TEMP. HVAC UNIT
- LOADING PLATFORM
- MATERIAL HOIST
- DUMPSTER
- TRASH CHUTE
- SCAFFOLD
- COVERED WALKWAY
- PROJECT SIGN
- SITE FENCE
- TENANT ACCESS
- CONSTRUCTION ENTRANCE/EXIT
- CURTAIN WALL INST. W/ TEMP WALL

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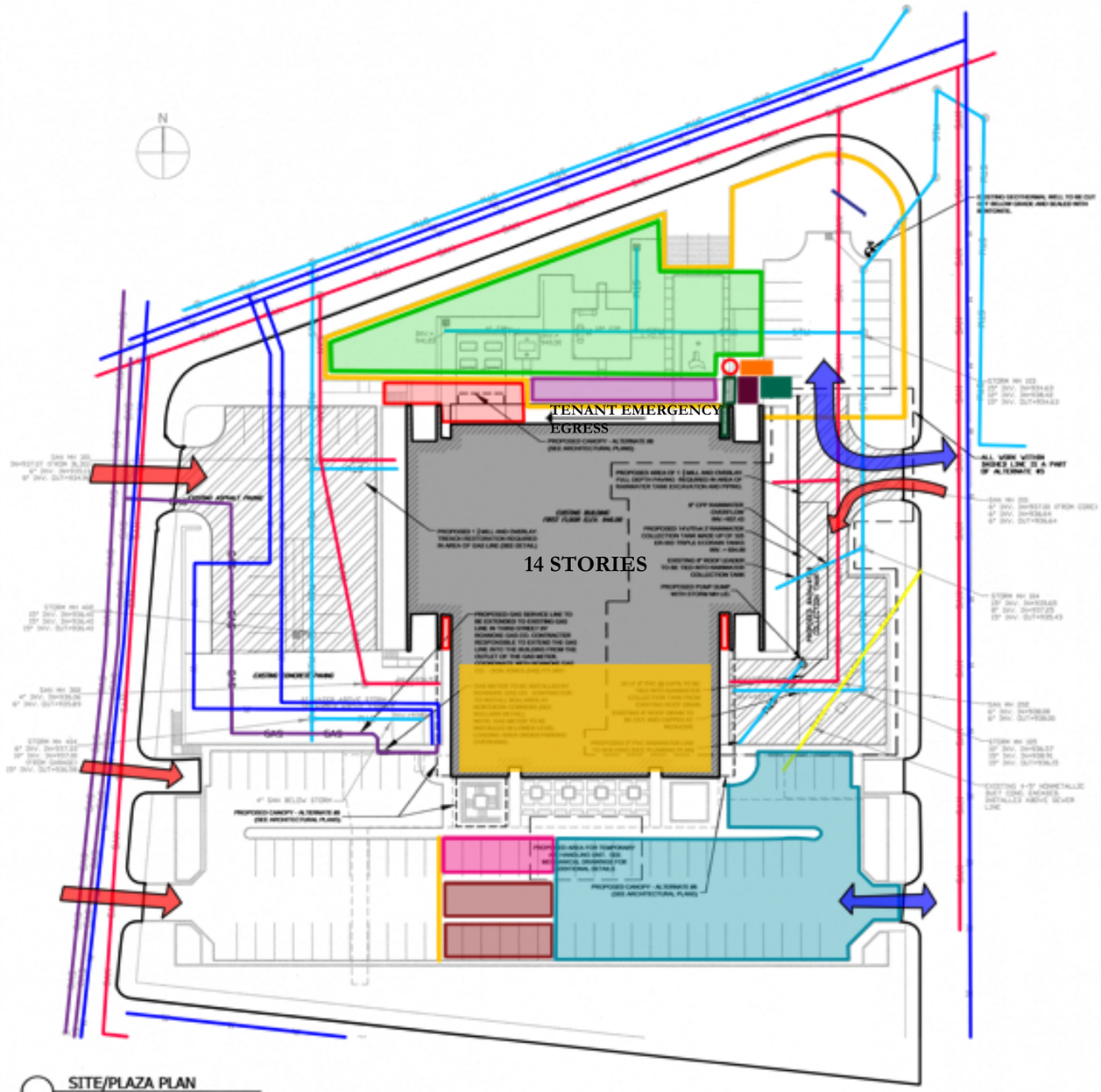
Phase 1A - North Curtain Wall



SITE/PLAZA PLAN

LEGEND

- WATER LINE
- STORM SEWER
- SANITARY SEWER
- ELECTRICAL LINE
- GAS LINE
- PROPOSED GAS LINE
- EX. GEOTHERMAL WELL
- PROTECTED HARDSCAPE
- CONSTRUCTION STAGING
- CURTAIN WALL LAYDOWN
- TRAILERS
- TEMP. HVAC UNIT
- LOADING PLATFORM
- MATERIAL HOIST
- DUMPSTER
- TRASH CHUTE
- SCAFFOLD
- COVERED WALKWAY
- PROJECT SIGN
- SITE FENCE
- TENANT ACCESS
- CONSTRUCTION ENTRANCE/EXIT
- LOWER ROOF AND SOLAR ARRAY

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Phase 3 - Lower Roof & Solar Panels