Penn State AE

# Technical Report 1: The Dull Silver Lion

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## Executive Summary

The Dull Silver Lion, a fictitious name aka DSL, is a 20 stories luxury apartment building located in the mid-Atlantic at a major mass transit facility. Overall the building is approximately 808,000 SF, one third parking and two thirds residential apartments, with 450 apartment units that will be on the market by mid-year 2016 along with a small portion of retail space at ground level. The first 8 stories of the building are mostly parking garage with two cornering sides being a single layer of apartments. On top this pedestal is partially a green roof garden and the base of a 12 story tower comprised of apartments units and featuring a yoga room and pool on the pent house level. This project is part of a greater development plan that is comprised of 6 buildings to be built within ten years. This complex rests on top of a “mega-garage” for parking at a mass transit station that is a on both bus and train routes.

Development of this project is being done by Comstock Partners, Comstock, who is a developer in the mid-Atlantic that focuses on mixed used, office and residential, transit oriented developments. Comstock is developing the entirety previously described development complex. James G. Davis Construction is the general contract working in relation with Comstock. Davis also built the mega-garage on which the DSL stands. The overall project cost is approximated at $130 million, $161/SF, and the construction costs are estimated at $93 million dollars, $126.42/SF.

The building is estimated to take a total duration of twenty months from tower crane erection to final unit turnovers. The project is fortunate to not have the normal schedule burden of site work for new building projects as it is to be built on top an existing concrete pedestal. This is a great relief as many project delays begin with site-work, excavation, and foundations. The overall project durations from design to final turnover is estimated to be three and a half years.

The building systems are typical of the area of construction and of this building type. The structural is of reinforced concrete consisting of both drop panel design and flat plate post-tensioned system. The envelope is comprised of standard vapor and weather barriers. The roof is partially TPO membrane and partially a hot fluid applied asphalt membrane. Cladding the building is a façade of precast panels, curtain walls, metal panels, and windows. The electrical system is a basic 480/277V and 208/120V system. Keeping the individual units tempered are water source heat pumps that are on a centralized boiler and cooling tower system; ventilation and exhaust requirements are met through a centralized system. Construction of these systems does not pose any particularly unique problems needing creative solutions. The site is slightly constricted and the need for two tower cranes was determined from the storage area being located in the rear of the city. A man and material hoist will also be utilized on the project. Constructors must also be cognoscenti of traffic patterns of the commuter garage and their constricted delivery space.

## Client Information

Comstock, the owner of this project, is the development group behind the development of the entire complex which is a public-private partnership.  Comstock is a developer that is focused on urban, mixed use, and transit oriented projects which are placed along public transportation lines. They also have a commitment to work force housing. This complex will consist of two high-rise residential apartment buildings, one high-rise condominium, three commercial office buildings, and a retail center. All but two of these buildings are being built on top of the existing public transportation parking facility. This is the first of the majoring building project of the complex and is a 21 story luxury apartment building with parking. Client information was found on Comstock's webstie.

## Building System Summary

This project does not incorporate and unique or cutting edge building systems. All 21 stories of the structure are a concrete structure; a very typical construction method used in the mid-Atlantic.  The base stories of the parking garage are a combination of drop panel construction with various post-tensioned beams. The 11 stories structure above is all flat plate post-tension system. The electrical distribution is a combination of 480/277V to major pieces of equipment and transformed down to satisfy common space lighting demands. 208/120V is routed to meter stack for each of the apartment units. The mechanical system is also individualized for climate control in each unit. This is down by using water source heat pumps in all units. These are fed by a condenser lines from which energy is removed by a cooling tower and added via a boiler. Ventilation and exhaust is provided via a centralized system.

## Project Delivery System

Davis was awarded this project as part of an existing relationship with the developer (85% of Davis's work is with repeat costumers). Along with this project Davis also built the public transit parking facility which most of the complex sits on. This business relationship has placed the project in a delivery method similar to a construction manager at risk while retaining their general contractor status. They did not need to bid for the project, nor was it open to public bid, and they worked directly with the owner and the designer to get the design within budget while doing all pre-construction planning and eventually procurement. This approached based on the strong relationship the owner and the contractor have and the contractors experience with this project site.

The contractual relationship between Davis and the owner is that of a Guaranteed Maximum Price, GMP, with an incentive of a 25% & 75% split between the contractor and the owner respectively. This incentivizes the general contractor to do what they can to save money as they will reap some of the reward. A GMP of approx. $92,000,000 was established during the design development phase by the estimating staff at Davis. When actual vendor and subcontractor numbers came in it was over budget by about 8% and through a serious of VE sessions and scope modification the construction team managed to reduce it back to the GMP. Any owner driven changes will be an adjustment to the GMP.

The relationship between the major players of the project resembles a rather traditional structure; which is represented in figure 1. The owner is contracted with the architect, Hickok Cole, who hires the appropriate engineers and consultants. The general contractor, Davis, is contracted to the owner through a GMP contract. Moving down the organization chart the subcontractors are contracted with lump sum contracts while the vendors are held in a purchase agreement with the GC. For minor work, described as being less than $25,000, and of low risk and labor only are under Service Agreements; examples include site surveying, photography, etc.

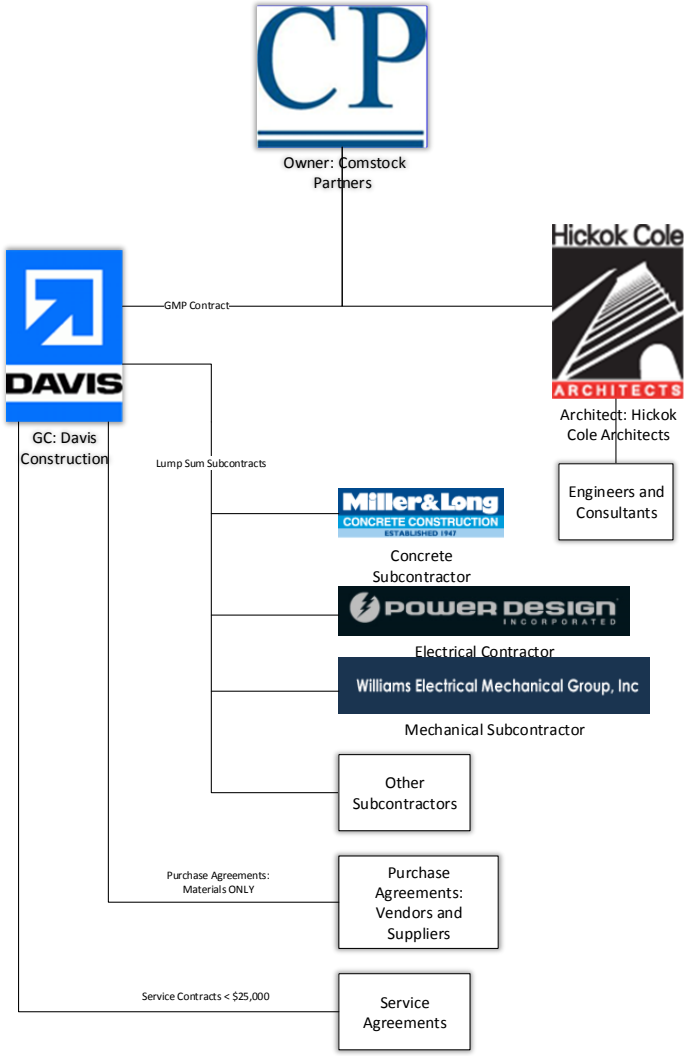


Figure 1; Project Organization Chart

## GC PROJECT STAFF:

The project team of the general contractor consists of an office side and field side that work separately but together to lead all aspects of the project. The following description of the project team is represented by figure 2. The team is headed by the Vice President Ron Juban and under him on the field side is Senior Superintendent Dave Mesich who oversees all trades. Dave works with Superintendents Josh Majerowicz, who oversees field supervision of the building envelope, Façade, and structure, and Blake Hilton who will be brought on later to lead interiors and finishes. Working under Josh Majerowicz is Assistant Superintendent Travis Thompson. Blake Hilton will also be working with an assistant superintendent, but the individual has yet to be determined. Layout engineer Ricardo Cazon works with both superintendents.

On the office side of the project Steve Hawryluk oversees all trades with the help of project managers Matt Dabrowski and Tim Seward. Matt Dabrowski is responsible for the envelope, façade, and structure with superintendent Josh Majerowicz and the help of project engineer Gjon Tomaj and Andrea Copeland. Tim Seward will be covering the MEP trades, security systems, and AV systems with the help of project engineer Kevin West.

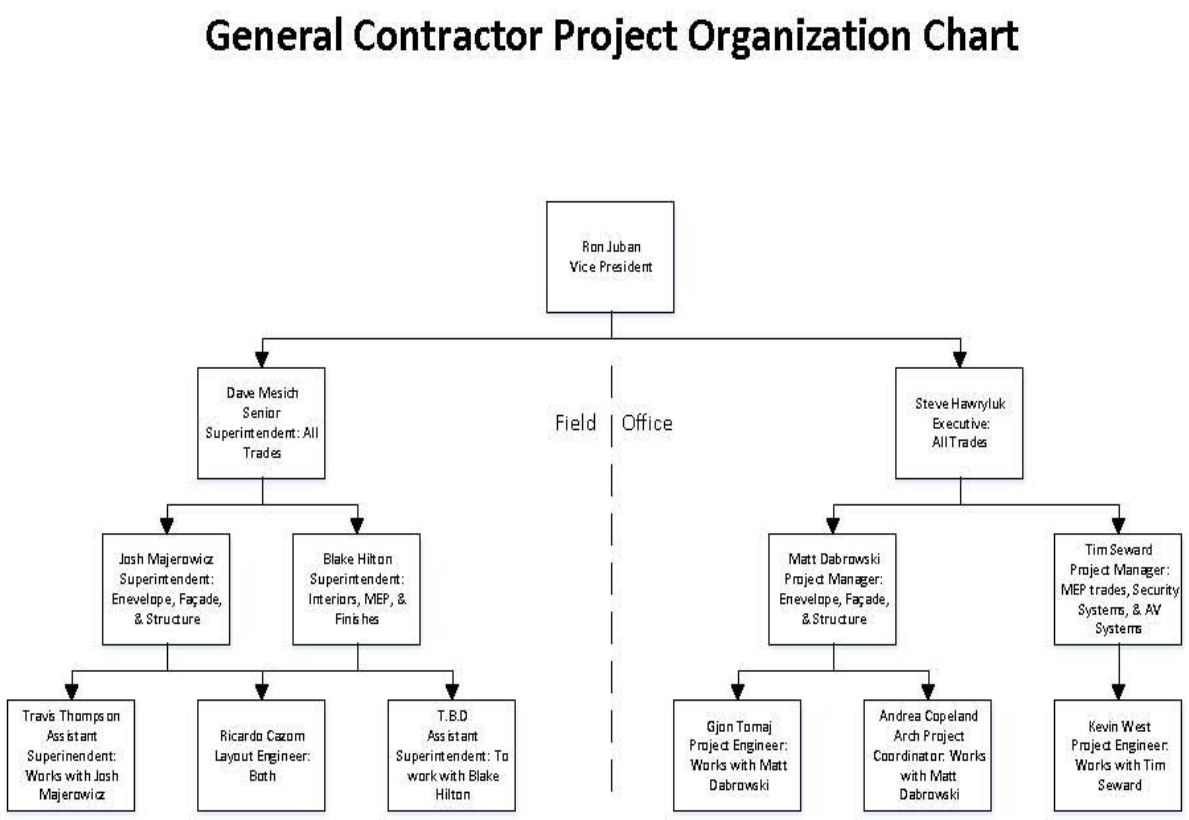


Figure 2; General Contractor Project Organization Chart

## Schedule

The sequence of work follows a bottom up approach through the entire project and the façade being installed in lifts starting with the east elevation and continuing clockwise around the building. Construction begins with the early mobilization of the two tower cranes and finishes with the unit turnovers. Since the building stands on an existing concrete structure no site work was necessary. The total duration of construction of this project is initially estimated to be 834 days, or approximately two years and three months. An estimate start date to the design of the project was placed on the beginning of October 2012. This number is rather speculative as the project was ultimately part of a great design which started earlier. A design start date has not yet been confirmed. A summary schedule can be found as an appendix. General Durations are as follows;

- Total project: 3 years 7 months
    - Design: 11 months
    - Pre-Construction: 3 months
    - Procurement: 10 months
    - Construction: 20 months

Major milestones are as follows;

- Start of Construction: January 6th, 2014
- Topping Out: June 18th, 2015
- 100% Dry-In: September 25th, 2015
- 100% Turnover: April 18th, 2016

## Cost

Using RS Means cost data for a 8-24 Story Apartments and cast-in-place Parking Garage a square foot estimate was developed for this project. This was done by separating the project into its components and combining them. This method produced a square foot estimate of $126.42/SF construction cost and a total building cost of approximately $102 million. Compared to the actual GMP of $93 million this estimate isn't exact but with the +/- 20% tolerance that a square foot estimate is appropriate for a difference of ~9% is a trustworthy estimate. The largest difference between trade costs is seen in the Mechanical and Plumbing subcategory. The economy seen in these trades may, in part, be due to an economy of scale realized by one contractor performing both trades under one package for the actual project. See appendix for calculation and cost data. Table 1 compares the actual costs to the estimated costs at the total cost and square foot cost levels for the project.

| | Total Actual | Total ($) Estimated | Square Foot ($/SF) Actual | Square Foot ($/SF) Estimated |
|---|---|---|---|---|
| Project Total | ~$130,000,000 | n/a | $161 | n/a |
| Construction | $92,400,000 | $102,100,000 | $114.44 | $126.42 |
| Structural | $16,300,000 | $17,300,000 | $20.19 | $21.43 |
| Mech/Plumbing | $14,300,000 | $21,600,000 | $17.71 | $26.75 |
| Electrical | $9,800,000 | $9,800,000 | $12.14 | $12.14 |

Table 1; Cost data for comparison of actual and estimated cost data.

For the project as a whole the developer is looking at approximately $130 million from various expenses such as (cost data is approximate); construction contingency ($2.5 mil), building permitting ($3.5 mil), ground leasing ($400,000/building), water meter ($500,000), telecom connections ($500,000), electrical duct banks to be shared by all buildings ($350,000/building), loan interest ($1 mil), developer fee ($6.5 mil), developer operations ($1.5 mil), consultants ($500,000-$2 mil), marketing ($500,000) and owners representative ($200,000/year).

## Site Plan and Existing Conditions

Very seldom do contractors have more knowledge about the existing conditions of a site. Since this building is being built on top a recently constructed “mega-garage”, as it could referenced as, the site is a concrete canvas on top of which building can begin immediately. Davis also built the mega-garage which gives them an advantage in construction since they are rather familiar with the site and its nuances. The site has no immediately neighboring buildings of significant scale and this is the first project of the site development so there is a reasonable amount of onsite storage, but the site is still relatively constricted.

The site plan, which can be seen in the appendix but is displayed here at a reduced scale, has two zones of concern; the “No Construction Zone” and the “Construction Zone”. The area shaded in red is the area of the site that is prohibited for use by the contractor due to it being a walking corridor for pedestrians traveling from the mega-garage to the train station located across the street. The footprint of the building and the footprint of the building next to it are usable space for construction and the future building site will be utilized as a material storage area. This site requires two cranes so that material can be unloaded and placed in the rear by building from the street where a single truck dock is located. A man & material hoist will also be used to aid in the distribution of materials throughout the building during all phases of construction and will remain after the cranes have been removed. Job trailers and management parking is located across the street while labor parking is located off-site. This layout of storage, trailers, cranes, etc will be consistent throughout the construction of the tower. The Site Plan can be seen in the appendix.

Information in this technical report is derived from correspondence with actual project team members and personal interpretation of the project documents, schedules, and estimates.

# Appendix