

ANALYSIS I | INDUSTRY AND THE ECONOMY

BACKGROUND

The construction industry has been affected by the current economic recession. Jobs are suspended, shut down, or not even starting and companies have to downsize. Companies are having trouble securing loans and allocating funds. Unfortunately, it is not likely that the recession will end anytime soon. In fact, “according to economists across the country, nonresidential spending is expected to drop by 3 to 9 percent in 2009, and labor costs will rise 3 to 4.5percent.” (Hale, 2009)

As of August 2008, DuPont Fabros became one of the companies that was having trouble securing loans and was forced to begin suspending its current job, Project Seven, until further notice. As mentioned in the Client Information section, Project Seven includes three projects – Mid-Atlantic Data Center 5 (MADC5) in Ashburn, VA, Northeast Data Center (NEDC) in Piscataway, NJ, and Northwest Data Center (NWDC) in Santa Clara, CA. NEDC and MADC5 followed suit and were suspended in October 2008 and November 2008, respectively.

Fortunately, unlike most companies affected by the economy, DuPont Fabros has several completely leased data centers in full operation that are producing steady revenue.

GOAL

The goal of this research is to develop a project execution plan that would be utilized in a down market environment, allowing the owner to evenly allocate funds throughout the job’s entirety. The research will focus on an evaluation of the industry issues discussed in the background information, the immediate need for all three data centers, project cost projections, and company revenue.

METHODOLOGY

1. Research the current status of the US economy and its effect on the construction industry by reading articles and literature focused on this topic.
2. Evaluate the planning of Project Seven, such as:
 - a. Projects in new markets
 - b. Constructing three projects almost simultaneously
3. Create a cost projection spreadsheet detailing the owner’s cash flow throughout the duration of Project Seven
4. Develop a project execution plan for future use in a down market economy by utilizing the spreadsheet.
5. Form conclusions and recommendations.

RESOURCES

- Current Events and Literature
- DuPont Fabros Technology, contact– Faran Kaplan
- Holder Construction onsite staff –Ashburn, VA (MADC5); Piscataway, NJ (NEDC); Santa Clara, CA (NWDC)

INDUSTRY ANALYSIS

ECONOMY'S EFFECT ON CONSTRUCTION

Similar to every other industry, the construction industry has been significantly impacted by the U.S. economy descending into a recession. Beginning in the fall 2007, the economy slowly declined until year's end when the economy temporarily halted. Since then, the economy has been on a continual decrease and finally declared a recession in the fall 2008.

Several sources have stated that two key causes of this recession include, but not limited to, the credit crunch and the Federal Reserve's response to a tightening of available capital. The credit crunch is the idea that the banks become more averse to offer loans for business investments. Moreover, firms are required to present additional information to lenders detailing an ability to maintain a decent credit line and repay the loans (Belman, 2008).

Unlike most industries, however, the construction industry was not immediately affected, but rather experienced a delayed impact. This was due to the fact that most projects currently under construction were based off of previous loans and financial status as opposed to the current situation. Any projects in the early stages of construction or pre-development planning experienced immediate impacts of the economy, resulting in suspensions or complete shut-down. Furthermore, projects within the private commercial construction sector suffered the most since such projects operate on rolling over short term loans for financing (Haughey, 2009).

According to Haughey, "The value of starts in October 2008 plunged 44% from September 2008 for the sum of hotel, office, retail and warehouse. Projects ready to start were held up to redo financing and/or wait for a clearer view of the scale of the recession." Unfortunately, this environment is projected to be an issue well into 2009.

Illustrated below in Table 11, is a projection of commercial construction growth and activity for 2009.

Table 11 - Commercial Construction Growth

Market Segment	2008	2009
<i>Commercial/Industrial</i>		
Hotels	5.1%	-3.1%
Office Buildings	1.7%	-3.7%
Industrial Facilities	-3.8%	0.4%
Retail	-5.7%	-3.6%
<i>Institutional</i>		
Healthcare Facilities	5.6%	3.6%
Education	5.5%	-0.1%
Public Safety	3.5%	0.4%
Amusement/Recreation	1.4%	-2.6%
Religious	-1.0%	4.0%

Source: (DiLouie, 2008)

EVALUATION OF THE PLANNING OF PROJECT SEVEN PROJECTS IN NEW MARKETS

When a company is looking to develop, a key concept it considers is the market which it desires to enter, for this is typically the reason why businesses fail. In most cases, especially with a slowing economy, a company would forgo entering a new market due to the unfamiliarity with that region. DuPont Fabros, however, opted against the standard and chose to initiate Project Seven, a job which would develop one data center in a familiar region and two data centers in completely unfamiliar territory. All three regions, Northern Virginia, Piscataway, NJ, and Santa Clara, CA in Silicon Valley, are premium markets for data center development primarily due to being center's for technology near reasonably priced power, major population hubs, and significant fiber optic networks. In fact, according to an article from MarketWatch:

"Silicon Valley, New York and Washington are still the country's top centers for high-tech employment. Metro New York was the U.S.'s top tech employer, with 316,500 of the roughly 5.8 million U.S. tech workers, based on 2006 figures, the report said. Washington, D.C., was second, with 295,800, and the San Jose/Silicon Valley area of Northern California, with 225,300."
(Pimentel, 2008)

The table on the following page, Table 12, includes information pertaining to the three markets that the Owner developed Project Seven.

Although it still may seem that expanding into a "new" region at such a time would likely cause trouble for a company, the table clearly illustrates that all three regions are more than perfect for developing data centers.

Table 12 - Market Information for VA, NJ, and CA

Region	Information
Northern Virginia	“Techoptia--as some local boosters call the new-economy belt around Washington. If software center Seattle is the new economy's brain and chipmaking Silicon Valley is its heart, then Washington is its central nervous system. Spread along, around and mostly under Techoptia's main drag, the Dulles Toll Road, are the vital electronic pathways--wires, cables and fiber-optic lines--that carry more than half of all traffic on the Internet. The region is home to more telecom and satellite companies than any other place on earth. It's not a coincidence that Virginia license plates recently got a new slogan: THE INTERNET CAPITAL OF THE WORLD.” (Donnelly & Zagorin, 2000)
	“The region contains the Internet Society, and used to contain the mainframe that houses the master list of all Internet domain names.” (Dulles Technology Corridor, 2008)
	“Washington, D.C., was the leader in computer systems design and similar services and in engineering services.” (Pimentel, 2008)
Piscataway, NJ	“Metro New York was prominent in the tech-service category, with many of its workers in telecommunications, Internet services, R&D and testing labs, and computer training services.” (Pimentel, 2008)
Santa Clara, CA (Silicon Valley)	“Silicon Valley is generally considered to have been the center of the dot-com bubble which started from the mid-1990s and collapsed after the NASDAQ stock market began to decline dramatically in April 2000. Even after the dot-com crash, Silicon Valley continues to maintain its status as one of the top research and development centers in the world. Thousands of high technology companies are headquartered in Silicon Valley.” (Silicon Valley, 2009)
	“San Jose/Silicon Valley also was the dominant area for technology manufacturing.” (Pimentel, 2008)

CONSTRUCTING THREE PROJECTS ALMOST SIMULTANEOUSLY

The idea of expanding and constructing three new data centers, especially given the locations, is a great concept for a growing company in a growing economy. These locations have proven to be more than suitable for success. The problem lies in the timing of the projects, granted at the start of construction the economy was more stable, but definitely slowing down.

According to the plan, Mid-Atlantic Data Center 5 was to begin February 2008 and finish April 2009. The construction of Northeast Data Center would follow relatively quickly by starting in May 2008 and finishing in May 2009. Two months later, June 2008, construction on Northwest Data Center was to initiate and be completed by October 2009. All in all, the Owner was anticipating spending approximately \$520 million within 20 months.

In hindsight, as discussed with an owner's representative, the construction schedules should have progressed in a much different manner. At the very most, the job should have been constructed in the same order as three individual projects occurring sequentially, as opposed to overlapping. In doing so, in the off chance that the market rapidly declines, it is much more financially feasible to construct and complete one data center rather than three at the same time.

PROJECT SEVEN SCHEDULE AND COST ANALYSIS

By evaluating Project Seven's construction expenditures and existing revenue, it was possible to create a cost projection which would detail the cash flow for the job's entirety. The cost projection includes the monthly construction expenditures for MAD5, NEDC, and NWC, as well as the revenue from DuPont Fabros' five existing data centers. Please reference Appendix D for a breakdown of the schedule and cost projections for this section and the following section titled "Project Execution Plan".

The following assumptions were made when developing the cost projection spreadsheets:

- Someone foresighted that the economy was going to rapidly decline like it has done. ("worst case scenario" idea)
- Starting point is \$0 at the beginning of construction. This is done as a means of simply evaluating the cash flow during the construction process. As a result, a majority of the values are negative.
- The lease rate is based off of numbers provided by the owner, but is not exact due to confidentiality reasons.
- Assumed the suspension point based on Project Seven's cash flow value the month prior to the suspension of MAD5. At that point, the owner believed it could no longer continue with any projects.
- Income includes revenue from leased space in MAD2, MAD3, MAD4, VA3, VA4, and CH1.
- Per research and conversations with the owner, MAD2, MAD3, MAD4, VA3, VA4 are 100% leased; CH1 is 20% leased for entire duration of Project Seven. The percent of leased space for MAD5, NEDC, and NWC begins one month prior to construction completion of each respective project. Once completed, leased spaces increase at a rate of two computer rooms per month.
- Cash flow schedule is not per the actual construction schedule, so it begins earlier and may end later. This is a result of costs pertaining to mostly planning, purchasing, preconstruction, logistics, and some equipment progress payments.
- Cash flow for NEDC is the same as MAD5 since values received for NEDC were based off of the job being suspended. (Values provided for MAD5 and NWC were pre-suspension)

ORIGINAL SCHEDULE AND CASH FLOW

Schedule

Project Seven's original schedule had an intended duration of 20 months, starting in February 2008 and finishing in September 2009. MAD5 was the first project to begin, lasting 15 months. NEDC followed

MADC5 three months later and lasted 13 months. NWDC was the final project, which began two months after NEDC and continued for 15 months. Given DuPont Fabros' past success with data center development, this plan seemed highly viable with one stipulation, optimal economy and market conditions. See Table 13 for a summary of the original Project Seven schedule.

Table 13 - Original Project Schedule

Project	Start	Finish	Orig. Duration (months)	Overlap (months)
MADC5	Feb 2008	Apr 2009	15	-
NEDC	May 2008	May 2009	13	11
NWDC	July 2008	Sept 2009	15	10
Total	Feb 2008	Sept 2009	20	-

Cash Flow

As illustrated in Figure 5 below, the first four months of Project Seven experienced a positive cash flow as the construction costs are significantly less than the incoming revenue. Immediately there is a significant increase in constructions costs causing a drastic decrease in the cash flow until NEDC is complete. At this point, despite both MADC5 and NEDC having leased a couple computer rooms, to provide additional revenue for the remainder of the job, Project Seven is at an ultimate low net income of -\$298.9 million. In fact, aside from the first four months, the job remains to be in the negative for the entire duration.

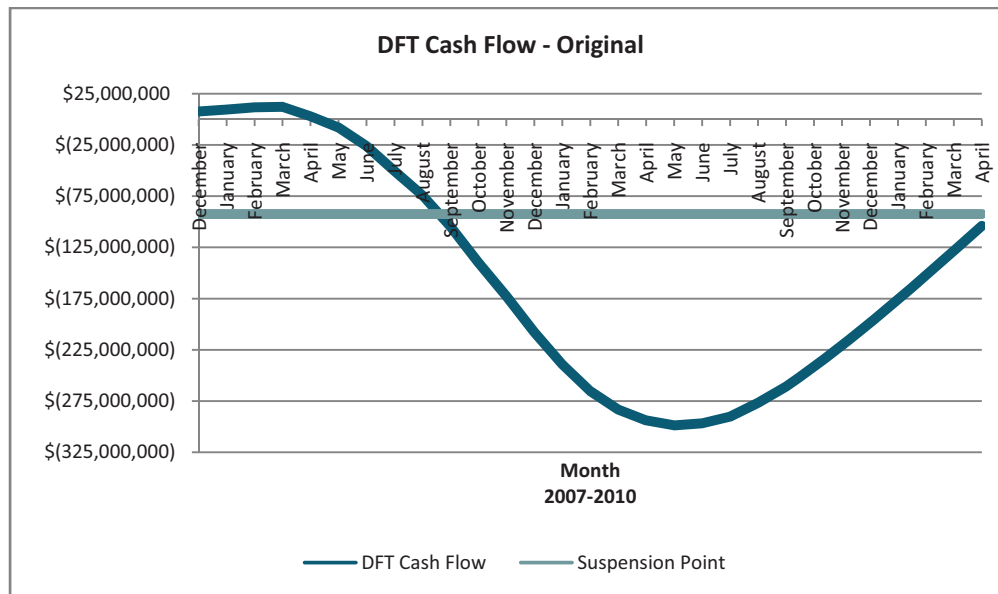


Figure 5 - Original Project Cash Flow

ACTUAL SCHEDULE AND CASH FLOW

Schedule

Previously mentioned above, DuPont Fabros decided to begin suspending Project Seven in August 2008 with NWDC. Of the three projects, NWDC was the newest project under construction and was still dealing with sitework and excavation, thus the most obvious choice for the first suspension. Project Seven continued in hopes of being able to complete both NEDC and MAD5 with the existing funding. Since the banks began to tighten their loaning capabilities, two months later NEDC was unable to continue with construction. With MAD5 the furthest in construction and having clients on board, the Owner chose not to suspend the project. It seemed feasible to finish this project since construction and financial progress was frozen on the other two projects. Unfortunately, with the economy continuing downward in the recession and banks making it extremely difficult to borrow loans, DuPont Fabros was forced to suspend the remaining project.

Fortunately, all three data center projects were only suspended and will be completed as the Owner’s revenue from existing properties continues to increase, providing a great chance to secure loans for construction. In fact, MAD5 remobilized in March 2009 and it is hopeful that NEDC will remobilize in August 2009 and NWDC in May 2010. Table 14 below provides a summary of the actual schedule.

Table 14 - Actual Project Schedule

Project	Start	Suspended	Finish	Orig. Duration (months)	Suspension (months)	Total Duration (months)
MAD5	Feb 2008	Aug 2008	July 09	15	3	18
NEDC	May 2008	Oct 2008	Mar 10	13	10	23
NWDC	July 2008	Nov 2008	Apr 10	15	20	35
TOTAL	Feb 2008	-	Apr 10	-	-	40

Cash Flow

The actual schedule follows a similar flow, shown below in Figure 6, as the original schedule from the start of Project Seven until the first suspension, NWDC, at a net income of -\$50.4 million. This suspension allowed the remaining two projects to continue for a couple months until it became harder to secure a loan. At the time of NEDC’s suspension, the net income was -\$87.9 million. Finally, at MAD5’s suspension, the net income was at the lowest point of -\$92.5 million, which was a value at which the owner believed it could no longer continue with any project. As such, in all evaluations of the cost projections, -\$92.5 million is the suspension value and should not be crossed in order to successfully finish Project Seven.

Fortunately, the purpose behind suspending the projects was strictly a result of the struggle to secure a loan for construction and not bankruptcy. DuPont Fabros utilized the suspension to allow the revenue from their assets to steadily increase to a point where the company could illustrate, to the bank, a

positive cash flow, which would result in a loan. It was vital that such point is considered “safe” enough such that the projects could have an uninterrupted completion.

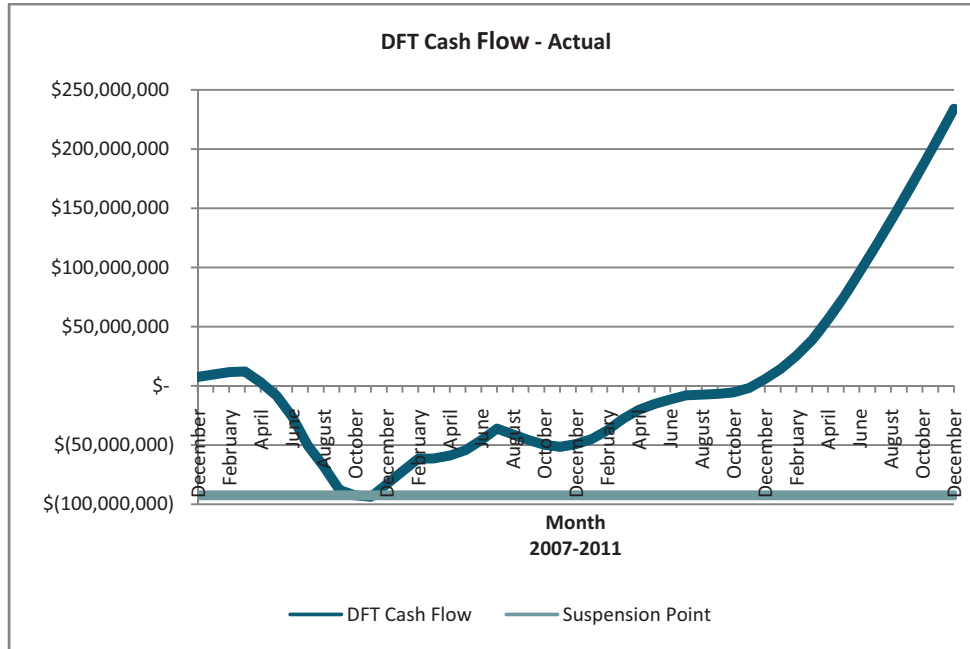


Figure 6 - Actual Project Cash Flow

PROJECT EXECUTION PLAN

The purpose of this project execution plan is to provide a better route for the owner to successfully complete Project Seven, given the time and nature of the economy, as opposed to pushing the typical fast paced construction in order to obtain tenants and future revenue. Through this plan, the owner would base the completion of the project more heavily on current revenue than on the payback of future revenue from Project Seven.

Successful completion of all three projects within Project Seven could occur by following any of the following three options:

1. Prolong each project schedule.
2. Maintain durations and sequence projects with a finish-to-start relationship.
3. Maintain durations with less of an overlap than the original plan.

For further breakdown of the cost projection spreadsheets and schedules, please reference Appendix D.

1. PROLONG PROJECTS

Schedule

The first option involves prolonging each individual project schedule. To accomplish this schedule, a decrease in the amount of work performed each month would occur which would push the remaining work to following month, thus extend the project schedule. Unfortunately, due to confidentiality issues,

a complete cost breakdown of the work performed each month was unavailable; therefore an exact final date of this plan cannot be determined. It can be assumed, however, that this option would significantly lengthen the overall project duration, which is not an ideal duration for data center construction.

Cash Flow

Several assumed conclusions can be determined about the cash flow of this option by evaluating the schedule. In general, increasing the duration of each project would result in a cost increase in equipment rental, labor, general conditions, and overhead and profit. Combining these additional costs for all three projects produces a significant cost increase for Project Seven. Another concept is the idea that prolonging each schedule would delay the possibility of receiving income from each project due to leased spaces. Thus, it limits the amount of overlap between each project without having additional revenue to sustain further construction. Lastly, as a result of earning less income than the potential, the overall project could be delayed even more in order to remain above the suspension point.

2. MAINTAIN DURATIONS WITH SEQUENTIAL PROJECTS

Schedule

The second option establishes the extreme case by maintaining the original schedule durations, but scheduling the projects sequentially with a finish-to-start relationship. This option is the standard method of constructing buildings for any owner, as DuPont Fabros has previously developed its data centers this way. A key concept for this approach is maintaining the original project schedules. Since it is vital for data centers to be immediately functional, both a 13 and 15-month schedule is optimal for construction. In total, Project Seven’s duration with this option is 43 months, which is only three months longer than the actual schedule. Please see Table 15 below.

Table 15 - Option 1 Project Schedule

Project	Start	Finish	Orig. Duration (months)
MADC5	Feb 2008	Apr 2009	15
NEDC	May 2009	May 2010	13
NWDC	June 2009	Aug 2011	15
Total	Feb 2008	Aug 2011	43

Cash Flow

As illustrated in Figure 7 on the following page, it is easy to conclude that utilizing a finish-to-start relationship would allow all three projects to be completed without any suspensions. Without any overlap, Project Seven remains considerably above the suspension point. Similar to the first option, a major disadvantage to this approach is that delaying the start of each project delays the point at which the owner could earn income from leased spaces of each respective project.

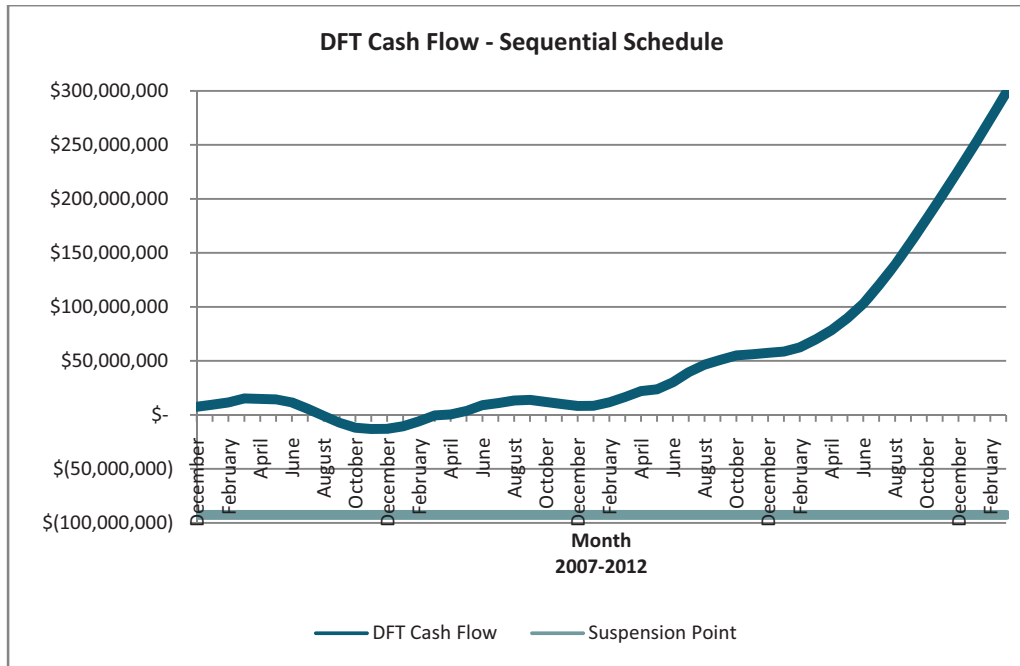


Figure 7 - Option 2 Project Cash Flow

3. MAINTAIN DURATIONS WITH LESS OVERLAP

Schedule

The third option consists of maintaining the original schedule durations and utilizing an overlap as in the original schedule, but not as extreme. In comparison, the overlaps within the original schedule were 11 months for NEDC and 10 months for NWDC, whereas, shown in Table 16 below, the overlaps for this schedule are 5 months and 2 months, respectively. The overall duration of this project would be 34 months, which is six months less than the actual schedule. Not only does this option provide the fastest individual project schedules, but also the fastest overall project schedule. Most importantly, discussed in the following section, despite a shorter schedule and utilizing overlaps, it is feasible to successfully complete all three projects.

Table 16 - Option 3 Project Schedule

Project	Start	Finish	Orig. Duration (months)	Overlap (months)
MADC5	Feb 2008	Apr 2009	15	-
NEDC	Nov 2008	Nov 2009	13	5
NWDC	Sept 2009	Nov 2010	15	2
Total	Feb 2008	Nov 2010	34	-

Cash Flow

Similar to the first two options, by maintaining the schedules and having a slight overlap, all three projects would be constructed without any added cost and suspensions, as shown below in Figure 8. Project Seven nears the suspension point during completion of NEDC and start-up of NWDC; however it never crosses due to the additional revenue obtained from leased spaces in MADCS and NEDC. As a result of showing steady and even increased revenue throughout the duration of Project Seven, the owner would have an easier time securing a loan for the duration of the project. Additionally, the end of the schedule depicts a drastic increase in cash flow, which would illustrate to the bank that the owner has the potential to pay off the loan sooner.

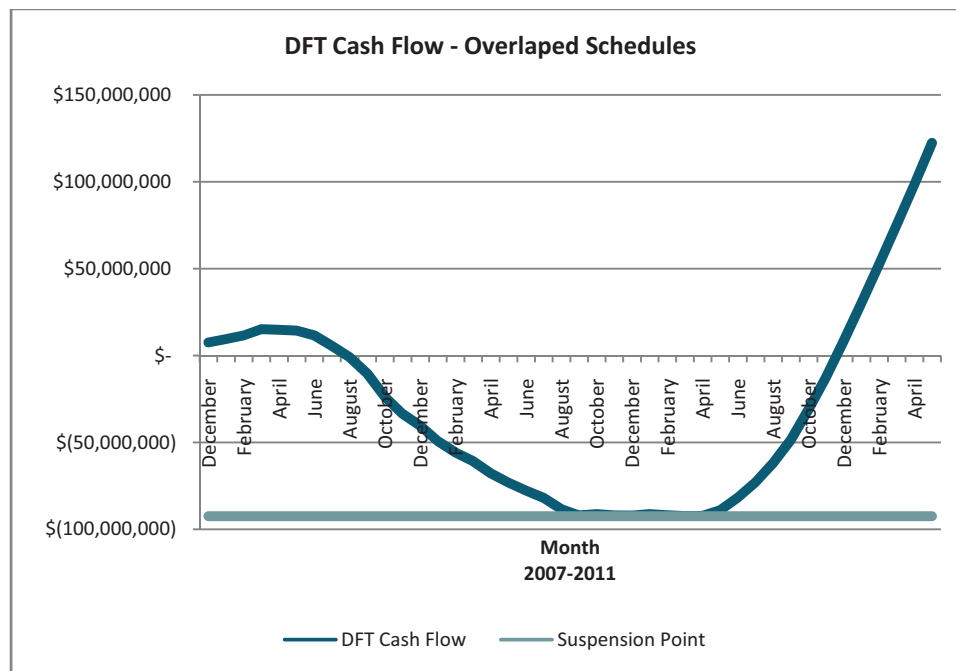


Figure 8 - Option 3 Project Cash Flow

Upon developing this option, a trial was performed to determine an additional benefit of utilizing this method, which is to determine if another project could commence based off of the given cost projection in a poor economy. DuPont Fabros has a desire, assuming the data center market continues to prosper, to eventually proceed with their development pipeline that includes four data centers within the same three regions as Project Seven (Development Pipeline, 2009). Further analysis concluded that with this option it is highly feasible to continue the pipeline within a down economy while remaining above the suspension point.

Table 17 - Additional Project Schedule

Project	Start	Finish	Orig. Duration (months)	Overlap (months)
MADC5	Feb 2008	Apr 2009	15	-
NEDC	Nov 2008	Nov 2009	13	5
NWDC	Sept 2009	Nov 2010	15	2
Add'l Project	Aug 2010	Oct 2011	15	3
Total	Feb 2008	Oct 2011	45	-

As demonstrated in above, the additional project would have the same duration as MAD5 and begin three months prior to the completion of NWDC. The total construction duration for all four projects would be 45 months, which is actually only five months longer than the actual schedule. Furthermore, exemplified in Figure 9 below, constructing a fourth project would never cross the suspension point while still maintaining an increased cash flow and eventually providing additional revenue.

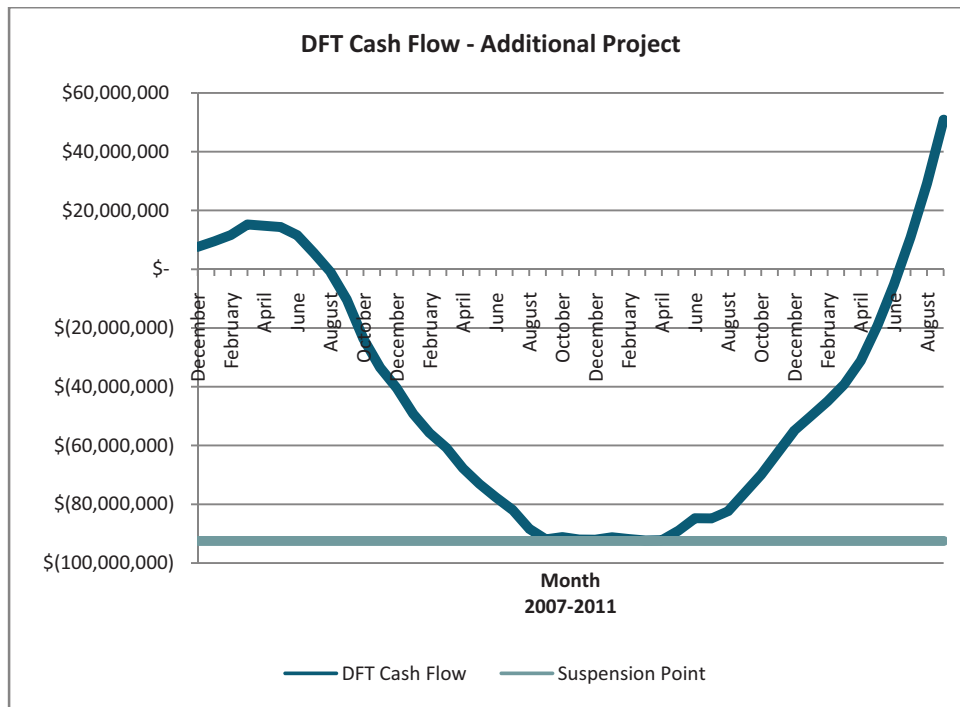


Figure 9 - Additional Project Cash Flow

CONCLUSIONS AND RECOMMENDATIONS

Given the economic times and the original plan for Project Seven, the possibility of successfully constructing all three projects is nonexistent. By adjusting and creating a plan to correspond to poor market conditions, Project Seven could be completed without any suspensions.

Table 18 - Summary of all Project Schedules

Option	Start	Finish	Orig. Duration (months)	Income at Nov 2010	Add'l Revenue
Actual Project Duration	Feb 2008	May 2011	40	\$452,599,560	\$0
1. Prolong Projects	Feb 2008	?	?	-	-
2. Maintain Duration with Sequential Projects	Feb 2008	Aug 2011	43	\$457,185,960	\$4,586,400
3. Maintain Durations with Less Overlap	Feb 2008	Nov 2010	34	\$485,850,960	\$33,251,400

After a thorough analysis of the owner's construction expenditures, construction schedule, and existing revenue, as summarized in Table 18 above and Figure 10 below, it is recommended that the third option, maintaining schedule durations with less of an overlap than the original plan, of the project execution plan be utilized to develop such a project given a poor economical conditions. Overall, this option provides a shorter construction schedule, **6 months**, and provides the owner with the most additional revenue, **\$33,251,400**, while remaining above the suspension point. Most importantly, it provides an opportunity to continue with future development.

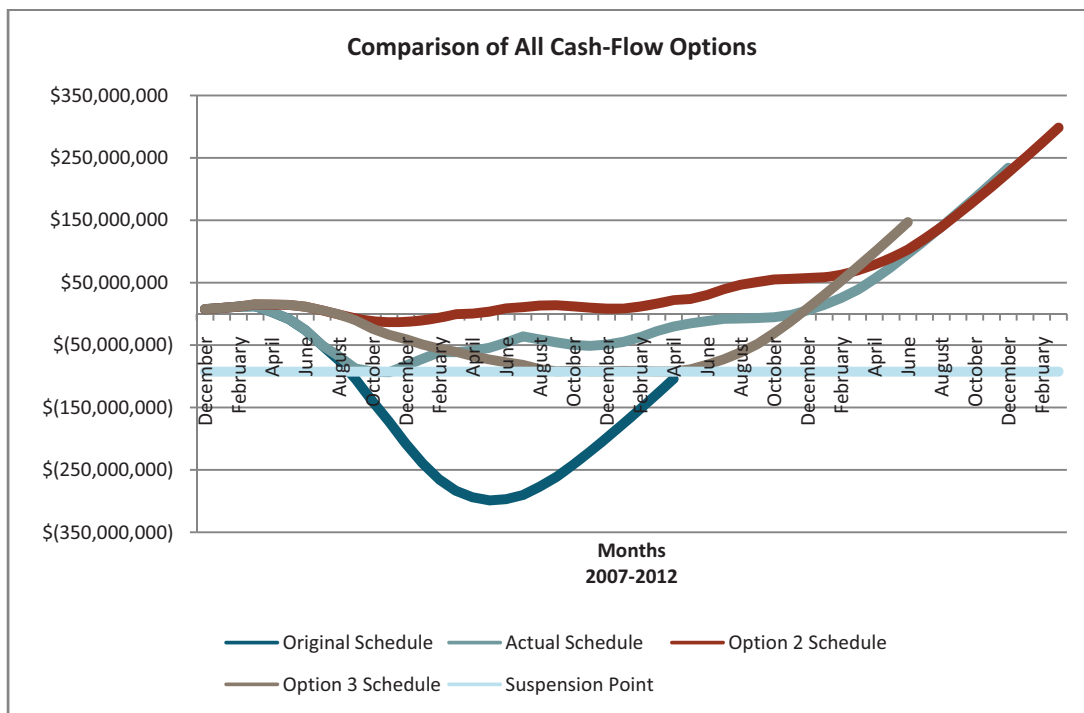


Figure 10 - Cash Flow of all Possible Project Scenarios