

## **9/30/11 CDIAC Webinar Transcript**

### **Bond Math, Part One**

The following transcripts attempt to capture the presentation of the Bond Math I webinar; however some areas of text may not be complete due to transcription issues; CDIAC has made an effort to correct areas of the transcript.

**Cover page and Page 1.** Welcome everyone to our first CDIAC webinar. This is Mark Campbell, Executive Director, and I want to begin with a little introduction about our workshops that are well-established built on a history of over 20 years. With the transformations within the municipal finance industry and the continued pace of change that we see as well as the challenging environment, we recognize the opportunity to provide more responsive focused training via Internet technology. As a result CDIAC has developed a Webinar series including this two-part Webinar on Bond Math. The second part will be on October 7 and requires a second registration. I will come back to that at the end of the program, however I want to cover a couple of housekeeping issues. If you are experiencing technical issues as the screen indicates you have the opportunity to call the direct line, 916-653-3269, and operators are standing by to answer your calls. We expect others will be joining the call shortly. As well, on the right hand top toolbar, you will see a feedback icon as you will have the opportunity to send us a little note regarding your ability to hear the program, the pace of the program or any other concerns that you are having and we will try to address those directly to the general audience. If you have questions specific to the presentation and the presenters there is another item on the toolbar for Q&A. On that, you will have a drop down screen that will give you an opportunity to type in your question. The question will not be viewed by other participants. We will pass that along to the speakers and they will be able to respond appropriately.

**Pages 2 and 3.** Now I am going to introduce the speakers. We are very fortunate to have two excellent presenters on this topic, Michelle Issa, Senior Managing Director with PRAG located in the Los Angeles Office Michelle Issa joined PRAG in 2009 after 22 years in finance and investments at Bear Stearns, Bank of America and Merrill Lynch in California and New York. She has a strong general government experience with state and local level in California and Oregon and Florida encompassing both the fixed and variable rate finance and short and long-term financing. In addition, she has senior managed a variety, senior managed to radio spots, general obligation, pension, revenue bonds and certificates of participation. I think in the adjoining office interestingly, Louis Choi, Senior Managing Director with PRAG, also located in Los Angeles. Mr. Choi joined PRAG in 2005 after 10 years experience in the municipal finance industry having been an investment banker in the public finance department of Bear Stearns and Bank of America Securities. He currently provides financial advice on credit and financing structures to a wide range of issuers including the state of Oregon, California and New Mexico cities of Los Angeles San Jose, Santa Monica and Beverly Hills and some of the larger special districts including the Metropolitan water District of Southern California.

**Poll Questions (not included in PowerPoint Presentation).** Before we begin, and in order to get a sense of who is participating in the audience we've got a couple of polling questions. If you could take a minute to respond to these we would appreciate it and we will post the results immediately.

The first question is: are you a representative of a public or private agency? And, I think we've got 100% response. The results are we are at about 82% public and 17% private.

Okay so let's move to the next polling question which should come up on the screen shortly, if you are a representative of a public agency, are you from a federal, state, county, city, special district, school or county office of education? I will give everyone a few minutes to respond. The results show we are

fairly evenly mixed between the State, County, City.

Okay, we've got two more questions. I want to get a sense of attendance as I know there are groups participating under one registration, and as CDIAC would like to know how many people we are actually educating if you would take a minute to indicate whether you have additional people participating at your location. Thank You, we've got some big groups out there. I hope you are sharing coffee.

Okay., the last polling question is for the presenters to get a sense of what your current understanding of debt service or debt structuring? Thank you, it appears about 24% of participants have a good understanding with the majority of some understanding and a small number with no understanding.

Okay, with that one I will turn it over to Michelle and Louis. Thank you.

**Page 4.** Good morning everyone this is Michelle Issa from PRAG and on behalf of myself and Louis Choi we are happy to be here today to kick off the webinar series. I'm going to click onto the first page of our presentation and we will get started.

**Page 5.** Our objective in this webinar is to increase issuers' quantitative literacy of municipal bonds. And we believe it's important to have a basic understanding of bond math and by understanding the mathematical aspects of issuing bonds Government issuers can learn how to read the debt service schedules that Financial Advisors and Bankers center on to their clients on a regular basis throughout a financing. By having a better understanding, of these concepts you will be able to identify the structuring options and be able to compare alternative structures, which ultimately means that as an issuer you will be able to develop a more tailored plan of finance as there isn't just one way to structure a financing, there are many ways. The more knowledgeable an issuer is about how the pieces of a financing come together, the more input you can have into developing the plan of finance that works best for your agency.

**Page 6.** Just stepping back for a moment, we saw from one of the questions that Mark asked is that a number of participants have a significant amount of experience, but we wanted to step back just for a moment and ask the basic questions what are bonds and why are they issued? Bonds are in the form of a loan where the borrower or this case the issuer promises to repay the base value to the lenders at a specified future date. And in this instance, the lenders are bondholders so it's not like going to a bank getting a loan from one financial institution it is really selling bonds to a wide variety of investor types. Usually Agencies provide interest throughout the life of the bond through periodic payments. Typically on a fixed-rate deal these are semi-annual interest payments, then annual principal payments on bonds that have maturities from 1 to 20 to 30 years. Why are bonds issued? Really because they enable the issuer to leverage their limited annual revenues to get a large upfront sum of money. Initial bonds proceeds are typically used to finance a capital project and we know this is a significant difference from the federal government in the United States. The federal government doesn't want all the European sovereigns that are getting so much attention to issue bonds to finance operating, not capital projects but operating expenses. In addition to providing the upfront sum of money, one of the advantages by doing upfront sums of money as it allows more projects to get done simultaneously, not just one project based on the amount of money somebody has today.

**Page 7.** Hello, I'm Louis Choi, the other presenter for the webinar. Before going to detail on cash flows and schedules and a number specific to bonds which would take up most of the webinar, we want to spend a moment to touch upon, in a very cursory manner, a fundamental bond math concept of time

value of money. The basics of bond math is the time value of money as it is calculated, and the present value and future value formulas so what the time value of money really does is describes in measurable terms the relationship between dollar amounts yesterday, today and tomorrow. It values these amounts at different times as either investments, which can grow over time or conversely as a loan which interest has to be repaid. The primary application for the time value of money is to assess competing scenarios where the receipts and payments occur in different amounts at different times and one is then able to simply look at the true numbers and know which is better. This page has the formula for present value. On here, what we see is on the left-hand side PV is the present value is equal to the future value at the top. Divided by  $1 + \frac{I}{N}$  the frequency of discounting that by the power of time(t). Plugging numbers into the formula describes what the other different time should be considered equivalent for a given discount rate and often written as a rate of return on investments or the interest rate on some debt. For bonds themselves, the time value of money really becomes an application in terms of how one goes about pricing a bond. And this is covered extensively in the second webinar offered by CDI AC as there are many nuances to doing that and it would take the better part of an hour to explain. Suffice to say, the present value the price investors would be willing to pay for the bonds today, and the future values are the sum of the principal and interest payments being made by the issuer overtime and the discount is the interest rate being paid on the bonds themselves.

**Page 8.** However, before we leave the time value of money we want to take a look at just one example of using an example here that illustrates the effect of compounding frequency on valuing money. In this particular example we are having an investor deposit \$100 into a bank and the bank has promised to pay this person 5% interest compounded annually. At the end of one year she expects to receive \$105. Of course we do not need much math to figure that out, but we wanted to simply look at this and see how it fits into the formula from the prior slide. Anyways to reinforce the concept of time value of money. Then with a little algebra here are two of the present value and future value in terms of different sides of the = and applying the numbers we see the hundred where the present value would be, 0.05 was the discount rate would be, a term of one recognizing that this is the amount of compounding frequency we are looking at in the compounding frequency and ended term, as well as one again for the time value term because that is how long the investment is being held for. And working through all those numbers we indeed come up with \$105 that we had just mentally been able to calculate in our collective heads. Example 2 is very much the same as example 1. Except that it is not being compounded annually but semi-annually. The semi-annual concept is consistent with how municipal bonds themselves are being done and when we plug in the same terms into our formula with 100 being the deposit 0.05 as the discount rate, but not number two in terms of the compounding frequency and two as well for the time period over which it's being compounded because it is one year, but it is being split into two halves. What we see is the value actually goes up to be \$105.06. And what we have illustrated here is the magic of compounding and why everybody is supposed to be depositing money into their retirement accounts. Now, we just very quickly, and I am speaking a little quickly here, to illustrate some of the examples with time value of money I won't spend any time on it but it is something that is important to bear in mind as you review the cash flows get presented on later pages.

**Page 9.** To take a look at a financing structure we thought we would have a little bit of fun with it because we know the bond math is not the most exciting of all topics. So we created a fictional project that we will be walking through a financing structure for and our project is based on the state wanting to capitalize on the current popularity of magic and wizardry and financing has been approved for a California Branch of the Academy of Magic and Wizardry and will offer undergraduate and graduate studies as well as a semester abroad in England. It will be located on one of the state's university campuses and rather than paying for the project with cash, the Academy will be financed over 25 years. It's already got construction bids and it's ready to finance the facility by selling bonds but the

consultants from England aren't familiar with municipal bonds and would like to understand the numbers so we are going to go through the numbers.

**Page 10.** A mathematical model is used to develop the debt service structure or really to look at alternative debt service structures, but in order to do that we really need to get some facts from the issuer and we also need to make some assumptions. So we are assuming that the debt delivery date will be October 31, 2011, an auspicious day. The project cost will be 40 million however, importantly, the Academy is only able to afford in debt service of \$4 million or less. It's going to take 18 months to build the Academy and we are assuming and this is based on information that we've gotten from the issuer, they will be drawing down 18 years and monthly draws in order to do the construction, and as anybody who has done them on the deal knows a lot of times you assume something like 18 even draws but it won't necessarily work out that way. So as a result the issuer is going to capitalize interest and capitalizing interest is typically used in two situations. One situation is the California Lease Revenue Bond structure that many of you are familiar with however, you are not able to make debt service payments until you <have> use and occupancy of the project and in other instances it's really a revenue bond issue where there will not be enough revenue coming in from the project until after there is a beneficial use and occupancy so you want to wait and not start having interest required to be paid by the issuer until the whole construction is complete. We said the project is 18 months plus we've also incorporated another six months of cushion for a total capitalized interest of 24 months and that would be financed with the bond proceeds. We also need a reserve fund and based on tax law that is the lesser of 10% of proceeds, 125% of average annual debt service or maximum annual debt service. The amount that underwriters are going to charge the issuer for selling the bonds we are assuming is four dollars per bond or four dollars per thousand dollars of bonds and the cost of issuance fees which includes bond counsel fees, trustee fees of \$150,000 and we are assuming since this will be a long-lived asset that will have a final maturity of 25 years. So putting all those things into the pot and saying our spell, working with bonds and financing scholars we can multiply our limited dollars, so we can now take a look at a bond deal that is based on these assumptions.

**Page 11.** We wanted to also highlight a couple of key debt service concepts before we actually look at the debt run model, and they are the principal amount which is also known as the face value of the bonds and is the amount that will be paid back by the maturity date, as well as typically municipal bonds are sold in \$5000 principal denominations. The maturity date on which principal payments are due, as in our case is November 1 of years one through, well... we will talk about it later but the final maturity is in 30 years and then we start paying principal after the capitalized interest is over. Our coupon is the actual annual interest rate which is expressed as a percentage and there will be a different coupon or interest rate for each maturity of a fixed rate bond. But, we know that there could also be bonds that have variable rates, that do not have a coupon. The interest is the cost of borrowing for the issuer and it is usually paid periodically and as Louis mentioned that is usually semi-annually for fixed rate bonds and it can be more frequently for variable-rate bonds. Interest is calculated very simply by multiplying the principle by the coupon for each maturity date. Now, the yield is different in the coupon and that is the percentage rate to the investor that will actually earn and it is different than the coupon rate because of the price of the bond and the pricing of bonds will be discussed in much more detail in bond math two. The debt service is the sum of all principal interest to due on a bond series. The first thing that we do to run the model is to get what current market interest rates are and investor preferences for how the bond will be structured. We get the information by looking at other deals that have been priced in the market recently or by reaching out and talking to some underwriting desks to get them to write a skill for a particular financing based on its particular credit characteristics.

**Page 12.** So what you see on page 12 is, there are four columns, one is the maturity date, one is the

coupon rate that we talked about, one is the yield and one is the bond type. So on the maturity date column you see that we have serial bonds, you see this in the first column and fourth column, serial bonds with principal maturing on November 1, 2014 through 2024. And then you can see the coupon in the next column versus the yield in the column to the right. So looking at 2014, as an example it is a 2% coupon, but the investor is only getting a yield of 0.95% and you do not see a column here that shows the price and is really a mathematical computation that takes into consideration the price. If you go down to the year 2020, for maturity to the 2036, 2031 and 2036 maturities you can see they are term, then we will talk about those on the next page but basically the issuer will still be making debt service payments figures 25 and 26 is the final maturity of that term bond, and for the 2036 maturity the issuer will still be making payments in 2032, 33, 34, 35, final maturity in 2036 and as I said we will talk about them were on the next page. Two pages from now.

**Page 13.** On page 13 we are looking at a typical bond structure and amortization structure. Based on the assumptions we referred to before which is that the project cost is 40,000,000+ related reserves, capitalized interest and cost of insurance for total bond financing of 47.8 million. Most bond issues are structured to produce level debt service but as we mentioned we've got capitalized interest for a couple of years and in this case we are beginning to make principal payments which are the blue bars until year four. So, for the first couple of years we are just making interest payments. They are mostly covered with simple interest bond proceeds and at the beginning of principal and interest payments and it is just level straight across the 3.5 million.

**Page 14.** Page 14, we are turning back to the actual bonds on a maturity by maturity basis. And what we talked about on page 12 was that some of our bonds are serial bonds and you can see that those are circled in the red box. And the red upper box and a few of the 20 year maturities were principally of 1 million. At 15,000, we have the 2% coupon and a yield of .95. More interestingly are that term bonds, and we show underneath the first red box, for three term bonds show how much principal each term bond is in total and we show the final maturity is, November 26, 2026, 2031, and 2036, but we've also blown up the description you would see in an official statement for the 2036 term bonds. And what that really means is that there's principal that is due in each of the years, each of the sinking fund years, 2032, 2033, 2034, 2035, 2036 so the issuer is going to make the level debt service payment and all the investors that on the 2036 term bond will be subject to a lottery. So the trustee does a lottery and figures out which of the investors are going to get paid out or a portion paid out in 2032 or 2033. So a municipal bond doesn't know until after the trustee does this lottery what year it is going to get paid out.

**Page 15.** On page 15, we take a look at coupon and interest rate a little bit more in detail, and as we noted earlier the coupon is the annual rate of interest payable on a bond based on its principal requirement and the interest is the periodic payments made by the issuer based on principal and coupon. And the calculation of interest is literally just a principal times the coupon. So it does not take into consideration the yield at all. The yield measures how much the investor is earning based on their price and the coupon. But literally, the interest that the issuer pays will be based on the coupon times the principal in each year.

**Page 16.** Page 16, looks at the overall debt service structure. So here we see that after the initial years of capitalized interest where there is no principal being amortized in 2012, 2013 and 2014 then after that if you look at the debt service column, the issuer will be paying 3,485,000 in every single solitary year. So, level debt service whether it is serial bonds or term bonds, is the way we ask the model to for the principal amortization to achieve that level debt service.

**Page 17.** On page 17, we wanted to point out the other types of debt service structures that may be possible, as we said, a real objective of our discussion today is to really show the issuer that it can have a say subject to legal restrictions on how extensive this gets amortized. So the one on the upper left-hand side is level debt service. And then if you move over to the one on the right hand side, it is leveled principal and there you can see in blue, that instead of having ascending principal like we have in the level debt service it is just level principal. This used to be smart in the past as it is a more conservative type of structure because it has a shorter average life, the issuer will pay off its bonds faster, so that is leveled principal. On the lower left-hand side, the ascending debt service structure has principal being paid faster than in the level debt service structure. So you can see how the total of principal and interest has a steep line going up and alternatively, the structure on the lower right-hand side has descending debt service. Now, when actual bond issuance period issuers often receive innumerable pages of cash flow schedules. Their intent is to reflect the assumptions and restraints that should be used as well as the results and are always delivered from various parties with the subtle implication that the issuers receive the cash flows and should flag any errors or issues that they have or anything else that might not work for them. Certainly but not absolutely true that necessarily happens, and certainly other professionals will check through these numbers. But it is very important that the issuer is comfortable with the cash flows. After all the issuer is probably the only person that has to live with the consequences of what bond financing may be structured like for the next 20 or 30 years. These cash flows are typically generated by different software packages the most common being DBC finance, but also Immunex and sometimes in Excel and in the days of yore even micromini.

**Page 18.** This webinar in large part is designed to get you more comfortable with these numbers and to understand what is important as you review these numbers. And for this particular example we have chosen to try to go over a number of those bond financing reports that come in particular the sorts of uses, the bond summary statistics, bond pricing, debt service, negative service, project fund, reserve funds, capitalist interests, debt service fund, and the cost of issuance. The orders of the pages are according to taste but the information discussed here is terminally found somewhere in the packages that you receive from people.

**Page 19.** Beginning with the sources and uses page, this page is very much like a double data entry accounting where there is a balance between the sources and the uses and you notice here that you see the total \$48.2 million. And from the sources cited the bond proceeds or not, the sources of funds consist primarily of bond proceeds in a typical financing, and of that amount, most of it comes from the par amount, or the total principal amount or face value of those three equivalent terms as well as a small net premium or discount if the coupons and yields do not match and in many cases and in the municipal finance world coupons and yields do not match. For our particular issue neither the aggregate coupons are higher than the yields an aggregate, thus we see a slight net premium of \$402,000 or so and added to that the \$47.8 million that that is being issued with general total proceeds amount of \$48.2 million. And that once again, that fits perfectly to \$40.2 million in the uses parts which are separated to a number of categories namely the project fund, capitalist interests fun, debt service reserve fund, cost of issuance, underwriters discount as well as surrounding contingency due to the \$5000 by denomination rounding that Michelle talked about earlier which is labeled additional proceeds and we will go over the uses parts in greater detail in the next slide.

**Page 20.** We begin with the project fund which is really why the issuances even taking place. In this particular instance, we had our project costs of \$40 million and for our particular example we have gross funded the project. With level withdrawals for 18 months, what gross funding means is that the \$40 million we are funding is the sum of all the expenditures over the 18 months. Now one could also choose to net fund the project and what net funding means is that the deposit will only meet the

requirements, the required growth overtime after you take into account investment earnings we've chosen not to do that here just to simplify things a little bit. The next component is capitalized interest which is really borrowing to pay interest and this often makes sense, especially when revenues are only generated after the project is completed as it the case for this particular situation we probably can't collect tuition until we have a school for people to attend. The other reason that capitalized interest is used a lot at least in California finances, is because of the Lee's Law where in order to make the lease payments an- issuer has to have beneficial use of the facility before we can really make the debt service payments. The next aspect is the debt service reserve fund, which as Michelle alluded too in the earlier side is based on tax law and is typically calculated as the lesser of the three prongs, 10% of the proceeds 125% of annual debt service or maximum debt service and in our particular example, those three numbers work out to be \$4.8 million or so for 10% of proceeds, 4.14 125% of average annual debt service, 3 1/2 or so for maximum annual debt service and so the lesser of those. In addition, and of course there's also the cost of issuance that Michelle talked about earlier when people just say it attempts to encompass both the cost of issuance and the underwriters discount but they are both certainly distinct things and attorneys and underwriters get paid from that particular fund. Turning to the next slide, we see here the statistics of the software package has produced and reproduced a number of statistics.

**Page 21.** Seemingly too many times to try to summarize the issue, you see here at the top of the page number of different dates related to a particular issue. As well as some single rates. These single rates are helpful in that they attempt to boil down all of the numbers that you see everywhere into a single one to measure how much the financing costs for a particular financing might be. And it's very similar to what you might see in one's mortgage for instance, where you know the mortgage itself can have the rates that you repay in terms of interest, but they also have fees associated in points and other things that boil down to a single number known as the APR. Bond financing works very much the same way except the things that we have are a whole slew of principal amortization's over different periods, including coupon rates for maturity as well as each yields maturity. Yields for each maturity taking a quick look at the single rate for a moment, focusing on the right-hand side here in the arbitrage yield, this is the number that tax attorneys care a lot about. This capitalization is driven by arbitrage regulations, tax laws and what the IRS deems to be important and with the particular rate, the primary effectiveness rate is the rate at which you cannot invest higher with the bond proceeds of the limit at which you can retain your earnings for proceeds of a bond issue except for certain exceptions. But this finds the arbitrage yield is probably the best measure of how much a persons own findings will cost. What the All-In TIC is that rate at which you discount the debt service cash flow to arrive at the target value and the target value here is the net of all of the underwriters account and cost of issuance expenses. So this number, the 4.865% represents the true cost to the issuer for this particular financing. today.

Louis, I want to interrupt. I wanted to mention two things, going back to the slide where we talked about how there are different ways that an issuer might be able to decide how it wants to structure its debt, this, the call and TIC is a good way for an issuer to look at various structures and decide whether and is worth it. Whether they are doing let's say, level principle save them so much money over time that it is a better way to go in their mind, than doing an ascending debt service on the other point I wanted to make with respect to the arbitrage yield is depending on market conditions and when are in an extreme. Now a negative arbitrage where is an issuer is deciding whether to do like a commercial paper program and tomorrow at very low rates, and today take out the interim financing with a long-term bond deal after construction, one of the things to think about is that if you are going to have a project funding in today's market you issued your bond proceeds today, and then you invest in new only be able to make like 10 basis points but under other market conditions you might be able to take

like the full arbitrage yield, what Louis said and if you are in the full arbitrage yield on your project funds, then it is like a wash and you could just issue your bonds today and it would be that much more cost effective. So arbitrage yield as Louis said is something that the tax lawyers make astute and from a practical perspective it really matters to an issuer because it tells you how much you could earn on your debt service reserve fund in your escrow. If it is a refunding deal, or on the project funding it might make you think about how you want to structure the deal depending on what's going on in the market.

**Page 22.** Thank you, Michelle. Turning to the second page of bond statistics like I said it generates a whole bunch of statistics and we are not going to bother going through every single one of them here, but I think the important thing I want to point out is that the presence of the statistics makes it easy for one to look over the numbers that are being prepared so that you don't necessarily need to break out a calculator for every single thing. Instead it might just require you to flip a couple pages to find the corresponding number you want to see and doublecheck. For instance, in this particular instance here we might want to check on the maximum annual debt service and the average annual debt service, though the sort of numbers when we are doing that provide a picture that we want it to be.

**Page 23.** That covers the bond pricing table which shows the maturity dates, the principal amounts, the coupons and the yields for a particular financing and the things that appear in the Official Statement as Michelle has gone over that earlier in the presentation. What these ultimately drive is the price of a transaction which is expressed as a percentage basis, and when you multiply this price against the principal amount you get the <pretty young> premium, and this troubled discount aggregated together to generate the net original premium discount that you saw on the sources and uses page add another @402,191. Once again I made an exercise of how to determine the price which is part of the second seminar for CDI AC but the thing that we think is important when you look at this particular schedule, in the cash flow that you have received and to make sure that the numbers here, the coupons, the yields, or call dates and everything reflect what has been negotiated with the underwriters, and make sure to the extent that anything you negotiate to reduce your yields and so forth, that those numbers in the final cash flow truly reflect what has been a good and not something else negotiated.

**Page 24.** Another schedule usually appears on the bottom page may be the second page depending on the pages, which is the bond calculation of the purchase price. The purchase price being that amount which will be ultimately be delivered to the issuer. At the issuance of bonds this worked out to be the sum of the principal amount we are issuing, the original issue premium, the total net of that, \$403,000 we pointed out in the previous page. Less the underwriters discount, that is the amount they are choosing to retain for themselves for their services to arrive at the issue price. And this is the number that ultimately appears on your bond to purchase contract of negotiated sale or in the settlement instructions and receipt and so forth before a competitive sale.

**Page 25.** The other, besides the sources and uses page should probably be another very important page in the cash flow schedules, the debt service requirements or debt service table pages as this describes what is really most important to an issuer from a maintenance perspective. It is a summary of what one has to pay overtime, it shows the principal payments on their specific dates and here as is commonly done the principal payments are happening on the annual basis once a year after a certain number of years and interest payments, which have been semiannually, twice a year, and together, they constitute the debt service, and often these schedules often have also the summations of the two numbers on a fiscal year basis, just adding together the two or three or however many periods might exist in terms of the debt service payments and other schedules on a fiscal year basis. On a cash basis and I know some of you guys when you are doing accounting might use a different method, but it is important to bear in mind as you take the number not just to take it at face value that it is what it is. That, to really know and

understand how it fits with your accounting system. The other thing to really check on this particular schedule, besides obviously the magnitude of payments and unfortunately our particular project is affordable by the Academy's requirement to pay only less than \$4 million per year, the other thing to check is the timing of the payments. To make sure that it is in line with your particular operations. For instance, the schedule has the principal amount being paid on November 1<sup>st</sup>, of each year after 2014. And you know, if a particular issuer gets most of their monies from let's say, December or January and so forth, they probably would be okay with this schedule. They would look at it and say well I get most of my money December, and January, and it will actually sit around for a whole year before it is applied to repay the principal, all the while it is sitting around I am earning, at least in today's market basically nothing and I'm accruing interest on my debt. In that case the issuer may request for somebody to rearrange the principal amounts to be a date that is not desirable on their part, so once again this is part of the old checking the numbers aspect of receiving these reports to make sure that what is being done in these reports reflect what particular issuer's needs are, and not something else. Nobody knows their own needs like themselves.

**Page 26.** Besides the debt service schedule it might not be a full representation of what you owe, and is where the sort of tentative service schedule comes in. In our particular example we have capitalized interest for two years, meaning that we borrowed extra money so that we can pay off the interest in the interim before our tuition comes in. And so your net debt service is really the amount of debt service you would have otherwise paid, with the capitalized interest amounts less the capitalized interest amounts being available to you. And that is really what the net debt services in the fourth column that is shown here. In addition, the other thing that is common in terms of offsetting one's debt service requirements Interest earnings from the reserve fund, or earnings from anything else for that matter and releases from the reserve funds and the schedule is helpful to understand what ultimately your liability might be after taking into account all of those receipts.

**Page 27.** Turning to the next slide, and as we previously discussed there is a possibility that either gross fund or fund a project fund and for gross funding, really the schedule is not that helpful because at the end of the day, the amount that you are borrowing for is just a sum of all of the amounts that we have. But, with the expanded amounts, but from a net under perspective the schedule tends to be helpful to really gain perspective of whether or not the particular payouts reflect what you really truly expect to happen for your project. It may be that your project is not going to start for a number of months in which case you can do further draws a little bit in terms of doing minute funding schedule and then you're able to earn more interest, and you might not have to borrow as much making the overall transaction more efficient other things for you to look at are if you expect the reimbursement for yourself at the beginning of a project because for instance a broad consortium to write by the time you're issuing a bond or maybe there was some accumulated design costs that you have a reimbursement resolution passed going and you can get yourself paid back for. You should really be reflective here because you do not want to accidentally, earn interest on money that is really out the door as soon as it gets into the account. In that instance you can just make sure that the schedule draws we are gesturing here in the second to last column on the right reflect what your expectation is.

**Page 28.** Next comes the capitalized interest account improving here as shown is to make sure the payments are going out as far as you expect them to go out, and that it aligns with what your particular purposes are here, in this example we have chosen to do 24 months, which is a term of construction. For six months, in case of delays and the six-month cushion is sort of a rule of thumb that many people just use, because as we know especially with capital projects at the earlier stages there can be delays with design, with permitting, specifically just with in construction and especially for like a lease revenue bonds transaction where you are not even able to make debt service payments until a particular

project is complete. You need to be very certain that by the time you're debt service, your actual debt service payments that you need to appropriate for her coming due, that you have the legal authority to do so. And this schedule helps prove that and helps you to visualize the payments that might be coming in. The other thing I would just bring to your attention to is to make sure the interest rate assumption is reasonable or it is something that you can lock in at the very beginning because at the end of the day especially if you have not something capitalized, the interest like we are doing here is the interest rate assumption in terms of your earnings which is not good that you will not be able to capitalize as long as you want because the amount of funds available to you is less than what you wanted it to be.

Louis. Let's go back to that page for a second, I just want to point out that we are actually gross funding the capitalized interest here because their folks take a look at the deposit on 10/31/2011 it is 4.373 million. And we generally purposely gross fund capitalized interest as it just flowed the earnings, which it says on the bullets, for the earnings to pay debt service after the capitalized interest. because you want to make absolutely sure we have enough money to pay interest during the period when the initial draw is due, would be able to pay the interest of that's why you see the deposit is \$4,373 and when he got the schedule draws of about \$4,373 and the underwriter (inaudible). To pay after the debt service capitalize.

**Page 29.** Okay, thank you. The next one is the debt service reserve fund the schedule. Often times, the reserve fund doesn't seem very helpful, it just sort of sits there and doesn't do anything. But the one thing about the schedule that one wants to look at and really make sure of is that the interest earnings are going to the right places in terms of how the numbers play out. In this particular instance the debt service reserve fund earnings are being applied to the capitalized interest accounts to try to reproduce a little bit while in the construction period. Then applied to the debt service after, one thing I do want to point out is at the end of the bond issuance the outstanding bond insurance and that is indicated by the red oval at the lower right part of the page, is that the debt service reserve fund to the extent that you have not drawn upon it will be available to you to pay the debt service at the very end of the bond issue, and that is something to think about and keep track of as one gets near the end of the life of a bond issue itself.

**Page 30.** The next slide to just covers some of the typical expenses that you see, and usually these appear I think in two separate reports. One report is the cost of issuance, the issuers cost of insurance for things like the rating agencies, issue administration fees that you might want to retain, and I think a lot of people keep track of hours, make a good-faith effort to determine the amount of effort they have undertaken really that is countable and attributable to the bond issuance itself and do not necessarily to extend, standard operations in determining the amount. We see that periodically and I wouldn't say it's frequent, but we do see it sometimes. Then there's also things like the bond counsel and the disclosure counsel fees as well as any expenses they might have, trustee fees for administering the trustee of the bonds or entering into adventure things like that as well as any counsel they might retain for that sort of purpose. There is a financial advisor you want to keep on board because they help protect you, printing and mailing costs and service are contingent seat fees that you might have unique to a transaction, were that just sort of creep up. There's a variety of ranges and depends on the maturity, the specific credit, what manage to negotiate at the end of the day and that sort of gets multiplied out per maturity. There is a management fee that could be a management fee, rather this is infrequently seen but for certain transactions where one feels like the senior manager or investment banker has provided special service or there is just special things that needs to be done that can sometimes appear. There's underwriters counsel because everybody loves hiring attorneys. They have one too and they are actually required to have one and the underwriters counsel offers certain opinions and other things necessary for the

underwriter to be taking. There's also DTC, CUSIP, Telcom, all of those fees are some kind of industry formula. They're typically all pretty much around the same amount per at some of those dependent on the amount of funds that are being issued, some of those are fixed dollar amounts. There's also if you choose to use electronic order entry it is typically an additional fee assessed by the service that does that. There is a CD IAC fee which is assessed for long-term issuances and can be up to \$3000 after the bond issuance exceeds \$20 million. There is a date on which is the amount of interest that the assessment bank processes for the one day of settlement where they deposit the money before you give them the bonds and that typically is a number that is small and every investment bank has a different formula for it. I should say small. It is proportional to the size of the issuance of self, so I guess if you're issuances very big, the number could be significant and the last of those is miscellaneous which of course is travel and other components. You want to make sure that this is a reasonable fee. For instance if there was no travel involved, like people did not have to go visit rating agencies would you from an investment bank, didn't go with you to go to a pricing in San Francisco, New York or whatever, then maybe the travel should really be limited, but if they have provided those additional services and maybe that it is required and adjusted to reflect that. Then there is also historically other components of underwriters discount that is started to be phased out, things like PSA fees as well as MSRP fees which has never been allowed. You want to make sure that those components do not appear in the underwriters discount because they are not allowed to be collected by MSRB rules themselves.

**Page 31.** So, what we hoped we went over in today's webinar, and I'm going to open it up for questions in just a minutes, really to highlight that there is a framework for modeling a financing, but an issuer can have a lot of input into the assumptions and relieve the effects that go into modeling your financing, and the more you get comfortable with the way the components of the debt service structure, to the better fit your financings can be which includes things like when do you want to start making the debt service payments?, can you start making the debt service payments before the project is completed?, what is the investment policy?, because that can have an impact on how you finance the debt reserves under interest fund and a whole host of other small and big inputs that an issuer can think about to really get the financing to work the way it you want it to work. With that we have the last grand opening of the Academy and it appears have to redo the financing after October 31, 2013 and we welcome the class of 2017 to the program, and with that we have some questions already from people so if you want to queue up additional questions Louis and I will start taking a look at what is in the queue and we will try to respond to questions that have been submitted.

**Questions and Answers (no slides).** >> I want to encourage others who have questions out there to go ahead and use the scrollbar Q&A as this is an opportunity to submit questions and we will answer them in order. Michelle and Louis I will let you guys handle the ones that you have received.

Louis, do you want to take the first one?

**Question.** I think the first question is why does the debt service scheduled total show the total principal amount repaid as \$13,465,047.8 million. I think for some of these debt service schedules we just had to skip over a number of years to try to convince numbers and that is sort of an error. On our part.

Wait, let's go to that page. Which page is that on?

I just saw it. Here. And that is an error on our part because he skipped over some periods. And we just sort of totaled the amount, otherwise I should have reflected all those amounts I think the... just sort of got us off on that.

I am not really seeing the questions.

It's under manage. We also received a question about is there a demonstration of an excel model for these calculations. In general, most people do not use Excel 40 -- for a number of articulations (inaudible) deleted in the timeframe over which people have to do that turn when one pricing has gone very short, we are certainly capable of putting together one of those for whatever financial advisors but overall that is something that goes well beyond the scope of this particular course and would take a very long time to sort of explain and make sure somebody is properly doing it. But suffice to say that some of this stuff is really, the arithmetic and straightforward in terms of this column pluses: because this number, or this times this equals the southern number and so forth and somebody with a full understanding of cash flows is capable, would be capable of reconstructing many of the schedules.

Right but the truth is just in practice generally most numbers are run on the campus software, and Louis is right, you know we can do that and people can do them in Excel, but the software programs have really become the standard and when you are accepted and feels just very different, and when you get numbers from underwriters or financial advisors you are going to generally see things that come out of packaged programs.

**Question.** The next question is can you describe the difference between the term and serial bonds, and returned to page 15 to try to show the difference between term and serial bonds are. Serial bonds are how one really thinks of a bonded typically. There is a single maturity date where principle is repaid on the date and until the date there is interest payments being paid to somebody based on the amount of the holding credit is called serial really because generally there are a whole bunch of them put together that constitute a series if you will. A term bond is a bond that is slightly different and it has what is known as a mandatory sinking fund redemptions. They exist in an effort to make the blocks of the bonds that are being offered larger so that what has really happened is that the principal amounts over multiple years are aggregated to generate a single term bond that has the exact same cute date, maturity date, the same yield, the idea being that, and these typically happen at the very long end of the yield curve, because the yield curve there is very flat and to the extent that a bond could be serialized and the yields on them improve slightly, that the difference is nominal, and really the aggregation of making them bigger is intended to make the treating of the blocks easier to do overtime by investors and the theory goes that by turning up these bonds that they are really catering only to institutional trading appetites that you would end up with a better yield overall and be able to get a lower yield in the first place that you otherwise would if you ended up serializing.

**Question.** The next question relates strictly to that which is what is a sinking fund redemption. A sinking fund redemption is shown in the text on the lower left hand side of page 14. That obligation on the part of the issuer to repay a portion of a bond. And the text describes at the bonds maturing in November 1, 2036 are subject to redemption prior to the state of maturity from sinking fund payments made by the issuer at the redemption fund price. And so forth. And what that means is that on a certain date even though in this particular example the issuer sold one bond that had a nominal maturity date of November 1, 2036 in the total aggregate amount of \$15,235,000 on November 1, 2032, they are obligated to redeem at face value \$2,720,000 of that particular bond. And that is what you see in the first one and one year later November 1, 2033 they are obligated to repay \$2,875,000 the next year 3,040,000 and so forth. And what that really does is at the end of the day it creates an obligation for an issuer that is very similar to if he had it issued five separate serial bonds in his examples. But instead he has just created a single term bond and once again the term bond has really created for the benefit of investors and their ability to trade that and really try to get a price that way for you overall.

**Question.** And I will do the next ones that are really asking about why do we use 10% of the proceeds versus its cutoff, versus 10% of the par amount, and of that is tax law. The whole sizing of the debt service reserve fund, which is the lesser of 10% of proceeds were 125% of average annual debt service or the maximum annual debt service is tax law, and typically if a deal is short, then the lesser is the 10% of proceeds, and if it is loan it is usually MADS and if it is regular then it is usually 105% of average annual debt purpose.

In terms of the difference between the par amount and proceeds in terms of reserve fund is usually several things that are competing against that. On the one hand, the tax laws are requirements that it is this three-pronged test a 10% of proceeds and the others are actually little additional rules about if you can round up your amounts if you are close enough and things of that sort, but really the other constraint on what a reserve fund is, is actually specific to the bond issue. If you define a specific bond issue to use 10% of the par amount it will use 10% of the par amount as long as it does not violate the IRS rules on the three-pronged test and that is why there are differences between proceeds in a typical market like we have right now, where the vast majority of bonds are premium bonds, the amount of proceeds you receive actually tends to greatly exceed as much as 15, 20% of par amount was sold and an issuer will typically get a better tool by having a smaller debt service reserve fund requirement and therefore picking 10% of par amount is probably advantageous at least in the current market.

**Question.** What can be done if the cost of the project exceeds the cost of the projected original cost, there it kind of goes back to what is good for the issuer to really take the time to think about how much to finance, and if you end up coming up short you really have to find another way, another place to get additional money. So potentially you can issue another small bond deal, or you can try to put equity into the transaction. Louis I don't know if you have other thoughts on that?

People do sometimes it depends on the amount you are short by and why you are short. Sometimes people do second issuance is of bonds to fund balance. Sometimes people redesign, but the end of the day it is really project specific in terms of what can be done when people actually do sometimes is an issuer ends up having enough money to build the project but maybe some of the, furnishings or the equipment need to be purchased and there is not enough money, then maybe a separate bond deal that is not even attached to the original bond deal is done, or sometimes they can be done as additional bonds under an existing set of legal documents.

**Question.** Okay. Okay. There are a number of questions about the premium itself and how you got that number. A lot of that has to do with sort of the second seminar if you will, for bond math which talks about bond pricing and things of that sort. The premium itself is sort of calculated and I think I just briefly touched upon it when I was going through the bond pricing page as the product of times the price which is expressed on a percentage basis. The next Bond Math part two seminar, so we will be the sort save that for next time.

That's a technical answer but I think it is important for folks to know that it is not you who decides yields it is really what investors are demanding so typically if there is premium all it means is that the principal amount of your deal is smaller by that amount, so that you get the same amount of proceeds that you need to construct your project and your debt service which is better in the sense that this is what issuer is demanding in terms of the coupon structure and if you did not give them what they demanded that they would charge you a higher yield. So usually it is good to get market input to develop your coupon structure and hopefully to result in the lowest cost which means lower debt service, but it is still important for an issuer and their financial advisor to go back and forth with the underwriter and if you are doing a negotiated deal the question doesn't have to be this coupon, does it

have to be this yield as that is part of a process that goes on when you're doing a negotiated sale. However, ultimately you are not getting any more or less proceeds that you need to do your transaction it just might be different in terms of how much is the par amount or the face value of the bond and how much you are getting out of the premium which are still bond proceeds.

In terms of the premium itself the premium is reflected in the official statement and typically there is estimated sources and uses schedules. We did not have an example of it in this particular presentation, but typically that is used as part of the proceeds of the bonds along with the principal amount you may have, the proceeds you receive from issuance of the principal amount. It isn't really segregated from everything else that is all sort of kept together and comes together to the extent that it would have generated premium or a substantial amount of premium grilling up our amount of the bonds should be reduced and in terms of a premium can be used for you. In addition, for whatever reason you can't reduce the par amount of the bonds that is really dependent on the legal authorization under which a particular bond issued is being used and in a lot of instances there's very limited cases where that can be done, and some of the issuers have gone as far as to try to constrain how much premium they receive from a particular issue.

**Page 32.** Louis and Michelle if there is a quick question that you are able to handle it will let you go ahead and do it. I know we have several in the queue. We've decided to do is answer those questions and post the answers on the website CD IAC website, so we look at those that are remaining if there is a concluding question or comment the speakers would like to make I will go and give you a couple of minutes to do that we are running up against our clock here.

I think Mark we made sense if there any questions we have not been able to address we can post them in the Q&A following the presentation but now, I think that this really concludes our presentation. We appreciate the opportunity to put this together and presented through CD IAC in and hope that we've been able to demystify parts of bond math and it empowers people to be a more active participant in structuring their bond deals. Louis?

Yeah, I agree with and I mean I think a lot of people are curious about the bond pricing process itself and I would certainly encourage you to sign up for the next bond math to seminar that is being offered I think a week from now.

Yet, that segues perfectly into the concluding comments. Michelle, Louis, thank you very much for participating in our inaugural webinar. I know we all have premiere night jitters but I think this came off beautifully, so thank you again. For those still listening if you do have questions and questions that follow this program I encourage you to submit to the CD IAC education website we will have the speakers respond to those I'm sorry, our e-mail, CD IAC education@treasurer.ca.gov. Our weapon is webinar series is available on the website as well so I would ask you to take a look at as well as the classroom-based cleaning and training schedule print shortly following this we are going to send out a brief survey asking for your comments and evaluation of the program to help us to structure the follow-on program. Again, bond to math will be offered October 7. You will need to register for that separately for this one. So, to what that website and submit your registration. Again, if you had technical problems during this program you were not able to resolve those, please give us a call or e-mail is strictly and we will try to work with you individually so that the future webinars you are able to receive without complication. I'm going to take a minute to thank Linda Louie, Margrit Lockett, Angel Hernandez for the hard work in putting the program together. We look forward to future webinars.

Thank you for participating.