

Part I of AM 1000 Talk Show Dec. 15, 1988

Greg: The CRAM subject. Dr. Miller, you invented a substance noted as the CRAM. Actually that's the whole system itself, CRAM. Would you explain what that means and how you developed it?

Dr. M. Yes.

Greg: And, what the benefits are, briefly for us?

Dr. M. CRAM is an acronym for our Pavement, Contained Rock Asphalt Mat. It is a pavement system we developed here, took place over about 10 years. I did the first in-house research back in 1979. We contracted with the City of Rancho Palos Verdes in 1983 and we built our first pavement system. The structural section we have is deceptively simple, it consists of a base asphalt layer placed directly on our subgrade. On top of that, we have an open Graded Rock layer about three inches thick. On top of that, we will have 3 to 5 inches of Dense Graded Aggregate and then we have our surface course, which can be anywhere from an inch and a-half to three inches in thickness, depending on traffic use.

Greg: OK, now how does that compare to a conventional asphalt surface that is normally used in city streets and freeways?

Dr. M. Conventional asphalt pavements are constructed first with a thick layer of aggregate material placed directly...

Greg: Like gravel?

Dr. M. Gravel, placed directly on our soil. On top of that, we have an asphalt concrete layer. We can contrast the thicknesses of these materials with the CRAM pavement on the Palos Verdes project. The CRAM total section thickness was 10 inches, the conventional pavement had 18 inches of this gravel. Atop that, it had 4 1/2 inches of asphalt concrete. So we had 22 1/2 inches of material on one section and 10 inches on the CRAM section.

Greg: Now, what are the benefits of the CRAM system as opposed to the conventional and why is it better?

Dr. M. Well, obviously, we use much less material.

Greg: Its cheaper to lay down?

Dr. M. Its much cheaper. Yes. We are using our materials in a far more efficient manner. So, not only can we reduce our cost of construction but we can improve the quality of our structural section. The pavement we built at Palos Verdes, we believe is going to last 50 years and beyond, contrasted with 15 years for our conventional pavements.

Greg: So its 15 for regular asphalt?

Dr. M. Its some place between 10, 15 and 20 years.

- Greg: OK, now, the reason I am asking you all these questions about cost, and how long its going to last, we are going to get into later. You did present this to the Carlsbad City Council as an option for them to use on repavement of Palomar Airport Road? And, at a substantial savings, plus a projected wear of the road to last an extra 20, 30 years longer than what the system they chose to go with would last them and they did turn you down?
- Dr. M. Well, we presented that through Sully-Miller who is a paving contractor and Chilcote Corporation who is the General contractor. They made the presentation to the City and, of course, they offered them a savings of two hundred thousand dollars which they would share equally.
- Greg: OK, well, we will get back to the City of Carlsbad. Well, how have you, what, where have you tested this so far? What cities have taken it?
- Dr. M. Well, we have the Palos Verdes project which has been down now for 5 1/2 years.
- Greg: It has been down over 5 years? What size of a road is that?
- Dr. M. That would be just about the size of Palomar, its a slightly lighter section. It was probably, it was designed to carry, here is a number you can remember, in the neighborhood of 375,000 maximum loadings. The Palomar Road is designed to carry 2.4 million. You might contrast this with I-15 which is designed to carry 16 million.
- Greg: What, what do those numbers actually mean?
- Dr. M. Its the traffic that that road is suppose to carry during its projected life.
- Greg: Now, OK. And, there is a section on I-15?
- Dr. M. Yes.
- Greg: How big is that section?
- Dr. M. We have a 15 inch CRAM section contrasted to 35 inches. Then the thickness of...
- Greg: That is the thickness of it?
- Dr. M. Yes.
- Greg: OK. How long is that section?
- Dr. M. These are test strips, so they were about a 1000 feet.
- Greg: OK. And, when was that put in?
- Dr. M. That was put in about 2 years ago.
- Greg: And, do you have any kind of feed back on either Palos Verdes or from the Caltrans on how their test strips are doing?

Dr. M. Yes.

Greg: What are they saying?

Dr. M. Well, we've of...

Greg: You have computer projections?

Dr. M. We have computer projections. The wear measurements on Palos Verdes indicates a $1/3$ to $1/2$ the deformations, the permanent deformations in the CRAM that we're getting in the conventional. You can project that out, its not a linear projection. You project that out in a non-linear manner, it tells you your going to get about 2 million loadings before you have to do any maintenance work on that particular roadway. So, that's very good evidence.

Greg: So, not only is there a drastic savings in cost when the road is first set down, but its going to last a lot longer, twice as long, at least.

Dr. M. It will last more than twice as long.

Greg: Yes, in that time, the other road would have to be replaced at still more of a cost than the CRAM system.

Dr. M. Yes, replaced or some kind of maintenance, some kind of major overhaul to that roadway.

Greg: Now, you used computers to develop this. Now, how did that come about? That seems kind...I wouldn't think that an asphalt roadway would be designed by a computer?

Dr. M. Well there is a tremendous amount of technology that has been developed since the 50s and 60s in line with the space technology that tells us how to measure load responses of materials, how environmental factors affect them. We can crank that information into computers, apply our loads to our assumed or projected sections, run them through our computers and pick out just how the performance is going to be. We can do that with our conventional roadways and we can do that with our CRAM roadways and essentially most any type of roadways we want to build.

Ken: Dr. Miller, what do you think was the resistance from the City of Carlsbad City Council? What was their problem? What was their hold back?

Dr. M. The technology is quite complex, I...

Greg: You mean, you mean its hard to understand why it works?

Dr. M. Its difficult to understand why it works. You have to dig in very hard to really grasp the mechanisms controlling how this system performs.

Greg: Now, the council members all fell back onto the recommendations of the City Engineer. OK, now who we're going to be talking with shortly, OK.

Ken: We will talk to in a couple of minutes.

Greg: In a couple of minutes.

Ken: We will go to the break and we will get him on the phone.

Greg: Did you ever here that 5 1/2 years wasn't long enough of a time? Did that come up at all?

Dr. M. I am sure that would come up.

Greg: I mean in Carlsbad, did they say that to you? Or did they give any indication that was part of the problem? That we got to wait for another 10 years?

Dr. M. Well, they're, they're not specific. There taking the viewpoint that its experimental, mainly because the Federal Highway Administration and Caltrans have not adopted it for their use.

Ken: Now, Rancho Palos Verdes is one of the most exclusive, lucrative areas in Southern California. I don't know, but I would imagine that if you have some well healed city fathers, you know, their not going to hire people that would allow the fly-by-night technology to be used to build a road.

Ken: Is that part of the City of Los Angeles? or is?

Dr. M. Its a local city.

Greg: OK, they don't have much... Also, in the same respect, they don't have much income there, other than taxes from the houses.

Dr. M. That is correct. They are a developed community.

Greg. They could be going for something that is going to save them a couple of hundred thousand dollars would be very appealing to them.

Ken: The long term question, correct me if I am wrong, is how long will it really last? Is that what everyone seems to be worried about?

Greg: Yes, it is suppose to last 50 years but no one is thinking that it is going to, right?

Dr. M. Well...

Greg: Or is sure of it, no one wants to take that chance.

Dr. M. No one wants to take that chance. Short of a time machine, we can't go, go through 50 years to see if it is performing. But, we do know that its primarily a mechanical system. We can fail a roadway in days under concentrated loadings. We can put 16 million loads on I-15 in 20 years then that means we can put, you know, little less than a million on in a year. That would fail the, the Palomar Road in 2, in 2 years.

Ken: OK, we'll listen, lets take a break and when we come back...

Greg: We will get Lloyd on and see what the City's official position is.

Ken: We will get Lloyd.

-Break-

Part II of AM 1000 Talk Show Dec. 15, 1988

Ken: Good evening, we're back. This is night talk prime time radio for North County. And, with us now is Lloyd Hubbs the engineer with the City of Carlsbad. Good evening Lloyd.

Lloyd: Hello.

Ken: How are you?

Lloyd: Fine.

Ken: Thank you for joining us.

Greg: Mr. Hubbs, we're here with Dr. Miller from 2R Engineering in San Marcos who I think you're familiar with.

Lloyd: Yes.

Greg: Would you kind of go over with us the City of Carlsbad's position on using the CRAM system on the Palomar Airport road and how you came about your decision to pass up this opportunity to save the City 200,000 dollars?

Lloyd: I think the first thing to be aware of is that it is an experimental product. It hasn't been generally accepted in the industry. So, I think that's important to remember. There has really been no independent evaluation of Dr. Miller's claim for the product and he generally stresses the life time cost savings, life cycle cost savings of the CRAM system and there hasn't really been any independent verification of that. I think the second point that I wanted to make is that local government is really not equipped to provide the types of control and follow up testing to adequately evaluate any kind of experimental product. Nor, do I think that the local tax payers should have to risk their, their funds on research and development types of projects. I guess the last thing was I think Dr. Miller does himself a disservice and his product a disservice by attempting to sell it through public relations campaigns and political coercion or whatever. I think fortunately the Carlsbad Council didn't accept that approach and I think he would be better off to go ahead and work through the traditional channels and test the product and have it proven and if it meets all the factors that he claims, then I think it will be accepted by the industry and it could provide a real cost savings.

Ken: Lloyd, you, you brought up two points here. One point is, you know, elected city officials on the city level aren't sort of well versed in complex technological matters and its really difficult to try to talk to them and, you know, discuss these issues with them and, then in turn, try to get them to vote intelligently on them.

Lloyd: Uh huh.

- Ken: The other problem that you talked about, I would like to address that, and I would also like to address, which is, you said that Lloyd, (Dr. Miller) resorted to political coercion, well, I can't imagine the gentleman here seems a sort of a professor, a professorial type, he seems to be very, he knows a lot about physics and has a proven product here. I don't know, what are we talking about here political coercion? I mean, this is a product here that apparently makes a lot of sense, you know, if it works. laws of physics mandate that it works. So, now what are we talking about, political coercion?
- Lloyd: Well I think rather than going through the standard process of testing this product. You know, I don't think anything in the laws of physics that mandates it works.
- Ken: No. Its proved, proven that it works, right?
- Lloyd: Proven?
- Greg: No, its hasn't been totally proven. Its only been, there's only been a test section for 5 years.
- Lloyd: Right.
- Greg: Its projected from the tests that it will last as long as its been claimed to last.
- Ken: What do you mean by political coercion? Lets get to the bottom of that. What is political coercion when we come to aggregate...
- Lloyd: I think rather than, rather than approaching it from a technical issue and testing the product and proving the product and testing the claims that using media campaigns and, and using, you know, confusing the facts to sell a product.
- Ken: Mr. Hubbs, what facts have been confused?
- Lloyd: Huh?
- Ken: What facts have been misconstrued or confused?
- Lloyd: It hasn't been proven. None of the allegations or none of the facts have been proven.
- Greg: Could it be, how do you feel about the thinking that maybe no one in a bureaucracy kind of a system that we all work with in that no one's willing to stick their neck out and take the chance to go with this?
- Ken: Or, how about if we have a council made up of homemakers, you know, who you know, to try to talk to them about a technology and long term, you know, 10 years, 15 years ahead, you know, maybe the housewives aren't the right people to make a decision on advanced technological developments?
- Lloyd: Well, I wouldn't, I wouldn't, I wouldn't say housewife.
- Ken: Well, we have a housewife or two on the Carlsbad City Council, presently.

Lloyd: Well, I think the City Council and other local City Councils aren't in that position. And, in fact, a lot of local engineering departments aren't in the position.

Ken: Then, why are they hired? Why are they working there if they can't figure out if this system works or if this system doesn't work? Why are they here? why are they hired by the municipalities if they don't know? If they can't figure this out?

Lloyd: Well, its an experimental product and we're not in the process of, we're not in the business of developing new products.

Ken: How many years until its not an experimental product? Its been working for five years in Rancho Palos Verdes. How many years until its not an experimental product?

Lloyd: Well, I think when its generally accepted by the industry it will be utilized and incorporated.

Ken: So, your waiting for Caltrans or the National Highway Administration to approve it? right?

Lloyd: That's correct.

Ken: And, do you have any idea when this is going to take place?

Lloyd: No, I don't

Dr. M. Can I address the point on experimentation. Let me point out that the Federal Government just recently programmed a 150 million dollars to study conventional and new types of pavement systems. Does that mean because they are studying the conventional pavements that those are experimental? And, if they are experimental, can we then not, does that mean we cannot build our conventional pavements and does that mean the we should go back to dirt roads? I think that these are kind of the arguments that call something experimental and saying on that basis we cannot build it is not really totally addressing the facts. We can do some very simple things; on the first project that was put down 5 years ago. We used 10 inches of material as opposed to 22 1/2 inches of material in the conventional manner, now, Lloyd can go through the calculations on this, he would conclude that that roadway would have worn out in about three-four months, certainly less than a year, and definitely far less than five years. So, we have the proof, the direct empirical proof, that we have developed a system that is far more efficient in the use of our conventional road building materials.

Ken: Lloyd, does that empirical proof exist or not? and if you don't know, I want to know why you can't tell us why not?

Lloyd: Well, I think perhaps it would be more valuable for you to contact the people who actually tested it, which is Caltrans. Caltrans is in the process of testing it. And, if it is proven and it does meet all of the expectations then why isn't Caltrans extensively using the system?

Dr. M. Can I address that again? I don't think that the City of Carlsbad fully appreciates Caltrans requirements in a pavement system. The local government, cities, counties road usage generally are less than a million loadings for their 20 year life. I used the word previously. That tells you how much traffic is going to use that road. The Palomar Airport Road is designed for something like little over 2 million loadings. Typically, Caltrans' roads are designed for 5 million and greater. The I-15, as an example, is designed for 16 million loadings, substantial different usage. Also, Caltrans has several different environments they are using the pavement system in. They've got wet coastal climates.

Now, this is not a defense of Caltrans' approach to their evaluation. In 5 years, they've gotten a thousand feet down. I think that's very bad in a technology that they agree the theory is sound. I am a little disappointed in that, in that the City of Carlsbad did not follow up with research through the Caltrans' staff. Now, San Marcos has approved the CRAM use for, the CRAM system for use on their public streets. I spent quite a bit of time with their Director of Public Works. He also met with Caltrans' staff people on the I-15 during testing of that roadway. That's the kind of support I feel that is necessary to advance technology in the infrastructure area. This is the area that is most overloaded today and the area that is not getting, not developing to keep pace with our advanced technology. And, that is because we are not using our advanced technology in that area.

Ken: Anyway, we would like to move on. Mr. Hubbs, my theory on this that whether or not the contractor that Dr. Miller is working with happened to hire a PR firm or not, either what he is saying works or it doesn't work. Either, it is of sound physics, science theory or its not. And whether he had hired a PR firm or whether the contractor who has taken him under his wing has hired a PR firm has nothing to do with it. Does it work? does it not work? And, if you don't know, I don't get it.

Lloyd: Well, we don't know because it hasn't been tested.

Ken: Well, and or else you can't understand the scientific theories he has been pointing out.

Lloyd: I think its important Dr. Miller pointed out that Caltrans delt with freeways. Well, Caltrans also has an extensive system of conventional highways though out the State of California. They have all types of highways. If in fact, what he has said is true, Caltrans' could accrue, could accrue far more benefit economic from this and, they should be adopting it, moving ahead if it is proven. And, you know, pavement design is not developed, developed along the lines of physics. Its an empirical science based on testing of materials uses. Its not like nuclear physics and its not a mathematical formula developed from theoretical physics. Its a testing operation where you actually construct something, you load it and you test it and you test it over enough loadings so that you can predict life cycles. That has not occurred. And, until that occurs, it is not a proven technology.

Ken: OK, thank you very much for sharing your insights, Mr. Hubbs.

Lloyd: Thank you.

Ken: All right, thank you Dr. Miller, and I don't know if we illuminated or what but we enjoyed speaking with you and good luck.

Dr. M. Thank you.

Ken: And, we appreciate your concern in helping us in trying to save money here in Carlsbad.

-Off-

My reference to the City of San Marcus warrants a comment as we also failed to have the CRAM pavement constructed in that city as well. That failure to honor an agreement too exemplifies the fickle nature of these agencies. The City's public works director, Dick Wygant, who was not an engineer, had given us a letter allowing us to put the CRAM pavement on the bid documents as an alternate to the conventional pavement. When Mr. Wygant wrote his letter, he apparently had the concurrence of the city engineer. However, with the build-up for Desert Storm, the city engineer, who was a member of the reserves, was called to action. He was replaced by his assistant who then exercised his influence to prevent the placement of the CRAM pavement on the plans. Of course there was no explanation as to why he acted in the manner that he did.

The assistant city engineer apparently held the view too that he didn't have to explain anything, at least not to us, mere business residences of the City. What I susmise may have happened is that Lee Thebador, one of the council members and a salesman for Edington Oil Company in Long Beach, worked behind the scenes to prevent the CRAM pavement from being used. In spite of extensive efforts to contact Mr. Thebador including meeting with his co-workers at Edington Oil, we were unsuccessful. Yet, this council member was available to patrol with the police and perform other cowboy activities that seemed to make the local news media.