

**Willamette River Bridge Advisory Committee Meeting**  
December 11, 2008  
Meeting Notes

**WRBAC Members Present:**

Mayor Vera Katz (Chair)  
David Knowles (Facilitator)  
Bob Durgan, Andersen Construction  
Thomas Hacker, Thomas Hacker Architects Inc.  
Art Johnson, KPFF Consulting Engineers  
Sue Keil, Portland Bureau of Transportation  
Pat LaCrosse, Oregon Museum of Science and Industry  
Guenevere Millius, SRM Architecture and Marketing, Inc.  
Karl Rohde, Bicycle Transportation Alliance  
David Soderstrom, Portland Opera Board  
Chuck Steinwandel, Ross Island Sand and Gravel  
Mark Williams, Oregon Health & Science University  
Rick Williams, BPM Development  
Mike Zilis, Walker & Macy

**WRBAC Staff:**

Neil McFarlane, TriMet  
Bridget Wieghart, Metro

**WRBAC Members absent:**

Christe White, Williams & Dame Development

**Steering Committee Members present:**

Jim Bernard, Mayor of Milwaukie, Clackamas County Commissioner-Elect  
Lynn Peterson, Clackamas County Commissioner  
Robert Liberty, Metro Counselor

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**Mayor Vera Katz** opened the meeting by welcoming everyone, leading a round of introductions and recognizing the Steering Committee members present at the meeting.

**David Knowles** reminded the WRBAC at the last meeting a request was made for additional work to evaluate the cost and risk of the Wave Frame bridge type. Intensive work has been done on the Wave Frame over the past few weeks. There wasn't the time or budget to work on both the Cable-Stayed and the Wave Frame, so the focus has been on the Wave Frame.

Project staff gave a bridge study briefing to the Design Commission. Gwen Millius may not be able to be here today to report on it, but the Design Commission is writing a letter to the PMLR Steering Committee in support of the process.

Today's meeting goal is to present work done over last few weeks for the committee's benefit and then you will be asked to make some decisions about what you want to do with the two types of bridges.

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**Miguel Rosales** presented an update on the Wave Frame risk, constructability, and cost estimates (slides 1-19).

Miguel begins by stating he is working toward finding the best bridge for Portland. The bridge has to be aesthetic, be functional and the process has to be right. The Wave Frame is a unique bridge and his team has worked to improve the design. The bridge has pros and cons and it's going to be up to you what you want to do with the design. I think the design of the Wave Frame is very much improved and we will go through the steps we took to improve it. We also developed cost estimates for the improved design.

While I was in San Francisco I was looking at some of the bridges like the Golden Gate and the Bay Bridge. I want to remind the group that those landmarks were done in the depression era in the U.S. We are now in a depression era as well. So you can look at this bridge as an inspiration from San Francisco. A bridge is not something that you take lightly. You have to live with a bridge design for a long time. This bridge in Portland is going to attract national and international attention. You should consider this when you are making your decisions.

When we started to look at the Wave Frame, there were four different issues that were a concern and we tried to address each of them. The issues are fabrication and erection; material and superstructure, design and schedule.

There was a concern because the Wave Frame design uses high performance steel. We have reduced the quantity of high-performance steel with our improved design.

It is very important what impact you have on the river during construction and after. The National Constructors Group decided the way to build the Wave Frame bridge was to put a scaffolding in the river. This causes challenges in the navigation channel for a certain amount of time. Scaffolding in the river increases cost as well because you are building another bridge on the bridge to support the structure. We tried to find a new solution for this issue because we feel like there shouldn't be scaffolding in the river. It is better to fabricate a large piece of the bridge in the shop under controlled circumstances and then finished pieces can be brought by a barge to the bridge site and be welded and installed on site. Using this method, Rosales and Partners believes that the Wave Frame now has a comparable construction schedule to the Cable-Stayed bridge. We discussed this construction method with the contractor and they indicated that it decreases the number of field welds.

**Pat LaCrosse:** The Cable-Stayed bridge has piers on the greenway. Does the Wave Frame have piers on the shore?

**Miguel Rosales:** The Wave Frame has two-piers on the shore. The Wave Frame piers are a little further away from the abutment. On the Cable-Stayed with four-piers, the piers are closer to the abutment.

**Pat LaCrosse:** Are the piers on the Wave Frame on the water side of the greenway or are they above the greenway?

**Miguel Rosales:** TriMet studied the position of the piers carefully. Pier-wise this is the best arrangement. The Cable-Stayed piers are in shallow water.

**Sue Keil:** Where is the source of the high performance steel?

**Miguel Rosales:** I believe there are two sources in the U.S. for high performance steel. Philip Wenger, from Schlaich Bergermann and Partners (SBP) did some research on different manufacturers who could roll the steel. High performance steel (HPS) used to be used in the struts of the Wave Frame design and in our new design assumes that HPS will only be used for the top chord of the Wave Frame bridge. Now all the other steel on the wave is regular steel. There are still some disadvantages to the high-performance steel. Pricing can vary and sources are not as plentiful.

There were also some issues about how this structure connects between the concrete and steel. And also the non-redundant structure. The TriMet engineers want to know that if there is an accident that the bridge will not collapse. Phillip will talk about this later. SBP provided a memorandum about this issue.

Miguel finishes by saying that they have gone farther than preliminary design because they want to be sure that all the important issues are resolved.

Miguel introduces Phillip Wenger from SBP in Stuttgart, Germany. Phillip has been involved in this project from the beginning.

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**Phillip Wenger** summarizes the structural analysis of the Wave Frame bridge. (Slides 20-31.)

Because we needed more information to have a better understanding of the behavior of the structure, we did parametric studies. Phillip summarizes how they changed the amount of high-performance steel in the design and also how the complex steel to concrete connections on the bridge were redesigned. The advantages to this change in the connections are simplification of pedestrian walkway construction, avoidance of shear studs (shrinkage – creep – concrete consolidation), avoidance of post tensioning ducts, and better strut to concrete beam connection.

Phillip then talks about the redundancy of bridge elements. In the initial design there was a box configuration with 4-inch thick steel plate. In the revised design, thinner plates and a double “C” configuration are assumed.

A German bridge in Ingolstadt has the wave shape but is different because it is a closed framework. The trains in Germany are heavier so they need the strength of the closed framework. The open framework is fine for the Portland design because trains are much lighter.

Phillip goes on to say that erection methods were developed further so that prefabrication of 500 feet of bridge could be done and then lifted by crane into place. A balsa wood model is shown to further illustrate how this erection would be done using pontoons.

To summarize the risk, there is a lowered use of high performance steel and an increased use of standard steel. Construction details and methods have been simplified.

**Karl Rohde:** Which struts are in tension and which are compression?

**Phillip Wenger:** Struts carry the whole load. Smaller struts carry less load.

**Karl Rohde:** If you are riding over the bridge on a bicycle, will you feel the train going over?

**Phillip Wenger:** It wouldn't move more than any other bridge.

**Karl Rohde:** Describe the bike path on the bridge.

**Phillip Wenger:** Sidewalks are continuous concrete slab. Benefits are that it is smooth, and safer for user.

**Karl Rohde:** Is five meters the widest you can make the path?

**Miguel:** You could add a little more space. This would increase cost. We are trying not to increase cost.

**David Knowles:** On the Cable-Stayed bridge, where are the pedestrian/bicycle paths?

**Miguel Rosales:** If you put the cables outside, like CS4, the current assumption for the path is 1' less wide. If the cables are further in then you have more width, this is the assumption for CS2—the same width assumption as the Wave Frame. It's a different experience. I think it's better if it's open because there will be a better view. Also, it's not nice to have trains running right next to you. If it's open you will have about four feet between pedestrians and train.

**Mayor Katz:** So you did this work on the Wave Frame primarily for examining the steel issue we raised at the last meeting? You redesigned to use less high performance steel and then you also looked at the risk and the cost?

**Miguel Rosales:** TriMet was very good at identifying any potential risk with the Wave Frame bridge. Rosales and Partners and SBP are very comfortable with the revised design here. I think it was important that TriMet know there was not a major design issue with the Wave Frame. We researched as much as possible so you know everything.

**Sue Keil:** I thought that when we started out we had entirely independent, co-equal bridge engineering and bridge architectural firm. We are not hearing anything from the bridge engineering people and I would really like to hear from them. That kind of analysis is really critical to the decision-making process.

**Miguel Rosales:** For the Wave Frame I made the decision to use SBP because they had the experience of building a similar bridge. SBPs engineers from Germany have looked at this design and been involved all along.

**Rob Barnard:** The charge from the committee from the last meeting was to lower the risk profile of the Wave Frame. The team did a good job of doing that. Rob points out the improvements on constructability. See revised risk summary (slide 30). Rosales and SBP did improving the design of the bridge to reduce risks that were previously identified.

**Phillip Wenger:** High performance steel is better steel. It has 40 percent higher strength than regular steel. The strength of the steel makes it a more economical option and I believe it can be rolled in Portland.

**Rob Barnard:** The Committee had some issues with the constructability and risks of the Wave Frame bridge and Rosales answered those questions. Now, I want to address the opportunities and challenges.

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**Rob Barnard** presents the opportunities and challenges for the two and four-pier Cable-Stayed bridges and the Wave Frame bridge (slides 32-59).

Let's remember that the evaluation criteria are cost, risk, fundamental performance, architectural, urban context, greenway, environmental/sustainability, bridge operations, miscellaneous and opportunities.

The advantages of the two-pier Cable-Stayed are that it is the most open on the greenway (no landside piers), has lower lifecycle cost, and has the largest horizontal clearance at 760 feet. The challenge of the clearance is that this means it also moves in closer to the shallow water. It also has the lowest vertical clearance but still exceeds 75 feet. Another challenge is the curved spans at the greenway.

The four-pier Cable-Stayed has two landside piers and two in the water. The advantages of the four-pier Cable-Stayed bridge are low lifecycle cost because of the use of concrete, lowest risk profile for schedule and budget, second largest horizontal clearance at 700 feet, and this bridge type has mode flexibility for making the various bicycle, pedestrian, train and bus configurations. The challenges of the four-pier Cable-Stayed bridge is that this bridge has piers closest to the greenway. The Wave Frame was a little farther away from the greenway, but it was closer to ordinary high water which is an environmental impact. The four-pier Cable-Stayed is also the widest bridge over the greenway.

**Teresa Boyle:** If there is a decision to keep paths wider how would it affect cost?

**Rob Barnard:** Any additional width added to the structure is going to ripple through the cost. It also has landside impacts, bigger foundations would have to be built to accommodate the change, which would also affect the environmental impact in the water.

Rob continued discussing the Wave Frame opportunities and challenges. The Wave Frame is an innovative bridge type because there are no previous examples. It has in-water piers in the deepest water, which means that it is farther away from shallower water, but has landside piers at ordinary high water, which is near contaminated media and in an environmentally sensitive location. The wave also has the narrowest horizontal clearance. The Wave Frame is a prototype, so it has increased costs for design and construction engineering. There is bid risk for the steel construction because there are fewer people who can do the work. Steel has more price volatility than concrete. Steel also has higher lifecycle costs because of need for weld inspections and periodic painting.

Finally, the FTA (Federal Transit Administration) requires that the project hold on to a contingency on higher risk project elements. This would be held until we reached 20% construction of the superstructure. Basically, they keep the money until we have eliminated the risk. This means we can't use this money early in the project, we could miss opportunities to use it for other project needs. It's a small point but it is important from a project management standpoint.

**Mike Zilis:** According to the FTA, is there a special threshold that pushes this project into the high-risk category?

**Rob Barnard:** The FTA team of experts assign a risk category from information they receive at workshops with us.

**Thomas Hacker:** Has the work we've done lowered the risk factor with the FTA?

**Rob Barnard:** Yes.

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**Rob Barnard** continues by giving a presentation on cost (slides 60-75).

The goal was to establish a baseline quantity estimate. So after the work on the Wave Frame addressed the constructability issue, we revised the quantities for all three bridges (Wave Frame, two-pier and four-pier Cable-Stayed). We then held a wave frame risk workshop to take all the design, market, and construction risks out of the quantities. We just wanted to get the quantities and the construction costs without the risks included. This way we could compare “apples to apples.” At the end of this process, we had a baseline quantity estimate.

Then we did a risk assessment. This included determining all the risks and the likelihood of their occurrence as well as what impacts might happen if certain risks occur. Mitigation strategies were then developed. And finally, we needed to determine what the cost might be to mitigate each risk. The result from this process was a cost range for design, market and construction risks.

The cost range for design, market and construction risks for the Wave Frame are:  
Potential maximum risk value = \$16.9 million  
Potential minimum risk value = \$4.2 million  
Recommended risk value = \$8 million  
Result = Conceptual Cost Estimate Ranges

Rob walks through the spreadsheet, which explains the conceptual design estimate cost. (Slides 63-75) To summarize cost, the four-pier Cable-Stayed comes in closest to the budget, the two-pier Cable-Stayed comes in over budget and the Wave Frame comes in even more over budget.

Rob states that Miguel and Phillip also did a cost estimate. They did an estimate using a unit price, which is how an engineer looks at cost. The National Constructors Group did an estimate like a contractor would do. The real difference when you look at the estimates comes down to the steel pricing. Steel pricing is very volatile.

Miguel and Phillip had the most intimate knowledge of the Wave Frame, so that is the only bridge type they estimated. National Constructors Group did a bottoms-up estimate of all three bridges.

**David Soderstrom:** Did the risk factors on the four-pier Cable-Stayed have to do with the fact that two more piers are in the water?

**Sean Batty:** Let me clarify, all the bridges have two-piers in the water. The four-pier Cable-Stayed has two-piers in water and two at the top of bank. The Wave Frame has two-piers in water and two-piers on land at ordinary high water.

**Neil McFarlane:** We don't know what the costs might look like if you took a quantity base estimate like Rosales did for the Wave Frame with the two-pier or four-pier Cable-Stayed bridge types. They are very different cost estimate methodologies, so this is “apples and oranges.” Just wanted to be sure everyone knows it's hard to compare between them.

**Miguel Rosales:** In our opinion, our estimate is based on a lot of detail and research. We feel it is closer to the real cost. The Cable-Stayed bridge is schematic, so there is a difference. On one hand with the Wave Frame we are looking a lot of detail. On the other hand we are looking at a standard set of details.

**Bob Durgan:** There is no risk with the Cable-Stayed because they have been built many times. Also there are environmental issues with PCB's at ordinary high water line. What are you going to do about this issue?

**Rob Barnard:** Issues with PCBs will get resolved during preliminary engineering.

**Bob Durgan:** So there are a lot of contingency costs that are in the Wave Frame which are not worked out? For example the environmental issues surrounding where the piers are placed.

**Miguel Rosales:** The placement of the piers is not cast in stone. There is some flexibility.

**Mark Williams:** How confident do we feel about the risk contingency numbers? Looks like the design contingency costs are higher on the Cable-Stayed bridges than on the Wave Frame.

**Rob Barnard:** Because their overall cost is lower. The percentage of that design contingency number in that group of numbers is higher relative to a lower cost.

**Miguel Rosales:** In the Wave Frame there was risk analysis done. All of the specific amounts make the numbers more tailored.

**Rob Barnard:** This number is more a judgment from Paul Silvestri's (NCG) 40 years of building bridges. Rosales and Partners estimate was done with an arduous risk analysis process.

**Karl Rohde:** So all the bridges are over budget. Where is the money coming from?

**Neil McFarlane:** There is no great answer. The question has to be, what is the bridge we choose worth to community and partners who will fund it. With all due respect for the work that has been done on the cost estimates, I have a lot of regard for how contractors put estimates together. There is a lot more business reflected (for example labor costs) in the contractor's estimates. I am personally uncomfortable using any unit cost estimate in comparison to one done by a whole different methodology. We hired NCG to get the soundest estimates done.

**Miguel Rosales:** The estimate that we prepared took a lot from National Constructors Group numbers. It is actually a mix, it is not completely separate from what the NCG did. A lot of the amount and costs from the NCG were put in our estimates. The biggest difference is the steel cost. If you compare unit price to unit price the estimates are very similar. It's just specific points where they are different.

**Mayor Katz:** So the difference is the cost of steel?

**Rob Barnard:** Yes, the real difference is between the two experts opinions on the future price of steel.

**Mayor Katz:** And who provided us with that information?

**Rob Barnard:** The experts from Rosales and Partners as well as NCG. They both have had conversations with various steel providers and have made their best judgment.

**David Knowles:** Let's discuss where we go next. You have in front of you three different bridge types. The Wave Frame by both methodologies is more expensive than the Cable-Stayed options. If you stick with a single methodology, then the Wave Frame is 32-36 million dollars over budget. The two-pier Cable-Stayed is 6-10 million over budget and the four-pier is about at budget to 3 million dollars over. The question for the WRBAC is whether the Wave Frame is a compelling enough design to warrant the premium cost. And as a procedural question, is the Wave Frame compelling enough to push forward in a process that allows for more weighing in about type and design given the big cost difference where you may end up in the same place anyway in terms of a final selection. I'd like to get feedback from the group about how to balance cost and aesthetic desires.

**Thomas Hacker:** The third question is, are the Cable-Stayed bridges inappropriate enough to continue to consider the Wave Frame? I don't think it's completely about the fact that Wave Frame is beautiful. I think it has to do with whether you think the Cable-Stayed is an inappropriate structure for that site.

**Mayor Katz:** Speak more to the last thing you said about the Cable-Stayed being an inappropriate structure.

**Thomas Hacker:** It's in a set of bridges that are essentially more horizontal. It works within a rhythm of structures between the east and west side that have more similarities than differences in terms of the kind of scale of the spans they have. None of them have the tower elements that the Cable-Stayed has. So that bridge instantly becomes a singular bridge and a very monumental bridge in a place that is not particularly monumental space.

**Bob Durgan:** The new Gibbs Street Bridge (actually an extradosed) is similar to a Cable-Stayed and would speak to this bridge. It will be even higher than this bridge.

**Thomas Hacker:** That bridge is standing in an element that is close to the Tram and the freeway. The Wave Frame is more compatible with the set of bridges there and the multiple crossings of other bridges. It is better for the Portland aesthetic. Also, with estimates there are often differences between contractors and architects estimates. These differences can be resolved by having meetings between parties. The positive

qualities of Wave Frame warrant a detailed meeting with NCG and Rosales to try to reconcile what those differences are.

**Neil McFarlane:** That's what we've been doing and we've spent a lot of money. Remember we are still in a very preliminary stage of design.

**Sean Batty:** At the last meeting we heard the contractor's perspective regarding constructability issues. From that moment, we reworked the design, exchanged information, met for a two-day work session to share information, came up with a block of design assumptions and then developed a risk table that we could bring back to this committee and share. It is a design contingency that came from everyone. We have worked to reconcile the numbers per the request of the last WRBAC.

**Miguel Rosales:** The main focus of the risk workshop was the construction method. We focused on design issues first. In my opinion, unit prices and reconciling the budgets was not worked on at this meeting.

**Rob Barnard:** It's hard to get consensus around the steel pricing.

**Mike Zilis:** Steel prices are today's prices?

**Semyon Treyger:** Yes, today's prices.

**Mayor Katz:** We have a funding issue. Thomas raised the issue of appropriateness on the water. Forget the money for a minute, can we get a sense from this group about the Cable-Stayed design?

**Sue Keil:** We started out with the premise that we wanted this to look different and be appropriate for the site. I think the development on the east side will not be dissimilar to what is happening on the South Waterfront. I think the towers are fine. I like the transparency of Cable-Stayed bridge.

**Mark Williams:** Do towers have to be made as shown to us on the slide or are there more alternatives? We were told that there were alternatives and that we would see them, but we haven't seen them.

**Mayor Katz:** That's because the focus of the work was on the Wave Frame.

**Mark Williams:** One of my concerns is that we have the worst possible towers there to compare with the Wave Frame design. I don't think we can separate the design from the cost. We have to stay on budget, so if the Wave Frame could be made on budget, I think it would be a nice choice. Looks like the Wave Frame cannot be made within budget. The independent cost estimate of the Wave Frame is not like the other cost estimates. I don't think I can consider it if it's not done by the same method as the other estimates. We should see an "apples to apples" comparison.

**Mayor Katz:** Let's go around the table

**Gwen Millius:** The Wave Frame is the best design. The Design Commission feels the same way. Wave Frame is the winner from a design perspective.

**Jim Bernard:** First, we need to get to Clackamas County or we won't contribute. We need to get through Milwaukie or Milwaukie is going to have a problem, too. So I have to look at the budget. If the Wave Frame was within budget I'd be there 100%. I prefer the Wave Frame, but I need to be realistic so we can get to Clackamas County.

**Lynn Peterson:** Wave Frame is reminiscent of the Hawthorne Bridge. It is a modern twist on the Hawthorne. It has a historical connection with all the welding that was done in this area. Usually, I prefer concrete structures like the Cable-Stayed bridge, but I really like the Wave Frame, it catches the eye and makes you think. However, I really want the alignment to go as far as possible as well.

**Robert Liberty:** I'm stunned at numbers. All three are handsome bridges. Cable-Stayed cables will be invisible. The towers will be visible, but they are in the water so it's not quite the same thing. I would be happy with the Cable-Stayed as well. I don't have a preference between them. Modesty and reference to past are nice aspects of Wave Frame. I also think this project has to get past Milwaukie.

**David Soderstrom:** Scale of the towers is the issue here. I was hoping to see another rendition of the Cable-Stayed bridge. The present design of the Cable-Stayed chokes the space in the river. The city steps down to the river and we have these towers protruding up. The design accentuates this. Last time we tried to stay on budget we got this building (reference to the Portland Building)! It's not a very good building in my opinion. I like the Wave Frame and would like if there were some way to have it built on budget.

**Mike Zilis:** I agree with what Tom and Dave are saying. I believe the Wave Frame is the most appropriate form from a scale perspective. It's much more elegant. The scale of the bridge next to Marquam Bridge is not good. Agencies will be all over us with any bridge type we propose. The issue I have is that as any of the piers get closer to the bank we get in hotter and hotter spots. Also, wasn't it our goal to bring two or three bridges forward to public? I think it would be a mistake for this committee to bring one bridge forward to the public.

**David Knowles:** The question before the committee is if you have a \$32 million dollar budget gap, is it fair to take that bridge type to the expanded conversation with the public if, in the end, there really isn't a way to select the Wave Frame? I think this committee could make a recommendation to the Steering Committee, which is where it goes from here.

**Mayor Katz:** Let's go around the table again. Maybe we bring both bridges to the public and have them weigh the issue of more money vs. design. Let's finish the exercise of finding out what design the group likes better.

**Art Johnson:** I like the Wave Frame. But I think if the same effort was made on budget details as on the Wave Frame that the cost of the Cable-Stayed bridge may come down as well.

**David Soderstrom:** What would you do about budget issues this early in the process where you've got significant differences in different types of design? What else would you do to augment the budget numbers done on the Wave Frame at this point in the design?

**Thomas Hacker:** Since the steel price is the issue there needs to be some more research. I haven't been involved in the process and I respect all the work that has been done, but there is a huge gap between the Rosales and National Constructors Group numbers. A \$26 million dollar gap is so big that it makes me want to get conclusive information. We shouldn't make a decision against everyone's first design choice (Wave Frame) with a cost estimate difference of that magnitude.

**Mayor Katz:** Neil, what would you do about the steel issue?

**Neil McFarlane:** I think we could do some more research. There is going to be a lot of uncertainty about future steel prices. It comes down to what kind of risk dollars do you hold on it, we can perhaps put some more research into it and get a better definition of it. We'd be happy to do more work on this over the next month or so. For example, we can find out if our comparisons are "apples to apples" rather than "apples to oranges."

Neil requests to make a note about the question that David asked. I was involved in the Oregon Convention Center project. On that project, the contractor estimates were the ones we went with not the architect estimates. We were on budget with the contractor estimates. The builders understand what the real costs are, for example, time premiums. This is why we hired the National Constructors Group. Another budget point is that we have been building our light rail projects on budget over the last few years. FTA will insist on a lot of extra contingency on the Wave Frame prototype and it will drive cost up. A premium cost on this bridge is unavoidable because of this issue. Because we have to hold the money longer, we will lose opportunities to spend it on other things earlier in the bridge building process.

**Art Johnson:** How much of this \$26 million is the cost of steel as opposed to erection of the bridge and application costs?

**Mayor Katz:** If the \$26 million is not only the price of steel, I would demand a break down of the costs.

**Neil McFarlane:** I think the right question that Thomas asked is that is the Cable-Stayed bridge inappropriate? There are ways to mold that bridge type but we did not have the time and money for that after our last meeting. I don't want people to dismiss the Cable-Stayed bridge for this reason.

**Mayor Katz:** We may have to spend more time on the Cable-Stayed design because I don't want the committee to walk away not feeling good about it's design.

**Gwen Millius:** I have a concern about the Cable-Stayed bridge. The type that troubles me is the one that seems to have a fixed-width. If we don't have flexibility, it may have a negative effect on future bike and pedestrian use.

**Richard Brandman, Metro:** Given a lot of interest in the look of the Wave Frame and that it is higher risk, can we make a bridge that looks like it but is made in a way that is more inexpensive?

**Miguel Rosales:** Not really.

**Chuck Steinwandel:** The Wave Frame bridge is innovative and makes a statement about Portland. It's worth it over 100 years. If I'm going to stay with my empirical side, I think the Cable-Stayed two-pier design is a wonderful engineering solution to my problems with the 760 feet clearance.

**Karl Rohde:** I love the Cable-Stayed bridge. I'm not concerned with the scale because South Waterfront is wildly out of scale with the surrounding neighborhoods. But when I think about the Portland building, it is a model building from the 1980s. I think it started the renaissance of architecture in the Portland area regardless of how you feel about it aesthetically. Although I really like the Cable-Stayed bridge, it doesn't necessarily go with the Portland ethic. Portlanders are proud but not boastful. Cable-Stayed design is boastful. Wave Frame speaks to our history while projecting the future. The Wave Frame goes with the rolling hills of the surrounding landscape.

**Pat LaCrosse:** I was the first tenant in the Portland building and lived with its errors. They were costly. I was also Chair of the Tram Board of Directors. Looking at it strictly from an OMSI standpoint, at what elevation is it going to land? David Soderstrom of the Portland Opera is our neighbor and will live with the bridge design much more closely. OMSI could live with either solution. Height is my issue. I think there should be an opportunity for the community to react to both designs. Comments made on the Blue Oregon blog were keen comments. I like the Cable-Stayed. Let's think about what this space is going to look like in the future.

**Mayor Katz:** I'd like to recommend that we eliminate the Cable-Stayed four-pier design. I don't think we've had any support for this design from the beginning.

**Bridget Wieghart:** From environmental perspective, the two-piers in shallow water are not good on the two-pier design. Because they are bigger and in the shallow water. I'd like a little more consulting done before we eliminate the four-pier design.

**Rob Barnard:** The consensus was that we would take the best elements of the two and four-pier Cable-Stayed designs and combine them.

**Mayor Katz:** Yes, we need to combine the two Cable-Stayed bridge types and also get a cost break down of the Wave Frame so we understand the \$26 million disparity. If we finalize the numbers, I suggest we bring the public in on the discussion with the improved Cable-Stayed design and the Wave Frame.

**David Knowles:** At the January meeting, we'll review the refined information and then ask for public comment after that. Please hold January 13<sup>th</sup>, 3 to 5pm. Recommendations to the Steering Committee will come later. There will be additional work on the height question before Preliminary Engineering.

**Teresa Boyle:** When we look at the differences between cost estimates (architect vs. builder price), I was wondering how much the volatility of steel is because it is a design build contract?

**Rob Barnard:** This is something that is part of our process. More work will be done on it.

**Robert Liberty:** With respect to the premium, where is the money coming from? If both options were taken to the public, it is more respectful to tell them what we are struggling with so they can make an informed choice.

**Neil McFarlane:** Yes, remember that this project is still 100-200 million short in local money.

**Sue Keil:** Yes, how far can this project go with finite dollars?

**Bob Durgan:** I'm the only general contractor at the table. There is always a conflict between the architect, owner, and contractor over cost. The Cable-Stayed design is in line aesthetically with the Tram and the pedestrian bridge that it being built. We need to find a budget that we can work with by the fall.

**Rick Williams:** The Citizens Advisory Committee meets on January 15. They really understand the context of this bridge design. I want to remind you that the charge of the CAC is to get the alignment to Park Avenue. We'll be having discussion of trade-offs.

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## Public Comment Period

**Mayor Katz:** Two people would like to testify.

**James Lee:** SE Mitchell Street resident and physicist. Mr. Lee surmises that the Wave Frame is too weighty to be successful. He handed materials out to the WRBAC which outlined his analysis.

**Dan Yates:** Just a couple quick statements on cost. The cost estimate is based upon today's pricing, but we are not going to be spending this money for two or three years.

The budget numbers are 2010-2012. You really need to change the budget process and push them four years forward.

**Rob Barnard:** The money has been escalated to the point when we are actually going to do the work.

**Dan Yates:** With regard to the contingency, do you have any money in there to reflect the possibilities of the bridge being 10 ft taller to allow for more vertical clearance?

**Rob Barnard:** The additional cost for a higher bridge is a landside cost. The costs here don't reflect a higher or lower bridge.

**Mayor Katz:** Do we understand what we are doing for the next meeting?

**Rob Barnard:** We are going to do more work on pricing.

**Mayor Katz:** Also, we need a break down the elements of cost for wave and to investigate design for the Cable-Stayed options.

**Rob Barnard:** Do you want us to come back with one Cable-Stayed design with elements from both Cable-Stayed bridge designs?

**Mayor Katz:** That is correct, Rob. Mayor Katz thanked everyone and ended the meeting.