San Francisco Bay Conservation and Development Commission
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January 22, 2015

TO: All Engineering Criteria Review Board Members

FROM: Rafael Montes, Senior (Staff) Engineer (415/352-3670; rafael.montes@bcdc.ca.gov)

SUBJECT: **Approved Minutes of June 10, 2014 Engineering Criteria Review Board Meeting**

1. **Call to Order.** The meeting was called to order by the Chair Dr. Roger Borcherdt at approximately 1:30 p.m., in the Benicia Room, 455 Golden Gate Avenue, San Francisco, California.

2. **Roll Call.** The following Board Members were present: Dr. Roger Borcherdt, Board Chairman, Mr. Bob Battalio, P.E., Mr. Jim French, G.E., Mr. Richard Dornhelm, P.E., Professor Mary Comerio, Architect, Mr. William Holmes, S.E., Dr. Lou Gilpin, C.E.G. The members of the staff present were Mr. John Bowers, Staff Counsel, Ms. Jaime Michaels, Permit Analyst, Mr. Bob Batha, Chief of Permits, Ms. Linda Scourtis, Mr. Brad McCrea, Director of Regulatory Section, Ms. Marie-Laure Causin, BCDC intern, Ms. Margeanx Green, Logan Tillema, and Mr. Rafael Montes, Staff Engineer and Board Secretary.

Prior to the meeting there were introductions of the audience in the room. In attendance there were several of the applicant representatives such as Mr. Dominick Tagalog, Mr. Matthew Buell, Ms. Chris McDowell and Mr. Mark Patterson. The engineering team was made up of Mr. Wen Lin and Mr. Ted Trenkwalder of Ben C. Gerwick, Mr. Larry Bussinger, Mr. Chris Sebastian and Mr. Brian Wilson of Anvil Corp, Mr. Richard Rodgers and Dr. Ramin Golesorkhi of Langan Treadwell&Rollo.

3. **Approval of the Meeting Summary of December 5, 2012.** Chair Borcherdt solicited comments from the Board members regarding the last Board's meeting minutes of December 5, 2012 that included the review of the Bon Air Road bridge replacement sponsored by City of Larkspur and the IMTT refinery seismic (MOTEMS) upgrade in the City of Richmond. Mr. Dornhelm requested a correction to be made of a misquote regarding the hydraulics criteria in relation to the Bon Air Road bridge replacement project, followed by Ms. Comerio, who made the motion to approve the minutes; Mr. French seconded the motion. The Chair entertained the motion and the minutes were approved by a voice vote.

4. **Item Review:** Mr. Mark Patterson began the presentation by briefing the Board on the details of the project. The project consists in upgrading the wharf facilities to the new MOTEMS (Marine Oil Terminal Engineering and Maintenance Standards) regulations in order to facilitate a renewal of the lease with the California State Lands Commission. The current facilities consist of an approximately one mile long structure that extends from the main refinery off shore. The areas addressed by the project have been divided into A, B, C and D. The four areas include an access trestle a pipeway and a prospective new wharf Berth 1A at the offshore end. Areas A and B lie in the most inland section, and areas C and D are in the marsh and open Bay sections of the wharf. The latter sections are in the Bay and 100-foot shoreline band BCDC's jurisdiction. The project includes upgrade components which would involve the following activities:

A. On Areas A and B, the project proposes to retrofit the pipeway with repair of the piles and new pile caps along with the remake of the access trestle with a pedestrian walkway/bikeway fiberglass gating surface and pile repairs including new piles. These areas are outside of BCDC's jurisdiction.

B. On Areas C and D, the project proposes to upgrade the access trestle with new piles, pile caps and a concrete driving structure. It would also upgrade the pipeway with new piles and pile caps and construct a new Berth 1A.

C. The project would also include the demolition of Berth 5 at the northwest end of the wharf and the construction of new dolphins and emergency boat access structures.

Mr. Patterson reviewed the project milestones consisting of engineering, bidding schedules, publishing of final EIR, permitting of all the agencies, construction start and completion dates. He then introduced Mr. Rogers of Langan T&R for the first presentation of the technical aspect of the project.

Mr. Rogers's presentation highlighted the scope of the geotechnical evaluation of the project site in this the following order:

1. The review of the available subsurface information from Dames and Moor in 1965 to Treadwell&Roll, Inc. in 1997 and 2007.
2. The performance of supplemental subsurface exploration in 2011.
3. Development of a site-specific response spectra.
4. Evaluation of potential liquefaction and lateral spreading of ground surface
5. Development of vertical pile capacities (compression and uplift) for new piles.
6. Development of vertical pile deflection springs (T-Z curves) for new piles.
7. Development of lateral soil springs (p-y curves) for new piles.
8. Level 1 Earthquake, or 72-year return period, as prescribed by CBC Table 31F-4-2 and for a high-risk Level 2, or 475-year return period, as prescribed by CBC Table 31F-4-2.
9. Evaluation of impact of lateral ground deformation on piles.

He showed views of the structures with respect to the soil exploratory borings to map and characterize the ground conditions. The results of the exploratory borings showed that in the off-shore the mudline varied from -30 to -55 feet MLLW at the Berth 1A site and from 2 to -44 MLLW from Bents 3A to 68A moving towards the shoreline. The Estuarian Deposit (ED) ranged from zero to 30 feet in thickness whereby the top 15 to 30 feet (Upper ED or UED) consisted generally of loose to medium dense sand with varying amounts of non-plastic silt and medium stiff to still clay underlied the UED. Older Marine Deposits consisted generally of layers of dense to very dense granular layers (sands and gravels) and stiff to hard clays.

On the on-shore area, starting at the surface to 6 feet below, the soils were characterized as medium stiff to stiff clays and silts. Fifteen (15) to 45 feet of marsh deposits consisted of soft clay and peat; Older Marine Deposits generally consisted of layers of dense to very dense sand and gravel and stiff to hard clay. Mr. Rogers displayed a slide with a general characterization profile of the soils at the Berth 1A site. Mr. French wanted to know the details of the slope at the end of the wharf structure. Some discussion on this item ensued with the concerns that it had been generally accepted that the slope would move (lateral spreading) after a strong earthquake event. Although Mr. Rogers acknowledged that no assessment of horizontal movement had been performed, MOTEMS's provisions require that the structural engineer consider the additional load and effects of the material moving. However, he said that his team recommended neglecting the downhill sides on the upper estuarian deposits for any soils resistance for lateral loads and vertical capacities for the sizing and design of the piles basically acting as retaining walls. Mr. French's inquiry and concern was how far the slope was to move and whether the resistance value was sufficient to counter the movement. However, Mr. Rogers was allowed to continue his presentation considering that this item would be covered at the end of the presentation. He recounted that his group had done a slope stability analysis of the concrete wharf, which showed a much taller and steeper slope and that prior analysis showed a movement of 22 inches during the Level 2 Earthquake. He showed a summary of the shear strength in the various areas of the project based on the soil borings and laboratory data gotten from the site. The slide showed the shear strength in pounds-per-square-foot (psf) for the Upper Estuarian deposit and marsh areas (UE/M), to the Lower Estuarian deposits, and finally to the Older Marine Clay and Sands (OMCS). The shear strength values varied from 100 psf in the UE/M, 1,500 psf in the Lower Estuarian and 2,500 to 3,500 psf in the OMCS deposits.

Further, Mr. Rogers showed a sample of their development of a soil shear strength profile chart based on the CPTs, laboratory and blow count data. The goals of the seismic hazard evaluations included the Level 1 Earthquake, or 72-year return period, as prescribed by CBC Table 31F-4-2 and for a high-risk Level 2, or 475-year return period, as prescribed by CBC Table 31F-4-2. Estimation of liquefaction-induced settlements. Evaluation of liquefaction-induced lateral ground deformation.

The evaluation of potential liquefaction estimated liquefaction-induced settlements ranging from 0.75 to 2.3 inches (Level 2 peak ground acceleration or PGA), and the differential settlement in Trestle Area C of less than roughly 1 inch. Offshore, the potential liquefiable layers were at the mudline whereby the evaluation neglected for vertical support and used residual shear strengths

for lateral pile resistance. Onshore, the layers were generally pretty deep (greater than 80 feet below ground surface, bgs), relatively thin (1 to 2 feet thick) and discontinuous.

The slope deformation evaluations showed the slopes at the side of the existing berth were relatively gentle ranging greater than 10H to 1V, the lateral deformations of potentially liquefiable material were greater than 6 inches. The evaluation considered load due to lateral deformations in lateral pile analyses.

The development of the site-specific response spectra took into consideration the proximity to the Green Valley Fault approximately 1 km away from the site, and many other faults in the vicinity, including the Hayward Fault 23 km away. A probabilistic seismic hazard analysis was performed to develop rock spectra for two levels of shaking, Level 1 and Level 2, as prescribed by MOTEMS Tables 31F-4-2. The development of the spectra performed time domain spectral matching to rock spectra and a nonlinear ground response analyses using computer program DEEPSOIL for the shear wave velocity profiles based on field measurements (24:03). Much discussion ensued regarding the degree of conservatism between the rock characterization used for the site based on 1997 rock attenuation relationships models rather than a more recent analysis model as the MOTEMS codes only prescribes doing a PSHA using an appropriate rock attenuation relationships approach. Dr. Golesorkhi didn't agree with such assessment that the analysis used was not conservative enough. He said that the 1997 approach was inherently as conservative as any current analysis of the rock attenuation.

Dr. Borcherdt pointed out that although State Lands requires a level of earthquake readiness and preparedness of oil terminal facilities within its lease authority throughout the State including the Bay, the BCDC has a broader regional mandate to ensure that no fill going into the Bay poses a risk to the health of the Bay as prescribed in the Safety of Fills policies. He wanted to review the comments made by CSLC regarding upgrading the project to the 2013 CBC engineering criteria requirements.

The geotechnical recommendations for the off-shore included that (a) piles would have vertical support in friction only below the liquefiable deposits; (b) the lateral resistance of liquefiable soil would be neglected on the downhill side; (c) the design would consider residual strength on the uphill side; and (d) additional lateral load due to laterally displacing soil. Mr. French asked whether it was assumed that all the material on the liquefiable layers would be such and that no solid masses have been included in the analysis. A discussion of the procedures would be discussed later. The recommendations for the onshore piles included that the vertical support in friction would be only below the marsh deposits. Finally, the seismic design was considered appropriate based on site-specific response spectra.

Mr. Brian Wilson presented the structural criteria of the proposed Berth 1A first covering design loads aspect of the project. He described the operational load, dead loads including an allowance to dead load per MOTEMS for incidental loads, live loads on walkways, stairs, ramps and areas of forklift traffic, live load on Berth 1A deck areas, concentrated live load in general at Berth 1A, including forklifts and AASHTO H15 truck loads on approach trestle. In addition, he described the estimated load on berthing and mooring of the existing dolphins, the major superimposed dead

and fluid loads, and the seismic (Level 1 Earthquake, operating and Level 2 Earthquake, contingency earthquake scenarios), wind, waves and currents loads.

He explained the geometric constraints that included the maintenance of the current fender line, the logistics of positioning of the new Berth 1A just east of the existing Berth 1, SLR with respect to the new structures such that sight lines to existing facilities are maintained, maintenance of the existing elevation of trestle pipeway at this time and provisions for a loop in pipe routing around Berth 1A to accommodate differential seismic movement between the independent structures of the trestle and Berth 1A. Mr. Wilson explained the deck design, consisting of utilizing precast panels with topping slab at the proposed trestle to facilitate construction, utilizing composite cast-in-place slabs at Berth 1A in order to reduce deck deflections and to provide a horizontal diaphragm for distributing seismic load, to constructing the majority of Berth 1A deck onshore, in the largest practical modules for field installation later on and connecting the concrete pours, and finally to provide deck drainage (sloped surfaces to drains) to collect any hydrocarbon drips and incidental spills and carry them to a sump tank. He described Berth 1A seismic design criteria to meet MOTEMS Design Criteria using geotechnical information provided by others such as Langan Treadwell&Rollo, and common structural analyses. Further, he described the Response Spectrum Analysis developed from the seismic design (56.25). The maximum Level 2 EQ displacement would be 26 inches.

Mr. Trenkwalder covered the trestle analysis and design. He described the general profile of the access and pipeway trestles connections to Berth 1A at Areas D and C. The new piles would be 36-, 30- and 24-inch-in-diameter pipe piles with a new steel cap frame with precast concrete roadway for the access trestle. The maximum seismic displacements would be 18 inches for a Level 2 EQ design. The trestle pile seismic demand/capacity ratio values ranged from 0.71 to 0.86. The anchor station displacements ranged from 21- to 4-inches. Area C, the area between the shoreline area and Lands End, would consist of new 30- and 24-inch-in-diamter piles, new steel cap frame with precast concrete roadway, a trestle maximum seismic displacement of 6 inches for L2EQ and a trestle pile seismic demand/capacity ratio of 0.71 on the elevated region. Mr. Battalio inquired about the proposed steel cap under the pipelines as described in the drawings. His inquiry was in reference to the water levels that may affect the steel. Mr. Trenkwalder requested that a discussion later on regarding future sea level rise would follow after his presentation. He continued describing the proposed typical structural components of Areas A and B, covering areas between Lands End to Track 3, outside of BCDC's jurisdiction. The components included new 24-inch fox sleeves with 13-inch-in-diamter timber piles, new steel cap beams, trestle seismic displacement of 2 inches, trestle seismic D/C values of 0.81, anchor stations displacements of 7 and 4 inches and anchor station D/C values of 0.98 and 0.58.

Mr. Trenkwalder proceeded to present the sea level rise criteria. The design life of the overall structures was 50 years. The BCDC projections for future sea level rise were estimated to be 2 feet in 2070. Such future flood case included 7.9 feet of the FEMA Base Flood Elevation (BFE), 0.3 feet of 100-year flood historical information plus 2.0 projected sea level rise for a total of 10.2 feet MLLW. A present flood case (PFC) showed water levels at 8.2 feet MLLW. The existing top of steel under the pipeway at the lower point locations showed an elevation of 8.58 feet MLLW. He pointed

out that in 2030 when an approximately 0.6 feet of MSL change could happen, efforts will be underway to raise the pipeway to prevent it from flooding.

Discussion: Mr. Battalio inquired about the current water levels with the splash elevations in relation to the pipeline structure at the lowest points in Area C. The schematics showed elevations of the present flooding conditions and the present flood with splash conditions as being above the bottom of the pipeline support beam and over the pipes themselves, respectively. Mr. Trenkwalder said that there was no real wave action due to the marshland area. Mr. Battalio asked for the reason for not elevating the pipeway now instead of waiting for 2030 since water levels are already closed to the bottom of the existing pipeway. Was it a cost issue and more? Mr. Trenkwalder replied that although costs could be one of the factors, that there had been no observation of waves flooding come closed to the bottom of the pipeway and that flooding had not been an issue in the last 27 years. He explained that the pipeline structure, the top of steel or TOS, would be raised at the offshore side to meet the new Berth 1A at an elevation of +12.50 feet NAVD88 from +8.58 feet NAVD88 at TOS. He said he could provide the profile elevations for the Board later on since this had difficulty envisioning the conditions over the length of the pipeline structure. Mr. Battalio warned that although the 2 feet estimate for sea level rise for the life of the structure until year 2070 seemed reasonable, sea level rise was a condition that can only go up and that the life of the project was purported to be 50 years. But what would happen after the 50 years? What would happen to the project? He also warned that the current conditions may be a factor to consider taking action now in elevating the TOS supporting the pipelines. Mr. Trenkwalder said that they needed to minimize the work of the project to minimize disruption to the existing operations today. Further discussion ensued regarding the acceptability of the lack of measures for present flooding conditions in relation to the raising of the TOS. Dr. Borcherdt prompted the parties to move on to discuss other pressing issues of the engineering criteria. He also expressed his concerns about any measures to prevent potential spills, an issue that was critical in light of the SFBCDC Bay Plan policies to protect Bay natural resources.

Professor Comerio asked whether the slope from Lands End to the new Berth 1A needed to be maintained in the future when the piping would be raised due to anticipated SLR conditions. She wanted to know the reason for the proposed slope now and in the future. Mr. Patterson explained that the slope of the proposed configuration of the pipeline was not critical now and in the future. Chair Borcherdt proposed as a first contingency that Tesoro be able to provide a report summarizing the engineering measures implemented to address the engineering criteria identified in the California State Lands Commission March 17, 2014 letter to seek compliance that would be satisfactory with all regulatory and permitting agencies and their requirements. He expressed that it may be wise and essential for the applicant to fully explain these measures to reduce the risks on a second meeting. The key item with regards to BCDC/ECRB Bay Plan policies was the risks of spills in the Bay. As an example to the measures described in the report, he pointed out the description of shut-off valves that did not include any specifics as whether they were automatic or manual. This would make it necessary to come back to the Board for a full explanation of the potential spill risks scenarios and contingency plans to avert any spills on the Bay.

Mr. Patterson and Tesoro personnel asserted that shut-off valves were to be activated within 30 seconds from activation. The chair suggested that the applicant come back with a report describing the full operation and worse-case risks scenarios, including seismic or barge collisions, any potential spillage from breaks in the pipes, etc. He opined that this item was very critical as to know the specifics of the risk reduction measures in relation to worst-case scenarios that would prevent spills. Mr. Patterson explained that there was already an emergency plan in place and as per this there were several shut-off valves throughout the pipeline system.

Further discussion regarding spill emergency measures continued. Mr. Dornhelm inquired about the catch basins to be used to collect run-off and any spills. Mr. Wilson replied that the collecting system at Berth 1A would catch both run-off and any spills. Mr. Larry Bussinger, an operations manager from Tesoro, offered to give a synopsis of the risk reduction measures in place. He explained that the location of the shut-off system valves. These are fed by a motorized operated system running on electricity with back-up power generator. The triggers would be manually operated. A second line of defense would consist of motor operated shore isolation valves (SIVs). He explained the drain system with slops and sump tanks that serve for and to channel any run-off whether it be water or hydrocarbon designed for anticipated maximum demand. The chair asked whether this maximum demand design included a scenario where all the pipes could be damaged resulting in a spill. Mr. Bussinger said that any spills on that deck could be captured by the slops systems, which was designed with enough capacity. Further discussion of the system ensued. Ms. McDowell said that their plan had been discussed and approved by OSPR and the design of the structure including the features of the spillage prevention system were being reviewed for approval by State Lands Commission as required by MOTEMS. She said that an emergency contingency plan would need approval from OSPR prior to installation. The chair said that absent of a plan before the Board it would be difficult to discuss and approve of. Mr. Patterson and his team said that such plan could be provided to the Board before its submittal to OSPR for review. Mr. Tagalog said that when asked about the amount of oil that can get into the Bay, MOTEMS requires a number of shut-down motor-operated valves at Berth 1 and at the shore isolation valves in Tract 3, which would be about a mile length between SIVs. In discussions with MOTEMS regulators, they were able to get approval to install an SIV at Lands End versus Tract 3 to greatly reduce the risk of spills by shortening the distance of the pipes by half. In addition, there were several expansion loops throughout the pipeline system further limiting gravity flow but not limiting the pumps' quantities. So there would be the potential to isolate any spill at the wharf and at Lands End (shoreline). There was a mention regarding a reduction of flow by gravity due to the slope of the pipe, but the flow would still be affected by the pumping operations. He also mentioned the acquisition of a new spill boom reel that would be deployed for further isolation measures housed at the West Mooring Dolphin MD4 and an additional containment boom at the existing mooring dolphin MD1; therefore, there would be containment booms at both ends of the wharf. The goal is to encircle a tanker while berthed. There was also a contract with a third party to provide mitigation services for any spills and Tesoro's own equipment response team. The chair thought that it would benefit the applicant to have these measures written on a report to provide the public and other entities of the planning

efforts to minimize the risk of spills. Mr. Tagalog said that there were existing protocols and new ones as required by regulators that could be put together for the Board's review.

The discussion turned to the ground motions, Chair Borcherdt asked how the two structures, the new Berth 1A and the pipeline structures would reconcile their different designed movements during a ground shake. Mr. Trenkwalder said that the piping system were not restraint and were allowed to slide in between two anchor station locations, which consisted in braced frames with capability to take larger loads. In addition, there were expansion loops that could add to the system's capacity for movement. Mr. Holmes inquired whether seismic movement between both anchor stations were designed to be different. Mr. Trenkwalder confirm that statement. The piping system consists of different diameter pipes, which have different relative movement with respect to one another. Mr. Holmes asked with reference to the different pipe diameters and respective and different movement whether there was an analysis to take this into account at the supports. Mr. Trendwalder said that a pipe stress analysis had been performed. It was added that the piping system could act as a spring such that it could slide at every bend (1:47) except for the anchors at the ends. Mr. Wilson recalled photos taken several years ago when an errant truck hit the pipes displacing them by 12 feet in some locations resulting in minimal spills over the water. The pipelines were full. Further discussion regarding other regulatory agencies with purview on oil spills were discussed.

Dr. Gilpin inquired about construction practices and challenges that could trigger any slope failures during pile installation. Mr. Rogers said that their experience with vibrating piles of different diameter had not detected any evidence of soil displacements. The dredged channel abuts the fender line of the existing wharf Berth 1. The chair inquired again about any analysis on the displacement of the pipes as discussed previously. Mr. Patterson said that there was such analysis that could be provided.

Referring to Policy No. 3 regarding the provision of seismic instrumentation for all major fill projects, Chair Borcherdt inquired about such a plan. Mr. Patterson said that there had been an outreach made to the California Geological Survey's Strong Motion Instrumentation Program head, Dr. Tony Shakal, who had suggested some sites for instrumentation. Chair Borcherdt suggested two types of systems. One type would be motion-sensitive, and, perhaps more expensive, that would capture any kind of ground motions, great and small with instruments located on- and off-shore to monitor seismic motion and behavior throughout the structures through different types of soils considering the distance of the structural components from one another. The other type would be a simple system with instruments on the new Berth 1A and at each isolation vales of the pipeline structure and one further on land, which would capture mostly large ground shaking. Therefore, Chair Borcherdt told the applicant the Board would be looking forward to seeing the instrumentation plan for review and comments.

Chair Borcherdt inquired with Mr. Montes regarding the status of the project with respect to the permitting process. Ms. Michael offered an answer saying BCDC had received the application a month ago, and this had been deemed not complete and would not be for a while since there were many important pieces of information missing and may not be ready to go the Commission

until probably next Spring. Mr. Patterson further comment that it could be the first or second quarter on the following year before the project was ready for the Commission's consideration. The applicant representatives said that the final environmental review document (EIR) was slated for November of 2014. The chair pondered on the option to review the project one more time based on all the issues not resolved today. This option could be captured in a Board motion. He included that such motion could also require a report summarizing the engineering measure implemented to address the engineering criteria identified in the CSLC March 17, 2014 letter and the efforts to reconcile procedures of the CBC with those of MOTEMS to ensure that the most up-to-date engineering procedures were used for the project. Another item for the motion would be to include the submittal of an instrumentation plan report for review and approval by the Board. This request would consist of a report to know how the applicant complied with the reconciliation to CBC procedures. Ms. Michaels added that Mr. Battalio had requested the submittal of elevation profiles for the pipelines in reference to the sea level rise discussions.

However, there were remaining questions regarding the engineering criteria as presented. Mr. Holmes wanted to know about the analysis of the pipelines in reference to the residual displacement as much discussed in the meeting. Such displacement would consider the steel of the pipes and the other source would consider the soils. Further, he asked for the rationale for using light weight concrete for the structures. He argued that the concrete although lighter, it would be porous and not very suitable for marine applications. Mr. Wilson said that this concrete was of sand-light and not full-light weight. Mr. French asked whether this was light weight sand or light weight coarse aggregate or both. Mr. Wilson replied to be the coarse aggregate.

Continuing with the questions regarding the piping, Chair Borcherdt inquired whether the material of the pipe was susceptible to corrosion. Mr. Patterson said it was coated for protection. He added that there was a monitoring program in place as required by MOTEMS to tract corrosion of the pipes on a routine basis.

Mr. Holmes requested to know of any report or information comparing the CBC 2013 to MOTEMS since the latter were enacted and based on engineering evaluations in 2007.
Dr. Golesorkhi explained how this procedure could be done for comparison and suggested to do a comparison for the rock spectra already developed so as to see the basis for the ground response and how it compares for the 2014 versus when it was done in 2007 and see the differences whether they are material or not and move from there. If the differences are significant, perhaps there was a point of discussion and evaluation. The chair thought of this suggestion to be appropriate as a motion item.

There were further inquiries about the piping analysis. Mr. Holmes argued that there should be a seismic analysis on the piping to review. If there was a spectral analysis that takes into account differential inputs at different points in the system. Realizing it was a steel pipe, which is resilient by its very nature, but an analysis should provide confirmation of its resilience. Mr. Holmes requested that documentation describing the expected seismic differential movements of the piping support point and the piping be provided, including the elastic and nonlinear analyses procedures used to infer the response of the piping system and its capability to accommodate

expected differential motions. Further, he requested documentation of engineering design criteria implemented to account for the expected differential ground motions that would occur along the pipeline as a function of time during an earthquake. Chair Borcherdt requested any more comments from the Board, and Mr. French asked for a comparison of the result of the site-specific probabilistic seismic hazard analysis (PHSA) with those based on the FEMA/USGS maps as discussed in MOTEMS section 3104F.4.2.2 and a comparison of site-specific response analysis results (Section 3103F.4.2.5) with simplified method result (Section 3103F.4.2.4) for reasonableness. He also requested to see a comparison between the unprocessed (unmatched) and the matched spectra for the selected time histories and a comparison between matched and unmatched time histories. He requested the following information:

1. A bathymetric topo map of the site and cross sections for adjacent submarine slopes.
2. Documentation to address the following items:
    a. procedures to develop the 50 pcf (pounds per square foot) of the soils acting on the piles,
    b. proportions of inertia versus kinematic loading on the piles,
    c. documentation of the source of the 200 feet depth to bedrock assumption,
    d. a response as to whether the Upper Estuarine Deposits (UED) slide or deform before liquefaction is initiated, resulting in larger kinematic pressures acting against the piles due to movement of the UED, and
    e. a response as to whether the upper portion of the UED remain partially- or un-liquefied while sliding on top of a liquefied zone within the deposit, resulting in larger kinematic pressure acting against the piles due to sliding or deformation of the UED.

There was further discussion regarding Mr. French's comments and requests above; however, Mr. French wanted the applicant to address and document such response.

Professor Comerio asked whether there were any non-structural components on Berth 1A or on the trestle. Was there anything there that needs to be looked out that was non-structural? Mr. Montes asked whether the parking lot component was looked out and analyzed in the global sense of the project.

Among several comments made regarding the hydraulics/sea level rise criteria and information, Mr. Battalio requested a clarification regarding the hydraulics criteria in reference to MOTEMS Section 3103F.5.2.1.2 that prescribes that the 30-second wind duration wind speed shall be determined from the annual maximum wind data and that average annual summaries shall not be used. In reference to a current study, which is required by the code if the velocities were higher than 1.5 knots, he wanted to know the real time measurement. Mr. Dornhelm referred to the average values of Mean Sea Level (MSL) and Mean High Water (MHW) used in the storm high water tables for the "Design Water Levels of the Structural Design Basis." However, he noted that MOTEMS required the use of MHW/Tide values to be added to the largest run-up values.

Therefore, he wanted the applicant to explain any effects on the results to the loading combinations calculations, especially with regards to tsunamis, from the adjustment to the use of MHW.

In entertaining an anticipated motion from the Board members, Chair Borcherdt suggests that a motion should include the allowance for the project to move forward provided that the items put forward by the Board be fully explained and clarified with the option of the project returning for a second review. He enumerated many of the items discussed in the meeting and adding or reemphasizing some comments from different Board members such as the inclusion of pipeway elevation profiles and cross sections to better evaluate the flood risk of the pipeway, including its deck and discuss the resilience of this component to intermittent or periodic flooding now or in the near future (2030). Further, there was a request (1) to explain the risk evaluation process for not raising the structure now versus any potential implications to the marsh and the structure's own safety, (2) measures to safeguard the facility by instituting corrosion measures, expected maintenance actions and specificity about raising the pipeline deck by 2030.

Chair Borcherdt asked that in lieu of the applicant's pipe expert at the meeting, it would be essential to document the differential displacement, stresses, and vulnerabilities of the piping system. Further, he solicited a copy of the final report to the State Lands Commission that includes all the items in reference to the reconciliation procedures of the CBC with those of MOTEMS and what the responses are to such items, which would include the ground motion questions.
Mr. Holmes made the motion, which was seconded by Mr. French. The motion to approve was passed with no abstentions.

5. **Adjournment:** There being no further old or new business, the meeting was adjourned at approximately 5:00 p.m.

Respectfully submitted,

RAFAEL MONTES
Board Secretary

Approved, with no corrections at the
Engineering Criteria Review Board Meeting of January 22, 2015